BH SERIES

Analytical Balances

INSTRUCTION MANUAL

A&D Company, Ltd.

1WMPD4005456A

Warning Definition

The warnings described in this manual have the following meanings:

⚠CAUTION	A potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to the instrument.
CAUTION	Cautions to use the device correctly.
Note	Information or cautions to use the device correctly.

About This Manual

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Contents

1. Introduction

Thank you for purchasing A&D's electronic balance.
This manual provides detailed information on the functions and operations of the BH series, enabling users to fully utilize its features.
Please read this instruction manual carefully to understand and make full use of the BH series analytical balance.

CAUTION

❑ Operations may differ depending on the software version of your balance.
For confirmation of the software version of the balance, refer to "26. Checking the Software Version of the Balance".

1.1. About the models

This series includes a variety of models with different combinations of weighing capacity and readability. In this manual, the models are classified by readability, as shown in the table below.

Classification	Readability	Model
0.01 mg model	0.01 mg	BH-225 BH-225D
0.1 mg model	0.1 mg	BH-124 BH-224 BH-324

1.2. Features

Main unit

- ❑ A backlit LCD for easy viewing of the weighing display.
  (Refer to "3. Basic Display and Key Operations" for details.)
- ❑ Easy-to-turn leveling feet for level adjustment.
  (Refer to "2.4. How to adjust the level of the balance" for details.)
- ❑ An underhook for underhook weighing.
  (Refer to "6. Underhook Weighing" for details.)
- ❑ One-touch adjustment using the internal weight for sensitivity adjustment.
  (Refer to "8.2. Sensitivity adjustment using the internal weight" for details.)
- ❑ Sensitivity adjustment using an external weight.
  (Refer to "8.3. Sensitivity adjustment using an external weight" for details.)
- ❑ A removable glass breeze break for easy cleaning of the weighing chamber.
  (Refer to "27.1. Treatment of the balance" for details.)
- ❑ The smart range function for weighing with the precision range after subtracting the tare if within the weighing capacity.
  (Refer to "4.3. Smart range function" for details.)
  The BH-225D model comes standard with the smart range function. Precision range readability: 0.01 mg.

Features available at factory settings

- ❑ Counting mode for measuring quantities.
  (Refer to "4.4. Counting mode (PCS)" for details.)
- ❑ Percent mode for displaying the weighing value as a percentage.
  (Refer to "4.5. Percent mode (percentage weighing mode)" for details.)
- ❑ Impact Shock Detection (ISD) function for detecting impact shocks to the mass sensor and displaying and storing the impact level.
  (Refer to "5. Impact Shock Detection (ISD) Function" for details.)
- ❑ Automatic sensitivity adjustment for automatically adjusting sensitivity using the internal weight. The execution conditions (temperature change, specific time, intervals) can be modified by changing the function table of the balance.
  (Refer to "8.1. Automatic sensitivity adjustment" for details.)
- ❑ Auto door(s) that allow opening and closing without physical contact.
  (Refer to "3.2.2. Auto doors" for details.)

Features available by configuring the function table

- ❑ Auto power ON function: When the AC adapter is connected, the display automatically turns on and enters weighing mode. There is no need to press the [ON:OFF] key.
  (Refer to '10.3. Explanation for "Environment, Display"' for details.)
- ❑ Auto power OFF function: Automatically turns off the display after a period of inactivity (approximately 10 minutes) while keeping the power on.
  (Refer to '10.3. Explanation for "Environment, Display"' for details.)
- ❑ Data memory function: Stores the following weighing data.
  - Unit weight (Counting): Up to 50 entries.
  - Weighing value: Up to 200 entries.
  - Sensitivity adjustment history: Latest 50 entries.

  (Refer to "12. Data Memory" for details.)
- ❑ GLP/GMP support: Outputs maintenance reports compliant with GLP (Good Laboratory Practice) and GMP (Good Manufacturing Practice) standards, etc.
  GLP: Good Laboratory Practice, standards for implementing safety tests for drugs and medicines.
  GMP: Good Manufacturing Practice, rules for manufacturing and quality control.
  (Refer to "11.3. GLP output" for details.)
- ❑ Built-in clock/calendar: Enables the output of weighing values with the date and time.
  (Refer to "10.4. Clock and calendar function" for details.)
  The clock settings can be restricted so that only the Administrator can change them. [Password function]
- ❑ Net/gross/tare function: Outputs net weight, total weight, and tare weight.
  Refer to "13.1. Preparations for the net/gross/tare function" for details.)
- ❑ Minimum weight alert function: Facilitates easy judgment of whether the sample amount to be weighed meets the set minimum weight.
  (Refer to "14. Minimum Weight Alert Function" for details.)
- ❑ Password function: Restricts the use of the balance and changes to the function table.
  (Refer to "16. Password Function" for details.)

Communication

- ❑ RS-232C (D-Sub9P, male) interface: A standard feature of the balance for outputting weighing values and data.
  (Refer to "18.1. RS-232C" for details.)
- ❑ USB (Type C) interface: A standard feature of the balance for outputting the weighing values and data.
  (Refer to "18.2. USB" for details.)
- ❑ You can lock the key switches of the balance by sending a specified command to the balance, allowing it to be operated only by commands from an external device.
  (Refer to "25. Key Lock Function" for details.)
- ❑ The Universal Flex Coms (UFC) function enables the output of desired content when outputting weighing data.
  (Refer to "24. UFC Function" for details.)

Options and peripherals (sold separately)

- ❑ A variety of optional accessories are available for the balance.
  (Refer to "31. Peripherals" for details.)
- ❑ AD-8127 multi-functional compact printer / AD-8129TH compact thermal printer: Allows printing of the output from the balance.
  (Refer to "20. Printing Weighing Value Data on a Printer" for details.)
- ❑ AD-1683A ionizer: Uses a fanless ionizer to neutralize static electricity on charged weighing objects, reducing weighing errors caused by static.
- ❑ AD-8920A remote display: Allows the weighing value to be checked remotely.
- ❑ AD-8922A remote controller: Enables checking the weighing value remotely, performing key operations, comparator settings/output, BCD output, and analog voltage output.
  (Refer to "19. Connection with Peripheral Devices" for details.)
- ❑ AD-1653 density determination kit: Allows density (specific gravity) measurement.*1
  (Refer to "15. Density (Specific Gravity) Measurement" for details.)

*1 Density (specific gravity) measurement requires configuration of the balance's function table.

1.3. Compliance

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.)

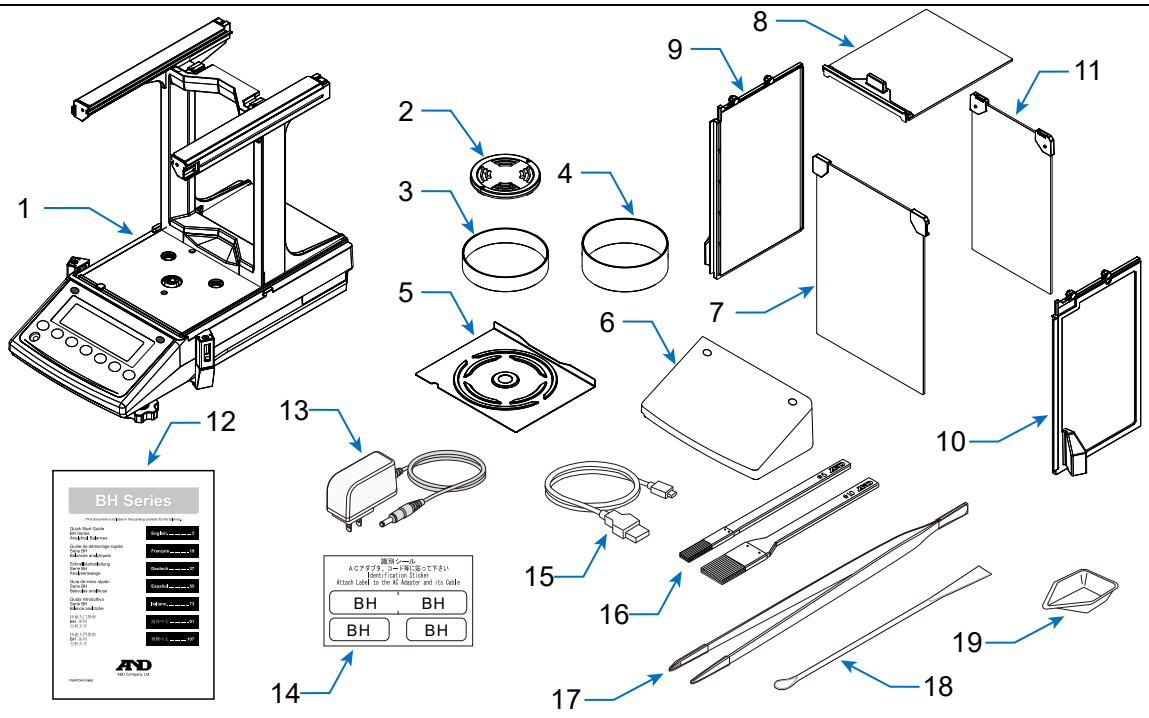
2. Part Names, Installation and Precautions

- ❑ This product is a precision instrument, and it should be carefully unpacked.
  The contents of the package vary depending on the product. Refer to the illustration of the packing contents and make sure that everything is included.
- ❑ It is advisable to store the packing materials so that they can be used when transporting the balance for repair.

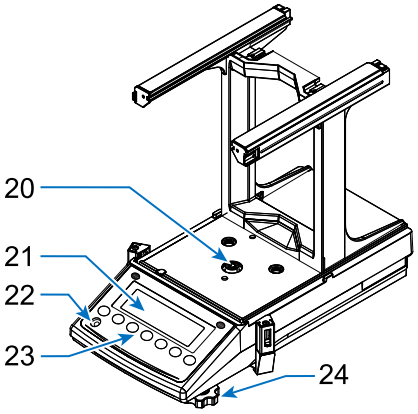
CAUTION

- ❑ Packaging materials and contents are subject to change without notice.
- ❑ For assembly and installation of the balance, refer to "2.2. Assembly and installation".
- ❑ When choosing a location to install the balance, please consider the descriptions in "2.3. Installation considerations, preparation and precautions".
- ❑ Refer to "2.4. How to adjust the level of the balance", and rotate the leveling feet to ensure the bubble is within the black circle of the bubble spirit level.

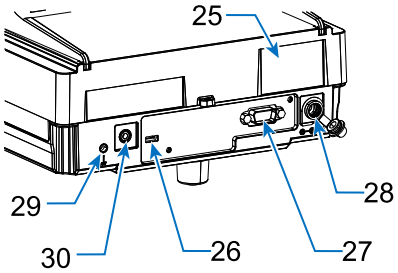
2.1. Unpacking



Front view



Rear view



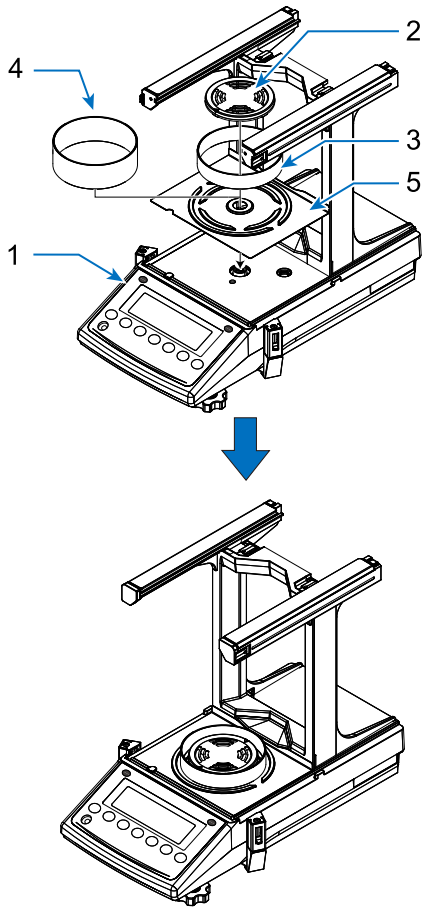
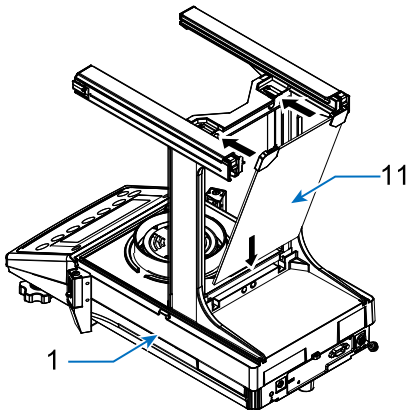
1	Main unit	16	Cleaning brushes (large, small)
2	Weighing pan	17	AD-1689 tweezers (for 0.01 mg models*1 only)
3	Low breeze break ring	18	Spatula (for 0.01 mg models*1 only)
4	High breeze break ring (for 0.01 mg models*1 only)	19	Weigh boat (10 pcs)
5	Breeze break bottom plate	20	Pan support boss
6	Display protection cover (PET plastic)*2	21	Backlit LCD
7	Breeze break front glass pane	22	Bubble spirit level
8	Breeze break top glass pane	23	Key
9	Breeze break left side glass pane	24	Leveling foot
10	Breeze break right side glass pane	25	Serial number
11	Breeze break rear glass pane	26	USB Interface (Type C)*3
12	Quick Start Guide	27	RS-232C interface
13	AC adapter*4	28	AC adapter input jack
14	AC adapter ID labels	29	Grounding terminal
15	USB cable (Approx. 2 m)	30	External input terminal

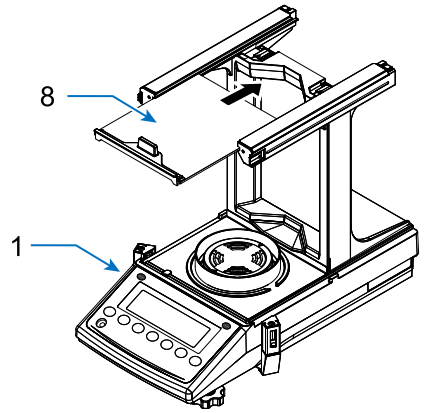
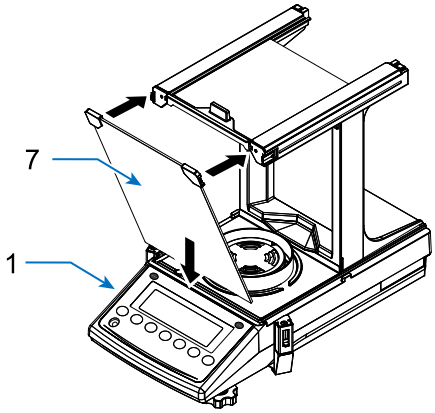
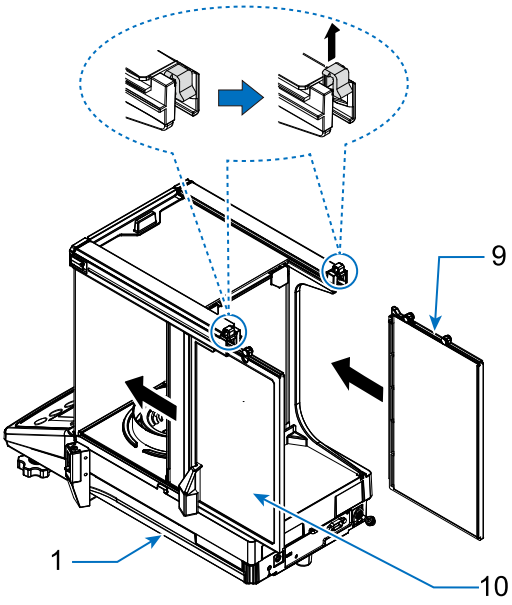
*1 BH-225/BH-225D
*2 Attached to the main unit.
*3 For communication only.
*4 Accessories vary depending on the destination region.

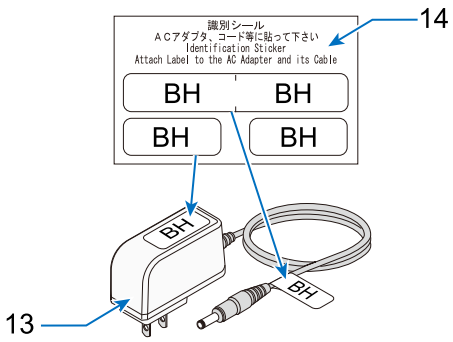
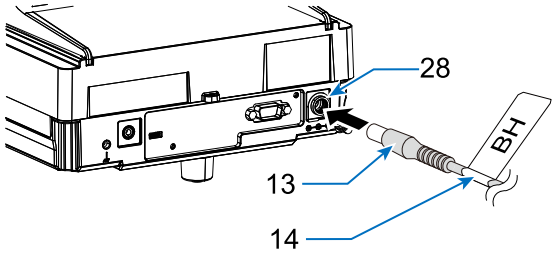
2.2. Assembly and installation

⚠CAUTION

❑ Perform the following steps with the AC adapter removed from the main unit.

Step	Description	Parts diagram
1	Attach the breeze break bottom plate (5), breeze break ring (3 or 4), and weighing pan (2) to the main unit (1). **Tips** ❑ The high breeze break ring (4) is an accessory exclusive to the 0.01 mg models. Compared with the low breeze break ring (3), the high breeze break ring (4) provides better mitigation against wind and convection effects. However, if the breeze break ring comes into contact with weighing paper or similar items, use the low breeze break ring (3) instead.	
2	Insert the breeze break rear glass pane (11) into the lower back groove of the main unit (1). Then, push the top of the glass pane into the latches until it clicks into place.	

Step	Description	Parts diagram
3	Insert the breeze break top glass pane (8) into the front groove of the breeze break frame from the front of the main unit (1).	
4	Insert the breeze break front glass pane (7) into the lower front groove of the main unit (1). Then, push the top of the glass pane into the latches until it clicks into place.	
5	For the breeze break side glass panes (9, 10), push the latches on the breeze break frame at the back of the main unit (1) upwards until they click. Insert the glass panes into the grooves of the breeze break frame from the back, ensuring the handles face outward. After inserting the breeze break side glass panes, return the latches to their original position.	

Step	Description	Parts diagram
6	Attach the AC adapter ID labels (14) to the AC adapters (13). ⚠CAUTION ❑ Ensure the AC adapter ID labels are attached to avoid using the wrong AC adapters. ❑ Confirm that the AC adapter type is correct for your local voltage and receptacle type. Power consumption: approx. 36 VA (including the AC adapter). ❑ Use only the dedicated AC adapter specified for the balance. ❑ Do not connect the included AC adapter to other devices. ❑ Using the wrong AC adapter may cause the balance and other equipment to malfunction.	
7	Insert the AC adapter (13) with the attached ID labels (14) into the AC adapter input jack (28) on the back of the main unit (1). Then, plug the other end into an outlet. CAUTION ❑ Be sure to warm up the balance for at least an hour before use.	

2.3. Installation considerations, preparation and precautions

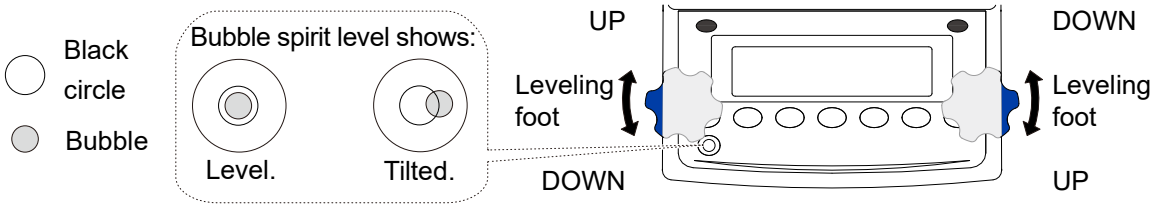
Prepare the following installation conditions in order to bring out the full performance of the balance.

- ❑ Install the balance in an environment where the temperature and humidity are not excessive. The best operating temperature is about 20°C ±2°C at about 45% to 60% RH relative humidity.
- ❑ Install the balance in a dust-free environment.
- ❑ The weighing table should be solid. An anti-vibration table or stone table is ideal.
- ❑ Install the balance in a stable location, avoiding areas with vibration and shock. Corners of rooms on the first floor are best, as they are less prone to vibration.
- ❑ Avoid installing the balance in locations where it will be directly exposed to airflow from equipment such as heaters or air conditioners. You can reduce the influence of breezes and drafts by using an AD-1672/AD-1672A tabletop breeze break.
- ❑ Ensure the balance is not exposed to direct sunlight.
- ❑ Keep the balance away from equipment that produces magnetic fields.
- ❑ Level the balance by adjusting the leveling feet so that the bubble of the bubble spirit level is centered in the black circle.
  Refer to "2.4. How to adjust the level of the balance".
- ❑ Warm up the balance for at least an hour before use, with the AC adapter connected to the power supply.
- ❑ Adjust the sensitivity of the balance before using it for the first time or after having moved it to another location so that accurate weighing can be performed. Refer to "8. Sensitivity Adjustment/Calibration Test".

⚠CAUTION

- ❑ Do not install the balance in areas where flammable or corrosive gases are present.

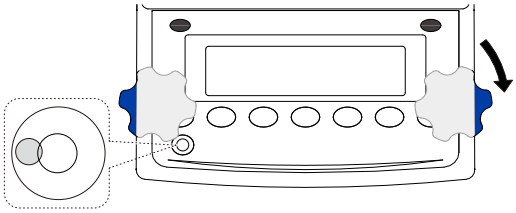
2.4. How to adjust the level of the balance



Level the balance by adjusting the leveling feet so that the bubble of the bubble spirit level is centered in the black circle.

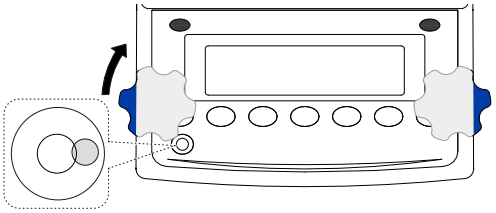
When the bubble is off to the left:

Turn the leveling foot on the front right clockwise.



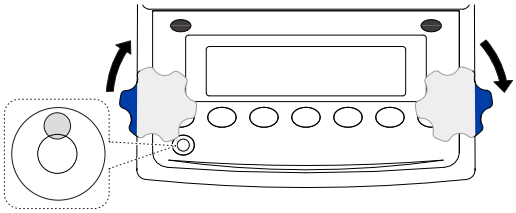
When the bubble is off to the right:

Turn the leveling foot on the front left clockwise.



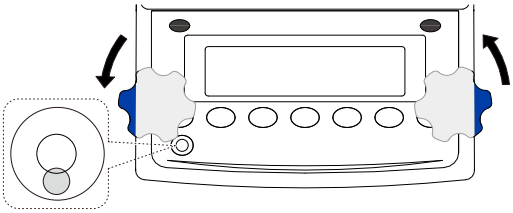
When the bubble is off to the back:

Turn both leveling feet on the front clockwise simultaneously.



When the bubble is off to the front:

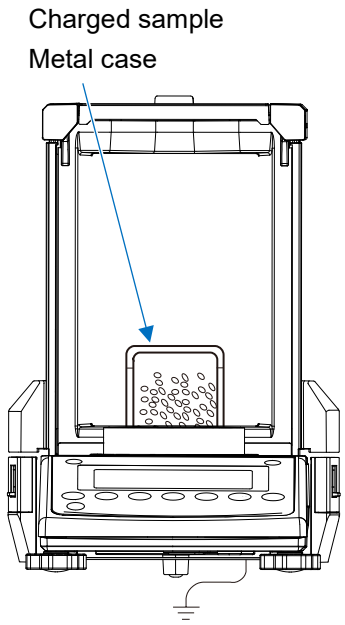
Turn both leveling feet on the front counterclockwise simultaneously.



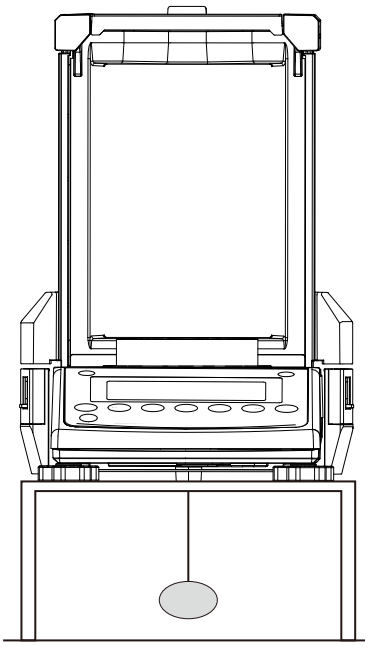
2.5. Precautions during use for more accurate weighing

For precise and accurate weighing, please take notice of the following.

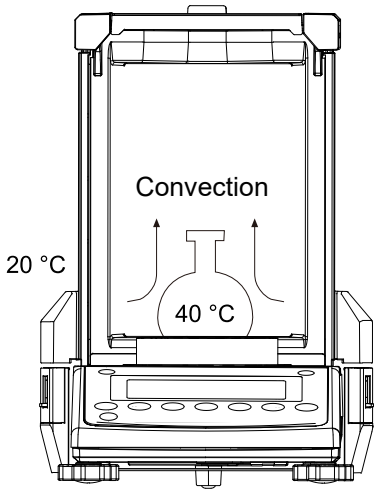
- ❑ Weighing errors may occur due to the influence of static electricity.
  Note that if the ambient humidity drops below 45%RH, insulators such as plastics are liable to have static electricity. Ground the balance and perform the following as needed.
  Additionally, use the grounding terminal to ground the balance.
  - ■ Use the AD-1683A external ionizer (sold separately) to remove static electricity directly from the sample.
  - ■ Increase the relative humidity at the place where the balance is installed.
  - ■ Weigh the sample in a conductive metal container or the like.
  - ■ Wipe off charged materials such as plastic with a damp cloth to suppress static electricity.



- ❑ Influence of magnetism may cause weighing errors.
  When measuring magnetic materials (iron, etc.), keep the sample away from the balance main body by means such as underhook weighing.

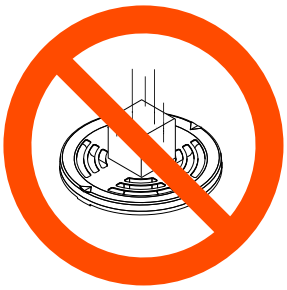


- Weighing errors may occur if there is a difference between the ambient temperature and temperature of the sample (and the container). For example, when the room temperature is 20 °C, convection occurs around a flask that is 40 °C, causing the balance to display a weight lighter than the actual weight.
  Before weighing the sample and the container, try to acclimatize them to the ambient temperature.



- Perform the weighing operation carefully and quickly. If the measurement takes a long time, error-inducing factors will increase due to evaporation or moisture absorption by the sample.

- When placing a sample on the weighing pan, do not drop it or place a sample that exceeds the balance's weighing capacity. Place the sample in the center of the weighing pan.
- Do not leave the sample on the weighing pan for an extended period of time. If a sample is left on the weighing pan for a long time, the measured value will change due to deviation from the zero point caused by environmental changes or due to creep phenomenon.
- For weighing where impurities will be a problem, it is advisable to prepare samples outside the weighing chamber in order to prevent the substance from scattering inside the weighing chamber.



DON'T

- When pressing keys, press the center of the key with your finger.
  Do not use a sharp object such as a pen.

DO DON'T

- Be sure to press the [RE-ZERO] key before weighing in order to eliminate measurement errors.
- Measurement results include error from air buoyancy. The buoyancy of air varies depending on the sample volume, atmospheric pressure, temperature, and humidity. Correct the buoyancy for the most precise measurement.
- Prevent foreign substances such as powder, liquid, and metal pieces from entering the balance.

2.6. Precautions after weighing (maintenance of the balance)

- ❑ Refer to "27. Maintenance" for details on maintenance.
- ❑ Avoid exposing the balance to mechanical shocks or dropping it.
- ❑ Do not disassemble the balance.
- ❑ Do not use organic solvents or chemical cleaning cloths to clean the balance. Clean the balance with a lint-free cloth moistened with a mild detergent.
- ❑ When cleaning the weighing pan, be careful not to injure your hands on the edges.

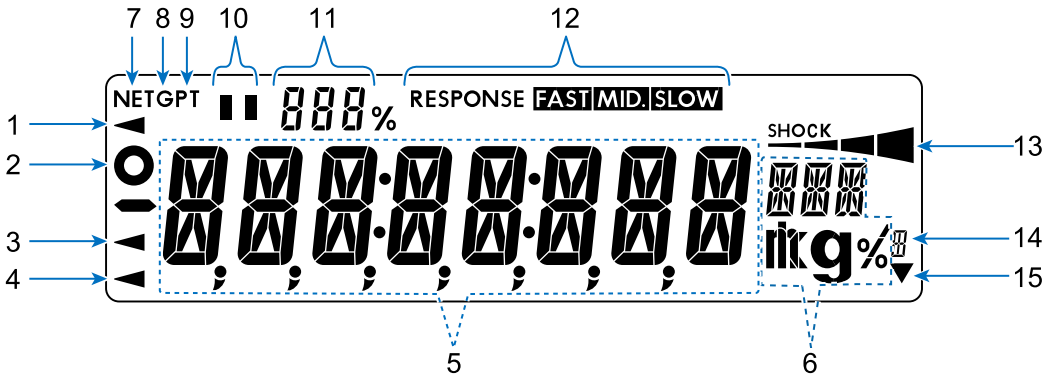
2.7. Precautions regarding power supply

- ❑ Do not unplug the AC adapter immediately after powering on or during sensitivity adjustment with the internal weight. The internal weight will not be secured, and moving the balance may damage its mechanism. When unplugging the AC adapter, always press the [ON:OFF] key and ensure the display shows zero.
- ❑ The balance remains powered as long as the AC adapter is connected. This does not adversely affect the balance.
  For accurate weighing, it is advisable to power on the balance at least an hour before use.

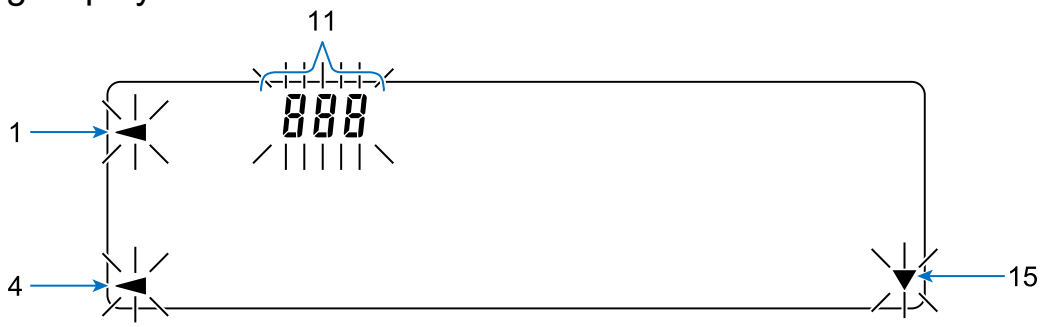
3. Basic Display and Key Operations

3.1. Display

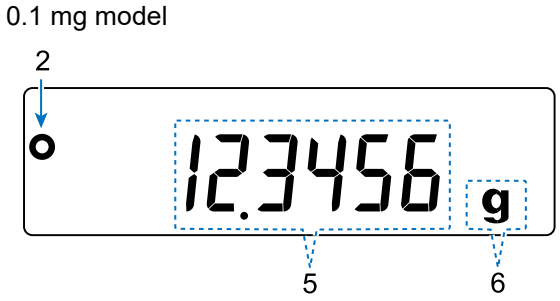
Lit display:



Blinking display:



Example of display



No.	Description
1	Processing indicator
2	Stabilization indicator
3	USB connection mark
4	When lit: Standby indicator When blinking: Automatic sensitivity adjustment notice
5	Displays weighing value and items
6	Unit display
7	Net mark
8	Gross mark
9	Preset tare mark
10	IR sensor indicator

No.	Description
11	When lit: Number of data entries (Data memory function) When blinking: Displays the function table setting value.
12	Response indicator (Lights up for about 30 seconds after the start of weighing)
13	Shock indicator
14	Gross zero mark
15	When lit: Interval output standby mode When blinking: Interval output mode

Key operations

Key operations affect how the balance functions.

Normal key operation during measurement is "Press and release the key immediately" or "Press and hold the key (for 2 seconds)".

Please do not "Press and hold the key (for 2 seconds)" unless required.

Key	 When pressed and released	 When pressed and held (for 2 seconds)
	Turns the display on and off. When the display is turned off, only the standby indicator is displayed. When the display is turned on, weighing is possible. The [ON:OFF] key is active at any time, and pressing this key during operation always turns off the display.	Switches the IR sensor on and off. Refer to "3.2.1. IR sensors".
	Enters the sensitivity adjustment mode using the internal weight. When the function table menu is displayed, cancels the operation.	Displays the menu related to sensitivity adjustment.
	Switches the weighing units stored in the function table. Note: To use the "oz" unit, register it in the function table.	Enters changing weighing speed mode. Refer to "7.1. Response adjustment".
	Switches the readability digit in weighing mode. In counting or percent mode, pressing the key causes the balance to enter the sample storing mode.	Displays the function table menu. (Refer to "10. Function Table".) Runs the repeatability check function when pressed and held for another 2 seconds after the function table menu is displayed. (Refer to "17. Repeatability Check Function".)
	At factory settings, outputs the weighing value when stable. During function table configuration, confirms the operation.	At factory settings, no function is set. By configuring the function table ("10. Function Table"), the following functions can be assigned. ❑ Outputs "Title block" and "End block" for GLP/GMP report. (Refer to "11.3. GLP output".) ❑ Displays the data memory menu. (Refer to "12. Data Memory" for details.) ❑ Enters mode to change the unit weight registration number in counting mode. (Refer to "4.4. Counting mode (PCS)".)
	Performs tare operation.	

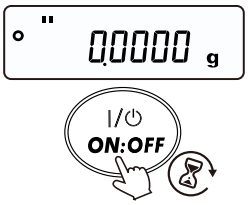
Key	 When pressed and released	 When pressed and held (for 2 seconds)
	Sets the displayed value to zero.	
	This is an IR sensor (touchless sensor). It reacts when you bring your hand close to it. Opening and closing of the breeze break door(s) are assigned. Refer to "3.2.1. IR sensors" for details.	

3.2. IR sensors and auto doors

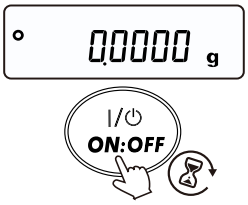
3.2.1. IR sensors

BH series analytical balances are equipped with IR sensors that allow operation without directly touching the balance display unit.
By default, the IR sensors on the left and right sides of the display are assigned to open and close the breeze break door(s).
By pressing and holding the [ON:OFF] key (for 2 seconds), you can switch the IR sensors on and off.

Turning off the IR sensors

Step	Description	Display and key operations
1	In weighing mode, press and hold the [ON:OFF] key (for 2 seconds).	 Press and hold the key for 2 seconds.
2	"iR oFF" is displayed for about 1 second.	
3	The IR sensor indicator on the upper left turns off.	OFF 

Turning on the IR sensors

Step	Description	Display and key operations
1	In the weighing mode, press and hold the [ON:OFF] key (for 2 seconds).	 Press and hold the key (for 2 seconds).
2	"iR oN" is displayed for 1 second.	
3	The IR sensor indicator on the upper left turns on.	IR sensor indicator 

Information: Function table related to the IR sensors and auto doors

The following settings for the IR sensors and auto doors can be changed using the function table of the balance.

For details on the function table, refer to "10. Function Table".

Class	Item	Parameter	Description	
Ex SW External switch [21]	SW External switch function selection	■ 0	[RE-ZERO]/[PRINT] key*	* The AX-SW137-PRINT (sold separately) functions as the [PRINT] key of the balance when connected. The AX-SW137-REZERO (sold separately) functions as the [RE-ZERO] key on the balance when connected.
		1	Door operation (open/close)	
iR-S IR Sensors [22]	iR IR Sensors	0	Disabled	ON/OFF switching of left and right IR sensors
		■ 1	ON	
	SENSE Sensitivity Adjustment	0	High sensitivity	Sensitivity adjustment of left and right IR sensors
		■ 1	Medium sensitivity	
			Low sensitivity	
A-door Auto Doors [23]	oPEN Opening position	0	Partially open	Refer to "3.2.2. Auto doors".
		1	Fully open	
		■ 2	Any position	
	doorTEST Doortest		Executes auto door check	

■ Factory setting

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

3.2.2. Auto doors

The BH series balances feature a breeze break with auto doors that can be opened and closed without touching them.

At factory settings, the IR sensors on the left and right sides of the display are assigned to open and close the breeze break door(s) with [iR-S] (IR sensors) in the function table.

At factory settings, the opening position of the breeze break door(s) is set to "2" (Last position it was opened to) for "oPEN" under [A-door] (Auto doors) in the function table. You can change the function table of the balance for the doors to be fully open or partially open. If you change the connection(s) of the joint(s), it is advisable to perform an auto door test with the function table.

You can also open and close the breeze break door(s) using the external switch AX-SW137-PRINT (or AX-SW137-REZERO) connected to the connection terminal EXT.SW and the setting for [Ex SW] (External input) in the function table

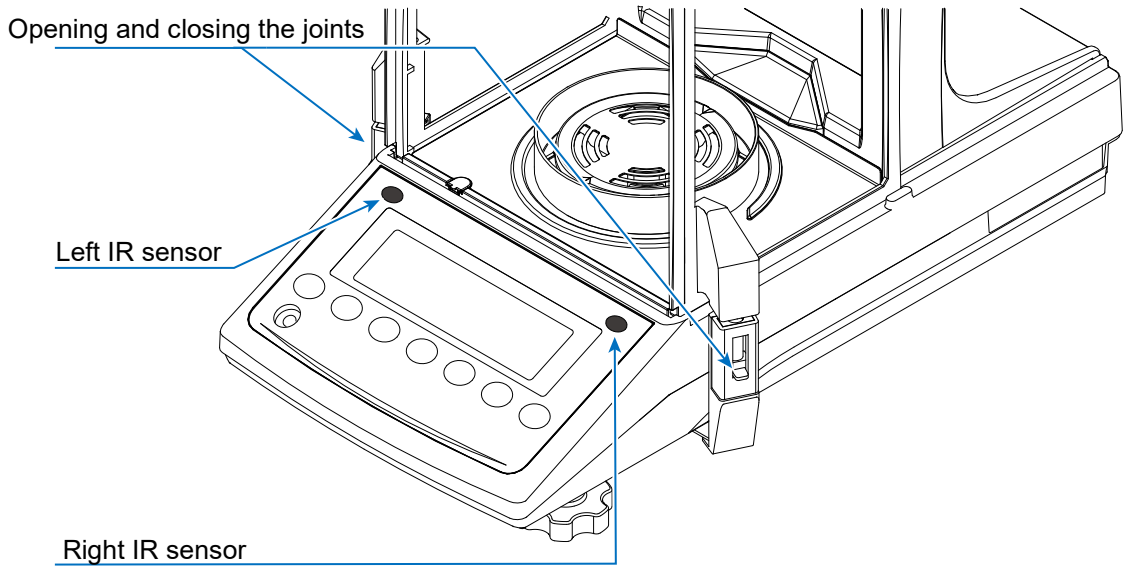
Opening the breeze break door(s)

Step	Description
1	When the breeze break is closed, place your hand over the right (or left) IR sensor.
2	The detection buzzer sounds, and the breeze break door(s) with the joint(s) and handle(s) connected open.

Closing the breeze break door(s)

Step	Description
1	When the breeze break is open, place your hand over the right (or left) IR sensor.
2	The detection buzzer sounds, and the breeze break door(s) with the joint(s) and handle(s) connected close.

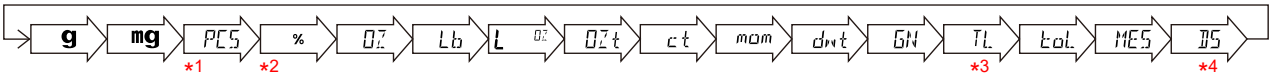
Operation example



4. Weighing

4.1. Unit of measure

The BH series are equipped with the units (modes) of measure shown below. You can specify the units (modes) to store with the function table. (Refer to "10.5. Explanation for unit"). The units (modes) that are not specified will be hidden when the balance displays the sequence of units (modes). To use a unit (mode), press the [MODE] key in weighing mode and choose the unit (mode) from the sequence.



*1 Counting mode. (For details on this mode, refer to "4.4. Counting mode (PCS)".)
*2 Percent mode. (For details on this mode, refer to "4.5. Percent mode (percentage weighing mode)".)
*3 For "tael", one of the four varieties can be selected at factory settings.
*4 Density mode. (For details on this mode, refer to "15. Density (Specific Gravity) Measurement".)
To use this mode, it must be stored for the function table. (Refer to "10. Function Table".) To store it, press the [MODE] key until the processing indicator blinks with the unit "**g**" displayed. Once stored, "DS" is displayed when a density value is displayed.

The table below shows details about the units (modes) available.

Unit / mode	Abbrev.	Display	Function table (Storing mode)	Conversion to grams
Gram	g	**g**	**g**	1 g
Milligram	mg	**mg**	**mg**	0.001 g
Counting mode	PCS	PCS	PCS	———
Percent mode	%	%	%	———
Ounce (Avoir)	OZ	OZ	OZ	28.349523125 g
Troy Ounce	Ozt	OZt	OZt	31.1034768 g
Metric Carat	ct	ct	ct	0.2 g
Momme	mom	mom	mom	3.75 g
Pennyweight	dwt	dwt	dwt	1.55517384 g
Grain (UK)	GN	GN	GN	0.06479891 g
Tael (HK general, Singapore)	tL	TL	TL	37.7994 g
Tael (HK jewelry)				37.429 g
Tael (Taiwan)				37.5 g
Tael (China)				31.25 g
Tola (India)	toL	toL	toL	11.6638038 g
Mesghal	MES	MES	MES	4.6875 g
Density mode*	DS	g DS is shown for the density.	DS	———

* The blinking processing indicator with "g" displayed indicates that density mode is selected.

The tables below indicate the weighing capacity and the readability for each unit, depending on the balance model.

Unit	BH-225	
	Precision range	
	Capacity	Readability
Gram	220	0.00001
Milligram	220000	0.01
Ounce (Avoir)	7.76	0.000001
Troy Ounce	7.07	0.000001
Metric Carat	1100	0.0001
Momme	58.7	0.00001
Pennyweight	141.5	0.00001
Grain (UK)	3395	0.0002
Tael (HK general, Singapore)	5.82	0.000001
Tael (HK jewelry)	5.88	0.000001
Tael (Taiwan)	5.87	0.000001
Tael (China)	7.04	0.000001
Tola (India)	18.86	0.000001
Mesghal	46.9	0.00001

Unit	BH-225D			
	Precision range		Standard range	
	Capacity	Readability	Capacity	Readability
Gram	51.0	0.00001	220	0.0001
Milligram	51000	0.01	220000	0.1
Ounce (Avoir)	1.80	0.000001	7.76	0.00001
Troy Ounce	1.64	0.000001	7.07	0.00001
Metric Carat	255	0.0001	1100	0.001
Momme	13.6	0.00001	58.7	0.0001
Pennyweight	32.8	0.00001	141.5	0.0001
Grain (UK)	787	0.0002	3395	0.001
Tael (HK general, Singapore)	1.35	0.000001	5.82	0.00001
Tael (HK jewelry)	1.36	0.000001	5.88	0.00001
Tael (Taiwan)	1.36	0.000001	5.87	0.00001
Tael (China)	1.63	0.000001	7.04	0.00001
Tola (India)	4.37	0.000001	18.86	0.00001
Mesghal	10.9	0.00001	46.9	0.0001

Unit	BH-124	BH-224	BH-324	Readability
	Capacity			
Gram	120	220	320	0.0001
Milligram	120000	220000	320000	0.1
Ounce (Avoir)	4.23	7.76	11.29	0.00001
Troy Ounce	3.86	7.07	10.29	0.00001
Metric Carat	600	1100	1600	0.001
Momme	32.0	58.7	85.3	0.0001
Pennyweight	77.2	141.5	205.8	0.0001
Grain (UK)	1852	3395	4938	0.002
Tael (HK general, Singapore)	3.17	5.82	8.47	0.00001
Tael (HK jewelry)	3.21	5.88	8.55	0.00001
Tael (Taiwan)	3.20	5.87	8.53	0.00001
Tael (China)	3.84	7.04	10.24	0.00001
Tola (India)	10.29	18.86	27.44	0.00001
Mesghal	25.6	46.9	68.3	0.0001

4.2. Basic operation

4.2.1. Zero-point, tare, and weighing range

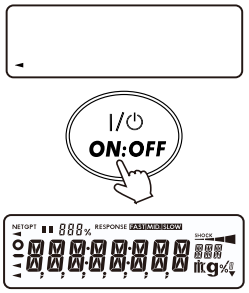
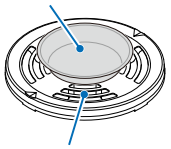
Entering the weighing mode

The balance determines the reference zero point when the [ON:OFF] key is pressed and enters the weighing mode.

Depending on the load condition at that time, the balance automatically judges whether to set the zero-point or to tare.

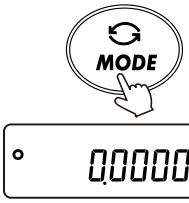
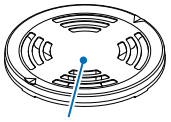
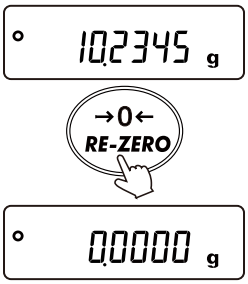
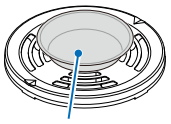
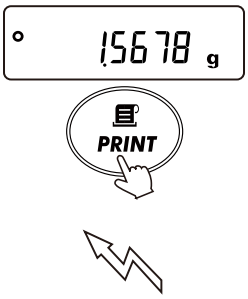
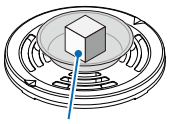
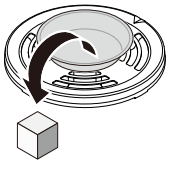
The condition for determining which is used is "power-on zero range", and when power-on zero range is exceeded, the tare operation is performed.

(Refer to "Weighing range" for details.)

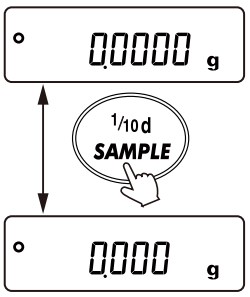
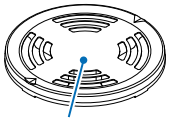
Step	Description	Display and key operations	Weighing operation
1	With the container (tare) placed on the weighing pan, press the [ON:OFF] key to start weighing.		Container (tare)  Weighing pan
2	You can start weighing from the zero display.		

Weighing after rezeroing

By pressing the [RE-ZERO] key, the displayed value can be set to zero.
The re-zero operation with the [RE-ZERO] key will automatically judge whether to set the zero-point or to tare.
The condition for determining which is used is "zero range", and when zero range is exceeded, the tare operation is performed.
(Refer to "Weighing range" for details.)

Step	Description	Display and key operations	Weighing operation
1	Press [MODE] key to select a unit of measure. Here, grams (g) is selected as an example.		 Weighing pan
2	If necessary, place a container on the weighing pan. Press the [RE-ZERO] key to set the display to zero. (This is an example for a 0.1 mg model. The decimal separator position depends on the balance model.)		 Container (tare)
3	Place the sample on the pan or in the container. Wait for "O" (the stabilization indicator) to appear. Read the displayed value. To output the weighing value, press the [PRINT] key while "O" (the stabilization indicator) is displayed.*1 *1 A printer, PC, and optional peripherals will be required. PC output example (WinCT, RsCom) A&D standard format ST,+0001.5678␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Data output	 Sample
4	Remove the sample and container from the weighing pan.		

Turning on/off the readability digit

Step	Description	Display and key operations	Weighing operation
1	The [SAMPLE] key switches the readability digit in weighing mode. Example: Readability can switch between 0.0000 g and 0.000 g.		 Weighing pan

Weighing range

The weight range that the balance can weigh and display varies depending on the model. When the gross weight*1 exceeds the maximum display for the model, E is displayed to indicate that the weighing range is exceeded. When exceeded in the negative direction, -E is displayed.

*1 Gross weight = Net weight (weighing value after tare operation) + Tare weight

Weighing range

Model	Power-on zero range*2	Zero range*3	-E display range
BH-225/BH-225D	Approx. ±22 g	Approx. -22 g to +4.4 g	Approx. less than -22 g
BH-324	Approx. ±32 g	Approx. -32 g to +6.4 g	Approx. less than -32 g
BH-224	Approx. ±22 g	Approx. -22 g to +4.4 g	Approx. less than -22 g
BH-124	Approx. ±12 g	Approx. -12 g to +2.4 g	Approx. less than -12 g

*2 Power-on zero refers to the zero point set when the power is turned on.
The power-on zero range is the range within which the zero point is set, based on the zero point during sensitivity adjustment. If the weighing value exceeds the power-on zero range, it is subtracted as the tare weight.
Weighing can be performed from the zero point up to the maximum capacity, but after subtracting the tare weight, weighing can only be performed up to the maximum capacity minus the tare weight.

*3 The zero range is the range within which the zero point is set, based on the power-on zero point.
When the [RE-ZERO] key is pressed and the weighing value is within the zero range, the zero point is set.
If the weighing value exceeds the zero range, it is subtracted as the tare weight.
Weighing can be performed from the zero point up to the maximum capacity, but after subtracting the tare weight, weighing can only be performed up to the maximum capacity minus the tare weight.

4.3. Smart range function

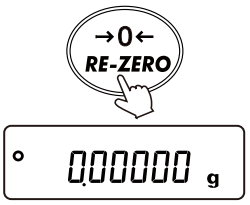
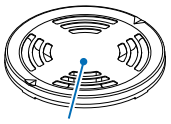
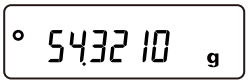
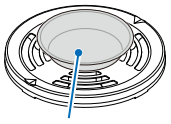
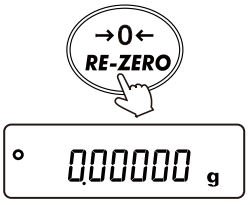
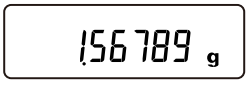
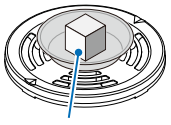
For the BH-225D, readability options include both standard range and the precision range (high resolution).

Smart range function

The range can switch automatically between the standard range and precision range (high resolution), depending on the value displayed.

Even if a heavy container (tare) exceeds the precision range, pressing the [RE-ZERO] key to set the display to zero allows for weighing in the precision range. The range can be fixed to the standard range by pressing the [SAMPLE] key.

Operation example

Step	Description	Display and key operations	Weighing operation
1	Start weighing in the precision range. Press the [RE-ZERO] key to set the display to zero.		 Weighing pan
2	Place a container. When the displayed value exceeds the precision range, the balance automatically switches to the standard range.		 Container (tare)
3	Enable the precision range. Press the [RE-ZERO] key to set the display to zero and enable the precision range.		
4	Place a sample. If the weighing value does not exceed the precision range, the sample can be weighed in the precision range.		 Sample

Precision range and standard range

Model	Unit	Precision range (after pressing the [RE-ZERO] key)	Standard range
BH-225D	Gram (g)	0.00000 g to 51.00009 g	51.0001 g to 220.0008 g
	Milligram (mg)	0.00 mg to 51000.09 mg	51000.1 mg to 220000.8 mg

4.4. Counting mode (PCS)

This is the mode to determine the number of objects in a sample. Based on the reference sample unit weight (weight per piece), the balance calculates and displays how many pieces the sample weight corresponds to. The smaller the variation in the unit weight of sample pieces is, the more accurate the count will be. The balance is equipped with the Automatic Counting Accuracy Improvement (ACAI) function to improve the counting accuracy.

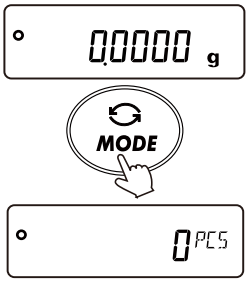
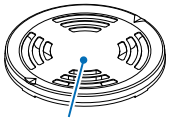
CAUTION

- ❑ The unit weight (weight per piece) of the sample should be at least 1 mg.
- ❑ If there is a large variation in the unit weight of sample pieces, it may not be possible to count accurately.
- ❑ If a large error is found in the counting measurement, try a method such as performing ACAI frequently or multiple measurements.

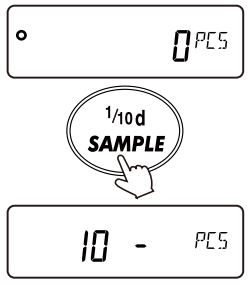
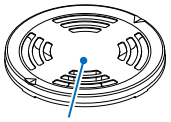
Tips

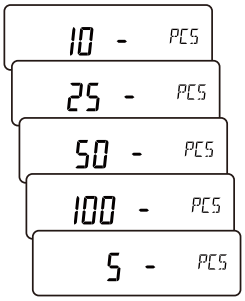
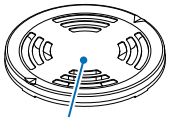
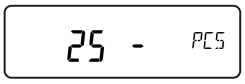
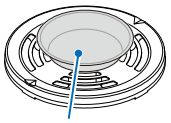
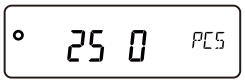
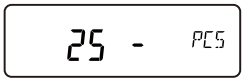
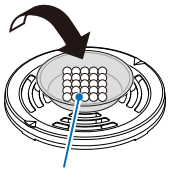
- ❑ The stored unit weight can be output with the "?UW" command and changed with the "UW： " command.
- ❑ For details on "?UW" command, refer to "23. Command".

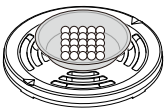
Selecting the counting mode

Step	Description	Display and key operations	Weighing operation
1	Press the [MODE] key to select the "PCS" unit. (PCS = pieces)		 Weighing pan

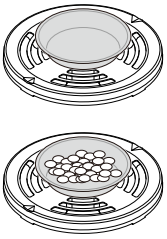
Storing a unit weight

Step	Description	Display and key operations	Weighing operation
2	Press the [SAMPLE] key to enter the unit weight storing mode*1. *1 Note that even in the unit weight storing mode, pressing the [MODE] key switches to the next mode.		 Weighing pan

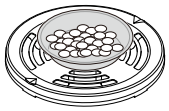
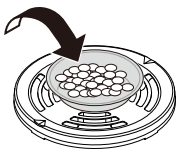
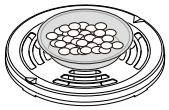
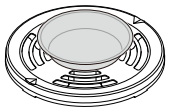
Step	Description	Display and key operations	Weighing operation
3	Each time you press the [SAMPLE] key, the number of sample pieces when storing changes. (10 pcs, 25 pcs, 50 pcs, 100 pcs, 5 pcs)*2 *2 The sample unit weight may vary slightly. Using a greater number of sample pieces when storing the unit weight will yield more accurate counting results.	 Press several times  The display repeats in this cycle.	 Weighing pan
4	If necessary, place a container on the weighing pan.		 Container
5	Press the [RE-ZERO] key to show the display shown to the right. (In this example, 25 pcs.)	 	
6	Place the displayed number of sample pieces on the weighing pan/container.		 Sample

Step	Description	Display and key operations	Weighing operation
7	After "O" (the stabilization indicator) lights up, press the [PRINT] key to register the unit weight calculated from the weighing value and display the count. (25 PCS is displayed when 25 is set.)*3, *4, *5 *3 If the balance determines that the loaded sample is too light (resulting in a large counting error), it will prompt you to add more sample pieces. Add sample pieces until the displayed number is reached, then press the [PRINT] key again. When the unit weight is stored correctly, the balance displays the count. *4 If the balance judges that the sample is too light to be stored as the unit weight, it displays Lo. The sample cannot be used. *5 The stored unit weight is retained in the balance's nonvolatile memory even when the power is turned off.	25 PCS PRINT 25 PCS	

Counting mode

Step	Description	Display and key operations	Weighing operation
8	Counting operation is enabled. To output the weighing value (count), press the [PRINT] key while "O" (the stabilization indicator) is displayed.*6 *6 A printer, PC, and optional peripherals will be required. PC output example (WinCT, RsCom) A&D standard format QT,+000000055␣PC<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	0 PCS 55 PCS PRINT Counting data output	

Automatic Counting Accuracy Improvement (ACAI)

Step	Description	Display and key operations	Weighing operation
9	The ACAI function automatically improves counting accuracy by increasing the number of sample pieces. This reduces errors by averaging the variations in sample weight. After storing the unit weight in step 7, proceed to step 10 below. **CAUTION** ❑ The ACAI function does not operate for unit weights set using the "UW: " command.	55 PCS	
10	Add a few sample pieces. "◄ " (the processing indicator) will then appear. (Three or more pieces are required in order to prevent errors. The processing indicator does not turn on if overloaded. Add approximately the same number of sample pieces as displayed.)	58 PCS	
11	Do not touch or move the sample pieces while the ◄ processing indicator is blinking. (The accuracy is being updated.)	58 PCS	
12	The accuracy is updated after "◄ " (the processing indicator) turns off. Each time this process is repeated, the counting accuracy will improve further. The range of ACAI after exceeding 100 is not predetermined. Add approximately the same number of sample pieces as displayed.	58 PCS	
13	Remove all the sample pieces used with ACAI from the weighing pan and start counting work. **CAUTION** ❑ Do not change units during ACAI processing.	0 PCS	

Storing unit weights

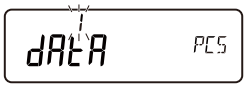
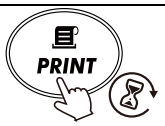
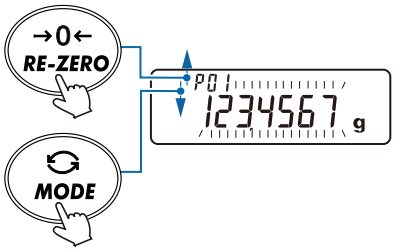
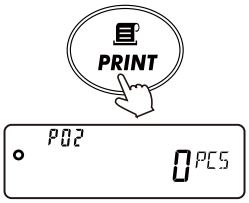
By using the data memory function, up to 50 unit weights can be stored.
(Refer to "12. Data Memory".)

CAUTION

- ❑ The ACAI function does not work for the unit weight that was read.

Tips

- ❑ The unit weight can be read using the "UN:mm" command. (mm ranges from 01 to 50 and corresponds to "P01" to "P50".)
  For details on commands, refer to "23. Command".
- ❑ The read unit weight can be output with the "?UW" command and changed with the "UW: " command.

Step	Description	Display and key operations
1	In advance, refer to "Enabling the data memory function (Changing the function table)" and set "1 " (Stores the unit weight) for "dAtA" (Data memory) in the function table ("10. Function Table").	
2	The selected registration number for the stored unit weight is displayed in " P ** ".	
3	Press and hold the [PRINT] key (for 2 seconds) to enter the mode for changing the unit weight registration number. [RE-ZERO] key ····· Changes the value of registration number. (+) [MODE] key ····· Changes the value of registration number. (-)	 Press and hold (for 2 seconds) 
4	Press the [PRINT] key to store the displayed registration number. (To cancel, press the [CAL] key.)	
5	Store the unit weight as necessary. Multiple unit weights can be stored by assigning individual unit weight registration numbers.	

4.5. Percent mode (percentage weighing mode)

The percent mode displays the weighing value in a percentage compared with a reference mass as 100%. This is useful for target weighing or sample variance checks.

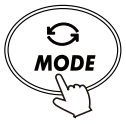
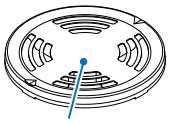
CAUTION

- ❑ [Lo] appears if the balance judges that the sample is too light to be stored as the 100% reference mass.
- ❑ The decimal separator position varies according to the 100% reference mass.

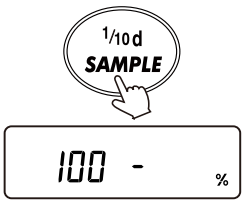
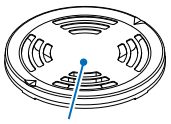
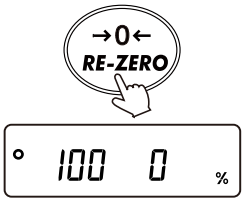
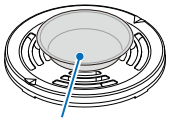
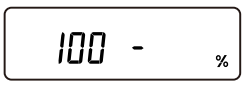
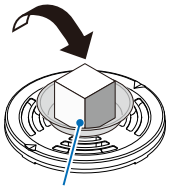
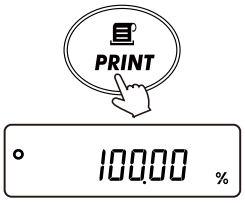
Decimal separator position for 100% reference mass display

Model	100% reference mass	Decimal separator position
BH-225/BH-225D BH-124/BH-224/BH-324	0.0100 g to 0.0999 g	1 %
	0.1000 g to 0.9999 g	0.1 %
	1.0000 g to	0.01 %

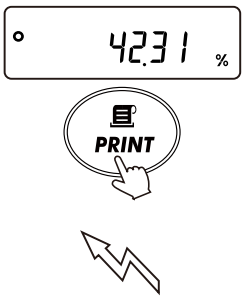
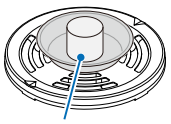
Selecting the percent mode

Step	Description	Display and key operations	Weighing operation
1	Press the [MODE] key several times to select the unit "%" (percent mode).	0.00000 g  Press several times 0.00 %	 Weighing pan

Storing a 100% mass

Step	Description	Display and key operations	Weighing operation
2	Press the [SAMPLE] key to enter the mode for storing a 100% reference mass.*1 *1 Even in the 100% reference mass storing mode, pressing the [MODE] key switches to the next mode.		 Weighing pan
3	If necessary, place a container on the weighing pan. Press the [RE-ZERO] key to show the display shown to the right.		 Container (tare)
4	Place a sample for the 100% reference mass on the weighing pan/container.		 100% reference mass sample
5	Press the [PRINT] key to store the 100% reference mass. The balance will then display the percentage value. The stored 100% reference mass is retained in the balance's nonvolatile memory even when the power is turned off.		

Percentage weighing

Step	Description	Display and key operations	Weighing operation
6	Perform a percentage weighing operation. To output the weighing value, press the [PRINT] key while "O" (the stabilization indicator) is displayed.*2 *2 A printer, PC, and optional peripherals will be required. PC output example (WinCT, RsCom) A&D standard format ST,+000042.31␣␣%<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Percentage data output	 Sample

5. Impact Shock Detection (ISD) Function

The BH series has the Impact Shock Detection (ISD) function to detect impact shocks to the mass sensor section, displaying the impact level. By lowering the impact level at the time of loading, it is possible not only to alleviate variation in the weighing value but also to reduce the risk of failure of the mass sensor section.

Especially when incorporating the balance in a production line, etc. and weighing by means such as an automated system, impact to the sensor may be applied greater than expected. When designing automatic systems and similar setups, you should minimize the impact level as much as possible while monitoring the shock indicator.

CAUTION

- ❑ Impact on the weighing sensor is not only that applied to the weighing pan when loaded, but also may be impact applied from the table on which the balance is installed. The impact detection function also works for impact coming from the table.

The shock indicator has 5 levels from level 0 to level 4.

Impact level display

Impact level	Shock indicator	Buzzer	Content
0	No indicator	No beeps	Safe
1	SHOCK	No beeps	CAUTION
2	SHOCK	No beeps	Caution: Alleviate impact shocks.
3	SHOCK	One beep	Warning: Do not apply any more impact shocks.
4	SHOCK	Two beeps	Danger: Sensor may be damaged.

Impact shock detection can be turned off by setting "0" (OFF) for "isd" (Impact shock detection) under [bASFnc] (Environment/Display) in the function table ("10. Function Table").

Even if the impact shock detection function is turned off, a record is kept in the balance when there is a shock impact.

5.1. Recording impact history

Impacts of level 3 or higher are automatically stored on the balance with date and time (up to 50 entries).

If the password lock function is enabled ["1" (On) is set for "PW" (Password function) under [PASSwd] (Password) in the function table ("10. Function Table")], login user information is added when outputting the impact history.

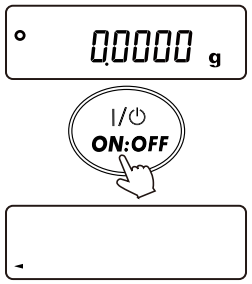
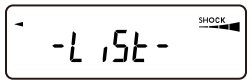
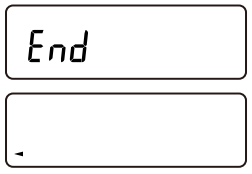
CAUTION

- ❑ If data entries exceed 50, the stored data with the lowest impact level will be overwritten.
- ❑ The stored impact history cannot be deleted.
- ❑ Impact data where the balance is not energized (during transport, etc.) is not stored.

5.2. Output impact history

The stored impact history can be output by sending a specified command to the balance or performing key operation.

Output by key operation

Step	Description	Display and key operations
1	Press the [ON:OFF] key to turn off the display.	
2	With the display turned off, press and hold the [MODE] key and press the [ON:OFF] key.	 While pressing and holding + 
3	The display shown to the right appears, and the stored impact data is output in bulk. (For output examples, refer to "Impact history output example".)	  Data output 

Output by command

The stored impact data will be output in bulk by sending a " ?SA" command to the balance.
(For output examples, refer to "Impact history output example".)

Impact history output example

Date, time, impact level and login user information are output together on one line.

Output example (WinCT, RsCom)

```
2025/01/17,09:11:55,SHOCK␣LV,4,--,␣␣␣␣␣<TERM>
2025/02/04,14:13:13,SHOCK␣LV,4,00,ADMIN<TERM>
2025/02/25,11:05:16,SHOCK␣LV,3,01,USER␣<TERM>
2025/02/25,11:09:07,SHOCK␣LV,4,10,USER␣<TERM>
2025/03/12,16:55:33,SHOCK␣LV,3,--,GUEST<TERM>
```

Date Time Impact level Login user information

␣ : Space, ASCII 20h
<TERM> :Terminator, CR LF
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

The login user information varies depending on the setting for the login user and the setting for "PW" (Password function) under PASSwd (Password) in the function table ("10. Function Table") when receiving impact.

Function table (PASSwd)	Output	Description
PW = 0, PW = 1	,--,␣␣␣␣␣	No login user
PW = 1	,00,ADMIN	Administrator
PW = 1	,01～10,USER	User
PW = 1	,--,GUEST	Guest

6. Underhook Weighing

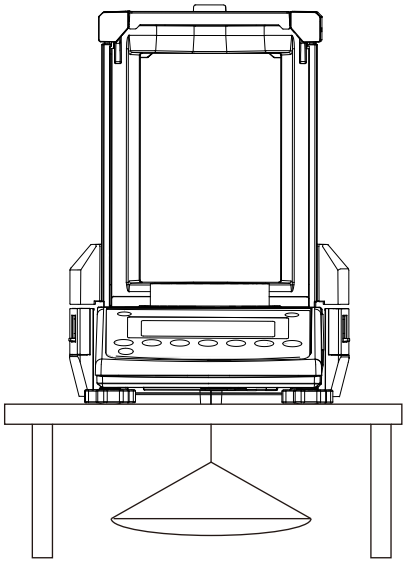
The built-in underhook is used for underhook weighing such as measurement of magnetic materials and the like. To use the underhook, open the cover on the bottom of the balance.

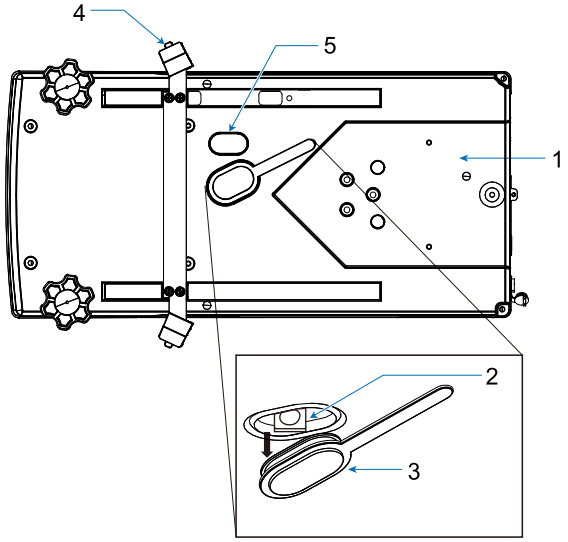
Removing the underhook cover

Step	Description
1	Move the arm (4) to the front side of the balance.
2	Remove the underhook cover (3) and attach it to the cover holder (5) on the bottom of the balance.
3	Suspend the underhook (2).

CAUTION

- ❑ Do not apply excessive force to the underhook part.
- ❑ Do not open the cover unless necessary. (For protection from dust)
- ❑ The underhook can be used only in the hanging direction (pulling direction).
- ❑ If the balance is tilted greatly, attached parts such as the weighing pan will come off. Remove them before work.
- ❑ Keep in mind that draft enters the balance easily when the underhook cover is removed, affecting the weighing values.
- ❑ When attaching the underhook, unplug the AC adapter from the balance before proceeding.
- ❑ If the IR sensor is set to control the door, disable the IR setting or assign another function to prevent the suspended pan from being caught. Refer to "3.2.1. IR sensors".





1 Bottom of the balance
2 Underhook (Hole diameter: approx. 4 mm)
3 Cover
4 Arm
5 Cover holder

7. Response Adjustment/Weighing Speed Setting

7.1. Response adjustment

Disturbances such as drafts and vibrations at the installation site can affect the balance's weighing performance. In the response adjustment settings, three levels of the response characteristics are available for the balance to accommodate these disturbances.

Display	Response characteristic	Weighing speed	Stability
FAST	Cond = 0	Fast response	Lower stability (More susceptible to disturbances)
MID.	Cond = 1	↑	↓
SLOW	Cond = 2	Slow response	Higher stability (More stable display)

Weighing speed setting

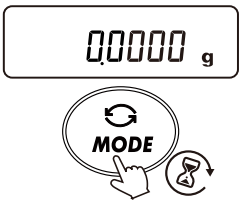
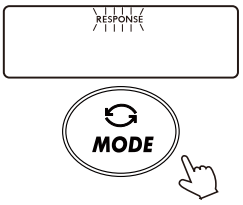
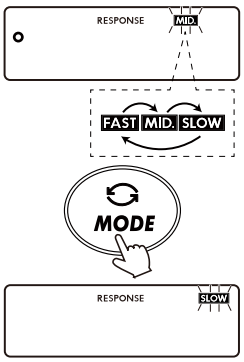
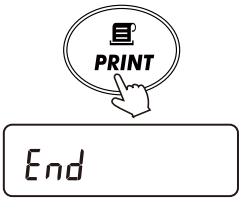
CAUTION

❑ When the response characteristic is set, "Cond" (Condition), "St-b" (Stability band width), and "SPd" (Display refresh rate) under bASFnc (Basic Function) in the function table ("10. Function Table") are changed as shown below.

Display	Response characteristic	Stability band width	Display refresh rate
FAST	Cond = 0	St-b = 2	SPd = 1 (Approx. 10 times per second)
MID.	Cond = 1	St-b = 1	SPd = 0 (Approx. 5 times per second)
SLOW	Cond = 2	St-b = 1	SPd = 0 (Approx. 5 times per second)

To use in a combination other than the above, set individually in the function table ("10. Function Table").

Setting method

Step	Description	Operation
1	Press and hold the [MODE] key (for 2 seconds) until RESPONSE is displayed.	 Press and hold (for 2 seconds)
2	When RESPONSE is displayed, release your finger from the key.	 Release
3	Press the [MODE] key to select the desired setting. (FAST, MID or SLOW can be selected.)	
4	Press the [PRINT] key or wait for a moment to complete the process.	
5	The balance returns to weighing mode and displays the updated response indicator for a moment.	

8. Sensitivity Adjustment/Calibration Test

Due to the high resolution of the balance, weighing values may be affected by gravity and daily environmental changes. To ensure consistent weighing values despite changes in gravity or the environment, it is necessary to perform sensitivity adjustment using a weight.
It is advisable to perform sensitivity adjustment when the balance is newly installed or relocated, or if significant deviations in weighing values are observed during daily checks.
Sensitivity adjustment involves calibrating the balance's weighing values using a reference weight or the internal weight.
Calibration test*1 is to weigh with a reference weight and compare how much the result deviates from the reference value.

Sensitivity adjustment

Automatic sensitivity adjustment

····· Automatically adjusts the sensitivity of the balance using the internal weight based on ambient temperature changes, set times, or intervals.

Sensitivity adjustment using the internal weight

····· Adjusts the balance using the internal weight, with a single touch.

Sensitivity adjustment using an external weight

····· Adjusts the balance using an external weight

Calibration test*1

Calibration test using an external weight*1

····· Checks the accuracy of weighing using an external weight and outputs the result.

Calibration test using the internal weight*1

····· Checks the accuracy of weighing using the internal weight and outputs the result.

*1 Note that sensitivity adjustment is not performed in calibration test.

Caution for sensitivity adjustment/calibration test

- ❑ Do not allow vibration or drafts to affect the balance during sensitivity adjustment or calibration tests.
- ❑ The GLP/GMP (etc.) compliant maintenance report can be output in sensitivity adjustment/calibration tests. To output the GLP/GMP compliant maintenance report, you need to set "i" (Internal clock data) or "E" (External device clock data) for "InFo" (GLP output) under dout (Data output) in the function table ("10. Function Table"). A PC or optional printer is required for GLP output. A timestamp (clock and calendar) is available for the GLP output using the balance's clock function. If the date and time are incorrect, refer to "10.4. Clock and calendar function" in "10. Function Table" and adjust the clock. The calibration test using an external weight is a function that is available only when the output setting for GLP/GMP (etc.) compliant report is set.
- ❑ By setting "E" (Stores the weighing data/sensitivity adjustment history) for "dAtA" (Data memory) under dout (Data output) in the function table ("10. Function Table"), you can store sensitivity adjustment records and calibration test records in the data memory.

Caution when using an external weight

- ❑ The accuracy of the weight used in sensitivity adjustment affects the accuracy of the balance after sensitivity adjustment.
- ❑ For sensitivity adjustment or calibration tests using your own weights, select weights from the table below.

Applicable weights for calibration test/sensitivity adjustment

Model	Usable weight	Factory setting	Adjustable range
BH-225/BH-225D	10 g, 20 g, 50 g, 100 g, 200 g	200 g	-15.00 mg to +15.99 mg
BH-124	10 g, 20 g, 50 g, 100 g	100 g	-15.0 mg to +15.9 mg
BH-224	10 g, 20 g, 50 g, 100 g, 200 g	200 g	
BH-324	10 g, 20 g, 50 g, 100 g, 200 g, 300 g		

Display

The "◄" indicator on the upper left side signifies that the balance is capturing sensitivity adjustment data or calibration test data. Do not allow vibration or drafts to affect the balance while this display is active.

8.1. Automatic sensitivity adjustment

This function automatically adjusts the sensitivity of the balance according to ambient temperature change, set time or intervals using the internal weight. It works even when the display is off. If GLP output is set, a sensitivity adjustment record is output after the adjustment.

- ❑ The execution conditions for the automatic sensitivity adjustment mode can be selected from the parameters, "0" (Temperature change), "1" (Set time), or "2" (Interval time), for "CFnc" (Sensitivity adjustment mode) under [AutoCAL] (Automatic sensitivity adjustment) in the function table ("10. Function Table"). (Default setting: "0" (Temperature measurement).)
- ❑ For the set time, "CtiME1" (Set time 1) and "CtiME2" (Set time 2) can be set under [AutoCAL] in the function table ("10. Function Table").
- ❑ You can set the interval time from the parameters, " 1" (0.5 h) to "24" (24 h), for "Cint" (Sensitivity adjustment Intervals)" under [AutoCAL] (Automatic sensitivity adjustment) in the function table ("10. Function Table").

CAUTION

- ❑ If the balance detects a load on the weighing pan, it will determine that it is in use and will not perform automatic sensitivity adjustment. The criteria for performing automatic sensitivity adjustment are as follows.

The criteria for performing automatic sensitivity adjustment

BH-225/BH-225D BH-324/BH-224/BH-124	Less than 0.5 g

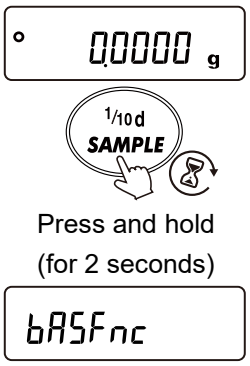
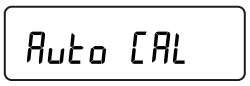
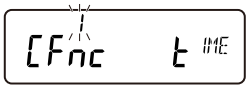
	The automatic sensitivity adjustment notice (the indicator blinking) indicates that the automatic sensitivity adjustment will start. If the balance is not used for a certain period of time with this indicator blinking, the balance automatically performs sensitivity adjustment using the internal weight. (The blinking period depends on the operating environment.)
	The balance is currently capturing sensitivity adjustment data. Do not allow vibration or drafts to affect the balance while this indicator is displayed. Upon completion, the balance automatically returns to the original display.

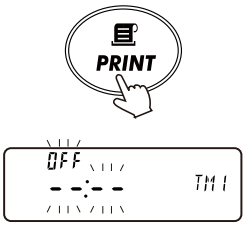
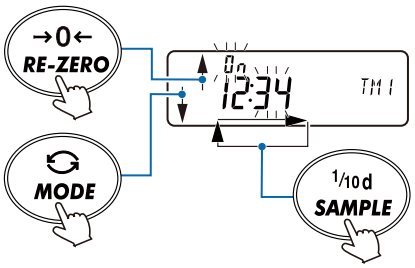
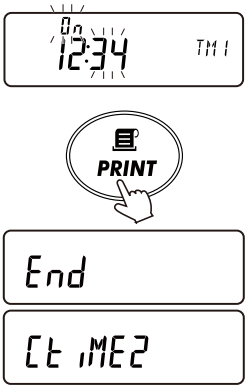
Tips

- ❑ Although it is possible to continue using the balance even while the indicator is blinking ( ), use after sensitivity adjustment is completed is advisable in order to maintain the weighing accuracy.
- ❑ "Prohibit automatic sensitivity adjustment" or "Allow automatic sensitivity adjustment" can be selected in the setting described in "9. Function Selection Switch and Initialization".

8.1.1. Inputting the set time

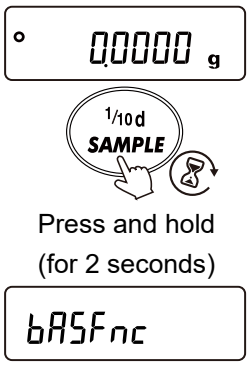
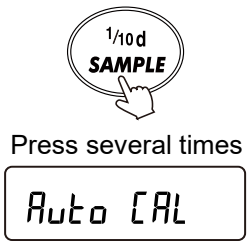
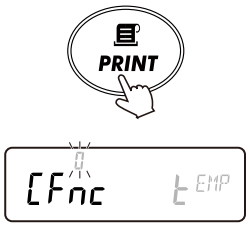
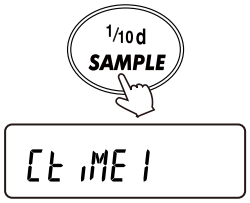
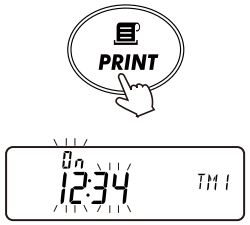
The method for inputting the set time is the same for both "Ct iME 1" (Set time 1) and "Ct iME2" (Set time 2). Below is an example of setting "Ct iME 1" (Set time 1).
To set "Ct iME2" (Set time 2), press the [SAMPLE] key several times in step 5 to select the desired time, then repeat steps 6 to 10.

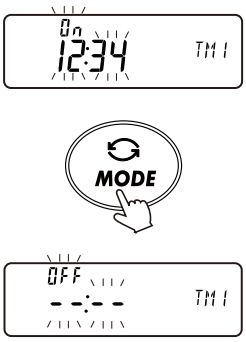
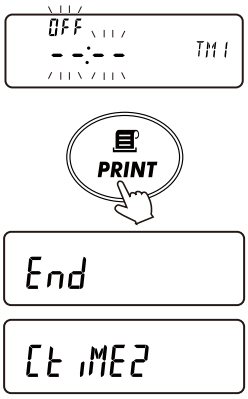
Step	Description	Operation
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds). The balance displays the function table menu ("10. Function Table").	 Press and hold (for 2 seconds)
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times 
3	Press the [PRINT] key to display "CFnc" (Sensitivity adjustment mode).	 
4	Press the [RE-ZERO] key several times to set the parameter to "1" (Set time 1).	 Press several times 
5	Press the [SAMPLE] key to show the display shown to the right.	 

Step	Description	Operation
6	Press the [PRINT] key to enter the set time 1 setting mode.	
7	Press [RE-ZERO] key.	
8	Using the following keys, set the time (in 24-hour format) to perform sensitivity adjustment. [RE-ZERO] key ····· Changes the value of the blinking digit (+) [MODE] key····· Changes the value of the blinking digit (-) [SAMPLE] key····· Selects the digit to blink.	
9	Press the [PRINT] key to register the time. (To cancel, press the [CAL] key.)	
10	To return to weighing mode, press the [CAL] key twice.	

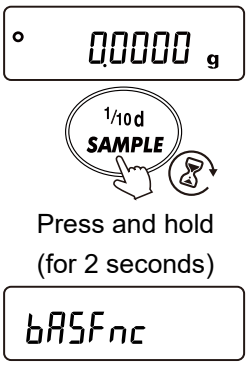
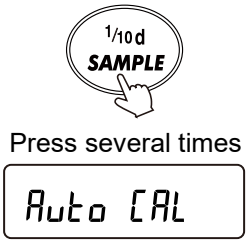
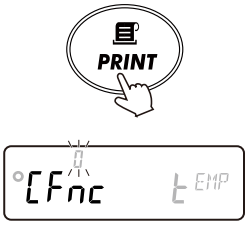
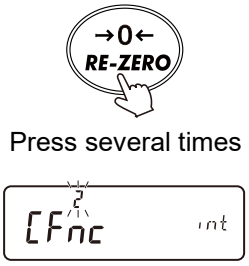
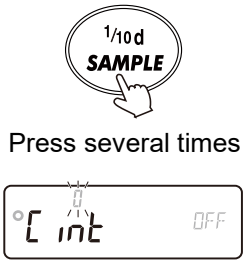
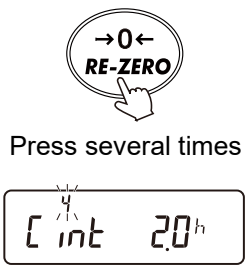
8.1.2. Clearing the set time

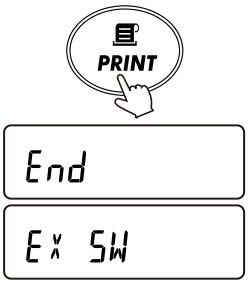
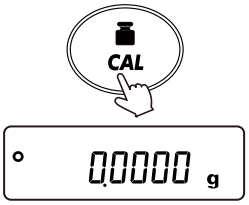
The method for clearing the set time is the same for both "CL tME 1" (Set time 1) and "CL tME2" (Set time 2). Below is an example of clearing "CL tME 1" (Set time 1).
To clear "CL tME2" (Set time 2), press the [SAMPLE] key several times in step 4 to select the time you want to clear, then repeat steps 5 to 7.

Step	Description	Operation
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds). The balance displays the function table menu. ("10. Function Table")	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to display "CFnc" (Sensitivity adjustment mode).	
4	Press the [SAMPLE] key to show the display shown to the right.	
5	Press the [PRINT] key to enter the set time 1 setting mode.	

Step	Description	Operation
6	Press the [MODE] key to show the display shown to the right.	
7	Press the [PRINT] key to complete the process.	
8	To return to weighing mode, press the [CAL] key twice.	 Press twice

8.1.3. Setting the interval time

Step	Description	Operation
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds). The balance displays the function table menu ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to display "CFnc" (Sensitivity adjustment mode).	
4	Press the [RE-ZERO] key several times to set the parameter to "2" (Interval time).	
5	Press the [SAMPLE] key several times to display "C int" (Sensitivity adjustment intervals).	
6	Press the [RE-ZERO] key several times to set the interval time from " 1" (0.5 hours) to "24" (24 hours) for performing automatic sensitivity adjustment. For the correspondence between the parameter and interval time, refer to the Correspondence table for automatic sensitivity adjustment intervals.	

Step	Description	Operation
7	Press the [PRINT] key to complete the process.	
8	To return to weighing mode, press the [CAL] key.	

Correspondence table for automatic sensitivity adjustment intervals

Item	Parameter	Description
C int Automatic sensitivity adjustment intervals	■ 0	Disabled
	1	0.5-hour interval time
	2	1.5-hour interval time
	3	1.0-hour interval time
	4	2.0-hour interval time
	5	2.5-hour interval time
	6	3.0-hour interval time
	7	3.5-hour interval time
	8	4.0-hour interval time
	9	4.5-hour interval time
	10	5.0-hour interval time
	11	5.5-hour interval time
	12	6.0-hour interval time
	13	7.0-hour interval time
	14	8.0-hour interval time
	15	9.0-hour interval time
	16	10.0-hour interval time
	17	11.0-hour interval time
	18	12.0-hour interval time
	19	14.0-hour interval time
	20	16.0-hour interval time
	21	18.0-hour interval time
	22	20.0-hour interval time
	23	22.0-hour interval time
	24	24.0-hour interval time

■ Factory setting

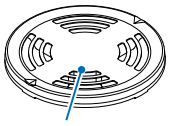
8.2. Sensitivity adjustment using the internal weight

The BH series can use its internal weight for sensitivity adjustment, enabling one-touch sensitivity adjustment.

CAUTION

- ❑ Refer to "2.4. How to adjust the level of the balance" and rotate the leveling feet to ensure the bubble is centered in the black circle of the bubble spirit level. Insufficient leveling may cause errors in the sensitivity adjustment results.
- ❑ The value of the internal weight may change due to factors such as the operating environment and aging.
  As needed, refer to "8.5. Correcting the internal weight value" and proceed with the correction.
  For more precise weighing management, it is advisable to regularly perform sensitivity adjustments using an external weight, as described in "8.3. Sensitivity adjustment using an external weight".

Operation method

Step	Description	Display and key operations	Weighing operation
1	Be sure to warm up the balance with nothing on the weighing pan for at least an hour.	0.0000 g	 Weighing pan
2	Press the [CAL] key to show the displays shown to the right. The balance will automatically start sensitivity adjustment using the internal weight. Avoid areas with drafts or vibrations.	 CAL in CAL. in CAL . in	
3	If GLP output is set, a sensitivity adjustment record is output or stored in the data memory after the adjustment. (Refer to "10. Function Table" for "inFo" (GLP output) and "dAtA" (Data memory) under dout (Data output).) For output examples, refer to "Output examples of sensitivity adjustment with the internal weight".	End GLP  GLP output End	
4	The balance automatically returns to weighing mode after sensitivity adjustment is complete.	0.0000 g	

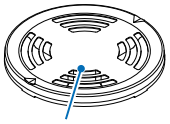
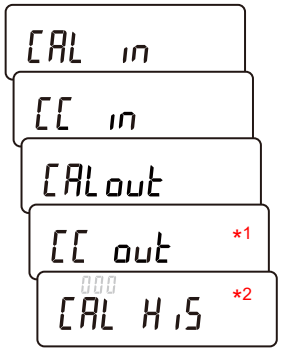
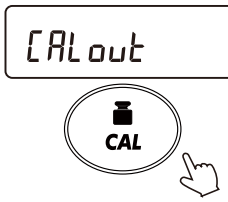
8.3. Sensitivity adjustment using an external weight

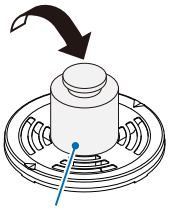
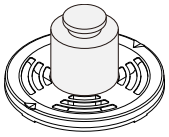
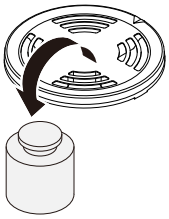
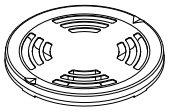
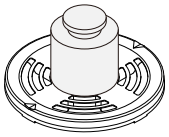
An external calibration weight is used to adjust the sensitivity.

CAUTION

❑ The default setting is automatic sensitivity adjustment (sensitivity adjustment due to temperature changes) enabled. Therefore, even after performing sensitivity adjustment with an external weight, automatic sensitivity adjustment using the internal weight may occur due to temperature changes. If you prioritize data continuity or prefer to always manage the balance using an external weight, select "Prohibit automatic sensitivity adjustment" in the settings of "9. Function Selection Switch and Initialization".

Operation method

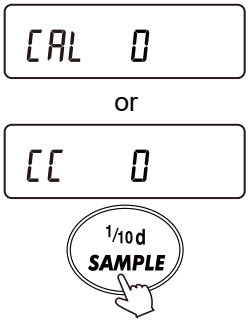
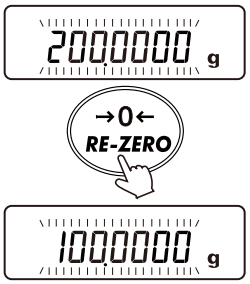
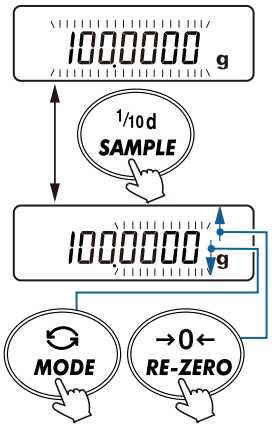
Step	Description	Display and key operations	Weighing operation
1	Be sure to warm up the balance with nothing on the weighing pan for at least an hour.		 Weighing pan
2	Press and hold the [CAL] key until [CALout] appears. Pressing and holding the key switches the display every 2 seconds. *1 Displayed only when "i" (Internal clock data) or "E" (External device clock data) is set for "inFo" (GLP output) under [dout] (Data output) in the function table ("10. Function Table"). (Refer to "8.7. Calibration test with an external weight" for details.) *2 Displayed only when "E" (Stores the weighing data/sensitivity adjustment history) is set for "dAtA" (Data memory) under [dout] (Data output) in the function table ("10. Function Table"). (Refer to "12.2.6. Storing and outputting sensitivity adjustment history" for details.)	 Press and hold (The display cycles every two seconds.) 	
3	When [CALout] is displayed, release your finger from the [CAL] key.	 Release	
4	The zero point is displayed during sensitivity adjustment. To change the weight value, refer to "8.4. Setting the value of the weight". If no change is needed, proceed to step 5.		

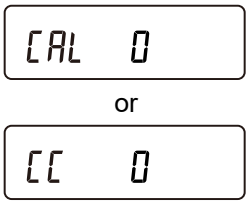
Step	Description	Display and key operations	Weighing operation
5	Make sure that nothing is on the weighing pan, and then press the [PRINT] key.	CAL 0 	
6	The balance measures the zero point. Do not apply vibration and the like to the balance.	CAL 0	
7	The weight value for sensitivity adjustment will be displayed. Place the external weight on the weighing pan and press the [PRINT] key to measure it.	200 	 Weight
8	Measure the weight. Do not apply vibration and the like to the balance.	200	
9	Remove the external weight from the weighing pan.	End	
10	If GLP output is set, the sensitivity adjustment record will be output or stored in the data memory after completion. (Refer to "10. Function Table" for "InFo" (GLP output) and "dAtA" (Data memory) under dout (Data output). For output examples, refer to "Output examples of sensitivity adjustment with an external weight".	GLP  GLP output End	
11	The balance automatically returns to weighing mode.	0.0000 g	
12	Place the external weight on the weighing pan again to check if it is within the parameter ±2 d.*3 If it is not within the range, start over from the first step of this procedure in the appropriate ambient conditions. *3 "d" represents scale division.	200.0000 g	

8.4. Setting the value of the weight

For a sensitivity adjustment or calibration test operation, the value of an external weight can be set.
Refer to "Applicable weights for calibration test/sensitivity adjustment" for weights that can be used.
The setting can be made according to the setting procedure after [CAL 0]/[CC 0] respectively is displayed in the procedure of "8.3. Sensitivity adjustment using an external weight" or "8.7. Calibration test with an external weight".

Operation method

Step	Description	Display and key operations
1	With [CAL 0] (Sensitivity adjustment using an external weight) or [CC 0] (Calibration test with an external weight) displayed, press the [SAMPLE] key.	
2	Use the [RE-ZERO] key to change the external weight (when all digits are flashing). Refer to "Applicable weights for calibration test/sensitivity adjustment" for available weights.	
3	Set the value of the weight with the following keys. [SAMPLE] key ····· Switches the display between "all digits blinking" (weight selection mode) and "last four digits blinking" (instrumental error adjustment mode). [RE-ZERO] key····· Changes the value of instrumental error. (+) (After the maximum value, it returns to the minimum value.) [MODE] key ····· Changes the value of instrumental error. (-) (After the maximum value, it returns to the minimum value.) Refer to "Caution for sensitivity adjustment/calibration test" for the range of instrumental error.	

Step	Description	Display and key operations
4	Press the [PRINT] key to save the updated weight value. The stored value is retained in the balance's nonvolatile memory even when the power is turned off. (To cancel without saving the weight value, press the [CAL] key.)	
5	The display will return to CAL 0 (Sensitivity adjustment using an external weight) or CC 0 (Calibration test with an external weight). Refer to step 5 and onwards of "8.3. Sensitivity adjustment using an external weight" or "8.7. Calibration test with an external weight".	

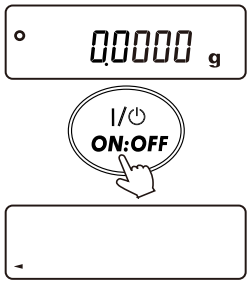
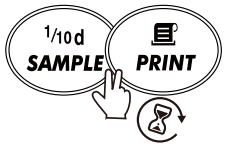
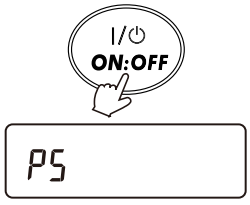
8.5. Correcting the internal weight value

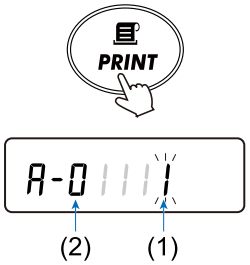
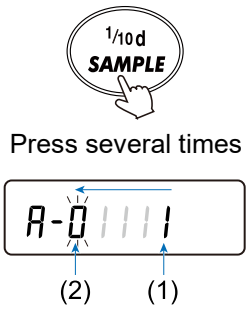
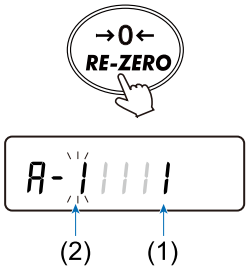
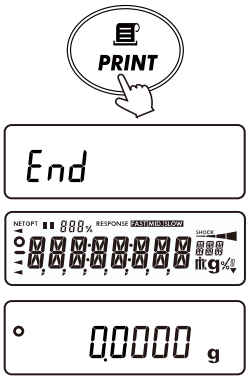
The internal weight value can be corrected using [CS in] in the function table.
This method corrects the value of the balance's internal weight for sensitivity adjustment based on an external weight.
Refer to "8.3. Sensitivity adjustment using an external weight" in advance, and perform the sensitivity adjustment. After the sensitivity adjustment with an external weight, the balance automatically loads and unloads the internal weight and corrects the internal weight value.
The corrected value is stored in nonvolatile memory even if the AC adapter is removed.

CAUTION

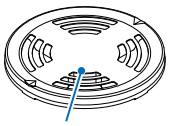
- ❑ Correction of the internal weight value cannot be performed with the factory settings.
  Refer to the following setting method or "9. Function Selection Switch and Initialization" to enable changes to the settings described in "9.1. Function selection switch" and to correct the internal weight value.

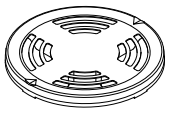
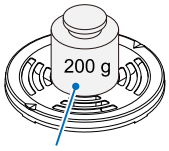
Setting method

Step	Description	Display and key operations
1	Press the [ON:OFF] key to turn the display off.	
2	While pressing and holding the [PRINT] and [SAMPLE] keys, press the [ON:OFF] key to show the display shown to the right.	 While pressing and holding + 

Step	Description	Display and key operations
3	Press the [PRINT] key to display the function selection switch. Function table switch (factory setting: 1) Internal weight value adjustment switch (factory setting: 0)	
4	Press the [SAMPLE] key several times until the switch (2) is blinking.	
5	Press the [RE-ZERO] key to change the switch (2) to "1".	
6	Press the [PRINT] key to save the setting. The balance will return to weighing mode.	

Operation method

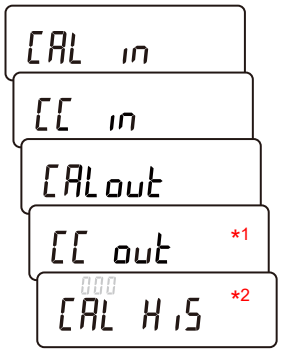
Step	Description	Display and key operations	Weighing operation
1	Correction of the internal weight value cannot be performed at factory settings. Refer to "8.5. Correcting the internal weight value" to enable changes to the settings described in "9.1. Function selection switch" and to correct the internal weight value.		
2	Perform the sensitivity adjustment in advance by referring to "8.3. Sensitivity adjustment using an external weight."		
3	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the function table menu ("10. Function Table").	0.00000 g  Press and hold (for 2 seconds) bASFnc	 Weighing pan
4	Press the [SAMPLE] key several times to display CS in. If CS in does not appear, follow the instructions in step 1 to set it.	 Press several times CS in	
5	Press the [PRINT] key to show the display shown to the right.	 Auto	
6	Ensure there is no external disturbance, then press the [PRINT] key. The displays shown to the right appear, and the correction of the internal weight value starts automatically.	 CAL. SET CAL . SET	
7	When the adjustment of the internal weight value is completed, the displays shown to the right appear, and the sensitivity adjustment with the adjusted internal weight starts automatically.	CAL. in CAL . in	

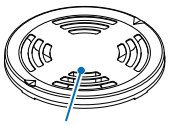
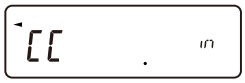
Step	Description	Display and key operations	Weighing operation
8	When the sensitivity adjustment is completed, the displays shown to the right appear.	End Ex SW	
9	To return to weighing mode, press the [CAL] key.	 0.0000 g	
10	Place the external weight used in step 2 again to confirm that the internal weight value has been correctly adjusted. If it is not correctly adjusted, repeat the process from step 2. (Ensure there are no external disturbances during the correction of the internal weight value.)	200.0000 g	 Weight

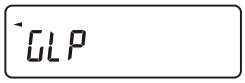
8.6. Calibration test with an internal weight

This function checks the accuracy of weighing using the internal weight. (Note that the result can be output, but sensitivity adjustment is not performed.)
This function is active only when either "i" (Internal clock data) or "2" (External device clock data) is set for "inFo" (GLP output) under doUt (Data output) in the function table ("10. Function Table").

Operation method

Step	Description	Display and key operations	Weighing operation
1	In advance, refer to "11.3. GLP output" and set either "i" (Internal clock data) or "2" (External device clock data) for "inFo" (GLP Output) under doUt (Data Output) in the function table ("10. Function Table").		
2	Be sure to warm up the balance with nothing on the weighing pan for at least an hour.	0.0000 g	 Weighing pan
3	Press and hold the [CAL] key (for 2 seconds) to display CC in. Pressing and holding the key switches the display every 2 seconds. *1 Displayed only when "i " (Internal clock data) or "2" (External device clock data) is set for "inFo" (GLP output) under doUt (Data output) in the function table ("10. Function Table"). (Refer to "8.7. Calibration test with an external weight" for details.) *2 Displayed only when "2" (Stores the weighing data/sensitivity adjustment history) is set for "dAtA" (Data memory) under doUt (Data output) in the function table ("10. Function Table"). (Refer to "12.2.6. Storing and outputting sensitivity adjustment history" for details.)	 Press and hold (The display cycles every two seconds.)  The display repeats in this cycle.	
4	When CC in is displayed, release your finger from the [CAL] key.	CC in  Release CC . in	
5	The balance checks the zero point. Do not apply vibration and the like to the balance.	CC . in	

<table>
<tr><th>Step</th><th>Description</th><th>Display and key operations</th><th>Weighing operation</th></tr>
<tr><td>6</td><td>The checked value of the zero point is displayed.</td><td> 
</td><td rowspan="3"> 
Weighing pan</td></tr>
<tr><td>7</td><td>The balance checks the full-scale point. Do not apply vibration and the like to the balance.</td><td>  </td></tr>
<tr><td>8</td><td>The checked value of the full-scale point is displayed. The reference values are shown below. When the displayed full-scale point value is within the normal range, it means that the sensitivity adjustment was performed correctly with the internal weight.
<table>
<tr><th>Model</th><th>Full-scale point</th><th>Normal range</th></tr>
<tr><td>BH-225
BH-225D</td><td>200.00000 g</td><td>±0.20 mg</td></tr>
<tr><td>BH-124
BH-224
BH-324</td><td>200.0000 g</td><td>±0.2 mg</td></tr>
</table></td><td> 
</td></tr>
<tr><td>9</td><td>If GLP output is set, the calibration test record will be output after completion.
Refer to "Output examples of calibration test with the internal weight" for the output results.
When using data memory storage, the results will be stored in the balance.
(Refer to "12.2.6. Storing and outputting sensitivity adjustment history" for details.)</td><td> 

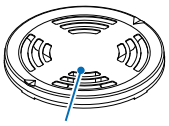
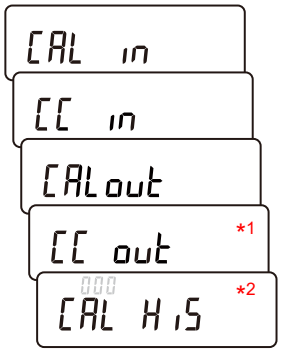
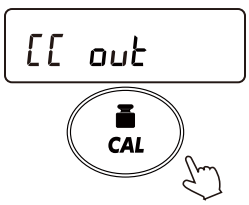
 

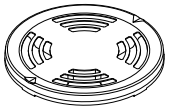
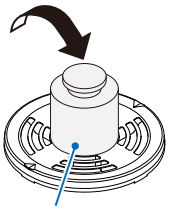
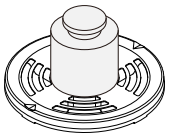
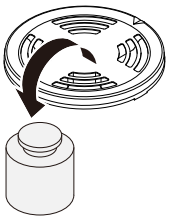
 
GLP output
 
</td><td></td></tr>
<tr><td>10</td><td>The balance automatically returns to weighing mode.</td><td> 
</td><td></td></tr>
</table>

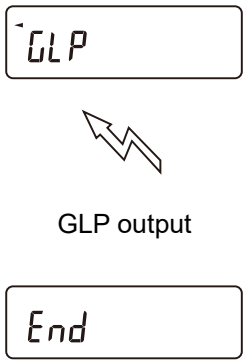
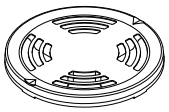
8.7. Calibration test with an external weight

Checks the accuracy of weighing using an external weight and outputs the result.
(Note that sensitivity adjustment is not performed.)
This function is active only when "i" (Internal clock data) or "E" (External device clock data) is set for "InFo" (GLP output) under [doUt] (Data output) in the function table ("10. Function Table").

Operation method

Step	Description	Display and key operations	Weighing operation
1	In advance, refer to "11.3. GLP output" and set "i" (Internal clock data) or "E" (External device clock data) for "InFo" (GLP output) under [doUt] (Data output) in the function table ("10. Function Table").		
2	Be sure to warm up the balance with nothing on the weighing pan for at least an hour.	0.00000 g	 Weighing pan
3	Press and hold the [CAL] key until [CC out] appears. Pressing and holding the key switches the display every 2 seconds. *1 Displayed only when "i" (Internal clock data) or "E" (External device clock data) is set for "InFo" (GLP output) under [doUt] (Data output) in the function table ("10. Function Table"). (Refer to "8.7. Calibration test with an external weight" for details.) *2 Displayed only when "E" (Stores the weighing data/sensitivity adjustment history) is set for "dAtA" (Data memory) under [doUt] (Data output) in the function table ("10. Function Table"). (Refer to "12.2.6. Storing and outputting sensitivity adjustment history" for details.)	 Press and hold (The display cycles every two seconds.)  The display repeats in this cycle.	
4	When [CC out] is displayed, release your finger from the key.		

Step	Description	Display and key operations	Weighing operation
5	The zero point is displayed during calibration test. If a change to the weight value is needed, refer to "8.4. Setting the value of the weight". If no change is needed, proceed to step 6.	CC 0	
6	Make sure that nothing is on the weighing pan and press the [PRINT] key.	CC 0 	
7	The balance measures the zero point. Do not apply vibration and the like to the balance.	CC 0	
8	The measured value of the zero point is displayed for a few seconds.	0.0000 g	
9	Place the external weight on the weighing pan and press the [PRINT] key to measure it.	200 	 Weight
10	Measure the weight. Do not apply vibration and the like to the balance.	200	
11	The measured value of the external weight is displayed for a few seconds.	200.0000 g	
12	Remove the external weight from the weighing pan.	End	

Step	Description	Display and key operations	Weighing operation
13	The calibration test record will be output after completion. Refer to "Output examples of calibration test with an external weight" for the output results. When using data memory storage, the results will be stored in the balance. (Refer to "12.2.6. Storing and outputting sensitivity adjustment history" for details.)		
14	The balance automatically returns to weighing mode.		

9. Function Selection Switch and Initialization

9.1. Function selection switch

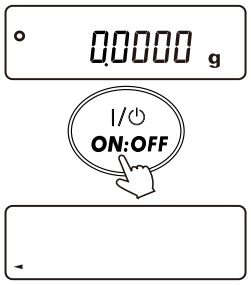
The balance stores data that must not be changed unintentionally (such as adjustment data for accurate weighing, data for adapting to the usage environment, data to control the communications interface, etc.). In order to protect such data, "Function selection switch" is provided and either "prohibit changes" or "allow changes/use" can be selected.

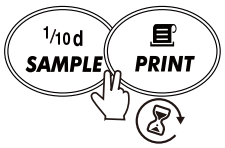
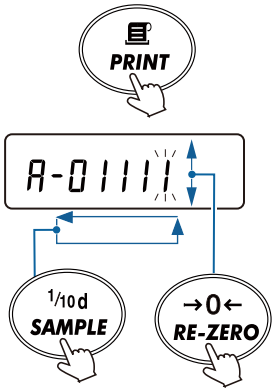
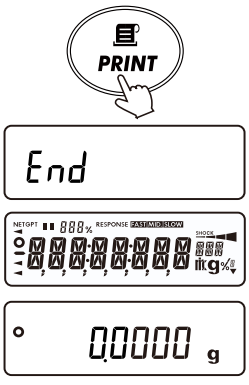
When "prohibit changes" is set, inadvertent data change can be prevented because the function cannot be activated.

The "function selection switch" involves the following functions:

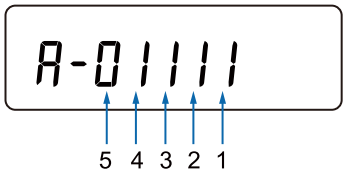
Item	Function
Function selection switch	- Function table - Sensitivity adjustment using the internal weight - Sensitivity adjustment using an external weight - Automatic sensitivity adjustment - Internal weight value correction

Setting method

Step	Description	Display and key operations
1	Press the [ON:OFF] key to turn the display off.	

Step	Description	Display and key operations
2	Press and hold the [PRINT] and [SAMPLE] keys, then press the [ON:OFF] key to show the display shown to the right. **CAUTION** ❑ If "1" (ON) is set for "PW" (Password function) under PASSwd (Password lock) in the function table ("10. Function Table"), the administrator (ADMIN) will be prompted to enter a password before the display shown to the right appears.	 While pressing and holding +  
3	Press the [PRINT] key. Select the function using the following keys. [SAMPLE] key ····· Selects the blinking digit (switch). [RE-ZERO] key ····· Selects a parameter for the blinking switch setting. 0: Prohibit changes/Prohibit use 1: Allow changes/Allow use	
4	Press the [PRINT] key to save the function selection switch settings. The balance will return to weighing mode. (To cancel the process, press the [CAL] key to display the next item CLr ALL. To return to weighing mode, press the [CAL] key again.)	

Function selection switch



No.	Name	Parameter	Description
1	Function table	0	Prohibit changes to the function table.
		■ 1	Allow changes to the function table.
2	Sensitivity adjustment using the internal weight	0	Prohibit sensitivity adjustment using the internal weight.*1
		■ 1	Allow sensitivity adjustment using the internal weight.
3	Sensitivity adjustment using an external weight	0	Prohibit sensitivity adjustment using an external weight.*1
		■ 1	Allow sensitivity adjustment using an external weight.
4	Automatic Sensitivity Adjustment	0	Prohibit automatic sensitivity adjustment.
		■ 1	Allow automatic sensitivity adjustment.
5	Internal weight value correction	■ 0	Prohibit internal weight value correction
		1	Allow internal weight value correction

■ Factory setting

*1 If "PW" (Password function) is set to "1", the logged-in Administrator (ADMIN) can use it. Logged-in User (USER) or Guest (GUEST) cannot use it.
(Refer to "16. Password Function").

9.2. Initialization

This function returns the parameters of the balance to the factory settings.

9.2.1. Initialization (all items)

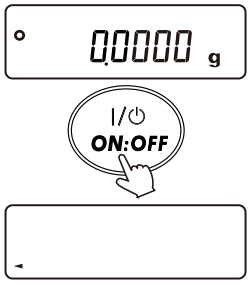
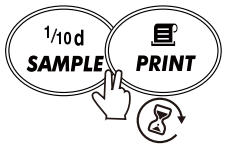
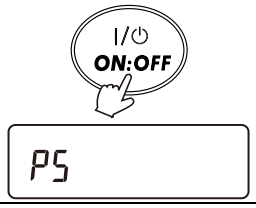
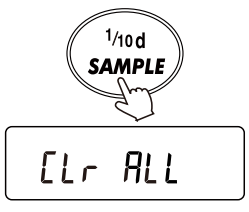
The data to be initialized are as follows.

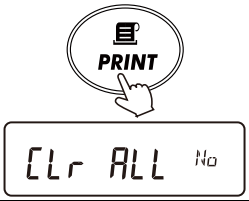
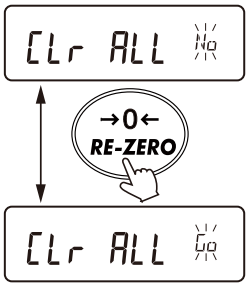
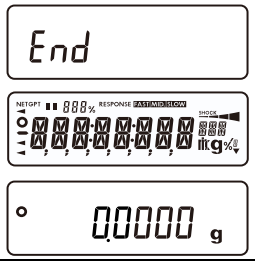
- ❑ Sensitivity adjustment data
- ❑ Function table (excluding password function)
- ❑ Unit weight value (counting mode), 100% reference mass value (percent mode)
- ❑ External weight value
- ❑ Function selection switch settings
- ❑ Correction value for the internal weight

CAUTION

- ❑ After initialization, be sure to perform sensitivity adjustment.
- ❑ After initialization, the order of the year, month, and day may change.

Setting method

Step	Description	Display and key operations
1	Press the [ON:OFF] key to turn the display off.	
2	Press and hold the [PRINT] and [SAMPLE] keys, then press the [ON:OFF] key to show the display shown to the right.	 While pressing and holding + 
3	Press the [SAMPLE] key to show the display shown to the right.	

Step	Description	Display and key operations
4	Press the [PRINT] key. (To cancel, press the [CAL] key.)	
5	Use the [RE-ZERO] key to switch between "No" and "Go".	
6	Press the [PRINT] key while "Go" is blinking to perform initialization.	
7	Upon completion, the balance will automatically return to weighing mode.	

9.2.2. Initialization (function table only)

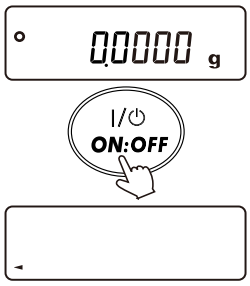
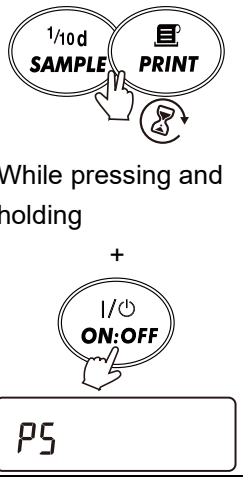
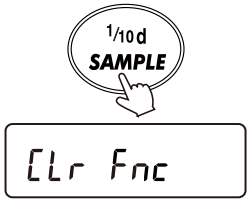
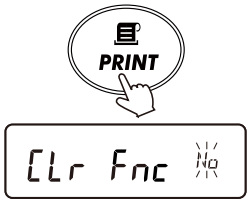
The data to be initialized are as follows.

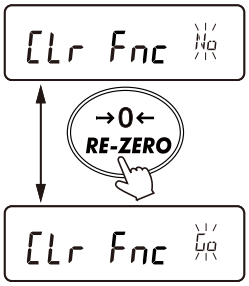
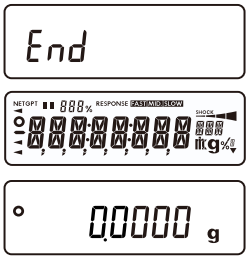
- ❑ Function table (excluding password function)
- ❑ Function selection switch settings

CAUTION

- ❑ After initialization, the order of the year, month, and day may change.

Setting method

Step	Description	Display and key operations
1	Press the [ON:OFF] key to turn the display off.	
2	Press and hold the [PRINT] and [SAMPLE] keys, then press the [ON:OFF] key to show the display shown to the right.	
3	Press the [SAMPLE] key twice to show the display shown to the right.	
4	Press the [PRINT] key. (To cancel, press the [CAL] key.)	

Step	Description	Display and key operations
5	Use the [RE-ZERO] key to switch between "No"/"Go".	
6	Press the [PRINT] key while Go is blinking to perform initialization.	
7	Upon completion, the balance will automatically return to weighing mode.	

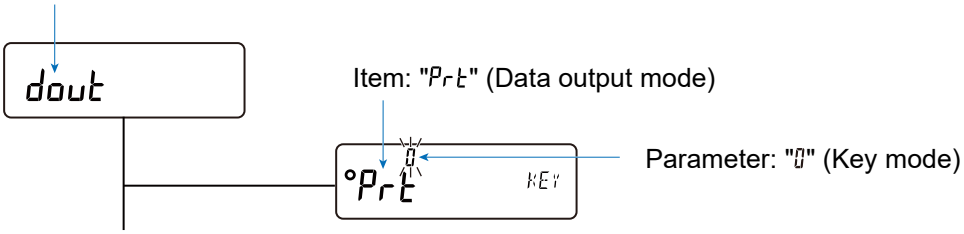
10. Function Table

In the function table, you can set and change the operational functions and communication settings of the balance.

Set parameters are retained in nonvolatile memory even when the AC adapter is disconnected.

The menu structure of the function table consists of two layers: classes and items. Each item has one parameter assigned to it. The function table enables the last parameter displayed for each item. Pressing the [PRINT] key will enable the updated parameter in the balance operation.

(Example) Class: dout (Data output)



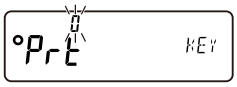
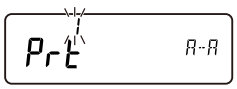
10.1. Method for setting the function table

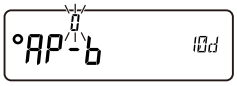
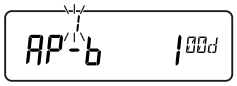
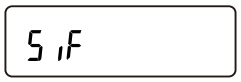
Display and key operation for the function table

°	The "°" indicator is displayed with the currently enabled parameter.
CAL	In item selecting mode, cancels the setting and proceeds to the next class. In class selecting mode, quits function table setting and returns to weighing mode.
MODE	Selects a class/item. In item selecting mode, returns to the previous class. In item selecting mode, proceeds to the next class.
1/10d SAMPLE	In weighing mode, pressing and holding this key (for 2 seconds) activates the function table menu. (The balance enters the class selection mode.) Selects a class/item. In class selecting mode, proceeds to the next class. In item selecting mode, proceeds to the next item.
PRINT	In class selecting mode, activates item selecting mode. Stores the parameter and proceeds to the next class.
→0← RE-ZERO	Changes the parameter in item selecting mode. Activates the parameter last displayed.

Setting method

Example of setting "1" (Auto print mode A) for "PrT" (Data output mode) and "0" (100 d) for "AP-b" (Auto print band width).

Step	Description	Class	Item
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	0.00000 g  Press and hold (for 2 seconds) bASFnc "Environment, Display"	
2	Press the [SAMPLE] key several times to select the class.	 Press several times dout "Data output"	
3	Press the [PRINT] key to enter the selected class and display the items.		 "Data output mode" "Key mode"
4	Press the [RE-ZERO] key to change the parameter of the selected item.		  "Data output mode" "Auto print mode A"

Step	Description	Class	Item
5	Press the [SAMPLE] key several times to select the item.		  "Auto print band width" "10 d"
6	To change additional item(s) within the same class, repeat steps 4 and 5. To complete the setting changes in the class, proceed to step 7.		  "Auto print band width" "100 d"
7	To store the setting changes, press the [PRINT] key. The display shown to the right will appear, followed by the next class. (To cancel the setting changes, press the [CAL] key to display the next class. The parameters will remain unchanged.)	 "Serial interface"	 
8	To change settings in a different class, start from step 2. To complete the setting changes and return to weighing mode, press the [CAL] key.	 	

10.2. Function table list

Class	Item	Parameter	Description	
bASFnc Environment, Display [00]	Cond Response characteristic	0	Fast response, sensitive value	Can also be changed by manual environment setting.
		■ 1	⇕	
		2	Slow response, stable value	
	St-b Stability band width	0	Stricter judgment (±1 d)	If the range within which the weighing display fluctuates over a certain period is less than the set parameter, the value is judged stable.
		■ 1	⇕	
		2	Less strict judgement (±3 d)	
	trc Zero tracking	0	Disabled	Keeps zero display by tracking zero drift.
		■ 1	Normal	
		2	Slightly strong	
		3	Strong	
	SPd Display refresh rate	■ 0	Approx. 5 times per second (5.2 Hz)	Display refresh rate
		1	Approx. 10 times per second (10.4 Hz)	
	Pnt Decimal separator	■ 0	Period (.)	Sets the symbol used as a decimal separator for display and output.
		1	Comma (,)	
	P-on Auto display-ON	■ 0	Disabled	Turns on the weighing mode display when the AC adapter is connected.
		1	ON	
	P-oFF Auto display-OFF	■ 0	Disabled	Turns off the display after 10 minutes of inactivity.
		1	Enabled (10 minutes)	
	bEEP Buzzer	0	Disabled	The buzzer sounds when you operate the keys and the like.
		■ 1	ON	
	diSP-LEd Backlight brightness	0 to 9	10 % to 100 %	
		■ 5	60 % (factory default)	
	LV-LEd Bubble spirit level LED	0	Disabled	LED for the bubble spirit level
		■ 1	ON	
	iSd Impact level display	0	Disabled	Impact level display
		■ 1	ON	

■ Factory setting

"d" represents scale division.

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

Class	Item	Parameter	Description	
CL AdJ Clock [01]		Refer to "10.4. Clock and calendar function".		Confirms and sets the time and date. The time and date are added to output data.
dout Data output [05]	Prt Data output mode	■ 0	Key mode	Outputs data with the [PRINT] key when the weighing value is stable.
		1	Auto print mode A: (Reference = zero)	Outputs data when the weighing value is stable and exceeds the range from the zero point set for "AP-P" and "AP-b" under dout.
		2	Auto print mode B: (Reference = the latest stable value)	Outputs data when the weighing value is stable and exceeds the range from the latest stable value set for "AP-P" and "AP-b" under dout.
		3	Stream mode	Outputs data at the specified display refresh rate.
		4	Key mode B (Immediate output)	Outputs data with the [PRINT] key regardless of whether the weighing value is stable or not.
		5	Key mode C (Output when stable)	If the weighing value is stable, outputs data immediately with the [PRINT] key. If the weighing value is not stable, outputs data once it has stabilized.
		6	Interval output mode	Outputs data periodically as set for "int" under dout.
	AP-P Auto print polarity	■ 0	Positive only	If greater than the reference.
		1	Negative only	If less than the reference.
		2	Bi-polar	Regardless of whether greater or less than the reference.
	AP-b Auto print band width	■ 0	10 d	Select difference from the reference.
		1	100 d	
		2	1000 d	

■ Factory setting

"d" represents scale division.

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

Class	Item	Parameter		Description	
dout Data output (continued) [05]	dAtA Data memory	■	0	Disabled	Refer to "12. Data Memory".
			1	Stores the unit weight.	
			2	Stores the weighing data/sensitivity adjustment history.	
	int Interval time		0	Display refresh rate	Used when "6" is set for "Prt" under dout.
		■	1	Every 2 seconds	
			2	Every 5 seconds	
			3	Every 10 seconds	
			4	Every 30 seconds	
			5	Every 1 minute	
			6	Every 2 minutes	
			7	Every 5 minutes	
			8	Every 10 minutes	
	d-no Data number	■	0	No output	Used when "2" is set for "dAtA" under dout.
			1	Outputs data number	
	S-td Time/date output	■	0	No output	Refer to "10.4. Clock and calendar function" for the settings of the output time and date.
			1	Outputs the time	
			2	Outputs the date	
			3	Time and date output	
	S- id ID number output	■	0	No output	Select the output of the ID number during data output.
			1	Outputs the ID number	
	PUSE Data output pause	■	0	Disabled	Sets a pause until data output.
			1	ON (Adds 1.6 seconds)	
	At-F Auto feed	■	0	Disabled	Sets a line feed after data output.
			1	ON (Adds one line)	
	inFo GLP output	■	0	Disabled	Refer to "11.3. GLP output".
			1	ON (Outputs with the internal clock)	
			2	ON (Outputs with an external device clock)	
	Ar-d Auto re-zero after data output	■	0	Disabled	Function to automatically set to zero after data output.
			1	ON	
	NGt Net/gross/tare output	■	0	OFF (Outputs net weight only)	Refer to "13. Net/Gross/Tare Function".
			1	Outputs net and tare weights.	
			2	Outputs net and gross weights.	
			3	Outputs net, gross, and tare weights.	

■ Factory setting

"d" represents scale division.

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

Class	Item	Parameter	Description	
SIF Serial interface [06]	bPS Baud rate	0	600 bps	
		1	1200 bps	
		■ 2	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	
		6	38400 bps	
	btPr Data bit, parity bit	■ 0	7 bits, even	
		1	7 bits, odd	
		2	8 bits, none	
	CrLF Terminator	■ 0	CR LF	CR: Carriage return (ASCII 0Dh) LF: Line feed (ASCII 0Ah)
		1	CR	
	tYPE Data format	■ 0	A&D standard format	Refer to "22.2. Weighing data format".
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	NU2 format	
		6	CSV format	
		7	TAB format	
		8	UFC format	
	t-UP Command timeout	0	No limit	The wait time to receive a command.
		■ 1	Limits to one second	
	ErCd AK, Error code	■ 0	Disabled	AK: Acknowledgement (ASCII 06h)
		1	ON	

■ Factory setting

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

Class	Item	Parameter	Description	
USB USB interface [07]	UFnc USB function mode	■ 0	Quick USB	Refer to "21.1. Quick USB mode".
		1	Bidirectional USB virtual COM	Refer to "21.2. Virtual COM mode".
	U-tP USB data format	■ 0	A&D standard format	Refer to "22.2. Weighing data format".
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	NU2 format	
		6	CSV format	
		7	TAB format	
		8	UFC format	
MW Fnc Minimum weight alert function 【11】	MW-CP Minimum weight comparison	■ 0	No comparison	Disables the minimum weight alert function.
		1	Enables comparison	Excluding near zero.
		2	Enables comparison	Including near zero.
	MW Minimum weight input	Refer to "14. Minimum Weight Alert Function".		
	Min out Data output when minimum weight is not reached.	0	Disabled	Refer to "14. Minimum Weight Alert Function".
		■ 1	ON	
Unit Unit [12]		Refer to "10.5. Explanation for unit".		
dS Fnc Density measurement function 【13】	Ldin Liquid density input	■ 0	Density measurement mode	Displayed only when the density mode is registered in unit registration. Refer to "15. Density (Specific Gravity) Measurement".
		1	Density input	
	dS Density measurement mode	■ 0	Solids	
		1	Liquids	

■ Factory setting

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

Class	Item	Parameter	Description	
id ID number setting [15]		Refer to "11.2. Setting the ID number".		
PASSwd Password lock [16]	PW Password function	■ 0	Disabled	Refer to "16. Password Function".
		1	ON	
	ADMIN		PASS No. (Password No.)	Administrator password input
			PS (Prohibition selection)	Function selection as Administrator Shared with the settings described in "9.1. Function selection switch".
	USER 01 to USER 10		PASS No. (Password No.)	Password input for User 1 to User 10
			PW-PS (Password prohibition selection)	Function selection for User 1 to User 10
Auto CAL Automatic Sensitivity Adjustment 【17】	CFnc Sensitivity adjustment mode	■ 0	Temperature measurement	Refer to Automatic Sensitivity Adjustment".
		1	Set time	
		2	Interval time	
	CtiME1 Set time 1	Refer to "8.1. Automatic sensitivity adjustment".		
	CtiME2 Set time 2			
	C int Sensitivity adjustment intervals	Refer to "Correspondence table for automatic sensitivity adjustment intervals".		
CS in Internal weight correction [18]		Auto (Auto)	Automatic input	Refer to "8.5. Correcting the internal weight value".

■ Factory setting

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

Class	Item	Parameter	Description	
Ex SW External switch [21]	SW External switch function selection	■ 0	[RE-ZERO]/[PRINT] key*	* The AX-SW137-PRINT (sold separately) functions as the [PRINT] key of the balance when connected. The AX-SW137-REZERO (sold separately) functions as the [RE-ZERO] key on the balance when connected.
		1	Door operation (open/close)	
iR-S IR Sensors [22]	iR IR Sensors	0	Disabled	ON/OFF switching of left and right IR sensors
		■ 1	ON	
	SENSE Sensitivity Adjustment	0	High sensitivity	Sensitivity adjustment of left and right IR sensors
		■ 1	Medium sensitivity	
		2	Low sensitivity	
A-door Auto Doors [23]	oPEN Opening position	0	Partially open	Refer to "3.2.2. Auto doors".
		1	Fully open	
		■ 2	Last position it was opened to	
	doorTEST Door test	Refer to "3.2.2. Auto doors".		

■ Factory setting

The number in [ ] is the classification number.

It is output as an identifier when outputting function table information in bulk.

Refer to "10.2.1. Outputting the function table information".

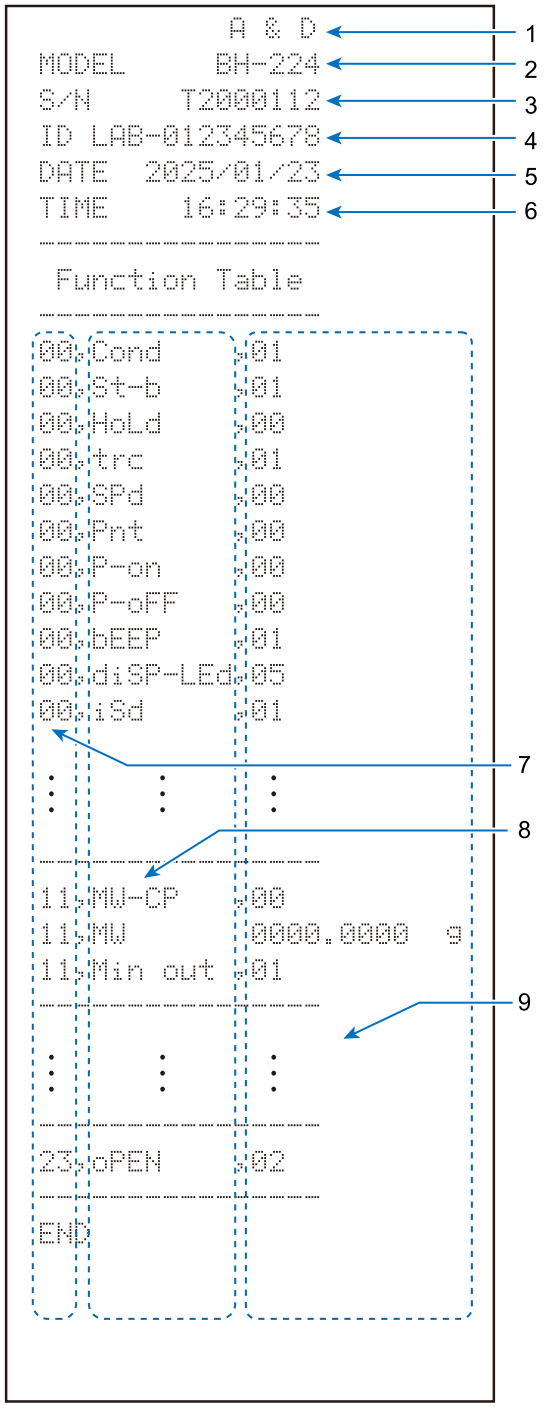
10.2.1. Outputting the function table information

In the function table, you can set the balance's operation to that appropriate for how it is used.
In the menu structure of the function table, items are included in each class, and a parameter is stored for each item. The function table information can be output in bulk by the following operation so that the settings when the balance is used can be recorded.

Bulk output of the function table information

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	0.0000 g  Press and hold (for 2 seconds) bASFnc
2	Press and hold the [PRINT] key (for 2 seconds). The display shown to the right will appear, and the current function table information will be output in bulk.	 Press and hold (for 2 seconds) -LiSt-  Data output End bASFnc

Output example (AD-8127, dump print mode)



1 Manufacturer
2 Model
3 Serial number
4 ID
5 Date
6 Time
7 Classification number (2 characters)
8 Item (8 characters)
9 Parameter (2 or 12 characters)

5, 6: Clock of the balance

7, 8, 9: Separated by commas.
For details on the class number, item, and parameter, refer to "10.2. Function table list" in "10. Function Table".

Output example 1. Outputting the function table information to a printer

Use an AD-8127 multi-functional compact printer or AD-8129TH compact thermal printer.

Step	Description
1	Connect the balance and the printer. When using an AD-8127 or AD-8129TH, set the print mode to "DUMP". For details on the settings and print modes, refer to the instruction manual of the printer. For details on connecting the balance and the printer, refer to "19. Connection with Peripheral Devices".
2	Ensure that communication between the balance and the printer is possible. Then, perform the output operation according to the previous section, "Bulk output of the function table information".

Output example 2. Outputting the function table information to a PC

For details on USB settings and WinCT, refer to "21. Connecting to a PC" or the separate WinCT Instruction Manual available on the A&D website (https://www.aandd.jp).

Step	Description
1	Connect the balance and the PC with the supplied USB cable or RS-232C cable (sold separately) CAUTION ❑ Note. To output via USB, Virtual COM mode must be used. It is not possible to output with Quick USB mode.
2	Install WinCT software on the PC. WinCT can be downloaded from the A&D website (https://www.aandd.jp).
3	Start RSCom and match the communication settings such as COM port and baud rate with the balance. Clicking the [Start] button enables communication.
4	Ensure that communication between the balance and the PC is possible. Then, perform the output operation according to the previous section, "Bulk output of the function table information".

10.3. Explanation for "Environment, Display"

Cond (Condition) details

Cond= 0	Sensitive response to fluctuation of a weighing value For powder or liquid target weighing, weighing a very light sample, or when work efficiency is required rather than display stability, set the parameter to be a small value. When set, FAST is displayed.
	
Cond= 2	Slow response to fluctuation of a weighing value. To prevent the weighing value from drifting due to vibration or drafts, set the parameter to be a high value. When set, SLOW is displayed.

St-b (Stability band width) details

This item is to control the width to regard a weighing value as a stable value. When the fluctuation range of weighing value within a certain period of time is less than the parameter, the balance displays the stabilization indicator and the data can be output. This setting influences "auto print mode". The readability being displayed is 1 d.

Example: For the BH-225, if 0.0001 g display is selected with the [SAMPLE] key, 0.0001 g is 1 d.

St-b= 0	±1 d	The stabilization indicator will not display if the value is not stable enough, and it will disappear if there are even slight fluctuations in the weighing value. To perform weighing with strict judgment, set the parameter to a low value.
	±2 d	
St-b= 2	±3 d	The stabilization indicator becomes less responsive to slight fluctuations in the weighing value. To prevent the weighing value from drifting due to vibration or drafts, set the parameter to be a high value.

trc (Zero tracking) details

This function tracks zero point drift caused by changes in the environment and stabilizes the zero point.
The degree of tracking can be selected from three levels.
If zero is not stable, increase the parameter.
To check weighing values that are only a few "d" from the zero point, disable zero tracking.
"d" represents scale division.

trc= 0	Disabled	Tracking function is not used.
trc= 1	±1 d/1 second	Normal zero tracking is used.
trc= 2	±1.5 d/0.5 seconds	Strong zero tracking is used.
trc= 3	±1.5 d/0.2 seconds	Very strong zero tracking is used.

SPd (Display refresh rate) details

The periodic time to refresh the display.

This timing also applies to data output. This parameter influences "baud rate", "data output pause" and the data output rate of "stream mode". It is automatically selected based on changes in weighing speed.

Pnt (Decimal separator) details

A symbol used as a decimal separator (point/comma) can be selected.

P-on (Auto power ON) details

When the AC adapter is plugged in, the display is automatically turned on without pressing the [ON:OFF] key and the balance enters weighing mode. This function is used when the balance is built into an automated system. For accurate weighing, ensure the balance is powered on for at least one hour before use.

P-oFF (Auto power OFF) details

This is a function to automatically turn off only the display when there is no operation made for a certain amount of time (approximately 10 minutes) while the power is on.

bEEP (Buzzer) details

Select ON/OFF for the built-in buzzer that sounds when a key is operated or the state changes.

diSP-LEd (Backlight brightness) details

Select the brightness of the backlight of the LCD display.

LV-LEd (Bubble spirit level LED) details

Select the on/off setting for the LED that illuminates the bubble spirit level.

iSd (Impact level display) details

Enable/disable the impact shock detection.

Even if the impact shock detection function is turned off, a record is kept in the balance when there is a shock impact.

10.4. Clock and calendar function

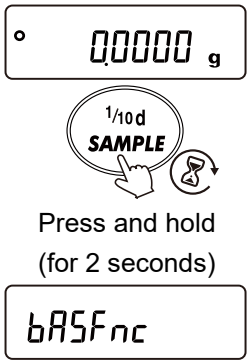
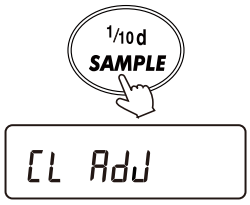
The balance is equipped with a clock and calendar function. In this mode, you can check and set the date and time. To add the time and date to the output of the weighing value, set "1" (Add time), "2" (Add date), or "3" (Add Time and Date) for "S-td" (Add Time/Date) under [dout] (Data output) in the function table ("10. Function Table"). To add the time and date to "GLP report", "title block", and "end block", set "1" (Internal clock data) or "2" (External device clock data) for "inFo" (GLP output) under [dout].

CAUTION

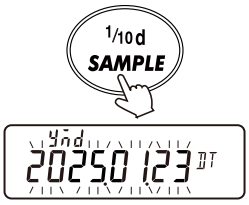
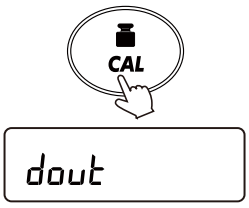
- ❑ Do not enter invalid values such as a non-existing date when setting the time and date.
  The balance displays [rtc PF] when the clock backup battery has been depleted.
  Battery replacement will be repaired by your local A&D dealer. Even if the backup battery of the clock runs out, it does not affect the functions other than the clock and calendar function. The clock and calendar function works normally if the balance is powered with the AC adapter.
  Press any key to set the time and date.

The time and date can be checked/changed by the following operations.

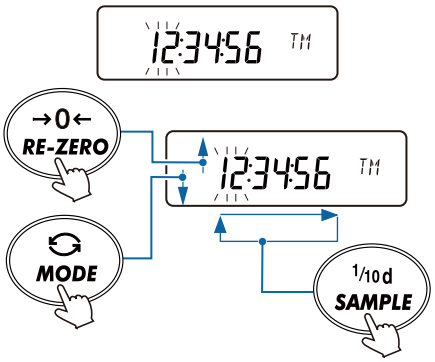
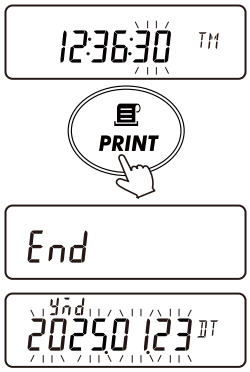
Entering time/date confirmation mode

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key to show the display shown to the right.	
3	Press the [PRINT] key to check the time.	

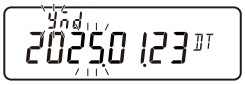
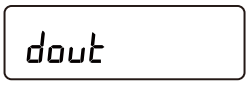
Checking the time

Step	Description	Display and key operations
4	The current time is displayed. (All digits blinking) Use the following key operations as needed:	
	To change the time, press the [RE-ZERO] key. Proceed to step 5, "Setting the time".	 To "Setting the time"
	To check the date, press the [SAMPLE] key. Proceed to step 7, "Checking the date".	 To "Checking the date"
	To complete the setting, press the [CAL] key. Proceed to step 10, "Completing check and settings".	 To "Completing check and settings"

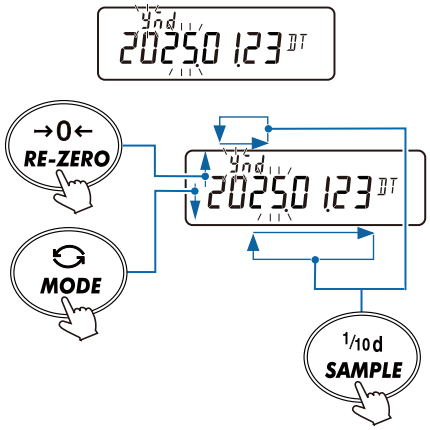
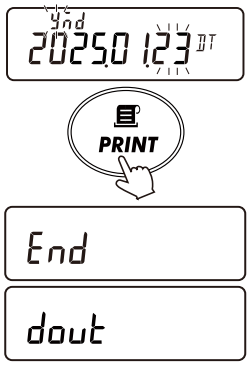
Setting the time

Step	Description	Display and key operations
5	Set the time using the following keys. (24-hour format) [RE-ZERO] key ····· Changes the value of the blinking digit. (+1) [MODE] key ····· Changes the value of the blinking digit. (-1) [SAMPLE] key ····· Selects the digit to blink.	
6	Press the [PRINT] key to save the updated time. (To cancel, press the [CAL] key.) Proceed to step 7, "Checking the date".	 To "Checking the date"

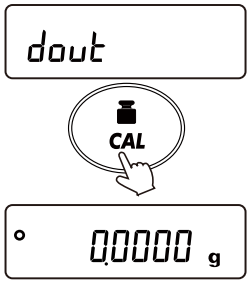
Checking the date

Step	Description	Display and key operations
7	The current date is displayed. (All digits blinking) Use the following key operations to proceed:	
	To change the order of year [last two digits] (y), month (n) and day (d), press the [MODE] key. The date will be output in the specified order.	  The display repeats in this cycle.
	To change the date, press the [RE-ZERO] key. Proceed to step 8, "Setting the time".	  To "Setting the date"
	To confirm the time again, press the [SAMPLE] key Proceed to step 4, "Setting the time".	  To "Setting the time"
	To complete the setting, press the [CAL] key. Proceed to step 10, "Completing check and settings".	  To "Completing check and settings"

Setting the date

Step	Description	Display and key operations
8	Set the date using the following keys. (The year is set with the last 2 digits of the year as per Western calendar) [RE-ZERO] key ····· Changes the value of the blinking digit. (+1) [MODE] key ····· Changes the value of the blinking digit. (-1) [SAMPLE] key ····· Selects the digit to blink.	
9	Press the [PRINT] key to save the updated time. (To cancel, press the [CAL] key.) Proceed to step 10, "Completing check and settings".	 To "Completing check and settings"

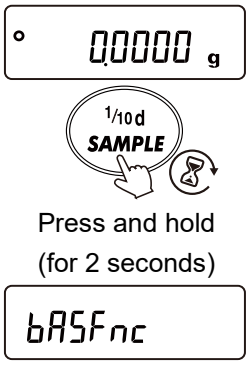
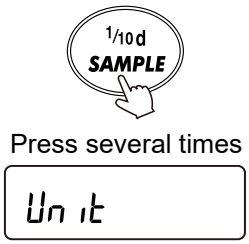
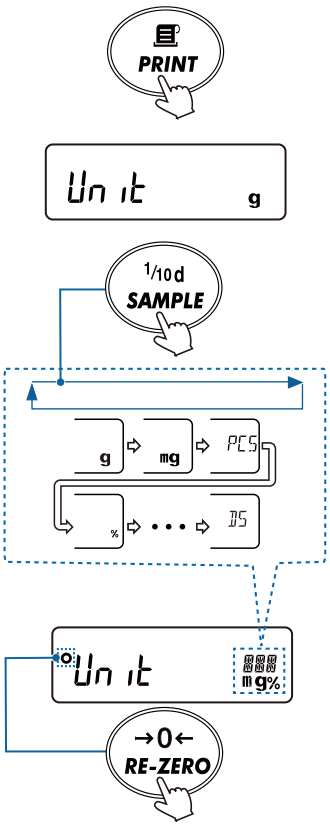
Completing check and settings

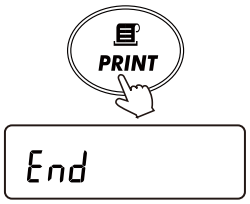
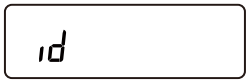
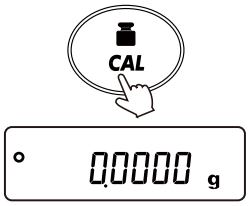
Step	Description	Display and key operations
10	The next item in the function table, [CP Fnc], will be displayed. Press the [CAL] key to return to weighing mode.	

10.5. Explanation for unit

To configure [Unit] (Unit) in the function table ("10. Function Table"), use the following procedure. This setting is used when changing the order of units or hiding unnecessary units.
Units (modes) can be selected using the [MODE] key in weighing mode. Stored units are retained in nonvolatile memory even when the AC adapter is disconnected, and they are valid until rewritten.

Setting procedure

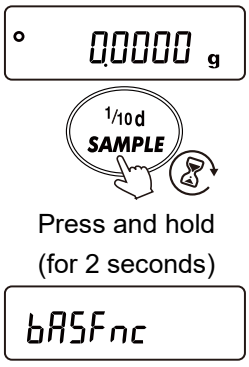
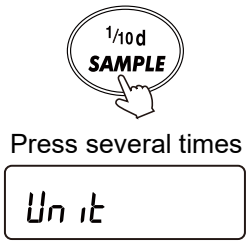
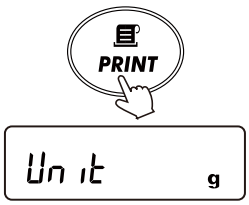
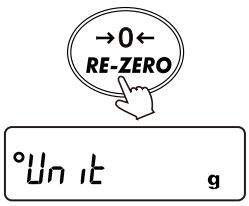
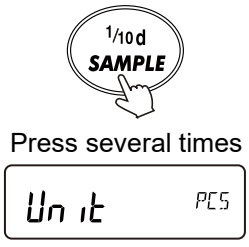
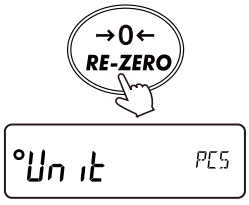
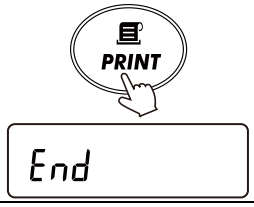
Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key. Use the following keys to specify the desired units to be displayed in the specified order. [SAMPLE] key ····· Cycles through the units. [RE-ZERO] key ····· Displays "O" (the stabilization indicator) for the unit to be selected. When the unit is selected and displayed with the indicator, pressing the key turns off the indicator.	

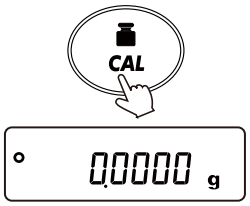
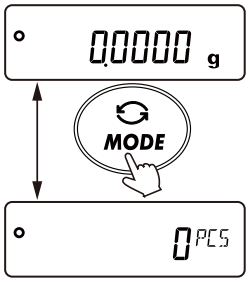
Step	Description	Display and key operations
4	Press the [PRINT] key to store the setting.	
5	The next class in the function table is displayed.	
6	Press the [CAL] key to return to weighing mode. The unit specified first will be displayed in weighing mode.	

Tips

- ❑ The first unit stored in step 4 above will be the unit when the power is turned on.

Example: Registering units in the order of "g" (grams) → "PCS" (counting mode)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key.	
4	Press the [RE-ZERO] key to specify the "g" unit and display "o" (the stability indicator).	
5	Press the [SAMPLE] key several times until the display shown to the right appears.	
6	Press the [RE-ZERO] key to specify the "PCS" unit and display "o" (the stability indicator).	
7	Press the [PRINT] key to register the specified unit.	

Step	Description	Display and key operations
8	The next class in the function table is displayed.	
9	To return to weighing mode, press the [CAL] key. The "**g**" unit specified first will be displayed in weighing mode.	
10	Each time the [MODE] key is pressed, the units will switch in the order of "**g**" →"PCS".	

11. GLP Report and ID Number

11.1. Main objectives

By setting "i" (ON: Balance clock data) or "C" (On: External device clock data) for "InFo" (GLP output) under [dout] (Data output) in the function table ("10. Function Table"), you can output data compliant with GLP/GMP from the balance to a printer or PC.

GLP: Good Laboratory Practice, standards for implementing safety tests for drugs and medicines.
GMP: Good Manufacturing Practice, rules for manufacturing and quality control.

The GLP/GMP compliant report includes the balance manufacturer (A&D), model name, serial number, ID number, date, time, and space for signature. For a sensitivity adjustment or calibration test, the result and the weight used are also included.
The balance can output the following GLP/GMP compliant reports via the RS-232C or USB.

- Sensitivity adjustment report
  (Output for sensitivity adjustment using the internal weight, sensitivity adjustment using an external weight)
- Calibration test report
  (Output for calibration test using the internal weight or an external weight)
- Breaks ("title block" and "end block") for easy management of a series of weighing data
  ("Title block", "End block")
  By changing the function table ("10. Function Table"), you can store sensitivity adjustment results and calibration test results in the data memory and output them in bulk.
  (Refer to "12. Data Memory" for details.)

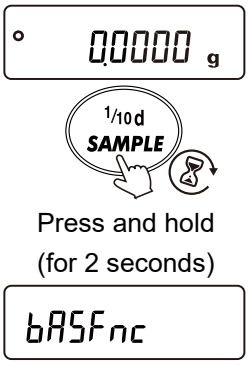
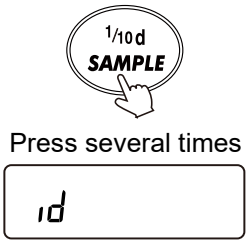
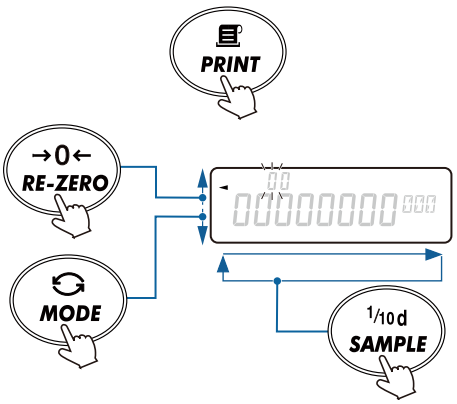
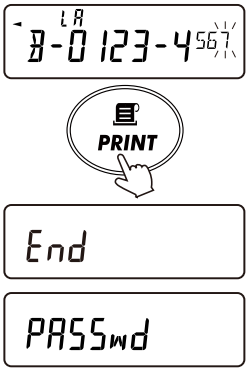
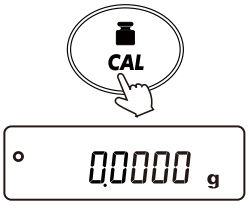
❑ The ID number can be used as an identification number for the balance during maintenance of the balance.
❑ The ID number is stored in non-volatile memory, even if the AC adapter is removed, and it is valid until a new registration is made.
❑ For checking and adjusting the time and date, refer to "10.4. Clock and calendar function".
❑ When printing a GLP compliant report with an AD-8127 multi-functional compact printer or AD-8129TH compact thermal printer connected to the balance, the clock function of the printer can be used to print the time and date. ("C" set for "InFo" under [dout] ("10. Function Table").) This is effective for centrally managing the prevention of time and date tampering using the password lock function on the AD-8127 or AD-8129TH.

Tips

❑ To output GLP/GMP compliant reports, set the print mode of the AD-8127/AD-8129TH to" DUMP" (dump print mode). If "EXT.KEY" (external key print mode is set for weighing value printing, press and hold the [ENT SAVE] button on the AD-8127 (for 2 seconds) to switch between the external key print mode and dump print mode.

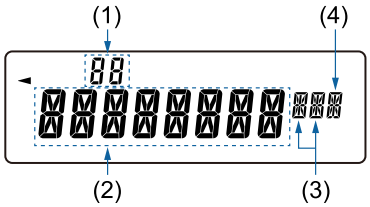
11.2. Setting the ID number

Setting method (Changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key. Set the ID number using the following keys. [SAMPLE] key ····· Selects the digit to blink. [RE-ZERO] key ····· Changes the character of the blinking digit. (+) [MODE] key ····· Changes the character of the blinking digit. (-)	
4	Press the [PRINT] key to store the setting. (To cancel without saving changes, press the [CAL] key.)	
5	To return to weighing mode, press the [CAL] key.	

Note

- There are four types of segments used in the balance's display. Note that the shape of the characters may vary depending on the type of segment. Refer to the display correspondence table below for details.



Display correspondence table

(1) 7-segment display

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	ı	J	K	L	n	O	P	q	r	S	t	U	v	W	X	Y	Z

<-- [MODE] key ␣Space [RE-ZERO] key -->

(2) 11-segment display

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	ı	J	K	L	M	N	o	P	Q	R	S	t	U	V	W	x	Y	Z

<-- [MODE] key ␣Space [RE-ZERO] key -->

(3) 14-segment display

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

<-- [MODE] key ␣Space [RE-ZERO] key -->

(4) 15-segment display

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

<-- [MODE] key ␣Space [RE-ZERO] key -->

11.3. GLP output

To output data compliant with GLP/GMP to the AD-8127 multi-functional printer/AD-8129TH thermal printer, or a PC, set "i" (ON: Internal clock data) or "2" (External clock data) for "InFo" (GLP output) under dout (Data output) in the function table ("10. Function Table")

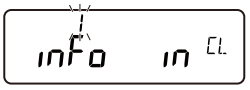
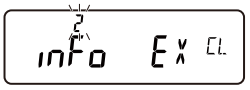
By setting "2" for "InFo", when outputting data compliant with GLP/GMP, you can use the clock data from external devices such as a PC or printer instead of the balance's internal clock data. This setting is used to unify the clock data with the clock function of the external device.

CAUTION

- ❑ When outputting the balance's internal clock data ("i" set for "InFo"), if the date and time are incorrect, adjust the date and time using CL AdJ (Clock) in the function table ("10. Function Table").
- ❑ The clock data output from an external device can be used with a device that has a clock function and that can output the date and time in response to <ESC>D, <ESC>T.*1
  (AD-8127 multi-functional compact printer, AD-8129TH compact thermal printer, RsCom [WinCT] data communication software, etc.)
  *1 <ESC> is the escape code (ASCII 1Bh).
- ❑ When storing the sensitivity adjustment history with the data memory function, the internal clock data of the balance is stored even if "2" is set for "InFo".
- ❑ To output data to the AD-8127 multi-functional printer or the AD-8129TH thermal printer, set the print mode to "DUMP" (dump print mode).

Setting method (Changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	0.00000 g  Press and hold (for 2 seconds) bASFnc
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times dout

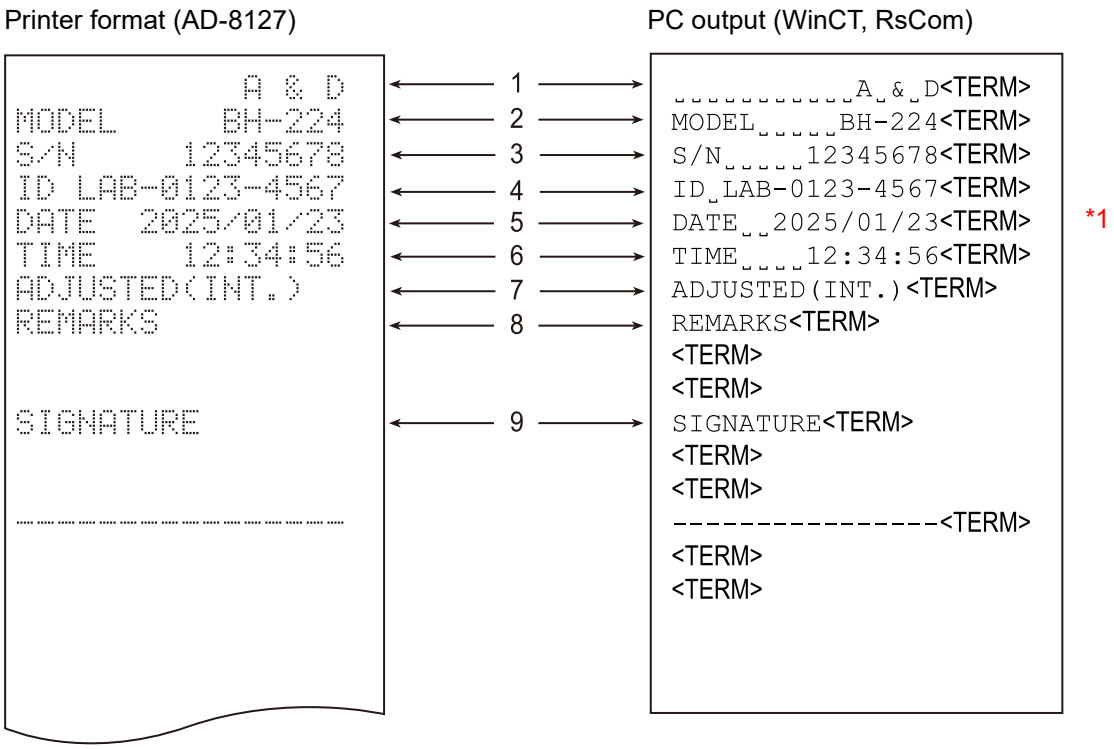
Step	Description	Display and key operations
3	Press the [PRINT] key.	 
4	Press the [SAMPLE] key several times to display "inFo" (GLP output).	 Press several times 
5	Press the [RE-ZERO] key several times to set "i" (Internal clock data) or "E" (External device clock data) for "inFo" (GLP output).	 Press several times  or 
6	Press the [PRINT] key to store the setting.	  
7	Press the [CAL] key to return to weighing mode.	 

Output examples of sensitivity adjustment with the internal weight

The forms in which GLP data is output when the sensitivity of the balance is adjusted using the internal weight are shown below.

Output example 1

When "i" (Internal clock data) is set for "inFo" (GLP output) under dout (Data output) in the function table ("10. Function Table")



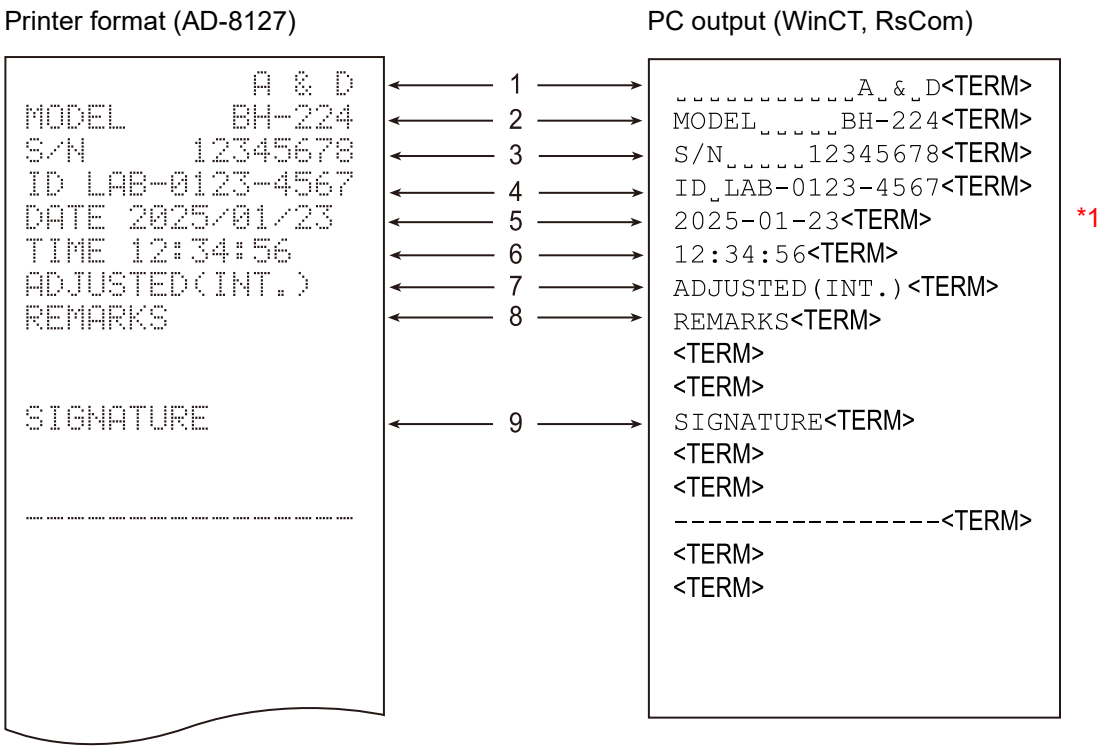
␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

1 Manufacturer
2 Model
3 Serial number
4 ID number
5 Date
6 Time
7 Sensitivity adjustment using the internal weight
8 Remarks
9 Signature

*1 The output order of the year, month, and day varies depending on the destination region.

Output example 2

When "2" (External device clock data) is set for "InFo" (GLP output) under dout (Data output) in the function table ('10. Function Table')



␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

1 Manufacturer
2 Model
3 Serial number
4 ID number
5 Date (external device's clock data)
6 Time (external device's clock data)
7 Sensitivity adjustment using the internal weight
8 Remarks
9 Signature

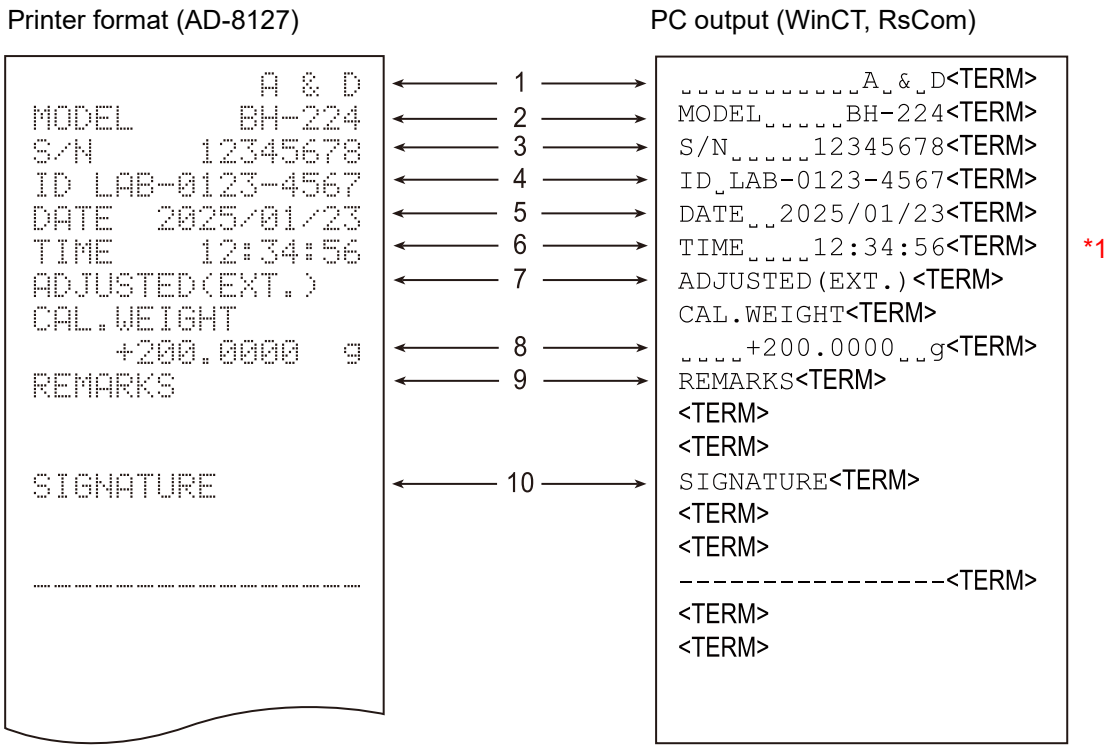
*1 The output order of the year, month, and day varies depending on the destination region.

Output examples of sensitivity adjustment with an external weight

The GLP output forms when the sensitivity of the balance is adjusted using an external weight are shown below.

Output example

When "i" (Internal clock data) is set for "inFo" (GLP output) under dout (Data output) in the function table ("10. Function Table")



␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

1	Manufacturer	6	Time
2	Model	7	Sensitivity adjustment using an external weight
3	Serial number	8	Weight value
4	ID number	9	Remarks
5	Date	10	Signature

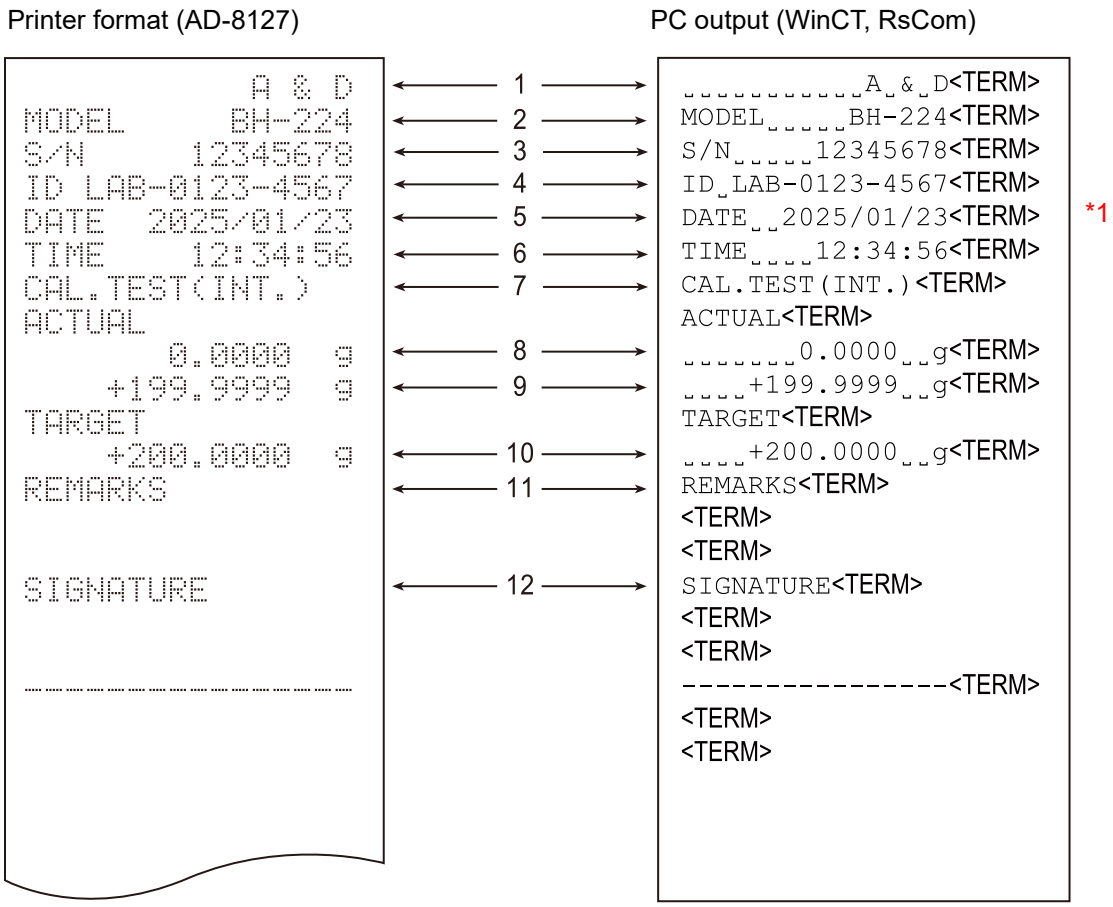
*1 The output order of the year, month, and day varies depending on the destination region.

Output examples of calibration test with the internal weight

The GLP output forms when the weighing accuracy of the balance is checked using the internal weight are shown below. (Note that sensitivity adjustment is not performed.)

Output example

When "i" (Internal clock data) is set for "inFo" (GLP output) under [dout] (Data output) in the function table ("10. Function Table")



␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

1	Manufacturer	7	Calibration test
2	Model	8	Zero point result
3	Serial number	9	Loaded weight result
4	ID number	10	Target weight used
5	Date	11	Remarks
6	Time	12	Signature

*1 The output order of the year, month, and day varies depending on the destination region.

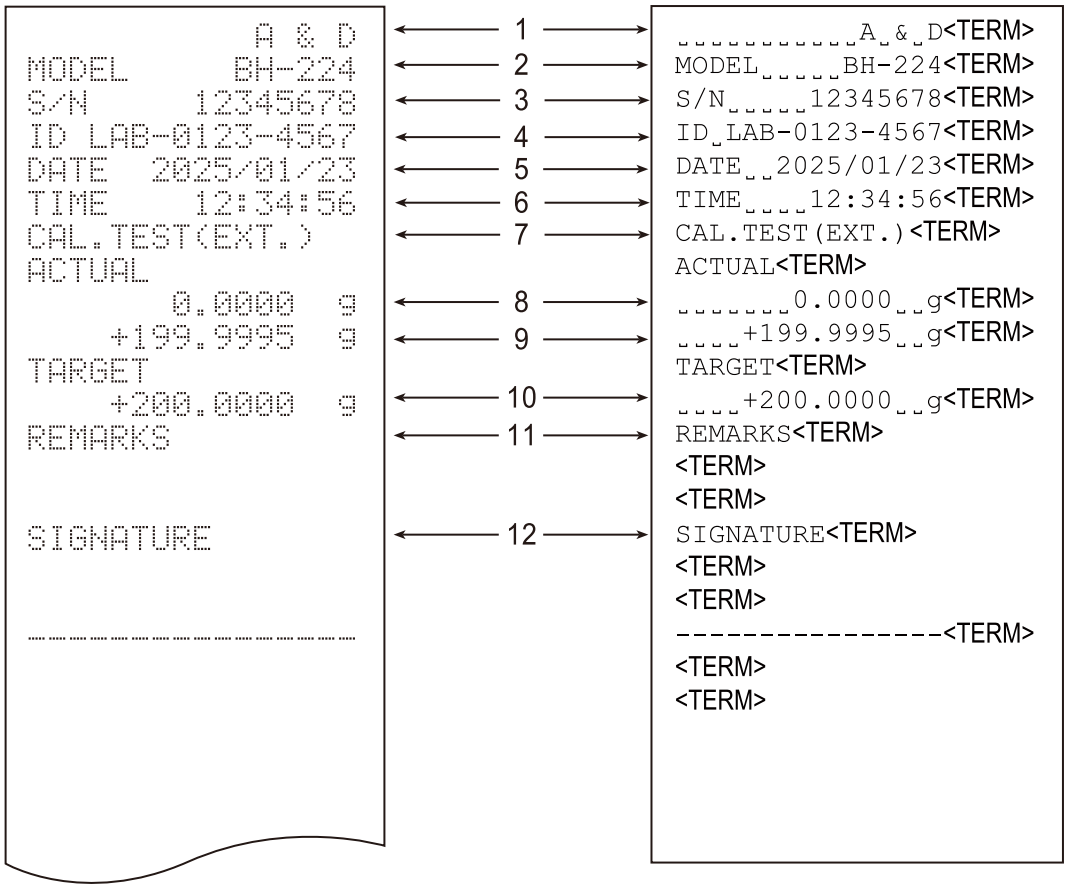
Output examples of calibration test with an external weight

The GLP output forms when the weighing accuracy of the balance is checked using the internal weight are shown below. (Note that sensitivity adjustment is not performed.)

Output example

When "i" (Internal clock data) is set for "inFo" (GLP output) under [dout] (Data output) in the function table ("10. Function Table")

Printer format (AD-8127) PC output (WinCT, RsCom)



*1

␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

1 Manufacturer
2 Model
3 Serial number
4 ID number
5 Date
6 Time
7 Calibration test
8 Zero point result
9 Loaded weight result
10 Target weight used
11 Remarks
12 Signature

*1 The output order of the year, month, and day varies depending on the destination region.

Title block and End block

A "Title block" and "End block" can be added before and after a series of weighing values for data management.

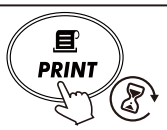
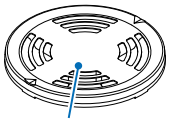
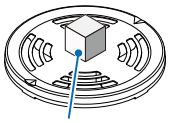
Pressing and holding the [PRINT] key (for 2 seconds) outputs the "Title block" and "End block" alternately.

This is convenient when you need to output the date, time, etc., before weighing.

CAUTION

❑ If the data memory function is used, the Title block and End block cannot be output.

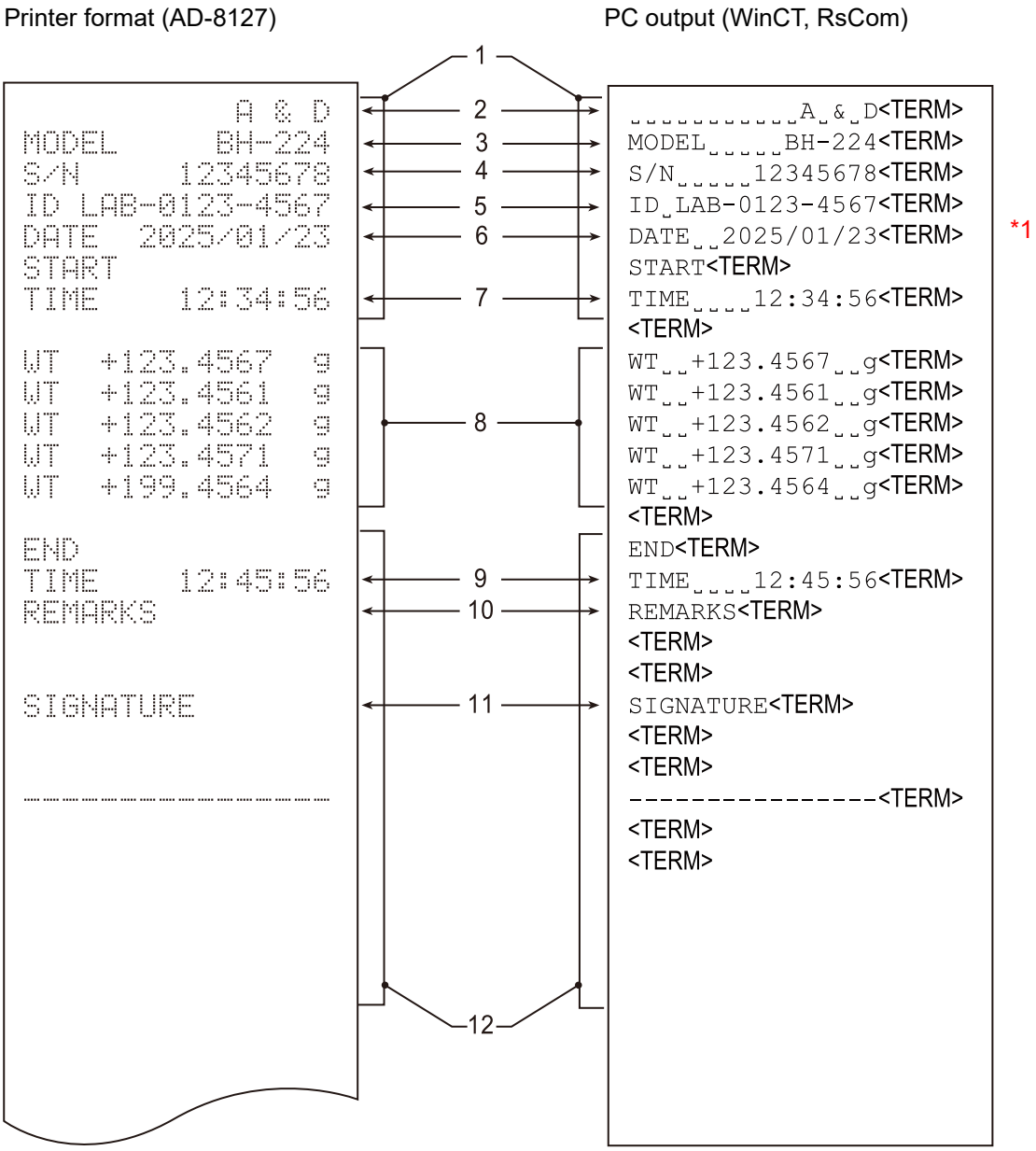
Output method

Step	Description	Display and key operations	Weighing operation
1	In weighing mode, press and hold the [PRINT] key (for 2 seconds) to display "StArt". The balance outputs the "Title block".	0.0000 g  Press and hold the key (for 2 seconds). StArt "Title block" is output. End	 Weighing pan
2	Press the [PRINT] key to output the "weighing value". The output method depends on the setting of the data output mode.	1234567 g  "Weighing value" is output.	 Sample

Step	Description	Display and key operations	Weighing operation
3	Press and hold the [PRINT] key (for 2 seconds) to display rEcEnd. The balance outputs the "End block".	 Press and hold the key (for 2 seconds). rEcEnd  "End block" is output. End	

Output example

When "i" (Internal clock data) is set for "inFo" (GLP output) under dout (Data output) in the function table ("10. Function Table")



␣ : Space, ASCII 20h

<TERM> : Terminator, CR LF or CR

CR : Carriage return, ASCII 0Dh

LF : Line feed, ASCII 0Ah

1 "Title block"
2 Manufacturer
3 Model
4 Serial number
5 ID number
6 Date
7 Start time
8 "Weighing value"
9 End time
10 Remarks
11 Signature
12 "End block"

*1 The output order of the year, month, and day varies depending on the destination region.

12. Data Memory

The data memory function stores unit weight for counting weighing, weighing values, sensitivity adjustment history, and other data in the balance. This allows for later data verification and bulk output.
To configure the data memory function, use "dAtA" (Data memory) under [dout] (Data output) in the function table ("10. Function Table").

CAUTION

- ❑ The data memory function is disabled when the minimum weight alert function is selected.
- ❑ Cannot be used in conjunction with the net/gross/tare function or density (specific gravity) measurement.

Storable data

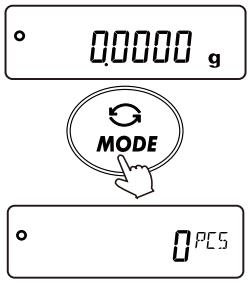
Function table	Description	Number of Stored Data
dAtA = 1	Unit weight (counting mode)	Up to 50 entries
dAtA = 2	Weighing value	Up to 200 entries
	Sensitivity adjustment history ・ Report of the sensitivity adjustment with the internal weight ・ Report of the calibration test with the internal weight ・ Report of the sensitivity adjustment with an external weight ・ Report of the calibration test with an external weight	Latest 50 entries

12.1. Storing unit weights

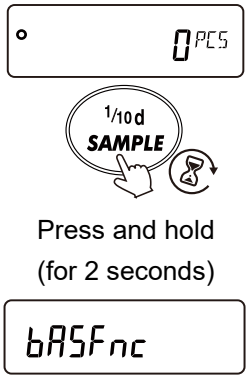
- ❑ Up to 50 entries can be stored for "unit weight" in the counting mode.
- ❑ P01 is the first unit weight data and serves as the standard memory in normal counting mode. Up to 49 additional unit weights can be stored.
- ❑ The stored unit weight is retained in the balance's nonvolatile memory even when the power is turned off.
- ❑ By reading the stored unit weight, the counting operation can be performed without registering the unit weight each time.
- ❑ The read unit weight can be changed in "Load registration mode" (method of registering the unit weight by placing a specified number of samples) or "Digital registration mode" (method of inputting the unit weight digitally).

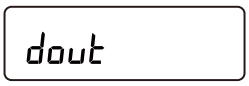
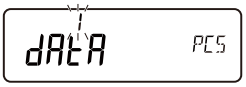
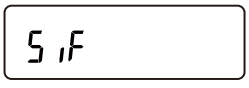
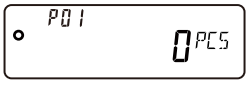
12.1.1. Preparations for the data memory function (unit weight)

Changing the weighing unit

Step	Description	Display and key operations
1	Press the [MODE] key to select the unit "PCS" (counting mode). CAUTION To display "PCS," ensure it is included in the units set in the function table beforehand. (Refer to "10.5. Explanation for unit".)	

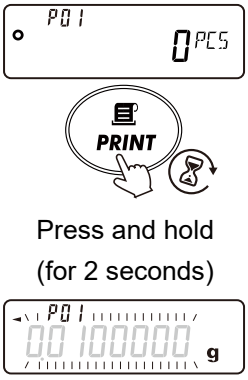
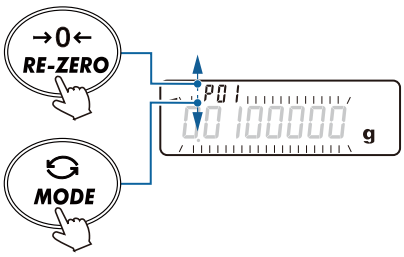
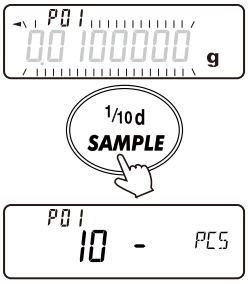
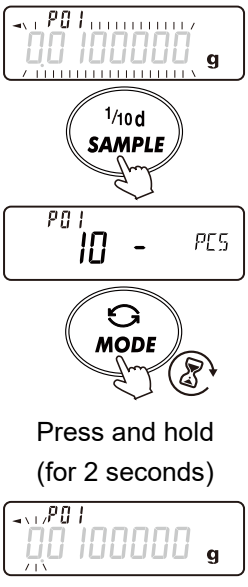
Enabling the data memory function (Changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	

Step	Description	Display and key operations
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times 
3	Press the [PRINT] key.	 
4	Press the [SAMPLE] key several times to display "dAtA" (Data memory function).	 Press several times 
5	Press the [RE-ZERO] key to display "1" (Stores the unit weight) for "dAtA". (The display shown to the right is "1" for "dAtA".)	 
6	Press the [PRINT] key to store the setting.	  
7	Press the [CAL] key to return to weighing mode.	 

12.1.2. Registering unit weight data

To register a new unit weight, select the desired unit weight number (unit weight data) and register it using either "Load registration mode" or "Digital registration mode".
Unit weight number: "P01" to "P50".

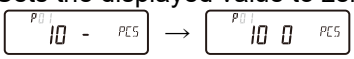
Step	Description	Display and key operations
1	Press and hold the [PRINT] key (for 2 seconds) to enter confirmation mode. The unit weight data (the unit weight number and blinking display of unit weight) is read. The latest unit weight data selected or registered is displayed.	
2	Use the following keys to select the unit weight number to register. [RE-ZERO] key ····· Increases the unit weight number by one. [MODE] key ····· Decreases the unit weight number by one.	
3	To use "Load registration mode" for registration, press the [SAMPLE] key.	
	To use "Digital registration mode" for registration, press the [SAMPLE] key. Then, press and hold the [MODE] key to enter "Digital registration mode".	

Load registration mode

Load registration mode is a mode in which the specified number of samples are placed on the weighing pan and the unit weight is registered.

In Load registration mode, you can use ACAI after registering the unit weight. (Refer to "4.4. Counting mode (PCS)")

Register the actual weight using the following keys.

Step	Description
1	[RE-ZERO] key ·····Sets the displayed value to zero.  [SAMPLE] key ·····Changes the number of samples used for registration.  [PRINT] key ·····Place the sample and press the [PRINT] key to register the unit weight in the data memory. This will return the balance to the state described in step 1 of "12.1.2. Registering unit weight data". For details on how to register unit weight, refer to "4.4. Counting mode (PCS)". [CAL] key ·····Returns the balance to the state described in step 1 of "12.1.2. Registering unit weight data". Press and hold the [MODE] key (for 2 seconds).....Enters "Digital registration mode".

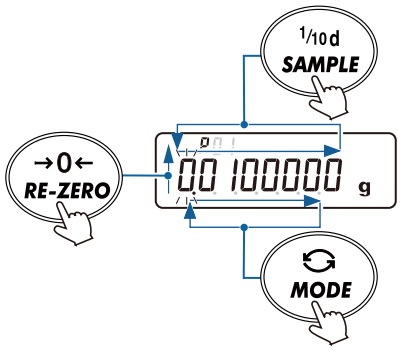
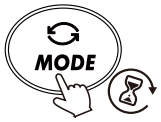
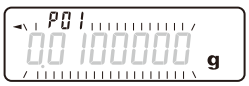
Digital registration mode

Digital registration mode is a mode in which the unit weight of a sample is input digitally (as a numerical value) when the unit weight of the sample (weight of one sample) is known in advance. In Digital registration mode, the digit to change blinks.

CAUTION

- ❑ In digital registration mode, ACAI cannot be applied after registering the unit weight. (Refer to "4.4. Counting mode (PCS)".)
- ❑ Up to the last two digits of the readability can be registered. Any digits beyond that will be truncated.

Perform digital registration using the following keys.

Step	Description	Display and key operations
1	[SAMPLE] key ·····Changes the setting digit. [RE-ZERO] key·····Changes the setting value. (+) [MODE] key ·····Changes the position of the decimal separator.	
	Press and hold the [MODE] key (for 2 seconds). ..... Enters "Load registration mode".	 Press and hold (for 2 seconds)  To "Load registration mode"
2	Press the [PRINT] key to register (store) the unit weight in data memory. (To cancel, press the [CAL] key.) This will return the balance to the state described in step 1 of "12.1.2. Registering unit weight data".	  To step 1 in "12.1.2. Registering unit weight data".

Note

- ❑ Use "**UW:**" command to change the unit weight.
  (Refer to "23. Command".)

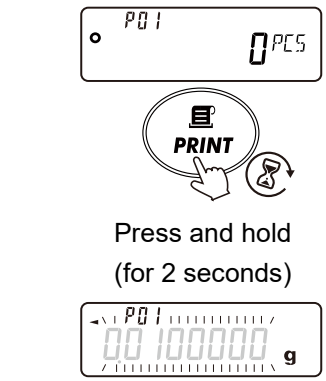
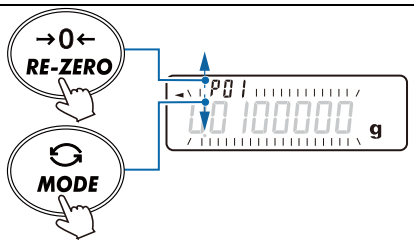
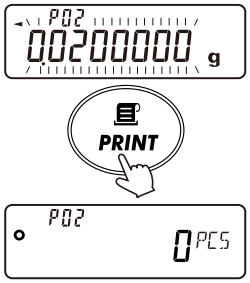
12.1.3. Reading the unit weight data

CAUTION

- ❑ If the set value is less than the setting range, Error 2 is displayed.
  For details on minimum unit weight, refer to "29.2. Individual specifications".
- ❑ ACAI cannot be applied to the read unit weight.

Note

- ❑ The unit weight can be read using the "UN:mm" command.
  mm is **01** to **50.**
- ❑ The unit weight read by the "**UW:**" command can be output.

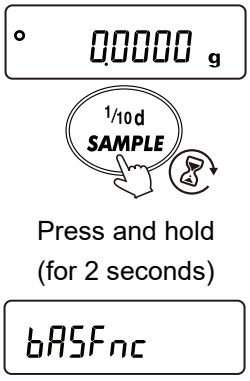
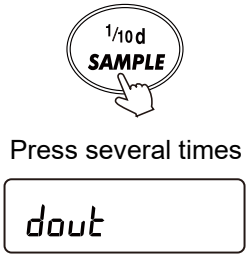
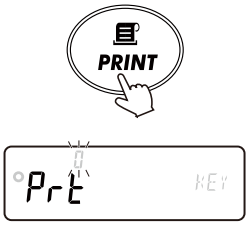
Step	Description	Display and key operations
1	Press and hold the [PRINT] key (for 2 seconds) to enter confirmation mode. The unit weight data (the unit weight number and blinking display of unit weight) is read. The latest unit weight data selected or registered is displayed.	
2	Select the unit weight number to use with the following keys. [RE-ZERO] key ····· Increases the unit weight number by one. [MODE] key ····· Decreases the unit weight number by one.	
3	Press the [PRINT] key to set the unit weight to use. (To cancel, press the [CAL] key.) The balance returns to weighing mode (count display).	

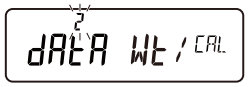
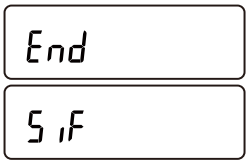
12.2. Storing the weighing data/sensitivity adjustment history.

- ❑ Weighing results and sensitivity adjustment history can be stored in the internal memory of the balance.
- ❑ The balance can store weighing results so that you can continue weighing work without a printer or a PC connected.
- ❑ The balance can store weighing results so that you can perform weighing work without occupying a printer or PC for a long time.
- ❑ Stored data can be displayed on the balance as needed for confirmation.
- ❑ Stored data can be output in bulk (to a printer or PC). The output format and whether to add a data number, time/date, and ID number can be selected with the function table.
- ❑ The balance can store up to 200 entries of weighing data with time/date, along with the latest 50 entries of sensitivity adjustment history.

12.2.1. Preparations for data memory function (weighing data and sensitivity adjustment history)

Enabling the data memory function (Changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times to show the display shown to the right.	
3	Press the [PRINT] key.	
4	Press the [SAMPLE] key several times to display "dAtA" (Data memory function).	

Step	Description	Display and key operations
		Press several times 
5	Press the [RE-ZERO] key several times to display "2" for "dAtA" (Stores the weighing data/sensitivity adjustment history).	 
6	Press the [PRINT] key to store the setting.	 
7	Press the [CAL] key to return to weighing mode.	 

Adding a data number, time/date, and ID number

The function table allows you to configure the output selection for data number, time/date, and ID number. Refer to the table below for the output selection.

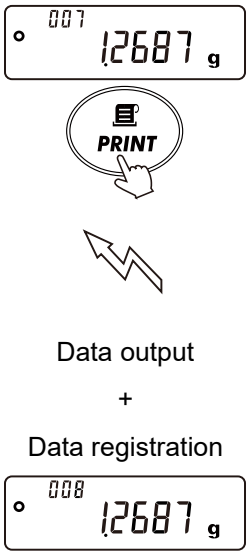
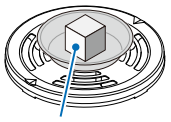
Output selection for data number, ID number, and time/date

Data number	No output	d-no = 0	Time/date	No output	S-td = 0	-
	Output	d-no = 1		Outputs the time	S-td = 1	Up to 200 entries of data can be stored.
ID number	No output	S- id = 0		Outputs the date	S-td = 2	
	Output	S- id = 1		Time and date output	S-td = 3	

Tips

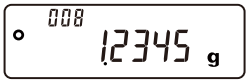
- ❑ The data number, time/date, and ID number can be changed after the weighing values are stored.

12.2.2. Storing (registering) weighing data

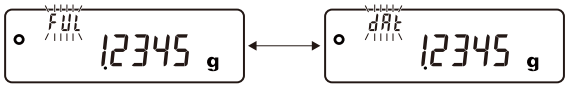
Step	Description	Display and key operations	Weighing operation
1	Pressing the [PRINT] key in weighing mode outputs the weighing value. Simultaneously, the data memory function stores the weighing data. The number of stored data entries is updated at the top left of the display.		 Sample

Display and indicator

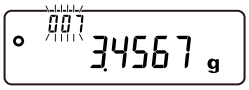
Weighing display:
The number of stored data entries is shown at the top left of the display.



When the storage capacity for weighing values is reached, "FUL ⟷ dAt" will blink alternately.



Stored data display:
The data number of the displayed weighing value blinks.



CAUTION

- ❑ The weighing value is stored and simultaneously output via RS-232C and USB.
- ❑ FUL indicates that the memory capacity has been reached. More data cannot be stored unless the stored data is deleted.
- ❑ When "3" is set for "Prt" (Stream mode), data may not be stored correctly.

The method for storing weighing values depends on the operation of "PrE" (Data output mode) under [doutE] (Data output) in the function table ("10. Function Table").

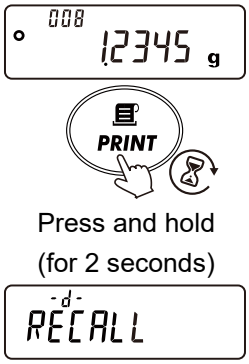
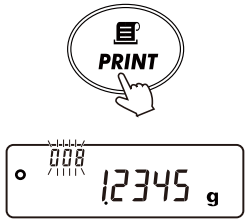
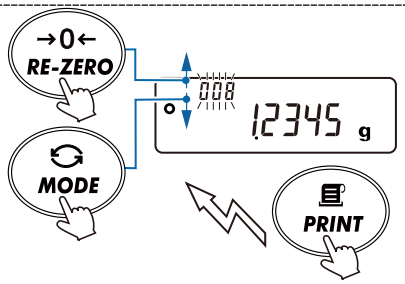
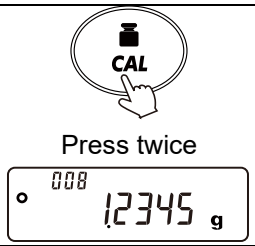
Combination of operation methods and function table settings

Item / Mode	Data output mode	Auto print polarity and band width	Data memory	Intervals
Key mode	PrE = 0	N/A	dAtA = 2	N/A
Auto print mode A	PrE = 1	AP-P = "0" to "2"		
Auto print mode B	PrE = 2	AP-b = "0" to "2"		
Key mode B (immediate output)	PrE = 4	N/A		
Key mode C (output when stable)	PrE = 5			
Interval output mode	PrE = 6			inE = "0" to "8"

12.2.3. Displaying and outputting the stored weighing data

CAUTION

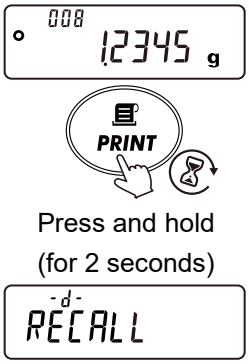
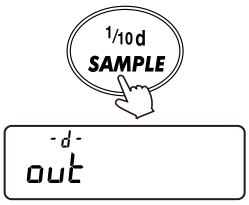
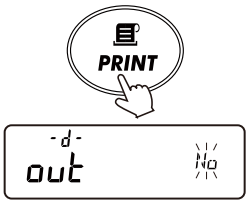
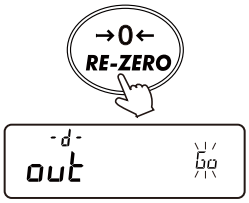
- ❑ Ensure that "2" (Stores the weighing data/sensitivity adjustment history)" is set for the "dAtA" (Data memory) under doUt (Data out) in the function table ("10. Function Table").
- ❑ When there is no stored data, No dAtA will be displayed.

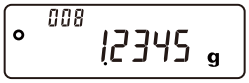
Step	Description	Display and key operations
1	In weighing mode, press and hold the [PRINT] key for 2 seconds. "-d-" or "d-t" is displayed at the top left of the RECALL display.*1 -d-: Without time/date setting (doUt > S-td = 0) d-t : With time/date setting (doUt >S-td = 1 to 3) *1 The time and date output settings can be changed after the weighing values are stored.	
2	Press the [PRINT] key. The balance enters the memory recall mode.	
	Operate the following keys. [RE-ZERO] key ..... Displays the next data set. [MODE] key..... Displays the previous data set. [PRINT] key..... Outputs the displayed data via RS-232C or USB.	
3	To return to weighing mode, press the [CAL] key twice.	

12.2.4. Outputting the stored weighing results in bulk.

CAUTION

❑ To perform bulk output, you need to pre-configure the [SIF] (Serial interface) settings in the function table ("10. Function Table") to match the communication settings of the connected peripheral devices. Refer to"10. Function Table" and "19. Connection with Peripheral Devices".

Step	Description	Display and key operations
1	In weighing mode, press and hold the [PRINT] key for 2 seconds. "-d-" or "d-t" is displayed at the top left of the [RECALL] display. *1 -d-: Without time/date setting ([dout], S-td = 0) d-t : With time/date setting ([dout], S-td = 1 to 3) *1 The time and date output settings can be changed after the weighing values are stored.	
2	Press the [SAMPLE] key.	
3	Press the [PRINT] key.	
4	Use the [RE-ZERO] key to switch between "No"/"Go".	

Step	Description	Display and key operations
5	Press the [PRINT] key while Go is blinking. The balance outputs all stored data via RS-232C/USB.	  Bulk output  
6	Press the [CAL] key to return to weighing mode.	 

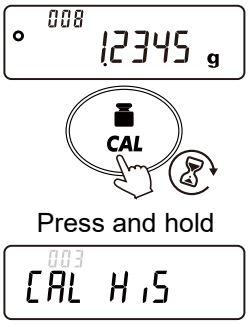
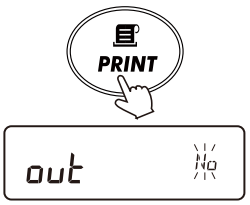
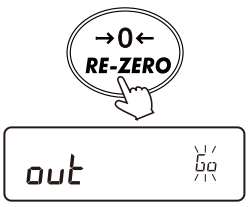
12.2.5. Deleting the stored weighing results in bulk.

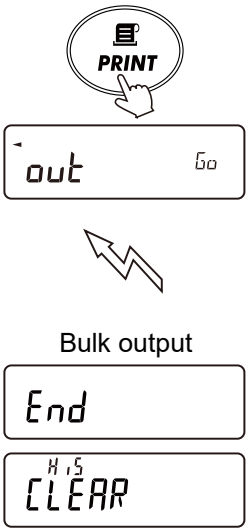
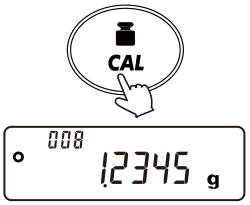
Step	Description	Display and key operations
1	In weighing mode, press and hold the [PRINT] key (for 2 seconds). "-d-" or "d-t" is displayed at the top left of the RECALL display . *1 -d-: Without time/date setting (dout, S-td = 0) d-t : With time/date setting (dout, S-td = 1 to 3) *1 The time and date output settings can be changed after the weighing values are stored.	000 12345 g  Press and hold (for 2 seconds) -d- RECALL
2	Press the [SAMPLE] key several times.	 Press several times -d- CLEAR
3	Press the [PRINT] key.	 -d- CLEAR No
4	Use the [RE-ZERO] key to switch between "No"/"Go".	 -d- CLEAR Go
5	Press the [PRINT] key. The balance deletes all stored data.	 -d- CLEAR Go End
6	The balance returns automatically to weighing mode. Data number "000" will be displayed.	000 12345 g

12.2.6. Storing and outputting sensitivity adjustment history

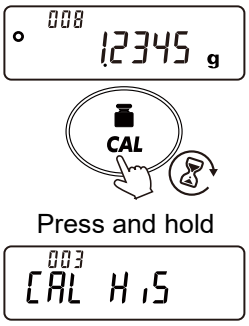
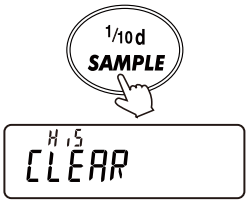
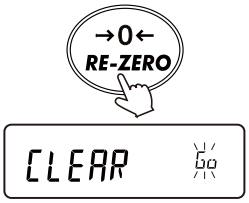
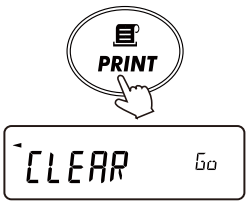
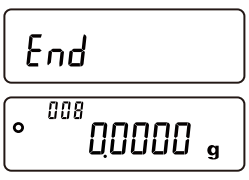
- ❑ The histories of sensitivity adjustment (with the internal weight/with an external weight) and the results of calibration test can be stored in the internal memory of the balance.
- ❑ The stored results can be output in bulk (to a printer or PC).
- ❑ The balance can store the results of the last 50 sensitivity adjustments/calibration tests.
- ❑ When the number of data entries exceed 50, the display will blink alternately.

Outputting the sensitivity adjustment history

Step	Description	Display and key operations
1	In weighing mode, press and hold the [CAL] key until [CAL H.5] is displayed. (While pressing and holding the [CAL] key, the item display will switch every 2 seconds.) **CAUTION** ❑ If the [FUL] ⟷ [CAL] displays are blinking alternately in weighing mode, it indicates that the memory capacity of 50 data entries has been reached. If a new result is saved in this state, the oldest data will be overwritten. Delete some of the data stored in memory.	
2	Release your finger from the [CAL] key. **CAUTION** ❑ If there is no sensitivity adjustment history, [No dAtA] is displayed, then the balance returns to weighing mode.	
3	Press the [PRINT] key.	
4	Use the [RE-ZERO] key to switch between "No"/"Go".	

Step	Description	Display and key operations
5	Press the [PRINT] key while Go is blinking. The balance outputs all stored history data via RS-232C/USB.	
6	Press the [CAL] key to return to weighing mode.	

Deleting the sensitivity adjustment history

Step	Description	Display and key operations
1	In weighing mode, press and hold the [CAL] key until [CAL H.S] is displayed. (While pressing and holding the [CAL] key, the item display will switch every 2 seconds.) **CAUTION** ❑ If the FUL ⟷ CAL displays are blinking alternately in weighing mode, it indicates that the memory capacity of 50 data entries has been reached. If a new result is saved in this state, the oldest data will be overwritten. Delete some of the data stored in memory.	
2	Release your finger from the [CAL] key. **CAUTION** ❑ If there is no sensitivity adjustment history, [No dAtA] is displayed, then the balance returns to weighing mode.	
3	Press the [SAMPLE] key.	
4	Press the [PRINT] key.	
5	Use the [RE-ZERO] key to switch between "No"/"Go".	
6	Press the [PRINT] key while Go is blinking. The balance deletes all stored history.	
7	When bulk deletion is completed, the balance automatically returns to weighing mode.	

13. Net/Gross/Tare Function

Zero setting and tare operations can be performed separately. Data can be output in the order of net weight, gross weight, and tare weight.

Function table (excerpt)

Class	Item	Parameter	Description
dout Data output	NGt Net/gross/tare output	■ 0	OFF (Outputs net weight only)
		1	Outputs net and tare weights.
		2	Outputs net and gross weights.
		3	Outputs net, gross, and tare weights.

13.1. Preparations for the net/gross/tare function

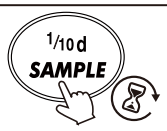
To use the net/gross/tare function, set "1" (Outputs net and tare weights.), "2" (Outputs net and gross weights.), or "3" (Outputs net, gross, and tare weights.) for "NGt" (Net/gross/tare output) under dout (Data output) in the function table ("10. Function Table").

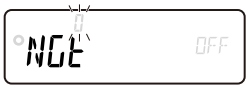
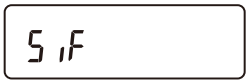
To return to the normal weighing mode (factory default), set to "0" (OFF) for "NGt" (Net/gross/tare output).

CAUTION

❑ This function cannot be used with the minimum weight alert function, density (specific gravity) measurement, and data memory function.

Switching to net/gross/tare mode (changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	0.0000 g  Press and hold (for 2 seconds) bASFnc
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times dout
3	Press the [PRINT] key.	 Prt KEY

Step	Description	Display and key operations
4	Press the [SAMPLE] key several times to display "NGt" (Net/gross/tare function).	 Press several times 
5	Press the [RE-ZERO] key several times to set "1" (Net and tare weights), "2" (Net and gross weights), or "3" (Net, gross, and tare weights) for "NGt".	 Press several times 
6	Press the [PRINT] key to store the setting.	  
7	Press the [CAL] key to return to weighing mode.	 

Key operations

The following describes the key functions for the weighing value (gross) state.

Key operations for the weighing value (gross) state

Key	Function	Weighing value (gross)	Operation
→0← RE-ZERO	Zero setting or tare	Within the zero range*1	Updates the zero point and clears the tare value.
		Exceeding the zero range*1	Performs tare operation and updates the tare value.
		Negative value	Updates the zero point and clears the tare value.
→T← TARE	Tare	Positive value	Performs tare operation and updates the tare value.
		Gross zero*2 (Gross zero indicator displayed)	Clears the tare value.
		Negative value	No tare operation. Press the [RE-ZERO] key.

*1 For the zero range of each model, refer to "Weighing range".

*2 "Gross zero" indicates that the minimum division of the gross weight is within the zero range when the unit is grams (g).
(The state in which the gross zero indicator is lit.)

Display

Indicators for the net/gross/tare function in use

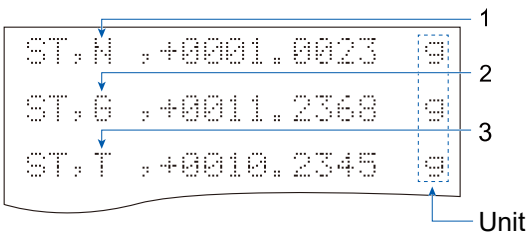
No.	Indicator	Description
1	NET	Lights up when the tare value is not zero.
2	G	Lights up when the tare value is zero.
3	PT	Lights up along with the NET indicator when the preset tare is set using the PT command.
4	◻	Lights up when the minimum division of the gross weight is in the zero range in grams.

Output

Pressing the [PRINT] key outputs data in the following order: net weight, gross weight, and tare weight.
The supported weighing data formats are as follows.
Weighing data formats for the net/gross/tare function

Function table SIF (Serial interface)	Function table USb (USB interface)	Weighing data format
tYPE = 0	tYPE = 0	A&D standard format
tYPE = 1	tYPE = 1	DP format
tYPE = 5	tYPE = 5	CSV format
tYPE = 7	tYPE = 7	TAB format

Output example (A&D standard format)

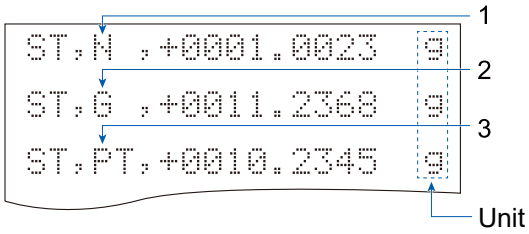


1 Net weight
2 Gross weight
3 Tare weight

Unit

When the balance unit setting is "PCS" (counting mode) or "%" (percent mode), the unit output for gross weight, tare weight, and preset tare weight will be in the "g" unit.

Example of tare output when preset tare is set (A&D standard format)



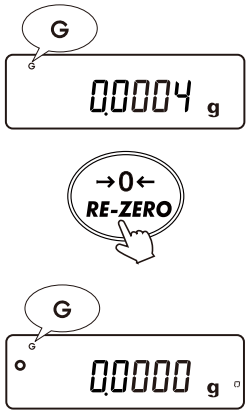
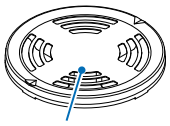
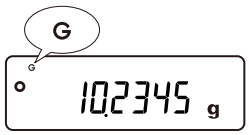
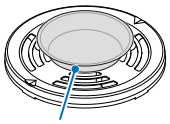
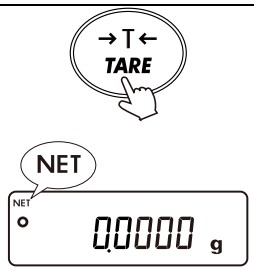
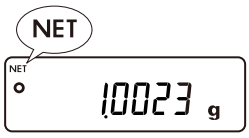
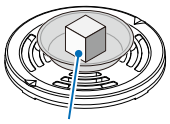
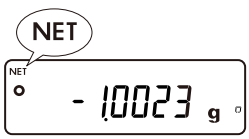
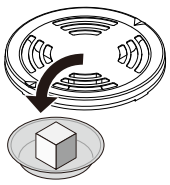
1 Net weight
2 Gross weight
3 Preset tare weight

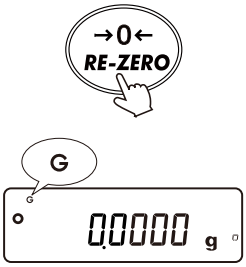
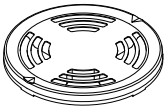
Note

- The output content and order can be configured using the UFC function.
  For the UFC function, refer to "24. UFC Function".

13.2. Using the gross/net/tare function (example)

Operation method

Step	Description	Display and key operations	Weighing operation
1	Refer to "13. Net/Gross/Tare Function" to enable the net/gross/tare function.		
2	Press the [RE-ZERO] key with nothing on the weighing pan.		 Weighing pan
3	Place an empty container to be used on the weighing pan.		 Container (tare)
4	Press the [TARE] key to display "NET". The tare value is set (updated).		
5	Place the sample to be weighed.		 Sample
6	Pressing the [PRINT] key outputs data in the following order: net weight, gross weight, and tare weight. Refer to "Output example (A&D standard format)".	 Data output	
7	Remove the sample and container from the weighing pan.		

Step	Description	Display and key operations	Weighing operation
8	Press the [RE-ZERO] key to update the zero point and clear the tare weight. The balance returns to the same state as Step 1. To continue weighing with the same tare value, remove only the sample and place the next sample, and then press the [PRINT] key to output the data.		

14. Minimum Weight Alert Function

Minimum weight is the minimum sample weight required to perform correct quantitative analysis taking the measurement error of the balance used into account. If the sample amount is too small, the proportion of measurement error in the measured value increases, and the reliability of the analysis result thus may drop.

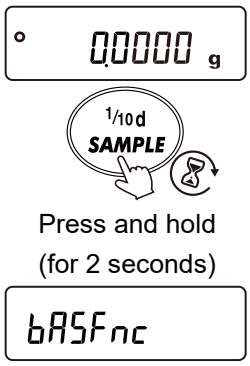
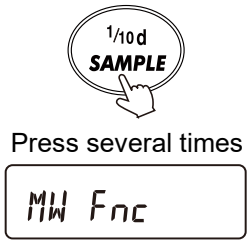
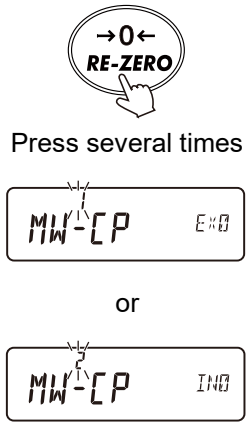
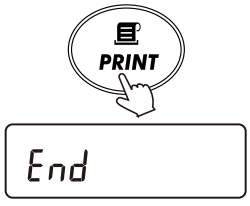
- ❑ The minimum weight alert function allows you to quickly determine if the sample amount meets the set minimum weight.
- ❑ This function can only be used when the unit mode is "**mg**".
- ❑ With this function, "MIN" displays blinking at the top of the unit when the sample amount is less than the set minimum weight. When the sample amount exceeds the set minimum weight, "MIN" is hidden.
- ❑ The minimum weight can be changed in the function table. The factory setting is 0 mg.
  When the setting value is 0 mg, the minimum weight alert function will not display an alert, even if it is set to "1" (Enables comparison excluding near zero) or "2" (Enables comparison including near zero) for "MW-CP" (Minimum weight comparison) under MW Fnc (Minimum weight alert function) in the function table ("10. Function Table"). Values above the weighing capacity cannot be set as a minimum weight.
- ❑ There are two types of alert displays for "MW-CP" (Minimum weight comparison):
  "1" (Enables comparison excluding near zero) and "2" (Enables comparison including near zero)
  Near zero is within ±10 d of 0 mg.

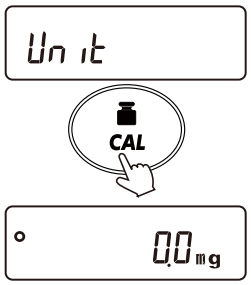
CAUTION

- ❑ When a parameter other than "0" (No comparison) is set for "MW-CP" (Minimum weight comparison), the [MODE] key is assigned to the minimum weight setting, and the unit cannot be changed with the [MODE] key. (The unit is fixed to "mg".)
- ❑ To change the unit, disable the minimum weight alert function.
- ❑ To turn off the minimum weight alert function for the minimum weighing value, refer to the steps in "14.1. Preparations for minimum weight alert function" and set the parameter for "MW-CP" (comparison of minimum weighing value) to "0" (No comparison).
- ❑ This function cannot be used in conjunction with the data memory function or density (specific gravity) measurement.

14.1. Preparations for minimum weight alert function

Enabling the minimum weight alert function (Changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to display "MW-CP" (Minimum weight comparison).	
4	Press the [RE-ZERO] key several times to set "1" (Enables comparison excluding near zero) or "2" (Enables comparison including near zero) for "MW-CP" (Minimum weight comparison).	
5	To input the minimum weighing value, press the [SAMPLE] key to switch to the MW display. If you want to register the minimum weight via direct key input, proceed to step 4 of "14.2.1. Inputting minimum weight". Alternatively, if you want to register the minimum weighing value based on the repeatability of your weights, proceed to step 4 of the procedure for inputting based on the repeatability of your weights. To complete the setting, press the [PRINT] key without pressing the [SAMPLE] key.	

Step	Description	Display and key operations
6	The next class in the function table is displayed. Press the [CAL] key to return to weighing mode.	

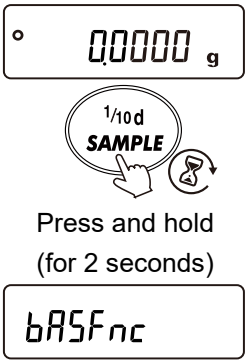
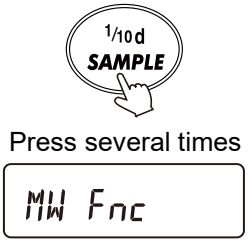
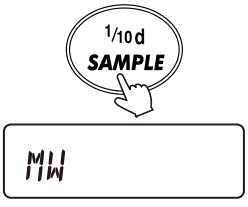
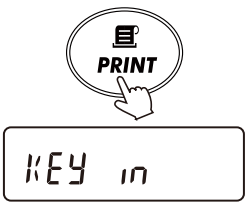
14.2. Inputting and outputting minimum weight

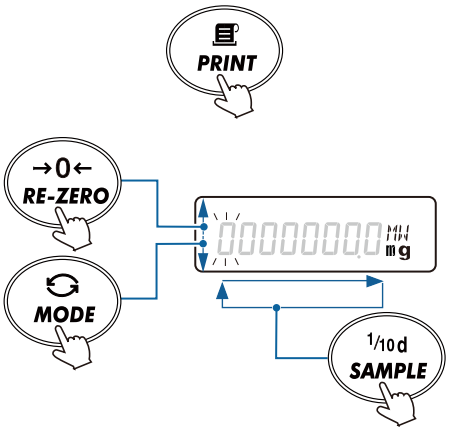
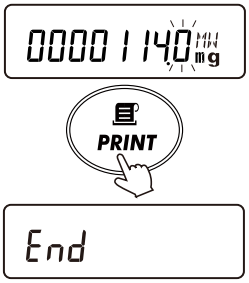
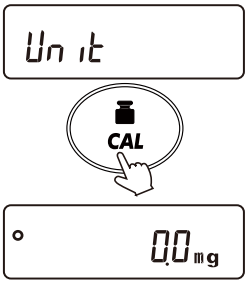
14.2.1. Inputting minimum weight

Use the following methods to set a minimum weight:

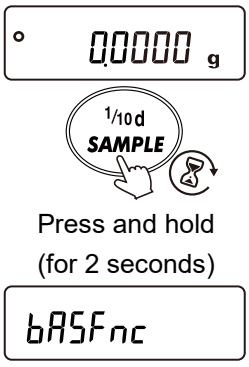
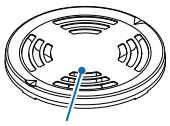
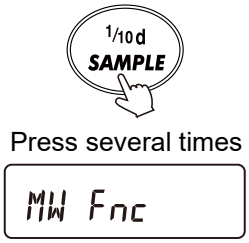
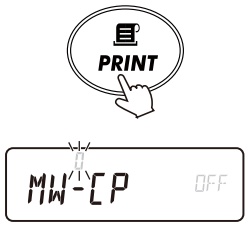
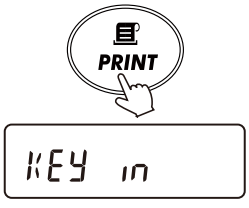
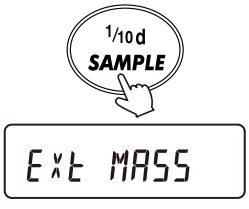
- Direct key input
- Input using repeatability obtained from 10 measurements with an external weight

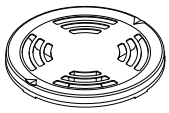
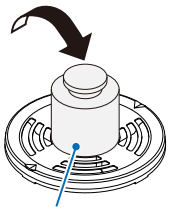
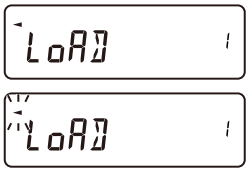
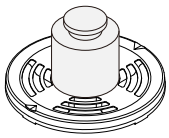
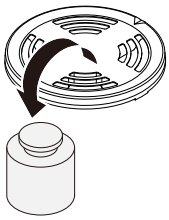
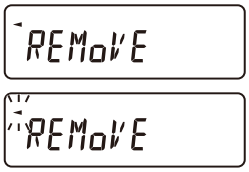
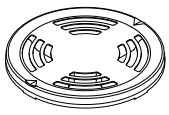
Direct key input (Entering minimum weight directly)

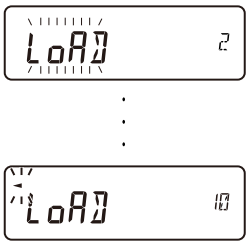
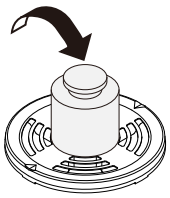
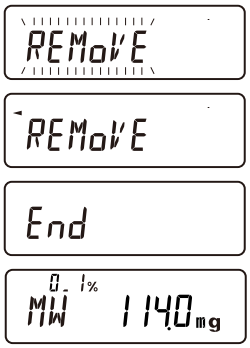
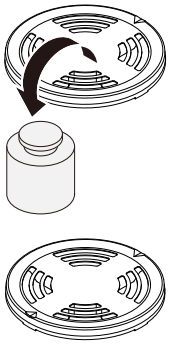
Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to display "MW-CP" (Minimum weight comparison).	
4	Press the [SAMPLE] key several times until the display shown to the right appears.	
5	Press the [PRINT] key to show the display shown to the right.	

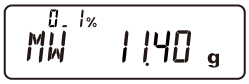
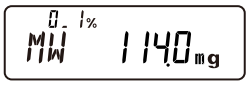
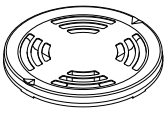
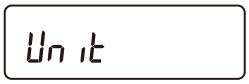
Step	Description	Display and key operations
6	Press the [PRINT] key to set the minimum weight. Use the following keys to input a minimum weight: [RE-ZERO] key ····· Changes the value of the blinking digit (+). [MODE] key ····· Changes the value of the blinking digit (-). [SAMPLE] key ····· Selects the digit to blink.	
7	Press the [PRINT] key to store the setting. If "MW-CP" is set to "0" (No comparison), the parameter is automatically changed to "1" (Excluding near zero), and the minimum weight comparison function is enabled. (To cancel without saving the setting, press the [CAL] key.)	
8	The next class in the function table is displayed. Press the [CAL] key to return to weighing mode.	

Input using repeatability with an external weight

Step	Description	Display and key operations	Weighing operation
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	 Press and hold (for 2 seconds)	 Weighing pan
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times	
3	Press the [PRINT] key to display "MW-CP" (Minimum weight comparison).		
4	Press the [SAMPLE] key several times until the display shown to the right appears.		
5	Press the [PRINT] key to show the display shown to the right.		
6	Press the [SAMPLE] key several times until the display shown to the right appears.		

Step	Description	Display and key operations	Weighing operation
7	Press the [PRINT] key. The display transitions as shown to the right.		
8	When the display shown to the right appears, place the weight on the weighing pan.		 Weight
9	With the weight placed, the balance displays "◄" (the processing indicator).		
10	When "◄" (the processing indicator) starts blinking and then remains stable for 2 seconds, the weighing value is displayed.		
11	When the display shown to the right appears, remove the weight from the weighing pan.		
12	When the weight is removed, the balance displays "◄" (the processing indicator).		

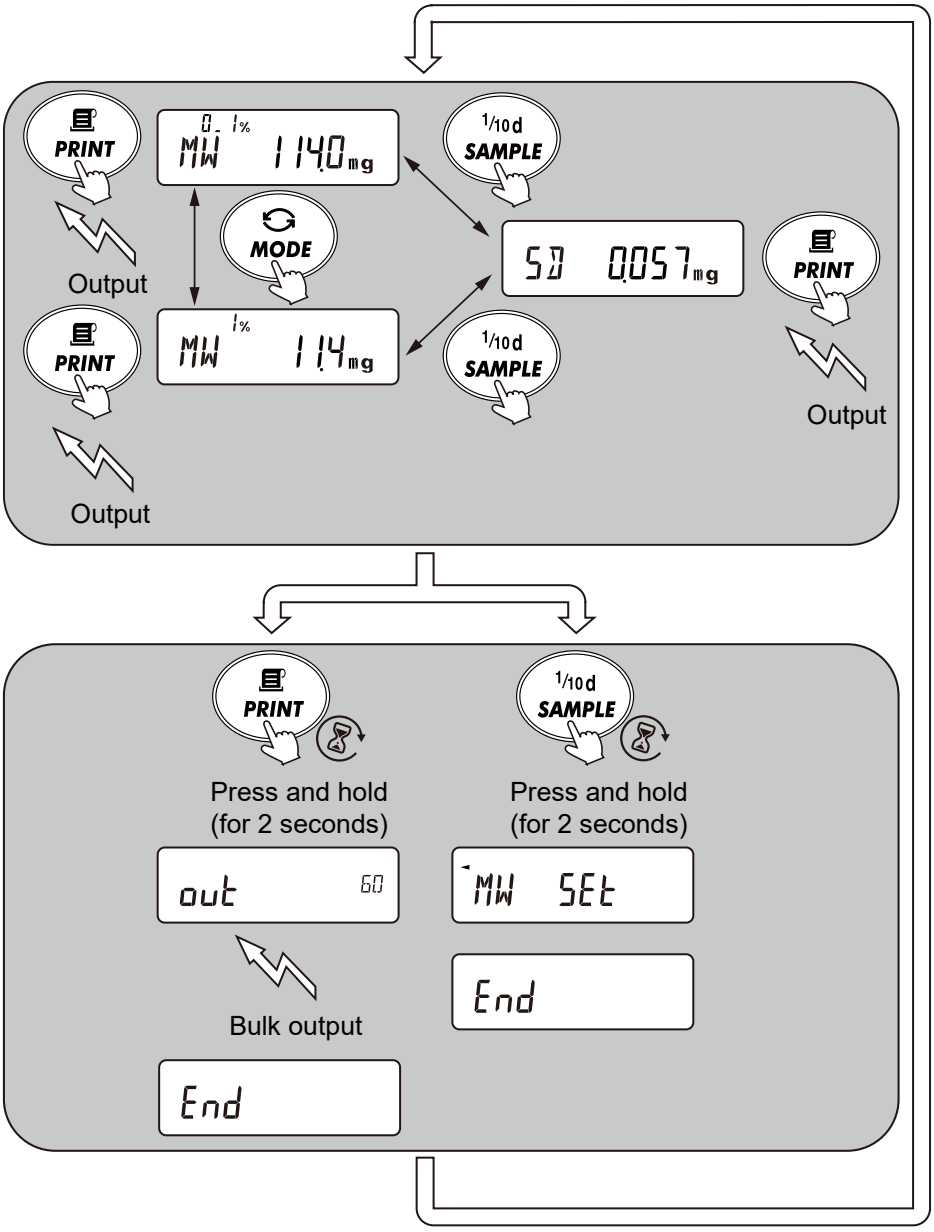
Step	Description	Display and key operations	Weighing operation
13	Each time the display requests the next load, repeat steps 8 to 12 until you have completed 10 cycles.	 Repeat steps 8 to 12.	
14	After completing the 10th measurement, the result (minimum weight) is displayed. CAUTION ❑ If there is no key operation for approximately 2 minutes, the minimum weight will not be registered, and the display will automatically move to the next item in the function table. While the measurement result is displayed, the following operations can be performed: For details, refer to "Key operations when measurement results are displayed". • Select and output the display of "MW" (Minimum weight)/"SD" (Repeatability). • Switch the fixed tolerance in the "MW" (Minimum weight) display. • Output the measurement results in bulk. (Step 15) • Set the minimum weight calculated from the measurement results. (Step 16)		

Step	Description	Display and key operations	Weighing operation
15	To output the measurement results in bulk, press and hold the [PRINT] key (for 2 seconds). For output examples, refer to "Example of bulk output when repeatability with an external weight is used".	 Press and hold (for 2 seconds)   Bulk output  	
16	Press and hold the [SAMPLE] key (for 2 seconds) to set the minimum weight. If "MW-CP" is set to "0" (No comparison), the parameter is automatically changed to "1" (Excluding near zero), and the minimum weight comparison function is enabled.	 Press and hold (for 2 seconds)   	
17	Press the [CAL] key to complete the process.	 	
18	Press the [CAL] key to return to weighing mode.	 	

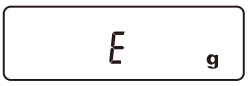
Key operations when measurement results are displayed

For additional information on step 14 in "Input using repeatability with an external weight", refer to the following.

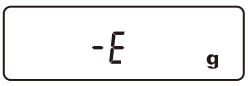
Description
The following key operations are available: [SAMPLE] key····· Switches the display between "MW" (Minimum weight) and "SD" (Repeatability). [MODE] key····· Switches between 0.1% and 1% (measurement tolerance) while displaying "MW" (minimum weight). [PRINT] key····· Outputs the data being displayed. (Refer to "Example of repeatability output" or "Example of minimum weight (reference) output".) Pressing and holding the [PRINT] key (for 2 seconds)·····Outputs the measurement results in bulk. (Refer to "14.2.4. Example of bulk output for the set minimum weight".) Pressing and holding the [SAMPLE] key (for 2 seconds) ····Stores the minimum weight.



Error displays for repeatablity measurement

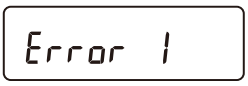


Load exceeding the capacity is applied.



Not enough load is applied.

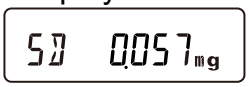
The balance resumes repeatability measurement once the error is resolved in either case.



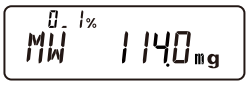
Weighing value unstable (for approx. 20 seconds) during repeatability measurement.

After this error is displayed, the balance forcibly ends the repeatability measurement and returns to function table mode.

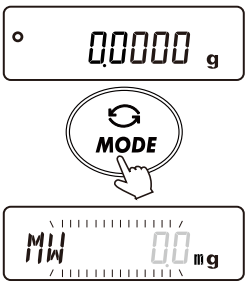
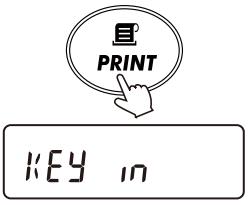
Example of repeatability output

Description
Display    Output SD␣␣␣␣+0.057 mg<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah

Example of minimum weight (reference) output

Description
Display    or    Output MW␣␣␣␣+114.0 mg<TERM> MW␣␣␣␣+11.4 mg<TERM> ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah

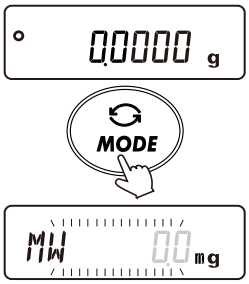
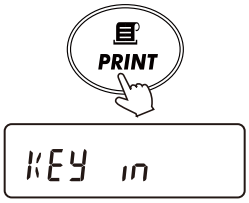
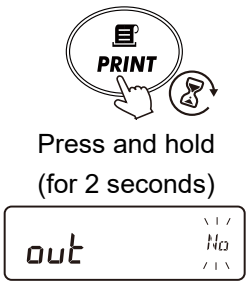
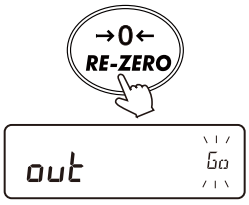
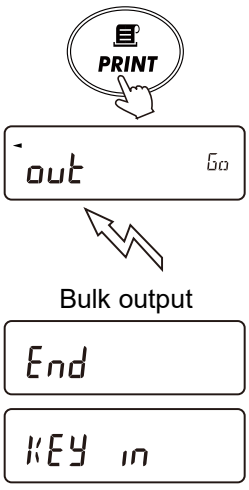
14.2.2. Checking and changing the set minimum weight

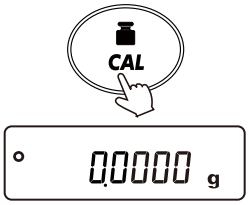
Step	Description	Display and key operations
1	In weighing mode, press the [MODE] key. The current minimum weight is displayed. To change the minimum weight, proceed to step 2.	
2	Press the [PRINT] key to show the display shown to the right.	
3	To enter the minimum weight using key input, refer to step 6 and onwards of "Direct key input (Entering minimum weight directly)".	
	To enter the minimum weight using repeatability with an external weight, refer to step 6 and onwards of "Input using repeatability with an external weight".	

14.2.3. Outputting the setting values in bulk

The set minimum weight and repeatability results can be output in bulk.

Setting method

Step	Description	Display and key operations
1	In weighing mode, press the [MODE] key. The current minimum weight is displayed.	
2	Press the [PRINT] key to show the display shown to the right.	
3	Press and hold the [PRINT] key (for 2 seconds).	
4	Use the [RE-ZERO] key to switch between "No" and "Go".	
5	Press the [PRINT] key while Go is blinking to output in bulk. For output examples, refer to "14.2.4. Example of bulk output for the set minimum weight".	

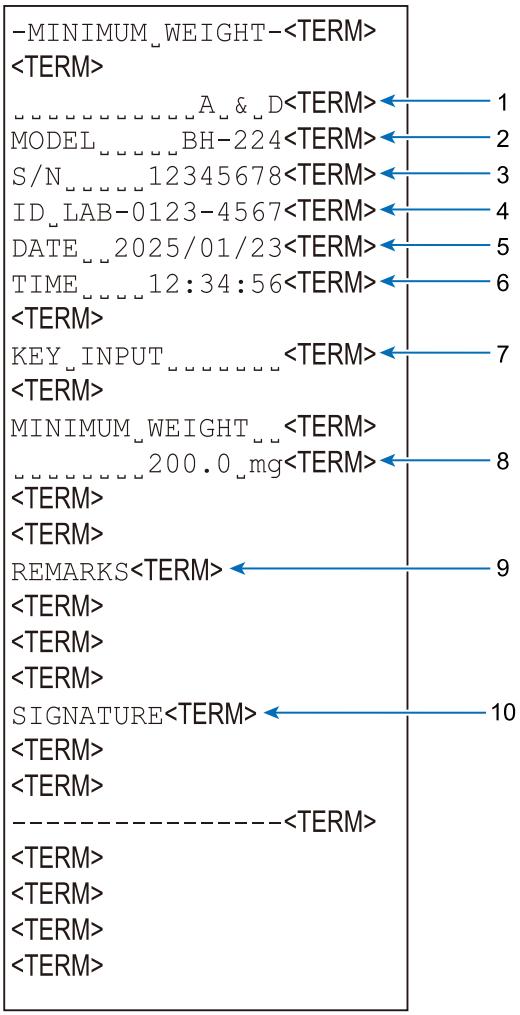
Step	Description	Display and key operations
6	Press the [CAL] key to return to weighing mode.	

14.2.4. Example of bulk output for the set minimum weight

The output content depends on the minimum weight setting method.

Example of bulk output when direct key input is used

Output



1	Manufacturer
2	Model
3	Serial number
4	ID number
5	Date
6	Time
7	Input method (Direct key input)
8	Parameter
9	Remarks
10	Signature

␣ : Space, ASCII 20h

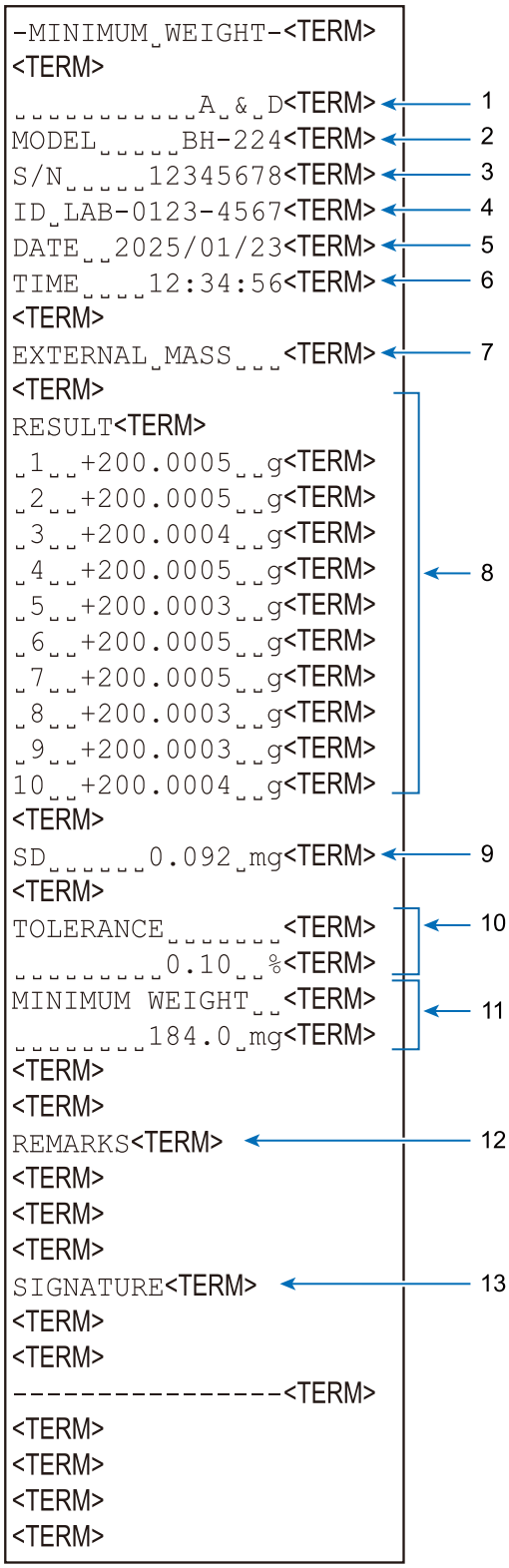
<TERM> :Terminator, CR LF or CR

CR : Carriage return, ASCII 0Dh

LF : Line feed, ASCII 0Ah

Example of bulk output when repeatability with an external weight is used

Output



1	Manufacturer
2	Model
3	Serial number
4	ID number
5	Date
6	Time
7	Measurement method (External weight)
8	Weighing results
9	Repeatability
10	measurement tolerance
11	Minimum weight (reference)
12	Remarks
13	Signature

␣ : Space, ASCII 20h

<TERM> :Terminator, CR LF or CR

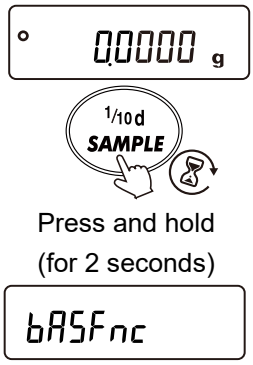
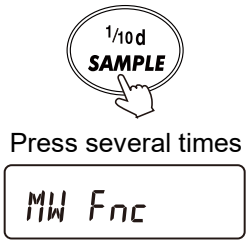
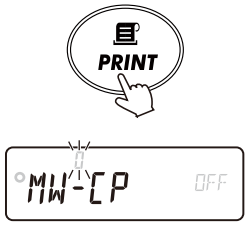
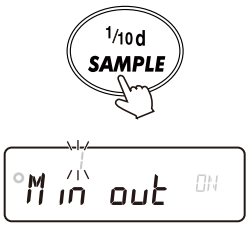
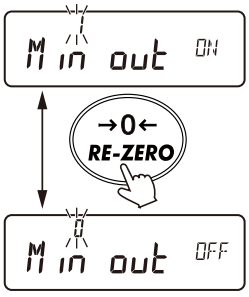
CR : Carriage return, ASCII 0Dh

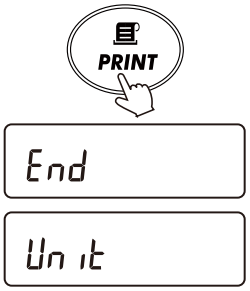
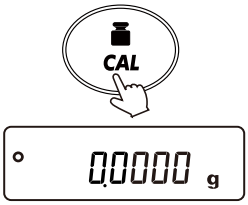
LF : Line feed, ASCII 0Ah

14.3. Data output when minimum weight is not reached.

The setting for "Min out" (Data output when minimum weight is not reached) under MW Fnc (Minimum weight alert function) in the function table ("10. Function Table") allows switching the data output on/off when the value is below the minimum weight.

Setting method

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key.	
4	Press the [SAMPLE] key several times to display "Min out" (Data output when minimum weight is not reached).	
5	Press the [RE-ZERO] key to select "1" (ON) or "0" (Disabled). **Tips** ❑ If "0" (Disabled) is selected, data will not be output when the weighing value is below the set minimum weight, even if the [PRINT] key is pressed in weighing mode.	

Step	Description	Display and key operations
6	Press the [PRINT] key to store the setting.	
7	Press the [CAL] key to return to weighing mode.	

15. Density (Specific Gravity) Measurement

The balance has a density mode that calculates the density of a solid or liquid from the weight in air and the weight in liquid.

We recommend using the AD-1653 Density Determination Kit (sold separately) for measurements. For assembly and installation instructions, refer to the AD-1653 Instruction Manual.

CAUTION

- ❑ Density mode is disabled by default. To use density mode, register the unit "dS" using the function table ("10. Function Table"). Refer to "10.5. Explanation for unit".
- ❑ Readability of weighing values is fixed in density mode.
- ❑ When density mode is enabled, dS Fnc (Density measurement function) will be displayed next to Unit (Unit). If density mode is not enabled, dS Fnc (Density measurement function) will not be displayed in the function table ("10. Function Table").
  First, register density mode using Unit (Unit) in the function table ("10. Function Table").
  When Density mode is enabled, dS Fnc (Density measurement function) will be displayed after Unit (Unit).
- ❑ For details on changing the function table ("10. Function Table"), refer to "15.1. Preparations before measurement".
- ❑ Density mode cannot be used simultaneously with the data memory function, minimum weight alert function, and Net/gross/tare function.

Density formula

- ❑ Density of a solid

  The density of a solid can be determined from the weight of the sample in air, the weight of the sample in liquid, and the density of the liquid.

$$\rho = \frac{A}{A-B} \times \rho_0$$

ρ	:	Density of sample	A	:	Weight of sample in air
ρ_0	:	Density of liquid	B	:	Weight of sample in liquid

- ❑ Density of a liquid

  Using a sinker with a known volume, the density of a liquid can be determined from the weight of the sinker in air, the weight of the sinker in liquid, and the volume of the sinker.

$$\rho = \frac{A-B}{V}$$

ρ	:	Density of sample	A	:	Weight of sinker in air
V	:	Volume of sinker	B	:	Weight of sinker in liquid

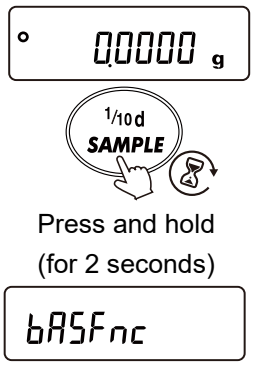
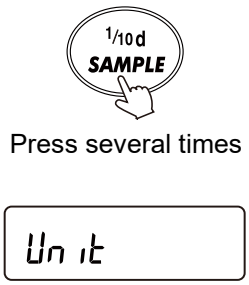
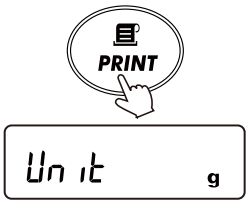
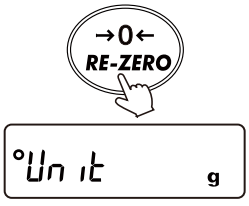
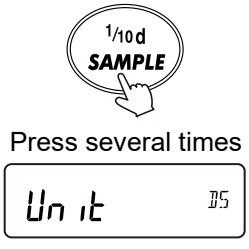
15.1. Preparations before measurement

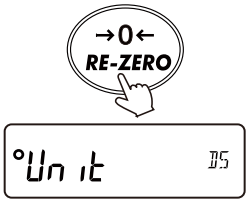
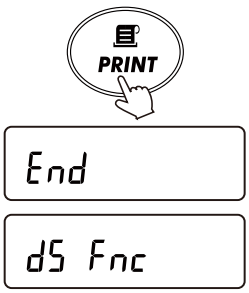
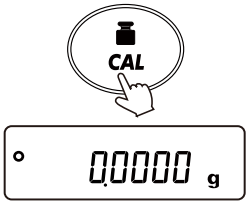
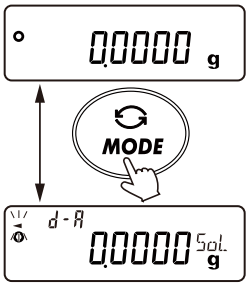
Prior to density (or specific gravity) measurement, change the function table of the balance as follows.

Storing "dS" (Density mode) for "Unit"

Register "dS" (Density mode) for [Unit] (Unit) in the function table ("10. Function Table").
The example below shows how to set the units in the order with "**g**" (gram) as the first unit followed by "dS" (Density mode).

Storing procedure (Changing function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to show the display shown to the right.	
4	Press the [RE-ZERO] key to specify the unit and display "o" (the stabilization indicator).	
5	Press the [SAMPLE] key several times until the display shown to the right appears.	

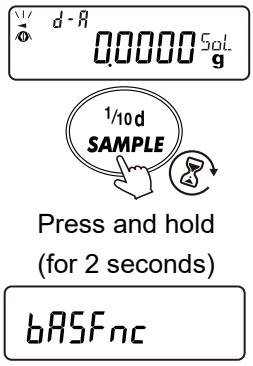
Step	Description	Display and key operations
6	Press the [RE-ZERO] key to specify the unit and display "o" (the stabilization indicator).	
7	Press the [PRINT] key to save the specified unit.	
8	To return to weighing mode, press the [CAL] key.	
9	Each time the [MODE] key is pressed, the unit switches in the specified order. g → d5 *1 *1 In density mode, the "d5" unit is displayed when density is calculated. In weight measurement in air mode (with ◄ blinking and "d-A" lit on the top left) and weight measurement in liquid mode (with "◄" lit and "d-b" lit on the top left), "g" is displayed.	

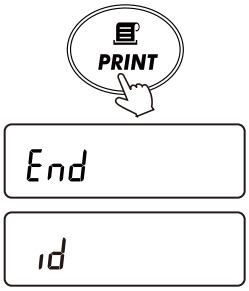
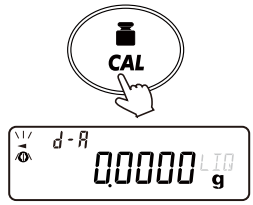
Sample selection

Select either solids or liquids as the sample to be measured.

The sample to be measured can be specified with "dS" (Density measurement mode) under dS Fnc (Density measurement function) in the function table ("10. Function Table").

Selecting method

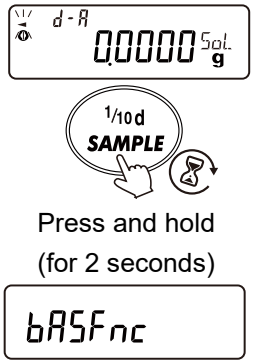
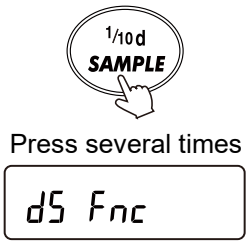
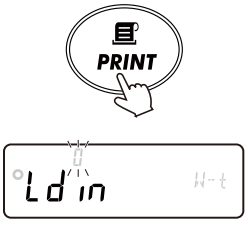
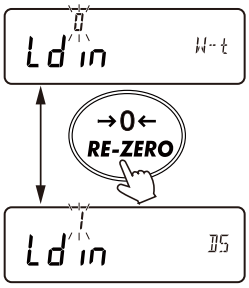
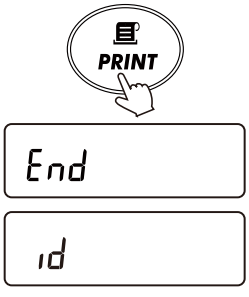
Step	Description	Display and key operations
10	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	 Press and hold (for 2 seconds) bASFnc
11	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times dS Fnc
12	Press the [PRINT] key.	 Ld in W-t
13	Press the [SAMPLE] key to display "dS" (Density measurement mode).	 dS So LID
14	Press the [RE-ZERO] key to select either "0" (Solids) or "1" (Liquids) as the parameter for "dS" (Density measurement mode).	dS 0 So LID  dS 1 LIQUID

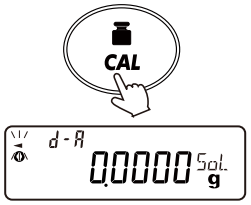
Step	Description	Display and key operations
15	Press the [PRINT] key to store the setting.	
16	Press the [CAL] key to return to weighing mode. Depending on the setting value of step 14, the following operations differ.	
17	When "dS" = 0 (Solids): Proceed to step 18 of ‘Selecting "Liquid density input" for solid density (specific gravity) measurement’.	
	When "dS" = 1 (Liquids): The preliminary setting is complete. Proceed to step 18 of "15.3. Measuring the density (specific gravity) of a liquid"	

Selecting "Liquid density input" for solid density (specific gravity) measurement

Continued from step 17 of "Sample selection".

Selecting method

Step	Description	Display and key operations
18	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
19	Press the [SAMPLE] key several times until the display shown to the right appears.	
20	Press the [PRINT] key.	
21	Press the [RE-ZERO] key to select either "0" (Water temperature) or "1" (Density input)" as the parameter for "Ld in" (Liquid density input)".	
22	Press the [PRINT] key to store the setting.	

Step	Description	Display and key operations
23	Press the [CAL] key to return to weighing mode. Proceed to "15.2. Measuring the density (specific gravity) of a solid".	

15.2. Measuring the density (specific gravity) of a solid

The following describes the operation when "0" (Solids) is set for "dS" (Density measurement mode) under [dS Fnc] (Density measurement function) in the function table ("10. Function Table"). For the setting method, refer to "15.1. Preparations before measurement".

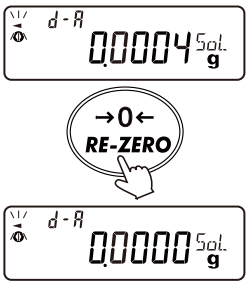
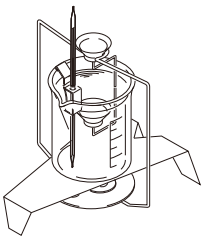
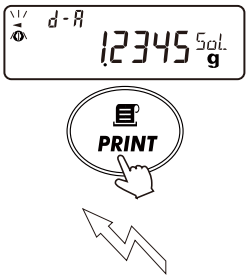
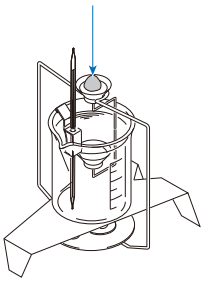
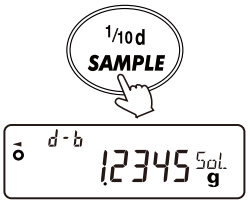
CAUTION

- ❑ In density (specific gravity) display, the 4 digits after the decimal point are fixed. The readability cannot be changed with the [SAMPLE] key.
- ❑ In density (specific gravity) measurement, the density is fixed and displayed according to weight in air measurement and weight in liquid measurement.

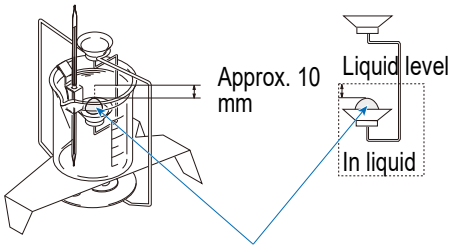
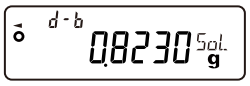
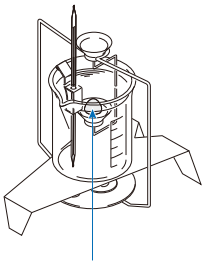
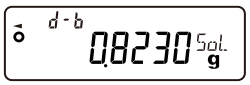
Measurement procedure

In the following example, the AD-1653 Density Determination Kit is used.

Weight in air measurement mode

Step	Description	Display and key operations	Weighing operation
1	Confirm the weight in air measurement mode ("d-A" lit, ◄ blinking): Press the [RE-ZERO] key with nothing on the weighing pan in air to set the display to zero.		
2	Place a sample on the weighing pan in air and wait for the display to stabilize. To output the sample weight, press the [PRINT] key. **Output example with PC: Weight in air** A&D standard format (factory setting) ST,+0001.2345␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Weighing data output	Sample in air 
3	Press the [SAMPLE] key to confirm the weight in air and switch to "Weight in liquid measurement mode" ("d-b" lit, "◄ " lit). **CAUTION** ❑ If [ε] (overload error) is displayed, the [SAMPLE] key does not work.		

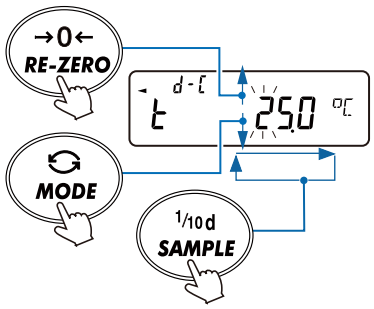
Weight in liquid measurement mode

Step	Description	Display and key operations	Weighing operation
4	Transfer the sample from the weighing pan in air to the weighing pan in liquid and wait for the display to stabilize. ("d-b" lit, "◄ " lit) At this time, adjust so that the sample is about 10 mm below the liquid level.  Sample in liquid	 	 Sample in liquid
5	To output the sample weight, press the [PRINT] key. **Output example with PC: Weight in liquid** A&D standard format (factory setting) `T,+0000.8230␣␣g<TERM>` ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	  Weighing data output	
6	Press the [SAMPLE] key to confirm the weight in liquid and switch to "Liquid density input mode" ("d-L" lit, "◄ " lit). Depending on the setting for "Ld in" (Liquid density input) under [dS Fnc] (Density measurement function) in the function table ("10. Function Table"), the "Liquid density input mode" differs. **CAUTION** ❑ If [E] (overload error) is displayed, the [SAMPLE] key does not work.	 	

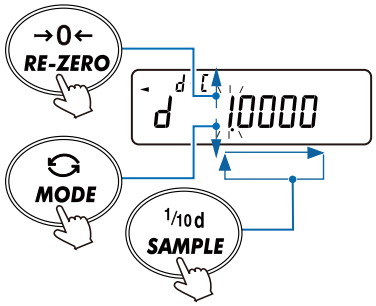
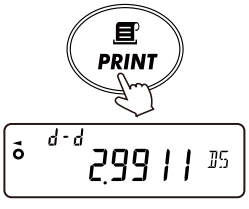
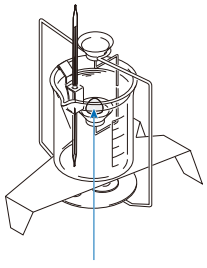
Liquid density input mode

<table>
<tr><th>Step</th><th>Description</th><th>Display and key operations</th><th>Weighing operation</th></tr>
<tr><td>7</td><td>When "Ld in" = 0 (Water temperature):

The currently set water temperature is displayed.
(The factory setting: 25.0 °C)
For relationship between water temperature and water density, refer to "Water temperature and density correspondence table".
The setting range is from 0.0 °C to 99.9 °C, with increments of 0.1 °C.

[RE-ZERO] key ····· Changes (+1) the water temperature.
("0" reappears after "9".)
[MODE] key ····· Changes (−1) the water temperature.
("9" reappears after "0".)
[SAMPLE] key ····· Selects the digits to blink.</td><td colspan="2"> 
</td></tr>
<tr><td></td><td>When "Ld in = 1 (Density input) ":

The currently set density is displayed.
(The factory setting: 1.000 g/cm³)
The parameter for density can be changed with the key operations explained below.
The setting range is from 0.000 g/cm³ to 1.999 g/cm³.

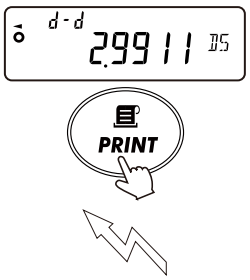
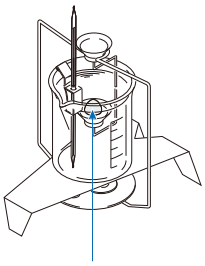
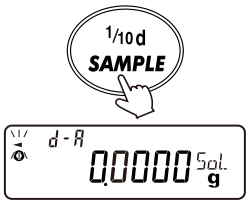
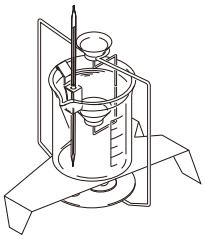
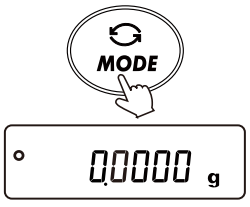
[RE-ZERO] key ····· Changes (+1) the density
("0" reappears after "9".)
[MODE] key ····· Changes (−1) the density
("9" reappears after "0".)
[SAMPLE] key ····· Selects the digits to blink.</td><td colspan="2"> 
</td></tr>
<tr><td>8</td><td>Press the [PRINT] key to switch to "Solid density display mode" ("d-d" lit, "◄ " lit).</td><td> 
</td><td> 
Sample in liquid</td></tr>
</table>

Water temperature and density correspondence table

°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

g/cm^3

Solid density display mode

Step	Description	Display and key operations	Weighing operation
9	When a density is displayed, pressing the [PRINT] key outputs the density. The density (specific gravity) unit is "DS". **Output example with PC: Density (specific gravity)** A&D standard format (factory setting) ST,+0002.9911␣DS<TERM> ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Weighing data output	 Sample in liquid
10	To measure another sample, press the [SAMPLE] key to start from step 1 in "Weight in air measurement mode" ("d-A" lit, ☀ blinking).		
11	If the temperature of the liquid changes during measurement or when the type of liquid is changed, reset the density of the liquid by referring to "Liquid density input mode" as necessary.		
12	To switch to another weighing mode, press the [MODE] key.		

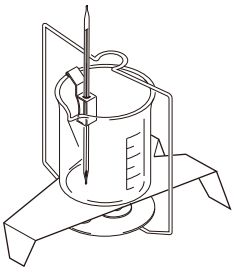
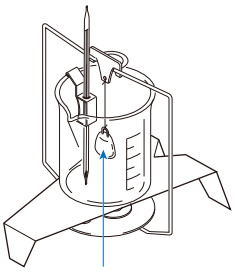
15.3. Measuring the density (specific gravity) of a liquid

The following describes the operation when "i" (Liquids) is set for "dS" (Density measurement mode) under [dS Fnc] (Density measurement function) in the function table ("10. Function Table"). For the setting method, refer to "15.1. Preparations before measurement".

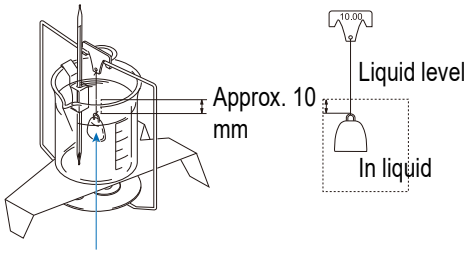
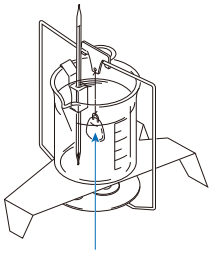
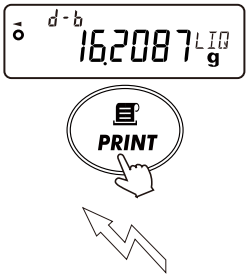
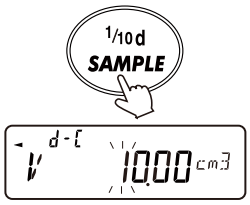
CAUTION

- ❑ In density (specific gravity) display, the 4 digits after the decimal point are fixed. The readability cannot be changed with the [SAMPLE] key.
- ❑ In density (specific gravity) measurement, the density is fixed and displayed according to weight in air measurement and weight in liquid measurement.

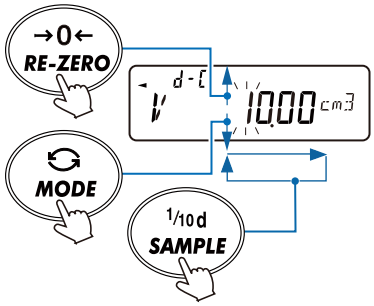
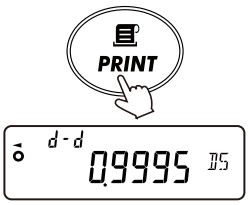
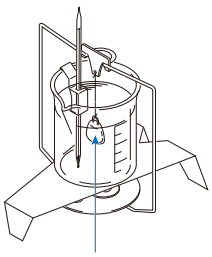
Weight in air measurement mode

Step	Description	Display and key operations	Weighing operation
1	Confirm the weight in air measurement mode ("d-A" lit, ◄ blinking): Press the [RE-ZERO] key with nothing placed to set the display to zero.	d-A 0.0003 LIO g →0← RE-ZERO d-A 0.0000 LIO g	
2	Place a sinker and wait for the display to stabilize. To output the sinker weight, press the [PRINT] key. **Output example with PC: Weight in air** A&D standard format (factory setting) ST,+0026.2034␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	d-A 26.2034 LIO g PRINT Weighing data output	 Sinker in air
3	Press the [SAMPLE] key to confirm the weight in air and switch to "Weight in liquid measurement mode" ("d-b" lit and "◄ " lit). **CAUTION** ❑ If [E] (overload error) is displayed, the [SAMPLE] key does not work.	1/10d SAMPLE d-b 26.2034 LIO g	

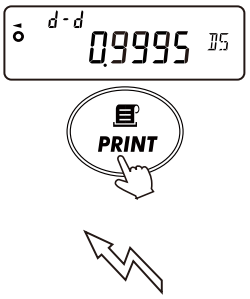
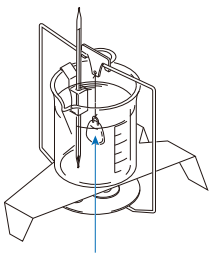
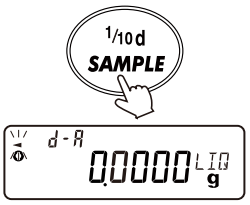
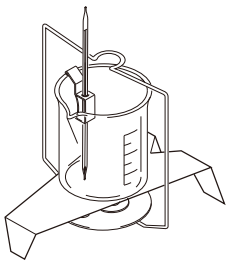
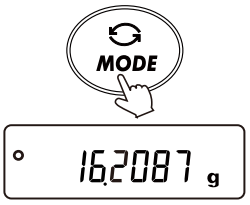
Weight in liquid measurement mode

Step	Description	Display and key operations	Weighing operation
4	For density measurement, put the liquid in the beaker and sink the sinker. ("d-b" lit, "◄ " lit) At this time, adjust so that the sinker is about 10 mm below the liquid level.  Sinker in liquid		 Sinker in liquid
5	Wait for the display to stabilize. To output the sample weight, press the [PRINT] key. **Output example with PC: Weight in liquid** A&D standard format (factory setting) ST,+0016.2087␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Weighing data output	
6	Press the [SAMPLE] key to confirm the weight in liquid and switch to "Sinker volume input mode" ("d-C" lit, "◄ " lit). CAUTION ❑ If E (overload error) is displayed, the [SAMPLE] key does not work.		

Sinker volume input mode

Step	Description	Display and key operations
7	Input the volume of the sinker: The currently set volume of the sinker is displayed. (Factory setting is 10.00 cm^3). The parameter can be changed with the key operations explained below. The setting range is from 0.01 cm^3 to 99.99 cm^3, with increments of 0.01 cm^3. [RE-ZERO] key ····· Changes (+1) the blinking value. ("0" reappears after "9".) [MODE] key ····· Changes (−1) the blinking value. ("9" reappears after "0".) [SAMPLE] key ····· Selects the digits to blink	
8	Press the [PRINT] key to switch to "Liquid density display mode" ("d-d" lit, "◄ " lit).	  Sinker in liquid

Liquid density display mode

Step	Description	Display and key operations	Step
9	When the density is displayed, pressing the [PRINT] key outputs the density. **Output example with PC: Density (specific gravity)** A&D standard format (factory setting) ST,+0000.9995␣DS<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Weighing data output	 Sinker in liquid
10	To measure another sample, press the [SAMPLE] key to start from "Weight in air measurement mode" ("d-A" lit, ✳ blinking).		
11	To switch to other weighing mode, press the [MODE] key.		

16. Password Function

Intended use

❑ The password function allows you to restrict the use and functions of the balance.
It is effective in preventing falsification of date and time settings or preventing changes in the function table by the user.

Input

❑ Enter a 4-digit password using the five keys. 625 combinations are available (5 x 5 x 5 x 5 = 625).
Five keys: [MODE], [SAMPLE], [PRINT], [TARE], [RE-ZERO]

Function settings

❑ The password function is disabled by default at the factory settings.
You can enable or disable the password function and register passwords in the internal table ("10. Function Table").
Two types of settings are available for "PW" (Password function) under PASSwd (Password lock) in the function table ("10. Function Table").

Parameter	Function
PW = 0	Password function ON
PW = 1	Password function OFF (Administrator password required to change the settings)

PW = 0: Password function ON

❑ The password function is not used. The balance can be used for weighing operations by anyone. All functions are available.

PW = 1: Password function OFF (Administrator password required to change the settings)

❑ The Administrator (ADMIN) can limit users of the balance by setting individual passwords.
The factory default password for the Administrator (ADMIN) is set to four presses of the [RE-ZERO] key.
The display will show "7777".

❑ With the display turned off, pressing the [ON:OFF] key while pressing and holding the [CAL] key will prompt the user to enter a password before starting weighing.

❑ To execute a disabled function, you will be prompted to enter a password and required to log in. Then, logging in with an allowed user is necessary.

❑ There are three login levels: Administrator (ADMIN), User (USER 01 to USER 10), and Guest (GUEST).

Login level	Description
Administrator (ADMIN)	All functions and settings are available.
User (USER 01 to USER 10)	Restrictions can be set for each user for setting changes, including the clock, and operations such as sensitivity adjustment and initialization.
Guest (GUEST) - No password required	Only weighing operations are available.

Usage availability by login level

Login level	Administrator (ADMIN)	User (USER 01 to USER 10)	Guest (GUEST)
Weighing operation	Enabled		
Internal weight value	Enabled*2	Selectable	Disabled
Automatic sensitivity adjustment			
Sensitivity adjustment using an external weight			
Sensitivity adjustment using the internal weight			
Function table*1			
Initialization	Enabled	Disabled	

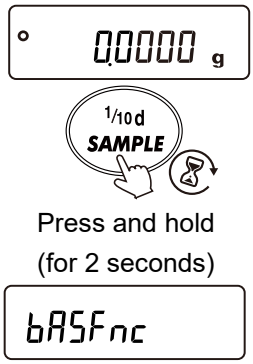
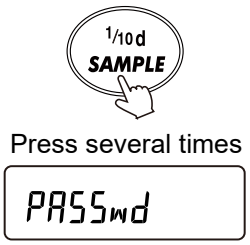
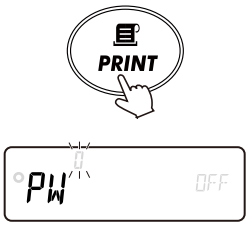
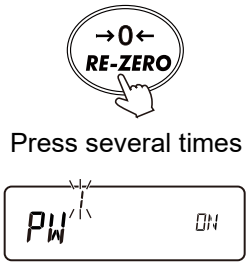
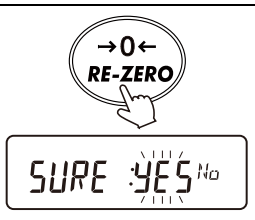
*1 Only the Administrator (ADMIN) can enable or disable the password function.

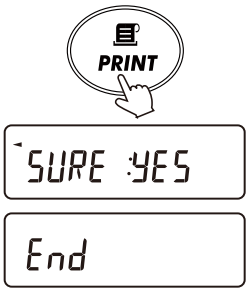
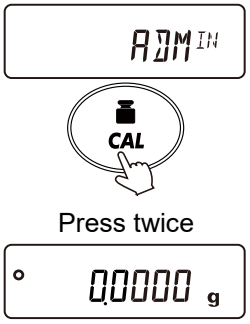
*2 Enabling/disabling the Administrator (ADMIN) is set as described in "9.1. Function selection switch". Refer to "9.1. Function selection switch".

16.1. Preparations for password function

"PW" (Password function) under PASSwd (Password lock) in the function table ("10. Function Table") allows switching between "0" (Disabled) and "1" (ON).

Enabling the password function (Changing the function table)

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to display "PW" (Password function). (To cancel, press the [CAL] key.)	
4	Press the [RE-ZERO] key to display "1" (ON).	
5	Press the [PRINT] key to show the display shown to the right. (No blinks when "No" is selected.)	
6	Use the [RE-ZERO] key to toggle between "YES" and "No". Set YES to blink.	

Step	Description	Display and key operations
7	Press the [PRINT] key while YES is blinking to enable the password function.	
8	The display shown to the right appears. To return to weighing mode without registering (changing) a password, press the [CAL] key twice. To register (change) the password, proceed to step 5 of "16.2. Registering (changing) the password".	

16.2. Registering (changing) the password

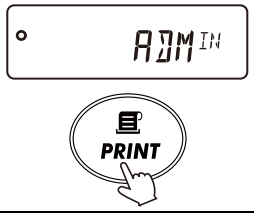
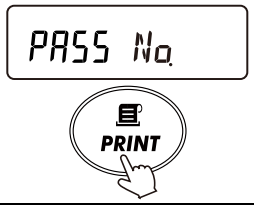
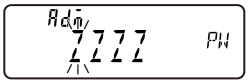
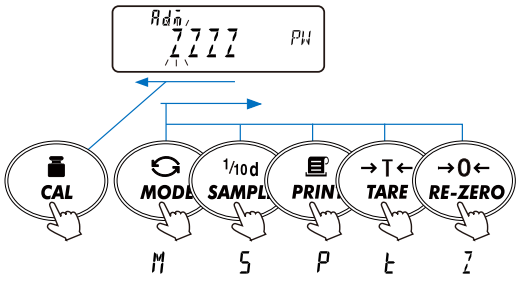
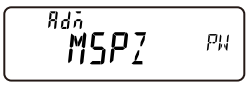
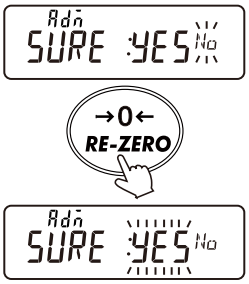
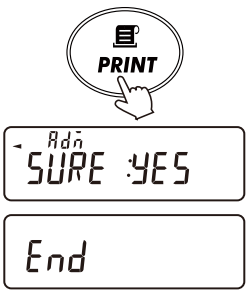
The "PASS No" (Password No.) setting under PASSwd (Password registration) in the function table ("10. Function Table") allows for registering (changing) the password.

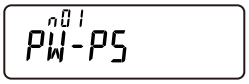
CAUTION

- ❑ Pressing the [ON:OFF] key turns off the display and logs out the user.
- ❑ If the password is lost or forgotten, the balance will become unusable. Be sure to record, save and manage the registered passwords.
- ❑ Users (USER 01 to USER 10) cannot register a password that is already registered for the Administrator (ADMIN).
- ❑ For instructions on deleting the password, refer to "16.5. Deleting the User password".

Method for registering (changing)

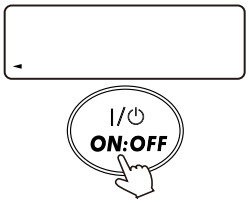
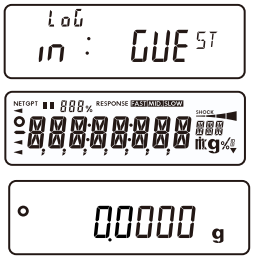
Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	0.00000 g  Press and hold (for 2 seconds) bASFnc
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times PASSwd
3	Press the [PRINT] key to display "PW" (Password function).	 PW OFF
4	Press the [SAMPLE] key to display the login level you want to change. In this example, "ADMIN" (Administrator) is displayed. When a password is registered for the login level, "o" (the stability indicator) will be displayed. The password can be changed.	 Press several times USER 01 ⟆ USER 10 ADMIN

Step	Description	Display and key operations
5	With the desired login level displayed, press the [PRINT] key. This example explains how to change the password for the Administrator (ADMIN).	
6	Press the [PRINT] key.	
7	The current password is displayed. (The factory default password for the Administrator (ADMIN) is set to "7777", which is entered by pressing the [RE-ZERO] key four times.)	
8	Enter a 4-digit password using the following keys. Note that the display will automatically turn off after 10 minutes of inactivity. [MODE] key ····· M Input [SAMPLE] key ····· S Input [PRINT] key ····· P Input [TARE] key····· t Input [RE-ZERO] key····· 7 Input [CAL] key ····· Back key 10 minutes of inactivity ····· Display off	
9	After entering the four digits with the keys, the new password will be displayed.	
10	Use the [RE-ZERO] key to toggle between "YES" and "No". Set YES to blink.	
11	Press the [PRINT] key while YES is blinking to register the password.	

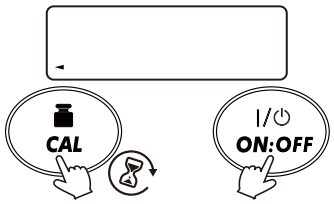
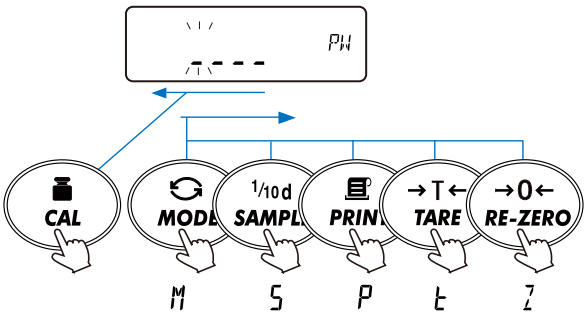
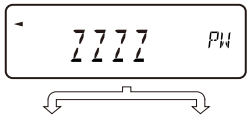
Step	Description	Display and key operations
12	The setting process is complete. The next item, Password Prohibition Selection, will be displayed. To continue setting the function selection, refer to "16.7. Password prohibition selection".	
13	To exit the setting mode and return to weighing mode, press the [CAL] key three times.	 Press three times 

16.3. Login method

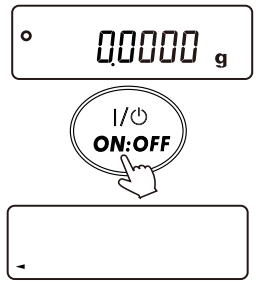
Logging in at the Guest (GUEST) level

Step	Description	Display and key operations
1	With the display turned off, press the [ON:OFF] key.	
2	The balance will show the displays shown to the right and enter weighing mode.	

Logging in at the Administrator (ADMIN) or User (USER) level

Step	Description	Display and key operations
1	With the display turned off, press and hold the [CAL] key and press the [ON:OFF] key.	 While pressing and holding
2	The display will prompt for password entry.	
3	Enter a 4-digit password using the following keys. Note that the display will automatically turn off after 10 minutes of inactivity. [MODE] key ····· M Input [SAMPLE] key ····· S Input [PRINT] key ····· P Input [TARE] key····· t Input [RE-ZERO] key····· 7 Input [CAL] key ····· Back key 10 minutes of inactivity ····· Display off	
4	When the correct password is entered, the login level is displayed, followed by all segments/indicators, and then the weighing display. Entering the Administrator password will log you in as the administrator. The Administrator (ADMIN) password at the factory default setting has been set to "7777" (four presses of the [RE-ZERO] key). If the password is incorrect, the buzzer sounds three times with FAIL displayed, and then the display turns off.	 Correct password Incorrect password  Buzzer sounds three times.  Display off  Weighing display

16.4. Logging out

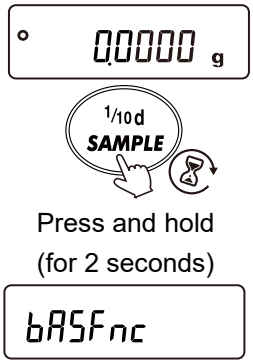
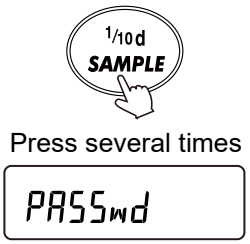
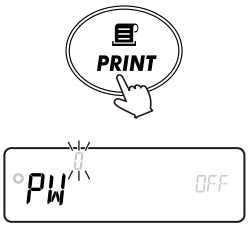
Step	Description	Display and key operations
1	Pressing the [ON:OFF] key turns off the display and logs out the user.	

16.5. Deleting the User password

CAUTION

❑ The Administrator (ADMIN) password cannot be deleted. Refer to "16.2. Registering (changing) the password" to change to a desired password.

Deleting method

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	
2	Press the [SAMPLE] key several times until the display shown to the right appears.	
3	Press the [PRINT] key to display "PW" (Password function).	

Step	Description	Display and key operations
4	Press the [SAMPLE] key to display the login level you want to change. In this example, "USER 01" (User 01) is displayed. When a password is registered for the login level, "o" (the stability indicator) will be displayed.	 Press several times 
5	Press the [PRINT] key.	 
6	Press the [PRINT] key. The current password is displayed.	 
7	Press and hold the [CAL] key (for 2 seconds) until the display shown to the right is displayed.	 Press and hold (for 2 seconds) 
8	Press the [PRINT] key to show the display shown to the right.	 
9	Use the [RE-ZERO] key to switch between "Go"/"No".	 
10	Press the [PRINT] key while Go is blinking to delete the password.	  

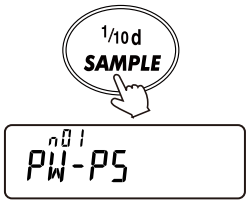
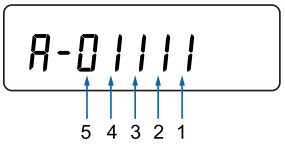
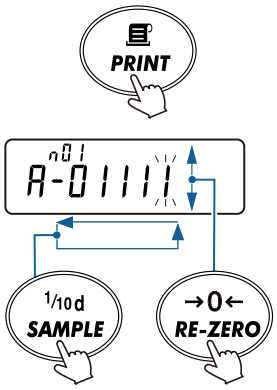
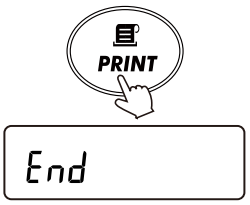
16.6. If the Administrator password is lost or forgotten

If the password is lost or forgotten, the balance cannot be used.

Password reset must be done at the manufacturer. Contact your local A&D dealer for repairs.

16.7. Password prohibition selection

Function selection method

Step	Description	Display and key operations
1	Refer to "16.2. Registering (changing) the password" to select Administrator (ADMIN)*1 or User (USER 01 to USER 10) and to display PASS No.	
2	Press the [SAMPLE] key. For the Administrator (ADMIN), PS is displayed. For the User (USER 01 to USER 10), n01-PW PS is displayed.	
3	Press the [PRINT] key. Select the function using the following keys. [SAMPLE] key ····· Selects the blinking digit (switch). [RE-ZERO] key ····· Selects a parameter for the blinking switch setting. 0 : Prohibit changes/Prohibit use 1 : Allow changes/Allow use Function selection switch  	
4	Press the [PRINT] key to save the setting. The display will return to PS or n01-PW PS. (To cancel the process, press the [CAL] key. The display will return to PS or n01-PW PS. To return to weighing mode, press the [CAL] key again.)	

Function selection switch

No.	Name	Parameter		Description
1	Function table		0	Prohibit changes to the function table.
		■	1	Allow changes to the function table.
2	Sensitivity adjustment using the internal weight		0	Prohibit sensitivity adjustment using the internal weight. *1
		■	1	Allow sensitivity adjustment using the internal weight.
3	Sensitivity adjustment using an external weight		0	Prohibit sensitivity adjustment using an external weight. *1
		■	1	Allow sensitivity adjustment using an external weight.
4	Automatic Sensitivity Adjustment		0	Prohibit automatic sensitivity adjustment.
		■	1	Allow automatic sensitivity adjustment.
5	Internal weight value correction	■	0	Prohibit internal weight value correction
			1	Allow internal weight value correction

■ Factory setting

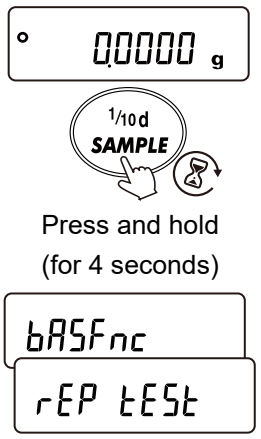
*1 The function selection for Administrator (ADMIN) is shared with the settings described in "9.1. Function selection switch". If either is switched to allow or prohibit, the change will be reflected in both. In addition, functions prohibited by the Administrator (ADMIN) are prohibited for all users (USER 01 to USER 10).

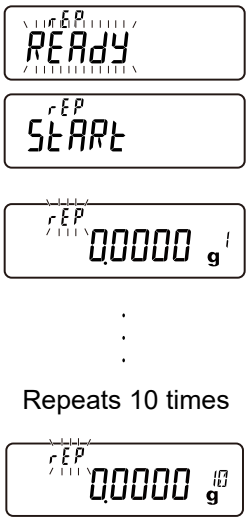
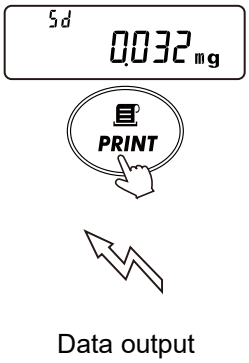
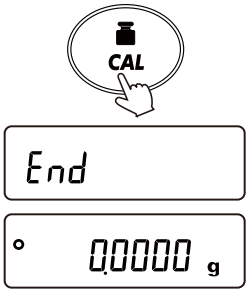
17. Repeatability Check Function

- ❑ Repeatability is an index of variation in measured values when the same mass is repeatedly loaded and unloaded, and is usually expressed as the standard deviation (n-1).
- ❑ The repeatability check function uses the internal weight to perform 10 measurements in order to calculate and display the standard deviation.
  This function allows you to verify the repeatability of the balance in its installation environment.
  Example: "Standard deviation = 0.0002 g" shows that the results of repeated measurements of the same sample fall within the range of ±0.0002 g with a frequency of about 68%.

CAUTION

- ❑ The result of this function uses the internal weight of the balance (approximately 200 g). Since this differs from the repeatability conditions in "29. Specifications", please treat it as a reference value.
- ❑ To ensure accurate data measurement, avoid applying vibration or drafts while collecting data.
- ❑ If the password lock function is enabled, this function is only available to the Administrator (ADMIN).
- ❑ The BH-124 can not use this function.

Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 4 seconds) until the display transitions as shown to the right.	 Press and hold (for 4 seconds)
2	When the display shown to the right appears, release your finger from the [SAMPLE] key.	

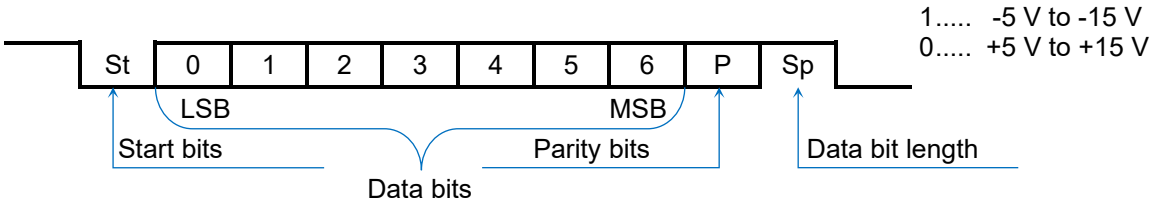
Step	Description	Display and key operations
3	When [rEP READY] is displayed, the display transitions as shown to the right, and data collection starts automatically. rEP is blinking while data is being collected. To cancel the process, press the [CAL] key. [CANCEL] appears and the balance returns to weighing mode.	
4	When data collection is completed, the repeatability (standard deviation) is displayed. To output the result, press the [PRINT] key. The repeatability will be output. PC output example (WinCT, RsCom) SD␣␣␣␣␣+0.032␣mg<TERM> ␣ : Space, ASCII 20h <TERM> :Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	
5	Press the [CAL] key to return to weighing mode.	

18. Interface Specification

18.1. RS-232C

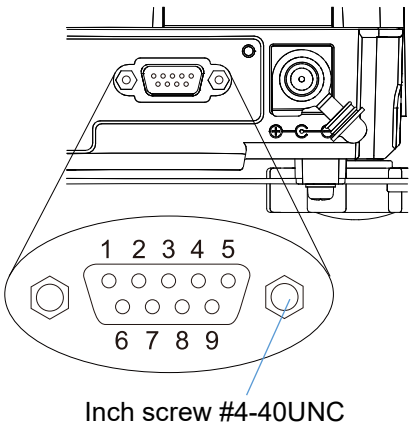
Connector:	D-Sub 9-pin (male)	
Transmission system:	EIA RS-232C	
Transmission form:	Asynchronous, bi-directional	
Transmission rate:	Approx. 5 times/second (5 Hz) or approx. 10 times/second (10 Hz)	
	(Linked with "SPd" under bASFnc in the function table (”10. Function Table”).	
Signal format:	Baud rate	600, 1200, 2400, 4800, 9600, 19200, 38400 bps
	Data bits	7 bits or 8 bits
	Parity	EVEN or ODD (at a data bit length of 7 bits)
		NONE (at a data bit length of 8 bits)
	Data bit length	1 bit
	Code	ASCII

1-character format (when data bit length is 7 bits)



D-Sub 9-pin assignments

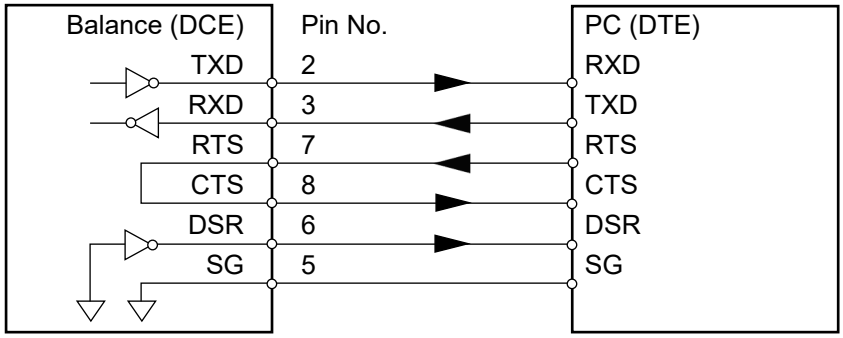
Pin No.	Signal name	Direction	Description
1	-	-	Same potential as SG *1
2	TXD	Output	Transmit data
3	RXD	Input	Receive data
4	-	-	No connection
5	SG	-	Signal ground
6	DSR	Output	Data set ready
7	RTS	Input	Request to send
8	CTS	Output	Clear to send
9	-	Output	12 V output *1



*1 Used with some A&D peripherals. Do not connect to third-party product that is supplying power. Ensure a compatible cable is used, as using the wrong connection cable may damage the device.

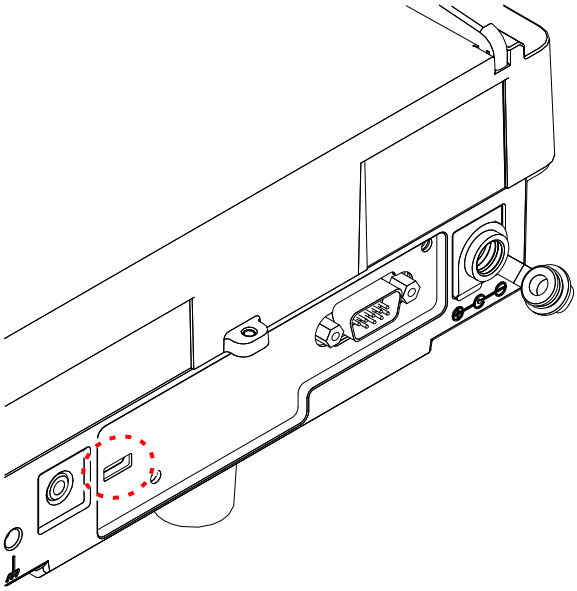
Signal names other than TXD and RXD are designated on the DTE side.

Wiring diagram (when connected to a PC)



18.2. USB

Connector: Type-C
Specification: USB 2.0
Device class: Human Interface Device (HID), Quick USB Communication Device Class (CDC), Virtual COM



CAUTION

- ❑ Power cannot be supplied from a USB AC adapter or mobile battery.
  Do not connect a USB AC adapter or mobile battery, as it may cause malfunction.
- ❑ USB Type-C USB flash drives cannot be used.
- ❑ Power cannot be supplied from the balance to external devices.

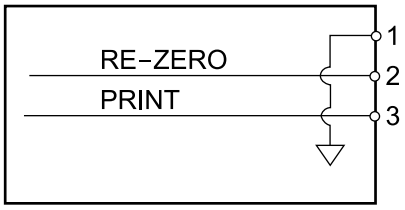
18.3. External input terminal

- ❑ The external input terminal provides the function of the "[RE-ZERO] key input" or "[PRINT] key input" on the balance or "Opening and closing the breeze break door(s)" to the "contact input" via the wire extended from the connected plug.
- ❑ To turn the "contact input" on, short it for 100 ms or more.
- ❑ To use the external input terminal, select the function with "EXSW" (External input) in the function table ("10. Function Table").
- ❑ The following optional accessories are available.
  AX-SW137-PRINT (sold separately): Foot switch for the [PRINT] key.
  AX-SW137-REZERO (sold separately): Foot switch for the [RE-ZERO] key.
- ❑ For the plug connected to the external input terminal, use a 3.5 mm stereo plug MP-013LC (Marushin Electric Mfg. Co., Ltd) or an equivalent product.

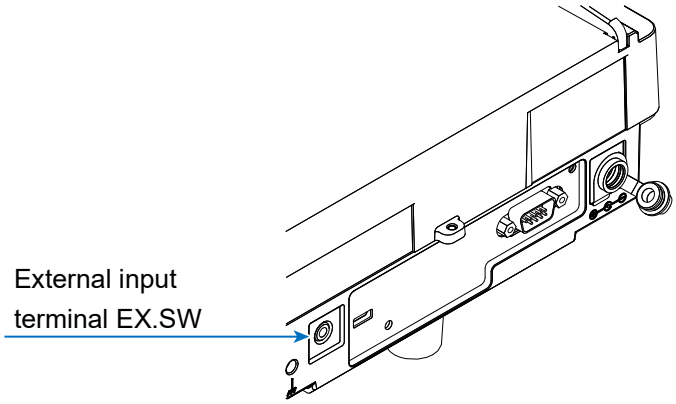
CAUTION

- ❑ Plugs are not included. If you choose to prepare the plug yourself, you will need to solder the plug, wire, switch, and other components.

Circuit diagram of external input terminal



External input terminal

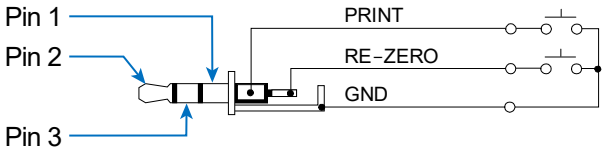


Example of compatible plug

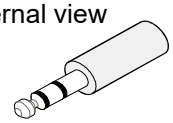
Pin assignment

Pin	Description
1	GND: Common ground terminal
2	RE−ZERO: External contact input
3	PRINT: External contact input

Circuit diagram



External view



Information. Balance function table, "ExSW" (External switch)

Class	Item	Parameter	Description	
ExSW External switch [21]	SW External switch function selection	■ 0	[RE-ZERO]/[PRINT] key*	* The AX-SW137-PRINT (sold separately) functions as the [PRINT] key on the balance when connected. The AX-SW137-REZERO (sold separately) functions as the [RE-ZERO] key on the balance when connected.
		1	Opens/closes the breeze break door(s)	

■ Factory setting

19. Connection with Peripheral Devices

BH series analytical balances are equipped with an RS-232C connector and a mini-B USB connector, allowing connection to peripherals, PCs, PLCs, and other devices for data transmission and reception.

19.1. Cables required to connect to peripheral devices

The connection cables compatible with the interface used for peripheral devices are listed in the peripheral and connection cable compatibility table below.

Peripheral and connection cable compatibility table

<table>
<tr><th colspan="2">Peripherals</th><th rowspan="2">Communication interface to use</th><th colspan="2">Connection cable</th><th rowspan="2">Note</th></tr>
<tr><th>Product name</th><th>Model</th><th>Standard accessory or sold separately</th><th>Cable model</th></tr>
<tr><td>Multi-functional compact printer</td><td>AD-8127</td><td rowspan="8">RS-232C</td><td rowspan="2">[Standard accessory]
RS-232C cable included with the printer</td><td rowspan="2">AX-KO2741-100</td><td rowspan="2">*1</td></tr>
<tr><td>Thermal printer</td><td>AD-8129TH</td></tr>
<tr><td>Remote display</td><td>AD-8920A</td><td rowspan="2">[Standard accessory]
RS-232C cable included with the remote display/controller</td><td>AX-KO3412-100</td><td>*2</td></tr>
<tr><td>Remote controller</td><td>AD-8922A</td><td>AX-KO2466-200</td><td>*2</td></tr>
<tr><td rowspan="2">Expansion controller for production line weighing system</td><td>AD-8923-BCD</td><td rowspan="3">[Sold separately]</td><td rowspan="3">AX-KO2466-200</td><td rowspan="2"></td></tr>
<tr><td>AD-8923-CC</td></tr>
<tr><td>PLC</td><td></td><td rowspan="2"></td><td>*3</td></tr>
<tr><td rowspan="2">PC</td><td rowspan="2"></td><td>*4</td></tr>
<tr><td>USB</td><td>[Standard accessory]
USB cable included with the balance</td><td>AX-KO7919-200</td><td></td></tr>
</table>

*1 When using the AD-8529PR-W (*Bluetooth*® converter, sold separately), the RS-232C cable included with the printer is not used.

*2 5 m and 10 m cables are also available (sold separately).

*3 Check the interface specifications of the BH series and PLC, and prepare a compatible cable.

*4 Can be connected to a PC using AX-USB-9P, AD-8541-SCALE, AD-1688, or AD-8527.
The connection cable included with these products can be used when transferring data.

19.2. Data output mode

You can adjust the operation of the balance by changing the function table settings to match the intended use.
Details on the function table, refer to "10. Function Table".

Output mode for weighing data via the RS-232C/USB interface

Specify the mode using "PrE" (Data output mode) under doUt (Data output) in the function table ("10. Function Table").

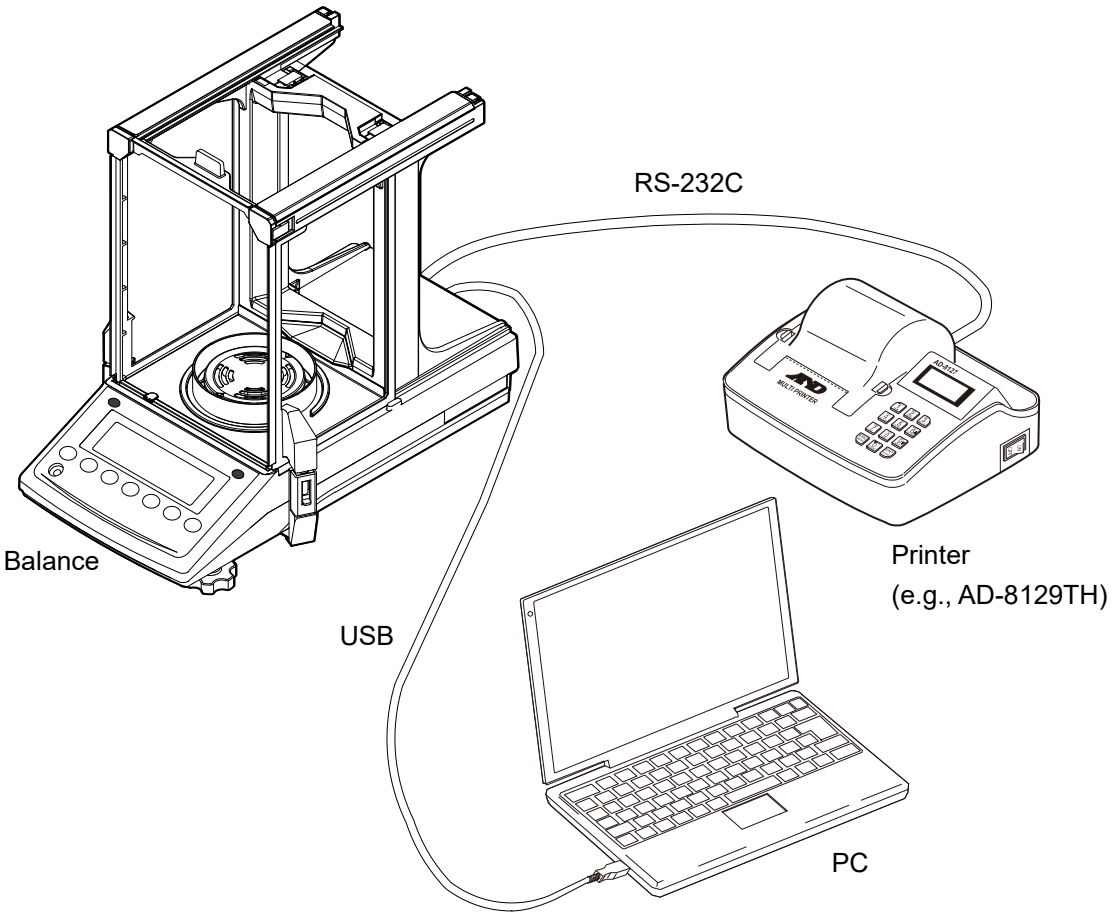
Data output mode

Class	Item	Parameter	Description	
doUt	PrE Data output mode	0	Key mode	Outputs data with the [PRINT] key when stable.
		1	Auto print mode A	Automatically outputs data when stable (Reference = zero)
		2	Auto print mode B	Automatically outputs data when stable (Reference = the latest stable value)
		3	Stream mode	Continuous output
		4	Key mode B	Outputs data immediately with the [PRINT] key, whether stable or not.
		5	Key mode C	Outputs data immediately with the [PRINT] key if stable; otherwise, outputs once stabilized.
		6	Interval output mode	Starts with the [PRINT] key and outputs data at set intervals.

19.3. Examples: Connecting multiple peripheral devices simultaneously

(1) Printer and PC connection

Example of use Printing the weighing value on a printer and simultaneously capturing the weighing value on a PC.

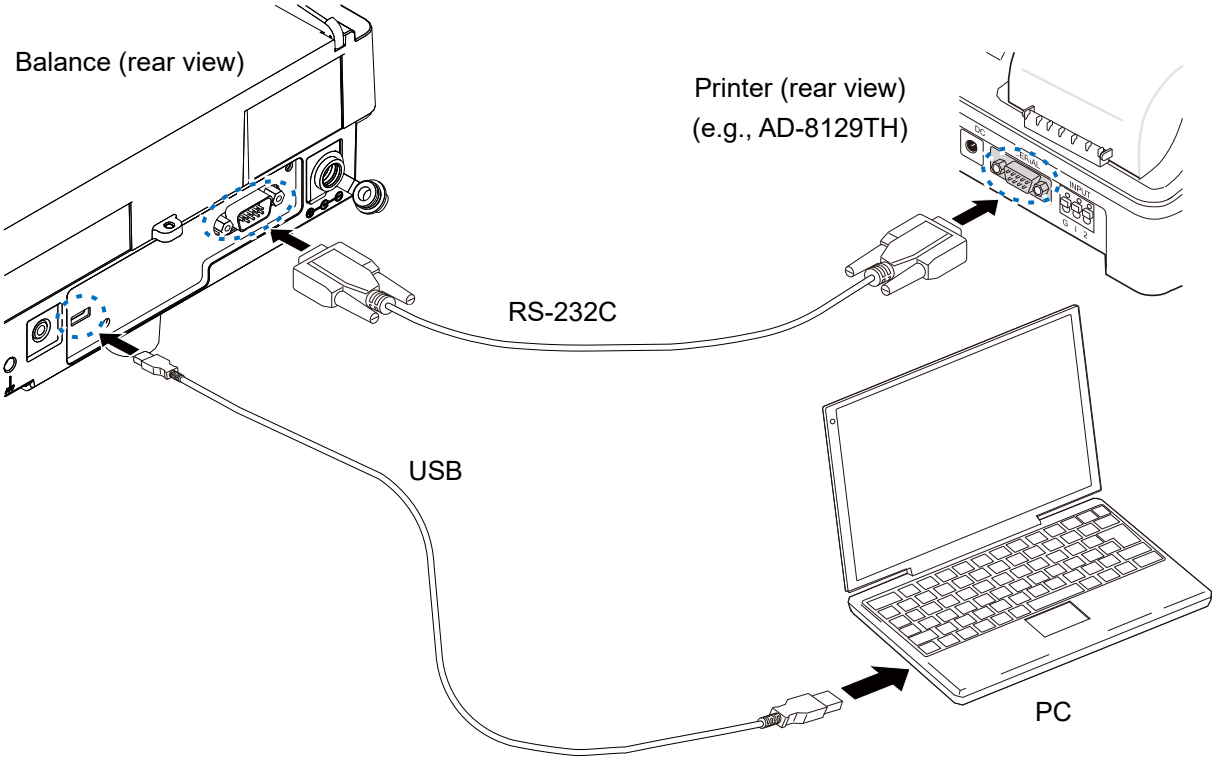


Simultaneous connection example 1: Printer and PC

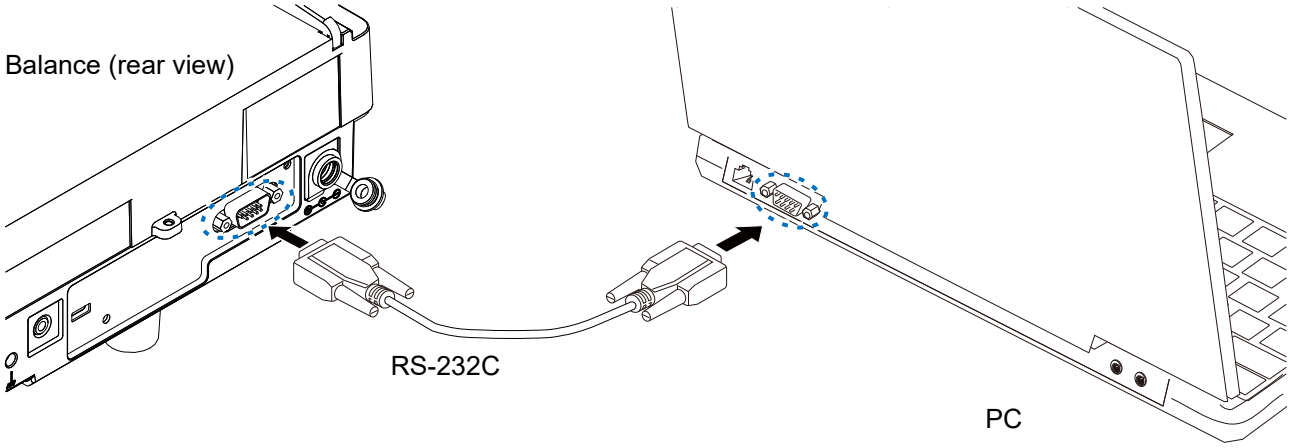
Connection method		Connection interface			
Interface	Device	Class	Item	Parameter	Description
(Common setting)		dout	Prt	0 to 6	Select the data output mode that is suitable for the printer/PC settings and applications.*1
RS-232C	Printer	SIF	tYPE	0, 1	Select the weighing format that is suitable for the printer settings and applications. (A&D standard format, DP format)
USB	PC	USb	U-tP	0 to 4	Output format optimal for PC

*1 The data output mode is a common setting for both the printer and the PC. The weighing value is output simultaneously.

The dedicated printers for balances are AD-8127 (multi-functional printer) and AD-8129TH (thermal printer).



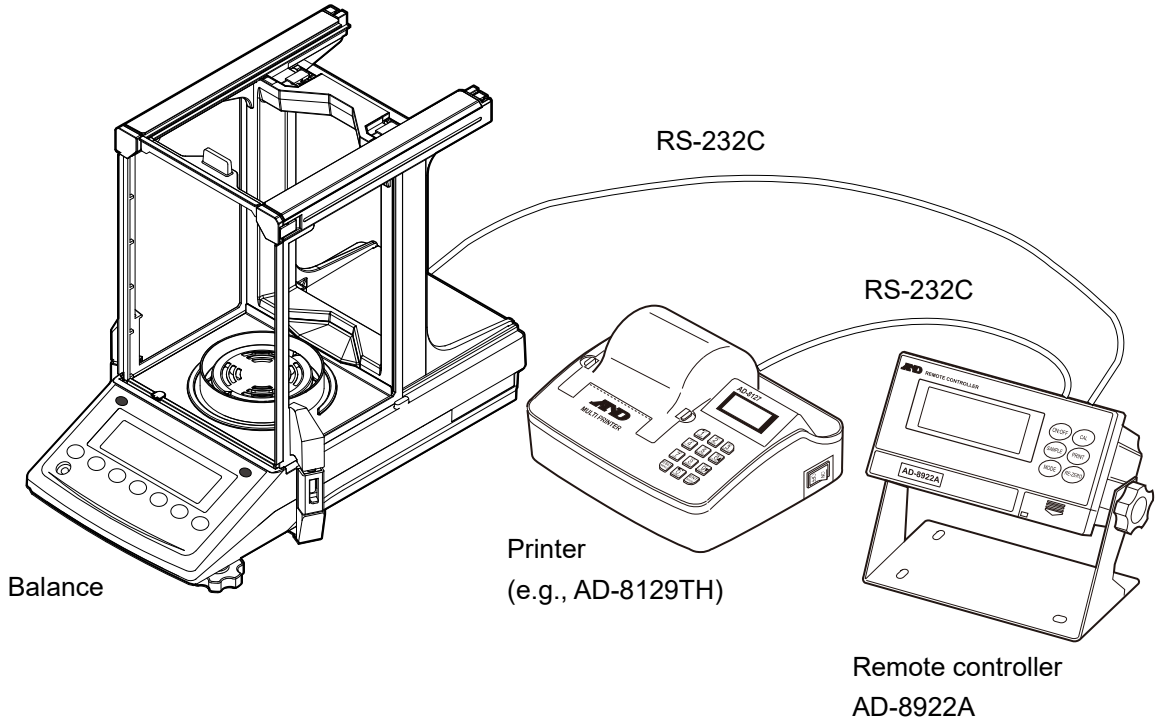
To connect only the balance and the PC, you can use either a USB cable or an RS-232C cable.



If the PC does not have an RS-232C interface (COM port), use a USB converter (AX-USB-9P, sold separately).

(2) Printer and remote display connection

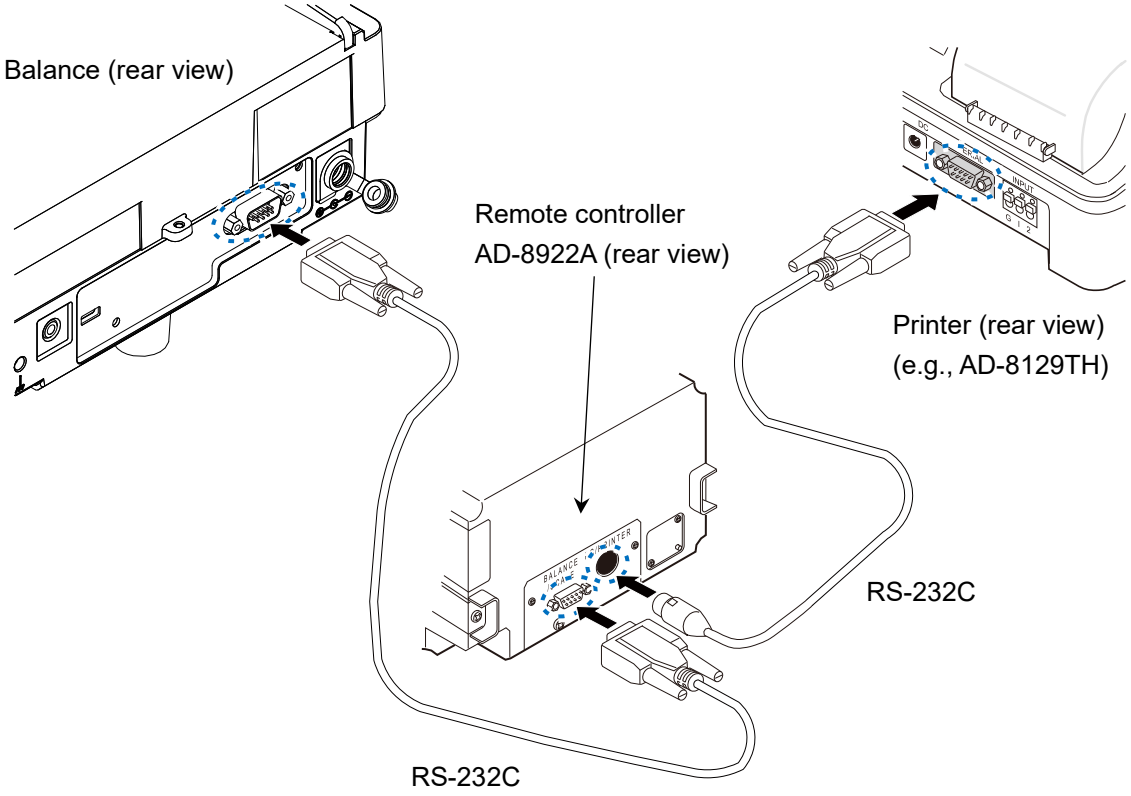
Example of use Displaying the weighing value on a remote display while printing the weighing value on a printer.



Simultaneous connection example 2: Printer and AD-8922A remote display

Connection method		Connection interface			
Interface	Device	Class	Item	Parameter	Description
RS-232C	Remote display AD-8922A	dout	Prt	3	Stream mode
		SIF	tYPE	0	A&D standard format
AD-8922A (RS-232C)	Printer	Fnc *1	out	2	Output data with the [PRINT] key on the AD-8922A

*1 Function table of AD-8922A


Balance (rear view)
Remote controller
AD-8922A (rear view)
Printer (rear view)
(e.g., AD-8129TH)
RS-232C
RS-232C

20. Printing Weighing Value Data on a Printer

Refer to the following examples for printer settings and the balance's function table, based on the type of printer used and the method of printing weighing data.

20.1. Printer: AD-8127, AD-8129TH

The AD-8127 multi-functional compact printer and the AD-8129TH compact thermal printer are versatile printers. The printer settings for specific applications are described below.

20.1.1. Printing only weighing value data

Common settings with the balance when printing only weighing value data on the AD-8127 or AD-8129TH

Class	Item	Parameter	Description
SIF Serial interface	tYPE Data format	0	A&D standard format

Settings for printing only weighing value data on the AD-8127 or AD-8129TH

Printing method	Balance function table			AD-8127 function table	
	Class Item	Parameter	Description	PRN.MODE	Description
Press the [PRINT] key on the balance to print the weighing value.	doUt Data output PrT Data output mode	0	Key mode	EXT.KEY	External key print mode
		4	Key mode B (Immediate output)*1		
		5	Key mode C (Output when stable)		
Automatically prints weighing value data based on weighing value change.		1	Auto print mode A (Reference = zero)		
		2	Auto print mode B (Reference = the latest stable value)		
Prints weighing value data at regular intervals		6	Interval output mode*1		
Press the [PRINT] key on the printer to print the weighing value.		3	Stream mode*1	MANUAL	Manual print mode
Prints weighing value data in chart format.				CHART	Chart print mode

*1 Unstable data is also output.
To set the AD-8127/AD-8129TH to a mode other than dump print mode and also print unstable data, change the setting to "Unstable data, Printed out ("US PRN", "PRINT")" in the function table of the AD-8127/AD-8129TH.

20.1.2. Printing weighing value data with the ID number and timestamp using the clock/calendar function of the balance

Common settings with the balance when printing weighing value data and other information on the AD-8127 or AD-8129

Class	Item	Parameter	Description
SIF Serial interface	TYPE Data format	1	DP format

Settings for printing weighing value data and other information on the AD-8127 or AD-8129TH

Printing method	Balance function table			AD-8127 function table	
	Class Item	Parameter	Description	PRN.MODE	Description
Press the [PRINT] key on the balance to print the weighing value.	doUt Data output	0	Key mode	DUMP	Dump print mode*2
		4	Key mode B (Immediate output)*1		
		5	Key mode C (Output when stable)		
Automatically prints weighing value data according to the change in the weighing value.	PrT Data output mode	1	Auto print mode A (Reference = zero)		
		2	Auto print mode B (Reference = the latest stable value)		
Prints weighing value data at regular intervals		6	Interval output mode*1		

*1 Unstable data is also output.

*2 Printing using the printer's keys or in chart format is not possible.

20.1.3. Printing information other than weighing value data

To print sensitivity adjustment/calibration test reports (GLP compliant output), change the printer setting to dump print mode.

Printer function table for printing information other than weighing value data on the AD-8127 or AD-8129TH

Function table of AD-8127 and AD-8129TH	
PRN.MODE	Description
DUMP	Dump print mode

❑ Switching PRN.MODE (print mode) of the AD-8127/AD-8129TH

By pressing and holding the ENT SAVE key on the AD-8127/AD-8129TH, you can switch between EXT.KEY (External key print mode) and DUMP (Dump print mode) without using the printer's function table. This is convenient when temporarily switching the AD-8127/AD-8129TH to dump print mode for GLP output, etc.

21. Connecting to a PC

21.1. Quick USB mode

Quick USB mode allows you to connect the balance to a PC using a USB cable and directly input the balance's output into PC software such as Excel or Word. The supported operating systems are Windows XP or later.

Since the Windows standard driver (HID) is used, there is no need to install a dedicated driver. Communication with the PC is enabled simply by connecting.

CAUTION

- ❑ Quick USB provides one-way communication from the balance to the PC. Commands to control the balance cannot be sent from the PC.
- ❑ Turn off the screen saver and standby mode on the PC.
- ❑ Do not use Quick USB when the data output mode of the balance is set to stream mode.
  In stream mode, the balance continuously outputs weighing data to the PC, which may cause unintended operations on the PC.

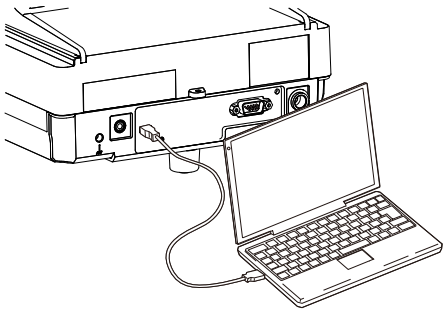
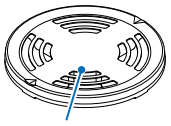
USB data format

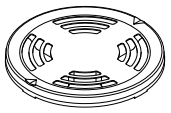
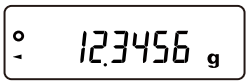
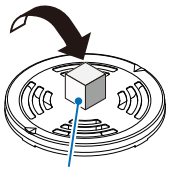
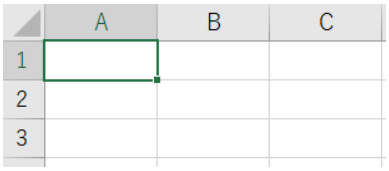
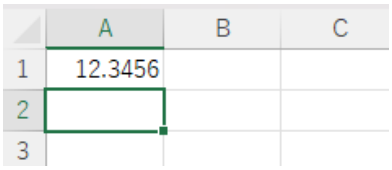
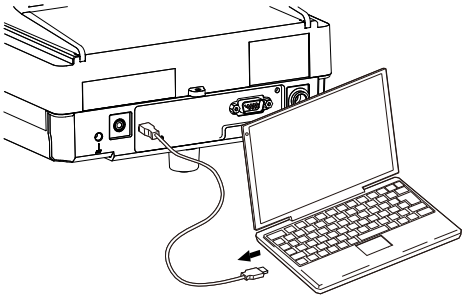
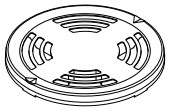
The data format is fixed to NU2 format when using Quick USB mode.

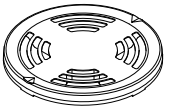
For details on the data format, refer to "22.2. Weighing data format".

Usage

The following example explains how to output weighing data from the balance using the [PRINT] key.

Step	Description	Display and key operations	Weighing operation
1	Connect the balance to the PC using the USB cable included with the balance.  When the balance is connected to the PC for the first time, the PC will automatically begin installing the driver.	0.0002 g	 Weighing pan
2	Once communication between the balance and the PC is established, the balance display will show a Quick USB connection indicator (for 2 seconds), as shown to the right, and then automatically return to weighing mode.*1 During the USB connection, the "◄" (USB connection indicator) will be displayed. *1 If the indicator is not displayed, check that the parameter for USB operation mode in the function table ("10. Function Table") is set to Quick USB.	USb Quick Displayed for 2 seconds 0.0002 g	
3	Launch the software (e.g., Excel) used for transmitting weighing data on the PC.		

Step	Description	Display and key operations	Weighing operation
4	Be sure to set the keyboard to single-byte input mode. (Data cannot be entered correctly in the double-byte input mode.)		
5	Press the [RE-ZERO] key to set the display to zero.	 	
6	Place a sample on the weighing pan.		 Sample
7	Place the cursor where you want to enter the weighing data. (Ensure that the keyboard input is single-byte alphanumeric characters.) 		
8	Press the [PRINT] key to send the weighing data from the balance. The data will be entered at the cursor position. 	  Data output	
9	To end the data transmission, disconnect the USB cable. 		

Step	Description	Display and key operations	Weighing operation
10	When the balance is disconnected from the PC, the display will show a USB disconnection indicator (for 2 seconds) as shown to the right, and then automatically return to weighing mode. "◄" (the USB connection indicator) turns off.	 Displayed for 2 seconds 	

21.2. Virtual COM mode

Virtual COM mode is a function that allows a balance to connect to a PC using the included USB cable, creating a COM port on the PC for bidirectional communication. The supported operating systems are Windows XP or later. On Windows 10 and Windows 11, a driver will be installed automatically. If it is not installed automatically, please refer to the PDF file in the driver for Virtual COM mode*1 on the A&D website (https://www.aandd.jp).

*1 User information must be entered in order to download the driver.

Communication equivalent to RS-232C is possible by selecting the COM port with the Windows Communication Tools Software (WinCT).
Virtual COM mode requires no configuration of the baud rate, data bits, parity, or stop bits in the data communication software.

CAUTION

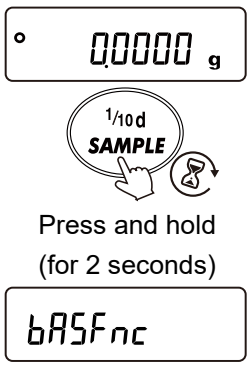
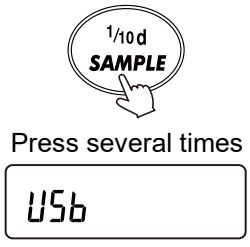
❑ When installing the driver for Virtual COM mode for the first time, the installation process may take some time.

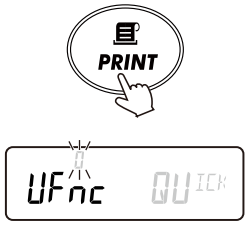
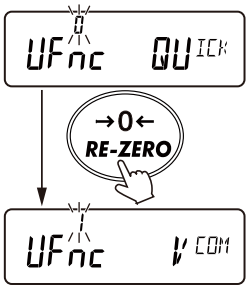
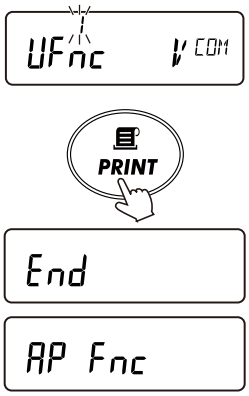
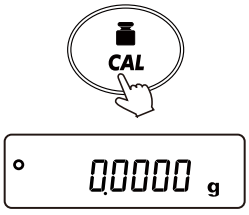
Usage

The following example explains how to output weighing data from the balance using the [PRINT] key or a data request command from the PC.

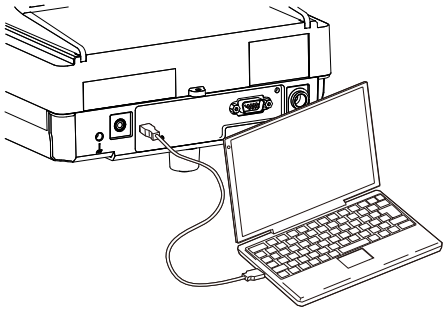
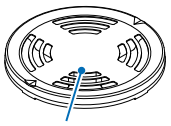
Enabling the Virtual COM mode (Changing the function table)

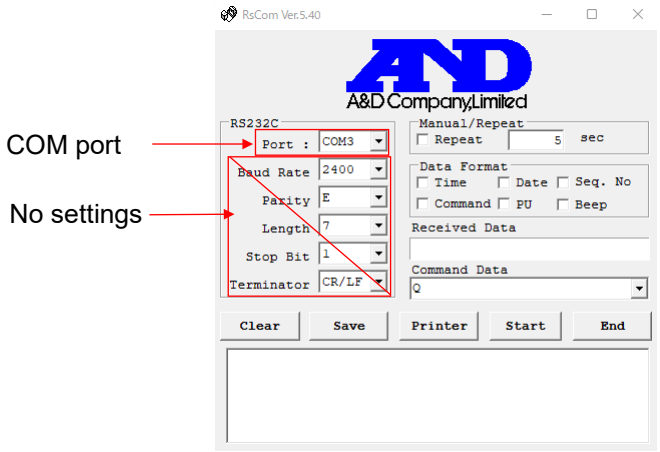
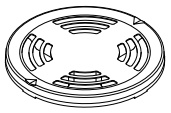
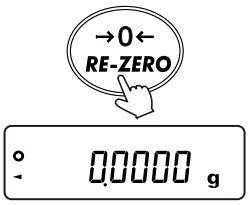
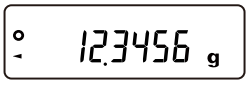
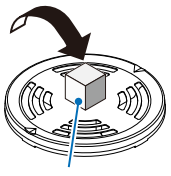
Switching between Quick USB mode (unidirectional communication) and Virtual COM mode (bidirectional communication)

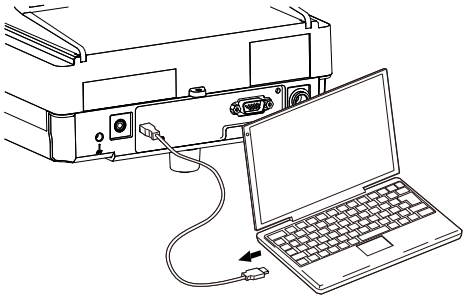
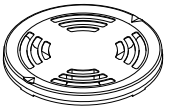
Step	Description	Display and key operations
1	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("10. Function Table").	 Press and hold (for 2 seconds)
2	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times

Step	Description	Display and key operations
3	Press the [PRINT] key.	
4	Use the [RE-ZERO] key to switch the parameter for "UFnc" (USB function mode) to " 0" (Quick USB) or " 1" (Virtual COM mode).	
5	When the display shown to the right appears, press the [PRINT] key to store the setting.	
6	Press the [CAL] key to return to weighing mode.	

Weighing method

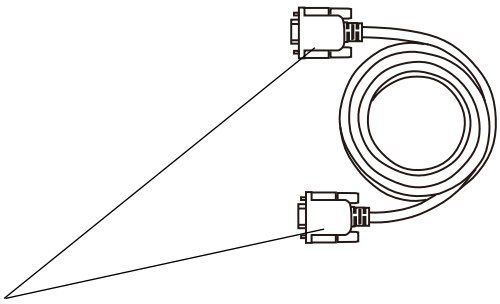
Step	Description	Display and key operations	Weighing operation
7	Connect the balance to the PC using the USB cable included with the balance.  When connecting for the first time on Windows 10 or Windows 11, the PC will automatically start installing the driver. For operating systems other than Windows 10 and Windows 11, you need to install the driver manually. Refer to the PDF file in the driver for Virtual COM mode*1 on the A&D website (https://www.aandd.jp) for instructions on how to install the driver. *1 User information must be entered in order to download the driver.		 Weighing pan
8	When the balance is connected to the PC, the "USB" will blink on the balance display, as shown to the right (while establishing communication with the PC).		
9	Once communication between the balance and the PC is established, the balance display will show a Virtual COM connection indicator for 2 seconds, as shown to the right, and then automatically return to weighing mode. During the USB connection, "◄" (the USB connection indicator) will be displayed.	 Displayed for 2 seconds 	
10	Launch the software (e.g., WinCT) used for transmitting weighing data on the PC.		

Step	Description	Display and key operations	Weighing operation
11	Communication equivalent to RS-232C is possible by selecting the COM port). Virtual COM mode requires no configuration of the baud rate, data bits, parity, or stop bits in the data communication software. For instructions on using WinCT, please download the necessary manuals from the Software page on the A&D website (https://www.aandd.jp). Example: RsCom  	 	
12	Press the [RE-ZERO] key to set the display to zero.	 	
13	Place a sample on the weighing pan.	 	 Sample
14	The following example explains how to output weighing data from the balance using either the [PRINT] key or a data request command from the PC. The balance will output the weighing data. Output example A&D standard format ST,+0012.3456␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 or, send a data request command from the PC  Data output	

Step	Description	Display and key operations	Weighing operation
15	To end the data transmission, disconnect the USB cable. 	0.0000 g	
16	When the balance is disconnected from the PC, the display will show a USB disconnection indicator (for 2 seconds) as shown to the right, and then automatically return to weighing mode. "◄" (the USB disconnection indicator) turns off.	USB dISConnECt Displayed for 2 seconds 0.0000 g	

21.3. RS-232C

The RS-232C interface of the balance is a Data Communication Equipment (DCE) that can be connected to a PC. The RS-232C cable to be connected is a straight type. If the PC does not have an RS-232C connector, use the USB Virtual COM mode for connection.



D-Sub 9-pin female with inch screws

21.4. WinCT: Data communication software

- ❑ WinCT is Windows-based data communication software designed for easily receiving weighing data from the balance on your PC. The PC communication settings use RS-232C.
- ❑ Please download WinCT from the Software page on the A&D website (https://www.aandd.jp).
  For installation and setup instructions, refer to the Setup Manual and Instruction Manual available on the A&D website.
- ❑ WinCT includes three applications: RsCom, RsKey, and RsWeight.

RSCom

- ❑ Allows you to control the balance by sending commands to the balance.
- ❑ Displays received data and saves it as a text file (.txt).
- ❑ Enables communication with multiple balances by running multiple instances.
- ❑ Can be run simultaneously with other applications. (Does not monopolize the PC.)
- ❑ Receives GLP output data from the balance.

RsKey

- ❑ Directly inputs weighing data from the balance into other applications.
- ❑ Compatible with any application that allows keyboard input, such as Word or Excel.
- ❑ Inputs GLP output from the balance.
- ❑ Uses the test display function to make the PC an external display for the balance.
  (in stream mode)

RsWeight

- ❑ Graphs received data in real-time.
- ❑ Calculates and displays maximum, minimum, average, standard deviation, and coefficient of variation of received data.
- ❑ Displays received data and saves it as a CSV file.
- ❑ Allows re-graphing by opening a CSV file.

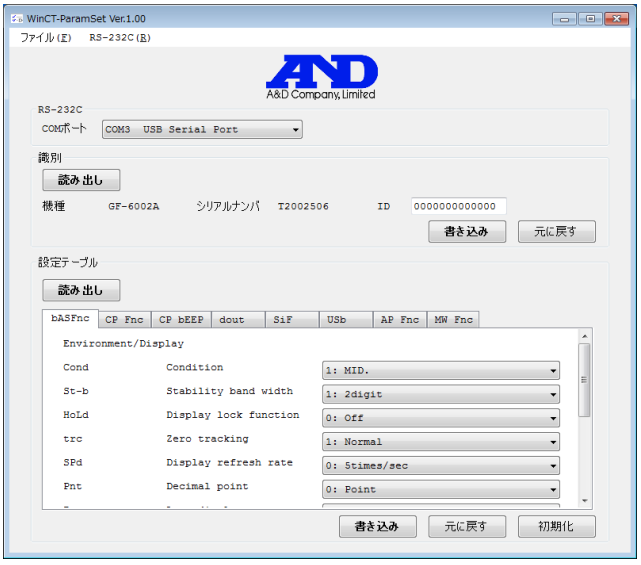
21.5. WinCT-ParamSet: Windows communication tools for parameter setting

WinCT-ParamSet is Windows-based data communication software that allows you to change the balance's function table from your PC. Communication with the PC uses either USB or RS-232C.

CAUTION

- ❑ To connect via USB, refer to "Enabling the Virtual COM mode (Changing the function table)" and set the parameter to "1" (Virtual COM mode) for "UFnc" (USB function mode) under USb (USB Interface) in the function table ("10. Function Table").
- ❑ To connect via RS-232C, you need a separate cable to connect the PC and the balance. (e.g., USB conversion cable AX-USB-9P)

- ❑ Please download WinCT-ParamSet from the Software page on the A&D website (https://www.aandd.jp). For installation and setup instructions, download the software from the Software page on the A&D website (https://www.aandd.jp) and refer to the following:
  "WinCT-ParamSet_Setup_EN_Ver.1.**.pdf"
  "WinCT-ParamSet_Instruction_Manual_EN_Ver.1.**.pdf"
  (The file names vary depending on the software version of WinCT-ParamSet, with asterisks (*) representing digits 0-9.)
- ❑ Reads and changes the ID number and function table data from the balance in bulk.
- ❑ Saves the settings as a CSV file.
- ❑ Loads the saved CSV file and writes the settings to the balance.



CAUTION

- ❑ Except for ID settings, settings that involve numerical input (e.g., unit weight settings for counting mode) cannot be configured using this software. To configure, use the balance's key operations.
- ❑ If the balance's password lock function is enabled, this software cannot be used.
  Additionally, this software cannot enable the setting if it is disabled. To set the password lock function, use the balance's key operations.
- ❑ When writing settings from a saved CSV file, the software version of the balance recorded in the CSV file must match the software version of the balance to which you are writing.

22. Data Output

22.1. Data output mode

The data output timing of the balance can be changed by using "PrT" (Data output mode) under dout (Data output mode) in the function table ("10. Function Table").

Key mode

Function table: dout, PrT = 0

If the [PRINT] key is pressed when "O" (the stabilization indicator) is displayed, the weighing value will be output once.
At this time, the weighing value display will blink once to show that it has been output.

Auto print mode A

Function table: dout, PrT = 1

If the weighing value exceeds the range from the reference "zero display" to the parameters set for "AP-P" (Auto print polarity) and "AP-b" (Auto print band width) under dout (Data output) in the function table ("10. Function Table") and "O" (the stabilization indicator) is displayed, the weighing value will be output once. In addition, pressing the [PRINT] key when "O" (the stabilization indicator) is displayed will output the weighing value once. At this time, the weighing value display will blink once to show that it has been output.

Example of use

Automatically outputting the weighing value each time a sample is weighed.

Required function table settings

dout, PrT = 1 (Auto print mode A)
dout, AP-P (Auto print polarity)
dout, AP-b (Auto print band width)

Auto print mode B

Function table: dout, PrT = 2

If the weighing value exceeds the range from the latest stable value to the parameters set for "AP-P" (Auto print polarity) and "AP-b" (Auto print band width) under dout (Data output) in the function table ("10. Function Table") and "O" (the stabilization indicator) is displayed, the weighing value will be output once. In addition, pressing the [PRINT] key when "O" (the stabilization indicator) is displayed will output the weighing value once. At this time, the weighing value display will blink once to show that it has been output.

Example of use

Automatically outputting the weighing value while adding samples.

Required function table settings

dout, PrT = 2 (Auto print mode B)
dout, AP-P (Auto print polarity)
dout, AP-b (Auto print band width)

Stream mode

Function table: dout, Prt = 3

Regardless of the "o" (stabilization indicator) status, the weighing value is output at the display refresh rate set for "SPd" (Display refresh rate) under bASFnc (Environment, Display) in the function table ("10. Function Table"). The display does not blink during this.

CAUTION

- ❑ Depending on the display refresh rate and baud rate, not all data may be transmitted. Increase the baud rate.

Example of use

Continuously monitoring the weighing value on a PC and displaying the weighing value on a remote display.

Required function table settings

dout, Prt = 3 (Stream mode)

bASFnc, SPd (Display refresh rate)

S iF, bPS (Baud rate)

Key mode B

Function table: dout, Prt = 4

Regardless of the "o" (stabilization indicator) status, the weighing value is output once when the [PRINT] key is pressed.

Key mode C

Function table: dout, Prt = 5

When the [PRINT] key is pressed while "o" (the stabilization indicator) is displayed, the weighing value will be output once.

If "o" (the stabilization indicator) is not displayed, pressing the [PRINT] key will output the weighing value once the indicator appears.

At this time, the weighing value display will blink once to show that it has been output.

Interval output mode

Function table: dout, Prt = 6

Regardless of the presence of "o" (the stabilization indicator), the weighing value is output at intervals set for "int" (Interval time) under dout (Data output) in the function table ("10. Function Table").

Pressing the [PRINT] key will start output. Pressing the [PRINT] key again during output will stop it.

CAUTION

- ❑ In some combinations of interval time and baud rate, not all data may be transmitted unless the baud rate is increased.

Example of use

Outputting the weighing value at regular intervals.

Required function table settings

dout, Prt = 6 (Interval output mode)

dout, int (Interval time)

22.2. Weighing data format

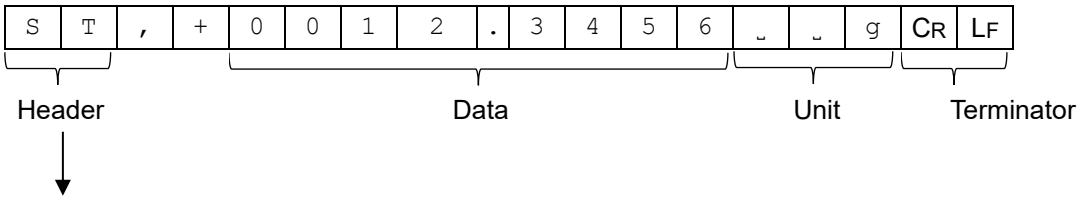
The data output format of the balance can be changed by using "tYPE" (Data format) under [SIF] (Serial interface) for RS-232C and "U-tP" (USB data format) under [USb] (USB interface) for USB in the function table ("10. Function Table").

A&D standard format

For RS-232C connection. Function table: [SIF], tYPE = 0

For Virtual COM mode connection. Function table: [USb], U-tP = 0

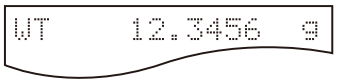
- ❑ This is the standard format for sending data to peripheral devices.
- ❑ The data consists of 16 characters (excluding the terminator).
- ❑ A 2-character header indicates the condition of the data.
- ❑ The data is padded with polarity and zeros (filling the higher order surplus part with zeros).
- ❑ When the data is zero, the polarity is positive.
- ❑ The unit consists of three characters.



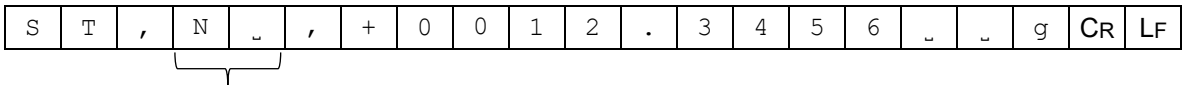
S	T	When stable
U	S	When unstable
Q	T	Counting mode when stable
O	L	When overloaded

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

- ❑ In external key print mode "EXT.KEY", the AD-8127 multi-functional compact printer or AD-8129TH compact thermal printer prints the received A&D standard format as shown to the right.



- ❑ If any parameter from "1" to "3" is set for "NGt" (Net/gross/tare output) under [dout] (Data output) in the function table ("10. Function Table"), a second header corresponding to net/gross/tare is appended to the header.



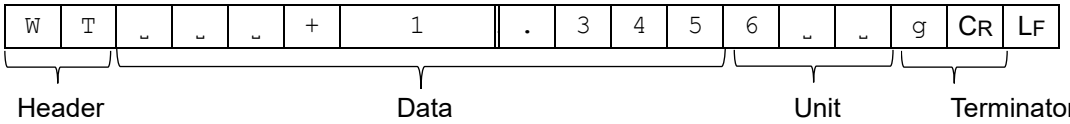
N	␣	Net weight
G	␣	Gross weight
T	␣	Tare weight
P	T	Preset tare weight

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

DP format (dump print)

For RS-232C connection. Function table: [SIF], tYPE = 1
For Virtual COM mode connection. Function table: [USb], U-tP = 1

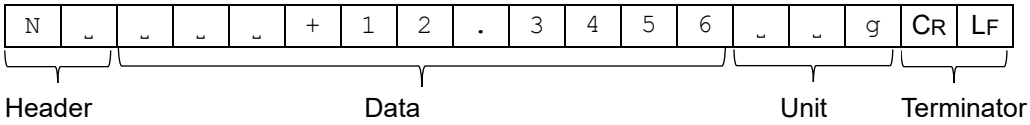
- ❑ This format is suitable for dump printing.
- ❑ The data consists of 16 characters (excluding the terminator).
- ❑ A 2-character header indicates the condition of the data.
- ❑ The polarity sign is added right before the value if it is not an overload or zero.
- ❑ The data is zero-suppressed, meaning leading zeros are replaced with spaces.
- ❑ The unit consists of three characters.



W	T	When stable
U	S	When unstable
Q	T	Counting mode when stable

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

- ❑ If any parameter from "1" to "3" is set for "NGt" (Net/gross/tare output) under [dout] (Data output) in the function table ("10. Function Table"), the header is replaced with the one corresponding to net/gross/tare.



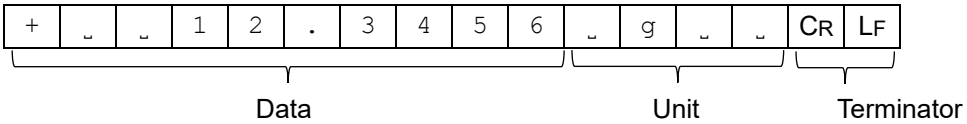
N	␣	Net weight
G	␣	Gross weight
T	␣	Tare weight
P	T	Preset tare weight

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

KF format

For RS-232C connection. Function table: [SIF], tYPE = 2
For Virtual COM mode connection. Function table: [USb], U-tP = 2

- ❑ This is the Karl-Fischer moisture meter format.
- ❑ The data consists of 14 characters (excluding the terminator).
- ❑ There are no headers.
- ❑ The polarity sign is added to the first character if it is not an overload or zero.
- ❑ The data is zero-suppressed, meaning leading zeros are replaced with spaces.
- ❑ When stable, the unit is output. When not stable, the unit is not output.



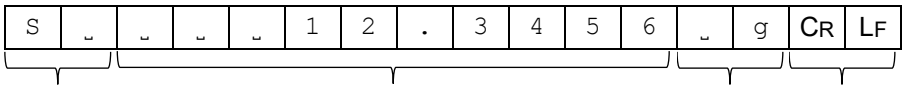
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah
␣ : Space, ASCII 20h

␣	g	␣	␣	With a unit when stable
␣	␣	␣	␣	No unit when unstable

MT format

For RS-232C connection. Function table: [SIF], tYPE = 3
For Virtual COM mode connection. Function table: [USb], U-tP = 3

- Used when connecting to devices manufactured by other companies. Note that there is no guarantee of compatibility.
- The length of data depends on the length of the unit.
- Has a two-character header.
- The data is zero-suppressed, meaning leading zeros are replaced with spaces.



Header Data Unit Terminator

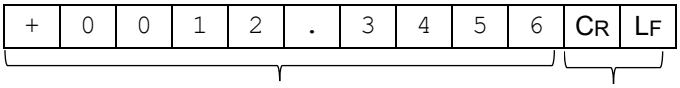
S	␣	When stable (Output with a command)
S	D	When unstable (Output with a command)
S	I	When overloaded
␣	␣	When stable (Output with the [PRINT] key)
␣	D	When unstable (Output with the [PRINT] key)

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

NU format

For RS-232C connection. Function table: [SIF], tYPE = 4
For Virtual COM mode connection. Function table: [USb], U-tP = 4

- Only numerical data of the weighing value is output.
- The data consists of 10 characters (excluding the terminator).
- The data is padded with polarity and zeros (filling the higher order surplus part with zeros).
- When the data is zero, the polarity is positive.

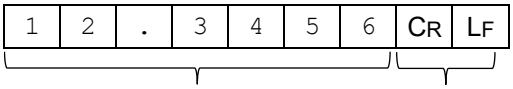


Data Terminator

NU2 format

For RS-232C connection. Function table: [SIF], tYPE = 5
For Virtual COM mode connection. Function table: [USb], U-tP = 5
For Quick USB mode connection. Function table: [USb], UFnc = 0

- Only numerical data of the weighing value is output.
- If the data is zero or positive, no polarity is added.



Data Terminator

CSV format

For RS-232C connection. Function table: [SIF], tYPE = 6
For Virtual COM mode connection. Function table: [USb], U-tP = 6

- This is a format in which the data section and unit section of the A&D standard format are separated by a comma (",").
- The unit is output when overloaded.
- If "," (Comma [,]) is set for "Pnt" (Decimal separator) under [bASFnc] (Environment/Display) in the function table ("10. Function Table"), the separator is a semicolon (";").

S	T	,	+	0	0	1	2	.	3	4	5	6	,	␣	␣	g	CR	LF

- If additional output data is appended to the weighing value, all data is output in a single line.
  When ID number, data number, date, and time are added, the output is as follows:

```
SAMPLE-0123-4,No,012,2025/01/23,12:34:56,ST,+0012.3456,␣␣g
```

ID number Data number Date Time Weighing value

TAB format

For RS-232C connection. Function table: [SIF], tYPE = 7
For Virtual COM mode connection. Function table: [USb], U-tP = 7

- This is a format, in which the separator of the CSV format is changed from comma to TAB.

S	T	TAB	+	0	0	1	2	.	3	4	5	6	TAB	␣	␣	g	CR	LF

TAB Horizontal tab ASCII 09h

UFC format

For RS-232C connection. Function table: [SIF], tYPE = 8
For Virtual COM mode connection. Function table: [USb], U-tP = 8

- By using the Universal Flex Coms (UFC) function, you can output desired contents when outputting weighing data. Refer to"24. UFC Function" for details.

Other data formats

In addition to weighing data, various other data can be added. As needed, toggle the desired settings ON or OFF in the function table.

Data number

Function table dout, d-no = 1

- ❑ When the data memory function is used, the data number is output.
- ❑ The data consists of 6 characters (excluding the terminator).
- ❑ In Quick USB mode, only dots (".") and numbers are output.

N	o	.	0	0	1	CR	LF

Data number Terminator

Quick USB connection (for outputting numerical values only) Function table: USb, UFnc = 0

.	0	0	1	TAB

Data number Terminator

ID number

Function table: dout, S-id = 1

- ❑ The ID number stored in the balance is output.
- ❑ The data consists of 13 characters (excluding the terminator).
- ❑ (In Quick USB mode, only the hypen ("-") and numbers are output.

S	A	M	P	L	E	-	0	1	2	3	-	4	CR	LF

ID number Terminator

Quick USB connection (for outputting numerical values only) Function table: USb, UFnc = 0

-	0	1	2	3	-	4	TAB

ID number Terminator

Date

Function table: dout, S-td = 2 or 3

- The date is output from the clock data of the balance.
- The YYYY/MM/DD order setting can be changed.
- The data consists of 10 characters (excluding the terminator).
- In Quick USB mode, slashes ("/") are converted to dots (".") and output.

2	0	2	5	/	0	1	/	2	3	CR	LF

Date Terminator

Quick USB connection (for outputting numerical values only) Function table: USb, UFnc = 0

2	0	2	5	.	0	1	.	2	3	TAB

Time

Function table: dout, S-td = 1 or 3

- The time is output from the clock data of the balance.
- 24-hour format.
- The data consists of 8 characters (excluding the terminator).
- In Quick USB mode, colons (":") are converted to dots (".") and output.

1	2	:	3	4	:	5	6	CR	LF

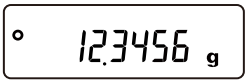
Time Terminator

Quick USB connection (for outputting numerical values only) Function table: USb, UFnc = 0

1	2	.	3	4	.	5	6	TAB

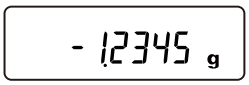
22.2.1. Data format output example

When stable



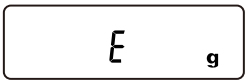
A&D	S	T	,	+	0	0	1	2	.	3	4	5	6	␣	␣	g	CR	LF
DP	W	T	␣	␣	␣	+	1	2	.	3	4	5	6	␣	␣	g	CR	LF
KF	+	␣	␣	1	2	.	3	4	5	6	␣	g	␣	␣	CR	LF		
MT	S	␣	␣	␣	␣	1	2	.	3	4	5	6	␣	g	CR	LF		
NU	+	0	0	1	2	.	3	4	5	6	CR	LF						
NU2	1	2	.	3	4	5	6	CR	LF									
CSV	S	T	,	+	0	0	1	2	.	3	4	5	6	,	␣	␣	g	CR	LF
TAB	S	T	TAB	+	0	0	1	2	.	3	4	5	6	TAB	␣	␣	g	CR	LF

When unstable



A&D	U	S	,	-	0	0	0	1	.	2	3	4	5	␣	␣	g	CR	LF
DP	U	S	␣	␣	␣	␣	-	1	.	2	3	4	5	␣	␣	g	CR	LF
KF	-	␣	␣	␣	1	.	2	3	4	5	␣	g	␣	␣	CR	LF		
MT	S	D	␣	␣	␣	-	1	.	2	3	4	5	␣	g	CR	LF		
NU	-	0	0	0	1	.	2	3	4	5	CR	LF						
NU2	-	1	.	2	3	4	5	CR	LF									
CSV	U	S	,	-	0	0	0	1	.	2	3	4	5	,	␣	␣	g	CR	LF
TAB	U	S	TAB	-	0	0	0	1	.	2	3	4	5	TAB	␣	␣	g	CR	LF

When overloaded (positive)



A&D	O	L	,	+	9	9	9	9	9	9	9	9	E	+	1	9	CR	LF
DP	␣	␣	␣	␣	␣	␣	␣	␣	E	␣	␣	␣	␣	␣	␣	␣	CR	LF
KF	␣	␣	␣	␣	␣	␣	H	␣	␣	␣	␣	␣	␣	␣	CR	LF		
MT	S	I	+	CR	LF													
NU	+	9	9	9	9	9	9	9	9	CR	LF							
NU2	+	9	9	9	9	9	9	9	9	CR	LF							
CSV	O	L	,	+	9	9	9	9	9	9	9	E	+	1	9	,	␣	␣	g	CR	LF
TAB	O	L	TAB	+	9	9	9	9	9	9	9	E	+	1	9	TAB	␣	␣	g	CR	LF

ASCII symbols

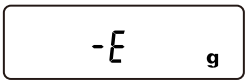
CR : Carriage return, ASCII 0Dh

LF : Line feed, ASCII 0Ah

␣ : Space, ASCII 20h

TAB : Horizontal tab, ASCII 09h

When overloaded
(negative)



A&D	O	L	,	-	9	9	9	9	9	9	9	9	E	+	1	9	CR	LF		
DP	␣	␣	␣	␣	␣	␣	␣	-	E	␣	␣	␣	␣	␣	␣	␣	CR	LF		
KF	␣	␣	␣	␣	␣	␣	L	␣	␣	␣	␣	␣	␣	␣	CR	LF				
MT	S	I	-	CR	LF															
NU	-	9	9	9	9	9	9	9	9	CR	LF									
NU2	-	9	9	9	9	9	9	9	9	CR	LF									
CSV	O	L	,	-	9	9	9	9	9	9	9	E	+	1	9	,	␣	␣	g	CR	LF
TAB	O	L	TAB	-	9	9	9	9	9	9	9	E	+	1	9	TAB	␣	␣	g	CR	LF

ASCII symbols

CR : Carriage return, ASCII 0Dh

LF : Line feed, ASCII 0Ah

␣ : Space, ASCII 20h

TAB : Horizontal tab, ASCII 09h

Unit code

		A&D CSV TAB	DP	KF	MT
Gram	g	␣ ␣ g	␣ ␣ g	␣ g ␣ ␣	␣ g
Milligram	mg	␣ m g	␣ m g	␣ m g ␣	␣ m g
Counting mode	PCS	␣ P C	␣ P C	␣ p c s	␣ P C S
Percent mode	%	␣ ␣ %	␣ ␣ %	␣ % ␣ ␣	␣ %
Ounce (Avoir.)	OZ	␣ o z	␣ o z	␣ o z ␣	␣ o z
Troy Ounce	OZt	o z t	o z t	␣ o z t	␣ o z t
Metric Carat	ct	␣ c t	␣ c t	␣ c t ␣	␣ c t
Momme	mom	m o m	m o m	␣ m o m	␣ m o
Pennyweight	dwt	d w t	d w t	␣ d w t	␣ d w t
Grain	GN	␣ G N	␣ G N	␣ g r ␣	␣ G N
Tael (HK general, Singapore)	TL	␣ t l	␣ t l	␣ t l s	␣ t l
Tael (HK, jewelry)	TL	␣ t l	␣ t l	␣ t l h	␣ t l
Tael (Taiwan)	TL	␣ t l	␣ t l	␣ t l t	␣ t l
Tael (China)	TL	␣ t l	␣ t l	␣ t l c	␣ t l
Tola (India)	tol	␣ ␣ t	␣ ␣ t	␣ t o l	␣ t
Mesghal	MES	m e s	m e s	␣ M S ␣	␣ m
Density mode	DS	␣ D S	␣ D S	␣ D S ␣	␣ D

ASCII symbols

C_R : Carriage return, ASCII 0Dh

L_F : Line feed, ASCII 0Ah

␣ : Space, ASCII 20h

TAB : Horizontal tab, ASCII 09h

23. Command

By sending specified commands from a PC or a programmable logic controller (PLC) to the balance, you can control the balance to request weighing data, perform key operations, change parameters, and more. To send a command to the balance, append the terminator <CR><LF> or <CR> to the command string by using "CrLF" (Terminator) under SIF (Serial interface) in the function table ("10. Function Table").

23.1. Control commands

Commands to query weighing data

Command	Content
Q	Requests the weighing data immediately.
RW	Requests the weighing data immediately.
SI	Requests the weighing data immediately.
S	Requests the weighing data when stabilized.
<ESC>P	Requests the weighing data when stabilized.
SIR	Requests the weighing data continuously. (Stream output)
C	Cancels the "S, "<ESC>P", or "SIR" command.

- ❑ The "Q", "RW", and "SI" commands perform the same function.
- ❑ The "S" and "<ESC>P" commands perform the same function.
- ❑ <ESC>: Escape code, ASCII 1Bh

Key control commands

Command	Content [Functions in weighing mode]
P	Same as the [ON:OFF] key.
ON	Turns the display on.
OFF	Turns the display off.
CAL	Same as the [CAL] key. Sensitivity adjustment using the internal weight
EXC	Sensitivity adjustment using an external weight
U	Same as the [MODE] key. [Unit switching]
SMP	Same as the [SAMPLE] key. [Readability switching]
PRT	Same as the [PRINT] key. [Data output]
R RZ <ESC>T	Same as the [RE-ZERO] key. [Zero display]
T TR	Tare [Zero display]
ZR*1	Zero
TST	Calibration test with an internal weight
KL:***	Changes the key lock status. KL:000 Unlock all keys. KL:001 Lock all keys.
?KL	Requests the key lock status. KL,000 All keys unlocked KL,001 All keys locked

Command	Content [Functions in weighing mode]
LK:*****	Locks the specified key. The value ***** represents a number ranging from 00000 to 00511. Refer to "25.2. Locking specified key switches".
?LK	Requests the status of the specified locked key. Refer to "25.2. Locking specified key switches".
RIR	Same as the right IR sensor.
LIR	Same as the left IR sensor.

❑ The "R", "RZ", and "<ESC>T" commands perform the same function.

❑ The "T" and "TR" commands perform the same function.

❑ <ESC>: Escape code, ASCII 1Bh

*1 If the load is within ±2% of the capacity from the initial zero point, the zero point is updated, the tare value is cleared and the display is set to zero. If the load exceeds ±2%, no processing is done.

Commands to preset the tare value

Command	Content
PT:**.****␣␣g	Sets the preset tare value. Values exceeding the weighing capacity cannot be set. Negative values cannot be set. For the unit, you need to use the A&D standard format (3 characters). If the display unit is PCS or percent (%), you need to set the value in grams. To set the preset tare to 1.23456 g, the input is "PT:1.23456 g"
?PT	Requests the tare value. The tare value set by the "PT" command will be output.

"␣" represents a space.

Commands to control the data memory function

Command	Content
UW:*.****␣␣g	Sets the unit weight value (weight per piece). Values exceeding the weighing capacity cannot be set. Negative values cannot be set. For the unit, you need to use the A&D standard format (3 characters). To set the unit weight to 1.2345 g, the input is "UW:1.2345␣␣g".
?UW	Requests the unit weight value.

"␣" represents a space.

Commands to control the data memory function (Function table: dout, dAtA = 1)

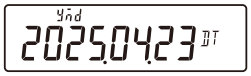
Command	Content
UN:mm	Changes the unit weight registration number. For "mm", you need to enter a number from 01 to 50.
?UN	Requests the currently selected unit weight registration number.

Commands to control the data memory function (Function table: dout, dAtA = 2

Command	Content
?MA	Requests all stored weighing data.
?MQnnn	Requests the weighing data stored with data number "nnn". For "nnn", you need to enter a number from 001 to 200.
?MX	Requests the number of stored data.
MD:nnn	Deletes the weighing data stored with data number "nnn". For "nnn", you need to enter a number from 001 to 200.
MCL	Deletes all stored weighing data.

Commands to set time and date

Command	Content
TM:**:**:**	Sets time. (Do not set non-existing time values.) To set the time to "twelve thirty-four fifty-six seconds", the input is "TM:12:34:56".
DT:**/**/**	Sets date. (Do not set non-existing date values.) The command varies depending on the date display order. Example: When setting the date to April 23, 2025

Display	Order	Command
	Year/Month/Day	DT:25/04/23
	Month/Day/Year	DT:04/23/25
	Day/Month/Year	DT:23/04/25

?TM	Requests the time.
?DT	Requests the date.

Commands to open and close the door(s)

Command	Content
DR:000	Closes the door(s).
DR:001	Opens the door(s).
?DR	Requests the door status. DR,000 Closed DR,001 Open

Commands to request other data

Command	Content
?T	Requests the tare value. The tare value set by the PT or T command will be output. The header will be "PT" when the preset tare value is set with the PT command, and "T" when the tare value is set with the T command.
?ID	Requests the ID number.
?SN	Requests the serial number.
?TN	Requests the device name.
?SA	The stored impact data will be output in bulk.

23.2. <AK> code and error codes

When "1" (On) is set for "ErCd" (AK, Error code) under SiF (Serial interface) in the function table ("10. Function Table"), the balance will always respond to all commands received from a PC or PLC. Verifying the response code improves communication reliability.
By setting "1" (On) for "ErCd" (AK, Error code), the following responses will be performed.

- ❑ When the balance receives a command requesting data: If the balance cannot output the data, it sends an error code (EC, Exx). If the balance can output the data, it sends the requested data.

- ❑ When the balance receives a command to control it: If the balance cannot execute the command, it sends an error code (EC, Exx). If the balance can execute the command, it sends an <AK> code.
  The <AK> code is ASCII 06h.

- ❑ The following commands are processed by the balance, and the balance sends an <AK> command not only when the command is received but also upon completion of the processing. If the processing does not complete successfully, the balance sends an error code (EC, Exx). In this case, use the CAL command to clear the error.

Command	Content
"ON" command	Turns the display on.
"P" command	Turns the display on/off. (Only when the display is on.)
"R" / "RZ" command	[RE-ZERO] key
"T" / "TR" command	Tare
"ZR" command	Zero*1
"CAL" command	Sensitivity adjustment with the internal weight
"EXC" command	Sensitivity adjustment with an external weight
"TST" command	Executes calibration test with the internal weight.

*1 If the load is within ±2% of the capacity from the initial zero point, the zero point is updated, the tare value is cleared and the display is set to zero. If the load exceeds ±2%, no processing is done.

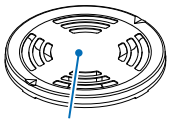
23.3. Command usage examples

This example demonstrates the setting where "1" (ON) is set for "ErCd" (AK, Error code) under 5.F in the function table to output an <AK> code.

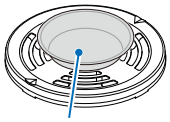
ASCII symbols

CR	:	Carriage return	(ASCII 0Dh)	LF	:	Line feed	(ASCII 0Ah)
␣	:	Space	(ASCII 20h)	AK	:	Acknowledgement	(ASCII 06h)

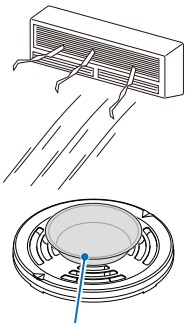
Example of the ON command (Display ON)

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	ON command O N CR LF	→		Display off	 Weighing pan
		←	AK CR LF Reception confirmation		
2				 Power-on zero Stabilizing (Processing)	
		←	AK CR LF Completion confirmation		

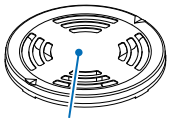
Example of the R command (Re-zero)

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	R command R CR LF	→		10.0023 g Before execution	 Place a sample on the weighing pan.
		←	AK CR LF Reception confirmation		
2				. g Re-zero stabilizing (Processing)	
		←	AK CR LF Completion confirmation		
3				0.0000 g Zero display	

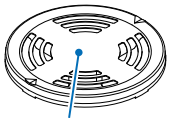
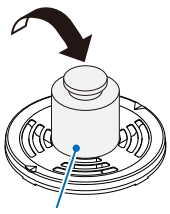
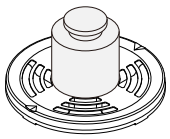
Example of the R command for error code output (Re-zero)

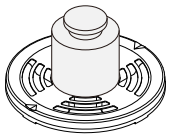
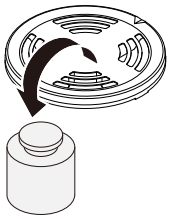
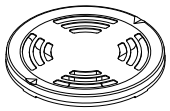
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	R command R CR LF	→		10.0012 g Before execution	
		←	AK CR LF Reception confirmation		
2				. g Re-zero stabilizing (Processing) Timeout due to instability	Place a sample on the weighing pan.
		←	EC , E 1 1 CR LF Error code output	Error 1 Display	
3	CAL command or wait for approx. 5 seconds C A L CR LF	→		10.0023 g Weighing display	
		←	AK CR LF Reception confirmation		

Example of the CAL command

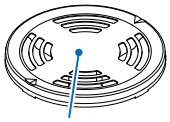
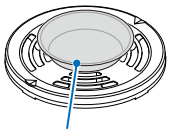
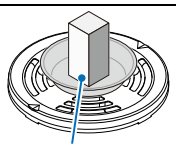
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	CAL command C A L CR LF	→		0.0000 g Before execution	 Nothing on the weighing pan.
		←	AK CR LF Reception confirmation		
2				CAL in CAL. in Processing End . g Re-zero stabilizing (Processing)	
		←	AK CR LF Completion confirmation		
3				0.0000 g Zero display	

Example of the EXC command

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	EXC command E X C CR LF	→	AK CR LF Reception confirmation	0.00000 g Before execution	 Nothing on the weighing pan.
2				CAL 0 Waiting for zero setting	
3	PRT command P R T CR LF	→	AK CR LF Reception confirmation		
4			AK CR LF Process completed	CAL 0 Setting the zero (Processing)	
5				200 Waiting for the specified weight to be loaded	 Place the weight
6	PRT command P R T CR LF	→	AK CR LF Reception confirmation		
7			AK CR LF Process completed	200 Weighing the weight (Processing)	

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
8				End Waiting for unloading	
9					 Remove the weight
10		←	AK CR LF Process completed	g Re-zero stabilizing (Processing)	
11				0.0000 g Zero display	

Example of the T command

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	R command R CR LF	→		0.00 12 g Before execution	 Nothing on the weighing pan.
		←	AK CR LF Reception confirmation		
2				. g Re-zero stabilizing (Processing)	
		←	AK CR LF Completion confirmation		
3				0.0000 g Zero display	
4	T command T CR LF	→		123456 g	 Place a sample on the weighing pan.
		←	AK CR LF Reception confirmation		
				. g	
		←	AK CR LF Completion confirmation	0.0000 g	
5				100.0000 g	 Place a sample in the container.
6	S command S CR LF	→			
		←	S T , + 0 1 0 0 . 0 0 0 0 ␣ ␣ g CR LF Net weight value		

Step	PC side	Balance side		
	Command	Response	Display	Weighing operation
7	?PT command ? P T CR LF	T ␣ , + 0 0 1 2 . 3 4 5 6 ␣ ␣ g CR LF Tare weight value		

"␣" represents a space.

24. UFC Function

By using the Universal Flex Coms (UFC) function, you can output customized content when outputting weighing data. You can also output character strings for barcode printing with a label printer or similar device.

To use the UFC function, set "*1*" (ON) for "*UFC*" (UFC function) under [dout] (Data output) in the function table ("10. Function Table").

24.1. UFC program commands

The desired output format can be stored in the balance by sending a program command from the PC. The stored output format is retained in the balance's nonvolatile memory even when the power is turned off.

Creating program commands

- ❑ The maximum length for a program command is 512 characters.
  Begin with the "PF," command.
- ❑ Program commands can be combined using comma or space delimiters, which can be omitted to reduce character count.
  The comma after the PF command, however, cannot be omitted.

Program command list

Command	Content	Output example
PF,	FC command header (Add this to the beginning of the program command.)	
$MN	Manufacturer name	␣ ␣ ␣ ␣ ␣ ␣ ␣ A ␣ & ␣ D
$TY	Model	␣ ␣ ␣ ␣ ␣ ␣ B H - 2 2 4
$SN	Serial number	␣ ␣ ␣ ␣ T 1 2 3 4 5 6 7
$ID	ID number	S A M P L E - 1 2 3 4 - 5
$DT	Date	2 0 2 5 / 0 1 / 3 1
$TM	Time	1 2 : 3 4 : 5 6
$WT	Weighing data	␣ ␣ ␣ + 1 2 . 3 4 5 6 ␣ ␣ g
$GR	Gross data (gross weight)	␣ ␣ ␣ + 1 2 . 3 4 5 6 ␣ ␣ g
$NT	Net data (net weight)	␣ ␣ ␣ ␣ + 2 . 3 4 5 6 ␣ ␣ g
$TR	Tare data (tare weight)	␣ ␣ ␣ + 1 0 . 0 0 0 0 ␣ ␣ g
$PC	Counting data	␣ ␣ ␣ ␣ ␣ ␣ + 1 2 3 4 ␣ P C
$UW	Unit weight data	␣ ␣ ␣ ␣ + 0 . 1 2 3 4 ␣ ␣ g
$CM	Comma	,
$SP	Space	␣ ASCII 20h
$CR	<CR> Carriage return	ASCII 0Dh
$LF	<LF> Line feed	ASCII 0Ah

- Enclose any user-specified ASCII string in single quotation marks (' '). The output string can include alphanumeric characters and symbols.
  Example: To output the string "SAMPLE-12", enter 'SAMPLE-12'

  To represent a single quotation mark itself, use two single quotation marks (' ').
  Example: To output the string "A'BC'D", enter 'A''BC''D'

- To output an ASCII control code, enter "# + 2 hexadecimal characters".
  Example: To output "End of Transmission, EOT (04h)", enter #04.

- By adding '* and a number (up to 2 characters)' after the command, space ($SP), CR ($CR), LF ($LF), and TAB ($HT) can be repeated as many times as the number entered.
  Example: To output 12 spaces, enter $SP*12
  To output 9 carriage returns, enter $CR*9.

- When sending two or more lines of program commands, add '&' to the end of a line that the command continues on the next line. (RS-232C only)

- After receiving a program command, the balance sends an <AK> code if the command is executed successfully; otherwise, it sends an error code. The <AK> code is ASCII 06h.

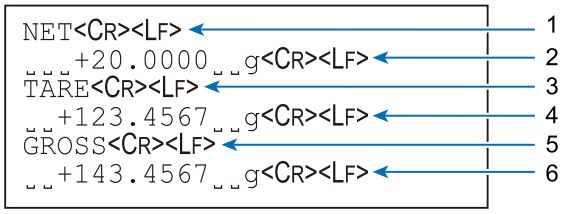
- Windows Communication Tools for UFC (WinCT-UFC) is software designed for creating program commands.
  You can download WinCT-UFC from the Software page on the A&D website (https://www.aandd.jp) by filling out the necessary form.

24.2. Examples of UFC program command creation

CAUTION

❑ The terminator (newline) in the UFC format is not automatically sent.
Add the terminator code at the end of the character data as needed.

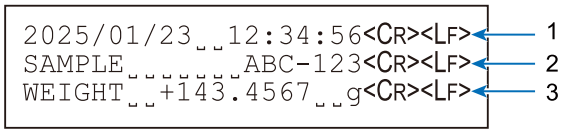
Output example 1



No.	Content	Program command example
1	PF, Command, String "NET", Newline	PF,'NET',$CR,$LF,&
2	Net Data, Newline	$NT,$CR,$LF,&
3	String "TARE", Newline	'TARE',$CR,$LF,&
4	Tare data, Newline	$TR, $CR,$LF,&
5	String "GROSS", Newline	'GROSS', $CR,$LF,&
6	Gross data	$GR,$CR,$LF

"␣" represents a space.

Output example 2



No.	Content	Program command example
1	PF, Command, Date, Space, Space, Time, Newline	PF,$DT,$SP,$SP,$TM,$CR,$LF,&
2	String "SAMPLE␣␣␣␣␣␣␣ABC-123", Newline	'SAMPLE␣␣␣␣␣␣␣ABC-123',$CR,$LF,&
3	String "WEIGHT", Weight data	'WEIGHT',$WT,$CR,$LF

"␣" represents a space.

25. Key Lock Function

The key switches of the balance can be locked by sending a specified command to the balance.
This function is useful when you want to control the balance exclusively with an external device such as a PC.

- ❑ Even in the key lock state, it is possible to operate the keys using key control commands.
  For commands to perform key operations, refer to "23. Command".
- ❑ The key lock state can be checked by sending a status check command to the balance.
- ❑ The key lock is maintained until a release command is sent to the balance or the power is turned off by unplugging the AC adapter.

25.1. Locking all key switches

All key switches of the balance, except for the IR sensors, can be disabled by sending a KL command to the balance.

Command string	Content
`?KL`	Requests the lock state of all keys. `KL,000` All keys unlocked. `KL,001` All keys locked.
`KL:***`	Replace *** with either 000 or 001. `KL:000` Unlock all keys. `KL:001` Lock all keys.

25.2. Locking specified key switches

Any key switches can be enabled or disabled by the numerical value specified by the LK command.
The numerical value (*****) is the sum of the decimal numbers converted from the bit values assigned to each key switch, as shown below.

Bit	Decimal number	Key
0	1	[ON:OFF] key
1	2	[CAL] key
2	4	[MODE] key
3	8	[SAMPLE] key
4	16	[PRINT] key
5	32	[TARE] key
6	64	[RE-ZERO] key
7	128	IR sensor (left)
8	256	IR sensor (right)

Example 1 Locking all key switches except the [PRINT] key.
Add the decimal numbers corresponding to the keys to be locked:

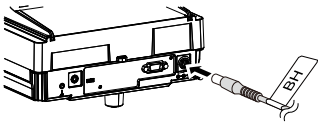
[ON:OFF] key: 1 × 1 (locked) +
[CAL] key: 2 × 1 (locked) +
[MODE] key: 4 × 1 (locked) +
[SAMPLE] key: 8 × 1 (locked) +
[PRINT] key: 16 × 0 (enabled) +
[TARE] key: 32 × 1 (locked) +
[RE-ZERO] key: 64 × 1 (locked) +
IR sensor (left): 128 × 1 (locked) +
IR sensor (right): 256 × 1 (locked) = 495

Command string	Content
`?LK`	Requests the status of the specified key locks. Example 1: When the key switches other than the [PRINT] key are locked. `LK,00495` Example 2: When all key switches are unlocked. `LK,00000`
`LK:*****`	Locks the specified keys. A number from 00000 to 00511 is entered in place of *****. This sends the LK: command to the balance. Example 1: When locking the key switches other than the [PRINT] key. `LK:00495` Example 2: When unlocking all key switches. `LK:00000`

26. Checking the Software Version of the Balance

Specifications may vary depending on the balance software version.
Check the software version as follows.

Checking method

Step	Description	Display and key operations
1	Disconnect and reconnect the AC adapter to the balance.	
2	The LEVEL display blinks.	LEVEL
3	"P-*.***": The software version, represented as *.***, is displayed for about 1 second. The number in place of *.*** indicates the software version.	P- 1.500

27. Maintenance

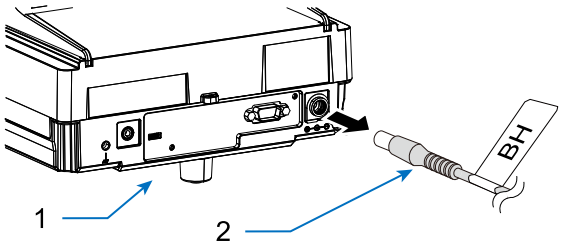
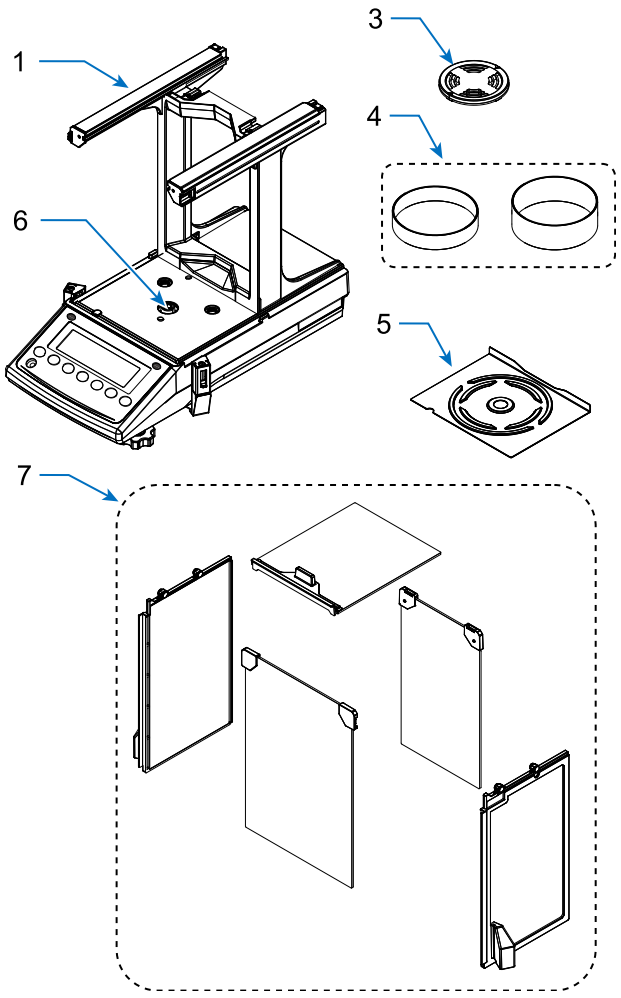
27.1. Treatment of the balance

Cleaning the balance

- ❑ Do not use organic solvents, alcohol, or chemical cleaning cloths.
- ❑ Do not disassemble the balance.
- ❑ When transporting the balance, use the packing materials and box that the balance was originally packed in when purchased.

Main unit	Use the included cleaning brushes to remove dust from the main unit. For oil stains, use a soft, lint-free cloth dampened with a neutral detergent.
Breeze break	The breeze break glass panes are treated with an anti-static coating. Wipe them with a soft, lint-free cloth.
Weighing pan	The weighing pan is made of stainless steel. When cleaning, be careful not to injure your hands on the edges.

Cleaning method

Step	Description	Parts diagram
1	Disconnect the AC adapter plug (2) from the main unit (1).	
2	Remove the breeze break glass panes (7) from the main unit (1) and clean the glass.	
3	Remove the weighing pan (3), breeze break rings (4), and breeze break bottom plate (5), and clean the top surface of the main unit (1).	
4	Do not apply force to the pan support boss (6) during cleaning. Be careful not to let dust or debris enter the main unit through the hole in the pan support boss. Do not remove the stickers attached to the main unit during cleaning.	
5	After cleaning is complete, refer to "2.2. Assembly and installation" for setup.	

1 Main unit
2 AC adapter plug
3 Weighing pan
4 Breeze break rings
5 Breeze break bottom plate
6 Pan support boss
7 Breeze break glass panes

28. Troubleshooting

28.1. Checking the balance performance and environment

Since the balance is a precision instrument, in some cases it may not be able to measure correct values due to adverse effects of the measurement environment or measurement method.
If repeatability is poor when the sample is loaded and unloaded several times, or if the balance seems to be operating abnormally, check the following items.
If the problem persists after checking each item, contact your local A&D dealer for repair. "Frequently Asked Questions" and answers to them are also posted on the A&D website (https://www.aandd.jp).

1. Checking that the balance works properly.

- ❑ As a simpler test, check the repeatability with an external weight. Be sure to place the weight in the center of the weighing pan.
- ❑ As a precise test, check the repeatability, linearity, weighing value, etc. with a weight of a known weight.

2. Checking that the measurement environment and method are appropriate.

Operating environment

- ❑ Is the table on which the balance is placed sturdy?
- ❑ Is the balance level? Refer to "2.4. How to adjust the level of the balance".
- ❑ Is the operating environment free from vibration and drafts?
- ❑ Are all the breeze break glass panes correctly assembled?
- ❑ Is there any strong electrical or magnetic noise source such as a motor near the balance?

Weighing method

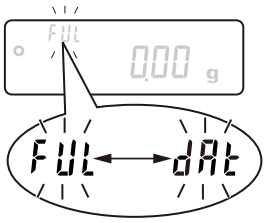
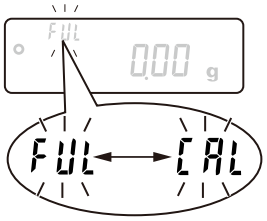
- ❑ Is the weighing pan set so that it does not touch other parts, such as the breeze break or dust plate frame? (Is it installed correctly?)
- ❑ Do you always press the [RE-ZERO] key before placing your sample on the weighing pan?
- ❑ Do you place your sample in the center of the weighing pan?
- ❑ Did you perform a sensitivity adjustment before weighing?
- ❑ Did you warm up the balance before weighing for at least an hour with the AC adapter connected to the power supply?

Sample and container

- ❑ Is the sample free from moisture absorption or evaporation due to the influence of ambient temperature and humidity?
- ❑ Is the temperature of the container of the sample acclimatized to the ambient temperature? Refer to "2.5. Precautions during use for more accurate weighing".
- ❑ Is the sample free of static electricity? Refer to "2.5. Precautions during use for more accurate weighing". When the relative humidity is low, the sample may become charged with static electricity, potentially affecting the weighing value.
- ❑ Is the sample made of a magnetic material, such as iron? Care must be taken when weighing magnetic materials. Refer to "2.5. Precautions during use for more accurate weighing".

28.2. Error displays (error codes)

Display	Error code	Description and possible countermeasure
E		**Overload error** The weighing value exceeds the balance's weighing capacity. Remove the object from the pan.
-E		**Weighing pan error** The weighing value is too light. The weighing pan is not installed correctly. Set the weighing pan correctly. Perform a sensitivity adjustment.
LoW Volt		**Power supply voltage fault** The voltage supplied from the AC adapter is abnormal. Check that the AC adapter is the one supplied with the balance.
Error 0		**Internal error** If this error persists, please contact your local A&D dealer for repair.
Error 1	EC, E11	**Stability error** Due to the unstable weighing value, functions such as "zero display" and "sensitivity adjustment" cannot be executed. Check around the pan. Refer to "2.5. Precautions during use for more accurate weighing". Improve the environment of the installation location (vibration, drafts, static electricity, etc.). To return to weighing mode, press the [CAL] key.
Error 2		**Entry value error** The value entered exceeds the setting range. Enter a value within the setting range.
Error 6	EC, E16	**Internal weight error** Raising and lowering the internal weight does not yield a change in the mass value greater than that specified. Confirm that there is nothing on the pan and perform the operation from the beginning. If this error continues to be displayed, repair is necessary.
Error 7	EC, E17	**Internal weight error** The internal weight application mechanism does not function properly. Perform the operation from the beginning. If this error continues to be displayed, repair is necessary.
CAL E	EC, E20	**Calibration weight error (Positive value)** The sensitivity adjustment weight is too heavy. Check around the pan. Check the calibration mass value. To return to weighing mode, press the [CAL] key.
-CAL E	EC, E21	**Calibration weight error (Negative value)** The calibration weight is too light. Check around the pan. Check the calibration mass value. To return to weighing mode, press the [CAL] key.
Lo		**Sample mass error** The sample is too light to be stored as a sample mass for the counting mode or percent mode. The sample cannot be used.

Display	Error code	Description and possible countermeasure
25 - PCS 50 - PCS 100 - PCS		**Unit weight error** The sample mass for the counting mode is too light. Storing and using it for counting may cause a counting error. Add samples until the specified number is reached, then press the [PRINT] key. Pressing the [PRINT] key without adding samples will still put the balance in counting mode, but for accurate counting, ensure samples are added.
SD Error MW Error		**Repeatability error** The standard deviation (SD) of repeatability has exceeded 50 d. *1 Review the installation environment of the balance. SD Error "SD Error" appears in repeatability display. MW Error Displayed in minimum weighing value (reference value) display. *1 "d" represents scale division.
		**Full memory** The number of stored weighing values has reached the upper limit. In order to store a new weighing value, it is necessary to delete data. Refer to "12. Data Memory".
		**Full memory** The stored sensitivity adjustment / calibration test history has reached 50 results. In order to store a new result, the oldest history will be deleted. Refer to "12. Data Memory".
rtc PF		**Clock battery error** The clock backup battery has been depleted. Press any key and set the time and date. Even if the clock backup battery is depleted, the clock and calendar function works normally as long as the balance is powered with the AC adapter. If this error appears frequently, contact your local A&D dealer for repair.
door Err		**The breeze break auto doors are not functioning properly.** Ensure there are no obstructions preventing the breeze break auto door(s) from opening and closing, then perform the door test (refer to "3.2.2. Auto doors"). If this error continues to be displayed, repair is necessary.
Error 3		**Malfunction of the internal memory element of the balance** If this error persists, please contact your local A&D dealer for repair.

Display	Error code	Description and possible countermeasure
Error 5		**Mass sensor error** If this error continues to be displayed, repair is necessary.
-Error 5		**Mass sensor error** Set the weighing pan correctly. If this error continues to be displayed, repair is necessary.
Error 8		**Abnormality in the internal memory data of the balance** If this error persists, please contact your local A&D dealer for repair.
Error 9		**Abnormality in the internal memory data of the balance** If this error persists, please contact your local A&D dealer for repair.
	EC, E00	**Communications error** A protocol error occurred in communication. Check the format, baud rate, etc.
	EC, E01	**Undefined command error** An undefined command was found. Check the transmitted command.
	EC, E02	**Not ready** The received command cannot be executed. Example: The Q command was received when not in weighing mode. Example: The Q command was received while re-zeroing. Adjust the delay time for transmitting a command.
	EC, E03	**Timeout error** When "1" (1-second limit) is set for "t-UP" (Command timeout) under SIF (Serial interface) in the function table ("10. Function Table"), a wait time of approximately 1 second or more occurred while receiving command characters. Check the communication.
	EC, E04	**Character length error** The number of characters in the received command has exceeded the limit. Check the command to transmit.
	EC, E06	**Format error** The description of the received command is incorrect. Example: The number of digits in the numerical values is incorrect. Example: Alphabet characters are present among the numerical values. Check the transmitted command.
	EC, E07	**Parameter setting error** The value of the received command has exceeded the allowed value. Check the setting range of the numerical value of the command.

Display	Error code	Description and possible countermeasure
Other error displays		If any other error displays appear, or if the above errors cannot be resolved, please contact your local A&D dealer for repair.

28.3. Asking for repair

If any issues occur after verifying the balance's operation, or if error displays indicating repairs being required appear, please contact your local A&D dealer. The balance is a precision instrument. Handle it with care during transport.

- ❑ When transporting the balance, use the packing materials and box that the balance was originally packed in when purchased.
- ❑ Remove the weighing pan and pan support from the main unit before transporting.

29. Specifications

29.1. Common specifications

29.1.1. Function

Internal weight		Approx. 200 g *1
Sensitivity drift (10 °C to 30 °C)		±2 ppm/°C (Automatic sensitivity adjustment OFF)
Operating environment		5 °C to 40 °C, 85%RH or less (no condensation)
Display refresh rate		5 times/second or 10 times/second
Counting mode	Number of sample pieces to store	5, 10, 25, 50 or 100 pieces
Percent mode	Readability	0.01%, 0.1%, 1% (Automatically changed by 100% reference mass)
Communication		RS-232C (printer, remote display, PLC, etc.), USB (PC), 3.5 mm stereo jack (external switch)
Power (AC adapter)		Confirm that the adapter type is correct for the local voltage and power receptacle type. Power consumption: approx. 36 VA (including the AC adapter).

*1 The internal weight may change in mass due to the usage environment and deterioration over time.

29.1.2. Size/weight

Weighing pan size	φ90 mm
Main body weight	Approx. 8 kg
External dimensions	265 (W) × 442 (D) × 381 (H) mm

29.2. Individual specifications

29.2.1. 0.01 mg model

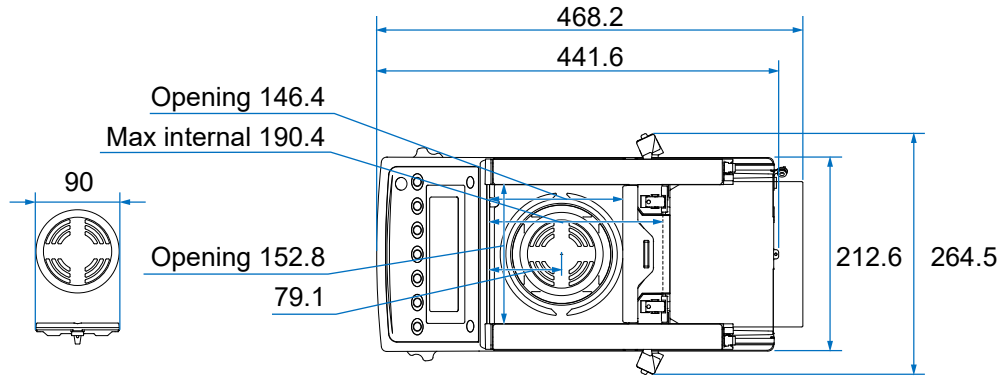
		BH-225	BH-225D
Weighing capacity		220 g	220 g
			51 g
Maximum display		220.00084 g	220.0008 g
			51.00009 g
Readability		0.01 mg (0.00001 g)	0.1 mg (0.0001 g)
			0.01 mg (0.00001 g)
Repeatability Standard Deviation (Measurement Load)		0.015 mg (50 g) 0.03 mg (200 g)	0.1 mg (200 g)
			0.025 mg (50 g)
Linearity		±0.10 mg	±0.2 mg
Stabilization time (FAST setting, good environment)		Approx. 7 seconds	Approx. 3 seconds
			Approx. 7 seconds
Counting mode	Minimum unit weight	0.1 mg	
Percent mode	Minimum 100% reference mass	10.0 mg	
Applicable weights for sensitivity adjustment		200 g (factory setting) 100 g 50 g 20 g 10 g	200 g (factory setting) 100 g 50 g 20 g 10 g

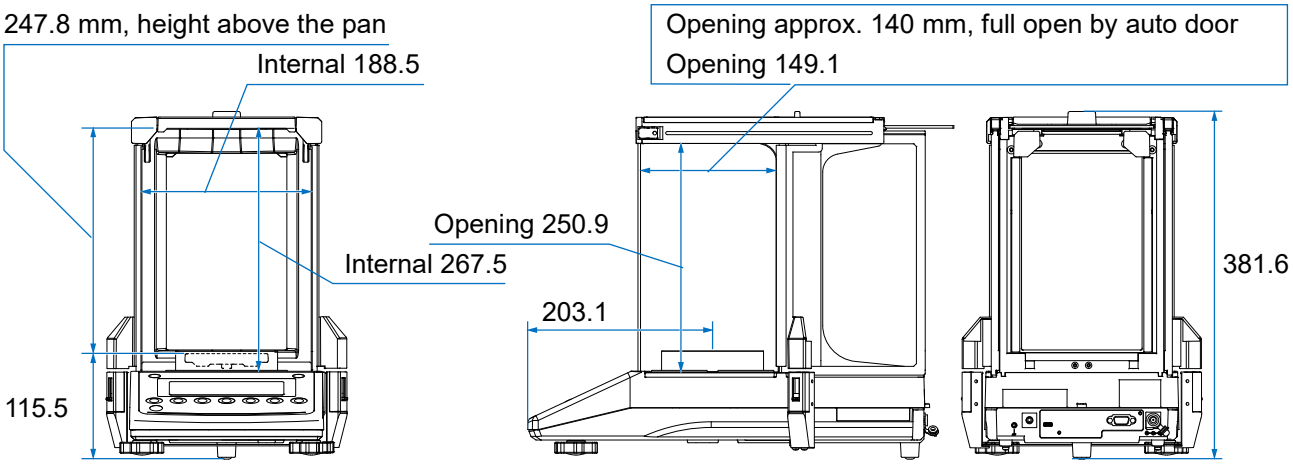
29.2.2. 0.1 mg model

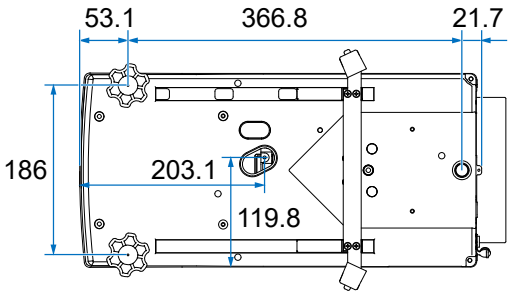
		BH-124	BH-224	BH-324
Weighing capacity		120 g	220 g	320 g
Maximum display		120.0084 g	220.0084 g	320.0084 g
Readability		0.1 mg (0.0001 g)		
Repeatability Standard deviation		0.09 mg		0.1 mg
Linearity		±0.2 mg		
Stabilization time (FAST setting, good environment)		Approx. 3 seconds		
Counting mode	Minimum unit weight	0.1 mg		
Percent mode	Minimum 100% reference mass	10.0 mg		
Applicable weights for sensitivity adjustment		100 g (factory setting) 50 g 20 g 10 g	200 g (factory setting) 100 g 50 g 20 g 10 g	300 g 200 g (factory setting) 100 g 50 g 20 g 10 g

30. External Dimensions

When the breeze break top glass pane is fully open







Unit: mm

31. Peripherals

A variety of optional accessories (sold separately) are available for the balance.

31.1. Consumables and peripheral devices

AX-BH-31: Display cover for BH series (a set of 5 pcs)

- Transparent PET display covers (standard accessory).

AD-8127: Multi-functional compact printer

- A small dot impact printer that connects to the balance via the RS-232C interface.
- Multiple features available, including date/time printing, statistical calculation, interval mode, and chart mode.

(For details, refer to the AD-8127 Instruction Manual.)

AD-8129TH: Compact thermal printer

- A small direct thermal printer that connects to the balance via the RS-232C interface.
- Multiple features available, including date/time printing, statistical calculation, interval mode, and chart mode.

(For details, refer to the AD-8129TH Instruction Manual.)

AD-8920A: Remote display

- Connects to the balance via the RS-232C interface to display the weighing value.

(For details, refer to the AD-8920A Instruction Manual.)

AD-8922A: Remote controller

- Connects to the balance via the RS-232C interface to display the weighing value. Performs the balance's key operations.

(For details, refer to the AD-8922A Instruction Manual.)

AD-1683A: Ionizer

- Prevents weighing errors caused by static charges on the sample.
- Ideal for precise weighing of powders and the like using the DC method to generate a high volume of ions without airflow.
- Enables touchless static elimination by operating via an infrared sensor.

(For details, refer to the AD-1683A Instruction Manual.)

AD-1684A: Electrostatic field meter

- Measures the electrostatic charge of measured objects or peripheral devices such as containers or breeze breaks for the balance (on automated measuring lines and similar setups) and displays the measurement results. For elimination of charged static electricity, use the AD-1683A ionizer.

AD-1687: Weighing environment logger

- Records environmental data independently using built-in sensors for temperature, humidity, barometric pressure, and vibration.
- Allows recording of environmental data along with weighing data when connected to the balance via the RS-232C interface.

(For details, refer to the AD-1687 Instruction Manual.)

AD-1688: Weighing data logger

- Connects to the balance via the RS-232C interface to log weighing data.
- Ideal for recording data in locations where using a PC is not possible.

(For details, refer to the AD-1688 Instruction Manual.)

AD-8541-SCALE: RS-232C to Bluetooth® converter

- Connects the balance to a smartphone, tablet, or PC via Bluetooth, with a maximum communication distance of 10 meters. A dedicated app, "WinCT-WeiV," is available for smartphones and tablets.
- For connection to a PC, use the AD-8541-SCALE together with the AD-8541-PC (listed below) on the PC side.

(For details, refer to the AD-8541-SCALE Instruction Manual.)

AD-8541-PC: Bluetooth® dongle for PC

- Connects the balance to a PC via Bluetooth, with a maximum communication distance of 10 meters.
- Use together with the AD-8541-SCALE (listed above).

(For details, refer to the AD-8541-PC Instruction Manual.)

AX-SW137-PRINT: Foot switch for PRINT

- An external switch that functions the same way as the [PRINT] key.

AX-SW137-REZERO: Foot switch for RE-ZERO

- An external switch that functions the same way as the [RE-ZERO] key.

AD-1671: Anti-vibration table for balances

- A tabletop anti-vibration table made of natural granite. Its body weight of approximately 27 kg, and rubber cushioning material can reduce vibrations transmitted from the installation table to the balance, minimizing fluctuations in the display caused by vibrations.

AD-1689: Tweezers for sensitivity adjustment weights

- A pair of tweezers ideally suited for holding sensitivity adjustment weights of 1 g to 500 g.

AX-KO2741-180: RS-232C cable 1.8 m (D-sub 9-pin female - D-sub 9-pin female)

- Cable for connecting the balance to a PLC or similar device.

AX-KO7919-200: USB cable 2 m (Type A - Type C)

- USB cable (standard accessory)

AX-USB-9P: USB converter

- Converts the balance's RS-232C interface to USB.
- Driver installation is required.

(For details, refer to the AX-USB-9P Instruction Manual.)

32. Terms

Terms	Description
Stable display	The weighing value when the stabilization indicator is displayed.
Environment	Ambient conditions such as vibration, drafts, temperature changes, static electricity, magnetic fields, and other factors that affect the weighing operation.
Sensitivity adjustment	Adjustment of the balance to ensure accurate weighing.
Zero point	A weighing reference point. Refers to the weighing value displayed when nothing is on the weighing pan (the reference value). Normally, the reference value is displayed as zero.
d	Scale division, a unit of digital resolution. Represents the readability that the balance can display as one unit.
Tare	To cancel the weight of a container, paper, etc., that is placed on the weighing pan and is not to be weighed.
Re-zero	To set the display to zero.
GLP	Good Laboratory Practice.
GMP	Good Manufacturing Practice.
Repeatability	Variation in measured values obtained when the same weight is placed and removed repeatedly. Usually expressed as a standard deviation. Example: Standard deviation = 0.1 mg. This means that the measured values fall within ±0.1 mg approximately 68% of the time.
Stabilization time	The time required for the stabilization indicator to be displayed with the weighing value after placing a sample on the weighing pan.
Sensitivity drift	The effect of temperature changes on the weighing data, expressed as a temperature coefficient. Example: At temperature coefficient = 2 ppm/°C, if a load is 300 g and the temperature changes by 10°C, the displayed value changes by: 0.0002 %/°C x 10 °C x 300 g = 6 mg

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