MC-M SERIES

Mass Comparator

INSTRUCTION MANUAL

A&D Company, Ltd.

1WMPD4005467A

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 an A&D electronic balance. Please read this instruction manual carefully before using the MC-M series top-loading electronic balance to fully understand and utilize it.

1-1 Features

- It can display one digit finer than the minimum display of conventional general-purpose balances, making it suitable for managing OIML F1 class weights.
- It can measure small amounts of powder or liquid even with a heavy tare.
- When used as a mass comparator, the accessory center of gravity adjustment plate can be used to reduce eccentric error, allowing for more precise measurements.
- It is equipped with a self-check function that automatically evaluates repeatability performance without using weights. (Electronic Controlled Load: ECL)
- It can detect shocks applied to the balance's mass sensor, display the shock level, and store it. (Impact Detection Function: ISD)
- It is equipped with a data memory function that can store weighing values, sensitivity adjustment results, and multiple unit masses (mass per sample in count mode).
  (Up to 200 weighing values can be stored)
- The MC-M series can automatically adjust sensitivity with built-in weights (automatic sensitivity adjustment). (Temperature changes, specific times, at regular intervals)
- It can output sensitivity adjustments and other data in compliance with GLP/GMP standards.
  The results of sensitivity adjustments can be recorded using an optional printer.
  GLP stands for "Good Laboratory Practice," which is a standard for conducting safety tests on pharmaceuticals.
  GMP stands for "Good Manufacturing Practice," which is a regulation for manufacturing and quality control.
- The balance has a built-in clock function, allowing weighing values to be output with date and time.
  (Clock settings can be restricted to administrators only with a password function)
- Pre-set upper/lower limits can be compared with weighing values, and the comparison results can be displayed as HI, OK, or LO, making it useful for pass/fail judgments and ranking. (Five-level comparison is also possible with settings)
- It is equipped with a weighing indicator function that shows the remaining capacity relative to the balance's weighing capacity.
- It has a display hold function that can be used for animal weighing.
- It comes standard with an underfloor weighing hook for magnetic material measurements.
- The password function can restrict users and changes to internal settings.
- The key lock function disables key operations on the balance, allowing it to be operated only by commands from external devices.
- It is equipped with standard RS-232C and USB interfaces for outputting weighing values and data. Additionally, data communication with Windows PCs is easy using the WinCT software.
  The latest version of WinCT can be downloaded from our website.
  Windows is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.

1-2 Compliance

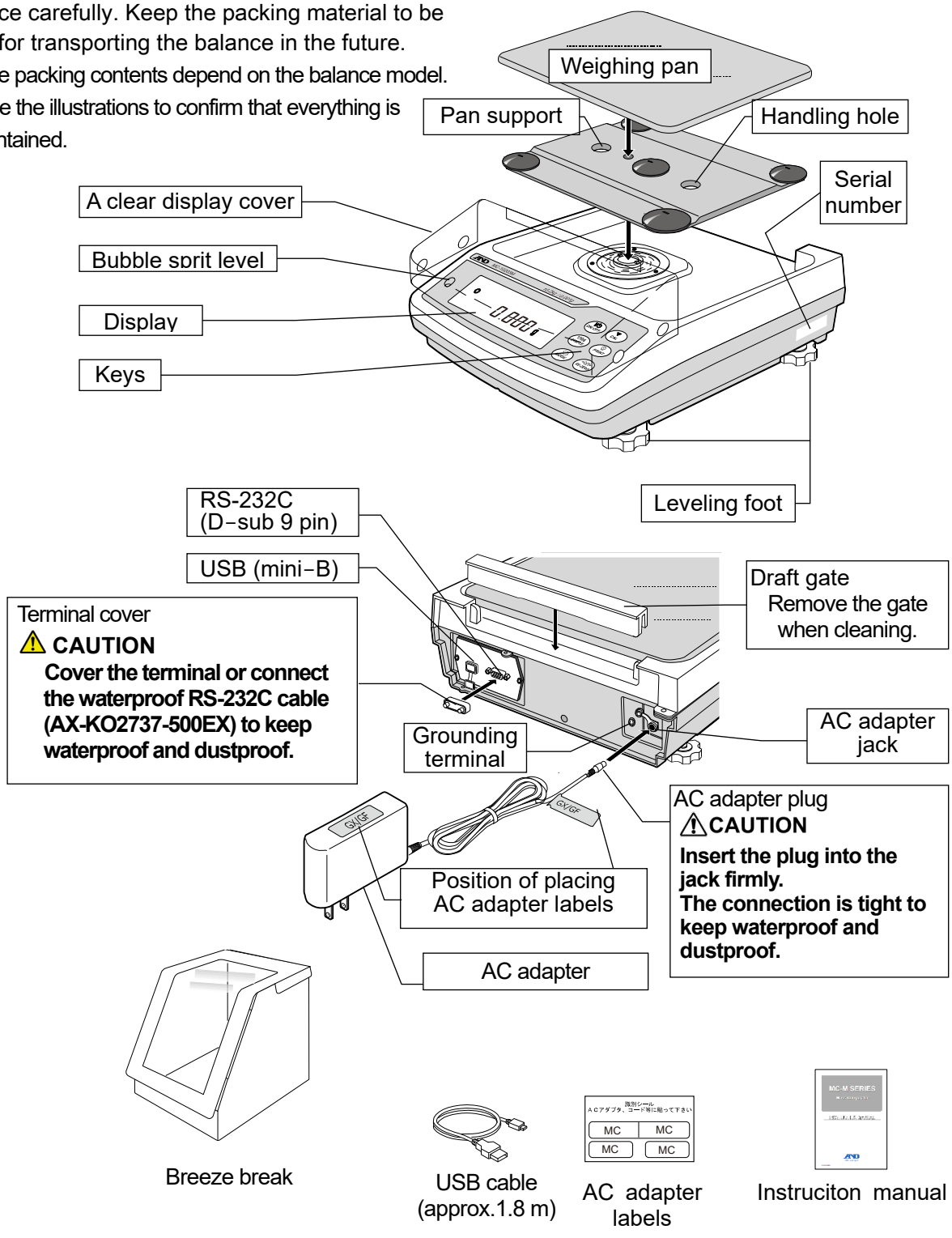
Compliance with FCC Rules

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. Product Configuration (Names of Each Part), Installation and Precautions

The balance is a precision instrument. Unpack the balance carefully. Keep the packing material to be used for transporting the balance in the future.

- The packing contents depend on the balance model. See the illustrations to confirm that everything is contained.



⚠ CAUTION

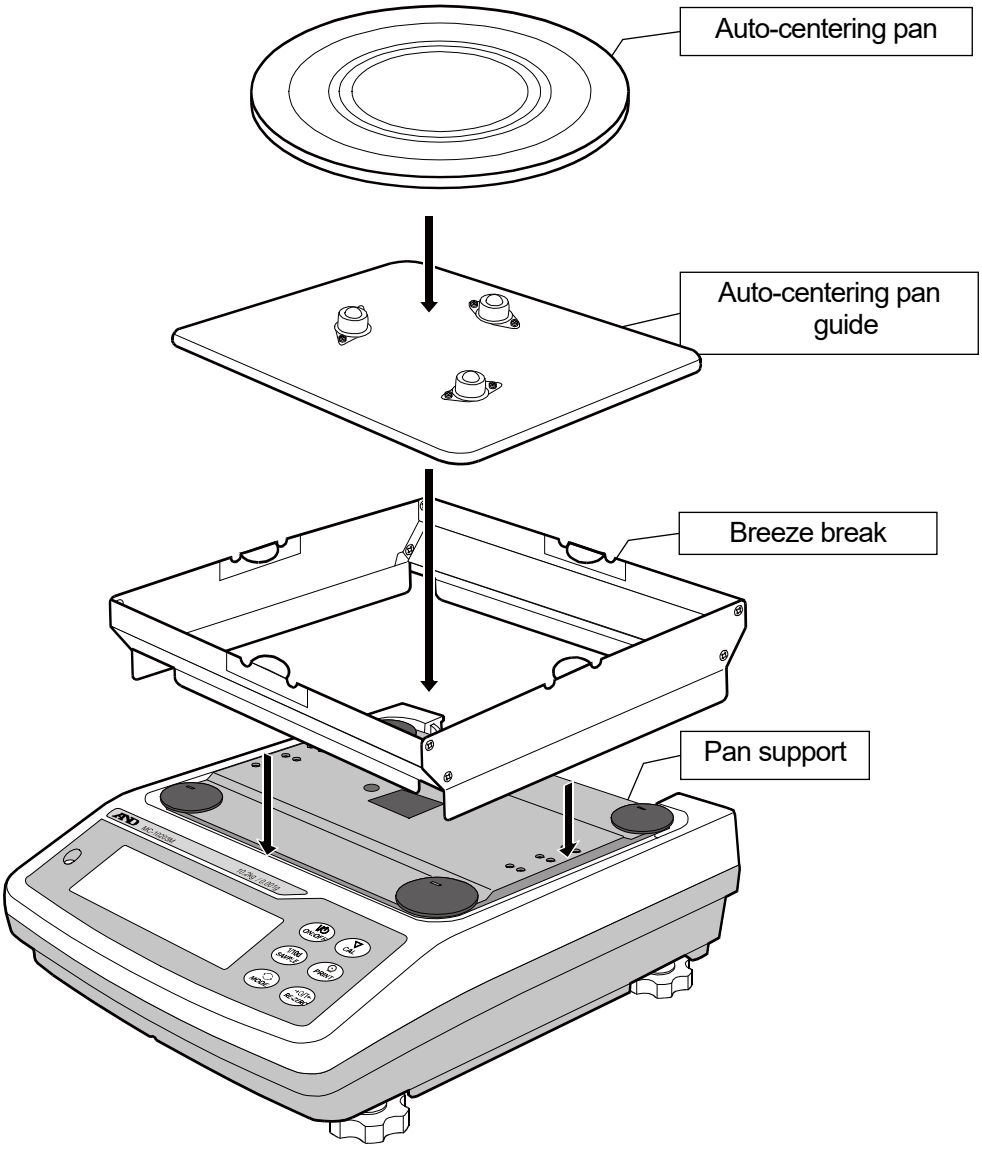
- ❑ **Use the specified dedicated AC adapter for the balance.**
- ❑ **Do not connect the included AC adapter to other devices.**
- ❑ **Using the wrong AC adapter may cause the balance and other devices to malfunction.**

How to Attach the Center of Gravity Adjustment Plate (AX-MC10K / 30KPAN)

⚠ CAUTION During installation, do not to apply excessive force to the balance.

❑ When used as a mass comparator, the accessory center of gravity adjustment plate can be used to reduce eccentric error, allowing for more precise measurements.

1. Place the pan support on the balance body. Use the grooves on the body to place the adjustment draft shield.
   Place the adjustment plate guide on the pan support, and then place the center of gravity adjustment plate on top.

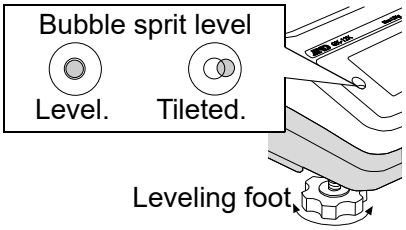


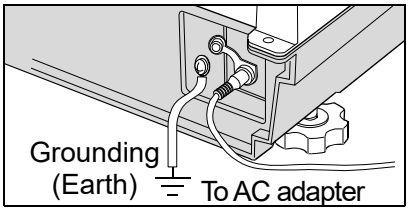
CAUTION When replacing the weighing pan with the auto-centering pan, be sure to calibrate the balance before weighing
(Refer to "7. Sensitivity Adjustment/Calibration Test".)

2-1 Installing the Balance

Install the balance as follows:

1. Refer to "2-2. Precautions Before Use ".
2. Install the pan support, weighing pan and draft gate. Refer to the previous page.
3. Adjust the leveling feet to level the balance. Confirm it using the bubble spirit level.
4. Confirm that the AC adapter type is correct for the local voltage and power receptacle type.
5. Connect the AC adapter to the balance firmly. Earth the balance with the grounding terminal. Warm up the balance for at least an hour with nothing on the weighing pan.

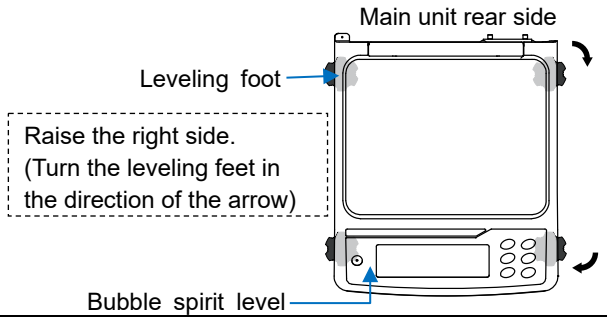
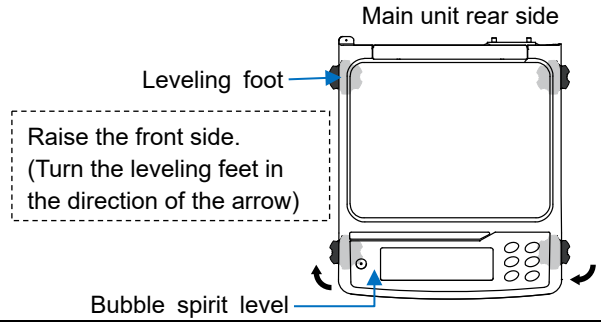
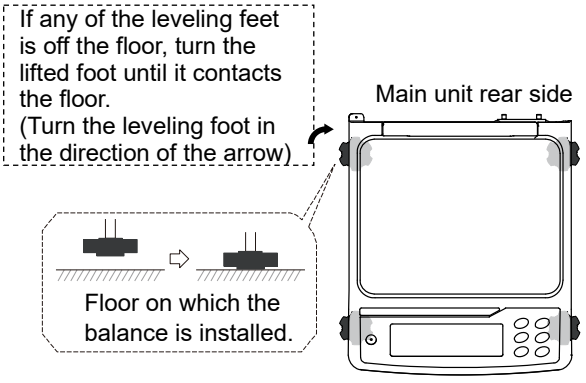




Adjusting the level of the balance

E.g. Procedure when the bubble is on the top left of the bubble spirit level:

Center circle of the bubble spirit level Bubble

Bubble spirit level	Procedure	How to adjust the leveling feet
 The left side of the balance main unit is tilted high.	Step 1 Adjust the right-left tilt: Turn the leveling feet to adjust the height. (In this example, the right side is raised as shown in the figure on the right.)	
 The rear side of the balance main unit is tilted high.	Step 2 Adjust the front-rear tilt: Turn the leveling feet to adjust the height. (In this example, the front side is raised as shown in the figure on the right.)	
 The balance is level.	Step 3 Check the leveling feet: Check that the leveling feet at the four corners are not lifting off the floor. If any of the leveling feet is off the floor, turn thelifted foot until it contacts the floor. Be careful not to misalignthe bubble with the center circle.	

2-2 Precautions Before Use

To get the optimum performance from the balance and acquire accurate weighing data, note the following:

- The maximum resolution of the precision balance is one million counts. Therefore, there are tendencies to be influenced by temperature change, air pressure change, vibration and drafts where the balance is placed.
- Install the balance in an environment where the temperature and humidity are not excessive. The best operating temperature is about 20 ºC ± 2 ºC and 45-60% humidity.
- Install the balance where it is not exposed to direct sunlight and it is not affected by heaters or air conditioners.
- Install the balance where it is free of dust.
- Install the balance away from equipment that produces magnetic fields.
- Install the balance in a stable place avoiding vibration and shock. Corners of rooms on the first floor are best, as they are less prone to vibration.
- The weighing table should be solid and free from vibration, drafts and as level as possible.
- Level the balance by adjusting the leveling feet and confirm it using the bubble spirit level.
- Ensure a stable power source when using the AC adapter.
- Connect the AC adapter and warm up the balance for at least an hour.
- When the balance is installed for the first time or has been moved, warm up the balance for at least 6 hours to allow the balance to reach equilibrium with the ambient temperature, and then perform sensitivity adjustment before use.
- The balance's dustproof and waterproof rating is equivalent to IP65, and its second digit, "5", corresponds to "having no harmful influence by receiving direct jet of water". Washing with strong water pressure, washing with the weighing pan removed, or submersion in water may cause water to enter the balance, resulting in a malfunction.
- When washing with warm water, condensation may occur and harm the components. Be careful not to allow water vapor to get inside.
- Confirm that "the plug is inserted firmly into the jack" and "the terminal is covered using the waterproof cover or the waterproof RS-232C cable (AX-KO2737-500EX)", when using the balance.
- Use the waterproof option cable AX-KO2737-500EX, when the RS-232C interface is used with IP-65. AX-KO2466-200, a standard RS-232C cable, is not waterproof or dustproof.
- Confirm that the weighing pan does not touch to rim.
- Errors due to moving the weighing system:
  The performance of this product is guaranteed when it is used in a stationary condition. If the balance is incorporated into a system that moves the balance, you must carefully perform checks in advance while paying attention to the following.
  - If the balance is moved, it may be damaged by impact shocks. In addition, the weighing value will be unstable immediately after the balance is moved. Avoid sudden movements, stops, or impact shocks, and provide a sufficient waiting time for the weighing value to stabilize when acquiring weighing data.
  - The moving device should have a structure where the balance can be kept level. If thelevel is shifted, the zero point or sensitivity will be shifted, so perform re-zero operation or sensitivity adjustment.
  - In order to avoid the influence of vibration, the moving platform should have a structure not easily susceptible to vibration by means such as reducing the play of moving parts.

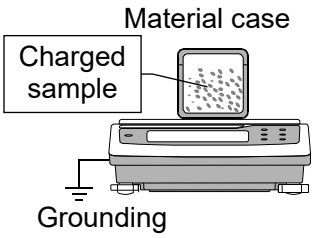
⚠ CAUTION

- **Do not install the balance where flammable or corrosive gas is present.**
- **Please use the dedicated AC adapter specified for the balance.**
- **If you use the wrong AC adapter, the balance and other equipment may not operate properly.**

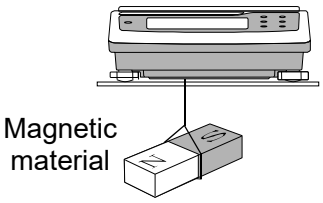
2-3 Precautions during use for more accurate weighing

To perform accurate weighing, please pay attention to the following points.

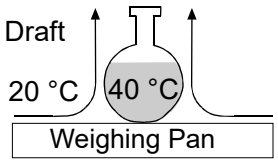
- Discharge static electricity from the weighing material. When weighing sample (plastics, insulator, etc.) could have a static charge, the weighing value is influenced. Ground the balance by using the grounding terminal. For the location of the grounding terminal, refer to "2-1 Installing the Balance".
  - Eliminate the static electricity by AD-1683A as an accessory.
  - Or try to keep the ambient humidity above 45%RH at the room.
  - Or use the metal shield case.
  - Or wipe a charged material (plastic sample etc.) with the wet cloth.



- This balance uses a strong magnet as part of the balance assembly, so please use caution when weighing magnetic materials such as iron. If there is a problem, use the underhook on the bottom of the balance to suspend the material away from the influence of the magnet.



- Eliminate any temperature difference between the sample and the environment. When a sample is warmer (cooler) than the ambient temperature, the sample will be lighter (heavier) than the true weight. This error is due to a rising (falling) draft around the sample.



- Make each weighing gently and quickly to avoid errors due to changes in the environmental conditions.
- Do not drop things upon the weighing pan, or place a sample on the pan that is beyond the balance weighing capacity. Place the sample in the center of the weighing pan.

- Do not use a sharp instrument such as a pencil to press the keys. Use your finger only.
- Press the RE-ZERO key before each weighing to prevent possible errors.

- Calibrate the balance periodically so as to eliminate possible errors.
- Take into consideration the affect of air buoyancy on a sample when more accuracy is required.
- Prevent foreign matter, such as powder, liquid and metal, from invading the area around the weighing pan.
- Use the "breeze break" for a precision weighing.

2-4 Precautions after weighing)maintenance of the balance)

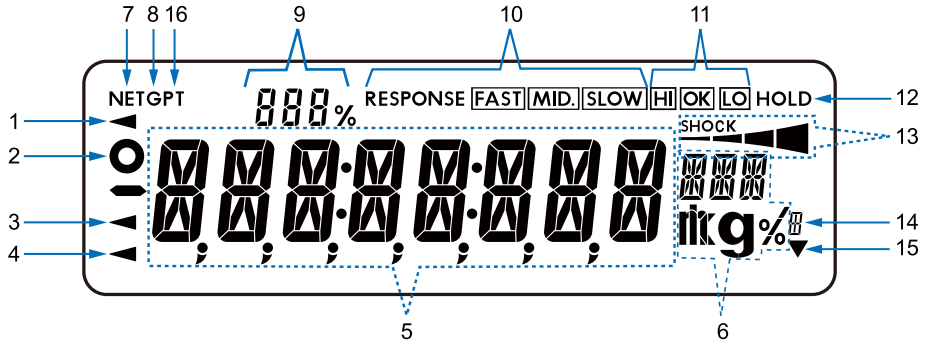
- Avoid mechanical shock to the balance.
- Do not disassemble the balance. Contact the local A&D dealer if the balance needs service or repair.
- Do not use organic solvents to clean the balance. Clean the balance with a lint free cloth that is moistened with warm water and a mild detergent.
- Do not allow the balance to be immersed in water. Even though the balance complies with IP code, the balance will not withstand being completely immersed in water.
- The weighing pan, pan support and draft gate can be removed to clean the balance. Clean by splashing with water.

2-5 Precautions regarding power supply

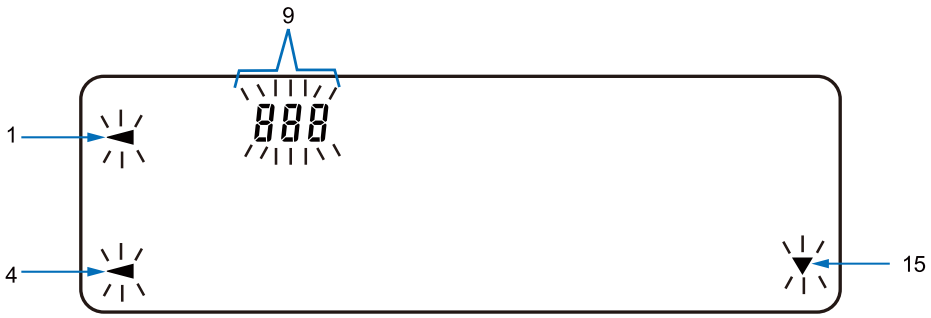
- Do not remove the AC adapter while the internal mass is in motion, for example, right after the AC adapter is connected, or during sensitivity adjustment using the internal mass.
  If the AC adapter is removed under the conditions described above, the internal mass will be left unsecured, that may cause mechanical damage when the balance is moved.
  Before removing the AC adapter, press the [ON:OFF] key and confirm that zero is displayed.
- When the AC adapter is connected, the balance is in the standby mode if the standby indicator is on. This is a normal state and does not harm the balance. For accurate weighing, keep the AC adapter connected to the balance and AC power unless the balance is not to be used for a long period of time.

3. Display Symbols and Key Operation

Display symbols



Blinking Display

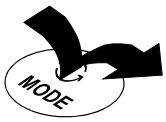


No.	Name
1	Processing Mark
2	Weighing Value Stability Mark
3	USB Connection Mark
4	Lit: Power Standby Indicator Blinking: Automatic Sensitivity Adjustment Notice
5	Displays Weighing Values, Stored Data, and Setting Item Names
6	Unit Display
7	Net Mark
8	Gross Mark
9	Number of Statistical Data (Statistical Calculation Function) Data Memory Number Displays the Relationship Between Load and Weighing Capacity as a Percentage (Weighing Capacity Indicator) Displays Internal Setting Values
10	Response Characteristic Setting State (Lit for About 30 Seconds After Weighing Starts)
11	Comparator Display
12	Display Hold Mark
13	ISD Shock Indicator
14	Gross Zero Mark
15	Lit: Interval Output Standby Blinking: Interval Output Active
16	Preset Tare Mark

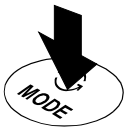
Key operation

Key operation affects how the balance functions. The basic key operations are:

- “Press and release the key immediately” or “Press the key”
  = normal key operation during measurement
- “Press and hold the key”



Press the key
(press and release the key immediately).



Press and hold the key
(for 2 seconds).

*1 When the gross-net-tare function is selected, turning off the display requires pressing and holding for about 2 seconds. Refer to "13. Gross Net Tare Function."

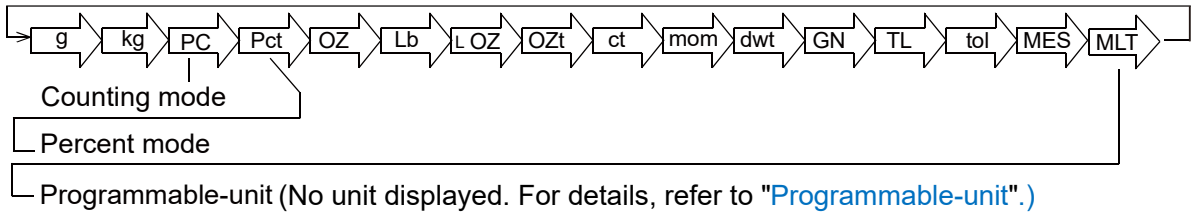
Key	When pressed	When pressed and held (for 2 seconds)
I/⏻ ON:OFF	Turns the display ON:OFF. The standby indicator is displayed when the display is turned off. The weighing mode is enabled when the display is turned on. When password function is enable, password input display will be displayed. Refer to "15-2 How to Input the Password at the Start of Weighing" This ON:OFF key is available anytime. Pressing the ON:OFF key during operation will interrupt operation and turn the display OFF. *	
1/10d SAMPLE	In the weighing mode, pressing this button turns on/off the readability digit. In the counting or percent mode, enters the sample storing mode.	• Enters the function table mode. Please refer to "9. Function Table". • Run the repeatability check function. Please refer to "16. Repeatability Check Function ".
MODE	Switches the weighing units stored in the function table. Refer to "4. Weighing ".	Enters mode of the Self-Check Function.
▼ CAL	Performs sensitivity adjustment of the balance using the internal mass.	Displays other items of the sensitivity adjustment menu.
⊙ PRINT	Stores the weighing data in memory or outputs to a printer or personal computer depending on the function table settings. (Factory setting = output)	Enters mode to change the unit mass registration number in counting mode. By changing the function table: • Outputs "Title block" and "End block" for GLP, GMP report. • Displays the data memory menu. • Enters mode for reading density number in flow measurement.
→0/T← RE-ZERO	Sets the display to zero.	

* **When the "Gross net tare function" is selected, the display is turned off by pressing and holding (for 2 seconds). Please refer to "13. Gross Net Tare Function".**

4. Weighing

4-1 Units

With the balance, only the unit “g” (gram) was set at the factory.
The following weighing units and weighing modes are available for selection:



A unit or mode can be selected and stored in the function table as described in "9.Function Table".
If a weighing mode (or unit of weight) has been turned off, that mode or unit will be missing in the sequence. Tael has four varieties, one of which can be selected and installed at the factory.
To select a unit or mode for weighing, press the MODE key.

For details about the units and modes, see the table below:

Name (unit, mode)	Abbrev.	Display	Function table (Storing mode)	Conversion factor 1 g =
Gram	g	g	g	1 g
Kilogram	kg	kg	kg	1000 g
Counting mode	PCS	PCS	PCS	——
Percent mode	%	%	%	——
Ounce (Avoir)	OZ	OZ	OZ	28.349523125 g
Pound	Lb	Lb	Lb	453.59237 g
Pound/Ounce	L OZ	L OZ	LO	1 Lb=16 oz, 1 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
Messghal	MES	MES	MES	4.6875 g
Programmable-unit (Multi-unit)	MLT	MLt	MLt	——

- The tables below indicate the weighing capacity and the readability for each unit, depending on the balance model.
- When a measurement unit other than gram is used, it is not possible to weight up to capacity of the balance because the display does not have sufficient digits.
  Use the MC series balance within the values shown in the tables below.

Unit		MC-10203M	
		Capacity	Minimum display
Gram	g	10200	0.001
Kilogram	kg	10.2	0.000001
Ounce (Avoir)	oz	359	0.00005
Pound	Lb	22.4	0.000005
Pound/Ounce	L oz	22L 7.7oz	0.01
Troy Ounce	Ozt	327	0.00005
Metric Carat	ct	51000	0.005
Momme	mom	2720	0.0005
Pennyweight	dwt	6559	0.001
Grain (UK)	GN	157410	0.02
Tael (HK general, Singapore)	TL	269	0.00005
Tael (HK jewelry)	TL	272	0.00005
Tael (Taiwan)	TL	272	0.00005
Tael (China)	TL	326	0.00005
Tola (India)	Tol	875	0.0001
Messghal	Mes	2176	0.0005

Unit		MC-32002M	
		Capacity	Minimum display
Gram	g	32200	0.01
Kilogram	kg	32.2	0.00001
Ounce (Avoir)	oz	1136	0.0005
Pound	Lb	71.0	0.00005
Pound/Ounce	L oz	70L 15.8oz	0.01
Troy Ounce	Ozt	1035	0.0005
Metric Carat	ct	161000	0.05
Momme	mom	8587	0.005
Pennyweight	dwt	20705	0.01
Grain (UK)	GN	496922	0.2
Tael (HK general, Singapore)	TL	852	0.0005
Tael (HK jewelry)	TL	858	0.0005
Tael (Taiwan)	TL	859	0.0005
Tael (China)	TL	1030	0.0005
Tola (India)	Tol	2761	0.001
Messghal	Mes	6869	0.005

Programmable-unit

Programmable-unit is a function for conversion. This function multiplies the weighing value in grams by the coefficient that can be set in the function table and displays the result.
The coefficient must be within the range between the minimum and maximum shown below. If the coefficient set is beyond the range, an error is displayed, and the balance returns to the coefficient setting mode,prompting to enter an appropriate value. "1" is set as the default coefficient at factory settings.

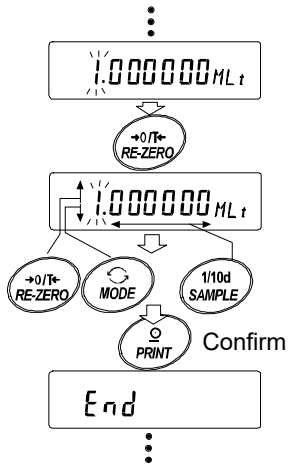
Model	Minimum coefficient	Maximum coefficient
MC-10203M	0.000001	1000
MC-32002M		100

Operation

1. Press and hold the [SAMPLE] key until [bASFnc] of the function table is displayed.
2. Press the [SAMPLE] key several times to display [MLt].
3. Press the [PRINT] key. The balance enters the mode to confirm or set the coefficient.

Confirming the coefficient

4. The current coefficient is displayed with the first digit blinking.
   - When it is not to be changed, press the [CAL] key and go to step 6.
   - When it is to be changed, press the [RE-ZERO] key and go to step 5.



Setting the coefficient

5. Set the coefficient using the following keys.

   [SAMPLE] key ..... To select a digit to change the value. The selected digit blinks.

   [RE-ZERO] key..... To change the value.

   [MODE] key ..... To change the decimal point position. Each time the switch is pressed, the decimal point position changes as follows:

   → 0.000001 ⟶ 00.00001 ⟶ ... ⟶ 000000.1 ⟶ 0000001 ┐

   [PRINT] key ..... To store the new setting, display [End] and go to step 6.

   [CAL] key..... To cancel the new setting and go to step 6.

Quitting the operation

6. The balance displays [Unit]. Press the [CAL] key to exit the programmable-unit function and return to the weighing mode.

Using the function

Press the [MODE] key to select the programmable-unit (no display on the unit section). Perform weighing as described in "4-2 Basic operation". After weighing, the balance displays the result (weighing data in grams x coefficient).

4-2 Basic operation

1. Press the [MODE] key to select the unit.
   Here, select **g** as an example.

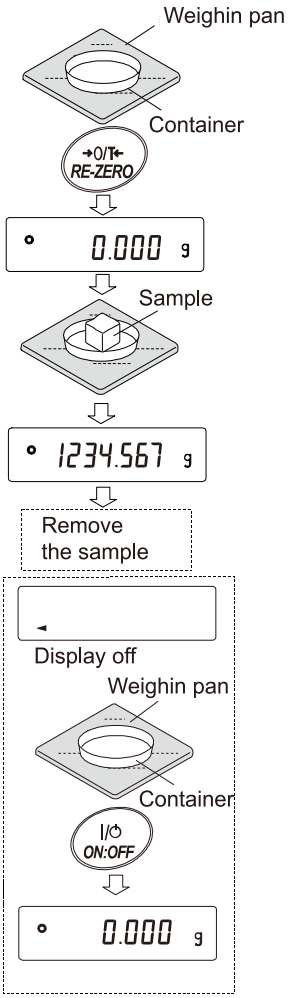
Note
The unit "g" (gram) was set at the factory.
To use other units, select and store units and displaying order in the function setting of "Unit".
For details on weighing unit storing procedure, refer to "9-7 Description of Unit".

2. Place a container if necessary, and press the [RE-ZERO] key to display [0.000 g] (The decimal point position varies by model).

3. Place the weighing object, and read the weighing value after the stability mark [ ] is displayed.

4. After weighing, remove the objects from the weighing pan.

- Pressing the [SAMPLE] key toggles the smallest display digit on/off.
- By changing the internal settings, weighing values can be stored in the data memory. Refer to "11. Data Memory" for details.
- When starting weighing with a container placed, pressing the [ON:OFF] key will automatically tare and start from zero.



About the operation when the power is turned on

The balance will decide the reference zero-point when the power is turned on with the ON:OFF key. Depending on the load condition at that time, the balance will automatically judge whether to perform zeroing (power on zero) or tare subtraction operation. The condition for determining power on zero is used is "power on zero range" by making the zero point during sensitivity adjustment a standard. When power on zero range is exceeded, the tare subtraction operation is performed by making the zero point during sensitivity adjustment a standard.

About re-zero operation

By pressing the RE-ZERO key, the display can be changed to zero.
Re-zero with the RE-ZERO key will automatically determine whether zero or tare operation is performed. The condition for determining zero is used is "zero range" by making the zero point (power on zero) at the start of weighing a standard. When zero range is exceeded, the tare subtraction operation is performed by making power on zero a standard.

About measurement range

For the balance, the range that can be weighed is determined by model.
The total amount (net amount + tare quantity) up to the maximum display of each model is displayed, and when the maximum display is exceeded, E is displayed to indicate that the weighing range is exceeded. When in excess in negative, -E is displayed.

Model	Power-on Zero Range	Zero Range	−E display range
MC-10203M	Approx. ±1.6 kg	Approx. -1 kg to +200 g	Less than -1.6 kg
MC-32002M	Approx. ±3 kg	Approx. -3 kg to +600 g	Less than -3 kg

4-2-1 For More Stable Weighing

□ To reduce the effects of wind and vibration, set the "Response Characteristics (bASFnc)" in the internal settings "Environment/Display (Cond)" to "(SLOW)." *1

Function table

Classification Item	Setting Item	Parameter	Content / Purpose
bASFnc Environment / Display	Cond Response Characteristics	2	Slow response, stable display *2

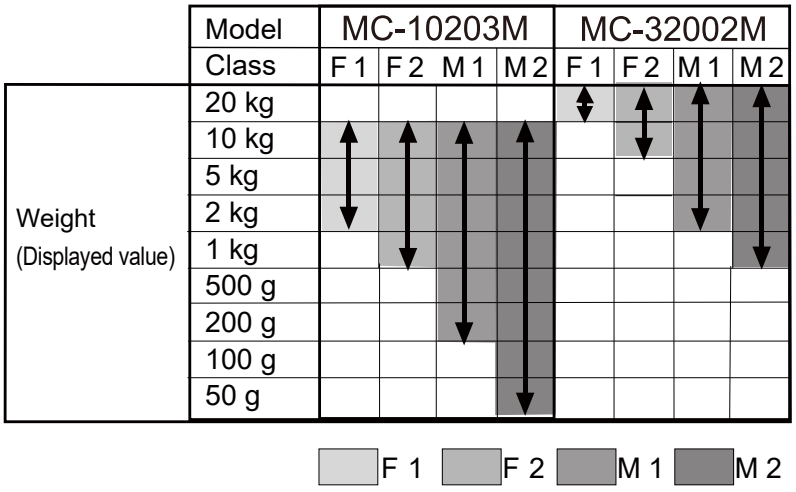
*1 The factory setting is 2 (SLOW).

*2 Refer to "9-3. Description of the Class "Environment, Display".

4-2-2 When Using as a Mass Comparator

- To avoid the effects of eccentric error, place the weighing object in the center of the pan. Alternatively, it is recommended to use the center of gravity adjustment plate (AX-MC10K / 30KPAN). Using the optional external controller AD-8922A allows you to perform "CAL," "RE-ZERO," etc., with the AD-8922A key operations. Refer to the AD-8922A instruction manual for the connection method between the balance and AD-8922A.
- Perform weighing operations in a stable environment, paying attention to error factors such as temperature changes, pressure fluctuations, vibrations, wind, and static electricity at the installation location.
- The table on the right shows the recommended weight class and measurement range for each model. The measurement range in this table assumes the balance's repeatability is within 1/3 of the allowable error for each weight class.

Weight class and recommended measuring range



4-2-3 When Using as Part of a System

- When designing a dedicated pan, design it within the weighing capacity. To prevent the effects of static electricity and magnetism, it is recommended to design the dedicated pan with materials other than resin or magnetic materials (such as iron).
- There is a function to remember the previous weighing value even when the power is turned off. Setting "Display at Power On (P-ZEro)" in the internal settings "Environment/Display (bASFnc)" to " 1 " will display the previous weighing value after turning the power off and on again. Refer to "9-3 Description of the Class "Environment, Display" for details on the power-on explanation.

4-3 Counting Mode (PCS)

This is the mode to determine the number of objects in a sample based on the standard sample unit mass. Unit mass means the mass of one sample. The smaller the variables in each sample unit mass is, the more accurate the counting will be. This series balance is equipped with the Automatic Counting Accuracy Improvement (ACAI) function to improve the counting accuracy.

Note

- **For counting, use samples that have a unit mass at least 100 times greater than that of the readability in grams.**
- **If the sample unit mass variable is too large, it may cause a counting error.**
- **To improve the counting performance, use the ACAI function frequently or divide the samples into several groups and count each group.**

Selecting the counting mode

1. Press the [MODE] key to select [PCS] (PCS = unit)

Storing a sample unit mass

2. Press the [SAMPLE] key to enter the sample unit mass storing mode.
3. To select the number of samples, press the [SAMPLE] key several times. It may be set to 5, 10, 25, 50 or 100.

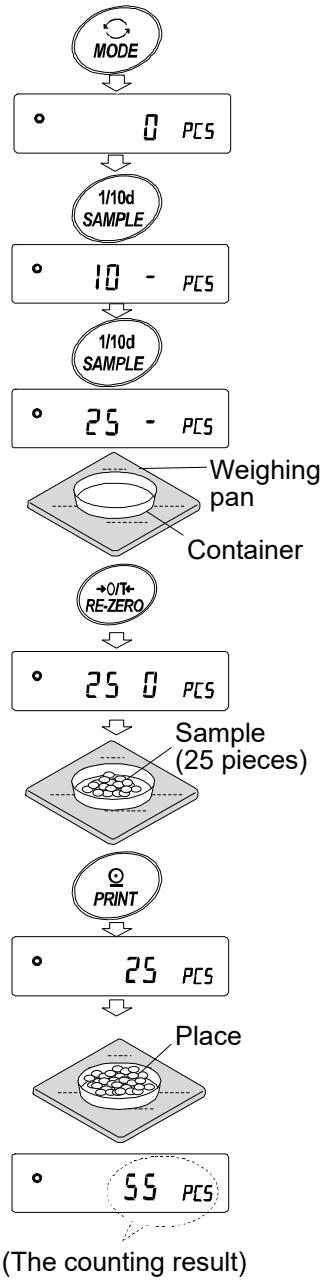
Note

A greater number of samples will yield more accurate counting result. Place a container on the weighing pan, if necessary. Press the [RE-ZERO] key to cancel the weight (tare). The number specified in step 3 appears. [25.0] is displayed if 25 is selected in "3".

4. Place the number of samples specified on the pan. In this example, 25 pieces.
5. When [PRINT] key pressed, unit mass is stored and changes the count display. (Ex: when the number is 25, [25 PCS] is displayed.

Note

- **If the balance judges that the mass of the samples is too light to acquire accurate weighing, it displays an error requiring the addition of more samples to the specified number and press the [PRINT] key. When the unit mass is stored correctly, the balance proceeds to the counting mode.**
- **If the balance judges that the mass of the samples is too light and is not adequate to be used as the unit mass, it displays [Lo].**
- **Registered unit mass is remembered even when the power is turned off.**

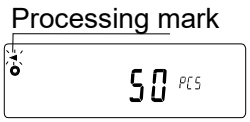


(The counting result)

Number mode (counting mode)

6. Counting is possible.

Counting Mode Using the ACAI Function



The ACAI is a function that improves the accuracy of the unit mass automatically by increasing the number of samples as the counting process.
ACAI: Automatic Counting Accuracy Improvement

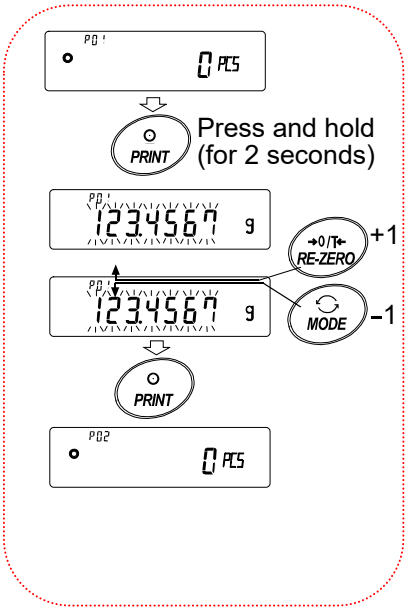
After registering unit mass of "5", proceed to the following "7". ACAI (Automatic Counting Accuracy Improvement)

7. If a few more samples are added, the processing indicator turns on.
   To prevent an error, add three or more. The processing indicator does not turn on if overloaded.
   Try to add the same number of samples as displayed.
8. The balance re-calculates the unit mass while the processing indicator is blinking. Do not touch the balance or samples on the pan until the processing indicator turns off.
9. Counting accuracy is improved when the processing indicator turns off.
10. Each time the above operation is performed, a more accurate unit mass will be obtained. There is no definite upper limit of ACAI range for the number of samples exceeding 100. Try to add the same number of samples as displayed.
11. Remove all the samples used in ACAI and proceed with the counting operation using the improved unit mass.

Note

- **Do not change units during the ACAI processing.**
- **ACAI can be used up to 30,000 pieces.**

Storing the unit mass



By using the data memory function, 50 instances of storing a sample unit mass can be stored.
Refer to "11.Data Memory".

1. Set the function setting item "Data memory function (dAtA) " to "Stores unit mass in counting (dAtA 1)".
   Refer to "9. Function Table".
2. The displayed " P ** " is the selected unit mass registration number.
3. Press and hold the [PRINT] key (for 2 seconds) to switch to the mode to change the unit mass registration number.
   [RE-ZERO] key .... Changes the registration number(+).
   [MODE] key..... Changes the registration number (-).
   [PRINT] key..... Decides on the displayed registration number.
   [CAL] key..... Cancel the displayed registration number.
4. Multiple unit masses can be stored by registering them with different unit mass registration numbers.

Note

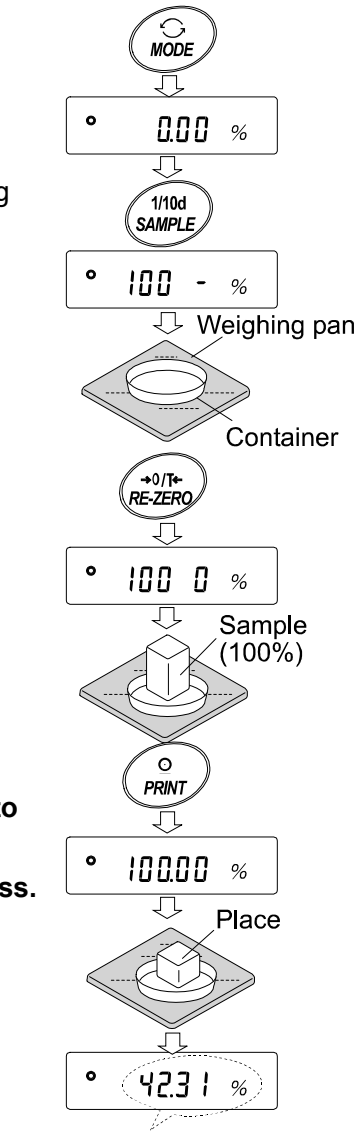
- **P **: The unit weight registration number is entered.**
- **Unit weight can be read by " UN:mm " command.**
  (mm corresponds to P01 to P50 with 01 to 50.)
- **The read unit mass can output by " ?UW " command and can be changed by " UW " command.**

Note

- **ACAI cannot be used for the read unit mass.**

4-4 Percent Mode (%)

The percent mode displays the weighting value in percentage compared to a 100% reference mass and is used for target weighing or checking the sample variance.



Selecting the Percent Mode

1. Press the [MODE] key to select the unit % (Percent mode).

Storing the 100% Reference Mass

2. Press the [SAMPLE] key to enter the 100% reference mass storing mode. Even in the storing mode, pressing the [MODE] key will switch to the next mode.
3. Place a container on the weighing pan, if necessary. Press the [RE-ZERO] key to cancel the weight (tare). The balance displays [100 0 %].
4. Place the sample to be set as the 100% reference mass on the pan or in the container.
5. Press the [PRINT] key to store the reference mass. The balance displays [100.00 %]. (The decimal point position depends on the reference value. The reference mass stored, even if the AC adapter is removed, is maintained in non-volatile memory.)

Note

- **If the balance judges that the mass of the sample is too light to be used as a reference, it displays [Lo].**
- **The displayed percentage is based on the 100% reference mass.**

Model	100% mass	Decimal point position
MC-10203M	1.000 g to 9.999 g	1%
	10.000 g to 99.999 g	0.1%
	100.000 g or more	0.01%
MC-32002M	10.00 g to 99.99 g	1%
	100.00 g to 999.99 g	0.1%
	1000.00 g or more	0.01%

- **Registered values are stored even when the power is turned off.**

6. Remove the sample

Reading the percentage

7. Please a sample to be compared to the reference mass on the pan. The displayed percentage is based on the 100% reference mass. The stored value is retained in the balance's nonvolatile memory even when the power is turned off.

5. Impact Shock Detection Function (ISD)

MC-M series has a function to detect impact to the mass sensor section and to display 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 the like, it is recommended that you minimize the impact level as much as possible while checking the shock indicator.

Impact level display is from level 0 to level 4, 5 levels.

Impact level	Shock indicator	Buzzer	Contents
0	No indicator	No beep	Safe
1		No beep	Caution
2		No beep	Caution: Consider impact mitigation
3		One beep	Warning: Do not apply greater impact
4		Two beeps	Danger: Sensor may be damaged

You can turn off the impact level display by setting " (Impact shock detection) " to " (off) " in "bASFnc ISd 0 " in "9. 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.

Note

- **Impact on the weighing sensor may be applied to the weighing pan at time of loading, or it may be applied from the table on which the balance is installed.**
  The impact shock detection function (ISD) also works for impact applied from the table.

5-1 Recording Impact History

Impacts of impact level 3 or higher are stored on the balance with data and time included (maximum 50 data instances).
When the password function is on (Lock 1 or Lock 2), the login user information is added when outputting the impact history.

Note

- **If 50 data instances are exceeded, the data with the lowest impact level is 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

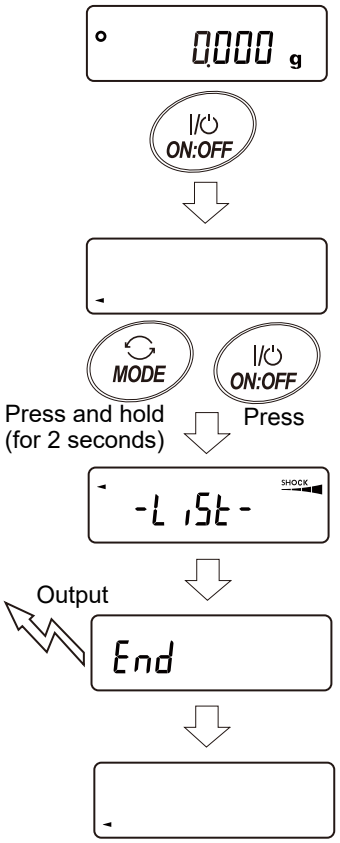
The stored impact history can be output by sending a specified command to the balance or performing a key operation.

Output by command

The stored impact data will be output all at once by sending a ?SA command to the balance.

Output by key operation

1. Press the [ON:OFF] key to turn off the display.
2. With the display off, press the [ON:OFF] key while holding down the [MODE] key.
3. -L iSt- is displayed, and the stored impact data is output all at once.



Impact history output example

Date, time, impact level, login and login user information are output together on one line.
The login user information varies by the setting of the login user and the setting of Function table LocK when receiving impact.

Output	Login user	Function table LocK
, --,	No login user	0, 1, 2
,00, ADMIN	Administrator	1
,01~10,USER	User	1
, --,GUEST	Guest	2

Output example

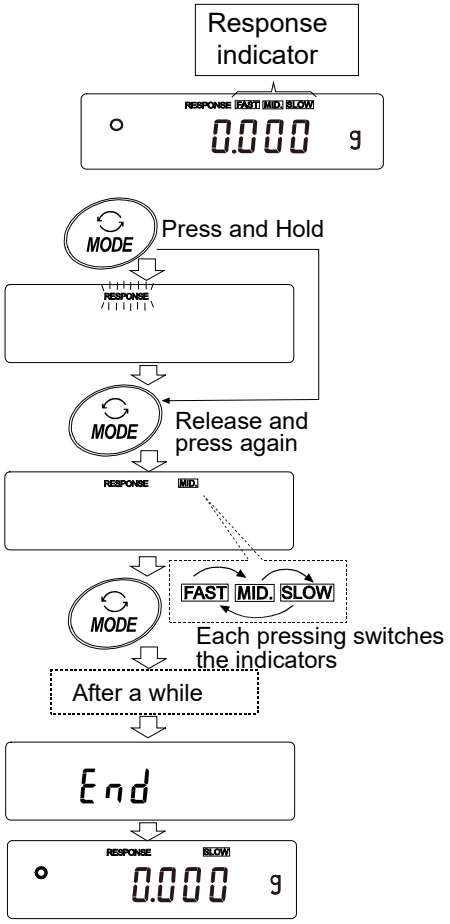
2018/05/29,11:08:18,SHOCK LV,3,--,
2018/05/29,11:12:27,SHOCK LV,4,00,ADMIN
2018/05/29,11:13:38,SHOCK LV,3,01,USER
2018/05/29,11:17:04,SHOCK LV,4,--,GUEST

6. Environmental Settings / Self-Check Function Using Electronically Controlled Load (ECL)

6-1 Environmental Settings

This function stabilizes the weight value, reducing the influence on weighing that is caused by drafts and/or vibration at the place where the balance is installed. This function adjusts by automatically analyzing the environment or by hand-operation. The function has three stages as follows : Changing the weighing speed changes the display refresh rate.

Display	Function setting	Response characteristic
FAST	Cond 0	Fast response, Sensitive value
MID.	Cond 1	⬆ ⬇
SLOW	Cond 2	Slow response, Stable value



Response adjustment can be changed by the following method.

1. Press and hold the MODE key (for 2 seconds) until RESPONSE is displayed, and then release the key.
2. Press the MODE key to select a weighing speed. Either FAST, MID or SLOW can be selected.
3. After a few seconds of inactivity the balance displays End.
4. Then, it returns to the weighing mode and displays the updated response indicator. The response indicator remains displayed for a while.

Note

When the response adjustment is set, "Condition (Cond)" and "Display refresh rate (SPd)" and "Stability band width (St-b)" in the 9.Function Table "Environment display (bASFnc)" are changed as below.

Display	Cond (Condition)	SPd (Display refresh rate)	St-b (Stability bad width)
FAST	0	2	2
MID.	1	0	1
SLOW	2	0	1

When using a combination other than the above, please set individually as shown in "9.Function Table".

Note

If RESPONSE is displayed and you leave without pressing the MODE key, the "Self-check function" is activated. Please refer to "6-2 Self-Check-Function / Automatic Setting of Minimum Weight". For the setting method, refer to "9.Function Table".

6-2 Self-Check-Function / Automatic Setting of Minimum Weight

The self-check function can easily check about whether proper performances are satisfied for the balance by checking and displaying repeatability in addition to malfunction check. In addition, it can also display and store minimum weight (reference value) using data of the repeatability.

Note

- **The USP (Pharmacopoeia of the United States of America) defines minimum measured value as the repeatability measurement using a weight. Please note that repeatability and minimum measured value calculated by the ECL (Electronically Controlled Load) should be used as a reference value only.**
- **Refer to "Balance information" on the A&D web site (https://www.aandd.jp/) for details of the minimum weight.**

Setting procedure (Refer to the setting flow chart on next page as well)

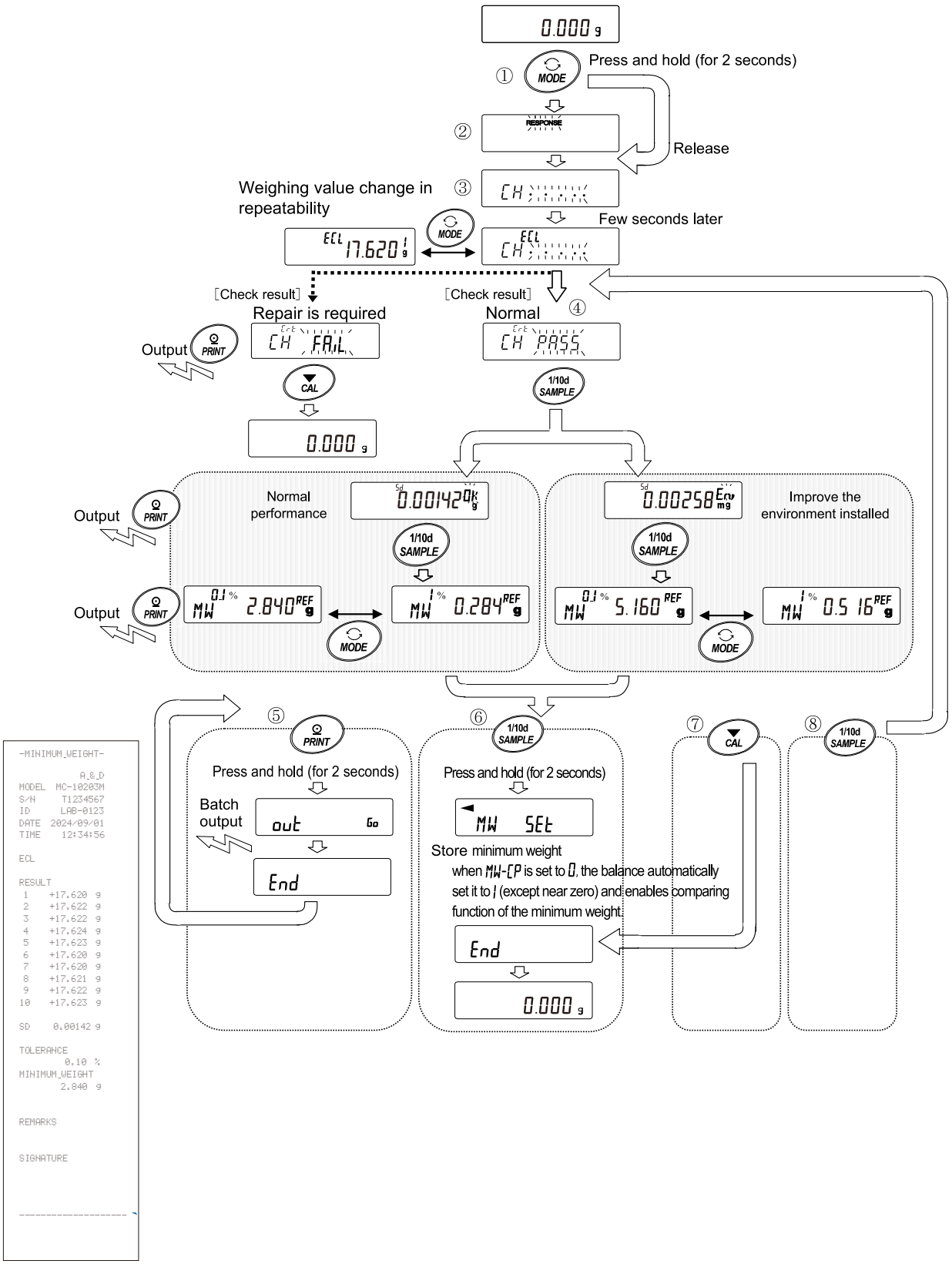
1. Press and hold the [MODE] key (for 2 seconds) in weighing mode.
2. Release the key after displaying [RESPONSE].
3. Display shows [CH] and self-check function is started.
   After few seconds, display shows "ECL".
   Press the [MODE] key while [CH ECL] is displayed to observe changes in the weighing value of the repeatability using electronic control load (ECL).
4. Display shows a check result after check. When there is no error in the balance, display shows [CH PASS] in blinking. When display shows [CH FAIL] in blinking, there is a possibility that serious malfunctions occur in the balance. In such case, the balance requires repair.
   [SAMPLE] key ..... Switches a display among check result, repeatability and minimum weight (reference value).
   [PRINT] key ..... Outputs currently displayed contents
   At repeatability display, display shows "OK" if it is satisfied for catalog spec. However, if it is not satisfied for catalog spec, display requests an improvement in an environment for the balance installed by blinking "Env"
   [MODE] key ..... Switches an allowable measurement error of the minimum weight (reference value).

Use the following keys while the minimum weight (reference value) is displayed to perform each operation.

5. Outputting data of the minimum weight at once
   Press and hold the [PRINT] key (for 2 seconds) to display [Out]. After outputting at once, [End] is displayed.
6. Storing as minimum weight (reference value) of "14.Minimum weight alert function"
   Press and hold the [SAMPLE] key (for 2 seconds) to display [MW 5Et]. Minimum weight (reference value) is stored. After storing, display shows [End] and returns to weighing mode.
7. When not storing
   Press the [CAL] key to return to weighing mode after displaying [End].
8. To return to check result display
   Press the [SAMPLE] key to return to check result display in Step 4.

* **Refer to "14.Minimum weight alert function" for warning function of minimum weight.**

Setting flow chart




```
-MINIMUM WEIGHT-
            A&D
MODEL   MC-10203M
S/N      T1234567
ID       LAB-0123
DATE   2024/09/01
TIME     12:34:56

ECL

RESULT
 1    +17.620 g
 2    +17.622 g
 3    +17.622 g
 4    +17.624 g
 5    +17.623 g
 6    +17.620 g
 7    +17.620 g
 8    +17.621 g
 9    +17.622 g
10    +17.623 g

SD     0.00142 g

TOLERANCE
         0.10 %
MINIMUM WEIGHT
        2.840 g


REMARKS


SIGNATURE
```

7. Sensitivity Adjustment / Calibration Test

Since the balance's resolution is high, weighing values may change due to gravity and daily environmental changes. It is necessary to perform sensitivity adjustment with the weight in order to keep the weighing values from changing even if gravity or the environment changes.
It is recommended that you calibrate if the balance is installed for the first time or relocated, or when the weighing values change significantly in daily inspection, etc.
Adjustment means to adjust the weighing value of the balance using the reference weight or internal mass. Sensitivity adjustment is to weigh with the reference weight and compare how much the result deviates from the reference value. (Adjustment is not performed in sensitivity adjustment.)

Sensitivity adjustment

Automatic sensitivity adjustment ..... Automatically adjust the balance using the internal mass depending on the temperature change of the operating environment or the set time and interval time. (MC-M series)

Sensitivity adjustment using the internal mass ..... Using the internal mass, adjust the balance with a single touch.

Sensitivity adjustment using an external weight..... Using an external mass, adjust the balance with an external mass.

Calibration test

Calibration test with an external weight····· Output the result of checking the accuracy of weighing using your own weight.

*** No adjustment is made.**

Note

- **Do not allow vibration or drafts to affect the balance during sensitivity adjustment.**
- **To output the data for GLP/GMP using the RS-232C interface, set "GLP/GMP output (InFo)" of "Data output (dout)". Refer to "9. Function Table". The time and date can be added to the GLP/GMP report. If the time or date is not correct, adjust them. Refer to "9-4 Clock and Calendar Function".**
- **The sensitivity adjustment and calibration test data can be stored in memory. To store them, set "Data memory (dAtA)".**

Caution when using your external weight

- **The accuracy of the weight used in sensitivity adjustment affects the accuracy of the balance after sensitivity adjustment.**
- **Select the mass to be used for sensitivity adjustment and calibration tests from the table below.**

Model	Usable sensitivity adjustment weight	Factory setting	Adjustable range
MC-10203M	2 kg, 3kg, 4kg, 5kg, 6kg, 7kg, 8kg, 9kg, 10kg	10 kg	±9.999
MC-32002M	20kg, 30kg	20 kg	±99.99

Display

This indicator means "In process of measuring sensitivity adjustment data". Do not allow vibration or drafts to affect the balance while the indicator is displayed.

7-1 Automatic Sensitivity Adjustment

This function automatically calibrates the balance using the internal weight due to a temperature change in the ambient environment, time set or interval time. It can function even when the balance's display is in off. If GLP output in function table is selected, the balance outputs the sensitivity adjustment report or store the data in memory after sensitivity adjustment.
In the automatic sensitivity adjustment mode, either the temperature change (CFnc 0), the setting time (CFnc 1), or the interval time (CFnc 2) can be set with the function setting CFnc.
For the setting time, the three function setting of Ct iME1, Ct iME2 and Ct iME3 can be set.
Interval time can be set from 0.5h to 24h with function setting C int.

CAUTIONS

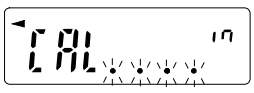
If the balance detects a load on the weighing pan, it will determine that it is in use and will not perform automatic sensitivity adjustment. The criteria for performing automatic sensitivity adjustment are as follows.

The criteria for performing automatic sensitivity adujustment.

MC-10203M	MC-32002M
Less than 20 g	Less than 200 g

To maintain the calibrated state, keep the weighing pan clear while not in use.

Indicates that the balance detects a change in ambient temperature and automatic sensitivity adjustment will start. If the balance is not used for a few minutes with this indicator (◄) blinking, the balance performs automatic sensitivity adjustment. The blinking duration depends on the environment.



Indicates that the balance is measuring sensitivity adjustment data. Do not allow vibration or drafts to affect the balance while this indicator is displayed. After sensitivity adjustment, the balance returns to indicate the previous display.

Note

The balance can be used while the indicator blinks. But, it is recommended that to maintain the accuracy, stop using the balance and confirm that there is nothing on the pan and allow the balance to perform self sensitivity adjustment.

Depending on the setting of "8. Function Switch and Initialization", "change prohibited" or "changeable (usable)" can be selected.

7-1-1 Inputting the set time

1. Press and hold the [SAMPLE] key for 2 seconds to display [bASFnc].

2. Press the [SAMPLE] key several times to display [AutoCAL].

3. Press the [PRINT] key to display [CFnc].

4. With [CFnc] displayed, press the [RE-ZERO] key several times to display [CFnc tiME].

5. Press the [SAMPLE] key to display [CtiME1].

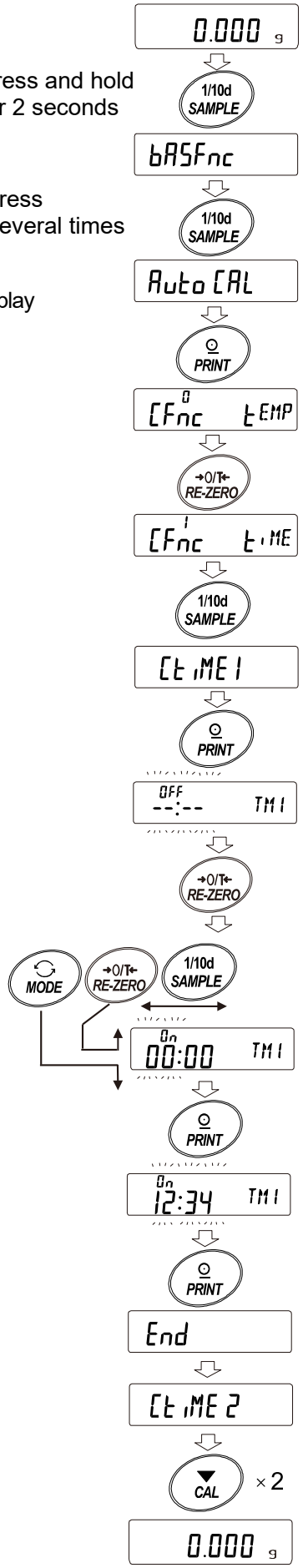
6. Press the [PRINT] key to enter the set time 1 setting mode.

7. With [OFF --:-- TM1] displayed, press the [RE-ZERO] key. The currently set time is displayed.

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.
   - [PRINT] key..... Stores the new time setting.
   - [CAL] key..... Cancels the new time setting.

9. Press the [PRINT] key to display [End].
10. To set the set time 2, display the set time 2 and repeat the steps 6 to 9.

11. To return to weighing mode, press the [CAL] key twice.



7-1-2 Clearing the set time

12. Refer to steps 1 to 5 in "7-1-1 Inputting the set time" to display [CL iME1].

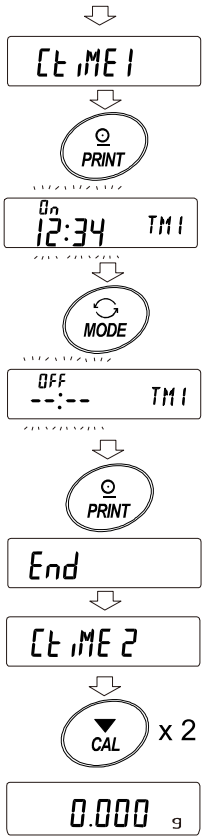
13. Press the [PRINT] key to display the currently set time.

14. Press the [MODE] key to display [OFF --:-- TM1].

15. Press the [PRINT] key to display [End].

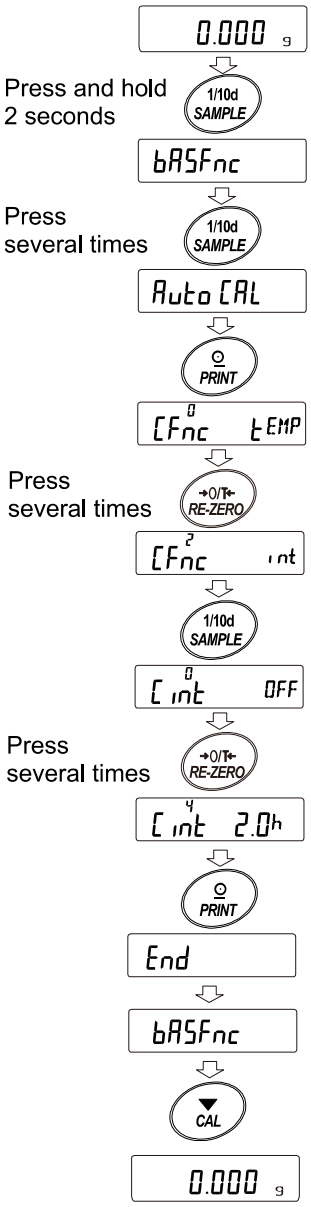
16. Press the [CAL] key twice to return to weighing mode.

Pefer to steps 1 to 5 on the previous page



7-1-3 Setting the interval time

1. Press and hold the [SAMPLE] key for 2 seconds to display [bASFnc].
2. Press the [SAMPLE] key several times to display [Auto CAL].
3. Press the [PRINT] key to display [CFnc].
4. With [CFnc] displayed, press the [RE-ZERO] key several times to display [CFnc int].
5. Press the [SAMPLE] key to display [C int].
6. Press the [RE-ZERO] key several times to set the interval time (0.5 hours to 24 hours) to perform sensitivity adjustment. For the correspondence between the set value and interval time, refer to the correspondence table on the next page.
7. Press the [PRINT] key to display [End].
8. Press the [CAL] key to return to weighing mode.



Correspondence table between the set value and interval time of the item [C int].

Item	Parameter	Description
C int	■ 0	Off
	1	0.5-hour interval time
	2	1.0-hour interval time
	3	1.5-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

7-2 Sensitivity Adjustment Using the Internal Mass

Sensitivity adjustment using the internal mass can be performed with one key press.

1. Connect the AC adapter and warm up the balance for at least an hour with nothing on the weighing pan.
2. Press the CAL key. The balance displays CAL in.
3. The balance performs sensitivity adjustment using the internal mass. Do not allow vibration or drafts to affect the balance.
4. After sensitivity adjustment, if GLP output (inFo)" is set, a “sensitivity adjustment report” is output or stored to data memory.
5. The balance returns automatically to weighing mode.

About the internal mass

The value of the internal mass may change due to factors such as the operating environment and aging. Correct the internal mass value as necessary. Refer to "7-5. Correcting the Internal Mass Value ".

Since the internal mass is about 850 g, the possibility of error may increase as the weighing value incereases.

To maintain the weighing accuracy, perform the sensitivity adjustment using an external weight periodically, as described in "7-3. Sensitivity Adjustment Using an External Weight".

7-3 Sensitivity Adjustment Using an External Weight

This function performs sensitivity adjustment of the balance using your external weight.

1. Connect the AC adapter and warm up the balance for at least an hour with nothing on the weighing pan.

2. Press and hold the [CAL] key (for 2 seconds) until [CAL out] is displayed, then release the key.

3. Make sure that nothing is on the weighing pan and press the [PRINT] key to weigh the zero point. Do not apply vibration, etc.

4. Place the external weight on the weighing pan and press the [PRINT] key.
   Do not apply vibration etc.

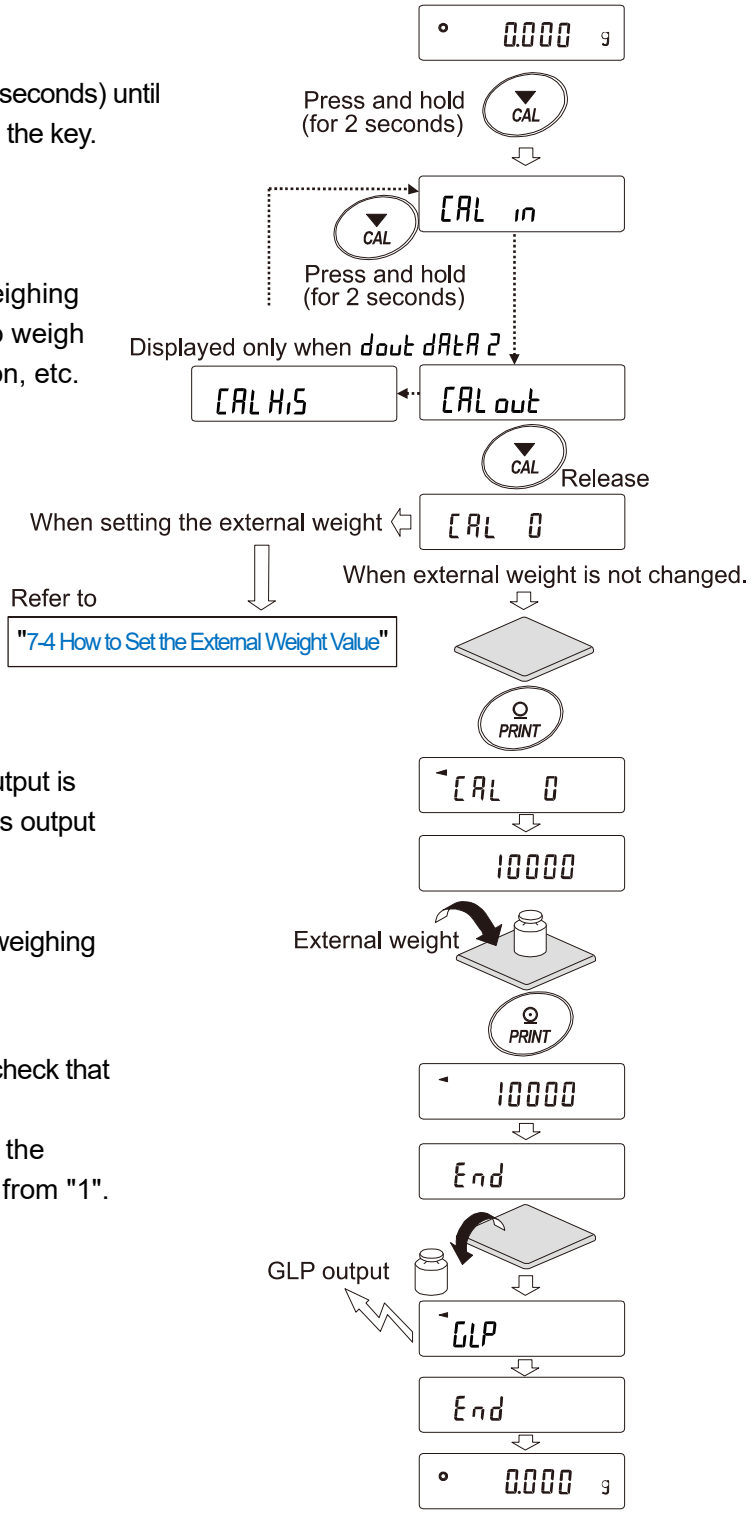
5. Remove the external weight from the weighing pan.

6. After sensitivity adjustment, if GLP output is set, " sensitivity adjustment report" is output or stored in data memory.

7. The display automatically returns to weighing display.

8. Place the external weight again and check that the set value is ± 2 d.
   If it is out of range, pay attention to the surrounding environment and start from "1".

* **"d" is a unit of readability.**



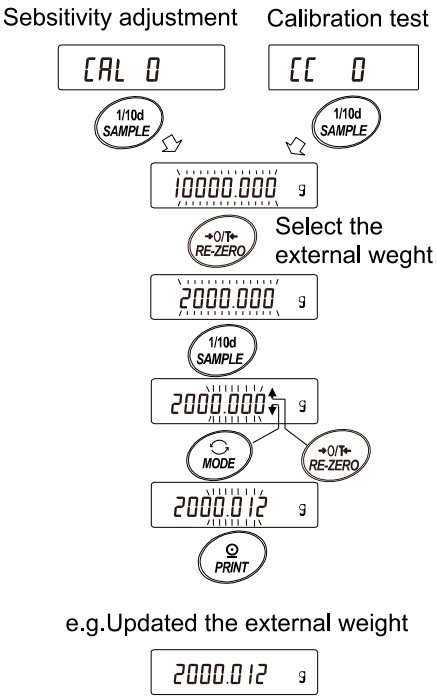
7-4 How to Set the External Weight Value

When calibrating the balance or performing a calibration test, the external weight you have on hand can be set. (Refer to "Usable sensitivity adjustment weight" on page 33.)
After [CAL 0] is displayed, the external weight value can be set as shown in "7-3 Sensitivity Adjustment Using an External Weight". Or, after [CC 0] is displayed, the external weight value can be set as shown in "7-6 Calibration Test Using an External Weight".

1.After displayed [CAL 0], or after displayed [CC 0], press the SAMPLE key.

2. Press the RE-ZERO key at all digits blinking to change the weight to be used.

3. Specify the sensitivity adjustment weight value as follows.
   SAMPLE key ..... Switches the display condition to: "All of the segments blinking" (sensitivity adjustment weight selection mode) or "The last four digits blinking"(value adjustment mode).
   RE-ZERO key ..... Changes the external weight value (all of the segments blinking) or changes the adjustment range (last four digits blinking).
   MODE key
   In the adjustment range setting, the value becomes -9999 d after +9999 d.
   PRINT key..... Registers the changed external weight value. Registered values are stored even when the power is turned off.
   CAL key..... Suspends setting. (Returns to [CAL 0] or [CC 0].)



e.g.Updated the external weight

* **"d" is a unit of readability.**

7-5 Correcting the Internal Mass Value

Internal mass value can be corrected with function setting CS in . There is one correction method as follows.

AUTO: This is a method of correcting the internal mass weight value based on an external weight.

Note

- **Correction of internal mass value cannot be executed at factory setting. Refer to "8. Function Switch and Initialization" or the following setting method, and enable changing of the function setting and correction the internal mass value.**

Setting procedure

1. Press the [ON:OFF] key to turn off the display.

2. Hold down the [PRINT] and [SAMPLE] keys, and press the [ON:OFF] key to display [PS].

3. Press the [PRINT] key and set the "internal mass correction switch" and "function setting switch" to " 1 " with the next key.

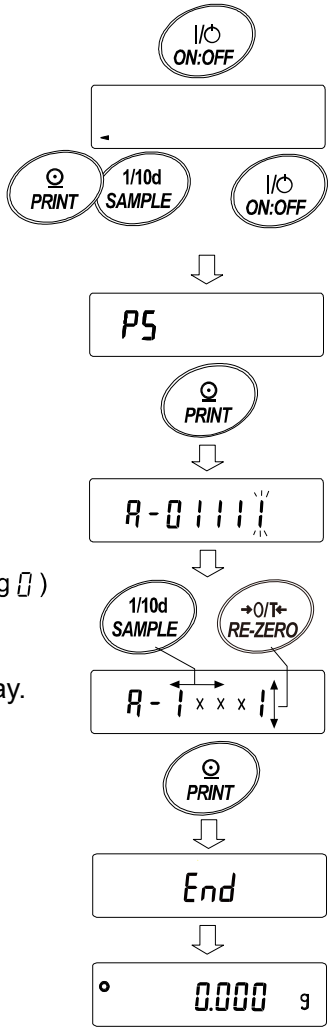
   [SAMPLE] key .....Select the switch (blinking digit).

   [RE-ZERO] key.....Change the value of the blinking switch.

   A-1xxx1 ← Internal setting switch (Factory setting 1)

   Internal mass correcting switch (Factory setting 0)

4. Press the [PRINT] key to register and display the weighing display.



7-5-1 Correcting the Internal Mass Value (AUTO)

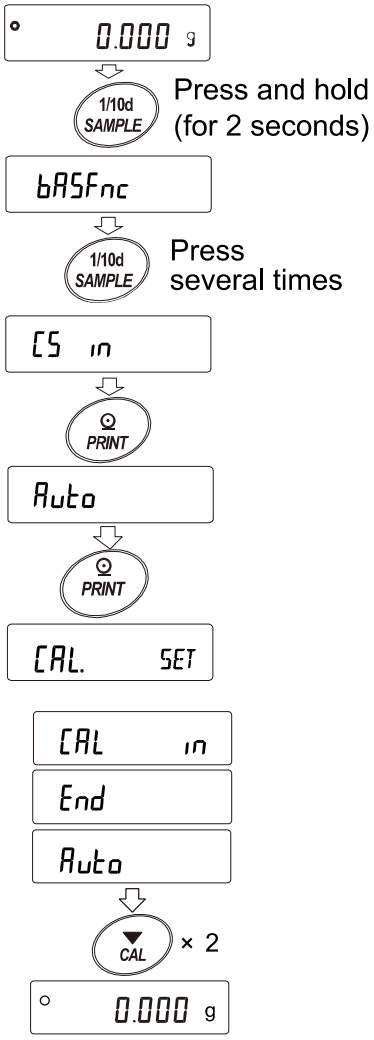
This is a method of correcting the internal mass weight value based on an external weight.

After sensitivity adjustment with the external mass, the balance automatically loads and unloads the internal mass and corrects the internal mass value.

Setting procedure

The internal mass value cannot be corrected at factory settings. Refer to "7-5. Correcting the Internal Mass Value" and enable changing of the function setting and correction the internal mass value

1. In weighing mode, press and hold (for 2 seconds) the SAMPLE key to display bASFnc.
2. Press the SAMPLE key several times until CS in appears. If CS in does not display, perform "1".
3. Press the PRINT key to display Auto.
4. When preparation is completed, press the PRINT key.
5. CAL SET is displayed and the internal mass value is automatically corrected.
6. When adjustment of the internal mass value is completed, CAL in is displayed and sensitivity adjustment is performed automatically with the adjusted internal weight.
7. When sensitivity adjustment is completed, Auto is displayed.
8. Press the CAL key twice to return to weighing mode.
9. Place the external weight used for sensitivity adjustment on the balance to check whether the balance was corrected. If it is not corrected properly, return to "2".



7-6 Calibration Test Using an External Weight

This function tests the weighing accuracy using an external weight and outputs the result. This is available only when the GLP / GMP output parameter is set to "dout inFo 1 or 2".
(Calibration test does not perform sensitivity adjustment.)

1. Connect the AC adapter and warm up the balance for at least an hour with nothing on the weighing pan.

2. Press and hold the CAL key (for 2 seconds) until CC out is displayed and release the key.

3. Make sure that nothing is on the weighing pan and press the PRINT key and weigh the zero point.
   Do not apply vibration etc.

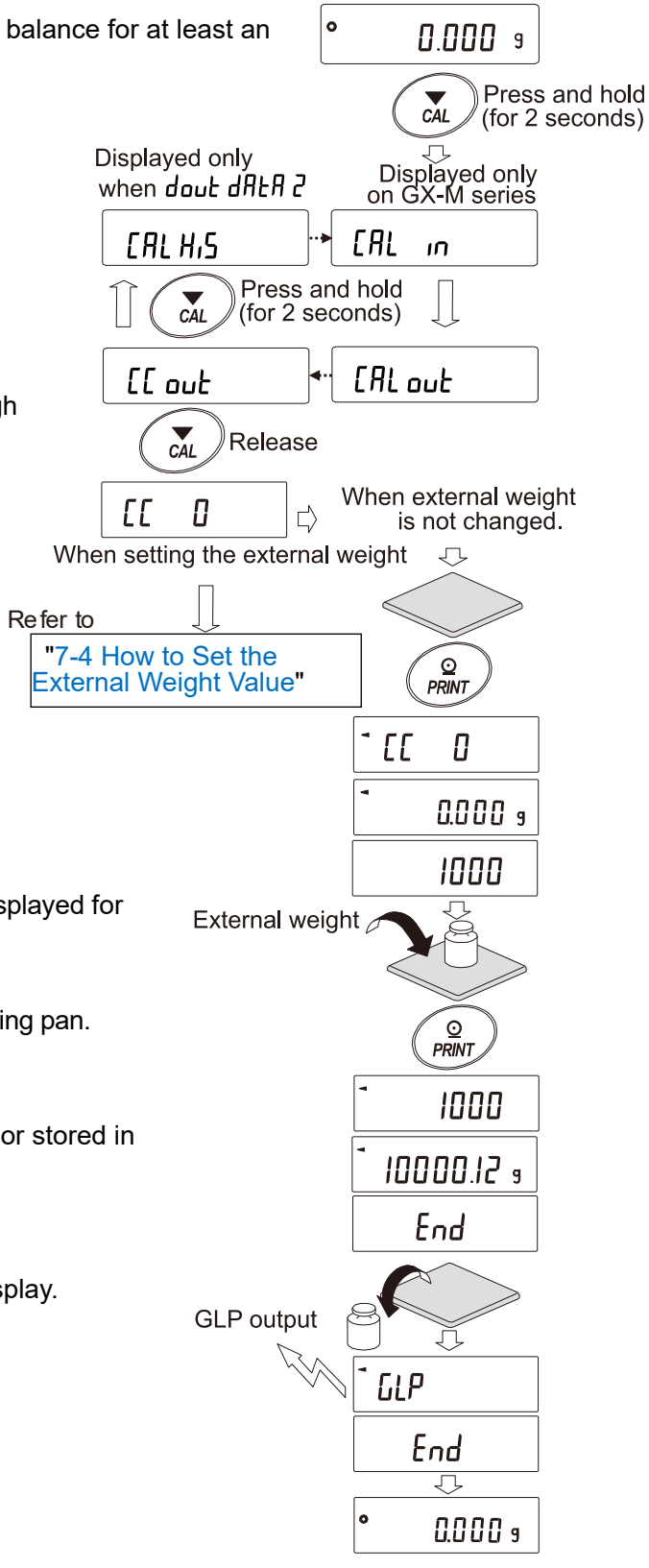
4. The weighing value of zero point is displayed for several seconds. Place the external weight on the weighing pan and press the PRINT key.
   Weigh the external weight. Do not apply vibration, etc

5. Weighing value of the external weight is displayed for several seconds.

6. Remove the external weight from the weighing pan.

7. The sensitivity calibration status is output or stored in the data memory.

8. It automatically returns to the weighing display.



8. Function Switch and Initialization

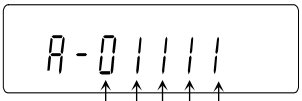
8-1 Permit or Inhibit

The balance stores parameters that must not be changed unintentionally adjustment data for accurately weighing, data for adapting to the usage environment, data to control the communications interface, etc. "A function selection switch" is provided to protect those parameters and it can be used to select "change prohibited" or "changeable (usable)". By setting to "change prohibited", that function cannot be entered, so inadvertent change.

"Switch for function selection" has the following five.
"Function table", "Sensitivity adjustment using the internal mass", "Sensitivity adjustment using the external weight", "Automatic sensitivity adjustment", "Internal mass correction".

Setting procedure

1. Press the [ON:OFF] key to turn off the display.
2. While pressing and holding the [PRINT] key and the [SAMPLE] key, press the [ON:OFF] key to display [PS].
3. Press the [PRINT] key. Then the balance displays the function switches.
   [SAMPLE] key ..... To select a switch to change the parameter. The selected switch blinks.
   [RE-ZERO] key ..... To change the parameter of the switch selected.
   0 To inhibit changes. (Cannot be used.)
   1 To permit changes. (Can be used.)
   [PRINT] key ..... To store the new parameter and return to the weighing mode.
   [CAL] key ..... To cancel the operation (display [Clr]) . Press the [CAL] key and return to the weighing mode



The display shown left indicates the factory settings.

Function table
- 0 To inhibit changes to the function table.
- 1 To permit changes to the function table.

Sensitivity adjustment using the internal mass
- 0 To inhibit sensitivity adjustment using the internal mass.
- 1 To permit sensitivity adjustment using the internal mass.

Sensitivity adjustment using an external weight
- 0 To inhibit sensitivity adjustment using an external weight.
- 1 To permit sensitivity adjustment using an external weight.

Automatic sensitivity adjustment (Sensitivity adjustment due to changes in temperature)
- 0 To inhibit automatic sensitivity adjustment.
- 1 To permit automatic sensitivity adjustment.

Internal mass correction
- 0 To inhibit correction
- 1 To permit correction

8-2 Initializing the Balance

This function returns the following parameters to factory settings.

8-2-1 Initialization (all items)

The data to be initialized are as follows.

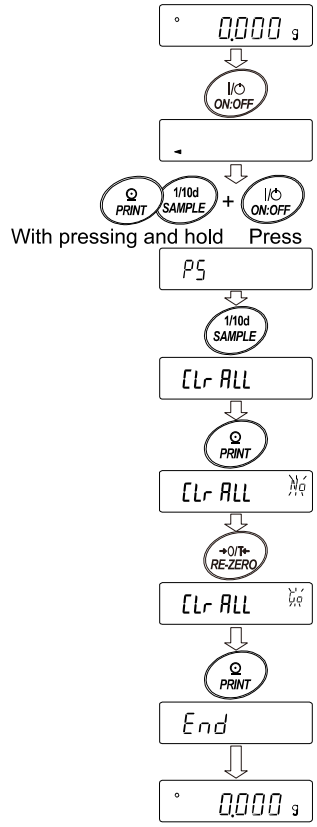
- ❑ Sensitivity adjustment data
- ❑ Function table (excluding password function)
- ❑ Unit weight value (counting mode), 100% reference mass value (percent mode)
- ❑ External weight value
- ❑ Function selection switch settings
- ❑ Statistical calculation mode
- ❑ Correction value for the internal weight

Note

Be sure to perform sensitivity adjustment with the balance after initialization.

Setting procedure

1. Press the [ON:OFF] key to turn off the display.
2. While pressing and holding the [PRINT] key and the [SAMPLE] key, press the [ON:OFF] key to display [PS].
3. Press the [SAMPLE] key to display [CLr ALL].
4. Press the [PRINT] key.
   To cancel this operation, press the [CAL] key.
5. Press the [RE-ZERO] key to change [No / Go].
6. With displaying [CLr ALL Go] press the [PRINT] key to initialize the balance. The balance will automatically return to the weighing mode.



8-2-2 Initialization (function table only)

The data to be initialized are as follows.

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

1. Press the [ON:OFF] key to turn off the display.

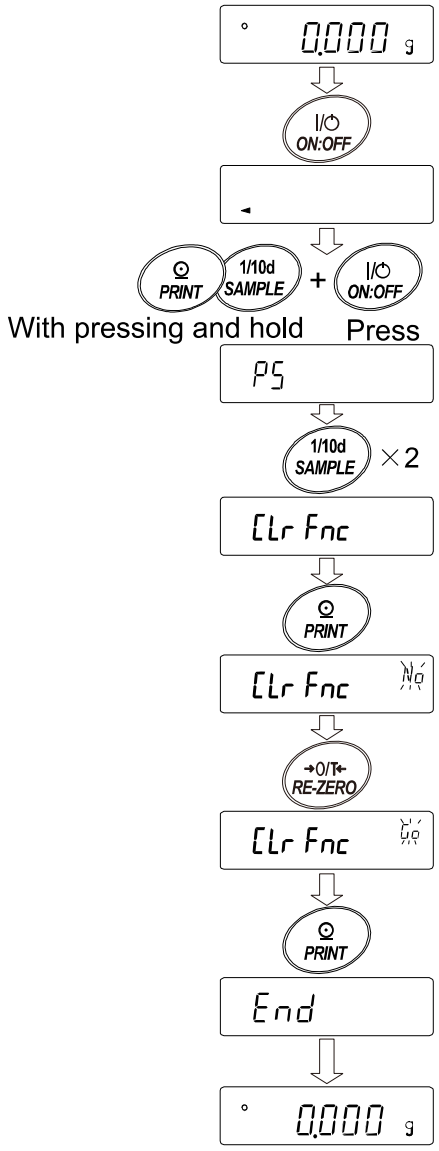
2. While pressing and holding the [PRINT] key and the [SAMPLE] key, press the [ON:OFF] key to display [PS].

3. Press the [SAMPLE] key twice to display [CLr ALL].

4. Press the [PRINT] key.
   To cancel this operation, press the [CAL] key.

5. Press the [RE-ZERO] key to change [No / Go].

6. With displaying [CLr ALL Go] press the [PRINT] key to initialize the balance. The balance will automatically return to the weighing mode.

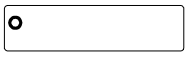
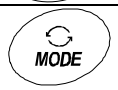
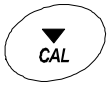


9. Function Table

The function table reads or rewrites the parameters that are stored in the balance. These parameters are maintained in non-volatile memory, even if the AC adapter is removed.
The function table menu consists of two layers. The first layer is the "Class" and the second layer is the "Item".

9-1 Setting the Function Table

Display symbol and keys

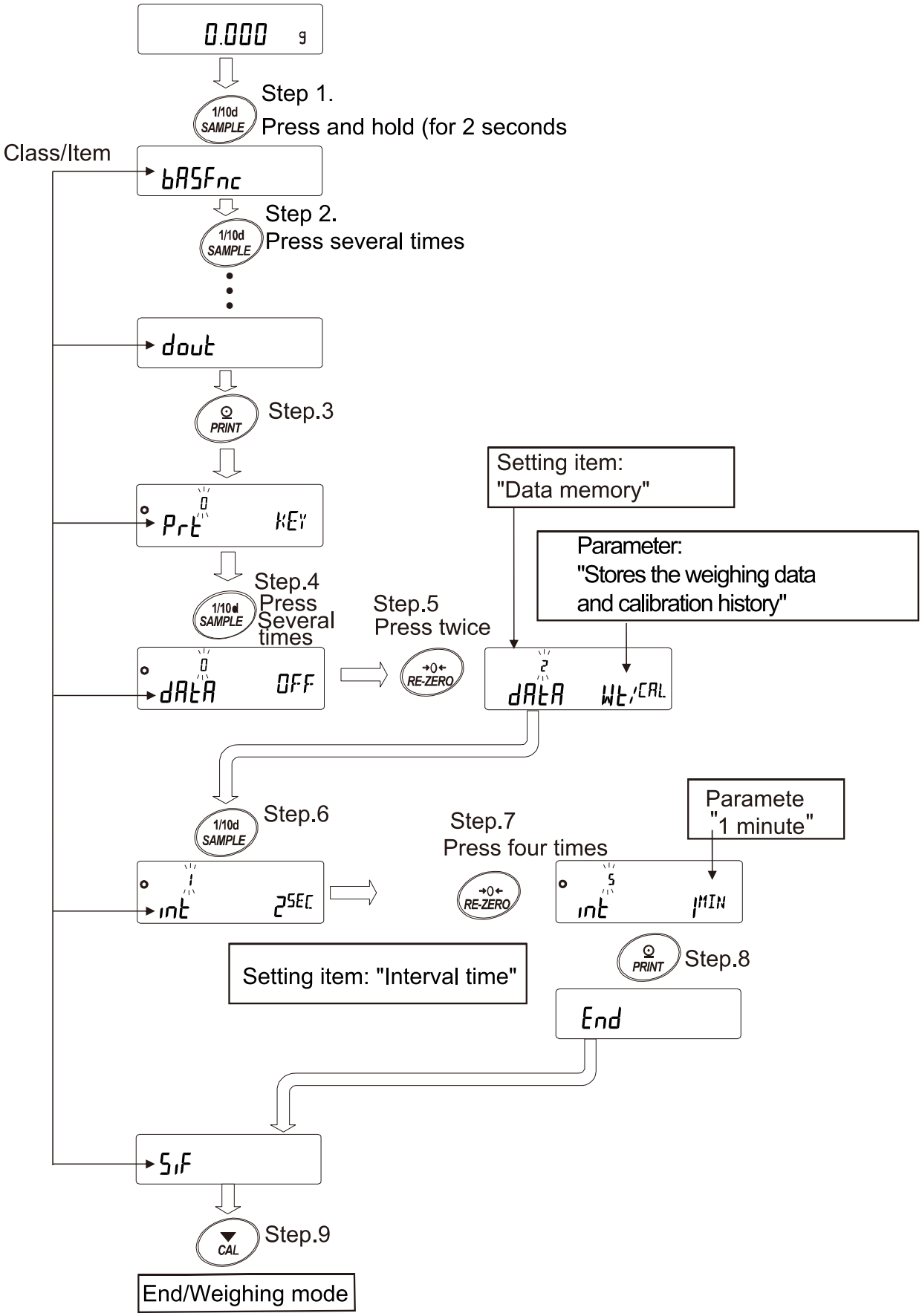
	The symbol "O" shows effective parameter.
	When pressing and holding the key (for 2 seconds) in the weighing mode, the balance enters the function table mode. The key to select the class or item in the function table mode.
	The key to change the parameter.
	The key to change the parameter.
	When a class is displayed, moves to an item in the class. When an item is displayed, stores the new parameter, and displays the next class.
	When an item is displayed, cancels the new parameter, and displays the next class. When a class is displayed, exits the function table mode and returns to the weighing mode.

Setting procedure

1. Press and hold the [SAMPLE] key (for 2 seconds) until [bASFnc] of the function table is displayed in the weighing mode, then release the key
2. Press the [SAMPLE] key to select a class.
3. Press the [PRINT] key to enter the class
4. Press the [SAMPLE] key to select a item.
5. Press the [RE-ZERO] key to select a parameter for the selected item.
6. To change another (multiple) item with the same class, repeat "4" and "5". To end the setting change of the same class, proceed to "7".
7. If storing parameters of the selected class, press the [PRINT] key.
   Then the next class is displayed.
   If canceling the current operation, press the [CAL] key. Then the next class is displayed.
8. When specifying parameters for another class, proceed to "2".
   When finishing the setting, press the [CAL] key twice to return to weighing mode.

Setting Example

This example sets "Stores weighing data (dAtA 2)" for "Data memory (dAtA)" and "1 minute (int 5)" for "Interval time (int)".



9-2 Details of the Function Table

Class	Item	Parameter	Description	
bASFnc 【00】 (**Bas**ic **Func**tion) Environment Display	Cond (**Cond**ition) Condition	0	Fast response, sensitive value ⇕ Slow response, stable value	Can be changed by response adjustment.
		1		
		■ 2		
	St-b (**St**ability **b**and width) Stability band width	0	Stable when within ± 1 d ⇕ Stable when within ± 3 d	The stabilization indicator illuminates with the display fluctuation within the range.
		■ 1		
		2		
	HoLd (**Hold**) Hold function	■ 0	OFF	A mode Holds the display when unstable in animal mode. B mode Holds the display when stable. After the object is removed, the display remains fixed for 5 seconds in either mode.
		1	A mode (Averaging hold function)	
		2	B mode (Stable hold function)	
	trc (**Tra**cking) Zero tracking	0	OFF	Keeps zero display by tracking zero drift.
		■ 1	Normal	
		2	Strong	
		3	Very strong	
	SPd (**Spe**ed) Display refresh rate	■ 0	5 times/second	Output frequency approx. 5.2 Hz
		1	10 times/second	Output frequency approx. 10.4 Hz
		2	20 times/second	Output frequency approx. 10.4 Hz
	Pnt (**Poi**nt) Decimal point	■ 0	Point (.)	Decimal point format
		1	Comma (,)	
	P-on (**P**ower **On**) Auto display-ON	■ 0	OFF	Turns on the weighing mode display when AC adapter is connected.
		1	ON	
	P-oFF (**P**ower **Off**) Auto display-OFF	■ 0	OFF	Turns off the display after 10 minutes of inactivity.
		1	ON	
	rnG (**Ran**ge) Readability	■ 0	Display readability	Display at weighing start.
		1	Not display readability	
	bEEP (**Beep**) Buzzer	0	OFF	Buzzer sound such as key operation
		■ 1	ON	
	P-Zero (**P**ower On **Zero**) Display when power-on	■ 0	OFF Zero indication at power on	
		1	ON Previous time weighing indication at power on	

■ Factory setting.

Note: "d" is a unit of readability.

* A number shown in [ ] is class number and output as identification sign when outputting the function setting information at once. Refer to "9-2-1 Outputting the Function Setting Information".

Class	Item	Parameter	Description		
bASFnc 【00】 (**Bas**ic **Func**tion) Environment Display	d iSP-LEd (**Disp**lay **LED**) Backlight brightness	0 to 9	10% to 100%		
		■ 5	Factory setting 60%		
	iSd (**I**mpact **S**hock **D**etection) Impact Shock Detection	0	OFF	Impact shock detection function	
		■ 1	ON		
CL AdJ 【01】 (**Cl**ock **Adj**ustment) Clock		Refer to "9-4 Clock and Calendar Function".			Confirms and sets the time and date. The time and date are added to output data.
CP Fnc 【02】 (**Comp**arator **Func**tion) Comparator	CP (**Comp**arator) Comparator mode	■ 0	No comparison (Do not use the comparator function)		
		1	Comparison when stable value or overloaded		
		2	Continuous comparison		
	CP-t (**Comp**arator **T**ype) Number of comparator stages	■ 0	3 stage comparator		HI, OK, LO
		1	5 stage comparator		HH, HI, OK, LO, LL
	CP-Z (**Comp**arator **z**ero) ゼロ付近	0	Compare near zero as well		
		1	±5 d are not compared		
		■ 2	±10 d are not compared		
		3	±20 d are not compared		
		4	±50 d are not compared		
		5	±100 d are not compared		
	CP-P (**Comp**arator **P**olarity) 極性	0	Plus only		
		1	Minus only		
		■ 2	Bipolarity		
	CP-R (Comparator Result) Comparator result adding	■ 0	OFF	Comparator results can be added to output data. Use this mode with A&D standard format (SiF tYPE 0).	
		1	ON		
	CP in (**Comp**arator **in**put method) Input method	■ 0	Digital input, upper/lower limits		CP HH, CP Hi, CP Lo, and CP LL can be selected.
		1	Weighing input, upper/lower limits		
		2	Digital input, reference value		CP rEF, CP LMt, and CP LMt2 can be selected.
		3	Weighing input, reference value		
	CP-b (Comparator) Expanding display function	■ 0	OFF	HI, OK, and LO can be displayed largely at the weighing display when using comparator mode.	
		1	ON		

■ Factory setting

Note: "d" is a unit of readability.

Class	Item	Parameter	Description	
CP VALUE 【03】 (Comparator **Value**) Comparator Value	CP HH (Comparator **HH**) Second upper limit	Refer to "9-5 Comparator Function".		Displayed only when CP in is set to 0 or 1 . CP HH and CP LL are displayed only when 5 step comparator is set.
	CP Hi (Comparator **HI**) Upper limit			
	CP Lo (Comparator **LO**) Lower limit			
	CP LL (Comparator **LL**) Second lower limit			
	CP rEF (Comparator **Ref**erence) Reference value	Refer to "9-5 Comparator Function".		Displayed only when CP in is set to 2 or 3. CP LMt2 is displayed only when 5 step comparator is set.
	CP LMt (Comparator **Limit**) Tolerance value			
	CP LMt2 (Comparator **limit2**) Second tolerance value			
CP bEEP 【04】 (Comparator **Beep**) Comparator buzzer	bEP HH (**Beep HH**) HH buzzer	■ 0	OFF	Displayed only when 5 step comparator is set.
		1	ON	
	bEP Hi (**Beep HI**) HI buzzer	■ 0	OFF	
		1	ON	
	bEP ok (**Beep OK**) OK buzzer	■ 0	OFF	
		1	ON	
	bEP Lo (**Beep LO**) LO buzzer	■ 0	OFF	
		1	ON	
	bEP LL (**Beep LL**) LL buzzer	■ 0	OFF	Displayed only when 5 step comparator is set.
		1	ON	

■ Factory setting

Note: "d" is a unit of readability.

Class	Item	Parameter	Description	
dout【05】 (**D**ata **Out**) Data output	PrT (**Pr**int) Data output mode Note Commands can be used in all modes.	■ 0	Key mode	Accepts the PRINT key only when the display is stable.
		1	Auto print mode A (Reference = zero)	Outputs data when the weighing value stabilizes beyond the range from AP-P to AP-b from the zero point.
		2	Auto print mode B(Reference = last stable value)	Outputs data when the weighing value stabilizes beyond the range from AP-P to AP-b from last stable value.
		3	Stream mode	Outputs data at the specified display refresh rate.
		4	Key mode B (Immediately)	Accepts the PRINT
		5	Key mode C (When stable)	key regardless of the display condition.
		6	Interval output mode	Outputs data for each time set by int.
		7	Auto print C mode (When comparater result is OK)	Outputs data when the comparison result is OK, and the display is stable beyond the range from AP-P to AP-b from the zero point.
	AP-P (**A**uto **P**rint **P**olarity) Auto print polarity	■ 0	Plus only	Displayed value > Reference
		1	Minus only	Displayed value < Reference
		2	Bipolarity	Regardless of displayed value
	AP-b (**A**uto **P**rint **B**and Width) Auto print difference	■ 0	10 d	Difference between reference value and displayed value
		1	100 d	
		2	1000 d	
	dAtA (**Data** Memory) Data memory	■ 0	OFF	Refer to "11. Data Memory".
		1	Stores unit mass in counting mode	
		2	Stores the weighing data and calibration history	
		3	Stores comparator setting values	
		4	Stores tare values	
	int (**Int**erval Time) Interval time	0	Every measurement	Interval time in the interval memory mode when using PrT 6.
		■ 1	2 seconds	
		2	5 seconds	
		3	10 seconds	
		4	30 seconds	
		5	1 minute	
		6	2 minutes	
		7	5 minutes	
		8	10 minutes	

■ Factory setting

Note: "d" is a unit of readability.

Class	Item	Parameter	Description	
dout【05】 (**D**ata **Out**) Data output mode	d-no (**D**ata **No**.) Data number	■ 0	No output	Valid when data memory function is ON.
		1	Output	
	S-td (**S**end **T**ime **D**ate) Time/date output	■ 0	No output	Refer to "9-4 Clock and Calendar Function".
		1	Time only	
		2	Date only	
		3	Time and date	
	S-id (**S**end **ID**) ID number output	■ 0	No output ID number	Option to include ID number when exporting data.
		1	Output ID number	
	PUSE (**P**au**se**) Data output pause	■ 0	OFF	Selects the data output interval.
		1	ON after 1.6 seconds	
	At-F (**A**uto **F**eed) Auto feed	■ 0	OFF	Selects whether or not automatic feed is performed.
		1	ON after 1 line	
	inFo (**Infor**mation) GLP output	■ 0	OFF	Refer to "10-3 GLP Report".
		1	ON	
		2	ON (output clock of external device clock)	
	Ar-d (**A**uto **R**e-zero After **D**ata Output) Auto re-zero after output	■ 0	OFF	Function to apply re-zero after outputting data.
		1	ON	
	UFC (**U**niversal **F**lex **C**oms) UFC function	■ 0	OFF	Refer to “23. UFC Functionl”.
		1	ON	
SiF【06】 (**S**erial **I**nter**f**ace) Serial interface	ModE (**Mode**) Access port	■ 0	PC	All communication setting are possible.
		1	Printer	Only tYPE 0, 1 can be selected.
		2	External indicator	Selects stream with tYPE 0.
	bPS (**B**its **P**er **S**econd) Baud rate	0	600 bps	
		1	1200 bps	
		■ 2	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	
		6	38400 bps	

■ Factory setting

Note: "d" is a unit of readability.

Class	Item	Parameter	Description	
SiF【06】 (**S**erial **I**nterface) Serial interface	btPr (**B**its **P**arity) Data bit, parity bit	■ 0	7 bit EVEN	
		1	7 bit ODD	
		2	8 bit NONE	
	CrLF (**C**arriage **R**eturn, **L**ine **F**eed) Terminator	■ 0	CRLF	CR: ASCII 0Dh LF: ASCII 0Ah
		1	CR	
	tYPE (**Type**) Data format	■ 0	A&D standard format	Refer to "21-2 Weighing data format".
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	CSV format	
		6	NU2 format	
		7	TAB format	
	t-UP (**T**ime **U**p) Command time out	0	Not limited	Selects wait time during command reception
		■ 1	Limited for one second	
	ErCd (**E**rror **C**ode) AK, error code	■ 0	OFF	AK:ASCII 06h
		1	ON	
USb【07】 (**U**niversal **S**erial **B**us) USB interface *1	UFnc (**U**SB **F**unction) USB function mode	■ 0	Quick USB	Refer to "20. Connecting to a PC".
		1	Bidirectional USB virtual COM	
	U-tP (**U**SB **T**ype) USB data format	■ 0	A&D standard format	Refer to "21-2 Weighing data format".
		1	NU format	
		2	CSV format	
		3	TAB format	
		4	NU2 format	
AP FnC 【10】 (**A**pplication **F**unction) Application function	APF (**A**pplication **F**unction) Application mode	■ 0	Normal weighing mode	Refer to "9-6 Description of Application".
		1	Capacity indicator	
		2	Statistical calculation mode	
		3	Flow measurement mode	

■ Factory setting

Note: "d" is a unit of readability.

*1 In Quick USB mode, the USB data format is fixed to the NU2 format

Class	Item	Parameter	Description	
AP Fnc 【10】 (**Ap**plication **Func**tion) Application function	StAF (**Sta**tistical **F**unction) Statistical function mode output items	■ 0	Number of data, sum	
		1	Number of data, sum, max, min, range (max-min), average	
		2	Number of data, sum, max, min, range (max-min), average, standard deviation, coefficient of variation	
		3	Number of data, sum, max, min, range (max-min), average, standard deviation, coefficient of variation, relative error	
MW Fnc 【11】 (**M**inimum **W**eight **Func**tion) Minimum weighing warning function	MW-CP (**M**inimum **W**eight **Comp**arison) Minimum weighing comparison	■ 0	No comparison. Do not use Minimum weighing warning function.	
		1	Comparison without near zero.	
		2	Comparison including near zero.	
	MW (**M**inimum **W**eight) Minimum weight input	Refer to "14. Minimum weight alert function".		
	Min out (**Min**imum Weight **O**ut) Minimum weight output	0	OFF	Refer to "14. Minimum weight alert function".
		■ 1	ON	
Unit 【12】 (**Unit**) Unit		Refer to "9-7 Description of Unit".		

■ Factory setting

Note: "d" is a unit of readability.

Class	Item	Parameter	Description	
MLt【14】 Programmable-unit (Multi-unit)		Sets an arbitrary coefficient. Refer to "Programmable-unit"" of "4-1 Units".		Available only when programmable-unit mode is selected
id【15】 (**ID**) ID number setting		Refer to "10-2 Setting the ID Number".		
PASSwd 【16】 (**Passwo**rd) Password	LocK (**Lock**) Lock function	■ 0	OFF	Refer to "15. Password".
		1	ON (Limit weighing operation)	
		2	ON (Basic weighing is possible)	
	PASS No. (**Passwo**rd **No.**) Password registration	ADMIN	Administrator password input	
		USER 01 to USER 10	User 1 password input User 10 password input	
【17】 (**Auto Cal**ibration) Auto calibration	CFnc (**C**alibration **Func**tion) Calibration mode	■ 0	Setting temperature	
		1	Setting time	
		2	Interval time	
	CtiME1 (**C**alibration **Time1**) Setting time 1	Refer to "7-1 Automatic Sensitivity Adjustment ".		
	CtiME2 (**C**alibration **Time2**) Setting time 2			
	CtiME3 (**C**alibration **Time3**) Setting time 3			
	C int (**C**alibration **int**erval) Interval time			
CSin【18】 (**C**alibration **S**et **In**ternal) Correction of internal mass value		AutO (**Auto**)	Automatic input	Refer to "7-5-1 Correcting the Internal Mass Value (AUTO)".

■ Factory setting

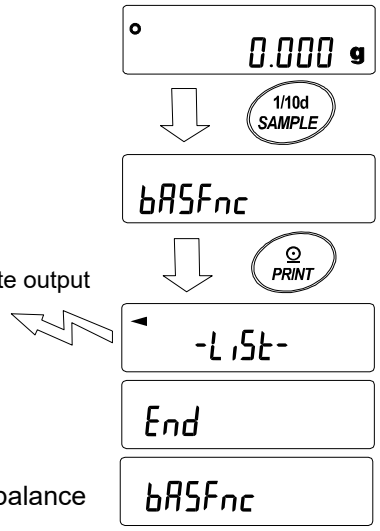
Note: "d" is a unit of readability.

9-2-1 Outputting the Function Setting Information

Function setting can set the balance to appropriate operations for your needs. The function table menu consists of two layers. The first layer is the "Class" and the second layer is the "Item". By performing the following procedure, the function setting status can be output at once, so settings of balance being used can be recorded.

Outputting the function setting information at once

1. Press and hold the [SAMPLE] key (for 2 seconds) in weighing mode
2. [bASFnc] is displayed.
3. Press and hold the [PRINT] key (for 2 seconds) to display [-LiSt-]. A current function setting information is output at once.



[Output example]

```
          A & D
MODEL   MC-10203M
S/N       T1Z34567
ID        LAB-0123
DATE   2024/09/01
TIME      12:34:56
```

Model
Serial number
ID
Date
Time
} Output a data and time for the balance

```
 Function Table
00,Cond      ,01
00,St-b      ,01
00,HoLd      ,00
00,trc       ,01
00,SPd       ,00
00,Pnt       ,00
00,P-on      ,00
00,P-oFF     ,00
00,rnG       ,00
00,bEEP      ,01
00,P-ZEro    ,00
00,diSP-LEd  ,05
00,iSd       ,01
```

ⓐ ⓑ ⓒ

```
10,APF       ,00
10,StAF      ,00
11,MU-CP     ,00
11,MU        ,+0000.000
11,Min out   ,01
16,LocK      ,00
17,CFnc      ,00
17,Cint      ,00
END
```

ⓐ Class (2 characters)
ⓑ Item (8 characters)
ⓒ Parameter (1 character) or (12 characters)
* Each one is divided using comma.
* Refer to "9-2 Details of the Function Table" in "9.Function Table" for details of class, item and parameter.

Use example 1　Outputting the function setting information to a printer

Use AD-8129TH compact thermal printer.

1. Connect the printer to the balance.
   When using AD-8129TH, set the print mode to “DUMP”.
   Refer to instruction manual of the printer for details of the settings or print mode.
   Refer to “19. Printing Weighing Value Data on a Printer” in this manual of the connection method between the balance and printer.
2. Confirm that the communication can be made between the balance and printer and output an information using “Outputting the function setting information at once” described on previous page.

Use example 2　Outputting the function setting information to a PC

Refer to “20. Connecting to a PC” in this manual and “WinCT manual” on A&D web site (https://www.aandd.jp/) for details of the USB setting or WinCT.

1. Connect between the PC and balance using the provided USB cable or sold separately RS-232C cable.
   * Use the USB at virtual COM mode.
   It cannot be output using quick USB.
2. Install the WinCT to a PC to be used.
   Download WinCT software from A&D web site (https://www.aandd.jp/).
3. Start up RSCom and match communication settings such as COM port or baud rate to settings of the balance.
   Press the [Start] button to enable the communication.
4. Confirm that the communication can be made between the balance and PC and output an information using “Outputting the function setting information at once” described on previous page.

9-3 Description of the Class "Environment, Display"

Condition (Cond)

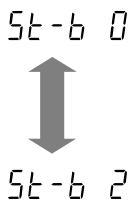
Cond 0 — This parameter is for sensitive response to the fluctuation of a mass value. Used for powder target mass, weighing a very light sample or when quick response weighing is required. After setting, the balance displays FAST.

Cond 2 — This parameter is for stable weighing with slow response. Used to prevent a mass value from drifting due to vibration or drafts. After setting, the balance displays SLOW.

Stability band width (St-b)

This item controls the width to regard a mass value as a stable value. When the fluctuation per second is less than the parameter, the balance displays the stabilization indicator and outputs or stores the data by function setting (dout, dAtA, etc.) The parameter influences the "Auto print mode". Also, the readability being displayed is 1 d.

Ex. If 0.01 g display is selected by pressing the SAMPLE key on the MC-10203M, 0.01 g is 1 d.



St-b 0 — This parameter is used for sensitive response of the stabilization indicator. Used for exact weighing.

St-b 2 — This parameter ignores slight fluctuations of a mass value. Used to prevent a mass value from drifting due to vibration or drafts

Hold function (HoLd)

A mode (Averaging hold function, Animal weighing mode)

This function is used to weigh a moving object such as an animal.*1 When the weighing data is over the weighing range from zero display and the display fluctuation is within the stabilization range for a fixed period of averaging time, the processing indicator illuminates and the balance displays the average weight of the animal. When the animal or sample is removed from the weighing pan, the display returns to zero automatically.*2 This function is available only when the hold function parameter is set to " 1 " (the animal mode indicator HOLD illuminates) and any weighing unit other than the counting mode is selected. The stabilization range and averaging time are set in "Condition (Cond)" and "Stability band width (St-b)".

Weighing range	
MC-10203M	2.000 g or more
MC-32002M	20.00 g or more

Averaging time	
Cond 0	2 sec. (Efficiency priority)
Cond 1	4 sec.
Cond 2	8 sec. (Exact priority)

Stabilization range		
St-b 0	Lesser	6.25%
St-b 1		12.5%
St-b 2	Greater	16.7%

*1 **Animal container kit (GXK-012) can be installed.**

B mode (stable hold function)

When the weighing value exceeds a certain range from zero (same weighing range as in A Mode) and the stability indicator is lit, the value is held on the display.
After the object is removed from the weighing pan, the displayed value remains for 5 seconds before automatically switching to zero.*2.
This function is available only when the unit is set to a mode other than counting mode.

*2 If the value is within the zero range, the zero point is updated. If it exceeds the zero range, tare is performed.

Zero tracking (trc)

This function tracks zero point drift caused by changes in the environment and stabilizes the zero point. When the weighing data is only a few d, turn the function off for accurate weighing.

trc 0 The tracking function is not used. Used for weighing a very light sample.
trc 1 The normal tracking function is used. (±1 d / 1 second)
trc 2 The strong tracking function is used. (±1 d / 0.5 second)
trc 3 The very strong tracking function is used. (±1 d / 0.2 second)

*** "d" is a unit of readability.**

Display refresh rate (SPd)

The periodic time to refresh the display. This parameter influences "Baud rate", "Data output pause" and the data output rate of "Stream mode".

Decimal point (Pnt)

The decimal point format can be selected.

Auto display-ON (P-on)

When the AC adapter is plugged in, the display is automatically turned on without the ON:OFF key operation, to display the weighing mode. Used when the balance is built into an automated system. An hour warm up is necessary for accurate weighing.

Auto power-OFF (P-oFF)

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

Readability (rnG)

When weighing with rough precision, the readability can be turned off without key operation. This is useful when built into an automated system.

Buzzer (bEEP)

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

Display when power-on (P-ZEro)

After turning on the power supply, the display will not be automatically set to zero, and it will start from the previous weighing value. This is useful when a hopper, etc. is attached to the weighing pan and the power needs to be turned off while weighing discharge.

Backlight brightness (d iSP-LEd)

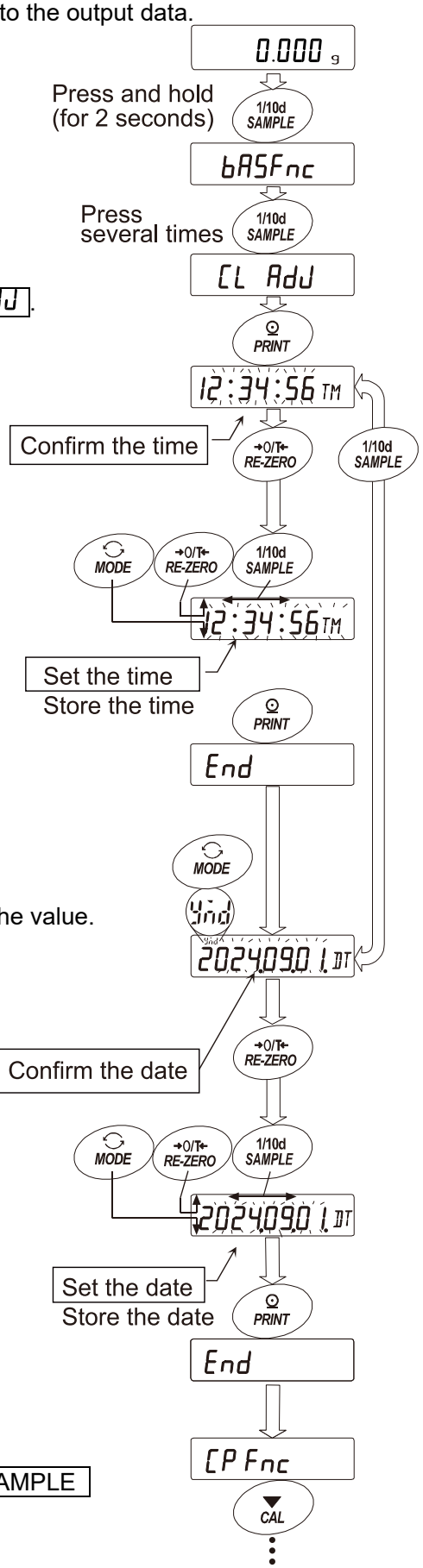
Select the brightness of the backlight of the LCD display.

Impact shock detection (iSd)

Select ON/OFF for the impact shock detection.

9-4 Clock and Calendar Function

The balance is equipped with a clock and calendar function. When the Clock and Calendar function (dout, S-td) is set, the time and date are added to the output data.
Set or confirm the time and date as follows:



Operation

1. Press and hold the [SAMPLE] key (for 2 seconds) until [bASFnc] of the function table is displayed in the weighing mode, then release the key.
2. Press the [SAMPLE] key several times to display [CL AdJ].
3. Press the [PRINT] key. The balance enters the mode to confirm or set the time and date.

Confirming the time

4. The current time is displayed with all the digits blinking.
   - When the time is not correct and is to be changed, press the [RE-ZERO] key and go to "5".
   - When the time is correct and the date is to be confirmed, press the [SAMPLE] key and go to "6".
   - When the time is correct and the date does not need to be confirmed, press the [CAL] key and go to "8".

Setting the time

5. Set the time in 24-hour format using the following keys.
   - [RE-ZERO] (+) key.....To increase the value by one.
   - [MODE] (−) key.....To decrease the value by one.
   - [SAMPLE] key.....To select the digits to change the value. The selected digits blink.
   - [PRINT] key.....To store the new setting, display [End] and go to "6".
   - [CAL] key.....To cancel the new setting and go to "6".

Confirming the date

6. The current date is displayed with all the digits blinking.
   - To change the display order of year (Y), month (n) and day (d), press the [MODE] key. The date is output in the order as specified.
   - When the date is not correct and is to be changed, press the [RE-ZERO] key and go to "7".
   - When the date is correct and the operation is to be finished,press the [CAL] key and go to "8".
   - When the time is to be confirmed again, press the [SAMPLE] key and go back to "4".

Setting the date

7. Set the date using the following keys. (The year is set with the last 2 digits of the Christian era)
   RE-ZERO (+) key····· To increase the value by one.
   MODE (−) key ····· To decrease the value by one.
   SAMPLE key····· To select the digits to change the value. The selected digits blink.
   PRINT key····· To store the new setting, display End and go to "8".
   CAL key ····· To cancel the new setting and go to "8".

Quitting the operation

8. The balance displays the next menu (CP Fnc) of the function table. Press the CAL key to exit the clock and calendar function and return to the weighing mode.

Note **Do not enter invalid values such as a non-existing date when setting the time and date.**
When the clock backup battery has been depleted, the balance displays rtc PF.
When a replacement of the battery is necessary, please contact your local A&D dealer.
The dead battery only affects the clock and calendar function. Even so, the function works normally as long as the AC adapter is connected to the balance.

9-5 Comparator Function

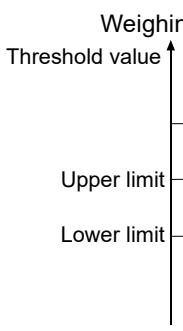
The comparison of comparators can select 3-steps or 5-steps (CP Fnc, CP-t), and it is set to 3-steps at the factory setting. When 3-step comparator is set, the results of the comparison are indicated by
HI OK LO on the display. When 5-step comparator is set, HH is indicated by HI blinking and LL by LO blinking. By using GXM-04, it is possible to output the comparison result at the contact point.

There are three types of scope that can be selected as follows.

- No comparison
- Comparison when the weight data is stable or overloaded
- Continuous comparison

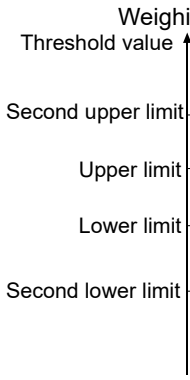
The conditions for comparing near zero are in six levels from "including near zero" to "± 100 d". "Upper limit value and lower limit value" and "reference value and tolerance range" are the comparison standards.
There are "Digital input" and "Input by sample load" as input method for each value.
Refer to the function setting CP Fnc.
By setting the function setting CP bEEP, it is also possible to sound an internal buzzer depending on the result of the comparison.

3-step comparison result



Judgment formura	3-step comparison - display			
	Judgment result	Lit display	Blinking display	Buzzer control
Upper limit value < Weighing value	HI	HI		bEP Hi
Lower limit value ≦ Weighing value ≦ Upper limit value	OK	OK		bEP ok
Weighing value < Lower limit value	LO	LO		bEP Lo

5-step comparison result



Judgment formura	5-step comparison - display			
	Judgment result	Lit display	Blinking display	Buzzer control
2nd Upper limit value < Weighing value	HH		HI	bEP HH
Upper limit value < Weighing value ≦ 2nd Upper limit value	HI	HI		bEP Hi
Lower limit value ≦ Weighing value ≦ Upper limit value	OK	OK		bEP ok
2nd Lower limit value ≦ Weighing value < Lower limit value	LO	LO		bEP Lo
Weighing value < 2nd Lower limit value	LL		LO	bEP LL

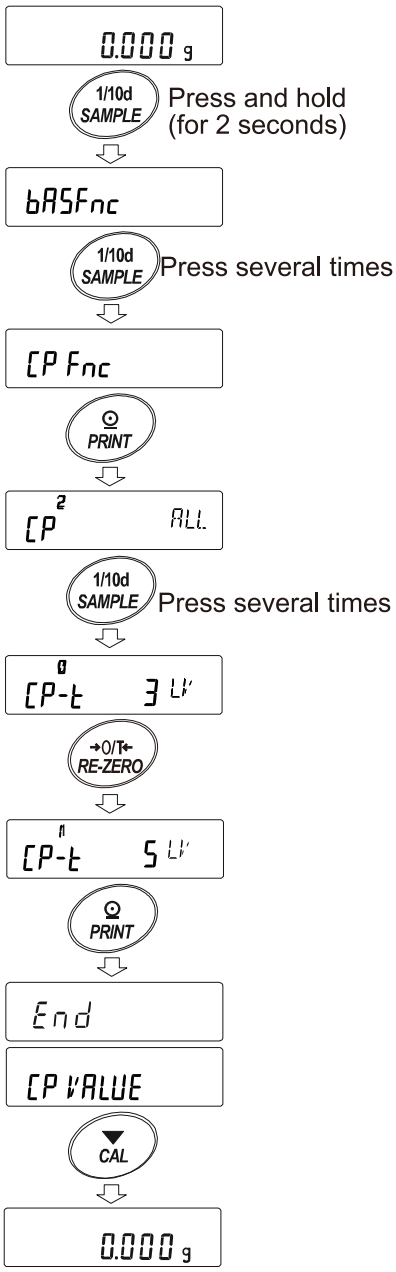
Note

□ **The comparator function in the flow measurement mode (APF 3) is compared at the factory setting with the flow rate value. By setting CP-Frd of the Function table CP Fnc to "1", it is also possible to compare with weight value (g unit).**

□ *** "d" is a unit of readability.**

Selecting the comparator stage (3 stages/5 stages)

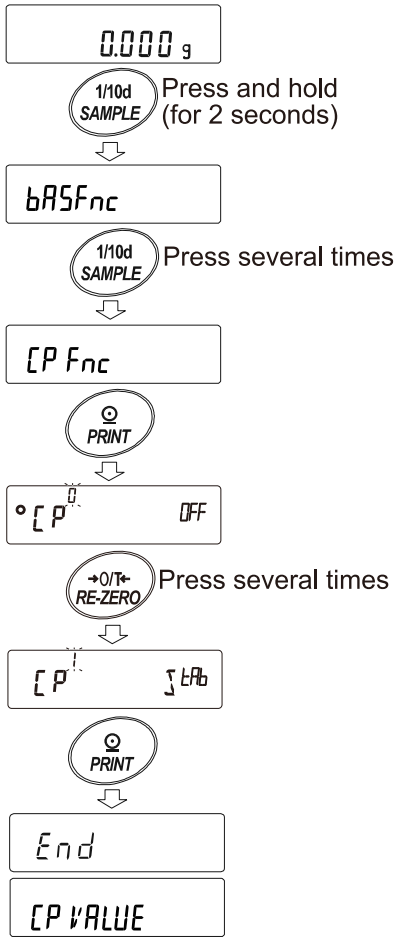
1. Press and hold the [SAMPLE] key (for 2 seconds) to display [bASFnc] of function settings.
2. Press the [SAMPLE] key several times to display [CP Fnc].
3. Press the [PRINT] key.
4. Press the [SAMPLE] key several time to display [CP-t].
5. Press the [RE-ZERO] key to select "0" of 3 stages or "1" of 5 stages.
   Press the [PRINT] key to confirm.
6. Press the [CAL] key to return to weighing mode.



Setting example 1.
Comparison when stable or overloaded. Upper/lower limits digital input.

Selecting a comparison method (operating range, comparison criteria, and value input) (setup procedures starting from the factory default setting) (with the 3-stage comparator, comparison when stable or overloaded excluding near zero ±10 d, upper limit 10000.500 g, lower limit 9999.500 g)

1. Press and hold the [SAMPLE] key (for 2 seconds) to display [bASFnc] of function settings.
2. Press the [SAMPLE] key several times to display [CP Fnc].
3. Press the [PRINT] key.
4. Press the [RE-ZERO] key several times to display [CP STAb] ("1" Comparison when stable value or overloaded).
5. Press the [PRINT] key to store the selected method.



Entering the values

6. With [CP VALUE] displayed, press the [PRINT] key.

7. Display [CP Hi].

8. Press the [PRINT] key.

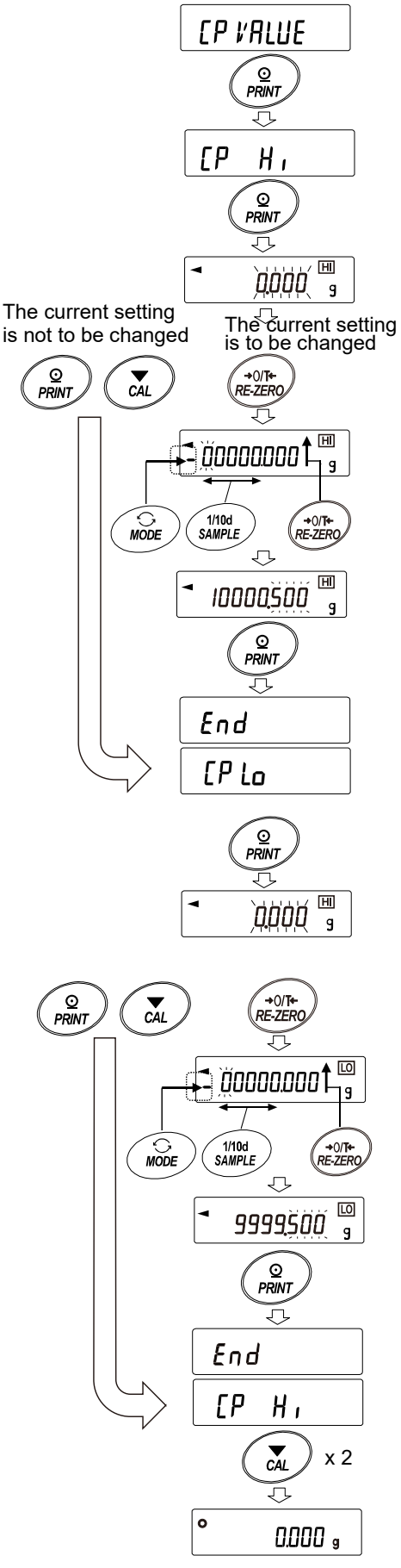
9. The current setting value is displayed with all of the digits blinking.
   When the current setting is not to be changed, press the [PRINT] or [CAL] key to go to "10".
   When the current setting is to be changed, press the [RE-ZERO] key and store the following keys.
   [SAMPLE] key·····Move the blinking digit.
   [RE-ZERO] key ·····Change the value of the blinking digit.
   [MODE] key·····Switch the polarity.
   [PRINT] key·····Store the new setting and go to "10".
   [CAL] key ·····Cancel the new setting and go to "10".

10. Display [CP Lo].

11. Press the [PRINT] key.

12. The current setting value is displayed with all of the digits blinking. When the current setting is not to be changed, press the [PRINT] or [CAL] key to go to "13". When the current setting is to be changed, press the [RE-ZERO] key and store the following keys.
    [SAMPLE] key·····Move the blinking digit.
    [RE-ZERO] (+) key··Change the value of the blinking digit.
    [MODE] (-) key ·····Switch the polarity.
    [PRINT] key·····Register and go to "13".
    [CAL] key ·····Cancel and go to "13".

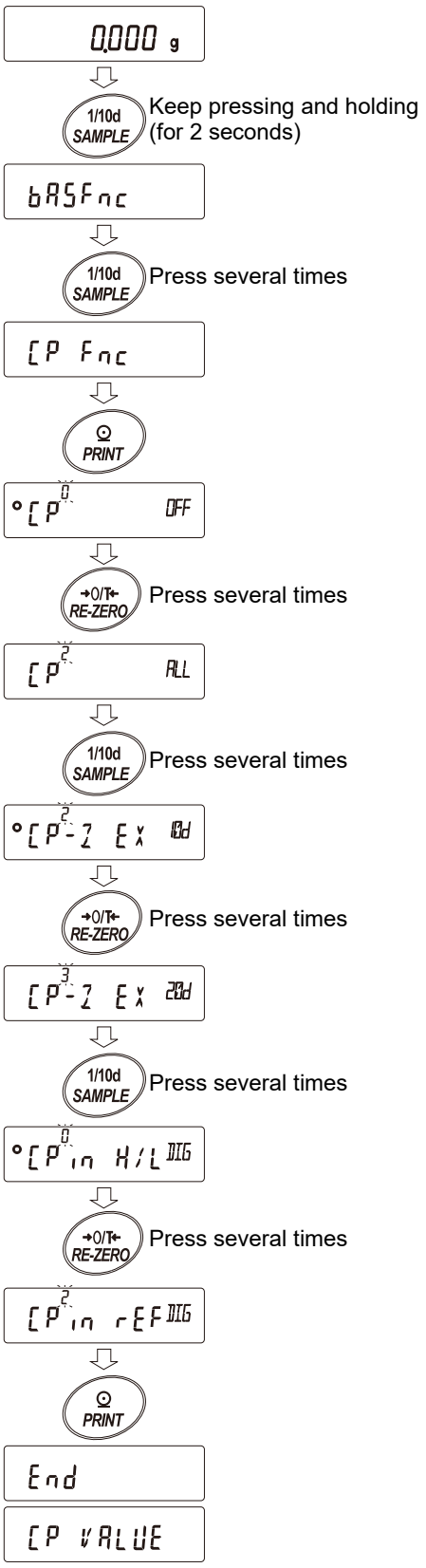
13. Press the [CAL] key twice to return to the weighing display.



Setting example 2.
Continuous comparison except near zero ± 20 d. Reference / tolerance digital input.

Selecting a comparison method (operating range, comparison criteria, and value input)

1. Press and hold the [SAMPLE] key (for 2 seconds) until [bASFnc] of the function table is displayed, then release the key.
2. Press the [SAMPLE] key several times to display [CP Fnc].
3. Press the [PRINT] key.
4. Press the [RE-ZERO] key several times to display [CP ALL] ("2" always compare).
5. Press the [SAMPLE] key several times to display [CP-Z].
6. Press the [RE-ZERO] key several times to display [CP-Z EX 20d] ("3" ± 20 d is not compared.)
7. Press the [SAMPLE] key several times to move to [CP in].
8. Press the [RE-ZERO] key several times to display [CP in rFE DIG]. ("2" reference value is set. digital input)
9. Press the [PRINT] key to store the selected method.



* **"d" is a unit of readability.**

Entering the values

10. With [CP VALUE] displayed, press the [PRINT] key.

11. Display [CP rEF].

12. Press the [PRINT] key.

13. The current setting value is displayed with all of the digits blinking.

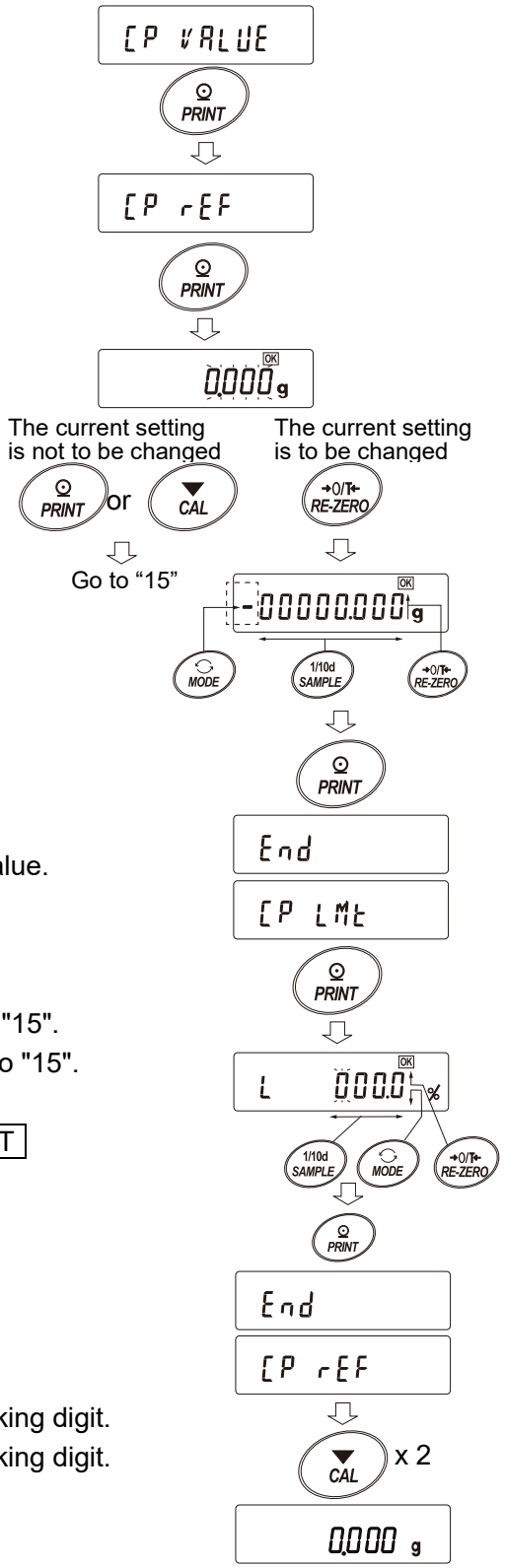
14. When the current setting is not to be changed, press the [PRINT] or [CAL] key to go to "15".

    When the current setting is to be changed, press the [RE-ZERO] key and store the following keys.

    [SAMPLE] key ··· Select the digit to change the value.
    [RE-ZERO] key·· Change the value of the digit selected.
    [MODE] key ····· Switch the polarity.
    [PRINT] key ····· Store the new setting and go to "15".
    [CAL] key····· Cancel the new setting and go to "15".

15. When [CP LMt] is displayed, pressing the [PRINT] key will display the currently set value.
    If changing the setting value, it can be registered the tolerance value with the following keys.
    For tolerance value, enter the value with the reference value set to 100%.
    [SAMPLE] key ····· Move the blinking digit.
    [RE-ZERO] (+) key·· Change the value of the blinking digit.
    [MODE] (-) key····· Change the value of the blinking digit.
    [PRINT] key ····· Register and go to "16"
    [CAL] key····· Cancel and go to "16"

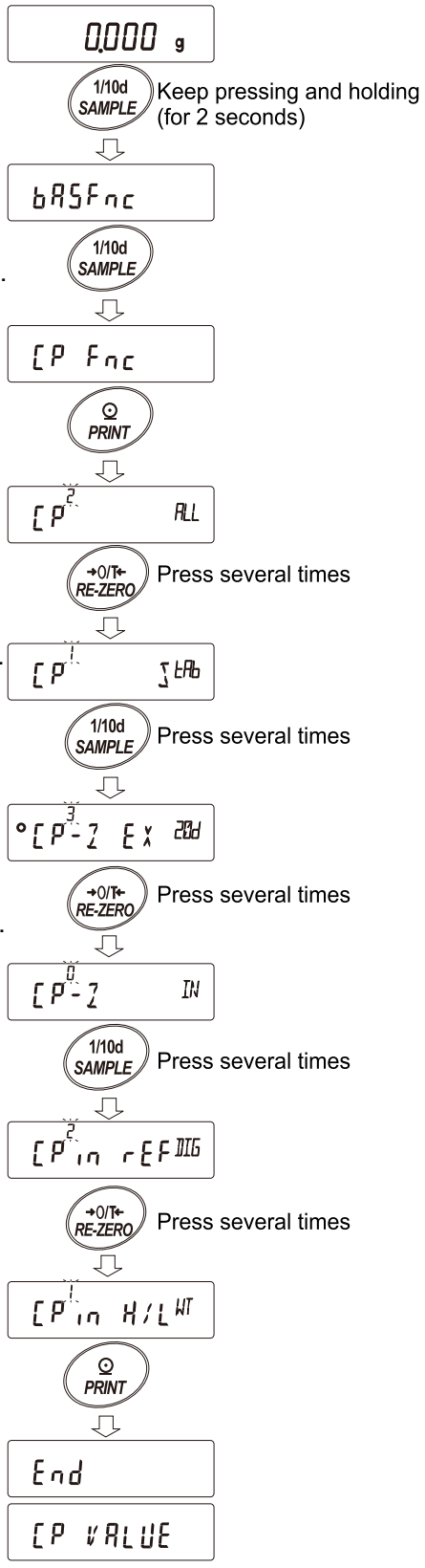
16. Press the [CAL] key twice to return to the weighing display.



Setting example 3.
Comparison when stable or overloaded including near zero. Upper/lower limits.
Weighing input.

Selecting a comparison method (operating range, comparison criteria, and value input)

1. Press and hold the [SAMPLE] (for 2 seconds) key until [bASFnc] of the function table is displayed, then release the key.
2. Press the [SAMPLE] key several times to display [CP Fnc].
3. Press the [PRINT] key.
4. Press the [RE-ZERO] key several times to display [CP STAb]. (" 1 " compared when stable and over)
5. Press the [SAMPLE] key several times to display [CP-Z].
6. Press the [RE-ZERO] key several times to display [CP-Z IN]. (" 0 " near zero is also compared.)
7. Press the [SAMPLE] key several times to display [CP in].
8. Press the [RE-ZERO] key several times to display [CP in H/L WT]. (" 1 " upper-lower limit is set. Input by loaded.)
9. Press the [PRINT] key to store the new setting.



Entering the reference and tolerance values

10. When [CP VALUE] is displayed, press the [PRINT] key. [CP Hi] will be displayed.

11. When [CP Hi] is displayed, press the [PRINT] key to check the currently set value (all blinking).

12. Press the [RE-ZERO] key to enter the load input mode. [0.00 g] is displayed.
    Place a sample of the weight of the upper limit on the balance and press the [PRINT] key. (Register the upper limit value.)

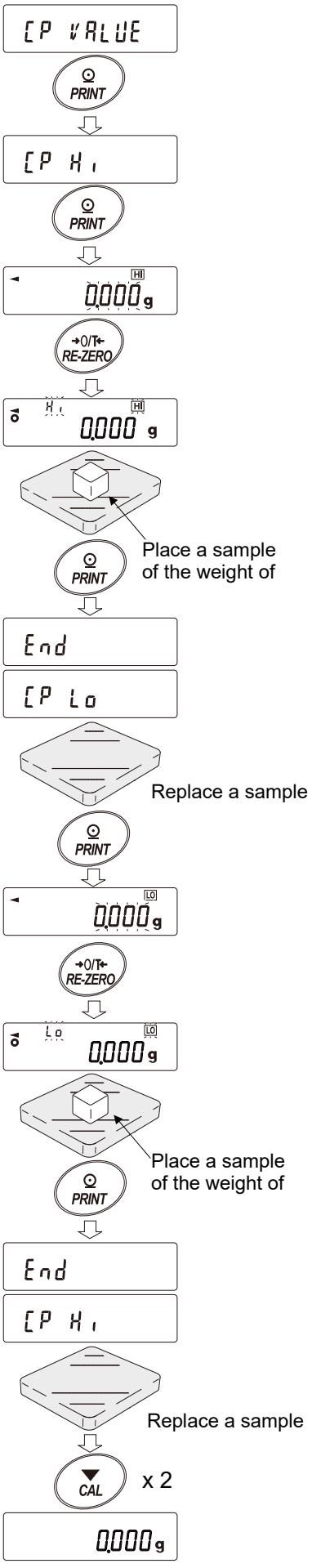
13. When finished, [CP Lo] is displayed. (Replace a sample of the weight of the upper limit from the balance.)

14. When [CP Lo] is displayed, press the [PRINT] key to check the currently set value (all blinking).
    Press the [RE-ZERO] key to enter the load input mode.

15. Press the [RE-ZERO] key, [0.00 g] is displayed.

16. Place a sample of the weight of the lower limit on the balance
    and press the [PRINT] key. (Register the lower limit value.)

17. When finished, [CP Hi] is displayed. (Replace a sample of the weight of the lower limit from the balance.)
    Press the [CAL] key twice to return to the weighing display.



Sound the built-in buzzer corresponding to the comparison result

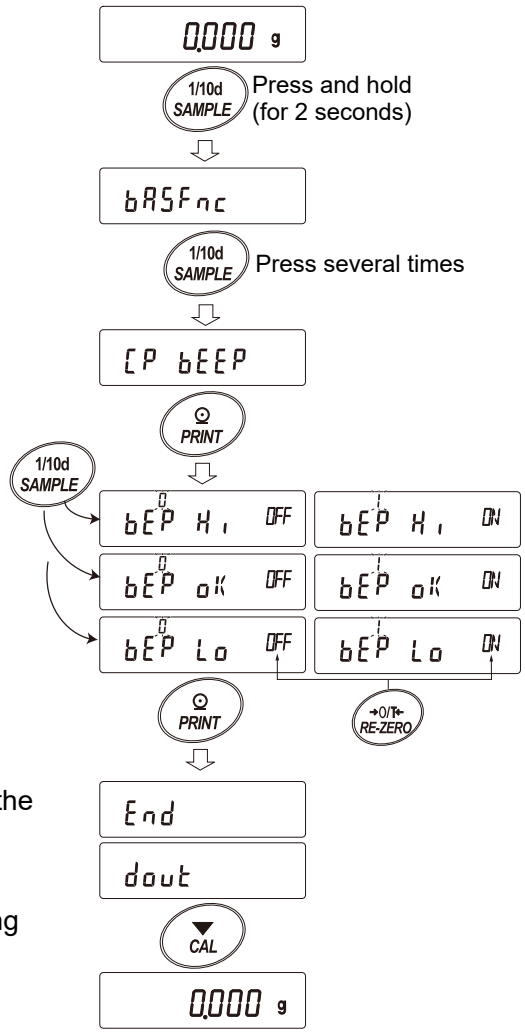
1. Press and hold the SAMPLE key (for 2 seconds) until bASFnc of the function table is displayed.

2. Press the SAMPLE key several times to display CP bEEP.

3. Press the PRINT key.

4. Press the SAMPLE key to set the buzzer sound setting "ON/OFF" of the comparison result.
   When 3-step comparator is set, the display can be selected from the following 3 kinds.
   bEP Hi | bEP oK | bEP Lo
   When 5-step comparator is set, the display can be
   selected from the following 5 kinds.
   bEP HH | bEP Hi | bEP oK | bEP Lo | bEP LL

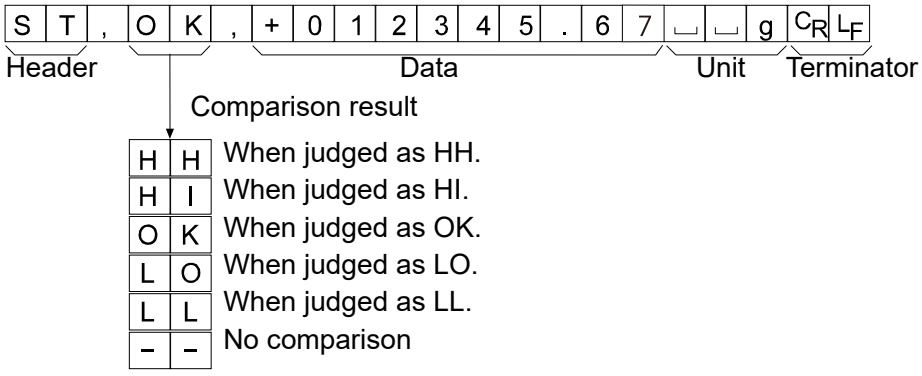
   SAMPLE key ····· Select the comparison result.
   RE-ZERO key···· Set the buzzer sound setting of the comparison result "ON/OFF"
   PRINT key ····· Store the setting.
   CAL key ····· Cancel and return to the weighing display.



*For setting the comparator level (CP-L), please refer to "Selecting the comparator stage (3 stages/5 stages)" on page 65.

Adding the Comparison Results

By setting the "Comparison results (CP-R)" of the function table to "1", the comparison results can be added to the data output using the RS-232C serial interface or USB interface. Use A&D standard format (tYPE 0).The comparison results are added after the header in A&D standard format as below.



Note

☐ **While the gross net tare function is in use, the above is not available.**

Main Display Comparison Function

The main display comparison function displays the comparison results in a magnified way, on the main portion of the display in place of the weight value.

Selecting a unit

Step 1 Press the MODE key to select a unit to be used for comparison.

Note **While the main display comparison function is in use, unit selection using the MODE key is not available.**

Setting the function table

Step 2 Press and hold the SAMPLE key (for 2 seconds) until bASFnc of the function table is displayed, then release the key.

Step 3 Press the SAMPLE key several times to display CP Fnc.

Step 4 Press the PRINT key.

Step 5 Press the SAMPLE key several times to display CP-b oFF.

Step 6 Press the RE-ZERO key to display CP-b oN.

Note **To disable the main display comparison function, set the "Main display comparison (CP-b)" parameter to "0 ".**

Step 7 Press the PRINT key to store the setting.

Step 8 Press the CAL key to return to the weighing mode.

Setting the comparator values

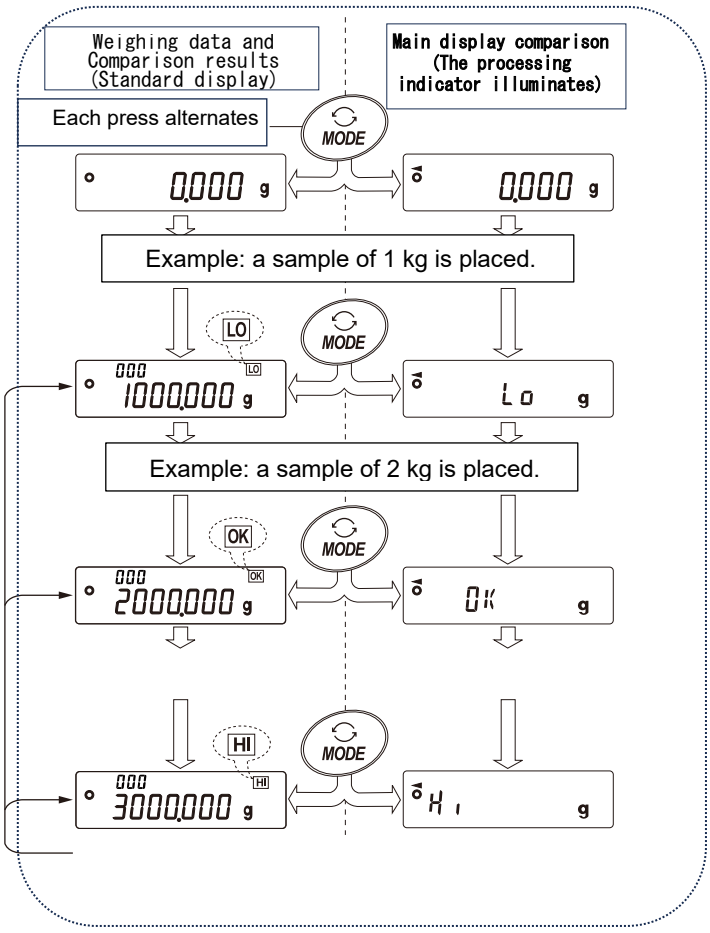
Setting the comparator values as described in the previous section.
This example uses CP 3 (Continuous comparison, excluding "near zero").

Using the main display comparison function

Step 1 Press the RE-ZERO key to set the display to zero.

Step 2 Place a sample on the pan. The balance performs a comparison using the specified comparison values and displays the comparison results, HI, OK or LO.

Step 3 Each time the MODE key is pressed, the balance switches between the standard display and the main display comparison. Note that "Go" appears for OK.



Note

- **While the main display comparison function is in use, the processing indicator  illuminates as shown in the illustration.**
- **If the comparison is not performed, for example, because the weight value is near zero or unstable, the balance displays the weight value even when the main display comparison function is used.**
- **Even while the main display comparison function is in use, the balance re-zeroing and data output are possible.**
- **Only the unit selected before this function can be used.**
- **While the main display comparison function is in use, the data memory function is not available.**
- **To disable the main display comparison function, set the "Main display comparison (CP-b)" parameter to " 0 ".**

9-6 Description of Application

To switch application modes, use the “APF (Application Function)” setting found under " AP Fnc (Application Mode) " in the function table(9.Function Table.)

9-6-1 Description of the normal weighing mode

The normal weighing mode of the factory setting.

Required function table settings

AP Fnc	APF = 0	Normal weighing mode

9-6-2 Description of the weighing indicator mode

The weighing indicator displays the relation between load and weighting capacity in percent in normal weighing.

（Zero 0%, weighing capacity 100% ）

Required function table settings

AP Fnc	APF = 1	Weighing indicator

Note

- ❑ It cannot be used with the data memory in the function table（"9.Function Table"） dout dAtA = 1 to 4 ）

9-6-3 Description of the statistical calculation mode

This is a function to statistically calculate the weighing value and to display and output the result.

Required function table settings

AP Fnc	APF = 2	Statistical calculation mode

Refer to "12. Statistical Calculation Mode"

9-6-4 Description of the gross net tare mode

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

Required function table settings

AP Fnc	APF = 4	Gross net tare mode

Refer to "13. Gross Net Tare Function".

9-7 Description of Unit

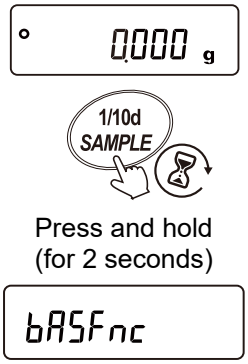
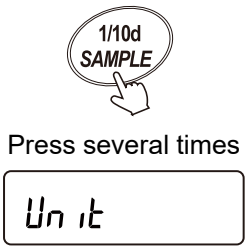
To configure (Unit) [Un it] in the function table ("9.Function Table"), use the following procedure.

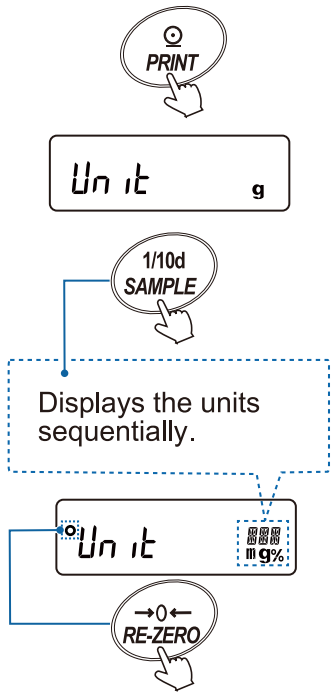
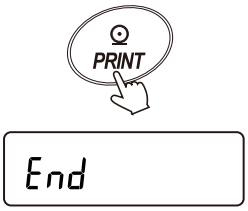
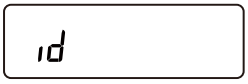
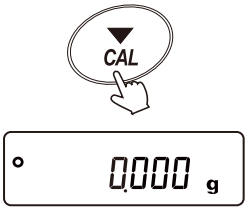
This setting is used when changing the order of units or hiding unnecessary units.

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

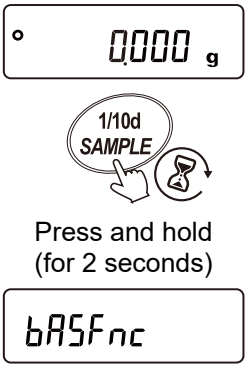
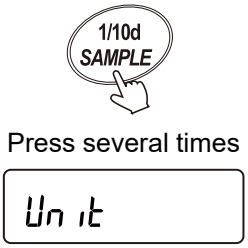
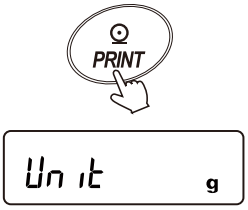
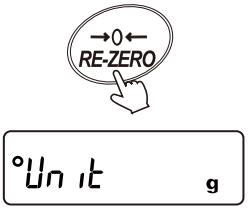
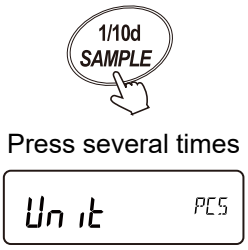
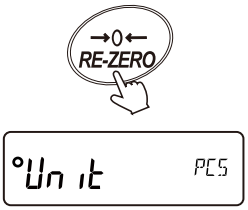
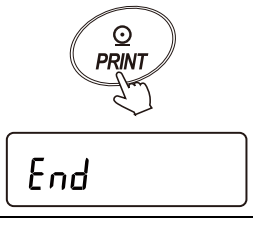
Step	Description	Display and key operations
1.	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("9.Function Table").	
2.	Press the [SAMPLE] key several times until the display shown to the right appears.	

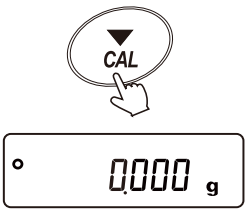
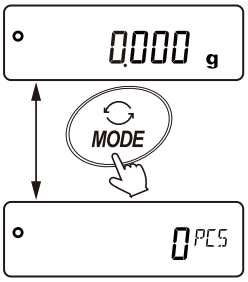
Step	Description	Display and key operations
3.	Press the PRINT key. Use the following keys to specify the desired units to be displayed in the specified order. SAMPLE key·····Cycles through the units. RE-ZERO key ·····Displays "O" (the stabilization indicator) for the unit to be selected. When the unit is selected and displayed with the indicator, pressing the key turns off t "O"(the stability indicator).	
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 ("9.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".	

10. GLP Report and ID Number

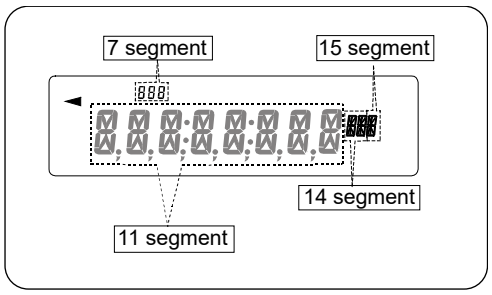
10-1 Main Objectives

- The data output compatible with "GLP/GMP" can be output to a personal computer or printer using the RS-232C serial interface.
- 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.
- 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 an external weight)
- Breaks (“title block" and "end block") for easy management of a series of weighing data
- By changing the function table, you can store sensitivity adjustment results and calibration test results in the data memory and output them in bulk. Refer to "11. 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 maintained in non-volatile memory even if the AC adapter is removed, and it is valid until a new registration is made.
- For details on confirming and setting the time and date. Refer to "9-4 Clock and Calendar Function".
- By setting "InFo 2" in the Function Table, the balance will not output its internal clock data. Instead, it allows the use of time data from an external device such as a printer.

10-2 Setting the ID Number

1. Press and hold the [SAMPLE] key (for 2 seconds) until [bASFnc] of the function table is displayed, then release the key.
2. Press the [SAMPLE] key several times to display [id].
3. Press the [PRINT] key. Set the ID number using the following keys.
   [SAMPLE] key ····· To select the digit to change the value.
   [RE-ZERO] key, [MODE] key ···· To set the character of the digit selected.
   Refer to the display character set shown below.
   [PRINT] key····· To store the new ID number and display [PASSwd].
   [CAL] key····· To cancel the new ID number and display [PASSwd].
4. With [PASSwd] displayed, press the [CAL] key to return to the weighing mode.

Note The display segment of the balance is divided into 4 types. For each segment display, refer to the "Display correspondence table" in the next page.



Display correspondence table

11 segments

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

␣ Space

7 segments

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

␣ Space

14 segments

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

␣ Space

15 segments

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

␣ Space

10-3 GLP Report

Set the function setting to " InFo 1 " (use data of clock built in to the balance) or " InFo 2 " (use clock data of external equipment) to output the GLP / GMP data with the AD-8129TH (compact thermal printer) or a personal computer.

Note

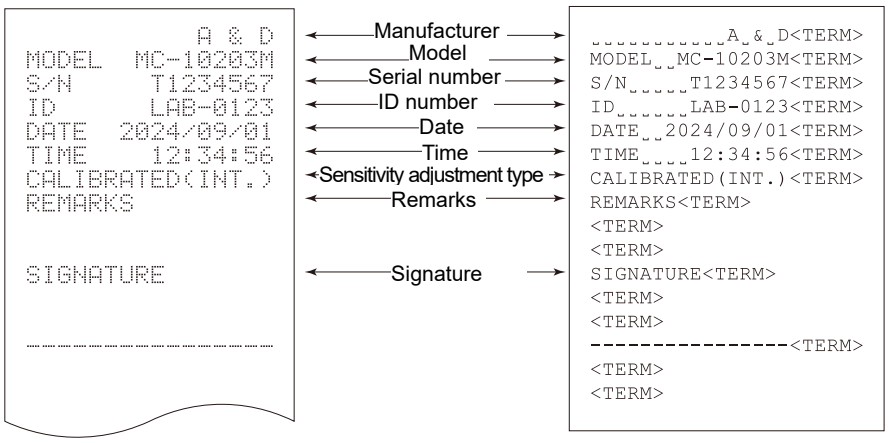
- **In case of outputting clock data built in the balance (InFo 1), if the date/time is incorrect, adjust the date/time referring to "9-4 Clock and Calendar Function" in "9. Function Table".**

Examples of sensitivity adjustment report using the internal weight

This is the GLP report when the balance is adjusted using the internal weight.

Output the clock data of built in balance (InFo 1)

Printer format (AD-8129TH) / PC format (RsCom)



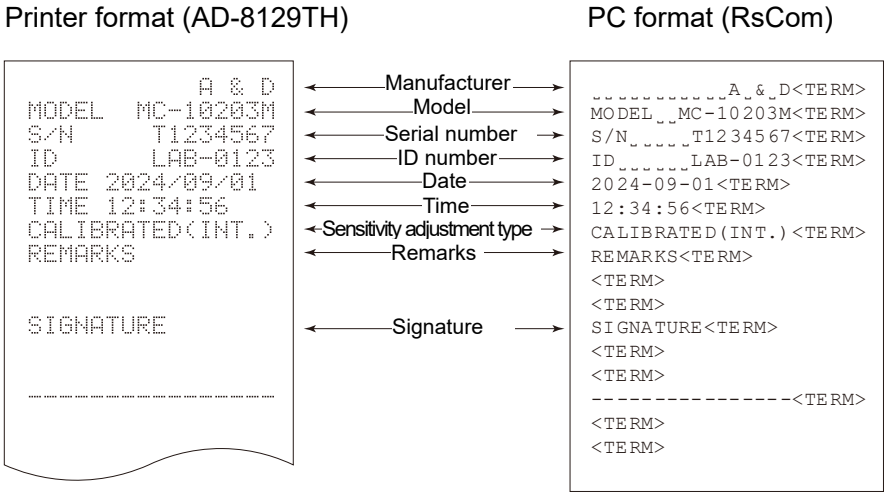
␣ :	Space, ASCII 20h
<TERM> :	Terminator, CR LF or CR
CR:	Carriage return, ASCII 0Dh
LF:	Line feed, ASCII 0Ah

Output the clock data of external device (InFo 2)

By setting the function table "InFo 2" for outputting data such as GLP / GMP, the clock data of the external device such as PC or printer can be used without using the clock data of the balance.

Note

- **Clock data output from external device is for devices that have a clock function and can receive date and time data by receiving <ESC>D, <ESC>T. (Ex. AD-8129TH compact thermal printer, RsCom WinCT etc.)**
- **When saving the sensitivity adjustment history of the data memory function, the built in clock data is saved even if it is set to "InFo 2".**

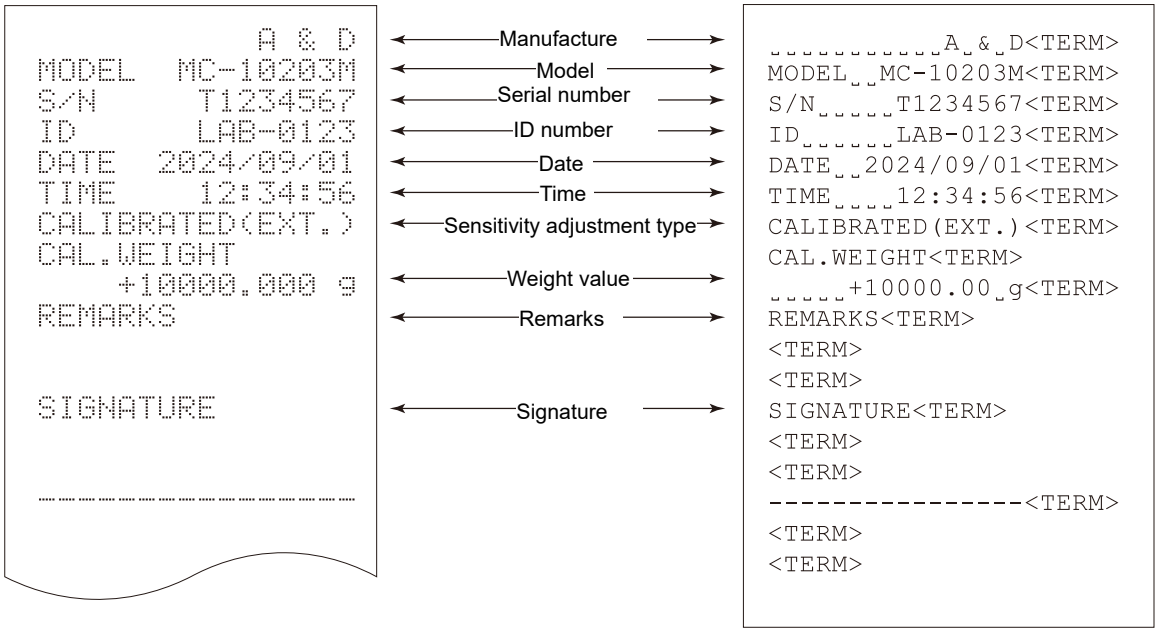


␣ :	Space, ASCII 20h
<TERM> :	Terminator, CR LF or CR
CR:	Carriage return, ASCII 0Dh
LF:	Line feed, ASCII 0Ah

Examples of sensitivity adjustment report using an external weight

This is the GLP report when the balance is adjusted using the external weight.

Printer format (AD-8129TH) PC format (RsCom)



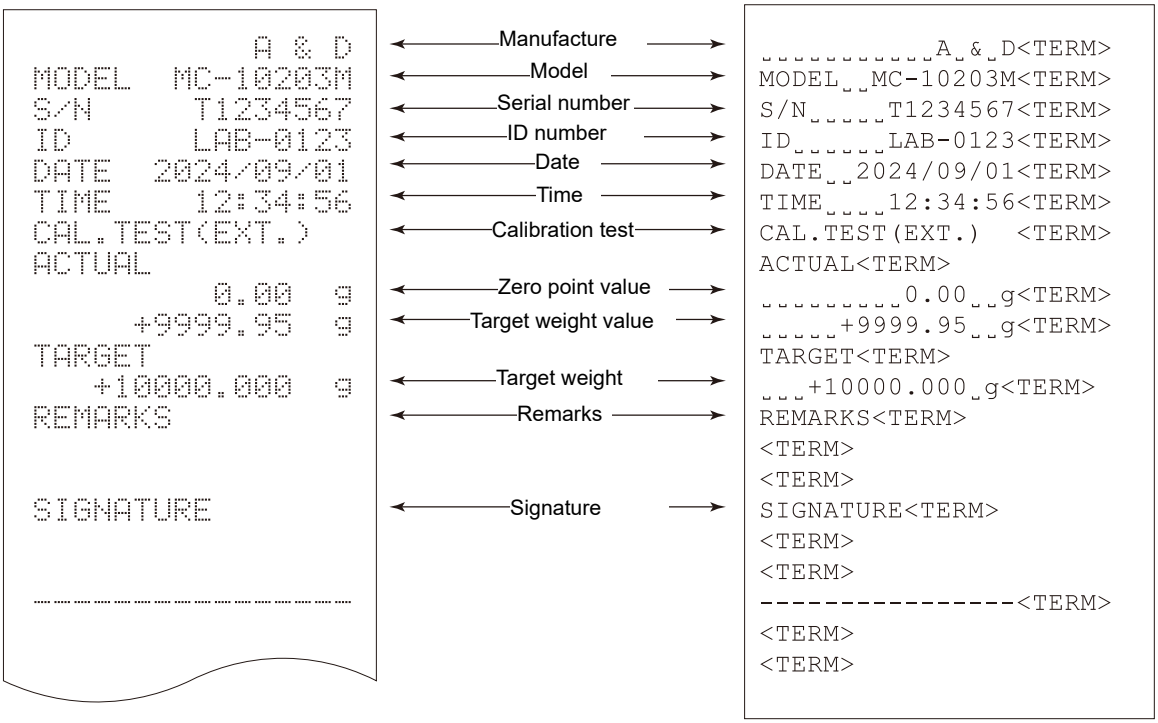
␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR: Carriage return, ASCII 0Dh
LF: Line feed, ASCII 0Ah

Calibration test report using an external weight

This is the GLP report when checking the weighing accuracy of the balance with the external weight. (Adjustment is not performed)

Setting of inFo 1
Printer format (AD-8129TH)

Setting of inFo 1
PC format (RsCom)



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

Heading and ending output

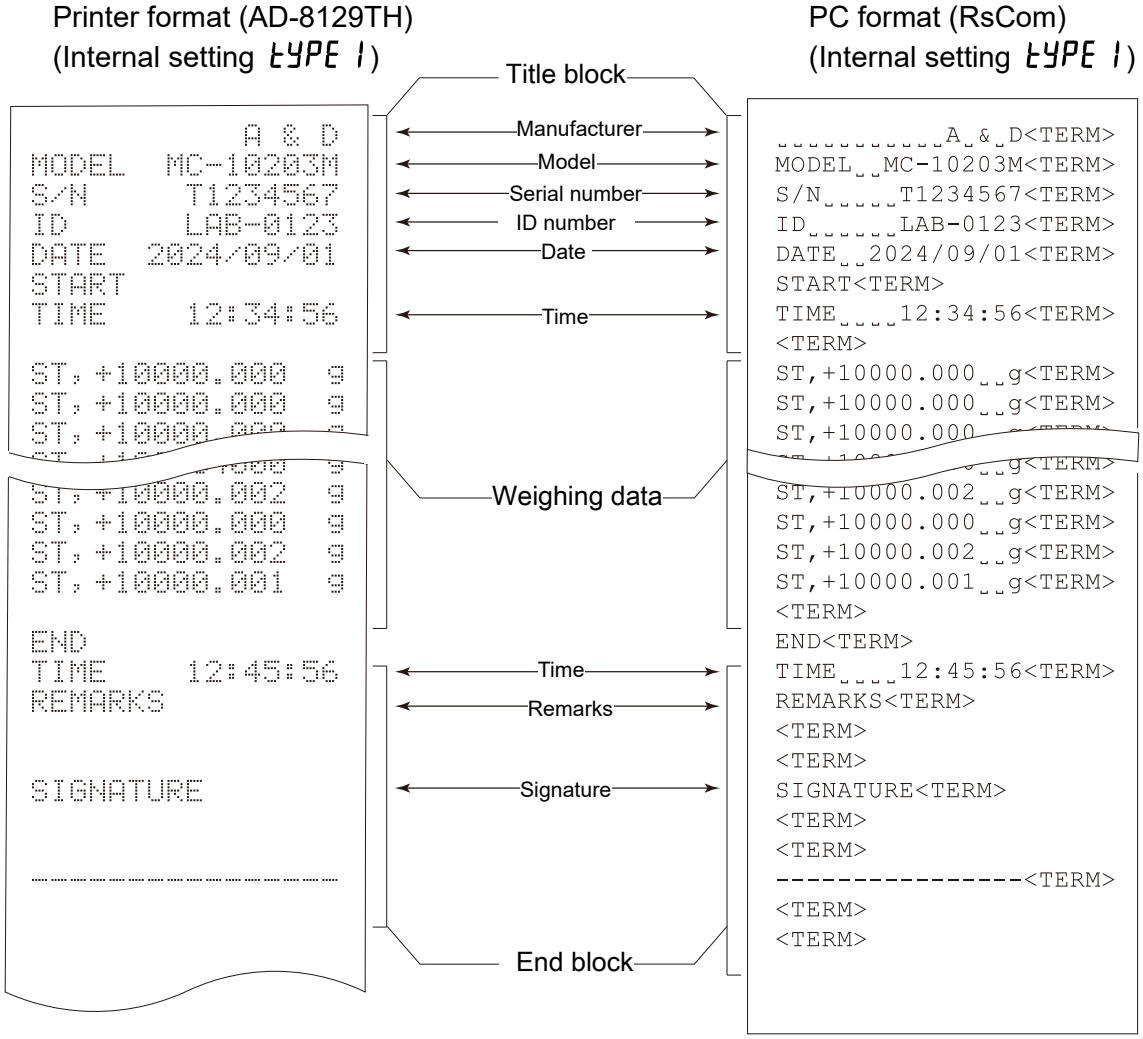
As a method of managing weighing values, add "Heading" and "End" parts before and after the weighing value. By pressing and holding the PRINT key (for 2 seconds), "Heading" and "End" are output in turn.

Note

- **If the data memory function is used (except when dAtA 0), heading and end cannot be output.**

Key output method

1. While displaying the weighing value, hold down the PRINT key (for 2 seconds) and display StArt to output "Heading".
2. Output the weighing value. The output method depends on the setting of the data output mode.
3. Press and hold the PRINT key (for 2 seconds) to display rEcEnd, "End" is output.



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

11. Data Memory

Data memory is a function to store weighing data and sensitivity adjustment data in memory. The data stored in memory are available for outputting at one time to a printer or personal computer.

To configure the data memory function, use "dAtA" (Data memory) under [dout] (Data output) in the function table ("9. Function Table").

CAUTION

- **Cannot be used together with the capacity indicator mode, statistical calculation function, gross net tare function, or minimum weight alert function.**
- **"Heading and ending output" of GPL output is not possible.**

The following five types of data can be stored.

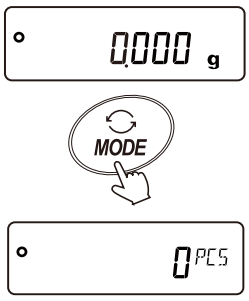
Function table	Description	Number of Stored date
dAtA = 1	Unit weights (Counting mode)	Up to 50 sets
dAtA = 2	Weighing values	Up to 200 sets
	Sensitivity adjustment history Internal weight sensitivity adjustment report External weight sensitivity adjustment report Calibration test report External weight calibration test report	Last 50 sets
dAtA = 3	Comparator settings Upper limit and lower limit only	Up to 20 sets
dAtA = 4	Tare values	Up to 20 sets

11-1 Storing unit weights

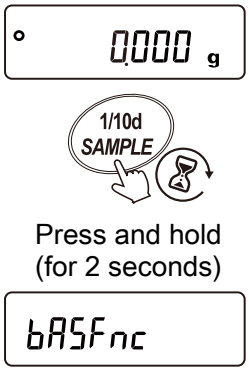
- ❑ Up to 50 entries can be stored for "unit weight" in the counting mode.
- ❑ P01 is the first unit weight data and serves as the standard memory in normal counting mode. 49 additional unit weights can be stored.
- ❑ The stored unit weight is retained in the balance's nonvolatile memory even when the 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).

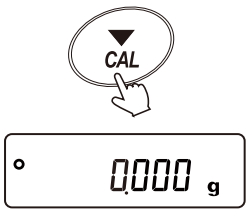
11-1-1 Preparations for the data memory function (unit weight)

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 "9-7 Description of Unit"	

Enabling the data memory function (Changing the function table)

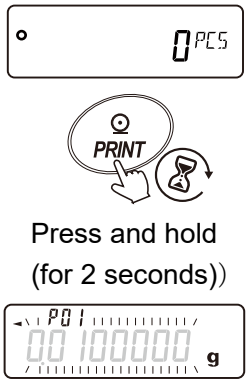
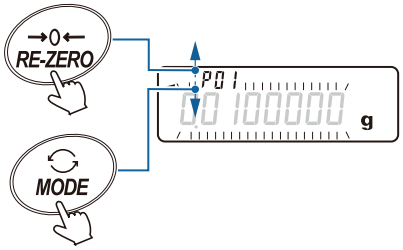
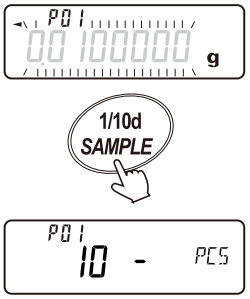
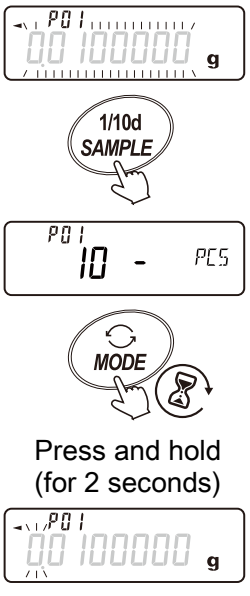
Step	Description	Display and key operations
1.	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the menu of the function table ("9. Function Table").	 Press and hold (for 2 seconds) bASFnc
2.	Press the [SAMPLE] key several times until the display shown to the right appears.	 Press several times dout
3.	Press the [PRINT] key.	 PrT KEY
4.	Press the [SAMPLE] key several times until " (Data memory function) "is displayed. dAtA	 Press several times dAtA OFF
5.	Press the [RE-ZERO] key to display " 1 to 4 " (Stores the unit weight) for "dAtA". (The display shown to the right is " 1" for " dAtA".)	 dAtA 1 PCS
6.	Press the [PRINT] key to store the setting.	 End S 1F

Step	Description	Display and key operations
7.	Press the CAL key to return to weighing mode.	

11-1-2 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.

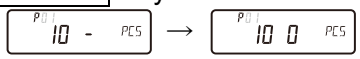
Step	Description	Display and key operations
1.	Press and hold the PRINT key (for 2 seconds) to enter confirmation mode. The unit weight data (the unit weight number and blinking display of unit weight) is read. The latest unit weight data selected or registered is displayed.	 Press and hold (for 2 seconds))
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 "Load registration mode"
	❑ To use the "Digital registration mode" for registration, press the SAMPLE key. Then, press and hold the MODE key to enter "Digital registration mode".	 Press and hold (for 2 seconds) To "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 "4-3 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 3 of confirmation mode in "11-1-2 Registering unit weight data". For details on how to register unit weight, refer to "4-3 Counting Mode (PCS)" CAL key ..... Returns the balance to the state described in step 1 of "11-1-2 Registering unit weight data". Press and hold the MODE key (for 2 seconds). Enters "Digital registration mode".

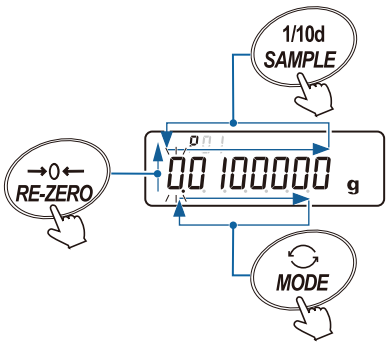
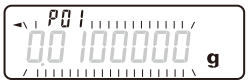
Digital registration mode

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 to be applied after registering the unit weight. (Refer to "4-3 Counting Mode (PCS)")**
- ❑ **Up to the last one digit 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 3 of Confirmation mode in "11-1-2 Registering unit weight data".	  To step 3 of confirmation mode in "11-1-2 Registering unit weight data".

Note

- ❑ **Use "UW: " command to change the unit weight. (Refer to "22. Command".)**

11-1-3 Reading the unit weight data

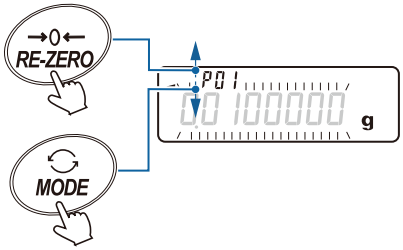
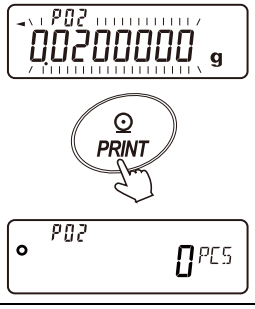
CAUTION

- ❑ **If the set value is less than the setting range, " Error 2 " is displayed.**
  For details on minimum unit weight, refer to "28-2 Individual Specifications".
- ❑ **ACAI cannot be applied to the read unit weight.**

Note

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

Confirmation mode

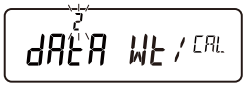
Step	Description	Display and key operations
1.	The unit weight data (the unit weight number and blinking display of unit weight) is read. The latest unit weight data selected or registered is displayed.	
2.	Following steps 1 through 3 "11-1-1 Preparations for the data memory function (unit weight)" will activate the confirmation mode.	
3.	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.	
4.	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).	

11-2 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.

11-2-1 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.	Refer to "Enabling the data memory function (Changing the function table) " in 11-1-1 Preparations for the data memory function (unit weight), and set "dAtA" under [dout] in section 9, Function Table, to "2" (to store weighing data and sensitivity adjustment history).	

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.

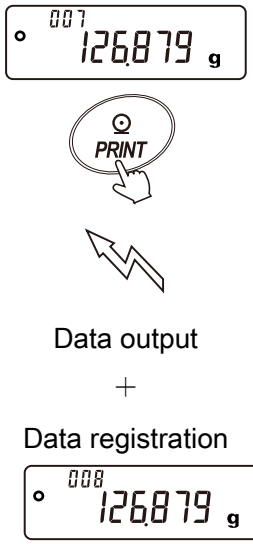
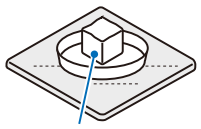
Output selection for data number, ID number, and time/date

Data number	No output	d-no = 0
	Output	d-no = 1
ID number	No output	S-id = 0
	Output	S-id = 1

Time/date	No output	S-td = 0
	Outputs the time	S-td = 1
	Outputs the date	S-td = 2
	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.

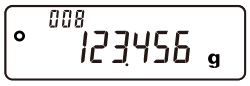
11-2-2 Storing (registering) weighing data

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

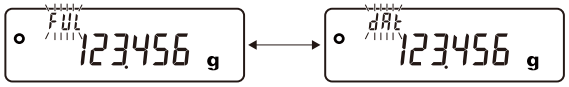
Display and indicator

Weighing display

The number of stored data entries is updated at the top left of the display.

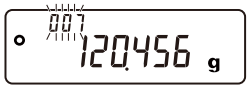


When the storage capacity for weighing values is reached, "" will blink alternately. FUL ⟷ dAt



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.**
- ❑ **Automatic sensitivity adjustment due to temperature changes is disabled while the interval mode is active.**
- ❑ **The statistical calculation function cannot be used while the data memory function is active.**
- ❑ **When "3" is set for "PrE" (Stream mode), data may not be stored correctly.**

The method for storing weighing values depends on the operation of "Prt" (Data output mode) under (Data output "dout") in the function table ("9. Function Table").

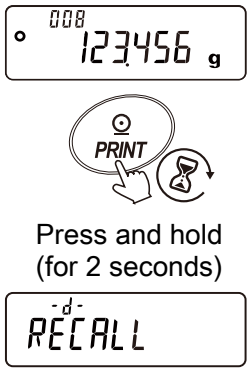
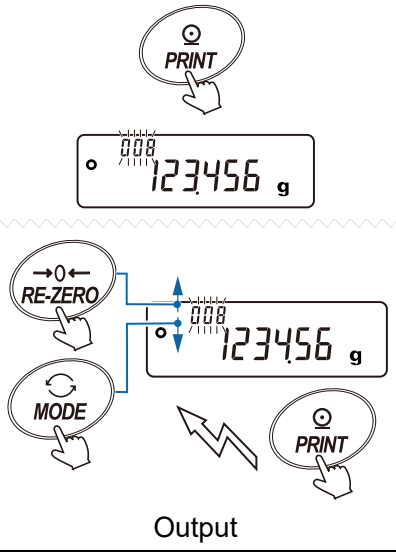
Combination of operation methods and function table settings

Item / Mode	Data output mode	Auto print polarity, difference	Data memory function	Interval time
Key mode	Prt = 0	Not used	dAtA = 2	Not used
Auto print mode A	Prt = 1	AP-P = 0 to 2 AP-b = 0 to 2		
Auto print mode B	Prt = 2			
Key mode B (immediate)	Prt = 4	Not used		
Key mode C (stable)	Prt = 5			
Interval output mode	Prt = 6			int = 0 to 8
Auto print mode C	Prt = 7	AP-P = 0 to 2 AP-b = 0 to 2		Not used

11-2-3 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 (Data out) in the function table ("9. Function Table" [dout]).**
- **When there is no stored data, " [No dAtA] " will be displayed.**

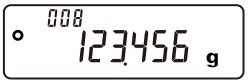
Step	Description	Display and key operations
1.	In weighing mode, press and hold the [PRINT] key (for 2 seconds). [RECALL] "-d-" or "d-t" is displayed at the top left of the display . *1 -d-: Without time/date setting ([dout] > 5-td = 0) d-t : With time/date setting ([dout] > 5-td = 1 to 3) *1 The time 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.	

11-2-4 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 ("9. Function Table") to match the communication settings of the connected peripheral devices. Refer to"9. Function Table" and "18. Connection with Peripheral Devices".**

Step	Description	Display and key operations
1.	In weighing mode, press and hold the [PRINT] key (for 2 seconds). [RECALL] "-d-" or "d-t" is displayed at the top left of the 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.	008 123456 g  Press and hold (for 2 seconds) -d- RECALL
2.	Press the [SAMPLE] key.	 -d- out
3.	Press the [PRINT] key.	 -d- out No
4.	Use the [RE-ZERO] key to switch between "No" / "Go" .	 -d- out Go

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

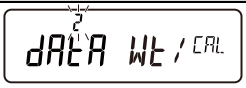
11-2-5 Deleting the stored weighing results in bulk.

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 display [RECALL]. -d-: Without time/date setting ([dout] > 5-td = 0) d-t : With time/date setting ([dout] > 5-td = 1 to 3) *1 The time and date output settings can be changed after the weighing values are stored.	008 123456 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 123456 g

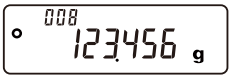
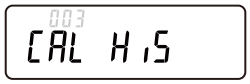
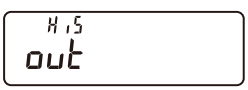
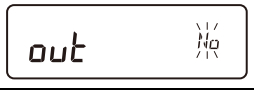
11-2-6 Storing and outputting sensitivity adjustment history

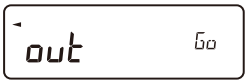
- ❑ The histories of sensitivity adjustment (with the internal weight/with an external weight) and the results of calibration test can be stored in the internal memory of the balance.
- ❑ The stored results can be output in bulk (to a printer or PC).
- ❑ The balance can store the results of the last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

Enabling the data memory function (Changing the function table)

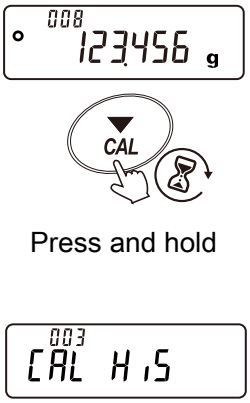
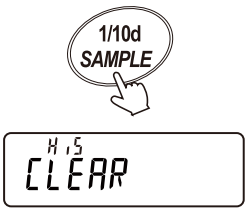
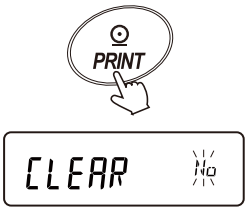
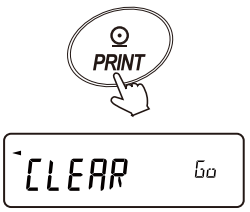
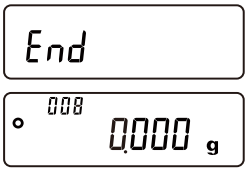
Step	Description	Display and key operations
1.	Refer to "11-2-1 Preparations for data memory function (weighing data and sensitivity adjustment history) " and set "dAtA" under "dout"in the function table ("9. Function Table"), to "2" (to store weighing data and sensitivity adjustment history).	
2.	In this state, performing a standard sensitivity adjustment or calibration test will automatically store the data.	

Outputting the sensitivity adjustment history

Step	Description	Display and key operations
1.	In weighing mode, press and hold the CAL key until CAL HIS is displayed. (While pressing and holding the CAL key, the item display will switch every 2 seconds.) **CAUTION** ❑ **If the "FUL" and "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.**	  Press and hold 
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.**	 Release 
3.	Press the PRINT key.	 

Step	Description	Display and key operations
4.	Use the RE-ZERO key to switch between "No / Go".	 
5.	Press the PRINT key while "Go" is blinking. The balance outputs all stored history data via RS-232C/USB.	   Bulk output  
6.	Press the CAL key to return to weighing mode.	 

11-2-7 Deleting the sensitivity adjustment history

Step	Description	Display and key operations
1.	In weighing mode, press and hold the [CAL] key until [CAL HIS] is displayed. (While pressing and holding the [CAL] key, the item display will switch every 2 seconds.) **CAUTION** **If the "FUL" and "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.	

11-3 Data Memory for Comparator Settings

- ❑ The data memory function can store 20 sets of upper and lower limit values for the comparator mode.
- ❑ By recalling the stored upper and lower limit values, weighing can be performed without having to register them each time.
  In addition, the stored values can be easily recalled using the MODE key (Simple Selection Mode).
- ❑ The stored upper and lower limit values can be recalled and modified as needed.
- ❑ The recalled upper and lower limit values can be modified using either the "Digital registration mode" (for entering limits manually via numeric input) or the "Load registration mode" (for setting limits by placing actual samples on the pan).

CAUTION

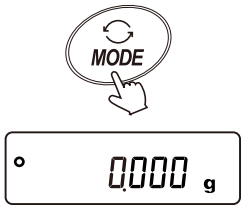
- ❑ **Only the upper and lower limit values can be stored; reference values and tolerance ranges cannot be saved.**

11-3-1 Preparation for Using the Data Memory Function with Comparator Setting

CAUTION

- ❑ **Unit selection using the MODE key is not available while data memory is in use.**

Changing the weighing unit

Step	Description	Display and key operations
1.	Press the MODE key to select the unit to be used for registration in advance.	

Enabling the data memory function (Changing the function table)

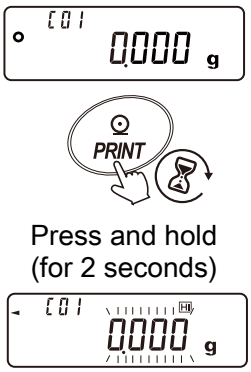
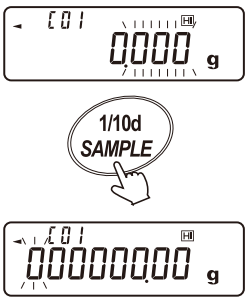
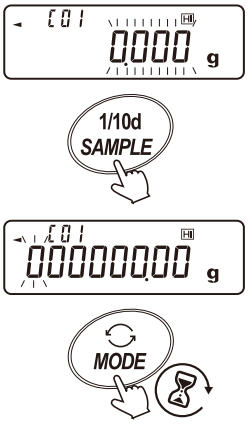
Step	Description	Display and key operations
2.	Refer to "Enabling the data memory function (Changing the function table) " and set " dAtA (Data Memory Function) " under dout the function table "9. Function Table to " 3 (Comparator Setting Value Storage) ".	

CAUTION

By referring to "9-5 Comparator Function", you can enable the comparator function to register (store) the upper and lower limit values of the comparator.

11-3-2 How to Register Comparator Data

To register (store) new upper and lower limit values for the comparator, select the desired comparator number (comparator data), then register the values using either "Digital registration mode" or "Load registration mode. " The comparator numbers range from C01 to C20.

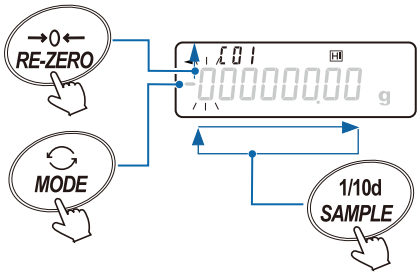
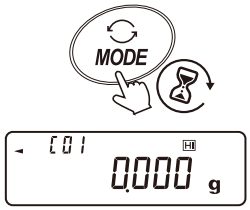
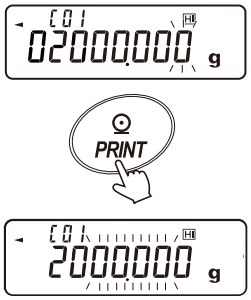
Step	Description	Display and key operations
1.	Press and hold the PRINT key (for 2 seconds) to enter confirmation mode. The upper limit data of the comparator (comparator number [C01 to C20] and the upper limit mass [blinking display]) will be recalled. The displayed value corresponds to the upper limit of the last selected comparator.	
2.	Select the comparator number to be used in the next key operation. (Selectable from C01 to C20) RE-ZERO key ····· Increases the comparator number by 1. MODE key ····· Decreases the comparator number by 1. By operating the keys as described above, the display toggles alternately between upper (HI) and lower (LO) limits, such as: C01 HI (lit) ⇔ C01 LO (lit) ⇔ C02 HI (lit) ⇔ C02 LO (lit) ⇔ ··· In the case of 5-step comparison, the display switches in the following sequence: HI (blinking) ⇔ C01 HI (lit) ⇔C01 LO (lit) ⇔C01 LO (blinking) ⇔C02 HI (blinking) LO (lit) ⇔ ···	
3.	To change the settings using digital input, press the SAMPLE key to enter "Digital registration mode. " ❑ To use "Load registration mode" for registration, press the SAMPLE key. Then, press and hold the MODE key to enter "Load registration mode".	 To "Digital registration mode"  To "Load registration mode"

Digital registration mode

Digital registration mode allows you to enter the upper and lower limit values for the comparator using numeric input.

In Digital registration mode, the digit to change blinks.

Perform 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 polarity.	
	Press and hold the MODE key (for 2 seconds). ····· Enters "Load registration mode".	
2.	Press the PRINT key to store the upper and lower limit values into the data memory. (To cancel, press the CAL key.) Returns to the state described in Step 3 of "11-3-2 How to Register Comparator Data"	

Note

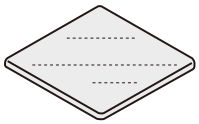
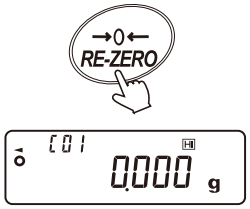
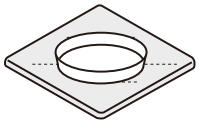
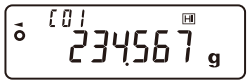
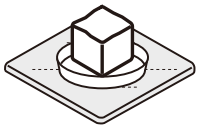
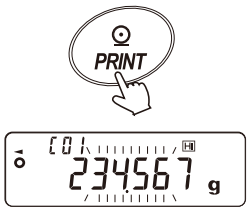
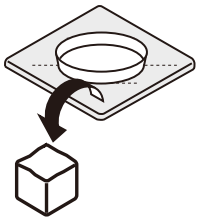
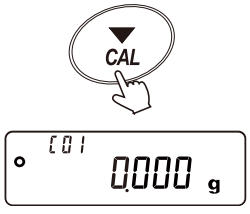
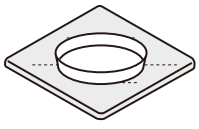
- **To change the upper limit value, use the "HI:" command. To change the lower limit value, use the "Lo:" command.**
  For details, refer to "22 Command "

Load registration mode

Load registration mode allows you to register the upper and lower limit values by placing sample weights corresponding to those limits on the weighing pan.

Note

- **If the CAL key is pressed during operation, the process returns to the state described in Step 1 of "11-3-2 How to Register Comparator Data"**
- **To enter Digital registration mode, press and hold the MODE key for approximately 2 seconds.**

Step	Description	Display and key operations	Weighing operation
1.	When entering load registration mode, the "HI" indicator lights up on the display, and the registered comparator number along with the current weight value is shown. The example on the right shows the display when [01 HI (upper limit) is selected and lit. (When the second upper limit is selected, the "HI" indicator blinks.)		
2.	If necessary, place a container on the weighing pan. Press the RE-ZERO key. Sets the displayed value to zero.		
3.	Place a sample corresponding to the upper limit value of the comparator on the weighing pan.		
4.	Press the PRINT key. The upper limit value of the comparator is stored in the data memory for [01.		
5.	Remove the sample from the weighing pan.		
6.	Press the CAL key. The balance returns to weighing mode.		

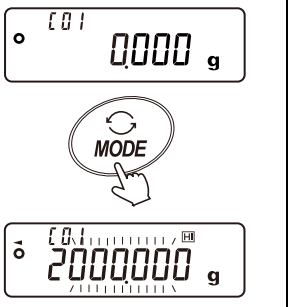
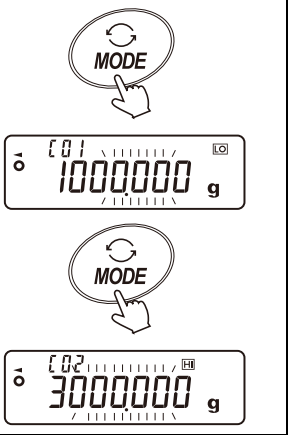
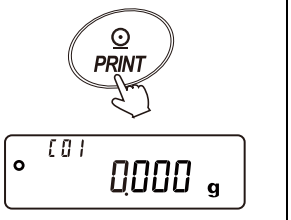
11-3-3 Simple Method for Recalling Comparator Upper and Lower Limit Values (Simple Selection Mode)

This function allows you to easily recall the upper and lower limit values of the comparator stored in the data memory.

With this operation, the stored limit values can be quickly retrieved and used immediately.

CAUTION

❑ **Ensure that "3" (Storing Comparator Settings) is set for the "dAtA" (Data memory) under dout in the function table ("9. Function Table").**

Step	Description	Display and key operations
1.	In the weighing display, press the MODE key to enter Simple Selection Mode for setting values. When entering Simple Selection Mode, the comparator upper limit value (blinking) and the comparator number are displayed. The displayed values correspond to the last selected settings.	
2.	Press the MODE key several times to select the value. Each time the key is pressed, the setting toggles in the following sequence: C01 HI (lit) ⇒ C01 LO (lit) ⇒ C02 HI (lit) ⇒C02 LO (lit) ⇒ ⋯ In the case of 5-step comparison, the sequence is as follows: C01 HI (blinking) ⇒ C01 HI (lit) ⇒ C01 LO (lit) ⇒ C01 LO (blinking) ⇒ C02 HI (blinking) ⇒ ⋯	
3.	When the desired setting value is displayed (for example, "C02" in the figure on the right), press the PRINT key to confirm the selection. The balance will then switch to weighing mode. You can perform weighing operations using the upper and lower limit values set in comparator mode "C02". **CAUTION** ❑ **Pressing the CAL key returns the display to weighing mode without cofirming any setting.**	

Note

❑ **The upper and lower limit values of the comparator can be read using the "CN:mm" command.**

mm ranges from 01 to 20, corresponding to C01 to C20.

❑ **The upper limit value can be output using the "?HI" command, and the lower limit value can be output using the "?LO" command.**

11-4 Storing tare values

- ❑ Up to 20 tare values used for weighing can be stored in memory.
- ❑ By reading the stored value, the weighing operation can be performed without registering the tare each time.
  The stored tare values can be easily recalled using the MODE key (Simple Selection Mode).
- ❑ Stored tare values can be recalled and modified.

Note

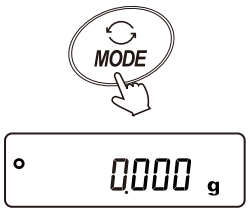
- ❑ **The recalled tare value can be modified using either Digital registration mode (entering the tare value digitally) or Load registration mode (placing the tare weight on the pan to register the tare value).**
- ❑ **During tare operation, the "NET" and "PT" indicators will light up.**

11-4-1 Preparations for the data memory function (tare value)

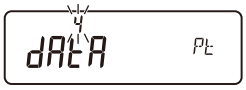
CAUTION

- ❑ **When the RE-ZERO key is pressed with nothing on the weighing pan, the display will reset to zero, and the "NET" and "PT" indicators will not be shown.**
- ❑ **The " t-- " symbol indicates that tare subtraction is not being performed using a tare value stored in the data memory.**
- ❑ **While using the data memory, unit selection with the MODE key is not available.**

Changing the weighing unit

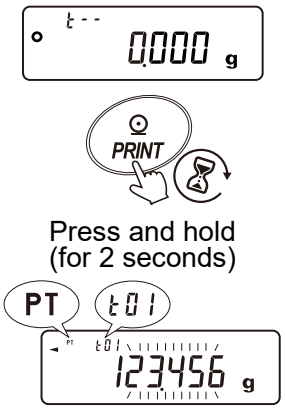
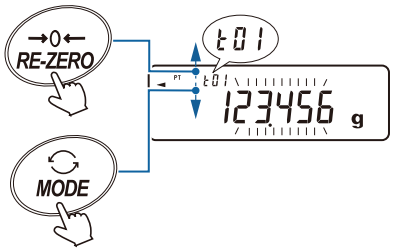
Step	Description	Display and key operations
1.	In weighing mode, press the MODE key to select the preset unit to be used for registration.	

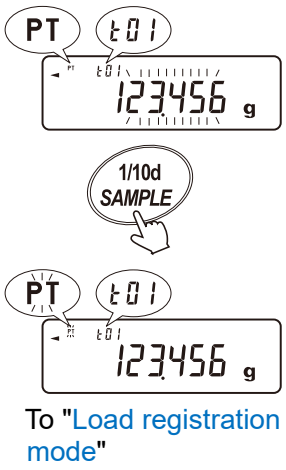
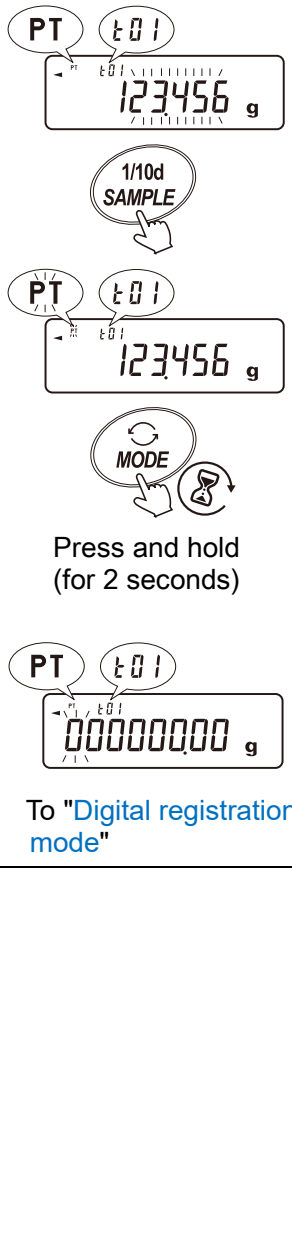
Enabling the data memory function (Changing the function table)

Step	Description	Display and key operations
2.	Refer to "Enabling the data memory function (Changing the function table) " and set "dAtA (Data Memory Function) " under dout in the function "9. Function Table" to " 4 (Tare Value Memory) ".	

11-4-2 How to Register Tare Value

To register a new tare value, select the desired tare value number (tare value data) and register it using either "Digital registration mode" or "Load registration mode". Tare value number: "t01" to "t02".

Step	Description	Display and key operations
1.	In weighing mode, press and hold the PRINT key (for 2 seconds) to enter confirmation mode. The tare value data (the tare value number and blinking display of tare value) is read. The latest value selected or registered is displayed.	
2.	Select the tare value number to use with the following keys. (You can change the setting from t01 to t20.) RE-ZERO key ·····Increases the tare value number by 1. MODE key ·····Decreases the tare value number by 1. By using the above key operations, the display cycles through the tare value numbers as follows: t01 ⇔ t02 ⇔ ··· ⇔ t20 ⇔ t01 ⇔ ···	

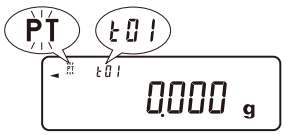
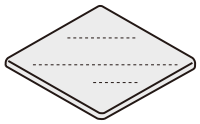
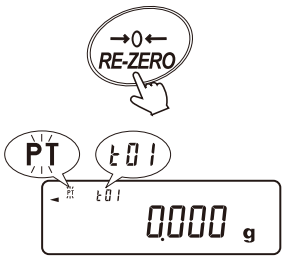
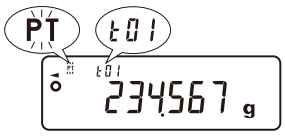
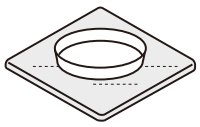
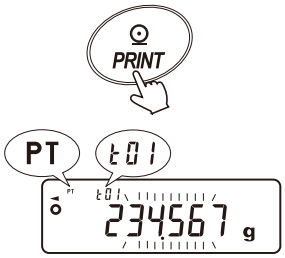
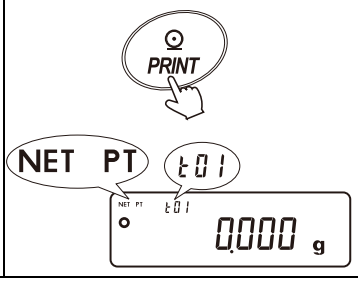
Step	Description	Display and key operations
3.	❑ To use "Load registration mode" for registration, press the SAMPLE key.	 To "Load registration mode"
	❑ To use the "Digital registration mode" for registration, press the SAMPLE key. Then, press and hold the MODE key to enter "Digital registration mode".	 Press and hold (for 2 seconds) To "Digital registration mode"

Load registration mode

Load registration mode is a mode in which the tare value is registered by placing the tare object on the weighing pan.

CAUTION

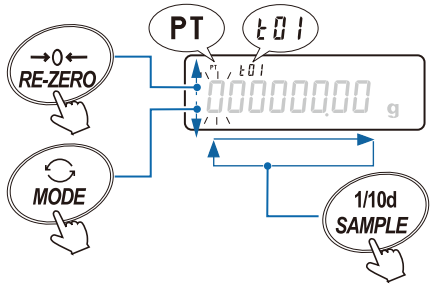
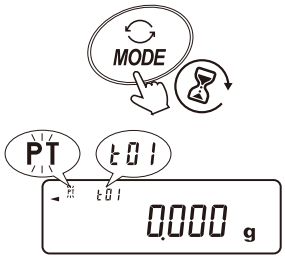
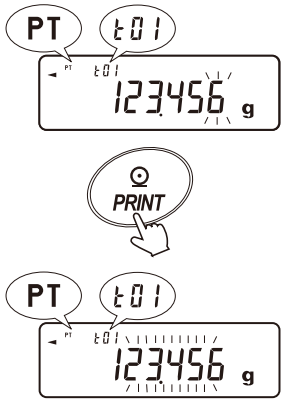
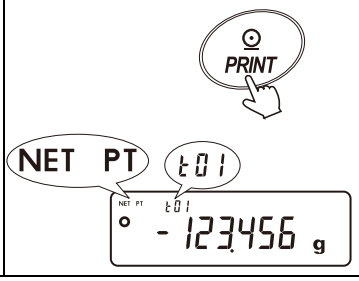
- **If the CAL key is pressed during operation, the process will return to Step 3 of "11-4-2 How to Register Comparator Data"**
  To switch to Digital Registration Mode, press and hold the [MODE] key.

Step	Description	Display and key operations	Weighing operation
1.	When entering Load Registration Mode, the "PT" indicator on the display will start blinking, and the tare value number along with the current weight value will be shown.		
2.	If necessary, press the [RE-ZERO] key to set the display to zero.		
3.	Place the tare weight on the weighing pan.		
4.	Press the [PRINT] key to store the tare value.		
5.	Press the [PRINT] key to return to weighing mode. The "NET" and "PT" indicators will light up to indicate that tare subtraction is being performed.		

Digital registration mode

Digital registration mode is a mode in which the tare value is entered digitally (as a numerical value). In Digital registration mode, the digit to change blinks.

Perform 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 setting value. (-)	
	Press and hold the MODE key (for 2 seconds). ·····Enters "Load registration mode".	 To "Load registration mode"
2.	Press the PRINT key to register (store) the tare value in data memory. (To cancel, press the CAL key.) Returns to the state described in Step 3 of "11-4-2 How to Register Comparator Data"	
3.	Press the PRINT key to return to weighing mode. The " NET " and " PT " indicators light up to indicate that tare subtraction is in progress.	

Note

- **The "PT: "command allows you to read the upper and lower limit values of the comparator.**
  (For details, refer to "22. Command")

11-4-3 How to Easily Recall the Tare Value (Simple Selection Mode)"

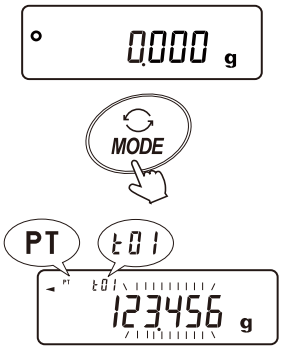
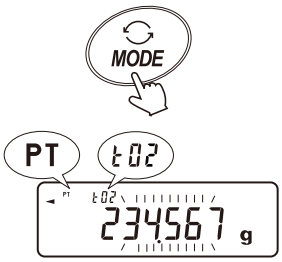
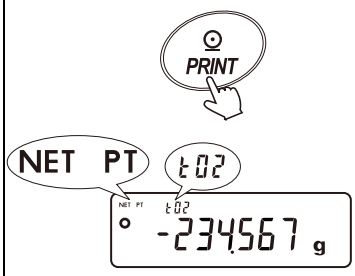
This procedure enables quick retrieval of the tare value stored in the data memory. Once recalled, the tare value can be immediately applied for weighing operations.

Note

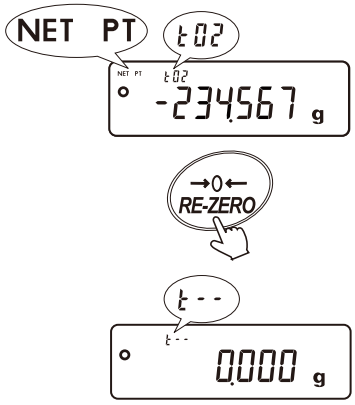
- ❑ **The tare value can be read using the "PN:mm" command. mm ranges from 01 to 20 and corresponds to "t01" to "t20".**

CAUTION

- ❑ **Ensure that "4" (Tare value memory) is set for the "dAtA" (Data memory) under dout (Data out) in the function table ("9. Function Table").**

Step	Description	Display and key operations
1.	Press the MODE key to enter the Simple Selection Mode for preset values." When entering Simple Selection Mode, the tare value (blinking), the "PT" indicator, and the tare value number (t01 to t20) are displayed. The latest value selected is displayed.	
2.	Press the MODE key to select the desired setting value. Each time the key is pressed, the setting value cycles as follows: t01 ⇒ t02 ⇒ t03 - ··· ⇒ t20 ⇒ t01.	
3.	When the desired setting value is displayed (e.g., t02 in the example on the right), press the PRINT key to confirm the selection. The balance will then switch to weighing mode using the selected setting. You can perform weighing using the tare value set in t02. **CAUTION** ❑ **Pressing the CAL key will cancel the selection and return the display to weighing display without applying any settings."**	

How to Cancel the Tare Value Data

Step	Description	Display and key operations
1.	To cancel the tare value data, remove any objects from the weighing pan and press the RE-ZERO key. The recalled tare value will be cleared.	

12. Statistical Calculation Mode

- The statistical calculation mode statistically calculates the weight data, and displays or outputs the results. To use the statistical calculation mode, set the "Application function (APF)" parameter of "AP Fnc (Application)" in " 9. Function Table" to "2", as described below. To return to the normal weighing mode (factory setting), set "Application mode (APF)" to "0".
- Statistical items available are number of data, sum, maximum, minimum, range (maximum-minimum), average, standard deviation and coefficient of variation. What statistical items to output can be selected from the four modes of "AP Fnc (Application)" in " 9. Function Table" to "AP Fnc"
- The wrong data input can be canceled by the key operation, if immediately after the input.
- Turning the balance off will delete the statistical data. (The ON/OFF key does not initialize the settings.)
- The standard deviation and coefficient of variation are obtained by the equation below:

$$\text{Standard deviation} = \sqrt{\frac{N\cdot\Sigma(X_i)^2-(\Sigma X_i)^2}{N\cdot(N-1)}}$$ where Xi is the i-th weight data, N is number of data.

$$\text{Coefficient of variation (CV)} = \frac{\text{Standard deviation}}{\text{Average}} \times 100\ (\%)$$

$$\text{Relative error of maximum value} = \frac{\text{Maximum value} - \text{Average}}{\text{Average}} \times 100\ (\%)$$

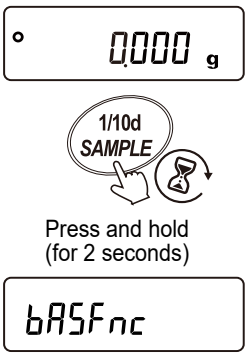
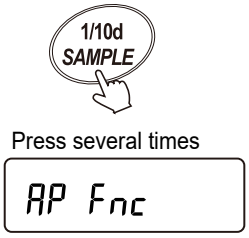
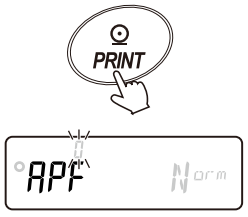
$$\text{Relative error of minimum value} = \frac{\text{Minimum value} - \text{Average}}{\text{Average}} \times 100\ (\%)$$

Note

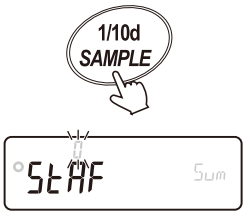
- **When there is data with a readability off, the calculation result is displayed with the readability off. (Readability is rounded off.)**
- **When the data memory function "dout dAtA" in = "1" to "4" in "9. Function Table" is in use, the statistical calculation function cannot be used.**
- **When registering the warning function of the minimum weight, the statistical calculation function cannot be used.**
- **When the density measurement is in use, the statistical calculation function cannot be used.**
- **If the total (SUM) is more than the digits, it will not be displayed correctly.**

12-1 Preparations for statistical calculation mode

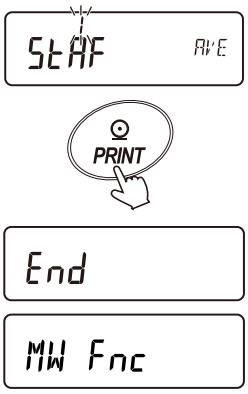
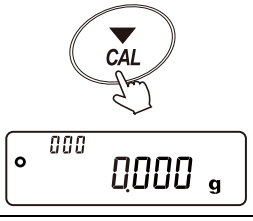
Enabling the statistical calculation mode (Changing the function table)
(Changing The Function Table)

Step	Description	Display and key operations
1.	Press and hold the SAMPLE key (for 2 seconds) until bASFnc of the "9. Function Table" is displayed, then release the key.	
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 several times to display APF = 2 .	
5.	To select the statistical items to output, proceed to Step 6 of "Selecting the statistical items to output." To save the current settings as they are, proceed to Step 8 of "Selecting the statistical Items to output." To disable the statistical calculation mode, press the RE-ZERO key several times until "APF = 0" is displayed.	

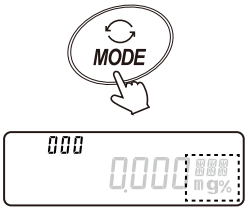
Selecting the statistical items to output

<table>
<tr><th>Step</th><th>Description</th><th>Display and key operations</th></tr>
<tr><td>6.</td><td>Press the [SAMPLE] key.</td><td> 
</td></tr>
<tr><td>7.</td><td>Press the [RE-ZERO] key to select the output items STAT.
In the example, output the number of data, sum, maximum, minimum, range (maximum-minimum) and average are selected.

<table>
<tr><th>Parameter
(STAT)</th><th>Description</th></tr>
<tr><td>■ 0</td><td>Number of data, sum</td></tr>
<tr><td>1</td><td>Number of data, sum
Maximum, minimum, range (maximum – minimum), average</td></tr>
<tr><td>2</td><td>Number of data, sum
Maximum, minimum, range (maximum – minimum), average, standard deviation, coefficient of variation</td></tr>
<tr><td>3</td><td>Number of data, sum
Maximum, minimum, range (maximum – minimum), average, standard deviation, coefficient of variation
Relative error of maximum value, relative error of minimum value</td></tr>
</table>
■ Factory setting</td><td> 

Press several times</td></tr>
<tr><td>8.</td><td>Press the [PRINT] key to store the setting.</td><td> 
</td></tr>
<tr><td>9.</td><td>Press the [CAL] key to return to the weighing mode.</td><td> 
</td></tr>
</table>

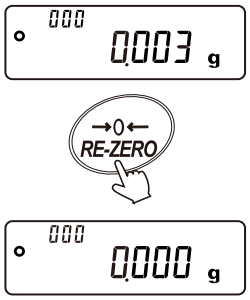
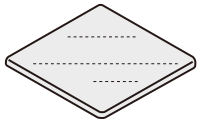
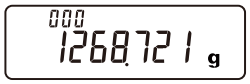
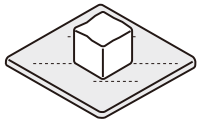
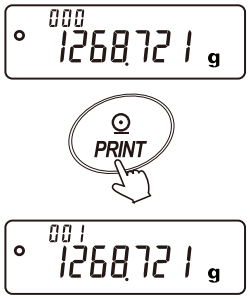
Selecting the unit

Step	Description	Display and key operations
10.	Press the MODE key to select the unit to be used for the statistical calculation mode. **Note** ❑ **Selecting the unit using the MODE key is not available after the data is entered. In this case, clear the data as described on page "Clearing the statistical data" and select the unit using the MODE key.** ❑ **When the unit used for the statistical calculation mode is to be enabled upon power-on, select the unit in "Unit" of "9. Function Table" beforehand.**	

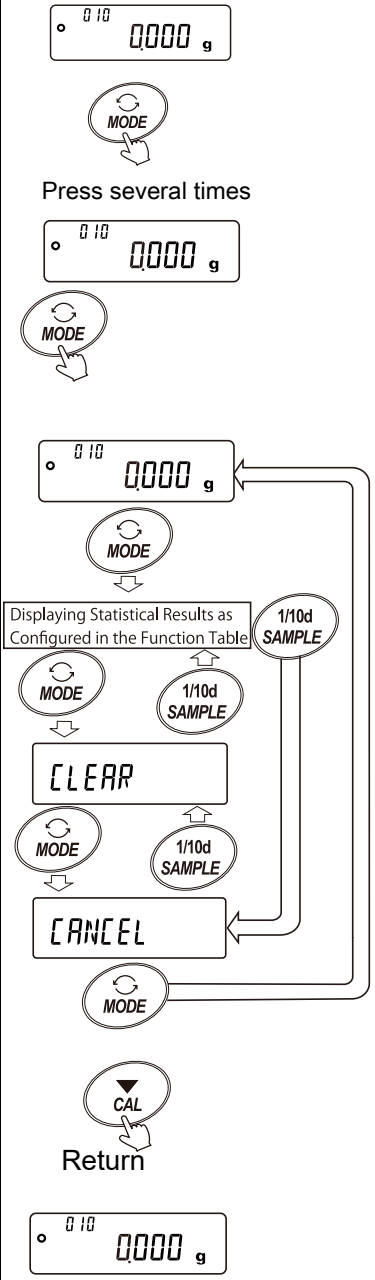
12-2 How to Use the Statistical Calculation Mode

In the statistical calculation mode, the data number of the measured value used for the calculation is shown in the upper left corner of the display.

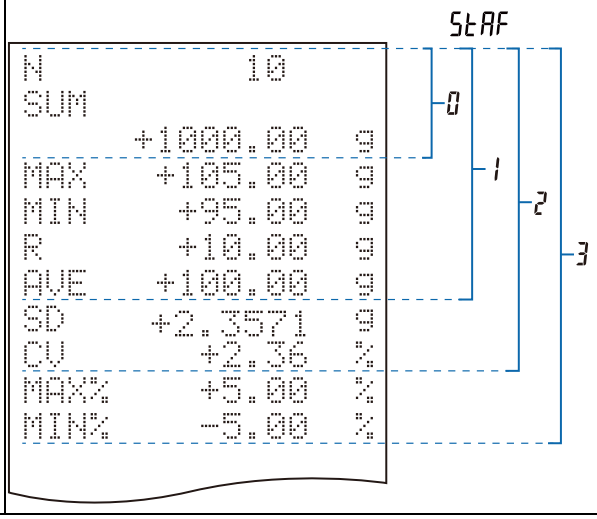
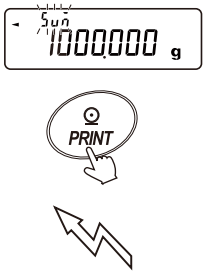
Sampling Procedure for Weighing Data

Step	Description	Display and key operations	Weighing operation
1.	Press the [RE-ZERO] key to set the display to zero.		
2.	Place the sample on the weighing pan.		
3.	Press the [PRINT] key to add the data displayed to statistical calculation. The number of data on the upper left of the display increases by 1.		
4.	Repeat steps 1 to 3 for each weighing.		

"Display and Output of Statistical Results (When Number of Data is 1 or more.)

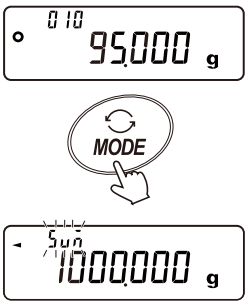
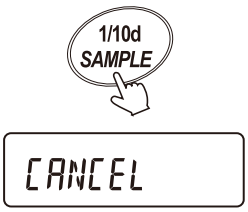
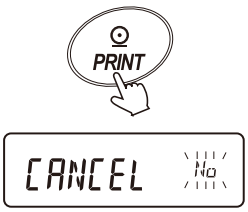
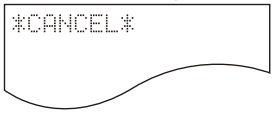
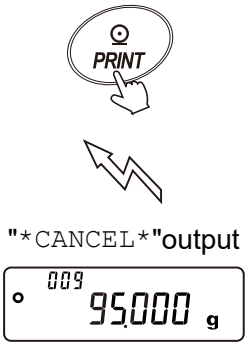
Step	Description	Display and key operations
1.	Each time the MODE key is pressed, the display changes: the results as selected in "Statistical function mode output item (StAF)", and CLEAR, CANCEL. When pressing the SAMPLE key, the previous item is displayed. ❑ **When the number of data is 1, the coefficient of variation and relative error is displayed as** ---------- %. ❑ **When the average is 0, the coefficient of variation and relative error is displayed as** ---------- %. **Statistical items are indicated on the upper left of the display using the following symbols.**	

Symbol	Statistical item	Function table parameter (StAF)			
Sum	Sum	0	1	2	3
nAH	Maximum				
n in	Minimum				
r	Range (Maximum – minimum)				
AvE	Average				
Sd	Standard deviation				
Cv	Coefficient of variation				
nAH%	Relative error of maximum value				
n in%	Relative error of minimum value				

Step	Description	Display and key operations
2.	When pressing the [PRINT] key while displaying the statistical result, the statistical result is output. Output example（Dump print mode of AD-8219TH）  	 Output of Statistical Results

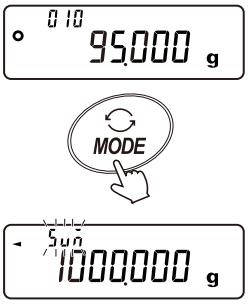
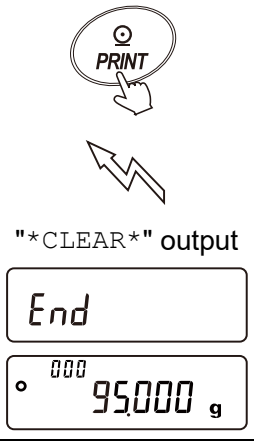
Deleting the latest data

When the wrong data is entered, it can be deleted and excluded from statistical calculation. Only the latest data can be deleted.

Step	Description	Display and key operations
1.	In the weighing mode, press the [MODE] key. The statistical calculation results are displayed.	
2.	Press the [PRINT] key to display [CANCEL]. Displays the option to delete the most recent data.	
3.	Press the [PRINT] key. Displays whether or not to dlete the latest data.	
4.	Press the [RE-ZERO] key. Switches between "No" and "Go" options.	
5.	Press the [PRINT] key while "Go" is blinking. The latest data entry is excluded from the statistical processing, reducing the total number of data entries displayed. The balance outputs a message indicating that the most recent data has been deleted. Output example (AD-8129TH, dump print mode) 	

Clearing the statistical data

All the statistical data will be deleted and the number of data will be 0 (zero).

Step	Description	Display and key operations
1.	In the weighing mode, press the [MODE] key several times. Displays the statistical data.	
2.	Press the [SAMPLE] key twice. Displays the option to clear statistical data.	
3.	Press the [PRINT] key. Displays whether the statistical data has been cleared.	
4.	Press the [RE-ZERO] key to switch No / Go .	
5.	Press the [PRINT] key while "Go" is blinking. The latest data is excluded from the statistical calculation, and the number of data in weighing mode is reduced by one. A message indicating the deletion of the latest data is output from the balance. Output example (AD-8129TH, dump print mode) *CLEAR*	

13. Gross Net Tare Function

Zero setting and taring can be operated separately, and data output for Gross (total amount), Net (net amount), Tare (tare quantity) becomes possible.
When the gross net tare function is selected, the key operation is changed as follows.

Key	Operation
ON:OFF key	Zero setting (Operate as the ZERO key)
RE-ZERO key	Tare (Operate as the TARE key)

13-1 Preparation of Gross Net Tare Function

To use the gross net tare function, set "4" (gross net tare mode) for "APF" (application function mode) under "AP Fnc" (application) in the function table ("9.Function Table").

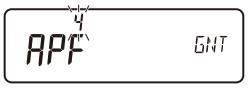
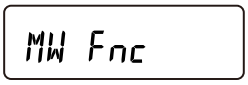
To return to the standard weighing mode (factory default setting), set " AP Fnc (Application Mode) " in the function table ("9.Function Table") to " 0 (Standard Weighing Mode). "

CAUTION

❑ **Cannot be used in conjunction with the minimum weight warning function.**

Switching to gross/net/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 function table menu ("9.Function Table").	0.000 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 AP Fnc
3.	Press the PRINT key to display "APF" (application function mode).	 APF Norm

Step	Description	Display and key operations
4.	Press the [RE-ZERO] key several times until the display shown to the right appears.	 Press several times 
5.	Press the [PRINT] key to store the setting.	 
6.	The next class in the function table is displayed. 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
I/⏻ ON:OFF	Zero setting (ZERO)	Within the zero range *1	Updates the zero point and clears the tare value.
		Exceeding the zero range *1	The zero point will not be updated. The tare (container weight) will also not be cleared.
→0/T← RE-ZERO	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.

*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.)

CAUTION

❑ To turn off the balance display while "APF (Application Function)" under [AP Fnc] (" Application") in the function table (" 9.Function Table") is set to " 4 Gross/Net/Tare Mode," press and hold the [ON:OFF] key for approximately 2 seconds.

❑ Display

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	o	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.

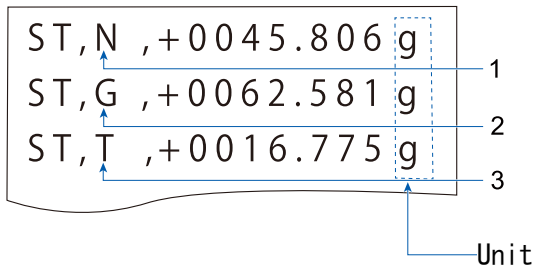
The supported weighing data formats are as follows.

Weighing data formats for the gross/net/tare function

Function table S1F (Serial interface)	Function table USb (USB interface) *1	Weighing data format
tYPE = 0	U-tP = 0, 1	A&D standard format
tYPE = 1		DP format
tYPE = 5	U-tP = 2	CSV format

*1 This section explains the weighing data format settings for Virtual COM mode. When outputting in Quick USB mode, the weighing data format is set to NU2 format.

Output example(A&D standard format)

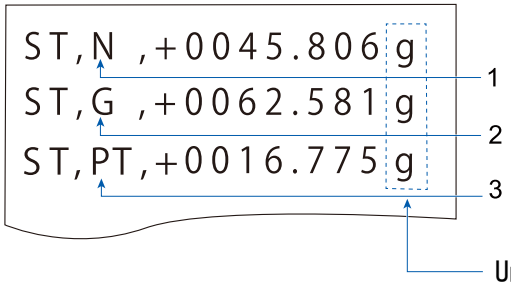


1. Net weight
2. Gross weight
3. Tare weight

Unit

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

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



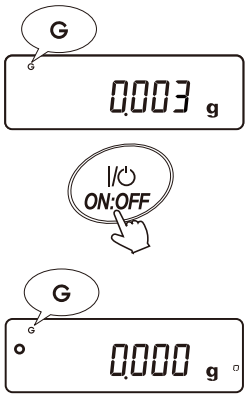
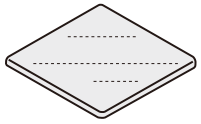
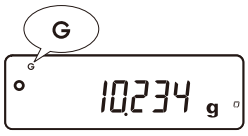
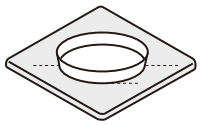
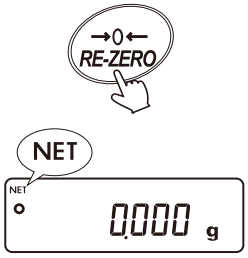
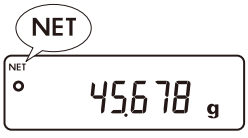
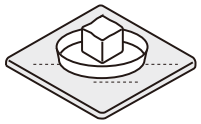
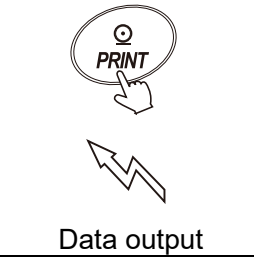
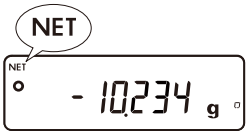
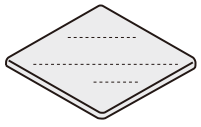
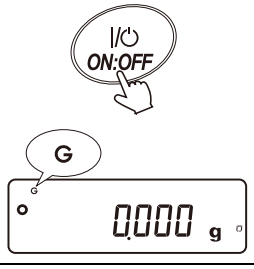
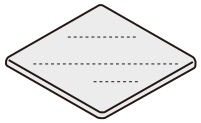
1. Net weight
2. Gross weight
3. Preset tare weight

Note

❑ **The output content and order can be configured using the UFC function.**
For the UFC function, refer to "23. 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. Gross Net Tare Function" to enable the gross/net/tare function.		
2.	Press the ON:OFF (ZERO) key with nothing on the weighing pan.		
3.	Place an empty container to be used on the weighing pan.		
4.	Press the TARE key to display "NET". The tare value is set (updated).		
5.	Place the sample to be weighed.		
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.		
8.	Press the ON:OFF (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

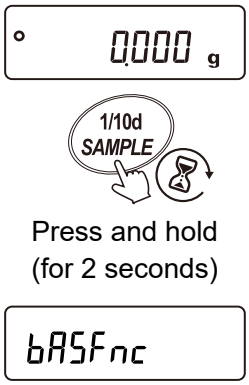
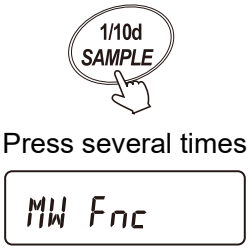
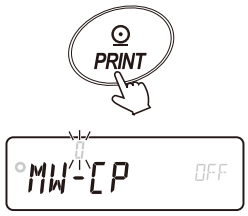
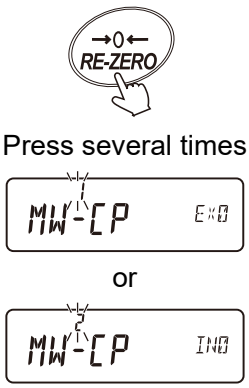
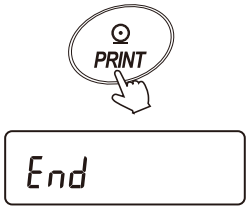
- Minimum weight is the minimum sample weight required to perform correct quantitative analysis taking the measurement error of the balance used into account. If the sample amount is too small, the proportion of measurement error in the measured value increases, and the reliability of the analysis result 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 used when the unit mode is "**g**" or "**kg**".
- 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 g.
  When the setting value is 0 g, 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 ("9.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)
  "2" (Enables comparison including near zero)
  Near zero is within ±10 d of 0 g.

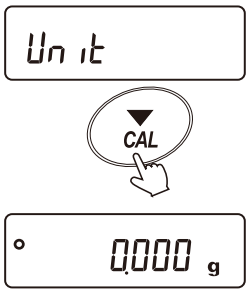
CAUTION

- **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.**
  Therefore, unit conversion using the MODE key is no longer possible.
  (The previously used unit remains fixed.)
- **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).**
- **The minimum weight alert function cannot be used with statistical calculation mode and data memory function.**

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 function table menu ("9.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. When UNIT is displayed, press the CAL key to return to the weighing display.	

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.	

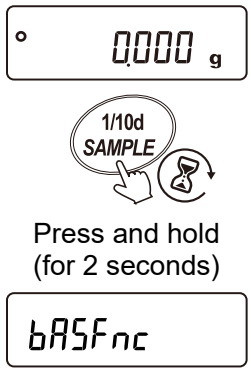
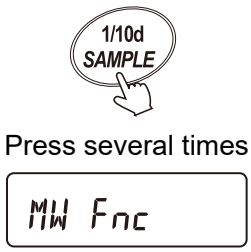
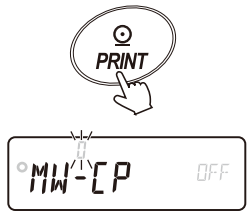
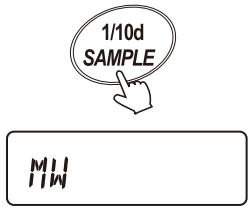
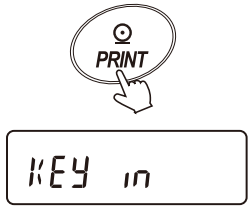
14-2 Inputting and outputting minimum weight

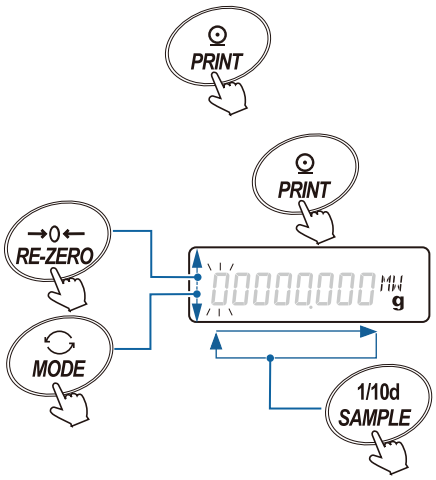
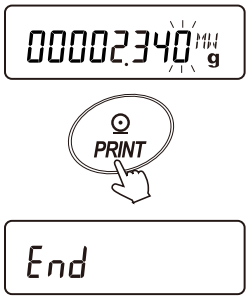
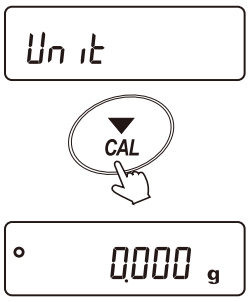
14-2-1 Inputting minimum weight

Use the following methods to set a minimum weight:

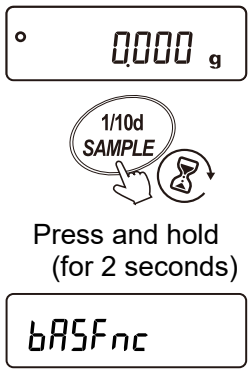
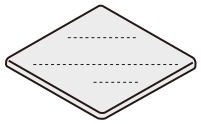
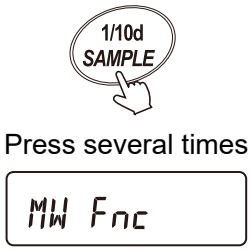
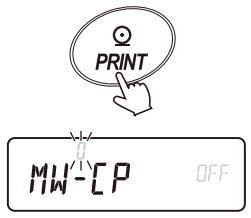
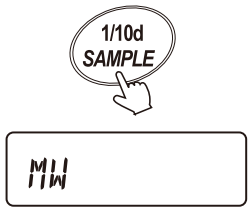
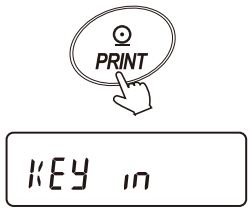
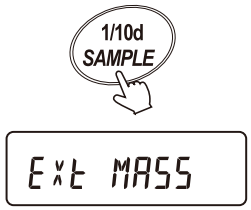
- ❑ Direct key input
- ❑ Input using repeatability obtained from 10 measurements with an external weight

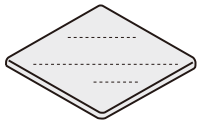
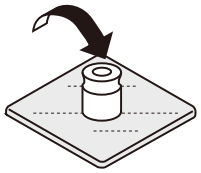
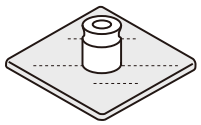
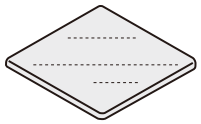
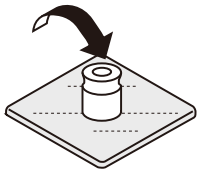
Direct key input (Entering minimum weight directly)

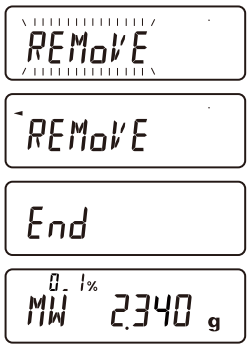
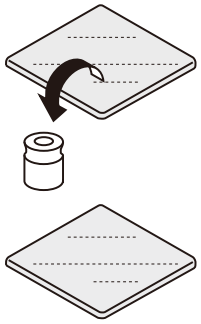
Step	Description	Display and key operations
1.	In weighing mode, press and hold the SAMPLE key (for 2 seconds) to display the function table menu ("9.Function Table").	
2.	Press the SAMPLE key several times until the display shown to the right appears.	
3.	Press the PRINT key to display "MW-CP" (Minimum 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 digits 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 function table menu ("9.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.		
6.	Press the SAMPLE key several times until the display shown to the right appears.		

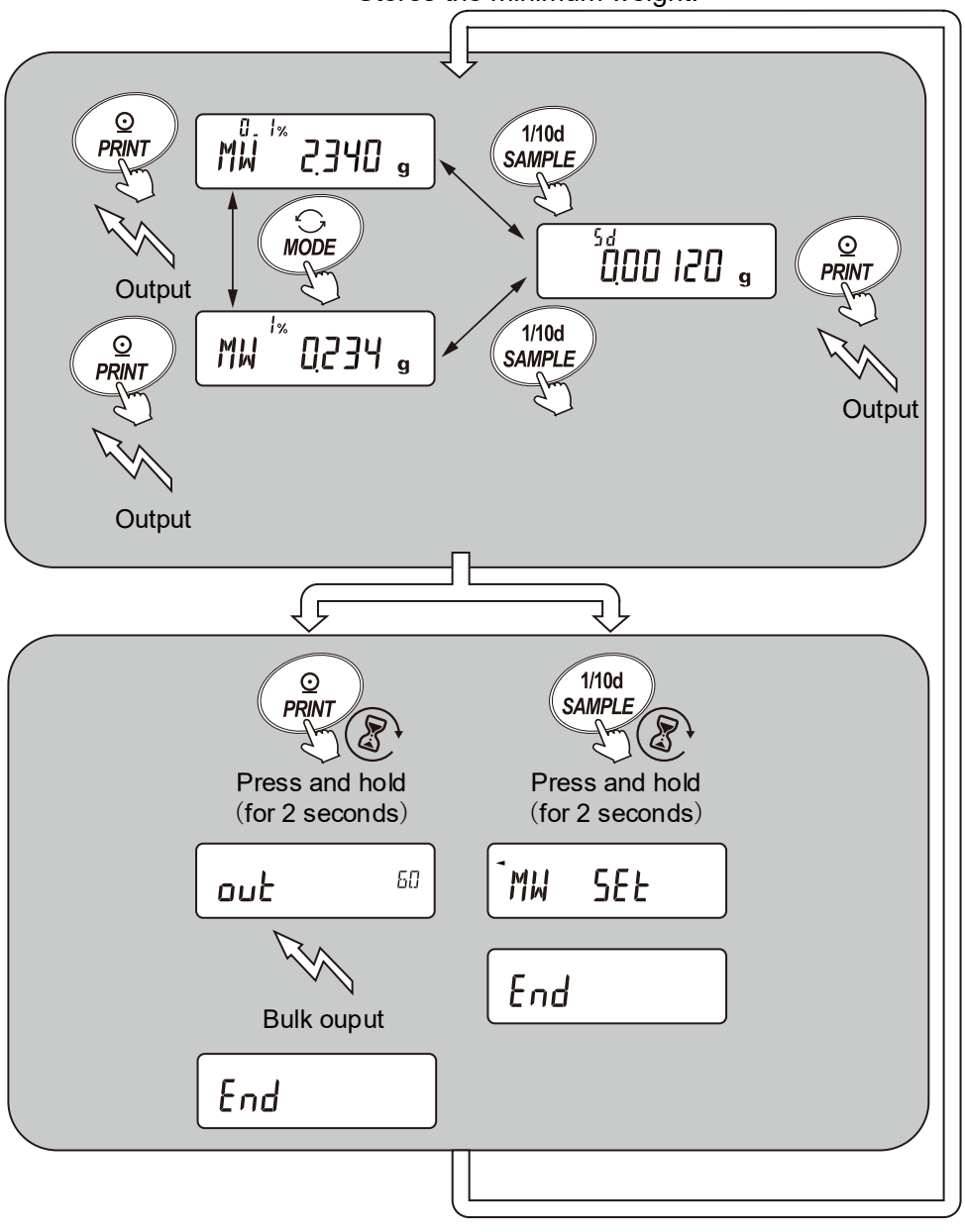
Step	Description	Display and key operations	Weighing operation
7.	Press the PRINT key. The display transitions as shown to the right.	   	
8.	When the display shown on the right appears, place the weight on the weighing pan.		
9.	With the weight placed, the balance displays "◄ " (the processing indicator).	 	
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).	 	
13.	Each time the display requests the next load, repeat steps 8 to 12 until you have completed 10 cycles. From this point onward, repeat the weighing process from steps 8 to 12 up to the 10th time.	 . . .  Repeat steps 8 to 12.	

Step	Description	Display and key operations	Weighing operation
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. ・ Outputs the measurement results in bulk. (Step 15) ・ Set the minimum weight calculated from the measurement results. (Step 16)		
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 for minimum weighing value when repeatability with an external weight is used."	 Press and hold (for 2 seconds) out 60  Bulk output End	

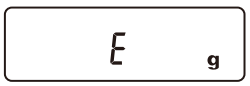
Key operations when measurement results are displayed

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

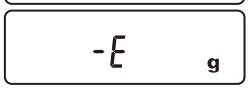
Description
The following key operations are available: SAMPLE key ····· Switches the display between "MW" (Minimum weight) and "SD" (Repeatability). MODE key ····· Switches between 0.1% and 1% (measurement tolerance) while displaying "MW" (minimum weight). PRINT key ····· Outputs the data being displayed. (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 display



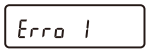
Load exceeding the capacity is applied.



Not enough load is applied.

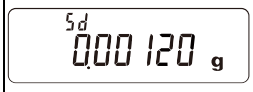
The balance resumes repeatability measurement once the error is resolved in either case.

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

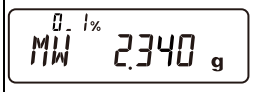
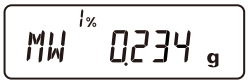


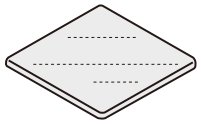
After this error is displayed, the balance forcibly ends the repeatability measurement and returns to function table mode.

Example of repeatability output

Description
Display    Output SD␣␣␣+0.00120␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah

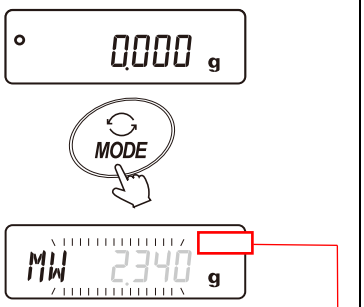
Example of minimum weight (reference) output

Description
Display    or    Output MW␣␣␣␣+2.340␣␣g<TERM> MW␣␣␣␣+0.234␣␣g<TERM> ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah

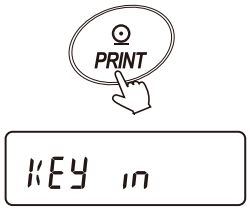
Step	Description	Display and key operations	Weighing operation
16.	Press and hold the SAMPLE key (for 2 seconds) to set the minimum weight. Note that if "MW-CP" is set to "0" (No comparison), the parameter is automatically changed to "1" (Excluding near zero), and the minimum weight comparison function is enabled. MW-CP01	 Press and hold (for 2 seconds) MW SEt End MW 2.340 g	
17.	Press the CAL key to complete the process.	 Unit	
18.	Press the CAL key to return to weighing mode.	 0.000 g	

14-2-2 Checking and changing the minimum weight

Checking minimum weight

Step	Description	Display and key operations
1.	In weighing mode, press the MODE key. The current minimum weight is displayed.	

Changing minimum weight

Step	Description	Display and key operations
1.	Press the PRINT key to show the display shown to the right.	
2.	To enter the minimum weight using key input, refer to step 6 and onwards of "14-2-1 Inputting minimum weight". 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".	

Display the setting history above the unit indication.

KEY Enter the setting value.

EXt Enter the setting value based on the repeatability of external weight

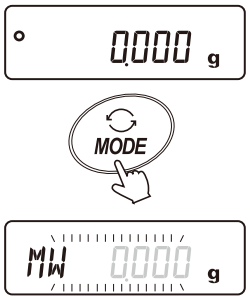
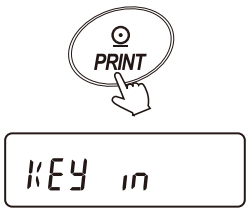
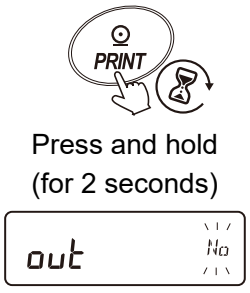
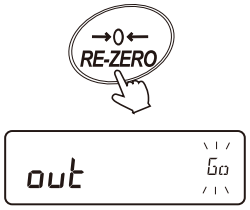
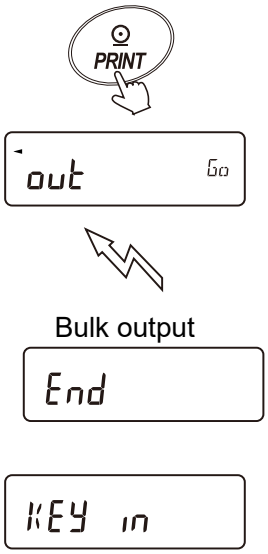
ECL Enter via ECL (Press and hold the MODE key).

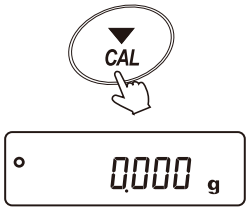
Refer to "6-2 Self-Check-Function / Automatic Setting of Minimum Weight"

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 / 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

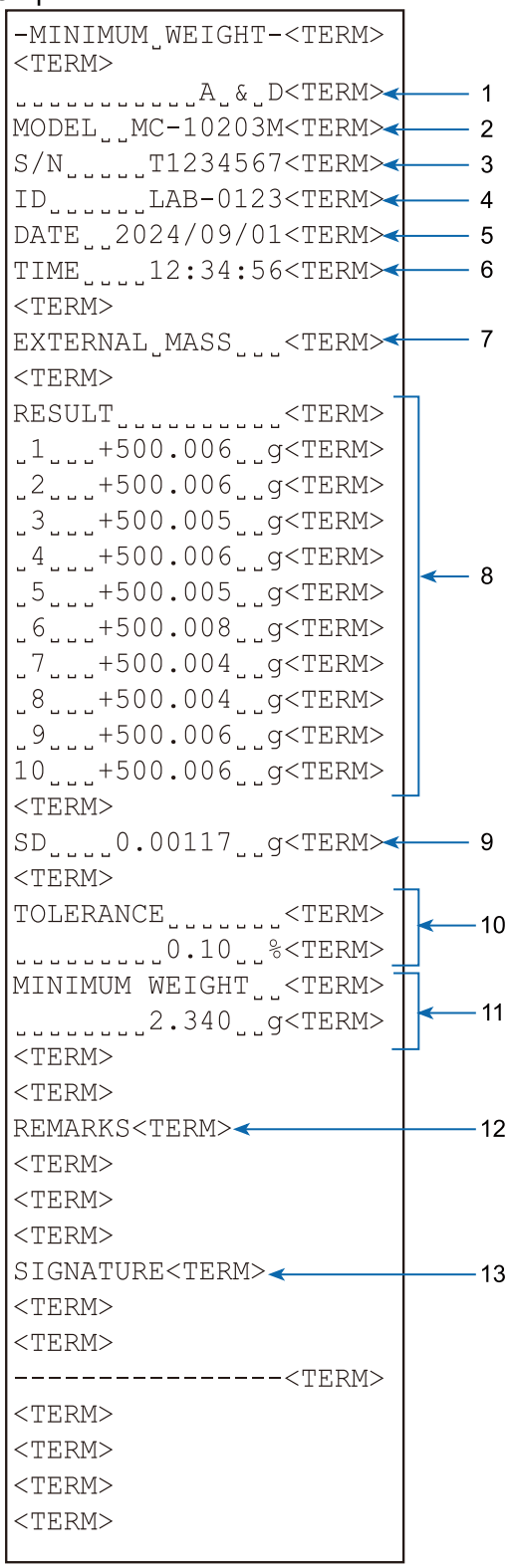
```
-MINIMUM␣WEIGHT-<TERM>
<TERM>
␣␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>          1
MODEL␣␣MC-10203A<TERM>            2
S/N␣␣␣␣␣T1234567<TERM>            3
ID␣␣␣␣␣␣LAB-0123<TERM>            4
DATE␣␣2024/09/01<TERM>            5
TIME␣␣␣␣12:34:56TERM>             6
<TERM>
KEY␣INPUT␣␣␣␣␣␣␣<TERM>           7
<TERM>
MINIMUM␣WEIGHT␣␣<TERM>
␣␣␣␣␣␣␣␣2.340␣␣g<TERM>           8
<TERM>
<TERM>
REMARKS<TERM>                     9
<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>                   10
<TERM>
<TERM>
----------------<TERM>
<TERM>
<TERM>
<TERM>
<TERM>
```

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 for minimum weighing value when repeatability with an external weight is used.

Output



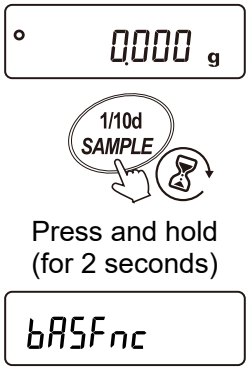
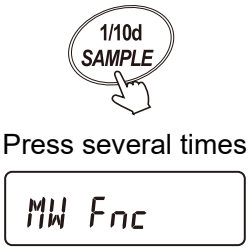
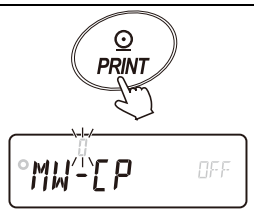
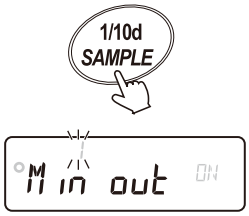
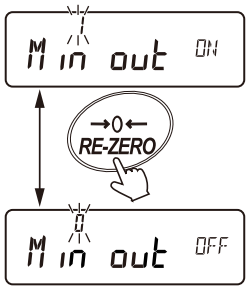
1 Manufacturer
2 Model
3 Serial number
4 ID number
5 Date
6 Time
7 Measurement method (External weight)
8 Weighing results
9 Repeatability
10 measurement tolerance
11 Minimum weight (reference)
12 Remarks
13 Signature

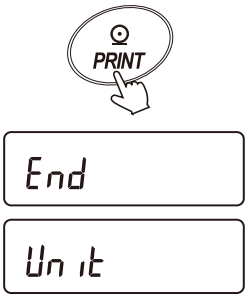
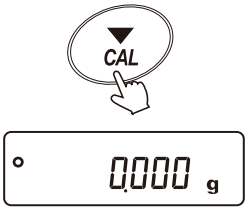
␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah

14-3 Data output when minimum weight is not reached.

In the function table ("9.Function Table") , the "MW Fnc" (Minimum Weight Warning Function) allows you to toggle data output on/off when below the minimum weighing value through the "Min out" (Data output when minimum weight is not reached) setting.

Setting method

Step	Description	Display and key operations
1.	In weighing mode, press and hold the SAMPLE key (for 2 seconds) to display the function table menu ("9.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 until "Min out" (Data output when minimum weight is not reached) is displayed.	
5.	Press the RE-ZERO key to select "1" (data output ON) or "0" (data output OFF).	

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. Password Function

By using the password function, it is possible to limit the usage 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.

The password is set with four keys [MODE], [SAMPLE], [PRINT] and [RE-ZERO] keys in four digits (4 x 4 x 4 x 4 = 256 outcomes).
At factory setting, the password function is disabled. Enabling/disabling the password function and registering the password are performed in the 9.Function Table. Three types of settings are possible depending on the "LocK" setting of the Function Table "Password ([PASSwd])".

Parameter	Function
LocK = 0	No password function
LocK = 1	Request password input at the start of weighing
LocK = 2	To change the setting, login is required with the administrator's password.

LocK = 0 No password function

- ❑ The password function is not used.
- ❑ The balance can be used for weighing operations by anyone.
- ❑ All functions can be used.
- ❑ Setting changes are also possible.

LocK = 1 Request password input at the start of weighing

- ❑ An administrator (ADMIN) can limit the users of the balance by setting individual passwords. The factory default administrator password ("ADMIN") is input by pressing the [RE-ZERO] key four times ("2222").
- ❑ The password input is required at the start of weighing with the [ON:OFF] key.
- ❑ The balance cannot be in weighing state unless you enter the correct password.正
- ❑ There are two login levels: Administrator (ADMIN) and user (USER 01 to USER 10).

Login level	Description
Administrator (ADMIN)	All functions and settings can be used.
	Passwords for 10 users can be set individually.
User (USER 01 to USER 10)	Initialization and setting changes are restricted (including clock). Restrictions apply to initialization and password functions.
No password	The balance cannot be used.

LocK = 2 To change the setting, login is required with the administrator's password.

❑ Anyone can perform weighing work, and initialization and setting changes can be restricted (including clock).
(Password input is not requested when weighing starts with the ON/OFF key.)

❑ here are two levels of login level: Administrator (ADMIN) and user (GUEST)

Login level	Description
Administrator （ ADMIN ）	All functions and settings can be used.
	Passwords for 10 users can be set individually.
Guest （ GUEST ） No password *1	Initialization and setting changes are restricted (including clock).

*1 When weighing is started with the ON:OFF key while pressing the CAL key when the display is off, the password of the administrator ("ADMIN") is requested.

Usage availability by login level

Login level	Weighing		
	Password input at weighing start	Sensitivity adjustment	Change the function setting *2
Administrator (ADMIN)	Necessary	Possible	Possible
User (USER 01 to USER 10)		Possible or Impossible *3	Impossible
Guest (GUEST)	Unnecessary		

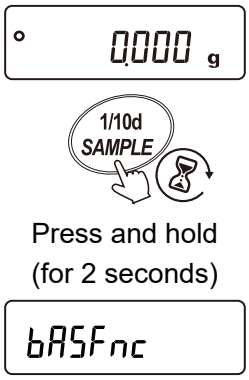
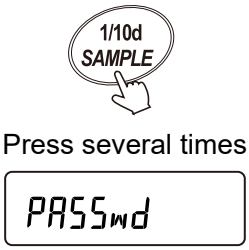
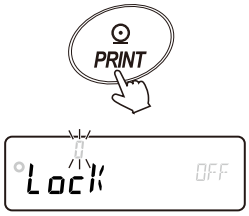
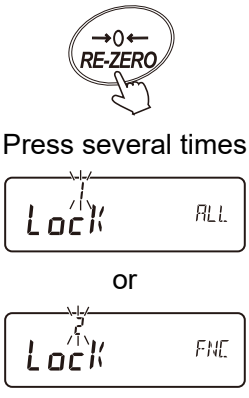
*2 Changing response characteristics, function selection, and initialization in the function table ("9.Function Table") (time and date settings, etc.).

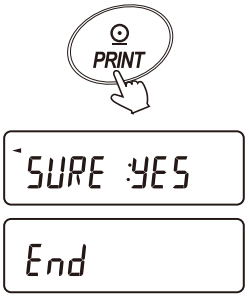
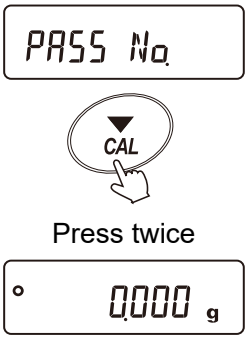
*3 Normally, usage is allowed, but the administrator ("ADMIN") can restrict access for users (USER 01 to USER 10) and guests ("GUEST") by setting to inhibit usage ("8-1 Permit or Inhibit").

15-1. Preparing the Password Function

By the password function (PASSwd) of the "9.Function Table", the password function can be switched between "Invalid (LocK = 0) /Valid (LocK = 1 or 2) ".

Enable the password function (Changing the function table)

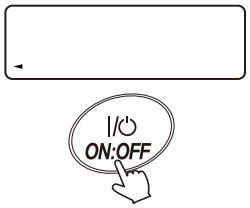
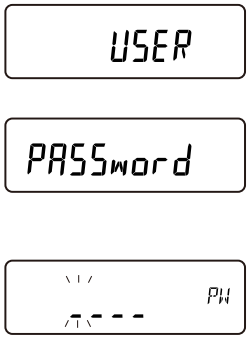
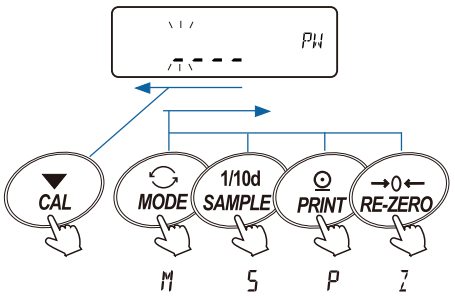
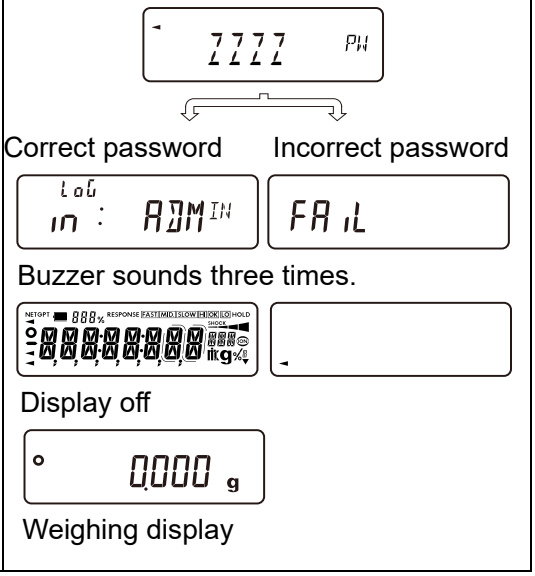
Step	Description	Display and key operations
1.	In weighing mode, press and hold the SAMPLE key (for 2 seconds) to display the function table menu ("9.Function Table").	
2.	Press the SAMPLE key several times until the display shown to the right appears.	
3.	Press the PRINT key to display LocK OFF. (To cancel, press the CAL key.)	
4.	Press the RE-ZERO key to display "1" (ON: Limit weighing operation) or "2" (ON: Basic weighing is possible).	
5.	Press the PRINT key to show the display shown to the right. (No blinks when "No" is selected.)	

Step	Description	Display and key operations
6.	Press the [RE-ZERO] key to switch between YES / No and set YES to blink.	
7.	Press the [PRINT] key while "YES" is blinking to enable the password function.	
8.	The display shown on 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 "5" on the "15-4. Registering Password (Changing)".	

15-2 How to Input the Password at the Start of Weighing

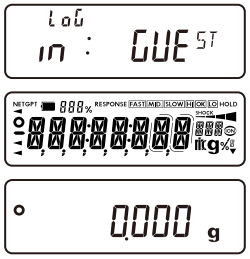
When logging in as an administrator (" ADMIN ") or a user (" USER 01 " to " USER 10 ")

When "LocK" (Lock Function) under [PASSwd] " (Password) in the function ("9.Function Table") is set to LocK " 1 " (ON: Limit weighing operation), password entry is required at the start of weighing.

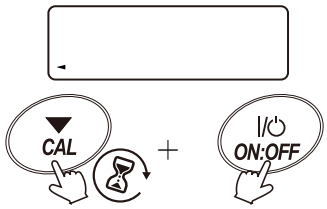
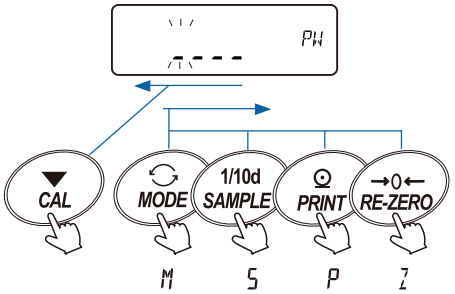
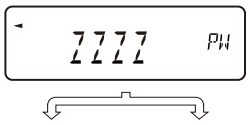
Step	Description	Display and key operations
1.	With the display turned off, press the [ON:OFF] key.	
2.	The display will prompt for password entry.	
3.	Enter a 4-digit password using the following keys. Note that the display will automatically turn off after 10 minutes of inactivity. [MODE] key····· M Input [SAMPLE] key····· S Input [PRINT] key····· P Input [RE-ZERO] key ···· Z 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 password at the factory default setting has been set to "ZZZZ" (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.	

When logging in as a guest ("GUEST")

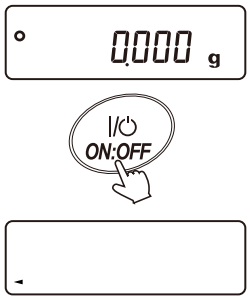
When "Lock" (Lock Function) under " PASSwd " (Password) in the function ("9.Function Table") is set to Lock "2" (ON: Basic weighing is possible), password entry is not required at the start of weighing.

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.	

When logging in as an administrator (" ADMIN ").

Step	Description	Display and key operations
1.	With the display turned off, press and hold the [MODE] 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 [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 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

15-3 Logging out

Step	Description	Display and key operations
1.	Pressing the ON:OFF key turns off the display and logs out the user. When LocK = 1, a password must be entered again when transitioning from the display-off state to the weighing display.	

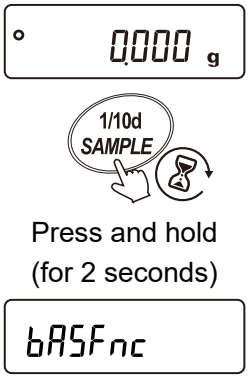
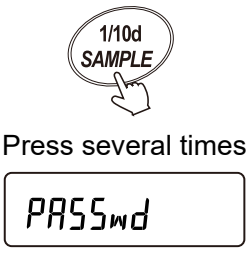
15-4 Registering (changing) the password

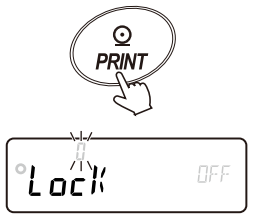
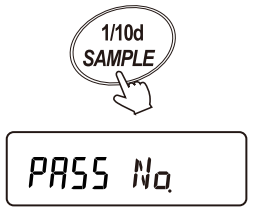
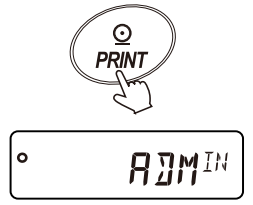
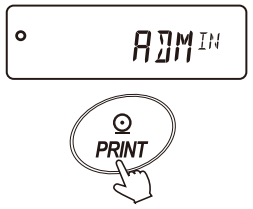
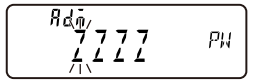
In the "9.Function Table," the "PASSwd" (Password) section allows password registration or modification through "PASS No." (Password Registration).

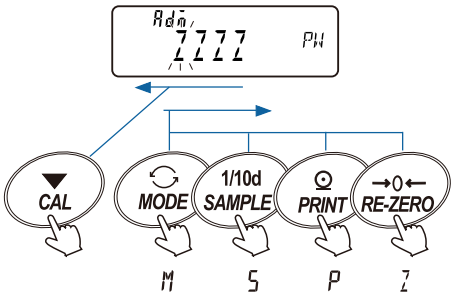
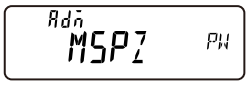
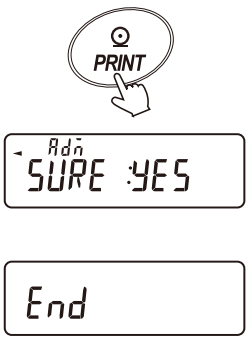
CAUTION

- ❑ **Pressing the ON:OFF key turns off the display and logs out the user.**
- ❑ **When LocK = 2, logging in as an administrator ("ADMIN") requires entering the administrator password. However, password registration for users ("USER 01" to "USER 10") is not required.**
- ❑ **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 a password, refer to "15-5 How to Delete a Password (For Users Only)."**

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 function table menu ("9.Function Table").	
2.	Press the SAMPLE key several times until the display shown to the right appears.	

Step	Description	Display and key operations
3.	Press the [PRINT] key to display the "LocK" (Lock Function) option.	
4.	Press the [SAMPLE] key.	
5.	Press the PRINT key to display the login level ("[ADMIN]").	
6.	Press the [SAMPLE] key to display the login level you want to change. In this example, "ADMIN" (Administrator) is displayed. ADMIN When a password is registered for the login level, "**O**" (the stability indicator) will be displayed. The password can be changed.	
7.	With the desired login type displayed, press the [PRINT] key. This example explains how to change the password for the Administrator (ADMIN).	
8.	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.)	

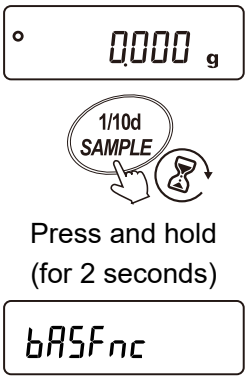
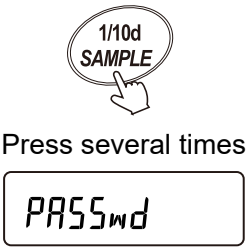
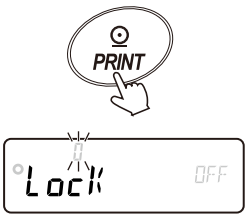
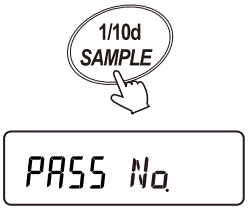
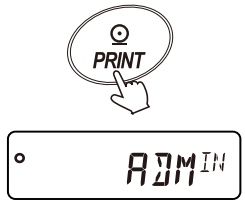
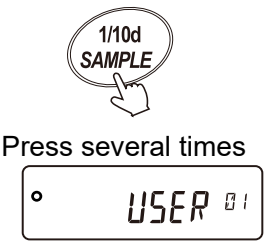
Step	Description	Display and key operations
9.	Enter a 4-digit password using the following keys. Note that the display will automatically turn off after 10 minutes of inactivity. [MODE] key ····· M Input [SAMPLE] key ····· S Input [PRINT] key····· P Input [RE-ZERO] key····· Z Input [CAL] key····· Back key 10 minutes of inactivity Display off	
10.	After entering the four digits with the keys, the new password will be displayed.	
11.	Use the [RE-ZERO] key to toggle between "YES" and "No". Set "YES" to blink.	
12.	Press the [PRINT] key while "YES" is blinking to register the password.	
13.	Once settings configuration is complete, the next login level will be displayed. To continue the configuration, follow the steps from Step 6.	
14.	To exit the setting mode and return to weighing mode, press the [CAL] key three times.	

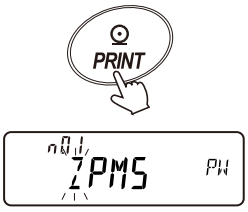
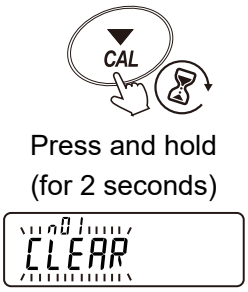
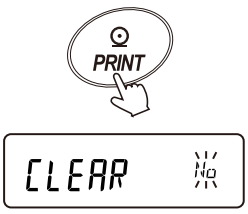
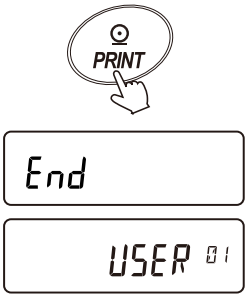
15-5 How to Delete a Password (For Users Only).

CAUTION

- **The administrator ("ADMIN") password cannot be deleted. Refer to "15-4 Registering (changing) the password" to change it to a password of your choice.**

Deleting method

Step	Description	Display and key operations
1.	In weighing mode, press and hold the [SAMPLE] key (for 2 seconds) to display the function table menu ("9.Function Table")	
2.	Press the [SAMPLE] key several times until the display shown on the right appears.	
3.	Press the [PRINT] key to display the "Lock" (Lock Function) option.	
4.	Press the [SAMPLE] key to show the display shown to the right.	
5.	Press the [PRINT] key to display the login level ("ADMIN").	
6.	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.	

Step	Description	Display and key operations
7.	Press the [PRINT] key. The current password is displayed.	
8.	Press and hold the [CAL] key (for 2 seconds) until the display shown to the right is displayed.	
9.	Press the [PRINT] key to show the display shown to the right.	
10.	Use the [RE-ZERO] key to switch between "Go / No".	
11.	Press the [PRINT] key while "Go" is blinking to delete the password.	

15-6 Forgot Password

If the correct password has been forgotten, the balance cannot be used.

Password reset must be done at the manufacturer. Please request repair.

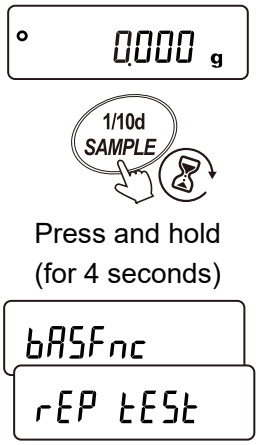
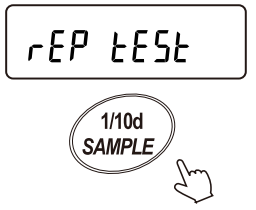
16. Repeatability Check Function

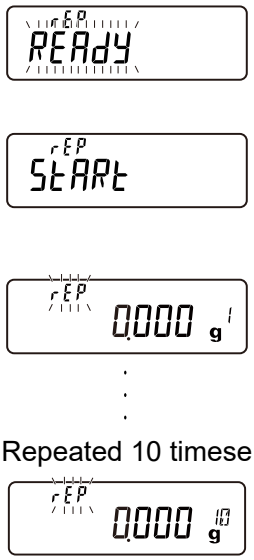
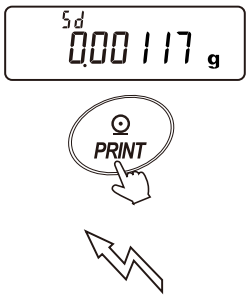
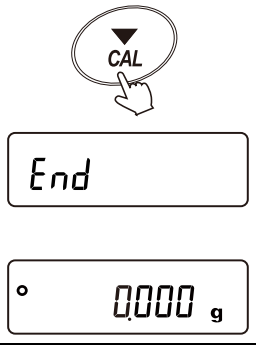
- Repeatability is an indicator of variations in measured values when the same weight is repeatedly loaded and unloaded, and it is usually expressed in terms of standard deviation (σ_{n-1}).
- With the repeatability check function, the balance obtains 10 measurement data using the built-in weight and displays its standard deviation. By installing the balance and using this function, it is possible to check repeatability in the environment where the balance is installed.

  Eg. "Standard deviation = 0.001 g " means that the result of repeated measurements of the same weighing material falls within the range ±0.001 g at a frequency of about 68%.

CAUTION

- **The results of this function differ from the repeatability conditions of "28-2. Individual Specifications" because they use the balance's internal weight (about 200 g), so treat the value as a reference value.**
- **To ensure accurate data measurement, avoid applying vibration or drafts while collecting data.**
- **If the password function is enabled, this function is only available to the Administrator (ADMIN).**

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.	
2.	When the display shown to the right appears, release your finger from the SAMPLE key.	

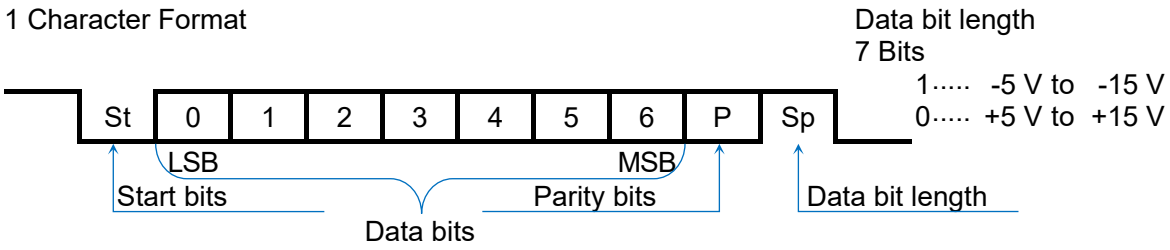
Step	Description	Display and key operations
3.	When [READY] is displayed, the screen transitions as shown in the diagram, and data collection begins automatically. "rEP" is blinking while data is being collected. To cancel the process, press the [CAL] key. " [CANCEL] " appears and the balance returns 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␣␣␣␣␣+10.0␣g<TERM>] ␣ : Space, ASCII 20h <TERM> : Terminator, CR LF or CR CR : Carriage return, ASCII 0Dh LF : Line feed, ASCII 0Ah	 Data output
5.	Press the [CAL] key to return to weighing mode.	

17. Interface Specification

17-1 RS-232C

Connector	D-Sub 9-pin (male)		
Transmission system	EIA RS-232C		
Transmission form	Asynchronous, bi-directional		
Transmission rate	Approximately 5 times/sec (5.21 Hz), approximately 10 times/sec (10.42 Hz), approximately 20 times/sec (20.83 Hz). Linked with SPd of bASFnc in the function table ("9.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	(Data bit length: 7 Bits)
		NONE	(Data bit length: 8 Bits)
	Data bit length	1 bit	
	Code	ASCII	

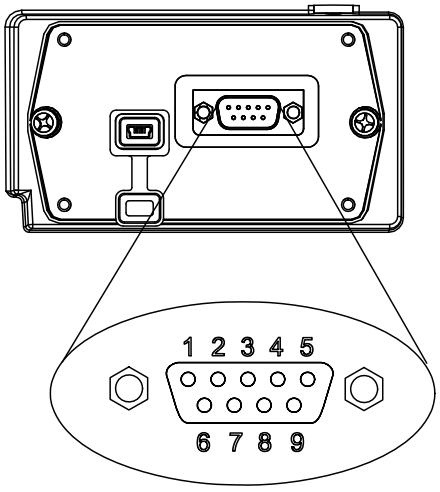
1 Character Format



Data bit length
7 Bits
1····· -5 V to -15 V
0····· +5 V to +15 V

D-Sub 9-pin assignments

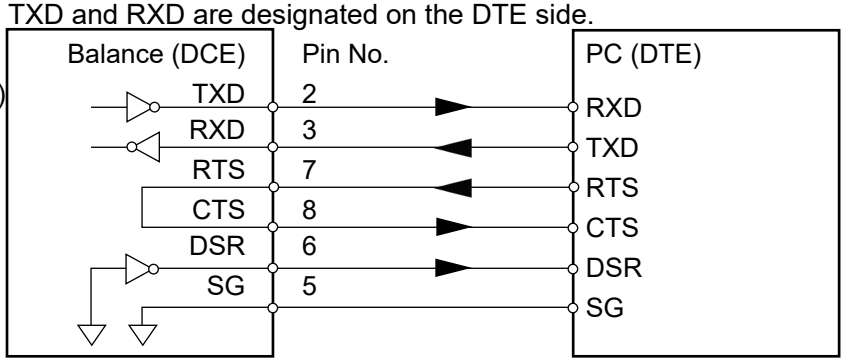
Pin No.	Signal name	Direction	Description
1	-	-	Same potential as SG *1
2	TXD	Output	Transmit data
3	RXD	Input	Receive data
4	-	-	No connection
5	SG	-	Signal ground
6	DSR	Output	Data set ready
7	RTS	Input	Request to send
8	CTS	Output	Clear to send
9	-	Output	12 V output *1



Inch screw #4-40UNC

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

Wiring diagram (when connected to a PC)



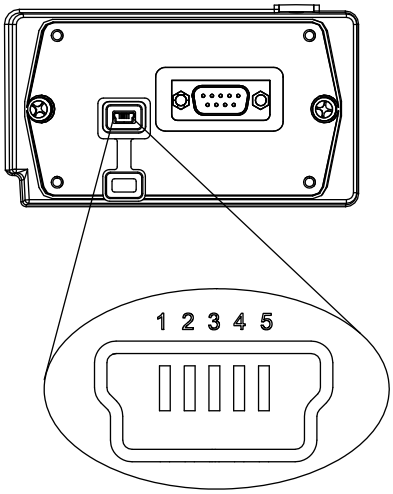
*1 Used with some A&D peripherals. Do not connect to devices from other manufacturers that output power. Ensure a compatible cable is used, as using the wrong connection cable may damage the device.

17-2 USB

Connector	Mini B（Female）
Specification	USB 2.0
Device class	Human Interface Device (HID): Quick USB CDC (commnunication device class):Virtual COM port

Mini-B Pin Configuration

Pin No.	Signal name	Direction	Description
1	VBUS	Input	Power supply
2	D−	-	Transmission and Reception data
3	D+	-	Transmission and Reception data
4	ID	-	No connection
5	GND	-	Signal ground



18. Connection with Peripheral Devices

You can connect peripheral devices, PCs, or PLCs using the RS-232C connector and USB mini-B connector, which are standard equipment on the balance.

18-1 Cables required to connect to peripheral devices

The connection cables compatible with the peripheral devices and interfaces used are as follows.

Connection Cables for Peripheral Devices

<table>
<tr><th rowspan="2">Product name</th><th rowspan="2">Model</th><th rowspan="2">Communication Interface used</th><th colspan="2">Connection cable</th><th rowspan="2">Note</th></tr>
<tr><th>Standard accessory / Optional</th><th>Cable model</th></tr>
<tr><td>Thermal printer</td><td>AD-8129TH</td><td>RS-232C</td><td>[Standard accessory]
RS-232C cable included with the printer</td><td>AX-KO2741-100</td><td>*1, *5</td></tr>
<tr><td>Remote display</td><td>AD-8920A</td><td rowspan="5">RS-232C</td><td rowspan="2">[Standard accessory]
Communication Cable for External Display or External Controller</td><td>AX-KO3412-100</td><td>*2, *5</td></tr>
<tr><td>Remote controller</td><td>AD-8922A</td><td>AX-KO2466-200</td><td>*2, *5</td></tr>
<tr><td rowspan="2">Extension Controller for Weighing Line</td><td>AD-8923-BCD</td><td rowspan="2">【Optional】</td><td rowspan="2">AX-KO2466-200</td><td rowspan="2">*5</td></tr>
<tr><td>AD-8923-CC</td></tr>
<tr><td>PLC</td><td></td><td>【Optional】</td><td></td><td>*3</td></tr>
<tr><td rowspan="2">PC</td><td rowspan="2"></td><td>RS-232C</td><td>【Optional】</td><td></td><td>*4, *5</td></tr>
<tr><td>USB</td><td>[Standard accessory]
USB cable included with the balance</td><td>AX-KO5465-180</td><td></td></tr>
</table>

Note

*1 **If you use the optional AD-8529PR-W (Bluetooth® Converter), the RS-232C cable included with the printer will not be used.**

*2 **Optional cables in 5m and 10m lengths are also available.**

*3 **Please check the interface specifications of the MC-M and the PLC you are using, and prepare a compatible cable accordingly.**

*4 **You can connect to a PC using AX-USB-9P, AD-8529PC-W, AD-1688, and AD-8527. For data transfer, the connection cables included with these products can be used.**

*5 **If using for dustproof and waterproof performance, please attach the waterproof RS-232C cable (AX-KO2737-500JA).**

18-2 Data output method

You can adjust the operation of the balance by changing the function table settings to match the intended use.
For details on internal settings, please refer to "9.Function Table."

(1) Output method for weighing data via the RS-232C/USB interface

You can specify it in " PrE (Data Output Mode) " under " doutE (Data Output) " in the function table (" 9.Function Table").

Data output mode

Class	Item	Parameter	Description	
doutE	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.
		7	Auto print mode C	Data output occurs when the comparison result is OK and stable, exceeding the AP-P and AP-b range from zero display.

(2) Precautions when connecting multiple peripheral devices simultaneously

Peripheral devices such as external displays, external controllers, and extended controllers for weighing lines (Connection Cables for Peripheral Devices) are used to display weighing values in real time. To achieve this, the balance typically operates in continuous output mode (stream mode) for measurement data.

On the other hand, when connecting peripheral devices such as printers, PLCs, and PCs, if the balance is set to stream mode (continuous output of weighing values), usability may be negatively affected.

To accommodate the simultaneous connection of peripheral devices operating in stream mode and other peripheral devices, the RS-232C allows exceptional operation based on the connected peripheral devices. [SIF] ModE (Connection Destination) in the function table ("9.Function Table") enables this.

Funtion table （ ModE ）

Class	Item	Parameter	Description	Data output mode	Data format
[SIF]	ModE Devices Connected to RS-232C	0	General-purpose Devices (e.g.,PCs, PLCs, etc.)	Follow the [dout] Prt setting	[SIF] tYPE
		1	Printer		[SIF] tYPE Type Setting (Only A&D Standard Format and DP Format can be selected.)
		2	External Display Devices, etc.	Operates in stream mode regardless of the [dout] Prt setting.	Output is in A&D Standard Format regardless of the [SIF] tYPE setting. *1

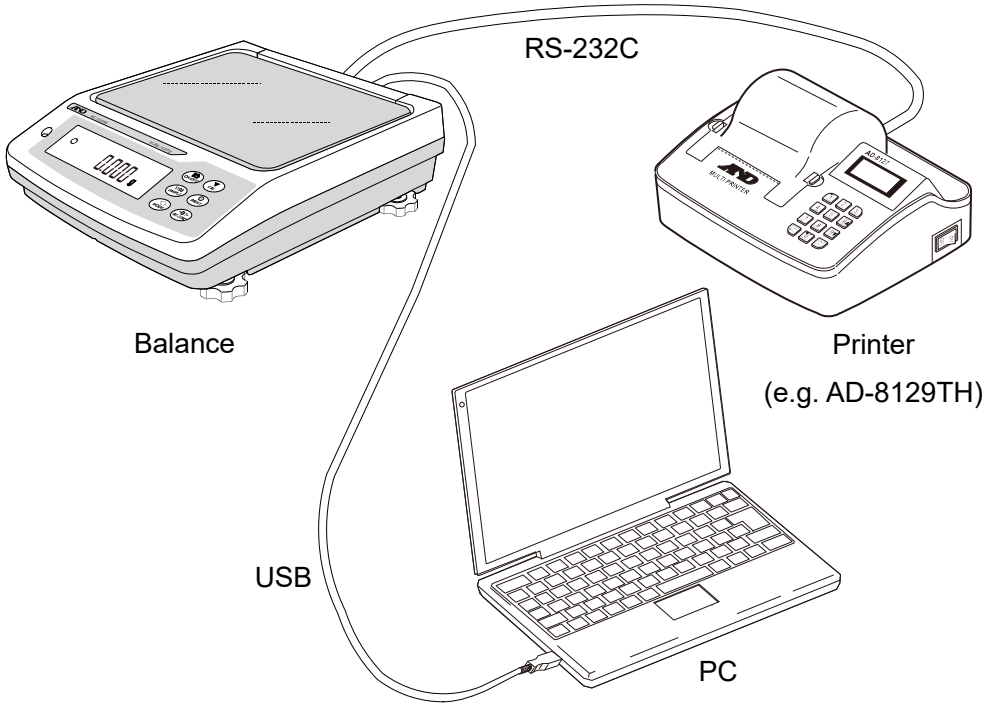
*1 Only weighing values are output continuously.

The functions of S-td (Date, Time), S- id (ID Number), PUSE (Data Output Interval), At-F (Auto Feed), and inFo (GLP Output) in [dout] are disabled.

18-3 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.

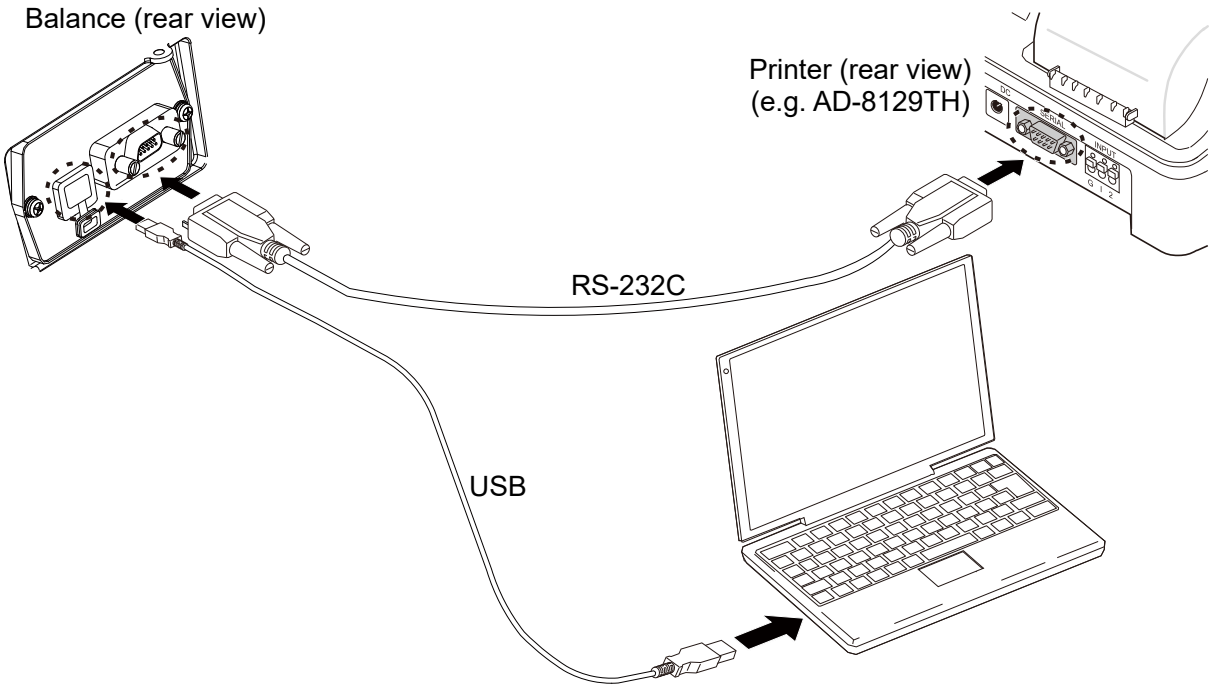


Simultaneous connection example 1: Printer and PC

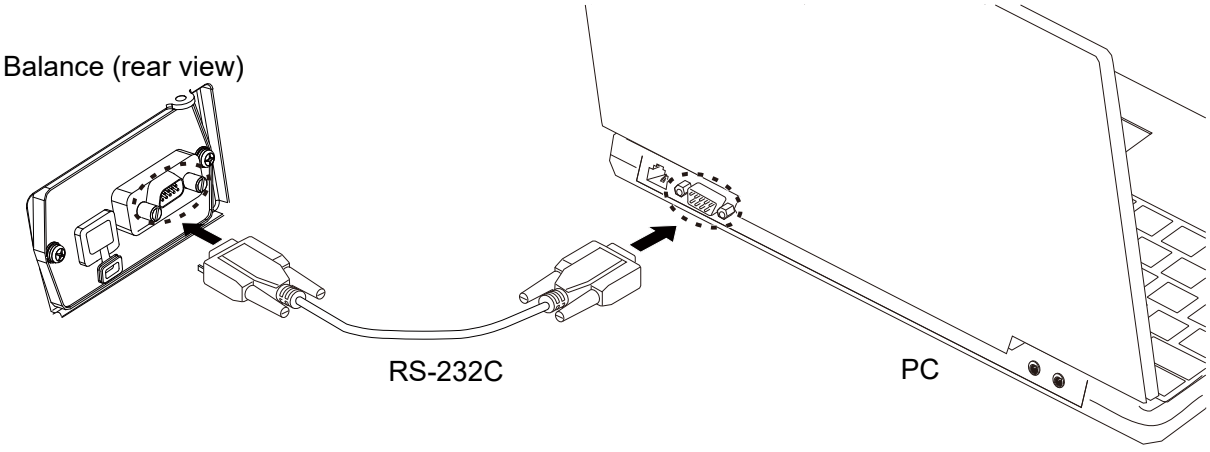
Connection method		Connection interface			
Interface	Device	Class	Item	Parameter	Description
(Common setting)		dout	Prt	0 to 7	Select the data output mode that is suitable for the printer/PC settings and applications. *1
RS-232C	Printer	SIF	ModE	1	Select the weighing format that is suitable for the printer settings and applications. (A&D standard format, DP format)
			tYPE	0, 1	
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 balance printers include AD-8129TH (Compact 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), the USB converter (AX-USB-9P) can be used.

(2) Connecting printers and external display devices

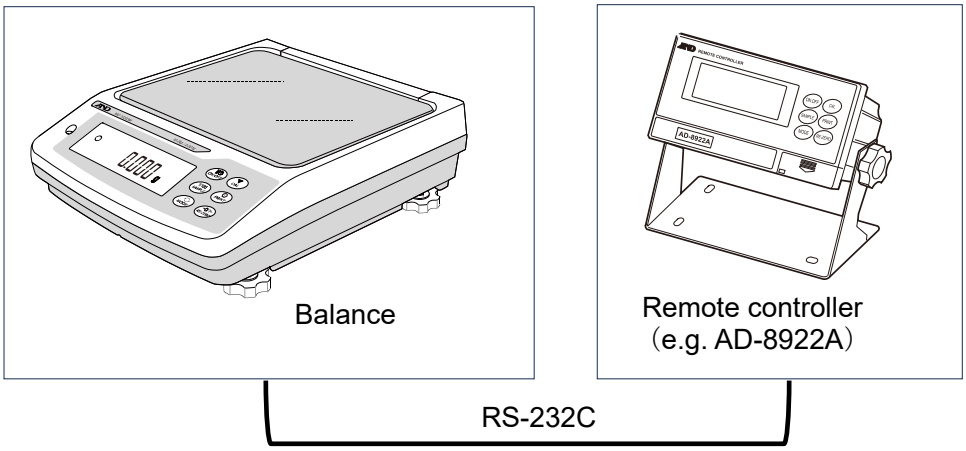
Example of Use: While displaying the weighing values on an external display device, the printer also prints the weighing values simultaneously.

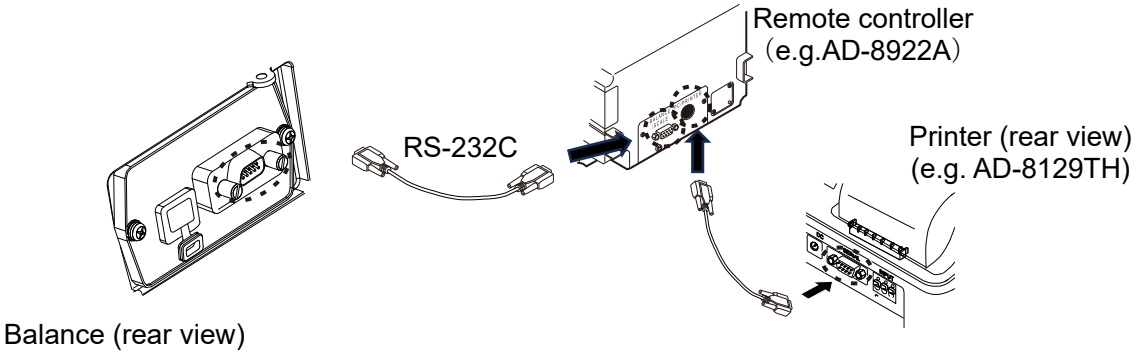
Example of Simultaneous Connection [2]: "Printers and External Display Devices"

Connection method		Connection interface			
Interface	Device	Class	Item	Parameter	Description
RS-232C	Printer	dout	Prt	0 to 7	Select the data output mode that suits the printer's usage and settings.
		SIF	ModE	1	Select the weighing format that is suitable for the printer settings and applications. (A&D standard format, DP format)
			tYPE	0, 1	
USB	[None]				

When checking weighing values or performing key operations away from the balance unit, connect a dedicated external display device.

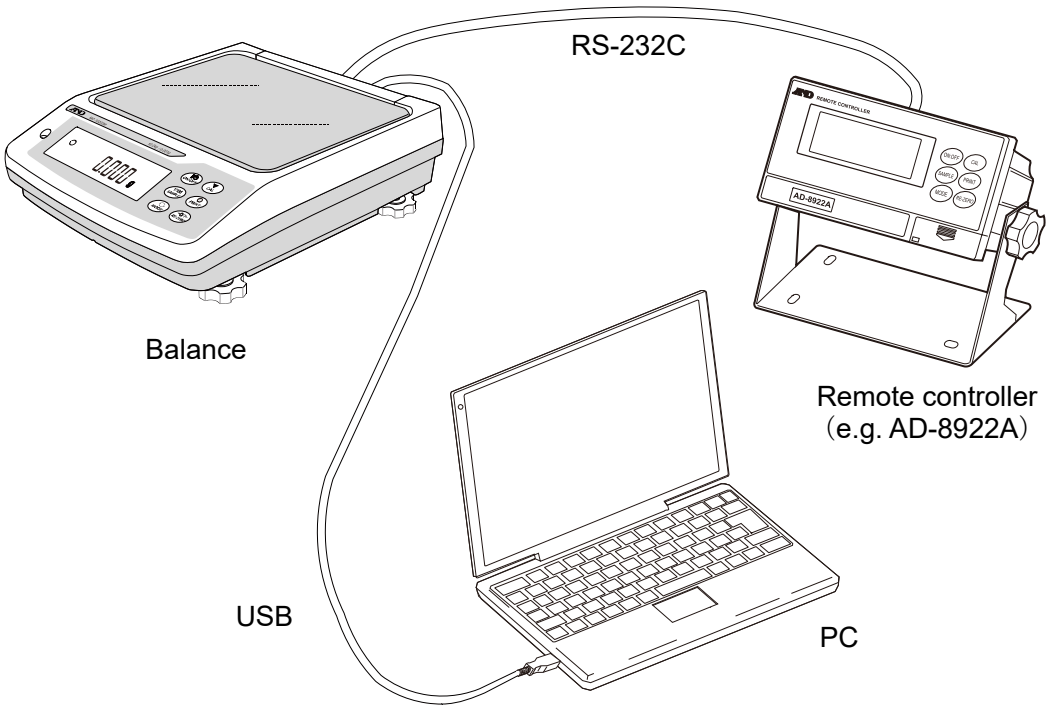
The dedicated external display devices for the balance are AD-8920A (External Display: Display Only) and AD-8922A (External Controller).





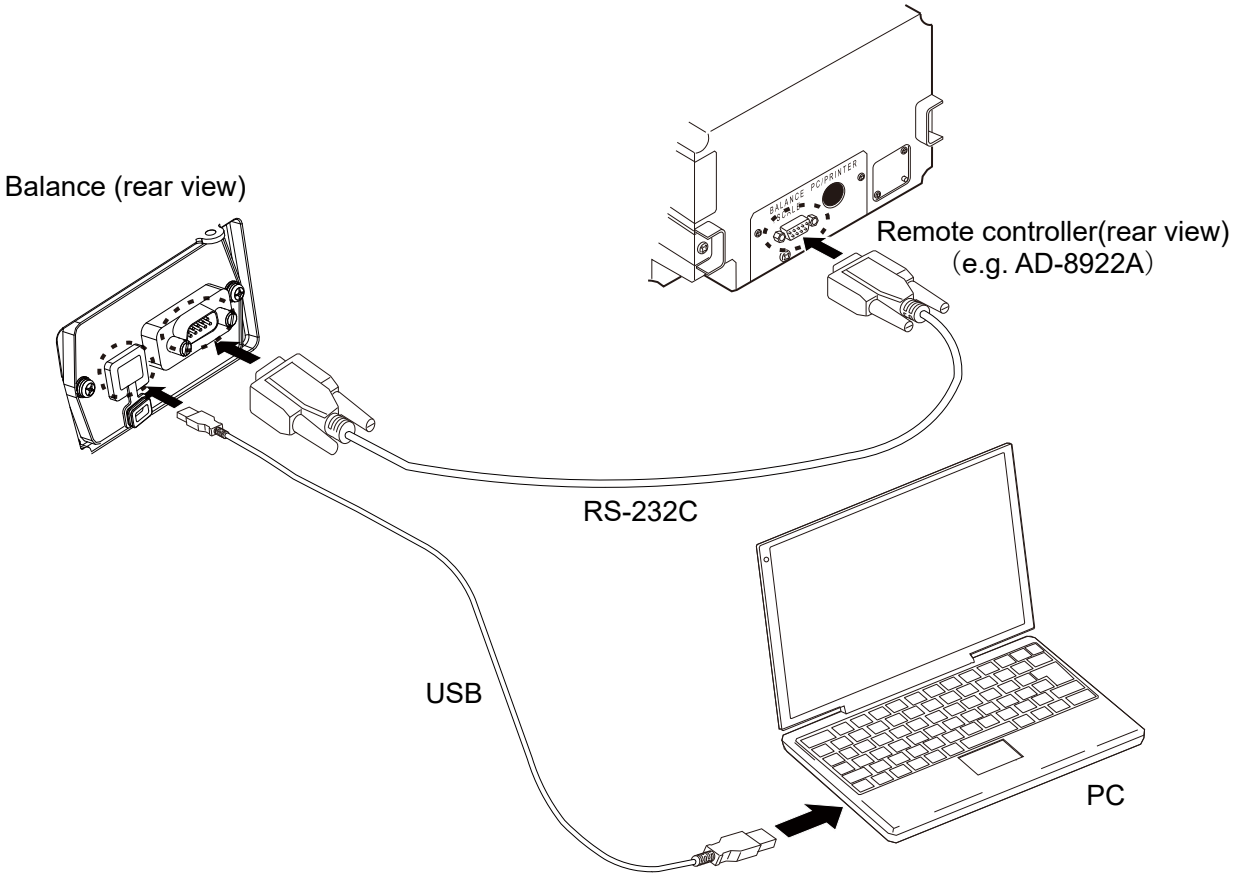
(3) Connecting external display devices and PCs

Example of Use: While displaying the weighing value on an external display device, the PC captures the weighing value simultaneously.



Example of Simultaneous Connection [3]: "External Display Devices and PCs"

Connection method		Connection interface			
Interface	Device	Class	Item	Parameter	Description
RS-232C	Remote display	SIF	ModE	2	The external display device continuously outputs weighing values in A&D Standard Format.
USB	PC	dout	Prt	0 to 7	Select the data output mode that suits the PC's logging method.
		USb	U-tP	0 to 4	Select the output format that is easy for the PC to process.


Balance (rear view)
Remote controller(rear view)
（e.g. AD-8922A）
RS-232C
USB
PC

19. 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.

19-1 With AD-8129TH

19-1-1 Printing only weighing value data

Common Balance Settings When Printing Only Weighing Values on AD-8129TH

Class	Item	Parameter	Description
SIF Serial interface	ModE Connection destination	1	Printer connection
	tYPE Data format	0	A&D standard format

Settings for Printing Only Weighing Values on AD-8129TH

Printing method	Balance function table			AD-8129TH Funtion 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)		
		7	Auto print mode C		
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.

If AD-8129TH is set to a mode other than dump print mode and unstable data needs to be printed, change the internal setting of AD-8129TH to “Print Unstable Data” (US PRN / PRINT).

19-1-2 Printing weighing value data with the ID number and timestamp using the clock/calendar function of the balance

Common balance settings when printing weighing values with additional information on AD-8129TH

Class	Item	Parameter	Description
SIF Serial interface	MODE Connection destination	1	Printer connection
	TYPE Data format	1	DP format

Settings for printing weighing values with additional Information on AD-8129TH

Printing method	Balance function table			AD-8129THFuntion 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	DUMP	Dump print mode *2
		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)		
		3	Auto print mode C		
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.

19-1-3 Printing information other than weighing value data

When printing maintenance records of sensitivity adjustment/calibration tests (GLP output) or when the balance outputs statistical calculation results, change the printer to dump print mode.

AD-8129TH Function Table for Printing Information Other Than Weighing Values

AD-8129TH Funtion table	
PRN.MODE	Description
DUMP	Dump print mode

Switching AD-8129TH Print Mode (PRN.MODE)

❑ Press and hold the ENT SAVE key on the printer to toggle between EXT.KEY (External Key Print Mode) and DUMP (Dump Print Mode) without entering the function table of AD-8129TH. This is useful when temporarily switching AD-8129TH to Dump Print Mode for GLP output, etc.

20. Connecting to a PC

20-1 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

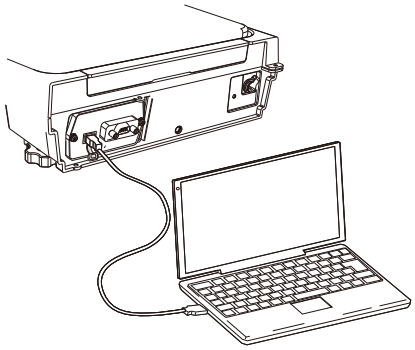
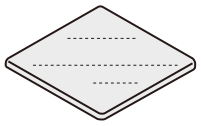
- ❑ When using USB, the data format follows the NU2 format.

  Regardless of the U-tP (USB Data Format) setting value, the format is fixed to NU2 format.

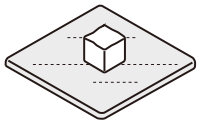
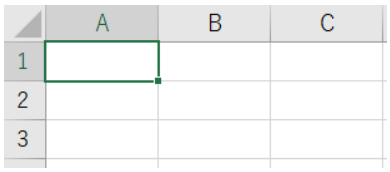
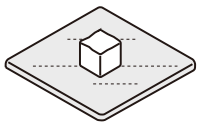
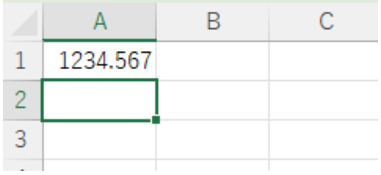
Function table	Output example
	NU2 format 1 2 . 3 4 5 CR LF

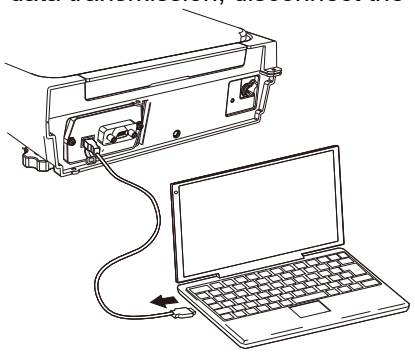
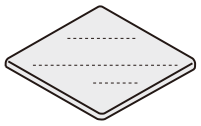
␣ : Space, ASCII 20h
<TERM> : Terminator, CR LF or CR
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah
TAB : Horizontal Tab, ASCII 09h

- ❑ When additional data such as time is present, the separator between the weighing data and the additional data is TAB (Horizontal Tab).
  Refer to the Quick USB Output Example in "21-2 Weighing data format" for more details.

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.	0.000 g	
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 on the right, and then automatically return to weighing mode. During the USB connection, "◄" (the USB connection indicator) will be displayed.	USb Quick Displayed for 2 seconds 0.000 g	
3.	Launch the software (e.g. Excel) used for transmitting weighing data on the PC.		
4.	Be sure to set the keyboard to single-byte input mode. (Data cannot be entered correctly in the double-byte input mode.)		

* If the indicator is not displayed, check that "UFnc (USB Operation Mode)" in the function table ("9.Function Table") is set to "1 (Quick USB)".

Step	Description	Display and key operations	Weighing operation
5.	Place a sample on the weighing pan.	1234.567 g	
6.	Place the cursor where you want to enter the weighing data. 	1234.567 g	
7.	Press the PRINT key to send the weighing data from the balance. The data will be entered at the cursor position. 	  Data output	

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

20-2 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, the 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).

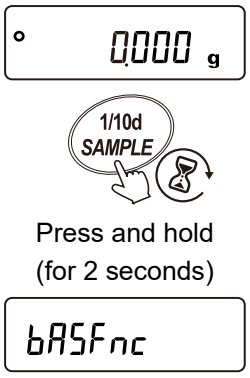
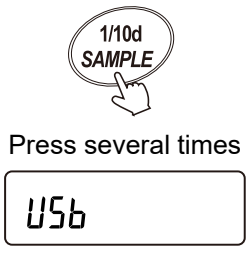
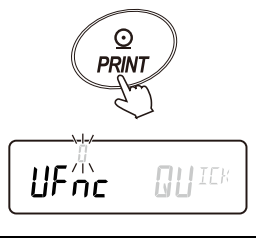
*1 User information must be entered in order to download the driver.

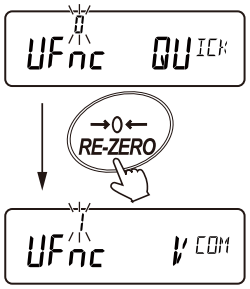
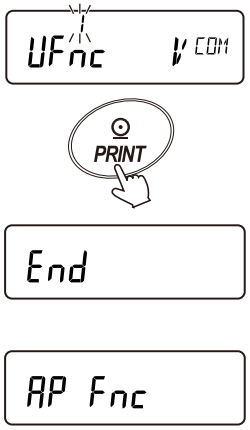
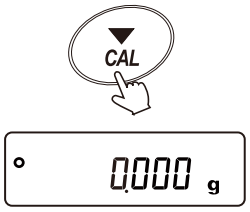
Communication equivalent to RS-232C is possible by selecting the COM port with the Windows Communication Tools Software (WinCT).
Virtual COM mode requires no configuration of the baud rate, data bits, parity, or stop bits in the data communication software.

CAUTION

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

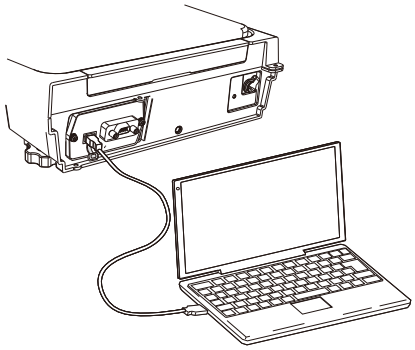
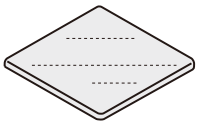
Enabling the Virtual COM mode (Changing the function table)
Switching between Quick USB mode (unidirectional communication) and Virtual COM mode (bidirectional communication)

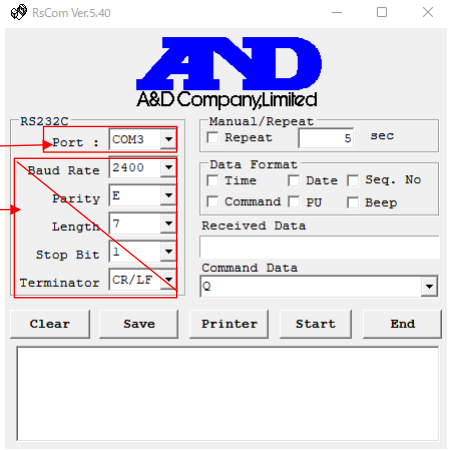
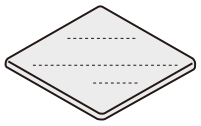
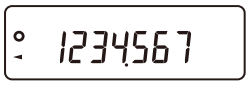
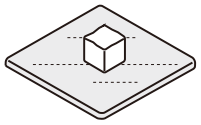
Step	Description	Display and key operations
1.	In weighing mode, press and hold the SAMPLE key (for 2 seconds) to display the function table menu ("9.Function Table").	
2.	Press the SAMPLE key several times until the display shown to the right appears.	
3.	Press the PRINT key.	

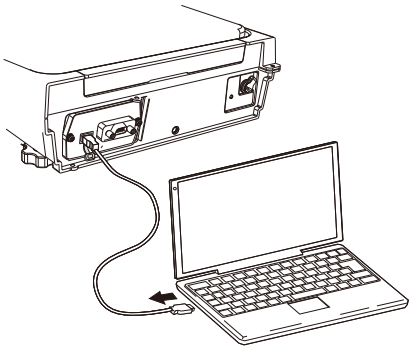
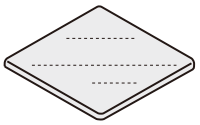
Step	Description	Display and key operations
4.	Use the [RE-ZERO] key to switch the parameter for "UFnc" (USB function mode) to "0" (Quick USB) or "1" (Virtual COM mode).	
5.	When the display shown on the right appears, press the [PRINT] key to store the setting.	
6.	Press the [CAL] key to return to weighing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

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.

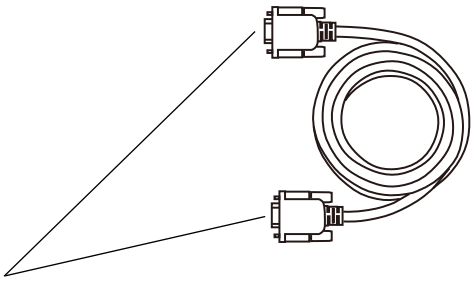
Step	Description	Display and key operations	Weighing operation
7.	Connect the balance to the PC using the USB cable included with the balance.  When connecting for the first time on Windows 10 or Windows 11, the PC will automatically start installing the driver. For operating systems other than Windows 10 and Windows 11, you need to install the driver manually. Refer to the PDF file in the driver for Virtual COM mode on the A&D website (https://www.aandd.jp) for instructions on how to install the driver.		
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 on 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 COM port No 		
12.	Press the RE-ZERO key to set the display to zero.	 	
13.	Place a sample on the weighing pan.		
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,+00012.345␣␣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. 		
16.	When the balance is disconnected from the PC, the display will show a USB disconnection indicator (for 2 seconds) as shown on the right, and then automatically return to weighing mode. "◄" (the USB disconnection indicator) turns off.	 Displayed for 2 seconds 	

20-3 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

20-4 WinCT 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.

20-5 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 ("9. 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 function is enabled, this software cannot be used. Additionally, this software cannot enable the setting if it is disabled. To set the password 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.

20-6 Balance weighing speed adjustment software WinCT-GXA-Filter

WinCT-GXA-Filter is data communication software that allows adjustment of the balance weighing speed.

WinCT-GXA-Filter can be downloaded from the A&D website (https://www.aandd.jp) by entering user information on the "Software Download [WinCT-GXA-Filter] Application" page.

Features

- ❑ Reads setting data from the balance and modifies it collectively.
- ❑ Saves the settings as a CSV file.
- ❑ Loads a saved CSV file and writes the settings to the balance.
- ❑ Toggles the extension function (detailed filter settings) on/off.

21. Data Output

21-1 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 ("9. Function Table").

Key mode

Function table: [dout] Prt 0

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.

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 ("9. 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	A mode
[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 ("9. 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	B mode
[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 ("9. 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 ("9. Function Table").

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

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

Auto print C mode Function table: dout PrT 1

When the weighing value exceeds the range specified by AP-P (Auto Print Polarity) and AP-b (Auto Print Width) from zero display, and the comparator result is OK while displaying the "O" (the stabilization indicator), the weighing value is output once.

Additionally, when the "O" (the stabilization indicator) is displayed, pressing the PRINT key outputs the weighing value once.

At this time, the display blinks once to indicate that the output has been completed.

Example of use

Outputting and recording the weighing value when it falls within a certain range.

Required function table settings

dout	PrT = 1	C mode
dout	AP-P	Auto print polarity
dout	AP-b	Auto print band width
CP Fnc	CP = 1 to 2	Comparator mode
CP VALUE	CP Hi	Setting the upper limit value
CP VALUE	CP Lo	Setting the lower limit value

21-1-1 Data output method

RS-232C can be configured in "ModE (Connection Destination)" under SiF in the function table ("9.Function Table") to enable exceptional operations according to the connected peripheral device.

Function of the Setting Item "ModE (Connection Destination) "

Class	Item	Parameter	Description		
			Device	Data output mode	Data format
SiF	ModE Devices Connected to RS-232C	0	General-Purpose Devices Such as PC and PLC	Follow the dout PrT Settings	Follow the SiF tYPE Settings
		1	Printer	Follow the dout PrT Settings	Follow the SiF tYPE Settings (Only A&D standard and DP format can be selected)
		2	External Display Devices, etc.	Stream Mode is enabled regardless of the dout PrT Settings *1	SiF tYPE settings are fixed to A&D standard format

- *1 Only the weighing value is continuously output
  Time/Date (S-td) and ID Number (S- id) are not added.
- The functions in "9.Function Table" "dout (Data Output)", including "PrT (Data Output Mode)", "PUSE (Data Output Interval)", "At-F (Auto Feed)", and "inFo (GLP Output)", are also disabled.

21-2 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 "9. Function Table".

CAUTION

The Quick USB data format is NU2 format regardless of the internal settings.

A&D standard format

RS-232 connection: Function table [SIF] tYPE = 0

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

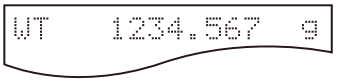
- ❑ This is the standard format for sending data to peripheral devices.
- ❑ The data consists of 16 characters (excluding the terminator).
  This differs from the 15-character A&D standard format used by other balances and scales.
- ❑ A 2-character header indicates the condition of the data.
- ❑ The 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	,	+	0	1	2	3	4	.	5	6	7	␣	␣	g	CR	LF
Header			Data										Unit			Terminator	

ST	When stable
US	When unstable
QT	Counting mode when
OL	When overloaded

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

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

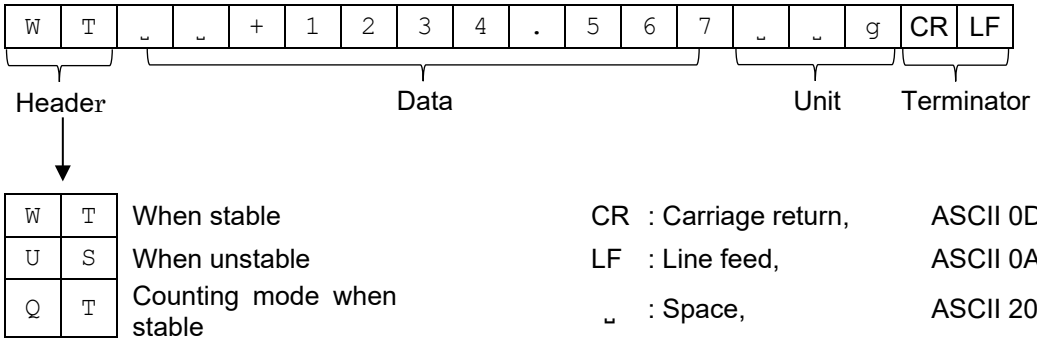


DP format (dump print)

RS-232C connection: Function table [SIF] TYPE = 1

For Virtual COM mode connection: No function

- ❑ 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

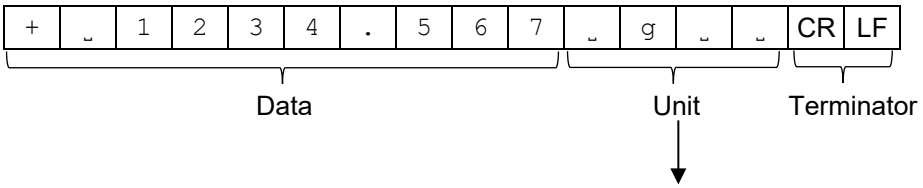
CR : Carriage return, ASCII 0Dh
LF : Line feed, ASCII 0Ah
␣ : Space, ASCII 20h

KF format

RS-232Cconnection: Function table [SIF] TYPE = 2

For Virtual COM mode connection: No function

- ❑ This is the Karl-Fischer moisture meter format.
- ❑ The data consists of 16 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

RS-232C connection: Function table [SIF] tYPE = 3

For Virtual COM mode connection: No function

- ❑ 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.

S	␣	␣	␣	1	2	3	4	.	5	6	7	␣	g	CR	LF
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

RS-232C conncection: Function table [SIF] tYPE = 4

For Virtual COM mode connection: Function table [USb] U-tP = 1

- ❑ Only numerical data of the weighing value is output.
- ❑ The data consists of 10 characters (excluding the terminator).
  This differs from the 9-character NU format used by other balances and scales.
- ❑ 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.

+	0	1	2	3	4	.	5	6	7	CR	LF
Data										Terminator	

CSV format

RS-232C connection: Function table [SIF] tYPE = 5

For Virtual COM mode connection: Function table [USb] U-tP = 2

- ❑ The A&D standard format separates the weighing data section and unit section using the "," separator.
- ❑ The unit is output when overloaded.

If "prt (Decimal Point)" under "[bASFnc] (Environment/Display)" in the function table ("9.Function Table") is set to "1 (Comma ',')", the separator becomes a semicolon ';'.

S	T	,	+	0	1	2	3	4	.	5	6	7	,	␣	␣	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,012,2017/07/01,12:34:56,ST,+01234.567,␣␣g
```

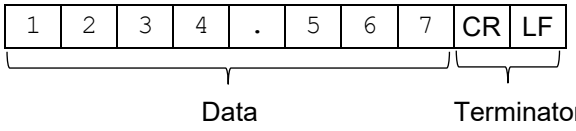
ID number | Data number | Date | Time | Weighing value

NU2 format

RS-232C connection: Function table [S.F] tYPE = 6

For Virtual COM mode connection: Function table [USb] U-tP = 4

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

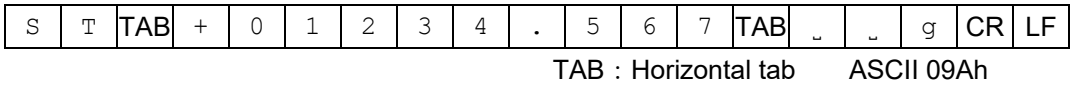


TAB format

RS-232C connection: Function table [S.F] tYPE = 7

For Virtual COM mode connection: Function table [USb] U-tP = 3

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

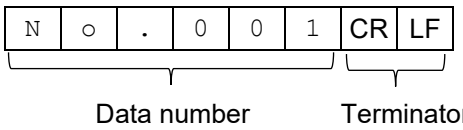


Other data formats

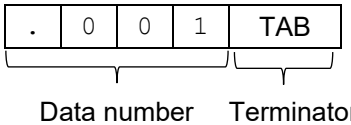
In addition to weighing data, various other data can be added. As needed, toggle the desired settings ON or OFF in the function table.

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, when selecting NU or NU2 format, only dots "." and numbers are output.



Quick USB connection (numeric output only): No function table required



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, when selecting NU or NU2 format, only hyphens "-" and numbers are output.

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

ID number — Terminator

Quick USB connection (numeric output only): No Function table required

-	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, when selecting NU or NU2 format, slashes "/" are converted to dots ('.') in the output.

2	0	2	4	/	0	6	/	3	0	CR	LF

Date — Terminator

Quick USB connection (numeric output only): No Function table required

2	0	2	4.	.	0	6	.	3	0	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, when selecting NU or NU2 format, colons " : " are converted to dots " . " in the output.

1	2	:	3	4	:	5	6	CR	LF

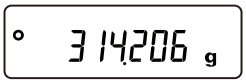
Time — Terminator

Quick USB connection (numeric output only): No Function table required

1	2	.	3	4	.	5	6	TAB

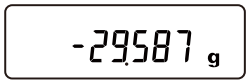
21-3 Weighing data format output example

When stable



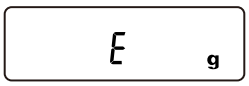
A&D	S	T	,	+	0	0	3	1	4	.	2	0	6	␣	␣	g	CR	LF
DP	W	T	␣	␣	␣	+	3	1	4	.	2	0	6	␣	␣	g	CR	LF
KF	+	␣	␣	3	1	4	.	2	0	6	␣	g	␣	␣	CR	LF		
MT	S	␣	␣	␣	␣	3	1	4	.	2	0	6	␣	g	CR	LF		
NU	+	0	0	3	1	4	.	2	0	6	CR	LF						
CSV	S	T	,	+	0	0	3	1	4	.	2	0	6	,	␣	␣	g	CR	LF
NU2	3	1	4	.	2	0	6	CR	LF										
TAB	S	T	TAB	+	0	0	3	1	4	.	2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

When unstable



A&D	U	S	,	-	0	0	0	2	9	.	5	8	7	␣	␣	g	CR	LF
DP	U	S	␣	␣	␣	␣	-	2	9	.	5	8	7	␣	␣	g	CR	LF
KF	-	␣	␣	␣	2	9	.	5	8	7	␣	␣	␣	␣	CR	LF		
MT	S	D	␣	␣	␣	-	2	9	.	5	8	7	␣	g	CR	LF		
NU	-	0	0	0	2	9	.	5	8	7	CR	LF						
CSV	U	S	,	-	0	0	0	2	9	.	5	8	7	,	␣	␣	g	CR	LF
NU2	-	2	9	.	5	8	7	CR	LF										
TAB	U	S	TAB	-	0	0	0	2	9	.	5	8	7	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	9	CR	LF						
CSV	O	L	,	+	9	9	9	9	9	9	9	9	E	+	1	9	,	␣	␣	g	CR	LF
NU2	+	9	9	9	9	9	9	9	9	9	CR	LF										
TAB	O	L	TAB	+	9	9	9	9	9	9	9	9	E	+	1	9	TAB	␣	␣	g	CR	LF

ASCII symbols

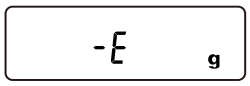
CR : Carriage return, ASCII 0Dh

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	9	CR	LF						
CSV	O	L	,	-	9	9	9	9	9	9	9	9	E	+	1	9	,	␣	␣	g	CR	LF
NU2	-	9	9	9	9	9	9	9	9	9	CR	LF										
TAB	O	L	TAB	-	9	9	9	9	9	9	9	9	E	+	1	9	TAB	␣	␣	g	CR	LF

Unit code

Unit	A&D CSV TAB	DP	KF	MT
g	␣ ␣ g	␣ ␣ g	␣ g ␣ ␣	␣ g
PCS	␣ P C	␣ P C	␣ p c s	␣ P C S
%	␣ ␣ %	␣ ␣ %	␣ % ␣ ␣	␣ %
ct	␣ c t	␣ c t	␣ c t ␣	␣ c t
mom	m o m	m o m	␣ m o m	␣ m o

ASCII symbols

CR : Carriage return, ASCII 0Dh

LF : Line feed, ASCII 0Ah

␣ : Space, ASCII 20h

TAB : Horizontal tab, ASCII 09h

22.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 ("9. Function Table").

22-1 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", 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 with the internal weight ・ Sensitivity adjustment with an external weight
EXC	Sensitivity adjustment with 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 Z <ESC>T	Same as the [RE-ZERO] key. [Zero display]
T TR	Tare [Zero display]
ZR	Zero [If the display is within the zero range indicated in "Weighing Range," based on the zero point taken at power-on (power-on zero), the zero point will be updated, the tare value will be cleared, and the display will be set to zero. If it exceeds the range, no processing is done.]
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 00063. Refer to "20-9-2. Locking specified key switches".
?LK	Request the status of the specified locked key. Refer to "20-9-2. Locking specified key switches".

❑ 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

Commands to preset the tare value

Command	Content
PT:****. **␣␣g	Set 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 1234.567 g, the input is "PT:1234.567␣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	Set 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 12.345 g, the input is "UW:12.345␣␣g".
?UW	Requests the unit weight value.

"␣" represents a space.

Commands for controlling the comparator function

Command	Content
HI:****.**␣␣g HH:****.**␣␣g LO:****.**␣␣g LL:****.**␣␣g	Set the upper limit value Set the second upper limit value Set the lower limit value Set the second lower limit value ❑ Add the Unit in the A&D Standard Format (3 Characters) ❑ When setting the upper limit value to 456.789 g, it will be displayed as HI:456.789␣␣g. ❑ Values exceeding the weighing capacity cannot be set.
?HI	Request the upper limit value
?HH	Request the second upper limit value
?LO	Request the lower limit value
?LL	Request the second lower limit value

"␣" represents a space.

❑ When using the comparator commands, set "CP in (Data Input Method)" under "CP Fnc (Comparator)" in the function table ("9.Function Table") to "0" or "1".

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 control the data memory function (Function table: dout dATA = 3)

Command	Content
CN:mm	Enter a number between 01 and 20 for "mm".
?CN	Request the currently selected comparator registration number.

Commands to control the data memory function (Function table: dout dATA= 4)

Command	Content
PN:mm	Retrieve the stored tare value. Enter a number between 01 and 20 for "mm".
?PN	Request the currently selected tare value registration number.

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.) When setting the date to September 1, 2024, the input is DT:24/09/01
?TM	Requests the time.
?DT	Requests the date.

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 TARE key or the T or TR 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.

22-2 <AK> code and error codes

When "ı " (On) is set for "ErCd" (AK, Error code) under SıF (Serial interface) in the function table ("9.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 "ı" (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

*1 If within the zero range, the zero point is updated, the tare value is cleared, and the display is set to zero. If outside the zero range, no processing is performed. Refer to "Weighing Range" for the zero range of each model.

- Refer to "27-2. Error display (error code)" for Error Codes.

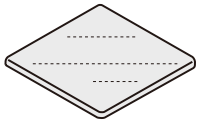
22-3 Command usage examples

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

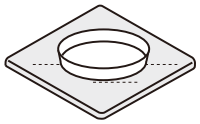
ASCII symbols

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

Example of ON command (Turning the display on)

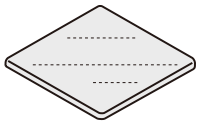
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1.	ON command O N CR LF	→		Display off	
		←	AK CR LF Reception confirmation		
2.				 . g Power-on zero Stabilizing (Processing)	
		←	AK CR LF Completion confirmation	0.000 g	

Example of the R command (Re-zero)

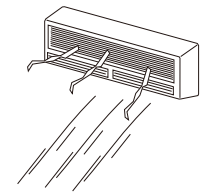
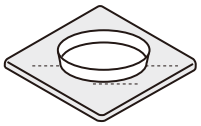
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1.	R command R CR LF	→		30.123 g Before execution	 Place a sample on the weighing pan.
		←	AK CR LF Reception confirmation		
2.				. g Re-zero stabilizing (Processing)	
		←	AK CR LF Completion confirmation		
3.				0.000 g Zero display	

Example of the CAL command

（Sensitivity adjustment using the internal weight）

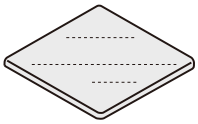
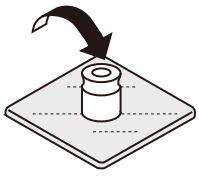
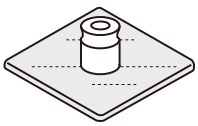
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1.	CAL command C A L CR LF	→		0.000 g Before execution	 Nothing on the weighing pan.
		←	AK CR LF Reception confirmation		
2.				CAL in	
				CAL. in Processing	
				End	
				g Re-zero stabilizing (Processing)	
		←	AK CR LF Completion confirmation		
3.				0.000 g Zero display	

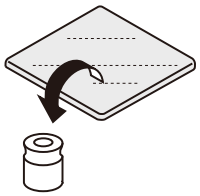
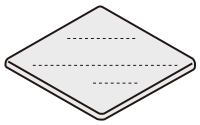
Example of the R command for error code output (Re-zero)

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1.	R command R CR LF	→		30.123 g Before execution	
		←	AK CR LF Reception confirmation		 Place a sample on the weighing pan.
2.				. g Re-zero stabilizing (Processing) Timeout due to instability	
		←	E C , 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	→		30.123 g Weighing display	

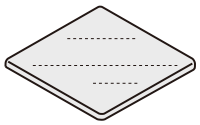
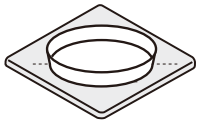
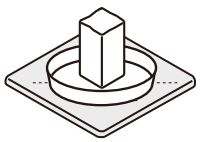
Example of EXC command

（Sensitivity adjustment using external weight）

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1.	EXC command E X C C_R L_F	→		0.000 g Before execution	 Nothing on the weighing pan.
		←	AK C_R L_F Reception confirmation		
2.				CAL 0 Waiting for zero setting	
3.	PRT command P R T C_R L_F	→			
		←	AK C_R L_F Reception confirmation		
4.				CAL 0 Setting the zero (Processing)	
		←	AK C_R L_F Process completed		
5.				10000 Waiting for the specified weight to be loaded	 Place the weight
6.	PRT command P R T C_R L_F	→			
		←	AK C_R L_F Reception confirmation		
7.				10000 Weighing the weight (Processing)	
		←	AK C_R L_F Process completed		
8.				End Waiting for unloading	

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
9.					 Remove the weight
10.		←	AK CR LF Process completed	. g Re-zero stabilizing (Processing)	
11.				° 0.000 g Zero display	

Example of the T command

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1.	R command R CR LF →		← AK CR LF Reception confirmation	0.123 g Before execution	
2.			← AK CR LF Completion confirmation	. g Re-zero stabilizing (Processing)	
3.				0.000 g Zero display	
4.	T command T CR LF →		← AK CR LF Reception confirmation ← AK CR LF Completion confirmation	123.456 g . g 0.000 g	
5.				10000.000 g	
6.	S command S CR LF →		← S T , + 1 0 0 0 0 . 0 0 0 ␣ ␣ g CR LF Net weight value		
7.	?PT command ? P T CR LF →		← P T , + 0 0 1 2 3 . 4 5 6 ␣ ␣ g CR LF Tare weight value		

"␣" represents a space.

23. 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 out put) in the function table ("9.Function Table").

23-1 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	␣ ␣ ␣ M C - 1 0 2 0 3 M
$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 7 / 0 1
$TM	Time	1 4 : 2 6 : 4 9
$WT	Weighing data	␣ ␣ + 5 0 0 0 . 1 0 4 ␣ ␣ g
$GR	Gross data (gross weight)	␣ ␣ + 6 0 1 3 . 0 5 4 ␣ ␣ g
$NT	Net data (net weight)	␣ ␣ ␣ 5 0 0 0 . 1 0 4 ␣ ␣ g
$TR	Tare data (tare weight)	␣ ␣ ␣ 1 0 1 2 . 9 5 0 ␣ ␣ g
$PC	Counting data	␣ ␣ ␣ ␣ ␣ ␣ + 1 2 4 9 ␣ P C
$UW	Unit weight data	␣ ␣ ␣ ␣ ␣ ␣ + 0 . 0 1 ␣ ␣ g
$CP	Comparator result	H I
$CM	Comma	,
$SP	Space	␣ ASCII 20h
$CR	<CR>Carriage return	ASCII 0Dh
$LF	<LF> Line feed	ASCII 0Ah
$HT	<TAB> Horizontal tab	ASCII 09h

- 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.

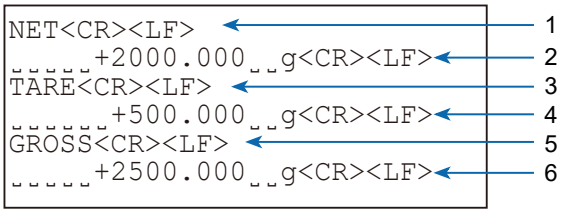
- Windows Communication Tools for UFC (WinCT-UFC) is software designed for creating program commands.
  You can download WinCT-UFC from the Software page on the A&D website (https://www.aandd.jp) by filling out the necessary form

23-2 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.**

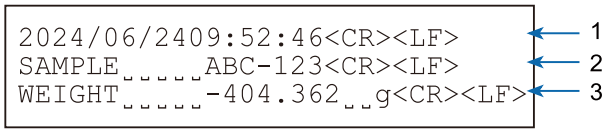
Output example 1



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

"␣" represents a space.

Output example 2



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

"␣" represents a space.

24. 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 "22. 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.

24-1 Locking all key switches

All key switches of the balance 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 All keys unlocked. KL:001 Lock all keys.

24-2 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	RE-ZERO key

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)	+
RE-ZERO key:	32	×	1 (locked)	= 47

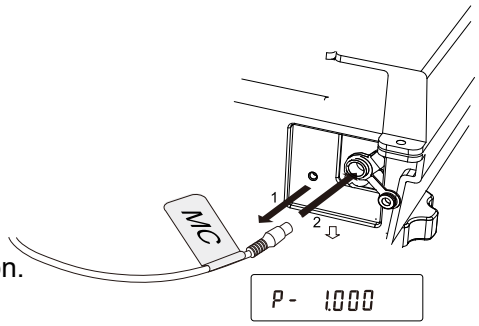
Command string	Content
?LK	Requests the status of the specified key locks. Example 1 When the key switches other than the PRINT key are locked. LK,00047 Example 2 When all key switches are unlocked. LK,00000
LK:*****	Locks the specified keys. A number from 00000 to 00063 is entered in place of (*****). This sends the LK: command to the balance. Example 1 When locking the key switches other than the PRINT key. LK:00047 Example 2 When unlocking all key switches. LK:00000

25. Checking the Software Version of the Balance

Specifications may vary depending on the balance software version.

Check the software version as follows.

1. Disconnect and reconnect the AC adapter to the balance.
2. "P-∗.∗∗∗": the software version, represented as ∗.∗∗∗,
   is displayed for about 1 second.
   The number in place of *.*** indicates the software version.

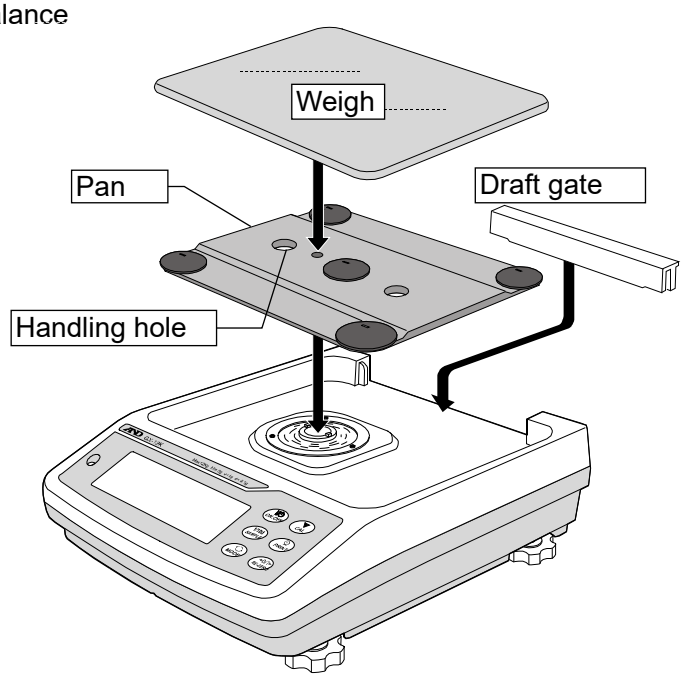


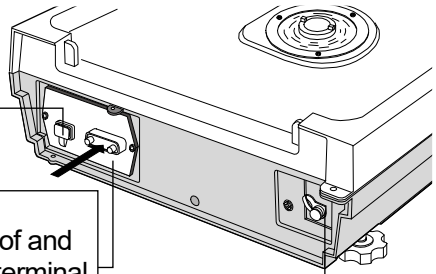
26. Maintenance

26-1 Cleaning the balance

The dustproof and waterproof performance of this product complies with everyday waterproof standards (IP65), allowing the pan to be washed with water while installed.
However, please note that—submerging the balance or exposing the bottom of the balance to water pressure may cause water to enter the interior.

- Clean the balance with a lint free cloth that is moistened with warm water and a mild detergent.
- Do not use organic solvents to cleanthe balance.
- Do not disassemble the balance.
- Use the original packing material for transp ortation.
- When washing the balance with water, attach a terminal cover or a waterproof RS-232C cable to the RS-232C port. Also, close the AC adapter cap and the USB terminal cap.
- When washing with warm water, condensation may form inside the balance, potentially causing deterioration of its components. Additionally, take precautions to prevent steam from entering the interior of the balance.





USB terminal cap
When the USB cable is not connected, cover the terminal.

RS-232C terminal cover
When using the device for dustproof and waterproof performance, attach a terminal cover or a waterproof RS-232C cable.

AC adapter cap
When the AC adaptor is not connected, cover the terminal.

27. Troubleshooting

27-1 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.

- ☐ Check the balance performance using the self-check function as described in "6-2 Self-Check-Function/Automatic Setting of Minimum Weight". An error display appears when a malfunction is found.
- ☐ Check the balance repeatability using 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.

Please check the following items.

Operating environment

- ☐ Is the table on which the balance is placed sturdy?
- ☐ Is the balance level? Refer to "2-2 Precautions Before Use".
- ☐ Is the operating environment free from vibration and drafts?
- ☐ 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 "2-3 Precautions during use for more accurate weighing".
- ☐ Is the sample free of static electricity? Refer to "2-3 Precautions during use for more accurate weighing".
- ☐ Is the sample made of a magnetic material, such as iron? Care must be taken when weighing magnetic materials. Refer to "2-3 Precautions during use for more accurate weighing".

27-2 Error display (error code)

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. If the issue is not resolved, repair is necessary.
-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.
LoWVoLt		**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 "2-3 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.

Display	Error code	Description and possible countermeasure
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.
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** In the self-check function, the standard deviation (SD) of repeatability using electronically controlled load (ECL) has exceeded 50 d. *1 Review the installation environment of the balance. ❑ SD Error Displayed when showing repeatability using ECL. ❑ MW Error Displayed when showing the minimum weighing value (reference value) using ECL. Refer to "6-2 Self-Check-Function / Automatic Setting of Minimum Weight". *1 "d" represents scale division.
FUL Alternate dAt (Blink)		**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 "11. Data Memory".
FUL Alternate CAL (Blink)		**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 "11. 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.
Error 3		**Malfunction of the internal memory element of the balance** If this error continues to be displayed, repair is necessary.
Error 5		**Mass sensor error** If this error continues to be displayed, repair is necessary.

Display	Error code	Description and possible countermeasure
-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 continues to be displayed, repair is necessary.
Error 9		**Abnormality in the internal memory data of the balance** If this error continues to be displayed, repair is necessary.
	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 °t-UP 1SEC is set, a waiting time of approximately 1 second or more occured 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.
	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.

Note: "d" represents scale division.

Automatic sensitivity adjustment notification mark (◄ mark blinking)
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.)

Tips

The balance can be used while this indicator is blinking. We recommend that you perform automatic self calibration for precision weighing.

27-3 Asking for repair

If any issues occur after verifying the balance's operation, or if error displays requiring repair appear, please contact your local A&D dealer.

The balance is a precision instrument. Handle it with care during transportation.

- When transporting the balance, use the packing materials and box that the balance was originally packed in when purchased.
- Remove the weighing pan, pan support, breeze break ring and dust plate from the main unit.

28. Specifications

28-1 Common specifications

28-1-1 Function

Internal weight		Built-in function*1
Time and clock function		Built-in function
Operating environment		5°C to 40°C (41°F to 104°F), 85%RH or less (No condensation)
Display refresh rate		5 times/second or 10 times/second or 20 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% (Depends on the reference mass stored.)
Communication		RS-232C、USB
Power (AC adapter)		AC adapter Confirm that the adapter type is correct for the local voltage and power receptacle type. Power consumption: Approx. 30 VA (supplied to the AC adapter)
Power consumption		DC 12V Approx. 0.2A (excluding AC adapter and options)
Dust and water protection		Complying with IP65

*1 The internal weight may undergo mass changes due to environmental conditions or aging.

28-1-2 Size/weight

Weighing pan size	270 mm×210 mm
Main body weight	Approx. 9.3 kg
External dimensions	300(W)×355(D)×111(H) mm

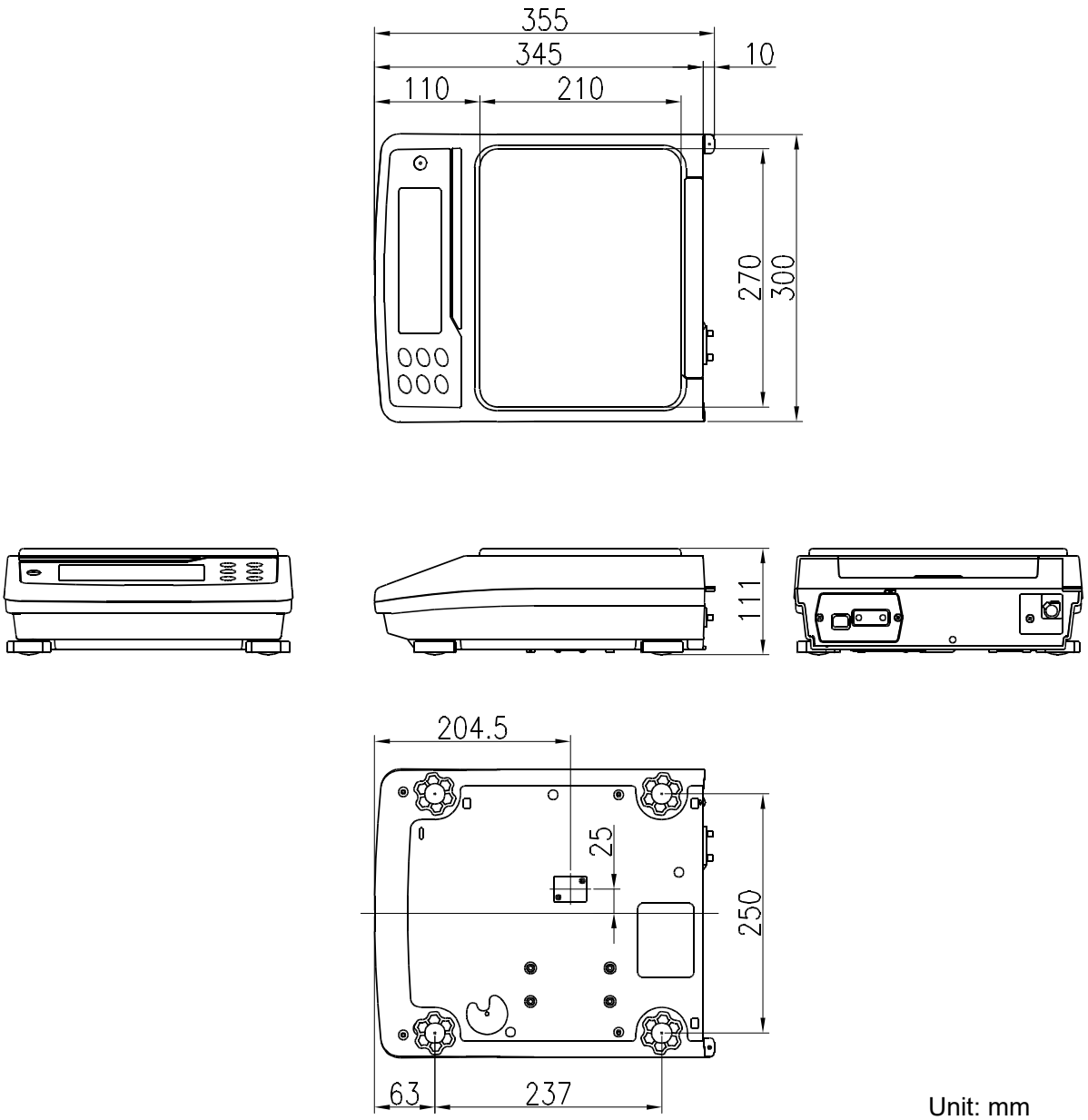
28-2 Individual Specifications

		MC-10203M	MC-32002M
Weighing capacity		10.2 kg	32.2 kg
Maximum display		10.200844 kg	32.20844 g
Readability		0.001g	0.01 g
Repeatability (Standard deviation) *1		0.0035 g / 2kg to10kg 0.0015 g / 2kg less than	0.05 g / 20kg to 30kg 0.015 g / 20kg less than
Linearity		±0.03 g	±0.2 g
Sensitivity drift, (10 °C to 30 °C / 50 F to 86 F When automatic sensitivity adjustment is turned off)		±2ppm/℃	±3ppm/℃
Accuracy after sensitivity adjustment using the internal weight *2		±0.150 g	±1.50 g
Counting mode	Minimum unit weight	0.001 g	0.01 g
Percent mode	Minimum 100% reference mass	1.000 g	10.00 g
Applicable weights for sensitivity adjustment		2 kg, 3 kg, 4 kg, 5 kg, 6 kg, 7 kg, 8 kg, 9 kg, 10kg	5kg,10 kg, 20 kg, 30 kg

*1 When the auto-centering pan is used or when loading and unloading are performed at the same place using the automatic loading machine under good ambient conditions.

*2 Accuracy right after calibration using the internal mass under good ambient conditions (within the temperature range of 10 ℃ to 30 ℃ (50 F to 86 F) with no abrupt changes in temperature or humidity, no drafts, no effect by magnetic fields or static electricity).
The value of the internal mass may change due to corrosion or other damage caused by the operating environment, or due to aging. Check the internal mass using an external weight periodically.

29. External dimensions



Unit: mm

30.Peripherals

30-1 Options

CAUTION

GXM-04, GXM-06, GXM-08, and GXM-27 cannot be used simultaneously.
When using GXM-04, GXM-06, or GXM-08, the dustproof and waterproof functionality will not be available..

Name	Function
GXM-04 Comparator Output (Relay/with a Buzzer) /RS-232C/External key input	❑ This option includes an external contact input terminal that allows operation of "Relay and Buzzer Output (mini-DIN 8-pin)," "RS-232C Interface," "PRINT," and "Re-Zero". *1 ❑ This function allows contact output of the result of comparison of the weighing value and the upper and lower limits. ❑ There are six contact outputs: "HH", "HI", "OK", "LO", "LL", and "READY", which indicates the balance status. The comparator output can be set to either three stages or five stages. ❑ You can select whether the buzzer sounds based on the comparison result. ❑ The external contact input terminal that allows operation of "Re-Zero"*1 and "PRINT" is compatible with foot switches sold separately (AX-SW137-PRINT, AX-SW137-REZERO). *1 If within the zero range, the zero point is updated; if exceeding the zero range, tare subtraction is performed.
GXM-06 Analog Voltage Output/RS-232C	❑ Analog voltage output mode includes the method of converting a specified digit of the weighing value into voltage, and the method of converting the weighing value into voltage within the range from zero to the weighing capacity. ❑ The voltage output range can be switched between 0 to1V or 0.2 to 1V using the 0V or greater /0.2V or greater slide switch on the option panel. The factory setting is 0 to 1V. The voltage obtained varies depending on the displayed value.
GXM-08 Ethernet (TCP/IP) interface	❑ Can connect the balance to a LAN (Ethernet) and perform bi-directional communication with a PC on the LAN. ❑ Windows Data Communication Software for LAN Connection "WinCT-Plus" can be downloaded from A&D website. ➢ Enables data acquisition from multiple weighing instruments with a single PC via LAN connection. ➢ Weighing instruments can be controlled by sending commands from the PC. ➢ Data acquisition (e.g.) Data is transmitted to the PC by pressing the PRINT key on the balance. ➢ Recorded data can be formatted in Microsoft Excel. (Microsoft Excel must be pre-installed.)

Name	Function
GXM-27 *Bluetooth*® interface	❑ Weighing values can be input to a PC, tablet, or smartphone equipped with Bluetooth. (HID function) ❑ The AD8541-PC dongle for PC connection enables wireless command communication with a PC. ❑ The A&D WeiV app for iOS and Android™ allows Bluetooth communication with smartphones and tablets using commands. **Note** Bluetooth® communication capability is disabled for regions where the balance is not certified as being compliant with local laws regarding use of Bluetooth® communication.
GXK-012 Animal Weighing Bowl	❑ This bowl can be used to weigh a small animal. ❑ When using this bowl, the weighing range that can beused is an approximately 1.5 kg less than the weighing capacity.
AX-073007197-S Display Protection Cover: Set of 5	❑ Standard display protection cover

30-2 Peripherals

Name	Function
AD-8129TH Thermal printer	❑ A compact direct thermal printer that connects via RS-232C interface. ❑ Multiple features are available, including date/time, statistical calculation, interval, and chart printing.
AD-8920A Remote display	❑ This option can be connected to the balance using the RS-232C interface or current loop and displays the weighing data transmitted by the balance.
AD-8922A Remote controller	❑ This option can be connected to the balance using the RS-232C interface and can control the balance remotely. ❑ Various options such as comparator output or analog output are available.
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.
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.
AX-KO2737-500EX Waterproof and Dustproof RS-232C Cable (5 m D-Sub 9P female-female)	❑ Length 5 m, D-Sub 9-pin (female) – 9-pin (female) ❑ Only the 9-pin on the balance side is waterproof type. ❑ Connectable devices: PC, PCL,etc.
AX-KO7695-500 Waterproof and Dustproof RS-232C Cable (5 m D-Sub 9P female-male)	❑ Length 5 m, D-Sub 9-pin (male) – 9-pin (female) ❑ Only the 9-pin on the balance side is waterproof type. ❑ Connectable devices: AD-1688, AD-8527,etc.
AX-KO5465-180 USB cable (A-mini B type) 1.8m	❑ Length 1.8 m, A – mini B type. ❑ Standard accessory
AX-USB-9P-EX USB converter	❑ Adds a COM port to a PC. ❑ Enables bi-directional communication between the PC and the balance when a USB driver is installed. ❑ Can use serial communication software such as WinCT on a PC without COM ports.
AD-8541-PC *Bluetooth*® dongle for PC *1	❑ Bidirectional communication via Bluetooth COM port is enabled between A&D balances (equipped with GXA-27 or AD-8541-SCALE) and a PC. ❑ Connects the balance to a PC via Bluetooth, with a maximum communication distance of 10 meters. (For details, refer to the AD-8541-PC Instruction Manual.)
AD-8541-SCALE RS-232C to *Bluetooth*® converter *1	❑ A&D balances equipped with an RS-232C (D-Sub 9-pin) interface can wirelessly communicate via Bluetooth with Bluetooth-enabled devices such as smartphones/tablets, PCs, and external displays equipped for Bluetooth communication (AD-8931-JA, AD-8541-PC). ❑ Maximum communication distance: Approx.10 m (For details, refer to the AD-8541-SCALE Instruction Manual.)

*1 Bluetooth® communication capability is disabled for regions where the balance is not certified as being compliant with local laws regarding use of Bluetooth® communication.

Name	Function
AD-1687 Weighing Environment Logger	❑ A data logger equipped with 4 sensors for temperature, humidity, barometric pressure and vibration that can measure and store environmental data. When connected to the RS-232C interface of the balance, the AD-1687 can store environmental data along with weighing data. Therefore, it is possible to store data in an environment where a computer can not be used. ❑ The stored data can be read to a personal computer using USB. As the AD-1687 is recognized as USB memory, special software is not required to read the data.
AD-1688 Weighing data logger	❑ When connected to the RS-232C interface of the balance, the AD-1688 can store the data in an environment where a personal computer can not be used. ❑ The stored data can be read to a personal computer using USB. As the AD-1688 is recognized as USB memory, special software is not required to read the data.
AD-8526 Ethernet converter	❑ Used to connect the RS-232C interface of the balance to the Ethernet (LAN) port of a computer. This allows management of the balance weighing data with a computer connected to a network. Includes the communication software “WinCT-Plus”.
AD-8527 Quick USB Adapter	❑ Can transmit weighing data to a personal computer in real time when connected to the RS-232C interface of the analyzer and to the computer using USB. ❑ Data transmission to any application such as Excel and Word. (Simplex)
AD-1682 Rechargeable battery	❑ Allows use of the balance in a place where AC power is not available. After battery discharge, recharging allows repeated use.

31. 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. （Good Laboratory Practice）
GMP	Good Manufacturing Practice. （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 = 1 digit: This means that measured values, obtained when the same sample is placed and removed repetitively, fall within ±1 digit in the frequency of about 68%
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
Dust and water protection (Complying with IP65)	Dust does not penetrate the interior. When installed, it shall remain unaffected by direct water jets from any direction. However, it cannot withstand strong direct jets or submersion.

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