FZ / FX SERIES
FZ-WP / FX-WP SERIES

Precision Balances

INSTRUCTION MANUAL

FZ Series (Internal Adjustment Type)
FZ-104 / FZ-154 / FZ-254 / FZ-254D
FZ-123 / FZ-223 / FZ-323 / FZ-523
FZ-1202 / FZ-2202 / FZ-3202 / FZ-5202

FX Series (External Adjustment Type)
FX-104 / FX-154 / FX-254 / FX-254D
FX-123 / FX-223 / FX-323 / FX-523
FX-1202 / FX-2202 / FX-3202 / FX-5202

FZ-WP Series (Dustproof and Waterproof, Internal Adjustment Type)
FZ-123WP / FZ-223WP / FZ-323WP
FZ-1202WP / FZ-2202WP / FZ-3202WP

FX-WP Series (Dustproof and Waterproof Type, External Adjustment Type)
FX-123WP / FX-223WP / FX-323WP
FX-1202WP / FX-2202WP / FX-3202WP

A&D Company, Ltd.

1WMPD4004606A

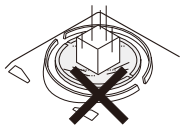
SAFETY NOTES AND OTHER NOTES

This manual contains the following safety warnings, symbols and other messages.

Word and symbol (for harm to persons / for damage to property):

⚠ **CAUTION**	A hazardous situation that, if not avoided, will or could result in minor or moderate injury or property damage.

Graphic and symbol:

	A cross symbol (X) indicates something that must not be done (i.e., prohibited actions). The prohibited action is described in writing or in graphics where X is shown. Example) The notice shown left indicates "Do not apply impact shock".

General message:

Caution	Points to be careful of for appropriate use.
Notice	'High possibility of inappropriate handling' or 'general advice on using the product'.
Tip	Information useful for using the device.

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Contents

1. Introduction

Thank you for purchasing A&D's electronic balance.
This instruction manual describes how the FZ / FX / FZ-WP / FX-WP series balance works.
For effective use, read this instruction manual thoroughly before using the balance.

Caution

Operations may differ depending on the software version of your balance.
For confirmation of the software version of the balance, refer to "19. Checking the Software Version of the Balance".

1.1. About the models

The FZ / FX / FZ-WP / FX-WP series are available in multiple models with different combinations of weighing capacities and readability. In this manual, they are classified and described according to the readability as shown in the table below.

Classification	Readability	Model	
		Internal adjustment type	External adjustment type
0.0001 g model	0.0001 g	FZ-104 / FZ-154 / FZ-254 / FZ-254D	FX-104 / FX-154 / FX-254 / FX-254D
0.001 g model	0.001 g	FZ-123 / FZ-223 / FZ-323 / FZ-523	FX-123 / FX-223 / FX-323 / FX-523
		FZ-123WP / FZ-223WP / FZ-323WP	FX-123WP / FX-223WP / FX-323WP
0.01 g model	0.01 g	FZ-1202 / FZ-2202 / FZ-3202 / FZ-5202	FX-1202 / FX-2202 / FX-3202 / FX-5202
		FZ-1202WP / FZ-2202WP / FZ-3202WP	FX-1202WP / FX-2202WP / FX-3202WP

- ❑ The FZ / FZ-WP series is equipped with the internal weight for sensitivity adjustment.
- ❑ The FX / FX-WP series does not have a built-in weight for sensitivity adjustment. When performing sensitivity adjustment, it is necessary to prepare a calibration weight separately.
- ❑ The FZ-WP / FX-WP series is dustproof and waterproof (compliant with IP65).

1.2. Features

- The FZ / FX / FZ-WP / FX-WP series are compact balances with readability from 0.0001 g to 0.01 g and can be installed almost anywhere. (For details, refer to "22. Specifications".)
- The FZ / FZ-WP series are equipped with an internal weight so sensitivity adjustment can be performed with just one key press. (For details, refer to "7.1. Sensitivity adjustment using the internal weight (FZ / FZ-WP series only)".)
- The FZ-WP / FX-WP series are dustproof and waterproof (IP65 compliant) and have a casing structure that is resistant to dust and liquid intrusion. (For details, refer to "FZ-WP / FX-WP series specifications" in "20.1. Treatment of the balance".)
- For more accurate weighing, a small breeze break is provided as standard for the FZ / FZ-WP series (except the 0.0001 g models) and for the FX-123 / 223 / 323 / 523 / 123WP / 223WP / 323WP. A large breeze break is provided as standard for all 0.0001 g models. (For details, refer to "2. Part Names, Installation and Cautions".)
- The balance comes standard with an underhook for underhook weighing. (For details, refer to "10. Underhook".)
- The balance can detect the impact applied to its mass sensor, and display and store the impact level. (For details, refer to "5. Impact Shock Detection (ISD) Function".)
- Multiple weighing modes can be selected. (For details, refer to "9.7. "Unit" for storing units (modes) explanation".)
- The weighing value of the sample placed on the weighing pan can be quickly read in a response time of as fast as approx. one second (or approx. two seconds with 0.0001 g models) (when the response characteristics is set to FAST). (For details, refer to "6. Response Adjustment".)
- The FZ / FZ-WP series are equipped with a clock function, and when set in the balance's function table, the date and time can be added to the output of weighing values. (For details, refer to "9.4. "Clock" explanation (FZ / FZ-WP series only)".)
- Comparison results can be displayed with the HI / OK / LO indicator when set in the balance's function table. (For details, refer to "9.5. "Comparator" explanation".)
- A hold function that can also be used for weighing animals is available when set in the balance's function table. (For details, refer to ""Hold function (HoLd)" (Animal weighing mode)" in "9.3. "Environment / Display" explanation".)
- The capacity indicator displaying the weighing value in percentage relative to the weighing capacity is available when set in the balance's function table. (For details, refer to "9.9.2. "Capacity indicator mode".)
- A statistical calculation function to display and output statistical calculation data such as weighing value sum, maximum, minimum, range (maximum–minimum), average, standard deviation, and coefficient of variation is available when set in the balance's function table. (For details, refer to "9.9.3. "Statistical calculation mode".)
- A password function to restrict users and operations of the balance is available when set in the balance's function table. (For details, refer to "12. Password Lock Function".)
- An RS-232C interface for outputting the weighing value and data of the balance is equipped as standard. (For details, refer to "13.1. RS-232C".)
- Reports compliant with GLP / GMP (etc.) can be output when set in the balance's function table. (For details, refer to "9.8.3. GLP report".)

- The keys on the balance can be locked by sending a specified command to the balance. (For details, refer to "17. Key Lock Function".)
- Various optional devices (sold separately) are available. (For details, refer to "23.1.1. Options".)
- When an optional communication interface, FXi-05, FXi-08, or GXA-27, is installed, weighing data format different from that of the RS-232C interface can be selected. (For details, refer to "18.1.2. Additional settings for FX-05", "18.2.2. Additional settings for the FXi-08", "18.3.1. Additional settings for the GXA-27", and "9.6.3. Weighing data format".)
- The output from the balance can be printed out on an AD-8127 multi-functional compact printer (sold separately). (For details, refer to "14. Printing Weighing Values to the Printer".)
- The weighing values can be checked away from the balance by using an AD-8920A remote display or AD-8922A remote controller (both sold separately). (For details, refer to "23.1.2. Accessories".)
- A density (specific gravity) measurement function using an AD-1654 density determination kit (for the FZ / FX series, sold separately) is available when set in the balance's function table. (For details, refer to "23.1.2. Accessories" and "11. Density (Specific Gravity) Measurement".)

1.3. Compliance

Compliance with FCC rules

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

2. Part Names, Installation, and Cautions

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

⚠CAUTION

- **Confirm that the AC adapter type is correct for your local voltage and receptacle type. Use the dedicated AC adapter specified for the balance.**
- **Do not use the AC adapter provided with the balance for other models or equipment with which the AC adapter may not be compatible.**
- **If you use the wrong AC adapter, the balance and other equipment may not operate properly.**

2.1. 0.0001 g models

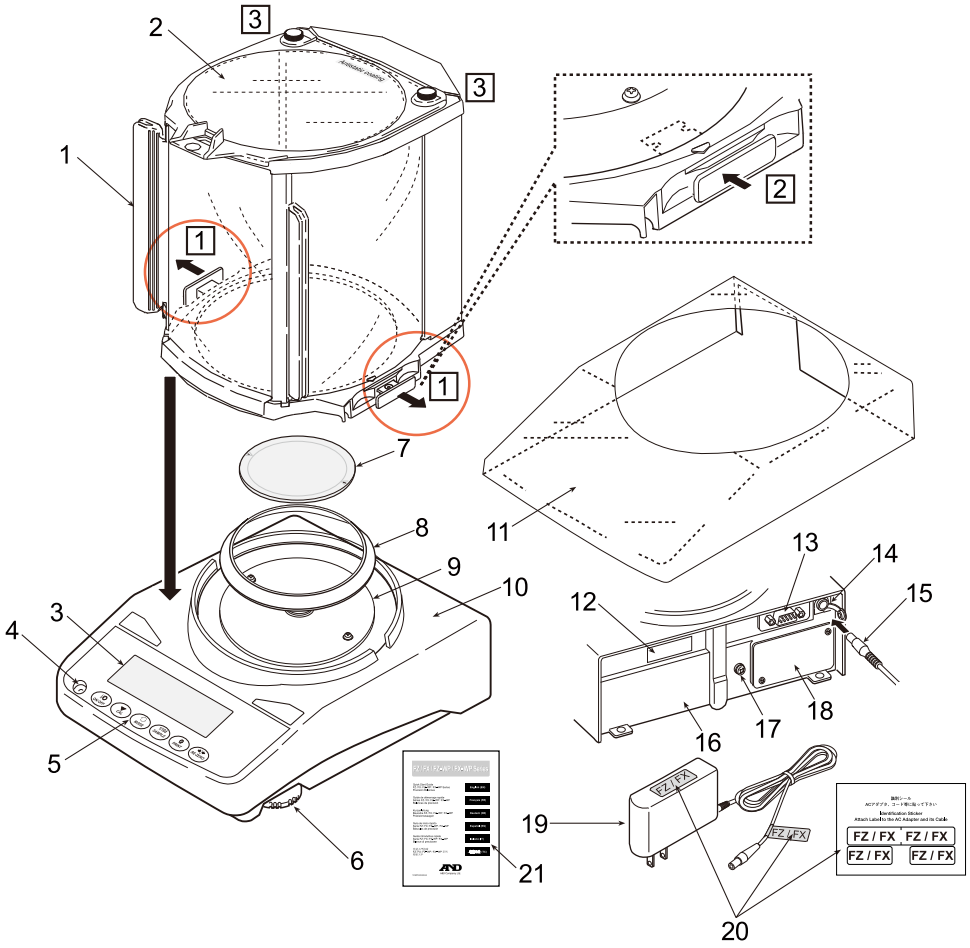
The large breeze break(1) must be attached before use.

Follow steps 1 to 3 below to attach the large breeze break(1).

1 Place the large breeze break(1) on the main unit(10) with the locking handles pulled out.

2 Push the locking handles back in while keeping the breeze break(1) pressed against the main unit(10). Ensure that the locking handles are inserted into the breeze break bottom plate(9).

3 How to open the top door(2):
Remove either one of the screws on the top door(2). Then, slide open the door using the other screw as a pivot.



No.	Name
1	Large breeze break*1
2	Top door
3	Display
4	Bubble spirit level
5	Keys
6	Leveling feed
7	Weighing pan
8	Breeze break ring

No.	Name
9	Breeze break bottom plate
10	Main unit
11	Main unit cover AX-FXi-31 (PET resin)
12	Serial number
13	RS-232C serial interface
14	AC adapter jack*2
15	AC adapter plug
16	Main unit rear side

No.	Name
17	Grounding terminal
18	Blank panel
19	AC adapter
20	AC adapter ID labels*3
21	Quick Start Guide

*1 Antistatic treatment applied.

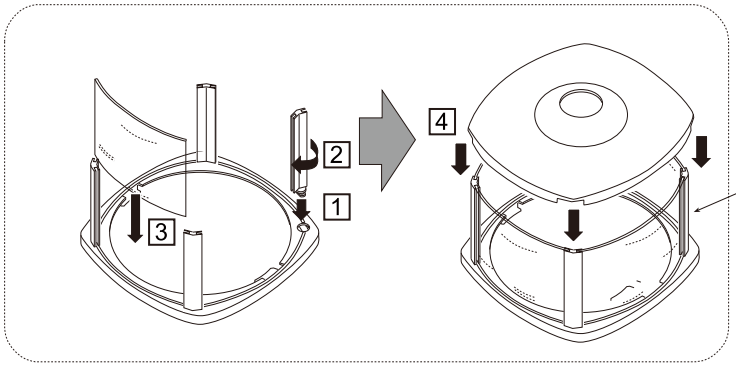
*2 The AC adapter plug is designed to fit tight in order to prevent dust from entering, so it is not easy to insert. Insert the plug while rotating it.

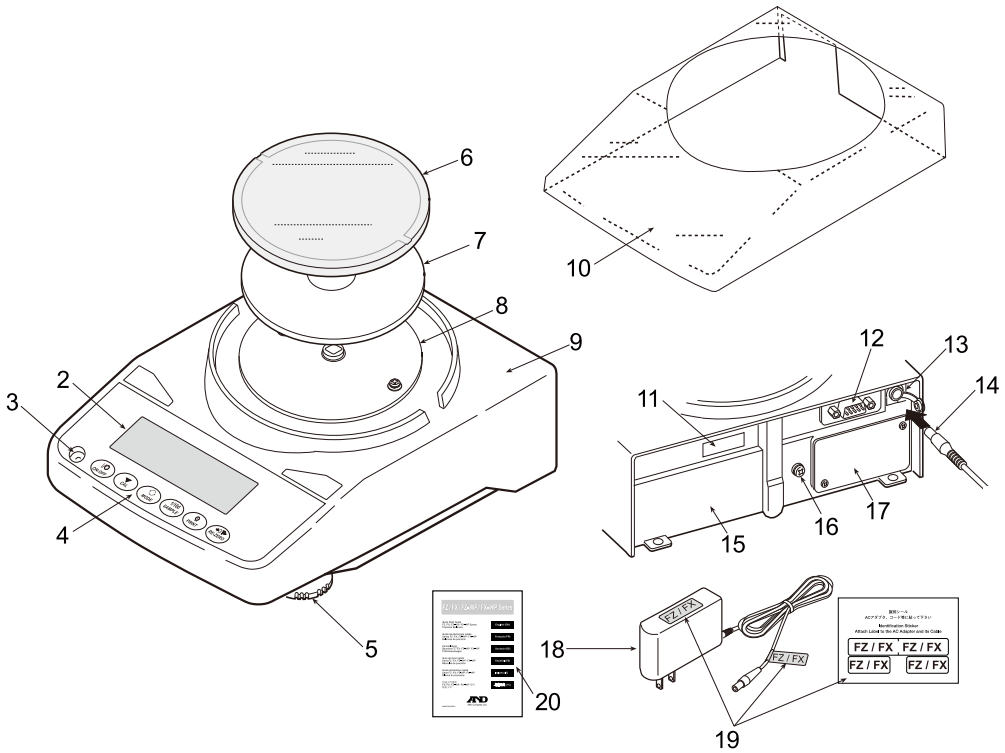
*3 To ensure that the correct AC adapter is always used, attach the AC adapter ID labels to the AC adapter and never remove them.

2.2. 0.001 g models / 0.01 g models

Follow steps 1 to 4 below to assemble the small breeze break(1).

(Refer to the next page for the dustproof and waterproof type, 0.001 g models / 0.01 g models.)





No.	Name
1	Small breeze break*1
2	Display
3	Bubble spirit level
4	Keys
5	Leveling foot
6	Weighing pan
7	Pan support*2
8	Breeze break bottom plate

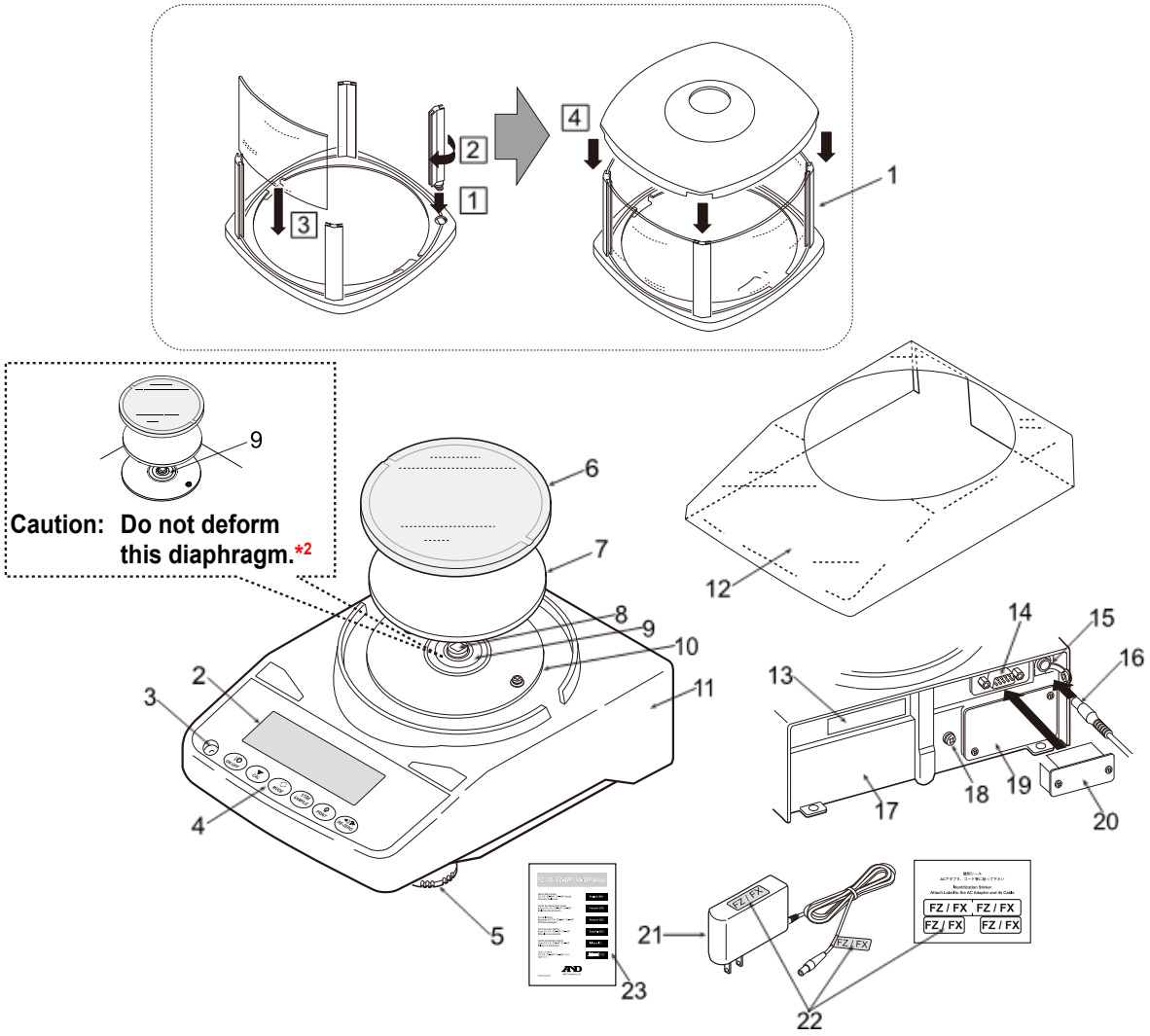
No.	Name
9	Main unit
10	Main unit cover AX-FXi-31 (PET resin)
11	Serial number
12	RS-232C serial interface
13	AC adapter jack*3
14	AC adapter plug
15	Main unit rear side
16	Grounding terminal

No.	Name
17	Blank panel
18	AC adapter
19	AC adapter ID label*4
20	Quick Start Guide

*1 Antistatic treatment applied. Provided as standard for all FZ models and the FX-123 / 223 / 323 / 523.
*2 Aluminum pan support is provided as standard for the FZ-5202 and FX-5202.
*3 The AC adapter plug is designed to fit tight in order to prevent dust from entering, so it is not easy to insert. Insert the plug while rotating it.
*4 To ensure that the correct AC adapter is always used, attach the AC adapter ID labels to the AC adapter and never remove them.

2.3. Dustproof and waterproof type 0.001 g models / 0.01 g models

Follow steps 1 to 4 below to assemble the small breeze break(1).



No.	Name
1	Small breeze break*1
2	Display
3	Bubble spirit level
4	Keys
5	Leveling foot
6	Weighing pan
7	Pan support
8	Pan support boss

No.	Name
9	Diaphragm for achieving the waterproof performance*2
10	Breeze break bottom plate
11	Main unit
12	Main unit cover AX-FXi-31 (PET resin)
13	Serial number
14	RS-232C serial interface
15	AC adapter jack*3
16	AC adapter plug

No.	Name
17	Main unit rear side
18	Grounding terminal
19	Blank panel
20	Terminal cover*4
21	AC adapter
22	AC adapter ID label*5
23	Quick Start Guide

*1 Antistatic treatment applied. Provided as standard for all FZ-WP models and the FX-123WP / 223WP / 323WP.

*2 Be careful not to deform this diaphragm when installing the pan support.

*3 The AC adapter plug is designed to fit tight in order to prevent dust from entering, so it is not easy to insert. Insert the plug while rotating it.

*4 To provide the balance with dustproof and waterproof performance, attach the terminal cover or waterproof RS-232C cable (AX-KO2737-500).

*5 To ensure that the correct AC adapter is always used, attach the AC adapter ID labels to the AC adapter and never remove them.

2.4. Assembling

Assemble the weighing pan and the small breeze break (included with all models of the FZ / FZ-WP series except for the 0.0001 g models and with the FX-123 / 223 / 323 / 523 / 123WP / 223WP / 323WP) or the large breeze break (included with all the 0.0001 g models) while referring to the previous section "2. Part Names, Installation and Cautions".

- ❑ Level the balance by adjusting the leveling feet so that the bubble of the bubble spirit level is centered in the red circle.
- ❑ Confirm that the adapter type is correct for the local voltage and power receptacle type. Connect the AC adapter plug to the AC adapter jack on the rear side of the balance and connect the power plug on other end of the cord to an outlet. (Be sure to warm up the balance by providing power using the AC adapter (connected to a power supply) for at least half an hour, or at least an hour for the 0.0001 g models, before use.)

Notice

If the AC adapter plug is difficult to insert, insert the plug while twisting it.

2.5. Precautions before use (Installation considerations and preparation)

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

- ❑ The best operating temperature is about 20 °C ± 2 °C at about 45% to 60% RH relative humidity.
- ❑ Install the balance where it is free of dust.
- ❑ The weighing table should be solid. (An anti-vibration table or stone table is ideal.)
- ❑ Install the balance in a stable location, avoiding vibration and shock. Corners of rooms on the first floor of a building, i.e. the floor which is level with the ground, are best as they are less prone to vibration.
- ❑ Install the balance where it is not affected by heating, ventilation, or air conditioning units and the like. Avoid breezes and drafts in the room.
- ❑ Avoid locations in direct sunlight.
- ❑ Install the balance away from equipment which produces magnetic fields.
- ❑ Level the balance by adjusting the leveling feet so that the bubble of the bubble spirit level is centered in the red circle. Refer to "2.6. Adjusting the level of the balance".
- ❑ For preparation before use, the balance should be provided with power using the AC adapter (connected to a power supply) for at least half an hour, or at least an hour for the 0.0001 g models.
- ❑ When the balance is installed for the first time or has been moved, be sure to perform sensitivity adjustment before use. For sensitivity adjustment, refer to "7. Sensitivity Adjustment / Calibration Test".
- ❑ 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 the level 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.

FZ-WP/FX-WP series

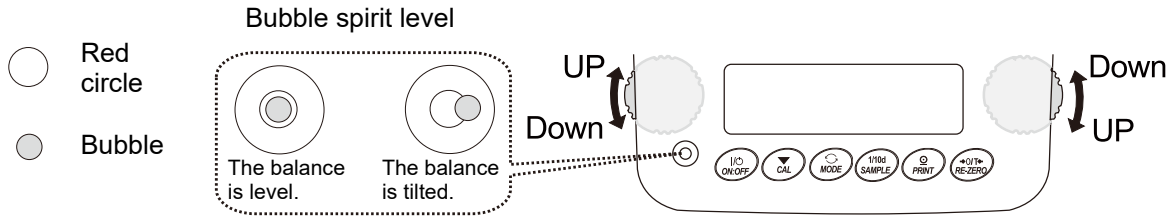
- The balance’s dustproof and waterproof rating is equivalent to IP65, and its second digit, "5", corresponds to "having no harmful influence by receiving direct jet of water". Washing with strong water pressure or submersion in water may cause water to enter the balance and cause a malfunction.
- When cleaning with hot water, condensation may occur inside the balance and the balance parts may deteriorate. Be careful not to let water vapor get inside the balance.
- When installing and using the balance under conditions requiring dustproof and waterproof performance, make sure that the AC adapter plug is fully inserted into the AC adapter jack and that the terminal cover is attached to the RS-232C interface or the waterproof RS-232C cable (AXKO2737-500) is used.
- If the RS-232C terminal cover is removed or the waterproof RS-232C cable (AX-KO2737-500) is not used, protection against dust and water is not provided.

⚠ CAUTION

- **Use the dedicated AC adapter specified for the balance.**
- **Confirm that the AC adapter type is correct for your local voltage and receptacle type.**
- **Do not install the balance where flammable or corrosive gas is present.**

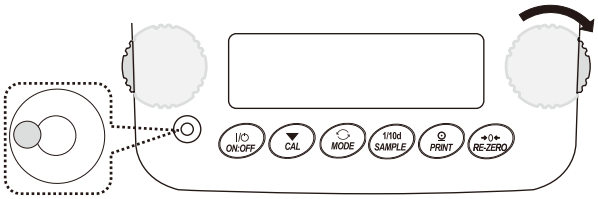
2.6. Adjusting the level of the balance

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



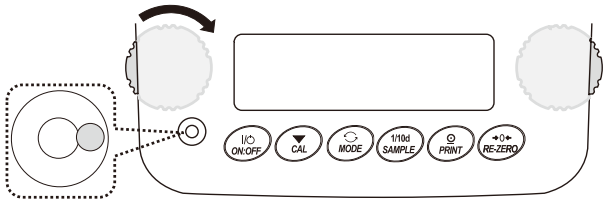
When the bubble is off to the left.

Turn the leveling foot on the front right in the clockwise direction.



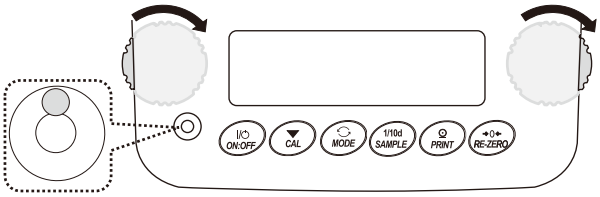
When the bubble is off to the right.

Turn the leveling foot on the front left in the clockwise direction.



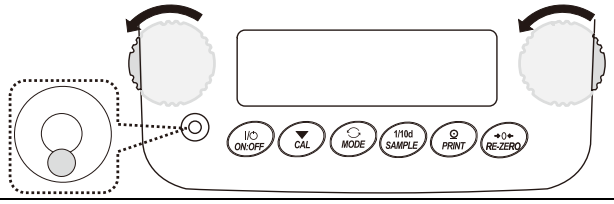
When the bubble is off to the backward position.

Turn both leveling feet on the front in the clockwise direction at the same time.



When the bubble is off to the forward position.

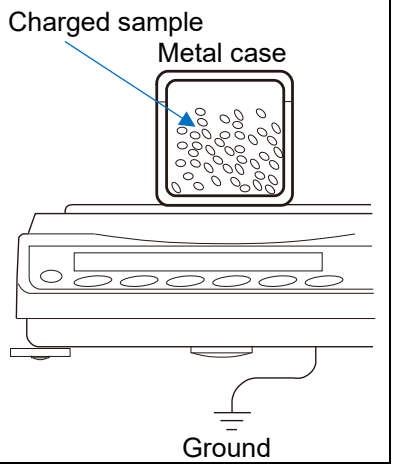
Turn both leveling feet on the front in the counter clockwise direction at the same time.



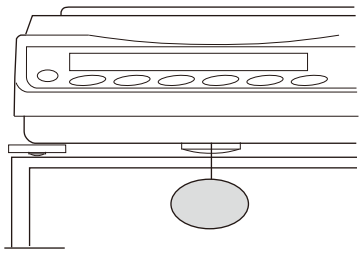
2.7. Precautions during use (for more accurate weighing)

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

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

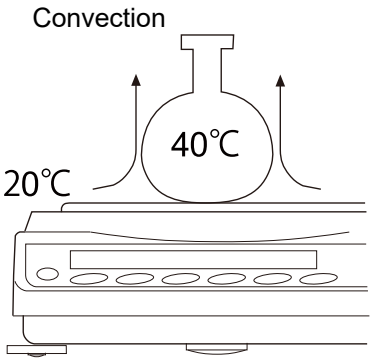


- Influence of magnetism may cause weighing errors. When measuring magnetic materials (iron, etc.), keep the sample away from the balance main body by means such as underhook weighing.

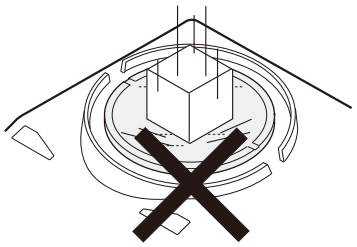


Magnetic material

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

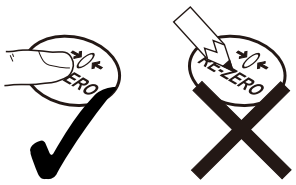


- When placing a sample on the weighing pan, do not drop it, or do not place a sample greater than the balance weighing capacity. Place the sample in the center of the weighing pan.



No impact shock

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



Good Bad

Caution

- **Perform weighing operations carefully and quickly. Note that error-inducing factors will increase due to moisture evaporation/absorption in the sample if measurement takes a long time.**
- **Do not leave the sample on the weighing pan for an extended period of time. If a sample is left on the weighing pan for a long time, the measured value will change due to deviation from the zero-point caused by environmental changes or due to creep phenomenon.**
- **Be sure to press the RE-ZERO key before weighing in order to eliminate measurement errors.**
- **Measurement results include error from air buoyancy. The buoyancy of air varies depending on the sample volume, atmospheric pressure, temperature, and humidity. Correct the buoyancy for the most precise measurement.**

- **Prevent foreign substances such as powder, liquid, and metal pieces from entering the balance.**
- **A small breeze break is provided as a standard accessory for all models of the FZ / FZ-WP series (except the 0.0001 g models) and the FX-123 / 223 / 323 / 523 / 123WP / 223WP / 323WP. A large breeze break is provided as a standard accessory for all 0.0001 g models. An anti-static treatment has been applied to the breeze break components, however, there are cases where they may be charged with static electricity for a while after they are unpacked or when the humidity is low. If the weight value is unstable even when there are no drafts in the measurement environment or if repeatability is poor, try removing the breeze break from the balance. Or wipe the clear plates using a cloth dampened with water to resolve the problem by discharging them. As another approach, using the optional AD-1683A static eliminator or applying an anti-static spray is also effective.**

About the FZ-WP / FX-WP series

- The balance has a highly airtight casing for achieving dustproof and waterproof performance. Therefore, the values displayed on the balance may become unstable due to minute indoor pressure fluctuations in the room when opening or closing the door. Try weighing after the pressure fluctuations has subsided.
- If water droplets or powder remain on the diaphragm for achieving waterproof performance or on the pan support boss, there may be cases where proper performance cannot be obtained from the balance. Use the balance after cleaning those.
- If the diaphragm for achieving the waterproof performance is deformed for reasons such as excessive load being applied, there may be cases where the values displayed on the balance is unstable until the deformation is fixed.

2.8. Cautions after use

- Avoid mechanical shock to the balance.
- Do not disassemble the balance.
- Do not use any strong organic solvents to clean the balance. Clean the balance with a lint-free cloth that is moistened with a mild detergent.
- When cleaning the weighing pan, handle it carefully so that your fingers are not injured by the edges.
- An anti-static treatment has been applied to the breeze break components. Wipe them with a dry and lint-free soft cloth. Wiping them using a cloth dampened with water or a mild detergent repeatedly or washing them using water may cause the anti-static treatment performance to decrease.

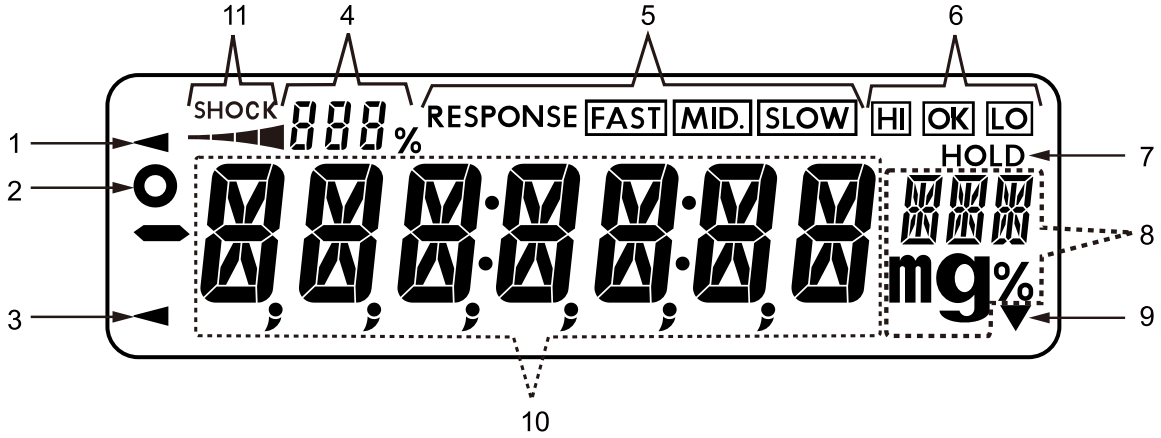
2.9. Caution on the power supply

- The balance is constantly provided with power as long as the AC adapter is connected.
  The balance is not adversely affected in this state.
  For accurate weighing, it is advisable to warm up the balance before use by providing power for at least half an hour, or at least an hour for the 0.0001 g models.

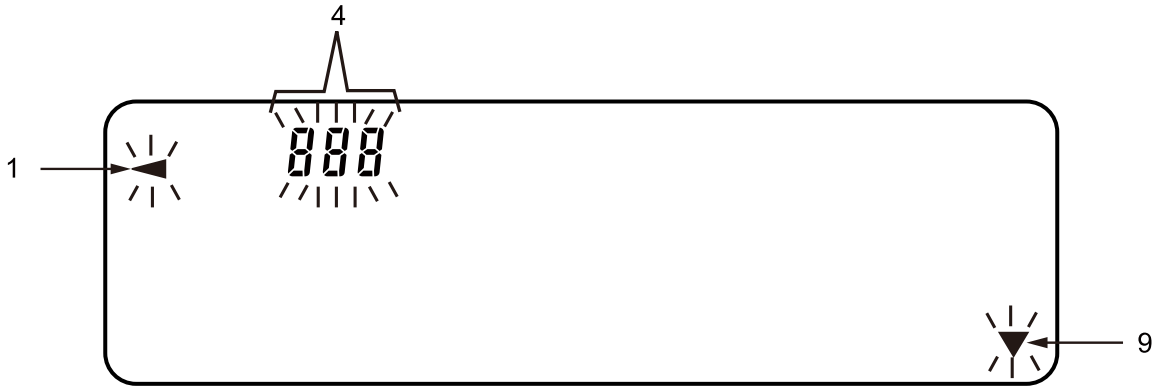
3. Display and Key Panel (Basic Operation)

3.1. Display

Lit display



Blinking display

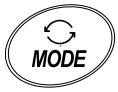


No.	Name
1	Processing indicator
2	Stabilization indicator
3	Standby indicator for power supply
4	Number of statistical data (statistical calculation function) Load/capacity relationship in % (Capacity indicator) Function table set value display
5	Response indicators (lit for 30 seconds after start of weighing)
6	Comparator indicators
7	Display hold mark
8	Unit display Auxiliary display for the function table
9	Interval output mode in standby
10	Displays the weighing value or setting item name.
11	Impact shock detection (ISD) indicator

3.2. Key operation

Key operations affect how the balance functions. Normal key operation during measurement is "Press and release the key immediately" or "Press and hold the key for (approx.) 2 seconds".
Please do not press and hold the key for 2 seconds unless required.

 Press the key (Press and release the key immediately.)	 Press and hold the key for 2 seconds.

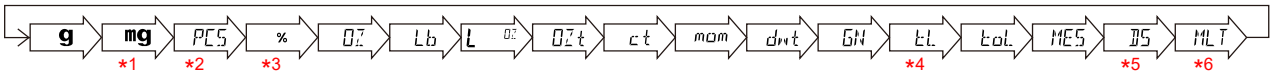
Key	When pressed and released	When pressed and held for 2 seconds
	Turns the display on and off. When the display is turned off, only the standby indicator is displayed. When the display is turned on, weighing is possible. If the password function is enabled, you will be prompted to enter the password when the display is turned on. For details, refer to "12.2. Entering a password at the start of weighing". The ON:OFF key is active at any time, and pressing this key during operation always turns off the display.	
	For the FZ / FZ-WP series, this key activates the mode for sensitivity adjustment using the internal weight. In function table mode, this key cancels the operation.	Displays the sensitivity adjustment related menu.
	Switches the weighing units stored in the function table. Refer to "4.1. Units of measure".	Activates the response adjustment mode. Refer to "6. Response Adjustment".
	In weighing mode, this key turns the readability digit on/off. In counting or percent mode, this key enables the sample storing mode.	Activates the function table mode. Refer to "9. Function Table".
	Outputs the weighing data when stable. Confirms the setting operation when in a setting mode.	No function at factory settings. By changing the setting (refer to "9. Function Table"), the following function can be assigned: ❑ Outputting "Title block" and "End block" for GLP/GMP reports. (Refer to "9.8. GLP report and ID number ".)
	Sets the display to zero.	

4. Weighing

4.1. Units of measure

4.1.1. Units

The FZ / FX / FZ-WP / FX-WP series are equipped with the units (modes) of measure shown below. You can specify the units (modes) to store with the function table. (Refer to "9.7. "Unit" for storing units (modes) explanation"). The units (modes) that are not specified will be hidden when the balance displays the sequence of units (modes). To use a unit (mode), press the MODE key in weighing mode and choose the unit (mode) from the sequence.



*1 "mg" (milligram) is only available for the 0.0001g models.
*2 Counting mode. (For details about this mode, refer to "4.4. Counting mode (PCS) ".)
*3 Percent mode. (For details about this mode, refer to "4.5. Percent mode (Percent weighing mode) ".)
*4 For "tael", one of the four varieties can be selected for the factory default setting.
*5 Density mode. (For details about this mode, refer to "11. Density (Specific Gravity) Measurement".) To use this mode, it must be stored with the function table. (Refer to "9. Function Table".) Once stored, press the MODE key until the processing indicator blinks with the unit g displayed. DS is displayed when a density value is displayed.
*6 Programmable-unit (For details, refer to "4.1.2. Programmable-unit".)

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

Unit / mode name	Abbrev.	Display	Function table (Storing mode)	Conversion to grams
Gram	g	g	g	1 g
Milligram	mg	mg	mg	0.001 g
Counting mode	PCS	PCS	PCS	——
Percent mode	%	%	%	——
Ounce (Avoir)	OZ	OZ	OZ	28.349523125 g
Pound	Lb	Lb	Lb	453.59237 g
Pound/Ounce	L OZ	L OZ	L OZ	1Lb=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
Mesghal	MES	MES	MES	4.6875 g
Density mode*	DS	g DS is shown for the density.	DS	——
Programmable-unit (Multi-unit)	MLT	MLT	MLT	——

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

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

Unit	Capacity			Readability
	FZ / FX			
	104	154	254	
Gram	102	152	252	0.0001
Ounce (Avoir)	3.59	5.36	8.88	0.00001
Troy Ounce	3.27	4.88	8.10	0.00001
Metric Carat	510	760	1260	0.001
Momme	27.2	40.5	67.2	0.0001
Pennyweight	65.5	97.7	162.0	0.0001
Grain (UK)	1574	2346	3889	0.002
Tael (HK general, Singapore)	2.69	4.02	6.66	0.00001
Tael (HK jewelry)	2.72	4.06	6.73	0.00001
Tael (Taiwan)	2.72	4.05	6.72	0.00001
Tael (China)	3.26	4.86	8.06	0.00001
Tola (India)	8.74	13.0	21.6	0.00001
Mesghal	21.7	32.4	53.7	0.0001

Unit	FZ-254D / FX-254D			
	Precision range		Standard range	
	Capacity	Readability	Capacity	Readability
Gram	62	0.0001	252	0.001
Ounce (Avoir)	2.18	0.00001	8.88	0.0001
Troy Ounce	1.99	0.00001	8.10	0.0001
Metric Carat	310	0.001	1260	0.01
Momme	16.5	0.0001	67.2	0.001
Pennyweight	39.8	0.0001	162.0	0.001
Grain (UK)	956	0.002	3889	0.01
Tael (HK general, Singapore)	1.64	0.00001	6.66	0.0001
Tael (HK jewelry)	1.65	0.00001	6.73	0.0001
Tael (Taiwan)	1.65	0.00001	6.72	0.0001
Tael (China)	1.98	0.00001	8.06	0.0001
Tola (India)	5.31	0.00001	21.6	0.0001
Mesghal	13.2	0.0001	53.7	0.001

Unit	Capacity				Readability
	FZ / FX / FZ-WP / FX-WP			FZ / FX	
	123	223	323	523	
Gram	122	220	320	520	0.001
Ounce (Avoir)	4.30	7.76	11.2	18.3	0.00005
Pound	0.268	0.485	0.705	1.14	0.000005
Pound/Ounce	0L 4.30 oz	0L 7.76 oz	0L 11.29 oz	0L 18.34 oz	1L 0.01 oz
Troy Ounce	3.92	7.07	10.2	16.7	0.00005
Metric Carat	610	1100	1600	2600	0.005
Momme	32.5	58.6	85.3	138	0.0005
Pennyweight	78.4	141	205	334	0.001
Grain (UK)	1882	3395	4938	8024	0.02
Tael (HK general, Singapore)	3.22	5.82	8.46	12.1	0.00005
Tael (HK jewelry)	3.25	5.87	8.54	13.8	0.00005
Tael (Taiwan)	3.25	5.86	8.53	13.8	0.00005
Tael (China)	3.90	7.04	10.2	16.6	0.00005
Tola (India)	10.4	18.8	27.4	44.5	0.0001
Mesghal	26.0	46.9	68.2	110	0.0005

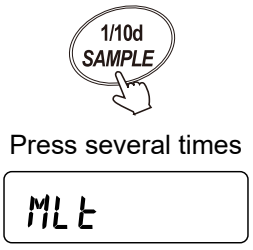
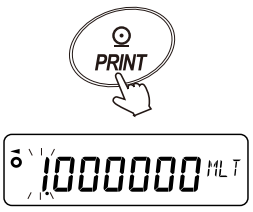
Unit	Capacity				Readability
	FZ / FX / FZ-WP / FX-WP			FZ / FX	
	1202	2202	3202	5202	
Gram	1220	2200	3200	5200	0.01
Ounce (Avoir)	43.0	77.6	112	183	0.0005
Pound	2.68	4.85	7.05	11.4	0.00005
Pound/Ounce	2L 11.03 oz	4L 13.60 oz	7L 0.88 oz	11L 7.65 oz	1L 0.01 oz
Troy Ounce	39.2	70.7	102	167	0.0005
Metric Carat	6100	11000	16000	26000	0.005
Momme	325	586	853	1386	0.005
Pennyweight	784	1414	2057	3343	0.01
Grain (UK)	18827	33951	49383	80248	0.2
Tael (HK general, Singapore)	32.2	58.2	84.6	121	0.0005
Tael (HK jewelry)	32.5	58.7	85.4	138	0.0005
Tael (Taiwan)	32.5	58.6	85.3	138	0.0005
Tael (China)	39.0	70.4	102	166	0.0005
Tola (India)	104	188	274	445	0.001
Mesghal	260	469	682	1109	0.005

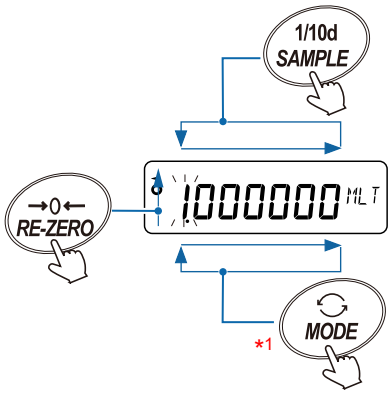
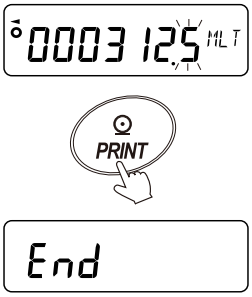
4.1.2. Programmable-unit

The programmable-unit function allows the balance to calculate and display the conversion result by multiplying the weighing value in grams with the coefficient you have set with the function table. Note that the coefficient must be within the minimum and maximum range below. If the coefficient is outside this range, an error message will appear, and the balance will return to setting mode, prompting you to enter a valid value. The factory default coefficient is 1.

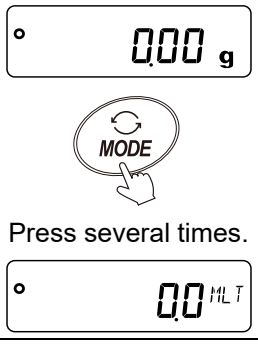
Model	Minimum coefficient	Maximum coefficient
FZ-104 / FZ-154 / FZ-254 / FZ-254D FX-104 / FX-154 / FX-254 / FX-254D	0.000001	10000
FZ-123 / FZ-223 / FZ-323 / FZ-523 FX-123 / FX-223 / FX-323 / FX-523 FZ-123WP / FZ-223WP / FZ-323WP FX-123WP / FX-223WP / FX-323WP		1000
FZ-1202 / FZ-2202 / FZ-3202 / FZ-5202 FX-1202 / FX-2202 / FX-3202 / FX-5202 FZ-1202WP / FZ-2202WP / FZ-3202WP FX-1202WP / FX-2202WP / FX-3202WP		100

Setting procedure

Step	Description	Display and key operation
1	In weighing mode, press and hold the [SAMPLE] key for 2 seconds to display [bASFnc].	
2	Press the [SAMPLE] key several times until [MLt] is displayed.	
3	Press the [PRINT] key. The balance enters programmable-unit setting mode.	

Step	Description	Display and key operation
4	**Confirming the set coefficient** The currently set coefficient is displayed with the first digit blinking. **Setting a new coefficient** Set a coefficient by operating the keys as explained below. **SAMPLE key** Selects a digit to change the value. The selected digit blinks. **RE-ZERO key** Changes the value. **MODE key**[*1] Changes the decimal point position. *1 Each time the MODE key is pressed, the decimal point position shifts, as shown below: 0.000001 → 00.00001 → ... → 000000.1 → 0000001	
5	To store the setting, press the PRINT key. (Or, to cancel it, press the CAL key.)	
6	**Quitting the programmable-unit setting mode** The balance displays Unit. Press the CAL key to exit the programmable-unit setting mode. The balance returns to weighing mode.	

Using the programmable-unit

Step	Description	Display and key operation
7	In weighing mode, you can activate the programmable-unit by pressing the MODE key several times until MLt is displayed. Perform weighing as described in "4.2. Basic operation". The balance displays the conversion result (weighing value in grams × the set coefficient).	

4.2. Basic operation

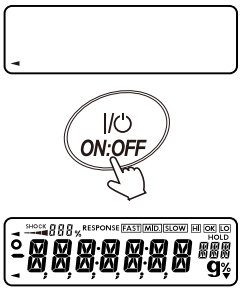
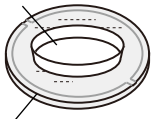
4.2.1. Zero-point setting, tare subtraction operation, and weighing range

At the start of weighing

The balance determines the reference zero-point when the weighing display 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 or tare subtraction operation.

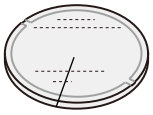
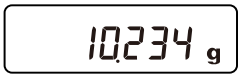
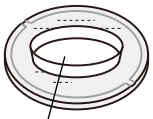
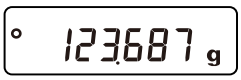
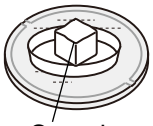
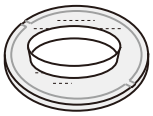
The condition for determining which is used is "power on zero range", and when power on zero range is exceeded, the tare subtraction operation is performed.

Step	Description	Display and key operation	Weighing operation
1	Place a container on the weighing pan, and then press the ON:OFF key to start weighing.		Container (tare)  Weighing pan
2	Perform weighing with zero value displayed.		

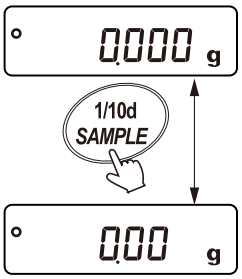
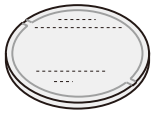
Re-zero operation

Pressing the [RE-ZERO] key sets the display to zero.

Re-zero operation with the [RE-ZERO] key automatically determines which operation to perform: zero setting or tare subtraction. Based on the "zero range", tare subtraction is performed when the range is exceeded.

Step	Description	Display and key operation	Weighing operation
1	Press the [MODE] key to select the unit. "g" is selected here as an example.	 	 Weighing pan
2	Place a container on the weighing pan as necessary. Press the [RE-ZERO] key to display 0.000 g. (The decimal separator position depends on the balance model.)	  	 Container
3	Place a sample on the weighing pan. Wait for the stabilization indicator to be displayed. Then, read the weighing value. When the stabilization indicator is lit, pressing the [PRINT] key outputs the weighing value externally. * To output, peripheral equipment (sold separately), printer, or PC is required. Example of output to a PC (RsCom) A&D standard format (at factory settings) [ST,+0123.687␣␣g<TERM>] ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	   Data output	 Sample
4	Remove the sample from the weiging pan.		

Turning on/off the readability digit

Step	Description	Display and key operation	Weighing operation
1	Pressing the SAMPLE key toggles the readability digit on / off.		

Weighing range

Each balance model has a specific range in which it can weigh and display. If a gross weight exceeds the maximum display capacity for the model, the balance displays E, indicating that the weight is over the weighing range. If a gross weight is below the range, the balance displays -E.

Gross weight = Net weight [weighing value after tare subtraction] + Tare weight

Model		Power-on zero range	Zero range	-E display range
FZ-104,	FX-104	± 10.2 g	± 2.04 g	Less than −2.04 g
FZ-154,	FX-154	± 15.2 g	± 3.04 g	Less than −3.04 g
FZ-254,	FX-254	± 25.2 g	± 5.04 g	Less than −5.04 g
FZ-254D,	FX-254D			
FZ-123,	FX-123	± 12.2 g	± 2.44 g	Less than −2.44 g
FZ-123WP,	FX-123WP			
FZ-223,	FX-223	± 22 g	± 4.4 g	Less than −4.4 g
FZ-223WP,	FX-223WP			
FZ-323,	FX-323	± 32 g	± 6.4 g	Less than −6.4 g
FZ-323WP,	FX-323WP			
FZ-523,	FX-523	± 52 g	± 10.4 g	Less than −10.4 g
FZ-1202,	FX-1202	± 122 g	± 24.4 g	Less than −24.4 g
FZ-1202WP,	FX-1202WP			
FZ-2202,	FX-2202	± 220 g	± 44 g	Less than −44 g
FZ-2202WP,	FX-2202WP			
FZ-3202,	FX-3202	± 320 g	± 64 g	Less than −64 g
FZ-3202WP,	FX-3202WP			
FZ-5202,	FX-5202	± 520 g	± 104 g	Less than −104 g

Power-on zero is the zero point determined when the balance's display is turned on.
The power-on zero range is within ±10% of the weighing capacity at power-on zero in reference to the zero point in sensitivity adjustment. The zero point will be set if the weighing value is within the range. If the weighing value exceeds the range, it will be subtracted as tare weight.

The zero range is within ±2% of the weighing capacity in reference to the power-on zero. The zero point will be set if the weighing value is within the range when the RE-ZERO key is pressed. If the weighing value exceeds the range, it will be subtracted as tare weight.
The balance weighs from the zero point up to the weighing capacity. Note that, after tare subtraction, the balance weighs from the zero point up to the weighing capacity minus the tare weight.

4.3. Smart range function

The FZ-254D and FX-254D are equipped with two ranges: standard range and precision range (high resolution range).

Smart range function

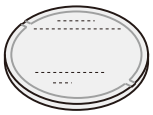
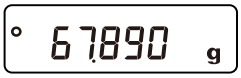
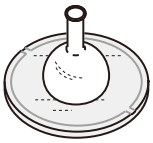
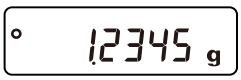
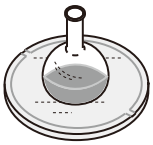
- The balance automatically switches between the standard and precision (high resolution) ranges depending on the value to be displayed.
- The precision range can be used even with a heavy container (tare) on the weighing pan if you set the display to zero by pressing the [RE-ZERO] key.
- The range can be fixed to the standard range with the [SAMPLE] key.

Precision range and standard range

Unit*		Precision range (After the [RE-ZERO] key is pressed)	Standard range
g	Gram	0.0000 g to 62.0009 g	62.001 g to 252.008 g
mg	Milligram	0.0 mg to 62000.9 mg	62001 mg to 252008 mg
ct	Metric carat	0.000 ct to 310.005 ct	310.01 ct to 1260.04 ct
mom	Momme	0.0000 mom to 16.5336 mom	16.534 mom to 67.202 mom

* Refer to "4.1.1. Units" for units of measure other than those shown in this table.

Example of operation

Step	Description	Display and key operation	Weighing operation
1	Prepare to start weighing in the precision range. Press the [RE-ZERO] key to set the display to zero and activate the precision range.	  Precision range	 Weighing pan
2	Place a container (tare) on the weighing pan. When the value to be displayed exceeds the precision range, the balance switches to the standard range.	 Standard range	 Container
3	Press the [RE-ZERO] key to set the display to zero and to activate the precision range.	  Precision range	
4	Place the sample to be weighed. Weighing is performed with the precision range while the displayed value is within the precision range.	 Precision range	 Sample

4.4. Counting mode (PCS)

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

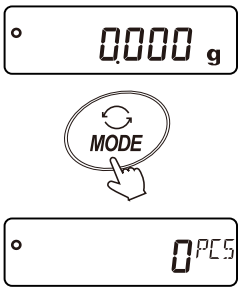
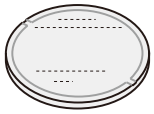
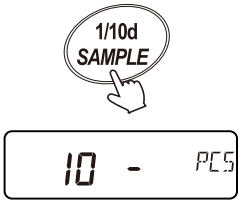
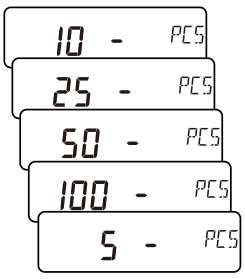
Caution

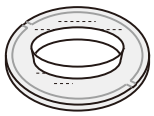
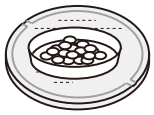
- **The recommended sample unit weight (weight per piece) is at least ten times the balance's readability. For example, with a 0.001 g readability model, the recommended sample unit weight is 0.01 g or more.**
- **If there is a large variation in weight per piece, it may not be possible to count accurately.**
- **If a significant counting error occurs, try a method such as performing the ACAI function frequently or dividing the sample and counting several times.**

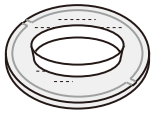
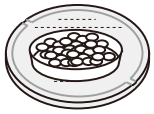
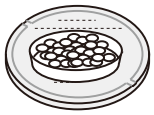
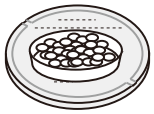
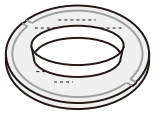
Notice

- **The stored sample unit weight can be output using the "?UW" command and changed using the "UW:" command.**
- **For the "?UW" command, refer to "16. Commands".**

Setting procedure

Step	Description	Display and key operation	Weighing operation
1	Selecting the counting mode Press the [MODE] key to select PCS. (PCS means pieces.)		 Weighing pan
2	Storing a sample unit weight Press the [SAMPLE] key to enter the mode for storing a sample unit weight. **Tip** **The storing mode can be switched to the next mode with the [MODE] key.**		
3	Select the number of sample pieces (10, 25, 50, 100, or 5 pcs) by pressing the [SAMPLE] key as necessary. **Tip** **It is a good idea for accurate counting to store a larger number of sample pieces because there could be some variation in the unit weight of sample pieces.**	 Press several times.  The display cycles.	

Step	Description	Display and key operation	Weighing operation
4	Place a container on the weighing pan if necessary.	25 - PCS	 Container
5	Press the RE-ZERO key to display ° 25 0 PCS. (In this example, the number of sample pieces to store is 25.)	 ° 25 0 PCS	
6	Place the specified number of samples on the weighing pan.	25 - PCS	 Sample
7	When the stabilization indicator " ⊙ " is lit, press the PRINT key. The balance stores the sample unit weight calculated from the weighing value and displays the count. (When the count is 25: ° 25 PCS) **Tip** ❑ **The balance prompts to add more sample pieces if it judges that the loaded sample is too light (resulting in large counting error). Add more sample pieces until the displayed number is reached, and then press the PRINT key again. When the sample unit weight is stored correctly, the balance displays the count.** ❑ **The balance displays Lo if the sample is too light to store as the sample unit weight. The sample cannot be stored.** **Example) When you use a balance with 0.001 g readability to perform counting of a sample whose total weight of 10 pieces is only 0.005 g:** **Store the sample unit weight of 100 pieces as 10. Perform counting of the sample, then multiply the displayed count by 10 to know an approximate number of the sample pieces.** ❑ **The stored unit weight is stored in nonvolatile memory even if the power is removed.**	° 25 - PCS  ° 25 PCS	

Step	Description	Display and key operation	Weighing operation
8	**Counting mode** The balance is now ready to perform counting. With the stabilization indicator lit, pressing the PRINT key outputs the weighing value (count) externally. **Tip** **A printer, PC, or peripheral equipment (sold separately) is required.** Example of output to a PC (RsCom) A&D standard format (at factory settings) `QT,+00000055␣PC<TERM>` ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	0 PCS 55 PCS PRINT Outputting count data	 
9	**Automatic Counting Accuracy Improvement (ACAI)** This function automatically improves the counting accuracy each time the number of sample pieces is increased. Errors will be reduced as variations in sample weight are averaged. After storing the sample unit weight in step 6, proceed to step 10 below. **Caution** **The ACAI function does not apply to the unit weight set with the "UW:" command.**	55 PCS	
10	Add some sample pieces. The processing indicator (◄) will then turn on. (To prevent a malfunction, three or more pieces must be added. Note that the processing indicator will not turn on when overloaded. Add sample pieces while avoiding a significant increase in the displayed count.)	58 PCS	
11	Do not touch or move the sample pieces while the processing indicator is blinking (◄). (The accuracy is being updated.)	58 PCS	
12	The accuracy is updated when the processing indicator (◄) turns off. Each time this process is repeated, the counting accuracy will improve further. The range of ACAI after exceeding 100 pieces is not predetermined. Add sample pieces while avoiding a significant increase in the displayed count.	58 PCS	
13	Remove all the sample pieces used for ACAI from the weighing pan and start counting work. **Tip** **Do not change units during the ACAI processing.**	0 PCS	

4.5. Percent mode (Percent weighing mode)

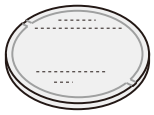
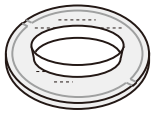
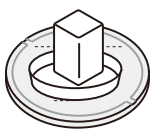
The percent mode displays the weighing value in a percentage compared with a reference mass as 100%. This is useful for target weighing or sample variance checks.

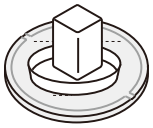
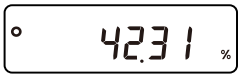
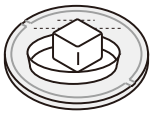
Caution

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

Model	100% reference mass	Decimal separator position
0.0001 g model	0.0100 g to 0.0999 g	1 %
	0.1000 g to 0.9999 g	0.1 %
	1.0000 g -	0.01 %
0.001 g model	0.100 g to 0.999 g	1 %
	1.000 g to 9.999 g	0.1 %
	10.000 g -	0.01 %
0.01 g model	1.00 g to 9.99 g	1 %
	10.00 g to 99.99 g	0.1 %
	100.00 g -	0.01 %

Setting procedure

Step	Description	Display and key operation	Weighing operation
1	Selecting the percent mode Press the [MODE] key to select the unit %.	0.000 g MODE 0.00 %	
2	Storing a reference mass as 100% (Preparation for percent weighing) Press the [SAMPLE] key to enter the mode for storing a 100% reference mass. **Tip** **Even in storing mode, you can switch it to the next mode by pressing the [MODE] key.**	1/10d SAMPLE 100 - %	
3	Place a container on the weighing pan as necessary. Press the [RE-ZERO] key to set the display to [100 0 %].	→0← RE-ZERO 100 0 %	
4	Place a sample for the 100% reference mass.	100 - %	

Step	Description	Display and key operation	Weighing operation
5	Press the [PRINT] key to store the 100% reference mass. The balance displays 100.00 %. **Tip** **The stored 100% reference mass is stored in nonvolatile memory even if the power is removed.**	 	
6	Percent weighing Now it is ready to perform percent weighing. When the stabilization indicator is lit, pressing the [PRINT] key outputs the weighing value externally. **Tip** **A printer, PC, or peripheral equipment (sold separately) is required.** Example of output to a PC (RsCom) A&D standard format (at factory settings) [ST,+00042.31␣␣%<TERM>] ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	   Percent data output	

5. Impact Shock Detection (ISD) Function

The balance has a function to detect impact shocks 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 advisable to minimize the impact level as much as possible while checking the shock indicator.

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

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

You can turn off the impact shock detection function by setting " iSd " to " 0 " in [bASFnc] of the function table ("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.

Caution

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

5.1. Recording impact history

Impacts of impact level 3 or higher are automatically stored on the balance (up to 50 instances).
(With the FZ / FZ-WP models, data and time are added.)

When the password lock function is set to ON ("Lock" set to " 1" or "2" in [PASSwd] of the function table ("9. Function Table")), the login user information is added when outputting the impact history.

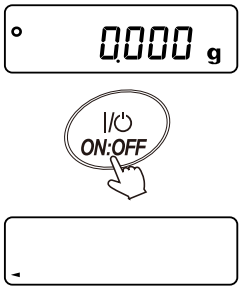
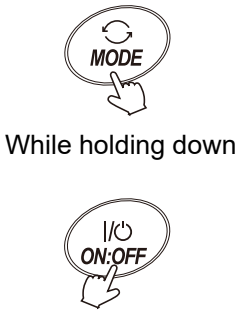
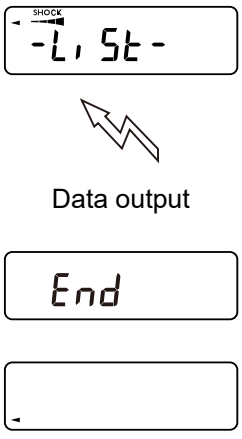
Caution

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

5.2. Impact history output

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

Output by key operation

Step	Description	Display and key 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	SHOCK -L, St- is displayed, and the stored impact data is output all at once.	

Output by command

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

Examples of impact history output

The output contents of the FZ / FZ-WP series and those of the FX / FX-WP series are different.

FZ / FZ-WP series: Date, time, impact level and login user information are output together on one line.

FX / FX-WP series: Impact level and login user information are output together on one line.

Output example of the FZ / FZ-WP series (RsCom)

```
2023/04/28,14:11:55,SHOCK␣LV,4,--,␣␣␣␣␣<TERM>
2023/04/28,14:13:13,SHOCK␣LV,4,00,ADMIN<TERM>
2023/04/28,14:13:16,SHOCK␣LV,3,01,USER␣<TERM>
2023/04/28,14:14:07,SHOCK␣LV,4,10,USER␣<TERM>
2023/04/28,14:17:33,SHOCK␣LV,3,--,GUEST<TERM>
```

Date Time Impact level Login user information

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

Output example of the FX / FX-WP series (RsCom)

```
SHOCK␣LV,4,--,␣␣␣␣␣<TERM>
SHOCK␣LV,4,00,ADMIN<TERM>
SHOCK␣LV,3,01,USER␣<TERM>
SHOCK␣LV,4,10,USER␣<TERM>
SHOCK␣LV,3,--,GUEST<TERM>
```

Impact level Login user information

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

The login user information varies depending on the settings of the login user and "LocK" in PASSwd of the function table ("9. Function Table") when receiving impact.

Output	Login user	Function table (PASSwd)
,--,	No login user	"LocK" set to "0", "LocK" set to "1", "LocK" set to "2"
,00,ADMIN	Administrator	"LocK" set to "1"
,01～10,USER	User	"LocK" set to "1"
,--,GUEST	Guest	"LocK" set to "2"

6. Response Adjustment

Disturbances such as draft and vibration at the place where the balance is installed affect weighing. In the response adjustment settings, the response characteristics of the balance can be set in three stages according to the disturbance.

Indicator	Function table	Response	Display stability
FAST	Cond set to 0	Fast	Susceptible to draft and vibration
MID.	Cond set to 1	↑	↓
SLOW	Cond set to 2	Slow	Stable

Response setting

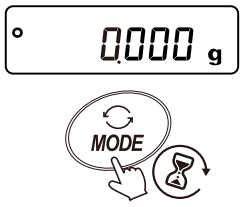
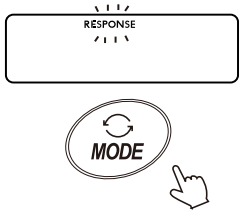
Caution

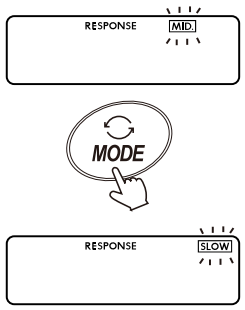
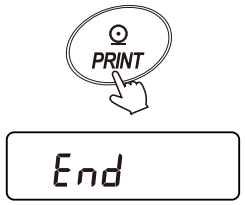
Setting the response characteristics changes the parameters of "Cond (Condition)" and "SPd (Display refresh rate)" in "Environment / Display (bASFnc)" of the function table ("9. Function Table") as shown below:

Indicator	Cond (Condition)	SPd (Display refresh rate)
FAST	0	2 (approx. 20 times / sec.)
MID.	1	0 (approx. 5 times / sec.)
SLOW	2	0 (approx. 5 times / sec.)

When the balance is to be used with setting combinations other than the above, set each parameter in the function table ("9. Function Table").

Setting procedure

Step	Description	Operation
1	Press and hold the MODE key until RESPONSE is displayed.	 Press and hold for 2 seconds
2	Release the key when RESPONSE appears.	 Release

Step	Description	Operation
3	Press the [MODE] key to select a rate of the response adjustment. (Either [FAST], [MID.], or [SLOW] can be chosen.)	
4	After a few seconds of inactivity, or when the [PRINT] key is pressed, the balance displays [End].	
5	The balance returns to weighing mode and displays the updated response indicator for a while.	

7. Sensitivity Adjustment / Calibration Test

- Since the balance resolution is high, its weighing values may change due to gravity and day-to-day environmental changes. It is necessary to perform sensitivity adjustment using a weight to keep the weighing values from changing even if gravity or the environment changes.
  It is advisable to perform sensitivity adjustment when the balance is installed for the first time or relocated or when the weighing values in daily inspection and the like have deviated significantly.
- Sensitivity adjustment means adjusting the balance with a reference weight or the internal weight to ensure accurate weighing.
- Calibration test means weighing a reference weight with the balance to compare how much the result deviates from the reference value. **Note that no sensitivity adjustment is performed.**

Sensitivity adjustment

Sensitivity adjustment using the internal weight

Adjustment of the balance using the internal weight is executed by pressing one key. (The FZ / FZ-WP series only)

Sensitivity adjustment using an external weight

Adjustment of the balance is done using an external weight.

Calibration test

Calibration test using an external weight

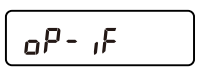
The accuracy of the balance is checked using an external weight, and the result is output.
Note that no sensitivity adjustment is performed.

Calibration test using the internal weight (0.0001 g models of the FZ series only)

The accuracy of the balance is checked using the internal weight, and the result is output.
Note that no sensitivity adjustment is performed.

Cautions on sensitivity adjustment / calibration test

- When performing a sensitivity adjustment, the small breeze break (provided with all models of the FZ / FZ-WP series except the 0.0001 g models and with the FX-123 / 223 / 323 / 523 / 123WP / 223WP / 323WP) or the large breeze break (provided with the 0.0001g models) must be attached.
- Do not allow vibration or drafts to affect the balance during a sensitivity adjustment / calibration test.
- In a sensitivity adjustment / calibration test, the balance can output a report compliant with GLP/GMP and the like.

  To output a report compliant with GLP/GMP and the like, set "inFo (GLP output)" in " 
  (Serial interface)" or " 
  (Option interface)" of the function table ("9. Function Table").

  A PC or optional printer is required to output GLP reports. In GLP reports, date and time are output using the balance's clock function. If the date and time are not correct, set the clock while referring to "9.4. "Clock" explanation (FZ / FZ-WP series only)". Note that the calibration test function is available only when output of reports compliant with GLP / GMP is set.

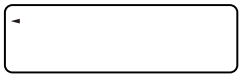
Cautions on using an external weight

- ❑ It is critical that the weight for sensitivity adjustment be accurate as it ensures the accuracy of the balance after sensitivity adjustment.
- ❑ Select from the list below an appropriate weight for sensitivity adjustment / calibration test using an external weight.

Model				Usable weight	Adjustable range
FZ-104	FX-104			100 g*, 50 g	−0.0150 g to +0.0150 g
FZ-154	FX-154			150 g, 100 g*, 50 g	
FZ-254	FX-254			250 g, 200 g*, 100 g, 50 g	
FZ-254D	FX-254D			250 g, 200 g*, 100 g, 50 g, 20 g	
FZ-123	FX-123	FZ-123WP	FX-123WP	100 g*, 50 g	−0.050 g to +0.050 g
FZ-223	FX-223	FZ-223WP	FX-223WP	200 g*, 100 g, 50 g	
FZ-323	FX-323	FZ-323WP	FX-323WP	300 g, 200 g*, 100 g, 50 g	
FZ-523	FX-523			500 g*, 400 g, 300 g, 200 g, 100 g, 50 g	
FZ-1202	FX-1202	FZ-1202WP	FX-1202WP	1000 g*, 500 g	−0.50 g to +0.50 g
FZ-2202	FX-2202	FZ-2202WP	FX-2202WP	2000 g*, 1000 g, 500 g	
FZ-3202	FX-3202	FZ-3202WP	FX-3202WP	3000 g, 2000g*, 1000 g, 500 g	
FZ-5202	FX-5202			5000 g*, 4000 g, 3000 g, 2000 g, 1000 g, 500 g	

* Factory setting

Display



This indicator means the balance is measuring sensitivity adjustment data/calibration test data. Do not allow vibration or drafts to affect the balance while this indicator is displayed.

7.1. Sensitivity adjustment using the internal weight (FZ / FZ-WP series only)

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

(The FX / FX-WP series does not have a function to perform sensitivity adjustment using the internal weight.)

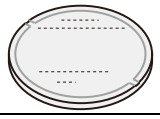
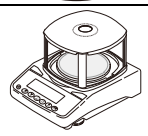
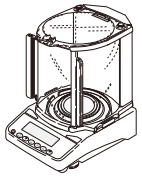
Caution

- **Refer to "2.6. Adjusting the level of the balance" and level the balance by turning the leveling feet so that the bubble in the bubble spirit level is in the center of the red circle. Poor level adjustment may cause a sensitivity adjustment error.**

Cautions on the internal weight

- **The value of the internal weight may change due to factors such as the operating environment, aging, etc.**
  Correct the internal weight value as necessary by referring to "7.6. Correcting the internal weight value (FZ / FZ-WP series only)".
  It is advisable to perform sensitivity adjustment regularly for the best weighing management while referring to "7.3. Sensitivity adjustment using an external weight".

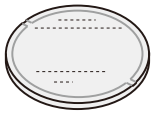
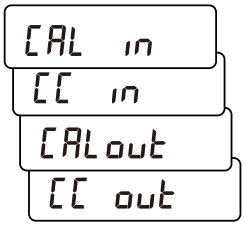
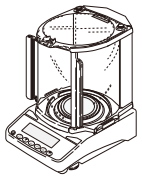
Operating procedure

Step	Description	Display and key operation	Weighing operation
1	With nothing on the weighing pan, warm up the balance by providing power for at least half an hour, or at least an hour for the 0.0001 g models.	0.000 g	
2	Attach the breeze break. Then, press the CAL key to display CAL in. The balance automatically starts a sensitivity adjustment with the internal weight. Do not apply vibration and the like to the balance.	 CAL in CAL CAL	 or 
3	After the sensitivity adjustment, the balance will output the "sensitivity adjustment report" if GLP output is set in the function table. (Refer to "9. Function Table" for "inFo (GLP output)". For output examples, refer to "Output for sensitivity adjustment with the internal weight".	End GLP  GLP output (Only when "inFo (GLP output)" is set ("9. Function Table")). End	
4	After completing the sensitivity adjustment, the balance returns automatically to weighing mode.	0.000 g	

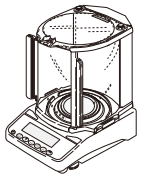
7.2. Calibration test using the internal weight (0.0001 g models of the FZ series only)

This function uses the internal weight to check how accurate the balance weighs. (No sensitivity adjustment is performed.)
This function is available only when the output of reports compliant with GLP/GMP and the like is set (InFo set to 1 or 2) in the function table ("9. Function Table").

Operating procedure

Step	Description	Display and key operation	Weighing operation
1	With nothing on the weighing pan, warm up the balance by providing power for at least half an hour, or at least an hour for the 0.0001 g models.	0.00000 g	
2	Refer to "9. Function Table" and set "InFo" to "1" or "2".		
3	Attach the breeze break. Then, press and hold the CAL key until CC in is displayed. The display changes every 2 seconds while the key is held down. Display / Refer to: CAL in — "7.1. Sensitivity adjustment using the internal weight (FZ / FZ-WP series only)." CC in — "7.2. Calibration test using the internal weight (0.0001 g models of the FZ series only)"* CALout — "7.3. Sensitivity adjustment using an external weight" CC out — "7.4. Calibration test using an external weight"* * Displayed only when "InFo" is set to "1" or "2" in the function table ("9. Function Table").	 Press and hold.  The display cycles.	
4	Release the CAL key when CC in is displayed.	CC in  Release.	
5	The balance checks the zero-point. Do not apply vibration and the like to the balance.	CC in	
6	The checked zero-point value is displayed.	0.00000 g	
7	The balance checks the full-scale point. Do not apply vibration and the like to the balance.	CC in	

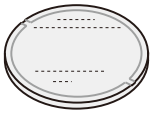
<table>
<tr><th>Step</th><th>Description</th><th>Display and key operation</th><th>Weighing operation</th></tr>
<tr><td>8</td><td>The checked full-scale point value is displayed. For the full-scale point, see the reference values shown below. If the displayed value falls within the normal range, the balance has been adjusted correctly with the internal weight.

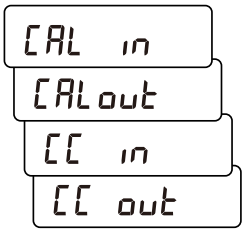
<table><tr><th>Model</th><th>Reference value</th><th>Normal range</th></tr><tr><td>FZ-254</td><td>200.0000 g</td><td rowspan="2">± 0.0002 g</td></tr><tr><td>FZ-154
FZ-104</td><td>100.0000 g</td></tr><tr><td>FZ-254D</td><td>200.000 g</td><td>± 0.0020 g</td></tr></table></td><td>  </td><td rowspan="3">  </td></tr>
<tr><td>9</td><td>After the calibration test, the balance will output the "calibration test report". For the output examples, refer to "Output for calibration test with the internal weight".</td><td> 
 
 
GLP output
  </td></tr>
<tr><td>10</td><td>The balance returns automatically to weighing mode.</td><td>  </td></tr>
</table>

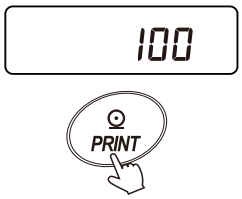
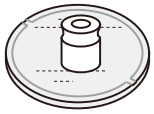
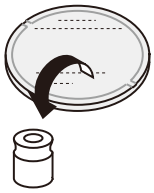
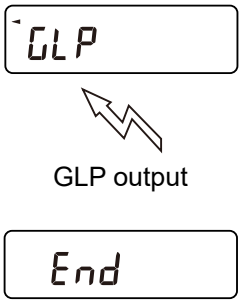
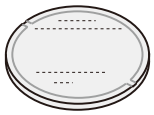
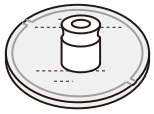
7.3. Sensitivity adjustment using an external weight

This is a function to perform sensitivity adjustment using an external weight.

Operating procedure

<table>
<tr><th>Step</th><th>Description</th><th>Display and key operation</th><th>Weighing operation</th></tr>
<tr><td>1</td><td>With nothing on the weighing pan, warm up the balance by providing power for at least half an hour, or at least an hour for the 0.0001 g models..</td><td>0.0000 g</td><td rowspan="7">  </td></tr>
<tr><td>2</td><td>Press and hold the [CAL] key until [CALout] is displayed.
The display changes every 2 seconds while the key is held down.

<table>
<tr><th>Display</th><th>Refer to</th></tr>
<tr><td>[CAL in]</td><td>"7.1. Sensitivity adjustment using the internal weight (FZ / FZ-WP series only)"</td></tr>
<tr><td>[CC in]</td><td>"7.2. Calibration test using the internal weight (0.0001 g models of the FZ series only)" *</td></tr>
<tr><td>[CALout]</td><td>"7.3. Sensitivity adjustment using an external weight"</td></tr>
<tr><td>[CC out]</td><td>"7.4. Calibration test using an external weight"*</td></tr>
</table>
* Displayed only when [inFo] is set to [1] or [2] in the function table ("9. Function Table").</td><td> 
Press and hold.
 
The display cycles.</td></tr>
<tr><td>3</td><td>When [CALout] is displayed, release the [CAL] key.</td><td>[CALout]
 
Release</td></tr>
<tr><td>4</td><td>To change the value of the weight, refer to "7.5. Setting the value of the external weight". If no change is required, proceed to step 5.</td><td>[CAL 0]</td></tr>
<tr><td>5</td><td>Make sure that nothing is on the weighing pan. Then, press the [PRINT] key.</td><td>[CAL 0]
  </td></tr>
<tr><td>6</td><td>The balance weighs the value for the zero-point. Do not apply vibration and the like to the balance.</td><td>[CAL 0]</td></tr>
</table>

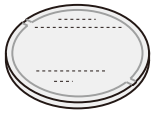
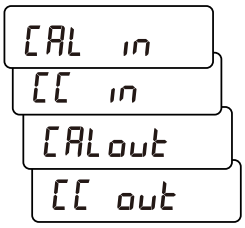
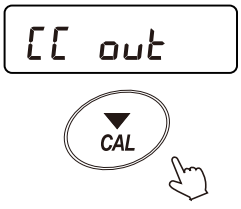
Step	Description	Display and key operation	Weighing operation
7	Place the external weight on the weighing pan. Then, press the [PRINT] key.		
8	The balance weighs the weight. Do not apply vibration and the like to the balance.		
9	Remove the weight from the weighing pan.		
10	After the sensitivity adjustment, the balance will output the "sensitivity adjustment report" if GLP output is set. For the output examples, refer to "Output for sensitivity adjustment with an external weight ".		
11	The balance returns automatically to weighing mode.		
12	Place the external weight on the weighing pan again and check if the set value ± 2 d is displayed. If the value is not within the range, redo this procedure from step 1 in the appropriate ambient conditions. “d” represents scale division.		

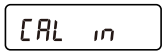
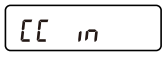
7.4. Calibration test using an external weight

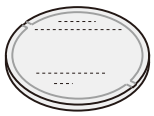
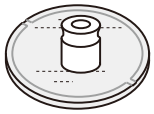
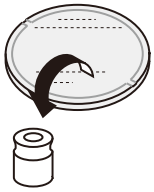
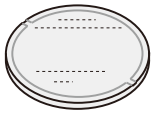
This is a function to perform calibration test using an external weight to check how accurate the balance weighs. (No sensitivity adjustment is performed.)

This function is available only when the output of reports compliant with GLP/GMP and the like is set (inFo set to 1 or 2) in the function table ("9. Function Table").

Operating procedure

Step	Description	Display and key operation	Weighing operation
1	With nothing on the weighing pan, warm up the balance by providing power for at least half an hour, or at least an hour for the 0.0001 g models.		
2	Set inFo to 1 or 2 while referring to "9. Function Table".		
3	Press and hold the CAL key until CC out is displayed. The display changes every 2 seconds while the key is held down. *** Displayed only when "inFo" is set to "1" or "2" in the function table ("9. Function Table").**	 Press and hold.  The display cycles.	
4	When CC out is displayed, release the key.		
5	To change the value of the external weight, refer to "7.5. Setting the value of the external weight". If no change is required, proceed to step 6.		
6	Make sure that nothing is on the weighing pan. Then, press the PRINT key.	 	

Display	Refer to
	"7.1. Sensitivity adjustment using the internal weight (FZ / FZ-WP series only)"
	"7.2. Calibration test using the internal weight (0.0001 g models of the FZ series only)" *
	"7.3. Sensitivity adjustment using an external weight"
	"7.4. Calibration test using an external weight" *

Step	Description	Display and key operation	Weighing operation
7	The balance weighs the value for the zero-point. Do not apply vibration and the like to the balance.	CC 0	
8	The measured zero-point value is displayed for a few seconds.	0.000 g	
9	Place the weight on the weighing pan. Then, press the PRINT key.	100 	
10	The balance weighs the weight. Do not apply vibration and the like to the balance.	100	
11	The value of the weight is displayed for a few seconds.	100.001 g	
12	Remove the weight from the weighing pan.	End	
13	After the calibration test, the balance will output the "calibration test report". For the output examples, refer to "Output for calibration tests with an external weight".	GLP  GLP output End	
14	The balance returns automatically to weighing mode.	0.000 g	

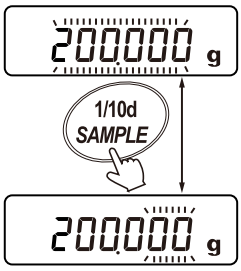
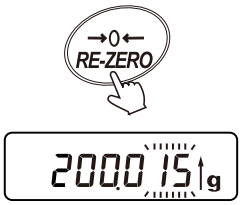
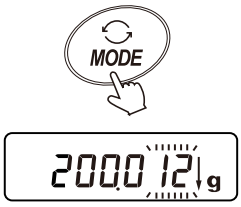
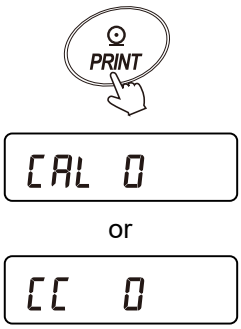
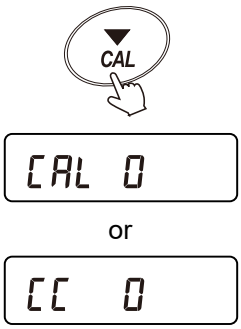
7.5. Setting the value of the external weight

When performing a sensitivity adjustment or calibration test, the value of your external weight can be set. For usable weights, refer to the list for "Cautions on using an external weight".

To set the value, follow the setting procedure after [CAL 0] is displayed as described in "7.3. Sensitivity adjustment using an external weight" or after [CC 0] is displayed as described in "7.4. Calibration test using an external weight".

Setting procedure

Step	Description	Display and key operation
1	When [CAL 0] or [CC 0] is displayed in the sensitivity adjustment or calibration test, press the [SAMPLE] key.	[CAL 0] or [CC 0] 
2	Use the [RE-ZERO] key to change the value of the external weight (when all digits are blinking). For usable weights, refer to the list for "Cautions on using an external weight".	[100.000 g]  [200.000 g]

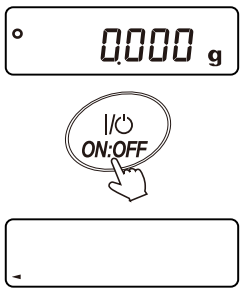
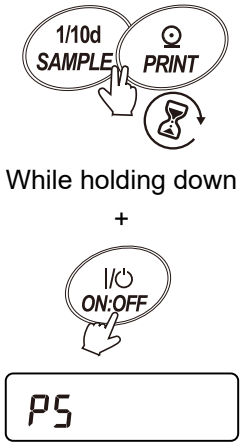
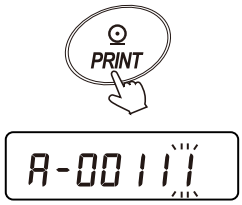
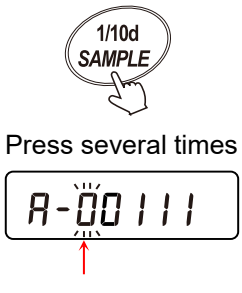
Step	Description	Display and key operation
3	Set the value of the weight by operating the keys as explained below.	
	SAMPLE key Toggles between the display where all digits blink (weight selection mode) and where the last two digits blink*1 (instrumental error adjustment mode). *1 With the 0.0001 g models, the last three digits blink.	Weight selection  Instrumental error selection
	RE-ZERO key Changes (+) the value of the instrumental error*2. *2 0.0001 g model……−150 d appears after +150 d. Other models……−50 d appears after +50 d. “d” represents scale division.	
	MODE key Changes (−) the value of the instrumental error.*3 *3 0.0001 g models……+150 d appears after −150 d. Other models……+50 d appears after −50 d. “d” represents scale division.	
	PRINT key Stores the changed value of the weight. The new value is stored in nonvolatile memory even if the power is removed.	
	CAL key Cancels setting operations. The value of the weight does not change. (The display returns to CAL 0 or CC 0.)	

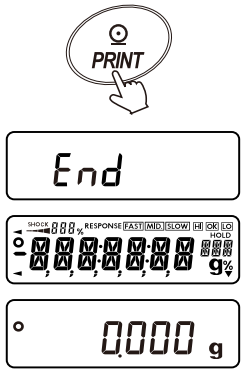
7.6. Correcting the internal weight value (FZ / FZ-WP series only)

Caution

The function to perform correction of the internal weight value is disabled at factory settings.
To enable it, follow the setting procedure below.

Setting procedure

Step	Description	Display and key operation
1	Press the [ON: OFF] key to turn the display off.	
2	While holding down the [PRINT] and [SAMPLE] keys, press the [ON: OFF] key to display PS.	
3	Press the [PRINT] key to display "Function table switch".	
4	Press the [SAMPLE] key several times to make "Internal weight value correction switch" blink.	

Step	Description	Display and key operation
5	Press the [RE-ZERO] key to set "Internal weight value correction switch" to " 1".	 "Internal weight value correction switch"
6	To store the setting and return to weighing mode, press the [PRINT] key.	

7.6.1. How to correct the internal weight value: method 1 (MANUAL)

In this method, the value of the balance's internal weight is manually corrected based on an external weight: First, perform sensitivity adjustment with the internal weight while referring to "7.1. Sensitivity adjustment using the internal weight (FZ / FZ-WP series only)".

Next, place the external weight on the weighing pan to confirm the value to be corrected, and then enter the value in the balance.

The corrected value is stored in nonvolatile memory even if the AC adapter is removed.

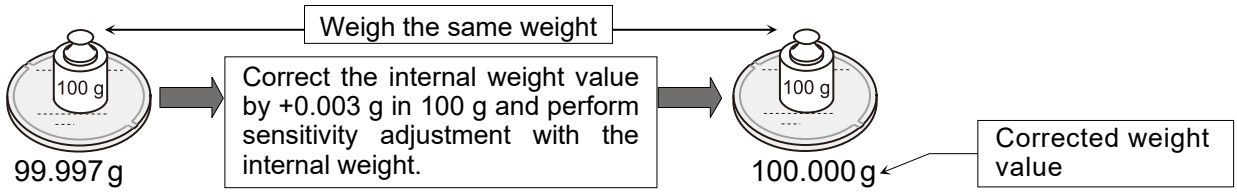
The table below shows the correction reference values and adjustable ranges.

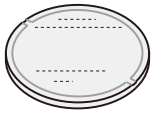
Model	Correction reference value	Adjustable range
FZ-104	100.0000 g	± 0.0150 g
FZ-154		
FZ-254	200.0000 g	
FZ-254D		

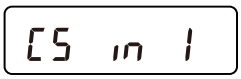
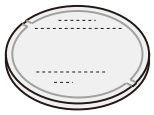
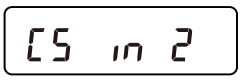
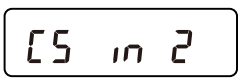
Model	Correction reference value	Adjustable range
FZ-123, FZ-123WP	100.000 g	± 0.050 g
FZ-223, FZ-223WP	200.000 g	
FZ-323, FZ-323WP		
FZ-523		
FZ-1202, FZ-1202WP	1000.00 g	± 0.50 g
FZ-2202, FZ-2202WP	2000.00 g	
FZ-3202, FZ-3202WP		
FZ-5202		

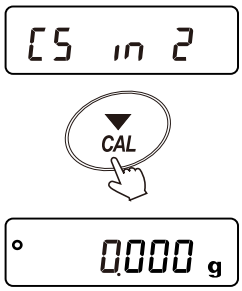
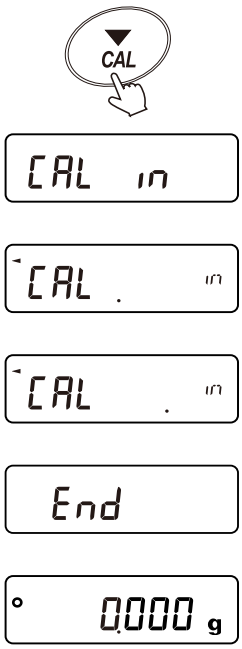
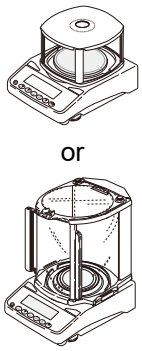
Setting procedure

In this example for the FZ-123WP, a 100.000 g weight is used and the value to be corrected is +0.003 g in 100 g. Note that if a 50 g weight is used and the value to be corrected is +0.003 g, the value needs to be converted to +0.006 g as the correction reference value is 100 g.



Step	Description	Display and key operation	Weighing operation
1	The function to perform correction of the internal weight value is disabled at factory settings. To enable it, refer to "7.6. Correcting the internal weight value (FZ / FZ-WP series only)".	Refer to "7.6. Correcting the internal weight value (FZ / FZ-WP series only)".	
2	Perform sensitivity adjustment with the internal weight. Then, place the external weight and confirm the value to be corrected.	99.997 g	
3	Press and hold the SAMPLE key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds. bASFnc	

Step	Description	Display and key operation	Weighing operation
4	Press the SAMPLE key several times until CS in 1 is displayed. If CS in 1 does not appear, follow step 1 to change the setting.	 Press several times 	
5	Press the PRINT key. Perform correction by operating the following keys as explained below.	 	
	RE-ZERO key Changes (+1) the value to be corrected.	 	
	MODE key Changes (−1) the value to be corrected.	 	
	PRINT key Stores the changed value to be corrected and displays the next item. Proceeds to step 6.	   	
	CAL key Cancels setting operations and displays the next item. The value to be corrected does not change. Proceeds to step 6.	  	

Step	Description	Display and key operation	Weighing operation
6	Press the CAL key. The balance returns to weighing mode.		
7	Attach the breeze break, and then press the CAL key to perform sensitivity adjustment with the internal weight.		 or
8	Place the external weight on the weighing pan to confirm that the internal weight value has been adjusted correctly within the correct range (refer to "22.2. Individual specifications" for the value of "Accuracy after sensitivity adjustment with the internal weight"). If not, perform readjustment to correct the internal weight value.	100.000 g	

7.6.2. How to correct the internal weight value: method 2 (AUTO)

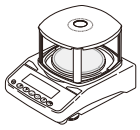
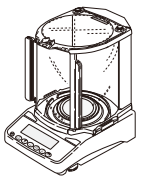
In this method, the value of the balance's internal weight is automatically corrected based on an external weight:

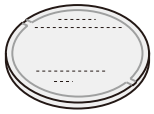
First, perform sensitivity adjustment while referring to "7.3. Sensitivity adjustment using an external weight".

When the sensitivity adjustment process is over, the balance automatically loads and unloads the internal weight and corrects the internal weight value.

The corrected value is stored in nonvolatile memory even if the AC adapter is removed.

Setting procedure

Step	Description	Display and key operation	Weighing operation
1	Correction of the internal weight value cannot be performed at factory settings. Refer to "7.6. Correcting the internal weight value (FZ / FZ-WP series only)" and enable the function of internal weight value correction.	Refer to "7.6. Correcting the internal weight value (FZ / FZ-WP series only)".	
2	Attach the breeze break. In weighing mode, press and hold the [SAMPLE] key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds. bASFnc	 or 
3	Press the [SAMPLE] key several times until CS in 2 is displayed. If CS in 2 does not appear, follow step 1 to change the setting.	 Press several times. CS in 2	
4	Press the [PRINT] key to display CAL 0.	 CAL 0	

Step	Description	Display and key operation	Weighing operation
5	Perform sensitivity adjustment while referring to "7.3. Sensitivity adjustment using an external weight".	 CAL 0 100  100 End	
6	Once the sensitivity adjustment process is over and the weight is removed, READY appears. When preparation is complete, press the PRINT key.	READY 	
7	With CAL. SET displayed, the balance automatically starts correcting the internal weight value.	CAL. SET CAL . SET	
8	When the process of correcting the internal weight value is completed, CAL. in is displayed and the balance automatically performs sensitivity adjustment with the corrected internal weight value.	CAL. in CAL . in	
9	End is displayed and the balance returns to weighing mode.	End 0.000 g	
10	Place the same weight on the weighing pan to confirm that the internal weight value is adjusted correctly. If it is not, readjust it by performing the procedure from step 2 again. (Make sure there is no external disturbance during the adjustment process.)	100.000 g	

8. Function Selection Switch and Initialization

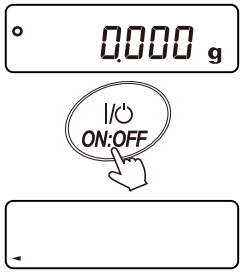
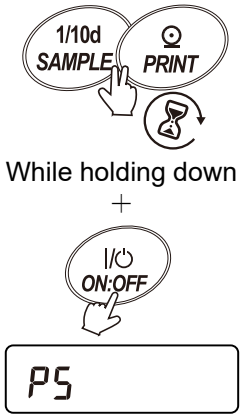
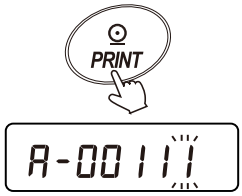
8.1. Function selection switch

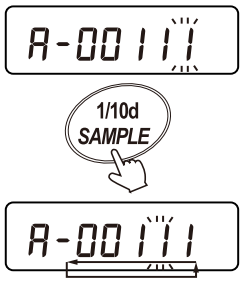
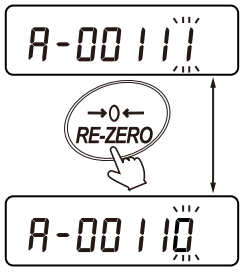
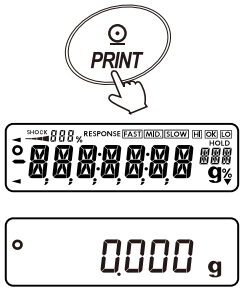
The balance stores data that must not be changed unintentionally (such as adjustment data for accurate weighing, data for adapting to the usage environment, data to control the communications interface, etc.). In order to protect such data, the "Function selection switch" function is provided and either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

There are the following types of "Function selection switch".

Item	FZ / FZ-WP series	FX / FX-WP series
Function selection switch	・Function table ・Sensitivity adjustment using the internal weight ・Sensitivity adjustment using an external weight ・Internal weight correction	・Function table ・Sensitivity adjustment using an external weight

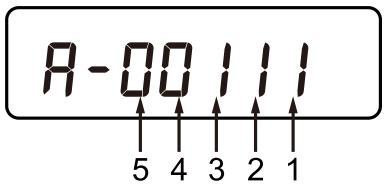
Setting procedure

Step	Description	Display and key operation
1	Press the [ON: OFF] key to turn the display off.	
2	While holding down the [PRINT] and [SAMPLE] keys, press the [ON: OFF] key to display [PS]. **Caution** **If "LocK (Lock function)" is set to "1 (ON - Restrict weighing operation)" or "2 (ON – Allow basic weighing)" in "PASSwd (Password lock)" of the function table ("9. Function Table"), you will be prompted to enter the password of the administrator (ADMIN) before [PS] is displayed.**	
3	Press the [PRINT] key to display the function table switch.	

Step	Description	Display and key operation
4	Set the function selection switch by operating the keys as explained below.	
	SAMPLE key Selects the blinking digit (switch) to change.	
	RE-ZERO key Changes the value of the blinking digit (switch). 0: Prohibit changes and use 1: Allow changes and use	
	PRINT key Stores the new value. The balance returns to weighing mode.	
	CAL key Cancels setting operations and displays the next item. The switch setting does not change.	

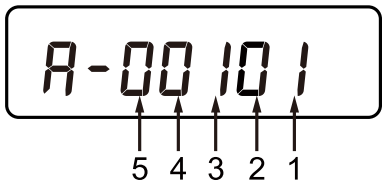
Function selection switches

FZ / FZ-WP series (the display at factory settings)



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

FX / FX-WP series (the display at factory settings)



No.	Name	Parameter	Description
1	Function table	0	Prohibit changes to the function table.
		▪ 1	Allow changes to the function table.
2	No function	▪ 0	No function
3	Sensitivity adjustment using an external weight	0	Prohibit sensitivity adjustment with an external weight*1
		▪ 1	Allow sensitivity adjustment with an external weight.
4	No function	▪ 0	No function
5	No function	▪ 0	No function

*1 Allowed when logged in as Administrator (ADMIN) if "Lock (Lock function)" is set to " 1" or "2". Prohibited when logged in as a user (USER) or guest (GUEST).
(Refer to "12. Password Lock Function".)

8.2. Initializing the balance

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

8.2.1. Initialization (all items)

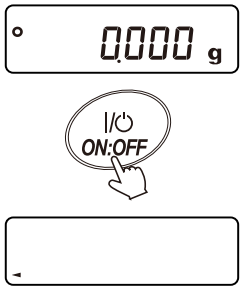
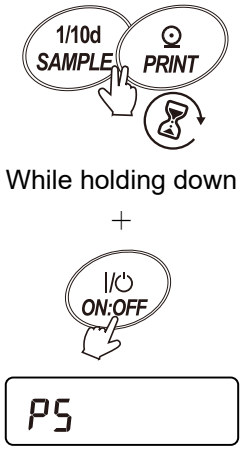
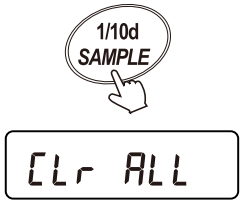
This function resets the following parameters to the factory settings.

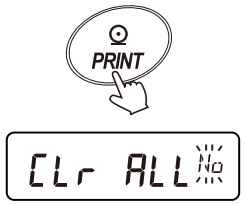
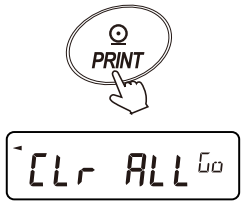
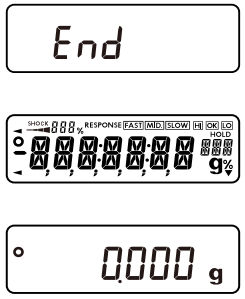
- ❑ Sensitivity adjustment data
- ❑ Function table other than the password lock function, unit weight (counting mode), and 100% reference mass value (percent mode)
- ❑ External weight value
- ❑ Function selection switch settings
- ❑ Statistical calculation data
- ❑ Internal weight value (FZ / FZ-WP only)

Caution

- ❑ **After initializing the balance, be sure to perform sensitivity adjustment.**

Setting procedure

Step	Description	Display and key operation
1	Press the [ON: OFF] key to turn the display off.	
2	While holding down the [PRINT] and [SAMPLE] keys, press the [ON: OFF] key to display PS.	
3	Press the [SAMPLE] key to display CLr ALL.	

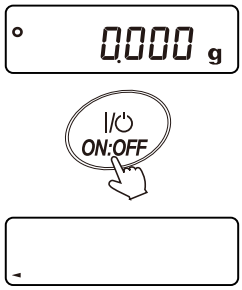
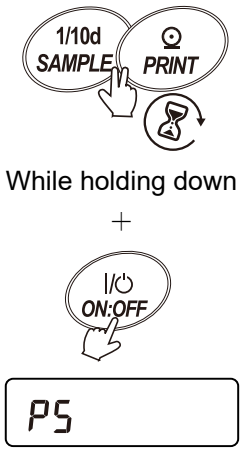
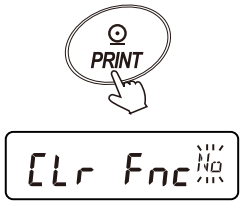
Step	Description	Display and key operation
4	Press the [PRINT] key. (To cancel, press the [CAL] key.)	
5	Press the [RE-ZERO] key to switch between " No / Go ".	
6	Pressing the [PRINT] key starts initialization.	
7	When the process is completed, the balance automatically returns to weighing mode.	

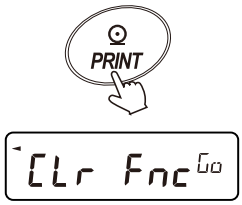
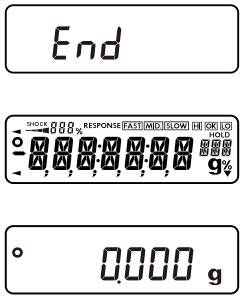
8.2.2. Initialization (function table only)

This function returns the following parameters to the factory settings.

- ❑ Function table other than the password lock function
- ❑ Function selection switch settings
- ❑ Statistical calculation data

Setting procedure

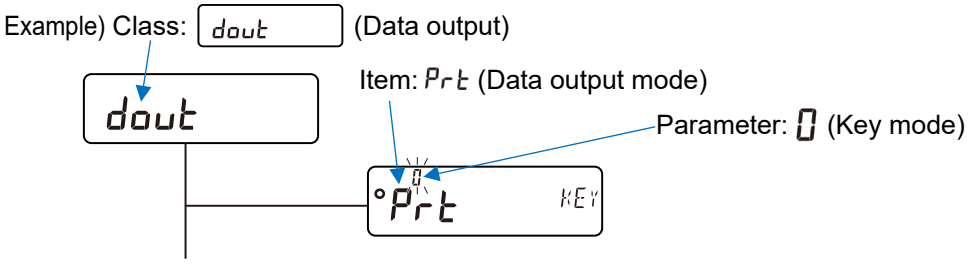
Step	Description	Display and key operation
1	Press the [ON: OFF] key to turn the display off.	
2	While holding down the [PRINT] and [SAMPLE] keys, press the [ON: OFF] key to display [PS].	
3	Press the [SAMPLE] key twice to display [CLr Fnc].	
4	Press the [PRINT] key. (To cancel, press the [CAL] key.)	
5	Press the [RE-ZERO] key to switch between " No / Go ".	

Step	Description	Display and key operation
6	Pressing the PRINT key starts initialization.	
7	When the process is completed, the balance automatically returns to weighing mode.	

9. Function Table

The balance's functions, communications, etc. can be set and changed with the function table ("9. Function Table"). The set parameters are stored in nonvolatile memory, even if the AC adapter is removed.

The menu of the function table ("9. Function Table") consists of two layers: classes and items. Each item stores a parameter. For each item, the last parameter displayed is enabled. Press the PRINT key to apply the updated parameter to the balance.



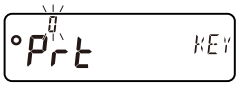
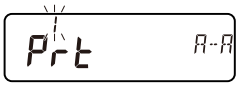
9.1. Setting procedure

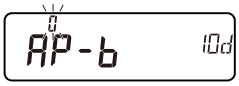
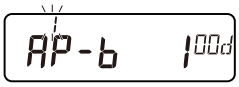
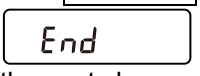
Display and key operation for the function table

°	The " ° " indicator shows that the parameter is currently enabled.
1/10d SAMPLE	Holding down this key (for 2 seconds) in weighing mode activates function table mode. (The class menu is displayed.) Selects the class / item.
→0← RE-ZERO	Selects a parameter for the item displayed. The parameter last displayed is enabled.
PRINT	Activates item selecting mode. Stores the new setting and proceeds to the next class.
CAL	When in item selecting mode, cancels setting operations and proceeds to the next class. When in class selecting mode, quits function table mode and returns to weighing mode.

Setting procedure

This example shows how to set the parameters for "PrT (Data output mode)" and "AP-b (Auto print difference)" to " 1 (Auto print mode A)" and "1 (100 d)" respectively.

Step	Description	Key operation	Class	Item
1	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds	bASFnc "Environment / Display"	
2	Press the SAMPLE key several times to select the class.	 Press several times	dout "Data output"	
3	Press the PRINT key to enter the class.	 		 "Key mode" of "Data output mode"
4	Change the parameter of the selected item with the RE-ZERO key.	 		 "Auto print mode A" of "Data output mode"

Step	Description	Key operation	Class	Item
5	Press the SAMPLE key several times to select the item.	 Press several times		 "10 d" of "Auto print band width"
6	If you want to change other item(s) in the same class, repeat steps 4 and 5. To finish changing the settings for the class, proceed to step 7.			 "100 d" of "Auto print difference"
7	If you want to store the settings for the class, press the PRINT key. After  is displayed, the next class appears.	 	 "Serial interface"	
	If you want to cancel the settings for the class, press the CAL key to display the next class. The parameters do not change.		 "Serial interface"	
8	If you want to change the settings for other class(es), repeat from step 2. To exit function table mode, press the CAL key. The balance returns to weighing mode.	 		

9.2. Details of the function table

Class	Item	Parameter	Description	
bASFnc Environment / Display	Cond Condition	0	Fast response, sensitive value	This setting also acts as the averaging time when "HoLd (Hold function)" is set to " 1 (On)".
		▪ 1		
		2	Slow response, stable value	
	St-b Stability Band Width	0	Stricter judgment (The lowest digit displayed ±1)	If the range in which the weighing display fluctuates for a certain period of time is less than the set parameter, the value is judged to be stable. This setting also acts as the stability range when "HoLd (Hold function)" is set to " 1 (ON)".
		▪ 1		
		2	Less strict judgement (The lowest digit displayed ±3)	
	HoLd Hold function	▪ 0	Off	Holds the display when stable. HOLD lights up when enabled.
		1	On	
	trc Zero tracking	0	Off	Keeps zero display by tracking zero drift.
		▪ 1	Normal	
		2	Strong	
		3	Very strong	
	SPd Display refresh rate	▪ 0	Approx. 5 times/second	Period to refresh the display
		1	Approx. 10 times/second	
		2	Approx. 20 times/second	
	Pnt Decimal separator	▪ 0	Point (.)	Symbol used as a decimal separator for display and output
		1	Comma (,)	
	P-on Auto display-ON	▪ 0	Off	When the AC adapter is connected, the weighing display automatically turns on.
		1	On	
	PoFF Auto display-OFF	▪ 0	Off	After 10 minutes of inactivity, the display automatically turns off.
		1	On (10 minutes)	
	rnG Readability	▪ 0	Show readability digit	Displayed at the start of weighing
		1	Hide readability digit	

▪ Factory setting

Class	Item	Parameter	Description	
bASFnc Environment / Display (Continued from previous page)	bEEP Buzzer	0	Off	The buzzer sounds when you operate the keys and the like.
		▪ 1	On	
	iSd Impact Shock Detection	0	Off	Impact shock level indicator
		▪ 1	On	
CL AdJ *2 Clock		Refer to "9.4. "Clock" explanation (FZ / FZ-WP series only)".		Confirms and sets the time and date. The time and date are added to output data.
CP Fnc Comparator	CP Comparator mode	▪ 0	No comparison	
		1	Comparison when stable or overloaded (excluding near zero)	
		2	Comparison when stable or overloaded (including near zero)	
		3	Continuous comparison (excluding near zero)	
		4	Continuous comparison (including near zero)	
	bEP_ LO buzzer	▪ 0	Off	
		1	On	
	bEP- OK buzzer	▪ 0	Off	
		1	On	
	bEP¯ HI buzzer	▪ 0	Off	
		1	On	
CP Hi Upper limit		Refer to "9.5."Comparator" explanation".		
CP Lo Lower limit				

▪ Factory setting

*2 Only for the FZ / FZ-WP series

Class	Item	Parameter	Description	
dout Data output	Prt Data output mode	▪ 0	Key mode	Outputs data accepting the PRINT key when the weighing value is stabled.
		1	Auto print mode A (Reference: zero)	Outputs data when the weighing value is stable beyond the range of AP-P and AP-b from the zero point.
		2	Auto print mode B (Reference: the latest stable value)	Outputs data when the weighing value is stable beyond the range of AP-P and AP-b from the latest stable value.
		3	Stream mode	Outputs data at the specified display refresh rate.
		4	Key mode B (Immediate output)	Outputs data accepting the PRINT key regardless of whether or not the weighing value is stable.
		5	Key mode C (Output when stable)	Immediately outputs data accepting the PRINT key when the weighing value is stable. When unstable, outputs data after the weighing value becomes stable.
		6	Interval output mode	Outputs data periodically as set for int.
		7	Auto print mode C (When the comparator result is OK.)	Outputs data when the weighing value is stable beyond the range of AP-P and AP-b from zero point and the weighing value is stable with an OK result.
	AP-P Auto print polarity	▪ 0	Positive only	If greater than the reference.
		1	Negative only	If less than the reference.
		2	Bi-polar	Regardless of whether greater or less than the reference.
	AP-b Auto print band width	▪ 0	10 d*1	Setting for the difference from the reference.
		1	100 d	
		2	1000 d	

▪ Factory setting

*1 “d” represents scale division.

Class	Item	Parameter	Description	
dout Data output (Continued from previous page)	int Interval time	0	At the specified display refresh rate	Used when "Interval output mode" is set for "Data output mode" (Prt set to 6).
		▪ 1	Every 2 seconds	
		2	Every 5 seconds	
		3	Every 10 seconds	
		4	Every 30 seconds	
		5	Every 1 minute	
		6	Every 2 minutes	
		7	Every 5 minutes	
		8	Every 10 minutes	
	Ar-d Auto rezero after data output	▪ 0	Off	Function to automatically set to zero after data output.
		1	On	
SiF Serial interface	ModE Connection	▪ 0	PC	
		1	Printer	Output with tYPE set to 0 or 1
		2	External indicator	Stream output with tYPE set to 0
	bPS Baud rate	0	600 bps	
		1	1200 bps	
		▪ 2	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	
	btPr Data bit, Parity bit	▪ 0	7 bits, even	
		1	7 bits, odd	
		2	8 bits, none	
	CrLF Carriage return Line feed	▪ 0	CR LF	CR: Carriage return ASCII 0Dh LF: Line feed ASCII 0Ah
		1	CR	

▪ Factory setting

Class	Item	Parameter	Description	
S iF Serial interface (Continued from previous page)	tYPE Data format	▪ 0	A&D standard format	Refer to "9.6. "Data output" explanation"
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	CSV format	
	S- id ID output	▪ 0	No output	Sets whether or not the ID number is output.
		1	Output	
	S-td*2 Time / date output	▪ 0	No output	For setting the time / date to be output, refer to "9.4. "Clock" explanation (FZ / FZ-WP series only)".
		1	Time output only	
		2	Date output only	
		3	Time and date output	
	PUSE Data output pause	▪ 0	Off	Sets a pause before data output.
		1	On: Add 1.6 seconds	
	At-F Auto feed	▪ 0	Off	Sets a line feed after data output.
		1	On: Add one line	
	t-UP Timeout	0	No limit	
		▪ 1	Limit to 1 second	
	ErCd AK, Error code	▪ 0	Off	
		1	On	
	inFo GLP output	▪ 0	Off	Refer to "9.8.3. GLP report".
		1	On (with the balance's internal clock)	
		2	On (with the external device's clock)	
oP- iF Optional interface	This class is available only when FX-05, FXi-08, or GXA-27 is installed. The items displayed in this class depend on the connected option. For FX-05, refer to "18.1.2. Additional settings for FX-05". For FXi-08, refer to "18.2.2. Additional settings for the FXi-08". For GXA-27, refer to "18.3.1. Additional settings for the GXA-27".			

▪ Factory setting

*2 Only for the FZ / FZ-WP series

Class	Item	Parameter	Description	
dS Fnc Density measurement function	Ld in Liquid density input	▪ 0	Water temperature	Displayed only when density mode is stored in unit registration. Refer to "11. Density (Specific Gravity) Measurement".
		1	Density	
	dS Density measurement mode	▪ 0	Solids	
		1	Liquids	
MLt Programmable-unit (Multi-unit)		Sets a coefficient. Refer to "4.1.2. Programmable-unit".		This setting is only applicable when the "programmable-unit" is stored for units/modes.
Un it Unit		Refer to "9.7. "Unit" for storing units (modes) explanation".		
id ID number setting		Refer to "9.8.2. Setting the ID number".		
AP Fnc Application function	APF Application mode	▪ 0	Normal weighing mode	
		1	Capacity indicator mode	
		2	Statistical calculation mode	
	StAF Statistical function mode output items	▪ 0	Number of data instances, Sum	
		1	Number of data instances, Sum, Max, Min, Range (max-min), Average	
		2	Number of data instances, Sum, Max, Min, Range (max-min), Average, Standard deviation, Coefficient of variation	
		3	Number of data instances, Sum, Max, Min, Range (max-min), Average, Standard deviation, Coefficient of variation, Relative error	

▪ Factory setting

Class	Item	Parameter	Description	
PASSwd Password lock	LocK Lock function	▪ 0	Off	Refer to "12. Password Lock Function".
		1	On (Restrict weighing operation)	
		2	On (Allow basic weighing operation)	
	PASSNo Password registration	ADMIN	Administrator password input	
		USER01	User 1 password input	
		to	to	
		USER10	User 10 password input	
CS in 1 *2 Correction of the internal weight value: method 1		Refer to "7. Sensitivity Adjustment / Calibration Test".		Displayed only when "Function selection switch" is set.
CS in 2 *2 Correction of the internal weight value: method 2				

▪ Factory setting

*2 Only for the FZ / FZ-WP series

9.3. "Environment / Display" explanation

"Condition (Cond)"

Cond set to 0	Sensitive response to fluctuation of a weighing value. For powder or liquid target weighing, weighing a very light sample, or when work efficiency is required rather than display stability, set the parameter to be a small value. When set, FAST is displayed.

Cond set to 2	Slow response to fluctuation of a weighing value: To prevent the weighing value from drifting due to vibration or drafts, set the parameter to be a high value. When set, SLOW is displayed.

This setting also acts as the averaging time when "Hold function" is turned on.

"Stability band width (St-b)"

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

“d” represents scale division.

Example) For FZ-62001L, if 0.01 g display is selected with the SAMPLE key, 0.01 g is 1 d.

St-b set to 0	The stabilization indicator will not be displayed unless the weighing value is stable enough, and it will disappear if there are even slight fluctuations in the weighing value. To perform weighing with strict judgment, set the parameter to a low value.

St-b set to 2	The stabilization indicator becomes less responsive to slight fluctuations in the weighing value. To prevent the weighing value from drifting due to factors such as the usage environment, set the parameter to a high value.

This setting also acts as the stability range when "Hold function" is turned on.

"Hold function (HoLd)" (Animal weighing mode)

This function is used to weigh a moving object such as an animal. When the weighing data is over the animal weighing range from zero 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 weighing data. When the animal is removed from the weighing pan, the display returns to zero automatically. This function is available only when the hold function parameter is set to "HoLd" set to " 1 " (the display hold mark HOLD illuminates) and any weighing unit other than the counting mode is selected. The stabilization range and averaging time are set by "Condition (Cond)" and "Stability band width (St-b)" in the function table "9. Function Table".

Animal weighing range	
0.0001 g model	0.0200 g or more
0.001 g model	0.200 g or more
0.01 g model	2.00 g or more

Averaging time	
Cond set to 0	2 seconds (Priority on work efficiency)
Cond set to 1	4 seconds
Cond set to 2	8 seconds (Priority on measurement)

Stability range		
St-b set to 0	Small	6.25%
St-b set to 1	⇕	12.5%
St-b set to 2	Large	16.7%

"Zero tracking (trc)"

This function automatically tracks zero-point drift caused by changes in the environment and the like and stabilizes the zero display. The degree of tracking can be selected from three levels.

If zero is not stable, increase the parameter.

Turn off the zero tracking function when weighing only a few "d". “d” represents scale division.

Zero tracking	Effect	Description
trc set to 0	Off	Tracking function is not used.
trc set to 1	± 1 d / 1 second	Normal zero tracking is used.
trc set to 2	± 1 d / 0.5 seconds	Strong zero tracking is used.
trc set to 3	± 1 d / 0.2 seconds	Very strong zero tracking is used.

"Display refresh rate (SPd)"

The periodic time to refresh the display. This timing also applies to data output.

This parameter influences "baud rate", "data output pause" and the operation in the stream mode.

Note that this setting is selected automatically when the response rate is changed.

"Decimal separator (Pnt)"

A symbol used as a decimal separator can be selected.

"Auto power-ON (P-on)"

When the AC adapter is plugged in, the display is automatically turned on without pressing the ON:OFF key and the balance enters weighing mode. This setting is used when the balance is built into an automated system. Note that, for accurate weighing, the balance should be provided with power for at least half an hour, or at least an hour for the 0.0001 g models, after being turned on.

"Auto power-OFF (PoFF)"

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

"Readability (rnG)"

For weighing with lower precision, the readability digit can be turned off without key operation. This is useful when built into automated devices.

"Buzzer (bEEP)"

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

"Impact shock detection (iSd)"

Select ON / OFF for the function to display impact level.

9.4. "Clock" explanation (FZ / FZ-WP series only)

The FZ / FZ-WP series balance is equipped with a clock and calendar function. When " S-td (Time / date output)" is set in " S iF (Serial interface)" or " oP- iF (Optional interface)" of the function table ("9. Function Table"), the time / date can be added to the output data.

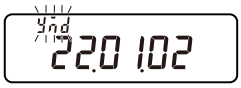
If the "inFo (GLP output)" parameter is set, it is possible to add time / date to the GLP output data, title block, and end block.
The time and date can be checked or set by performing the following checking / setting procedure.

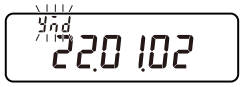
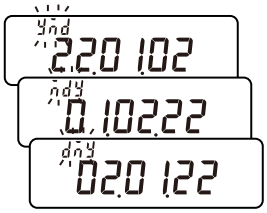
Caution

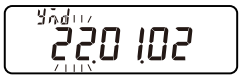
- **Do not enter invalid values such as a non-existing date when setting the time and date.**
- **The balance displays rtc PF when the clock backup battery has been depleted.**
- **Battery replacement must be repaired by your local A&D dealer. Even if the backup battery of the clock runs out, it does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

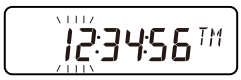
Checking / setting procedure

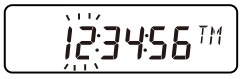
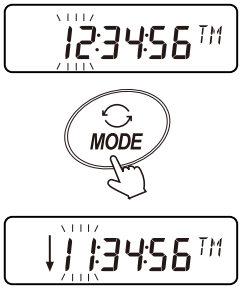
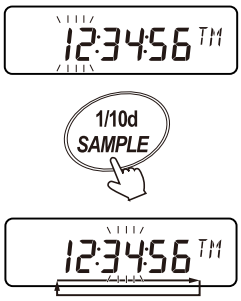
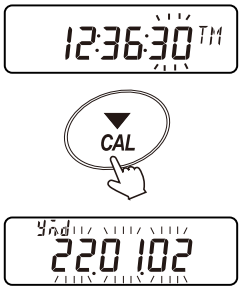
Step	Description	Display and key operation
1	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds bASFnc
2	Press the SAMPLE key to display CL AdJ.	 CL AdJ
3	Press the PRINT key to enter the mode to check and set the time and date. Proceed to step 4 "Checking the date".	 22.0 10 2 To step 4 "Checking the date"

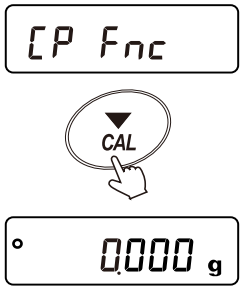
Step	Description	Display and key operation
4	**Checking the date** The currently set date is displayed.	
	If you need to change the date, press the [RE-ZERO] key. Proceed to step 5 "Setting the date (Selected digits blink)".	  To step 5 "Setting the date (Selected digits blink)"
	If the date is correct and you do not need to check the time, press the [CAL] key. Proceed to step 9 "Finishing checking / setting".	 To step 9 "Finishing checking / setting"
	If the date is correct and you need to check the time, press the [SAMPLE] or [PRINT] key. Proceed to step 7 "Checking the time".	 or   To step 7 "Checking the time"

Step	Description	Display and key operation
5	**Setting the date (Selected digits blink)** First, select a date format for the order of displaying year (y), month (m), and day (d). Operate the keys as explained below.	
	RE-ZERO key With each press, the selection changes in the order of "year(y)/month(m)/day(d)","month(m)/day(d)/year(y)", and "day(d)/month(m) /year(y)".	 Press several times  The display cycles.
	SAMPLE key Selects the digits that blink to change the date. Then, proceeds to step 6 "Changing the date".	  To step 6 "Changing the date".
	PRINT key Displays End to proceed to step 7 "Checking the time".	   To step 7 "Checking the time"
	CAL key Proceeds to step 7 "Checking the time".	  To step 7 "Checking the time"

Step	Description	Display and key operation
6	**Changing the date** Set the date by operating the keys as explained below. (Input the last two digits of the year. For example, "22" means 2022.)	
	RE-ZERO key Changes (+1) the value of the blinking digits.	  
	MODE key Changes (−1) the value of the blinking digits.	  
	SAMPLE key Selects the digits that blink.	  
	PRINT key Stores the new setting for the date. Displays End to proceed to step 7 "Checking the time".	    To step 7 "Checking the time"
	CAL key Cancels the date setting to proceed to step 7 "Checking the time".	  To step 7 "Checking the time"

Step	Description	Display and key operation
7	**Checking the time** The currently set time is displayed. (All digits blink.)	
	If you need to change the time, press the RE-ZERO key. Proceed to step 8 "Setting the time".	  To step 8 "Setting the time".
	If the time is correct and you do not need to check the date again, press the CAL key. Proceed to step 9 "Finishing checking / setting".	 To step 9 "Finishing checking / setting".
	If the time is correct and you need to check the date again, press the SAMPLE key. Proceed to step 4 "Checking the date".	  To step 4 "Checking the date".

Step	Description	Display and key operation
8	**Setting the time** Set the time (in 24-hour format) by operating the keys as explained below.	
	[RE-ZERO] key Changes (+1) the value of the blinking digits.	
	[MODE] key: Changes (−1) the value of the blinking digits.	
	[SAMPLE] key Selects the digits that blink.	
	[PRINT] key Stores the new setting of time. Displays End to proceed to step 9 "Finishing checking / setting".	 To step 9 "Finishing checking / setting".
	[CAL] key Cancels the time setting to proceed to step 4 "Checking the date".	 To step 4 "Checking the date".

Step	Description	Display and key operation
9	Finishing checking / setting The next item [CP Fnc] of the function table menu is displayed ("9. Function Table"). To finish checking / setting, press the [CAL] key. The balance returns to weighing mode.	

9.5. "Comparator" explanation

The results of the comparison are indicated by HI, OK, and LO on the display. There are five types of comparisons:

- "No comparison"
- "Comparison when stable or overloaded (excluding near zero)"
- "Comparison when stable or overloaded (including near zero)"
- "Continuous comparison (excluding near zero)"
- "Continuous comparison (including near zero)"

The criteria for comparison are "upper limit value and lower limit value"

"Digital input" method is used to input the values.

Refer to "9. Function Table" for "CP Fnc (Comparator)".

"Near zero" is within ±10 d of readability. For example, with FZ-323 in gram mode, the range of ±0.010 g is "near zero". “d” represents scale division.

Each comparison result buzzer can be set to On / Off.

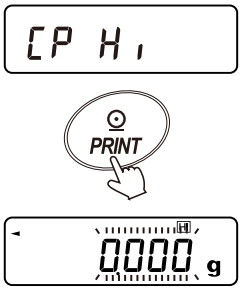
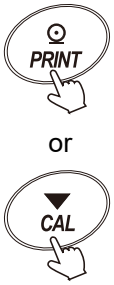
- "LO buzzer (bEP_)"
- "OK buzzer (bEP-)"
- "HI buzzer (bEP¯)"

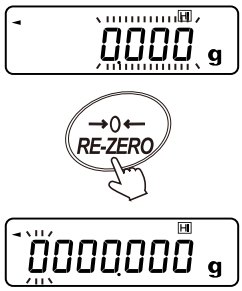
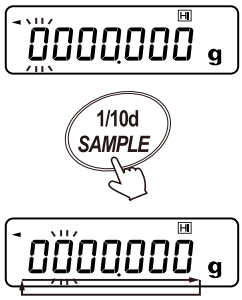
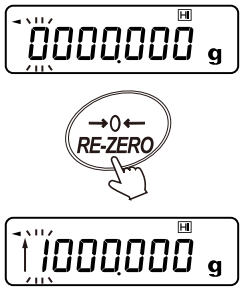
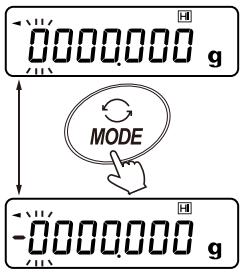
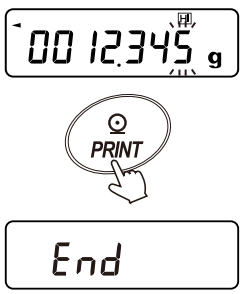
9.5.1. Setting example. "Comparison when stable or overloaded (excluding near zero)"

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

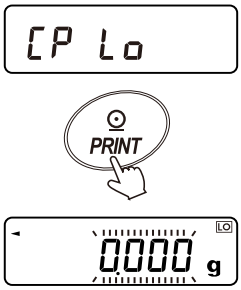
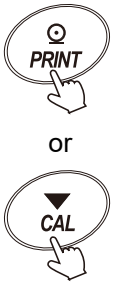
Step	Description	Display and key operation
1	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds bASFnc
2	Press the SAMPLE key several times to display CP Fnc.	 Press several times CP Fnc
3	Press the PRINT key.	 CP 0 OFF
4	Press the RE-ZERO key several times to display CP StAb EXT.	 Press several times CP StAb EXT
5	To store the selected method, press the PRINT key.	 End CP Hi

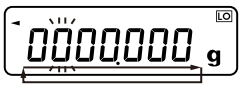
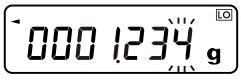
Entering the upper limit value

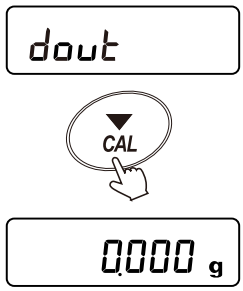
Step	Description	Display and key operation
6	With [CP H1] displayed, press the [PRINT] key. The currently set upper limit value is displayed (with all digits blinking).	
7	If no change is required for the value, press the [PRINT] or [CAL] key. Proceed to step 9.	 To step 9.

Step	Description	Display and key operation
8	To change the value, press the [RE-ZERO] key. Change and store the setting by operating the keys as explained below.	
	[SAMPLE] key Selects the digit that blinks.	
	[RE-ZERO] key Changes (+1) the value of the blinking digit.	
	[MODE] key Reverses the polarity.	
	[PRINT] key Stores the new setting, and then displays [End] to proceed to step 9 "Entering the lower limit value".	 To step 9 "Entering the lower limit value"
	[CAL] key Cancels setting operations to proceed to step 9 "Entering the lower limit value".	 To step 9 "Entering the lower limit value"

Entering the lower limit value

Step	Description	Display and key operation
9	With [CP Lo] displayed, press the [PRINT] key. The currently set lower limit value is displayed (with all digits blinking).	
10	If no change is required for the value, press the [PRINT] or [CAL] key. Proceed to step 12.	 To step 12.

Step	Description	Display and key operation
11	To change the value, press the [RE-ZERO] key. Change and store the setting by operating the keys as explained below.	 
	[SAMPLE] key Selects the digit that blinks.	  
	[RE-ZERO] key Changes (+) the value of the blinking digit.	  
	[MODE] key Reverses the polarity.	  
	[PRINT] key Stores the new setting, and then displays [End] to proceed to step 12.	   To step 12.
	[CAL] key Cancels setting operations to proceed to step 12.	 To step 12.

Step	Description	Display and key operation
12	To return to weighing mode, press the CAL key.	

9.6. "Data output" explanation

9.6.1. Data output modes

The data output timing of the balance can be switched by setting "Prt (Data output mode)" in "dout (Data output)" of the function table ("9. Function Table").

Key mode

Function table: dout, Prt set to 0

The balance outputs the weighing data once when the PRINT key is pressed while the stabilization indictor is displayed. The weighing value displayed blinks once to notify that it has been output.

Auto print mode A

Function table: dout, Prt set to 1

The balance outputs the weighing data when the weighing value is stable beyond the range of "AP-P (Auto print polarity)" and "AP-b (Auto print band width)" set in the function table ("9. Function Table") from the reference zero point. The balance outputs the weighing data when the PRINT key is pressed while the stabilization indicator is displayed. The weighing value displayed blinks once to notify that it has been output.

Example of use:

"To output automatically the weighing data every time a sample is weighed"

Required function table settings:

dout	Prt set to 1	Mode A
dout	AP-P	Auto print polarity
dout	AP-b	Auto print band width

Auto print mode B

Function table: dout, Prt set to 2

The balance outputs the weighing data when the weighing value is stable beyond the range of "AP-P (Auto print polarity)" and "AP-b (Auto print band width)" set in the function table ("9. Function Table") from the latest stable value. The balance outputs the weighing data when the PRINT key is pressed while the stabilization indicator is displayed. The weighing value displayed blinks once to notify that it has been output.

Example of use:

"To output automatically the weighing data while adding samples to be weighed"

Required function table settings:

dout	Prt set to 2	Mode B
dout	AP-P	Auto print polarity
dout	AP-b	Auto print band width

Stream mode

Function table: dout, Prt set to 3

The balance outputs the weighing value at the rate set by "SPd (Display refresh rate)" in "bASFnc (Environment/Display)" of the function table ("9. Function Table"), regardless of the status of the stabilization indicator. The display does not blink at this time.

Example of use:

"To monitor constantly the weighing values on a computer"

Required function table settings:

dout	Prt set to 3	Stream mode
bASFnc	SPd	Display refresh rate
S iF	bPS	Baud rate

Caution

- **Depending on the display refresh rate and baud rate, data may not be completely transmitted unless the baud rate is increased.**

Key mode B

Function table: dout, Prt set to 4

The balance outputs the weighing data when the PRINT key is pressed, regardless of the status of the stabilization indicator.

Key mode C

Function table: dout, Prt set to 5

The balance outputs the weighing data when the PRINT key is pressed while the stabilization indicator is displayed. If the PRINT key is pressed when the stabilization indicator is turned off, the balance outputs the weighing data the next time the stabilization indicator is turned on. The weighing value displayed blinks once to notify that it has been output.

Interval output mode

Function table: dout, Prt set to 6

The balance outputs the weighing data at the interval set by "int (Interval time)" in the function table ("9. Function Table"), regardless of the state of the stabilization indicator.

Pressing the PRINT key starts data output, and pressing the PRINT key again during it stops it.

Example of use:

"To output the weighing values periodically"

Required function table settings:

dout	Prt set to 6	Interval output mode
dout	int	Interval time

Caution

- **Depending on the interval time and baud rate, complete data may not be transmitted unless the baud rate is increased.**

Auto print mode C

Function table: dout, PrT set to 7

The balance outputs the weighing data when the weighing value is beyond the range of "APP (Auto print polarity)" and "APb (Auto print band width)" from the reference zero point and the comparator indicator shows OK with the stability indicator turned on.
When the PRINT key is pressed with the stability indicator turned on, the balance outputs the weighing data and the value display blinks one time.
Example of use:
"To output and record weighing values within a certain range"

Required function table settings:

dout	PrT set to 7	Mode C
dout	APP	Auto print polarity
dout	APb	Auto print band width
CP Fnc	CP set to between 1 and 4	Comparator mode
CP Hi		Upper limit setting
CP Lo		Lower limit setting

9.6.2. Data output settings

RS-232C connection can be set by "ModE (Connection)" in " S iF (Serial interface)" of the function table ("9. Function Table") in such a way as to allow irregular operations according to connected peripheral devices. "

"ModE" setting functions

Class	Item	Param-eter	Description		
			Device connected	Data output mode	Data format
S iF	ModE Devices connected via RS-232C	0	General-purpose devices such as a PC or PLC	dout Follows the Prt setting.	S iF Follows the setting of tYPE.
		1	Printer	dout Follows the Prt setting.	S iF Follows the tYPE setting. (A&D standard or DP format can be selected.)
		2	External indicators and the like	dout Enters Stream mode regardless of the Prt setting.	S iF The tYPE setting is fixed to A&D standard format.*1

*1 Only weighing values are output continuously.
"S-td (Time / date output)" and "S- id (ID output)" are not added. The functions of "Prt (Data output mode)", "PUSE (Data output pause)", "At-F (Auto feed)", and "inFo (GLP output)" are not available.

9.6.3. Weighing data format

Selecting the weighing data format

The output format used with the RS-232C interface can be selected by setting "tYPE (Data format)" in "S iF (Serial interface)" of the function table ("9. Function Table").

The output format used with an optional communication interface can be selected by setting "tYPE (Data format)" of "oP- iF (Optional interface)" in the function table ("9. Function Table").

A&D standard format

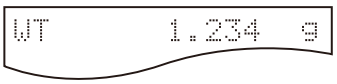
RS-232C interface: S iF, tYPE set to 0
Optional interface: oP- iF, tYPE set to 0

- This is the standard format for sending data to peripheral devices.
- Consists of 15 characters (excluding the terminator).
- The condition of the data is indicated with a 2-character header.
- The data is added with polarity and zeros (filling the data's higher order's surplus part with zeros).
- If the data is zero, the polarity is positive.
- The unit consists of three characters.

S	T	,	+	0	0	0	1	.	2	3	4	␣	␣	g	CR	LF
	Header		Data									Unit			Terminator	

S	T	Stable	CR: Carriage return	ASCII 0Dh
U	S	Unstable	LF: Line feed	ASCII 0Ah
Q	T	Stable in counting mode	␣: Space	ASCII 20h
O	L	Overloaded		

- In the external key print mode of AD-8127 multi-functional compact printers, the following is printed when A&D standard format is received.



DP format (dump print)

RS-232C interface: S iF, tYPE set to 1
Optional interface*: oP- iF, tYPE set to 1
(* except for FX-05)

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

W	T	␣	␣	␣	␣	␣	+	1	.	2	3	4	␣	␣	g	CR	LF
	Header				Data									Unit		Terminator	

W	T	Stable	CR: Carriage return	ASCII 0Dh
U	S	Unstable	LF: Line feed	ASCII 0Ah
Q	T	Stable in counting mode	␣: Space	ASCII 20h

KF format

RS-232C interface: [S.IF], tYPE set to 2
Optional interface*: [oP-.IF], tYPE set to 2
(* except for FX-05)

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

+	␣	␣	␣	␣	1	.	2	3	4	␣	g	␣	␣	CR	LF

Data: + ␣ ␣ ␣ ␣ 1 . 2 3 4
Unit: ␣ g ␣ ␣
Terminator: CR LF

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

␣ g ␣ ␣	The unit is output when stable.
␣ ␣ ␣ ␣	The unit is not output when not stable.

MT format

RS-232C interface: [S.IF], tYPE set to 3
Optional interface*: [oP-.IF], tYPE set to 3
(* except for FX-05)

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

S	␣	␣	␣	␣	␣	␣	1	.	2	3	4	␣	g	CR	LF

Header: S ␣
Data: ␣ ␣ ␣ ␣ ␣ ␣ 1 . 2 3 4
Unit: ␣ g
Terminator: CR LF

S ␣	Stable (Output with a command)	
S D	Unstable (Output with a command)	
S I	Overloaded	
␣ ␣	Stable (Output with the [PRINT] key)	
␣ D	Unstable (Output with the [PRINT] key)*1	

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

*1 Can be output if "PrT (Data output mode)" is set to "4 (Key mode B - Immediate output)".

NU format

RS-232C interface: [S.IF], tYPE set to 4
Optional interface: [oP-.IF], tYPE set to 4

- Only numerical data of the weighing value is output.
- Consists of 9 characters (not including the terminator).
- The data is padded with polarity and zeros (filling the data's higher order's surplus part with zeros).
- If the data is zero, the polarity is positive.

+	0	0	0	1	.	2	3	4	CR	LF

Data: + 0 0 0 1 . 2 3 4
Terminator: CR LF

CSV format

RS-232C interface: [S iF], tYPE set to 5
Optional interface: [oP- iF], tYPE set to 5

- The data part and unit part of A&D standard format are separated by a separator ",".
- Outputs the unit even when overloaded.
- When the decimal comma (,) is set, a semicolon (;) will be used instead as a separator.

S	T	,	+	0	0	0	1	.	2	3	4	,	␣	␣	g	CR	LF
Header			Data										Unit			Terminator	

S	T	Stable	CR:	Carriage return	ASCII 0Dh
U	S	Unstable	LF:	Line feed	ASCII 0Ah
Q	T	Stable in counting mode	␣:	Space	ASCII 20h
O	L	Overloaded			

- When other data is added to the weighing value, all data will be displayed in one line. The output sample is as follows if the data number, ID number, date, and time are added.

No	123	ABCDEFG	2022/01/02	12:34:56	ST	+0001.234	␣␣g
Data number	ID number		Date	Time		Weighing value	

NU2 format

Optional interface*: [oP- iF], tYPE set to 6
(* FX-05 only)

- Only numerical data of the weighing value is output.
- If the value is zero or positive, polarity is not added.

1	.	2	3	4	CR	LF
Data					Terminator	

TAB format

Optional interface*: [oP- iF], tYPE set to 7
(* FX-05 only)

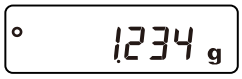
- This format is the same as the CSV format, except that TAB is used instead of commas as the separators.
- Used when connecting to a PC and inputting to Excel and the like.

S	T	TAB	+	0	0	0	1	.	2	3	4	TAB	␣	␣	g	CR	LF
Header			Data										Unit			Terminator	

S	T	Stable	CR:	Carriage return	ASCII 0Dh
U	S	Unstable	LF:	Line feed	ASCII 0Ah
Q	T	Stable in counting mode	␣:	Space	ASCII 20h
O	L	Overloaded	TAB:	Horizontal tab	ASCII 09h

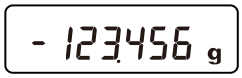
9.6.4. Output examples of weighing data format

When stable



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

When unstable

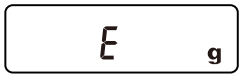


A&D	U	S	,	−	0	1	2	3	.	4	5	6	␣	␣	g	CR	LF
DP	U	S	␣	␣	␣	−	1	2	3	.	4	5	6	␣	␣	g	CR	LF
KF	−	␣	␣	1	2	3	.	4	5	6	␣	␣	␣	␣	CR	LF		
MT	S	D	␣	␣	−	1	2	3	.	4	5	6	␣	g	CR	LF		
NU	−	0	1	2	3	.	4	5	6	CR	LF							
CSV	U	S	,	−	0	1	2	3	.	4	5	6	,	␣	␣	g	CR	LF
NU2	−	1	2	3	.	4	5	6	CR	LF								
TAB	U	S	TAB	−	0	1	2	3	.	4	5	6	TAB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

ASCII character codes

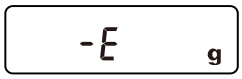
CR:	Carriage return	ASCII 0Dh
LF:	Line feed	ASCII 0Ah
␣ :	Space	ASCII 20h
TAB:	Horizontal tab	ASCII 09h

When overloaded (positive)



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

When overloaded (negative)



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

ASCII character codes

CR:	Carriage return	ASCII 0Dh
LF:	Line feed	ASCII 0Ah
␣:	Space	ASCII 20h
TAB:	Horizontal tab	ASCII 09h

Units

		A&D	D.P.	KF	MT
g	g	␣ ␣ g	␣ ␣ g	␣ g ␣ ␣	␣ g
mg	mg	␣ m g	␣ m g	␣ m g ␣	␣ m g
Counting mode	PCS	␣ P C	␣ P C	␣ p c s	␣ P C S
Percent mode	%	␣ ␣ %	␣ ␣ %	␣ % ␣ ␣	␣ %
Ounce (Avoir)	OZ	␣ o z	␣ o z	␣ o z ␣	␣ o z
Pound	Lb	␣ l b	␣ l b	␣ l b ␣	␣ l b
Pound ounce	L OZ	␣ o z	␣ o z	␣ o z ␣	␣ o z
Troy ounce	OZt	o z t	o z t	␣ o z t	␣ o z t
Metric carat	ct	␣ c t	␣ c t	␣ c t ␣	␣ c t
Momme	mom	m o m	m o m	␣ m o m	␣ m o
Pennyweight	dwt	d w t	d w t	␣ d w t	␣ d w t
Grain	GN	␣ G N	␣ G N	␣ g r ␣	␣ G N
Tael (HK general, Singapore)	tL	␣ t l	␣ t l	␣ t l s	␣ t l
Tael (HK, jewelry)	tL	␣ t l	␣ t l	␣ t l h	␣ t l
Tael (Taiwan)	tL	␣ t l	␣ t l	␣ t l t	␣ t l
Tael (China)	tL	␣ t l	␣ t l	␣ t l c	␣ t l
Tola (India)	tol	␣ ␣ t	␣ ␣ t	␣ t o l	␣ t
Mesghal	MES	m e s	m e s	␣ M S ␣	␣ m
Density	DS	␣ D S	␣ D S	␣ D S ␣	␣ D S
Programmable-unit (Multi-unit)	MLT	M L T	M L T	␣ M L T	␣ M L T

9.6.5. Other data formats

In addition to weighing data, other data can be added.
Switch each function on/off as necessary in the function table ("9. Function Table").

ASCII character codes

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

ID number

- ❑ To output, set "S- id (ID output)" to " 1 (Output)" in the function table ("9. Function Table").
- ❑ The ID number stored in the balance is output.
  To set the ID number, refer to "9.8.2. Setting the ID number".
- ❑ Consists of 7 characters (not including the terminator).
- ❑ Only "-" and numbers are output when NU or NU2 format is selected with Quick USB mode for option FX-05.

L	A	B	-	1	2	3	CR	LF

ID number Terminator

Quick USB mode FX-05 interface: oP- iF, UFnc set to 0

- ❑ With an FX-05 installed, set "UFnc (USB operating mode)" of "oP- iF (Optional interface)" to "0 (Quick USB mode)".

-	1	2	3	CR	LF

ID number Terminator

Date

- ❑ To output the date using the clock data of the FZ / FZ-WP series balance, set "S-td (Time / date output)" to "2 (Date output only)" or "3 (Time and date output)" in the function table ("9. Function Table").
- ❑ The order of YYYY/MM/DD can be changed by setting.
- ❑ Consists of 10 characters (not including the terminator).
- ❑ "." is output instead of "/" when NU or NU2 format is selected with the Quick USB mode for option FX-05.

2	0	2	2	/	0	1	/	0	2	CR	LF

Date Terminator

Quick USB mode FX-05 interface: oP- iF, UFnc set to 0

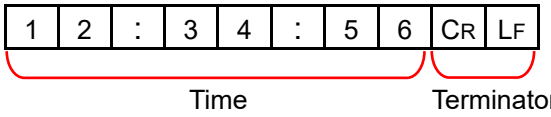
- ❑ With an FX-05 installed, set "UFnc (USB operating mode)" of "oP- iF (Optional interface)" to "0 (Quick USB mode)" in the function table ("9. Function Table").

2	0	2	2	.	0	1	.	0	2	CR	LF

Time Terminator

Time

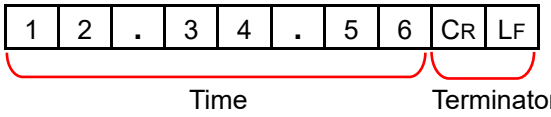
- To output the time using the clock data of the FZ / FZ-WP series balance, set "S-tm (Time / date output)" to "1 (Time output only)" or "3 (Time and date output)" in the function table ("9. Function Table").
- 24-hour format.
- Consists of 10 characters (excluding the terminator).
- "." is output instead of ":" when NU or NU2 format is selected with the Quick USB mode for option FX-05.



Quick USB mode

FX-05 interface: oP-iF, UFnc set to 0

- With an FX-05 installed, set "UFnc (USB operating mode)" to "0 (Quick USB mode)" in "oP-iF (Optional interface)" of the function table ("9. Function Table").



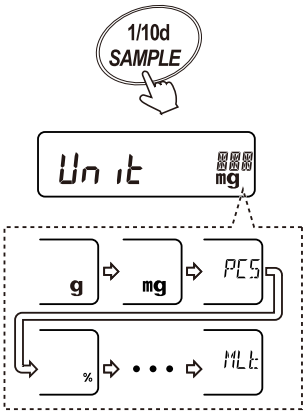
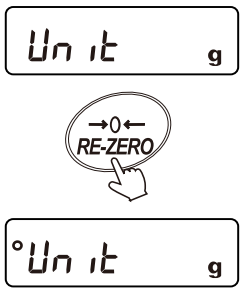
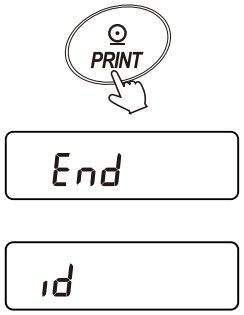
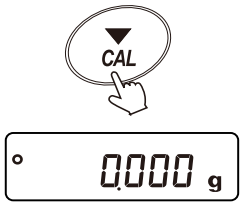
9.7. "Unit" for storing units (modes) explanation

This section explains "Unit (Un it)" of the function table ("9. Function Table").

The units (modes) can be stored by the following procedure to select with the MODE key when the balance is in weighing mode. Use this setting to change the order of units or hide unnecessary units.
The units stored are maintained in non-volatile memory even if the AC adapter is removed and are valid until updated.

Setting procedure

Step	Description	Display and key operation
1	Press and hold the SAMPLE key to display bASFnc.	0.000 g  Press and hold for 2 seconds bASFnc
2	Press the SAMPLE key several times to display Un it.	 Press several times Un it
3	Press the PRINT key.	 Un it g

Step	Description	Display and key operation
4	Specify the units (and modes) in the order they are displayed by operating the keys as explained below.	
	SAMPLE key: Selects a unit (or mode).	
	RE-ZERO key: Specifies the selected unit (or mode) and displays "o".	
5	Press the PRINT key to store the units (modes). The balance displays End and then proceeds to display the next item.	
6	Press the CAL key to return to weighing mode. The balance displays the weighing value display with the first unit specified.	

Notice

The first unit specified in step 4 above will be displayed when the balance is turned on.

9.8. GLP report and ID number

9.8.1. Main objectives

Data compliant with GLP, GMP and the like can be output to a printer or PC via an RS-232C or optional interface.
GLP stands for Good Laboratory Practice.
GMP stands for Good Manufacturing Practice.
For GLP / GMP report output, data includes the balance manufacturer (A&D), model name, serial number, ID number, date*, time*, and space for a signature. For sensitivity adjustment or calibration test report output, data includes the weight used and results also.

* The FZ / FZ-WP series only.

The balance can output the following data compliant with GLP, GMP and the like via an RS-232C or optional interface.

- ❑ Sensitivity adjustment report
  (Output for a sensitivity adjustment using the internal weight / an external weight)
- ❑ Calibration test report
  (Output for a calibration test using the internal weight / an external weight)
- ❑ Breaks ("title block" and "end block") for easy management of a series of weighing data.
- ❑ For checking and adjusting the time / date, refer to "9.4. "Clock" explanation (FZ / FZ-WP series only)".
- ❑ When printing a GLP report with an AD-8127 multi-functional compact printer connected to the balance, the clock function of the printer can be used to print the time and date. ("9. Function Table", inFo 2)
  Centralized management using the password lock function on the AD-8127 side is effective in preventing time and date tampering.

Notice

To output data compliant with GLP, GMP and the like, set the print mode of the AD-8127 to dump printing mode. If the external key print mode is set for weighing value printing, press and hold the ENT SAVE key on the AD-8127 for 2 seconds to switch between the external key print mode and dump printing mode.

9.8.2. Setting the ID number

- ❑ The ID number can be used as an identification number for the balance during maintenance of the balance.
- ❑ The ID number is stored in non-volatile memory even if the AC adapter is removed and is valid until a new registration is made.

Display character set

For the display character set, refer to the correspondence table below.

Correspondence table

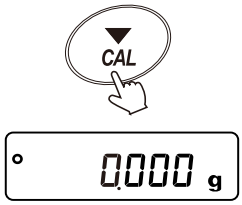
0	1	2	3	4	5	6	7	8	9	—	Space	A	B	C	D	E	F	G
0	1	2	3	4	5	6	7	8	9	-	_	A	b	C	d	E	F	G

H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
H	ı	J	K	L	M	N	o	P	Q	R	S	t	U	V	W	x	y	Z

Setting procedure

Step	Description	Display and key operation
1	Press and hold the SAMPLE key for 2 seconds to enter function table mode ("9. Function Table"). bASFnc is displayed.	0.000 g  Press and hold (2 seconds). bASFnc
2	Press the SAMPLE key several times to display id.	 Press several times. id

Step	Description	Display and key operation
3	Press the [PRINT] key. Set the ID number by operating the keys as explained below.	 
	[SAMPLE] key Selects the digit that blinks.	  
	[RE-ZERO] key Changes the character of the blinking digit (in forward order). Refer to "Correspondence table".	  
	[MODE] key Changes the character of the blinking digit (in reverse order). Refer to "Correspondence table".	  
	[PRINT] key Stores the change and displays End and then AP Fnc.	   
	[CAL] key Cancels the change and displays AP Fnc.	 

Step	Description	Display and key operation
4	Press the CAL key to return to weighing mode.	

9.8.3. GLP report

To output data compliant with GLP, GMP and the like using an AD-8127 compact printer or a PC, set "InFo (GLP output)" to " 1 (On with the balance's internal clock)" or " 2 (On with the external device's clock)" in " SIF (Serial interface)" or " oP-IF (Optional interface)" of the function table ("9. Function Table").

Caution

- **When outputting with a printer**
  - **For connection, refer to "14. Printing Weighing Values to a Printer".**
  - **With an AD-8127 multi-function printer, set to dump printing mode. If the external key print mode is set for weighing value printing, press and hold the ENT SAVE key of the AD-8127 for 2 seconds to switch between the external key print mode and dump printing mode.**
  - **The internal clock of the balance may need to be adjusted. If necessary, adjust the time and date with CL AdJ in the function table ("9. Function Table").**
- **When using an optional interface**
  - **"InFo (GLP output)" parameters: " 1 (On with the balance's internal clock)" " 2 (On with the external device's clock)"**

    If "InFo (GLP output)" set in " oP-IF (Optional interface)" is different from that in " SIF (Serial interface)", " 1 (On with the balance's internal clock)" will be applied to output by both interfaces.

Output for sensitivity adjustment with the internal weight

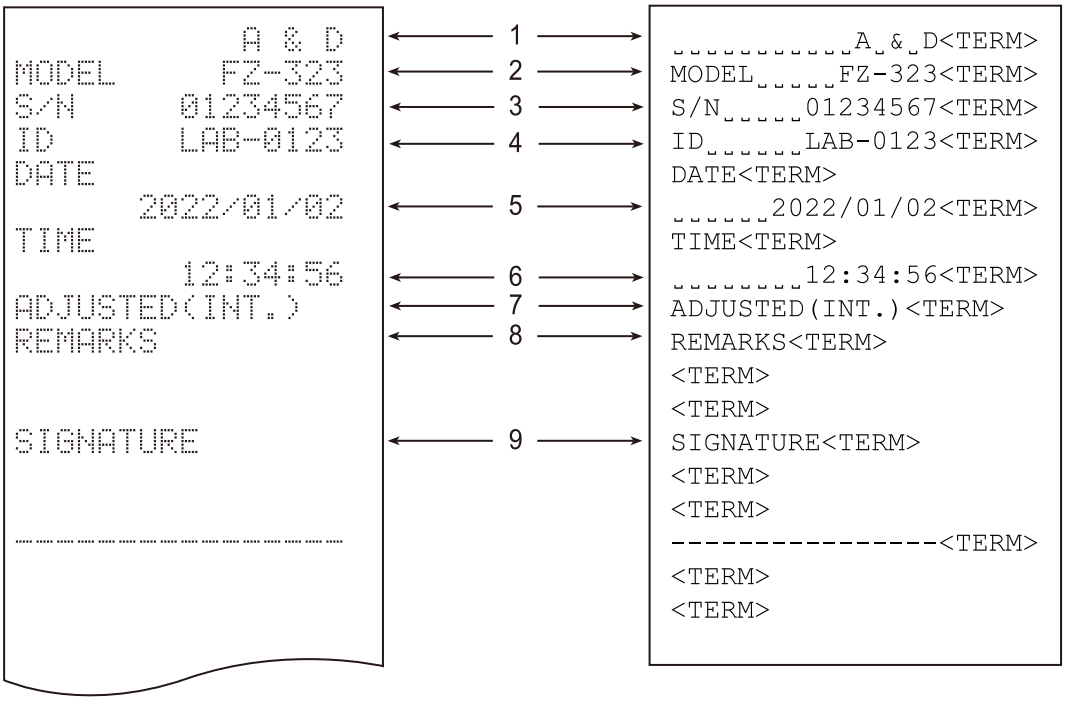
This is the GLP output when sensitivity adjustment of the balance is performed with the internal weight. (Function table: "InFo" set to " I")

Caution

- **The balance's internal clock may require adjustment. If so, set with CL AdJ in the function table ("9. Function Table").**

Examples

Printer format (AD-8127) / PC format (RsCom)



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

No.	Name
1	Manufacturer
2	Model
3	Serial number
4	ID
5	Date
6	Time
7	Sensitivity adjustment with internal weight
8	Remarks
9	Signature

Outputting clock data of an external device

The examples below show data output compliant with GLP, GMP, and the like when "InFo" is set to "2 (On with the external device's clock)" in the function table ("9. Function Table").

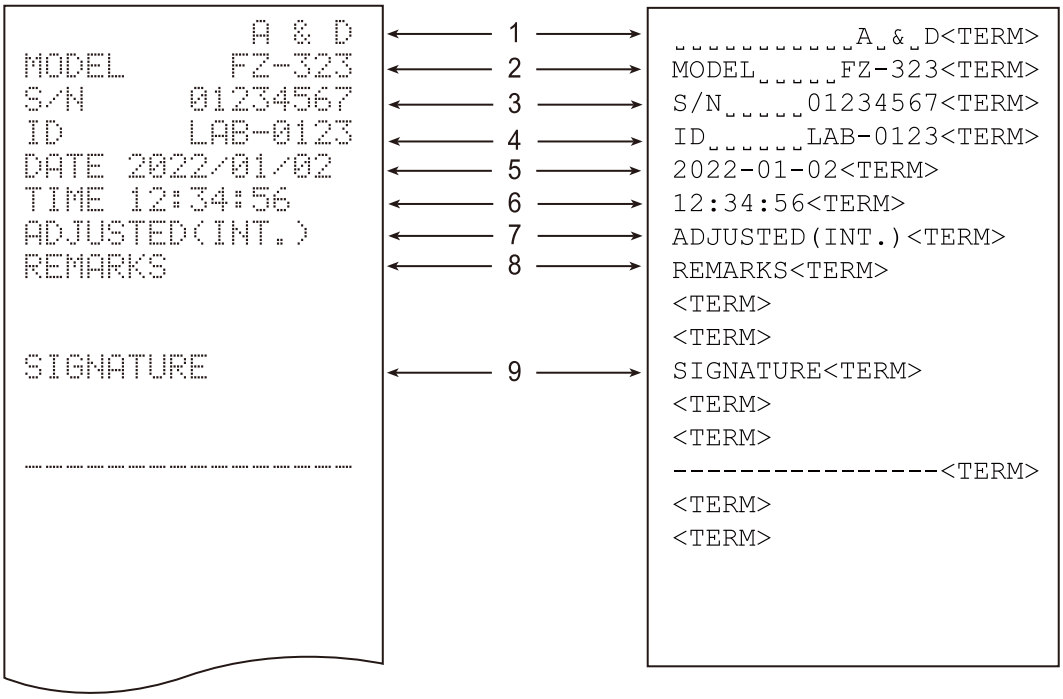
It is possible to use the clock data of an external device such as a PC or printer when "InFo" is set to "2". This setting can be used to unify the clock data using the clock function of the external device.

Caution

- **To output data using the clock function of an external device, use a device that has a clock function and can receive <ESC>D or <ESC>T to output the date and time. (Example: AD-8127 compact printer, RsCom [WinCT] data communication software)**

Examples

Printer format (AD-8127) / PC format (RsCom)



␣: Space, ASCII 20h
<TERM>: Terminator, CR LF or CR
CR: Carriage return, ASCII 0Dh
LF: Line feed, ASCII 0Ah
<ESC>: Escape, ASCII 1Bh

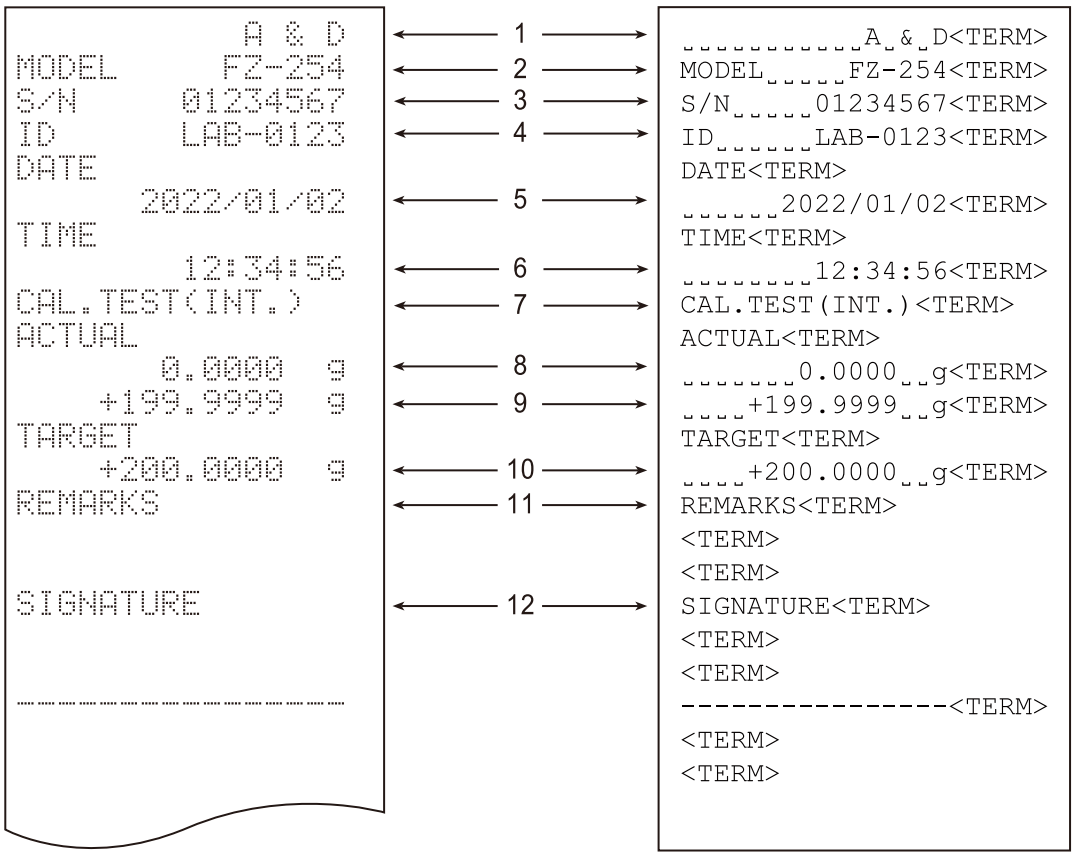
No.	Name
1	Manufacturer
2	Model
3	Serial number
4	ID
5	Date
6	Time
7	Sensitivity adjustment with internal weight
8	Remarks
9	Signature

Output for calibration test with the internal weight

This is the GLP output when the accuracy of a balance is checked with the internal weight.
(Sensitivity adjustment is not performed.)
Only 0.0001 g models support this output. (Function table: "InFo" set to " 1")

Examples

Printer format (AD-8127) PC format (RsCom)



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

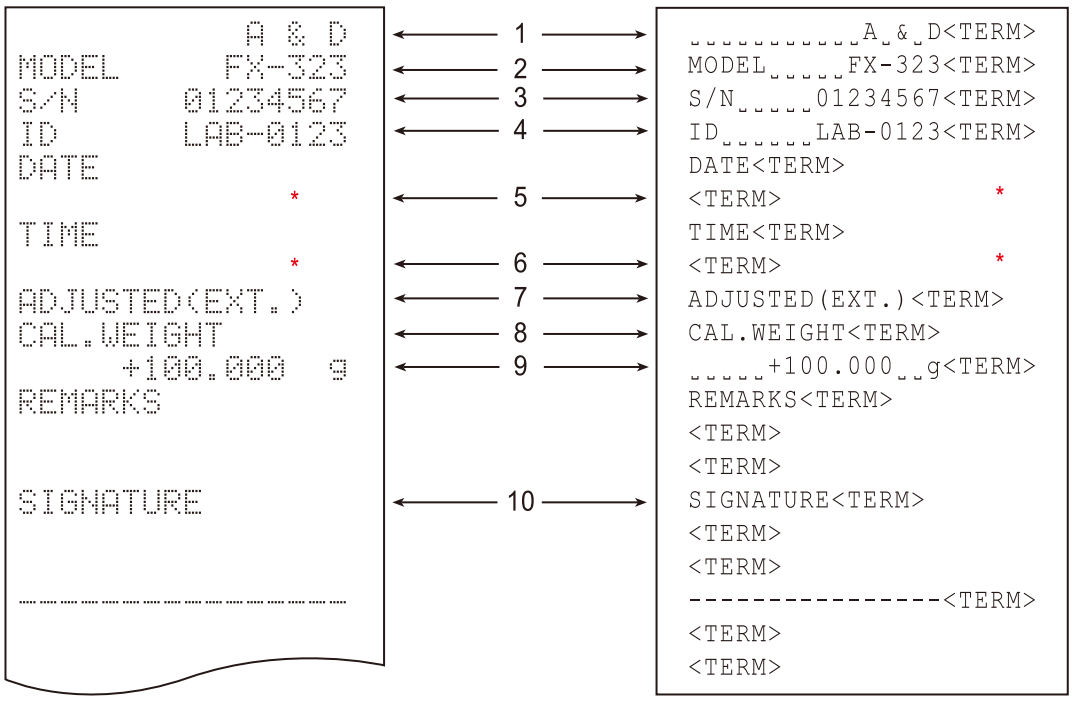
No.	Name
1	Manufacturer
2	Model
3	Serial number
4	ID
5	Date
6	Time
7	Calibration test
8	Zero point value
9	Target weight value
10	Target weight
11	Remarks
12	Signature

Output for sensitivity adjustment with an external weight

This is the GLP output when a sensitivity adjustment of a balance is performed with an external weight.
(Function table: "InFo" set to "1")

Examples

Printer format (AD-8127)



PC format (RsCom)

* With the FZ / FZ-WP series, date and time data is output.

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

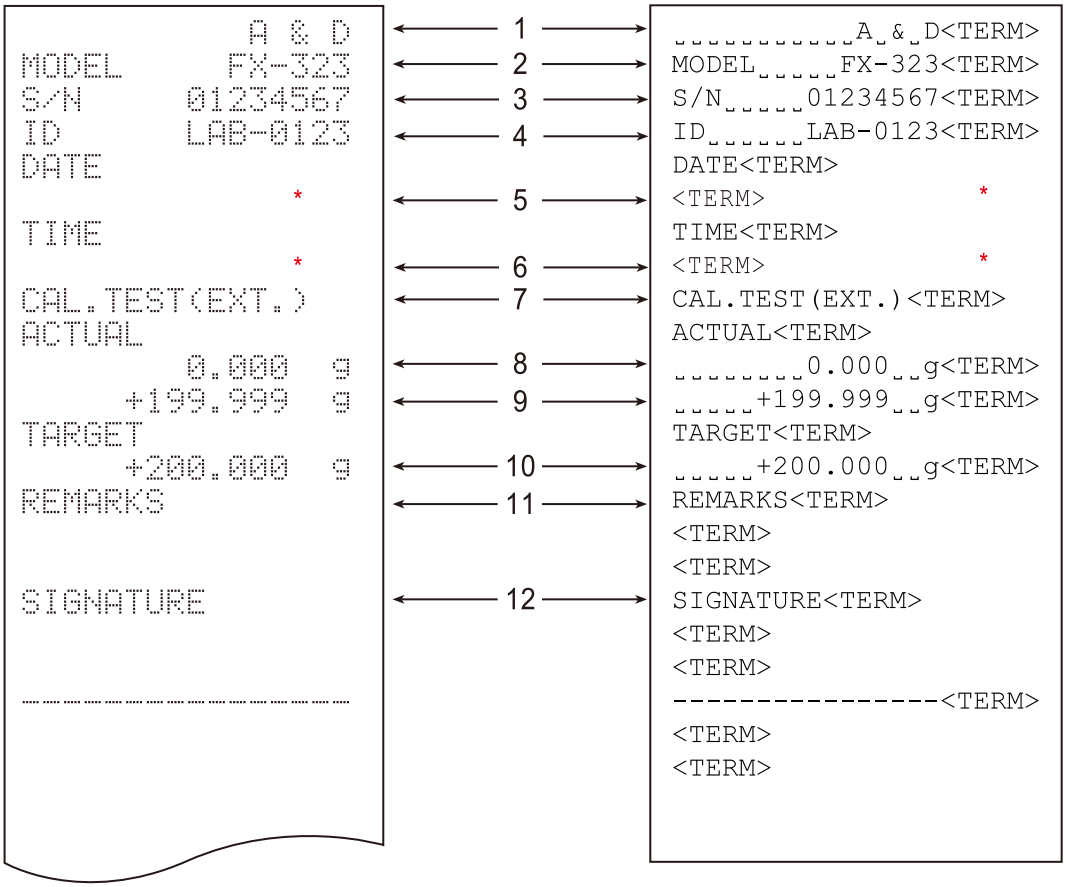
No.	Name
1	Manufacturer
2	Model
3	Serial number
4	ID
5	Date
6	Time
7	Sensitivity adjustment with an external weight
8	Sensitivity adjustment weight
9	Remarks
10	Signature

Output for calibration tests with an external weight

This is the GLP output when the accuracy of a balance is checked with an external weight.
(Sensitivity adjustment is not performed.)
(Function table: "InFo" set to " 1")

Examples

Printer format (AD-8127) / PC format (RsCom)



* With the FZ / FZ-WP series, date and time data is output.

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

No.	Name
1	Manufacturer
2	Model
3	Serial number
4	ID
5	Date
6	Time
7	Calibration test
8	Zero point value
9	Target weight value
10	Target weight
11	Remarks
12	Signature

Output of "Title block" and "End block"

Purpose and operation

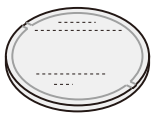
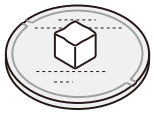
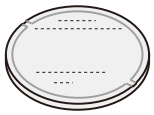
The "Title block" and "End block" can be added before and after a series of weighing data for data management.

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

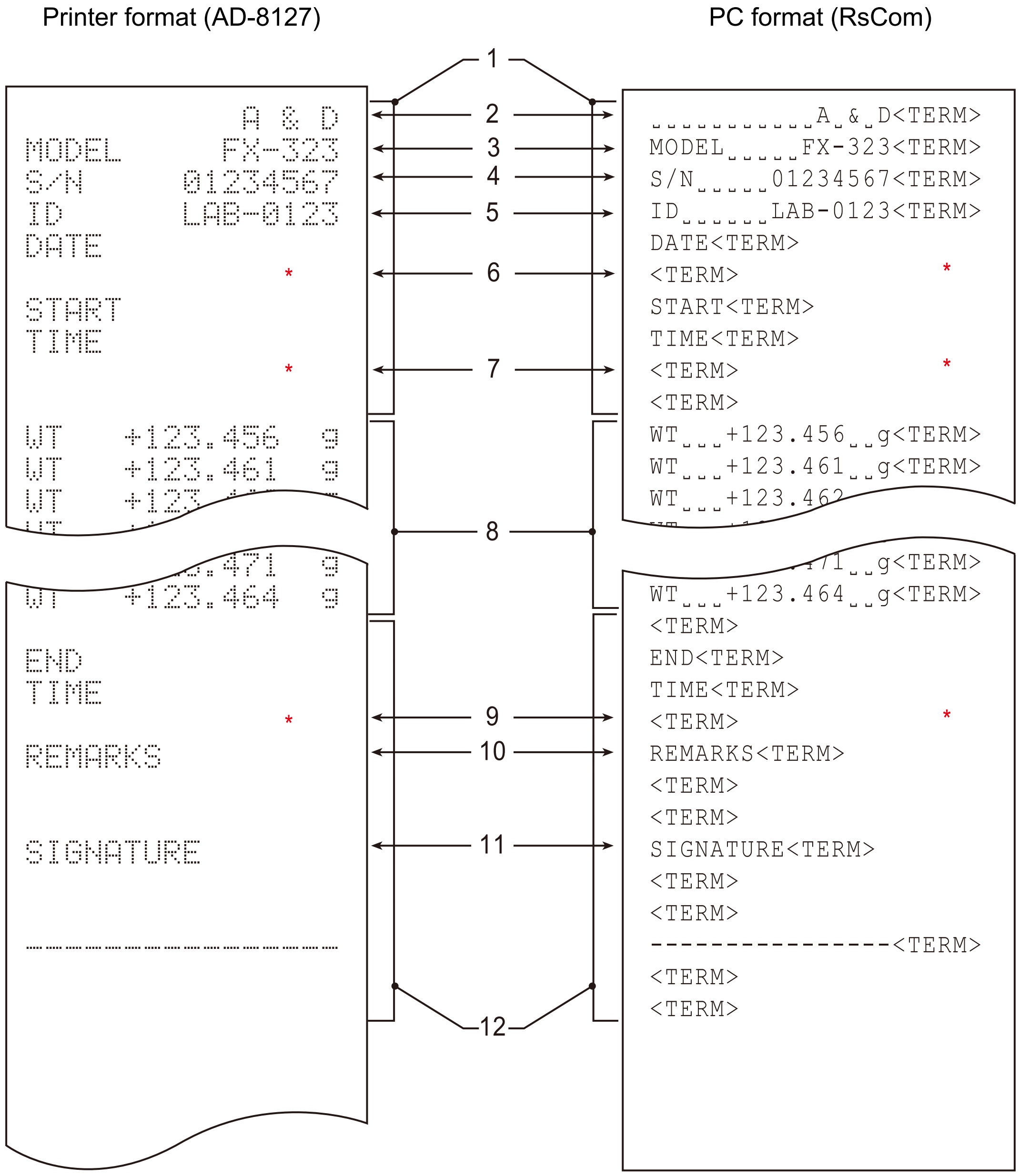
Caution

- **When an AD-8127 compact printer is used to output data, set it to dump printing mode.**

Output method using the keys

Step	Description	Display and key operation	Weighing operation
1	In weighing mode, press and hold the [PRINT] key for 2 seconds; The balance displays "StArt" and outputs the "Title block".	0.000 g  Press and hold for 2 seconds StArt "Title block" output End	
2	Press the [PRINT] key to output the weighing data. Data is output according to the setting for data output mode.	123456 g  "Weighing data" output	
3	Press and hold the [PRINT] key for 2 seconds. The balance displays "rEcEnd" and outputs the "End block".	0.000 g  Press and hold for 2 seconds. rEcEnd "End block" output End	

Examples (Function table: "info" set to " 1 ", "type" set to " 1 ")



* With the FZ / FZ-WP series, date and time data is output.

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

No.	Name
1	Title block
2	Manufacturer
3	Model
4	Serial number
5	ID
6	Date
7	Start time
8	Weighing values

No.	Name
9	End time
10	Remarks
11	Signature
12	End block

9.9. "Application function"

Applications can be switched by "APF (Application mode)" in " AP Fnc (Application function)" of the function table ("9. Function Table").

9.9.1. "Normal weighing mode"

This mode is for normal weighing. It is enabled at factory settings.

"APF (Application mode)" set to "0"

9.9.2. "Capacity indicator mode"

This mode displays the relation between the load and weighing capacity in percent for normal weighing. (Zero: 0%, Weighing capacity: 100%)

"APF (Application mode)" set to " 1"

9.9.3. "Statistical calculation mode"

This mode processes weighing values statistically and displays/outputs the result.

"APF (Application mode)" set to "2"

Calculation items available for display/output include the number of data instances, sum, maximum, minimum, range (Max-Min), mean, standard deviation, coefficient of variation, relative error of maximum value, and relative error of minimum value. You can select these output data in four steps with "StAF (Statistical function mode output items)" in " AP Fnc (Application function)" of the function table ("9. Function Table").

- Incorrect data input can be canceled by key operation if it is immediately after the input.
- Statistical results are initialized if the power is turned off. (The ON/OFF key does not initialize them.)
- The standard deviation, coefficient of variation, and relative error are obtained by the equation below.
- If weighing values whose readability digit was turned off are included in the data, the calculation result will be displayed with the readability digit hidden. (The values are rounded.)
- If the sum exceeds the display digits, the result will not be displayed correctly.

$$\text{Standard deviation} = \sqrt{\frac{N\cdot\Sigma(X_i)^2-(\Sigma X_i)^2}{N\cdot(N-1)}}$$

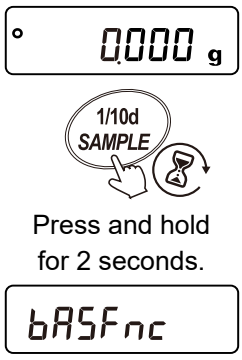
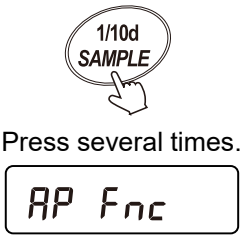
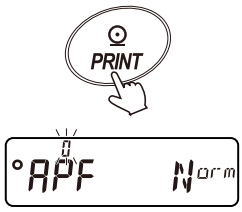
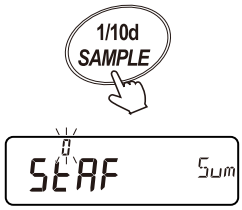
where Xi is the i-th weight data, N is the number of data instances.

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

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

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

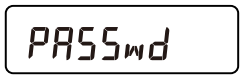
(1) Preparation

Step	Description	Display and key operation
1	Switching to "Statistical calculation mode" (Change in the function table) Press and hold the [SAMPLE] key for 2 seconds to display bASFnc.	
2	Press the [SAMPLE] key several times to display AP Fnc.	
3	Press the [PRINT] key to display °APF Norm.	
4	Press the [RE-ZERO] key several times to display APF StAt. ・If you want to select statistical calculation output items, proceed to step 5 "Selecting statistical calculation output items". ・If you want to store the setting as is, proceed to step 7. ・If you want to exit "Statistical calculation mode", press the [RE-ZERO] key several times to return to °APF Norm.	
5	Selecting statistical calculation output items Press the [SAMPLE] key to display StAF Sum.	

<table>
<tr><th>Step</th><th>Description</th><th>Display and key operation</th></tr>
<tr><td>6</td><td>Press the [RE-ZERO] key to select the desired parameter for StAF.
The example on the right shows the display when the parameter "3" is selected to output the following items: Number of data instances, Sum, Maximum, Minimum, Range (maximum–minimum), Average, Standard deviation, Coefficient of variation, Relative error of maximum value, and Relative error of minimum value.

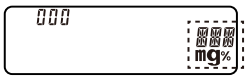
<table>
<tr><th>Parameter (for StAF)</th><th>Calculation item</th></tr>
<tr><td>▪ 0</td><td>Number of data instances, Sum</td></tr>
<tr><td>1</td><td>Number of data instances, Sum, Maximum, Minimum, Range (maximum–minimum), Average</td></tr>
<tr><td>2</td><td>Number of data instances, Sum, Maximum, Minimum, Range (maximum–minimum), Average, Standard deviation, Coefficient of variation</td></tr>
<tr><td>3</td><td>Number of data instances, 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>7</td><td>Press the [PRINT] key to store the setting.</td><td> 

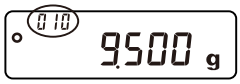
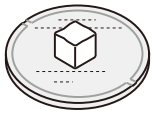
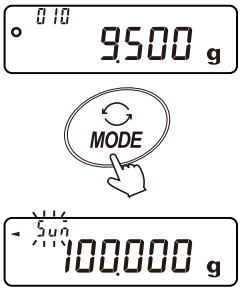
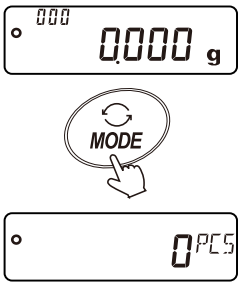
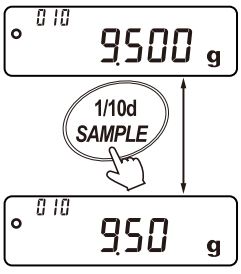
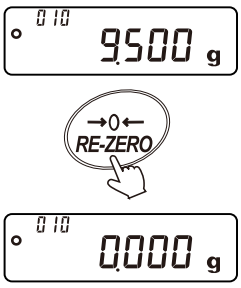
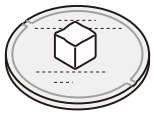

</td></tr>
<tr><td>8</td><td>To return to the weighing value display, press the [CAL] key.</td><td> 

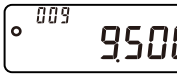
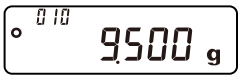
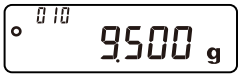
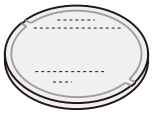
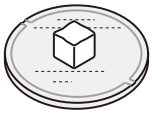

</td></tr>
<tr><td>9</td><td>Selecting the weighing unit

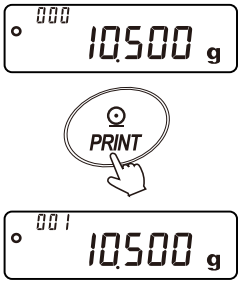
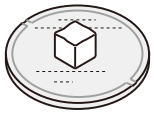
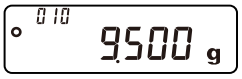
Using the [MODE] key, select the unit to use in statistical calculation mode.
Tip
❑ When data has been entered, unit selection using the [MODE] key does not work. In this case, clear the data while referring to "(4) Clearing statistical data", and then select the unit with the [MODE] key.
❑ To enable the unit used for statistical calculation mode from when the balance is turned on, it is convenient to store the unit in advance with "[UnIt] (Unit)" in the function table ("9. Function Table").</td><td> 


</td></tr>
</table>

(2) Operating procedure

Step	Description	Display and key operation	Weighing operation
1	**Entering data for statistical calculation** In statistical calculation mode, the data No. of the weighing value used for statistical calculation is displayed in the display's upper left corner. Operate the statistical calculation functions by operating the keys as explained below.		
	MODE key (when weighing data is entered) Switches the display between the weighing value, statistical result, and data operation, with each press of the key.		
	MODE key (when no weighing data is entered) Changes the unit (mode).		
	SAMPLE key Turns on/off the readability digit of the displayed weighing value.		
	RE-ZERO key Returns the displayed weighing value to zero.		

Step	Description	Display and key operation	Weighing operation
2	**PRINT key (when a weighing value is displayed)** Outputs the data No. and weighing value and adds the displayed weighing value to statistical processing. (The output is different from the format set in "9.6.3. Weighing data format") Output example No. 9 ST,+0009.500 g	   Output of weighing value  	
	PRINT key (when a statistical result is displayed) Outputs the displayed statistical result when statistical result is displayed. For the output example, refer to "Example of statistical results output".	   Output of statistical result. (Refer to "Example of statistical results output")	
	CAL key Returns the statistical result display / data operation display to the weighing display.	   	
3	Press the RE-ZERO key to return the display to zero.	   	
4	Place the object to be weighed on the weighing pan.	 	

<table>
<tr><th>Step</th><th>Description</th><th>Display and key operation</th><th>Weighing operation</th></tr>
<tr><td>5</td><td>When the stabilization indicator lights up, press the [PRINT] key to add the displayed weighing value to the statistical processing. The number of data instances at the display's top left increases by one.</td><td> 
</td><td rowspan="2">  </td></tr>
<tr><td>6</td><td>Repeat steps 2 to 4 for every weighing.</td><td> 
</td></tr>
<tr><td>7</td><td>Outputting the displayed statistical results (when there is one or more data instance)

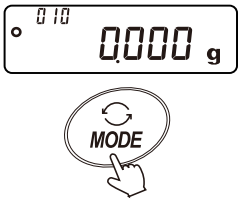
Each time you press the [MODE] key, each statistical result set with "StAF (Statistical function mode output items)", [CLEAR], and [CANCEL] are displayed in that order.

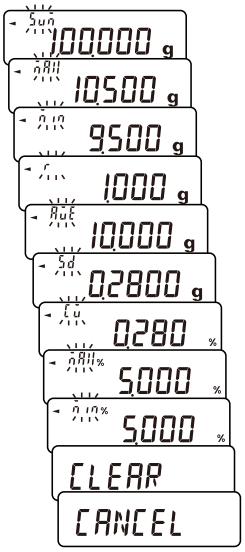
* If there is only one data instance, [- - - - - - - %] is displayed for coefficient of variation and relative error.

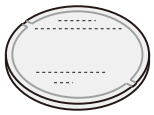
* To enable the unit used for the statistical mode from the moment when the power is turned on, it is convenient to store the unit in advance with "[Unit] (Unit)" in the function table (9. Function Table).

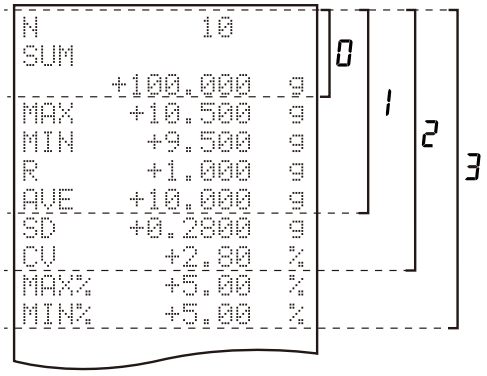
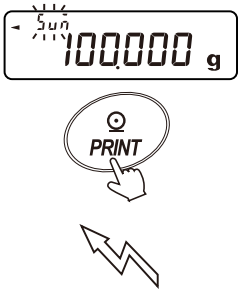
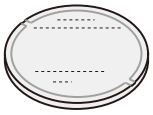
* If the average is zero, [- - - - - - - %] is displayed for the coefficient of variation.

* The symbol at the top left of the display indicates which calculation item is currently shown.

<table><tr><th>Symbol</th><th>Calculation item</th><th colspan="4">Parameter (for StAF)</th></tr><tr><td>Sun</td><td>Sum</td><td>0</td><td rowspan="9"></td><td rowspan="9"></td><td rowspan="9"></td></tr><tr><td>nAH</td><td>Maximum</td></tr><tr><td>n in</td><td>Minimum</td></tr><tr><td>r</td><td>Range (maximum-minimum)</td><td rowspan="6">1</td></tr><tr><td>AvE</td><td>Average</td></tr><tr><td>Sd</td><td>Standard deviation</td><td rowspan="5">2</td></tr><tr><td>Cv</td><td>Coefficient of variation</td></tr><tr><td>nAH%</td><td>Relative error of maximum value</td></tr><tr><td>n in%</td><td>Relative error of minimum value</td><td rowspan="2">3</td></tr></table></td><td> 

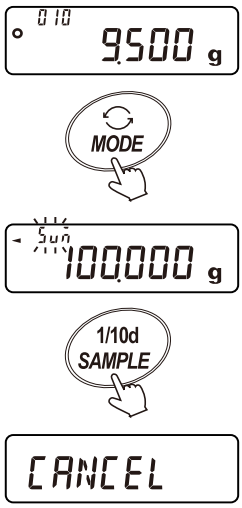
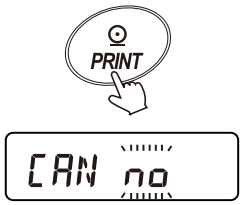
Press as necessary
 

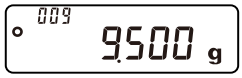
The display cycles.</td><td>  </td></tr>
</table>

Step	Description	Display and key operation	Weighing operation
8	To output the statistical results, press the [PRINT] key when a statistical result is displayed. Example of statistical results output Parameter (for StAF)  	 Statistical results output	

(3) Deleting the latest data

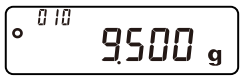
When the wrong data is entered, it can be deleted and excluded from statistical calculation. Only the last entry will be deleted, and other previous data cannot be deleted.

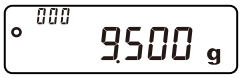
Step	Description	Display and key operation
1	Press the [MODE] key when a weighing value is displayed, and then press the [SAMPLE] key to display CANCEL.	
2	Press the [PRINT] key to display CAN no.	
3	Press the [RE-ZERO] key to display CAN Go.	

Step	Description	Display and key operation
4	Press the PRINT key to exclude the latest data from statistical processing. The number of data instances displayed with the weighing value is reduced by one. Output example *CANCEL*	  "*CANCEL*" output 

(4) Clearing statistical data

All statistical data will be deleted and the number of data instances will be zero.

Step	Description	Display and key operation
1	Press the MODE key when the weighing value is displayed, and then press the SAMPLE key several times to display CLEAR.	    Press several times 
2	Press the PRINT key to display CLr no.	 
3	Press the RE-ZERO key to display CLr Go.	 

Step	Description	Display and key operation
4	Pressing the PRINT key initializes the statistical data. The number of data instances returns to zero. Output example *CLEAR*	  "*CLEAR*" output  

9.9.4. Statistical calculation mode (example of use)

Here, as an example of using statistical calculation mode, mixing of the multiple formula ingredients such as medicine is explained. The mixing process is recorded using the balance and the printer.
In this example, an FX-323 and AD-8127 (in dump printing mode) are connected using the RS-232C serial interface.

Changing the function table

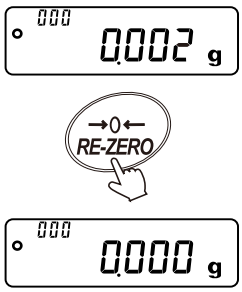
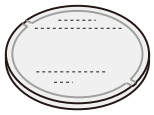
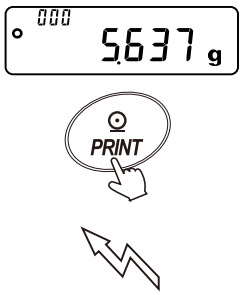
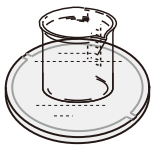
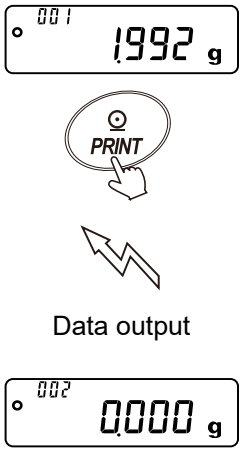
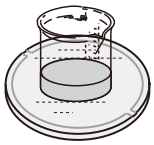
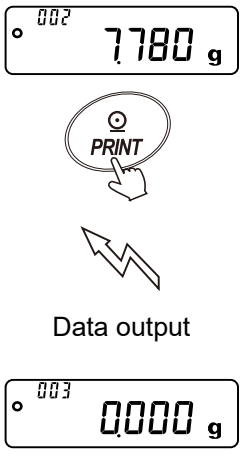
- Enable "statistical calculation mode"
- Enable "auto rezero after data output"

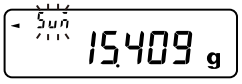
(1) Preparation

Step	Description	Display and key operation
1	**Enabling statistical calculation mode** In weighing mode, activate function table mode ("9. Function Table") by pressing and holding the [SAMPLE] key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds bASFnc
2	Select "Application mode" by pressing the [SAMPLE] key several times to display AP Fnc then the [PRINT] key to display 0APF Norm.	 Press several times AP Fnc  0APF Norm
3	Change the application mode parameter to "2 (Statistical calculation mode)" by pressing the [RE-ZERO] key several times to display 2APF StAt. Press the [PRINT] key to confirm the change. After End is displayed, PASSwd appears.	 Press several times 2APF StAt  End PASSwd

Step	Description	Display and key operation
4	Enabling "Auto rezero after data output" Select "Auto rezero after data output" by pressing the [SAMPLE] key several times to display [dout] then the [PRINT] key to display [PrT KEY].	 Press several times dout  PrT KEY
5	Press the [SAMPLE] key several times to display [°Ar-d OFF].	 Press several times °Ar-d OFF
6	Enable "Auto rezero after data output" by pressing the [RE-ZERO] key to display [Ar-d ON].	 Ar-d ON
7	Press the [PRINT] key to confirm the change. After [End] is displayed, [S iF] appears.	 End S iF
8	Returning to the weighing display Press the [CAL] key to return to the weighing display.	 0.000 g

(2) Operating procedure

Step	Description	Display and key operation	Weighing operation
1	Press the RE-ZERO key to set the display to zero.		
2	Place a container on the weighing pan, then press the PRINT key to set the display to 0.000 g. (The tare weight is stored.) If an external output device is connected, the data is output. Output example No. 1 ST,+0005.637 g ..... Tare value		
3	Weigh the formula ingredient 1, then press the PRINT key to set the display to 0.000 g. (The weight of the formula ingredient 1 is stored.) If an external output device is connected, the data is output. Output example No. 1 ST,+0005.637 g ..... Tare value No. 2 ST,+0001.992 g ..... Formula ingredient 1		
4	Weigh the formula ingredient 2, then press the PRINT key to set the display to 0.000 g. (The weight of the formula ingredient 2 is stored.) If an external output device is connected, the data is output. Output example No. 1 ST,+0005.637 g ..... Tare value No. 2 ST,+0001.992 g ..... Formula ingredient 1 No. 3 ST,+0007.780 g ..... Formula ingredient 2		

Step	Description	Display and key operation	Weighing operation
5	When there are more formula ingredients to mix, repeat step 4. To finish mixing, proceed to step 6.		To step 4 or step 6
6	After mixing is completed, press the [MODE] key to display the statistical result.	 	
7	Press the [PRINT] key to output the number of stored data instances including the tare value and the total weight to the external output device. Output example No. 1 ST,+0005.637 g ····· Tare value No. 2 ST,+0001.992 g ····· Formula ingredient 1 No. 3 ST,+0007.780 g ····· Formula ingredient 2 N 3 SUM +15.409 g ····· Total weight	  Data output	

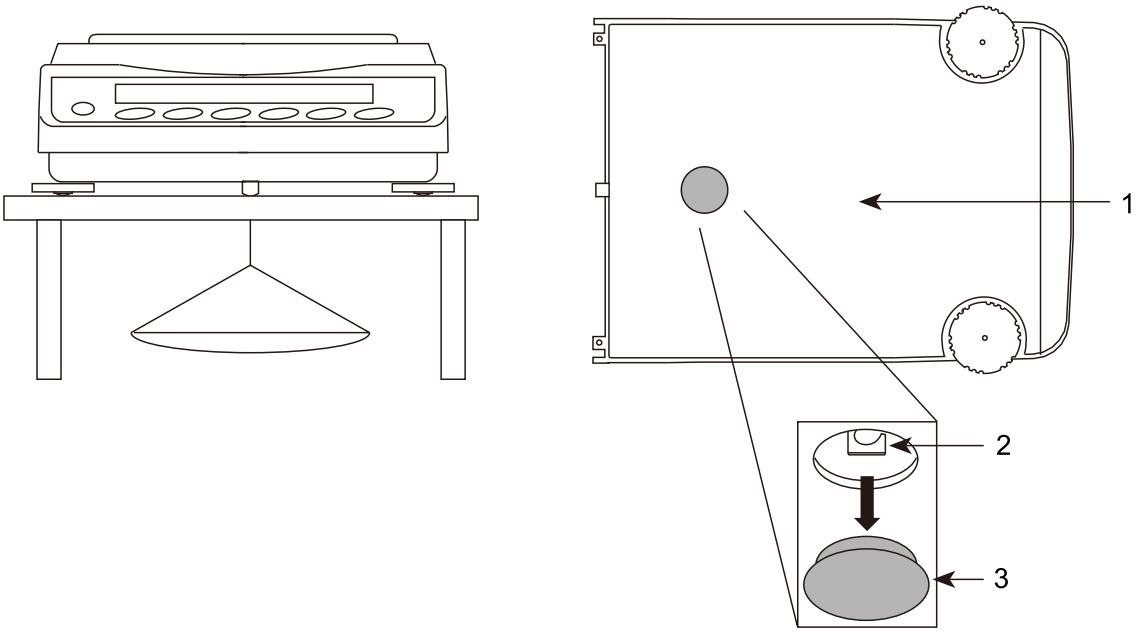
10. Underhook

The underhook is used for underhook weighing such as the measurement of magnetic materials.

To use the built-in underhook, remove the cap on the bottom of the balance.

Caution

- **Do not apply excessive force to the underhook.**
- **When not in use, attach the cap to prevent dust from getting into the balance.**
- **Do not push the underhook upward.**



No.	Name
1	Bottom of the balance
2	Underhook (Hole diameter: approx. 4 mm)
3	Cap

11. Density (Specific Gravity) Measurement

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

We recommend using a separately sold AD-1654 density determination kit for measurements.

For assembly and installation instructions, refer to the "AD-1654 Density Determination Kit Instruction Manual".

Caution

- **Density mode is disabled by default. To use it, enable "dS (density mode) " in the function table ("9. Function Table"). (For details, refer to "Storing "dS (Density mode)" with "Unit".)**
- **Readability of weighing value is fixed in density mode.**

Density formula

- Density of a solid:

  The density can be obtained from the weight of the sample in air, the weight in liquid, and the density of the liquid.

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

ρ: Density of sample　　A: Weight of sample in air

ρ_0: Density of liquid　　B: Weight of sample in liquid

- Density of a liquid:

  The density of a liquid can be obtained from the weight of the float in air, the weight of the float in a liquid, and the known volume of the float.

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

ρ: Density of sample　　A: Weight of float in air

V: Volume of float　　B: Weight of float in liquid

Caution

- **"dS Fnc (Density measurement function) " does not appear if density mode is not activated in the function table ("9. Function Table").**
- **Store density mode with "Unit (Storing units/modes)" in the function table ("9. Function Table") in advance.**
- **When density mode is enabled, dS Fnc will be displayed after SiF.**

  To change the function table, refer to "9. Function Table".

Class	Item and parameter		Description
dS Fnc Density measurement function	Ldin Liquid density input	▪ 0	Water temperature
		1	Density input
	dS Density measurement mode	▪ 0	Solids
		1	Liquids

▪ Factory setting

11.1. Preparation for measurement (Change in function table)

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

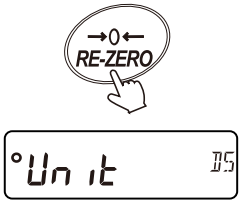
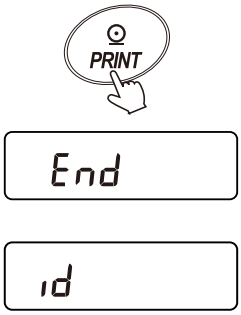
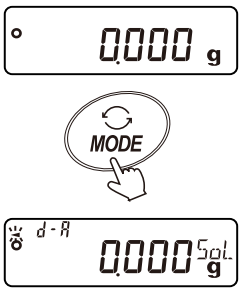
Storing "dS (Density mode)" with "Unit"

"dS (Density mode)" can be stored with "Unit (Unit)" in the function table ("9. Function Table").

The example below shows how to set the units in the order " **g** (gram)" followed by "dS (Density mode)".

Storing procedure

Step	Description	Display and key operation
1	When the balance is in weighing mode, pressing and holding the SAMPLE key for 2 seconds displays bASFnc and activates function table mode.	° 0.000 g  Press and hold for 2 seconds. bASFnc
2	Press the SAMPLE key several times to display Unit.	 Press several times. Unit
3	Press the PRINT key to display Unit g.	 Unit g
4	Press the RE-ZERO key to specify the unit; the indicator "o" is displayed with the specified unit.	 °Unit g
5	Press the SAMPLE key several times to display Unit dS.	 Press several times. Unit dS

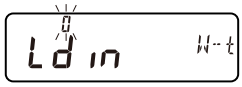
Step	Description	Display and key operation
6	Press the [RE-ZERO] key to specify the unit; the indicator "**o**" is displayed with the specified unit.	
7	Press the [PRINT] key to store the specified units.	
8	Press the [CAL] key to return to weighing mode.	
9	Pressing the [MODE] key switches the units in the specified order: "**g**" →"d5*" * In density mode, the "d5" unit is displayed when density is calculated. In the weight measurement in air mode (with "◄" blinking and "d-A" lit on the top left) and the weight measurement in liquid mode (with "◄" lit and "d-b" lit on the top left), "**g**" is displayed.	

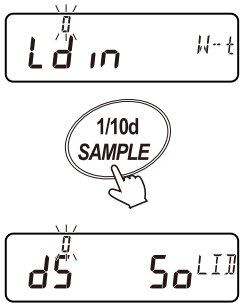
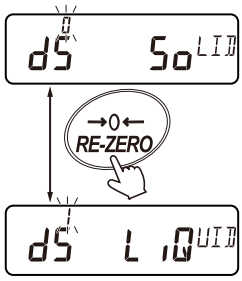
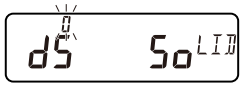
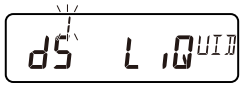
Sample selection

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

The sample to be measured can be specified with "dS (Density measurement mode)" in "dS Fnc (Density measurement function)" of the function table ("9. Function Table").

Selecting procedure

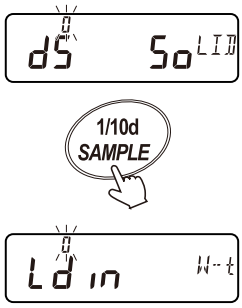
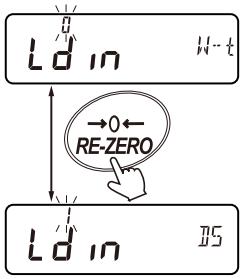
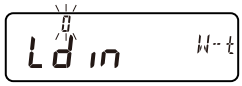
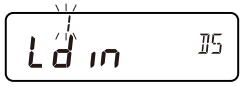
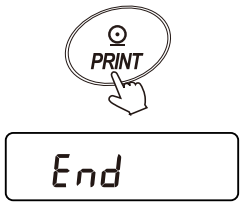
Step	Description	Display and key operation
10	To enter function table mode when the balance is in weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	  Press and hold for 2 seconds. 
11	Press the SAMPLE key several times to display "dS Fnc (Density measurement function)".	 Press several times. 
12	Press the PRINT key to enter the item menu.	 

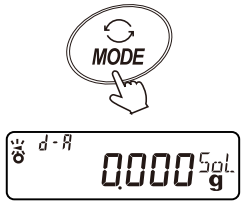
Step	Description	Display and key operation
13	Select the sample to be measured by operating the keys as explained below.	
	SAMPLE key Selects "dS (Density measurement mode)".	
	RE-ZERO key Selects "0 (Solids)" or " 1 (Liquids)" for "dS ".	
14	The following settings are available.	
	"dS " set to "0 (Solids)" After step 18, proceed to "11.2. Measuring the density (specific gravity) of a solid".	
	"dS " set to " 1 (Liquids)" After step 18, proceed to "11.4. Measuring the density (specific gravity) of a liquid".	

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

Proceed to step 17 for liquid density (specific gravity) measurement when "dS" is set to " 1 (Liquids)" as the setting of [Ld in (Liquid density input)] is not related.

Selecting procedure

Step	Description	Display and key operation
15	Select "Liquid density input" by operating the keys as explained below.	
	SAMPLE key Selects "Ld in (Liquid density input)".	
	RE-ZERO key Selects "0 (Water temperature)" or " 1 (Density input)" for "Ld in".	
16	The following settings are available.	
	"Ld in" set to "0 (Water temperature)" Proceed to "Water temperature input method" in "11.3. Inputting the density of the liquid" from step 7 of "11.2. Measuring the density (specific gravity) of a solid".	
	"Ld in " set to " 1 (Density input)" Proceed to "Density input method" in "11.3. Inputting the density of the liquid" from step 7 of "11.2. Measuring the density (specific gravity) of a solid".	
17	Press the PRINT key to store the setting.	

Step	Description	Display and key operation
18	The preliminary setting is complete. To start measurement, press the CAL key to return to weighing display.	
19	Press the MODE key to display density mode unit. Proceed to "11.2. Measuring the density (specific gravity) of a solid" or "11.4. Measuring the density (specific gravity) of a liquid".	 "dS" set to "0 (Solids)" or  "dS" set to " 1 (Liquids)"

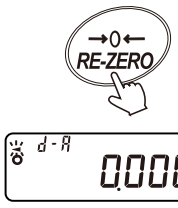
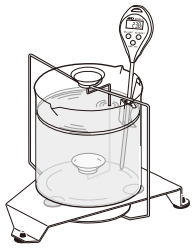
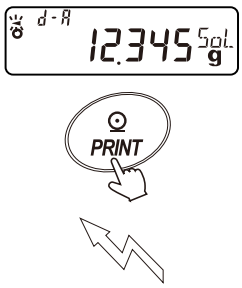
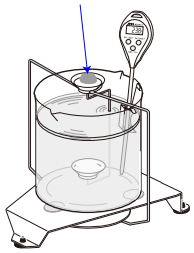
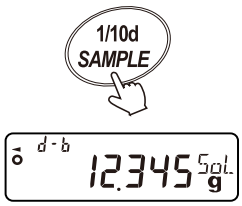
11.2. Measuring the density (specific gravity) of a solid

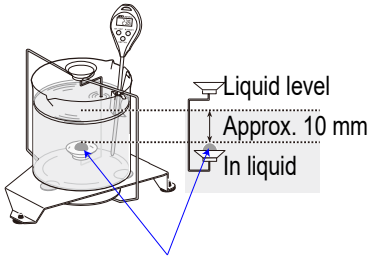
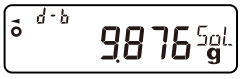
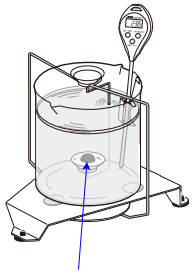
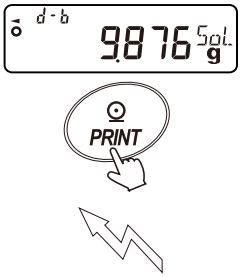
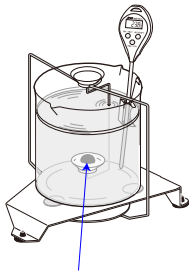
The following describes the operation when "dS (Sample selection)" is set to "0 (Solids)" in "dS Fnc (Density measurement function)" of the function table ("9. Function Table"). For the setting method, refer to "11.1. Preparation for measurement (Change in function table)".

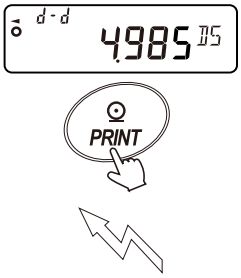
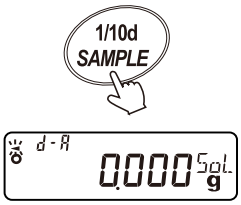
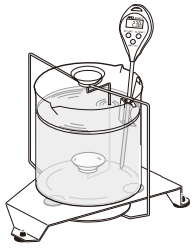
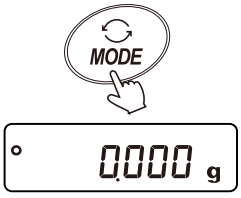
Caution

- **If temperature of the liquid changes during measurement or when type of liquid is changed, reset the density of a liquid by referring to "11.3. Inputting the density of the liquid" as necessary.**
- **In density (specific gravity) display, the three digits (four digits for 0.0001g models) after the decimal point are fixed. The readability cannot be changed with the SAMPLE key.**
- **In density (specific gravity) measurement, the density is fixed and displayed according to weight in air measurement and weight in liquid measurement.**

Measurement procedure

Step	Description	Display and key operation	Weighing operation
1	Weight in air measurement mode Confirm the weight in air measurement mode ("d-A" lit, "◄" blinking): Press the RE-ZERO key with nothing on the weighing pan in air to set the display to zero.		
2	Place a sample on the weighing pan in air and wait for the display to stabilize. To output the sample weight, press the PRINT key. Output example with PC (RsCom): Weight in air A&D standard format (factory setting) ST,+0012.345␣␣g<TERM> ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	 Weighing data output	Sample in air 
3	Press the SAMPLE key to confirm the weight in air and enter the weight in liquid measurement mode ("d-b" lit, "◄" lit). **Caution** **If a negative value or E (overload error) is displayed, the SAMPLE key is disabled.**		

Step	Description	Display and key operation	Weighing operation
4	**Weight in liquid measurement mode** Transfer the sample from the weighing pan in air to the weighing pan in liquid and wait for the display to stabilize. ("d-b" lit, " ◄ " lit) At this time, adjust so that the sample is about 10 mm below the liquid level.  Sample in liquid	 	 Sample in liquid
5	To output the sample weight, press the PRINT key. Output example with PC (RsCom): Weight in liquid A&D standard format (factory setting) ST,+0009.876␣␣g<TERM> ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	 Weighing data output	 Sample in liquid
6	Press the SAMPLE key to confirm the weight in liquid and enter liquid density input mode ("d-[" lit, " ◄ " lit). **Caution** **If [E] (overload error) is displayed, the SAMPLE key is disabled.**	 	
7	**Liquid density input mode** Input the density of the liquid: Set the density by referring to "Water temperature input method" or "Density input method" in "11.3. Inputting the density of the liquid".	 "Ld in" set to "0" (Water temperature) or  "Ld in" set to "1" (Density input)	
8	Press the SAMPLE key to enter the solid density display mode ("d-d" lit, " ◄ " lit).	  	

Step	Description	Display and key operation	Weighing operation
9	**Solid density display mode** When a density is displayed, pressing the [PRINT] key outputs the density. The density (specific gravity) unit is "DS ". Output example with PC (RsCom): Density (specific gravity) A&D standard format (factory setting) [ST,+0004.985␣DS<TERM>] ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	 Density (specific gravity) output	
10	To measure another sample, press the [SAMPLE] key to start from step 1 in "Weight in air measurement mode" ("d-A" lit, "◀" blinking).		
11	If the temperature of the liquid changes during measurement or when type of liquid is changed, reset the density of a liquid by referring to step 7 in "Liquid volume input mode" as necessary.	Refer to step 7 in "Weight in liquid measurement mode".	
12	To enter weighing mode, press the [MODE] key.		

11.3. Inputting the density of a liquid

A method of liquid density input for solid density measurement can be selected.

For "Ld in (Liquid density input)", "0" (for "Water temperature input method") and "1" (for "Density input method") are available in the function table ("9. Function Table").

Correspondence table between water temperature and density

°C	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
0	0.99984	0.99990	0.99994	0.99996	0.99997	0.99996	0.99994	0.99990	0.99985	0.99978
10	0.99970	0.99961	0.99949	0.99938	0.99924	0.99910	0.99894	0.99877	0.99860	0.99841
20	0.99820	0.99799	0.99777	0.99754	0.99730	0.99704	0.99678	0.99651	0.99623	0.99594
30	0.99565	0.99534	0.99503	0.99470	0.99437	0.99403	0.99368	0.99333	0.99297	0.99259
40	0.99222	0.99183	0.99144	0.99104	0.99063	0.99021	0.98979	0.98936	0.98893	0.98849

g/cm^3

Water temperature input method

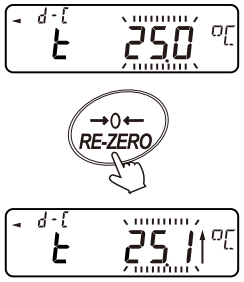
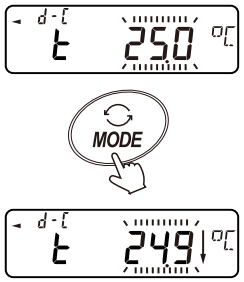
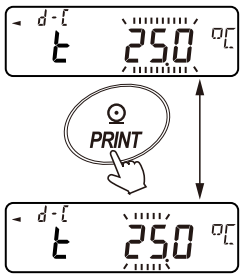
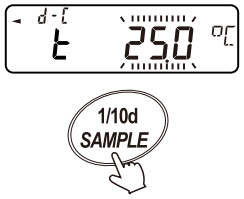
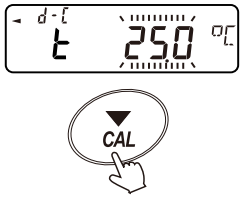
Below is a supplementary explanation of step 7 "Liquid density input mode ("Ld in" set to "0")" in "11.2. Measuring the density (specific gravity) of a solid ("dS" set to "0")".

The currently set water temperature is displayed. (25.0 °C at factory settings)

For relationship between water temperature and water density, refer to "Correspondence table between water temperature and density".

The setting range is between 0.0 °C to 99.9 °C with 0.1 °C increments.

Input method

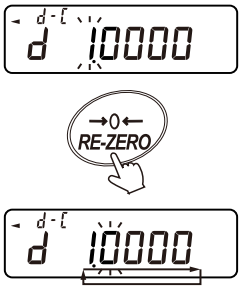
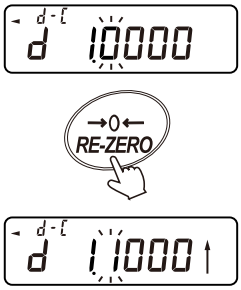
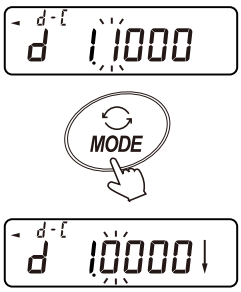
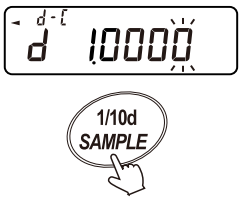
Step	Description	Display and key operation
1	**RE-ZERO** key Increases the value of the blinking digits by one (+). ("0" appears after "9".)	
	MODE key Decreases the value of the blinking digits by one (−). ("9" appears after "0".)	
	PRINT key Selects the digits that blink.	
	SAMPLE key Stores the set value and activates the density display mode. (To step 9 "Solid density display mode" in "11.2. Measuring the density (specific gravity) of a solid".)	
	CAL key Activates the density display mode without storing the set value. (To step 9 "Solid density display mode" in "11.2. Measuring the density (specific gravity) of a solid".)	

Density input method

Below is a supplementary explanation of step 7 "Liquid density input mode" ("Ld in" set to "1")" in "11.2. Measuring the density (specific gravity) of a solid ("dS" set to "0")".

The currently set density is displayed. (1.000 g/cm^3 at factory settings.)
The set value can be changed with the key operations explained below.
The setting range is between 0.000 g/cm^3 to 1.999 g/cm^3.

Input method

Step	Description	Display and key operation
1	**PRINT** key Selects the digit that blinks.	
	RE-ZERO key Increases the value of the blinking digit by one (+). ("0" appears after "9".)	
	MODE key Decreases the value of the blinking digit by one (−). ("9" appears after "0".)	
	SAMPLE key Stores the set value and activates the density display mode. (To step 9 "Solid density display mode" in "11.2. Measuring the density (specific gravity) of a solid".)	
	CAL key Activates the density display mode without storing the set value. (To step 9 "Solid density display mode" in "11.2. Measuring the density (specific gravity) of a solid".)	

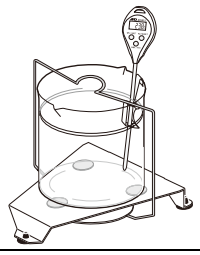
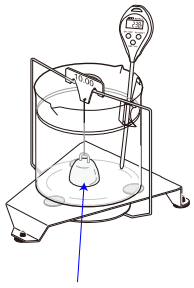
11.4. Measuring the density (specific gravity) of a liquid

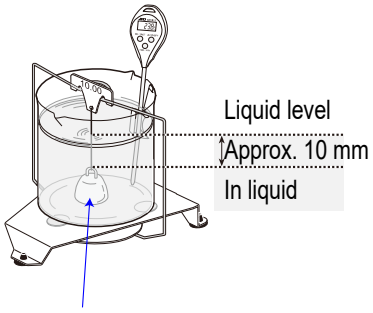
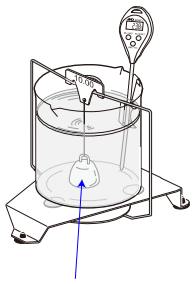
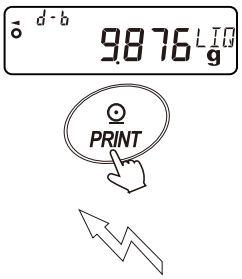
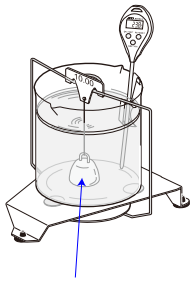
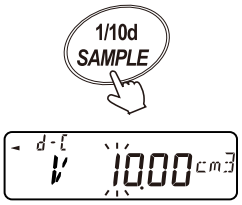
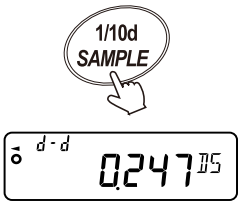
The following describes the operation when "dS (Sample selection)" is set to " 1 (Liquids)" in " dS Fnc (Density measurement function)" of the function table ("9. Function Table"). For the setting method, refer to "11.1. Preparation for measurement (Change in function table)".

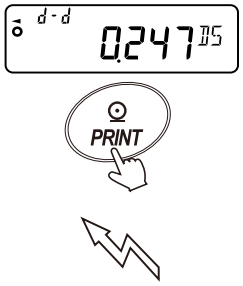
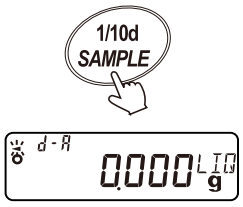
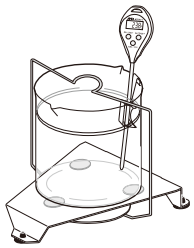
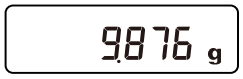
Caution

- **In density (specific gravity) display, the three digits (four digits for 0.0001 g models) after the decimal point are fixed. The readability cannot be changed with the SAMPLE key.**
- **In density (specific gravity) measurement, the density is fixed and displayed according to the float weight in air measurement and float weight in liquid measurement.**

Measurement procedure

Step	Description	Display and key operation	Weighing operation
1	Weight in air measurement mode Confirm the weight in air measurement display (with "d-A" lit and "◄" blinking displayed). Before placing a float, press the RE-ZERO key to set the display to zero.	→0← RE-ZERO d-A 0.000 g	
2	Place the float and wait for the display to stabilize. To output the float weight, press the PRINT key. Output example with PC (RsCom): Weight in air A&D standard format (factory setting) ST,+0012.345␣␣g<TERM> ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	d-A 12.345 g PRINT Weighing data output	 Float in air
3	Press the SAMPLE key to confirm the weight in air and enter the weight in liquid measurement mode ("d-b" lit and "◄" lit). **Caution** **If a negative value or E (overload error) is displayed, the SAMPLE key is disabled.**	1/10d SAMPLE d-b 12.345 g	

Step	Description	Display and key operation	Weighing operation
4	**Weight in liquid measurement mode** For density measurement, put the liquid in the beaker and sink the float. ("d-b" lit, " ◄ " lit) At this time, adjust so that the float is about 10 mm below the liquid level.  Float in liquid		 Float in liquid
5	Wait for the display to stabilize. To output the float weight, press the [PRINT] key. Output example with PC (RsCom): Weight in liquid A&D standard format (factory setting) [ST,+0009.876␣␣g<TERM>] ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	 Weighing data output	 Float in liquid
6	Press the [SAMPLE] key to confirm the weight in liquid and enter the volume input mode ("d-C" lit, " ◄ " lit). **Caution** **If [E] (overload error) is displayed, the [SAMPLE] key is disabled.**	 Volume input mode	
7	**Liquid volume input mode** Input the volume of the liquid: Input the volume by referring to "11.5. Inputting the volume of the float".	Refer to "11.5. Inputting the volume of the float".	
8	Press the [SAMPLE] key to enter the density display mode. ("d-d" lit, " ◄ " lit)		

Step	Description	Display and key operation	Weighing operation
9	Liquid density display mode When a density is displayed, pressing the [PRINT] key outputs the density. Output example with PC (RsCom): Density (specific gravity) A&D standard format (factory setting) [ST,+0000.247␣DS<TERM>] ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	 Density (specific gravity) output	
10	To measure another sample, press the [SAMPLE] key to start from the weight in air measurement mode ("d - A" lit, "◀" blinking).		
12	To enter weighing mode, press the [MODE] key.		

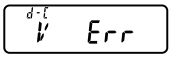
11.5. Inputting the volume of the float

Below is a supplementary explanation of step 7 "Liquid volume input mode" in "11.4.Measuring the density (specific gravity) of a liquid".

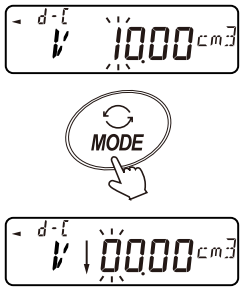
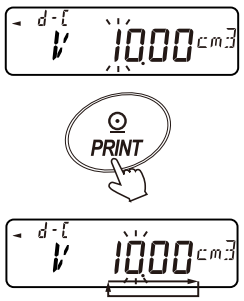
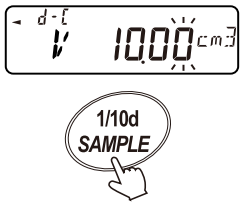
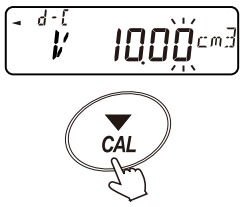
The currently set volume of the float is displayed. (Factory setting is 10.00 cm^3).

The set value can be changed with the key operations explained below.

The setting range is between 0.01 cm^3 to 99.99 cm^3 with increments of 0.01 cm^3.

If a value outside the setting range is entered, the display shows  and returns to the input display.

Input method

Step	Description	Display and key operation
1	**RE-ZERO key** Increases the value of the blinking digit by one (+). ("0" appears after "9".)	
	MODE key Decreases the value of the blinking digit by one (−). ("9" appears after "0".)	
	PRINT key Selects the digit that blinks.	
	SAMPLE key Stores the set value and activates the density display mode. (To step 9 "Liquid density display mode" in "11.4 Measuring the density (specific gravity) of a liquid".)	
	CAL key Activates the density display mode without storing the set value. (To step 9 "Liquid density display mode" in "11.4 Measuring the density (specific gravity) of a liquid".)	

12. Password Lock Function

Usage

The password lock function can restrict the use and functions of the balance.

It is effective in preventing falsification of date and time settings or preventing changes in the function table by the user.

Input

The password is set with four digits using the following four keys: 256 combinations (= 4 × 4 × 4 × 4) are available.

Four keys: [MODE], [SAMPLE], [PRINT], and [RE-ZERO].

Functions and settings

The password lock function is disabled at factory settings.

To enable/disable the password lock function and register a new password, change the settings in the function table ("9. Function Table").

This function can be set in three ways by "LocK" in "PASSwd (Password lock)" of the function table ("9. Function Table").

Parameter	Description
"LocK" set to "0"	No password required.
"LocK" set to "1"	Password entry required at the start of weighing.
"LocK" set to "2"	Login with the Administrator's password required when changing settings.

Function table settings

"LocK" set to "0": No password required

- ❑ The password lock function is disabled.
- ❑ Anyone can perform weighing work.
- ❑ All functions are available.
- ❑ The settings can also be changed.

"LocK" set to "1": Password entry required at the start of weighing

- ❑ The administrator (ADMIN) can restrict balance users by setting individual passwords.

  The factory default password of the Administrator (ADMIN) is 7777 PW, which is set by pressing the [RE-ZERO] key four times.
- ❑ The password will be required to start weighing work with the [ON:OFF] key.
- ❑ The balance cannot enter weighing mode unless the correct password is used.
- ❑ There are two login levels: Administrator (ADMIN) and User (USER01 to USER10).

Login level	Description
Administrator (ADMIN)	All functions and settings are available.
	Passwords for 10 users can be set individually.
User (USER01 to USER10)	Restrictions can be placed on setting changes (including clock). Initialization and password lock function are restricted.
No password	The balance cannot be used.

LocK set to 2: Login with the Administrator's password required when changing settings

- ❑ Anyone can perform weighing operations, but restrictions can be placed on initialization and setting changes (including clock).
  (Password entry using the ON:OFF key will not be required at the start of weighing.)
- ❑ There are two login levels: Administrator (ADMIN) and Guest (GUEST).

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

- ❑ With the display off, if you press the ON:OFF key while holding down the CAL key to start weighing, the balance will prompt a password entry of Administrator (ADMIN).

Restricted items according to login level

Login level	Weighing		
	Password input (at the start of weighing)	Sensitivity adjustment	Setting changes*1
Administrator (ADMIN)	Required	Available	Available
User (USER01 to USER10)		Available or not available*2	Not available
Guest (GUEST)	Not required		

*1 Response adjustment change, function selection and initialization, and function table ("9. Function Table") (clock & calendar setting, etc.).

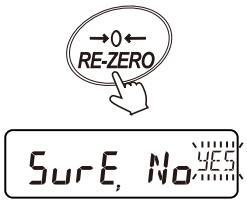
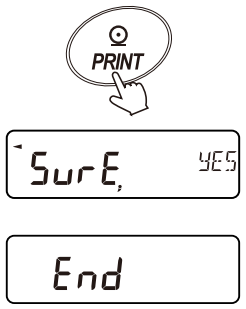
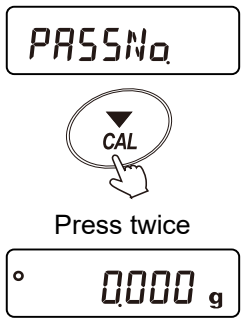
*2 It usually can be used, but if the administrator (ADMIN) sets it to "Prohibit" in "Function selection" ("8.1. Function selection switch"), it can be disabled for users (USER01 to USER10) and guests (GUEST).

12.1. Enabling password lock function

With "PASSwd (Password function)" set in the function table ("9. Function Table"), the password function can be switched between Disabled ("Lock set to "0"), Enabled ("Lock set to "1"), and Enabled ("Lock " set to "2").

Setting method

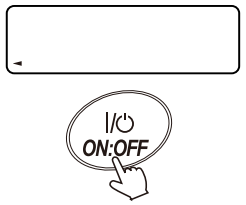
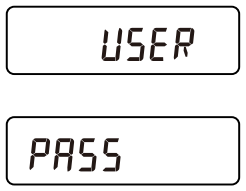
Step	Description	Display and key operation
1	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds bASFnc
2	Press the SAMPLE key several times until PASSwd is displayed.	 Press several times PASSwd
3	Press the PRINT key to display Lock 0 oFF. (To cancel, press the CAL key.)	 Lock 0 oFF
4	Press the ZERO key to switch the number. Select Lock 1 ALL or Lock 2 FNC.	 Press several times Lock 1 ALL or Lock 2 FNC
5	Press the PRINT key to display SurE, No YES. ("No" is blinking when No is selected.)	 SurE, No YES

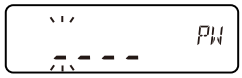
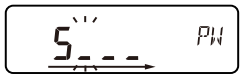
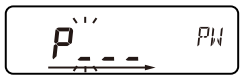
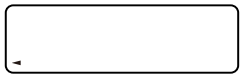
Step	Description	Display and key operation
6	Press the [RE-ZERO] key to switch between "No" and "YES" to display SurE, No YES. ("YES" is blinking when YES is selected.)	
7	With "YES" selected, press the [PRINT] key to enable the password lock function.	
8	PASSNo is displayed. To return to weighing mode without registering (changing) a password, press the [CAL] key twice. To register (change) a password, proceed to step 5 of "12.4. Registering (changing) password".	

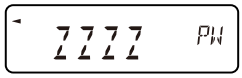
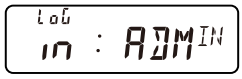
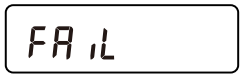
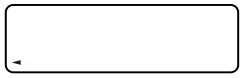
12.2. Entering a password at the start of weighing

12.2.1. Password entry required at the start of weighing ("Lock" set to "1")

When logging in as an administrator (ADMIN) or user (USER01 to USER10)

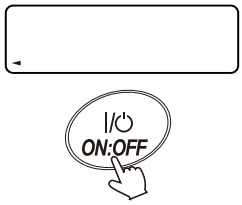
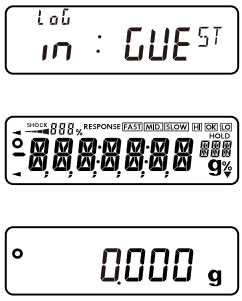
Step	Description	Display and key operation
1	With the display off, press the [ON:OFF] key.	
2	After USER and PASS are displayed, the password input display - - - - PW appears.	

Step	Description	Display and key operation
3	Enter a 4-digit password with the key operations explained below.	
	MODE key Enters " M ", and then activates the next digit to the right for input.	 
	SAMPLE key Enters " S ", and then activates the next digit to the right for input.	 
	PRINT key Enters " P ", and then activates the next digit to the right for input.	 
	RE-ZERO key Enters "7", and then activates the next digit to the right for input.	 
	CAL key Activates the next digit to the left for input.	  
	Note that the display will turn off after 10 minutes of inactivity.	No key operation for 10 minutes. 

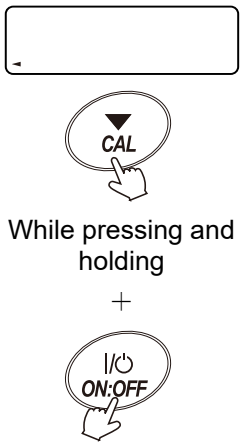
Step	Description	Display and key operation
4	When the correct password is entered, the login level, all segments and indicators, and weighing display are displayed in order. To log in as the Administrator, enter the password of the Administrator. (The factory default password is set at the Administrator level, which can be changed by pressing the [RE-ZERO] key four times: "7777".)	   
	If the password is incorrect, [FAIL] is displayed and the buzzer sounds three times, and then the display turns off.	 The buzzer sounds three times. 

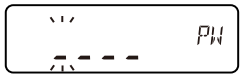
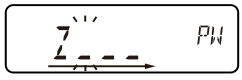
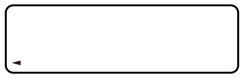
12.2.2. Login with the password of the Administrator when changing the settings ("LocK" set to "2")

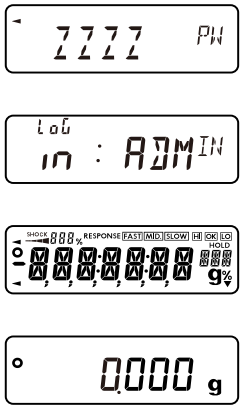
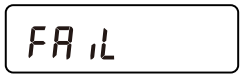
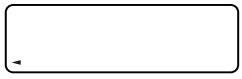
To log in as a guest (GUEST)

Step	Description	Display and key operation
1	With the display turned off, press the ON:OFF key.	
2	After LoG IN : GUEST appears, the balance returns to weighing mode.	

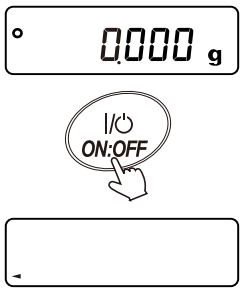
To login as the Administrator (ADMIN)

Step	Description	Display and key operation
1	With the display turned off, press the ON:OFF key while pressing and holding the CAL key.	
2	After ADMIN and PASS are displayed, the password input display PW - - - - appears.	

Step	Description	Display and key operation
3	Enter a 4-digit password with the key operations explained below.	
	MODE key Enters " M ", and then activates the next digit to the right for input.	 
	SAMPLE key Enters " S ", and then activates the next digit to the right for input.	 
	PRINT key Enters " P ", and then activates the next digit to the right for input.	 
	RE-ZERO key Enters "7", and then activates the next digit to the right for input.	 
	CAL key Activates the next digit to the left for input.	  
	Note that the display will turn off after 10 minutes of inactivity.	No key operation for 10 minutes. 

Step	Description	Display and key operation
4	When the correct password is entered, the login level, all segments and indicators, and weighing display are displayed in order. To log in as the Administrator, enter the password of the Administrator. (The factory default password is set at the Administrator level, which is set by pressing the [RE-ZERO] key four times: "7777".)	
	If the password is incorrect, [FAIL] is displayed and the buzzer sounds three times, and then the display turns off.	 The buzzer sounds three times. 

12.3. Logging out

Step	Description	Display and key operation
1	You can log out by pressing the [ON:OFF] key to turn off the display. When the "Lock" is set to "1", you will be prompted to enter the password again at the start of weighing with the display off.	

12.4. Registering (changing) password

The password can be changed by "[PASSNo] (Password)" in the function table ("9. Function Table").

Caution

- **To log out, turn off the display by pressing the [ON:OFF] key.**
- **When "Lock" is set to "2", the password of the Administrator ([ADMIN]) is required to login as the Administrator.**

  Password registration for [USER01] through [USER10] is not necessary.

How to register

Step	Description	Display and key operation
1	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	0.000 g  Press and hold for 2 seconds bASFnc
2	Press the SAMPLE key several times until PASSwd appears.	 Press several times PASSwd
3	Press the PRINT key to display Lock.	 Lock
4	Press the SAMPLE key to display PASSNo.	 PASSNo.
5	Press the PRINT key to display the login level (ADMIN).	 ADMIN
6	Displaying the login level Perform the following procedure to display the login level.	ADMIN

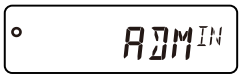
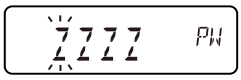
Step	Description	Display and key operation
7	Press the [SAMPLE] key to select the login level (ADMIN / USER01 through USER10) that you want to change. If the login level has a registered password already, the stability indicator " o " lights. (The password can be changed.)	   Press several times. 
8	To change the password, press the [PRINT] key. Refer to "12.5. Changing password".	 To "12.5. Changing password"

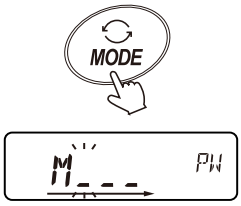
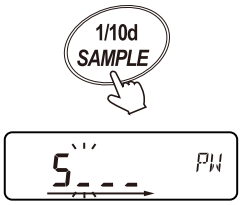
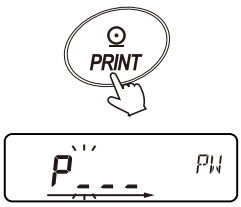
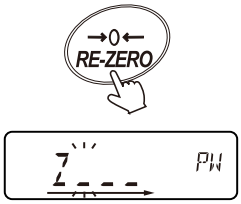
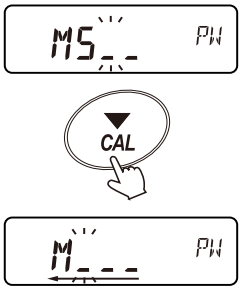
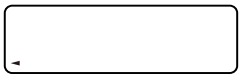
12.5. Changing password

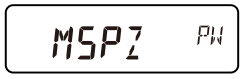
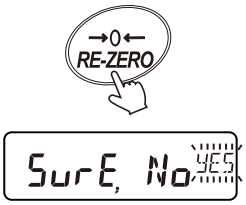
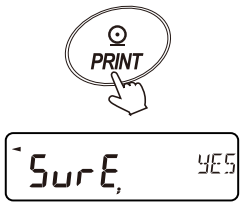
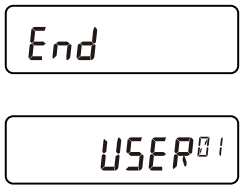
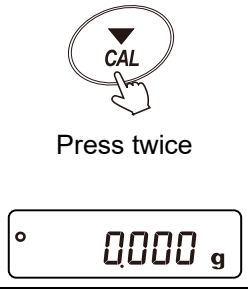
Caution

- **If the password is forgotten or lost, the balance cannot be used. Be sure to record and keep the registered password. The same password that has already been registered as the Administrator (ADMIN) cannot be registered.**
- **To delete the password, refer to "12.6. Deleting password (User)".**

How to change

Step	Description	Display and key operation
1	Refer to "12.4. Registering (changing) password" and display the login level at which you want to change the password.	
2	Press the [PRINT] key to display the current password. (The factory default password is set at the Administrator level, which is set by pressing the [RE-ZERO] key four times: " 7777 ".)	 

Step	Description	Display and key operation
3	Enter a 4-digit password with the key operations explained below.	
	[MODE] key Enters "M ", and then activates the next digit to the right for input.	
	[SAMPLE] key Enters "5 ", and then activates the next digit to the right for input.	
	[PRINT] key Enters "P ", and then activates the next digit to the right for input.	
	[RE-ZERO] key Enters "7 ", and then activates the next digit to the right for input.	
	[CAL] key Activates the next digit to the left for input.	
	[CAL] key (when pressed and held for 2 seconds) To delete the password, refer to "12.6. Deleting password (User)". **Caution** ❑ **The administrator password (ADMIN) cannot be deleted.**	 Refer to "12.6. Deleting password (User)"
	Note that the display will turn off after 10 minutes of inactivity.	No key operation for 10 minutes 

Step	Description	Display and key operation
4	When all four entries using the keys are completed, the new password is displayed.	
5	SurE, No YES appears. ("No" is blinking when No is selected.)	
	(If the CAL key is pressed, the display returns to the 4th digit entry.)	
6	Press the RE-ZERO key to switch between "No" and "YES " to SurE, No YES. ("YES " is blinking when YES is selected.)	
7	With "YES " selected, press the PRINT key to register the new password.	
8	When the setting is completed, the next level is displayed. To continue setting, operate from step 2.	
9	To finish setting, press the CAL key twice to return to weighing mode.	 Press twice

12.6. Deleting password (User)

Caution

- **The administrator password cannot be deleted. To change the password, refer to "12.4. Registering (changing) password" and "12.5. Changing password"**

How to delete

Step	Description	Display and key operation
1	While referring to "12.5. Changing password", select the user (USER01 through USER10) whose password you want to delete and display the password entry display.	
2	When entering the password, press and hold the CAL key for 2 seconds to display CLEAR blinking.	 Press and hold for 2 seconds 
3	Press the PRINT key to display CLEAR No.	 
4	Press the RE-ZERO key to switch between "Go" and "No".	 
5	With CLEAR Go displayed, press the PRINT key. End appears and the password is deleted.	  

12.7. If password is lost or forgotten

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

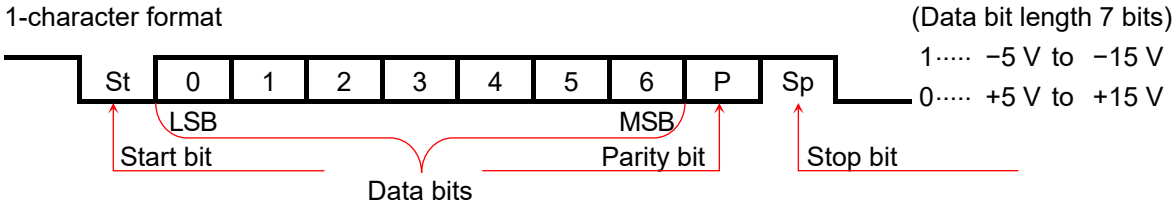
To unlock the password, the balance must be sent to the manufacturer and repaired. Please ask your local A&D dealer for repair.

13. Interface Specifications

13.1. RS-232C

Connector	D-Sub 9-pin (male)
Transmission system	EIA RS-232C
Transmission form	Asynchronous, bi-directional
Data transmission rate	Approx. 5 times per second, approx. 10 times per second, approx. 20 times per second (Linked with "SPd (Display refresh rate)" in "bASFnc (Environment / Display)" of the function table ("9. Function Table").
Signal format	Baud rate: 600 / 1200 / 2400 / 4800 / 9600 / 19200 bps Data bits: 7 or 8 bits Parity: EVEN or ODD.....(Data bit length 7 bits) NONE.....(Data bit length 8 bits) Stop bits: 1 bit Code: ASCII

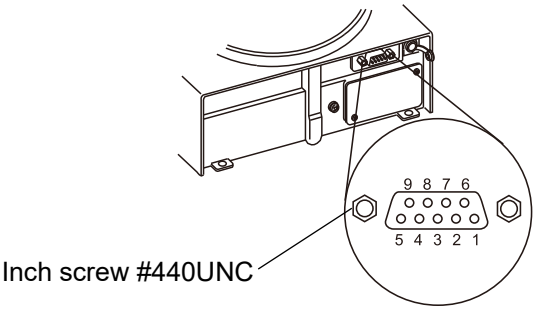
1-character format



(Data bit length 7 bits)
1····· −5 V to −15 V
0····· +5 V to +15 V

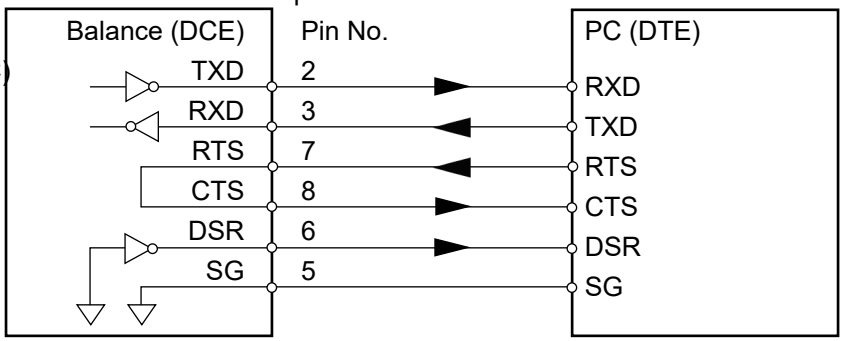
D-Sub 9, pin arrangement

Pin No.	Signal name	Direction	Meaning, remarks
1	—	—	Same potential with SG*1
2	TXD	Output	Transmitted data
3	RXD	Input	Received data
4	—	—	N.C.
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



The signal name is the name of the DTE side except for TXD and RXD.

Connection diagram (when connecting to a PC)



*1 For use with some A&D products. Do not connect the cables to other manufacturers' products such as a PC and PLC. Using the wrong connection cable may damage the device. Be sure to check the compatible cable.

13.2. Cables needed to connect to peripheral devices

Connection cables for peripheral devices and interfaces are as follows.

Connection cables for peripheral interface

Peripheral		Communication interface	Connection cable		Note
Name	Model		Standard / Option	Model	
		RS-232C	[Standard] RS-232C cable included with the printer.	AX-KO1710-200	*4
Multi-functional compact printer	AD-8127			AX-KO2741-100	*1, *4
PLC			[Sold separately]		*2, *4
PC					*3, *4
		USB (Option FX-05)	[Option] USB cable included with FX-05.		

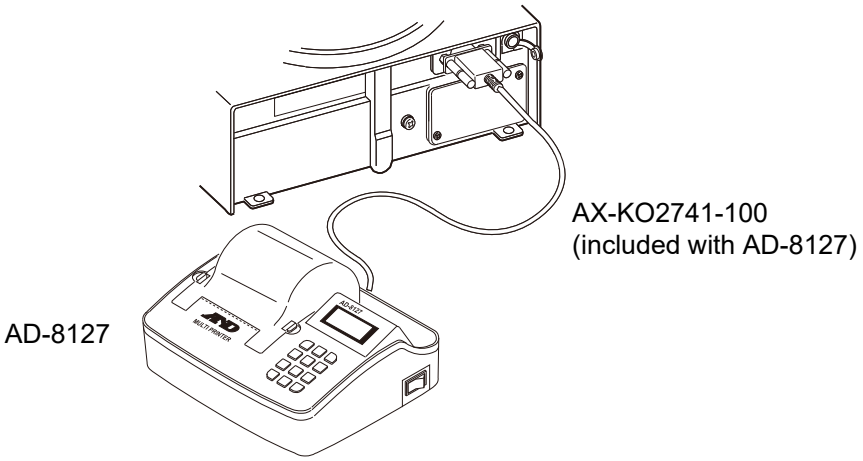
Notes

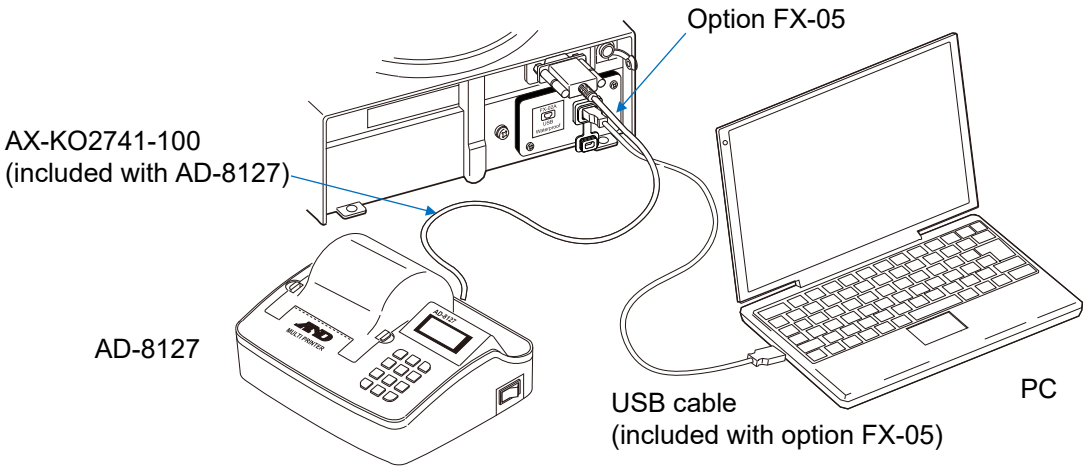
*1 If an AD-8529PR-W (*Bluetooth*® converter for printer; sold separately) is used, the RS-232C cable included with the printer is not used.

*2 Check the interface specifications for the balance and the PLC to prepare a compatible cable.

*3 The balance can be connected to a PC using AX-USB-9P (USB converter with cable), AD-8529PC-W (*Bluetooth*® converter for PC), AD-1688 (weighing data logger), or AD-8527 (quick USB adapter).
The connection cable included with these products can be used for data transfer.

*4 To use the balance with dustproof and waterproof performance, attach the waterproof RS-232C cable (AX-KO2737-500).





14. Printing Weighing Values to a Printer

The following shows examples of the balance's function table settings and the printer settings corresponding to the type of printer to be used and the method of printing data, such as weighing value.

14.1. AD-8127 multi-functional compact printer

14.1.1. Printing only weighing values

Common settings for the balance to print only weighing values on the AD-8127

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

Settings to print only weighing values on the AD-8127

Weighing value printing method	Balance's settings			AD-8127's settings	
	Class Item	Parameter	Description	PRN.MODE	Description
Print the weighing value when the PRINT key on the balance is pressed.	doUt Data output Prt Data output mode	0	Key mode	EXT.KEY	External key printing mode
		4	Key mode B (Immediate output)*1		
		5	Key mode C (Outputs when stable)		
Automatically print the weighing value when the weighing value changes.		1	Auto print mode A (Reference: zero)		
		2	Auto print mode B (Reference: the latest stable value)		
		7	Auto print mode C		
Print the weighing value at regular intervals.		6	Interval output mode*1		
Print the weighing value when the PRINT key on the printer is pressed.		3	Stream mode*1	MANUAL	Manual printing mode
Print the weighing value in chart format.				CHART	Chart printing mode

*1 Unstable data is also output.
To print unstable data with the AD-8127 by setting it to a mode other than dump printing mode, set the AD-8127 to the setting for printing unstable data ("US PRN" set to "PRINT").

14.1.2. Adding information such as date/time and ID number to weighing values with the balance's clock function

Common settings for the balance to print weighing values and additional information on the AD-8127

Class	Item	Parameter	Description
S iF Serial interface	ModE Connection	1	Printer
	tYPE Data format	1	DP format

Settings to print weighing values and additional information on the AD-8127

Weighing value printing method	Balance's settings			AD-8127's settings	
	Class Item	Parameter	Description	PRN.MODE	Description
Print the weighing value when the PRINT key on the balance is pressed.	dout Data output	0	Key mode	DUMP	Dump printing mode*2
		4	Key mode B (Immediate output)*1		
		5	Key mode C (Output when stable)		
Automatically print the weighing value when the weighing value changes.	Prt Data output mode	1	Auto print mode A (Reference: zero)		
		2	Auto print mode B (Reference = the latest stable value)		
		7	Auto print mode C		
Print the weighing value at regular intervals.		6	Interval output mode*1		

*1 Unstable data is also output.

*2 Printing using the printer key or in chart format is not possible.

14.1.3. Outputting information other than weighing values

To print sensitivity adjustment / calibration test reports (compliant with GLP) or output statistical calculation results calculated by the balance, set the printer to dump printing mode.

Settings for the AD-8127 to print information other than weighing values on the AD-8127

PRN.MODE	Description
DUMP	Dump printing mode

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

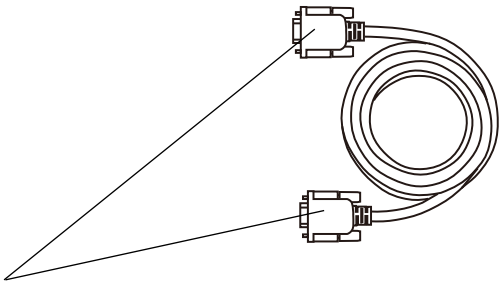
Even if the AD-8127 is not in the function table mode, "EXT.KEY (external key mode)" and " DUMP (dump printing mode)" can be switched by pressing and holding the ENT SAVE key on the AD-8127.

It is convenient to switch the AD-8127 temporarily to dump printing mode when outputting a GLP report and the like.

15. Connecting to a PC

15.1. RS-232C

The RS-232C interface of the balance is the DCE (Data Communication Equipment) that can be connected to a PC. Straight-through cables should be used at the RS-232C cables. If the PC does not have an RS-232C connector, use an AX-USB-9P (USB converter with cable, sold separately).



D-Sub9 pin, female, inch screw

15.2. Windows Communication Tools Software (WinCT)

- ❑ WinCT software for Windows is easy to use for data communication, allowing a PC to receive weighing data from balances. Communication setting for a PC is performed via RS-232C.
  A cable is required to connect the balance and PC: e.g., AX-USB-9P (USB converter with cable, sold separately).
- ❑ WinCT can be downloaded from the "WinCT" page of A&D website (https://www.aandd.jp). To install and setup WinCT, refer to "Setup manual" and "Operation manual" on the "WinCT" page of A&D website.
- ❑ WinCT consists of three components: RsCom, RsKey, and RsWeight.

RsCom

- ❑ Commands can be transmitted to control the balance.
- ❑ The data transmitted from the balance can be displayed and the data saved as a text file (.txt).
- ❑ Multiple windows can be opened at the same time when multiple balances are connected.
- ❑ Other applications can be run at the same time as WinCT. (Does not exclusively occupy the PC)
- ❑ GLP output data from the balance can be received.

RsKey

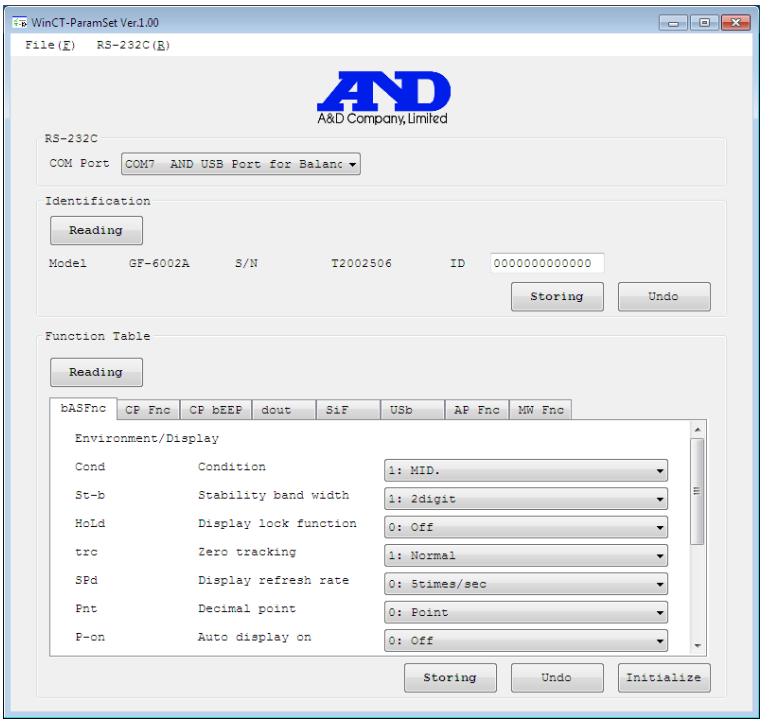
- ❑ The weighing data can be directly input into an application.
- ❑ Any applications that have a keyboard input function are supported, such as Word and Excel.
- ❑ GLP output data from the balance can be input.
- ❑ Using the test display function, the PC can be used as an external display for the balance (when the balance is in stream mode).

RsWeight

- ❑ The weighing data transmitted from the balance can be displayed in graph form on the monitor in real-time.
- ❑ Maximum, minimum, average, standard deviation, and coefficient of variation values can be calculated and displayed on the monitor.

15.3. Windows Communication Tools for Parameter Setting (WinCT-ParamSet)

- ❑ WinCT-ParamSet is data communication software for Windows that enables a PC to change the function table settings in the FZ / FX / FZ-WP / FX-WP series balances. Communication with a PC is performed via RS-232C.
  For connection between the balance and PC, a cable such as AX-USB-9P (USB converter with cable) is required.
- ❑ "WinCT-ParamSet" can be downloaded from the "WinCT-ParamSet" page of A&D website.
  To install and setup "WinCT-ParamSet", download the software from the "WinCT-ParamSet" page of A&D website and then refer to:
  "WinCT-ParamSet_Set_Up_EN_Ver.1.**.pdf" and
  "WinCT-ParamSet_Instruction_Manual_EN_Ver.1. **.pdf".
  (The above file names vary depending on the software version of "WinCT-ParamSet", and a number from 0 to 9 is entered in place of "*".)
- ❑ ID number and function table settings can be read from the balance and changed simultaneously.
- ❑ Settings can be saved in CSV file format.
- ❑ Settings can be written to the balance by reading a saved CSV file.



Caution

- ❑ **Except for the ID settings, settings that require numerical input (e.g., unit mass setting for piece counting) cannot be set with this software. Use the keys on the balance to set.**
- ❑ **This software cannot be used when the password lock function of the balance is enabled. Also, it cannot be used to change from disabled to enabled. Use the keys on the balance to set the password lock function.**
- ❑ **When writing the settings from a saved CSV file, the software version of the balance described in the CSV file must match the software version of the balance it will be written to.**

16. Commands

By sending specified commands from a PC or a PLC to the balance, it can be controlled for operations such as requesting weighing data, operating the keys, and changing the parameters. Add a terminator to the command character string when sending a command to the balance. For a terminator, "CR LF" or "CR" can be set by "CrLF (Terminator)" in "S iF (Serial interface)" or "oP- iF (Optional interface)" of the function table ("9. Function Table").

ASCII codes and symbols

CR: Carriage return, ASCII 0Dh
LF: Line feed, ASCII 0Ah
<ESC>: Escape, ASCII 1Bh
␣: Space, ASCII 20h

16.1. Control commands

Send weighing data commands

Command	Description
Q	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 have the same function.
The S and <ESC>P commands have the same function.

Key control commands

Command	Description	[Function in weighing mode]
P	Operates the ON:OFF key.	
ON	Turns the display on.	
OFF	Turns the display off.	
CAL	Operates the CAL key. FZ / FZ-WP series: Sensitivity adjustment with the internal weight FX / FX-WP series: Sensitivity adjustment with an external weight	
EXC	FZ / FZ-WP series: Sensitivity adjustment with an external weight	
U	Operates the MODE key.	[Switches the unit]
SMP	Operates the SAMPLE key.	[Switches the readability]
PRT	Operates the PRINT key.	[Outputs data]
R	Operates the RE-ZERO key	[Displays zero]
Z		
<ESC>T		
T	Tare subtraction.	[Displays zero]
KL:***	Changes key switch locking status. KL:000 Unlock all key switches. KL:001 Lock all key switches.	
?KL	Requests key switch locking status. KL,000 All key switches unlocked. KL,001 All key switches locked.	

Command	Description [Function in weighing mode]
LK:*****	Locks specified key switches. A numerical value from 00000 to 00063 enters in place of *****. (For details, refer to "17.2. Locking specified key switches").
?LK	Requests the locking status for specified key switches. (For details, refer to "17.2. Locking specified key switches").

❑ The R, Z, and <ESC> commands have the same function.

Preset tare commands

Command	Description
PT:*.***␣␣g	Sets the preset tare value. Values exceeding the weighing capacity cannot be set. Negative values cannot be set. Add the unit in the A&D standard format (3 characters). For the counting (PCS) or percent (%) mode, gram is used. In the case of setting the preset tare value to 1.234 g, the input will be PT:1.234␣␣g.
?PT	Requests the tare value. Outputs the tare value set by the PT or T command. The header is "PT" when the tare value is set with the PT command and "T" when it is set with the T command.

"␣" represents a space.

Commands to control piece counting

Command	Description
UW:*.***␣␣g	Sets the unit weight (weight per piece). Values exceeding the weighing capacity cannot be set. Negative values cannot be set. Add the unit in the A&D standard format (3 characters). In the case of setting the unit weight to 1.234 g, the input will be UW:1.234␣␣g.
?UW	Requests the unit weight.

"␣" represents a space.

Commands to set time and date (FZ / FZ-WP series only)

Command	Description
TM:**:**:**	Sets time. Do not set non-existing time values. In the case of setting time to "twelve thirty-four fifty-six seconds", the input will be TM:12:34:56.
DT:**/**/**	Sets date. Do not set non-existing date values. In the case of setting date to January 23, 2024, the input will be DT:24/01/23.
?TM	Requests the time.
?DT	Requests the date.

Other send data commands

Command	Description
?T	Requests the tare weight value. Outputs the tare value set by the PT or T command. The header is "PT" when the tare value is set with the PT command and "T" when it is set with the T command.
?ID	Requests the ID number.
?SN	Requests the serial number.
?TN	Requests the device name.
?SA	Outputs stored impact data all at once.

16.2. <AK> code and error codes

When "ErCd (AK, Error code)" is set to " 1 (On)" in " SIF (Serial interface)" or " oP-1F (Optional interface)" of the function table ("9. Function Table"), the balance always responds to reception of all commands sent from a PC or a PLC. Communication reliability is improved by checking the responding code.

Balance response

- When the balance receives a send data command:
  If the balance can output the data, it sends the requested data.
  If the balance cannot output the data, it sends an error code (EC, Exx).
- When the balance receives a control command:
  The balance will send an AK code (acknowledgment, ASCII 06h) upon confirmation of receipt of the command and completion of the process.
  If the balance cannot execute the command, it sends an error code (EC, Exx).
- The following control commands have multiple responses from the balance during processing.
  An <AK> code (acknowledgement, ASCII 06h) will be sent when the command is confirmed and each process ends.
  If the balance cannot execute the command process, it sends an error code (EC,Exx).

Command	Description
ON	Turns the display on.
P	Turns the display on/off. (Only when the display is on.)
R、Z、<ESC>T	Same as the RE-ZERO key.
T	Tare operation
CAL	FZ / FZ-WP series: Sensitivity adjustment with the internal weight FX / FX-WP series: Sensitivity adjustment with an external weight
EXC	FZ / FZ-WP series: Sensitivity adjustment with an external weight

16.3. Command usage examples

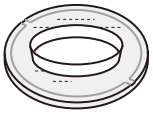
In the following examples, "ErCd (AK, Error code)" is set to "1 (On)" in "[5 iF] (Serial interface)" or "[oP- iF] (Optional interface)" of the function table ("9. Function Table") so that an <AK> code (ackknowledgement, ASCII 06h) is sent when the balance has successfully processed the command.

ASCII codes and symbols

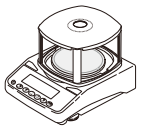
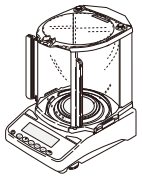
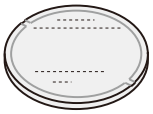
CR: Carriage return, ASCII 0Dh
LF: Line feed, ASCII 0Ah
␣: Space, ASCII 20h
AK: Acknowledgement, ASCII 06h

- An error code is returned if the transmitted command is disturbed due to noise or the like or when a communication error (such as a parity error) occurs. In such cases, the command can be resent or otherwise processed.

Example of the R command

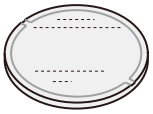
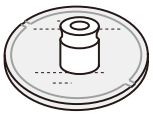
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	R command R CR LF	→		126.876 g Before execution	 Place a container on the weighing pan
		←	AK CR LF Command received		
2				. g Waiting for zero stability (Processing)	
		←	AK CR LF Command completed		
3				0.000 g Zero display	

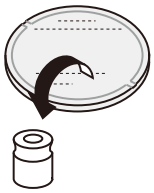
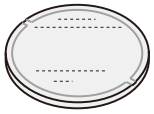
Example of the CAL command (Sensitivity adjustment with the internal weight of the FZ/FZ-WP series)

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	CAL command C A L CR LF	→		° 0.000 g Before execution	Attach the breeze break  or 
		←	AK CR LF Command received		
2				CAL in CAL. in Processing End . g Waiting for rezero stability (Processing)	 Nothing on the weighing pan
		←	AK CR LF Command completed		
3				° 0.000 g Zero display	

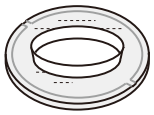
Example of the CAL command (Sensitivity adjustment with the internal weight of the FX/FX-WP series)

* EXC command for the FZ / FZ-WP series

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	CAL command * C A L CR LF	→	AK CR LF Command received	0.000 g Before execution	 Nothing on the weighing pan
2				CAL 0 Waiting for the zero setting	
3	PRT command P R T CR LF	→	AK CR LF Command received		
4				CAL 0 Inputting the zero setting (Processing)	
		←	AK CR LF Process completed		
5				100 Instruction for loading a weight Waiting	 Place the weight
6	PRT command P R T CR LF	→	AK CR LF Command received		
7				100 Weighing the weight (Processing)	
		←	AK CR LF Process completed		
8				End Waiting for weight removal	

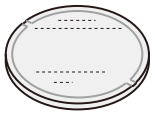
Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
9					 Remove the weight
10		←	AK CR LF Process completed	. g Waiting for rezero stability (Processing)	
11				° 0.000 g Zero display	

Example of the T command

Step	PC side		Balance side		
	Command		Response	Display	Weighing operation
1	T command T CR LF	→			
		←	AK CR LF Command received	° 126.876 g Before execution	 Place the container on the weighing pan
2		←	AK CR LF Command completed	. g Waiting for tare operation stability (Processing)	
3				° 0.000 g Zero display	
4	?T command ? T CR LF	→			
		←	T ␣ , + 0 1 2 6 . 8 7 6 ␣ ␣ g CR LF Tare value		

"␣" represents a space.

Example of the PT command

Step	PC side	Balance side		
	Command	Response	Display	Weighing operation
1	PT command (Tare weight: 100 g) P T : 1 0 0 ␣ ␣ g C_R L_F	AK C_R L_F Command received	° 0.000 g Before execution	
2			° - 100.000 g Tare value display	
3	?PT command ? P T C_R L_F	P T , + 0 1 0 0 . 0 0 0 ␣ ␣ g C_R L_F Tare value		

"␣" represents a space.

17. Key Lock Function

By sending a specific command to the balance, you can lock the key switches on the balance. When controlling the balance only with an external device such as a PC, use this function.

- ❑ The key control commands can be executed even when the key switches are locked.
  For the key control commands, refer to section "16. Commands".
- ❑ Key lock status can be checked by sending a command for confirmation to the balance.
- ❑ Key lock is maintained until either the balance receives key unlock command or the power is turned off by unplugging the AC adapter.

17.1. Locking all key switches

The KL command disables all key switches on the balance.

Command	Description
?KL	Requests the locking status for all key switches. KL,000 All key switches unlocked. KL,001 All key switches locked.
KL:***	000 or 001 is entered in place of ***. KL:000 Unlock all key switches. KL:001 Lock all key switches.

17.2. Locking specified key switches

The LK command can set whether to enable or disable specific key switches by specifying with a numerical value "*****".

The numerical value "*****" is set by combining the decimal numbers corresponding to the bits for the key switches shown in the table below.

Bit	Decimal number	Key switch
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 the key switches other than the PRINT key:

All the decimal numbers for the keys to lock are added.

ON:OFF key:	1	× 1 (Lock)	+
CAL key:	2	× 1 (Lock)	+
MODE key:	4	× 1 (Lock)	+
SAMPLE key:	8	× 1 (Lock)	+
PRINT key:	16	× 0 (Unlock)	+
RE-ZERO key:	32	× 1 (Lock)	= 47

Command string	Description
?LK	Requests the locking status for specified key switches. Example 1) If the key switches other than the PRINT key are locked: LK,00047 Example 2) If all key switches are unlocked: LK,00000
LK: *****	Locks specified key switches. A numerical value from 00000 to 00063 is entered in place of "*****"; the LK: command is sent to the balance. Example 1) Lock the key switches other than the PRINT key. LK:00047 Example 2) Unlock all key switches. LK:00000

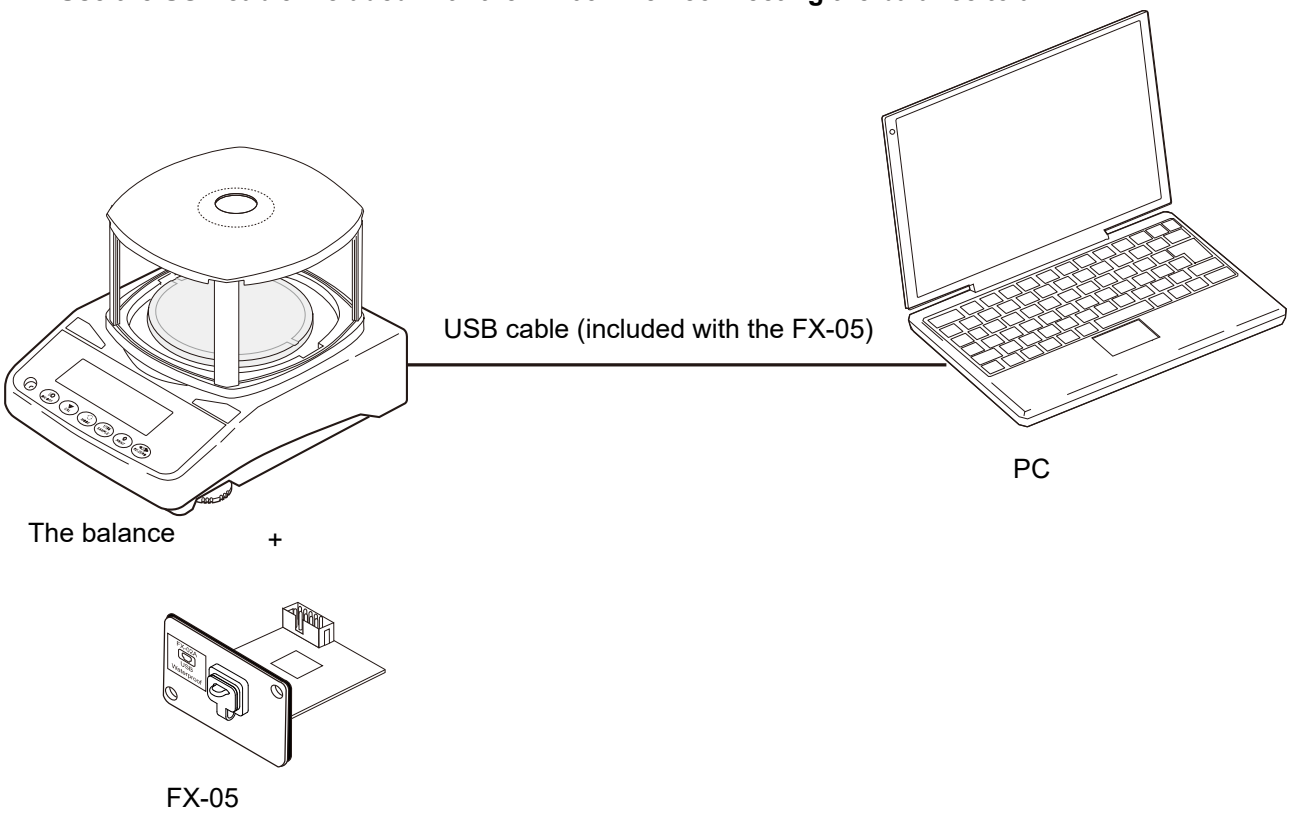
18. Communication Options (FX-05 / FXi-08 / GXA-27)

18.1. FX-05 (USB interface)

- An FX-05 (sold separately) installed on the balance allows connection between the balance and a PC via the included USB cable in order to output weighing data to the PC.
- Two methods of communication, Quick USB mode (uni-directional communication) and Virtual COM mode (bi-directional communication) are available, which can be switched by "UFnc (USB function)" in "oP-iF (Optional interface)" of the function table ("9. Function Table").

Caution

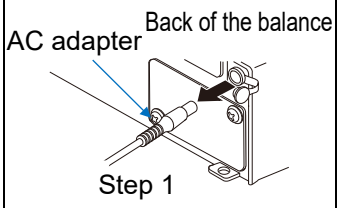
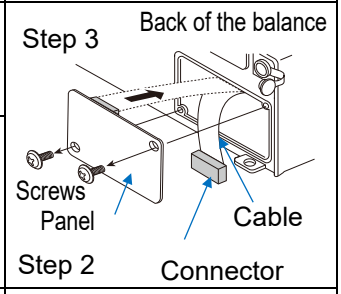
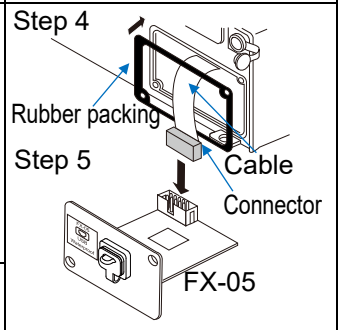
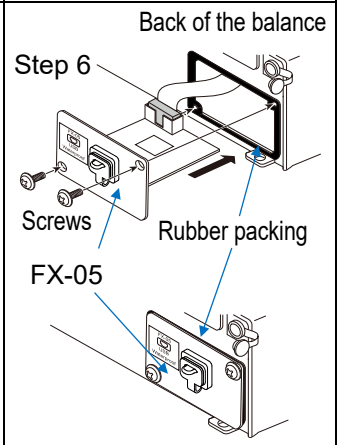
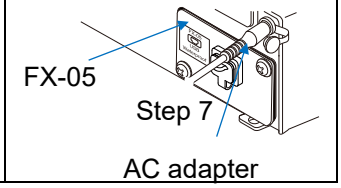
- **Use the USB cable included with the FX-05 when connecting the balance to a PC.**



18.1.1. How to install

⚠CAUTION

- ❑ **Unplug the AC adapter from the balance and work with the power off.**

Step	Description	Work
1	Unplug the AC adapter from the balance.	
2	Remove the screws (2 pieces) and panel on the back of the balance. For the FZ-WP/FX-WP series, also remove the rubber packing attached with the panel.	
3	Peel off the cable connector attached to the panel with double-sided adhesive tape, and pull it out of the balance case.	
4	Pass the cable through the rubber packing of the FX-05. **⚠CAUTION** ❑ **If the rubber packing is not installed correctly, the weighing display of the balance may become unstable. This may also affect the dustproof and waterproof specifications of the FZ-WP / FX-WP series.**	
5	Insert the connector into the FX-05. **⚠CAUTION** ❑ **Do not pull the cable forcibly.**	
6	Secure the FX-05 with the two screws removed in step 1. **⚠CAUTION** ❑ **Fix firmly so that there are no gaps between the back of the balance, the rubber packing, and the FX-05 panel.**	
7	Connect the AC adapter to the balance.	

18.1.2. Additional settings for FX-05

Installing an FX-05 on the balance adds the following " oP- iF (Optional interface)" menu after " S iF (Serial interface)" in the function table ("9. Function Table").

Set the following items related to output of data via the FX-05.

Class	Item	Parameter	Description	
oP- iF Optional interface	UFnc USB Operation mode	▪ 0	Quick USB mode	
		1	Virtual COM mode	
	CrLF Terminator	▪ 0	CR LF	CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah
		1	CR	
	tYPE *2 Data format	▪ 0	A&D standard format	Refer to "9.6 About "Data output"".
		4	NU format	
		5	CSV format	
		6	NU2 format	
		7	TAB format	
	S- id ID output	▪ 0	No output	Selects whether or not the ID number is output.
		1	Output	
	S-td *1 Time / date output	▪ 0	No output	For setting the time and date to be output, refer to "9.4 About "Clock" (FZ / FZ-WP series only)".
		1	Time output only	
		2	Date output only	
		3	Time and date output	
	PUSE Data output pause	▪ 0	Off	Sets a pause before data output.
		1	On with 1.6 seconds	
	At-F Auto feed	▪ 0	Off	Sets a line feed after data output.
		1	On with one line	
	t-UP Timeout	0	No limit	Sets the waiting time during command reception.
		▪ 1	Limited to one second	
	ErCd AK, error code	▪ 0	Off	AK: Acknowledgement ASCII 06h
		1	On	
	inFo GLP output	▪ 0	Off	Refer to "9.8.3 GLP report".
		1	On (with the balance's clock data)	
		2	On (with the external device's clock data)	

▪ Factory setting

*1 Only for the FZ / FZ-WP series

*2 This setting is only effective when USB Operation mode (UFnc) is set to Virtual COM mode (1).
If the USB Operation mode (UFnc) is set to Quick USB mode (0) , the data will be output in NU2 format.

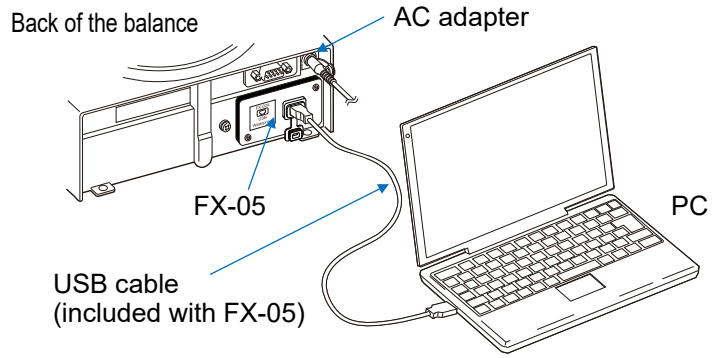
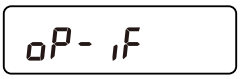
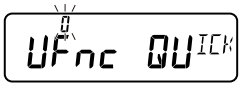
18.1.3. USB operation modes

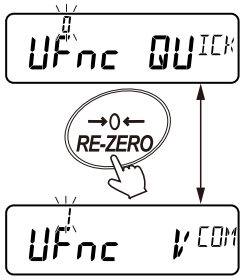
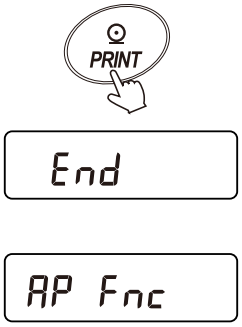
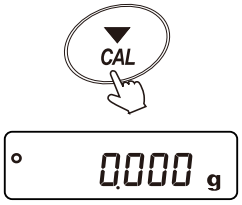
To switch Quick USB mode (uni-directional communication) and Virtual COM mode (bi-directional communication), follow the steps below.

Caution

- **If the parameters other than "0 (Quick USB mode)" cannot be selected in "UFnc" of the function table, unplug the AC adapter and plug it in again.**

Setting procedure

Step	Description	Display and key operation
1	Connect the balance and PC using the USB cable included with the FX-05.  	
2	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	  Press and hold for 2 seconds 
3	Press the SAMPLE key several times to display oP-iF.	 Press several times 
4	Press the PRINT key.	 

Step	Description	Display and key operation
5	Select "0 (Quick USB mode)" or "1 (Virtual COM mode)" as the parameter for "UFnc" with the RE-ZERO key.	Quick USB mode  Virtual COM mode
6	Press the PRINT key to store the setting.	
7	Press the CAL key to return to weighing mode.	

18.1.4. Quick USB mode

- In Quick USB mode, connect the balance to your PC with the included USB cable to input the output data of the balance directly into Excel, Word, or other software on your PC. Windows 7 or later is supported.
- This mode uses the standard Windows driver (HID), so a dedicated driver is not required and communication is enabled simply by connecting your PC and the balance.

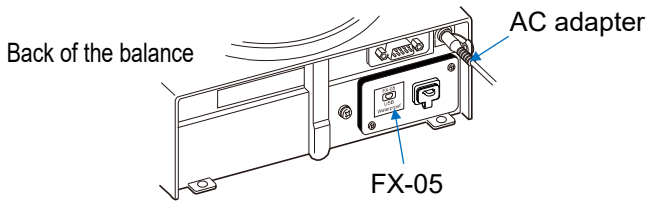
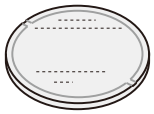
Caution

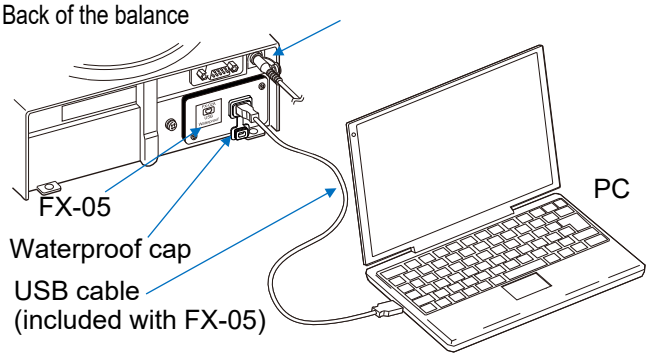
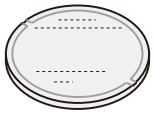
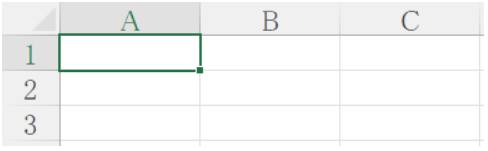
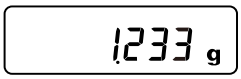
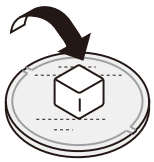
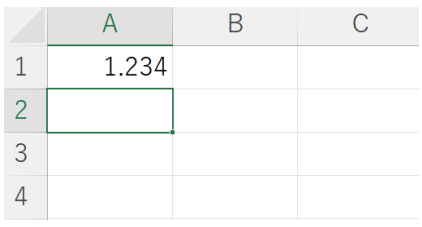
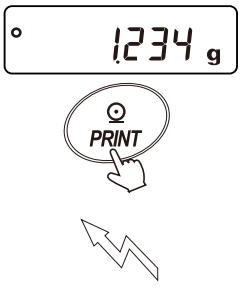
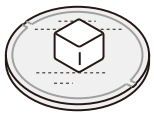
- **Quick USB is a uni-directional communication from the balance to the PC. It is not possible to send control commands from the PC to the balance.**
- **Turn off the PC's screen saver and stand-by modes.**
- **Do not use quick USB when the output mode of the balance is set to Stream mode. In Stream mode, the balance continues to output weighing data to the PC, which may cause unintended PC operations.**

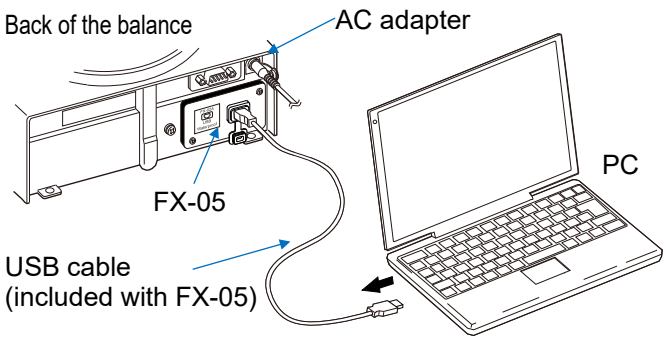
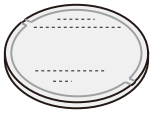
Output format with Quick USB mode

- The data output format is fixed to NU2 format.

How to operate (when sending weighing data with the PRINT key on the balance)

Step	Description	Display and key operation	Weighing operation
1	Install the FX-05 to the balance while referring to "18.1.1 How to install". 		
2	Press the ON:OFF key on the balance to enter weighing mode.	 0.000 g	
3	While referring to "18.1.3. USB operation modes", set "UFnc" to "0 (Quick USB mode)" in oP-1F of the function table ("9. Function Table").	UFnc QUICK	

Step	Description	Display and key operation	Weighing operation
4	Open the waterproof cap. Connect the balance to a PC using the USB cable included with the FX-05. At the initial connection, the PC will automatically start installing the driver. Back of the balance  **⚠CAUTION** ❑ **Hard to insert due to its design (dust-tight, protected against water jets). Insert firmly.** ❑ **When not using the USB cable, attach the waterproof cap.**	 	
5	When the connection is established, "USb" is lit in the upper left corner of the balance display for about two seconds.	 	
6	Start the software (such as Excel) on the PC to which the weighing data will be sent.	 	
7	If the keyboard is set to an input mode that uses double-byte characters, change it to one that uses single-byte characters. Note that data will not be entered correctly with double-byte characters.		
8	Place the cursor where you want to enter the weighing data.  		
9	Place a sample on the weighing pan.	 	
10	Pressing the PRINT key on the balance sends the weighing data from the balance and enters the data at the location where the cursor is placed.  	 	

Step	Description	Display and key operation	Weighing operation
11	To end communication, disconnect the USB cable. 		

18.1.5. Virtual COM mode

- In Virtual COM mode, connect the balance to your PC with the included USB cable and create a COM port on your PC to enable bi-directional communication.
- Windows 7 or later is supported. A dedicated driver is required to enable use on PCs running an OS other than Windows 10 or 11.
- For the driver, download the "Virtual COM mode driver" software from A&D website: https://aandd.jp/products/software/software.html. (The same driver as for the GX-A / GF-A series.)
- When selecting a COM port with WinCT data communication software, the same data communication as RS-232C will be available.
  In Virtual COM mode, no settings for baud rate, data bits, parity and stop bits are necessary.

Caution

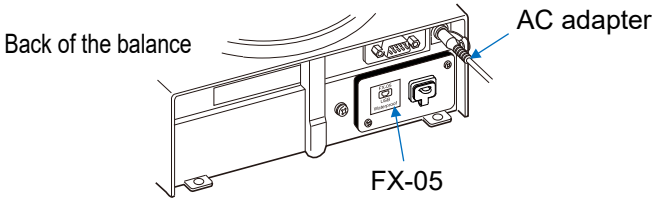
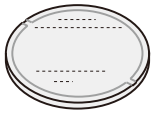
- **Installing the virtual COM mode driver may take some time for the first time.**
- **If communication fails, unplug the AC adapter and plug it in again to turn the power of the balance back on.**

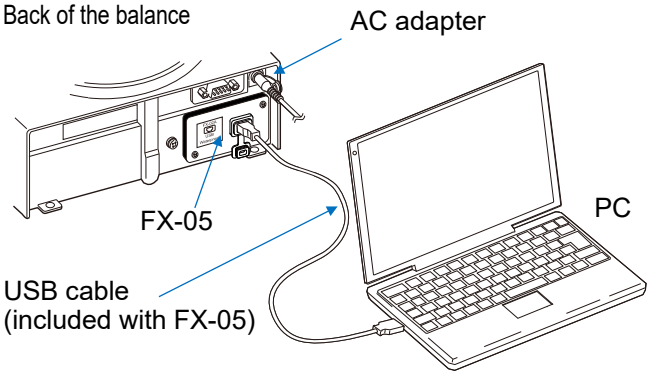
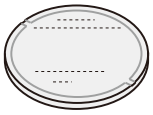
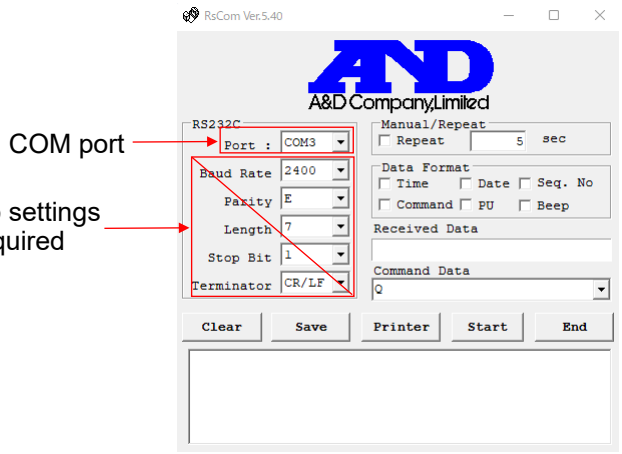
Output format with Virtual COM mode

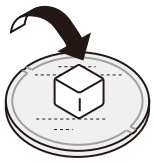
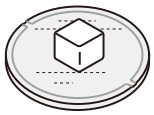
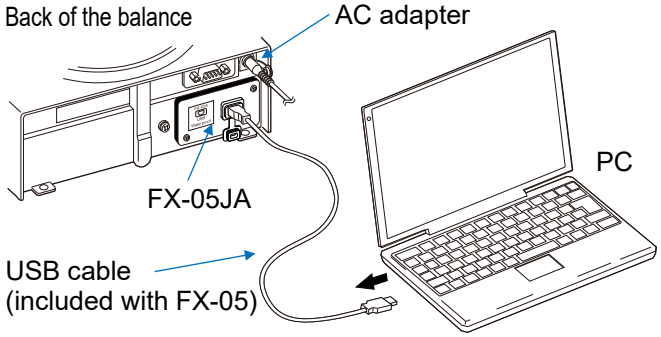
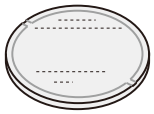
- Select from the "tYPE (Data format)" parameters in " oP-iF (Optional interface)" of the function table ("9. Function Table").
- For the details of the output formats, refer to "9.6.3 Weighing data format".

How to operate

When acquiring weighing data using the PRINT key on the balance or a command from a PC (WinCT)

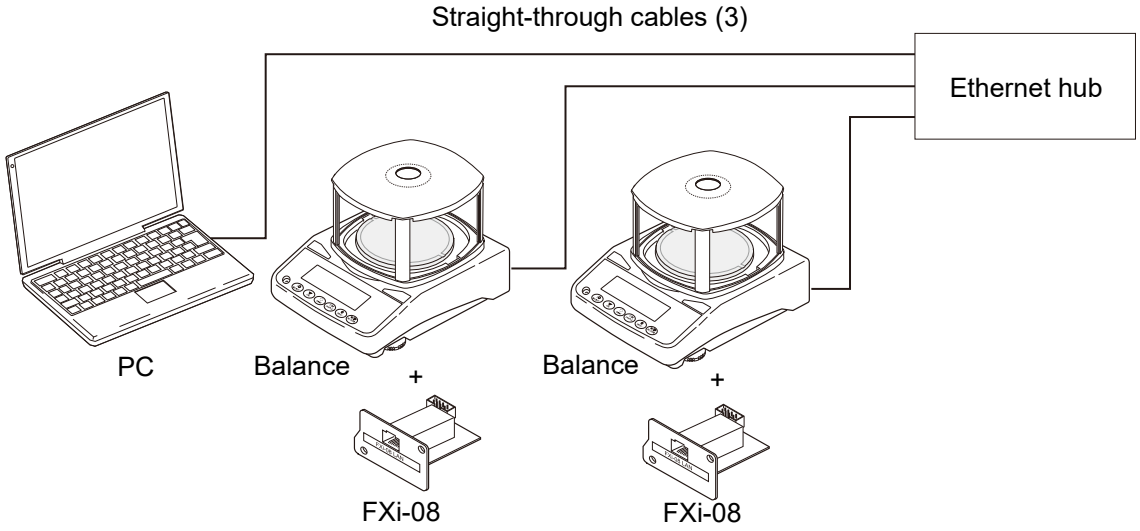
Step	Description	Display and key operation	Weighing operation
1	Install the FX-05 to the balance while referring to "18.1.1 How to install". 	0.000 g	
2	While referring to "18.1.3 USB operation modes", set "UFnc" to " 1 (Virtual COM mode)" in oP-iF of the function table ("9. Function Table").	UFnc 1 COM	

Step	Description	Display and key operation	Weighing operation
3	Connect the balance to a PC using the USB cable included with the FX-05.  	 	
4	A driver must be installed manually in systems other than Windows 10 or 11. For instructions on how to install the driver, refer to the PDF file in "Virtual COM mode driver software" on A&D website: "Driver Software" https://www.aandd.jp/products/software/software.html.		
5	When the connection is established, "USb" is lit in the upper left corner of the balance display for about 2 seconds.	 	
6	Start the software (such as WinCT RsCom) on the PC to which the weighing data will be sent.	 	
7	Selecting the COM port enables communication equivalent to RS-232C. In Virtual COM mode, it is not necessary to set the baud rate, data bit, parity, and stop bit in the data communication software. For instructions on how to operate the WinCT software, download the manual from A&D website and refer to it as necessary: WinCT (RsCom / RsKey / RsWeight) https://www.aandd.jp/products/software/winct.html. Example of "RsCom"  		

Step	Description	Display and key operation	Weighing operation
8	Place a sample on the weighing pan.	1.233 g	
9	To send weighing data from the balance, press the PRINT key on the balance or send a send data command from the PC. Output example with PC (RsCom): A&D standard format (factory setting) ST,+0001.234␣␣g<TERM> ␣: Space, ASCII 20h <TERM>: Terminator, CR LF or CR CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah	° 1.234 g  or send a data send command from the PC  Data outut	
10	To end communication, disconnect the USB cable.  	° 0.000 g	

18.2. FXi-08 (Ethernet interface)

- Installing an FXi-08 (sold separately) on the balance allows connection to a LAN (Ethernet) to enable bi-directional communication with a PC on the LAN by TCP/IP.

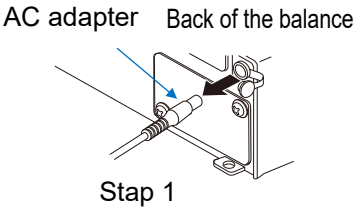
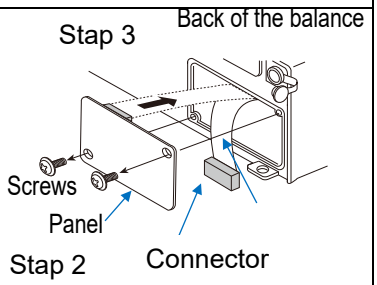
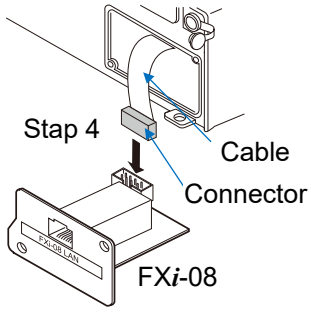
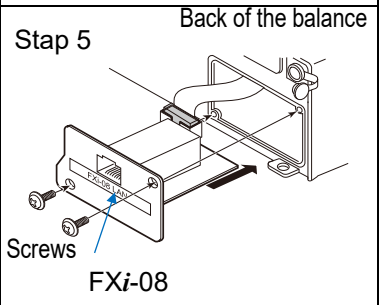
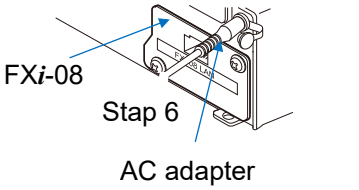


- This manual describes the procedure for communication using the WinCT-Plus software at factory settings. For more details, refer to "FXi-08 Ethernet Interface Manual" and "WinCT-Plus Instruction Manual (OP-08)" on A&D website.

18.2.1. How to install

⚠CAUTION

- ❑ **Unplug the AC adapter from the balance and work with the power off.**
- ❑ **The balance is not dustproof or waterproof if an FX-08 is installed.**

Step	Description	Work
1	Unplug the AC adapter from the balance.	
2	Remove the two screws (2 pieces) and panel on the rear of the balance. For the FZ-WP / FX-WP series, also remove the rubber packing with the panel.	
3	Peel off the cable connector attached to the panel with double-sided adhesive tape, and pull it out of the balance case.	
4	Insert the connector into the FXi-08. **⚠CAUTION** ❑ **Do not pull the cable forcibly.**	
5	Secure the FXi-08 with the two screws removed in step 2.	
6	Connect the AC adapter to the balance.	

18.2.2. Additional settings for the FXi-08

Installing an FXi-08 on the balance adds the following "oP-iF (Optional interface)" menu after "S iF (Serial interface)" in the function table ("9. Function Table").

Set the following items related to output of data via the FXi-08.

Class	Item	Parameter	Description	
oP-iF Optional interface	CrLF Terminator	▪ 0	CR LF	CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah
		1	CR	
	tYPE Data format	▪ 0	A&D standard format	Refer to "9.6 About "Data output"".
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	CSV format	
	S-id ID output	▪ 0	No output	Selects whether or not the ID number is output.
		1	Output	
	S-td *1 Time / date output	▪ 0	No output	For setting the time and date to be output, refer to "9.4 About "Clock" (FZ / FZ-WP series only)".
		1	Time output only	
		2	Date output only	
		3	Time and date output	
	PUSE Data output pause	▪ 0	Off	Sets a pause before data output.
		1	On with 1.6 seconds	
	At-F Auto feed	▪ 0	Off	Sets a line feed after data output.
		1	On with a line	
	t-UP Timeout	0	No limit	Sets the waiting time during command reception
		▪ 1	Limited to 1 second	
	ErCd AK, error code	▪ 0	Off	AK: Acknowledgement, ASCII 06h
		1	On	
	inFo GLP output	▪ 0	Off	Refer to "9.8.3 GLP report".
		1	On (with the balance's clock data)	
		2	On (with the external device's clock data)	

▪ Factory setting

*1 Only for the FZ / FZ-WP series

18.2.3. Installing software programs

If the following software programs are already installed on your PC, proceed to "18.2.4 Configuring the network".
If not, log in by a user name with administrator privileges and install them.

(1) Installation of "DeviceInstaller" for FXi-08 configuration

The "DeviceInstaller" software configures the FXi-08's IP address and the like.
Download "DeviceInstaller" from the URL below, and install it on your PC.

Caution

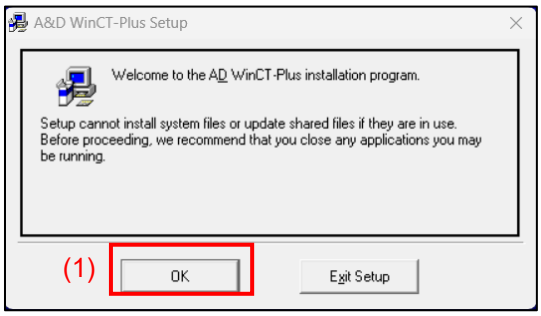
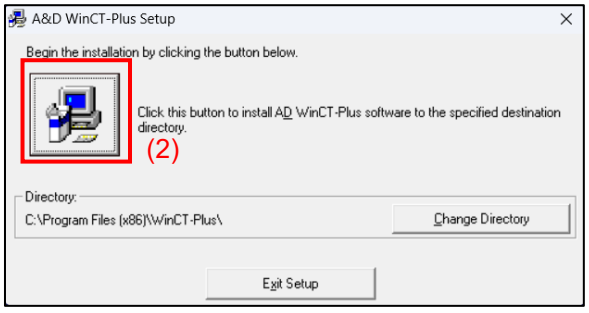
- ❑ **Use Microsoft Edge to access the URLs below. Although a warning may appear depending on your downloading environment, it is safe to disregard it and save the file.**

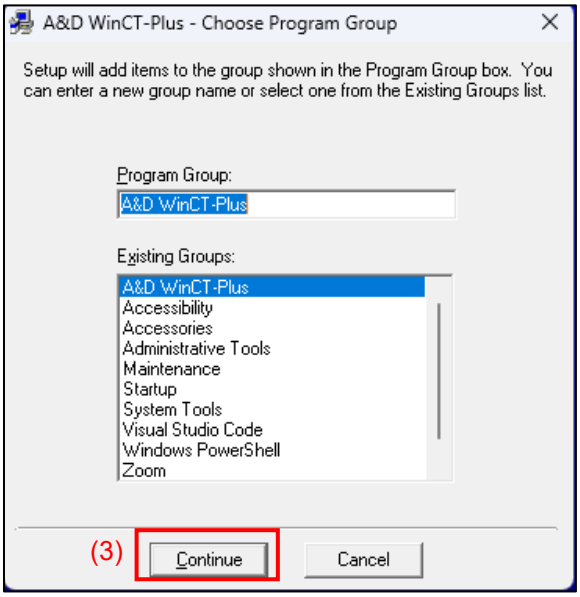
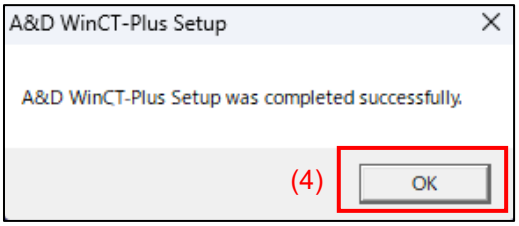
●Windows 8.1 / 10 / 11 (32-bit version) "DI_x86DLJA_4.4.0.7.msi"
http://ts.lantronix.com/ftp/DeviceInstaller/Lantronix/4.4/4.4.0.7/Installers/Download_Web/DI_x86DLJA_4.4.0.7.msi
●Windows 8.1 / 10 / 11 (64-bit version) "DI_x64DLJA_4.4.0.7.msi"
http://ts.lantronix.com/ftp/DeviceInstaller/Lantronix/4.4/4.4.0.7/Installers/Download_Web/DI_x64DLJA_4.4.0.7.msi

(2) Installation of "RsMulti" for data acquisition

The "RsMulti" software included in "WinCT-Plus" collects data from the balance with an FXi-08 installed.

How to install

Step	Description
1	Download "WinCT-Plus" from the Support page on A&D website
2	Unzip the downloaded zip file to any location and run Setup.exe from Disk1.
3	Follow the on-screen instructions to install.  

Step	Description
3	 

18.2.4. Configuring the network settings

To implement a LAN connection, it is required to set the IP address, subnet mask, etc. for both the PC and the FXi-08. Please consult with the network administrator before assigning IP addresses, etc.

FXi-08 factory settings

IP address	172.16.100.2
Subnet mask	255.255.0.0
Port number	10001

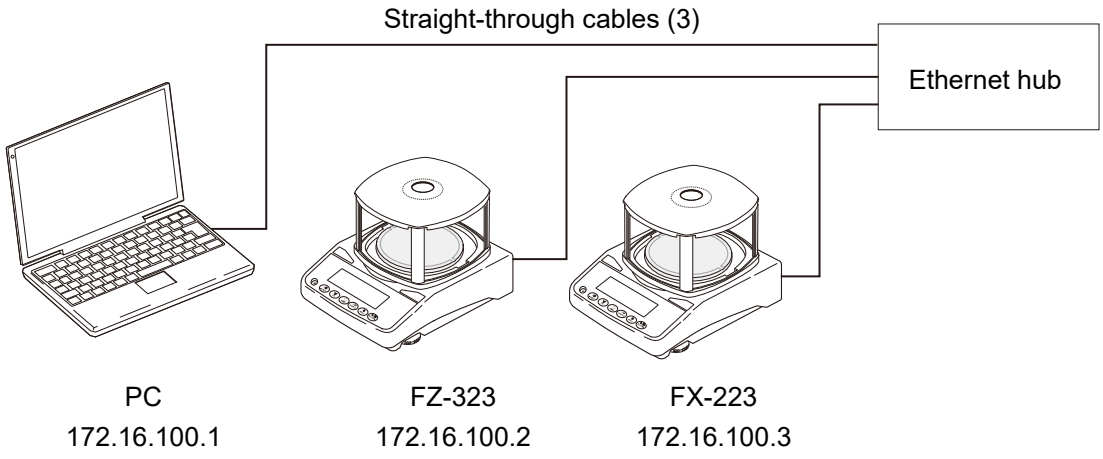
Caution

- **Before connecting to an existing network, consult with the network administrator in order to avoid network failures. A&D Company, Limited assumes no responsibility whatsoever for network failures that may occur.**

Setting example

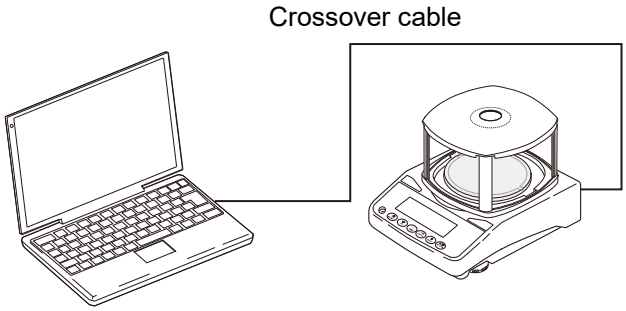
Example 1) When two balances (with an FXi-08 installed) and a PC are connected
Straight-through cables should be used at the LAN cables.

Instrument	IP address	Subnet mask
PC	172.16.100.1	255.255.0.0
FZ-323	172.16.100.2	
FX-223	172.16.100.3	



Example 2) When a PC is connected directly to a single balance (with an FXi-08 installed)
Crossover cables should be used at the LAN cables.

Instrument	IP address	Subnet mask
PC	172.16.100.1	255.255.0.0
FZ-323	172.16.100.2	



PC
172.16.100.1

FZ-323
172.16.100.2

18.2.5. Configuring the PC settings

Set the PC's IP address and subnet mask.
Open the "Internet Protocol Version 4 (TCP/IPv4) Properties" window, select "Use the following IP address", and enter the IP address and the subnet mask.
Please consult with the network administrator for the set values.

Caution

- **Please set the PC's IP address manually. (If obtained automatically, communication with the FXi-08 will not be possible.)**

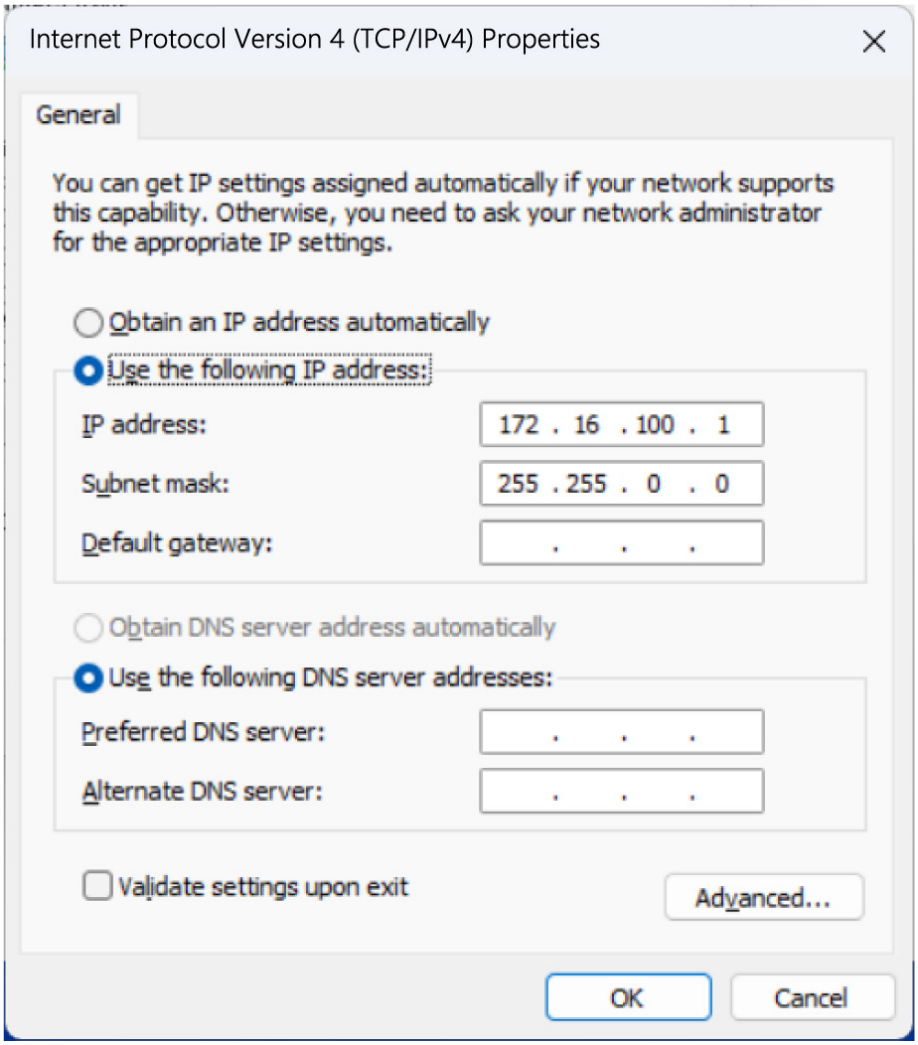
Opening the Properties window of TCP/IP

"Control Panel" → Resize the control panel view to "Large icons" → "Network and Sharing Center" → "Change adapter settings" → "Ethernet" → "Properties".
Select "Internet Protocol Version 4 (TCP/IPv4)" and click "Properties".

Caution

- **The setting procedure may differ depending on your PC environment.**

"Internet Protocol Version 4 (TCP/IPv4) Properties" on the PC side (Example for Windows 11)



18.2.6. Checking the settings of the balance and FXi-08

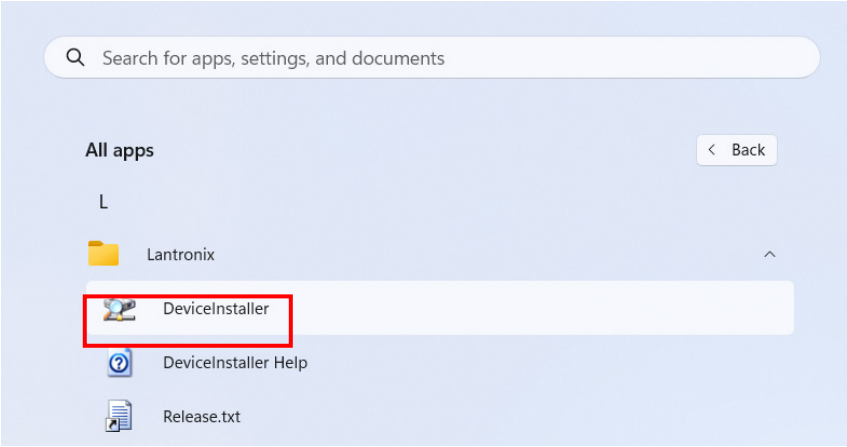
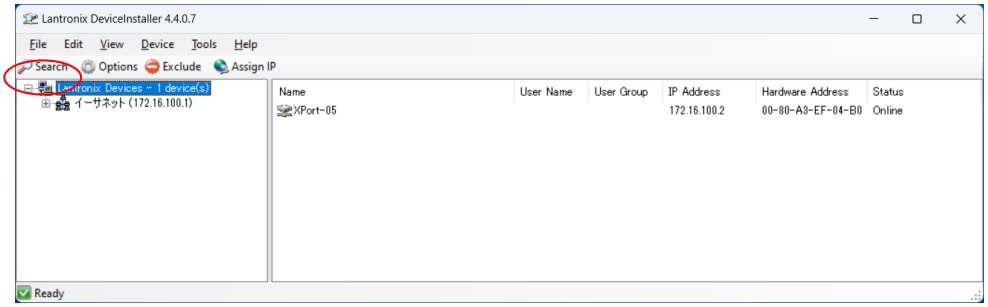
(1) Settings of the balance

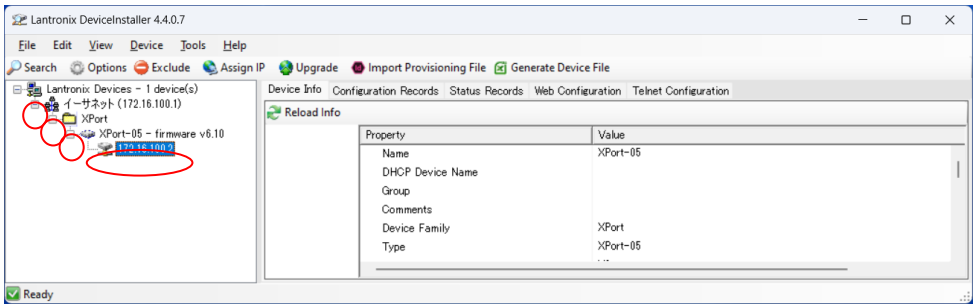
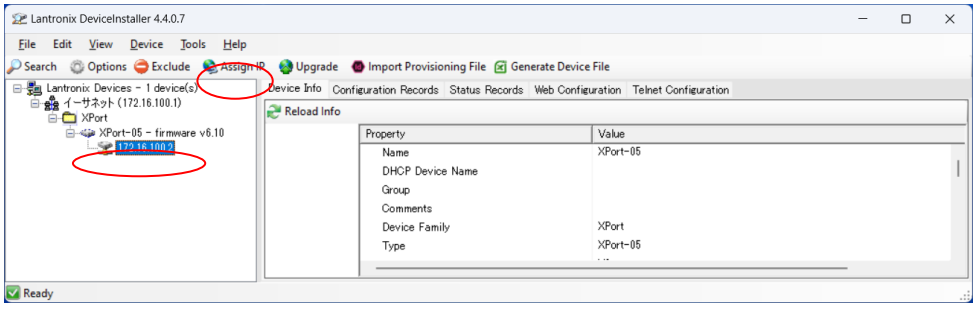
Communication settings for the balance and FXi-08 are made automatically.

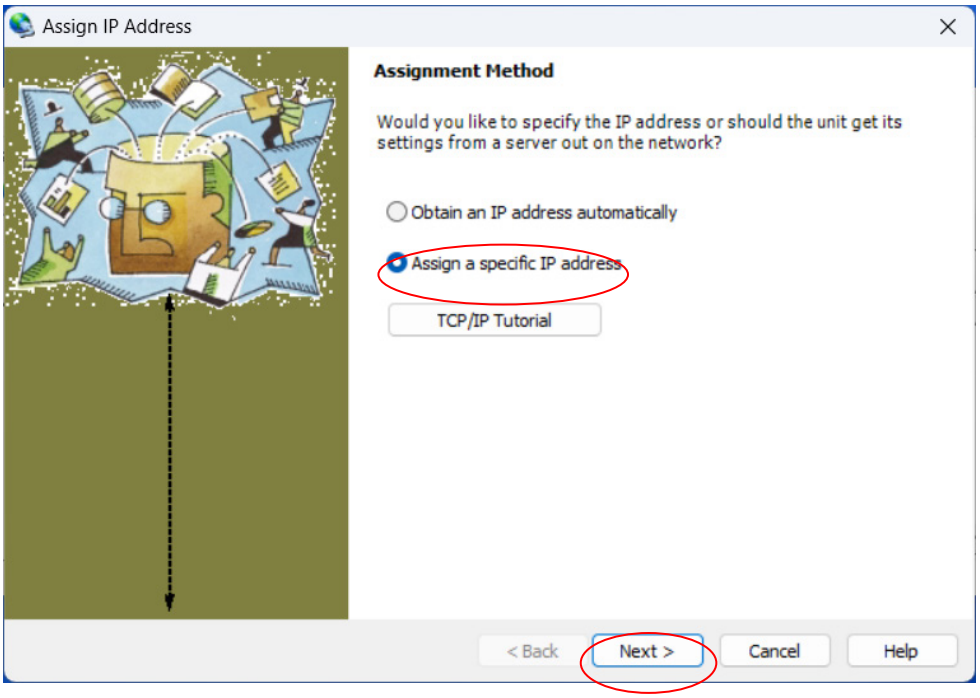
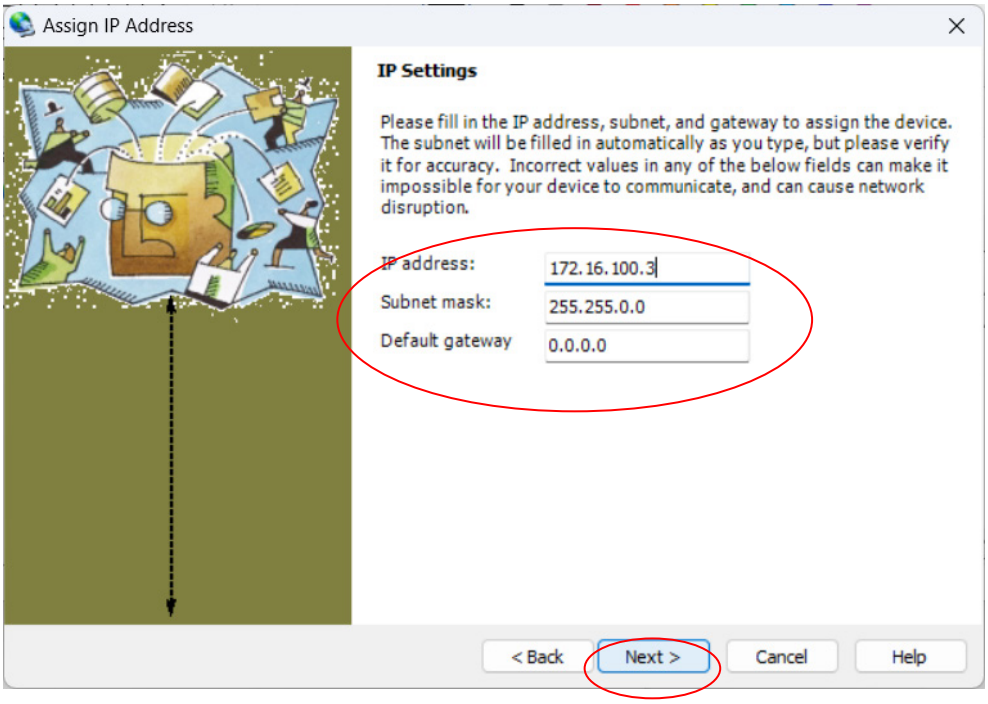
To change the balance's output data, refer to "18.2.2 Additional settings for the FXi-08".

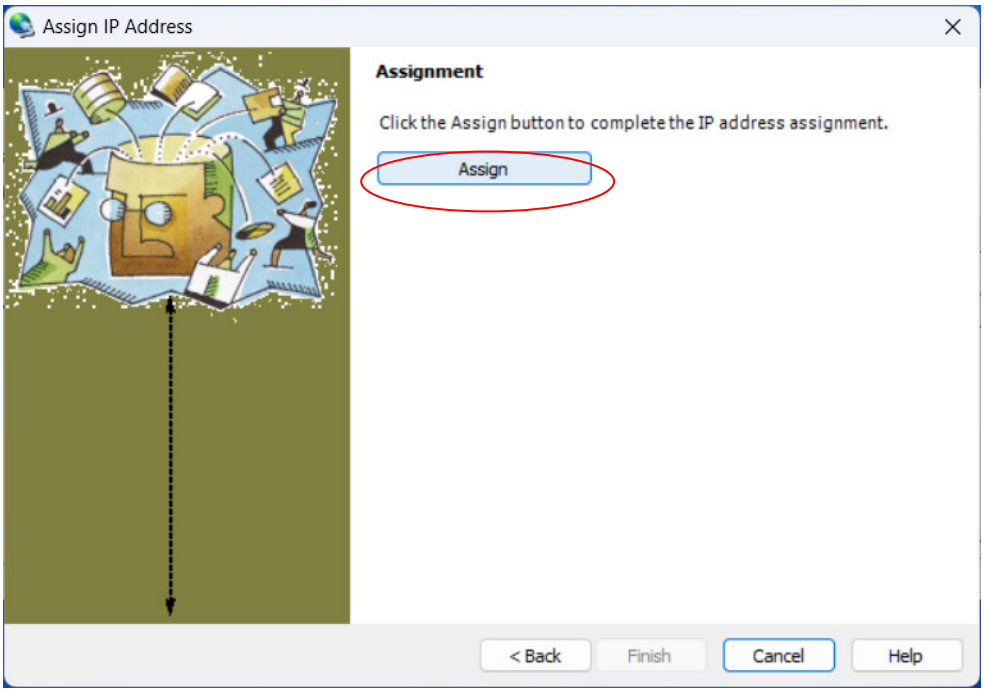
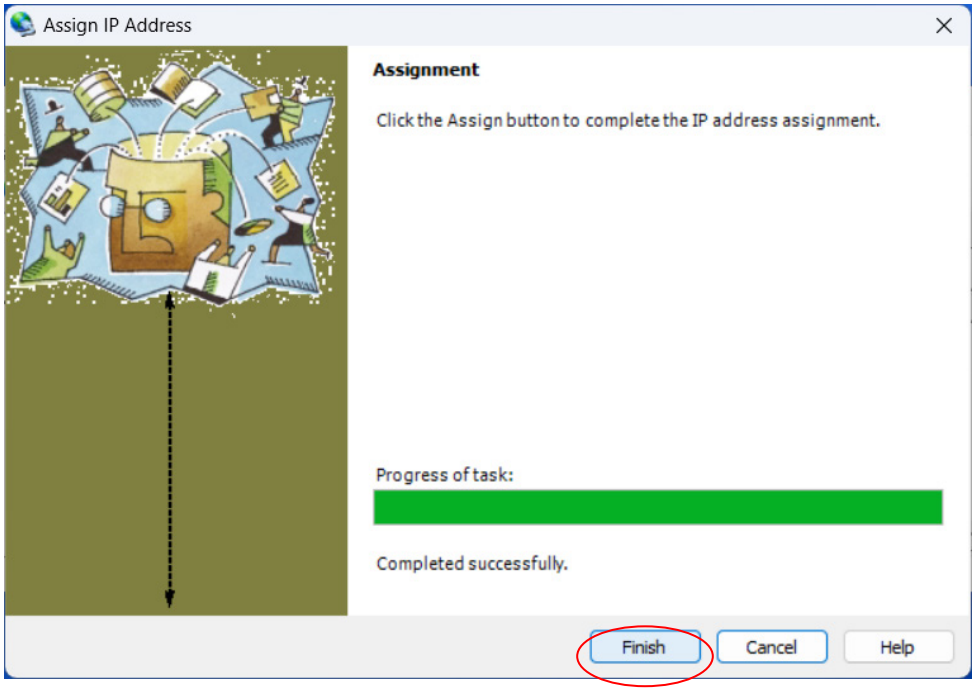
(2) Settings of the FXi-08

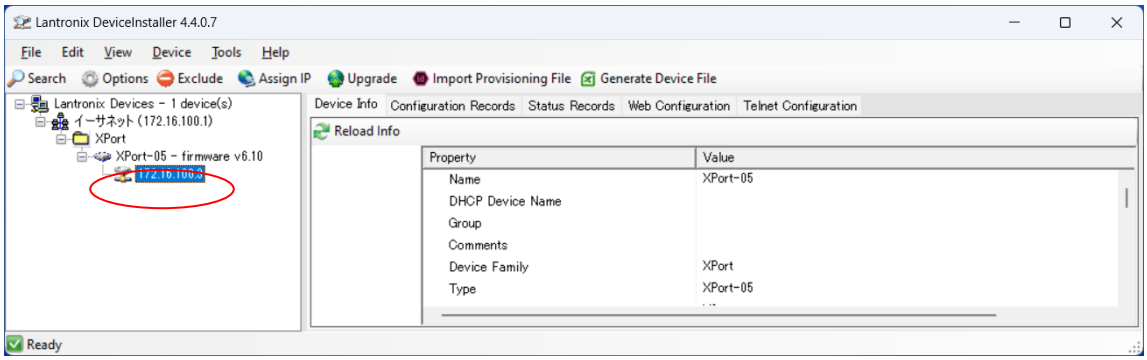
Using the "DeviceInstaller" software, set the IP address and other settings.

Step	Description
1	Connect the balance with the FXi-08 installed and the PC to the same network. To set multiple units, connect them one at a time. The same IP address (172.16.100.2) is set at factory settings.
2	Start from the Start menu on the PC. Click "Start", "All apps", "Lantronix", "DeviceInstaller" to start.  **Caution** ❑ **The startup procedure may differ depending on your PC environment.**
3	Click "Search" to automatically detect the IP address for the FXi-08 connected to the network (172.16.100.2)*. * The FXi-08's IP address is set at 172.16.100.2 at factory settings. If the IP address has been changed, a different IP address will be displayed. 

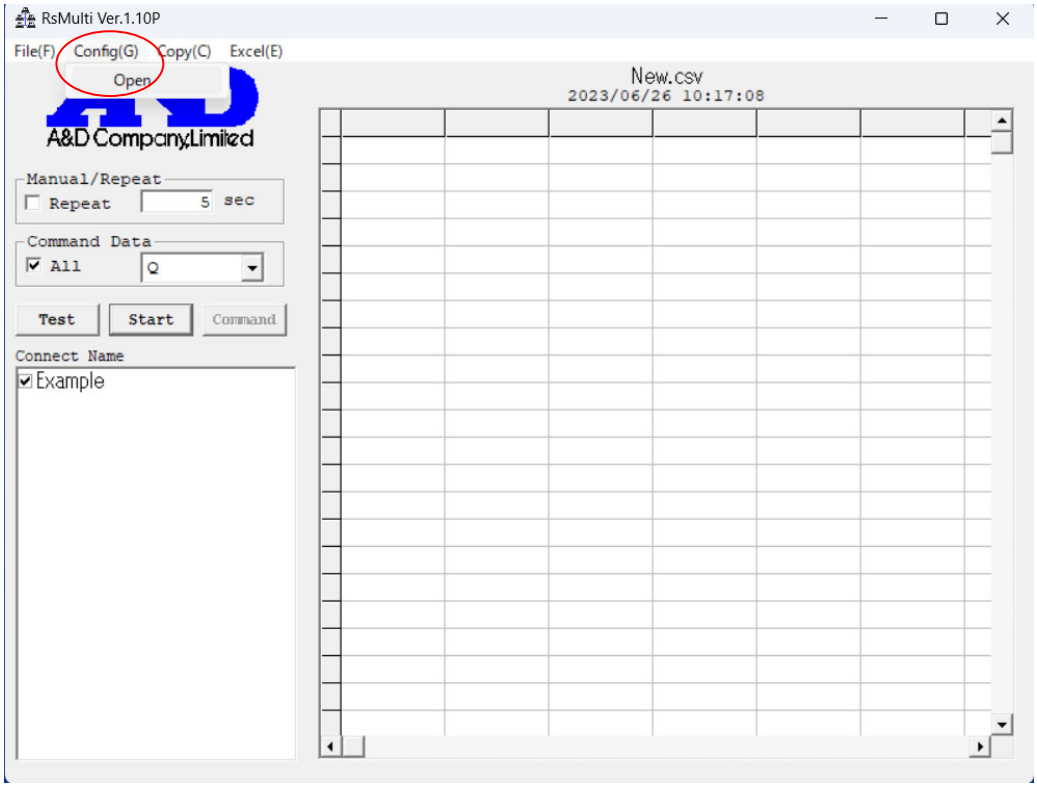
Step	Description
4	Click on the [+] mark to expand the parameters and select the IP address that you would like to change as shown in the figure below. The FXi-08 is set to 172.16.100.2 at factory settings. If you do not change the IP address, proceed to "19.2.7. Setting RsMulti". To change the IP address, proceed to step 5. 
5	**Changing the FXi-08's IP address** Confirm that the IP address is selected, and click the Assign IP button. If the following setting is made without selecting the IP address, a communication error may occur. 

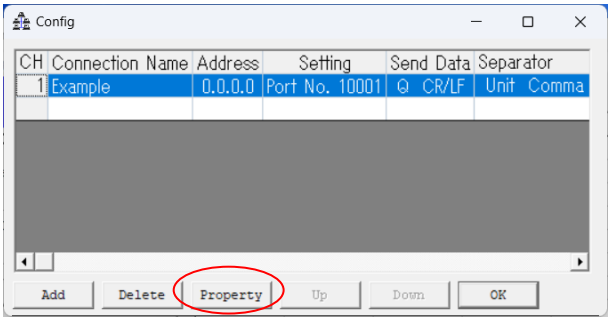
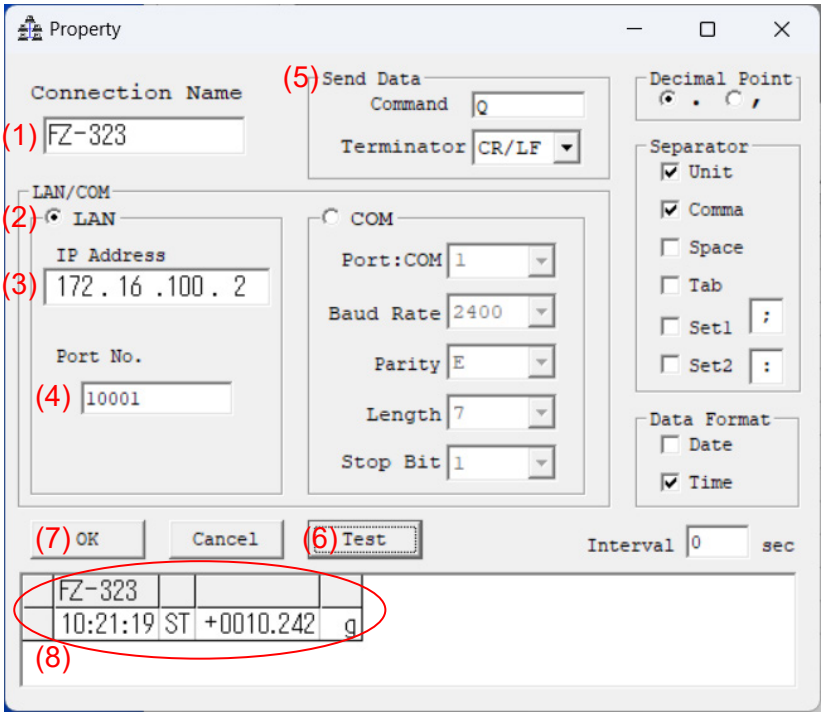
Step	Description
6	Check the "Assign a specific IP address" option, and click "Next". 
7	Enter the IP address, subnet mask, and default gateway, and click "Next". It may take a while to proceed to the next screen. Example of IP address: 172.16.100.3 

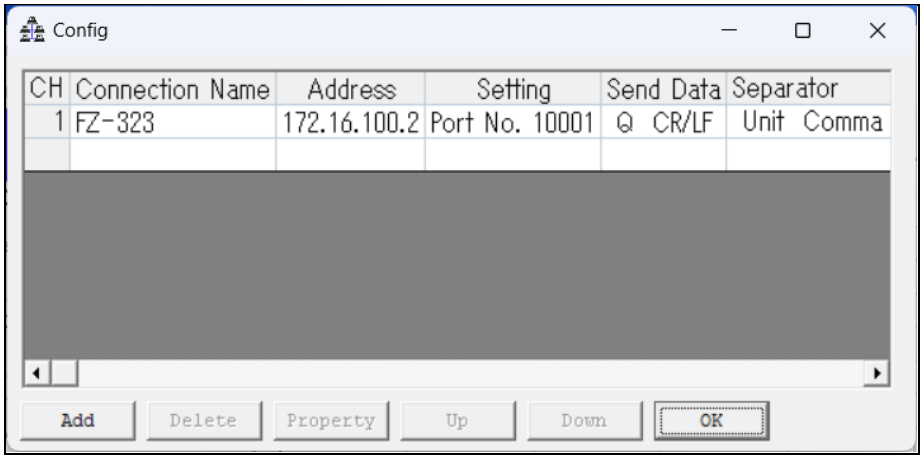
Step	Description
8	Click the "Assign" button. It may take a while to complete the setting. 
9	Click "Finish". 

Step	Description
10	Quit after verifying that the IP address has been changed. 
11	Write down the set IP address on the IP address label included with the FXi-08 and attach it to the balance for identification.

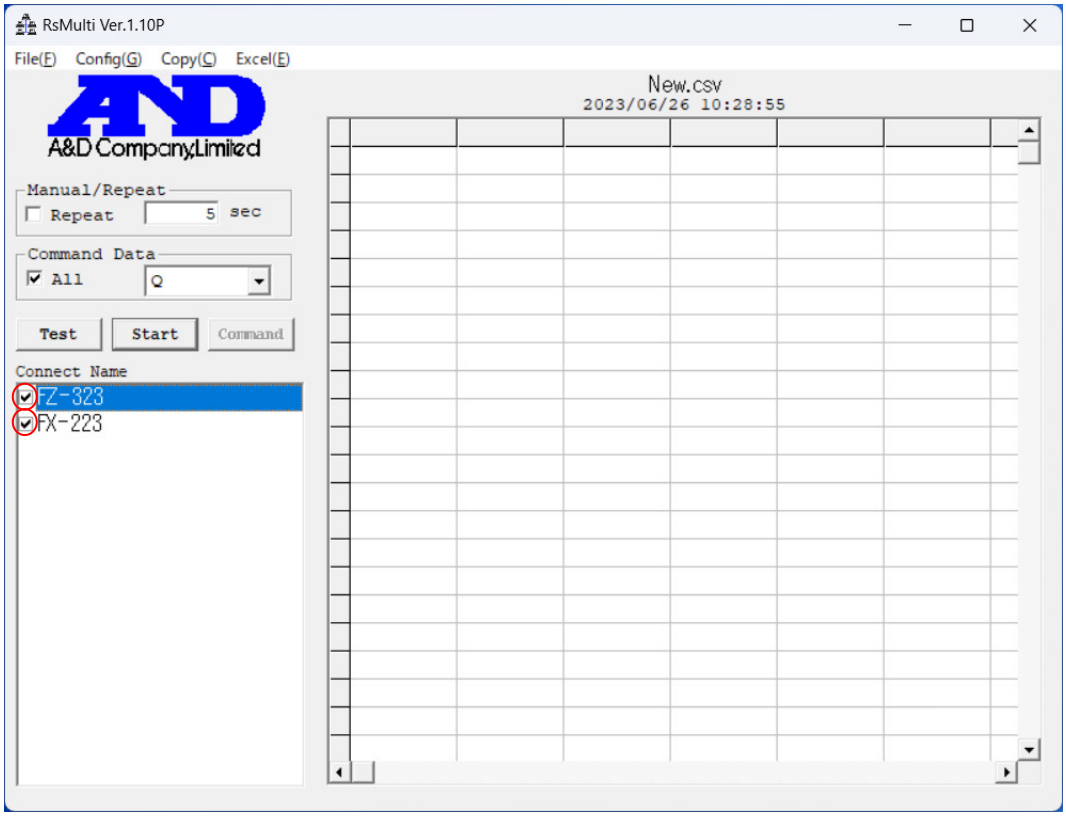
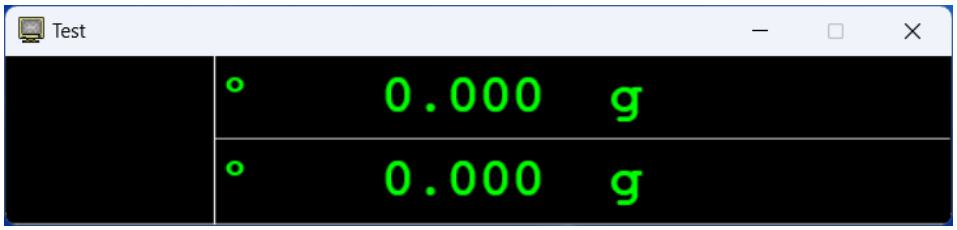
18.2.7. Configuring the RsMulti settings

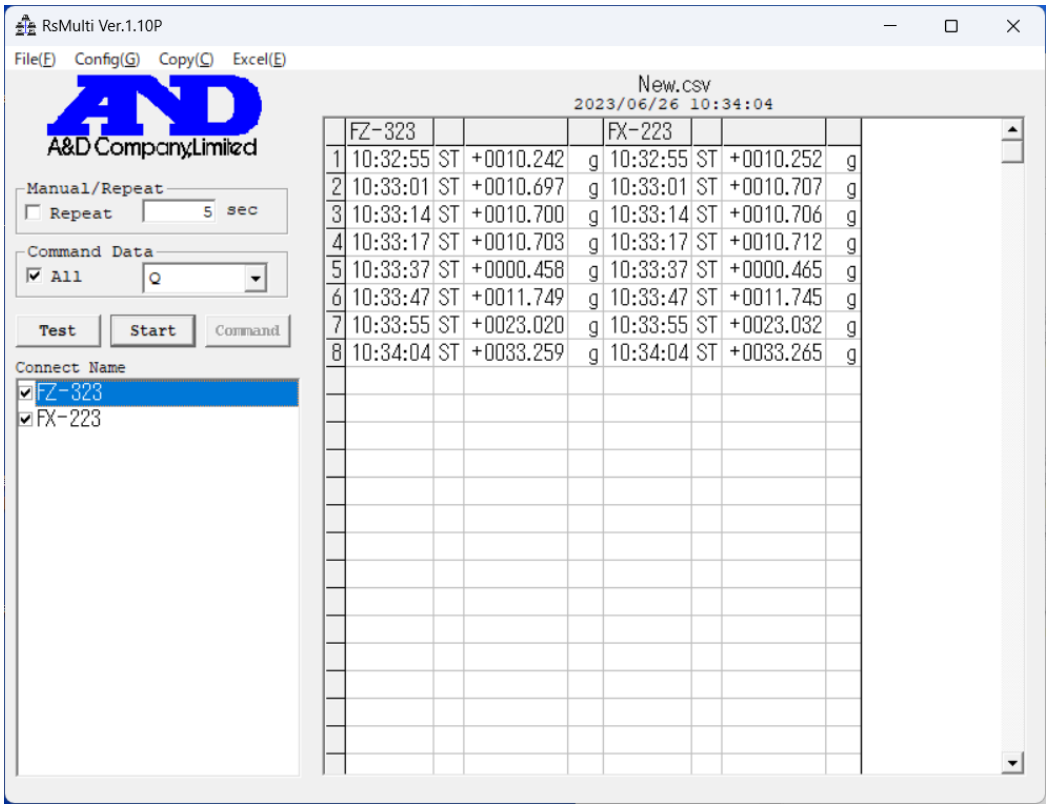
Step	Description
1	Launch the software program from the Start menu on the PC: Click "Start", "Program", "A&D WinCT-Plus", "RsMulti".  **Caution** **The setting procedure may differ depending on your PC environment.**
2	To open the <Config> window, select [Open] from the [Config] menu in the RsMulti window. 

Step	Description
3	The connection settings can be added and changed in the <Config> window.  To make a new addition, click [Add]. To change, click [Property]. For details, refer to the explanations about the <Config> and <Property> windows. In the default setting, "Example" is registered at CH1 and the IP address and the port number are set at the same as the default settings of FXi-08. Select "Example" and click the [Property] button.
4	The "Property" window opens.  Follow the steps below to set up: (1) Provide a name for the connection: E.g., FZ-323 (the name of the balance). (2) Check the "LAN" option to select LAN connection. (3) Enter the IP address of the FXi-08. (4) Enter the port number of the FXi-08. In the default settings, it is set at 10001. (5) Make sure that the command and terminator sent to the balance are as shown below. Command: Q Terminator: CR/LF (6) Click the [Test] button to check that the communication is established. If data is displayed as shown in (8) above, it indicates communication is enabled. If it is blank, check the settings again. (7) Click the [OK] button to complete the configuration.

Step	Description
5	As shown below, FZ-323 is registered in the <Config> window.  To connect multiple units, click the [Add] button to add each unit connected and configure the settings in the same manner. The configuration is now ready. Press the [OK] button to save the settings.

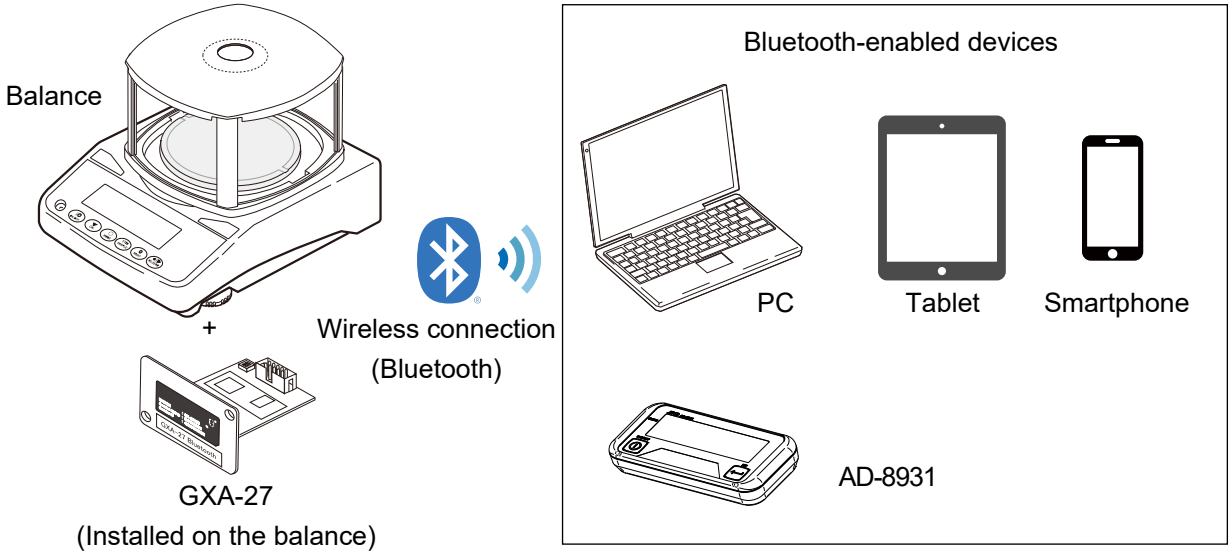
18.2.8. Data acquisition with RsMulti

Step	Description
1	**Preparations for communication** From the [Connect Name] list in the <RsMulti> window, select the name of the balance to be connected, and then click the [Test] button to check the connection.   ・ **When sending a send data command to the balance for data acquisition:** Enter "Q" in the "Command Data" box, and then click the [Test] button to send the command set in the <Property> window. A response to the command is displayed if communication is enabled. ・ **When sending data from the balance by pressing the PRINT key on the balance:** Press the PRINT key on the balance to send data. Data is displayed if communication is enabled.
2	**Starting communication** Click the [Start] button to enable communication.

Step	Description
3	Data acquisition ・ **When sending the "Q" command to the balance for data acquisition:** Click the "Command" button to send the set command to the balance for data acquisition. The sent data enters into the cells. (If [Repeat] is selected in the [Manual/Repeat] option, the command will be automatically sent in every setup time.) ・ **When sending data from the balance by pressing the PRINT key on the balance:** (When used in Key mode, Auto print mode, or Stream mode) Press the PRINT key on the balance to send data. The sent data enters into the cells. **Caution** ❑ **The total for data instances in data acquisition should not exceed 10,000.** 
4	Quitting communication Click the [Stop] button.
5	Storing data The acquired data can be saved in CSV format. Select [Save Data] from the [File] menu in RsMulti and save it to your desired location.

18.3. GXA-27 (*Bluetooth*® interface)

❑ With a GXA-27 (sold separately) installed, the balance can be paired with a compatible instrument or a Bluetooth-equipped PC / tablet / smartphone to communicate wirelessly. The FZ-WP / FX-WP models have the capability for wireless communication without compromising dust-proof and waterproof performance (IP65 compliant).



❑ Use the DIP switch on the GXA-27 to select a communication method from the following two types.

- Keyboard input connection (using HID over GATT Profile)
  For details, refer to "18.3.4. Keyboard input connection (with HID over GATT Profile)".
- Bi-directional communication connection
  For details, refer to "18.3.5. Bi-directional communication connection".

Caution

❑ **Please contact your local A&D representative to find out whether GXA-27 is certified for compliance with Bluetooth communication laws in your country.**

18.3.1. Additional settings for the GXA-27

Installing a GXA-27 on the balance adds the following " oP-iF (Optional interface)" menu after " S iF (Serial interface)" in the function table ("9. Function Table"). Set the following items related to output of data via the GXA-27.

Caution

❑ **The oP-iF parameters are only available when biE is lit (bi-directional communication connection) on the upper left of the balance display.**

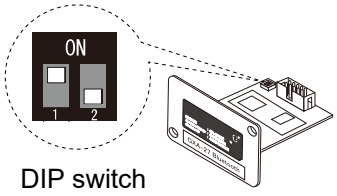
Class	Item	Parameter	Description	
oP-iF Optional interface	CrLF Terminator	▪ 0	CR LF	CR: Carriage return, ASCII 0Dh LF: Line feed, ASCII 0Ah
		1	CR	
	tYPE Data format	▪ 0	A&D standard format	Refer to "9.6 About "Data output"".
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	CSV format	
	S-id ID output	▪ 0	No output	Sets whether or not the ID number is output.
		1	Output	
	S-td *1 Time / date output	▪ 0	No output	To set the time and date to be output, refer to "9.4 About "Clock" (FZ / FZ-WP series only)".
		1	Time output only	
		2	Date output only	
		3	Time and date output	
	PUSE Data output pause	▪ 0	Off	Sets a pause before data output.
		1	On: Add 1.6 seconds	
	At-F Auto feed	▪ 0	Off	Sets a line feed after data output.
		1	On: Add a line	
	t-UP Timeout	0	No limit	Sets the waiting time during command reception
		▪ 1	Limited to 1 second	
	ErCd AK, error code	▪ 0	Off	AK: Acknowledgement, ASCII 06h
		1	On	
	inFo GLP output	▪ 0	Off	Refer to "9.8.3 GLP report".
		1	On (with the balance's clock data)	
		2	On (with the external device's clock data)	

▪ Factory setting

*1 Only for the FZ / FZ-WP series

18.3.2. Setting the DIP switch

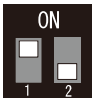
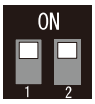
Before installing the GXA-27 on the balance, set the DIP switch to match the connection method for the Bluetooth-enabled device. For the connection methods, refer to "18.3.4. Keyboard input connection (with HID over GATT Profile)" and "18.3.5. Bi-directional communication connection".



DIP switch

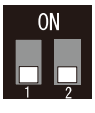
(1) Setting a keyboard input connection (with HID over GATT Profile)

The settings to connect to a Bluetooth-enabled device without using a dedicated application are shown below.
Set the DIP switch to the setting A-1 or A-2, and then install the GXA-27 into the balance.

Setting	Connection method	DIP switch No. 1 (HID)	DIP switch No. 2 (S/N)	Output data
A-1	Keyboard input. Adds no serial numbers to data output. (Factory setting)	ON HID  S/N	OFF	Numerical data only (No header, "+" sign, or unit) Example 1) 1.23 Example 2) −4.56 ↑ Weighing value
A-2	Keyboard input. Adds serial numbers to data output.	ON HID  S/N	ON	The serial number is added before the numerical data with <TAB> in between. Example 1) 12345678 1.23 Example 2) 901234567 −4.56 ↑ S/N ↑ <TAB> ↑ Weighing value S/N (Serial number) <TAB> (Horizontal tab), ASCII 09h

(2) Setting a bi-directional connection

The settings to connect to an A&D Bluetooth-compatible product or A&D communication application are shown below.
Set the DIP switch to the setting B-1, and then install the GXA-27 into the balance.

Setting	Connection method	DIP switch No. 1 (HID)	DIP switch No. 2 (S/N)	Output data
B-1	Bi-directional*	OFF HID  S/N	OFF	The output format set by "tYPE" in oP-iF of the function table is used.

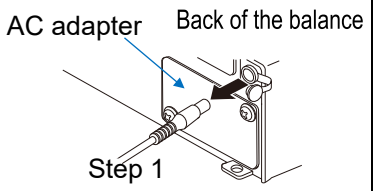
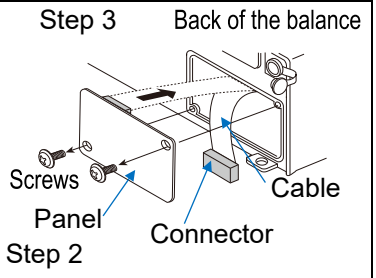
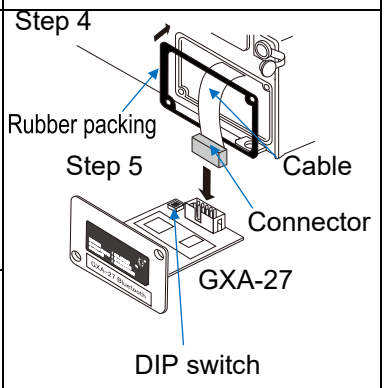
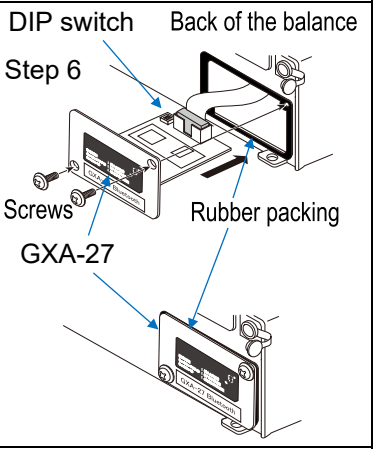
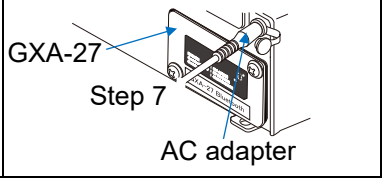
* For usage, refer to "18.3.5. Bi-directional communication connection".

18.3.3. How to install

Set the DIP switch before installation work while referring to "18.3.2 Setting the DIP switch".

⚠CAUTION

- ❑ **Unplug the AC adapter from the balance and work with the power off.**

Step	Description	Work
1	Unplug the AC adapter from the balance.	
2	Remove the two screws from the rear of the balance and remove the panel. For the FZ-WP / FX-WP series, also remove the rubber packing attached to the panel.	
3	Peel off the cable connector attached to the panel with double-sided adhesive tape, and pull it out of the balance case.	
4	Pass the cable through the rubber packing of the GXA-27. **⚠CAUTION** ❑ **If the rubber packing is not installed correctly, the weighing display of the balance may become unstable. This may also affect the dust / waterproof specifications of the FZ-WP / FX-WP series.**	
5	Insert the connector into the GXA-27. **⚠CAUTION** ❑ **Do not pull the cable forcibly.**	
6	Secure the GXA-27 with the two screws removed in step 1. **⚠CAUTION** ❑ **Fix firmly so that there are no gaps between the back of the balance, the rubber packing, and the GXA-27 panel.**	
7	Connect the AC adapter to the balance.	

18.3.4. Keyboard input connection (with HID over GATT Profile)

- ❑ In this connection method, you connect the balance with the GXA-27 installed to a terminal that operates as a wireless keyboard, such as a Bluetooth-enabled PC, tablet, or smartphone. The output data from the balance can be input into general text applications (such as memo pad or spreadsheet software).
- ❑ This connection method allows HID uni-directional communication from the balance (with the GXA-27 installed) to a Bluetooth-equipped terminal.
- ❑ The data output from the balance (with the GXA-27 installed) is the weighing value only or the weighing value with the serial number.
- ❑ When pairing is established, "Hid" appears in the upper left of the balance display.

About pairing and data acquisition

Perform pairing operations from the Bluetooth-equipped terminal.

For details, refer to the separate instruction manual "A&D Weiv® Communication Application for Balances and Scales Using Bluetooth®".

18.3.5. Bi-directional communication connection

- ❑ Bi-directional communication is possible between the balance (with the GXA-27 installed) and a Bluetooth-equipped terminal.
- ❑ When pairing is established, "bLE" appears in the upper left of the balance display.

- ❑ The following three ways of connection are available.

(1) Connecting to a tablet or smartphone (using A&D WeiV®)

This manual describes the procedure for establishing paring and connection between the balance (with the GXA-27 installed) and A&D WeiV®. For the details of A&D WeiV®, refer to the separate instruction manual "A&D Weiv® Communication Application for Balances and Scales Using Bluetooth®".

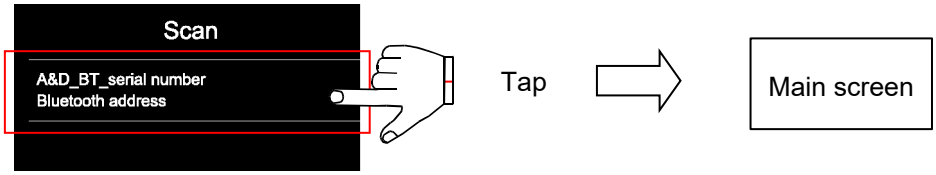
Downloading software

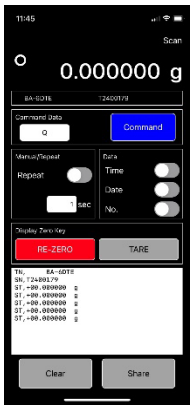
Step	Description
1	Install A&D WeiV® on your terminal (Bluetooth-enabled tablet or smartphone). A&D WeiV® can be downloaded from the App Store or Google Play. • App Store https://apps.apple.com/jp/app/a-d-weiv/id6443930190 Download on the App Store • Google Play https://play.google.com/store/apps/details?id=jp.co.aandd.balanceapp GET IT ON Google Play

Paring with A&D WeiV®

Caution

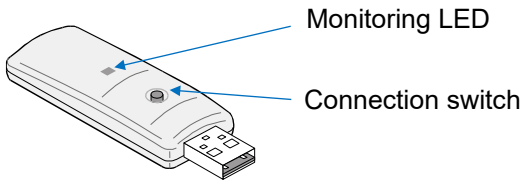
❑ **Use the Scan screen of A&D WeiV® to pair the balance with A&D WeiV®.**
If you have performed pairing using the settings screen of the Bluetooth-equipped terminal, unpair once and then operate the Scan screen of A&D WeiV® to pair.

Step	Description
1	Make sure the Bluetooth mode on the Bluetooth-equipped terminal is enabled.
2	With the weighing value displayed on the balance (with the GXA-27 installed), tap the icon of A&D WeiV® installed on the terminal to start the application.
3	Select and tap the balance to be connected. If the balance is not shown, swipe down the screen to re-scan.
4	When you are prompted for pairing, tap [OK]. Scan screen  **Caution** ❑ **Depending on the manufacturing date of the model and option board, a number that is not the serial number of the balance may be shown.** ❑ **If the screen does not change from the Scan screen to the main menu, perform the following.** · **When the terminal is already paired with the balance, unpair (delete the balance) on the settings screen of the terminal.** · **If the problem persists, turn off the balance and then turn it back on. For details of other cases and actions to take, refer to the separate instruction manual "A&D Weiv® Communication Application for Balances and Scales Using Bluetooth®".**

Step	Description
5	Once the connection is established, the balance model name and serial number will be displayed on the main screen. 

(2) Connecting to a PC for bi-directional communication

This manual describes the procedure for connection by pairing the balance (with the GXA-27 installed) and an AD-8541-PC Bluetooth® dongle for PC (sold separately). For more details, refer to the separate instruction manual "AD-8541-PC Wireless Communication Interface".



AD-8541-PC (sold separately)

Paring with an AD-8541-PC

Follow the steps below to pair with an AD-8541-PC when using it for the first time. Note that you can perform pairing again by following the same steps if you do not know which weighing instrument to connect.

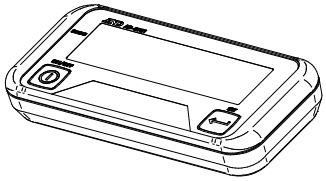
Caution

- ❑ **The driver software must be installed on the PC to use an AD-8541. Installation of the driver is required only for the first connection.**

Step	Description
1	Connect the AD-8541-PC to a PC. Press and hold the connection switch (about 3 to 4 seconds) until the monitoring LED blinks orange.
2	Turn on the balance (with the GXA-27 installed) and wait for a while. If there are multiple communication devices, turn off the devices that are not to be connected.
3	When pairing and connection have been established, the LED blinks green.
4	To enable communication, start an application such as WinCT on the PC. For information on how to operate WinCT, download and refer to the instruction manual as necessary from "Software" on the A&D website: https://www.aandd.jp. Confirm the COM port number of the "USB serial port" displayed in the device manager. Settings for communication with the balance (with the GXA-27 installed) are automatically configured, so there is no need to change settings on the balance side. If you want to change the data output from the balance, please refer to "18.3.1. Additional settings for the GXA-27".

(3) Connecting to a remote display for bi-directional communication

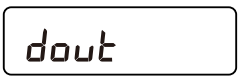
This manual describes the procedure for connection by pairing the balance (with the GXA-27 installed) and an AD-8931 remote display (sold separately), via Bluetooth®. For the details of AD-8931 Bluetooth remote display (sold separately), refer to the separate instruction manual "Wireless Remote Display AD-8931".

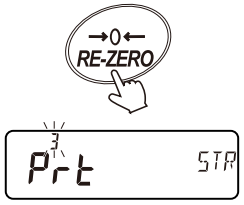
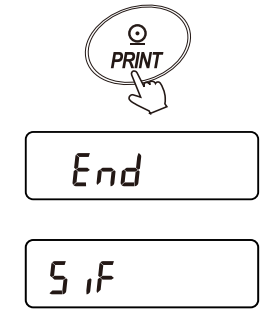


AD-8931 (sold separately)

Setting the balance (with the GXA-27 installed)

Set " PrE " to "3 (Stream mode)" in dout of the function table ("9. Function Table").

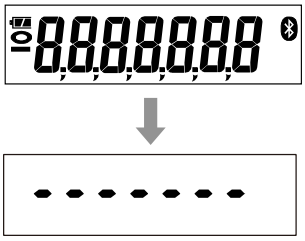
Step	Description	Display and key operation
1	Press the ON:OFF key on the balance to enter weighing mode.	 
2	In weighing mode, press and hold the SAMPLE key for 2 seconds to display bASFnc.	  Press and hold for 2 seconds 
3	Press the SAMPLE key several times to display dout.	 Press several times 
4	Press the PRINT key.	 

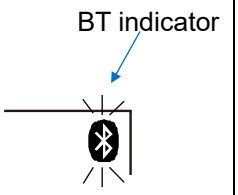
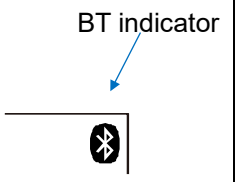
Step	Description	Display and key operation
5	Press the [RE-ZERO] key several times to change the "Prt" to "3 (Stream mode)".	
6	Press the [PRINT] key to store the setting.	
7	Press the [CAL] key to return to weighing mode.	

Pairing with an AD-8931

Caution

- **One AD-8931 can be connected to one compatible weighing instrument.**
- **When pairing, turn off the instruments other than the one to pair.**

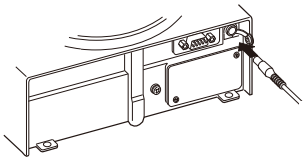
Step	Description	Display and key operation
1	Press the [ON/OFF] key on the AD-8931 to turn on the power.	**ON/OFF** 
2	After all the segments are displayed, [-------] appears.	
3	Press and hold the [SET] key for about 3 seconds until the BT indicator (top right of the display) starts blinking.	**SET** 

Step	Description	Display and key operation
4	The BT indicator blinks, and pairing starts.	
5	When pairing is established, the BT indicator lights up. If the balance to be connected is not found (i.e., if the BT indicator does not light up), the power will turn off after about one minute. Retry the pairing process from step 1.	
6	The product is connected to the balance. If the balance's power is disconnected or the connection is lost, the BT indicator's light will turn off.	
7	The weighing data received is displayed. ❑ If the BT indicator is not lit, turn off the AD-8931 and the balance once and retry the above procedure. ❑ Once pairing is established, the paired balance is detected and connected automatically; there is no need to perform pairing after that. ❑ In the following cases, perform pairing again. ・When the connection to the balance has failed. ・When you do not know which weighing instrument is paired. ・When another weighing instrument is to be connected.	

19. Checking the Software Version of the Balance

Balance specifications may differ depending on the software version of the balance.
To confirm the software version, follow the steps shown below.

How to check

Step	Description	Display and key operation
1	Unplug the AC adapter from the balance and plug it in again.	
2	P-*.*** is displayed for about one second. In place of "*.***", the software version is displayed.	P-4.400

20. Maintenance

20.1. Treatment of the balance

When cleaning the balance

- Do not use organic solvents, alcohol, or chemical wipes.

Main unit	Wipe the main unit with a lint free cloth that is moistened with warm water and a mild detergent.
Breeze break	The breeze break parts have an antistatic coating. Clean it with a dry, lint-free soft cloth. Cleaning it repeatedly with a cloth moistened with a neutral detergent or water or washing it with water may reduce the antistatic effect of the coating.
Weighing pan	Be careful not to hurt your hands on the edges when cleaning the weighing pan.

- When transporting the balance, use the packing material and box that the balance was contained at the time of purchase.
- Do not disassemble the balance. Please refer to the following pages if you remove the weighing pan or the like.

Cleaning 0.0001 g models

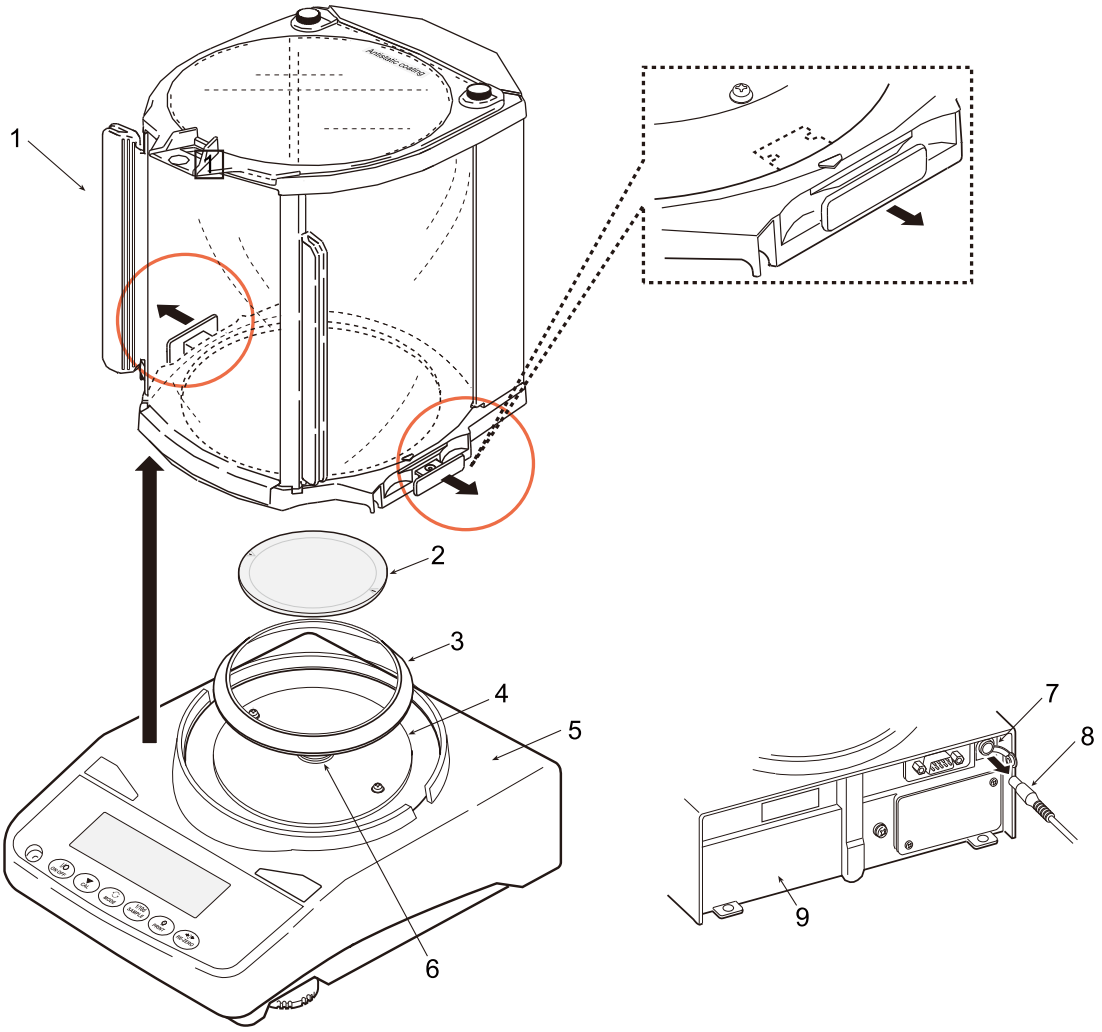
Step 1. Before cleaning the balance, unplug the AC adapter from the outlet.

Step 2. Pull out the locking handles and remove the large breeze break(1) from the main unit(5).

Step 3. Remove the weighing pan(2) and breeze break ring(3), and clean the top of the main unit(5).

Step 4. When cleaning, be careful not to touch the pan support boss(6) or allow dirt to get into the pan support boss. Also, do not remove the screws on the breeze break floorboard(4).

Step 5. After cleaning, install the balance while referring to "2. Part Names, Installation and Precautions".



No.	Name
1	Large breeze break
2	Weighing pan
3	Breeze break ring
4	Breeze break bottom plate (non-detachable)
5	Main unit
6	Pan support boss
7	AC adapter jack
8	AC adapter plug
9	Main unit rear side

Cleaning 0.001 g or 0.01 g models

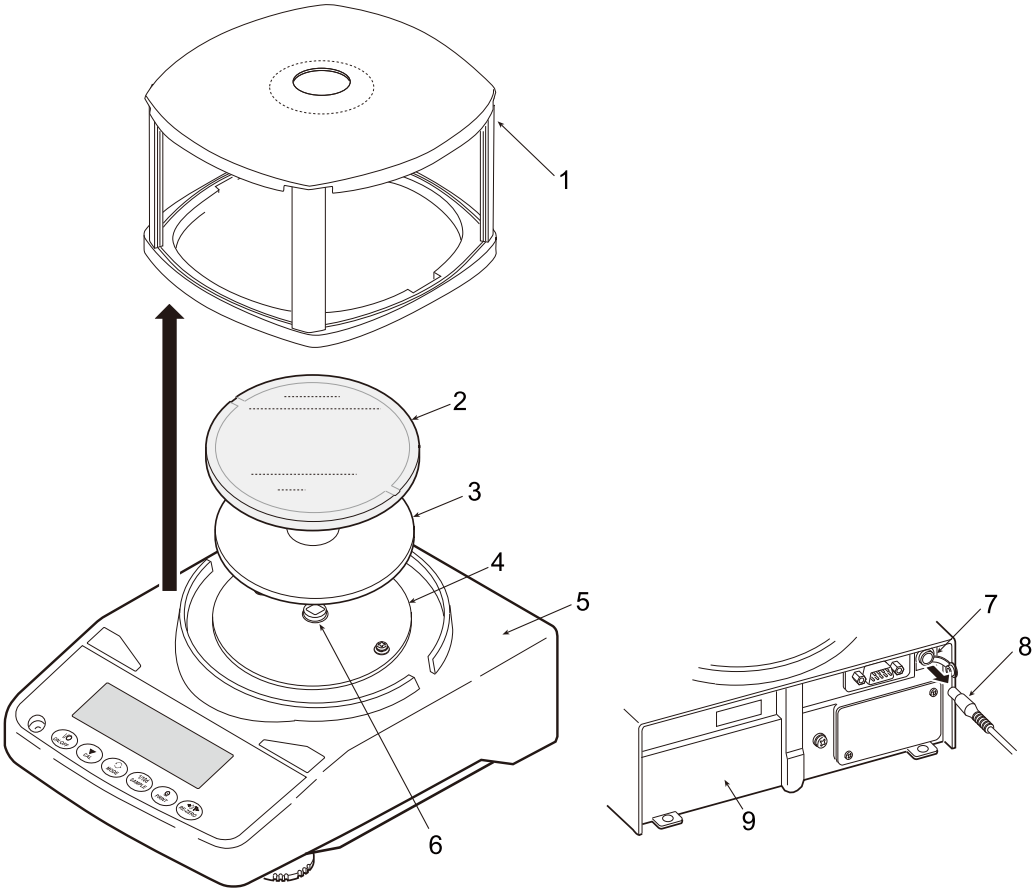
Step 1. Before cleaning the balance, unplug the AC adapter from the outlet.

Step 2. Remove the small breeze break(1) from the main unit(5). (For all FZ models and FX-123 / 223 / 323 / 523 models)

Step 3. Remove the weighing pan(2) and pan support(3), and clean the top of the main unit(5).

Step 4. When cleaning, be careful not to touch the pan support boss(6) or not to allow dirt to get into the pan support boss. Do not remove the screws on the breeze break bottom plate(4).

Step 5. After cleaning, install the balance while referring to "2. Part Names, Installation and Precautions".



No.	Name
1	Small breeze break
2	Weighing pan
3	Pan support
4	Breeze break bottom plate (non-detachable)
5	Main unit
6	Pan support boss
7	AC adapter jack
8	AC adapter plug
9	Main unit rear side

Cleaning dust-proof and waterproof 0.001 g or 0.01 g models

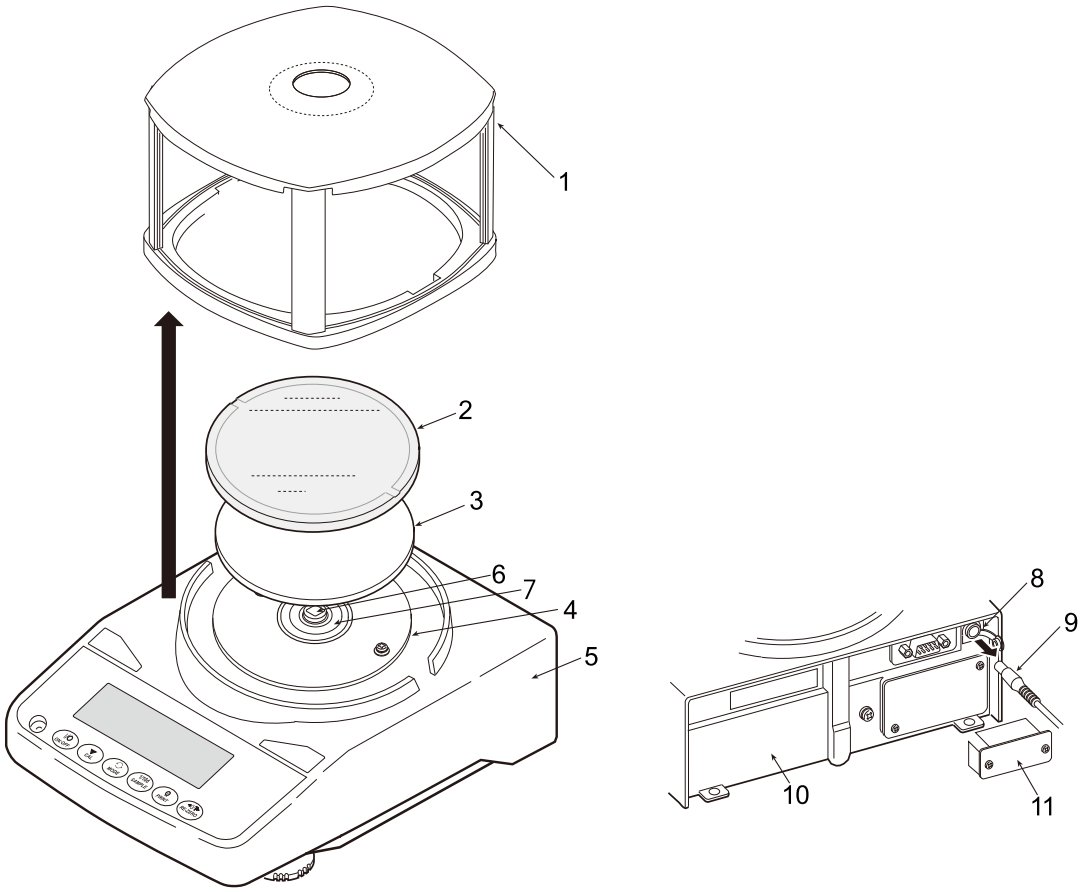
Step 1. Before cleaning the balance, unplug the AC adapter from the outlet.

Step 2. Remove the small breeze break(1) from the main unit(5). (For all FZ-WP models and FX-123WP / 223WP / 323WP models)

Step 3. Remove the weighing pan(2) and pan support(3), and clean the top of the main unit(5).

Step 4. When cleaning, be careful not to touch the pan support boss(6) or allow dirt to get into the pan support boss. Do not remove the screws on the breeze break bottom plate(4).

Step 5. After cleaning, install the balance while referring to "2. Part Names, Installation and Precautions".

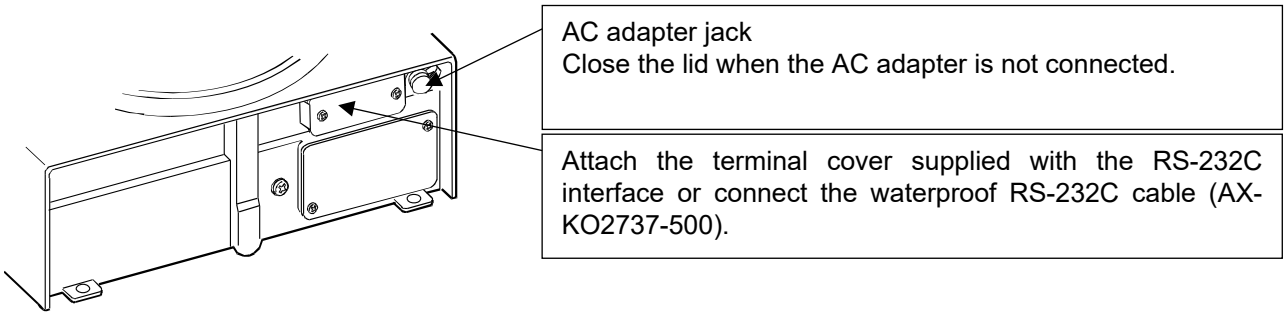


No.	Name
1	Small breeze break
2	Weighing pan
3	Pan support
4	Breeze break bottom plate (non-detachable)
5	Main unit
6	Pan support boss
7	Diaphragm for achieving the waterproof performance
8	AC adapter jack
9	AC adapter plug
10	Main unit rear side
11	Terminal cover *1

*1 To use the balance with dustproof and waterproof performance, attach the terminal cover or waterproof RS-232C cable (AX-KO2737-500).

FZ-WP / FX-WP series specifications

- The dustproof and waterproof specifications of the FZ-WP / FX-WP series are waterproof for daily use, which allows the weighing pan to be washed in water while installed. Note that if the balance is submerged in water or used in such a way that water pressure is applied to the bottom of the balance body, water may enter the interior of the balance.
- When washing the balance with water, attach the terminal cover to the RS-232C interface or connect the waterproof RS-232C cable (AXKO2737-500). Close the lid of the AC adapter input jack. Make sure that the cover of the underhook is also closed.



- Note that, if something such as water remains in the waterproof diaphragm, the weighing value may become unstable. Be careful not to deform the diaphragm when cleaning it.
- Note that, when cleaning with hot water, condensation may occur inside the balance, and the balance parts may deteriorate. Also, be careful not to let water vapor get inside the balance.

21. Troubleshooting

21.1. 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 our website (https://www.aandd.jp/).

1. Checking that the balance works properly

Method 1 As a simpler test, check the repeatability with an external weight. Be sure to place the weight in the center of the weighing pan.

Method 2 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

Check the following check items.

Operating environment

- ❑ Is the weighing table solid enough? (Especially for the 0.0001 g models)
- ❑ Is the balance level? For how to adjust the bubble spirit level, refer to "2.6. Adjusting the level of the balance".
- ❑ Is the operating environment free from vibration and drafts?
- ❑ Is the small breeze break (included) attached to a 0.001 g model or the large breeze break (included) to a 0.0001 g model?
- ❑ 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 and 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 connect the balance to the power supply for at least 30 minutes, or an hour for the 0.0001 g models, to warm up before weighing?

Sample and container

- ❑ Is the sample free from moisture absorption or evaporation due to the influence of ambient temperature and humidity?
- ❑ Is the temperature of the container of the sample acclimatized to the ambient temperature? Refer to "2.5. Precautions before use (Installation considerations and preparation)".
- ❑ Is the sample free of static electricity? Refer to "2.7. Precautions during use (for more accurate weighing)".
  Especially the 0.0001 g models and 0.001 g models are susceptible to static electricity when the relative humidity is low.
- ❑ Is the sample a magnetic material (iron, etc.)? Care must be taken when weighing magnetic materials. Refer to "2.7. Precautions during use (for more accurate weighing)".

21.2. Error displays and codes

Display	Code	Description and possible countermeasure
E		**Overload error** A sample beyond the weighing capacity has been placed on the weighing pan. Remove the sample from the pan.
-E		**Weighing pan error** The weighing value is too light. Check that the weighing pan is installed correctly. Set the weighing pan correctly. Perform sensitivity adjustment of the balance.
LoWVoLt		**Power supply voltage fault** The voltage supplied from the AC adapter is abnormal. Please check if the problem is the AC adapter supplied with the balance.
Error0		**Internal error** If this error continues to be displayed, contact your local A&D dealer for repair.
Error 1	EC, E11	**Stability error** Weighing value is unstable and therefore the "zero display", "sensitivity adjustment", etc. cannot be executed. Check around the pan. Refer to "2.7. Precautions during use (for more accurate weighing)". Improve the environment of the installation location to prevent factors such as vibration, drafts, and static electricity from influencing the balance. To clear the error and return to weighing display, press the CAL key.
Error2		**Out of the setting range** The value to be set exceeds the setting range. Set again within the setting range.
Error7	EC, E17	**Internal weight error (FZ/FZ-WP series only)** The internal weight application mechanism does not function properly. Perform the operation from the beginning again. If there is no improvement, contact your local A&D dealer for repair.
CAL E	EC, E20	**Sensitivity adjustment weight error (Positive value)** The sensitivity adjustment weight is too heavy. Check around the pan. Check the mass value of the weight. To return to the weighing mode, press the CAL key
-CAL E	EC, E21	**Sensitivity adjustment weight error (Negative value)** The sensitivity adjustment weight is too light. Check around the pan. Check the mass value of the weight. To return to weighing mode, press the CAL key.
Lo		**Sample weight error** The sample is too light to be stored as a sample weight for the counting mode or percent mode. It cannot be used as a sample.

Display	Code	Description and possible countermeasure
25 - PCS 50 - PCS 100 - PCS		**Unit weight error** The sample unit weight is too light to be used in counting mode; which may cause a significant counting error. For accurate counting, add samples to reach the displayed number, then press the [PRINT] key (even though pressing the [PRINT] key with no samples added will put the balance in counting mode).
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 provided with power. Contact your local A&D dealer for repair if this error appears frequently.
Error3		**Malfunction of the internal memory element of the balance** If this error continues to be displayed, contact your local A&D dealer for repair.
Error5		**Weight sensor error** If this error continues to be displayed, contact your local A&D dealer for repair.
-Error5		**Weight sensor error** Set the weighing pan correctly. If this error continues to be displayed, contact your local A&D dealer for repair.
Error8		**Abnormality in the internal memory data of the balance** If this error continues to be displayed, contact your local A&D dealer for repair.
	EC, E00	**Communications error** A protocol error occurred in communications. 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) Q command was received when not in weighing mode. Example) Q command was received while re-zeroing. Adjust the delay time to transmit a command.
	EC, E03	**Timeout error** With the timeout parameter set to [t-UP 1SEC], there was a wait time of approximately one second or more 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.

Display	Code	Description and possible countermeasure
	EC, E06	**Format error** The description of the received command is incorrect. Example) The number of digits of numerical values is incorrect. Example) There are alphabet characters 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 errors		If the errors described above cannot be released or other errors are displayed, contact your local A&D dealer.

21.3. Asking for repair

If a problem occurs after having checked the operations of the balance or if an error message appears indicating that repair is required, contact your local A&D dealer.

The balance is a precision instrument. Use much care when handling the balance and observe the following when transporting it:

- Use the original packing material.
- Remove the weighing pan and pan support from the balance main unit.

22. Specifications

22.1. Common specifications

22.1.1. Function

Internal weight		Equipped to FZ / FZ-WP series*1
Clock & calendar function		Equipped to FZ / FZ-WP series
Sensitivity drift (10 °C to 30 °C)		± 2 ppm/°C
Operating temperature and humidity		5 °C to 40 °C, 85 %RH or lower (no condensation)
Display refresh rate		5 times/second, 10 times/second, or 20 times/second
Units of measure		g (gram), mg (milligram)*2, PCS (counting mode), % (percent mode), OZ (ounce), Lb (pound), L OZ (pound/ounce), OZt (troy ounce), ct (metric carat), mom (momme), dwt (pennyweight), GN (grain), TL (tael), tol (tola), MES (mesghal), DS (density mode)*3, MLT (programmable-unit)
Counting mode	Number of samples	5, 10, 25, 50, or 100 pieces
Percent mode	Readability	0.01 %, 0.1 %, 1 % (Automatically changed by 100% mass)
Communication interface		RS-232C
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)
Dustproof and waterproof rating (FZ-WP / FX-WP series only)		Compliant with IP65

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

*2 "mg (milligram)" can only be selected for 0.0001 g models.

*3 "DS (density mode)" can be enabled by changing the factory default setting in the function table of the balance.

22.1.2. Size / Weight

	0.0001 g model	0.001 g model	0.01 g model
Weighing pan size	φ90 mm	φ130 mm	φ150 mm
Main unit	FZ series: approx. 3.9 kg FX series: approx. 3.5 kg	FZ series: approx. 3.0 kg (FZ-WP series: approx. 3.2 kg) FX series: approx. 2.5 kg (FX-WP series: approx. 2.7 kg)	
External dimensions	198(W) x 294(D) x 315(H) mm (With a large breeze break)	193 (W) x 262.5 (D) x 85.5 (H) mm 193 (W) x 262.5 (D) x 176 (H) mm (With a small breeze break)	

22.2. Individual specifications

22.2.1. 0.0001 g models

Internal adjustment type		FZ-104	FZ-154	FZ-254	FZ-254D
External adjustment type		FX-104	FX-154	FX-254	FX-254D
Weighing capacity		102 g	152 g	252 g	252 g 62 g
Maximum display		102.0084 g	152.0084 g	252.0084 g	252.008 g 62.0009 g
Readability		0.0001 g			0.001 g 0.0001 g
Repeatability (Standard deviation)		0.0001 g		0.0002 g / 200 to 250 g 0.0001 g / 0 to 200 g	0.0005 g 0.0001 g
Linearity		± 0.0002 g		± 0.0003 g	± 0.001 g ± 0.0003 g
Stabilization time (when set to FAST under a good environment)		Approx. 2 seconds			
Counting mode	Minimum unit mass	0.0001 g			0.001 g
Percent mode	Minimum 100% mass	0.0100 g			0.100 g
External sensitivity adjustment weights		100 g 50 g	150 g 100 g 50 g	250 g 200 g 100 g 50 g	250 g 200 g 100 g 50 g 20 g

22.2.2. 0.001 g models

Internal adjustment type	FZ-123	FZ-223	FZ-323	FZ-523
External adjustment type	FX-123	FX-223	FX-323	FX-523
Dustproof and waterproof, internal adjustment type	FZ-123WP	FZ-223WP	FZ-323WP	
Dustproof and waterproof type	FX-123WP	FX-223WP	FX-323WP	
Weighing capacity	122 g	220 g	320 g	520 g
Maximum display	122.084 g	220.084 g	320.084 g	520.084 g
Readability	0.001 g			
Repeatability (Standard deviation)	0.001 g			
Linearity	± 0.002 g			
Stabilization time (when set to FAST under a good environment)	Approx. 1 second			
Accuracy after sensitivity adjustment with the internal weight (In the FZ / FZ-WP series weighing capacity)*	± 0.010 g			
Counting mode / Minimum unit mass	0.001 g			
Percent mode / Minimum 100% mass	0.100 g			
External sensitivity adjustment weights	100 g 50 g	200 g 100 g 50 g	300 g 200 g 100 g 50 g	500 g 400 g 300 g 200 g 100 g 50 g

* ❑ The accuracy immediately after sensitivity adjustment with the internal weight at a temperature of 10°C to 30°C in an environment free from sudden changes in temperature and humidity, vibration, draft, static electricity, etc., when the included small breeze break is used.

❑ The internal weight of the FZ / FZ-WP series may change in mass due to the usage environment and deterioration over time. It is advisable to perform sensitivity adjustment and maintenance using an external weight regularly.

22.2.3. 0.01 g models

Internal adjustment type		FZ-1202	FZ-2202	FZ-3202	FZ-5202
External adjustment type		FX-1202	FX-2202	FX-3202	FX-5202
Dustproof and waterproof, internal adjustment type		FZ-1202WP	FZ-2202WP	FZ-3202WP	
Dustproof and waterproof type		FX-1202WP	FX-2202WP	FX-3202WP	
Weighing capacity		1220 g	2200 g	3200 g	5200 g
Maximum display		1220.84 g	2200.84 g	3200.84 g	5200.84 g
Readability		0.01 g			
Repeatability (Standard deviation)		0.01 g			
Linearity		± 0.02 g			
Stabilization time (when set to FAST under a good environment)		Approx. 1 second			
Accuracy after sensitivity adjustment with the internal weight (In the FZ / FZ-WP series weighing capacity)*		± 0.10 g		± 0.15 g	
Counting mode	Minimum unit mass	0.01 g			
Percent mode	Minimum 100% mass	1.00 g			
External sensitivity adjustment weights		1000 g 500 g	2000 g 1000 g 500 g	3000 g 2000 g 1000 g 500 g	5000 g 4000 g 3000 g 2000 g 1000 g 500 g

* ❑ The accuracy immediately after sensitivity adjustment with the internal weight at a temperature of 10°C to 30°C in an environment free from sudden changes in temperature and humidity, vibration, draft, static electricity, etc., when the included small breeze break is used.

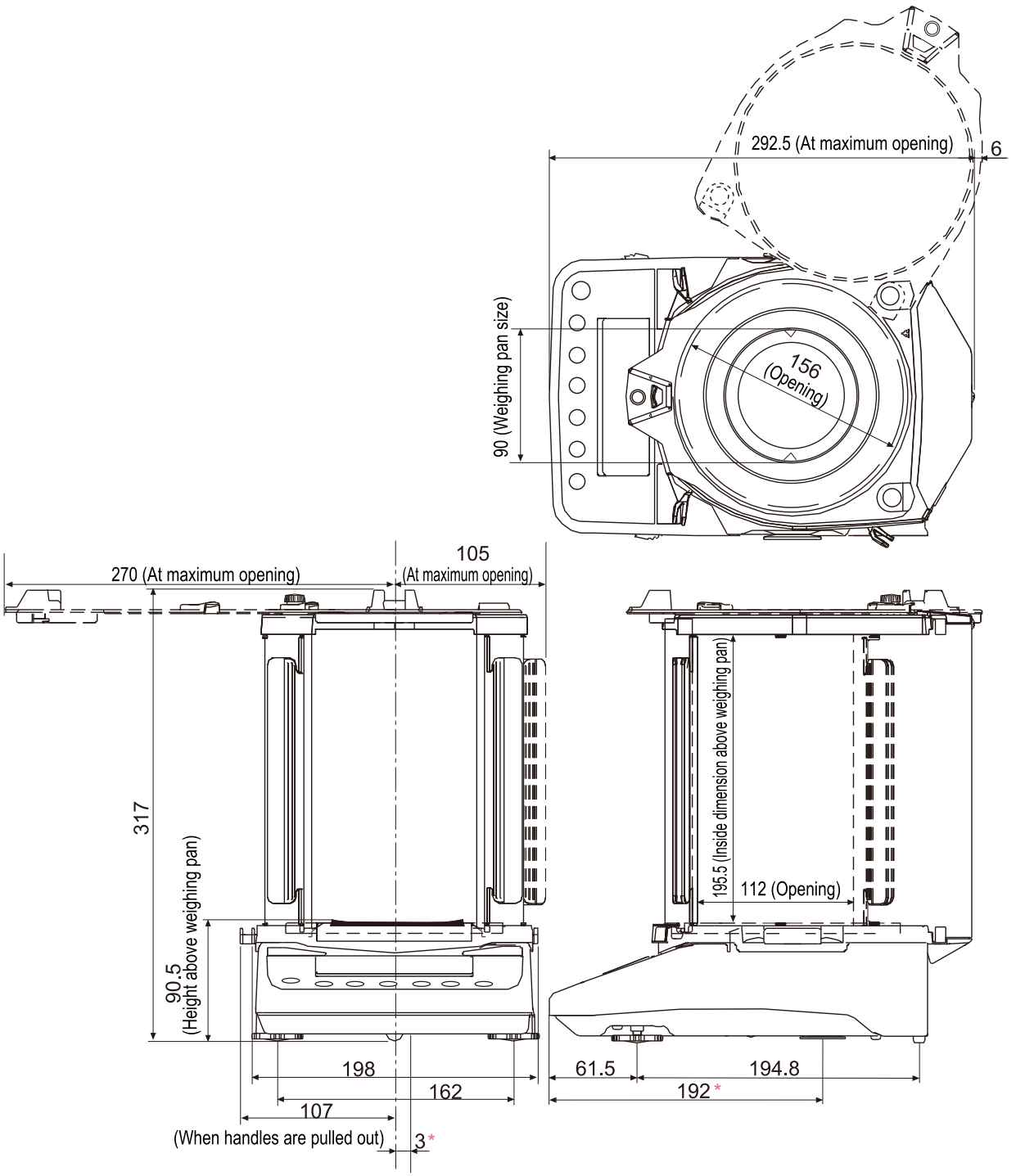
❑ The internal weight of the FZ / FZ-WP series may change in mass due to the usage environment and deterioration over time. It is advisable to perform sensitivity adjustment and maintenance using an external weight regularly

22.3. External dimensions

FZ-104 / 154 / 254 / 254D
FX-104 / 154 / 254 / 254D

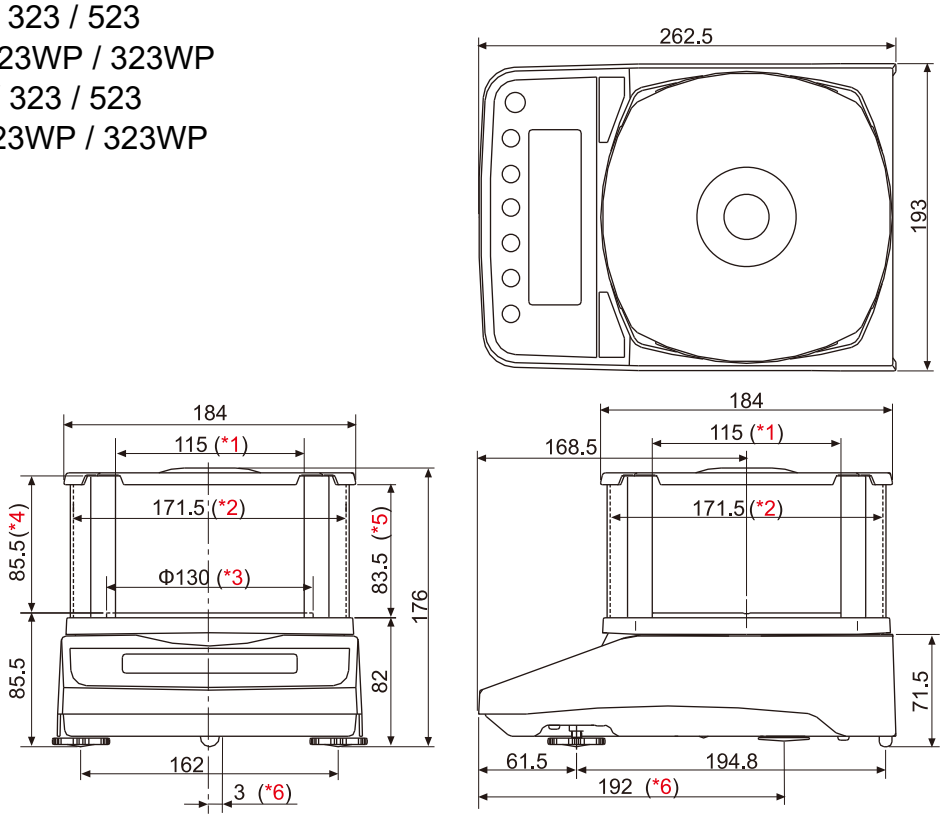
Unit: mm

* Area under the floor weighing platform



FZ-123 / 223 / 323 / 523
FZ-123WP / 223WP / 323WP
FX-123 / 223 / 323 / 523
FX-123WP/ 223WP / 323WP

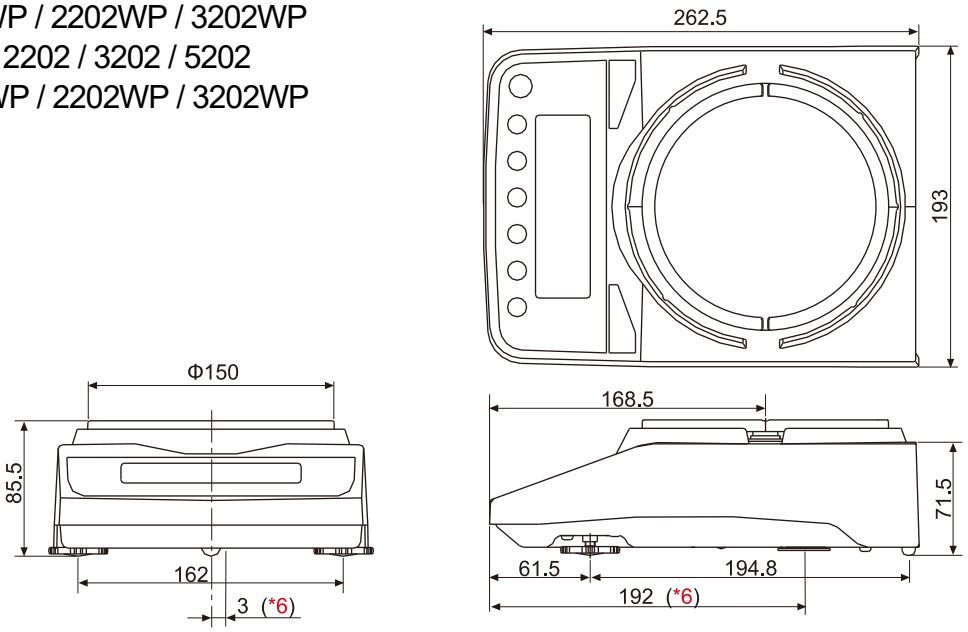
Unit: mm



*1: Width of the opening when a clear plate is removed.
*2: Inside dimension
*3: Weighing pan diameter
*4: Height from the weighing pan up to the cap of the breeze break (inside dimension)
*5: Height of the opening when a clear plate is removed.
*6: Area under the floor weighing platform

FZ-1202 / 2202 / 3202 / 5202
FZ-1202WP / 2202WP / 3202WP
FX-1202 / 2202 / 3202 / 5202
FX-1202WP / 2202WP / 3202WP

Unit: mm



The FZ-1202 / 2202 / 3202 / 5202 / 1202WP / 2202WP / 3202WP models equipped with an internal weight for sensitivity adjustment come with a small breeze break.

23. Options and Accessories

23.1.1. Options

Caution

- ❑ **Only one of FX-05, FXi-08, FXi-09, or GXA-27 can be installed.**
- ❑ **When used with FXi-08 or FXi-09, the FZ-WP / FX-WP series are not dustproof or waterproof compliant with IP65.**

FX-05: USB interface (Supported OS: Windows 7 or later)

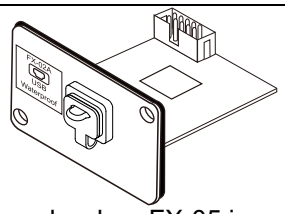
- ❑ An FZ-WP / FX-WP balance installed with an FX-05 has the capability for communication without compromising its dust-proof and waterproof performance (compliant with IP65).
- ❑ The communication method can be selected from two types by setting the table function of the balance:

"Quick USB Mode":

- ■ Weighing data can be sent uni-directionally from a balance to a PC via USB.
- ■ Weighing data can be input into applications such as Excel, Word, or Notepad.
- ■ No driver installation required.

"Virtual COM Mode":

- ■ Bi-directional communication (weight data reception using the Q command, etc.) with data communication software such as "WinCT" is possible.
- ■ If Virtual COM mode is used for the first time on a PC running an OS other than Windows 10 or 11, installation of the dedicated driver is necessary.



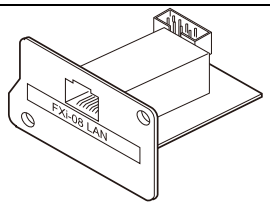
Example when FX-05 is used.
(Quick USB Mode)

	A	B	C
1	ST,+0201.924	g	
2	ST,+0201.926	g	
3	ST,+0201.928	g	
4	ST,+0223.258	g	
5	ST,+0201.927	g	
6	ST,+0201.927	g	
7	ST,+0201.926	g	
8	ST,+0186.345	g	
9			
10			

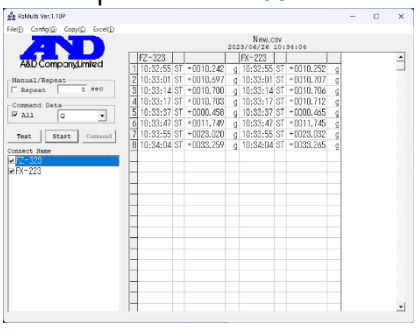
FXi-08: Ethernet interface

- ❑ Can connect the balance to a LAN (Ethernet) to perform bi-directional communication with a PC on the LAN.
- ❑ The WinCT-Plus Windows Data Communication Software for LAN Connection can be downloaded from Software on the A&D website (https://www.aandd.jp/).
  - ■ For data acquisition from multiple weighing instruments with a single PC via LAN connection.
  - ■ Weighing instruments can be controlled by sending commands from a PC.
  - ■ Data can be transmitted from the weighing instrument for data acquisition:

    Example) Pressing the PRINT key on the balance outputs data for data acquisition.



Example when FXi-08 is used.



GXA-27: Bluetooth interface

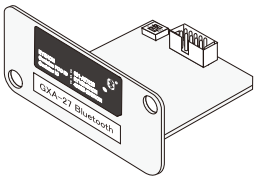
- ❑ Enables the balance to communicate wirelessly with a paired Bluetooth-equipped terminal such as a PC / tablet / smartphone.
- ❑ An FZ-WP / FX-WP balance installed with a GXA-27 has the capability for communication without compromising its dustproof and waterproof performance (compliant with IP65).
- ❑ The following two connection methods can be switched with the DIP switch (No.1) on the GXA-27 before it is installed on the balance:

"Keyboard input connection (with HID over GATT Profile)"

- ■ Weighing data (numeric values only) can be sent uni-directionally from the balance to a paired terminal. By switching the DIP switch (No. 2), the balance serial number can be added before the weighing data.
- ■ Weighing data can be input into applications such as Excel, Word, or Notepad.

"Bi-directional communication connection"

- ■ For Bi-directional communication with
  AD-8541-PC (Bluetooth® dongle for PC, sold separately)
  AD-8931 (Bluetooth® wireless remote display, sold separately)
  A&D WeiV® (Application for A&D balances and scales, freeware)



Caution

Please contact your local A&D representative to find out whether GXA-27 is certified for compliance with Bluetooth® communication laws in your country.

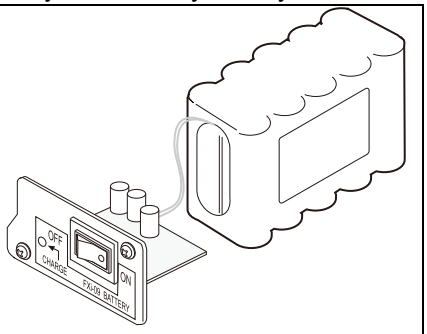
FXi-09: Built-in battery unit (Ni-MH rechargeable battery pack)*

Only available by factory installation

- ❑ Charging time: Approx. 14 hours.
- ❑ Continuous operation hours: Approx. 8 hours

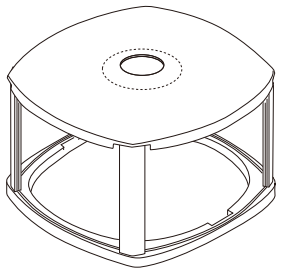
Caution

The charging time depends on the operating environment. During charging, the balance is not available for use.



FXi-10: Small breeze break

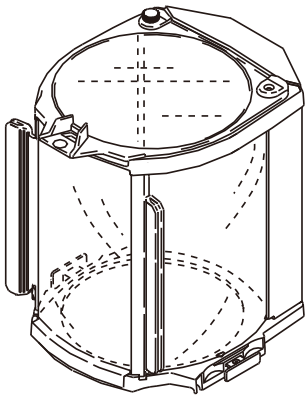
❑ Can be attached to all models of the FZ / FX series and FZ-WP / FX-WP series except for 0.0001 g models.



FXi-10 compatible models			
FZ / FZ-WP series	123	123WP	Included as standard accessory
	223	223WP	
	323	323WP	
	523		
	1202	1202WP	
	2202	2202WP	
	3202	3202WP	
	5202		
FX / FX-WP series	123	123WP	
	223	223WP	
	323	323WP	
	523		
	1202	1202WP	Optional
	2202	2202WP	
	3202	3202WP	
	5202		

FXi-11: Large breeze break

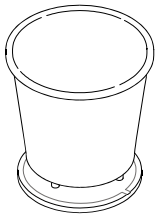
❑ Can be attached to all models of the FZ / FX / FZ-WP / FX-WP series. A large breeze break is used for tall beakers, measuring cylinders, etc.



FXi-11 compatible models			
FZ / FX / FZ-WP / FX-WP series	104		Included as standard accessary
	154		
	254		
	254D		
	123	123WP	Optional
	223	223WP	
	323	323WP	
	523		
	1202	1202WP	
	2202	2202WP	
	3202	3202WP	
	5202		

FXi-12: Animal weighing pan

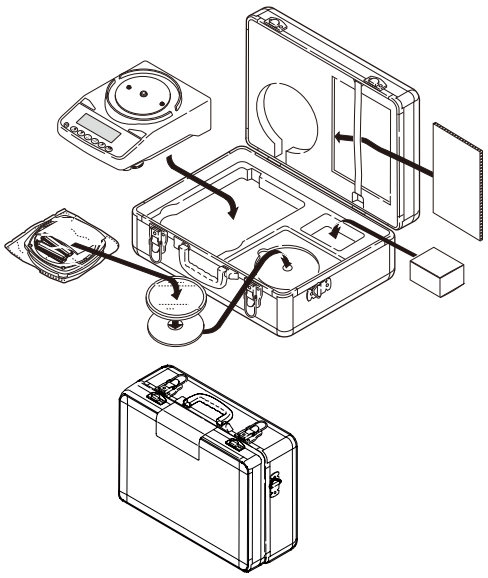
- ❑ For weighing small animals.
- ❑ Placing the animal weighing pan on the balance will reduce the weighing capacity by approximately 200 g.



FXi-12 compatible models		
FZ / FZ-WP series	1202, 2202, 3202, 5202	1202WP, 2202WP, 3202WP
FX / FX-WP series	1202, 2202, 3202, 5202	1202WP, 2202WP, 3202WP

FXi-15: Carrying case

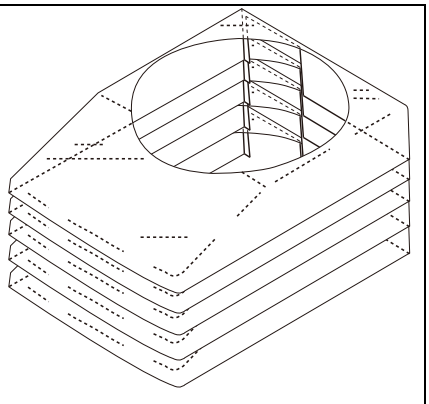
- ❑ A carrying case that can store and carry any model of the FZ / FX series and FZ-WP / FX-WP series except for 0.0001 g models.



FXi-15 compatible models		
FZ / FZ-WP series	123	123WP
	223	223WP
	323	323WP
	523	
	1202	1202WP
	2202	2202WP
	3202	3202WP
	5202	
FX / FX-WP series	123	123WP
	223	223WP
	323	323WP
	523	
	1202	1202WP
	2202	2202WP
	3202	3202WP
	5202	

AX-FXi-31-JA: Main unit cover (a set of five pieces)

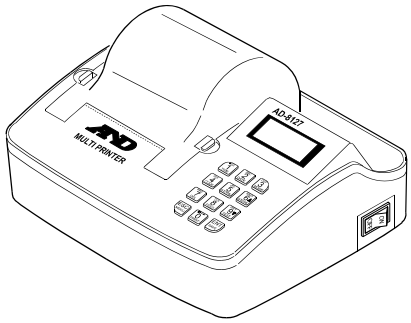
- ❑ Main unit protective cover provided as a standard accessory.



23.1.2. Accessories

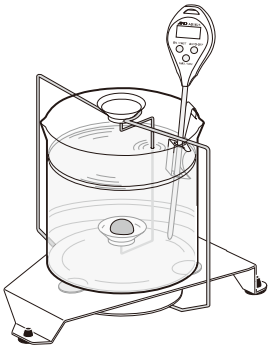
AD-8127: Multi-functional compact printer

- ❑ Small dot impact printer that connects with an A&D balance via the RS-232C interface.
- ❑ Various functions such as clock and calendar function, statistical function, interval print function, graphic print function, etc. are provided.



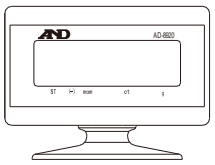
AD-1654: Density Determination Kit (for the FZ / FX series)

- ❑ Specific gravity (density) of solids and liquids can be easily measured.
- ❑ Comes with instruments (float, thermometer, and beaker) for measuring weight in liquid or weight in air.



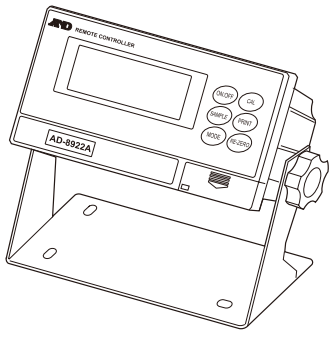
AD-8920A: Remote display

- ❑ Can read weighing values remotely from an FZ / FX series balance connected via the RS-232C interface.

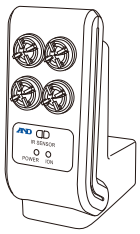


AD-8922A: Remote controller

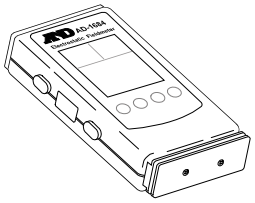
- ❑ Can remotely operate an FZ / FX series balance connected via the RS-232C interface.
- ❑ Optional analog and comparator outputs can be installed.



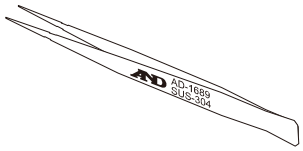
AD-1683A: Static eliminator (Ionizer)

❑ Prevents weighing errors caused by electrically charged weighing samples. ❑ This DC-type static eliminator generates ions that travel far with no breeze, which is ideal for precisely measuring powder and such. ❑ A non-contact switch is equipped so that you can perform static elimination only when necessary.	

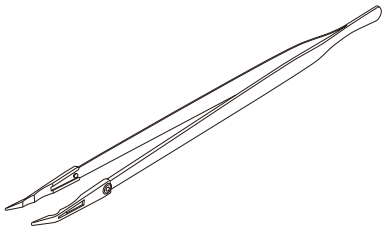
AD-1684A: Electrostatic field meter

❑ Measures how electrically charged the weighing sample and tare, the balance's breeze break, or other peripheral devices (including those in the automatic weighing line) are and then indicates the result. Use an AD-1683A (ionizer) to eliminate electric charge if detected.	

AD-1689: Tweezers for handling calibration weights

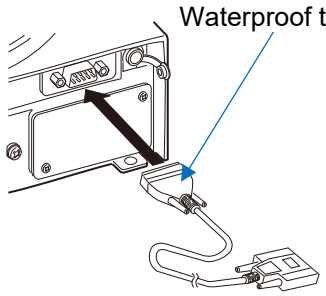
❑ Designed to pick up weights from 1 g to 500 g easily and firmly, reducing fatigue during calibration work. ❑ AD-1689 has tips made of styrene-based elastomer material.	

AX-TWEEZERS-25: Tweezers for handling calibration weights

❑ Designed to pick up weights from 1 mg to 500 g easily and firmly, reducing fatigue during calibration work. ❑ AX-TWEEZERS-25 have tips made of anti-static, polycarbonate + 10% carbon + 10% glass fiber.	

AX-KO2737-500: Waterproof RS-232C cable (5 m, D-Sub 9-pin, female to female)

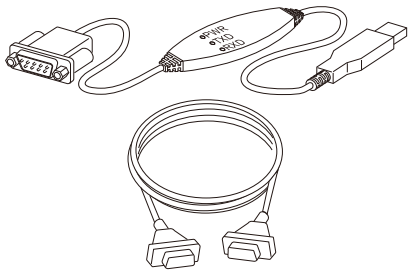
- ❑ Length: 5 m. D-Sub 9-pin (female) to 9-pin (female)
- ❑ Only the 9-pin on the balance side is waterproof.
- ❑ Device connected: PC, PLC, printer, etc.



Waterproof RS-232 cable

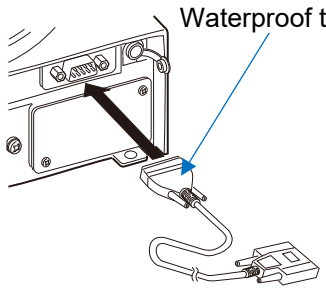
AX-USB-9P: Serial / USB converter with cable (Cable length: approx. 80 cm)

- ❑ Adds a COM port to a PC.
- ❑ Enables bi-directional communication between an A&D balance and a PC with a driver installed.
- ❑ By connecting via a USB interface, software for serial communication, such as "WinCT", can be used even on a PC with no COM ports.



AX-KO7695-500: Waterproof RS-232C cable (5 m, D-Sub 9P, female to male)

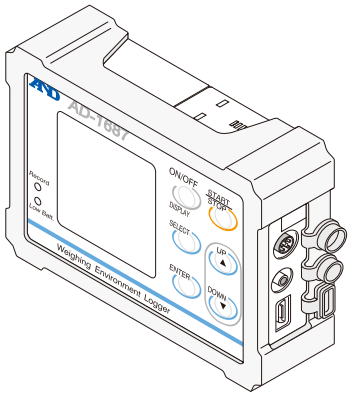
- ❑ Length: 5 m. D-Sub 9-pin (female) to 9-pin (male)
- ❑ Only the 9-pin on the balance side is waterproof.
- ❑ Device connected: AD-1688, AD-8527, etc.



Waterproof RS-232 cable

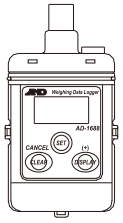
AD-1687: Weighing environment logger

- ❑ AD-1687 is equipped with four sensors for temperature, humidity, barometric pressure, and vibration to measure and store environmental data. When connected to the RS-232C interface of a balance, the AD-1687 can store environmental data along with weighing data.
- ❑ Data can be saved even in environments where a PC cannot be used.
- ❑ The data stored can be read on a PC connected via its USB port.



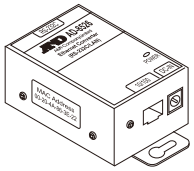
AD-1688: Weighing data logger

- ❑ No dedicated power supply is required. The AD-1688 can import weighing data from an A&D balance via an RS-232C interface.
- ❑ Weighing data can be saved even where a PC is not available.
- ❑ The data stored can be read on a PC connected via its USB port.
- ❑ AD-1688 is recognized as a USB flash drive. No dedicated software for data acquisition is required.



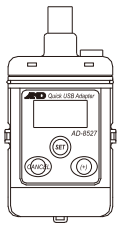
AD-8526: Serial / Ethernet (TCP / IP) converter

- ❑ Connects the RS-232C interface of an A&D balance to a PC's Ethernet (LAN) port; It allows management of the balance weighing data with a PC connected to a network (TCP/IP).
- ❑ Using the WinCT-Plus data communication software, you can perform data accumulation for multiple balances.



AD-8527: Quick USB adapter

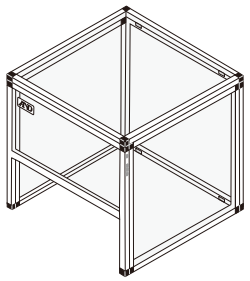
- ❑ This adapter transmits real-time weighing data to a PC where the data can be input directly into an application such as Excel or Word. No dedicated power supply is required.



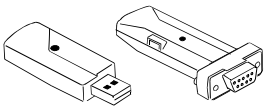
AD-1671: Anti-vibration table

- ❑ This anti-vibration table with a weight of approx. 27 kg and cushioning rubber reduces vibration from the floor and stabilizes the balance's weighing display.

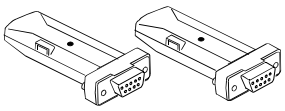
AD-1672: Tabletop breeze break

❑ This tabletop breeze break protects the balance from breezes and drafts due to air conditioning and the like or body movements. The transparent panel assembly consists of antistatic plastic material which protects the balance from static electricity.	

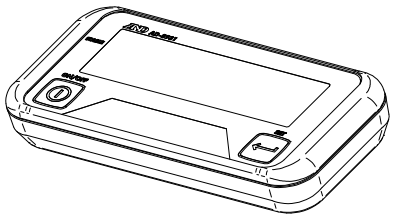
AD-8529PC-W: Bluetooth® converter (for a PC connection)

❑ Enables wireless communication between an A&D balance and a PC via Bluetooth up to 10 m. ❑ Driver installation is required.	

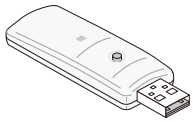
AD-8529PR-W: Bluetooth® converter (for a printer connection)

❑ Enables wireless communication between an A&D balance and a printer via Bluetooth up to 10 m.	

AD-8931: Bluetooth® wireless remote display

❑ Displays wirelessly (via Bluetooth) the weighing data streamed* from an A&D balance (with the GXA-27 installed) up to 10 meters away. **Caution** **The factory default setting must be changed in the function table of the balance.**	

AD-8541-PC: Bluetooth® dongle for PC

❑ Allows bi-directional communication (via COM port) with a PC. ❑ Enables wireless communication between an A&D balance (with the GXA-27 installed) and a PC via Bluetooth up to 10 m.	

24. Terms

Term	Description
Stable display	The weighing value when the stabilization indicator is displayed.
Environment	Ambient conditions such as vibration, drafts, temperature change, static electricity, magnetic fields, and the like that affect the weighing operation.
Sensitivity adjustment	Adjustment of the balance so that it can weigh accurately.
Zero point	A weighing reference point or the zero display. 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	The letter "d" represents the smallest measurable increment that the balance can display (i.e., scale division).
Tare	To cancel the weight of a container, paper, etc. not to be weighed that is placed on the weighing pan.
Re-zero	To set the display to zero.
GLP	Good Laboratory Practice
GMP	Good Manufacturing Practice
Repeatability	Variation in measured values obtained when the same weight is placed and removed repeatedly. Usually expressed as a standard deviation. Example) Standard deviation = 1 d: This means that the measured values fall within ±1 d at a probability of about 68%.
Stabilization time	The time until the weighing value is displayed with the stabilization indicator shown after a sample is placed on the weighing pan.
Sensitivity drift	An affect that a change in temperature causes to the weighing data. Expressed as temperature coefficient. Example) Temperature coefficient = 2 ppm/°C: If a load is 300 g and the temperature changes by 10 °C, the value displayed changes by the following value. 0.0002 %/°C x 10 °C x 300 g = 6 mg
IP65, dustproof and waterproof rating	IP65 is a rating that indicates no ingress of dust and no harmful influence by receiving direct jets of water from any direction. Note that the balance will not withstand strong direct water jets or being completely immersed in water.

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