# FZ-*i* / FX-*i* SERIES
# FZ-*i* WP/ FX-*i* WP SERIES
# FZ-GD/ FX-GD SERIES

## Precision Balance

# INSTRUCTION MANUAL

**FZ-120*i* / FZ-200*i* / FZ-300*i* / FZ-500*i***
**FZ-1200*i* / FZ-2000*i* / FZ-3000*i* / FZ-5000*i***
**FX-120*i* / FX-200*i* / FX-300*i* / FX-500*i***
**FX-1200*i* / FX-2000*i* / FX-3000*i* / FX-5000*i***

**FZ-120*i* WP / FZ-200*i* WP / FZ-300*i* WP**
**FZ-1200*i* WP / FZ-2000*i* WP / FZ-3000*i* WP**
**FX-120*i* WP / FX-200*i* WP / FX-300*i* WP**
**FX-1200*i* WP / FX-2000*i* WP / FX-3000*i* WP**

**FZ-120GD / FZ-200GD / FZ-300GD**
**FZ-1200GD / FZ-2000GD / FZ-3000GD**
**FX-120GD / FX-200GD / FX-300GD**
**FX-1200GD / FX-2000GD / FX-3000GD**

## A&D

### A&D Company, Ltd.

**1WMPD4001863E**

# CONTENTS

## Functions

## RS-232C Serial Interface

## Maintenance

# 1. INTRODUCTION

This manual describes how the FZ-*i* / FX-*i* / FZ-*i*WP / FX-*i*WP / FZ-GD / FX-GD series balance works and how to get the most out of it in terms of performance.

Read this manual thoroughly before using the balance and keep it at hand for future reference.

## 1.1.    About This Manual

This manual consists of the following five parts:

Basic operation ......................... Describes precautions on handling the balance, balance construction and basic balance operation.

Adapting to the environment .... Describes response adjustment and calibration.

Functions ................................. Describes various functions of the balance.

RS-232C serial interface .......... Describes the interface which transmits data and controls the balance.

Maintenance ............................. Describes maintenance, error codes, troubleshooting, specifications and options.

## 1.2.    Features

- Compact general-purpose balance, can be installed almost anywhere.
- The FZ-*i* / FZ-*i* WP / FZ-GD series balance is equipped with an internal mass for one-touch calibration.
- Casing construction, strong protection against dust and moisture.
- Stabilization time of one second. When $\boxed{\text{FAST}}$ is selected for the response rate, a stabilization time of one second, to read a displayed value after a sample is placed on the pan, has been achieved.
- Multiple weighing units with most of the common units used around the world.
- Standard RS-232C serial interface to communicate with a computer and to output the Good Laboratory Practice (GLP) / Good Manufacturing Practice (GMP) compliant report.
- Statistical calculation mode to statistically calculate the weight data, and display or output the sum, maximum, minimum, range (maximum-minimum), average, standard deviation and coefficient of variation.
- Comparator ndicators for displaying the comparison results using $\boxed{\text{HI}}$, $\boxed{\text{OK}}$ and $\boxed{\text{LO}}$.
- Hold Function, provided for weighing a moving object such as an animal.
- Breeze break, provided for the 120/200/300 of the FZ-*i* series, FZ-*i* WP series and FZ-GD series (including 500 for the FX-*i* series), for more accurate weighing.
- Underhook, provided for suspended weighing.
- As options, the USB interface (FX*i*-02), the Ethernet interface (FX*i*-08) and the built-in battery unit (FX*i*-09) are available. * Using these options with the FZ-*i* WP / FX-*i* WP series prevent the balance from having dustproof and waterproof performance.
  Connecting the USB interface, by cable to a Windows computer, allows transmission of the weight data to Excel or Word. The Ethernet interface allows connection of the balance to a personal computer through a LAN. The battery unit allows use of the balance where a power source is not available.
- The AD-8920A remote display, that is sold separately, allows reading the weight value in a place away from the balance.

## 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 a Class A computing device pursuant to Subpart J of 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.)

**Compliance With Directives of CE mark**

This device features radio interference suppression, safety regulation and restriction of Hazardous Substances in compliance with the following Council Directives

| | | |
|---|---|---|
| Council directive 2004/108/EC | EN61326 | EMC directive |
| Council directive 2006/95/EC | EN60950 | Safety of Information Technology Equipment |
| Council directive 2011/65/EU | EN50581 | Restriction of the use of certain Hazardous Substances |

The CE mark is an official mandatory European marking.

Please note that any electronic product must comply with local laws and regulations when sold or used anywhere outside Europe.

# 2. PRODUCT CONFIGURATION (PART NAMES), INSTLLATION AND PRECAUTIONS

## 2.1. Unpacking

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

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

**How to assemble the breeze break**
(included with all models of FZ-*i*/FZ-*i*WP/FZ-GD series, and FX-120*i*/200*i*/300*i*/500*i*, FX-120*i*WP/200*i*WP/300*i*WP and FX-120GD/200GD/300GD)
Assemble the breeze break as shown below.
Follow the numbered sequence.

Weighing pan
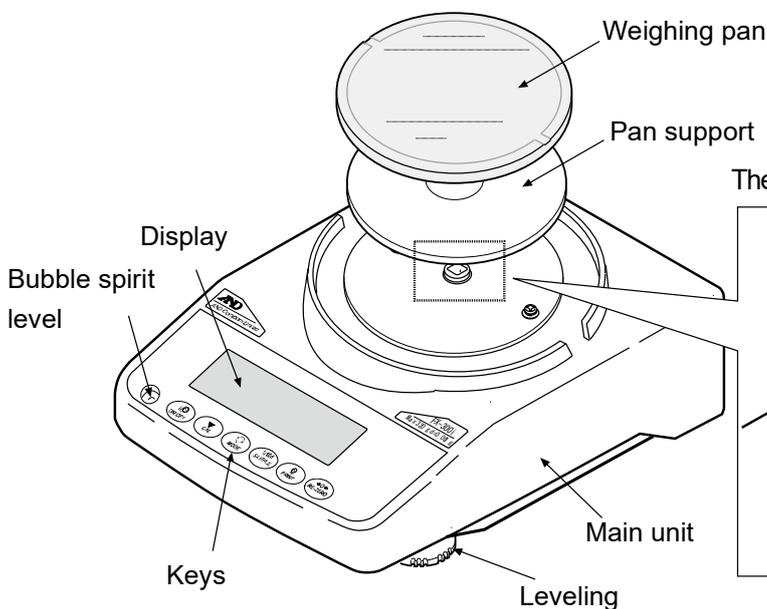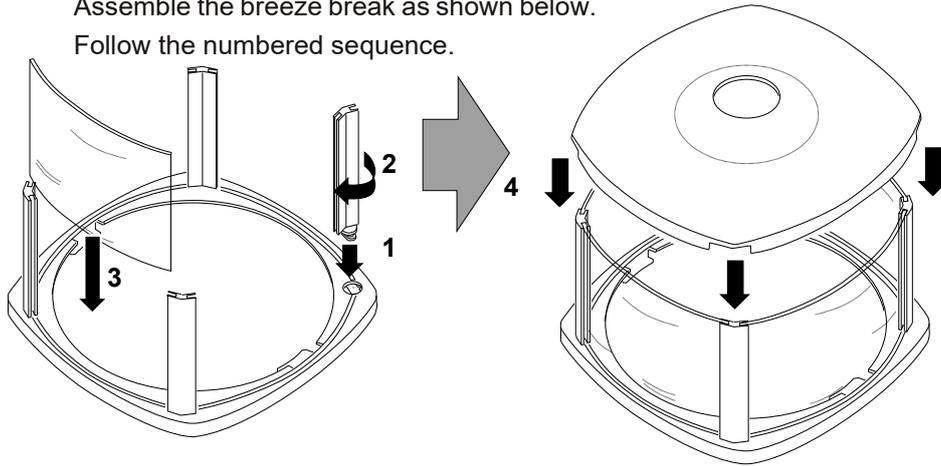
Pan support

Aluminum pan support
for FZ-5000*i* and FX-5000*i*

Display

Bubble spirit level

Keys

Leveling

Main unit

The FZ-*i*WP/FX-*i*WP series have a different configuration.

Weighing pan

Pan support

Pan support boss
Diaphragm
for waterproof
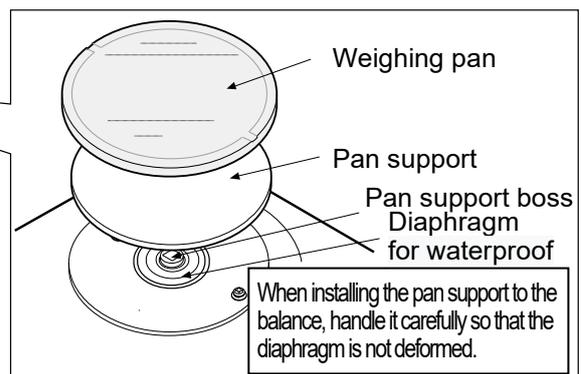
When installing the pan support to the balance, handle it carefully so that the diaphragm is not deformed.

## Main unit rear side

AC adapter jack

RS-232C serial interface

Serial number

AC adapter plug

Grounding terminal

The AC adapter plug is protected against dust and may be difficult to insert. When inserting the plug, turn the plug while pushing on it.
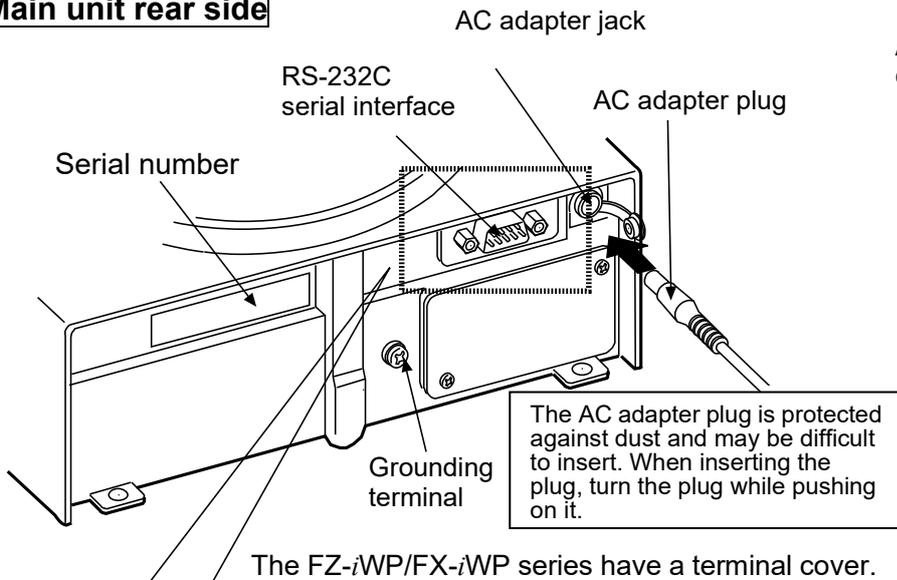
Affix the AC adapter ID label to the cord as shown in the figure below.

AC adapter ID label
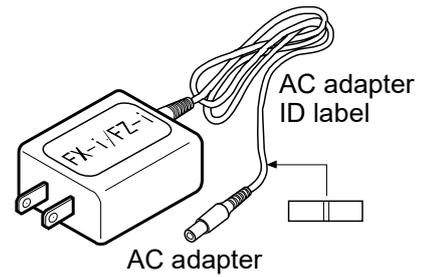
AC adapter

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

The FZ-iWP/FX-iWP series have a terminal cover.

RS-232C serial interface

Serial number

AC adapter jack

AC adapter plug

Grounding terminal

Terminal cover

Main unit cover

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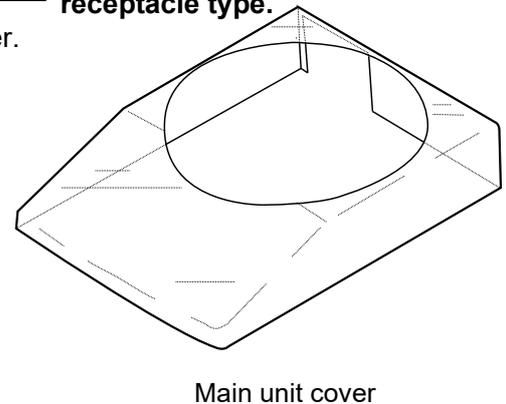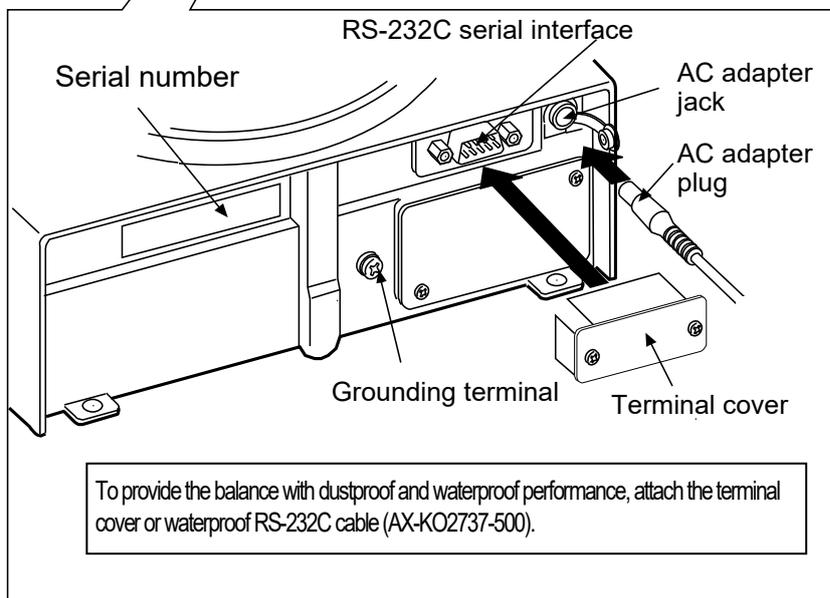
**CAUTION**

□ **Use the AC adapter specified for the balance.**

□ **Do not connect the provided AC adapter to equipment that it is not compatible with.**

□ **Using the wrong AC adapter with the balance may prevent the balance and its peripheral equipment from operating properly.**

## 2.2. Assembling

Install the balance as follows:

1. Place the balance on a solid weighing table. Refer to "2. PRODUCT CONFIGURATION (PART NAMES), INSTLLATION AND PRECAUTIONS" to assemble the weighing pan and breeze break.

2. Level the balance by turning the leveling feet so that the bubble in the bubble spirit level is inside the red circle.

3. Connect the AC adapter plug to the AC adapter jack on the rear side of the balance and connect the plug on other end of the cord to an outlet. * If the AC adapter plug is difficult to insert, insert the plug while twisting it.
   **Note**
   **Confirm that the AC adapter type is correct for the local voltage and power receptacle type.**

4. Connect the balance to the power for at least 30 minutes with nothing on the weighing pan before use.

# 3. PRECAUTIONS

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

## 3.1. Before Use

● Install the balance in an environment where the temperature and humidity are not excessive. The best operating temperature is about 20°C / 68°F at about 50% relative humidity.
● Install the balance where it is not exposed to direct sunlight and it is not affected by heaters or air conditioners.
● Install the balance where it is free of dust.
● Install the balance away from equipment which produces magnetic fields.
● Install the balance in a stable place avoiding vibration and shock. Corners of rooms on the first floor are best, as they are less prone to vibration.
● The weighing table should be solid and free from vibration, drafts and as level as possible.
● Level the balance by turning the leveling feet so that the bubble in the bubble spirit level is inside the red circle.



Make sure that the bubble is in the center of 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 counterclockwise direction at the same time.

● Ensure a stable power source when using the AC adapter.
● Plug in the AC adapter and warm up the balance for at least one hour.
● Calibrate the balance before use or after having moved it to another location.

**With the FZ-*i*WP/ FX- *i*WP series**

● The meaning of IP-65 is "No ingress of dust. Projected against water jets".
If a powerful water jet is used or the balance is immersed in water, it may cause a damage that is due to ingress of water.

● Confirm that "the plug is inserted firmly into the jack" and "the terminal is covered using the waterproof cover or the waterproof RS-232C cable (AX-KO2737-500)", when using the balance.

● If the terminal cover for the RS-232C is removed from the balance or the waterproof RS-232C cable (AX-KO2737-500) is not used for the balance, the balance is prevented from having the dustproof and waterproof performance.

**Caution: Do not install the balance where flammable or corrosive gas is present.**

# 3.2.    During Use

● Discharge static electricity from the material to be weighed (hereinafter referred to as the sample). When a sample could have a static charge, the weight data is influenced. Ground the balance and try the following:
  ■ Eliminate static electricity using the optional AD-1683 DC static eliminator.
  ■ Try to keep the ambient humidity above 45%RH.
  ■ Use a metal shield case for a charged sample.
  ■ Wipe charged plastic samples with a moistened cloth.

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

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

● Make each weighing gently and quickly to avoid errors caused by the evaporation of moisture from the sample or the absorption of moisture by the sample.

● Do not drop things upon the weighing pan, or place a sample on the pan that is beyond the balance weighing capacity. Place a sample in the center of the weighing pan.

● Do not use a sharp instrument such as a pencil to press the keys. Use your finger only.

● Press the RE-ZERO key before each weighing to eliminate possible errors.

● Calibrate the balance periodically so as to eliminate possible errors.

● Take into consideration the affect of air buoyancy on a sample when more accuracy is required.

● Keep the balance interior free of dust and foreign materials.
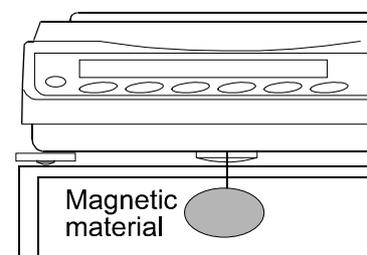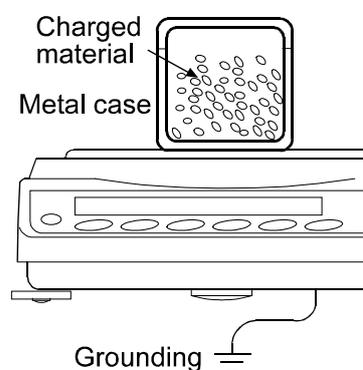
- With all models of FZ-*i*/FZ-*i*WP/FZ-GD series and the 120/200/300 of the FX- *i*/FX- *i* WP/FX-GD series (including 500 for the FX- *i* series), a breeze break is provided as a standard accessory. Since an anti-static treatment has been applied to the breeze break components, there are cases where 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 repeatability cannot be obtained properly, 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-1683 DC static eliminator or applying an anti-static spray is also effective.

**With the FX-*i*WP/ FZ-*i*WP series**

- The balance has a highly airtight case due to it having dustproof and waterproof performance. Therefore, there are cases when the values displayed with the balance become unstable due to minute indoor pressure fluctuations such as when opening or closing the room door. Try measuring after stabilizing the pressure fluctuations.

- If water droplets or powder remain on the diagram 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 diagram 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.

## 3.3.    After Use

- Do not apply excessive shock to the balance or allow it to be dropped.

- Do not disassemble the balance.

- Do not use organic solvents or chemically treated cloth to clean the balance. When cleaning other than the breeze break, wipe using a lint free soft cloth dampened with water and a mild detergent.

- An anti-static treatment has been applied to the breeze break components. Wipe them with dry and a 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.

- When cleaning the weighing pan, handle it carefully so that your fingers are not injured by the edges.

## 3.4.    Power Supply

- When the AC adapter is connected, the balance is in the standby mode if the standby indicator is on (refer to "4. DISPLAY SYMBOLS AND KEY OPERATION"). This is a normal state and does not harm the balance. For accurate weighing, warm up the balance for at least 30 minutes before use.

# 4. DISPLAY SYMBOLS AND KEY OPERATION

## Key operation

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

- "Press and release the key immediately" or "Press the key"
  = normal key operation during measurement

- "Press and hold the key" (for 2 seconds)
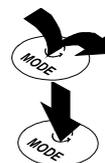
## Display symbols

- Number of statistical data
  (Statistical calculation mode)
- Displays the weight data relative to the
  weighing capacity, in percentage, in the
  weighing mode **(Capacity indicator)**

Response indicators

Animal mode indicator

Comparator indicators

Processing indicator

Stabilization indicator

Standby indicator

Units

Interval output mode
standby indicator

Weight data

Processing indicator

Blinking

Interal output mode
active indicator
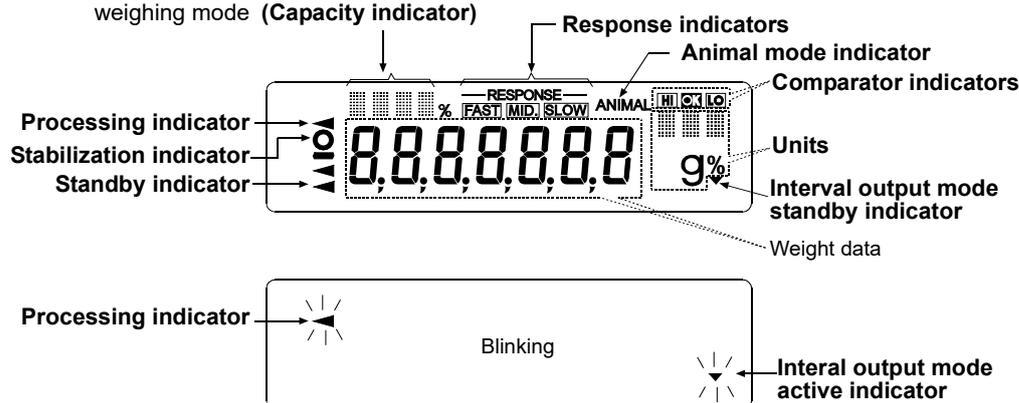
Each key, when pressed or when pressed and held, functions as follows:

| Key | When pressed | When pressed and held (for 2 seconds) |
|---|---|---|
| I/Ö ON:OFF | Turns the display on or off. The standby indicator is displayed when the display is turned off. The weighing mode is enabled when the display is turned on. This key is available anytime. Pressing the key during operation will interrupt the operation and turn the display off. | |
| 1/10d SAMPLE | In the weighing mode, turns the minimum weighing value on or off. In the counting or percent mode, enters the sample storing mode. | Enters the function table mode. Refer to "10. FUNCTION TABLE". |
| MODE | Switches the weighing units stored in the function table. Refer to "5. WEIGHING UNITS". | Enters the response adjustment mode. |
| ▼ CAL | Cancels the operation when performing settings. With the FZ-*i* / FZ-*i*WP / FZ-GD series, enters the calibration mode using the internal mass. (One-touch calibration) | Enters the calibration mode. |
| ○ PRINT | Outputs the weight data to a printer or personal computer using the RS-232C serial interface, depending on the function table settings. Confirms the operation when performing settings. | No function at the factory setting\n\nBy changing the function table: Outputs "Title block" and "End block" for GLP/GMP compliant report.(Refer to "11.2. GLP Report".) |
| →0← RE-ZERO | Sets the display to zero. | |

# 5. WEIGHING UNITS

## 5.1.    Units

With the FZ-*i* / FX-*i* / FZ-*i*WP / FX-*i*WP / FZ-GD / FX-GD series balance, the following weighing units and weighing modes are available:



Counting mode

Percent mode

Programmable-unit (No unit displayed. For details, refer to "13. PROGRAMMABLE-UNIT".)
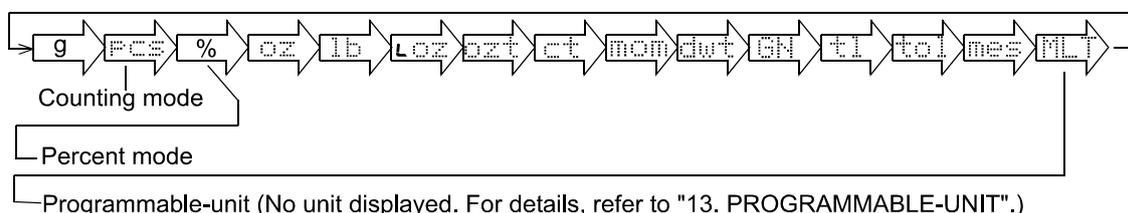
A unit or mode can be selected and stored in the function table as described below.
If a weighing mode (or unit of weight) has been turned off, that mode or unit will be missing in the sequence. Tael has four varieties, one of which can be selected and installed at the factory.

To select a unit or mode for weighing, press the MODE key.

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

| Name (unit, mode) | Abbrev. | Display | Function table (Storing mode) | Conversion factor 1 g = |
|---|---|---|---|---|
| Gram | g | g | g | 1 g |
| Counting mode | Pcs | PCS | PCS | —— |
| Percent mode | % | % | % | —— |
| Ounce (Avoir) | Oz | oz | oz | 28.349523125 g |
| Pound | Lb | lb | lb | 453.59237 g |
| Pound/Ounce | L OZ | L oz | LO | 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 |
| Messghal | Mes | mes | mes | 4.6875 g |
| Programmable-unit (Multi-unit) | Mlt | MLT | MLT | —— |

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

| Unit | Capacity | | | | Minimum display |
|---|---|---|---|---|---|
| | FZ-*i*/FZ-*i*WP/FZ-GD/FX-*i*/FX-*i*WP/FX-GD | | | FZ-*i*/FX-*i* | |
| | 120 | 200 | 300 | 500 | |
| 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 |
| Messghal | 26.0 | 46.9 | 68.2 | 110 | 0.0005 |

| Unit | Capacity | | | | Minimum display |
|---|---|---|---|---|---|
| | FZ-*i*/FZ-*i*WP/FZ-GD/FX-*i*/FX-*i*WP/FX-GD | | | FZ-*i*/FX-*i* | |
| | 1200 | 2000 | 3000 | 5000 | |
| 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 |
| Messghal | 260 | 469 | 682 | 1109 | 0.005 |

# 5.2. Storing Units

The units or modes can be selected and stored in the function table. The sequence of displaying the units or modes can be arranged in the function table so as to fit the frequency of use.

Select a unit or mode and arrange the sequence of display as follows:

1  Press and hold the SAMPLE key until $bASFnc$ of the function table is displayed.

2  Press the SAMPLE key several times to display $1Unit$.

3  Press the PRINT key to enter the unit selection mode.

4  Specify a unit or mode in the order to be displayed using the following keys.

   SAMPLE key          To sequentially display the units.

   RE-ZERO key         To specify a unit or mode. The stabilization indicator appears when the displayed unit or mode is specified.

5  Press the PRINT key to store the units or modes. The balance displays $End$ and then displays the next menu item of the function table.

6  Press the CAL key to exit the function table. Then the balance returns to the weighing mode with the unit specified first in step 4.
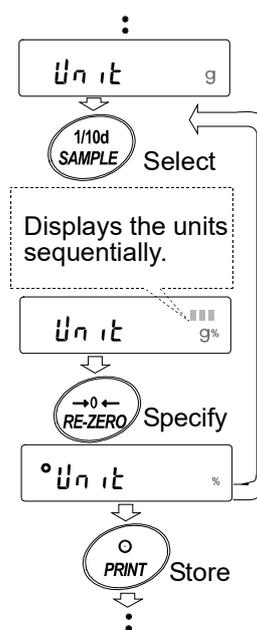


## Notes

**When the power is turned on, the scale displays the unit specified first in step 4.**

**In the weighing mode, to select a unit or mode for weighing, press the MODE key.**

# 6. WEIGHING

## 6.1.    Basic Operation (Gram Mode)

1   Place a container on the weighing pan, if necessary.
Press the RE-ZERO key to cancel the weight (tare). The balance displays 0.00 g. (The decimal point position depends on the balance model.)

2   Place a sample on the pan or in the container.

3   Wait for the stabilization indicator to turn on. Read the value.

While the stabilization indicator is on, pressing the PRINT key will output the weight value, using the RS-232C serial interface.

**Note**
**Peripheral equipment, that is sold separately , such as a printer or a personal computer is required.**

4   Remove the sample and container from the pan.

**Notes**
**To use other units, press the MODE key and select an appropriate unit.**
**Press the SAMPLE key to turn on or off the minimum weighing value.**

When the ON:OFF key is pressed with a container placed on the weighing pan, the balance displays 0.00 g and weighing is started,

Weighing pan

Container

0.00 g

Sample

126.87 g

Remove the sample

(Display off)

Weighing pan

Container

0.00 g
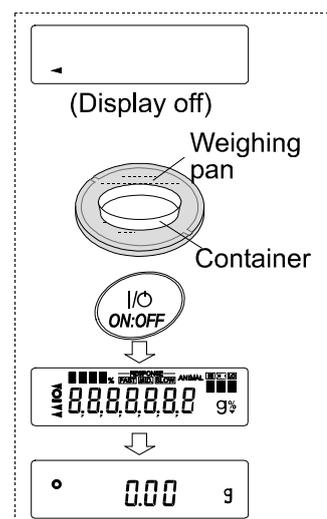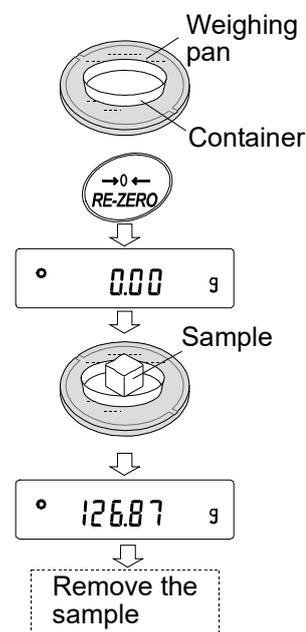
## 6.2.　FZ-GD / FX-GD Series Balances

The default setting of the unit of weight for the FZ-GD / FX-GD series balances is grams (g).

To use other units, refer to "5-2 Storing Units" on to store the units.

## 6.3.　Basic Operation (FZ-GD / FX-GD Series Balances)

1　Place a container on the weighing pan, if necessary.
Press the RE-ZERO key to cancel the weight (tare). The balance displays *0.000 g* (The decimal point position depends on the balance model.)

2　Place a sample on the pan or in the container.

3　Wait for the stabilization indicator to be displayed. Read the value.

While the stabilization indicator is on, pressing the PRINT key will output the weight value, using the RS-232C serial interface.

**Note**
**Peripheral equipment, that is sold separately , such as a printer or a personal computer is required.**

4　Remove the sample and container from the pan.
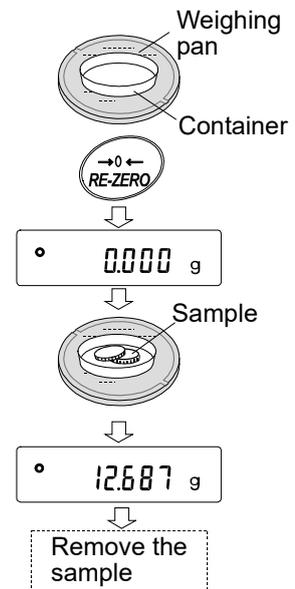
**Notes**
**When other units of weight are stored as described in "9-9 Storing Units", pressing the MODE key switches the displayed unit.**

**Press the SAMPLE key to turn on or off the minimum weighing value.**

When the ON:OFF key is pressed with a container placed on the weighing pan, the balance displays *0.000 g* and weighing is started,



Weighing pan
Container
RE-ZERO
0.000 g
Sample
12.687 g
Remove the sample



(Display off)
Weighing pan
Container
ON:OFF
0.000 g
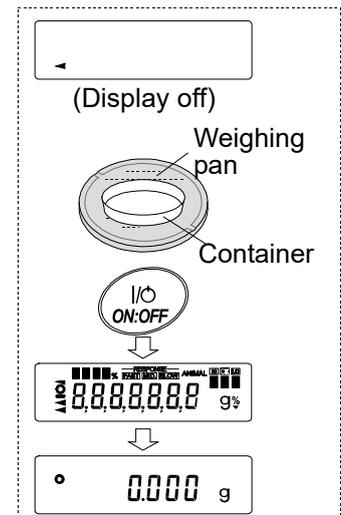
**With the zero point setting, tare and weighing range**

About the operation at when power is turned on

The balance will determine the reference zero point when the ON:OFF key is pressed to enter the weighing mode.

Depending on the load condition at that time, it will automatically judge whether to perform zero or tare 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.

About re-zero operation

By pressing the RE-ZERO key, the display can be changed to zero.

Re-zero with the RE-ZERO key will automatically determine whether zero or tare operation is performed.

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

About measurement range

For the balance, the range that can be weighed is determined by model.

The total amount (net amount + tare quantity) up to the maximum display of each model is displayed, and when the maximum display is exceeded, E is displayed to indicate that the weighing range is exceeded.

When in excess in negative, -E is displayed.

| Model | Power on zero range | Zero range | -E display range |
|---|---|---|---|
| FZ-120 *i* , FX-120 *i*<br>FZ-120 *i* WP, FX-120 *i* WP<br>FZ-120GD, FX-120GD | Approx.±60g | Approx.±2g | Approx.-60g or less |
| FZ-200 *i*, FX-200 *i*<br>FZ-200 *i* WP, FX-200 *i* WP<br>FZ-200GD, FX-200GD | | Approx.±4g | |
| FZ-300 *i*, FX-300 *i*<br>FZ-300 *i* WP, FX-300 *i* WP<br>FZ-300GD, FX-300GD | | Approx.±6g | |
| FZ-500 *i*, FX-500 *i* | | Approx.±10g | |
| FZ-1200 *i*, FX-1200 *i*<br>FZ-1200 *i* WP, FX-1200 *i* WP<br>FZ-1200GD, FX-1200GD | Approx.±600g | Approx.±20g | Approx.-600g or less |
| FZ-2000 *i*, FX-2000 *i*<br>FZ-2000 *i* WP, FX-2000 *i* WP<br>FZ-2000GD, FX-2000GD | | Approx.±40g | |
| FZ-3000 *i*, FX-3000 *i*<br>FZ-3000 *i* WP, FX-3000 *i* WP<br>FZ-3000GD, FX-3000GD | | Approx.±60g | |
| FZ-5000 *i*, FX-5000 *i* | | Approx.±100g | |

# 6.4.    Counting Mode (PCS)

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

**Notes**

**For counting, use samples with a unit mass of at least ten or more times the minimum weighing value of the balance,.**

**If the sample unit mass variable is too large, it may cause a counting error.**

**To improve the counting performance, use the ACAI function frequently or divide the samples into several groups and count each group.**

### Selecting the counting mode

1   Press the MODE key to select 1PCS (counting mode).

### Storing a sample unit mass

2   Press the SAMPLE key to enter the sample unit mass storing mode.
    Even in the storing mode, pressing the MODE key will switch to the next mode.

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

### Note

**A greater number of samples will yield more accurate counting result.**

4   Place a container on the weighing pan, if necessary. Press the RE-ZERO key to cancel the weight (tare). The number specified in step 3 appears.
    e.g.: 25  0 is displayed if 25 is selected in step 3.

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

6   Wait for the stabilization indicator to turn on. Press the PRINT key to calculate and store the unit mass. The balance displays 25 PCS (counting mode) and is set to count samples with this unit mass.

    To improve the accuracy of the unit mass, go to step 8.



Weighing pan
Container

Sample (25 pieces)

Place sample to be counted

The counting result
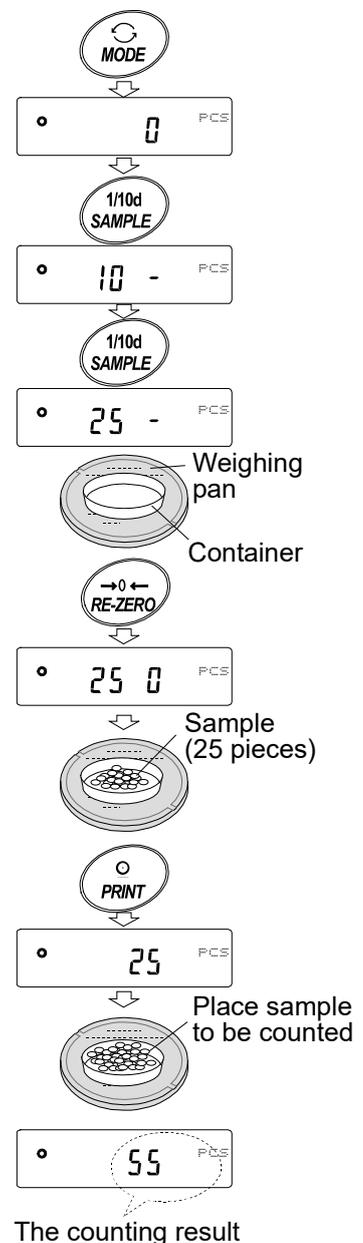
**Notes**
**If the balance judges that the mass of the samples is too light and is not adequate to be used as the unit mass, it displays $\boxed{Lo}$. In that case, store the mass by some quantity. For example, when the model with the minimum weighing value of 0.01 g is used and 10 pieces of samples weigh 0.05 g. Store 100 pieces of samples as 10 and multiply the weighing result by 10.**

**If the balance judges that the mass of the samples is too light to acquire accurate weighing, it displays an error requiring the addition of more samples to the specified number. For example, $\boxed{150-\ PCS}$ appears to require 25 more samples. Add 25 samples and press the $\boxed{PRINT}$ key. When the unit mass is stored correctly, the balance proceeds to the counting mode.**

**For a more accurate counting operation, use samples with a unit mass of at least ten or more times the minimum weighing value of the balance. For example, when a balance with a minimum weighing value of 0.01 g is used, the recommended sample unit mass is 0.1 g or more.**

**The sample unit mass stored, even if the AC adapter is removed, is maintained in non-volatile memory.**

## Counting operation

7   Place the samples to be counted on the pan.
While the stabilization indicator is on, pressing the $\boxed{PRINT}$ key will output the weight value (number of objects), using the RS-232C serial interface.

**Note**
**Peripheral equipment, that is sold separately , such as a printer or a personal computer is required.**

## Counting mode using the ACAI function

The ACAI is a function that improves the accuracy of the unit mass automatically by increasing the number of samples and averaging the unit mass variable to minimize the weighing error, as the counting process proceeds.

Processing indicator

50    PCS
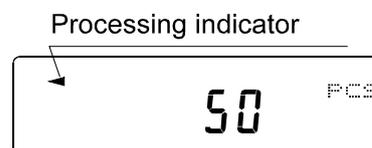
8   If a few more samples are added, the processing indicator turns on. To prevent an error, add three or more. The processing indicator does not turn on if overloaded. Try to add the same number of samples as displayed.

9   The balance re-calculates the unit mass while the processing indicator is blinking. Do not touch the balance or samples on the pan until the processing indicator turns off.

10  Counting accuracy is improved when the processing indicator turns off.

Each time the above operation is performed, a more accurate unit mass will be obtained. There is no definite upper limit of ACAI range for the number of samples exceeding 100. Try to add the same number of samples as displayed.

11  Remove all the samples used in ACAI and proceed with the counting operation using the improved unit mass.

# 6.5.　　Percent Mode (%)

This is the mode to display the weight value in percentage compared to a 100% reference mass and is used for target weighing or checking the sample variable.

## Selecting the percent mode

1　Press the MODE key to select % (percent mode).

## Storing the 100% reference mass

2　Press the SAMPLE key to enter the 100% reference mass storing mode.

Even in the storing mode, pressing the MODE key will switch to the next mode.

3　Place a container on the weighing pan, if necessary. Press the RE-ZERO key to cancel the weight (tare). The balance displays ⌊ 100  0  % ⌋.

4　Place the sample to be set as the 100% reference mass on the pan or in the container.

5　Press the PRINT key to store the reference mass. The balance displays ⌊ 100.00  % ⌋. (The decimal point position depends on the reference value.)

## Notes

**If the balance judges that the mass of the sample is too light to be used as a reference, it displays ⌊ Lo ⌋. Do not use the sample.**

**The reference mass stored, even if the AC adapter is removed, is maintained in non-volatile memory**

6　Remove the sample.

## Reading the percentage

7　Place a sample to be compared to the reference mass on the pan. The displayed percentage is based on the 100% reference mass.
While the stabilization indicator is on, pressing the PRINT key will output the weight value, using the RS-232C serial interface.

## Note

**Peripheral equipment, that is sold separately , such as a printer or a personal computer is required.**

MODE

°　　0.00　　%

1/10d
SAMPLE

°　　100  -　　%

Weighing pan

Container

→0←
RE-ZERO

°　　100  0　　%

Sample (100%)

○
PRINT

°　　100.00　　%

Place sample to be weighed

°　　42.31　　%

Weighing result compared to 100% reference mass
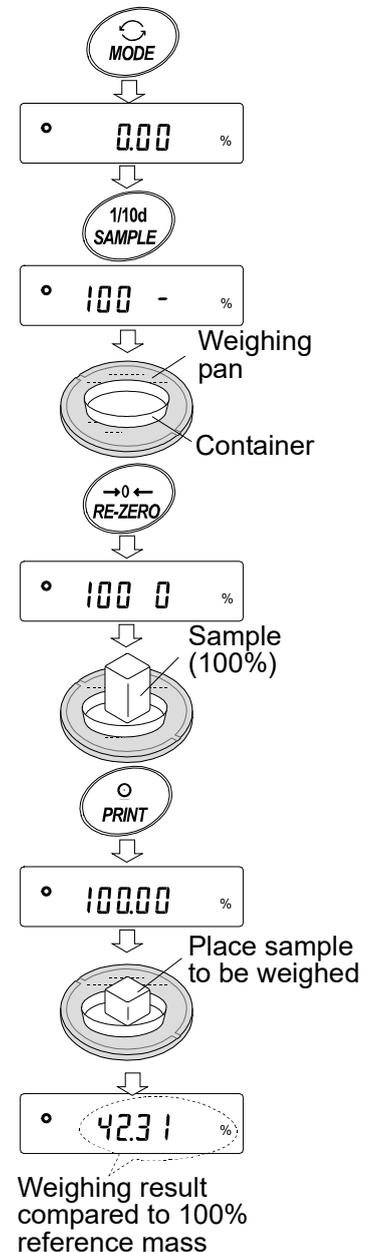
## 6.6. Statistical Calculation Mode

The statistical calculation mode statistically calculates the weight data, and displays or outputs the results. To use the statistical calculation mode, set the "Application function ($APF$)" parameter of "Application ($AP\ Fnc$)" in the function table to "$2$", as described below.

Statistical items available are number of data, sum, maximum, minimum, range (maximum-minimum), average, standard deviation and coefficient of variation. What statistical items to output can be selected from the four modes in the function table.

- The wrong data input can be canceled by the key operation, if immediately after the input.
- Turning the balance off will delete the statistical data. (The ON:OFF key will not initialize the balance.)
- The standard deviation and coefficient of variation are obtained by the equation below:

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

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

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

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

### 6.6.1. Getting Started

**Switching to the Statistical Function Mode (Changing The Function Table)**

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

Press and hold 1/10d SAMPLE for 2 seconds

$bASFnc$

2 Press the SAMPLE key several times to display $1AP\ Fnc$.

Press several times 1/10d SAMPLE

$AP\ Fnc$

3 Press the PRINT key to display $APF\ 0$.

PRINT

Norm $°APF\ 0$

4 Press the RE-ZERO key several times to display $APF\ 2$.

Press several times →0← RE-ZERO

Stat $APF\ 2$

To select statistical items to output, go to step 5.
To store the statistical function mode setting, go to step 7.
To disable the statistical calculation mode, press the RE-ZERO key to select $APF\ 0$.

To store the setting, go to step 7.   To select statistical items to output, go to step 5.

23
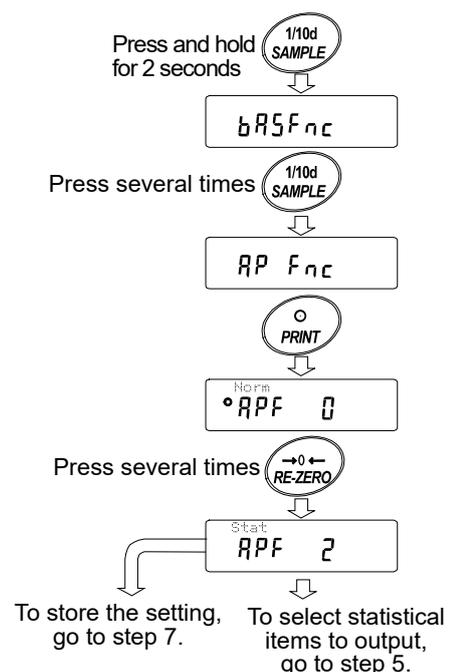
## Selecting the statistical items to output

5  Press the SAMPLE key to display ⌈ 5tAF 0 ⌉.

6  Press the RE-ZERO key to select the output items.
   In the example, ⌈ 5tAF 1 ⌉ is selected to output the number of
   data, sum, maximum, minimum, range (maximum-minimum)
   and average.

| Parameter | Description |
|---|---|
| ▪ 0 | Number of data, sum |
| 1 | Number of data, sum<br>Maximum, minimum, range (maximum – minimum), average |
| 2 | Number of data, sum<br>Maximum, minimum, range (maximum – minimum), average,<br>Standard deviation, coefficient of variation |
| 3 | Number of data, sum<br>Maximum, minimum, range (maximum – minimum), average,<br>Standard deviation, coefficient of variation<br>Relative error of maximum value, relative error of minimum value |
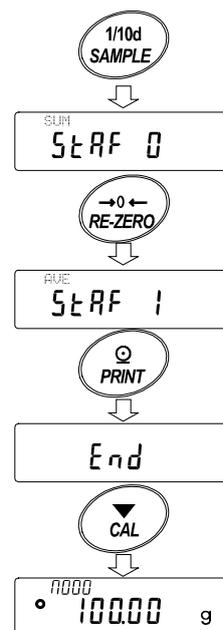
7  Press the PRINT key to store the setting.

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

## Selecting the unit

9  Press the MODE key to select the unit to be used for
   the statistical calculation mode. In the example shown
   at the right, gram (g) is selected.
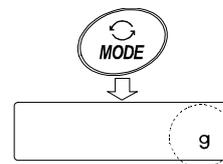
**Notes**

**Selecting the unit using the MODE key is not available after the
data is entered. In this case, clear the data as described on page
27 and select the unit using the MODE key.**

**When the unit used for the statistical calculation mode is to be enabled upon power-on,
select the unit in "Unit (Un it)" of the function table beforehand.**

## 6.6.2. Using The Statistical Calculation Mode

**Entering data for statistical calculation**

Use the following keys to operate the statistical calculation mode.

MODE key ················• When the data is entered, moves between the displaying items (weighing mode, statistical results and data operation) each time the key is pressed.
• When no data has been entered, selects the unit.

SAMPLE key..............Turns the minimum weighing value on or off, in the weighing mode.

RE-ZERO key··········Sets the display to zero in the weighing mode.

PRINT key ···············• Outputs the data number and the weight data and includes the weight data to statistical calculation in the weighing mode. (Output is not in the data format specified in the function table because of the data number added.)
• Outputs the statistical results while the statistical results are displayed. (Output is not in the data format specified in the function table.)

CAL key ···················Returns to the weighing mode.

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

2   Place the sample on the weighing pan and wait for the stabilization indicator to turn on.

3   Press the PRINT key to add the data displayed to statistical calculation. The number of data on the upper left of the display increases by 1.

4   Repeat steps 1 to 3 for each weighing.
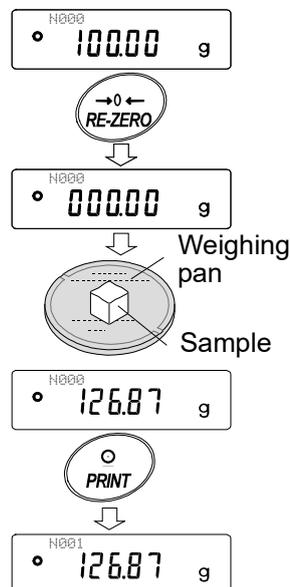
## Outputting the statistical results

5   Each time the MODE key is pressed, the display changes: the results as selected in "Statistical function mode output items (5ERF)", [LLEAr] and [ERnLEL].

## Notes

**When the number of data is 1, the coefficient of variation is displayed as - - - - - - - .**

**When the average is 0, the coefficient of variation / relative error is displayed as - - - - - - - .**

**Statistical items are indicated on the upper left of the display using the following symbols.**

| Symbol | Statistical item |
|--------|------------------|
| SUM | Sum |
| MAX | Maximum |
| MIN | Minimum |
| R | Range (Maximum – minimum) |
| AVE | Average |
| SD | Standard deviation |
| CV | Coefficient of variation |
| MAX% | Relative error of maximum value |
| MIN% | Relative error of minimum value |
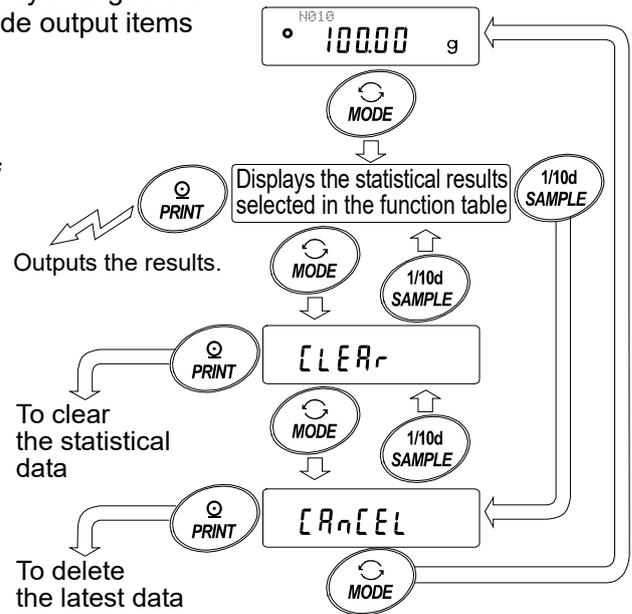
6   While the results are displayed, press the PRINT key to output the results.

N010
100.00   g

MODE

PRINT   Outputs the results.

Displays the statistical results selected in the function table

1/10d SAMPLE

MODE          1/10d SAMPLE

PRINT         [LLEAr]

To clear the statistical data

MODE          1/10d SAMPLE

PRINT         [ERnLEL]

To delete the latest data

MODE

Output example

Function table (5ERF) parameter

| N | 10 | |
|---|----|---|
| SUM | | |
| | +100.00 | g |
| MAX | +10.50 | g |
| MIN | +9.50 | g |
| R | +1.00 | g |
| AVE | +10.00 | g |
| SD | +0.280 | g |
| CV | +2.80 | % |
| MAX% | +5.00 | % |
| MIN% | +5.00 | % |

0
1   2
3

## Deleting the latest data

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

1   In the weighing mode, press the MODE key, and then press the SAMPLE key to display 1CAnCEL.

2   Press the PRINT key to display CAn no.

3   Press the RE-ZERO key to display CAn Go.

4   Press the PRINT key to delete the latest data and exclude it from statistical calculation.
The number of data decreases by 1 when the balance returns to the weighing mode.

N010
100.00   g

⟳ MODE

SUM
1000.00   g

1/10d SAMPLE

CAnCEL

PRINT

CAn no

→0← RE-ZERO

CAn GO

PRINT

End

N009
100.00   g
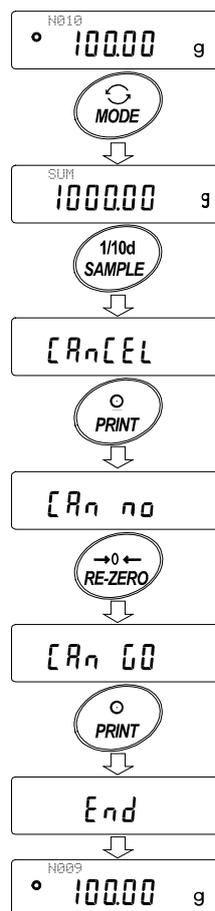

## Clearing the statistical data

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

1   In the weighing mode, press the MODE key, and then press the SAMPLE key several times to display CLEAr.

2   Press the PRINT key to display Clr no.

3   Press the RE-ZERO key to display Clr Go.

4   Press the PRINT key to delete the statistical data.
The number of data becomes 0 (zero) when the balance returns to the weighing mode.

N010
100.00   g

⟳ MODE

SUM
1000.00   g

Press several times   1/10d SAMPLE

CLEAr

PRINT

Clr no

→0← RE-ZERO

Clr GO

PRINT

End

N000
100.00   g

27
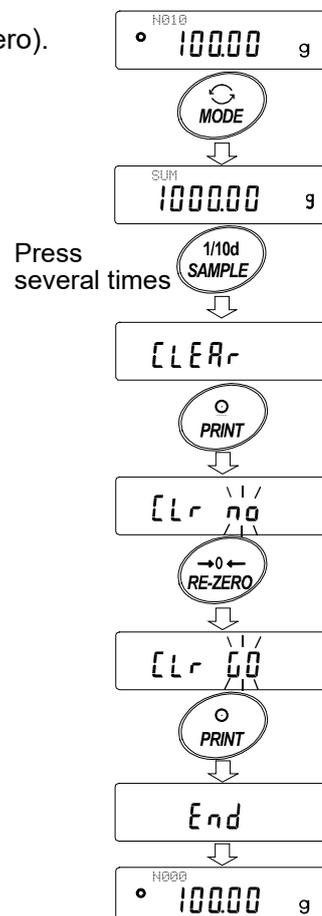
# 6.7. Statistical Calculation Mode (Example of Use)

Here, as an example of use of the statistical calculation mode, mixing of the multiple formulae such as medicine is described. The mixing process is recorded using the balance and the printer.
In the example, the FX-3000*i* and the AD-8127 (dump print mode) are connected using the RS-232C serial interface.

## 6.7.1. Getting Started

### Changing the function table

Changes : ●To enable the statistical calculation mode
●To enable "Zero after output"

### Enabling the statistical calculation mode

1 Enter the function table menu.

Press and hold the SAMPLE key until $bAS Fnc$ of the function table is displayed, then release the key.

2 Select the application function.

Press the SAMPLE key several times to display $IAP Fnc$. Then, press the PRINT key to display $I°APF \ 0$.

3 Change the application function parameter to "$2$".

Press the RE-ZERO key to display $APF \ 2$. Press the PRINT key to confirm the change. After $End$, $1LocFnc$ is displayed.

### Enabling "Zero after output"

4 Select "Zero after output".

Press the SAMPLE key several times to display $Idout$. Then, press the PRINT key to display $°Prt \ 0$, and press the SAMPLE key several times to display $I°Ar-d \ 0$.

5 Enable "Zero after output".

Press the RE-ZERO key to display $Ar-d \ 1$. Then, press the PRINT key to confirm the change. After $1End$, $S \ iF$ is displayed.

### Returning to the weighing mode

6 Press the CAL key to return to the weighing mode.

Press and hold (for 2 seconds) **1/10d SAMPLE**
↓
$bASFnc$

Press several times **1/10d SAMPLE**
↓
$AP \ Fnc$

**PRINT**
↓
Norm $°APF \ 0$

**RE-ZERO**
↓
Stat $APF \ 2$

**PRINT**
↓
$End$

$LocFnc$

Press several times **1/10d SAMPLE**
↓
$dout$

**PRINT**
↓
key $°Prt \ 0$

Press several times **1/10d SAMPLE**
↓
off $°Ar-d \ 0$

**RE-ZERO**
↓
on $Ar-d \ 1$

**PRINT**
↓
$End$

$S \ iF$

**CAL**
↓
Return to the weighing mode
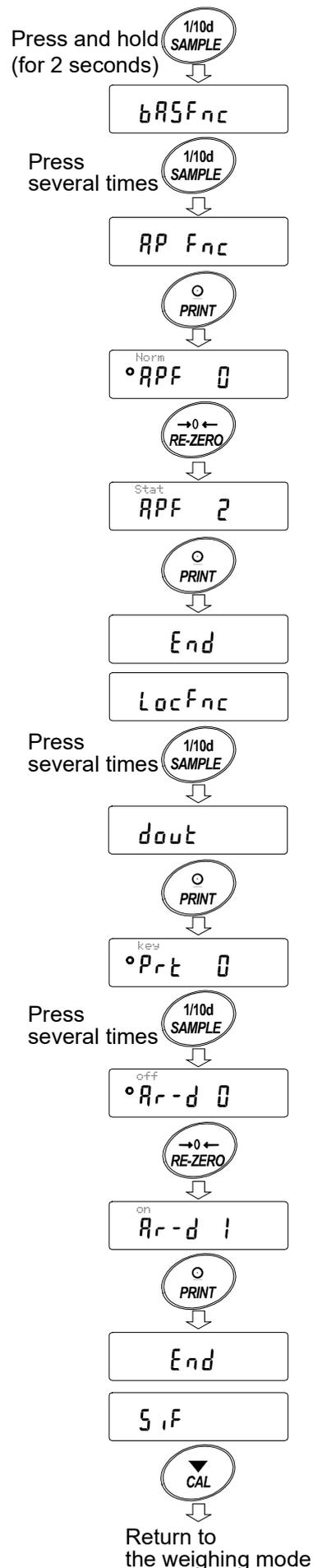
## 6.7.2. Using The Statistical Calculation Mode

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

2 Place a container on the weighing pan.
Press the PRINT key to cancel the weight (tare). The balance displays 0.00 g. (Storing the tare value)
The tare value data is output when the peripheral output equipment is connected.

3 Weigh formula 1 and press the PRINT key. The balance displays 0.00 g. (Storing the weight value of formula 1)
The weight value data is output when the peripheral output equipment is connected.

4 Weigh formula 2 and press the PRINT key. The balance displays 0.00 g. (Storing the weight value of formula 2)
The weight value data is output when the peripheral output equipment is connected.

5 When there are some more formulae to be added, repeat step 4.

6 After mixing is complete, press the MODE key to display the statistical results.

7 Press the PRINT key to output the number of data saved including the tare value and the total weight.

Output example

```
No.   1
ST,+00005.63   g  ------- Tare value
No.   2
ST,+00001.99   g  ------- Formula 1
No.   3
ST,+00007.78   g  ------- Formula 2

N       3
SUM
        +15.40   g  ------- Total weight
```
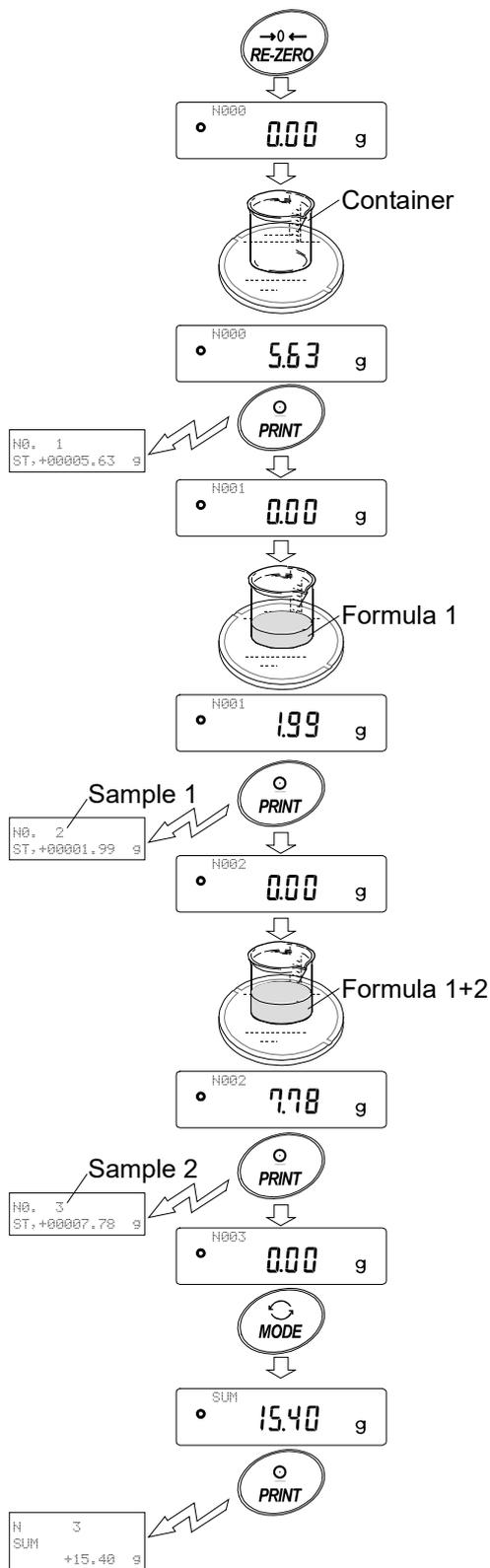
# 7. RESPONSE ADJUSTMENT

This function stabilizes the weight value, reducing the influence on weighing that is caused by drafts and vibration at the place where the balance is installed.

The function has three stages as follows and can be changed by simple key operation.

| Indicator | Description |
|---|---|
| FAST | Fast response, but prone to drafts and vibration. Good for target weighing. |
| MID. | |
| SLOW | Slow response, but strong against drafts and vibration Good for weighing which requires a stable display. |

Response indicators

## Operation

1 Press and hold the MODE key until RESPONSE is displayed. And then, release the key.

2 Press the MODE key to select a rate of the response adjustment. Either FAST, MID. or SLOW can be selected.

3 After a few seconds of inactivity, or when the PRINT key is pressed, the balance displays eEnd. Then, it returns to the weighing mode and displays the updated response indicator. The response indicator remains displayed for a while.
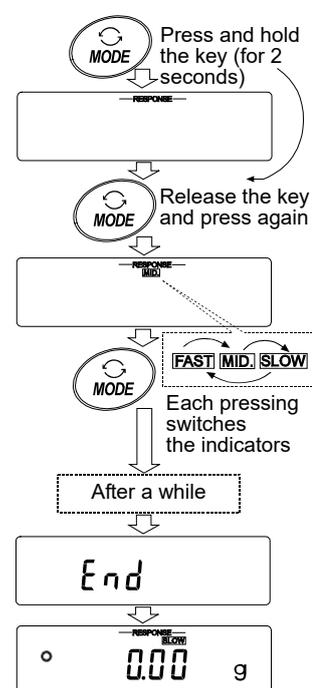
## Note
**Setting the response rate automatically changes the "Condition (Cond)" and "Display refresh rate (SPd)" parameters of "Environment, Display (bASFnc)" in the function table, as shown below:**

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

**When the balance is to be used with other setting combinations, set each parameter in the function table.**

Press and hold the key (for 2 seconds)

Release the key and press again

FAST MID. SLOW

Each pressing switches the indicators

After a while

End

# 8. CALIBRATION

## 8.1.   Calibration Mode

The balance has the following modes.
- Calibration using the internal mass (One-touch calibration, only for the FZ-*i* / FZ-*i*WP / FZ-GD series)
- Calibration using an external weight
- Calibration test using an external weight (Calibration test does not perform calibration.)

### Terms
The following terms are defined as follows:

External weight   =   A weight that you have. Referred to as a calibration weight when used for calibration.
Calibration weight =   A weight used for calibration
Target weight     =   An external weight used for calibration test

### Caution
- Calibration adjusts the balance for accurate weighing.
  Besides periodic calibration and before each use, perform calibration when:
  • The balance is installed for the first time.
  • The balance has been moved.
  • The ambient environment has changed.
- Do not allow vibration or drafts to affect the balance during calibration.
- To output the GLP / GMP compliant using the RS-232C serial interface, set "GLP output ( $\mathit{info}$ )" of "Data output ( $\mathit{dout}$ )". For details, refer to "10. FUNCTION TABLE".
- Calibration test is available only when "GLP output ( $\mathit{info}$ )" of "Data output ( $\mathit{dout}$ )" is set to " $\mathit{1}$ " or " $\mathit{2}$ ".
- When calibrating, use the accessory breeze break. (All models of the FZ-*i* series, FZ-*i* WP series and FZ-GD series, and the 120/200/300 of the FX-*i* series, FX-*i* WP series and FX-GD series (including the 500 for the the FX-*i* series))

### Caution on using an external weight
- The accuracy of an external weight will influence the accuracy of weighing. Select an appropriate weight as listed below:

| Model | | | | Usable calibration weight (your weight) | Adjustable range |
|---|---|---|---|---|---|
| FZ-120 *i* | FX-120 *i* | FZ-120 *i* WP | FX-120 *i* WP | **100g**, 50g | |
| FZ-200 *i* | FX-200 *i* | FZ-200 *i* WP | FX-200 *i* WP | **200g**, 100g,  50g *1 | -0.050g to +0.050g |
| FZ-300 *i* | FX-300 *i* | FZ-300 *i* WP | FX-300 *i* WP | 300g, **200g**, 100g,  50 *1 | |
| FZ-500 *i* | FX-500 *i* | | | **500g**, 400g, 300g, 200g 100g, 50g | |
| FZ-1200 *i* | FX-1200 *i* | FZ-1200 *i* WP | FX-1200 *i* WP | **1000g**, 500g | |
| FZ-2000 *i* | FX-2000 *i* | FZ-2000 *i* WP | FX-2000 *i* WP | **2000g**, 1000g,  500g *1 | -0.50g to +0.50g |
| FZ-3000 *i* | FX-3000 *i* | FZ-3000 *i* WP | FX-3000 *i* WP | 3000g, **2000g**, 1000g, 500g *1 | |
| FZ-5000 *i* | FX-5000 *i* | | | **5000g**, 4000g, 3000g, 2000g, 1000g 500g | |

The calibration weight in bold type: factory setting
The calibration weight value can be adjusted within the range above.

*1  Can be selected with balance software version 3.10 or later.

**Display**

```
  ◄
```

● This indicator means "the balance is measuring calibration data". Do not allow vibration or drafts to affect the balance while this indicator is displayed.

# 8.2.　Calibration Using the Internal mass
## (One-Touch Calibration, only for FZ-*i* /FZ-*i* WP/FZ-GD series)

This function calibrates the balance using the internal mass. The only operation required is to press the CAL key. (The FX-*i*/FX-*i*WP/FX-GD series do not have the one-touch calibration function.)

**Note**
**Level the balance by adjusting the leveling feet and confirm that the bubble is in the center of the spirit level.**
**Poor level adjustment may cause a calibration error while using the internal mass.**

**Operation**

1　Connect the AC adapter and warm up the balance for at least 30 minutes with nothing on the weighing pan.

2　Place the accessory breeze break on the balance and press the CAL key.

3　The balance displays $\boxed{CAL\ in}$ and performs calibration using the internal mass. Do not allow vibration or drafts to affect the balance.

4　The balance displays $\boxed{End}$ after calibration. If the "GLP output ( $info$ )" parameter of the function table is set to " $1$ ", " $2$ " or " $3$ ", the balance displays $\boxed{GLP}$ and outputs "Calibration Report" using the RS-232C interface or stores the data in memory. For details on the calibration report format, refer to "11.2. GLP Report".

5　The balance will automatically return to the weighing mode after calibration.

**About the internal mass**

The FZ-*i*/FZ-*i*WP/FZ-GD series can readjust the internal weight value using an external weight (your weight) as reference value.

The mass of the internal mass may change due to corrosion or other damage caused by the operating environment, or due to aging. Check the internal mass periodically. Correct the internal mass value as necessary. For details, refer to "8.5. Correcting the internal mass value: 1" and "8-4 Correcting the internal mass value: 2".

To maintain the weighing accuracy, perform the internal mass value correction periodically.

## 8.3.    Calibration Using an External Weight

This function calibrates the balance using an external weight.

**Operation**

1  Connect the AC adapter and warm up the balance for at least 30 minutes with nothing on the pan.

2  Press and hold the CAL key until ⌈CALout⌉ is displayed, and then release the key.

3  The balance displays ⌈CAL  0⌉.

   ● If you want to change the calibration weight (a list of usable weights is shown on page 31), press the SAMPLE key and go to step 4.

   ● If you use the calibration weight value stored in the balance, go to step 5.

4  Specify the calibration weight value as follows:

SAMPLE key         To switch the display condition to: "All of weight selection mode) or "The last two digits blinking" (value adjustment mode).

RE-ZERO key (To increase the value)
MODE key (To decrease the value)
                   To select the calibration weight or adjust the value.

PRINT key          To store the new weight value. Even if the AC adapter is removed, the data is maintained in non-volatile memory.

CAL key            To cancel the operation and return to ⌈CAL  0⌉.
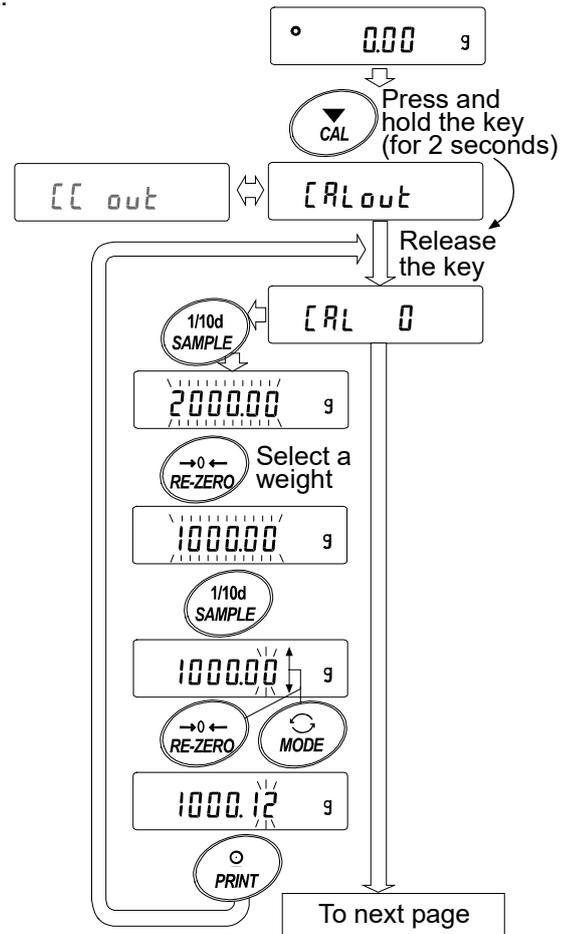
e.g. Calibration weight value 1000.12 g

To next page

5   Confirm that there is nothing  on the pan and press the PRINT key. The balance measures the zero point. Do not allow vibration or drafts to affect the balance.

The balance displays the calibration weight value.

6   Place the displayed calibration weight on the pan and press the PRINT key. The balance measures the calibration weight. Do not allow vibration or drafts to affect the balance.

7   The balance displays $End$ . Remove the weight from the pan.

8   When the GLP output is set, the balance displays $GLP$ and outputs "Calibration Report".

9   The balance will automatically return to the weighing mode.

10   Place the calibration weight on the pan and confirm that the value displayed is within ±2 digits of the specified value. If it is not within the range, check the ambient conditions such as drafts and vibration, also check the weighing pan. Then, repeat steps 1 to 9.

From previous page

PRINT

⌐CAL   0

1000

Calibration weight

PRINT

◄   1000

End

GLP output

⌐GLP

End

0.00   g
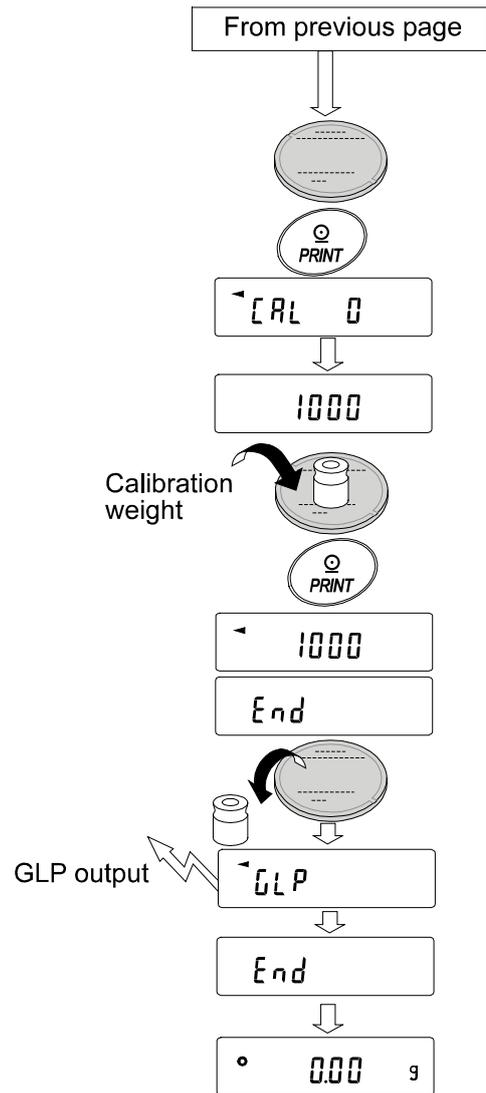
# 8.4.    Calibration Test Using an External Weight

This function tests the balance weighing accuracy using an external weight and outputs the result. This is available only when the "GLP output ( $\mathit{info}$ )" parameter is set to " $\mathit{1}$ ", " $\mathit{2}$ "or " $\mathit{3}$ ". (Calibration test does not perform calibration.)

## Operation

1  Connect the AC adapter and warm up the balance for at least 30 minutes with nothing on the pan.

2  Press and hold the CAL key until $\boxed{\mathit{CCout}}$ is displayed, and then release the key.

3  The balance displays $\boxed{\mathit{CC \quad 0}}$ .
   ● If you want to change the target weight (a list of usable weights is shown on page 31), press the SAMPLE key and go to step 4.
   ● If you use the target weight value stored in the balance, go to step 5.

4  Specify the target weight value as follows:

   SAMPLE key    To switch the display condition to: "All of the segments blinking" (target weight selection mode) or "The last two digits blinking" (value adjustment mode).

   RE-ZERO key (To increase the value)
   MODE key (To decrease the value)
                 To select the target weight or adjust the value.

   PRINT key    To store the new weight value. Even if the AC adapter is removed, the data is maintained in non-volatile memory.

   CAL key      To cancel the operation and return to $\boxed{\mathit{CC \quad 0}}$ .



e.g. Target weight value
1000.12 g

To next page
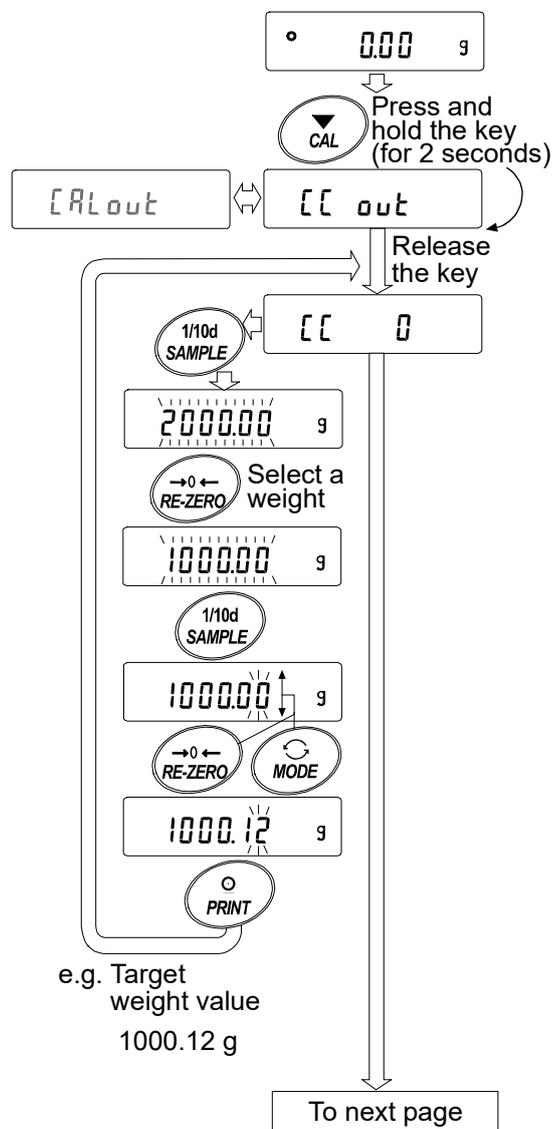
5  Confirm that there is nothing on the pan and press the PRINT key. The balance measures the zero point and displays the measured value. Do not allow vibration or drafts to affect the balance.
The balance displays the target weight value.

6  Place the displayed target weight on the pan and press the PRINT key. The balance measures the target weight and displays the measured value. Do not allow vibration or drafts to affect the balance.

Target weight

7  The balance displays End. Remove the weight from the pan.

8  When the GLP output is set, the balance displays GLP1 and outputs "Calibration Test Report".

9  The balance will automatically return to the weighing mode.

GLP output

```
PRINT

CC      0

0.00   g

1000

PRINT

1000

1000.12  g

End

GLP

End

0.00   g
```
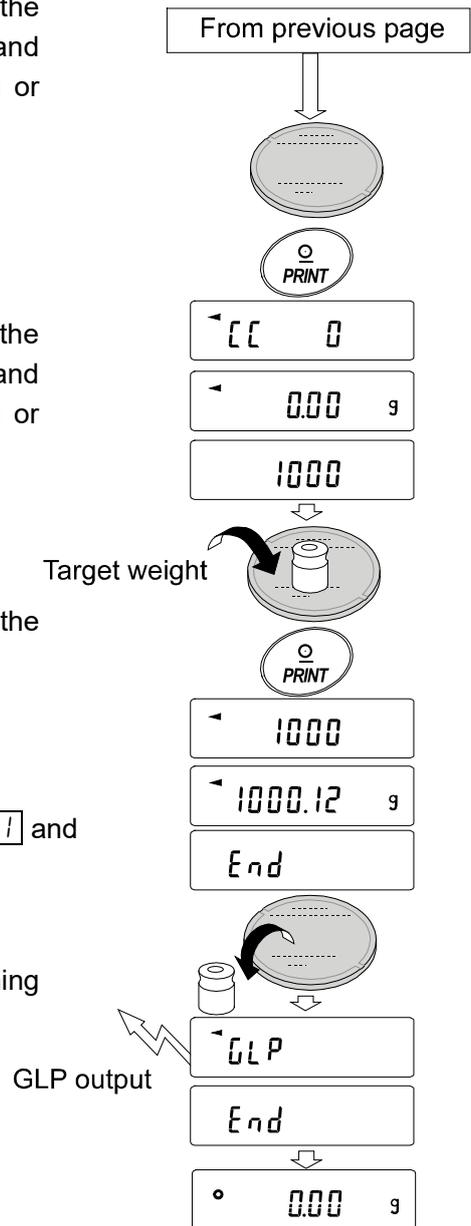
## 8.5. Correcting the Internal Mass Value: 1 (Only for FZ-*i* /FZ-*i*WP /FZ-GD series)

● The FZ-*i* /FZ-*i*WP /FZ-GD series balance can correct the internal mass value using an external weight.
  Method 1: Calibrate the balance using the internal mass. Measure the external weight. Calculate the correction value. And store it in the balance.

● The adjustable range of the internal mass value is as follows:

| Model | | | Correction reference value | Adjustable range |
|---|---|---|---|---|
| FZ-120*i* | FZ-120*i*WP | FZ-120GD | 100 g | |
| FZ-200*i* | FZ-200*i*WP | FZ-200GD | | -0.050 g to +0.050 g |
| FZ-300*i* | FZ-300*i*WP | FZ-300GD | 200 g | |
| FZ-500*i* | | | | |
| FZ-1200*i* | FZ-1200*i*WP | FZ-1200GD | 1 kg | |
| FZ-2000*i* | FZ-2000*i*WP | FZ-2000GD | | -0.50 g to +0.50 g |
| FZ-3000*i* | FZ-3000*i*WP | FZ-3000GD | 2 kg | |
| FZ-5000*i* | | | | |

### Operation

Example : Correcting the weight value by +0.003 g in 100 g using the FZ-120*i*

If correcting the weight value by +0.003 g in 50 g, use the correction value of +0.006 g as the correction reference value is 100 g..



The same mass

100 g — 99.997 g → Correct the internal mass by +0.003 g in 100 g. Calibrate with the corrected internal mass. → 100 g — 100.000 g Corrected mass value

1  Perform calibration using the internal mass (one-touch calibration). Place the external weight on the FZ-120*i* weighing pan to obtain the correction value.

2  With the factory setting, the balance can not correct the internal mass value. Refer to "9. FUNCTION SWITCH AND INITIALIZATION" and set the internal mass value correction switch to *1*.

3  In the weighing mode, press and hold the SAMPLE key to display bASFnc ..

4  Press the SAMPLE key several times until [5 in 1 is displayed.
   If [5 in 1 is not displayed, perform step 2.

5  Press the PRINT key.
   Correct the internal mass value using the following keys:

   RE-ZERO key    To increase the value by one.
   MODE key       To decrease the value by one.
   PRINT key      To store the correction value and display the next menu item of the function table.
   CAL key        To cancel the operation and return to the weighing mode.

   The balance displays -50 digits after +50 digits

6  Press the CAL key to return to the weighing mode.

7  Press the CAL key to perform calibration using the internal mass.

8  Confirm that the internal mass value has been corrected properly by placing the external weight on the weighing pan.
   If the internal mass value has not been corrected properly, repeat the procedure to adjust the correction value.



0.000 g

1/10d SAMPLE — Press and hold the key (for 2 seconds)

bASFnc

Press several times 1/10d SAMPLE

[5 in

PRINT

0.003 g

MODE    RE-ZERO

PRINT

End

[5 in 2

CAL

0.000 g

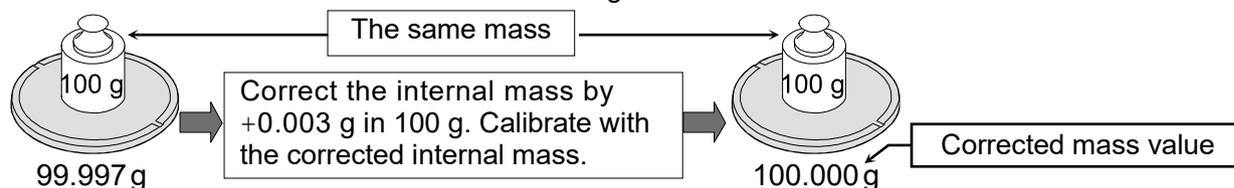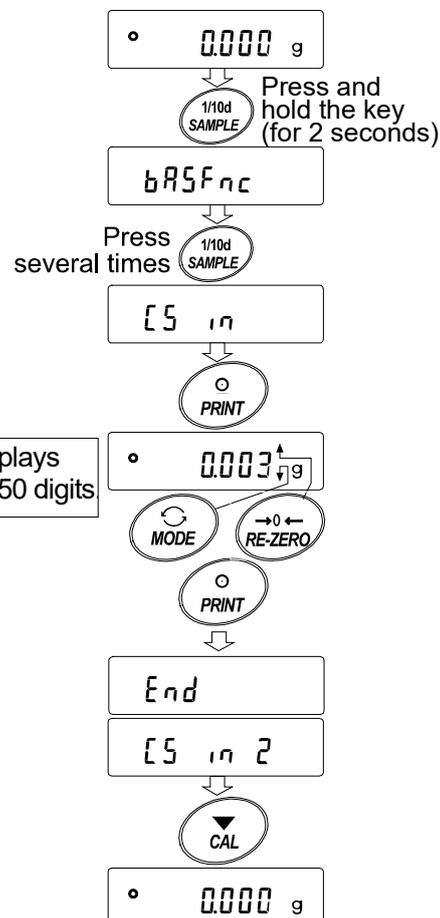## 8.6. Correcting the Internal Mass Value: 2 (Only for FZ-*i* /FZ-*i* WP /FZ-GD series)

● The FZ-*i* /FZ-*i*WP /FZ-GD series balance can correct the internal mass value using an external weight.
Method 2: Calibrate the balance using the external weight. The balance performs automatic calibration using the internal mass, corrects the internal mass value and stores it in the balance. The corrected mass value is maintained in non-volatile memory even if the AC adapter is removed.

● The usable calibration weights and the adjustable range are as follows:

| Model | | | Usable calibration weight | Adjustable range |
|---|---|---|---|---|
| FZ-120*i* | FZ-120*i*WP | FZ-120GD | **100 g**, 50 g | |
| FZ-200*i* | FZ-200*i*WP | FZ-200GD | **200 g**, 100 g, 50 g *1 | |
| FZ-300*i* | FZ-300*i*WP | FZ-300GD | 300 g, **200 g**, 100 g, 50 g *1 | -0.050 g to +0.050 g |
| FZ-500*i* | | | **500 g**, 400 g, 300 g, 200 g 100 g, 50 g | |
| FZ-1200*i* | FZ-1200*i*WP | FZ-1200GD | **1000 g**, 500 g | |
| FZ-2000*i* | FZ-2000*i*WP | FZ-2000GD | **2000 g**, 1000 g, 500 g *1 | |
| FZ-3000*i* | FZ-3000*i*WP | FZ-3000GD | 3000 g, **2000 g**, 1000 g, 500 g *1 | -0.50 g to +0.50 g |
| FZ-5000*i* | | | **5000 g**, 4000 g, 3000 g, 2000 g 1000 g, 500 g | |

The calibration weight in bold type: factory setting
The calibration weight value can be adjusted within the range above.
*1 Can be selected with balance software version 3.10 or later.

### Operation

1 With the factory setting, the balance can not correct the internal mass value. Refer to "9. FUNCTION SWITCH AND INITIALIZATION" and set the internal mass value correction switch to *l*.

2 In the weighing mode, press an d hold the SAMPLE key to display bASFnc .

3 Press the SAMPLE key several times until CS in 2 l is displayed.
If CS in 2 is not displayed, perform step 1.

4 Press the PRINT key to display CAL 0 .
Refer to "8-5 Calibration Using an External Weight", to perform the calibration.

5 After calibration, End is displayed. The balance displays 1rEAdY ? when the weight is removed.
Place the accessory breeze break on the balance and press the PRINT key.

6 ICAL. SET is displayed and the balance corrects the internal mass value automatically

7 After correcting the internal mass value, the balance displays CCAL. in , and performs the calibration automatically using the corrected internal mass value.

8 The balance displays End and returns to the weighing mode.

9 Confirm that the internal mass value has been corrected properly by placing the external weight used for the correction procedure on the weighing pan.
If the internal mass value has not been corrected properly, repeat the procedure to adjust the correction value.
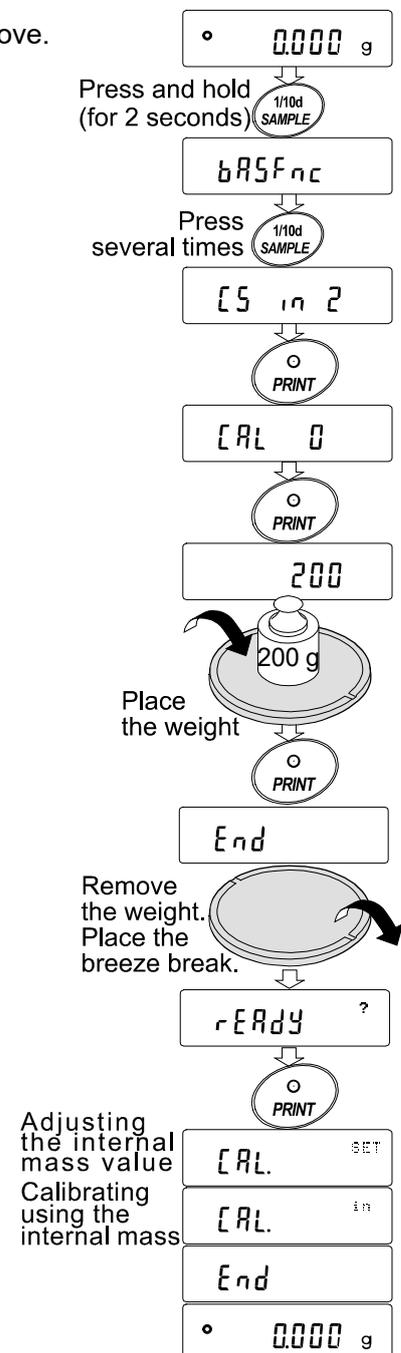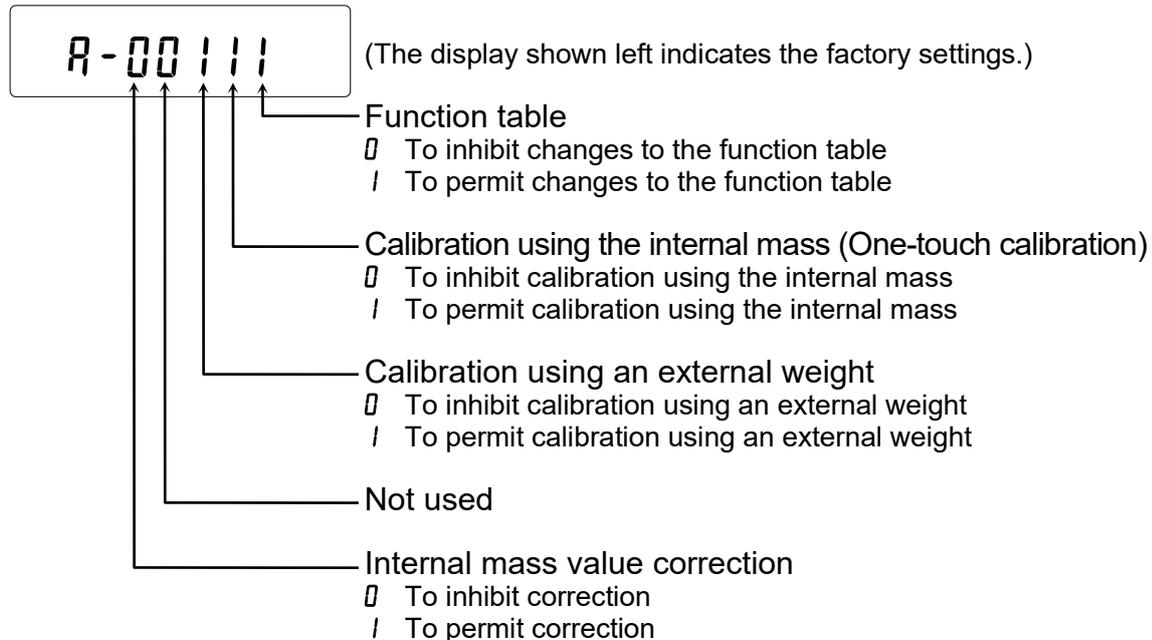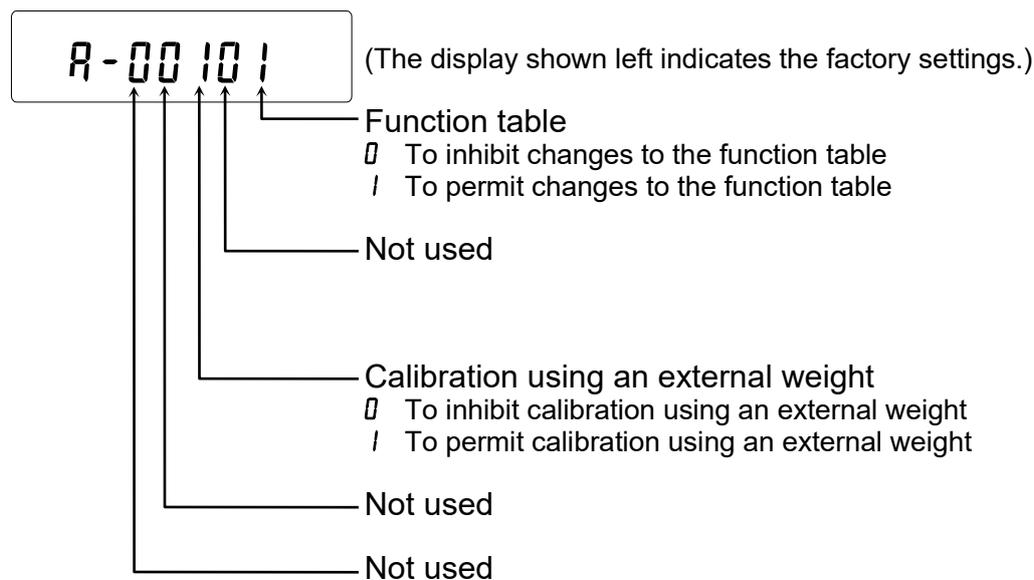
# 9. FUNCTION SWITCH AND INITIALIZATION

## 9.1.    Permit or Inhibit

The balance stores parameters that must not be changed unintentionally. There are two switches for the purpose of protecting these parameters. Each switch can select either "permit" or "inhibit". The "inhibit" protects parameters against unintentional operations.

### Switches (FZ-*i* / FZ-*i*WP / FZ-GD series)

$A$-$001111$    (The display shown left indicates the factory settings.)

Function table
*0*   To inhibit changes to the function table
*1*   To permit changes to the function table

Calibration using the internal mass (One-touch calibration)
*0*   To inhibit calibration using the internal mass
*1*   To permit calibration using the internal mass

Calibration using an external weight
*0*   To inhibit calibration using an external weight
*1*   To permit calibration using an external weight

Not used

Internal mass value correction
*0*   To inhibit correction
*1*   To permit correction

### Switches (FX-*i* / FX-*i*WP / FX-GD series)

$A$-$00101$    (The display shown left indicates the factory settings.)

Function table
*0*   To inhibit changes to the function table
*1*   To permit changes to the function table

Not used

Calibration using an external weight
*0*   To inhibit calibration using an external weight
*1*   To permit calibration using an external weight

Not used

Not used

## Operation

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

2 While pressing and holding the PRINT key and the SAMPLE key, press the ON:OFF key. The balance displays $P5$.

3 Press the PRINT key. Then the balance displays the function switches.

4 Set the switches using the following keys.

| | |
|---|---|
| SAMPLE key | To select the switch to change the parameter. The selected switch blinks. |
| RE-ZERO key | To change the parameter of the switch selected. |
| | $0$: To inhibit changes.   $1$: To permit changes |
| PRINT key | To store the new parameter and return to the weighing mode. |
| CAL key | To cancel the operation ( $[Lr$ is displayed.) To return to the weighing mode, press the CAL key once again. |

# 9.2.    Initializing the Balance

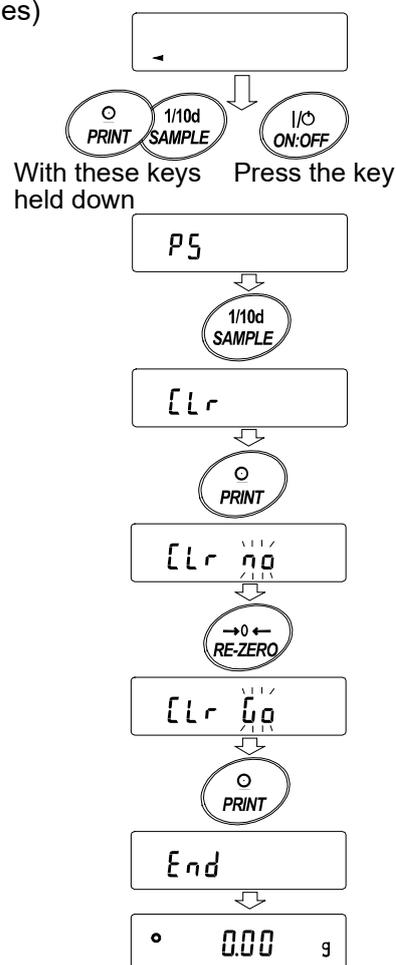This function returns the following parameters to factory settings.

- Calibration data
- Function table
- The sample unit mass value (counting mode), 100% reference mass value (percent mode)
- External calibration weight
- Function switch settings
- Statistical data
- Internal mass value (Only for the FZ-*i* / FZ-*i*WP / FZ-GD series)

## Note
**Be sure to calibrate the balance after initialization.**

## Operation

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

2 While pressing and holding the PRINT key and the SAMPLE key, press the ON:OFF key. The balance displays $P5$.

3 Press the SAMPLE key to display $[Lr$.

4 Press the PRINT key to display $[Lr\ no$.

   To cancel this operation, press the CAL key.

5 Press the RE-ZERO key to display $[Lr\ Go$.

6 Press the PRINT key to initialize the balance.

   The balance will automatically return to the weighing mode.



With these keys held down    Press the key

P5

1/10d SAMPLE

[Lr

PRINT

[Lr no

→0← RE-ZERO

[Lr Go

PRINT

End

0.00  g

# 10. FUNCTION TABLE

The function table reads or rewrites the parameters that are stored in the balance. These parameters stored, even if the AC adapter is removed, are maintained in non-volatile memory.

## 10.1. Structure and Sequence of the Function Table

The function table menu consists of two layers. The first layer is the "Class" and the second layer is the "Item". Each item stores a parameter.
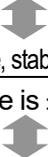
### Example

This example sets "Auto print mode A" for "Data output mode" and "100 digits" for "Auto print difference".
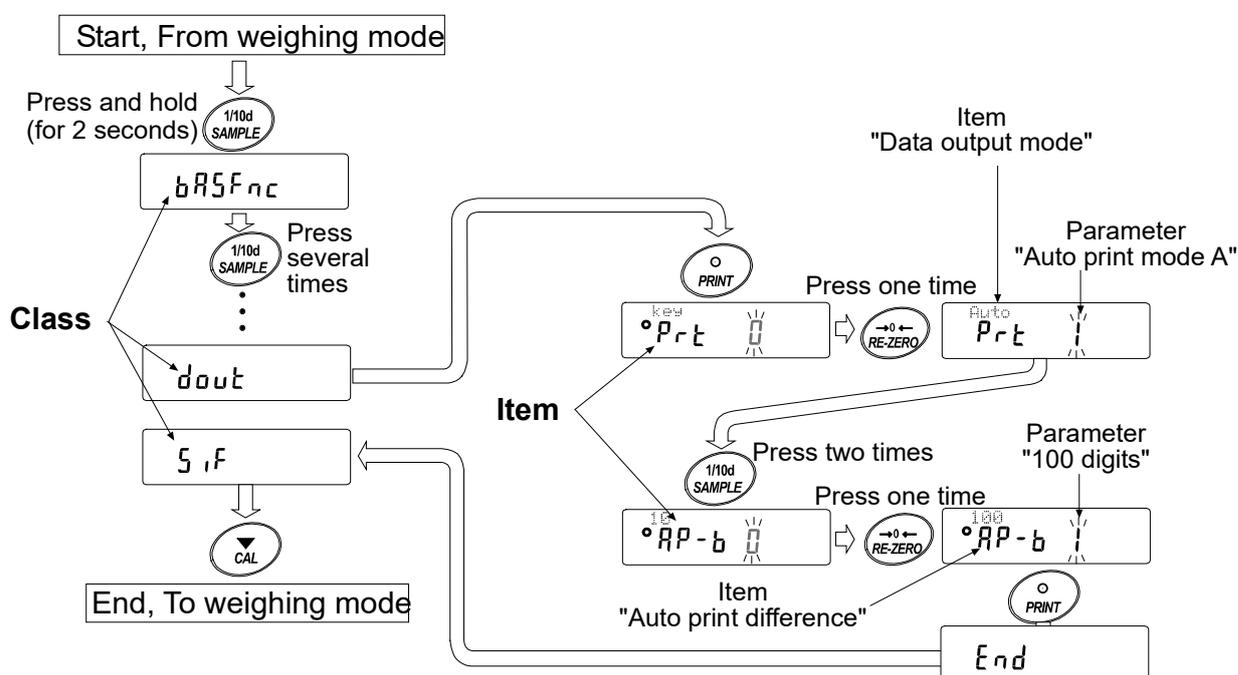


## 10.2. Display and Keys

| Display/Key | Description |
|---|---|
| ° (symbol) | The symbol "○" indicates that the parameter displayed is in effect. |
| 1/10d SAMPLE | When pressed and held for 2 seconds in the weighing mode, enters the function table mode. Selects the class or item in the function table mode. |
| →0← RE-ZERO | Changes the parameter. |
| PRINT | When a class is displayed, moves to an item in the class. When an item is displayed, stores the new parameter and displays the next class. |
| ▼ CAL | When an item is displayed, cancels the new parameter and displays the next class. When a class is displayed, exits the function table mode and returns to the weighing mode. |

## 10.3. Details of the Function Table

| Class | Item and Parameter | | | Description | |
|---|---|---|---|---|---|
| **bASFnc** Environment Display | *Cond* Condition | | 0 | Fast response, sensitive value FAST | With "*Hold 1*", sets the averaging time. |
| | | ▪ | 1 | ⬆⬇ MID. | |
| | | | 2 | Slow response, stable value SLOW | |
| | *St-b* Stability band width | | 0 | Stable range is ±1 digit | The stabilization indicator illuminates when the display fluctuation is within the range. With "*Hold 1*", sets the stabilization range. |
| | | ▪ | 1 | ⬆⬇ | |
| | | | 2 | Stable range is ±3 digits | |
| | *Hold* Hold function | ▪ | 0 | OFF | Holds the display when stable in animal mode. With "*Hold 1*", ANIMAL turns on. |
| | | | 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 | 5 times/second | Period to refresh the display |
| | | | 1 | 10 times/second | |
| | | | 2 | 20 times/second | |
| | *Pnt* Decimal point | ▪ | 0 | Point (.) | Decimal point format |
| | | | 1 | Comma (,) | |
| | *P-on* Auto display-ON | ▪ | 0 | OFF | Turns on the weighing mode display when the AC adapter is connected. |
| | | | 1 | ON | |
| | *PoFF* Auto display-OFF | ▪ | 0 | OFF | Turns off the display after 10 minutes of inactivity. |
| | | | 1 | ON (10 minutes) | |
| | *rnG* Display at start | ▪ | 0 | Displays | Select whether or not to display the minimum weighing value at weighing start. |
| | | | 1 | Does not display | |
| | *bEEP* Beep | | 0 | Does not sound | Select whether or not to sound the beep when operating on keys. |
| | | ▪ | 1 | Sounds | |
| **CL Adj** * Clock | | | | Refer to "10-9 Clock and calendar function". | 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, excluding "near zero" when stable value or overloaded | |
| | | | 2 | Comparison, including "near zero" when stable value or overloaded | |
| | | | 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 | |

▪: Factory settings. Digit is a unit of minimum weighing value
∗ : Only for the FZ-*i* /FZ-*i*WP /FZ-GD series

| Class | Item and Parameter | | | Description |
|---|---|---|---|---|
| *CP Hi*<br>Upper limit<br>*CP Lo*<br>Lower limit | Refer to "10.10. Comparator Function". | | | |
| *dout*<br>Data output | *Prt*<br>Data output mode | ■ *0* | Key mode | Accepts the PRINT key only when the display is stable. |
| | | *1* | Auto print mode A<br>(Reference = zero) | Outputs data when the display is stable and conditions of *AP-P*, *AP-b* and the reference value are met. |
| | | *2* | Auto print mode B<br>(Reference = last stable value) | |
| | | *3* | Stream mode | Outputs data continuously. |
| | | *4* | Key mode B (Immediately) | Accepts the PRINT key regardless of the display condition. |
| | | *5* | Key mode C (When stable) | Accepts the PRINT key immediately when the display is stable, or waits for the display to be stable when not. |
| | | *6* | Interval output mode | Uses interval output mode. |
| | *AP-P*<br>Auto print polarity | ■ *0* | Plus only | Displayed value>Reference |
| | | *1* | Minus only | Displayed value<Reference |
| | | *2* | Both | Regardless of displayed value |
| | *AP-b*<br>Auto print difference | ■ *0* | 10 digits | Difference between reference value and displayed value |
| | | *1* | 100 digits | |
| | | *2* | 1000 digits | |
| | *int*<br>Interval time | *0* | Every measurement | Interval time for the interval output mode<br>(With *Prt 6*) |
| | | ■ *1* | 2 seconds | |
| | | *2* | 5 seconds | |
| | | *3* | 10 seconds | |
| | | *4* | 30 seconds | |
| | | *5* | 1 minute | |
| | | *6* | 2 minute | |
| | | *7* | 5 minute | |
| | | *8* | 10 minute | |
| | *S-id*<br>ID number output | ■ *0* | No output | Selects whether or not the ID number is output. |
| | | *1* | Output | |
| | *S-td**<br>Time/Date output | ■ *0* | No output | |
| | | *1* | Time only | |
| | | *2* | Date only | |
| | | *3* | Time and date | |
| | *PUSE*<br>Data output pause | ■ *0* | No pause | Selects the data output interval. |
| | | *1* | Pause (1.6 seconds) | |
| | *At-F*<br>Auto feed | ■ *0* | Not used | Selects whether or not automatic feed is performed. |
| | | *1* | Used | |
| | *inFo*<br>GLP output | ■ *0* | No output | Selects GLP output method. |
| | | *1* | AD-8121 format | |
| | | *2* | General data format (output time and date using the built-in clock) | |
| | | *3* | General data format (output time and date using the clock of the external equipment) | |
| | *Ar-d*<br>Zero after output | ■ *0* | Not used | Adjusts zero automatically after data is output |
| | | *1* | Used | |

■ Factory settings.  Digit is a unit of minimum weighing value
∗ : Only for the FZ-*i* /FZ-*i*WP /FZ-GD series

| Class | Item and Parameter | | | Description | |
|---|---|---|---|---|---|
| 5 iF<br>Serial<br>interface | bPS<br>Baud rate | | 0 | 600 bps | |
| | | | 1 | 1200 bps | |
| | | ▪ | 2 | 2400 bps | |
| | | | 3 | 4800 bps | |
| | | | 4 | 9600 bps | |
| | | | 5 | 19200 bps | |
| | btPr<br>Data bit, parity bit | ▪ | 0 | 7 bits, even | |
| | | | 1 | 7 bits, odd | |
| | | | 2 | 8 bits, none | |
| | CrLF<br>Terminator | ▪ | 0 | CR LF | CR: ASCII code 0Dh<br>LF: ASCII code 0Ah |
| | | | 1 | CR | |
| | tYPE<br>Data format | ▪ | 0 | A&D standard format | Refer to "10.6. Description of the Item "Data Format"". |
| | | | 1 | DP format | |
| | | | 2 | KF format | |
| | | | 3 | MT format | |
| | | | 4 | NU format | |
| | | | 5 | CSV format | |
| | t-UP<br>Timeout | | 0 | No limit | Selects the wait time to receive a command. |
| | | ▪ | 1 | 1 second | |
| | ErCd<br>AK, Error code | ▪ | 0 | No output | AK:ASCII code 06h |
| | | | 1 | Output | |
| ALt<br>Programmable-unit (Multi-unit) | | | | Sets an arbitrary coefficient. | Available only when programmable-unit mode is selected. |
| Unit<br>Unit | | | | Refer to "5. WEIGHING UNITS". | |
| id<br>ID number | | | | Refer to "11. ID NUMBER AND GLP REPORT" | |
| APP Fnc<br>Application | APF<br>Application function | ▪ | 0 | Normal weighing mode | |
| | | | 1 | Capacity indicator | |
| | | | 2 | Statistical calculation mode | |
| | StAF<br>Statistical function mode output items | ▪ | 0 | Number of data, sum | |
| | | | 1 | Number of data, sum, maximum, minimum, average, range (maximum-minimum) | |
| | | | 2 | Number of data, sum, maximum, minimum, average, range (maximum-minimum), standard deviation, coefficient of variation | |
| | | | 3 | Number of data, sum, maximum, minimum, average, range (maximum-minimum), standard deviation, coefficient of variation, relative error | |
| LocFnc | PASS | ▪ | 0 | OFF | Refer to "14. PASSWORD LOCK FUNCTION". |
| | | | 1 | ON (limits weighing operations) | |
| | | | 2 | ON (enables basic weighing) | |
| | Loc no. | | AdmIN | Administrator password input | |
| | | | USEr01 | User 1 password input | |
| | | | ~ | | |
| | | | USEr10 | User 10 password input | |

∗ : Only for the FZ-*i* /FZ-*i*WP /FZ-GD series  ▪ : Factory settings.

| Class | Description | |
|---|---|---|
| *CS in 1* ∗<br>Internal mass value correction: Method 1 | *EFEr* to "8. CALIBRATION". | Displayed only when the function switch (internal mass value correction switch) is set to *i* |
| *CS in 2* ∗<br>Internal mass value correction: Method 2 | | |

∗ : Only for the FZ-*i* /FZ-*i*WP /FZ-GD series  ▪ : Factory settings.

## Caution

**The balance may not transmit the data completely at the specified refresh rate, depending on the baud rate.**

**When a refresh rate of 20 times/second is used, set the baud rate to 4800 bps or higher.**

# 10.4. Description of the Class "Environment, Display"

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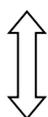
*Cond 0*  This parameter is for sensitive response to the fluctuation of a weight value. Used for powder target weighing, weighing a very light sample or when quick response weighing is required.
After setting, the balance displays FAST .

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

**Note**
**With "Hold function (*HoLd*)" set to "ON ( *1*)", this item is used to set the averaging time.**

## Stability band width ( *St-b* )

This item controls the width to regard a weight value as a stable value. When the fluctuation per second is less than the parameter, the balance displays the stabilization indicator and outputs the data. The parameter influences the "Auto print mode"

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

*St-b 2*  This parameter ignores slight fluctuation of a weight value. Used to prevent a weight value from drifting due to vibration or drafts.

**Note**
**With "Hold function (*HoLd*)" set to "ON ( *1*)", this item is used to set the stabilization range.**

## Hold function ( *HoLd* ) (Animal weighing mode)

This function is used to weigh a moving object such as an animal.

When the weight data is over the 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 animal. 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 " *1*" (the animal mode indicator ANIMAL illuminates) and any weighing unit other than the counting mode is selected.

The stabilization range and averaging time are set in "Condition (*Cond*)" and "Stability band width (*St-b*)".

| | Weighing range | | | | Averaging time | | Stabilization range | |
|---|---|---|---|---|---|---|---|---|
| FZ series | 120*i* 200*i* 300*i* 500*i* | 120*i* WP 200*i* WP 300*i* WP | 120GD 200GD 300GD | 0.200g or over | *Cond 0* | 2 seconds Faster | *St-b 0* | Lesser 6.25% |
| FX series | 120*i* 200*i* 300*i* 500*i* | 120*i* WP 200*i* WP 300*i* WP | 120GD 200GD 300GD | | *Cond 1* | 4 seconds ⇕ | *St-b 1* | ⇕ 12.5% |
| FZ series | 1200*i* 2000*i* 3000*i* 5000*i* | 1200*i* WP 2000*i* WP 3000*i* WP | 1200GD 2000GD 3000GD | 2.00g or over | *Cond 2* | 8 seconds More accurate | *St-b 2* | Greater 16.7% |
| FX series | 1200*i* 2000*i* 3000*i* 5000*i* | 1200*i* WP 2000*i* WP 3000*i* WP | 1200GD 2000GD 3000GD | | | | | |

## Zero tracking ( *trc* )

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

**Note**
**Digit indicates a unit of minimum weighing value.**

| | |
|---|---|
| *trc 0* | The tracking function is not used. Used for weighing a very light sample. |
| *trc 1* | The tracking function is used. Normal zero tracking. |
| *trc 2* | The tracking function is used. Strong zero tracking. |
| *trc 3* | The tracking function is used. Very strong zero tracking. |

## Display refresh rate ( *SPd* )

Period to refresh the display. This parameter influences "Stream mode" along with "Baud rate" and "Data output pause"

**Note**
**This item is selected automatically when the response rate is changed.**

## Decimal point ( *Pnt* )

The decimal point format can be selected.

## Auto display-ON ( *P-on* )

When the AC adapter is connected, the display is automatically turned on in the weighing mode, without the ON:OFF key operation. Used when the balance is built into an automated system. 30-minute warm up is necessary for accurate weighing.

## Auto display-OFF ( *PoFF* )

When the AC adapter is connected and no operation is performed (inactivity state) for 10 minutes, the display is automatically turned off and the standby indicator is illuminated.

## 10.5.    Description of the Item "Data Output Mode"

The parameter setting of the "Data output mode ( $Prt$ )" applies to the performance when the data is transmitted using the RS-232C serial interface.

### Key mode

When the PRINT key is pressed with the stabilization indictor turned on, the balance outputs the weight data and the display blinks one time.

| | | | |
|---|---|---|---|
| Required setting | $dout$ | $Prt$ $0$ | Key mode |

### Auto print modes A and B

When the displayed value is stable and the conditions of "Auto print polarity", "Auto print difference" and reference value are met, the balance outputs the weight data.
When the PRINT key is pressed with the stabilization indictor turned on, the balance outputs the data and the display blinks one time.

| Mode A: Example | | "For outputting the weight value each time a sample is added, with "$Ar$-$d$" set to " $1$" (to adjust zero after the data is output)." | |
|---|---|---|---|
| Required setting | $dout$ | $Prt$ $1$ | Auto print mode A (reference = zero) |
| | $dout$ | $AP$-$P$ | Auto print polarity |
| | $dout$ | $AP$-$b$ | Auto print difference |
| | $dout$ | $Ar$-$d$ $1$ | Auto re-zero |
| Mode B: Example | | "For outputting the weight value while a sample is added." | |
| Required setting | $dout$ | $Prt$ $2$ | Auto print mode B (reference = last stable value) |
| | $dout$ | $AP$-$P$ | Auto print polarity |
| | $dout$ | $AP$-$b$ | Auto print difference |

### Stream mode

The balance outputs the weight data continuously regardless of the display condition. The display does not blink in this mode.

| Example | | "For monitoring data on a computer" | |
|---|---|---|---|
| | | With the FZ-GD / FX-GD series, always display weighing values using the AD-8920A remote display. | |
| Required setting | $dout$ | $Prt$ $3$ | Stream mode |
| | $bASFnc$ | $SPd$ | Display refresh rate |
| | $S$ $iF$ | $bPS$ | Baud rate |

### Caution
**The balance may not transmit the data completely at the specified refresh rate and baud rate. Set the baud rate higher.**

### Key mode B

When the PRINT key is pressed, the balance outputs the weight data, regardless of the display condition. The display does not blink in this mode.

| | | | |
|---|---|---|---|
| Required setting | $dout$ | $Prt$ $4$ | Key mode B (Immediately) |

### Key mode C

When the PRINT key is pressed with the stabilization indictor turned on, the balance outputs the weight data. When the stabilization indicator is not on, the balance waits for the indicator to turn on and outputs the data. The balance blinks one time in this mode.

| | | | |
|---|---|---|---|
| Required setting | $dout$ | $Prt$ $5$ | Key mode C (When stable) |

## Interval output mode

The weight data is periodically output.

When the PRINT key is pressed, the balance starts to output the weight data at a preset interval time.

When the PRINT key is pressed again, the balance stops outputting the weight data.

| | | | |
|---|---|---|---|
| Example | "For outputting the weight data periodically." | | |
| Required setting | *dout* | *Prt 6* | Interval output mode |
| | *dout* | *int* | Interval time |

### Caution

**The balance may not transmit the data completely at the specified interval times and baud rate. Set the baud rate higher.**

# 10.6.  Description of the Item "Data Format"

### A&D standard format          *5 iF type 0*

This format is used when the peripheral equipment can receive the A&D format. If an AD-8127 printer is used, set the printer to MODE 1 or 2.

- This format consists of fifteen characters excluding the terminator.
- A header of two characters indicates the balance condition.
- The polarity sign is placed before the data with the leading zeros. If the data is zero, the plus sign is used.
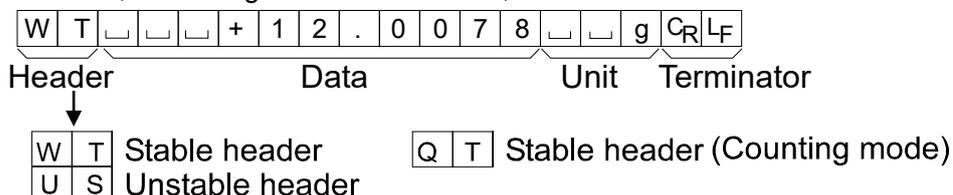- The unit, consisting of three characters, follows the data.
- Output example:

| S | T | , | + | 0 | 1 | 2 | . | 0 | 0 | 7 | 8 | ␣ | ␣ | g | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Header | Data | Unit | Terminator

| S | T | Stable header |
|---|---|---|
| U | S | Unstable header |
| O | L | Overload header |

| Q | T | Stable header (Counting mode) |
|---|---|---|
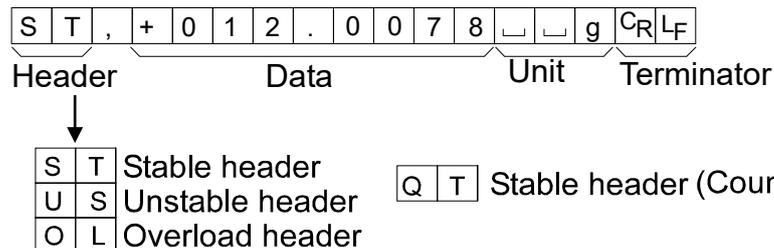
- Print example:

| W | T | ␣ | ␣ | ␣ | + | 1 | 2 | . | 0 | 0 | 7 | 8 | ␣ | ␣ | g | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Header | Data | Unit | Terminator

| W | T | Header for modes other than the counting mode |
|---|---|---|
| Q | T | Header for the counting mode |

### DP (Dump print) format          *5 iF type 1*

This format is suitable for the peripheral equipment that prints the received data as is.

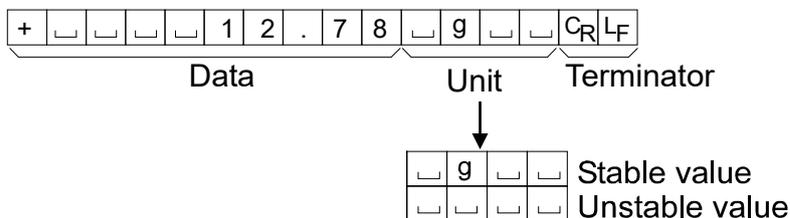When an AD-8127 printer is used, set the printer to MODE 3.

- This format consists of sixteen characters excluding the terminator.
- A header of two characters indicates the balance condition. No overload header is used.
- The polarity sign is placed before the data, with spaces in place of leading zeros, if the data is not zero or overloaded.
- The unit, consisting of three characters, follows the data.

| W | T | ␣ | ␣ | ␣ | + | 1 | 2 | . | 0 | 0 | 7 | 8 | ␣ | ␣ | g | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Header | Data | Unit | Terminator

| W | T | Stable header |
|---|---|---|
| U | S | Unstable header |

| Q | T | Stable header (Counting mode) |
|---|---|---|

## KF format   *SiF tYPE 2*

This is the Karl-Fischer moisture meter format and is used when the peripheral equipment can only communicate using this format.
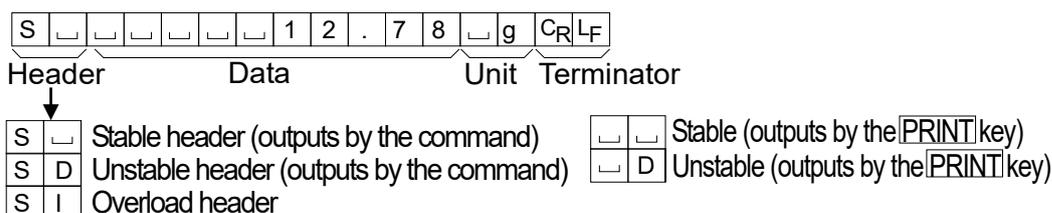
- This format consists of fourteen characters excluding the terminator.
- This format has no header characters.
- The polarity sign is placed before the data, with spaces in place of leading zeros, if the data is not zero or overloaded.
- This format outputs the unit only for a stable value.

| + | ␣ | ␣ | ␣ | ␣ | 1 | 2 | . | 7 | 8 | ␣ | g | ␣ | ␣ | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Data     Unit     Terminator

| ␣ | g | ␣ | ␣ | Stable value |
| ␣ | ␣ | ␣ | ␣ | Unstable value |

## MT format   *SiF tYPE 3*

This format is used when the peripheral equipment of other manufacturer is connected. Please note that the connection is not guaranteed.

- A header of two characters indicates the balance condition.
- The polarity sign is used only for negative data.
- The weight data uses spaces in place of the leading zeros.
- The character length of this format changes dependent upon the unit

| S | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | 1 | 2 | . | 7 | 8 | ␣ | g | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Header    Data    Unit   Terminator

| S | ␣ | Stable header (outputs by the command) |
| S | D | Unstable header (outputs by the command) |
| S | I | Overload header |

| ␣ | ␣ | Stable (outputs by the PRINT key) |
| ␣ | D | Unstable (outputs by the PRINT key) |

## NU (numerical) format   *SiF tYPE 4*

This format outputs only numerical data.

- This format consists of nine characters excluding the terminator.
- The polarity sign is placed before the data with the leading zeros. If the data is zero, the plus sign is used.

| + | 0 | 0 | 0 | 1 | 2 | . | 7 | 8 | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|

Data     Terminator
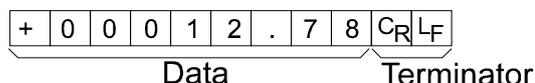
## CSV format   *SiF tYPE 5*

- Separates the data of A&D standard format and the unit by a comma (,).
- Outputs the unit even when the data is overloaded.

ST,+00012.78, ␣ ␣ g<CR><LF>

Weight data

| S | T | , | + | 0 | 0 | 0 | 1 | 2 | . | 7 | 8 | , | ␣ | ␣ | g | C_R | L_F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O | L | , | + | 9 | 9 | 9 | 9 | 9 | 9 | 9 | E | + | 1 | 9 | , | ␣ | ␣ | g | C_R | L_F |
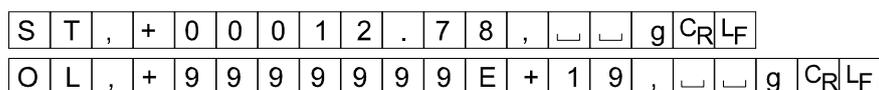
**ID number**   *dout 5-td 1* or *3*

- This is the identification number for the balance, and it is fixed to 7 digits.

| L | A | B | - | 1 | 2 | 3 | C<sub>R</sub> | L<sub>F</sub> |
|---|---|---|---|---|---|---|---|---|

**Date**   *dout 5-td 2* or *3*

- The date output order can be changed in "Clock (*Cl Adj*)".
- The year is output in a four-digit format.

| 1 | 2 | / | 3 | 1 | / | 2 | 0 | 1 | 0 | C<sub>R</sub> | L<sub>F</sub> |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Time**   *dout 5-td 1* or *3*

- The time is output in a 24-hour format.

| 1 | 2 | : | 3 | 4 | : | 5 | 6 | C<sub>R</sub> | L<sub>F</sub> |
|---|---|---|---|---|---|---|---|---|---|

# 10.7.  Data Format Examples

**Stable**

```
 °      1.27    g
```

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A&D | S | T | , | + | 0 | 0 | 0 | 0 | 1 | . | 2 | 7 | ␣ | ␣ | g | C<sub>R</sub> L<sub>F</sub> |
| DP | W | T | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | + | 1 | . | 2 | 7 | ␣ | ␣ | g C<sub>R</sub> L<sub>F</sub> |
| KF | + | ␣ | ␣ | ␣ | ␣ | ␣ | 1 | . | 2 | 7 | ␣ | g | ␣ | ␣ | C<sub>R</sub> L<sub>F</sub> | |
| MT | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | 1 | . | 2 | 7 | ␣ | g | C<sub>R</sub> L<sub>F</sub> | | |
| NU | + | 0 | 0 | 0 | 0 | 1 | . | 2 | 7 | C<sub>R</sub> L<sub>F</sub> | | | | | | |

**Unstable**

```
 -183.69    g
```

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A&D | U | S | , | - | 0 | 0 | 1 | 8 | 3 | . | 6 | 9 | ␣ | ␣ | g | C<sub>R</sub> L<sub>F</sub> |
| DP | U | S | ␣ | ␣ | ␣ | ␣ | - | 1 | 8 | 3 | . | 6 | 9 | ␣ | ␣ | g C<sub>R</sub> L<sub>F</sub> |
| KF | - | ␣ | ␣ | ␣ | 1 | 8 | 3 | . | 6 | 9 | ␣ | ␣ | ␣ | ␣ | C<sub>R</sub> L<sub>F</sub> | |
| MT | S | D | ␣ | ␣ | ␣ | - | 1 | 8 | 3 | . | 6 | 9 | ␣ | g | C<sub>R</sub> L<sub>F</sub> | |
| NU | - | 0 | 0 | 1 | 8 | 3 | . | 6 | 9 | C<sub>R</sub> L<sub>F</sub> | | | | | | |

**Overload**
Positive error

```
 E       g
```

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A&D | O | L | , | + | 9 | 9 | 9 | 9 | 9 | 9 | 9 | E | + | 1 | 9 | C<sub>R</sub> L<sub>F</sub> |
| DP | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | E | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | C<sub>R</sub> L<sub>F</sub> |
| KF | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | H | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | C<sub>R</sub> L<sub>F</sub> | |
| MT | S | I | + | C<sub>R</sub> L<sub>F</sub> | | | | | | | | | | | | |
| NU | + | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | C<sub>R</sub> L<sub>F</sub> | | | | | | |

**Overload**
Negative error

```
 -E      g
```

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A&D | O | L | , | - | 9 | 9 | 9 | 9 | 9 | 9 | 9 | E | + | 1 | 9 | C<sub>R</sub> L<sub>F</sub> |
| DP | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | - | E | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | C<sub>R</sub> L<sub>F</sub> |
| KF | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | L | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | ␣ | C<sub>R</sub> L<sub>F</sub> | |
| MT | S | I | - | C<sub>R</sub> L<sub>F</sub> | | | | | | | | | | | | |
| NU | - | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | C<sub>R</sub> L<sub>F</sub> | | | | | | |

␣   Space, ASCII 20h
C<sub>R</sub>   Carriage Return, ASCII 0Dh
L<sub>F</sub>   Line Feed, ASCII 0Ah

**Units**

| | | A&D | D.P. | KF | MT |
|---|---|---|---|---|---|
| g | g | ␣␣g | ␣␣g | ␣g␣␣ | ␣g |
| Counting mode | PCS | ␣PC | ␣PC | ␣pcs | ␣PCS |
| Precent mode | % | ␣␣% | ␣␣% | ␣%␣␣ | ␣% |
| Ounce (Avoir) | oz | ␣oz | ␣oz | ␣oz␣ | ␣oz |
| Pound | lb | ␣lb | ␣lb | ␣lb␣ | ␣lb |
| Pound Ounce | L oz | ␣oz | ␣oz | ␣oz␣ | ␣oz |
| Troy Ounce | ozt | ozt | ozt | ␣ozt | ␣ozt |
| Metric Carat | ct | ␣ct | ␣ct | ␣ct␣ | ␣ct |
| Momme | mom | mom | mom | ␣mom | ␣mo |
| Pennyweight | dwt | dwt | dwt | ␣dwt | ␣dwt |
| Grain | GN | ␣GN | ␣GN | ␣gr␣ | ␣GN |
| Tael (HK general, Singapore) | tl | ␣tl | ␣tl | ␣tls | ␣tl |
| Tael (HK, jewelry) | tl | ␣tl | ␣tl | ␣tlh | ␣tl |
| Tael (Taiwan) | tl | ␣tl | ␣tl | ␣tlt | ␣tl |
| Tael (China) | tl | ␣tl | ␣tl | ␣tlc | ␣tl |
| Tola (India) | tol | ␣␣t | ␣␣t | ␣tol | ␣t |
| tmr (India) | tol | tol | tol | ␣tol | ␣t |
| Messghal | mes | mes | mes | ␣MS␣ | ␣m |
| Newton | N | ␣␣N | ␣␣N | ␣N␣␣ | ␣N |
| Multi | MLT | MLT | MLT | ␣MLT | ␣MLT |

␣  Space, ASCII 20h

**Note**

**When "Pound Ounce" is selected, the data is output with the unit of ounce (oz).**

# 10.8.  Description of the Item "Application Function"

**Capacity indicator ( _APF 1_ )**

In the weighing mode, the indicator displays the weight data relative to the weighing capacity in percentage. (Zero = _0_ %, maximum capacity = _100_ %)

**Statistical calculation mode ( _APF 2_ )**

The mode statistically calculates the weight data, and displays or outputs the results. For details, refer to "6.6. Statistical Calculation Mode".

## 10.9. Clock and Calendar Function (Only for FZ-*i* / FZ-*i* WP / FZ-GD series)

The FZ-*i* /FZ-*i* WP /FZ-GD series balance is equipped with a clock and calendar function. When the "GLP output ( *info*)" parameter is set to " *1*" or "*2*" and the "Time/Date output (*5-td*)" parameter is set to " *1*", "*2*" or "*3*", the time and date are added to the output data. Set or confirm the time and date as follows:

**Note**
**Time and date cannot be confirmed and set with the FX-*i* /FX-*i*WP /FX-GD series.**

### Operation

1   Press and hold the SAMPLE key until *bASFnc* of the function table is displayed.

2   Press the SAMPLE key several times to display *CL Adj*.

3   Press the PRINT key. The balance enters the mode to confirm or set the time and date.

### Confirming the date

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

**Note**

**The year is expressed using a two-digit format. For example, the year 2010 is expressed as "10".**

### Setting the date (with part of the digits blinking)

Before setting the date, set the order in which to display year, month and date.

RE-ZERO key    To select "YMD", "MDY" or "DMY"

SAMPLE key     To make the date and time blink and enable it to be changed.

5   Set the date using the following keys.

SAMPLE key     To select the digits to change the value. The selected digits blink.

RE-ZERO key    To increase the value by one.

MODE key       To decrease the value by one.

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

CAL key        To cancel the new setting and go to step 6.
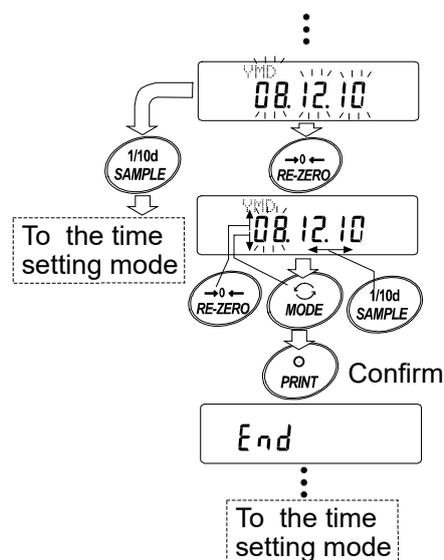
## Confirming the time

6 The current time is displayed with all the digits blinking.
- When the time is correct and the date does not need to be confirmed, press the CAL key and go to step 8.
- When the time is correct and the date is to be confirmed, press the SAMPLE key and go back to step 4.
- When the time is not correct and is to be changed, press the RE-ZERO key and go to step 7.

## Setting the time (with part of the digits blinking)

7 Set the time in a 24-hour format using the following keys.

| | |
|---|---|
| SAMPLE key | To select the digits to change the value. The selected digits blink. |
| RE-ZERO key | To increase the value by one. |
| MODE key | To decrease the value by one. |
| PRINT key | To store the new setting, display $End$ and go to step 8. |
| CAL key | To cancel the new setting and go back to step 4. |
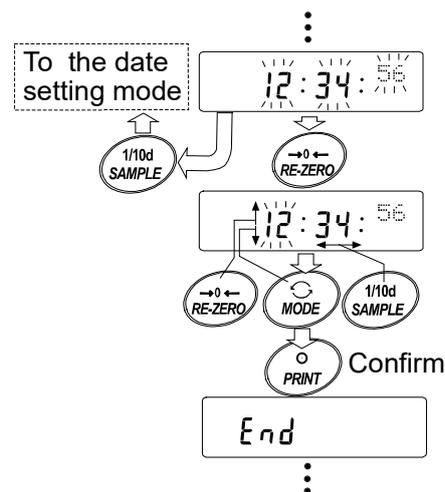
## Quitting the operation

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

### Notes

□ **Do not enter invalid values such as a non-existing date when setting the time and date.**

# 10.10. Comparator Function

The results of the comparison are indicated by HI OK LO on the display.

Operating conditions:
- No comparison
- Comparison when the weight data is stable or overloaded, excluding "near zero"
- Comparison when the weight data is stable or overloaded, including "near zero"
- Continuous comparison, excluding "near zero"
- Continuous comparison, including "near zero"

To compare, use:
- Upper limit value and lower limit value

Input method:
- Digital input

### Note
**"Near zero" means that the weight value is within ±10 digits of the minimum weighing value.
For example, using an FX-3000_i_ in gram mode, the range of ±0.10 g is "near zero".**

For the description of "Comparator ($CP\ Fnc$)", refer to "10.3. Details of the Function Table".

### Setting example
(Continuous comparison, excluding "near zero", upper limit and lower limit values, digital input)
### Selecting a comparator mode
1 Press and hold the SAMPLE key until $bASFnc$ of the function table is displayed.

2 Press the SAMPLE key several times to display $\boxed{\mathit{CP\ Fnc}}$.

3 Press the PRINT key.

4 Press the RE-ZERO key several times to display $\boxed{\mathit{CP\ 3}}$.

5 Press the PRINT key to store the selected mode.

## Entering the upper limit value

6 With $\boxed{\mathit{CP\ Hi}}$ displayed, press the PRINT key. The current setting of the upper limit value is displayed with all the digits blinking.

- When the current setting is not to be changed, press the PRINT or CAL key to go to step 7.
- When the current setting is to be changed, press the RE-ZERO key. Change the setting using the following keys.

| | |
|---|---|
| SAMPLE key | To select the digit to change the value. The selected digit blinks. |
| RE-ZERO key | To change the value of the digit selected. |
| MODE key | To switch the polarity. |
| PRINT key | To store the new setting and go to step 7. |
| CAL key | To cancel the new setting and go to step 7. |

## Entering the lower limit value

7 With $\boxed{\mathit{CP\ Lo}}$ displayed, press the PRINT key. The current setting of the lower limit value is displayed with all the digits blinking.

- When the current setting is not to be changed, press the PRINT or CAL key to go to step 8.
- When the current setting is to be changed, press the RE-ZERO key. Change the setting using the following keys.

| | |
|---|---|
| SAMPLE key | To select the digit to change the value. The selected digit blinks. |
| RE-ZERO key | To change the value of the digit selected. |
| MODE key | To switch the polarity. |
| PRINT key | To store the new setting and go to step 8. |
| CAL key | To cancel the new setting and go to step 8. |

8 Press the CAL key to exit the comparator function and return to the weighing mode.

# 11. ID NUMBER AND GLP REPORT

● The ID number is used to identify the balance when Good Laboratory Practice (GLP) or Good Manufacturing Practice (GMP) is used.

● The ID number is maintained in non-volatile memory even if the AC adapter is removed.

● The output format for GLP/GMP compliant report is selected at "GLP output ( *info* )" of the function table and can be output to a personal computer or printer using the RS-232C serial interface.

● The GLP/GMP compliant report includes the balance manufacturer, model, serial number, ID number and space for signature for weight data, and the weight used and results for calibration or calibration test data.
When the AD-8127 printer is used, the date and time can be printed using the AD-8127 clock and calendar function. In this case, set the "GLP output ( *info* )" parameter to " *1*".

● The balance can output the following:
"Calibration report" of the calibration, using the internal mass (Calibration due to changes in temperature and one-touch calibration.)
"Calibration report" of the calibration, using an external weight.
"Calibration test report" of the calibration test, using an external weight.
"Title block" and "End block" for the weight data.

## 11.1.   Setting the ID Number

1  Press and hold the SAMPLE key until `bASFnc` of the function table is displayed.

2  Press the SAMPLE key several times to display `id`.

3  Press the PRINT key. Set the ID number using the following keys.

| | |
|---|---|
| SAMPLE key | To select the digit to change the value. The selected digit blinks. |
| RE-ZERO key, MODE key | To set the character of the digit selected. Refer to the display character set shown below. |
| PRINT key | To store the new ID number and display `AP Fnc` |
| CAL key | To cancel the new ID number and display `AP Fnc` |

4  Press the CAL key to return to the weighing mode.

**Display character set**

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

⟵ ——— MODE key          ␣ Space                    RE-ZERO  key ———⟶

55

# 11.2. GLP Report

Set the following parameters to output the GLP/GMP compliant report.

- To print the report, set the "GLP output ( _ınᶠo_ )" parameter to " _1_ ", set the "Data output pause ( _PUSE_ )" parameter to " _1_ " and use MODE 3 of the AD-8127. For details on using the printer, refer to "17.1. Connection to the AD-8127 Multi Printer.
- To output the report to a personal computer using the RS-232C serial interface, set the "GLP output ( _ınᶠo_ )" parameter to " _2_ ".

**Note**

**If the time and date are not correct, adjust the AD-8127 clock and calendar (FX-*i* / FX-*i*WP / FX-GD series) or use "_CL Adj_ " of the function table to adjust the time and date (FZ-*i* / FZ-*i*WP / FZ-GD series).**

**Calibration report using an internal weight    Printout examples for the FX-*i* / FX-*i* WP / FX-GD series**

When the setting is " _ınᶠo   1_ ":                                    When the setting is " _ınᶠo   2_ ":

AD-8121 format                                                                 General data format



```
                  A & D
MODEL     FZ-3000i
S/N       012345678
ID         ABCDEFG
DATE    2011/12/31
TIME      12:34:56
CALIBRATED(INT.)
REMARKS


SIGNATURE


.....    .....    .....    .....    .....    .....
```

Manufacturer
Model
Serial number
ID number
Date
Time
Calibration type
Remarks

Signature

```
␣␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL␣␣␣FZ-3000i<TERM>
S/N␣␣␣␣012345678<TERM>
ID␣␣␣␣␣␣␣␣ABCDEFG<TERM>
DATE<TERM>
␣␣␣␣␣␣␣2011/12/31<TERM>
TIME<TERM>
␣␣␣␣␣␣␣␣12:34:56<TERM>
CALIBRATED(INT.)<TERM>
REMARKS<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
---------------<TERM>
<TERM>
<TERM>
```

␣        Space, ASCII 20h
&lt;TERM&gt;  Terminator, C_R, L_F or C_R
C_R  Carriage return, ASCII 0Dh
L_F  Line feed, ASCII 0Ah

**Calibration report using an external weight   Printout examples for the FX-*i* / FX-*i* WP / FX-GD series**

When the setting is "ınFo 1":
### AD-8121 format

```
              A & D
MODEL      FX-3000i
S/N        012345678
ID         ABCDEFG
DATE     2011/12/31
TIME       12:23:34
CALIBRATED(EXT.)
CAL.WEIGHT
        +200.0000 g
REMARKS


SIGNATURE


— — — — — — — — —
```

← Manufacturer →
← Model →
← Serial number →
← ID number →
← Date →
← Time →
← Calibration type
← Calibration weight
← Remarks
← Signature

␣        Space, ASCII 20h
<TERM>   Terminator, C_R , L_F or C_R
C_R      Carriage return, ASCII 0Dh
L_F      Line feed, ASCII 0Ah

When the setting is "ınFo 2":
### General data format

```
␣␣␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL␣␣␣FX-3000i<TERM>
S/N␣␣␣␣012345678<TERM>
ID␣␣␣␣␣␣␣ABCDEFG<TERM>
DATE<TERM>
<TERM>                    *
TIME<TERM>
<TERM>                    *
CALIBRATED(EXT.)<TERM>
CAL.WEIGHT<TERM>
␣␣␣␣␣+200.0000␣␣g<TERM>
REMARKS<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
----------------<TERM>
<TERM>
<TERM>
```

✱ With FZ-*i* / FZ-*i*WP / FZ-GD series, the time and date are added to output data.

---

**Calibration test report using an external weight   Printout examples for the FX-*i* / FX-*i* WP / FX-GD series**

(Calibration test does not perform calibration.)

When the setting is "ınFo 1":
### AD-8121 format

```
              A & D
MODEL      FX-3000i
S/N        012345678
ID         ABCDEFG
DATE     2011/12/31
TIME       12:23:34
CAL.TEST(EXT.)
ACTUAL
          0.0000 g
       +199.9999 g
TARGET
        +200.0000 g
REMARKS


SIGNATURE


— — — — — — — — —
```

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

␣        Space, ASCII 20h
<TERM>   Terminator, C_R , L_F or C_R
C_R      Carriage return, ASCII 0Dh
L_F      Line feed, ASCII 0Ah

When the setting is "ınFo 2":
### General data format

```
␣␣␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL␣␣␣␣FX-3000i<TERM>
S/N␣␣␣␣012345678<TERM>
ID␣␣␣␣␣␣␣ABCDEFG<TERM>
DATE<TERM>
<TERM>                    *
TIME<TERM>
<TERM>                    *
CAL.TEST(EXT.)<TERM>
ACTUAL<TERM>
␣␣␣␣␣␣␣␣0.0000␣␣g<TERM>
␣␣␣␣␣+199.9999␣␣g<TERM>
TARGET<TERM>
␣␣␣␣␣+200.0000␣␣g<TERM>
REMARKS<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
----------------<TERM>
<TERM>
<TERM>
```

✱ With FZ-*i* / FZ-*i*WP / FZ-GD series, the time and date are added to output data.

57

## Title block and end block

When a weight value is recorded as the GLP data, "Title block" and "End block" are inserted at the beginning and at the end of a group of weight values, in the GLP report.

## Operation  Printout examples for the FX-*i* / FX-*i* WP / FX-GD series

1  With the weight data displayed, press and hold the PRINT key until  $\boxed{5\xi Ar\xi}$  is displayed. The "Title block" is output.

2  The weight data is output according to the parameter setting of the data output mode.

3  Press and hold the PRINT key until  $\boxed{r\xi c\xi nd}$  is displayed. The "End block" is output.

When the setting is "  ınFo  l":  

### AD-8121 format

```
              A & D
MODEL       FX-3000i
S/N         01234567
ID          ABCDEFG
DATE       2008/12/31
START
TIME       12:23:34


─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─


WT        +1234.56  g
WT        +1234.61  g
WT
```

```
WT        +1234.61  g
WT        +1234.53  g
WT        +1234.71  g
WT        +1234.64  g

END
TIME       12:34:56
REMARKS


SIGNATURE


─ ─ ─ ─ ─ ─ ─ ─ ─ ─
```

**Title block**
- Manufacturer
- Model
- Serial number
- ID number
- Date
- Time

**Weight data**

- Time
- Remarks
- Signature

**End block**

⌴  Space, ASCII 20h
<TERM>  Terminator, $C_R$, $L_F$ or $C_R$
$C_R$  Carriage return, ASCII 0Dh
$L_F$  Line feed, ASCII 0Ah

When the setting is "  ınFo  2":

### General data format

```
⌴⌴⌴⌴⌴⌴⌴⌴⌴⌴A⌴&⌴D<TERM>
MODEL⌴⌴⌴FX-3000i<TERM>
S/N⌴⌴⌴⌴⌴01234567<TERM>
ID⌴⌴⌴⌴⌴⌴ABCDEFG<TERM>
DATE<TERM>
<TERM>                    *
START<TERM>
TIME<TERM>
<TERM>                    *
<TERM>
─────────────────────────
<TERM>
<TERM>
WT⌴⌴⌴+1234.56⌴⌴g<TERM>
WT⌴⌴⌴+1234.61⌴⌴g<TERM>
WT⌴⌴⌴+1234.6°
```

```
⌴⌴⌴⌴.51⌴⌴g<TERM>
WT⌴⌴⌴+1234.53⌴⌴g<TERM>
WT⌴⌴⌴+1234.71⌴⌴g<TERM>
WT⌴⌴⌴+1234.64⌴⌴g<TERM>
<TERM>
END<TERM>
TIME<TERM>
<TERM>                    *
REMARKS<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
───────────────<TERM>
<TERM>
<TERM>
```

✱ With FZ-*i* / FZ-*i*WP / FZ-GD series, the time and date are added to output data.

58

# 12. UNDERHOOK

The underhook can be used for magnetic materials or density measurement. The built-in underhook is revealed by removing the plastic cap on the bottom of the balance.

Use the underhook as shown below.



**Bottom of the balance**

Underhook

Cap
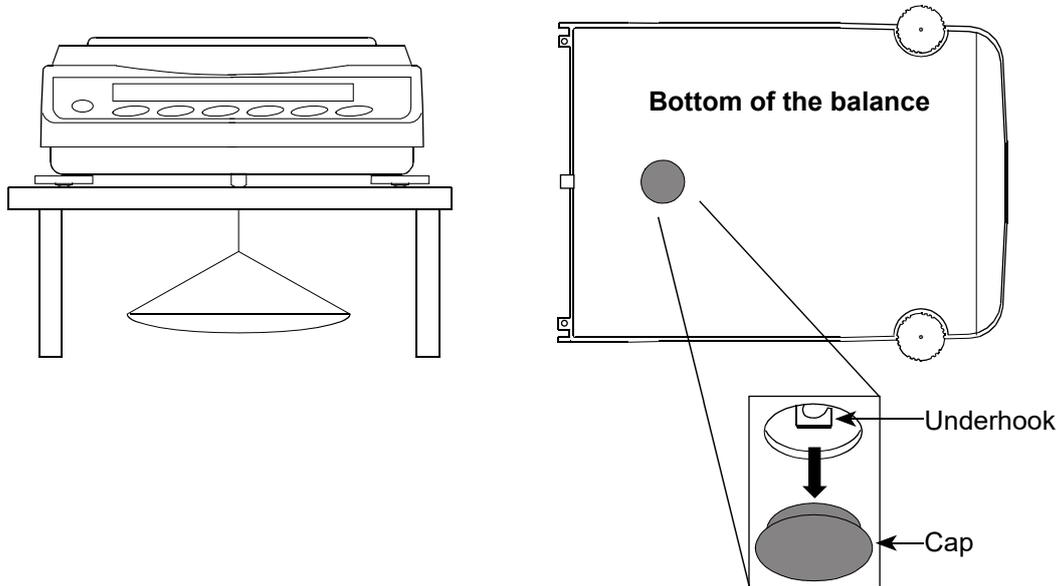
**Caution**

**Do not apply excessive force to the underhook.**

**When not in use, attach the plastic cap to prevent dust from getting into the balance.**

**Do not push the underhook upward.**

# 13. PROGRAMMABLE-UNIT

This is a programmable unit conversion function. It multiplies the weight data in grams by an arbitrary coefficient set in the function table and displays the result.

The coefficient must be within the range between the minimum and maximum shown below. If the coefficient set is beyond the range, an error is displayed and the balance returns to the coefficient setting mode, prompting to enter an appropriate value. A coefficient of 1 was set at the factory.

| Model | | | | Minimum coefficient | Maximum coefficient |
|---|---|---|---|---|---|
| FX/FZ series | 120*i* /200*i* /300*i* /500*i* | 120*i* WP/200*i* WP /300*i* WP | 120GD/200GD/300GD | 0.000001 | 1000 |
| FX/FZ series | 1200*i* /2000*i* /3000*i* /5000*i* | 1200*i* WP /2000*i* WP /3000*i* WP | 1200GD/2000GD/3000GD | | 100 |

## Operation

1  Press and hold the SAMPLE key until $\boxed{bASFnc}$ of the function table is displayed.

2  Press the SAMPLE key several times to display $\boxed{nLtd}$.

3  Press the PRINT key. The balance enters the mode to confirm or set the coefficient.

## Confirming the coefficient

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

## Setting the coefficient

5  Set the coefficient using the following keys.



| | |
|---|---|
| SAMPLE key | To select a digit to change the value. The selected digit blinks. |
| RE-ZERO key | To change the value. |
| MODE key | To change the decimal point position. Each time the switch is pressed, the decimal point position changes as follows: |

$$0.000001 \longrightarrow 00.00001 \longrightarrow ... \longrightarrow 000000.1 \longrightarrow 0000001$$

| | |
|---|---|
| PRINT key | To store the new setting, display $\boxed{End}$ and go to step 6. |
| CAL key | To cancel the new setting and go to step 6. |
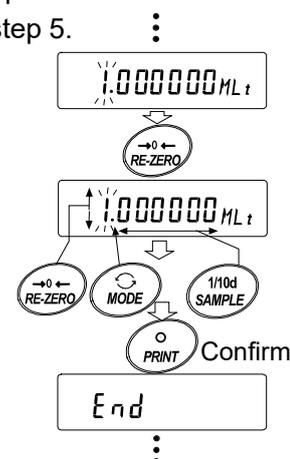
## Quitting the operation

6  The balance displays $\boxed{Unit}$. Press the CAL key to exit the programmable-unit function and return to the weighing mode.

## Using the function

Press the MODE key to select the programmable-unit (no display on the unit section). Perform weighing as described in "6.1. Basic Operation (Gram Mode)". After weighing, the balance displays the result (weight data in grams x coefficient).

# 14. PASSWORD LOCK FUNCTION

By using the password lock function, it is possible to limit the usage and functions of the balance.
This function is effective for preventing tampering of date / time setting and preventing internal setting changes by the user.
The password is set with four keys MODE , SAMPLE , PRINT and RE-ZERO keys in four digits (4 x 4 x 4 x 4 = 256 outcomes) .
At factory settings, the password lock function is disabled.
Enabling / disabling the password lock function and registering the password are performed in the function table.

**Note**
    **The password lock function can be used with balance software version 4.304 or later.**

## Description of Pass word Lock Function

Three types of settings are possible depending on the "$PASS$" setting of the Function Table "Password lock function ($LocFnc$)".

| | |
|---|---|
| $PASS$ $0$ | No password lock function |
| $PASS$ $1$ | Request password input at the start of weighing |
| $PASS$ $2$ | To change the setting, login is required with the administrator's password. |

$PASS$ $0$ ( No password lock function)
    The password lock function is not used.
    Anyone can perform weighing work. In addition, all functions can be used and setting changes are also possible.

$PASS$ $1$ (Request password input at the start of weighing)
    An administrator ($Ad\bar{m}IN$) can limit the users of the balance by setting individual passwords.
    (The password input is required at the start of weighing with the ON:OFF key.)
    The balance cannot be in weighing state unless you enter the correct password.
    There are two login levels: Administrator ($Ad\bar{m}IN$) and user ($USEr$ $01$ to $10$)

| | |
|---|---|
| Administrator ($Ad\bar{m}IN$) | All functions and settings can be used. |
| | Passwords for 10 users can be set individually. |
| User ($USEr$ $01$ to $10$) | Initialization and setting changes are restricted (including clock). |
| No password | The balance cannot be used. |

$PASS$ $2$ ( To change the setting, login is required with the administrator's password.)
    Anyone can perform weighing work, and initialization and setting changes can be restricted (including clock).
    (Password input is not requested when weighing starts with the ON/OFF key.)
    There are two levels of login level :Administrator ($Ad\bar{m}IN$) and user ($GUEST$)

| | |
|---|---|
| Administrator ($Ad\bar{m}IN$) | All functions and settings can be used. |
| Guest ($GUEST$) | Initialization and changing setting is restricted.(including clock) |

    When weighing is started with the ON:OFF key while pressing the CAL key when the display is off, the password of the administrator ($Ad\bar{m}IN$) is requested. (Refer to Page 65 for details of the operation.）

**Items that are limited by login level**

| Login level | Weighing | | |
|---|---|---|---|
| | Password input at weighing start | Calibration | Change the function setting*5 |
| Administrator ($Ad\bar{m}IN$) | Necessary | Possible | Possible |
| User ($USEr\ 01$ to $10$) | | Impossible *6 | Impossible |
| Guest ($GUEST$) | Unnecessary | | |

*5 Changing response characteristics, function selection and initialization, function settings (setting of date and time).

*6 The administrator ($Ad\bar{m}IN$) can set this to prohibited as shown in "9. FUNCTION SWITCH AND INITIALIZATION".

# Enable Password Lock Function

By the password function (*LocFnc*) of the Function table, the password function can be switched between "Invalid (*OFF*) / Valid (*ALL*) / Valid (*Fnc*)".

1. In the weighing mode, press and hold the [SAMPLE] key for 2 seconds to display [*bASFnc*].

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

3. Press the [PRINT] key to display [*PASS 0*]. (To cancel, press the [CAL] key.)

4. Press the [RE-ZERO] key to display [*PASS 1*]. (Press the [RE-ZERO] key again to display [*PASS 2*].

5. Press the [PRINT] key to display [*SurE, No* YES]. ("*No*" blinking while "No" selected.)

6. Press the [RE-ZERO] key to switch *No*/*YES*.

7. Display [*SurE, No* YES]. (*YES* blinking when selected YES.)

8. Press the [PRINT] key while YES is selected to enable the password lock function. (With *PASS 1*, password input is requested when the display is ON).

9. [*Loc no.*] is displayed. To register (change) the password, proceed to 4 on the "Registering Password (Changing)". If you will not register, press the [CAL] key twice to return to the weighing display.

---

0.00 g

Press and hold for 2 seconds — [1/10d SAMPLE]

*bASFnc*

Press several times — [1/10d SAMPLE]

⋮

*LocFnc*
⬇
[⊙ PRINT]
⬇
*PASS 0* (oFF)
⬇
[→0← RE-ZERO]
⬇
*PASS 1* (ALL)
⬇
[⊙ PRINT]
⬇
Select No — *SurE, No* YES
*SurE, No* YES ↔
[→0← RE-ZERO]
Change Yes/No
⬇
Select Yes — *SurE, No* YES
Confirm [⊙ PRINT]
⬇
*SurE,* YES
⬇
*End*
⬇
*Loc no.*
⬇
[▼ CAL] ×2
⬇
0.00 g
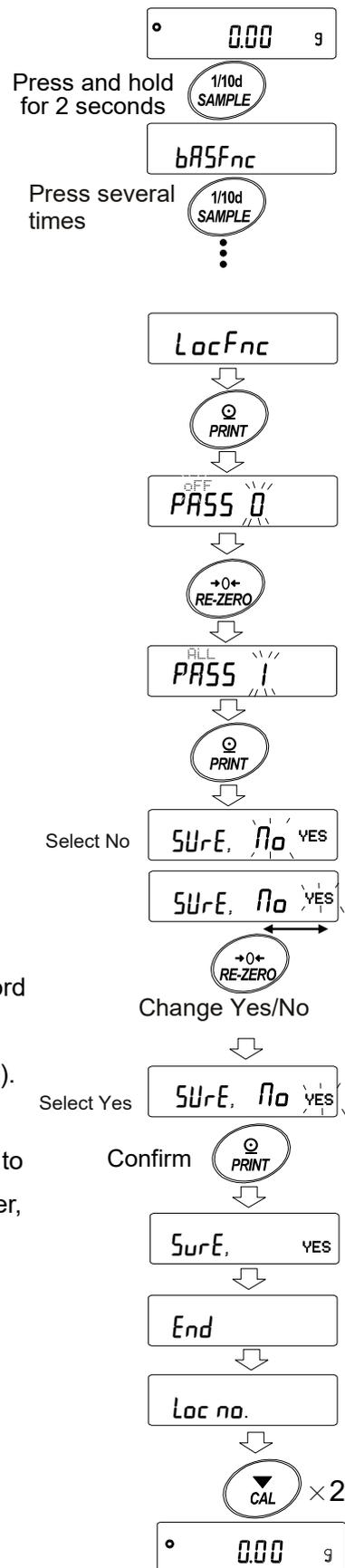
# How To Input The Password At The Start Of Weighing

$PASS \ 1$ (Request password input at the start of weighing)

1. Press the ON:OFF key while the display off.

2. After display $PASS$ , it becomes password input display ---- PW .

3. Input 4 digits password using the following keys.
   The balance will turn automatically after no operation for ten minutes.
   
   MODE key .............Character $\bar{n}$
   
   SAMPLE key..........Character $5$
   
   PRINT key .............Character $P$
   
   RE-ZERO key........Character $2$
   
   CAL key .................Back key

4. If the password is correct, the login level will be displayed, the weighing will be displayed after all lamps are illuminated. After entering the administrator's password, log in as an administrator.
   (At factory settings, the password is set to $2222$ by RE-ZERO key input 4 times at the administrator level.)
   If the password is incorrect, the buzzer sounds 3 times, $FAiL$ will display and the display will turn off.

Input 4 times

Password

Login level display

No key operation for 10 minutes

Password is incorrect

Weighing display          Display off

---
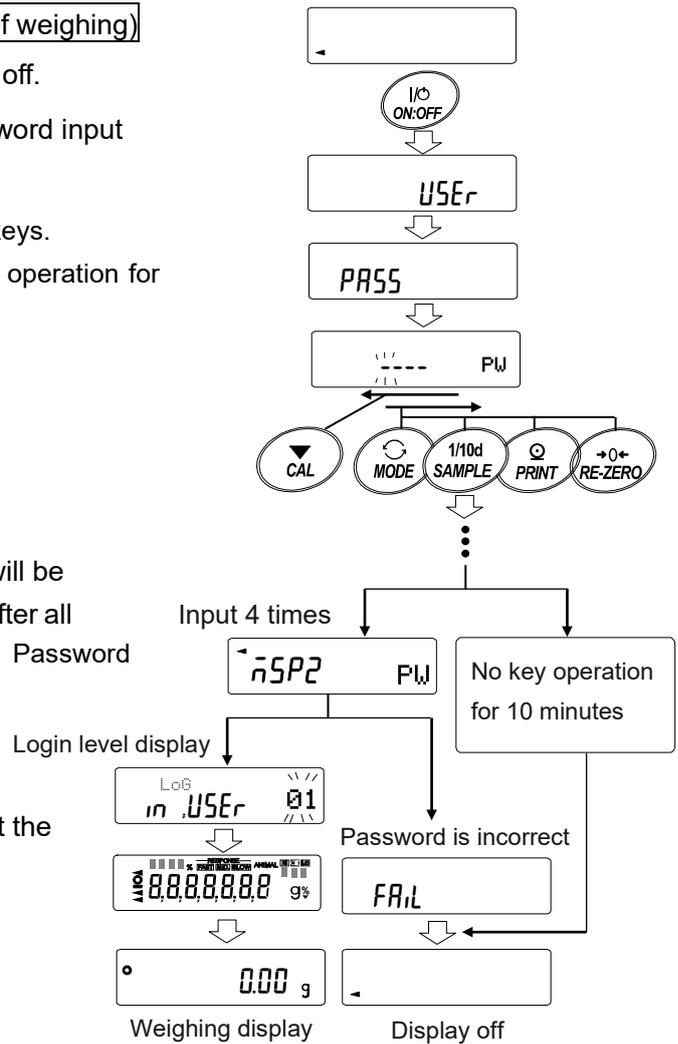
$PASS \ 2$ (To change the setting, login is required with the administrator's password)

When logged in as a guest ($GUESt$)

1. Press the ON:OFF key while the display off.

2. After in, GUEST displayed, return to the weighing display.

Weighing display
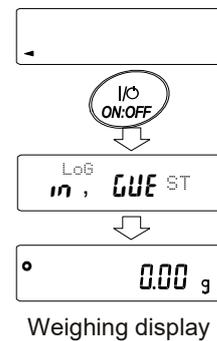
When logging in as administrator ($Ad\bar{m}IN.$) ($PASS\ 1$ or $PASS\ 2$)

1. Press the ON:OFF key with holding CAL key while the display off.

2. Input the 4 digits password using the following keys. The balance will turn automatically after no operation for 10 minutes.

   MODE key.............Character $\bar{n}$
   SAMPLE key.........Character $5$
   PRINT key ............Character $P$
   RE-ZERO key.......Character $2$
   CAL key................Back key

3. If the password is correct, the login level will be displayed, the weighing will be displayed after all lamps are displayed. (At factory settings, the password is set with $2222$ of RE-ZERO key input 4 times at the administrator level.) If the password is incorrect, the buzzer sounds 3 times in $FAiL$ display and the display turns off.

Pewss and hold

$Ad\bar{m}IN$

$PASS$

`‐‐‐‐     PW`

Input 4 times
Password is correct

`2222     PW`

No key operation for 10 minutes

`LoG _ in .Ad\bar{m}     IN`

`8.8.8.8.8.8.8.8   g%`

`0.00  g`
Weighing display

Password is incorrect

$FAiL$

Display off
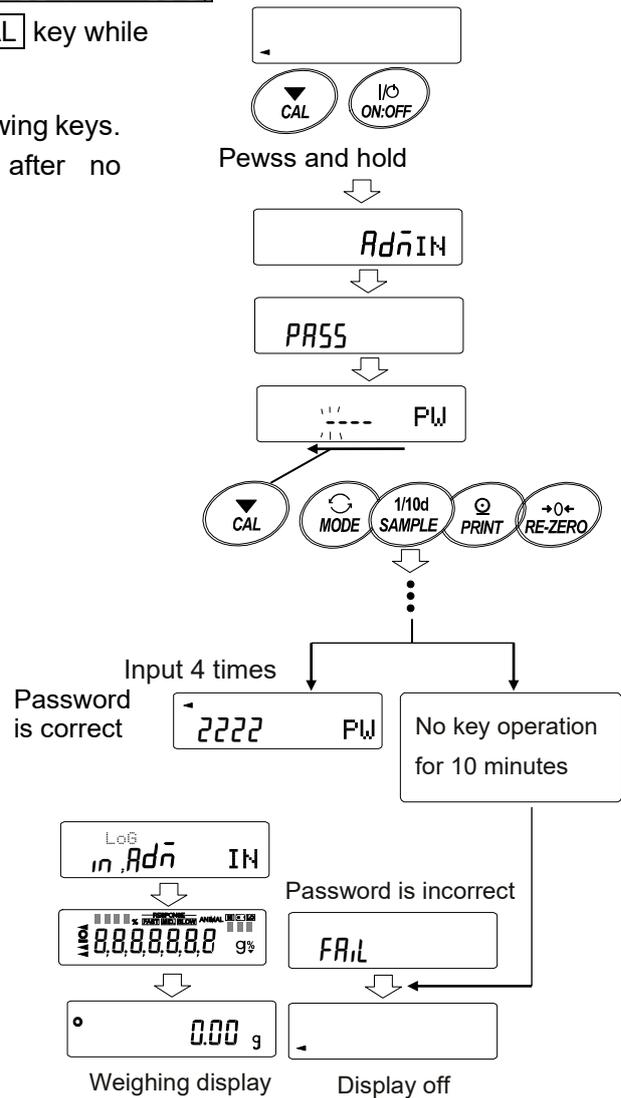
# How To Logout

Log out by turning off the display using the ON:OFF key.
If set to " $PASS\ 1$ ", the password will be requested again when switching the display from off to the weighing mode.

`0.00  g`
Weighing display

Display off
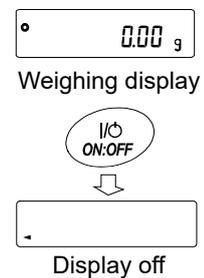
# Registering Password (Changing)

The password can be changed at "Password ($Loc\ no.$)" of the Function Table.

1. Press and hold the SAMPLE key for 2 seconds in the weighing mode.
   $bASFnc$ is displayed.

2. Press the SAMPLE key several times to diaplay $LocFnc$.

3. Press the PRINT key to display $PASS$.

4. Press the SAMPLE key to display $Loc\ no.$.

5. Press the PRINT key to display $AdmIN$.

6. Press the SAMPLE key to change the login level $AdmIN$ / $USEr$ $01$ to $10$.
   If the password is already registered at the login level, the stability mark [ o        ] is lit. (changeable)

7. Press the PRINT key to change the password.
   Refer to "Changing Password".
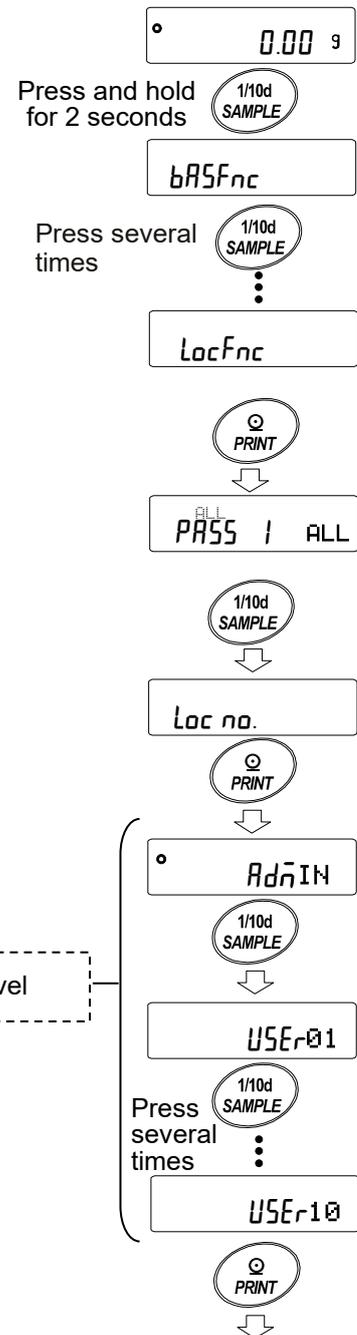
**Note**

☐ Log out by turning off the display using the ON:OFF key.

☐ If set to $PASS\ 2$, the $AdmIN$ password is required when logging in as an administrator.
   Password registration of $USEr$ $01$ to $10$ is unnecessary.

---

Right column diagram:

$0.00$ g

Press and hold for 2 seconds — 1/10d SAMPLE

$bASFnc$

Press several times — 1/10d SAMPLE

$LocFnc$

PRINT

$PASS$ $1$  ALL

1/10d SAMPLE

$Loc\ no.$

PRINT

$AdmIN$

Login level

1/10d SAMPLE

$USEr01$

Press several times — 1/10d SAMPLE

$USEr10$

PRINT

Refer to "Changing Password"

# Changing Password

1. Refer to "Registering Password (Changing)" and display the login level you want to change the password on.
2. Press the PRINT key to display the current password. At factory settings, the password is ⎡2222⎦. (the RE-ZERO key, 4 times)
3. Set the new password using the following keys. The balance will turn automatically after no operation for 10 minutes.
   - MODE key ....................Character ⁻ₙ
   - SAMPLE key................Character 5
   - PRINT key ..................Character P
   - RE-ZERO key .............Character 2
   - CAL key .......................Back key
   - CAL key(long press)..Delete password
   (Refer to "How To Delete The Password USEr 01 to 10)
4. Input 4 characters of the new password using these keys.
5. The balance displays ⎡SurE, �ⁿo YES⎦ where "No" is blinking when "No" is selected. (Press the CAL key to return to the 4th character input.)
6. Press the RE-ZERO key to display ⎡SurE, ⁿo YES⎦ where "YES" is blinking when "YES" is selected.
7. Press the PRINT key to store the new password when "YES" is selected.
8. When the setting is completed, the next level is displayed. To continue the setting, set it from "6". To end the setting, press the CAL key 3 times to return to the weighing display.

## Note
☐ If you forget your password, the balance can not be used. Please record and keep the password you registered.
☐ The password that is already registered by the administrator (Ad⁻ₘIN) cannot be registered by the user (USEr 01 to 10).

Refer to "Registering Password (Changing)"

⬇

° Ad⁻ₘ IN

PRINT ⬇

Current password display

ADM 2222 PW

CAL (Return one letter) | MODE | 1/10d SAMPLE | PRINT | RE-ZERO

Return one letter

Input 4th letter

ADM ⁻ₙSP2 PW

⬇

ADM ⁻ₙSP2 PW

⬇

SurE, ⁿo YES

CAL | RE-ZERO

No key operation for minutes

SurE, ⁿo YES

Determine PRINT ⬇

SurE, YES

⬇

End

Display off

⬇

USEr 01

PRINT | CAL ×3

⬇

° 0.00 g

67
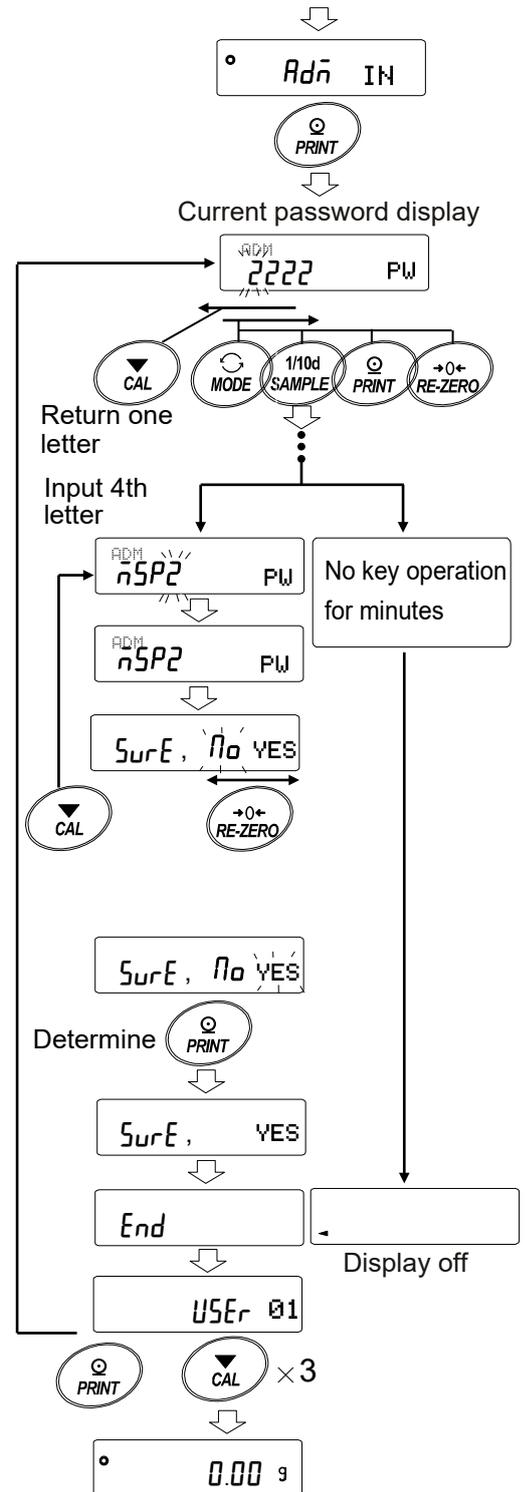
## How To Delete The Password (USEr 01 to 10 )

1. Refer to "Changing Password" and select the user (USEr 01 to 10) and display the Password input screen.

2. Hold down the CAL key when setting the password and display | CLEAr | (blink).

3. Press the PRINT key to display | CLEAr    No | .

4. Press the RE-ZERO to change Go / No

5. Press the PRINT when | CLEAr    Go | to display | End | and delete the password.

**Note**
☐ The administrator's password cannot be deleted. Please refer to "Registering Password (Changing)" and "Changing Password" to change an arbitrary password.

Refer to "Changing Password"
⇩
| n01 |
| n5P2    PW |

Press and hold for 2 seconds
▼ CAL
⇩

| n01 |
| CLEAr |

◎ PRINT
⇩

| CLEAr    No |

→0← RE-ZERO
⇩

| CLEAr    Go |

◎ PRINT
⇩

| End |
⇩

| USEr 01 |
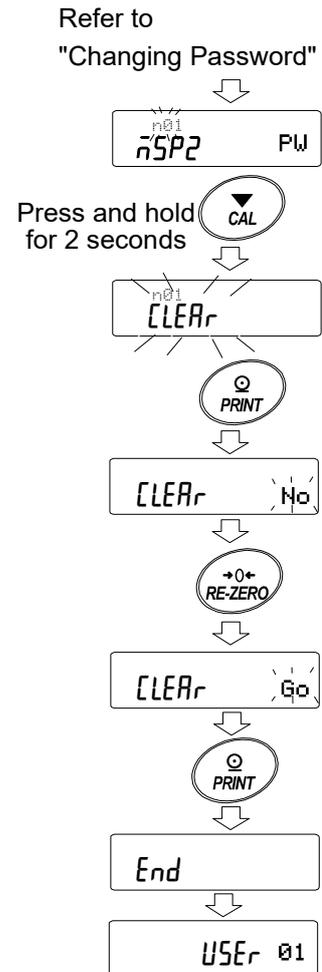
## Missing Password

If the correct password is missing, the balance can not be used.
Contact your local A&D dealer to reset the password to factory settings.

# 15. Checking the Balance Software Version

The balance specifications vary depending on the balance software version. Follow the steps below to check the balance software version.

1  Unplug the AC adapter from the balance and plug it back in.

2  | P- *.*** | is displayed with the software version in place of *.***.
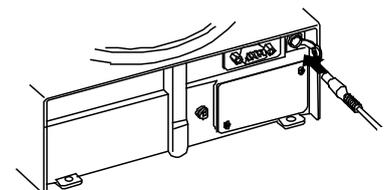
⇩
| P-4.304 |

# 16. RS-232C SERIAL INTERFACE

The balance is a Data Communication Equipment (DCE) device. Connect the balance to a personal computer (DTE) using a straight through cable.

| | | |
|---|---|---|
| Transmission system | : | EIA RS-232C (D-Sub 9-pin, male connector) |
| Transmission form | : | Asynchronous, bi-directional, half duplex |
| Transmission rate | : | 20 times/second, 10 times/second or 5 times/second (same as data refresh rate) |
| Data format | : | Baud rate : 600, 1200, 2400, 4800, 9600, 19200 bps |
| | | Data bits : 7 or 8 bits |
| | | Parity : Even, Odd (Data bits 7 bits) |
| | | None (Data bits 8 bits) |
| | | Stop bit : 1 bit |
| | | Code : ASCII |
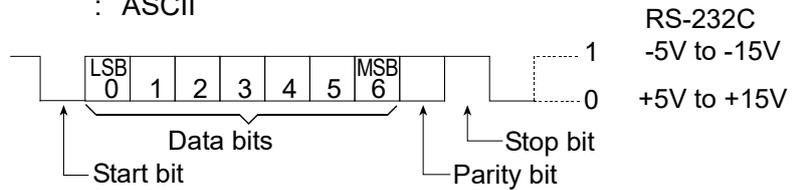


## D-Sub 9-pin assignments

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

Signal names of the balance side are the same as the DTE side with TXD and RXD reversed.



#4-40UNC
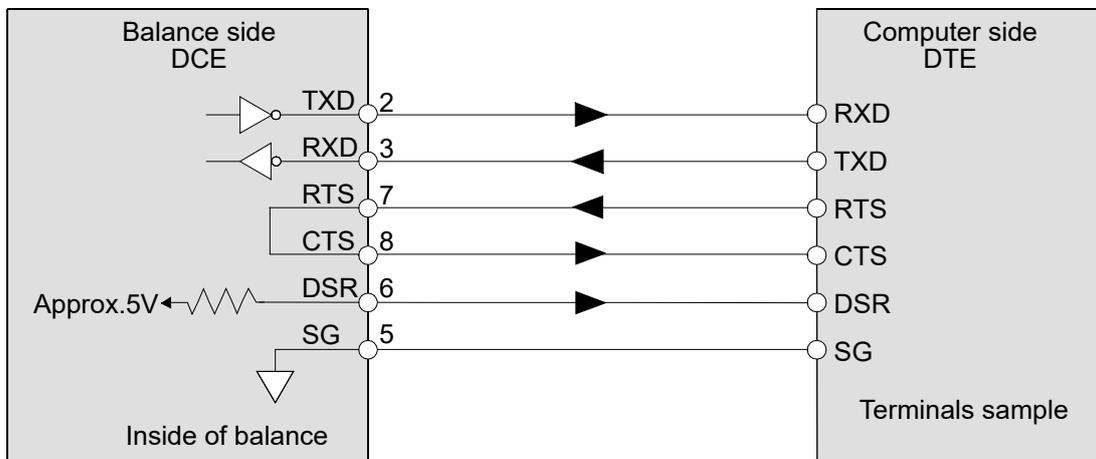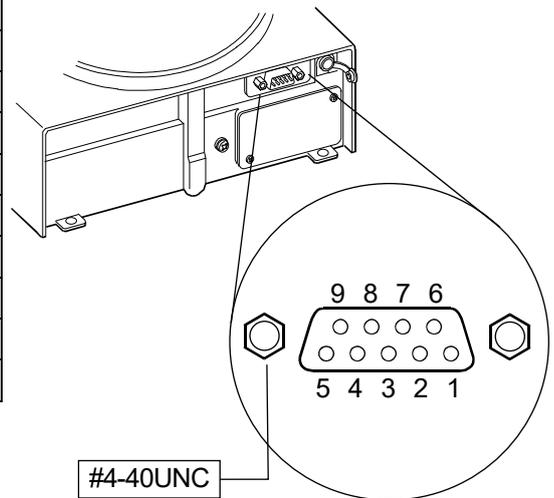


*1 For use with some A&D products.

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.

# 17. CONNECTION TO Peripheral EQUIPMENT

## 17.1. Connection to the AD-8127 Multi Printer or AD-8126 Mini Printer

When connecting the printer to the balance for printing measured values, configure the printer and the balance as follows according to these usage examples.

### Internal settings of the printer

| Usage example | AD-8126 Mini printer | AD-8127 Milti printer Printing mode settings |
|---|---|---|
| When printing values measured by the balance with the balance's PRINT key or its "Auto-print" mode. | No setting | EXT.KEY |
| When printing values measured by the balance with the printer's "Printing" key or while in its timer mode. When printing charts with the printer. | | MANUAL AUTO TIMER CHART |
| When printing the balance's statistical calculation results. When printing the balance's GLP data output. | No setting | DUMP |

▢ Refer to the instruction manual of the AD-8127 for how to change internal settings of the AD-8127 multi printer.

### Internal settings of the balance

| Usage example | Balance $Prt$ Data output mode | Balance $type$ Data format |
|---|---|---|
| When printing values measured by the balance with the balance's PRINT key or its "Auto-print" mode. | $0, 1, 2, 4, 5$ | $0$ |
| When printing values measured by the balance with the printer's "Printing" key or while in its timer mode. When printing charts with the printer. | $3, 6$ | $0$ |
| When printing the balance's statistical calculation results. When printing the balance's GLP data output. | $0, 1, 2, 4, 5, 6$ | $1$ |

**Precautions on use of the AD-8126 mini printer**

▢ **The AD-8126 is a dump printer. It prints data output from the balance as is.**
   **We recommend changing the printer settings to dump print format because the output format of the balance is set to A&D standard format at shipment.**

▢ **To set the balance to dump print format, set the function setting "$type$" to " $1$".**

## 17.2.   Connection to the AD-8121B Printer

Set the following parameters to use the AD-8121B printer.

| Example of use | AD-8121B mode setting |
|---|---|
| To print A&D standard format weight data, using the FZ-*i* / FX-*i* PRINT key or auto print mode. (The time and date can be added.) | MODE 1 |
| To print A&D standard format weight data, using the AD-8121B DATA key or AD-8121B built-in timer. (The time and date can be added.)<br>To print, using the AD-8121B chart printing function. | MODE 2 |
| To print the FZ-*i* / FX-*i* statistical data. | MODE 3 |
| To print GLP output. | MODE 3 |

| Class | Item and Parameter | | Factory settings | AD-8121B MODE 1 | AD-8121B MODE 2 | AD-8121B MODE 3 |
|---|---|---|---|---|---|---|
| *dout*<br>Data output | *Prt* | Data output mode | *0* | *0,1,2,4,5* *1 | *3* | *0,1,2,4,5* *1 |
| | *PUSE* | Data output pause | *0* | *0* | *0* | *0,1* *2 |
| *S iF*<br>Serial interface | *bPS* | Baud rate | *2* | *2* | *2* | *2* |
| | *btPr* | Data bit, parity bit | *0* | *0* | *0* | *0* |
| | *CrLF* | Terminator | *0* | *0* | *0* | *0* |
| | *tYPE* | Data format | *0* | *0* | *0* | *1* |

*1   Set appropriate parameters for "*AP-P* (Auto print polarity)" and "*AP-b* (Auto print difference) " when auto print mode A or B (*Prt   1* or *2*) is selected.
   Set the AD-8121B DIP switch No.3 to ON when unstable data is printed with "*Prt   4*".

 *2   Set *1* when multiple lines are printed in the FZ-*i* / FX-*i* /FZ-*i*WP /FX-*i*WP /FZ-GD /FX-GD statistical calculation mode.

**Notes**
**Refer to "11.2. GLP Report" for print samples.**
**Settings of AD-8121B DIP switches**

| MODE | AD-8121B DIP switch | Description |
|---|---|---|
| MODE 1 |  | Print at receiving data.<br>Standard mode, statistical calculation mode |
| MODE 2 |  | Print by the AD-8121B DATA key operation or AD-8121B built-in timer.<br>Standard mode, interval mode, chart mode |
| MODE 3 |  | Print at receiving data.<br>Dump print mode |
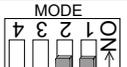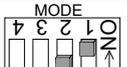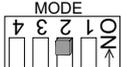
DIP switch No.3 : Handling unstable data
    ON      Print
    OFF    Not printed
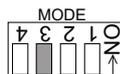
Set the DIP switch No.4 to OFF.
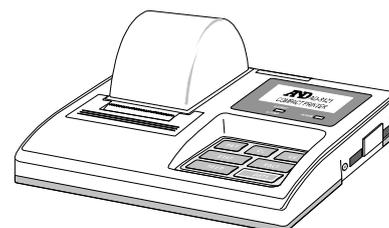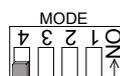
## 17.3.   Connection to a Computer

The balance can be connected to a personal computer using the RS-232C serial interface. As an option, the FX*i* –02 USB interface is available to transmit the balance data to a personal computer.

The balance is a DCE device. Use a straight through cable when connecting to a personal computer. A commercially available modem cable can be used. When purchasing, confirm the following specifications.

D-Sub 9-pin
Female connector
Inch screw thread
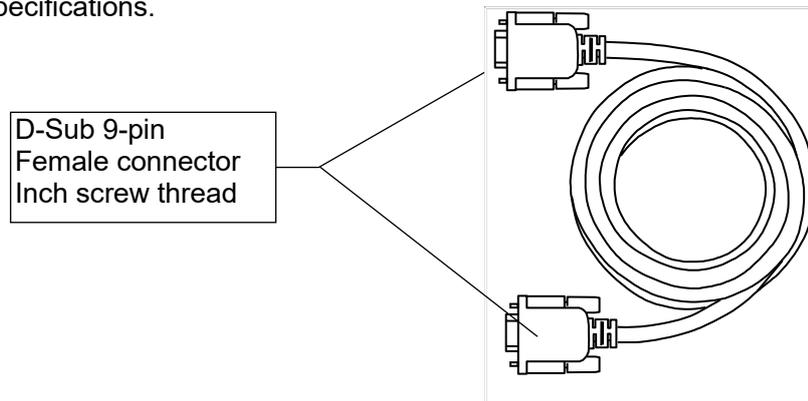
# 17.4.  Using Windows Communication Tools (WinCT)

When Windows is used as an operating system in a personal computer, the WinCT software, that is downloaded from the A&D website, can be used to transmit the weight data to the personal computer.

The WinCT has two communication methods: "RsCom" and "RsKey".

**RsCom**
- Can transmit commands to control the balance.
- Can make bi-directional communication between the balance and a personal computer using the RS-232C serial interface.
- Can display or store the data using a text file format. Can also print the data using a printer connected to a personal computer.
- When several ports of a personal computer have balances connected, can communicate with each balance simultaneously.
- Can share a personal computer with other application software.

**RsKey**
- Can transmit the weight data output from the balance directly to other application software such as Microsoft Excel.
- Can be used with most application software.

**RsWeight**
- Can retrieve the weight data from the balance and display the data as a graph in real time.
- Can calculate and display the maximum, minimum, average, standard deviation and coefficient of variation.

**Using the WinCT software, the balance can do the following:**

1  Analyzing the weight data and the statistics with "RsKey"
   The weight data can be input directly into an Excel worksheet. Then, Excel can analyze the data to obtain sum, average, standard deviation, maximum and minimum value, and display them as a graph.

2  Controlling the balance using commands from a personal computer
   By using "RsCom", the personal computer sends commands such as "re-zero" or "send weight data" to the balance and controls the balance.

3  Printing the balance GLP report using your printer
   The balance GLP report can be printed using a printer connected to a personal computer.

4  Receiving weight data at a certain interval
   The weight data can be received at a certain interval and data characteristic with elapsed time can be obtained.

5  Using a personal computer as an external indicator
   With the "RsKey" test mode function, a personal computer can be used as an external weight indicator for the balance. (To do this, set the balance data output mode to stream mode.)


## 17.5.　　Simultaneously Connecting the AD-8127 Printer and a Personal Computer

The balance can be connected to the AD-8127 printer and a personal computer simultaneously using the F*xi*-02 USB interface to store and print the data.
In that case, a USB cable and the winCT software are necessary.
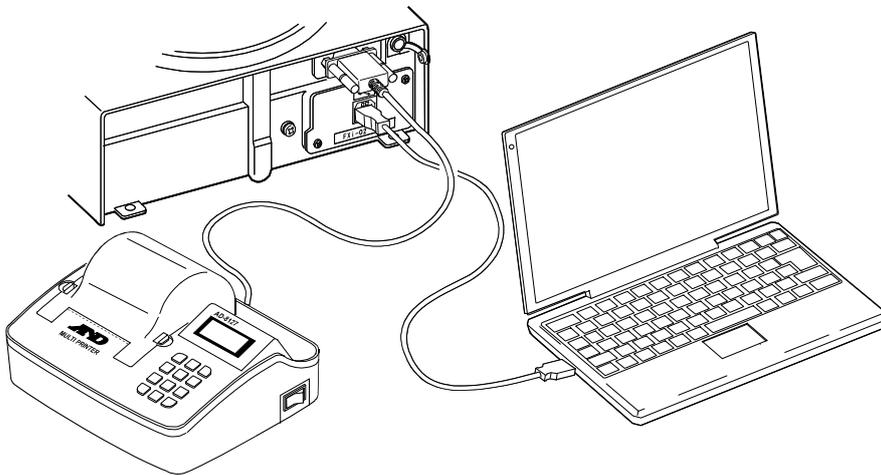
# 18. COMMANDS

## 18.1. Command List

**Note**
A command has a terminator added, that is specified using the "Terminator ($CrLF$)" parameter of "Serial interface ($SiF$)" in the function table, and is sent to the balance.

### Commands to query weight data

| | |
|---|---|
| C | Cancels the **S** or **SIR** command. |
| Q | Requests the weight data immediately. |
| S | Requests the weight data when stabilized. |
| SI | Requests the weight data immediately. |
| SIR | Requests the weight data continuously. |
| $^{Esc}$P | Requests the weight data when stabilized. |

**Note**: The "Q" and "SI" commands, the "S" and "$^{Esc}$P" commands behave the same.

### Commands to control the balance

| | |
|---|---|
| CAL | Same as the CAL key. |
| EXC * | Calibration using an external weight |
| OFF | Turns the display off. |
| ON | Turns the display on. |
| P | Same as the ON:OFF key |
| PRT | Same as the PRINT key |
| R | Same as the RE-ZERO key |
| SMP | Same as the SAMPLE key. |
| T | Tare key |
| Z | Same as the RE-ZERO key |
| $^{Esc}$T | Same as the RE-ZERO key |
| U | Same as the MODE key |
| ?ID | Requests the ID number. |
| ?SN | Requests the serial number. |
| ?TN | Requests the model name. |
| ?PT | Requests the tare weight. |
| PT: *****. *␣␣g | Changes the tare weight.<br>The unit added is the current weighing unit in A&D standard format. |
| ?UW | Requests the unit mass value. |
| UW: ***. ***␣␣g | Changes the unit mass value (weight per piece).<br>Use the unit code (three digits) in A&D standard format for the unit. |
| ?KL | Requests the key lock status.<br>KL,000   All keys unlocked<br>KL,001   All keys locked |
| KL: *** | Changes the key lock status.<br>KL:000   Unlock all keys<br>KL:001   Lock all keys |

**Note:**   The "R", "Z" and "$^{Esc}$T" commands behave the same.

$^{Esc}$ :   **ASCII code 1Bh**

\* :   **Only for the FZ-*i* / FZ-*i* WP  / FZ-GD series**

# 18.2. Acknowledge Code and Error Codes

When the "AK, Error code ($ErCd$)" parameter of "Serial interface ($SiF$)" is set to "$l$", the balance outputs <AK> code or an error code for each command as follows:

<AK> (06h) Acknowledge in ASCII code.

● When the balance receives a command to request data and can not process it, the balance transmits an error code (EC, Exx).

   When the balance receives a command to request data and can process it, the balance outputs the data.

● When the balance receives a command to control the balance and can not process it, the balance transmits an error code (EC, Exx).

   When the balance receives a command to control the balance and can process it, the balance transmits the acknowledge code.

   Among commands to control the balance, the following transmit the acknowledge code both when the balance receives the command and when the balance has accomplished the command. If the command can not be processed properly, the balance transmits an error code (EC, Exx). This error can be released using the CAL command.

   CAL command (When performing the calibration using a calibration weight)

   ON command, P command

   R command, Z command, T command (When setting the display to zero)

## R command example
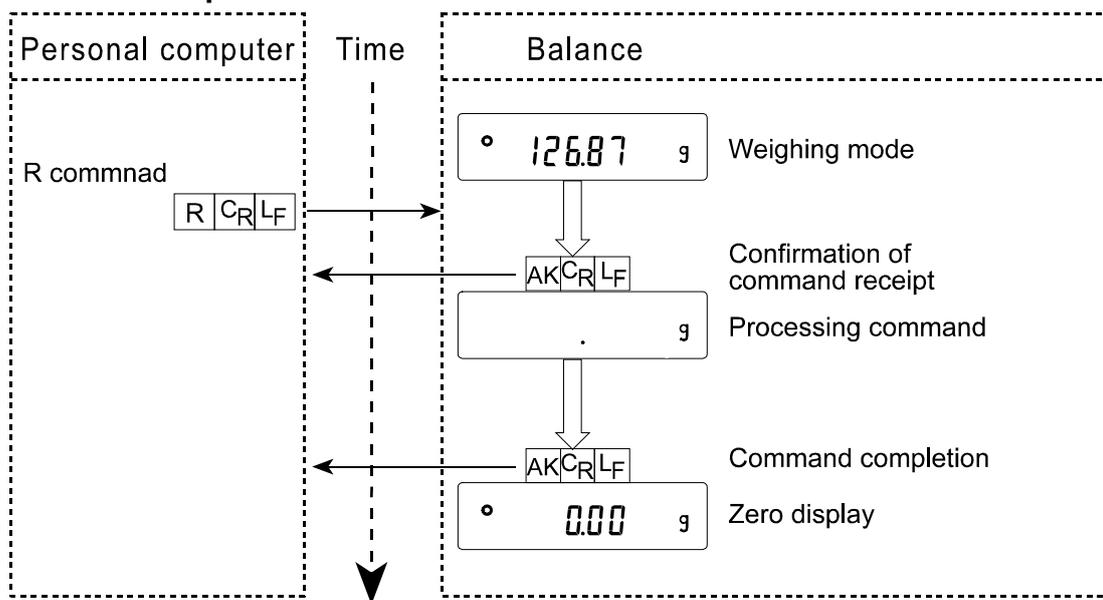


## CAL command example (FZ-*i* / FZ-*i*WP / FZ-GD series: Calibration using the internal mass)
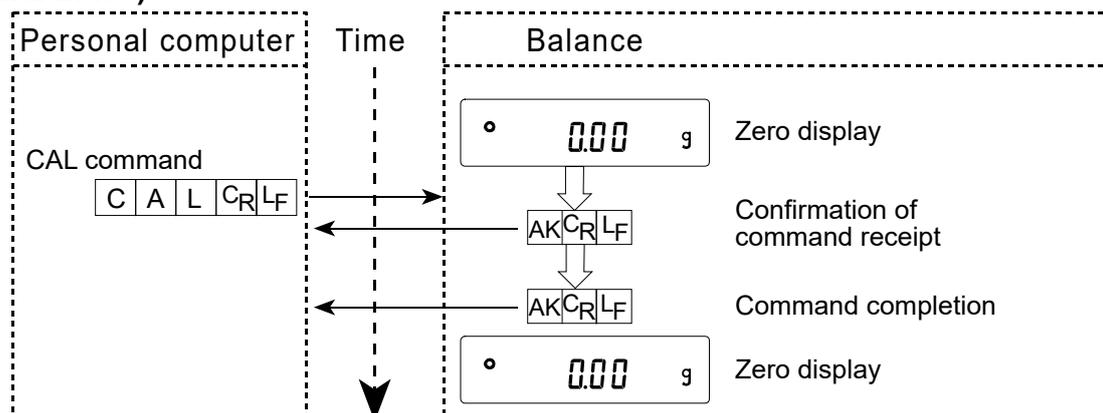
## CAL command example (FX-*i* / FX-*i*WP / FX-GD series: Calibration using an external weight)

∗ : EXC command for FZ-*i* / FZ-*i*WP / FZ-GD series

| Personal computer | Time | Balance | |
|---|---|---|---|
| | | °    0.00   g | Zero display |
| **CAL command** ∗ | | | |
| C \| A \| L \| C$_R$ \| L$_F$ →→→ | | | |
| ←←← AK\|C$_R$\|L$_F$ | | | Confirmation of command receipt |
| | | *C AL  0* | |
| **PRT command** | | | |
| P \| R \| T \| C$_R$ \| L$_F$ →→→ | | | |
| ←←← AK\|C$_R$\|L$_F$ | | | Confirmation of command receipt |
| | | ◄ *C AL  0* | Starts inputting data |
| ←←← AK\|C$_R$\|L$_F$ | | | |
| | | *2000* | Calibration weight value display |
| (Place the calibration weight on the weighing pan.) | | Calibration weight | |
| **PRT command** | | | |
| P \| R \| T \| C$_R$ \| L$_F$ →→→ | | | |
| ←←← AK\|C$_R$\|L$_F$ | | | Confirmation of command receipt |
| | | ◄ *2000* | Starts inputting data |
| ←←← AK\|C$_R$\|L$_F$ | | | Command completion |
| | | *End* | |
| (Remove the calibration weight from the weighing pan.) | | | |
| ←←← AK\|C$_R$\|L$_F$ | | | |
| | | .   g | RE-ZERO operation |
| ←←← AK\|C$_R$\|L$_F$ | | | |
| | | °    0.00   g | Zero display |

**T command example**



**PT command example**
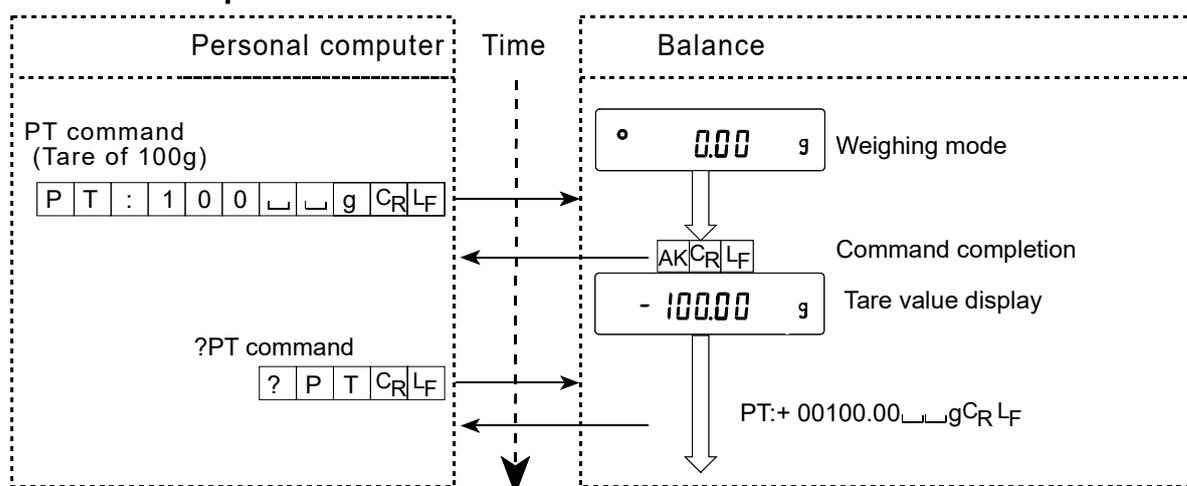


● When a communication error has occurred due to external noise, or a parity error has occurred due to transmission error, the balance transmits an error code. In this case, send the command again.

## 18.3. Settings Related to RS-232C

Concerning the RS-232C, the balance has two functions: "Data output ( $dout$ )" and "Serial interface ( $S\,iF$ )". Set each function as necessary.

# 19.  MAINTENANCE

## 19.1.  Care

**Cleaning the balance**

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

| | |
|---|---|
| Balance main unit | When cleaning the balance main unit, wipe it using a lint free soft cloth dampened with a mild detergent. |
| Breeze break | An anti-static treatment has been applied to the breeze break components. Wipe them with dry and a 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. |
| Weighing pan | When cleaning the weighing pan, handle it carefully so that your fingers are not injured by the edges. |

- Do not disassemble the balance.
- Use the original packing material for transportation.

**Specifications of the FZ-_i_WP/FX-_i_WP series**

- In normal use, the balance can be cleaned with water. But, keep the following precautions so that dust and water do not invade the balance.
    - Do not direct water pressure at the bottom of the balance.
    - Do not use powerful water jets.
    - Do not immerse the balance in water.
- While cleaning the balance and keeping it waterproof, cover the RS-232C interface connector using the terminal cover or connect the waterproof RS-232C cable  (AX-KO2737-500), and cover the AC adapter jack. Also, insure that the underhook cap is in place.



AC adapter jack
When the AC adapter is not connected, cover the jack.

RS-232C interface
Cover the interface connector or connect the waterproof RS-232C cable (AX-KO2737-500).
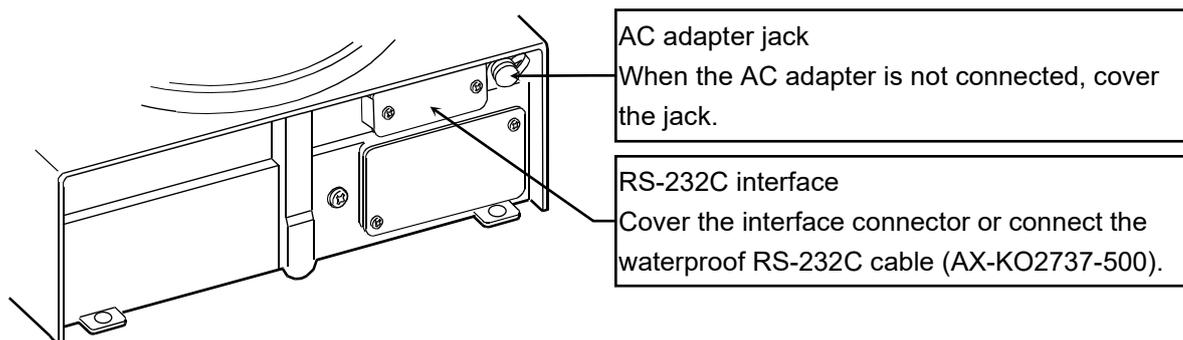
- If water accumulates on the waterproof diaphragm, a weight value may be difficult to become stable. Clean the diaphragm while taking much care not to deform it.
- If you wash the balance with hot water, condensation may form inside the balance.

    Be careful not to allow water vapor to enter inside.

# 20. TROUBLESHOOTING

## 20.1. Checking the Balance Performance and Environment

The balance is a precision instrument. When the operating environment or the operating method is inadequate, correct weighing can not be performed. Place a sample on the pan and remove it, and repeat this several times. If the balance seems to have a problem with repeatability or to perform improperly, check as described below. Also, visit our website, `http://www.aadd.jp/`, for "Information Library" and "FAQ". If improper performance persists after checking, contact the local A&D dealer for repair.

### Checking that the balance performs properly
● Check the balance repeatability using an external weight. Be sure to place the weight in the center of the weighing pan.
● Check the balance repeatability, linearity and calibrated value using external weights with a known value.

### Checking that the operating environment or weighing method is proper
#### Operating environment
● Is the weighing table solid enough (especially for the minimum weighing value of 0.001 g)?
● Is the balance level? Refer to "3.1. Before Use".
● Is the operating environment free from vibration and drafts? For the minimum weighing value of 0.001 g, has the breeze break been installed?
● Is there a strong electrical or magnetic noise source such as a motor near the balance?

#### Weighing method
● Is the weighing pan installed correctly?
● Is the RE-ZERO key pressed before placing a sample on the weighing pan?
● Is the sample placed in the center of the weighing pan?
● Has the balance been calibrated using an external weight? (Or one-touch calibration, only for the FZ-*i* / FZ-*i*WP / FZ-GD series)
● Has the balance been warmed up for 30 minutes before weighing?

#### Sample and container
● Has the sample absorbed or lost moisture due to the ambient conditions such as temperature and humidity?
● Has the temperature of the container been allowed to equalize to the ambient temperature? Refer to "3.2. During Use".
● Is the sample charged with static electricity? Refer to "3.2. During Use".
  The minimum weighing value of 0.001 g are prone to be charged with static electricity when the relative humidity is low.
● Is the sample of magnetic material such as iron? Caution is required for weighing magnetic materials. Refer to "3.2. During Use".

## 20.2. Error Codes

| Display | Error code | Description |
|---|---|---|
| `Error 1` | EC, E11 | **Stability error**<br>The balance can not stabilize due to an environmental problem. Prevent vibration, drafts, temperature changes, static electricity and magnetic fields.<br>Refer to "3. PRECAUTIONS" for details on the operating environment and "7. RESPONSE ADJUSTMENT" about adapting the balance to the environment.<br>To return to the weighing mode, press the CAL key. |
| `Error 2` | | **Out of range error**<br>The value entered is beyond the settable range.<br>Re-enter the value. |
| `Error 7` | EC, E17 | **Internal mass error (Only for the FZ-*i* /FZ-*i* WP /FZ-GD series)**<br>The internal mass application mechanism does not function properly. Perform the weighing operation from the beginning again. |
| `CAL E` | EC, E20 | **Calibration weight error**<br>The calibration weight is too heavy.<br>Confirm that the weighing pan is properly installed. Confirm the calibration weight value.<br>Press the CAL key to return to the weighing mode. |
| `-CAL E` | EC, E21 | **Calibration weight error**<br>The calibration weight is too light.<br>Confirm that the weighing pan is properly installed. Confirm the calibration weight value.<br>Press the CAL key to return to the weighing mode. |
| `E` | | **Overload error**<br>A sample beyond the balance weighing capacity has been placed on the pan.<br>Remove the sample from the pan. |
| `-E` | | **Weighing pan Error**<br>The weight value is too light.<br>Confirm that the weighing pan and pan support are properly installed. Press the ON:OFF key two times to return to the weighing mode. If the error still persists, calibrate the balance. |
| `Lo` | | **Sample mass error**<br>The balance can not store the sample for the counting mode or for the percent mode because it is too light.<br>Use a sample that is heavier |
| `25 - PCS`<br>`50 - PCS`<br>`100 - PCS` | | **Unit mass error**<br>The sample unit mass for the counting mode is too light. Storing and using it for counting will cause a counting error.<br>Add samples to reach the specified number and press the PRINT key.<br>Pressing the PRINT key without adding samples will shift the balance to the counting mode. But, to acquire accurate weighing, be sure to add samples. |

| | | |
|---|---|---|
| $Error0$ | | **Balance internal error**<br>If this error appears persistently, contact the local A&D dealer. |
| $rtc\ PF$ | | **Battery error for clock**<br>The back-up battery power for the clock was lost completely.<br>After pressing one of the keys, adjust the date and time. Even if the back-up battery power for the clock was lost and the balance is on or in the standby state, the balance performance will be normal. When this error appears frequently, repair is required. |
| $Lb$ | | **Low battery error**<br>Voltage of the power supply drops.<br>Confirm whether the correct AC adapter is used. |
| | EC, E00 | **Communications error**<br>A protocol error occurred in communications.<br>Confirm the format, baud rate and parity. |
| | EC, E01 | **Undefined command error**<br>An undefined command was received.<br>Confirm the command. |
| | EC, E02 | **Not ready**<br>A received command can not be processed.<br>e.g.  The balance received a Q command, but not in the weighing mode.<br>e.g.  The balance received a Q command while  processing a RE-ZERO command.<br>Adjust the delay time to transmit a command. |
| | EC, E03 | **Timeout error**<br>If the timeout parameter is set to "$t$-$UP$ $1$", the balance did not receive the next character of a command within the time limit of one second.<br>Confirm the communication. |
| | EC, E04 | **Excess characters error**<br>The balance received excessive characters in a command.<br>Confirm the command. |
| | EC, E06 | **Format error**<br>A command includes incorrect data.<br>e.g.  The data is numerically incorrect.<br>Confirm the command. |
| | EC, E07 | **Parameter setting error**<br>The received data exceeds the range that the balance can accept.<br>Confirm the parameter range of the command. |
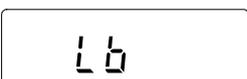
## 20.3.  Asking For Repair

If the balance needs service or repair, contact the local A&D dealer.

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

● Use the original packing material. ● Remove the weighing pan from the main unit

# 21. OPTIONS

## Accessories

**Note**
**The FX*i*-02, FX*i*-08 and FX*i*-09 can not be used at the same time.**
**Using the FX*i*-02, FX*i*-08 or FX*i*-09 with the FX-*i*WP, FZ-*i*WP**
**series prevents the balance from having the dustproof and**
**waterproof performance.**
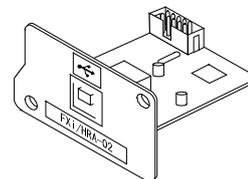
## FX*i*-02 USB interface
### (Installed in the balance, Applicable OS: Windows 98 OSR2 or later)
- Used to transmit the balance weight data (numerical value only) uni-directionally to a personal computer via USB.
- Can transmit the balance weight data (numerical value only) directly to application software such as Microsoft Excel, Word and memo pad.
- Driver installation is not necessary.

**Note**
**To perform bi-directional communication using**
**WinCT or input statistical data or GLP data to a**
**personal computer, use the USB converter**
**(AX-USB-9P-EX)**

FX *i* –02  Example of use

## FX*i*-08 Ethernet interface
- Used to connect the balance to a LAN.
- The "WinCT-Plus" data communication software is provided as a standard accessory and can perform the following.
  - Acquire data from multiple balances connected to a LAN.
  - Control these balances with commands.
  - Acquire data transmitted from balances.
    Example: When pressing the PRINT key of the balance, data is output and is acquired by the computer.
  - The stored data can be used with Microsoft Excel (if installed).

FX *i* –08 Example of use

## FX*i*-09 Built-in battery unit (Ni-MH rechargeable battery pack)
- Charging time: Approximately 10 hours.
- Continuous operation hours: Approximately 8 hours

**Note**
**The charging time depends on the operating environment. During charging, the balance is**
**not available for use.**

## FX*i*-10 Small breeze break

| Models the FX*i*-10 small breeze break can be installed on | | | |
|---|---|---|---|
| FZ/FX series | 120*i* | 120*i* WP | 120GD | Standard accessary |
| | 200*i* | 200*i* WP | 200GD | |
| | 300*i* | 300*i* WP | 300GD | |
| | 500*i* | | | |
| FZ/FX series | 1200*i* | 1200*i* WP | 1200GD | Installable |
| | 2000*i* | 2000*i* iWP | 2000GD | |
| | 3000*i* | 3000*i* WP | 3000GD | |
| | 5000*i* | | | |

## FX*i*-11 Large breeze break
● Breeze break with greater height. Can be used for all models.
  Convenient when a large beaker or measuring cylinder is used and requires more height.

## FX*i*-12 Animal weighing pan

| Models the FXi-12 animal weighing pan can be installed on | | | |
|---|---|---|---|
| FZ series | 1200*i*, 2000*i*, 3000*i*, 5000*i* | 1200*i* WP, 2000*i* WP, 3000*i* WP | 1200GD, 2000GD 3000GD |
| FX series | 1200*i*, 2000*i*, 3000*i*, 5000*i* | 1200*i* WP, 2000*i* WP, 3000*i* WP | 1200GD , 2000GD , 3000GD |
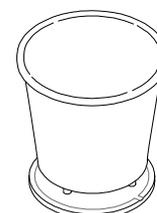
● Used for weighing small animals.
● Placing the animal weighing pan on the balance will reduce the weighing
  capacity by approximately 200 g.

## FX*i*-15-EX Carrying case
● You can carry the FZ-i / FX-i / FZ-*i*WP / FX-*i*WP / FZ-GD / FX-GD series balance by placing it in
  the carrying case.

## AX-FX*i*-31 Main unit cover
● Main unit protective cover provided as a standard accessory.

## AD-1654 Density Determination Kit

$$\frac{\text{Weigh in air}}{\text{Weigh in water - Weigh in the air}} \times \text{water density} = \text{sample density}$$

Example
$$\frac{10.0000 \text{ g}}{10.0000 \text{ g} - 9.5334 \text{ g}} \times 0.9970 \text{ g/cm}^3 = 21.4 \text{ g/cm}^3$$

| Temperature | Water density |
|---|---|
| 0 °C | 0.99984 g/cm$^3$ |
| 10 °C | 0.99970 g/cm$^3$ |
| 20 °C | 0.99820 g/cm$^3$ |
| 30 °C | 0.99565 g/cm$^3$ |

## Option

### AD-8127: Compact printer
- Small dot impact printer that connects with the balance via the RS-232C interface.
- Statistical function, clock and calendar function, interval print function, graphic print function, dump print mode

### AD-1691:Balance environment analyzer
- During the routine inspection, repeatability and the minimum weighing value can be easily checked.
- Also, this calculates measurement uncertainty and supports environmental evaluation of the scale.
- This analyzer can be easily carried to the scale site, so more than one scale can be controlled using this analyzer.

### AD-1687: Weighing environment logger
- A data logger equipped with 4 sensors for temperature, humidity, barometric pressure and vibration that can measure and store environmental data. When connected to the RS-232C interface of the balance, the AD-1687 can store environmental data along with weighing data. Therefore, it is possible to store data in an environment where a computer can not be used.
- The stored data can be read to a personal computer using USB. As the AD-1687 is recognized as USB memory, special software is not required to read the data.

### AD-1688: Data logger
- When connected to the RS-232C interface of the balance, the AD-1688 can store the data in an environment where a personal computer can not be used.
- The stored data can be read to a personal computer using USB. As the AD-1688 is recognized like USB memory, special software is not required to read the data.

### AD-8526: LAN converter
- This option can be used to connect the RS-232C interface of the balance to the Ethernet (LAN) port of a computer. This allows management of the balance weighing data with a computer connected to a network.

### AD-8527: Quick USB adapter

### AD-8920A: Remote display
- Connected to the GP series using the RS-232C interface.

### AD-8922A: Remote controller
- This option can be connected to the balance using the RS-232C interface and can control the balance remotely. Various options such as comparator output or analog output are available.

### AX-USB-9/25P-EX: USB converter
- Adds a COM port to a PC.
- Enables bi-directional communication between the PC and the balance when a USB driver is installed.
- Can use serial communication software such as WinCT on a PC without COM ports.
- An RS-232C cable is provided to connect the USB converter to the balance.

### AD-1671: Anti-vibration table
- Approximately 24kg, Artificial stone (Terrazzo).
- Use this table when unstable weighing is caused by vibration coming from the floor.
- Use the AD-8922A remote controller to avoid a weighing error by a slight table tilt that key operation may make.

### AD-1672: Tabletop breeze break
- Protects the balance from wind from sources such as air conditioning or people passing by, thereby reducing balance weighing error.
- The transparent panel assembly consists of antistatic plastic material that protects the balance from static electricity.

### AD-1683: Ionizer
- This ionizer eliminates static electricity to prevent weighing errors caused by electrification during measurement.
- This direct current and windless type is the most suitable for precisely weighing powder, etc.
- Small size, light weight

### AD-1684A: Electrostatic field meter
- This option measures the amount of the static charge on the sample, tare or peripheral equipment and displays the result.
- If those are found to be charged, discharge them using the AD-1683 DC static eliminator.

### AD-1689: Tweezers for calibration weight
- This option is the same as the tweezers provided as a standard accessory and is used when calibrating the balance using an external weight.

### AX-KO2737-500: Waterproof RS-232C cable
- 5m length, D-sub 9 pin-9 pin
- Only the 9-pin connector on the balance side is waterproof.



Waterproof RS-232C
cable
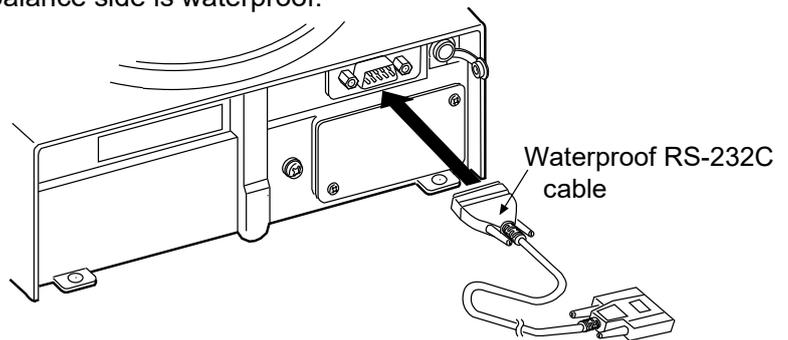
\* Be sure that a waterpfoor connector is used for the
RS-232C interface of the balance.

### AD-8529PC-W: Bluetooth converter (for connecting a personal computer)*
- This option connects a personal computer to the balance wirelessly (via Bluetooth®) up to 10 m.
- Driver installation is required.

### AD-8529PR-W: Bluetooth converter (for connecting a printer)*
- This option connects a printer to the balance wirelessly (via Bluetooth®) up to 10 m.

# 22. SPECIFICATIONS

| | | FZ series | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 120<br>*i*/*i* WP/GD | 200<br>*i*/*i* WP/GD | 300<br>*i*/*i* WP/GD | 500*i* | 1200<br>*i*/*i* WP/GD | 2000<br>*i*/*i* WP/GD | 3000<br>*i*/*i* WP/GD | 5000*i* |
| Weighing capacity [ g ] | | 122 | 220 | 320 | 520 | 1220 | 2200 | 3200 | 5200 |
| Maximum display [ g ] | | 122.084 | 220.084 | 320.084 | 520.084 | 1220.84 | 2200.84 | 3200.84 | 5200.84 |
| Minimum weighing value [ g / digit] | | 0.001 | | | | 0.01 | | | |
| Repeatability [ g ]<br>(Standard deviation) | | 0.001 | | | | 0.01 | | | |
| Linearity [ g ] | | ±0.002 | | | | ±0.02 | | | |
| Stabilization time<br>(typical at FAST) | | Approx. 1 second | | | | | | | |
| Sensitivity drift<br>(10°C to 30°C/50°F to 86°F ) | | ±2 ppm/°C | | | | | | | |
| Accuracy right after calibration using the internal mass.<br>See notes below * | | ±0.010 g | | | | ±0.10 g | | ±0.15 g | |
| | | The value above is to the weighing capacity. | | | | | | | |
| Internal mass | | Yes | | | | | | | |
| Clock and calendar function | | Yes | | | | | | | |
| Operating environment | | 5 °C to 40 °C (41 °F to 104 °F)<br>85 %RH or less (No condensation) | | | | | | | |
| Display refresh rate | | 5 times/second, 10 times/second or 20 times/second | | | | | | | |
| Counting mode | Minimum unit mass | 0.001 g | | | | 0.01 g | | | |
| | Number of samples | 5, 10, 25, 50 or 100 pieces | | | | | | | |
| Percent mode | Minimum 100% reference mass | 0.100 g | | | | 1.00 g | | | |
| | Minimum 100% display | 0.01%, 0.1%, 1% (Depends on the reference mass stored.) | | | | | | | |
| External calibration weight | | 100 g<br>50 g | 200 g<br>100 g<br>50 g | 300 g<br>200 g<br>100 g<br>50 g | 500 g<br>400 g<br>300 g<br>200 g<br>100 g<br>50 g | 1000 g<br>500 g | 2000 g<br>1000 g<br>500 g | 3000 g<br>2000 g<br>1000 g<br>500 g | 5000 g<br>4000 g<br>3000 g<br>2000 g<br>1000 g<br>500 g |
| Weighing pan diameter | | 130 mm | | | | 150 mm | | | |
| Net weight | | Approx. 3.0 kg (*i*WP series: approx. 3.2 kg) | | | | | | | |
| External dimensions | | 193 (W) x 262.5 (D) x 85.5 (H) mm | | | | | | | |
| AC adapter | | Confirm that the adapter type is correct for the local voltage and power receptacle type | | | | | | | |
| Power consumption | | Approx. 11VA (supplied to the AC adapter) | | | | | | | |
| Interface | | RS-232C | | | | | | | |
| Dustproof and waterproof specifications<br>(FZ-*i*WP / FX-*i*WP series only) | | IP65 standard | | | | | | | |

\* ● **Accuracy right after calibration using the internal mass, with the accessory breeze break installed and in good ambient conditions (within the temperature range of 10 °C to 30 °C (50 °F to 86 °F) with no abrupt changes in temperature or humidity, no drafts, no vibration and no effect by magnetic fields or static electricity).**

  ● **With the FZ-*i* / FZ-*i* WP /FZ-GD series balance, the environment and aging may cause internal mass value error. Calibrate using an external mass and perform maintenance regularly.**

| | | FX series | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 120 *i/i* WP/GD | 200 *i/i* WP/GD | 300 *i/i* WP/GD | 500*i* | 1200 *i/i* WP/GD | 2000 *i/i* WP/GD | 3000 *i/i* WP/GD | 5000*i* |
| Weighing capacity [ g ] | | 122 | 220 | 320 | 520 | 1220 | 2200 | 3200 | 5200 |
| Maximum display [ g ] | | 122.084 | 220.084 | 320.084 | 520.084 | 1220.84 | 2200.84 | 3200.84 | 5200.84 |
| Minimum weighing value [ g / digit] | | 0.001 | | | | 0.01 | | | |
| Repeatability [ g ] (Standard deviation) | | 0.001 | | | | 0.01 | | | |
| Linearity [ g ] | | ±0.002 | | | | ±0.02 | | | |
| Stabilization time (typical at FAST) | | Approx. 1 second | | | | | | | |
| Sensitivity drift (10°C to 30°C/50°F to 86°F ) | | ±2 ppm/°C | | | | | | | |
| Internal mass | | No | | | | | | | |
| Clock and calendar function | | No | | | | | | | |
| Operating environment | | 5 °C to 40 °C (41 °F to 104 °F) 85 %RH or less (No condensation) | | | | | | | |
| Display refresh rate | | 5 times/second, 10 times/second or 20 times/second | | | | | | | |
| Counting mode | Minimum unit mass | 0.001 g | | | | 0.01 g | | | |
| | Number of samples | 5, 10, 25, 50 or 100 pieces | | | | | | | |
| Percent mode | Minimum 100% reference mass | 0.100 g | | | | 1.00 g | | | |
| | Minimum 100% display | 0.01%, 0.1%, 1% (Depends on the reference mass stored.) | | | | | | | |
| External calibration weight | | 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 | 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 |
| Weighing pan diameter | | 130 mm | | | | 150 mm | | | |
| Net weight | | Approx. 3.0 kg (*i*WP series: approx. 2.7 kg) | | | | | | | |
| External dimensions | | 193 (W) x 262.5 (D) x 85.5 (H) mm | | | | | | | |
| AC adapter | | Confirm that the adapter type is correct for the local voltage and power receptacle type | | | | | | | |
| Power consumption | | Approx. 11VA (supplied to the AC adapter) | | | | | | | |
| Interface | | RS-232C | | | | | | | |
| Dustproof and waterproof specifications (FZ-*i*WP / FX-*i*WP series only) | | IP65 standard | | | | | | | |

# 23. EXTERNAL DIMENSIONS

**FZ-120*i* / 200*i* / 300*i* / 500*i***
**FZ-120*i* WP/ 200*i* WP / 300*i* WP**
**FZ-120GD / 200GD / 300GD**
**FX-120*i* / 200*i* / 300*i* / 500*i***
**FX-120*i* WP/ 200*i* WP / 300*i* WP**
**FX-120GD / 200GD / 300GD**
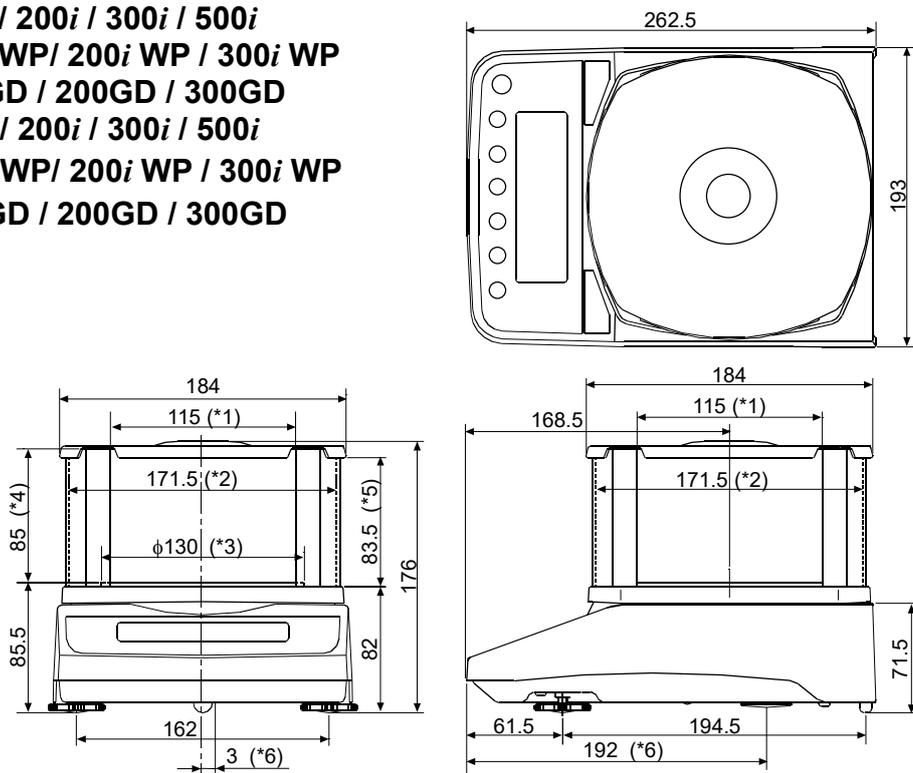


*1: Width of the opening when a clear plate is removed

*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-1200*i* /2000*i* / 3000*i* /5000*i***
**FZ-1200*i* WP/2000*i* WP/ 3000*i* WP**
**FZ-1200GD / 2000GD / 3000GD**
**FX-1200*i* /2000*i* / 3000*i* /5000*i***
**FX-1200*i* WP/2000*i* WP/ 3000*i* WP**
**FX-1200GD / 2000GD / 3000GD**
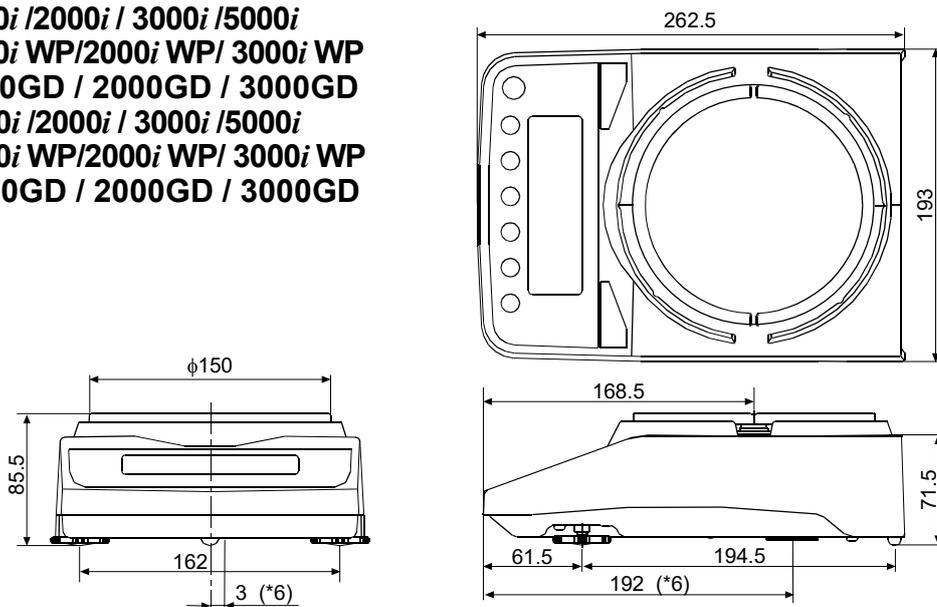


Unit: mm

The breeze break is provided as a standard accessory for FZ-1200 *i* /2000 *i* / 3000 *i*/ 5000 *i* /FZ-1200 *i* WP/ 2000 *i* WP/ 3000 *i* WP /1200GD / 2000GD / 3000GD.

# 24. TERMS/INDEX

## Terms

**Stable value**  The weight data when the stabilization indicator appears.

**Environment**  Ambient conditions such as vibration, drafts, temperature, static electricity and magnetic fields which affect the weighing operation.

**Calibration**  Adjustment of the balance so that it can weigh accurately.

**Output**  To output the weight data using the RS-232C serial interface.

**Zero point**  A weighing reference point or the zero display. Usually refers to the value displayed when nothing is on the weighing pan.

**Digit**  Unit of digital resolution. Used for the balance, a unit of minimum weighing value.

**Tare**  To cancel the weight of a container which is not included in the weight data.

**Mode**  Balance operational function.

**Re-zero**  To set the display to zero.

**GLP**  Good Laboratory Practice.

**Repeatability**  Variation in measured values obtained when the same weight is placed and removed repetitively. Usually expressed as a standard deviation.
e.g. Standard deviation=1 digit: This means that measured values fall within $\pm 1$ digit in the frequency of about 68%.

**Stabilization time**  Time required after a sample being placed, until the stabilization indicator illuminates and the weight data is displayed.

**Sensitivity drift**  An affect that a change in temperature causes to the weight data. Expressed as temperature coefficient.
e.g. Temperature coefficient = 2 ppm/$^\circ$C : If a load is 300 g and the temperature changes by 10$^\circ$C, the value displayed changes by the following value.
0.0002%/$^\circ$C x 10$^\circ$C x 300 g = 6 mg

**IP65**  IP code: Degree of protection provided by enclosures.
6: Dust-tight. No ingress of dust. 5: Protect against water jets.

## Index

### Keys and symbols

### A

### B

### C

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