

# FZ-CT/FX-CT Series

## Carat Balance

### INSTRUCTION MANUAL

FZ-1200CT / FZ-700CT / FZ-500CT  
FX-1200CT / FX-700CT / FX-500CT



A&D Company, Ltd.

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# Contents

|       |  |    |
|-------|--|----|
| 1.    | Introduction .....   | 5  |
| 1-1.  | About This Manual .....  | 5  |
| 1-2.  | Features .....   | 5  |
| 1-3.  | Compliance .....   | 6  |
| 2.    | Unpacking the Balance .....  | 7  |
| 2-1.  | Unpacking .....  | 7  |
| 2-2.  | Installing the Balance .....   | 9  |
| 3.    | Precautions .....  | 10 |
| 3-1.  | Before Use .....   | 10 |
| 3-2.  | During Use .....   | 11 |
| 3-3.  | After Use .....  | 12 |
| 3-4.  | Power Supply .....   | 12 |
| 4.    | Display Symbols and Key Operation .....  | 13 |
| 5.    | Weighing .....   | 14 |
| 5-1.  | Basic Operation (Gram Mode) .....  | 14 |
| 6.    | Response Adjustment .....  | 16 |
| 7.    | Calibration (Sensitivity Adjustment/Sensitivity Check) .....                                 | 17 |
| 7-1.  | Calibration Mode .....   | 17 |
| 7-2.  | Calibration Using the Internal Mass (One-Touch Calibration, Only for the FZ-CT Series) ..... | 18 |
| 7-3.  | Calibration Test Using the Internal Mass (Only for the FZ-CT Series) .....                   | 19 |
| 7-4.  | Calibration Using an External Weight .....   | 20 |
| 7-5.  | Calibration Test Using an External Weight .....  | 21 |
| 7-6.  | Correcting the Internal Mass Value 1 (Only for the FZ-CT Series) .....                       | 22 |
| 7-7.  | Correcting the Internal Mass Value 2 (Only for the FZ-CT Series) .....                       | 23 |
| 8.    | Function Switch and Initialization .....   | 24 |
| 8-1.  | Permit or Inhibit .....  | 24 |
| 8-2.  | Initializing the Balance .....   | 26 |
| 9.    | Function Table .....   | 27 |
| 9-1.  | Structure and Sequence of the Function Table .....   | 27 |
| 9-2.  | Display and Keys .....   | 27 |
| 9-3.  | Details of the Function Table .....  | 28 |
| 9-4.  | Description of the Class "Environment, Display" .....  | 32 |
| 9-5.  | Description of the Item "Data Output Mode" .....   | 34 |
| 9-6.  | Description of the Item "Data Format" .....  | 36 |
| 9-7.  | Data Format Examples .....   | 38 |
| 9-8.  | Weighing Units .....   | 40 |
| 9-9.  | Storing Units .....  | 42 |
| 9-10. | Counting Mode (PCS) .....  | 43 |
| 9-11. | Percent Mode (%) .....   | 45 |
| 9-12. | Description of the Item "Application Function" .....   | 46 |
| 9-13. | Statistical Calculation Mode .....   | 47 |
| 9-14. | Comparator Function .....  | 51 |
| 9-15. | Clock and Calendar Function (Only for the FZ-CT Series) .....                                | 52 |

|       |  |    |
|-------|--|----|
| 10.   | ID Number and GLP Report.....                          | 54 |
| 10-1. | Setting the ID Number .....                            | 54 |
| 10-2. | GLP Report.....  | 55 |
| 11.   | Underhook.....   | 60 |
| 12.   | Programmable-Unit.....                                 | 61 |
| 13.   | Password Function .....                                | 62 |
| 13-1. | Balance Software Version1.70 to 1.85.....              | 62 |
| 13-2. | Balance Software Version1.860 or later .....           | 62 |
| 13-3. | Using the Password Function .....                      | 64 |
| 13-4. | Entering the Password Before Weighing.....             | 65 |
| 13-5. | Logging Out .....                                      | 67 |
| 13-6. | Storing or Changing the Password .....                 | 67 |
| 13-7. | How to Change the Password .....                       | 68 |
| 13-8. | Deleting the Password (USER 01~10) .....               | 69 |
| 13-9. | If the Password is lost or forgotten .....             | 69 |
| 14.   | RS-232C Serial Interface.....                          | 70 |
| 15.   | Connection to Peripheral Equipment.....                | 71 |
| 15-1. | Connection to the AD-8121B Printer.....                | 71 |
| 15-2. | Connection to the AD-8127 Printer .....                | 72 |
| 15-3. | Connection to a Computer.....                          | 73 |
| 15-4. | Using Windows Communication Tools (WinCT).....         | 73 |
| 16.   | Commands.....  | 75 |
| 16-1. | Command List .....                                     | 75 |
| 16-2. | Acknowledge Code and Error Codes.....                  | 76 |
| 16-3. | Settings Related to RS-232C .....                      | 77 |
| 17.   | Key Lock Function .....                                | 78 |
| 17-1. | Locking All the Keys .....                             | 78 |
| 17-2. | Locking the Specified Keys.....                        | 78 |
| 18.   | Checking the Balance Software Version .....            | 79 |
| 19.   | Maintenance.....                                       | 79 |
| 20.   | Troubleshooting.....                                   | 80 |
| 20-1. | Checking the Balance Performance and Environment ..... | 80 |
| 20-2. | Error Codes .....                                      | 81 |
| 20-3. | Other Display .....                                    | 82 |
| 20-4. | Asking for Repair .....                                | 82 |
| 21.   | Options and Peripherals (Sold Separately).....         | 83 |
| 22.   | Specifications.....                                    | 86 |
| 23.   | External Dimensions .....                              | 88 |
| 24.   | Terms/Index.....                                       | 89 |
| 24-1. | Terms.....   | 89 |
| 24-2. | Index.....   | 90 |

# 1. Introduction

This manual describes how the FZ-CT / FX-CT 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.

- ※ Operation may vary depending on the software version of the balance. To check the software version of your balance, refer to “18. How to Check Software Version of Balance”.

## 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 (sensitivity adjustment).                          |
| Functions .....                   | Describes various functions of the balance.  |
| Interface and communication ..... | 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.
- Large breeze break, provided as a standard accessory for more accurate weighing.
- The breeze break can be removed with one touch, so cleaning is simple.
- Casing construction, strong protection against dust and moisture.
- Carat pans for weighing jewelry, provided as standard accessories.
- Multiple weighing units with most of the common units used around the world.  
The default settings of the unit of weight are the metric carat (ct) and grams (g). The unit can be switched by pressing the MODE key.
- Standard RS-232C serial interface to communicate with a computer and to output the Good Laboratory Practice (GLP) / Good Manufacturing Practice (GMP) compliant report.
- A built-in clock and calendar that can add the time and date to the output data. (Changing the clock setting can be limited to the administrator. Refer to “15. Password Function”.)
- The password function can be used to restrict balance users or changes to the function settings.
- The key lock function disables the balance key operation and enables the balance to be operated only by commands from external devices.
- 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 Indicators, displaying the comparison results.
- Underhook for below weighing, provided as a standard accessory.
- Hold Function, provided for weighing a moving object such as an animal.
- 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.  
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 weighing result in a place away from the balance. It receives power supply directly from the balance instead of the AC adapter when connected via RS-232C, so the cable arrangement is simplified.

## **1-3. Compliance**

### **Compliance with FCC rules**

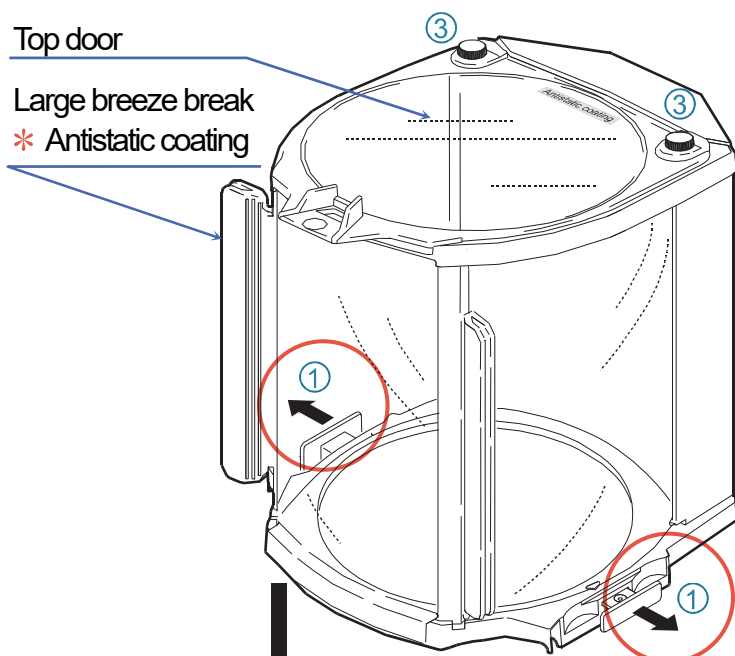
Please note that this device generates, uses and can radiate radio frequency energy. This device has been tested and has been found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against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

## 2. Unpacking the Balance

### 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.
- See the illustrations to confirm that everything is included.

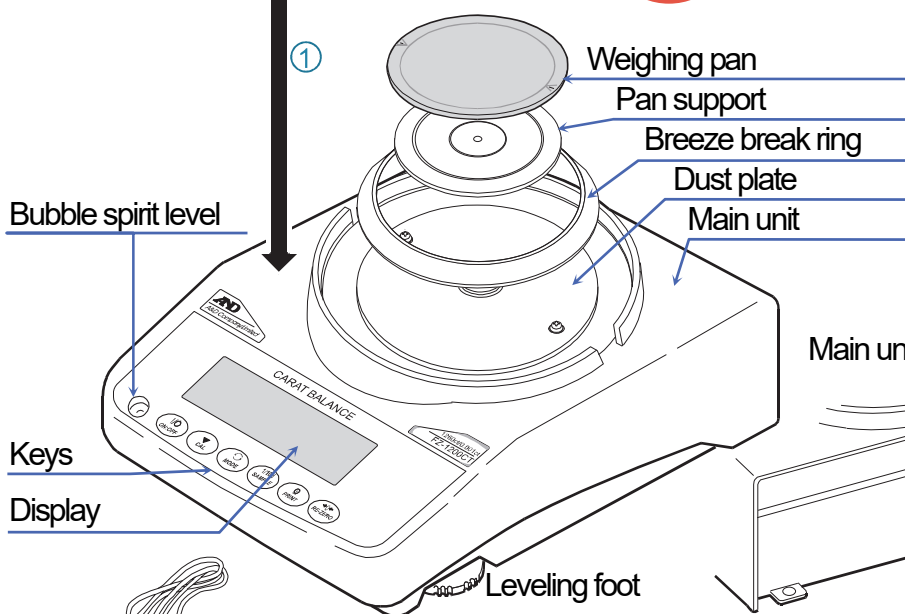
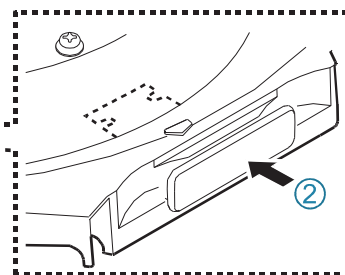
**Install the large breeze break when drafts are present**



#### How to install the large breeze break

Follow the numbered sequence.

- ① Pull out the locking handles, and install the large breeze break on the main unit.
- ② Push in the locking handles. Confirm that both of the locking handle hooks are under the dust plate.
- ③ How to open the top door  
If removing either of the securing screws (3) on the top door, the top door may be pivoted on the remaining screw.

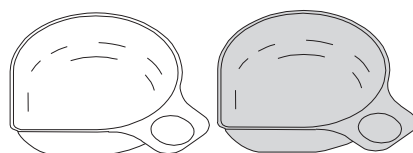
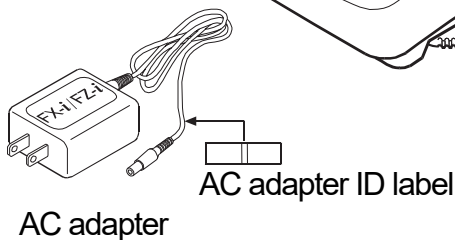


AC adapter plug  
AC adapter jack  
RS-232C serial interface

Main unit rear side

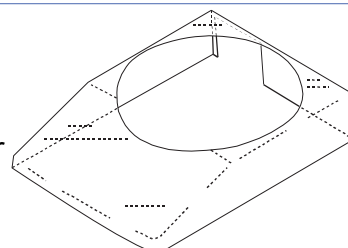
Grounding terminal

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.



Carat pan  
Silver and black colored, one each

Main unit cover  
AX-FXi-31



**Notes**

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



## 2-2. Installing the Balance

Install the balance as follows:

1. Place the balance on a solid weighing table. Refer to "3. Precautions" for installing the balance.
2. Assemble the pan support, weighing pan, breeze break ring and breeze break, on the balance as shown in the illustration on page 7.
3. Adjust the leveling feet to level the balance. Confirm it using the bubble spirit level.
4. Confirm that the AC adapter type is correct for the local voltage and power receptacle type.
5. Connect the AC adapter to the balance. Warm up the balance for at least one hour with nothing on the weighing pan.

### **Note**

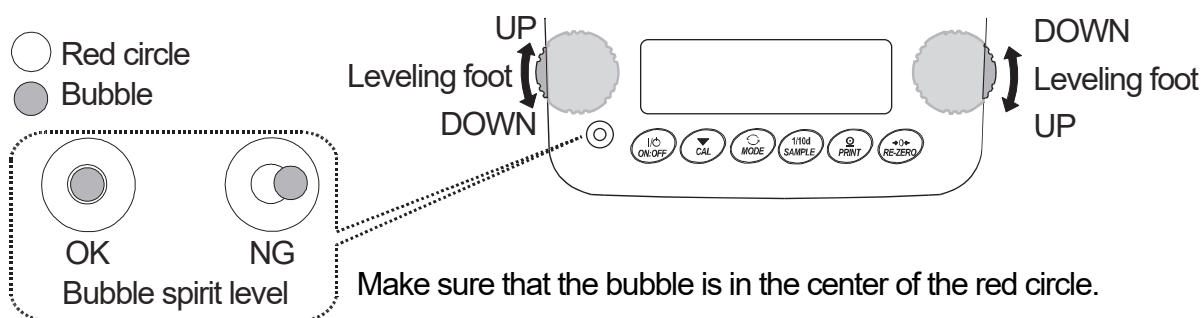
**The AC adapter plug is protected against dust and may be difficult to insert. When inserting the plug, turn the plug while pushing on it.**

### 3. Precautions

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

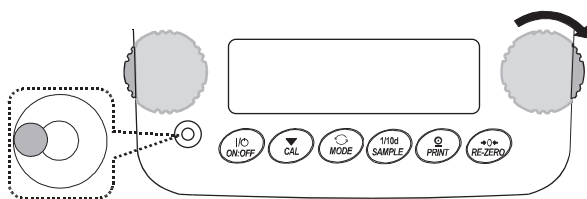
#### 3-1. Before Use

- 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 floor at the ground level are best, as they are less prone to vibration.
- The weighing table should be solid, free from vibration and drafts and as level as possible. (An anti-vibration table or stone table is ideal)
- Level the balance by adjusting the leveling feet and check it using the bubble spirit level.



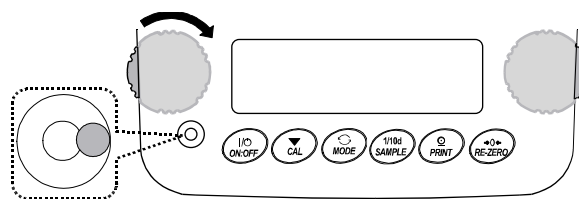
#### When the bubble is off to the left :

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



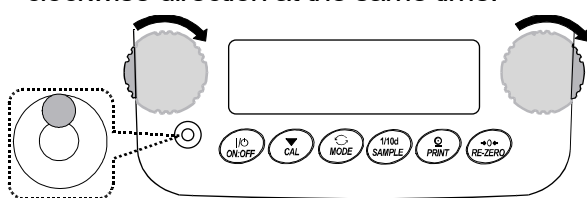
#### When the bubble is off to the right :

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

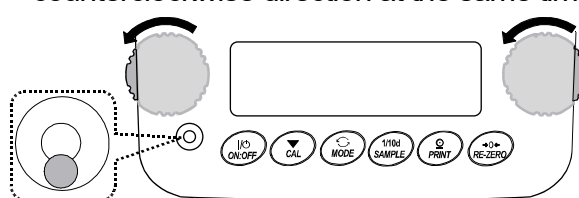


#### When the bubble is off to the backward position : When the bubble is off to the forward position:

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



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

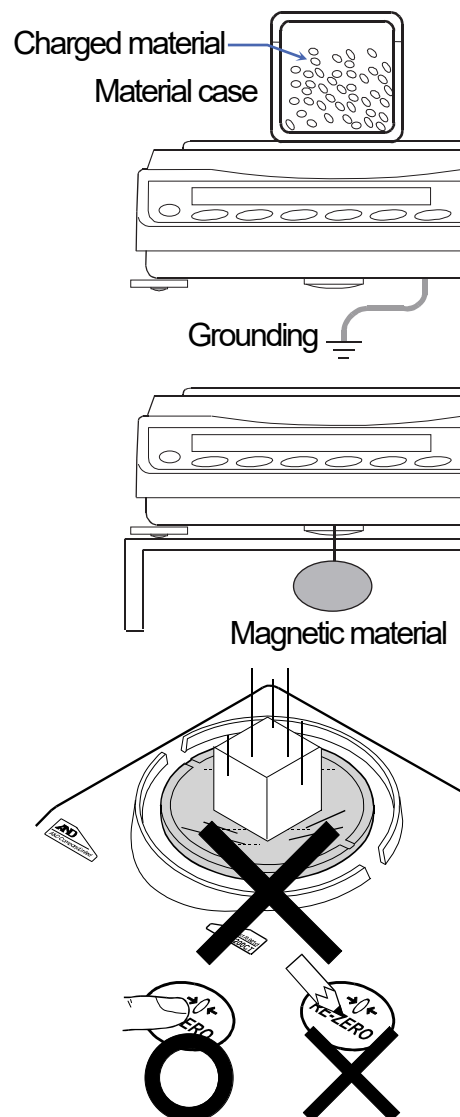


- Ensure a stable power source when using the AC adapter.
- Plug in the AC adapter and warm up the balance for at least one hour.
- Calibrate the balance before use or after having moved it to another location. Refer to “7. Calibration (Sensitivity adjustment/Calibration)”.

**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. Use a pair of long tweezers to place a sample on the pan to avoid placing a hand inside the breeze break.
- 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.
- The breeze break (The FZ-CT / FX-CT series) is provided as a standard accessory. An anti-static treatment has been applied to the breeze break components, but they may be charged with static electricity when they are unpacked or when the humidity is low. If the weighing value is unstable even when there are no drafts or the balance has a problem with repeatability, remove the breeze break. Or wipe the clear plates with a moistened cloth, use the optional AD-1683 DC static eliminator or apply an anti-static spray.



### 3-3. After Use

- Avoid mechanical shock to the balance.
- Do not disassemble the balance. Contact the local A&D dealer if the balance needs service or repair.
- Avoid dust and water so that the balance weighs correctly. Protect the internal parts from liquid spills and excessive dust.
- Do not use organic solvents or chemical cloth to clean the balance.

Clean the balance as described below:

|                                      |   |
|--------------------------------------|---|
| Balance main unit,<br>Weighing pan   | Use a soft, lint free cloth that is moistened with a mild detergent to clean.<br>The edge of the weighing pan is sharp. Use caution when cleaning the pan.  |
| Breeze break<br>(standard accessory) | An antistatic treatment has been applied to the breeze break components.<br>Use a soft, dry, lint free cloth to clean. Cleaning with a cloth that is moistened with water or a mild detergent repetitively, or washing with water, may degrade the antistatic effect. |

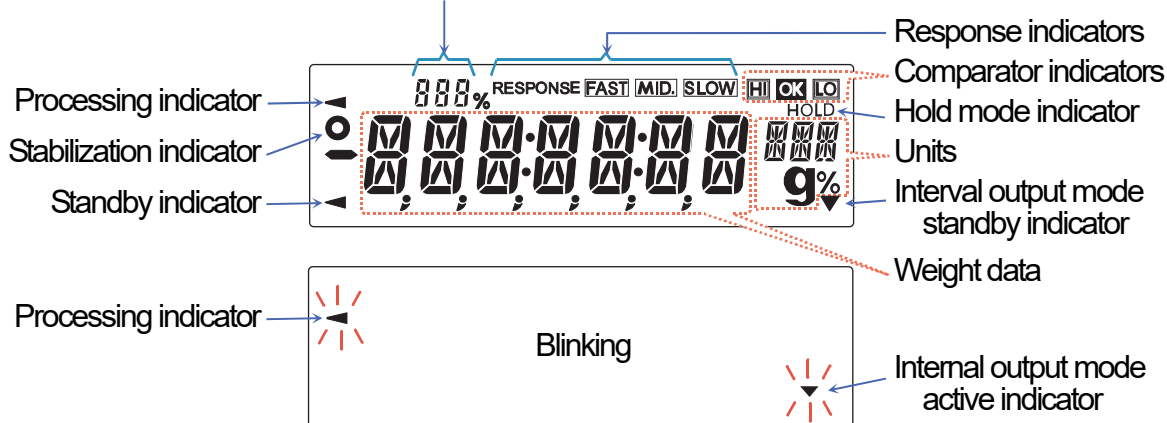
### 3-4. Power Supply

- 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, allow the balance to reach equilibrium with room temperature, and then warm up the balance for at least one hour before use.

## 4. Display Symbols and Key Operation

### Display symbols

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



### 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" .....



Each key, when pressed or when pressed and held, functions as follows:

| Key | When pressed   | When pressed and held (for 2 seconds)  |
|-----|--|--|
|     | <ul style="list-style-type: none"> <li>□ 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. When the display is turned on, the password input ( <code>PR55</code> ) is displayed if the password function is used. The weighing mode is enabled if the password function is not used. Refer to "13-4. Entering the Password Before Weighing".</li> <li>□ This key is available anytime. Pressing the key during operation will interrupt the operation and turn the display off.</li> </ul> |  |
|     | <ul style="list-style-type: none"> <li>□ In the weighing mode, turns the minimum weighing value on or off.</li> <li>□ In the counting or percent mode, enters the sample storing mode.</li> </ul>  | Enters the function table mode. Refer to "9. Function Table".  |
|     | Switches the weighing units stored in the function table. Refer to "9-8. Weighing Units".  | Enters the response adjustment mode.   |
|     | <ul style="list-style-type: none"> <li>□ Cancels the operation when performing settings. With the FZ-CT series, enters the calibration mode using the internal mass. (One-touch calibration)</li> </ul>  | Enters the calibration mode (calibration using an external weight).  |
|     | <ul style="list-style-type: none"> <li>□ Outputs the weight data to a printer or personal computer using the RS-232C serial interface, depending on the function table settings.</li> <li>□ Confirms the operation when performing settings.</li> </ul>  | <ul style="list-style-type: none"> <li>□ No function at the factory setting</li> <li>□ By changing the function table: Outputs "Title block" and "End block" for GLP/GMP compliant report. (Refer to "10-2. GLP Report".)</li> </ul> |
|     | Sets the display to zero.  |  |

## 5. Weighing

The default settings of the unit of weight are the metric carat (ct) and grams (g).

Pressing the **MODE** key switches the displayed unit, between ct and g.

To use other units, refer to “9–9. Storing Units” on page 37 to store the units.

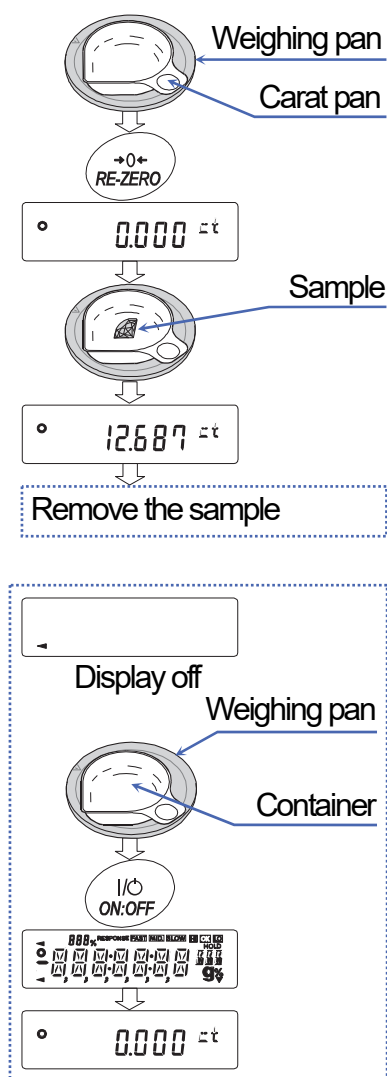
### 5–1. Basic Operation (Gram Mode)

- 1 Place a container (Carat pan) on the weighing pan, if necessary.  
Press the **RE-ZERO** key to cancel the weight (tare). The balance displays 0.000 ct.
- 2 Place a sample on the pan or in the container.
- 3 Wait for the stabilization indicator to turn on. Read the weighing value.  
While the stabilization indicator is on, pressing the **PRINT** key will output the weighing value, using the RS-232C serial interface.
- 4 Remove the sample and container from the pan.

#### Note

- **Peripheral equipment, that is sold separately, such as a printer or a personal computer is required.**
- **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 ct and weighing is started,



## Zero operation, tare operation and weighing range

### □ When weighing is started

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, the balance 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 operation is performed.

### □ Re-zero operation

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

The re-zero operation with the **RE-ZERO** key will automatically judge whether to perform zero or tare operation.

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

### □ Weighing range

The range that the balance can weigh varies depending on the model.

When the total amount (net weight + tare weight) displayed for each model exceeds the maximum display, **E** is displayed to indicate that the weighing range is exceeded.

When exceeded in the negative direction, **-E** is displayed.

| Model                | Power on zero range                        | Zero range                               | -E display range                         |
|----------------------|--|--|--|
| FZ-1200CT, FX-1200CT | Approx. $\pm 125$ ct<br>Approx. $\pm 25$ g | Approx. $\pm 25$ ct<br>Approx. $\pm 5$ g | Approx. -100 ct<br>Approx. -20g or less  |
| FZ-700CT, FX-700CT   | Approx. $\pm 75$ ct<br>Approx. $\pm 15$ g  | Approx. $\pm 15$ ct<br>Approx. $\pm 3$ g | Approx. -100 ct<br>Approx. -20 g or less |
| FZ-500CT, FX-500CT   | Approx. $\pm 50$ ct<br>Approx. $\pm 10$ g  | Approx. $\pm 10$ ct<br>Approx. $\pm 2$ g | Approx. -100 ct<br>Approx. -20 g or less |

## 6. Response Adjustment

This function stabilizes the weighing 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 | Parameter | Response       | Stability       |
|-----------|-----------|----------------|-----------------|
| FAST      | [Cond 0]  | Fast response, | Sensitive value |
| MID.      | [Cond 1]  |                |                 |
| SLOW      | [Cond 2]  | Slow response, | Stable value    |



### Operation

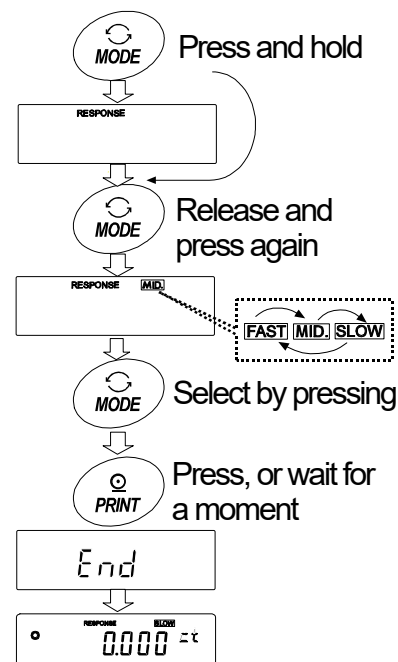
- 1 Press and hold the [MODE] key until [RESPONSE] is displayed. And then, release the key.
- 2 Select a setting for the response adjustment by pressing the [MODE] key. Either [FAST], [MID.] or [SLOW] can be selected.
- 3 After waiting for a moment, or when the [PRINT] key is pressed, the balance displays [End]. 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 (bR5Fnc)" in the function table, as shown below:**

| Indicator | Cond (Condition) | SPd (Display refresh rate)  |
|-----------|------------------|-----------------------------|
| FAST      | 0                | 1 (Approx. 10 times/second) |
| MID.      | 1                | 0 (Approx. 5 times/second)  |
| SLOW      | 2                | 0 (Approx. 5 times/second)  |

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





# 7. Calibration (Sensitivity Adjustment/Sensitivity Check)

## 7-1. Calibration Mode

Since the balance's resolution is high, weighing values may change due to gravity and daily environmental changes. It is necessary to perform calibration (sensitivity adjustment) with the weight in order to keep the weighing values from changing even if gravity or the environment changes.

Calibrate the balance if it is installed for the first time or relocated, or when the weighing values change significantly in daily inspection.

Calibration means to adjust the weighing value of the balance using the reference weight or internal mass.

Calibration test means to weigh with the reference weight and compare how much the result deviates from the reference value. (Calibration test does not perform adjustment.)

### Calibration (Sensitivity adjustment)

Calibration using the internal mass ——— Using the internal mass, adjust the balance with a single touch. (FZ-CT series)

Calibration using an external weight ——— Using an external weight, adjust the balance.

### Calibration test (Sensitivity check)

Calibration test using an external weight ——— Checks the accuracy of weighing using an external weight (target weight) and outputs the result.

\* No adjustment is made.

### Notes

- When calibrating, be sure to install the provided large breeze break.
- Do not allow vibration, drafts, or temperature change to affect the balance during calibration.
- 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.
- To output the GLP/GMP compliant report using the RS-232C serial interface, set "GLP output ( *inFo* )" of "Data output ( *dout* )". For details, refer to "9. Function Table". To display the GLP output, a printer or personal computer is required.
- Calibration test is available only when "GLP output ( *inFo* )" of "Data output ( *dout* )" is set to "1", "2" or "3".

### Note 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 weight                           | Adjustable range       |
|-----------------------|---|------------------------|
| FZ-1200CT / FX-1200CT | 250 g, <b>200 g</b> , 100 g, 50 g, 20 g | -0.0150 g to +0.0150 g |
| FZ-700CT / FX-700CT   | 150 g, <b>100 g</b> , 50 g, 20 g        |                        |
| FZ-500CT / FX-500CT   | <b>100 g</b> , 50 g, 20 g               |                        |

The calibration weight in bold type: factory setting.

The weight value can be adjusted within the range above.

### 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.

## 7-2. Calibration Using the Internal Mass (One-Touch Calibration, Only for the FZ-CT Series)

This function calibrates the balance using the internal mass. The only operation required is to press the **CAL** key. (The FX-CT series does not have this function.)

### Notes

- **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 one hour with nothing on the weighing pan.
- 2 Press the **CAL** key.
- 3 The balance displays **CAL in** and automatically performs calibration using the internal mass. Do not allow vibration or drafts to affect the balance.
- 4 The balance displays **End** after calibration. If the "GLP output (inF0)" parameter of the function table is set, the balance displays **GLP** and outputs the calibration report using the RS-232C interface. Refer to "GLP output (inF0)" in "10-2. GLP Report".
- 5 The balance automatically returns to the weighing mode after calibration.

### About the internal mass

The internal mass may change due to corrosion or other damage caused by the operating environment, or due to aging. The internal mass value can be corrected using an external weight. To maintain the weighing accuracy, perform the internal mass value correction periodically. Refer to "7-4. Correcting The Internal Mass Value 1" and "7-7. Correcting The Internal Mass Value 2".

## 7-3. Calibration Test Using the Internal Mass (Only for the FZ-CT Series)

- This function tests the balance accuracy using the internal mass.
- Calibration test does not perform adjustment.
- This is available only when the "GLP output (  $inF_0$  )" parameter is set to "1" or "2".

### Operation

- 1 Connect the AC adapter and warm up the balance at least one hour with nothing on the pan.
- 2 Refer to "9. Function Table" to set "GLP output (  $inF_0$  )" to "1" or "2".

- 3 Press and hold the **CAL** key until **CC in** is displayed, then release the key.

- 4 The balance measures the zero point.  
Prevent vibration and drafts to affect the balance.

- 5 The measured zero point data is displayed.

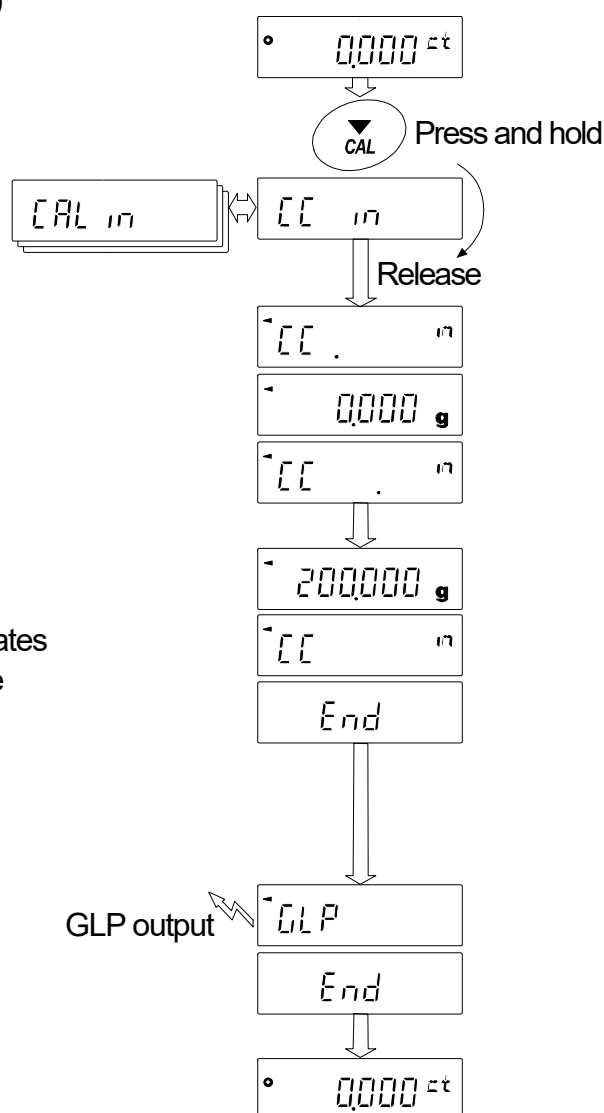
- 6 The balance measures the internal mass.  
Prevent vibration and drafts to affect the balance.

- 7 The value of the internal mass is displayed.  
The normal range of the value is as follows:  
If the displayed value is within the normal range, it indicates that the calibration sensitivity is correctly adjusted by the internal mass.

| Model     | Internal mass | Normal range |
|-----------|---------------|--------------|
| FZ-1200CT | 200.000 g     | ±0.002 g     |
| FZ-700CT  | 100.000 g     |              |
| FZ-500CT  |               |              |

- 8 If GLP output is set, **GLP** is displayed and the calibration test report is output using the RS-232C interface. Refer to "GLP output (  $inF_0$  )" of the function table, "10-2. GLP Report".  
**End** is displayed after the calibration.

- 9 The balance automatically returns to the weighing mode.

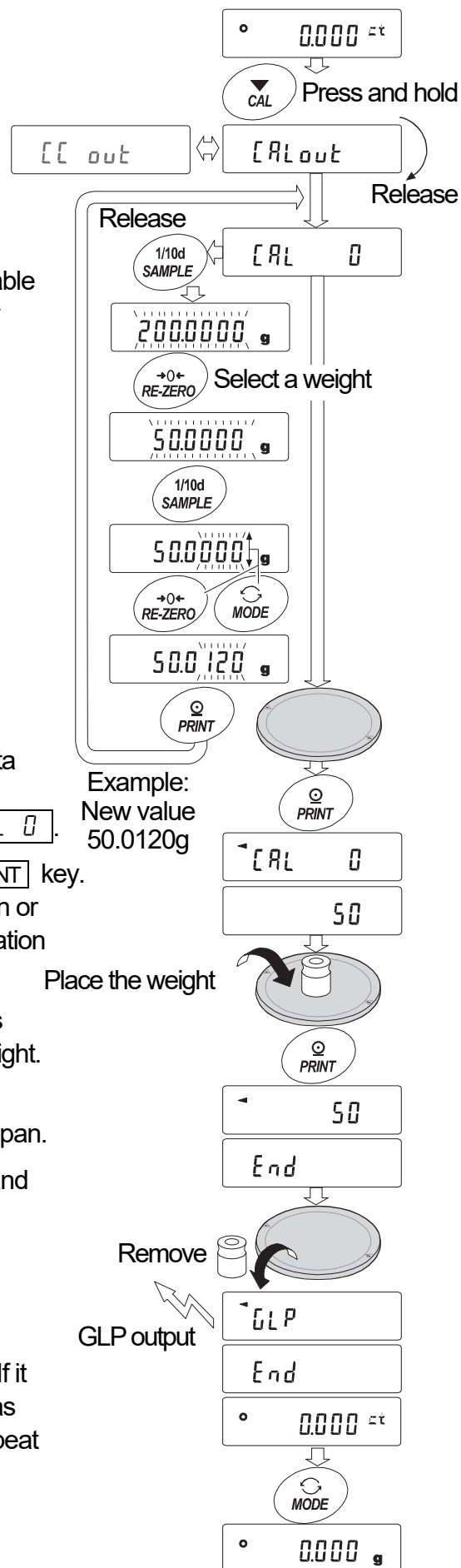


## 7-4. Calibration Using an External Weight

- This function calibrates the balance using an external weight.

### Operation

- 1 Connect the AC adapter and warm up the balance for at least one hour with nothing on the pan.
- 2 Press and hold the **[CAL]** key until **[CAL out]** 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 17), press the **[SAMPLE]** key and proceed to step 4.
  - If you use the calibration weight value stored in the balance, proceed to step 5.
- 4 Specify the calibration weight value as follows:
  - [SAMPLE]** key To switch between the calibration weight selection mode (all of the segments blinking) and the weight value adjustment mode (the last three digits blinking).
  - [RE-ZERO](+)** / **[MODE](-)** keys To select the calibration weight to use or adjust the value. (Refer to page 17.)
  - [PRINT]** key To store the new calibration 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]**.
- 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 the calibration report.
- 9 The balance automatically returns to the weighing mode.
- 10 Press the **[MODE]** key to select the gram mode. Place the calibration weight on the pan and confirm that the value displayed is within  $\pm 0.002$  g of the calibration weight 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.



## 7-5. 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 (info)” parameter is set to “1”, “2” or “3”. (Calibration test does not perform calibration.)

### Operation

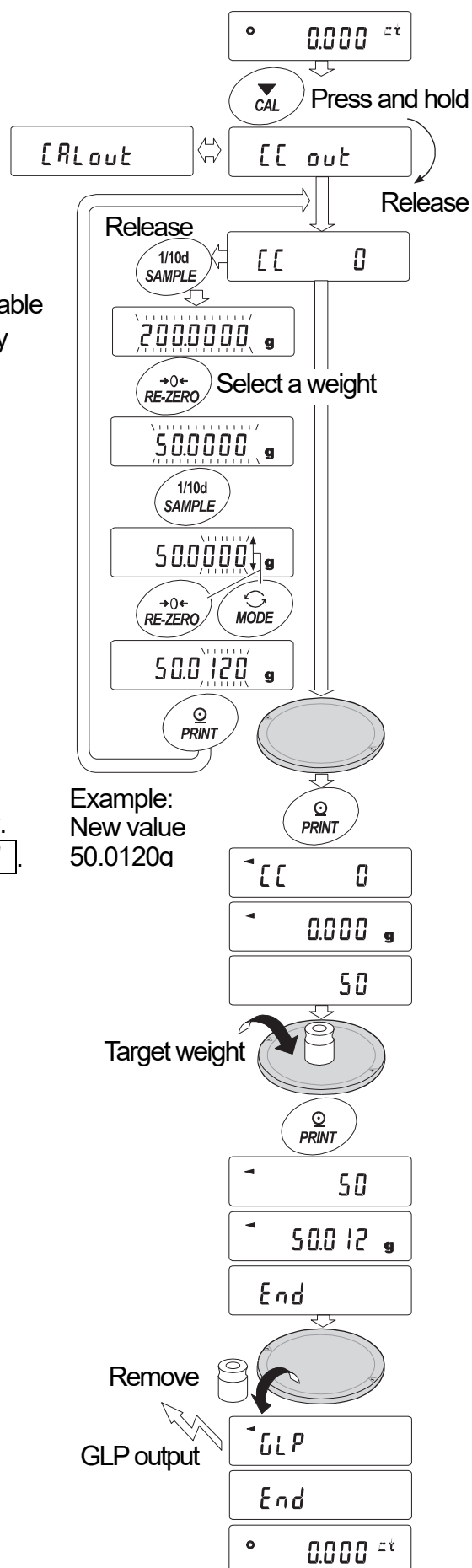
- 1 Connect the AC adapter and warm up the balance for at least one hour with nothing on the pan.
- 2 Press and hold the **[CAL]** key until **[EE out]** is displayed, and then release the key.
- 3 The balance displays **[EE 0]**.
  - If you want to change the calibration weight (a list of usable weights is shown on page 17), press the **[SAMPLE]** key and proceed to step 4.
  - If you use the calibration weight value stored in the balance, proceed to step 5.
- 4 Specify the calibration weight value as follows:
 

**[SAMPLE]** key To switch between the calibration weight selection mode (all of the segments blinking) and the weight value adjustment mode (the last three digits blinking).

**[RE-ZERO](+)** / **[MODE](-)** keys To select the calibration weight to use or adjust the value. (Refer to page 17.)

**[PRINT]** key To store the new calibration 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 **[EE 0]**.
- 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.
- 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 Test Report”.
- 9 The balance automatically returns to the weighing mode.



## 7-6. Correcting the Internal Mass Value 1 (Only for the FZ-CT Series)

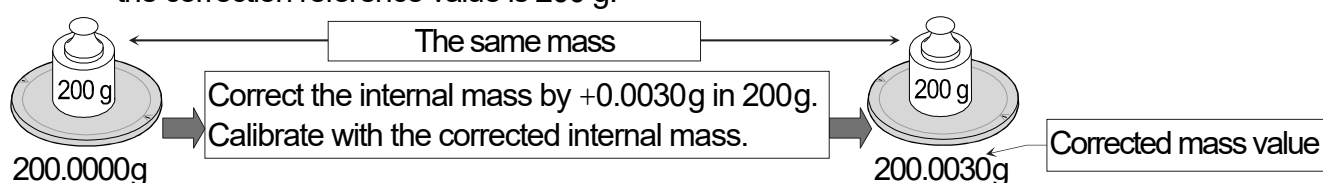
- The **FZ-CT** series balance can correct the internal mass value using an external weight.  
Method 1: Calibrate the balance using the internal mass. Measure the external weight.  
Calculate the correction value. And store it in the balance.
- The adjustable range of the internal mass value is as follows:

| Model     | Correction Reference Value | Adjustable Range       |
|-----------|----------------------------|------------------------|
| FZ-1200CT | 200 g                      | -0.0150 g to +0.0150 g |
| FZ-700CT  | 100 g                      |                        |
| FZ-500CT  |                            |                        |

### Operation

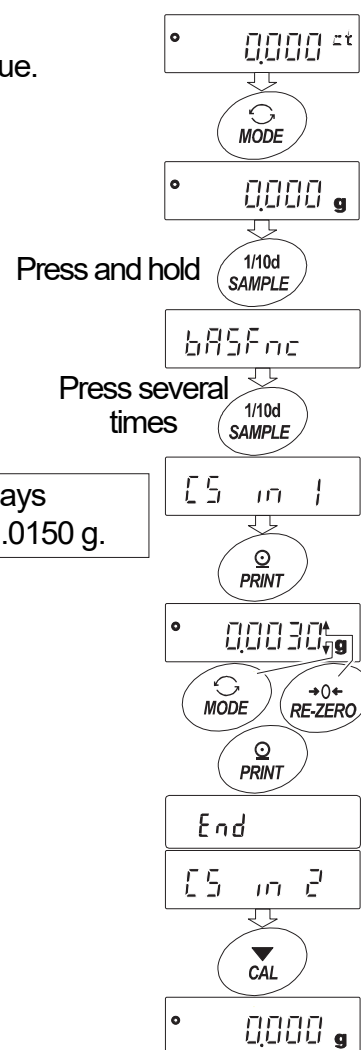
Example : Correcting the weight value by +0.0030 g in 200 g using the **FZ-1200CT**.

If correcting the weight value by +0.0030 g in 100 g, use the correction value of +0.0060 g as the correction reference value is 200 g.



- 1 Perform calibration using the internal mass (one-touch calibration).  
Place the external weight on the weighing pan to obtain the correction value.
- 2 With the factory setting, the balance cannot correct the internal mass value. Refer to "8. 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.
- 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.

The balance displays  
-0.0150 g after +0.0150 g.



## 7-7. Correcting the Internal Mass Value 2 (Only for the FZ-CT Series)

- The **FZ-CT** 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:

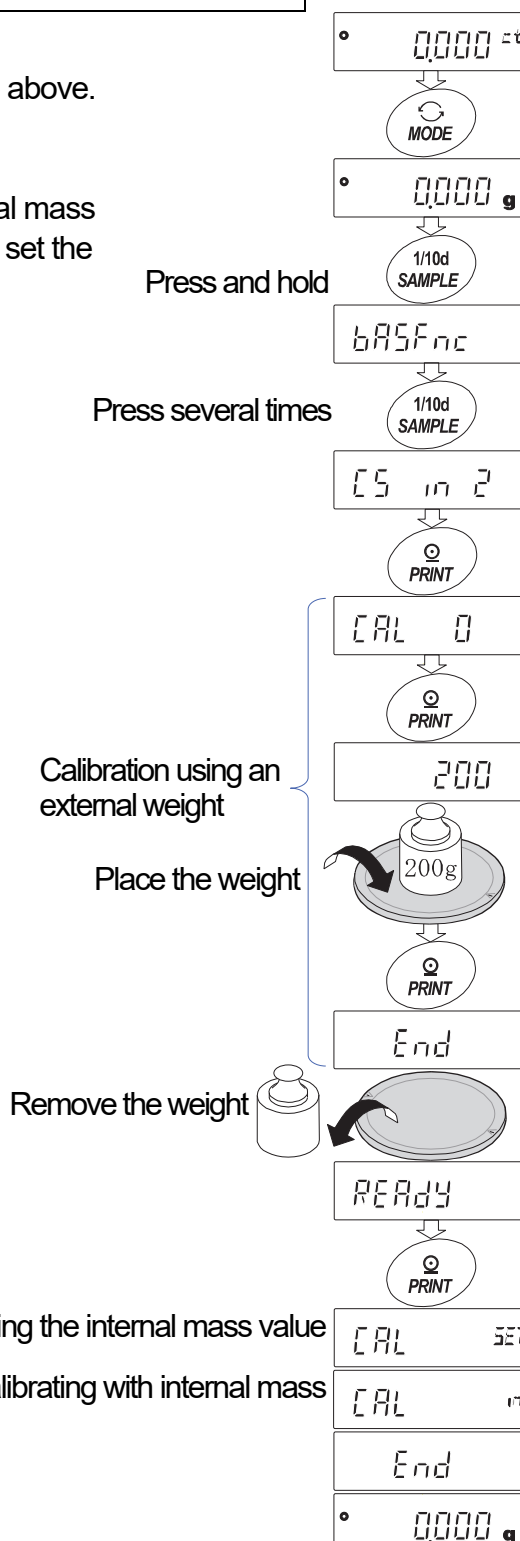
| Model     | Correction Reference Value              | Adjustable Range       |
|-----------|---|------------------------|
| FZ-1200CT | 250 g, <b>200 g</b> , 100 g, 50 g, 20 g | -0.0150 g to +0.0150 g |
| FZ-700CT  | 150 g, <b>100 g</b> , 50 g, 20 g        |                        |
| FZ-500CT  | <b>100 g</b> , 50 g, 20 g               |                        |

The calibration weight in bold type: factory setting.

The calibration weight value can be adjusted within the range above.

### Operation

- 1 With the factory setting, the balance cannot correct the internal mass value. Refer to "8. Function Switch And Initialization" and set the internal mass value correction switch to 1.
- 2 In the weighing mode, press and hold the **[SAMPLE]** key to display **bASFnC**.
- 3 Press the **[SAMPLE]** key several times until **[5 in 2]** is displayed. If **[5 in 2]** is not displayed, perform step 1.
- 4 Press the **[PRINT]** key to display **[CAL 0]**.  
Refer to "7-4. Calibration Using an External Weight", to perform the calibration.
- 5 After calibration, remove the weight.  
The balance displays **READY**. Press the **[PRINT]** key.
- 6 **[CAL SET]** is displayed and the balance corrects the internal mass value automatically
- 7 After correcting the internal mass value, the balance displays **[CAL 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.



## 8. Function Switch and Initialization

### 8-1. 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".

"Inhibit" protects parameters against unintentional operations.

Function selection can be restricted with the password function. When using balances with software version 1.860 or later, the password function can be used to restrict calibration (sensitivity adjustment) functions.

The switches for function selection" are as follows:

|                 | FZ-CT series   | FX-CT series  |
|-----------------|--|---|
| Function switch | <ul style="list-style-type: none"><li>- Function table</li><li>- Calibration using the internal mass</li><li>- Calibration using an external weight</li><li>- Internal mass correction</li></ul> | <ul style="list-style-type: none"><li>- Function table</li><li>- Calibration using an external weight</li></ul> |

### 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.  
    : To inhibit changes.   : To permit changes  
**PRINT** key ..... To store the new parameter and return to the weighing mode.  
**CAL** key ..... To cancel the operation ( **Err** is displayed.)  
    To return to the weighing mode, press the **CAL** key once again.



## Switches (FZ-CT series)

R - 00 1 1 1

(The display shown left indicates the factory settings)

Function table

0

To inhibit changes on the function table

1

To permit changes on the function table

Calibration using the internal mass (One-touch calibration)

0

Software version 1.43 to 1.85 To inhibit calibration using the internal mass  
Software version 1.860 or later

PASS 0 To inhibit calibration using the internal mass

PASS 1,2 \*1 To inhibit calibration using the internal mass when a user (USER) or a guest (GUE<sup>ST</sup>) is logged in.

1

To permit calibration using the internal mass

Calibration using an external weight

0

Software version 1.43 to 1.85 To inhibit calibration using an external weight  
Software version 1.860 or later

PASS 0 To inhibit calibration using an external weight

PASS 1,2 \*1 To inhibit calibration using the external mass when a user (USER) or a guest (GUE<sup>ST</sup>) is logged in.

1

To permit calibration using an external weight

Not used

Internal mass value correction

0

To inhibit correction

1

To permit correction

\* 1 The operation is permitted when logged in as an administrator (ADM<sup>IN</sup>).

## Switches (FX-CT series)

R - 00 1 0 1

(The display shown left indicates the factory settings)

Function table

0

To inhibit changes on the function table

1

To permit changes on the function table

Not used

Calibration using an external weight

0

Software version 1.43 to 1.85 To inhibit calibration using an external weight  
Software version 1.860 or later

PASS 0 To inhibit calibration using an external weight

PASS 1,2 \*1 To inhibit calibration using the external mass when a user (USER) or a guest (GUE<sup>ST</sup>) is logged in.

1

To permit calibration using an external weight

Not Used

Not Used

## 8-2. Initializing the Balance

This function restores the following parameters to factory settings.

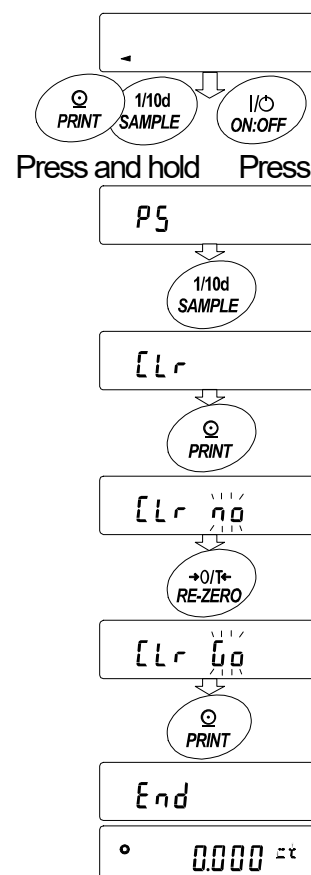
- Calibration data
- Function table
- Sample unit mass value (counting mode), 100% reference mass value (percent mode)
- External weight value
- Function switch settings
- Statistical data
- Internal mass value (Only for the FZ-CT series)

### Note

- Be sure to calibrate the balance after initialization.

### Operation

- 1 Press the **ON:OFF** key to turn off the display.  
While pressing and holding the **PRINT** key and the **SAMPLE** key, press the **ON:OFF** key. The balance displays **P5**.
- 2 Press the **SAMPLE** key to display **[Lr]**.
- 3 Press the **PRINT** key to display **[Lr no]**.  
(To cancel the operation, press the **CAL** key.)
- 4 Press the **RE-ZERO** key to display **[Lr 00]**.
- 5 Press the **PRINT** key to initialize the balance.  
The balance will automatically return to the weighing mode.



## 9. Function Table

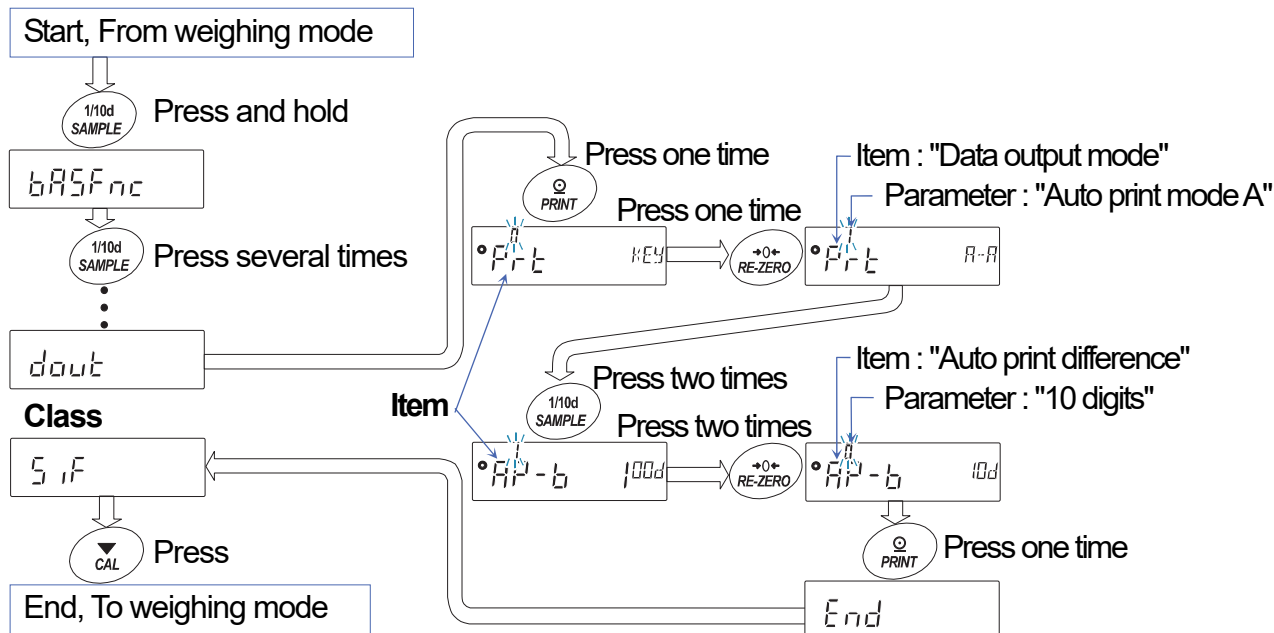
The function table reads or rewrites the parameters that are stored in the balance. These parameters stored, even if the AC adapter is removed, are maintained in non-volatile memory.

### 9-1. 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 (Prt I)" for "Data output mode (Prt)" and "10 digits (RP-b 0)" for "Auto print difference (RP-b 0)".



### 9-2. Display and Keys

| Display/Key                        | Description   |
|------------------------------------|---|
| $\odot$                            | The symbol $\odot$ indicates that the parameter displayed is in effect.   |
| $\frac{1}{10d}$ SAMPLE             | When pressed and held (for approx. 2 seconds) in the weighing mode, enters the function table mode.<br>Selects the class or item in the function table mode.                    |
| $\rightarrow 0 \leftarrow$ RE-ZERO | Changes the parameter.  |
| $\odot$ PRINT                      | When a class is displayed, moves to an item in the class.<br>When an item is displayed, stores the new parameter and displays the next class.                                   |
| $\nabla$ CAL                       | When an item is displayed, cancels the new parameter and displays the next class.<br>When a class is displayed, exits the function table mode and returns to the weighing mode. |

## 9-3. Details of the Function Table

| Class                            | Item and Parameter           |   | Description   |  |   |  |
|----------------------------------|------------------------------|---|---|--|---|--|
| bRSFnc<br>Environment<br>Display | Cond<br>Condition            | 0   | Fast response, sensitive value                                    | FAST   | With "HoLd I", sets the averaging time. |  |
|                                  |                              | 1   |   | MID.   |   |  |
|                                  |                              | 2   | Slow response, stable value                                       | SLOW   |   |  |
|                                  | St-b<br>Stability band width | 0   | Stable range is ±1 digit  | The stabilization indicator illuminates when the display fluctuation is within the range. With "HoLd I", sets the stabilization range. |   |  |
|                                  |                              | 1   |   |  |   |  |
|                                  |                              | 2   | Stable range is ±3 digits   |  |   |  |
|                                  | HoLd<br>Hold function        | 0   | OFF   | Holds the display when stable in animal weighing mode. With "HoLd I", <span>HOLD</span> turns on.                                      |   |  |
|                                  |                              | 1   | ON  |  |   |  |
|                                  | trc<br>Zero tracking         | 0   | OFF   | Keeps zero display by tracking zero drift.   |   |  |
|                                  |                              | 1   | Normal  |  |   |  |
|                                  |                              | 2   | Strong  |  |   |  |
|                                  | SPd<br>Display refresh rate  | 0   | Approx. 5 times/second  | Period to refresh the display  |   |  |
|                                  |                              | 1   | Approx. 10 times/second   |  |   |  |
|                                  |                              | Pnt<br>Decimal point                          | 0   |  |   |  |
|                                  | 1                            |   | Comma (,)   |  |   |  |
|                                  | P-on<br>Auto display-ON      | 0   | OFF   | Turns on the weighing mode display when the AC adapter is connected.   |   |  |
|                                  |                              | 1   | ON  |  |   |  |
|                                  | P-off<br>Auto display-OFF    | 0   | OFF   | Turns off the display after 10 minutes of inactivity.  |   |  |
| 1                                |                              | ON (10 minutes)                               |   |  |   |  |
| rnc<br>Display at start          | 0                            | Displays                                      |   |  |   |  |
|                                  | 1                            | Does not display                              |   |  |   |  |
| bEEP<br>Beep                     | 0                            | Does not sound                                | Select whether or not to sound the beep when operating on keys.   |  |   |  |
|                                  | 1                            | Sounds  |   |  |   |  |
| CL Add*<br>Clock                 |                              | Refer to "9-10. Clock and calendar function". |   | Confirms and sets the time and date. The time and date are added to output data.   |   |  |
| CP Fnc<br>Comparator             | CP<br>Comp 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"                      |  |   |  |
|                                  | bEEP-<br>LO buzzer           | 0   | OFF   |  |   |  |
|                                  |                              | 1   | ON  |  |   |  |
|                                  | bEEP-<br>OK buzzer           | 0   | OFF   |  |   |  |
|                                  |                              | 1   | ON  |  |   |  |
|                                  | bEEP-<br>HI buzzer           | 0   | OFF   |  |   |  |
| 1                                |                              | ON  |   |  |   |  |

0 : Factory setting    Digit is a unit of minimum weighing value

\* : Only for the FZ-CT series

| Class                           | Item and Parameter                         |   | Description                                       |  |
|---------------------------------|--|---|---|--|
| $\overline{P}H$<br>Upper limit  |  |   | Refer to "9-14. Comparator Function".             |  |
| $\overline{P}Lo$<br>Lower limit |  |   |   |  |
| Data output                     | $Prt$<br>Data output mode                  | 0 | Key mode  | Accepts the <span>PRINT</span> key only when the display is stable.  |
|                                 |  | 1 | Auto print mode A (Reference = zero)              | Outputs data when the display is stable and conditions of $\overline{RP-P}$ , $\overline{RP-b}$ and the reference value are met. |
|                                 |  | 2 | Auto print mode B (Reference = last stable value) |  |
|                                 |  | 3 | Stream mode                                       | Outputs data at the specified display refresh rate. e.g.: Used when connected to the AD-8920A remote display.                    |
|                                 |  | 4 | Key mode B (Immediately)                          | Accepts the <span>PRINT</span> key regardless of the display condition.  |
|                                 |  | 5 | Key mode C (When stable)                          | Accepts the <span>PRINT</span> 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.   |
|                                 | $\overline{RP-P}$<br>Auto print polarity   | 0 | Plus only   | Displayed value>Reference  |
|                                 |  | 1 | Minus only  | Displayed value<Reference  |
|                                 |  | 2 | Both  | Regardless of displayed value  |
|                                 | $\overline{RP-b}$<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 display refresh                             | Interval time for the interval output mode (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   |  |
|                                 | $S-td$ *<br>Time/Date output               | 0 | No output   |  |
|                                 |  | 1 | Time only   |  |
|                                 |  | 2 | Date only   |  |
|                                 |  | 3 | Time and date                                     |  |
|                                 | $S-id$<br>ID number output                 | 0 | No output   | Selects whether or not the ID number is output.  |
|                                 |  | 1 | Output  |  |
|                                 | $PUSE$<br>Data output pause                | 0 | No pause  | Selects the data output interval.  |
|                                 |  | 1 | Pause (1.6 seconds)                               |  |

▪ : Factory setting Digit is a unit of minimum weighing value

\* : Only for the FZ-CT series

| Class                           | Item and Parameter                  | Description                             |  |  |  |
|---------------------------------|-------------------------------------|---|--|--|--|
|                                 | <i>Alt-F</i><br>Auto feed           | 0                                       | Not used   | Selects whether or not automatic feed is performed.      |  |
|                                 |                                     | 1                                       | Used   |  |  |
|                                 | <i>inFo</i><br>GLP output           | 0                                       | No output  | Refer to “9-3. GLP Report”                               |  |
|                                 |                                     | 1                                       | AD-8121 format                                   |  |  |
|                                 |                                     | 2                                       | General data format (balance clock data)         |  |  |
|                                 |                                     | 3*1                                     | General data format (external device clock data) |  |  |
|                                 | <i>Ar-d</i><br>Zero after output    | 0                                       | Not used   | Adjusts zero automatically after data is output          |  |
|                                 |                                     | 1                                       | Used   |  |  |
| <i>SiF</i><br>Serial interface  | <i>bPS</i><br>Baud rate             | 0                                       | 600 bps  |  |  |
|                                 |                                     | 1                                       | 1200 bps   |  |  |
|                                 |                                     | 2                                       | 2400 bps   |  |  |
|                                 |                                     | 3                                       | 4800 bps   |  |  |
|                                 |                                     | 4                                       | 9600 bps   |  |  |
|                                 |                                     | 5                                       | 19200 bps  |  |  |
|                                 | <i>btPr</i><br>Data bit, parity bit | 0                                       | 7 bits, even                                     |  |  |
|                                 |                                     | 1                                       | 7 bits, odd                                      |  |  |
|                                 |                                     | 2                                       | 8 bits, none                                     |  |  |
|                                 | <i>CrLF</i><br>Terminator           | 0                                       | CR LF  | CR: ASCII code 0Dh<br>LF: ASCII code 0Ah                 |  |
|                                 |                                     | 1                                       | CR   |  |  |
|                                 | <i>tYPE</i><br>Data format          | 0                                       | A&D standard format                              |  | Refer to "9-6. Description of the Item "Data Format"". |
|                                 |                                     | 1                                       | DP format  |  |  |
|                                 |                                     | 2                                       | KF format  |  |  |
|                                 |                                     | 3                                       | MT format  |  |  |
|                                 |                                     | 4                                       | NU format  |  |  |
|                                 |                                     | 5                                       | CSV format                                       |  |  |
|                                 | <i>t-UP</i><br>Timeout              | 0                                       | No limit   |  | Selects the wait time to receive a command.            |
|                                 |                                     | 1                                       | 1 second   |  |  |
|                                 | <i>ErCd</i><br>AK, Error code       | 0                                       | No output  |  | AK: ASCII code 06h                                     |
|                                 |                                     | 1                                       | Output   |  |  |
| <i>nLt</i><br>Programmable-unit |                                     | Sets an arbitrary coefficient.          |  | Available only when programmable- unit mode is selected. |  |
| <i>Unit</i><br>Unit             |                                     | Refer to "9-8. Weighing Units".         |  |  |  |
| <i>ID</i><br>ID number          |                                     | Refer to "10. ID Number and GLP Report" |  |  |  |

▪ : Factory setting    Digit is a unit of minimum weighing value

\* : Only for the FZ-CT series

| Class   | Item and Parameter                                 |   | Description   |   |
|---|--|---|---|---|
| APP Fnc<br>Application                                | APP<br>Application function                        | 0 | Normal weighing mode  |   |
|   |  | 1 | Capacity indicator  |   |
|   |  | 2 | Statistical calculation mode  |   |
|   | Stat Fnc<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 |   |
| Loc Fnc<br>Password function                          | PASS *1<br>Password function                       | 0 | OFF   | Refer to “11. Password function”  |
|   |  | 1 | ON (limited weighing operation)   |   |
|   |  | 2 | ON (basic weighing is possible)   |   |
| Loc no.<br>Password                                   | ADMIN  |   | Password input by the administrator   |   |
|   | USER 01<br>  |   | Password input by user 1  |   |
|   | USER 10  |   | Password input by user 10 *2  |   |
| [5 in 1]*<br>Internal mass value correction: Method 1 |  |   | Refer to "7. Calibration".  | Displayed only when the function switch (internal mass value correction switch) is set to 1 |
| [5 in 2]*<br>Internal mass value correction: Method 2 |  |   |   |   |

0 : Factory setting Digit is a unit of minimum weighing value

\* : Only for the FZ-CT series

\*1: With the software version 1.70 to 1.85, only OFF (0) / ON (1) can be selected.  
If the software version is 1.860 or later, OFF (0) / ON (1) / ON (2) can be selected.



\*2: Available with the software version 1.860 or later.  
If the software version is 1.70 to 1.85, one password (equivalent to the administrator password) can be registered.

## Caution

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

## 9-4. Description of the Class "Environment, Display"

### Condition ( *Cond* )



- Cond* 0  This parameter is for sensitive response to the fluctuation of a weighing 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 weighing value from drifting due to vibration or drafts. After setting, the balance displays **SLOW**.

#### Note

- With "Hold function (*Hold*)" set to "ON ( *!* )", this item is used to set the averaging time.

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

This item controls the width to regard a weighing 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 weighing value. Used to prevent a weighing value from drifting due to vibration or drafts.

#### Note

- With "Hold function (*Hold*)" set to "ON ( *!* )", 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 0.0200 g or greater 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 " *!* " (the animal mode indicator **HOLD** illuminates) and any weighing unit other than the counting mode is selected.

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

| Weighing Range      | Averaging Time |           |               | Stabilization Range |         |       |
|---------------------|----------------|-----------|---------------|---------------------|---------|-------|
| 0.0200 g or greater | Cond 0         | 2 seconds | Faster        | St-b 0              | Lesser  | 6.25% |
|                     | Cond 1         | 4 seconds | ↕             | St-b 1              | ↕       | 12.5% |
|                     | Cond 2         | 8 seconds | More accurate | St-b 2              | Greater | 16.7% |

### 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 ( $SP_d$ )

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 ( $P_{nt}$ )

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. One hour warm up is necessary for accurate weighing.

## Auto display-off ( $P_{off}$ )

This function automatically turns off the balance display, if the weighing value is 0.5 g or less and the balance is in the no key operation or no command has been received for approx. 10 minutes. (The balance has the same power requirement in the weighing state as in the off state {standby mode}.)

## 9-5. 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 indicator turned on, the balance outputs the weighing 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 weighing data.

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

#### Mode A:

Example                    "For outputting the weighing data each time a sample is added (or removed), with "*Pt-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*            *Pt-d* 1            Adjusts zero automatically.

#### Mode B:

Example                    "For outputting the weighing data 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

Whether the stabilization indicator is displayed or not, the balance outputs the weighing data at the specified display refresh rate. The display does not blink in this mode.

Example                    "For monitoring data on the AD-8920A remote display

Required setting    *dout*            *Prt* 3            Stream mode  
                         *bPSFnc*        *SPd*            Display refresh rate  
                         *5 iF*            *bPS*            Baud rate

### Caution

- The balance may not transmit the data completely at the specified display refresh rate and baud rate. Set the baud rate higher.

### Key mode B

When the PRINT key is pressed, whether the stabilization indicator is displayed or not, the balance outputs the weighing data. The display does not blink in this mode.

Required setting    *dout*            *Prt* 4            Key mode B

## Key mode C

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

Required setting     *dout*     *Prt 5*     Key mode C

## Interval output mode

Whether the stabilization indicator is displayed or not, the balance outputs the weighing value periodically and the display blinks one time.

At that time the displayed weighing value will blink once to indicate that it had been output (or stored).

When the PRINT key is pressed, the balance starts to output the weighing value at a preset interval time. When the PRINT key is pressed again, the balance stops the output.

Example     "For outputting the weighing value 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.

## 9-6. 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. With an AD-8127 printer, use the external key printing mode, manual printing mode, auto printing mode or interval printing mode. With an AD-8121B printer, use 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 | 0 | 0 | 1 | . | 2 | 7 | 8 |      | c | t | C <sub>R</sub> | L <sub>F</sub> |
| Header |   | Data |   |   |   |   |   |   |   |   |   | Unit |   |   | Terminator     |                |

|   |   |                 |   |   |                               |
|---|---|-----------------|---|---|-------------------------------|
| S | T | Stable header   | Q | T | Stable header (Counting mode) |
| U | S | Unstable header |   |   |                               |
| O | L | Overload header |   |   |                               |

- Print example:
- |        |   |      |  |  |  |  |   |   |   |   |   |      |  |   |            |                |                |
|--------|---|------|--|--|--|--|---|---|---|---|---|------|--|---|------------|----------------|----------------|
| W      | T |      |  |  |  |  | + | 1 | . | 2 | 7 | 8    |  | c | t          | C <sub>R</sub> | L <sub>F</sub> |
| 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.

With an AD-8127 printer, use the dump printing mode. With an AD-8121B printer, use 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 | 7 | 8    |  | c | t          | C <sub>R</sub> | L <sub>F</sub> |
| Header |   | Data |  |  |  |  |   |   |   |   |   | Unit |  |   | Terminator |                |                |

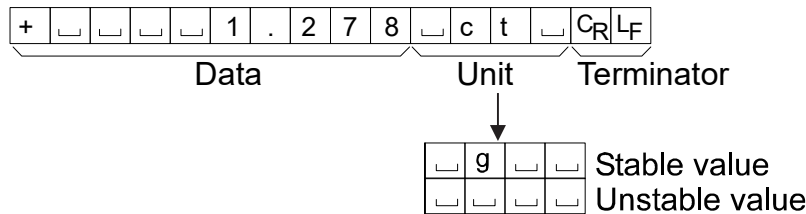
|   |   |                 |   |   |                               |
|---|---|-----------------|---|---|-------------------------------|
| W | T | Stable header   | Q | T | Stable header (Counting mode) |
| U | S | Unstable header |   |   |                               |

## KF format

5 IF 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.

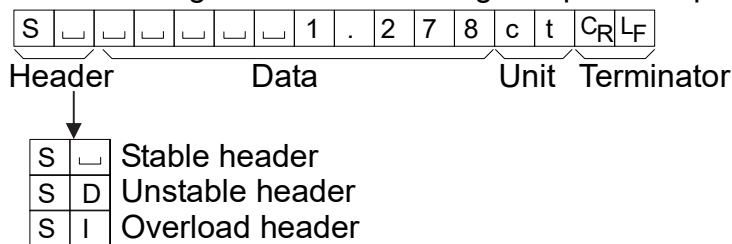


## MT format

5 IF 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

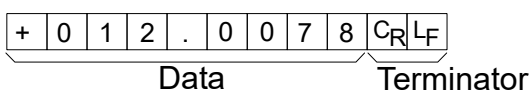


## NU (numerical) format

5 IF 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.

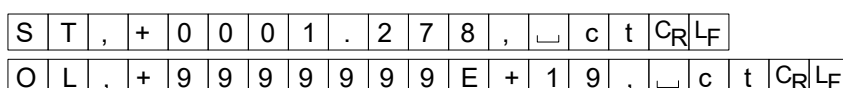


## CSV format

5 IF 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,+0001.278, c t<CR><LF>  
 Weight data



## 9-7. Data Format Examples

Stable

° 0.127 <sup>ct</sup>

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

Unstable

-18.369 <sup>ct</sup>

|     |   |   |   |   |   |   |   |   |   |                |                |   |   |   |                |                |                |                |
|-----|---|---|---|---|---|---|---|---|---|----------------|----------------|---|---|---|----------------|----------------|----------------|----------------|
| A&D | U | S | , | - | 0 | 0 | 1 | 8 | . | 3              | 6              | 9 | □ | c | t              | C <sub>R</sub> | L <sub>F</sub> |                |
| DP  | U | S | □ | □ | □ | □ | - | 1 | 8 | .              | 3              | 6 | 9 | □ | c              | t              | 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 | c | t | 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

£ <sup>ct</sup>

|     |   |   |   |                |                |   |   |   |   |                |                |   |   |   |   |                |                |                |
|-----|---|---|---|----------------|----------------|---|---|---|---|----------------|----------------|---|---|---|---|----------------|----------------|----------------|
| 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

-£ <sup>ct</sup>

|     |   |   |   |                |                |   |   |   |   |                |                |   |   |   |   |                |                |                |
|-----|---|---|---|----------------|----------------|---|---|---|---|----------------|----------------|---|---|---|---|----------------|----------------|----------------|
| 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                           | Display  | A&D                                 | D.P.                                | KF   | MT   |
|---------------------------------|----------|-------------------------------------|-------------------------------------|--|--|
| g                               | <b>g</b> | <span> </span> <span> </span> g     | <span> </span> <span> </span> g     | <span> </span> g <span> </span> <span> </span>     | <span> </span> g                                   |
| Counting mode                   | PCS      | <span> </span> P <span> </span> C   | <span> </span> P <span> </span> C   | <span> </span> p <span> </span> c <span> </span> s | <span> </span> P <span> </span> C <span> </span> S |
| Precent mode                    | %        | <span> </span> <span> </span> %     | <span> </span> <span> </span> %     | <span> </span> % <span> </span> <span> </span>     | <span> </span> %                                   |
| Ounce (Avoir)                   | oz       | <span> </span> o <span> </span> z   | <span> </span> o <span> </span> z   | <span> </span> o <span> </span> z <span> </span>   | <span> </span> o <span> </span> z                  |
| Pound                           | lb       | <span> </span> l <span> </span> b   | <span> </span> l <span> </span> b   | <span> </span> l <span> </span> b <span> </span>   | <span> </span> l <span> </span> b                  |
| Pound Ounce                     | L oz     | <span> </span> o <span> </span> z   | <span> </span> o <span> </span> z   | <span> </span> o <span> </span> z <span> </span>   | <span> </span> o <span> </span> z                  |
| Troy Ounce                      | ozt      | o <span> </span> z <span> </span> t | o <span> </span> z <span> </span> t | <span> </span> o <span> </span> z <span> </span> t | <span> </span> o <span> </span> z <span> </span> t |
| Metric Carat                    | ct       | <span> </span> c <span> </span> t   | <span> </span> c <span> </span> t   | <span> </span> c <span> </span> t <span> </span>   | <span> </span> c <span> </span> t                  |
| Momme                           | mom      | m <span> </span> o <span> </span> m | m <span> </span> o <span> </span> m | <span> </span> m <span> </span> o <span> </span> m | <span> </span> m <span> </span> o                  |
| Pennyweight                     | dwt      | d <span> </span> w <span> </span> t | d <span> </span> w <span> </span> t | <span> </span> d <span> </span> w <span> </span> t | <span> </span> d <span> </span> w <span> </span> t |
| Grain                           | GN       | <span> </span> G <span> </span> N   | <span> </span> G <span> </span> N   | <span> </span> g <span> </span> r <span> </span>   | <span> </span> G <span> </span> N                  |
| Tael (HK general,<br>Singapore) | tl       | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l <span> </span> s | <span> </span> t <span> </span> l                  |
| Tael (HK, jewelry)              | tl       | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l <span> </span> h | <span> </span> t <span> </span> l                  |
| Tael (Taiwan)                   | tl       | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l <span> </span> t | <span> </span> t <span> </span> l                  |
| Tael (China)                    | tl       | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l   | <span> </span> t <span> </span> l <span> </span> c | <span> </span> t <span> </span> l                  |
| Tola (India)                    | tol      | <span> </span> <span> </span> t     | <span> </span> <span> </span> t     | <span> </span> t <span> </span> o <span> </span> l | <span> </span> t                                   |
| Messghal                        | MEs      | m <span> </span> e <span> </span> s | m <span> </span> e <span> </span> s | <span> </span> M <span> </span> S <span> </span>   | <span> </span> m                                   |
| Multi                           | MLT      | M <span> </span> L <span> </span> T | M <span> </span> L <span> </span> T | <span> </span> M <span> </span> L <span> </span> T | <span> </span> M <span> </span> L <span> </span> T |

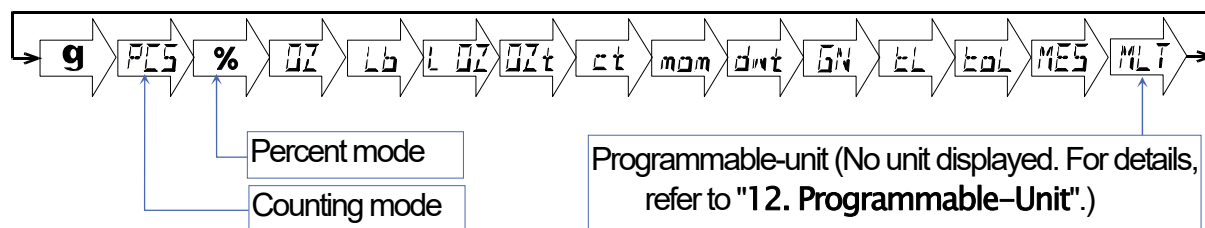
  Space, ASCII 20h

#### Note

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

## 9–8. Weighing Units

With the FZ–CT / FX–CT series balance, the following weighing units and weighing modes are available:



A unit or mode can be selected and stored in the function table as described on page 13.

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)              | Display | Function table<br>(Storing mode) | Conversion factor<br>1 g =            |
|--------------------------------|---------|----------------------------------|---------------------------------------|
| Gram                           | g       | g                                | 1 g                                   |
| Counting mode                  | PCS     | PCS                              | —                                     |
| Percent mode                   | %       | %                                | —                                     |
| Ounce (Avoir)                  | OZ      | OZ                               | 28.349523125 g                        |
| Pound                          | Lb      | Lb                               | 453.59237 g                           |
| Pound/Ounce                    | L OZ    | LO                               | 1 lb = 16 oz<br>1 oz = 28.349523125 g |
| Troy Ounce                     | OZt     | OZt                              | 31.1034768 g                          |
| Metric Carat                   | ct      | ct                               | 0.2 g                                 |
| Momme                          | mom     | mom                              | 3.75 g                                |
| Pennyweight                    | dwt     | dwt                              | 1.55517384 g                          |
| Grain (UK)                     | GN      | GN                               | 0.06479891 g                          |
| Tael (HK general, Singapore)   | 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                              | 11.6638038 g                          |
| Messghal                       | MES     | MES                              | 4.6875 g                              |
| Programmable-unit (Multi-unit) | MLT     | MLT                              | —                                     |



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

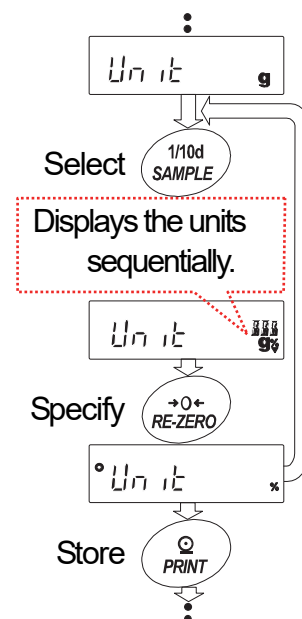
| Unit                         | Capacity               |                      |                      | Minimum Display |
|------------------------------|------------------------|----------------------|----------------------|-----------------|
|                              | FZ-1200CT<br>FX-1200CT | FZ-700CT<br>FX-700CT | FZ-500CT<br>FX-500CT |                 |
| Gram                         | 252                    | 152                  | 102                  | 0.001           |
| Ounce (Avoir)                | 8.89                   | 5.36                 | 3.59                 | 0.00005         |
| Pound                        | 0.555                  | 0.335                | 0.224                | 0.000005        |
| Pound/Ounce                  | 0L 8.88 oz             | 0L 5.36 oz           | 0L 3.60 oz           | 0L 0.01 oz      |
| Troy Ounce                   | 8.10                   | 4.88                 | 3.27                 | 0.00005         |
| Metric Carat                 | 1260                   | 760                  | 510                  | 0.001           |
| Momme                        | 67.2                   | 40.5                 | 27.2                 | 0.001           |
| Pennyweight                  | 162.0                  | 97.7                 | 65.5                 | 0.001           |
| Grain (UK)                   | 3888                   | 2345                 | 1574                 | 0.02            |
| Tael (HK general, Singapore) | 6.66                   | 4.02                 | 2.69                 | 0.00005         |
| Tael (HK jewelry)            | 6.73                   | 4.06                 | 2.72                 | 0.00005         |
| Tael (Taiwan)                | 6.72                   | 4.05                 | 2.72                 | 0.00005         |
| Tael (China)                 | 8.06                   | 4.86                 | 3.26                 | 0.00005         |
| Tola (India)                 | 21.6                   | 13.0                 | 8.74                 | 0.0001          |
| Messghal                     | 53.7                   | 32.4                 | 21.7                 | 0.0005          |

## 9-9. 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 **Unit**.
- 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.

## 9-10. 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

- If the sample unit mass variable is too large, it may cause a counting error.
- To improve the counting performance, use the ACAI function frequently or divide the samples into several groups and count each group.

### Selecting the Counting Mode

- 1 Press the **MODE** key to select **PCS** (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 10, 25, 50 or 100.

### Note

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

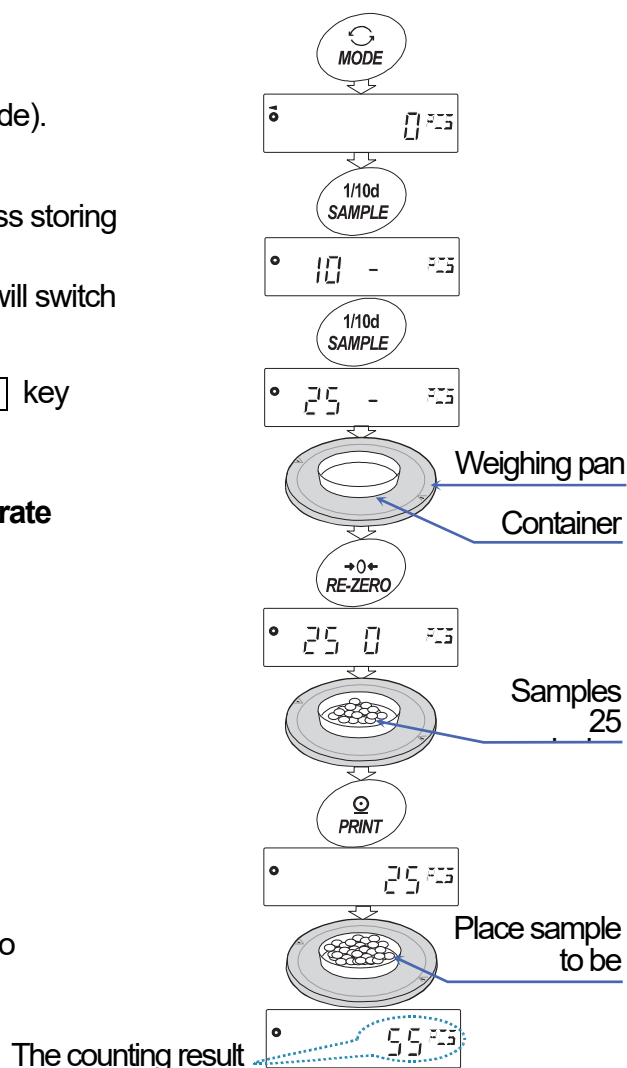
- 4 Place a container on the weighing pan, if necessary. Press the **RE-ZERO** key to cancel the weight (tare).

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.



### 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 **Lo**. In that case, store the mass by some quantity. For example, when the model with the minimum weighing value of 0.001 g is used and 10 pieces of samples weigh 0.005 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, **50- PCS** appears to require 25 more samples. Add 25 samples and press the **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 0.001 g is used, the recommended sample unit mass is 0.01 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 **PRINT** key will output the weighing value (number of objects), using the RS-232C serial interface.

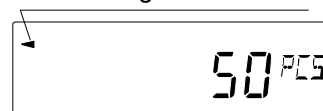
### Note

- A printer, a personal computer, or peripheral equipment that is sold separately, 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



- 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.

## 9-11. Percent Mode (%)

This is the mode to display the weighing 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).

Note

- If the percent mode is not displayed, refer to "9-8. Weighing Units" and "9-9. Storing Units" and enable the 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 **10000 %**. (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 **L0**. Do not use the sample.
- The position of the decimal point varies with 100% reference mass.

| 100% reference mass  | Minimum weighing value |
|----------------------|------------------------|
| 0.0100 g to 0.0999 g | 1 %                    |
| 0.1000 g to 0.9999 g | 0.1 %                  |
| 1.0000 g ~           | 0.01 %                 |

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

- 6 Remove the sample.

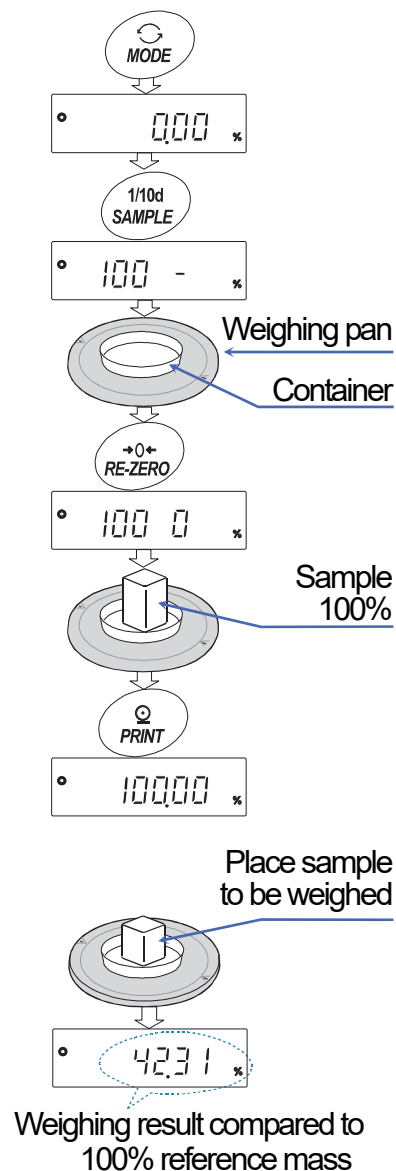
### Reading the percentage

- 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 weighing value, using the RS-232C serial interface.

Note

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



## 9-12. 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 "6-5 Statistical Calculation Mode".

## 9-13. 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, coefficient of variation and relative error. 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 standard deviation, coefficient of variation and relative error are obtained by the equation below:

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

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

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

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

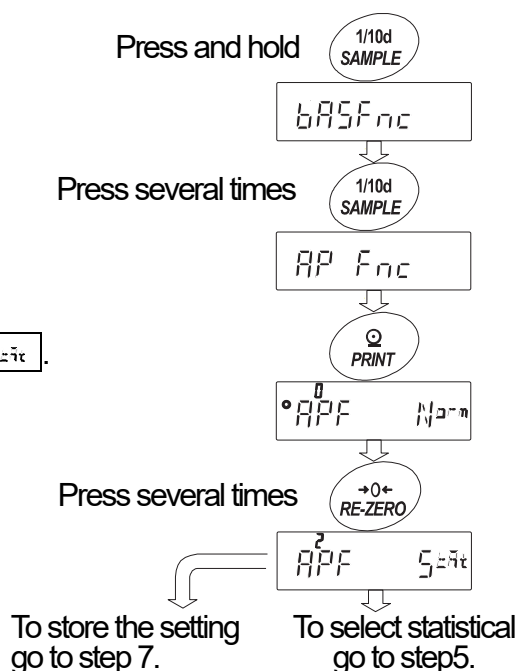
Note

- **When data with the minimum weighing value turned off are used in the statistical calculation, results will be displayed with the minimum weighing value turned off. (The minimum weighing value will be rounded off.)**

### 9.13.1. Getting Started

#### Switching to the statistical function mode (Changing the function table)

- 1 Press and hold the **SAMPLE** key until **bASFnC** of the function table is displayed, then release the key.
- 2 Press the **SAMPLE** key several times to display **AP Fnc**.
- 3 Press the **PRINT** key to display **APF N=0**.
- 4 Press the **RE-ZERO** key several times to display **APF Set**.  
 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 N=0**.



## Selecting the statistical items to output

5 Press the **[SAMPLE]** key to display

6 Press the **[RE-ZERO]** key to select the output items.

In the example, is selected to output the number of data, sum, maximum, minimum, range (maximum-minimum) and average.

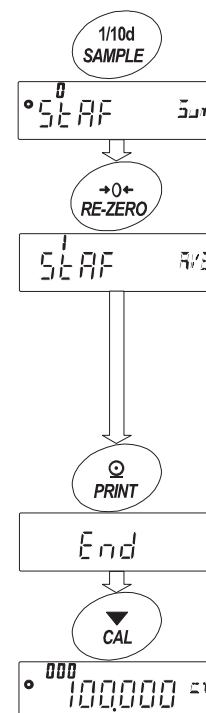
| Parameter | Description   |
|-----------|---|
| 0         | Number of data, Sum   |
| 1         | Number of data, Sum, Maximum, Minimum, Range (maximum – minimum), average   |
| 2         | Number of data, Sum, Maximum, Minimum, Range (maximum – minimum), Average, Standard deviation, Coefficient of variation   |
| 3         | Number of data, Sum, Maximum, Minimum, Range (maximum – minimum), Average, Standard deviation, Coefficient of variation, Relative error of maximum value, Relative error of minimum value |

7 Press the **[PRINT]** key to store the setting.

Note

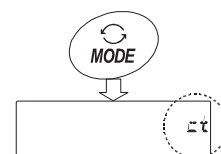
- The statistical calculation mode will be enabled using the **[ON:OFF]** key or when the power is turned on.

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, carat (ct) 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 50 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 (Unit)" of the function table beforehand.

### 9.13.2. Using the Statistical Calculation Mode

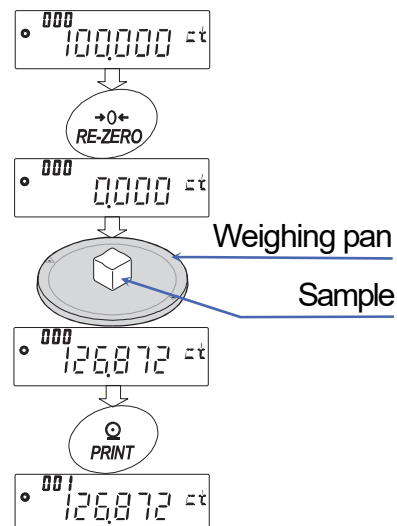
#### Entering data for statistical calculation

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.



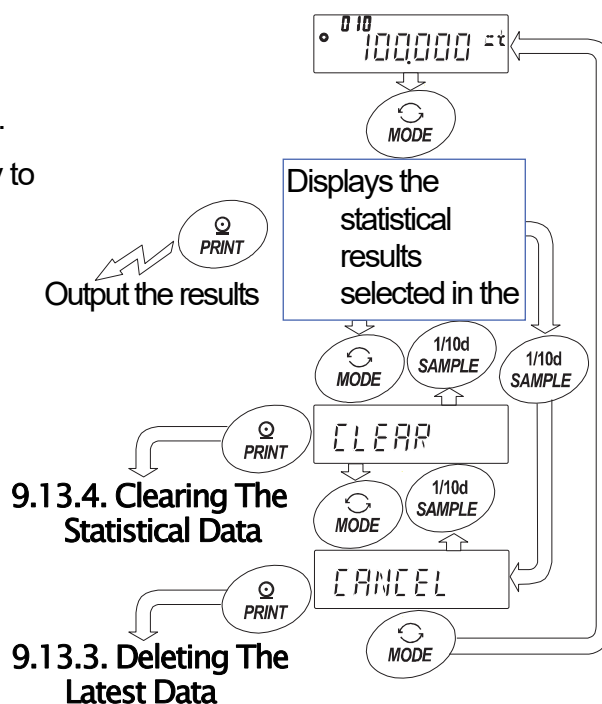
## Outputting the statistical results

- 5 Each time the **MODE** key is pressed, the display changes: the results as selected in "Statistical function mode output items (STAT)", **CLEAR** and **CANCEL**.
- 6 While the results are displayed, press the **PRINT** key to output the results.

### Notes

- When the number of data is 1, the coefficient of variation is displayed as **-----**.
- When the average is 0, the coefficient of variation is displayed as **-----**.
- Statistical items are indicated on the upper left of the display using the following symbols.

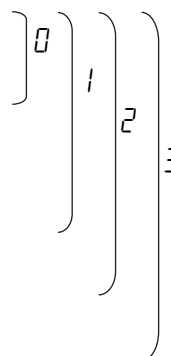
| Symbol            | Statistical item                |
|-------------------|---------------------------------|
| $\Sigma n$        | Sum                             |
| $\bar{n} \Pi$     | Maximum                         |
| $\bar{n} \Pi$     | Minimum                         |
| $r$               | Range (Maximum – minimum)       |
| $\bar{A} \bar{E}$ | Average                         |
| $\Sigma d$        | Standard deviation              |
| $\bar{C} \bar{V}$ | Coefficient of variation        |
| $\bar{n} \Pi \%$  | Relative error of maximum value |
| $\bar{n} \Pi \%$  | Relative error of minimum value |



### Output example

|      |           |
|------|-----------|
| N    | 10        |
| SUM  | 100.0000g |
| MAX  | 10.5000g  |
| MIN  | 9.5000g   |
| R    | 1.0000g   |
| AVE  | 10.0000g  |
| SD   | 0.280 g   |
| CV   | 2.80 %    |
| MAX% | 5.00 %    |
| MIN% | 5.00 %    |

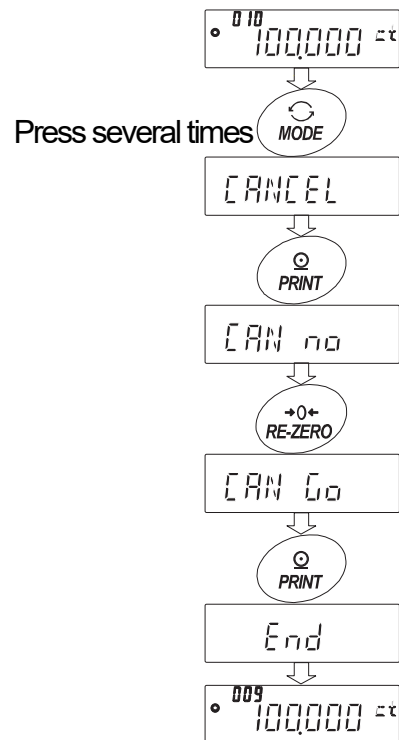
### Function table parameter



### 9.13.3. 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.

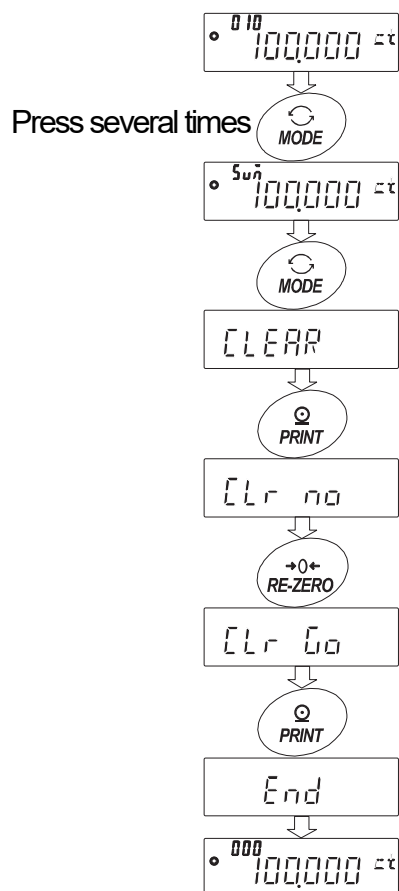
- 1 In the weighing mode, press the **MODE** key several times to display **CANCEL**.
- 2 Press the **PRINT** key to display **CAN no**.
- 3 Press the **RE-ZERO** key to display **CAN Co**.
- 4 Press the **PRINT** key to delete the latest data and exclude it from statistical calculation.  
The number of data decreases by 1 when the balance returns to the weighing mode.



### 9.13.4. 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 several times to display **CLEAR**.
- 2 Press the **PRINT** key to display **CLr no**.
- 3 Press the **RE-ZERO** key to display **CLr Co**.
- 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.



## 9-14. 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, excluding "near zero"
- ☐ Comparison when the weight data is stable, 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 weighing value is within  $\pm 10$  digits of the minimum weighing value. For example, using an FZ-1200CT in gram mode, the range of  $\pm 0.010$  CT is "near zero". For the description of "Comparator (**[CP Fnc]**)", refer to "9-3 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 **[bAS Fnc]** of the function table is displayed.
- 2 Press the **[SAMPLE]** key several times to display **[CP Fnc]**.
- 3 Press the **[PRINT]** key.
- 4 Press the **[RE-ZERO]** key several times to display **[CP ALL EN]**.
- 5 Press the **[PRINT]** key to store the selected mode.

### Entering the upper limit value

- 6 With **[CP H<sub>1</sub>]** 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 **[CP L<sub>0</sub>]** 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.

## 9-15. Clock and Calendar Function (Only for the FZ-CT Series)

The **FZ-CT** series balance is equipped with a clock and calendar function. (This function is not available for the **FX-CT** series)

When the "GLP output (INF)" parameter is set to "1" or "2" and the "Time/Date output (Std)" 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:

### 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 and 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 time does not need to be confirmed, 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".

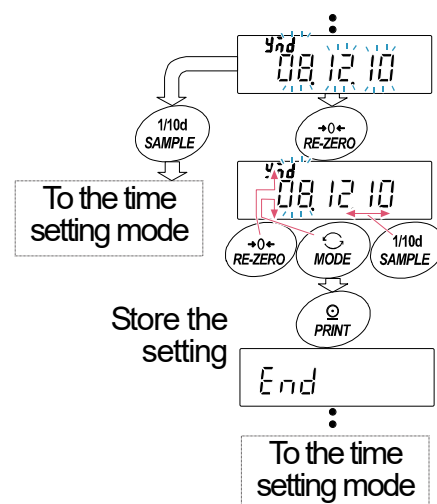
### Setting the date (with part of the digits blinking)

- 5 Set the date using the following keys.
 

|                    |  |
|--------------------|--|
| <b>SAMPLE</b> key  | To select the digits to change the value. The selected digits blink. |
| <b>RE-ZERO</b> key | To increase the value by one.  |
| <b>MODE</b> key    | To decrease the value by one.  |
| <b>PRINT</b> key   | To store the new setting, display <b>End</b> and go to step 6.       |
| <b>CAL</b> key     | To cancel the new setting and go to step 6.                          |

### Confirming the time

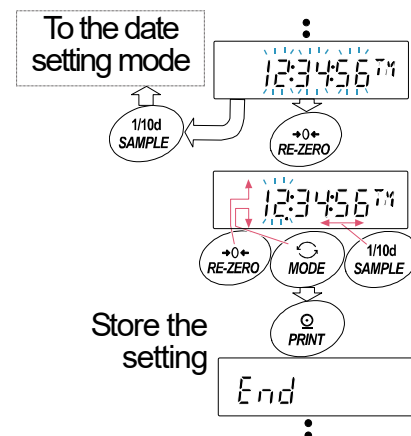
- 6 The current time is displayed with all the digits blinking.
  - When the time is correct and the date does not need to be reconfirmed, press the **CAL** key and go to step 8.
  - When the time is correct and the date is to be reconfirmed, press the **SAMPLE** key and go back to step 4.
  - When the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

### Note

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

When the clock backup battery has been depleted, the balance displays **rtc PF**.

Under this condition, press any key and set the time and date. The dead battery only affects the clock and calendar function. Even so, the function works normally as long as the AC adapter is connected to the balance.

## 10.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 ( *GLP* )" 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.

The FZ-CT series is equipped with the built-in clock and can output the time and date using a clock and calendar function.

With the FX-CT series, when an AD-8121B printer is connected to the balance, the time and date can be printed using the clock and calendar function of the printer. In this case, set the "GLP output ( *GLP* )" parameter to "I".

- When an AD-8127 printer is connected to the balance and outputs the GLP report, the time and date can be added to the report using the clock function of the printer. (Available for balances with software version 1.660 or later)

This is very useful for managing the time and date using the AD-8127 password lock function to prevent them from being falsified.

To output the GLP/GMP compliant report, set the AD-8127 printer to the dump printing mode.

- 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 and using the internal mass.  
 "Title block" and "End block" for the weight data.

### 10-1. 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.
 

|   |  |
|---|--|
| <b>[SAMPLE]</b> key                     | To select the digit to change the value. The selected digit blinks.                            |
| <b>[RE-ZERO]</b> key, <b>[MODE]</b> key | To set the character of the digit selected.<br>Refer to the display character set shown below. |
| <b>[PRINT]</b> key                      | To store the new ID number and display <b>[RP Fnc]</b>   |
| <b>[CAL]</b> key                        | To cancel the new ID number and display <b>[RP Fnc]</b>  |
- 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 |
| 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 → |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

## 10-2. GLP Report

To output the GLP/GMP compliant report to an AD-8121B printer, AD-8127 printer or a personal computer, set the "GLP output (INF0)" parameter of the function table to "1" (AD-8121 format), "2" (General format using the balance built-in clock data) or "3" (General format using the external device clock data).

### Notes on outputting the GLP/GMP compliant report to an AD-8121B/AD-8127 printer

- Refer to "12. RS-232C Interface" for connection to a printer.
- With an AD-8121B printer, use MODE 3. If MODE1 is used, select temporarily the dump print mode by pressing the STAT. key of the AD-8121B printer.
- With an AD-8127 printer, use the dump printing mode. If the external key printing mode is used, press and hold the ENT key of the AD-8127 printer to switch between the external key printing mode and the dump printing mode.
- Set "Data output pause (PLSE)" of the function table to "1".
- If the time and date are not correct when the FZ-CT series balance built-in clock data is output (INF0 1, 2), set the correct time and date in "Clock (CL Add)" of the function table. With the FX-CT series, set the correct time and date of the AD-8121B clock and calendar.
- "INF0 3" is available for balances with software version 1.860 or later.

## Calibration report using an internal mass (Only for the FZ-CT series)

When the setting is "inF0 I"

AD-8121 format

```

      A & D
MODEL  FZ-1200CT
S/N    012345678
ID     ABCDEFG
DATE   2011/12/31
TIME   12:34:56
CALIBRATED(INT.)
REMARKS

SIGNATURE
-----

```

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

When the setting is "inF0 2"

General data format

```

      A_&_D<TERM>
MODEL_FZ-1200CT<TERM>
S/N_012345678<TERM>
ID_012345678<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>

```

## Calibration test report using the internal mass (Only for the FZ-CT series)

(Calibration test does not perform sensitivity adjustment.)

When the setting is "inF0 I"

AD-8121 format

```

      A & D
MODEL  FZ-1200CT
S/N    012345678
ID     ABCDEFG
DATE   2011/12/31
TIME   12:23:34
CAL.TEST(INT.)
ACTUAL
      0.000 g
      +199.999 g
TARGET
      +200.0000 g
REMARKS

SIGNATURE
-----

```

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

When the setting is "inF0 2"

General data format

```

      A_&_D<TERM>
MODEL_FZ-1200CT<TERM>
S/N_012345678<TERM>
ID_012345678<TERM>
DATE<TERM>
2011/12/31<TERM>
TIME<TERM>
12:23:34<TERM>
CAL.TEST(INT.)<TERM>
ACTUAL<TERM>
0.000_g<TERM>
+199.999_g<TERM>
TARGET<TERM>
+200.0000_g<TERM>
REMARKS<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
-----<TERM>
<TERM>
<TERM>

```



## Calibration report using an external weight

When the setting is "inF0 l"

AD-8121 format

```

      A & D
MODEL  FX-1200CT
S/N    012345678
ID     ABCDEFG
DATE   2011/12/31
TIME   12:23:34
CALIBRATED(EXT.)
CAL.WEIGHT
      +200.0000 g
REMARKS

SIGNATURE
-----

```

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

When the setting is "inF0 2"

General data format

```

      A & D<TERM>
MODEL__FX-1200CT<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-CT series, the time and date are added to output data.

## Calibration test report using an external weight

(Calibration test does not perform calibration.)

When the setting is "inF0 l"

AD-8121 format

```

      A & D
MODEL  FX-1200CT
S/N    012345678
ID     ABCDEFG
DATE   2011/12/31
TIME   12:23:34
CAL.TEST(EXT.)
ACTUAL
      0.0000 g
      +199.999 g
TARGET
      +200.0000 g
REMARKS

SIGNATURE
-----

```

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

When the setting is "inF0 2"

General data format

```

      A & D<TERM>
MODEL__FX-1200CT<TERM>
S/N____012345678<TERM>
ID_____ABCDEFG<TERM>
DATE<TERM>
<TERM>
TIME<TERM>
<TERM>
CAL. TEST (EXT.)<TERM>
ACTUAL<TERM>
____0.000__g<TERM>
____+199.999__g<TERM>
TARGET<TERM>
____+200.0000__g<TERM>
REMARKS<TERM>
<TERM>
<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
-----<TERM>
<TERM>
<TERM>

```

\* With FZ-CT series, the time and date are added to output data.

## Title block and end block

When a weighing 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 weighing values, in the GLP report.

## Note

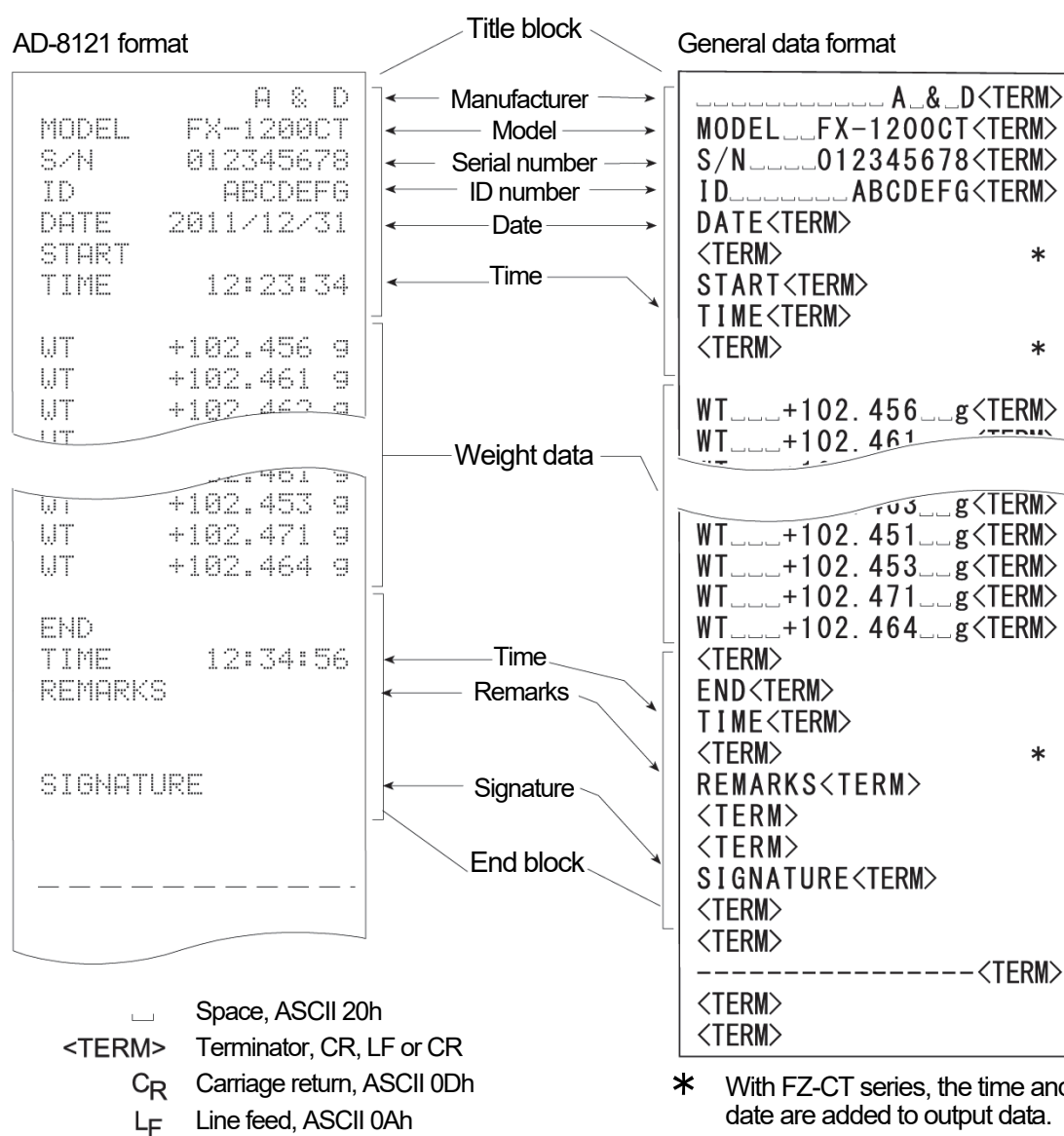
- **To output the report to an AD-8121B , use MODE 3 of the AD-8121B.**

## Operation

- 1 With the weight data displayed, press and hold the **PRINT** key until **Start** 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 **End** is displayed. The "End block" is output.

DP format (TYPE 1 of the function table)  
When the setting is "10F0 1":

DP format (TYPE 1 of the function table)  
When the setting is "INF02":



## Outputting the clock data of the external device “*inf0 3*” (with software version 1.860 or later)

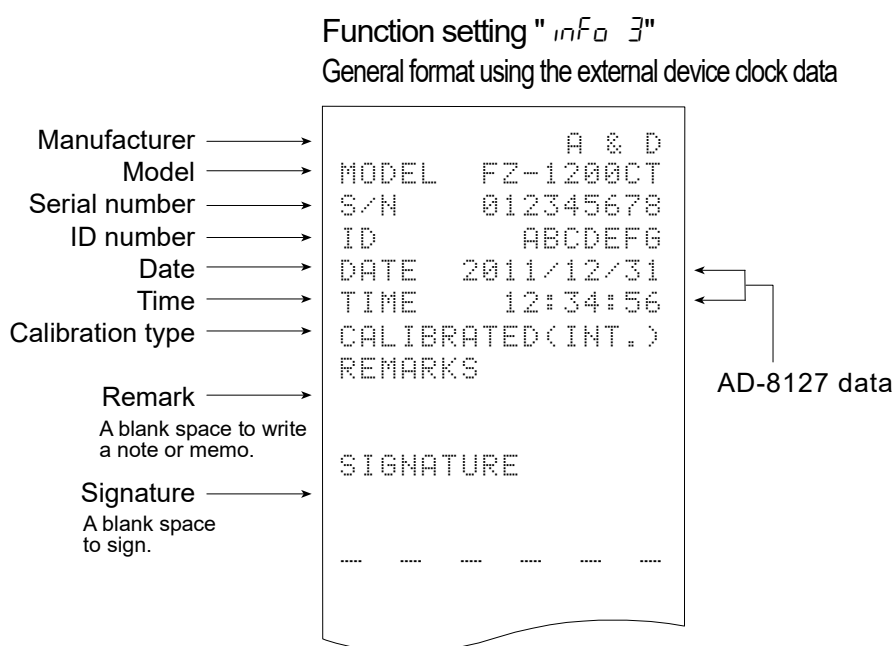
When the "GLP output (*inf0*)" parameter of the function table is set to "3", the clock data of external devices such as a printer or a personal computer can be used instead of the balance built-in clock data for the GLP/GMP compliant report. This is useful for standardizing the clock data using the clock function of an external device.

Except for the date and time, the same format as “*inf0 2*” is used.

### Notes

- “*inf0 3*” is available for balances with software version 1.860 or later.
- To output the clock data of an external device, the external device such as an AD-8127 printer or Windows communication tools software WinCT RsCom must have a function to output the time and date when <ESC>D or <ESC>T is received.
- Even with *inf0 3* set, the data memory function saves the balance built-in clock data for the calibration report.

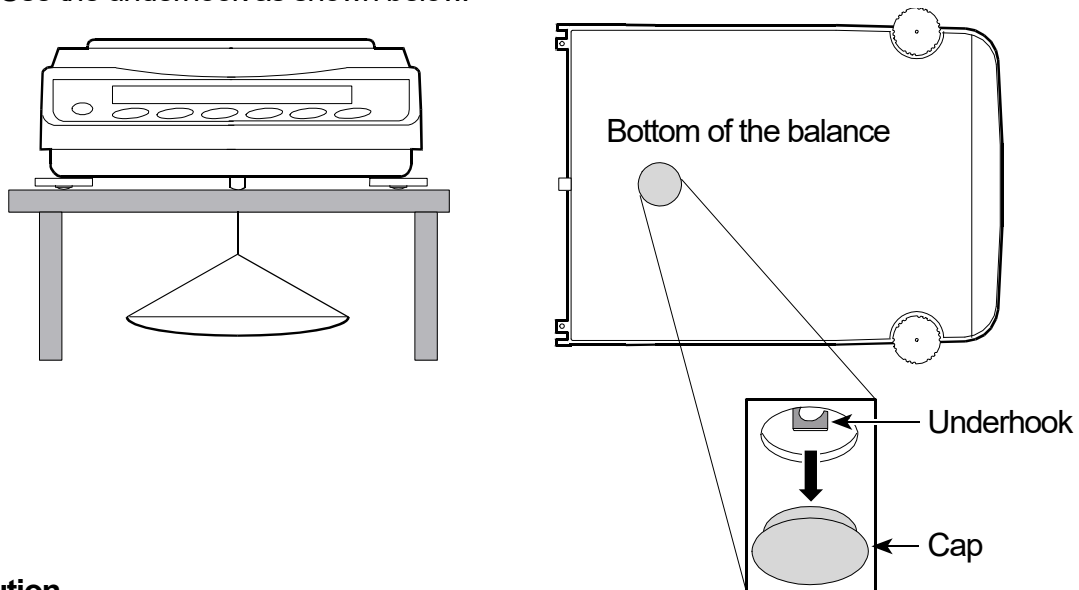
## Calibration report using the internal mass



## 11. 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.



### 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.**

## 12. 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 |
|-----------|----------|----------|---------------------|---------------------|
| FZ-1200CT | FZ-700CT | FZ-500CT | 0.000001            | 1000                |
| FX-1200CT | FX-700CT | FX-500CT |                     |                     |

### Operation

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

### Confirming the coefficient

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

### Setting the coefficient

- 5 Set the coefficient using the following keys.

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

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

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

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

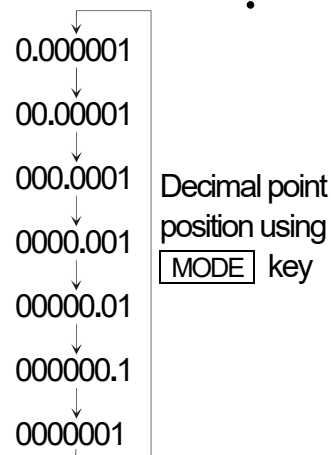
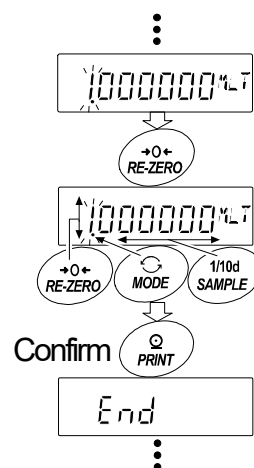
**[CAL]** key ..... To cancel the new setting and go to step 6.

### Quitting the operation

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

### Using the function

Press the **[MODE]** key to select the programmable-unit (no display on the unit section). Perform weighing as described in "5-1. Basic Operation (Gram Mode)". After weighing, the balance displays the result (weight data in grams x coefficient).



## 13. Password Function

The password function can be used to restrict balance use or functions. It is useful for preventing the time and date setting from being falsified and preventing users from changing other function settings.

Password: Four digits (4 x 4 x 4 x 4 = 256 outcomes) using **MODE**, **SAMPLE**, **PRINT** and **RE-ZERO** keys.

At factory setting, the password function is not used.

The management of the password function is performed in "Password function" of "9-3. Details of the Function Table".

### Note

- The password function varies depending on the balance software version.

### 13-1. Balance Software Version 1.70 to 1.85

Two settings are available in "Password function (PASSWORD)" of the function table.

|        |   |
|--------|---|
| PASS 0 | No password function.                                     |
| PASS 1 | Entering a password is required before starting weighing. |

**PASS 0** (No password function)

Anybody can perform weighing, use all the balance functions and make changes to them.

No password is required.

**PASS 1** (Entering a password is required before starting weighing.)

The administrator (ADM) sets a unique password to restrict balance users.

Only one password by the administrator can be set.

The correct password must be entered for the balance to enter the weighing mode.

### 13-2. Balance Software Version 1.860 or later

Three settings are available in "Password function (PASSWORD)" of the function table.

|        |   |
|--------|---|
| PASS 0 | No password function.   |
| PASS 1 | Entering a password is required before starting weighing.                   |
| PASS 2 | Logging in by the administrator password is required before making changes. |

**PASS 0** (No password function)

No password is required.

Anybody can perform weighing, use all the balance functions and make changes to them.

**PASS 1** (Entering a password is required before starting weighing.)

The administrator (ADM) sets unique passwords to restrict balance users.

(Pressing the **ON:OFF** key before weighing will prompt you to enter a password.

The correct password must be entered for the balance to enter the weighing mode.

Two login levels are available: administrator (ADM) and user (USER 01~10).

|                     |   |
|---------------------|---|
| Administrator (ADM) | All the functions and settings can be used.   |
|                     | A password can be set for each of 10 users.   |
| User (USER 01~10)   | Initialization and changes to the settings are restricted, including the clock setting. |
| No password         | The balance cannot be used.   |

**PASS 2** (Logging in by the administrator password is required before making changes.)

Anybody can perform weighing, but initialization and changes to the settings are restricted, including the clock setting.  
(Even if the **ON:OFF** key is pressed to start weighing, a password will not be required.)

Two login levels are available: administrator (**ADM<sup>IN</sup>**) and guest (**GUE<sup>ST</sup>**).

|   |   |
|---|---|
| Administrator ( <b>ADM<sup>IN</sup></b> )         | All the functions and settings can be used.   |
| Guest ( <b>GUE<sup>ST</sup></b> )<br>*No password | Initialization and changes to the settings are restricted, including the clock setting. |

When weighing is started by pressing the **ON:OFF** key while holding down the **CAL** key in the standby mode, the balance will prompt you to enter the administrator (**ADM<sup>IN</sup>**) password.

## Items restricted depending on the login level

| Login level                                  | Weighing                          |   |                            |
|--|-----------------------------------|---|----------------------------|
|  | Entering password before weighing | Calibration<br>(Sensitivity adjustment) | Changes to the settings *1 |
| Administrator<br>( <b>ADM<sup>IN</sup></b> ) | Required                          | Available                               | Available                  |
| User<br>( <b>USER 01 to 10</b> )             |                                   | Available or not available *2           | Not available              |
| Guest<br>( <b>GUE<sup>ST</sup></b> )         | Available                         |   |                            |

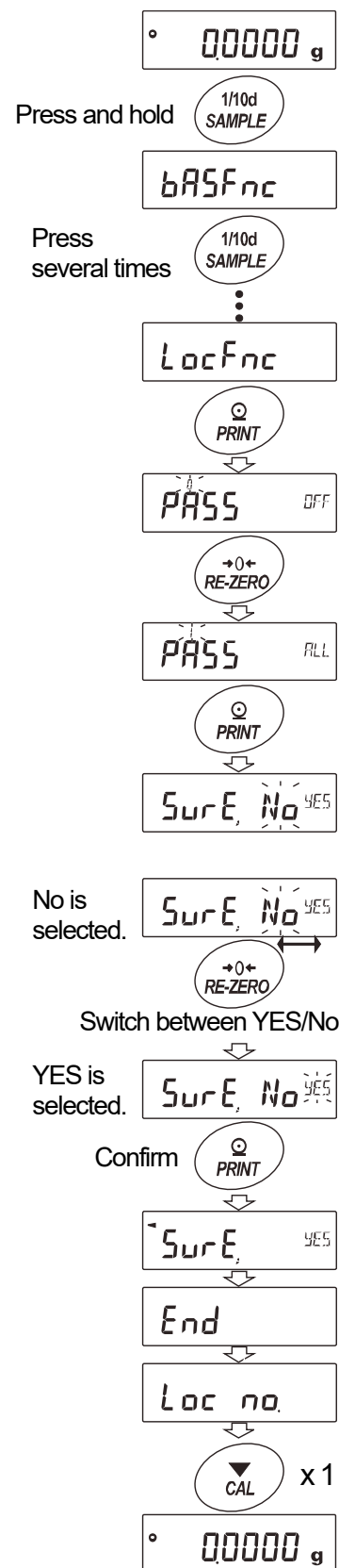
\*1: Response adjustment, repeatability test, function switch and initialization, function settings (clock setting)

\*2: Available under ordinary circumstances, but not available to users (**USER 01 to 10**) and guests (**GUE<sup>ST</sup>**) when the administrator (**ADM<sup>IN</sup>**) sets the function switch to “inhibit” shown in “7-1. Permit or Inhibit”.

### 13-3. Using the Password Function

The password function can be switched among “Not used (0)”, “Used (1)” and “Used (2)” in “Password function (LocFnc)” of the function table.

- 1 In the weighing mode, press and hold the **[SAMPLE]** key until **bASFnC** is displayed, and then release the key.
- 2 Press the **[SAMPLE]** key several times to display **LocFnc**.
- 3 Press the **[PRINT]** key to display **PASS** “0”.  
(To cancel the operation, press the **[CAL]** key.)
- 4 Press the **[RE-ZERO]** key to switch the numbers.  
Display “1” or “2”.
- 5 Press the **[PRINT]** key to display **SurE, No<sup>YES</sup>** with “No” blinking (“No” is selected).
- 6 “YES” and “No” can be switched with the **[RE-ZERO]** key.  
Press the **[RE-ZERO]** key to display **SurE, No<sup>YES</sup>** with “YES” blinking (“YES” is selected).
- 7 Press the **[PRINT]** key to store the new setting. The password function can now be used.
- 8 **Loc no.** is displayed. To store or change the password, proceed to Step 4 in “13.6. Storing or Changing the Password”.  
Not to store or change the password, press the **[CAL]** key to return to the weighing mode.



#### Note

- When the balance software version is 1.70 to 1.85, only “Not used (0)” or “Used (1)” is available.



## 13-4. Entering the Password Before Weighing

**PASS 1** (Entering a password is required before starting weighing)

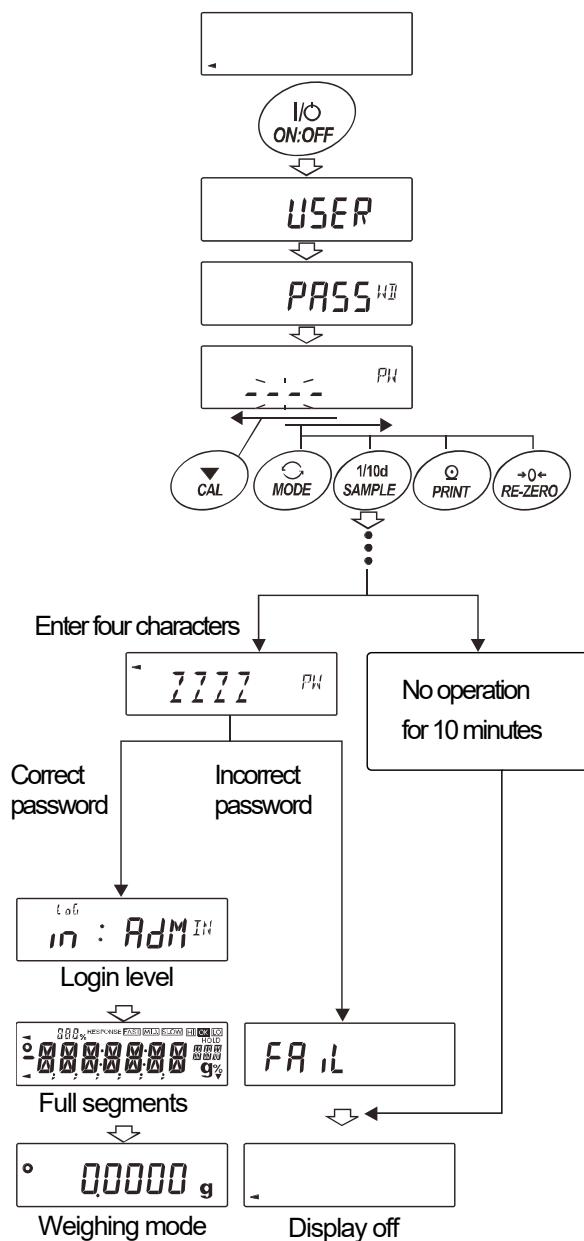
- 1 In the standby mode, press the **ON/OFF** key.
- 2 After **USER** **PASS**, **----** is displayed to prompt you to enter a password.
- 3 Enter a four-digit password using the following keys.  
The display will turn off automatically after ten minutes of non-operation.

**MODE** key.....To enter **M**  
**SAMPLE** key.....To enter **5**  
**PRINT** key.....To enter **P**  
**RE-ZERO** key.....To enter **7**  
**CAL** key.....To go back one character

- 4 When the password is correct, the balance displays the login level, turns all the display segments on, and then enters the weighing mode.

The default password set at the factory is **7777** (press the **RE-ZERO** key four times), for administrator level.

When the password is incorrect, the balance displays **FAIL**, sounds the buzzer three times and turns the display off.



### Notes

- When the balance software version is 1.70 to 1.85, the login level is not displayed when logged in.
- When the balance software version is 1.860 or later, enter the administrator password to log in as an administrator.

**PASS 2** (Logging in by the administrator password is required before making changes)

## Logging in as an administrator ( $Adm^{in}$ )

- 1 In the standby mode, while holding down the **CAL** key, press the **ON:OFF** key.

- 2 Enter a four-digit password using the following keys.  
The display will turn off automatically after ten minutes  
of non-operation.

**MODE** key..... To enter *M*

**SAMPLE** key ..... To enter 5

**PRINT** key ..... To enter 

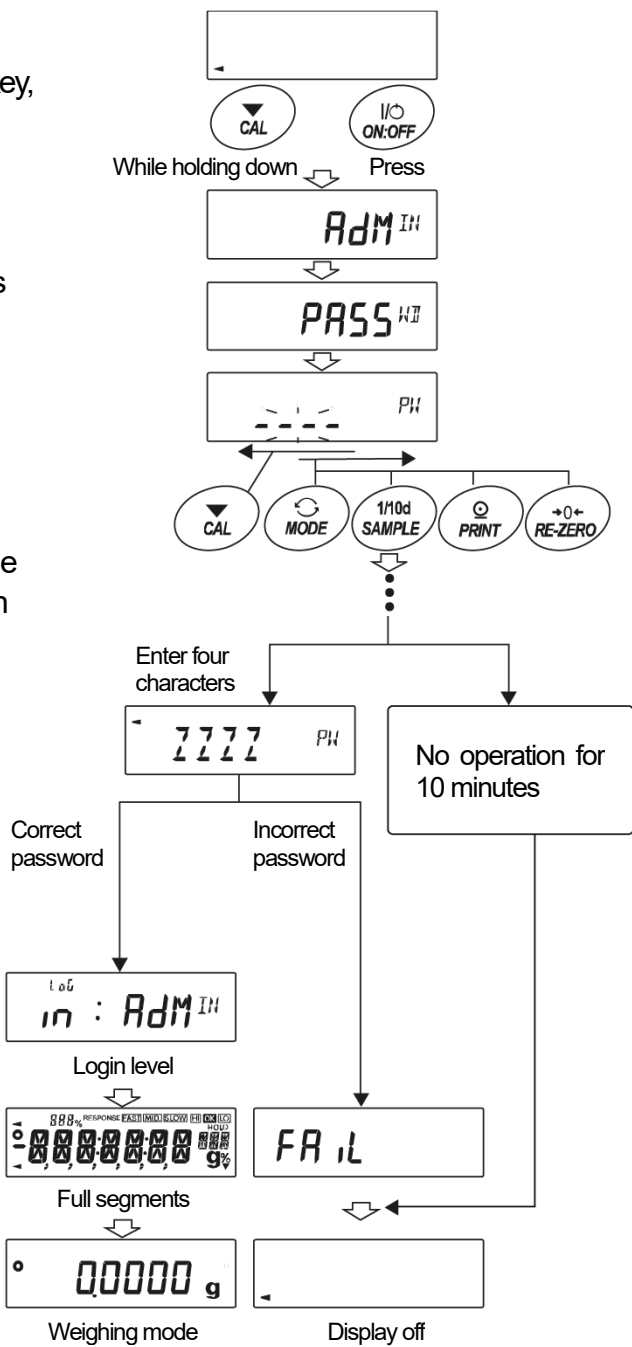
**RE-ZERO** key..... To enter 7

**CAL** key ..... To go back one character

- 3 When the password is correct, the balance displays the login level, turns all the display segments on, and then enters the weighing mode.


The default password set at the factory is **7777** (press the **RE-ZERO** key four times), for administrator level.

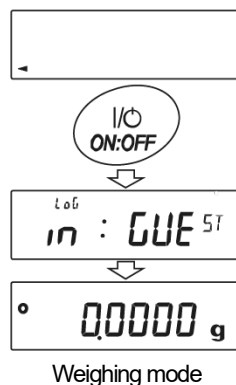
When the password is incorrect, the balance displays, **FAIL** sounds the buzzer three times and turns the display off.



## Logging in as a guest (CUE<sup>ST</sup>)

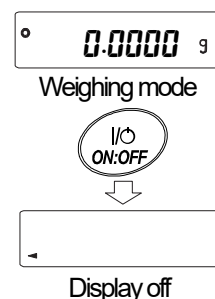
- 1 In the standby mode, press the **ON:OFF** key.

- 2 After , the balance enters the weighing mode.




## 13-5. Logging Out

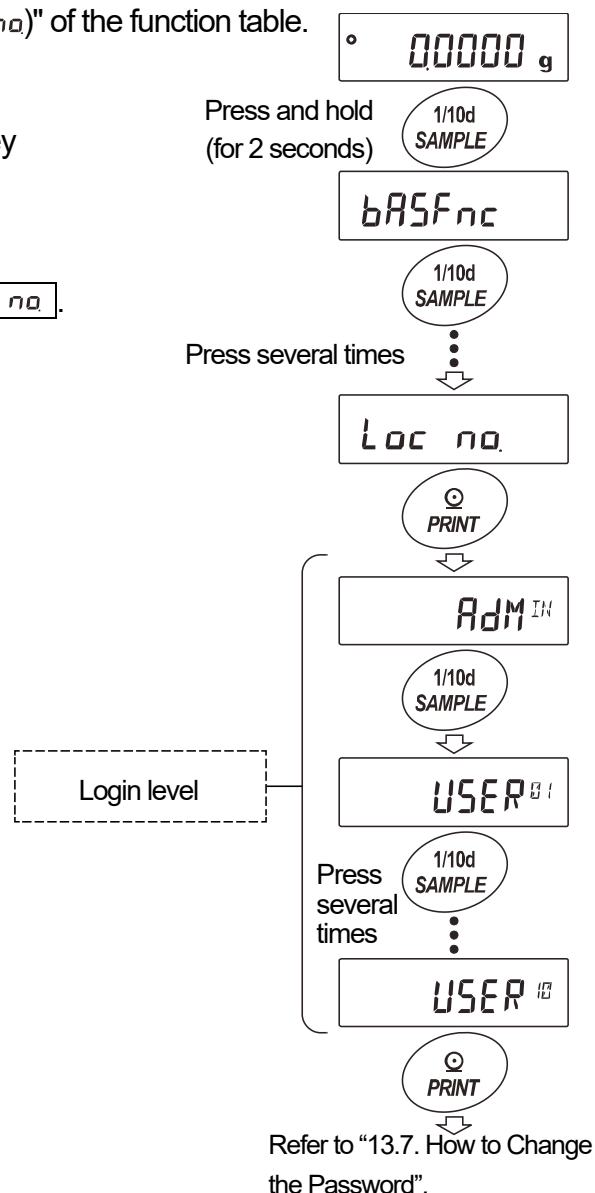
- 1 To log out, press the **ON:OFF** key to turn the display off.  
With the function **LocFnc 1** set, the password will need to be entered again to enter the weighing mode from the standby mode.



## 13-6. Storing or Changing the Password

The password can be set (changed) in "Password (**Loc nq**)" of the function table.

- 1 In the weighing mode, press and hold the **SAMPLE** key until **bASFnC** is displayed, and then release the key.
- 2 Press the **SAMPLE** key several times to display **Loc nq**.
- 3 Press the **PRINT** key to display the login level (**AdM<sup>IN</sup>**).
- 4 Press the **SAMPLE** key to display the login level to be changed (**AdM<sup>IN</sup> / USER 01 to 10**).  
The stabilization indicator  appears at a login level where a password has been stored. (The password can be changed.)
- 5 To change the password, press the **PRINT** key.  
For details, refer to "13.7. How to Change the Password".



### Notes

- To log out, press the **ON:OFF** key to turn the display off.
- With the function **LocFnc 2** set, the administrator password is required to log in as an administrator (**AdM<sup>IN</sup>**). No password needs to be stored for **USER 01 to 10**.
- When the balance software version is 1.70 to 1.85, only one password can be stored. While the balance displays **Loc nq**, press the **PRINT** key to display the current password.

## 13-7. How to Change the Password

1 Refer to “13.6. Storing or Changing the Password” to display the login level to be changed.

2 Press the **PRINT** key to display the current password.  
The default password set at the factory is **1111** (press the **RE-ZERO** key four times), for administrator level.

3 Enter a new four-digit password using the following keys. The display will turn off automatically after ten minutes of non-operation.

**MODE** key..... To enter **M**  
**SAMPLE** key..... To enter **5**  
**PRINT** key..... To enter **P**  
**RE-ZERO** key ..... To enter **1**  
**CAL** key ..... To go back one character  
**CAL** key (press and hold)..... To delete the password  
Refer to “13-8. Deleting the Password (USER 01 to 10)”.

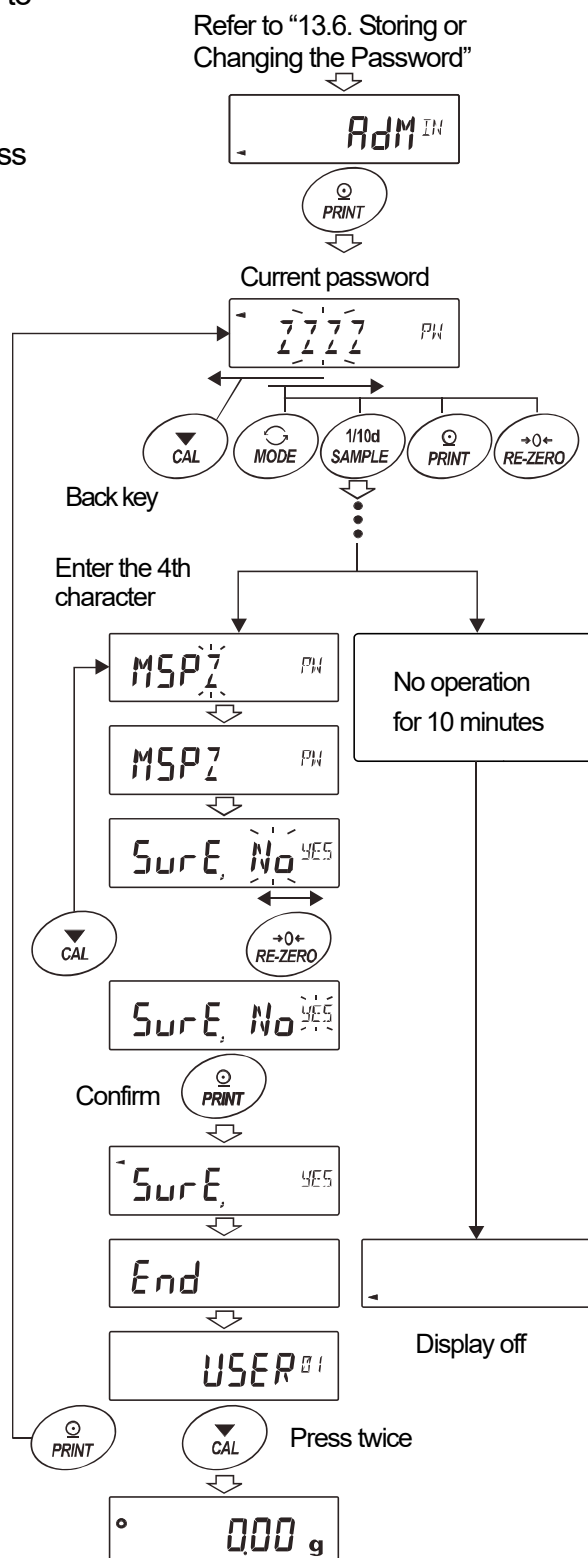
4 The new password is displayed.

5 **SurE, No<sup>YES</sup>** is displayed with "No" blinking ("No" is selected).  
(Press the **CAL** key to return to the fourth character entry position.)

6 Press the **RE-ZERO** key to display **SurE, No<sup>YES</sup>** with “YES” blinking (“YES” is selected).

7 While “YES” is blinking, press the **PRINT** key to store the new password.

8 When setting is complete, the next login level is displayed.  
To set a password for the next level, follow the procedure starting from Step 2. To finish the operation, press the **CAL** key twice to return to the weighing mode.



### Notes

- If you have forgotten the password, the balance cannot be used. Make a record of the password and keep it where you can refer to it if needed.
- The same password as the administrator (Adm IN) password cannot be used for the user (USER 01 to 10).

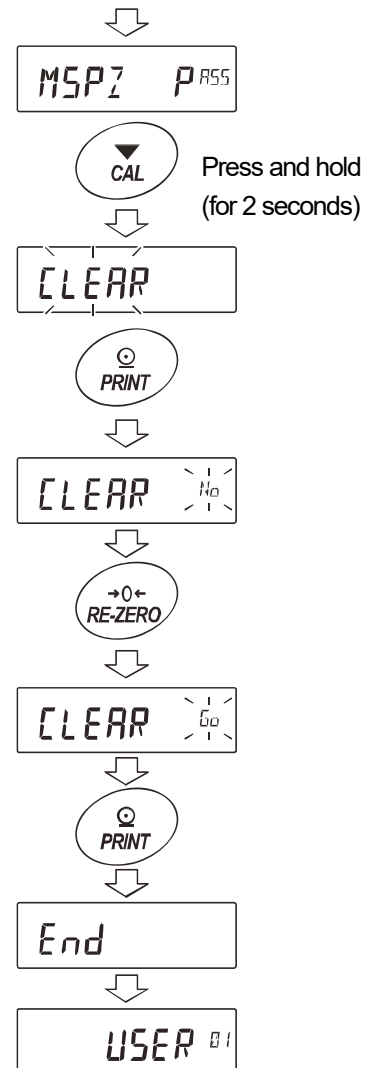
## 13-8. Deleting the Password (USER 01~10)

- 1 Refer to "13.7. How to Change the Password" to select the user (USER 01 to 10) whose password to be deleted and display the password.
- 2 Press and hold the **CAL** key to display **CLEAR** (blinking).
- 3 Press the **PRINT** key to display **CLEAR** **Go**.
- 4 Press the **RE-ZERO** key to switch between "Go" and "No".
- 5 While **CLEAR** **Go** is displayed, press the **PRINT** key to delete the password. The balance displays **End** and then displays the login level.

### Note

- The administrator password cannot be deleted, but it can be changed. Refer to "13.6. Storing or Changing the Password" and "13.7. How to Change the Password" to change it.

Refer to "13.7. How to Change the Password"



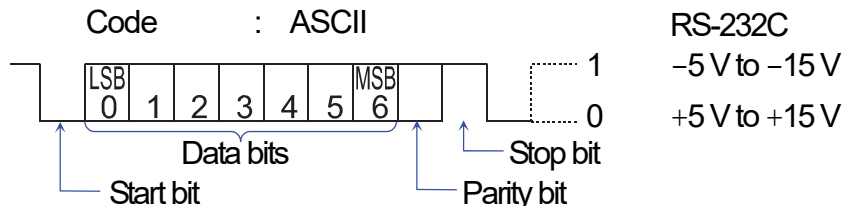
## 13-9. If the Password is lost or forgotten

If you have forgotten the password, the balance cannot be used.  
Contact your local A&D dealer to undo the password.

# 14.RS-232C Serial Interface

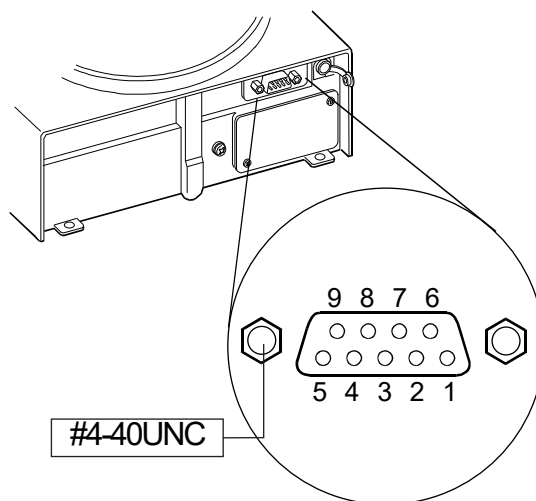
The balance is a Data Communication Equipment (DCE) device. Connect the balance to a personal computer (DTE) using a straight through cable.

Transmission system : EIA RS-232C (D-Sub 9-pin, female connector)  
 Transmission form : Asynchronous, bi-directional, half duplex  
 Transmission rate : Approx. 10 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

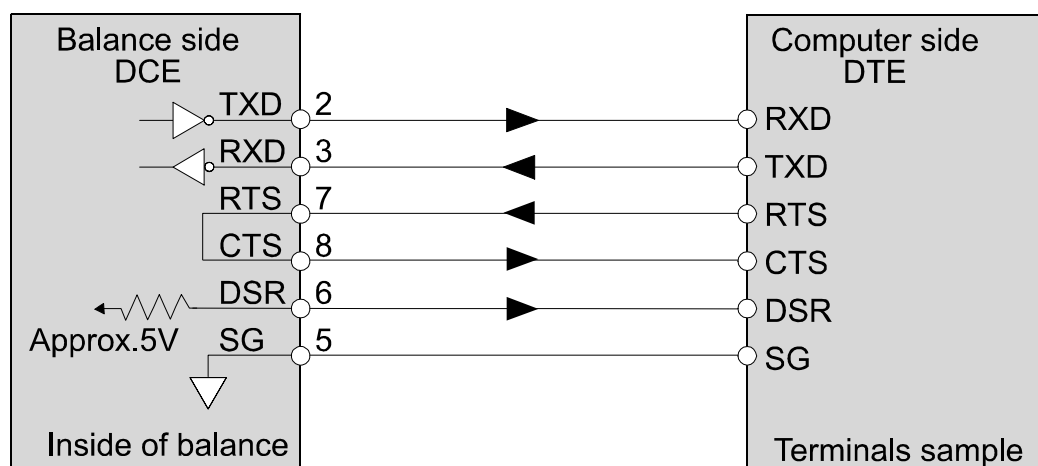


## D-Sub 9-Pin Assignments

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



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



\*1 Used with some peripheral devices manufactured by A&D.

Do not wire them when connecting to other companies' products such as PCs and PLCs.

Using the wrong connection cable may damage the device. Be sure to check the compatible cable.

# 15. Connection to Peripheral Equipment

## 15-1. 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 <b>FZ-CT / FX-CT</b> <b>PRINT</b> 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 <b>DATA</b> 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 <b>FZ-CT / FX-CT</b> statistical data.   | MODE 3                |
| To print GLP output.  | MODE 3                |

| Class            | Item and Parameter                  | Factory setting | AD-8121B MODE 1  | AD-8121B MODE 2 | AD-8121B MODE 3  |
|------------------|-------------------------------------|-----------------|------------------|-----------------|------------------|
| Data output      | <i>Prt</i><br>Data output mode      | 0               | 0, 1, 2, 4, 5 *1 | 3               | 0, 1, 2, 4, 5 *1 |
|                  | <i>PUSE</i><br>Data output pause    | 0               | 0                | 0               | 0, 1 *2          |
| Serial interface | <i>bPS</i><br>Baud rate             | 2               | 2                | 2               | 2                |
|                  | <i>btPr</i><br>Data bit, parity bit | 0               | 0                | 0               | 0                |
|                  | <i>TrLF</i><br>Terminator           | 0               | 0                | 0               | 0                |
|                  | <i>TYPE</i><br>Data format          | 0               | 0                | 0               | 1                |

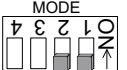
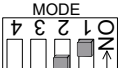

\*1 Set appropriate parameters for "AP-P (Auto print polarity)" and "AP-b (Auto print difference)" when auto print mode A or B (*Prt* = 1 or 2) is selected.

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-CT / FX-CT** statistical calculation mode.

### Notes

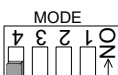
Refer to "10-2. GLP Report" for print samples. Settings of AD-8121B DIP switches

| 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 <b>DATA</b> 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   |

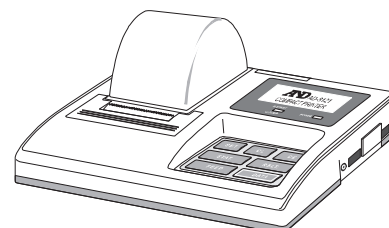
DIP switch No.3 : Handling unstable data

ON Print

OFF Not printed



Set the DIP switch No.4 to OFF.



## 15-2. Connection to the AD-8127 Printer

When connecting the AD-8127 printer to the balance for printing weighing data, configure the printer and the balance as follows according to the usage examples.

### Function settings of the printer

| Usage example  | Multi printer<br>AD-8127<br>Printing mode settings |
|--|--|
| When printing the balance weighing data with the balance's <b>PRINT</b> key or its "Auto print" mode.                                    | EXT.KEY  |
| When printing the balance weighing data with the printer's "Printing" key or its "TIMER" mode.<br>When printing charts with the printer. | MANUAL<br>AUTO<br>TIMER<br>CHART                   |
| When printing the balance's statistical calculation results.<br>When printing the balance's GLP report.                                  | DUMP   |

- Refer to the instruction manual of the AD-8127 printer for how to change the function settings of the AD-8127 printer.

### Function settings of the balance

| Usage example  | Balance<br><i>Print</i><br>Data output mode | Balance<br><i>TYPE</i><br>Data format |
|--|---|---------------------------------------|
| When printing the balance weighing data with the balance's <b>PRINT</b> key or its "Auto print" mode.                                    | 0, 1, 2, 4, 5                               | 0                                     |
| When printing the balance weighing data with the printer's "Printing" key or its "TIMER" mode.<br>When printing charts with the printer. | 3, 6  | 0                                     |
| When printing the balance's statistical calculation results.<br>When printing the balance's GLP report.                                  | 0, 1, 2, 4, 5, 6                            | 1                                     |

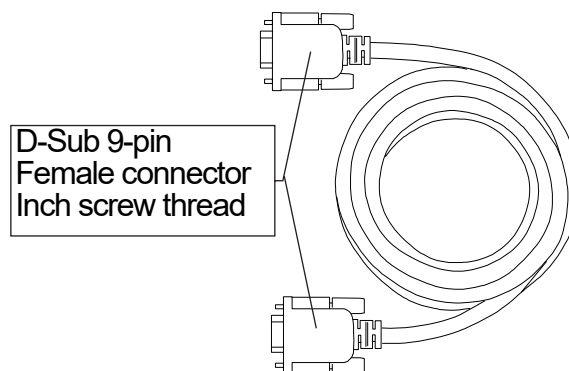
- Refer to "8. Function Table" for how to change the function settings of the balance.



### 15-3. Connection to a Computer

The balance can be connected to a personal computer using the RS-232C serial interface. As an option, the FXi-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.



### 15-4. 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 three communication methods: "RsCom", "RsKey" and "RsWeight".

#### 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.)

# 16. Commands

## 16-1. Command List

### Note

- A command has a terminator added, that is specified using the "Terminator (CRLF or CR)" parameter of "Serial interface (5 iF [rLF])" in the function table, and is sent to the balance.

### Commands to query weight data

|      |   |
|------|---|
| C    | Cancels the <b>S</b> or <b>SIR</b> 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.      |
| EscP | Requests the weight data when stabilized.   |

Note: The "Q" and "SI" commands, the "S" and "EscP" commands behave the same.

### Commands to control the balance

|               |  |
|---------------|--|
| CAL           | Same as the <span>CAL</span> key   |
| EXC *         | Calibration using an external weight   |
| OFF           | Turns the display off.   |
| ON            | Turns the display on.  |
| P             | Same as the <span>ON:OFF</span> key  |
| PRT           | Same as the <span>PRINT</span> key   |
| R             | Same as the <span>RE-ZERO</span> key   |
| SMP           | Same as the <span>SAMPLE</span> key.   |
| T             | Tare key   |
| Z             | Same as the <span>RE-ZERO</span> key   |
| EscT          | Same as the <span>RE-ZERO</span> key   |
| U             | Same as the <span>MODE</span> key  |
| ?ID           | Requests the ID number.  |
| ?SN           | Requests the serial number.  |
| ?TN           | Requests the model name.   |
| ?PT           | Requests the tare weight.  |
| PT:***.***_ct | Changes the tare weight.<br>The unit added is the current weighing unit in A&D standard format.                                |
| KL:***        | KL:000 Unlocks all keys.<br>KL:001 Locks all keys.<br>(Refer to 17. Key Lock Function)   |
| ?KL           | Requests locking all keys status.  |
| LK:*****      | Locks the specified key.<br>Enter numerical values from 00000 to 00063 in place of *****.<br>(Refer to 17. Key Lock Function.) |
| ?LK           | Requests locking the specified keys status.<br>(Refer to 17. Key Lock Function.)   |

### Note:

- The "R", "Z" and "EscT" commands behave the same.

Esc : ASCII code 1Bh

\* : Only for the **FZ-CT** series

## 16-2. Acknowledge Code and Error Codes

When the "AK, Error code ( $E_r C_d$  )" parameter of "Serial interface ( $S_i F$ )" is set to "1", the balance outputs an appropriate response for each command to improve the reliability of communications.

When  $E_r C_d$  1 is set:

- When the balance receives a command to request data and cannot 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 cannot 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 (AK).

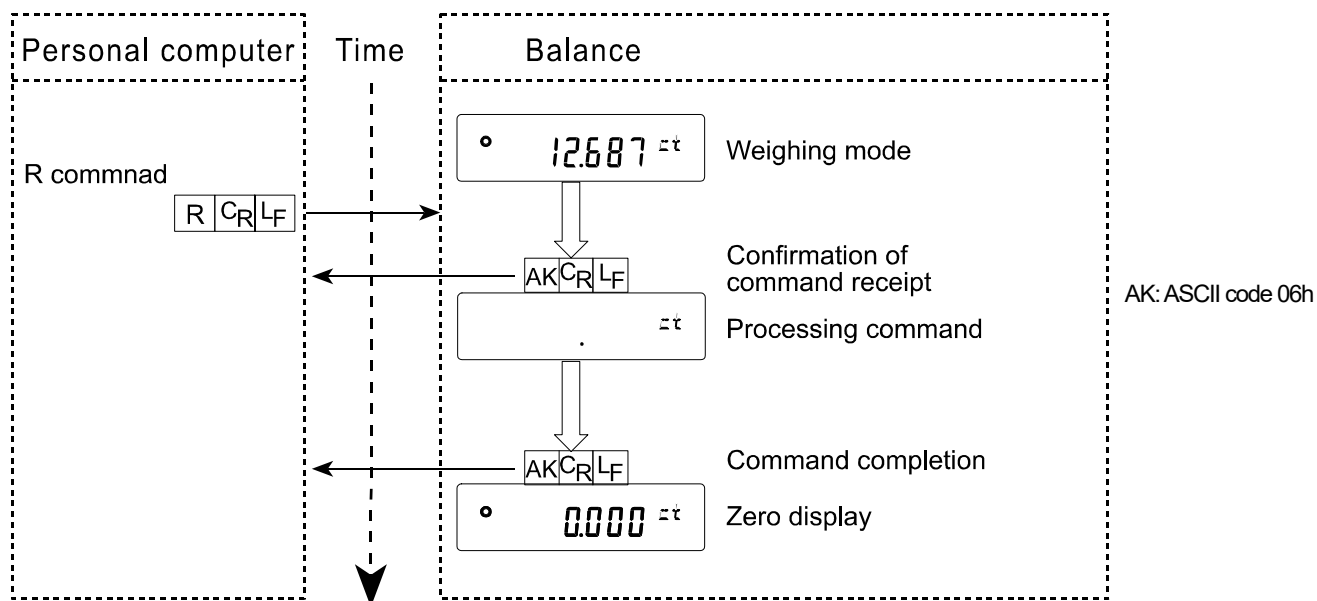
Among commands to control the balance, the following transmit the acknowledge code (AK) both when the balance receives the command and when the balance has accomplished the command. If the command cannot be processed properly, the balance transmits an error code (EC, Exx). This error can be released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

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

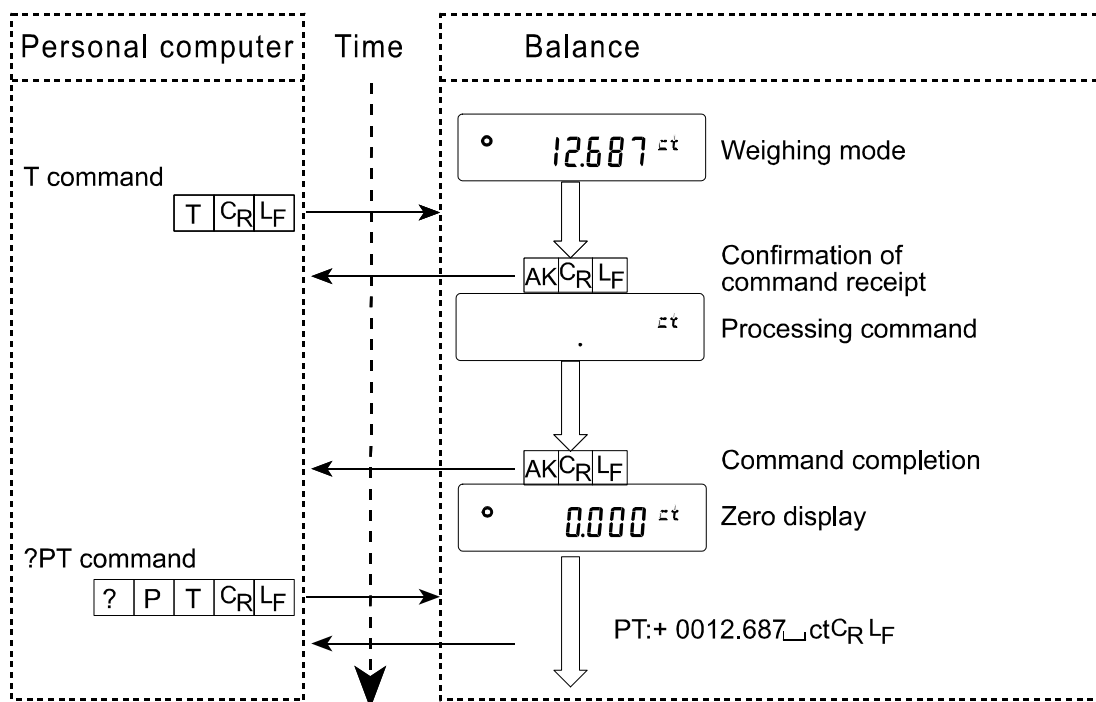
ON command, P command

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

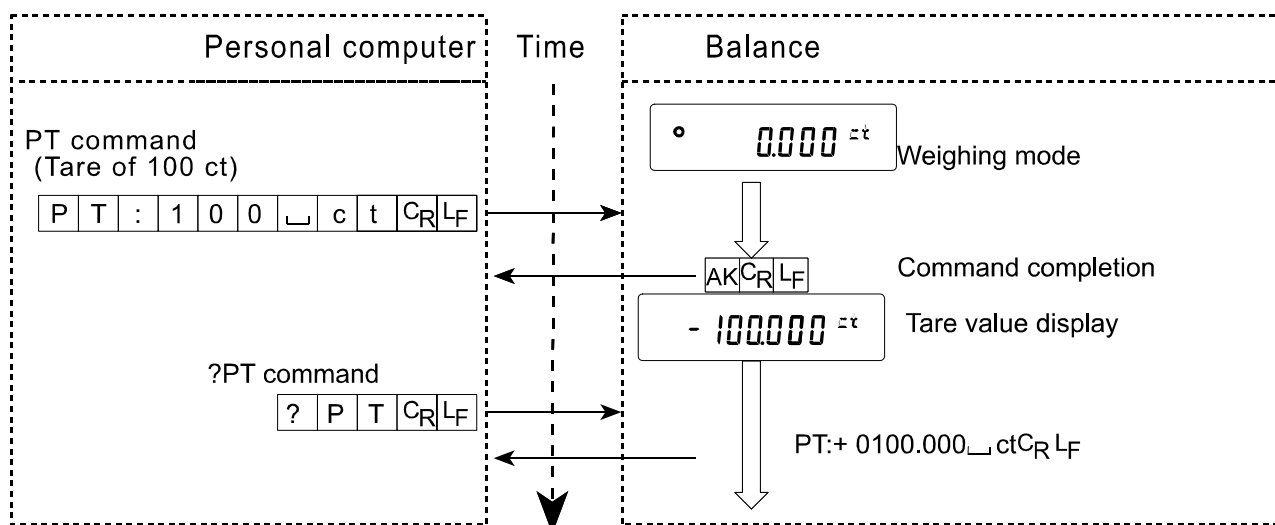
### R command example



## 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.

AK: ASCII code 06h

## 16-3. Settings Related to RS-232C

Concerning the RS-232C, the balance has two functions: "Data output (d<sub>out</sub>)" and "Serial interface (S<sub>I</sub>)". Set each function as necessary.

## 17. Key Lock Function

Sending specified commands to the balance will lock the keys on the balance to disable the key functions. This is useful for controlling the balance only by an external device such as a personal computer.

- Even if the keys are locked, key operations using commands are available. For details on commands to operate the keys, refer to “16. Commands”.
- The key lock state can be checked using the command to request the state of the balance keys.
- The key lock state is maintained until the balance receives the key unlocking command or the balance is turned off by removing the AC adapter.

### 17-1. Locking All the Keys

Using the KL command, all the keys on the balance can be disabled.

| Command string | Description  |
|----------------|--|
| ?KL            | Requests the state of the all key lock function.<br>KL, 000 All keys unlocked<br>KL, 001 All keys locked |
| KL:***         | KL:000 Unlocks all the keys<br>KL:001 Locks all the keys<br>Enter 000 or 001 in place of ***.            |

### 17-2. Locking the Specified Keys

Entering numerical values \*\*\*\*\* to the LK command will lock specified keys on the balance to disable their key functions. Set the numerical values \*\*\*\*\* by adding the decimal numbers converted from bits assigned to each key as shown below.

The LK command is available for balances with software version 1.860 or later.

| Bits | Decimal | Keys    |
|------|---------|---------|
| 0    | 1       | ON:OFF  |
| 1    | 2       | CAL     |
| 2    | 4       | MODE    |
| 3    | 8       | SAMPLE  |
| 4    | 16      | PRINT   |
| 5    | 32      | RE-ZERO |

**Example: Locking all the keys excluding the PRINT key**

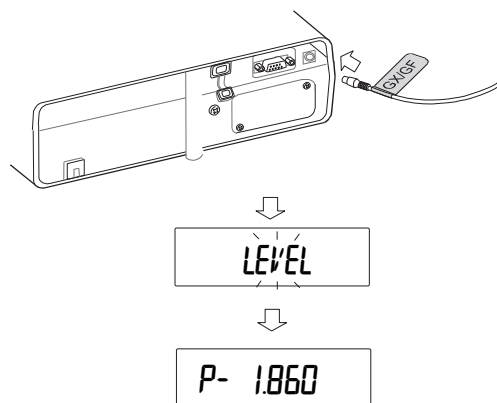
- 1 Add the decimal numbers corresponding to the keys to be locked.  
 $1 (\text{ON:OFF}) + 2 (\text{CAL}) + 4 (\text{MODE}) + 8 (\text{SAMPLE}) + 32 (\text{RE-ZERO}) = 47$
- 2 Send the LK command to the balance with the sum that is obtained in Step 1. LK:00047

| Command string | Description  |
|----------------|--|
| ?LK            | Requests the state of the specified key lock function.<br>e.g.1: LK, 00047 Locks all the keys excluding the <span style="border: 1px solid black; padding: 0 2px;">PRINT</span> key.<br>e.g. 2: LK, 00000 All keys unlocked. |
| LK:*****       | Locks the specified keys.<br>e.g.: LK:00047 Locks all the keys excluding the <span style="border: 1px solid black; padding: 0 2px;">PRINT</span> key.<br>Enter the numerical values 00000 to 00063 in place of *****.        |

## 18. Checking the Balance Software Version

Specifications may vary depending on the software version of the balance.  
The software version can be checked by the following procedure.

- 1 Reinsert the AC adapter of the balance.
- 2 P- \* . \* \* \* \* is displayed.  
The number shown in place of “\* . \* \* \* \*” is the software version.



## 19. Maintenance

- Do not use organic solvents to clean the balance. Clean the balance with a lint free cloth that is moistened with warm water and a mild detergent.

|                                      |   |
|--------------------------------------|---|
| Balance main unit.                   | Use a soft, lint free cloth that is moistened with a mild detergent to clean.   |
| Weighing pan                         | The edge of the weighing pan is sharp. Use caution when cleaning the pan.   |
| Breeze break<br>(standard accessory) | An antistatic treatment has been applied to the breeze break components.<br>Use a soft, dry, lint free cloth to clean. Cleaning with a cloth that is moistened with water or a mild detergent repetitively, or washing with water, may degrade the antistatic effect. |

- Do not disassemble the balance. Contact the local A&D dealer if the balance needs service or repair.
- Use the original packing material for transportation.

## 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 cannot 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, <https://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?
- Is the balance level? Refer to **"3-1. Before Use"**.
- Is the operating environment free from vibration and drafts? 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-CT** series)
- Has the balance been warmed up for 30 minutes before weighing?

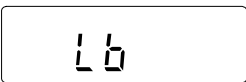
##### Sample and container

- 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 **FZ-CT** / **FX-CT** series balances 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"**.

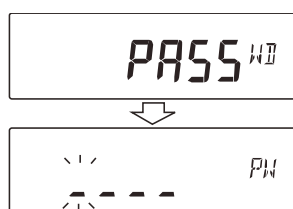


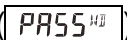
## 20-2. Error Codes

| Display                           | Error code | Description  |
|-----------------------------------|------------|--|
| Error 1                           | EC, E11    | <b>Stability error</b><br>The balance cannot stabilize due to an environmental problem. Prevent vibration, drafts, temperature changes, static electricity and magnetic fields. Refer to "3. Precautions" for details on the operating environment and "6. Response Adjustment" about adapting the balance to the environment. To return to the weighing mode, press the <b>CAL</b> key. |
| Error 2                           |            | <b>Out of range error</b><br>The value entered is beyond the settable range. Re-enter the value.   |
| Error 7                           | EC, E17    | <b>Internal mass error</b> (Only for the FZ-CT series)<br>The internal mass application mechanism does not function properly. Perform the weighing operation from the beginning again.   |
| CAL E                             | EC, E20    | <b>Calibration weight error</b><br>The calibration weight is too heavy. Confirm that the weighing pan is properly installed. Confirm the calibration weight value. Press the <b>CAL</b> key to return to the weighing mode.  |
| -CAL E                            | EC, E21    | <b>Calibration weight error</b><br>The calibration weight is too light. Confirm that the weighing pan is properly installed. Confirm the calibration weight value. Press the <b>CAL</b> key to return to the weighing mode.  |
| E                                 |            | <b>Overload error</b><br>A sample beyond the balance weighing capacity has been placed on the pan. Remove the sample from the pan.   |
| -E                                |            | <b>Weighing pan error</b><br>The weighing value is too light. Confirm that the weighing pan and pan support are properly installed. Press the <b>ON:OFF</b> key two times to return to the weighing mode. If the error still persists, calibrate the balance.  |
| Lo                                |            | <b>Sample mass error</b><br>The balance cannot store the sample for the counting mode or for the percent mode because it is too light. Use a sample that is heavier.   |
| 25 - PES<br>50 - PES<br>100 - PES |            | <b>Unit mass error</b><br>The sample unit mass for the counting mode is too light. Storing and using it for counting will cause a counting error. Add samples to reach the specified number and press the <b>PRINT</b> key. Pressing the <b>PRINT</b> key without adding samples will shift the balance to the counting mode. But, to acquire accurate weighing, be sure to add samples. |
| Error 0                           |            | <b>Balance internal error</b><br>If this error appears persistently, contact the local A&D dealer.   |
| rtc PF                            |            | <b>Battery error for clock</b><br>The back-up battery power for the clock was lost completely. 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.                         |

| Display   | Error code | Description   |
|---|------------|---|
|  |            | <b>Low battery error</b><br>Voltage of the power supply drops.<br>Confirm whether the correct AC adapter is used.   |
|   | EC, E00    | <b>Communications error</b><br>A protocol error occurred in communications. Confirm the format, baud rate and parity.   |
|   | EC, E01    | <b>Undefined command error</b><br>An undefined command was received. Confirm the command.   |
|   | EC, E02    | <b>Not ready</b><br>A received command cannot 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. Adjust the delay time to transmit a command. |
|   | EC, E03    | <b>Timeout error</b><br>If the timeout parameter is set to "L-UP 1", the balance did not receive the next character of a command within the time limit of one second. Confirm the communication.  |
|   | EC, E04    | <b>Excess characters error</b><br>The balance received excessive characters in a command. Confirm the command.  |
|   | EC, E06    | <b>Format error</b><br>A command includes incorrect data.<br>e.g. The data is numerically incorrect. Confirm the command.   |
|   | EC, E07    | <b>Parameter setting error</b><br>The received data exceeds the range that the balance can accept. Confirm the parameter range of the command.  |
| Other errors  |            | If the errors described above cannot be released or other errors are displayed, contact the local A&D dealer.   |

## 20-3. Other Display



The display () of the password input is displayed when using the password function and turning on the balance.  
Enter a correct password. Refer to "13. Password Function".

## 20-4. 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 and Peripherals (Sold Separately)

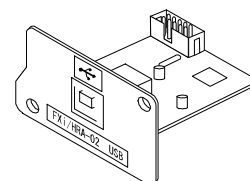
### Note

- The **FXi-02**, **FXi-08** and **FXi-09** cannot be used at the same time.

### FXi-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.



FXi-02 Example of use

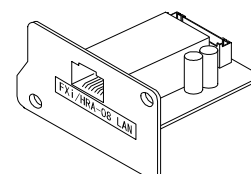
|    | A       | B | C | D | E | F | G |
|----|---------|---|---|---|---|---|---|
| 1  | 2019.24 |   |   |   |   |   |   |
| 2  | 2019.26 |   |   |   |   |   |   |
| 3  | 2019.28 |   |   |   |   |   |   |
| 4  | 2232.58 |   |   |   |   |   |   |
| 5  | 2019.27 |   |   |   |   |   |   |
| 6  | 2019.27 |   |   |   |   |   |   |
| 7  | 2019.26 |   |   |   |   |   |   |
| 8  | 1863.45 |   |   |   |   |   |   |
| 9  |         |   |   |   |   |   |   |
| 10 |         |   |   |   |   |   |   |
| 11 |         |   |   |   |   |   |   |
| 12 |         |   |   |   |   |   |   |
| 13 |         |   |   |   |   |   |   |
| 14 |         |   |   |   |   |   |   |
| 15 |         |   |   |   |   |   |   |

### 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)

### FXi-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).



FXi-08 Example of use

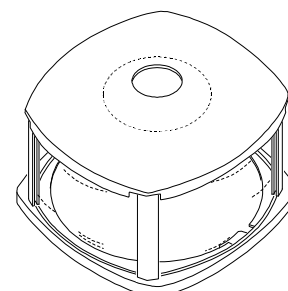
|    | FX-3000     | FX-3000    | FX-3000     |            |
|----|-------------|------------|-------------|------------|
| 1  | 11:19:43 ST | 0018.225 g | 11:20:02 ST | 02019.24 g |
| 2  | 11:19:49 ST | 0018.225 g | 11:20:05 ST | 02019.26 g |
| 3  | 11:21:07 ST | 0014.295 g | 11:20:12 ST | 02019.28 g |
| 4  | 11:21:12 ST | 0018.226 g | 11:20:39 ST | 02232.58 g |
| 5  | 11:21:17 ST | 0018.223 g | 11:20:47 ST | 02019.27 g |
| 6  | 11:21:33 ST | 0019.667 g | 11:23:02 ST | 02019.27 g |
| 7  | 11:21:41 ST | 0018.225 g | 11:23:09 ST | 02019.26 g |
| 8  | 11:21:51 ST | 0018.225 g | 11:23:16 ST | 01863.45 g |
| 9  | 11:22:00 ST | 0018.224 g |             |            |
| 10 | 11:22:30 ST | 0018.226 g |             |            |
| 11 | 11:22:33 ST | 0018.225 g |             |            |
| 12 | 11:22:40 ST | 0014.290 g |             |            |
| 13 | 11:22:53 ST | 0018.225 g |             |            |

### FXi-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.



### FXi-10 Small breeze break

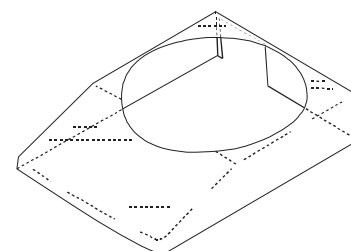
- Breeze break shorter than the standard large breeze break.  
(Total height of the small breeze break: 105 mm)

### FXi-11 Large breeze break

- Breeze break provided as standard.

### AX-FXi-31 Main unit cover

- Main unit protective cover provided as a standard accessory.



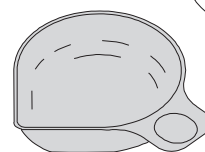
### **AX-CARATPAN-W      Carat pan (Silver colored)**

- Two silver colored carat pans (the same as the carat pan provided as a standard accessory)



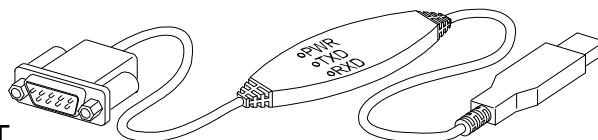
### **AX-CARATPAN-B      Carat pan (Black colored)**

- Two black carat pans (the same as the carat pan provided as a standard accessory)



### **AX-USB-9P      USB converter**

- Adds a COM port to a PC.
- Enables bi-directional communication between the PC and the balance when a USB driver is installed.
- Can use serial communication software such as WinCT on a PC without COM ports.



### **AD-1671      Anti-Vibration table**

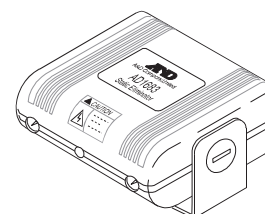
- A 27-kg table with vibration-absorbing rubber feet, to reduce vibration coming from the floor to enable stable weighing.
- Use the AD-8922A remote controller to avoid weighing errors that can be caused by slight table tilting when operating the scale manually.

### **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      DC static eliminator**

- Used to minimize weighing errors due to static electricity on the material. The AD-1683 is direct-current static eliminator. The ions generated produce no breeze and are effective over a long distance. Therefore, the balance can accurately weight powders, etc. by using the AD-1683.



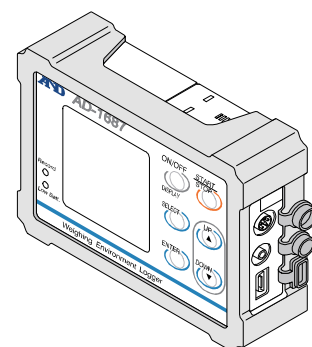
### **AD-1684A      Electrostatic field meter**

- 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.



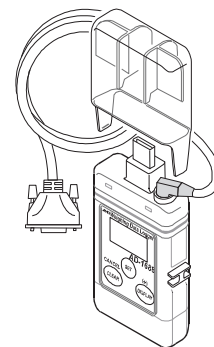
### **AD-1687      Weighing environment logger**

- 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 cannot 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.



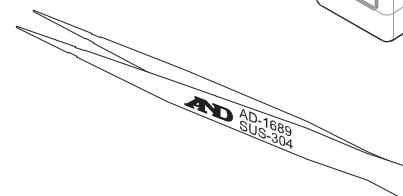
## **AD-1688 Data logger**

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



## **AD-1689 Tweezers for calibration weight**

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



## **AD-8127 Multi-Printer**

- Small dot impact printer that connects to the balance via the RS-232C interface.
- Statistical calculation mode, calendar/clock function, interval printing mode, chart printing mode, dump printing mode

## **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.

## **AD-8920A Remote display**

- Connected to the balance using the RS-232C serial interface to display the weight data away from the balance.

## **AD-8922A Remote controller**

- Connected to the balance using the RS-232C serial interface to display the weight data and to remotely control the balance.
- Analog output and comparator output available as an option to be installed.

## 22. Specifications

|  |                              | FZ-1200CT  | FZ-700CT   | FZ-500CT   |
|--|------------------------------|--|------------|------------|
| Weighing capacity                                    |                              | 1260 ct  | 760 ct     | 510 ct     |
|  |                              | 252 g  | 152 g      | 102 g      |
| Maximum display                                      |                              | 1260.042 ct  | 760.042 ct | 510.042 ct |
|  |                              | 252.008 g  | 152.008 g  | 102.008 g  |
| Minimum weighing value<br>(1 digit)                  |                              | 0.001 ct   |            |            |
|  |                              | 0.001 g  |            |            |
| Repeatability<br>Standard deviation                  |                              | 0.001 ct   |            |            |
|  |                              | 0.0005 g   |            |            |
| Linearity  |                              | ±0.002 ct  |            |            |
|  |                              | ±0.001 g   |            |            |
| Stabilization time<br>(typical at FAST)              |                              | Approx. 2 second*1   |            |            |
| Sensitivity drift<br>(10 °C - 30 °C / 50 °F - 86 °F) |                              | ±2 ppm/°C  |            |            |
| Internal mass  |                              | Available  |            |            |
| Clock and calendar function                          |                              | Available  |            |            |
| Operating environment                                |                              | 5 °C to 40 °C (41 °F to 104 °F) 85 %RH or less (No condensation)                         |            |            |
| Display refresh rate                                 |                              | Approx. 5 times/second*2 (or 10 times/second)  |            |            |
| Counting mode *3                                     | Minimum unit mass            | 0.001 g  |            |            |
|  | Number of samples            | 10, 25, 50 or 100 pieces   |            |            |
| Percent mode *3                                      | Minimum 100% reference m-ass | 0.100 g  |            |            |
|  | Minimum 100% display         | 0.01%, 0.1%, 1% (Depends on the reference mass stored.)                                  |            |            |
| Interface  |                              | RS-232C  |            |            |
| External calibration weight                          |                              | 250 g  | 150 g      | 100 g      |
|  |                              | 200 g  | 100 g      | 50 g       |
|  |                              | 100 g  | 50 g       | 20 g       |
|  |                              | 50 g   | 20 g       |            |
|  |                              | 25 g   |            |            |
| Weighing pan diameter                                |                              | 90 mm  |            |            |
| External dimensions                                  |                              | 198(W) x 294(D) x 315(H) mm  |            |            |
| AC adapter   |                              | Confirm that the adapter type is correct for the local voltage and power receptacle type |            |            |
| Power consumption                                    |                              | Approx. 11 VA (supplied to the AC adapter)   |            |            |
| Mass of product                                      |                              | Approx. 3.8 kg   |            |            |

<sup>\*1</sup>: With MID., factory setting of the rate of the response adjustment, the stabilization time is approx. 3 seconds.

<sup>\*2</sup>: Factory setting

<sup>\*3</sup>: To use the counting mode or the percent mode, storing each mode as described in “9–9. Storing Units” is required.

|   |                              | FZ-1200CT  | FZ-700CT   | FZ-500CT   |
|---|------------------------------|--|------------|------------|
| Weighing capacity                                     |                              | 1260 ct  | 760 ct     | 510 ct     |
|   |                              | 252 g  | 152 g      | 102 g      |
| Maximum display                                       |                              | 1260.042 ct  | 760.042 ct | 510.042 ct |
|   |                              | 252.008 g  | 152.008 g  | 102.008 g  |
| Minimum weighing value<br>(1 digit)                   |                              | 0.001 ct   |            |            |
|   |                              | 0.001 g  |            |            |
| Repeatability<br>Standard deviation                   |                              | 0.001 ct   |            |            |
|   |                              | 0.0005 g   |            |            |
| Linearity   |                              | ±0.002 ct  |            |            |
|   |                              | ±0.001 g   |            |            |
| Stabilization time<br>(typical at FAST)               |                              | Approx. 2 second*1   |            |            |
| Sensitivity drift<br>(10 °C - 30 °C / 50 °F - 86 °F ) |                              | ±2 ppm/°C  |            |            |
| Internal mass   |                              | Unavailable  |            |            |
| Clock and calendar function                           |                              | Unavailable  |            |            |
| Operating environment                                 |                              | 5 °C to 40 °C (41 °F to 104 °F) 85 %RH or less (No condensation)                         |            |            |
| Display refresh rate                                  |                              | Approx. 5 times/second*2 (or 10 times/second)  |            |            |
| Counting mode *3                                      | Minimum unit mass            | 0.001 g  |            |            |
|   | Number of samples            | 10, 25, 50 or 100 pieces   |            |            |
| Percent mode *3                                       | Minimum 100% reference m-ass | 0.100 g  |            |            |
|   | Minimum 100% display         | 0.01%, 0.1%, 1% (Depends on the reference mass stored.)                                  |            |            |
| Interface   |                              | RS-232C  |            |            |
| External calibration weight                           |                              | 250 g  | 150 g      | 100 g      |
|   |                              | 200 g  | 100 g      | 50 g       |
|   |                              | 100 g  | 50 g       | 20 g       |
|   |                              | 50 g   | 20 g       |            |
|   |                              | 25 g   |            |            |
| Weighing pan diameter                                 |                              | 90 mm  |            |            |
| External dimensions                                   |                              | 198(W) x 294(D) x 315(H) mm  |            |            |
| AC adapter  |                              | Confirm that the adapter type is correct for the local voltage and power receptacle type |            |            |
| Power consumption                                     |                              | Approx. 11 VA (supplied to the AC adapter)   |            |            |
| Mass of product                                       |                              | Approx. 3.4 kg   |            |            |

<sup>\*1</sup>: With MID., factory setting of the rate of the response adjustment, the stabilization time is approx. 3 seconds.

<sup>\*2</sup>: Factory setting

<sup>\*3</sup>: To use the counting mode or the percent mode, storing each mode as described in “9–9. Storing Units” is required.

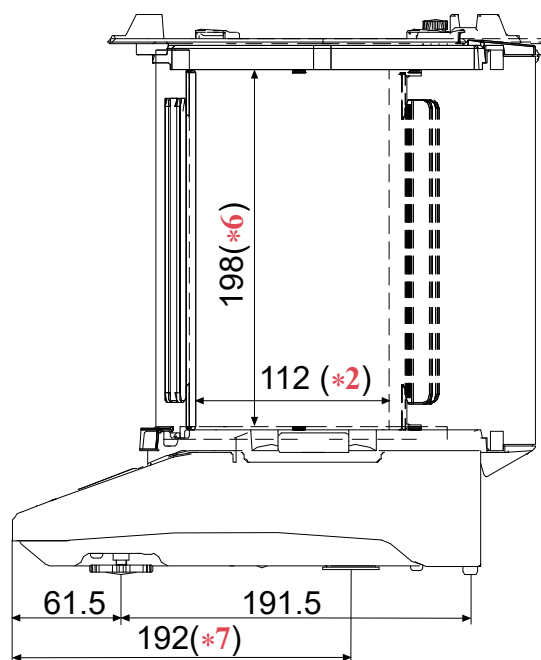
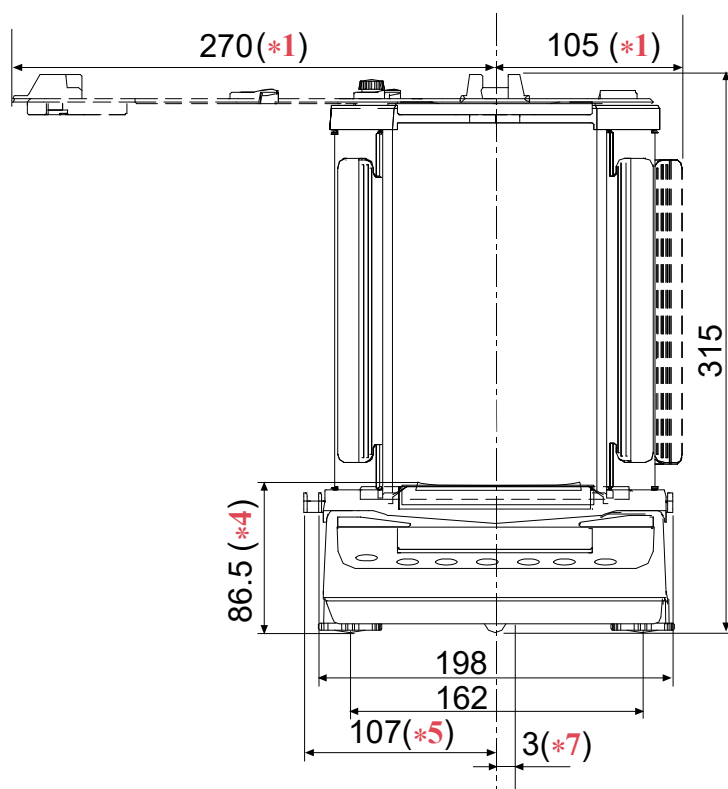
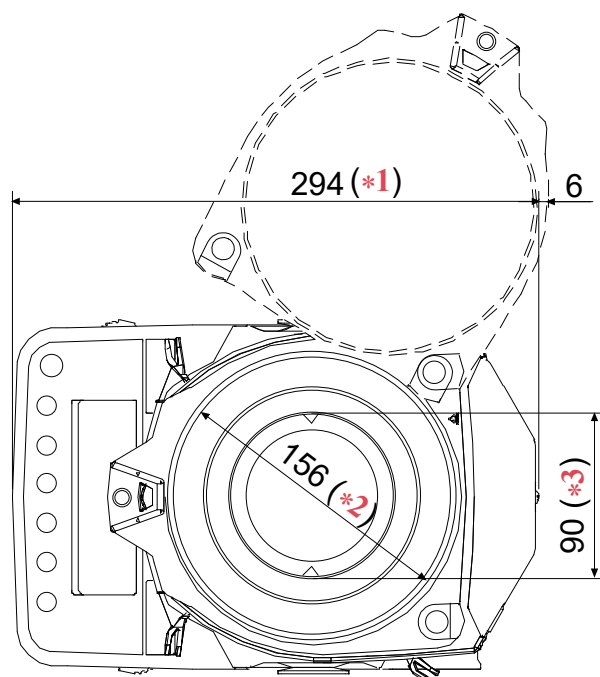
## 23. External Dimensions

FZ-1200CT    FZ-700CT    FZ-500CT

FX-1200CT    FX-700CT    FX-500CT

Unit : mm

- \*1: When opening maximum
- \*2: Inside dimension
- \*3: Weighing pan diameter
- \*4: Height up to the weighing pan
- \*5: When pulling out the locking handle
- \*6: Inside dimension (from up to the weighing pan)
- \*7: Underhook position (hole center)



















## 24. Terms/Index

### 24-1. Terms

|                           |   |
|---------------------------|---|
| <b>Stable value</b>       | The weight data when the stabilization indicator appears.   |
| <b>Environment</b>        | Ambient conditions such as vibration, drafts, temperature, static electricity and magnetic fields which affect the weighing operation.  |
| <b>Calibration</b>        | Adjustment of the balance so that it can weigh accurately.  |
| <b>Output</b>             | To output the weight data using the RS-232C serial interface.   |
| <b>Zero point</b>         | A weighing reference point or the zero display. Usually refers to the value displayed when nothing is on the weighing pan.  |
| <b>Digit</b>              | Unit of digital resolution. Used for the balance, a unit of minimum weighing value.   |
| <b>Tare</b>               | To cancel the weight of a container which is not included in the weight data.   |
| <b>Mode</b>               | Balance operational function.   |
| <b>Re-zero</b>            | To set the display to zero.   |
| <b>GLP</b>                | Good Laboratory Practice.   |
| <b>GMP</b>                | Good Manufacturing Practice.  |
| <b>Repeatability</b>      | Variation in measured values obtained when the same weight is placed and removed repetitively. Usually expressed as a standard deviation.<br>e.g. Standard deviation=1 digit: This means that measured values fall within $\pm 1$ digit in the frequency of about 68%.  |
| <b>Stabilization time</b> | Time required after a sample being placed, until the stabilization indicator illuminates and the weight data is displayed.  |
| <b>Sensitivity drift</b>  | An affect that a change in temperature causes to the weight data. Expressed as temperature coefficient.<br>e.g. Temperature coefficient = 2 ppm/ $^{\circ}\text{C}$ : If a load is 200 g and the temperature changes by $10^{\circ}\text{C}$ , the value displayed changes by the following value.<br>$0.0002\%/^{\circ}\text{C} \times 10^{\circ}\text{C} \times 200 \text{ g} = 4 \text{ mg}$ |

## 24-2. Index

- READY** ..... 23  
 **ON:OFF** key ..... 13  
 **CAL** key ..... 13, 27  
**CANCEL** Cancel ..... 50  
**CAN Go** Cancel Go ..... 50  
**CAN no** Cancel No ..... 50  
**CLEAR** Clear ..... 50  
 Left, Lower, Lighting, Standby indicator ..... 13  
 Left, Upper, Blinking, Density mode ..... 13  
 Left, Upper, Lighting, Effective indicator ..... 27  
 Left, Upper, Lighting, Process indicator ..... 13, 43  
 Left, Upper, Lighting, Stabilization indicator ..... 13  
 **MODE** key ..... 13  
 **PRINT** key ..... 13, 27  
**RESPONSE** **FAST** **MID.** **SLOW** Response indicator ..... 13  
 **RE-ZERO** key ..... 13, 27  
 Right, Lower, Blinking, In interval mode ..... 13  
 Right, Lower, Lighting, Interval mode standby ..... 13  
 **SAMPLE** key ..... 13, 27  
 Space mark ..... 36, 37, 54  
**S-ID** ID number output ..... 31  
**S-IF** Serial interface ..... 31, 34, 71  
**SPd** Display refresh rate ..... 28, 33  
**StAF** Statistic display ..... 31, 47  
**St-b** Stability detection ..... 28, 32  
**S-t-d** Time & Date output ..... 31  
**Sure** Sure ..... 62  
**AC adapter** ..... 7, 9, 12, 86, 87  
**ACAI** ..... 43  
**AD-1671** Anti-vibration table ..... 83  
**AD-1672** Tabletop breeze break ..... 83  
**AD-1683** DC static eliminator ..... 11, 83  
**AD-1684** Electrostatic field meter ..... 83  
**AD-1687** Weighing environment logger ..... 5, 84  
**AD-1688** Weighing data logger ..... 5, 84  
**AD-1689** Tweezers for calibration weight ..... 84  
**AD-8121B** Printer ..... 71, 84  
**AD-8127** ..... 59  
**AD-8920A** Remote display ..... 84  
**AD-8922A** Remote controller ..... 84  
**Air buoyancy** ..... 11  
**AK code** ..... 76  
**AP Fnc** Application ..... 31, 47  
**AP-b** Auto print difference ..... 31, 34  
**APF** Application function ..... 31, 46, 47  
**AP-P** Auto print polarity ..... 31, 34  
**Ar-d** Zero after output ..... 31  
**At-F** Auto feed ..... 31  
**Average** ..... 47  
**AX-CARAT PAN-BEX** Carat pan, black color.. 83  
**AX-CARAT PAN-WEX** Carat pan, silver color. 83  
**AX-FXi-31** Cover ..... 83  
**AX-USB-9P** USB Converter ..... 83  
**bASFnc** Environment & Display ..... 28, 34  
**Baud rate** ..... 70  
**bEEP** beep ..... 28  
**bEP-** OK buzzer ..... 28  
**bEP+** HI buzzer ..... 28  
**bEP-** LO buzzer ..... 28  
**bPS** Baud rate ..... 31  
**Breeze break** ..... 7, 9, 11  
**Breeze break ring** ..... 7, 9  
**btPr** Data bit, parity bit ..... 31  
**Bubble spirit level** ..... 7, 9, 10  
**CS in** Internal mass correction ..... 22, 23, 31  
**RL in** One-touch calibration ..... 18  
**Calibration** ..... 5, 18, 19, 20, 21, 22, 23, 24, 86, 87, 89  
    Calibration using an external weight ..... 20, 24  
    Correcting the internal mass value ..... 22, 23, 24  
    One-touch calibration ..... 19, 24  
**Calibration report** ..... 19, 20  
**Calibration test**  
    Calibration test using an external weight ..... 21  
**Calibration test report** ..... 21  
**RL out** Calibration using an external weight... 20  
**Carat pan** ..... 7  
**CL in** Calibration test ..... 19  
**CL out** Calibration test ..... 21  
**CE Mark** ..... 6  
**Characters for display** ..... 54  
**CL Adj** Clock ..... 28, 52  
**Cleaning** ..... 12, 79  
**Clock function** ..... 52, 86, 87  
**CLr** Cancel ..... 26  
**CLr Go** Initialization, Perform ..... 26, 50  
**CLr no** Initialization, Cancel ..... 26, 50  
**Comparator** ..... 13, 51  
**Cond** Condition ..... 28, 32  
**Container** ..... 14, 43  
**Counting mode** ..... 39, 40, 43, 86, 87  
**Cover** ..... 7  
**CP** Comparator mode ..... 28, 51

|                            |                              |                           |                            |                                  |        |
|----------------------------|------------------------------|---------------------------|----------------------------|----------------------------------|--------|
| CP Fnc                     | Comparator.....              | 28, 51                    | RE-ZERO Key .....          | 13, 27                           |        |
| CP Hi                      | Comparator upper limit ..... | 28, 51                    | SAMPLE Key .....           | 13, 27                           |        |
| CP Lo                      | Comparator lower limit.....  | 28, 51                    | Key Operation .....        | 13                               |        |
| CrLF                       | Terminator .....             | 31                        | Keys.....                  | 7, 13                            |        |
| CSV format .....           |                              | 37                        | Ld in                      | Liquid density input .....       | 31     |
| dS                         | Selection of a sample.....   | 31                        | Leveling foot.....         | 7, 9, 10                         |        |
| dS Fnc                     | Density function .....       | 31                        | Linearity.....             | 86, 87                           |        |
| Data bits.....             |                              | 70                        | LK command .....           | 78                               |        |
| Data format.....           |                              | 36, 37, 70                | Lo                         | Sample mass error .....          | 43, 45 |
| Data output.....           |                              | 54                        | Loc nQ                     | Password input .....             | 31     |
| Data output mode.....      |                              | 34, 36, 37                | LocFnc                     | Password function .....          | 31, 62 |
| Date .....                 |                              | 52                        | Magnetic substance.....    | 11                               |        |
| Dimensions .....           |                              | 86, 87, 88                | Mass of product.....       | 86, 87                           |        |
| Display .....              |                              | 7, 13                     | Maximum .....              | 47                               |        |
| Display refresh rate ..... |                              | 86, 87                    | Maximum display .....      | 86, 87                           |        |
| door.....                  |                              | 7                         | MID.....                   | 16                               |        |
| dout                       | Data output .....            | 31, 34, 71                | Minimum .....              | 47                               |        |
| Dust plate .....           |                              | 7                         | Minimum display .....      | 86, 87                           |        |
| EMC.....                   |                              | 6                         | nLt                        | Programmable-unit.....           | 31     |
| Environment.....           |                              | 80, 89                    | OL                         | Overload header.....             | 36     |
| ErCd                       | AK, Error code .....         | 31, 76                    | Operating environment..... | 86, 87                           |        |
| Error code.....            |                              | 81                        | Output.....                | 89                               |        |
| FAST.....                  |                              | 16                        | PS                         | Function selection mode .....    | 26     |
| FCC .....                  |                              | 6                         | PASS                       | Password.....                    | 62, 82 |
| Function Table.....        |                              | 24, 27, 28                | Pan support .....          | 7, 9                             |        |
| FXi-02                     | USB interface.....           | 5, 73, 83                 | Parity .....               | 70                               |        |
| FXi-08                     | Ethernet interface .....     | 5, 83                     | Percent mode.....          | 39, 40, 45, 86, 87               |        |
| FXi-09                     | Built-in battery .....       | 5, 83                     | Pnt                        | Decimal point.....               | 28, 33 |
| FXi-10                     | Small breeze break .....     | 83                        | PoFF                       | Automatic display-off .....      | 28, 33 |
| FXi-11                     | Main unit cover.....         | 83                        | P-on                       | Resume function.....             | 28, 33 |
| GLP.....                   |                              | 5, 18, 19, 20, 21, 54, 89 | Power consumption .....    | 86, 87                           |        |
| GMP .....                  |                              | 5, 54, 89                 | Power source .....         | 86, 87                           |        |
| Grounding .....            |                              | 11                        | Prt                        | Data output mode .....           | 31, 34 |
| Grounding terminal.....    |                              | 7                         | PUSE                       | Data output pause .....          | 31, 54 |
| Hold                       | Hold function .....          | 28, 32                    | QT                         | Percent mode header.....         | 36     |
| Hold indicator .....       |                              | 13                        | Remote Display             | AD-8920A.....                    | 5      |
| Humidity.....              |                              | 11                        | Repeatability .....        | 86, 87, 89                       |        |
| id                         | ID number setting .....      | 31, 54                    | RESPONSE .....             | 13, 16                           |        |
| ID label.....              |                              | 7                         | rnG                        | Dispaly at start.....            | 28     |
| ID number .....            |                              | 54                        | RS-232C .....              | 5, 7, 70                         |        |
| inFa                       | GLP output.....              | 31, 54                    | RsCom                      | Command mode for WinCT.....      | 73     |
| Initializing .....         |                              | 26                        | RsKey                      | Data output mode for WinCT ..... | 73     |
| int                        | Interval time.....           | 31                        | RsWeight                   | Data output mode for WinCT ..... | 73     |
| Interface.....             |                              | 86, 87                    | Sensitivity drift .....    | 86, 87, 89                       |        |
| Interval mode              | in .....                     | 35                        | SLOW .....                 | 16                               |        |
| Key                        |                              |                           | ST                         | Stable header.....               | 36     |
| ON:OFF Key .....           |                              | 13                        | Stability .....            | 86, 87                           |        |
| CAL Key .....              |                              | 13, 27                    | Stabilization time.....    | 89                               |        |
| MODE Key .....             |                              | 13                        | Stable value .....         | 89                               |        |
| PRINT Key.....             |                              | 13, 27                    | Standard deviation .....   | 47                               |        |

|                               |                |  |                                    |                |
|-------------------------------|----------------|--|------------------------------------|----------------|
| Static electricity.....       | 11             | <b>%</b>                                 | Percent mode .....                 | 39, 40, 45     |
| Static eliminator.....        | 11             | <b>Lb</b>                                | Pound .....                        | 39, 40         |
| Stop bit.....                 | 70             | <b>L OZ</b>                              | Pound Ounce .....                  | 39, 40         |
| Stream mode .....             | 34             | <b>MLT</b>                               | Programmable unit.....             | 39, 40, 61     |
| Sum .....                     | 47             | <b>EL</b>                                | Tael (Preset in the factory) ..... | 39, 40         |
| Symbols.....                  | 13             | <b>LoL</b>                               | Tola (India) .....                 | 39, 40         |
| Tare .....                    | 14             | <b>OZt</b>                               | Troy Ounce.....                    | 39, 40         |
| Temperature.....              | 11             | <b>Unit</b>                              | Unit mode .....                    | 31             |
| Terminator .....              | 36, 37         | <b>URL</b>                               | .....                              | 80             |
| Time .....                    | 52             | <b>US</b>                                | Unstable header.....               | 36             |
| <b>trc</b> Zero tracking..... | 28, 32         | <b>USB</b>                               | .....                              | 5              |
| <b>t-UP</b> Timeout .....     | 31             |  | Weighing capacity .....            | 86, 87         |
| <b>TYPE</b> Data format.....  | 31             |  | Weighing mode .....                | 14             |
| Underhook .....               | 11, 60         |  | Weighing operation .....           | 14             |
| Unit.....                     | 13, 39, 40, 42 |  | Weighing pan.....                  | 7, 9, 14, 43   |
| <b>PES</b> Counting mode..... | 39, 40, 43     |  | Weight or Mass .....               | 20, 21, 22, 23 |
| <b>GN</b> Grain (UK) .....    | 39, 40         | <b>WinCT</b>                             | .....                              | 59             |
| <b>g</b> Gram .....           | 39, 40         | <b>WinCT</b> Communication Tools .....   |                                    | 73             |
| <b>MES</b> Messghal.....      | 39, 40         | <b>WT</b> Counting mode header .....     |                                    | 36             |
| <b>ct</b> Metric carat.....   | 39, 40         | <b>WT</b> Stable header, DP format ..... |                                    | 36             |
| <b>mom</b> Momme.....         | 39, 40         | <b>Zero point</b> .....                  |                                    | 89             |
| <b>OZ</b> Ounce (Avoir).....  | 39, 40         | <b>Zero tracking</b> .....               |                                    | 28             |
| <b>dwat</b> Pennyweight.....  | 39, 40         |  |                                    |                |

# MEMO

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