270004M01

HT Density Measurement Kit
Operation Manual

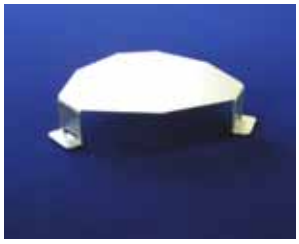
VIBRA

Introduction

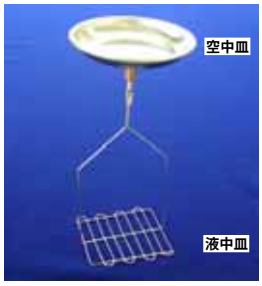
Thank you for purchasing Density Measurement Kit for HT/HTR balance. This manual is intended to describe only density measurements for HT/HTR balance. Please use this manual together with the operation manual for the balance.

Check for the following items before use.

Water tan platform



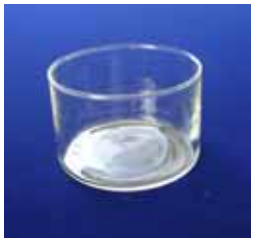
Measurement pan



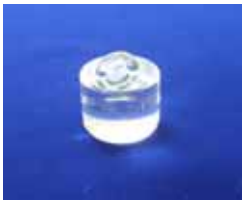
Pan cradle

Height adjuster

Water tank



Glass weight



Tweezers

Thermometer

Density Measurement kit manual

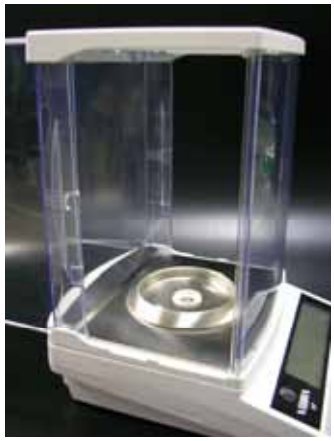
Contents

Caution

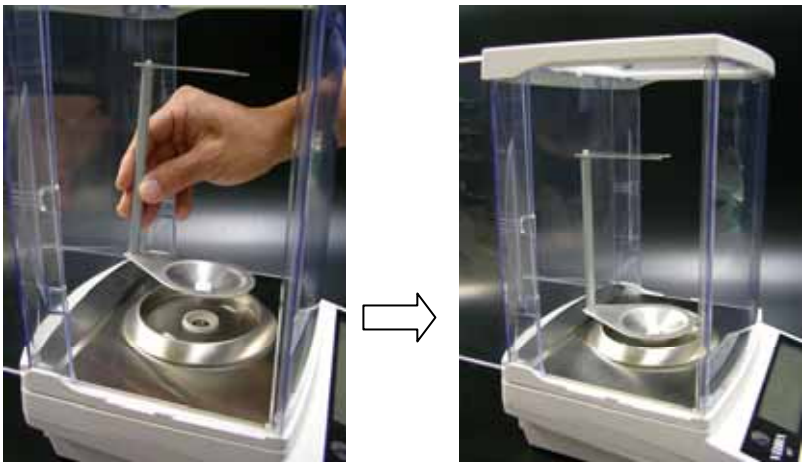
The weight of this kit is approximately 35g. This weight is deducted as tare value when the balance is used with this kit, and the maximum capacity to be measured in the balance decreases accordingly.

1 Assembly Procedures for Density Measurement Kit

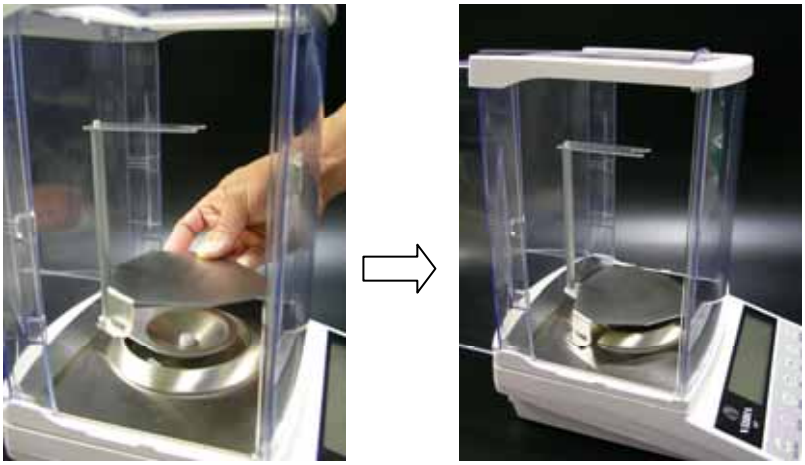
1 Remove the weighing pan
And pan base.
(Don’t remove the windshield ring)



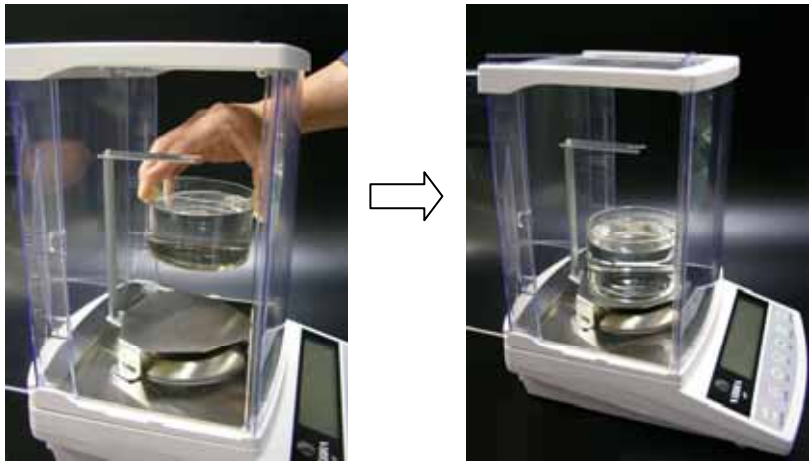
2 Attach the pan cradle as shown to the right (turn the screw in the center).



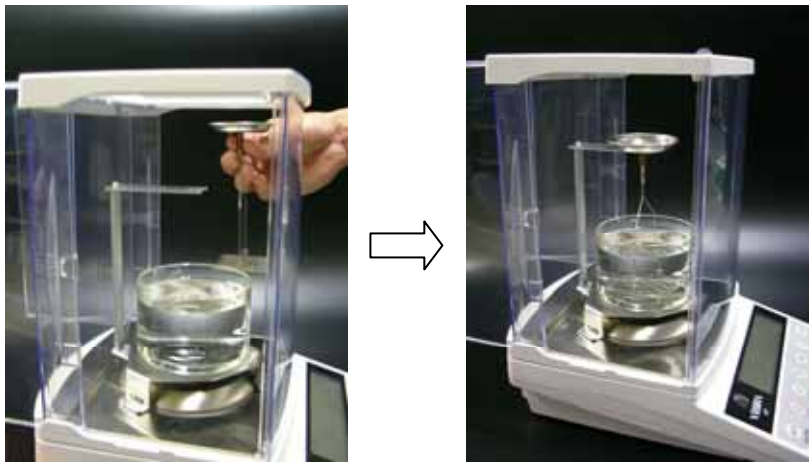
3 Attach the water tank platform as shown to the right.



4 Put the water tank in the position as shown to the right.



5 Set the measurement pan as shown to the right.



2 Procedures for Use

2.1 Measuring solid density

1 Setup Function 1. (Refer to the operation manual of the main unit at Section 9, "Function 1.")
   - Set the system in the solid density measurement mode [1SEt. 5].
   - Select the media to be used. If water is to be used, set [1 1nEd.] to [0]. If any other media is to be used, set to [1].
   - For enabling data output, set Output Data [12.dAtA] and Automatic Output [13. Ao].

2 Put water or other media into the accessory tank as appropriate.

3 If water is used, measure the water temperature using the accessory thermometer.

4 Set applicable coefficients. (Refer to Section 6, "Coefficient Setting.")
If the media is water, set the water temperature. Otherwise, set the density of the media.

5 Set the density measurement kit and the water tank in place. Turn off the balance power and then turn it on again.

6 Measure the density of a solid object according to Section 3, "Solid Density Measurement Mode."

2.2 Measuring liquid density

1 Setup Function 1.
   - Set the measurement mode to measure liquid density [1SEt. 6].
   - Select the media to be used for measuring the density of the accessory glass weight. If water is to be used, set [1 1nEd] to [0]. If any other medium is to be used, set to [1].
   - For enabling data output, set Automatic Output [13Ao].

2 Put water or other medium into the accessory tank as appropriate for measuring the density of the glass weight.

3 If water is used, measure the water temperature using the accessory thermometer.

4 Set applicable coefficients. (Refer to Section 6, "Coefficient Setting.")
If the medium to be used in measuring the density of the glass weight is water, set the water temperature. Otherwise, set the density of the medium. It is unnecessary to set the mass or density of the glass weight. These settings are made in the course of density measurements.

5 Set the density measurement kit and the water tank. Prepare the glass weight and turn off the power and then turn it on again.

6 Measure the liquid density according to Section 4, "Liquid Density Measurement Mode."

2.3 Precautions relating to use

1 If water is used as the medium, check the water temperature as frequently as appropriate.

2 You should be careful not to leave the thermometer in the water tank. It may hit the pan submerged in water to result in inaccurate measurements. When water temperature is to be measured, once remove the water tank from the balance.

3 Be careful not to spill water or other liquids inside the windshield. Immediately wipe off any splashed liquid using a soft cloth.

4 If water is used as the medium, add one or two drops of surface-active agent (liquid detergent for kitchen use). It will effectively prevent air bubbles from adhering to any measurement object.

3 Solid Density Measurement Mode

If you wish to interrupt an operation, press the Print key. The display will show [StOP] for a few seconds and then go back into the Weight mode.

3.1 Measurement for samples that sink down in the medium

1 Set the density measurement kit and press the ON/OFF key to turn on the balance.

2 Press the Zero/Tare key for zero adjustment or for tare range.

3 Put a sample to weigh on the pan in the air.

4 When the safety mark [O] is displayed, press the Set key.
The display shows [SG.StArt] for a few seconds, and starts weight measurement in the air.
The symbol [M] will flash while the measurement is in progress.

5 When the measurement is done, the weight measured in the air will be displayed for a few seconds.

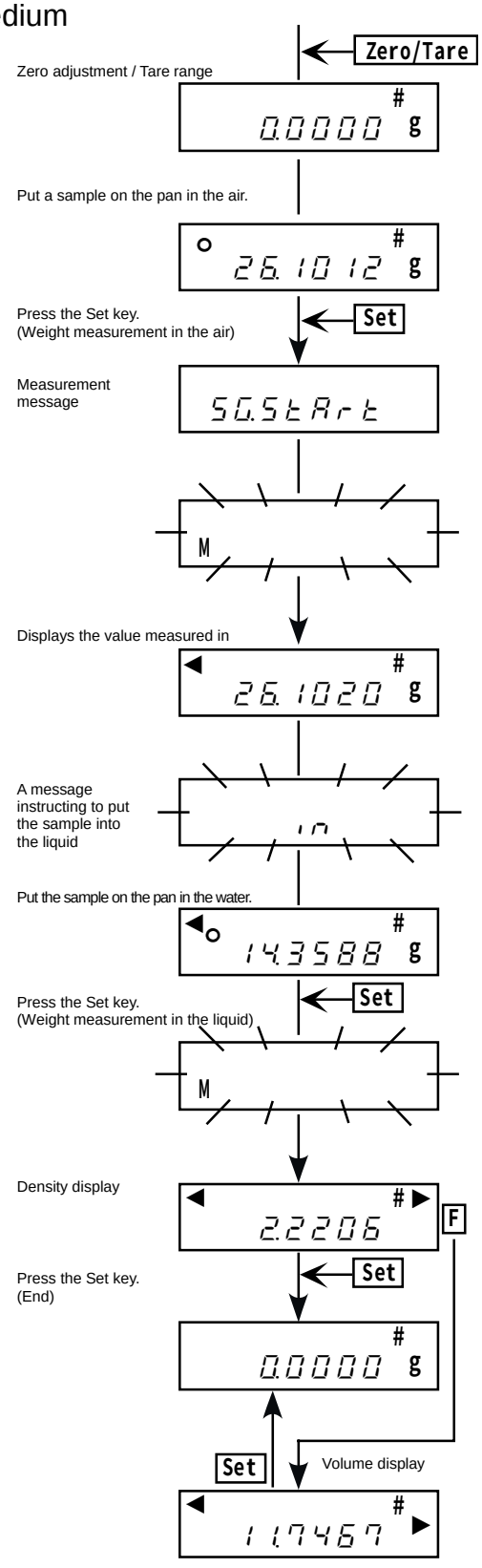
6 The display flashes [in] for a few seconds, and then changes to the weight display.

7 Put the sample on the pan submerged in the medium.
Make sure that the sample is free from air bubbles.

8 When the safety mark [O] is displayed, press the Set key.
Measurement will be made in the water.
The symbol [M] will flash while the measurement is in progress.

9 After the measurement is done, it displays the density.
The [▶] symbol will be lit in the top right of the display while the density is displayed.

10 Pressing the Function key toggles the display between density and volume.
The [▶] symbol will be lit in the center-right position while volume is displayed.
Press the Set key to return to the weight display.



3.2 Measurement for samples that can float in the medium

1. Attach the height adjuster on top of the pan cradle as shown to the right.

2 Set the density measurement kit (Put the weighing pan on Height adjuster). Press the ON/OFF key to turn on the balance.

3 Put the accessory glass weight on the pan in the air and press the Zero/Tare key for zero adjustment or for tare range.

4 Put a sample to weigh on the pan in the air.

5 When the safety mark [O] is displayed, press the Set key.
The display shows [SG.StArt] for a few seconds, and starts weight measurement in the air.
The symbol [M] will flash while the measurement is in progress.

6 When the measurement is done, the weight measured in the air will be displayed for a few seconds.

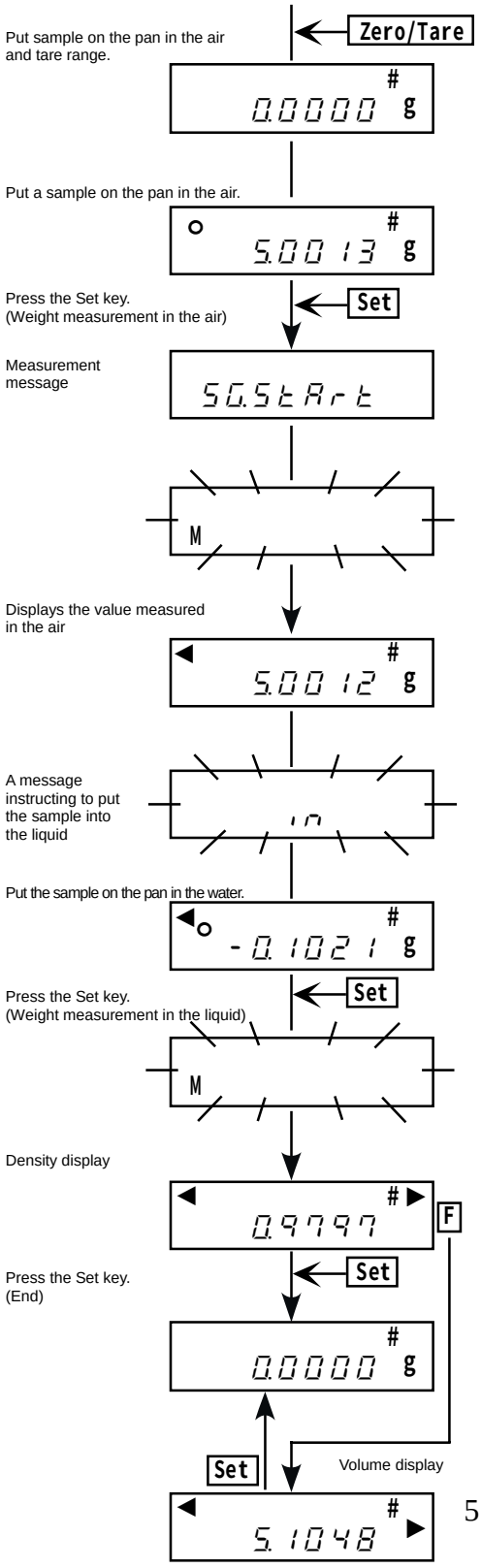
7 The display flashes [in] for a few seconds, and then changes to the weight display.

8 Put the sample **<u>under the pan</u>** submerged in the medium so that the sample is not floating.
Make sure that the measurement pan is not floating.
Make sure that the sample is free from air bubbles.

9 When the safety mark [O] is displayed, press the Set key.
Measurement will be made in the water.
The symbol [M] will flash while the measurement is in progress.

10 After the measurement is done, it displays the density.
The [▶] symbol will be lit in the top right of the display while the density is displayed.

11 Pressing the Function key toggles the display between density and volume.
The [▶] symbol will be lit in the center-right position while volume is displayed.
Press the Set key to return to the weight display.



4 Liquid Density Measurement Mode

Density of liquid is measured by using the accessory glass weight. In this measurement procedure, density of the glass weight is measured before measuring the density of liquid. The density value of the glass weight will be saved once it is measured. So, the corresponding operation may be skipped in subsequent measurements. You can also use other samples in place of the accessory glass weight. In doing so, you must perform a series of measurement steps to first measure the density of the sample and then to measure liquid density. Subsequently, you can skip the density measurement for the sample (refer to *2 below). Note that using another sample will overwrite the density value of the glass weight. If you are to use the glass weight again, you must measure the density of the glass weight before measuring liquid density.

1 Set the density measurement kit and press the ON/OFF key to turn on the balance.

2 Press the Zero/Tare key for zero adjustment or for tare range.
First, density of the accessory glass weight is measured.
Put water or any liquid whose density is accurately known (*1) into the water tank.
*1: Use the same medium as it is set for Medium (`1 1NEd`).
You can also use the previous value. (*2)

3 Put the glass weight on the pan in the air.

4 When the safety mark [O] is displayed, press the Set key.
The display shows [`SG.StArt`] for a few seconds, and starts weight measurement in the air.
The symbol [M] will flash while the measurement is in progress.
*2: Press the Set key while the measurement start message is on the display to skip the density measurement for the weight. Then, go to step 10.

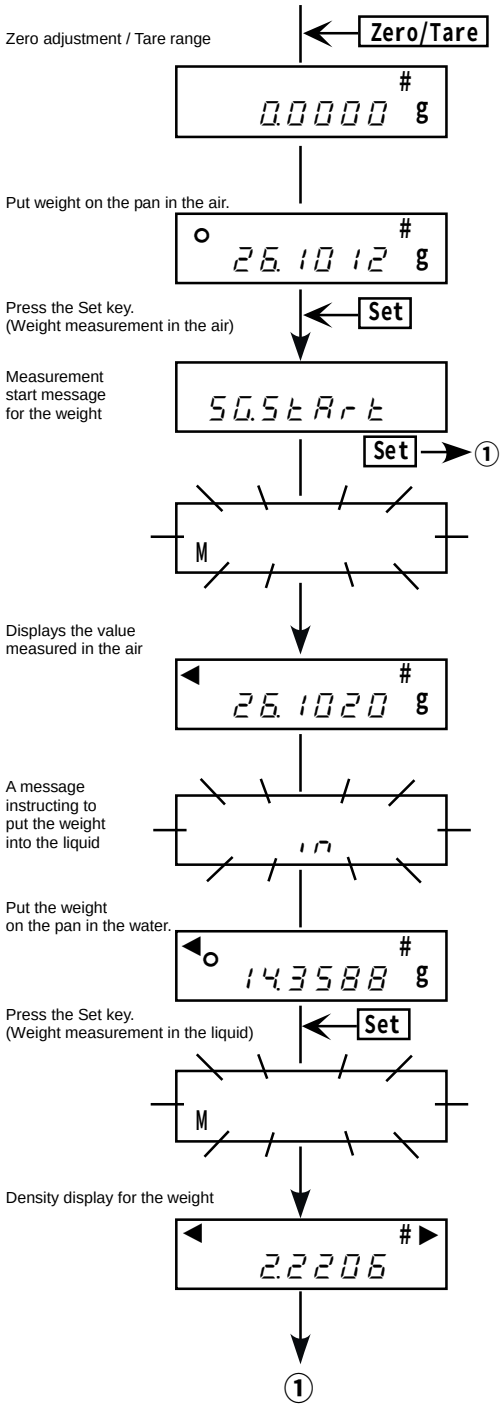
5 When the measurement is done, the weight measured in the air will be displayed for a few seconds.

6 The display flashes [`1n`] for a few seconds, and then changes to the weight display.

7 Put the weight on the pan submerged in the medium.
Make sure that the weight is free from air bubbles.

8 When the safety mark [O] is displayed, press the Set key.
Measurement will be made in the liquid.
The symbol [M] will flash while the measurement is in progress.

9 After the measurement is done, it displays the density of the weight for a few seconds.
The [▶] symbol will be lit in the top right of the display while the density is displayed.



10 The indication of [H. StArt] and a message telling that measurement of liquid density is started will be shown for a few seconds.
Replace the liquid in the tank with the liquid to be measured for density.

11 Press the Zero/Tare key for zero adjustment or for tare range.

12 Press the Set key to start measurement.

13 The display flashes [in] for a few seconds, and then changes to the Weight display.

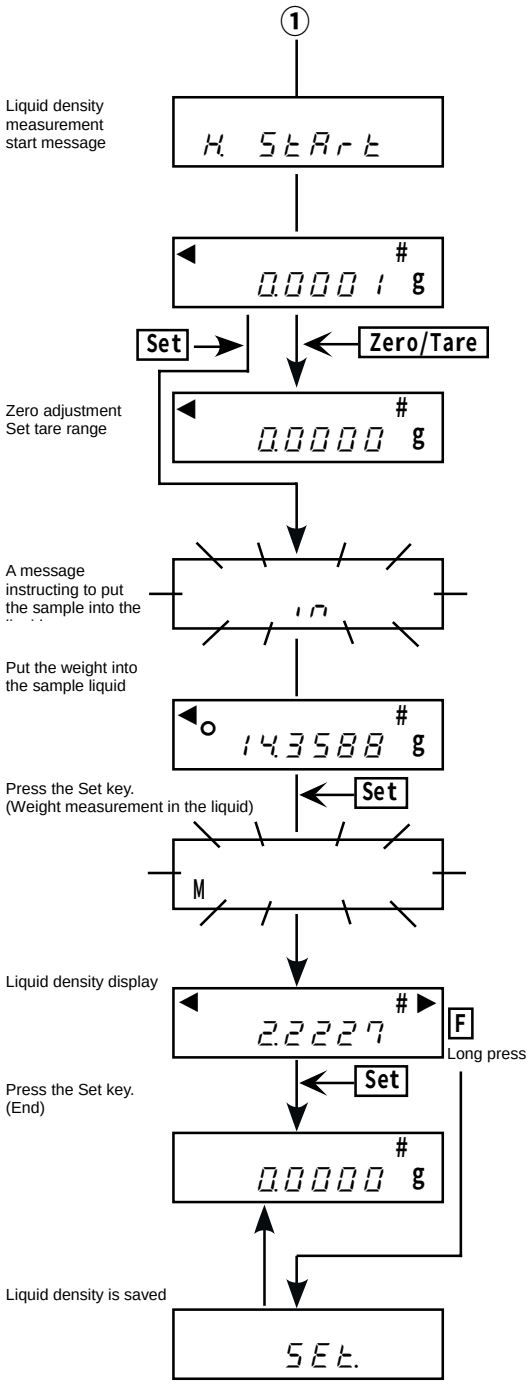
14 Put the weight on the pan submerged in the medium.
Make sure that the sample is free from air bubbles.

15 When the safety mark [O] is displayed, press the Set key.
Weight measurement will be made in the liquid sample.
The symbol [M] will flash while the measurement is in progress.

16 After the measurement is done, it displays the density of the liquid.
The [▶] symbol will be lit in the top right of the display while the density is displayed.

17 Press the Set key to return to the weight display.

18 You can also save the density value measured for the liquid. The value saved will be used as the liquid density value to be used in the measurement of solid samples when a liquid other than water is to be used.
Method to save: Press and hold the Function key until the [SEt.] display appears.
A message will be shown for several seconds and then it returns to the weight display.



5 Function 1

The following paragraphs describe Function 1 items to be set for the density measurement mode. Also refer to Section 9.2, "Density measurement details" of the operation manual of the main unit.

5.1 Item details

Media — The medium to be used in solid density measurements or in the measurement of the density of a glass weight (or an alternative sample) for measuring liquid density is set for this item.
If it is specified to use water, it is necessary to set the water temperature upon the measurement. Otherwise, it is necessary to set the density of the alternative medium. Refer to Section 6, "Coefficient Setting" for setting methods.

Output data — Output items of measurement results are to be set.
This item is functional only for the solid density measurement mode.
When it is set to [0], only the density value of the sample is output. When it is set to [1], mass of the sample, water temperature (or the density of the medium if any other medium is used), and volume of the sample are printed in addition to the density value. If the mode is set for measurement of liquid density, only the liquid density value is printed. Refer to Section 8, "Print Details" for details of output data.

Auto output — The timing to output measurement results is set. When "Auto Output" is disabled, pressing the Print key upon weight display (after density measurement is done) will print the results. The most recent measurement before the output timing will be printed. Don't press the Print key after power on and before any density measurement is made. You cannot expect normal values to be printed if no measurement has been made. When "Auto Output" is enabled, the results will be printed upon returning to the weight display after finishing the density measurement. Regardless of the Auto Output setting, the items set in the above "Output Data" setting will be printed.

6 Coefficient Setting

6.1 Coefficient setting items

The following coefficients must be set before density measurement. The setting values are different depending on the mode and medium selected. Note that the values once set are held in the balance even after power is turned off.

- Solid density measurement mode

Water as media — Setting value: Temperature of the water used
Displayed Unit: t
Setting Range: 0.0 to 99.9°C

Media other than water — Setting value: Density of the liquid used
Display Unit: ► (upper), ◄ (lower)
Setting Range: 0.0001 to 9.9999
* Any result of liquid density measurement can be used. (Refer to the operation procedure, step 18, of Section 4, "Liquid Density Measurement Mode.")

• Liquid density measurement mode

Water as media	Setting value: Temperature of the water used Same as with solid density
Media other than water	Setting value: Density of the liquid used Same as with solid density
Common	Setting value: Mass of glass weight Display Unit: g Setting value: Density of glass weight Display Unit: ► (upper) Once a series of measurements, i.e., measurement of the density of glass weight followed by the measurement of liquid density, is performed, the necessary settings are automatically made and no further changes are required in general. It is also allowed to set the parameters manually. In this case, the steps to measure the density of the glass weight must be skipped. When the density of the glass weight is measured, the parameters already set are overwritten by the new measurement. If any other sample is used instead of the glass weight, the mass and density values of the alternative sample are set as the corresponding parameter values.

6.2 Coefficient setting

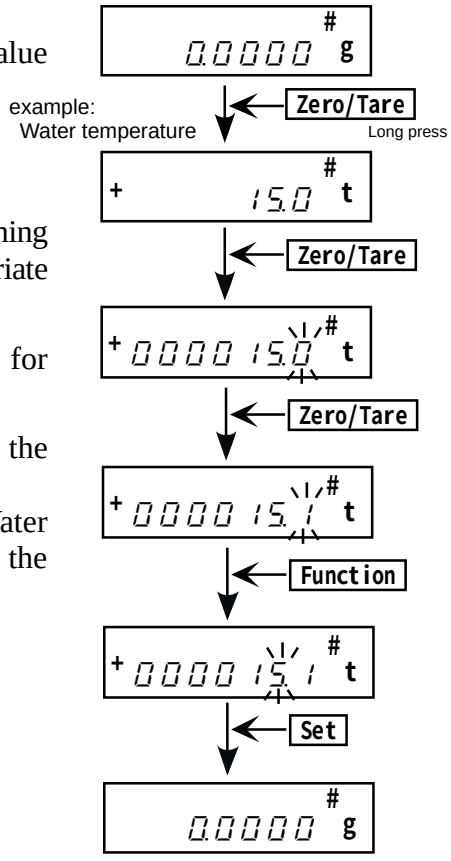
1 Keep pressing the Zero/Tare key until the applicable setting value (*1) is displayed.
*1: Refer to Section 4.1, "Numerical setting items."

2 Press the Zero/Tare key to initiate the numerical setting mode.

3 Every time you press the Zero/Tare key, the number of the flashing digit (the digit for value entry) will increment. Select an appropriate number by pressing the key as many times as required.

4 Press the Function key to move the flashing digit (the digit for value entry).

5 Pressing the Set key will set the value, and then it returns to the weight display.
In the case of liquid density, the item will be shifted from "Water temperature (media density)" to "Mass of weight." Repeat the above steps 2 to 5.



7 Display

7.1 Minimum indication

Minimum indication values of density and volume are as follows:
Density 0.0001
Volume 0.0001 (cm^3)

7.2 Unit notation

#	To be indicated in density measurement mode
► (Upper)	To be indicated when density is displayed
► (Center)	To be indicated when volume is displayed
◄ (Upper)	To be indicated while density measurement is in progress

8 Print Details

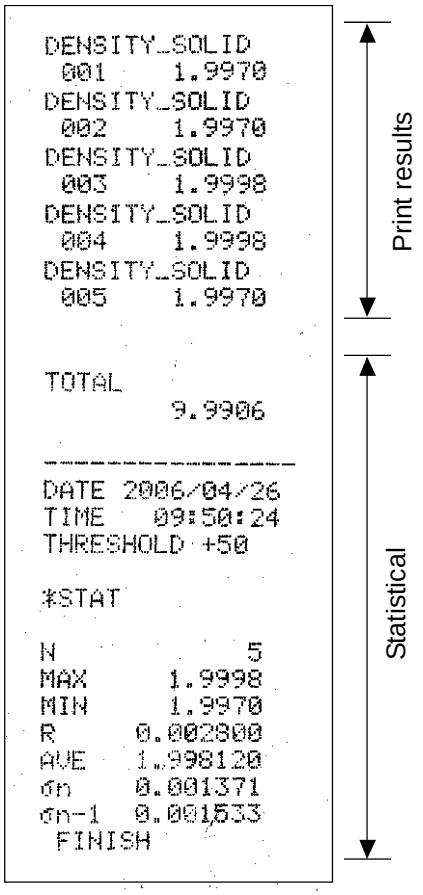
[Print samples for CSP-160]

Example: Water temperature

Solid density mode

Medium: Water

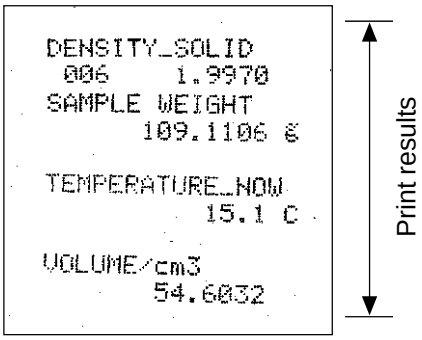
Only density is printed.



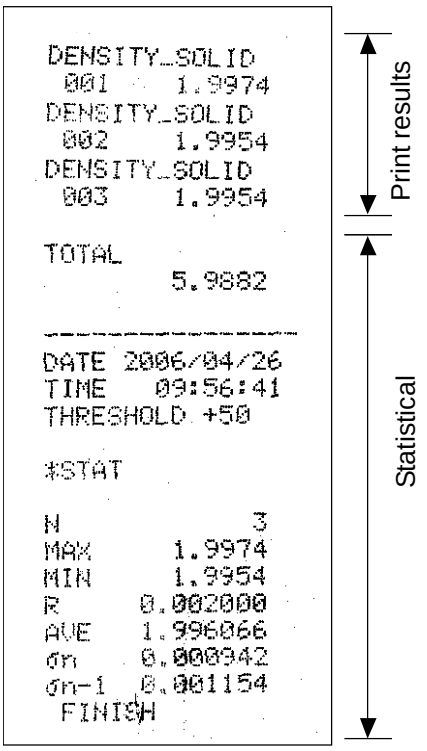
Solid density mode

Medium: Water

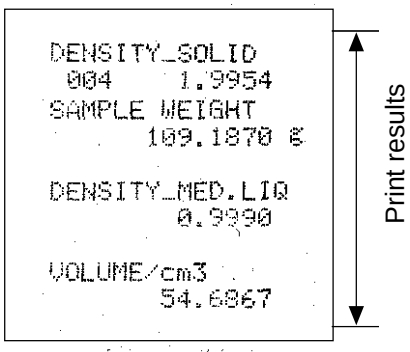
Density, mass, water temperature, and volume are printed.



Solid density mode
Medium: Other than water
Only density is printed.



Solid density mode
Medium: Other than water
Density, mass, density of medium, and volume are printed.



Liquid density mode