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8102
DENSITY ELECTRONIC BALANCE

Instruction Manual

PLEASE SCAN QR CODE TO WATCH THE OPERATION VIDEO OF PRODUCTS.

VIDEO

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1.Synopsis

■ High precision and sensitivity, fast response speed;
■Advanced line mode, the selection of materials and production process is excellent, thus the product is highly reliable, anti-interference ability, long service life, long-term stability, can adapt to the harsh use of the environment and a long time of continuous work;
■ With built-in standard weights and precision automatic loading device, special mechanisms and precision motors under the control of the computer to complete the loading and unloading, calibration operation is automatically completed by a key, completely avoiding the loss of weights and wrong change, weights wear and tear, weights placed on the strength of the size and impact of the balance and other issues affecting the accuracy, to fundamentally ensure the accuracy and performance of the balance.
■ Balance is equipped with a precision temperature measurement circuit, the ability to sense the temperature change to the level of 0.01 degrees. Therefore, the balance can correct the accuracy error of the balance in real time according to the change of the ambient temperature, and when the ambient temperature change exceeds the correctable range (every 1.5 degrees), it will automatically start the calibration function of the balance to complete the automatic calibration of the balance once, which ensures the measurement accuracy of the balance at any time. In addition, if the balance has been calibrated for 3 hours since the last calibration, an automatic calibration will also be activated to ensure that the balance will be fully calibrated over time to ensure that the balance will be fully calibrated over time to ensure that the balance will be fully calibrated over time to ensure that the balance will be fully calibrated over time.
■ With bottom weighing hook function; can measure density.

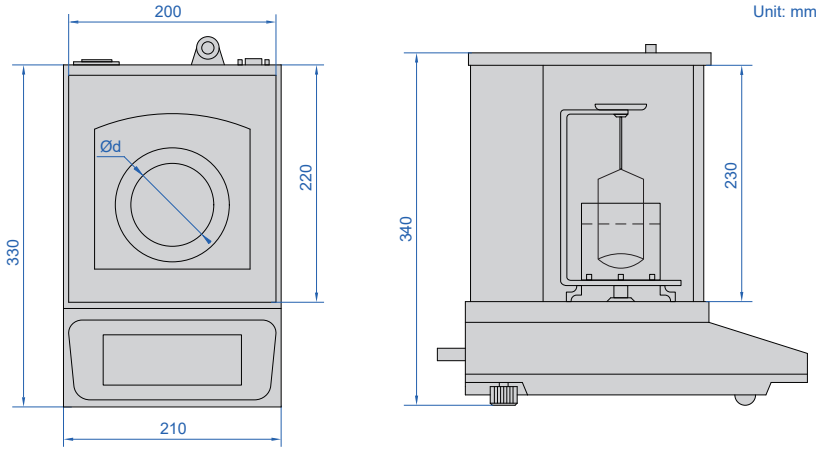
■With unit conversion function, can be converted between any of the 7 units;
■ balance configured with a data output interface, can be directly connected to the printer for data printing, but also directly with the computer interface, data collection, statistics, at the same time, the computer can also be controlled through the interface to control the work of the balance, the balance of real-time remote control;

In short, the fully automatic internal calibration function is the standard configuration of 8102 series density electronic balance, with unparalleled features and advantages, can bring great convenience to the user's use, the automatic loading system can ensure that throughout the balance's service life, the internal standard weights are always able to meet the requirements of the level of accuracy without wear and tear, to ensure the maximum degree of the balance's long-term stability and service life.

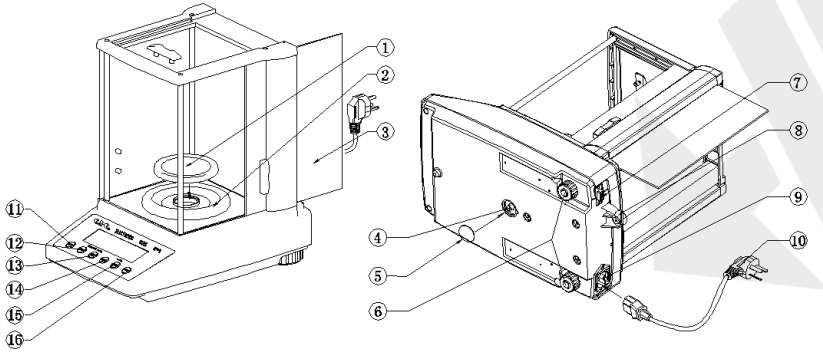
2.Model specification and technical parameters

SPECIFICATION

Code	8102-220	8102-320	8102-520	8102-620	8102-1020	8102-1520
Maximum weighing	220g	320g	520g	620g	1020g	1520g
Minimum weighing	20mg	20mg	100mg	100mg	100mg	100mg
Resolution (d)	1mg	1mg	1mg	1mg	1mg	1mg
Verification interval (e)	10mg	10mg	10mg	10mg	10mg	10mg
Accuracy (m is load)	m≤50g: ±5mg 50g<m≤200g: ±10mg m>200g: ±15mg		m≤500g: ±5mg m>500g: ±10mg			
Weighing pan size (Ød)	Ø80mm				Ø120mm	
Operation temperature	15~30°C		18~23°C			
Operation humidity	40~80%% RH		50%~70% RH			



3.Outline structure and installation diagram



■Part Name:

1. Scales
2. Windshield ring
3. Windshield glass sliding door
4. Lower scale hook
5. Nylon plug for lower scale hook
6. Levelling foot
7. RS232 data serial port
8. levelling bubble
9. power fuse 2-in-1 socket
10. Power cord
11. Touch display

■Mounting Sequence:

▲1. Unpacking: Take out the spare parts, tear off all the protective tape on the balance, and put the parts in order as shown in the picture.

▲2. Adjust the level: rotate the level foot left and right, and observe the bubble of the level bubble to reach the centre circle.

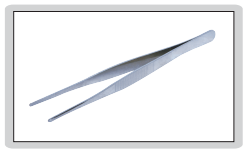
▲3. According to the method shown in the diagram to turn on the power that installation is complete.

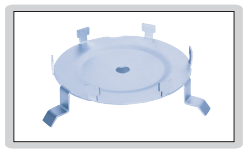
4. Standard components

Unpack the density determination kit, which shall contain the following components.

- Tweezers
- Floating Solid Baskets
- Sunken Solid Hanging Baskets
- Hook Auxiliary
- Thermometers
- Vessel Holder
- Beaker (Glassware)
- 10mL Sinking Hammer
- Fixed Bracket

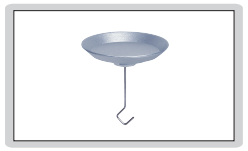
Density Accessories (Standard)

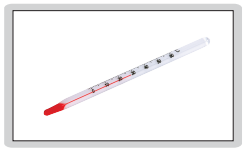

Tweezers

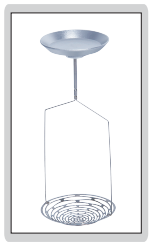

Vessel Holder


Beaker (Glassware)


10mL Sinking Hammer


Hook Auxiliary

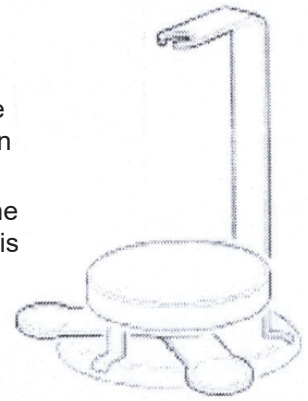

Thermometers


Sunken Solid Hanging Baskets


Floating Solid Baskets


Fixed Bracket

5. Preparation of scales before density determination



▲1. Open the door of the balance and remove the pan.

▲2. Place the fixed support in the balance with the pan removed so that its centre is in line with the centre line of the balance.

▲3.Place the container holder on top of the fixed support so that the front support foot is in the middle of the two weighing arms of the fixed support and make sure that the container holder does not touch the fixed support.

6. Principles of density determination

The density of an object is the ratio of its mass to its volume, using the following formula.

$$\rho = m / V$$

The determination of the density of an object is usually achieved by applying Archimedes' principle. Archimedes' theorem states that the buoyant force on a solid in a liquid is equal to the weight of the liquid it displaces. The determination of the density of an unknown solid or liquid has different procedures.

■ 6.1 Solid Density Determination

▲Measurement formula

Density determination of solids is usually the use of a known density of liquid (eg: water or ethanol) as an auxiliary liquid, through the air (A) and auxiliary liquids (B) in the successive weighing of the solid to be measured by the mass can be calculated to find its density, the specific formula is as follows.

$$\text{Density: } \rho = \frac{A}{A-B}(\rho_0 - \rho_L) + \rho_L$$

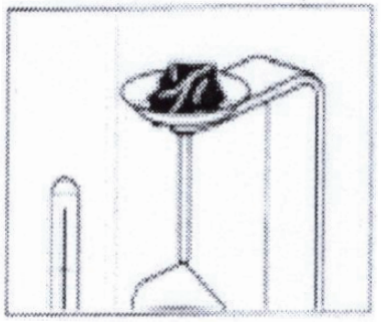
$$\text{Volume: } V = \alpha \frac{A-B}{\rho_0 - \rho_L}$$

▲**ρ**=Density of solid to be measured
▲**A**=weight of solid to be measured in air
▲**B**=weight of solid to be measured in auxiliary liquid
▲**ρ0**=Auxiliary liquid density
▲**ρL**=Air density(0.0012g/cm³)
▲**a**=Correction factor for air buoyancy (0.99985)

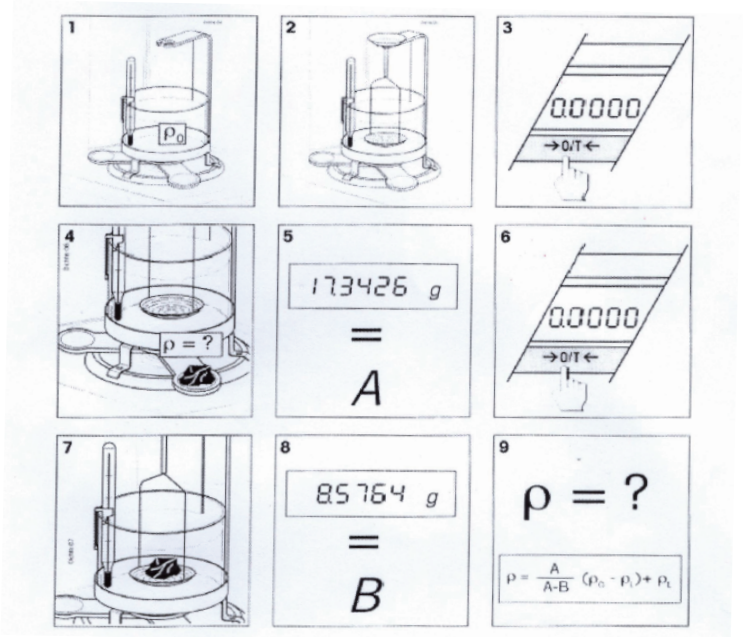
▲ Procedure for density determination of solids

Prepare to determine the density of a solid using a balance by following the steps in Section 2 as follows.

● 1. Hang the thermometer on the wall of the beaker.
● 2. Place the beaker in the centre of the container holder.
● 3. Fill the beaker with a reference liquid of known density (usually water or ethanol), making sure that the solid to be measured can be completely submerged by the liquid for more than 1cm.
● 4. Place the basket on a fixed stand, making sure that its surface is free of air bubbles and does not touch the beaker or thermometer.
● 5. Switch on the balance.
● 6. Close the damper and tare the balance.
● 7. Open the windshield of the balance and place the solid to be measured on the weighing arm of the fixed support or in the weighing pan at the top of the basket as shown in the figure; if the mass of the solid to be measured in air is greater than 20g, place it in the weighing pan at the top of the basket for weighing (see the figure below for details);

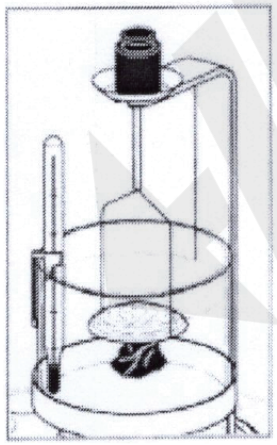


● 8. Close the windshield of the balance and record the weighing result after the balance has stabilised A.
● 9. Open the windshield of the balance, remove the solid to be measured, close the windshield of the balance and tare it.
● 10. Open the windshield of the balance and place the solid to be measured in the weighing net in the lower part of the basket and make sure that there are no air bubbles adhering to the surface of the solid (you can use a small brush to remove the air bubbles on the surface);.
● 11. Close the windproof door of the balance, wait for the balance to stabilise and record the weighing result B.
● 12. According to the density formula to calculate the density of the solid to be measured.



Solid Density Determination Procedure

Note: For the density determination of less dense solids (ρsolid < ρliquid), this can be achieved by using an additional weight and a basket that is completely submerged below the level of the auxiliary liquid (see figure on the right). After loading the additional weights, the density determination step should be repeated, i.e., the mass A of the solid in air should be reweighed, and then the mass B in the auxiliary liquid should be weighed to find the density of the unknown solid, ρsolid, by means of the formula.



▲Improve the accuracy of the results of determining the density of solids

● 1. Temperature effects

The effect of temperature on solids is very insensitive to temperature, and the corresponding change in density is insignificant. However, when solid density is determined using an auxiliary liquid according to the "Archimedes" principle, the temperature has a significant effect on the density of the liquid (1%-0.1/°C), which directly affects the accuracy of the third decimal place of the weighing result.

In order to obtain accurate weighing results, we recommend that the temperature of the auxiliary liquid should always be taken into account in solid density determinations. Tables of the densities of water and ethanol at different temperatures are given in Appendices 1 and 2.

● 2. Influence of surface tension of auxiliary liquids

The adhesion of the auxiliary liquid to the hanging line of the basket can increase the weighing mass by up to 3mg or so. Since the basket is always submerged in the auxiliary liquid during the solid density measurement, the effect of the surface tension of the auxiliary liquid on the weighing result can be ignored.

If more accurate weighing results are required, this can be achieved by adding a wetting agent to the auxiliary liquid (optional).

■ 6.2 Determination of liquid density

▲Measurement formula

The density of an unknown liquid can be realized by using a sinking hammer of known volume. The mass of the hammer is weighed in air and in the liquid of the density to be measured, respectively, and the density of the liquid is calculated using the following formula.

$$\text{Density: } \rho = \alpha \frac{A-B}{V} + \rho_L$$

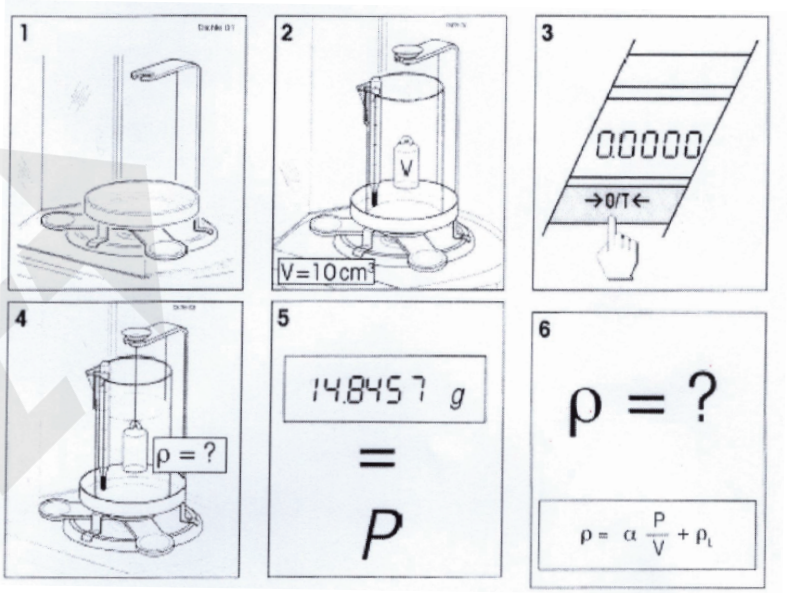
$$\rho = \alpha \frac{P}{V} + \rho_L$$

▲**ρ**=Density of liquid to be measured
▲**A**=Weight of sinking hammer in air
▲**B**=Weight of the sinking hammer in the liquid to be measured
▲**V**=Volume of sinking hammer
▲**ρL**=Air density(0.0012g/cm³)
▲**a**=Correction factor for air buoyancy (0.99985)
▲**P**=Weight of liquid drained(P=A-B)

▲Procedure for liquid density determination

Prepare to use a balance to determine the density of a liquid by following the steps in Section 2 as follows.

● 1. Hang the thermometer on the wall of the beaker.
● 2. Place the beaker in the center of the container holder.
● 3. Hang the sinking hammer (optional) on the fixed bracket and make sure it does not touch the beaker or thermometer.
● 4. Turn on the balance switch.
● 5. Close the damper and tare the balance.
● 6. Open the windshield of the balance and inject the liquid to be measured so that the hook of the sinking hammer is completely submerged for more than 1cm, make sure that there are no air bubbles around the hammer (you can use a small brush to remove the surface bubbles).
● 7. Close the windshield of the balance, wait for the balance to stabilize and write down the reading P.
● 8. Calculate the density of the liquid to be measured according to the density formula.



Liquid Density Determination Procedure

▲Improve the accuracy of the results of the determination of the density of liquids.

The volume of the sinking hammer should be calibrated for the optional sinking hammer volume, including the upper part of the suspension wire, in the determination of the density of liquids so that the error in the determination of the density of distilled water at 20°C is less than ±5‰g/cm³.

To determine the density of an object using an electronic balance, simply equip an existing balance with a density measurement module for accurate and reliable weighing.

7.Factors affecting density determination

In addition to the temperature of the auxiliary liquid and its surface tension, and the volume of the sinking weight, as discussed in the previous section, the following factors may also affect the balance's determination of the density of an object.

▲Depth of immersion of the basket and sinking weight in the liquid.

The sinking weight used in determining the density of a liquid is suspended in the liquid to be measured using a platinum wire of 0.2 mm diameter. The buoyant force on this wire in deionized water with a density of 1 g/cm³ is approximately 0.3 mg/10 mm Depth of immersion.

For example, if the sinking hammer hook is submerged below 10 mm in deionized water with a density of 1 g/cm³, approximately 40 mm of the platinum wire is submerged, which results in a buoyant force of approximately 1.2 mg on the wire in the deionized water, which is negligible compared to the buoyant force of 10 ml of the sinking hammer.

The basket used in the determination of the density of solids is made of two platinum wires of 0.7 mm diameter suspended in the liquid to be measured, which are buoyant in deionized water with a density of about 1 g/cm³ at a depth of immersion of about 0.4 mg/mm.

When weighing solids in air and liquid, the depth of immersion of the basket in the liquid is essentially constant (ignoring changes in the liquid surface due to immersion of the solid), so the buoyant force on the basket is constant and negligible. If the submergence of the solid causes a significant change in the liquid level, we should consider the effect of the depth of immersion of the basket in the liquid on the results of density determination.

▲Bubbles.

For poorly wetted liquids (no wetting agent added), air bubbles may adhere to submerged parts such as solids to be measured, sinking hammers or hanging baskets, thus affecting the weighing results (bubble buoyancy). The buoyancy of a 1mm diameter bubble is about 0.5mg, whereas that of a 2mm diameter bubble can be as high as 4mg, so in order to avoid the influence of air bubbles on the measurement results, we recommend the following precautions.

- Remove solvent-resistant dirt from solid surfaces
- Clean the basket and the sinking hammer regularly.
- Avoid touching parts submerged in liquids with your hands during density measurements.

Remove surface air bubbles by gently shaking the basket and the sinker during first use.

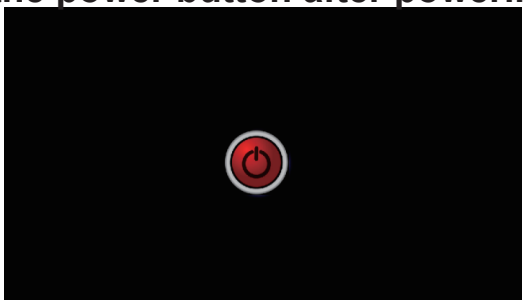
- Remove adhering air bubbles with a fine bristle brush.
- Use wetting agents or other organic liquids (ignore the effect of dripping wetting agents on the density of the liquid)

▲Porosity of solids

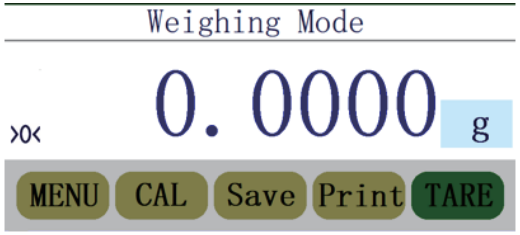
When a solid is immersed in a liquid, not all the gases in the holes are replaced by the liquid, which causes errors in buoyancy, so the density of porous solids can only be roughly determined.

8.Operating method

■Press the power button after powering on.

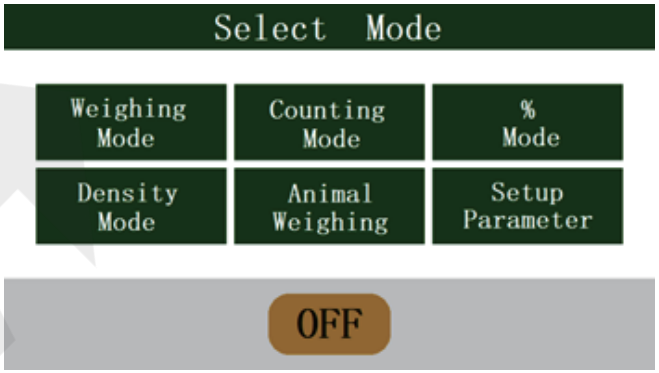


■Enter weighing mode after displaying the boot information.

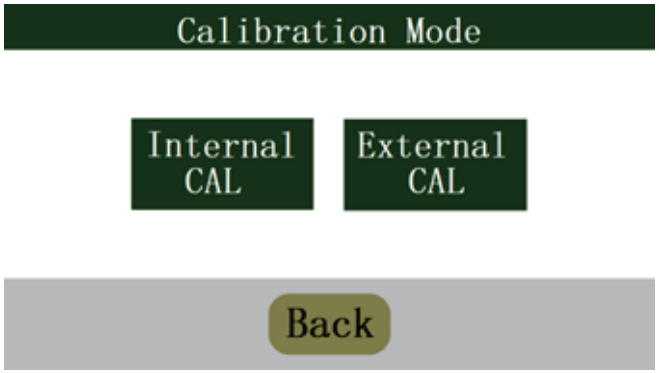


▲Click Set Time on the weighing page to adjust the current time.

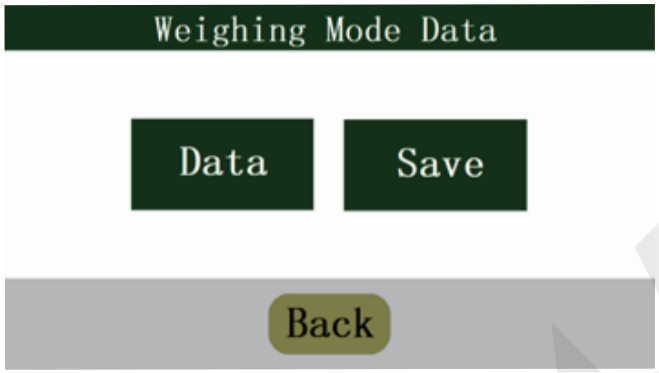
▲Press Function to enter the function selection page



▲Press Calibrate to enter the calibration method selection page



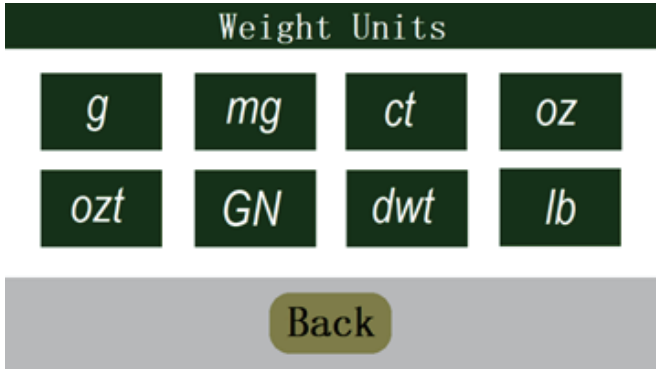
● During internal calibration, the balance starts the internal calibration mechanism to carry out fully automatic calibration, the display of CAL indicates that calibration is in progress, and the display of C ----F indicates that the balance is not at zero position or is in an unstable state.
For external calibration, when C XXX is displayed, the standard weight corresponding to the displayed value is placed, and after stabilization, the calibration is automatically completed and the actual weight value of the weight is displayed. The display of C ----F indicates that the balance is not in zero position or in an unstable state.
Press the store button, choose to view the saved records or save the current data.



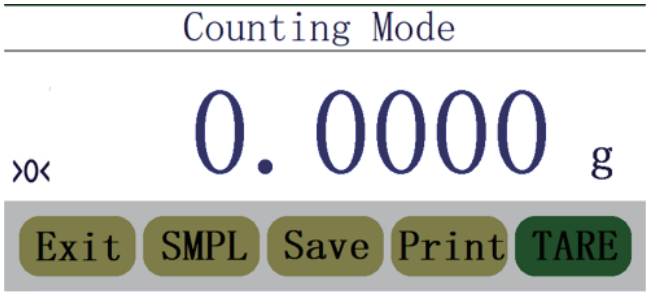
● Press Print to output data from the balance's serial port
● Press Tare to zero the display when the balance is stabilized.

■The function selection module has six options: Weighing Mode, Counting Mode, % Mode, Density Measurement, Animal Weighing, and Parameter Setting.

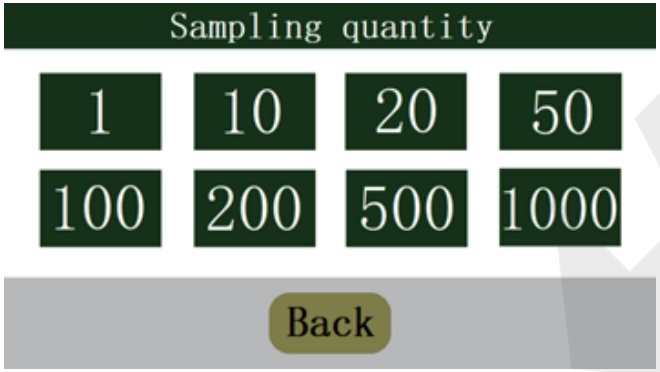
▲Weighing Mode: In the normal weighing state of the balance, tap the unit symbol to enter the weighing unit selection page, there are 8 kinds of weight units to choose from.



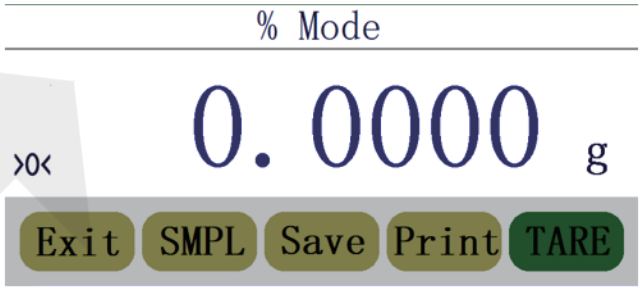
▲Counting Mode: The balance enters the counting state.



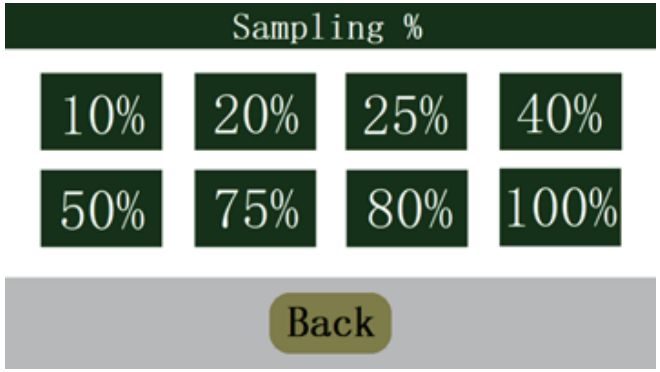
● After placing the sample, tap the Sample button to enter the number of samples selection page, select the number of samples corresponding to the placement of the sample, there are 8 kinds of quantities can be selected.



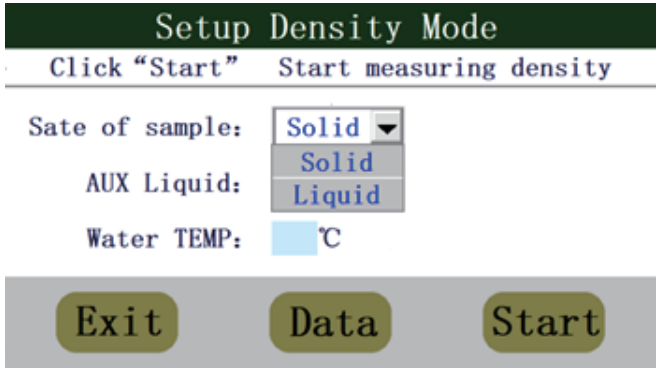
▲Percentage mode: the balance enters the percentage state



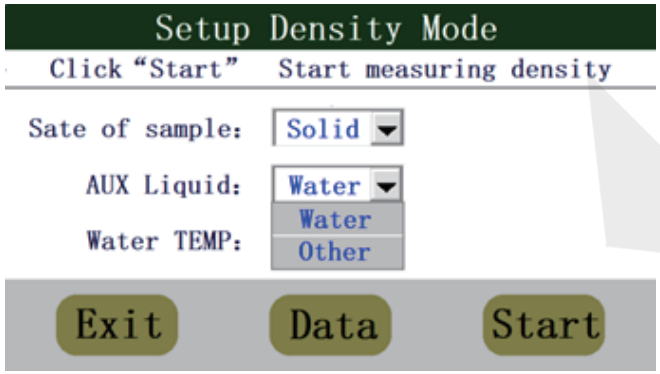
● After placing the sample, tap the Sampling button to enter the Sampling Percentage Selection page, and select the percentage corresponding to the placed sample, there are 8 types of percentages to choose from.



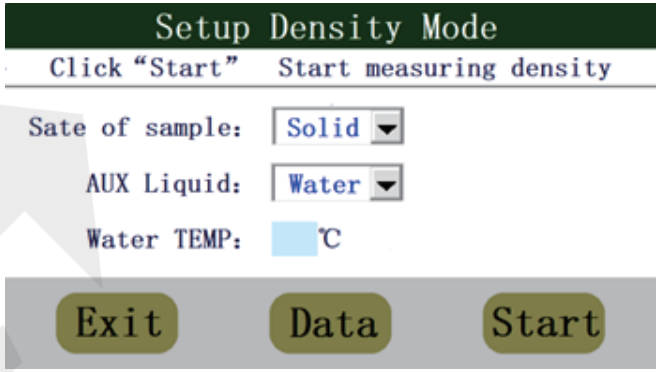
▲Density Measurement: Density measurement requires a density measurement device. To carry out density measurements need to first density measurement settings to select the test sample form solid or liquid.



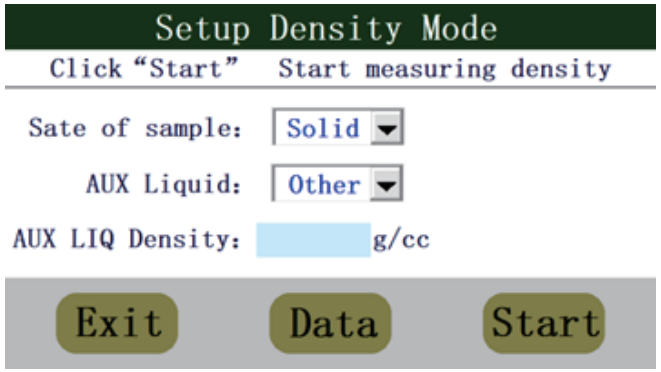
● Selection of auxiliary liquid water or other, for density measurement of solids



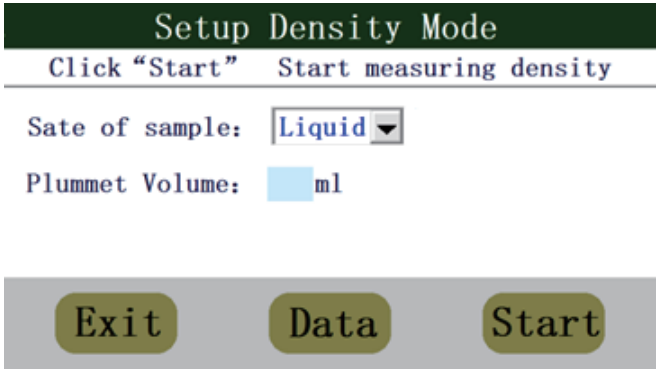
● Setting the water temperature when the auxiliary liquid is water



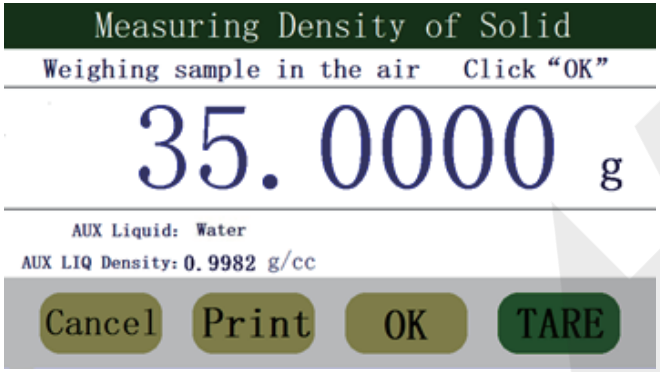
● Auxiliary liquid for other is to set the auxiliary liquid density



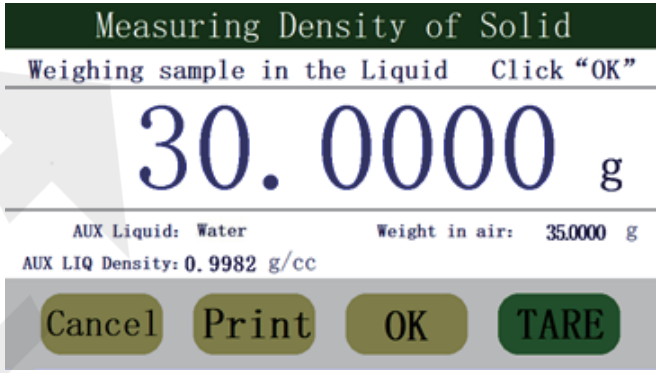
● Setting the sinking hammer volume for liquid density measurement.



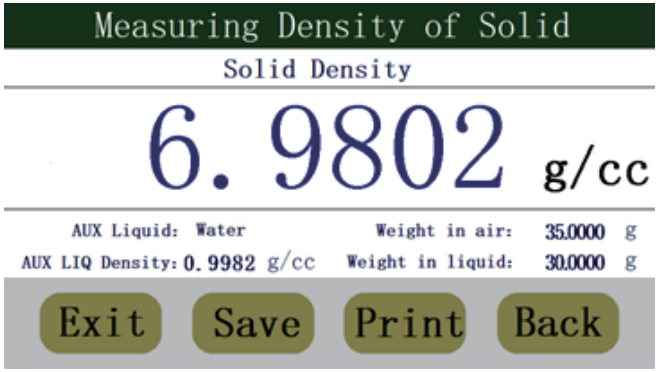
● Once the setup is complete tap to start the density measurement. Density measurement starts with weighing in air



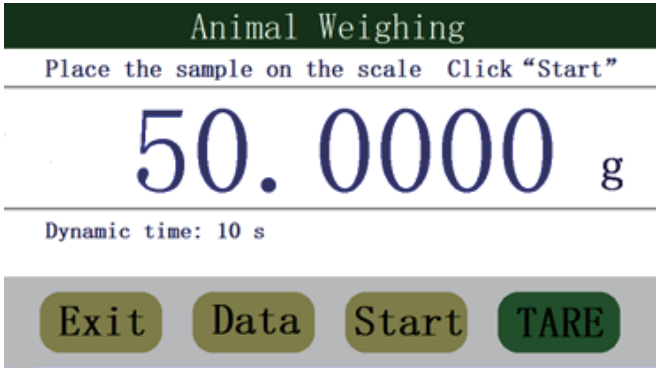
● Press OK after stabilization to record weight in air, then weigh in liquid



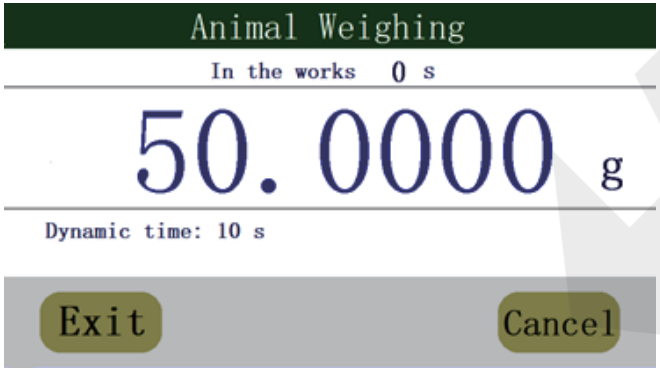
● After stabilization, press OK to record the weight in the liquid and the balance displays the density value of the measured sample



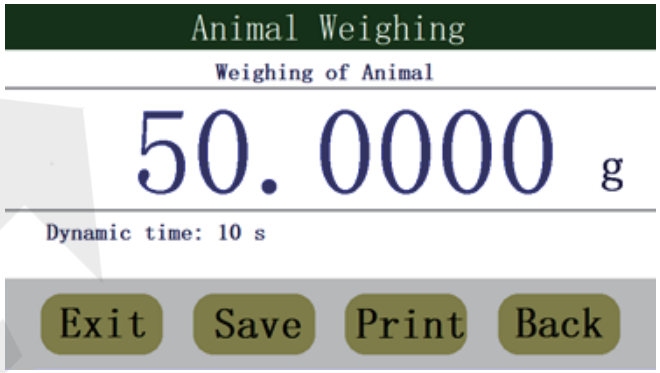
▲Animal weighing:
Animal weighing begins when the weighing item is placed on the scale.



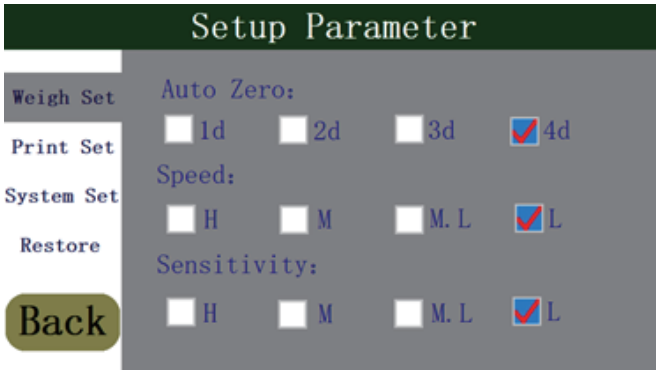
● Countdown to 10 seconds after the start of animal weighing



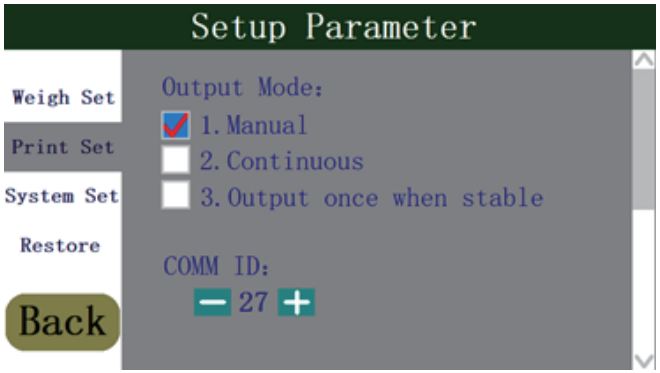
● Shows animal weight as an average weight over 10 seconds

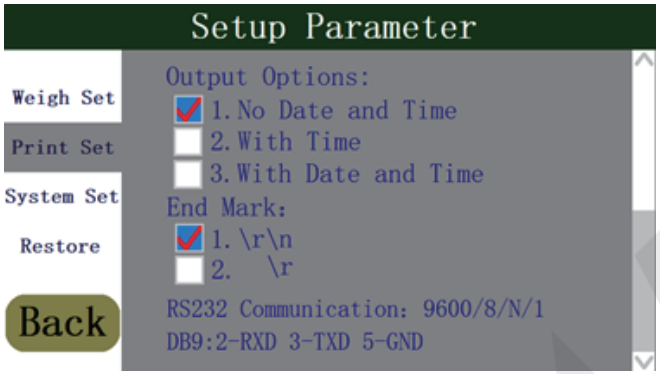


▲Parameter setting:
Weighing setup selects the range of automatic zero return, stabilization time and environmental requirements. The higher the environmental requirements, the higher the sensitivity and the lower the stability.

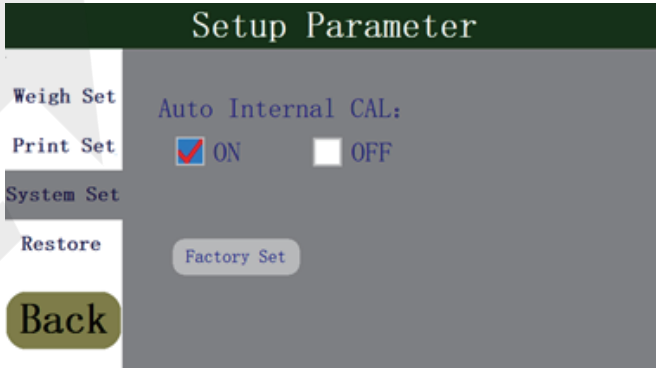


● Communication settings select the output method and balance communication number.



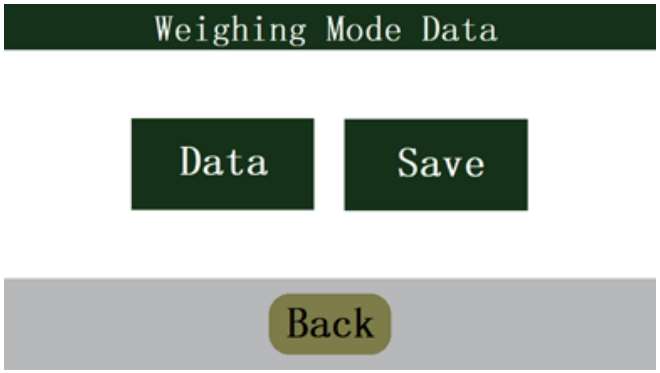


● The system settings select whether to turn on automatic internal calibration (the temperature changes by 1.5°C after being turned on or the internal calibration is automatically started every 3 hours). Users do not need to use the factory settings.

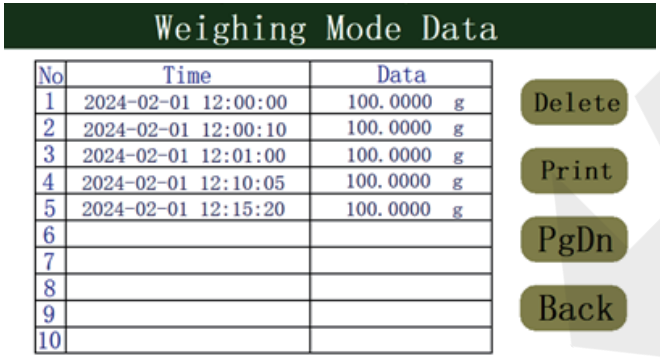


● Click Restore the factory Settings button will be restored to factory settings.

● Data recording and storage



● Each function is stored in an independent database. Enter the corresponding function to view the recorded data in that function.



9. Data output function

■Communication protocol:

Baud rate: 9600; data bits: 8 bits; stop bit: 1 bit; no parity bit.

■There are three ways to output data: key or command output; automatic output once per second; automatic output once loading is stable.

■Output options: Output data only; Output data with time; Output data with date and time

■Output terminator: the output ends with a carriage return and line feed (suitable for printing output); the output ends with a space and a carriage return (suitable for direct data output to a table).

■Output data format: output 14-bit data (ASCII code).

Symbol	Data	Unit	Carriage	Return Line Feed
1 digit	8 digits	3 digits	1 digit	1 digit

When the data is not negative, the first digit is a space, and the data that is not displayed is output as a space.

Example: When displaying 100.1234 g, the output data is □100.1234□g□↓←

When displaying – 100.123 g, the output data is -□100.123□g□↓←

A total of 14 bits of data.

When the output terminator is set to a space and carriage return, the last two digits are □↓.

When outputting time, the first line outputs the time and the second line outputs the data.

12:00:01

100.0000g

When outputting date and time, the first line outputs the date and time, and the second line outputs the data.

2024-01-01 12:00:01

100.0000g

■**Receive command:** You need to receive the corresponding communication signal first, and then receive the command.
When the communication signal is 27 (factory status), which is 1B in hexadecimal, the command is as follows (data is in hexadecimal):

1B 70: Print (requires the balance to send data once);
1B 74: tare;

■RS232C output pin definition (DB9 socket (female)):
Pin 2: RXD Pin 3: TXD Pin 5: GND. When connecting to the computer RS232C socket or using the RS232C socket (DB9 socket (male)) on the USB-to-serial cable, a male-to-female 23 crossover serial cable should be used. The wiring is as follows:

2 —— 3
3 —— 2
5 —— 5

▲To directly output balance data to the table, you need to use a dedicated data cable provided by the manufacturer (not a USB to RS232 cable).

10. Precautions for use

■Use environment: indoor use, power fluctuation is less than ±10% or less.
■Electronic balance is a precision instrument, when weighing objects should be placed carefully and avoid exceeding the maximum weighing range of the electronic balance, any form of overload or shock may cause permanent damage to the electronic balance, even in the case of the electronic balance is not energized.
■The working environment of the balance should be free from large vibration and power interference, no magnetic equipment next to it, no corrosive gases and liquids.
■Guaranteed warm-up time after energization.
■For daily use, the product should be handled gently, and wiped with a damp cloth moistened with a neutral detergent. The use of solvent or chemically treated solvents for cleaning is prohibited.
■Warning: Please read the instruction manual carefully before using the electronic balance and use it correctly according to the instructions. Improper use of the balance is likely to cause performance degradation or damage.

11. Common faults and troubleshooting methods

Fault phenomenon	Cause of Failure	Treatment
boot up without displaying	Poor contact with power plug	Check AC power outlets
	Poor switch key contact	Replacement of switch buttons
	Internal circuit damage	Needs to be returned to the factory for repair
Display F-H	weight on a balance pan	Removing weights from the scale
	Calibration data error	Press the tare key to turn on the power to read the backup data and recalibrate the balance
	Damaged sensors	Needs to be returned to the factory for repair
Display C-F during calibration	Balance zero position is unstable or not at zero point	Press the tare button when the pan is empty to make the balance display 0 and then calibrate it

Fault phenomenon	Cause of Failure	Treatment
Display F-2	A/D conversion error	Needs to be returned to the factory for repair
	Damaged sensor	
232 communication is not possible	Communication parameter setting error	Detect whether the C3 C4 setup parameters are correct
	Communication cable error	Detecting the correct communication connection cable

■Distilled Water Density Table

T/°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
10.	0.99973	0.99972	0.99971	0.99970	0.99969	0.99968	0.99967	0.99966	0.99965	0.99964
11.	0.99963	0.99962	0.99961	0.99960	0.99959	0.99958	0.99957	0.99956	0.99955	0.99954
12.	0.99953	0.99951	0.99950	0.99949	0.99948	0.99947	0.99946	0.99944	0.99943	0.99942
13.	0.99941	0.99939	0.99938	0.99937	0.99935	0.99934	0.99933	0.99931	0.99930	0.99929
14.	0.99927	0.99926	0.99924	0.99923	0.99922	0.99920	0.99919	0.99917	0.99916	0.99914
15.	0.99913	0.99911	0.99910	0.99908	0.99907	0.99905	0.99904	0.99902	0.99900	0.99899
16.	0.99897	0.99896	0.99894	0.99892	0.99891	0.99889	0.99887	0.99885	0.99884	0.99882
17.	0.99880	0.99879	0.99877	0.99875	0.99873	0.99871	0.99870	0.99868	0.99866	0.99864
18.	0.99862	0.99860	0.99859	0.99857	0.99855	0.99853	0.99851	0.99849	0.99847	0.99845
19.	0.99843	0.99841	0.99839	0.99837	0.99835	0.99833	0.99831	0.99829	0.99827	0.99825
20.	0.99823	0.99821	0.99819	0.99817	0.99815	0.99813	0.99811	0.99808	0.99806	0.99804
21.	0.99802	0.99800	0.99798	0.99795	0.99793	0.99791	0.99789	0.99786	0.99784	0.99782
22.	0.99780	0.99777	0.99775	0.99773	0.99771	0.99768	0.99766	0.99764	0.99761	0.99759
23.	0.99756	0.99754	0.99752	0.99749	0.99747	0.99744	0.99742	0.99740	0.99737	0.99735
24.	0.99732	0.99730	0.99727	0.99725	0.99722	0.99720	0.99717	0.99715	0.99712	0.99710
25.	0.99707	0.99704	0.99702	0.99699	0.99697	0.99694	0.99691	0.99689	0.99686	0.99684
26.	0.99681	0.99678	0.99676	0.99673	0.99670	0.99668	0.99665	0.99662	0.99659	0.99657
27.	0.99654	0.99651	0.99648	0.99646	0.99643	0.99640	0.99637	0.99634	0.99632	0.99629
28.	0.99626	0.99623	0.99620	0.99617	0.99614	0.99612	0.99609	0.99606	0.99603	0.99600
29.	0.99597	0.99594	0.99591	0.99588	0.99585	0.99582	0.99579	0.99576	0.99573	0.99570
30.	0.99567	0.99564	0.99561	0.99558	0.99555	0.99552	0.99549	0.99546	0.99543	0.99540

■Ethanol density table

T/°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
10.	0.79784	0.79775	0.79767	0.79758	0.79750	0.79741	0.79733	0.79725	0.79716	0.79708
11.	0.79699	0.79691	0.79682	0.79674	0.79665	0.79657	0.79648	0.79640	0.79631	0.79623
12.	0.79614	0.79606	0.79598	0.79589	0.79581	0.79572	0.79564	0.79555	0.79547	0.79538
13.	0.79530	0.79521	0.79513	0.79504	0.79496	0.79487	0.79479	0.79470	0.79462	0.79453
14.	0.79445	0.79436	0.79428	0.79419	0.79411	0.79402	0.79394	0.79385	0.79377	0.79368
15.	0.79360	0.79352	0.79343	0.79335	0.79326	0.79318	0.79309	0.79301	0.79292	0.79284
16.	0.79275	0.79267	0.79258	0.79250	0.79241	0.79232	0.79224	0.79215	0.79207	0.79198
17.	0.79190	0.79181	0.79173	0.79164	0.79156	0.79147	0.79139	0.79130	0.79122	0.79113
18.	0.79105	0.79096	0.79088	0.79079	0.79071	0.79062	0.79054	0.79045	0.79037	0.79028
19.	0.79020	0.79011	0.79002	0.78994	0.78985	0.78977	0.78968	0.78960	0.78951	0.78943
20.	0.78934	0.78926	0.78917	0.78909	0.78900	0.78892	0.78883	0.78874	0.78866	0.78857
21.	0.78849	0.78840	0.78832	0.78823	0.78815	0.78806	0.78797	0.78789	0.78780	0.78772
22.	0.78763	0.78755	0.78746	0.78738	0.78729	0.78720	0.78712	0.78703	0.78695	0.78686
23.	0.78678	0.78669	0.78660	0.78652	0.78643	0.78635	0.78626	0.78618	0.78609	0.78600
24.	0.78592	0.78583	0.78575	0.78566	0.78558	0.78549	0.78540	0.78532	0.78523	0.78515
25.	0.78506	0.78497	0.78489	0.78480	0.78472	0.78463	0.78454	0.78446	0.78437	0.78429
26.	0.78420	0.78411	0.78403	0.78394	0.78386	0.78377	0.78368	0.78360	0.78351	0.78343
27.	0.78334	0.78325	0.78317	0.78308	0.78299	0.78291	0.78282	0.78274	0.78265	0.78256
28.	0.78248	0.78239	0.78230	0.78222	0.78213	0.78205	0.78196	0.78187	0.78179	0.78170
29.	0.78161	0.78153	0.78144	0.78136	0.78127	0.78118	0.78110	0.78101	0.78092	0.78084
30.	0.78075	0.78066	0.78058	0.78049	0.78040	0.78032	0.78023	0.78014	0.78006	0.77997