FISON

PORTABLE DENSITY METER

FM-PDM-A100

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Index

1. Safety Measures

- Kindly read this user manual carefully before operation.
- Do not disassemble or replace accessories without authorization to avoid damaging safety.
- Do not perform charging operations in explosive hazardous areas.
- Operators must comply with operating procedures when using.
- This instrument can only be serviced by the manufacturer or authorized agent.
- It is a precision instrument and should be handled with care. The impact is strictly prohibited to avoid damage.
- If you encounter an instrument failure, please cease using it immediately.
- Trained professionals operate this instrument according to the steps in the operating instructions and compliance with safety standards and regulations.
- If the measuring cell has been filled with water, do not place the instrument in an environment below 0°C.

2. Introduction

Portable Density Meter FM-PDM-A100 is an advanced, pocket-sized instrument that has a capacity of 2 ml for efficient minimal-material density measurement. This enhances operational efficiency by greatly reducing the time required for density measurements. It automatically converts density and temperature into standard values for specific gravity, focus, and density. Our Density Meter ensures reliable results for liquid and gas samples across applications.

3. Features

- Efficient data management
- Long-lasting battery
- Easy-to-read display
- Integrated temperature control
- Portable data logging

4. Specifications

Model	FM-PDM-A100
Capacity	2 ml
Measuring range	0g/ cm3 to 3.0g/ cm3
Temperature	5℃ to 55 ℃
Ambient temperature	-10℃ to 60 ℃
Accuracy	±0.2
Resolution	0.01 ℃
Density	0.0001g/ cm3
Repeatability	0.0002g/ cm3
Internal storage	5000 Measurement results
Continuous working time	More than 20 hours
Explosion-proof grade	Ex ia IIC T4 Ga
Ingress Protection	IP67
Interface	Bluetooth
Power supply	Rechargeable lithium battery 3.7V
Dimensions	245 ×95 ×125 mm
Weight	650g

5. Applications

It is employed for laboratory oil and sampling density, as well as in the food beverages, pharmaceutical, and cosmetic industries.

6. Instrument Introduction

6.1 Composition

The structure of the density meter is shown in **Figure 1.**

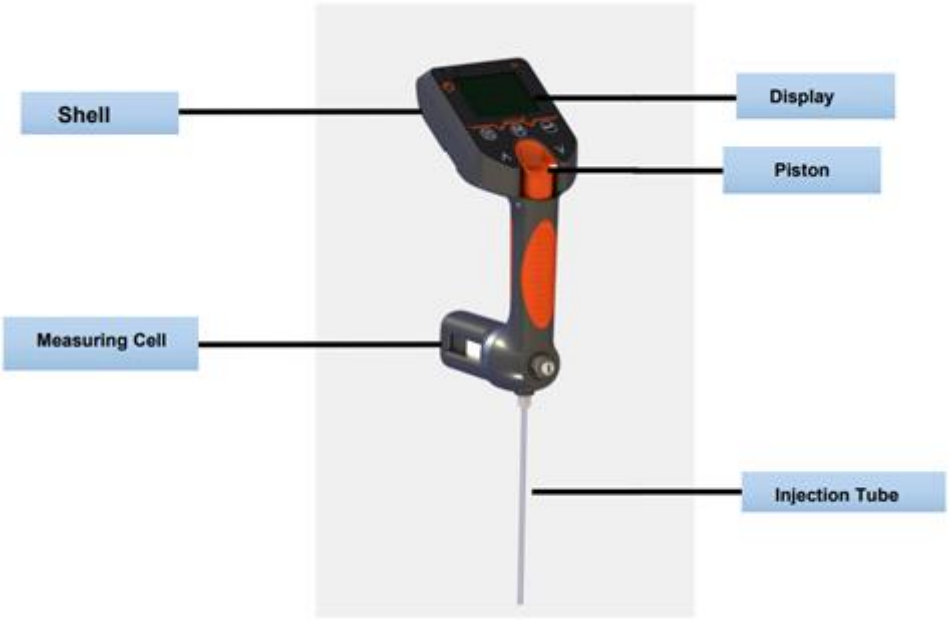


Figure-1

6.2 Key Description

Key Sign	Function
	Long press for 3s to turn on and off
	Confirm
	Main Menu/Return
	Storage
	Option Adjustments

6.3 Standard Configuration

- Portable Density Metre
- Instrument Case
- Wireless Module
- Dsm Density Meter Data Management Terminal
- User Manual
- Test Certificate
- Charging Cable
- Charger
- Injection Tub

7. Software Operations

7.1 Display Description

As shown in **Figure 2**, the main interface after startup is the measurement interface, which can be selected by pressing "∧∨".

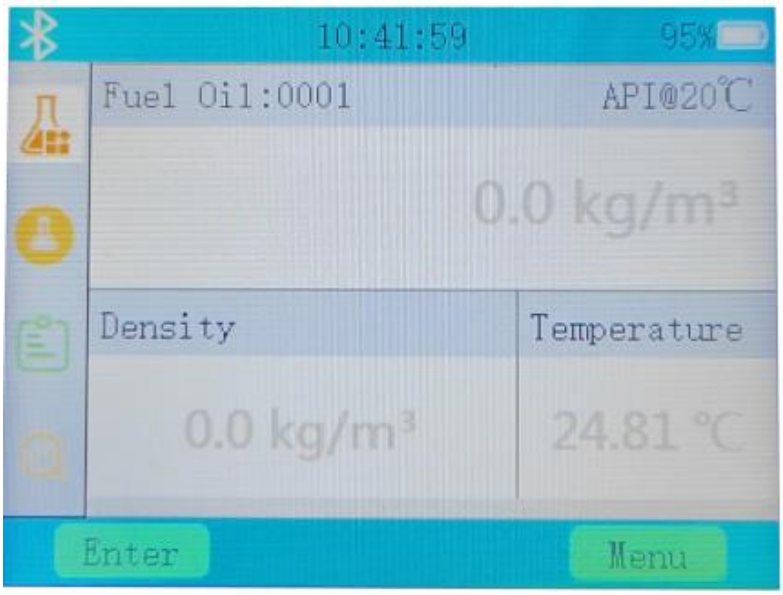


Figure-2

7.1.1 Measurement Interface

The measurement interface is shown in **Figure 3**

Figure-3

7.1.2 Sample Editing Interface

Under the main interface display, press " " to switch to the sample editing interface, as shown in **Figure 4.**

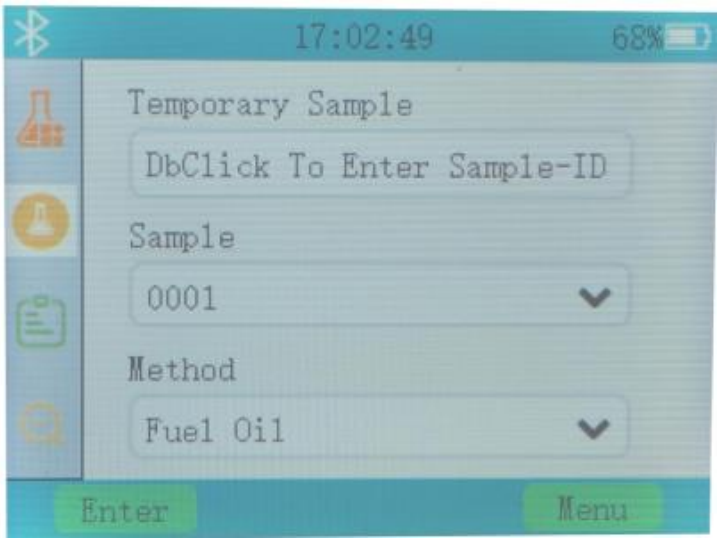


Figure-4

Under this interface, there are three modes of operation:

1) **Temporary sample editing**: Press " " twice to enter the temporary sample editing interface. Under this interface, you can edit the sample name through a floppy disk. After editing, press " " to complete the sample name editing, as shown in **Figure 5.**

Figure-5

2) **Sample selection:** Press" V " to select a sample in the sample editing interface. Press " ↵ " to select the edited sample name. After selection, press " ↵ " to complete the sample selection, as shown in **Figure 6.**

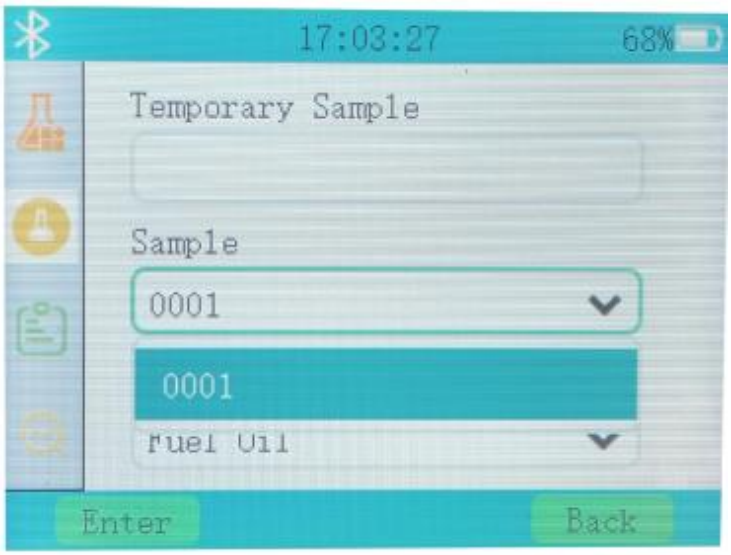


Figure-6

3) **Method selection:** Press" V " to select the method in the sample editing interface. Press " ↵ " to select the measurement method, which includes three methods: crude oil, finished oil, and lubricating oil, as shown in **Figure 7.**

Figure-7

7.1.3 Unit Selection Interface

Under the main interface display, press "▼" to switch to the unit selection interface, as shown in **Figure 8.**

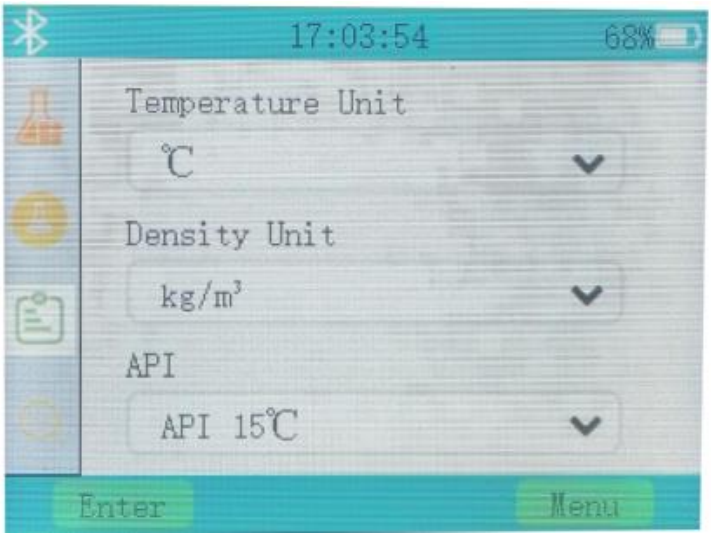


Figure-8

Under this interface, three types of unit selections are available:

1) **Temperature unit selection**: Press "↵" twice to enter the temperature unit selection interface. Use "▼" to select Celsius temperature and Fahrenheit temperature. After selection, press "↵" to complete the selection, as shown in **Figure 9**

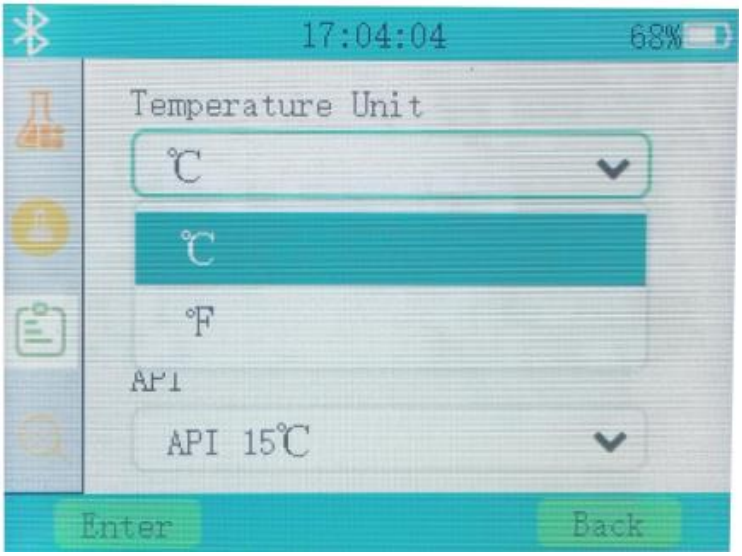


Figure-9

2) Density unit selection: Press "  " to select the density unit, and press "  " to select the density unit, there are three unit's total. After selection, press "  " to complete the density unit selection, as shown in **Figure 10**.

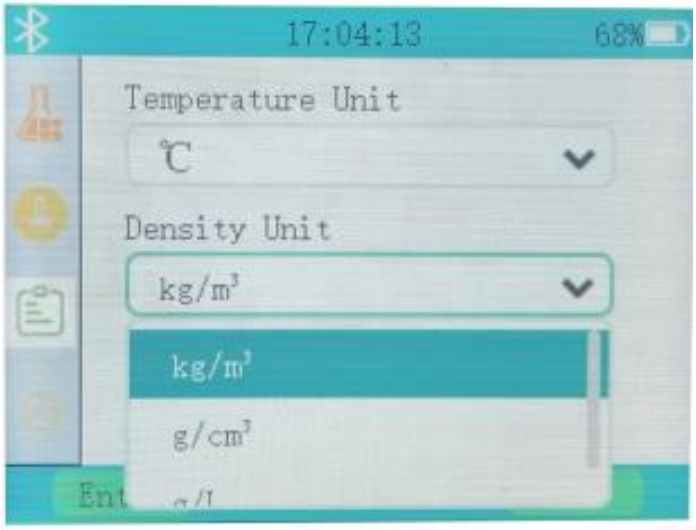


Figure-10

3) Selection of calculation table: Press "  " to select the calculation table, and press "  " to enter the selection interface. There are two types of calculation tables, namely 20 ℃ standard density and 15 ℃ standard density. After selection, press "  " to complete the selection of the calculation table, as shown in **Figure 11.**

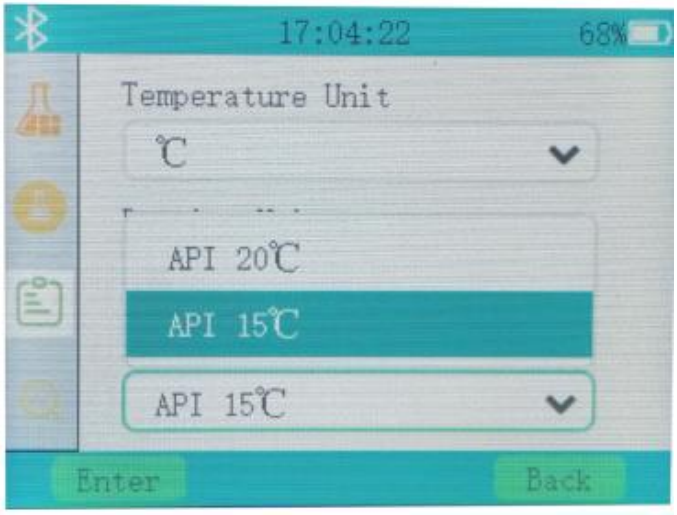


Figure-11

7.1.4 Quick Query Interface

Under the main interface display, press " " to switch to the quick query interface, as shown in **Figure 12.**

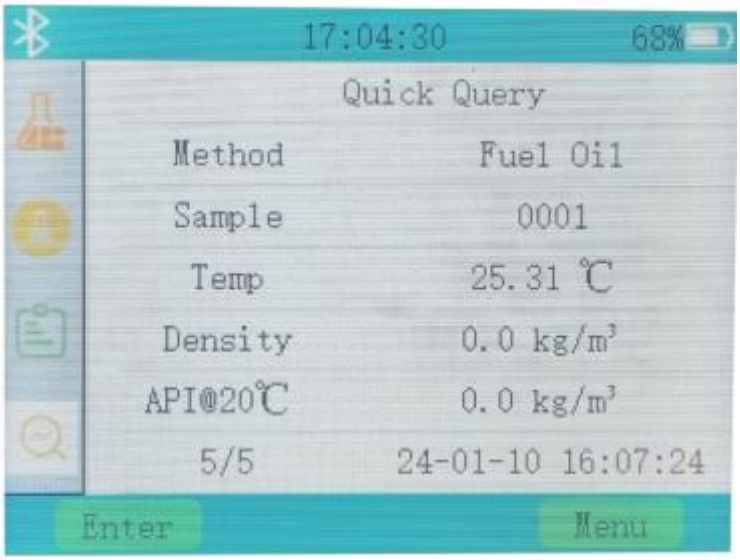


Figure-12

Quick query cannot set filtering criteria. Query from back to front time. Press "  " to enter the page-turning interface. At this time, you can query the saved data by pressing "  ", as shown in **Figure 13.**

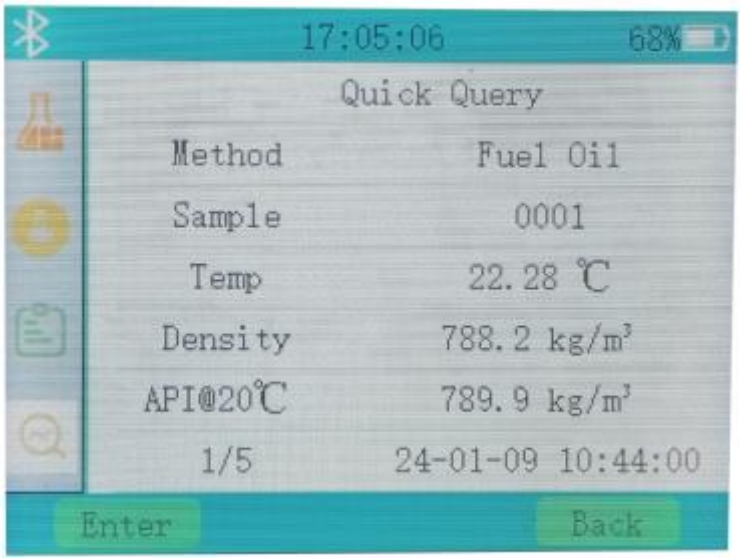


Figure-13

7.2 Setting

Press "" to enter the menu interface. You can select the desired function through "". The selected function is surrounded by a green border. Press "" to enter the corresponding function interface, as shown in **Figure 14.**

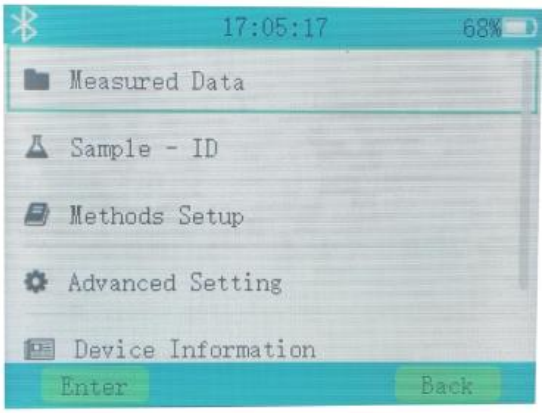


Figure-14

【Measurement data】: Operate on stored data.
【Sample ID】: Set the measurement sample name.
【Method】: Set measurement standards.
【Advanced Settings】: Perform internal settings on the device.
【Device Information】: View device version information and real-time data.
【Battery Information】: View battery information.

7.2.1 Measurements

Select the【 Measurement Data】 option, press "", and the density meter will enter the measurement data interface, as shown in **Figure 15**.

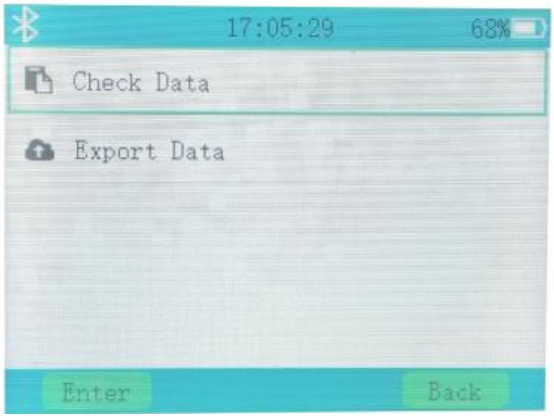


Figure-15

Select "Data Query", and press "↵" to enter the data query interface. Through "∧∨", you can select "Query by Sample" and "Query by Time" to view data through these two methods, as shown in **Figure 16.**

Figure-16

Select "Upload Data", and press "↵" to enter the data query interface. Through "∧∨", you can choose "Upload Latest Data" and "Upload All Data". You can upload data through these two methods, as shown in **Figure 17.**

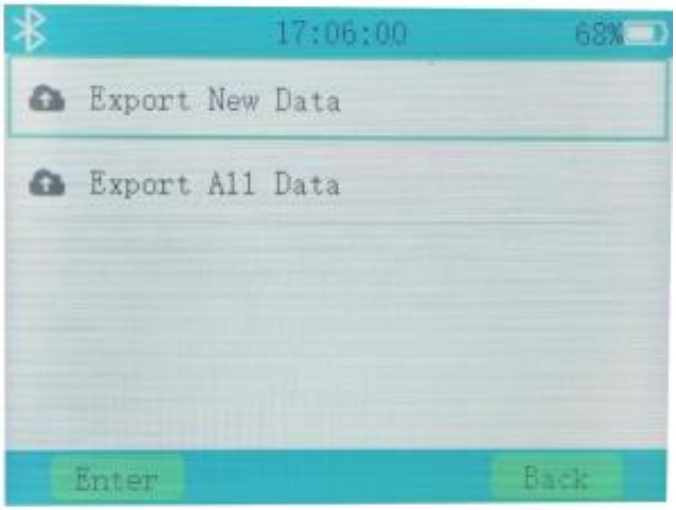


Figure-17

Note:
The latest data is not uploaded, and all data is saved

7.2.2 Sample ID

Select the【Sample ID】option, press "  ", and the density meter will enter the sample ID interface, as shown in **Figure 18.**

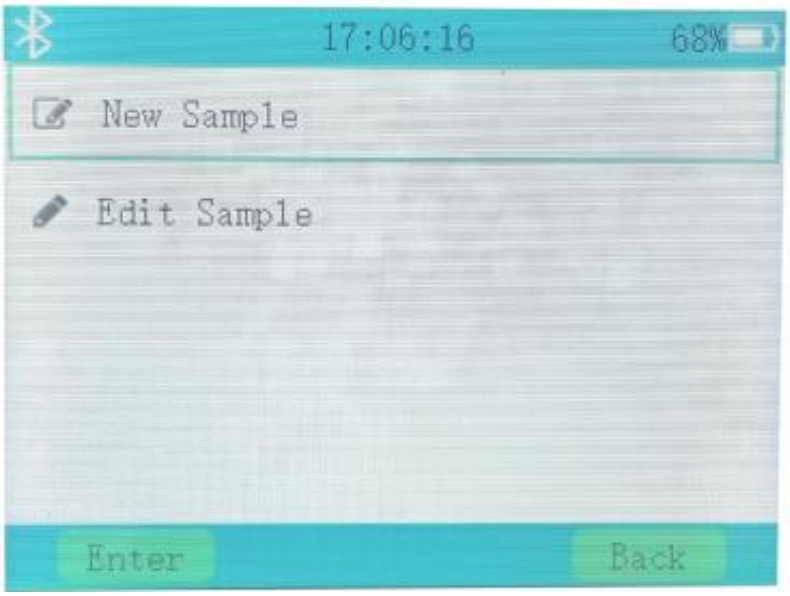


Figure-18

Select "New Sample" and press "  " to enter the new sample interface. You can set the sample name through the floppy disk, as shown **in Figure 19.**

Figure-19

Select "Edit Sample" and press "  " to enter the edit sample interface. You can modify the sample name through a floppy disk, as shown in **Figure 20.**

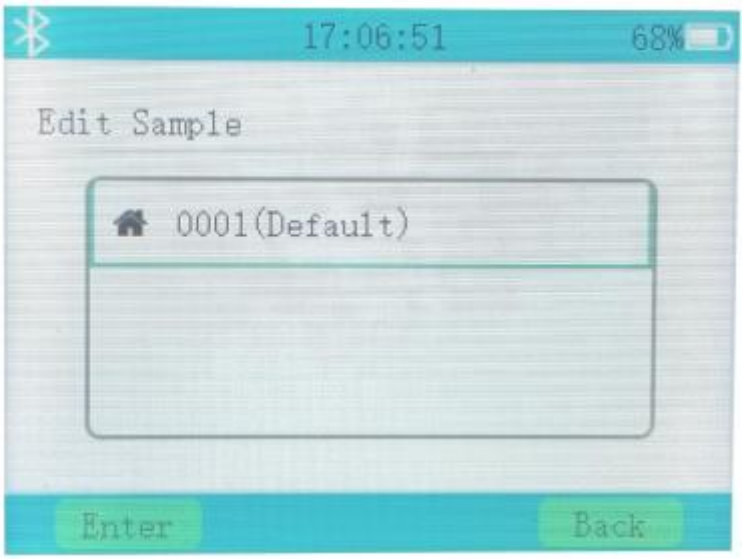


Figure-20

7.2.3 Method

Select the 【Method】 option, press "  " to enter the method setting interface, click "  " to select the measurement standard to be used, and then press "  " to confirm, as shown in **Figure 21.**

Figure-21

7.2.4 Advanced Settings

Select 【Advanced Settings】option, and press " " to enter the Advanced Settings interface, as shown in **Figure 22.**

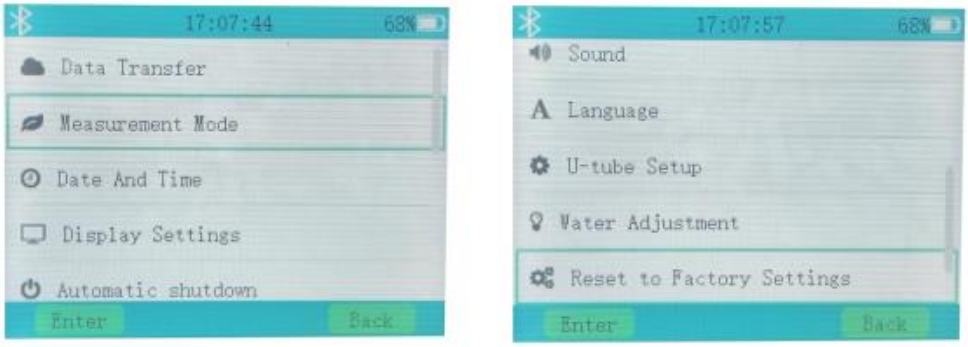


Figure-22

There are multiple settings in the advanced settings, as follows:
【Data Transmission】: Export stored data.
【Measurement mode】: Select different measurement modes.
【Time Setting】: Set the device time.
【Screen Settings】: Set the device screen.
【Auto shutdown】: Adjust the device to automatically shut down.
【Sound】: Adjust the device's sound.
【Measurement pool setting】: Set up the measurement pool.
【Water calibration】: Perform water calibration on the measuring pool.
【Restore Factory Settings】: Restore the device settings before leaving the factory.

7.2.4.1 Data Transmission

Select the【Data Transmission】option, and press " " to enter the interface, as shown in **Figure 23.**

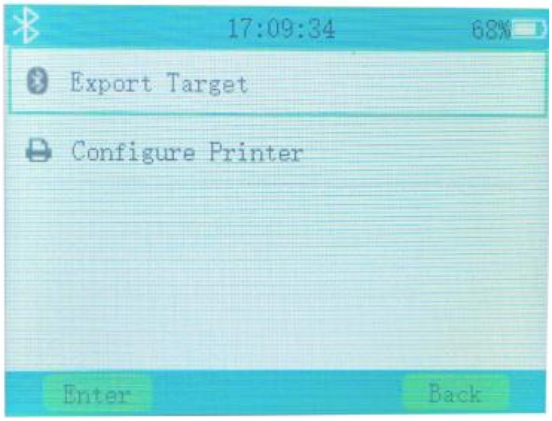


Figure-23

Select "**Export Target**", enter the interface, turn on Bluetooth, and you can connect to a Bluetooth printer.
Select "printer configuration" to enter the interface, where you can select the information to be printed.

7.2.4.2 Measurement Mode

Select the 【Measurement Mode】option, and press "  " to enter the interface.

In the dropdown menu options, press "  " to select different measurement modes: manual mode and automatic mode, as shown in Figure 24.

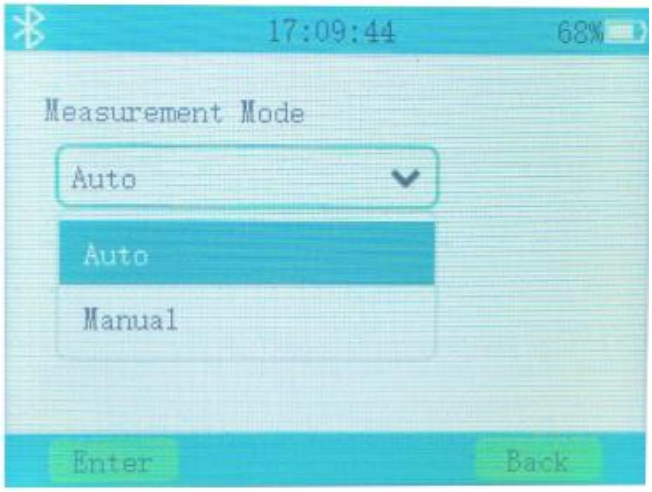


Figure-24

In manual mode, the density meter will not automatically perform stability checks, and users can read the data themselves. In automatic mode, the Density Meter will automatically make a stable judgment, and there will be a corresponding prompt after the measurement is completed, as shown in **Figure 25.**

Figure-25

7.2.4.3 Time Setting

Select the【Time Setting】option, and press "  " to enter the interface, as shown in **Figure 26.**

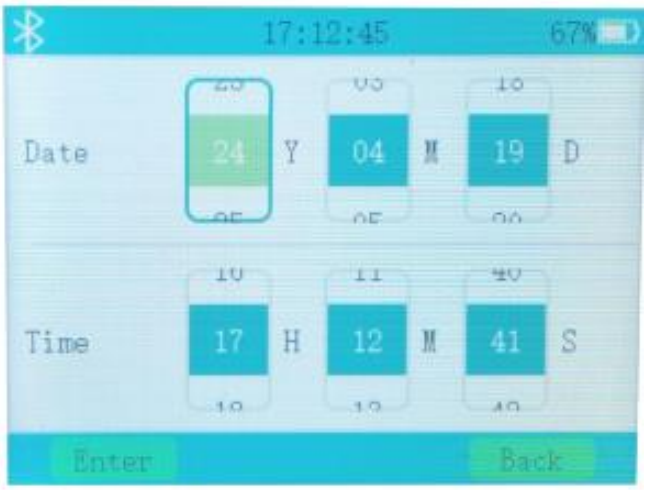


Figure-26

You can adjust the date and time as needed. The time and date have already been adjusted between the factory and do not need to be reset.

7.2.4.4 Screen Setting

Select the 【Screen Settings】 option, and press "  " to enter the interface, as shown in **Figure 27.**

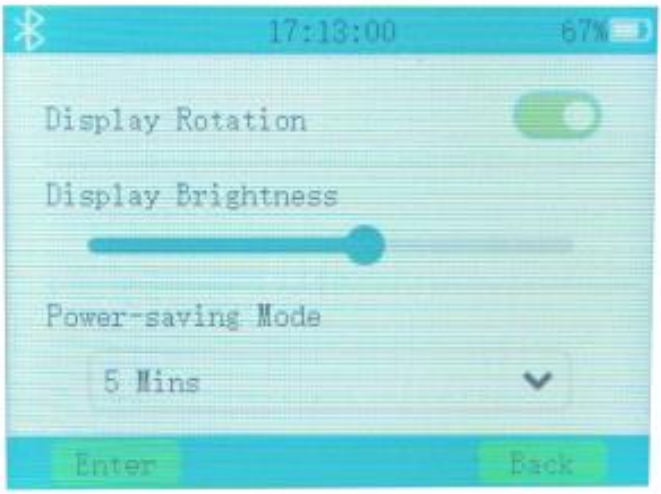


Figure-27

7.2.4.5 Auto Shutdown

Select the 【Auto Shutdown】 option, press "  " to enter the interface, as shown in **Figure 28.**

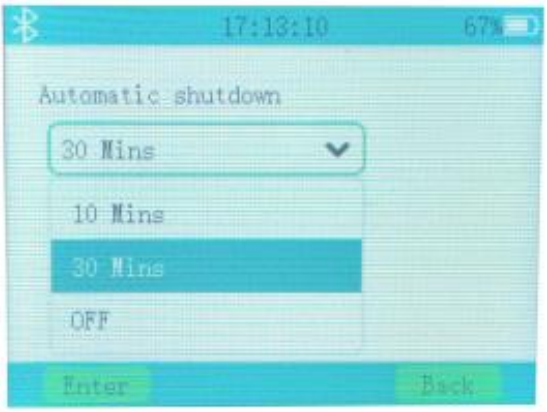


Figure-28

Press "  ", and there will be "10 minutes", "30 minutes", and "close menu" in the drop-down menu. Press "  " to select different automatic shutdown times, and press "  " to set the automatic shutdown.

7.2.4.6 Sound

Select the 【Sound】 option, and press "  " to enter the interface, as shown in **Figure 29.**

Figure-29

Press "  " to choose to turn off the buzzer.

7.2.4.7 Measurement pool setting

Select the 【Measurement Pool Settings】option, press "  " to enter the interface, as shown in **Figure 30.**

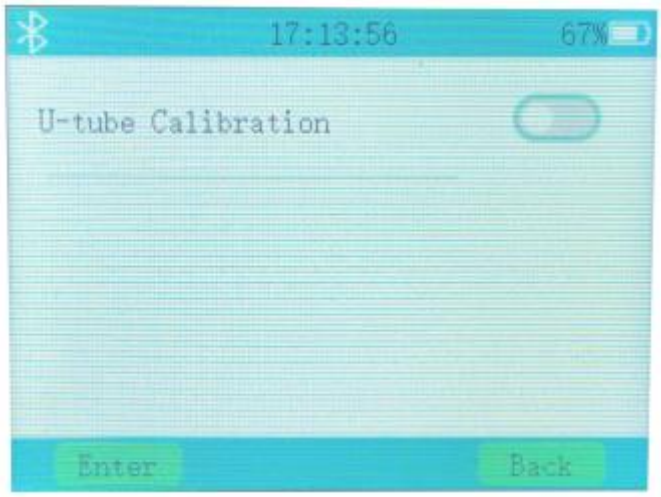
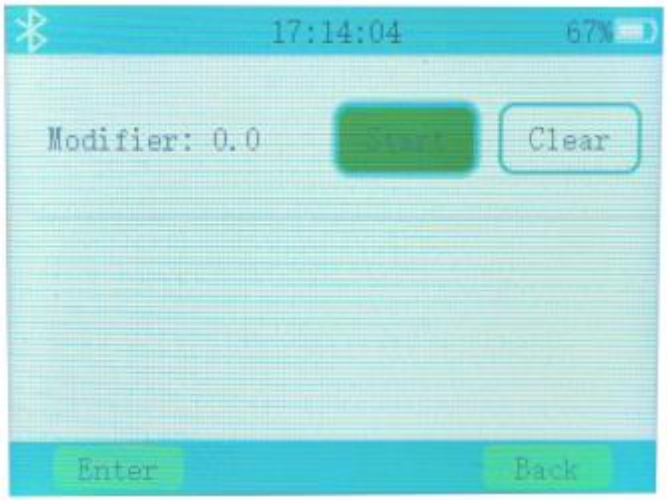


Figure-30

The measurement pool setting function is calibrated by the manufacturer and should not be operated by non-professionals.

7.2.4.8 Water Calibration

Select the【Water Calibration】option, and press "  " to enter the interface, as shown in **Figure 31**.



Through the water calibration mode, users can calibrate the instrument themselves to ensure accuracy.

7.2.4.9 Restore Factory Settings

Select the 【 Restore Factory Settings 】 option, and press "  " to enter the interface, as shown in **Figure 32**.

Figure-32

Restoring factory settings requires a password to be used, and users cannot operate it on their own.

7.2.5 Device Information

Select the【Device Information】option, and press "  " to enter the device information interface, which has two submenus: "System Information" and "Real-time Raw Data". By selecting these two submenus, you can view the device's version information and current internal data, as shown in **Figure 33**.

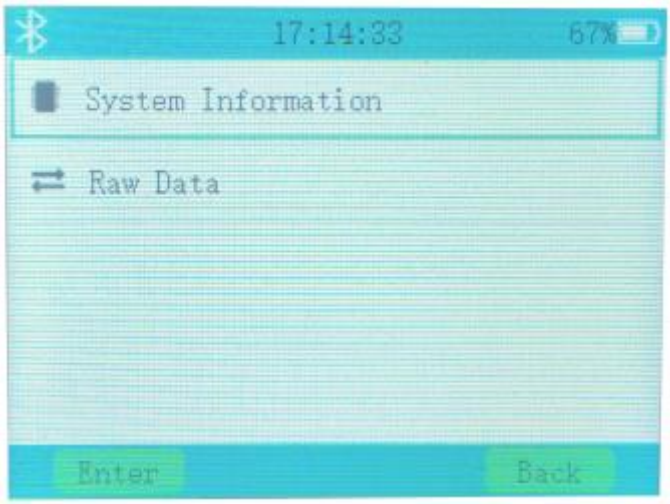


Figure-33

7.2.6 Battery Information

Select the【Battery Information】option, and press "  " to enter the battery information interface, where you can view battery-related information, as shown in **Figure 34.**

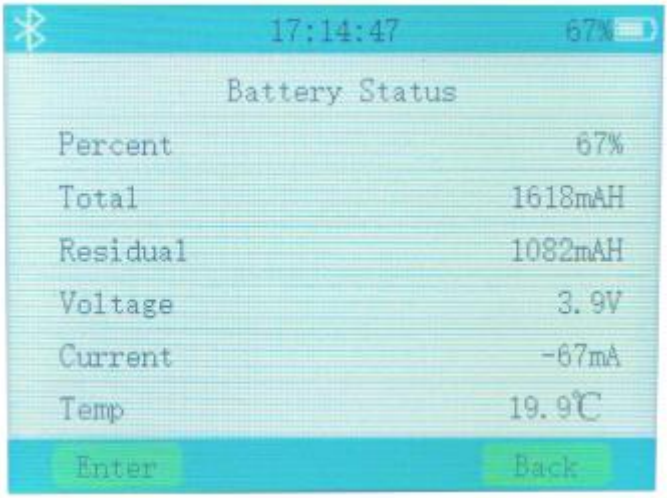

17:14:47
67%
Battery Status
Percent 67%
Total 1618mAH
Residual 1082mAH
Voltage 3.9V
Current -67mA
Temp 19.9℃
Enter
Back

Figure-34

8. Operations

8.1 Preparation

- Take out the instrument, check the appearance, and press the piston to confirm it can work normally.
- Long press “  ”key to turn on the instrument, check whether the temperature display on the interface is normal and observe through the window whether there is foreign matter in the U-tube sensor and whether it is dirty. If there is foreign matter or dirt, it needs to be cleaned before measurement.
- Check whether the power is sufficient. If the density meter shows insufficient power, Kindly charge it in time.
- When charging, kindly plug the USB connector of the data cable into the charger and connect the magnetic charging head to the charging port of the density. meter, and then plug the charger into the 220V (50Hz) power socket. If the magnetic charging head is in good contact with the charging port, the power status will be displayed on the display screen, and the charging process is shown in **Figure 35**. Generally, the charging time is about 3~4 hours. After charging is completed, kindly unplug the charger from the density meter and the power socket for storage.

Figure-35

Note:

1) When low battery, Kindly charge it in time to avoid affecting normal use.
2) If it has not been used for more than one month, it needs to be charged for 4-6 hours.
3) When the magnetic charging head meets the charging port, the charging screen "" appears, indicating that charging is normal. Otherwise, you need to re-plug the magnetic charging head until the charging screen "" appears.

Warning

- The density meter must be charged in a safe place.
- A special charger for the density meter must be used for charging.

8.2 Measurement Mode

Density measurement is divided into four steps, namely Turning on, aspirating liquid, Measuring, and Draining liquid.

1) Turn on: Long press the ""key to turn on the device and press the" "key to select the corresponding measurement method and sample number or name. You can measure directly if you do not need to select, as shown in **Figure 36**.

Figure-36

2) Aspirating liquid: Press the piston, press it down as much as possible, insert the sampling tube into the liquid to be measured, slowly lift the piston, and suck the liquid to be measured into the measuring cell. as shown in **Figure 37**.

Figure-37

3) **Measuring:** Wait for the measurement data to be stable (judge yourself in manual mode, the screen progress bar turns green in automatic mode), indicating the measurement is completed. The device can be read vertically or placed flat for reading, as shown in **Figure 38.**

Figure-38

4) **Draining liquid:** Insert the sampling tube into the waste liquid bottle, press the piston to drain the liquid, and press it several times to ensure complete drainage.

Note:

- Make sure there are no bubbles in the measuring cell. If bubbles exist, multiple samples must be taken to ensure that the bubbles disappear.
- If you cannot ensure that the measuring cell is clean, you can take samples three times in a row to ensure that the liquid in the measuring cell is free of contamination.
- Kindly be sure to fill the measuring cell.
- Kindly ensure the sample temperature does not differ too much from room temperature. If the difference is too large (more than 15°C), the measurement stabilization time will be very long.
- If the temperature of the measured sample exceeds the temperature range (0-55°C), the alarm "T-ERR" will appear on the display.
- Kindly clean the measuring cell after each measurement to avoid leaving residues in the measuring cell.
- Kindly use the appropriate solvent to clean the measuring cell. (ethanol, solvent gasoline).

8.3 Data Storage

After the data is stable, the data can be read directly or the data can be stored, press "  "key to save the data directly. After saving, "Save Complete" will be displayed on the interface. The maximum number of data stored is 5000 groups, as shown in **Figure 39**.

Figure-39

8.4 Query

After saving the data, if you need to query the data, you can choose two query modes:

1) Quick Query
2) Regular Query

Regular query, that is query by sample and time.

Note:

Query interface 5/5 indicates that there are a total of 5 data stored, currently the 5th one.

8.5 Data Transmission

If you need to upload the density meter storage data to the computer client, first install the "DSM Density Meter Data Management Terminal" on the computer. After installation, a "  " shortcut will be automatically generated on the computer desktop, as shown in **Figure 40**.

Figure-40

Additionally, connect the wireless module to the computer, as shown in **Figure 41.**

Figure-41

After installation is completed, double-click the shortcut on the computer desktop, and the bottom left corner of the computer interface shows that COM has been successfully opened, as shown in **Figure 42**.

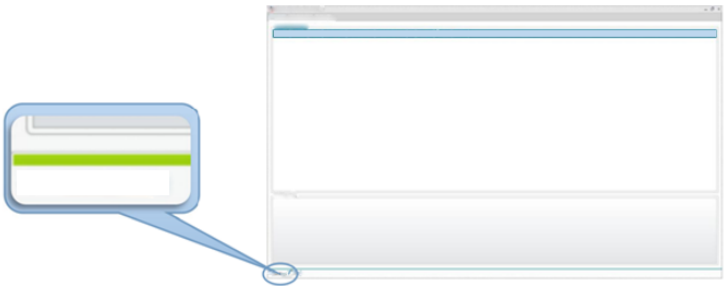


Figure-42

Note: The COM serial port may vary due to different computer settings, such as COM1, and COM2.
The data uploaded to the computer can be queried, exported, and other operations.

8.6 Operation Completed

After use, clean the measuring cell, then long press "  " to turn off the density meter. After drying, put the density meter into the instrument box.
Note: You can use detergent (anhydrous ethanol, gasoline) to clean the measuring cell. During cleaning, continue to inhale and discharge the cleaning agent until the sensor is clean.

8.7 Water Calibration

To ensure accurate measurement, the instrument needs to be calibrated regularly to ensure that the measurement accuracy of the instrument is not affected. Generally, we can use deionized water for instrument calibration. The specific steps are as follows:

1) Kindly follow the process in 9.1.1 to clean the measuring cell.
2) After powering on, press "  " to enter the menu interface, select 【Advanced Settings】, and enter the water calibration interface.

3) Use an instrument to inhale deionized water to avoid bubbles. The temperature of the deionized water must be between 15°C and 25°C and the ambient temperature must also be controlled between 15°C and 25°C.

4) Select Start Calibration, press "  ", and the device will start water calibration. The entire water calibration process is in automatic mode and no additional operations are required, as shown in **Figure 43.**

Figure-43

5) After the water calibration is completed, the device will display the calibration value, as shown in **Figure 44.**

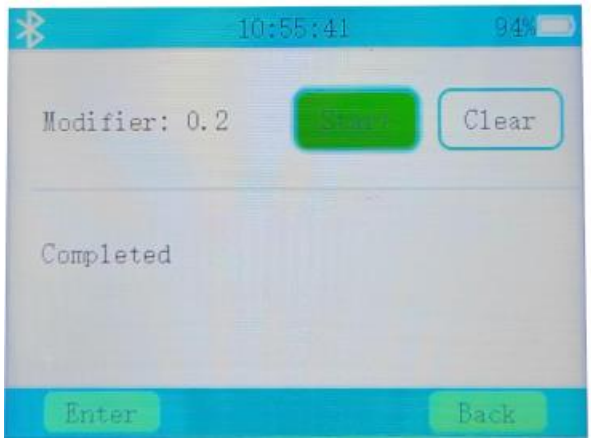


Figure-44

6) If you need to remove the calibration value, you can choose to reset the calibration and press "  " to remove the calibration Value.

Note: During the calibration process, if "Calibration failed: Density ER2-1" appears, means that there are bubbles in the measuring cell, or it has not been cleaned.

During the calibration process, if "Calibration failed: Temperature ER1-1" or "Calibration failed: Temperature ER1-2" appears, it means that the liquid temperature in the measuring cell exceeds the set range.

9. Maintenance

9.1 Cleaning

Instrument cleaning can be divided into measuring cell module cleaning, piston cleaning, and shell and display cleaning.

9.1.1 Measuring Cell Module Cleaning

To ensure the long-term accuracy of measurement results, kindly clean the measurement cell module with a suitable solvent before and after each measurement. If the measurement cell is not thoroughly cleaned, waste liquid and residue may accumulate in the measurement cell and affect the accuracy of the measurement results. Depending on the application, cleaning may be required between each measurement.

1) The cleaning steps are as follows:
2) Place the injection tube into a suitable container for the sample waste liquid.
3) Press the piston to empty the measuring cell.
4) Fill the measuring cell with a suitable solvent.
5) Press the piston multiple times to allow the solvent to circulate multiple times in the measuring cell.
6) Press the piston to empty the measuring cell.
7) Let it sit for 10 minutes to dry the measuring cell.

9.1.2 Piston Cleaning

When measuring some liquids with relatively high viscosity or impurities, some impurities and liquids will remain inside the piston and cannot be discharged. At this time, in order not to contaminate other measurement liquids, the piston needs to be cleaned. The cleaning steps are as follows:

1) Pull the piston button outward, pull-out part of it, and then rotate it 45° counterclockwise to pull out the piston, as shown in **Figure 45**.

Figure-45

2) Pull out the upper part of the piston, put it into the cleaning agent, and clean it with a brush, as shown in **Figure 46.**

Figure-46

3) Wipe all parts clean and assemble and reset.
4) Install and reset the piston. The installation method is shown in **Figure 47.**

Figure-47

9.1.3 Housing and Displaying Cleaning

Use a soft cloth dampened with a little water or alcohol to clean the case and display.

9.2 Instrument Storage

Kindly clean the measuring cell module as described in 9.1.1 before storing the instrument for a long period. This prevents waste liquids from condensing in the measuring cell, which could cause inaccurate measurements in the measuring cell.

10. Appendix

Appendix 1 Water Density

T °C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	.99984	.99985	.99985	.99986	.99987	.99987	.99988	.99988	.99989	.99989
1	.99990	.99990	.99991	.99991	.99992	.99992	.99993	.99993	.99993	.99994
2	.99994	.99994	.99995	.99995	.99995	.99995	.99996	.99996	.99996	.99996
3	.99996	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997
4	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997
5	.99996	.99996	.99996	.99996	.99996	.99995	.99995	.99995	.99995	.99994
6	.99994	.99994	.99993	.99993	.99993	.99992	.99992	.99991	.99991	.99991
7	.99990	.99990	.99989	.99989	.99988	.99988	.99987	.99987	.99986	.99985
8	.99985	.99984	.99984	.99983	.99982	.99982	.99981	.99980	.99980	.99979
9	.99978	.99977	.99977	.99976	.99975	.99974	.99973	.99973	.99972	.99971
10	.99970	.99969	.99968	.99967	.99966	.99965	.99964	.99963	.99962	.99961
11	.99960	.99959	.99958	.99957	.99956	.99955	.99954	.99953	.99952	.99951
12	.99950	.99949	.99947	.99946	.99945	.99944	.99943	.99941	.99940	.99939
13	.99938	.99936	.99935	.99934	.99933	.99931	.99930	.99929	.99927	.99926
14	.99924	.99923	.99922	.99920	.99919	.99917	.99916	.99914	.99913	.99911
15	.99910	.99908	.99907	.99905	.99904	.99902	.99901	.99899	.99897	.99896
16	.99894	.99893	.99891	.99889	.99888	.99886	.99884	.99883	.99881	.99879
17	.99877	.99876	.99874	.99872	.99870	.99869	.99867	.99865	.99863	.99861
18	.99859	.99858	.99856	.99854	.99852	.99850	.99848	.99846	.99844	.99842
19	.99840	.99838	.99836	.99835	.99833	.99831	.99828	.99826	.99824	.99822
20	.99820	.99818	.99816	.99814	.99812	.99810	.99808	.99806	.99803	.99801
21	.99799	.99797	.99795	.99793	.99790	.99788	.99786	.99784	.99781	.99779
22	.99777	.99775	.99772	.99770	.99768	.99765	.99763	.99761	.99758	.99756
23	.99754	.99751	.99749	.99747	.99744	.99742	.99739	.99737	.99734	.99732
24	.99730	.99727	.99725	.99722	.99720	.99717	.99715	.99712	.99709	.99707
25	.99704	.99702	.99699	.99697	.99694	.99691	.99689	.99686	.99683	.99681
26	.99678	.99676	.99673	.99670	.99667	.99665	.99662	.99659	.99657	.99654
27	.99651	.99648	.99646	.99643	.99640	.99637	.99634	.99632	.99629	.99626
28	.99623	.99620	.99617	.99615	.99612	.99609	.99606	.99603	.99600	.99597
29	.99594	.99591	.99588	.99585	.99582	.99579	.99577	.99574	.99571	.99568
30	.99564	.99561	.99558	.99555	.99552	.99549	.99546	.99543	.99540	.99537
31	.99534	.99531	.99528	.99524	.99521	.99518	.99515	.99512	.99509	.99506
32	.99502	.99499	.99496	.99493	.99490	.99486	.99483	.99480	.99477	.99473
33	.99470	.99467	.99463	.99460	.99457	.99454	.99450	.99447	.99444	.99440
34	.99437	.99433	.99430	.99427	.99423	.99420	.99417	.99413	.99410	.99406
35	.99403	.99399	.99396	.99393	.99389	.99386	.99382	.99379	.99375	.99372
36	.99368	.99365	.99361	.99358	.99354	.99350	.99347	.99343	.99340	.99336
37	.99333	.99329	.99325	.99322	.99318	.99314	.99311	.99307	.99304	.99300
38	.99296	.99292	.99289	.99285	.99281	.99278	.99274	.99270	.99267	.99263
39	.99259	.99255	.99252	.99248	.99244	.99240	.99236	.99233	.99229	.99225
40	.99221	.99217	.99214	.99210	.99206	.99202	.99198	.99194	.99190	.99186