



USER MANUAL

Automated Distillation Tester LB-11ADT

Index

Sr.no	Title	Page no
1.	Safety Measures	2
2.	Introduction	3
3.	Features	3
4.	Specifications	3
5.	Instrument Introduction	4
6.	Operations	6
7.	Accessories	16
8.	Appendix	17

1. Safety Measures

- To ensure safety, ground the instrument well before usage; check the earth terminal regularly.
- Do not store or operate the instrument in a wet and corrosive environment; wrap it for long-term storage to prevent the entry of dust.
- Any test sample at the surface of the instrument shall be wiped off as soon as possible with a warm cloth. Pay special attention to the electric control parts to avoid the entry of water.
- Put the box at a level position in the room.
- Avoid sticking of oil at the bottom of the flask. Wipe with a cloth if any, otherwise, it may cause a fire.
- This device is calibrated before ex-factory. Do not touch optical and other precision equipment during operation.
- Set accurate parameters; otherwise, the test results may be false.
- Do not start the refrigeration equipment continuously. Wait for 10 minutes or more before restarting.
- The bath must be filled with medium before powering on to avoid damaging the heater.
- For long-term storage of the instrument, extract all liquid in the bath using a pump. Wipe the equipment with a cloth to avoid effect on the lifetime of the instrument caused by the medium. Fill the bath with medium before the next usage.
- For safety, the rear port can be connected to a nitrogen or carbon dioxide source. For equipment without an automatic extinguisher, in case of a fire, turn off the main power switch, and then press the red Fire button on the front panel; the gas flow will be jetted to fight the fire.
- In case of any faults during the usage of the instrument, do not dismantle it freely. Have it done by Maintenance staff.
- The instrument is tested before shipment and qualified.

2. Introduction

Automated Distillation Tester LB-11ADT operates within a steam temperature range of 0 to 400°C and an oven temperature range of 0 to 500°C. It has a controlled heating system that maintains a flow rate of 95 for uniform heating. Our unit includes a mechanical refrigeration system with a compressor. Users can monitor the distillation process in real-time on a 10-inch touchscreen LCD, improving usability.

3. Features

- Provides initial and final boiling point temperatures
- Automatic atmospheric pressure compensation
- Utilizes a high-stepping linear motor for precise tracking
- Stores, queries, and prints test results
- Automatic shutdown mechanism

4. Specifications

Model No.	LB-11ADT
Steam Temperature Range	0 to 400°C
Oven Temperature Range	0 to 500°C
Refrigeration Temperature Range	0 to 60°C
Refrigeration Accuracy	± 1°C
Temperature Measurement Accuracy	± 0.1°C
Volume Measurement Accuracy	± 0.1 ml
Heating Power	2 kW
Cooling Power	0.5 kW
Power supply	AC 220V ±10%, 50 Hz
Box 01 Dimensions	410 × 280 × 270 mm
Box 02 Dimensions	660 × 590 × 750 mm
Box 01 Weight	6 kg
Box 02 Weight	66 kg

5. Instrument Introduction

5.1 Instrument Structure

The automatic temperature control system for the bath or distillation, the refrigeration system, the automatic level tracking system, the security system, and other parts make up this simulated distillation apparatus. To improve intelligent and automatic measuring, the instrument uses multi-thread operation and control to accomplish automated operation, control, computation, and display. The fuzzy temperature control principle is used by this device. To precisely regulate the temperature of the condenser and receiver chamber, refrigeration equipment uses a freon compressor. For accurate steam temperature measurement, the temperature measurement apparatus uses high-precision heat resistance. With an accuracy of 0.1 ml, this device uses an imported high-precision level tracking technology to measure distillation volume precisely.

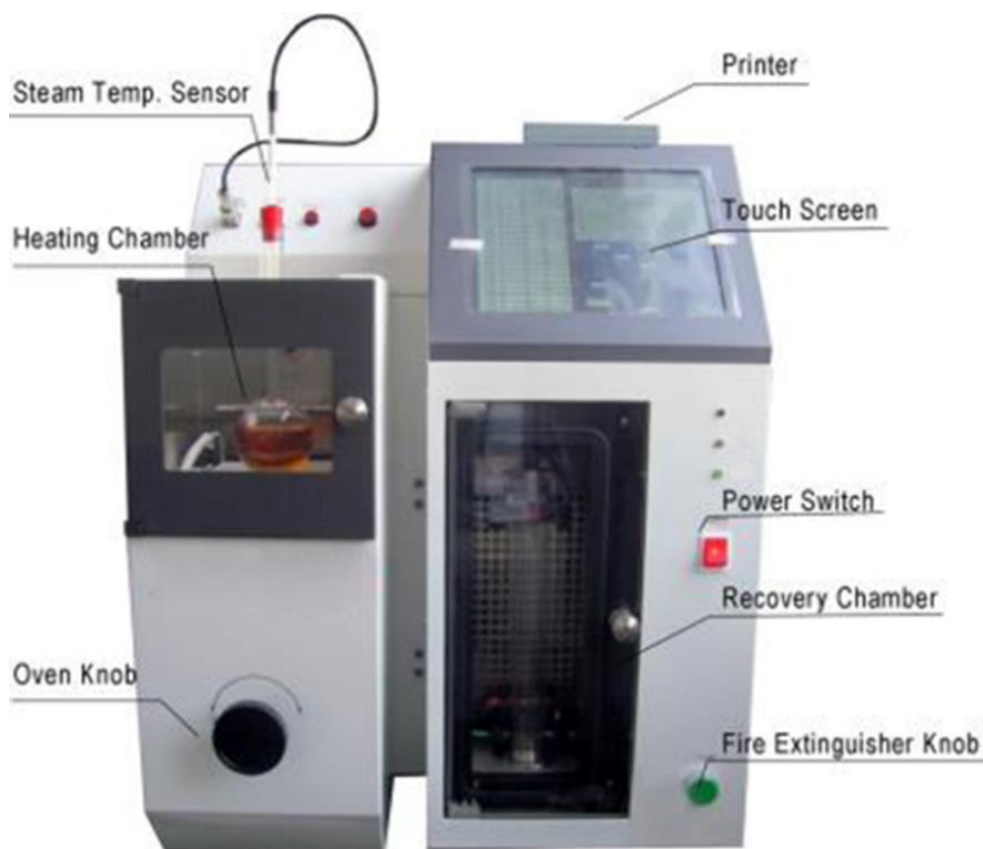


Figure-1

The device uses a true-color touch screen to enable human-machine interaction and lets users adjust parameters using the touch screen. This makes it possible to track temperature-volume curves, record critical temperatures, store 256 groups of test data, access past data for different oils, and monitor operating parameters in real time.

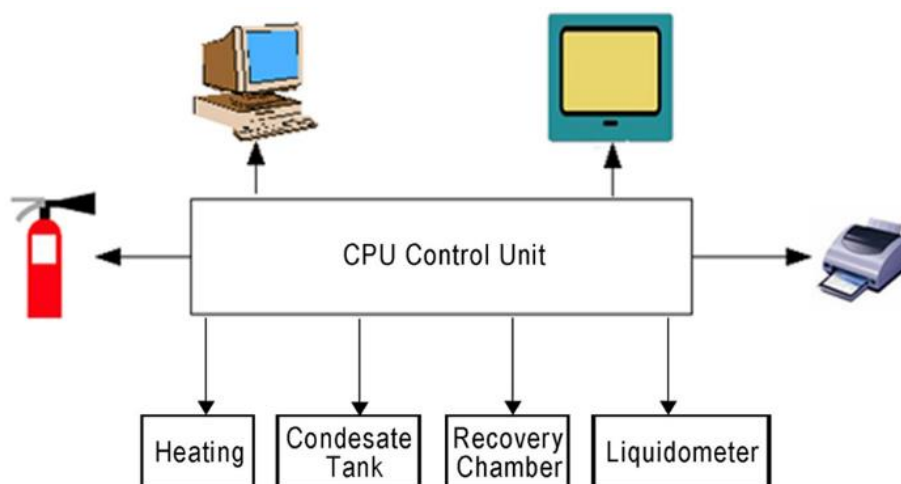


Figure-2

The automated pressure calibration can be turned on or off by the user. A highly accurate air pressure measuring instrument is integrated into the system. The instrument also has auxiliary equipment, a fire extinguisher, temperature, pressure, and level tracking devices for automated monitoring. The technology would automatically advise users to take immediate action to avert accidents in the event of a malfunction.

5.2 Working Conditions

Indoor working environment:

- 1) Temperature: 10-38°C (recommended 10-28°C)
- 2) Humidity: $\leq 70\%$.

6. Operations

6.1 Operation Steps

- 1) Count the spare parts after unpacking.
- 2) Handle the instrument vertically. The swing angle to the height shall not exceed 30 degrees. Install the instrument in a ventilated dark place at 0.2 m or above from the wall. Place the instrument evenly to reduce vibration and noise.
- 3) Check the antifreeze that was added before ex-factory.
- 4) Connect the power of the instrument to a power outlet with a capacity of 220V/15A or above. Ground reliably.
- 5) Get a 100ml sample using a measuring cylinder. Pour all samples in the measuring cylinder into the distillation flask. No liquid shall flow into the branch tube of the distillation flask.
- 6) Insert the steam temperature sensor into the distillation flask vertically. The lowest part of the sensor shall be 10mm lower than the lowest part of the bottom of the inner wall of the branch tube of the distillation flask.
- 7) Insert the branch tube of the distillation flask into the condenser for 25 mm~50mm, so that the rubber plug of the branch tube is connected to the condenser tightly. Turn the knob of the lift to adjust the height of the oven. Adjust the quartz glass partition so that the oven is aligned with the bottom center of the distillation flask.
- 8) Hang the drainage sheet on the cylinder wall, and then put the cylinder into the recovery chamber. Rotate the cylinder so that the drainage sheet is not in the initial boiling point light path. Turn off the door of the recovery chamber.
- 9) Check if every part is ready. Turn on the main power. Set distillation parameters as prompted on the touch screen.
- 10) Turn off the power switch after the test ends.

6.2 Instruction of the touch screen

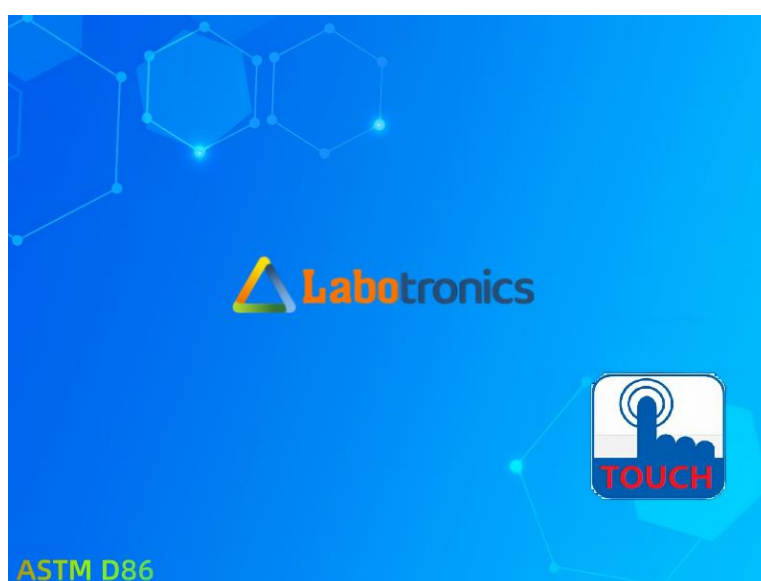


Figure-1

6.2.1 Booting

Click **"CLICK HERE"** to enter the next screen.



Figure-2

6.2.2 Precautions

Click **"OK"** to enter the next screen.



Figure-3

6.2.3 Selection of oil

Select the proper type of oil; otherwise, abnormal test results will occur.

Supported oil: Diesel, gasoline, kerosene, methanol, benzene, solvent oil, and custom oil products. For an unknown type of oil and custom oil products, estimate the initial boiling point before work and set it in the system.

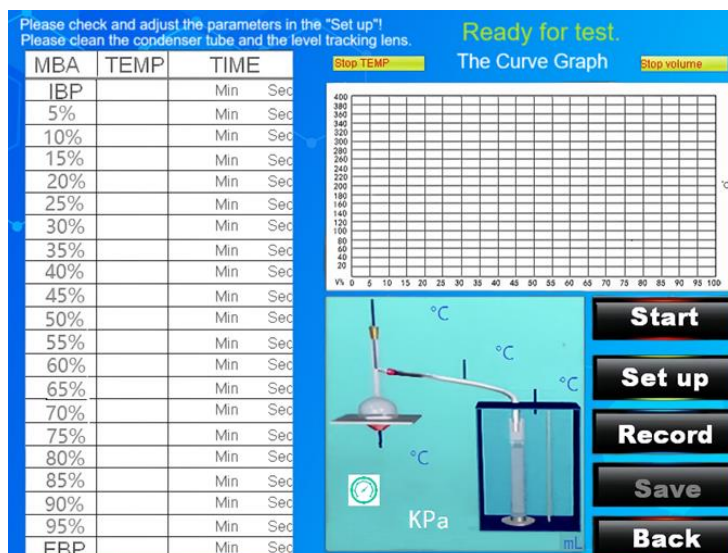


Figure-4

6.2.4 Monitoring of Test

- 1) Click **Start**, and the system will start to work at pre-set parameters.
- 2) Click **Set** to enter the Set screen for setting test parameters.
- 3) Click **History** to enter the History Query screen for querying the history sample data.
- 4) Click **Back** to exit the screen automatically and return to Step 2.
- 5) The Store button is gray, which means that it is invalid in its current state.
- 6) The temperature of various critical volume points during distillation is displayed in the lower left area of the screen.
- 7) The temperature-volume curve during heating is displayed at the top, whereas the x-axis represents the volume, and the y-axis represents the temperature.
- 8) Real-time values of the parameters during the heating are displayed in the middle and lower areas, including the atmospheric pressure, heating temperature, temperature of steam in the distillation flask, refrigeration tube temperature, recovery chamber temperature, and recovery volume.

NOTE: Before clicking **Start**, make sure that all test parameters are set correctly; otherwise, once the test begins, you cannot modify the parameters. If you click the Stop button during testing, the test will end in advance; this test is unsuccessful, and all data is invalid. Click **Back** to perform the test again.

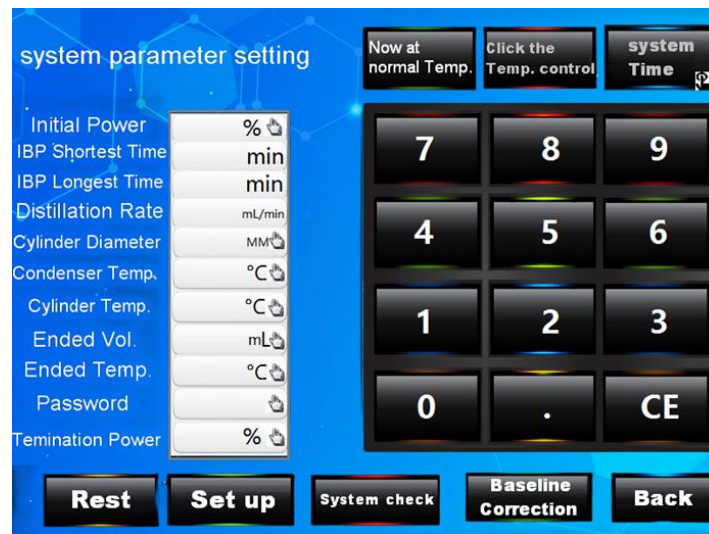


Figure-5

6.2.5 Setting of parameters

- 1) Click the hand-shape region to set parameters. At most one decimal place can be input. After choosing a parameter, click **Set** to determine the parameter. The parameters are automatically saved after modification. CE is the backspace key.
- 2) Click **Reset**, and all parameters will restore to the initial value before the last setting.
- 3) The special measuring column is designed for debugging. Click it to enter the special password area. The operator shall not click this column. In case of wrong operation, click the Back button.
- 4) Click **Self-test** to enter the self-test screen to test all parts of the system, and ensure that all parts can work properly. On the 1st of each month, the system will automatically prompt the user for a self-test. The user can also set it manually at each operation for self-testing.
- 5) Before delivery of the equipment, the default diameter of the cylinder is calibrated to 26.3mm. As cylinders of other diameters are used, set the diameter of the cylinder accurately to three decimal places.
- 6) Click **Back** to return to the test monitoring screen.
- 7) Click the **Temperature Control** button, and the system will work based on the set temperature. Click **Room Temperature**, the system will default to work under the current temperature, and the setting is invalid. To avoid frequent start of the temperature control system, only as the difference between the setting and the current temperature exceeds 3°C, can the temperature control system start.
- 8) Click the **clock** icon in the upper right corner to enter the time setting screen.
- 9) All settings have a range. Any entry outside the range will be ignored automatically by the system.

Automated Distillation Tester LB-11ADT

For example, the current condenser temperature is 15°C. As the user enters 30°C, select the Temperature Control option, and the temperature control system will start to heat and hold after the temperature reaches the setting. As the user enters 2°C, select the Temperature Control option. Now, refrigeration is required. But the compressor of the refrigeration system cannot start frequently, so the temperature control system will still not work after setting. Now, click the **Back** button and confirm that the setting is complete. Click the **Start** button to start the refrigeration system.

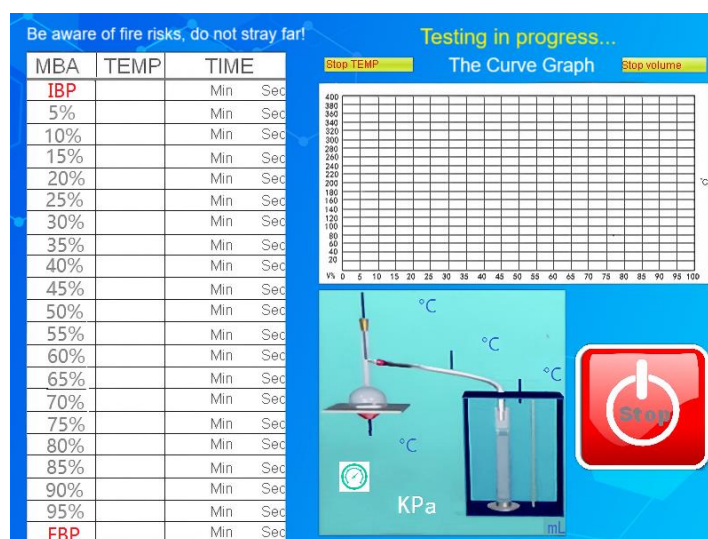


Figure-6

6.2.6 Test Starts

Click **Stop** to quit the test in case of emergency. This button is invalid as it is gray.

Note: After the test starts and in normal state, the system will conduct distillation at the set parameters in order; only when the temperature of the refrigeration tube, the temperature of the recovery chamber meet the requirements, and the oven temperature is below 40°C, can the test starts, otherwise, the system will automatically adjust the temperature, and the oven will not heat during this process.

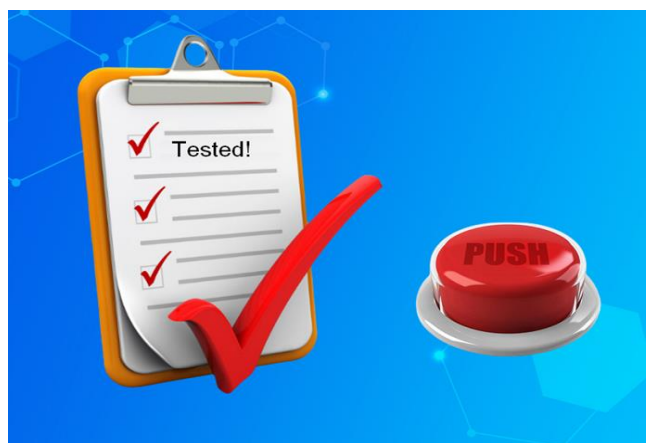


Figure-7

6.2.7 Distillation Completed

After distillation final boiling point occurs, and the distillation process ends. The system automatically stops heating. The temperature of the condenser and receiver chamber remains at the original settings. Current critical data is saved and displayed on the screen, giving a voice signal. Click **OK** to enter the next screen.

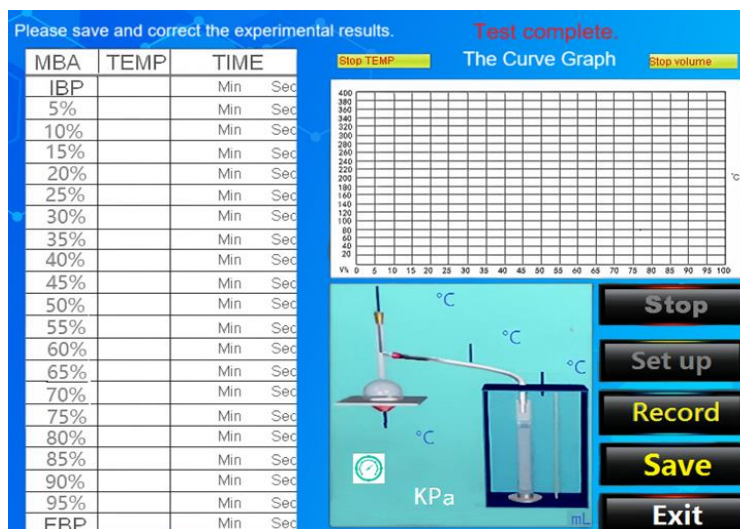


Figure-8

6.2.8 Distillation Selection Completed

- 1) Click **Store**, and the system will automatically save the current parameters and print all test data.
- 2) Click **Back**, and the system will continue to the next test.

NOTE: After the test ends, click the **Save** button to save the data. The system can save 256 groups of final test data. After the number of tests is greater than 256, the system will automatically overwrite the oldest data.

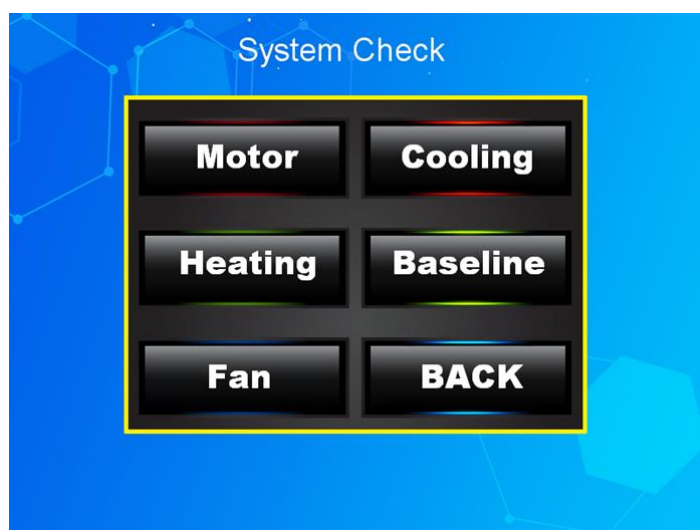


Figure-9

6.2.9 Self-test

- 1) During self-testing, the level tracking device can move up and down under control. Do not run the tracking motor to the top or bottom of the recovery chamber.
- 2) The self-test of refrigeration equipment takes 5 minutes.
- 3) During the self-test of the heater, the oven will heat for 20s.
- 4) During the calibration self-test, the thermometer and the pressure of steam can be calibrated. Be careful.
- 5) During the self-test of the auxiliary system, the fan will work and give an alarm.
- 6) On the 1st of each month, the equipment will automatically prompt for a self-test.

NOTE: It is not recommended for frequent self-testing of refrigeration equipment. A new entry is possible during self-test.

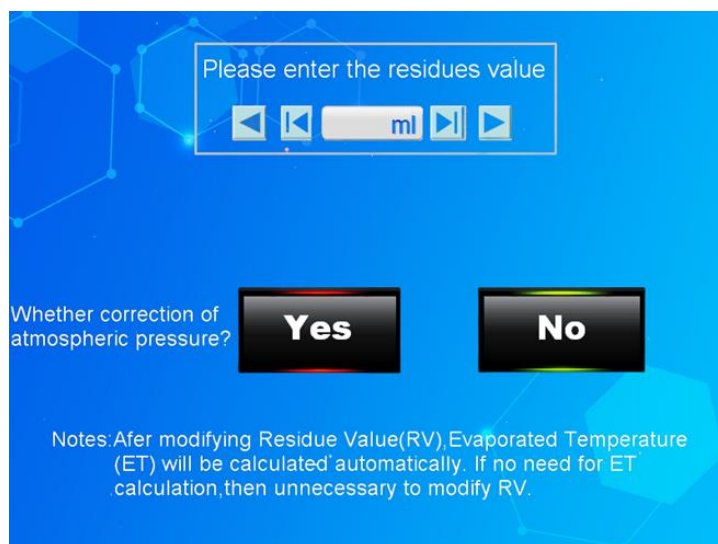


Figure-10

6.2.10 Correct based on atmospheric pressure or not

To select the correction of atmospheric pressure or not. To correct the temperature measurement based on the atmospheric pressure, click the check mark, then the system will automatically correct and store the data, which can be printed through a printer. After returning to the main monitoring screen, all data is the corrected one.

Record Data **BACK**

Tester: _____	Oil NO.: _____	Test Time: _____	BARO: _____
IBP: _____ °C	_____ M S	Ambient TMP: _____ °C	Correction: _____
5% _____ °C	_____ M S	55% _____ °C	_____ M S
10% _____ °C	_____ M S	60% _____ °C	_____ M S
15% _____ °C	_____ M S	65% _____ °C	_____ M S
20% _____ °C	_____ M S	70% _____ °C	_____ M S
25% _____ °C	_____ M S	75% _____ °C	_____ M S
30% _____ °C	_____ M S	80% _____ °C	_____ M S
35% _____ °C	_____ M S	85% _____ °C	_____ M S
40% _____ °C	_____ M S	90% _____ °C	_____ M S
45% _____ °C	_____ M S	95% _____ °C	_____ M S
50% _____ °C	_____ M S		
FBP: _____ °C	_____ M S	Dry Point: _____ °C	
PCT Recovered: _____		Corrected PCT Recovery: _____	
PCT Residue: _____		Corrected Loss: _____	
PCT Total Recovery: _____		Corrected PCT: _____	
Percent Loss: _____		Total Recovery: _____	

Forward **Print** **Backward**

Figure-11

6.2.11 History Data Query

- 1) Click the **Left** arrow to move up. Query the history data based on the test time.
- 2) Click the **Right** arrow to move down.
- 3) Click **Print** to print the displayed query results.
- 4) Click **Back** to return to the main monitoring screen.

NOTE: The history test time, laboratory staff, oil numbers, temperature, and the final distillate volume will be displayed on this page.

Select Type of Sample **Delete All**

Diesel Oil	Gasoline	Kerosene
Methanol	Benzene	Solvent Oil
Group 2	Group 1	Group 0
Group 4	Group 3	Unkown Oil

Figure-12

6.2.12 Selection of History Data for Oil

Select the distillation oil model for the query. To facilitate inquiries, classification is required. The system can store up to 256 sets of data. Click the **Clear History** button to clear all history data.



Figure-13

6.2.13 Online Selection

This device can support touch screens and computer terminals. After booting, the touch screen is valid by default. Click the **Computer button** on the touch screen, and the system will automatically shut down the touch screen to enter a computer terminal. Choose a touch screen to enter the touch screen control terminal. This function is invalid for this version. Only the touch screen is valid!

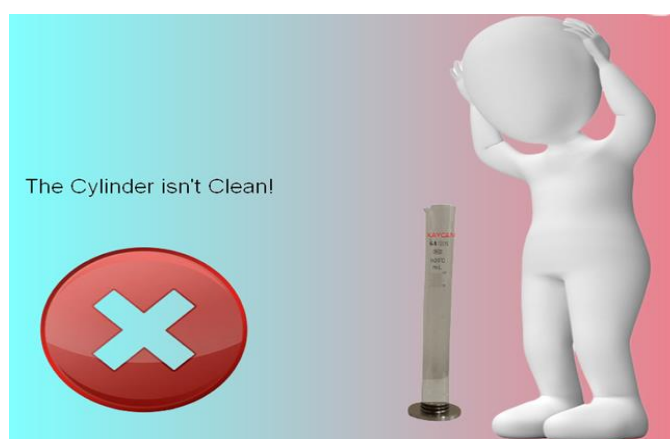


Figure-14

6.2.14 Alarm for the cylinder is not clean

Click the **Start** button, and the system will begin distilling. The level tracking device will automatically detect whether the cylinder is clean. As the wall of the cylinder is not clean, the touch screen will automatically prompt as shown in the figure. Click the **exclamation** point area, and then clean the cylinder again before conducting the test.

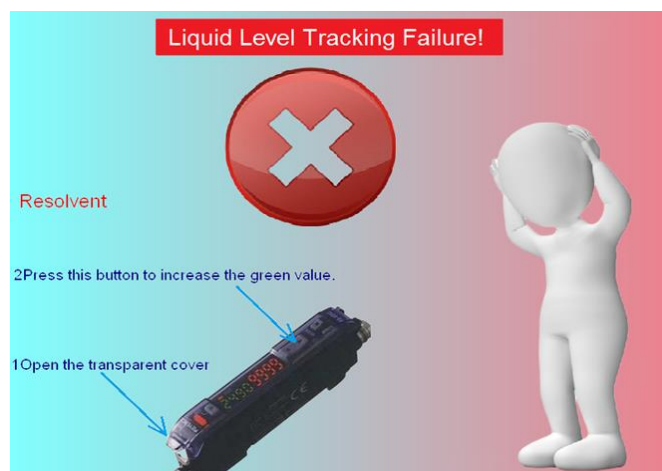


Figure-15

6.2.15 Level Tracking Out of control

When the level tracking system is abnormal, to avoid damage to the equipment, the level tracking out of control screen will automatically appear. This test is deemed to be a failure. The oven will automatically stop. Click **OK** to conduct the test again.

NOTE: When the user's parameter settings are wrong, or the heating speed is too high, or the distillation oil is opaque, the level tracking device will not work normally, making it impossible to track or out of control.



Figure-16

6.2.16 Time Calibration

- 1) To set a new time after entering the screen.
- 2) Click the **Clear** button first to enter the time setting mode.
- 3) Enter a new time in order. Click **OK** after setting, the system time is modified successfully.
- 4) Click **Back** to return to the Setting of Parameters screen.

Example: The current time is 01-01-2012 12:00:00, and the new time is 01-02-2012 16:30:00. Click Clear and enter 1, 2, 0, 2, 0, 1, 1, 6, 3, and 0 in sequence, and then click OK.

7. Accessories

Standard Accessories:

S. No	Accessory Name	Quantity
1	Temperature Sensors	1 Pc
2	125 ml Distillation Flasks	1 Pc
3	100ml Measuring Cylinders	1 Pc

8. Appendix

Reference Table for initial power setting value and initial distillation point temperature:

Initial boiling point temperature (°C)	Initial power
$T \leq 50$	5-20%
$50 < T \leq 80$	10-25%
$80 < T \leq 120$	15-30%
$120 < T \leq 160$	20-35%
$160 < T \leq 200$	25-50%
$T > 200$	40-80%

NOTE: This table is the reference setting value; the initial power has been set before the distillation instrument leaves the factory.

Parameter setting value initial default value table:

Oil name	Initial default				
	Initial power	Condenser temperature °C	Cylinder temperature °C	Terminal power	Cylinder diameter (mm)
Diesel oil	40%	40	25	90%	27.10
gasoline	20%	2	15	35%	
kerosene	45%	40	25	90%	
Methanol	30%	2	15	7%	
Benzene	30%	2	15	15%	
Naphtha	30%	2	15	40%	
2	20%	2	15	35%	
1	20%	2	15	35%	
0	20%	2	15	35%	
4	40%	40	25	90%	
3	40%	40	25	90%	
Unknown oil	40%	40	25	90%	

Parameter setting range:

	Initial power	Condenser temperature °C	Cylinder temperature °C	Cylinder diameter (mm)
Set Range	0-100	0-60	5-40	26.2-27.5