Quick-Read Installation Instruction

Intelligent Touch Viscometer
NTV-AI Series

NTV-AI

■ Thank you for choosing Shanghai Nirun touch viscometer.

■ Please read the instruction ahead for safe and correct operation.

■ Please keep the instruction for reference at any time.

■ Please keep the warranty card attached.

■ The illustrations are effect pictures.

Please open the packing box and check the attachment of the product
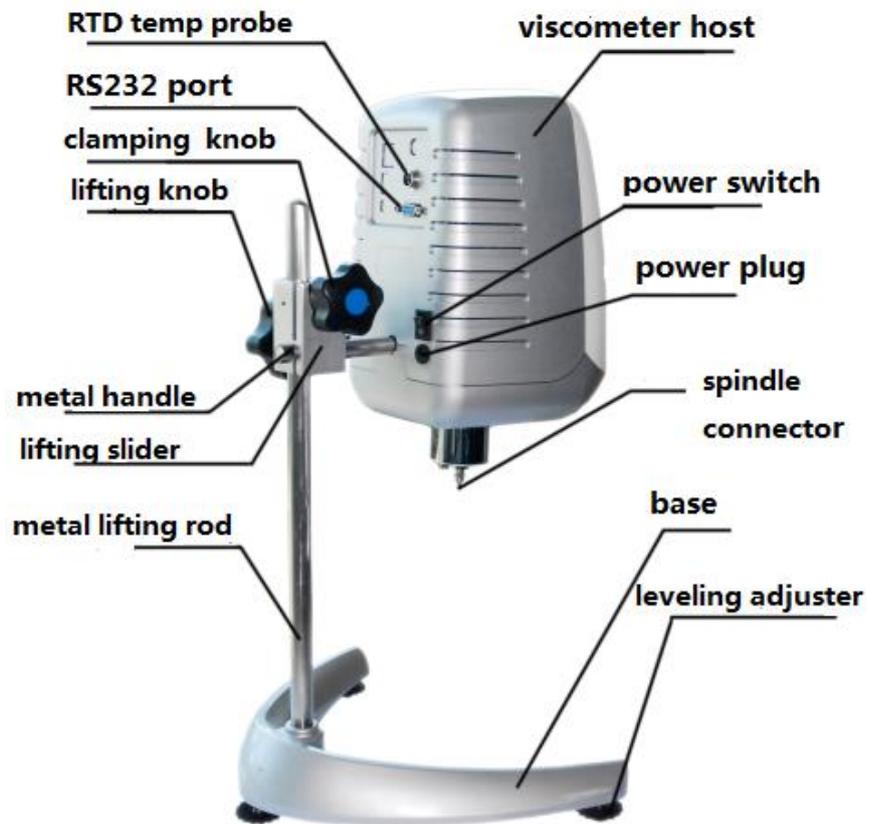
Composition of the product:

1.NTV-AI Host   2.SC4 Spindles (21、27、28、29)

                        Or LV Spindles (1、2、3、4)

3.Power adapter (15V1.5A)   4.protection framework (for LV Spindles)

5.U Disk   6.lifting rod and base

7.M8 wrench   8.Touch pen

9.connector   10.connecting rod

11.RTD temp probe (for LV spindles) 12. Certificate

13. Instruction   14. Instruction of temperature controller

Packing list
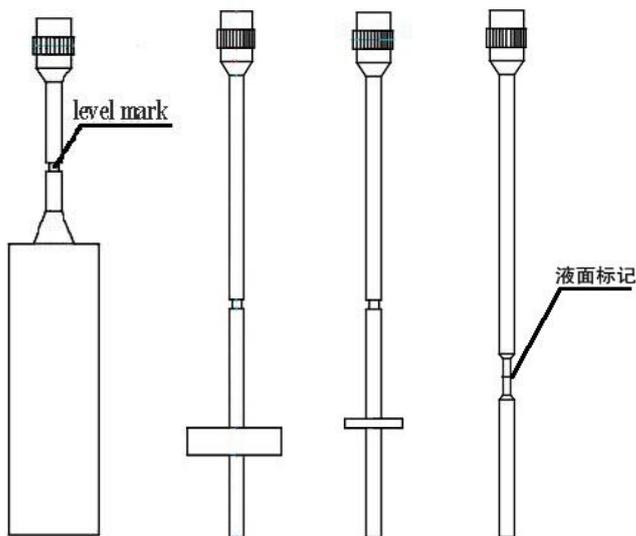
1.a heater   2.a temperature controller   3. a connection line

4.a power line(220V)   5.a protection framework

6.a testing container   7.a sampling tool   8. a cap for heater

9.a scraper   10. a framework for testing container

Note: Please make comparison according to the actual situation because different types match with specific spindles and accessories respectively.
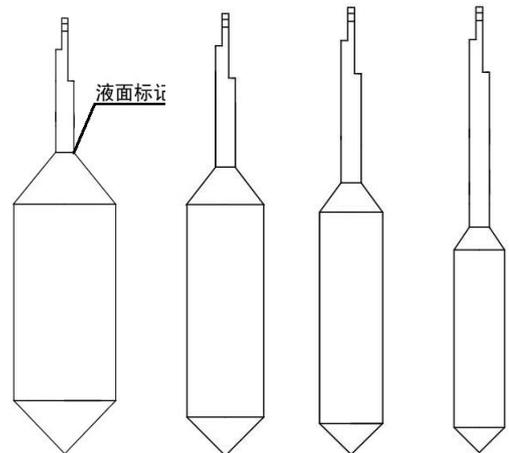
1.Preparation before use

RTD temp probe
RS232 port
clamping knob
lifting knob
viscometer host
power switch
power plug
metal handle
lifting slider
spindle connector
metal lifting rod
base
leveling adjuster

LV Spindles

SC4 Spindles

level mark

液面标记

液面标记

1 号   2 号   3 号   4 号   SC4-21   SC4-27 SC4-28   SC4-29

NTV-AI Series Assembly Diagram

Lifting slider   Adjusting screw   Lifting knob   Metal lifting rod

Handle clamping knob

8mm washer   Spring washer   Inner hexagon screw

Slider adjusting screw

Handle clamping knob

Lifting knob

Lifting rob

Handle jack

Base

Level adjusting screw
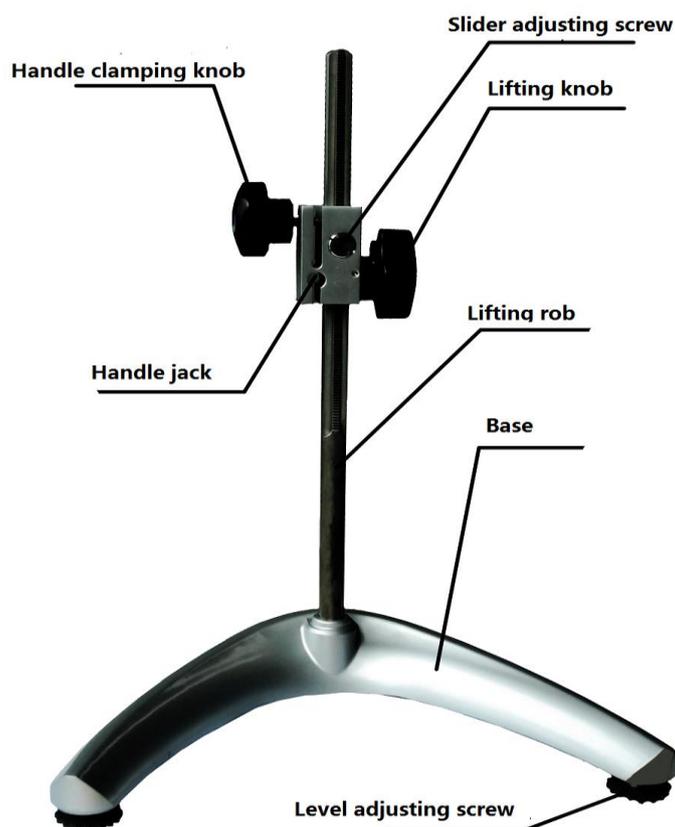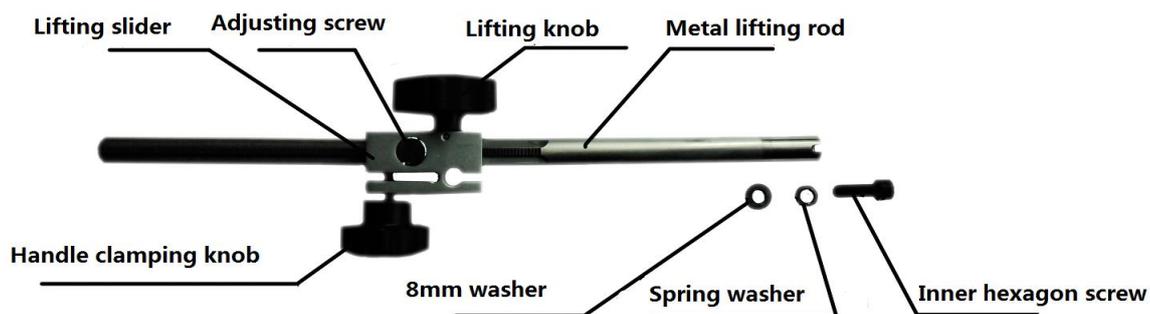
The metal lifting rod and the base assembly diagram

1. Remove parts of a viscometer from the packing box, such as the base, the metal lifting rod, the host, the spindle frame, protection frame, power adapter, RTD temp probe etc.

2. Insert the lifting rod into the middle hole of the base and keep the gap at the bottom of the lifting rod being correspondent with the groove in the middle hole. Then fix the lifting rod on the reverse side of the base with the M8 hexagon screw and spring washer. Please tighten M8 screws with a wrench. Screw two level adjustment feet respectively into the two ends of the base with equal screwing distance as far as possible.

3. Turn the knob on the lifting rod to check flexibility and self-locking of the lifting clamp. If it is too loose or too tight, adjust the adjustment screw in front of the lifting rob with a screwdriver enabling it to lift vertically (It is advisable to be a little tighter.) to avoid the automatic fall of the viscometer. **Note: the adjustment has been made on the factory.**

4. Insert the metal handle of the intelligent touch viscometer into the small round hole on the slider, rotate the handle to clamp the knob, and keep the level position on the middle horizontally. Clamp the handle to make the viscometer firmly mounted on the lifting frame. Remove the black cap below the instrument and put it aside（**It must be installed during transportation**）.**The black cap can protect the connecting screw, so it must be installed during a long time of no use or transportation.**

5. Adjust two level adjustment feet until the bubble level is in a central location.

6. Please install the RTD temp probe into the RTD temp probe interface . If necessary, install the printer into the RS232 interface and USB into USB interface. If the viscometer need to connect with a computer, please install the connection into corresponding interface.

7. Make sure the viscometer power switch is on " OFF" . Connect the power adapter to the viscometer DC power socket. Insert the other side into the 220V AC power supply socket. If you want to disconnect the AC power adapter, first remove the AC power plug from the socket, and then remove the DC power plug from the viscometer.

2. Parameters:

M: Million

Type	NTV-AI	NTV-AI250	NTV-AI500
Mea range mPa.s	1-6M or 6-80M	5-1M or 50-10M	5-1M or 50-10M
Temperature range	Thermostatic water bath(optional)	Indoor temp+5℃ to 250℃ or 500℃	
Rotate speed (RPM)	0.1-200		
Spindles	LV1, 2, 3, 4(Optional: 0# Spindle)	Standard: SC4-21, 27, 28, 29 Optional: SC4-14, 15, 16, 18, 25, 31, 34	
Accuracy	±1.0%(of full range)		
Repeatability	±0.2%(of full range)		
Power supply	AC100-240V, 50Hz/60Hz. Output DC12V1.5A		

Note: Ultra low viscosity adapter(0# Spindle): for low viscosity (1mPa.s or 6mPa.s)

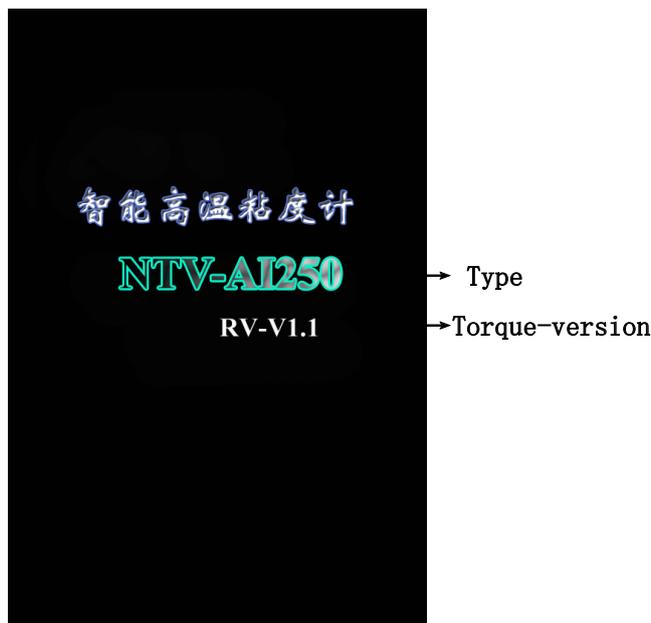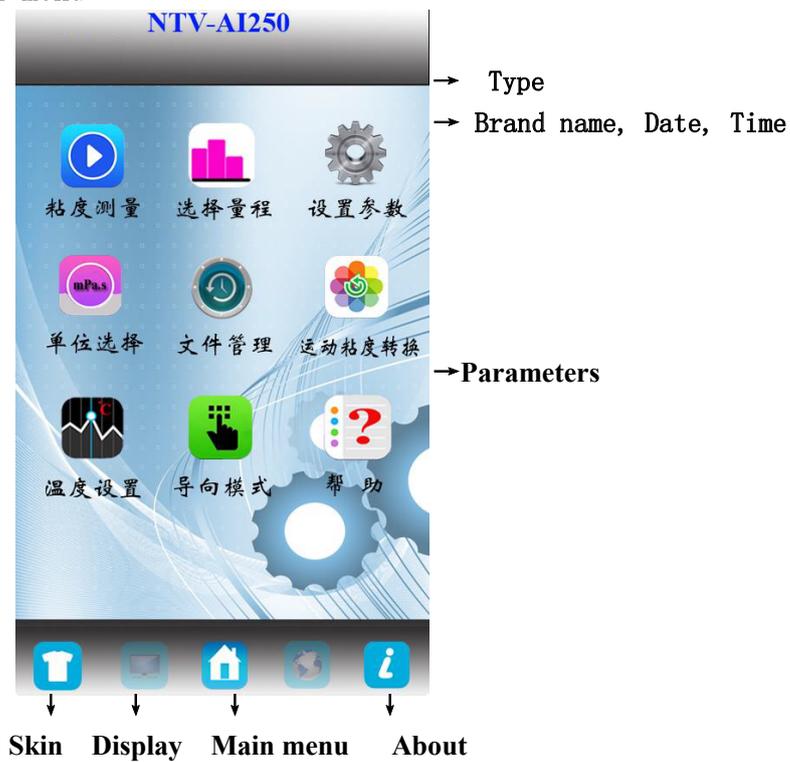3.Screen

Boot screen: type and version are displayed.(FIG.1)

→ Type
→Torque-version

FIG.1

FIG.2

FIG.2: Main menu

→ Type
→ Brand name, Date, Time

→Parameters

Skin   Display   Main menu   About

Please set parameters before testing.

1.Temperature setting(FIG.1): click the button (FIG.3).

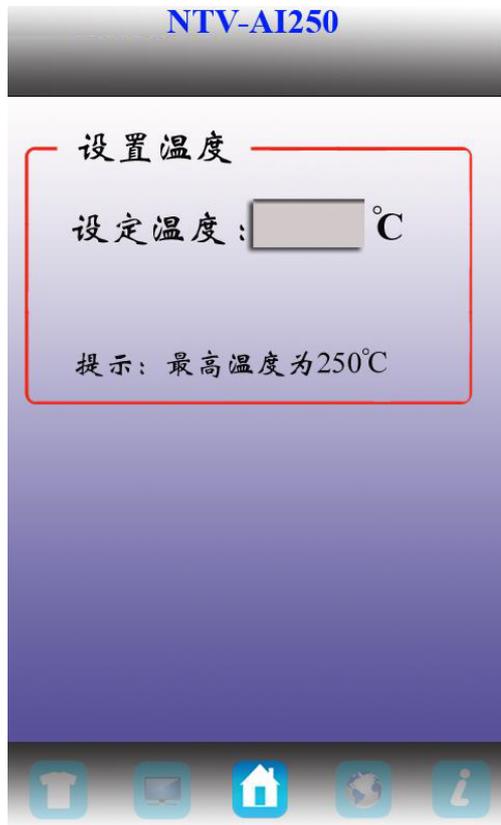| NTV-AI250	NTV-AI250P
设置温度 设定温度：[____] ℃ 提示：最高温度为250℃	程序温度设定 开始温度 [____] ℃ 结束温度 [____] ℃ 持续时间 [____] 分 序号 / 开始温度 / 结束温度 / 持续时间 添加 删除
FIG.3	FIG.4

FIG.3: single point setting, click the input box, and input temperature value, then click
🏠 .

FIG.4: programmed temperature. Click the input box, and input initial temperature value(e.g. 20℃) and temperature (100℃)you want to reach. The time has to be calculated by heating rate. For example, the heating rate is 2℃ per minute, so input the time value{(100-20)/2=}40 minutes. Then click "Add" icon to complete the first temperature input. There are 5 temperature program segments. After inputting，click 🏠 back to main menu.

2. Range (FIG.5)

NTV-AI250		
转子 \ 转速	60.0 RPM	10.0 RPM
21号转子	833	5000
27号转子	4166	25000
28号转子	8333	50000
29号转子	16666	100000
单位：mPa.s	🏠 选择量程 ➡	

图 5

NTV-AI250		
转子 \ 转速	60.0 RPM	10.0 RPM
21号转子	833	5000
27号转子	4166	25000
28	1 2 3 0	)00
29	4 5 6 清除	000
	7 8 9 .	
	确认 取消	
单位：mPa.s	🏠 选择量程 ➡	

图 6

AI Series viscometer has variable speed. The default value are 10RPM and 60RPMand their full range. Users can change them by a touch pen(FIG.6). choose 60 RPM, the screen will show all full ranges of spindles at 60RPM. If users choose 8333(full range), viscometers will input parameters: spindle 28, 60RPM, full range of 8333. Viscometers will save the last parameters before shutdown.

3. Parameters setting

NTV-S1

常用系数设置
文件管理和测量模式设置 进入
测量时间： 0 : 0
测量次数： 3
打印间隔： 00 : 10

修正系数设置
请输入验证码
0   进入

网络通信设置
IP 地址： 192 168 1 252
数据端口： 1031

FIG. 7

1) File management and testing mode: click **Enter** by a touch pen.

FIG. 8

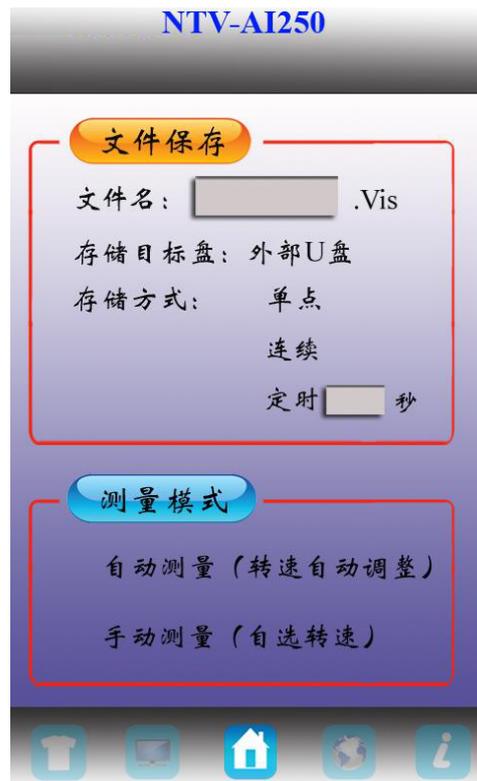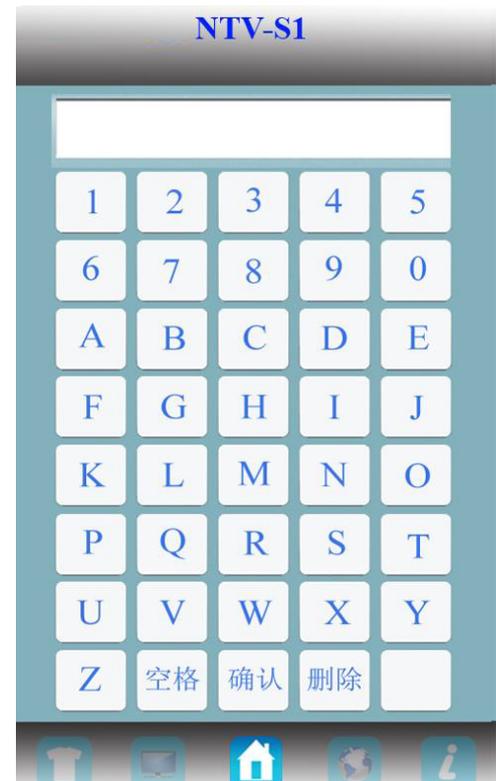**FIG. 9**

File saving: click at input box of file name(FIG.9), and input a file name(**6 characters at most**）, then click OK. There are three kinds of storage mode: **single point, continuous, timing.**

Click "Single point", the viscometer will collect a single data when meet the conditions. Users can click **Save** repeatedly to save data at different single points.

Click "Continuous", the viscometer will collect data based on time. During the process, click **Save** and that button will turn **保存……** . Click **保存……** and **停止** to stop the collection.

Click "Timing" to input collection time (the interval of data saving)
During collection process, click **Save** to save data dynamically. Click **保存……** and **停止** to end the collection.

Measuring modes: auto mode and manual mode. It defaults to manual mode. Auto mode: only for Newtonian fluid

2) **Measuring time**: ending time. The default time is 00:00。

Click **Min** to set measuring time. Input a value then click OK

3) **Measuring number:** average number of viscosity measurement. E.g. the number is 3, the average viscosity in the measuring menu will be the average value of 3 times. It can be generally used in the average viscosity detection of "Newtonian fluid", and "non-Newtonian fluid" within the same periods. To test 3 average values, first press

the "measure" button, measure the viscosity of samples and press "stop" button to get a single final numerical value as viscosity. Repeat 2 more times to get 3 average viscosity value.

4) **Print time:** If users are equipped with printers, please install the connection line and printing paper as required(thermal printing paper, pay attention to the front and the back). Set the interval(e.g.15 seconds), and click Print during measurement process, the printer will print viscosity value every 15 seconds.

5) **Correction factor setting:** The default value is 0. If users are equipped with all conditions of viscosity measurement standards, they can contact with manufacture to get password and set correction factors.

6) Network communication setting: There is a default IP address. If users can not connect with network, then change IP address to get normal communication. Generally users can change parameter "252".
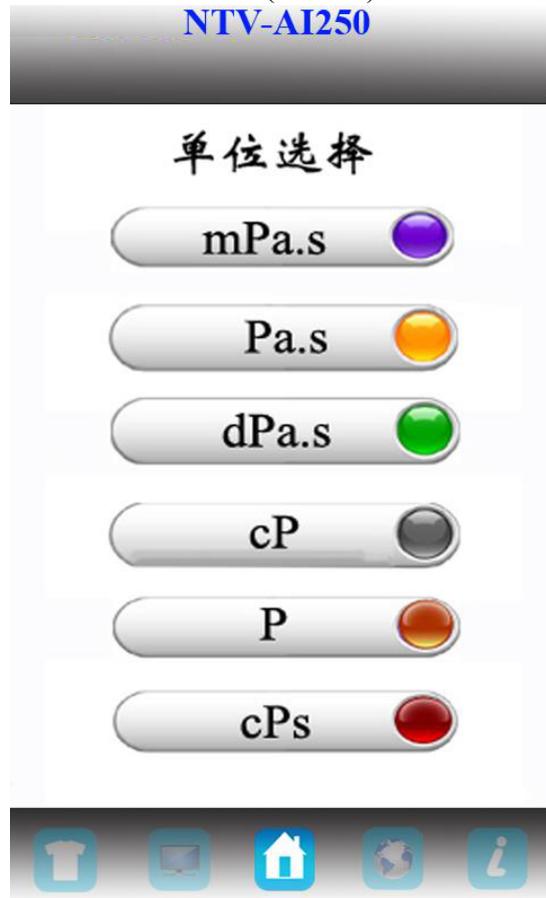
4. Unit：click the unit icon(FIG.10)

图 **10**

Choose a unit by a touch pen then back to main menu [home icon] .

Note: only mPa.s, cPs, cP can be used in the full range less than 100.

5. Kinematic viscosity conversion: If users know about the sample density, click the conversion icon(FIG.11) and input the value. Kinematic viscosity calculation can be a part of the detection process (The default value is 1.000g/cm^3). Click and return to main menu.

FIG.11

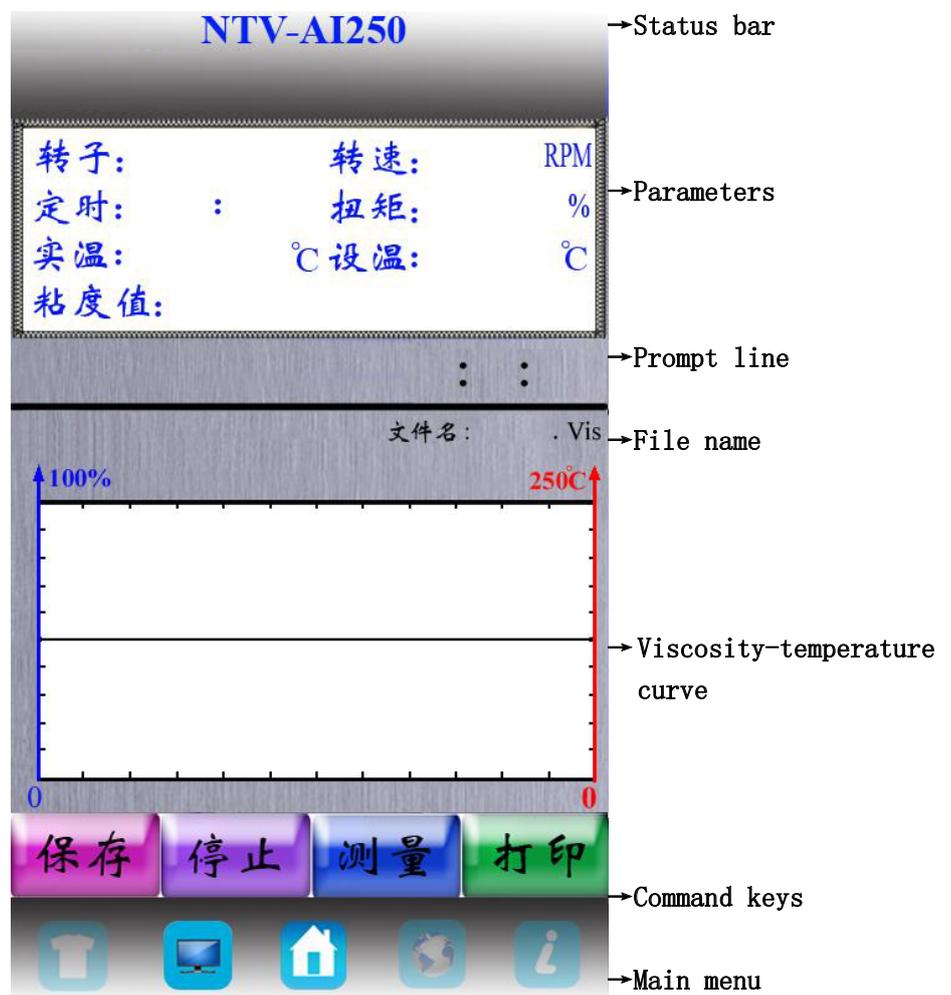## 6.Measurement: click "Measurement" after parameters setting.(FIG.12)

FIG. 12

Click [icon] to display "Data icon"(FIG.13)

NTV-AI250 →Status bar

温度　　　　℃扭矩　　　　%
定时　　：
转子　　　　转速　　　RPM
满量程

：　：ㅤ→Prompt line

文件名：　　.Vis →File name

→Viscosity value

运动粘度　　　平均粘度

→Viscosity

mm²/s
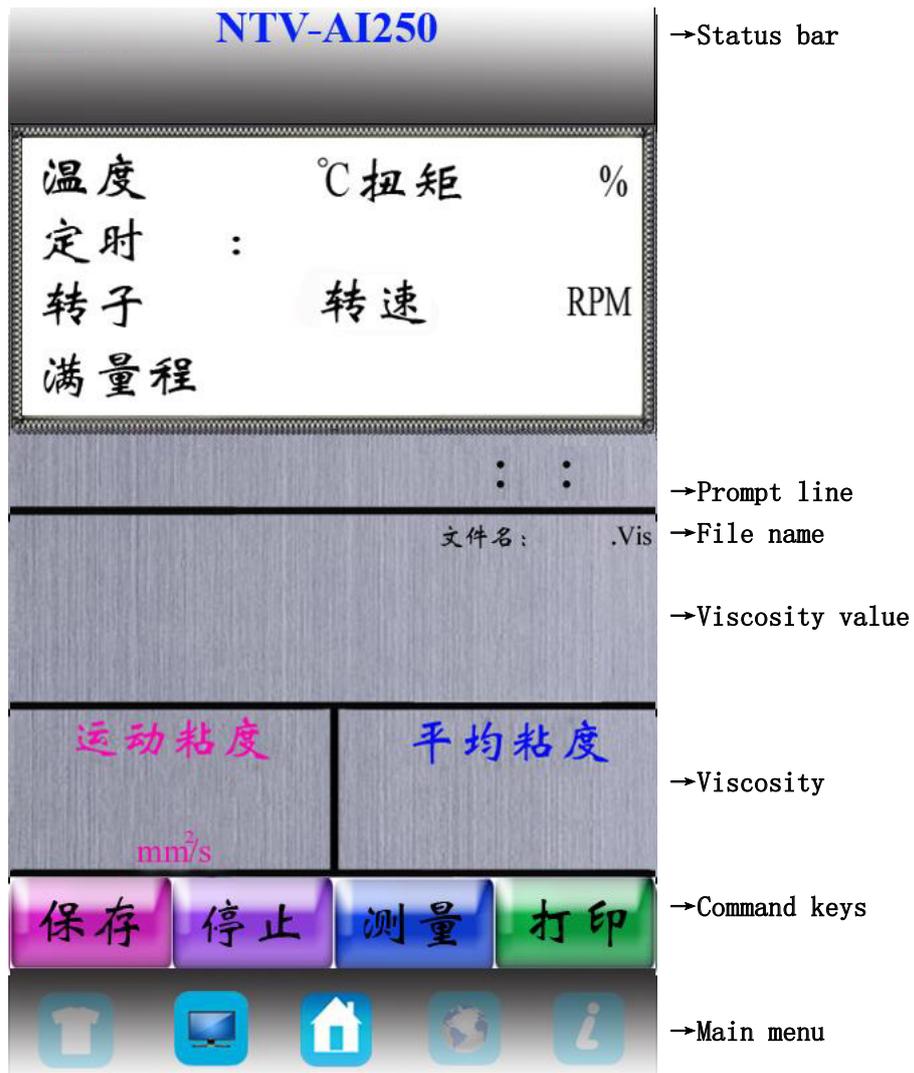
保存　停止　测量　打印ㅤ→Command keys

→Main menu

FIG.13

Parameters:

Temperature——real-time temperature tested by PT100. The default temperature is 0.0℃(without PT100).

Torque——percentage(expressed as 0-100%) If a percentage is between 10% and 100%, NTV-AI Series can get a result accords with accuracy demands. If a percentage is lower than 10%, there will be an alarming. Uses can adjust measuring parameters in time.

Viscosity——the value is calculated by a spindle and its speed. Users have to get a value in range after viscosity unit setting.

Timing——time of measuring process.

Full range——maximum measuring range according to spindles and their speed. The screen will display 100% with "du du" alarming while a value out of range

PV——Actual temperature

SV——Setting temperature

[icon] : measuring

Check all parameters, then prepare samples and start to measure.

In FIG.12, the blue curve means viscosity expressed as percentages. The red curve

means temperature value, e.g. 250℃ means the highest temperature is 250℃， the same as the number 500℃

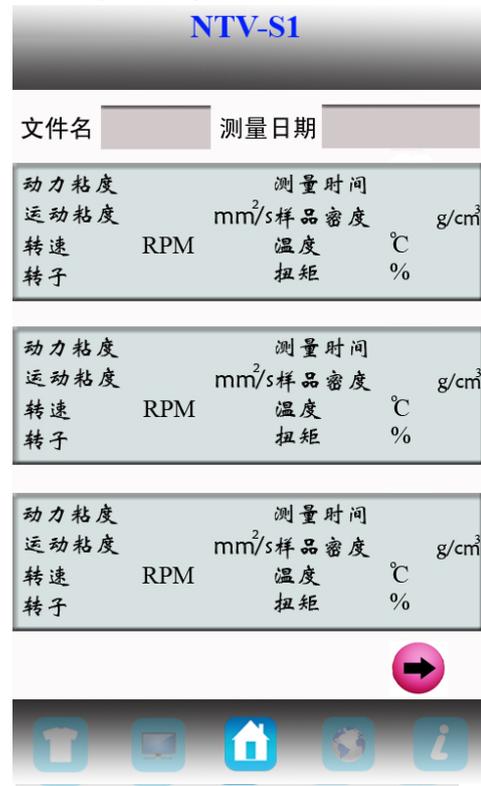## 7.View historical data：click "historical data"(FIG.14)

FIG.14

FIG.15

The 1ˢᵗ file name: 123.Vis , Date: 17-10-20 08:10:30，click ✓ to view data(FIG.15), click ✗ will delete historical data. Click Delete historical data will delete all historical data(unable to be recovered).

4. Preparation before testing

A）Viscometer：Install the viscometer according to the installation steps; use two adjusting screws of the base to adjust the level, and confirm level state by the gradienter in front of the viscometer. Detect the horizontal position before each test or in the test process.

B) Sample: the measured fluid (sample) must be placed in a container. LV is suitable for 400ml type spindle in high beaker (diameter greater than or equal to 70mm). We recommend you choose the appropriate spindle with specific container. Replace container can be used for convenience, but it may have a certain impact on the measurement precision. Our viscometer is matched with the form container. The result of replace container is repeatable, but it may not be the real standard viscosity value.

The LV spindle is used with protection framework installed. If not, the results can be repeatable but may not be the true viscosity value.

When you compare data with others, please check whether the protective frame is used, whether the sample container, the spindle, the

spindle speed and the sample temperature is consistent.

In the viscosity test, many samples the specific temperature must be controlled, when adjusting the sample temperature, also need to control the temperature of the spindle and the sample container.

C）The spindle and rotation speed: NTV-S series can test fluid in the range of 1- 80M (M means million cP). For an unknown fluid, repeated experiments are usually needed to select the spindle and spindle speed. The suitable selection can make viscometer torque in the range of 20%-100%. There are two general rules in the trial process: 1) viscosity range is inversely proportional to spindle size.2) viscosity range is inversely proportional to spindle speed. In other words, for the test of high viscosity, choose a small volume and low speed spindle. If the spindle and spindle speed make the torque greater than 100%, please reduce speed or choose smaller spindle. When the test proves that several spindle and speed combinations can reach the test results, any of these combinations can be used.

Non-Newtonian fluid viscosity value tested may change with the spindle and speed.

To compare the viscosity data, please make sure to use the same test, i.e. using the same device, spindle, speed, container, temperature and test time.

5. Operation（SNB-AI Series: LV Spindles）

（1） Please install the viscometer according instruction.
（2） Install the protection framework(Spin it right to install, left to uninstall).
（3） Spin the selected spindle into the connecting screw.(Spin left to install, right to uninstall)
（4） Start up. Set the test parameters.
（5） Rotate lifting frame knob to lower the viscometer and make the spindle gradually immerse in the measured liquid until the mark on the spindle is as high as liquid level. Adjust the viscometer to horizontal state once again.
（6） Click the "measurement" button and measure the viscosity value and percent scale at current spindle and speed simultaneously.
（7） In the process of measurement, if you need to replace the spindle, you can directly press the stop button with the motor stopping rotating and viscometer in charged state. Repeat the above steps (5) and (6) to continue when the spindle replacement is completed.

6．Attention

（1） Slightly and carefully raise the connecting screw when installing and uninstalling the spindle. Avoid excessive force and lateral force in order to avoid spindle bending.
（2） Please do not put the viscometer equipped with spindle side or upside down.
（3） Keep the connecting end face of connecting screw and the spindle and the thread clean, or it will affect the spindle vibration.
（4） Support viscometer with hand when it's lifting to prevent falling due to weight.
（5） Please enter a new range after replacing the spindle. The used spindle should be timely cleaned (wiped up) and put back the spindle rack. Please do not clean spindle remaining on the instrument.
（6） When the liquid is changed, please clean (wipe up) the spindle and spindle protection framework to avoid the measurement error caused by the confusion of the measured

ones.

（7） A viscometer should be equipped with its LV spindles. Match the instrument and the special spindle one to one. Please don't confuse the instrument and the spindle.

（8） Please do not disassemble and adjust the instrument freely.

（9） During the moving and transporting process, you should install the black cap to the connecting screw, tighten the screws and put them into the packing box.

（10） Please do not rotate spindles for a long time(without fluid), to avoid damage the shaft tip.

（11） There are a lot of non-Newtonian liquids among suspension, emulsion, polymer and other high viscosity liquid, the viscosity value of which varies with changes of the shear rate, time and other conditions. It's normal that the results in different cases of spindle, rotating speed and time are not consistent. It's not the error of instrument. Generally, the spindle, rotation speed and time should be specified in measurement of non-Newtonian liquid.

（12） To get highly accurate results, the flowing steps can be done:

- Please control an accurate value of sample temperature.
- Control the temperature of the liquid to be measured accurately.
- Keep the uniformity of the liquid.
- Place the spindle in the center of container and install the protective frame before the test.
- Ensure the cleanness and shaking degree of the spindle.
- When high-speed measurement turns into low-speed immediately, the test should be stopped; or the measure time at low rotation speed should be a little longer to overcome the error due to the rotation inertia caused by the liquid rotation.
- Determination of low viscosity match with spindle No.1; high viscosity with spindle No.4.
- The measure time at low rotation speed should be a little longer.
- Check and adjust the horizontal position of the viscometer in time after changing the position of viscometer by turning lifting chuck for the need of changing spindle or the liquid to be measured in the measurement process.
- Keep the AC power supply well grounded, eliminating the damage in the internal circuit caused by static electricity.
- Note: in the process of operation, is strictly prohibited in the rotation of the spindle, the spindle will be gradually immersed in the sample, especially for high viscosity samples, so as to avoid damage to the internal structure of the instrument, caused by measurement error.

Nirun intelligent touch viscometer product guarantee

1. Nirun touch intelligent viscometer enjoy two-year free warranty from the date of purchase.
2. No free warranty service for the following failures caused by individual users. Such as:
   a) The fault caused by users' refit;
   b) the fault caused by accidentally drop in use or transportation process;
   c) the fault caused by the lack of reasonable maintenance;
   d) the fault caused by incorrect operations not following the instructions ,etc.;
3. The fault caused by incorrect operations not following the instructions ,etc.;
4. Please call customer service telephone for warranty service;
5. Repair parts can be provided in five years after the product is not in production;
6. Please refer to relevant regulations for warranty issues of spare parts.