T Series Touch Screen Viscometer

Instruction Manual

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* This Instruction Manual is applicable for all viscosity meters, please read as per the model or configuration of the instrument you purchased!

Dear User:

Thank you for selecting our viscometer, please read through this Instruction Manual before correctly using this product. Any further revision will not be informed separately.

Contents

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I. Working principle and purpose

The brand new touch screen viscometer is an intelligent instrument based on the ARM technology, and it is the first full touch screen viscometer in China replacing the traditional operation mode with keys and a small-size LCD. This series of viscometer is integrated with a high-performance step motor and a driver running accurately and stably as per the program setting, and the motor drives the rotor to rotate through a torque sensor at a constant speed. When the rotor meets any viscous resistance in the liquid tested, the resistant force will be fed back to the torque sensor, processed and computed internally, and then displayed as a viscosity value of the liquid tested.

Comparing with similar instruments, this series of instrument has many advantages such as convenient operation, direct reading, rich display, high measuring accuracy, stable rotating speed, high interference resistance and wide working voltage (100V~240V, 50/60Hz), etc.

For the operation with this series of instrument, the measuring value percentage of the full measuring range can be displayed, and the instrument has the functions of measuring range overflow warning and automatic scanning. The user can choose a suitable rotor and a combination of rotating speeds directly, fast and accurately, save the identified testing conditions, and use them conveniently for future testing.

This series of instrument can be extensively used in measuring the viscosity of solvent adhesive, emulsion, biochemical product, paint, cosmetics, ink, paper pulp and food, etc.

II. Main technical performance

Model	Measuring range (mPa.s/cp)	Measuring accuracy (full range)	Standard rotors	Rotating speed	Optional accessories
NDJ-5T NDJ-9T	1*-100,000	±1%	1, 2, 3, 4	6, 12, 30, 60	Thermostatic bath, jacket cup, high temperature heating oven, temperature sensor, portable printer, standard viscosity fluid, minor sample adaptor rotor, ultra-low viscosity adaptor rotor (rotor #0), rotor R1, software Optional accessories are chosen as per the viscometer model, as they are not applicable for
NDJ-8T SNB-1T	1*-2,000,000	±1%	1, 2, 3, 4	0.3, 0.6, 1.5, 3, 6, 12, 30, 60	
SNB-1A-T NDJ-1C-T SNB-1J-T	10-200,000	±1%	21, 27, 28, 29	0.5, 1, 2, 5, 10, 20, 50	
LVDV-1T	1* - 2,000, 000	±1%	L1、L2、L3、L4	0.3~100 stepless speed change, 998 optional rotating speed steps	
LVDV-2T	1* - 6, 000, 000	±1%	L1、L2、L3、L4	0.1~2000stepless speed change, 2000 optional rotating speed steps	
RVDV-1T	100**-13,000,000	±1%	R2, R3, R4, R5, R6, R7	0.3~100 stepless speed change, 998 optional rotating speed steps	
HADV-1T	200**-26,000,000	±1%	R2, R3, R4, R5, R6, R7	0.3~100 stepless speed change, 998 optional rotating speed steps	
HBDV-1T	800**-104,000,000	±1%	R2, R3, R4, R5, R6, R7	0.3~100 stepless speed change, 998 optional rotating speed steps	
RVDV-2T	100**-40,000,000	±1%	R2, R3, R4, R5, R6, R7	0.1~200 stepless speed change, 2000 optional rotating speed	

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				steps	all models.
HADV-2T	200**-80,000,000	±1%	R2, R3, R4, R5, R6, R7	0.3~100 stepless speed change, 2000 optional rotating speed steps	
HBDV-2T	800**-320,000,000	±1%	R2, R3, R4, R5, R6, R7	0.3~100 stepless speed change, 2000 optional rotating speed steps	
STM-2T	40.2-141KU 27-5250cp 32-1099g	±1%	KU1	200	

1*cp, the low limit reachable with rotor #0 / ** the lower limit reachable with rotor R1;
Unit conversion: 1Pa.s=1000mPa.S, 1P=100mPa.S, 1cp=1mPa.S

III. Environmental conditions

Ambient temperature: 5°C ~ 35°C (recommended temperature: 20°C)
Relative humidity: ≤80%
Power supply: AC100~240V (50/60Hz)
There is no strong electromagnetic interference, no strenuous vibration and no corrosive gas near the instrument.

IV. Instrument installation

(1)Take out the base, lifting pole, viscometer main machine, main machine connecting bar, and power supply adapter, etc. As shown in Fig. 1, insert the lifting pole into the base hole and tighten by the nut (**notice: the lifting knob is at the right**), remove the screw from the main machine connecting bar, insert it into the installing hole at the back and bottom of the main machine with the milling flat down, and then tightly fix the main machine connecting bar to the base with the removed hexagonal screw. Finally, insert the main machine with the well fixed connecting bar into the installing hole of the elevating slider, and tighten the fixing knob at the calibrated position.
(2)Swirl the elevating knob and adjust it into a suitable elevating tightness at which the main machine will not slide down automatically, and the damping feeling is favorable in elevating, and the a word nut in front of the elevating slider can be rotated to adjust if it is too loose or too tight.
(3)Adjust the three horizontal stand bar under the base and make the bubbler of level in front

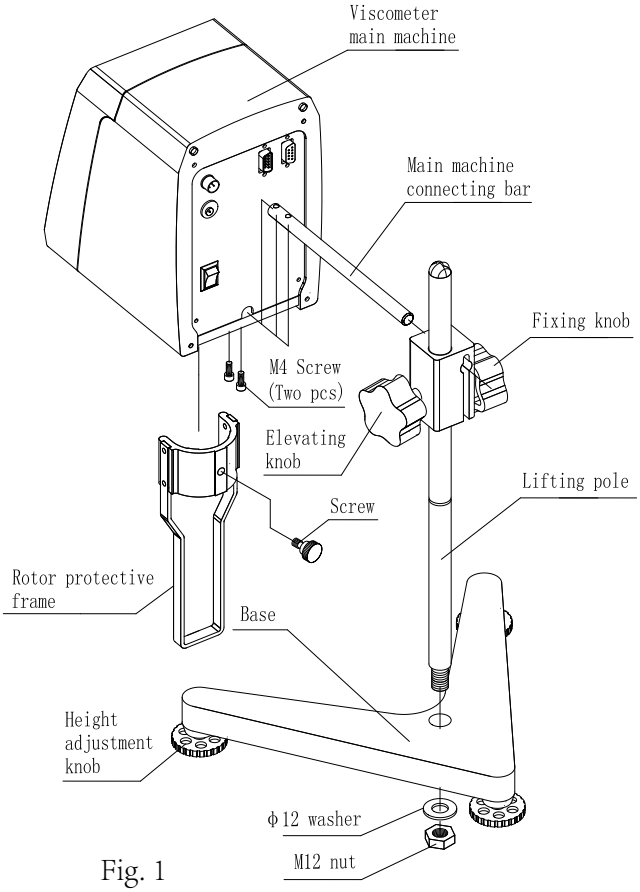

Fig. 1

of the instrument at the center of the black circle.

(4) Remove the protective cap under the instrument.

(5) Connect the instrument to the power supply, and the assembled shape is shown as Fig. 2.

(6)The structures of standard rotors #1~#4 for series NDJ/SNB/LVDV viscometers are shown in Fig. 3. The structures of rotors R1~R7 for series RVDV/HADV/HBDV viscometers are shown in Fig. 7. Rotor R1 is optional, and no rotor protective frame is equipped for series HA/HB viscometers.

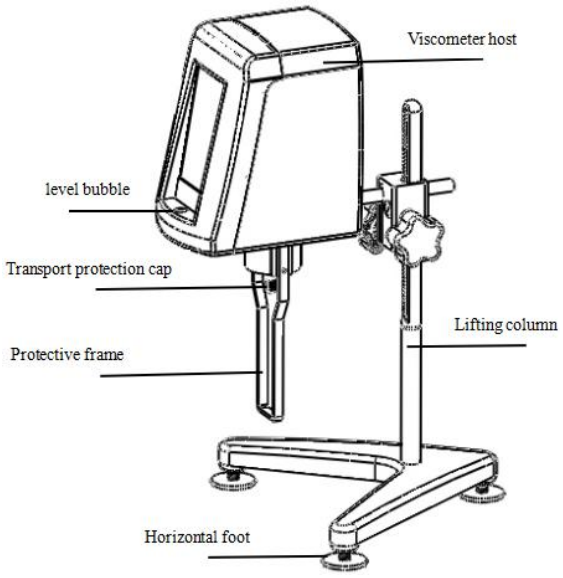

Fig. 2

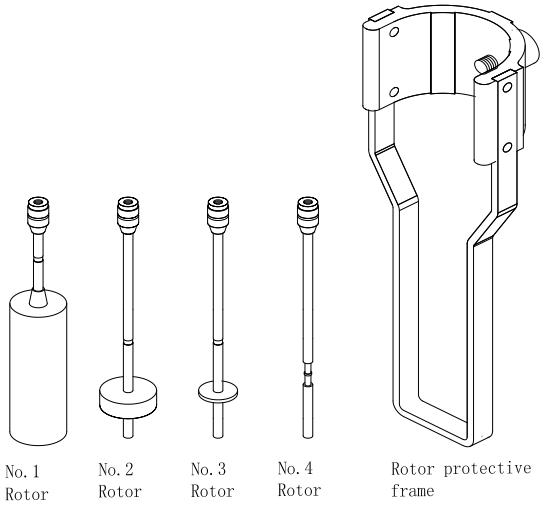

Fig. 3

7. Installation and operation of rotor #0 (this part is optional)

(1) Rotor #0 consists of a fixing sleeve, rotor #0 and a testing tube, as shown in Fig. 4. This part can be only used in testing with rotor #0, and cannot be used with any other rotor.

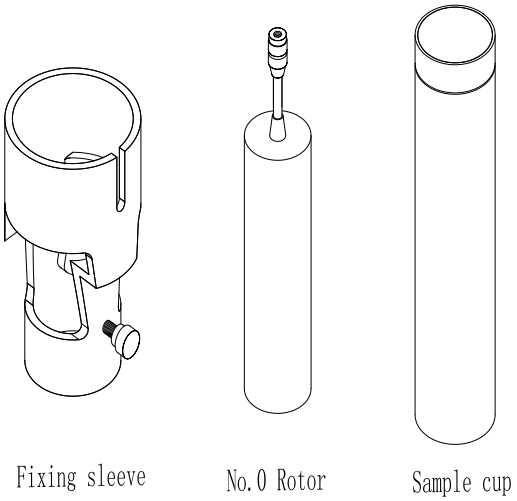

Fig. 4

(2) Install rotor #0 as per Fig. 5, firstly mount rotor #0 onto the rotor connecting screw (universal joint) by rotating it **clockwise (counter-thread)**.

(3) Attach the fixing sleeve to the cylinder under the instrument from bottom to up (avoid touching rotor 0#), and fix the sleeve with fixing screws.

(4) Transfer 20mL of the tested liquid into the sample cup.

(5) Insert the sample cup with liquid from bottom to the top of the fixing sleeve, and then

fasten by the fixing screws (don't touch rotor 0# when inserting), the cone end of fixing screw must be tipped to the triangular chute on the upper end of the outer sample cup. The completed installation of rotor #0 is shown as Fig. 6, and testing can be started when the liquid temperature is controlled and the instrument is leveled.

(6) Rotor 0# cannot run with no load when no liquid is filled, and the rotor protective frame is unnecessary when rotor 0# is used.

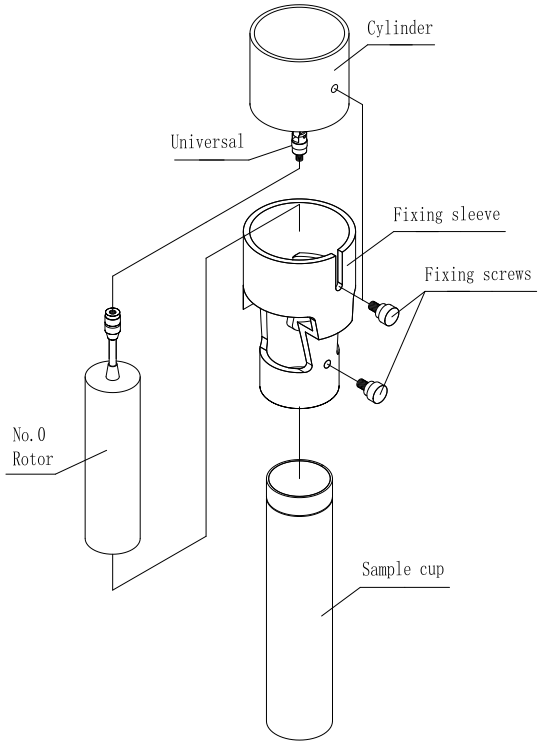

Fig. 5

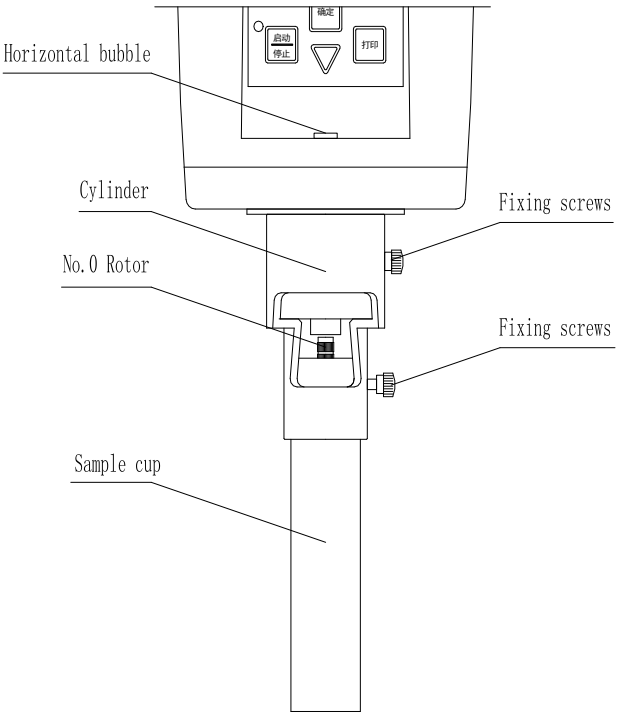

Fig. 6

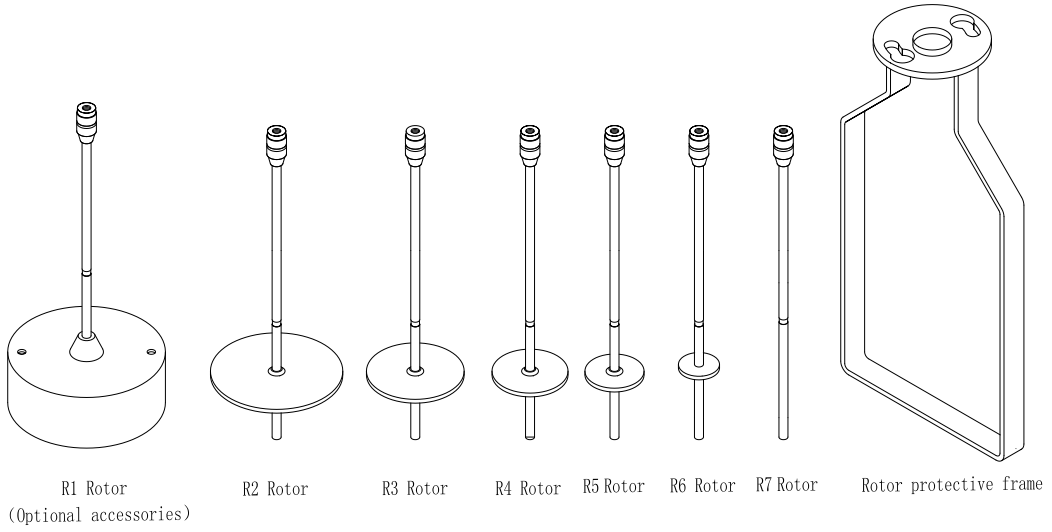

Fig. 7

8. Steps for installing the rotor of viscometer SNB-1A-T

(1) The rotor part of viscometer consists of a fixing ring, a testing tube, a metal connecting piece, an extension hook, fixing screws and four rotors (#21, #27, #28 and #29), as shown in Fig. 8.

(2) Prepare the tested sample and control the temperature of the tested liquid if possible. Transfer a suitable amount of the tested sample into the testing tube as per the rotor selected (see Tab. 1).

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(3) Screw the extension hook into the universal joint **clockwise (counter-thread)** as per Fig. 9, and select and hook a rotor according to the sample viscosity range.

Notice: the universal joint must be gently lifted up when attaching or removing the extension hook, and the rotating shaft must be protected from damage.

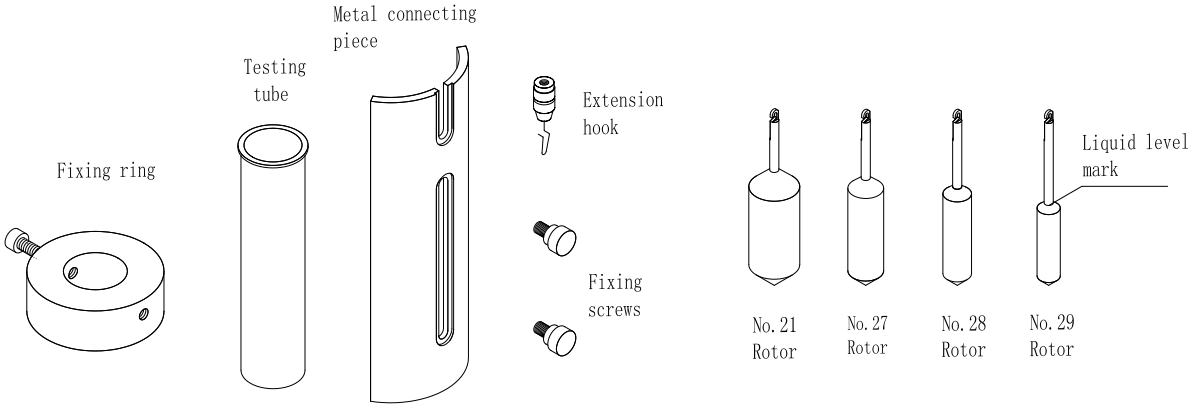

Fig. 8

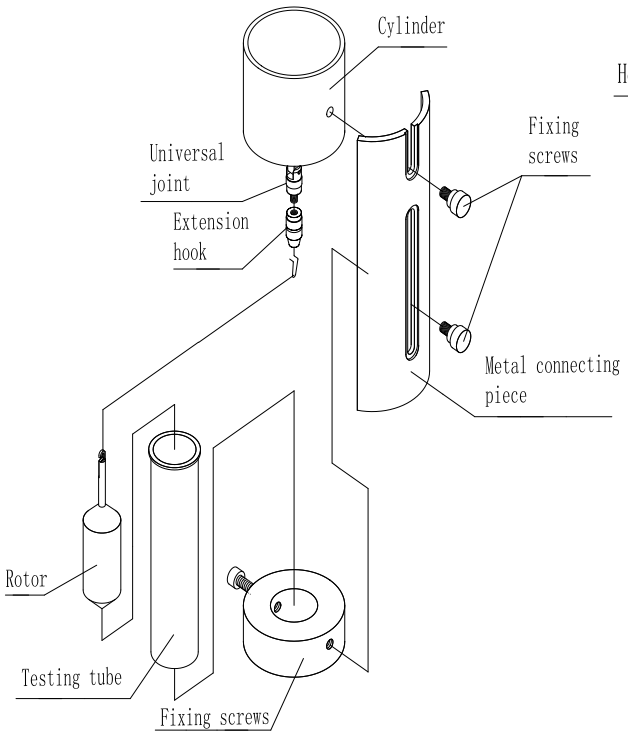

Fig. 9

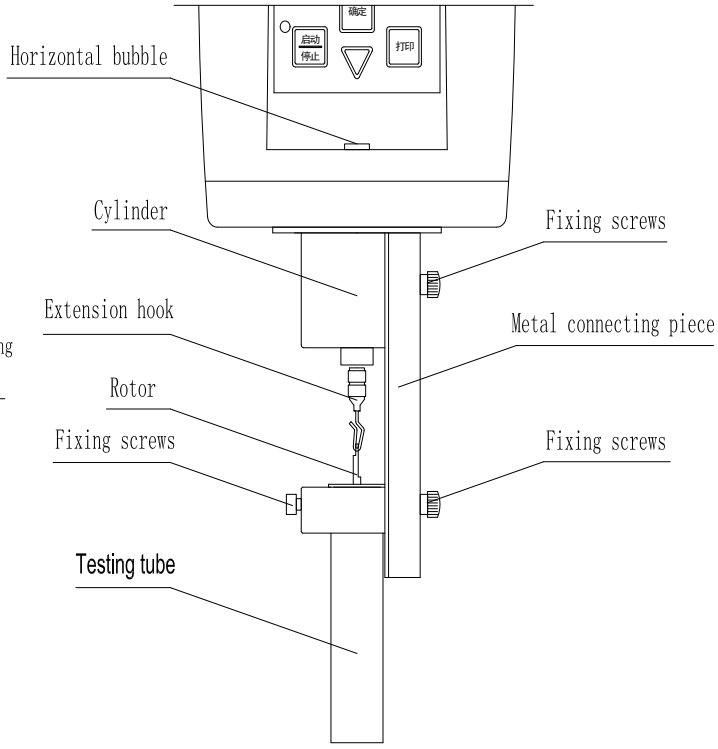

Fig. 10

Tab. 1

Rotor	21	27	28	29
Sample volume (approximate)	14mL	18mL	22mL	22mL

(4) Put the testing tube into the fixing ring, and then tighten the screw at the side surface of the fixing ring.

(5) Attach the fixing ring to the metal connecting piece with the fixing screw.

(6) Fix the well installed metal connecting piece to the bottom casing of the main machine of the viscometer. The well installed part is shown as Fig. 10.

7) Adjust the immersion depth of the rotor, align the liquid level with the "Liquid level mark" on the rotor. The liquid level mark is according to the top the rotor cone end. See details in Fig. 8.

(8) Level the instrument again, and make the bubbler at the center.

(9) Select and confirm the suitable rotating speed, and press "Start" key to test the viscosity directly.

9. Steps for installing the rotor of viscometer STM-2T

(1) Take the rotor and rotor sleeve out from the packing box, and fix the rotor with the fixing screw. Notice: fix the screw to the oblate opening on the rotor bar, and fix the other end of the rotor sleeve to the central axis. Transfer a suitable amount of the tested sample into the material tube. See details in Fig. 11.

(2) Rotate the elevating knob to lower the instrument slowly, immerse the rotor into the sample and align the liquid level mark (the concave or convex line on the rotor pole) to the level of the tested liquid. See details in Fig. 12.

(3) Check if the front level meter of the instrument is at the level position.

(4) Make sure everything is well prepared and then click “Run” to test the viscometer directly.

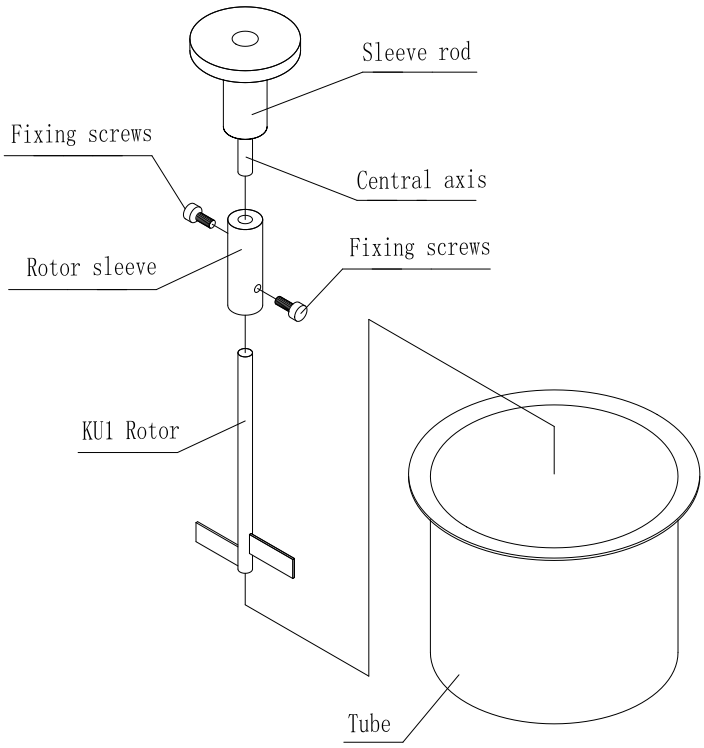

Fig. 11

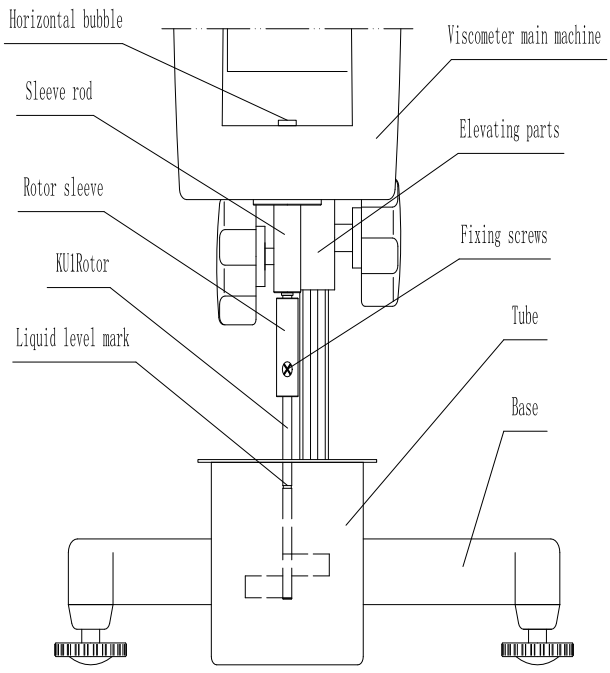

Fig. 12

10. Installation of viscometer NDJ-1C-T/SNB-1J-T

(1) Take each part of the machine out of the packing box, and connect the main machine of the viscometer to the base as per the “Instrument installation” mentioned above.

(2) Install the heater under the main machine, regulate the leveling legs of the heater to make the spirit bubble on the heater base at the center, and then tighten the leveling leg tightening nut.

(3) Insert the heater wire to the signal input port on the back cover of the temperature

controller, and the well installed shape is shown in Fig. 13. (The wire must be correctly connected by matching the slot with the corresponding position.) The front and back of the temperature controller NKY-25 is shown in Fig. 14.

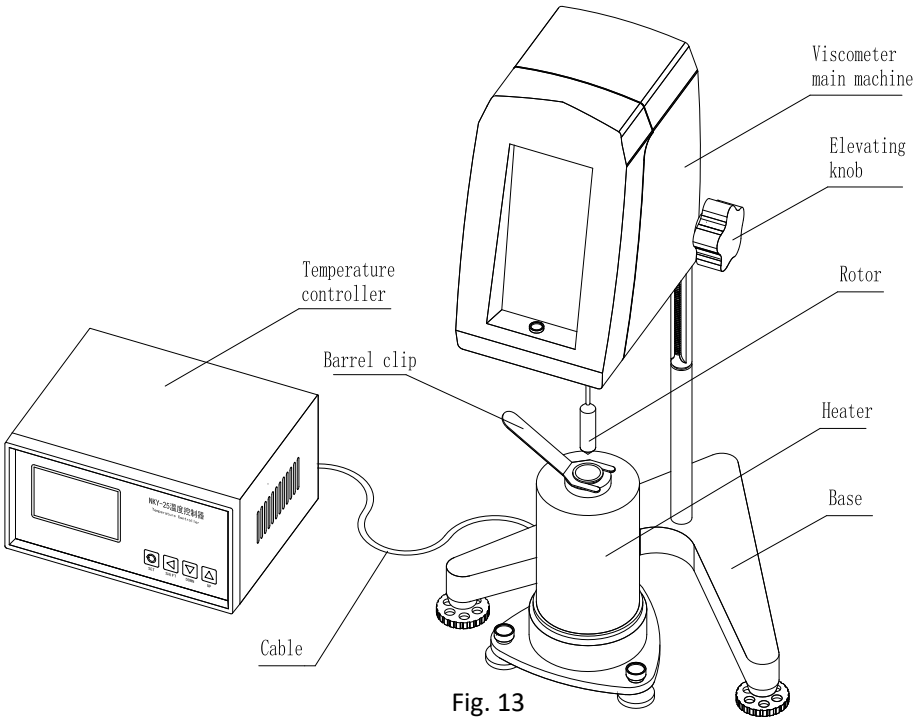

Fig. 13

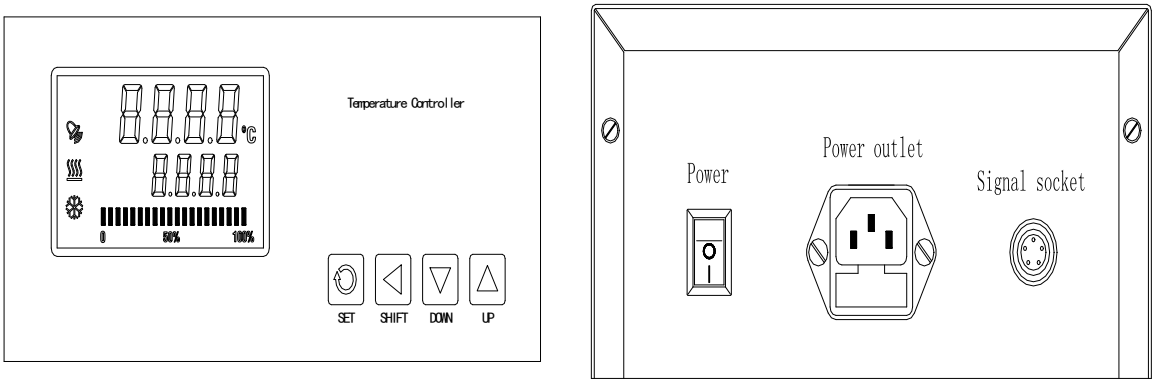

Fig. 14

(4) Take out the plastic cap on the shaft under the main machine of the viscometer, screw the extension hook into the universal joint **clockwise (counter-thread)**, and select and hook a rotor according to the sample viscosity range. See details in Fig. 15.

5) According to the selected rotor, take a corresponding amount of sample tested (see details in Tab. 1) into the material tube, (sample mass can be converted from the density), avoid sample overflow or insufficiency. If originally the sample is a fluid and the rotor can be inserted into the sample, insert the selected rotor into the sample. If the sample is originally solid or paste, the rotor cannot be inserted into the sample. The rotor shall be inserted when the sample starts to be melted with temperature rising. If possible, the rotor can be in an oven heated to a temperature near the set value before attached to the extension hook and inserted in to the sample when the sample reaches the set value.

(6) After the rotor is inserted into the sample, check if the liquid level is suitable (see details in Fig. 16), and the liquid level can be regulated by the elevating knob.

(7) Take the sample tube out from the heater chamber with a special handle after testing, and avoid burning injury.

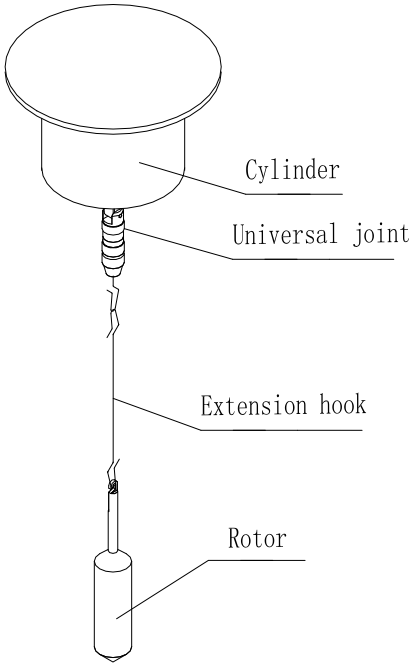

Fig. 15

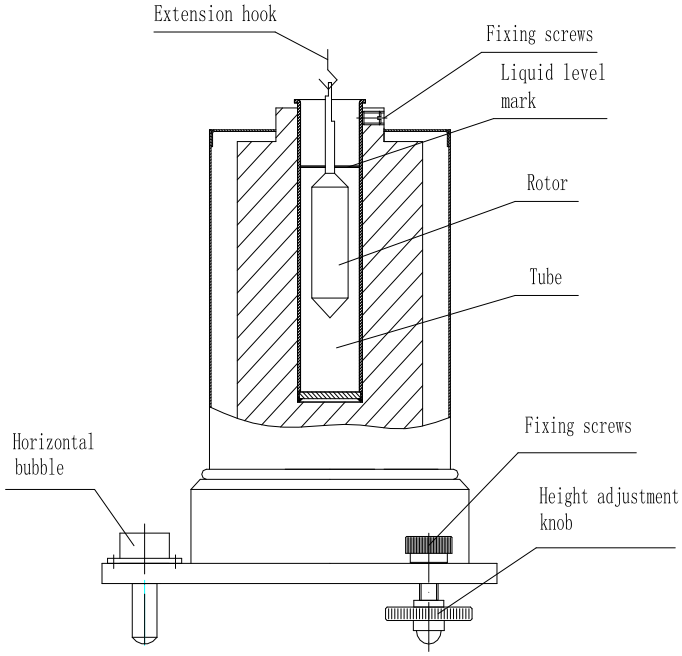

Fig. 16

11. Operation of temperature controller NKY-25

(1) Fig. 14 shows the front view of temperature controller, the LCD part at the left is the temperature display area, and the right part is the temperature setting area.

“Measured value”: The actual temperature in the sample cup

“Set value”: Target temperature value preset

“SET”: Used to modify the set value and confirm the modification

“SHIFT”: Used to shift to another digit in parameter modifying

“DOWN”: The corresponding set value will be decreased by 1 once this key is pressed

“UP”: The corresponding set value will be increased by 1 once this key is pressed

(2) The vertical bars under the set value represent the heating power percentage of machine output, and a higher percentage means a higher heating power. The heating power is controlled automatically by the machine, generally a larger difference between the measured value and the set value means a higher heating power, and vice versa.

(3) “Power On/Off”: controlling the on and off of the power supply to the temperature controller.

“Power socket”: the power fuse is integrated with the power socket of the temperature controller.

“Signal input port”: connected to the heater wire.

(4) Temperature controller parameter setting

Heating temperature setting: when the instrument is connected to the power supply at the standby state, press "SET" and the LCD will display "SP" (means it enters the temperature setting state), and the last digit on the displayed value will flicker. And then press "DOWN" or "UP" and "SHIFT" to set or modify the heating temperature parameter. After setting, press "SET" to confirm the temperature value, and enter the time setting state.

Heating time setting: when the instrument is connected to the power supply at the standby state, press "SET" twice and the LCD will display "ST" (means it enters the time setting state), and then press "DOWN" or "UP" and "SHIFT" to set or modify the heating time parameter. After setting, press "SET" to confirm the time value, and the displayer will return back to the standard display state.

Notice:

■ Each time when pressing "SET", the displayer will circulate within temperature setting (SP) → time setting (ST) → standard displaying state.

■ Press "SET" after parameter setting to confirm the set value, or the set value will not be saved.

■ The set time starts from the moment when the heater temperature reaches the set value. After timing, the temperature controller will give a warning sound and the "Set value" will display as END.

V. Preparation before test

1. For series NDJ/SNB/LVDV viscometers, transfer the tested sample into a round and flat-bottom container whose diameter is 60mm at least.

For series RVDV/HADV/HBDV viscometers, the diameter of the sample container must be 100mm at least.

2. Mount the rotor protective frame onto the silver casing under the instrument. (Installing method: mount the two circular sleeves on the top of the protective frame into the fixing shaft on the bottom casing, and rotate counterclockwise).

3) Select a suitable rotor, and clockwise (counter-thread)screw it to the shaft connector under the main machine.

4. Rotate the elevating knob to lower the instrument slowly, immerse the rotor into the sample and align the liquid level mark (the concave or convex line on the rotor pole) to the level of the tested liquid.

5. Check if the front Horizontal bubble of the instrument is at the level position.

Notices: Never transversally pull the shaft connector when attaching or detaching the rotor, or the inner structure may be damaged.

The ambient temperature must be constant during measuring so as to maintain the stability and correctness of the measured value.

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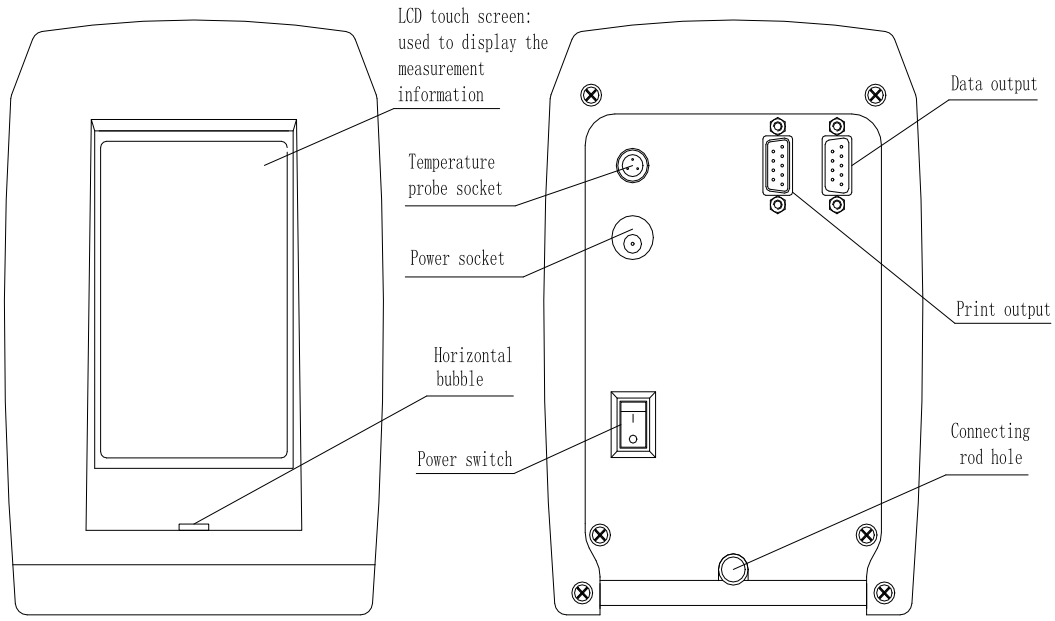
VI. Instrument operating interface and operating method



Take model NDJ-8T for example, after turned on, the instrument will firstly display the initial interface and then enter the main menu after 3sec, and the main menu has 4 option bars:

Viscosity test: test the viscosity of the sample;

View results: view and print the saved test result;

Manage results: output or delete the saved test data in batch;

Setting: set the basic parameters of the instrument, including: time, date, save path, factory parameter resetting, language selection, and background light adjusting, etc.

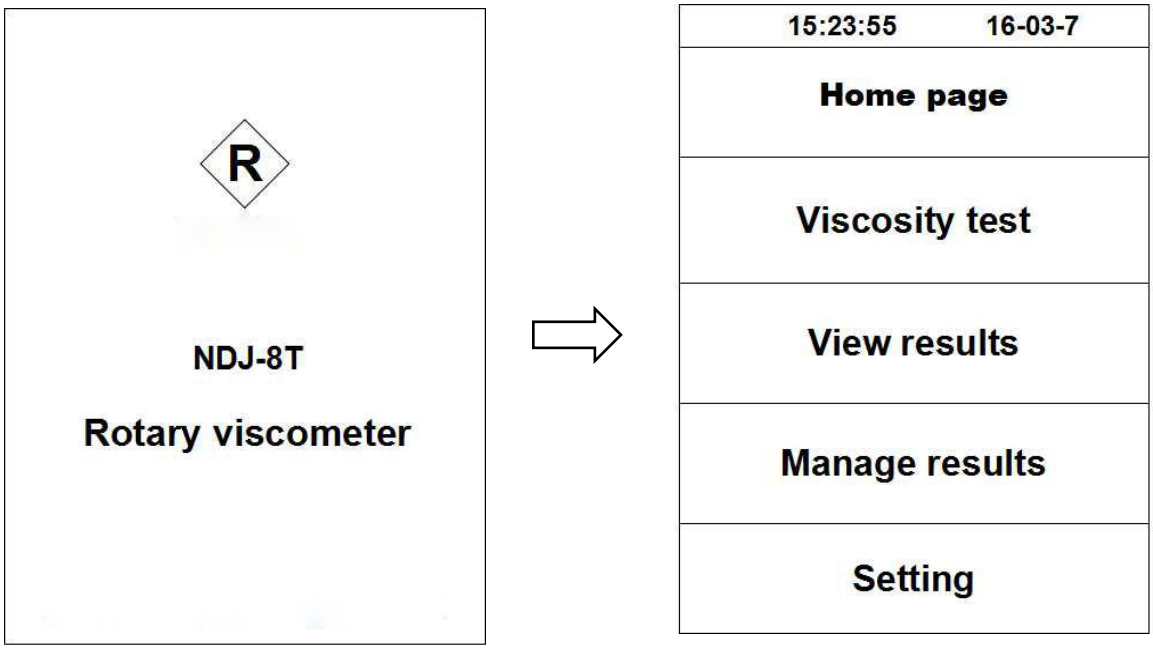


Fig. 17

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1. Viscosity test

1.1 Click **"Viscosity test"** to enter the interface of viscosity test (Fig. 18) which has 5 options:

Continue test: continue testing in the previous testing conditions (before power off)

Quick test: test the viscosity rapidly on by selecting a rotor and a rotating speed without saving the tested data

New test: create a new test with a new record

Stored test: test with a saved record

Manage stored test: delete the saved testing conditions

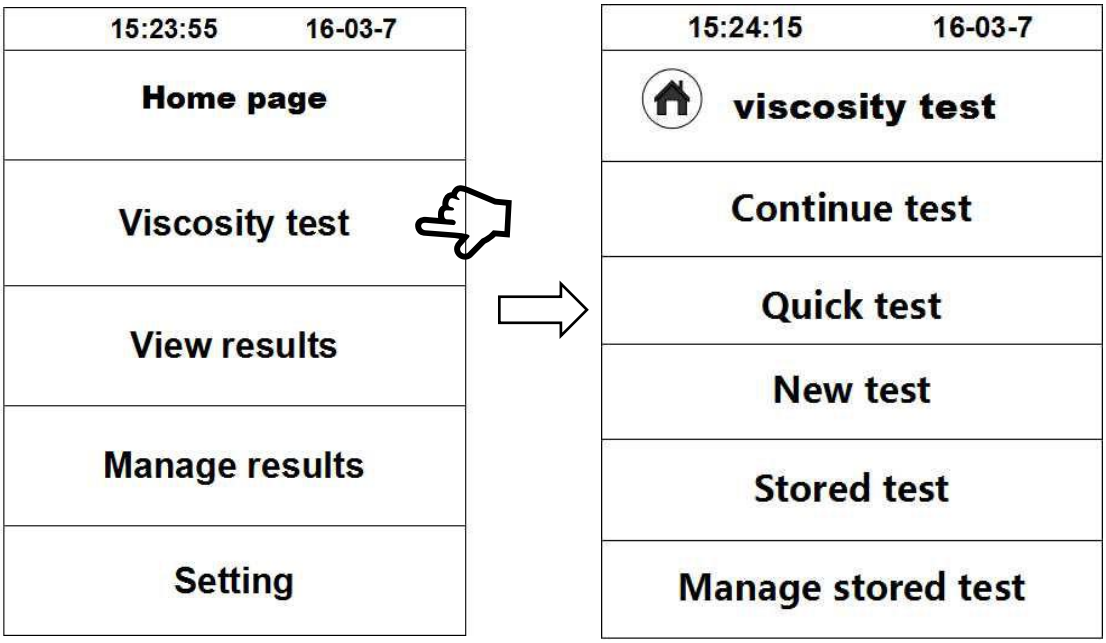

Fig. 18

1.2 Click one of the options of **"Continue test"**, **"Quick test"** and **"New test"** according to the test demand, for example, click **"New test"** to enter the interface for parameter setting (Fig. 19).

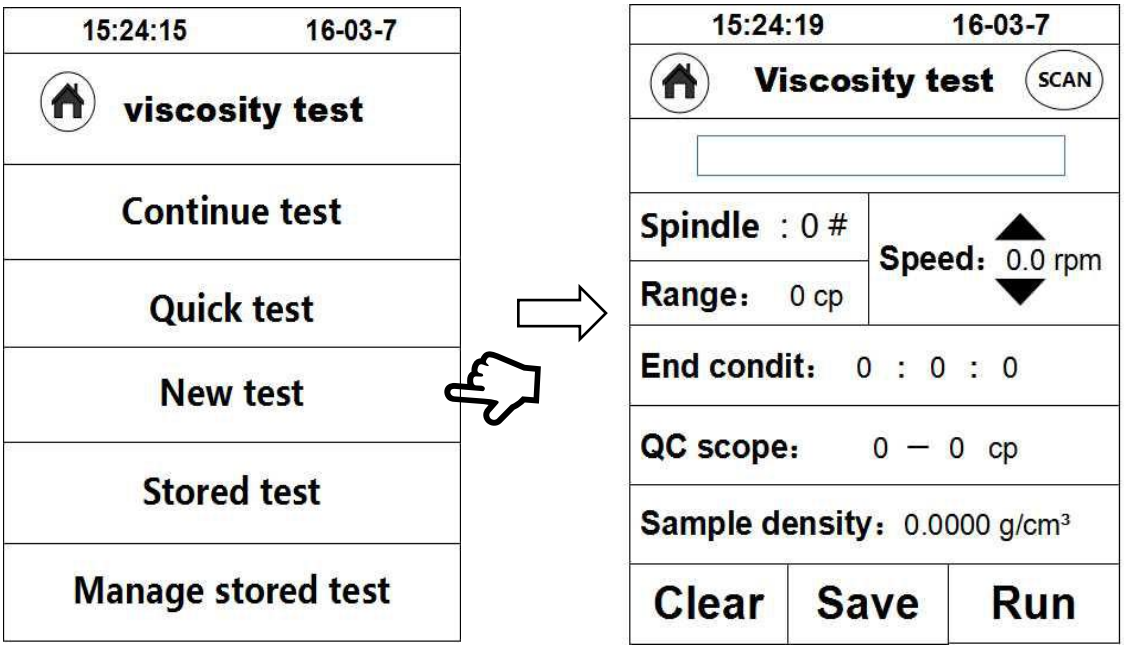

Fig. 19

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1.3 Parameter setting: set the testing parameters of the tested sample before viscosity test, in which, **"Sample name", "Spindle"** and **"speed"** are options which must be filled while **"End condit"**, **"QC scope"** and **"Sample density"** are selectively filled. The rotating speed is selected by the UP and DOWN arrows, and other parameters are entered by clicking the parameter and entering via a virtual keyboard.

E.g.: if the viscosity of the tested sample is about 3000mpa.s, the following combination can be chosen:

Rotor #2, 6rpm or Rotor #3, 30rpm

The well set parameters can be saved in the memory and directly used for viscosity test through **"Continue test"** in the next test. This group of parameters can be selected from the **"Stored test"** in future testing.

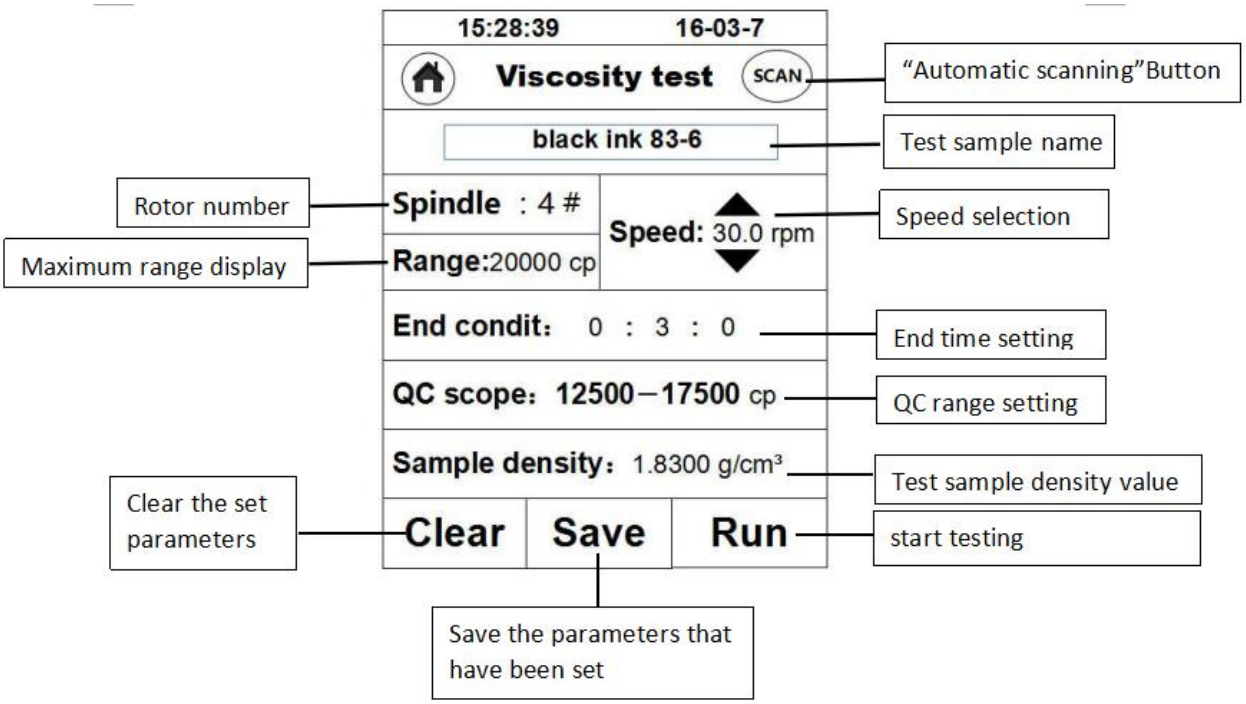

Fig. 20

1.4 Start testing: after parameters are well set, click "**Run**" to start testing and switch the interface to the testing interface (Fig. 21).

Viscosity (η): viscosity of the tested sample (if ERROR is displayed in testing, it means a larger measuring range is required)

Temp: the temperature value measured by the temperature sensor (The temperature sensor must be matched to display the temperature value, otherwise the temperature value will be 0.0)

Torque: Percentage of the measured value to the full measuring range

Spindle: code of the rotor selected

speed: the current rotating speed selected (the rotating speed of series RVDV/HADV/HBDV viscometers can be adjusted steplessly, i.e. the rotating speed can be adjusted without stopping rotation)

Shearing rate: the shearing rate in the current testing conditions

Shearing stress: the current shearing stress

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Tendency bar: it is the torque tendency bar, the scale represents the current torque percentage, and the red dot lines at both ends are 10% and 90% respectively

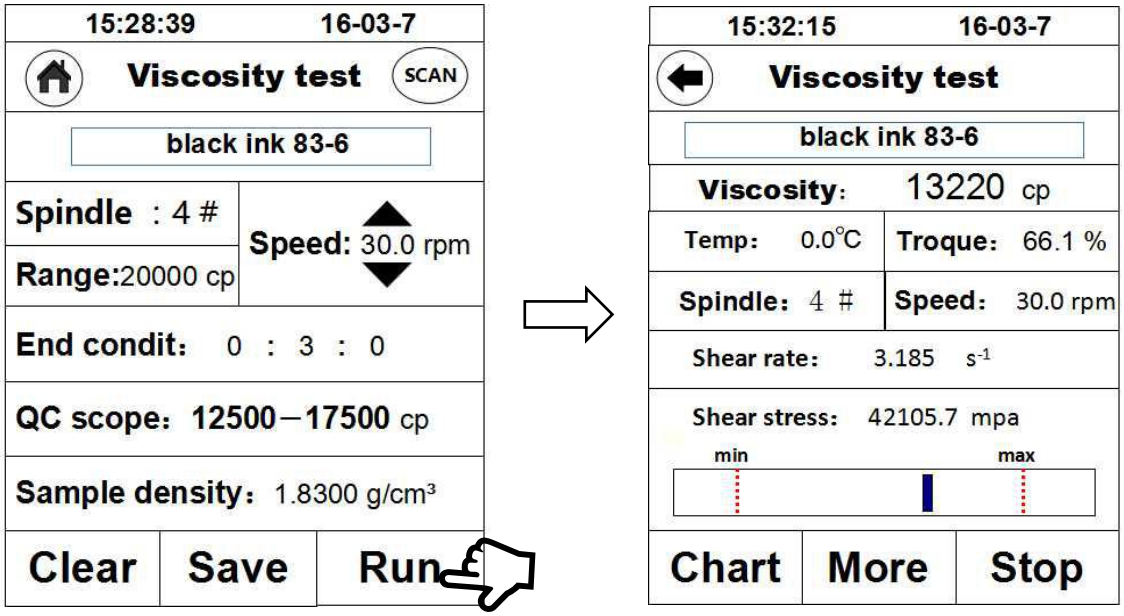

Fig. 21

1.5 Click **"Chart"** in testing, and the displaying interface will display the coordinate system (Fig. 22), click **[⬅]** at the left top to return to the list interface, and click **"Print"** to print the current test data and coordinate curve through an externally equipped printer (an external printer is required).

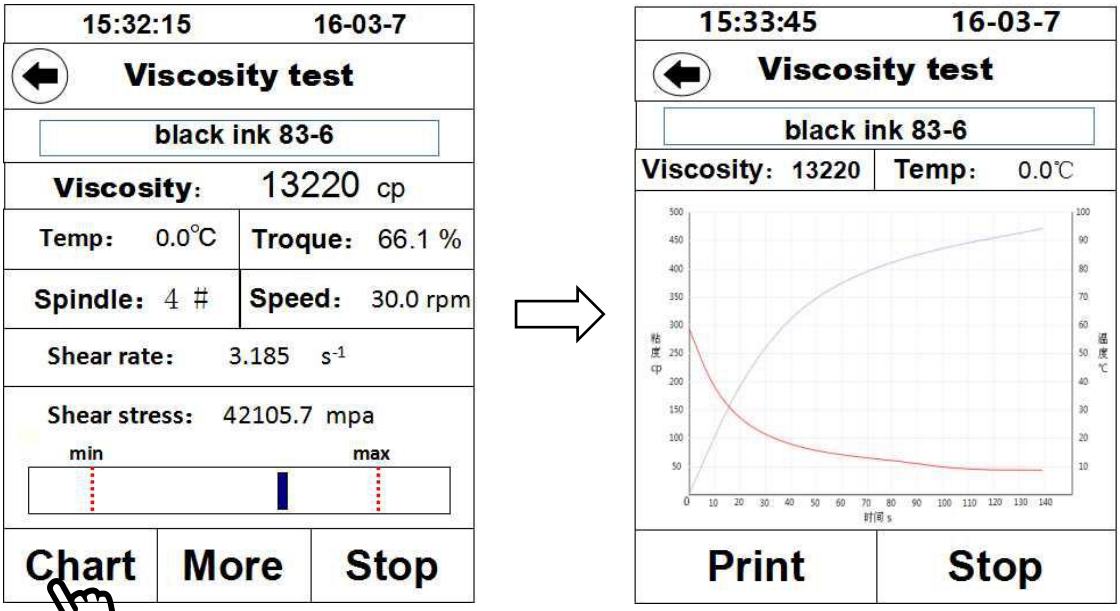

Fig. 22

1.6 Click "**More**" in testing to display the previous optional parameters (Fig. 23), but nothing will be displayed if no parameter is set before testing.

End condit: if a time section is set, and testing will be automatically terminated at the time end, and the data will stop on the testing interface. This function is useful in testing any non-Newton fluid which will be thinned by shearing.

Remaining: remaining time before terminated

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Density: the density of the tested sampled entered before testing, used to calculate the kinematic viscosity

Kinematic viscosity (V): the kinematic viscosity of the tested sample

QC scope: preset a viscosity range to determine if the viscosity tested conforms to the viscosity standard of the sample corresponded in the tendency bar below, in which, the red dot lines at both ends represent the minimum value and the maximum value. E.g.: the standard viscosity of the sample is 12,500cp~17,500cp in the figure below, the actually measured viscosity is 13,220cp, the scale line in the tendency bar is within the dot lines, and thus it conforms to the standard. By this function, the quality of different samples can be controlled in production.

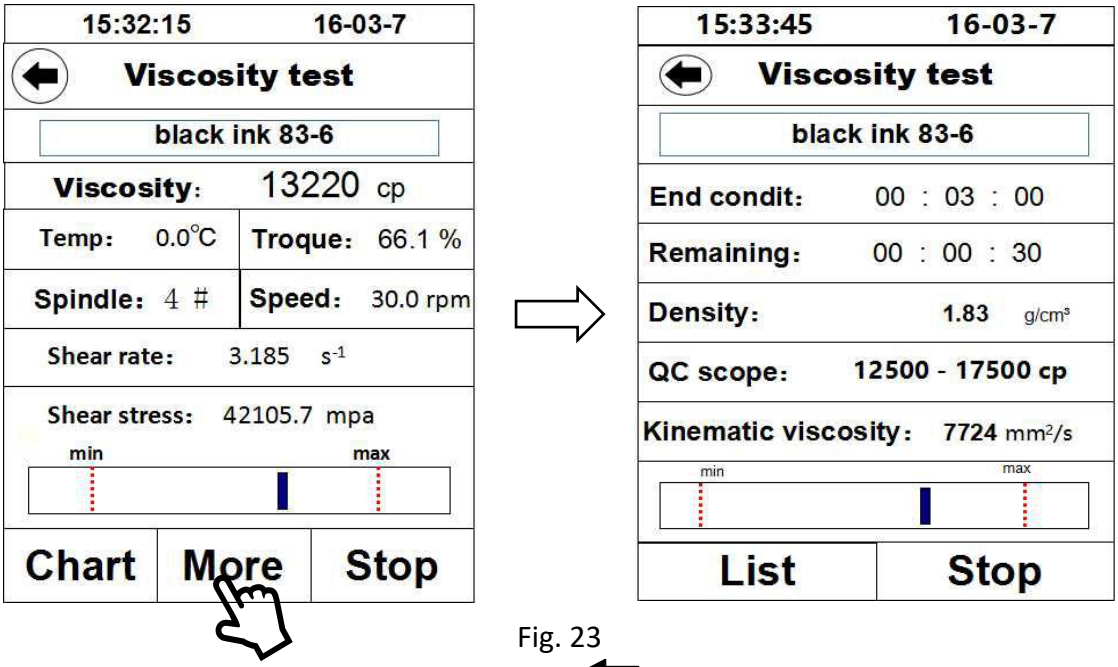

Fig. 23

1.7 Click "Stop" to finish the test. Click the "⬅" symbol to return to the test end screen, as shown in Fig 24. click "Save" to save the test record in the memory of the instrument, view and print in "Stored test", and enter the sample name before saving, or nothing can be saved.

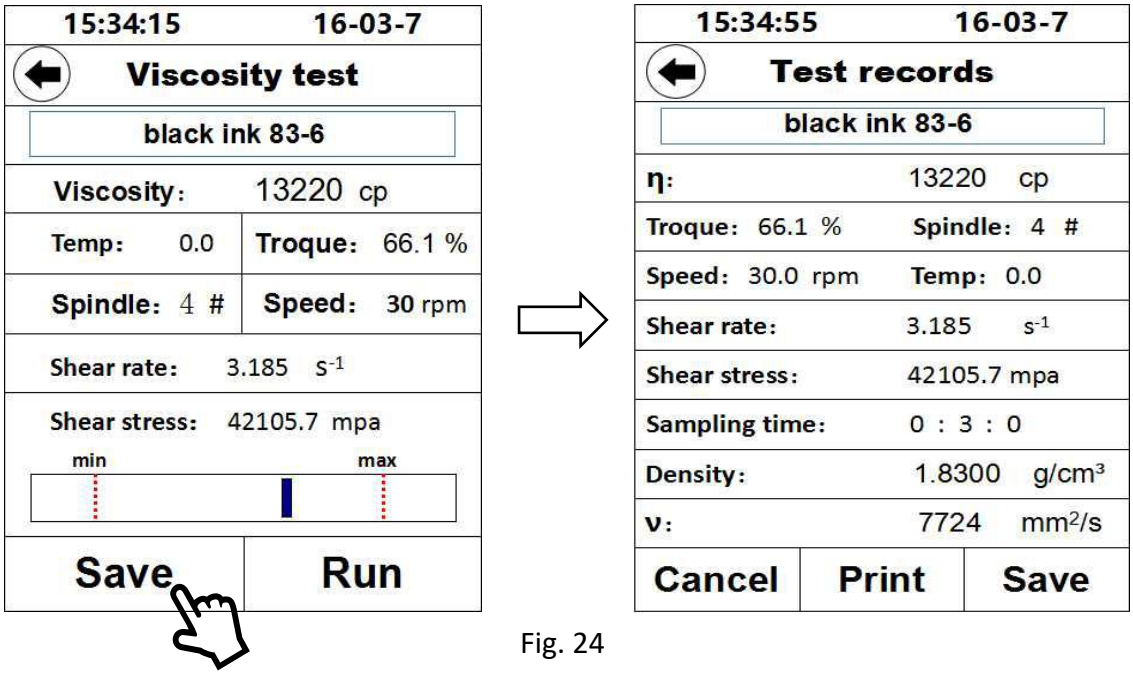

Fig. 24

* This Instruction Manual is applicable for all viscosity meters, please read as per the model or configuration of the instrument you purchased!

1.8 Automatic scanning: this function provides the operator with the optimal combination of rotor and rotating speed. Click the **"SCNA"** at the top right on the parameter setting interface and enter the scanning interface (Fig. 25), set any a rotor and mount the corresponded rotor, start to scan by clicking "Enter", and the scanning state will be displayed on the "Scan", and when the scanning result satisfies the test requirement, "Suitable" will be displayed , and then click "Use" to apply the scanning result in the testing parameters. If the scanning result cannot satisfy the test requirement, "Please use a smaller rotor" or "Please use a bigger rotor" will be displayed on the "Scanning result", and then operate as per the indication on the screen.

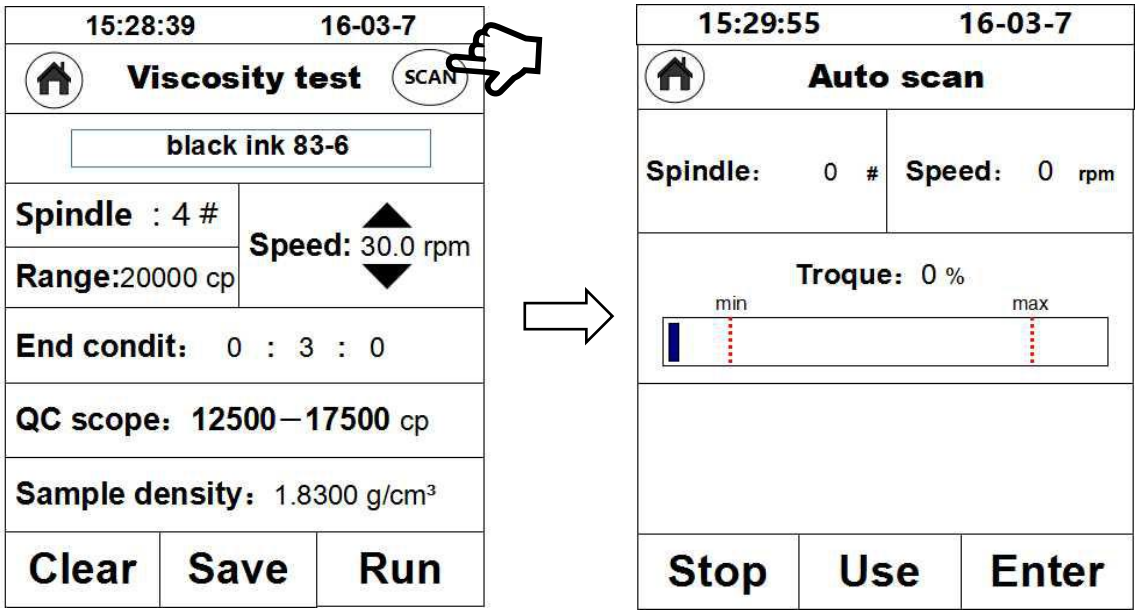

Fig. 25

2. View and print the test data: click "View results" to display the saved test data on the screen (Fig. 26), and then select to view or print the record required.

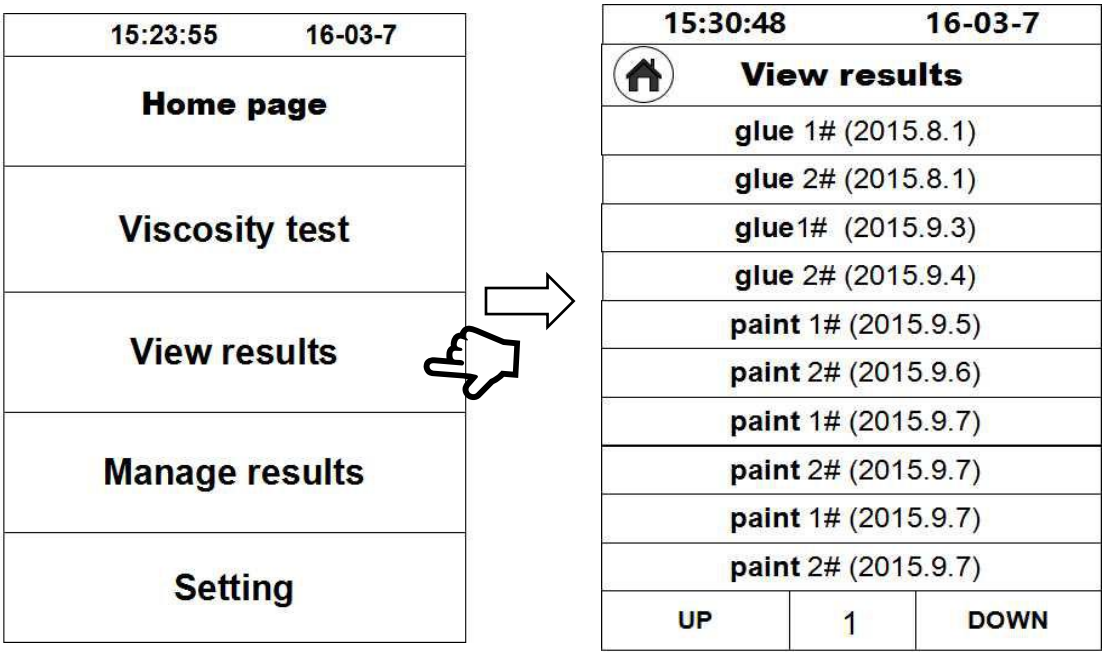

Fig. 26

3. Manage the test data: click "Manage the test data" to display the saved test data on the screen (Fig. 27), and then select and delete the record required.

* This Instruction Manual is applicable for all viscosity meters, please read as per the model or configuration of the instrument you purchased!

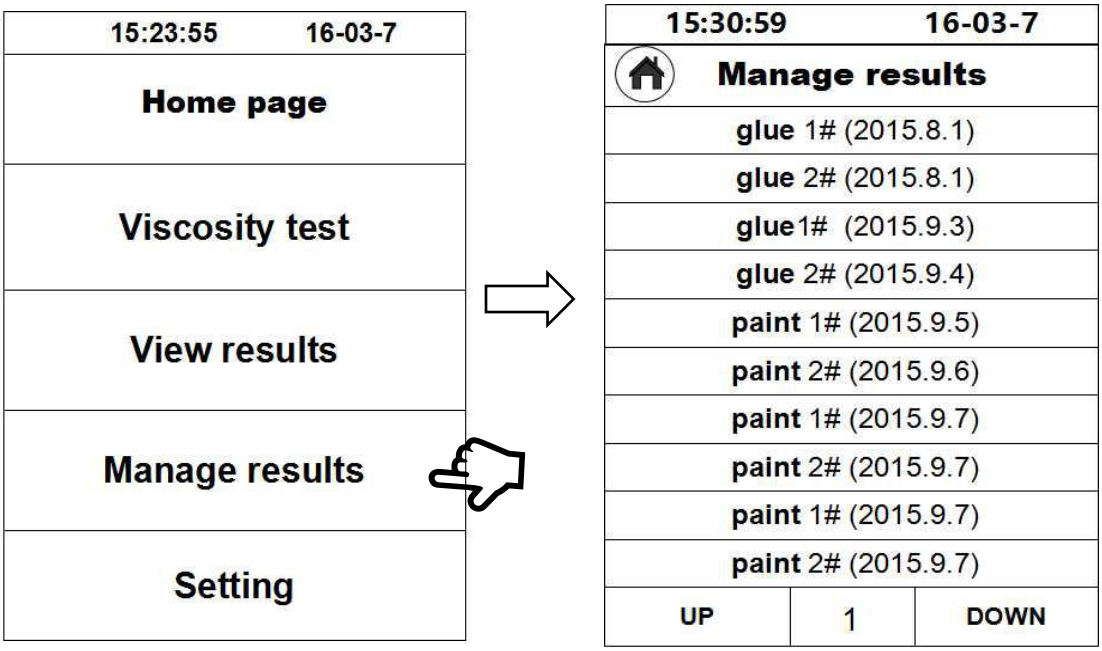

Fig. 27

4. Setting: set the time and date, etc of the instrument (Fig. 28).

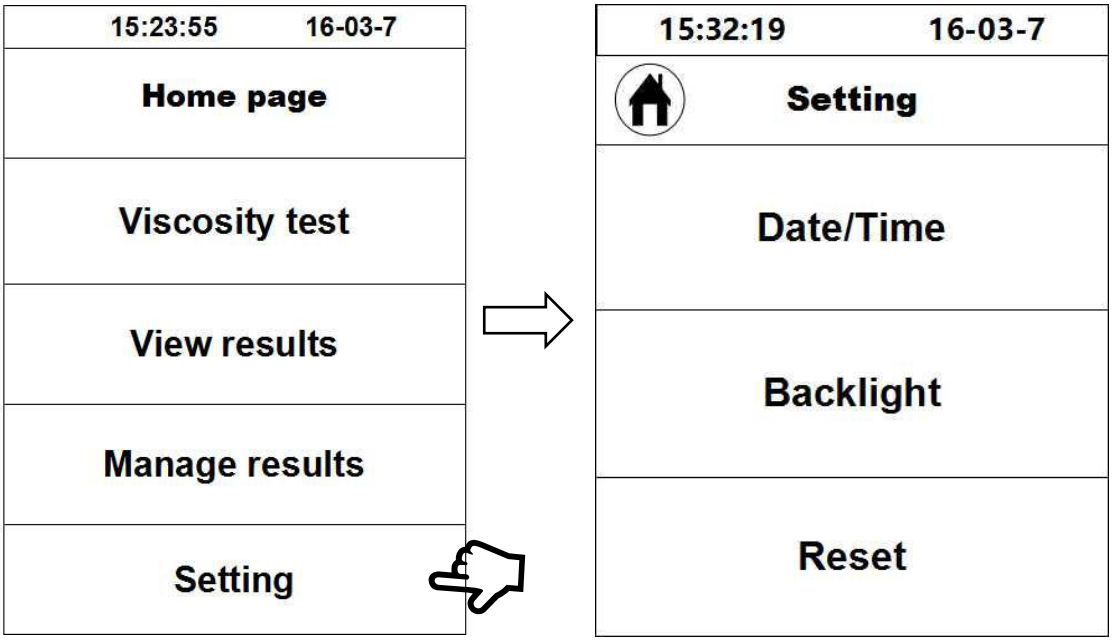

Fig. 28

4.1 Time and date setting: click **"Time/date setting"** to adjust the values of date and time (Fig. 29).

* This Instruction Manual is applicable for all viscosity meters, please read as per the model or configuration of the instrument you purchased!

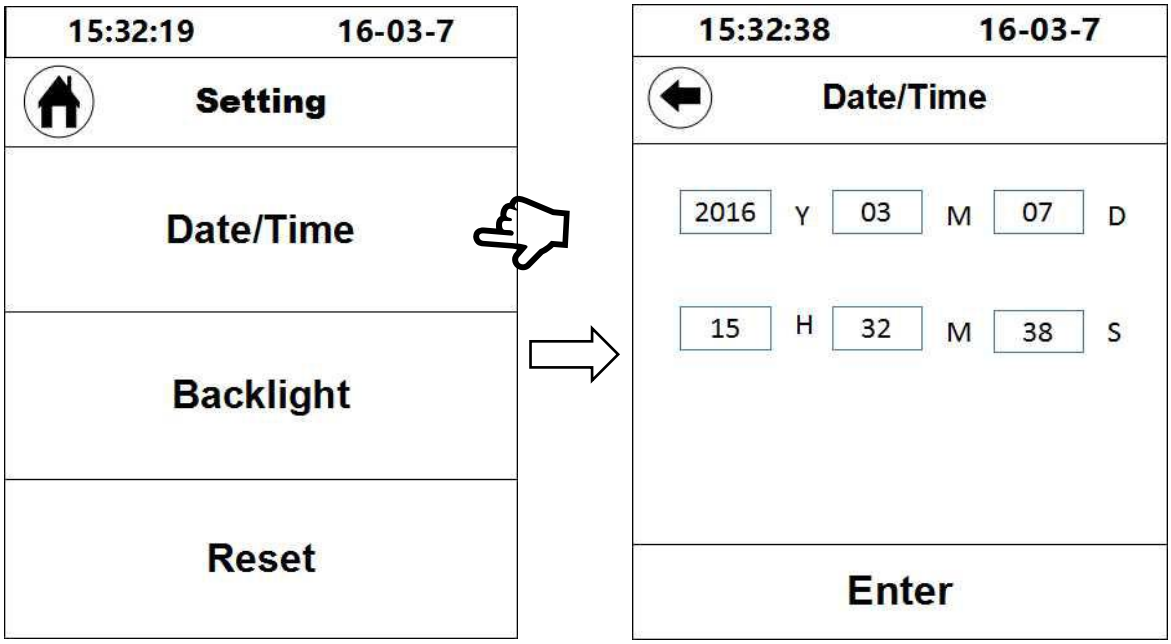

Fig. 29

4.2 Background light adjustment: click “Backlight” to adjust the screen brightness via the “-” and “+” or by directly dragging the circular adjusting icon (Fig. 30).

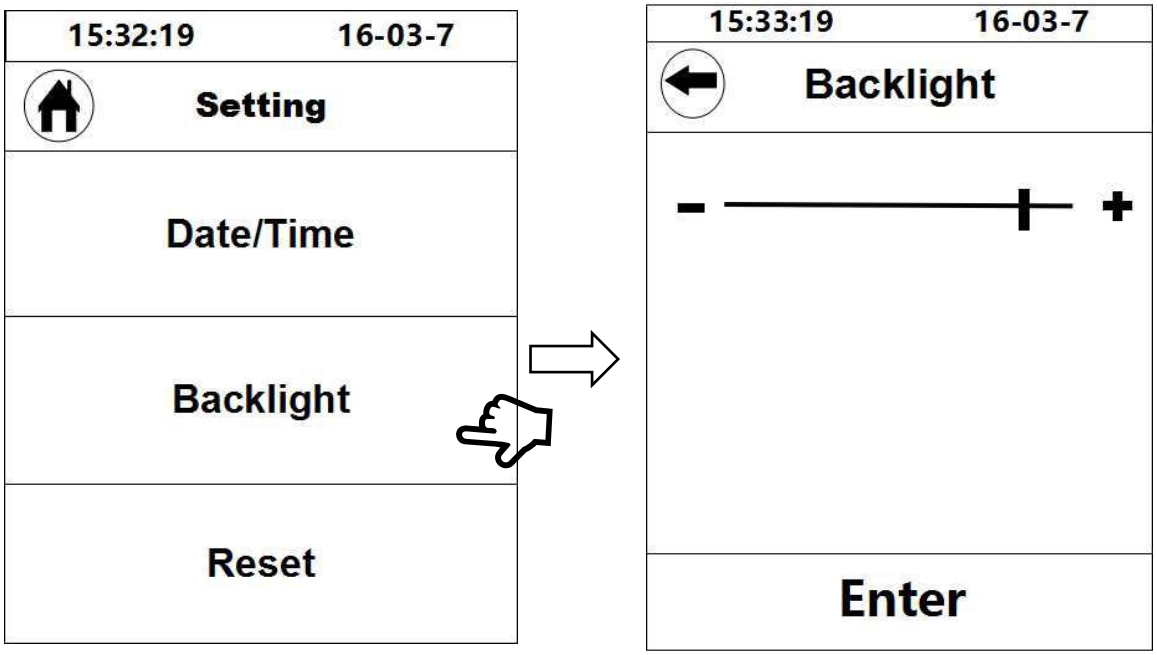

Fig. 30

4.3 Reset to the factory parameters: Click“Reset”to enter the interface show at right below, click “Enter” to reset the instrument to the factory state, and clear the test records and parameter records saved in the memory (Fig. 31).

* This Instruction Manual is applicable for all viscosity meters, please read as per the model or configuration of the instrument you purchased!

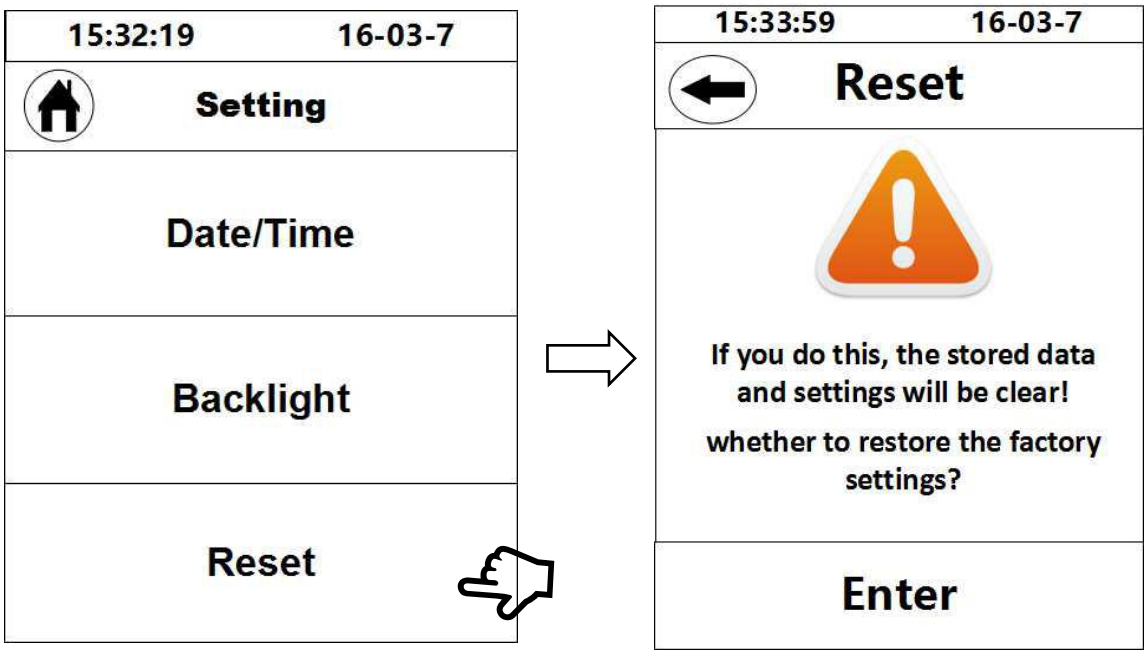

Fig. 31

5. Operating interface of model STM-2T

After turned on, the instrument will firstly display the initial interface and then enter the main menu after 3sec (Fig. 32), and the main menu has 4 option bars:

Viscosity test: test the viscosity of the sample;

View test data: view and print the saved test result;

Manage test data: output or delete the saved test data in batch;

Setting: set the basic parameters of the instrument, including: time, date, save path, factory parameter resetting, language selection, and background light adjustment, etc.

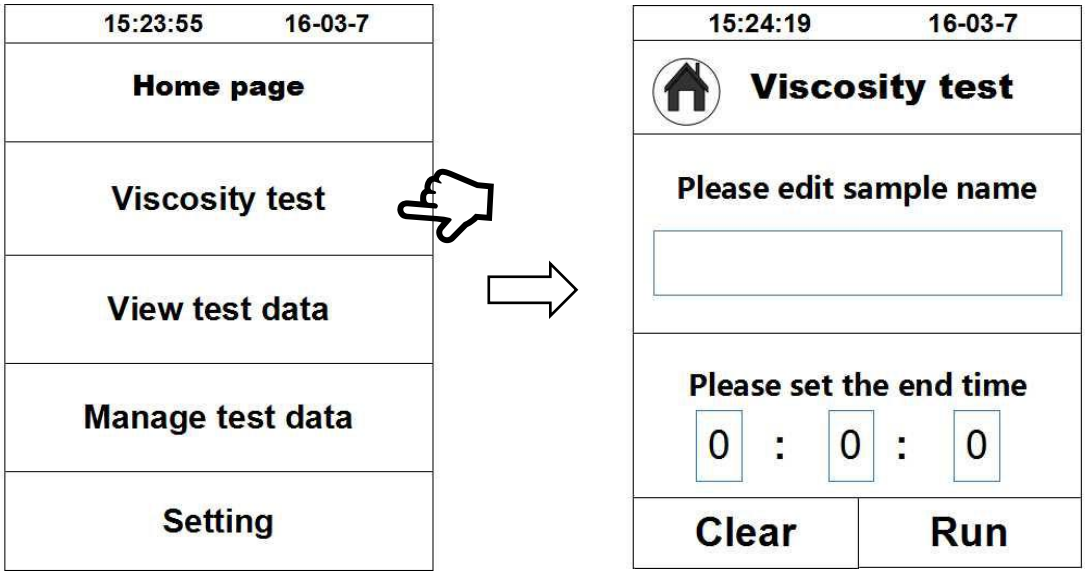

Fig. 32

5.1. Viscosity test

Click “Viscosity test” to enter the interface for viscosity testing (Fig. 32), firstly enter the sample name (CH/EN, or digital), set the testing time (H-M-S), and then click “RUN” to start

viscosity testing. If you do not enter a name, the name shows "Default" and the End time is 23:59:59 by default.

Start testing: enter the viscosity measuring interface (Fig. 33) after testing is started, and in this interface, values of the sample tested can be read directly. In testing, click "**Chart**" to enter the coordinate curve interface (Fig. 34), and in this interface, the data will be displayed as a curve in a coordinate system. After testing, click "**Stop**" to complete the test, or testing will be automatically terminated at the end of the testing time set.

If the sample viscosity is excessively large, there will be an overflow warning, and ERROR will be displayed for KU, CP and the load, in this case, it means the sample viscosity is beyond the maximum measuring range of this instrument.

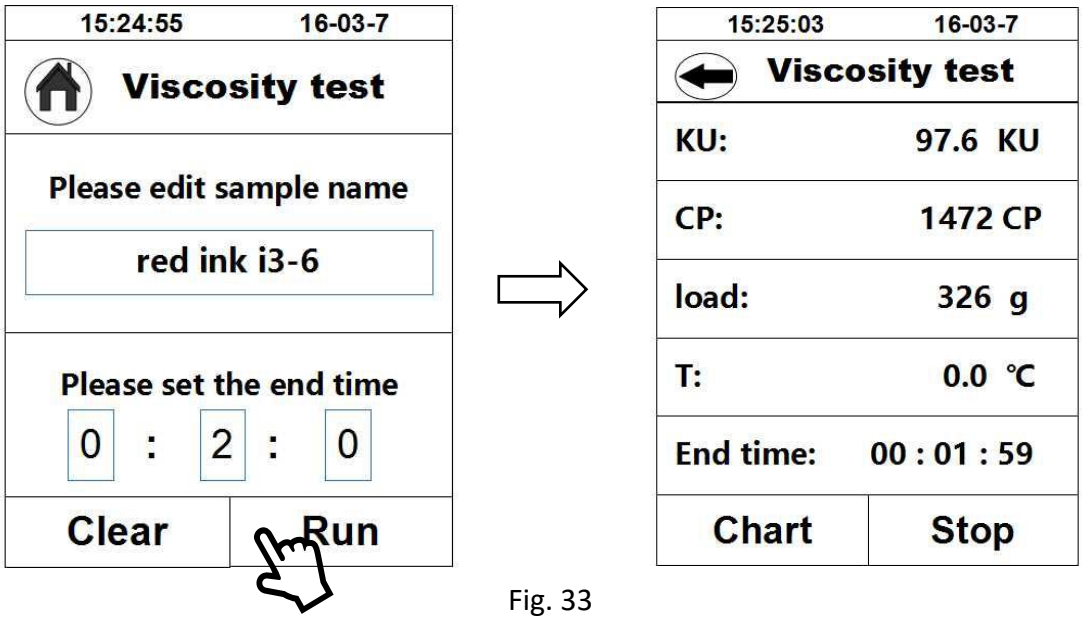

Fig. 33

"KU" represents the Stormer viscosity value

"CP" represents the viscosity value

"load" represents the load weight value

"T" represents the temperature value (the temperature probe needs to be configured separately, there is no installation temperature probe shows 0.0)

"End time" represents the value of the test end time

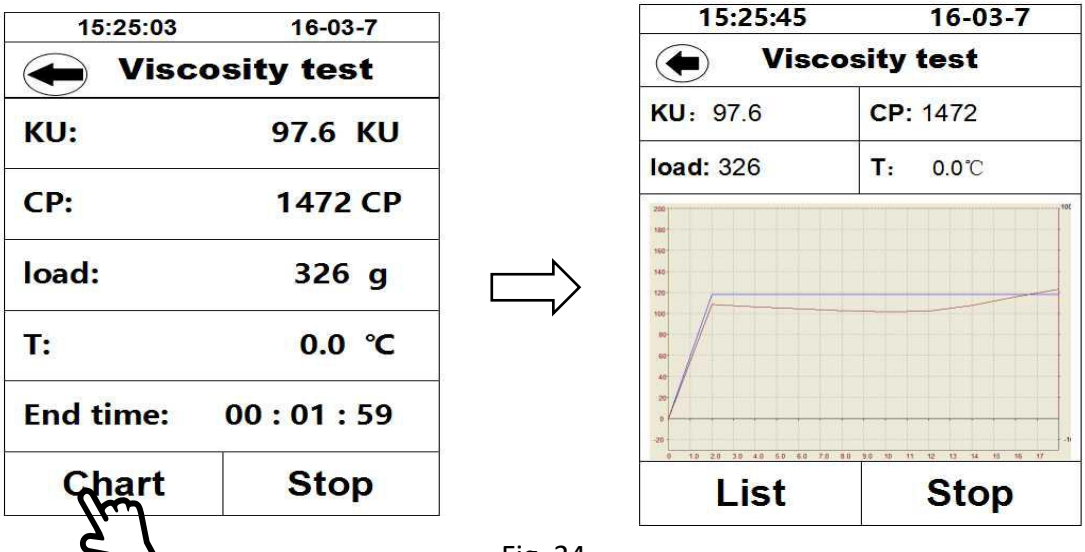

Fig. 34

The tested data and coordinate curve can be saved and printed after testing.

For measuring the viscosity of an unknown sample, the viscosity of the sample shall be estimated at first before selecting the corresponding combination of rotor and rotating speed.

If it is hard to estimate the approximate viscosity of the sample, it is necessary to imagine the sample has a high viscosity before measuring by rotors from small to big (cubage) and in a rotating speed from low to high.

The principle for viscosity measuring is: small (cubage) rotor and low rotating speed for a high viscosity fluid; big (cubage) rotor and high rotating speed for a low viscosity fluid.

VII. Precautions

1. Viscosity is a function of temperature, so the temperature fluctuation must be controlled within ±0.1°C when the instrument is working at the normal temperature, or the measurement accuracy will be degraded, and a thermostatic bath can be equipped if necessary.

2. The rotor surface must be kept clean.

3. The hairspring has a certain linear area, so the torque percentage shall be controlled during measurement, and this value shall be 10%~90%, and if the angle percentage is too high or too low, “ERROR” will be displayed for the torque and viscosity, the rotor or rotating speed shall be changed, or the measurement accuracy will be degraded.

E.g.: when LVDV-1T is used for sample testing by the combination of “Rotor 1# and rpm 60”, the torque percentage displayed is “ERROR”, so the rotating speed shall be decreased. If the value is decreased to "rpm 0.3" but the torque percentage displayed is still “ERROR”, it means a smaller rotor (smaller surface area) shall be used for measuring. If the torque percentage is always 10%~90% at different rotating speed with a same rotor, the one whose intermediate percentage is near 50% shall be used, and other tests are performed by analogy.

4. The rotor shall be carefully mounted or removed by lifting the universal joint up gently. The rotor cannot be forced under any horizontal stress or pulled down, otherwise the shaft will be damaged. Because the rotor and the universal joint are connected in left thread, rotor attaching or detaching must be performed in the correct the rotating direction (Fig. 35), or the universal joint will be damaged.

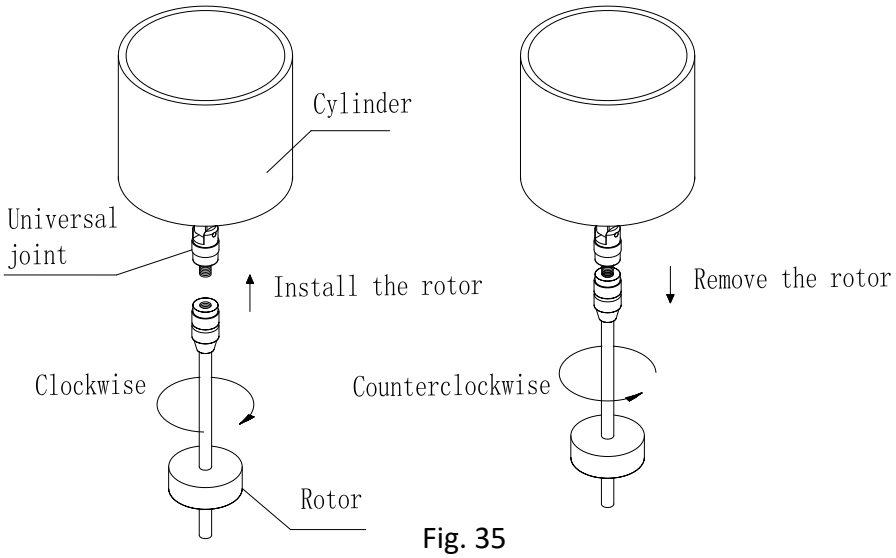

Fig. 35

5. The instrument shall be lowered slowly by carrying it by hands to protect the shaft from vibration.

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6. The universal joint shall be protected by plastic cap when the instrument is being transported or handled.

7. Suspending liquid, emulsion liquid, high polymer and some other high viscosity liquid are mostly "Non-Newton" liquid, and their viscosity is varying with shear velocity and time, so there will be different measured values when measuring with different rotors, rotating speeds and durations, (the result will be also varying if measuring a non-Newton liquid with a same rotor in different rotating speeds) it is determined by the liquid property, and is not any problem arising from the instrument.

VIII. Viscometer standard packing list

SN	Name	Qty	SN	Name	Qty
1	Digital display viscometer main machine	1 set	9	Power supply adaptor	1 piece
2	Main machine connecting rod	1 piece	10	Instruction manual	1 piece
3	Elevating pole and elevating slider	1 set	11	Certificate of Acceptance	1 piece
4	Triangle base	1 piece	12	Card of Guaranteed Repair	1 piece
5	Rotor sleeve (Only for STM-2T)	1 piece	13	Material tube (Only for STM-2T)	1 piece
6	Rotor protective frame (Not available for HA/HB/STM)	1 piece	14	Hexagon wrench	1 piece
7	Rotors (Varying with model)	1 set	15	Fixing ring, testing tube, metal connecting piece, extension hook (Only for SNB-1A-T)	1 piece each
8	Temperature controller NKY-25 (only for SNB-1J-T/NDJ-1C-T)	1 piece	16	Heater (Only for SNB-1J-T/NDJ-1C-T)	1 piece