

ATO-NDJ series

Digital Display Viscometer

Instruction Manual





Dear users:

Thank you very much for choosing our viscometer. In order to make sure you can use this product properly, please read the instructions carefully before using it.

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I. Working principle and application

This series has high performance stepper motor and driver, according to the procedures set accurately and smoothly running, the motor drive torque sensor by constant speed rotation of the rotor. When the rotor is in the measured by liquid viscous resistance, and force feedback to the torque sensor, and then after the corresponding internal processing and operation, the viscosity data can be displayed the measured liquid to the LCD screen. In terms of the use of the instrument operation, the instrument has a series of measurements for the full-scale value 100% range overflow function, alarm display, automatic scanning function, the user can rely on these, intuitive, fast, and accurate rotor speed combinations available to choose the right, and can save the test conditions to determine, convenient and use the fast out of the testing process in the production of the day.

This series of instruments are widely used in solvent adhesives, latex, biochemical products, paints, coatings, cosmetics, inks, pulp, food and other industries.

II. Main technical performance

1. NDJ-5S、NDJ-9S

measuring range	1mPa.S - 100,000mPa.S,when less than 15CP, use the No. 0 rotor test
Display accuracy	0.01mpa.s
measurement accuracy	5S: $\pm 3\%$ (Full scale) 9S: $\pm 1.5\%$ (Full scale)
Rotor specification	1#, 2#, 3#, 4#, Four rotors (No. 0 rotors are optional)
speed	6, 12, 30, 60 RPM/min
Outline size	95*130*155 (Excluding base)
Net weight	2kg (Excluding base)

2. NDJ-8S

measuring range	1mPa.S – 2,000,000mPa.S when less than 15CP, use the No. 0 rotor test
Display accuracy	0.01mpa.s
measurement accuracy	$\pm 3\%$ (Full scale)
Rotor specification	1#, 2#, 3#, 4#, Four rotors (No. 0 rotors are optional)
speed	0.3, 0.6, 1.5, 3, 6, 12, 30, 60 RPM/min
Outline size	95*130*155 (Excluding base)
Net weight	2kg (Excluding base)

III. Use environmental conditions

Ambient temperature: 5 degrees ~35 degrees Celsius (recommended using ambient temperature of about 20 degrees)

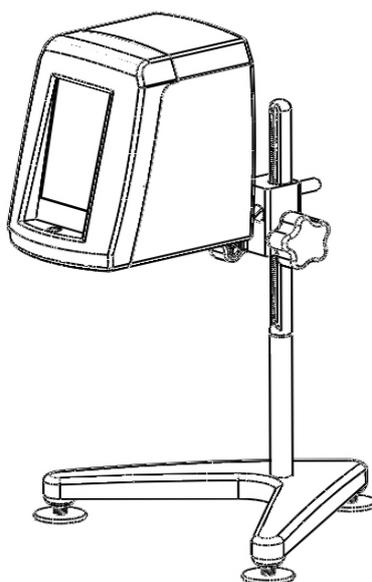
Relative humidity: less than 80%

IV. Instrument installation

Power supply: AC100~240v (50/60Hz)

There is no strong electromagnetic interference near the instrument, no corrosive gas, no violent vibration.

1. Open the box to take out a lifting column, a connecting rod, viscometer host, power adapter and other components. The lifting column is inserted into the base hole nut and tight (Note: the lifting knob on the right), then connect the screw rod on the host, and then down the plane milling insert into the mounting hole below after the host, the host and the fixing rod connecting and fastening screw with the floor under the inner six angle screw mounting hole. The connecting rod is inserted into the host installed in the lifting slider, right after fasten the knob.
2. The lifting knob is adjusted to the proper lifting tightness, the host does not automatically fall, and when the lifting handle moderate damping is appropriate, such as too loose or too tight can be adjusted by adjusting the screw lifting slider ahead.
3. By adjusting the three horizontal feet under the base, the instrument's front bubble is in the center of the black circle
4. Remove the protective cap under the instrument. Switch on the instrument power. After the assembly, the shape is shown below.



V. Operation

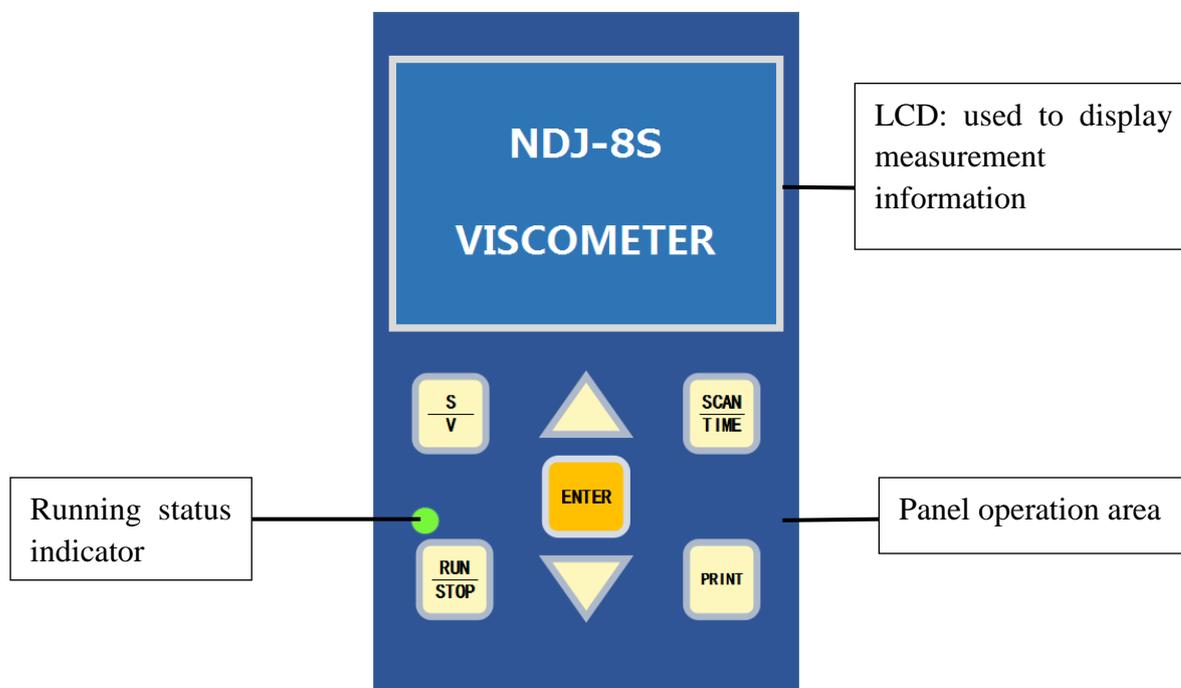
1. The sample shall be poured into a round flat container of no less than 60mm diameter. (0# rotor or a small sample adapter shall be used with a special container).

2. The rotor frame is arranged to protect the instrument beneath the silver shell. (The installation method: upper protective frame two hole is sheathed in the lower casing on the fixed shaft, then screw counterclockwise can).
3. Select the applicable rotor, turn counterclockwise to the lower rotating shaft joint.
4. Twist the lifting knob, so that the instrument slowly decline, the rotor immersed in the sample, and the liquid level line (rotor rod groove or convex line) and the measured liquid surface to keep flat.
5. Check again whether the instrument is horizontal in front of the instrument.

Note: when loading and unloading the rotor, do not drag the shaft joint downward or crosswise so as to avoid damage to the internal structure

During the test, the ambient temperature must be constant to ensure the stability and accuracy of the measurements

VI. Instrument operation interface description



After the boot, the instrument first displays the instrument type information and waits for 3 seconds to get into the test state. At this point, there are 4 lines in the LCD screen:

rotor:	Current rotor number;
speed:	Current speed;
range:	The corresponding rotor, the full scale of the speed;
Time, temperature:	Preset automatic stop time, the current temperature measured by the temperature probe (if the temperature is not checked, the probe is shown as "0")

(Because the machine has the power off memory function, that is, set the rotor speed, preset time will continue to remain in the page after the power is switched on again, so as to facilitate the user's operation.)

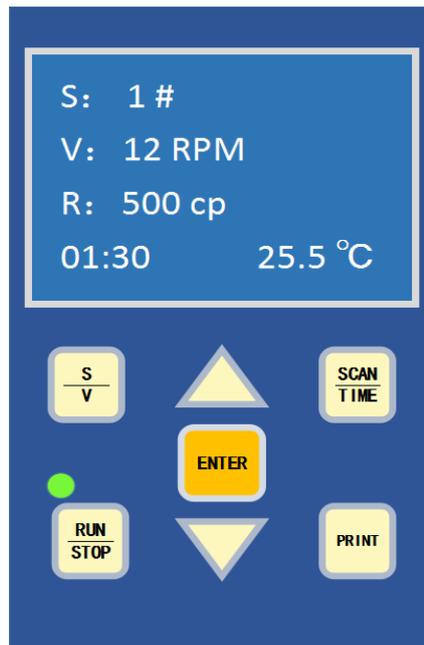


Figure 1

Panel operation instructions

There are 7 buttons and a LED indicator light in the panel operation area:

- Rotor / rev: Select rotor speed;
- Start / stop: Control the operation of the instrument and stop;
- ▲/▼: Adjust the corresponding parameters;
- Confirm: Validation of parameter values and options;
- Scan / timing: Enable auto scan function and timing auto stop function;
- Print: Print the measured data (you need to connect a dedicated external printer);
- LED indicator light: When the motor is in operation, the indicator light is on, the motor stop lamp is extinguished, and when the speed is low, the operation state of the instrument can be understood

After you select the right rotor / rpm, press start to start the test and start the test screen. See Figure 2.

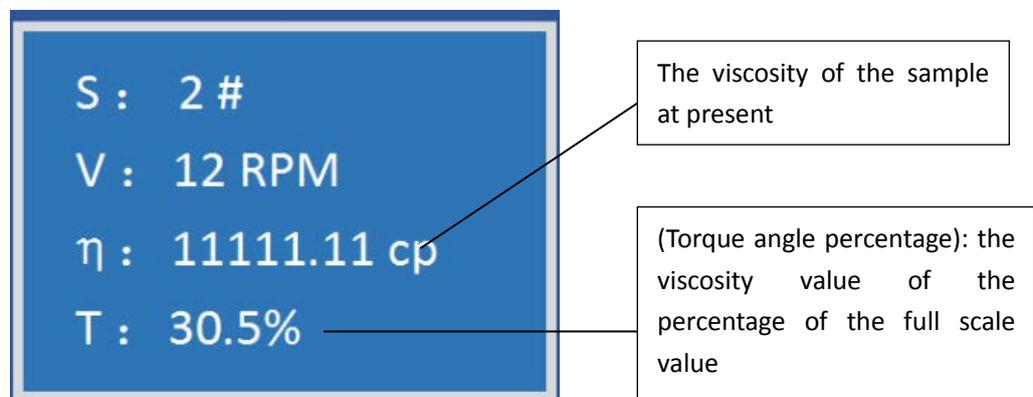


Figure 2

When the viscosity data of the tested samples displayed on the screen, do not rush to read the viscosity, should make full circle after the first 3~5 rotary instrument to observe the

bottom line of the "torque" value, the value is only between 15%~80% is effective, the time to read the viscosity value. If the value is less than the "torque" 15% or more than 80%, is regarded as the current range selection is not appropriate, should switch the other ranges (specific operation way: "torque" value is less than 15% belong to the range selection is too large, need to reduce the range, can improve the speed or change with the large volume of rotor; torque values greater than 80% belong to the range is too small, the need to increase range, can reduce or replace the small volume of the rotor speed). This instrument has the full range of overflow alarm function, when the torque value is greater than 80%, the viscosity value is shown as "EEEE", and with the alarm buzzer, then switch to a small range to be tested.

For measuring the viscosity of the sample, should first estimate the sample viscosity value. Then select several groups corresponding to the rotor speed, combined to make the measurement. When not able to estimate roughly viscosity of the fluid to be measured value, should assume that the sample with high viscosity value, from small to large (volume) of the rotor and from slow to fast the speed of testing.

The principle of viscosity measurement is that:

The high viscosity fluid uses a small (volume) rotor with slow speed;

Low viscosity fluids use large (volume) rotors, fast and fast

The test range corresponding to the rotor and the speed of the combination:

Speed / rotor	No.1	No.2	No.3	No.4	No.0
	Full scale value mPa.s				
60 r/min	100	500	2000	10000	10
30 r/min	200	1000	4000	20000	20
12 r/min	500	2500	10000	50000	50
6 r/min	1000	5000	20000	100000	100
3 r/min	2000	10000	40000	200000	200
1.5 r/min	4000	20000	80000	400000	400
0.6 r/min	10000	50000	200000	1000000	1000
0.3 r/min	20000	100000	400000	2000000	2000

VII. Matters needing attention

Because the viscosity is a function of temperature, when the instrument is working at normal temperature, the temperature fluctuation should be controlled at + 0.1, otherwise it will affect the accuracy of measurement

1. Keep the rotor surface clean
2. Because the spring has certain linear measurement, please note that the numerical torque percentage is between 15%-80%, when the high percentage of numerical angle, torque and viscosity will overflow the sign "EEEE", this time should replace or change the rotor speed, and otherwise it will affect the accuracy of the measurement.

For example: NDJ-8S type test specimen with one rotor, 60 rpm speed combination test, torque per cent show "EEEEEE", it should reduce speed. As has been reduced to "0.3 RPM", the torque per cent still shows "ERROR"; it should be selected smaller the rotor (surface area) measurement test. As test samples in the same rotor case, numerical torque percentage for different speeds are between 15%~80%. It takes in between the torque per cent is close to 50% for the standard. Other types of testing and so on.

3. Loading and unloading rotor should be careful operation, the universal joint micro upward, not excessive force. Do not let the rotor transverse force, must not drop the rotor, so as not to damage the shaft tip
4. Universal joint head should be kept clean
5. When the instrument falls slowly, it is better to hold it with your hands to avoid vibration and damage the axle center
6. When the instrument is moving or moving, the universal connector shall be provided with a protective cap
7. suspension, emulsion, and polymers and other high viscosity liquids in many are "non Newton liquid, its apparent viscosity change with shear rate and time, so at different rotor speed and time determination, the results are not consistent is normal, is measured (such as non Newtonian fluid even in the same rotor, different speeds; the results will be decided by the nature of the deviation) are fluid, is not the instrument testing problems.

VIII. Viscometer package

Serial number	Name	Number
1	Viscometer host	1
2	Main connecting rod	1
3	The lifting rod and the lifting slider	1
4	Tripod base	1
5	Rotor protection frame	1
6	rotor (1, 2, 3, 4)	1
7	power adapter	1
8	instruction manual	1
9	Certificate	1
10	Warranty card	1
11	Inner hexagon spanner	1

IX. Options

Serial number	Name	Number	Remarks
1	Temperature probe	1	Display the current temperature of the fluid to be measured (temperature range 0 to 100°C)
2	No. 0 rotor	1	Used to measure ultra-low viscosity samples below 15mPa.S
3	Micro printer	1	Direct print data

X. Installation procedure and application method of No. 0 rotor

1. The construction of No. 0 rotor is shown in Figure 3. Its components can only be used for rotor No. 0, and other rotor tests are not applicable. The operation of No. 0 rotor must use all the components as shown below together.
2. First install the 0# rotor on the rotor connecting rod (installed on rotating in the counterclockwise direction).
3. Then from bottom to top put the fixing sleeve sheathed on the bottom of the instrument cylinder (Note: don't touch the 0# rotor) and use the sleeve fixing screw for tightening.
4. Pour the fluid into the test cylinder about 18 to 20ml.



Figure 3

Note: No. 0 rotor shall not be used when no fluid is loaded. No rotor protection frame shall be used when the No. 0 rotor is in use.