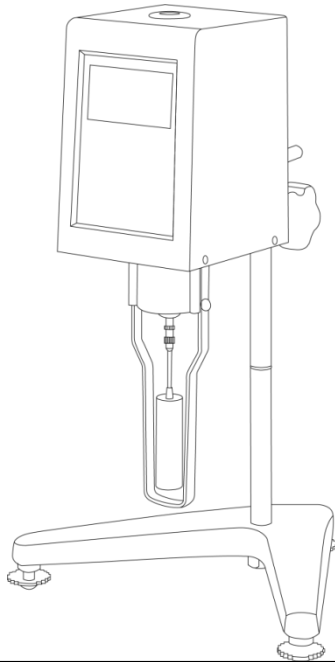




# Digital Rotary Viscometer



This manual should be made available to all users of this equipment, For best results, and for maximum durability of the equipment, carefully read and follow all instructions. Failure to do so can lead to serious injury or catastrophic damage to the user, machine, supplies, or surrounding areas A safety suggestions must be followed closely, and extreme precaution must be taken to assure proper use of the equipment by only qualified personnel who have read this guide.

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# I. Getting Started

Thank you for choosing U.S. Solid Rotary Viscometer. For smooth and safe operations, please read and understand this manual. The operation and maintenance information listed within has been updated as of its printing.

- Only personnel with relevant training should operate this instrument.
- Adhere to applicable regulations, including safety, personal safety, and accident prevention.
- Be mindful of the magnetic field's impact on the environment, especially on data memory and pacemakers.
- Place the instrument on a stable, clean, non-slip, dry, and fireproof surface. Avoid exposure to corrosive gases.
- Ensure the power cord does not touch the instrument's panel surface.
- Use appropriate protective equipment based on the processing medium to prevent hazards like liquid splashes or the release of toxic or combustible gases.
- Inspect the instrument and accessories before each use to ensure they are undamaged.
- When handling toxic and volatile substances, use airtight containers and work in a suitable fume hood.
- Ensure the instrument's power supply frequency error range

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conforms to the specified voltage to maintain measurement accuracy.

- Handle the rotor carefully during installation and removal. Before disassembling, gently lift the connector at the lower part of the instrument. Keep the connecting parts, rotor connection end surfaces, and threads clean to ensure proper rotor connection and stable rotation.
- After installing the rotor, avoid rotating it without liquid to prevent damage to the rotor tip and bearings.
- Keep the measuring rotor (including the outer cylinder) clean and free from dirt. Clean it promptly after each use. Disassemble the rotor for cleaning using a suitable organic solvent; never clean it while attached to the instrument, especially after measuring paints or adhesives. Avoid using metal knives to prevent surface scratches that could affect measurement accuracy. After cleaning, store the rotor properly in its storage box.
- During movement and transport of the instrument, secure the rotor connector with the yellow protective cap.
- Before powering on the instrument, always remove the yellow protective cap to prevent damage.
- Do not disassemble or adjust the instrument's parts arbitrarily, and do not add lubricating oil on your own.
- Many suspensions, emulsions, polymers, and other viscous liquids are "non-Newtonian fluids," meaning their apparent viscosity

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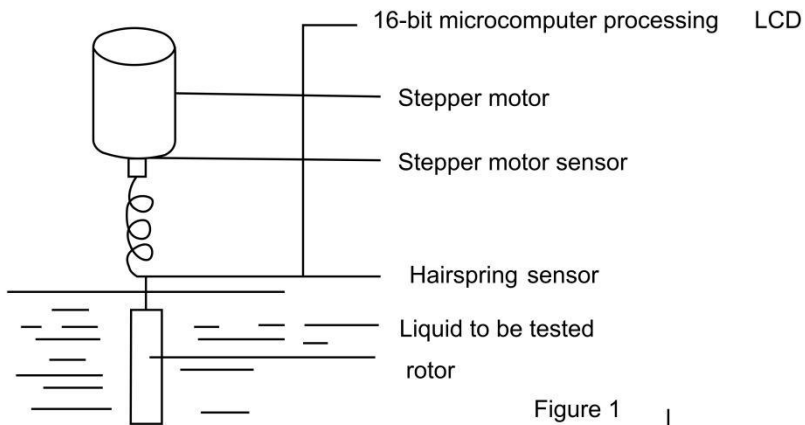
varies with shear rate and time. Therefore, variations in results under different rotors, speeds, and times are normal and do not indicate instrument inaccuracy. When measuring non-Newtonian liquids, specify the rotor type, speed, and duration.

- Achieve accurate viscosity measurements by:
- Controlling the temperature of the liquid precisely.
- Immersing the rotor in the liquid for sufficient time at a consistent temperature matching the liquid.
- Ensuring uniformity of the liquid. d. Centering the rotor in the container during measurement.
- Preventing air bubbles from adhering to the rotor's bottom when immersing it in liquid.
- Using a protective frame during measurement.
- Maintaining cleanliness of the rotor.
- Following operational instructions strictly.
- Using the # 0 rotor for liquids below 11 mPa·s.

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## II.Over Review

The upgraded Digital Rotary Viscometer features advanced mechanical design, manufacturing processes, and microcomputer control technology, ensuring precise data acquisition. Its LCD display with a blue backlight provides high brightness for clear visibility of the data.



Renowned for its high measurement sensitivity and dependable test results, this viscometer offers convenient operation and an attractive design. It serves as a precision instrument used to measure both the absolute viscosity of Newtonian liquids and the apparent relative viscosity of non-Newtonian liquids. Its versatile applications include industries such as grease, paint, plastics, pharmaceuticals, food, coatings, adhesives, resins, and chemical materials.

Operationally, the digital viscometer employs a motor to drive the rotor at a constant speed through variable speed control. As the rotor

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rotates within a liquid sample, it generates viscosity torque proportional to the liquid's viscosity. Sensors detect this torque, which is then processed by the microcomputer to calculate viscosity readings.

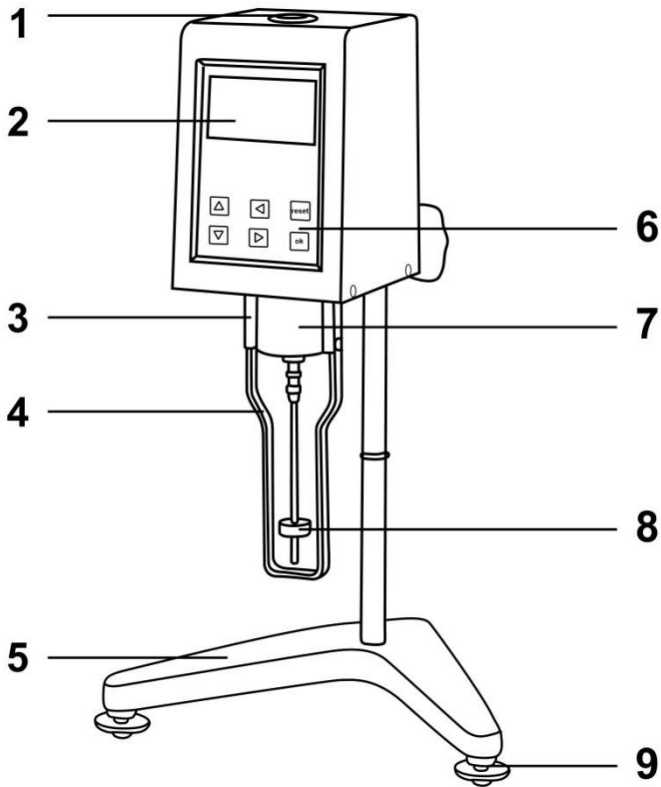
Innovatively utilizing microcomputer technology, the instrument allows for easy adjustment of parameters such as rotor type and speed range. During measurement, it digitally processes sensor data and displays essential information such as rotor type, speed, viscosity value of the measured liquid, and percentage of the full-scale range.

The USS-DVT00004 and USS-DVT00006 models are equipped with 4 types of rotors (NO. 1, 2, 3, 4) and 4 speeds (6, 12, 30, 60 rpm), offering a total of 16 combinations. This configuration allows for measuring the viscosity of various liquids within the specified range. Additionally, the USS-DVT00006 includes a temperature measuring device that displays temperature directly on the screen, enabling observation of viscosity changes due to temperature fluctuations.

On the other hand, the USS-DVT00001 model features 4 types of rotors (NO.1, 2, 3, 4) and 8 speeds (0.3, 0.6, 1.5, 3, 6, 12, 30, 60 rpm), providing 32 combinations in total. This broader range of speeds allows for measuring the viscosity of liquids across a wider spectrum within its measurement capabilities.

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## III. Structure

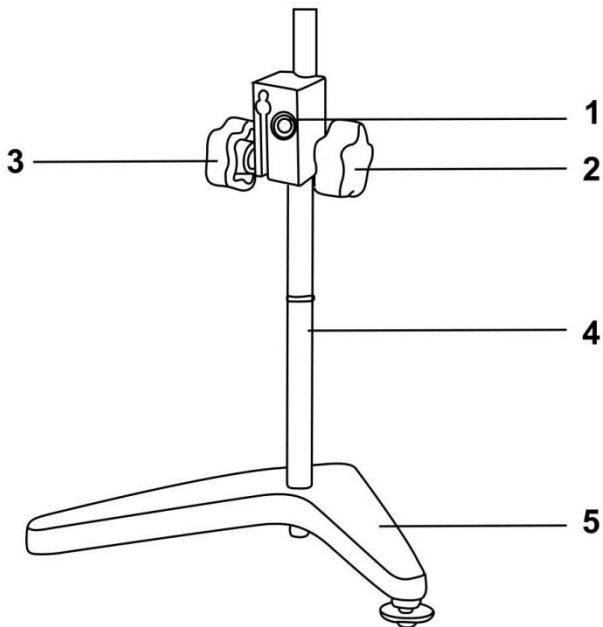


- |                       |                          |
|-----------------------|--------------------------|
| 1. Level indicator    | 6. Operation keyboard    |
| 2. LCD                | 7. Rotor connector       |
| 3. Housing            | 8. Rotor                 |
| 4. Protection bracket | 9. Level adjustment knob |
| 5. Base               |                          |

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### III. Structure

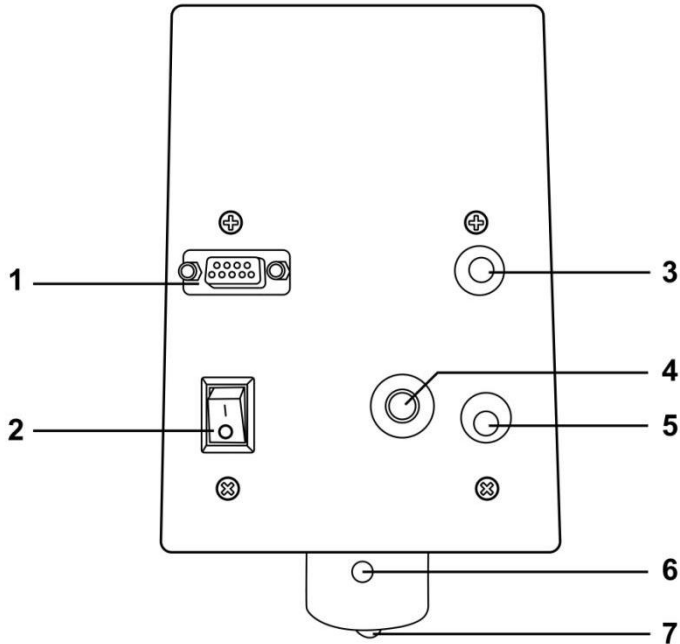


1. Lifting and tightening adjustment screw (with hexagonal plate head)
2. Lifting hand-wheel
3. Machine head fixed hand-wheel
4. Stanchion with teeth
5. Base

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## III. Structure

### The back side of the instrument

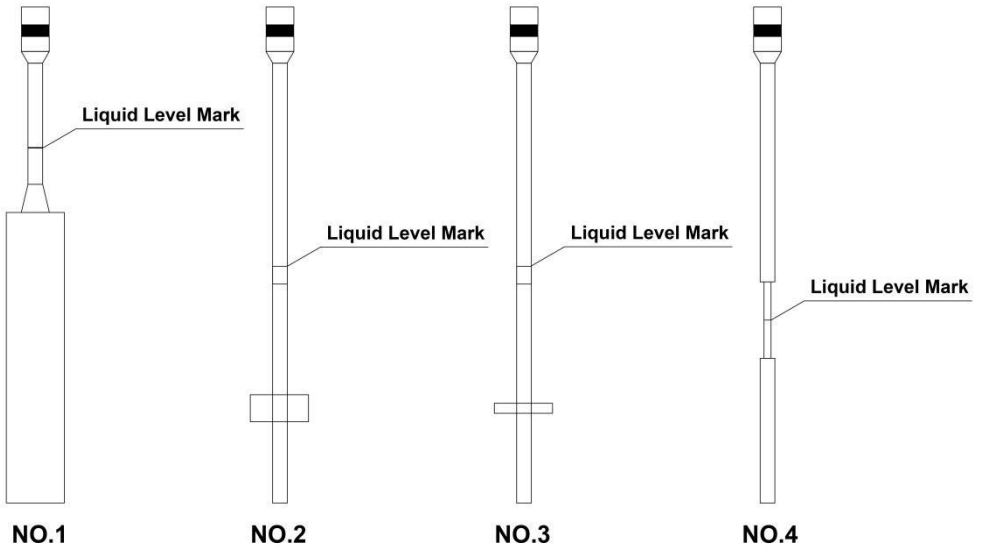


1. RS232 interface (optional)
2. Power switch
3. Temperature sensor probe interface (USS-DVT00006 only)
4. Mounting hole for machine head handle
5. Power cord socket
6. Mounting hole for the protection bracket
7. Protective cap

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# III. Structure

## Rotor Kit



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## IV.Parameters

Model	USS-DVT4	USS-DVT5	USS-DVT6	USS-DVT1	USS-DVT8
Measurement Range	1 to $1 \times 10^5$ mPa·s			1 to $2 \times 10^6$ mPa·s	
Measurement Accuracy	±2% (Newtonian Liquid)				
Rotor Specification	No. 1~4 rotor (optional: No. 0 rotor can measure low viscosity to 0.1 mPa·s)				
Rotor Speed	6, 12, 30, 60 rpm and Auto			0.3, 0.6, 1.5, 3, 6, 12, 30, 60 rpm and Auto	
Temperature Measuring		YES	YES		YES
RS232 Connector		YES			YES
Power Supply	AC 110 V±10, 60 Hz±10%				
Working Environment	Temperature: 5°C to 35°C Relative Humidity: ≤80%				
Dimension	370 × 325 × 280 mm				
Net Weight	6.8 kg				

In Auto mode, TIMING function does not work.

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## V.Preparation

- Ensure the working area is clean and dry.
- Place the instrument on a level and stable workbench.
- Set up the workbench in a location free from vibration interference.
- Keep the instrument away from objects and equipment that have magnets or can generate magnetic fields.
- Avoid using the instrument in areas prone to explosive hazards.
- Avoid prolonged use of the instrument in high humidity or highly dusty environments.

## VI.Installation

- Unpack both the shipping box and the instrument storage box, and verify each part of the instrument against the packing list provided in the manual appendix.
- Insert the toothed vertical shaft column into the round hole of the base, ensuring that the toothed surface of the vertical shaft faces the front of the base. Tighten the nut on the column using a wrench to secure it and prevent rotation.
- Rotate the lifting handwheel to adjust the vertical movement. If the handwheel feels too tight or loose, adjust the tightening screw located on the front of the lifting seat to achieve a slight tightness.

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This prevents the viscometer head from descending under its own weight. Next, insert the handle of the viscometer head into the designated round hole to maintain a level position, then secure it in place using the fixed handwheel.

- Remove the yellow protective cap located underneath the viscometer head.
- Adjust the leveling screw on the base until the bubble is centered at the central point.

## VII.Operation

- Place the liquid to be tested in a beaker or straight container with a diameter of at least 70mm and a height of at least 125mm.
- Accurately control the temperature of the liquid.
- Carefully adjust the instrument's level, ensuring the bubble is centered, to maintain the instrument in a horizontal working position (installing the protective frame).
- Estimate the viscosity range approximately, and then select the rotor and rotation speed based on the range table. If the viscosity of the liquid cannot be estimated, consider the measured liquid as high viscosity. Select rotors from small to large (rotor numbers from high to low) and rotate at slower to faster speeds. Generally, for high viscosity liquids, use a small rotor and slow speed; for low viscosity liquids, use a large rotor and fast speed. ***Screw the rotor into the rotor connector by rotating left to install and right to***

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***remove.***

- Slowly adjust the lifting knob to raise or lower the rotor until it is level with the liquid level at the mark (midpoint of the groove) in the measured liquid.
- Keyboard operation and display interface description
- Turn on the power switch on the back of the instrument and wait for initialization.
- When the cursor is on "1#", press ◀ or ▶ to select the desired ROTOR number. The available rotor numbers include 1#, 2#, 3#, 4#, and 0#.
- Press the ▲ or ▼ key to navigate to the SPEED setting. Then, use the ◀ or ▶ key to select the desired speed. *The speed of USS-DVT4, USS-DVT5 and USS-DVT6 is divided into 5 gears, which are 6 rpm, 12 rpm, 30 rpm, 60 rpm and Automatic gear. The speed of USS-DVT1 and USS-DVT8 is divided into 9 speeds, which are 0.3 rpm, 0.6 rpm, 1.5 rpm, 3 rpm, 6 rpm, 12 rpm, 30 rpm, 60 rpm and Automatic gear.*
- Press the ▲ or ▼ key to navigate to OUTPUT setting. Then, use the ◀ or ▶ key to select the desired OUTPUT. **If your machine doesn't have an RS232 connector, please skip this step and proceed to the next.***There are two OUTPUTS: PRINT and SENT. In PRINT OUTPUT, data is saved for printing. In SENT OUTPUT, the data is sent to your computer in real-time.*
- Press the ▲ or ▼ key to navigate to CLOCK setting. Then, use the

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◀ or ▶ key to select the desired one. *There are three CLOCK settings: TIMING, MODIFYING, and VIEW. In TIMING, you can set the total testing time, **but please note that the TIMING function does not operate in AUTO mode.** In MODIFYING, you can edit the testing date. In VIEW, you can see detailed information about the testing date.*

- Pressing Reset will halt the viscometer's measurement process. Press OK again to resume measuring with the last used rotor number and rotation speed settings. You can also press the Reset key to return the system to its initial state.

## VIII. Measurement Range table

USS-DVT4, USS-DVT5, USS-DVT6 Range (mPa·s)				
Rotor \ Speed	60 Rpm	30 Rpm	12 Rpm	6 Rpm
0# rotor	10	20	50	100
1# rotor	100	200	500	1,000
2# rotor	500	1,000	2,500	5,000
3# rotor	2,000	4,000	10,000	20,000
4# rotor	10,000	20,000	50,000	100,000

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USS-DVT1, USS-DVT8(mPa·s)								
Speed Rotor	60 Rpm	30 Rpm	12 Rpm	6 Rpm	3 Rpm	1.5 Rpm	0.6 Rpm	0.3 Rpm
0# rotor	10	20	50	100	/	/	/	/
1# rotor	100	200	500	1000	2000	4000	10000	20000
2# rotor	500	1000	2500	5000	10000	20000	50000	100000
3# rotor	2000	4000	10000	20000	40000	80000	200000	400000
4# rotor	10000	20000	50000	100000	200000	400000	1000000	2000000

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## IX. Packing List

No.	Name	QTY	Standard	Options
1	Main Machine	1 pcs	√	
2	1~4# Rotors	1 Set	√	
3	Power Adapter	1 pcs	√	
4	Protection frame	1 pcs	√	
5	Base	1 pcs	√	
6	Lifting Vertical Shaft	1 set	√	
7	0#Rotor	1 set		√
8	hexagonal Wrench	1 pcs	√	
9	Solid Wrench	1 pcs	√	
10	Machine Head Handwheel	1 pcs	√	

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## **Contact Information**

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