

Digital Viscometer

LB-11DV



info@labotronics.com

www.labotronics.com

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1. Safety Measures

- 1) Kindly carefully read the Operation Manual before using and operate the instrument as per the test requirement.
- 2) The power supply should be within the tolerance range of the voltage and frequency, or it will affect the measurement accuracy.
- 3) Be careful to assemble and disassemble the spindle. Users should raise the connection bolt at the lower section of the instrument to assemble and disassemble the spindle.
- 4) Do not handle the spindle by excessive force and do not transversely move the spindle to avoid bending the spindle. Keep the connection surface and screwthread of the connection bolt, and the spindle clean, or they will affect the installation and rotation stability of the spindle.
- 5) Do not let the spindle rotate when there is no liquid in the sample cylinder to avoid any damage to the shaft and bearing.
- 6) Clean the spindle immediately after each test. Disassemble the spindle when you want to clean it. It is forbidden to clean the spindle when it is in the instrument. The spindle should be kept in the storage case after cleaning.
- 7) Mount on the yellow protection cap, rise the connection bolt, and screw on the deadbolt on the protection cap tightly before instrument movement or transportation.

Note: The protection cap should be disassembled before you connect the instrument to the power supply, to avoid any damage to the instrument.

- 8) Do not disassemble the instrument or change any part of the instrument unnecessarily. Do not add lubricating oil to the instrument by yourself.
- 9) Most suspending liquids, emulsions, high polymers, and other high-viscosity liquids are non-Newton liquids. The apparent viscosity of them always changes together with the change of shear speed and time. When you determine the viscosity of the sample using different spindles, rotation speed, and time, it is normal that the test data are different.
- 10) Do not lay down the instrument.
- 11) If you make tests as per the following requirement, you can get the correct value.

- Control the temperature of the liquid to be determined.

Note: you can purchase a circulation constant temperature water bath and a special two-layer sample cup if necessary.

- Immerse the spindle in the liquid to be determined for a long time, so that its temperature is the same as that of liquid to be determined.
- Ensure the uniformity of liquid to be determined.
- Place the spindle in the center of the container during measurement.
- Carry out measurements using the spindle protection shield.
- Keep the spindle clean.
- Take great care to avoid any bubble adhering to the lower section of the spindle when you immerse the spindle into the liquid to be determined.

Warning: If any breakdown appears, please cut off the power supply immediately.

2. Introduction

Digital Viscometer LB-11DV is a bench top, microprocessor-controlled unit. Integrated with stepping motor for stable rotation. Digital screen automatically displays measured values, including 2 digits after decimal point. Timer is set to test viscosity of non-Newtonian fluids. Provision to connect micro-printer to print various data for interpretation.

3. Features

1. Adjustable horizontal display
2. Gearless driven (Noiseless operation)
3. Blue screen digital LCD display
4. Screen displays viscosity, speed, torque, rotor number etc.
5. Printing interface: micro-printer

4. Specifications

Model No.	LB-11DV
Measurement range	1 mPa.s ~ 2×10^6 mPa.s
Rotor speed	0.3 rpm, 0.6 rpm, 1.5 rpm, 3 rpm, 6 rpm, 12 rpm, 30 rpm, 60 rpm
Sample consumption	250 ml ~ 400 ml
Rotors	4 types
Accuracy	$\leq \pm 2.0 \% \text{ F.S}$
Repeatability	$\pm 5 \%$
Power supply	110 V ~ 230 V
	50 Hz / 60 Hz
Dimensions	400 × 200 × 430 mm
Weight	4.8 kgs

5. Applications

Used to measure the viscosity of grease, paint, coatings, drugs, food, cosmetics, adhesive, etc. It also measures liquid viscosity resistance and absolute viscosity.

6. Instrument structure



Figure-1

1. Instrument head
2. LCD screen
3. Operation panel
4. Sensor
5. Spindle protection holder
6. Regulating screw
7. Outer shell
8. Stand column
9. Spindle joint
10. Spindle
11. Pedestal

7. Installation

- 1) Check power supply to ensure it meets the requirements of the instrument. It should have a reliable grounding end.
- 2) The instrument should be installed on a workbench without corrosive gas, electromagnet interference, and shaking.
- 3) Screw the toothed standing rod in the screw hole on the pedestal of the main unit. The toothed surface should face the front of the pedestal. Screw the nut on the standing rod tightly with a spanner to avoid rotation of the standing rod (It is shown as a 6-instrument structure).
- 4) Install the up and down clamps of the viscometer head on the standing rod. Rotate the up and down knob to move the instrument head up and down.
- 5) If the up and down knob is too tight or too loose, you can adjust the adjusting bolt on the upper surface of the up and down clamps.
- 6) When you move the instrument head to a proper position, you can screw the deadbolt on the back of the up and down clamp to fasten the instrument head.



Figure-2

- 7) Screw off the locknut on the yellow protection cap and take off the protection cap.
- 8) Adjust the two-level regulation bolts on the pedestal so that the bubble of the water levelmeter on the instrument head is in the center.
- 9) Connect the power wire of the printer (the socket on the back of the instrument head, shown as above in Fig).
- 10) Note: the printer is an optional component.

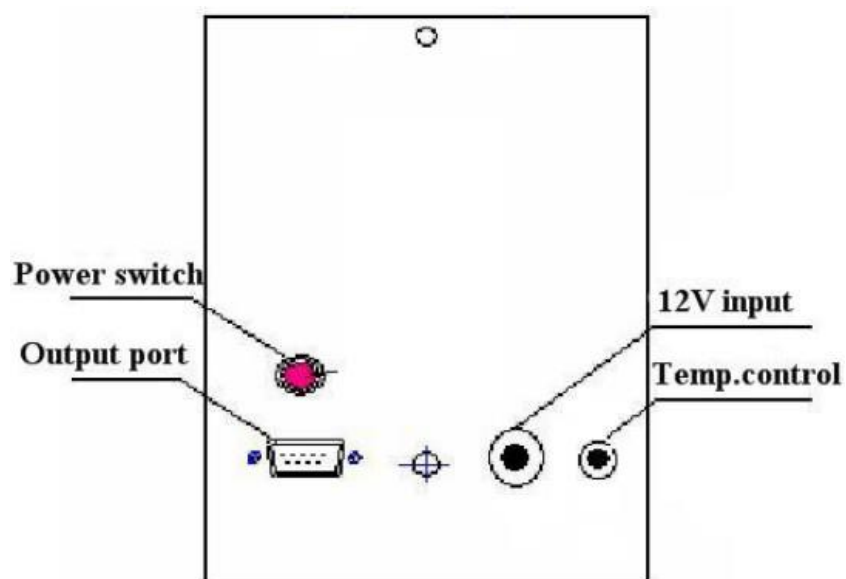


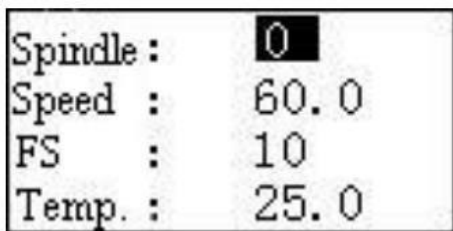
Figure-3

8. Working Principle

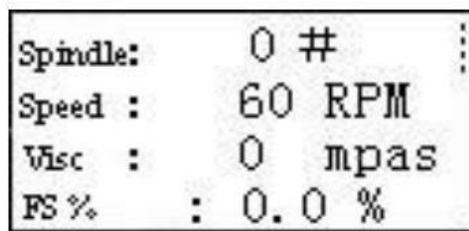
- 1) The instrument is a rotational viscometer.
- 2) The motor is used to drive the spindle rotating at a constant speed after speed regulation. When the spindle rotates in the liquid, the liquid will produce a viscosity moment that affects the spindle.
- 3) The higher the viscosity of liquids is, the higher the viscosity moment is. In contrast, the lower the viscosity of liquids is, the lower the viscosity moment is.
- 4) The viscosity moment affected on the spindle is determined by a sensor. Users can get the viscosity of the liquid to be determined after data processing.
- 5) By adopting microprocessor technology, it can conveniently preset the full scale (Spindle No. and rotation speed) and can carry out data processing for the data determined by the sensor.
- 6) It can also show the spindle number, rotation speed, the viscosity of liquid to be determined, and FS% clearly on the display.
- 7) The instrument has different kinds of spindles and different grades of rotation speed. So, it can form a variety of combinations and can test different liquid viscosities within the range.
- 8) In addition, it can choose the appropriate speed to do stepless speed-adjusting measurements according to different viscosities.

9. Operations

1. Prepare liquid to be determined and place the liquid in a beaker or cylinder not less than 70 mm in diameter, and not less than 125 mm in height.
2. Correctly control the temperature of the liquid to be determined.
3. Adjust the level of the instrument and check the bubble of the water level meter to ascertain whether the bubble is in the center. Make sure the instrument is level.
4. Select a suitable spindle and rotation speed according to the estimated viscosity of the liquid.
5. Rotate the up and down knob, slowly adjusting the height of the spindle in the liquid to be determined until the liquid surface sign on  the spindle is equal to the liquid surface.
6. Keyboard operation and indication interface
 - Turn on the power switch, and the screen will show as above.
 - Press  ^{OL}  to revise the current data.
 - Press to choose the parameter item. Then press the enter key to enter the measurement interface.



Spindle : 0
Speed : 60.0
FS : 10
Temp. : 25.0



Spindle: 0 #
Speed : 60 RPM
Visc : 0 mpas
FS % : 0.0 %

Figure-4

- ① **Adjust the speed after entering the measurement interface** The screen will show, a press or key to adjust the speed.
- ② Under measuring conditions, press a key to switch over the showing temperature and percentage.
- ③ Under the measuring condition, press the key to transmit the current data to the computer or printer.
- ④ Print Under the measuring condition, pressing the enter key will print current data. Revise the parameters of the instrument turn on the power switch, and the screen will show, press will enter the parameter revise condition.



TC: -0.1

Figure-5

TC: It indicates the temperature revise

If the instrument showing temperature, the operator value. Press the Reset key to

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the temperature is different from the actual can revise the temperature by modifying the TC exit to the original Condition.

9.1 Operation Instruction

- (1) You should estimate the viscosity range of the liquid to be determined and select a suitable spindle and rotation speed as per the full-scale sheet shown in table 1.
- (2) If the viscosity of the liquid to be determined could not be estimated, users should take the viscosity of the liquid to be determined as high viscosity. Then you should select a spindle from small to large (the spindle number is from high to low) and a rotation speed from slow to quick.
- (3) In principle, you should select a smaller spindle (higher spindle number) and slower rotation speed to determine high-viscosity liquids and select a larger spindle (lower spindle number) and quicker rotation speed to determine low-viscosity liquids.
- (4) To ensure the measurement precision, the FS% should be at 10% ~ 100% during measurement. If the viscosity value glitters, it indicates that the reading is too large or too small, so you need to change the spindle or rotation speed.
- (5) Whenever you press the Reset button, it will back to the initial state, and the operation interface will back to the user selection interface.

Full-scale table

Full scale mPa • s RPM Spindle	1	2	3	4
60	100	500	2000	10000
30	200	1000	4000	20000
12	500	2500	10000	50000
6	1000	5000	20000	100000
3	2000	10000	40000	200000
1.5	4000	20000	80000	400000
0.6	10000	50000	200000	1000000
0.3	20000	100000	400000	2000000

9.2 Operation Method of Small Sample Adapter

1. **Measurement range:** 100 mPa·s ~ 4000000 mPa·s.
2. **Spindle:** No. 21, 27, 28, and 29.
3. **Rotation speed:** 0.3 RPM, 0.6 RPM, 1.5 RPM, 3 RPM, 6 RPM, 12 RPM, 30 RPM, and 60 RPM.
4. **Operation methods.**

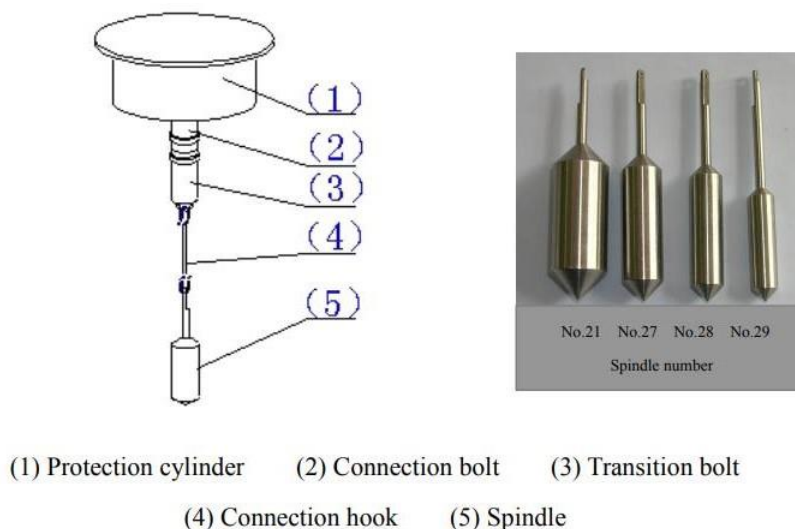


Figure-6

- Connect the small sample adapter with the circulation water bath to accurately control the temperature of the liquid to be determined.
 - Level the instrument. Check the bubble to ascertain whether it is in the center of the water level meter. Make sure the instrument is level.
 - Select the proper spindle and rotation speed according to the estimated liquid viscosity. If the estimated liquid viscosity is unknown, take it as a high-viscosity liquid.
 - Then you should select spindle from small to large (spindle No. from high to low) and spindle speed from slow to quick.
 - In principle, you should select the smallest spindle (the largest spindle No.) and the slowest rotation speed for high viscosity measurement and select the largest spindle (the lowest spindle No.) and the quickest speed for low viscosity liquid. The spindle No. is shown on the spindle handle.
 - Rotate the up and down knob slowly to adjust the position of the spindle in the liquid to be determined until the surface mark of the spindle (in the center of the slot) is level with the liquid surface.
3. To ensure measurement accuracy, the FS% should be at 10% ~ 100% during measurement. If the measurement value glitters, it indicates that the measurement value is too large or too small. Change the spindle or rotation speed.
 4. Whenever users press the Reset button, the instrument will go back to the initial state. The interface will be back to the user selection interface.

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Full-Scale table

Full scale mPa • s RPM	Spindle No. 21	27	28	29
60	1000	5000	10000	20000
30	2000	10000	20000	40000
12	5000	25000	50000	1000000
6	10000	50000	100000	2000000
3	20000	100000	200000	4000000
1.5	40000	200000	400000	8000000
0.6	100000	500000	1000000	20000000
0.3	200000	1000000	2000000	40000000

5. **Attention,** Hold up the connection bolt when you assemble or disassemble the spindle. Rotate the spindle anticlockwise to assemble it and rotate the spindle clockwise to disassemble it.



Labotronics Scientific. 1007 N Orange St., Wilmington, DE 19801, USA
 info@labotronics.com | www.labotronics.com