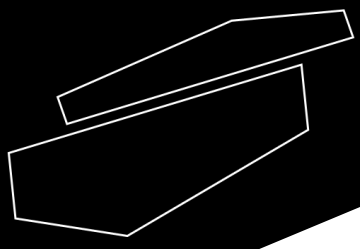
METRIA

Digital Viscometer, VDM2

Please read the User Manual carefully before use, and follow all operating and safety instructions!



user manual

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User Manual

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VD2M Digital Viscometer

Preface

Users should read this Manual carefully, follow the instructions and procedures, and beware of all the cautions when using this instrument.

Service

In order to guarantee this equipment works safely and efficiently, it must receive regular maintenance. In case of any faults, do not try to repair it yourself. If help is needed, you can always contact your supplier or Labbox via **www.labbox.com.**

Please provide the customer care representative with the following information:

- Serial number
- Description of problem
- Your contact information

Warranty

This instrument is warranted to be free from defects in materials and workmanship under normal use and service, for a period of 12 months from the date of invoice. The warranty is extended only to the original purchaser. It shall not apply to any product or parts which have been damaged on account of improper installation, improper connections, misuse, accident, or abnormal conditions of operation.

For claim under the warranty please contact your supplier.

General Information

VD2M is a digital rotary viscometer that has been upgraded. This viscometer features advanced mechanical design, manufacturing processes, and microcomputer control technology, ensuring accurate data acquisition. The LCD display with blue backlight and high brightness makes the data clear and easy to read.

The VD2M digital rotary viscometer is used for determining liquid viscosity and absolute viscosity. Compared to similar products, this instrument offers the following features:

- High measuring accuracy
- Stable display
- Easy operation and readout
- Excellent anti-interference

The VD2M is widely used for measuring the viscosity of liquids in various applications, including grease, paints, pharmaceuticals, and adhesives.

Main Technical Data

1. Measurement Range: 10 to 2 x 10^6 mPa·s
2. Rotor Types: 1#, 2#, 3#, and 4# rotors (it is possible to measure viscosities as low as 0.1 mPa·s with the 0# rotor)
3. Rotor Velocities: 0.3, 0.6, 1.5, 3, 6, 12, 30, 60 rpm; automatic
4. Measurement Error: ±5% (for Newtonian liquids)
5. Power Supply: 220V ±10%, 50 Hz ±10%
6. Ambient Temperature: 5°C to 35°C; Relative Humidity: ≤80%

Working Principle

This instrument is a rotary viscometer where the rotor is continuously rotated by a variable-speed motor. As the rotor turns, it experiences a torque proportional to the viscosity of the liquid due to viscous resistance. This torque is measured by sensors, processed, and displayed as viscosity on the screen.

The instrument utilizes microcomputer technology, allowing the user to set the measurement range (rotor number and speed). The data from the sensors are processed conveniently, and parameters such as rotor number, speed, and viscosity are clearly displayed on the LCD.

The viscometer is designed with 4 rotors (1#, 2#, 3#, 4#) and 8 different speeds (0.3, 0.6, 1.5, 3, 6, 12, 30, 60 rpm), enabling it to measure a wide range of viscosity values within the specified range.

Installation

1. Instrument Structure

Figure 1

① Level Indicator
② LCD
③ Housing
④ Protection Bracket
⑤ Base
⑥ Operation Key
⑦ Rotor Connector
⑧ Rotor
⑨ Level Adjustment Knob

2. Installation
    a. Check Power Supply: Ensure the power supply meets the instrument's requirements. The instrument should be properly grounded according to relevant regulations.
    b. Environmental Conditions: Ensure the surrounding area is free from corrosive gases, electromagnetic interference, and severe vibrations.
    c. Attach Stanchions: Screw the stanchions into the holes on the base. Position the toothed side of the stanchions facing the front of the base and tighten them with a wrench to prevent loosening (see Figure 2).
    d. Adjust Clamping Bolt: Use the clamping bolt to adjust the instrument's position, ensuring it moves up and down smoothly and is secured to prevent it from falling off the stanchions.

Figure 2

e. Remove the yellow cover cap from the bottom of the viscometer by loosening it.
f. f. Adjust the level adjustment screw so that the level bubble is centered.

Note: The "PC Computer Interface", "Printer Interface", and "Temperature Sensor Probe Interface" shown in Figure 3 are not in use.

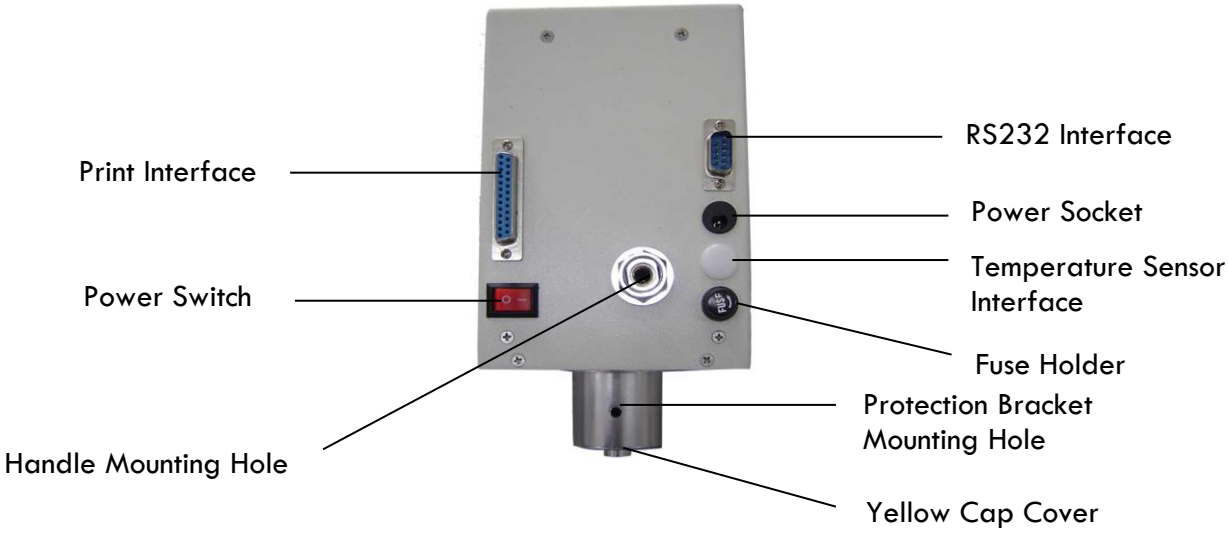


Figure 3

Operation Procedures

1. Prepare the liquid to be measured and pour it into a glass beaker or a suitable container with a diameter of at least 70 mm and a height of no less than 125 mm.
2. Monitor the temperature of the liquid.
3. Ensure that the instrument is level.
4. Adjust the lifting screw and immerse the rotor into the liquid until the level mark on the rotor is at the liquid surface.
5. Operate the control panel and view the display interface.
   a. Control Panel:

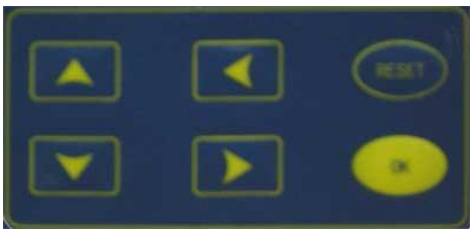


Figure 4

b. Turn on the power switch to enter standby mode. The instrument display will show both Chinese and English characters. See Figure 5 for the screen display.

Press  or  to select the desired language mode. Press OK to set the language and enter the selection. The screen will appear as shown below:

Figure 5

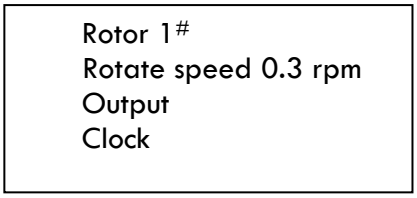


Figure 6

When the cursor stops at 1#, press ▲ or ▼ to select the desired rotor.

c. Press ► or ◄ to switch to the rotation speed mode. When the cursor stops at 6 rpm (see Figure 6), press ► or ◄ to select the desired rotation speed. The instrument offers five rotation speeds: 0.3, 0.6, 1.5, 3, 6, 12, 30, 60 rpm, and an auto mode. After setting the rotor and rotation speed, press "OK" to begin rotation and start measurement, as shown in Figure 7.
d. If you select auto mode and set the rotor, press "OK" to begin automatic measurement. The instrument will gradually search for the appropriate speed and then display the measured result or the required rotor number automatically.

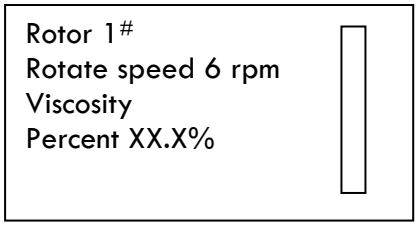


Figure 7

In Figure 7, the rotation speed is displayed in rpm, and the viscosity is shown in mPa·s. The vertical bar on the right side indicates the sampling process. The percentage represents how the measured viscosity compares to the full scale.

e. In Figure 6, move the cursor to the output mode. Press ► or ◄ to select between communication mode or print mode.
f. Note: The print and communication functions are not yet in use.
g. In Figure 6, move the cursor to the clock mode. Press ► or ◄ to choose between display mode or amendment mode. In display mode, the current time is shown. In amendment mode, you can adjust the time and date.
h. Press "Reset" to stop the measurement. Press "OK" again to resume measurement according to the rotor number and rotation speed set previously.
i. Estimate the viscosity range approximately and select the appropriate rotor and rotation speed based on the range table.
j. If the viscosity of the liquid cannot be estimated, treat it as a high-viscosity liquid. Start with a small rotor and low speed, and progressively move to larger rotors and higher speeds if necessary. Generally, use a small rotor and slow speed for high-viscosity liquids, and a larger rotor with a faster speed for low-viscosity liquids.

k. The instrument features an overload alarm function. If the measured value exceeds 100%, the display will show "over". To ensure measurement accuracy, keep the range percentage between 10% and 100%.
l. Press the Reset key at any time to return the system to its initial state.
m. Range Table:

Rotor / Range / Velocity	0	1	2	3	4
0.3	/	2×10^4	10×10^4	40×10^4	200×10^4
0.6	/	1×10^4	5×10^4	20×10^4	100×10^4
1.5	/	4×10^3	2×10^4	8×10^4	40×10^4
3	/	2×10^3	1×10^3	4×10^4	20×10^4
6	100	1×10^3	5×10^3	2×10^4	10×10^4
12	50	500	2.5×10^3	1×10^4	5×10^4
30	20	200	1×10^3	4×10^3	2×10^4
60	10	100	500	2×10^3	1×10^4

Precautions

1. The instrument has been rigorously calibrated before leaving the factory. Please read the operation manual carefully before use.
2. Use the instrument only within the specified voltage and frequency ranges. Deviating from these specifications may result in incorrect measurements.
3. When mounting or removing rotors, handle them gently and lift the connecting screw bolt to avoid applying transverse force that could bend the rotor. Keep the screws and connecting points between the rotor and the connecting bolt clean to prevent unstable rotation during measurements.
4. Do not operate the instrument with the rotor mounted but without liquid, as this can damage the axis tip.
5. After each measurement, clean the rotor thoroughly (remove it from the instrument for cleaning) and place it on the protection bracket.
6. When moving or shipping the instrument, replace the yellow cover cap, lift the connecting bolt rod, and tighten the bolt on the cap securely.
7. Unauthorized removal or replacement of instrument parts, as well as the application of lubricants, is not permitted.
8. Suspensions, emulsions, polymers, and other high-viscosity liquids are non-Newtonian fluids. Their viscosity can change with shear rate and time. Inconsistent results under the selected rotor, velocity, and time are normal and do not indicate instrument problems. Generally, the rotor, velocity, and time should be specifically chosen for non-Newtonian liquids.
9. To obtain accurate measurement results, observe the following precautions:
    a. Accurately control the temperature of the liquid being measured.
    b. Immerse the rotor in the liquid for enough time to ensure its temperature matches that of the liquid.
    c. Ensure the liquid is homogeneous.
    d. Position the rotor at the center of the liquid container during measurement.
    e. Remove any bubbles adhering to the rotor before immersing it in the liquid.
    f. Use settings that are close to the full range for measurement.
    g. Use the rotor protection bracket during measurement.
    h. Ensure the rotor is clean.
    i. Strictly follow the operating instructions for measurement.
    j. Use the 0# rotor if the viscosity of the measured liquid is less than 15 mPa·s.

Nota importante para los aparatos electrónicos vendidos en España

Important note for electronic devices sold in Spain

Remarque importante pour les appareils électroniques vendus en Espagne

Instrucciones sobre la protección del medio ambiente y la eliminación de aparatos electrónicos:

Los aparatos eléctricos y electrónicos marcados con este símbolo no pueden desecharse en vertederos.
De conformidad con la Directiva 2002/96/ CE, los usuarios de la Unión Europea de aparatos eléctricos y electrónicos, tienen la oportunidad de retornar el instrumento para su eliminación al distribuidor o fabricante del equipo después de la compra de uno nuevo. La eliminación ilegal de aparatos eléctricos y electrónicos es castigada con multa administrativa.

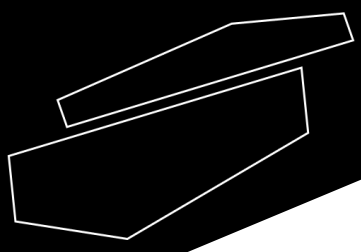
Nota importante para los aparatos electrónicos vendidos en Francia

Important note for electronic devices sold in France

Remarque importante pour les appareils électroniques vendus en France

Informations sur la protection du milieu environnemental et élimination des déchets électroniques :

Les appareils électriques et électroniques portant ce symbole ne peuvent pas être jetés dans les décharges.
En réponse à la règlementation, Labbox remplit ses obligations relatives à la fin de vie des équipements électriques de laboratoire qu'il met sur le marché en finançant la filière de recyclage de Récylum dédiée aux DEEE Pro qui les reprend gratuitement (plus d'informations sur www.recylum.com).
L'élimination illégale d'appareils électriques et électroniques est punie d'amende administrative.



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