ACUTEK A220B Viscometer

New User Interface
- Keypad control
- Sharp viewing screen for close up or distance viewing

No calculations required
- Direct reading of viscosity

Displayed Info:
- Viscosity (mPa•s)
- % Torque
- Speed/Spindle

8 Speeds
for wide range capability

Bubble Level
conveniently located for easy adjustment

Accuracy: ±1.0% of range
Repeatability: ±0.5%

What's Included?

Instrument
4 Spindles
Spindle Guard Leg
Lab Stand
Carrying Case

www.digitalviscometer.com

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Contents

1. General

A-220B is a Digital Rotary Viscometer used for determining the viscosity of fluids. This instrument adopts advanced mechanical design & microprocessor technology. This allows the instrument to measure highly accurate results. A-220B also sports a large size blue back-light display with sharp viewing angles and high brightness. Ergonomically colored keypad design helps easy operation. Microprocessor technoloy enables the viscometer to give stable & repeatable results within set limits.

The Acutek™ A-220B is widely used to determine & measure viscosity in many applications such as grease, paints, lacquer, varnish, pharmacy, detergent, soap, adhesives, polymers, inks and many more.

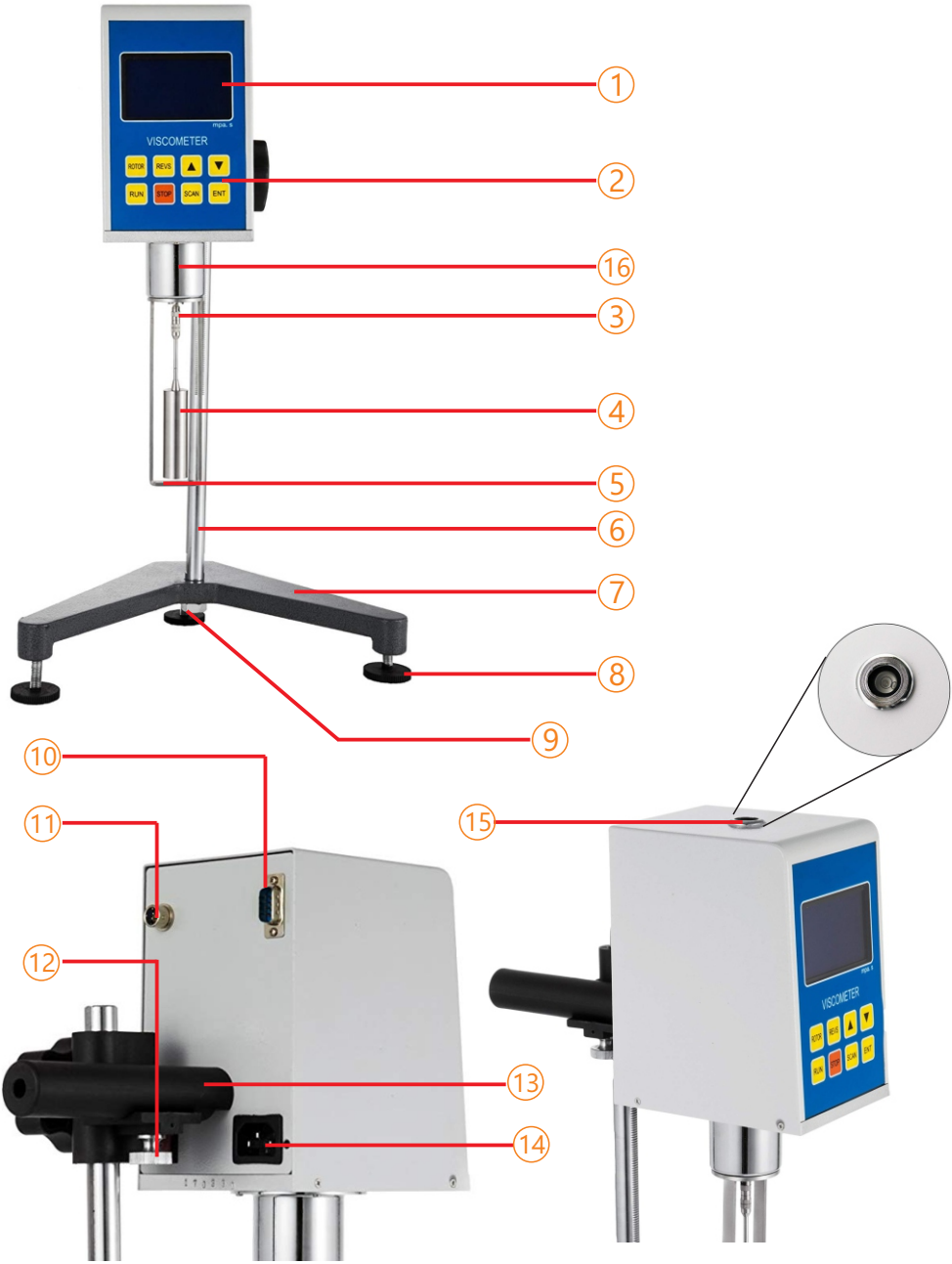
2. Main Technical Data

Measuring Range	20 ~ 2,000,000 (mPa.s)
No. of Speeds	0.3, 0.6, 1.5, 3, 6, 12, 30, 60 RPM (8 speeds)
Spindles	#1, #2, #3, #4 is standard configuration
Accuracy	±1.0% Full Scale
Repeatability	±0.5% Full Scale
Display	LCD
Temp. Reading	Yes
Functions	With auto range function
	Liner Calibration
	High quality Stepping Motor
Power Source	100V-240V

3. Environmental Conditions

A-220B is operate-able between 5°C to 35°C. And ambient relative humidity should not be more than 80%.

4. Structure


VISCOMETER
ROTOR
REVS
RUN
STOP
SCAN
ENT
1
2
16
3
4
5
6
7
8
9
10
11
12
13
14
15

List of Parts

1 LCD Display
2 Keypad Panel
3 Spindle Connection
4 Spindle
5 Spindle Guard Leg
6 Stanchion with Teeth
7 Base
8 Base Adjusting Knob
9 Base Nut
10 Printer Interface Socket
11 Temp. Probe Socket
12 Clamping Bolt
13 Mounting Clamp
14 Power Socket
15 Level Bubble
16 Motor Cover

5. Installation

Step 1: Put the Base(7) on a flat surface. Install the Stanchion with Teeth(6) in the hole present on the base(7).

Step 2: From the other side screw the base nut(9) on the stanchion with teeth(6).

Step 3: Now take the main instrument and find the hole on the mounting clamp(13). Align this hole with screw of clamping bolt(12). Now gently press the instrument against the clamping bolt(12) and start spinning the clamping bolt(12). Tread the bolt until the main unit it fixed on the stand.

Step 4: Find 2 holes on the spindle guard leg(5) and align them with the 2 structures present on the motor cover(16). Gently slide the spindle guard leg(5) on the motor cover(16) and rotate it softly to fit it together.

Step 5: This step is to be done very carefully and gently. With one hand hold the upper spindle connection(3) and press it upper. Hold it stable & firmly. Now take any spindle(4) as per your testing material and align it with the spindle connection(3). Rotate the spindle(4) until a firm connection is established. Very slowly and softly leave the spindle in the center of the spindle guard leg(5).

Step 6: Now connect the power cable to power socket(14). And turn the instrument ON. Instillation is now complete.

6. Working Principle

This instrument is a rotary viscometer. Therefore a rotor/spindle can be rotated constantly by the variable speed stepping motor installed in the machine. Rotating the standard spindle, the spindles will be subject to a torque percentage proportional to liquid viscosity because of the liquid viscose hysteresis.
The torque moment will be measured by the sensors and processed into the viscosity and shown on the display.
The instruments adopts microprocessor technology. Rotor number, speed, viscosity are displayed on the LCD.
The instrument is designed and manufactured with 4 rotors and 8 different velocity settings which enable it to measure any viscosity value in the given range.

7. Operating Procedure

Scenario A: Spindle Number & Rotor is known

Step 1: Pour the fluid in a beaker or container with diameter not less than 70mm and height not less than 125mm.

Step 2: Gauge the level bubble(15) present on top surface of the instrument to ensure the instrument is perfectly level. You may use the 3 base adjusting knobs(8) to adjust the height and level.

Step 3: Take care of the temperature of the sample fluid.
(We highly recommend buying & using TM-220 probe for ease)

Step 4: Adjust the lifting screw and put the spindle in the liquid till the liquid reaches the level mark on the spindle.

Step 5: Turn the instrument ON. Press the 'ROTOR' button to input the spindle number selected. Use the arrow keys to toggle between Spindle #1 to #4. Then press 'ENT' to save your spindle selection.

Step 6: Press the 'REVS' button to input the speed you wish to measure at. Use the arrow keys to toggle between 8 speeds from 0.3 RPM to 60 RPM. Then press 'ENT' to save your speed selection.

Step 7: Press the 'RUN' button to start the measurement cycle. Wait for at least 5 complete rotations to get a stable reading. The value displayed against mPa.S is your viscosity.

Scenario B: Spindle Number & Rotor is not know, but approximate idea of viscosity is know

Step 1: Use the below table to guess the the spindle number & speed.

ROTOR / SPEED	1#	2#	3#	4#
0.3 RPM	20000	100000	400000	2000000
0.6 RPM	10000	50000	200000	1000000
1.5 RPM	4000	20000	80000	400000
3 RPM	2000	10000	40000	200000
6 RPM	1000	5000	20000	100000
12 RPM	500	2500	10000	50000
30 RPM	200	1000	4000	20000
60 RPM	100	500	2000	10000

Step 2: Pour the fluid in a beaker or container with diameter not less than 70mm and height not less than 125mm.

Step 3: Gauge the level bubble(15) present on top surface of the instrument to ensure the instrument is perfectly level. You may use the 3 base adjusting knobs(8) to adjust the height and level.

Step 4: Take care of the temperature of the sample fluid.
(We highly recommend buying & using TM-220 probe for ease)

Step 5: Adjust the lifting screw and put the spindle in the liquid till the liquid reaches the level mark on the spindle.

Step 6: Turn the instrument ON. Press the 'ROTOR' button to input the spindle number selected. Use the arrow keys to toggle between Spindle #1 to #4. Then press 'ENT' to save your spindle selection.

Step 7: Press the 'REVS' button to input the speed you wish to measure at. Use the arrow keys to toggle between 8 speeds from 0.3 RPM to 60 RPM. Then press 'ENT' to save your speed selection.

Step 8: Press the 'RUN' button to start the measurement cycle. Wait for at least 5 complete rotations to get a stable reading. The value displayed against mPa.S is your viscosity.

Scenario C: Spindle Number & Rotor is not know, but approximate idea of viscosity is also unknown

If you do not know any of the data, you must do a little hit and trial to know the correct spindle and speed for the fluid.

Step 1: Pour the fluid in a beaker or container with diameter not less than 70mm and height not less than 125mm.

Step 2: Gauge the level bubble(15) present on top surface of the instrument to ensure the instrument is perfectly level. You may use the 3 base adjusting knobs(8) to adjust the height and level.

Step 3: Take care of the temperature of the sample fluid.
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Step 4: Adjust the lifting screw and put the spindle#4 in the liquid till the liquid reaches the level mark on the spindle.

Step 5: Turn the instrument ON. Press the 'SCAN' button to automatically scan. The display will prompt you to 'select S please'. The means the instrument wants us to enter the rotor #4. Use the arrow keys to toggle & select spindle #4. Then press 'ENT'. The instrument will start the scanning.

Step 6: Once done, the machine shall give a decision if this spindle is correct or you need to experiment with another spindle. In case the machine finishes scanning. Note the torque mentioned if it's between 35~75% the spindle is correct. Note the speed at which the machine finished scanning. This is your correct spindle and speed.

In case the spindle and speed is wrong, the machine will give a message such as 'Finished. Try Spindle S3'. If so, repeat the Step 6 until the desired spindle & speed is known.

Step 7: Once done, the machine shall give a decision if this spindle is correct or you need to experiment with another spindle. In case the machine finishes scanning. Note the torque mentioned if it's between 35~75% the spindle is correct. Note the speed at which the machine finished scanning. This is your correct spindle and speed.

Step 8: Restart your instrument. Press the 'ROTOR' button to input the spindle number selected. Use the arrow keys to toggle between Spindle #1 to #4. Enter the spindle# found in last step 7. Then press 'ENT' to save your spindle selection.

Step 9: Press the 'REVS' button to input the speed you wish to measure at. Use the arrow keys to toggle between 8 speeds from 0.3 RPM to 60 RPM. Enter the speed found in last step 7. Then press 'ENT' to save your speed selection.

Step 10: Press the 'RUN' button to start the measurement cycle. Wait for at least 5 complete rotations to get a stable reading. The value displayed against mPa.S is your viscosity.

5. Precautions

1. The instrument has been calibrated and checked strictly before leaving factory. Please read the instruction manual carefully before using or assembling the instrument.
2. When this viscometer works under room temperature, the tolerance of the test temperature should be kept within ± 0.1°C . Otherwise measurement accuracy will be substantially affected.
3. Pay attention to test values and their percentage torques of the entire measurement range. When numbers are too high or too low, rotor or rotating speed should be changed to keep the percentage within 35%~75%.

4. The instrument mounted with rotor should not be revolved without liquid to avoid damaged to the axis tip.
5. Extreme care should be taken for mounting or removing rotors. Slightly lift the connecting screw bolt to avoid a transverse force acting on the rotor sensors. Such a mishandle could bend the sensor and cause permanent damage to instrument.
6. The spindle connecting part and connecting screw on machine should be gently cleaned to allow well aligned and well joined connection. Else it could result in unstable rotation and cause error in measurement.
7. After completing measurement each time, the rotor should be fully cleaned. Rotor should be removed from instrument for cleaning. Then it should be placed in the protective case.
8. Emulsions or polymers and other high viscosity liquids are non-newtonian fluids, their viscosity will change with sheer velocity and time. Inconsistent results under the selected rotor and velocity and time is normal for these fluids. In general, the rotor, velocity & time should be specified for non-newtonian fluids.
9. Ensure the liquid is homogenous.
10. When instrument is moved or transported, spindle connector should be covered by protective cap.
11. Use bigger rotor with higher rotating speed for low viscosity liquid; use smaller rotor with lower speed for high viscosity liquid.
12. Keep rotor and liquid to be tested under constant temperature at the same time so as to keep the same temperature for both
13. Keep environmental temperature uniform.
14. Put the rotor located in the center of the liquid container at the time of measurement.