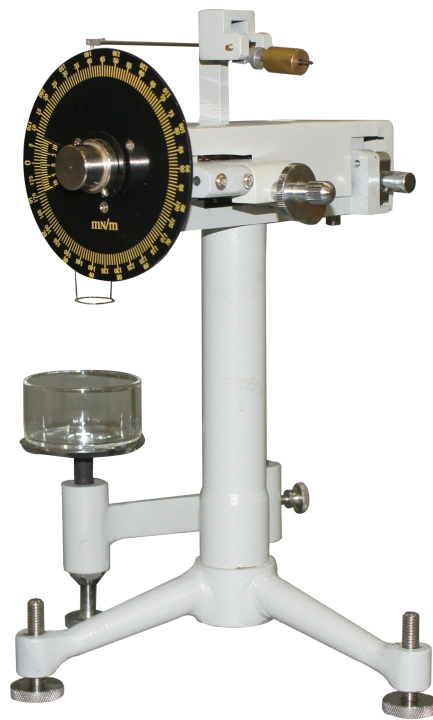


HZ1721 Interface Tension Meter



Dear user:

Thank you for choosing HZ1721 Interface Tension Meter.

We hope that this instrument can make your work easier and more enjoyable, so that you can get the feeling of office automation in the test and analysis work.

Before using the instrument, please read this manual, and operate and maintain the instrument according to the manual to prolong its service life. "Just a light press, the test will be completed automatically" is the operating characteristics of this instrument.

If you are satisfied with this instrument, please tell your colleagues; if you are not satisfied with this instrument, please call (0312) 6775656 to tell you to serve you at all times-Baoding Huazheng Electric Manufacturing Co., Ltd., our company will definitely make you satisfied !

Contents

I.Main Function and Working Principles.....	1
II.Technical Parameters.....	1
III.Diagrammatic Sketch.....	2
IV.Machine Setup and Adjustments.....	2
V.Usage and Maintenance.....	3
VI. Packing List.....	5

I. Main Function and Working Principles

HZ1721 interfacial tension meter is an easy-operated machine that can quickly and accurately calculate the interfacial and surface intension of various kinds of liquid. It's used to calculate the interfacial and surface intension of industrial oil in hydraulic department and electric department to strengthen the supervision of insulating oil. Besides, it's also widely used in petroleum industry, chemical industry, research departments and education departments.

This machine mainly consists of torsion wires, platinum rings, sample brackets, dial scales, cursor pointer, kickstand, lever brackets, sharp tuning worm gears, testing worm gears and sample kickstands. The machine imposes torsion to torsion wires through revolving the testing worm gear, and balancing the torsion with the liquid surface's tension caused by the platinum ring. When the torsion keeps increasing until the liquid surface breaks, the number shown on the dial scale is the value of tension. (expressed in M, Unit: mN/m) Then the real value of interface tension, δ , is calculated through M multiplied by correction factor F.

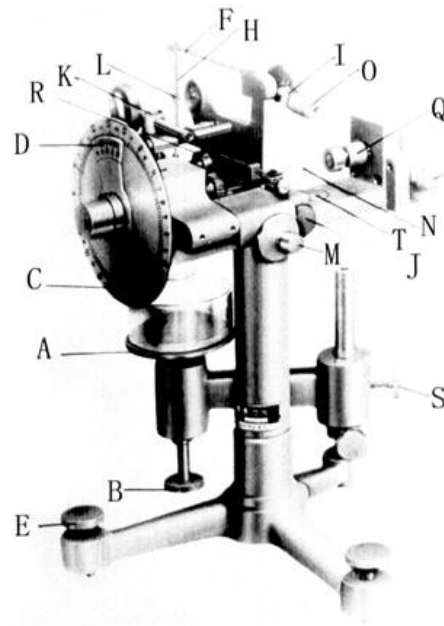
This product is manufactured according to JB/T9388-2002 Technical Requirements for Interfacial Tension Meter, ISO1409-1995 Surface Intension Measurements for Plastic, Rubber, Polymer Dispersion and Latex and SH/T 1156-95 Surface Intension Measurement for Synthetic Latex.

II. Technical Parameters

1. Measurement Range: 0-180 mN/m
2. Minimum Division Value: 1mN/m
3. Precision: 0.1mN/m
4. Size: 240*270*325 (mm)
5. Net Weight: 4.3Kg

III.Diagrammatic Sketch

- A. Sample holder
- B. Bolt for sample holder
- C. Dial scales
- D. Cursor
- E. Horizontal bolt
- F. Arm 1
- G. Arm 2
- H. Arm 3
- I. Bolt for adjusting arm
- J. Arm bolt (1)
- K. Arm bolt (2)
- L. Pointer
- M. Handle for worm gear
- N. Steel wire
- O. Sliding Poise
- P. Handle for fine tuning worm gear
- Q. Bolt for fixing steel
- R. Magnifier
- S. Brake for sample holder
- T. Leveling bubble



IV.Machine Setup and Adjustments

1. Open the box, take out the machine and put it on a platform without vibration. Observe the leveling bubble and adjust the machine to horizontal level through bolt E. Room temperature should be kept between 20-25°C.
2. Install the platinum ring at the downside of hanger rod. Cut a small piece of paper and put it on the platinum ring. Turn on the brake J and K. Then adjust the magnifier until the pointer L on the arm H coincides with the red line on the reflector.
3. Correction under mass method: put weight with certain mass on the paper. Then

adjust the handle for testing worm gear M. If the pointer coincides with the red line on the reflector, the position of the pointer is consistent with calculated value, so the machine doesn't need adjustments. Else you can adjust the length of arm F and arm G through bolt I and I'. The two adjusting bolts should be revolved for the same value, so the two arms are kept in the same proportion and the platinum ring can move vertically in the tests. The adjusting result is reached through moving sliding poise O back and forth.

Concrete process: put a weight between 0.0005 and 0.0008Kg on the paper, and then revolve the handle for worm gear until pointer L coincides with the red line on the reflector.

Write the value on the scale. (accurate to 0.1 division) Using 0.0008kg weight, the value on the scale M is $M=mg/2L$, mN/m. That is, $M=(0.0008*9.8017*10^3)/(2*0.06)=65.3\text{mN/m}$

In the equation: m-mass of weight (kg) L-perimeter of platinum ring (m)

g-acceleration of gravity

If the recorded number is larger than calculated, you should adjust the two bolts on the lever arm to shorten the length of the two arms. If the recorded number is smaller than calculated, then the two arms should be prolonged. Using this method for several times until the number on the scale equals the number calculated.

4. Before measurement, the platinum ring and glass should be well cleaned with mixed liquid of 10ml saturated solution of potassium dichromate and 90ml sulphuric acid. Then wash them with distilled water.

V.Usage and Maintenance

1. Measurement for Surface Tension: Hang the platinum ring on the arm and pour the tested solution into the glass until the liquid level has a height between 20 and 25 mm. Put the glass on the center of the sample holder A. Revolve the bolt B at the bottom of sample holder and then the glass will rise with sample holder A. Immerse the platinum ring into the solution and make coincidence with pointer L and the red line on the reflector. Revolve the worm gear handle M to increase torsion. When the surface of the liquid is pulled tight, pointer L should coincide with the red line. Then two forces keep balancing until the surface breaks and the number shown on the scale is the surface tension value of tested liquid.

2. Measurement for Interface Tension: For water and liquid that has a density lower than water, the platinum ring should move upward. For water and liquid that has a density larger than water, the platinum ring should move downward.

(1) When measuring interfacial tension of water and liquid that has a density lower than water, you should first raise the sample holder so the platinum ring can immerse into the water for about 5-7mm. Pour the tested liquid carefully on the surface of the water for 5-10mm and revolve the bolt B of the sample holder. Adjust position of the platinum ring to the interface of the two liquid. Then the test should be conducted the same as the method of measuring surface tension.

(2) When measuring interfacial tension of water and liquid that has a density larger than water, it requires the platinum ring to have a downward force. Pour the liquid into the glass for 10mm deep or more, and then pour water into the glass for 5mm deep. Raise the sample holder to immerse the platinum ring into water so when the ring is on the interface of liquid, pointer L coincides with the reflector's red line. Increase the torsion of steel wire and push the ring down while keeping pointer L coinciding with the reflector's red line. When the interface breaks, the number shown on the scale is the value of interfacial tension M.

3. Correction for real surface tension: Surface tension is the surface effect when the surface of liquid is a tight film. Surface tension is always tangent to surface. When measuring surface tension using ring method, the following two conditions needs to be considered:

(1) During the experiment, the pull-up of platinum ring makes the surface of liquid deformed. This deformation becomes greater when the moving distance of the ring increases. Therefore, the diameter from center to break point is smaller than the diameter of the ring. This influence is given through the diameter of platinum ring divided by platinum wire.

(2) Little liquid adhere to the bottom of platinum ring. This influence can be expressed using a function.

From the above two influences, the real value of tension δ should be calculated by measured tension M times correction factor F. That is $\delta=M*F$

In this equation, M is the number shown on the scale when the surface or interface breaks.

Unit: mN/m.

$$F = 0.7250 + \sqrt{\frac{0.03678M + P}{r_r^2(p_0 - p_1)}}$$

In this equation:

$$p = 0.04534 - \frac{1.679r_w}{r_r}$$

p₀: Upper phase medium density at 25°C

p₁: Next phase medium density at 25°C

r_w: platinum wire has a diameter of 0.3mm

R_r: platinum ring has a diameter of 9.55mm

4. The machine needs to be kept clean. After testing, take the platinum ring down and clean it. The torsion wire shouldn't be kept under stress. The degree to which the wire is turned around shouldn't be more than 360°. The lever arm should be fixed using eccentric shaft and plywood. When the steel wire is damaged and needs to be changed, the fore-end should be fixed with platen and the back-end should be fixed with bolt.

VI. Packing List

No.	Item	Qty
1	Main engine	1
2	platinum loop	1
3	Sample cup	1