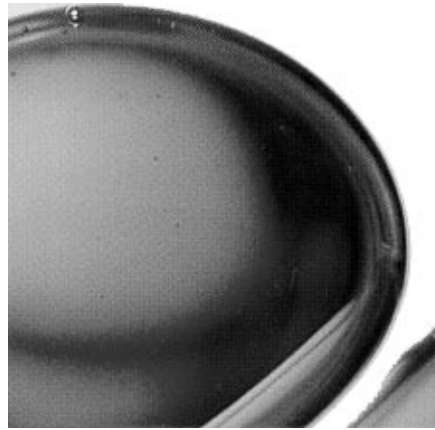


SURFACE
TENSION
METER
STM2141



ANALITE



Economical measurement of surface tension

SIMPLE, ACCURATE
RUGGED, VERSATILE



The ANALITE Surface Tension Meter Model 2141 is a state of the art instrument ideally suited to both laboratory and QA applications. It is a multifunction instrument utilising precision mechanics and microprocessor technology to offer the perfect compromise between accuracy and price. The ANALITE Model 2141 functions as either a surface tension meter, mass scale or fluid density meter. Ambient or sample fluid temperature may also be measured at any time.

Operation of the ANALITE Model 2141 is simple with all controls on a separate control console so as to minimise mechanical vibration to the mechanical test bed when making measurements. All operations and results are clearly shown on the two line alphanumeric LCD display on the control console. All procedures are simple - all are indicated and confirmed on the LCD display. All measurement results are clearly shown on the LCD display in their correct units as well as the ambient or sample fluid temperature. All results can be transmitted to a computer, logger or printer via the RS232 port on the control console.

The ANALITE Model 2141 uses the Wilhelmy Plate method to determine surface tension as this offers more accurate results than the Du Nouy Ring method. The STM2141 will also measure surface tension using the Du Nouy method using the optional Du Nouy ring fitting.

All measurement of surface tension, mass and fluid density uses the same novel force balance mechanism in the ANALITE Model 2141. This technique does not require sensitive and fragile strain gauges, which damage easily instead it uses non-contact magnetic and optic techniques thereby making the ANALITE Model 2141 extremely robust and accurate. The force balance mechanism is mounted on jeweled bearings for consistently accurate readings over a wide range.



Featuring precision and resilient technology for the field or laboratory

PREPARATION

Preparation to make a measurement is simple. Firstly ensure the instrument is properly installed in a solid base and the test bed levelled by adjusting the feet until the in-built bubble level is centred. Switch on the instrument and a welcome message on the alphanumeric LCD display will indicate the ANALITE Model 2141 is ready to make measurements.

Make sure you have the sample fluid or mass ready for measurement. Fluids are best measured for surface tension in a shallow dish of at least 55mm diameter and depth of about 5 - 10mm. For fluid density the dish or beaker need only be about 30mm diameter with a depth of about 30mm.

Surface tension measurements requires cleanliness. The surface tension of many fluids are dependent on their level of contamination; this is particularly so for water. So it is important that the measurement procedure does not introduce any further contamination into the sample fluid. The glass plates provided for surface tension measurement should be handled carefully so as not to introduce contaminants on the surfaces that will interface with the sample fluid. Glass slides should be cleaned in a 4 molar solution of sodium hydroxide if contamination is suspected.

FUNCTION



With the fluid samples or mass ready, the ANALITE Model 2141 is ready to be instructed as to its required function - surface tension, mass or fluid density.

Simply press the FUNCTION button on the control console until the desired function is indicated. Once the desired measurement function is selected the LCD display will indicate that it is ready to be zeroed (or referenced).

ZERO

To zero or reference the ANALITE Model 2141 you must first attach the necessary measurement jigs on the force balance arm within the test bed. If surface tension is to be measured attach the glass plate holder loaded with a clean glass plate, for mass attach the optional scale pan and for fluid density attach the optional calibrated volume.

Press the ZERO button and wait for the ready message on the alphanumeric LCD display to indicate the ANALITE Model 2141 has now been zeroed and is ready for measurement.



ARM UP AND DOWN

The force balance arm may be moved up and down by simply pressing the UP or DOWN buttons on the control console. Each momentary press of the UP or DOWN button will move the force balance arm 0.1mm. Depressing an UP or DOWN button for longer than 0.3 seconds will move the force balance arm at a fixed speed of 10mm/second.

The UP and DOWN buttons allow for quick and accurate movement of the glass plate or calibrated volume into the sample fluids with minimal mechanical vibration.

MEASURE



The actual measurement procedure varies according to the function chosen but in all cases it is straight forward.

For surface tension measurement simply move the glass plate DOWN until the bottom edge is about 1mm below the surface of the sample fluid. Then move the glass plate UP so that an even meniscus is evident and press the MEASURE button. The measurement result will be indicated on the LCD display plus a confirmation message to indicate that all measurement safeguards were met during the measurement. The temperature probe may then be inserted into the sample fluid to record its temperature (if required).

For mass measurement place the sample mass on the optional scale pan and press the MEASURE button. Again the measurement result will be indicated on the LCD display plus a confirmation message to indicate that all measurement safeguards were met during the measurement.

For fluid density measurement submerge the optional calibrated volume into the sample fluid up to the calibration notch. Press the MEASURE button. The measurement will be indicated on the LCD display together with the confirmation message.

TRANSMIT

All measurements may be transmitted to a computer, logger or printer by means of the 25 pin RS232 interface on the control console. Each measurement may only be transmitted once and each measurement transmitted includes the function selected, the measurement, the unit of measurement, and the measured temperature.

The transmitted measurement message has a fixed and delimited format for easy insertion into spreadsheet, word processor or database programs.

To transmit a measurement simply press the TRANSMIT button after a valid measurement has been completed.



SPECIFICATION

ANALITE Model 2141 Surface Tension Meter

Measurement	Surface tension (mN/m and mg), Mass (mg), Fluid density (gm/cc), Temperature (°C).
Surface Tension	using plate with 98mm perimeter on supplied plate holder.
Range	2.5 to 250.0mN/m or 25 to 2,500mg.
Resolution	0.1mN/m or 1mg.
Accuracy	better than $\pm 1.0\%$ FSD to 50mN/m or to 500mg. better than $\pm 1.5\%$ FSD for >50mN/m or >500mg.
Mass	using optional scale pan available.
Range	25 to >2,500mg.
Resolution	1mg.
Accuracy	better than $\pm 1.0\%$ FSD.
Fluid Density	using optional calibrated volume available.
Range	0.020 to 2.000gm/cc.
Resolution	0.005 gm/cc.
Accuracy	better than $\pm 1.0\%$ FSD to 0.5gm/cc. better than $\pm 1.5\%$ FSD for >0.5gm/cc.
Temperature Probe	
Range	-9.7°C to +69.7°C.
Resolution	0.3°C.
Accuracy	better than $\pm 0.6^\circ\text{C} \pm 1$ lsb digit.
Time Constant	120 seconds in free still air. 20 seconds in water (5mm insertion).
Drift	(Surface Tension, Mass and Fluid Density).
Zero Drift	better than 0.5% FSD/°C.
Span Drift	better than 0.05% FSD/°C.
Measuring Arm Control	
Vertical Travel	50mm.
Step Motion	0.1mm per step nominal per momentary press of ARM UP or ARM DOWN.
Continuous Motion	10mm/sec nominal if ARM UP or ARM DOWN is pressed for >0.3 second.
Environmental	
Operating Temperature	10 to 35°C.
Storage Temperature	0 to 50°C.
Humidity	0 to 90% non-condensing.
Data Output	2 x 32 character alphanumeric LCD display, and transmission via RS232 (DB25 female) port at 9600BPS if required.
Other	
Power	98 to 132V ac or 200 to 264Vac switch settable on rear of instrument (Test Bed), 48 to 62Hz, 10VA max.
Size	Test Bed 220mm x 270mm x 280mm. Console 185mm x 180mm x 48mm.
Shipping Size	Overall 330mm x 330mm x 430mm.
Net Weight	Test Bed 6.0kg. Console 1.0kg.
Shipping Weight	Overall 9.0kg.

Specifications subject to change.

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