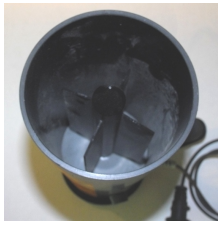
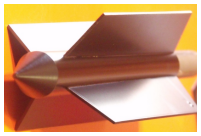
SINAR TECHNOLOGY

COFFEE LABORATORY

Sinar large seed Moisture Analyser

- Easy to use – no sampling, weighing or grinding, simply fill and read
- Fast – instant digital readout of moisture and temperature
- Robust – rugged construction with no moving parts
- Accurate – many readings can be taken in a few minutes to give a truly representative picture of moisture in bulk commodities





Fins of sensor made from durable FR4

Product Description

The LSA8011 allows the analysis of any bulk hygroscopic commodity. Simply fill the cell high enough to cover the probe tip, to measure in seconds what traditional methods would take minutes to achieve. This makes the routine analysis of every bulk good a reality, giving you confidence that your product is exactly right without having to waste time taking samples back to the office or lab for analysis.

Comes calibrated for seven commodities which can be chosen from the large catalogue of calibrations that we have built up and refined over the past 20 years. Changing calibrations at a later date can also easily be achieved using the built in communication port. This means that however specialized the application the LSA8100 can deliver fast accurate results.

No moving parts and its mild steel polyester powder coated shaft is rugged enough to withstand even the toughest of operating conditions allowing results to be obtained wherever they are needed.

QUOTE REQUEST ✓ **BUY ONLINE** ✓

Product Features

Accuracy:	typically ± 0.5 % mc and ± 0.1 ℃
Measurement Range:	0 to 35 % mc dependant on application, -20 to 60 ℃
Operating Environment:	
Dimensions:	Control Box 20x15x3 cm
Weight:	1 kg
Power Supply:	4 x 1.5V AA cells
Measurement principles:	Moisture - temperature compensated electric field Temperature - Platinum resistance detector
Printer output:	RS232C, 300 or 4800 baud
Resolution:	Moisture 0.1% Temperature 0.1℃

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I: How a Sinar Capacitance Moisture Analyzer works

1. The Theory

The moisture content of a sample is defined as the ratio of mass of free water to the total mass of the sample, and is generally found by weighing the sample, dehydrating it, and re-weighing.

$$\%MC = \frac{\text{Initial Mass} - \text{Final Mass}}{\text{Initial Mass}} \times 100 \quad \text{or} \quad \%MC = \frac{\text{Wet Mass} - \text{Dry Mass}}{\text{Wet Mass}} \times 100$$

It is also possible to measure the moisture content indirectly using the electrical properties of water. This does, in theory, give much quicker readings and speeds up the analytical process. Developing instrumentation that measures these indirect electrical properties is Sinar Technologies business and speciality.

Sinar Technology instrumentation uses the relationship between moisture content and the samples dielectric constant as the basis of measurement. It has been noted for many years that the variation of the dielectric constant of hygroscopic materials against moisture content is approximately linear over a limited but useful range of 0% - 35% moisture content.

The dielectric constant of water is 81, whereas the dielectric constant of most materials of vegetable origin[1] is quite low, ranging from 2.2 to 4.0 in a dry condition. The presence of a very small quantity of water in the material will, therefore, cause a considerable change in the dielectric constant of the combined system. Therefore this direct link between Moisture Content and dialectic content enables Sinar Analyzers to predict, successfully the Moisture Content of a wide range of samples.

2. The Problems

The relationship between moisture content and dielectric constant is complicated by several factors. These problems and the answers that Sinar Technology applies to them can be summarised thus:

- **Problem:** Inconsistent and high sample temperatures that inherently change the dielectric constant of samples.[2]
- **Answer:** Measure the sample temperature (at the same time as the dielectric constant) and compensate accordingly.

- **Problem:** Uneven distribution of water throughout the sample.
- **Answer:** Calibrate using typical samples in the state that they will be measured in practice. For example pre-dried or even freshly harvested.

- **Problem:** Packing density of the sample
- **Answer:** By filling the measurement cell to the same approximate height every time the volume of the sample is kept roughly constant. Use of a loading hopper improves consistency of packing density.

[1] For example, paper, wood, or grains

[2] The dielectric constant of most grains and cereals varies approximately linearly with temperature.

Measurement of the sample mass[3] also enables the unit to automatically compensate for differences in sample volume.

- **Problem:** Other chemical and physical parameters within a given sample, for example shape, size, protein content etc.
- **Answer:** Sinar Technology develops individual calibrations for each significantly different species or differently grown sample of the same species.

3. Calibrations

Before any readings can be taken in the field using a Sinar Analyzer, a robust calibration must be established for the commodity that we wish to measure. How might this be achieved?

- First, obtain samples of the commodity to be measured, which vary in moisture-content one from another. For a variety of wheat, take at least 10 samples differing from each other by at least 1% moisture content. Obviously, moistures depend upon the availability of samples and the moisture range over which you wish to measure.

- The samples you are using must be measured accurately using the reference method laid down for that particular commodity.[4] This reference method will vary from sample to sample and country to country. Consult Sinar Technology if you require any assistance finding reference methods for a given commodity.

- The samples are then placed, in turn, into a Sinar moisture meter and the capacitance (dielectric constant) reading is taken.

- A graph is then constructed of Sinar capacitance reading against reference moisture content for each sample. This can be greatly simplified by using the Sinar MoistureNet calibration software, which automatically predicts all calibration curves.

- The resulting calibration curve can then be input into a Sinar moisture meter (see elsewhere in this manual for instruction) and used accordingly.

Note – In most cases, Sinar Technology is able to supply the Moisture Analyzers ready calibrated to individual requirements. We now have over 20 years of calibration experience in many different commodities and countries.

4. What is the unit doing when I take a measurement?

The instrument takes three separate readings and correlates the information ready to be processed by the instrument's microprocessor. These three readings are:

- The **mass** of the sample is measured: An oscillating, inertia weight-balance performs this role. The instrument measures the period of oscillation of a spring, which is set in motion once a load has been applied. The resulting period is a function of the mass of the load. This measurement is carried out automatically, in seconds, and the reading used to help compensate for varying sample.

- The **temperature** of the sample is measured: A thermistor located within the sample-cell[5] measures sample-temperature many times and the values are compared within the microprocessor. If the

[3] using the weight-balance built into each instrument

[4] Example: for Wheat measured in UK the reference method is the oven test – 3 hrs @ 105°C. This is IS0712.

[5] The black bridging plastic insert within the sample-cell cavity

temperature is found to be varying then the microprocessor waits and then takes further readings at one-second intervals. Such a method reduces errors if warm or cold samples (with rapidly changing temperatures) are placed into the analyzer.

- The **capacitance** (dielectric constant) is measured. The capacitance reading is corrected by the temperature and mass readings simultaneously taken on the sample. The final result (known as Code 0) is applied against the calibration curve to calculate the true moisture content of the sample.

Sinar Moisture Net Software

Features:

1. Develop new, accredited, calibrations for Sinar Moisture Analyzers
2. Compile and group calibrations for download into Sinar Moisture Analyzer
3. Moisture Analyzer hardware can be interrogated and checked by non-trained engineers
4. Moisture Analyzer hardware calibration can be performed using the software
5. Instrument calibrations can be checked for authenticity (tampering) and quality
6. Software / calibration faults can be immediately corrected
7. Library feature allows for easy storage of calibration data
8. If used in conjunction with Sinar **Acoustic Coupler**, software allows full remote control of Moisture Analyzer

Benefits:

1. As new crops or crop varieties require testing, MNET can be used to develop new calibrations for these new applications. Calibrations can be prepared and authorized by accredited laboratories
2. Hundreds of calibrations can be downloaded by choice increasing the functionality of Sinar Moisture Analyzer
3. Suspect hardware can be immediately checked and remedies found decreasing instrument downtime and possible errors from use of faulty hardware
4. Disputes immediately settled by checking veracity of calibrations and hardware performance of the moisture analyzer
5. Large calibration data files can be compiled electronically removing need for paper records