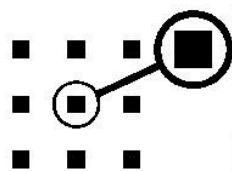


MOISTURE METER 2155



OPERATION INSTRUCTIONS

VERSION 1.0



FARMSCAN

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1.0 OPERATION

1.1 OPERATING CONDITIONS

Test cell and grain **MUST** be free of any condensation or surface moisture. Moisture on grain or in test cell will cause high readings. Very hot or cool grain will pick up moisture when it warms or cools. The pressure cap of the tester can squeeze moisture from high moisture grains, such as corn, into the bottom of the cell.

Grain exposed to the open air can gain or lose 1% to 2% indicated moisture in only a few minutes. If a sample is to be held for even a short time before being tested, it should be stored in an air-tight container, such as a zip lock bag or jar.

Grain MUST be clean and free from foreign matter.

Because grains are irregularly shaped and may not always pack the same way in the test cell, minor variations in readings may occur. To enhance accuracy, always take three (3) successive readings of the total sample being tested, and average the results. Empty and refill the tester between each test.

The tester is most accurate when the grain and tester are between 60° F (16° C) and 90° F (32° C). The unit will, however, operate at temperatures between 32° F (0° C) and 120° F (49° C). For best results, grain temperatures should not be below 40° F (4° C) or above 110° F (43° C).

If the temperature of the grain sample is much colder or hotter than the tester, "preheat" the tester for 30 seconds following Preheat instructions on page 5.

The moisture range limits of the tester will vary depending on how far the grain and test cell temperatures are from ambient temperature. If the tester reads "BELOW" or "ABOVE LIMIT", you may be able to get a reading by allowing the tester and grain to stabilise closer to ambient temperature. The tester will always be most accurate at or near room temperature.

1.2 OPERATING PROCEDURE - NORMAL OPERATION

1. Remove the cap. Inspect the test cell to be sure that it is clean and empty.
2. Press and hold ON-OFF button to turn on tester. Display will show the name of the last grain tested.
3. When the grain to be tested has been selected by using the select arrows, fill the test cell level with the top of the cell, with the sample to be tested.
4. Replace the cap and tighten until the pressure-indicator screw in the cap is flush with the top of the cap.
5. IMMEDIATELY* press the TEST button. The word TESTING will be displayed for about 10 seconds, while the tester compensates for temperature. The moisture % will then be displayed for about 10 seconds.
6. The tester will then return to displaying the name of the last grain tested. Empty the test cell and refill with a fresh sample and test again.
(Do not re-test the sample without emptying and refilling.)

NOTE: Some grains, such as grass seeds are too small to push up the pressure-indicator screw to become flush with the top of cap. In this case, screw cap down all the way and take reading. Do not attempt to add additional grain to the test cell.

NOTE: *High moisture grain will continue to compress in the test cell once the pressure cap is screwed down. High readings will result if the TEST button is not pressed immediately after screwing on the cap.

NOTE: The unit is most accurate when the temperature of the grain and tester are the same, and between 60°F (16°C) and 90°F (32°C).

1.3 OPERATING PROCEDURE - PREHEATING

If the temperature of the grain sample is 20°F (11°C) more or less than the temperature of the unit, preheat the tester as follows:

1. Remove cap and fill test cell with grain sample.
2. Replace cap loosely. Do not tighten.
3. After 30 seconds, empty test cell and immediately refill with fresh grain.
4. Replace and tighten cap and test as normal. (No need to preheat before additional tests.)

1.4 TO SELECT A NEW GRAIN SCALE (OR FUNCTION)

1. At start up, the tester will always display the name of the last grain tested, such as Corn.
2. To select a new grain scale, press either the up or down arrow on the SELECT button to index forward or backward through the grain (function) menu. The grains are listed in alphabetical order.

NOTE: To check the battery condition or view the computed temperature of the test cell*, press SELECT button up or down to the end of the alphabetically listed grains to get desired function. Then push TEST button to test that function.

*Temperature displayed is not actual grain or cell temperature. It is a complex differential measurement of 2 sensors in the tester.

1.5 MESSAGES DISPLAYED

Symbol

Definition

*	Calibration has been adjusted from the factory setting for the grain being tested
BAT.LOW	Battery needs replacing.
MOISTURE BELOW LIMIT	Moisture is below low limit.
MOISTURE ABOVE LIMIT	Moisture is above high limit.
TEMPERATURE BELOW LIMIT	Temperature is below low limit.
TEMPERATURE ABOVE LIMIT	Temperature is above high limit.
NEEDS SERVICE (---) ERROR	Electronic failure.

1.6 TO TURN OFF TESTER

1. Press ON-OFF button.
OR
2. Tester will also automatically turn itself off 2 minutes after the last button has been pressed.

1.7 TO REPLACE BATTERY

1. The tester is supplied with a 9 volt Alkaline battery. There are spaces for 2 batteries, The space behind the CAL button side is for the system power battery. The space behind the ON-OFF and TEST button side is for the back lighting.
2. The tester will flash a BAT LOW message, if either battery needs replacing, which is at about 7.5 volts or lower.
3. At any time select BATTERY CHECK from the main grain/function menu. Press TEST to display actual voltage and condition of the battery.
4. Open the battery compartment door located on the bottom of the tester by sliding the latch towards the front of the tester. There is a directional arrow moulded in the bottom of the case.
5. When replacing the battery, make sure that the + and - of the battery matches the + and - moulded into the tester bottom. If installed incorrectly, it will not harm the tester, but the tester will not operate.
6. Use only 9 volt Alkaline batteries.

2.0 CALIBRATION

2.1 CALIBRATION ADJUSTMENT

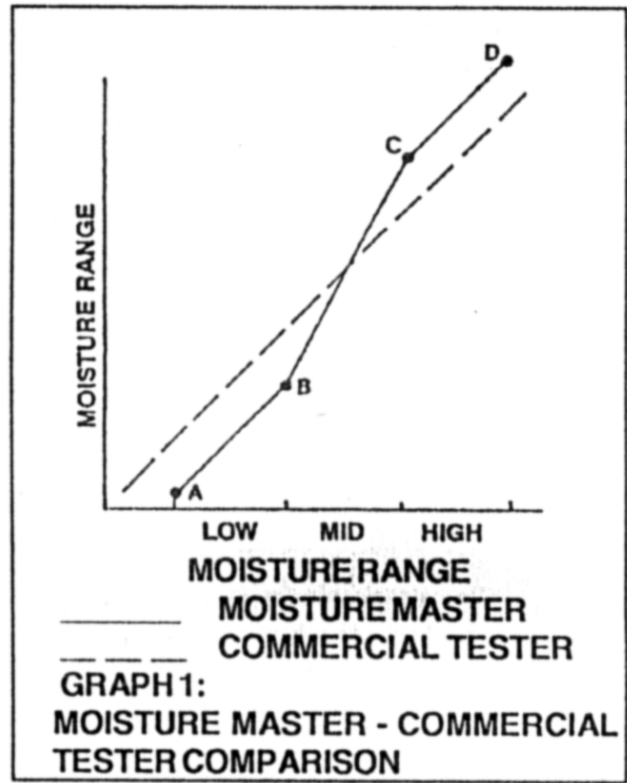
1. Each grain scale can be individually adjusted up or down 4.9% by increments of 0.1% to more closely match the results of a local elevator tester. All adjustments are retained, even if the battery is removed.
2. First select the grain to be adjusted, and make sure that the tester is displaying that grain.
3. Press the CAL button to display the adjustment amount. It should read 0.0% when in factory calibration.
4. Press the up arrow to raise the adjustment amount or the down arrow to lower. The tester will add or subtract up to 4.9% by increments of 0.1% to the test reading.
5. After the adjustment amount has been selected, press the CAL button to return to grain testing mode.

NOTE: An asterisk* will appear after the moisture reading, if an adjustment has been made from factory calibration for the grain being tested. At any time the CAL button can be pressed to display the adjustment amount for the grain being tested. Press CAL button again to return to testing mode.

1. **Differences between testers:** All commercial testers do not exactly match one another, and none exactly match the actual weighted moisture of any given grain. They all vary within acceptable error limits, above and/or below, the actual moisture, as determined by laboratory, air-oven tests. The difference between different commercial testers, as well as between your MOISTURE master and a commercial tester is not a constant value. Therefore, a correction adjustment at one moisture level may not be valid for a different moisture level.

Graph 1 illustrates how your unit might compare to a commercial tester over a broad range of moisture. Your tester, and most commercial testers are most accurate in the mid range of moisture for each grain. The readings for the commercial tester (shown on the graph by the dotted line) will closely match those of your unit (shown by solid line) for that range, as illustrated.

However, at either high or low moisture levels, differences between your test and the commercial test not only become greater, but may switch from your unit reading higher than the commercial tester to it reading lower than the commercial tester. For example in Graph 1 the area between B and C represents the mid range moisture. The 2155 readings match the commercial tester readings with an accuracy of $\pm 0.5\%$. The area between A and B represents the low moisture range. Here, your unit's readings differ more from commercial tester readings, and are lower than the commercial tester readings. The area between C and D represents HIGH moisture range. Your tester readings again differ more from the commercial tester readings than they did in the mid-range moistures, but here the readings are HIGHER than the commercial tester readings.



2. **Calibration - very dry or wet grain:** Graph 1 illustrates that the portable tester's readings closely match commercial tester readings at mid-range moisture levels. Calibration adjustments if required in this mid-moisture range would be small. However, if grain is very dry or very wet, it may be necessary to re-adjust your unit to the commercial tester for testing the very dry or wet samples. Record the calibration adjustment required for that range (low and/or high). It will be valid for all testing in that moisture range for that grain.

3. **Effects of calibrating high or low moisture grain:** Graph 2 shows how the tester's readings may compare after your unit has been adjusted for a very dry (low moisture range) sample.

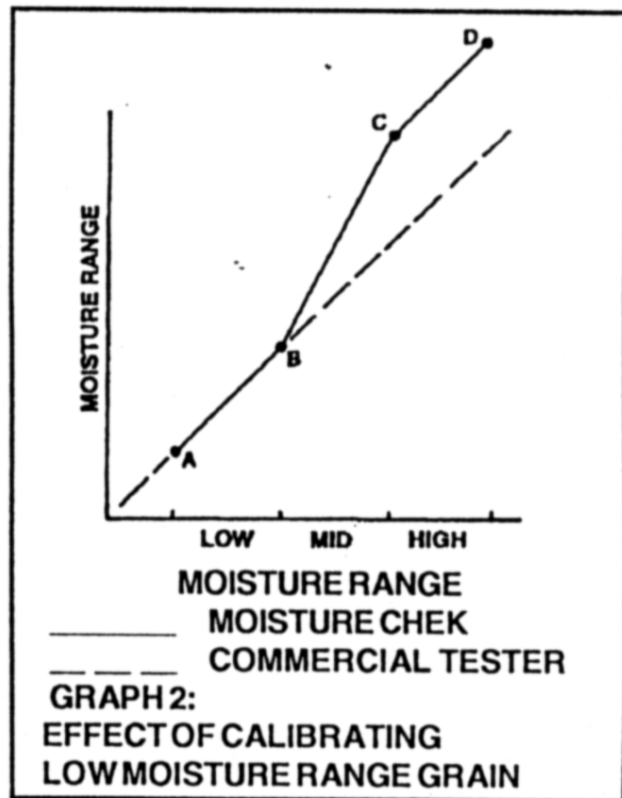
Note that while low moisture samples now test at or very close to commercial tester results, the calibration adjustment has made the difference between the portable and commercial tester results even greater for mid-range (are B to C) and high-moisture

range (area C to D) samples. Therefore, when testing any grain at significantly different moisture than used for calibration, you may need to re-calibrate your unit for the new moisture level.

IMPORTANT: Record calibration adjustment figures in low, mid and high moisture ranges. These adjustment values should be re-used when testing that grain in that moisture range.

IMPORTANT: Recalibration is required whenever testing grain at moistures significantly different from moisture level used for current calibration of unit.

NOTE: Graphs shown are for illustration purposes only and do not reflect actual test data.



2.2 GRAIN MOISTURE LIMIT GUIDELINES

Grains English	Moisture Range Low Limit	Moisture Range High Limit
Barley	8.5%	19.5%
Canola	7.5%	15.0%
Flax (Linseed)	5.0%	13.5%
Lupins	8.0%	20.0%
Maize	8.0%	40.0%
Oats	8.0%	22.0%
Peas: Green	8.0%	21.0%
Peas: Yellow	8.0%	21.0%
Rice (Long)	8.5%	23.0%
Sorghum	10.0%	20.5%
Soybeans	8.0%	24.0%
Sunflower: Stripe	7.5%	22.0%
Triticale	6.0%	22.0%
Wheat: Durum	8.5%	20.0%
Wheat: White	8.0%	24.0%
Wheat: Sft Winter	8.5%	22.0%

NOTE: If grain temperature is 40°F (4°C) or below, or 110°F (43°C) or above, and the grain moisture is near either the high or low limit (listed above), the tester is programmed to close down its range of operating limits.

(Specifications and design subject to change without notice.)

3.0 TROUBLESHOOTING

SYMPTOM

A. Unit does not power up or loses power occasionally.

SOLUTION

1. Press ON-OFF button for a shorter time. DO NOT hold button down.
2. Check battery for 7.5 volts or higher. Replace as necessary.
3. Battery contacts may be making poor contact. Remove battery and pull metal contacts up from bottom of compartment using needle-nose pliers.

B. Unit is inaccurate.

1. Tester may have been adjusted to match wet grain and later found to be inaccurate at lower moistures. Readjust calibration using dry grain (within the normal moisture range of stored and traded grain). See CALIBRATION LIMITATIONS.
2. Temperature of the grain and unit may be more than 20°F (11°C) different. Follow preheat procedure.
3. Grain and/or test cell may have developed surface moisture from rapid changes in temperature of grain sample. Allow grain and tester to stabilise near room temperature. Inspect for visible moisture on grain and inside test cell. Dry test cell with soft cloth or blow dryer, if necessary. Retest grain.

C. Unit reads "Needs Service (---) Error"

1. If the unit is at or below 32°F (0°C), allow the tester to warm up to above 32°F (0°C). If the unit will then turn on without the error message, the tester is working normally. If the error message still appears, the tester requires service.

4.0 SPECIFICATIONS

Battery :	9 volt Alkaline Type
Accuracy :	Within 0.5% of oven dried method
Moisture Range :	See Low/High Limits for each grain type.
Grain Temp Range :	0° C to 49° C
Scale Adjustment :	± 4.9% by 0.1% increments
Weight :	800g (1.3kg packed)
Dimensions :	H 185mm x W 100mm x D 100mm

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**IMPORTANT: Keep original invoice or other proof of purchase.
Proof of purchase is required to determine if service
will be performed within warranty period at no charge.**

WARRANTY

This tester is guaranteed to be free from defects in materials and workmanship for one year from date of retail purchase. This warranty does not cover the battery or damage resulting from misuse, neglect, accident or improper installation or maintenance. This warranty does not apply to any product which has been repaired or altered outside the factory or by an unauthorised factory repair station.

The foregoing warranty is exclusive and in lieu of all other warranties of merchantability, fitness for purpose and any other type, whether expressed or implied. FARMSCAN neither assumes nor authorises anyone to assume for it any other obligation or liability in connection with its product and will not be liable for consequential damages.