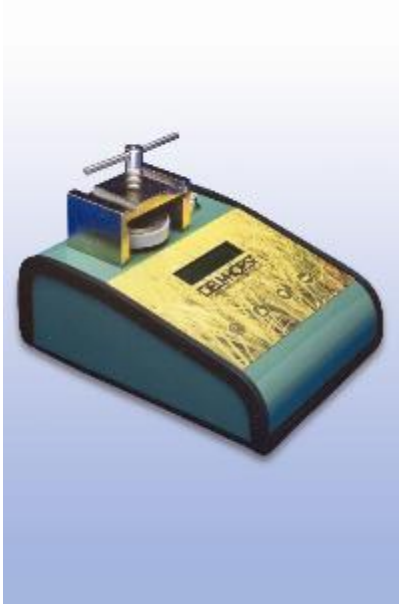
G-7

GRAIN MOISTURE METER

OPERATION MANUAL

(For instruments beginning with SN 13481)



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IMPORTANT NOTE: When turning G-7 "ON", allow it to run through its entire initialization before pressing any keys. Any interruption to the initialization ("power up")will result in a "Calibration Fail" when performing a calibration check. If this occurs, reset the meter, power it down, and then power it up properly.

INTRODUCTION

Thank you for purchasing the G-7 Grain Moisture Meter. The G-7 is a full-featured meter that incorporates a double disc, pressure type electrode. The lower disc forms the base of a shallow cup in which the grain sample is placed. The upper electrode screws down over the sample cup. Both discs have sharp points that penetrate the seed coat and make contact with the interior of the grain.

This system rests on a pressure plate that is mounted on a pretensioned calibrated spring, insuring uniformity of pressure from one test to another for optimum repeatability.

The G-7 has been calibrated against well-conditioned samples whose moisture content was determined by standardized, approved methods. In these laboratory tests it was found that the readings are on the average within ± 0.5% in the range 9 to 17 and ± 1.0% in the range 17 to 23.

The operating instructions for the G-7 are divided into three sections. Section A (Meter Operation) is a step-by-step guide to the different features and basic use of your moisture meter. Section B (Taking a Reading) contains information on how the meter is used for testing different grains. Section C (Factors Affecting your Readings) discusses various factors that may affect your readings.

Please read the instructions carefully. If you require additional information, contact Delmhorst for assistance at info@delmhorst.eu.

G-7 FEATURES

- Designed to check %MC in the following grains and hay:
  - Barley 9%-30%
  - Coffee 7%-25%
  - Corn 9%-30%
  - Flax 8%-15%
  - Hay 10%-40%
  - Oats 9%-30%
  - Pasta (dried) 7%-25%
  - Rapeseed 6%-19%
  - Rough rice 9%-30%
  - Rye 9%-30%
  - Sorghum 9%-25%
  - Soybeans 7%-30%
  - Wheat 9%-30%

- Nominal MC Range: 9% - 30% MC depending on grain
- Built-in temperature correction
- User programmable offset
- Stores up to 150 readings
- Adjustable set point indicator
- Includes (1) 9-Volt Alkaline Battery
- Proven microcontroller circuit
- One year warranty

SECTION A – METER OPERATION

KEY SWITCH FUNCTIONS

#1 – ON/OFF
Turns the meter on and off.

The G-7 has an automatic shut off feature, which turns the meter off after 4 minutes of either LOW readings only or no key activity. The 4-minute timer is user-adjustable.

#2 – ENTER

The ENTER key accepts a selection you make for the various functions made available through the menus. This key also stores displayed reading in memory.

NOTE: If you do not press the ENTER key to execute a particular function, the selection will not be accepted, and the display will return to the main menu.

#3 UP
Allows you to scroll up the menu options

#4 DOWN
Allows you to scroll down the menu options

SET UP MENU

The set up menu is accessed by using the UP/DOWN keys. Within the set up menu are a number of preferences you may set before using the meter. Below is a description of those functions.

TO ACCESS THE SET UP MENU:

- **Press the UP/DOWN** key until the display reads Setup Menu?
- **Press** ENTER

The following setup functions are accessed in this order by pressing the UP key. **These instructions assume that you have already accessed the Setup Menu as described above:**

TEMP. MODE –

The G-7 defaults to a temperature of 80°F. As grain temperature increases, indicated moisture content rises. Lower grain temperatures result in lower indicated moisture content.

The temperature modes are:

AUTOMATIC: A built-in temperature sensor measures the temperature of the grain sample. Let the grain sample remain in the sample cup for at least 5 minutes prior to taking a reading to allow the meter to correctly read the grain temperature. The meter will then display a temperature-corrected reading.

MANUAL: Allows you to manually input the grain temperature as taken with an external thermometer or temperature system. After the temperature is input, the meter will display a temperature-corrected reading.

Do not use the manual temperature mode unless you are confident that the temperature of the grain and the temperature of the meter are essentially the same.

To change the temperature mode:

- **Press the UP key** until the display reads Temp Mode?
- **Press the ENTER key** to select a temperature mode. The meter will display the current temperature mode.
- **To choose the temperature mode**, press UP or DOWN keys to toggle, then ENTER to set.

TEMP. SCALE

- **Press the UP key** until the display reads Temp Scale?
- **Press the ENTER key** to select the temperature scale (Fahrenheit or Celsius).
- **Use the UP/DOWN keys** to scroll forward or backward to the temperature scale desired.
- **When scrolling in either direction**, press ENTER to set the desired temperature scale.

%MC OFFSET

The %MC offset allows you to make a correction to the calibration of the meter in order to match the readings of the commercial grain elevator. The offset may be changed in increments of 0.1%.

Before changing the offset, we recommend that you determine the average of at least three tests with the G-7 on the sample that was tested with the elevator meter. If you accept the elevator moisture meter as a standard, then adjust the %MC offset to match the elevator.

- **Press the UP key** until the display reads Set %MC offset?.
- **Press Enter** to change the %MC offset.
- **Use the UP/DOWN keys** to scroll forward or backward to the offset value desired.
- **When scrolling in either direction**, press ENTER to select the desired offset.

SET OFF TIMER

The off timer allows you to change the meter's automatic shut off in one-minute increments. The default setting is four minutes. If the meter reads only a LO reading, or no key has been pressed for four minutes, the meter will shut off automatically.

- **Press the UP key** until the display reads Set Off Timer?
- **Press the ENTER key** to enter this mode. The display will read "Change off timer to:"
- **Press the UP/DOWN keys** to select the desired increment of the timer.
- **When scrolling in either direction**, press the ENTER key to select the desired timer increment.

SET MENU TIMER

The menu timer allows you to change the amount of time in which a menu will timeout if no key is pressed. If no key is pressed in the amount of time set on the timer, the display will revert back to the main display. The menu timer is adjustable in increments of seconds.

- **Press the UP key** until the display reads Set menu timer?
- **Press ENTER**. The display will read "Change timeout to:"
- **Use the UP/DOWN keys** to scroll up or down to the desired timeout
- **When scrolling in either direction**, press ENTER to select the desired timeout.

RESET METER

This feature clears data memory and restores default parameters as follows:

a) Grain = first in list (Barley)
b) Temp. Mode = AUT
c) Temp. Scale = Fahrenheit
d) Alarm Set Point = 15.0%
e) All Offsets = 0
f) Menu Timer = 4 secs.
g) Off Timer = 4 minutes

- **Press the UP key** until the display reads Reset meter?

- **Press ENTER** to reset meter. The display will read “Memory storage is cleared. Meter is reset.”

The following functions are “stand alone functions” accessed by scrolling up or down the main menus. They are not part of the Setup Menu.

CHECK METER CALIBRATION

- **Press the UP or DOWN key** until the display reads **Cal test?**

- **Press the Enter key** and the meter will go through the following sequence:

  “Measured nominal 14.0%” Then it will display “mc-14.0%.” Then it will read “Calibration Pass.”

  - **The meter is considered in calibration if the display reads 14.% ±0.5%.**

- **If the calibration does not pass**, the sequence will end with a “Calibration Failed” display.

CHANGE THE SET-POINT

The set point is a user adjustable %MC value that will flash two arrows in an upward direction on the display screen if the meter reads higher than the selected value. The set point value may be changed in increments of 1.0%.

- **Press the UP key** until the display reads “Change Setpoint?

- **Press ENTER**. The display will read “Change Set Point Alarm To:”

- **Use the UP/DOWN keys** to scroll up or down to the desired set point.

- **When scrolling in either direction**, press ENTER to select the desired set point.

LOW BATTERY INDICATION

The meter displays **"BATTERY LOW"** when the battery voltage drops to approximately 5.8 volts. This is an indication that the remaining battery life is 1-1/2 hrs of continuous "on" time.

SELECT THE GRAIN

- **To change the scale,** press the UP/DOWN key until the display reads "Select grain?
- **Press ENTER to** view the available grains. The meter will display "Change Grain to:
- **Using the UP/DOWN keys** to view the list of grains.
- **Press Enter** to select the desired grain.

Note: if you do not press the ENTER key after having reached your desired setting for any of the above selections, the meter will remain at the previous value prior to scrolling in either direction.

STORAGE MENU

The storage menu of the G-7 allows you to view any stored readings and display various statistics about those readings. It also allows you to clear the memory.

TO ACCESS THE STORAGE MENU:

- **Press the UP/DOWN keys** until the display reads Storage Menu?
- **Press ENTER**

The following functions are accessed in this order by pressing the UP key. **These instructions assume that you have already accessed the Storage Menu as described above:**

VIEW READINGS

After entering the storage menu, the display will immediately read "View Readings?"

- **Press the ENTER key**. The display will read "Select Batch:" and will list the name of one of the grains which has stored data.
  Note: If you have stored readings in "batches" for a number of different grains, you may select the grain to view by pressing the UP/DOWN keys until the desired grain is displayed. Then Press ENTER to select that grain. The meter will display the first reading of the selected batch.

- **Press the UP key** to scroll to the next stored readings.
- **To scroll backward** to a previously stored reading, press the DOWN key

VIEW STATISTICS

- **Press the UP key** until the display reads “Statistics?

- **If you have stored readings** in more than one batch, the meter will display the current grain.
  To view statistics of another grain with stored readings, press the UP key until the desired batch is displayed.

- **After you have selected the batch**, press the ENTER key . The display will cycle through the following statistics:

1. Total: Avg.:

   The meter displays the total number of readings stored for the selected batch, and the average of those stored readings.

2. Std. Dev Co Var.

   The meter displays the standard deviation for the readings stored in the selected batch, and the co-efficient of variation. Definition of standard deviation and co-efficient of variance is as follows:

   Standard Deviation is a statistical parameter that gives the user, in one single figure, an indication of the “range” of readings that make up the AVERAGE. The lower the standard deviation, the closer all readings are to the average, indicating a uniform distribution of moisture content throughout the batch or load.

   Cov or co-efficient of variation is a term used to express the standard deviation as a percentage of the average. Its values are between 0.0 and 1.0 and again, a low COV would indicate a more uniform distribution of moisture.

3. Low High

   The meter displays the lowest and highest reading for the stored readings in the selected batch.

TO CLEAR MEMORY:

This function allows you to clear the stored readings, while maintaining all other settings such as grain, temperature, mode, etc.

- **Press the UP key** until the display reads: Clear Memory?
- **Press the ENTER key**. The display will read "Memory storage is cleared."

SECTION B – TAKING A READING

TESTING GRAINS

- **Fill the sample cup** with a single layer if grain or seed and place it on the pressure plate.
- **Place electrode upper plate in position**. Turn the electrode screw until you feel some resistance to turning it. Then turn it an additional one and a half turns.
- **Press the "ENTER" key** to store the displayed reading in memory.
- **Turn the upper electrode** counter clockwise, empty the cup and clean it with the brush in preparation for next test.

TESTING GRAIN AND SEED IN BAGS

- Screw the optional #832 long pin prod into the H-4 handle and connect the electrode cable to the external connector on top of the moisture meter.
- Push the #832 prod into the seed bag and Press down on the electrode until the head of the screw which holds the pressure button, touches the palm of your hand.
- **Press the "ENTER" key** to store the displayed reading in memory.

NOTES:

Make several tests on various parts of the bag. Push the prod into the lower portion of the bag being tested, or into one of the bags on the bottom of the pile. You may stand on a bag and apply the electrode between your feet.

When using the #832 Long Pin Prod, the following correction should be added to the meter readings:

Oats, Corn, Wheat	1.0%	Rye, Sorghum, Soybeans	2.0%
Barley	1.5%	Rough Rice, Coffee	2.5%

TESTING FESCUE AND OTHER GRASS SEEDS

- **Screw the optional #832 long pin prod** into the H-4 handle and connect the electrode cable to the external connector on top of the moisture meter.

- **Set the meter to HAY.**

- **Push the #832 prod** into the seed and Press down on the electrode until the head of the screw which holds the pressure button, touches the palm of your hand.
- **Press the "ENTER" key** to store the displayed reading in memory.

NOTE:

A reading of 12% normally indicates that the seed is at a safe level of moisture content. A reading of 14% indicates a borderline condition of moisture content. In this case, additional readings are recommended.

TESTING HAY

- **Set the meter to**

Hay. TESTING

BALED HAY

- **Screw the optional #830-2 10" prod** into the H-4 handle and connect the electrode cable to the external connector on top of the moisture meter.

- **Insert the probe into the bale.**

- **Press the "ENTER" key** to store the displayed reading in memory.

TESTING IN THE WINDROW

- **Attach the #831** short pin prod to the H-4 handle and connect the handle to the external connector on top of the meter.

- **Prepare a representative sample** by collecting hay from various parts of the windrow.

- **Place hay in a non-conductive container** (such as a 5 to 10 gallon plastic pail) and apply the short pin prod to the hay.

- **Press down on the electrode** until the head of the screw which holds the pressure button, touches the palm of your hand.

- **Press the "ENTER" key** to store the displayed reading in memory.

- **Mix the sample once again** and take at least two more readings and use the highest.

When testing in the windrow, push down on the pressure button until the palm of your hand touches the screw that holds the key in place. The pressure button depresses a calibrated spring inside the handle. When the screw touches the palm of your hand, the pressure applied

on the sample is 27 – 30 lbs., which closely simulates the pressure in a standard bale of hay. If you do not have the #831 short pin prod, squeeze a handful of hay around the tip of the 830-2 for an estimate of windrow moisture levels.

For more detailed information about using the G-7 on hay, please call Delmhorst Europe at 0031 73 6395080. You also may download any of the owner's manuals for our hay moisture meters from the main web site at www.delmhorst.com

SECTION C: FACTORS AFFECTING YOUR READINGS:

GRAIN TEMPERATURE

- Wide differences may exist between the grain temperature and that of the instrument. Under such conditions, the temperature of the samples may change so that it becomes difficult to measure it accurately.

MOISTURE DISTRIBUTION

- This condition prevails when grain is drying, especially when using heat or rapid circulation of air. Differences in moisture content are also found in different parts of the same field because some parts may mature at different times. Actual differences in moisture content can also be found in a single ear of corn – moisture usually being greater near the stalk.

SAMPLE SIZE

- The G-7 tests a small sample and therefore its reading is directly related to the moisture content of the grain from where the sample was selected.

- If the initial two or three tests indicate uniform moisture content, there is no need to make additional tests on other samples. On the other hand, if the initial tests indicate considerable variations in moisture content among the various samples, we recommend that you test more samples in order to have a more accurate determination of the average moisture content, and the range of moisture present.

UNIFORMITY OF SAMPLE

- When checking the operation of a dryer, select samples of grain from different locations to determine how well the drier is performing, since the drying rate may not be uniform throughout the grain. Also, when checking the moisture content of grain in a bin, it is necessary to select various samples from different parts of the bin and test them individually. In such cases it is very important to ascertain that there is no grain in any part of the bin with a moisture content too high for safe storage.

- It is more important to know the range and distribution of moisture in stored grain than it is to know the average moisture content, since an average may not reveal the presence of high moisture pockets.

- Moisture migration may result in an accumulation of moisture in the top layers of the grain. It is necessary, therefore, to take at least one sample from this area when checking the moisture content of grain in a bin. Proper use of a moisture meter will show when to ventilate a bin and when fans can be shut down. These tests can be made in a very short time.

CARE OF YOUR METER

To keep your meter in good working order:

- ./ Store your meter in a clean, dry place. The protective carrying case provided is an ideal storage place when the meter is not in use.
- ./ Change the 9-Volt battery as needed. Continued use with a low battery may cause the meter to go out of calibration.
- ./ Change contact pins as needed. Keep pin retainers hand tightened.
- ./ Clean the meter, contact plates, pins and probes with any biodegradable cleaner.
- ./ Use the cleaner sparingly and on external parts only. Keep the cleaner out of the external connector.
- ./ DO NOT IMMERSE THE METER OR ANY ELECTRODE IN WATER.
- ./ Remove the battery if the meter will not be used for one month or longer.

SERVICE FOR YOUR METER

- ./ Pack your meter securely. Enclose a purchase order or letter with a brief description of the problem.
- ./ There is no need to call us for a return authorization number if you are within the EU. Customers outside the EU must contact us for more specific instructions prior to returning a meter.
- ./ Include your name, address, daytime phone and fax numbers or e-mail address. If you believe the meter is under warranty, please provide the original sales slip or invoice.
- ./ Ship via UPS, Expedited or Express service, Priority Mail or any overnight carrier who provides prompt service. Do not use standard parcel post.
- ./ Insure your instrument for its full value and ship prepaid. We are not responsible for damage in transit.
- ./ We do not accept COD shipments or cover any incoming freight or duty charges on returned merchandise
- ./ Turnaround time on repairs is approximately two weeks.
- ./ We will call you with an estimate if you specifically request one, or if we determine that the meter may be too costly to repair.
- ./ Non-warranty repairs will be returned via GLS or UPS/COD unless you have already established other payment terms. There is no COD service outside the EU.
- ./ Payments have to be made by Bank transfer prior to the return shipment. A proforma invoice will be raised in advance.
- ./ Warranty repairs will be returned at no charge if shipped within the EU via GLS or UPS Carrier Services. Freight charges for expedited services (i.e., UPS/2 Day, UPS/1 Day, etc.) are the customer’s responsibility and will be charged as per the above terms.

WARRANTY

ArtTest B.V., referred to hereafter as Delmhorst Europe, guarantees the G-7 meter for one year from date of purchase and any optional electrodes against defects in material or workmanship for 90 days. If, within the warranty period of the instrument, you find any defect in material or workmanship return the meter following the instructions in the "**Service for Your Meter"** section. This limited warranty does not cover abuse, alteration, misuse, damage during shipment, improper service, unauthorized or unreasonable use of the meter or electrodes. This warranty does not cover batteries, pin assemblies, or pins. If the meter or any optional electrodes have been tampered with, the warranty shall be void. At our option we may replace or repair the meter. Delmhorst Europe shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to this product or its calibration. With proper care and maintenance the meter should stay in calibration; follow the instructions in the "**Care of Your Meter"** section.

Under no circumstances shall Delmhorst Europe be liable for any incidental, indirect, special, or consequential damages of any type whatsoever, including, but not limited to, lost profits or downtime arising out of or related in any respect to the meters or electrodes and no other warranty, written, oral or implied applies. Delmhorst Europe shall in no event be liable for any breach of warranty or defect in this product that exceeds the amount of purchase of this product. The express warranty set forth above constitutes the entire warranty with respect to Delmhorst meters and electrodes and no other warranty, written, oral, or implied applies. This warranty is personal to the customer purchasing the product and is not transferable.

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For over 65 years, Delmhorst is a leading brand for high-quality resistance moisture meters. Today the Delmhorst range consists of a complete line of portable moisture meters for a variety of different applications including woodworking / lumber, agriculture, construction and paper.

This product is covered by EU directive 2002/96/EC (WEEE). For disposal please contact your supplier or local authorities for instructions as to best do so.

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