

C-2000

owners manual



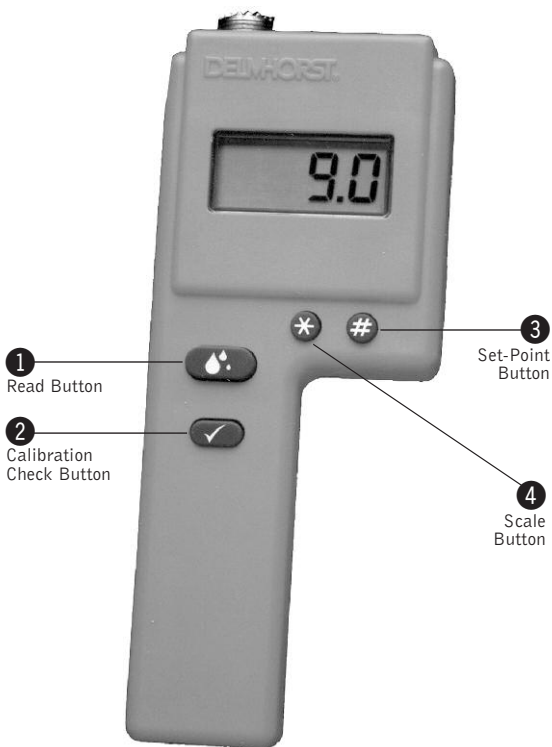
DELMHORST[®]
INSTRUMENT CO.

WHEN ACCURACY IS THE POINT.[™]

TABLE OF CONTENTS

2	C-2000 Features
3	Button Functions
3	Check Calibration
4	Set the Scale
4	To Change the Set-Point
5	Information About Your Readings
5	To Check the Accumulated Readings
6	To Reset Meter
6	Applications
9	Temperature Correction
9	Care Of Your Meter
10	Service for Your Meter
11	Warranty

DELMHORST C-2000



C-2000 FEATURES

- ▶ Designed to check the moisture content in lint cotton and seed
- ▶ Resistance technology recognized around the world as the most accurate method for measuring moisture.
- ▶ Averages up to 100 accumulated readings
- ▶ 4%–16% moisture range on lint cotton
- ▶ 6%–20% moisture range on seed cotton
- ▶ Digital readout
- ▶ Includes (1) 9-volt battery
- ▶ Proven microcontroller circuit
- ▶ One-year warranty
- ▶ 60 years of proven quality, accuracy and service

BUTTON FUNCTIONS

1 Read:

Reads the % MC value.

2 Check:

Checks the meter calibration. Displays the average of up to 100 accumulated readings; displays the highest stored reading; erases the readings from memory.

3 Set-Point:

Displays the current set-point. Also acts as an arrow (scroll) key to increase the set-point value in 1% increments. A buzzer will alert you if the meter reads higher than the selected %MC value.

4 Scale:

Displays the meter scale as #1 (Lint) or #2 (Seed) cotton and acts as a toggle to change between the two scales. Also acts as an arrow key to decrease the set-point value.

CHECK CALIBRATION

- ▶ Press the calibration check button **2** and read button **1** simultaneously. Meter is in calibration if it displays 11.1%, ± 0.2 , regardless of the scale setting.

When checking calibration, there is no need to disconnect the external electrode.

If you check the calibration and the display does not read 11.1, it is likely an indication of a low battery. If this occurs, change the battery immediately. Continued use with a low battery may cause the meter to go out of calibration. If you have a fresh battery and the instrument still does not indicate an acceptable calibration, return it to DELMHORST for service. See **Service for Your Meter** section.

When the battery is replaced, the meter displays its software version for one second and then turns itself off. After replacing the battery, you must reset the meter as described in the **Resetting the Meter** section.

TO SET THE SCALE

Set the scale for #1 Lint Cotton or # 2 Seed Cotton.

- ▶ **To change the scale**, press the scale button ④. The meter will display the current scale for one second.
- ▶ **Press and hold the scale button ④** to toggle between the two scales.
- ▶ **Release the scale key ④** to stop at the desired scale.

Changing the scale will automatically reset the set-point value to the default setting for that particular scale. Default settings are as follows:

Lint Cotton – 7%
Seed Cotton – 12%

TO CHANGE THE SET-POINT

- ▶ **To change the set-point value** press the set-point button ③. The meter will display the current set-point value for the scale you have chosen for one second.
- ▶ **To scroll forward** to a higher value for that scale hold the set-point button ③ while the current set-point is displayed and scroll to the set-point value desired.
- ▶ **To scroll backward** through the set-point values, press and release the set-point button ③. Within one second, press and hold the scale button ④. Continue to hold the scale button ④ and the set-point will decrease.
- ▶ **When scrolling in either direction**, release the button to stop at your desired set-point.
- ▶ **A buzzer sounds** if the meter reads a %MC higher than the set-point.

INFORMATION ABOUT YOUR READINGS

The meter will accumulate up to 100 readings. After all 100 readings are "stored" it will not add new readings until the memory has been cleared. It will also continue to display the average of all 100 readings as a reminder that the memory is full.

▶ **To add a reading** to the sum of all the previously stored readings, release the read button **1** within 2 seconds.

When taking and storing readings for a specific material, be sure to clear the meter before moving on to the next scale if you do not want to group all of the readings together.

Moisture content of the samples is the primary factor affecting meter readings. However, readings are also affected by the following:

- ▶ Type of cotton
- ▶ Area where it is grown
- ▶ Impurities
- ▶ Compaction (density) around the electrode surfaces
- ▶ Temperature of the sample

In order to minimize the effect of these factors and improve the repeatability of the meter readings, keep in mind the following points:

- ▶ Use samples with minimum of impurities.
- ▶ Optimal accuracy may be obtained if meter readings are checked against %MC by means of properly run oven tests on the particular product being tested.

TO CHECK THE ACCUMULATED READINGS

This feature displays the total number of all accumulated readings for the given material you have chosen, the average of those readings, and the highest stored reading.

▶ **To view the readings**, press and release the calibration check button **2**. First the meter displays the number of accumulated readings for one second, then the average of those readings for two seconds. Then it displays the highest stored reading for two seconds. The total "cycle" time is five seconds.

- ▶ To keep the accumulated readings in memory release the calibration check button ② before the total cycle time is complete.
- ▶ To erase readings, hold the calibration check button ② for more than five seconds. The total, average and highest readings will be displayed as above, followed by a zero to indicate all readings have been erased.

TO RESET METER

- ▶ Press and release the calibration check button ②.
- ▶ Within one second, press and hold the scale button ②. The meter will display a reset sequence as follows: "121", "8", "1.1", "11.1". The last number, "11.1" is a calibration check.
- ▶ Resetting the meter clears the memory and restores default settings.

APPLICATIONS

Testing Lint Cotton

- ▶ Attach the #52-E/C Sample Cup Electrode to the connector on top of the meter.
- ▶ Set the scale for (#1) Lint Cotton and select a set point.
- ▶ Place a small quantity of cotton in the sample cup. Press the cotton firmly into the cup with your finger. The cotton sample in the cup should be overflowing during the test, even while you are pressing it with your finger.
- ▶ Press the read button ① and read the moisture content on the display. The meter displays the %MC for two seconds.

Readings below 4% lint cotton will be displayed as a negative number. Readings above 16% lint will be displayed as a blinking "16.2%". Both the underrange and overrange readings should be disregarded. They will not be added to the accumulated readings or used in calculation of the average or highest reading.

Testing Seed Cotton

- ▶ Attach the #52-E/C Sample Cup Electrode to the connector on top of the meter.
- ▶ Set the scale for (#2) Seed Cotton and select a set point.
- ▶ Place a small quantity of cotton in the sample cup. Press the cotton firmly into the cup with your finger. The cotton sample in the cup should be overflowing during the test, even while you are pressing it with your finger.
- ▶ Press the read button **1** and read the moisture content on the display. The meter displays the %MC for two seconds.

Readings below 6% seed cotton will be displayed as a negative number. Readings above 20% seed cotton will be displayed as a blinking "20.2%". Both the extreme low and extreme high readings should be disregarded. They will not be added to the accumulated readings or used in calculation of the average or highest reading.

Tests made on seed cotton may not be as accurate as those made on lint cotton. This is due to the fact that the seed cotton sample is obviously made up of lint and seed, and the quantity of seed may vary from sample to sample. Also, the moisture content of the seed is usually higher than that of the lint.

When testing seed cotton, direct contact is still made with the cotton fiber only and not with the seed of the sample. Variables in quantities and moisture content of the seed, during calibration and in field tests, may affect the accuracy and repeatability of the meter readings. The seed cotton scale gives an indication of "total" moisture content (the moisture content of the seed and the lint in a sample as determined by oven tests) in the seed cotton sample. This may be of interest only in buying and selling seed cotton where some consideration may be given to the weight relationship between moisture content and dry matter.

Testing Baled Cotton

- ▶ Slide the plastic spacer over the #491 contact pins from the bottom of the pins, mount the pins in the chucks and tighten the set screws. (The #491 contact pins are not inserted into the chucks for shipping purposes).
- ▶ Attach the #30-E/C Electrode to the connector on top of the meter.
- ▶ Set the Scale to #1 Lint Cotton and select a set point.
- ▶ Insert the electrode pins into the bale and press the read button ①.
- ▶ Place the pin spacers near the tips of the pins when contact is first made with the bale. This helps to keep the pins parallel as they are forced into the bale.

The #491 contact pins are insulated, except for 1-3/4" at the tip. The insulation helps to identify the area of moisture, since the reading is obtained from the tip of the pin. Keeping track of moisture readings as the pins are pushed into the bale will give an idea of the uniformity of moisture distribution in the bale. Higher moisture readings near the surface are an indication that the cotton has been exposed to higher moisture after baling.

The C-2000 gives accurate results on normally compressed bales. If the bale is loosely packed, the meter will read lower than the actual moisture content. If the bale is very tightly packed, the readings will be only slightly higher than normal, and as a rule, no correction needs to be made.

Well-conditioned material will give uniform readings; however, material that is baled before it is dry will show a wide range of moisture content. Several tests should be made on each bale, and you should note the average and the highest readings of these tests.

Testing Yarn

- ▶ Connect the #37-E/C multi-pin electrode to the connector on top of the meter.
- ▶ Set the scale to #1 lint cotton and select a set point.
- ▶ Insert the electrode pins into the yarn and press the read button ①.

Temperature Correction

The basic calibration assumes the cotton temperature to be 70°F. For best accuracy, apply a temperature correction if the cotton temperature is outside the range of 60°F to 80°F. Make a correction of approximately 1.0% for every 20° F. The meter will read higher than the actual moisture content as cotton temperature increases, and will read lower as cotton temperature decreases.

Example:

At 70°F, a reading of 7% indicates actual %MC of 7%. At varied temperatures, meter readings will vary as follows:

Cotton Temperature	Meter Reading	Actual %MC
110°F	9.0%	7%
50°F	6.0%	7%

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.
- ▶ Clean the meter, contact 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

- ▶ Before sending in your meter we recommend you give one of our trained technicians a call. Many times troubleshooting can be taken care of over the phone. Call us at 877-DELMHORST.
- ▶ 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 U.S. Customers outside the U.S. 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, Express Mail, Priority Mail or any overnight courier 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 UPS/COD unless you have already established other payment terms. There is no COD service outside the U.S. To pay by credit card, include the card number and expiration date with your repair. We accept Visa/MasterCard and American Express.
- ▶ Warranty repairs will be returned at no charge if shipped within the U.S. via UPS Ground Service. Freight charges for expedited services (i.e., Federal Express, UPS/2 Day, UPS/1 Day, etc.) are the customer's responsibility and will be charged as per the above terms.

WARRANTY

Delmhorst Instrument Co., referred to hereafter as Delmhorst, guarantees its C-2000 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 C-2000, 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 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 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 its meters or electrodes and no other warranty, written, oral or implied applies. Delmhorst 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.

For 60 years Delmhorst has been the leading manufacturer of high quality moisture meters and thermohygrometers. Today we offer the innovative KIL-MO-TROL® in-kiln monitoring system. We also offer a wide range of meters for a variety of applications including wood-working/lumber, agriculture, construction, paper, restoration, IAQ and flooring.

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