

RDM3-P Paper Moisture Meter

MANUAL

Version 1.0

Rev 02/13



DELMHORST
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WHEN ACCURACY IS THE POINT.

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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.

1. GENERAL DESCRIPTION

Thank you for your purchase of Delmhorst Instrument Co.'s **RDM-3P** handheld paper moisture meter. The RDM-3P follows a long line of "RDM" meters with data acquisition capabilities, and offers the latest in features and functionality. The RDM-3P is intuitive and easy to operate. We recommend that you read the following pages in detail to take full advantage of all that the RDM-3P has to offer.

Outstanding features:

- Three scales for
 - PAPER (5.3%-23%),
 - RELATIVE (0-100) scale, and
 - BALED PAPER (8%-40%).

NOTE: Displayed readings outside of this nominal range should be taken as a "no reading". They are included in statistical calculations to provide a more complete profile of the moisture distribution.

- Operating Temperature of -20° to 70°C (-4°F to 158°F)
- Integral contact pins mounted on top of meter – 8mm (5/16") penetration
- Connector for external electrode
- Date and time stamp for each stored reading
- Job groupings – up to 98
- Optional IR linking capability w/ application software
- Resolution - 0.1% MC
- Battery - 9V alkaline included
- warranty - 1-year
- Carrying case included

2. Operating Instructions -User Guide-

This guide provides step-by-step instructions on powering up, using and powering down the meter.



Figure 1. Key pad Layout

NAVIGATION:

The meter uses an on-screen, menu-driven approach to navigate through the meter features, allowing for an intuitive understanding of keypad functions. Each screen presents the user with a number of selectable options. One of the options is always selected and the user can move (navigate) the selection to any other available option. The keypad is aimed at providing navigational control, and not at accessing specific features. There are four directional keys aligned intuitively around a middle (fifth) key (see Figure 1): Above (UP), below (DOWN), to the right (RIGHT) and to the left (LEFT). The middle key is used to SELECT the option highlighted on the screen.

INSTALLING THE BATTERY:

The battery compartment is located on the underside of the case, at the bottom of the handle.

- i. Open the battery compartment by sliding the lid back while pressing on the release indent.
- ii. Ensure correct polarity, and push the battery in flush with the bottom board until the connectors snap together on both sides.
- iii. Replace the battery compartment lid.

NOTE: DO NOT REMOVE THE BATTERY WITHOUT TURNING THE METER OFF FIRST. BATTERY REMOVAL WHILE THE METER IS ON MAY CAUSE LOSS OF STORED READINGS AND MAY CORRUPT THE STORAGE MEMORY. IF THIS OCCURS, CERTAIN FUNCTIONS (SUCH AS STATISTICS, READING RECALL, ETC) WILL FAIL AND LOCK UP THE METER. If the battery is removed by accident while the meter is ON, and if the readings already stored are important, DO NOT store additional readings. Turn the meter back on and perform a PC download. Beware that any readings stored during the power cycle that included the battery removal WILL NOT be available and CANNOT be recovered. Once the download is complete, perform a meter reset by choosing "RESTORE DEFAULTS" in the Storage Menu. If a download is not necessary, go directly to "RESTORE DEFAULTS".

LOW BATTERY:

The meter features a battery status monitor, designed to warn the user as well as protect measurement accuracy from impending battery failure conditions. The battery warning is triggered by either continuous or temporary low voltage conditions. Visible (a battery icon on the top right side of the display) and audible (buzzer) indicators accompany a battery warning.

Once a permanent low battery condition is detected, all measurement functions are disabled. Enough power remains for other menu functions, including a PC download, although almost any user action at this time causes a low-battery warning to be generated. The battery should be replaced immediately. If the battery reaches critical levels, the meter will refuse to stay on at power-up.

This gradual warning system is intended to provide the user advanced battery status notice and give ample time for replacement before operational limitations occur.

NOTE: *Stored readings are not lost during battery replacement or low battery conditions. Current meter settings are maintained as well.*

POWERING UP THE METER:

- I. Press and hold the center (SELECT) button.
- II. The meter switches on and displays the meter name and software version for a couple of seconds. If the button is released during this time the meter will turn off immediately.
- III. Following the meter name/software version screen, the meter switches the display to the Main Menu and pre-selects the "PIN MODE" option. Release the SELECT button at any time now and the meter will remain ON.

NOTE: *Once the power-on cycle is complete, the center button returns to its main function of selecting the currently highlighted option on the screen.*

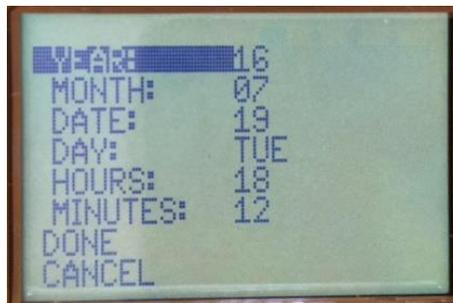
SETUP MENU:

The Setup group of features allows access to the configurable parameters of the meter. They are: Date and Time, Power-off time and Backlight. All can only be accessed in the Setup Menu.

Storage Menu entry descriptions:



- **Return to Main Menu:** This menu option returns the meter to Main Menu. The meter also returns to Main Menu if no user input is detected for 20 Seconds.
- **Set Date and Time:** This menu option allows user access to the date and time set screen:



The Date and Time set screen is populated with the time and date values present in the meter at access time. UP and DOWN key action switches the row selection among available parameters. LEFT and RIGHT key action changes the selected parameter's value (for "DONE" and "CANCEL" – parameters without assigned values, the LEFT and RIGHT keys perform no function). All parameter values are incremented using the RIGHT key and decremented using the LEFT key. The DAY parameter moves forward through weekdays using the RIGHT key and backward using the LEFT key. The SELECT (center) key is only active when menu selection is applied to "HOURS" (switch between standard or military time), "DONE" or "CANCEL". Selecting "DONE" exits this screen back to the SETUP MENU and updates the clock with the newly chosen values. Selecting "CANCEL" exits this screen back to the SETUP MENU without updating the clock.

- **Set Power_Off time:** This menu option allows the user to change the amount of time allowed to lapse between the last key press and meter shut-down. Allowable range is 1min – 9min, with a default value of 2min.



- **Set Backlight:** This menu option allows the user to change the amount of time allowed to lapse between the last key press and backlight shutdown. The default setting for this feature is "NO", where the backlight is completely disabled. Backlight shutdown delays are 10, 20, 30sec. It is recommended that the backlight delay be set to the minimum amount of time necessary in order to maximize battery life.



NOTE: Except for clock settings, all other parameters will return to their default values, as indicated above, when the "RESTORE DEFAULTS" option is selected in the Storage Menu. The values chosen for the Setup Menu parameters will remain in effect even if the meter is turned off, and even if the battery is removed.

Meter Use

This chapter describes each meter menu in detail, as well as the use of each meter feature.

MAIN MENU:

The RDM-3P Main Menu is the default screen at power-up. It provides access to every available meter function, as well as to each feature or feature category.



- **PIN MODE:** This menu option selects the contact paper scale Moisture Content measurement function
- **Storage:** This menu option selects Reading Storage and related features. They are: View Statistics, Stored Readings, Clear Memory, Restore Defaults
- **IR Link:** This menu option selects the PC download interface feature
- **Setup:** This menu option selects access to the rest of the meter features: Set Date and Time, Set Power-off Time and, Set Backlight
- **Off:** This menu options turns the meter off. It should be noted here that the meter will remember certain configurable parameters through to the next power-up.

Meter functions:

PIN MODE:

The RDM-3P operates on the principle of electrical resistance - it uses paper as the element in a circuit by driving two electrode pins into it. This method is effective because moisture is an excellent conductor of electricity and paper is an effective insulator.

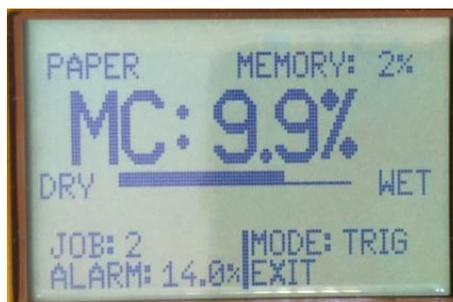
The meter is able to store MC measurement results for review, statistical analysis or download to a PC. In order to allow the user to better keep track of stored data, the meter organizes MC readings in groups called JOBS.

- A reading cannot be taken or stored without being part of a job. There are no limitations to a job size, other than those imposed by storage memory limits.
- The meter supports up to 98 different jobs at any one time.
- The meter imposes strict boundaries among existing jobs. All operations on stored data can only be performed on the job selected.
- The meter restricts each job to one scale. Only readings taken from the same scale can belong to a specific job. More than one job can be defined with the same scale.

RDM-3P automatically configures MC READ Mode with the following default set of parameters when this feature is first accessed:

- Default scale: Paper
- Default Job Number: 1
- Alarm: Off
- Mode: Trig

An example of the main PIN MODE screen is shown below:



This screen provides a complete snapshot of the current meter settings, as well as the current reading. In the upper left corner the meter indicates the current scale being measured. The large text in the line below shows the current MC measurement. The Dry-Wet bar below shows where the current reading falls between "DRY" and a user-defined "WET" condition.

NOTE: The "WET" bar limit is directly tied to the Alarm value, when it is used. If the Alarm feature is off, the WET bar limit is reached at a reading of 7% MC Paper. If another scale is used, this value becomes the scale-corrected reading for 7% MC Paper.

Below the Dry-Wet bar is an information area, showing the job number, alarm setting and the measurement mode. The EXIT option allows the user to exit this function.

The selected scale screen has both selectable and non-selectable items.

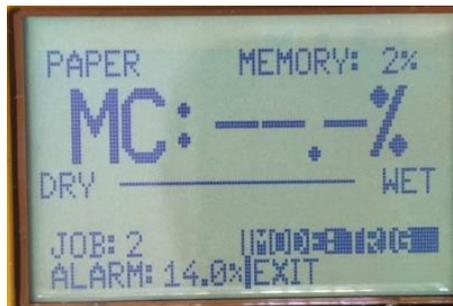
Non-selectable items:

- SCALE NAME (top line)
- DRY/WET bar
- The MEMORY status (top right corner)

Selectable items:

- MC reading (large text)
- JOB (current job)
- ALARM (current alarm setting)
- MODE (current measurement mode)
- EXIT (leave MC READ Mode)

NOTE: The default selection on this screen is MC reading, which places the meter in measurement mode. Pressing the SELECT key causes a single reading to be taken (Triggered mode) or initiates a reading stream (Continuous mode).

READ MODE – CONTINUOUS/TRIGGERED

The meter has two measurement modes: Triggered and Continuous. Choosing the MODE option and pressing the SELECT key will change the measurement mode.

- Triggered mode causes a single reading to be taken every time the SELECT button is pressed. Each reading is stored in memory. The last measurement remains displayed on the screen.
- Continuous mode starts by pressing the SELECT key. The meter keeps taking MC readings in this mode. These readings are NOT stored until the SELECT key is pressed again. To exit continuous mode WITHOUT STORING the current reading, press any directional key (UP, DOWN, RIGHT, LEFT). To exit continuous mode and STORE the current reading, press the SELECT key. Exiting continuous mode leaves the last reading on the screen. To resume continuous mode, press the SELECT key again. Use the directional keys to choose a different option.

CREATE/EDIT A JOB:

This menu option selects the job edit function:



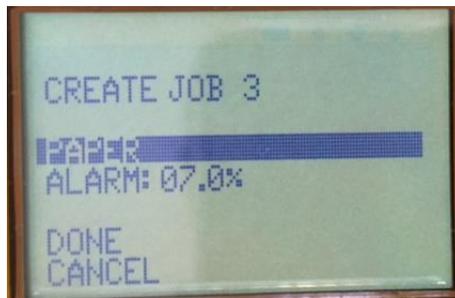
This screen always begins by displaying the current job.

NOTE: If "DONE" is selected with the current job on the screen, there can be two outcomes:

- The current job is empty; the meter will proceed to the "Create Job" screen. This is done to give the user the opportunity to modify the settings for the current job (this is possible because no readings have been stored yet).
- The current job is not empty; the meter will immediately return to the MC READ Mode menu. This is the same as selecting "CANCEL".

Select "JOB" and use the LEFT or RIGHT keys to change the job number to the one desired. When finished, select "DONE". To abandon, select "CANCEL".

If the selected job does not already exist, a "Create Job" screen appears, such as this:



This screen offers the opportunity to configure the complete measurement environment, as applied to the new job. All parameters are alterable while taking readings in the new job, except for the scale. Selecting one of the three scales will bring you back to the "CREATE JOB" screen. The navigational selections are always at the bottom: Done , Cancel. "DONE" brings the user to the MC READ screen, and "CANCEL" returns the user to the JOB EDIT screen.



ALARM SETTING:

Click SELECT on the ALARM to switch the ALARM on and off. If "on", a Value% is shown. Use the left/right switches to lower or increase, and select DONE to return to the MC READ screen



The "ALARM" feature in the meter provides the user with a set-point: readings above a specified value (considered "WET" or unacceptable) generate an audible alarm.

The first reading breaking the alarm set-point will be signaled by four short beeps in quick sequence. Subsequent readings that remain above the set-point will be signaled by a single short beep. A reading below the threshold will cause the alarm signal to reset, such that any following reading above the threshold will be once again signaled by four beeps.

Once ALARM is chosen, pressing the SELECT key toggles the state of the alarm feature (ON-OFF). The ON state is marked by the current alarm threshold value, while the OFF state is indicated with an "OFF" statement. When the alarm is ON, pressing the LEFT or RIGHT keys will change the threshold value (down and up, respectively). Threshold values range from 0.05% MC to 59.5% MC (default is 8%). Select "DONE" to return to the Create Job menu.

Selecting "DONE" in the Create Job menu returns the user to the MC READ screen. The meter is now configured with the new job and all parameters defined in the "Create Job" screen. Selecting "CANCEL" in the Create Job menu returns the user to the Job Select screen; where it has the opportunity to re-start the job select/create process. Pressing CANCEL in the Job Select screen brings the user back to MC READ. The meter maintains the configuration it had before the JOB option was selected.

USE OF THE VARIOUS SCALES

TESTING PAPER, PAPER CORES, AND CORRUGATED PRODUCTS

- **Set the meter scale** for **PAPER**.
Check that the contact pins are firmly hand tightened.
- **Push the contact pins** into the paper product to their full penetration if possible.
- **Press the SELECT** button to read %MC when in TRIGGER mode. In CONTINUOUS mode, press SELECT to start readings and press SELECT again to store a reading.

Since the readings are the result of an "average" calibration, if a high degree of accuracy is required, the meter should be checked on the specific material and corrections determined by the user. Meter readings indicate moisture content at room temperature of 21°C - 32°C. Meter readings will be affected by lower or higher temperatures. Lower temperatures cause readings to be lower; higher temperatures cause readings to be higher than the actual MC.

The meter tends to read the highest moisture content that is in contact with both pins. If thick samples are not well equalized, it may be necessary to make tests at different depths to determine the degree of uniformity of moisture distribution in the sample. If the meter is used on stock so thin that the full length of the pins is not entirely embedded in the thickness of the sample, the readings tend to indicate a lower than actual MC. This can be overcome by testing more than one sample in stacks.

USING THE 0 -100 RELATIVE SCALE

This scale is used to test the moisture content of hygroscopic materials for which a calibration is not available. Depending on the material, a special application external electrode, instead of the integral contact pins may be required. Increasing readings on the 0-100 reference scale indicate higher levels of moisture content. These readings can be translated into *percent moisture content* once a calibration has been developed.

- **Set the meter scale** to **REL 0-100**. If necessary, attach an external electrode to the meter.
- **Push the contact pins** into the material or apply the external electrode.
- **Take readings** as described above.

The readings may also be used for comparative tests, after meter readings have been related to given conditions for the materials involved. When the meter is used as a gauge for comparative tests, readings should be taken on samples considered to be at "safe" levels or in satisfactory condition. These readings are then used as the "standard" against which subsequent readings on the same material are evaluated. The "standard" for any given material is related to safe storability or any other property which is important for further production processing.

TESTING BALED SCRAP PAPER

- **Set the meter scale to BALED PAPER.** Attach an external electrode to the meter.
- **Push the external electrode** into the material being tested.
- **Take readings** as described above.

The level of accuracy of meter readings depends on a number of factors: similarity between the material tested and samples on which the calibration was made; moisture distribution; and chemical application or processing which may affect the electrical properties of the paper product.

The required electrode is the H-4 with a #830-series prod (25cm(10") or 45cm(18")). A sharp, steel rod to open the hole for the prod may be helpful if the bale is very dense.

A few meter readings in a limited number of specific areas of a large mass can hardly be projected to indicate an average moisture content of an entire bale. The readings can be very helpful in providing an indication of the *overall moisture condition* inside the bale and to detect areas of excessive moisture.

Meter readings may be used as an arbitrary guideline in determining whether or not to accept or reject the material. Since checking the moisture condition of bales is performed when buying and selling, the specific value of the meter readings remains an element to be agreed upon between buyer and seller. Such an agreement should consider not only a specific "range" of readings, but the number and location of where they are taken.

The following ranges can be used as a guideline and may help to interpret the readings:

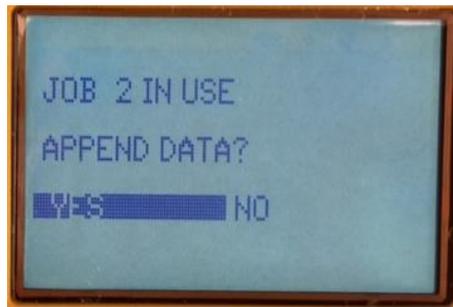
- Readings of 8%-12%, with environmental humidity up to 60% RH are usually considered "dry".
- Readings from 12%-20% with environmental humidity up to 95% are usually considered "acceptable" but should be taken with some reservation.
- Readings of 20%-40% are considered "wet" and unacceptable.

NOTE: MC RANGE AND VALID READINGS

Readings below 5% or above 60% are displayed as LOW or HIGH, respectively. However, since the resistance of the paper also depends on the scale and temperature of the paper, the meter may not always be able to read down to 5%. For different scale and different paper temperatures, there is a minimum %MC limit below that the meter cannot read. All readings below this "lowest limit" are displayed as LOW, and are not stored. These readings are not considered valid readings and are not used by the meter in any statistical calculations.

APPENDING DATA TO A JOB:

If the chosen job does already exist, the user does not have the option to edit the existing job settings. An "Append Data?" screen appears:



If YES is selected, the meter will retrieve the selected job's settings (during this time a "PROCESSING..." message appears) and then switch back to the Pin Mode screen with the restored settings.

If NO is selected, the meter returns to the Select Job screen.

STORAGE:

Data (readings) may be recalled internally for review or MC statistical analysis and may be downloaded to a PC for record keeping or further study. MC measurements are collected and stored in individual groups called JOBS. The user has the option to separate readings collected from various scale of paper or entire kiln charges. MC readings can be separated by up to 98 distinct jobs (labeled 1 through 98). Each stored result is accompanied by a date and time stamp, job identification, reading number, total number of readings in the job, the paper scale on which the reading was taken and the measurement sample temperature, as defined by the user.

There are no restrictions regarding job-numbering sequences. The meter keeps track of existing jobs automatically. The meter also offers excellent flexibility in allowing the user to switch among existing jobs, or create new ones, at random. There are no restrictions regarding measurement storage based on job number. For example, the user is free to take and store readings pertaining to job 3, then job 5, back to job 3 etc. The meter stores all readings in the order they were taken, placing markers in memory to keep track of each stored measurement's job and associated information. The maximum storage capability of the meter is therefore determined by the way in which it is used. Heavy use of the meter's flexibility capabilities (i.e. measurements accompanied by frequent job or reading type changes), forces the meter to add additional internal tracking information to memory records and thereby reduces storage capacity. Depending on meter use, up to 1,416 readings can be stored in the RDM-3P. Various memory usage-tracking features are present to make it easy for the user to determine the rate at which storage space is being used up, as well as providing information related to the amount of storage space left. Once all available storage space has been filled, the meter will stop storing readings (i.e. no overwriting occurs) and warn the user after every measurement that the memory is full. The user has the option to clear the memory at any time.

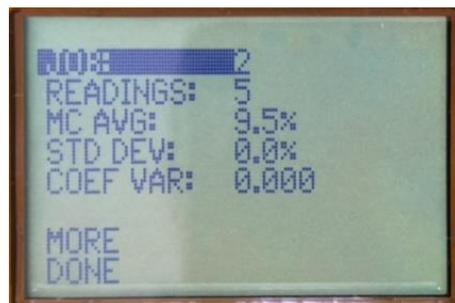
NOTE: Individual memory records cannot be deleted. Only block memory erasure is allowed. The storage memory is not deleted after a PC download. Delete the readings as instructed below after a download if desired.

STORAGE MENU:

The Storage Menu groups all meter features related to measurement storage, retrieval and manipulation. All operations on stored readings may only be performed on a single job. **Storage Menu entry descriptions:**

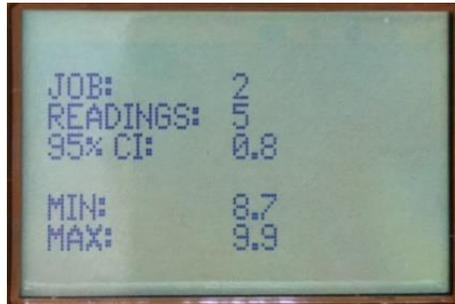


- **View Statistics:** This menu option selects the meter's statistical analysis option. Selecting this option gives the user access to two sets of statistical data. A screen shot example of the first set is shown below:



- The first line indicates the Moisture Content (MC) job being analyzed.
- The second line shows the number of readings stored in the specific job
- The third line shows the Average MC value for all stored readings in the specific job.
- The fourth line shows the Standard Deviation for the specific job.
- The fifth line shows the Coefficient of Variation for the specific job.
- Selecting "DONE" returns the user to the storage menu screen.
- Selecting "MORE" gives the user access to the second set of statistical data.

NOTE: The second set of calculations may require significant processing time, depending on the number of readings stored in the specific job. The meter will display a screen with the word "PROCESSING..." while calculations take place. User input is ignored during this time. Control is returned to the user once the algorithm is complete and the second statistics screen is shown, as in the example below:



- The first line indicates the specific MC job.
- The second line indicates the number of readings present in the specific job.
- The third line shows the 95% Confidence Interval for the specific job. This is the value (+/-) away from the calculated average value within which 95% of the stored readings are guaranteed to exist.
- The fourth line shows the value of the lowest MC reading stored in the specific job.
- The fifth line shows the value of the highest MC reading stored in the specific job.

There are no control entries present in this screen, such as "MORE", "CANCEL" or "DONE". The only available option is to return to the storage menu screen, by pressing any key.

- **Stored Readings:** This menu option selects the measurement review feature of the meter, allowing the user access to measurements stored in memory. Only readings belonging to the selected job will be retrieved.
NOTE: Stored readings can only be reviewed in ascending sequence (ex: reading 1, 2, 3, etc.). The meter assists moving to a set of readings later in the sequence by allowing the user to specify a start point for this ascending sequence, such that the readings of interest will be displayed first. The reading review process may be abandoned at any time.
- **Show MC Readings:** This feature selects stored MC readings for review. Choosing this feature allows the user access to a job overview screen. This screen always begins by displaying the current job, whether it contains any readings or not.

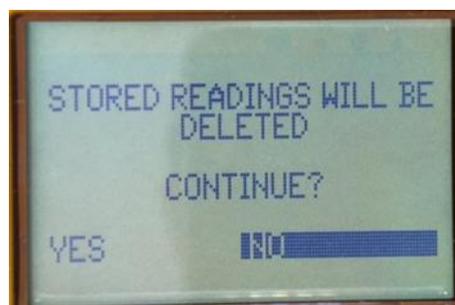


The Left and Right buttons can be used to navigate sequentially through all available job numbers (1-98) while the "JOB:" entry is selected. Jobs that are undefined or empty will display "no readings". Use the Up or Down buttons to change the line selection on the screen. An empty or undefined job will only have one other selectable option: CANCEL. Choosing this option and pressing the Select (center) button will bring the user back to the Storage Menu. A selected job containing readings offers two other selectable options: "VIEW SET" and "DONE".

- **VIEW SET:** This option allows the user to view a specific range of readings in a particular job, as opposed to the entire set, by providing a configurable start point. It becomes useful when large numbers of readings are present in the meter. View Set always begins by displaying "1 TO XXX", where XXX is the maximum number of readings in the selected job. If left unchanged, the first reading to be reviewed will be number 1. Readings may only be reviewed in ascending sequential order.
Using the Left or Right buttons, the left-side value can be changed in increments of 10. For example, assume the selected job contains 23 readings. The View Set entry will begin by displaying "1 TO 23". Successive Right button presses will yield the following: "11 TO 23" and "21 TO 23". At this point, the value on the left side is within 10 readings of the value on the right side. Alternately, pressing the Left button causes the meter to subtract 10 from the current left-side value.
- **DONE:** Selecting this option signals to the meter that the user has completed the reading recall setup process and is ready to begin reviewing readings.

NOTE: There may be a significant delay while the meter processes the required set of readings for review, depending on the number of jobs present in the meter, percentage of memory space occupied by readings, current job size and fragmentation. The meter will display a screen with the word "PROCESSING...". User input is ignored during this time. Control is returned to the user once the algorithm is complete and the Retrieved Readings screen is displayed, as shown in the example below:

- **Cancel:** This feature returns the meter to the Storage Menu
- **Clear Memory:** This menu option will erase the storage memory while keeping the default meter settings intact. This feature offers accidental feature access protection through the use of a subsequent memory deletion confirmation screen:



NOTE: Memory deletion is irreversible.

- **Restore Defaults:** This menu option will erase the storage memory AND restore pre-programmed meter defaults. This feature offers accidental feature access protection through the use of a subsequent memory deletion interactive confirmation screen.

NOTE: Memory deletion is irreversible.

- **Exit:** This menu options returns the meter to Main Menu.

IR LINK:

- This meter option initiates a wireless communication session during which the currently stored readings will be downloaded to a PC. Before using this feature, the target PC must be loaded with Delmhorst's Universal Application Program and a Delmhorst Base Unit must be connected to an available serial port. Note that the Base Unit also requires power for operation, supplied by an AC adapter – included in the PC/KIT. A serial cable is also provided in the PC/KIT.

Requirements:

The wireless communication technology employed in the meter requires line-of-sight access between the red side window of the meter and the receiving window of the Base Unit. Simply place the meter and Base Unit on a flat surface, with the red side window of the meter facing the receiving window of the Base Unit. Separation requirements between the meter and Base Unit are anywhere from 0 to 30 cm (0" to 12").

Operation:

1. Begin by starting the Delmhorst Universal Application Program (double click the application icon, or chose the program from the Start Menu).
2. Once the RDM³ and Base Unit are lined up and the Base Unit is powered (a green LED should be lit), select the IR Link option in the Main Menu. The meter will display the message "Linking..." for a few seconds, followed by "Link OK" when successful communication was established with the Base Unit. The Base Unit will also indicate communication established by turning off the green LED and turning on a red LED.
3. Press the "Manage Data" button in the Delmhorst Universal Application Program. The meter will display "Data" on the screen and the Base Unit will alternately turn on a yellow and red LED while data transfer takes place (red indicates communication between the meter and Base Unit, while yellow indicates communication between the Base Unit and the PC). When finished, the meter will return to the Main Menu and the Base Unit will, once again, turn on its green LED. For further details on managing the meter data in the PC please refer to the HELP feature in the program.

NOTE: The above sequence of events in initiating communication between the PC and the meter is not mandatory. The Application Program may be started first, or the IR Link may be selected first. The Manage Data button may also be pressed before communication is started between the Base

Unit and the meter. The meter, Base Unit and Application Program all have ample delays built in to allow the other link components to come online in any sequence.

Troubleshooting The I/R Link:

Most problems tend to occur due to the positioning of the meter relative to the Base Unit. There are a few error messages that may appear on the meter's screen:

- a. Timeout: This error message occurs when too much time has passed between data sent by the meter and the response that should have been received from the Base Unit. Possible causes:
 - o Meter misalignment with the Base Unit (make sure the communication windows are facing each other, within the distance indicated).
 - o Base Unit is not powered. If power is present, one Base Unit LED should be lit. If this is not the case, check power connections.
 - o No connection to the PC. The Base Unit must be connected to the PC through a serial cable. Check connection.
- b. KBD: This message occurs when the user presses a key during communications. The meter interprets this as a request to escape this activity and returns to the Main Menu. The Base Unit should return to a green LED *status in a few seconds. A message should appear on the PC screen as well, indicating lost communications.*
- c. Sync: This message occurs when data framing is lost during data transmission. This would only happen if the wireless link becomes unreliable. Ensure the meter and Base Unit are aligned and restart the session.
- d. Data E: This message occurs when the content of a correctly framed data packet is invalid. Again, this is an unreliable wireless link problem.

NOTE: Individual records cannot be downloaded to the PC. The entire storage content is delivered to the PC during a link session.

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 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, 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 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 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 EUROPE, referred to hereafter as DELMHORST, guarantees your moisture meter for 1 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 meter, 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 the 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.

ARTTEST B.V.

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For already 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 paper working / lumber, agriculture, construction and paper.