14-IN-1 DATA LOGGING THERMO-HYGROMETER WITH PIN/PINLESS MOISTURE METER

USER'S MANUAL

RHMG700DL

Please read this manual carefully and thoroughly before using this product.

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INTRODUCTION

Thank you for purchasing General Tools & Instruments' (General's) RHMG700DL 14-in-1 Data Logging Thermo-Hygrometer with Pin/Pinless Moisture Meter. Please read this user's manual carefully and thoroughly before using the instrument.

The RHMG700DL is a handheld instrument that will prove useful to three broad groups of users: HVAC/R system installers and technicians, facility maintenance professionals and water damage restoration contractors.

The first two groups will exploit the meter's ability to measure, display and store/recall ten condensation-related parameters: ambient temperature, relative humidity (RH), absolute humidity (AH), GPP (mixing ratio—in grains per pound or g/kg), dew point, wet bulb temperature, surface temperature (using an optional "K" type thermocouple probe), condensation temperature (using an optional "K" type thermocouple probe), atmospheric pressure and vapor pressure. The meter's

large, primary readouts of each of the last eight parameters are accompanied by a smaller, secondary readout of the first parameter: ambient temperature. The ten parameters measured, monitored and displayed—individually or in pairs—by the RHMG700DL are most valuable in two applications:

- Environmental monitoring of office buildings, greenhouses, food and equipment storage facilities, wineries, freezers, shipping containers, HVAC/R installations, computer rooms, labs, libraries, museums and saunas.
- Electronics manufacturing. Alerts provided by the low RH alarm of the RHMG700DL can mitigate the risk of damaging high-voltage static discharges.

Water damage remediators will also make use of the RHMG700DL's ability to calculate an environment's mixing ratio (often represented using the unit GPP, or grains per pound). GPP is a more useful moisture metric than RH to water damage remediators. Using RH alone, a remediator might unknowingly introduce moist air—with a low RH but a high GPP—during a job's drying phase.

Another parameter of interest to water damage remediators is the moisture level of a substance (typically, wood or building materials). The RHMG700DL can measure this parameter using either a pinless (non-marring) or pin-type (penetrating) probe; the meter includes both kinds of probe.

Operating in internal moisture mode, the meter uses a non-invasive (pinless) sensor on the back of the unit to detect moisture up to 3/4 in. (20mm) below the surface of the following materials: wallboard, masonry, hardwood and softwood. It infers the level of moisture from the material's capacitance, which the meter measures by gauging its effect on an electric field that the meter generates each time it is operated in internal moisture mode.

In internal moisture mode, the meter exploits two physical phenomena to make its measurements:

1. The linear relationship between a solid material's moisture level and its dielectric constant—and therefore its capacitance.
2. The so-called fringing-field effect—the slight spreading of the electric field produced by current flowing between two electrodes when both electrodes are on the same side of a material.

Behind the back cover of the RHMG700DL are two metal plates. When the meter is powered on, the plates are given small and opposite charges. The potential difference causes current to flow, creating a three-dimensional electric field.

When the back of the meter is placed against one side of a material with moisture on or slightly below its surface, the increased capacitance of the material distorts the electric field to an extent that can be sensed (as a change in flux over the sensing area) and measured. Displayed readings reflect the average moisture level of the material between its surface and the electric field's maximum penetration of 3/4 in. Moisture closer to the surface has a greater effect on readings than moisture at the maximum penetration depth.

In external moisture mode, the meter bases its measurements on the relationship between the moisture content of a material and its electrical conductivity. The wetter a material, the higher its conductivity. The two replaceable steel pins of the included external probe serve as the electrodes of a conductance meter optimized for measuring moisture content. The meter displays measurements in the unit %WME (Wood Moisture Equivalent).

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For hard materials like wood or concrete, the meter's readings largely reflect surface moisture content because: 1) Moisture close to a surface has a greater effect on a reading than moisture deep below it; and 2) The pins of the external probe are only 3/8 in. (10mm) long and cannot be driven deep into a hard material. For softer materials like soil, paper or powders, readings are more likely to reflect the average moisture level of the material between its surface and the penetration depth of the pins (normally far less than 3/8 in.).

The instrument can be set up to sound an alarm if a measured RH or moisture level is above or below a user-defined setpoint. Finally, the unit can track the maximum or minimum reading of any parameter over the duration of a measurement session.

The RHMG700DL can store and recall 20 pairs of measurements in internal nonvolatile memory. It can also log (with date and time stamps) up to 8000 data points internally, for later download to a PC and display as an Excel-formatted graph or table.

KEY FEATURES

- Measures 1) ambient temperature, 2) relative humidity (RH), 3) absolute humidity (AH, in mg/L or g/m^3), 4) GPP (mixing ratio—in grains per pound or g/kg), 5) relative moisture level using pinless sensor, 6) absolute moisture level using included pin-type probe, 7) dew point, 8) wet bulb temperature, 9) surface temperature (requires optional "K" type thermocouple probe), 10) condensation temperature (requires optional "K" type thermocouple probe), 11) atmospheric pressure and 12) vapor pressure

- Stores/recalls 20 pairs of readings in/from on-board nonvolatile memory

- Logs up to 8000 data points internally, for later download and display as Excel-formatted graph or table on Windows PC using included software, driver and USB cable

- Settable high and low alarms for RH, relative moisture level and absolute moisture level

- Backlit LCD with 3-digit primary readout + 4-digit secondary readout

- Field calibratable in pinless moisture level mode

- Min/Max, Data Hold, and 30-minute Auto Power Off functions

- 1 year limited warranty

SAFETY INSTRUCTIONS

- Do not operate the RHMG700DL in the presence of flammable or explosive gases.

- The steel pins of the external moisture probe are very sharp. When using the probe, be careful not to stab yourself or anyone else. Remember to replace the protective cap over the pins when finished using the probe.

WHAT'S IN THE PACKAGE

The RHMG700DL comes in a soft carrying pouch inside a box. Also included in the box or pouch are a pin-type moisture probe, a sensor protection cap, a PC interface program and driver on a mini-disc, a USB cable, a "9V" battery and this user's manual.

PRODUCT OVERVIEW

Fig. 1 shows the names and locations of all of the controls, connectors and physical structures of the RHMG700DL. Fig. 2 shows all possible indications on the unit's LCD. Familiarize yourself with the labels, positions and functions of all buttons and connectors before moving on to the Setup Instructions and Operating Instructions.

Fig. 1. The controls and physical structures of the RHMG700DL

A. Humidity/temperature sensor under protective cap

B. Removable hanger tab

C. Socket for optional "K" type thermocouple probe with spade lugs

D. LCD

E. **LOG/SET** button. Starts and stops data logging. Also used to view data logging settings.

F. **MAX/MIN** button. For all parameters except moisture level, **pressing button once displays highest reading** since entering that measurement mode. **Pressing button twice displays lowest reading** since entering that measurement mode. Pressing button a third time resumes measurement and display of same parameter.
Also used to enter alarm set mode.

G. **ZERO** button. **With meter off**, used to disable APO function. In measurement mode, used to calibrate pinless moisture (**Moisture Internal** or **MI**) measurements. **In memory and data logging modes**, used to clear stored readings and data.

H. **UNIT** button. **In measurement mode, each press toggles between Imperial and metric** measurement units for the following parameters: Ambient Temperature & Dew Point (°F or °C); Absolute Humidity (mg/L or g/m^3); Mixing Ratio (GPP or g/kg); Barometric Pressure and Vapor Pressure (mBAR or KPa). **In memory mode**, used to clear stored readings. **Also used to enter alarm set mode**.

I. **<DN** button. **In measurement mode, each press shifts mode selector one position to the left. In memory mode, each press decrements record counter** by one digit. **In alarm set mode, each press decreases alarm setpoint by 0.1%**.

J. **UP>** button. **In measurement mode, each press shifts mode selector one position to the right. In memory mode, each press increments record counter** by one digit. **In alarm set mode, each press increases alarm setpoint** by 0.1%.

K. **STORE/ENTER** button. **In measurement mode, stores both displayed readings** in memory when pressed and held for >2 seconds. **In alarm set mode**, **saves displayed Hi alarm setpoint** and advances to Lo alarm setting, or saves displayed Lo alarm setpoint and resumes measurement mode. **In memory mode, exits memory mode** and resumes measurement and display of last selected parameter.

L. ⏻ **HOLD** button. **With meter off**, pressing button powers it on. **With meter on**, pressing button briefly freezes primary and secondary readouts; pressing and holding button powers meter off.

M. Jack for included pin-type moisture probe

N. Mini-USB jack

O. Pinless moisture sensor (on back)

P. Battery compartment (on back)

**Fig. 2.
All possible
display
indications**
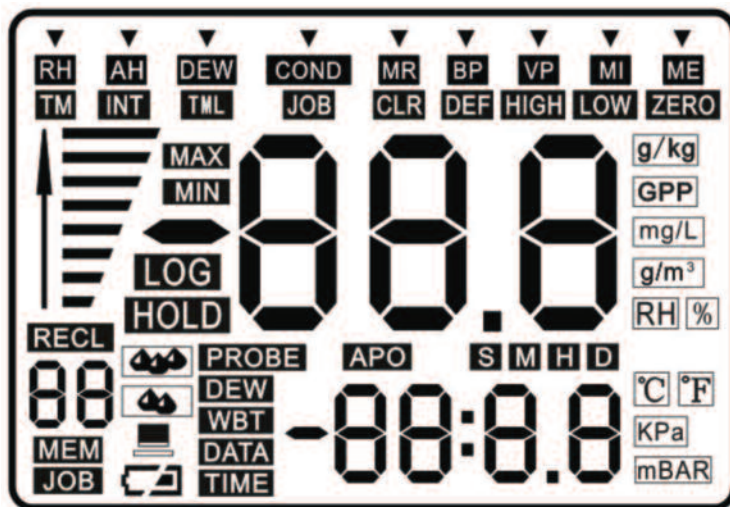
▼: Mode selector

RH : Relative humidity mode indicator

AH : Absolute humidity mode indicator

[Upper] DEW : Dew point mode indicator

COND : Condensation temperature mode indicator

MR : Mixing ratio mode indicator

BP : Barometric (ambient) pressure mode indicator

VP : Vapor pressure mode indicator

MI : Pinless moisture measurement mode indicator

ME : Pin-type moisture mode indicator

TM : Time setting indicator

INT : Data logging interval setting indicator

[Upper] TML : Data logging length setting indicator

JOB : Data log working group setting indicator

CLR : Clear data logging setting indicator

DEF : Default setting indicator

HIGH , LOW : Alarm limit indicators

LOG : Data logging indicator

ZERO : Zero indicator

▤: Pin/pinless moisture level indicator

MAX , MIN : Maximum & minimum value indicators

HOLD : Data hold indicator

88.8: Primary readout

-88:8.8: Secondary readout

RECL : Recall mode indicator

88.: Record number indicator

⟪⟫ ⟪⟫ : Condensation level indicators

▤: USB connection indicator

▱: Low battery icon

PROBE : Probe indicator

[Lower] DEW : Dew point temperature indicator

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WBT : Web bulb temperature indicator

DATA, **TIME** : Date and Time indicators

APO : Auto power off enabled indicator

g/kg, **GPP** : Mixing ratio units

mg/L, **g/m³** : Absolute humidity units

RH, **%** : Relative humidity unit

℃ **℉** : Temperature units

KPa, **mBAR** : Pressure units

S M H D : Seconds, minutes, hour, day indicators

SETUP INSTRUCTIONS
INSTALL BATTERY

To open the battery compartment:

1) Turn the meter over and loosen the single screw securing the battery compartment cover. Remove the screw and set it aside.

2) Lift the tab at the bottom of the cover in order to remove it and set it aside.

3) Plug the included "9V" battery into the wired socket inside the compartment. The terminals of the battery and the socket mate in only one way, with the smaller male terminal plugging into the larger female terminal.

4) Replace the battery compartment cover and reinstall the screw to secure the cover.

OPERATING INSTRUCTIONS
POWERING ON & OFF

To power on the meter, press the ⏻ **HOLD** button. By default, the instrument will immediately begin making and displaying RH (relative humidity) measurements.

Before using the meter to make measurements, remove the dust cap protecting the humidity/temperature sensor.

To power off the meter, press and hold the ⏻ **HOLD** button for at least 2 seconds. The shutdown will be announced by two short beeps.

After powering off the meter, replace the sensor protection cap if you do not expect to use the instrument within the next few hours.

By default, the meter will automatically power itself off if no front-panel button is pressed within any 30-minute period. The upcoming shutdown will be announced by three beeps of the beeper. When this Auto Power Off function is active, the term **APO** will appear in the middle of the LCD (see Fig. 2).

To disable the APO function, you must power on the meter in a special way, by pressing and holding the **ZERO** button while pressing the ⏻ **HOLD** button. When the APO function has been disabled, the term **APO** will *not* appear on the LCD.

SELECTING A PARAMETER

The RHMG700DL can measure and display the value of multiple moisture-related parameters. When the meter is in measurement mode, you select a parameter by pressing either the **UP>** or **<DN** button to move the ▼ pointer on the top line of the LCD directly above it. For example, at right is the display for RH measurement mode—the operating mode that the meter enters by default when it is powered on.

As the lower figure at right shows, moving the ▼ pointer one position to the right (by pressing the **UP>** button once) changes the measured parameter to AH (absolute humidity).

GENERAL CONTROLS

Changing measurement units. By default, the RHMG700DL uses Imperial units for all parametric readouts. **To switch to metric units**, press the **UNIT** button. Ambient, wet bulb and dew point temperatures will then be displayed as °C rather than °F; absolute humidity values will be stated in g/m^3 rather than in mg/L; mixing ratios will be displayed in units of g/kg rather than GPP; and barometric pressures and vapor pressures will be stated in KPa rather than mBAR.

Backlight. The RHMG700DL has a green backlight that automatically illuminates whenever any button is pressed. It will remain on for 30 seconds and then extinguish to extend battery life.

Holding readings. *Briefly* pressing the ⏻ **HOLD** button freezes both the primary and secondary readouts. **HOLD** will appear on the display to remind you that the readouts are frozen.

To release the hold, briefly press the ⏻ **HOLD** button again.

Note: When the RHMG700DL is in Hold mode, it takes two separate presses of the ⏻ **HOLD** button to power off the meter. The first (brief) press (accompanied by a short beep) releases the hold. The second press (and hold) initiates shutdown (announced by two short beeps).

Storing readings. Pressing and holding the **STORE/ENTER** button for at least 2 seconds saves the values shown on the primary and secondary readouts as a pair in the meter's nonvolatile memory. Each "save" automatically increases by one the Record number indicator—the number above **MEM** at the lower left of the LCD. The readings remain in memory, available for recall, after the meter powers off.

The next section of this manual contains instructions for recalling saved readings.

MIN/MAX tracking. For all parameters except moisture level:

• **Pressing the MAX/MIN button once displays the highest reading** since entering that measurement mode. **MAX** will appear at the left of the primary readout.

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- **Pressing the button twice displays the lowest reading** since entering that measurement mode. **MIN** will appear at the left of the primary readout.

- **Pressing the button a third time resumes real-time measurement** and display of the same parameter.

RECALLING STORED READINGS

To enter Recall mode, press the **<DN** and **UP>** buttons at the same time. **RECL** will appear above the Record number indicator at the lower left of the LCD. The Record number indicator will correspond to the last pair of readings stored.

You can now use the **<DN** and **UP>** buttons to navigate to and display a specific pair of readings. For example, the screen shot below shows that a pair of readings of 63.8% for RH and 28.8°C for temperature were stored in Record location 08.

Alternatively, you can repeatedly press the **UP>** button to recall all readings in the order in which they were stored, or the **<DN** button to recall them in reverse order. Pressing the **UP>** button when the last stored pair of readings is displayed returns the Record number indicator to **01**, corresponding to the first pair of readings stored. Pressing the **<DN** button when the first stored pair of readings is displayed returns the indicator to the record number of the last pair of readings stored.

To exit Recall mode and resume making real-time measurements, press the **STORE/ENTER** button.

To erase all stored readings, press and hold the **ZERO** and **UNIT** buttons at the same time for at least 2 seconds. The meter will respond by sounding three short beeps and resetting the Record number to **01**. You can clear all stored readings while operating in Recall mode or Measurement mode. Clearing the memory in Recall mode produces the display at right.
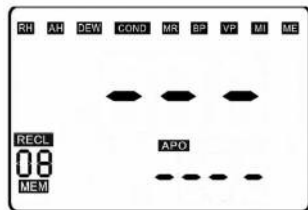
SETTING ALARMS

*Note: Follow the instructions in this section to manually set, change or arm/disable the RH and moisture level alarms using buttons on the meter. T***o perform the same tasks using the X-In-1 software** *included with the meter, install and operate the program using the instructions in the "Using the Included Software" section beginning on p. 15.*

The RHMG700DL allows you to set alarms that will repeatedly sound the beeper if the measured RH level or the moisture level of a material (measured by either the pinless or pin-type sensor) is above or below a certain value. The upper and lower limits are called alarm setpoints. For example, the screen shot at right shows that the upper limit for RH—the **HIGH** setpoint of the RH alarm—has been set to 63.8%.

To enter Alarm set mode, press the **MAX/MIN** and **UNIT** buttons at the same time while in **RH, MOISTURE INTERNAL (MI)** or **MOISTURE EXTERNAL (ME)** mode. Doing so will display the current value of the selected parameter's high setpoint and cause the word **HIGH** to appear on the display, as shown in the screen shot at the bottom of the previous page.

All three parameters require you to use the same three-step sequence of button presses for changing their setpoint(s). After entering Alarm set mode (with **HIGH** appearing on-screen), you can either raise or lower the **HIGH** setpoint by using the **UP>** or **<DN** button, or leave it unchanged (if you wish to change only the **LOW** setpoint). Each press of the **UP>** button increases the setpoint by 0.1%. Each press of the **<DN** button decreases the setpoint by 0.1%. To change the value of the setpoint by a large amount, you can press and hold the **UP>** or **<DN** button for at least 3 seconds.

Whether or not you change the **HIGH** setpoint, you must press the **STORE/ENTER** button to proceed to the next step in the sequence: changing the **LOW** setpoint. Pressing the **STORE/ENTER** button with **HIGH** on-screen saves the value shown on the primary readout as the selected parameter's new **HIGH** setpoint. It also changes **HIGH** to **LOW** and switches the primary readout to show the current value of the parameter's **LOW** setpoint.

Once **LOW** appears on-screen, you can use the **UP>** or **<DN** button to change the value of the parameter's **LOW** setpoint, as explained earlier in the paragraph on **HIGH** setpoints. Alternatively, you can leave the **LOW** setpoint unchanged. Whether or not you make a change, your next step must be to press the **STORE/ENTER** button. Doing so saves the value shown on the primary readout as the selected parameter's new **LOW** setpoint. It also causes **LOW** to disappear and returns the RHMG700DL to operation in real-time RH measurement mode.

To disarm any of the six alarms (**HIGH** and **LOW** for **RH**, **MI** and **ME**), you must reset its setpoint to 100.0% or 0.0% by pressing the **UP>** or **<DN** button. When disarming a **HIGH** alarm, it is faster to use the **UP>** button to increase its setpoint to 100% than to use the **<DN** button to decrease its setpoint to 0.0%. In practice, what you would do is: 1) press and hold the **UP>** button until the display shows a value greater than 99%, 2) release the button, and 3) use brief presses to reach 99.9%. When the primary readout shows 99.9%, the next press of the **UP>** button will change the readout to **OFF**. Pressing the **STORE/ENTER** button at this point will disarm the **HIGH** alarm for that parameter.

Similarly, you would disarm a **LOW** alarm by 1) pressing and holding the **<DN** button until the display shows a value less than 1%, 2) releasing the button, and 3) using brief presses to reach 0.1%. When the primary readout shows 0.1%, the next press of the **<DN** button will change the readout to **OFF**. Pressing the **STORE/ENTER** button at this point will disarm the **LOW** alarm for that parameter. The screen below right shows the next-to-last step (prior to pressing the **STORE/ENTER** button) of disarming the **LOW** alarm for **RH**.

Two notes related to alarms:

1) **HIGH** alarm setpoints must be higher than **LOW** alarm setpoints. When the display is showing **LOW** in Alarm set mode, pressing the **STORE/ENTER** button to save a change that violates this rule will not succeed in returning the RHMG700DL to real-time measurement. Instead, the beeper will sound four times and the

Alarm set sequence will return to the first step. Consider this a prompt to reset the **HIGH** alarm setpoint to a value greater than the **LOW** alarm setpoint.

2) The original factory settings of the **HIGH** and **LOW** alarm setpoints are 85% and 25%, respectively. So if your first use of the meter is in a exceptionally humid or dry environment, an alarm may sound immediately. To disarm the alarm, follow the instructions in the preceding two paragraphs.

MEASURING MOISTURE LEVELS

In addition to the modes for measuring five condensation-related parameters, the RHMG700DL has two separate moisture level measurement modes: **MI** and **ME**. In MI mode, the meter uses a non-invasive (pinless) sensor on the back of the unit to detect moisture on or within 0.75 in. (19mm) of the surface of a material. In **ME** mode, the meter uses the included pin-type probe to measure the conductivity of a material as a proxy for its moisture content.

In both moisture level measurement modes, the RHMG700DL's display adds a vertical bar graph to the digital readout of a material's moisture level. The bar graphs (see below) have no scale; they exist only to provide an analog way to quickly track changes in relative moisture levels.

**To use the included pin-type probe to measure the moisture level of a material:**

    1. Use the **UP>** or **<DN** button to move the ▼ pointer above **ME**.

    2. Insert the plug of the probe into the jack on the bottom of the RHMG700DL.

    3. Remove the protective cap from the business end of the probe and set it aside.

    4. Insert the pins of the probe into the material whose moisture level you wish to measure.

The measured moisture level will appear on the primary readout as a percentage, with the ambient temperature below it on the secondary readout.

To use the pinless sensor to measure the moisture level of a material, use the **UP>** or **<DN** button to move the ▼ pointer above **MI**. Hold the meter in either hand by wrapping your fingers around the rubber grip at the bottom of the unit. Make sure that no part of your hand or fingers is touching—or even near—the pinless sensor on the back of the meter.

If the primary readout shows **0.0%** with the meter in your hand (and not touching anything), the meter is ready to make measurements. To measure the moisture level of a material, press the pinless sensor on the back of the meter (Fig. 1, Callout M) against it. The moisture level, as a percentage, will appear on the primary readout.

If the primary readout shows a value other than **0.0%**, you must calibrate the meter to operate in **MI** mode. To do so, continue to hold the meter in your hand (touching nothing) and press the **ZERO** button. Immediately after the term **ZERO** appears briefly below the bar graph at the left of the display, the primary readout will show **0.0%** and the meter will be calibrated and ready to operate in **MI** mode.
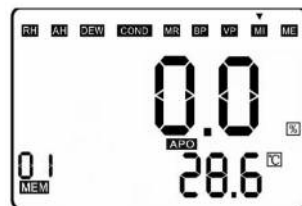
To obtain accurate readings in **MI** mode, you must recalibrate the meter each time you re-enter that mode from another mode.

CHECKING CALIBRATION

Although you cannot calibrate the RHMG700DL yourself, you can *check* the meter's calibration periodically to assure yourself of the accuracy of humidity-related readings (RH, absolute humidity, dew point and mixing ratio). Factory calibration should minimize the humidity sensor's drift for several years—well beyond the warranty period.

At a minimum, a calibration check should entail immersing the slotted structure protecting the humidity sensor in two bottles containing saturated salts. One reference salt should produce a reading of a 33%; the other should produce a reading of 75%.

Two salts of this type are available from General: the HR33LJ (33%) MgCl Calibration Salt and the HR75LJ (75%) NaCl Calibration Salt.

Depending on the size and shape of the calibration salt bottle that you use, you may have to remove the hanger tab (Fig. 1, Callout B) from the meter to provide sufficient clearance for the bottle to fit snugly over the slotted structure protecting the humidity/temperature sensor (after removing the dust cap). The hanger tab is removable for that reason.

DATA LOGGING

This section explains how to use front-panel buttons on the RHMG700DL to view and manually change data logging settings and to clear logged data from the meter's memory.

The final section of this manual—*Using the Included Software*, beginning on p. 15—outlines how to do the same tasks more quickly and easily by pressing soft buttons on the X-ln-1 application included with the meter.
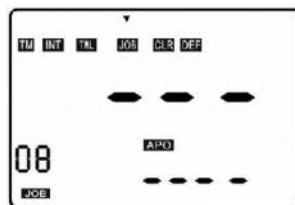
Viewing Data Logging Settings
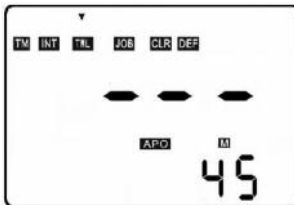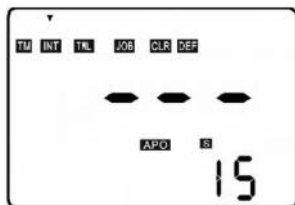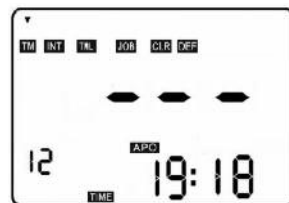
To view your data logging settings, press the **LOG/SET** button. If the ▼ mode selector does not appear above **TM**, press the **<DN** or **UP>** button to move the selector above **TM**, at the left side of the top line of the display. Once the selector is above **TM**, the two-digit date portion of the system clock setting (09:18, or September 18, 2012 in the upper screen shot at right) will be visible on the secondary readout.
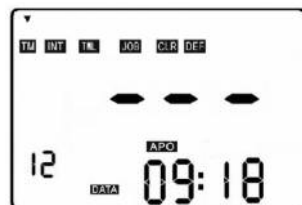
To show the time portion of the system clock setting, press the **UNIT** or **STORE/ENTER** button with the date value on-screen. In the lower screen shot at right, the time shown is 19:18:12 (7:18:12 p.m.)

Next, press the **UP>** button to shift the ▼ icon one position to the right, above **INT**.

Doing so will shift the secondary display to the value of the auto recording time interval **INT**. Press the **UP>** button once more to display the recording time length **TML**, and then again to display the working group **JOB** number.

To stop displaying data logging settings and return to showing real-time readings, press the ⏻ **HOLD** button.

Changing Data Logging Settings

To reset the system clock, begin by pressing the **LOG/SET** button and making sure the ▼ mode selector is positioned over **TM**.

With **DATA** showing on-screen, press the **LOG/SET** button. This will cause the Year field at the left side of the LCD to begin flashing. To increment the Year value, press the **UNIT** button. To decrement the Year value, press the **STORE/ENTER** button.

When the Year value is correct, press the **LOG/SET** button to save the setting and advance to the Month field, which should now be flashing. Use the **UNIT** or **STORE/ENTER** button to correct the Month setting. Then press the **LOG/SET** button to save the setting and advance to the Day field. Again use the **UNIT** or **STORE/ENTER** button to correct the Day value and press the **LOG/SET** button to save the setting.

Pressing the **LOG/SET** button with the Day value of the system clock flashing switches the secondary display to show the current time. As you did with the Date, use the **UNIT** or **STORE/ENTER** button to correct each of the Hour, Minutes and Seconds values in turn. Once you have finished setting the system clock, press the **LOG/SET** button to save the setting. Complete the process by pressing the ⏻ **HOLD** button to return to displaying real-time readings.

To change the value of the data logging time interval INT:

- Press the **LOG/SET** button to enter viewing and setting mode
- Move the ▼ mode selector over **INT**.
- Press the **LOG/SET** button again. This will cause the two digits on the secondary display to flash.

- Use the **UNIT** button to increase the **INT** value or the **STORE/ENTER** button to decrement it. The default value of **INT** is 15 seconds. It is also the minimum possible value. The maximum possible value is 24 hours. The terms **S**, **M** and **H** on the line above the **INT** value stand for seconds, minutes and hours, respectively. If you press and hold the **UNIT** or **STORE/ENTER** button, you can ramp up or down quickly to any possible value. The seconds, minutes and hours indicators will automatically change as you ramp up and down.

- When you have finished changing the value of **INT**, press the **LOG/SET** button to save your setting.

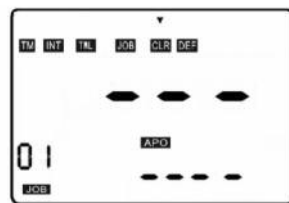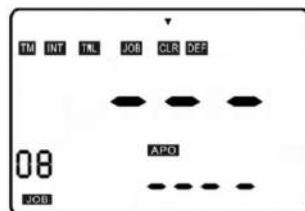- Complete the process by pressing the ⏻ **HOLD** button to return to displaying real-time readings.

To change the value of the data logging time length setting TML:

- Press the **LOG/SET** button to enter viewing and setting mode.

- Move the ▼ mode selector over **TML**.

- Press the **LOG/SET** button again. This will cause the two digits on the secondary display to flash.

- Use the **UNIT** button to increment the **TML** value or the **STORE/ENTER** button to decrement it. The default value of **TML** is 15 minutes. The minimum possible value is 1 minute, and the maximum possible value is 30 days. It's important to understand that the value of **TML** must be greater than that of **INT**. The terms **D, H** and **M** on the line above the **TML** value stand for days, hours and minutes, respectively. If you press and hold the **UNIT** or **STORE/ENTER** button, you can ramp up or down quickly to any possible value. The days, hours and minutes indicators will automatically change as you ramp up and down.

- When you have finished changing the value of **TML**, press the **LOG/SET** button to save your setting.

- Complete the process by pressing the ⏻ **HOLD** button to return to displaying real-time readings.

CLEARING DATA LOGS

To clear all stored data logs:

- Press the **LOG/SET** button to enter viewing and setting mode.

- Move the ▼ mode selector over **CLR** (see screen shot at right).

- Press and hold the **ZERO** button for at least 2 seconds. The screen below left will appear briefly, followed by the screen below right. All stored data logs will be erased and the number of the **JOB** working group will be reset to **01**.

- Complete the process by pressing the ⏻ **HOLD** button to return to displaying real-time readings.

Starting and Stopping Data Logging

To initiate data logging, make sure the RHMG700DL is *not* operating in settings viewing or changing mode. Then disable the meter's Auto Power Off (APO) function by pressing and holding the **ZERO** button while pressing the ⏻ /**HOLD** button. Next, press and hold the **LOG/SET** button for at least 2 seconds. The terms **LOG** and **JOB** and the current real-time data readout will appear on-screen.

The unit will begin logging data according to stored settings. Note that the term **APO** has disappeared from the screen, indicating that the meter's Auto Power Off function has been disabled.

To stop data logging, press and hold the **LOG/SET** button for at least 2 seconds. The terms **LOG** and **JOB** will disappear from the screen.

Each time logging is started or stopped, the **JOB** working group number will automatically be increased by 1 up to a maximum of 99 groups. When 98 groups have been stored, the term **JOB** will be replaced by the term **FL** (full). Additional logging cannot occur until existing logs are cleared.

USING THE INCLUDED SOFTWARE

The main purpose of the X-ln-1 application on the mini-disc supplied with the RHMG700DL is to display data logs captured and stored by the meter. The program's secondary function is to make it easy to set the meter's system clock and to change its data logging settings and temperature and moisture alarm setpoints.

To install the X-In-1 program, place the mini-disc face-up in the tray of your computer's optical drive, open the <Volume> folder, and double-click the <setup.exe> file. Run the installation Wizard, which will also automatically locate and install the correct driver for your PC's operating system.

After the program installs, do not open it yet. First, connect the RHMG700DL to your computer by inserting the mini-plug end of the included USB cable into the mini-USB jack on the bottom of the meter (Fig. 1, Callout N) and inserting the full-size plug at the other end of the cable into a USB port of your computer. Note that inserting the cable causes the 🖥 icon to appear on the meter's LCD.

The icon indicates that a two-way link has been established between the meter and the software. Working in one direction, the link enables data logs stored in the meter to be downloaded to your PC and displayed by the program as a table or graph. Working in the opposite direction, the link allows you to set the system clock and change data logging and alarm settings using your mouse and have those changes reflected inside the meter.

It's important to realize that **data logging cannot be started or stopped while the RHMG700DL is connected** to your PC.

Now open the X-In-1 program. The screen shot below shows the main area for displaying a data log as a graph or table (list). Above this area are boxes you can check to select which logged parameters you wish to display. At the upper left side of the screen are circles you can check to select the units of key measurement parameters. Below these circles are six boxes for manually entering high and low (Min and Max) RH and Moisture alarms and the data logging sampling interval and run time. Below those circles are four buttons, including one (SynTime) for synchronizing the RHMG700DL's system clock to your computer's clock, and another for Downloading data logs from the meter to your PC.
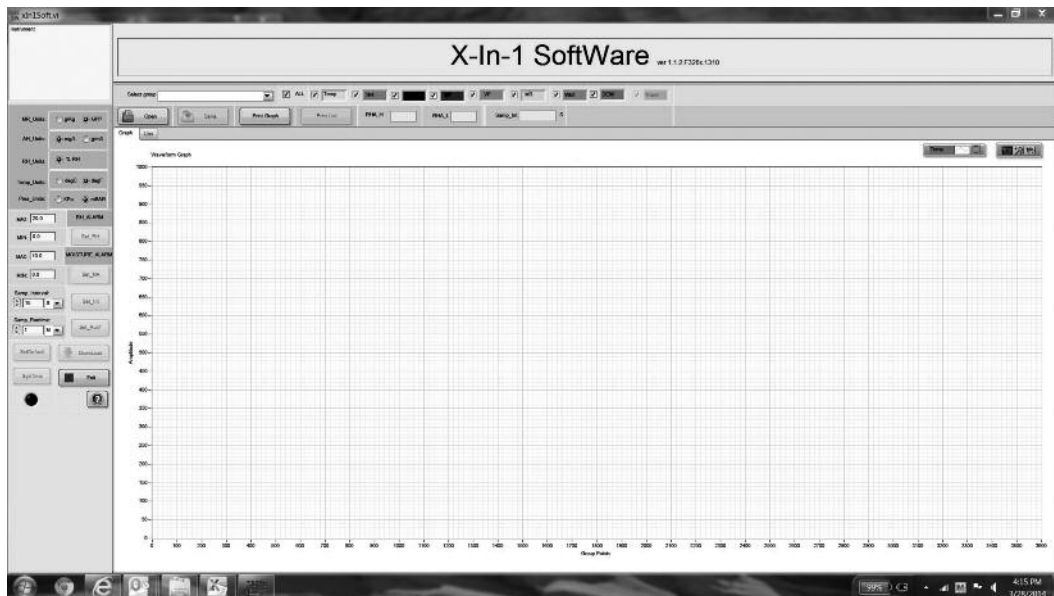
SPECIFICATIONS

Ambient Temperature Measurement Range	-20° to 167°F (-29° to 75°C)
Ambient Temperature Measurement Accuracy	±3.6°F (2°C)
RH Measurement Range	0 to 100%
RH Measurement Accuracy	±2.5% from 11 to 90%RH; ±3%RH elsewhere
Absolute Humidity Range	0.5 to 240mg/m^3 (mg/L)
GPP Range	0 to 999 GPP (0 to 160g/kg)
Relative/Absolute Moisture Level Range	0 to 99.9%
Pinless Moisture Measurement Depth	0.75 in. (19mm)
Dew Point Range	-76° to 140°F (-60° to 60°C)
Atmospheric Pressure Range	30 to 120 kPA
Vapor Pressure Range	0 to 20.0 kPA
Surface Temperature Measurement Range:	-148° to 1832°F (-100° to 1000°C)
Sampling Rate	2X/sec
Memory Capacity	20 pairs of readings
Auto Power Off Trigger	30 minutes of inactivity
Backlight Duration	30 seconds
Battery Life	6 to 8 weeks (4 hrs/day use)
Operating Temperature	32° to 110°F (0° to 43°C)
Storage Temperature	-14° to 140°F (-30° to 60°C)
Dimensions	7.3 x 2.8 x 1.4 in. (185 × 72 × 36mm)
Weight	6.2 oz. (175g), without battery
Power Source	(1) "9V" battery (included)

OPERATING & MAINTENANCE TIPS

- When the ⊏▱ icon appears on the bottom left of the LCD, it's time to install a fresh "9V" battery using the procedure on .

- Do not immerse the RHMG700DL in water or get water on it.

- Do not disassemble the unit. Opening the case voids the warranty.

- To avoid fouling the humidity/temperature sensor, do not operate the unit in very dusty environments. Rotate the sensor protective cap to close the vents after each measurement session.

- Remove the battery if you do not expect to use the unit for several months or longer. This will avoid potential leaks of battery acid that might damage or destroy the unit.

WARRANTY INFORMATION

General Tools & Instruments' (General's) RHMG700DL 14-in-1 Data Logging Thermo-Hygrometer with Pin/Pinless Moisture Meter is warranted to the original purchaser to be free from defects in material and workmanship for a period of one year. Subject to certain restrictions, General will repair or replace this instrument if, after examination, the company determines it to be defective in material or workmanship. The warranty period begins on the date of purchase. You are encouraged to register your product online. General will extend your warranty an additional 60 days if you register at www.generaltools.com/ProductRegistry.

This warranty does not apply to damages that General determines to be from an attempted repair by non-authorized personnel or misuse, alterations, normal wear and tear, or accidental damage. The defective unit must be returned to General Tools & Instruments or to a General-authorized service center, freight prepaid and insured.

Acceptance of the exclusive repair and replacement remedies described herein is a condition of the contract for purchase of this product. In no event shall General be liable for any incidental, special, consequential or punitive damages, or for any cost, attorneys' fees, expenses, or losses alleged to be a consequence of damage due to failure of, or defect in any product including, but not limited to, any claims for loss of profits.

Register now at www.generaltools.com/ProductRegistry to receive a 60-day extension to your warranty.

RETURN FOR REPAIR POLICY

Every effort has been made to provide you with a reliable product of superior quality. However, in the event your instrument requires repair, please contact our Customer Service to obtain an RGA (Return Goods Authorization) number before forwarding the unit via prepaid freight to the attention of our Service Center at this address:

General Tools & Instruments

75 Seaview Drive

Secaucus, NJ 07094

212-431-6100

Remember to include a copy of your proof of purchase, your return address, and your phone number and/or e-mail address.

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