

## GENERAL DESCRIPTION & FEATURES

Thank you for your purchase of Delmhorst Instrument Co's **HT-4000** handheld thermo-hygrometer. The **HT-4000** offers the latest in features and functionality. The meter is easy to operate, measures ambient temperature, relative humidity, and calculates dewpoint, absolute humidity (grains per pound), and vapor pressure. We recommend that you read the following pages in detail to take full advantage of all that the **HT-4000** has to offer.

**NOTE: THE HT-4000 AND HT-4000F ARE THE SAME INSTRUMENT. THE HT-4000F DESIGNATION INDICATES THE METER IS SHIPPED WITH THE RH/T-S3 SENSOR THAT COMPLIES WITH ASTM F2170 FOR IN-SITU TESTING OF RELATIVE HUMIDITY IN CONCRETE FLOOR SLABS. THE HT-4000 IS SHIPPED WITH THE RH/T-S1 SENSOR FOR WATER DAMAGE RESTORATION AND GENERAL INDUSTRIAL APPLICATIONS.**

# HT-4000/HT-4000F

## THERMO-HYGROMETER

### Owner's Manual

### Versions 1.0, 1.1

#### Specifications:

- Measures RH over the range of 0-100% (with accuracy of +/- 2% over 10%-90%)
- Measures temperature over the range of -40°F-255°F with accuracy of +/- 1.8°F over -4°F to 158F (range of -40°C - 124°C with accuracy of +/- 1°C over -20° to 70°C)
- Calculates Dew Point over the range of -40°F - 176°F (-40°C - 80°C)
- Calculates GPP (Grains Per Pound) when in Fahrenheit mode over the range of 0.1-3820 GPP
- Calculates GPK (Grains Per Kilogram) when in Celsius mode over the range of 0.01-545 GPK
- Calculates PSI (Pounds Per Square Inch) when in Fahrenheit mode over the range of 0-7 PSI
- Calculates KPA (Kilopascals) when in Celsius mode over the range of 0-47 KPA
- Operating temperature - -4 to 158F (-20 to 70C)
- **Sensors - RH/T-S1 for water damage/restoration and general industrial applications; RH/S3 for in-situ concrete floor slab testing (ASTM F2170)**

#### Features:

- Detachable RH Sensor with optional extension cable (RH/T-C1)
- LCD backlit display
- 9V battery (included)
- 1-year warranty
- Carrying Case (included)

# OPERATING INSTRUCTIONS

## -USER GUIDE-

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

### 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. For purposes of this owner's manual, the five keys will be referred to as ← → ↑ ↓ and SELECT.



Fig. 1 Keypad Layout

### INSTALLING THE BATTERY:

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

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

### 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 warble) indicators accompany a battery warning.

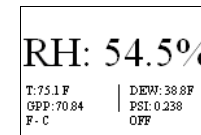
Once a permanent low battery condition is detected, all measurement functions are disabled. Enough power remains for other menu functions, but almost any user action at this time causes a low-battery warning to be generated. The battery should be replaced immediately. If the battery reaches critical 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.

## METER USE

### TO POWER THE METER ON:

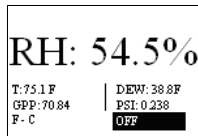
1. Before turning on the meter, firmly insert the sensor into the top of the meter, making sure to align the pin-out on the DIN connector.
2. **To turn the meter on, press and hold the SELECT** button for approx. 2 seconds. The first screen will temporarily display the meter name (HT-4000) and the software revision level. Refer to this revision number whenever you call Customer Service.
3. The meter will display the main **RH Measurement screen**, as shown below:



4. **The meter will begin taking readings.** As a default setting the RH reading will be the most prominent on the screen. If you would like to make another variable (temperature, GPP/GPK, PSI/KPA or dew point) the prominent reading, use the ↑ ↓ and ← → keys to highlight your selection. Press the **SELECT** key to choose that variable.

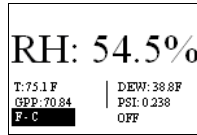
### TO POWER THE METER DOWN:

1. To power the meter down, highlight OFF using the ↑ ↓ and ← → keys, and press SELECT.
2. Alternatively, if no keys are pressed for 2 minutes, the meter will power down automatically.



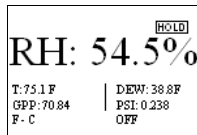
#### FAHRENHEIT / CELSIUS MODE TOGGLE

- To switch between Fahrenheit and Celsius measuring modes, use the  $\leftarrow$   $\rightarrow$   $\uparrow$   $\downarrow$  keys to highlight F-C.
- Pressing SELECT will toggle between Fahrenheit (degrees F, GPP, PSI) and Celsius.(Degrees C, GPK, KPA) modes



#### TO HOLD METER READINGS ON-SCREEN

- To hold a reading on-screen while in measuring mode, press the SELECT key.
- Press the SELECT key again to resume taking continuous readings.



#### MEASURING RELATIVE HUMIDITY IN CONCRETE FLOOR SLABS IN ACCORDANCE WITH ASTM STANDARD F2170 – USE SENSOR RH/T-S3

Select test locations to provide information about moisture distribution across the entire concrete slab, especially areas of potentially high moisture, or if the slab is thick (>4 in.) and air circulation is poor. For slabs on-grade and below-grade, include a test location within 3ft of each exterior wall. Perform minimum three tests for the first 1000 ft sq and at least one additional test for each additional 1000 ft sq.

- Drill a 5/8" hole to a depth of 40% of the slab thickness using a rotary hammer drill. Use a drill bit specially designed for rotary drills and with 3 or 4 cutting edges to insure a smooth, round hole.
- Vacuum the hole thoroughly, then use a wire brush to clean and loosen any concrete remaining in the hole. Vacuum again and repeat the process a second time.
- Insert the yellow sleeve into the hole. Use silicone (or other water-resistant sealant) to seal the interface between the collar of the sleeve and the concrete surface. Use a hammer to insure the sleeve is fully inserted into the hole and sealed to the concrete.
- Insert the protective yellow cap into the sleeve and let the hole acclimate for 72 hours.
- Remove the cap and immediately insert the sensor to full hole depth. Wait minimum 1h and then take RH readings by connecting one end of the RH/T-C1 cable to the top of the meter and the other end to the exposed connector on the sensor housing. Check for drift. The meter reading must not drift more than 1% RH over 5 minutes.

- Alternately, insert the RH sensor into the sleeve immediately after setting the sleeve. Readings can then be taken as soon as the hole has acclimated.

The complete ASTM document is available at:  
<http://www.astm.org/Standards/F2170.htm>

#### CAUTION - ABOUT THE RH/T SENSOR

Continued exposure to high temperature and humidity, chemical vapors, and any other corrosive environment will accelerate inevitable sensor aging, loss of calibration, and possible permanent damage. The sensor always must be stored inside the pouch in which it was received and in a clean, dry place when not in use. It is best to keep the meter and sensor in the carrying case. We recommend checking calibration periodically with either a "reference sensor" which is kept strictly for this purpose, or a salt solution. Both are available from Delmhorst or your supplier.

#### CARE OF YOUR METER

- 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. If the meter has been left in a hot or cold environment overnight or for an extended period, allow the meter to acclimate to the temperature conditions in which it will be used for minimum 1-2 hours, or as long as possible.
- Clean the meter with any biodegradable cleaner. Use the cleaner sparingly and on external parts only. Keep cleaner out of the sensor input connector.
- After each use, place the RH/T-S1 sensor in the static-free bag it was shipped in and keep in the carrying case or a clean, dry environment.
- Remove the battery if the meter will not to be used for one month or longer.

#### SERVICE FOR YOUR METER

If your meter is not working properly or you believe it to be giving erroneous readings, replace the battery with a new one and/or try using a new sensor. If either of these steps does not resolve the problem, go to [www.delmhorst.com](http://www.delmhorst.com) and follow the instructions under the Product Support tab. If you require further assistance please call 877-DELMHORST (335-6467) or 973-334-2557.

#### WARRANTY

**Delmhorst Instrument Co., referred to hereafter as Delmhorst, guarantees the HT-4000 meter for one year from date of purchase and the RH/T-S1 and RH/T-S3 sensors against defects in material or workmanship for 90 days.** If, within the warranty period of the meter/sensor, you find any defect in material or workmanship, return the meter or sensor following the instructions in the "Service for Your Meter" section. This warranty does not cover abuse, alteration, misuse, damage during shipment, improper service, unauthorized or unreasonable use of the meter or sensor, batteries. If the meter/sensor have been tampered with, the warranty shall be void. At our option, we may replace or repair the meter/sensor.

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.