CALIBRATABLE 7-FUNCTION PSYCHROMETER

USER'S MANUAL

EP8710

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

TABLE OF CONTENTS

INTRODUCTION

Thank you for purchasing General Tools & Instruments' EP8710 Calibratable 7-Function Psychrometer. Please read this user's manual carefully and thoroughly before using the instrument.

The EP8710 can measure any environment's ambient temperature, relative humidity (RH), dew point and wet bulb temperatures and other condensation-related parameters. These measurements are typically made by three groups of users:

- Water damage restoration contractors
- HVAC/R system installers and technicians
- Professionals charged with monitoring and maintaining the environment of facilities such as office buildings, greenhouses, food and equipment storage facilities, wineries, freezers, shipping containers, computer rooms, labs, libraries, museums and saunas.

The dew point is the temperature below which the water vapor in a volume of air at a given constant barometric pressure will condense into liquid water at the same rate at which it evaporates. Condensed water is called dew when it forms on a solid surface.

Another way to think of the dew point is as an air saturation temperature associated with relative humidity (RH). A high RH value indicates that the dew point is close to the current ambient air temperature. At 100% RH, the dew point temperature is equal to the ambient temperature because the air is completely saturated with water.

The wet bulb temperature is the temperature that a volume of air would have if it were cooled to saturation (100% RH) by the evaporation of water into it, with the latent heat coming from the volume of air. It is the lowest temperature that can be reached under current ambient conditions by the evaporation of water only. The wet

bulb temperature is the temperature you feel when your skin is wet and exposed to moving air as opposed to the actual air temperature—the dry bulb temperature.

Because the EP8710 includes an external temperature probe, the instrument can also measure and display two additional parameters of particular importance to HVAC/R system installers and technicians:

1) the surface temperature of a solid object, the object's internal temperature (if it can be penetrated), or the temperature of a liquid or gas
2) a solid object's condensation temperature—the difference between its surface temperature and the dew point temperature

The EP8710 is powered by one "9V" battery (included).

KEY FEATURES

- Jumbo backlit display with 2-line readout
- Field calibratable using optional 33% and 75% salts
- Data hold and Min/Max functions
- External probe for measuring internal and surface temperatures of objects and fluids
- °F/°C switch
- 20-minute Auto Power Off function
- Low battery indicator

WHAT'S IN THE BOX

The EP8710 comes fully assembled in a box along with a sensor protection cap, an external temperature probe, a "9V" battery and this user's manual.

PRODUCT OVERVIEW

Figure 1 shows all of the controls, indicators and physical structures on the front, top and bottom of the EP8710. Figure 2 shows all text and icons that could appear on the unit's LCD. Familiarize yourself with the positions and functions of all buttons, structures and icons before moving on to the Setup Instructions and Operating Instructions.

Fig. 1. The EP8710's controls, indicators and physical structures

A. Humidity and temperature sensors

B. LCD

C. ⏻ (Power on/off) button

D. **HOLD** button

E. T1/ΔT DEW (Ambient/dew point temperature) button

F. Battery compartment

G. **MAX/MIN** button

H. T2/Δ6 WBT Probe/condensation/wet bulb temperature) button

I. **F/C** button

J. External temperature probe plugged into jack on side of unit

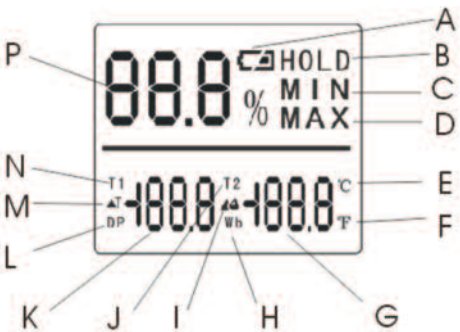

Fig. 2. All possible display indications and their meanings

A. Low battery icon

B. Data hold indicator

C. Minimum reading indicator

D. Maximum reading indicator

E. °C indicator

F. °F indicator

G. Probe (T2)/wet bulb temperature readout

H. Wet bulb (Wb) temperature indicator

I. Condensation temperature ( ) indicator (available only with external probe plugged in). An object's condensation temperature is the difference between its surface temperature and the dew point temperature.

J. Probe temperature (T2) indicator (available only with external probe plugged in)

K. Ambient (T1)/dew point temperature readout

L. Dew point temperature indicator

M. ΔT indicator (available only with external probe plugged in). ΔT is the difference between ambient temperature (T1) and the surface or internal temperature (T2) of a solid or fluid touched or penetrated by the probe.

N. Ambient (T1) temperature indicator

O. Relative humidity (RH) readout

SETUP INSTRUCTIONS

INSTALL BATTERY

1. The meter's battery compartment (Fig. 1, Callout F) is accessible from the bottom of the unit. Use a Phillips-head screwdriver to loosen the single screw in the back of the unit that holds the yellow battery compartment cover in place. Set the cover and screw aside.

2. 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.
3. Replace the battery compartment cover and tighten the screw to secure it to the housing.

OPERATING INSTRUCTIONS

MAKING BASIC MEASUREMENTS

Before making any measurements, rotate the sensor protection cap with your thumb and index finger so its three vents are open to the ambient environment from both the front and back. Press the ⏻ button to power on the meter. The upper display will immediately begin reading out the RH value of the environment. The lower left display will immediately begin reading out the ambient temperature (indicated by the text T1 at its left). The lower right display will immediately begin reading out the wet bulb temperature (indicated by the text **Wb** at its left).

To display the dew point temperature (instead of ambient temperature) on the lower left readout, press the $\frac{T1/\blacktriangle T}{DEW}$ button. The

reading will be accompanied by the symbol **DP** at its left. To return to displaying ambient temperature, press the T1/ΔT DEW button again.

By default, the EP8710 displays ambient, dew point, wet bulb, and objects' and fluids' surface and internal temperatures in °C. **To switch to °F**, press the **F/C** button.

To hold the readings on all three displays, press the **HOLD** button. The text **HOLD** will appear at the right of the RH readout. To "unfreeze" the display and resume showing real-time readings, press the **HOLD** button again. This will cause **HOLD** to disappear from the RH readout.

Pressing any button turns on the green backlight for 10 seconds.

To extend the life of the "9V" battery powering the EP8710, the unit's Auto Power Off (APO) function will automatically shut down the instrument if no front-panel buttons are pressed within any 20-minute period. **To disable the APO function**, power on the unit in a special way by pressing and holding the **HOLD** button while pressing the ⏻ button. The LCD will confirm that you are disabling the APO function by displaying its complete set of icons (see Fig. 2) until you release the **HOLD** button. The APO function will be enabled the next time you power on the unit in the normal way.

To power off the EP8710, press and hold the ⏻ button for at least 3 seconds.

USING THE EXTERNAL TEMPERATURE PROBE

The external temperature probe included with the EP8710 can measure the surface temperature of any solid object, the internal temperature of an object (if it can be penetrated), or the temperature of a liquid or gas.

The probe plugs into a jack on the right side of the EP8710. With the probe plugged in:

- A third parameter—ΔT—is available by pressing the T1/ΔT / DEW button. ΔT is the difference between ambient temperature (T1) and the surface or internal temperature (T2) of a solid or fluid touched or penetrated by the probe.
- Two additional parameters—T2 and a solid object's condensation temperature—are available by pressing the T2/Δ / WBT button. T2 is the surface or internal temperature of a solid or fluid touched or penetrated by the probe. An object's condensation temperature is the difference between its surface temperature and the dew point temperature.

TRACKING MIN AND MAX LEVELS

After being powered on, the EP8710 automatically operates in “Recording” mode for the purpose of tracking maximum and minimum RH and ambient temperature measurements.

To display the maximum RH and ambient temperature values measured since the meter was powered on, press the **MAX/MIN** button once. The text **MAX** will appear at the right of the upper (RH) readout, and the upper and lower left readouts will display the highest values of RH and ambient temperature measured since power on.

To display the minimum RH and ambient temperature values measured since the meter was powered on, press the **MAX/MIN** button again. The text **MIN** will replace **MAX** at the right of the upper (RH) readout, and the upper and lower left readouts will display the lowest values of RH and ambient temperature measured since power on.

To return to displaying real-time RH and ambient temperature readings, press the **MAX/MIN** button a third time. The text **MIN** will disappear from the RH readout.

CALIBRATING THE METER

Your EP8710 was calibrated at the factory, so its measurements should remain within their specified tolerance for several years. However, you can re-calibrate the unit yourself to reassure yourself of the accuracy of readings, especially after the instrument has been operated for many hours in a dusty environment.

To calibrate the EP8710, you must use two jars of standard calibration salt: one containing a 33% solution of MgCl and the other a 75% solution of NaCl. Both are available for purchase from General as part numbers SKUs HR33 and HR75.

Before beginning the calibration procedure—which takes at least 2-1/2 hours to complete—you must disable the APO function so the instrument can remain on for more than 20 minutes. **To disable the APO function**, power on the unit in a special way by pressing and holding the **HOLD** button while pressing the ⏻ button.

Following is the calibration procedure:

1. With the unit powered on and the APO function disabled, rotate the sensor protection cap to open its three vents and expose the humidity sensor to the environment.

2. Turn the unit upside-down and insert the sensor structure in the opening of the 33% salt bottle after removing the bottle's cap. The fit should be tight, with no air leaking into the bottle.
3. Leave the unit upside-down in the 33% salt bottle for at least 40 minutes.
4. Check the upper RH readout without turning the unit right-side up or removing the sensor structure from the bottle. If the reading is between 32.5% and 33.5%, the meter is operating within its RH specification. Remove the meter from the 33% salt bottle and proceed to step 10.
5. If the reading is not between 32.5% and 33.5%, the unit is out of calibration at this reference point. To adjust its calibration, press the **HOLD** and **F/C** buttons at the same time to enter calibration mode. The lower left readout will switch from displaying ambient temperature to showing the following: "- -. 1"
6. If the reading is less than 32.5%, press the **F/C** button as many times as necessary to increase it to a value between 32.5% and 33.0%. If the reading is greater than 33.5%, press the **HOLD** button as many times as necessary to decrease it to a value between 33.0% and 33.5%.

7. Store the calibration adjustment you have just made by pressing the ⏻ button.
8. Remove the unit from the 33% salt bottle and repeat Steps 2 through 7 to calibrate the unit to the 33% reference a second time. When you press the **HOLD** and **F/C** buttons to enter calibration mode this time, the left readout will display the following: "- -.2". Two calibrations constitute a cycle.
9. Store the calibration adjustment you have just made by pressing the ⏻ button. The EP8710 is now calibrated to the 33% reference standard. Remove the unit from the 33% salt bottle.
10. Insert the EP8710 upside-down in the opening of the 75% salt bottle after removing the bottle's cap. The fit should be tight, with no air leaking into the bottle.
11. Leave the unit upside-down in the 75% salt bottle for at least 40 minutes.
12. Check the upper RH readout without turning the unit right-side up or removing the sensor structure from the bottle. If the reading is between 74.5% and 75.5%, the meter is operating within its RH specification. Remove the EP8710 from the 75% salt bottle.
13. If the reading is not between 74.5% and 75.5%, the unit is out of calibration at this reference point. To adjust its

calibration, press the **HOLD** and **F/C** buttons at the same time to enter calibration mode. The lower left readout will switch from displaying ambient temperature to showing the following: "- -. 1"

14. If the reading is less than 74.5%, press the **F/C** button as many times as necessary to increase it to a value between 74.5% and 75.0%. If the reading is greater than 75.5%, press the **HOLD** button as many times as necessary to decrease it to a value between 75.0% and 75.5%.
15. Store the calibration adjustment you have just made by pressing the ⏻ button.
16. Remove the unit from the 75% salt bottle and repeat Steps 10 through 15 to calibrate the unit to the 75% reference a second time. When you press the **HOLD** and **F/C** buttons to enter calibration mode this time, the lower left readout will display the following: "- -.2". Two calibrations constitute a cycle.
17. Store the calibration adjustment you have just made by pressing the ⏻ button. The EP8710 is now calibrated to the 75% reference standard.

SPECIFICATIONS

Ambient Temperature Measurement Range: 14° to 122°F (-10° to 50°C)

Ambient Temperature Measurement Accuracy: 1.8°F (±1°C)

External Temperature Probe Measurement Range: 14° to 158°F (-10° to 70°C)

External Temperature Probe Measurement Accuracy: ±1.8°F (±1.0°C)

External Probe Cord Length: 48 in. (1.22m)

Temperature Measurement Resolution: 0.1°

RH Measurement Range: 0 to 99.9%

RH Measurement Accuracy: ±3% from 5% to 95% RH

RH Measurement Resolution: 0.1%

Response Time: <80 seconds

Display Size: 1.7 in. (43mm) diagonal

Current Consumption: <15mA

Battery Life: 60 hours (typical)

Dimensions of Instrument: 7.56 x 2.40 x 1.57 in. (192 x 61 x 40mm)

Dimensions of Box: 7.76 x 3.66 x 1.58 in. (197 x 93 x 40mm)

Weight (without battery): 3.77 oz. (107g)

Power Source: (1) “9V” battery (included)

OPERATING & MAINTENANCE TIPS

When the  icon appears on the top line of the display (Fig. 2, Callout A), it's time to replace the "9V" battery that powers the instrument (although measurements will remain valid for several hours after the icon first appears). To replace the battery, follow the instructions on pages 8 and 9.

To prevent dust and moisture from degrading the performance of the humidity and temperature sensors, after each measurement session rotate the sensor protection cap to close its three vents.

Do not operate the EP8710 in the presence of a flammable or explosive gas or near an arc welder or induction heater.

After subjecting the unit to a large change in ambient temperature, wait at least 30 minutes before making measurements to guarantee the accuracy of readings.

Remove the battery when storing the unit or when you do not expect to use it for an extended period of time (months rather than weeks).

Do not drop or disassemble the EP8710 or immerse it in water.

WARRANTY INFORMATION

General Tools & Instruments' (General's) EP8710 Calibratable 7-Function Psychrometer 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.

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.

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
80 White Street • New York, NY 10013
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.

GENERAL®

Specialty Tools & Instruments

GENERAL TOOLS & INSTRUMENTS
80 White Street New York, NY 10013-3567
PHONE (212) 431-6100 FAX (212) 431-6499
TOLL FREE (800) 697-8665
e-mail: sales@generaltools.com
www.generaltools.com
EP8710 User's Manual
Specifications subject to change without notice

MAN#EP8710
5/3/13