User's Guide

EXTECH
INSTRUMENTS
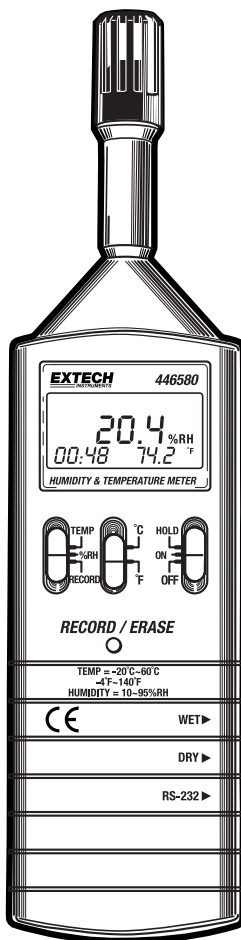
Hygro-Thermometers

Models 4465CF and 446580

Introduction

Congratulations on your purchase of the Extech 4465CF or 446580 Hygro-Thermometer. The Extech Hygro-Thermometers measure and display temperature and relative humidity. The 446580 has a PC interface and built-in datalogging capabilities. Careful use of these meters will provide years of reliable service.

Warranty

*EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for **one year** from date of shipment (a six month limited warranty applies to sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website www.extech.com for contact information. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.*

Specifications

General Specifications

Display	Multi-function 3 ½ digit (2000 count) LCD display
Measurement	Relative Humidity% (RH) and Temperature (°C & °F)
Data Hold	Freezes Display
Datalogger (446580)	Records approx. 7000 readings
Data Output	446580: RS 232 PC serial interface
	4465CF: Analog 10mvDC per °C/F or %RH
Response Time Humidity	45% to 95%: ≤ 3 minutes
	95% to 45%: ≤ 5 minutes
Measurement rate	4465CF: 2.5 readings per second
	446580: 1 reading per second
Operating Temperature	4465CF: 32 to 122°F (0 to 50 °C)
	446580: 32 to 104 °F (0 to 40 °C)
Operating Humidity	< 80% RH
Storage Temperature	14 to 140°F (-10 to 60°C)
Storage Humidity	< 70% RH
Power Supply	9V battery
Battery life	4465CF: 400 hours; 446580: 50 hours (approx.)
Weight	4465CF: 7.0 oz. (198 g); 446580: 7.1 oz. (200 g)
Size	10.6 x 2.7 x1.0" (180 x 72 x 32mm)

Measurement Specifications

	Range	Resolution	Accuracy (Full Scale)
% Relative Humidity	10% to 95% RH	0.1% RH	30 to 95% RH: ±3% RH
			10 to 30% RH: ±7% RH
Temperature	4 °F to 140 °F (20°C to 60 °C)	0.1° F/C	±1.5 °F (±0.8°C)

Meter Description

1. Temperature-Humidity Sensor
2. LCD Display
3. ON/OFF/HOLD switch
4. Temperature units switch (°C & °F)
5. Temperature/Humidity/Record switch
   (RECORD position only on the 446580)
6. RECORD / ERASE button (Model 446580 only)
7. Wet bulb calibration adjustment (for factory use only)
8. Dry bulb calibration adjustment (for factory use only)
9. PC Interface jack (Model 446580) or
   Analog output jack (Model 4465CF)
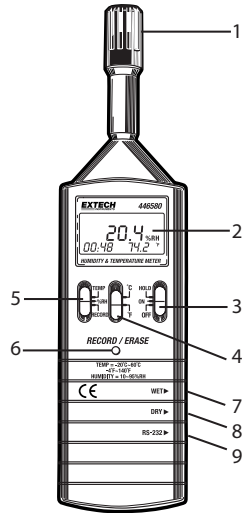
The battery compartment and the tripod mount are located
on the rear of the instrument.

Operation

Getting Started

1. Set the TEMP-%RH switch to the TEMP or %RH position.
2. Move the °C-°F switch to the desired temperature unit of measure.
3. Move the ON-OFF-HOLD switch to the ON position. If the display does not switch on please check that the 9V battery is installed and is fresh.
4. The Humidity and Temperature sensors are contained in the tip of the meter. Mount or hold the meter in the area to be tested. For convenience, a standard tripod mount is located at the rear of the meter.
5. Humidity changes take time (3 to 5 minutes) to stabilize. Please allow time for the display to settle.
6. When the low battery icon flashes on the LCD, replace the 9V battery.

Displayed Readings

The Model 4465CF displays humidity or temperature readings in the center of the LCD depending upon the position of the TEMP-%RH switch.

The Model 446580, displays both parameters simultaneously with the primary measurement in the center of the LCD (large digits) and the secondary measurement in the lower right hand side of the LCD (smaller digits). The 446580 also momentarily displays the Date on power-up (in MM:DD format) on the lower left of the LCD. The date display becomes the clock display (24-hour clock format) after several seconds.

Battery Replacement

The Battery Compartment is located on the lower back of the instrument housing. Slide the compartment cover off in the direction of the arrow. Replace the 9V battery and secure the compartment cover.

Data Hold

Set the ON-OFF-HOLD switch to the HOLD position to freeze a displayed reading. The **H** icon will switch on. Move the switch to the ON position to continue normal operation (the **H** icon will switch off).

Analog Output - Model 4465CF

The Model 4465CF has an analog output whereby the user can connect a datalogging device such as a chart recorder to capture temperature and humidity readings. The analog output jack located on the right side of the Model 4465CF accepts a TIP-RING-SLEEVE 3.5mm phono plug (detailed below).

SLEEVE **RING (both Ground)**

3.5mm phono plug

TIP (DC Voltage)
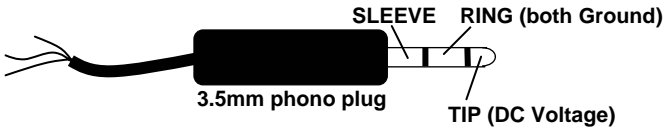
The analog output signal is 10mVDC per Temperature degree (with TEMP selected on front panel switch) or 10mVDC per Relative Humidity percentage unit (with %RH selected via front panel switch). For example, for a temperature of 65°F the analog output signal would be 650mVDC. For a humidity of 50% the analog output signal would be 500mVDC. The output impedance of the analog circuit is 50 ohms.

PC Interface – Model 446580

Data Acquisition and Datalogger modes

The Model 446580 can perform DATALOGGING and DATA ACQUISITION functions. These two modes of operation, distinctly different, are explained separately.

In the Datalogger mode, the meter records data remotely then, at a later time, the meter is connected to the PC and the readings are transferred.

In the Data Acquisition mode, the meter takes readings while connected to the PC. The readings are taken, displayed, and stored all at the same time.

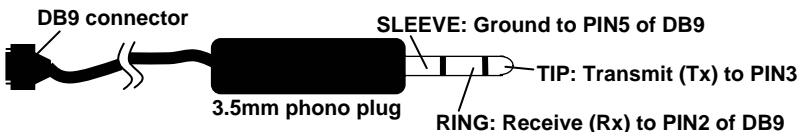These two modes are discussed in the subsequent sections:

Datalogging Mode

The meter can log up to 7000 readings that can later be transferred to a PC. The benefit is that the meter can record remotely without having to be connected to a PC. The supplied Windows[TM] software allows the user to transfer data from the meter to a PC at any time. Before Datalogging, the user must first set the sampling rate and the real time clock. Please reading the remaining sections of this manual for instructions on these and other functions including datalogging, downloading data from the meter to a PC, and the Data Acquisition mode of operation.

Connecting the Model 446580 to a PC

The Model 446580 has an RS-232 PC Interface jack on its right side. The supplied mini-plug to DB9 cable (see diagram) is used to connect the meter to a PC. The phono plug end of the cable is inserted in the meter's PC interface jack and the DB9 (9-pin) side is inserted into an available serial port on the PC. Do not run the supplied software until the meter is properly connected to the PC.

DB9 connector **SLEEVE: Ground to PIN5 of DB9**

TIP: Transmit (Tx) to PIN3

3.5mm phono plug

RING: Receive (Rx) to PIN2 of DB9

Running the supplied Datalogging software

1. Place the supplied software CD in the PC CD-ROM drive and follow the on-screen instructions for installation.
2. Launch the program by double clicking the program file in the location where it was saved during installation.
3. Remember not to run the supplied software until the meter is properly connected to the PC as described earlier.
4. Select COM1 or COM2 when prompted. The PANEL software window will open (see PANEL window diagram).

   Note that the PC Interface communication settings are as follows:

   Baud rate: 9600; Parity: none; Data bits: 8; Stop bits: 1

PANEL Software Window Description

When the supplied software is launched the first software screen that appears is the PANEL window (see diagram). Refer to this diagram for the remainder of the manual since other described functions will use the PANEL window.

1. Menu heading
2. Display facsimile
3. Meter buttons (only TEMP-RH can be selected remotely)
4. REC (click to put meter in continuous datalogging mode)
5. rec (click to log one reading in the meter)
6. Sampling rate (for data acquisition, <u>not</u> datalogger)
7. Current data filename and location for data acquisition
8. PC COM port status (COM1 or COM2 will appear if communication is active, NO COM will appear if communication is not active)
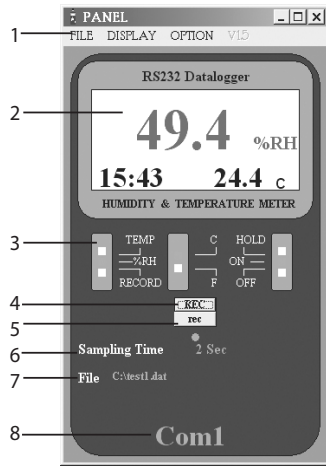
PANEL Software

Setting the Meter's Real Time Clock

1. Click OPTION in the PANEL software window and select SYSTEM TIME SET.
2. The current PC system time and date will now be transferred to the meter.
3. When data is logged, the time and date information is saved alongside each data point.

ID CODE

This field is reserved for future use. At present, a 5-digit code can be entered for reference.

Setting the Datalogger Recording (Sampling) Interval

In the Continuous recording mode (described earlier) the meter stores readings at a certain interval of time. This interval of time, known as the sampling rate, is user-programmable. Set the rate as follows:

1. Select MEMORY from the OPTION menu in the PANEL software window. The LOGGER window will open (see the LOGGER window diagram).
2. Type the desired sampling rate in the SAMPLING field in the LOGGER window. The rate can be set from 1 second to 65 seconds. This means that readings can be stored every second up to every 65 seconds.
3. Important! Click on the word SAMPLING after the time interval has been typed. This will activate the new sampling rate. Confirm the change by closing and re-opening the LOGGER software window.

Datalogging One Reading (Manual Logging) with the Model 446580

1. Set the TEMP-%RH-RECORD switch to the RECORD position
2. Press the RECORD-ERASE button once. The RECORD display icon will flash briefly on the LCD.
3. One reading is now placed in the internal memory of the meter.

Datalogging Continuously (Automatic Logging)

1. Set the TEMP-%RH-RECORD switch to the RECORD position
2. Press and hold the RECORD-ERASE button for 3 seconds. The RECORD display icon will flash periodically as readings are stored at the programmed sampling interval. To change the sampling interval, refer to SETTING THE DATALOGGER RECORDING INTERVAL section later in this manual.
3. To stop recording, momentarily press the RECORD-ERASE button. Note that when recording is started again, the new data points will be stored in a new 'set'. Data sets are discussed in the remaining sections.

## Erase Stored Data using the meter's RECORD-ERASE button

1. With the meter turned off, press and hold the RECORD-ERASE button while turning the meter on.
2. When the **DEL** display icon flashes on the LCD, release the RECORD-ERASE button. All data is now cleared.
3. Note that data can also be erased via software as explained later in this manual.

Download data from the Model 446580

1. With the meter connected to the PC and with the supplied software running, select MEMORY from the OPTION menu in the PANEL software window. The LOGGER window will open (see LOGGER window description).
2. To initiate the data transfer, click on the TIME OF RECORDING button.
3. The data will appear in groups or 'sets'. Each set represents a separate recording session.
4. To view the data in a particular set, click on the set number and then click on the SHOW DATA button. The REC LIST software will open and the individual data points within the selected set will appear.

Logger Software Window Description

1. Total and remaining memory fields – Total memory is 32K
2. Current Date (YY:MM:DD) and Time (HH:MM:SS)
3. Number of data sets currently in the meter
4. Number of data points in the currently selected data set
5. Press to show the data points contained in the currently selected data set
6. User selectable 5-digit reference number
7. Current sampling rate for the Datalogging function not the Data Acquisition function

8. Press TIME OF RECORDING to download the data sets contained in the meter to the PC
9. List of downloaded data sets
10. Data Set numbers (click on a number to select a set)

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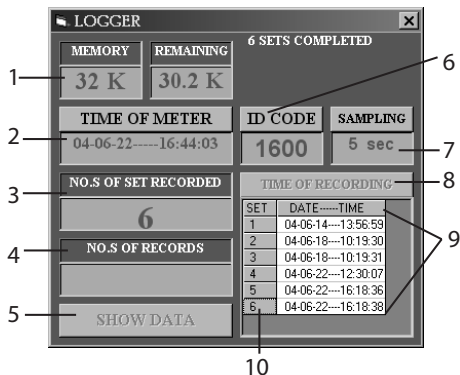
Graph the Downloaded Data

1. After downloading data as previously described, select TEMPERATURE or HUMIDITY from the GRAPH menu heading in the REC LIST software window.

2. An x-y graph will appear that plots Temperature or Humidity over Time.

3. The graph can be printed by selecting PRINT from the menu heading in the graph window.

4. To limit the number of points on the graph, select the LIMIT menu heading. The RANGE window opens and is used to narrow the number of data points. Select a particular temperature/humidity range or select data points by number (see the RANGE window diagram).
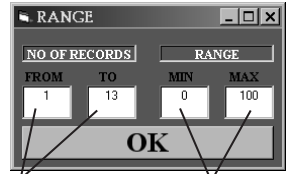
Select the record numbers to view

Select the Temperature or Humidity Range to view

Print the Downloaded Data

1. After downloading data as previously described, select PRINT from the FILE menu in the PANEL software window.

2. A list will print that includes the data number, date, time, measurement, unit of measure, and the 9V battery status.

Save the Downloaded Data

1. Download data as previously described and select SAVE from the FILE menu heading in the PANEL software window.

2. A 'SAVE AS' window will open prompting for a filename and a storage location.

3. For convenience, the saved text file (filename.dat) can be opened in spreadsheet programs such as EXCEL^{TM} (see instructions later in this manual).

Erasing stored data via software

With the meter connected to the PC, clear the entire contents of the meter's internal memory by selecting ERASE from the OPTION menu in the PANEL software window.

# Data Acquisition Mode

1. With the meter connected to the PC and the supplied software up and running, select SAVE AS from the FILE menu in the PANEL software window.

2. A window will appear prompting for a filename and location. Select a filename and a storage location.

3. Select START RECORDING from the FILE menu. The PC will now store readings in the file at the current sampling rate.

4. To change the sampling rate, go to the OPTION menu heading in the PANEL window and select SAMPLE RATE. Type in the desired sample rate from 1 to 65 seconds.

5. While acquiring data, the PANEL window will show the sampling rate, the filename and location of the data file, the PC communication status, temperature/humidity measurement, Time & Date (see the PANEL software window diagram earlier in this manual).

6. Select LIST or GRAPH from the DISPLAY menu in the PANEL window to choose the way the data is displayed. In the GRAPH mode the data is presented in an x-y plot. The user can select LIMIT (to thin the data) and PRINT from the menu headings. In the LIST mode the data is presented line by line; the user can select CONTINUE, PAUSE, and PRINT from the menu headings.

7. Select STOP RECORDING from the FILE menu in the PANEL window to end the recording session.

Dew Point Display

While working in the Data Acquisition mode, the Dew Point temperature can be viewed by selecting DEW POINT from the OPTION menu in the PANEL window (see Dew Point software window diagram).

Temperature
Relative Humidity
Dew Point Temperature
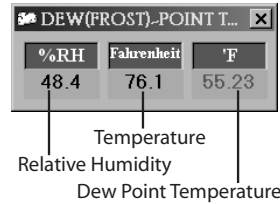
Opening a data file in Excel™

1. Open the spreadsheet program Excel™

2. In Excel™ click on the FILE menu and select OPEN - the OPEN dialog box will appear.

3. In the OPEN box, change FILES OF TYPE to ALL FILES.

4. Locate and open the previously saved data file. The Text Import Wizard will open.

5. Step 1 of 3 in the Wizard: Choose DELIMITED.

6. Click NEXT.

7. Step 2 of 3 (see diagram): Under DELIMITERS check the TAB box, type a quotation mark in the OTHER box, and select NONE in the TEXT QUALIFIER field.

8. Click NEXT.

9. Step 3 of 3: Click FINISH. The data file will now open. You may wish to save the file as an Excel™ file rather than a data file when finished.
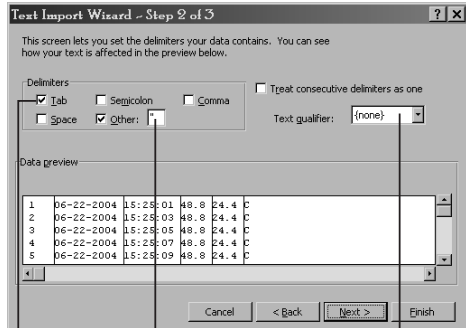
Select TAB   Type quotation mark   Select none

Calibration and Repair Services

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Service Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

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Support line (781) 890-7440

Technical support: Extension 200; E-mail: support@extech.com
Repair & Returns: Extension 210; E-mail: repair@extech.com

Product specifications subject to change without notice

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