

RH/Temperature SD Card Datalogger

800021

Instruction Manual

RH/Temperature SD Card Datalogger 800021

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Printed in the USA

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INTRODUCTION

The Sper Scientific RH/Temperature SD Card Datalogger (Model 800021) is an extremely accurate meter with fast response times that reads relative humidity (RH), ambient temperature, dew point, wet bulb, and functions as a Type K/J thermocouple thermometer.

This meter features a real time SD memory card datalogger. Standard, portable SD memory cards provide unlimited data storage and upload pre-formatted data directly to Excel, eliminating the need for cables or software. Alternatively, manually record 99 readings for on-screen review or stream data directly to a computer using the optional software and cables. Each data set includes temperature, RH, time and date.

FEATURES

- Functions as humidity/temperature, dew point, wet bulb, and Type K/J thermometer
- SD memory card datalogger
- Manual datalogger option
- Fast response time for humidity
- Highly accurate microcomputer circuit
- RS232 or USB PC connection
- Direct upload of data to Excel
- Detachable probe for measuring flexibility
- Internal clock and calendar
- Touch-tone
- Tripod mounting screw
- Built-in tabletop stand

FEATURES

- Maximum and minimum
- Hold function
- Auto-power-off
- Low battery indicator
- Backlight

MATERIALS SUPPLIED

- Meter
- Probe
- SD Card
- 6 AA Batteries
- Instruction Manual
- Soft Carrying Case

POWER SUPPLY

This meter can be powered by six AA (1.5 V, UM3) batteries or an optional 9 Volt DC adapter. See page 31 for battery replacement instructions.

Plug the adaptor into the power port labeled “DC 9V,” located on the side of the meter.

Note...

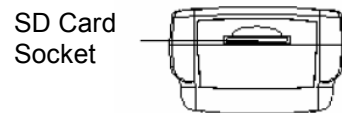
When using the adapter to run the meter, the meter will remain permanently **on** and the **POWER** button will be disabled.

METER COMPONENTS

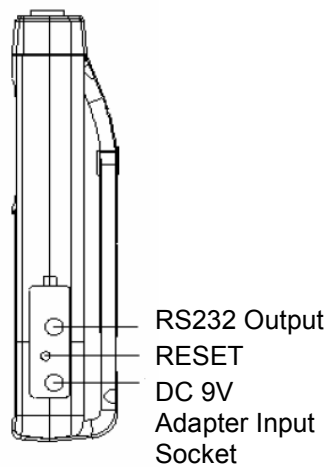
Top of Meter



Bottom of Meter

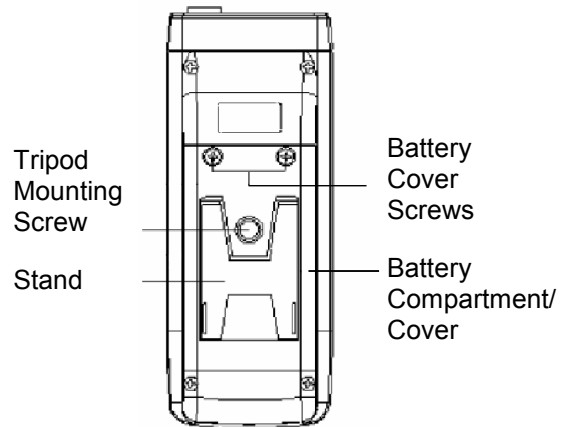


Side of Meter

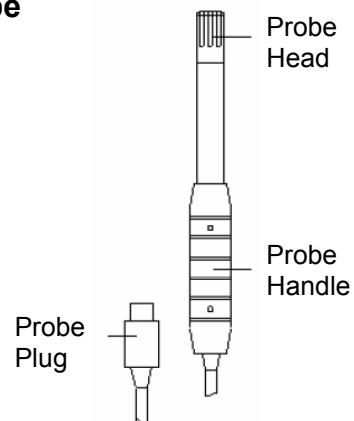


METER COMPONENTS

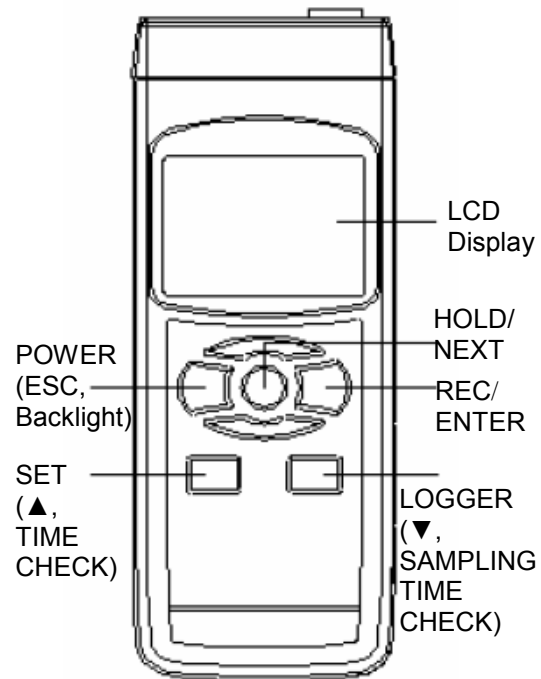
Back of Meter



Probe



KEYPAD



SETUP MODE

The advanced Setup Mode allows you to customize the following meter preferences and defaults:

- Real Time Clock
- Decimal Type
- Auto Power Off
- Touch-Tone
- Thermometer Type K/J
- Temperature Units
- Sampling Time
- SD Memory Card Format

Note...

The setup functions can be performed under any parameter but not while utilizing the datalogger function. Once selections are saved, the meter will default to the selected preferences when the meter is turned **off** and **on** again. Once a selection is

SETUP MODE

saved, the meter automatically advances to the next setup function (i.e., after setting the real time clock, the meter will automatically enter the decimal type setup function).

1. Press **POWER** to turn the meter **on**.
2. Press **SET** for 2 seconds or longer to enter Setup Mode.
3. Press **NEXT** to cycle through the setup functions.

Note...

Press **ESC** to exit Setup Mode. The meter will return to Normal Mode.

Real Time Clock

1. Enter the clock function from Setup Mode (as described above). "dAtE" appears on the LCD.
2. Press **ENTER**. The year will appear on the LCD.

SETUP MODE

3. Press ▲ or ▼ to adjust the value.
Press **ENTER** to save the value.
4. Repeat Step 3 to adjust the month, date, hour, minute and second.

Note...

This procedure adjusts the meter's internal clock. The internal clock will function when the meter is turned **off** but only when the batteries have adequate power (not with low battery power.)

Decimal Type

Although the decimal is commonly expressed as the "." symbol (such as 20.6 or 1000.53), some (European) countries use a "," symbol to represent the decimal (such as 20,6 or 1000,53). The meter defaults to the period symbol. To adjust:

1. Enter the decimal type function from Setup Mode (see page 13).
"dEC" appears on the LCD.

SETUP MODE

2. Press ▲ or ▼ to select Basic (.) or Euro (,). Press **ENTER** to save the selection.

Auto Power Off

The meter automatically turns **off** after 10 minutes of inactivity, however this function can be disabled.

1. Enter the auto power off function from Setup Mode (see page 13). "PoFF" appears on the LCD.
2. Press ▲ or ▼ to select yes (auto power off enabled) or no (auto power off disabled). Press **ENTER** to save the selection.

Touch-Tone

1. Enter the touch-tone function from Setup Mode (see page 13). "bEEP" appears on the LCD.
2. Press ▲ or ▼ to select yes (touch-tone enabled) or no (touch-tone disabled). Press

SETUP MODE

ENTER to save the selection.

Thermometer Type K/J

1. Enter the thermometer type function from Setup Mode (see page 13). "tYPE" appears on the LCD.
2. Press ▲ or ▼ to select K or J. Press **ENTER** to save the selection.

Temperature Units

1. Enter the temperature units function from Setup Mode (see page 13). "t-CF" appears on the LCD.
2. Press ▲ or ▼ to select C (degrees Celcius) or F (degrees Farhenheit). Press **ENTER** to save the selection.

Sampling Time

The sampling time is the time allotted

SETUP MODE

between successive measurements.
To adjust the sampling time (in seconds):

1. Enter the sampling time function from Setup Mode (see page 13). "SP-t" appears on the LCD.
2. Press ▲ or ▼ to adjust the value (1, 2, 5, 10, 30, 60, 120, 300, 600, 800, 1800, 3600 seconds). Press **ENTER** to save the value.

SD Memory Card Format

Enabling this function will format the SD memory card to work specifically with your meter. Formatting the SD card will erase any previous memory on the card. New SD cards should be formatted to work with your meter.

1. Enter the SD memory card format function from Setup Mode (see page 13). "Sd F" appears on the LCD.
2. Press ▲ or ▼ to select yes

SETUP MODE

(format the SD memory card) or no (do not format the SD memory card). Press **ENTER** to confirm your selection. If selecting yes, “yES Enter” will appear on the LCD, press **ENTER** again and the meter will format the SD card.

MEASUREMENT PROCEDURES

Turning the Unit On/Off

1. Press **POWER** to turn the meter **on**.
2. Press and hold **POWER** for 2 seconds to turn the meter **off**.

Selecting the Function

1. Press and hold **FUNC** to cycle through the options listed below. Release **FUNC** when you reach the desired function.
 - Humidity/temperature
“rH” appears on the LCD.
 - Dew point
“dP” appears on the LCD.
 - Wet bulb
“Et” appears on the LCD.
 - Type K/J thermometer
“tP” appears on the LCD.

MEASUREMENT PROCEDURES

Note...

The meter will default to the last function setting used when it is turned **off** and **on** again.

Humidity and Temperature

1. Press **POWER** to turn the meter **on**.
2. Plug the probe plug into the probe input socket.
3. Press and hold **FUNC** to cycle through the options until "rH" appears on the LCD. Release the **FUNC** button. The humidity value (%RH) appears on the upper display and the temperature value (°C or °F) appears on the lower display.

Note...

When using the meter for the first time, the meter will default to the humidity/temperature function and to the Celsius scale for the temperature value. See page 16 for instructions

MEASUREMENT PROCEDURES

on changing the temperature scale.

Dew Point

1. Follow Steps 1-2 in the preceding Humidity and Temperature section.
2. Press and hold **FUNC** to cycle through the options until “dP” appears on the LCD. Release the **FUNC** button. The dew point value (°C or °F) appears on the upper display and “dP” appears on the lower display.

Wet Bulb

1. Follow Steps 1-2 in the preceding Humidity and Temperature section.
2. Press and hold **FUNC** to cycle through the options until “Et” appears on the LCD. Release the **FUNC** button. The wet bulb value (°C or °F) appears on the upper display and “Et” appears on the

MEASUREMENT PROCEDURES

lower display.

Type K/J Thermometer

1. Press **POWER** to turn the meter on.
2. Press and hold **FUNC** to cycle through the options until “tP” appears on the LCD. Release the **FUNC** button.
3. Plug a thermocouple temperature probe (type K or J) into the type K/J thermometer socket. The LCD will display the measurement value from the temperature probe.
4. “K” or “J” appear on the LCD to indicate the type of thermometer.

Note...

When using the meter for the first time, the meter will default to K type thermocouple. See page 16 for instructions on selecting the thermocouple type.

MEASUREMENT PROCEDURES

Hold Function

1. When measuring any parameter, press **HOLD** to freeze the reading on the display. "HOLD" will appear on the LCD.
2. Press **HOLD** again to release the hold function. "HOLD" will disappear from the LCD.

Maximum and Minimum

To record maximum and minimum readings:

1. When measuring any parameter, press **REC** to begin recording the maximum and minimum values. "REC" appears on the LCD.
2. Press **REC**. The maximum value and "REC MAX" will appear on the LCD.

MEASUREMENT PROCEDURES

3. Press **REC**. The minimum value and “REC MIN” will appear on the LCD.
4. To delete the maximum or minimum value, press **HOLD**. “REC” appears on the LCD and the meter will begin recording the maximum and minimum values again.
5. To exit the min/max function, press and hold **REC** for 2 seconds or longer. The meter will return to Normal Mode.



Note...

The meter cannot be turned **off** from the memory record function. Exit the function, then press and hold **POWER** to turn the meter **off**.

Backlight

1. The backlight turns **on** automatically when the meter is turned **on**.

MEASUREMENT PROCEDURES

2. Press  to turn the backlight off.
3. Press  to turn the backlight on.

View Real Time Clock

To view the time function during normal measurement (not during datalogging):

1. Press **TIME CHECK**. The time information (Year, Month/Date, Hour/Minute) will appear on the lower display of the LCD.

View Sampling Time

To view the sampling time function during normal measurement (not during datalogging):

1. Press **SAMPLING CHECK**. The sampling time (in seconds) will appear on the lower display of the LCD.

DATALOGGER

Preparing the Datalogger

1. Insert the SD card into the SD card socket on the bottom of the meter, ensuring that the front of the SD card faces the back of the meter.
2. Format the SD card as needed (see page 17).
3. Set the real time clock if using the meter for the first time (see page 13).
4. Set the decimal type if using the meter for the first time (see page 14.)

Auto Datalogging

1. Set the sampling time to ≥ 1 second. Refer to page 16.
2. Press **REC**. "REC will appear on the LCD.

DATALOGGER

3. Press **LOGGER**. "REC" will flash on the LCD and the alarm will sound while the measurement data and time information are saved to memory.
4. To pause datalogging, press **LOGGER**. The meter will temporarily stop recording and "REC" will stop flashing on the LCD. Press **LOGGER** again to resume datalogging. "REC" will flash on the LCD.
5. To finish datalogging, while the datalogger is paused, press **REC** for 2 seconds or longer. "REC" will disappear from the LCD to indicate that datalogging has ended.

Note...

To enable/disable the touch-tone feature, see page 15.

DATALOGGER

Manual Datalogging

1. Set the sampling time to 0 seconds. Refer to page 16.
2. Press **REC**. "REC" will appear on the LCD.
3. Press **LOGGER**. "REC" will flash on the LCD and the alarm will sound while the measurement data and time information are saved to memory. The position (location) number will appear on the bottom of the LCD and will also be recorded on the SD card.

Note...

To enable/disable the touch-tone feature, see page 15. To change the position number, press ▼. The position number will flash on the LCD. Press ▲ or ▼ to set the position number (from 1 to 99). To indicate the position location, P x (x = 1 to 99) will appear on the lower display. After selecting the position number, press **ENTER** to confirm.

DATALOGGER

4. To finish datalogging, press **REC** for longer than 2 seconds. "REC" will disappear from the LCD to indicate that datalogging has ended.

SD Card Data Structure

1. The first time a SD card is used in this meter, a folder HTA01 will be generated.
2. If the datalogger is being used for the first time, a new file HTA01001.XLS will be generated under the route HTA01\ . After exiting the datalogger and executing the function again, the data is saved to the HTA01001.XLS file until the data reach 30,000 data columns. A new file will then be generated (i.e., HTA01002.XLS).
3. The folder HTA01\ will hold 99 files. A new route (i.e., HTA02\) will be generated when exceeding 99 files.

DATALOGGER


4. The file's route structure:

```
HTA01\  
    HTA01001.XLS  
    HTA01002.XLS  
    .....  
    HTA01099.XLS  
HTA02\  
    HTA02001.XLS  
    HTA02002.XLS  
    .....  
    HTA02099.XLS  
HTAXX\  
    .....  
    .....
```

Note...

XX: Maximum value is 10.

BATTERY REPLACEMENT

This meter uses six AA (1.5 V, UM3) batteries. When the low battery indicator  appears on the LCD, battery replacement is needed. After the icon appears on the LCD, in-spec measurement can still be made for several hours before becoming inaccurate.

1. Press **POWER** to turn the meter **off**.
2. Unscrew the battery cover and remove from the meter.
3. Remove the old batteries and replace with six new AA batteries, ensuring correct polarity.
4. Replace the battery cover.
Tighten the screws on the battery cover to secure to the meter.

TROUBLESHOOTING

System Reset

If the meter is not functioning properly (i.e., the system is frozen and the keypad is non-operational), reset the meter:

1. Press **POWER** to turn the meter **on**.
2. Use a small tool (such as a disassembled paperclip or a pin) to press the **RESET** button (located on the right side of the meter under the protective black cover). Wait a few seconds for the meter to restart.

PC CONNECTION

To save data from the SD card to a PC (using Excel software):

1. After datalogging is complete, remove the SD card from the meter's SD card socket.
2. Insert the SD card into the computer's SD card slot (if built into the computer) or into a SD card adapter (ensuring that the adapter is connected to the computer).
3. Turn the computer **on** and run the Excel program.
4. Download the saved data file (i.e., HTA01001.XLS, HTA01002.XLS) from the SD card to the computer. The saved data will appear in the Excel software screen. The data can then be used in Excel to create graphs, etc.

Note...

When uploading to Excel, the rH

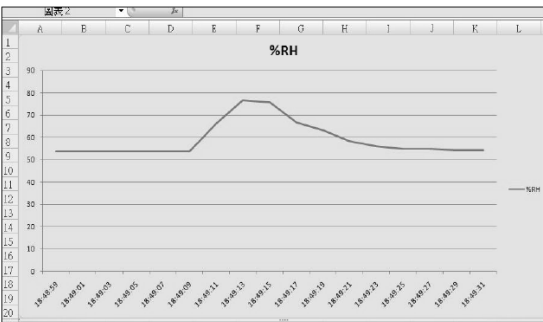
PC CONNECTION

channel will upload rH and temperature data; the dP channel will upload dP, rH and temperature data; the Et channel will upload Et, rH and temperature data; and the tP channel will upload tP data only.

Excel Data Screen

| | A | B | C | D | E | F | G | H | I | J |
|----|-------|-----------|----------|-------|------|-------|----------|-------|------|---|
| 1 | Place | Date | Time | Value | Unit | Value | Unit | Value | Unit | |
| 2 | 1 | 2009/4/23 | 18:48:59 | 53.8 | %RH | 29.5 | Degree C | | | |
| 3 | 2 | 2009/4/23 | 18:49:01 | 53.8 | %RH | 29.5 | Degree C | | | |
| 4 | 3 | 2009/4/23 | 18:49:03 | 53.8 | %RH | 29.5 | Degree C | | | |
| 5 | 4 | 2009/4/23 | 18:49:05 | 53.8 | %RH | 29.5 | Degree C | | | |
| 6 | 5 | 2009/4/23 | 18:49:07 | 53.7 | %RH | 29.5 | Degree C | | | |
| 7 | 6 | 2009/4/23 | 18:49:09 | 53.7 | %RH | 29.5 | Degree C | | | |
| 8 | 7 | 2009/4/23 | 18:49:11 | 66.1 | %RH | 29.5 | Degree C | | | |
| 9 | 8 | 2009/4/23 | 18:49:13 | 76.7 | %RH | 29.5 | Degree C | | | |
| 10 | 9 | 2009/4/23 | 18:49:15 | 75.9 | %RH | 29.6 | Degree C | | | |
| 11 | 10 | 2009/4/23 | 18:49:17 | 66.8 | %RH | 29.7 | Degree C | | | |
| 12 | 11 | 2009/4/23 | 18:49:19 | 63.2 | %RH | 29.6 | Degree C | | | |
| 13 | 12 | 2009/4/23 | 18:49:21 | 58.5 | %RH | 29.6 | Degree C | | | |
| 14 | 13 | 2009/4/23 | 18:49:23 | 50 | %RH | 29.6 | Degree C | | | |
| 15 | 14 | 2009/4/23 | 18:49:25 | 55 | %RH | 29.6 | Degree C | | | |
| 16 | 15 | 2009/4/23 | 18:49:27 | 54.8 | %RH | 29.5 | Degree C | | | |
| 17 | 16 | 2009/4/23 | 18:49:29 | 54.4 | %RH | 29.5 | Degree C | | | |
| 18 | 17 | 2009/4/23 | 18:49:31 | 54.3 | %RH | 29.5 | Degree C | | | |
| 19 | | | | | | | | | | |

Excel Graphic Screen

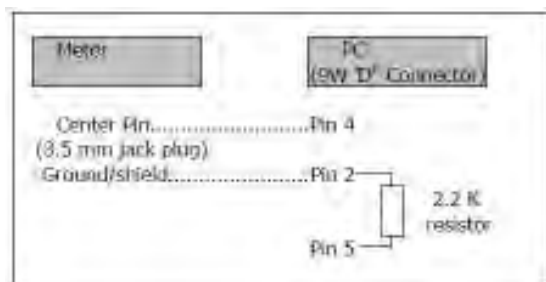


PC CONNECTION

RS232 PC Serial Interface

This meter has a RS232 PC serial interface via a 3.5 mm terminal. The data output is a 16 digit stream that can be utilized for the user's specific application.

A RS232 lead with the following connection will be required to link the meter with the PC serial port:



The 16 digit data stream will display in the following format:

D15 D14 D13 D12 D11 D10 D9 D8
D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicates the following status:

PC CONNECTION

| | | | |
|-----------|--|---------|-----------|
| DO | End word | | |
| D1 & D8 | Display reading, D1 = LSD, D8 = MSD For example: If the display reading is 1234, then D8 to D1 is 00001234 | | |
| D9 | Decimal point (DP) position from right to left 0 = No DP, 1 = 1 DP, 2 = 2 DP, 3 = 3DP | | |
| D10 | Polarity, 0 = Positive, 1 = Negative | | |
| D11 & D12 | Annunciator for Display | | |
| | °C = 01 | °F = 02 | % RH = 04 |
| D13 | When send the upper display data = 1 When send the lower display data = 2 | | |
| D14 | 4 | | |
| D15 | Start word | | |

PC CONNECTION

RS232 Format: 9600, N, 8, 1

| | |
|--------------|-------------|
| Baud rate | 9600 |
| Parity | No parity |
| Data bit no. | 8 Data bits |
| Stop bit | 1 Stop bit |

OPTIONAL ACCESSORIES

800060~77 Type K Thermocouple
Probes

840057 RS232 Computer
Cable

840059 2GB SD Card

840090 Water Resistant
Instrument Pouch

840093 Field Tripod

840094 USB Computer
Cable

840097 AC Adaptor

850080 Software

SPECIFICATIONS

General

| | |
|---------------------------------|--|
| Circuit | Custom one-chip of microprocessor LSI circuit |
| Display | LCD size: 52 mm x 38 mm Backlight function |
| Measurement Unit | Humidity/Temp: %RH/°C or °F Dew point (Humidity): °C or °F Wet bulb (Humidity): °C or °F Type K/J Thermometer: °C or °F |
| Temperature Compensation | Automatic temperature compensation for the humidity function and the type K/J thermometer |
| Sampling Time of Display | Approximately 1 second |
| Data Output | RS232/USB PC computer interface |
| Memory Card | SD card 1 GB to 16 GB |
| Operating Temperature | 0 ~ 50°C |

SPECIFICATIONS

| | |
|---------------------------|---|
| Operating Humidity | < 85%RH |
| Power Supply | Alkaline or heavy duty DC 1.5 V battery (UM3, AA) x 6 pieces |
| | DC 9V adapter input (AC/DC power adapter is optional) |
| Power Current | Normal Operation (without use of the datalogger or backlight): Approximately DC 3.5 mA |
| | Datalogger Operation (backlight is off): Approximately DC 28 mA |
| | If the backlight is on, the power consumption will increase by approximately 12 mA. |
| Dimensions | 177 x 68 x 45 mm 7 x 2 ¾ x 2" |
| Weight | 489 g (1 lb) |

SPECIFICATIONS

Humidity

| | |
|------------|---|
| Range | 5% ~ 95% RH |
| Resolution | 0.1% RH |
| Accuracy | $\geq 70\% \text{ RH:}$ $\pm (3\% \text{ reading} + 1\% \text{ RH})$ $< 70\% \text{ RH:}$ $\pm 3\% \text{ RH}$ |

Temperature

| | | |
|------------|--|---------------------------|
| Range | $0^{\circ}\text{C} \sim 50^{\circ}\text{C}$ $(32^{\circ}\text{F} \sim 122^{\circ}\text{F})$ | |
| Resolution | 0.1° | |
| Accuracy | °C | $\pm 0.8^{\circ}\text{C}$ |
| | °F | $\pm 1.5^{\circ}\text{F}$ |

Dew Point (Humidity)

| | | |
|----|------------|--|
| °C | Range | $-25.3^{\circ}\text{C} \sim 48.9^{\circ}\text{C}$ |
| | Resolution | 0.1°C |
| °F | Range | $-13.5^{\circ}\text{F} \sim 120.1^{\circ}\text{F}$ |
| | Resolution | 0.1°F |

SPECIFICATIONS

Note...

The dew point value is automatically calculated from the humidity/temperature measurement. The dew point accuracy is the sum accuracy value of the humidity and temperature measurement.

Wet Bulb (Humidity)

| | | |
|----|------------|------------------|
| °C | Range | -21.6°C ~ 50.0°C |
| | Resolution | 0.1°C |
| °F | Range | -6.9°F ~ 122.0°F |
| | Resolution | 0.1°F |

Note...

The wet bulb value is automatically calculated from the humidity/temperature measurement. The wet bulb accuracy is the sum accuracy value of the humidity and temperature measurement.

SPECIFICATIONS

Type K/J Thermometer

| Sensor Type | Range | Resolution | Accuracy |
|-------------|----------------------------------|------------|--|
| Type K | -50.0 ~ 1300°C -50.1 ~ -100°C | 0.1°C | ± (0.4% reading + 0.5°C) ± (0.4% reading + 1°C) |
| | -58.0 ~ 2372°F -58.1 ~ -148°F | 0.1°F | ± (0.4% reading + 1°F) ± (0.4% reading + 1.8°F) |
| Type J | -50.0 ~ 1200°C -50.1 ~ -100°C | 0.1°C | ± (0.4% reading + 0.5°C) ± (0.4% reading + 1°C) |
| | -58.0 ~ 2192°F -58.1 ~ -148°F | 0.1°F | ± (0.4% reading + 1°F) ± (0.4% reading + 1.8°F) |

WARRANTY

Sper Scientific warrants this product against defects in materials and workmanship for a period of five (5) years from the date of purchase, and agrees to repair or replace any defective unit without charge. If your model has since been discontinued, an equivalent Sper Scientific product will be substituted if available. This warranty does not cover probes, batteries, battery leakage, or damage resulting from accident, tampering, misuse, or abuse of the product. Opening the meter to expose its electronics will void the warranty. To obtain warranty service, ship the unit postage prepaid to:

SPER SCIENTIFIC LTD
7720 E Redfield Rd, Suite 7
Scottsdale, AZ 85260

The defective unit must be accompanied by a description of the problem and your return address. Register your product online at www.sperscientific.com, or return your warranty card within 10 days of purchase.



Rev. 6/17/2011