Environmental Quality
SD Card Logger

850071

Instruction Manual

SPER
SCIENTIFIC

Environmental Measurement Instruments

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Environmental Quality SD Card Logger 850071

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INTRODUCTION

This Sper Scientific Environmental Meter with SD Card Datalogger (Model 850071) is an extremely fast and accurate meter with multiple functions. The meter reads humidity, air temperature, air velocity, and measures light in Lux or Ft-cd. Optional Type K/J thermocouple probes available.

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. Each data set includes the measured value along with the time and date. Sampling time can be set from 1 second to 3600 seconds. Alternatively, manual datalogging is available to record 99 readings.

FEATURES

- Functions as a light meter, anemometer, and humidity/ temperature meter. Optional adapter enables Type K/J thermometer.
- Measures humidity in both %RH and temperature
- Displays air velocity in five units of measure
- Lux or Foot Candles unit selection
- Zero Adjustment
- Highly accurate microcomputer circuit
- Direct upload of data to Excel
- SD memory card datalogger
- Manual datalogger option
- Internal clock and calendar
- Touch-tone
- Tripod mounting screw
- Built-in tabletop stand
- Maximum and Minimum
- Hold function
- Auto power off
- Low battery indicator
- Backlight

MATERIALS SUPPLIED

• Meter
• Sensor
• SD Card
• 6 AA Batteries
• Instruction Manual
• Hard Carrying Case

OPTIONAL ACCESSORIES

1GB SD Card
2GB SD Card
AC to DC 9V Adapter
USB Computer Cable
RS232 Cable
Data Acquisition Software
Type K/J Thermocouple Probes
Benchtop Tripod
Field Tripod
Water Resistant Instrument Pouch

POWER SUPPLY

This meter can be powered by six AA (1.5V, UM3)
batteries or an optional 9 Volt DC adapter.

Plug the adapter into the power port labeled
"DC 9V," located on the side of the meter.

Note…
When using the adapter, the meter will remain permanently
on and the **POWER** button will be disabled.
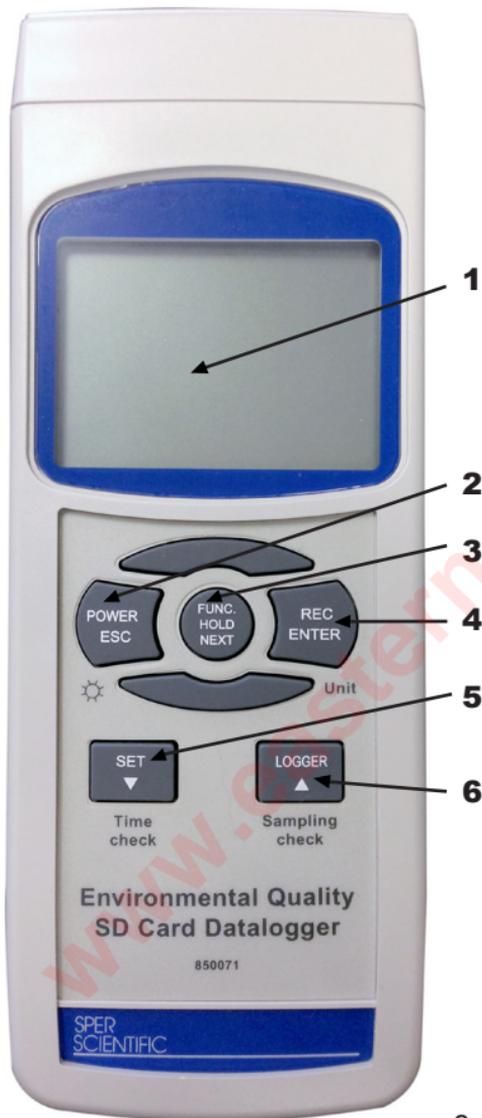
METER COMPONENTS

Keypad

1. LCD Display
2. POWER/ESC
3. FUNCTION /HOLD/ NEXT
4. REC/ENTER
5. SET/▼ (TIME CHECK)
6. LOGGER/▲ (SAMPLING TIME CHECK)

Side of Meter

7. RS-232 Output Terminal / RESET
8. DC9V Power Adapter Input Socket

Back of Meter

9. Battery Cover Screws
10. Tripod Mounting Screw
11. Battery Compartment / Cover Stand

8
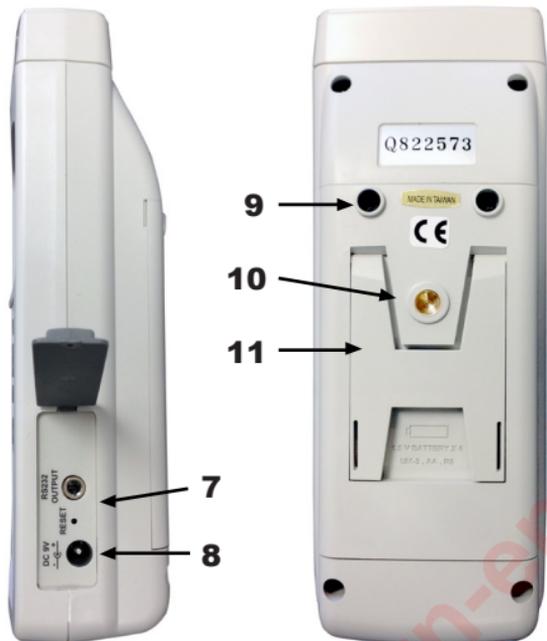
Top of Meter

12. Type K/J Thermometer Socket
13. Probe Input Socket

Bottom of Meter

14. SD Card Socket

Sensor Probe

15. Anemometer Vane
16. Humidity/ Temperature Sensor
17. Light Sensor

Q822573

MADE IN TAIWAN

CE

RS232 OUTPUT

RESET

DC 9V

THERMOCOUPLE

Temp probe

Do not take out SD card during datalogging.

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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.

Entering Setup Mode

1. Press **POWER** to turn the meter **on**.

2. Press and hold **SET** for at least 2 seconds 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 (see above). "dAtE" appears on the LCD.

2. Press **ENTER**. The year will appear on the LCD.

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** as long as the batteries have adequate power.

Decimal Type

Although the decimal is commonly expressed as the "."
symbol (i.e., 20.6 or 1000.53), some European countries
use a "," symbol to represent the decimal (i.e., 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 11). "dEC" appears on the LCD.

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. To disable this function:

1. Enter the auto power off function from Setup Mode
   (see page 11). "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 11). "bEEP" appears on the LCD.

2. Press ▲ or ▼ to select yes (touch-tone enabled) or no (touch-tone disabled). Press **ENTER** to save the selection.

Thermometer Type K/J

1. Enter the thermometer type function from Setup Mode (see page 11). "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 11). "t-CF" appears on the LCD.

2. Press ▲ or ▼ to select C (degrees Celsius) or F (degrees Fahrenheit). Press **ENTER** to save the selection.

Sampling Time

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

1. Enter the sampling time function from Setup Mode (see page 11). "SP-t" appears on the LCD.

2. Press ▲ or ▼ to adjust the value (1, 2, 5, 10, 30, 60, 120, 300, 600, 1800, or 3600 seconds). Press **ENTER** to save the value.

SD Memory Card Format

This function will format the SD memory card to work specifically with your meter. New SD cards should always be formatted before first use. Formatting the SD card will erase any previous memory on the card.

1. Enter the SD memory card format function from Setup Mode (see page 11). "Sd F" appears on the LCD.

2. Press ▲ or ▼ to select yes (format the SD memory card) or no (do not format the SD memory card). Press **ENTER** to confirm the selection.

3. If you selected yes in step 2 the display will show "yES Ent." 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

Press and hold **FUNC** to cycle through the options listed below. Release **FUNC** when you reach the desired function.

Code on Display	Function
An	Air velocity/temperature
rH	Humidity/temperature
tP	Type K/J thermometer
LIgHt	Light meter

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

Air Velocity and Air Temperature

1. Plug the anemometer probe plug into the probe input socket.

2. Press **POWER** to turn the meter **on**.

3. Press and hold **FUNC** to cycle through the options until "An" appears on the LCD. Release the **FUNC** button.

4. Hold the probe handle and point the probe head toward the air flow. The air velocity value appears on the upper display and the air temperature value appears on the lower display.

Selecting the Air Velocity Unit

1. Press and hold **UNIT**. The meter will cycle through m/s, Km/h, mph, Knot, and FPM.

2. Release **UNIT** when the desired unit appears on the LCD.

Note…
To change the temperature unit, see page 13.

Humidity and Temperature

1. Plug the probe plug into the probe input socket.

2. Press **POWER** to turn the meter **on**.

3. Press and hold **FUNC** to cycle through the options until "rH" appears on the LCD. Release the **FUNC** button.

4. The humidity value appears on the upper display and the air temperature value appears on the lower display.

Note…
To change the temperature unit, see page 13.

Type K/J Thermometer

Note…
The anemometer probe must be disconnected from the meter to obtain accurate Type K/J readings.

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, optional) into the type K/J thermometer socket. The LCD will display the measurement value from the temperature probe.

4. "K" or "J" appears on the LCD to indicate the type of thermometer.

Notes…
When using the meter for the first time, the meter will default to K type thermocouple. See page 13 for instructions on selecting the thermocouple type.

To change the temperature unit, see page 13.

Light Meter

1. Press **POWER** to turn the meter on.

2. Press and hold **FUNC** to cycle through the options until "LIgHt" appears on the LCD. Release the **FUNC** button.

3. Plug the probe plug into the probe input socket.

4. While holding the sensor handle, point the light sensor directly toward (facing) the light source. The light measurement will appear on the LCD.

Note…
This meter measures light in LUX or Foot Candles (Ft-cd). To change the light unit, press and hold **REC ENTER**. Release **REC ENTER** when the desired unit appears on the LCD.

Zero Adjustment

During light measurement, if the display does not show a value of 0 when the light sensor is completely covered, zero adjustment is needed.

1. With the sensor covered, press **LOGGER** for >3 seconds. "0" appears on the LCD.

2. Uncover the sensor to resume normal measurement.

Sound Meter

The optional sound adapter permits the meter to measure sound in decibels.

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

2. Plug the sound adapter plug into the probe input socket.

3. Turn on the sound adapter.

4. Press **POWER** to turn the meter **on**. "Sound" will appear on the LCD, and then the meter will return to Normal Mode. Sound levels will be displayed in "db".

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" appears on the LCD.

3. Press **REC**. The minimum value and "REC MIN" appears on the LCD.

4. When you are viewing the maximum or minimum value, you may press **HOLD** to delete the value. "REC" appears on the LCD and the meter will begin recording maximum and minimum values again.

5. To exit the max/min function, press and hold **REC** for 2 seconds. 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

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

1. Press **POWER** once to turn the backlight **off**.

2. Press **POWER** again 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 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 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 14).

3. Set the clock if using the meter for the first time (see page 11).

4. Set the decimal type if using the meter for the first time (see page 12).

Auto Datalogging

1. Set the sampling time to ≥ 1 second (see page 13).

2. Press **REC**. "REC" will appear on the LCD.

3. Press **LOGGER**. "REC" will flash on the LCD. The tone will sound as 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.

5. To finish datalogging, pause the datalogger. Press **REC** for ≥ 2 seconds. "REC" will disappear from the LCD to indicate that datalogging has ended.

Note…
To enable/disable the touch-tone feature, see page 12.

Manual Datalogging

1. Set the sampling time to 0 seconds (see page 13).

2. Press **REC**. "REC" will appear on the LCD.

3. Press **LOGGER**. "REC" will flash on the LCD. The tone will sound as 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.

4. To change the position number, press ▼. The position number will flash on the LCD.

5. Press ▲or ▼ to set the position number (from 1 to 99).

6. To indicate the position location, P x (x= 1 to 99) will appear on the LCD.

7. Select the position number and press **ENTER** to confirm.

8. To finish datalogging, press REC for ≥ 2 seconds. "REC" will disappear from the LCD to indicate that datalogging has ended.

Note…
To enable/disable the touch-tone feature, see page 12.

SD Card Data Structure

- The first time a SD card is used in this meter, a folder EMA01 will be generated.

- If the datalogger is being used for the first time, a new file EMA01001.XLS will be generated under the route EMA01\.

- After exiting the datalogger and executing the function again, the data is saved to the EMA01001.XLS file until the data reach 30,000 data columns. A new file will then be generated (i.e. EMA01002.XLS).

- The folder EMA01\ will hold 99 files. A new route will be generated when exceeding 99 files (i.e. EMA02\).

The file's route structure:

```
EMA01\
        EMA01001.XLS
        EMA01002.XLS

        …………………
        EMA010099.XLS
EMA02\
        EMA02001.XLS
        EMA02002.XLS

        …………………
        EMA020099.XLS
EMAXX\
        …………………
```

Note…
XX: Maximum value is 10.

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 an 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., EMA01001.XLS, EMA01002.XLS) from the SD card to the computer.

5. The saved data will appear in the Excel software screen. The data can then be used in Excel to create graphs, etc.

Excel Data Screen (example)

	A	B	C	D	E	F	G
1	Place	Date	Time	Value	Unit	Value	Unit
2	1	6/8/2013	15:12:16	0.8	m/S	28.8	AMTemp C
3	2	6/8/2013	15:12:17	2.2	m/S	28.8	AMTemp C
4	3	6/8/2013	15:12:18	2.1	m/S	28.8	AMTemp C
5	4	6/8/2013	15:12:19	2.9	m/S	28.9	AMTemp C
6	5	6/8/2013	15:12:20	2.9	m/S	28.8	AMTemp C
7	6	6/8/2013	15:13:21	2.7	m/S	28.8	AMTemp C
8	7	6/8/2013	15:13:22	3.6	m/S	28.8	AMTemp C
9	8	6/8/2013	15:12:23	2.9	m/S	28.8	AMTemp C
10	9	6/8/2013	15:12:24	2.9	m/S	28.8	AMTemp C

RS232 PC Serial Interface

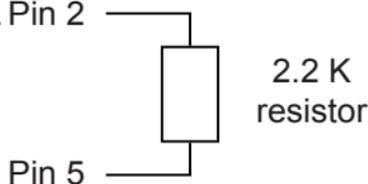This meter has a RS232 PC serial interface via a 3.5 mm terminal.

The data output is a 16 digit stream suitable 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:

Meter	PC (9W'D" Connector)

Center Pin . . . . Pin 4
(3.5 mm jack plug)

Ground/shield . . . . Pin 2 ┐

                                     2.2 K
                                     resistor

                              Pin 5 ┘

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:

D0	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 R to L 0 = no DP, 1 = 1 DP, 2 = 2 DP, 3 = 3 DP
D10	Polarity: 0 = Positive, 1 = Negative
D11 & D12	Annunciator for Display
D13	When sending the upper display data = 1 When sending the lower display data = 2
D14	4
D15	Start word

Annunciator for Display:

°C = 01	Knot = 09	Mile/h = 12
°F = 02	Km/h = 10	m/S = 08
Ft/min = 11	LUX = 15	Ft-cd = 16
%RH = 4		

RS232 Format: 9600, N, 8, 1

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

BATTERY REPLACEMENT

This meter uses six AA (1.5V, 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 and hold POWER for 2 seconds 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

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

1. 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).

2. Press POWER to turn the meter on.

SPECIFICATIONS

Circuit	Custom one-chip of microprocessor LSI circuit	
Display	LCD size: 52 mm x 38 mm LCD with green backlight (ON/OFF)	
Measurement Unit	• Type K/J thermometer • Humidity/Temp. meter • Anemometer with Temp. • Light Meter • Sound level meter (optional adaptor)	
Datalogger Sampling Time Setting Range	Auto	1 second to 3600 seconds @ For anemometer measurement, the sampling time setting value should be ≥ 2 seconds. @ Sampling time can set to 1 second, but memory data may loss.
	Manual	Push the data logger button once will save data one time. @ Set the sampling time to 0 second @ Manual mode, can also select the 1 to 99 position (Location) no.
Memory Card	SD memory card. 1 GB to 16 GB.	

Advanced setting	• Set clock time (Year/Month/Date/Hour/Minute/Second) • Decimal point of SD card setting • Auto power OFF management • Set beep Sound ON/OFF • Set thermometer type to Type K or Type J • Set temperature unit to C or F • Set sampling time • SD memory card Format
Temperature Compensation	Automatic temp. compensation for the Anemometer function and the type K/J thermometer
Data Hold	Freeze the display reading
Memory Recall	Maximum & Minimum value
Sampling Time of Display	Approx. 1 second
Data Output	RS 232/USB PC Computer interface • Connect the optional RS232 cable UPCB-02 will get the RS232 plug. • Connect the optional USB cable USB-01 will get the USB plug.
Operating Temperature	0 to 50 C
Operating Humidity	Less than 85% RH

Power Supply	• Alkaline or heavy duty DC 1.5 V battery (UM3, AA) x 6 PCs, or equivalent
	• DC 9V adapter input (AC/DC power adapter is optional)
Power Current	Normal operation (w/o SD card save data and LCD Backlight if OFF): Appox. DC 15 mA.
	When SD card save the data and LCD Backlight is OFF: Appox. DC 36mA.
Weight	515 g (1.13 lbs)

Anemometer

A. Air Velocity

Meas.	Range	Resolution	Accuracy
m/S	0.4 ~ 25.0 m/S	0.1 m/S	± (2% + 0.2 m/S)
km/h	1.4 ~ 90.0 km/h	0.4 kn/h	± (2% + 0.8 km/h)
mph	0.9 ~ 55.9 mile/h	0.1 mile/h	± (2% + 0.4 mile/h)
knot	0.8 ~ 48.6 knots	0.1 knots	± (2% + 0.2 m/S)
FPM	80 ~ 4930 ft/min	1 ft/min	± (2% + 40 ft/min)
Note:	m/S - meters per second km/h - kilometers per hour mph - miles per hour knot - nautical miles per hour (international knot) FPM - feet per minute		

B. Temperature

Measuring Range	32 ~ 122 F (0 ~ 50 C)
Resolution	0.1 C / 0.1 F
Accuracy	± 0.8 C / 1.5 F

Humidity/Temp. Meter

A. Humidity

Measuring Range	0% to 95% RH
Resolution	0.1 %R.H.
Accuracy	≥ 70% RH: ± (3% reading + 1% RH) < 70% RH: ± 3% RH

B. Temperature

Measuring Range	32 ~ 122 F (0 ~ 50 C)
Resolution	0.1 C / 0.1 F
Accuracy	± 0.8 C / 1.5 F

Light Meter

Measuring Range	LUX Ft-cd	0 to 20,000 LUX 0 to 1, 860 ft-cd
Resolution	LUX Ft-cd	1 LUX 0.1 Ft-cd
Accuracy	± (5% rdg ± 8 dgt)	

Type K/J Thermometer

Sensor Type	Res	Range	Accuracy
Type K	0.1 C	-50.0 ~ 1300.0 C	± (0.4% + 0.8 C)
		-50.1 ~ 100.0 C	± (0.4% + 1 C)
	0.1 F	-58.0 ~ 2372.0 F	± (0.4% + 1.5 F)
		-58.1 ~ 148.0 F	± (0.4% + 1.8 F)
Type J	0.1 C	-50.0 ~ 1200.0 C	± (0.4% + 0.8 C)
		-50.1 ~ 100.0 C	± (0.4% + 1 C)
	0.1 F	-58.1 ~ 2192.0 F	± (0.4% + 1.5 F)
		-58.1 ~ 148.0 F	± (0.4% + 1.8 C)

• Accuracy value is specified for the meter only.

• Type K probes are optional accessories.

• Above specification tests under the environment RF Field
  Strength less than 3 V/M & frequency less than 30 MHz only.

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 break the waterproof seal and void the warranty. To obtain warranty service, ship the unit postage prepaid to:

<div align="center">

SPER SCIENTIFIC LTD.
8281 E. Evans Rd., Suite #103
Scottsdale, AZ 85260
(480) 948-4448

</div>

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.

www.eastern-energy.net

Email: info@ete.co.th