ULTIMATE THERMOMETER

800043
Instruction Manual

- *IR thermometer*
- *Pt 100 ohm*
- *Type K/J/R/E/T*

SPER
SCIENTIFIC LTD.

CONTENTS

I. PANEL DESCRIPTION

1. LCD Display
2. POWER button
3. SENSOR & ⇦left button
4. REL (relative) & ⇩down button
5. HOLD & BACKLIGHT (>2S☼) button
6. REC (record) & MAX/MIN button
7. °C/°F & ⇧up button
8. EMISSIVITY (EMIS>2S) & LASER I/O button
9. RS-232 Output Socket
10. Battery Compartment
11. Thermocouple Input Socket (Type J/K/R/E/T)
12. Infrared (IR) Sensing Head
13. Pt100Ω Input Socket
14. Laser Guide button

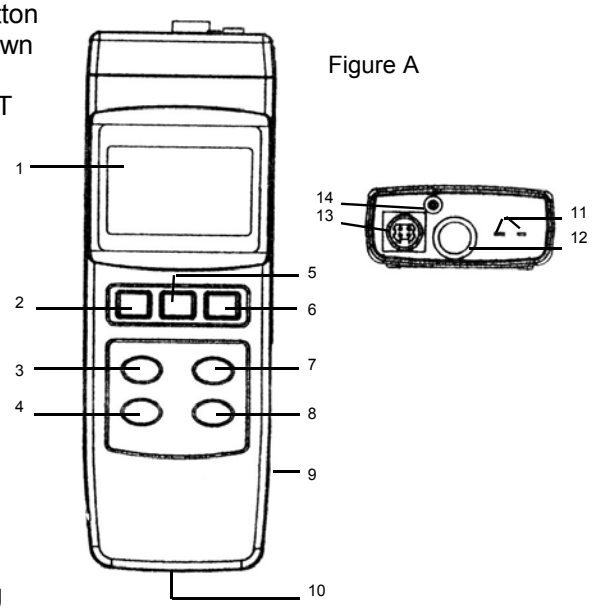


Figure A

II. **INTRODUCTION** Combines Infrared, RTD and thermocouple capabilities in a single unit. For general purpose applications chose any type K, J, R, E, or T thermocouple probe. For a precise temperature reading use the PT100 RTD probe. The built-in IR thermometer features a laser guide and adjustable emissivity. The distance-to-spot ratio is approximately 7:1. Other features include RS232 computer interface, C & F selection, min-max memory, relative temperature, auto power off and hold. Has a convenient tripod back and an easy to read back-lit display with large ½" high digits.

LASER WARNING!

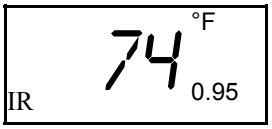
CAUTION: Do not point laser directly at eye. Use caution around reflective surfaces. Keep out of reach of children.

III. OPERATING INSTRUCTIONS - See Fig A, page 2 for button locations.

A. IR MEASUREMENT

1. Press the **POWER** button (2) to turn the unit on. The display will count down from 99999, 88888, etc. to 00000, then show the IR temperature and the emissivity on the LCD's right bottom corner.

Example indicates a temperature of 74°F with emissivity of 0.95 →



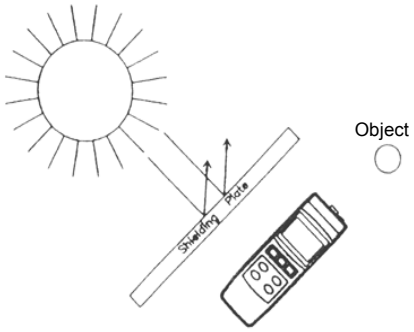
2. Use the **°C/°F** button (7) to change scales.
3. Point the **IR Sensing Head** (12) at the object to be measured. The meter will display the surface temperature.

EMISSIVITY - All objects emit invisible energy. The amount of energy is emitted proportional to the object's temperature and it's ability to emit energy. Emissivity is based on the material that the object is made of and it's surface roughness. Emissivity values range from 0. 1 for highly reflective objects, to 1.00 for a flat black surface. The probe of your IR Thermometer senses energy and calculates the temperature based on the amount of IR energy it receives, plus a factory set emissivity value of 0.95.

An emissivity value of 0.95 will cover 90% of the typical applications. If the emissivity value of the measured material is not 0.95, you can adjust the emissivity value. Matching the correct emissivity with the specific value of the object is important in order to obtain the exact temperature.

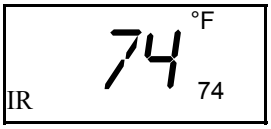
Press the **EMISSIVITY** button (8) for at least 2 seconds. Release the button when the emissivity value begins to flash. Use the ⇦left button (2) to select the digit and the ⇧up (7) or ⇩down (4) buttons to adjust the emissiv-

DISTURBANCE - Objects with low emissivity or objects with a low temperature and high emissivity, emit little infrared energy. For this reason, measurement of these objects is affected by infrared energy radiated from nearby objects with high emissivity or high temperatures.

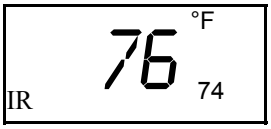


When such objects are measured in sunlight for example, radiated energy from the sun is reflected by the surface of the object and received by the sensor. Use a shielding plate to block outside infrared energy.

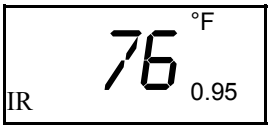
CALIBRATION - Check the unit against a known standard. If the value has drifted, press and hold down both the **HOLD** (5) and **REC** (6) buttons. The temperature reading and the small digits in the lower right corner will display the same value.



Continue pressing the **HOLD** and **REC** buttons while using the ⇧up (7) or ⇩down (4) buttons to adjust the temperature reading to your standard. The small digits retain your pre-calibration reading. Release all buttons when you have reached the adjusted temperature.



After releasing the buttons, the small digits will disappear in Thermocouple or RTD modes and the calibration is complete. In IR mode, the preset emissivity will be displayed.



NOTES

- If the object you are measuring is covered with frost, clear the frost to expose the object's surface before taking the measurement.
- If the surface you are measuring is highly reflective, apply masking tape or a paint that has a 0.95 emissivity.
- The display may fluctuate if the meter is moved during measurement.
- The unit will automatically compensate for ambient temperature.
- For the most accurate measurement, allow the unit to adjust to the ambient temperature for about 30 minutes before use.
- When a low temperature is measured directly after a high temperature has been measured, the display may take some time to stabilize.

B. THEMOCOUPLE MEASUREMENT (K, J, T, E, R)

1. With the meter on, press the **SENSOR** button (3) to select your sensor type. The display shows: IR, Pt3850, K, J,T, E, or R.
2. Insert the probe plug into the **Thermocouple Input** (11).
3. Press the **°C/°F** button (7) to select the temperature scale.
4. The LCD will display the temperature reading.
5. If needed, follow the Calibration Procedures on page 4.

NOTES

- Match the plug's polarity to the unit's polarity.
- To obtain the most accurate reading, the plug must stabilize at the temperature of the socket. This will take a few minutes and only applies if the probe plug has been exposed to an ambient temperature different to that of the thermometer.

C. PT 100 OHM MEASUREMENT

1. With the meter on, press the **SENSOR** button (3) to select "Pt3850."
2. Insert the PT 100 probe into the **Pt100Ω Input Socket** (13).
3. Press the **°C/°F** button (7) to select the temperature scale. The LCD will display the temperature reading.
4. If needed, use the Calibration Procedures on page 4.

D. DATA HOLD

1. Press the **HOLD** button (5) during measurement to freeze the displayed measurement. "HOLD" and the measurement are displayed.
2. Press the **HOLD** button (5) again to exit this function.

E. DATA RECORD (Display the Maximum / Minimum Measurements)

1. With the meter on, press the **REC** button (6) once. "REC" and the current measurement are displayed.
2. Press the **REC** button (6) again. "REC Max" and the maximum recorded measurement are displayed.
3. Press the **REC** button (6) again. "REC Min" and the minimum recorded measurement are displayed.
4. To exit this function, press and hold the **REC** button (6) for at least 2 seconds. The display reverts to the current reading.

F. RELATIVE MEASUREMENT

1. Press the **REL** button (4) during measurement to store the current reading into memory. "REL" and a zero value appears on the LCD.
2. Subsequent readings will be measured and only the difference (higher or lower) will be displayed.
3. Press the **REL** button (4) again to cancel this function.
4. Example: An IR measurement of 75°F was stored in memory by pressing the REL button. The meter is then aimed at an object that's temperature is 55°F. "REL" and "- 20°F" will be displayed.

G. LCD BACK LIGHT - Press the **BACK LIGHT** >2S☼ button (5) for at least 2 seconds. The LCD will light for approximately 10 seconds, then turn off.

H. AUTO POWER OFF - If no buttons are pushed for approximately 10 minutes, the meter will automatically turn off. To disable this feature, select the Data Record function (page 5) by pressing the **REC** button (6). "REC" will be displayed.

I. BATTERY REPLACEMENT - Accurate thermometer readings may be taken for several hours after the low battery indicator is displayed. Open the battery cover, install a fresh 9V battery and replace the cover.

J. RS232 PC SERIAL INTERFACE - This unit features an **RS232 Output Socket** (9) on the side of the unit. Gently lift the hinged cover from the bottom. The output is a 16 digit data stream which can be utilized by user's specific application. An RS232 lead with the following connection is required to link the instrument with the PC serial input:

Meter (3.5 mm jack plug)	PC (9W "D" Connector)	
Center Pin	Pin 4 Pin 2	2.2K resister
Ground/Shield	Pin 2 Pin 5	

RS232 FORMAT: 9600, N, 8, 1

The 16 digit data stream will be displayed as follows:

D15D14D13D12D11D10D9D8D7D6D5D4D3D2D1D0

Each digit indicates the following status:	
D0	End Word
D1 & D8	Display reading, DI " LSD, D8 MSD. For example: If the display reading is 1234, then D8 to D I is: 00001234
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1 = 1 DP, 2 = 2 DP, 3 = 3 DP
D10	0 = Positive, 1 = Negative
D11 & D12	Anunuciator for Display: 01=°C, 02=°F
D13	1
D14	4
D15	Start Word

IV. SPECIFICATIONS

Type	Range	Res	Accuracy (meter only)
PT 100	-200 ~ 850°C, -328 ~ 1562°F	0.1°	± 0.2%+0.5°C or 1°F
Type K	-100 ~ 1300°C, -148 ~ 2372°F		
Type J	-100 ~ 1150°C, -148 ~ 2102°F		
Type T	-100 ~ 400°C, -148 ~ 752°F		
Type E	-100 ~ 900°C, -148 ~ 1652°F		± 0.2%+0.5°C or 1°F
Type R	0 ~ 600°C 601 ~ 1700°C 32 ~ 1112°F 1113 ~ 3092°F	1°	±1%+5°C ±1.5%+5°C ±1%+10°F ±1.5%+10°F
Infrared	-20 ~ 400°C -4 ~ 752°F		±3% rdg or ±3°C or ±5°F (which ever is greater)
Note: Accuracy is tested within 23 ± 5°C.			

Display	2" x 1 1/4" (51mm x 32mm) and 1/2" (15mm) digits.
Sensor Types	1. Non Contact Infrared thermometer 2. Platinum PT 100 ohm (0.00385 alpha coefficient, meets DIN IEC 751 standards) 3. Thermocouple probes: K, J, T, E, R
Circuit	Exclusive microcomputer circuit with built-in linearity correction function. The Pt 100 ohm's curve is stored in the CPU circuit.
Laser	Red laser light guide, less than 1mW meets EN60825 standards
Probe Input	1. PT 100 ohm probe: DIN 4 pin socket 2. Thermocouple probe: Standard 2 pin socket
Sampling Time	Approximately 1 second
Over Range Indicator	" - - - - "
Data Output	RS232 PC serial interface
Operating Temp/RH	32 ~ 122°F, 0 ~ 50°C and less than 80% relative humidity
D/S	Distance-to-Spot ratio is approximately 7:1.

Power Supply	Alkaline or heavy duty type, DC 9V battery.
Power Consumption	Approx DC 11 mA (w/o laser light on). Approx DC 16 mA (with laser light on). Above consumption value is calculated using the IR thermometer without LCD backlight.
Size	HWD 200x 68 x 30mm (7.9 x 2.7 x 1.2")
Weight	8 oz, 220 g
IR Wavelength Reg.	6 to 12 micrometer
Input Socket	DIN 4 pin socket

V. OPTIONAL ACCESSORIES

- 800044 Replacement PT 100 Probe
- 840057 RS232 Cable
- 840094 USB Cable Adaptor
- 840090 Water Resistant Instrument Pouch
- 840092 Bench Top Tripod
- 840093 Field Tripod
- 850080 Data Acquisition Software

VI. 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, or damage resulting from accident, misuse, or abuse of the product. In order to obtain warranty service, simply ship the unit postage prepaid to:

SPER SCIENTIFIC, 7720 E Redfield, Ste 7, Scottsdale, AZ 85260
480-948-4448, www.sperscientific.com, info@sperscientific.com

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