DATALOGGING UVAB / UVC METER

850031

Instruction Manual

SPER SCIENTIFIC

Environmental Measurement Instruments

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INTRODUCTION

Your new Sper Scientific Model 850031 UV Light Meter meets professional standards for ultraviolet irradiance measurements. It provides precise UVA and UVC light measurements with real-time SD card datalogging capabilities, making it ideal for industrial, scientific, and safety applications.

This meter covers dual UV ranges (2 mW/cm² and 20 mW/cm²) with 0.001 mW/cm² resolution and includes both UVA/B (365nm) and UVC (254nm) sensors with cosine correction filters for accurate measurements.

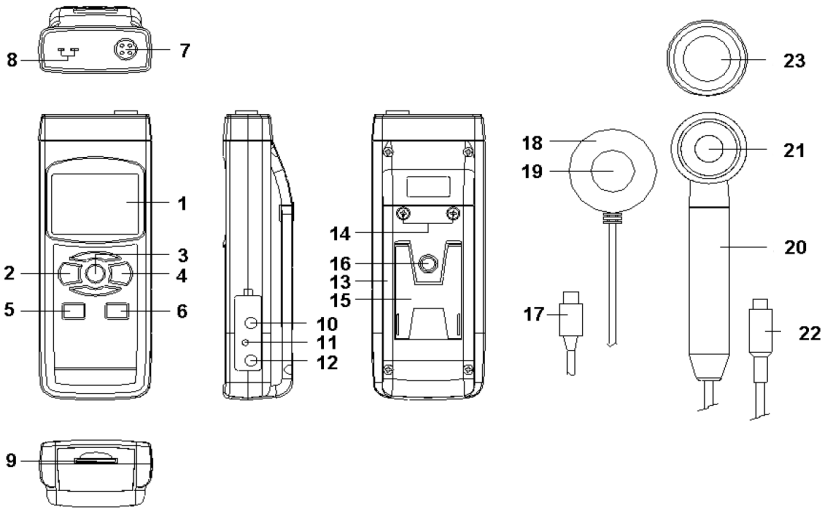
Key Features:

- Dual UV measurement capability: UVA/B (365nm) and UVC (254nm) in one meter
- Real-time SD memory card datalogger with built-in clock and calendar
- Professional UV sensors with cosine correction filters
- Type K/J thermocouple thermometer with automatic temperature compensation
- Dual measurement ranges: 2 mW/cm² and 20 mW/cm² for optimal accuracy
- Memory function to store Max. & Min. values
- Hold and Zero adjustment functions
- LCD with green backlight for easy reading in all conditions
- RS232/USB PC interface for data transfer
- Sampling time from 1 second to 3600 seconds
- Manual datalogger capability with position tracking (1-99)

Applications:

- UV sterilization monitoring
- Welding radiation hazard assessment
- Graphic arts and photochemical processes
- UV EPROM erasure verification
- Photoresist exposure control
- Curing process monitoring (inks, adhesives, coatings)
- Laboratory research and quality control

PANEL DESCRIPTION



Front Panel Controls:

1. Display - 52mm x 38mm LCD with green backlight
2. Power Button (ESC/Backlight) - Power on/off and backlight control
3. Hold Button (Function/Next) - Data hold and function selection
4. REC Button (Enter) - Recording functions and menu confirmation
5. SET Button (▼/Time Check) - Settings navigation and time display
6. Logger Button (▲/Sampling Check/Zero) - Datalogger control and zero adjustment
7. Probe Input Socket - Connection for UVA/UVC probes
8. Type K/J Thermometer Socket - Thermocouple probe connection

Side/Rear Panel:

9. SD Card Socket - Memory card slot for datalogging
10. RS-232 Output Terminal - Serial communication port
11. Reset Button - System reset function
12. DC 9V Power Adapter Socket - External power input
13. Battery Compartment/Cover - Houses 6 AA batteries
14. Battery Cover Screws - Secure battery compartment
15. Stand - Desktop positioning support
16. Tripod Fix Nut - Standard tripod mounting

Probe Components:

17. UVC Probe Plug - Connection cable for UVC sensor
18. UVC Sensor Body - Protective housing for UVC detector
19. UVC Sensor - 254nm ultraviolet detector (200-290nm range)
20. UVA/B Probe Handle - Ergonomic grip for UVA/B sensor
21. UVA/B Sensor - 365nm ultraviolet detector (250-390nm range)
22. UVA/B Probe Plug - Connection cable for UVA/B sensor
23. UVA/B Sensor Cover - Protective cover for zero adjustment

MEASUREMENT PROCEDURES

UVA Light Measurements

Setup:

1. Power ON the meter by pressing and holding the Power Button for at least 1.5 seconds
2. Select UVA function by pressing and holding the Function Button (Hold) until display shows “A” for UVA Light meter
3. Connect the UVA Probe Plug into the Probe Input Socket
4. The display will show “mW/cm²” unit, confirming UVA measurement mode

Measurement:

1. Remove the UVA Sensor Cover if attached
2. Hold the UVA Probe Handle and point the UVA Sensor directly toward the UV light source
3. The display will show the UVA irradiance value in mW/cm²
4. For optimal accuracy, position the sensor perpendicular to the light source

Zero Adjustment:

1. Cover the UVA Sensor with the UVA Sensor Cover
2. If display does not show zero, press and hold the Zero Button (Logger Button) for more than 3 seconds
3. Display will show zero value
4. Remove sensor cover to resume measurements

Range Selection:

- Range 1: 0.000 to 1.999 mW/cm² (0.001 mW/cm² resolution)
- Range 2: 0.00 to 19.99 mW/cm² (0.01 mW/cm² resolution)
- Meter automatically selects appropriate range

UVC Light Measurements

Setup:

1. Power ON the meter as described above
2. Select UVC function by pressing and holding the Function Button until display shows “C” for UVC Light meter
3. Connect the UVC Probe Plug into the Probe Input Socket
4. The display will show “mW/cm²” unit, confirming UVC measurement mode

Measurement:

1. Hold the UVC Sensor Body and point the UVC Sensor directly toward the UVC light source
2. The display will show the UVC irradiance value in mW/cm²
3. Maintain proper distance as specified by your application requirements

Zero Adjustment:

1. Block the UVC Sensor from all light sources
2. If display does not show zero, press and hold the Zero Button for more than 3 seconds
3. Display will show zero value
4. Resume normal measurement position

Safety Warning: UVC radiation is harmful to eyes and skin. Always follow proper safety protocols when working with UVC sources.

Temperature Measurements (Type K/J Thermometer)

Setup:

1. Select thermometer function by pressing and holding the Function Button until display shows “tP” for Type K/J Thermometer
2. Do NOT connect UV probes to the Probe Input Socket
3. Connect Type K or Type J thermocouple probe (optional accessory) to the Type K/J Probe Input Socket
4. Display shows “K” for Type K or “J” for Type J thermometer mode

Measurement:

1. Place thermocouple probe in contact with measurement target
2. Allow time for thermal equilibrium
3. Display shows temperature in °C or °F (selectable in Advanced Settings)
4. Meter provides automatic temperature compensation

Note: Meter defaults to Type K thermometer. To change to Type J, refer to Advanced Settings section.

DATA HOLD AND RECORDING FUNCTIONS

Data Hold

- Press the Hold Button once to freeze the current reading on display
- “HOLD” symbol appears indicating data hold is active
- Press Hold Button again to release and resume live readings
- Function works in all measurement modes (UVA, UVC, Temperature)

Max/Min Recording

Start Recording:

1. Press REC Button once to start recording function
2. “REC” symbol appears on display
3. Meter continuously tracks maximum and minimum values

View Maximum Reading:

1. Press REC Button again while “REC” symbol is displayed
2. “REC MAX” symbol appears with maximum recorded value
3. To clear maximum value: press Hold Button once, display returns to “REC” mode

View Minimum Reading:

1. Press REC Button again to display minimum value
2. “REC MIN” symbol appears with minimum recorded value
3. To clear minimum value: press Hold Button once, display returns to “REC” mode

Exit Recording:

1. Press and hold REC Button for at least 2 seconds
2. “REC” indication disappears
3. Display returns to normal measurement mode

LCD Backlight

Manual Control:

- Press Power Button once (short press) to toggle backlight ON/OFF
- Backlight automatically activates at power-on
- Backlight adds approximately 16mA to power consumption

Auto Control During Datalogging:

- During datalogger operation, press Power Button for 2+ seconds to activate backlight
- Helps conserve battery life during extended logging sessions

DATALOGGER FUNCTIONS

Preparation

Insert SD Card:

1. Insert card into SD Card Socket with front panel facing down
2. Ensure card clicks securely into place

Format SD Card (First Use):

1. If using SD card for first time with this meter, format is recommended
2. Access Advanced Settings (see section 7-8)
3. Warning: Formatting erases all existing data on card
4. Important: Do not use cards previously formatted by other devices

Set Clock Time:

1. For accurate data timestamps, set internal clock before first use
2. Access Advanced Settings → Clock Time (see section 7-1)
3. Internal clock continues running even when powered off (with good batteries)

Decimal Format Setting:

1. Default format uses "." as decimal point (example: 20.6, 1000.53)
2. European format uses "," as decimal point (example: 20,6, 1000,53)
3. Change in Advanced Settings → Decimal Point if needed
4. Setting affects data export format to Excel

Auto Datalogger (Sampling Time ≥ 1 second)

Start Datalogger:

1. Press REC Button once - LCD shows "REC"
2. Press Logger Button - "REC" begins flashing
3. Measurement data saves automatically at preset intervals
4. Time information included with each data point

Pause Datalogger:

1. During active logging, press Logger Button once
2. "REC" stops flashing (paused state)
3. Data saving temporarily stops
4. Current measurement display continues

Resume Datalogger:

1. While paused, press Logger Button once
2. “REC” resumes flashing
3. Data logging continues from pause point

Finish Datalogger:

1. While paused, press and hold REC Button for at least 2 seconds
2. “REC” indication disappears
3. Datalogger session complete
4. Data saved to SD card

Sampling Time Options:

- Adjustable from 1 to 3600 seconds
- Set in Advanced Settings → Sampling Time
- Shorter intervals provide more detailed data but consume more memory

Manual Datalogger (Sampling Time = 0 seconds)

Setup:

1. Set sampling time to 0 seconds in Advanced Settings
2. Press REC Button once - LCD shows “REC”
3. Press Logger Button once - “REC” flashes briefly with beep
4. Lower display shows position number (P1, P2, etc.)

Log Individual Readings:

1. Position meter for measurement
2. Press Logger Button once to save current reading
3. Data saved with timestamp and position number
4. Beeper confirms data saved (if enabled)

Set Measurement Position:

1. Press ▼ Button (SET) - position number flashes
2. Use ▲ Button (Logger) or ▼ Button (SET) to select position 1-99
3. Press Enter Button (REC) to confirm position
4. Useful for tracking different measurement locations (rooms, stations, etc.)

Finish Manual Datalogger:

1. Press and hold REC Button for at least 2 seconds
2. “REC” indication disappears
3. All logged data saved to SD card

Check Time and Sampling Information

Check Current Time:

1. During normal measurement (not in datalogger mode)
2. Press Time Check Button (SET) once
3. Lower LCD displays: Year/Month/Date, Hour/Minute
4. Useful for verifying clock accuracy before important measurements

Check Sampling Time Setting:

1. During normal measurement mode
2. Press Sampling Button (Logger) once
3. Lower LCD displays current sampling time in seconds
4. Confirms datalogger interval setting

SD Card Data Structure

Automatic Folder Creation:

1. First use: SD card creates folder “UVA01”
2. First datalogger session: Creates file “UVA01001.XLS”
3. Subsequent sessions: Data added to same file until 30,000 data points
4. New file creation: When capacity reached, creates “UVA01002.XLS”

File Organization:

```
UVA01\
├── UVA01001.XLS
├── UVA01002.XLS
├── ...
└── UVA01099.XLS
UVA02\
├── UVA02001.XLS
├── UVA02002.XLS
└── ...
(Up to UVA10\ maximum)
```

File Capacity:

- Maximum 99 files per folder
- Each file holds up to 30,000 data points

Data Transfer to Computer

Remove SD Card:

1. Complete all datalogger sessions
2. Power off meter
3. Carefully remove SD card from socket

Connect to Computer:

1. Insert SD card into computer's SD card slot, or
2. Use SD card adapter/reader connected to USB port
3. Card appears as removable drive

Open Data Files:

1. Launch Microsoft Excel or compatible spreadsheet software
2. Navigate to UVA01 folder on SD card
3. Open desired data file (example: UVA01001.XLS)
4. Data displays with columns for: Place, Date, Time, Value, Unit

Data Analysis:

1. Use Excel's built-in functions for statistical analysis
2. Create charts and graphs from time-series data
3. Export data to other analysis software if needed
4. Sort and filter data by time, position, or measurement value

ADVANCED SETTINGS

Access Advanced Settings:

1. Ensure meter is NOT in datalogger mode
2. Press and hold SET Button for at least 2 seconds
3. Enter "Advanced Setting" mode
4. Press Next Button (Hold) to cycle through eight main functions

Setting Options:

- dAtE - Set clock time (Year/Month/Date, Hour/Minute/Second)
- dEC - Set SD card decimal character
- PoFF - Auto power OFF management
- bEEP - Set beeper sound ON/OFF
- tYPE - Select thermometer type (Type K or Type J)
- t-CF - Select temperature unit (°C or °F)
- SP-t - Set sampling time (1-3600 seconds)
- Sd F - SD memory card format

Exit Advanced Settings: • Press ESC Button (Power) once at any time to return to normal operation

Set Clock Time (dAtE)

When display shows “dAtE”:

1. Press Enter Button (REC) once
2. Use ▲ Button (Logger) or ▼ Button (SET) to adjust year value
3. Press Enter Button to move to next setting (Month)
4. Continue sequence: Year → Month → Date → Hour → Minute → Second
5. After setting seconds, automatically advances to next menu item

Important Notes:

- Set time accurately for proper data timestamps
- Internal clock runs continuously when batteries are good
- Clock maintains time even during power-off periods

Decimal Point Setting (dEC)

When display shows “dEC”:

1. Use ▲ or ▼ buttons to select format: • bASIC - Uses “.” as decimal point (20.6, 1000.53) • Euro - Uses “,” as decimal point (20,6, 1000,53)
2. Press Enter Button to save selection

Application:

- Affects SD card data format
- Choose based on regional Excel settings
- European Excel versions typically use comma decimal

Auto Power OFF Management (PoFF)

When display shows “PoFF”:

1. Use ▲ or ▼ buttons to select: • yES - Auto power-off enabled (conserves battery) • no - Auto power-off disabled (meter stays on)
2. Press Enter Button to save selection

Behavior:

- When enabled: Meter automatically powers off after period of inactivity
- When disabled: Meter remains on until manually powered off
- Datalogger operation overrides auto power-off

Beeper Sound Control (bEEP)

When display shows “bEEP”:

1. Use ▲ or ▼ buttons to select:
   - yES - Beeper sound enabled
   - no - Beeper sound disabled
2. Press Enter Button to save selection

Beeper Functions:

- Confirms button presses
- Indicates datalogger events
- Alerts for system functions
- Automatically muted during continuous datalogging to conserve battery

Thermometer Type Selection (tYPE)

When display shows “tYPE”:

1. Use ▲ or ▼ buttons to select:
   - K - Type K thermometer (default)
   - J - Type J thermometer
2. Press Enter Button to save selection

Thermocouple Types:

- Type K: -50°C to 1300°C range, general purpose
- Type J: -50°C to 1100°C range, iron-constantan

Temperature Unit Selection (t-CF)

When display shows “t-CF”:

1. Use ▲ or ▼ buttons to select:
   - C - Celsius (°C)
   - F - Fahrenheit (°F)
2. Press Enter Button to save selection

Display Format:

- Affects both live readings and datalogger recordings
- Temperature compensation remains accurate in both units

Sampling Time Setting (SP-t)

When display shows “SP-t”:

1. Use ▲ or ▼ buttons to select interval: • Available: 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800, 3600 seconds • 0 seconds - Manual datalogger mode
2. Press Enter Button to save selection

Considerations:
- Shorter intervals = more detailed data, faster memory usage
- Longer intervals = extended recording time, less detail
- Manual mode (0 seconds) = user-triggered data points only

SD Memory Card Format (Sd F)

When display shows “Sd F”:

1. Use ▲ or ▼ buttons to select:
   - yES - Format the SD card
   - no - Cancel format operation
2. If selecting “yES”, press Enter Button
3. Display shows “yES Enter” to confirm
4. Press Enter Button again to execute format

Warning:
- Formatting permanently erases ALL data on SD card
- Only format if necessary (new card, errors, corruption)
- Backup important data before formatting

Zero Adjustment (Built-in)

UVA/B Zero Adjustment:

1. Set meter to UVA mode
2. Cover UVA Sensor completely with UVA Sensor Cover
3. If display does not read zero, press and hold Zero Button (Logger) for 3+ seconds
4. Display adjusts to zero reading
5. Remove cover to resume measurements

UVC Zero Adjustment:

1. Set meter to UVC mode
2. Block UVC Sensor from all light sources (dark environment)
3. If display does not read zero, press and hold Zero Button for 3+ seconds
4. Display adjusts to zero reading
5. Resume normal measurement position

Professional Calibration

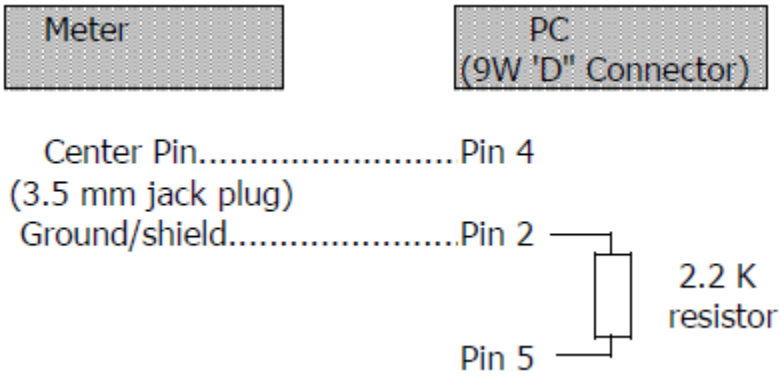
Professional calibration is recommended on an annual basis.
- Calibration performed under controlled light sources
- UVA: 365nm black light sources
- UVC: 254nm germicidal lamps
- Accuracy: ±(4% FS + 2 digits) full scale

OUTPUT OPTIONS

RS232 Interface

- Format: 9600 baud, no parity, 8 data bits, 1 stop bit
- Connection: 3.5mm terminal to PC 9-pin connector
- Cable: Optional RS232 cable (840057) , Optional USB cable (LUT-USB-01)
- Data Stream: 16-digit format for custom applications

Wiring Configuration:



Data Format:

The 16-digit data stream format:
D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Digit Definitions:

- D15: Start Word
- D14: 4 (fixed)
- D13: Data type
  (1=upper display, 2=lower display)
- D12, D11: Unit indicator
  (mW/cm² = A8, °C = 01, °F = 02)
- D10: Polarity
  (0=positive, 1=negative)
- D9: Decimal point position
  (0=none, 1-3=position from right)
- D8-D1: Display reading
  (D1=least significant, D8=most significant)
- D0: End Word

BATTERY REPLACEMENT

Low Battery Indication

Warning Signs:

- Battery symbol appears in left corner of LCD display
- Reduced display brightness
- Erratic readings or display flickering
- Datalogger function may become disabled

Steps:

1. Power off meter completely
2. Remove screws from Battery Cover
3. Remove battery cover carefully
4. Remove old batteries noting polarity orientation
5. Install 6 new AA alkaline or heavy-duty batteries ensuring correct polarity (+/- orientation)
6. Replace battery cover and secure with screws
7. Power on meter to verify operation

Battery Life:

- Normal operation (no SD card, backlight off): ~300 hours
- With SD card logging (backlight off): ~75 hours
- With backlight on: Reduce by ~15% additional consumption

Storage Recommendations:

- Remove batteries if storing meter for extended periods (>3 months)
- Store batteries separately in cool, dry location
- Check battery expiration dates before installation

Power Adapter Option

External Power:

- Input: DC 9V power adapter (optional accessory)
- Connection: DC 9V Power Adapter Input Socket
- Operation: Meter operates continuously when adapter connected • Power Button: Function disabled during adapter use

PRECAUTIONS

Operating Environment

Temperature Range:

- Operating: 0°C to 50°C (32°F to 122°F)
- Storage: -10°C to 60°C (14°F to 140°F)
- Allow temperature stabilization before critical measurements

Humidity:
- Maximum: Less than 85% RH (non-condensing)
- Avoid condensation on sensors or electronics
- Use in well-ventilated areas when possible

Sensor Care

UV Sensor Protection:
- Handle sensors carefully to avoid damage
- Avoid touching sensor surfaces directly
- Clean only with soft, lint-free cloth
- Store with sensor covers when not in use

Cosine Correction Filters:
- Filters are precisely calibrated - do not remove
- Avoid scratches or contamination
- Replace entire sensor if filter damaged

SD Card Management

Card Selection:
- Use only SD cards 1GB to 16GB capacity
- Format new cards with meter before first use
- Avoid cards formatted by other devices

Data Protection:
- Backup important data regularly
- Remove card safely (power off meter first)
- Protect cards from physical damage and extreme temperatures

Safety Considerations

UV Exposure:
- UV radiation can cause eye and skin damage
- Wear appropriate protective equipment
- Follow facility safety protocols
- Be aware of reflected UV radiation

Electrical Safety:
- Keep meter dry and clean
- Do not operate with damaged cables
- Use only specified power adapters
- Avoid exposure to strong electromagnetic fields

UV SENSOR SPECTRAL CHARACTERISTICS

UVA Sensor Specifications

Spectral Range: 250nm to 390nm
Peak Sensitivity: ~340nm
Cosine Correction: Integrated filter for accurate irradiance measurement

Spectral Response Curve:
- 200-240nm: Minimal response (0.00-0.02)
- 260-280nm: Low response (0.02-0.04)
- 300-320nm: Moderate response (0.04-0.08)
- 340-360nm: Peak response (0.08-0.10)
- 380-400nm: Declining response (0.06-0.02)
- 420-440nm: Minimal response (0.00-0.01)

UVC Sensor Specifications

Spectral Range: 200nm to 290nm
Peak Sensitivity: ~254nm
Cosine Correction: Integrated filter for accurate irradiance measurement

Spectral Response Curve:
- 200-220nm: Low response (0.00-0.02)
- 240-260nm: Peak response (0.06-0.07)
- 280-300nm: Declining response (0.04-0.01)
- 320-400nm: Minimal response (<0.01)

SPECIFICATIONS

General Specifications	
Display	52mm x 38mm LCD with green backlight, 4-digit resolution
Circuit	Custom one-chip microprocessor LSI circuit
Measurement Types	UV Light (UVAB, UVC), Type K/J thermometer
Function Selection	Push-button selection between UVAB, UVC, and temperature

UV Light Specification		
Parameter	Range 1	Range 2
Measurement Range	0.000 to 1.999 mW/cm²	0.00 to 19.99 mW/cm²
Resolution	0.001 mW/cm²	0.01 mW/cm²
Accuracy	±(4% FS + 2 digits)	

Temperature Specifications			
Sensor Type	Resolution	Range	Accuracy
Type K	0.1°C	-50.0 to 1300.0°C	±(0.2% + 0.5)°C
	0.1°F	-58.0 to 2372.0°F	±(0.2% + 1)°F
Type J	0.1°C	-50.0 to 1100.0°C	±(0.2% + 0.5)°C
	0.1°F	-58.0 to 2012.0°F	±(0.2% + 1)°F
Extended Range Accuracy:		-50.1 to -100.0°C	±(0.2% + 1)°C
		-58.1 to -148.0°F	±(0.2% + 1.8)°F

Datalogger Specifications	
Memory Type	SD memory card (1GB to 16GB)
Sampling Time	Auto: 1 second to 3600 seconds
	Manual: 0 seconds (user-triggered)
Memory Capacity	Up to 30,000 data points per file
File Format	Excel-compatible (.XLS)
Time Stamp	Year/Month/Date/Hour/Minute/Second
Position Tracking	Manual mode: 1 to 99 positions

Data Functions	
Memory Recall	Records and recalls Maximum & Minimum readings
Data Hold	Freezes display reading
Sampling Time	Approximately 1 second display update
Temperature Compensation	Automatic compensation for Type K/J thermometer

Communication Interface	
RS232	9600 baud, no parity, 8 data bits, 1 stop bit
Data Format	16-digit stream for custom applications
Optional Cables	RS232 cable (840057), USB cable (LUT-USB-01)

Environmental Specifications	
Operating Temperature	0°C to 50°C (32°F to 122°F)
Operating Humidity	Less than 85% RH (non-condensing)
Storage Temperature	-10°C to 60°C (14°F to 140°F)
RF Field Strength	<3 V/M, frequency <30 MHz

Power Specifications	
Battery Type	6 x AA alkaline or heavy-duty 1.5V
Normal Operation Consumption	~6.5 mA (without SD card, backlight off)
SD Card Logging Consumption	~30 mA (backlight off)
LCD Backlight Consumption	Additional ~16 mA when activated
External Power	DC 9V adapter (optional)

Physical Specifications		
Component	Dimensions	Weight
Main Unit	177 × 68 × 45 mm	351 g
UVA Probe Head	45 mm dia × 32 mm	100 g
UVA Probe Handle	125 × 24 mm dia	
UVC Probe	38 mm dia × 25 mm	103 g

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.

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

Please note: The most current version of the manual can always be found at www.sperdirect.com

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