

## Information Sheet

# The Preservation Environment Monitor and Climate Notebook

### THE PEM

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The Preservation Environment Monitor (PEM) is a battery-powered temperature and RH measuring device intended for use in monitoring storage and display conditions for cultural



materials. It has a number of features designed to make the job of collecting and interpreting data easier in the institutional preservation context. It is accurate and convenient to use. It has a display that can be turned off, if desired, without interrupting data collection. One of the advantages of a traditional hygrothermograph is its ability to visually scan recent conditions in a space. At the push of a button, the PEM can recall conditions to the display for up to the previous 90 days. The PEM offers a unique method of uploading stored data into a

computer; it uses a memory card that is inserted into a slot on the side of the PEM. All data in the PEM is copied to the memory card in less than 20 seconds. Each card can hold up to 16 PEMs' worth of data, depending on the size of the card. The memory card can be read by most Windows® laptop computers or by a desktop computer that is equipped with a \$150 card reader accessory. Users can have printed reports from the Climate Notebook software within minutes of collecting the data from the storage spaces. Compared to hygrothermographs or conventional dataloggers, the fast memory card upload of the PEM and the data-organizing features of Climate Notebook combine to save significant amounts of time for preservation managers.

### A Unique Feature for Preservation Use

The PEM calculates and displays, in real time, values that reflect the decay rate of organic materials stored in that location. These values, known as Preservation Index (PI) and Time-Weighted Preservation Index (TWPI), show how temperature and humidity combine to influence the rate of decay processes such as paper discoloration, dye fading, deterioration of plastics, and textile embrittlement. The PEM displays PI and TWPI values alternately with temperature and RH on a 15-second cycle. Thus, no computer is needed to immediately determine the overall quality of storage conditions with respect to the "natural aging" rate of all types of organic objects in collections.

## PEM SPECIFICATIONS

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### General

Size: 165 x 102 x 45 mm (6.5 x 4 x 1.75 in.)

Weight: 500 g (1.2 lbs.) with four batteries

Case material: ABS plastic

Operating limits: -40°C to 65°C (-40°F to 150°F)

Batteries: four (4) 9-volt lithium, 1500 mAmp

Battery life: >5 years with four lithium batteries (as received from factory) in normal operation;  
less with frequent use of History Mode or Read on Demand

### PC card requirements

128 KB to 2 MB SRAM memory

### Temperature Sensor

Type: digital thermometer (Dallas DS1620)

Range: -55°C to 125°C (-67°F to 257°F)

Accuracy:  $\pm .5^{\circ}\text{C}$  ( $1^{\circ}\text{F}$ ) across entire operating range

Resolution:  $.1^{\circ}\text{C}$  ( $.1^{\circ}\text{F}$ )

### Humidity Sensor

Type: thin film polymer capacitive sensor (HyCal IH3605A)

Range: 0% RH to 100% RH (non-condensing)

Accuracy:  $\pm 2\%$  RH; 5% to 95% across operating temperature range

### Memory

Holds one year of 30-minute readings as the average of six five-minute readings. Holds an additional five years of four-hour readings as the average of eight 30-minute readings.

## THE ADTRON ACCENT LPC CARD READER

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The Accent PC Card Reader/Writer connects to the printer port.



## SRAM 2 MB MEMORY CARD

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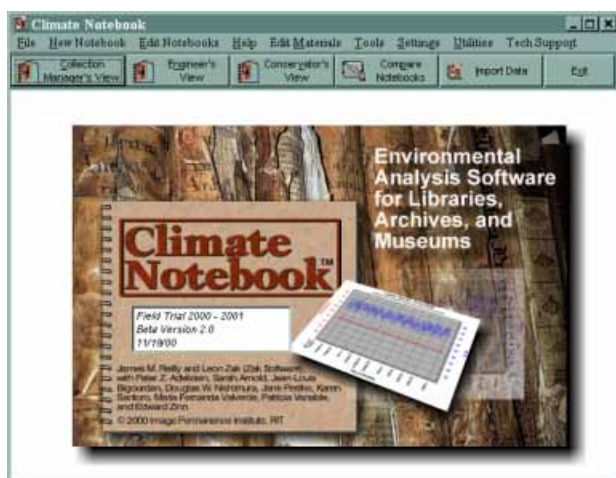


## THE CLIMATE NOTEBOOK SOFTWARE

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The Climate Notebook software is a Windows®-based application (no Mac version is currently planned) for analyzing and organizing temperature and RH data from collection storage and display spaces in cultural institutions. Climate Notebook is designed to extract useful preservation management information and report it in several different formats. It goes well beyond the capabilities of existing software, because it offers a number of generic and object-specific types of analysis that explain and document how collections are being affected by storage conditions. It is the first software to make use of the PI and TWPI concepts and the first to incorporate a prediction of the likelihood and severity of mold growth.

A unique aspect of Climate Notebook is the use of a database of environmental parameters required for safe storage of specific types of collection objects. This database contains text, pictures, and numerical limits used by the software to alert users to harmful conditions. Database records come with the program but also can be created or modified at will by users of the soft-



ware. At the moment, this database is very limited in size. It is one of the objectives of the project to enlarge it to include at least several hundred material records. Another aspect of the project is for IPI to create a Web site ([climatenotebook.org](http://climatenotebook.org)) where the database records may be searched, viewed, or downloaded for local use. Institutions that contribute modified or new database records to the password-protected Web site will retain the ability to edit or delete them over time. Climate Notebook is software aimed directly at the preservation management and institutional

management functions. It includes four different “views” into the data:

**The Engineer’s View:** Presents graphs of temperature and RH as well as the average and variation of each. This view also compares the measured conditions to pre-set target conditions. A one-page printable report can assist communication with facilities personnel.

**The Collection Manager’s View:** Presents an analysis of conditions in simple language. (“The temperature is warm,” “The RH variation is extreme,” “The mold risk is severe.”) It also presents information in numerical form. (“The TWPI is 47 Years,” “The average RH is 39%.”) This view also includes a customized list of material types found within a collection and presents preservation alerts, including one for mold, when measured environmental conditions will negatively impact those materials. The alert message includes brief information explaining the reason for the alert. A one-page printable report detailing all the related data is easily obtained for collection management records and communication within the institution. This one-page summary is available within seconds after upload with one button click.

**The Conservator’s View:** Encompasses all the information involved in the other two views, with additional details available in the graphed measurements, ranges of conditions, and material alerts. Very detailed customized scenarios for harmful conditions may be explored here.

**The Notebook Comparison View:** Allows for quick graphical and tabular comparison of data from a number of storage areas at once. This is useful for exploring similarities and differences among areas that may share air-handling systems. Presents a one-page report comparing different storage spaces, sorted by ascending or descending T, RH, TWPI, Mold Risk, or location name. This report summarizes the key performance parameters for an entire institution’s storage area

Climate Notebook can import data from a variety of devices and sources. It natively supports data from the PEM, and it also currently supports ACR™, Spectrum™, Hobo™, and Rotronic™ datalogger data. With non-PEM devices, a special import filter is used to bring data into Climate Notebook. For example, a user with ACR™ dataloggers would export the data from the ACR™ proprietary software as a text file. Climate Notebook reads that text file and then stores the data in “notebook” format on the computer’s hard drive. Import filters for other types of dataloggers are planned. Notebook files may also be stored on network drives.

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