

## ENVIRONMENTAL MONITORING

### FOR MUSEUM CURATION

#### DATA LOGGERS MONITOR TEMP, HUMIDITY, LIGHT & MORE

In museum environments, accurate and reliable data is essential for preservation purposes. In fact, many art and curative organizations will not loan their collections out unless the institution in question can prove that they have a monitoring system in place to ensure that the art is always stored in safe conditions.



Some lenders require one or more years of climate-control readings before agreeing to loan out their exhibitions. They ask for evidence of the environmental data to be submitted in the Facility Report, a document adopted by the American Alliance of Museums when applying for and receiving exhibits and loans.

A **Data Logger** is an ideal device to record environmental data and transfer the readings to your PC for later analysis. In this brief overview, CAS DataLoggers covers the basics of environmental monitoring and how it helps curators to protect their collections.

#### ***Climate Control Verification:***

Manual data collection is very time-consuming, and retrieving the data can be difficult due to all the individual records. In particular, Temperature and Relative Humidity (RH) must be closely controlled and kept at suitable levels (generally a temperature of **68° to 72°F**, and RH of **50%** with +/- 5% fluctuation). Warmer temperatures can cause heat damage to certain objects, and high RH levels can lead to mold formation and cause objects to corrode, warp, crack or cockle.

Fragile paintings and other artwork also need to be protected against excessive illumination and ultraviolet light. Through automated monitoring, facilities can ensure that their protective measures (such as UV light filters and tinted panels) are fully effective.

Another key challenge is balancing the optimal conditions for preservation *and* those for occupant comfort. Data loggers are also useful to verify an internal climate-control computer system.

### ***Transporting Artwork:***

Temperature and humidity alarm systems are commonly used in libraries, archives and document storage rooms and for transporting these valuable assets between facilities. Pieces in transport require a compact, lightweight solution to record all the necessary environmental parameters.

All data is timestamped to show users the effectiveness of their climate control systems and other preventative measures.

## **What Should You Monitor?**

Common parameters of interest in museum applications include:

- Temperature
- Humidity
- Visible (Illuminance) and Ultraviolet light (UV levels)

Environmental dataloggers track and alarm temperature, humidity, and illuminance/UV light to protect artwork and other installations in galleries and historical sites. These values can all be monitored at high accuracy. Turnkey solutions are also available to save users from the hassle and cost of installing a wired system.

Whether you need a simple single-channel unit to log temperature or a multi-channel system to log several temperature inputs and other parameters at the same time, you can find a data logger to meet your exact needs.



## **How to Monitor Temperature:**

If you know in advance what temperature sensor type you'll be using, you can significantly lower your cost--for example some specialty data loggers are designed to take data only from thermocouple probes.

The same goes for sampling rates; most museums don't need an expensive device that takes a reading every 10 seconds when one reading every minute will be just as good of a warning of rising temperatures. You'll also have less data to comb through for regulatory compliance.

Many temperature dataloggers come equipped with their own internal sensors, so you don't have to purchase and connect any sensors. This is ideal when you just need a quick solution, say for monitoring temperature in a single room.

## **How to Monitor Humidity:**

Humidity is an important parameter to track when you're storing materials such as metals and paper products. Rot and rust are common results in facilities that neglect high humidity levels. As with temperature sensor placement, be sure you have enough sensors to give good coverage of the goods or room you're monitoring.

Specific models of data loggers measure relative humidity (RH) in the surrounding area up to a certain range. For example one model might measure from 10% to 95% RH while another can record 5% to 95% RH. For many applications the given range may be enough, but when storing certain materials you'll want to be sure.

Many of these models record data using their own internal sensors, while others allow you to attach external sensors. High-accuracy models are also available.

## **How to Monitor Light Levels:**

Many dataloggers use sensors that simultaneously measure and record illuminance/UV intensity. Some devices also calculate the cumulative illuminance and cumulative amount of UV light during recording sessions, which can be viewed without stopping recording.

For example, wide-ranged illuminance measurements can range from 0 to 130,000 lx, while UV range can be from 0 - 30 mw/cm<sup>2</sup>.

## Going Wireless:

Because of the sheer size of some exhibit areas, it can be extremely difficult to install a wired system. **Wireless monitoring systems** are ideal for museum interiors to verify that exhibits are in a controlled and non-damaging environment. Popular communication options include WiFi, Bluetooth, Cellular, and more. Additionally, many of today's networked wireless WiFi versions can instantly send all data online onto a cloud server for real-time monitoring and archiving.



Typically wireless systems consist of Remote Wireless Units which automatically monitor storage conditions and transmit all their temperature data and alarms online. They in turn send their data to a Wireless Gateway, which send it to an office PC or mobile device.

The choice of whether to go wireless or wired depends on several factors including your facility's network, the physical layout, wireless range, and where the dataloggers will be installed. A wireless setup saves personnel the cost of installing wiring and the hassle of running lengths of cables through the building.

Wireless systems are ideal when:

- You need to monitor a number of distributed points or floors;
- It's difficult or expensive to run wires from these points back to a central location;
- Data needs to be collected and transmitted from a vehicle while it is in motion;
- Data and/or alarms need to be collected from a site that is difficult to access or doesn't have regular internet connectivity.

## Wireless range:

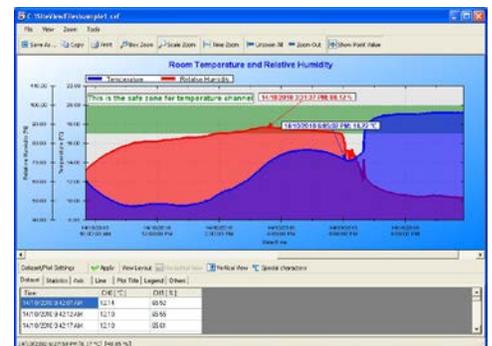
Wireless devices can be deployed in hard-to-access locations if necessary, including storage areas and inside display cases, giving personnel easy access to the data using mobile devices.

For example, **Bluetooth Smart** technology enables curators to download the readings wirelessly from up to 100 feet away with just a smart phone or tablet. Historical data and real-time data are equally accessible.

## Logging Unattended With Standalone Devices:

If your exhibit areas or storage areas have multiple walls or obstructions, then you may want a wired or standalone solution instead. Standalone dataloggers perform unattended temperature monitoring completely independent of a PC. These are most commonly **USB data loggers** which can be set to record on their own. Simple, direct USB connection enables users to quickly and easily download each datalogger's data directly to a PC via the USB cable.

These devices commonly feature alarming capability notifying you the moment that your values go out of specification in a variety of ways including text warnings, emails, LED status lights and more.



**FTP (File Transfer Protocol)** is another popular way to download recorded data and current readings from remote units. For example this can be a warning report mail containing alarm details sent out to 4 specified addresses.

## Who Gets Alarms and How?

**Alarm generation** is one of the most important factors to consider: do you want a datalogger that indicates an alarm by LED, or do you need the system to send out email warnings? Many data logger models support several alarm capabilities so you can choose how you want to receive alerts, such as on your mobile device.

All considered, the most effective alarm type is the one you're sure will go to the right people and be immediately acted upon.

**Analysis software:**

Typical software capabilities include:

- Configuring and naming sensors
- Automatically updating site data to a datafile or database
- Sending alarms via email or text message if any channel inputs go outside of safe limits
- Generating reports presenting the data

Users can track readings by room to get a highly accurate environmental profile to aid long-term preservation. For example, today's software allows users to color-code areas such as room and walls, so you can focus on a length of wall in green or the ambient temperature of a room in blue. This way all data collected is made as meaningful as possible to the museum.

**Contact Information:**

CAS DataLoggers, Inc.  
8437 Mayfield Rd, Unit 104  
Chesterland, Ohio 44026  
(440) 729-2570  
(800) 956-4437  
sales@dataloggerinc.com  
[www.dataloggerinc.com](http://www.dataloggerinc.com)