

White Paper:

## How Important is Your Temperature & Humidity Data? *Only as important as your critical product and processes.*

In Life Science facilities, Metrology/Calibration labs and Electronics manufacturing environments, temperature and humidity often need to be displayed for monitoring and alarmed 24/7 to safeguard products and processes. In monitored environments, reporting on real-time data to ensure conditions are "in-spec" is critical.

In cases where certain personnel are accountable for ensuring temperature or humidity remain within appropriate parameters; an alarm notification is also necessary to ensure people aren't chained to a PC that is displaying current readings. Ideally, the alarm system should come to where you are; pagers, email and cell phones should all be able to relay an alert.

Additionally, historical records, which are easily compiled and stored, are requisite for quality reviews and audits, as well as meeting regulatory and accreditation requisites. Ensuring that this data is free of gaps can be a challenge when most systems are both power and network dependant. If there is a power outage, the data will not be collected; likewise, if your Network fails temporarily.

Although most buildings are equipped with centralized systems for heating and air conditioning, most of these systems can't fulfill accurate, industry-specific monitoring, recording and reporting requirements. Depending on the needs of the application, the choices come down to one or more of three methods: Manual pen-and-paper systems, chart recorders, or a secondary centralized hard-wired system.

Each of these methods offers various advantages and disadvantages that depend on how they are being used. Consequently, facility managers often have to make difficult compromises to get the temperature monitoring system that fits both their needs and their budget.

While systems that are based on a network or mechanical devices like chart recorders come with the inherent risks of lost and inaccurate data, it is possible to assemble a monitoring system that combines all the advantages of other methods with none of the downsides. Such a system would take all the elements of a centralized monitoring system that save time and money, while sacrificing nothing in terms of accuracy or data integrity.

In order to understand the benefits and risks of each monitoring and alarm method, it will be helpful to look at each method separately.

## Traditional Monitoring & Data Collection Methods

### ***The Simplest System: Manual Data Collection***

Surprisingly, manual humidity and temperature data collection methods are still in wide use today. Manual collection involves one or more operators recording initialed readings on a regular basis from a fixed read-out device (such as a digital thermometer or hygrometer). These readings are usually entered on a prominently displayed chart next to the area of interest, such as a refrigerator, freezer, or chamber. Recording temperature and humidity readings in this manner has some obvious advantages; there is minimal equipment to purchase and there is next to nothing to maintain.

However, manual systems are inherently time-consuming to operate and error prone, making them unsuitable for most critical environments. One hospital estimated labor costs of 3,000 hours per year were taken up performing routine checks on monitored environments. Typically, the personnel required to manually record temperature were nurses concurrently tasked with patient care. The same hospital frequently had to deal with missing data that impacted their need to meet regulatory requirements. Worse: critical products were at risk because of an unreliable, error-prone system.

When the system was audited, it was found that the risks to product increased during off-hours, when limited resources resulted in missed temperature checks. Problems could easily go undetected for days, resulting in serious damage or loss.

### ***One Step Up: Chart Recorders***

Chart recorders are one of the most popular ways to automatically collect and locally display data. They record and display operating data on paper charts which are then changed regularly and archived, usually on a weekly basis. Chart recorders are relatively easy to deploy, power wiring is usually all that's required and they have often been included as a built-in feature of various equipment. Although expensive, chart recorders are simple to operate and provide local display of real-time and short-term historical data. Many of the issues with manual collection are eliminated by chart recorders.

But for all their advantages, chart recorders are still dependent on manual processes to function properly. Charts and pens must be changed regularly or else valuable information is lost. Being mechanical devices, they cannot provide the kind of measurement accuracy that critical monitored environments require. Chart recorders are prone to periodic mechanical failures and require frequent re-calibration. In addition, in today's increasingly networked world, the inherent inability of chart recorders is quickly making them obsolete. Isolated devices that cannot be monitored remotely or access a variety of communications vehicles (email, pagers, cells) make retrieving data—required when the auditors arrive—a time-consuming and tedious process.

## ***Wired Back to a Central Location: CM Systems***

Centralized monitoring (CM) systems for temperature and humidity consist of a network of remote sensors that are literally wired back to distributed or centralized input panels. Not to be confused with Building Automation Systems, a CM system is an auxiliary system tailored to the specific monitoring and reporting requirements of a particular industry.

CM systems offer many advantages including remote temperature monitoring, alarming, and reporting. By avoiding the need for manual data collection and chart replacement, such systems are a significant time-saving alternative to chart recorders and manual methods.

The main drawback to these systems is that they are costly, vulnerable to system-wide failures and limited in their ability to display localized information. A typical CM system requires expensive data acquisition equipment as well as a proprietary hard-wired network. Installation and wiring costs can often be prohibitive, particularly in older buildings. The large capital expense of such systems can also lead to a protracted budget approval process.

Centralized systems are also prone to global failures that can result in missed records and unreliable reporting. For example, system viruses, computer crashes, network failures, power outages, or operator errors can interrupt the data collection process throughout the whole system.

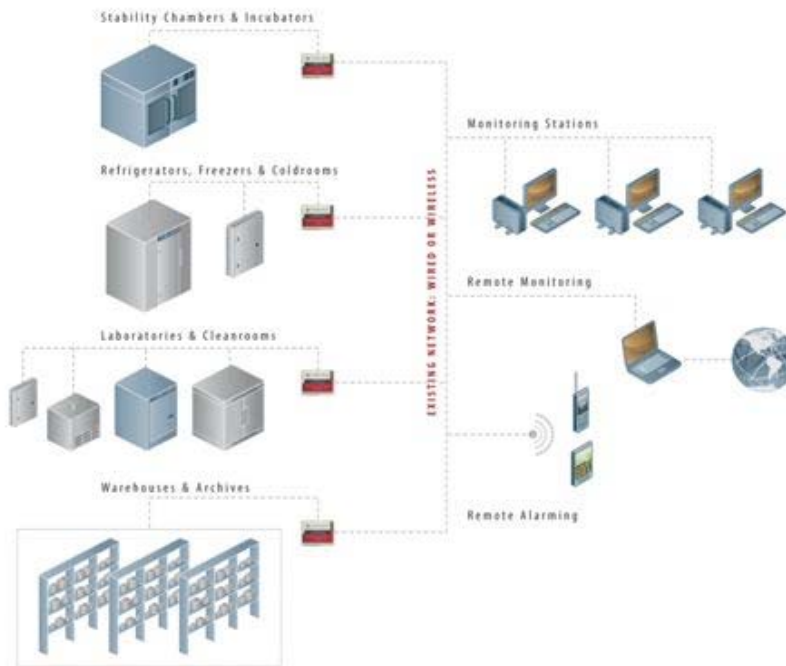
An oft overlooked issue with CM systems is their inability to display data on a localized basis, a key requirement in many industries. Instead, data can only be viewed or retrieved at one central location.

## ***Combining Traits: A Hybridized Solution***

Veriteq Instruments developed a monitoring system based on networking their standalone data loggers, essentially creating small satellite sensing, recording, and archiving units that connect via (but function independently of) an intranet. The system's software, trade named viewLinc, connects to Veriteq's data loggers, each equipped with an ultra-stable thermistor, a 10-year battery life, and on-board memory that never runs out. Temperature and/or humidity is therefore recorded autonomously and displayed remotely.

Along with integrated temperature or temperature/humidity sensors, memory, clock, and the lithium battery, viewLinc sends an alarm via email, pager or cell phone as soon as out of spec conditions occur. The loggers interface to an existing network either through a computer on the network or through a device server.

Fig 1. Hybrid monitoring systems: *in situ* monitoring and data archiving with remote display & alarm



The system combines the standalone, application-specific, *in situ* monitoring traits of chart recorders, (minus the vulnerability to power outages) and the CM system's ability to monitor remotely.

One of the key differences in the hybridized viewLinc system from a conventional CM system is that they employ a highly distributed architecture. The collected data from each logger is accessible, both on an historical and real-time basis, which allows for centralized monitoring and 24/7 alarming. In addition, this architecture makes a hybridized system, exceptionally easy to install, scalable, reliable and cost-effective. Simply place the loggers, download the software, and begin.

### ***viewLinc: Easy, Scalable & Smart***

A key advantage found by users of the viewLinc system is how easily, quickly, and inexpensively the data loggers can be deployed and later expanded as required. Personnel in a variety of environments—from Metrological labs, to clinical research environments, found that it was a simple matter to start small and expand on the system as needed, avoiding the delay of having a large capital expenditure approved.

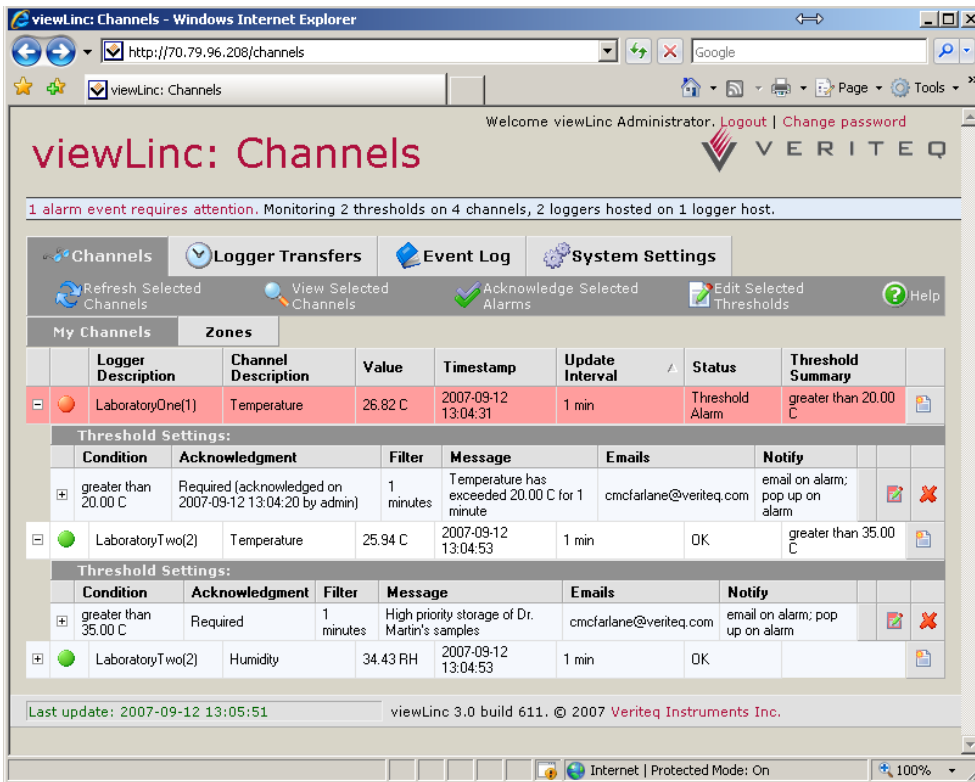


Fig. 2 On-screen interface to control settings for monitoring unlimited points. Can be displayed on one host PC only, or numerous.

As of 2008, Veriteq added an OPC server to their software suite, further leveraging their systems for users who wanted to use Veriteq data loggers to almost any other Windows-based monitoring system.

The system is easily scalable according to user requirements, from a single data logger and workstation location to a system of an unlimited number of data loggers and multiple monitoring stations. Thanks to the flexibility of hybridized systems: Veriteq's data loggers can be easily relocated or, in some cases, used for an entirely different application, such as thermal validation.  
Centralized vs Distributed Monitoring & Alarming

### ***Safeguarding Data Without Compromising Accuracy***

With the viewLinc system users set up automatic regular downloads of data logger information to one or more central locations. This data then is safely archived and accessible and can be used to create detailed reports on demand.

After installing the system, users found that ease-of-use, reliability, scalability, and network accessibility were the key factors reduced costs in time, energy, as well as protected product and processes. Without the usual compromises of high initial costs, high operating costs, time-consuming implementation schedules, and limited functionality, all viewLinc users have found the system paid for itself within the 1<sup>st</sup>

year of purchase. In some cases, one power outage, and the product saved by the alarm system, was enough to more than justify the cost of the system.

For more information on viewLinc monitoring please contact: [info@veriteq.com](mailto:info@veriteq.com) or 1-800-273-2874 or visit Veriteq Instruments at [www.veriteq.com](http://www.veriteq.com)