

## 4 Pillars of Laboratory Equipment Monitoring

### Improving your lab's efficiency and data quality doesn't have to be difficult or costly

Internet of Things (IoT) technology is changing the way scientists collect and utilize data. By monitoring instrument and equipment status as well as the laboratory environment, scientists are able to better understand physical variables in the lab that may affect their research.

When considering a laboratory monitoring system, there are a number of variables to consider.

#### 1. Monitoring Should Be Reliable and Convenient

Critical to the success of any lab monitoring system is its usability. For any monitoring system to be remotely useful, data must be easy to access and readily available 24/7 to teams both on-site and to those working remotely. Preference should be given to products with intuitive designs and shared web-based dashboards that enable users to track the performance of critical instruments and equipment, to understand usage patterns to optimize operations, and to quickly identify potential issues that may arise.

For many labs, change is inevitable, and flexibility is the key to success. Having the capacity to adapt quickly and easily to accommodate future projects is a necessary consideration for most lab managers. For this reason, equipment monitoring solutions should be scalable both user-wise and equipment-wise. Wireless and battery operated monitoring devices offer the easiest installation solution for laboratory monitoring, and when equipped with low-battery warnings and cellular backups they offer 24/7 operation with full confidence that data will always be available.

#### 2. Compliance Is Critical

Regardless of which quality system a lab is required to follow, be it GLP, GMP, ISO or CFR QSR, adopting a laboratory monitoring system will facilitate meeting the requirements for detailed, thorough recordkeeping. Capturing time-stamped electronic data of test parameters will increase the efficiency of the lab while eliminating the likelihood of human error. Beyond compliance, captured data can be further utilized to drive process changes and optimize laboratory operations.

For labs that fall under the jurisdiction of FDA compliance, 21 CFR Part 11 specifies requirements for electronic data collection and storage to ensure that the data collected are trustworthy, reliable, and equivalent to paper records. FDA regulated labs require solutions that offer complete audit trails. Events such as user logins and changes to key parameters that may affect process outcomes must be tracked. The lab monitoring system must also include user management and data security features such that only authorized users may access the system, that data measurements are uneditable, and that event details are time stamped to ensure data integrity.

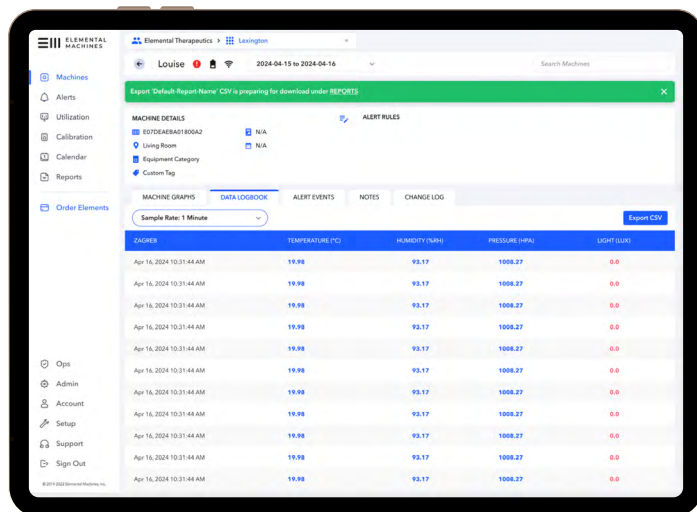


Data can be utilized to drive process change and optimize laboratory operations

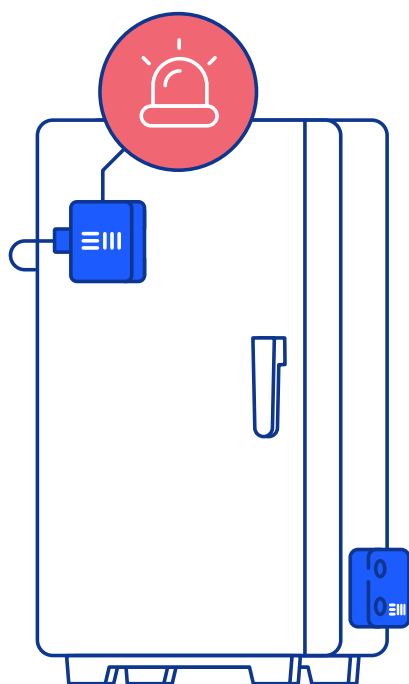


### 3. Improve Your Data Integrity

Lack of repeatability and reproducibility of results is a common problem for many researchers. The inability to confidently repeat protocols and achieve identical outcomes results in enormous amounts of wasted time for scientists and delays in research progress. Much of the problem surrounding irreproducibility of data lies in a lack of information and insights into how ambient conditions can influence experiments. Fortunately, advanced laboratory monitoring systems are a simple remedy to the problem. By reviewing data for equipment status and ambient conditions, researchers are able to rapidly identify issues contributing to experimental variability and rule out those factors that are not actually affecting experimental results. Furthermore, researchers are able to refine protocols by specifying optimized environmental and instrument parameters to achieve the desired results.



Collected data help scientists identify problems and refine processes



Automated alerts mitigate risk of critical loss of materials or specimens

### 4. Manage Risk and Save Money

Cost savings are often at the core of managing any laboratory budget. By utilizing a laboratory monitoring system, lab managers can avoid the time-consuming expense of facility walk-throughs and paper-based recording processes. Automated email and/or SMS alerts of instrument failures can prevent loss of valuable, and often irreplaceable, laboratory materials and specimens. Finally, equipment utilization data can offer insights on equipment usage patterns and influence purchasing decisions regarding capital expenditures.

Connect With Us

### About Elemental Machines

Elemental Machines' Intelligent Operations Platform leverages the best of Internet of Things (IoT) technology and custom hardware/software solutions, delivering actionable insights to operators in life sciences, biopharma labs, biobanks, analytical labs, and manufacturing facilities. By connecting the physical and digital worlds, the platform simplifies, optimizes, and augments operations. Leaders in science, facilities, and technology trust Elemental Machines' ecosystem for insights that accelerate innovation, predict outcomes, and shift from reactive to proactive management. With scalable solutions from incubator to enterprise, custom integrations to fit each operation's unique needs, and a wide ecosystem of partnerships, Elemental Machines ensures operational excellence and the future-proofing of lab and manufacturing processes.