High-Performance LXI DAQ System Vital for Blood Storage

VTI Instruments

Blood banks around the world collect and store large volumes of blood and its components for use by hospitals and other medial care facilities. Because the handling and storage of blood is highly regulated by government and international standards, storage equipment must be properly tested and certified before it can be used.

BloodSource, a non-profit company located in Northern California, has been serving the medical community and delivering blood to patients in need for over 60 years. This blood center collects, tests, and processes blood from its volunteer donors. BloodSource now supplies blood to 40 hospitals in 25 counties in Northern and Central California.

Each day, BloodSource strives to collect some extra blood (and its components) to prevent shortages that may delay or cancel scheduled surgeries at local hospitals. The surplus also gives BloodSource the flexibility in inventory management to ship blood products across the U.S. to other blood centers short on supply.

The Challenge: Keeping it Cold and Constant

BloodSource's 1,848-square-foot storage facilities must be kept at a cold, constant temperature to maintain product freshness, potency and purity. The FDA and the American Association of Blood Banks enforce strict guidelines for blood storage and perform audits to ensure that the regulations are being followed. Additionally, BloodSource has a quality control team that regularly inspects and tests storage containers.

BloodSource storage chamber

The storage containers are constantly monitored using a system comprised of a PC-based program, computers (nodes), and temperature probes. If a probe detects a temperature that is outside the acceptable range, an alarm will notify staff members who can troubleshoot the problem with the storage container or transport the blood products to another suitable container.

Whole blood must be refrigerated at 1–6 °C while plasma is typically stored at -30 °C. Platelets must be stored at room temperature (20–24 °C). For long-term storage, most blood components must be frozen at temperatures between -40 °C and -20 °C.

BloodSource wanted to expand its storage facilities by adding three new coolers and three new freezers ranging in size from 400 to 3,200 cubic feet. The temperature of the coolers could only vary ±1 °C throughout while the freezers could fluctuate ±2 °C.

The Solution: High-Density DAQ System with COTS Support

BloodSource commissioned All Temp Engineering, an engineering/service group that specializes in providing and maintaining thermal environments, to build and test the new storage chambers. All Temp Engineering partnered with m+p international to design the new temperature monitoring system for the new coolers and freezers.

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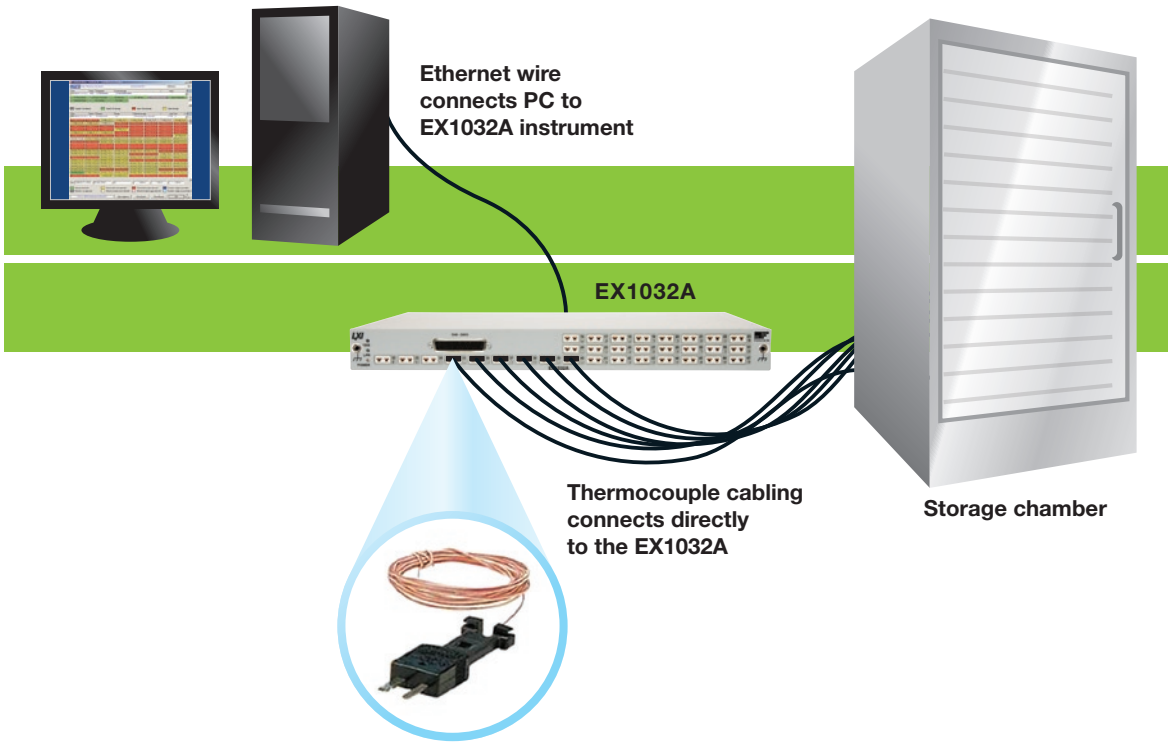
The new measurement system consists of m+p's Coda (**Co**ntinuous **D**ata **A**cquisition) software and two of VTI's EX1032A precision thermocouple/voltage measurement instruments. The LXI-based EX1032A is a low-cost hardware solution that offers precise high-density measurements in a small footprint. The two EX1032As combined offer 96 channels in 19" x 3.5" (2 units) of rack space.

Each EX1032A allows the user to measure up to 32 points of temperature and 16 points of voltage in the storage room. This large number of temperature points allows slight variations in room temperature to be identified quickly. Voltage measurements increase safety by monitoring the performance of circulation fans and making sure that the entrance door has been closed.

CODA alarm screenshot

The high accuracy of the EX1032A was needed to minimize the uncertainty of the temperature measurements, allowing for fewer channels. Open transducer indicator LEDs provide an additional level of confidence and improve system troubleshooting. If a thermocouple goes into an open condition, the built-in OTD detection is used to notify the staff to immediately repair/replace that channel.

CODA provides a comprehensive alarm capability, which increases user confidence in the system and reduces the amount of operator oversight. When an alarm condition is met, CODA not only displays the alarm condition and notifies the operator, but the time and duration of the out-of-tolerance condition are fully logged. In fact, all user interaction is logged and available for analysis.



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The new monitoring system was an especially attractive solution for BloodSource because the hardware and software is COTS and readily available without customization, making it easy to support. The new system also enables users to monitor multiple locations at the same time without waiting to start the validation process. Because of this flexibility, testing/validation of the new storage chambers was completed in only 12 days, instead of 24.

Due to the success of the newly added storage chambers, BloodSource is considering replacing the smaller, older monitoring systems with additional EX1032A instruments to create one centralized system for the entire facility.

About VTI Instruments Corporation

VTI Instruments delivers precision instrumentation for electronic signal distribution, data acquisition, and monitoring. The company continues to lead in the development of open standards for test and measurement along with scalable, modular products that maximize performance in a small footprint. With nearly two decades of experience primarily in the aerospace, defense, and energy and power generation markets, VTI helps customers maintain a competitive edge and preserve the integrity of their brand.