

Temperature Uniformity Monitoring: Biotech

Challenge

Help a leading biotechnology company measure and evaluate the temperature uniformity of freeze-dryers from a number of suppliers, allowing them to select the product with the best performance and to improve their processes.

Solution

Use Data Translation's portable and high-accuracy DT9871 TEMPpoint instrument and ready-to-measure software to measure up to 48 thermocouples at different locations within a freeze-dryer

Results

- The DT9871 TEMPpoint instrument reduced start-up time by providing a small, portable instrument capable of measuring up to 48 thermocouples with free, easy-to-use software.
- High-accuracy measurements allowed precise characterization of temperature uniformity for evaluating freeze-dryer performance, allowing the customer to select the best performing product.
- The customer was able to improve their process for developing and monitoring biological therapies.

Biotechnology companies continue to revolutionize disease treatment options. Many of today's leading-edge biotech therapeutics require freeze drying for storage and transportation. To ensure uniform sample preservation, process yield, and sample integrity, it is critical that manufacturers measure the temperature uniformity of their freeze-drying systems to ensure best performance..



Challenge

A leading biotechnology company needed to evaluate freeze-dryers from a number of suppliers to select the best performing product for use in their processes to develop/monitor biological therapies. Temperature uniformity was considered the key indicator of product performance. Since monitoring temperature uniformity requires measurements from dozens of locations within a controlled environment, the customer needed an instrument capable of measuring up to 48 T-type thermocouples (with very small wire gauges) within a freeze-dryer. Additionally, the customer needed a portable laptop system, capable of being transported easily and set up quickly at supplier site.

Solution

Typically, lower-cost temperature instruments, designed for ease-of-use, provided only one or two channels – hardly enough to monitor temperature uniformity. These instruments also often lacked the accuracy required for precise measurements as well as the ability to record temperatures over time. Temperature instruments with sufficient channel count, however, were often very large, cumbersome to use, expensive, inaccurate, or all of the above.

The TEMPpoint instrument proved to be an excellent choice for this application by providing a cost-effective solution with the following key benefits:

Easy to Use

TEMPpoint includes:

- A ready-to-measure application that displays temperature and logs data to disk.
- Easy-access jacks for connecting thermocouples.
- A standard USB connector and cable for connecting to a laptop.
- Small, rugged enclosure making it easy to transport and ship.



High-Accuracy

TEMPpoint provides:

- Up to 48 separate thermocouple inputs - mix and match B, E, J, K, N, R, S, and/or T thermocouples as well as voltage inputs.
- No multiplexing and 1000 V galvanic isolation to eliminate cross-talk.
- 24-bit Delta-Sigma A/D converters for the highest resolution (1 part in 16 million).
- An A/D converter for each channel.
- A CJC for each channel to make TEMPpoint more accurate and more immune to temperature variations both inside and outside the instrument.
- Built-in anti-aliasing filters to reject 50 Hz and 60 Hz power line frequencies.
- 150 dB common-mode rejection.

Robust

- TEMPpoint was designed with robustness from component-selection up, including:
- 48 parallel instrument architecture for component redundancy.
- 1000 V isolation to protect the instrument from the environment.



Results

- **The DT9871 TEMPpoint instrument reduced start-up time** by providing a small, portable instrument capable of measuring up to 48 thermocouples with free, easy-to-use software.

The customer took the TEMPpoint instrument to a number of freeze-dryer suppliers to evaluate temperature uniformity. TEMPpoint's ease-of-use and small size made it possible to measure and evaluate temperature uniformity at the supplier site with minimal start-up time. The customer loved the resolution and the graphical representation of the measurements provided by the ready-to-measure application shipped with the TEMPpoint instrument.

- **High-accuracy measurements allowed precise characterization of temperature uniformity** for evaluating freeze-dryer performance, allowing the customer to select the best performing product.

The accuracy of TEMPpoint gave everyone confidence in the measured results. Remarkably, the supplier with the best temperature uniformity specifications had the worst measured performance! As a result, the customer was able to make a purchasing decision based on product performance rather than on specifications alone.

- **The customer was able to improve their process for developing and monitoring biological therapies.**

TEMPpoint allowed the customer to monitor temperature measurements directly; this gave them direct information about the freeze-drying process and information about the uniformity of conditions in the freeze-dryer. As a result, the customer was able to optimize their process more quickly, which reduced process development time and expense.

Products Used

DT9871 USB TEMPpoint instrument

Ready-to-Measure TEMPpoint application