

## Cold storage

## Reduce costs, while continuing to safeguard samples, by raising the setpoint for ULT freezers from $-80^{\circ}\text{C}$ to $-70^{\circ}\text{C}$

One way researchers can fortify efforts toward more sustainable energy efficiency is by evaluating the setpoints of their ultra-low temperature (ULT) freezers. These freezers help maintain an extremely low temperature environment for valuable samples and, in the process, may consume high amounts of energy. By raising the temperature from  $-80^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$ , there is potential for energy savings, and a technologically advanced refrigeration system will not need to work as hard to achieve the slightly less stringent cold requirement.

Still, these extreme temperatures serve an important purpose, which is to slow down molecular and cellular processes of biological samples preserving their viability for future analysis. Most purified nucleic acids can safely be stored at  $-20^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$  with the same being said for bacteria and viruses. It is vital that the stability of proteins and enzymes be assessed for each study and monitored before using higher temperatures for optimal long-term storage [1]. Characterizing the quality of other biological samples, such as isolated blood cells and tissues, should similarly be examined.

Therefore, the decision to raise the long-term storage temperature of a ULT freezer depends on the sample type and needs of the laboratory. Changing the setting from  $-80^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$  can have several benefits, both in terms of less energy consumption and storage of biorepository samples [2]. Knowing what type of sample is being collected, including storage durations and expected usage, will help you make the most operationally effective decision. Making a setpoint adjustment is just one part of reducing costs and keeping high-performing equipment tuned to the needs of your workflow.

## Save even more energy with a TSX Universal Series ULT Freezer at $-70^{\circ}\text{C}$

Thermo Scientific™ TSX Universal Series ULT freezers are designed to provide sample protection and energy savings with features and benefits that support environmental sustainability.



### Save more energy at a $-70^{\circ}\text{C}$ setpoint

While conventional-refrigerant ULT freezers can run up to 18 kWh/day in energy usage, TSX Universal freezers offer savings of up to 54%. And, by switching from a  $-80^{\circ}\text{C}$  to  $-70^{\circ}\text{C}$  setpoint, you can save an additional 34–37% in energy:\*

- TSX70086FA at  $-80^{\circ}\text{C}$  = 8.2 kWh/day; at  $-70^{\circ}\text{C}$  = 5.4 kWh/day.  
**An additional savings of 34%.**
- TSX60086A at  $-80^{\circ}\text{C}$  = 7.9 kWh/day; at  $-70^{\circ}\text{C}$  = 5.1 kWh/day.  
**An additional savings of 35%.**
- TSX50086FA at  $-80^{\circ}\text{C}$  = 7.8 kWh/day; at  $-70^{\circ}\text{C}$  = 5.0 kWh/day.  
**An additional savings of 36%.**
- TSX40086A at  $-80^{\circ}\text{C}$  = 7.8 kWh/day; at  $-70^{\circ}\text{C}$  = 4.9 kWh/day.  
**An additional savings of 37%.**

### Design features to support sustainability

- Variable-speed compressor (V-Drive) technology is designed to continually adapt to a lab's environment, offering significant energy savings without compromising sample protection.
- Natural, hydrocarbon refrigerants provide a lower environmental impact and provide higher cooling efficiency.
- Water-blown foam insulation eliminates refrigerant outgassing, which is common in other foam products.
- All TSX Universal ULT freezers are manufactured in a Zero Waste to Landfill facility (93% recycling, 7% waste to energy).

### Conclusion

Running a TSX Universal Series ULT Freezer at  $-70^{\circ}\text{C}$ , when samples allow, can help reduce energy usage while continuing to safeguard the integrity of your samples.

\* Based on internal performance data at  $-70^{\circ}\text{C}$  setpoint. Data on file, January 2024.

### References

1. Hubel A et al. (2014) Storage of human biospecimens: selection of the optimal storage temperature. *Biopreserv Biobank* 12(3):165–175. doi: [10.1089/bio.2013.0084](https://doi.org/10.1089/bio.2013.0084)
2. My Green Lab.  $-70$  is the new  $-80$ . <https://www.mygreenlab.org/-70-is-the-new--80.html>. Accessed January 2024.

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