Liquid-Helium Ultra-Low Temperature Tribometer

Closed-Loop Liquid Helium Precision
for the Quantum Frontier

Rtec instruments

ACCREDITED
MSCB-132
Certified ISO 9001:2015

Pushing the Limits
of Cryogenic Tribology

Understanding friction, wear, hardness, and scratch resistance at ultra-low temperatures is critical for next-generation technologies—from superconducting materials to quantum devices and space exploration systems. Yet traditional cryogenic tribometers are constrained by helium consumption, unstable temperatures, and limited measurement fidelity.

Zero Helium Consumption. Zero Compromise.

This breakthrough design enables long-duration experiments at ultra-low temperatures without interruption—something open-loop systems simply cannot achieve.

The Rtec Liquid-Helium Ultra-Low Temperature Tribometer is engineered to deliver:

- Unparalleled Thermal Stability
- Precision Temperature Control
- Experimental Reliability

A fully closed-loop liquid helium circulation architecture.

- ✓ Helium is fully contained and continuously recirculated
- ✓ No helium loss
- ✓ No refilling required
- ✓ Eliminates supply risks, operating costs, and downtime

Unmatched Ultra-Low Temperature Performance **Measured & Proven**

Every performance metric is validated by real measurement data, not theoretical estimates.

- Base Temperature: **Down to 3.5 K**
- Pre-cool to 100 K: **~1.5 hours**
- Reach 10 K at sample surface: **< 5 hours**
- **Real-time surface temperature feedback** ensures experimental accuracy where it matters most
- **Integrated Mechanical Characterization** of micro and macro hardness, scratch, friction, and wear testing at extreme cryogenic temperatures

Precision at the Quantum Frontier

Designed for the most demanding research environments

Closed-Loop Down Force Control - Nano, Micro, Macro Range

Patented capacitive sensors with a test range from mN to 200 N.

Nanometer-Level Vibration Isolation

Ensures exceptionally low mechanical noise at the contact interface for ultra-sensitive measurements.

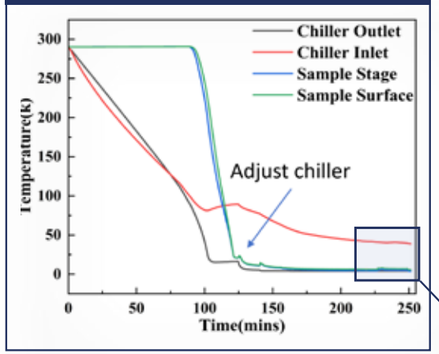
Exceptional Thermal Stability

Maintain precise temperature control over hours or days of operation.

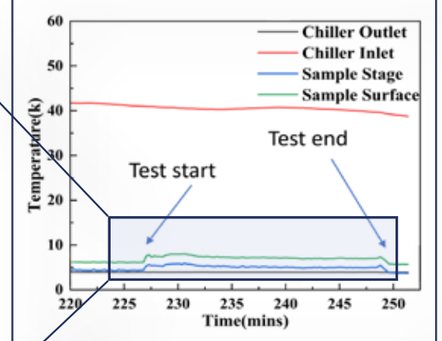
Data You Can Trust
at Cryogenic Extremes

Understanding tribological behavior at ultra-low temperatures requires precise knowledge of temperature at every critical point. The Rtec Liquid-Helium Ultra-Low Temperature Tribometer continuously records temperature data throughout the cooling process and steady-state operation, providing complete visibility into system performance.

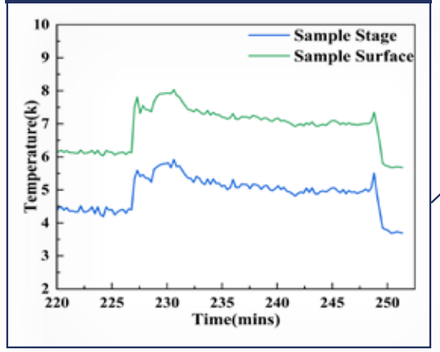
Rapid and Controlled Cooldown from Ambient Conditions



Stable Control Throughout Extended Test Cycles



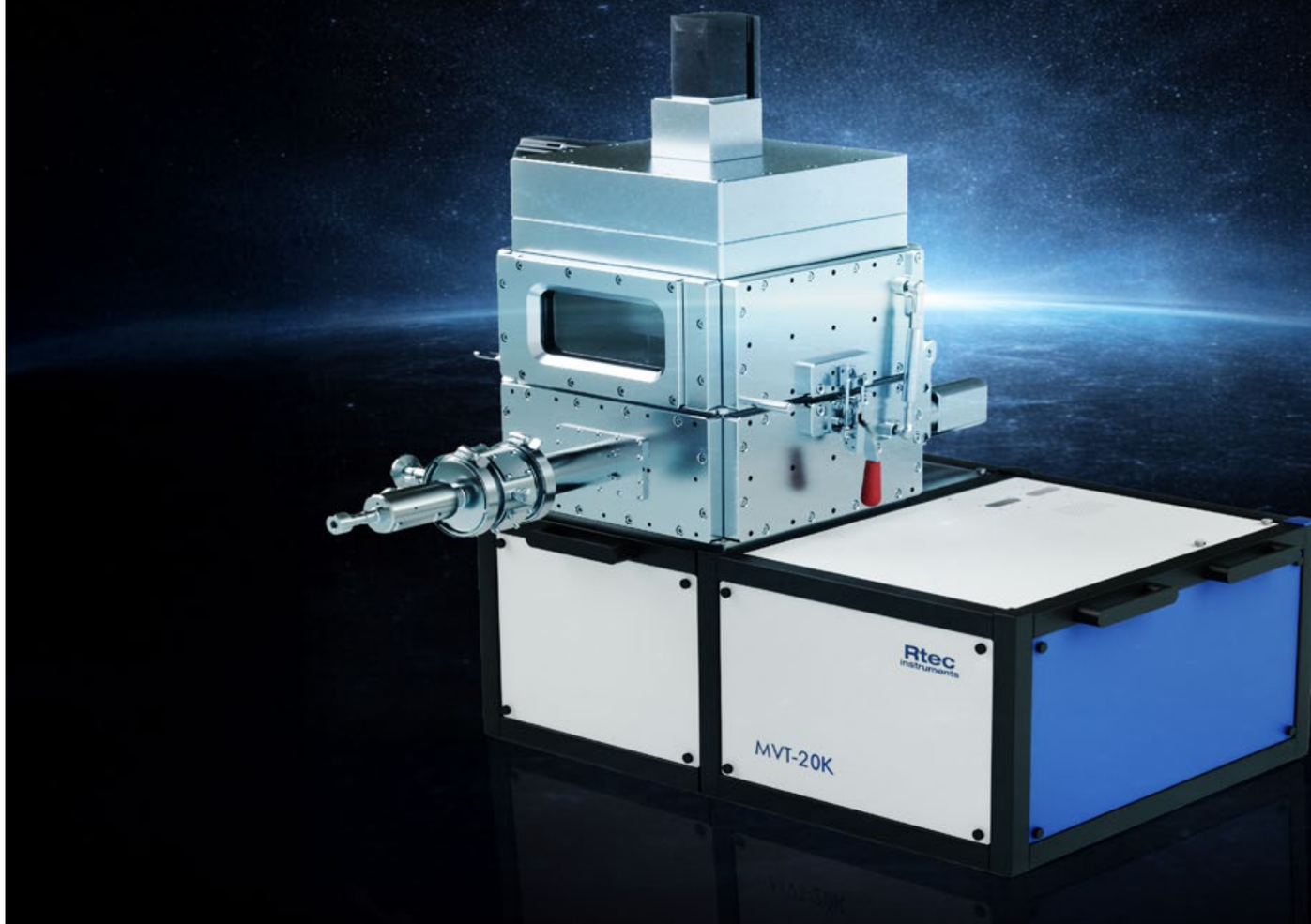
Accurate Data with a Complete Thermal Profile



Simulate the Harshest Environments
On Earth or Beyond

With a single fully integrated platform, researchers can replicate:

- **Outer space conditions**
- **Quantum computing device environments**
- **Superconducting material interfaces**
- **Cryogenic mechanical systems**



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Rtec sets the benchmark for friction and wear testing at the coldest achievable temperatures.

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