Section 6. Low / High Temperature Manipulators

Multi-axis Helium-free Manipulator

Highlights

- Cooled by GM cryocooler
- Low cost of ownership
- Multiple Axis: Up to 6
- Temperature range: ＜6K-325K
- RT to 6K: ＜4 hours

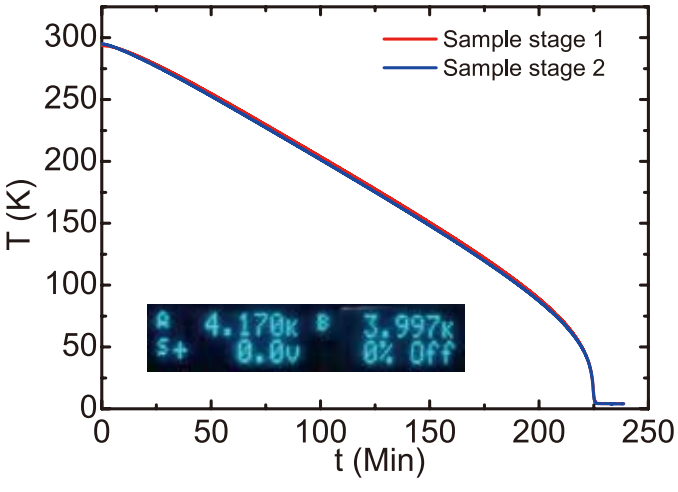
Options

- Sample parking stage
- Secondary Low Temperature Stage
- High Temperature (E-beam) Stage
- Sample Floating Module
- YAG Stage
- Auto Mapping Module
- Low Temperature Cleavage Module
- Four-probe Transport Module

Mechanical Specifications

Polar rotation	360° (-180°, +180°)
Tilt rotation	60° (-15°, +45°)
Azimuthal rotation	240° (-120°, +120°)
X / Y stroke	25mm(max 50mm)
Z stroke	Up to 650mm

Cooling Curves



Multi-axis Low Helium Consumption Manipulator

Highlights

- Cooled by liquid helium
- Multiple Axis: Up to 6
- Temperature range: 3K-400K
- RT to 10K, ＜15 min
- Liquid nitrogen compatible: ＜65K Operation （with pump)

Options

- ✓ Sample parking stage
- ✓ YAG Stage
- ✓ Secondary Low Temperature Stage
- ✓ Auto Mapping Module
- ✓ High Temperature (E-beam) Stage
- ✓ Low Temperature Cleavage Module
- ✓ Sample Floating Module
- ✓ Four-probe Transport Module

Mechanical Specifications

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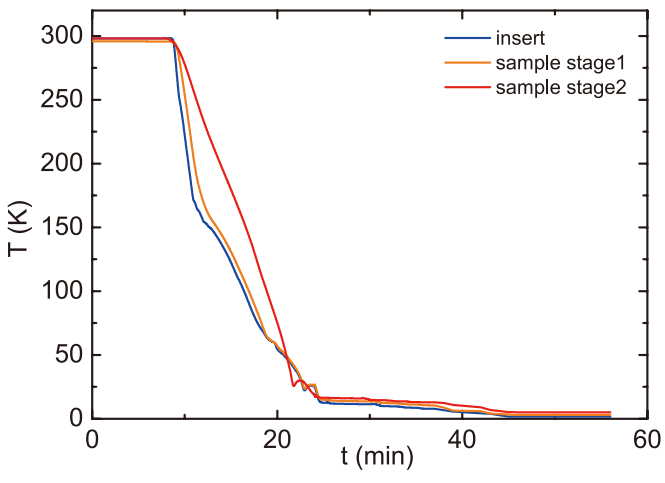
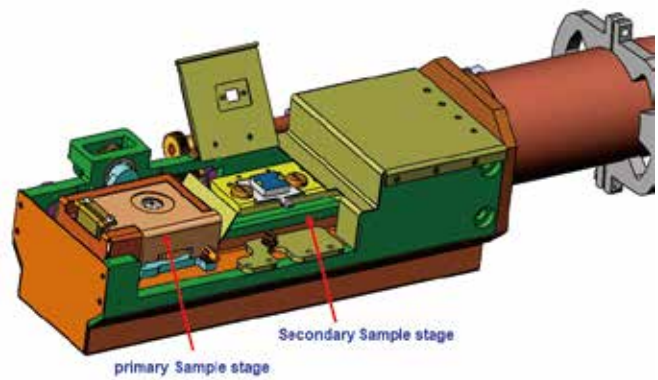
Cooling Curves



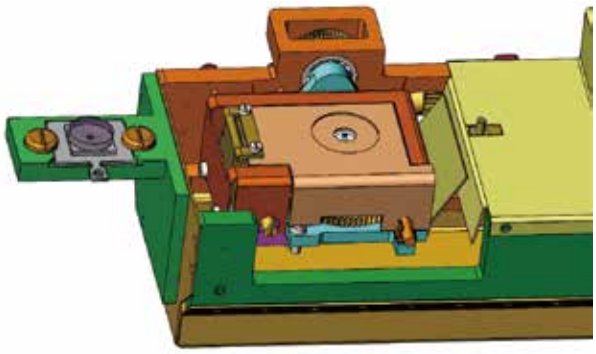
Options

Secondary Low Temperature Sample Stage



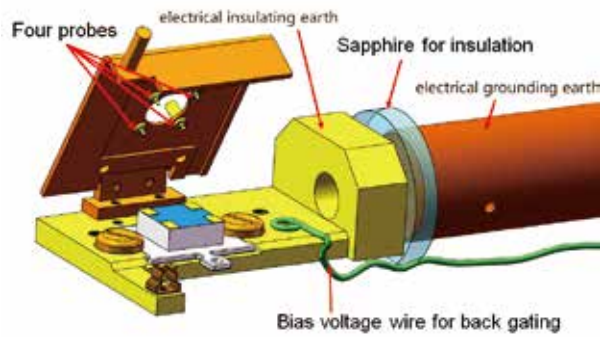
- Compatible with flag type sample holder
- Compatible with LEED measurement
- Silicon diode sensor
- Temperature range: 4.5K-400K
- Temperature controller replaced by Lakeshore 336

Photocurrent Measurement Module



- Including Sample Floating Module
- YAG crystal on sample holder to monitor the light spot
- Aluminum foil on sample holder to measure the light intensity
- Kapton insulated wire for photocurrent measurement

Four-probe Transport Measurement Module

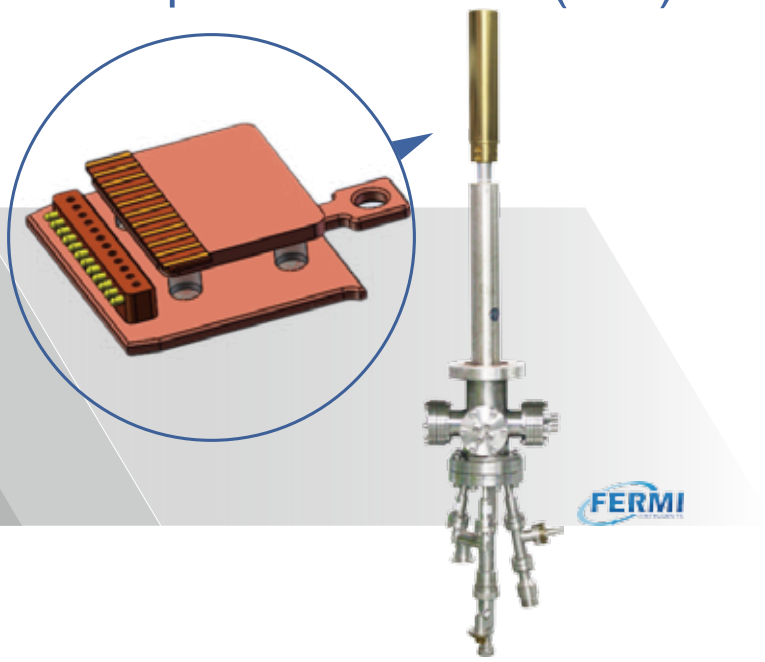


- Back gating (or sample floating) module
- Four probes for sample bias or transport measurements
- Insulation breakdown voltage: 100 V DC
- Min. bias Current: 0.1nA

Low Temperature Cleavage Module

- Mounting at the bottom of shielding
- Compatible with flag type sample holder but with special sample's fasteners
- Suitable for many times cleaving before opening the UHV system
- For surface preparation of hard ionic crystals (e.g. MgO) with high precision

Variable Temperature Insert (VTI)



Variable Temperature Insert (VTI) is a continuous flow cryostat that can provide a temperature range from 1.5K to 400K. Various sample stages can be mounted onto the cold head in UHV environment.

Highlights

- Initial Cooling time (from RT to 10K): ＜15min
- Temperature range: 67-400 K with LN2
- Temperature range:1.5-400K with LHe
- Lowest temperature achieved: 1.5 K(with pump)
- LHe consumption: ≤0.3L/h above 10K
- LN2 consumption: 0.5L/h LN2 at 100K
- Bakeable: Up to 120℃

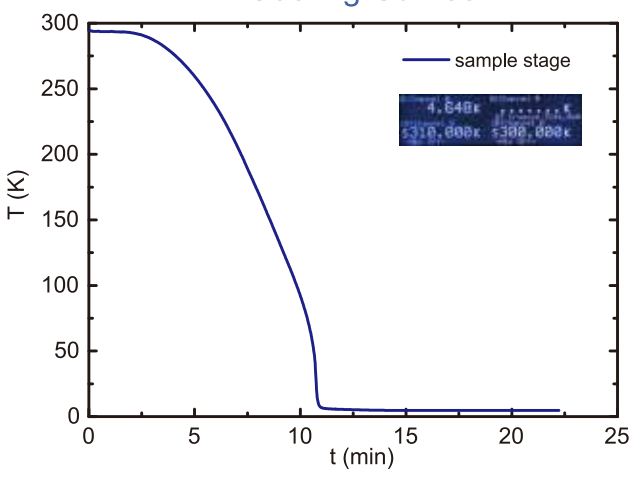
Applications

- Surface measurement
- Optical science
- Transport measurement

Configuration

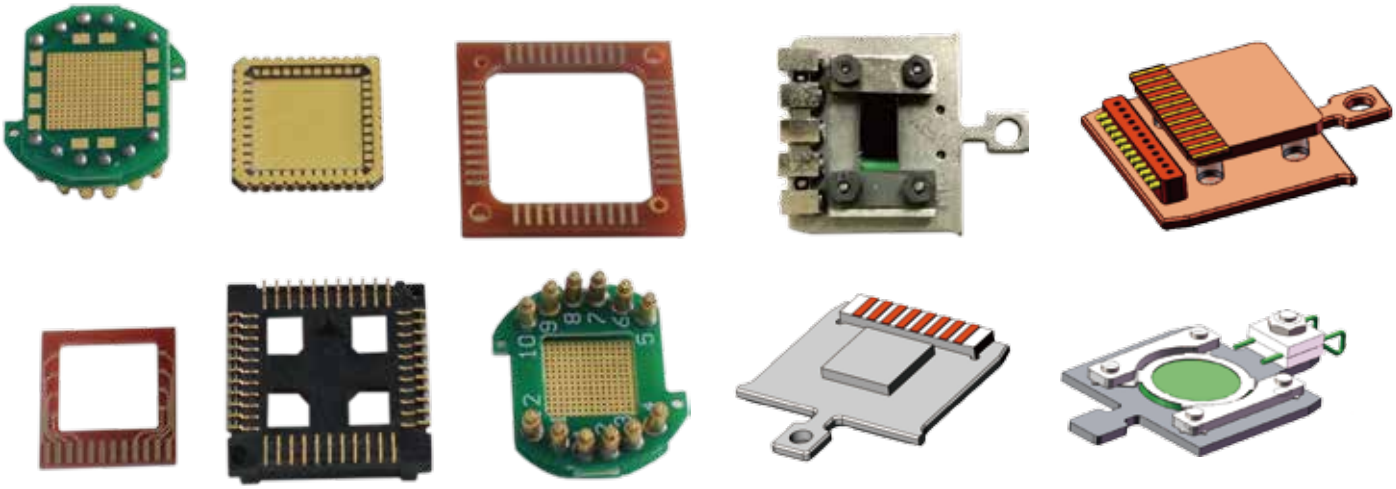
- CF100,63,35 Mounting flange available
- 1-5 spare CF16 flanges available
- Two temperature sensors
- One control heater
- Optional radiation shield
- Optional UHV electrial feedthrough
- Optional electrial insulation
- Optional temperature controller
- Optional LN2 or LH_e transfer line

Cooling Curves

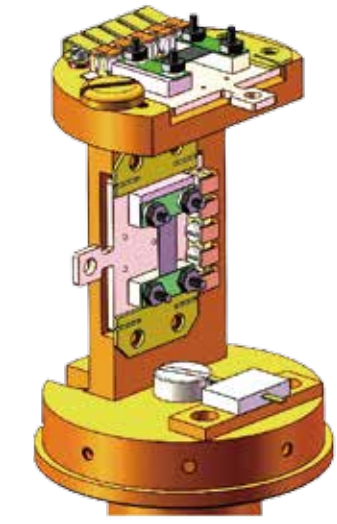


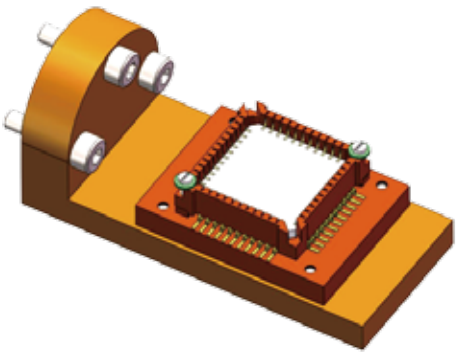
Options

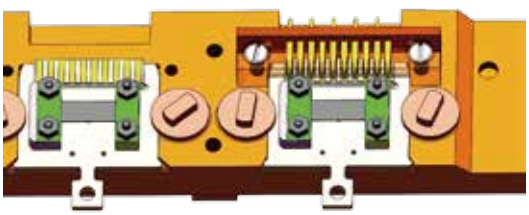
sample holders

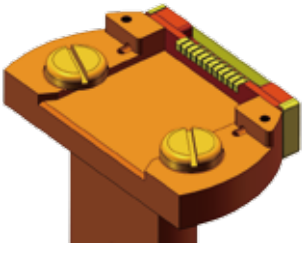


Sample stages

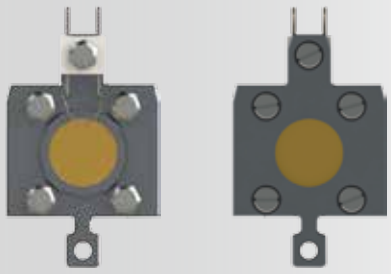








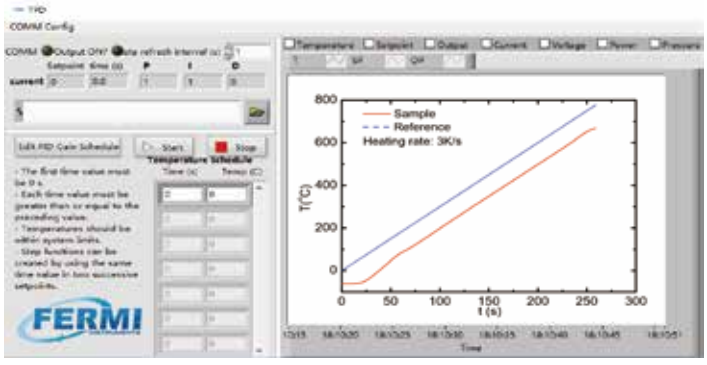
TPD Manipulator



Temperature-Programmed Desorption (TPD) is used to study thermodynamics and kinetics of desorption from solid surfaces while its temperature is changed in a controlled manner.

Highlights

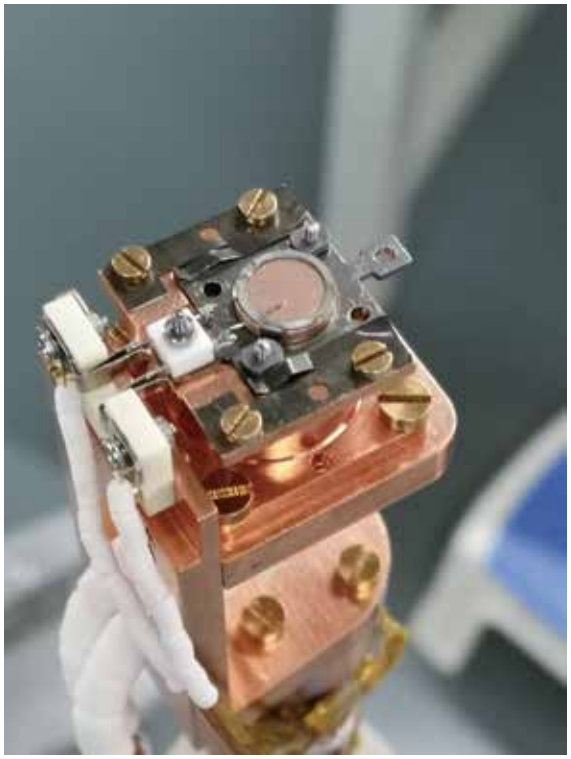
- Intergrated temperature sensor and filament
- Easy sample/ filament changing
- Fully Temperature control and data logging
- Restricted heating area
- Quick sample cooling
- Low background degasing
- Up to 4-axis movement



Applications

- Catalysis Analysis
- Thermal Analysis
- Thin Films Engineering
- Surface Engineering
- Residual Gas Analysis

TPD Stage



Standard Technical Data

Max.sample lateral size	10mm
Max.sample height	2mm
Sample heating	up to 1000K
Sample cooling	down to 90K(LN2)
Heating rate	0.1-3K/s
Cooling rate	10min(1000K to RT)

Optical cryostat

Optical cryostat for use in microscopy, spectroscopy, wafer probing, IC testing and more.

Highlights

- The windows and sample holders can be easily changed
- Easy to use: A range of window materials are available
- Configured for reflectance and transmission measurements
- Lowest temperature achieved: 1.5 K(with pump)
- Operates in any orientation
- Compact, lightweight and portable
- Short working distance

Specifications

- liquid helium or nitrogen compatible
- Low liquid helium consumption, < 0.5 L/h
- Temperature range ： < 4K to 325K
- Fast Cooling： RT to 4.2 K around 10 minutes
- 8-pin electrical feedthrough for temperature control
- 8- pin electrical feedthrough for transport
- Measurement-ready, via 8-pin electrical wiring to the sample

Options

- Optional superconducting magnet field
- Optional low-loss flexible transfer line
- Optional Lakeshore temperature controller

E-Beam Sample Heating Stage

The modular design guarantees this E-beam Sample Heating Stage is easy mounting and changing. The sample plate can be heated radiatively or by electron bombardment.

Highlights

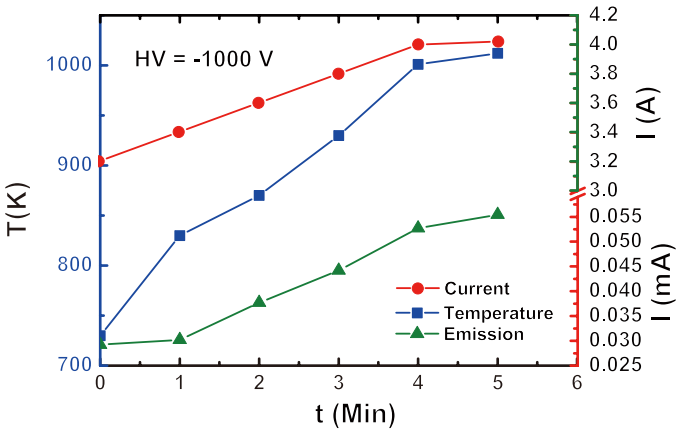
- Compatible with all our cryomaipulator
- Tungsten- Thorium Oxide heating wire
- Easy sample/ filament changing
- Efficient/ Quick sample heating
- High voltage applied to the filament
- Flag type sample holder
- Up to 4-axis movement
- Compatible with UHV environment
- Optional pyrometer sensor

Working State

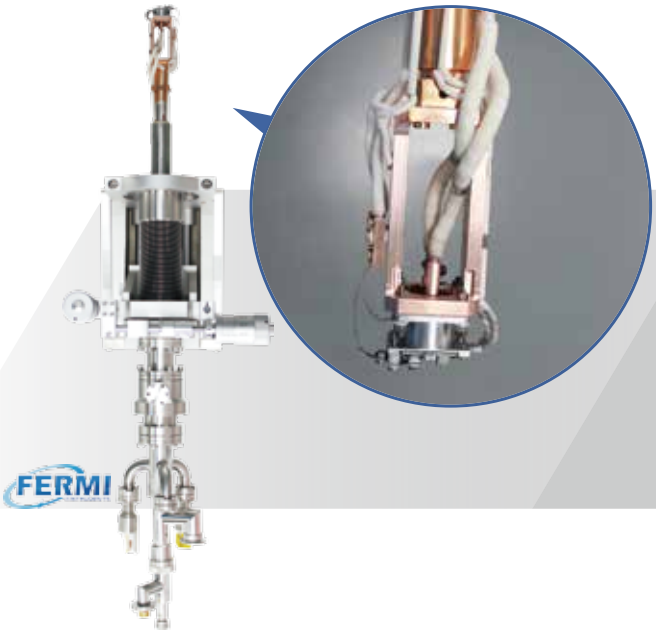
Technical Data

High voltage	-1000V
Heat power	up to 80W
Radiation heating	up to 500℃
E-beam heating	up to 1000℃
Thermocouple	K/E type
Heating rate	20sec to 1000℃

Heating Curves



4 Axes High/ low Temperature Manipulator



Highlights

Coaxial design LN2 cooling head

- Excellent thermal isolation
- Fast cooling

Side sealing DPRF

- No pumping needed for 10^{-8} mbar
- Single port pumping for 10^{-10} mbar
- Self locking mechanism for R1

Guide tube

- High strength supproting tube for smooth sample transfer

2000℃ heating stage

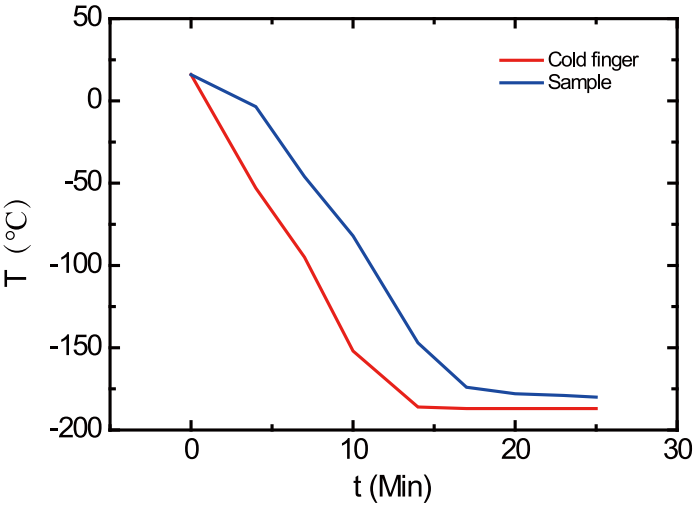
- Optional direct heating module

Standard Technical Data

Temperature regulation	Control Range
Radiative heating	RT-1200℃
E-beam heating	RT-2000℃
Direct heating	RT-1400℃
LN2 Cooling	-150℃-RT

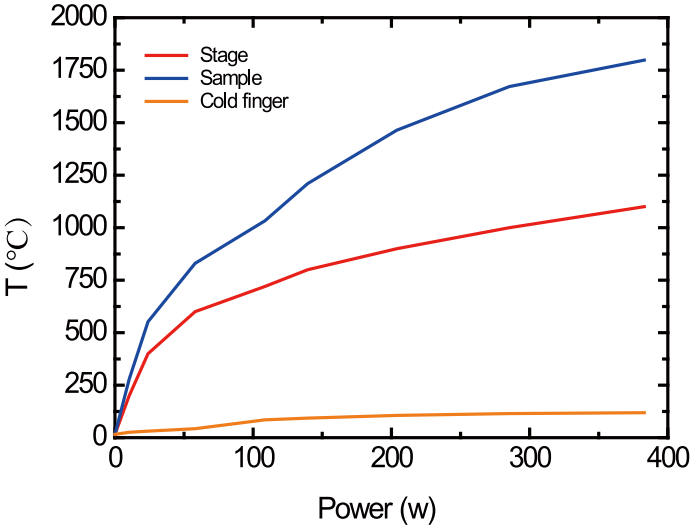
Polar rotation	360°
X and Y movements	±9mm
Z movements	Up to 300mm

Cooling curves

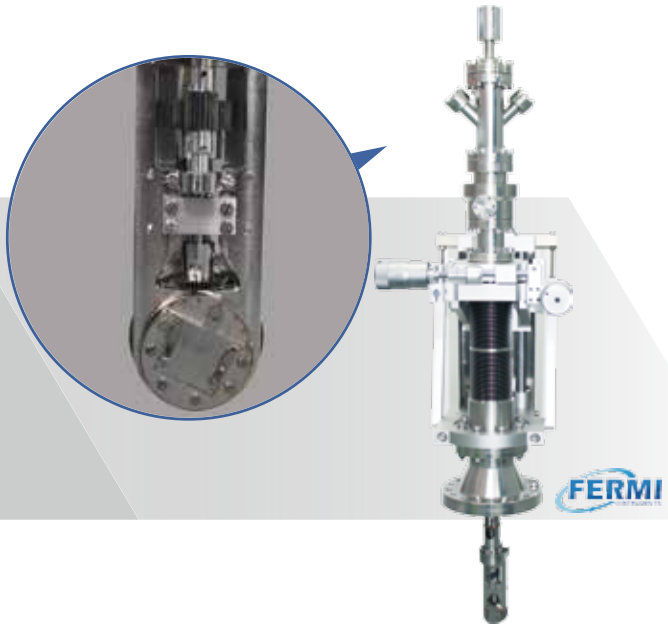


*20 min from RT to 80K

Heating Curves



5 Axes High Temperature Manipulator



Highlights

High precision R3 manipulation

- 4:1 gear ratio, high precision: Δ~0.03°
- Smooth rotation

Side sealing DPRF R1

- Decoupling R1 and R3 rotation

Guide tube

- High strength supproting tube for smooth sample transfer

Hight temperature R3 rotation stage

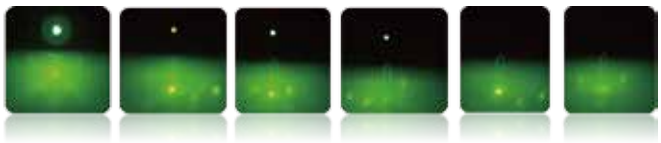
- Excellent thermal isolation and minimum heat transfer
- 360° Continuous rotor design
- E-beam compatible design

Technical Data

Temperature regulation	Control Range
Radiative heating	RT-1000℃

Azimuthal rotation	360°
X and Y movements	±9mm
Z movements	Up to 300mm

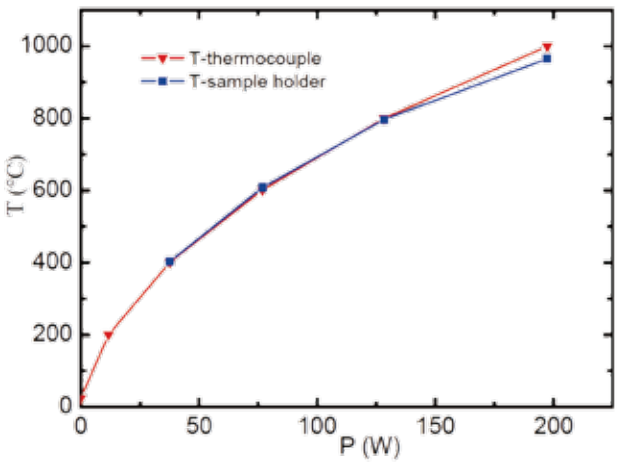
Excellent for RHEED



High Temperature Rotation

*Si_3N_4 bearing support for rotation at temperature up to 1000℃

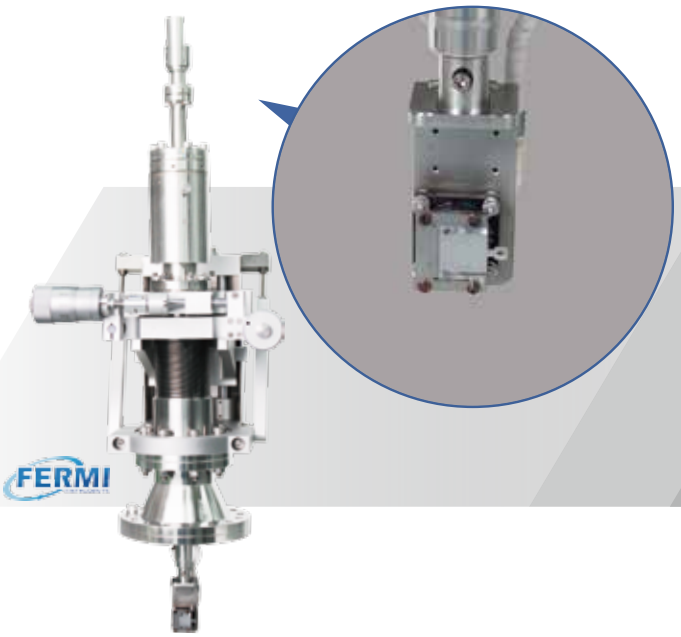
Heating Curves



*Heat up to 1000℃

*Reliable reference Tc measurement (Δ＜50℃ from Ts)

4 Axes High Temperature Manipulator



Highlights

Magnetic coupled Rotary feedthrough

- ±179° rotation

Supporting tube

- High strength supproting tube for smooth sample transfer
- Wiring inside the tube, no interference in manipulation

Heating stage

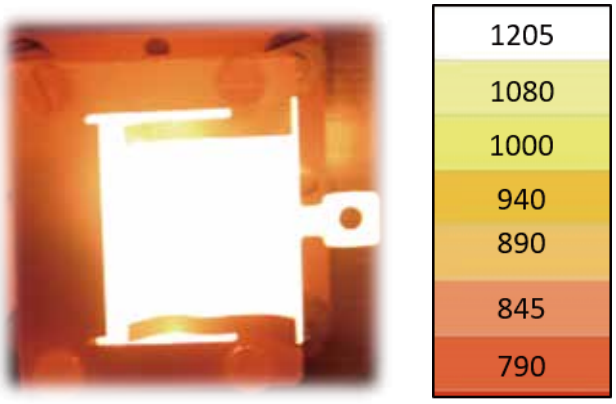
- Same design in all 4 axes STD. stage
- Molybdenum stage, Low degasing
- 1200℃ for radiative heating
- 2000℃ for e-beam heating
- Optional direct heating module

Technical Data

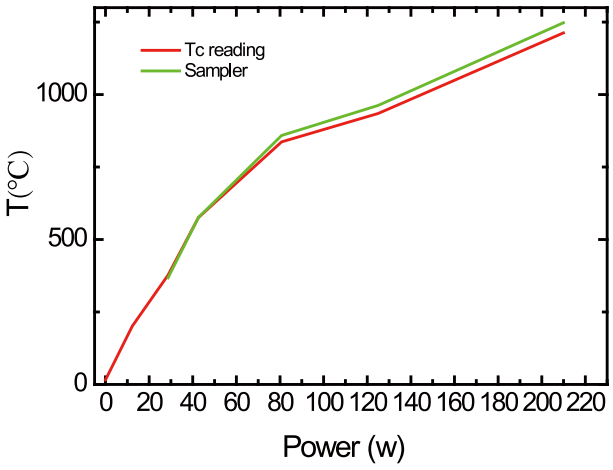
Temperature regulation	Control Range
Radiative heating	RT-1200℃
E-beam heating	RT-2000℃
Direct heating	RT-1400℃

Polar rotation	±179°
X and Y movements	±9mm
Z movements	Up to 300mm

Excellent temperature uniformity



Heating Curves



*Reliable reference T_C measurement (Δ < 50℃ from T_S)