

THE CRYOGENIC EXTENSIVE PRODUCT RANGE...

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CRYOGENIC LIMITED

WORLD'S FIRST 17 TESLA CRYOGEN FREE MEASUREMENT SYSTEM (CFMS) DELIVERED!

... with a He-3 Insert for temperatures down to 0.3K.

High magnetic field at low running costs!
Modular configuration with interchangeable measurement inserts.
Easy to use - as there is no liquid helium.
Full protection against accidental quench.
User-friendly front-end measurement software.

- 17 Tesla Cryogen Free Magnet
- Integrated Variable Temperature sample space down to 1.6K
- Vibrating Sample Magnetometer (VSM) for measurements of DC magnetic moment.
- AC calorimeter to measure Specific Heat capacity of samples.
- Resistivity and Hall Effect probe with sample rotation
- AC Susceptibility probe with compensated pair of pick-up coils.
- Ultra low field with $\pm 50\text{mT}$ Resolution.



11 Tesla optical system with VTI



7 Tesla split pair with integrated VTI for Neutron Scattering



Rotating sample probe



6.5 Tesla iron shielded magnet for Nuclear beam experiments



AC Susceptibility Probe



Specific Heat Probe



6.5 Tesla 300mm bore magnet with iron shielding



4 Tesla split pair system with 4 way optical access



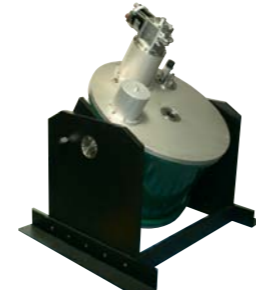
5 Tesla high homogeneity Cryogen Free superconducting magnet system



12 Tesla magnet with top loading variable temperature cryostat



6.5 Tesla split pair with optical access



12 Tesla system with rotating stand



16 Tesla cryogen free measurement system



14 Tesla Cryogen Free magnet system with integrated VTI



14 Tesla measurement system



16T CFM with dual pulse tube cryocoolers



17T CFM System with GM Cryocooler

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Cryogen Free He-3 Insert for temperatures down to 0.3K.

The Cryogenic Helium-Three insert is designed as an alternative to the standard sample probe. The inserts extend the range of experimental temperatures accessible in a Cryogen-Free variable temperature sample space beyond the standard 1.6K-300K. Using only the cooling power of the VTI and two internal temperature-controlled sorption pumps, the sample platform of the Helium-Three Insert can be maintained at any temperature from below 300mK to above 300K.

Operating Parameters For Helium-Three Insert

He-3 capacity:	Total He-3 gas volume 2 STP litres Working volume in normal use approx 1.3 STP litres
Initial Cooldown time:	3.5 hours from room temperature sample change to He-3 condensation temperature under standard cryogen-free VTI operating conditions.
Recondensation time:	25 minutes to condense 90% of He-3 charge and cool pot to below 2K
Performance tests:	>24 hours at 285mK with zero load 17 hours at 340mK with 25μW load 3 hours at 550mK with 185μW load



Cryogenic Introduces The Zero Boil-off Cryostat for The SQUID Magnetometer.

- Full magnetic shield built into the cryostat to protect the measurement system from external influence and provide a background field of typically 100 micro Tesla at the sample measurement point.
- Cooled by a newly developed ultra quiet Pulse Tube cooler which provides 1 Watt cooling power at 4K
- Special built in facility for liquifying helium gas from room temperature.
- The Pulse Tube cooler provides refrigerator at 4K for the liquid helium bath and at 50K for a radiation shield to intercept external radiation.
- There is optimised radiation shielding to reduce external heat loads to the minimum.

The cryostat is filled initially once only with liquid helium. A 100 litre storage vessel should be sufficient for this operation. Thereafter the liquid helium reservoir is filled and maintained by the Pulse Tube cryocooler, which also reliquifies the gas used for the VTI. Once the cryocooler is turned on it can be used to reliquify helium gas from a cylinder at the rate of about 2 litres per day. Short term fluctuation in heat load from ramping the magnet etc, will not result in liquid helium losses since there is a buffer tank full of reserve of helium gas charge supplied with the system.

The zero boil-off Magnetometer system reduces operating costs very substantially and makes the operation and use of a SQUID Magnetometer practical in all locations, especially those areas where helium is expensive and regular supplies are difficult to acquire. The recommended maintenance for the pulse tube cryocooler is every 25,000 hours of use which is only every 3 to 4 years of continuous operation. This helps to keep all operating costs to minimal.

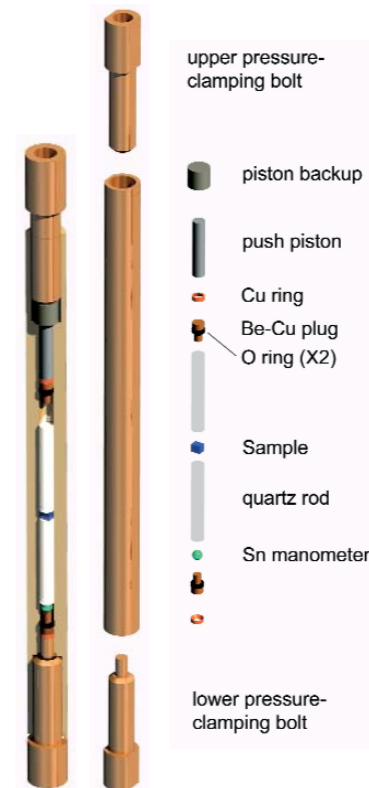
Hydrostatic Pressure Cell Measurement Option

The need to apply high pressure on a sample using the SQUID Magnetometer and to measure magnetisation are increasing. The high-pressure generating technology as a means of physical-properties evaluation has developed considerably recently. The piston cylinder method for high-pressure generating equipment is often used for physical-properties research.

Cryogenic offer high pressure experimental apparatus as a complete integrated system with pressure of 1GPa at 7 Kelvin.

Hydrostatic pressure cells option for magnetic measurements for electrical resistivity / AC Susceptibility.

We offer a cylindrical hydrostatic pressure cell with nominally 20mm outer diameter, giving a pressure of 3GPa at Room Temperature. The pressure cell is mounted on a special probe which can be inserted inside the AC susceptibility coils. LabVIEW software is provided to measure and subtract the background signal due to the pressure cell itself.



High Homogeneity Mini-CFM for Neutron Magnetic Resonance (NMR)

'A small high homogeneity and high persistence cryogen Free magnet system that can be run off 3 single phase electrical sockets.'

Field:	2.5T
Homogeneity:	10ppm in a 10mm DSV
Persistence:	Drift < 0.1 ppm/hr
Bore:	50.8mm Room Temperature bore.
Size of Cryostat:	224 x 258 x 640 mm



Miniature Cryogen Free Vibrating Sample Magnetometer (Mini-VSM)

- Cryogen Free Magnet to 5 Tesla
- 51mm RT bore
- Cryocooled Variable Temperature Cryostat
- Temperature range 1.6 to 300K
- Cooling power using GM or pulse tube cooler – with low vibration and maintenance



Measurement Options:

- Vibrating Sample Magnetometer (VSM) with sensitivity of 10⁻⁵ emu.
- Resistivity and Hall Effect measurements with resistance values of 10⁻⁷ to 10⁹ ohms.
- AC Calorimeter to measure Specific Heat capacity of samples.
- AC Susceptibility with sensitivity to 10⁻⁷ emu.
- Thermal Transport Measurements using a new lock-in method.
- 3He insert providing temperatures down to 300mK.
- High Temperature Insert for temperatures of 300K to 1000K.
- New 20-bit magnet power supply with ultra-high resolution and stability.