



High Performance Cryogenic Systems

Tailored to your specific requirements

www.iceoxford.com

At ICEoxford we specialise in custom solutions.

*Please contact us to request a bespoke system quotation
for your individual experimental requirements.*

DRY ICE 1.5K SYSTEM

LOW TEMPERATURE WITH FAST SAMPLE CHANGE

- Optimised for maximum sample throughput
- Customised tails for individual beamlines

FEATURES

- <1.3K base temperature continuous cryogen free operation
- Full temperature range : 10mK to 800K
- Patented Dualcool technology allows sample cool down in <30mins
- 3He and Dilution insert compatible
- Remote and fully automated operation via supplied ICE SOFTWARE

TEMPERATURE OPTIONS

12mK

70mm DILUTION FRIDGE



Base Temp <15mK

Cooling Power 70µW@100mK

25mK

50mm DILUTION FRIDGE



Base Temp <25mK

Cooling Power 20µW@100mK

300mK

³HE INSERT 30/50/70/100mm



Base Temp <280mK

Hold time > 60 hrs
Cooling Power 50µW@320mK for up to 16hrs

1.5k

1K PROBE



Base Temp <1.4K

Sample space 30/50/70/100mm in vacuum or exchange gas

SPECIFICALLY DEVELOPED NEUTRON BEAMLINE TAIL



Systems in operation at:
RAL, NIST, JPARC, LANL, NRC, HZB, NECSA and ANL

QUANTUM CRYOSTATS 290mK to 425K

DRY benchtop cryostats developed for research and development of quantum technology based detectors. < 1.2m in height, these compact cryostats allow for a fast sample turnaround and optimal use of lab space.

The DRY ICE 1.2K is a continuous cryostat designed to take a large experiential heat load. DRY ICE 300mK is a single-shot system perfect for detector research at ultra-low temperature.

| | DRY ICE 1.2K CONTINUOUS | DRY ICE 300mK SINGLE SHOT |
|------------------------------------|---|------------------------------------|
| COOLING POWER | >400mW @ 2K >80mW @ 1.7K | 50μW @ 300mK |
| BASE TEMPERATURE | <1.2K | <290mK |
| MODE OF OPERATION | Continuous | Single Shot |
| SYSTEM COOLDOWN | <8 Hours | <10 Hours |
| SAMPLE SPACE | Custom designed (Ø200x200mm standard) | |
| DIAGNOSTIC WIRING | 24-way Fischer | |
| CUSTOMER DC WIRING | Constantan, Manganin or Copper looms fitted on request. | |
| COAX | UT-85, SS, S1, BeCu and Niobium available. Other COAX available on request | |
| OPTICAL FIBRES | Available with FC-APC feedthroughs | |
| ACCESS TO SAMPLE SPACE | Bottom loading as standard | |
| OPTICAL WINDOWS | Sapphire, Quartz and Spectrosil windows. Other materials available on request. | |
| INTEGRATED SUPERCONDUCTING MAGNETS | Solenoid, split-pair and 2D vector magnet options available | |
| OPERATING RANGE | 1.2K to 425K | 300mK to 425K |
| TEMPERATURE STABILITY | <±10mK @1.2K | <±10mK below 10K <±5mK below 2K |
| SAMPLE ENVIRONMENT | Vacuum | Vacuum or Exchange Gas |

SPECIFICATIONS

- <±100nm peak-peak vibrations at sample plate. (Using advanced AV frame)
- Fully automated
- Available with GM or Pulse Tube Cryocoolers.



A Z-AXIS PROBE WITH COARSE ROTATION

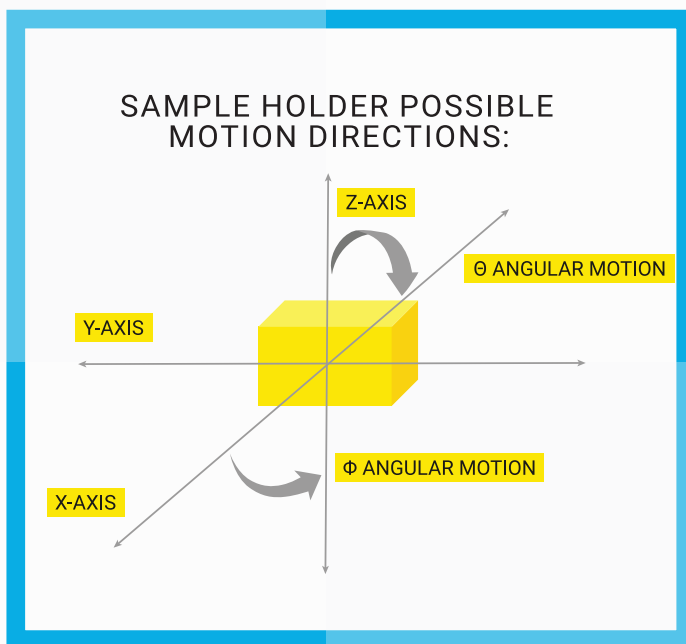
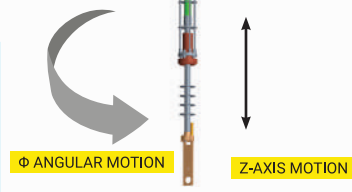
Z-AXIS PROBE WITH ACCURATE ROTATION **B**

Sample space motion:

- Height range $\pm 32\text{mm}$ motion with position accuracy of 0.5mm
- 360° about z-axis (Φ) with position accuracy of 1°
- Manual adjustment of sample space position by physically relocating the sample rod up/down

Sample space motion:

- Accurate Z-axis motion obtained using micrometre

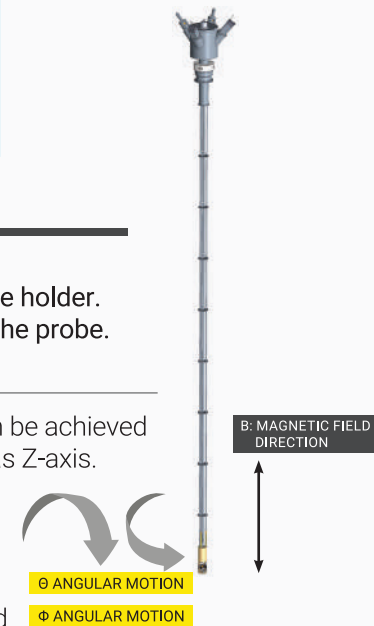


Sample space motion:

- In addition to the manual adjustment available on probe A.
- The drive rod rotates the worm gear that is used to rotate the sample holder.
- Accurate motion is obtained using micrometre placed on the top of the probe.
- Options for stepper motor automatic rotation

- $0\text{-}360^\circ$ rotation perpendicular to the magnetic field, 0.1° rotation accuracy.
- Compatible with helium 3 and dilution insert systems

- Two axis angular motion can be achieved with a sample cage, as well as Z-axis.
- To maintain the sample position at the field centre the second drive rod is automatically counter rotated against the motion of the first drive rod.



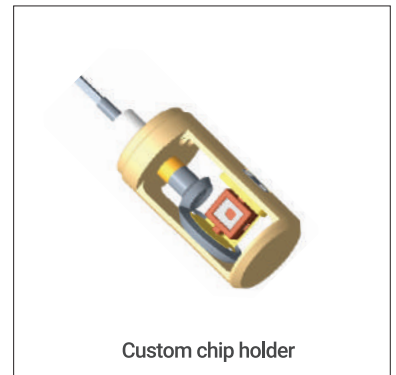
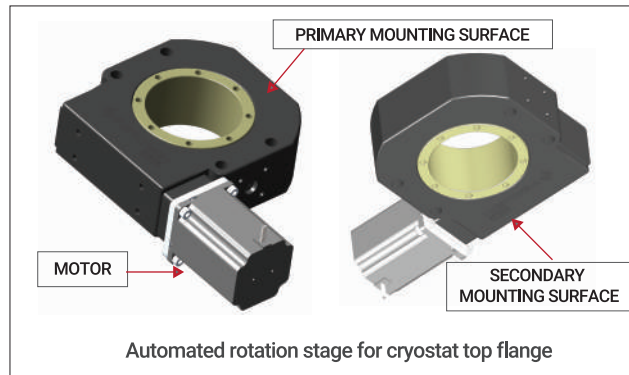
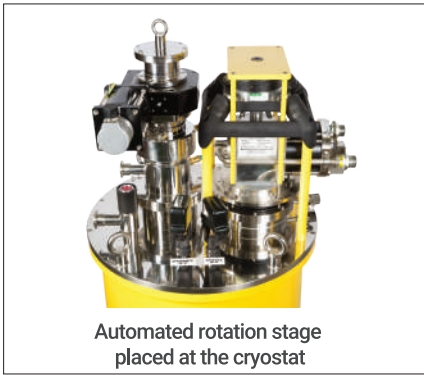
C X-AXIS PROBE WITH AUTOMATED ROTATION STAGE

DUAL AXIS : Z-AXIS AND X-AXIS PROBE **D**

ROTATOR PROBES

Single / Dual / Multiple Sample Movement Manipulation probes

AUTOMATED ROTATION STAGE FOR CRYOSTAT TOP FLANGE



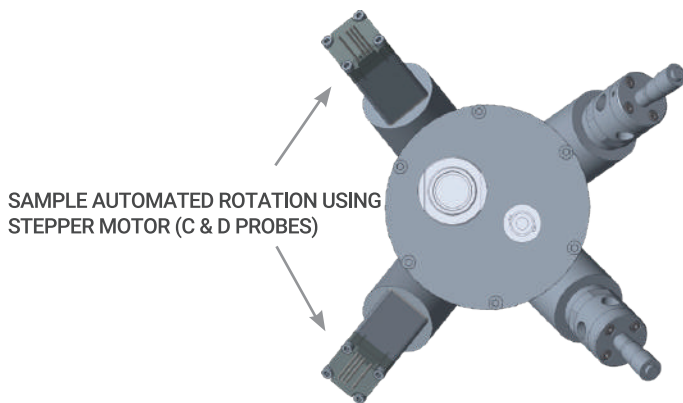
ICEoxford uses the latest generation of motorized worm-gear-drive rotary stages to provide significant improvements in speed, load capacity, and long-term positioning performance.

Available in both continuous and limited travel versions. The rotation stage base is fabricated from an aluminium alloy that offers significant weight savings in multi-axis arrangements and other weight critical applications, while providing high structural stiffness and long-term stability. Each stage is designed with two high-precision angular contact bearings with optimal spacing to provide excellent error motions coupled with high load capacities in a small, compact package.

Designed for use with ICEoxford and existing inserts up to 100mm in diameter. Allows automated rotation of an insert continuously through 360° with an accuracy of 180 arcsec. The rotation stage is controlled via an optional encoder and LabVIEW based software. The rotation stage is supplied with a mounting kit for integration with an existing cryostat and insert.

SAMPLE AUTOMATED ROTATION USING STEPPER MOTOR (C & D PROBES)

Stepper motor can be used in order to achieve high accuracy and automatic motion. The 2-axis rotator probe is capable of 360° sample platform rotation and 180° sample cradle rotation.

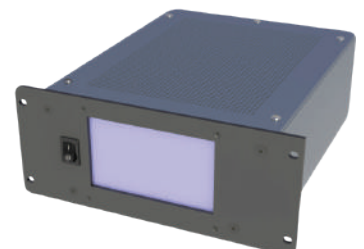


MOTOR SPECIFICATION

- 1.4 A Phase current
- 0.117 Nm holding torque
- 1.8° or 0.9° step angle
- ±5% step accuracy

MOTOR MOVEMENT SPECIFICATION

- 1.8 or 0.9 degrees stepper motor angle
- Number of steps for full rotation of 200 or 400 depending on Stepper motor angle
- Worm gear ratio 40:1
- 360 degrees rotation on both stages
- Standard angle resolution of 0.045° or 0.022° with micro-stepping
- Encoder option for increased positional accuracy



- ICErotate controller is a 3-axis stepper motor controller that is used to provide accurate stepper motor control for a range of motion applications.

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ICE Innovative Cryogenic Engineering

OSSE OXFORD SCIENCE SYSTEMS

CASE STUDIES

ISIS Facility

Institute: Rutherford Appleton Labs, UK
Description: Fully Automatic Dilution Refrigerator System for the Muon Beamline
Specification: 70mm diameter dipper - 15mK Base Temperature, 40 μ W @100mK
Comment: Installed 2013, unique welded heat exchangers



The ISIS facility operates a VTI with a 70mm dilution refrigerator insert. This customised system was designed to be easily transported around the ISIS facility and allow fast turnaround mK experiments.

It also allowed experiments from the mK range to 300K within the same cryostat. It also had complex experimental wiring added and achieved the best base temperature and cooling power within such a compact design.

CUSTOMERS CURRENTLY USING Dry ICE^{NS} LEMON SYSTEMS

Lujan Neutron Scattering Center

Institute: Los Alamos National Laboratory
Description: DRY1.5K with 50mm Probe
Specification: 1.4K – 300K Variable Temperature Insert
Comment: Installed 2013, fully automatic.



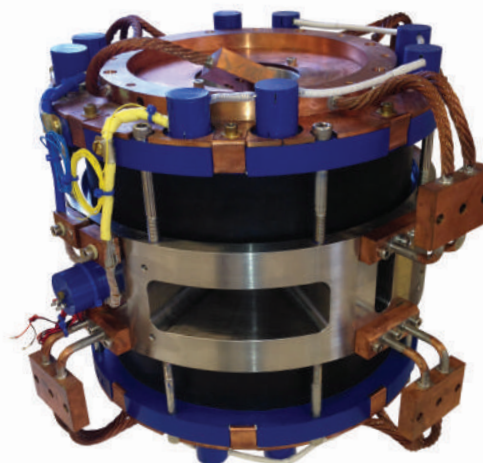
System Cool down time : 60 hours

1.5K Probe

- Base temperature : 1.4 K
- Temperature stability at <2K : ± 10 mK

3He Cold Probe

- Base temperature : < 300mK
- Cool down time (300K-1.5K) : 8 hours
- Hold time at base temperature: >60 hours
- Temperature stability : ± 10 mK



The Los Alamos National Laboratory operates a VTI with a 7T split pair magnet. This system has two 1.5K probe inserts as well as a Helium 3 insert.

The system achieved a base temperature of 1.5K on both probes and a base temperature of 295mK on the Helium 3 insert. The high access 7T split pair magnet allows for a wide range of scattering angles, to suit your neutron beam.

ONLINE CRYOGENIC SPARES FROM ICEOXFORD

Cryobitz™ is run by a team of Engineers at ICEoxford who have many years' experience in designing manufacturing and operating cryogenic equipment. Cryobitz™ offer effective and rapid solutions throughout the globe that incorporate a comprehensive range of spares and accessories for your cryogenic needs.

CRYOBITZ
Cryogenic Laboratory Spares

Helium & Nitrogen Storage

We supply a variety of storage dewars from 20L to over 500L and transportation vessels flasks from 0.5L - 50L.



Electronics

Magnet power supplies, helium level meters, fully automatic gas handling systems and more.



Thermometry

A complete range of sensors to measure from 800k to 20mk to suit all cryogenic environments.






Tubing

We supply an extensive range of stainless steel tube (304, 316 & 321), copper (C106, C103 & C110), brass (CZ126 & CZ108). Sizes range from 0.028" O/D up to 5" O/D with varying wall thickness in all grades.



304/304L, 316/316L specifications also available

-  ONLINE QUOTE BASKET
-  EASY TO ORDER
-  FAST-RESPONSE DELIVERY

Repair And Refurbishment

Offering a full range of repairs, rework and upgrades for any transfer tubes, windows, wiring, variable temperature inserts and dilution refrigerator systems.

Upgrades to existing equipment including extended temperature ranges, additional experimental wiring, improved sample access and space saving gas handling systems.



Transfer Lines

Can be made to customer specifications

- Special design to meet your specific application
- Dewar leg, Cryostat leg, and Span from drawings to reality
- All of our transfer tubes are manufactured with multiple radiation shields
- High vacuum insulation

Standard Transfer lines

- Normal short duration cryogen transfer
- Stainless steel and vacuum insulated mechanical properties help to achieve best thermal performance
- Avoid losses and leaking
- Compatible with Cryogenic gases such as Helium, Nitrogen, Hydrogen, and Neon

Low loss transfer lines

- To obtain lowest Helium consumption
- Utilise the Helium bail-off to pre-cool the line
- Increases overall application efficiency and reduces operating costs
- Automated needle valve used to obtain steady temperature control

If you can't find what you want .. just ask!!

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www.iceoxford.com

ICEsf

Standard Flexible Transfer tube

CRYOSTAT

ICESr

Standard Rigid with Horizontal Demountable Joint

CRYOSTAT

ICESfe

Standard Flexible Single Elbow

CRYOSTAT

ICESfd

Standard Flexible with Horizontal Demountable Joint

Vertical feed to Cryostat

Horizontal feed to the Cryostat

 **ICE** Innovative Cryogenic Engineering

 **ISSE**
ESTABLISHED 1982