Cryogenic Systems Catalogue

UK
ICEoxford Limited
Unit 3, Ferry Mills, Osney Mead, Oxford, OX2 0ES

Phone: +44 (0) 1865 202300      E-mail: sales@iceoxford.com

JAPAN
E-mail: www.sekitech.co.jp
Web:    www.sekitech.biz

INDIA/SINGAPORE
E-mail: info@anarghyainnotech.com
Web:    www.anarghyainnotech.com
This catalogue demonstrates some examples of the products designed and manufactured by ICEoxford Ltd. Although it lists many of our standard products, we have made and are prepared to custom make a wide range of inserts.

As we develop new products and add them to our line up, the catalogue lags behind, so please contact us with your requirements. We regularly take on custom work and are able to offer this at a competitive price.

### Table 1: Base Temperature

<table>
<thead>
<tr>
<th>Base Temperature</th>
<th>‘Wet’</th>
<th>DRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>77 K</td>
<td>ICEBATH</td>
<td>ICEBATH</td>
</tr>
<tr>
<td>10 K</td>
<td>ICE10K</td>
<td>ICE10K</td>
</tr>
<tr>
<td>4 K</td>
<td>ICE4K</td>
<td>ICE4K</td>
</tr>
<tr>
<td>1.5 K</td>
<td>ICEV1.5K</td>
<td>ICEV1.5K</td>
</tr>
<tr>
<td>1 K</td>
<td>ICE1K</td>
<td>ICE1K</td>
</tr>
<tr>
<td>0.3 K</td>
<td>ICE3.0K</td>
<td>ICE3.0K</td>
</tr>
<tr>
<td>~0.015 K</td>
<td>ICEEASY FIT 450</td>
<td>ICEEASY FIT 200</td>
</tr>
</tbody>
</table>

All systems prefixed with **DRY** are cryogen free, thus requiring no liquid cryogens for the use.

If you want to upgrade an existing system, your primary factor in the decision could well be dominated by the space available for the insert. The following table serves to give examples of possible solutions based on insert diameter:

### Table 2: Insert Diameter

<table>
<thead>
<tr>
<th>Insert diameter</th>
<th>Range</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mm</td>
<td>Parasitic VT20</td>
<td>ICEVT20 (page 8)</td>
</tr>
<tr>
<td>32mm</td>
<td>Parasitic VT32</td>
<td>ICEVT32 (page 8)</td>
</tr>
<tr>
<td>50mm</td>
<td>DIPPER and Minifridge</td>
<td>ICEVTI (page 7) or ICEMINIFRIDGE (page 14)</td>
</tr>
<tr>
<td>&gt;50mm</td>
<td>TL, EasyFit</td>
<td>ICEEASYFIT 200 (page 15) or ICEVTI (page 14)</td>
</tr>
<tr>
<td>Custom</td>
<td></td>
<td>Fit your cryostat… Custom Please talk to us!</td>
</tr>
</tbody>
</table>

It is very important to stress that this list does not list every possibility, so please do contact us with your exact requirements and we'll see what we can do.
## Products

### Wet 4-1.5K Systems
- **CFICE** Liquid Helium Continuous Flow Cryostat
- **CFICE1K** Liquid Helium Continuous Flow Optical Cryostat
- **OPTICECF** Liquid Helium Continuous Flow Optical Cryostat
- **CFICEN** Liquid Nitrogen Continuous Flow Cryostat
- **MICROICEN** Liquid Nitrogen Continuous Flow Optical Cryostat
- **VTICEBL** Liquid Helium Variable Temperature Cryostat
- **OPTIICEN** Liquid Nitrogen Bath Cryostat
- **4ICE** Variable Temperature Insert
- **4ICEDIPPER®** VTI for LHe Storage Dewars or Magnet Systems

### Wet <300mK Systems
- **3ICEVT20 & 25** Parasitic 3He Insert for use with VTI (20/25mm Dia)
- **3ICEVT32** Parasitic 3He Insert for use with VTI (32mm Dia)
- **3ICEDIPPER®** 3He Insert for LHe Storage Dewars or Magnet Systems
- **3ICETL** Sample in Liquid 3He Refrigerator
- **3ICETL UHV** Sample in UHV 3He Insert

### Wet <50mK Systems
- **3ICEPR** Top Loading Probes
- **DICEVT** 20 µW Parasitic Dilution Refrigerator for use with VTI’s
- **DICE40** 40 µW @ 100mK Dilution Refrigerator System
- **DICE75** 75 µW @ 100mK Dilution Refrigerator System
- **DICEasyFit 200** 200 µW @ 100mK Dilution Refrigerator System
- **DICEasyFit400** 400 µW @ 100mK Dilution Refrigerator System
- **DICEasyFit®®** 20 µW Dilution refrigerator for LHe Storage Dewars or Magnet Systems
- **DICTLM** Top Loading into Mixture Dilution Refrigerator System
- **DICEPR** Top Loading Probes

### Dry 4-1.5K Systems
- **DRYICE4K** Cryogenfree 4K Cryostat
- **DRYICEOPTIK** Quick Loading Cryogenfree Optical Cryostat
- **DRYICEOPTTH** Top Loading into Vapour Cryogenfree Optical Cryostat
- **DRYICEVTI** Top Loading Cryogenfree VTI System
- **DRYICEVTI OPTI** Optical Cryogenfree VTI System

### Dry <300mK Systems
- **DRYICE3** Cryogenfree 3He System
- **DRY3ICETL** Top Loading Cryogenfree 3He System

### Dry <50mK Systems
- **DRYICEasyFit** Cryogenfree Dilution Refrigerators

---

**Tel:** +44 (0)1865 202300  
**E-mail:** sales@iceoxford.com  
**Web:** www.iceoxford.com
Liquid Helium Continuous Flow Cryostat  
Product Code: CFICE

An adaptable modular range of static and dynamic continuous flow cryostats.

Sample holders, temperature range, tails dimensions length & diameter can all be modified to suit the customers needs.

**Specification of Cryostat shown:**
- OVC outer diameter 70 mm
- Sample space diameter 49 mm
- Single shot base temp 1.3K
- Helium consumption < 1.5 l/h
- Continuous Flow Temp 2.2 K (with > 20 cubic meter/hour pump)

**Special Liquid Helium Continuous Flow Cryostat** (sample in vacuum)  
Product Code: CFICE1K100

Designed initially for Neutron Facilities, this continuous flow insert has a very low stable base temperature, in both single shot and continuous flow modes, the insert operates in a vacuum and can be supplied with it's own vapour cooled shields and cryostat or it can parasitize within a cold bore environment. The insert also benefits from a fast sample turn around time, and large sample in vacuum space.

**Specifications:**
- Sample space up to 100mm
- Single shot base temperature <1.2K
- Continuous flow base temperature <1.4K
- Temperature range 1.2K to 300K
- Stability below 10K ±0.1K
- Stability Above 10K ±0.5K

A CFICE1K50 50mm diameter version is also available.

Liquid Helium Continuous Flow Optical Cryostat  
Product Code: OPTICECF

Continuous flow CF of either LN2 or LHe is directed through a heat exchanger which in turn cools the sample either by direct contact with the flow (Dynamic) or via exchange gas (Static).

Range of windows

Suitable for the following range of spectroscopy techniques:
- Raman
- Infared
- Visible and ultra-violet spectroscopy

**Specification:**
- Temperature Range 2.2 - 300 K
- Stability ±0.1 K
- Base Temperature 1.6 K (single shot)
- Sample Turnaround 5 mins
- Continuous Flow Temp 2.2 K (with > 20 cubic meter/hour pump)

See our Cryo bitz catalogue for an extensive range of spares for the cryogenic laboratory.
Liquid Nitrogen Continuous Flow Cryostat  

An adaptable modular range of static and dynamic continuous flow cryostats. 
Sample holders, temperature range, tails dimensions length & diameter can all be modified to suit the customers needs.

**Specification:**
- OVC outer diameter: 95 mm
- Sample space diameter: 35 mm
- Base temp: 77 K
- Temperature control from: 77K to Room Temperature

Liquid Nitrogen Continuous Flow Optical Cryostat  

A very small optical cryostat with adjustable window to sample proximity. Ideal for low temperature microscopy.

**Specification:**
- Flow Rate: 500cc/hour
- Temperature: 77-300K
- Stability: ±1 K
- Window Access: 10 mm
- Window Adjustment: 2 mm
- Transmission Access possible
Liquid Helium Variable Temperature Cryostat

A helium bath cryostat with a variable temperature insert built in, allowing a choice of either Dynamic, Static, or Sample in Vacuum. Dimensions can be adjusted to increase the bath volumes. Ideal for use on Beam lines, designed for use with VT probes, 3ICEVT systems and DICEVT systems. Range of windows, see cryolabspares.
Suitable for the following range of spectroscopy techniques:
- Raman
- Infared
- Visible and ultra-violet spectroscopy
- Photoluminescence
- Photo-conductivity and Electro-optical Studies

Specification:
- Temperature Range 1.5 - 300 K
- Stability ±5 K
- Helium Volume 8.0 Ltrs
- Nitrogen Volume 11.0 Ltrs
- Window Option 4 Radial + 1 Axial

Liquid Nitrogen Bath Cryostat

Continuous flow CF of either LN2 or LHe is directed through a heat exchanger which in turn cools the sample either by direct contact with the flow (Dynamic) or via exchange gas (Static). Range of windows
Suitable for the following range of spectroscopy techniques:
- Raman
- Infared
- Visible and ultra-violet spectroscopy
- Photoluminescence
- Photo-conductivity and Electro-optical Studies

Specification:
- Temperature Range 77 – 300 K
- Stability ±1 K
- Flow Rate 600 L/H
- Window Option 4 Radial + 1 Axial
- Window Access 15 mm dia.

See our Cryo catalogue for an extensive range of spares for the cryogenic laboratory.
Variable Temperature Insert
These Variable Temperature Inserts (VTI) operate in a transport dewar or magnet cryostat picking up Helium from within this bath temperatures of below 1.5K can be achieved together with high cooling powers. Both are top loading with a variety of top loading sample holders available.

Specification:
- Temperature Range 1.5 - 300 K with 30 mm sample space
- Temperature Range 1.5 - 200 K with 37 mm sample space
- Stability ±0.1 K
- Base Temperature 1.5 K
- Sample Change Time 1 min

VTI for Storage Dewars or Magnet Systems
These Variable Temperature Inserts (VTI) operate in a transport dewar or magnet cryostat picking up Helium from within this bath temperatures of below 1.5K can be achieved together with high cooling powers. Both are top loading with a variety of top loading sample holders available.

Specification:
- Operating Temperature 1.5 - 300 K with 25 mm sample space
- Stability ±0.1 K
- Base Temperature 1.5 K
- Sample Change Time 1 min

Tel: +44 (0)1865 202300         E-mail: sales@iceoxford.com       Web: www.iceoxford.com
Parasitic $^3$He Insert for use with VTI's

Product Code: $^3$ICEVT20 & 25

A small fast turn around insert 20/25mm outer diameter. Designed to be ‘Top Loaded’ into any manufacturers Variable Temperature Insert or continuous flow system (size permitting) and uses this inserts capability of reaching 1.5K in order to condense the self contained $^3$He charge.

Specification:

- Base Temperature <320 mK
- Cooling Power 50µW for >2 hours @ 350 mK
- Diameter 20 mm
- Length 350 mm
- Hold Time > 4 Hours

For more details please call ICE. (all specs. and dimensions can be adjusted to suit users needs)

Parasitic $^3$He Insert for use with VTI's

Product Code: $^3$ICEVT32

A repeat of the VT20 except with a 32mm outer diameter for use in a larger VTI. Allows a larger sample space, potential for lower base temperatures and longer hold time.

To load into a 2K or below environment

Specification:

- Base Temperature <280 mK
- Cooling Power 50µW for >3 hours @ 350 mK
- Diameter 32 mm
- Length 450 mm
- Hold Time > 4 Hours

For more details please call ICE. (all specs. and dimensions can be adjusted to suit users needs)
3He Insert for Storage Dewars or Magnet Systems

A sample in vacuum insert top loads into either Helium transport dewar or magnet systems. Self contained, sorption pumped, single shot, system dimensions can be modified to suit a customers needs. Fast cooldown and sample

Product Code: 3ICE®

Specification:

- Diameter     To suit LHe Storage Dewar or Magnet System
- Length       To suit System
- Base Temperature  <260 mK for >60 hours (no heat load applied)
- Cooling Power  <300 mK for >6 hours with 40µW applied heat load
- Stability     ±3 mK at T < 1.5 K
- 3He Regeneration Time  30 mins

For more details please call ICE. (all specs. and dimensions can be adjusted to suit users needs)
Sample in Liquid 3He Insert

Top Loading 3He System, sample on probe (PRICE3) loads into the Insert, down to the liquid 3He or just above. Thermal contact to the cold source, surface of the liquid, can be done with the use of a thermal link made of copper, or a low eddy current cold finger if needed.

Fast and easy sample changing using a top loading probe (see PRICE3) for a range of probe wiring and manipulator options.

The system below compromises a special telescopic probe for use in labs with restricted head room.

Sample in Liquid 3He Insert

Product Code: 3ICE^TL

Specification:

- Diameter     To suit LHe Storage Dewar or Magnet System
- Length       To suit System
- Base Temperature     <260 mK for >50 hours (no heat load applied)
- Cooling Power      <300 mK for >6 hours with 400µW applied heat load
- Stability below 1.2 K  <±3 mK
- 3He Regeneration Time  50 mins

For more details please call ICE. (all specs. and dimensions can be adjusted to suit users needs)
Sample in UHV 3He Insert

A proven 50mm diameter UHV chamber surrounded by a $^3$He System. Allows the cool down by thermal contact of STM head to <300mK

**Product Code: $^3$ICETL UHV**

**Specification:**

- Diameter: Depends on chosen system cryostat
- Length: Depends on chosen system cryostat
- Base Temperature: <275 mK for >30 hours (no heat load applied)
- Cooling Power: <300 mK for >6 hours with 400µW applied heat load
- Stability below 1.2 K: <±3 mK
- $^3$He Regeneration Time: 50 mins

For more details please call ICE. (all specs. and dimensions can be adjusted to suit users needs)
Top Loading Probes (Oxford Instruments compatible)  
Product Code: 3ICEPR

A superior probe designed to suit other manufacturers existing top loading 3He systems.
Modular approach to top housing assembly for easy modification.
All types of wiring, co-ax, wave guides, available on request. As well as a range of sample holders, two standard types, as well as vacuum can, or a rotator mechanism. (see model)

Tel: +44 (0)1865 202300  E-mail: sales@iceoxford.com  Web: www.iceoxford.com
An Expansive range of Dilution refrigerator systems each of which uses the - DICEGH – Dilution System Gas Handling and Control.

<table>
<thead>
<tr>
<th>Description</th>
<th>VT</th>
<th>MINIFRIDGE</th>
<th>40</th>
<th>75</th>
<th>200</th>
<th>450</th>
<th>TLM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Temperature (mK)</td>
<td>&lt;35</td>
<td>&lt;35</td>
<td>&lt;20</td>
<td>15</td>
<td>10</td>
<td>&lt;7</td>
<td>&lt;30</td>
</tr>
<tr>
<td>Cooling Power (µW @ 100 mK)</td>
<td>&gt;15</td>
<td>&gt;15</td>
<td>40</td>
<td>75</td>
<td>200</td>
<td>450</td>
<td>300</td>
</tr>
<tr>
<td>Wiring Supplied **</td>
<td>Special</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Probe (Top Loading)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

** Standard wiring - 24 way Diagnostic plus 24 way Constantan twisted pair

20 µW Parasitic Dilution Refrigerator for use with VTI’s
Product Code: DICEVT
Top loading into a variable temperature insert this system uses the 1K capability of the VTI in order to condense the mixture and continues the cooling process into the millikelvin range.

20 µW Dilution Refrigerator for use in LHe Storage Dewars
Product Code: DICEMINIFRIDGE®
A small compact Dilution Refrigerator (D.R.) system designed to fit through the 50mm neck of a standard Helium storage vessel. The use of sliding and greased cone seals allow fast turn around and easy loading for time saving sample evaluation work.
40 µW @100mK Dilution Refrigerator System  
Product Code: DICE40

A compact simple to operate Dilution Refrigerator system additional ports for experimental access make this a versatile first millikelvin system for a low temperature laboratory.

75 µW @100mK Dilution Refrigerator System  
Product Code: DICE75

Higher cooling power version of the compact DICE40 robust and versatile this system can be used for any sample in vacuum experimental applications.

200 µW @100mK Dilution Refrigerator System  
Product Code: DICEEASYFIT 200

Still compact though slightly larger D.R. system with a large amount of experimental access incorporating easyFit experimental add on’s to allow fast re-designation of system application.

450 µW @100mK Dilution Refrigerator System  
Product Code: DICEEASYFIT 450

ICE’s highest cooling power D.R. system large amounts of access for experimental needs, such as special wiring coaxial cables, rotators and drive rods, wave guides.

See our catalogue for an extensive range of spares for the cryogenic laboratory.
Top Loading into Mixture Dilution Refrigerator System

Top Loading into Mixture (TLM) dilution refrigerator, fast sample change and large range of probes with customisation our speciality gives ICEoxford™ the edge over any competitor with a similar product but prices approximately 35% less than any competitor.

See also DICEPR
Top Loading Probes (Oxford Instruments compatible)  
Product Code: DICEPR  
A high quality probe to suit top loading dilution refrigerator systems produced by any manufacturer. Modular top housing design allows additions, upgrades and modification. Wiring designed and fitted to suit, available on request. As well as a range of sample holders, two standard types, as well as vacuum can, or a rotator mechanism.

See our Cryo bitz catalogue for an extensive range of spares for the cryogenic laboratory.
Cryogenfree Cryostat

- Capable of handling greater than 1W at temperatures below 4.2K, we will fit a 77K(approx) shield, and an OVC.
- Choice of wiring on all systems.
- Sample holder to suit your experiment.

Top Loading Cryogenfree Optical Cryostat

A cryogenfree optical cryostat designed to suit a range of optical studies. Suitable applications include:

- Raman
- Infared
- Visible and ultra-violet spectroscopy
- Photoluminescence
- Photo-conductivity and Electro-optical Studies

Specification:

- Base Temperature: Depends on size of windows
- Sample turnaround Time (Base T to Base T): 1 hour
- Sample Size: 30 mm
- Number of wires: 18
- Sample replacement repeatability: 0.1° rotational
- Sample replacement repeatability: 0.1 mm height
Top Loading into Vapour Cryogenfree Cryostats

A less efficient top loading system for those users that need to have a sample in an exchange gas environment. Allows sample manipulation, e.g., Rotational 2 planes.

Specification:
- Base Temperature: Depends on size of windows and probe design
- Sample turnaround Time (Base T to Base T): 3 hours
- Sample Size: 30 mm
- Number of wires: 18

See our catalogue for an extensive range of spares for the cryogenic laboratory.
Top Loading Cryogenfree VTI System

A top loading cryogen free Variable Temperature system, capable of reaching a continuous base temperature of 1.5K with a full temperature controlled range up to 300K. The continuous flow VTI can be either Static or Dynamic, fully top loading into a 30mm sample space. Uses a simple gas handling / pumping system to circulate a volume of Helium gas.

Base Temperature 1.6K
Components:-
- Closed cycle cooler, vibration reducing bellows fitted, cold head, and compressor
- Cryostat
- 1K low temperature stage
- Probe
- Pumping system
- Temperature controller (automatic) and matched sensors
- 4He gas dumps. With gas handling manifold

Optical Cryogenfree VTI System

A cryogen free continuous Variable Temperature System, with a base temperature of 1.5K, windows can be fitted for use in spectrometry or in beam line Physics. With the possibility of adding ICEoxford’s QL technology.

Base Temperature 1.6K
Components:-
- Closed cycle cooler, vibration reducing bellows fitted, cold head, and compressor
- Cryostat
- 1K low temperature stage
- Pumping system
- Temperature controller (automatic) and matched sensors
- 4He gas dumps. With gas handling manifold

Options / Customisation:-
- Further vibration isolation
- Line of sight ports
- Optical Window additions / changes
- Additional Wiring
- Coaxial cables
- Wave guides
- ICEoxford QL system
Cryogenfree 3He System

A compact cryogenfree 3He system, sample in vacuum, uses closed cycle cooler with vibration eliminated by a bellows system. A 1K stage allows full condensation of the 3He charge, this extends the hold time at a base temperature of 300mK to 40 hours, and gives a fast regeneration time. The temperature range for this system is 300mK to 300K temperature control across the range.

Components:
- Closed cycle cooler, cold head, and compressor
- Cryostat
- 1K and 300mK low temperature stages.
- Pumping system
- Temperature controller (automatic) and matched sensors
- 3He and 4He gas dumps. With gas handling manifold

Options / Customisation:
- Further vibration isolation
- Additional Wiring
- Coaxial cables
- Wave guides
- Line of sight ports
- Optical Windows

Probe additions:
- Additional Wiring
- Coaxial cables
- Wave guides

See our catalogue for an extensive range of spares for the cryogenic laboratory.
Cryogenfree Dilution Refrigerator System

A range of compact cryogen free Dilution Refrigerator systems, sample in vacuum, using GM closed cycle cooler with vibration elimination by a bellows system or a pulsed tube Cooler.

A 1K stage allows full condensation of the 3He/4He mixture charge, this circulating mixture is controlled by the ICE\textsuperscript{CUBE} gas handling system and controller.

The base temperature for this range as low as 7mK with temperature control up to 4.2K (up to 300k optional) and a range of cooling powers up to 400\textmu W.

Components:-
- Closed cycle cooler, cold head, and compressor
- Cryostat
- 1K and 300mK low temperature stages.
- Pumping system
- Temperature controller (automatic) and matched sensors
- 3He and 4He gas dumps. With gas handling manifold

Options / Customisation:-
- Further vibration isolation
- Additional Wiring
- Coaxial cables
- Wave guides