

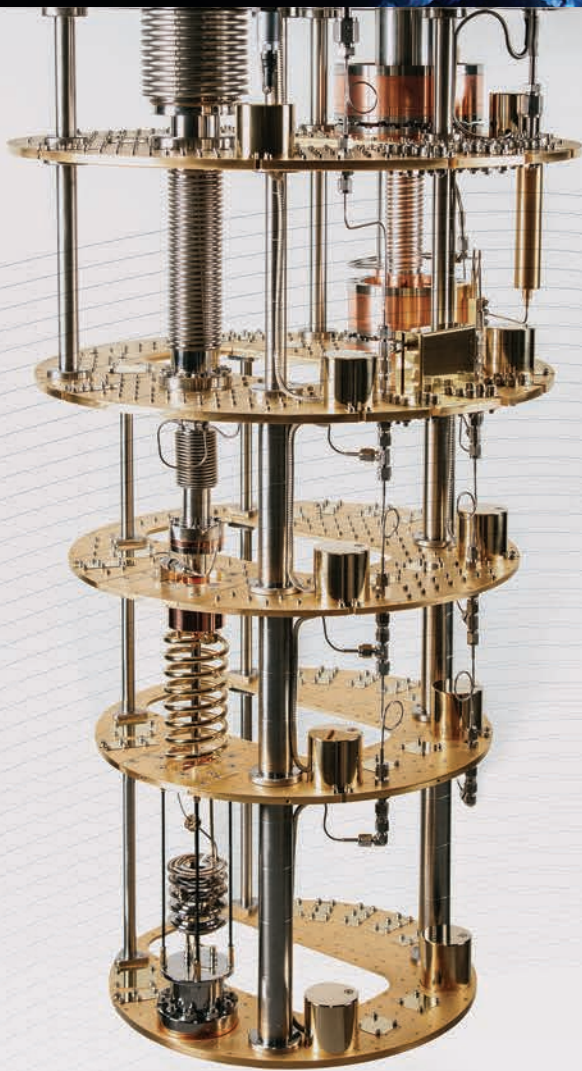
# Proteox™

Next Generation Thinking



The **Proteox™** dilution refrigerator from Oxford Instruments  
A step change in system modularity

The Proteox™ dilution refrigerator enables a step change in Cryofree® system modularity - designed for enhanced adaptability, reliability and increased experimental capacity.



### Maximise system value

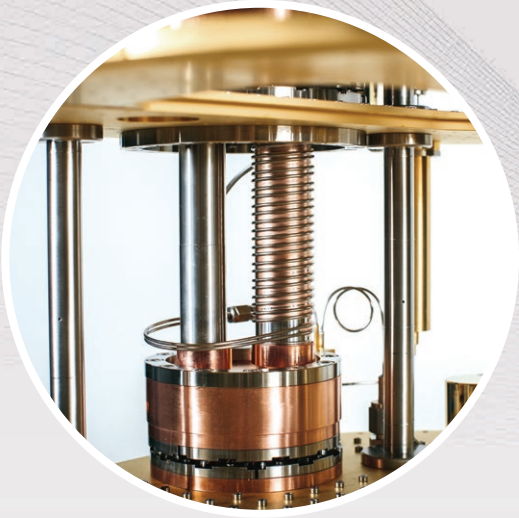
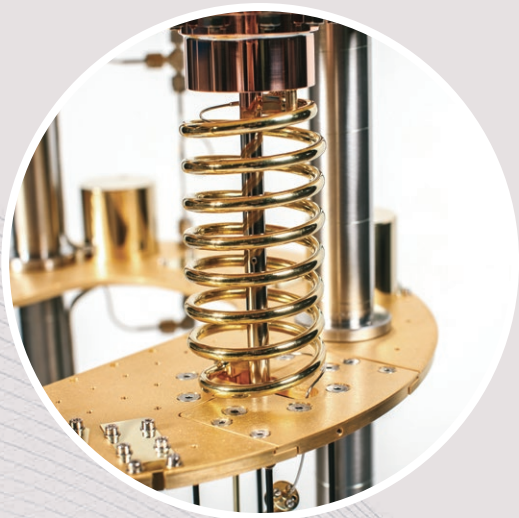
Customisable, self-supporting Secondary Insert enhances adaptability to varied application requirements and enables rapid exchange of full experimental set-ups.

### Multi-user and multi-experiment

DC wiring, coaxial wiring, cold electronic components and samples can be fully integrated on to multiple Secondary Inserts for easy removal, modification and exchange.

### Future-proof investment

Fully cross-compatible and upgradeable Secondary Inserts can be exchanged between current and future systems in the Proteox family.



### Greater control

A patented gas gap heat switch system provides active control of thermal conductivity between plates

### Fast, tuneable cool down

When combined with our bottom loader technology, it enables cool down of sample pucks from 300 K.

### High temperature operation

With independent control of the experimental plate in excess of 30 K and fast recovery to base temperature



### Unlock new applications

Increased capacity for components, experimental services and sample mounting to facilitate Qubit scale-up and QIP applications.

### High input/output capability

Enables high input/output applications through abundant line-of-sight (LOS) access. Up to 2 × ISO100 ports on the Secondary Insert, 2 × KF40 and 2 × KF25 on the Primary Insert.

### Extensive experimental volume

Large 360 mm diameter mixing chamber plate, combined with increased spacing to provide a large experimental volume.



### Reliability and convenience

New gas handling system delivers increased reliability and longer service intervals. This is combined with a new, powerful software control system.

### Simple, powerful software

- Web-based, platform-independent, control software
- Published API interface allows full programmatic control
- Event log tracking
- Powerful system logfile visualisation
- Smart session management for multi-user access
- Secure database for logging of system data

### Performance where you need it

Low base temperatures and high cooling power to support increased capacity.

500  $\mu$ W dilution unit:

- Base temperature: < 10 mK
- Cooling power at 20 mK: 12  $\mu$ W
- Cooling power at 100 mK: > 450  $\mu$ W

# The Proteox™ Secondary Insert is a customisable, self-supporting module to enable installation and exchange of full experimental set-ups.

## Full experiment modularity

Moving beyond standard access ports, the Secondary Insert can accommodate full experimental set-ups, including DC wiring, coaxial wiring and cold electronic components. The flexible, modular format enhances adaptability to varied application requirements.

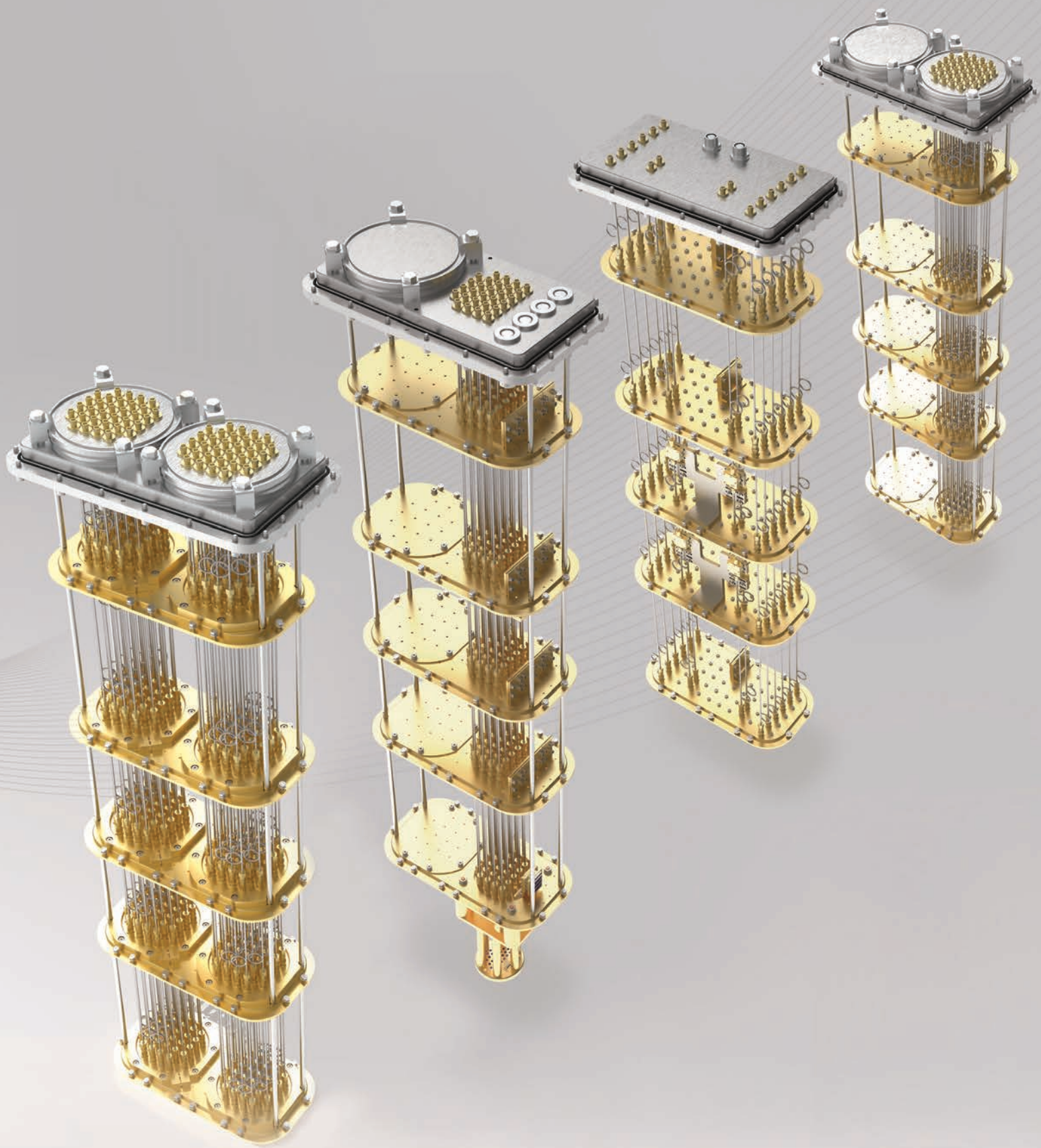
## Optimised for ease of use

- Side loading for rapid experiment exchange and low ceiling height installations
- Self-supporting plates maintain wiring and components as a single assembly

## Configure for your application

The Secondary Insert provides a large 117 mm × 253 mm rectangular LOS access port. This can be configured as a single customisable plate, or with 2 × ISO100 ports and a range of standard options.

- Mount wiring and components directly onto the Secondary Insert for unrivalled flexibility, with customisation to suit experimental set-up
- Custom configurations allow for increased coax capacity of up to 128 UT85 lines per insert



## Extensive wiring options

Wide selection of factory installed wiring. This has been cryogenically cycled, factory tested and benefits from the full 3-year system warranty.

## Flexible wiring

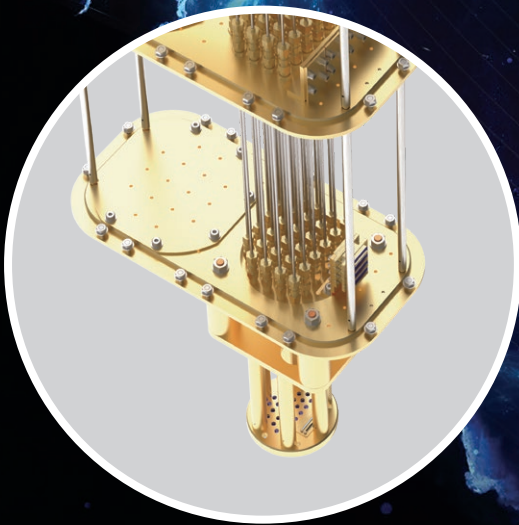
- 24-way twisted-pair DC looms with Cu Constantan or NbTi conductors
- Flexible coaxial (S1) wiring for use up to 500 MHz
- Single-mode and multi-mode optical fibres
- Thermo-coaxes for effective filtering of high frequency noise
- Low impedance looms suitable for nano positioning piezo devices

## Line-of-sight wiring

- UT34, UT47 & UT85 coax with SMA or SK connectors for 18 GHz or 40 GHz bandwidth operation
- Range of coax conductors including stainless steel, CuNi and NbTi
- Heat sinking using bulkhead connectors at all experimental plates with optional 0 dB attenuators for efficient conductor thermalisation

## Signal conditioning

- Selection of attenuators for low noise quantum computing applications
- Low pass filters for low electron temperature and low noise for integration, directly onto the Secondary Insert



## Integrate sample exchange

The Secondary Insert can be ordered with our patented bottom loading system as an option. This will allow rapid sample exchange and can be coupled with magnet integration.

# Options available to enhance the utility of your system with customisable features for specific application.

## Sample pucks for rapid exchange

Our patented, market leading sample loading mechanism allows for fast and easy sample exchange, without the need to warm the entire system to room temperature:

- Loading a sample puck takes less than 15 minutes and the system automatically cools back to base temperature
- Up to 28 RF and 96 DC connections on a single sample puck
- Ideal solution for multi-user facilities since different experiments can be prepared in multiple sample pucks
- Patented loading concept allows for safe and easy operation

## SampleProtect system secures against ESD

SampleProtect enables grounding or bias of samples during sample exchange to safeguard your experiments. It provides users with an end-to-end method of protecting sensitive samples from accidental electrostatic discharge (ESD).

System can be used over a wide variety of temperatures with all of the Oxford Instruments product range and new experimental measurement probes.

High quality, fully earthed cables for low level signals:

- Low noise
- High attenuation shielding
- Low cross-talk
- BNC or Twinax option
- 24 connectors and 12 twisted pairs



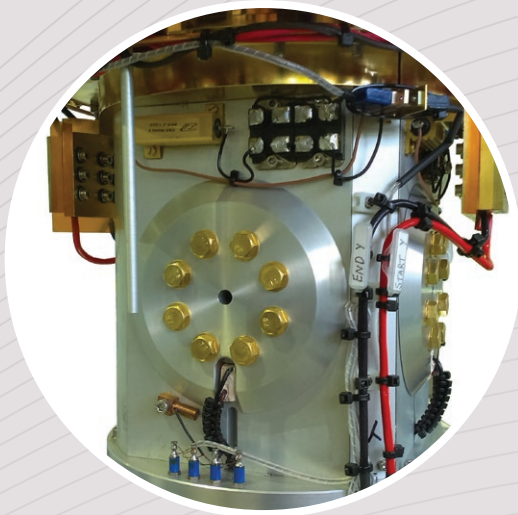
## Magnet options

In-house design, manufacturing and support of both the dilution refrigerator and the superconducting magnet provides a fully integrated system with unified software control and data logging.

## Solenoid magnets

Range of field strengths from 1 T to 14 T

- High filament count for reduced size, high sweep rate and low flux jumping
- Large bore sizes from 77 mm to 152 mm diameter across the solenoid magnet range
- Maximum sweep rate of 2 Amp/minute
- Quench protected



| Magnet options     |           | Bottom loader puck options |                      |
|--------------------|-----------|----------------------------|----------------------|
| Magnetic field (T) | Bore (mm) | Puck diameter (mm)         | Puck connectivity    |
| 14                 | 77        | 60                         | up to 22 coax, 48 DC |
| 12                 | 90        | 72                         | up to 28 coax, 96 DC |
| 12                 | 77        | 60                         | up to 22 coax, 48 DC |
| 10                 | 90        | 72                         | up to 28 coax, 96 DC |
| 8                  | 77        | 60                         | up to 22 coax, 48 DC |
| 5                  | 152       | 72                         | up to 28 coax, 96 DC |
| 1                  | 100       | 72                         | up to 28 coax, 96 DC |

## Vector rotate magnets

- Three-axis vector magnets with a vertical field up to 9 T and a horizontal field up to 3 T
- 90 mm large bore across all high field vector rotate options

| Magnet options     |           | Bottom loader puck options |                      |
|--------------------|-----------|----------------------------|----------------------|
| Magnetic field (T) | Bore (mm) | Puck diameter (mm)         | Puck connectivity    |
| 9,1,1              | 90        | 72                         | up to 28 coax, 96 DC |
| 6,2,2              | 90        | 72                         | up to 28 coax, 96 DC |
| 6,3,1,5            | 90        | 72                         | up to 28 coax, 96 DC |
| 6,2,1              | 90        | 72                         | up to 28 coax, 96 DC |
| 6,1,1              | 90        | 72                         | up to 28 coax, 96 DC |

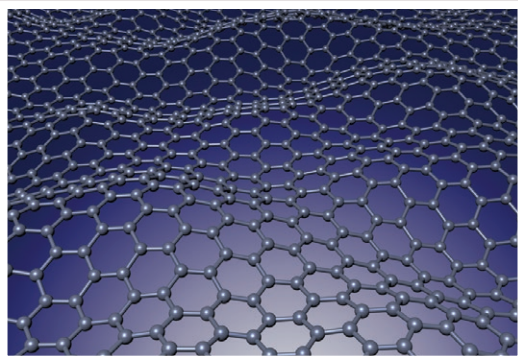
## Customised magnets

- Customised options for improved homogeneity, persistence stability or field resolution
- Specialised capability for advanced magnet design including split pair and actively shielded magnet systems



## Quantum Technologies

- Quantum Sensing and Metrology
- Quantum Transport Measurement
- Quantum Computing
- Qubit Development



## Low Dimensional Materials

- Topological Insulators
- Graphene and 2D Materials
- Quantum Dots
- Nanowires



## Condensed Matter Research

- Bulk Magnetism
- Superconductivity
- Neutron Scattering
- Fermiology



## Probing and Sensing

- Flux Vortices
- SPM, STM, AFM
- Low Temperature Detectors
- Spintronics

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