



## Nitrogen, continuous flow optical cryostat

Nitrogen-cooled, the MicrostatN vacuum loading continuous flow cryostat offers a wide temperature range from 80 K to 500 K. It also facilitates experiments requiring short working distances.

### Applications

The compact size, lightweight and excellent optical access make the MicrostatN ideal for microscopy based measurements such as:

- Microscope based spectroscopy (micro-luminescence, micro-Raman and micro-FTIR)
- Optical microscopy (brightfield, darkfield, phase contrast and confocal measurements).
- Enables temperature dependent studies

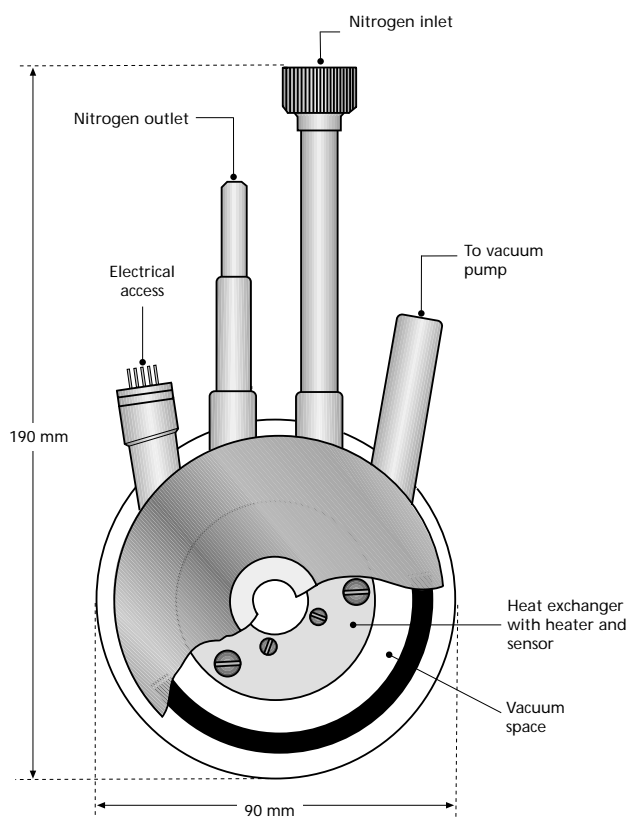
### Components

The MicrostatN system consists of:

- MicrostatN continuous flow optical cryostat
- Sample holder(s)
- Transfer tube
- ITC temperature controller
- Gas flow pump
- Gas flow controller
- Nitrogen dewar

## Features and Benefits

- **Wide temperature range** – rapid response to required temperature changes from 80 K – 500 K permits the study of processes that cannot be observed at room temperature
- **Economical use of cryogenics** – easy to use liquid nitrogen based system to provide rapid cool down: <10 mins to 80 K.
- **Adjustable sample holder** – accommodating large and multiple samples, yet also facilitating a minimal working distance of less than 3 mm to samples.
- **Easy integration into commercial microscopes** – light weight and compact.
- **Range of demountable windows** – for reflection and transmission experiments.
- **Experimental flexibility** – may be operated in any orientation.
- **Easy to use** – simple operational setup



MicrostatN dimensions



## Photo-Luminescence measurements

F. De Weerd and A. Anthonis of the Diamond High Council (HRD) in Antwerp (Belgium) are using the MicrostatN cryostat for Photo-Luminescence measurements. The excellent long term stability enables the examination of luminescence properties of atomic defects in diamonds and to record line and area scans. These measurements are used to determine whether a diamond is treated to enhance its appearance or whether it is naturally coloured.

## Operation

The MicrostatN is a particularly simple system to operate. A transfer tube links a liquid nitrogen dewar to the MicrostatN transfer tube entry. The MicrostatN is designed with a small heat exchanger on which the sample platform is thermally anchored. The MicrostatN exhaust line is fitted with a gas flow controller and a small gas flow pump. With the controlled flow of nitrogen, the MicrostatN quickly cools down to 80 K (typically in 10 minutes). When the base temperature is reached, temperature control is maintained by controlling the flow of liquid nitrogen and the heater power via the Oxford Instruments ITC601 temperature controller. The sample is changed with the cryostat at room temperature, the vacuum released and the outer casing removed.

## Optical Performance

A single thin window is used to separate the temperature controlled sample from ambient. This results in a short working distance of less than 3 mm. This short working distance and the wide angle of admittance ensure that the MicrostatN is ideal for temperature dependent studies, where high image magnification is essential.

Measurements with both reflected and transmitted light are possible. For reflection experiments, the cryostat is fitted with a single window; a second is added for transmission measurements. In the second case, the position of the sample may be adjusted to optimise the working distance for both the objective and condenser lenses.

If greater access to the sample is required (for example large or multiple samples) a window with 25 mm clear access may be fitted. However, the larger diameter windows necessitates an increase in thickness to withstand the vacuum forces. For this reason, unless large access is specifically required, the thinner window is fitted.

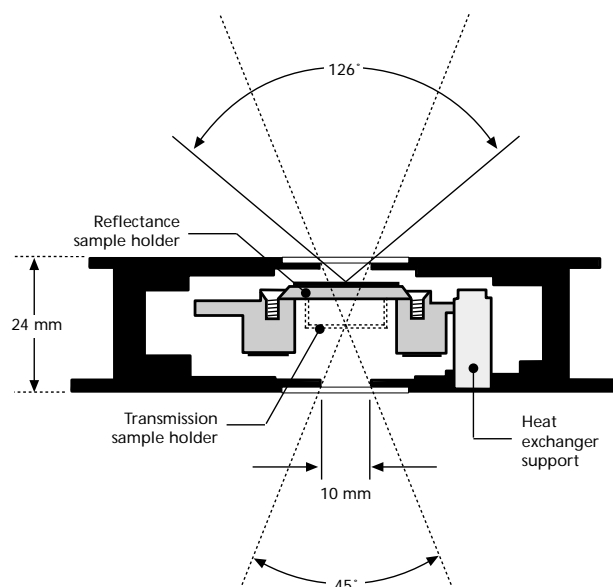
Thinner windows have the following advantages:

- The working distance (from the outside of the cryostat to the sample) may be reduced, allowing higher magnification lenses to be used.
- Spherical aberration is minimised.

## Window options

A 0.5 mm thick Spectrosil B quartz window is fitted as standard. However, a wide range of window materials are available on request. For example, for infrared measurements ZnSe or KRS5 windows may be fitted (see separate windows data sheet).

## MicrostatN Specifications



Schematic cross-section view of MicrostatN. Note the window aperture and angles of admittance for 0.5 mm thick windows.

### Optical specifications

	Reflectance	
Window thickness	0.5 mm	1.5 mm
Clear access diameter	10 mm	25 mm
Sample holder to window top surface	3 mm	3 mm
Angle of admittance (to surface of sample holder at centre)	126°	160°
Max sample thickness	2 mm	1 mm
Max sample diameter	20 mm	20 mm

*All dimensions are approximate and relate to the top window with plane sample holder*

### Standard Specification

### Description

Cooling medium	Liquid nitrogen
Operating temperature range	80 K to 500 K
Temperature stability	+/- 1 K from 80 K to 120 K +/- 0.5 K from 120 K to 500 K
Nitrogen consumption	<0.6 lhr <sup>-1</sup> (at 80 K)
Cool down time	From ambient to 80 K with transfer tube cold = <10 mins
Sample holder drift at constant temperature	+/- 1.0 µm (see note 1)
Maximum size of sample	20 mm dia x 2 mm (in reflection) 15 mm dia x 8 mm (in transmission)
Sample window material	Spectrosil B fused quartz Other materials available on request
Standard temperature sensor	Platinum resistor
Sample change time	~30 mins
Weight	0.4 kg

*1. Approximate measurement. The stability is neither measured nor guaranteed and will be dependent upon the final system's configuration and the environment that the equipment is used in.*

## System Components

MICRON	MicrostatN for microscopy and optical spectroscopy
MNSH1	Flat, plain sample holder
MNSH2	Flat, optical sample holder
QNR05	Top flange with 0.5mm thick Spectrosil B window for reflection
TTLMIC	Transfer Tube
GF3	Gas flow pump
VC51	Gas flow controller with nitrogen flow meter
ITC601PT	Temperature controller
CC1	3 m cryostat cable, 10-pin connector
ND2	Nitrogen dewar (2.5 litre capacity)
RP15	2 stage rotary pump (1.5 m <sup>3</sup> hr <sup>-1</sup> ) and pumping line
FT	Foreline trap

## Standard Options

MICRONIF	Interface plate for attaching MicrostatN to microscope translation stage
QNR15	Top flange with 1.5 mm thick Spectrosil B window for reflection
QNT05	Bottom flange with 0.5 mm thick Spectrosil B window for transmission
QNT15	Bottom flange with 1.5 mm thick Spectrosil B window for transmission
MNSH3	Transmission sample holder with 10 mm clear aperture
LX4	4-PIN Electrical feed wire to heat exchanger
ITC502/ITC503	Temperature controller

## Oxford Instruments Superconductivity

UK  
Tubney Woods, Abingdon  
Oxfordshire OX13 5QX  
Tel: +44 (0)1865 393 200  
Fax: +44 (0)1865 393 333

China  
Rm. 14-F, No.1 Plaza  
No.800 Nanjing East Road  
Shanghai 200001  
Tel: +86 21 63608530/1/2/3  
Fax: +86 21 63608535

Germany  
Otto-von Guericke Ring 10  
D-65205 Wiesbaden  
Tel: +49 6122 937 171  
Fax: +49 6122 937 175

Italy  
Via Leone Tolstoj 86  
20098 San Giuliano  
Milanese  
Milan  
Tel: +39 02 98 2215  
Fax: +39 02 98 2414

Japan  
Haseman Building  
2-11-6 Tomioka, Koto-ku  
Tokyo 135-0047  
Tel: +81 03 5245 3261  
Fax: +81 03 5245 4472

Spain  
Avda Mata Piñonera, 2  
28700 San Sebastian de los Reyes  
Madrid  
Tel: +34 91 659 0740  
Fax: +34 91 654 6794

U.S.A.  
130A Baker Ave. Ext.  
Concord, MA 01742-2121  
Tel: +1 978 369 9933  
Fax: +1 978 369 6616

E-mail:  
[superconductivity@oxinst.co.uk](mailto:superconductivity@oxinst.co.uk)

Visit our web site at  
[www.oxford-instruments.com](http://www.oxford-instruments.com)

This publication is the copyright of Oxford Instruments Superconductivity Limited and provides outline information only which (unless agreed by the company in writing) may not be used, applied or reproduced for any purpose or form part of any order or contract or be regarded as a representation relating to the products or services concerned. Oxford Instruments' policy is one of continued improvement. The company reserves the right to alter, without notice, the specification, design or conditions of supply of any product or service. Oxford Instruments acknowledges all trade marks and registrations

©Oxford Instruments Superconductivity Limited, 2003. All rights reserved.

Reference No: HCC OI631 08/03

UK sites of Oxford Instruments Superconductivity Limited, operate a Quality Management System approved to the requirements of BS EN ISO 9001.



Certificate No Q4118

**OXFORD**  
INSTRUMENTS