

Microscopy Cryostat System

RC102-CFM Microscopy Cryostat **fast cooldown, high efficiency,** **lowest thermal drift, excellent temperature** **stability and ultra low vibration**

Optical cryostat for use in microscopy, spectroscopy, wafer probing, IC testing and more.

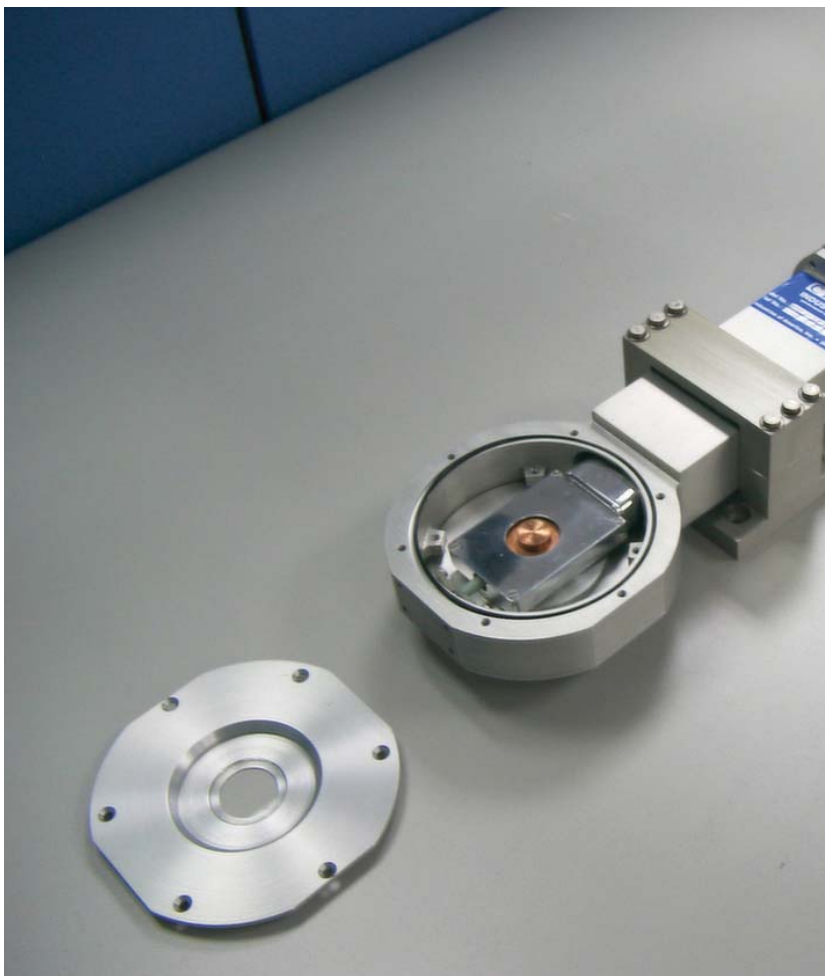
Easy to operate and 'Performance by Design'. Open the flow valve; insert the transfer line into a storage dewar and cooling commences. Operates with liquid helium or nitrogen.

Interchangeable sample holders provide height adjustment and optimize the cryostat for varying samples and different experimental configurations. The sample can be set to be very close to the window.

Highly efficient detachable stainless steel flexible transfer line connects the microscopy WORKSTATION to a storage (transport) dewar. Incorporated in the system is our XE insulating technology for the highest in efficiency.

Add a magnetic field now or later. Versatile design allows magnet and microscopy cryostat to be used together or independently. Select a 2 Tesla or 5 Tesla superconducting magnet field!

- Large clear view windows
Reflection and transmission
Extra thin windows available
0.5 mm (0.020")
1.5 mm (0.06") is standard
- Short working distance
Sample height adjustment up to the window
- Ultra low nanometer drift and sample vibration
- Sturdy strong stable sample support
- 'HiRes-NOMOVE' design results in near zero movement due to thermal contraction
- Operating temperature range - <4 to 325K
- Efficient with 'Push' (pressurized storage dewar) or 'Pull' (small vacuum pump operation)
- Use either liquid helium or nitrogen
- Go THIN - 30 mm thick
'THIN' fits more microscopes
- Compact, lightweight and portable, easily integrated into microscopes and spectrometers
- Efficient economical operation - lower liquid helium consumption using our break-through XE insulating system
- Versatility - expansion kits include 2 inch wafer probing, DIP IC testing, magnetic fields



√ Compact - lightweight and portable, easily integrated into microscopes and spectrometers

√ Efficient - lower cryogen consumption, economical operation and fast cooldown

√ Flexible - operates in any orientation

√ Optimized - adjustable close working distance to sample allows proper positioning of high power lens

√ Reliable - no diaphragm pump required
- based on our popular and proven RC102 Cryogenic Workstation

√ Variable temperature - <4K to 325K
(500K optional)

√ Versatile - Use either liquid helium or nitrogen - 'push-or-pull' operation

The MICROSCOPY WORKSTATION

The RC102-CFM is a 'sample in vacuum' cryostat. The sample holder is located in vacuum. A flow of liquid helium or nitrogen cools the sample, which can be adjusted away from or very close to the window using vari-height thread in sample holders. For high rigidity and stability, the sample is supported by opposing tension supports.

Liquid cryogen is delivered to the sample mount through the vacuum insulated transfer line. An adjustable needle valve provides flow rate control. Connect the heater on the sample mount to the temperature controller for automatic variable temperature operation.

The WORKSTATION can be operated in any orientation. The standard system includes a six (6) foot (8 foot optional) flexible transfer line with a 50 inch long (60 inch optional) storage dewar leg.

The typical setup consists of the RC102-CFM cryostat, a liquid helium (or nitrogen) storage dewar, helium gas cylinder with pressure regulator and a vacuum pump. A stainless steel flexible transfer line is supplied with the system.

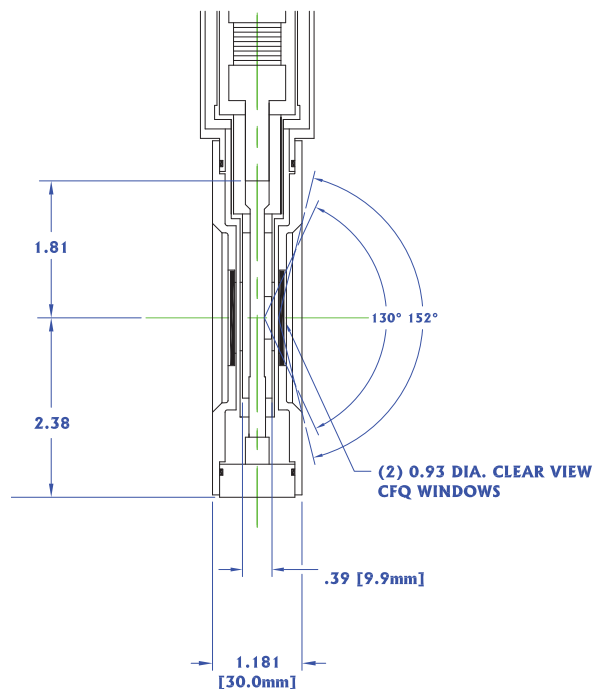
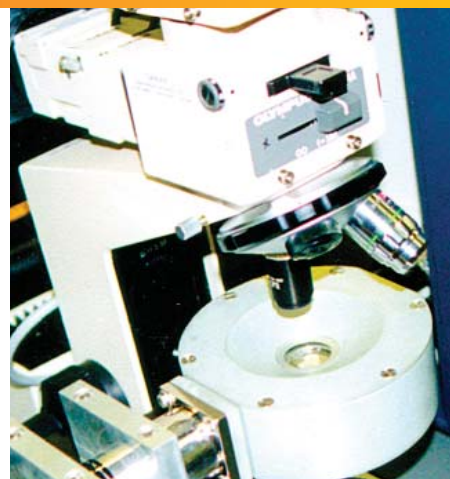
The transfer line leg inserts into the liquid cryogen. A small pressure is used to transfer the liquid out of the storage dewar, through the transfer line and directly to near the sample mount. Alternately, a small vacuum pump can be used to 'pull' the liquid helium from the storage dewar. A flow control valve regulates the cryogen flow. Pressure inside the storage dewar cryogen reservoir can be adjusted using a helium gas cylinder. An activated charcoal cryopump built into the transfer leg will automatically pump when inserted into liquid helium or low pressure nitrogen dewar, maintaining excellent vacuum during extended periods of operation. The transfer line quick disconnects to and from the microscopy WORKSTATION.

Electrical connections to the sample are made through the o-ring sealed ports located on the instrumentation housing. A spare port is provided for future requirements. For safety, the shroud and transfer line are protected against overpressure by pressure reliefs.

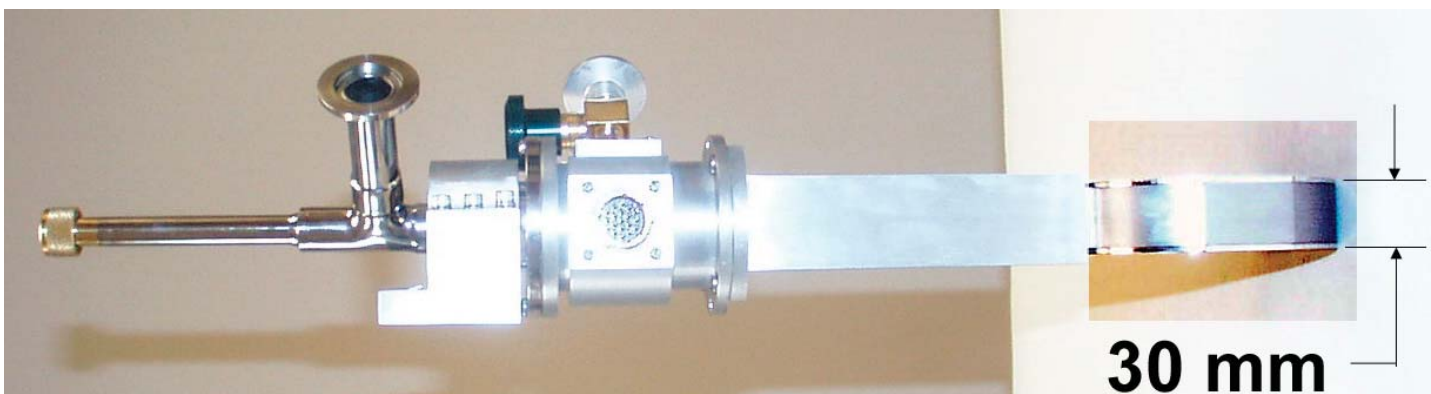
The evacuation valve for the transfer system is located above the valve control knob. The evacuation valve for the sample region is on the instrumentation housing. The vacuums are completely independent.

Windows at 0 and 180 degrees provide optical access. For reflection, the total angle of acceptance is 130 - 152 degrees, depending on sample position. For transmittance, the angle used quartz, 1.5 mm thick (0.5 mm thick option is available); suprasil, ZnSe and other window materials can be selected. The standard clear view aperture is 24 mm diameter (13 mm for 0.5 mm thick windows). The adjustable holder allows the sample to be moved right up to the window. Samples can be mounted through the radiation shield opening or half the radiation shield is removable to allow full access.

Variable temperature is automated using an electronic temperature controller. A heater is imbedded in the sample holder. Set the temperature into the controller and obtain the desired temperature. Operation below 4K is achieved by reducing the flow pressure by pumping on the helium vent.



Temperature range	3.2 K to 325 K up to 500K optional
Cool down time	20 minutes typical
Temperature stability	Better than +/- 50 mK
Weight	3.2 kg
Vibrational amplitude	20 nm
Drift (over 1 hour)	+/- 150 nm
LHe usage	~0.7 l/hr at 5K less at higher temperatures



PUSH OR PULL?

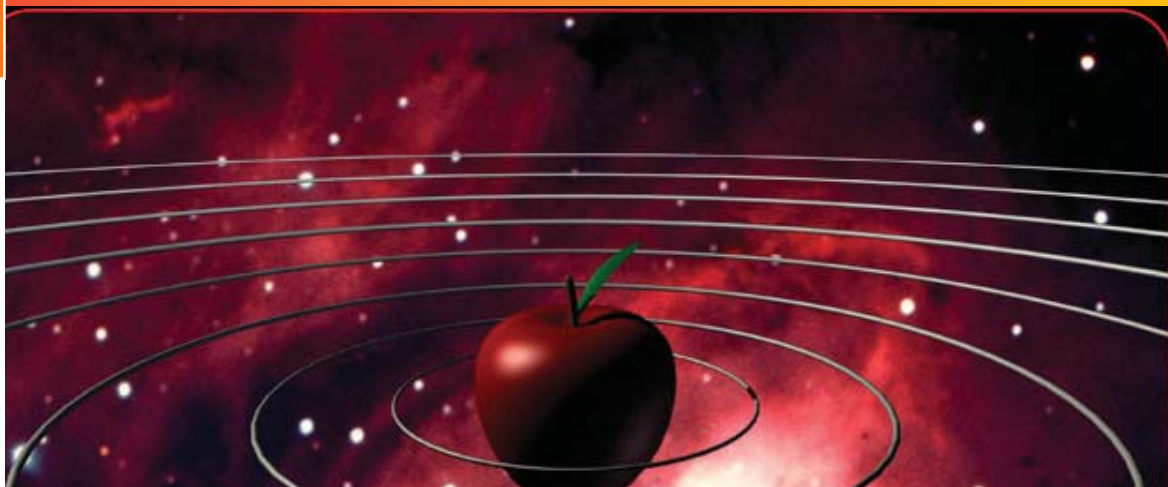
CRYO Industries flow cryostats can be operated in 'push' or 'pull' operating modes. Liquid cryogen helium or nitrogen can be drawn from the main reservoir into the sample region by either:

"Pushing" - A small pressure in the storage dewar 'pushes' the cryogen from the storage dewar into the transfer line to the sample mount.

Or,

"Pulling" - Sucking liquid from the main storage dewar to the cold finger by using a small pump. The liquid helium is drawn from the main reservoir of the storage dewar into the sample mount using a small diaphragm (gas flow) pump, while maintaining the storage dewar near one atmosphere.

- 3.2 K to 325 K operating temperature range
- Operates with either LHe or LN₂
- Operates in Push or Pull modes
 - Push - storage dewar overpressure = 'push'
 - Pull - pump = 'pull'
- (2) 0.93 inch [23.6 mm] diameter windows x 0.062 inch [1.59 mm] thick optical suprasil
0.020 inch [0.5 mm] thick window optional
- Windows top and bottom
- Adjustable sample holder
Can be adjusted right up to the window
- 50 ohm heater installed on sample mount
- 19-pin hermetic electrical feedthrough
- Spare blank feedthrough port
- NW25 vapor pumping port & vacuum valve with safety pressure relief
- Flexible stainless steel transfer line with flow control valve
- Silicon diode temperature sensor installed on sample holder near the sample
- 30 mm thin
- Solid - internal support spacer



NOMOVE

What is a NOMOVE?

The sample holder is supported radially with opposite and equal support forces. The supports are rigid and anchored directly to the outer vacuum jacket. There is no physical support to the sample holder through the cold finger and radiation shield,. The sample is physically decoupled from the internal thermally contracting (moving) cold components.

Thermal contraction is toward the center of the sample, resulting in the lowest movement design. The supports are designed to operate in the elastic region. Supports are rigid and under tension.

Movement toward or away from the window is virtually zero because there is no support component in this z-direction.

Lowest Vibration

High Resolution

NOMOVE

Easy Cryostat Mounting with adjustable position support

Adjust the support close to the microscope for more rigidity or move to fit your setup.

Compact design (30 mm thick) and still with fast cooldown, high efficiency, excellent temperature stability and ultra low vibration levels.

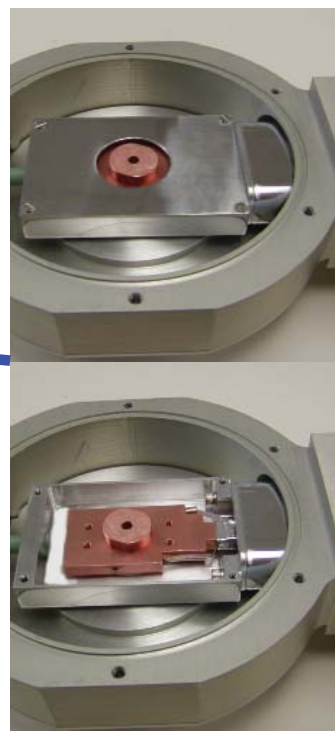
A flow of liquid helium or nitrogen cools the sample, which can be adjusted away from or very close to the window; or adjusted for varying sample thicknesses. The sample holder is supported by opposing tension forces, anchored directly to the outer vacuum shell.



Interchangeable single thread sample holders allow for quick sample change, adjustable distances and selectable diameters and apertures.



Full sample access
Remove the full size cover. The sample can be quickly accessed through the radiation shield. Plus, the radiation shield splits in half to allow fast full access to the sample mount.



Add a Magnetic Field with Narrow Gap Kit or Superconducting Magnet for use with electromagnets

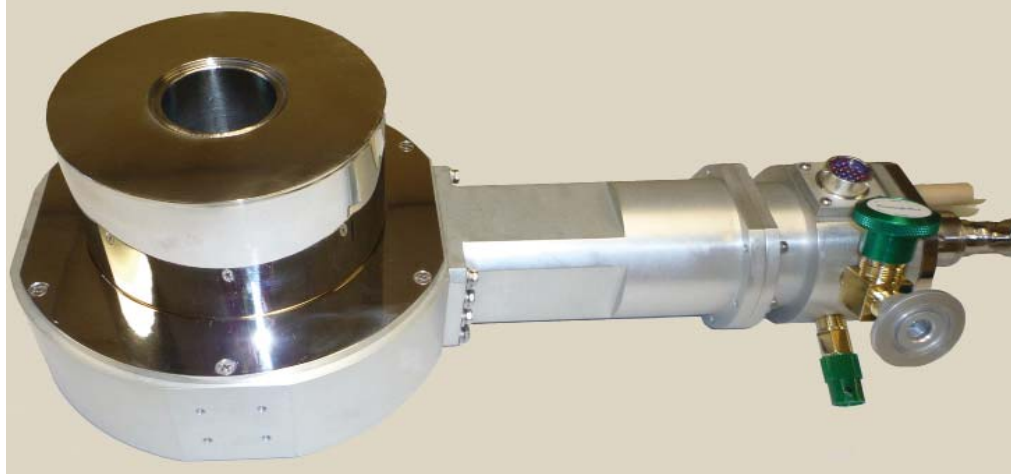
- Fits narrow 1.0 inch gap
- Strain free window mounting (top window)

or

High Temperature Superconducting Magnet

- Mates to top of cryostat - no modifications needed
- High field - select 2 Tesla or 5 Tesla





Micromag 5 Tesla magnet system

Micromag-5 provides a 5 Tesla magnetic field in a Room Temperature Bore (RTB). A compact table top design that mates to the microscopy cryostat and offers high efficiency, easy of operation, ultra low vibration and is also available in a cryogen free design. **Micromag-2** is a 2 Tesla version.

The **Micromag** can be separated from the microscopy cryostat providing independent operation and a high magnetic field in a 1.875" [47.6 mm] diameter bore for use with many other different experiments. An EZ install 'sample extender kit' is available to position the sample in the microscopy cryostat in the center of the magnetic field.

Easy to operate and 'Performance by Design'. Open the flow valve; insert the transfer line into a storage dewar and cooling commences. Efficient detachable stainless steel flexible transfer line connects the microscopy WORKSTATION to a storage (transport) dewar. Incorporated in the system is our XE insulating technology for the highest in efficiency.

The magnetic bore can be orientated horizontally or vertically.

Versatile design allows magnet and microscopy cryostat to be used together or independently. The magnetic field can be added to the microscopy cryostat now or later. Select a 2 Tesla or 5 Tesla superconducting magnet field!

- Large Magnetic Field
Select 5 Tesla or 2 Tesla
- Large Room Temperature Bore (1.87" [47.6 mm])
- Integrates directly to standard microscopy cryostat
- Demounts from the sample microscopy cryostat and is capable of independent operation for other experimental applications
- Magnet cryostat does not need to be physically coupled to sample cryostat
- The magnetic field and magnet bore can be orientated horizontally or vertically, relative to the floor
- Location of magnetic field center only 74.6 mm from top

Magnetic Field	up to 5 Tesla
Homogeneity	+/-1.5% over 10 mm DSV
Sample Temperature Range	3.2 K to 325 K up to 500K optional
Cool down time	~ 4 hours
Helium Consumption	1.0 l/hr vertical 1.3 l/h horizontal 1.0 l/h horizontal with gas flow pump
Weight	10 kg

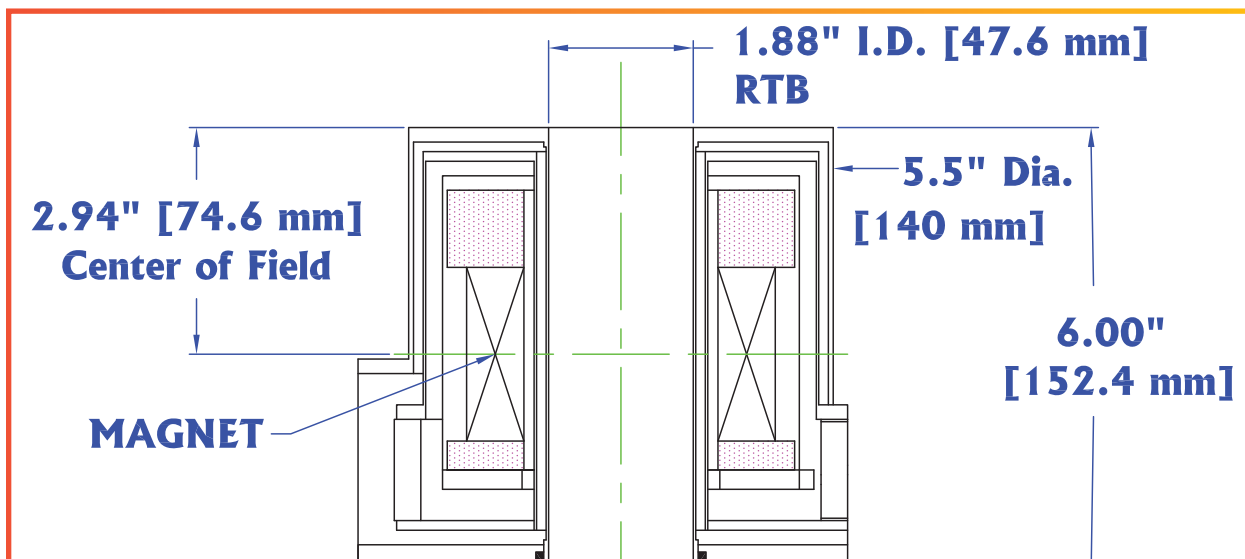
Closed cycle refrigerator can replace magnet flow cryostat for cryogen free superconducting magnet operation!



Extender kit for standard microscopy cryostat - for positioning sample in the center of the magnetic field



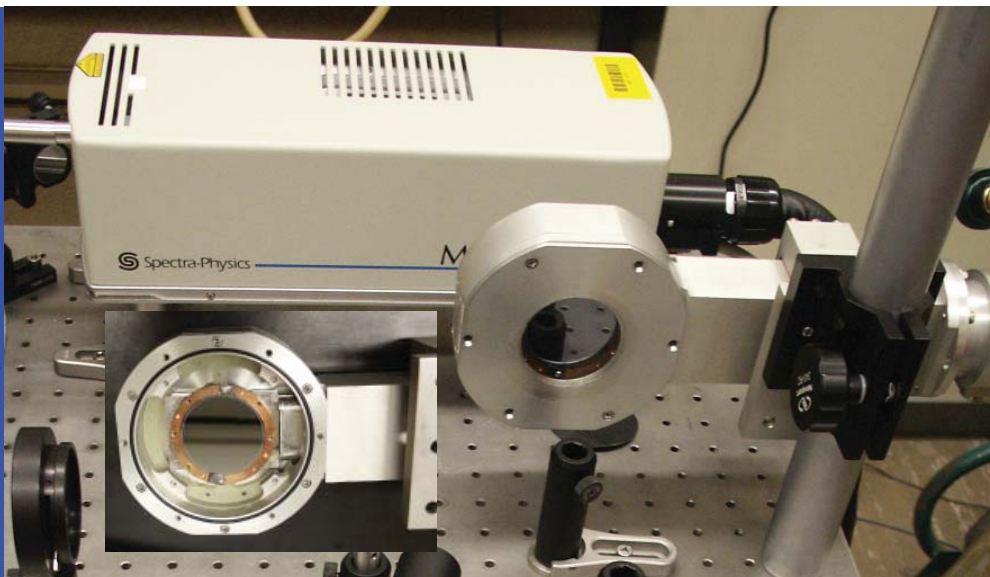
Operates with bore in vertical or horizontal operation
Room Temperature Bore (RTB) fits over microscopy cryostat with sample extender kit installed



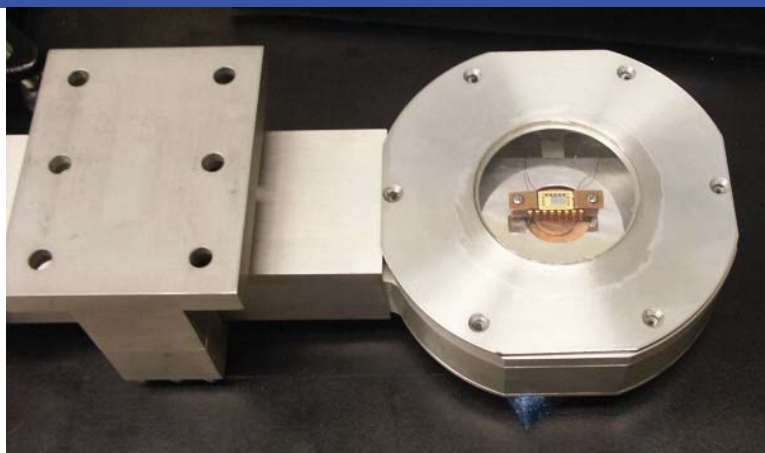
ACCESSORY Wafer Probing Kit for 2 inch wafers

Dual or single wafer
mounting.

Dual mounting al-
lows probing one
side, flip it over and
probe the second
wafer.



ACCESSORY - DIP IC TESTING

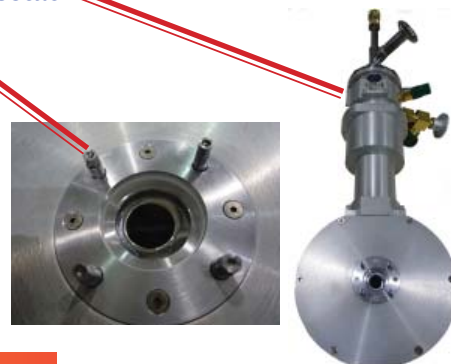


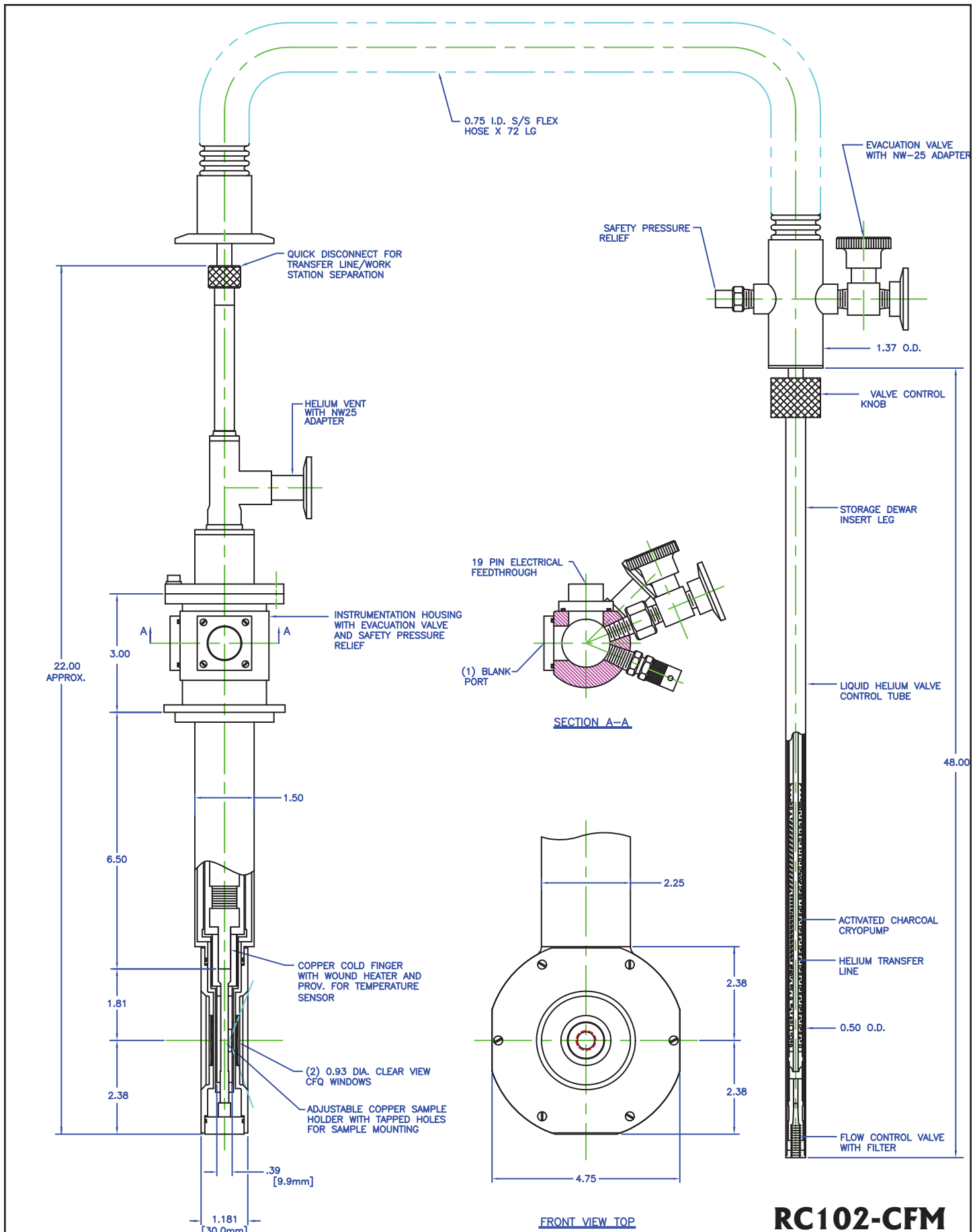
CUSTOMIZE/OTHER CONFIGURATIONS

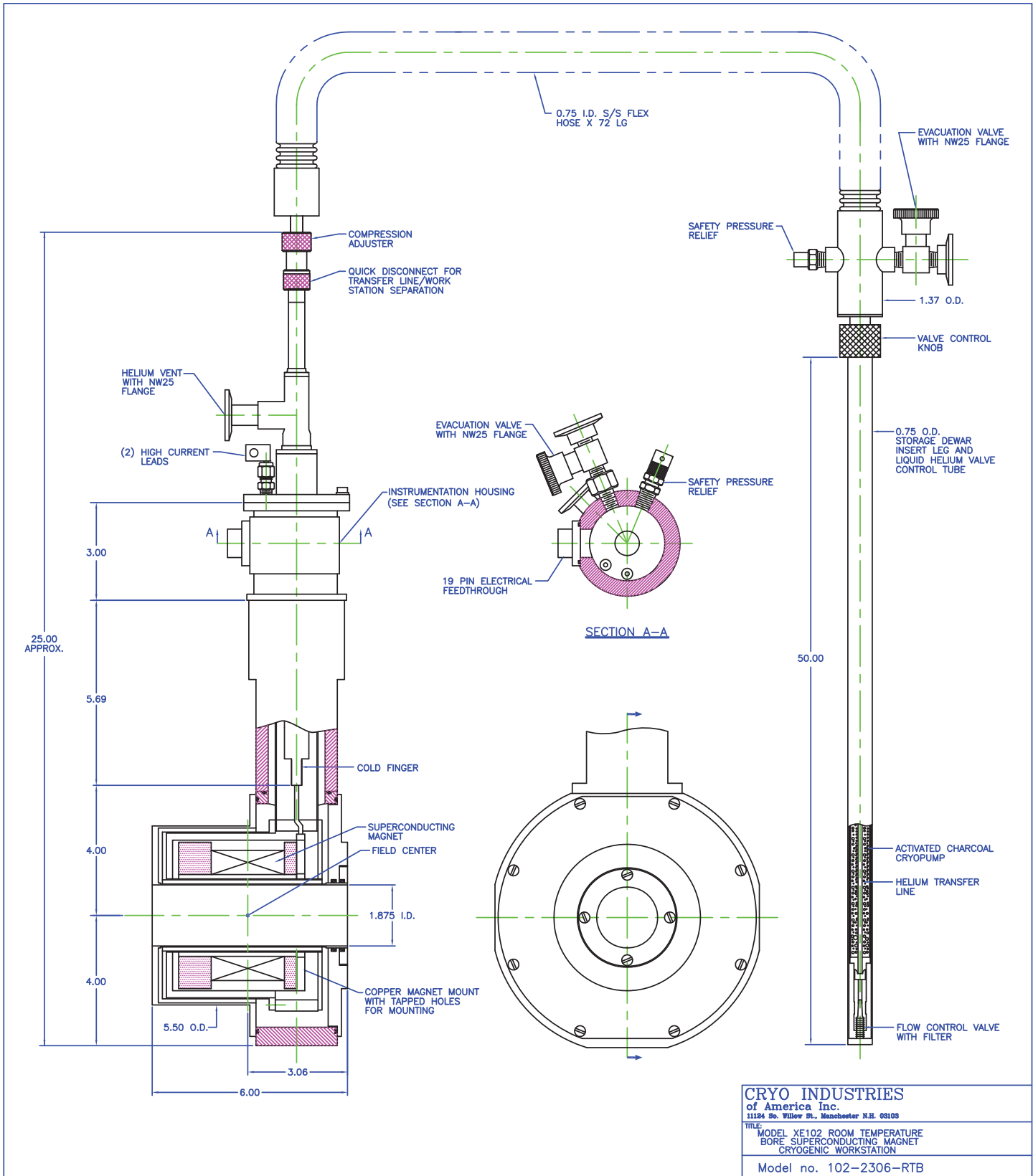
Customization and other configurations are available. Some examples are diamond cell anvil (shown in picture), nano-positioning stage from Attocube, manual external positioning stage, UHV (Ultra High Vacuum) and more.

Diamond cell anvil cryostat

Anvil adjusting rods







CRYO INDUSTRIES
 of America Inc.
 11194 So. Willow St., Manchester N.H. 03103
 TITLE:
 MODEL XE102 ROOM TEMPERATURE
 BORE SUPERCONDUCTING MAGNET
 CRYOGENIC WORKSTATION
 Model no. 102-2306-RTB