



Cryogen Free Superconducting Magnet Systems



Cryo Industries of America, Inc. has over 38 years of experience in designing and manufacturing Superconducting Magnet Systems. Custom designs are our specialty!

Through our team of physicists and engineers we are able to custom design a Superconducting Magnet System that meets your specifications. We also offer many systems to meet any experimental need, such as Mossbauer.

Cryo offers Closed Cycle Superconducting Magnet Systems that integrate innovative design with magnetic fields that range from 2 Tesla up to 15 Tesla (depending on design), you select the magnetic field. Magnet configurations available include Vertical Field Solenoid or Horizontal Field Split Coil magnets.

Cryo offers Superconducting Magnet designs with a clear vertical room temperature bore or a top loading variable temperature insert or both. The magnet is cooled through a Gifford-McMann cooler or a Pulse Tube cooler for low vibration experiments. Typically, one refrigerator is used to cool the magnet and integrated Variable Temperature Insert (VTI).

All complete Superconducting Magnet Systems include:

- Conductivity cooled superconducting magnet
- Removable room temperature bore or variable temperature insert
- Closed cycle refrigerator (G-M or pulse tube) and compressor
- Programmable reversing bipolar magnet power supply
- Integral energy absorber
- Temperature controller
- Temperature sensor(s)

Cryo Industries's 'performance by design' Superconducting Magnet Systems offers many field tested and proven designs throughout the scientific community. Cryo is able to offer continued technical support for the life of the system.

CIA-DRYMAG

The **CIA-DRYMAG** is a cryogen free superconducting magnet system with an integrated variable temperature insert (VTI) that can be configured to meet your experimental needs.

Simple operation..turn-key system.



The **CIA-DRYMAG** features:

- 4K Coldhead - Pulse Tube or GM
- 1.5K - 325K operating temperature range
- Simple Operation
- Optional Gas Handling System
- Upgradeable to accept Helium3 Insert
- You select the magnetic field

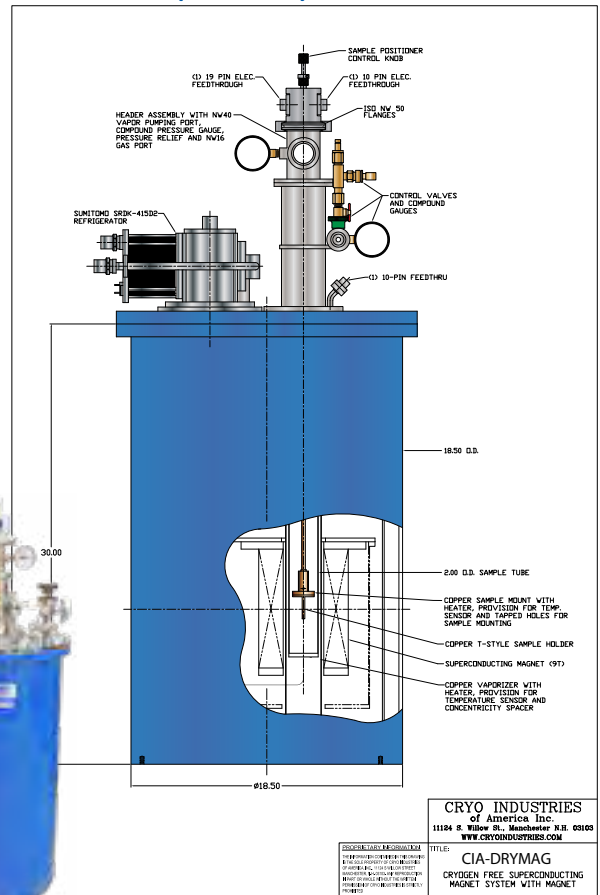
The **CIA-DRYMAG** Superconducting Magnet Systems include:

- Conductively cooled superconducting magnet
- Integrated VTI - sample in dynamic flow
(static exchange gas and vacuum available)
- Top-loading, quick sample change
- Closed cycle refrigerator (G-M or pulse tube)
- Bipolar superconducting magnet power supply
- Temperature controller
- Remote software control

You customize the system:

- Solenoid, Split-Pair, 2-Axis and 3-Axis designs
- Gas handling system available for sample tube pumped helium gas (for operation below 4.2 K)
- Ultra-low vibration designs available
- Future, Upgradeable to 300 mK
(Helium3-Insert top-loads into the VTI)
- Experimental wiring: DC or RF options available
- Rotating Sample Holder (Perpendicular to the Field)

CIA-DRYMAG (SOLENOID)



CIA-DRYMAG_(CONT.)

In the **CIA-DRYMAG (SPLIT-PAIR)** a cryogen free split-pair superconducting magnet is integrated into a tail to provide optical access to the sample.

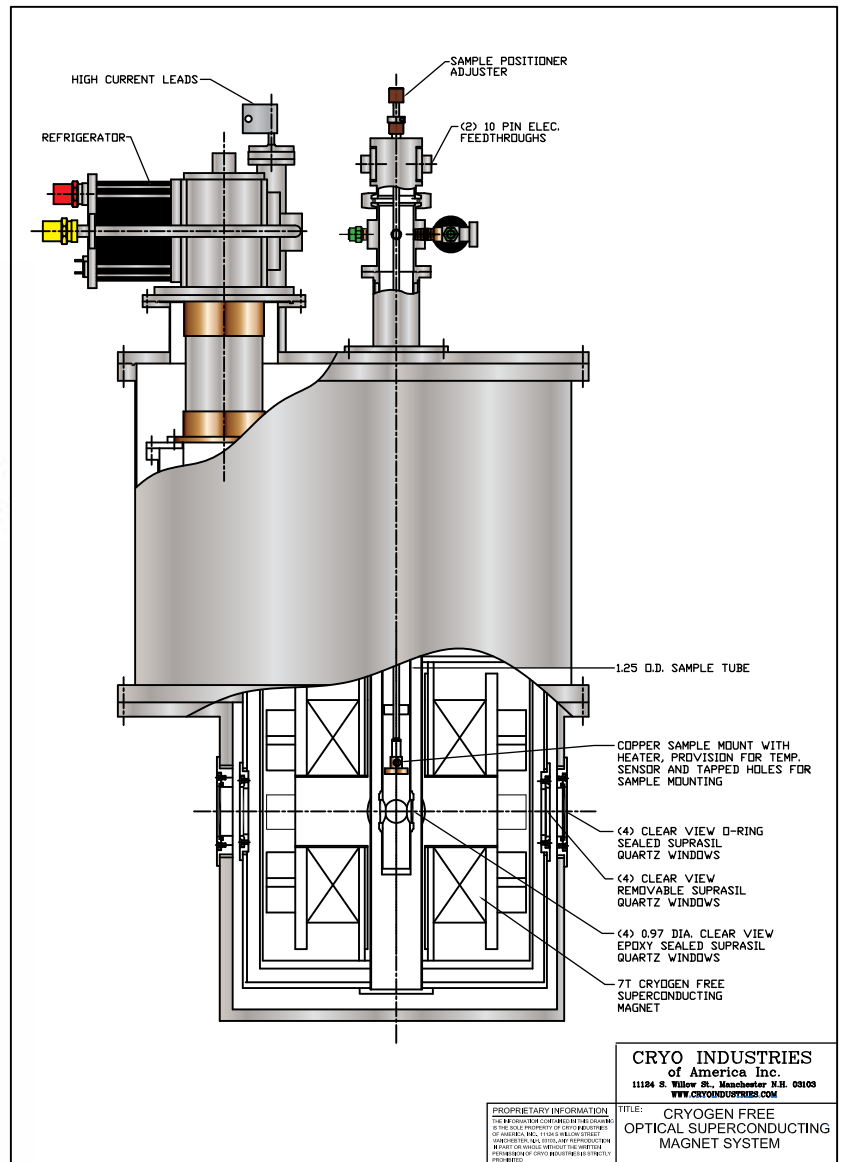
The optical tail is customized to meet your experimental requirements (optical angle, window material).

The windows can be designed to be removable, to allow in-situ changing of windows/window materials.

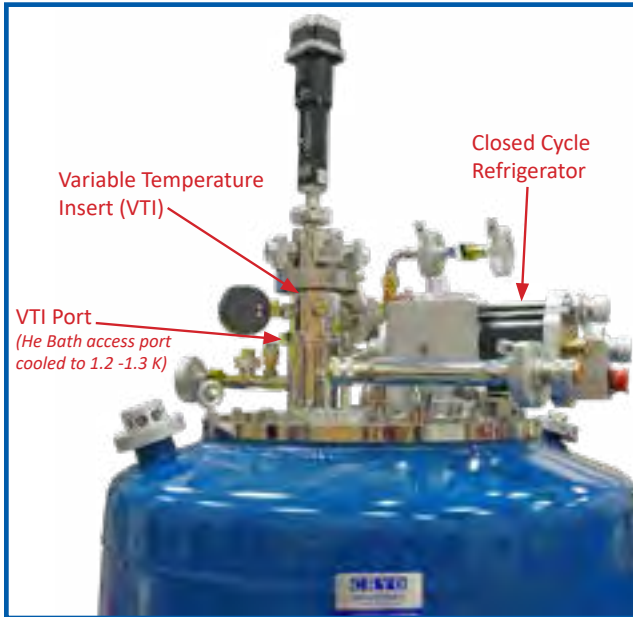
- (4) Epoxy sealed Suprasil Quartz windows on sample tube cold window block
- (4) Removable Suprasil Quartz windows on the radiation shield
- (4) Removable O-ring sealed Removable Suprasil Quartz windows on outer shroud



CIA-DRYMAG (SPLIT-PAIR)



SUBCOOLED LHe



The **SUBCOOLED LHe** is a cryogen free helium liquefier with an access port to the **SUBCOOLED** liquid helium bath for insertion of superconducting magnet inserts and variable temperature inserts (VTI).

The subcooled liquid helium bath provides many benefits over a traditional 4.2K liquid helium bath.

- Up to 2 Tesla additional field from existing superconducting magnets rated at 4.2 K
- Lower sample base temperature: 1.2 K – 1.3K (down from 1.4 K-1.5 K)
- Increased cooling power: 150mW @ 1.5 K (increased from 25mW)
- Zero liquid helium consumption – pumped helium returned into SC Dewar

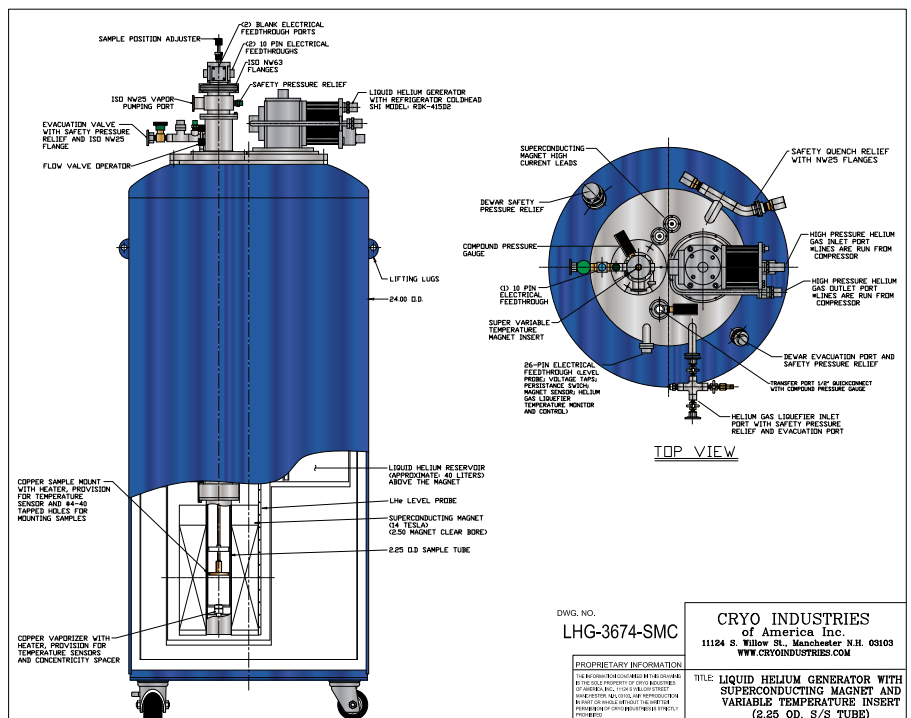
The SUBCOOLED LHe produces usable liquid helium with only 2-3 gas cylinders.
Capable of producing excess liquid helium for use with other systems
All of these advantages with ZERO Liquid Helium loss!

The **CIA-DRY MAG** Superconducting Magnet Systems include:

- Wet “LHe” superconducting magnet
- Removable/Exchangeable VTI
- Closed cycle refrigerator
- Bipolar superconducting magnet power supply
- Temperature controller

You customize the system:

- Solenoid, 2-Axis and 3-Axis designs
- Variable Temperature Insert - You select the insert (sample in vacuum, static exchange gas dynamic flow, He3 inserts available)
- Gas handling system available



CF500-RTB

The **CF500-RTB** is a cryogen free superconducting magnet system with a Room Temperature Bore, which allows for optional sample cryostats.

The most common sample cryostat is a Cryogen Free Top-Loading Sample in Static Exchange Gas System, the tail of CCR sample cryostat inserts into the Room Temperature Bore.

This versatile configuration allows for both system (sample and superconducting magnet) to be operated independently (*reference photos*).

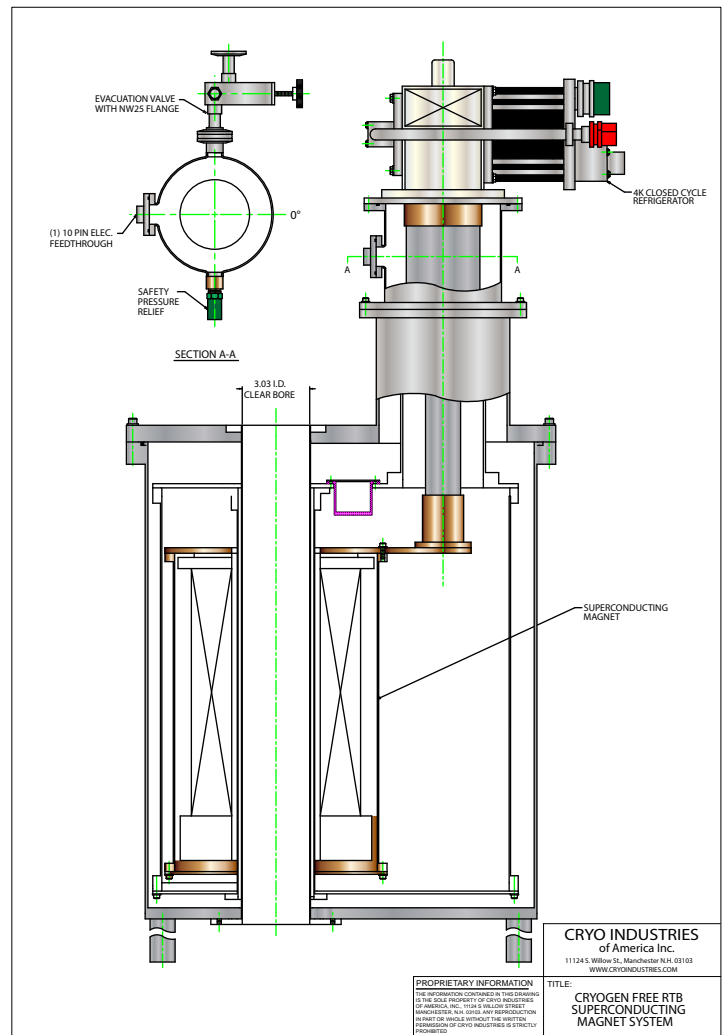


The **CF500-RTB** Superconducting Magnet Systems include:

- Conductively cooled superconducting magnet
- Closed cycle refrigerator
- Variable Temperature sample cryostat (*if required*)- CCR or Wet systems available
- Bipolar superconducting magnet power supply
- Temperature controller

You customize the system:

- You select the desired field
- Room Temperature Bore Size
- Variable Temperature Insert - You select the insert (*wet or dry (cryogen free), sample in vacuum, static exchange gas, dynamic flow inserts available*)



MICROMAG



The **MICROMAG** is an ultra-compact, cryogen free tabletop, superconducting magnet system with a Room Temperature Bore, which allows for optional sample cryostats.

The MicroMag is most commonly used with a microscopy cryostat (wet and cryogen free versions available).

This versatile configuration allows for both systems (sample and superconducting magnet) to be operated independently.

Two Models Available:

MICROMAG-101

- Single phase, low energy consumption (3.0kW)
- Air-Cooled Compressor
- Simple, cost efficient operation

MICROMAG-408

- Three phase consumption
- Fast cooldown time
- Water -Cooled Compressor
(Air cooled available upon request)



Left: MicroMag-408, Cryogen Free Compact (Tabletop) RTB Magnet System installed in end user lab with a Cryogen Free Microscopy Cryostat

Below: MicroMag-408 installed in end user lab with a Continuous Flow Microscopy Cryostat



MICROMAG

- **5 or 7 Tesla Superconducting Magnet**
- **Ultra-Compact, Tabletop Design**
- <175mm RTB length
- Ramp Rate: >0.5 T/min
- 1.93 inch (49mm) Room Temperature Bore
- Horizontal or Vertical Mounting
- Cryogen Free
- Mates to CIA Microscopy cryostat

