



## Product Description

**Quantum Design's OptiCool** is a new, magneto-optical cryostat that builds on our 30+ years of experience developing and manufacturing automated temperature and magnetic field control platforms. The innovative cryostat and magnet design puts the sample in the heart of your optical environment. This highly integrated design means, even with a magnet, your sample isn't buried inside a large cryostat, far away from the optics. Seven side optical ports and one top optical port allow for optical access to your sample from a wide array of directions.

Every aspect of the OptiCool has been developed to provide the largest range of sample access, while also ensuring that the system is easy to use. Utilizing and adapting DynaCool's successful approach to cryocooler equipment design, the system requires only a small volume of helium gas for its fully automated startup and operation.

## Magnetic Design & Control

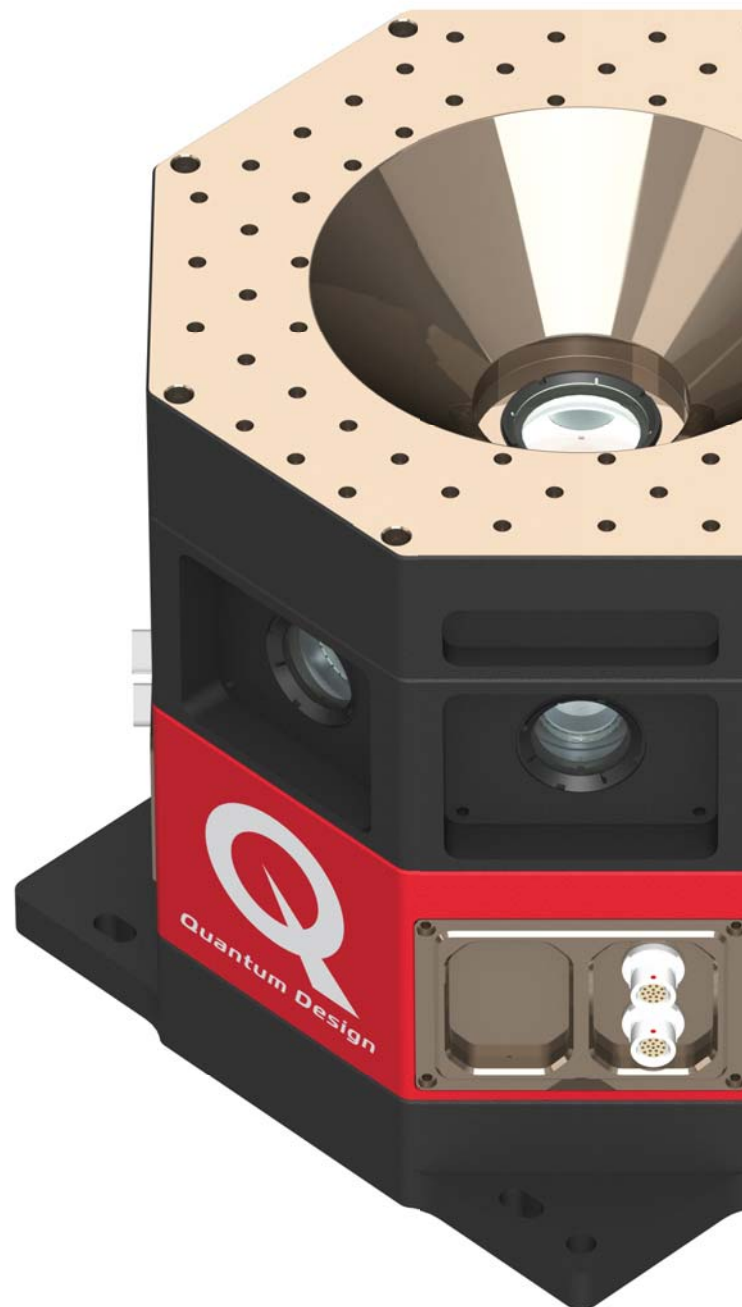
The OptiCool comes with a new super-conducting, split-coil, conical magnet that has been custom designed by Quantum Design for this platform. This large bore magnet offers fields perpendicular to the optical table up to  $\pm 7$  tesla. The system includes a hybrid digital/analog magnet controller designed for precise, quiet control of the magnetic field. The bipolar design also allows smooth continuous ramping through zero field.

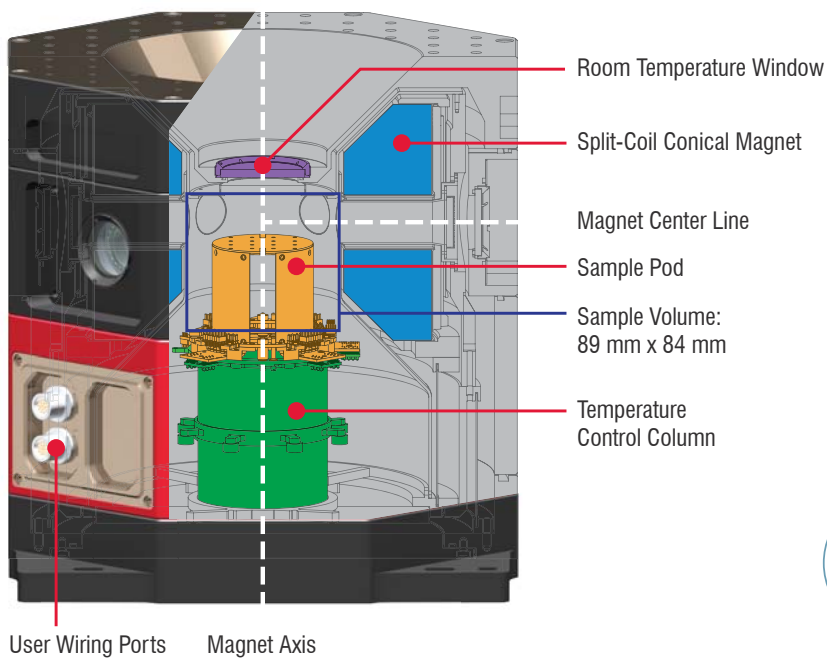
## Temperature Control

Quantum Design customers have come to expect easy-to-use automated temperature control. OptiCool delivers on this promise with a unique, single-cooler design that provides cooling for both the magnet and the circulating helium. This system provides seamless transitions throughout its temperature range of 350 K to 1.7 K, and stable operation at its base temperature of 1.7 K.

## Fully Automated Operation

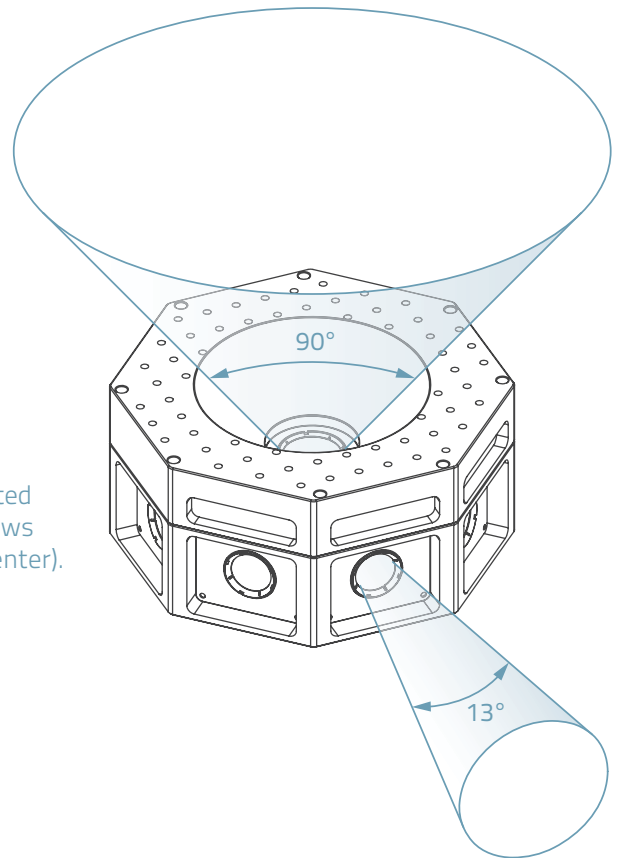
Included with the OptiCool is custom control software that automates the operation of the cryostat. The cryostat can be cooled down and warmed up with a click of the mouse, requiring no user intervention. Changing the sample temperature or applied magnetic field is also fully automated. The software also allows you to graph and analyze your data in real time to quickly see trends and features. A LabView interface is included to allow you to control the instrument within your existing LabView measurement software.





Cutaway of OptiCool Cryostat showing sample pod, sample space and magnetic axis and center.

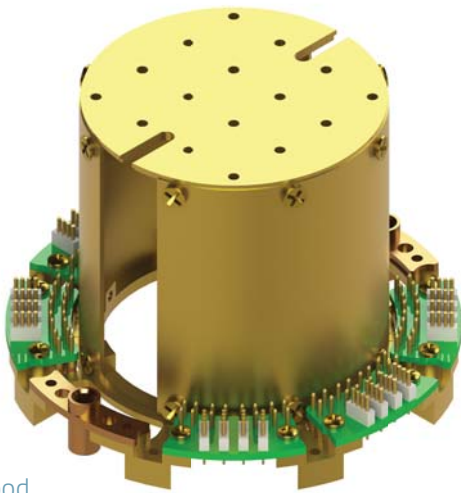
Illustration of OptiCool Cryostat demonstrating optical access angles available through 8 optical ports. Top window (NA > 0.7; 90° for sample located 13 mm above magnetic center) and 7 side windows (NA > 0.11; 13° for sample located at magnetic center).



### Optical Access & Sample Space

OptiCool leverages state-of-the-art magnet and cryostat design to offer an excellent combination of optical access and magnetic field range. This unique magnet allows the sample space to be accessed by eight optical ports – one top and seven side ports – all within a magnetic field range of  $\pm 7$  tesla. With a numerical aperture of  $>0.7$  for the top port and  $>0.11$  for side ports, OptiCool provides a wide variety of optical angles and magnetic field variations. In addition, the 89 mm (diameter) by 84 mm (height) sample volume offers lots of space for your experimental hardware inside the cryostat vacuum.

A History of Innovation  
8 Optical Access Ports  
1.7 K to 350 K;  $\pm 7$  tesla  
**Cryogen Free**  
Automated Operation



OptiCool sample pod showing sample surface and prewired sample boards available.

### Sample Pod & Wiring Possibilities

OptiCool's Sample Pod provides a place to build and customize your experiment on the bench. When you are ready to make a measurement, the Sample Pod easily plugs into the pre-wired temperature control column. When your measurement is finished, the pod is easily swapped with another pod, already wired up with your next experiment. OptiCool comes pre-wired with 16 wires, routed and thermally anchored from the outer User Wiring Ports to the sample volume. Additional wires can be installed for up to 80 wires total.

With this ease of access, large sample volume, and wide range of possible wiring configurations, a researcher will only be limited by their imagination.

*Only be limited by your imagination...*



# OptiCool™ Specifications\*

## Temperature Control

Temperature Range:	1.7 K to 350 K
Temperature Stability:	$\pm 0.2\%$ for $T < 20$ K; $\pm 0.02\%$ for $T > 20$ K
System Cooldown Time:	~20 hours

## Magnetic Field Control

Maximum Field:	$\pm 70,000$ Oe ( $\pm 7$ T)
Field Uniformity:	$\pm 0.5\%$ over a 3 cm spherical volume; $\pm 0.03\%$ over a 1 cm spherical volume

## Optical Access

Access Port Details: (8 total access ports standard)	1 top window (user-replaceable), 50 mm diameter, 41.5 mm clear bore 7 side windows (user-replaceable), 40 mm diameter, 24.5 mm clear bore
Numerical Aperture:	Top Window: $NA > 0.7$ for sample located 13 mm above field center. Side Windows: $NA > 0.11$ for sample located on magnet axis.
Acceptance Angle, Top Window:	70 degrees full angle: Sample located at magnet center 90 degrees full angle: Sample located 13 mm above magnet center
Acceptance Angle, Side Window:	13 degrees full angle: Sample located at magnet axis

## Vibrational Stability

Horizontal:	$< 10$ nm peak-to-peak
Vertical:	$< 4$ nm peak-to-peak

## Sample Space

Maximum Sample Volume:	89 mm diameter by 84 mm tall
Sample Environment:	Sample in cryostat vacuum space

## Dimensions

Optical Table:	Cryostat Footprint: 1 m x 0.5 m (minimum) Cryostat Height: 1 m (minimum)
Floor Space:	Tower Footprint: 0.75 m x 0.75 m Tower Height: 2 m (minimum) Cabinet** Footprint: 1 m x 1 m Cabinet** Height: 0.68 m (minimum)



OptiCool Platform



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