

Low-Cost Cryogenic Temperature Controller for Gas Sorption Analyzers

This amazingly powerful and affordable cryocooling accessory allows users of Autosorb iQ analyzers and other gas sorption instruments to smoothly synchronize the generation of precise sorption analyses at liquid argon temperature (87 K), *while using less expensive liquid nitrogen (77 K) as the cryogen*, with the newest IUPAC recommendations (Thommes et al., Pure Appl. Chem. 87(9-10), 1051-1069 (2015)).

Features:

- The **CryoSync™ Cryocooler** uses liquid nitrogen (77 K) to generate user-programmable liquid argon temperature (87 K) with excellent precision.
- A standard cell with the sample to be analyzed is placed on a thermostatic block whose temperature is accurately controlled by warming a heat sink immersed in liquid nitrogen.
- The **CryoSync™ Cryocooler** is capable of maintaining excellent temperature stability in the thermostatic block, with a standard deviation better than ± 0.005 K for a minimum of 50 hours.
- Although the **CryoSync™ Cryocooler** can work without a PC, it is supplied with Windows-compatible software that allows temperature monitoring and recording in real time.
- The **CryoSync™ Cryocooler**, developed by Quantachrome Instruments (patent pending), provides a very cost-effective and convenient way to meet the latest IUPAC recommendations for argon-87K-based micropore analyses on any gas sorption instrument that accepts an external temperature control option.



Quantachrome's **CryoSync™**.

Summary of Features:

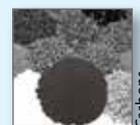
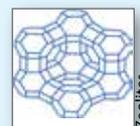
- Performs analyses at liquid argon temperature (87 K) using less expensive liquid N₂ (77 K).
- Temperature stability better than ± 0.005 K (std. dev.).
- Analysis duration greater than 50 hours.
- Simple and affordable alternative to much costlier cryostatic compressor devices.
- Menu-driven, easy-to-use software allows the user to collect, display, analyze, and archive data.
- Each data point can be acquired and saved to the data file during analyses in progress.
- Multiple instruments can be controlled by a single computer.
- USB interface between instrument and PC allows remote access to all functions and data.
- Universal accessory, easily adapts to any commercial gas sorption analyzer able to accept an external temperature control option.
- Ideally suited to synchronize the need for **liquid-argon-free analyses** with **IUPAC-recommended high resolution micropore analyses** using argon gas at liquid argon temperature (87 K).

Quantachrome Instruments
1900 Corporate Drive, Boynton Beach, FL 33426
Tel: 800.989.2476 | local: 561.731.4999
email: qc.sales@quantachrome.com

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Your local Representative:

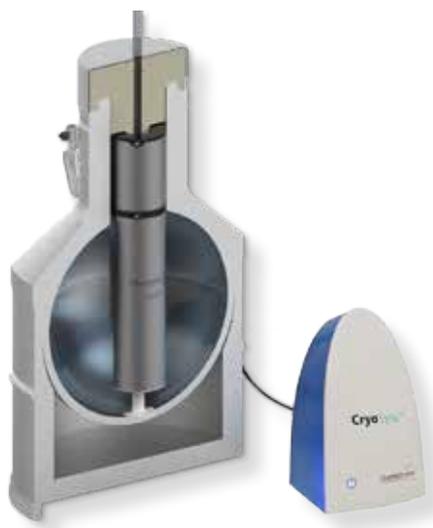
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Benefits:

- **Promotes New IUPAC Recommendations:**
Argon adsorption at 87 K is now recommended by IUPAC for micropore analysis (Thommes et al., Pure Appl. Chem. **87** (9-10), 1051-1069 (2015)), because of nitrogen's quadrupole moment and diffusional limitations at 77 K.
- **Produces Improved Results:**
The **CryoSync™ Cryocooler** technology, developed by Quantachrome Instruments (patent pending), improves data quality by ensuring a very highly precise and constant temperature and, therefore, constant P_0 (as opposed to having to measure P_0 changes continuously) throughout entire analyses.
- **Provides Universal Applicability:**
An independent Control Box and a complementary CryoTemp Monitor software enable standalone operation of the **CryoSync™ Cryocooler** accessory with any gas sorption instrument (regardless of manufacturer) that accepts an external temperature control system.
- **Represents Cost-Effective Alternative:**
Much more economical than routinely using liquid argon or expensive cryostatic compressors.



CryoSync™ system components.

Physical Specifications:

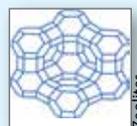
- **Dimensions:**
Height 12" (30 cm).
Width 4" (10 cm).
Depth 4" (10 cm).
- **Weight:**
5.0 pounds (2.3 kg).
- **Electrical:**
100-240 volts, 50-60 hertz, 10 W (max.), grounded connection.
- **Ambient:**
15-35 °C operating range, 20-90% relative humidity.

Technical Specifications:

- **Temperature Range:**
82-115 K nominal with standard liquid N_2 supply.
- **Temperature Stability:**
better than ± 0.005 K (std. dev.).
- **Sample Cells:**
One per **Argon Cryocooler** accessory.
- **Analysis Duration:**
+50 hours without Dewar refilling.



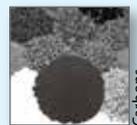
CryoSync™ controller front and back.



Zeolites



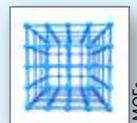
Catalysts



Carbons



Polymers



MOFs