

The Quantum Heater-Cooler



Spectrum Medical is proud to present its newest addition to

A powerful and revolutionary Heater-Cooler technology that eliminates the growth the disruption of Operating Room based laminar flow systems and eliminates the

The following three design strategies are fundamental to this radically new patient – safety system:

- The Quantum Heater-Cooler technology is a world first solution in which hot and cold thermal energy is supplied to the patient perfusion circuit using Spectrum Medical's specially formulated Glycol solution which eradicates water from the Operating Room and the patient perfusion circuit.
- The Glycol circuit transfers its thermal energy to the patient perfusion circuit using two compatible single-use sterile heat exchangers specifically developed by Spectrum Medical for both the

Arterial and Cardioplegia circuits from Neonates to Adults.

- The Heater-Cooler Unit is silent, extremely powerful and requires no cleaning other than that performed by Spectrum Medical during its annual Sentinel servicing plan.

Within Spectrum Medical and by many of our future customers, Spectrum Medical's radically new Heater-Cooler technology is already known as "Mr. Frosty". Mr. Frosty is clean, safe and silent in the Operating Room and with its unique penguin graphic brings fun back to what has been a very unhappy space.



the Quantum family of Perfusion technologies.

environment for the Mycobacterium Chimaera bacteria, eliminates time-consuming need for hazardous cleaning procedures.

System Overview

The Quantum Heater-Cooler unit provides thermal energy to two independent circuits facilitating the simultaneous delivery of either hot or cold energy to both the patient and cardioplegia heat exchangers.

Simply connect the hoses to the single-use PureFlow sterile heat exchangers using Spectrum Medical's drip-free connectors and with the simple and intuitive user interface initiate the priming function. During the priming phase the air contained within the single-use PureFlow heat exchangers will be replaced with Glycol heat transfer fluid.

To end the process simply press the de-prime button and when the de-prime cycle is complete remove the hoses from the heat exchangers. The maintenance of the Glycol heat transfer fluid volume within Mr. Frosty is managed automatically during the re-charging process.

The Heater-Cooler is a fully functional standalone device or can be integrated within the Quantum Perfusion System and controlled directly from the Quantum Workstation.

Mr. Frosty works with both 110v and 220v AC supplies. In a fully charged condition the stored cooling energy is equivalent to 2.1 kW.



System Charging

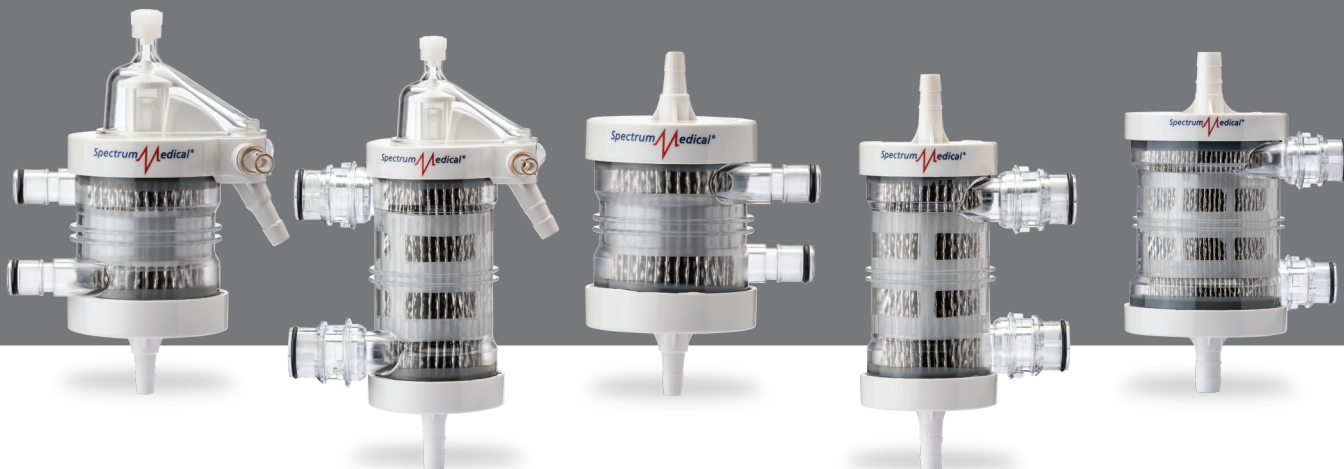
The recharging of the Heater-Cooler's stored cold energy is accomplished by using Spectrum Medical's "Igloo" Chiller system. The required number of chiller systems will be dependent on the number of Heater-Cooler systems in daily use and the customer specified Heater-Cooler re-charge times.

The Spectrum Medical Igloo Chiller system has been designed to support the simultaneous charging of two Quantum Heater-Cooler systems. Alternatively, and for larger hospital installations the Igloo Chiller system can be integrated into a ring-main circuit with the expanded potential to support the simultaneous charging of up to five Quantum Heater-Cooler systems.

Ring main configuration and installation design is a "partnership process" between the hospital and Spectrum Medical's engineering support team. Factors requiring consideration will be the number of Quantum Heater-Coolers in use, available area within the hospital, power distribution, etc.



Quantum PureFlow



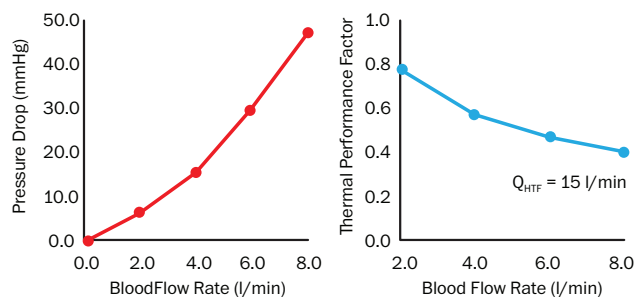
The Quantum PureFlow range of sterile disposable heat exchangers have been designed by Spectrum Medical to provide the safest solution for eliminating the growth environment for the Mycobacterium Chimaera bacteria.

Specifically developed to operate exclusively with the Quantum Heater-Cooler technology and its Glycol heat transfer fluid. Both the Arterial heat exchanger and the Cardioplegia heat exchanger are compact in design, with low priming volumes and minimal pressure drops.

Technical Specifications

Standard Heat Exchanger: High Flow (adult size)

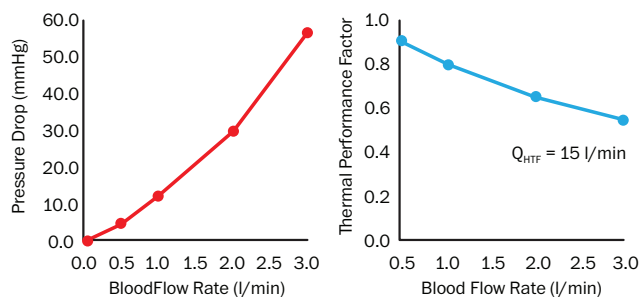
- Priming volume blood side: 55 ml
- Exchange Surface: 0.12 m²
- Priming volume HTF side: 70 ml
- Maximum flow rate: 8 l/min



Pressure drop curve were generated using bovine blood (Hct: 32±2% - Hb: 12±1[g/dl]) at 37±1°C

Standard Heat Exchanger: Medium Flow (pediatric size)

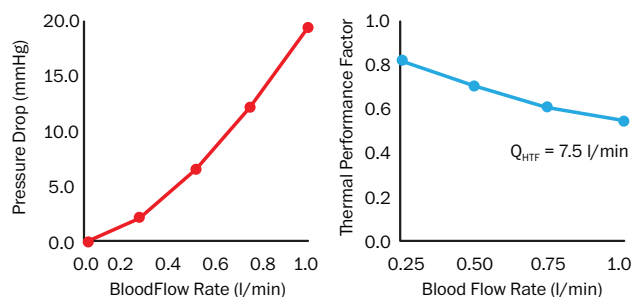
- Priming volume blood side: 22 ml
- Exchange Surface: 0.05 m²
- Priming volume HTF side: 38 ml
- Maximum flow rate: 3 l/min



Pressure drop curve were generated using bovine blood (Hct: 32±2% - Hb: 12±1[g/dl]) at 37±1°C

Standard Heat Exchanger: Low Flow (neonatal size)

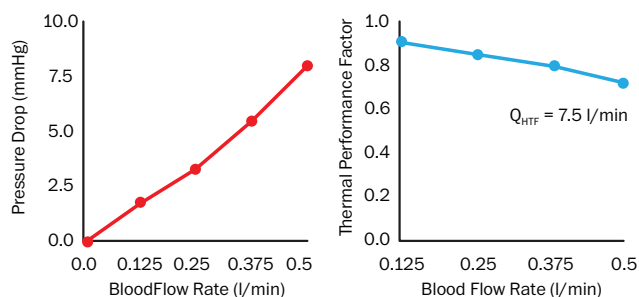
- Priming volume blood side: 11 ml
- Exchange Surface: 0.028 m²
- Priming volume HTF side: 22 ml
- Maximum flow rate: 1 l/min



Pressure drop curve were generated using bovine blood (Hct: 32±2% - Hb: 12±1[g/dl]) at 37±1°C

Cardioplegia Heat Exchanger

- Priming volume blood side: 22 ml
- Exchange Surface: 0.028 m²
- Relief Valve Opening Pressure: 500 mmHg
- Priming volume HTF side: 22 ml
- Maximum flow rate: 0.5 l/min



Pressure drop curve were generated using bovine blood (Hct: 32±2% - Hb: 12±1[g/dl]) at 37±1°C

Total Customer Support

With an absolute dedication to customer support and total solutions approach to maximizing equipment availability within the hospital, Spectrum Medical has designed a two-tier customer support system called Guardian and Sentinel Total Care.

Guardian Total Care:

Annual Servicing: Includes all required servicing visits performed by dedicated Spectrum Medical service personnel and the cost of all servicing items.

Annual Software Updates: During the service visit the Quantum Software will be maintained to latest standards including changes to user functionality, updates to enhance maintainability and reliability.

Comprehensive 24/7 Support: Spectrum Medical's innovative 24-hour live messaging support platform enables users to have immediate access to an extensive knowledge-based product library, frequently asked questions and troubleshooting tips. Additionally the 24-hour support platform supports immediate communication with Spectrum Medical's global support team which comprise, service technicians, clinical consultants and system application experts via a dedicated phone number, email address or Spectrum Medical's 24-hour live messaging service.

Sentinel Total Care:

Extended Warranty: Full warranty on your Quantum Heater-Cooler for its 10-year life at no cost to the customer. Quantum Products beyond economic repair will be replaced with latest 'new-build' technologies.

Accidental Damage: Accidental damage including accessories (hose assemblies) for the 10-year life of your Quantum Product at no cost to the customer.

Emergency Loan Equipment: Loan equipment provided at no cost if the defective equipment cannot be rectified within 24 hours of being returned to Spectrum Medical.

Quantum eLearning: Includes access to Spectrum Medical web-based electronic Learning Management System (or LMS) to streamline product training and to compliment your current training practice and recertification.

Time Expired Sterile Products: Partnering with hospitals in the provisioning care is at the core of the Sentinel relationship. Quantum sterile products supplied by Spectrum Medical that have exceeded their expiration date can be returned to Spectrum Medical and exchanged for new replacement products free of charge.



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