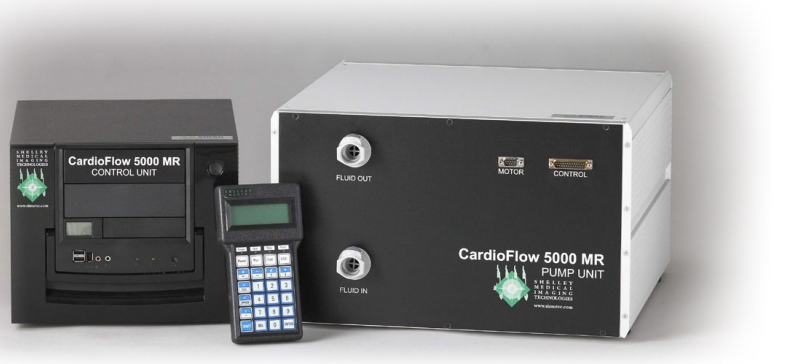
CardioFlow 5000 MR Computer-controlled Flow Pump System



Product Description

The new and improved CardioFlow 5000 MR flow pump system is designed to generate realistic, accurate and repeatable physiological volume flow waveforms, including pre-programmed; carotid, femoral, sine, square and constant flow waveforms. The system includes an embedded industrial grade motherboard and proprietary *SimuFlow III Waveform Editing Software* for creating user-defined physiological flow waveforms. Users have the option of inputting their own waveform data points, reshaping the supplied pre-programmed waveforms (click and drag) or downloading waveforms onto the system.

The CardioFlow 5000 MR is accurate to with ±3.0% over a flow range of 50 to 300 ml/s. Each system is calibrated and accompanied by a *certificate of calibration* specifying the calibration results at relevant flow rates, as well as being provided with a calibration constant to verify the pump systems accuracy.

The CardioFlow 5000 MR is three-unit design, a Control Unit, a Pump Unit and an external Reservoir. For MRI environments the Control Unit is positioned outside the MRI suite, the Pump Unit can be positioned in close proximity to a magnet bore. Shielded cables are supplied to connect the computerized motor control unit to the pump unit via the penetration panel or waveguide.

Combine the CardioFlow 5000 MR with an appropriate vascular phantom and blood mimicking fluid, and the resulting closed flow loop ensures easy, accurate and reliable evaluation and validation of diagnostic imaging systems and techniques. The system is ideal for MRA, iMRI, DSA, CTA, Doppler ultrasound, particle image velocimetry (PIV) and endovascular simulation applications.

Applications

Research and new technology developments requiring accurate and repeatable pulsatile and constant flow waveforms (i.e. flow quantification, MRA, iMRI, DSA, CTA Doppler ultrasound, particle image velocimetry (PIV) and endovascular techniques.

Ability to control waveform shape.

Gated flow studies.

Calibration of clinical imaging systems.

Product Features

REALISTIC PHYSIOLOGICAL FLOW WAVEFORMS
PULSATILE AND CONSTANT FLOW WAVEFORMS
ACCURATE VOLUME FLOW WAVEFORMS
REPRODUCIBLE WAVEFORMS
PROGRAMMABLE USER DEFINED WAVEFORMS
CALIBRATION CERTIFICATE
MULTIMODALITY IDEAL FOR COMPARING IMAGING MODALITIES

Pump unit can be in close proximity to a magnetic bore, resulting in clinical acquisition of realistic and accurate (± 3.0%) physiological waveforms.

Pre-programmed waveforms include; carotid, femoral, sine, rectangular and constant flow waveforms.

Embedded industrial grade motherboard and SimuFlow III waveform editing software allows for the design of user-defined pulsatile and constant flow waveforms. Users can control the shape of the waveform.

Robust gear pump ensures uninterrupted volume flow waveforms.

Accurate and reproducible physiological flow waveforms including those with reverse flow components such as the femoral waveform.

Control options include the use of a remote hand-held LCD display/keypad or alternatively a keyboard, mouse and monitor can be connected to control the embedded computer.

Calibration certificate is provided with each system verifying the systems accuracy. The system can be calibrated and certified traceably to a national standard for regulatory requirements. A re-calibration service is available.

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Fluid Flow Specifications

Volume range 1.0 – 300 ml/s
Accuracy of ± 3% for 50 to 300 ml/s
Sine waves up to 12 Hz
Physiological flow waveforms including reverse flow components

Mechanical Specifications

High-torque servo-motor
Gear pump
Adjustable over-pressure shut-off (7 to 50 psi)
Self-sealing 5/8 inch inner diameter plastic connectors

Computer Control

On-board dedicated motor controller
Easily upgraded high level control software
Windows XP Embedded Operating System

Interface Options

Hand-held remote control keypad with backlit LCD
User supplied monitor, keyboard and mouse

Physical

Control Unit dimensions: 14" (L) x 11" (W) x 9" (H)
Control Unit Weight: 11.2 lbs. (5.1 kg)
Pump Unit dimensions: 17" (L) x 17 ¾" (W) x 10 ½" (H)
Pump Unit Weight: 44 lbs. (20 kg)
Reservoir capacity: 20 litres
Circulating Fluid Volume: 9 litres minimum

File Format

Waveform data is stored on embedded harddrive
Files can contain up to 1,000 flow-rate values describing a waveform
User specified time-base ranging from 2 to 50 ms per point
Waveforms can be looped continuously
Variable frequency waveforms can be generated

Electrical

110/220 VAC 50/60 Hz, 4.0 amps @ 120V
EMI shielding
1 RS-232 serial communication port
1 remote controller port
1 ECG TTL trigger output (BNC)
Monitor port
Keyboard port
Mouse port
Two shielded cables between the Control Unit and a penetration panel (10 foot lengths).
Two shielded cables between the Pump Unit and a penetration panel (20 foot lengths).

Calibration Options

Standard calibration
Traceable calibration to a National Standard

Accessory Products

MR Finger for ECG gated flow studies
Multi+ Variable Waveform Software Option to mimic arrhythmia
Anatomically correct heart and vascular phantoms
Blood mimicking fluids

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