**PhysioFlow 50 MR Physiological Flow Pump System**

**MRI & PIV Version**

![Image of PhysioFlow 50 MR](image)

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**Product Description**

The PhysioFlow 50 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 PhysioFlow 50 MR is accurate to within ± 3.0% over a flow range of 1.0 to 50 ml/s. Each system is calibrated and accompanied with 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 PhysioFlow 50 MR is two-unit design, a Control Unit and a Pump Unit with an internal reservoir. For MRI environments the Control Unit is positioned outside the MRI suite, the Pump Unit can be positioned in the scanning room. Shielded cables are supplied to connect the computerized motor control unit to the pump unit via the penetration panel or wave-guide.

Combine the PhysioFlow 50 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 flow quantification in MRA, iMRI, DSA, CTA, Doppler ultrasound, optical coherence tomography (OCT), particle imaging velocimetry (PIV) and endovascular simulation applications.

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**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**

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

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

**SimuFlow III waveform editing software** allows for the development of user-defined pulsatile and constant flow waveforms. Users can control the shape of the waveform.

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

**Control** with user supplied keyboard, mouse and monitor to communicate with 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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**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, optical coherence tomography (OCT), particle imaging velocimetry (PIV) and endovascular techniques.

- Ability to control waveform shape.
- Gated flow studies.
- Calibration of clinical imaging systems.

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**Shelley Medical Imaging Technologies**

*Advancing Image Quality*
PhysioFlow 50 MR Physiological Flow Pump System

Fluid Flow Specifications

- Volume range 1.0 – 50 ml/s
- Accuracy of ± 3.0%
- Sine waves up to 12 Hz
- Physiological flow waveforms including reverse flow components

Mechanical Specifications

- High-torque servo motor
- Rotary gear pump
- Adjustable over-pressure shut-off (7 to 50 psi)
- Self-sealing 1/4 inch inner diameter plastic connectors

Computer Control

- On-board dedicated motor controller
- Easily upgraded high level control software
- Windows 7, 32 Bit Embedded Operating System

Interface Options

- User supplied monitor, keyboard and mouse

Physical

- Control Unit dimensions: 14.0” (L) x 11.0” (W) x 9.0” (H)
- Control Unit Weight: 15.0 lbs. (6.8 kg)
- Pump Unit dimensions: 19.6” (L) x 10.0” (W) x 9.25” (H)
- Pump Unit Weight: 38 lbs. (17.2 kg)
- Reservoir capacity: 1.5 litres
- Circulating Fluid Volume: 2 litres

File Format

- Waveform data is stored on embedded hard drive.
- 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

- Silicone vascular models with the following features:
  - Anatomically realistic & accurate patient-specific or custom models
  - Refractive index (RI) of 1.41, ideal for PTV
- MR Finger for ECG gated flow studies
- Multi+ Variable Waveform Software Option to mimic arrhythmia
- MRI QA Flow Phantom Set
- Anatomically correct vascular models
- Blood mimicking fluid, BMF-MR

SHELLEY MEDICAL IMAGING TECHNOLOGIES

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