

SUPERPUMP

The most widely used computer-controlled pump for cardiac flows

Product Code: 10647

The ViVitro SuperPump is a digitally controlled hydraulic piston pump that creates physiological cardiac flows. Unsurpassed in reliability, functionality, and versatility, the AR Series digital technology provides maximum control with precision accuracy. The SuperPump works with ViVitro or independently produced accessories to create reliable cardiac flows for any type of cardiovascular device.



The SuperPump AR is pre-loaded with up to 5 waveforms stored on the controller which enables the pump to be used as a standalone device. Custom waveforms may also be stored on the controller for standalone use.

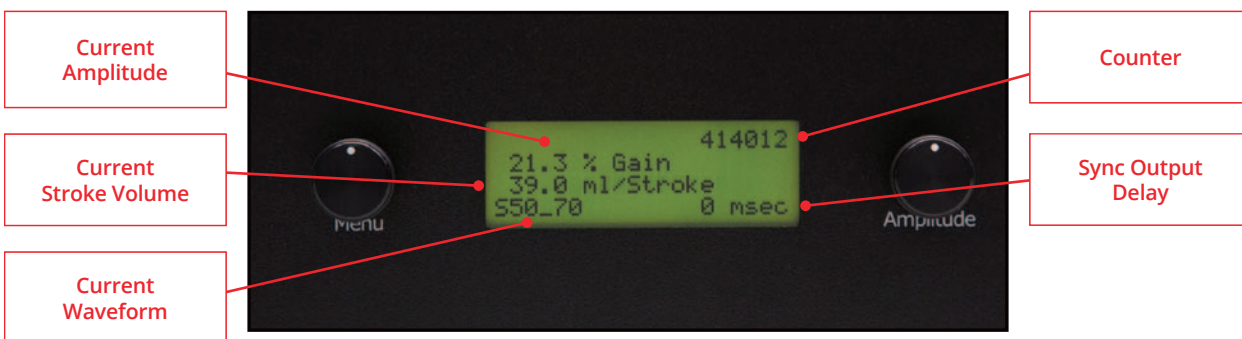
The ViVitro SuperPump AR Series can be driven by external waveform sources giving flexibility for waveform input. Function generators, personal computers with I/O functionality, custom hardware, microcontroller development boards, and even smartphones can directly control the flow output of the pump. SuperPump feedback can be captured using an oscilloscope or other acquisition device to monitor waveform accuracy.

> Testing Capabilities and Applications

- Heart valve function testing
- Peripheral devices
- Vascular devices
- Aortic Valve By-Pass
- LVADs simulator
- Flow transducer evaluation/ calibration
- Isolated heart driver
- Echo Doppler flow phantom
- Neurovascular studies
- Blood vessel flow studies
- MRI studies
- Bioreactors & Incubators
- Applications requiring physiological flows and pressure
- Other cardiovascular devices

> Specifications

| | |
|----------------------------|--|
| Dimensions | |
| Pump | 15 x 55 x 17 cm |
| Controller | 11 x 48 x 33 cm |
| Dry weight | |
| Pump | 7.65 kg |
| Controller | 4.7 kg |
| Voltage | 90 - 240 VAC / 50 - 60 Hz |
| Cycle Rate | 3 - 200 BPM |
| Displacement Volume | 0 - 180 mL |
| Piston Area | 38.32 cm ² |
| Waveform Accuracy | < 4% of Stroke Volume at 70 BPM (±3 mL @ 75 mL/stroke) |
| | < 5% of Stroke Volume at 200 BPM (±3.8 mL @ 75 mL/stroke) |
| Standard Waveforms | Physio at 70 BPM - (complex physiological waveform) |
| | Sine 30% at 45 BPM |
| | Sine 35% at 70 BPM |
| | Sine 50% at 70 BPM |
| | Sine 50% at 120 BPM |
| Sync Pulse | +5V signal for 10ms duration |
| | Adjustable from 0 to 2000ms delay |



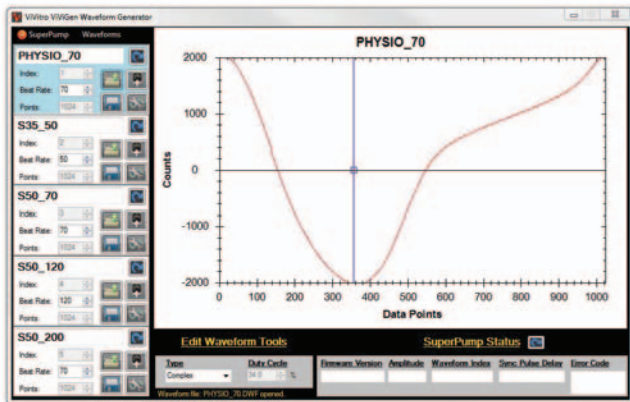
SuperPump and SuperPump controller with close up of SuperPump controller display

ViVigen + ViVitest Software

Optional - ViVidro ViVigen software enables users to create and upload custom waveforms to the SuperPump. Sinusoidal or linear waveforms can be modified with the ViVigen interface. Complex waveforms can be created numerically in a spreadsheet for more precision. Waveforms are sent via USB interface from the computer directly to the controller. ViVigen software is intended for third party testing systems, and use with wide ranges of waveforms.

The logo for ViVigen features a red ECG line that forms the letter 'V' at the beginning of the word 'ViVigen', which is written in a grey, sans-serif font.The logo for ViVitest features a red ECG line that forms the letter 'V' at the beginning of the word 'ViVitest', which is written in a grey, sans-serif font.

ViVidro ViVitest software is the most advanced solution for the ViVidro SuperPump AR Series system. It includes all of the waveform generation and review capabilities of ViVigen software, but drives the controller directly during testing. There is no limit to the number of waveforms that can be stored in ViVitest. Users can quickly change between large numbers of waveforms. ViVitest also offers advanced waveform control features such as custom wavetrains with up to 10 unique waveforms and custom cubic spline interpolated waveform generation with up to 20 segments.

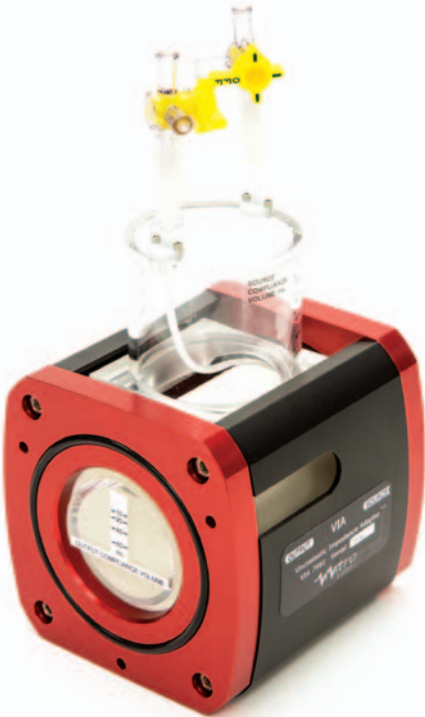


Easy-to-read user screens from ViVigen and ViVitest software



Viscoelastic Impedance Adapter (VIA)

Product Code: VIA7991



The ViVITRO Viscoelastic Impedance Adapter (VIA) works in conjunction with the SuperPump to produce more realistic physiological ventricular pressures. It consists of a fixed resistive element and two adjustable compliance chambers to simulate ventricular viscoelastic behavior.

Features:

- Adjustable dP/dt ratio to produce both physiological and diseased cardiac models
- Filters high frequency noise when testing prosthetic valves and aortic conduits
- Easily adjusted

Fixed Resistance: 200 c.g.s. units

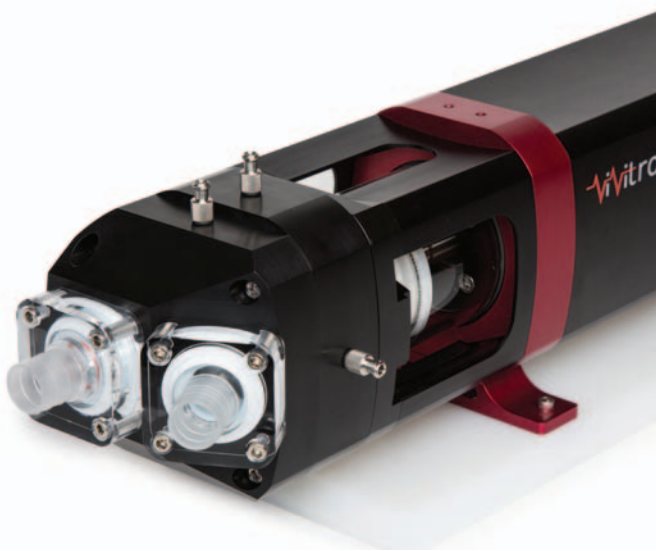
Compliance Air Volume: SOURCE 0-120 mL, OUTPUT 0-60 mL, syringe adjustable

Total Liquid Volume: 500 mL with SOURCE / OUTPUT compliance air volumes zero

Materials: Acrylic, Polycarbonate, Delrin, Nylon, Polyethylene, Stainless Steel, Viton

Pump Head

Product Code: 16796



The ViVITRO Pump Head can be used with the ViVITRO SuperPump to create a circulatory, pulsatile flow loop. The Pump Head accommodates ventricular pressure monitoring using Luer fittings. It may be mounted directly to the SuperPump or can be used in conjunction with the ViVITRO Viscoelastic Impedance Adaptor to attenuate pressure traces.

Features:

- Silicone ventricle membrane to isolate SuperPump piston from test fluid.
- Low closing volume spring loaded disc valves
- 19 mm (3/4") hose connectors
- Easy to debubble
- Easy to disassemble and clean