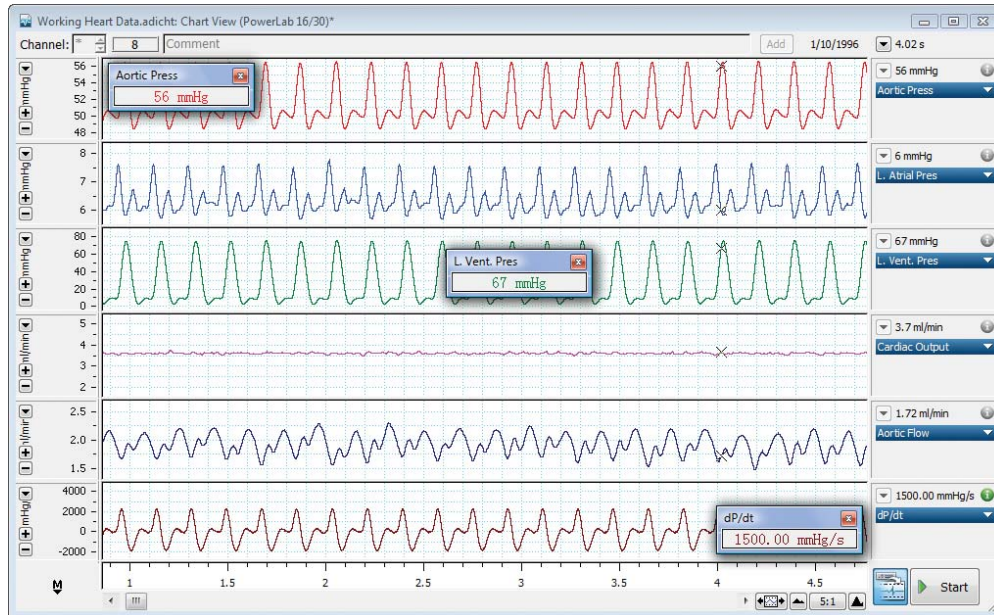


Isolated Heart Systems

Working Heart & Langendorff Studies with PowerLab Systems



LabChart recording of mouse isolated working heart parameters. Data courtesy of Prof. John Headrick, Heart Foundation Research Centre, Griffith University,

ADInstruments and Radnoti Glass Technology provide a range of Langendorff and Working Heart Systems that are ideal for studying the isolated hearts of transgenic mice and other small animal models. Isolated heart experiments allow researchers to study cardiac function without the systemic influences of other physiological processes. Small animal isolated heart studies are highly reproducible preparations that can be carried out in a timely and cost effective manner.

Each Isolated Heart System includes the Radnoti glassware, PowerLab hardware, LabChart Pro software, signal conditioners, transducers and accessories required to measure, record and analyze cardiac parameters from mice, rats and other small animals. Laboratory setup is made simple with the pre-configured, research-quality systems.

Radnoti's modular designs have set the standard in glassware technology and functionality for over thirty five years. The apparatus is easy to assemble, customize and adapt using the wide range of compatible components available in Radnoti's standard product range.

The glassware connects seamlessly to PowerLab systems and LabChart software for data acquisition and analysis. PowerLab systems are the preferred choice for life science researchers worldwide, with over 8000 research citations already published.

Features & Benefits

- Complete research systems for small animal studies
- Modular glassware for simple assembly and part replacement
- Software-controlled data acquisition hardware and signal conditioners
- Easy-to-use and powerful LabChart software for data acquisition and display
- Specialized software for BP, dose response and ECG analysis



Working Heart Systems

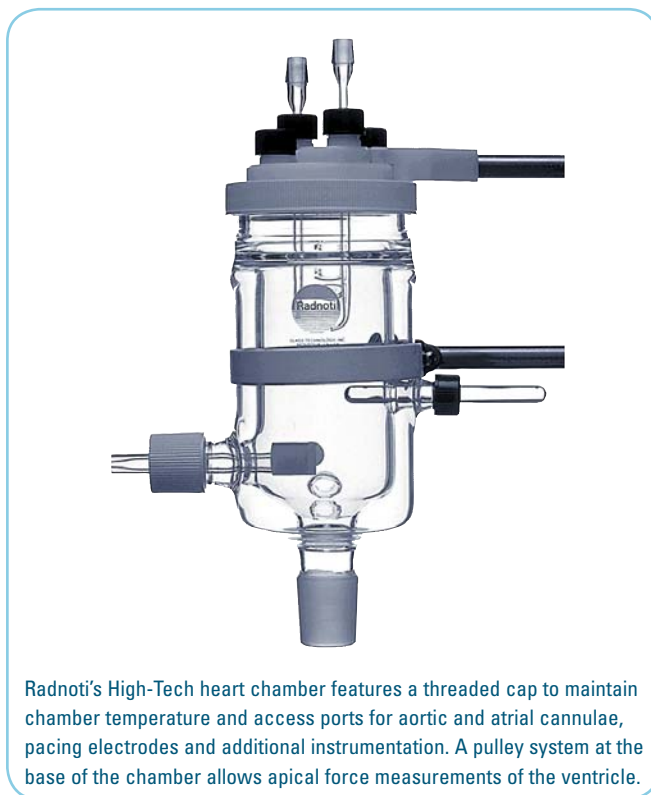
Working heart preparations allow researchers to monitor left atrial parameters as well as ventricular function. Nutrient solution is perfused through the cannulated left atrium and ventricle with the cardiac chambers functioning as they would *in vivo*.

Radnoti Working Heart glassware is easy to setup and adapt for a range of studies. The apparatus can be used for both Langendorff and Working Heart preparations. The user can switch between circulating and non-recirculating modes at the turn of a three-way tap.

The heart chamber, 2L reservoir, bubble traps and perfusate lines are water-jacketed to ensure that the perfusate solution is maintained at a constant temperature and the isolated heart is maintained in a stable environment.

The glassware also includes a peristaltic pump to deliver oxygenated perfusate to the heart chamber. Air bubbles are removed from the system by a series of bubble trap compliance chambers. To maintain constant flow and signal integrity, the membrane oxygenating chamber gently aerates perfusate solutions containing proteins or red blood cells.

ADInstruments offers the **PL3508B55-V Working Heart System for Mice** and the **PL3508B50/X-V Working Heart System for Rats/Rabbits**. Other configurations are available to suit rat, guinea pig, cat, rabbit and porcine hearts.



Radnoti's High-Tech heart chamber features a threaded cap to maintain chamber temperature and access ports for aortic and atrial cannulae, pacing electrodes and additional instrumentation. A pulley system at the base of the chamber allows apical force measurements of the ventricle.

Working Heart System Parameters

- Left-Atrial Pressure (Preload)
- Aortic Pressure (Afterload)
- Aortic Line Systolic & Diastolic BP
- Heart Rate
- Temperature
- Biphasic Action Potential (Surface ECG)

Ultimate Working Heart Systems

For a comprehensive isolated heart solution ADInstruments has developed two Ultimate Working Heart Systems, PL3516B56-V (mouse) & PL3516B51/S-V (rat). Components are sourced from industry recognized gold standard manufactures to ensure full compatibility with PowerLab systems. In addition to the working heart parameters listed above, you can use the included 16 channel PowerLab to simultaneously measure:

Atrial Inflow and Aortic Outflow with Transonic Systems Flowmeter and Flowprobe.

Left-Ventricular Pressure (LVP) with Millar Instruments Ultra Miniature (1.1F) Pressure Catheter.

pH with the pH Amplifier and Electrode.

Oxygen Concentration with the Micro-Oxygen Electrode.

Pacing/Electrical Stimulation with the Stimulus Isolator.



PL3516B56-V Working Heart Ultimate System for Mice.

Langendorff Systems

The Langendorff technique is used to quickly and efficiently study heart function without hormonal or vagal influence. The heart is supplied with sufficient oxygen and nutrients in retrograde mode using a single cannula inserted into the ascending aorta.

Constant Flow

When the coronary artery is perfused in constant flow mode, the coronary flow does not change even if coronary dilation or contraction occurs. Consequently, changes of perfusion pressure are the measured parameter affected by any intervention or drugs. As flow is constant, it is easy to titrate drugs into the heart using a syringe pump (not included).

The **PL3508B3-V Langendorff System (Constant Flow)** for rats, guinea pigs and small rabbits maintains constant flow by sealing both top and side ports on the bubble trap at the top of the apparatus.

Constant Pressure

These systems perfuse the heart in constant pressure mode. Coronary flow is monitored to show the effects of any intervention or drugs.

The **PL3508B1-V Langendorff System (Constant Pressure)** can be used with transgenic mice and other small rodent models. By simply repositioning the system's three-way taps, the system can operate in both non-recirculating and recirculating modes. The **PL3508B4-V Langendorff System (Constant Pressure)** can be used with rats, guinea pigs and rabbits.

To measure constant flow or pressure in mice, the **PL3508B2-V Langendorff System for Mice** is ideal.

Langendorff Systems Parameters

- Perfusion Pressure
- Temperature
- Electrical Activity of the Heart & Monophasic Action Potentials
- Left Ventricular Pressure/ Developed Pressure

Data Acquisition and Analysis

ADInstruments PowerLab Systems can record up to 16 channels of raw data in real time at speeds of up to 200 kHz per channel or 400 kHz aggregate. Data is recorded and displayed in the included LabChart software.

LabChart software offers:

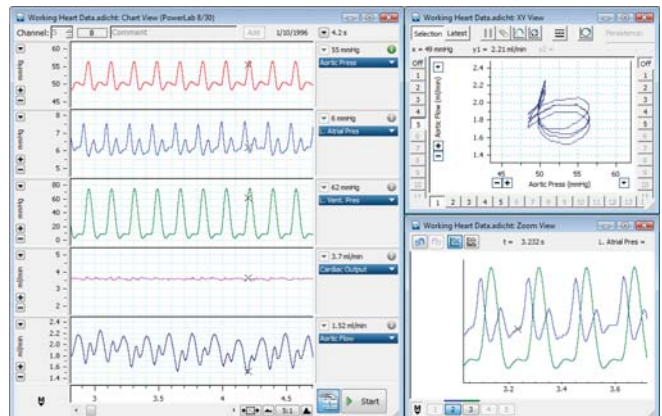
- 32 channels for data display and channel calculations
- Software control of PowerLab units and signal amplifiers
- Settings files with saved hardware and software parameters for quick experiment set-up and reproduction
- Data display options including signal overlay, Zoom View and the XY View
- Automatic extraction into Data Pad (LabChart's built-in spreadsheet) for statistical analysis
- Optional Modules for advanced analysis including Blood Pressure, ECG Analysis and Dose Response



Above: Langendorff Heart Perfusion data in LabChart. Coronary perfusion and left ventricular pressure have been recorded. dP/dt and heart rate have been calculated using LabChart Channel Calculations functions.



PL3508B1-V Langendorff System for Mice (Constant Pressure)



Above: Working heart recording in LabChart. Aortic pressure, left atrial pressure, left ventricular pressure, cardiac output and aortic flow have all been simultaneously recorded. The XY View has been used to create a pressure-flow plot. The Zoom View displays in "Overlay" mode left atrial and left ventricular pressure waveforms.

Ordering Information

Working Heart Systems

PL3516B56-V Working Heart Ultimate System for Mice* PL3516B51/S-V Working Heart Ultimate System for Rats* [§]	PL3508B55-V Working Heart System for Mice* PL3508B50/X-V Working Heart System for Rats/Rabbits* [§]
1 x PL3516 PowerLab 16/35 with LabChart Pro Software	1 x PL3508 PowerLab 8/35 with LabChart Pro Software
1 x FE224 Quad Bridge Amp	2 x FE221 Bridge Amp
2 x MLT844 Physiological Pressure Transducer	2 x MLT844 Physiological Pressure Transducer
2 x SP2881 Transducer Brackets	2 x SP2881 Transducer Brackets
1 x ML312 T-type Pod	1 x ML312 T-type Pod
1 x MLT1401 T-type Implantable Thermocouple Probe	1 x MLT1401 T-type Implantable Thermocouple Probe
1 x FE136 Animal Bio Amp	1 x FE136 Animal Bio Amp
1 x MLA1210 Spring Clip Electrodes (set of 3)	1 x MLA1210 Spring Clip Electrodes (set of 3)
1 x 130101EZ Radnoti Working Heart System for Mice [†] OR 1 x 120101bEZ/S Radnoti Working Heart System for Rats [†]	1 x MLAC17 Front-End Extension Cable Kit 1 x 130101EZ-V Radnoti Working Heart System for Mice [†] OR 1 x 120101bEZ Radnoti Working Heart System for Rats/Rabbits ^{†§}
1 x FE180 Stimulus Isolator	
1 x MLA260/L Stimulator Cable (4 mm Shrouded to Alligator Clip 2 m)	
1 x ML165 pH Amplifier	
1 x MI-405 Miniature Glass Electrode for pH Measurement	
1 x MI-409 Miniature Reference Electrode	
2 x SPR-671 Millar Pressure Catheter	
1 x AEC-10D Catheter Interface Cable (low profile)	
1 x MLT1120 Micro Oxygen Electrode 1 x MLT1122 Analog Adapter (for Micro-Oxygen Electrode)	
1 x T402-TT Transonic Two Channel Tubing Flowmeter	
2 x ME1PXN PXN Inline Flowprobe - 1.2 mm OR 2 x ME3PXN PXN Inline Flowprobe - 2.4 mm	
1 x MLAC16 BNC to BNC Cable (6 m)	
1 x MLAC17 Front-End Extension Cable Kit	
1 x SP0139 Teflon Insulated Silver Wire (7.5 m)	
Included in PL3516B51/S-V 170403 Latex Balloon (size 3 for rats, 10 pk) 170423 Flexible Teflon Balloon Catheter (for sizes 3 & 4)	

[†] Includes Thermo Bath/Circulator and Peristaltic Pump.

* Specify mains power: V = 115 for 110-115 V or V = 220 for 220-240 V

[§] Specify chamber size: X= S (rat, guinea pig), M (cat, rabbit)

ADInstruments also offers solutions for researchers working in GLP and 21 CFR Part 11 environments.

Langendorff Heart Systems

PL3508B1-V Langendorff System for Mice (Constant Pressure)*
PL3508B2-V Langendorff System for Mice (Constant Pressure or flow)*
PL3508B3-V Langendorff System for Rats (Constant Flow)*
PL3508B4-V Langendorff System for Rats (Constant Pressure)*

1 x PL3508 PowerLab 8/35 with LabChart Pro Software
2 x FE221 Bridge Amp
2 x MLT844 Physiological Pressure Transducer
2 x SP2881 Transducer Brackets
1 x ML312 T-type Pod
1 x MLT1401 T-type Implantable Thermocouple Probe
1 x FE136 Animal Bio Amp
1 x MLA1210 Spring Clip Electrodes (set of 3)
1 x MLAC16 BNC to BNC Cable (6 m)
1 x MLAC17 Front-End Extension Cable Kit
1 x 130102EZ Radnoti Langendorff Constant Pressure Recirculating Apparatus [†] OR 1 x 120103EZ Radnoti Langendorff Constant Flow Non-Recirculating Apparatus [†] OR 1 x 120105EZ Radnoti Langendorff Constant Pressure Non-Recirculating Apparatus [†]

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PowerLab systems and signal conditioners meet the European EMC directive. ADInstruments signal conditioners for human use are approved to the IEC60601-1 patient safety standard and meet the CSA C22.2 No. 601.1-M90 and UL Std No. 2601-1 safety of medical electrical equipment standards.



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