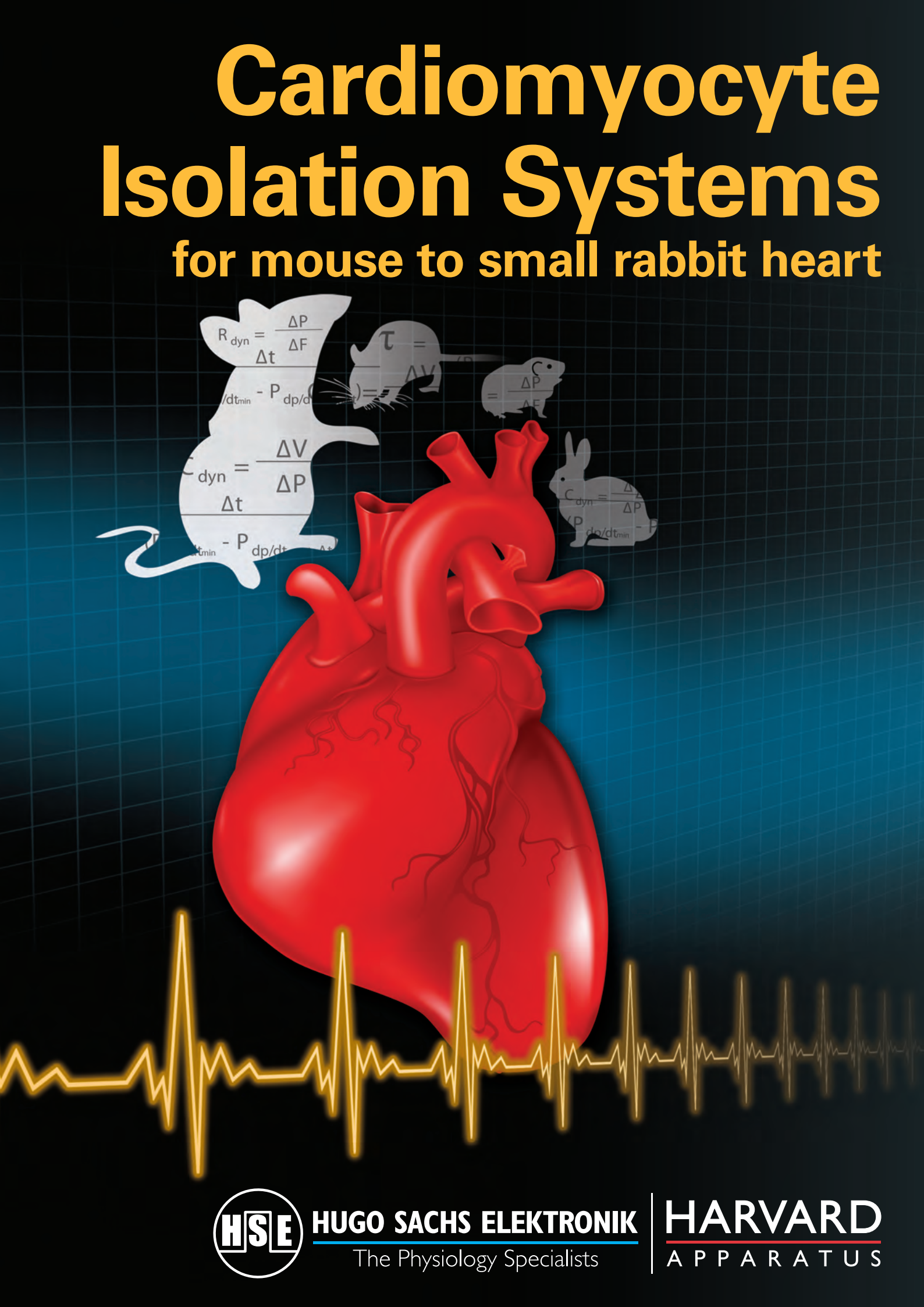
Cardiomyocyte Isolation Systems

for mouse to small rabbit heart



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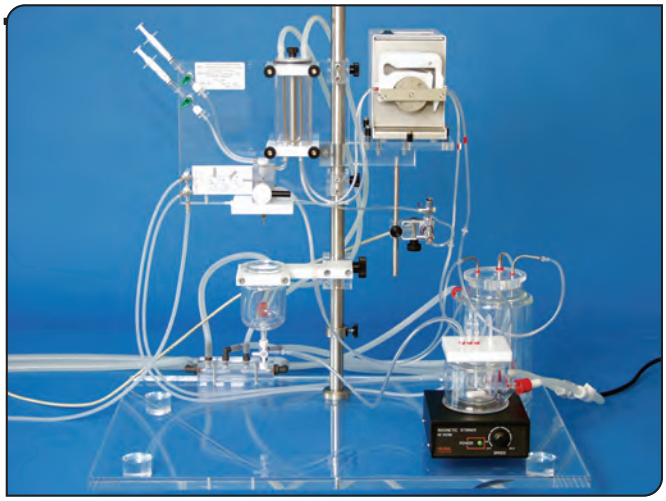
The Physiology Specialists

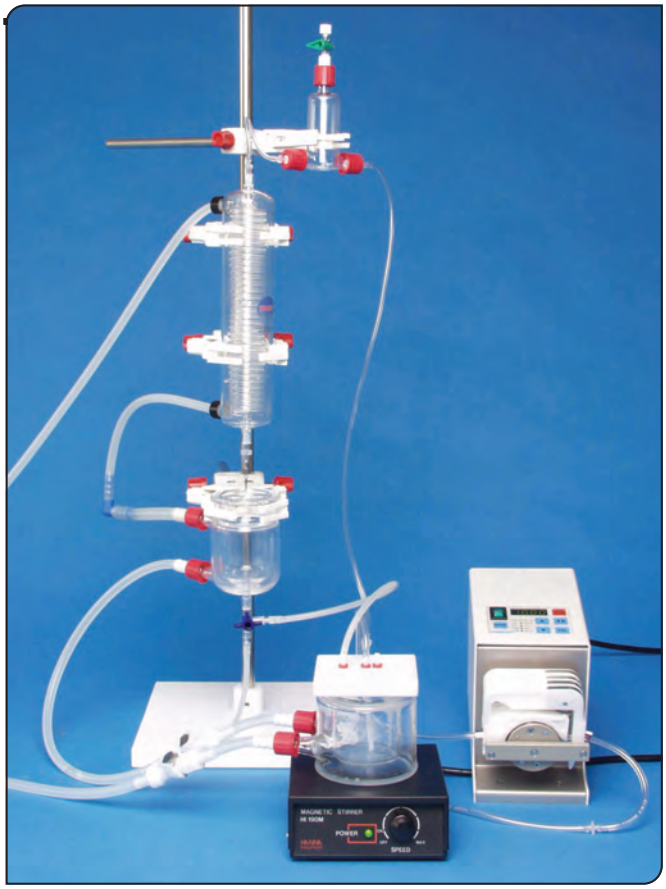
HARVARD APPARATUS

PSCI PERFUSION SYSTEM FOR CARDIOMYOCYTE ISOLATION

The PSCI is designed for pharmacology labs that require reproducible, high-yield viability for their cardiomyocyte assays. The PSCI has two separate perfusion pathways in order to separate clearing buffer from collagenase such that the solutions mix in less than 500 µl, with a simple switch between the two. All solutions recirculate to the aerated reservoir so that they are fresh at all times. The wetted path is compatible with ethanol allowing for a sterile preparation. The system perfusate volume is < 3 ml for the mouse version and <5 ml for the rat/guinea pig version.

SEE PAGES 3-6



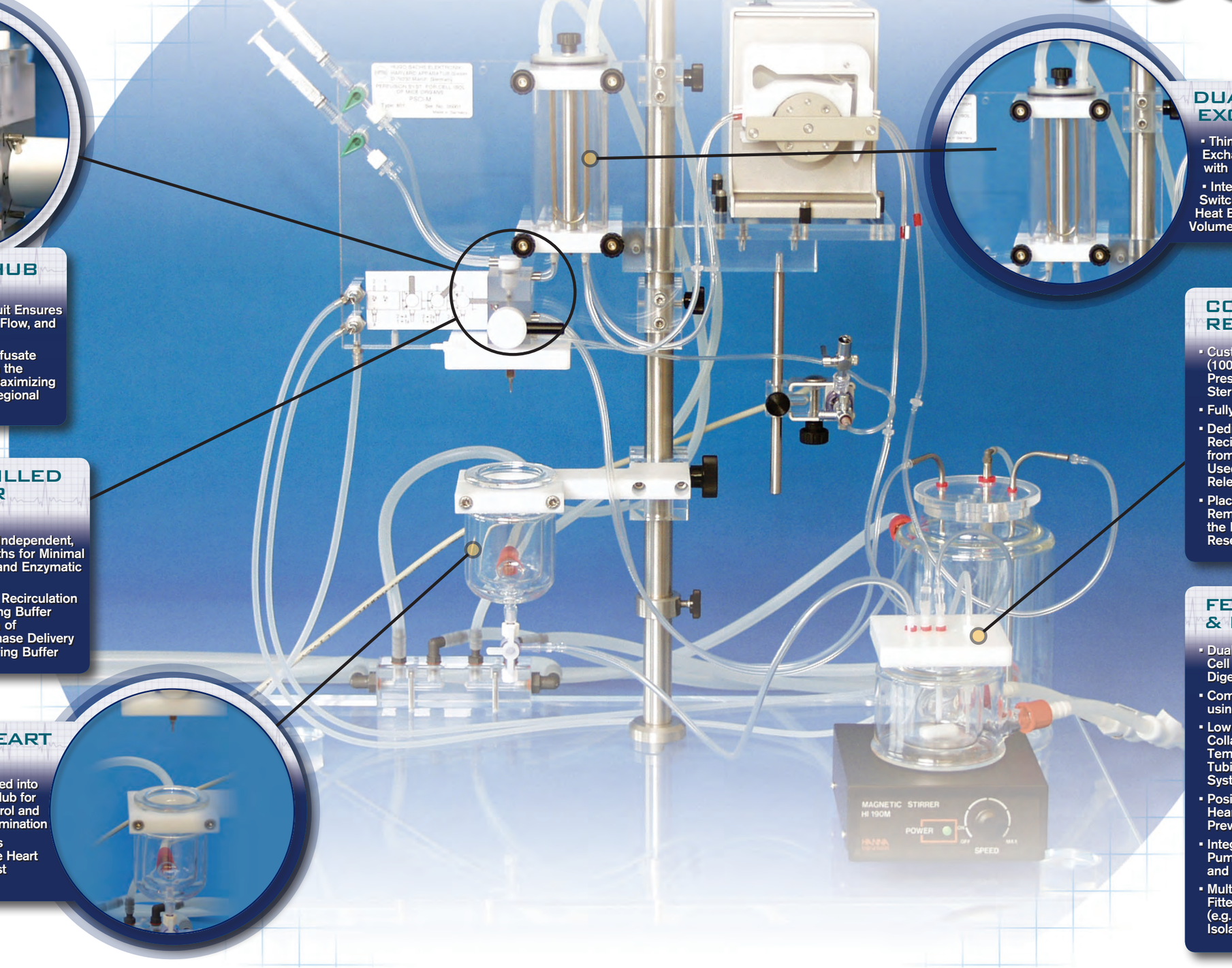


EASYCELL BASIC CARIOMYOCYTE ISOLATION SYSTEM

The EasyCell Basic system for use with mouse through guinea pig has a single perfusion pathway that is fully compatible with ethanol for disinfection. The transition from clearing buffer to collagenase is accomplished by either moving the suction tube or turning a stopcock. This system is recommended for basic research or student labs.

SEE PAGES 7-8

PSCI: Perfusion System for Cell Isolation



PERFUSION HUB

- Solid State Perfusion Circuit Ensures Thermal Stability, Laminar Flow, and Minimal System Volume
- Bubble Traps for Each Perfusate Stream Protect Heart from the Possibility of Air Emboli, Maximizing Cell Yield by Minimizing Regional Ischemia

PRECISION-MILLED CHANGEOVER STOPCOCK

- Integrated Stopcock with Independent, Non-Overlapping Fluid Paths for Minimal Mixing of Clearing Buffer and Enzymatic Buffers
- 3 Stopcock Positions for: Recirculation of Both Perfusates, Clearing Buffer Delivery with Recirculation of Collagenase, and Collagenase Delivery with Recirculation of Clearing Buffer

ENCLOSED HEART CHAMBER

- Heart Chamber Lid Integrated into the Base of the Perfusion Hub for Superior Temperature Control and to Isolate Heart from Contamination
- Low-Flow Gas Inlet Ensures Positive Pressure Within the Heart Chamber, Protecting Against Ingress of Bacteria

DUAL HEAT EXCHANGER

- Thin-Walled Stainless Steel Heat Exchanger Provides Quick Heating with Minimal Volume
- Interchangeable Insert Allows Switchover Between Mouse and Rat Heat Exchangers to Optimize Priming Volumes for the Two Species

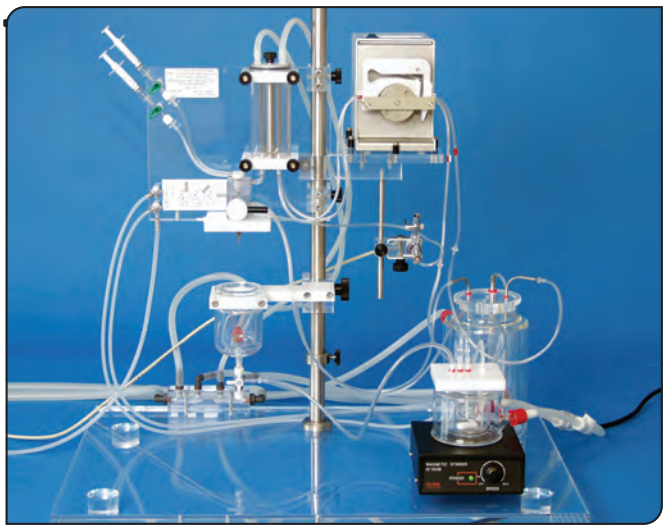
COLLAGENASE RESERVOIR

- Custom Designed Small Volume (100 mL) Reservoir With Positive Pressure Gas Supply to Maintain Sterility of Collagenase
- Fully Autoclavable Components
- Dedicated Return Lines for Recirculating Unused Perfusate from Hub and for Recirculating Used Perfusate and Capturing Released Cardiomyocytes
- Place Digested Heart in Remainder of Perfusate, Dissect the LV and Disassociate all in the Reservoir

FEATURES & BENEFITS

- Dual Perfusion System for Blood Cell Flushing and Enzymatic Digestion
- Compatible with Disinfection using Ethanol
- Low Priming Volume Conserves Collagenase and Minimizes Temperature Loss Through Tubing (< 3 mL for Mouse System, < 5 mL for Rat System)
- Positive Pressure Gas Flow in Heart Chamber and Reservoir Prevents Bacterial Contamination
- Integrated Platform for Roller Pump Minimizes system footprint and conserves bench space
- Multi-Purpose System can be Fitted For Use With Other Organs (e.g. *In Situ* or *Ex Vivo* Hepatocyte Isolation from Rat or Mouse Liver)

PSCI: Perfusion System



FEATURES & BENEFITS

- **Dual perfusion system for blood cell flushing and enzymatic digestion**
- **Compatible with disinfection using ethanol**
- **Positive pressure gas flow in heart chamber and reservoir prevent bacterial contamination**
- **Low priming volume conserves collagenase and minimizes temperature loss through tubing (< 3 ml for mouse system, < 5 mL for rat system)**
- **Integrated platform for roller pump minimizes system footprint and conserves use bench space**
- **Multi-purpose system can be fitted for use with other organs (e.g. *in situ* or *ex vivo* hepatocyte isolation from rat or mouse liver)**

PERFUSION SYSTEM FOR CELL ISOLATION OF RAT, GUINEA PIG OR MOUSE CARDIOMYOCYTES

The PSCI is specifically designed for harvesting individual cells from isolated organs like mouse, rat or guinea pig hearts, liver and other organs. Here we include systems specifically packaged for cardiomyocyte isolation; however, feel free to contact our technical team if you would also like to use your system with other organs.

The PSCI works such that individual cells are released from the cell structure of the tissue through perfusion with enzyme solution and are then flushed out. Those cardiomyocytes are collected in the collagenase reservoir to which the dissected left ventricle is added for further dissociation, allowing an increased total cell yield.

The apparatus is so designed that the individual steps required for preparing the cells can proceed as simply and clearly as possible. With two separate perfusion circuits, the organ can be switched between clearing buffer for removal of blood cells and collagenase buffer for organ digestion by means of a custom, precision-milled changeover stopcock.

Using the standard configuration, perfusion takes place under constant-flow conditions which are set by the researcher on the included peristaltic pump. The limits of the apparatus are a flow rate of about 50 or 100 ml/min depending on the configuration (mouse vs. rat/guinea pig). Common additions to the PSCI include perfusion pressure measurement and constant pressure perfusion. These options allow for optimized perfusion of the heart, further maximizing cell yield and viability by ensuring non-damaging physiological perfusion conditions.

The components wetted by the perfusion solutions are made from alcohol-resistant materials so that the apparatus can be filled with ethanol for sterilization/disinfection should your experiment require prolonged incubation time where bacterial contamination would be problematic.

The complete system includes everything required for simple cardiomyocyte isolation. For detailed descriptions of system extensions and options see page 65. Contact our expert technical team if you need assistance with system configuration, application support or custom design requests.

MEASURED SIGNALS & CALCULATED PARAMETERS ON A BIVENTRICULAR WORKING HEART SYSTEM:

The following signals can be monitored with the relevent optional packages:

- Perfusion Pressure
- Coronary Flow

PSCI: Core Systems and Options

PSCI-MH 73-4424 (115V) or 73-4425 (230V)

Core system PSCI for mouse cardiomyocyte isolation

Includes:

- PSCI-MH Base System for mouse heart
- Thermocirculator
- Analog Roller Pump and Tubing (Tygon)
- Aortic Cannula for mouse heart, 1.0 mm
- Protease Reservoir
- Mini Magnetic Stirrer
- Holder for Pressure Transducer
- 0.5 L Jacketed Buffer Reservoir and Tube Set

PSCI-RH 73-4426 (115V) or 73-4427 (230V)

Core system PSCI for rat or guinea pig cardiomyocyte isolation

Includes:

- PSCI-RH Base System for rat/guinea pig heart
- Thermocirculator
- Analog Roller Pump and Tubing (Tygon)
- Aortic Cannulae for rat and guinea pig hearts
  - 2.0 mm OD
  - 2.5 mm OD
  - 3.0 mm OD
- Protease Reservoir
- Mini Magnetic Stirrer
- Holder for Pressure Transducer
- 1.0 L Jacketed Buffer Reservoir and Tube Set

PSCI-PP 73-4428

Addition for perfusion pressure measurement to PSCI

Includes:

- PLUGSYS Minicase
- TAM-D Transducer Amplifier Module
- Pressure Transducer

SCP 73-2806

Addition for constant pressure perfusion to PSCI

Choose this option if you require the ability to perfuse a heart in constant pressure mode. This option requires option PSCI-PP (IH2 73-4428) pressure measurement

- Allows operation in constant pressure or constant flow with simple switch
- Additional Measured Signals

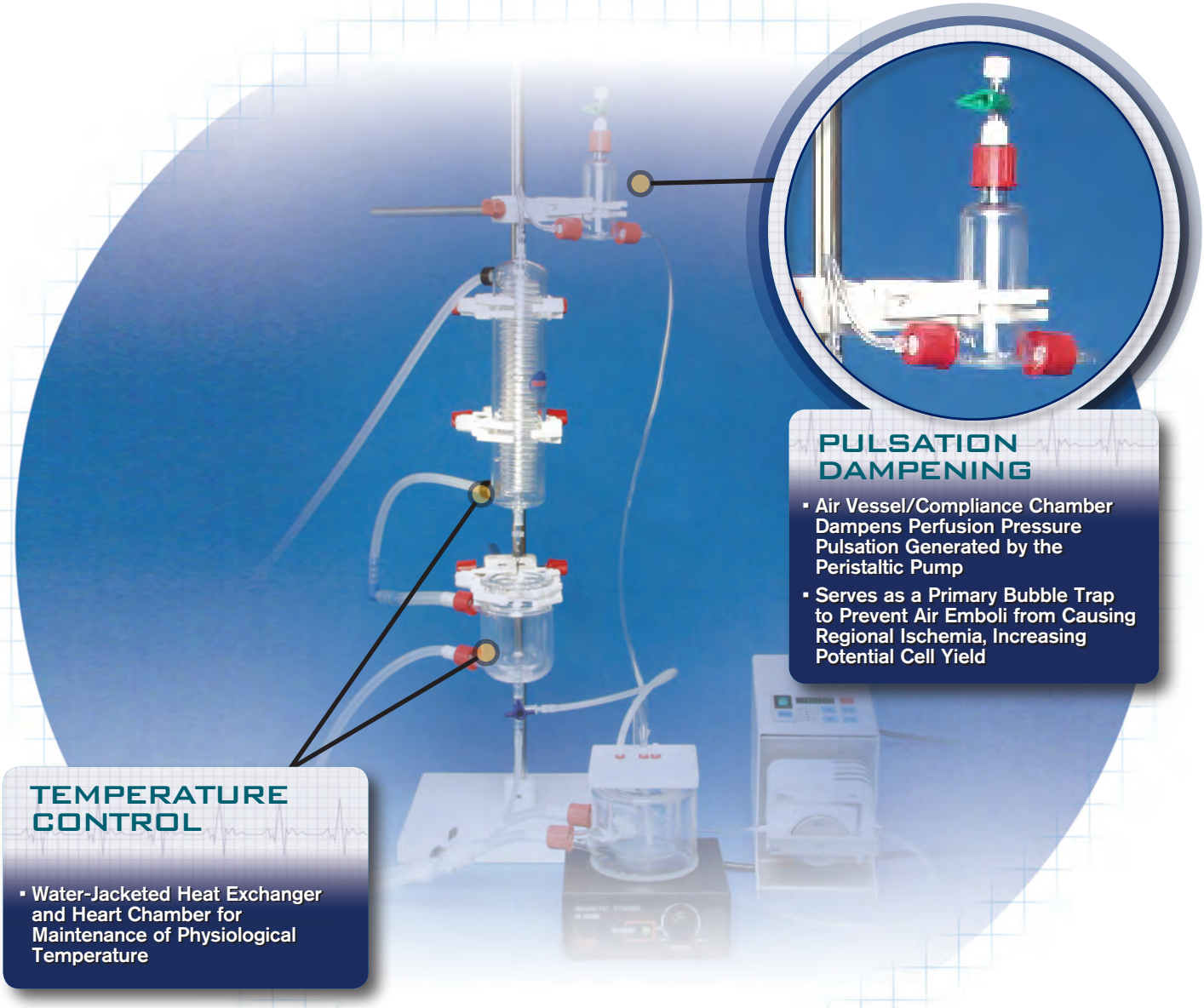
FEATURES & BENEFITS

- **Accurate control of perfusion pressure or flow, even at very low flow rates**
- **Flexible perfusion circuit setup adjusts to suit individual perfusion conditions**
  - Indirect coronary flow monitoring

Includes:

- SCP Servo Controlled Perfusion Module & Pump Connection Cable

EasyCell: Simple System for Cell Extraction



PULSATION DAMPENING

- Air Vessel/Compliance Chamber Dampens Perfusion Pressure Pulsation Generated by the Peristaltic Pump
- Serves as a Primary Bubble Trap to Prevent Air Emboli from Causing Regional Ischemia, Increasing Potential Cell Yield

TEMPERATURE CONTROL

- Water-Jacketed Heat Exchanger and Heart Chamber for Maintenance of Physiological Temperature

FEATURES & BENEFITS

- Designed for Cardiomyocyte Isolation from Small Rodent Hearts
- Can be Adapted for Other Small Rodent Organs *In Situ* or *Ex Vivo*
- Simple Constant Flow Perfusion System
- Easy to Set Up, Operate, and Maintain
- Wetted Parts can be Disinfected with 70% Ethanol or Autoclaved for Sterilization

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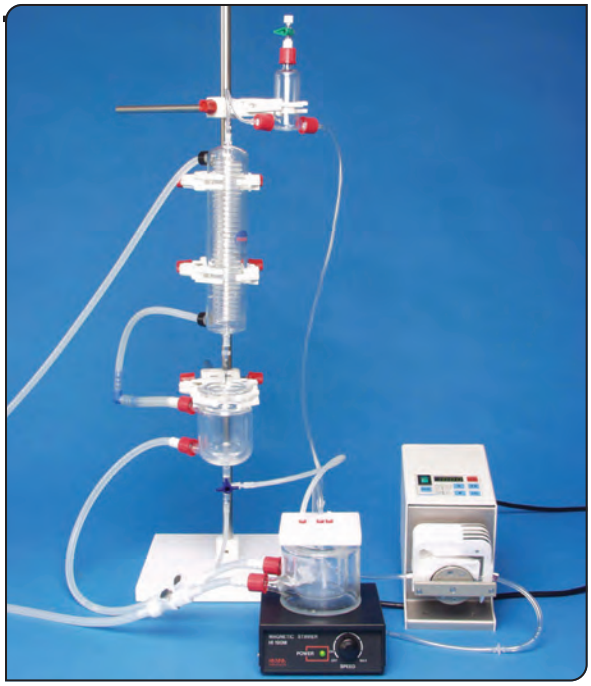
EasyCell System for Cardiomyocyte Isolation



FEATURES & BENEFITS

- **Designed for cardiomyocyte isolation from small rodent hearts**
- **Can be adapted for other small rodent organs *in situ* or *ex vivo***
- **Simple constant flow perfusion system**
- **Easy to set up, operate, and maintain**
- **Wetted parts can be disinfected with 70% ethanol or autoclaved for sterilization**

BASIC SYSTEM FOR CARDIOMYOCYTE ISOLATION IN MOUSE, RAT AND GUINEA PIG HEARTS

This perfusion system has been specifically created to meet the needs of individuals who wish to isolate primary cells from hearts of species in the size range of mouse to guinea pigs. The system can also be configured for either *in situ* or *ex vivo* organ perfusion with the addition of an operating table or moist chamber and appropriate cannulae.

The EasyCell System is simple to setup, operate and maintain and its compact design has a minimal footprint, conserving valuable bench space. The heart is first perfused with a warmed, aerated standard perfusion buffer for blanching/clearing the heart of blood and then with a warmed, aerated protease solution for tissue disintegration. Unlike the PSCI system, the clearing buffer and collagenase share the same perfusion line, slightly delaying the delivery of the collagenase after switching over from the clearing buffer. The wetted components of the perfusion circuit can be flushed with a 70% ethanol solution or autoclaved for sterilization purposes should the cells need to be incubated for a number of hours following isolation rather than for immediate use.

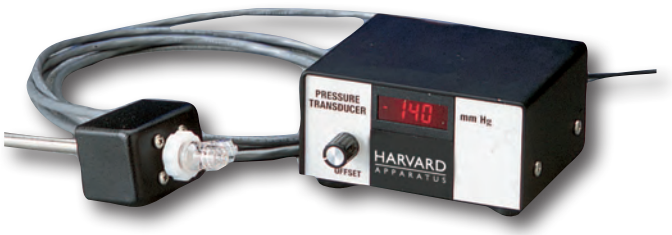
The system is supplied complete with everything you need for basic cardiomyocyte isolation. Perfusion pressure monitoring can easily be added to aid in choosing an appropriate, physiological perfusion pump flow setting.

EASYCELL-CM 73-4430 (115V) 73-4431 (230V)

Basic constant flow cardiomyocyte isolation system for small rodents

Includes:

- EasyCell System Base and Glassware
- 100 ml Jacketed Protease Reservoir
- 1 L Jacketed Buffer Reservoir with Tube Set
- Aortic Cannula Set
  - 1.0 mm OD mouse cannula
  - 2.0 mm OD rat cannula
  - 3.0 mm OD guinea pig cannula
- Thermocirculator
- Digital Peristaltic Pump
- Mini Magnetic Stirrer
- Perfusion Pressure MLT-MLT Adapter



EASYCELL-PP 72-4496 (115V) 72-4497 (230V)

Research grade blood pressure transducer

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Cardiomyocyte Isolation Systems

for mouse to small rabbit heart

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