MRI imaging techniques in animal research are growing rapidly, and the need to infuse dyes, drugs and nutrients at the MRI site is required. Harvard Apparatus is introducing a pump made of mostly non-magnetic materials that works well within three feet of the magnet. This pump has very high accuracy ±0.35 and ±0.05 precision at a broad flow rate range from 0.0001 µl/hr to 220.82 ml/min. The pump has a separate control unit at the pump site and a remote full control unit that can reach as far as 60 ft away from the pump if necessary.

The new 2004 Harvard Apparatus catalog has many other MRI compatible products: ventilators, catheters, clamps, stands and supports. If you have questions or require other MRI compatible products e-mail: bioscience@harvardapparatus.com or visit our new website: www.harvardapparatus.com See page vi in the 2004 Harvard Apparatus Full Line Catalog.

MRI Compatible Syringe Pump

MRI Compatible Clamps & Stands

The stronghold MRI Series… An entire family of non magnetic clamps and stands to work near your MRI. See pages O22-O27 in the 2004 Harvard Apparatus Full Line Catalog.

Electronic Magnification Glasses-Advanced Visualizations

This 5x and 10x magnification system can be operated from batteries or an electrical outlet. Can be linked to a computer to store images or view data. See page D40 in the 2004 Harvard Apparatus Full Line Catalog.

The Planar Lipid Bilayer Workstation

This advanced workstation is a total tool to studying lipid bilayer mechanisms. It has been designed to make these difficult experiments easy to run, and provide you with the highest quality data from your experiments. See page H6 in the 2004 Harvard Apparatus Full Line Catalog.

Equilibrium Dialysis For Binding Studies

For single or 96 simultaneous experiments: Protein and protein binding assays; receptor binding assays; ligand binding assays; protein and protein-DNA interactions. Membranes come in three molecular weight membrane cut off sizes: 5K, 10K and 25K. The singles handle volumes from 25 to 75 µl and the 96 well version 50 –200 µl. The 96 well version works with three rotators: single, dual or 8 plate. There are many more equilibrium dialysis products from Harvard Apparatus. See pages N38 to N44 in the 2004 Harvard Apparatus Full Line Catalog.

Biotelemetry System for EEG, EMG, EOG or PSG in Small Rodents

This system is a low noise, 2-channel wireless data system used to monitor physiological parameters on animals that weigh 100 grams or more. Parameters include: electroencephalogram; electromyogram; electrocardiogram; electrooculogram or polysomnography. Submicrovolt noise level is excellent for EEG.

This unit allows the animal to be untethered with a range of up to 50 feet. This unit also allows for monitoring of animals during activities such as in a treadmill, metabolic cage or rot-o-rod. This capability opens new areas of research on real-time monitoring of unrestrained animals in their natural environments. See page I101 in the 2004 Harvard Apparatus Full Line Catalog.
Breakthroughs
What’s NEW In Innovative Products For Bioresearch...

Volume 1, Series 101
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Innovative Products For Bioresearch...

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Inspir—is Advanced Safety Ventilator (ASV): Ventilate from Mice to Cats

This Basic Table Top Anesthesia Machine is an extremely compact, (L x W x H): 8 x 8 x 13 inches, making it ideal for locations where space is limited. Four models are available that differ only by the type of flowmeter supplied.


Rugged, Space Efficient Table Top Anesthesia Machine

The small size and dual calipers of this gauge is ideal for measuring ears, toes and fat deposits. Range 12 mm or 25 mm, resolution 0.01 mm. Battery operated.


Accurate, Easy-To-Use Thickness Gauge for Animals

1. Fill the cartridge with 3 drops of fresh whole blood
2. Insert cartridge in i-STAT® Analyzer
3. Critical results in less than 2 minutes for immediate therapy decisions

Available Chemistries

<table>
<thead>
<tr>
<th>Cate ACT</th>
<th>Hematocrit</th>
<th>Bicarbonate</th>
<th>Chloride</th>
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<tr>
<td>Glucose</td>
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<td>Total CO₂</td>
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<td>Creatinine</td>
<td>pH</td>
<td>Base Excess</td>
<td>Ionized Calcium</td>
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<tr>
<td>Sodium</td>
<td>PCO₂</td>
<td>O₂ Saturation</td>
<td>Anion Gap</td>
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<tr>
<td>Potassium</td>
<td>PO₂</td>
<td>Lactate</td>
<td></td>
</tr>
</tbody>
</table>

High Performance Ussing Chambers for Large & Micro Samples

The vertical diffusion chamber system is used for transport studies on both filter grown cell monolayers and surgically excised tissue sections. The vertical diffusion chamber system consists of six diffusion chambers, a 12-channel gas manifold and a heat block. Fourteen general types of vertical chambers are currently available: one for use with cells grown on Snapwell® membrane supports and the others for use with tissue. The model RC-50 Imaging Chamber is for transepithelial studies. It is a low profile, horizontally mounted Ussing Chamber incorporating special features for using confocal imaging.

See page M167 in the 2004 Harvard Apparatus Full Line Catalog

Portable Capnographs & Pulse Oximeters

These capnographs provide spot readings of End Tidal CO₂, CO₂ waveform and sample at a rate of 120ml/min.

Pulse oximeters: SpO₂, faster pulse rate up to 450 bpm, temperature, pulse strength, respiration rate, alarms all in one unit.


Harvard Apparatus is the leader in animal ventilation with a broad family of ventilation and anesthesia products for small and large animals. The Inspira is the most advanced and versatile ventilator.

Capable of ventilating mice to cats (15g to 10kg). Adjustable I:E ratio 1:4 to 4:1, two models - constant volume and volume/pressure and many other advanced features: sigh breath, assist mode, PEEP.

See pages F6 to F6 the 2004 Harvard Apparatus Full Line Catalog.

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See pages F6 to F6 the 2004 Harvard Apparatus Full Line Catalog.
Pneumotach Air Flow Transducers (Very Low Flow)

The TSD137 series pneumotachs can perform a variety of small animal pulmonary measurements relating to air flow, lung volume and expired gas analysis. Each TSD137 transducer type consists of a low flow pneumotach head coupled to a precision, highly sensitive, differential pressure transducer. See page L29 in the 2004 Harvard Apparatus Full Line Catalog.

New Trends In Ex Vivo & In Situ Isolated Organ Perfusion

Hugo Sachs Elektronik (a Harvard Apparatus Company) introduces the UP-100 and PS-1 Organ Perfusion Systems

- Compact size—single set-up for constant pressure or constant flow
- Only commercial in situ organ perfusion system available
- Easy-to-insert custom cannulae:
  - Occlusion Protection
  - With or Without Pressure Monitoring Port
  - Pressure Measurement at the Source
- Optimized temperature control
- Applications expertise from the leaders in perfusion systems
- Fully instrumented turnkey systems

Call 800-272-2775 for technical or ordering assistance

96 & 384 Well Economical Filter Plates

Harvard Apparatus introduces these new 96-Well and 384-Well Filter Plates which bring speed and high throughput to sample filtration on a microliter to milliliter scale. The membrane-bottom individual sample wells or chambers have separate high-strength single or dual filter membranes to provide rapid filtration rates and to eliminate leakage or cross-talk between adjacent wells. See pages N23 to N24 in the 2004 Harvard Apparatus Full Line Catalog.

Food and Liquid Consumption System

This Food and Liquid Consumption System is designed to provide nutrition researchers with the ability to precisely monitor food and liquid consumption of laboratory animals over time. In contrast to other systems, this system monitors consumption directly by weighing the reservoir continuously. See pages G6 and G7 in the 2004 Harvard Apparatus Full Line Catalog.

Metabolic Monitoring System for Treadmill & Activity Monitor

This Metabolic Monitoring System is ideal for measurement of oxygen consumption and carbon dioxide production in lab animals. It uses open circuit calorimetry technique. It is very flexible: the size of the animal is immaterial. The data can be analyzed by the statistical packages. The system comes with windows based software. The combination of the Metabolic Monitor and Activity Monitoring System permits measurement of metabolic rate and animal locomotor activity simultaneously, thus allowing this correlation to be calculated. The metabolic monitoring system works well with the motorized air tight treadmill for mice and rats. See pages G4 to G5 for the Metabolic Monitoring System.

Nitric Oxide, Rugged Probe Measurement System

This Nitric Oxide System is the most technologically advanced nitric oxide electrochemical detection system on the market today. Using the latest state of the art combination NO sensor design, the ‘amiNO’® series of nitric oxide sensors increases the sensitivity of electrochemical nitric oxide measurement by up to 100 times that of any existing electrochemical sensor on the market today. See pages M2 to M5 in the 2004 Harvard Apparatus Full Line Catalog.

Autocalculation of Target Structure & Digital Readout For Stereotaxic Instruments

Now setting up and reproducing settings on stereotaxic manipulators is easy, accurate and reproducible with the advent of electronic sensors on each axis of the manipulator bars. Measurements are accurate to ±10 microns in all three directions, and the easy to read display is programmable to a resolution of 1 to 10 microns. Other versions of digital control are available with computers that allow you to easily change the approach angle automatically calculating the new coordinates of the target structure. This reduces the need for extensive calculations and the risk of error. See pages L29 and L32 in the 2004 Harvard Apparatus Full Line Catalog.
The PLI-100 Pico-Injector and PDMI-2 Open Perfusion Micro-Incubator are two important tools for cellular research.

The PLI-100 Pico-Injector reliably delivers a wide range of volumes through micropipettes by applying a regulated pressure for a digitally set period of time. Compressed gas allows the user to deliver desired volumes from femtoliters to microliters while simultaneously holding a cell.

Whether you need to do large injections into capillaries or very small injections into mammalian nuclei, the PLI-100 is well suited for your experiment. Researchers say: “The PLI-100 is very robust, in constant use in our lab.”

“Most importantly, the PLI-100 valves prevent cytotoxic and cytolytic backflow into my pipette after ooocyte injection.”

“It’s very easy to control.”

“The PLI-100 is heavily used on a daily basis, and works great.”

“I like the fact that I can use the PLI-100 with TTL pulses.”

The PDMI-2 operates equally well under static or perfused conditions. When operated with perfusion, the micro-incubator’s unique design places flexible tubes carrying inflowing perfusate in contact with a temperature regulated Peltier heat plate, thus heating or cooling the incoming fluid to a desired temperature. The PDMI-2 also provides gas flow driven plate, thus heating or cooling the incoming fluid to a desired temperature.

This bidirectional microprocessor controlled Rota-Rod for mice features a front panel with a large, very readable backlight display. The panel can be oriented to select the most comfortable angle for the operator and to avoid glare.

This Mouse Rota-Rod has two operating modes. The Constant Speed Mode - the angular speed (RPM) is preset by the operator and comfortable angle for the operator. The Accelerating Speed Mode - the operator presets both the duration and the steepness of the ramp, e.g., 4 minutes to pass from 40 to 40 RPM, 5 minutes to pass from 6 to 30 RPM.

The Microject Plus from Harvard Apparatus was created for Stereotaxic injections where the amount of material injected is very small or expensive. This Syringe Pump is ideal for when you have small sample volumes to infuse/withdraw. The Microject Plus from Harvard Apparatus has the broadest range of sizes and selectivities of packings of any sample preparation products. This Harvard family of spin columns has the broadest range of sizes and selectivities of packings of any sample preparation products.

This Harvard family of spin columns has the broadest range of sizes and selectivities of packings of any sample preparation products.

Available Packing Materials

<table>
<thead>
<tr>
<th>Gel Filtration</th>
<th>Hydrophilic (polar)</th>
<th>Misc. Cellulose</th>
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<tr>
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<td>Detergent</td>
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<tr>
<td>G-25</td>
<td>Cyano</td>
<td>Removal</td>
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<tr>
<td>G-50</td>
<td>Hydrophilic</td>
<td>IMAC **</td>
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<td>G-100</td>
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<td>P-2 *</td>
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<td>P-6 *</td>
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<tr>
<td>Hydrophobic</td>
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<td>(non-polar)</td>
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<td>C4</td>
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</tbody>
</table>

See pages N17 to N22 in the 2004 Harvard Apparatus Full Line Catalog

PAGE 4
CPK–The Most Authentic Atomic Models

CPK ATOMIC models are the most accurate atomic models available. They are sold in kits, individual pieces or already constructed molecules. They are the best way to examine new drugs or model compounds.

See pages P2 to P16 in the 2004 Harvard Apparatus Full Line Catalog.

10 Syringe Feeding Station

This 10-Syringe Feeding System is a convenient and versatile system to feed multiple animals simultaneously, making it ideal for multiple animal feeding studies or other applications which require precise parallel pumping. The standard syringe rack can hold up to 10 syringes ranging in size from 50cc to 140cc. You can use plastic or glass syringes. The broad performance characteristics of the Feeding System make it ideal for small drug or large volume nutritional variables on large animal populations.

See page A31 in the 2004 Harvard Apparatus Full Line Catalog

Treadmill for Mice and Rats

Study exercise physiology in mice and rats with this quiet and compact unit for exercising. Airtight chambers are available for VO₂ and VO₂ studies.

See page G15 in the 2004 Harvard Apparatus Full Line Catalog

Isolated Perfused Rat Mesenteric Bed

For investigating the tone of small blood vessels under the effect of vascular substances. This unit is warm and moist and has electrical field stimulation capabilities.

See page K9 in the 2004 Harvard Apparatus Full Line Catalog

Refrigerated Fraction Collector For Microdialysis

48 samples from one or two microdialysis probes can be collected and refrigerated at 4°C. Handles volumes from 5 µl to 200 µl. Also great for LC fraction collection.

See page L28 in the 2004 Harvard Apparatus Full Line Catalog

Low EF Syringe Pumps For Perfusing Near Sensitive Physiological Sensors

Now the PHD 22/2000 Series and the Physio 22 syringe pumps have virtually no electrical noise emitted so that they can be used in close proximity to sensitive sensors without causing any noise interferences. This feature is ideal for cell physiology experiments.

See pages A12 to A13 in the 2004 Harvard Apparatus Full Line Catalog.

Mouse Metabolic Chamber with High Collection Efficiencies

This chamber is particularly useful with transgenic mice and is suitable for use in barrier facilities. It features an advanced design for accurate and efficient collection of urine and feces that are totally separated. This unit can be gas sterilized and is constructed of high impact resistant acrylic materials.

See page C11 in the 2004 Harvard Apparatus Full Line Catalog

Ideal Wireless Micro-Drill

This rechargeable drill is ideal for research applications that require surgical burrs and trephines. It is lightweight and the charge lasts for up to 8 hours.

See page G4 in the 2004 Harvard Apparatus Full Line Catalog

High Pressure Syringe Pump

...For Your Most Demanding Applications

- Can dispense up to 1,400 ml using ten 140 ml syringes
- ±0.5% Accuracy
- ±0.05% Reproducibility
- Two year warranty
- Advanced built-in programming capability or PC compatible
- Flow rates from: 1.5 µl/hr to 112.0 ml/min
- Provides 433 pounds of force

Applications:
  - Injecting into High Pressure Reaction Vessels
  - Multiple Simultaneous Animal Feeding Station
  - Accurate Delivery of Coatings
  - HPLC Delivery System
  - Remote Operation in Hazardous Environments

Call 800-272-2775 for technical or ordering assistance

www.harvardapparatus.com
Remote monitoring allows you to monitor your equipment while it is unattended. This Harvard Apparatus unit can monitor 24/7 and if it senses a problem it will automatically e-mail, telephone, or fax you anywhere in the world. See page A22 in the 2004 Harvard Apparatus Full Line Catalog.

For lymphatic, vascular or blood collection circuit access with minimum worry of thrombogenicity common in intravascular devices. See page B33 in the 2004 Harvard Apparatus Full Line Catalog.

Reduce animal trauma and cost with flexible, disposable, plastic feeding tubes. See page B27 in the 2004 Harvard Apparatus Full Line Catalog.

This professional quality trimmer is super convenient and suitable for all your small animal fur removal needs. The powerful yet quiet rotary motor runs at 6,000 rpm and does not require a spray coolant. This trimmer offers convenient cord or cordless operation to provide constant trimming power so you will always have a fully charged trimmer ready for use. See page C20 in the 2004 Harvard Apparatus Full Line Catalog.

If you are performing cardiovascular work, this is the pump for you. It truly simulates the pumping action of the heart. It features silicone rubber-covered heart-type ball valves and smooth flow paths which minimize hemolysis. The pumping head is easy to take apart and reassemble and can be sterilized. See page A37 in the 2004 Harvard Apparatus Full Line Catalog.

This cannula is designed for insertion in the very small vessels of mice or rats. OD 0.4mm (0.016in) x ID 0.2mm (0.008in). See page B36 in the 2004 Harvard Apparatus Full Line Catalog.
The days of struggling with tedious cuvettes limiting the number of samples and cell types tested are about to change. The Methods Optimization Systems, MOS 25 & MOS 96, allow you to boost your productivity by optimizing your conditions and increasing your yields and viability. Once you use the MOS 25 system you will never want to go back to using a traditional cuvette.

See page M55 in the 2004 Harvard Apparatus Full Line Catalog

Microprobes, 0.23 mm (0.009 in), for Temperature Measurement

Taking the rectal or vascular temperature of neonatal mice, spectrometer cuvettes etc., is easy with the 0.23 mm (0.009 in) Teflon™ coated probe. This highly flexible probe is autoclavable or gas sterilizable. The small mass of these probes allows for extremely fast reading times with time constants as low as 0.005 seconds.

These micro probes work with the controller above to measure temperatures with an accuracy of 0.1°C with auto correction compensating for ambient temperatures from 0 to 50°C. See page D16 in the 2004 Harvard Apparatus Full Line Catalog

OS-250 Overflow/Spill Sensor

The OS-250 Overflow/Spill Sensor from Warner Instruments provides a simple and effective method for detecting leaks and spills around sensitive equipment (such as microscopes). The integrated, switched power controller can be used to rapidly turn off all pumps and perfusion systems in the event of a spill. When assembled, the OS-250 can respond to as few as 3 drops of liquid. Liquids detected include: nanopure H₂O, normal saline, ETOH, MeOH, acetone, hexane, chloroform, decane, DMSO and others.

Please call for details or visit our website and type "Spill Detection" in the search box.

Advanced Magnification with Fiber Optics Illumination Systems & Headband

These advanced illumination systems provides 36,000 lux of bright white light. The working distance of 34 inches guarantees bright images of your treatment area. This illumination system clips onto the Leather Padded Headband and is ultra light (only 28g) and comfortable to wear. The advanced Galilean system binocular magnifier provides sharp images. See pages D38-D39 in the 2004 Harvard Apparatus Full Line Catalog

Knives for Microsurgery

Ideal for small animal surgery. These ultra sharp small tools with advanced ergonomic design enhance your ability to do surgery without distortion on small animals. Seven styles available.

See page E13 in the 2004 Harvard Apparatus Full Line Catalog
Across
1. Increasing _______ will speed up dialysis.
2. A group of geese in the air is a(n) _______.
6. The smallest dog is a(n) _______.
7. In Beer’s law A=_______.
8. The pig is the _______ smartest animal.
12. The oldest breed of dog is _______.
13. The square root of 400 is _______.
14. Spin columns go in a(n) _______.
18. (C_2H_5)_2O is the chemical formula for _______.
19. Canis latrans is the scientific name for an _______.
20. What you take when you cuff a rat’s tail _______.
22. The animal with the largest eyes is an _______.
23. Movement of molecules thru semi-permeable membrane is called _______.

Down
1. C_2C,CO,H
2. The fastest flying bird is the spine-tailed _______.
3. A group of geese on the ground is a(n) _______.
4. Elephants have _______ teeth.
5. _______ are the only animals with flaps around their ears.
8. House flies live for _______ days.
9. A substance which yields readily to any force which tends to alter its shape is a(n) _______.
10. _______ is what you call changing the liquid surrounding a cell.
11. An ostrich can run up to _______ km/h (43 mph).
12. A(n) _______ pump is the most accurate and pulseless.
15. There are 6,000 _______ of reptiles.
17. Fish and insects have no _______.
21. pH of 1 represents an _______.

For answers go to: www.harvardapparatus.com