Surgical Monitoring Mouse and Rat Made Easy

**MouseMonitor™**

**Better Results**
Get better study results while improving surgery quality & survival rate.

**Superior Data**
Ultra low-noise, high-resolution ECG, SpO2 & Respiration.

**Easy to Use**
Durable stainless steel surgical platform AND intuitive touch display.

**Stable Prep**
Maintain body temp. & monitor vital signs during surgery.

Heart Rate • SpO2 • Temperature • ECG • Warming

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# MouseMonitor™ Specification Sheet

## Physiological Parameters

**ECG**
- Ultra low-noise, high resolution
- Simultaneous Lead I, II & III
- 24-bit sigma-delta AD converters

**Heart Rate**
- Real-time numeric display
- Up to 999BPM
- Acquired from ECG waveform

**Pulse Oximetry**
- Ultra low-noise, high resolution
- Simultaneous SpO2 display
- 18-bit sigma-delta AD converters

**Respiration**
- Ultra low-noise, high resolution
- Based on thoracic impedance
- Signal acquired through ECG electrodes

**Breath Rate**
- Real-time numeric display
- Up to 300BrPM
- Acquired from respiration waveform

**Core Temperature**
- 0.1°C monitoring accuracy
- Mouse-specific rectal probe

**Warming**
- Electronic closed-loop control
- Intelligent zone heating
- Platform temperature control with 0.1°C resolution

## Intuitive Touch Interface

**25.5cm Touch screen**
Capacitive touch screen works with surgical gloves

**Ergonomic Display**
Waveforms and numeric data presented in an easily readable format

**Screenshot**
Take quick snapshots to capture interesting data

**Comments**
Apply notes, tags, and observations to mark events

**Record and Export**
Supports many analysis packages through CSV export

## Heated Surgical Platform

**Accessories**
Frame designed for magnetic accessories

**Expansion Modules**
Four expansion ports support analog output and SpO2 modules

**Durable**
Easy to clean stainless steel work surface and electrodes

**Warming Zone**
Homothermic heater maintains core temperature.

**ECG Electrodes**
Surface-mounted mouse & rat electrodes enable easy operation with low noise

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The MouseMonitor™ is a compact tabletop vital signs monitor that displays ECG and respiration waveforms as well as heart rate, breath rate and core temperature. The unique integrated pad incorporates ultra-low noise, high resolution ECG electronics and a home-thermic heating pad with a durable surgical steel operating surface that supports magnetic accessories. The included 10.1” touchscreen display ergonomically presents waveform and numeric data in an intuitive and legible layout, enabling you to quickly record and export your acquired data. The MouseMonitor™ is compatible with most DAQ systems when connected to the optional analog output module.

**ECG**
- Uses non-invasive pad mounted ECG electrodes
- Simultaneous Lead I, Lead II and Lead III ECG
- Works in supine or prone position, head in either direction
- Electrically isolated ECG bioamplifier
- High-resolution 24 bit sigma-delta AD converters

**Respiration**
- Impedance pneumography based measurement
- Uses non-invasive pad mounted ECG electrodes

**Temperature Control and Monitoring**
- Electronic closed-loop control
- Efficient, electrically heated warming zones
- Pad temperature control with resolution of 0.1°C
- Compact tabletop design without circulating water

## Specifications

**Heated Surgical Platform**

<table>
<thead>
<tr>
<th>ECG Electrodes</th>
<th>4 mouse limb electrodes</th>
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</thead>
<tbody>
<tr>
<td>4 rat limb electrodes</td>
<td></td>
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<tr>
<td>External electrodes with 1,5mm DIN jacks</td>
<td></td>
</tr>
<tr>
<td>Heater</td>
<td></td>
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<tr>
<td>Electronic heating with multiple zone control</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Adjustable, 35-42 °C</td>
<td></td>
</tr>
<tr>
<td>Audible Alarm</td>
<td></td>
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<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td></td>
</tr>
<tr>
<td>25,4 x 30,4cm</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
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<tr>
<td>+/- 3 kg</td>
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</tbody>
</table>

**Display Unit**

| Display |
| 25cm color, LED backlit, capacitive touch |
| Resolution |
| 1280 x 800 pixels |
| Storage |
| 8GB |
| Power |
| 100-240V AC adapter |

**Rectal Temperature Probe**

| Probe Type |
| Mouse specific stainless steel |
| Sensor Type |
| Copper-Constantan thermocouple |
| Accuracy |
| +/- 0,1°C after calibration |

## Measurements

**Numeric**

| Heart Rate |
| 200-999BPM |
| Respiration Rate |
| 660-300BrPM |
| Core Temperature |
| 25-50°C |
| Pad Temperature |
| 35-45°C |

**Waveform**

- ECG Lead I
- ECG Lead II
- ECG Lead III
- Respiration

**Available Expansion Modules**

- ANALOG OUTPUT
- Pulse Oximetry
- SpO2

UNO Roestvaststaal BV - PO Box 15 - NL 6900 AA ZEVENAAR
Tel: +31 316 524451 Email; info@unobv.com
Pulse Oximeter Module

MouseMonitor™

Anesthesia Monitoring • SpO2 • Ventilation Monitoring

Ventilation
Quickly determine whether any additional oxygen may be required

Superior Data
Ultra low-noise, high-resolution pulse oximeter electronics

Easy to Use
Easily acquire, visualize & record oxygen saturation values & plethysmograms

Anesthesia
Ensure you are delivering an appropriate amount of anesthesia

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The Pulse Oximeter module allows you to non-invasively measure arterial blood oxygenation in a wide variety of small animals. Pulse oximetry adds another real-time continuous data stream to the MouseMonitor, providing valuable information about ventilation efficacy and anesthesia depth. On top of that, SpO2 is easy to acquire and analyze. Pulse oximetry has been mandated in hospital and patient care guidelines for more than a decade because it combines valuable arterial blood oxygenation data with an easy to use clip or adhesive based sensor. The preclinical research world has taken note of this and the latest NIH guidelines repeatedly mention pulse oximetry / SpO2 monitoring during surgery and postoperative care to ensure adequate ventilation and proper anesthesia delivery.

A Few Quotes from the NIH Guide for the Care and Use of Animals, 8th edition, 2011

Use if balanced anesthesia...can help minimize physiologic fluctuations during surgery (Page 119).

Pain is a stressor, and if not relieved, can lead to unacceptable levels of stress and distress in animals. Furthermore, unrelieved pain may lead to “wind-up”, a phenomenon in which central pain sensitization results in a pain response to otherwise nonpainful stimuli. For these reasons, the proper use of anesthetics and analgesics in research animals is an ethical and scientific imperative (page 120).

For anesthesia delivery, precision vaporizers and monitoring equipment (e.g. pulse oximeter...) increase the safety and choices of anesthetic agents for use in rodents and other small species (page 122).

MouseMonitor™ Applications

- Stroke or Cerebrovascular Accident (CVA) Studies
- Myocardial Infarction Studies
- Ventilation & Forced Ventilation Monitoring
- Anesthesia Delivery Monitoring
- Pre-surgery Baseline Screening
- Telemetry Implantation Surgical Preparation & Monitoring
- Contrast Agent Injection Monitoring
- Pressure Catheterization Surgical Preparation & Monitoring
- Pharmaceutical Screening & Toxicology Studies
- High-Resolution Pulse Oximetry & SpO2 Acquisition

Specifications

Pulse rate Range: 200-999 BPM
Pulse rate Resolution: 1 BPM
SpO2 Range: 80-100%
SpO2 Resolution: 1%
Pulse Oximeter Sensors: Universal Compatibility

Connectors

- 1 DB9
- 1 Type-B USB

Size: 15.2 x 8.9 x 2.5 cm
Weight: 0.5 kg

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Analog Output Module

MouseMonitor™

Flexible
Universal compatibility with 3rd party data acquisition software & systems

Superior Data
High 4kHz sample rate with 16-bit digital to analog converters

Easy to Use
All output channels are easily configured on the Mouse Monitor display unit

Powerful Filters
Allows for configuration of high pass, low pass & notch filters on each channel

High Sample rate • 8 Channels • BNC Connectivity

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The Analog Output module allows you to export the high quality signals acquired by the MouseMonitor to a variety of data acquisition systems. Each output channel has individually configurable high pass, low pass and notch filters to allow for maximum data output control. Current customers have used the analog output module as an R-trigger for ultrasound imaging systems, as a TTL trigger for custom, high speed dual camera image capture systems and to supply data to many different brands of data acquisition systems. Many of the MouseMonitor analog output application have been developed through close collaborations with customers; we look forward to working with you to ensure that the MouseMonitor works well in your research application.

**Allows for easy integration with other devices such as:**

- Ultrasound Imaging Systems
- Optical Imaging Systems
- Blood Pressure Catheter Systems
- Pressure-Volume Catheter Systems
- Cardiac, Muscle & Neurological Stimulators
- Pulse Oximeter Devices
- Temperature Regulation Devices
- Cuff-based Blood Pressure Devices
- Capnography Devices
- Syringe Pumps
- Automated Ventilators
- Spirometers and Pneumotachs
- Custom Mouse Research Equipment

**MouseMonitor™ Applications**

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- Pharmaceutical Screening & Toxicology Studies
- High-Resolution Pulse Oximetry & SpO2 Acquisition

**Specifications**

- BNC Outputs: 8 Channels
- Sample Rate: 4kHz
- DAC Resolution: 16-bit
- Output Impedance: 1 kΩ typical
- Output Voltage (selectable):
  - +/- 10.0V
  - +/- 5.0V
  - +/- 2.0V
  - +/- 1.0V
  - +/- 0.5V
  - +/- 0.2V
- Maximum Output Current: 15mA
- Slew Rate: 12V/µs
- Settling Time: 20µs Typical
- Linearity Error: +/- 4 LSB
- Size: 15,2 x 8,9 x 2,5cm
- Weight: 0,5kg

**Available outputs:**

- ECG Lead I
- ECG Lead II
- ECg Lead III
- Heart Rate
- Heart Rate “R-Trigger”
- Respiration Waveform
- Breath Rate
- Breath rate Trigger
- Core Temperature
- Surgical Platform Temperature
- Pulse Oximetry Plethysmogram
- Saturation % Oxygen (SpO2)