Pressure Cycling Technology Sample Preparation System (PCT SPS)

…the Power of PCT

Pressure Cycling Technology (PCT) uses rapid cycles of hydrostatic pressure between ambient and ultra high levels to control biomolecular interactions, allowing for a high degree of safety, speed, reproducibility, and convenience. This unique, patented technology offers the potential for broad applications in a number of established and emerging fields, including genomics, proteomics, pathogen inactivation, drug discovery and development, protein purification, and immunodiagnostics.

…the PCT Sample Preparation System

Sample preparation is a significant bottleneck to discoveries in genomic and proteomic research. To address this problem, the PCT Sample Preparation System (PCT SPS) was developed, which allows for the safe, rapid, and reproducible extraction of DNA, RNA, proteins, and small molecules from a wide variety of cells and tissues, particularly those considered “hard-to-lyse”. The PCT SPS uses a small, semi-automated bench top instrument (Barocycler NEP3229), together with single-use sample processing containers (PULSE Tubes).

…the Barocycler NEP3229

The Barocycler NEP3229 is an affordable, high pressure laboratory instrument designed to fit on a bench top, inside a biological safety cabinet, or on the shelf of a cold room. The Barocycler NEP3229 is capable of processing up to three samples simultaneously using specially designed, single-use containers called PULSE Tubes. The Barocycler NEP3229 has an external chiller hook-up, automatic fill and dispense valves, and an integrated microprocessor with an easy-to-use keypad. The new bench top Barocycler NEP3229 fills an important and growing need in genomics, proteomics, and metabolomics for the rapid, robust, versatile, reproducible, and quantitative extraction of nucleic acids, proteins, and small molecules from a wide variety of organisms including, viruses, bacteria, plant and animal cells and tissues.

…PULSE Tubes (PT)

PULSE (Pressure Used to Lyse Samples for Extraction) Tubes (PT) transmit the power of PCT from the Barocycler instrument to the sample. For biomolecule extraction, the specimen (such as tissue) is placed on the Lysis Disk, the PT is placed in the pressure chamber of the Barocycler, pressure chamber fluid is added, and pressurization begins. As pressure increases, the Ram pushes the specimen from the Sample Chamber through the Lysis Disk and into the Fluid Retention Chamber. When pressure is released, the sample (now partially homogenized) is pulled back through the Lysis Disk by the receding Ram. The combination of physical passage through the Lysis Disk, rapid pressure changes, and other biophysical mechanisms breaks up the cellular structures of the specimen to quickly and efficiently release nucleic acids, proteins, and small molecules.
Specifications of the PCT SPS*

<table>
<thead>
<tr>
<th>Barocycler NEP3229</th>
<th>Pressure</th>
<th>Protocol Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Pressure</td>
<td>44 kpsi, 300 MPa</td>
<td>Protocol number</td>
</tr>
<tr>
<td>Working Pressure Range</td>
<td>5 to 35 kpsi</td>
<td>Holding Time (up or down) protocol number</td>
</tr>
<tr>
<td>Minimum Pressure</td>
<td>1 kpsi</td>
<td>Temp. Control</td>
</tr>
<tr>
<td>Recommended Pressure Range</td>
<td>10 to 35 kpsi</td>
<td>Number of Chambers</td>
</tr>
<tr>
<td>Ramp Time (up)</td>
<td>~3 kpsi/sec</td>
<td>Number of PULSE Tubes per Chamber</td>
</tr>
<tr>
<td>Ramp Time (down)</td>
<td>&lt; 0.3 sec</td>
<td>Dimensions</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>120 VAC, 20 Amps, 60 Hz</td>
<td>Top Unit: 19.0 × 17.5 × 27.5 in.</td>
</tr>
<tr>
<td>Bottom Unit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top Unit:</td>
<td></td>
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<td>Bottom Unit:</td>
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<td></td>
</tr>
<tr>
<td>Power Requirement</td>
<td>120 VAC, 20 Amps, 60 Hz</td>
<td></td>
</tr>
<tr>
<td>Laboratory Environment</td>
<td>15 to 35 °C, &lt; 85% Humidity</td>
<td></td>
</tr>
</tbody>
</table>

**PULSE Tube FT500**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>13 mm diameter × 51 mm long</th>
<th>Compatible solvent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Tube, cap, ram: Polypropylene</td>
<td>Solvent that is compatible with polypropylene and silicon rubber</td>
</tr>
<tr>
<td>O-ring Seal: silicon rubber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Size**</td>
<td>Solid: 50 – 500 mg</td>
<td>Operational Temperature</td>
</tr>
<tr>
<td></td>
<td>Liquid: 1.2 – 1.5 mL</td>
<td>4 to 37 °C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>- 70 to 35 °C</td>
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</tr>
</tbody>
</table>

* Specifications may be changed without prior notification
** The combined volume of solid sample and lysis buffer needs to be 1.2 – 1.5 mL

Features & Benefits of the PCT SPS

- Safe  
  PULSE Tubes offer a closed system to reduce sample handling and minimize exposure to pathogens/toxins
- Fast  
  Nucleic acids, proteins, and small molecules are released from a wide variety of cells and tissues in minutes
- Powerful  
  Up to 35,000 PSI (235 MPa, 2.35 kbar) can be used to lyse samples and release excellent quality and quantity of bio-molecules
- Efficient  
  Up to three samples can be extracted simultaneously, and in minutes
- Versatile  
  Animal, plant, and microbial samples can be processed; either standard or user defined protocols can be used
- Reproducible  
  Computer controlled protocols mean consistent extraction each time, every time

Third-Party Publications and Presentations


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