Improve Yield & Reduce Cost with Levitronix® Bearingless Pumps!

Stop Your Pumps from Stealing Your Profits!

**BEARINGLESS PUMP SYSTEMS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPS-1</td>
<td>1.6 bar</td>
<td>21 liters/min (5.5 gallons/min)</td>
</tr>
<tr>
<td>BPS-3</td>
<td>2.5 bar</td>
<td>75 liters/min (20 gallons/min)</td>
</tr>
<tr>
<td>BPS-4</td>
<td>4.5 bar</td>
<td>140 liters/min (37 gallons/min)</td>
</tr>
</tbody>
</table>

*BPS-1 and BPS-3 are not to be used for new applications. Alternative: BPS-200 and BPS-600.*

Levitronix® Bearingless Pump Technology
Your Solution for Better Yields and Lower Operating Costs
REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP

Levitronix® has developed a revolutionary centrifugal pump that has no bearings to wear out or seals to break. Based on the principles of magnetic levitation, the pump’s impeller is suspended contact-free inside a sealed casing and is driven by the magnetic field of the motor (Figure 1). The impeller and casing are both fabricated from chemical resistant, high-purity fluorocarbon resins. Together with the rotor magnet they make up the pump head. Fluid flow rate and pressure are precisely controlled by electronically regulating rotor speed and eliminates pulsations.

SYSTEM BENEFITS

- Improves process yields in CMP by producing 200-1000 times fewer scratching particles compared to other pumps.
- Increases filter life in CMP recirculation loops by a factor of up to 15 by generating less gels and large particles.
- Reduces particle contamination issues in wet processes by generating 10 to 50 times fewer particles.
- Improves and simplifies process control by eliminating pulsation and by accurately controlling both flow rate and rotor speed.
- Increases equipment uptime and lowers maintenance costs by reducing part wear.
- Increases equipment uptime and saves maintenance costs in plating applications by providing a clog-free operation.
- Saves valuable space in process tools by having a very small footprint.

APPLICATIONS

- Highest market share of liquid pumps in single wafer processing tools.
- Widely used in electrochemical deposition.
- The ideal pump for CMP slurry handling - from bulk delivery to point of use flow control.
- Well-accepted in bulk chemical delivery.
LEVITRONIX PUMPS ARE DESIGNED FOR HIGH-PURITY APPLICATIONS

The BPS pump systems are designed for high-purity fluid applications where extremely low particle shedding and metal contamination are required.

Tests conducted by an independent laboratory prove that particle generation from a Levitonix® pump is significantly less than that from bellows pumps. It was shown that Levitonix® pumps flush up 50 times faster than bellows pumps of comparable hydraulic performance. Extremely low particle generation is achieved because the levitating impeller rotates contact-free inside the pump casing.

Independent tests also indicate that the area normalized surface contamination from all parts of a Levitonix® pump is well below the surface contamination specification of semiconductor equipment manufacturers and comparable to other ultra pure fluid pumps. Having a wetted surface that is 30 times smaller compared to that of bellows pumps of comparable hydraulic performance, the actual ionic contamination is about 30 times less with a Levitonix® pump.

Comparative tests among Levitonix®, bellows and diaphragm pumps, conducted with CMP slurries, showed the Levitonix® pumps producing 200-1000 times fewer large particles, which can scratch and damage wafers. The tests also showed that the Levitonix® pump, in fact, extended filter life in the CMP recirculation loop by 5 to 15 times over the other pumps.

All wetted parts of the Levitonix® pumps are made from high-purity fluorocarbon resins (PTFE, PFA, ECTFE, PVDF). In addition, the rotor-magnet is totally encapsulated and protected by two polymeric layers, eliminating the possibility for metallic contamination (Figure 3). The first layer is a proprietary coating with extremely low permeability and the second is a high-purity PFA layer that enhances chemical resistance.

* Test reports are available upon request.

BPS-1 PUMP SYSTEM

Figure 4: Pressure-flow curves for BPS-1 pump system (liquid: 1 cP, 1 g/cm³).

Figure 5: Basic dimensions of motor BSM-1 with pump head CP-1 for BPS-1 pump system.

Figure 6: Basic dimensions of controller LC24 for BPS-1 pump system.
BPS-3 PUMP SYSTEM

Figure 7: Pressure-flow curves for BPS-3 pump system (liquid: 1 cP, 1 g/cm$^3$).

Figure 9: Basic dimensions of motor BSM-3 with pump head CP-3 for BPS-3 pump system.

Figure 11: Basic dimensions of controller LC48 for BPS-3 pump system.

BPS-4 PUMP SYSTEM

Figure 8: Pressure-flow curves for BPS-4 pump system (liquid: 1 cP, 1 g/cm$^3$).

Figure 10: Basic dimensions of motor BSM-4 with pump head CP-4 for BPS-4 pump system.

Figure 12: Basic dimensions of controller LC325 for BPS-4 pump system.
Bearingless Centrifugal Pumps for the Semiconductor Industry

Levitronix

Your Solution for Better Yields and Lower Operating Costs

CONNECTIVITY OF THE LEVITRONIX® PUMP SYSTEM

PC Connection:
- External
- Service

PLC-Connection
- Speed Control
- Flow
- Pressure

PLC-Module
PLC-A

DC

AC/DC Power Supply

Fluid In

Fluid Out

Motor
BSM-x

Controller
LC

Control Panel:
- Stand-Alone
- Speed Control

Stand-Alone}

RS232

LUI-A

Motor
BSM-x

Controller
LC

Fluid In

Fluid Out

Chemically Resistant Components

Bearingless Pump System BPS-x

STANDARD SYSTEM CONFIGURATIONS AND PRODUCT OPTIONS

** Custom configurations are available

<table>
<thead>
<tr>
<th>Part</th>
<th>Characteristics</th>
<th>Pump System BPS-1</th>
<th>Pump System BPS-3</th>
<th>Pump System BPS-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Head</td>
<td>Part Name</td>
<td>CP-1 (Pump Casing</td>
<td>CP-3 (Pump Casing</td>
<td>CP-4 (Pump Casing</td>
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<tr>
<td></td>
<td>Wet Materials: Impeller</td>
<td>PCA-1, Impeller</td>
<td>PCA-3, Impeller</td>
<td>PCA-4, Impeller</td>
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<tr>
<td></td>
<td>Pump Casing</td>
<td>PCA-1</td>
<td>PCA-3</td>
<td>PCA-4</td>
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<td></td>
<td>Fittings</td>
<td>Flaretek ½&quot;</td>
<td>Flaretek 1&quot;</td>
<td>Flaretek 1&quot;</td>
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<td></td>
<td>Sealing O-Ring</td>
<td>Kalrez® perfluoroelastomer 1 **</td>
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<tr>
<td></td>
<td>Max. Flow</td>
<td>21 liters/min / 5.5 gallons/min</td>
<td>75 liters/min / 20 gallons/min</td>
<td>140 liters/min / 37 gallons/min</td>
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<tr>
<td></td>
<td>Max. Diff.-Pressure</td>
<td>1.6bar / 23psi</td>
<td>2.5bar / 36psi</td>
<td>4.5bar / 65psi</td>
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<tr>
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<td>Max. Liquid Temp.</td>
<td>90°C / 194°F</td>
<td>90°C / 194°F</td>
<td>90°C / 194°F</td>
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<td>Motor</td>
<td>Part Name</td>
<td>BSM-1</td>
<td>BSM-3</td>
<td>BSM-4</td>
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<tr>
<td></td>
<td>Mechanical Power</td>
<td>50 W</td>
<td>300 W</td>
<td>900 W</td>
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<tr>
<td></td>
<td>Housing</td>
<td>ETFE coated Aluminum, waterproofed and submersible</td>
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<tr>
<td></td>
<td>Cable</td>
<td>1 cable, 5m, FEP jacket 2 **</td>
<td>2 cables, 6m, FEP jacket 2 **</td>
<td>2 cables, 6m, FEP jacket 2 **</td>
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<tr>
<td></td>
<td>Connector</td>
<td>D-SUB **</td>
<td>D-SUB / COMBICON **</td>
<td>D-SUB / COMBICON **</td>
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<td>Part Name</td>
<td>LC24</td>
<td>LC48</td>
<td>LC325</td>
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<tr>
<td></td>
<td>Electrical Power</td>
<td>120 W</td>
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<td>1500 W</td>
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<tr>
<td></td>
<td>Supply Voltage</td>
<td>24 V DC</td>
<td>48 V DC</td>
<td>200-230 V AC, 1 and 3-phase</td>
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</tbody>
</table>

1: Kalrez® is a registered trademark of DuPont Dow Elastomers

Levitronix® Bearingless Pump Technology

Your Solution for Better Yields and Lower Operating Costs
LEVITRONIX® SYSTEM COMPONENTS
Levitronix® product family for ultra pure fluid handling

ACCESSORIES
Levitronix® accessories for BPS-3 pump system (same or similar accessories are available for BPS-1 and BPS-4)