PuraLev®
Life Science Pump Series

PuraLev® 600SU (Single-Use)
3.1 bar (45 psi)
75 liters/min (20 gallons/min)

Low Shear Design - High Cell Viability
INTRODUCTION

Levitronix® has developed a revolutionary 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 biocompatible (FDA, USP-VI, BSE/TSE and Animal free) gamma sterilizable polypropylene (PP) and together they make up the disposable pump head. A simple and intuitive exchange of the single use pump head is achieved with a bayonet socket type mounting procedure (see Figure 5). Flow rate or pressure are precisely controlled by electronically regulating the rotor speed, which eliminates any pulsation. With the lack of mechanical bearings plus the self-contained pump head design, the risk of contamination is drastically reduced. The absence of narrow gaps between the impeller and pump casing, plus the low-shear pump design allows the gentle pumping of sensitive liquids. The pump casing is fabricated with Triclamp fittings and can be easily inserted and removed with an intuitive bayonet socket.

SYSTEM BENEFITS

- Low shear-forces
- Reduced risk of contamination due to the self-contained design with magnetic bearings
- No particle generation
- No over-pressure situations (compared to roller pumps)
- No narrow gaps between the impeller and pump casing where bacteria could be entrapped
- Pump head is gamma sterilizable
- Biocompatibility of wet materials: FDA, USP-VI, Animal/BSE/TSE free
- Bayonet socket design for easy and intuitive exchange of disposable pump head (see Figure 5)
- Small size
- Dry running capability
- Proven technology in the medical (disposable blood pumps) and semiconductor (high-purity pumps) industries
- High flow capability with compact design
- Pulsation free

APPLICATIONS

- Pumping of shear-sensitive liquids and cells
- Bioprocessing (for example perfusion)
- Recirculation and transfer applications in bioreactors
- Filtration
SYSTEM CONFIGURATIONS

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the PuraLev® 600SU pump system consists of a controller with an integrated user panel allowing the operator to set the speed manually (see Figure 6). The speed is automatically stored in the internal EEPROM of the controller. As an option, the speed can also be set with an analogue signal (see specification for Position 3a in Table 2).

EXTENDED SYSTEM CONFIGURATION

The extended version of the PuraLev® 600SU pump system (Figure 7) consists of a controller with an extended PLC interface. The PLC interface allows the speed to be set via an external signal, facilitating precise closed-loop flow or pressure control when either a flow or pressure sensor is integrated into the system (see specification of Position 3b in Table 2). A computer can be connected via a USB interface to allow communication with Levitronix® Service Software. Hence parameterization, firmware updates and failure analysis are possible.

ATEX / IECEx SYSTEM CONFIGURATION

An ATEX / IECEx certified motor together with the pump head allows installation of motor and pump head within an ATEX Zone 2 area (see Figure 8). The ATEX / IECEx motor (Pos. 2b in Table 2) comes with special connectors and relevant extension cables (Pos. 5a and 5b in Table 3). An Ex conform solution is needed for the motor cables to leave the ATEX area. One option is an ATEX certified cable sealing system as listed in Table 4 (see Pos. 9) and shown in Figure 12.

- ATEX / IECEx certified for Category 3G and 3D (Zone 2 for Gas and Zone 22 for Dust).
- Thermal classification T5 (< 100 °C) for maximum liquid temperature of 90 °C / 194 °F.
- ATEX / IECEx marking of motor with pump head:
  - Ex II 3G Ex nA IIC T5 Gc
  - Ex II 3D Ex tc IIIC T100°C Dc

![Figure 4: Pressure/flow curves (DCP-600.2 pump head)](image)

![Figure 5: Intuitive 3-step pump head mounting procedure with bayonet type socket (PHS-600.1)](image)
Figure 6: System configuration for standalone operation (Speed setting with integrated user panel)

Figure 7: Extended operation (flow or pressure control) with extended controller

Figure 8: System Configuration for ATEX / IECEx applications
DIMENSIONS OF MAIN COMPONENTS

Figure 9: Dimensions of controllers

Figure 10: Dimensions of motor with single-use pump head
### Table 1: Standard system configurations with motor, pump head socket and controller

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Component</th>
<th>Article Name</th>
<th>Article #</th>
<th>Characteristics</th>
<th>Value / Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Single-Use (SU) Pump Heads</td>
<td>DCP-600.2</td>
<td>100-90784</td>
<td>Impeller / Pump Housing In-Outlet Fittings Max. Flow Max. Diff.-Pressure Max. Viscosity Wet Pump Volume/Surface Max. Liquid Temp. Sterilization Methods</td>
<td>Polypropylene (FDA, USP Class VI, BSE/TESE/Animal free) Tridamp® 1™ (AISME BPE 2009) 76 l/min / 20 gallons/min 3.1 bar / 45 psi 50 cP 113 ml / 370 cm² 60°C / 140°F Gamma radiation up to 40 kGy.</td>
</tr>
<tr>
<td>1b</td>
<td>SU Pump Head with Sterile Fittings</td>
<td>DCP-600.2-G25</td>
<td>100-91079</td>
<td>Pump Type (A) / Adaptor (C) Sterile Fittings (B) Fitting Compatibility Applied Gamma Dosage</td>
<td>DCP-600.2 / Tridamp reducer in Polypropylene Epoxy (anti-corrosive) coated Aluminum, waterproofed (IP67) 2x 3m cables with PVC jacket / 2x circular (M33, IP-67)</td>
</tr>
<tr>
<td>2a</td>
<td>Motor (ATEX / IECEx)</td>
<td>LPM-600.5</td>
<td>100-10039</td>
<td>Housing Cable / Connectors ATEX / IECEx Marking</td>
<td>Epoxy (anti-corrosive) coated Aluminum, waterproofed (IP67) 2x 3m cables with FEP jacket / 2x circular (M23, IP-67)</td>
</tr>
<tr>
<td>3</td>
<td>Pump Head Socket</td>
<td>PHS-600.1</td>
<td>100-90969</td>
<td>Mounting Type Material Assembly Screws</td>
<td>Bayonet type with locking pin Anodized Aluminum 4 pcs M6x16 mm (Stainless Steel)</td>
</tr>
<tr>
<td>4a</td>
<td>Standalone Controller (User Panel)</td>
<td>LPC-600.1-01</td>
<td>100-30039</td>
<td>Voltage / Power Interfaces Standard Firmware</td>
<td>48V DC / 600 W Panel set to speed (automatic storage on internal EEPROM) PLC with 1x analog input (&quot;Speed&quot;) 1x digital input (&quot;Enable&quot;) 1x digital output (&quot;Status&quot;) 0-24 V (relais) 0-5 V (relais)</td>
</tr>
<tr>
<td>4b</td>
<td>Extended Controller (PLC and USB)</td>
<td>LPC-600.2-01</td>
<td>100-30040</td>
<td>Interfaces Standard Firmware</td>
<td>PLC with 1x analog input (&quot;Speed&quot;) 1x digital input (&quot;Enable&quot;) 1x digital output (&quot;Status&quot;) 0-24 V (relais) 0-5 V (relais) USB interface (for service and system monitoring)</td>
</tr>
</tbody>
</table>

### Table 2: Specification of standard components

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>5a</td>
<td>Extension Adaptor Cable for Sensors</td>
<td>MCAS-600-2-05 (0.5m)</td>
<td>190-10226</td>
<td>Jacket Material Connectors</td>
<td>PVC Circular Wallmountable, Metallic (IP-67) to D-SUB</td>
</tr>
<tr>
<td>5b</td>
<td>Extension Adaptor Cable for Power</td>
<td>MCAP-600-2-05 (0.5m)</td>
<td>190-10227</td>
<td>Jacket Material Connectors</td>
<td>PVC Circular Wallmountable, Metallic (IP-67) to COMBICON</td>
</tr>
</tbody>
</table>

### Table 3: Specification of adaptor/extension cables

<table>
<thead>
<tr>
<th>Pos.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>6a</td>
<td>Air Cooling Module</td>
<td>ACM-600.2</td>
<td>190-10140</td>
<td>Material / Connection Port Air Pressure</td>
<td>a) PP (+ 40% Talam) b) PP EL-S (conductive black PP) / NPT 1/4&quot; 1.1 - 3 bar (14.5 - 44.5 psi)</td>
</tr>
<tr>
<td>7a</td>
<td>Fan Cooling Module</td>
<td>FCM-800.1</td>
<td>190-10401</td>
<td>Housing / Cable Spec. Supply Spec. / IP Rating</td>
<td>PP + 20% Talam white / PP jacket, 3m, circular sealed M12 connector (PP) 24 VDC, 3.4 W / IP-65 (EN IP65 rated) 2x 3m cables with FEP jacket (PP) to open wires</td>
</tr>
<tr>
<td>7b</td>
<td>Fan Cool. Module Cable</td>
<td>FCC-1.1-50 (5 m)</td>
<td>190-10407</td>
<td>Specification</td>
<td>PP cable jacket with circular M12 connector (PP) to open wires</td>
</tr>
</tbody>
</table>

### Table 4: Specification of accessories

<table>
<thead>
<tr>
<th>Pos.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>ATEX Cable Sealing System</td>
<td>ACS-A-1 (Rextec)</td>
<td>100-90292</td>
<td>Sleeve (a) and Gasket (b) 2x Cable Module (d)</td>
<td>Stainless Steel and EPDM Rustproof (EPDM rubber) Stainless Steel and EPDM Rustproof (EPDM rubber) Note: Lubricant (e) and measurement plates (f) are included.</td>
</tr>
<tr>
<td>9</td>
<td>AC/DC Power Supply</td>
<td>TSP-600-148-M (M = Modified Leitronix design from Traco)</td>
<td>100-40013</td>
<td>Voltage / Power Output Voltage Input Certification or Standards</td>
<td>48 VDC / 600 W 85 – 265 VAC (automatic detection) CB, UL, CSA, Semit F47</td>
</tr>
</tbody>
</table>
Figure 11: Pump system with standard components

Figure 12: Accessories
Levitronix® is the world-wide leader in magnetically levitated bearingless motor technology. Levitronix® was the first company to introduce bearingless motor technology to the Semiconductor, Medical and Lifescience markets. The company is ISO 9001 certified. Production and quality control facilities are located in Switzerland. In addition, Levitronix® is committed to bring other highly innovative products like the LEVIFLOW® flowmeter series to the market.