

## **Better Pumps for Better Yield!**

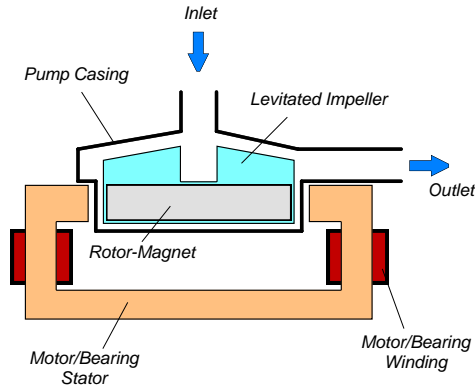


## **No Seals, No Bearings, No Particle Contamination!**

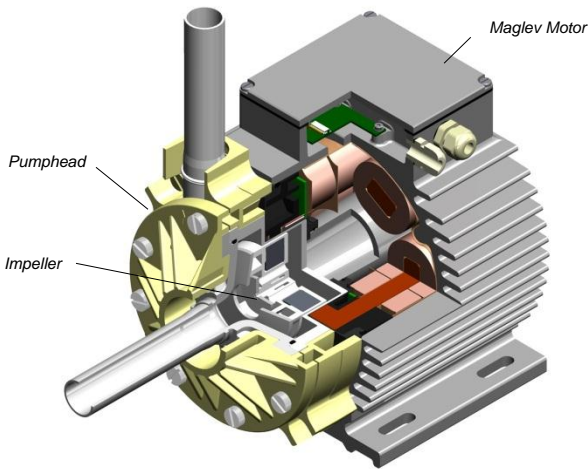
### **BPS-2000**

|                               |                |                  |
|-------------------------------|----------------|------------------|
| <b>High Pressure Profile:</b> | 6.9 bar        | (100 psi)        |
|                               | 80 liters/min  | (21 gallons/min) |
| <b>High Flow Profile:</b>     | 4.2 bar        | (61 psi)         |
|                               | 140 liters/min | (37 gallons/min) |

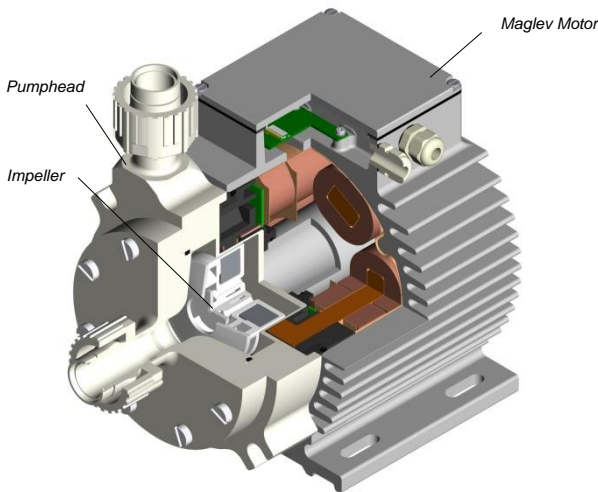
**Levitronix® MagLev Pump Technology  
Better Pumps for Better Yield!**



**Figure 1:** Schematic of the main elements of the maglev centrifugal pump



**Figure 2:** Maglev motor with "High-Flow" pump head



**Figure 3:** Maglev motor with "High Pressure" pump head

## REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP

The BPS-2000 pump system is a revolutionary centrifugal pump that has no bearings to wear out or seals to break down and fail. 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 the impeller speed and eliminating pulsation.

### SYSTEM BENEFITS

- Extremely low particle generation due to the absence of mechanically contacting parts. Reduces particle contamination issues in wet processes by generating 10 to 50 times fewer particles compared to other pumps.
- Increases equipment uptime.
- Lower maintenance costs by eliminating valves, bearings, rotating seals and costly rebuilds.
- Reduced risk of contamination due to the self-contained design with magnetic bearings.
- Very gentle to sensitive fluids due to low-shear design.
- No narrow gaps and fissures where particles or micro-organisms could be entrapped.
- Smooth, continuous flow without pressure pulsation.
- Electronic speed control.
- Compact design compared to pneumatic and magdrive pumps. Saves valuable space in process tools by having a smaller footprint.
- Proven technology in medical and semiconductor industry (MTBF > 50 years).

### APPLICATIONS

- Semiconductor wet processing.
- Solar cell production.
- Flat panel display manufacturing.
- Hard-disk fabrication.
- Printer ink handling.
- Pharmaceutical production.

## STAND-ALONE SYSTEM CONFIGURATION



The stand-alone configuration of the BPS-2000 pump system consists of a controller with an integrated user panel allowing the operator to set the speed manually (see Figure 8). The speed is automatically stored in the internal EEPROM of the controller. As an option, the speed can also be set with an analog signal (see specification for Position 3a in Table 2).

## EXTENDED SYSTEM CONFIGURATION

The extended version of the BPS-2000 pump system (Figure 9) 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 SYSTEM CONFIGURATION

An ATEX certified motor together with the pumphead allows installation of motor and pump head within an ATEX Zone 2 area (see Figure 10). The ATEX motor (Pos. 2b in Table 2) comes with special connectors and relevant extension cables (see Table 3). An ATEX 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 15.

- ATEX certified for Category 3G and 3D (Zone 2 for Gas and Zone 22 for Dust) (Testing and certification by ElectroSuisse, Switzerland, CH-8320 Fehraltorf)
- Thermal classification T4 (< 110 °C = 230 °F) for maximum liquid temperature of 90 °C / 194 °F.
- ATEX marking of motor with pump head:
  - CE  II 3G Ex c nAc IIC 110°C (T4)
  - CE  II 3D Ex c tc IIIC T110°C IP67
- Explosion groups:
  - Group IIA: Propane (IPA), Methane, Acetone, Acetaldehyde
  - Group IIB: Ethylene, Ethylenglycol
  - Group IIC: Acetylene, Hydrogen (not carbon disulphide)
- ATEX listing corresponds to UL hazardous location Class 1 Division 2.

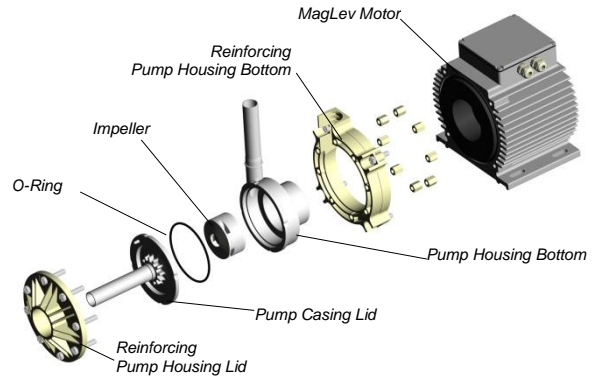


Figure 4: Disassembled "High Flow" pump head

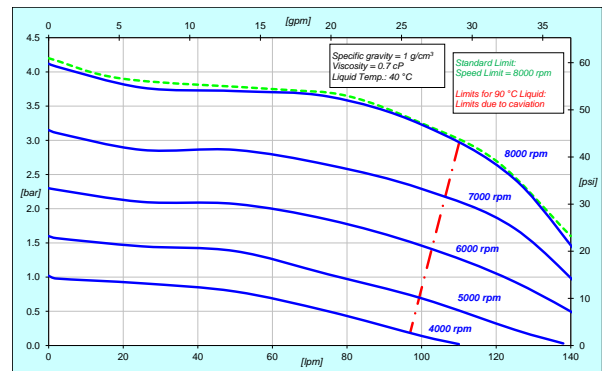


Figure 5: Pressure/flow curves for "High Flow" profile

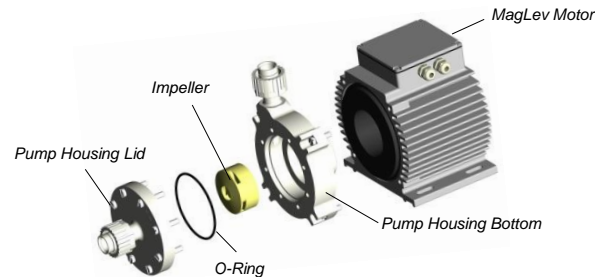


Figure 6: Disassembled "High Pressure" pump head

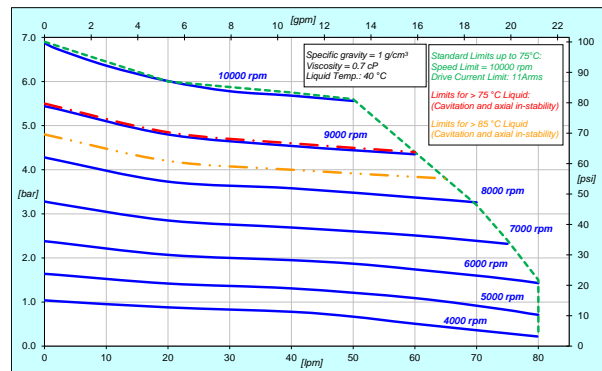
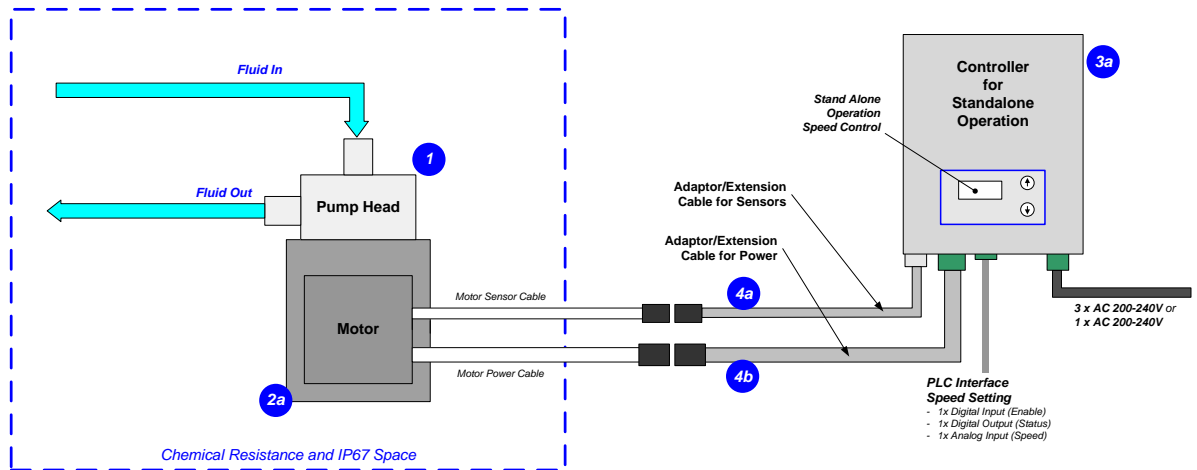
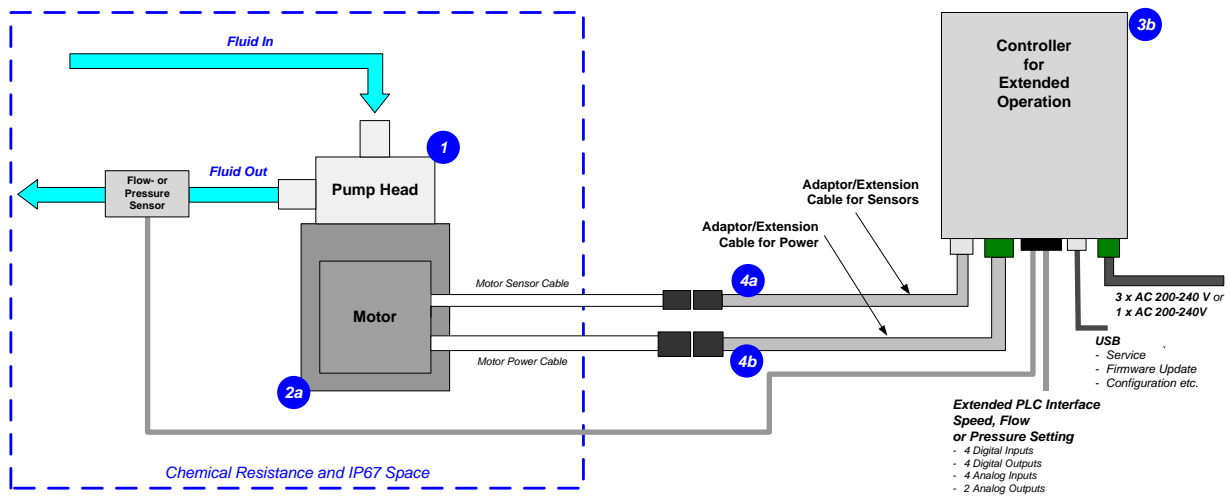


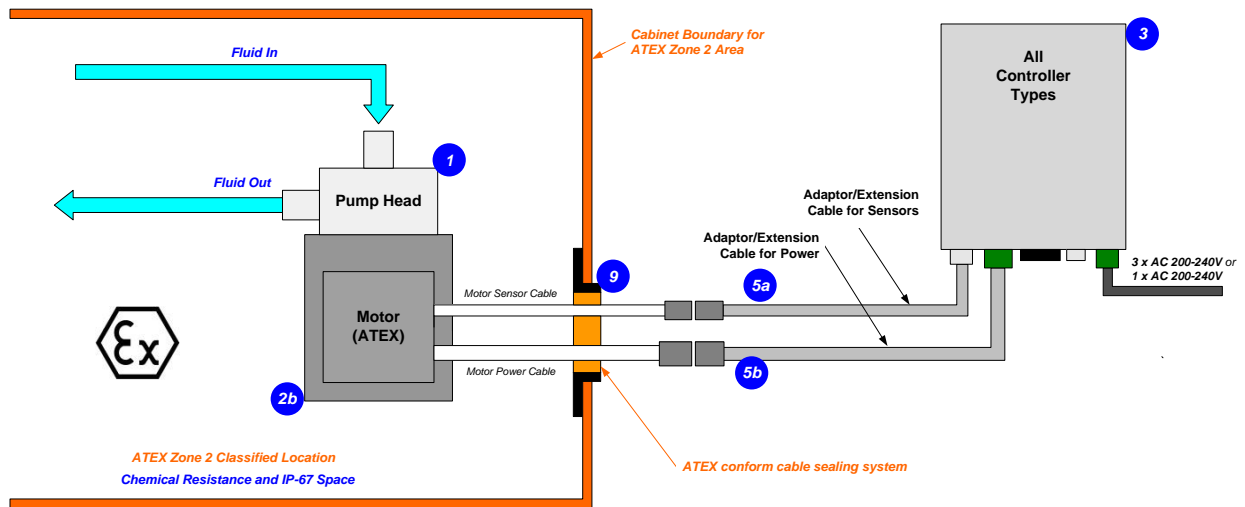
Figure 7: Pressure/flow curves for "High-Pressure" profile



**Figure 8:** System configuration for standalone operation (speed setting with integrated user panel)



**Figure 9:** Extended operation (flow or pressure control) with extended controller



**Figure 10:** System Configuration for ATEX applications



**DIMENSIONS OF MAIN COMPONENTS**

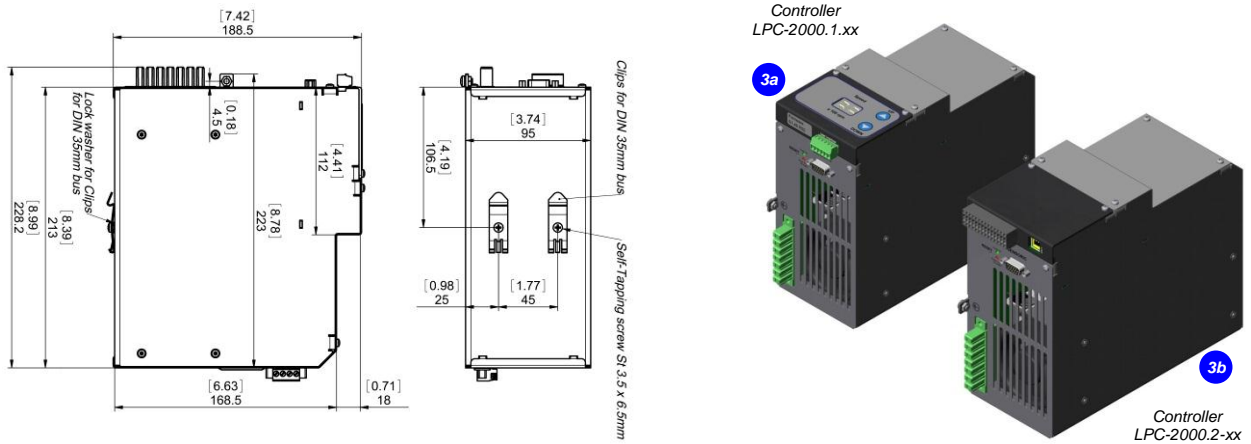


Figure 11: Dimensions of controllers LPC-2000.1-xx and LPC-2000.2-xx

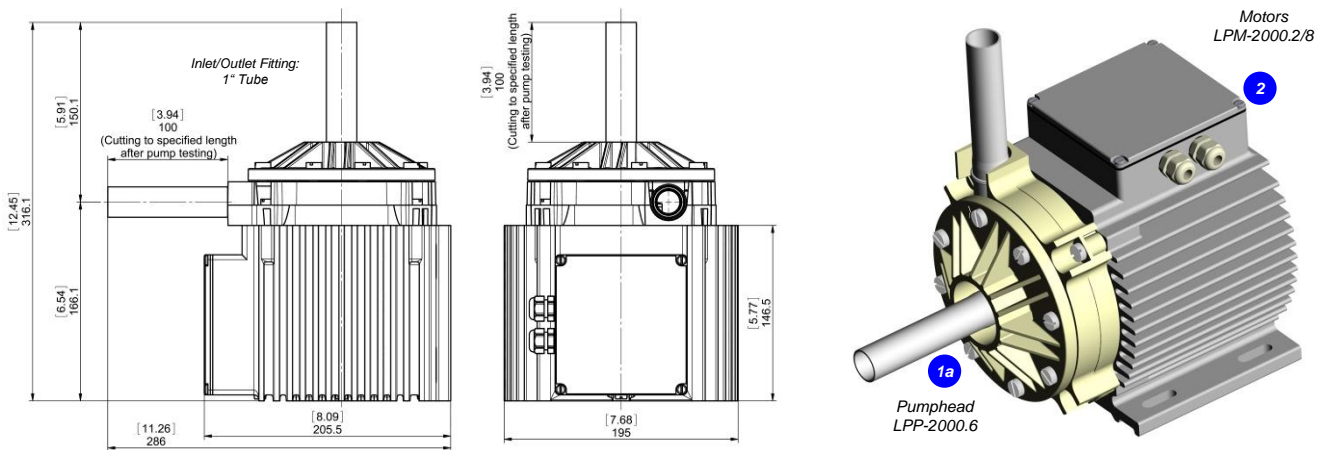


Figure 12: Dimensions of motor with "High-Flow" pump head

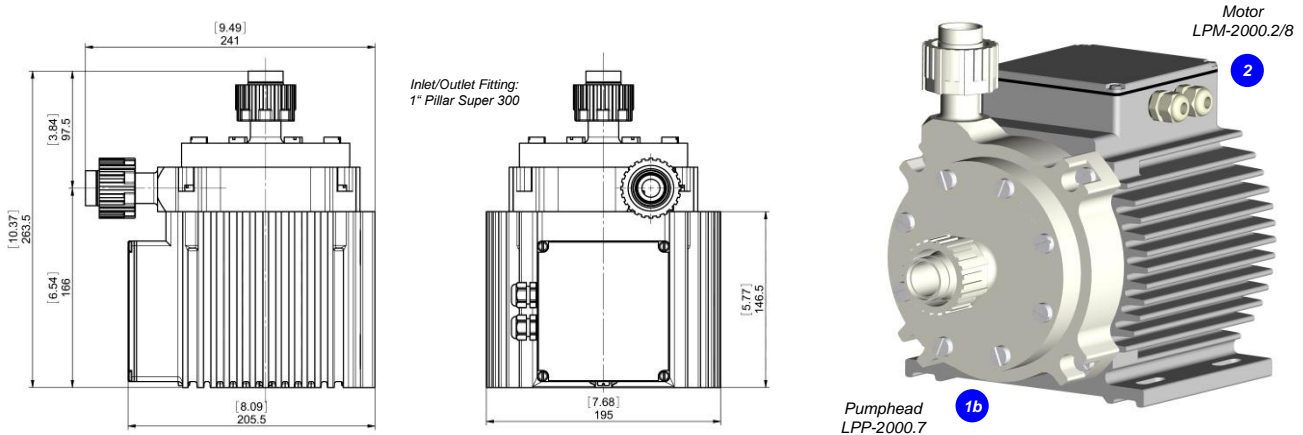


Figure 13: Dimensions of motor with "High Pressure" pump head

### ORDER INFORMATION

| System Name  | Article #  | Pumphead   | Controller   | Standard Firmware <sup>1</sup>       | Motor             | Note  |
|--|--|--|--|--------------------------------------|-------------------|---|
| BPS-2000.1<br>BPS-2000.2<br>BPS-2000.4<br>BPS-2000.5                               | 100-90479<br>100-90480<br>100-90482<br>100-90483 | LPP-2000.6 (High Flow)<br>LPP-2000.6 (High Flow)<br>LPP-2000.7 (High Pressure)<br>LPP-2000.7 (High Pressure) | LPC-2000.1-01<br>LPC-2000.2-01<br>LPC-2000.1-02<br>LPC-2000.2-02 | E 1.25<br>E 1.48<br>E 2.25<br>E 2.48 | LPM-2000.2        | Adaptor/Extension (0.5 - 10m) cables according to Table 3 (position 4a and 4b) have to be ordered as separate article with specified length.  |
| BPS-2000.7 (ATEX)<br>BPS-2000.8 (ATEX)<br>BPS-2000.10 (ATEX)<br>BPS-2000.11 (ATEX) | 100-90485<br>100-90486<br>100-90488<br>100-90489 | LPP-2000.6 (High Flow)<br>LPP-2000.6 (High Flow)<br>LPP-2000.7 (High Pressure)<br>LPP-2000.7 (High Pressure) | LPC-2000.1-01<br>LPC-2000.2-01<br>LPC-2000.1-02<br>LPC-2000.2-02 | E 1.25<br>E 1.48<br>E 2.25<br>E 2.48 | LPM-2000.8 (ATEX) | Adaptor/Extension (0.5 - 10m) cables according to Table 3 (Position 5a and 5b) have to be ordered as separate article with specified length. ATEX Cable Sealing System can be ordered according to Table 4 (Position 9) |

Table 1: Standard system configurations

| Pos. | Component                                | Article Name                       | Article #  | Characteristics  | Value / Feature  |
|------|--|------------------------------------|--|--|--|
| 1a   | Pumphead<br>"High Flow Profile"          | LPP-2000.6                         | 100-90418  | Impeller / Pump Housing<br>Reinforcing Housing<br>Sealing Ring / Fittings                    | PFA / PFA (wet parts)<br>PP + GF30<br>Kalrez <sup>®</sup> perfluoroelastomer <sup>1</sup> / Tube 1"  |
|      |  |                                    |  | Max. Flow<br>Max. Diff. Pressure<br>Max. Viscosity / Max. Density<br>Max. Liquid Temperature | 140 liters/min / 37 gallons/min<br>4.2 bar / 61 psi<br>80 cP / 1.6 g/cm <sup>3</sup><br>90 °C / 194 °F   |
| 1b   | Pumphead<br>"High Pressure Profile"      | LPP-2000.7                         | 100-90419  | Impeller / Pump Housing<br>Sealing Ring / Fittings   | PFA / PTFE (wet parts)<br>Kalrez <sup>®</sup> perfluoroelastomer <sup>1</sup> / Pillar 1" Female   |
|      |  |                                    |  | Max. Flow<br>Max. Diff. Pressure<br>Max. Viscosity / Max. Density<br>Max. Liquid Temperature | 80 liters/min / 21 gallons/min<br>6.9 bar / 100 psi<br>100 cP / 1.8 g/cm <sup>3</sup><br>90 °C / 194 °F  |
| 2a   | Motor                                    | LPM-2000.2                         | 100-10050  | Housing<br>Cable / Connectors  | ETFE (chemical resist.) coated Alu., waterproofed (IP67 without connectors)<br>2x 3m cables with FEP jacket / 2x circular (AMP types)  |
| 2b   | Motor (ATEX) <sup>2</sup>                | LPM-2000.8                         | 100-10060  | ATEX Marking   | CE II 3G Ex c nAc IIC 110°C (T4)<br>CE II 3D Ex c tc IIIC T110°C IP67  |
|      |  |                                    |  | Cable / Connectors   | 2x 3m cables with FEP jacket / 2x circular (M23, IP67)   |
| 3a   | Standalone<br>Controller<br>(User Panel) | LPC-2000.1-01<br>("High Flow")     | 100-30018<br>(Supply and Enable<br>connector included) | Voltage / Current / Power  | 1 x 200-240 V AC ±10% / 1 x 12.7 - 10.6 A ±10% / 2kW @ 50/60Hz<br>3 x 200-240 V AC ±10% / 3 x 8.1 - 6.8 A ±10% / 2kW @ 50/60Hz   |
|      |  | LPC-2000.1-02<br>("High Pressure") | 100-30019<br>(Supply and Enable<br>connector included) | Interfaces for<br>Standalone Controller  | Panel to set speed (automatic storage on internal EEPROM)<br>PLC with<br>1x analog input ("Speed") 4 - 20 mA<br>1x digital input ("Enable") 0 - 24 V (optocoupler)<br>1x digital output ("Status") 0 - 24 V (relais)   |
|      |  |                                    |  | Firmware "High Flow"<br>Firmware "High Pressure"   | E1.25 (standard firmware for "High Flow")<br>E2.25 (standard firmware for "High Pressure")   |
| 3b   | Extended<br>Controller<br>(PLC and USB)  | LPC-2000.2-01<br>("High Flow")     | 100-30021<br>(Supply and PLC<br>connector included)    | Interfaces for<br>Extended Controller  | PLC with<br>- up to 4 digital inputs 0 - 24V (optocoupler)<br>- up to 4 digital outputs 0 - 24 V (relais)<br>- up to 2 analog inputs 4 - 20mA<br>- up to 2 analog outputs 0 - 10 V<br>- up to 2 analog outputs 0 - 5 V |
|      |  | LPC-2000.2-02<br>("High Pressure") | 100-30022<br>(Supply and PLC<br>connector included)    |  | USB interface (for service and system monitoring)  |
|      |  |                                    |  | Firmware "High Flow"<br>Firmware "High Press."   | E1.48 (standard firmware for "High Flow")<br>E2.48 (standard firmware for "High Pressure")   |

Table 2: Specification of standard components

<sup>1</sup>: Kalrez<sup>®</sup> is a registered trademark of DuPont Dow Elastomers

| Pos.     | Component  | Article Name         |                 | Article # |           | Characteristics  | Value / Feature   |
|----------|--|----------------------|-----------------|-----------|-----------|--|---|
|          |  | Sensor Cable         | Power Cable     | Sensor    | Power     |  |   |
| 4a<br>4b | Extension Adaptor<br>Cable for Sensor (a)<br>and Power (b)       | MCAS-600.1-05 (0.5m) | MCAP-2000.1-05  | 190-10122 | 190-10208 | Jacket Material<br>Connector Types<br>Connector Material | PVC<br>Circular AMP to D-SUB (a)/COMBICON (b)<br>Plastics (PA)                    |
|          |  | MCAS-600.1-30 (3m)   | MCAP-2000.1-30  | 190-10123 | 190-10210 |  |   |
|          |  | MCAS-600.1-50 (5m)   | MCAP-2000.1-50  | 190-10124 | 190-10211 |  |   |
|          |  | MCAS-600.1-70 (7m)   | MCAP-2000.1-70  | 190-10101 | 190-10205 |  |   |
|          |  | MCAS-600.1-100 (10m) | MCAP-2000.1-100 | 190-10125 | 190-10212 |  |   |
| 5a<br>5b | Extension Adaptor<br>Cable for Sensor (a)<br>and Power (b) Wires | MCAS-600.3-05 (0.5m) | MCAP-2000.3-05  | 190-10158 | 190-10219 | Jacket Material<br>Connector Types<br>Connector Material | PVC<br>Circular M23 (IP-67) to D-SUB (a)/COMBICON (b)<br>Metallic - Nickel coated |
|          |  | MCAS-600.3-30 (3m)   | MCAP-2000.3-30  | 190-10159 | 190-10221 |  |   |
|          |  | MCAS-600.3-50 (5m)   | MCAP-2000.3-50  | 190-10130 | 190-10222 |  |   |
|          |  | MCAS-600.3-70 (7m)   | MCAP-2000.3-70  | 190-10160 | 190-10223 |  |   |
|          |  | MCAS-600.3-100 (10m) | MCAP-2000.3-100 | 190-10161 | 190-10224 |  |   |

Table 3: Specification of adaptor/extension cables

| Pos.         | Component   | Article Name                   | Article # | Characteristics  | Value / Feature   |
|--------------|---|--------------------------------|-----------|--|---|
| 6a           | Air Cooling Module                                  | ACM-4.2                        | 190-10139 | Material / Connection Port<br>Air Pressure   | PP (+ 40% Talkum) / NPT 1/4"<br>-1 - 3 bar (14 - 43 psi)  |
| 6b           | Air Cooling Module                                  | ACM-4.3                        | 190-10243 | Material   | PP-EL-S with conductive additive for operation with ATEX motor  |
| 7<br>(a-e)   | Impeller Exchange Kit<br>("High Pressure")          | IEK-2000.1<br>(for LPP-2000.7) | 100-90529 | Impeller (a) / O-Ring (b)<br>Pump Casing Screws (c)<br>Pump Motor Screws (d)<br>Imp. Exchange Tool IET-3.1 (e) | LPI-2000.1 in PFA / O-Ring, Kalrez <sup>®</sup> , 98.02 x 3.53<br>8pcs M8x40, Stainless Steel with PTFE coating<br>4pcs M8x30, Stainless Steel with PTFE coating<br>POM-C |
| 8<br>(a-e)   | Impeller Exchange Kit <sup>4</sup><br>("High Flow") | IEK-2000.2<br>(for LPP-2000.6) | 100-90530 | Impeller (a) / O-Ring (b)<br>Pump Casing Screws (c)<br>Pump Motor Screws (d)<br>Imp. Exchange Tool IET-3.1 (e) | LPI-2000.2 in PFA / O-Ring, Kalrez <sup>®</sup> , 98.02 x 3.53<br>8pcs M8x40, Stainless Steel with PTFE coating<br>4pcs M8x30, Stainless Steel with PTFE coating<br>POM-C |
| 9<br>(a - f) | ATEX Cable<br>Sealing System                        | ACS-A.1<br>(Roxtec)            | 100-90292 | Sleeve (a) and Gasket (b)<br>Frame (c)<br>2x Cable Module (d)  | Stainless Steel and EPDM<br>Roxylon (EPDM rubber)<br>Roxylon (EPDM rubber)<br><br>Note:<br>Lubricant (e) and measurement plates (f) are included.                         |

Table 4: Specification of accessories

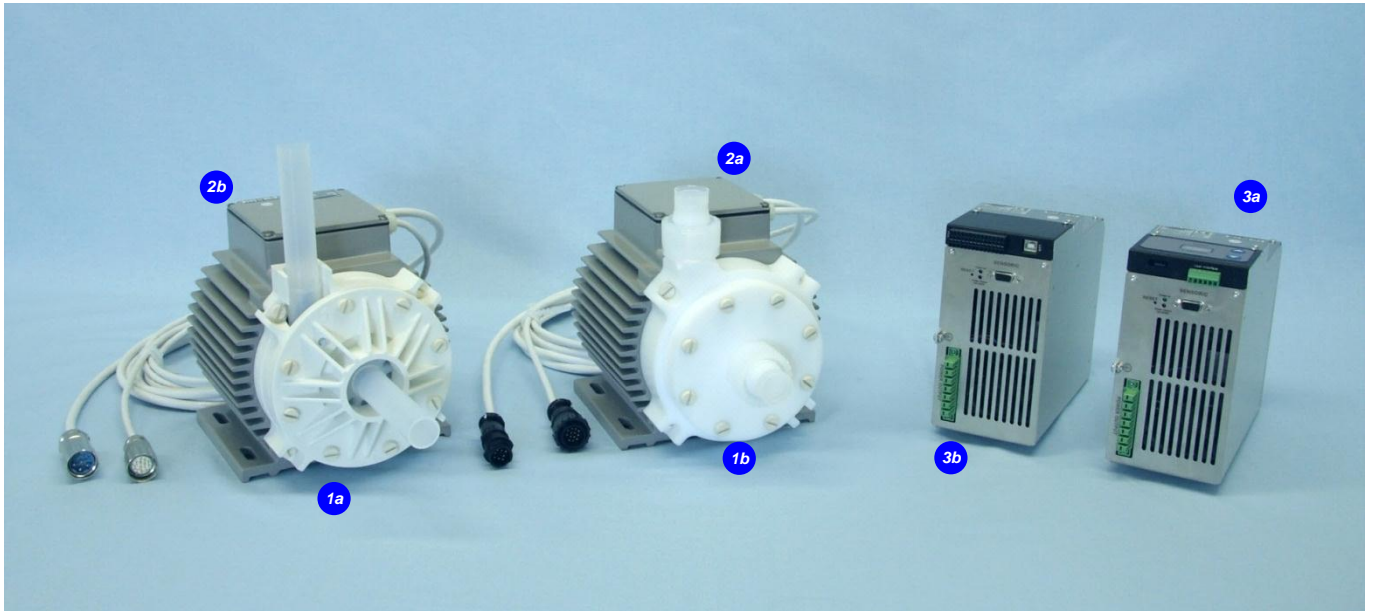


Figure 14: Pump system with standard components

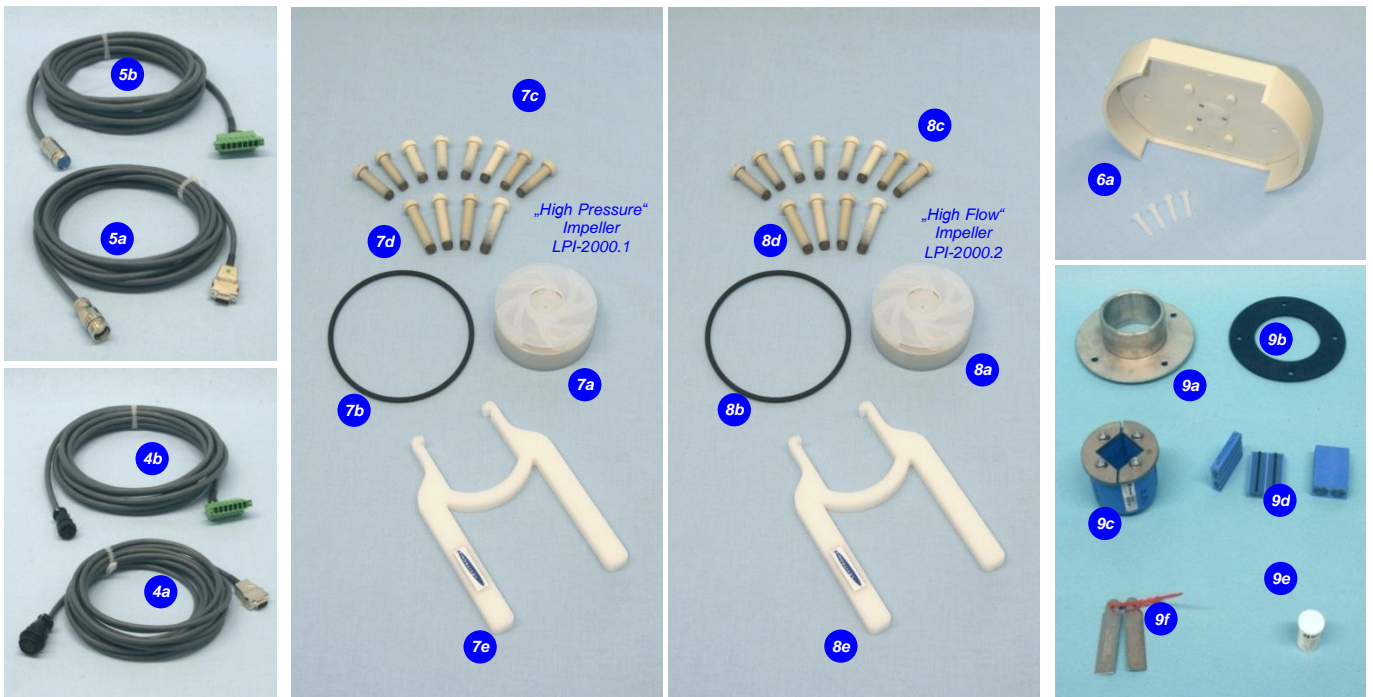


Figure 15: Accessories

**Levitronix<sup>®</sup> MagLev Pump Technology  
Better Pumps for Better Yield!**

**LEVITRONIX® THE COMPANY**

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 Life Science 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.



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