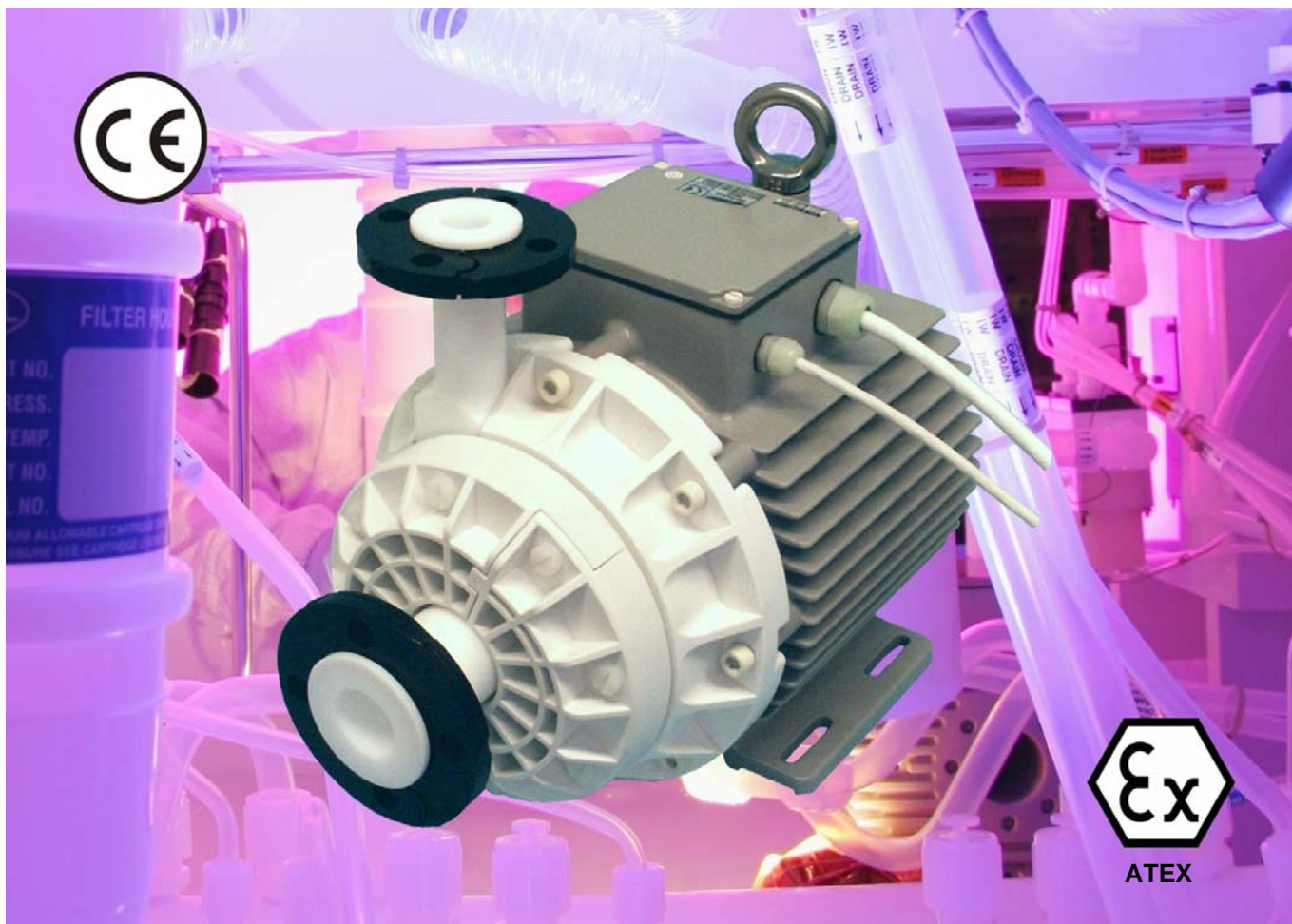


***Better Pumps for Better Yield!***

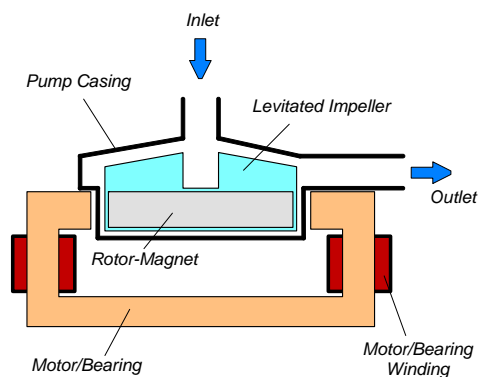


***No Seals, No Bearings,  
No Particle Contamination!***

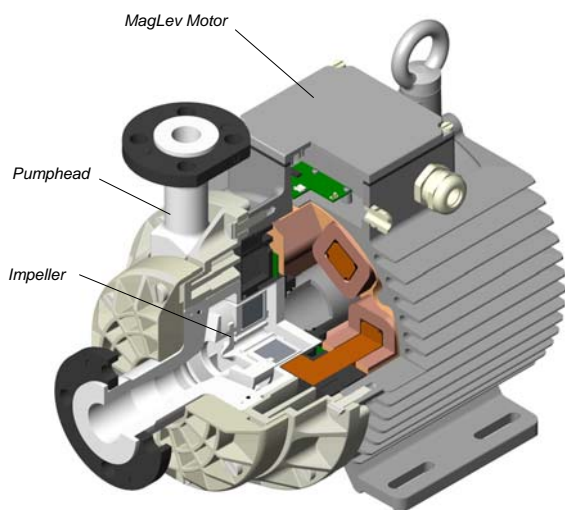
***BPS-4000***

|                       |                         |
|-----------------------|-------------------------|
| <i>6.3 bar</i>        | <i>(91 psi)</i>         |
| <i>280 liters/min</i> | <i>(74 gallons/min)</i> |

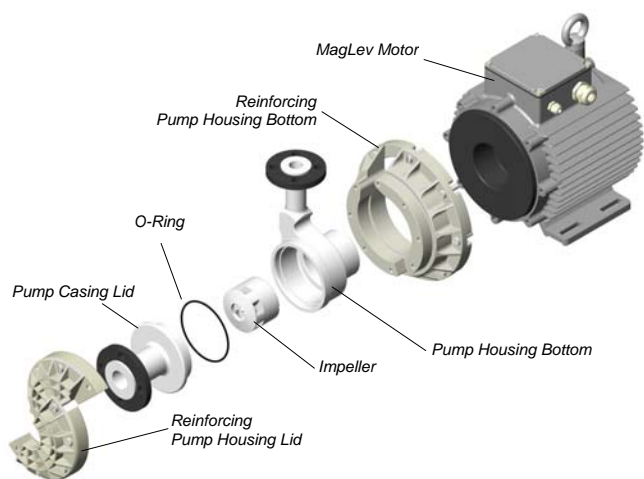
***Levitronix® MagLev Pump Technology  
Better Pumps for Better Yield!***



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



**Figure 2:** Maglev motor with pump head.



**Figure 3:** Disassembled pump head

### **REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP**

The BPS-4000 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 > 30 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-4000 pump system (see Figure 6) consists of a controller with an integrated user panel to set the speed manually. 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 BPS-4000 pump system (Figure 7) consists of a controller with an extended PLC interface. This allows setting the speed by an external signal (see specification of Position 3b in Table 2) and enables precise closed-loop flow or pressure control in connection with either a flow or a pressure sensor. A USB interface allows communication with a PC in connection with the 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 8). The ATEX motor (Pos. 2b in Table 2) comes with special connectors and according extension cables (Pos. 5a and 5b in 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 12.

- 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, Swiss testing No. STS 001, conformity statement SEV 09 ATEX 0131)
- Thermal classification T5 (< 100 °C = 212 °F) for maximum liquid temperature of 90 °C / 194 °F.
- ATEX marking of motor with pump head:
  - CE II 3G Ex nA IIC T5
  - CE II 3D Ex tD A22 IP67 T100°C
- Explosion groups:
  - Group IIA: Propane (IPA), Methane, Aceton, Acetaldehyde
  - Group IIB: Ethylene, Ethylenglycol
  - Group IIC: Acetylene, Hydrogen (not carbon disulphide)
- ATEX listing corresponds to UL hazardous location Class 1 Division 2.

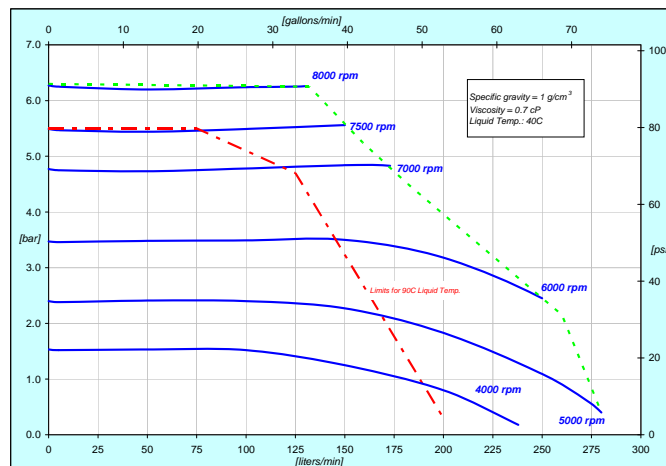


Figure 4: Pressure/flow curves for aqueous solutions

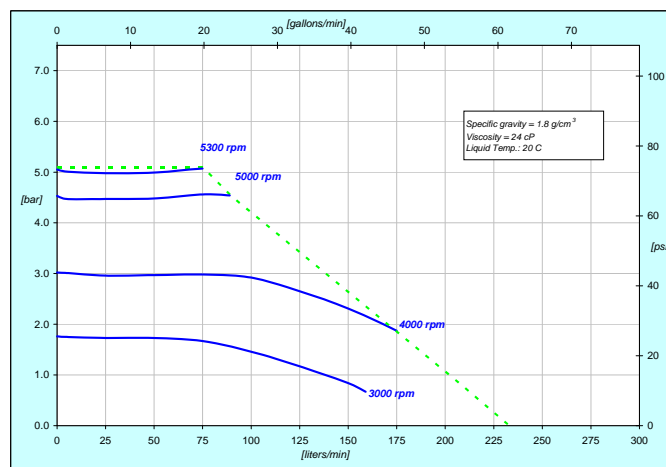
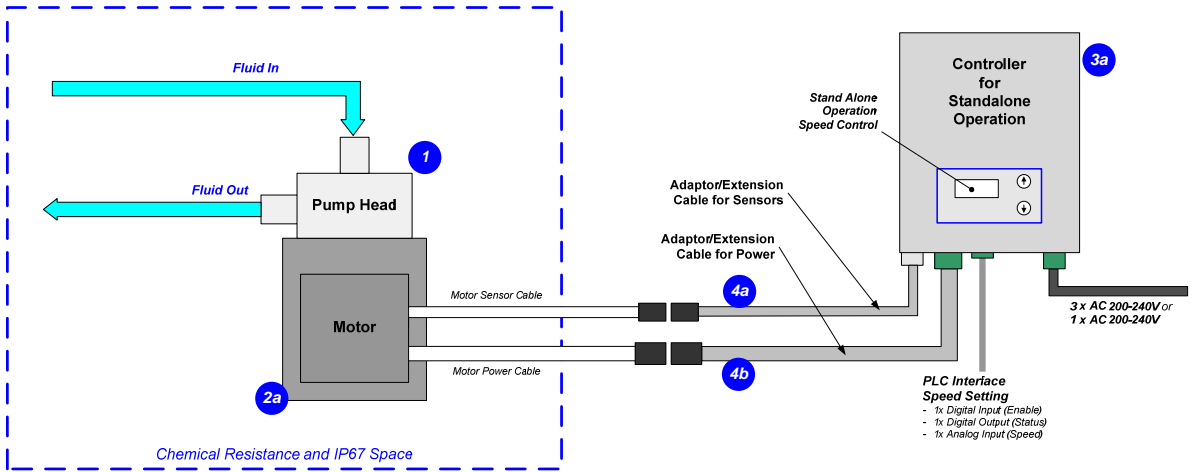
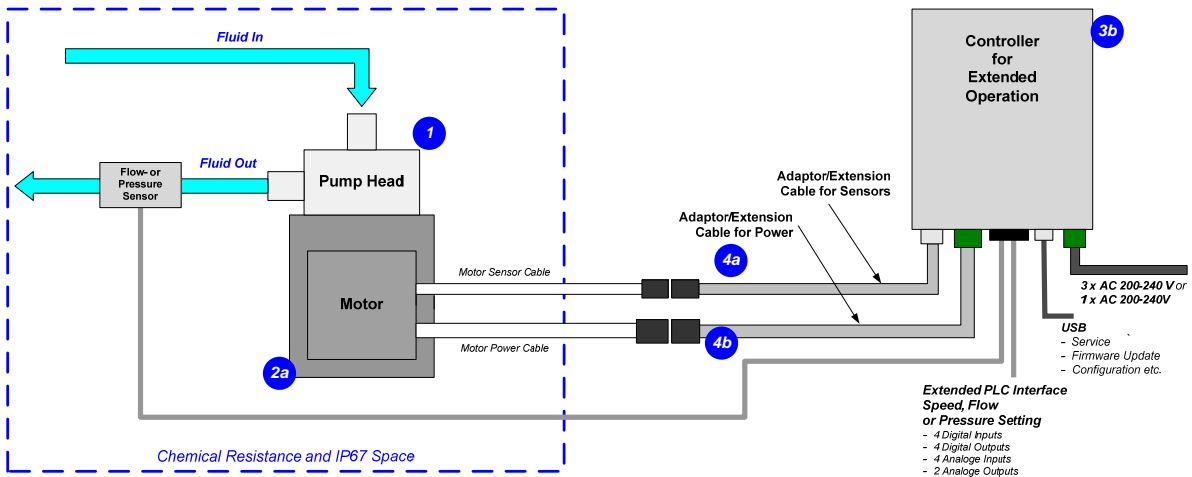


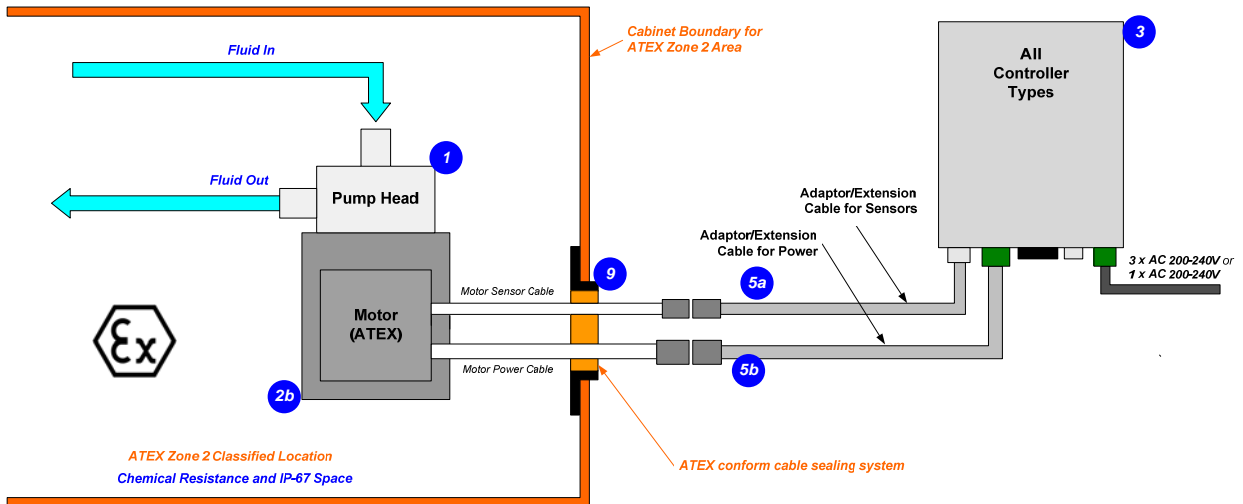
Figure 5: Pressure/flow curves for high density/viscosity liquids (for example sulfuric acid)



**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 applications

**DIMENSIONS OF MAIN COMPONENTS**

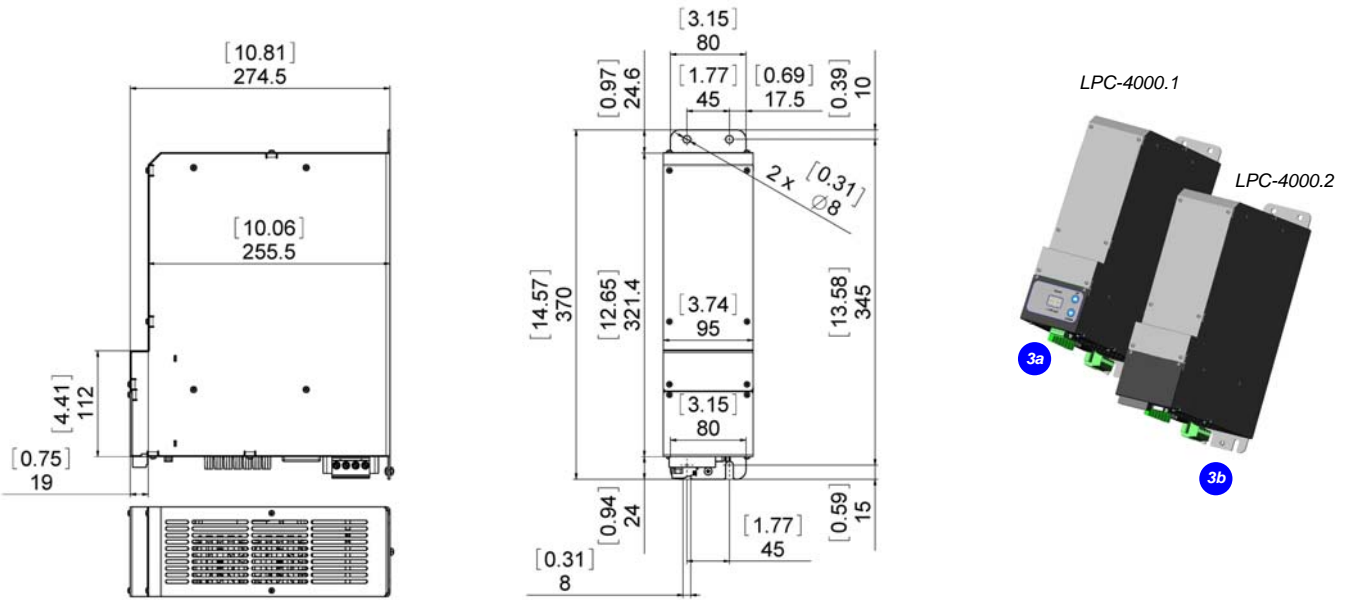


Figure 9: Dimension of controllers LPC-4000.x

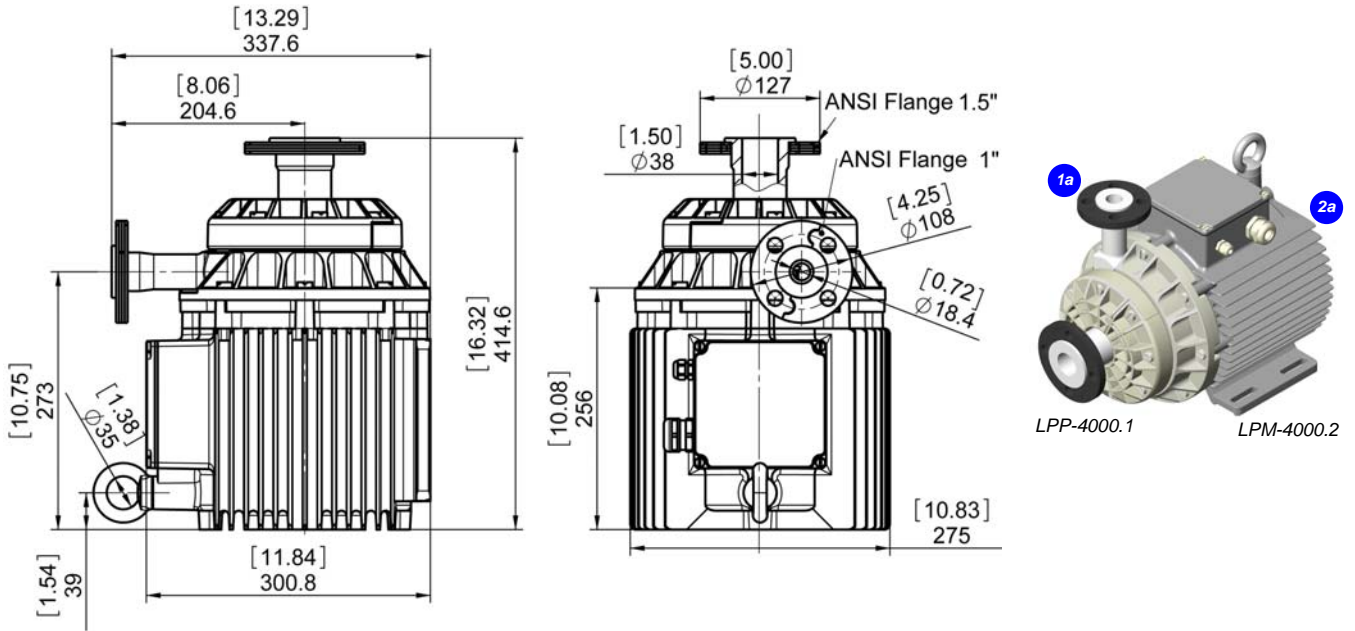


Figure 10: Dimensions of motor with pump head



### ORDER INFORMATION

| System Name        | Article # | Pumphead   | Motor             | Controller | Note   |
|--------------------|-----------|------------|-------------------|------------|--|
| BPS-4000.1         | 100-90372 | LPP-4000.1 | LPM-4000.2        | LPC-4000.1 | 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-4000.2         | 100-90373 |            |                   | LPC-4000.2 |  |
| BPS-4000.16 (ATEX) | 100-90436 |            | LPM-4000.8 (ATEX) | LPC-4000.1 | Adaptor/Extension (0.5 - 10m) cables according to Table 3 (Position 5a and 5b) have to be ordered as separate article with specified length.<br>ATEX Cable Sealing System can be ordered according to Table 4 (Position 8) |
| BPS-4000.17 (ATEX) | 100-90438 |            |                   | LPC-4000.2 |  |

Table 1: Standard system configurations

| Pos. | Component                          | Article Name | Article #   | Characteristics                      | Value / Feature  |
|------|------------------------------------|--------------|---|--------------------------------------|--|
| 1    | Pumphead                           | LPP-4000.1   | 100-90294   | Impeller / Pump Housing              | ECTFE / PTFE (wet parts)   |
|      |                                    |              |   | Reinforcing Housing                  | PP + GF30  |
|      |                                    |              |   | Sealing Ring                         | Kalrez <sup>2</sup> perfluoroelastomer <sup>1</sup>  |
|      |                                    |              |   | Fittings                             | ANSI Flange 1.5" Inlet / 1" Outlet   |
|      |                                    |              |   | Max. Flow.                           | 280 liters/min / 74 gallons/min  |
|      |                                    |              |   | Max. Diff. Pressure                  | 6.3 bar / 91 psi   |
|      |                                    |              |   | Max. Viscosity / Density             | 30 cP / 1.8 g/cm <sup>3</sup>  |
|      |                                    |              |   | Max. Liquid Temp.                    | Full performance: 70 °C / 158 °F<br>Limited performance: 70-90 °C / 158-194 °F (see Figure 8)  |
| 2a   | Motor                              | LPM-4000.2   | 100-10043   | Housing                              | - ETFE (chemical resistant) coated Aluminum<br>- waterproofed (IP67 without connectors)<br>- protective screw (SS with PTFE coating) sealing gasket for mounting thread included (see Figure 11, Pos. 2a)        |
|      |                                    |              |   | Cable / Connectors                   | 2x 3m cables with FEP jacket / 2x circular (AMP types)   |
| 2b   | Motor (ATEX)                       | LPM-4000.8   | 100-10048   | ATEX Marking                         | CE II 3G Ex nA T5<br>CE II 3D Ex tD A22 IP67 T100°C  |
|      |                                    |              |   | Cable / Connectors                   | 2x 3m cables with FEP jacket / 2x circular (M23, IP67)   |
| 3a   | Standalone Controller (User Panel) | LPC-4000.1   | 100-30012<br>(Controller with power supply and Enable connector incl. in 100-90370) | Voltage                              | 1 x 200-240 V AC ±10% / 1 x 22 - 18.4 A ±10%<br>3 x 200-240 V AC ±10% / 3 x 10.9-9.1 A ±10%  |
|      |                                    |              |   | Electrical Power                     | 4 kW   |
|      |                                    |              |   | Interfaces for Standalone Controller | Panel to set speed (automatic storage on internal EEPROM)  |
|      |                                    |              |   | PLC with                             | 1x analogue input ("Speed") 4 - 20 mA<br>1x digital input ("Enable") 0 - 24 V (optocoupler)<br>1x digital output ("Status") 0 - 24 V (relais)  |
| 3b   | Extended Controller (PLC and USB)  | LPC-4000.2   | 100-30013<br>(Controller with power supply and PLC connector incl. in 100-90371)    | Interfaces for Extended Controller   | - up to 4 digital inputs 0 - 24V (optocoupler)<br>- up to 4 digital outputs 0 - 24 V (relais)<br>- up to 2 analogue inputs 4 - 20mA<br>- up to 2 analogue outputs 0 - 10 V<br>- up to 2 analogue outputs 0 - 5 V |
|      |                                    |              |   |                                      | USB interface (for service and system monitoring)  |
|      |                                    |              |   |                                      |  |

Table 2: Specification of standard components

1: Kalrez<sup>2</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 Cable for Sensor (a) and Power (b)       | MCAS-600.1-05 (0.5m) | MCAP-4000.1-05  | 190-10122 | 190-10172 | Jacket Material<br>Connector Types<br>Connector Material | PVC<br>Circular AMP to D-SUB<br>Plastics (PA)                    |
|          |  | MCAS-600.1-30 (3m)   | MCAP-4000.1-30  | 190-10123 | 190-10173 |  |  |
|          |  | MCAS-600.1-50 (5m)   | MCAP-4000.1-50  | 190-10124 | 190-10174 |  |  |
|          |  | MCAS-600.1-70 (7m)   | MCAP-4000.1-70  | 190-10101 | 190-10175 |  |  |
|          |  | MCAS-600.1-100 (10m) | MCAP-4000.1-100 | 190-10125 | 190-10176 |  |  |
| 5a<br>5b | Extension Adaptor Cable for Sensor (a) and Power (b) Wires | MCAS-600.3-05 (0.5m) | MCAP-4000.2-05  | 190-10158 | 190-10180 | Jacket Material<br>Connector Types<br>Connector Material | PVC<br>Circular M23 (IP-67) to D-SUB<br>Metallic - Nickel coated |
|          |  | MCAS-600.3-30 (3m)   | MCAP-4000.2-30  | 190-10159 | 190-10181 |  |  |
|          |  | MCAS-600.3-50 (5m)   | MCAP-4000.2-50  | 190-10130 | 190-10182 |  |  |
|          |  | MCAS-600.3-70 (7m)   | MCAP-4000.2-70  | 190-10160 | 190-10183 |  |  |
|          |  | MCAS-600.3-100 (10m) | MCAP-4000.2-100 | 190-10161 | 190-10184 |  |  |

Table 3: Specification of adaptor/extension cables

| Pos.         | Component                 | Article Name     | Article # | Characteristics            | Value / Feature   |
|--------------|---------------------------|------------------|-----------|----------------------------|---|
| 6a           | Air Cooling Module        | ACM-4000.1       | 190-10177 | Material / Connection Port | PP / NPT 1/2"   |
|              |                           |                  |           | Air Pressure               | -1 - 3 bar (14 - 43 psi)                                  |
| 6b           | Air Cooling Module        | ACM-4000.3       | 190-10190 | Material                   | PP with conductive additive for operation with ATEX motor |
| 7            | Fan Cooling Module        | FCM-4000.1       | 190-10178 | Housing Material           | PP (+ 40% Talkum)   |
|              |                           |                  |           | Cable                      | PVC, 6m, open-end wires                                   |
|              |                           |                  |           | Supply Spec. / IP Rating   | 20.4 - 27.6 VDC, 31.2 W, 1.3 A   IP-55                    |
| 8<br>(a - d) | Impeller Exchange Kit     | IEK-4000.1       | 100-90522 | Impeller LPI-4000.1 (a)    | ECTFE   |
|              |                           |                  |           | O-Ring (b)                 | O-Ring, Kalrez, 113.9 x 3.53                              |
|              |                           |                  |           | Pump Casing Screws (c)     | 8pcs M10x35, PVDF   |
|              |                           |                  |           | Pump Motor Screws (d)      | 8pcs M10x35, Stainless Steel with PTFE coating            |
| 9<br>(a - f) | ATEX Cable Sealing System | ACS-A.1 (Roxtec) | 100-90292 | Sleeve (a) and Gasket (b)  | Stainless Steel and EPDM                                  |
|              |                           |                  |           | Frame (c)                  | Roxylon (EPDM rubber)                                     |
|              |                           |                  |           | 2x Cable Module (d)        | Roxylon (EPDM rubber)                                     |
|              |                           |                  |           | Note:                      | Lubricant (e) and measurement plates (f) are included.    |

Table 4: Specification of accessories

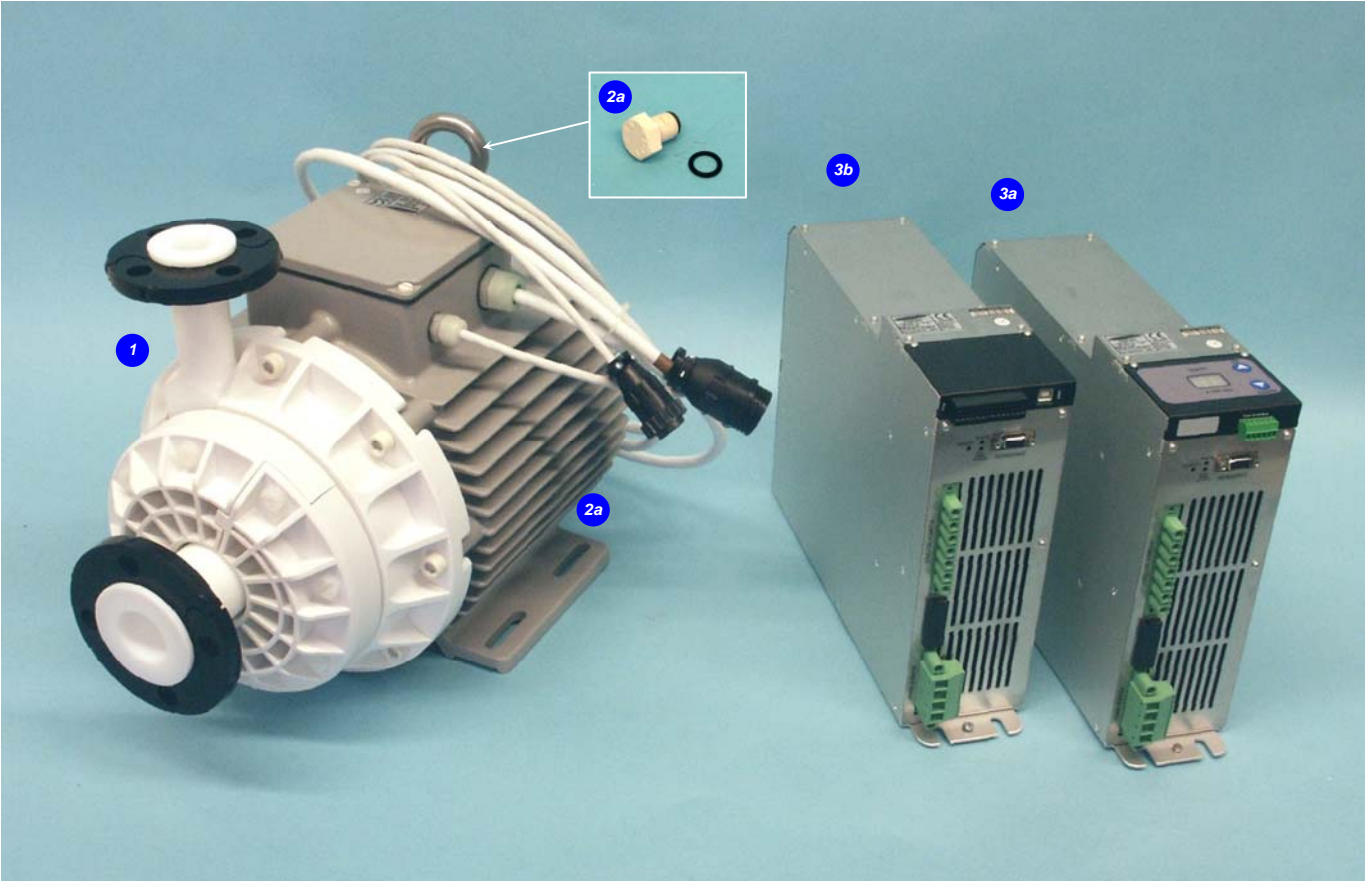


Figure 11: Pump system BPS-4000 with standard components



Figure 12: 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 medical and industrial markets. The company is ISO 12485, EN 46001 and EN ISO 9001 certified. Production and quality control facilities are located in Switzerland. In addition, the Levitronix is committed to bring other highly innovative products like the *LEVIFLOW™* flowmeter series to the market.



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