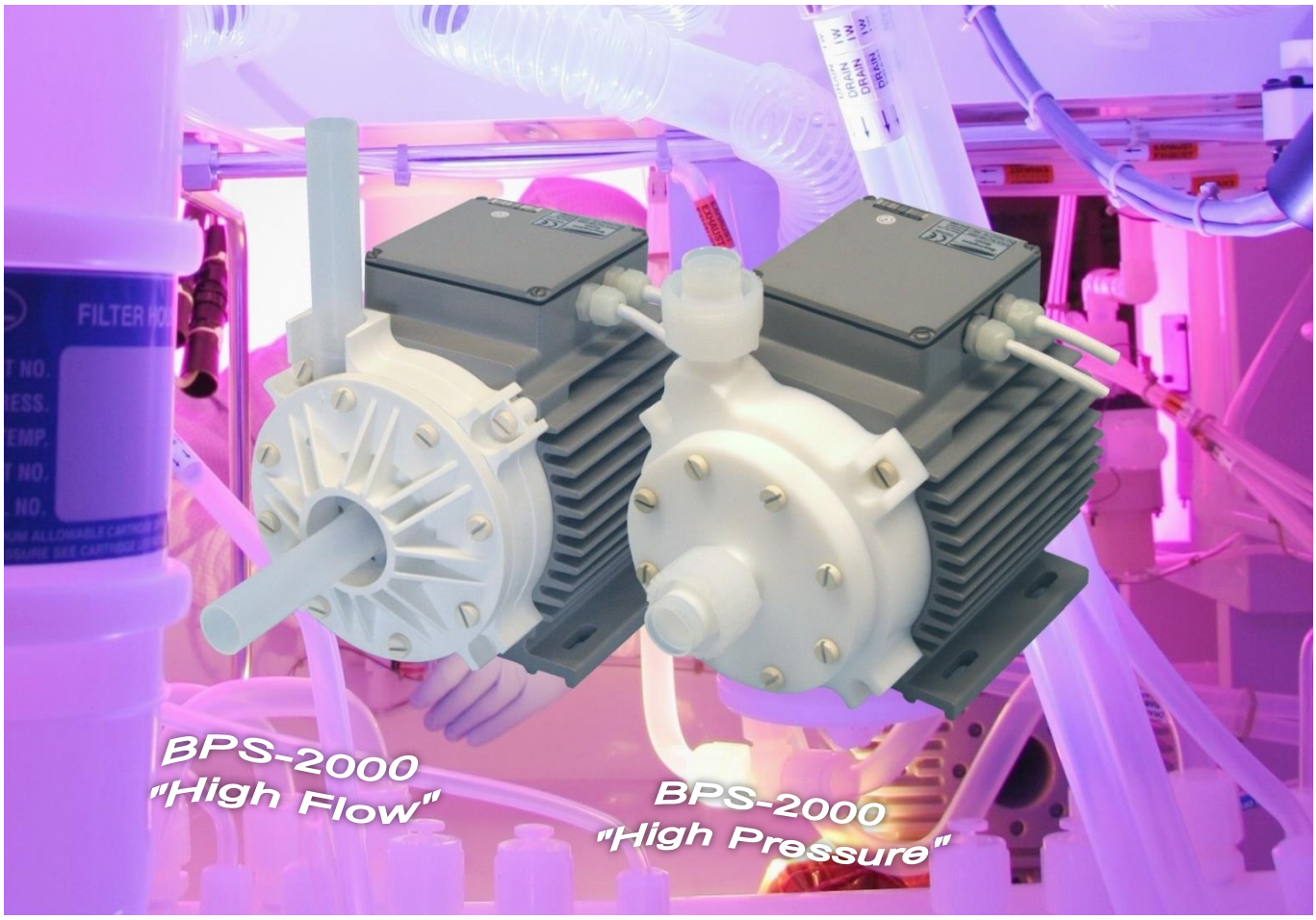
Better Pumps for Better Yield!



No Seals, No Bearings, No Particle Contamination!

BPS-2000

High Pressure Profile:	*6.9 bar* *80 liters/min*	*(100 psi)* *(21 gallons/min)*
High Flow Profile:	*4.2 bar* *140 liters/min*	*(61 psi)* *(37 gallons/min)*

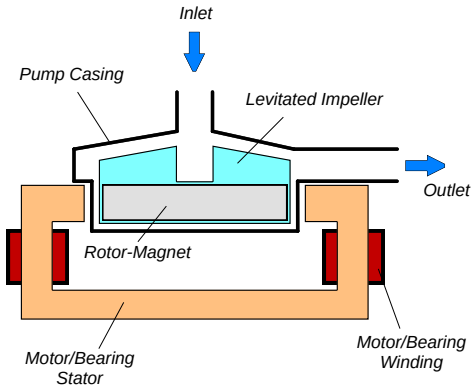


Figure 1: *Schematic of the main elements of the maglev centrifugal pump*

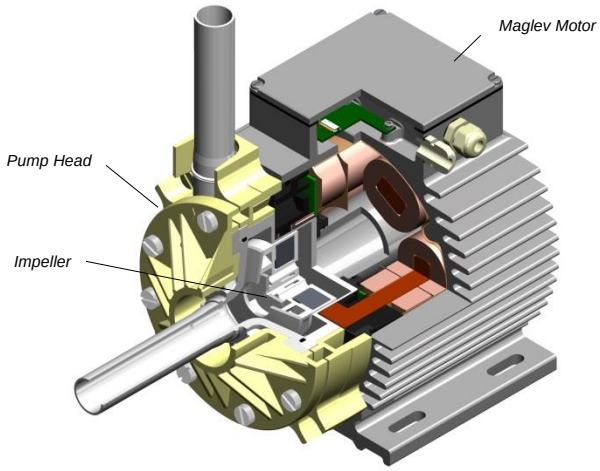


Figure 2: *Maglev motor with "High-Flow" pump head*

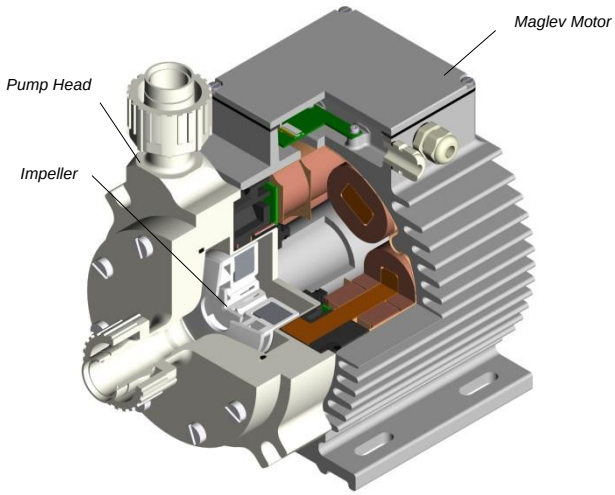


Figure 3: *Maglev motor with "High Pressure" pump head*

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 pump head 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 ^{0}C = 230 ^{0}F) for maximum liquid temperature of 90 ^{0}C / 194 ^{0}F.
- *ATEX* marking of motor with pump head:
  CE Ex II 3G Ex c nAc IIC 110^{0}C (T4)
  CE Ex 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*.

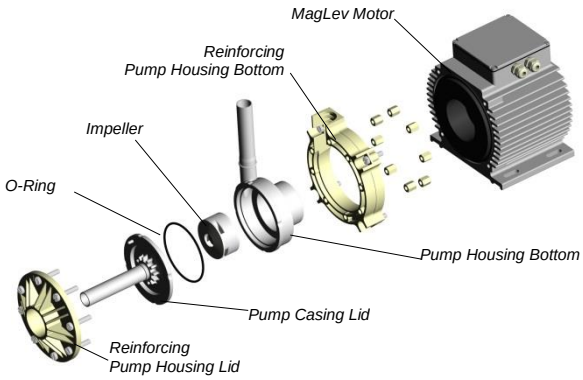


Figure 4: *Disassembled "High Flow" pump head*

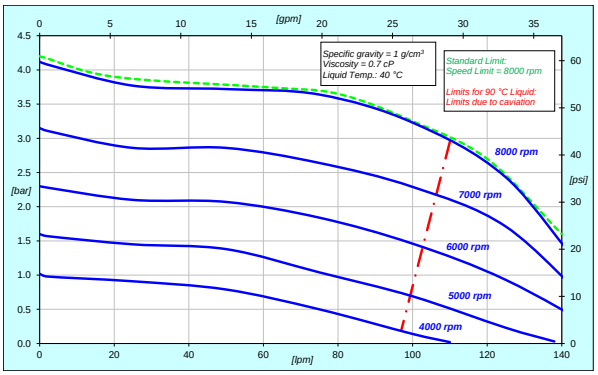


Figure 5: *Pressure/flow curves for "High Flow" profile*

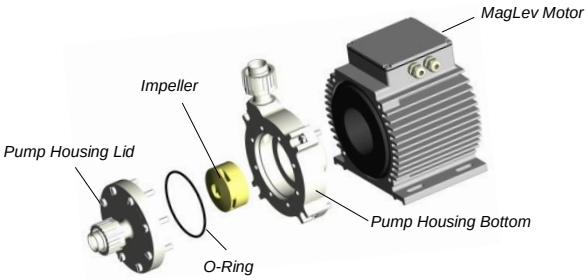


Figure 6: *Disassembled "High Pressure" pump head*

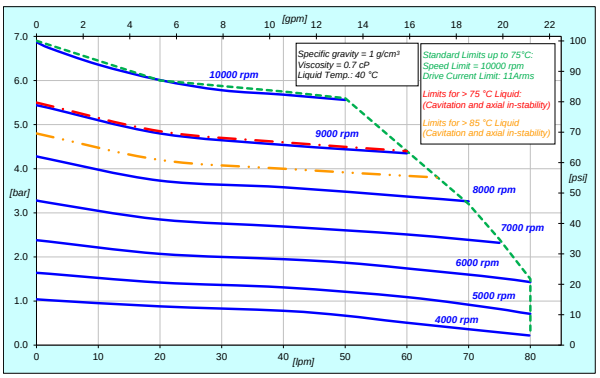


Figure 7: *Pressure/flow curves for "High-Pressure" profile*

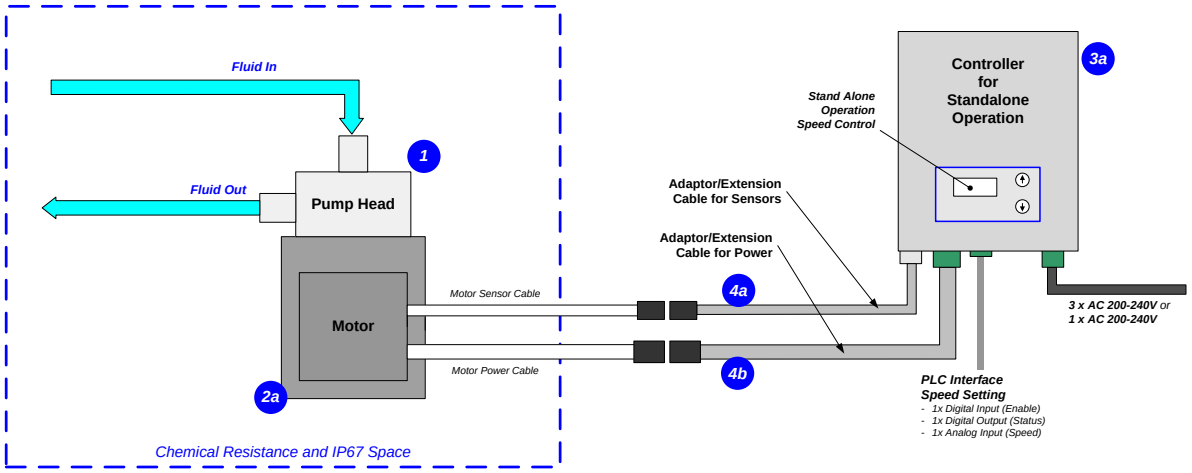


Figure 8: *System configuration for standalone operation (speed setting with integrated user panel)*

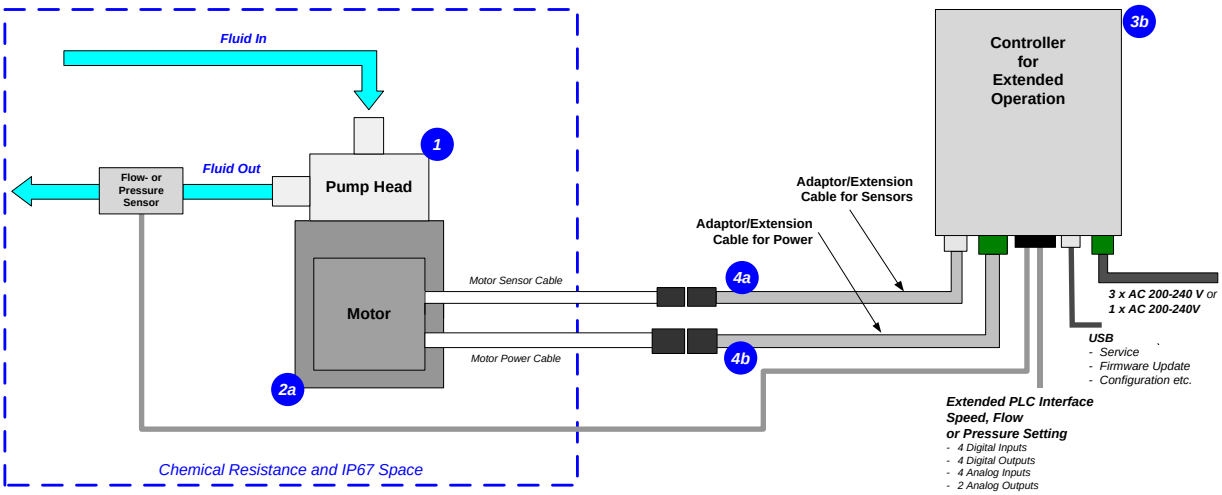


Figure 9: *Extended operation (flow or pressure control) with extended controller*

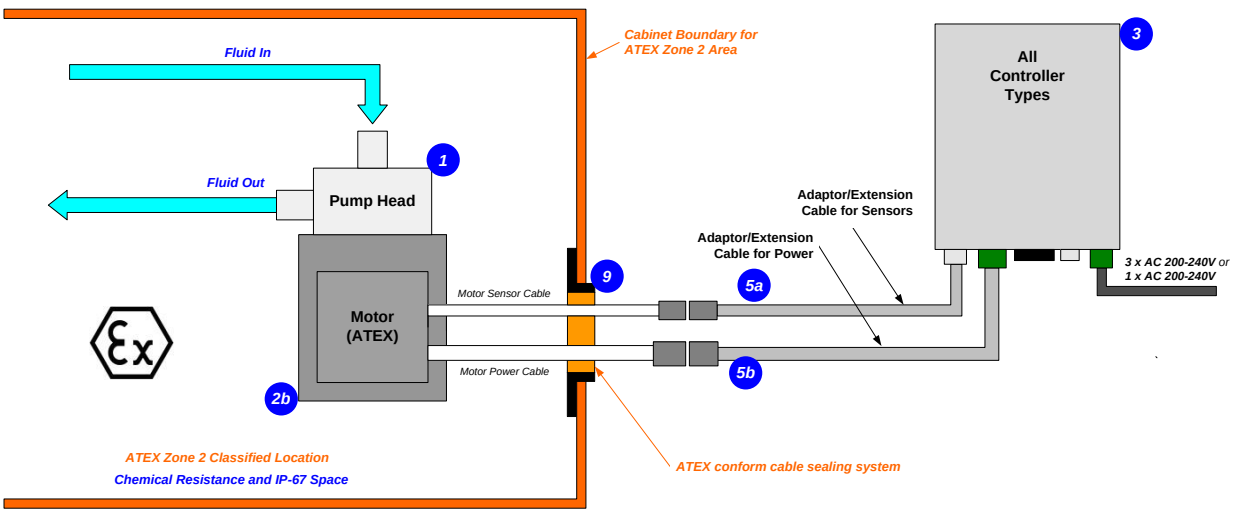


Figure 10: *System Configuration for ATEX applications*

DIMENSIONS OF MAIN COMPONENTS

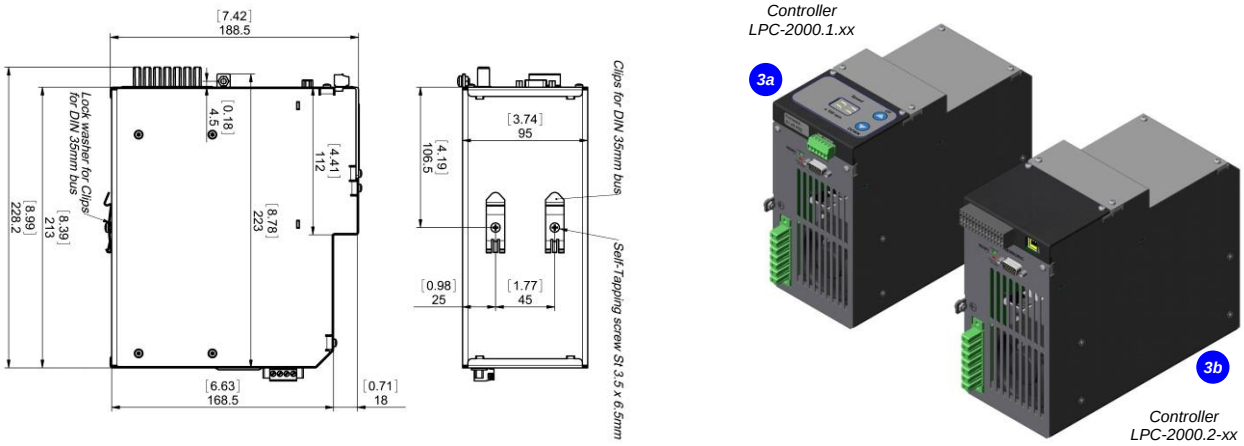


Figure 11: *Dimensions of controllers LPC-2000.1-xx and LPC-2000.2-xx*

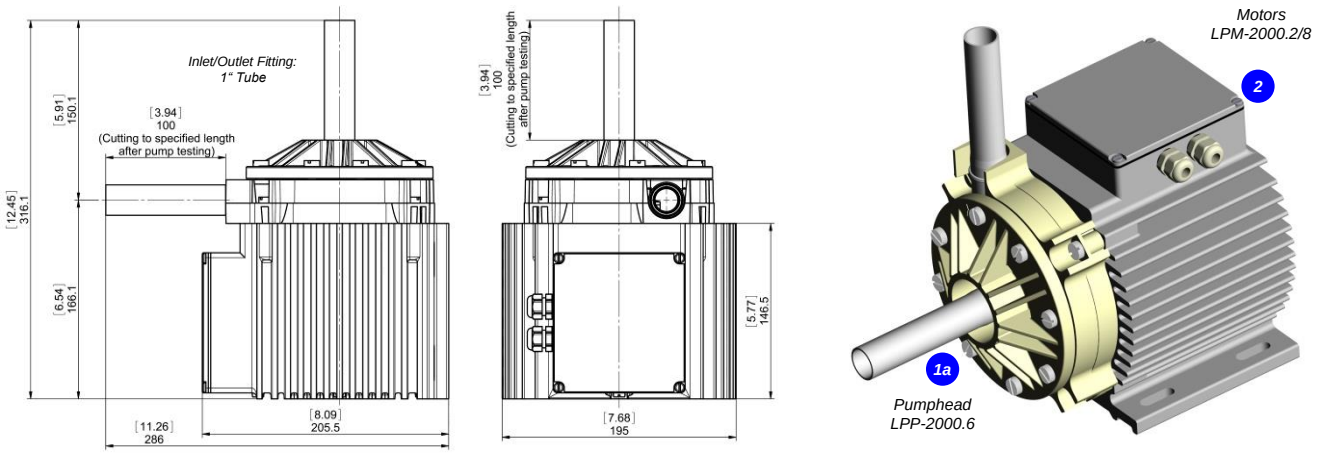


Figure 12: *Dimensions of motor with "High-Flow" pump head*

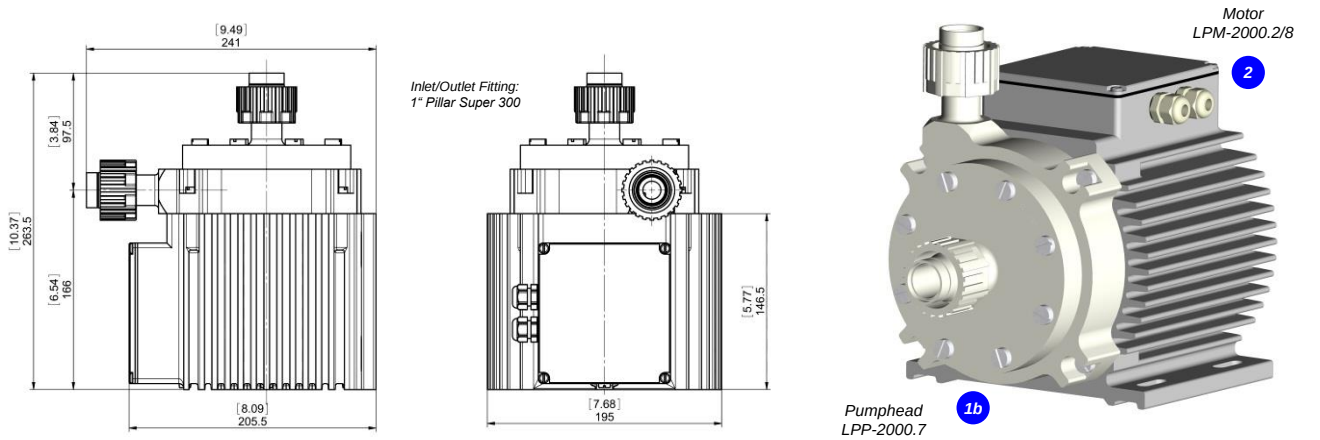


Figure 13: *Dimensions of motor with "High Pressure" pump head*

ORDER INFORMATION

System Name	Article #	Pump Head	Controller	Standard Firmware [1]	Motor	Note
BPS-2000.1 BPS-2000.2 BPS-2000.4 BPS-2000.5	100-90479 100-90480 100-90482 100-90483	LPP-2000.6 (High Flow) LPP-2000.6 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.7 (High Pressure)	LPC-2000.1-01 LPC-2000.2-01 LPC-2000.1-02 LPC-2000.2-02	E 1.25 E 1.48 E 2.25 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.* *Certifications: CE, IECEE CB scheme, ETL (NRTL).* [1]
BPS-2000.7 (ATEX) BPS-2000.8 (ATEX) BPS-2000.10 (ATEX) BPS-2000.11 (ATEX)	100-90485 100-90486 100-90488 100-90489	LPP-2000.6 (High Flow) LPP-2000.6 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.7 (High Pressure)	LPC-2000.1-01 LPC-2000.2-01 LPC-2000.1-02 LPC-2000.2-02	E 1.25 E 1.48 E 2.25 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)* *Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx.* [1]

Table 1: *Standard system configurations (1: Certified components are available on request.)*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Pump Head "High Flow Profile"	LPP-2000.6	100-90418	Impeller / Pump Housing Reinforcing Housing Sealing Ring / Fittings	*PFA / PFA (wet parts)* *PP + GF30* *Kalrez® perfluoroelastomer [1] / Tube 1"*
				Max. Flow Max. Diff. Pressure Max. Viscosity / Max. Density Max. Liquid Temperature	*140 liters/min / 37 gallons/min* *4.2 bar / 61 psi* *80 cP / 1.8 g/cm³* *90 °C / 194 °F*
1b	Pump Head "High Pressure Profile"	LPP-2000.7	100-90419	Impeller / Pump Housing Sealing Ring / Fittings	*PFA / PTFE (wet parts* *Kalrez® perfluoroelastomer [1] / Pillar 1" Female*
				Max. Flow Max. Diff. Pressure Max. Viscosity / Max. Density Max. Liquid Temperature	*80 liters/min / 21 gallons/min* *6.9 bar / 100 psi* *100 cP / 1.8 g/cm³* *90 °C / 194 °F*
2a	Motor	LPM-2000.2	100-10050	Housing	*ETFE (chemical resist.) coated Alu., waterproofed (IP67 without connectors)*
				Cable / Connectors	*2x 3m cables with FEP jacket / 2x circular (AMP types)*
2b	Motor (ATEX, IECEx)	LPM-2000.8	100-10060	ATEX/IECEx Marking	CE Ex II 3G Ex c nAc IIC 110°C (T4) CE Ex II 3D Ex c tc IIIC T110°C IP67
				Cable / Connectors	*2x 3m cables with FEP jacket / 2x circular (M23, IP67)*
3a	Standalone Controller (User Panel)	LPC-2000.1-01 ("High Flow") LPC-2000.1-02 („High Pressure")	100-30018 (Supply and Enable connector included) 100-30019 (Supply and Enable connector included)	Voltage / Current / Power	*1 x 200-240 V AC ±10% / 1 x 12.7 – 10.6 A ±10% / 2kW @ 50/60Hz* *3 x 200-240 V AC ±10% / 3 x 8.1 – 6.8 A ±10% / 2kW @ 50/60Hz*
				Interfaces for Standalone Controller	*Panel to set speed (automatic storage on internal EEPROM)*
				PLC with	*1x analog input ("Speed") 4 - 20 mA* *1x digital input ("Enable") 0 - 24 V (optocoupler)* *1x digital output ("Status") 0 - 24 V (relais)*
				Firmware "High Flow" Firmware "High Pressure"	E1.25 (standard firmware for "High Flow") E2.25 (standard firmware for "High Pressure")
3b	Extended Controller (PLC and USB)	LPC-2000.2-01 ("High Flow") LPC-2000.2-02 („High Pressure")	100-30021 (Supply and PLC connector included) 100-30022 (Supply and PLC connector included)	Interfaces for Extended Controller	*PLC with* *- up to 4 digital inputs 0 - 24V (optocoupler)* *- up to 4 digital outputs 0 - 24 V (relais)* *- up to 2 analog inputs 4 - 20mA* *- up to 2 analog inputs 0 – 10 V* *- up to 2 analog outputs 0 – 5 V*
					USB interface (for service and system monitoring)
				Firmware "High Flow" Firmware "High Press."	E1.48 (standard firmware for "High Flow") E2.48 (standard firmware for "High Pressure")

Table 2: *Specification of standard components*
1: Kalrez® is a registered trademark of DuPont Dow Elastomers

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

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 Air Pressure	*PP (+ 40% Talkum) / NPT 1/4"* *~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 (a-e)	Impeller Exchange Kit ("High Pressure")	IEK-2000.1 (for LPP-2000.7)	100-90529	Impeller (a) / O-Ring (b) Pump Casing Screws (c) Pump Motor Screws (d) Imp. Exchange Tool IET-3.1 (e)	*LPI-2000.1 in PFA / O-Ring, Kalrez®, 98.02 x 3.53* *8pcs M8x40, Stainless Steel with PTFE coating* *4pcs M8x30, Stainless Steel with PTFE coating* *POM-C*	
8 (a-e)	Impeller Exchange Kit" ("High Flow")	IEK-2000.2 (for LPP-2000.6)	100-90530	Impeller (a)../..O-Ring (b) Pump Casing Screws (c) Pump Motor Screws (d) Imp. Exchange Tool IET-3.1 (e)	*LPI-2000.2 in PFA / O-Ring, Kalrez®, 98.02 x 3.53* *8pcs M8x40, Stainless Steel with PTFE coating* *4pcs M8x30, Stainless Steel with PTFE coating* *POM-C*	
9 (a – f)	ATEX Cable Sealing System	ACS-A.1 (Roxtec)	100-90292	Sleeve (a) and Gasket (b) Frame (c) 2x Cable Module (d)	*Stainless Steel and EPDM* *Roxylon (EPDM rubber)* *Roxylon (EPDM rubber)*	*Note:* *Lubricant (e) and measurement plates (f) are included.*

Table 4: *Specification of accessories*

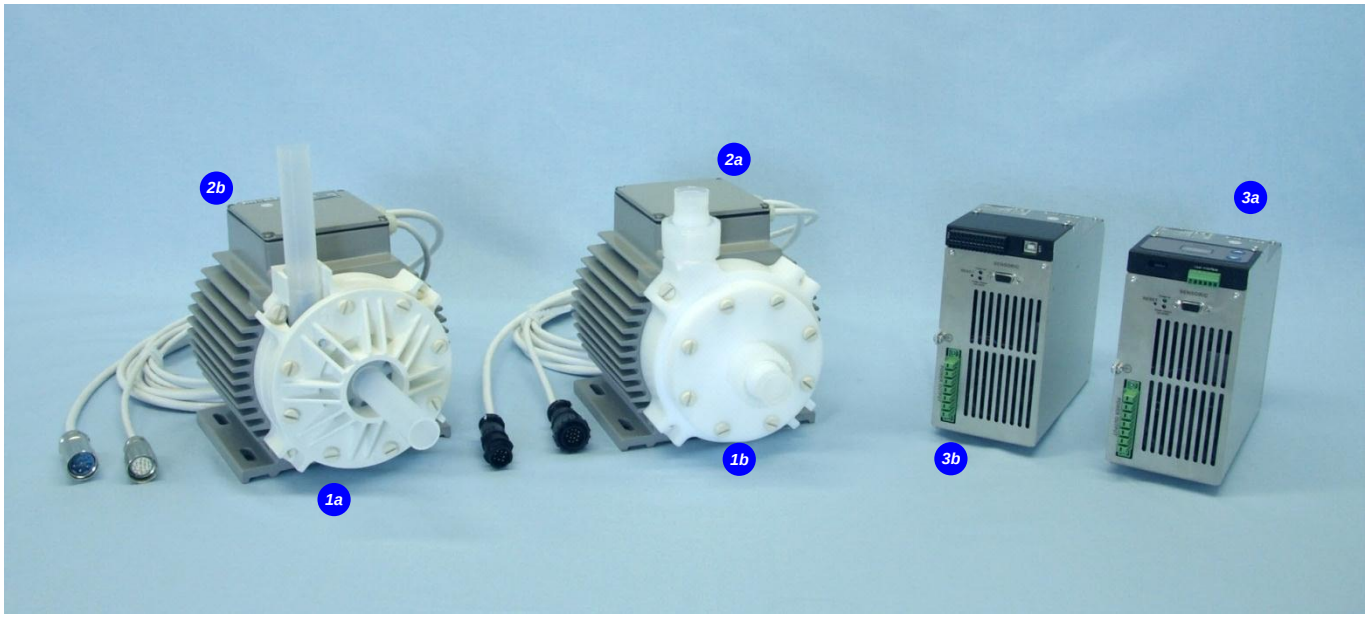


Figure 14: *Pump system with standard components*

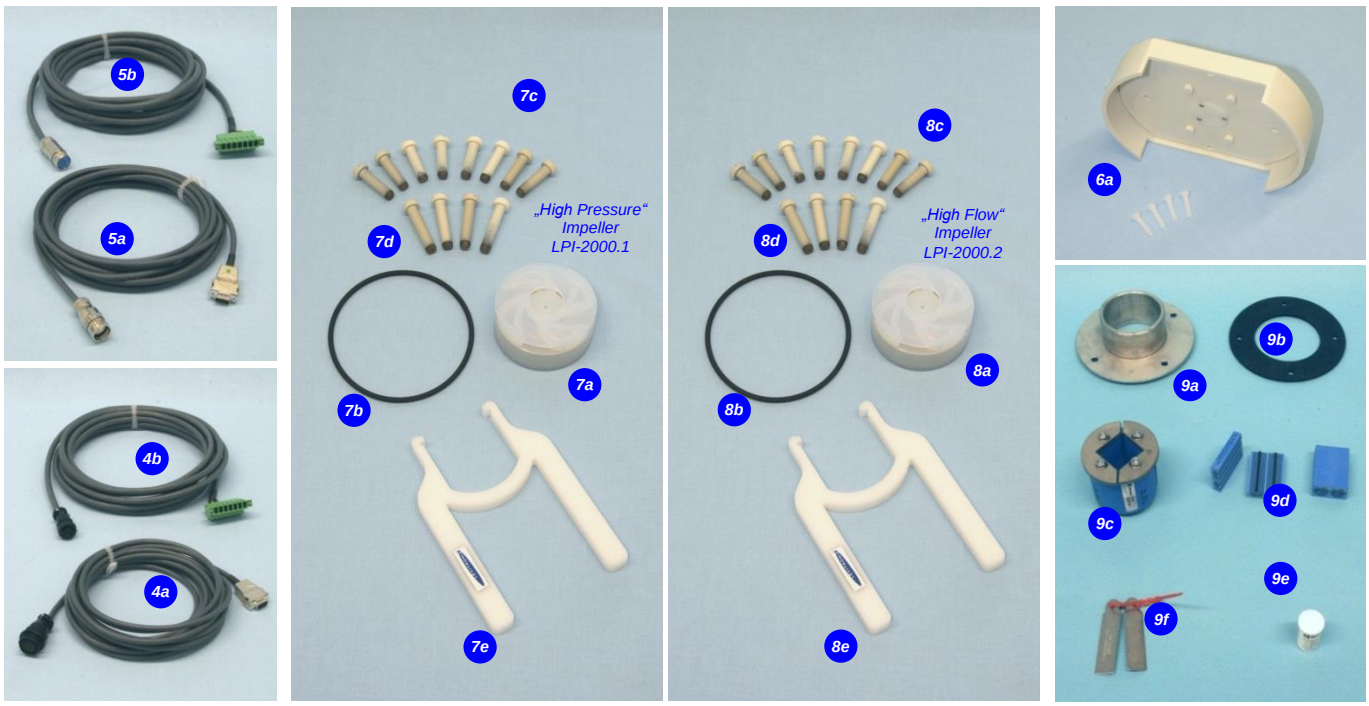


Figure 15*: Accessories*

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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