Better Pumps for Better Yield!

No Seals, No Bearings, No Particle Contamination!

BPS-4000

6.3 bar	*(91 psi)*
280 liters/min	*(74 gallons/min)*

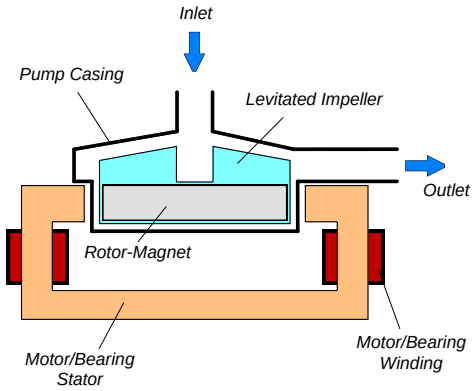


Figure 1: *Schematic of maglev centrifugal pump.*

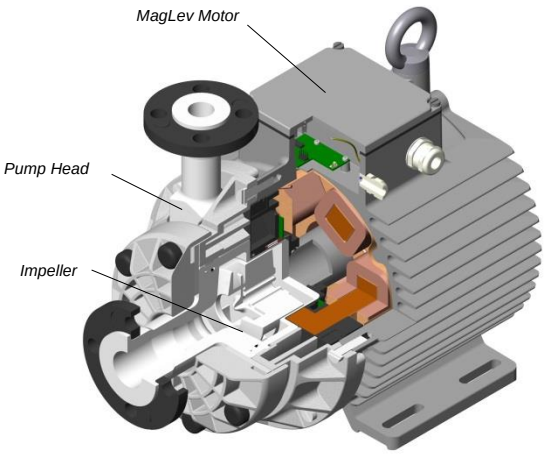


Figure 2: *Maglev motor with pump head LPP-4000.4/5*

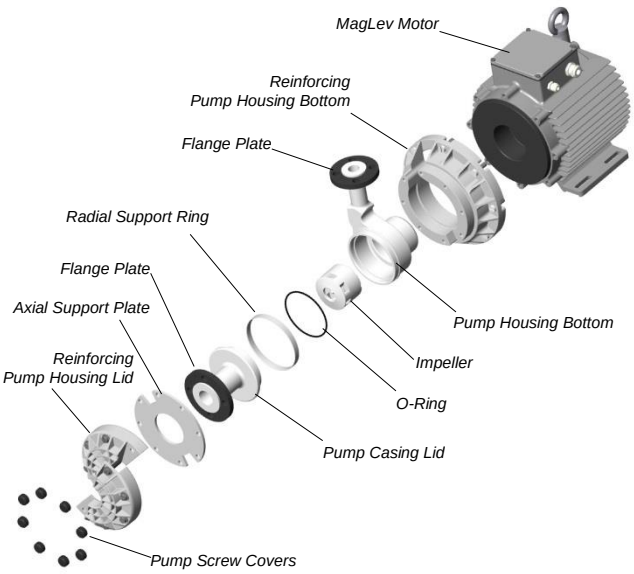


Figure 3: *Disassembled pump head LPP-4000.4/5*
(LPP-4000.2 does not have radial and axial support ring and plate)

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 allowing the operator 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 analog 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 pump head 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 relevant 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 ^{0}C = 212 ^{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 nA IIC T5
  CE Ex II 3D Ex tD A22 IP67 T100°C
- *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*.

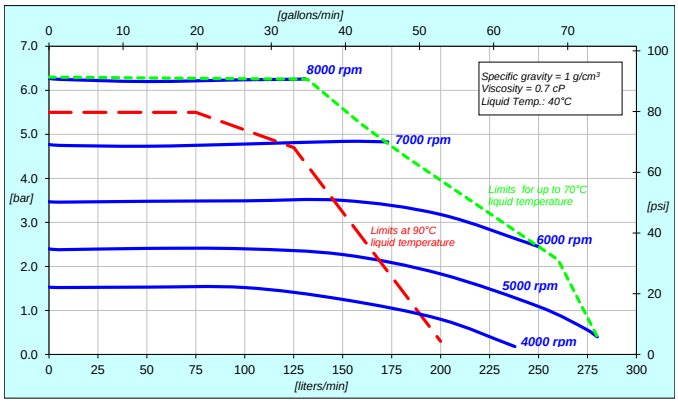


Figure 4: *Pressure/flow curves for pump head LPP-4000.5/2 (ECTFE Impeller LPI-4000.1)*

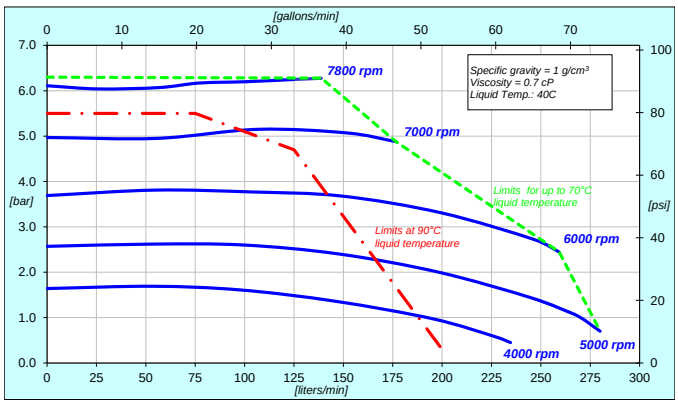


Figure 5: *Pressure/flow curves for pump head LPP-4000.4 (PFA impeller LPI-4000.3)*

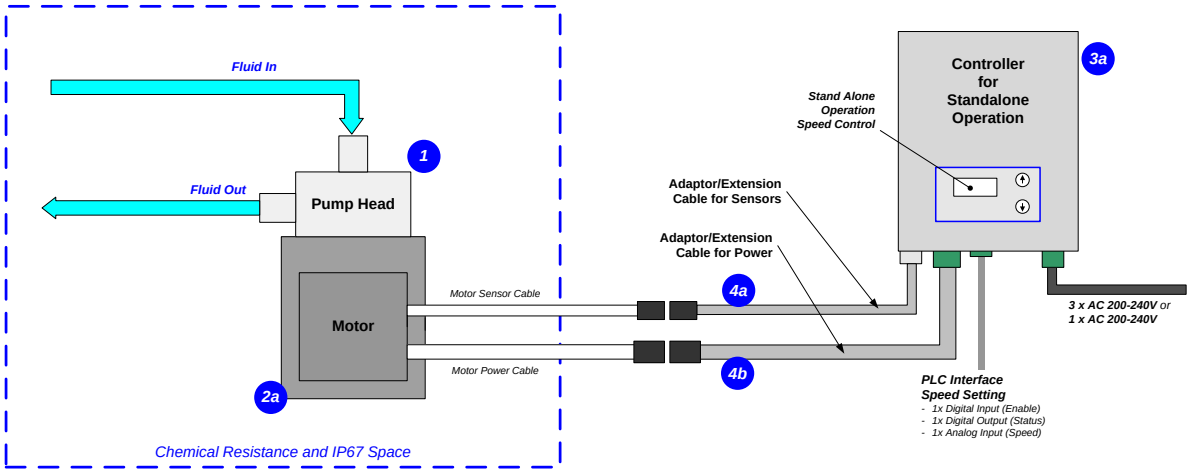


Figure 6: *System configuration for standalone operation (speed setting with integrated user panel)*

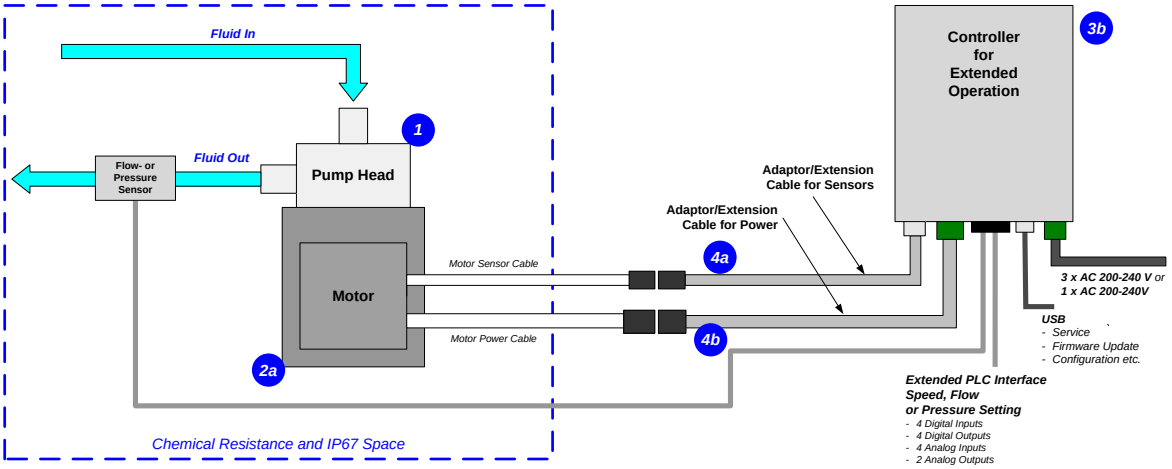


Figure 7: *Extended operation (flow or pressure control) with extended controller*

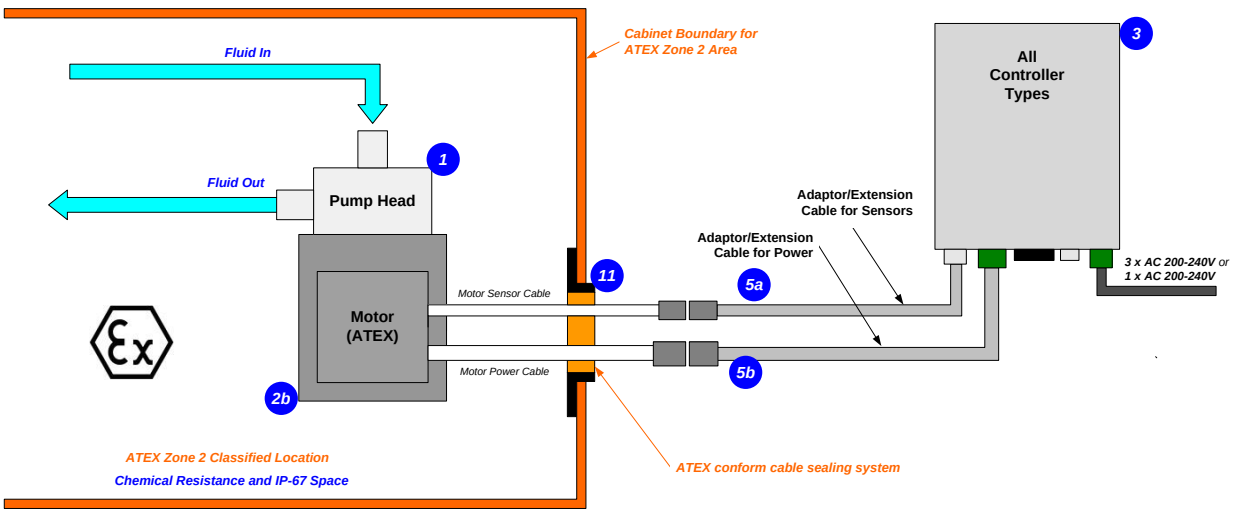
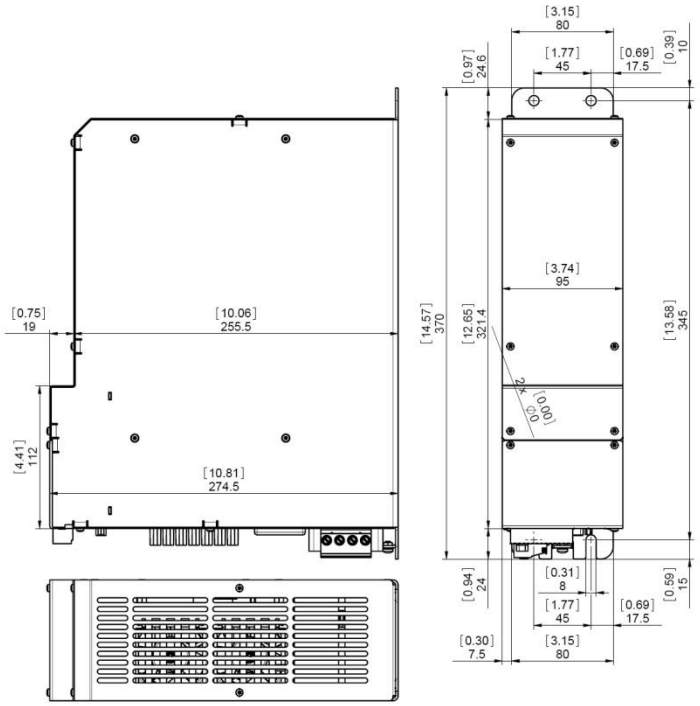


Figure 8: *System Configuration for ATEX applications*

DIMENSIONS OF MAIN COMPONENTS



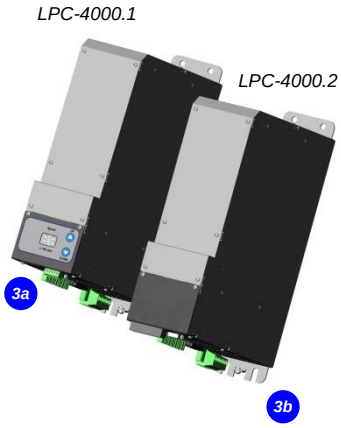
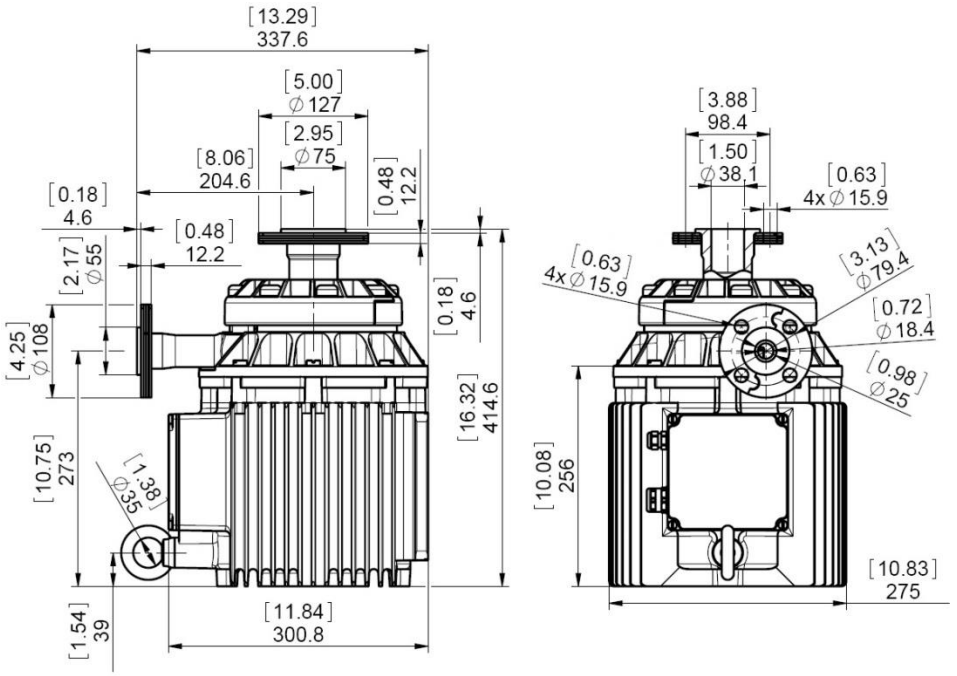


Figure 9: *Basic dimensions of controllers LPC-4000.x*



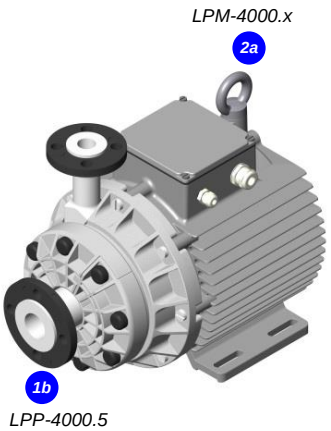


Figure 10: *Dimensions of motor LPM-4000.x with pump head LPP-4000.5*
(Same basic dimensions as motor LPM-4000.x with pump head LPP-4000.1 and LPP-4000.4)

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
BPS-4000.27	100-90962	LPP-4000.5 (ECTFE Impeller, Flange Fittings)	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. Certifications: CE, IECEE CB scheme, ETL (NRTL). [1]
BPS-4000.28	100-90963			LPC-4000.2	
BPS-4000.30 (ATEX)	100-90965		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. Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx. [1]
BPS-4000.31 (ATEX)	100-90966			LPC-4000.2	
BPS-4000.33	100-90975	LPP-4000.4 (PFA Impeller Flange Fittings)	LPM-4000.2	LPC-4000.1-02	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-4000.34	100-90976			LPC-4000.2-02	
BPS-4000.36 (ATEX)	100-90978		LPM-4000.8 (ATEX)	LPC-4000.1-02	Adaptor/Extension (0.5 - 10m) cables according to Table 3 (Position 5a and 5b) have to be ordered as separate article with specified length. Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx. [1]
BPS-4000.37 (ATEX)	100-90979			LPC-4000.2-02	
BPS-4000.3	100-90374	LPP-4000.2 (ECTFE Impeller Pillar Fittings)	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. Certifications: CE, IECEE CB scheme, ETL (NRTL). [1]
BPS-4000.4	100-90375			LPC-4000.2	
BPS-4000.13 (ATEX)	100-90397		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. Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx. [1]
BPS-4000.14 (ATEX)	100-90437			LPC-4000.2	

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Pump Head	LPP-4000.5	100-90960	Impeller / Pump Housing Sealing Ring / Fittings	ECTFE / PTFE (wet parts), Reinforcement of housing with PP+GF and SS+PTFE Kalrez® perfluoroelastomer [1] / ANSI Flange 1.5" Inlet / 1" Outlet
				Max. Flow / Max. Diff. Pressure Max. Viscosity / Density	280 liters/min / 74 gallons/min / 6.3 bar / 91 psi 30 cP / 1.8 g/cm³
				Max. Liquid Temp.	Full performance: 70 °C / 158 °F Limited performance: 70-90 °C / 158-194 °F (see Figure 8)
1b	Pump Head	LPP-4000.4	100-90969	Impeller / Pump Housing Fittings	PFA / Housing is same as for LPP-4000.5 pump head ANSI Flange 1.5" Inlet / 1" Outlet
1c	Pump Head	LPP-4000.2	100-90295	Impeller / Pump Housing Fittings	ECTFE / PTFE (wet parts), Reinforcement of housing with PP+GF Pillar Super 300, 1.5" Inlet and 1" Outlet
2a	Motor	LPM-4000.2	100-10043	Housing	ETFE coated Aluminum. waterproofed (IP67 without connectors)
				Cable / Connectors	2x 3m cables with FEP jacket / 2x circular (AMP types)
2b	Motor (ATEX, IECEx)	LPM-4000.8	100-10048	ATEX/IECEx Marking	CE Ex II 3G Ex nA T5 / CE Ex 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 (Firmware for LPP-4000.2/5) LPC-4000.1-02 (Firmware for LPP-4000.4)	100-90370 (Connectors included) 100-90971 (Connectors included)	Voltage / Electrical Power	1 x 200-240 V AC ±10%, 50/60 Hz / 4kW 3 x 200-240 V AC ±10%, 50/60 Hz / 4kW
				Interfaces for Standalone Controller	Panel to set speed (automatic storage on internal EEPROM)
				PLC with	1x analog input ("Speed") / 1x digital input ("Enable") / 1x digital output ("Status") — 4 - 20 mA / 0 - 24 V (optocoupler) / 0 - 24 V (relais)
3b	Extended Controller (PLC and USB)	LPC-4000.2 (Firmware for LPP-4000.2/5) LPC-4000.2-02 (Firmware for LPP-4000.4)	100-90371 (Connectors included) 100-90972 (Connectors included)	Interfaces for Extended Controller	PLC with — 4 digital inputs with 0 - 24V (optocoupler) / 2 analog inputs with 4 - 20mA / 2 analog outputs with 0 – 5 V — 4 digital outputs with 0 - 24 V (relais) / 2 analog inputs with 0 – 10 V
					USB interface (for service and system monitoring)

Table 2: *Specification of standard components (Note 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-4000.1-05 MCAP-4000.1-30 MCAP-4000.1-50 MCAP-4000.1-70 MCAP-4000.1-100	190-10122 190-10123 190-10124 190-10101 190-10125	190-10172 190-10173 190-10174 190-10175 190-10176	Jacket Material Connector Types Connector Material	PVC Circular AMP to D-SUB Plastics (PA)
5a 5b	Extension Adaptor Cable for Sensor (a) and Power (b) Wires	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-4000.2-05 MCAP-4000.2-30 MCAP-4000.2-50 MCAP-4000.2-70 MCAP-4000.2-100	190-10158 190-10159 190-10130 190-10160 190-10161	190-10180 190-10181 190-10182 190-10183 190-10184	Jacket Material Connector Types Connector Material	PVC Circular M23 (IP-67) to D-SUB Metallic – Nickel coated

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 / Cable Material	PP (+ 40% Talkum) / PVC, 6m, open-end wires	
				Supply Spec. / IP Rating	20.4 – 27.6 VDC, 31.2 W, 1.3 A / IP-55	
8 (a - d)	Impeller Exchange Kit (For pump head LPP-4000.1/2)	IEK-4000.1	100-90522	Impeller LPI-4000.1 (a) / O-Ring (b) Pump Casing (c) / Motor (d) Screws	ECTFE / O-Ring, Kalrez®, 110.7 x Ø3.53 8 pcs M10 x 35, PVDF / 8 pcs M10 x 35, Stainless Steel with PTFE coating	
9 (a - d)	Impeller Exchange Kit (For pump head LPP-4000.5)	IEK-4000.2	100-90961	Impeller LPI-4000.1 (a) / O-Ring (b) Pump Casing Screws (c) Pump Motor Screws (d)	ECTFE / O-Ring, Kalrez®, 110.7 x Ø3.53 8 pcs M10 x 40, Stainless Steel with double washer and protective FPM cover 8 pcs M10 x 35, Stainless Steel with PTFE coating	
10	Impeller Exchange Kit (For pump head LPP-4000.4)	IEK-4000.3	100-90970	Difference to IEK-4000.2	PFA impeller LPI-4000.3 (instead of ECTFE).	
11 (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)	Note: Lubricant (e) and measurement plates (f) are included.
12	Screw Seal Set	M16x16 PVDF/FKM	100-90913	Screw / Gasket Material Purpose	M16 x 16 (SW24), PVDF / FKM Chemical protection of lifting eyebolt mounting thread of motor.	

Table 4: *Specification of accessories*

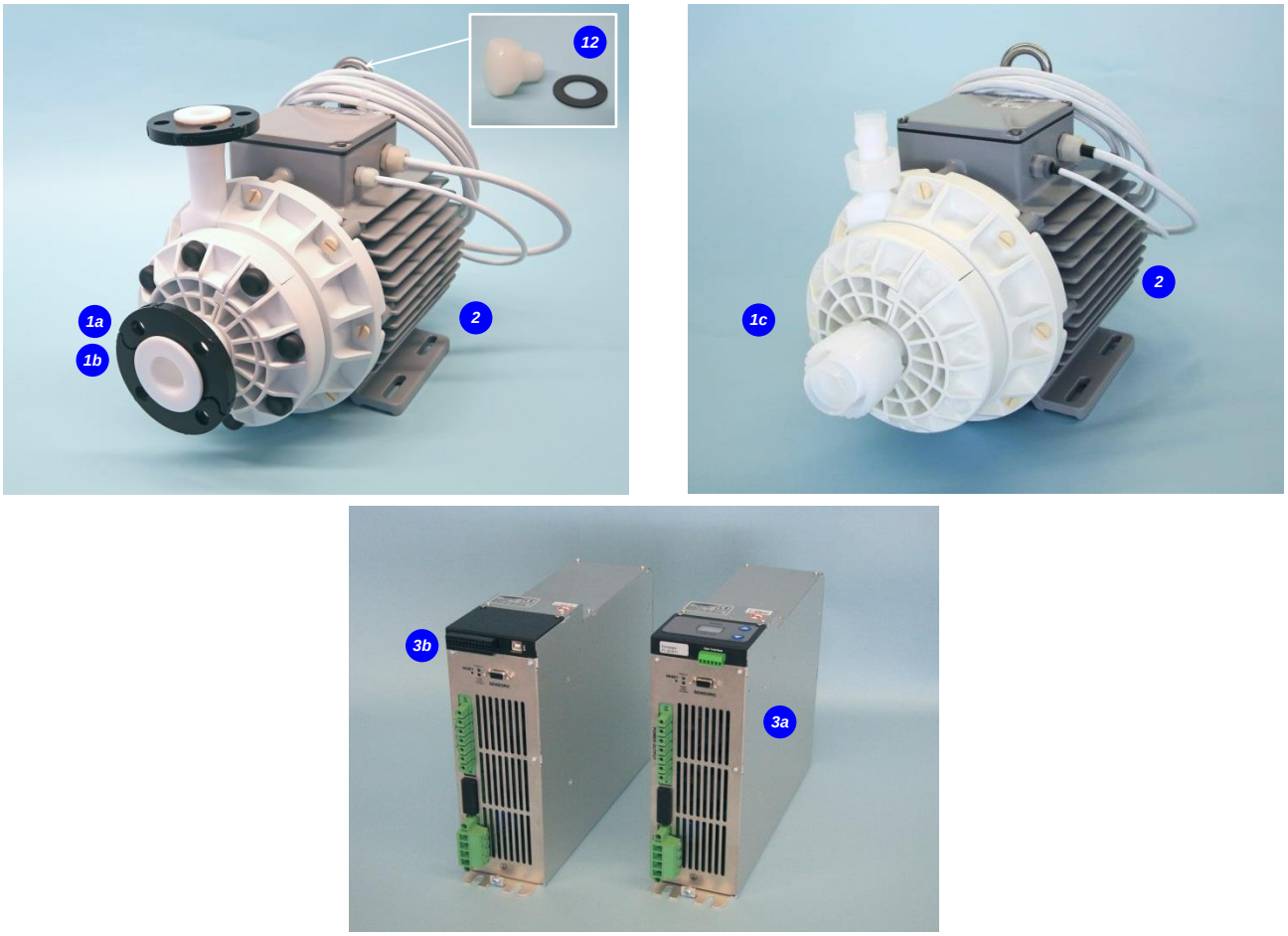


Figure 11: *Pump system BPS-4000 with standard components*

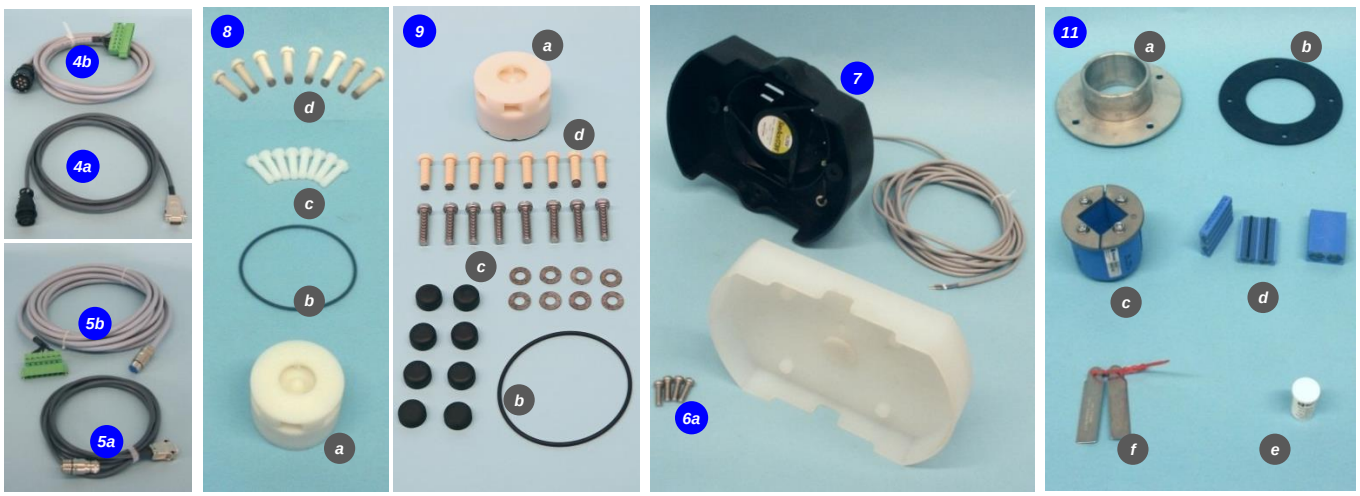


Figure 12*: Accessories*

Levitronix® 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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