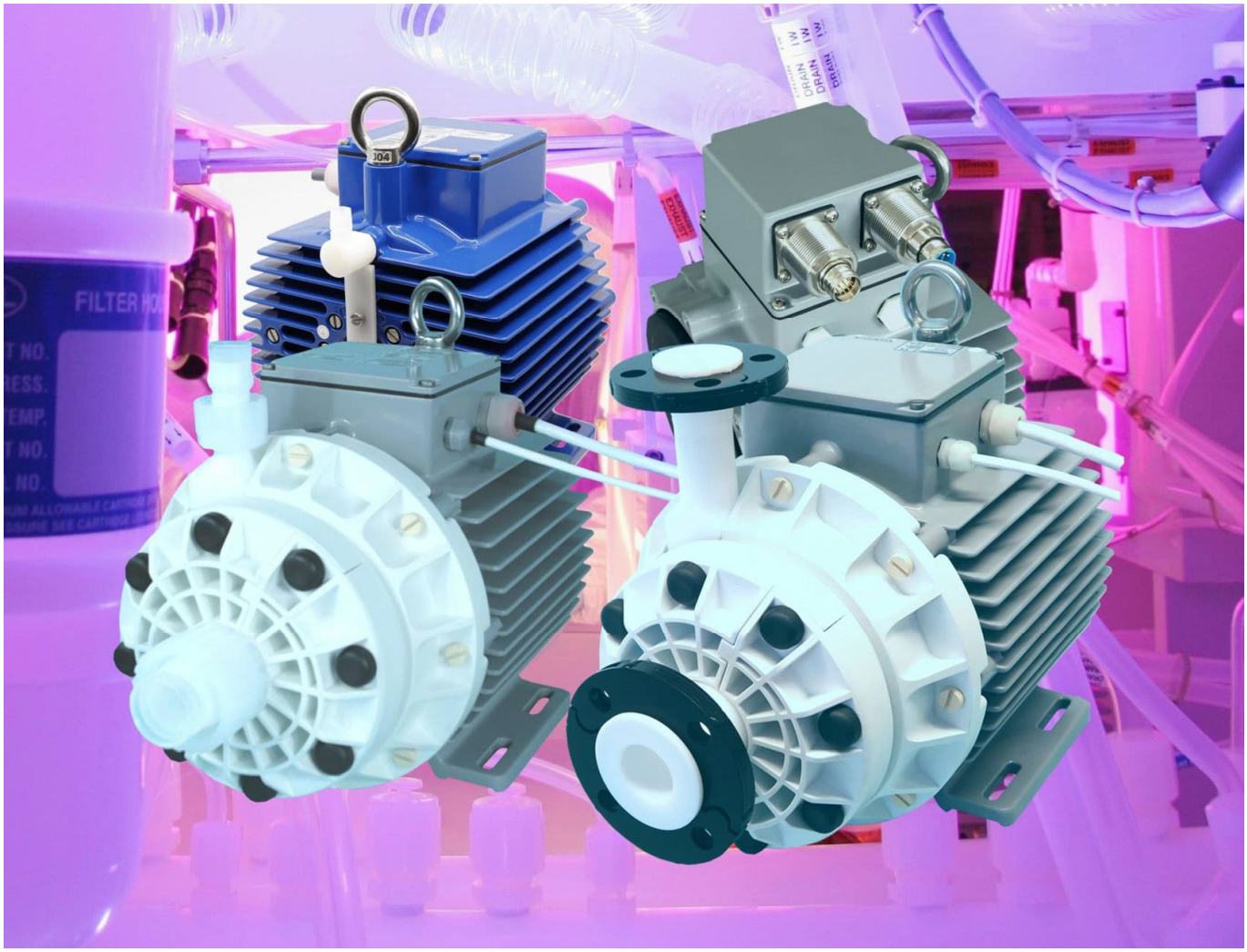
Better Pumps for Better Yield!



No Seals, No Bearings, No Particle Contamination!

BPS-4000

6.5 bar	*(94 psi)*
280 liters/min	*(74 gallons/min)*

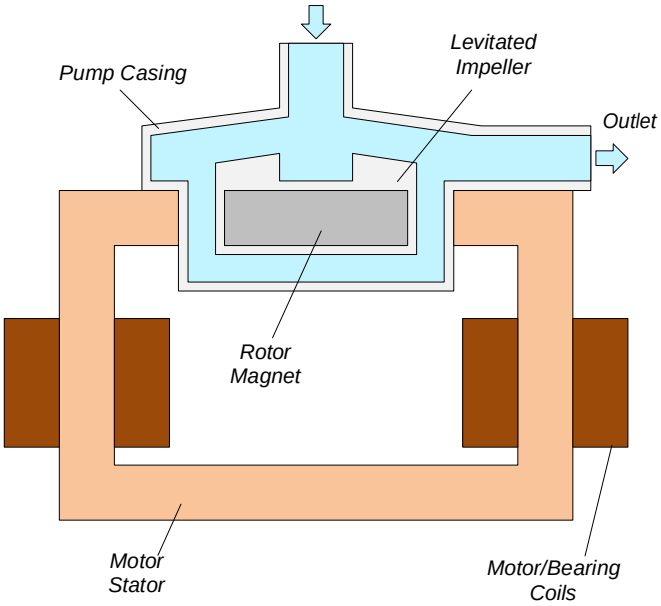


Figure 1: *Schematic of the main elements of the MagLev centrifugal pump*

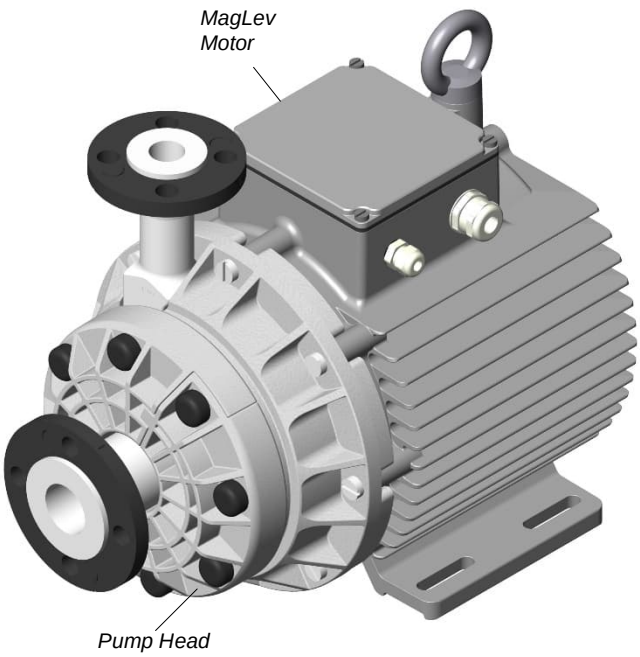


Figure 2: *MagLev pump motor with pump head*

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 microorganisms 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 5*) 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 6*) 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/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 7)*. 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 11.*

HAZLOC SYSTEM CONFIGURATION

A *Hazardous Location NRTL* certified motor together with the pump head allows installation of motor and pump head within a *Class I Division 2* area (see *Figure 7)*. The *HazLoc* motor (*Pos. 2c* in *Table 2*) comes with special connectors and NPT threads on the motor housing to attach a conduit for the cables to leave the hazardous location area.

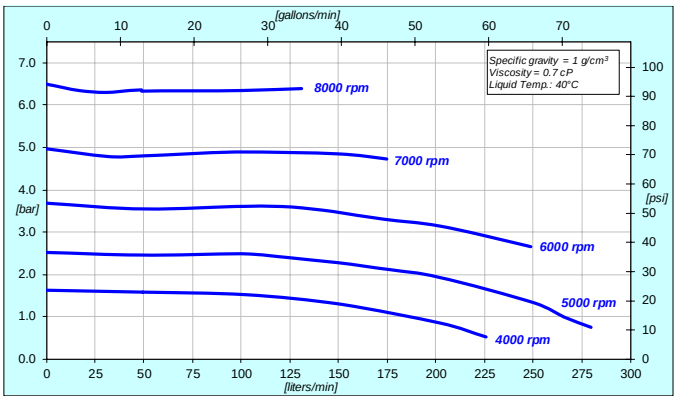


Figure 3: *Pressure/flow curves*
Note 1: Typical curves measured with pump head LPP-4000.7.

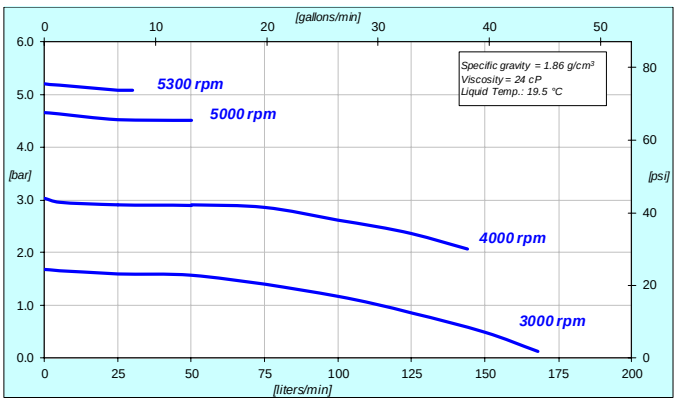


Figure 4: *Pressure/flow curves for high density/viscosity liquids*
Note 1: Typical curves measured with pump head LPP-4000.7.

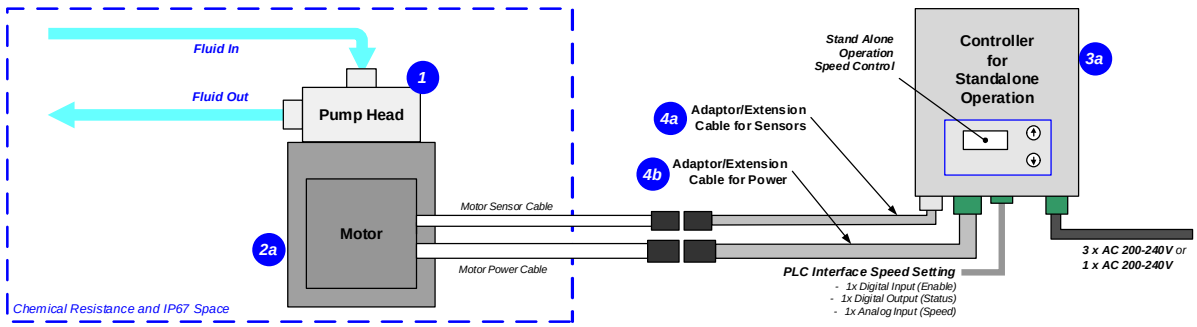


Figure 5: *System configuration for standalone operation (speed setting with integrated user panel)*

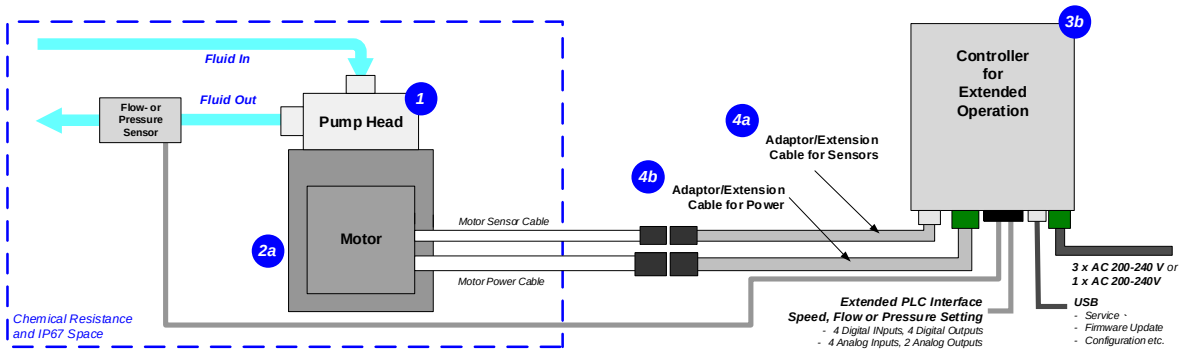


Figure 6: *Extended operation (flow or pressure control) with extended controller*

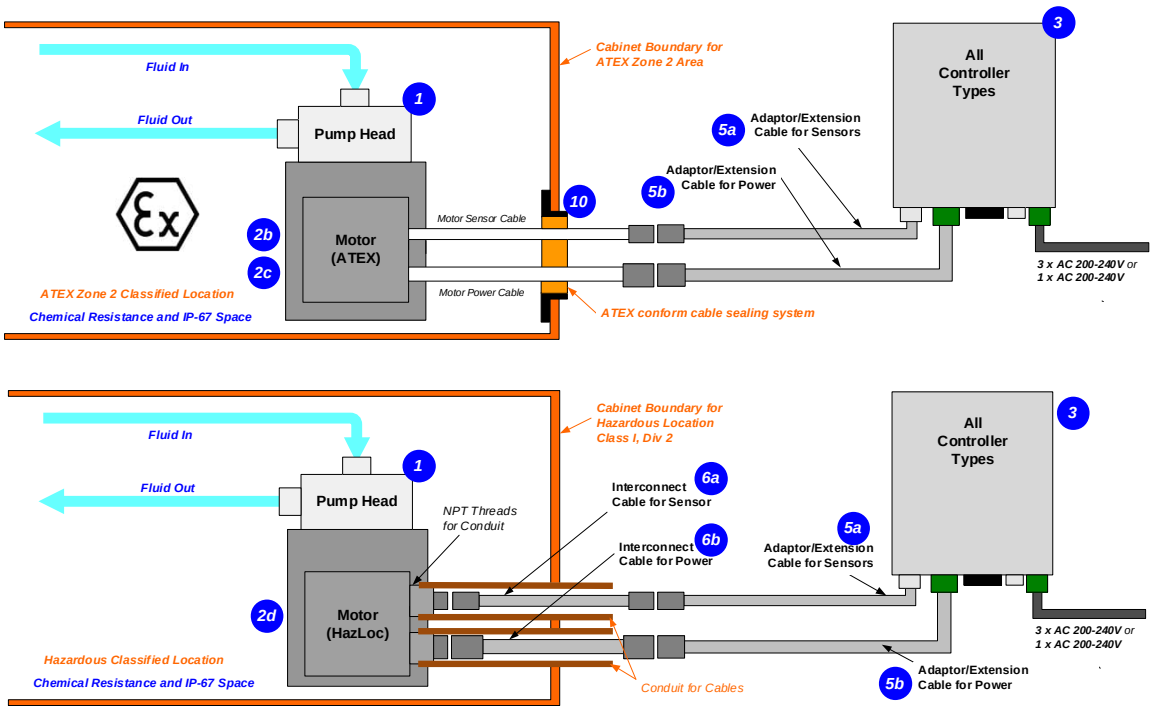
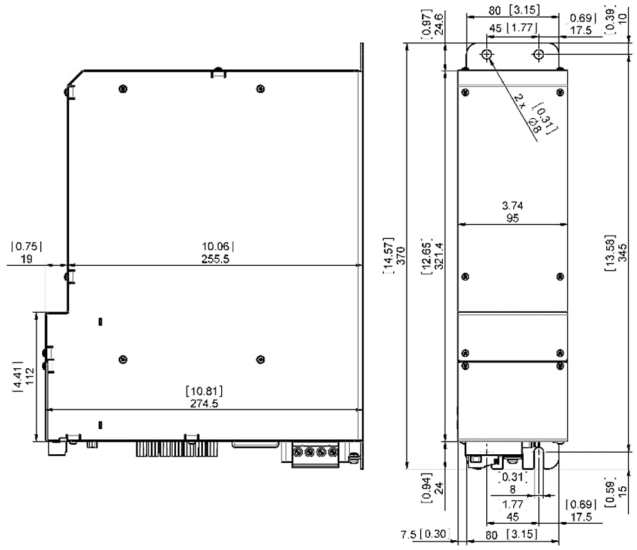


Figure 7: *System Configuration for ATEX and Hazardous Location applications*

DIMENSIONS OF MAIN COMPONENTS



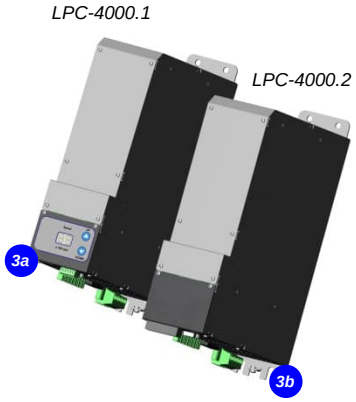
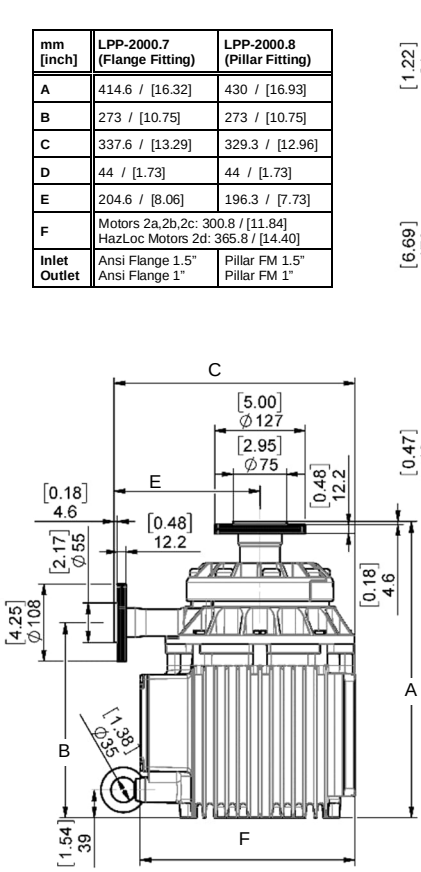
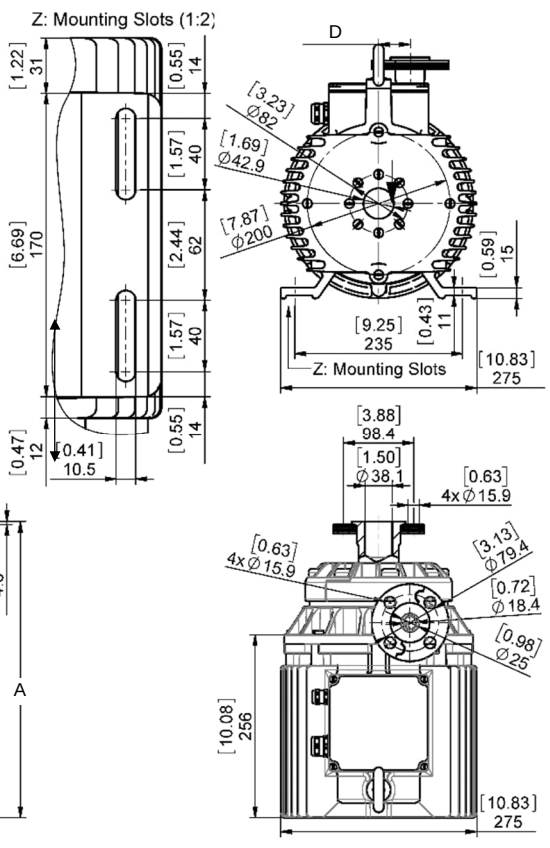


Figure 8: *Basic dimensions of controllers LPC-4000.x*
Note 1: Non-tolerated dimensions are for reference only.

mm [inch]	LPP-2000.7 (Flange Fitting)	LPP-2000.8 (Pillar Fitting)
A	414.6 / [16.32]	430 / [16.93]
B	273 / [10.75]	273 / [10.75]
C	337.6 / [13.29]	329.3 / [12.96]
D	44 / [1.73]	44 / [1.73]
E	204.6 / [8.06]	196.3 / [7.73]
F	Motors 2a,2b,2c: 300.8 / [11.84] HazLoc Motors 2d: 365.8 / [14.40]	
Inlet Outlet	Ansi Flange 1.5" Ansi Flange 1"	Pillar FM 1.5" Pillar FM 1"





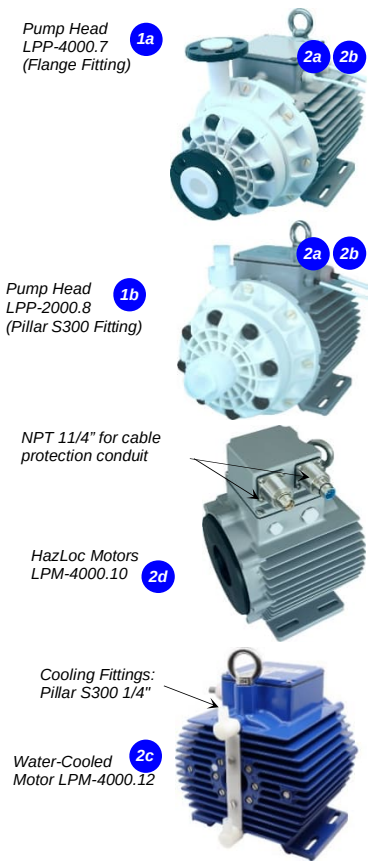


Figure 9: *Basic dimensions of motors LPM-4000.x with pump heads LPP-4000.7/8*
Note 1: Detailed Drawing with pump head LPP-4000.8 (Pillar fitting), hazardous location motors or motors with integrated water-cooling are available on request. Note 2: Non-tolerated dimensions are for reference only.

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
BPS-4000.64 BPS-4000.65	100-91250 100-91251	LPP-4000.7 (PFA Impeller, Flange Fittings)	LPM-4000.2	LPC-4000.1 LPC-4000.1	*Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (positions 4a and 4b) have to be ordered as separate articles.* *Certifications: CE, IECEE CB scheme, ETL (NRTL).* *Note: Includes Eyebolt Seal Set (see Table 4)*
BPS-4000.67 (ATEX) BPS-4000.68 (ATEX)	100-91253 100-91254		LPM-4000.8 (ATEX)	LPC-4000.1 LPC-4000.2	*Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (positions 5a and 5b) have to be ordered as separate articles.* *Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx.* *Note: Includes Eyebolt Seal Set (see Table 4)*
BPS-4000.88 (Waterc.) BPS-4000.89 (Waterc.)	100-91617 100-91618		LPM-4000.12 (Waterc.)	LPC-4000.1 LPC-4000.2	
BPS-4000.70 (HazLoc) BPS-4000.71 (HazLoc)	100-91256 100-91257		LPM-4000.10 (HazLoc)	LPC-4000.1 LPC-4000.2	*Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (see also Figure 7) have to be ordered as separate articles.* *Certifications: CE, IECEE CB scheme, ETL (NRTL), HazLoc Cl1 Div2* *Note: Includes Eyebolt Seal Set (see Table 4)*
BPS-4000.73 BPS-4000.74	100-91259 100-91260	LPP-4000.8 (PFA Impeller, Pillar Fittings)	LPM-4000.2	LPC-4000.1 LPC-4000.2	*Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (positions 4a and 4b) have to be ordered as separate articles.* *Certifications: CE, IECEE CB scheme, ETL (NRTL).* *Note: Includes Eyebolt Seal Set (see Table 4)*
BPS-4000.76 (ATEX) BPS-4000.77 (ATEX)	100-91262 100-91263		LPM-4000.8 (ATEX)	LPC-4000.1 LPC-4000.2	*Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (positions 5a and 5b) have to be ordered as separate articles.* *Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx.* *Note: Includes Eyebolt Seal Set (see Table 4)*
BPS-4000.90 (Waterc.) BPS-4000.91 (Waterc.)	100-91619 100-91620		LPM-4000.12 (Waterc.)	LPC-4000.1 LPC-4000.2	
BPS-4000.79 (HazLoc) BPS-4000.80 (HazLoc)	100-91165 100-91166		LPM-4000.10 (HazLoc)	LPC-4000.1 LPC-4000.2	*Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (see also Figure 7) have to be ordered as separate articles.* *Certifications: CE, IECEE CB scheme, ETL (NRTL), HazLoc Cl1 Div2.* *Note: Includes Eyebolt Seal Set (see Table 4)*

Table 1: *Standard system configurations*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a 1b	Pump Head	LPP-4000.7 (Flange) LPP-4000.8 (Pillar)	100-91242 100-91241	Impeller / Pump Housing Sealing Ring Fittings Type / Size	*PFA / PTFE (wet parts), reinforcement of housing with PP+GF and SS+PTFE* *FFPM (FFKM) perfluorelastomer [1]* *ANSI flange or Pillar Super 300 / 1.5" inlet and 1" outlet*
				Max. Flow / Max. Diff. Pressure Max. Viscosity / Density	*280 liters/min / 74 gallons/min / 6.5 bar / 94 psi* *30 cP / 1.8 g/cm³*
				Max. Liquid Temp.	*Full performance: 70 °C / 158 °F.* *Reduced performance.: 70-90 °C / 158-194 °F.*
2a	Motor	LPM-4000.2	100-10043	Housing Cable / Connectors	*ETFE coated aluminum, waterproofed (IP67 without connectors)* *2x 3 m long cables with FEP jacket / 2x circular connectors (AMP types)*
2b 2c	Motor (ATEX, IECEx)	LPM-4000.8 LPM-4000.12 (watercool.)	100-10048 100-10183	ATEX/IECEx Marking Housing Cable / Connectors Watercooling	II 3G Ex ec h mc IIC T4 Gc / II 3D Ex h tc IIIC T105°C Dc *LPM-4000.8/12: ETFE/Epoxy coating* *LPM-4000.8/12: 2x 3m cables with FEP/PVC jacket / 2x circular (M23, IP67)* *LPM-4000.12 motor: integrated water cooling with Pillar S300 1/4" male fittings.*
2d	Motor (HazLoc)	LPM-4000.10 (ETFE)	100-10115	Hazardous Location Marking Connectors	*Class I, Div2, Groups A-D T5 Class II, Div2, Groups E-G T5* *2x circular (M23, IP67) / NPT 1¼" for cable protection conduit*
3a	Standalone Controller (User Panel)	LPC-4000.1	100-90370 (Connectors included)	Voltage / Electrical Power Housing Rating	*1 x 200-240 VAC or 3x 200-240VAC ±10%, 50/60 Hz / 4 kW* *IP20*
				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 (relay)*
				Standard Firmware	*F1.25*
3b	Extended Controller (PLC and USB)	LPC-4000.2	100-90371 (Connectors included)	Interfaces for Extended Controller	*PLC with* *4 digital inputs with 0 – 24 V (optocoupler)* *4 digital outputs with 0 – 24 V (relay)* *2 analog inputs with 4 – 20 mA* *2 analog inputs with 0 – 10 V* *2 analog outputs with 0 – 5 V*
					USB interface (for service and system monitoring)
				Standard Firmware	*F1.48*

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 (a)	Power Cable (b)	Sensor (a)	Power (b)		
4a 4b	Extension Adaptor Cable for Sensor (a) and Power (b)	MCAS-600.1-05 (0.5 m) MCAS-600.1-30 (3 m) MCAS-600.1-50 (5 m) MCAS-600.1-70 (7 m) MCAS-600.1-100 (10 m)	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 (0.5 m) MCAS-600.3-30 (3 m) MCAS-600.3-50 (5 m) MCAS-600.3-70 (7 m) MCAS-600.3-100 (10 m)	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 (IP67) to D-SUB* *Metallic – Nickel coated*
6a 6b	Interconnect Cable for Sensor (a) and Power (b) Wires	MCIS-2000.1-05 (0.5 m) MCIS-2000.1-30 (3 m) MCIS-2000.1-50 (5 m) MCIS-2000.1-70 (7 m) MCIS-2000.1-100 (10 m)	MCIP-4000.1-05 MCIP-4000.1-30 MCIP-4000.1-50 MCIP-4000.1-70 MCIP-4000.1-100	190-10391 190-10392 190-10393 190-10394 190-10395	190-10402 190-10403 190-10404 190-10405 190-10406	Jacket Material Connector Types Connector Material	*PVC* *Circular M23 (IP67) to Circular M23* *Metallic – Nickel coated*

Table 3: *Specification of adaptor/extension cables*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
7a	Air Cooling Module	ACM-4000.1	190-10177	Material / Connection Port Air Pressure	*PP / NPT 1/2"* *~1 - 3 bar (14 – 43 psi)*
7b	Air Cooling Module	ACM-4000.3	190-10190	Material	*PP with conductive additive for operation with ATEX motor*
8	Fan Cooling Module	FCM-4000.1	190-10178	Housing / Cable Material Supply Spec. / IP Rating	*PP (+ 40% Talcum) / PVC, 6 m, open-end wires* *20.4 – 27.6 VDC, 31.2 W, 1.3 A I IP65*
9	Impeller Exchange Kit (For pump head LPP-4000.7/8)	IEK-4000.5	100-91244	Impeller LPI-4000.4 (A) / O-Ring (B) Pump Casing Screws (C) Pump Motor Screws (D)	*PFA / O-Ring FFPM (FFKM), 110.7 x Ø3.53* *8 pcs. M10 x 40, stainless steel with washer (F) and protective FPM cover (E)* *8 pcs. M10 x 35, stainless steel with PTFE coating*
10	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* *Note: Lubricant (E) and measurement* *Roxylon (EPDM rubber)* *plates (F) are included.*
11	Eyebolt 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.*
12	Cable Shield Grounding Module	CSG-4000.1	190-10487	Purpose	*Can be mounting on power cables MCAP-4000.5 improved EMC (emissions) behavior in electrical cabinets.*

Table 4: *Specification of accessories*

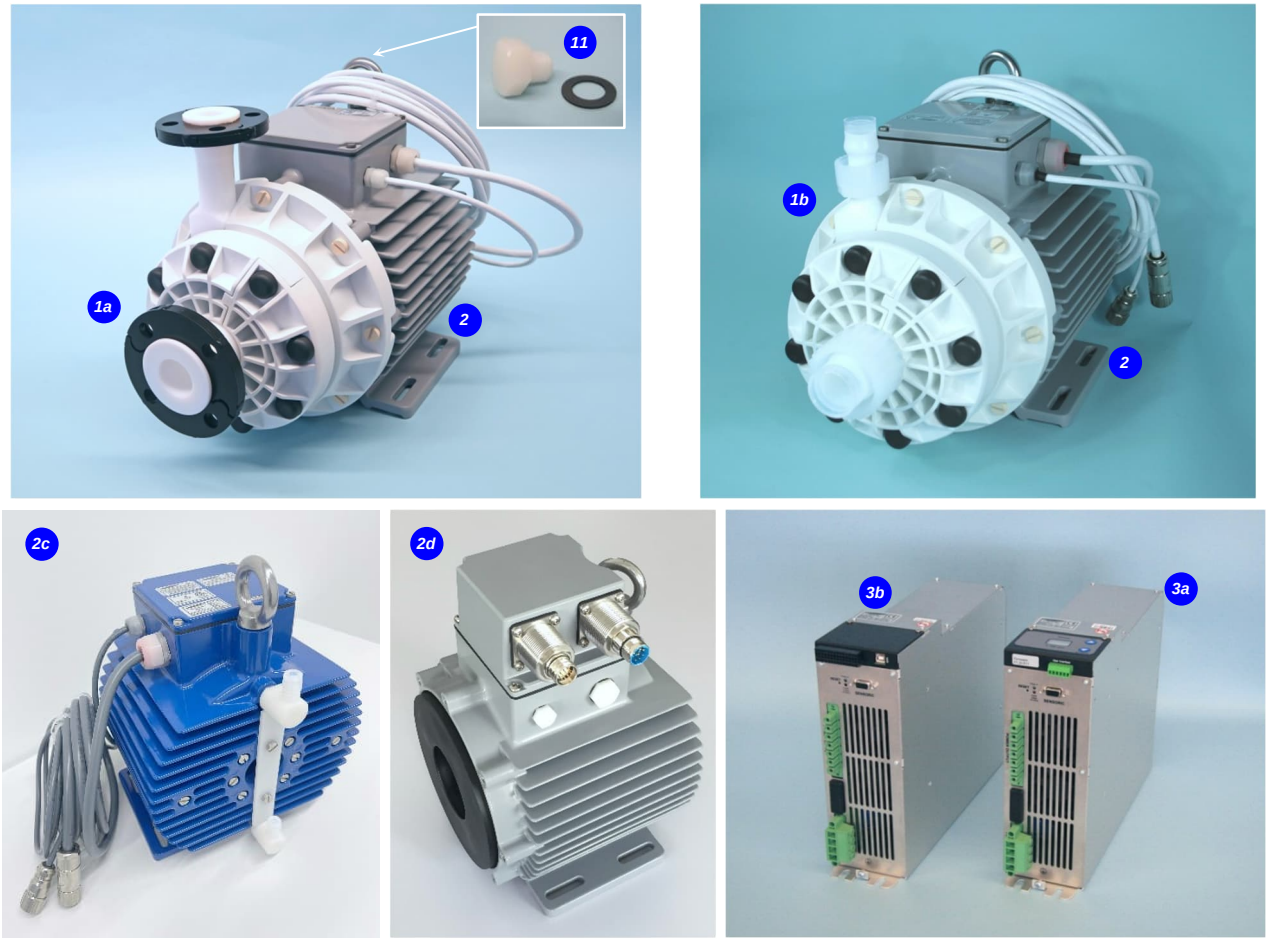


Figure 10: *Pump system BPS-4000 with standard components*

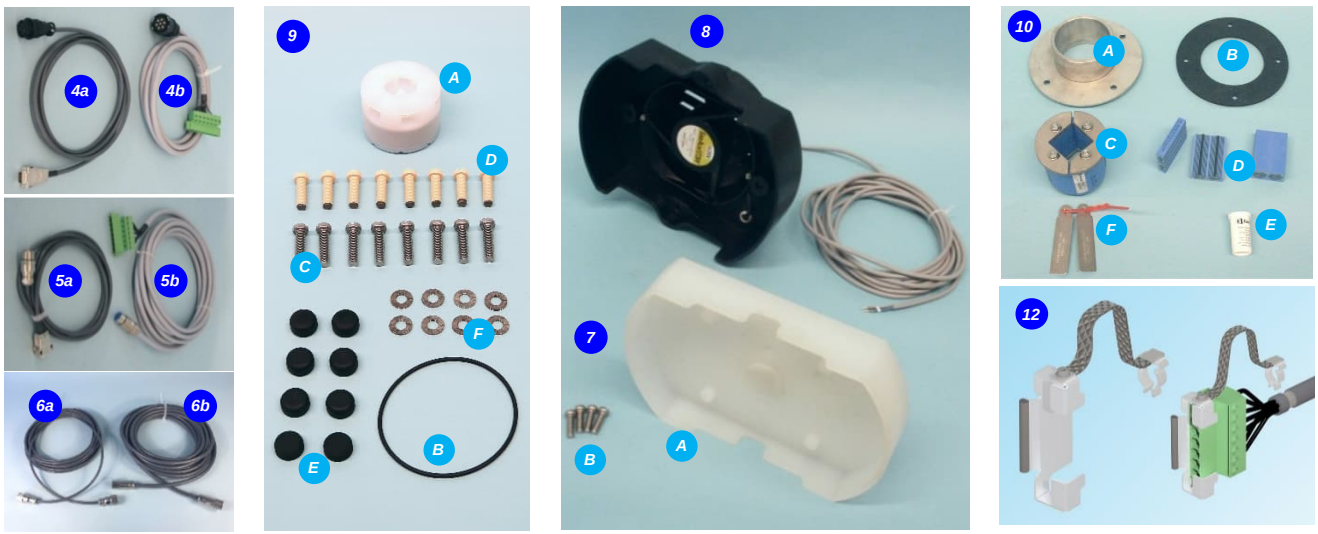


Figure 11*: Accessories*

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.

Headquarter and European Contact

Levitronix GmbH
Bändliweg 30
CH-8048 Zurich
Switzerland

Phone: +41 44 974 4000
E-Mail: salesEurope@levitronix.com

US Contact

Levitronix Technologies Inc.
10 Speen Street, Suite 102
Framingham, Massachusetts 01701
USA

Phone: +1 508 861 3800
E-Mail: salesUS@levitronix.com

Japan Contact

Levitronix Japan K.K.
Wing Eight 5floor, 4-16-4
Asakusabashi, Taito-ku
Tokyo, 111-0053 Japan

Phone: +81 3 5823 4193
E-Mail: salesJapan@levitronix.com

Taiwan Contact

Levitronix Taiwan
5F, No. 251, Dong Sec. 1,
Guangming 6th Rd., Chu Pei City,
Hsin-Chu 302, Taiwan, R.O.C.

Phone: +886 3 657 6209
E-Mail: salesAsia@levitronix.com

PL-4017-00, Rev15, DCO# 24-013 *First Release: 30-Jun-2011* *Last Update: 02-Feb-2024*