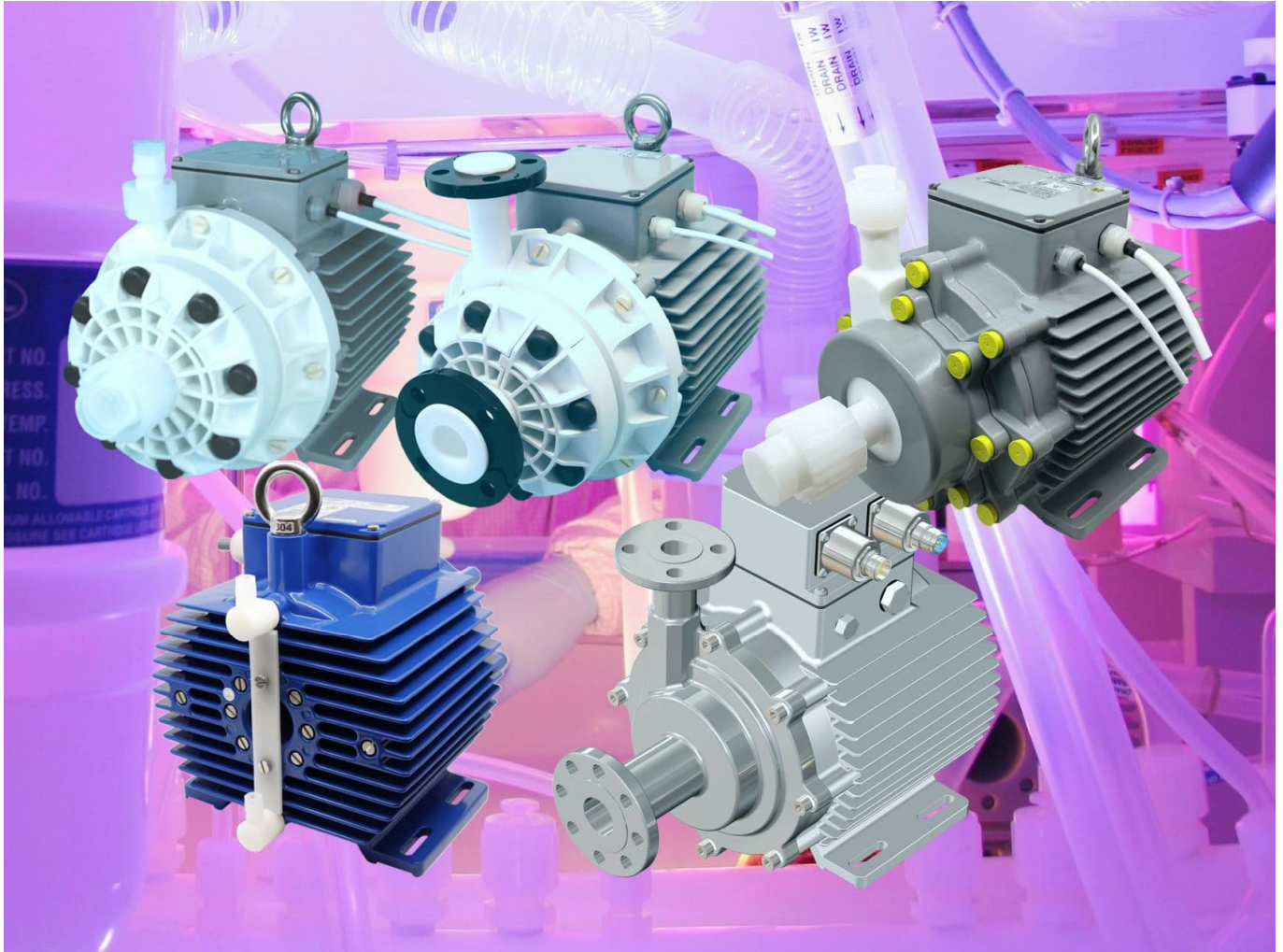




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Bearingless Pump System BPS-4000
MagLev Pumps for Ultrapure Fluid Handling

Better Pumps for Better Yield!



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

BPS-4000.S

(Same fit, form and function as BPS-4000 models)

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

Levitronix® MagLev Pump Technology
Better Pumps for Better Yield!

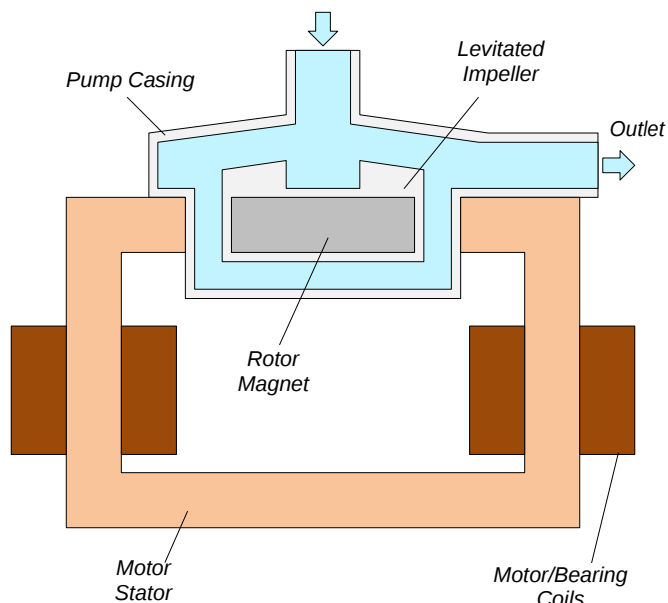


Figure 1: Schematic of the main elements of the MagLev centrifugal pump

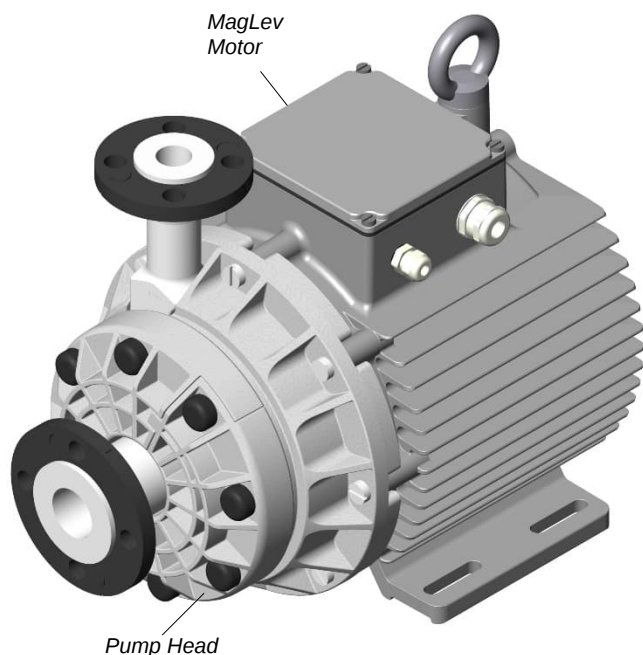


Figure 2: MagLev pump motor with pump head

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 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/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 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*.

The ATEX/IECEX motors have also a Japanese, Korean and Taiwanese Ex certification and marking.

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 8*). 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.

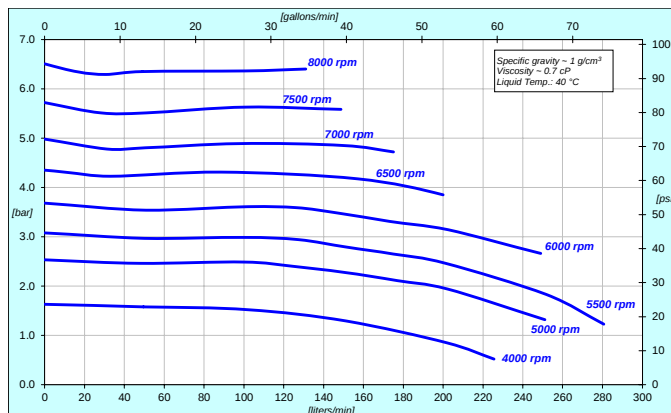


Figure 3: Pressure/flow curves for standard pump heads
Note 1: Typical curves for pump heads LPP-4000.7/8/13.

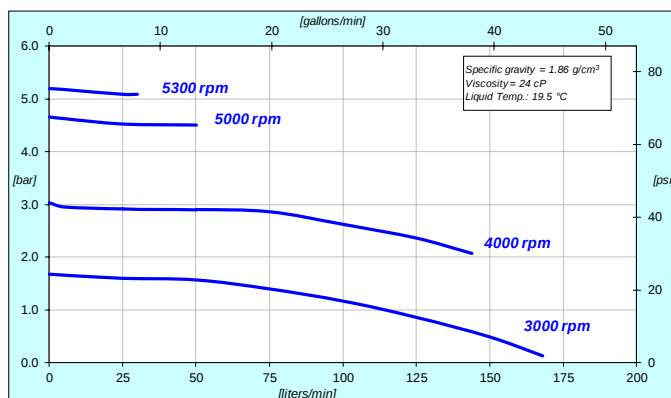


Figure 4: Pressure/flow curves for high density/viscosity liquids
Note 1: Typical curves for pump heads LPP-4000.7/8/13.

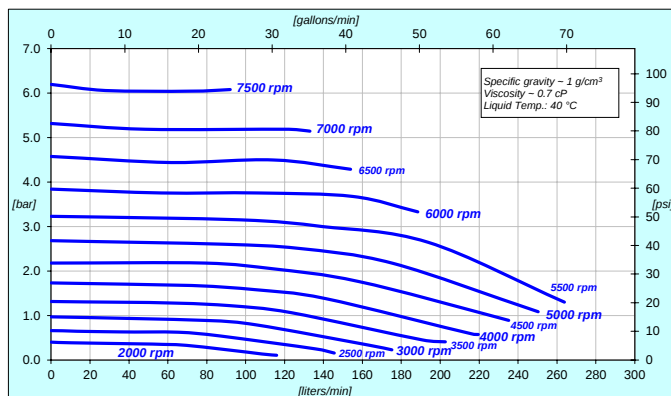


Figure 5: Pressure/flow curves for stainless steel pump heads
Note 1: Typical curves for pump heads LPP-4000.14.

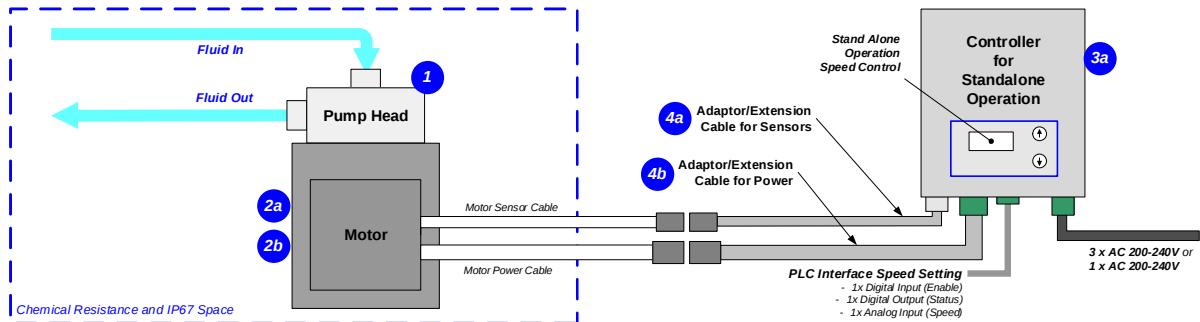


Figure 6: System configuration for standalone operation (speed setting with integrated user panel)

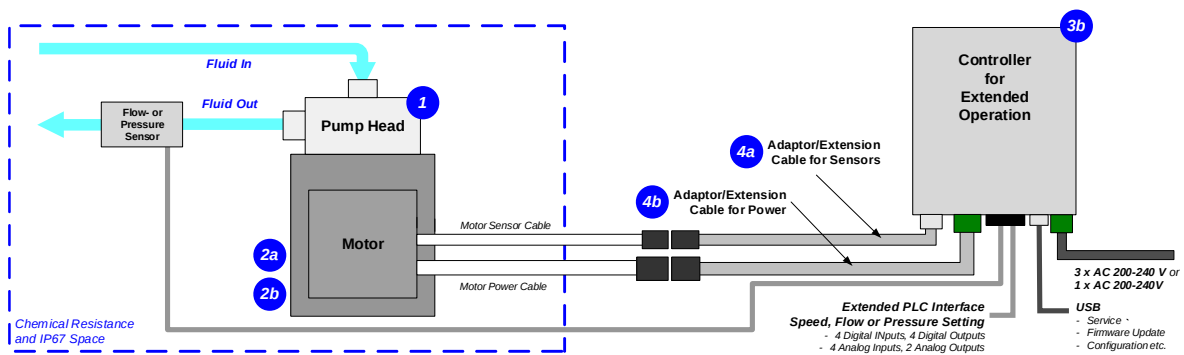


Figure 7: Extended operation (flow or pressure control) with extended controller

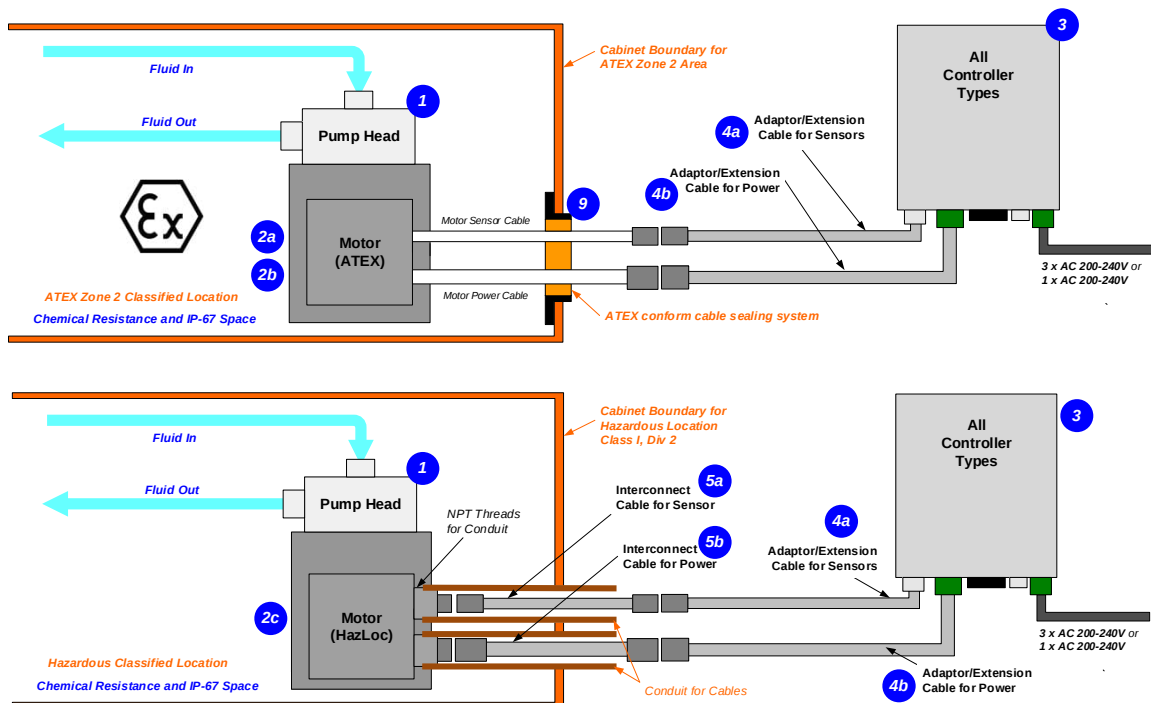
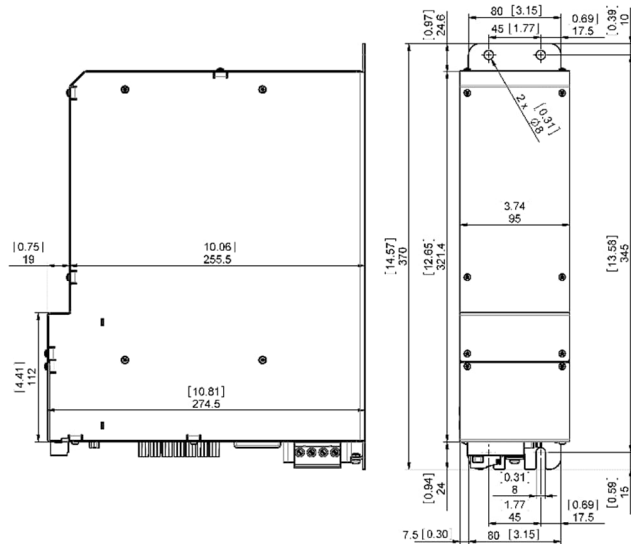


Figure 8: System Configuration for ATEX and Hazardous Location applications

DIMENSIONS OF MAIN COMPONENTS



LPC-4000S.1

LPC-4000S.2

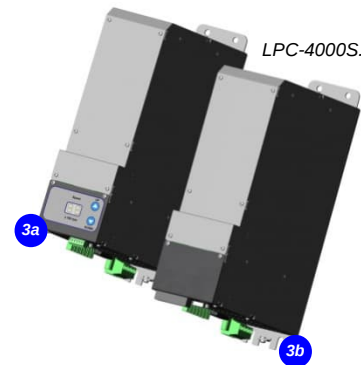
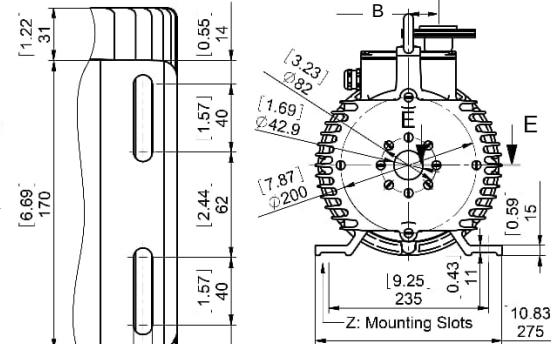
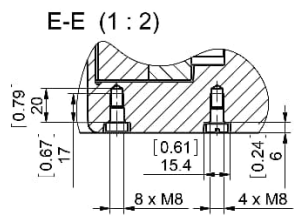


Figure 9: Basic dimensions of controllers LPC-4000S.x

Note 1: Non-tolerated dimensions are for reference only.

Z: Mounting Slots (1:2)

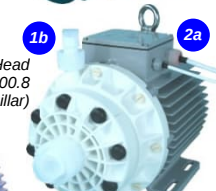
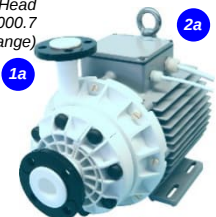


NPT 11/4" for
cable protection
conduit

Pump Head
LPP-4000.7
(PTFE, Flange)



HazLoc Motors
LPM-2000.10/21



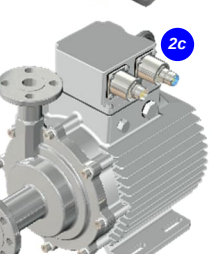
Cooling Fittings:
Pillar S300 1/4"



Water-Cooled
Motor LPM-4000.12



Pump Head
LPP-4000.13
(PTFE, Sealless)



Pump Head
LPP-4000.14
(Stainless Steel)

mm [inch]	LPP-4000.7	LPP-4000.8	LPP-4000.13	LPP-4000.14
A	414.6 [16.32]	430 [16.93]	430 [16.93]	414 [16.3]
B	44 [1.73]	44 [1.73]	44 [1.73]	44 [1.73]
C	337.6 [13.29]	329.3 [12.96]	332.3 [13.08]	337.6 [13.29]
D	273 [10.75]	273 [10.75]	273 [10.75]	272.3 [10.72]
E	204.6 [8.06]	196.3 [7.73]	196.3 [7.73]	204.6 [8.06]
F	Standard Motors 2a, 2b: 300.8 / [11.84] HazLoc Motors 2c: 366.8 / [14.44]			
Inlet	Ansi Flange 1.5"	FM Pillar 1.5"	FM Pillar 1.5"	Ansi Flange 1.5"
Outlet	Ansi Flange 1"	FM Pillar 1"	FM Pillar 1"	Ansi Flange 1"

Figure 10: Basic dimensions of motors with pump heads

Note 1: Detailed Drawing with other pump heads, 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-4000.67S BPS-4000.68S	100-91844 100-91845	LPP-4000.7 (PTFE, Flange)	LPM-4000.8 (ATEX)	LPC-4000S.1 LPC-4000S.2	Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (see also Figure 6) have to be ordered as separate articles. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx. Note: Includes Eyebolt Seal Set (see Table 4)
BPS-4000.88S BPS-4000.89S	100-91847 100-91848		LPM-4000.12 (Waterc.)	LPC-4000S.1 LPC-4000S.2	
BPS-4000.70S BPS-4000.71S	100-91850 100-91851		LPM-4000.10 (HazLoc)	LPC-4000S.1 LPC-4000S.2	
BPS-4000.76S / 104S BPS-4000.77S / 105S	100-91856 / 895 100-91857 / 896	LPP-4000.8 / 13 (O-Ring / Sealless) (PTFE, Pillar)	LPM-4000.8 (ATEX)	LPC-4000S.1 LPC-4000S.2	Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (see also Figure 6) have to be ordered as separate articles. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx. Note: Includes Eyebolt Seal Set (see Table 4)
BPS-4000.90S BPS-4000.91S	100-91859 100-91860		LPM-4000.12 (Waterc.)	LPC-4000S.1 LPC-4000S.2	
BPS-4000.79S BPS-4000.80S	100-91862 100-91863		LPM-4000.10 (HazLoc)	LPC-4000S.1 LPC-4000S.2	
BPS-4000.111S	100-92066	LPP-4000.14 (SS, Flange)	LPM-4000.17 (ATEX)	LPC-4000S.2-14	Adaptor/Extension (0.5 – 10 m) cables according to Table 3 (see also Figure 6) have to be ordered as separate articles. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx. Note: Includes Eyebolt Seal Set (see Table 4)
BPS-4000.113S	100-92068		LPM-4000.21 (HazLoc)	LPC-4000S.2-14	

Table 1: Standard system configurations

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a 1b 1c	Pump Head	LPP-4000.7 (Flange) LPP-4000.8 (Pillar) LPP-4000.13 (Pillar, Sealless) ⁴	100-91242 100-91241 100-91814	Impeller / Pump Housing Sealing Ring / Fittings Max. Flow / Max. Diff. Pressure Max. Viscosity / Density Max. Liquid Temp.	PFA / PTFE (wet parts) with non-wet reinforcement parts FFPM (FFKM) or Sealless / ANSI flange or Pillar S300 (1.5" inlet and 1" outlet) 280 liters/min (74 gallons/min) / 6.5 bar (94 psi) 30 cP / 1.8 g/cm ³ Full performance: 70 °C (158 °F) Reduced performance.: 70-90 °C (158-194 °F).
1c	Pump Head	LPP-4000.14 (Stainless Steel, Flange)	100-91825	Impeller / Pump Housing Sealing Ring / Fitting Types Max. Flow / Max. Diff. Pressure Max. Viscosity / Density Max. Liquid Temp.	Stainless Steel FFPM (FFKM) / ANSI flange (1.5" inlet and 1" outlet) 264 liters/min (69 gallons/min) / 6.2 bar (90 psi) 30 cP / 1 g/cm ³ (higher density on request) 70 °C (158 °F)
2a 2b 2c	Motor (ATEX, IECEx)	LPM-4000.8 LPM-4000.12 ⁵ LPM-4000.12 (watercool.) ³	100-10048 100-10331 100-10183	Housing Cable / Connectors Watercooling ATEX/IECEx Marking ⁴	LPM-4000.8/12: ETFE/Epoxy coating, IP67 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. CE CB II 3G Ex ec h mC T4 Gc / CE CB II 3D Ex h tc IIIC T105°C Dc
2c	Motor (HazLoc)	LPM-4000.10 (ETFE) LPM-4000.21 (ETFE) ⁵	100-10115 100-10032	Hazardous Location Marking Connectors	Class I, Div2, Groups A-D T5 Class II, Div2, Groups E-G T5 2x circular (M23, IP67) / NPT 1/4" for cable protection conduit
3a	Standalone Controller (User Panel)	LPC-4000S.1	100-30156 (Connectors and motor cable ferrite included)	Voltage / Electrical Power / IP Interfaces for Standalone Controller Standard Firmware	1 x 200-240 VAC or 3x 200-240VAC ±10%, 50/60 Hz / 4 kW / IP20 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) LPC-4000S.1: F1.25
3b	Extended Controller (PLC and USB) ²	LPC-4000S.2 LPC-4000S.2-14 ⁵	100-30145 100-30197 (Connectors and motor cable ferrite included)	Interfaces for Extended Controller Standard Firmware	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 outputs with 0 – 5 V USB interface (for service and system monitoring) LPC-4000S.2: F1.48 LPC-4000S.2-14: F7.48x

Table 2: Specification of standard components

Note 1: ATEX IECEx motors are also certified/marked for Japanese, Korean and Taiwanese Ex. Note 2: Controllers with 1x or 2x RS232 or EtherCAT interface available. Note 3: Motor version with ETFE coating available.
Note 4: No elastomer O-ring used. All wet parts are PTFE or PFA. Flange fittings on request. Note 5: Stainless steel pump heads can only operate with these motors and controllers.

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) 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 Note	PVC Circular M23 (IP67) to D-SUB Metallic – Nickel coated Wall-mountable version available.
5a 5b	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 Note	PVC Circular M23 (IP67) to Circular M23 Metallic – Nickel coated For Hazloc motors only

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 / Connect Port / Air Press.	PP / NPT 1/2" / 0.1 – 2 bar (pressure at inlet of ACM)
6b	Air Cooling Module	ACM-4000.3	190-10190	Material	PP with conductive additive for operation with ATEX motor
7a	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 / IP65
7b	Fan Cooling Module	FCM-4000.3	190-10586	Hous. / Cable / Supply / IP Rating Certifications:	PP (els) PVC jacket, 10m, open wire / 24 VDC ±5%, 30 W @ 12krpm / IP-67. CE, ATEX/IECEx Note: Bearingless fan BFS-i04 used.
8a	Impeller Exchange Kit (For pump head LPP-4000.7/8)	IEK-4000.5	100-91244	Impeller (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
8b	Impeller Exchange Kit (For pump head LPP-4000.13)	IEK-4000.8	100-91883	Impeller (A) / Back-Up Gasket (B) Pump (C) Screws / Motor Screws (D) Impeller Exchange Tools (E, F, G)	PFA / ePTFE 8x M10x20 (C1) / 8x M10x35 (D1 Note: incl. Washers (C2), Covers (C3)) 4x mounting blocks (E1+E2) with block screws (F1+F2) Auxiliary screws 3x M10x30 (G1) and 3x M10x25 (G2)
9	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.
10	Eyebolt Seal Set	M16x16 PVDF/FKM	100-90913	Screw / Gasket Material / Purpose	M16 x 16 (SW24), PVDF / FKM / Protection lifting thread of motor.
11	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

Levitronix® MagLev Pump Technology
Better Pumps for Better Yield!

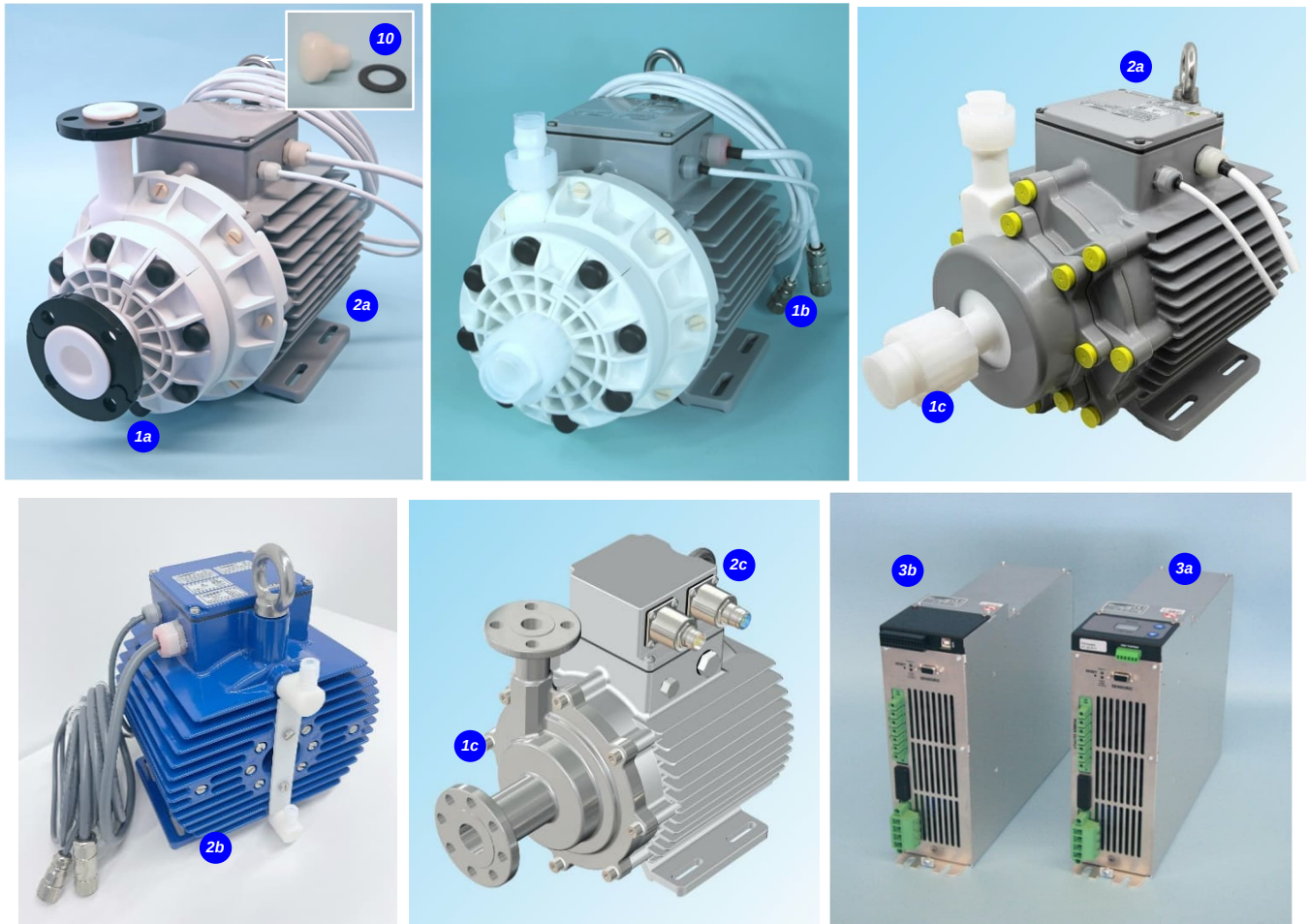


Figure 11: Pump system BPS-4000 with standard components

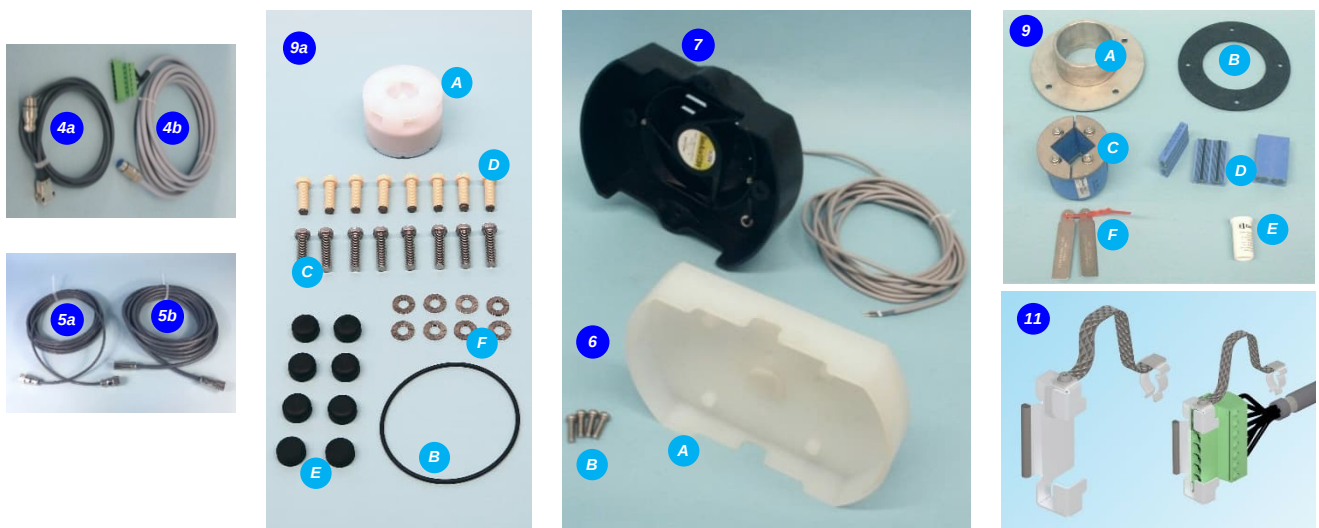


Figure 12: Accessories



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Bearingless Pump System BPS-4000 MagLev Pumps for Ultrapure Fluid Handling

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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Better Pumps for Better Yield!**