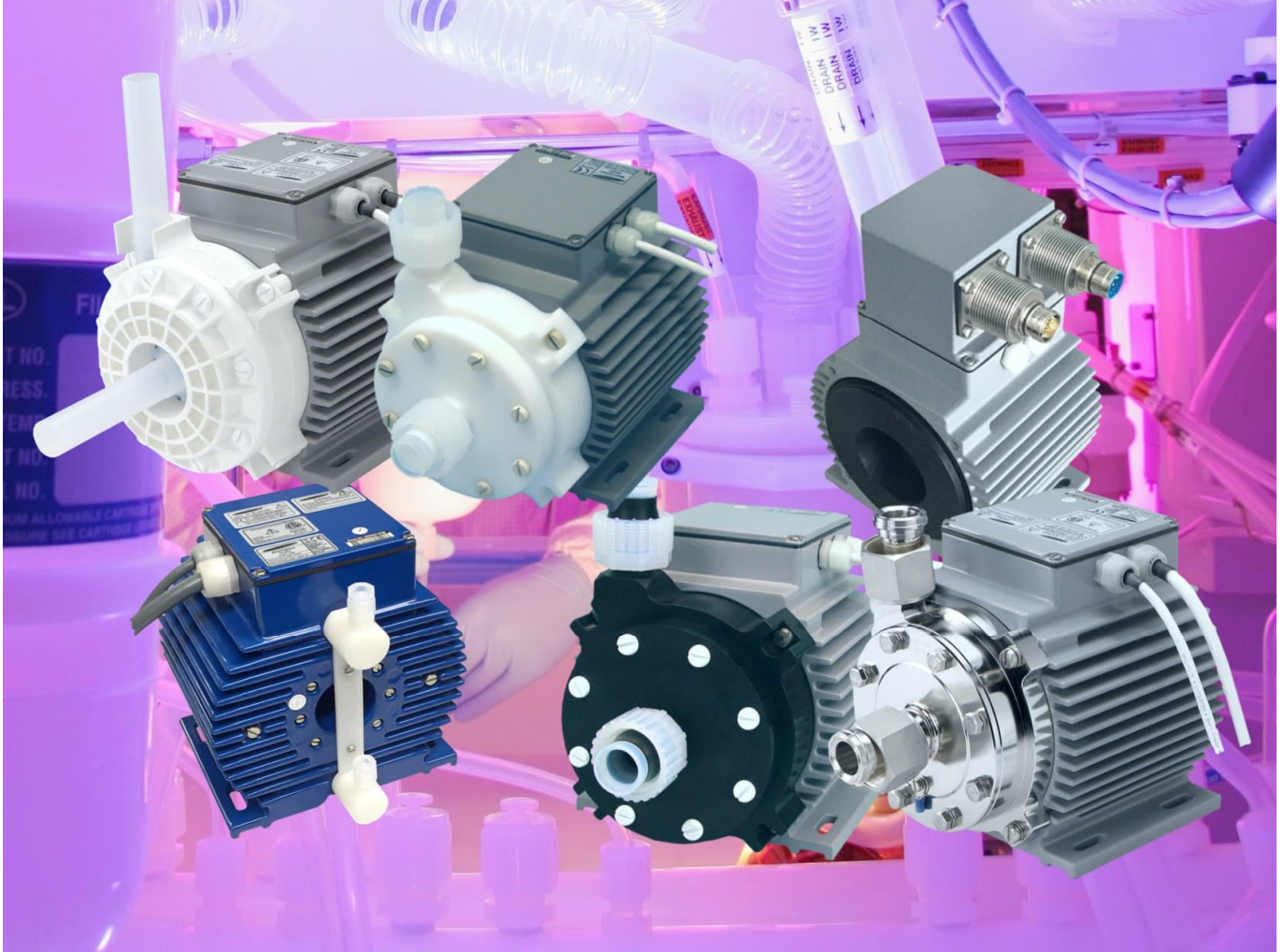


Better Pumps for Better Yield!



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

BPS-2000

High Pressure Profile:	6.9 bar (100 psi)	80 l/min (21 gallons/mmin)
High Flow Profile:	4.2 bar (61 psi)	140 liters/min (37 gallons/min)
Hybrid Profile:	5.7 bar (83 psi)	140 liters/min (37 gallons/min)

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

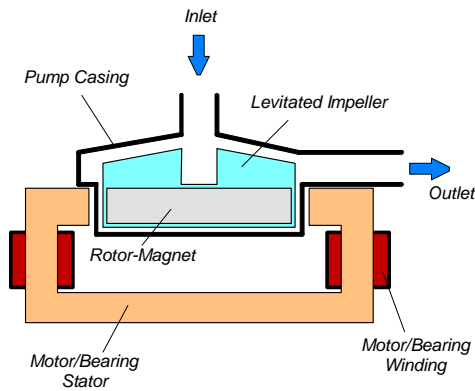


Figure 1: Schematic of the main elements of the maglev centrifugal pump

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.

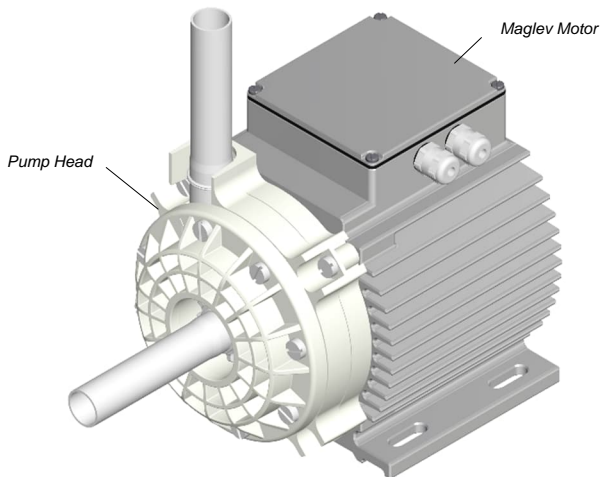


Figure 2: Maglev motor with "High-Flow" pump head

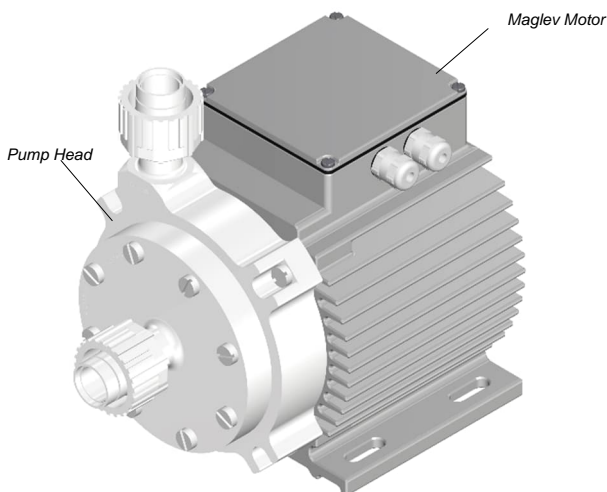


Figure 3: Maglev motor with "High Pressure" pump head

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/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 10). The ATEX motor (Pos. 2b/2c/2d) 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. 10) and shown in Figure 14.

The ATEX/IECEX motors have also a Japan and Korean Ex certification and marking.

HAZLOC SYSTEM CONFIGURATION

An Hazardous Location NRTL certified motor together with the pump head allows installation of motor and pump head within an Class I Division 2 area (see Figure 10). The HazLoc motor (Pos. 2e/2f 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.

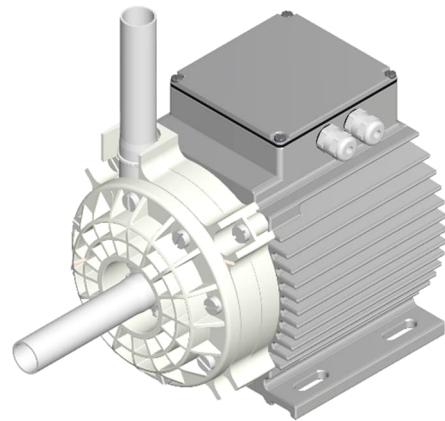


Figure 4: Maglev motor with stainless (welded) "Hybrid" pump head

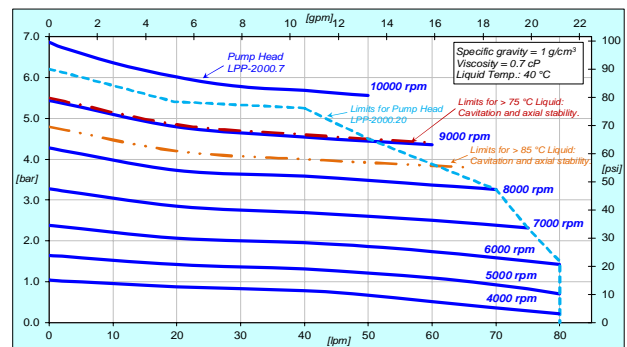


Figure 5: Pressure/flow curves for "High-Pressure" profile
Note 1: Typical data for pump heads LPP-2000.7 and LPP-2000.20.

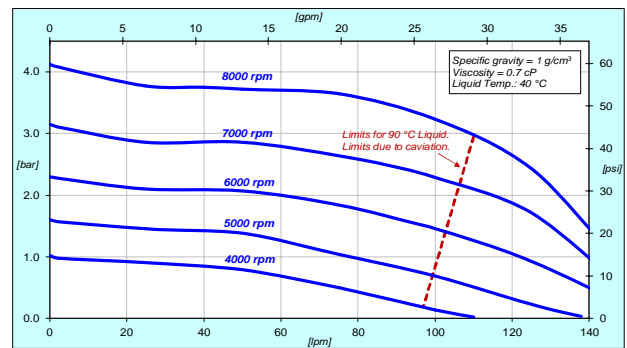


Figure 6: Pressure/flow curves for "High Flow" profile
Note 1: Typical data for pump head LPP-2000.22. Representative for LPP-2000.14.

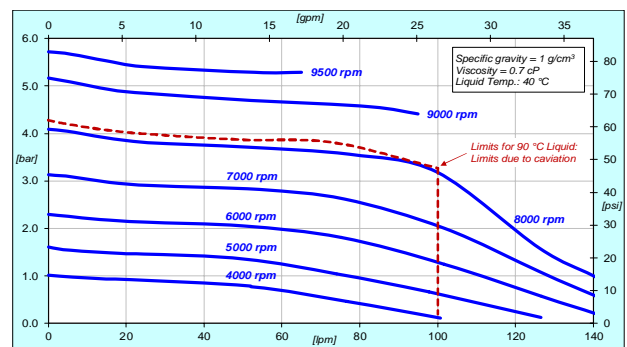


Figure 7: Pressure/flow curves for "Hybrid" profile
Note 1: Typical data for pump head LPP-2000.21 (sealless).

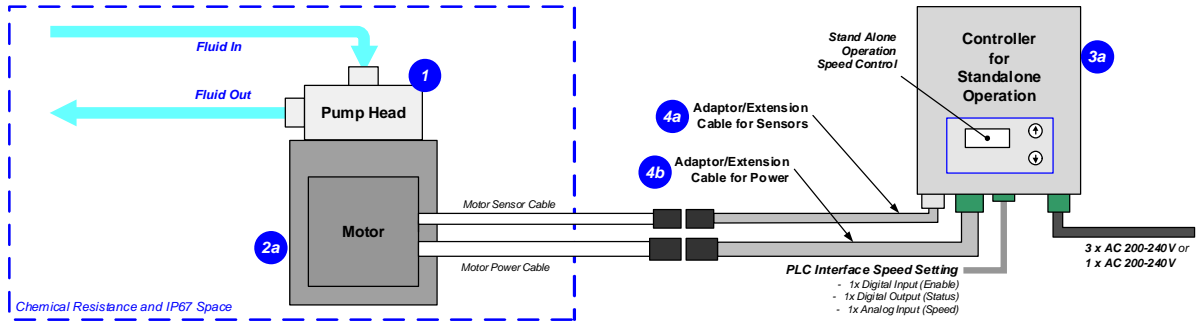


Figure 8: System configuration for standalone operation (speed setting with integrated user panel)

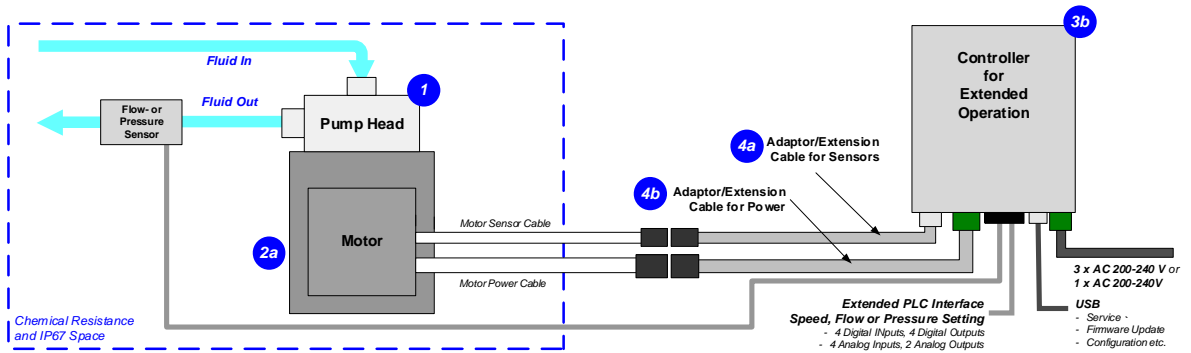


Figure 9: Extended operation (flow or pressure control) with extended controller

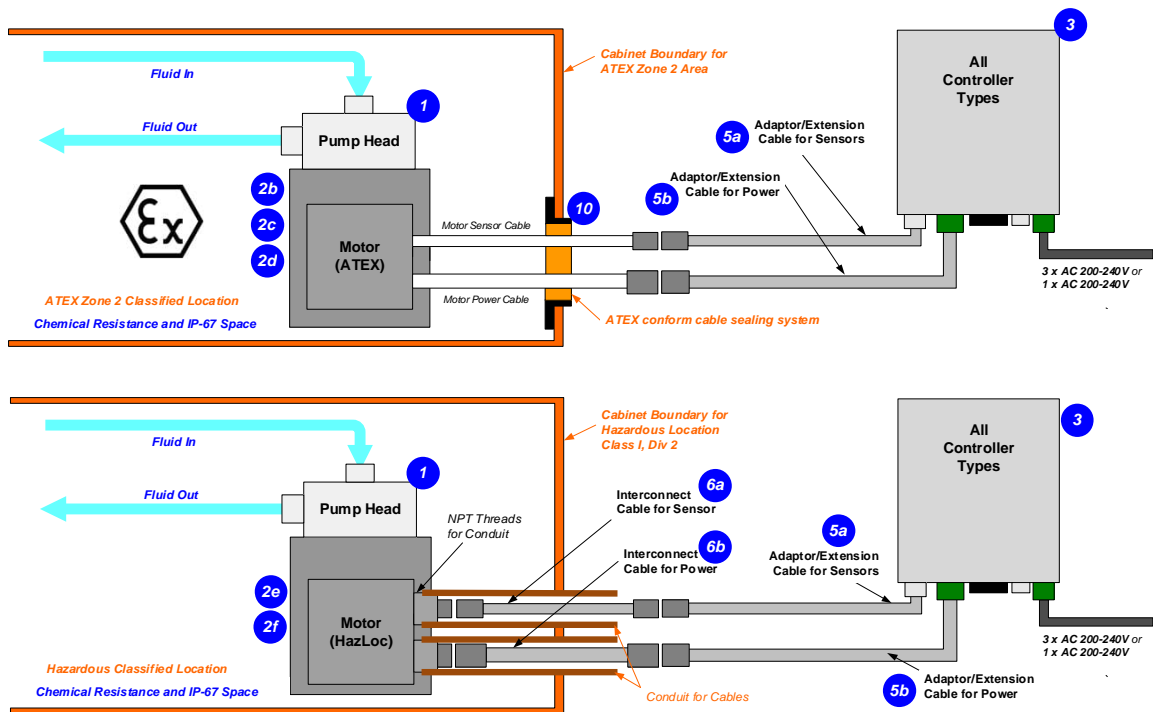


Figure 10: System Configuration for ATEX and Hazardous Location applications

DIMENSIONS OF STANDARD MAIN COMPONENTS

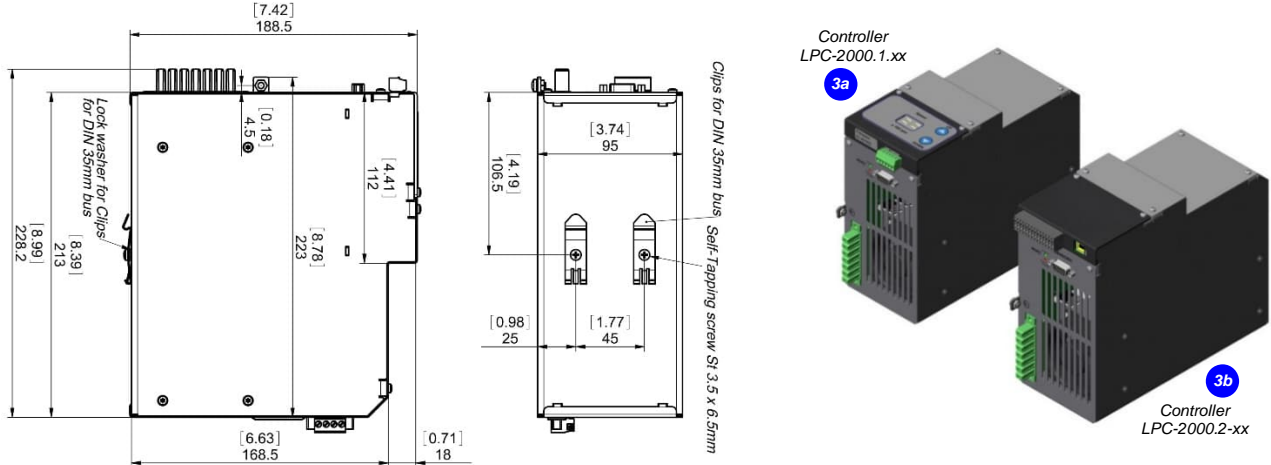


Figure 11: Basic dimensions of controllers LPC-2000.1-xx and LPC-2000.2-xx

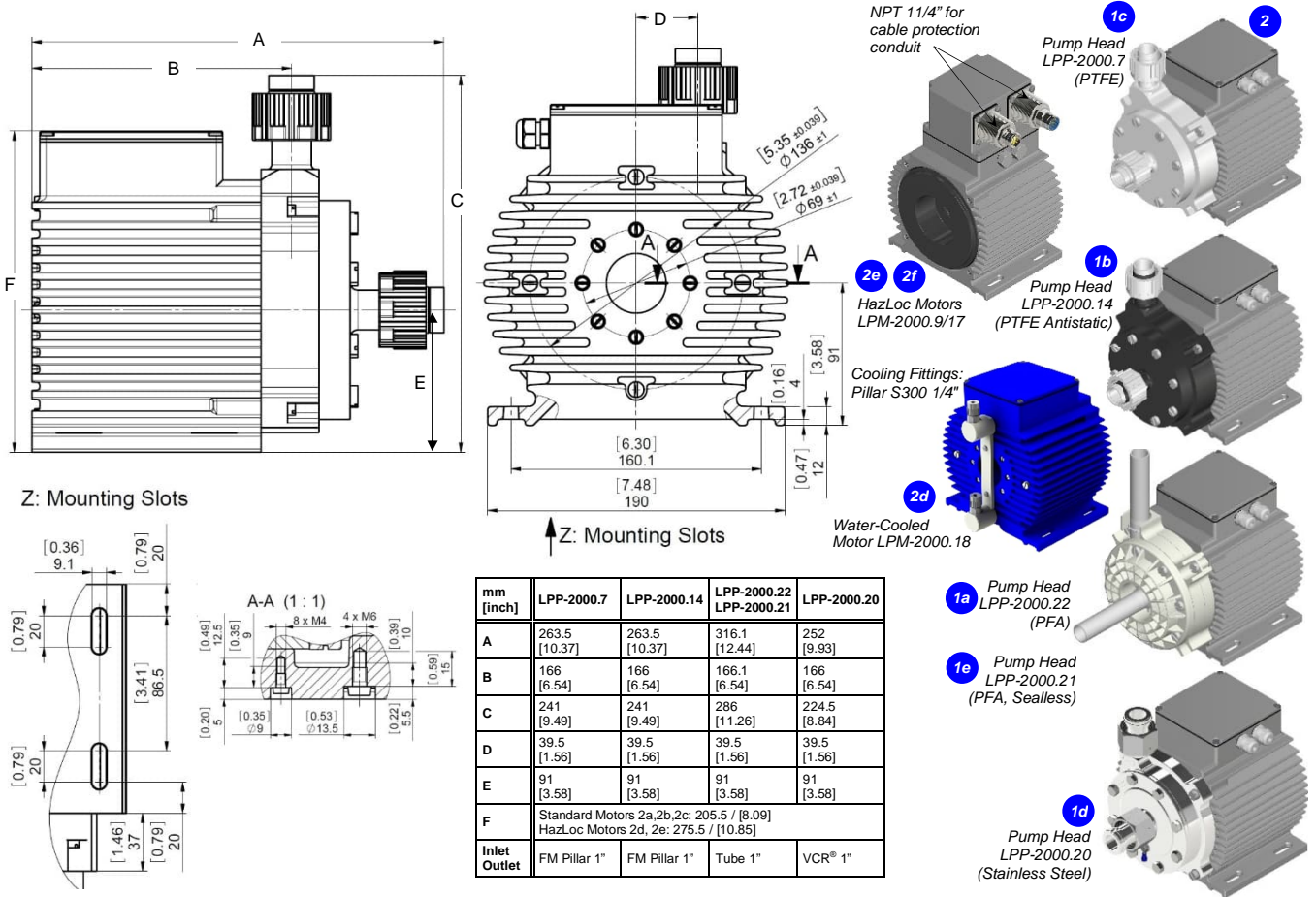


Figure 12: Basic dimensions of motors with pump heads
(Non-tolerated dimensions are for reference only.)



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Bearingless Pump System BPS-2000 MagLev Pumps for Ultrapure Fluid Handling

ORDER INFORMATION

System Name	Article #	Pump Head	Controller	Standard Firmware	Motor	Note
BPS-2000.48 / 49 BPS-2000.41 / 5 BPS-2000.65 / 66	100-91461 / 62 100-90482 / 83 100-91496 / 97	LPP-2000.22 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.21 (Hybrid, Sealless)	LPC-2000.1-01 / 2-01 LPC-2000.1-02 / 2-02 LPC-2000.1-14 / 2-14	E1.25 / E1.48 E2.25 / E2.48 E7.25 / E7.48	LPM-2000.2 LPM-2000.2 LPM-2000.2	Extension cables to be ordered according to Table 3 (position 4a and 4b). Certifications: CE, IECCE CB scheme, ETL (NRTL).
BPS-2000.50 / 51 BPS-2000.10 / 11 BPS-2000.68 / 69 BPS-2000.30 / 31 BPS-2000.58 / 59	100-91463 / 64 100-90488 / 89 100-91499 / 500 100-91103 / 04 100-91471 / 72	LPP-2000.22 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.21 (Hybrid, Sealless) LPP-2000.14 (HF, Antistatic) LPP-2000.20 (HP, Metallic)	LPC-2000.1-01 / 2-01 LPC-2000.1-02 / 2-02 LPC-2000.1-14 / 2-14 LPC-2000.1-01 / 2-01 LPC-2000.1-12 / 2-12	E1.25 / E1.48 E2.25 / E2.48 E7.25 / E7.48 E1.25 / E1.48 E5.25 / E5.48	LPM-2000.8 LPM-2000.8 LPM-2000.8 LPM-2000.8 LPM-2000.15	Extension cables to be ordered according to Table 3 (position 5a and 5b). ATEX Cable Sealing System to be ordered according to Table 4 (pos. 10). Certifications: CE, IECCE CB scheme, ETL (NRTL), ATEX and IECEx (including Ex for Japan and Korea).
BPS-2000.78 / 79 BPS-2000.81 / 82 BPS-2000.77 / 75	100-91519 / 20 100-91522 / 23 100-91518 / 16	LPP-2000.22 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.21 (Hybrid, Sealless)	LPC-2000.1-01 / 2-01 LPC-2000.1-02 / 2-02 LPC-2000.1-14 / 2-14	E1.25 / E1.48 E2.25 / E2.48 E7.25 / E7.48	LPM-2000.18 LPM-2000.18 LPM-2000.18	Note: LPM-2000.18 motor has integrated water cooling.
BPS-2000.53 / 54 BPS-2000.35 / 36 BPS-2000.71 / 72 BPS-2000.39 / 40 BPS-2000.56 / 47	100-91466 / 67 100-91152 / 53 100-91502 / 03 100-91173 / 74 100-91469 / 23	LPP-2000.22 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.21 (Hybrid, Sealless) LPP-2000.14 (HF, Antistatic) LPP-2000.20 (HP, Metallic)	LPC-2000.1-01 / 2-01 LPC-2000.1-02 / 2-02 LPC-2000.1-14 / 2-14 LPC-2000.1-01 / 2-01 LPC-2000.1-12 / 2-12	E1.25 / E1.48 E2.25 / E2.48 E7.25 / E7.48 E1.25 / E1.48 E5.25 / E5.48	LPM-2000.9 LPM-2000.9 LPM-2000.9 LPM-2000.9 LPM-2000.17	Extension cable to be ordered according to Table 3 (see also Figure 10). Certifications: CE, IECCE CB scheme, ETL (NRTL), HazLoc Cl I Div2

Table 1: Standard system configurations

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Pump Head "High Flow Profile"	LPP-2000.22	100-91415	Impeller / Pump Housing Sealing Ring / Fittings Max. Flow / Max. Diff. Pressure Max. Viscosity / Density / Liquid Temp.	PFA / PFA (wet parts), PP+GF30 and SS+PTFE coat. (reinforcing parts) FFPM (FFKM) perfluoroelastomer / Tube 1" 140 liters/min (37 gallons/min) / 4.2 bar (61 psi) 80 cP / 1.8 g/cm ³ / 90°C (194°F)
1b	Pump Head Antistatic "High Flow Profile"	LPP-2000.14	100-90985	Impeller / Pump Housing Sealing Ring / Fittings	PFA / PTFE+CFR (wet parts) Note: for solvent applications. FFPM (FFKM) perfluoroelastomer / Pillar 1" Female
1c	Pump Head "High Pressure Profile"	LPP-2000.7	100-90419	Impeller / Pump Housing Sealing Ring / Fittings Max. Flow / Max. Diff. Pressure Max. Viscosity / Density / Liquid Temp.	PFA / PTFE (wet parts) FFPM (FFKM) perfluoroelastomer / Pillar 1" Female 80 liters/min (21 gallons/min) / 6.9 bar (100 psi) 100 cP / 1.8 g/cm ³ / 90°C (194°F)
1d	Pump Head (Metallic) "High Pressure Profile"	LPP-2000.20	100-91424	Impeller / Pump Housing Sealing Ring / Fittings Max. Flow / Max. Diff. Pressure Max. Viscosity / Density / Liquid Temp.	Stainless Steel / Stainless Steel FFPM perfluoroelastomer / VCR [®] 1" 80 liters/min (21 gallons/min) / 6.2 bar (90 psi) 20 cP / 90°C (194°F)
1e	Pump Head (Sealless) "Hybrid Profile"	LPP-2000.21	100-91495	Impeller / Pump Housing Sealing / Fittings Max. Flow / Max. Diff. Pressure Max. Viscosity / Liquid Temp.	PFA / PFA (wet parts) and PP+GF30 (reinforcing parts) No sealing, welded PFA housing / Tube 1" 140 liters/min (37 gallons/min) / 5.7 bar (83 psi) 50 cP / 90°C (194°F)
2a	Motor	LPM-2000.2	100-10050	Housing / Cables / Connectors	ETFE (chemical resist.) coated Alu., waterproofed (IP67 without connectors) 2x 3m cables with FEP jacket / 2x circular (AMP types)
2b	Motor (ATEX, IECEx)	LPM-2000.8 LPM-2000.15 ²	100-10060 100-10164	ATEX/IECEx Marking ³ Cable / Connectors	CE UK Ex II 3G Ex ec h IIC T5 Gc CE UK Ex II 3D Ex h to IIIC T100°C Dc 2x 3m cables with FEP jacket / 2x circular (M23, IP67)
2d	Motor (Watercooling, ATEX, IECEx)	LPM-2000.18	100-10181	Housing / Cables / Connectors Water Cooling	Epoxy coated Alu. / 2x 3m PVC jacket / 2x circular (M23, IP67) Integrated water cooling with Pillar S300 1/4" male fittings, typical flow 0.5 l/min.
2e	Motor (HazLoc)	LPM-2000.9	100-10112	Hazardous Location Marking	Class I, Div2, Groups A-D T5 Class II, Div2, Groups F-G T5
2f	Motor (HazLoc)	LPM-2000.17 ²	100-10166	Connectors	2x circular (M23, IP67) / NPT 1/4" for cable protection conduit
3a	Standalone Controller (User Panel)	LPC-2000.1-01 (HF) LPC-2000.1-02 (HP) LPC-2000.1-14 (HB) LPC-2000.1-12 (HP) ³	100-30018 ¹ 100-30019 ¹ 100-30113 ¹ 100-30098 ¹	Voltage / Power Housing Rating Interfaces for Standalone Controller	1 x 200-240 V AC ±10%, 3 x 200-240 V AC ±10%, 2kW @ 50/60Hz IP20 User panel to set speed (automatic storage on internal EEPROM) PLC with 1x analog input ("Speed") 4 - 20 mA 1x digital input / 1 digital output 0 - 24 V (optocoupler) / 0 - 24 V (relais) 4 digital inputs / 4 digital outputs 0 - 24 V (optocoupler) / 0 - 24 V (relais)
3b	Extended Controller (PLC and USB)	LPC-2000.2-01 (HF) LPC-2000.2-02 (HP) LPC-2000.2-14 (HB) LPC-2000.2-12 (HP) ³	100-30021 ¹ 100-30022 ¹ 100-30115 ¹ 100-30094 ¹	Interfaces for Extended Controller	PLC with 2 analog inputs current / 2 inputs voltage 4 - 20mA, 0 - 10 V 2 analog outputs 0 - 5 V USB interface (for service and system monitoring)

Table 2: Specification of standard components

Note 1: Supply and PLC connector included. Note 2: Pump head LPP-2000.20 operates with these motors and controllers only.
Note 3: ATEX/IECEx motors are also certified and marked for Japan and Korean Ex. Note 4: HF = High Flow, HP = High Pressure., HB = Hybrid, SL = Sealless

Pos.	Component	Article Name		Article #		Characteristics	Value / Feature
		Sensor Cable (a)	Power Cable (b)	Sensor (a)	Power (b)		
4a	Extension Cables	MCAS-600.1-05 / 30 / 50	MCAP-2000.1-05 / 30 / 50	190-10122 / 23 / 24	190-10208 / 10 / 11	Materials Connector Types	Jacket: PVC, Connector: plastics (PA) Circular AMP to D-SUB (a)/COMBICON (b)
4b		MCAS-600.1-70 / 100	MCAP-2000.1-70 / 100	190-10101 / 25	190-10205 / 12		
5a	Extension Cables	MCAS-600.3-05 / 30 / 50	MCAP-2000.3-05 / 30 / 50	190-10158 / 59 / 30	190-10219 / 21 / 22	Materials Connector Types	Jacket: PVC, Connector: metallic (Nickel coated) Circular M23 (IP-67) to D-SUB (a)/COMBICON (b)
5b		MCAS-600.3-70 / 100	MCAP-2000.3-70 / 100	190-10160 / 61	190-10223 / 24		
6a	Interconnect Cables	MCIS-2000.1-05 / 30 / 50	MCIP-2000.1-05 / 30 / 50	190-10391 / 92 / 93	190-10396 / 97 / 98	Materials Connector Types	Jacket: PVC, Connector: metallic (Nickel coated) Circular M23 (IP-67) to -circular M23 (IP67)
6b		MCIS-2000.1-70 / 100	MCIP-2000.1-70 / 100	190-10394 / 95	190-10399 / 400		

Table 3: Specification of adaptor/extension cables

Note 1: Cable length index example MCAS-2000.1-yy: length = yy*100 mm.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
7a	Air Cooling Module	ACM-4.2	190-10139	Material / Connection / Pressure	PP (+ 40% Talkum) / NPT 1/4" / -1 - 3 bar (14 - 43 psi)
7b	Air Cooling Module	ACM-4.3	190-10243	Material	PP-EL-S with conductive additive for operation with ATEX and HazLoc motors.
8a	Fan Cooling Module	FCM-2000.1	190-10390	Housing / Cable Spec. Supply Spec. / IP Rating	PP (+ 20% Talkum) white / PP jacket, 3m, circular sealed M12 connector (PP). 24 VDC, 33.5 W / IP-65 (fan is IP68 rated).
8b	Fan Cool. Module Cable	FCC-1.1-50 (5 m) FCC-1.1-100 (10 m)	190-10407 190-10408	Specification	PP cable jacket with circular M12 connector (PP) to open wires
9a	Impeller Exchange Kit ("High Pressure")	IEK-2000.1 (for LPP-2000.7)	100-90529	Impeller (A) / O-Ring (B) Pump / Motor Screws (C/D) Imp. Exchange Tool IET-3.1 (E)	LPI-2000.1 in PFA / O-Ring, FFFPM, 98.02 x 3.53 8pcs M8x40, Stainless Steel with PTFE coating / 4pcs M8x30, SS with PTFE coating POM-C
9b	Impeller Exchange Kit ("High Flow")	IEK-2000.2 (for LPP-2000.6/22)	100-90530	Impeller (A) / O-Ring (B) Pump / Motor Screws (C/D) Imp. Exchange Tool IET-3.1 (E)	LPI-2000.2 in PFA / O-Ring, FFFPM, 98.02 x 3.53 8pcs M8x40, Stainless Steel with PTFE coating / 4pcs M8x30, SS with PTFE coating POM-C
9c	Impeller Exchange Kit ("Antistatic")	IEK-2000.8 (for LPP-2000.14)	100-90986	Impeller (A) / O-Ring (B) Pump / Motor Screws (C/D) Imp. Exchange Tool IET-3.1 (E)	LPI-2000.2 in PFA / O-Ring, FFFPM, 98.02 x 3.53 8pcs M8x40, Stainless Steel with PTFE coating / 4pcs M8x30, SS POM-C
10	ATEX Cable Sealing	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.

Table 4: Specification of accessories

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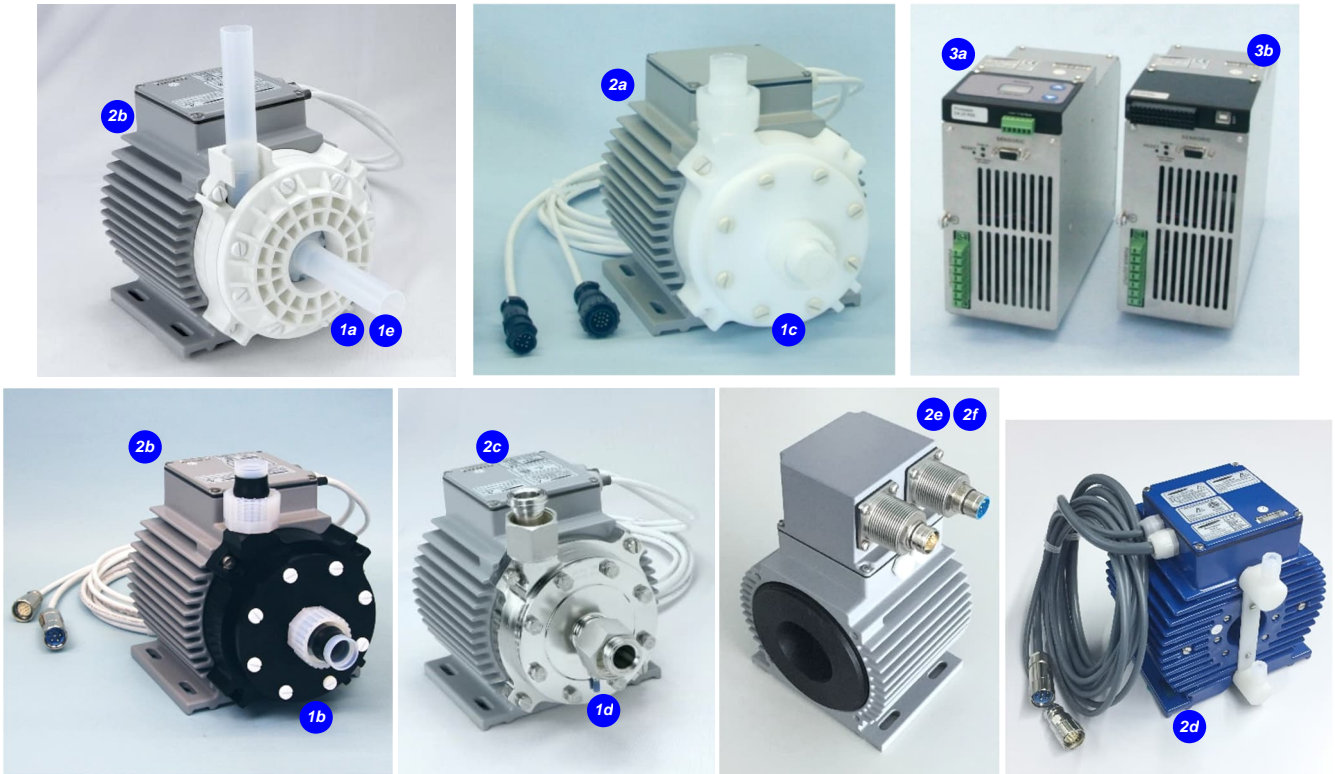


Figure 13: Pump system with main standard components



Figure 14: 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

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