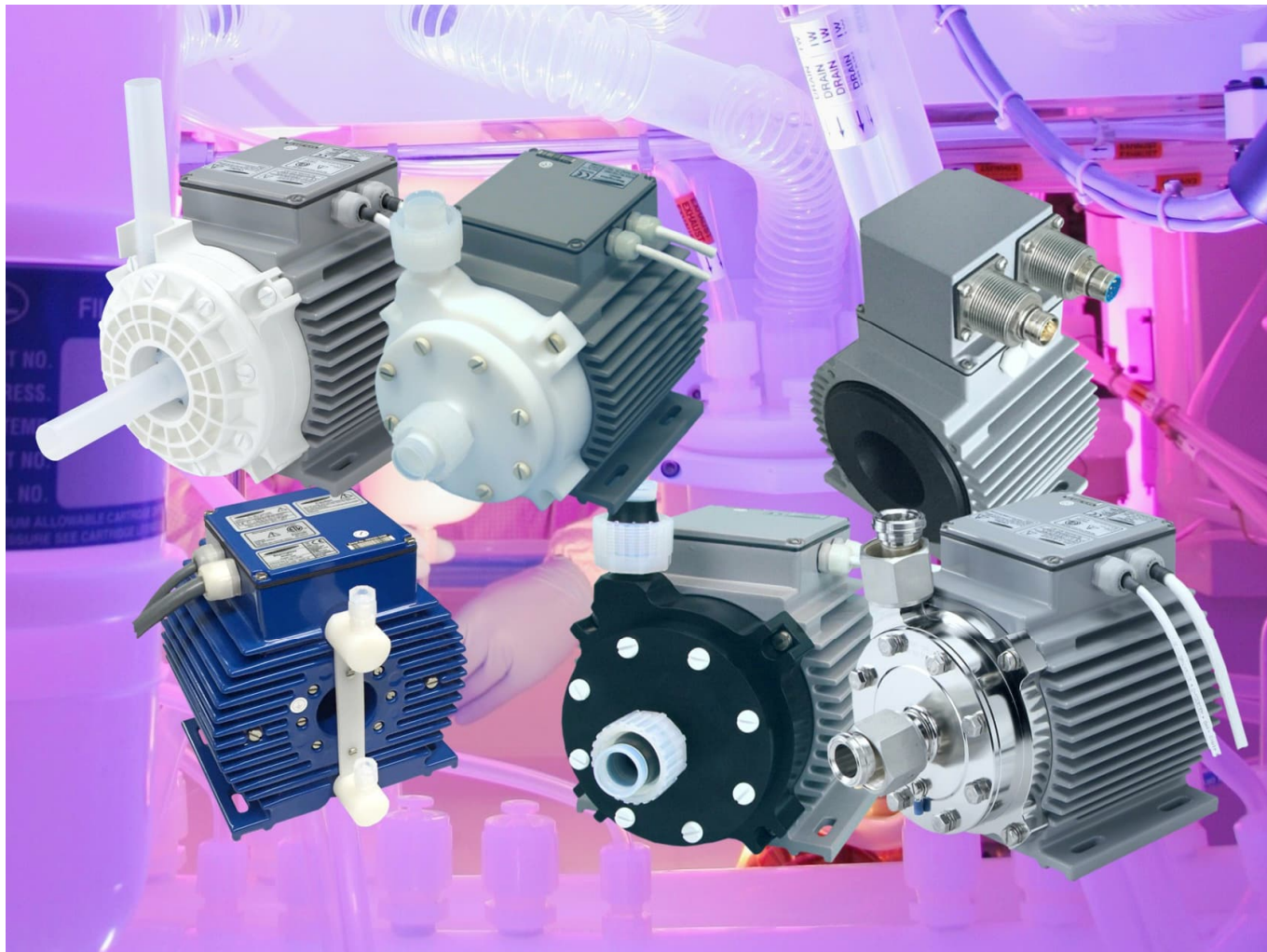


Better Pumps for Better Yield!



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

BPS-2000.S

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

Levitronix® MagLev Pump Technology
Better Pumps for Better Yield!

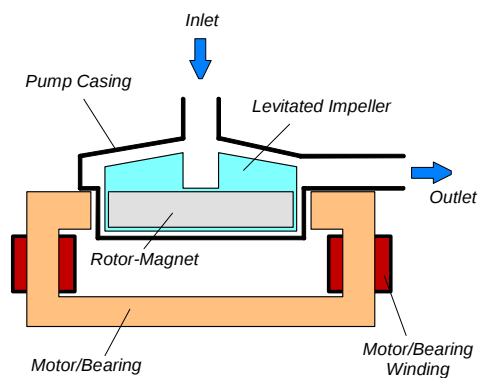


Figure 1: Schematic of the main elements of the maglev centrifugal pump

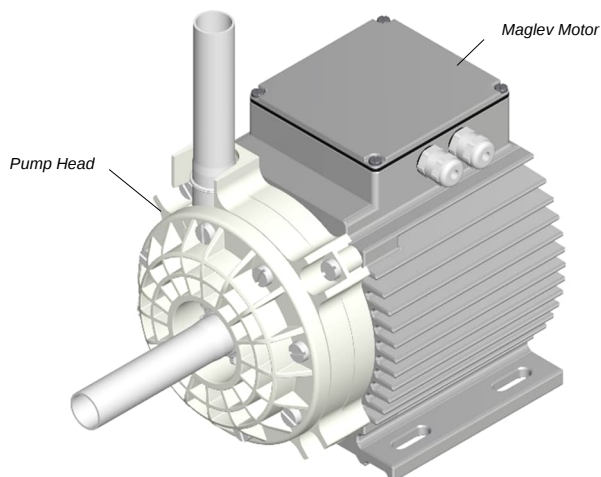


Figure 2: Maglev motor with "High-Flow" pump head

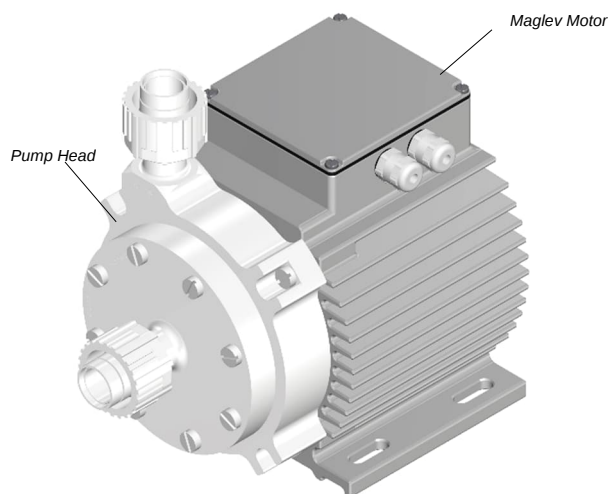


Figure 3: Maglev motor with "High Pressure" pump head

REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP

The BPS-2000.S 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/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.

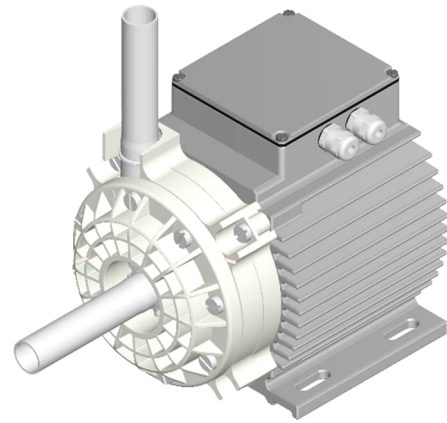


Figure 4: Maglev motor with sealless (welded) "Hybrid" pump head

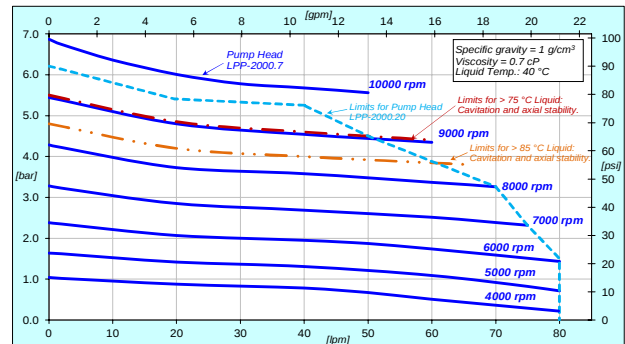


Figure 5: Pressure/flow curves for "High-Pressure" profile

Note 1: Typical data for pump heads LPP-2000.7 and LPP-2000.20.

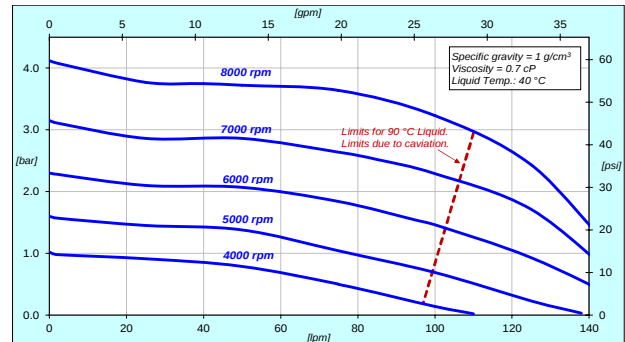


Figure 6: Pressure/flow curves for "High Flow" profile

Note 1: Typical data for pump head LPP-2000.22. Representative for LPP-2000.14.

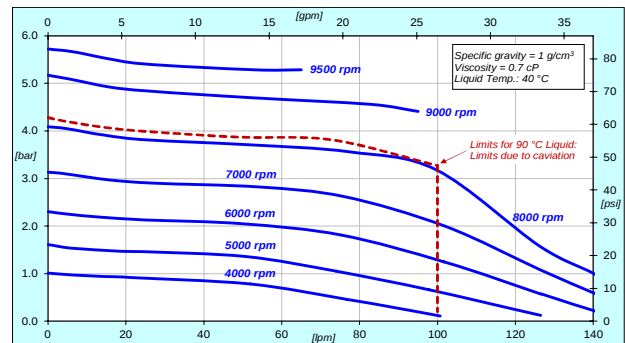


Figure 7: Pressure/flow curves for "Hybrid" profile

Note 1: Typical data for pump head LPP-2000.21 (sealless).

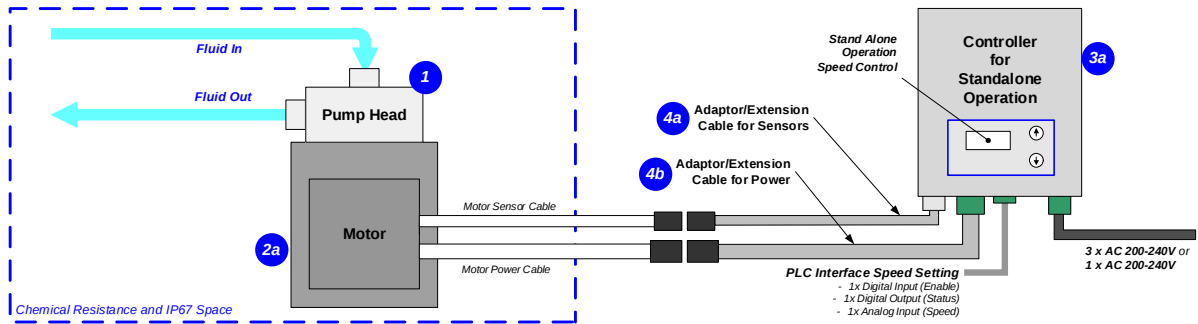


Figure 8: System configuration for standalone operation (speed setting with integrated user panel)

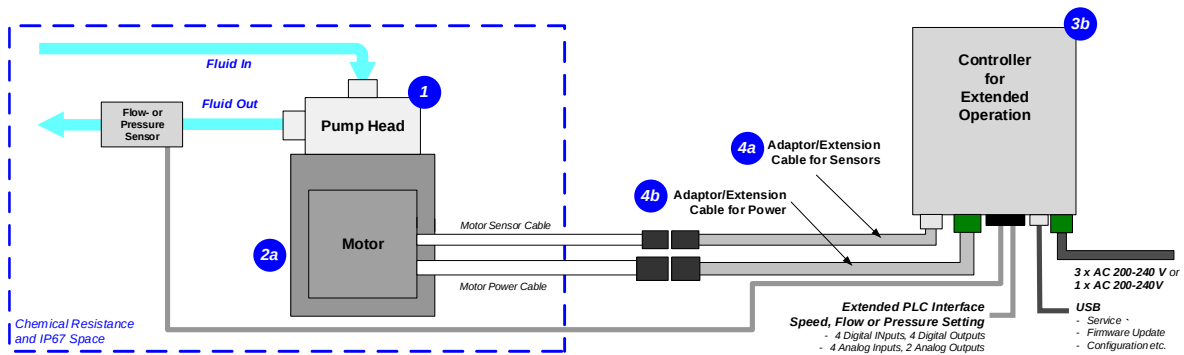


Figure 9: Extended operation (flow or pressure control) with extended controller

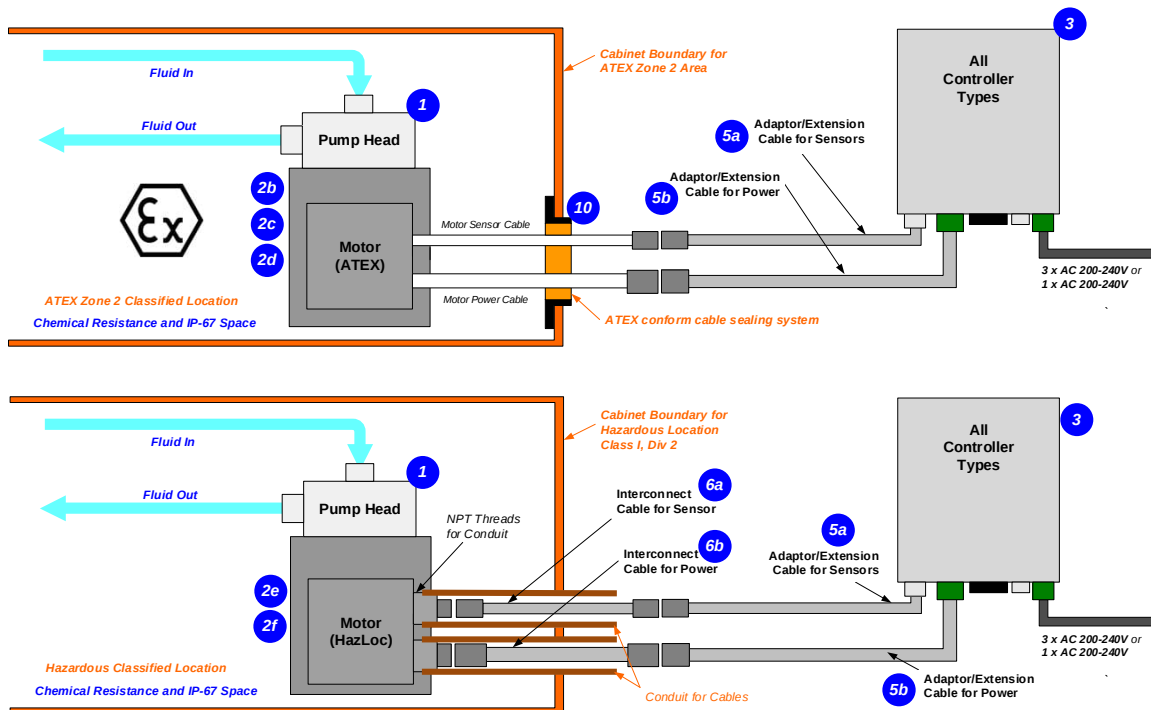
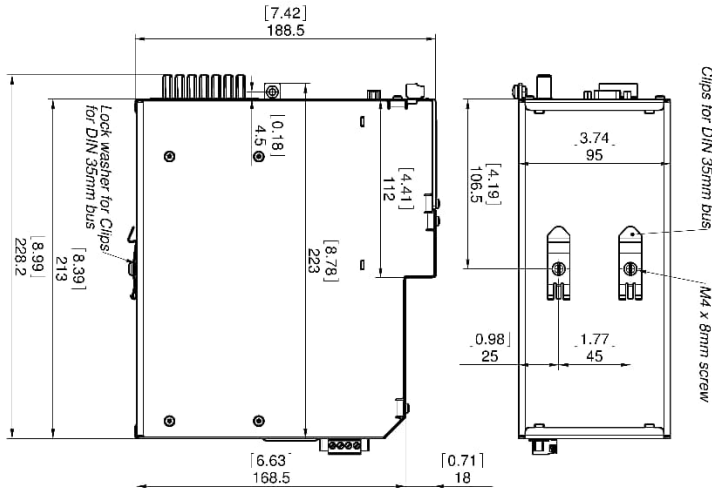


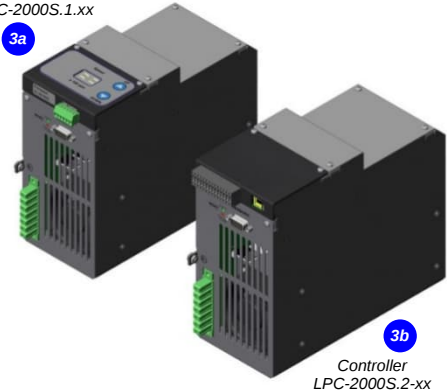
Figure 10: System Configuration for ATEX and Hazardous Location applications

DIMENSIONS OF STANDARD MAIN COMPONENTS



Controller
LPC-2000S.1-xx

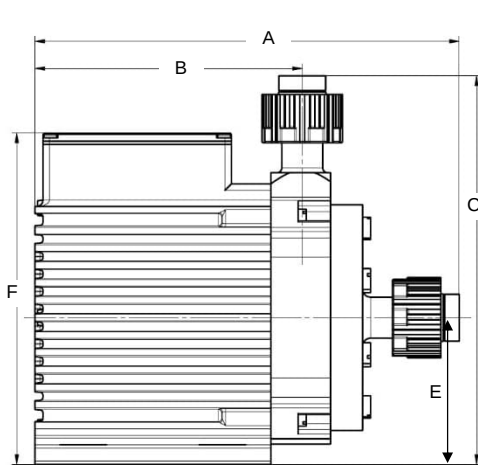
3a



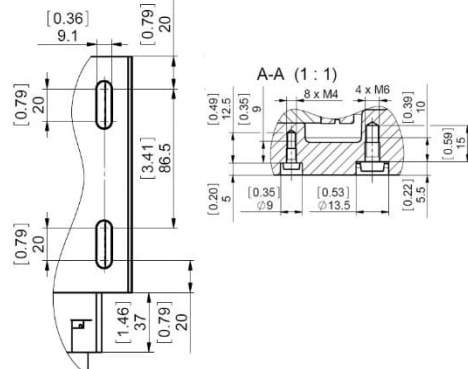
Controller
LPC-2000S.2-xx

3b

Figure 11: Basic dimensions of controllers LPC-2000S.1-xx and LPC-2000S.2-xx



Z: Mounting Slots

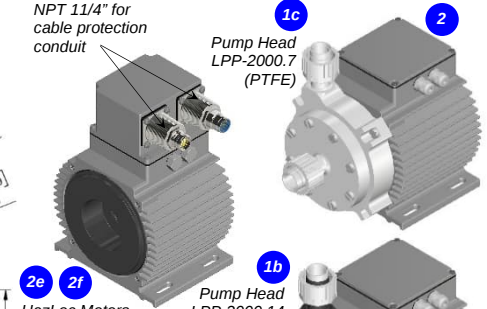


mm [inch]	LPP-2000.7	LPP-2000.14	LPP-2000.22 LPP-2000.21	LPP-2000.20
A	263.5 [10.37]	263.5 [10.37]	316.1 [12.44]	252 [9.93]
B	166 [6.54]	166 [6.54]	166.1 [6.54]	166 [6.54]
C	241 [9.49]	241 [9.49]	286 [11.26]	224.5 [8.84]
D	39.5 [1.56]	39.5 [1.56]	39.5 [1.56]	39.5 [1.56]
E	91 [3.58]	91 [3.58]	91 [3.58]	91 [3.58]
F	Standard Motors 2a,2b,2c: 205.5 / [8.09] HazLoc Motors 2d, 2e: 275.5 / [10.85]			
Inlet Outlet	FM Pillar 1"	FM Pillar 1"	Tube 1"	VCR® 1"

NPT 11/4" for
cable protection
conduit

2

Pump Head
LPP-2000.7
(PTFE)



HazLoc Motors
LPM-2000.9/17

1b

Pump Head
LPP-2000.14
(PTFE Antistatic)

Cooling Fittings:
Pillar S300 1/4"

Water-Cooled
Motor LPM-2000.18

2d

1a

1e

1d

1c

2e

2f

2g

2h

2i

2j

2k

2l

2m

2n

2o

2p

2q

2r

2s

2t

2u

2v

2w

2x

2y

2z

Figure 12: Basic dimensions of motors with pump heads
Note 1: Non-tolerated dimensions are for reference only.



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

ORDER INFORMATION

System Name	Article #	Pump Head	Controller	Standard Firmware	Motor	Note
BPS-2000.48S / 49S BPS-2000.4S / 5S BPS-2000.65S / 66S	100-91990 / 685 100-91977 / 686 100-92002 / 003	LPP-2000.22 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.21 (Hybrid, Sealless)	LPC-2000S.1-01 / 2-01 LPC-2000S.1-02 / 2-02 LPC-2000S.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 (pos. 4a and 4b). Certifications: CE, IECEx CB scheme, ETL (NRTL).
BPS-2000.50S / 51S BPS-2000.10S / 11S BPS-2000.68S / 69S BPS-2000.30S / 31S BPS-2000.58S / 59S	100-91991 / 992 100-91978 / 817 100-92004 / 91982 100-91980 / 981 100-91999 / 92000	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-2000S.1-01 / 2-01 LPC-2000S.1-02 / 2-02 LPC-2000S.1-14 / 2-14 LPC-2000S.1-01 / 2-01 LPC-2000S.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, IECEx CB scheme, ETL (NRTL), ATEX and IECEx (including Ex for Japan and Korea).
BPS-2000.78S / 79S BPS-2000.81S / 82S BPS-2000.77S / 78S	100-92011 / 91654 100-92013 / 14 100-92010 / 91664	LPP-2000.22 (High Flow) LPP-2000.7 (High Pressure) LPP-2000.21 (Hybrid, Sealless)	LPC-2000S.1-01 / 2-01 LPC-2000S.1-02 / 2-02 LPC-2000S.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-2000.53S / 54S BPS-2000.35S / 36S BPS-2000.71S / 72S BPS-2000.39S / 40S BPS-2000.56S / 47S	100-91994 / 95 100-91983 / 84 100-92006 / 07 100-91986 / 87 100-91997 / 89	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-2000S.1-01 / 2-01 LPC-2000S.1-02 / 2-02 LPC-2000S.1-14 / 2-14 LPC-2000S.1-01 / 2-01 LPC-2000S.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 Figure 10). Certifications: CE, IECEx CB scheme, ETL (NRTL), HazLoc Cl1 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 / 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 Cable / 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	100-10060	ATEX/IECEx Marking ³	CE (E) II 3G Ex ec h IIC T5 Gc CE (E) II 3D Ex h tc IIIC T100°C Dc
2c	Motor (ATEX, IECEx)	LPM-2000.15 ²	100-10164	Cable / Connectors	2x 3m cables with FEP jacket / 2x circular (M23, IP67)
2d	Motor (Watercooling, ATEX, IECEx)	LPM-2000.18 ⁶	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-2000S.1-01 (HF) LPC-2000S.1-02 (HP) LPC-2000S.1-14 (HB) LPC-2000S.1-12 (HP) ³	100-30164 ¹ 100-30165 ¹ 100-30167 ¹ 100-30166 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)
3b	Extended Controller (PLC and USB) ⁵	LPC-2000S.2-01 (HF) LPC-2000S.2-02 (HP) LPC-2000S.2-14 (HB) LPC-2000S.2-12 (HP) ³	100-30136 ¹ 100-30131 ¹ 100-30117 ¹ 100-30137 ¹	Interfaces for Extended Controller	PLC with 1x analog input ("Speed") 4 - 20 mA 1x digital input / 1 digital output 0 - 24 V (optocoupler) / 0 - 24 V (relais) PLC with 4 digital inputs / 4 digital outputs 0 - 24 V (optocoupler) / 0 - 24 V (relais) 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 Note 5: LPC-2000.3 controllers with RS232 instead of USB interface available. Note 6: Motor version with ETFE coating and FEP cables available.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
4a	Extension Cables	MCAS-600.1-05 / 30 / 50 MCAP-600.1-70 / 100	190-10122 / 23 / 24 190-10101 / 25	Sensor (a) Power (b)	Materials Connector Types
5a	Extension Cables	MCAS-600.3-05 / 30 / 50 MCAP-600.3-70 / 100	190-10158 / 59 / 30 190-10160 / 61	Sensor (a) Power (b)	Materials Connector Types
6a	Interconnect Cables	MCIS-2000.1-05 / 30 / 50 MCIP-2000.1-70 / 100	190-10391 / 92 / 93 190-10394 / 95	Sensor (a) Power (b)	Materials Connector Types

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)	190-10407	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, FFPM, 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, FFPM, 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, FFPM, 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)

Table 4: Specification of accessories

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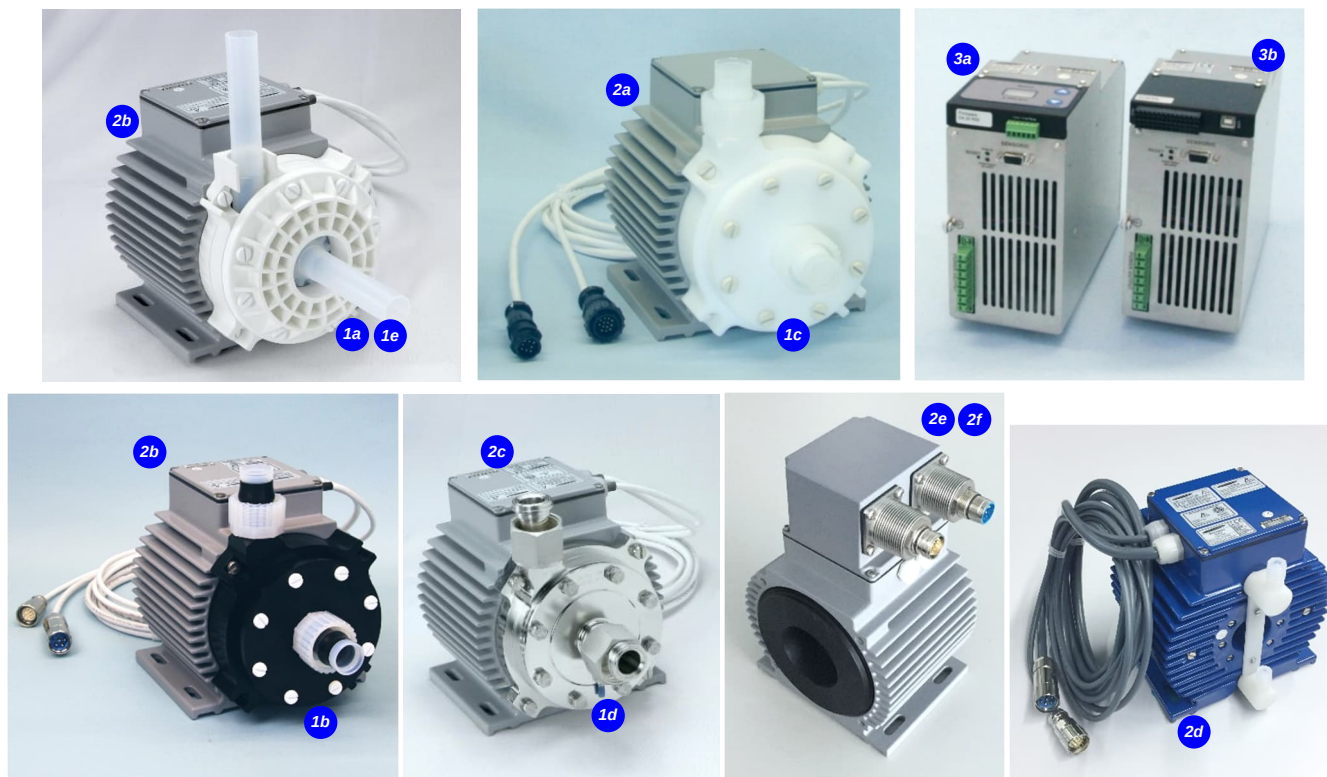


Figure 13: Pump system with main standard components



Figure 14: Accessories



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Bearingless Pump System BPS-2000.S 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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