

PuraLev® Life Science Pump Series



PuraLev® 2000SU (Single-Use)

4.3 bar	(62.4 psi)
140 liters/min	(37 gallons/min)

Low Shear Design - High Cell Viability

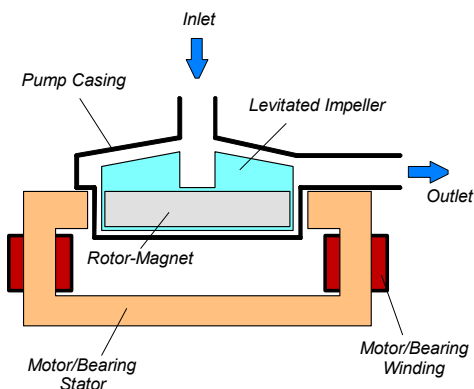


Figure 1: Schematic of the main elements of the maglev centrifugal pump

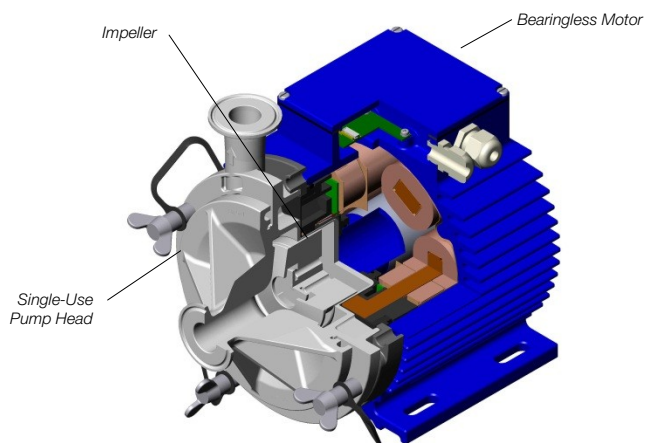


Figure 2: Cross-section of the bearingless pump motor and pump head.

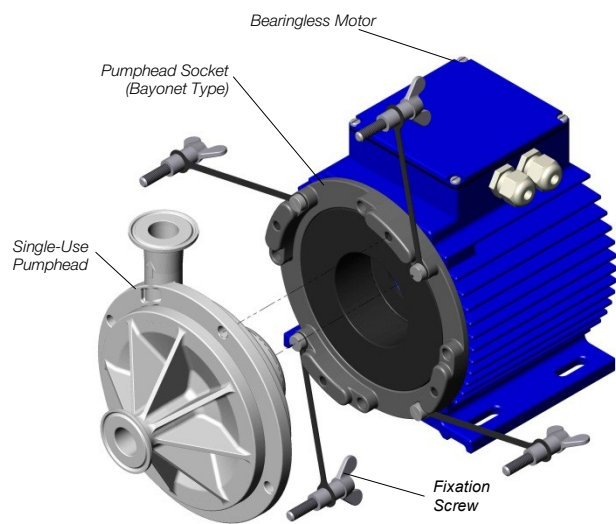


Figure 3: Single-use pump head concept.

INTRODUCTION

Levitronix® has developed a revolutionary pump that has no bearings to wear out or seals to break. 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 biocompatible (FDA, USP-VI, BSE/TSE and Animal free) gamma sterilizable polypropylene (PP) and together they make up the disposable pump head. A simple and intuitive exchange of the single use pump head is achieved with a pump head socket mounting procedure (see Figure 5). Flow rate or pressure are precisely controlled by electronically regulating the rotor speed, which eliminates any pulsation. With the lack of mechanical bearings plus the self-contained pump head design, the risk of contamination is drastically reduced. The absence of narrow gaps between the impeller and pump casing, plus the low-shear pump design allows the gentle pumping of sensitive liquids. The pump casing is fabricated with Triclamp fittings and can be easily inserted and removed with an intuitive bayonet socket.

SYSTEM BENEFITS

- Low shear-forces
- Reduced risk of contamination due to the self-contained design with magnetic bearings
- No particle generation
- No over-pressure situations (compared to roller pumps)
- No narrow gaps between the impeller and pump casing where bacteria could be entrapped
- Pump head is gamma sterilizable
- Biocompatibility of wet materials: FDA, USP-VI, Animal/BSE/TSE free
- Pump head socket design for easy and intuitive exchange of disposable pump head (see Figure 5)
- Small size
- Dry running capability
- Proven technology in the medical (disposable blood pumps) and semiconductor (high-purity pumps) industries
- High flow capability with compact design
- Pulsation free

APPLICATIONS

- Pumping of shear-sensitive liquids and cells
- Bioprocessing (for example perfusion)
- Recirculation and transfer applications in bioreactors
- Filtration

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the *PuraLev® 2000SU* pump system consists of a controller with an integrated user panel allowing the operator to set the speed manually (see *Figure 6*). The speed is automatically stored in the internal EEPROM of the controller. As an option, the speed can also be set with an analogue signal (see specification for *Position 3a* in *Table 2*).

EXTENDED SYSTEM CONFIGURATION

The extended version of the *PuraLev® 2000SU* pump system (*Figure 7*) 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 8*). The ATEX / IECEx motor (*Pos. 2b* in *Table 2*) comes with special connectors and relevant extension cables (*Pos. 5a* and *5b* in *Table 3*). An Ex 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 / IECEx certified for Category 3G and 3D (Zone 2 for Gas and Zone 22 for Dust).
- Thermal classification T5 (< 100 °C = 212 °F) for maximum liquid temperature of 90 °C / 194 °F.
- ATEX marking of motor with pump head:
 CE Ex II 3G Ex ec h IIC T5 Gc
 CE Ex II 3D Ex h tc IIIC T100°C Dc

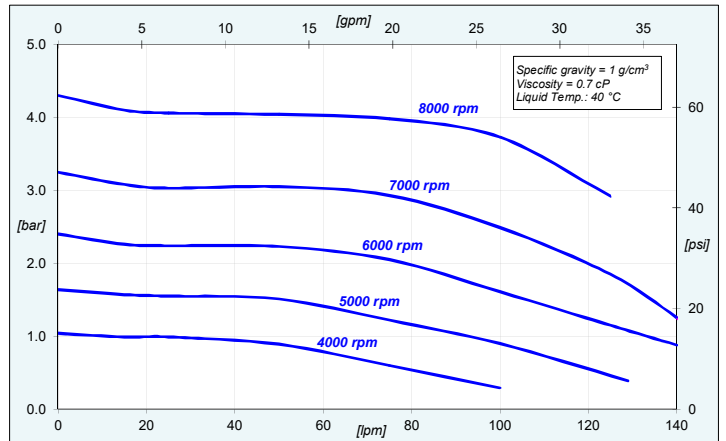


Figure 4: Pressure/flow curves (DCP-2000.2 pump head)

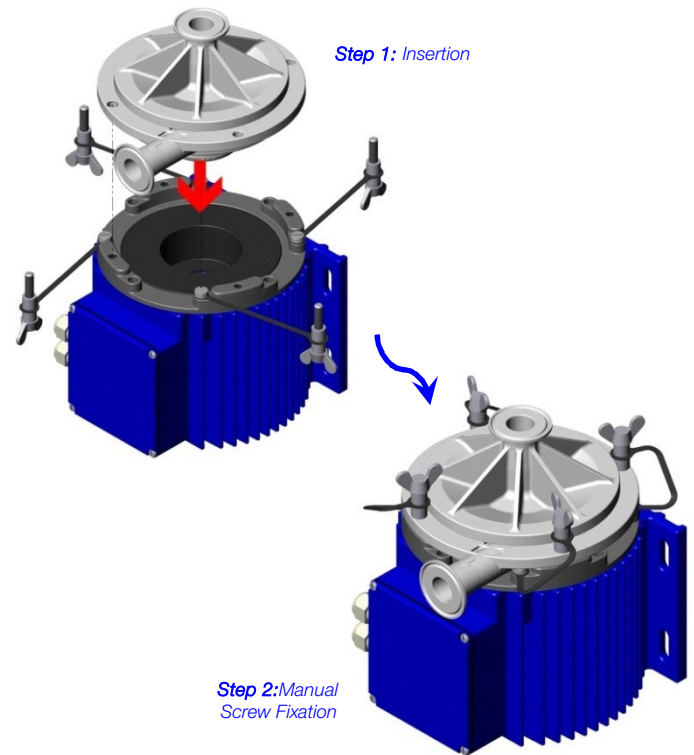


Figure 5: Intuitive 2-step pump head mounting procedure with manual screw fixation on pump head socket (PHS-2000.1)

SYSTEM CONFIGURATIONS

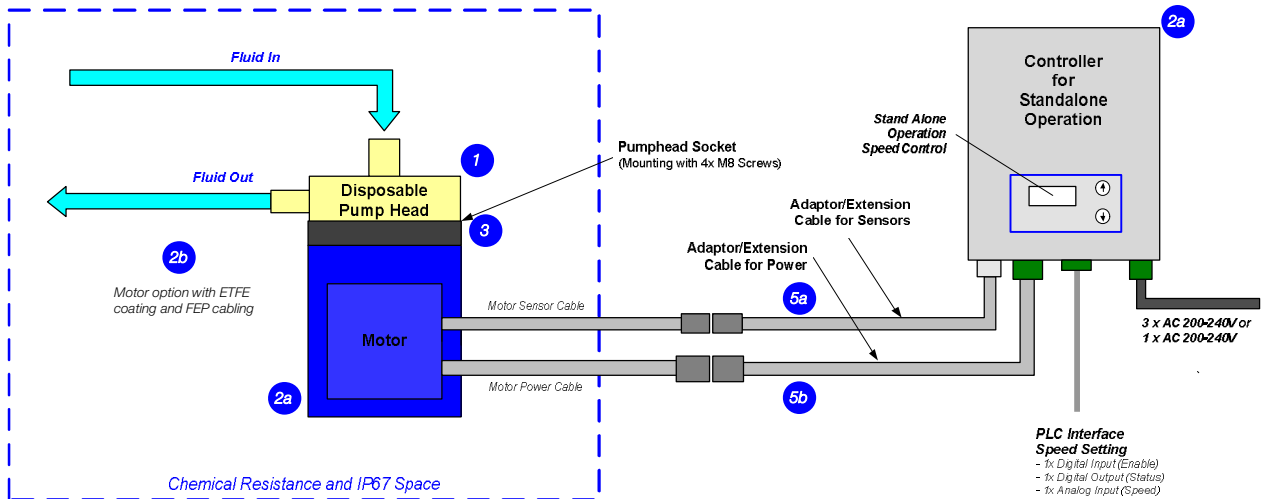


Figure 6: System configuration for standalone operation (Speed setting with integrated user panel)

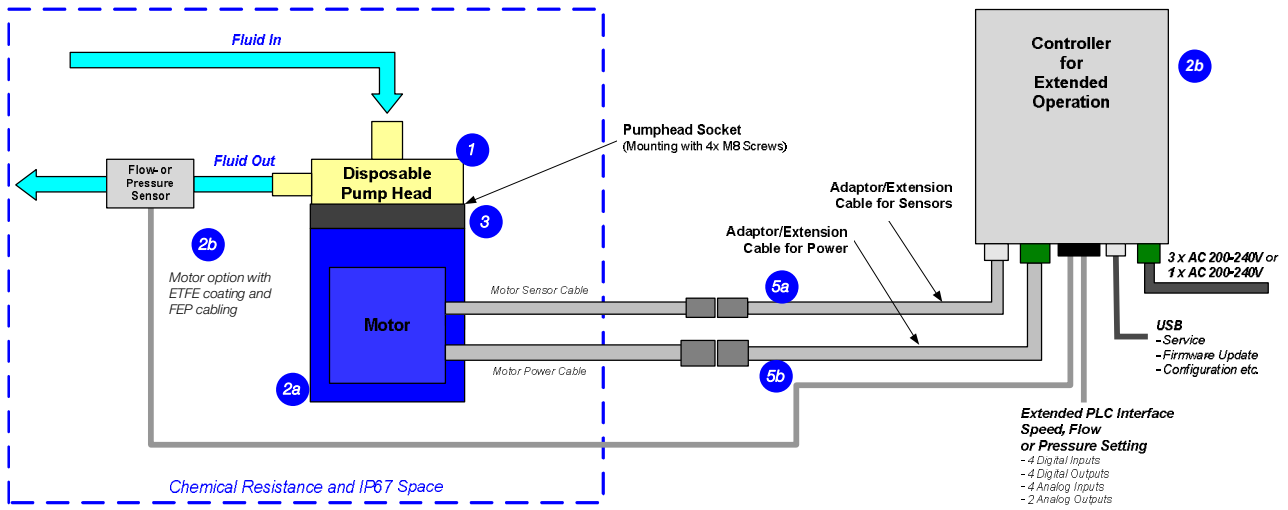


Figure 7: Extended operation (flow or pressure control) with extended controller

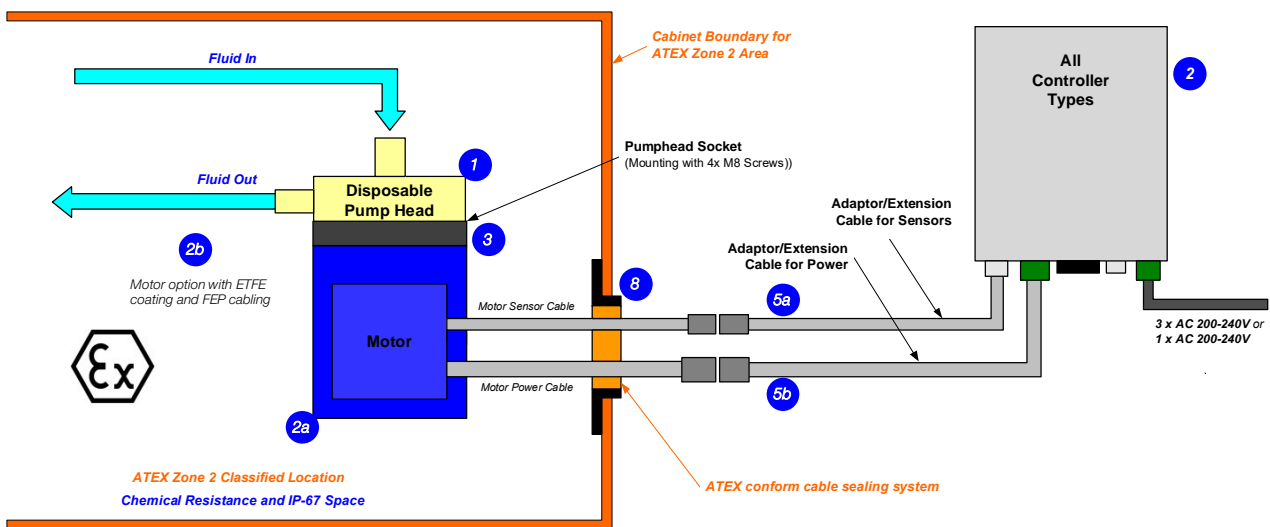


Figure 8: System Configuration for ATEX / IECEx applications

DIMENSIONS OF MAIN COMPONENTS

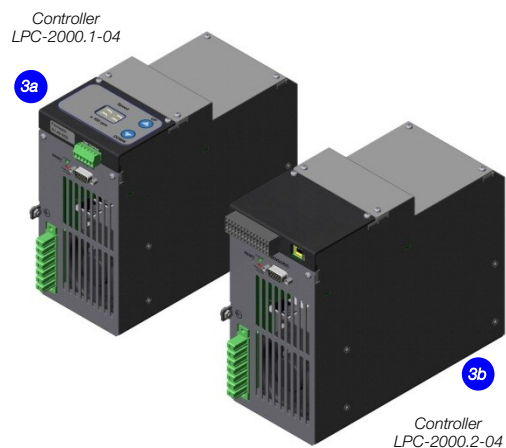


Figure 9: Dimensions of controllers

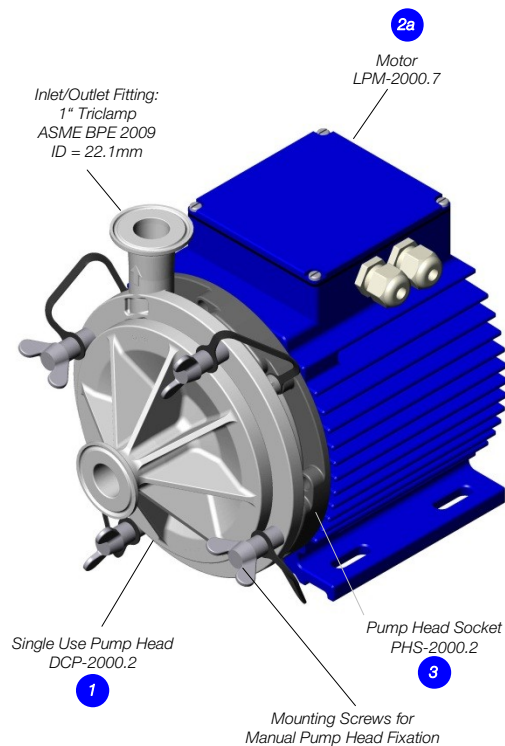


Figure 10: Dimensions of motor with single-use pump head

ORDER INFORMATION

System Name	Article #	Pump Head Socket	Motor	Controller	Note
PLD-2000SU.1	100-90726	PHS-2000.2	LPM-2000.7	LPC-2000.1-04	Adaptor/Extension (0.5 - 10m) cables according to Table 3 have to be ordered as separate article with specified length. ATEX Cable Sealing System can be ordered according to Table 4. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx.
PLD-2000SU.2	100-90727		LPM-2000.7	LPC-2000.2-04	
PLD-2000SU.4	100-90729		LPM-2000.8	LPC-2000.1-04	
PLD-2000SU.5	100-90730		LPM-2000.8	LPC-2000.2-04	

Table 1: Standard system configurations with motor, pump head socket and controller

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Single-Use Pump Head	DCP-2000.2	100-90889	Impeller / Pump Housing In-/Outlet Fittings Max. Flow Max. Diff.-Pressure Max. Viscosity Wet Pump Volume/Surface Max. Liquid Temp. Sterilization Methods	Polypropylene (FDA, USP Class VI, BSE/TSE/Animal free) Triclamp 1" (ASME BPE 2009) 140 liters/min / 37 gallons/min 4.3 bar / 62.4 psi 50 cP 270 ml / 630 cm ² 60°C / 140°F Gamma radiation up to 40kGy
1b	Irradiated Pump Head	DCP-2000.2-G25	100-91080	Applied Gamma Dosage	≥ 25 kGy
2a	Motor (ATEX, IECEx)	LPM-2000.7	100-10059	Housing Cable / Connectors ATEX/IECEx Marking	Epoxy (anti-corrosive) coated Aluminum, waterproofed (IP67) 2x 3m cables with PVC jacket / 2x circular (M23, IP-67) CE II 3G Ex ec h IIC T5 Gc CE II 3D Ex h tc IIIC T100°C Dc
2b	Motor (ATEX, IECEx)	LPM-2000.8	100-10060	Housing Cable / Connectors	ETFE (chemical resistant) coated Aluminum, waterproofed (IP67) 2x 3m cables with FEP jacket / 2x circular (M23, IP-67)
3	Pump Head Socket	PHS-2000.2	100-90891	Mounting Type Material Motor Assembly Screws	Mounting with 4x M8 screws Anodized Aluminum 4 pcs M8 x 25mm (Stainless Steel)
4a	Standalone Controller (User Panel)	LPC-2000.1-04	100-30064 (Power supply and Enable connector incl.)	Voltage / Power Interfaces	1 x 200 – 240 ± 10% 2kW 50/60 Hz 3 x 200 – 240 ± 10% 2kW 50/60 Hz 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 (relais)
4b	Extended Controller (PLC and USB)	LPC-2000.2-04	100-30065 (Power supply and PLC connector incl.)	Interfaces Standard Firmware	PLC with - up to 4 digital inputs 0 - 24V (optocoupler) - up to 4 digital outputs 0 - 24 V (relais) - up to 2 analog inputs 4 - 20mA - up to 2 analog inputs 0 - 10 V - up to 2 analog outputs 0 - 5 V USB interface (for service and system monitoring) E4.48

Table 2: Specification of standard components

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5a	Extension Adaptor Cable for Sensors	MCAS-600.2-05 (0.5m) MCAS-600.2-30 (3m) MCAS-600.2-50 (5m) MCAS-600.2-70 (7m) MCAS-600.2-100 (10m)	190-10226 190-10238 190-10127 190-10105 190-10239	Jacket Material Connectors	PVC Circular Wallmountable, Metallic (IP-67) to D-SUB
5b	Extension Adaptor Cable for Power	MCAP-2000.2-05 (0.5m) MCAP-2000.2-30 (3m) MCAP-2000.2-50 (5m) MCAP-2000.2-70 (7m) MCAP-2000.2-100 (10m)	190-10213 190-10215 190-10216 190-10217 190-10218	Jacket Material Connectors	PVC Circular Wallmountable, Metallic (IP-67) to COMBICON

Table 3: Specification of adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
6a	Air Cooling Module	ACM-4.2	190-10139	Material / Connection Port Air Pressure	PP (+ 40% Talkum) / NPT 1/4" - 1 - 3 bar (14 – 43 psi)
6b	Air Cooling Module	ACM-4.3 (ATEX)	190-10243	Material	PP-EL-S with conductive additive for operation with ATEX motor
7a	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).
7b	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
8 (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) Roxylon (EPDM rubber) Note: Lubricant (E) and measurement plates (F) are included.

Table 4: Specification of accessories



Figure 11: Pump system with standard components



Figure 12: Accessories

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 Lifescience 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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