

PuraLev® Life Science Pump Series



PuraLev® 2000MU (Multi-Use)

4.1 bar	(59.5 psi)
140 liters/min	(37 gallons/min)

No Bearings. No Seals. No Contamination!

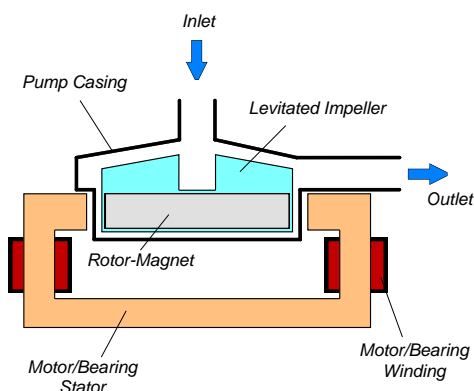


Figure 1: Schematic of the main elements of the maglev centrifugal pump

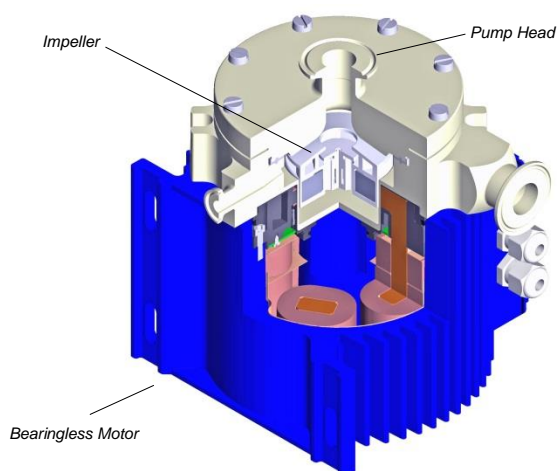


Figure 2: Cross-section of the bearingless pump motor and pump head.

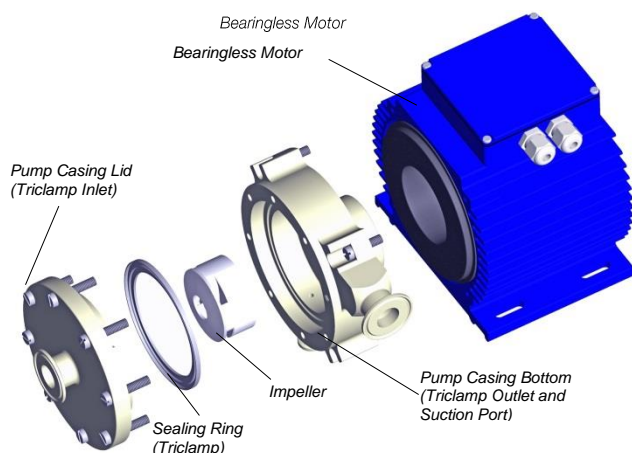


Figure 3: Multi-use pump head concept

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) fluorocarbon resins and together they make up the multi-use pump head. Flow rate or pressure is 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 has an aseptic seal design for the pump housing (see Figure 5).

SYSTEM BENEFITS

- Reduced risk of contamination due to the self-contained design with magnetic bearings
- Low shear-forces
- No particle generation
- No narrow gaps between the impeller and pump casing where bacteria could be entrapped
- Pump head is multiple times steam sterilizable (multi-use)
- Biocompatibility of wet materials: FDA, USP-VI, Animal/BSE/TSE free
- Easy disassembling of pump casing for cleaning
- Aseptic pump housing design with Triclamp fittings and sealing technology
- 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
- Recirculation and transfer applications in bioreactors
- Perfusion of hollow-fiber reactors
- Sterile and aseptic flow circuits in the pharmaceutical and food industry

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the *PuraLev® 2000MU* 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® 2000MU* 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 SYSTEM CONFIGURATION

An ATEX 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* and shown in *Figure 12*.

- ATEX certified for Category 3G and 3D (Zone 2 for Gas and Zone 22 for Dust) (Testing and certification by Electrosuisse, Switzerland, CH-8320 Fehraltorf)
- Thermal classification T4 (< 110 °C = 230 °F) for maximum liquid temperature of 90 °C / 194 °F.
- ATEX marking of motor with pump head:

CE Ex II 3G Ex c nAc IIC 110°C (T4)
 CE Ex II 3D Ex c tc IIIC T110°C IP67
- Explosion groups:

Group IIA: Propane (IPA), Methane, Acetone, Acetaldehyde
 Group IIB: Ethylene, Ethylenglycol
 Group IIC: Acetylene, Hydrogen (not carbon disulphide)
- ATEX listing corresponds to UL hazardous location Class 1 Division 2.

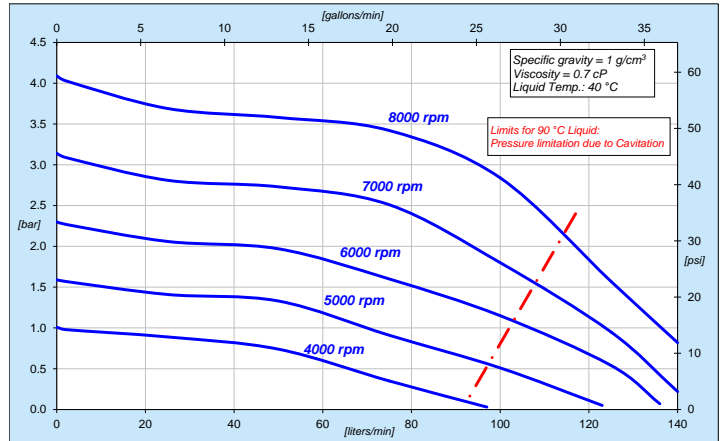


Figure 4: Pressure/flow curves

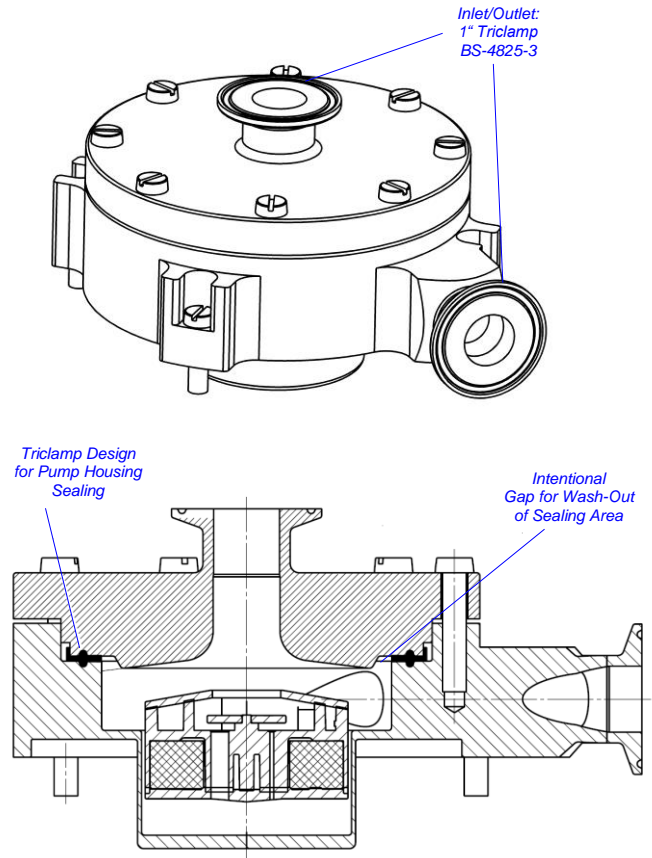


Figure 5: Aseptic pump head (without drain port)

SYSTEM CONFIGURATIONS

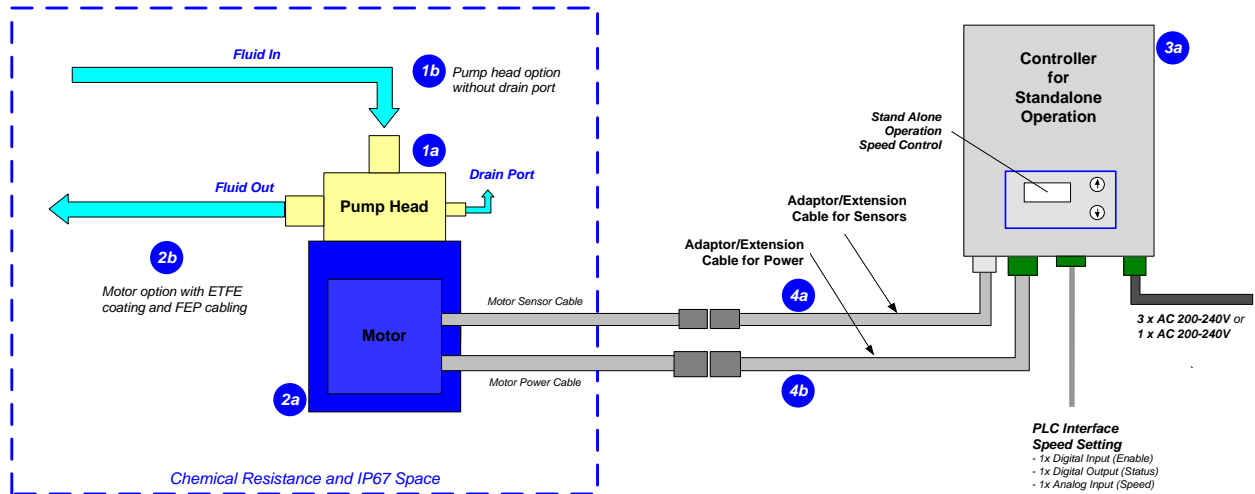


Figure 6: System configuration for standalone operation (speed setting with integrated user panel)

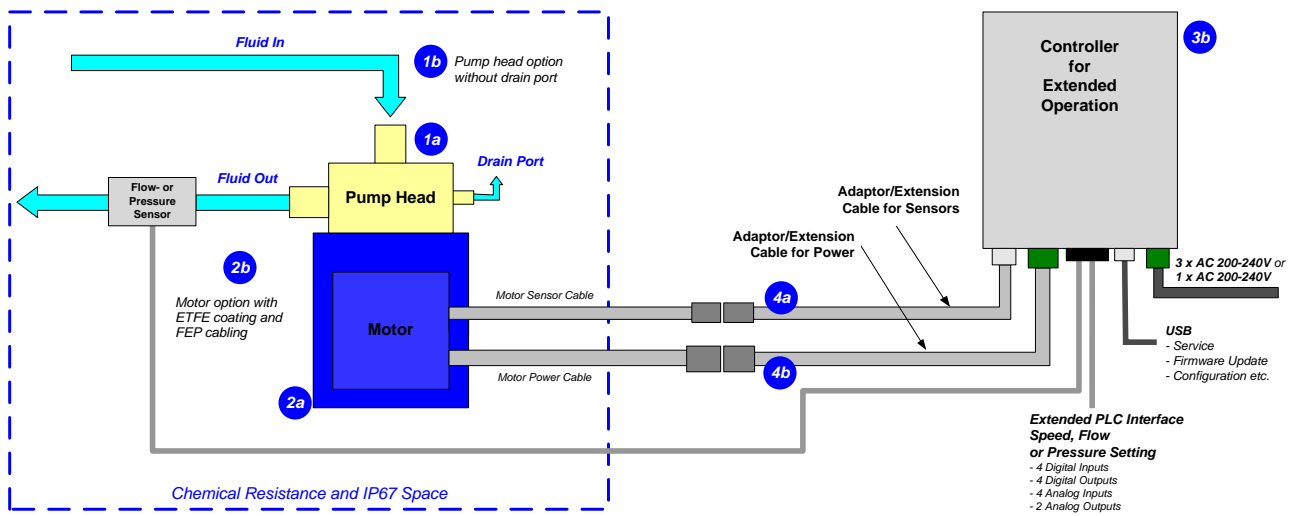


Figure 7: Extended operation (flow or pressure control) with extended controller

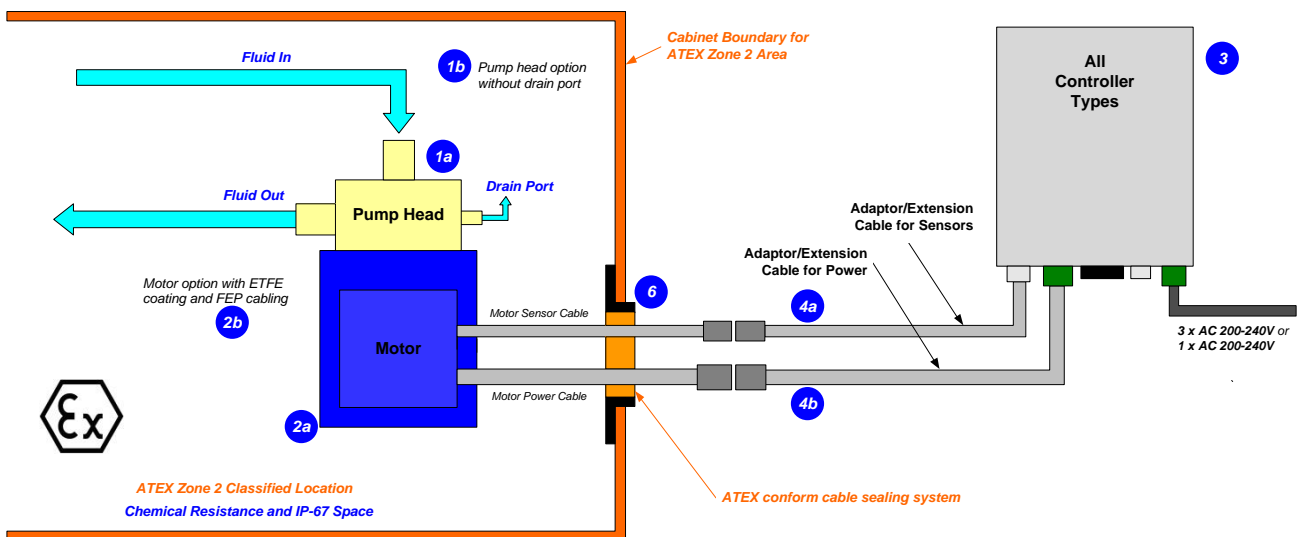
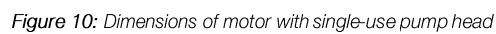


Figure 8: System Configuration for ATEX applications



ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
PuraLev® 2000MU.1	100-90634	CP-4.11 (with drain port)	LPM-2000.7	LPC-2000.1-05	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.
PuraLev® 2000MU.2	100-90635		LPM-2000.7	LPC-2000.2-05	
PuraLev® 2000MU.4	100-90637		LPM-2000.8	LPC-2000.1-05	
PuraLev® 2000MU.5	100-90638		LPM-2000.8	LPC-2000.2-05	
PuraLev® 2000MU.7	100-90640	CP-4.19 (without drain port)	LPM-2000.7	LPC-2000.1-05	Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx. ¹
PuraLev® 2000MU.8	100-90641		LPM-2000.7	LPC-2000.2-05	
PuraLev® 2000MU.10	100-90643		LPM-2000.8	LPC-2000.1-05	
PuraLev® 2000MU.11	100-90644		LPM-2000.8	LPC-2000.2-05	

Table 1: Standard system configurations with motor, controller and pump head
1: Certified components are available on request.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1	Multi-Use Pump Heads	CP-4.11 (with drain port)	100-90245	Impeller / Pump Housing Sealing Ring Fittings	PFA / PVDF (FDA, USP Class VI, BSE/TSE/Animal free) EPDM (FDA, USP Class VI, BSE/TSE/Animal free) Triclamp 1" for in/outlet and Triclamp ½" for drain port (Standard: BS-4825-3)
		CP-4.19 (without drain port)	100-90458	Max. Flow Max. Diff.-Pressure Max. Viscosity	140 liters/min / 37 gallons/min 4.1 bar / 59.5 psi 50 cP
				Wet Pump Volume/Surface Max. Liquid Temp.	260 ml / 629 cm ² 90°C / 194°F
				Sterilization Methods	CIP, SIP, Autoclaving ¹
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 c nAc IIC 110°C (T4) CE II 3D Ex c tc IIC T110°C IP67
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)
3a	Standalone Controller (User Panel)	LPC-2000.1-05	100-30036 (Power supply and Enable connector incl.)	Voltage / Power	1 x 200 – 240 ± 10% 2kW 50/60 Hz 3 x 200 – 240 ± 10% 2kW 50/60 Hz
				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 (relais)
3b	Extended Controller (PLC and USB)	LPC-2000.2-05	100-30037 (Power supply and PLC connector incl.)	Interfaces for Extended Controller	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
				Standard Firmware	USB interface (for service and system monitoring) E1.48

Table 2: Specification of standard components
1: Levitronix® to be contacted for more information.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
4a	Extension Adaptor Cable for Sensors	MCAS-600.2-05 (0.5m)	190-10226	Jacket Material Connectors	PVC Circular Wallmountable, Metallic (IP-67) to D-SUB
		MCAS-600.2-30 (3m)	190-10238		
		MCAS-600.2-50 (5m)	190-10127		
		MCAS-600.2-70 (7m)	190-10105		
		MCAS-600.2-100 (10m)	190-10239		
4b	Extension Adaptor Cable for Power	MCAP-2000.2-05 (0.5m)	190-10213	Jacket Material Connectors	PVC Circular Wallmountable, Metallic (IP-67) to COMBICON
		MCAP-2000.2-30 (3m)	190-10215		
		MCAP-2000.2-50 (5m)	190-10216		
		MCAP-2000.2-70 (7m)	190-10217		
		MCAP-2000.2-100 (10m)	190-10218		

Table 3: Specification of adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5a	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)
5b	Air Cooling Module	ACM-4.3 (ATEX)	190-10243	Material	PP-EL-S with conductive additive for operation with ATEX motor
6 (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.
7	Autoclaving Reinforcing Tool	ART-2000.1	190-10282	Purpose	Stabilization of pump housing during autoclaving
				Material	Anodized Aluminum
				Mounting Screws	4 pcs M8 x 30mm (Stainless steel)

Table 4: Specification of accessories



Figure 11: Pump system with standard components

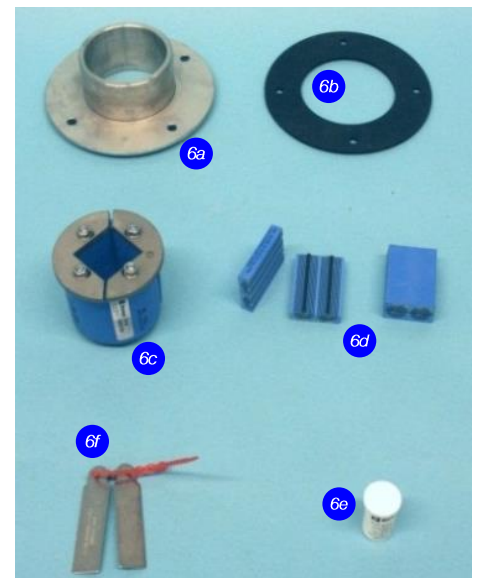
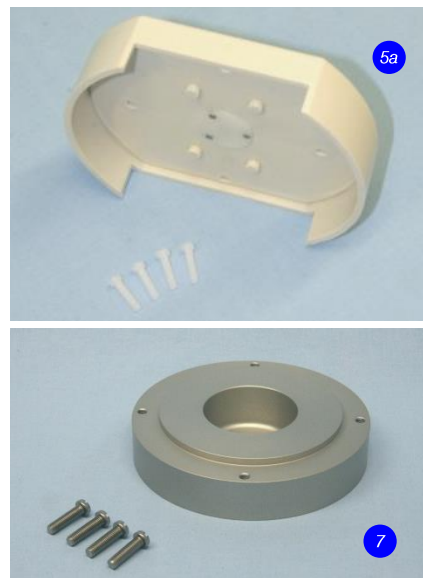


Figure 12: Accessories

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 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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