

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!

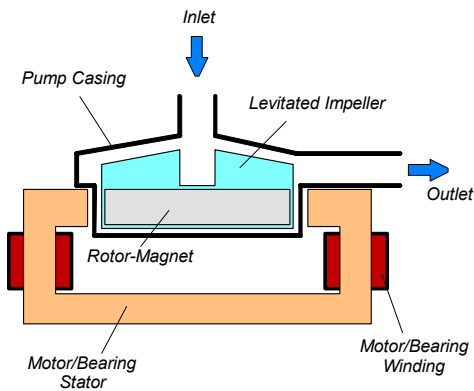


Figure 1: Schematic of the main elements of the maglev centrifugal pump

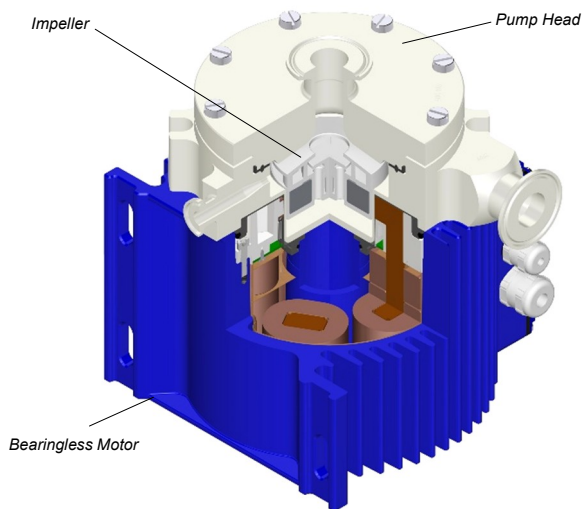


Figure 2: Cross-section of the bearingless pump motor and pump head.

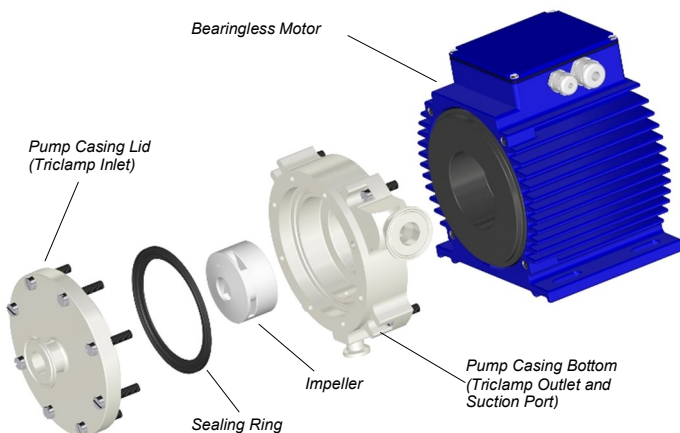


Figure 3: Mult-use pump head concept

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 either both fabricated from biocompatible (FDA, USP-VI, BSE/TSE and Animal free) fluorocarbon resins or stainless steel 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 (for plastics parts): 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

STANDALONE SYSTEM CONFIGURATION

The standalone 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 analog 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 motors (*Pos. 2b* in *Table 2*) come 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*.

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 8*). The HazLoc motors (*Pos. 2c* and *2d* in *Table 2*) come with special connectors and NPT threads on the motor housing to attach a conduit for the cables to leave the hazardous location area.

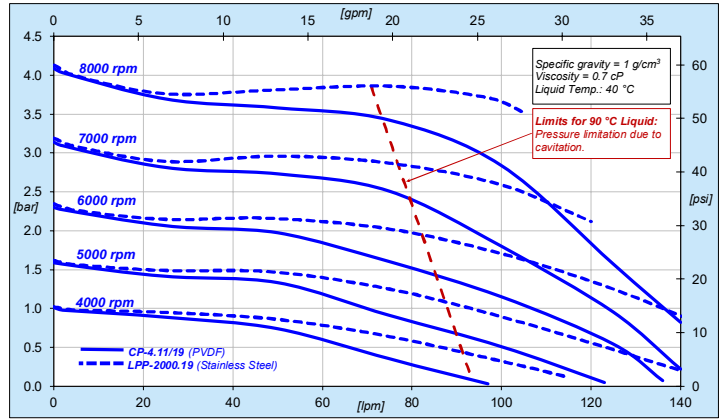


Figure 4: Pressure/flow curves

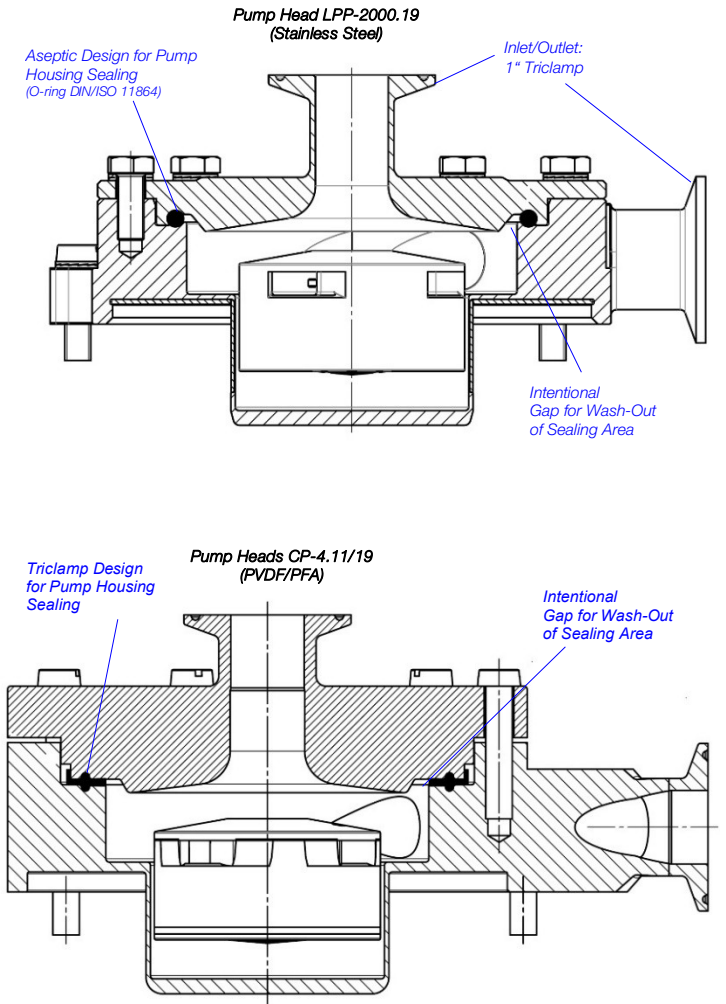


Figure 5: Aseptic design of pump head

SYSTEM CONFIGURATIONS

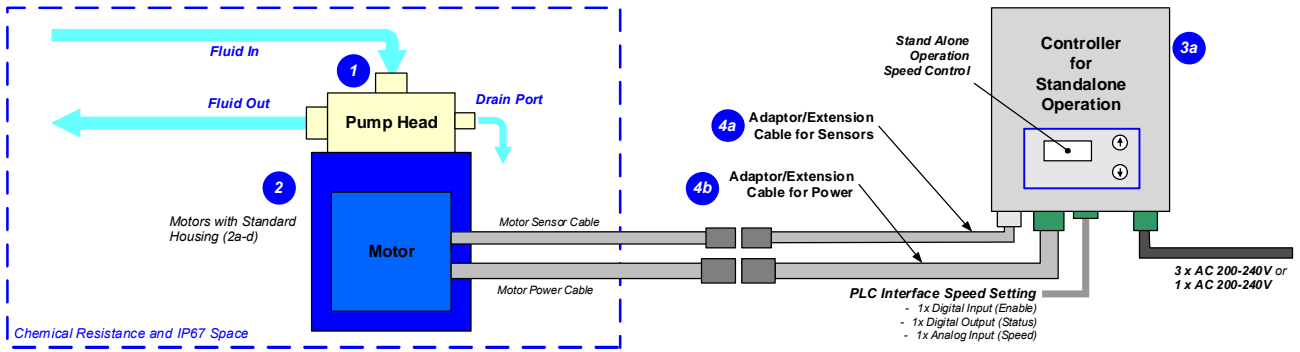


Figure 6: System configuration for standalone operation (speed setting with integrated user panel)

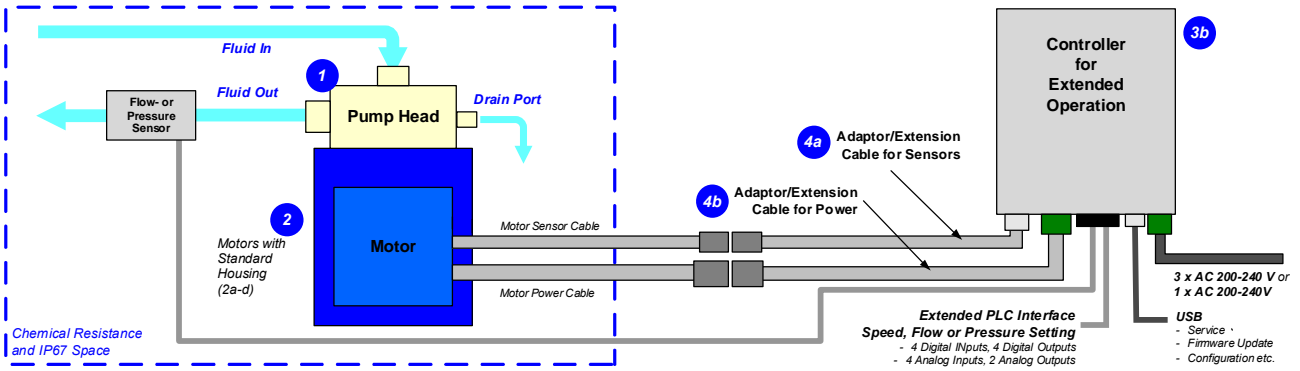


Figure 7: Extended operation (flow or pressure control) with extended controller

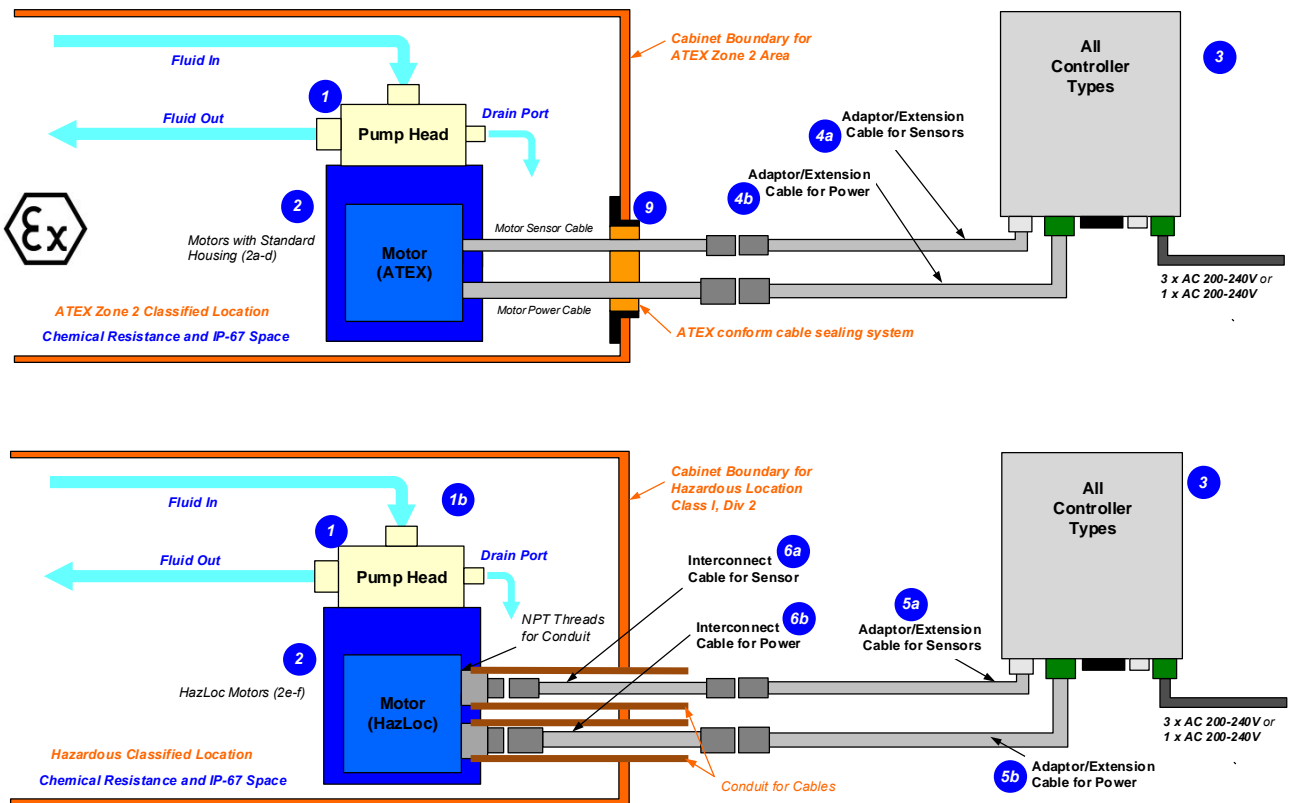


Figure 8: System Configuration for ATEX and Hazardous Location applications

DIMENSIONS OF MAIN COMPONENTS

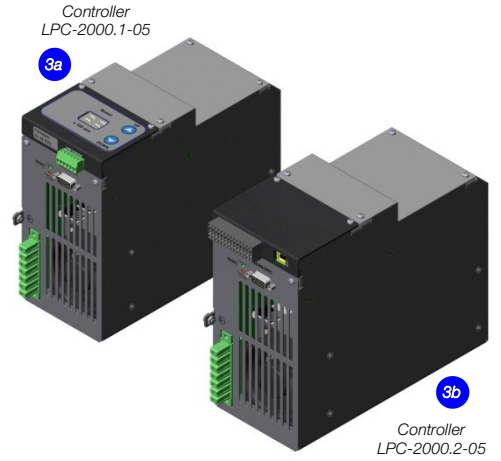
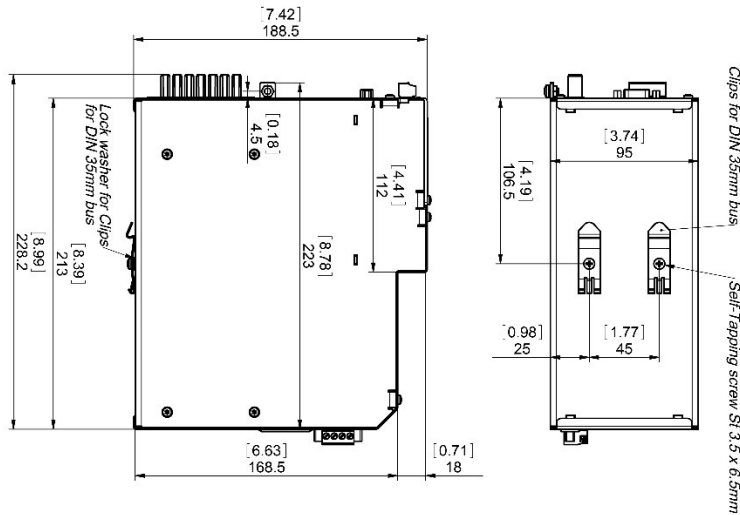


Figure 9: Dimensions of controllers
(Non-tolerated dimensions are for reference only.)

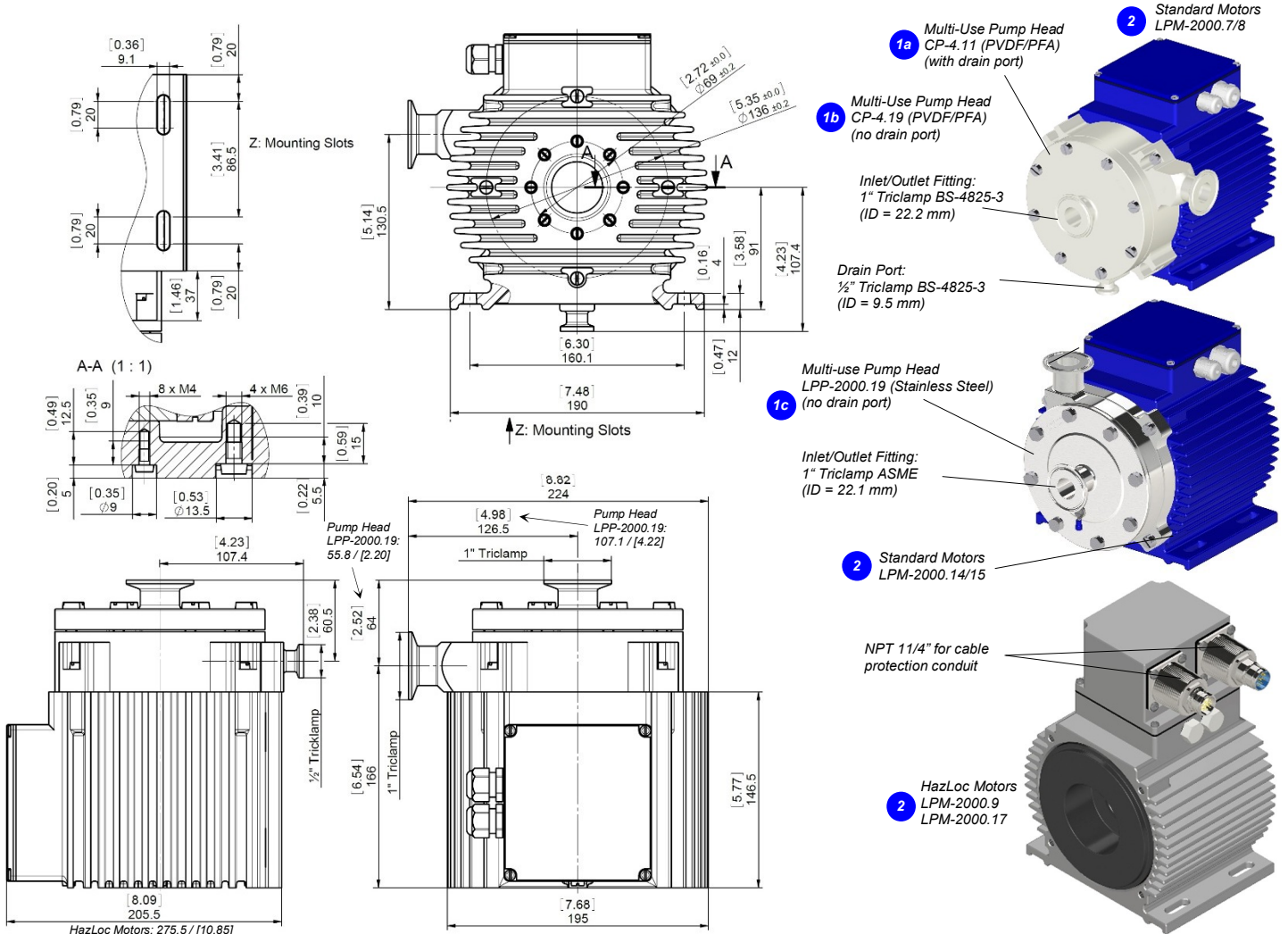


Figure 10: Basic dimensions of motors with multi-use pump heads (in mm and [inches])
(Non-tolerated dimensions are for reference only.)

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
PuraLev® 2000MU.1 / 2	100-90634 / 35	CP-4.11 (with drain port)	LPM-2000.7	LPC-2000.1-05 / 2-05	Extension cables to be ordered according to Table 3. ATEX Cable Sealing System can be ordered according to Table 4. Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx.
PuraLev® 2000MU.4 / 5	100-90637 / 38		LPM-2000.8	LPC-2000.1-05 / 2-05	
PuraLev® 2000MU.7 / 8	100-90640 / 41	CP-4.19 (no drain port)	LPM-2000.7	LPC-2000.1-05 / 2-05	
PuraLev® 2000MU.10 / 11	100-90643 / 44		LPM-2000.8	LPC-2000.1-05 / 2-05	
PuraLev® 2000MU.26 / 25	100-91448 / 47	LPP-2000.19 (no drain port)	LPM-2000.14	LPC-2000.1-13 / 2-13	Extension and interconnect cables to be ordered according to Table 3. Certifications: CE, IECEx CB scheme, ETL (NRTL), Hazardous Location Class I Div 2.
PuraLev® 2000MU.28 / 29	100-91450 / 51		LPM-2000.15	LPC-2000.1-13 / 2-13	
PuraLev® 2000MU.16 / 17	100-91200 / 01	CP-4.11 (with drain port)	LPM-2000.9	LPC-2000.1-05 / 2-05	Extension and interconnect cables to be ordered according to Table 3. Certifications: CE, IECEx CB scheme, ETL (NRTL), Hazardous Location Class I Div 2.
PuraLev® 2000MU.22 / 23	100-91206 / 07	CP-4.19 (no drain port)	LPM-2000.9	LPC-2000.1-05 / 2-05	
PuraLev® 2000MU.31 / 32	100-91453 / 54	LPP-2000.19 (no drain port)	LPM-2000.17	LPC-2000.1-13 / 2-13	

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Multi-Use Pump Heads (PVDF)	CP-4.11 (with drain port)	100-90245	Impeller / Pump Housing Sealing Ring Inlet-Outlet Fittings Max. Flow / Diff.-Pressure	PFA / PVDF (FDA, USP Class VI, BSE/TSE/Animal free) EPDM (FDA, USP Class VI, BSE/TSE/Animal free) Triclamp 1", Triclamp ½" for drain port (Standard: BS-4825-3) 140 liters/min (37 gallons/min) / 4.1 bar (59.5 psi)
1b		CP-4.19 (without drain port)	100-90458	Max. Viscosity / Liquid Temp. Wet Pump Volume/Surface Sterilization Methods	50 cP / 90 °C (194 °F) 260 ml / 629 cm ² SIP (Steam in Place), CIP (Clean in Place), Autoclaving ¹
1c	Multi-Use Pump Head (Stainless Steel)	LPP-2000.19 (without drain port)	100-91446	Impeller / Pump Housing Sealing Ring Inlet-Outlet Fittings Max. Flow / Diff.-Pressure Max. Viscosity / Liquid Temp. Wet Pump Volume/Surface Sterilization Methods	Stainless Steel (EN 1.4435, AISI 316L) Triclamp gasket EPDM (FDA, USP Class VI, BSE/TSE/Animal free) Triclamp 1" for in/outlet (Standard: ASME) 140 liters/min (37 gallons/min) / 4.1 bar (59.5 psi) 30 cP / 90 °C (194 °F) 250 ml / 630 cm ² SIP (Steam in Place), CIP (Clean in Place)
2a	Motor (ATEX, IECEx)	LPM-2000.7 (Epoxy)	100-10059	Housing	Epoxy (a) or ETFE (b) coated aluminum, waterproofed (IP67)
2b		LPM-2000.8 (ETFE)	100-10060	Cable / Connectors	2x 3 m cables with PVC (a) or FEP (b) jacket / 2x circular (M23, IP67)
2c		LPM-2000.14 (Epoxy)	100-10163 ³	ATEX/IECEx Marking	CE II 3G Ex ec h IIC T5 Gc CE II 3D Ex h tc IIC T100°C Dc
2d		LPM-2000.15 (ETFE)	100-10164 ³		
2e	Motor (HazLoc)	LPM-2000.9 (ETFE)	100-10112	Housing	ETFE coated aluminum, waterproofed (IP67)
2f		LPM-2000.17 (ETFE)	100-10166 ³	Connectors Hazardous Location Mark.	2x circular (M23, IP67) / NPT 1¼" for cable protection conduit Class I, Div2, Groups A-D T5 Class II, Div2, Groups F-G T5
3a	Standalone Controller (User Panel)	LPC-2000.1-05 ²	100-30036	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 (relay)
		LPC-2000.1-13 ²	100-30096 ³	Standard Firmware	LPC-2000.1-05: E1.25 LPC-2000.1-13: E6.25
3b	Extended Controller (PLC and USB)	LPC-2000.2-05 ²	100-30037	Interfaces for Extended Controller	PLC with - up to 4 digital inputs 0 – 24 V (optocoupler) - up to 4 digital outputs 0 – 24 V (relay) - up to 2 analog inputs 4 – 20 mA - up to 2 analog inputs 0 – 10 V - up to 2 analog outputs 0 – 5 V
		LPC-2000.2-13 ²	100-30095 ³	Standard Firmware	USB interface (for service and system monitoring) LPC-2000.2-05: E1.48 LPC-2000.2-13: E6.48

Table 2: Specification of standard components

Note 1: Levitronix® to be contacted for more information. Note 2: Power supply and PLC connector included. Note 3: Pump head LPP-2000.19 is operating with these motors and controllers only.

Pos.	Component	Article Name (a)	Article Name (b)	Article # (a)	Article # (b)	Characteristics	Value / Feature
4a	Extension Adaptor Cable for Sensors (a) and Power (b)	MCAS-600.2-05 (0.5m)	MCAP-2000.2-05 (0.5m)	190-10226	190-10213	Jacket Material Connectors	PVC Circular wall-mountable, metallic (IP67) to D-SUB (a) and COMBICON (b)
4b		MCAS-600.2-30 (3m)	MCAP-2000.2-30 (3m)	190-10228	190-10215		
		MCAS-600.2-50 (5m)	MCAP-2000.2-50 (5m)	190-10127	190-10216		
		MCAS-600.2-70 (7m)	MCAP-2000.2-70 (7m)	190-10105	190-10217		
5a	Extension Adaptor Cable for Sensors (a) and Power (b)	MCAS-600.3-05 (0.5m)	MCAP-2000.3-05	190-10158	190-10219	Jacket Material Connectors	PVC Circular, metallic (IP67) to D-SUB (a) and COMBICON (b)
5b		MCAS-600.3-30 (3m)	MCAP-2000.3-30	190-10159	190-10221		
		MCAS-600.3-50 (5m)	MCAP-2000.3-50	190-10130	190-10222		
		MCAS-600.3-70 (7m)	MCAP-2000.3-70	190-10160	190-10223		
6a	Interconnect Cable for Sensors (a) and Power (b)	MCIS-2000.1-05 (0.5 m)	MCIP-2000.1-05	190-10391	190-10396	Jacket Material Connector Types	PVC Circular M23 (IP-67) to -circular M23 metallic (Nickel coated) (IP67)
6b		MCIS-2000.1-30 (3 m)	MCIP-2000.1-30	190-10392	190-10397		
		MCIS-2000.1-50 (5 m)	MCIP-2000.1-50	190-10393	190-10398		
		MCIS-2000.1-70 (7 m)	MCIP-2000.1-70	190-10394	190-10399		
		MCIS-2000.1-100 (10 m)	MCIP-2000.1-100	190-10395	190-10400		

Table 3: Specification of adaptor/extension cables for motors

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
7a	Air Cooling Module	ACM-4.2	190-10139	Material / Connection Port Air Pressure	PP (+ 40% Talcum) / NPT 1/4" -1 - 3 bar (14 - 43 psi)
7b	Air Cooling Module	ACM-4.3 (ATEX)	190-10243	Material	PP-EL-S with conductive additive for operation with ATEX motor
8a	Fan Cooling Module	FCM-2000.1	190-10390	Housing / Cable Spec. Supply Spec. / IP Rating	PP (+ 20% Talcum) white / PP jacket, 3 m, circular sealed M12 connector (PP), 24 VDC, 33.5 W / IP65 (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
9 (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.
10	Autoclaving Reinforcing Tool	ART-2000.1	190-10282	Purpose Material / Mounting Screws	Stabilization of pump housing during autoclaving Anodized aluminum / 4 pcs, M8 x 30 mm (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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