LEVITRONIX®

PuraLev®
Life Science Pump Series

PuraLev® 4000MU (Multi-Use)

4.6 bar	(67 psi)
200 liters/min	(53 gallons/min)

No Bearings. No Seals. No Contamination!

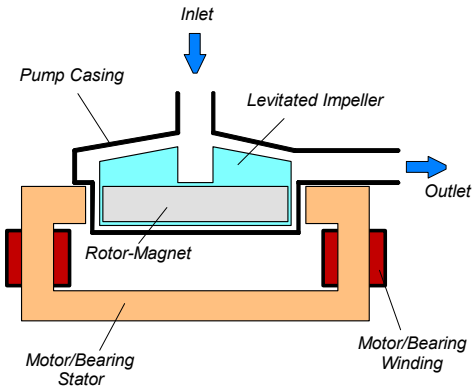


Figure 1: *Schematic of the main elements of the maglev centrifugal pump*

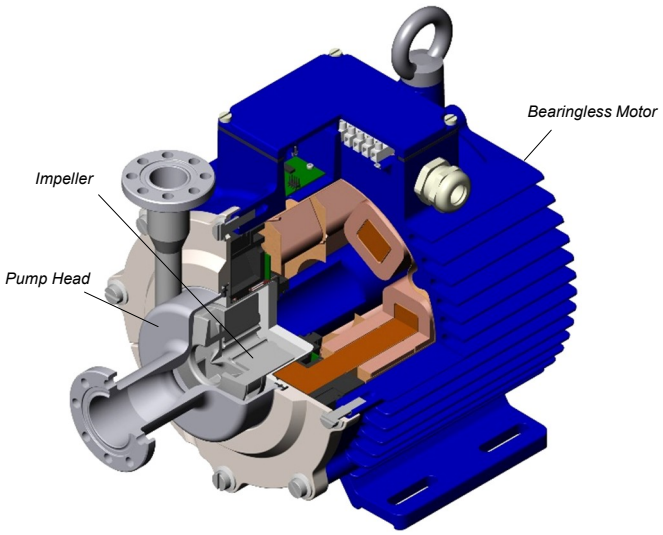


Figure 2: *Cross-section of the bearingless pump motor and pump head.*

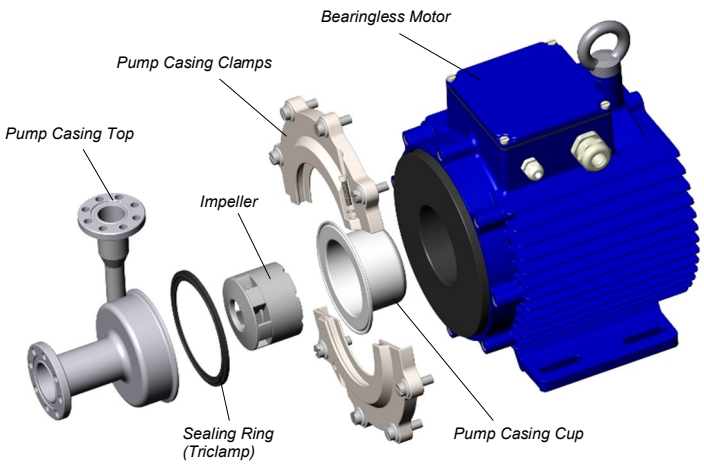


Figure 3: *Multi-use pump head concept*

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 cup are both fabricated from biocompatible (FDA, USP-VI, BSE/TSE free) fluorocarbon resins. The pump casing top with the fittings is made of stainless steel. 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 hygienic fittings and has an aseptic seal design (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 plastic materials: FDA, USP-VI, 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® 4000MU* 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® 4000MU* 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 motor (*see 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*.

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 motor (Pos. 2c 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.

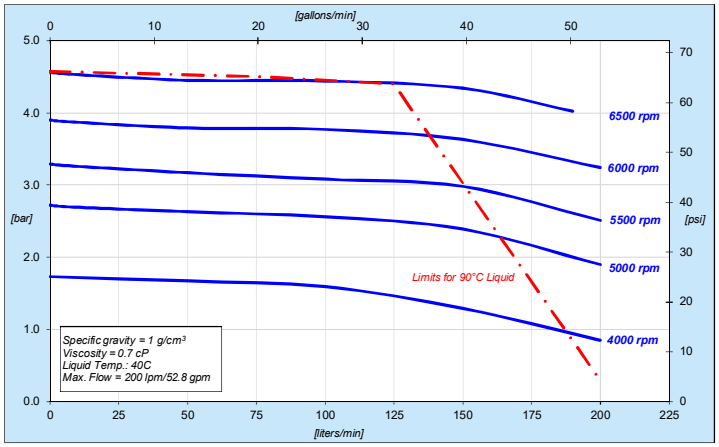


Figure 4: *Pressure/flow curves*

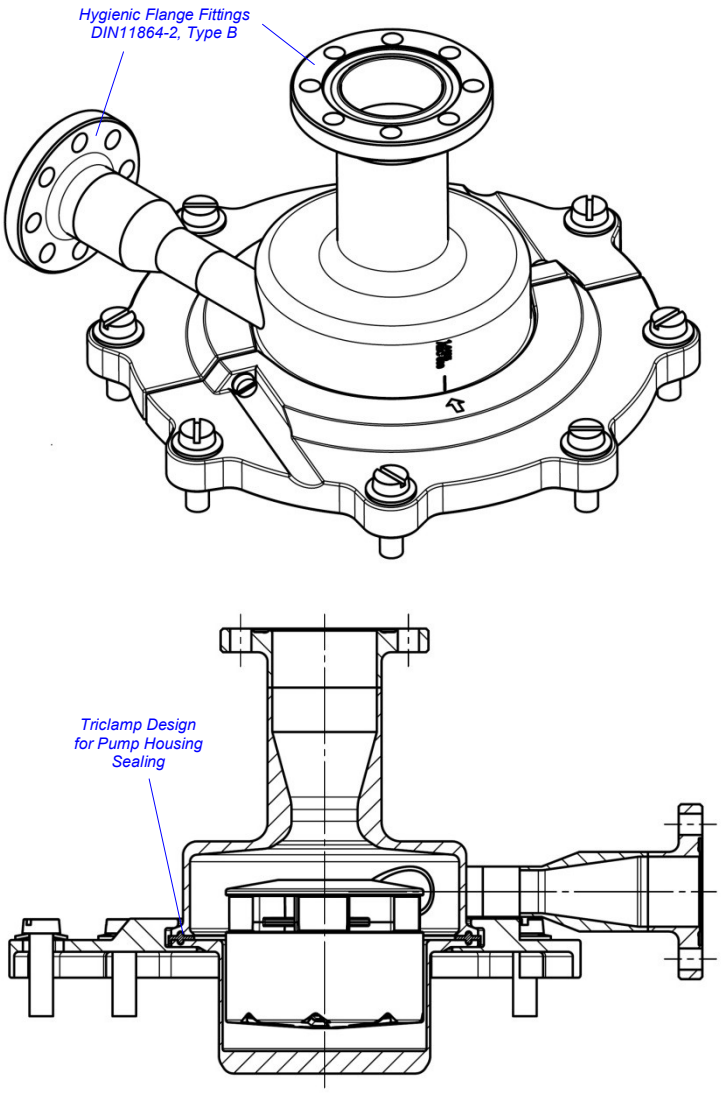


Figure 5: *Aseptic pump head*

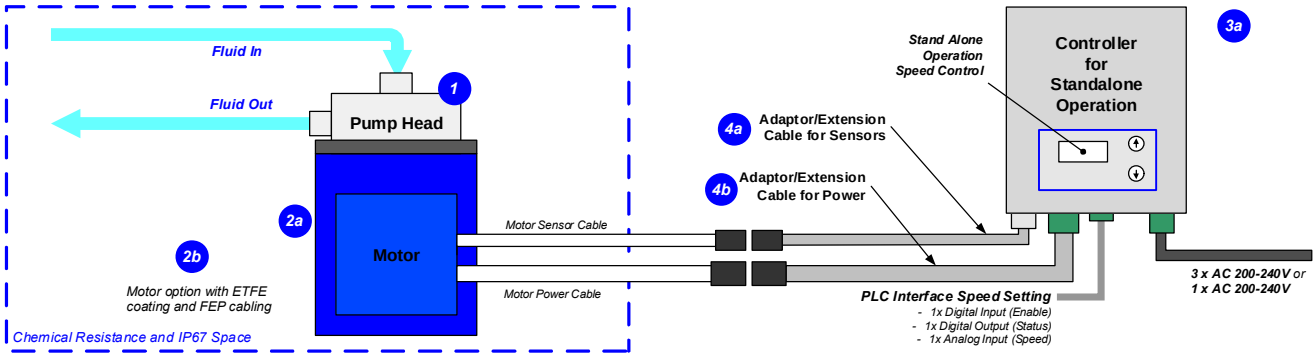


Figure 6: System configuration for standalone operation (speed setting with integrated user panel)

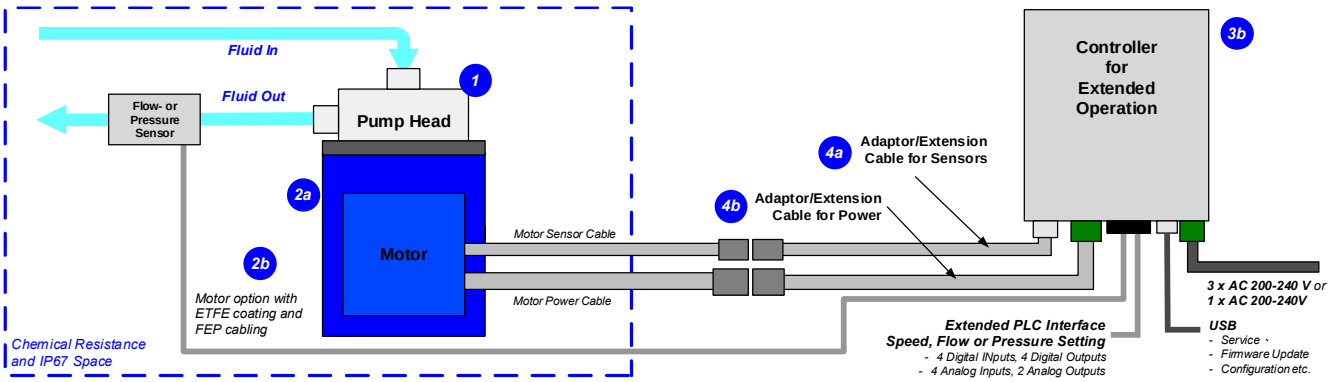


Figure 7: Extended operation (flow or pressure control) with extended controller

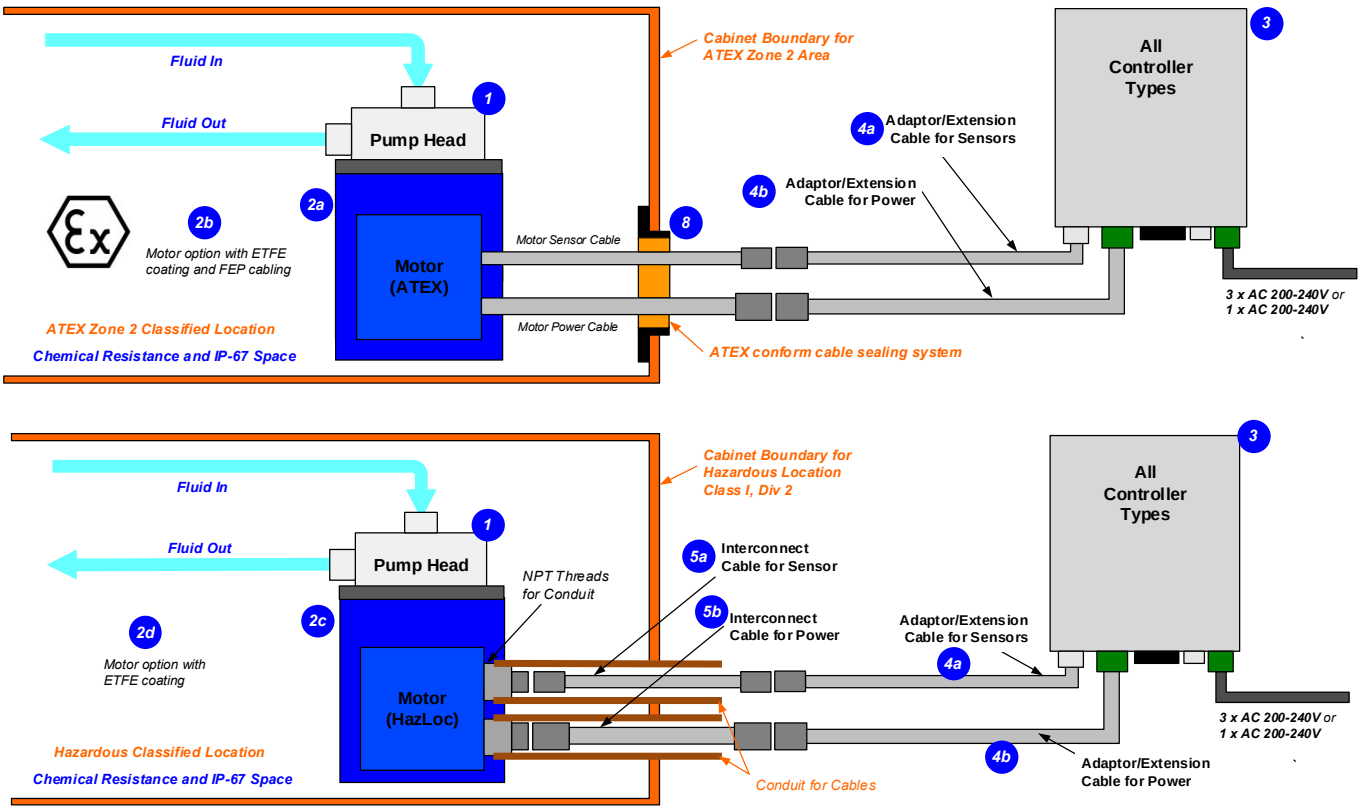
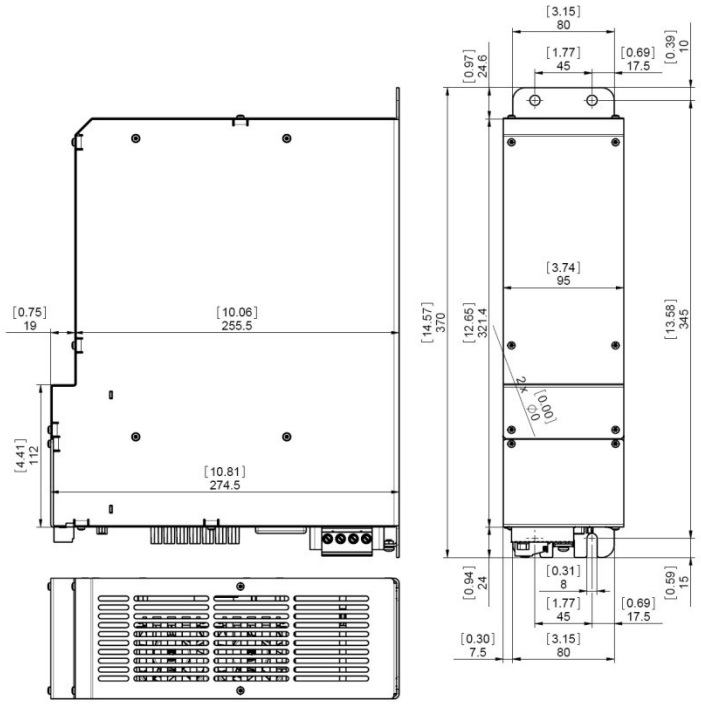


Figure 8: System Configuration for ATEX and Hazardous Location applications



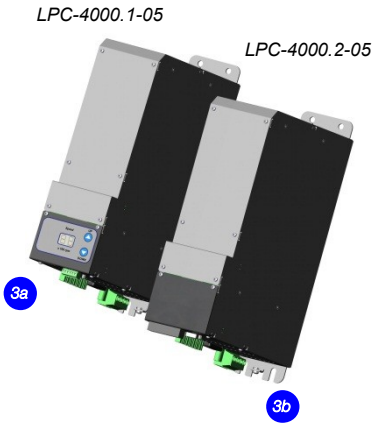
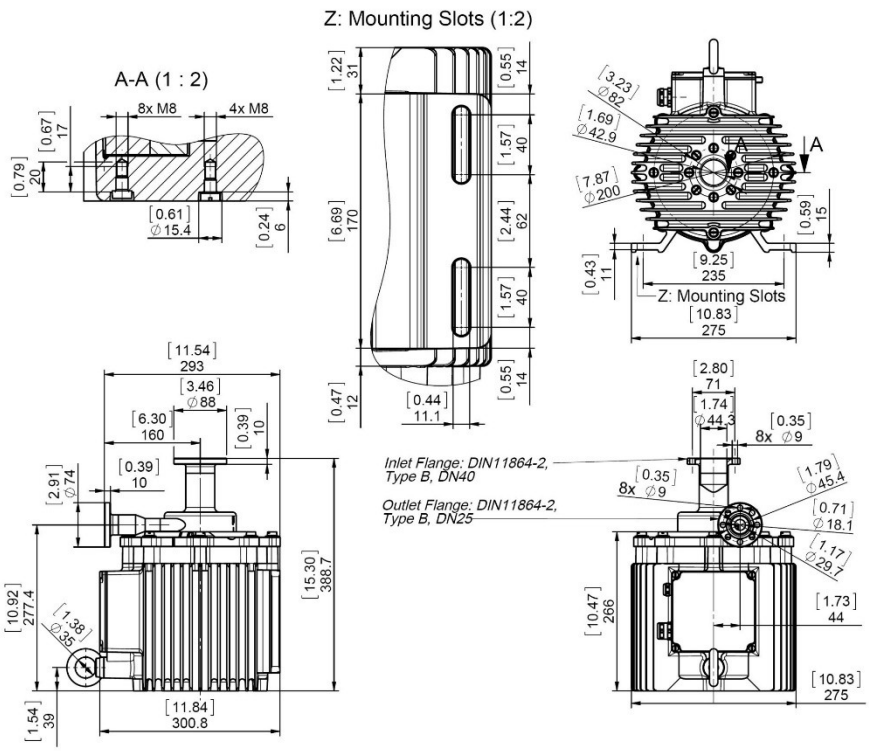


Figure 9: Dimensions of controllers



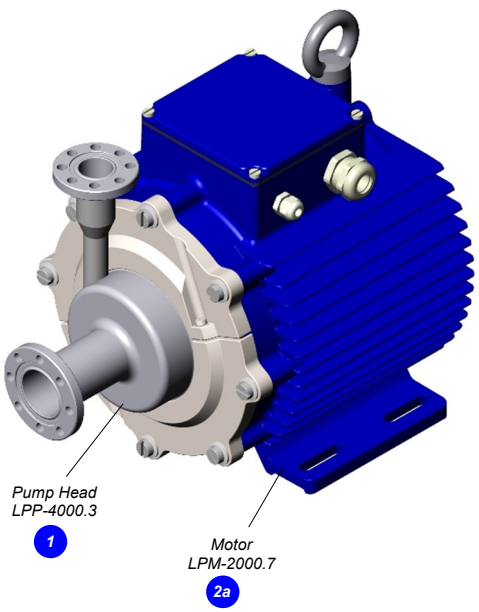


Figure 10: Dimensions of motor with single-use pump head

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
PuraLev® 4000MU.1	100-90822	LPP-4000.3	LPM-4000.7	LPC-4000.1-05	*Adaptor/Extension (0.5 – 10 m) 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, IECEE CB scheme, ETL (NRTL), ATEX and IECEx.*
PuraLev® 4000MU.2	100-90823		LPM-4000.7	LPC-4000.2-05	
PuraLev® 4000MU.4	100-90825		LPM-4000.8	LPC-4000.1-05	
PuraLev® 4000MU.5	100-90826		LPM-4000.8	LPC-4000.2-05	
PuraLev® 4000MU.7	100-91191	LPP-4000.3	LPM-4000.11	LPC-4000.1-05	*Adaptor/Extension (0.5 – 10 m) 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, IECEE CB scheme, ETL (NRTL), HazLoc Class 1 Division 2.*
PuraLev® 4000MU.8	100-91192		LPM-4000.11	LPC-4000.2-05	
PuraLev® 4000MU.10	100-91194		LPM-4000.10	LPC-4000.1-05	
PuraLev® 4000MU.11	100-91195		LPM-4000.10	LPC-4000.2-05	

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1	Multi-Use Pump Head	LPP-4000.3	100-90821	Impeller / Pump Housing Sealing Ring Fittings	*PFA / PEEK / Stainless Steel (FDA, USP Class VI, BSE/TSE free)* *EPDM (FDA, USP Class VI, BSE/TSE/animal free)* *DIN 11864-2, Type B, DN40 for inlet and DN25 for outlet*
				Max. Flow Max. Diff.-Pressure Max. Viscosity	*200 liters/min / 53 gallons/min* *4.6 bar / 67 psi* *Aqueous liquids (others on request)*
				Wet Pump Volume/Surface	*560 ml / 1103 cm²*
				Max. Liquid Temp.	*Full performance: 70 °C / 158 °F* *Limited performance: 70 – 90 °C / 158 – 194 °F (see Figure 4)*
				Sterilization Methods	*CIP and SIP*
2a 2b	Motor (ATEX)	LPM-4000.7 (Epoxy) LPM-4000.8 (ETFE)	100-10047 100-10048	Housing Cable / Connectors	*Epoxy (a) or ETFE (b) coated Alu., waterproofed (IP67).* *2x 3m cables with PVC (a) or FEP (b) jacket / 2x circular (M23, IP-67)*
				ATEX Marking	*CE Ex II 3G Ex nA IIC T5 Gc / CE Ex II 3D Ex tc IIIC T100°C Dc*
2c 2d	Motor (HazLoc)	LPM-4000.11 (Epoxy) LPM-4000.10 (ETFE)	100-10116 100-10115	Housing / Connectors	*Epoxy (a) or ETFE (b) coated alu., waterproofed (IP67 /circular connectors*
				Hazardous Location Marking	*Class I, Div2, Groups A-D T5 Class II, Div2, Groups F-G T5*
3a	Standalone Controller (User Panel)	LPC-4000.1-05	100-90820 (Power supply and Enable connector included)	Voltage / Power	*1 x 200 – 240 V or 3x 200 – 240 V ± 10% 4 kW 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 (relay)*
				Standard Firmware	*F2.25*
3b	Extended Controller (PLC and USB)	LPC-4000.2-05	100-90811 (Power supply and PLC connector included)	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* *USB interface (for service and system monitoring)*
				Standard Firmware	*F2.48*

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

Pos.	Component	Article Name		Article #		Characteristics	Value / Feature
		Sensor Cable (a)	Power Cable (b)	Sensor	Power		
4a 4b	Extension Adaptor Cable for Sensor (a) and Power (b) Wires	MCAS-600.2-05 (0.5 m) MCAS-600.2-30 (3 m) MCAS-600.2-50 (5 m) MCAS-600.2-70 (7 m) MCAS-600.2-100 (10 m)	MCAP-4000.5-05 (0.5 m) MCAP-4000.5-30 (3 m) MCAP-4000.5-50 (5 m) MCAP-4000.5-70 (7 m) MCAP-4000.5-100 (10 m)	190-10226 190-10238 190-10127 190-10105 190-10239	190-10291 190-10292 190-10293 190-10294 190-10295	Jacket Material Connector Types Connector Material	*PVC* *Circular wallmountable M23 (IP67) to D-SUB* *Metallic – Nickel coated*
5a 5b	Interconnect Cable for Sensor (a) and Power (b) Wires	MCIS-2000.1-05 (0.5 m) MCIS-2000.1-30 (3 m) MCIS-2000.1-50 (5 m) MCIS-2000.1-70 (7 m) MCIS-2000.1-100 (10 m)	MCIP-4000.1-05 (0.5 m) MCIP-4000.1-30 (3 m) MCIP-4000.1-50 (5 m) MCIP-4000.1-70 (7 m) MCIP-4000.1-100 (10 m)	190-10391 190-10392 190-10393 190-10394 190-10395	190-10402 190-10403 190-10404 190-10405 190-10406	Jacket Material Connector Types Connector Material	*PVC* *Circular M23 (IP67) to Circular M23* *Metallic – Nickel coated*

Table 3: *Specification of adaptor/extension cables*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
6a	Air Cooling Module	ACM-4000.1	190-10177	Material / Connection Port Air Pressure	*PP (+ 40% Talcum) / NPT 1/2"* *~1 - 3 bar (14 – 43 psi)*
6b	Air Cooling Module	ACM-4000.3 (ATEX)	190-10190	Material	*PP-EL-S with conductive additive for operation with ATEX motor*
7	Fan Cooling Module	FCM-4000.1	190-10178	Housing Material Cable Supply Spec. / IP-Rating	*PP (+ 40% Talcum)* *PVC, 6 m, open-end wires* *20.4 – 27.6 VDC, 31.2 W, 1.3 A / IP55*
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.*
8	Screw-Seal Set	M16 x 20 PTFE / FKM	100-90913	Screw / Gasket Materials Purpose	*M16 x 16 (SW24), PVDF / FKM* *Chemical protection of lifting eyebolt mounting thread of motor.*

Table 4: *Specification of accessories*

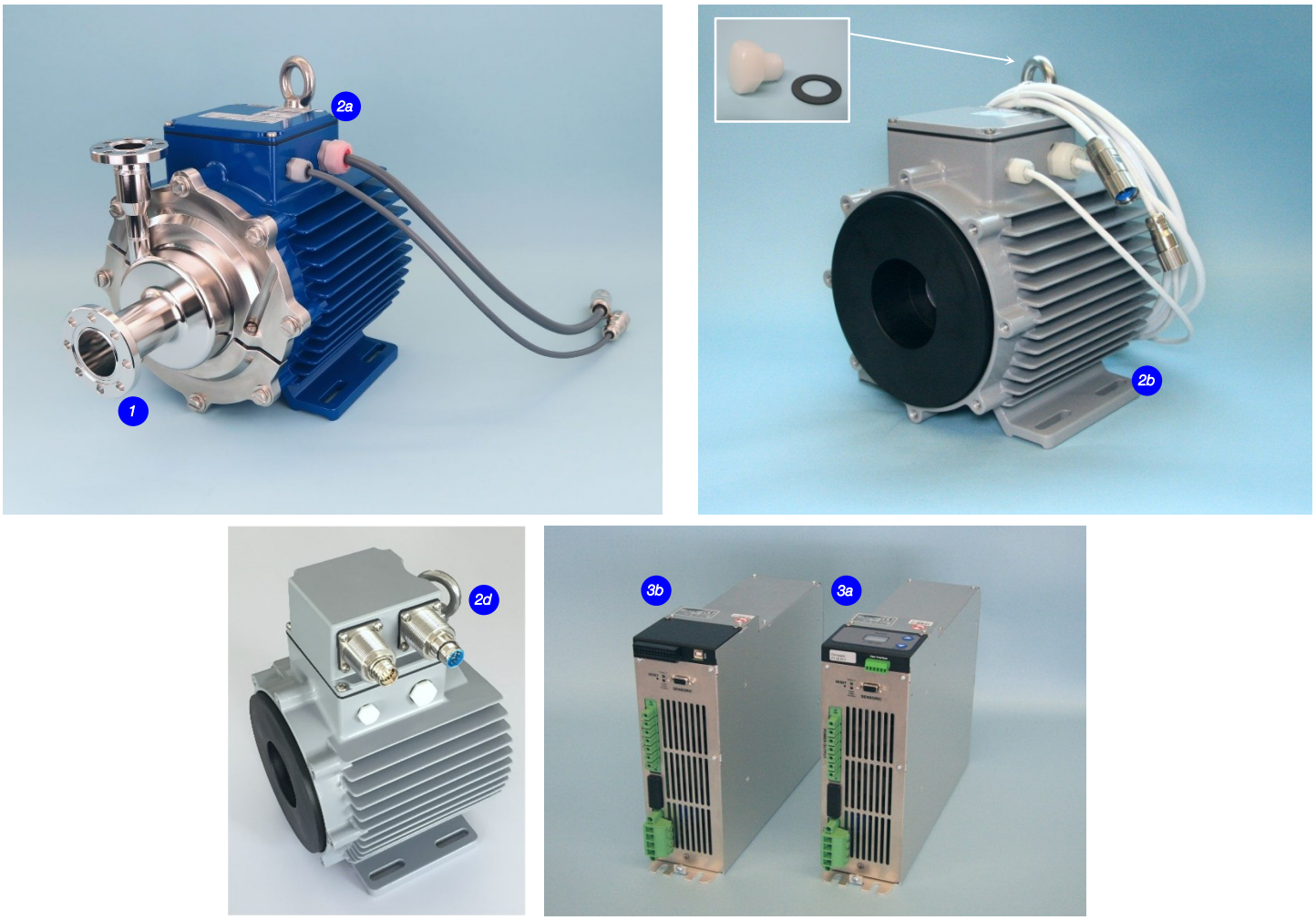


Figure 11: *Pump system with standard components*

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.

Headquarter and European Contact

Levitronix GmbH
Technoparkstr. 1
CH-8005 Zurich
Switzerland

Phone: +41 44 445 19 13
Fax: +41 44 445 19 14
E-Mail: salesEurope@levitronix.com

US Contact

Levitronix Technologies Inc.
10 Speen Street, Suite 102
Framingham, Massachusetts 01701
USA

Phone: +1 508 861 3800
Fax: +1 508 861 3837
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
Fax: +81 3 5823 4195
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
Fax: +886 988 321472
E-Mail: salesAsia@levitronix.com