

PuraLev® Life Science Pump Series



PuraLev® 2000MU.S (Multi-Use)

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

No Bearings. No Seals. No Contamination!

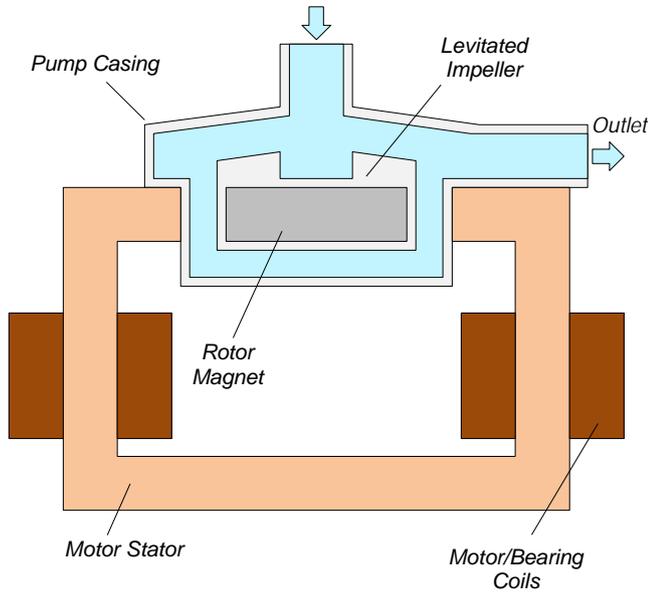


Figure 1: Schematic of the main elements of the maglev centrifugal pump

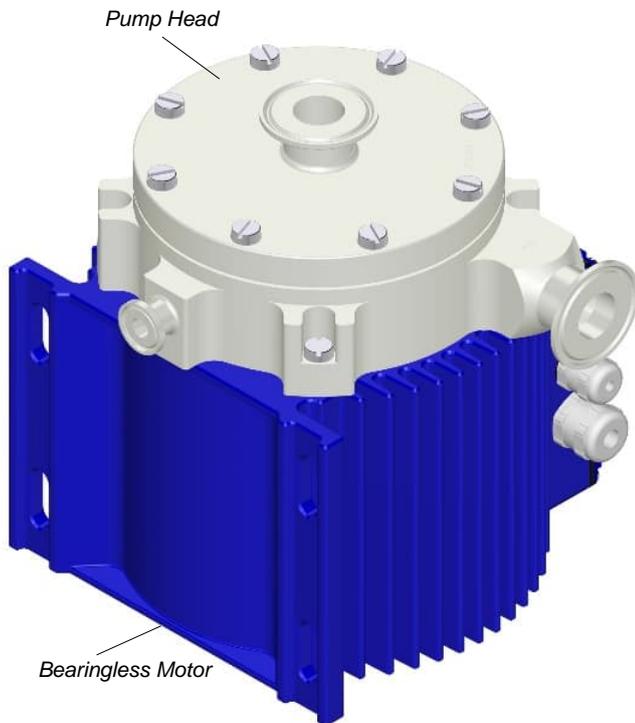


Figure 2: Bearingless pump motor and pump head.

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 4).

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 5*). 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 6*) 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 7*). The ATEX motors 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 11*.

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 1 Division 2* area (see *Figure 7*). 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.

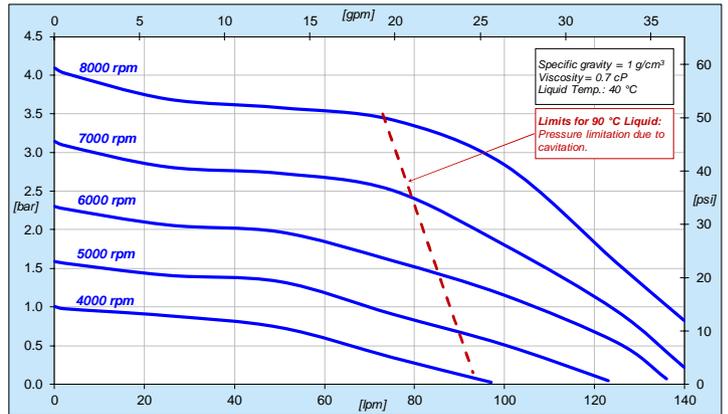


Figure 3: Pressure/flow curves for pump heads CP-4.11/19 (PVDF)

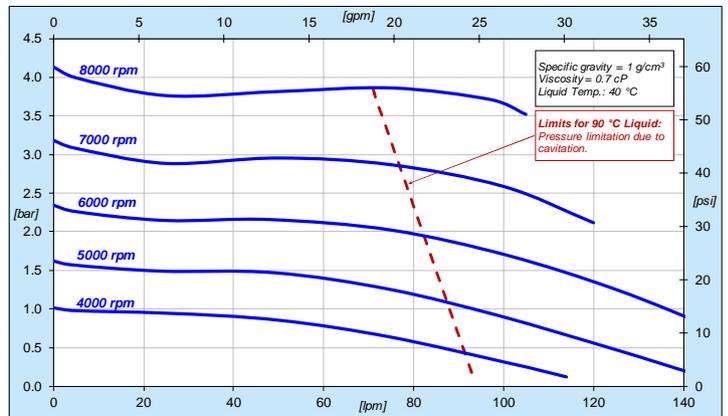


Figure 4: Pressure flow curves for pump heads LPP-2000.19/25

SYSTEM CONFIGURATIONS

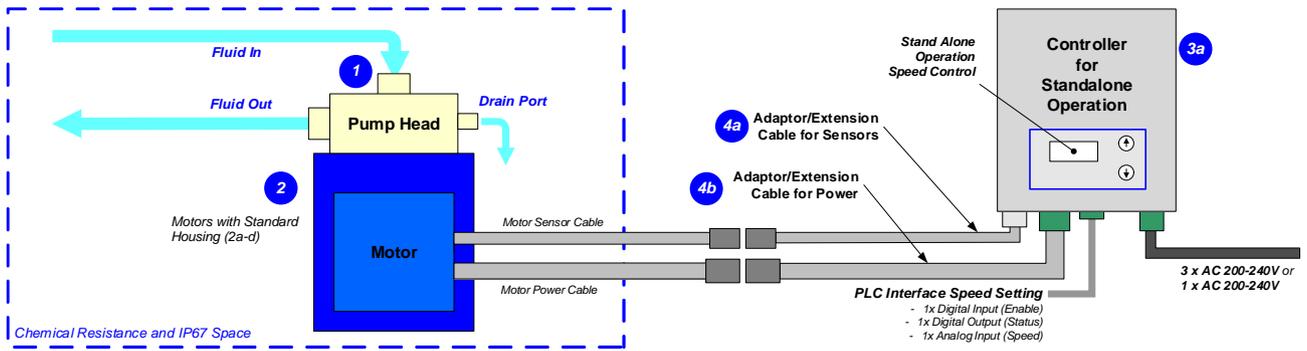


Figure 5: System configuration for standalone operation (speed setting with integrated user panel)

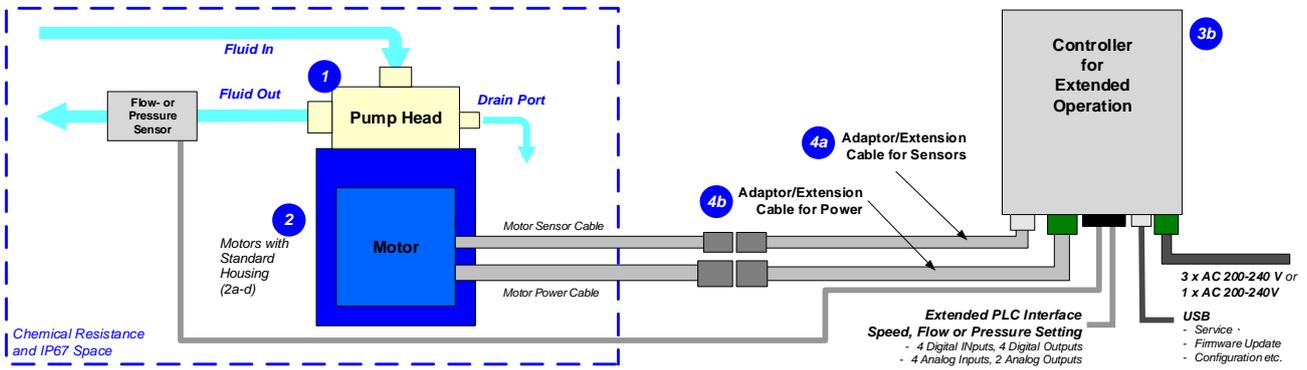


Figure 6: Extended operation (flow or pressure control) with extended controller

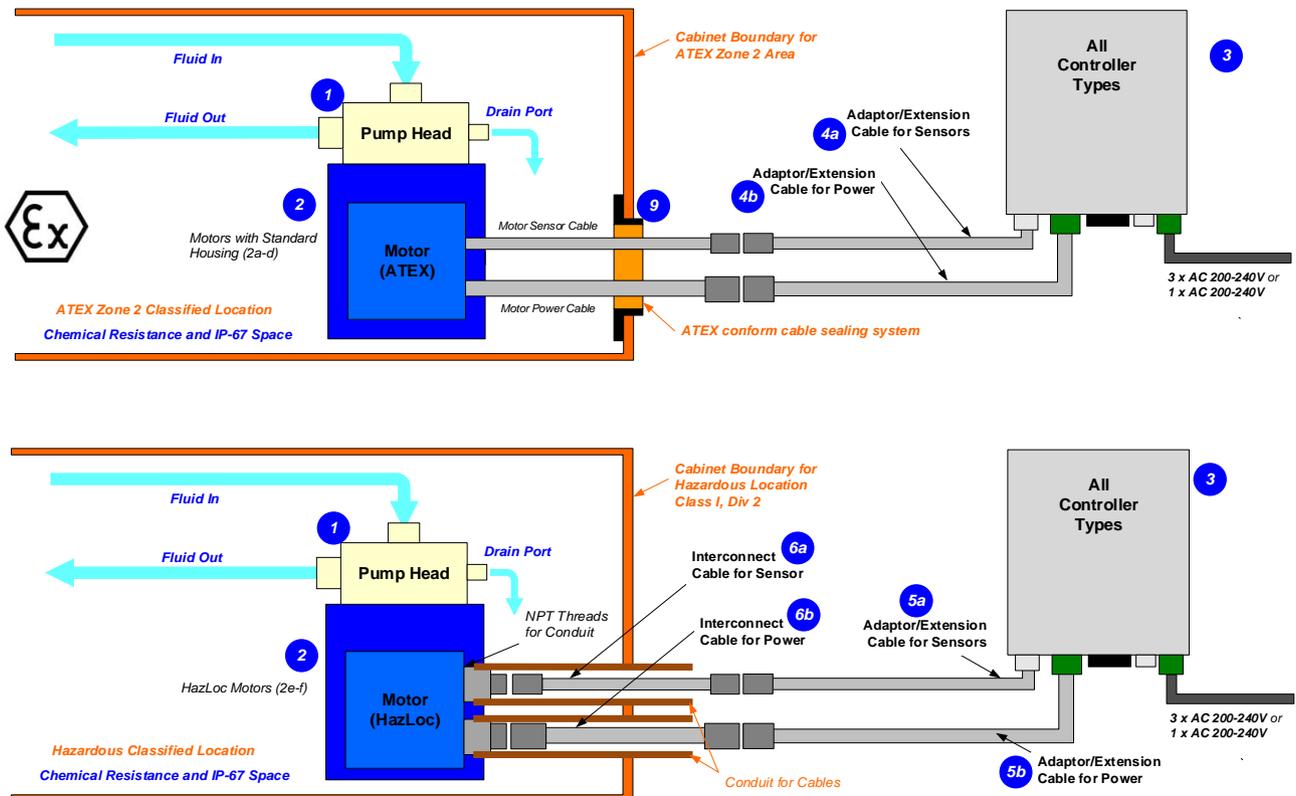


Figure 7: System Configuration for ATEX and Hazardous Location applications

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note	
PuraLev® 2000MU.1S / 2S	100-91941 / 42	CP-4.11 (with drain port)	LPM-2000.7	LPC-2000S.1-05 / 2-05	Extension cables to be ordered according to Table 3. ATEX Cable Sealing System can be ordered according to Table 4.	
PuraLev® 2000MU.4S / 5S	100-91944 / 45		LPM-2000.8	LPC-2000S.1-05 / 2-05		
PuraLev® 2000MU.7S / 8S	100-91947 / 48	CP-4.19 (no drain port)	LPM-2000.7	LPC-2000S.1-05 / 2-05		
PuraLev® 2000MU.10S / 11S	100-91950 / 51		LPM-2000.8	LPC-2000S.1-05 / 2-05		
PuraLev® 2000MU.34S / 35S	100-91968 / 69	LPP-2000.25 (with drain port)	LPM-2000.14	LPC-2000S.1-13 / 2-13	Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx, Ex certification for Japan and Korea.	
PuraLev® 2000MU.37S / 38S	100-91971 / 72		LPM-2000.15	LPC-2000S.1-13 / 2-13		
PuraLev® 2000MU.26S / 25S	100-91960 / 59	LPP-2000.19 (no drain port)	LPM-2000.14	LPC-2000S.1-13 / 2-13		
PuraLev® 2000MU.28S / 29S	100-91962 / 63		LPM-2000.15	LPC-2000S.1-13 / 2-13		
PuraLev® 2000MU.16S / 17S	100-91653 / 54	CP-4.11 (with drain port)	LPM-2000.9	LPC-2000S.1-05 / 2-05	Extension and interconnect cables to be ordered according to Table 3.	
PuraLev® 2000MU.22S / 23S	100-91966 / 67		CP-4.19 (no drain port)	LPM-2000.9		LPC-2000S.1-05 / 2-05
PuraLev® 2000MU.40S / 41S	100-91974 / 75	LPP-2000.25 (with drain port)	LPM-2000.17	LPC-2000S.1-13 / 2-13		Certifications: CE, IECEx CB scheme, ETL (NRTL), Hazardous Location Class I Div 2.
PuraLev® 2000MU.31S / 32S	100-91965 / 66		LPP-2000.19 (no drain port)	LPM-2000.17		

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 1/2" 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-2000.25 (with drain port)	100-91545	Impeller / Pump Housing Sealing Ring Inlet-Outlet Fittings Max. Flow / Diff. -Pressure	Stainless Steel (EN 1.4435, AISI 316L) Triclamp gasket EPDM (FDA, USP Class VI, BSE/TSE/Animal free) Triclamp 1" for in/outlet, Triclamp 1/2" for drain port (Standard: ASME) 140 liters/min (37 gallons/min) / 4.1 bar (59.5 psi)
1d		LPP-2000.19 (without drain port)	100-91446	Max. Viscosity / Liquid Temp. Wet Pump Volume/Surface Sterilization Methods	30 cP / 90 °C (194 °F) LPP-2000.19: 250 ml / 630 cm ² LPP-2000.25: 254 ml / 657 cm ² SIP (Steam in Place), CIP (Clean in Place)
2a	Motor (ATEX, IECEx)	LPM-2000.7 (Epoxy)	100-10059	Housing Cable / Connectors ATEX/IECEx Marking ⁴	Epoxy (a) or ETFE (b) coated aluminum, waterproofed (IP67) 2x 3 m cables with PVC (a) or FEP (b) jacket / 2x circular (M23, IP67) CE UK II 3G Ex ec h IIC T5 Gc CE UK II 3D Ex h tc IIIc T100°C Dc
2b		LPM-2000.8 (ETFE)	100-10060		
2c		LPM-2000.14 (Epoxy)	100-10163 ³		
2d		LPM-2000.15 (ETFE)	100-10164 ³		
2e	Motor (HazLoc)	LPM-2000.9 (ETFE)	100-10112	Housing Connectors Hazardous Location Mark.	ETFE coated aluminum, waterproofed (IP67) 2x circular (M23, IP67) / NPT 1/4" for cable protection conduit Class I, Div2, Groups A-D T5 Class II, Div2, Groups F-G T5
2f		LPM-2000.17 (ETFE)	100-10166 ³		
3a	Standalone Controller (User Panel)	LPC-2000S.1-05 ²	100-30170	Voltage / Power Housing Rating Interfaces for Standalone Controller	1 or 3 x 200 – 240 VAC ± 10% / 2 kW 50/60 Hz IP20 Panel to set speed (automatic storage on internal EEPROM)
		LPC-2000S.1-13 ²	100-30173 ³	Standard Firmware	LPC-2000.1-05: E1.25 LPC-2000.1-13: E6.25
3b	Extended Controller (PLC and USB) ⁵	LPC-2000S.2-05 ²	100-30171	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 outputs 0 – 10 V - up to 2 analog outputs 0 – 5 V
		LPC-2000S.2-13 ²	100-30174 ³		

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 heads LPP-2000.19/25 are operating with these motors and controllers only. Note 4: ATEX/IECEx motors are also certified and marked for Japan and Korean Ex. Note 5: LPC-2000.3 controllers with RS232 instead of USB interface available.

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)	190-10238	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)	190-10407	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 10: Pump system with standard components



Figure 11: 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
Bändliweg 30
CH-8048 Zurich
Switzerland

Phone: +41 44 974 4000
E-Mail: salesEurope@levitronix.com

US Contact

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

Phone: +1 508 861 3800
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
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
E-Mail: salesAsia@levitronix.com

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