LEVITRONIX®

PuraLev®
Life Science Pump Series

PuraLev® 600MU (Multi-Use)

3.2 bar	(46 psi)
75 liters/min	(20 gallons/min)

No Bearings. No Seals. No Contamination!

REVOLUTIONARY MAGLEV PUMP SYSTEM

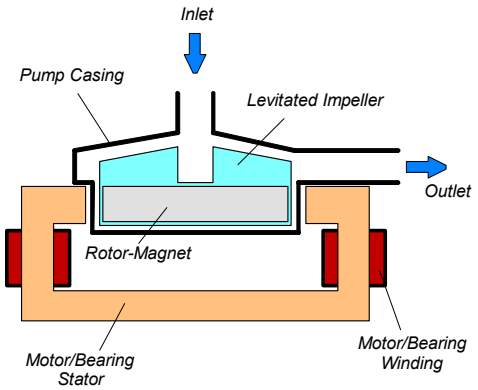

Figure 1: *Schematic of the main elements of the maglev centrifugal pump*

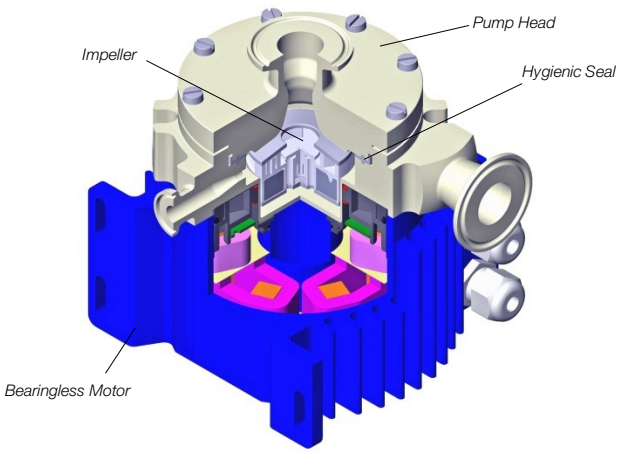

Figure 2: *Cross-section of the bearingless pump motor and pump head*
(Concept with pump head LPP-600.7 (PVDF/PFA))

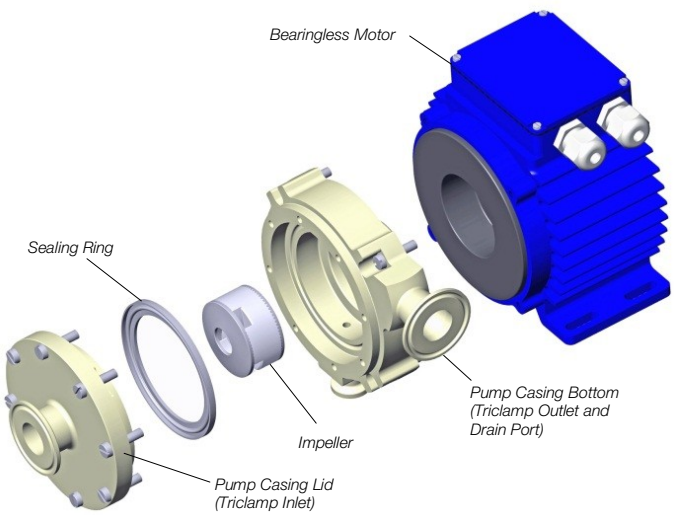

Figure 3: *Disassembled multi-use pump head (LPP-600.7)*

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 plastic 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

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the *PuraLev® 600MU* 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® 600MU* 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. 4a* and *4b* in *Table 3*). An *Ex* conform solution is needed for the motor cables to leave the *Ex* area. One option is an ATEX certified cable sealing system as listed in *Table 4* 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 / IECEx* marking of motor with pump head:
  CE Ex II 3G Ex nA IIC T5 Gc
  CE Ex II 3D Ex tc IIIC T100°C Dc

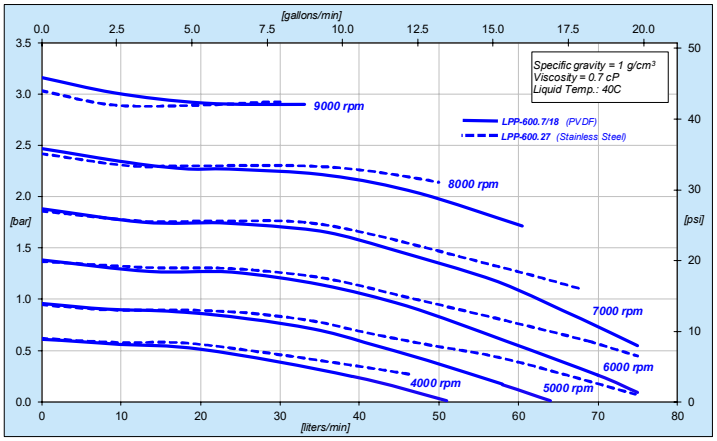

Figure 4: *Pressure/flow curves (Typical curves measured.)*

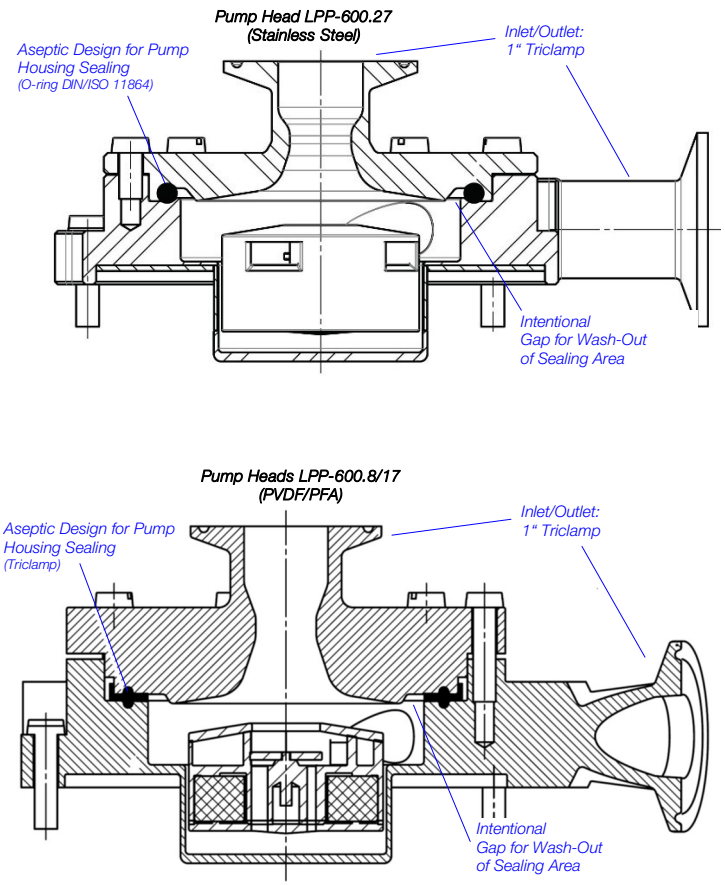

Figure 5: *Aseptic design of pump heads*

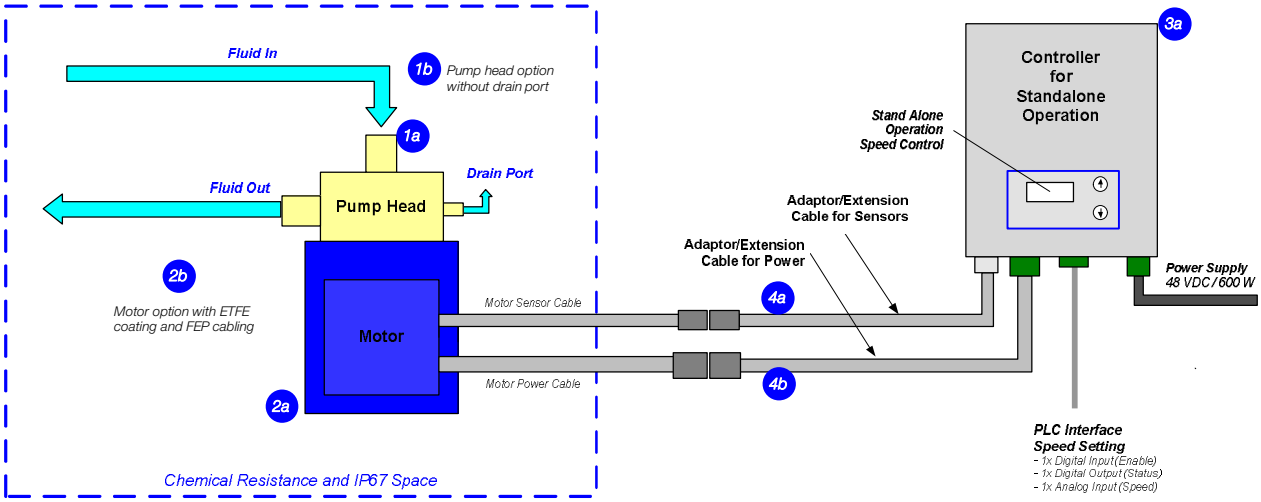

Figure 6: System configuration for standalone operation (Speed setting with integrated user panel)

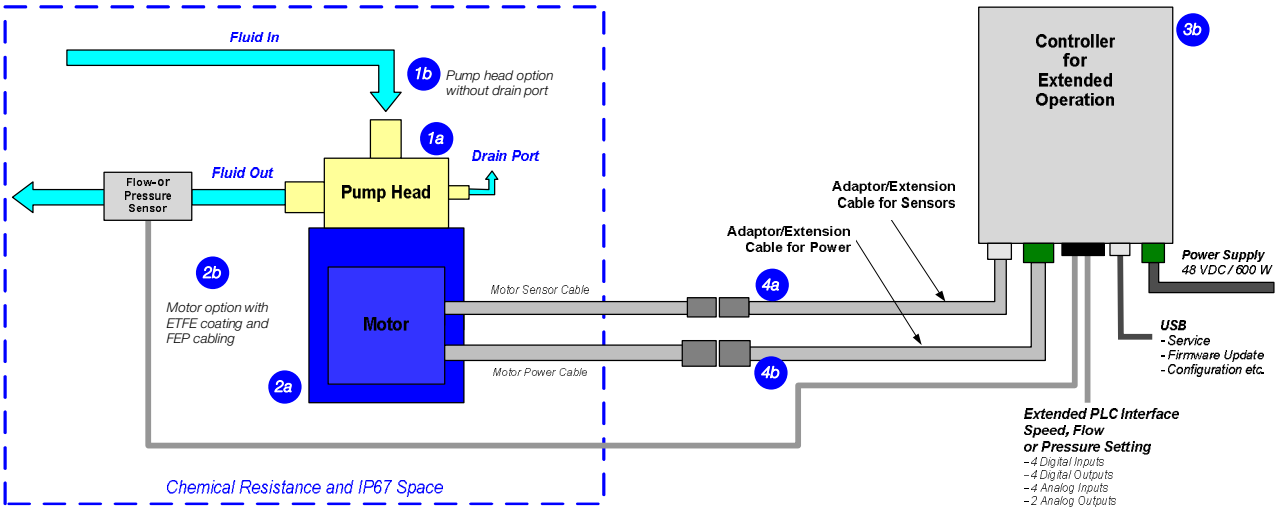

Figure 7: Extended operation (flow or pressure control) with extended controller

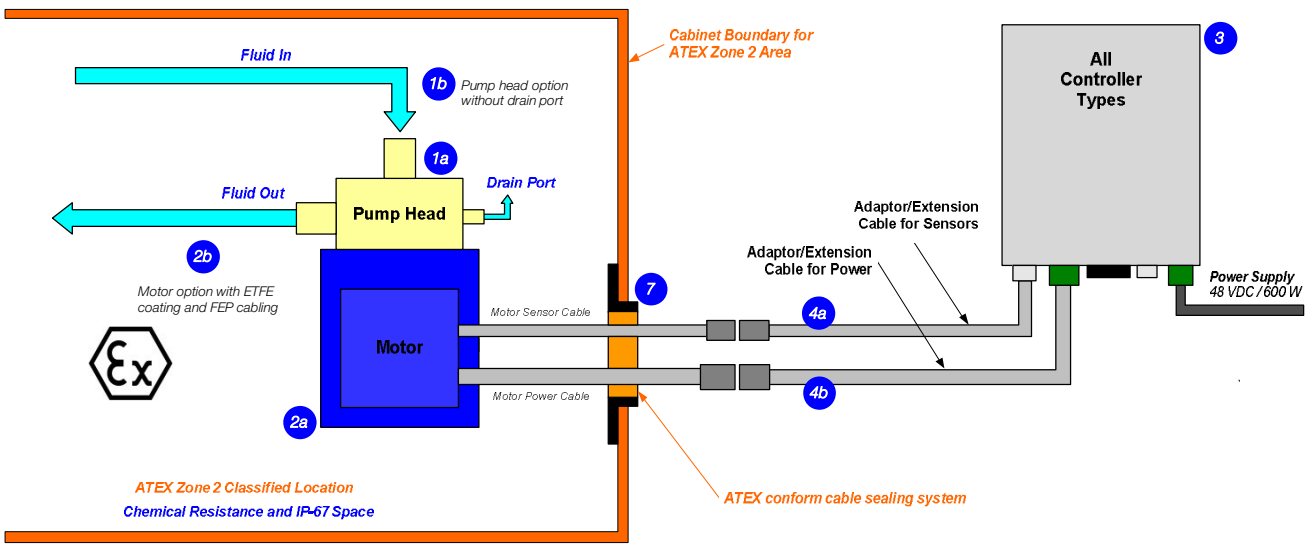

Figure 8: System Configuration for ATEX / IECEx applications

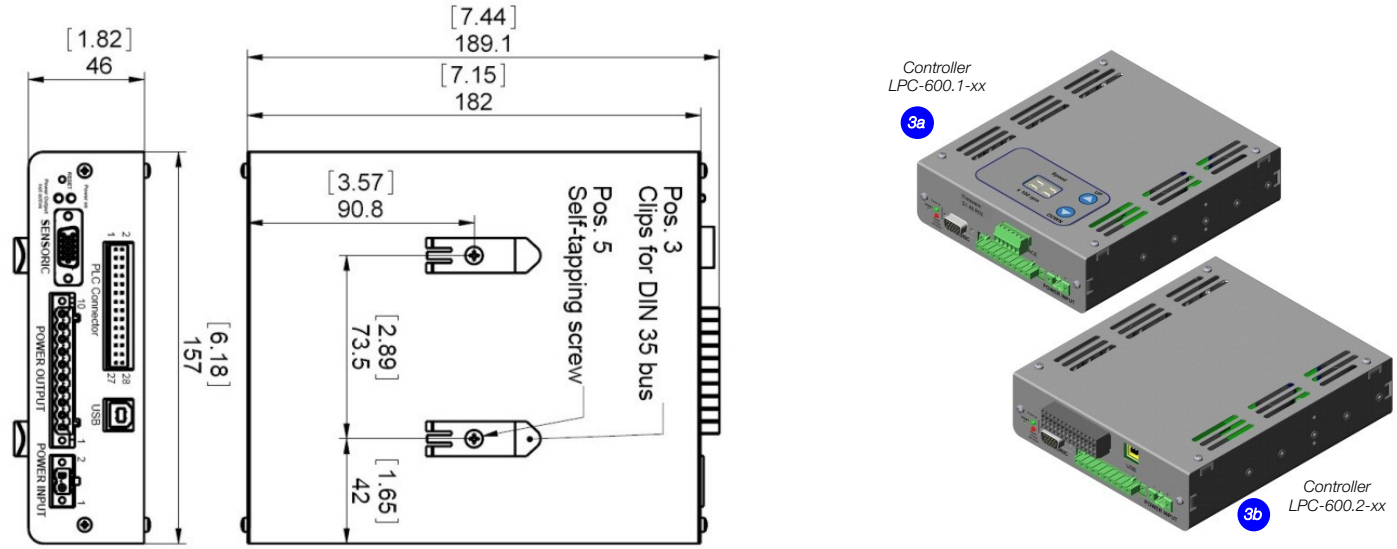

Figure 9: *Dimensions of controllers*

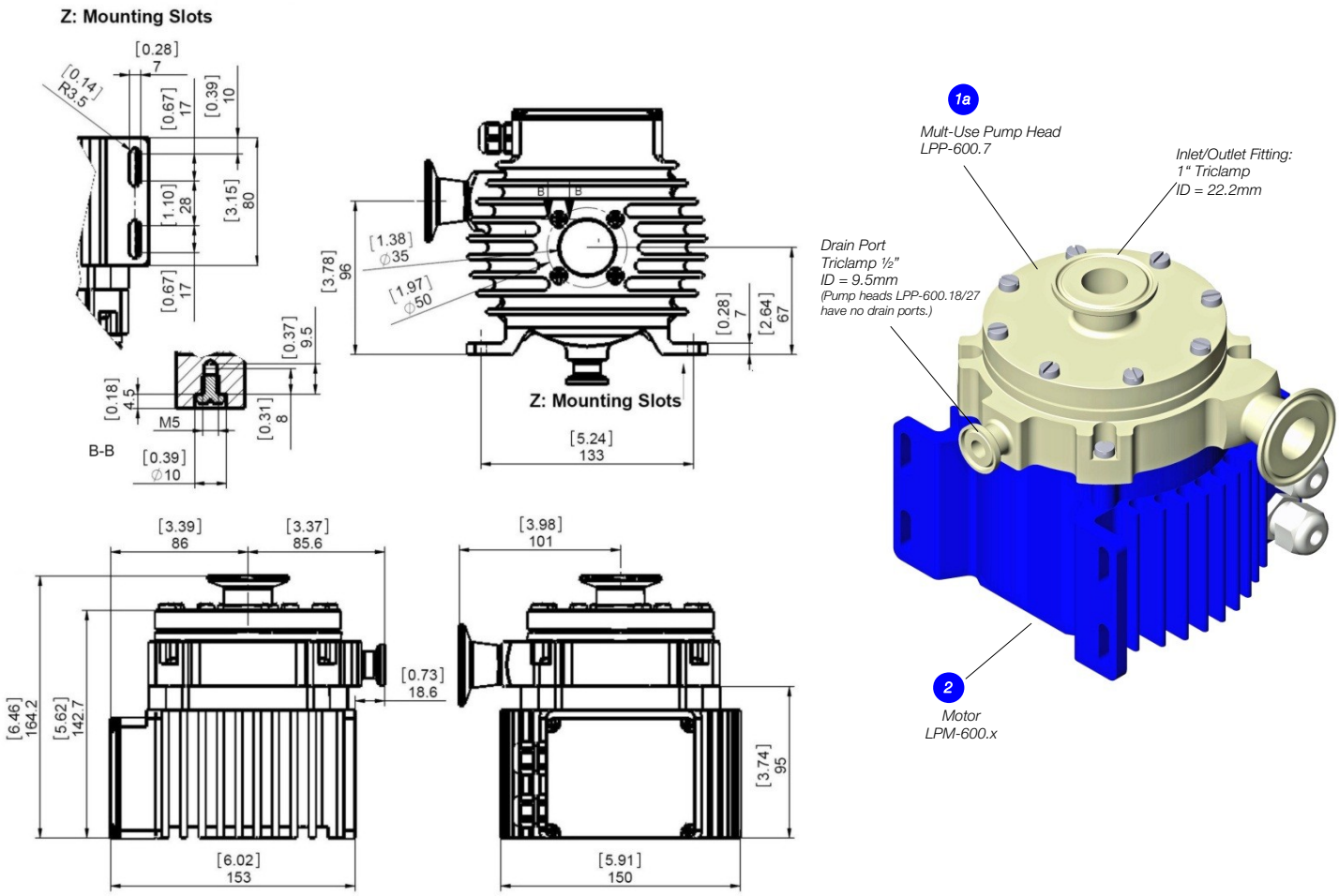

Figure 10: *Typical dimensions of motors LPM-600.x with multi-use pump head LPP-600.7/18*
(Similar dimensions for motor with pump head LPP-600.27. Consult relevant drawings for detailed information.)

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
PuraLev® 600MU.1	100-90590		LPM-600.5	LPC-600.1-02	
PuraLev® 600MU.2	100-90591	LPP-600.7 (PVDF)	LPM-600.5	LPC-600.2-02	
PuraLev® 600MU.4	100-90593	(with drain port)	LPM-600.4	LPC-600.1-02	
PuraLev® 600MU.5	100-90594		LPM-600.4	LPC-600.2-02	
PuraLev® 600MU.7	100-90596		LPM-600.5	LPC-600.1-02	
PuraLev® 600MU.8	100-90597	LPP-600.18 (PVDF)	LPM-600.5	LPC-600.2-02	
PuraLev® 600MU.10	100-90599	(without drain port)	LPM-600.4	LPC-600.1-02	
PuraLev® 600MU.11	100-90632		LPM-600.4	LPC-600.2-02	
PuraLev® 600MU.14	100-91325		LPM-600.13	LPC-600.1-06	
PuraLev® 600MU.15	100-91326	LPP-600.27 (SS)	LPM-600.13	LPC-600.2-06	
PuraLev® 600MU.17	100-91328	(without drain port)	LPM-600.12	LPC-600.1-06	
PuraLev® 600MU.18	100-91329		LPM-600.12	LPC-600.2-06	

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, IECEE CB scheme, ETL (NRTL), ATEX and IECEx.

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)	LPP-600.7 (with drain port)	100-90287	Impeller / Pump Housing Housing Sealing In-/Outlet Fittings Max. Flow / Max. Diff.-Pressure Max. Viscosity / Max. Liquid Temp. Wet Pump Volume/Surface Sterilization Methods	*PFA / PVDF (FDA, USP Class VI, BSE/TSE/Animal free)* *Triclamp EPDM (FDA, USP Class VI, BSE/TSE/Animal free)* *Triclamp 1" for in/outlet, Triclamp ½" for drain port (Standard: BS-4825-3)* *75 liters/min (20 gallons/min) / 3.2 bar (46 psi)* *50 cP / 90 °C (194 °F)* *113 ml / 363 cm² (without drain port)* *SIP (Steam in Place), CIP (Clean in Place), Autoclaving [1]*
1b		LPP-600.18 (without drain port)	100-90548		
1c	Multi-Use Pump Heads (Stainless Steel)	LPP-600.27 (without drain port)	100-91319	Impeller / Pump Housing Housing Sealing In-/Outlet Fittings Max. Flow / Max. Diff.-Pressure Max. Viscosity / Max. Liquid Temp. Wet Pump Volume/Surface Sterilization Methods	*Stainless Steel (EN 1.4435, AISI 316L)* *Triclamp O-ring (DIN/ISO 11864) EPDM (FDA, USP Class VI, BSE/TSE/Animal free)* *Triclamp 1" for in/outlet (Standard: ASME)* *75 liters/min (20 gallons/min) / 3.0 bar (43.5 psi)* *30 cP / 90 °C (194 °F)* *115 ml / 374 cm²* *SIP (Steam in Place), CIP (Clean in Place)*
2a	Motor (ATEX / IECEx)	LPM-600.5	100-10039	Housing Cable / Connectors	*Epoxy (anti-corrosive) coated Aluminum, waterproofed (IP67)* *2x 3m cables with PVC jacket / 2x circular (M23, IP-67)*
2b		LPM-600.13 [2]	100-10150	ATEX / IECEx Marking	CE Ex II 3G Ex nA IIC T5 Gc, CE Ex II 3D Ex tc IIIC T100°C Dc
2c	Motor (ATEX / IECEx)	LPM-600.4	100-10038	Housing	*ETFE (chemical resistant) coated Aluminum, waterproofed (IP67)*
2d		LPM-600.12 [2]	100-10149	Cable / Connectors	*2x 3m cables with FEP jacket / 2x circular (M23, IP-67)*
3a	Standalone Controller (User Panel)	LPC-600.1-02	100-30033	Voltage / Power	*48V DC / 600 W*
		LPC-600.1-06 [2]	100-30086	Interfaces	*Panel to set speed (automatic storage on internal EEPROM)*
			(Power cable and PLC connector incl.)	*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)*
				Standard Firmware	*For LPC-600.1-02: D6.25* *For LPC-600.1-06: D7.25*
3b	Extended Controller (PLC and USB)	LPC-600.2-02	100-30034	Interfaces	*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
		LPC-600.2-06 [2]	100-30087		*USB interface (for service and system monitoring)*
			(Power cable and PLC connector incl.)	Standard Firmware	*For LPC-600.2-02: D6.48* *For LPC-600.2-06: D7.48*

Table 2: *Specification of standard components*

Note 1: Autoclaving tool ART-600.1 necessary. Levitronix® to be contacted for more information. Note 2: LPP-600.27 pump head operating with these motor and controller combinations only.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
4a	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*
4b	Extension Adaptor Cable for Power	MCAP-600.2-05 (0.5m) MCAP-600.2-30 (3m) MCAP-600.2-50 (5m) MCAP-600.2-70 (7m) MCAP-600.2-100 (10m)	190-10227 190-10240 190-10126 190-10106 190-10241	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
5a	Air Cooling Module	ACM-600.2	190-10140	Material / Connection Port Air Pressure	*PP (+ 40% Talkum) / NPT 1/4"* *~1 - 3 bar (14 – 43 psi)*
5b	Air Cooling Module	ACM-600.3	190-10410	Material / Connection Port Air Pressure	*PP EL-S (black, conductive additive for ATEX applications) / NPT 1/4"* *~1 - 3 bar (14 – 43 psi)*
6a	Fan Cooling Module	FCM-600.1	190-10401	Housing / Cable Spec. Supply Spec. / IP Rating	*PP (+ 20% Talkum) white / PP jacket, 3m, circular sealed M12 connector (PP).* *24 VDC, 3.4 W / IP-65 (fan is IP68 rated).*
6b	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*
7 (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	AC/DC Power Supply	TSP 600-148-M (M = Modified Levitronix design from Traco)	100-40013 (Traco ID Number: T1068-01A)	Voltage / Power Output Voltage Input Certification or Standards	*48 VDC / 600 W* *85 – 265 VAC (automatic detection)* *CB, UL, CSA, Semi F47*
9	Autoclaving Reinforcing Tool	ART-600.1	190-10281	Purpose Material / Mounting Screws	*For stabilization of pump housing of pump heads during autoclaving* *Anodized Aluminum / 4 pcs M6 x 25mm (Stainless steel)*

Table 4: *Specification of accessories*

Figure 11: Pump system with standard components

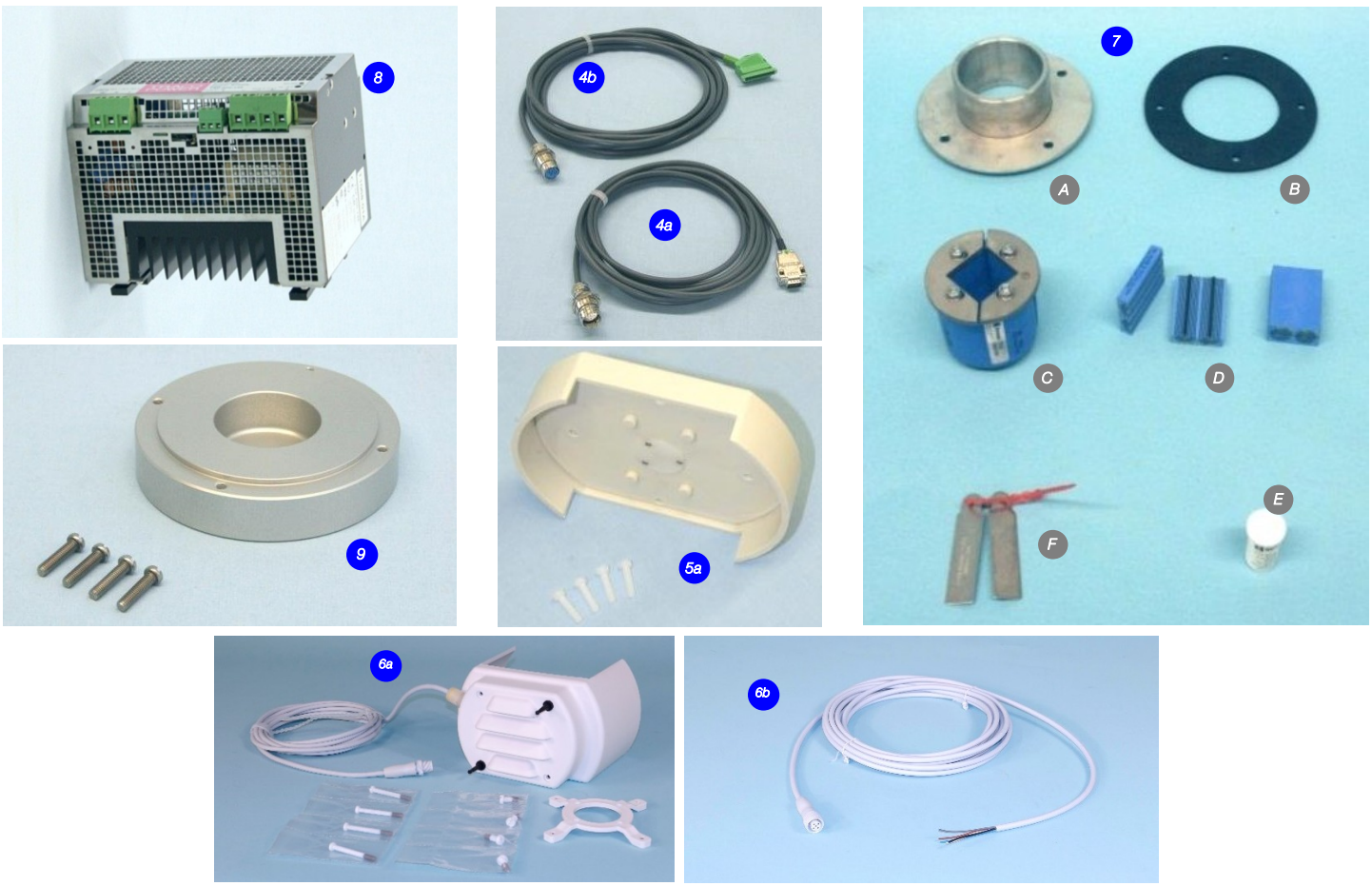

Figure 12: Accessories

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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