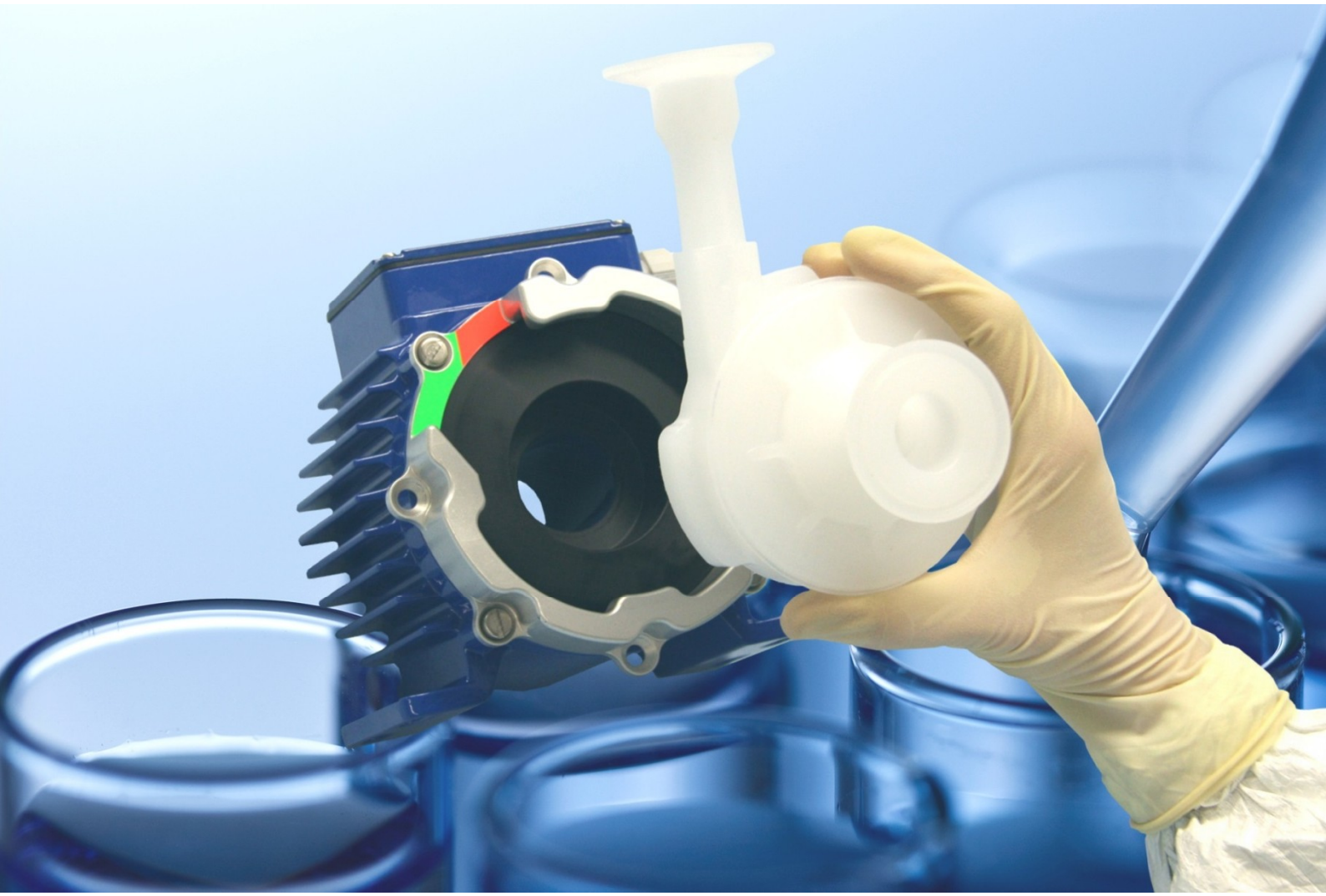
LEVITRONIX®

PuraLev®
Life Science Pump Series



PuraLev® 600SU (Single-Use)

3.1 bar	(45 psi)
75 liters/min	(20 gallons/min)

Low Shear Design - High Cell Viability

REVOLUTIONARY MAGLEV PUMP SYSTEM

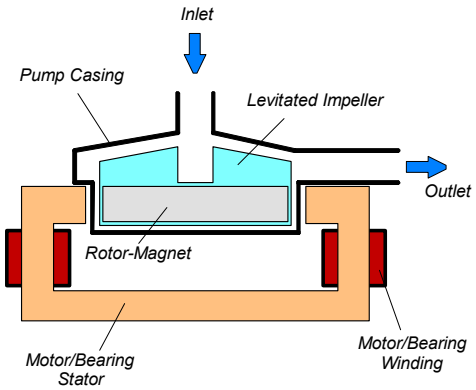


Figure 1: *Schematic of the main elements of the maglev centrifugal pump*

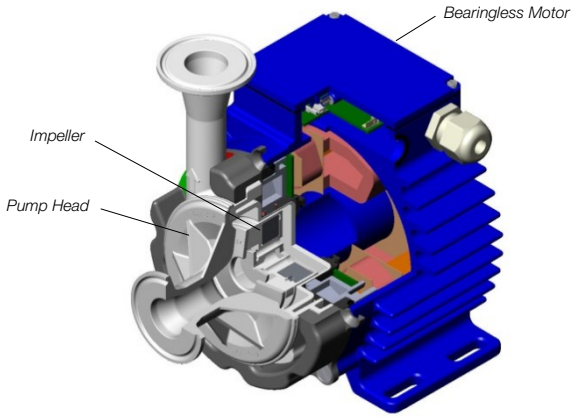


Figure 2: *Cross-section of the bearingless pump motor and pump head.*

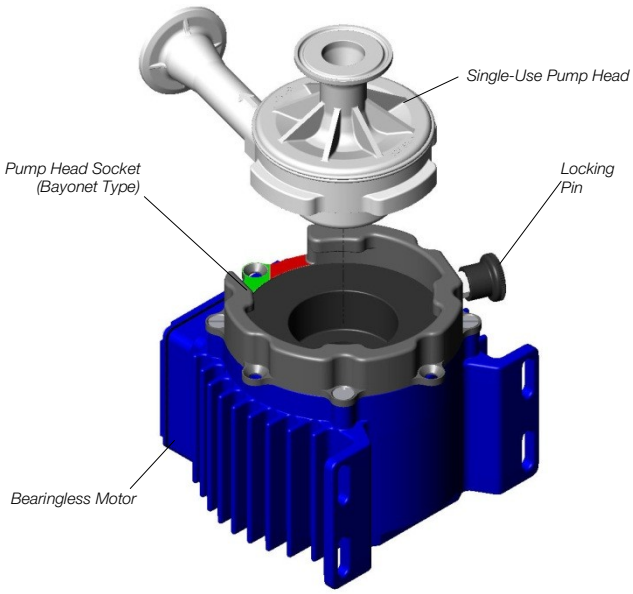


Figure 3: *Single-use pump head concept*

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) gamma sterilizable polypropylene (PP) and together they make up the disposable pump head. A simple and intuitive exchange of the single use pump head is achieved with a bayonet socket type mounting procedure (see *Figure 5*). Flow rate or pressure are 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 can be easily inserted and removed with an intuitive bayonet socket.

SYSTEM BENEFITS

- Low shear-forces
- Reduced risk of contamination due to the self-contained design with magnetic bearings
- No particle generation
- No over-pressure situations (compared to roller pumps)
- No narrow gaps between the impeller and pump casing where bacteria could be entrapped
- Pump head is gamma sterilizable
- Biocompatibility of wet materials:
  FDA, USP-VI, Animal/BSE/TSE free
- Bayonet socket design for easy and intuitive exchange of disposable pump head (see *Figure 5*)
- 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 (for example perfusion)
- Recirculation and transfer applications in bioreactors
- Filtration

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the *PuraLev® 600SU* 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® 600SU* 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. 5a* and *5b* in *Table 3*). An *Ex* 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* (see *Pos. 9*) 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) for maximum liquid temperature of 90 °C / 194 °F.
- *ATEX / IECEx* marking of motor with pump head:
  CE UKCA Ex II 3G Ex nA IIC T5 Gc
  CE UKCA Ex II 3D Ex tc IIIC T100°C Dc

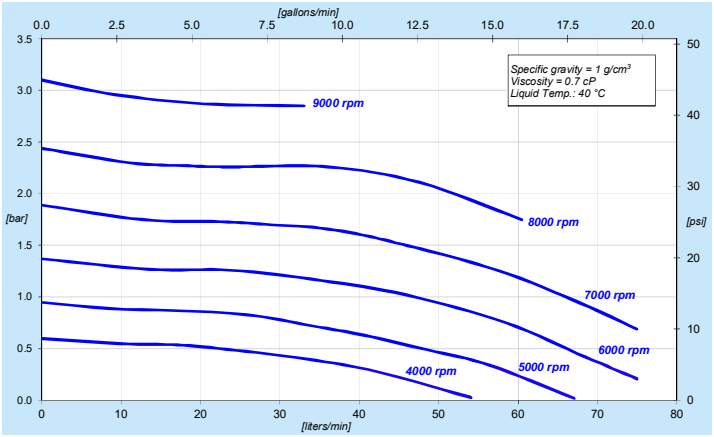


Figure 4: *Pressure/flow curves (DCP-600.2 pump head)*

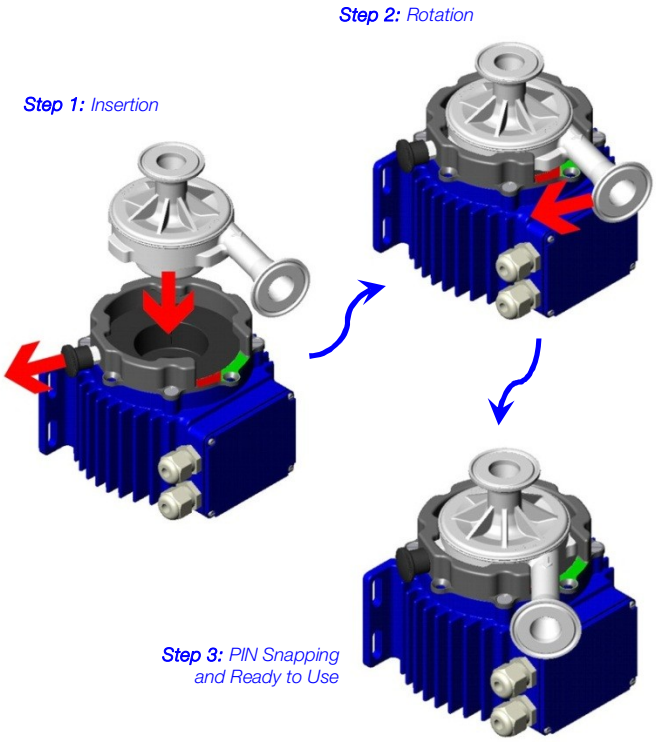


Figure 5: *Intuitive 3-step pump head mounting procedure with bayonet type socket (PHS-600.1)*

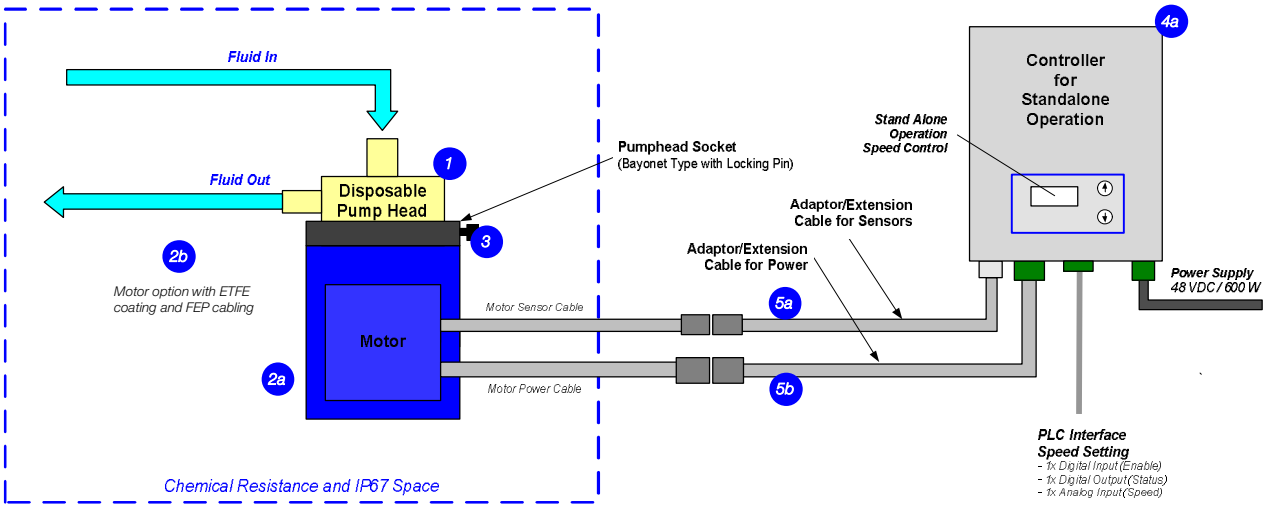


Figure 6: System configuration for standalone operation (Speed setting with integrated user panel)

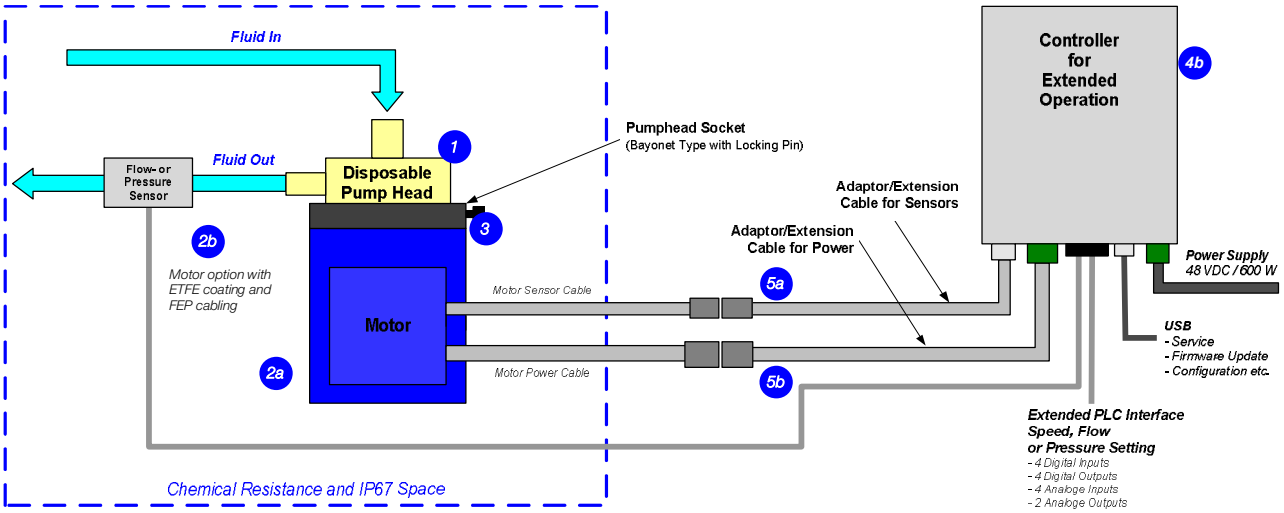


Figure 7: Extended operation (flow or pressure control) with extended controller

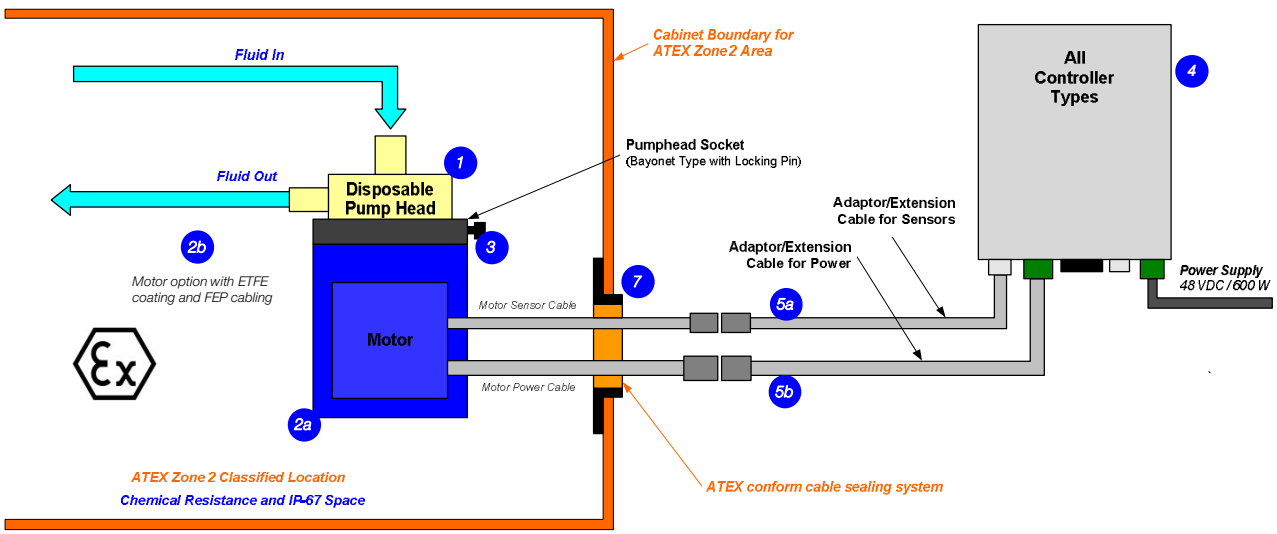


Figure 8: System Configuration for ATEX / IECEx applications

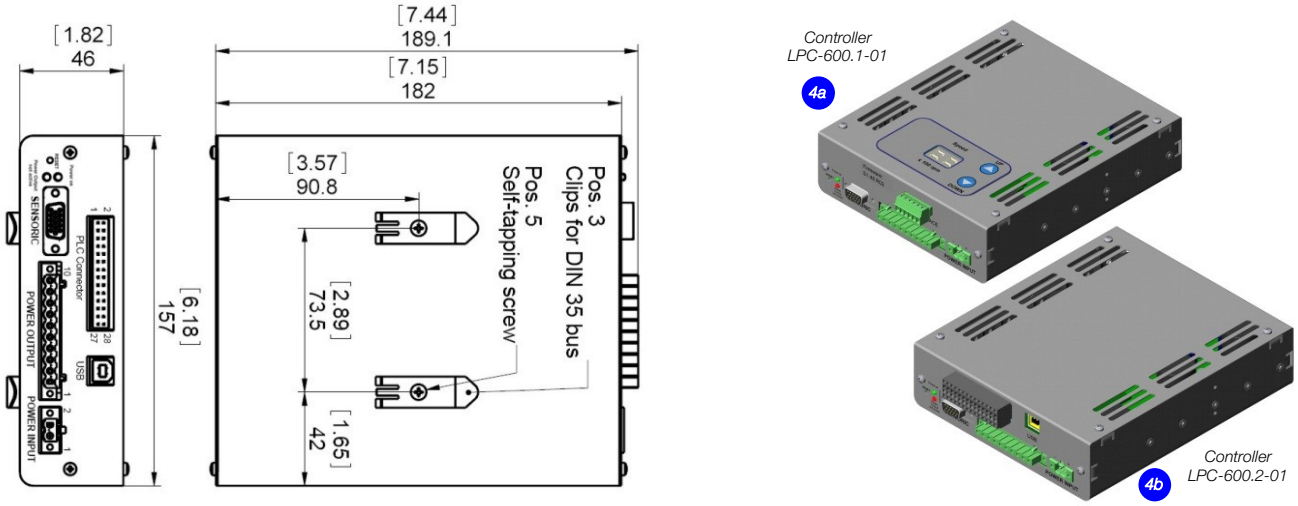


Figure 9: *Dimensions of controllers*
Note 1: Non-tolerated dimensions are for reference only.

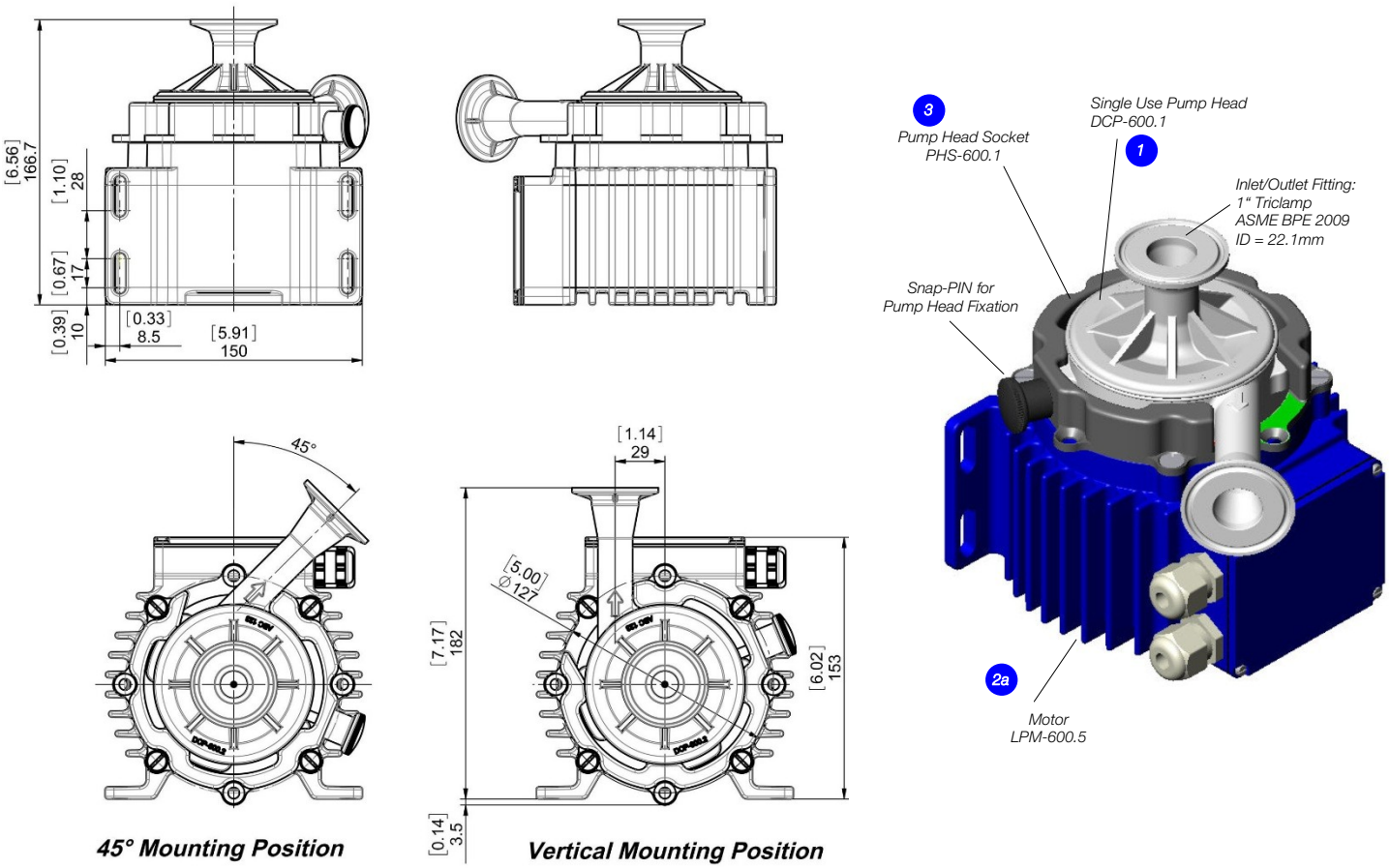


Figure 10: *Dimensions of motor with single-use pump head*
Note 1: Non-tolerated dimensions are for reference only.

ORDER INFORMATION

System Name	Article #	Pump Head Socket	Motor	Controller	Note
PLD-600SU.1	100-90654	PHS-600.1	LPM-600.5	LPC-600.1-01	*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.*
PLD-600SU.2	100-90655		LPM-600.5	LPC-600.2-01	
PLD-600SU.4	100-90657		LPM-600.4	LPC-600.1-01	
PLD-600SU.5	100-90658		LPM-600.4	LPC-600.2-01	

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	Single-Use (SU) Pump Heads	DCP-600.2	100-90784	Impeller / Pump Housing In-/Outlet Fittings	*Polypropylene (FDA, USP Class VI, BSE/TSE/Animal free)* *Triclamp 1" (ASME BPE 2009)*
1b		DCP-600.2-G25 (Gamma Irradiated with Dosage ≥ 25 kGy)	100-91079	Max. Flow Max. Diff.-Pressure Max. Viscosity Wet Pump Volume/Surface Max. Liquid Temp.	*75 liters/min / 20 gallons/min* *3.1 bar / 45 psi* *50 cP* *113 ml / 370 cm^2* *60°C / 140°F*
				Sterilization Methods	*Gamma radiation up to 40 kGy.*
1c	SU Pump Head with Sterile Fittings	DCP-600.2-SF1-G25	100-91294	Pump Type (A) / Adaptor (C) Sterile Fittings (B) Fitting Compatibility Applied Gamma Dosage	*DCP-600.2 / Triclamp reducer in Polypropylene* *AseptiQuik® X from CPC® with part # AQX33024* [1] *Various types including autoclavable versions available at CPC®* *≥ 25 kGy*
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)*
				ATEX / IECEx Marking	*II 3G Ex nA IIC T5 Gc / II 3D Ex tc IIIC T100°C Dc*
2b	Motor (ATEX / IECEx)	LPM-600.4	100-10038	Housing Cable / Connectors	*ETFE (chemical resistant) coated Aluminum, waterproofed (IP67)* *2x 3m cables with FEP jacket / 2x circular (M23, IP-67)*
3	Pump Head Socket	PHS-600.1	100-90696	Mounting Type Material Assembly Screws	*Bayonet type with locking pin* *Anodized Aluminum* *4 pcs M6x16 mm (Stainless Steel)*
4a	Standalone Controller (User Panel)	LPC-600.1-01	100-30039 (Power supply cable and Enable connector incl.)	Voltage / Power Housing Rating Interfaces Standard Firmware	*48V DC / 600 W* *IP20* *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) *D9.25*
4b	Extended Controller (PLC and USB)	LPC-600.2-01	100-30040 (Power supply cable and PLC connector incl.)	Interfaces Standard Firmware	*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 *USB interface (for service and system monitoring)* *D9.48*

Table 2: *Specification of standard components* *(Note 1: CPC® and AseptiQuik® are registered marks of the Colder Product Company)*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5a	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*
5b	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
6a 6b	Air Cooling Module	ACM-600.2 ACM-600.3 (for ATEX)	190-10140 190-10410	Material / Connection Port Air Pressure	*a) PP (+ 40% Talkum) b) PP EL-S (conductive black PP) / NPT 1/4"* *~1 - 3 bar (14 – 43 psi)*
7a	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).*
7b	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*
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.*
9	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*

Table 4: *Specification of accessories*

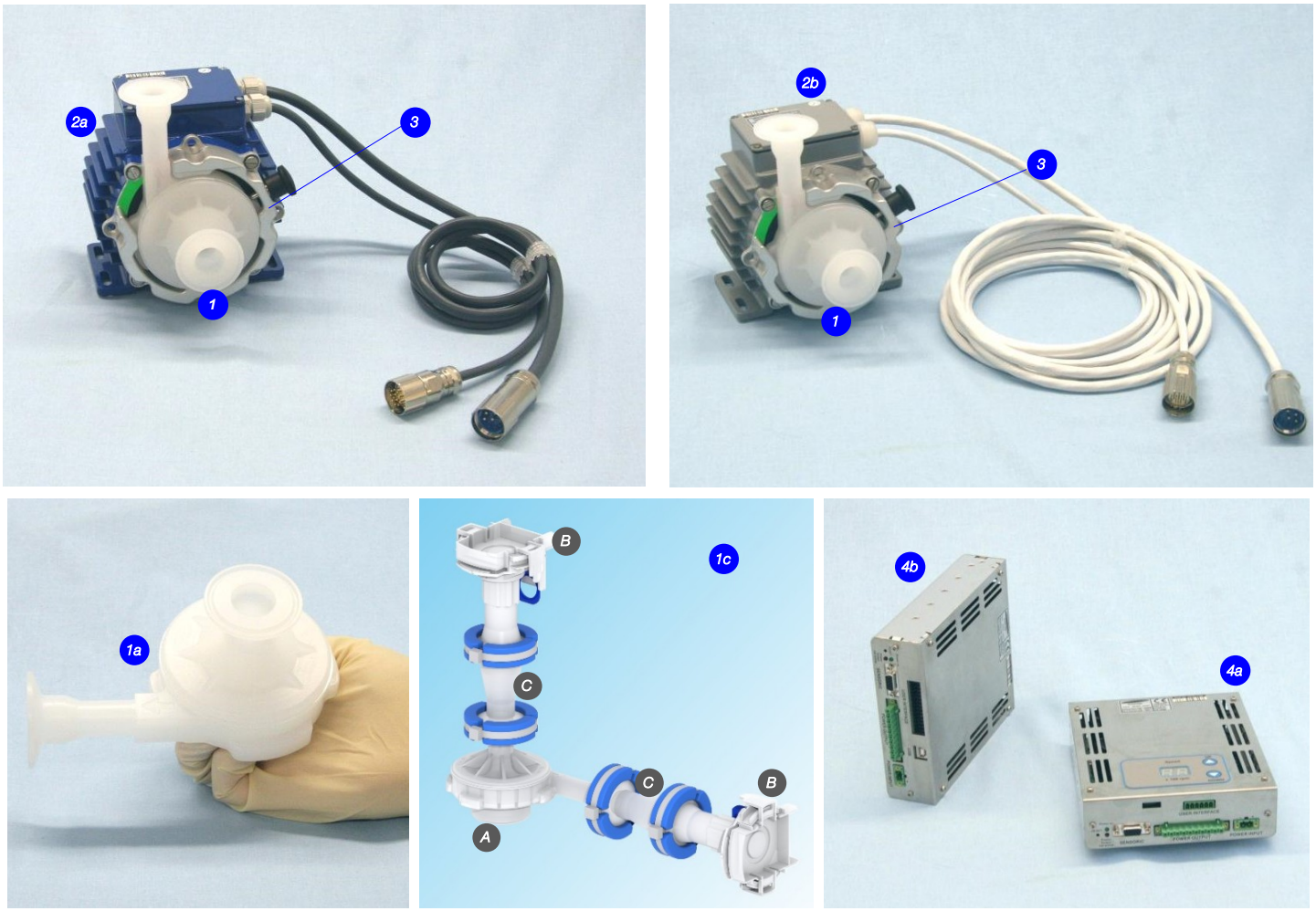


Figure 11: Pump system with standard components

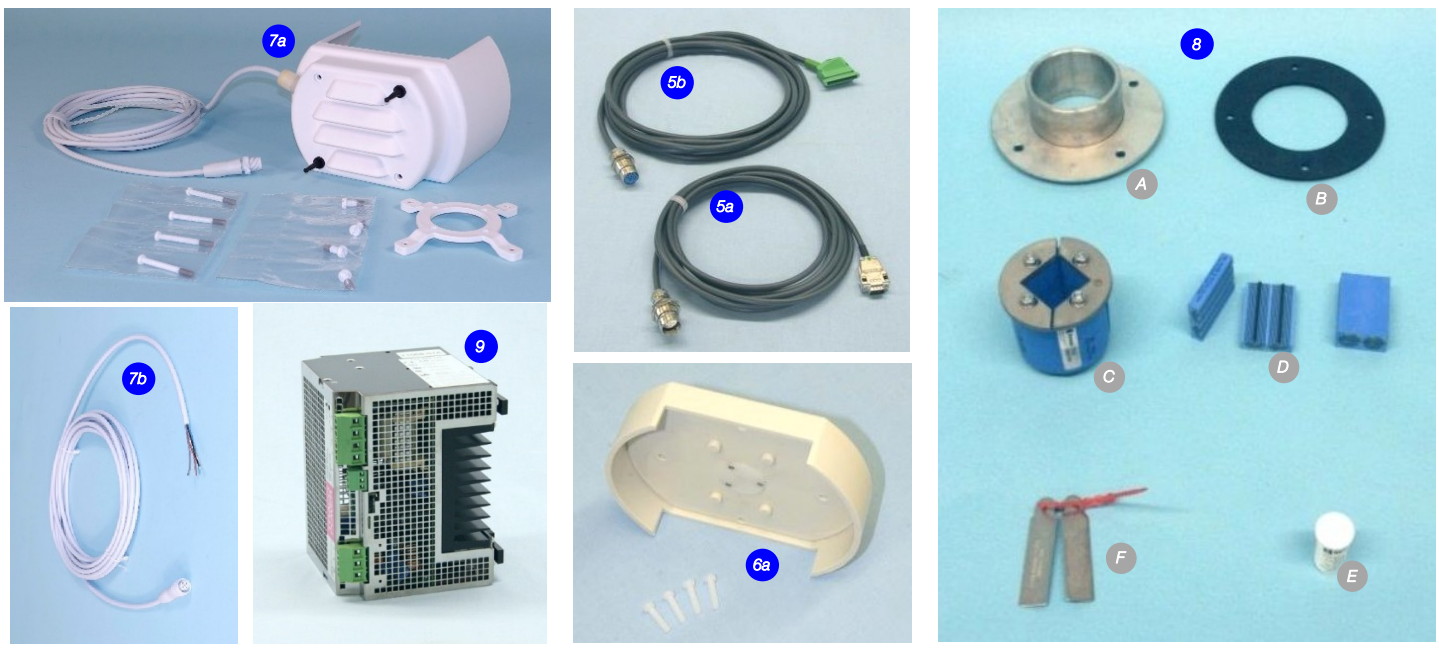


Figure 12: Accessories

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 Lifescience 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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