

PuraLev® Life Science Pump Series



PuraLev® 200SU (Single-Use)

2 bar	(29 psi)
21 liters/min	(5.5 gallons/min)

Low Shear Design - High Cell Viability

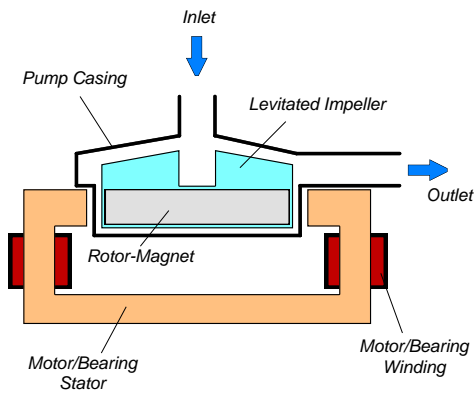


Figure 1: Schematic of the main elements of the maglev centrifugal pump

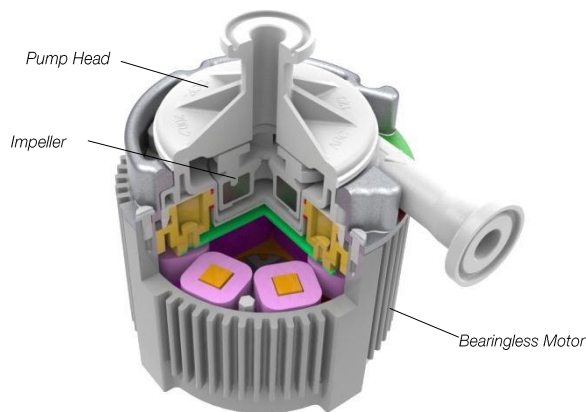


Figure 2: Cross-section of the bearingless pump motor and pump head

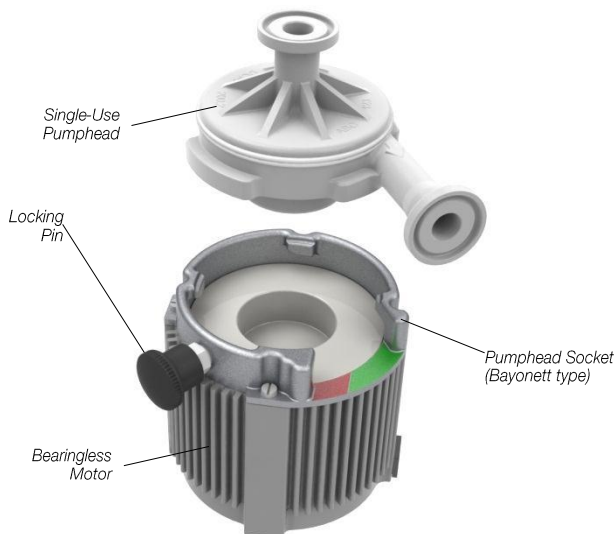


Figure 3: Single-use pump head concept

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® 200SU* 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 *Pos. 4a* in *Table 2*).



EXTENDED SYSTEM CONFIGURATION

The extended version of the *PuraLev® 200SU* 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 4b* 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. 5* in *Table 3*). An *Ex* conform solution is needed for the motor cables to leave the *ATEX* area. One option is an *Ex* certified cable sealing system as listed in *Table 4* (see *Pos. 8*) 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  II 3G Ex c nAc IIC T5
 CE  II 3D Ex c tc IIIC T100°C IP6x
- *Explosion groups*:

Group IIA: Propane (IPA), Methane, Acetone, Acetaldehyde
 Group IIB: Ethylene, Ethylenglycol
 Group IIC: Acetylene, Hydrogen (not carbon disulphide)
- *ATEX* listing corresponds to UL hazardous location *Class 1 Division 2*.

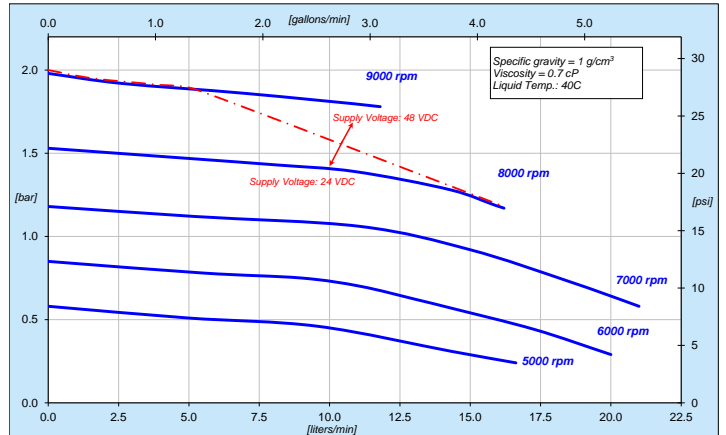


Figure 4: Pressure/flow curves (DCP-200.2 pump head)

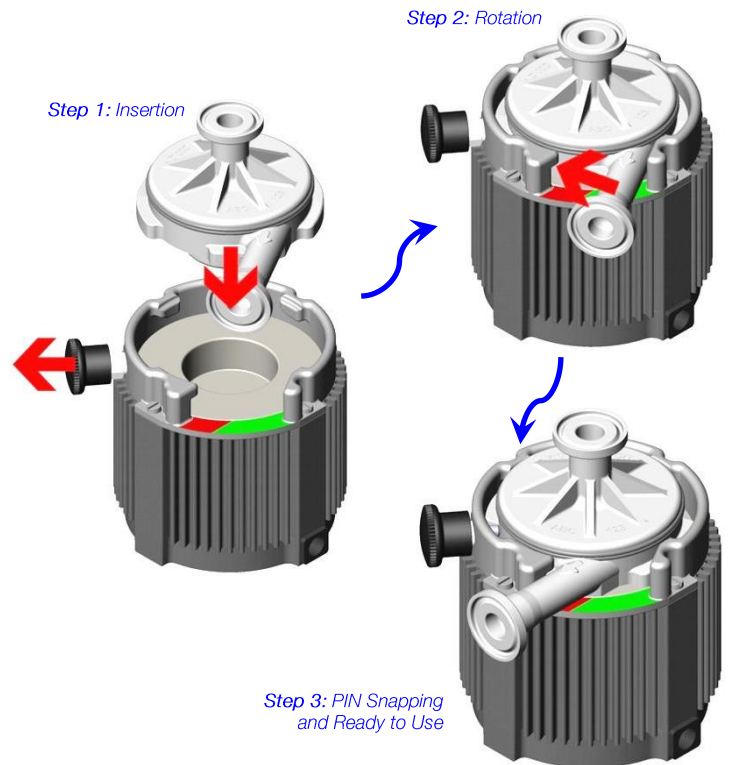


Figure 5: Intuitive 3-step pump head mounting procedure with bayonet type socket (PHS-200.1)

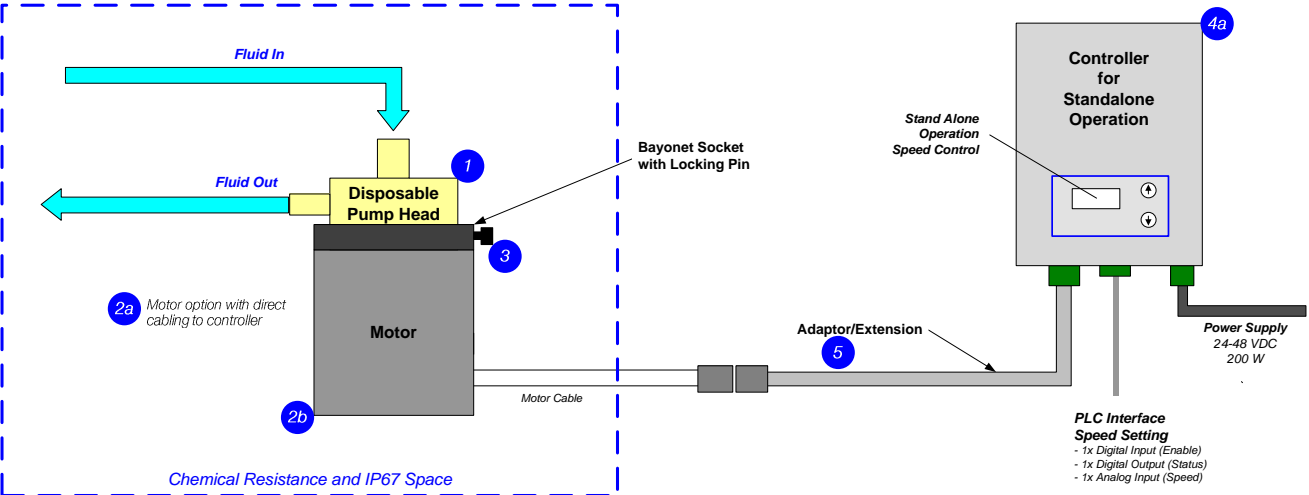


Figure 6: System configuration for standalone operation (Speed setting with integrated user panel)

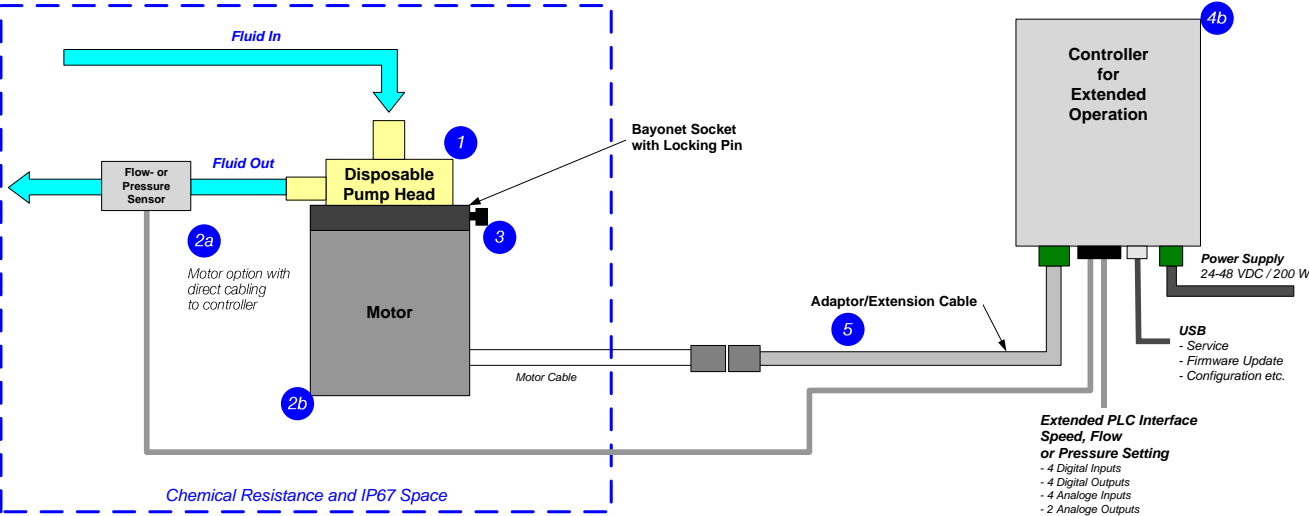


Figure 7: Extended operation (flow or pressure control) with extended controller

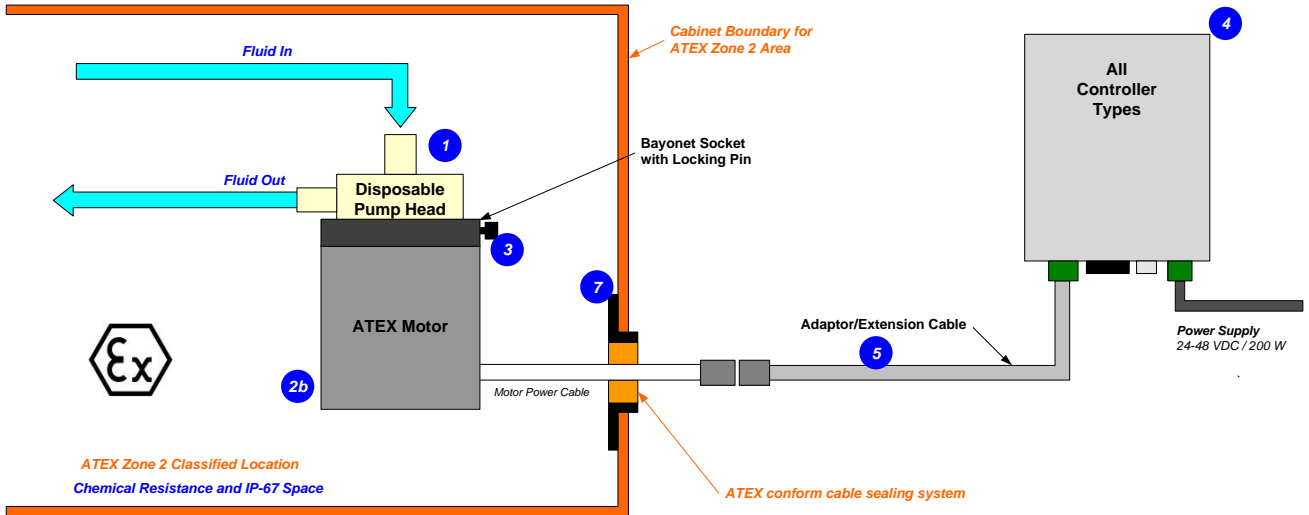


Figure 8: System Configuration for ATEX / IECEx applications

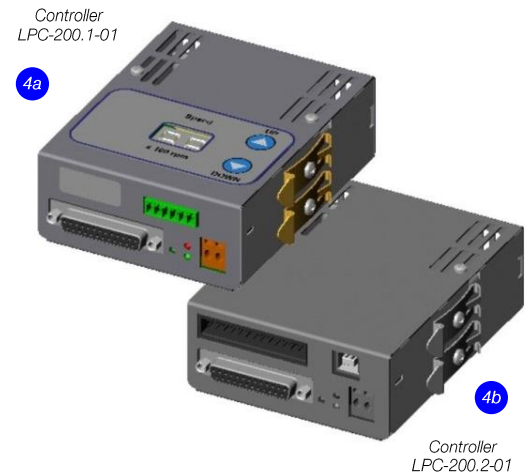
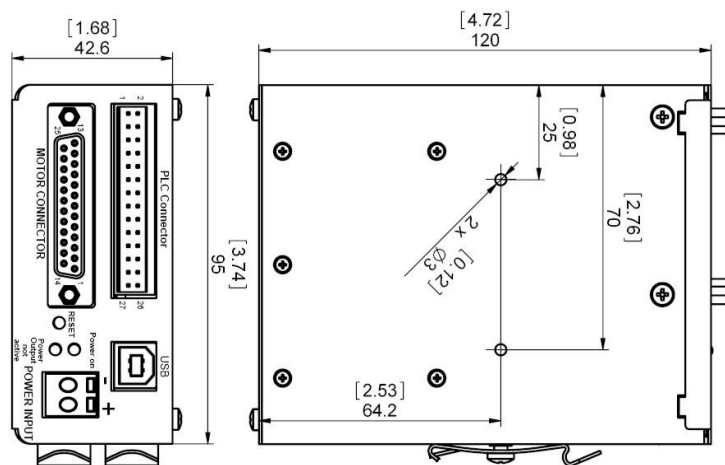


Figure 9: Dimensions of controllers

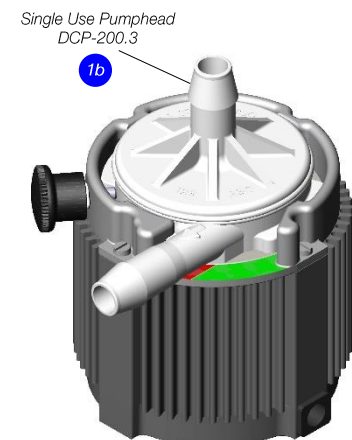
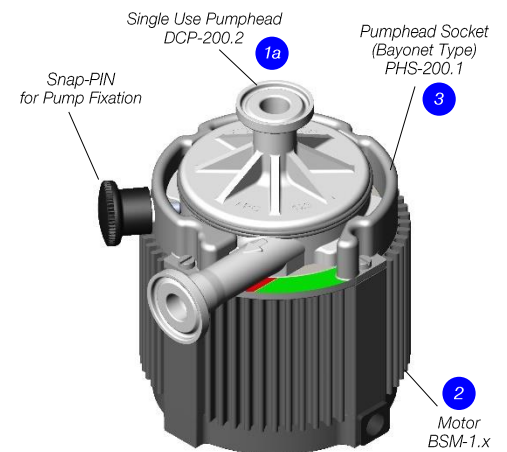
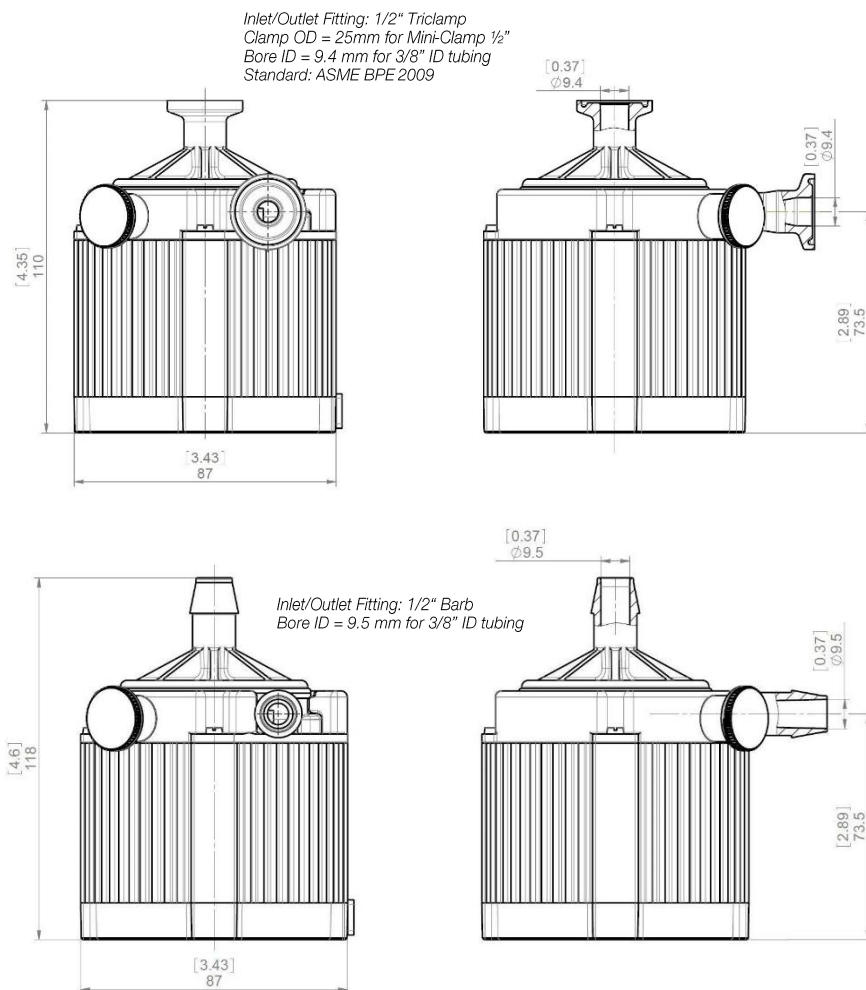


Figure 10: Basic dimensions of motor with single-use pump heads

ORDER INFORMATION

System Name	Article #	Pump Head Socket	Motor	Controller	Note
PLD-200SU.1	100-90647	PHS-200.1	BSM-1.4	LPC-200.1-01	Direct cabling between motor and controller.
PLD-200SU.2	100-90648	PHS-200.1	BSM-1.4	LPC-200.2-01	Certifications: CE, IECEx CB scheme, ETL (NRTL). ¹
PLD-200SU.4 (ATEX/IECEx)	100-90650	PHS-200.1	BSM-1.6	LPC-200.1-01	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.
PLD-200SU.5 (ATEX/IECEx)	100-90651	PHS-200.1	BSM-1.6	LPC-200.2-01	Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx.

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a 1b 1c 1d	Single-Use Pump Head	DCP-200.2 (Triclamp)	100-90734	Impeller / Pump Housing	Polypropylene (FDA, USP Class VI, BSE/TSE/Animal free)
		DCP-200.3 (Barb)	100-90792	Housing Sealing	Infrared welding
				In-/Outlet Fittings	Triclamp ½" or Barb ½" for tubing with typical ID 3/8"
				Max. Flow	21 liters/min / 5.5 gallons/min
		DCP-200.2-G25	100-91078	Max. Diff.-Pressure	2 bar / 29 psi
		DCP-200.3-G25	100-91122	Max. Viscosity	< 20 cP
		(Gamma Irradiated with Dosage ≥ 25 kGy)		Wet Pump Volume/Surface	24 ml / 150 cm² with Triclamp and 25 ml / 150 cm² with Barb fittings
				Max. Liquid Temp.	60°C / 140°F
				Applicable Sterilization	Gamma radiation up to 40kGy
2a	Motor	BSM-1.4	100-10005	Housing	ETFE (chemical resistant) coated Aluminum, waterproofed (IP67)
				Cable / Connectors	1x 5m cables with FEP jacket / 1x D-SUB (direct cable to controller)
2b	Motor (ATEX / IECEx)	BSM-1.6	100-10063	Cable / Connections	1x 2m cable with FEP jacket / 1x circular (M23, IP-67) (needs extension adaptor cable for connection to controller)
				ATEX / IECEx Marking	CE II 3G Ex c nAc T5 CE II 3D Ex c tc IIIC T100°C IP6x
3	Pump Head Socket	PHS-200.1	100-90695	Mounting Type	Bayonet type with locking pin
				Material	Anodized Aluminum
				Assembly Screws	4 pcs M3 x 8mm (Stainless Steel, INOX A4)
4a	Standalone Controller (User Panel)	LPC-200.1-01	100-30027 (Enable connector included)	Voltage / Power	24-48 V DC / 200 W
				Interfaces	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)
4b	Extended Controller (PLC and USB)	LPC-200.2-01	100-30028 (PLC connector included)	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
					USB interface (for service and system monitoring)
				Standard Firmware	C3.48

Table 2: Specification of standard components

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5	Extension Adaptor Cable for Motor	MCA-1.5-05 (0.5m)	190-10225	Jacket Material Connectors	PVC Circular Wallmountable Metallic (IP-67) to D-SUB
		MCA-1.5-30 (3m)	190-10231		
		MCA-1.5-50 (5m)	190-10199		
		MCA-1.5-70 (7m)	190-10232		
		MCA-1.5-100 (10m)	190-10233		

Table 3: Specification of adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
6	Air Cooling Module	ACM-1.1	190-10003	Material / Connection Port	PVDF / NPT 1/4"
				Air Pressure	~0.5 bar (7.2 psi)
7	Mounting Base Plate	MBP-1.1	190-10004	Material	PVDF
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.
9a	AC/DC Power Supply	TSP 360-124 (Standard Traco Supply)	100-40016	Voltage / Power Output Voltage Input	24 VDC / 360 W 85 - 132 / 187 - 264 VAC, autoselect
				Dimensions	125 x 125 x 80 mm
				Certification or Standards	UL, CSA, CB, Semi F47
9b	AC/DC Power Supply	TSP 360-148	100-40017	Voltage / Power Output	48 VDC / 300 W

Table 4: Specification of accessories

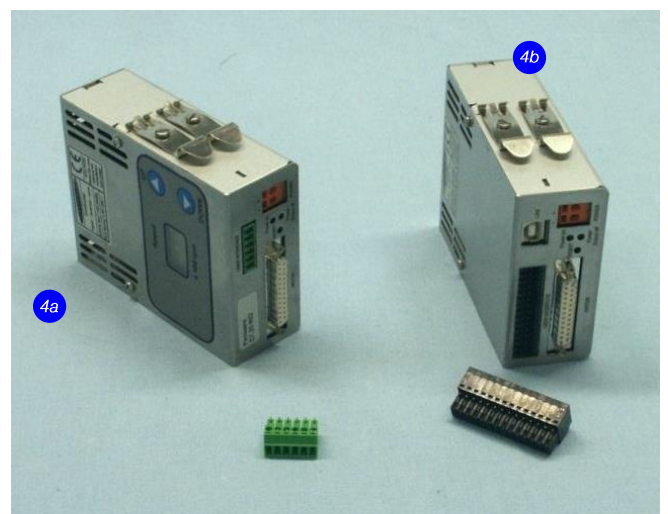
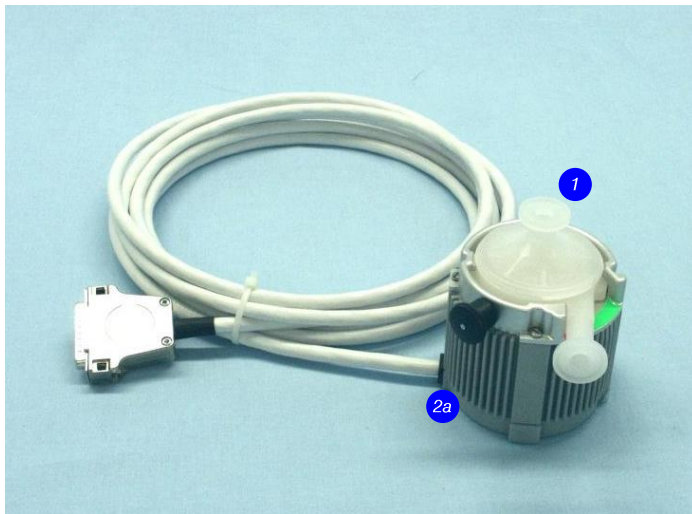


Figure 11: Pump system with standard components

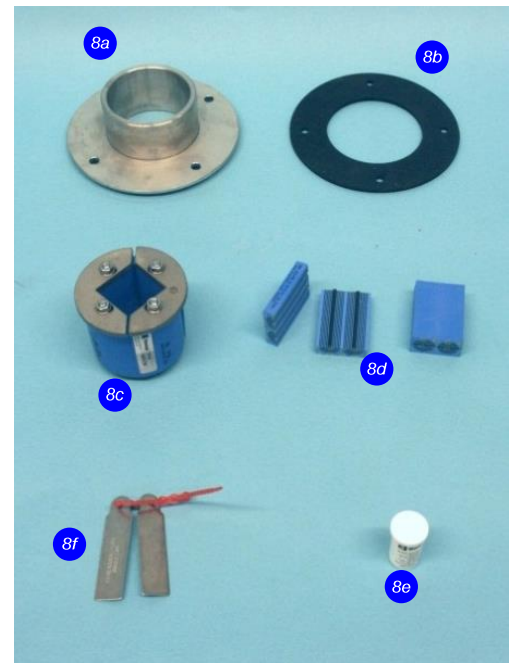
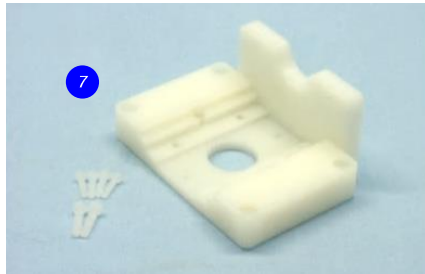
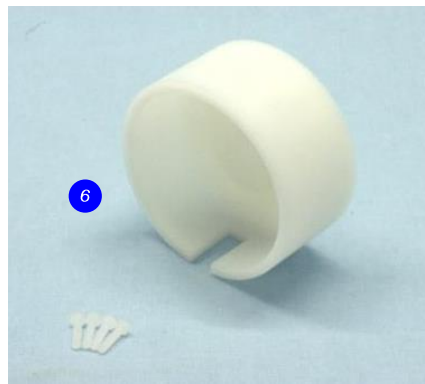


Figure 12: Accessories

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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