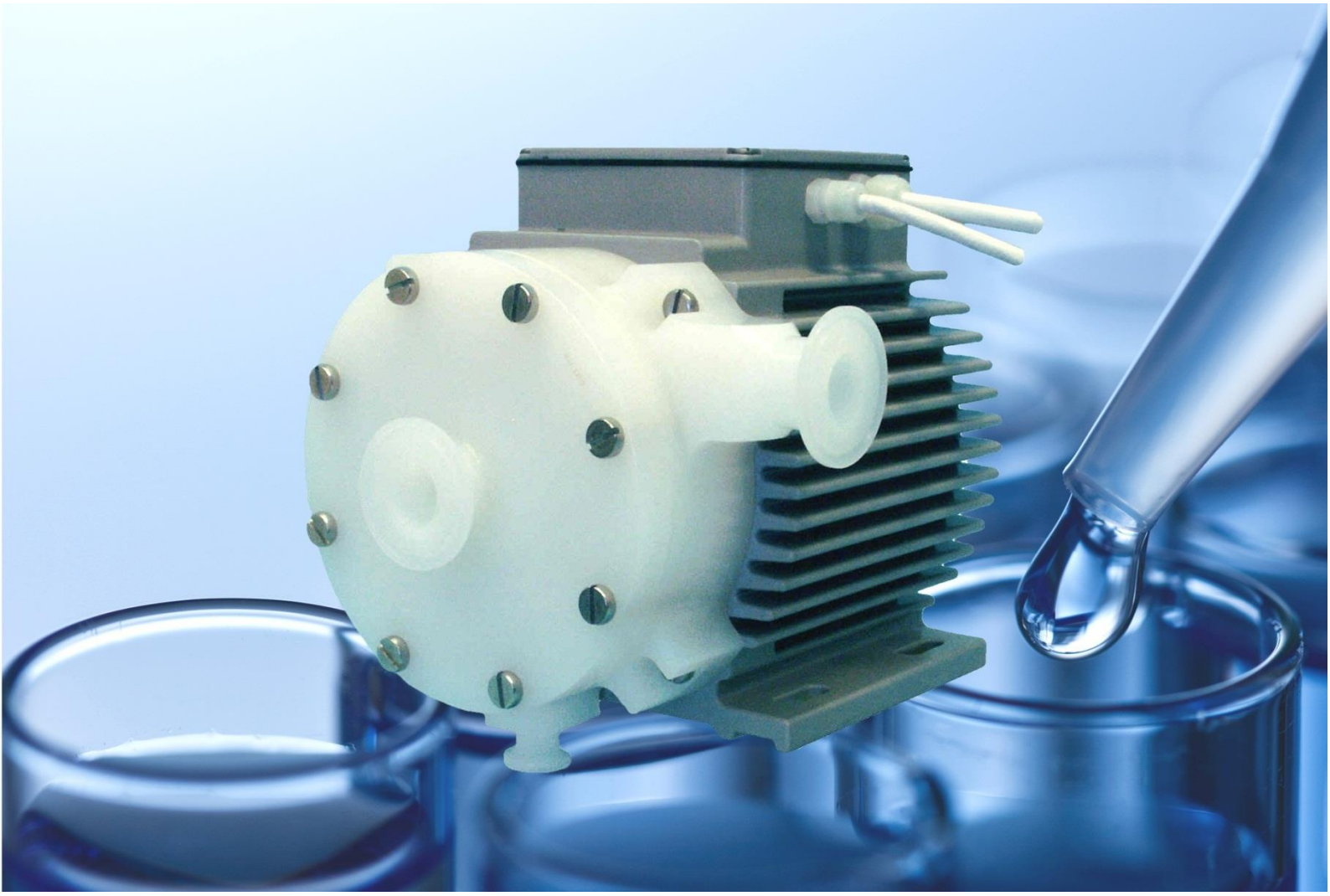
LEVITRONIX®

PuraLev®
Life Science Pump Series



PuraLev® 4MU (Multi-Use)

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

No Bearings. No Seals. No Contamination!

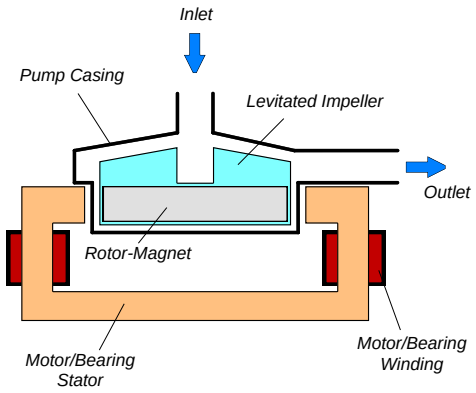


Figure 1: *Schematic of the main elements of the maglev centrifugal pump*

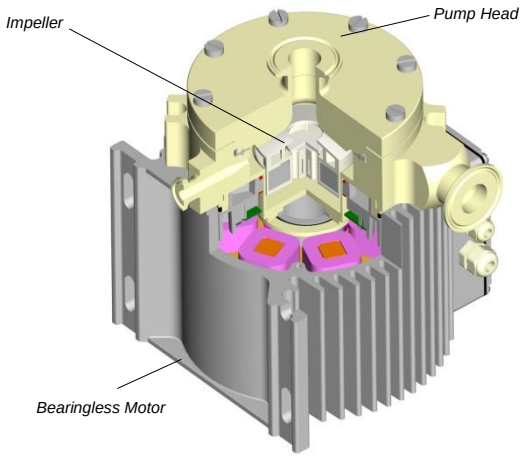


Figure 2: *Cross-section of the bearingless pump motor and pump head.*

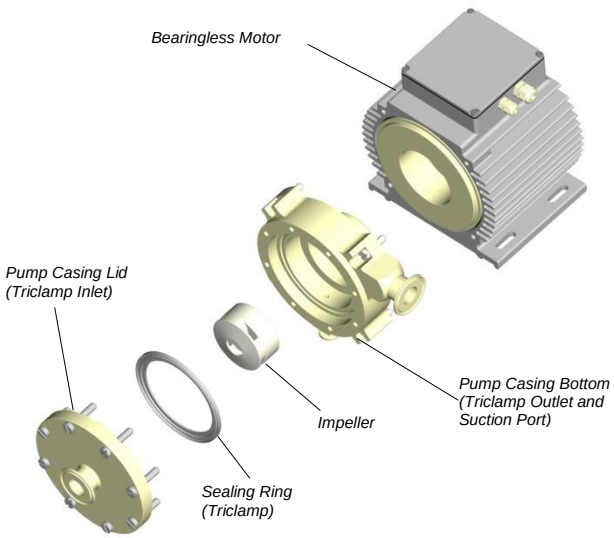


Figure 3: *Mulit-use pump head concept*

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) fluorocarbon resins 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 over-pressure situations (compared to roller pumps)
- 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:
  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

SYSTEM CONFIGURATION FOR STAND-ALONE OPERATION

If the *PuraLev® 4MU* needs to be operated as standalone system a handheld user panel (*LUI-A.1*) can be attached to the *RS232* port of the controller allowing the operator to set the speed manually (see *Figure 6*).

Furthermore the user panel displays also error messages for efficient problem solving.

SYSTEM CONFIGURATION FOR EXTENDED OPERATION

For external control with analog and digital signals a designated *PLC* module (*PLC-A.1*) can be attached to the controllers *PLC* interface allowing to set the speed with an analog signal and control operation with various digital signals (see *Figure 7*).

For more sophisticated operation and control the *RS232* port on the controller can be used. Contact *Levitronix®* for the relevant protocol.

A computer can be connected via the RS232 interface to allow communication with *Levitronix® Service Software*. Hence parameterization, firmware updates and failure analysis are possible.

SYSTEM CONFIGURATION FOR PROCESS CONTROL

Precise flow or pressure control can be realized in a closed loop together with a flowmeter or pressure sensor as illustrated in *Figure 8*. *Levitronix®* provides either turnkey solutions for closed-loop flow control or helps to design your own flow control system. In addition to the flow control function, the *Levitronix®* control firmware comes with several condition monitoring features to monitor the integrity of the fluid circuit. *Levitronix®* flow control systems can generate alarms for preventive filter exchange, no-flow conditions or line clogging. Dynamic Condition Trending (DCT) enables failure prediction and scheduling of preventive maintenance.

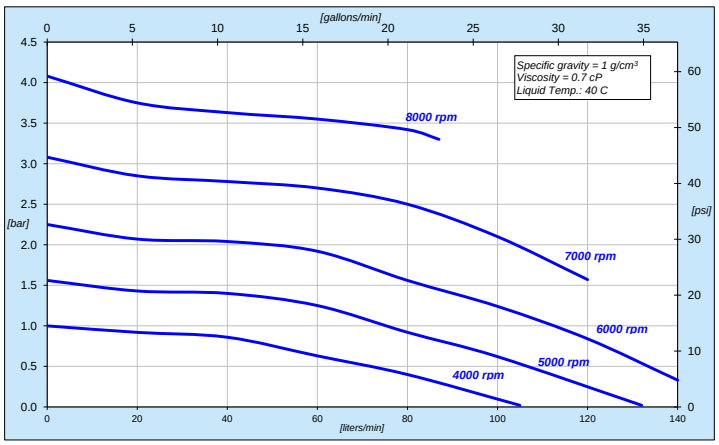


Figure 4: Pressure/flow curves

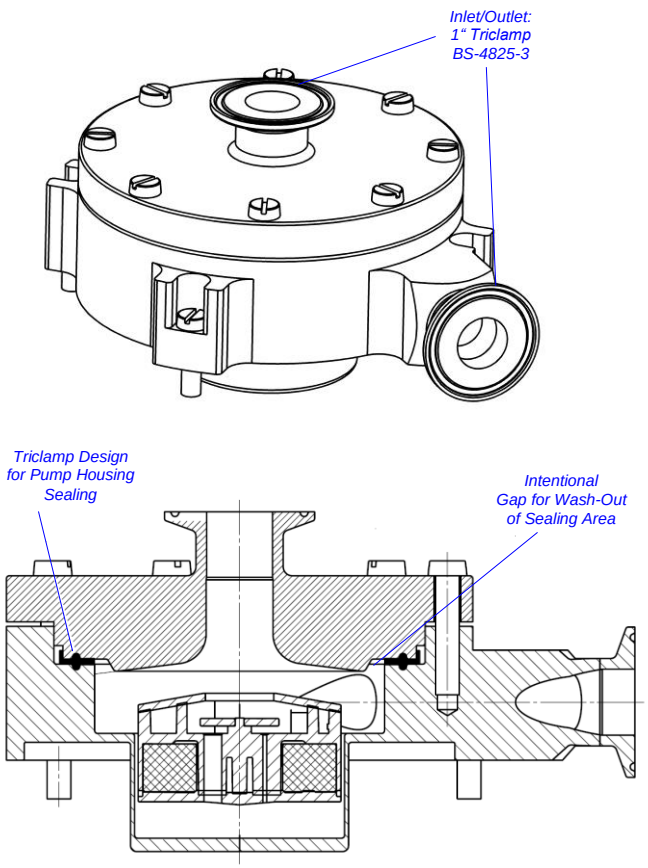


Figure 5: Aseptic pump head (without drain port)

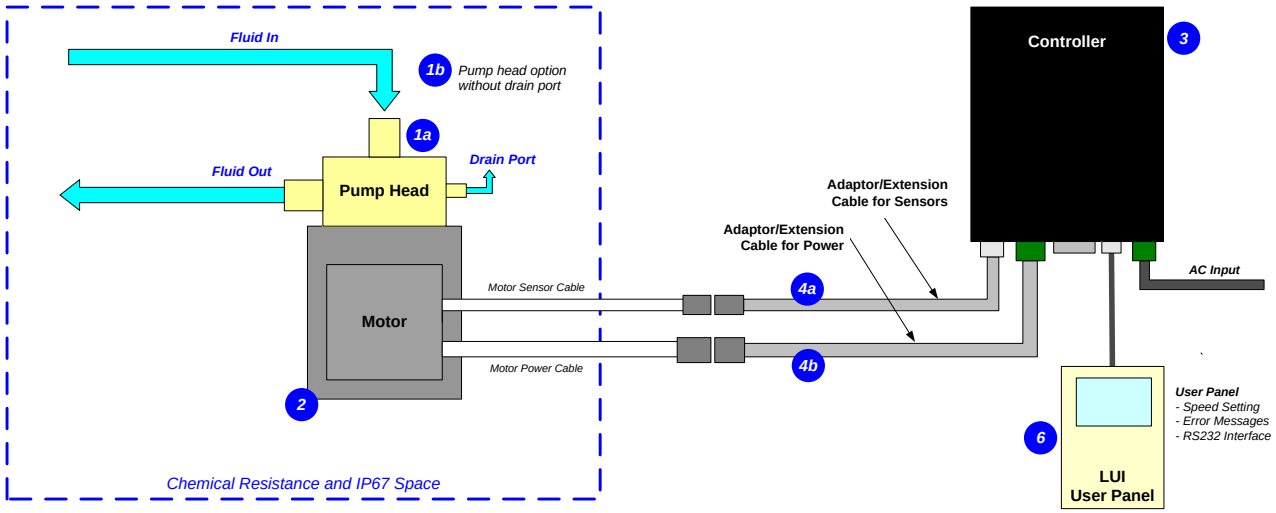


Figure 6: System configuration for standalone operation (speed setting with user panel)

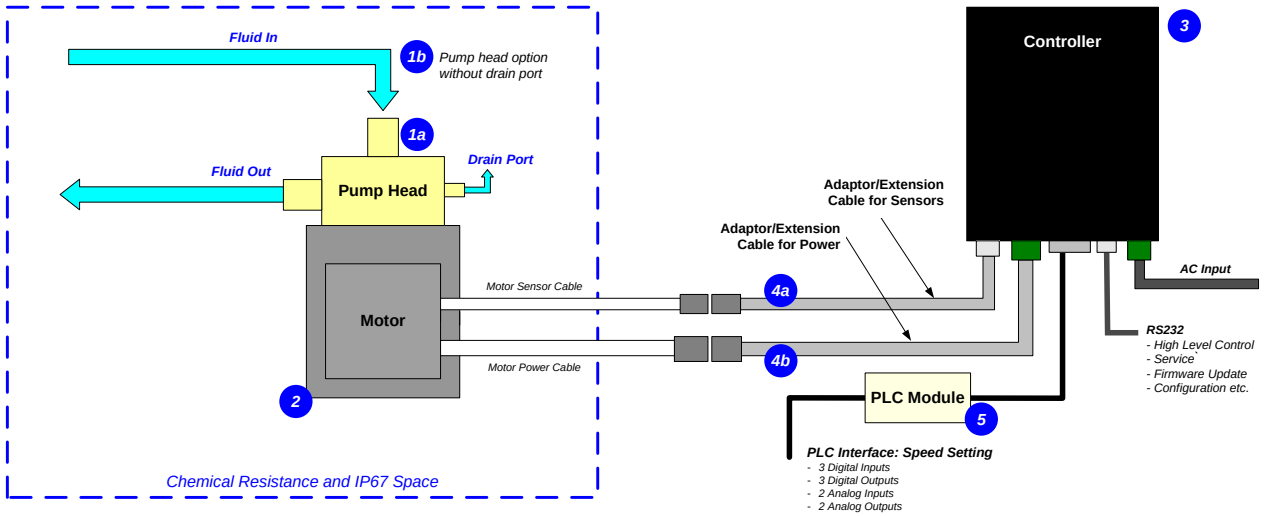


Figure 7: Extended operation with PLC module

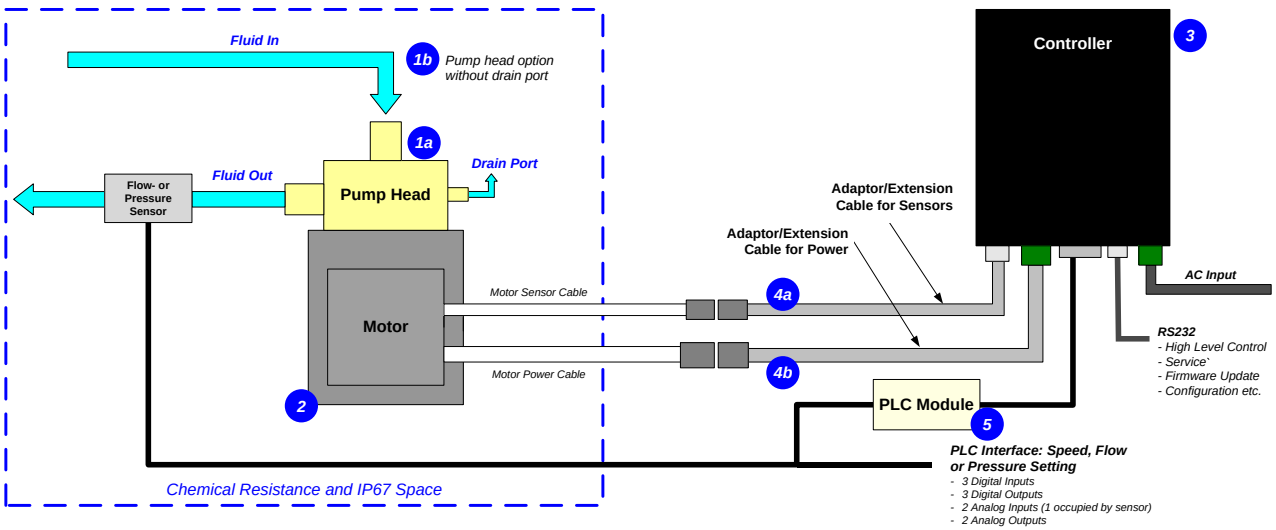


Figure 8: System configuration for process control (pressure or flow)

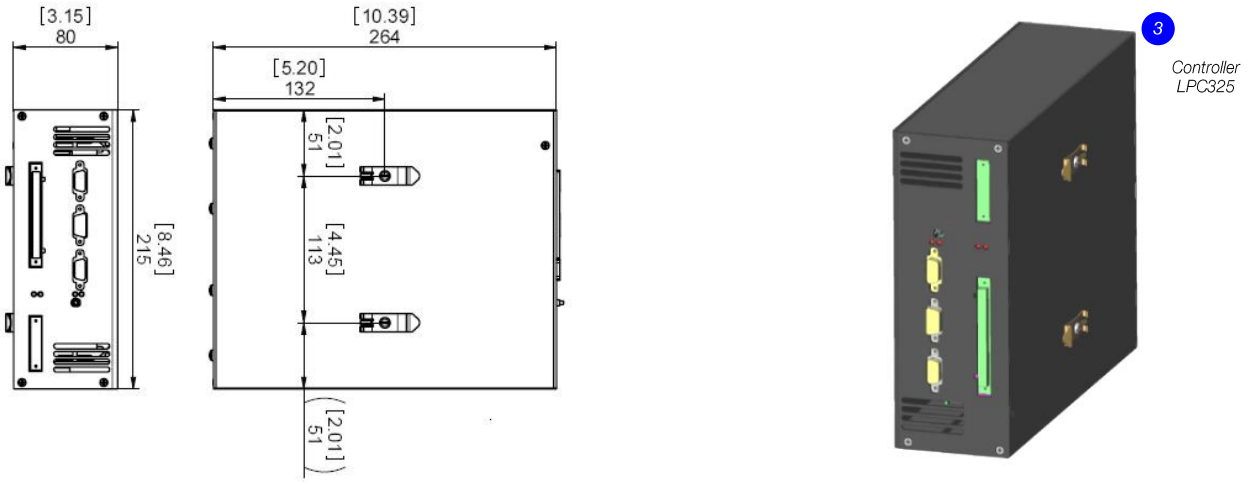


Figure 9: Dimensions of controller

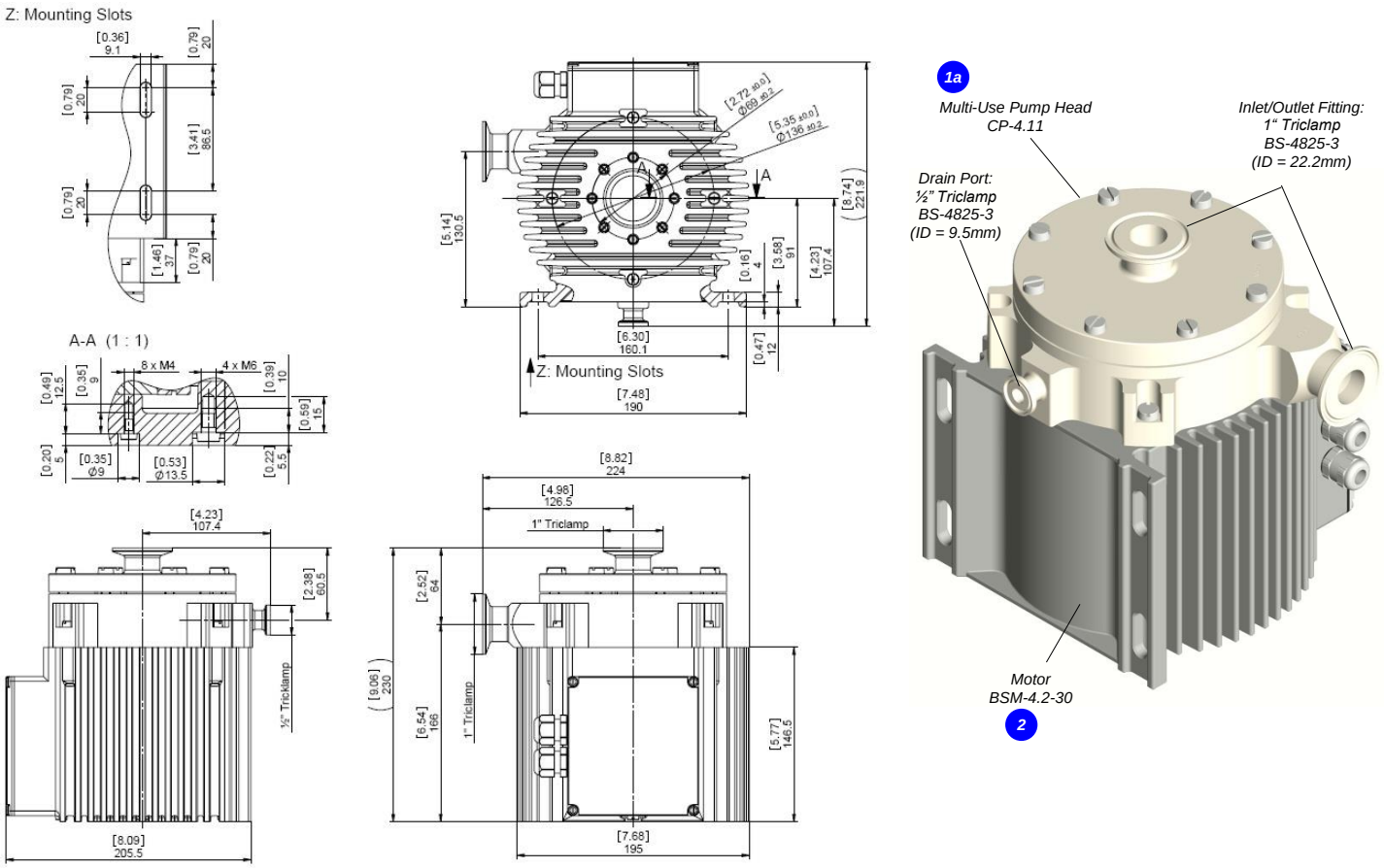


Figure 10: Dimensions of motor with multi-use pump head

ORDER INFORMATION

System Name	Article #	Pump Head	Motor	Controller	Note
PuraLev® 4MU.1	100-90786	CP-4.11 (with drain port)	BSM-4.2-30	LC325	*Adaptor/Extension (0.5 - 10m) cables according to Table 3 have to be ordered as separate article with specified length.*
PuraLev® 4MU.2	100-90787	CP-4.19 (without drain port)	BSM-4.2-30	LC325	

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1	Multi-Use Pump Heads	CP-4.11 (with drain port)	100-90245	Impeller / Pump Housing Sealing Ring Fittings	*PFA / PVDF (FDA, USP Class VI, BSE/TSE/Animal free)* *EPDM (FDA, USP Class VI, BSE/TSE/Animal free)* *Triclamp 1" for in/outlet and Triclamp ½" for drain port (Standard: BS-4825-3)*
				Max. Flow Max. Diff.-Pressure Max. Viscosity	*140 liters/min / 37 gallons/min* *4.1 bar / 59.5 psi* *50 cP*
		CP-4.19 (without drain port)	100-90458	Wet Pump Volume/Surface	*260 ml / 629 cm^2*
				Max. Liquid Temp.	*90°C / 194°F*
				Sterilization Methods	*CIP, SIP, Autoclaving [1]*
2	Motor	BSM-4.2-30	100-10011	Housing	*ETFE coated Aluminum, waterproofed (IP67)*
				Cable / Connectors	*2x 3m cables with PVC jacket / 2x circular (M23, IP-67)*
3	Controller	LC325	100-30003 (Controller with power supply connector incl. in 100-90313)	Voltage Power	*3x 200 or 208 V AC, 1x 230 V AC, ± 10%, 50/60 Hz* *1500 W*
				Interfaces	*PLC in connection with PLC module PLC-A.1* *RS232 interface (for service and system monitoring)*
				Standard Firmware	*S 1.48*

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

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
4a	Extension Adaptor Cable for Sensors	MCAS-4.2-05 (0.5m) MCAS-4.2-30 (3m) MCAS-4.2-50 (5m) MCAS-4.2-70 (7m) MCAS-4.2-100 (10m)	190-10285 190-10136 190-10134 190-10286 190-10287	Jacket Material Connectors	*PUR (Polyurethan)* *Circular Wallmountable, Metallic (IP-67) to D-SUB*
4b	Extension Adaptor Cable for Power	MCAP-4.2-05 (0.5m) MCAP-4.2-30 (3m) MCAP-4.2-50 (5m) MCAP-4.2-70 (7m) MCAP-4.2-100 (10m)	190-10288 190-10137 190-10135 190-10289 190-10290	Jacket Material Connectors	*PUR (Polyurethan)* *Circular Wallmountable, Metallic (IP-67) to COMBICON*

Table 3: Specification of adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
5	PLC Module	PLC-A.1	100-30204	Digital Inputs Digital Outputs	*3x 24V DC (typical), galvanic isolated* *3x closing relay (30V, 1A)*
				Analog Inputs Analog Outputs	*2x 4-20mA, not galvanic isolated* *2x 0-5V, not galvanic isolated*
6	User Interface Module	LUI-A.1	100-30300	Purpose	*Standalone manual operation*
				Interface	*RS232 (for connection to controller)*
7	Air Cooling Module	ACM-4.2	190-10139	Material / Connection Port	*PP (+ 40% Talkum) / NPT 1/4"*
				Air Pressure	*~1 - 3 bar (14 – 43 psi)*
8	Autoclaving Reinforcing Tool	ART-2000.1	190-10282	Purpose	*Stabilization of pump housing during autoclaving*
				Material	*Anodized Aluminum*
				Mounting Screws	*4 pcs M8 x 30mm (Stainless steel)*

Table 4: Specification of accessories

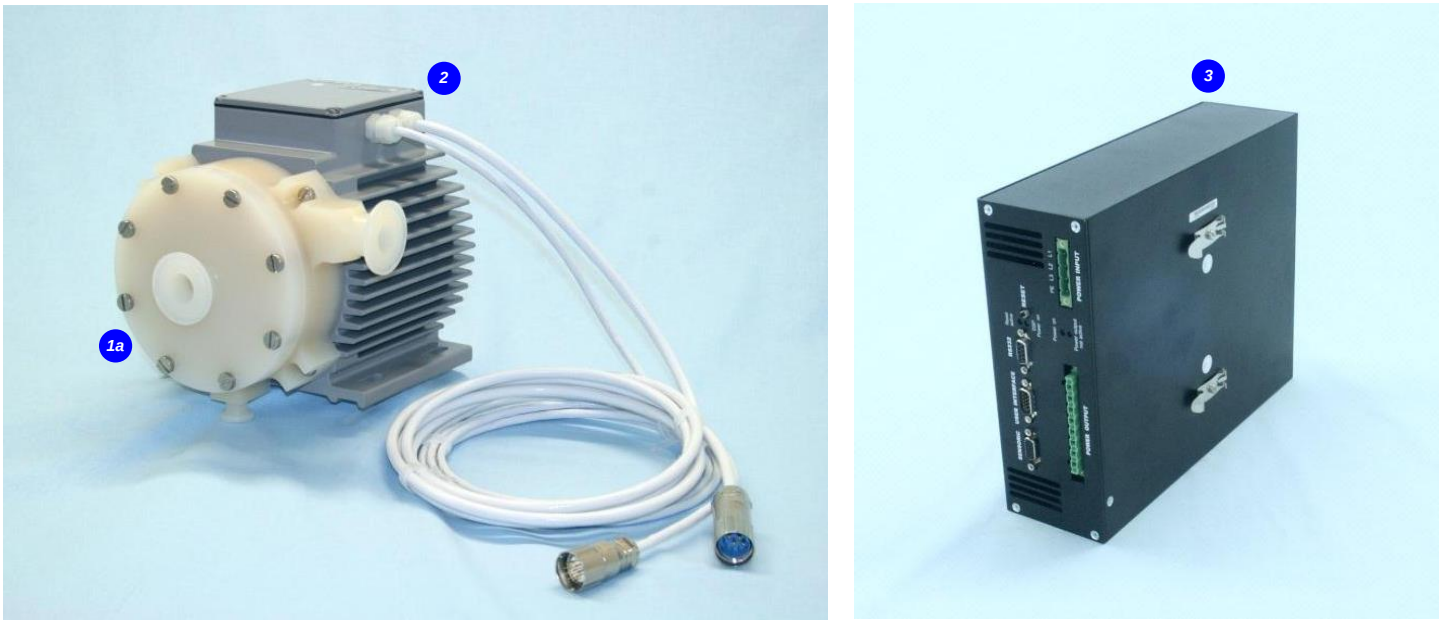


Figure 11: Pump system with standard components

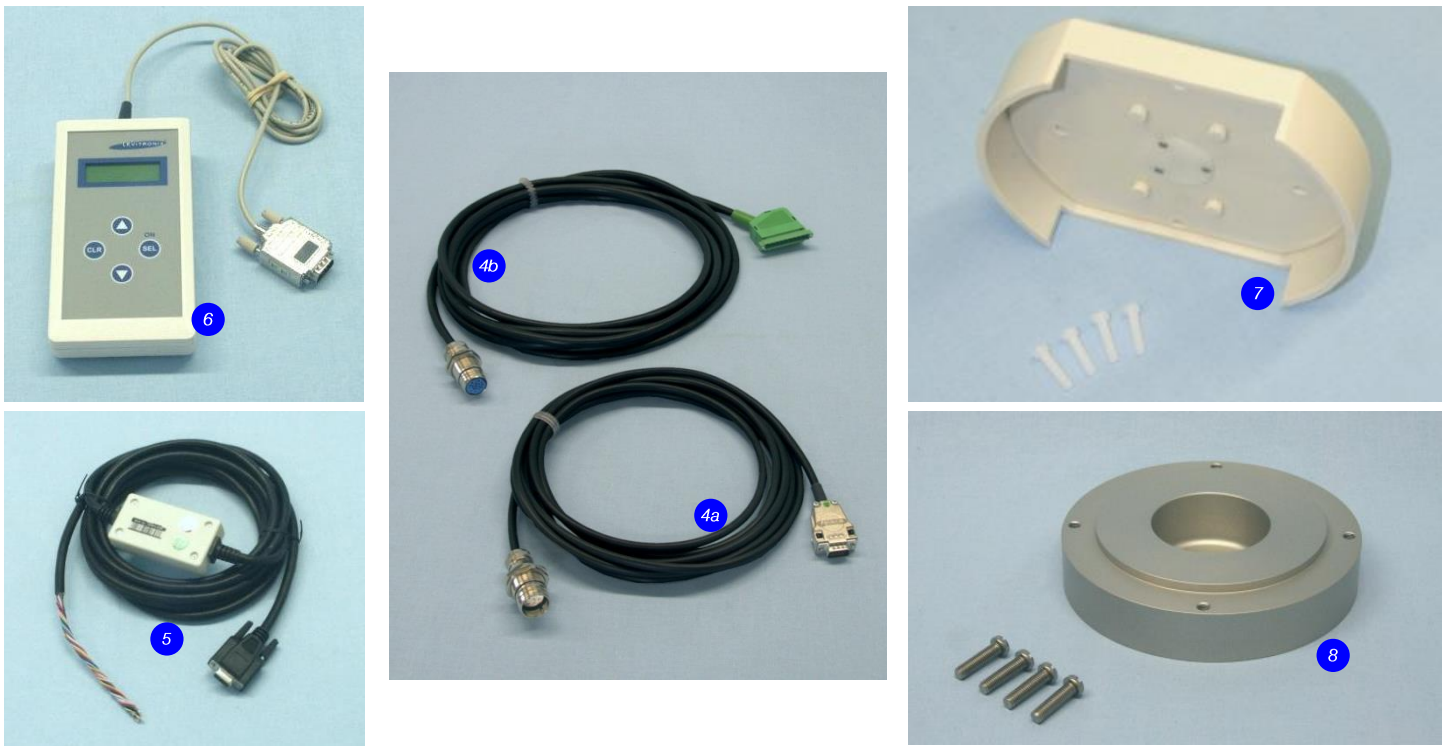


Figure 12: Accessories

LEVITRONIX® THE COMPANY

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: sales@levitronix.com

US Contact

Levitronix Technologies LLC
20 Speen Street
Framingham, Massachusetts 01701
USA

Phone: +1 781 622 5070
Fax: +1 781 622 5090
E-Mail: ussales@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: japansales@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: asiansales@levitronix.com