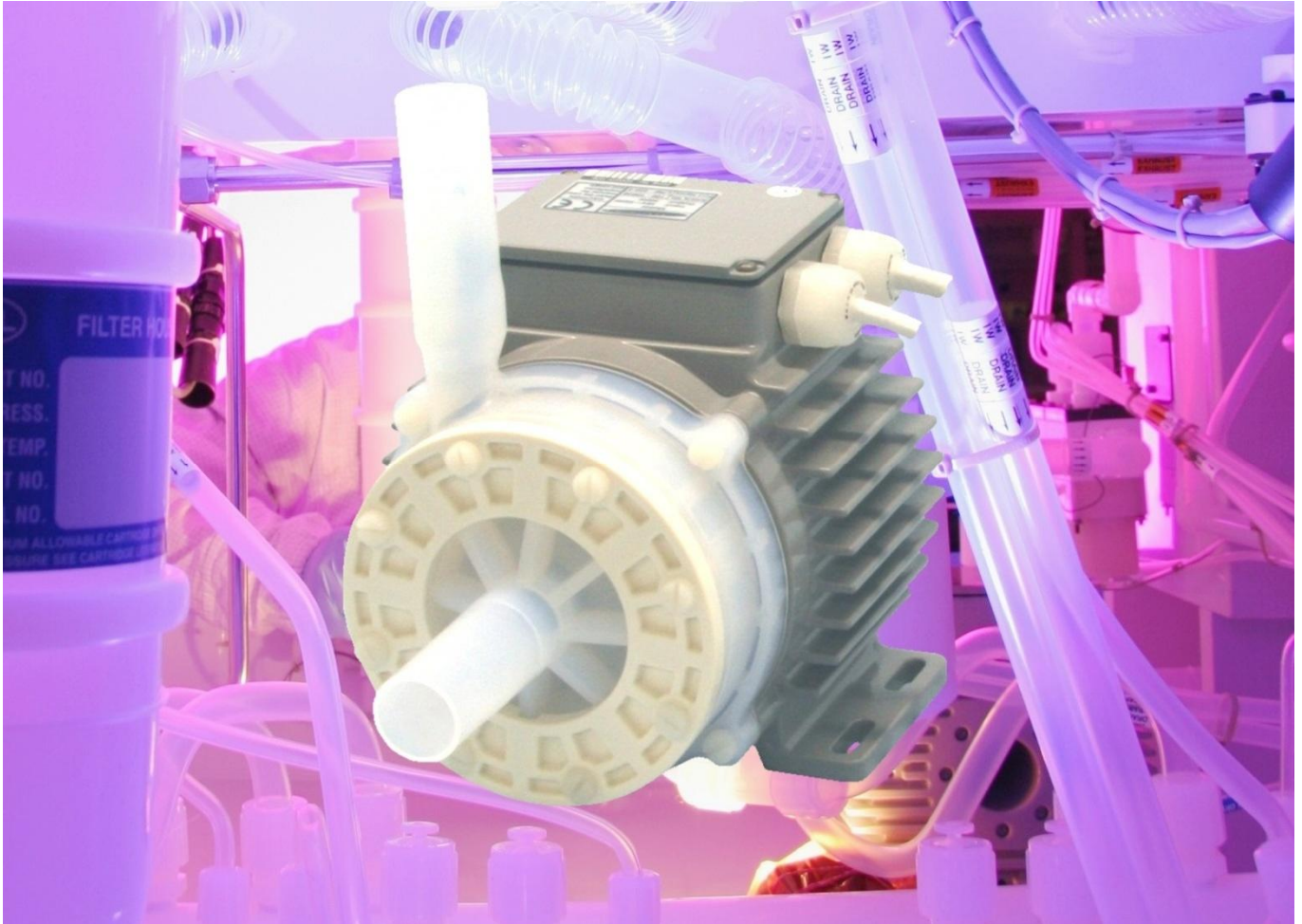


Better Pumps for Better Yield!



***No Seals, No Bearings,
No Particle Contamination!***

BPS-600 (PFA)

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

***Levitronix® MagLev Pump Technology
Better Pumps for Better Yield!***

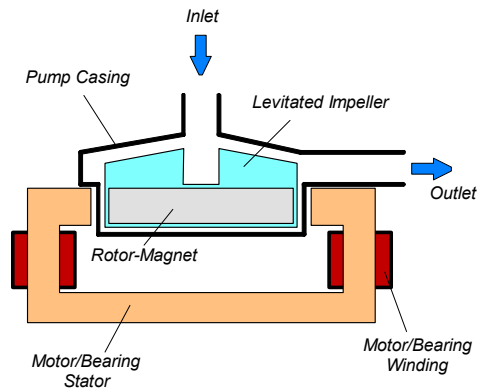


Figure 1: Schematic of the main elements of the MagLev centrifugal pump.

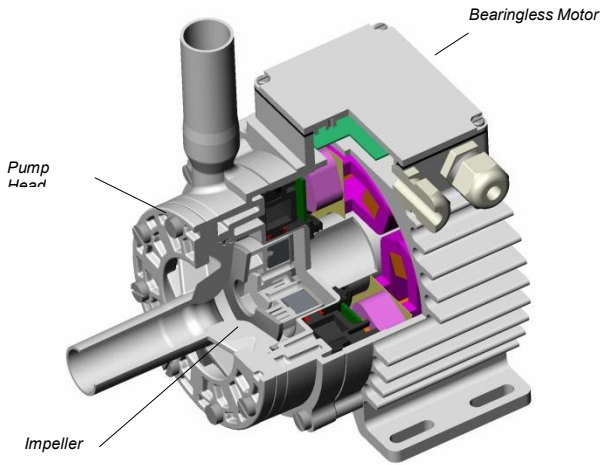


Figure 2: MagLev pump motor with pump head.

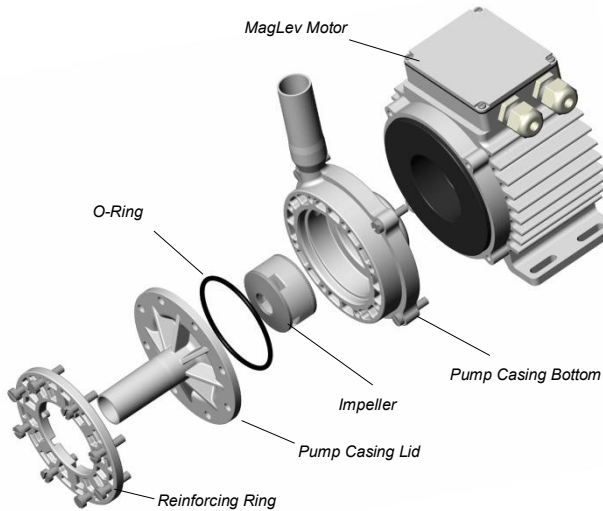


Figure 3: Disassembled pump head

REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP

The BPS-600 pump system is a revolutionary centrifugal pump that has no bearings to wear out or seals to break down and fail. 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 chemical-resistant high purity fluorocarbon resins (PFA). Together with the rotor magnet they make up the pump head.

Fluid flow rate and pressure are precisely controlled by electronically regulating the impeller speed without pulsation. Closed loop flow or pressure control is easy configurable with the usage of an additional pressure or flow sensor. Various system configurations are possible as explained in the following sections.

SYSTEM BENEFITS

- Extremely low particle generation due to the absence of mechanically contacting parts. Reduces particle contamination issues in wet processes by generating 10 to 50 times fewer particles compared to other pumps.
- Increases equipment uptime.
- Lower maintenance costs by eliminating valves, bearings, rotating seals and costly rebuilds.
- Reduced risk of contamination due to the self-contained design with magnetic bearings.
- Very gentle to sensitive fluids due to low-shear design.
- No narrow gaps and fissures where particles or micro-organisms could be entrapped.
- Smooth, continuous flow without pressure pulsation.
- Electronic speed control.
- Compact design compared to pneumatic and magdrive pumps. Saves valuable space in process tools by having a smaller footprint.
- Proven technology in medical and semiconductor industry (MTBF > 50 years).

APPLICATIONS

- Semiconductor wet processing.
- Flip chip and advanced packaging.
- Solar cell production.
- Flat panel display manufacturing.
- Hard-disk fabrication.
- Printer ink handling.
- Pharmaceutical production.

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the BPS-600 pump system consists of a controller with an integrated user panel allowing the operator to set the speed manually (Figure 7). 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 BPS-600 pump system (Figure 8) 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.

Precise ultrapure flow control systems can be realized with the BPS-600 pump system in combination with LEVIFLOW® flowmeters. Levitronix® provides either turnkey solutions for closed-loop flow control or helps to design your own flow control system. A block-diagram for a typical flow control system is shown in Figure 5. The versatility of Levitronix® flow control systems goes far beyond the capabilities of simple flow controllers. 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 6).

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 9). 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 Ex area. One option is an Ex certified cable sealing system as listed in Table 4.

- ATEX / IECEx certified for Category 3G and 3D (Zone 2 for Gas and Zone 22 Dust).
- Thermal classification T4 (< 110 °C = 230 °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
- Explosion groups:
 - Group IIA: Propane (IPA), Methane, Acetone, Acetaldehyde
 - Group IIB: Ethylene, Ethylenglycol
 - Group IIC: Acetylene, Hydrogen (not carbon disulphide)
- ATEX / IECEx listing corresponds to UL hazardous location Class 1 Division 2.

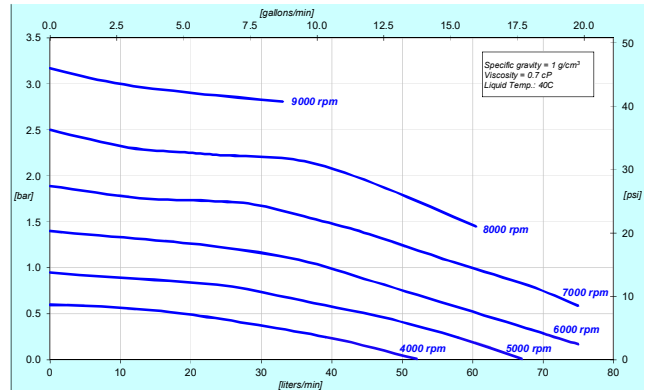


Figure 4: Pressure/flow curves of LPP-600.17 pump head

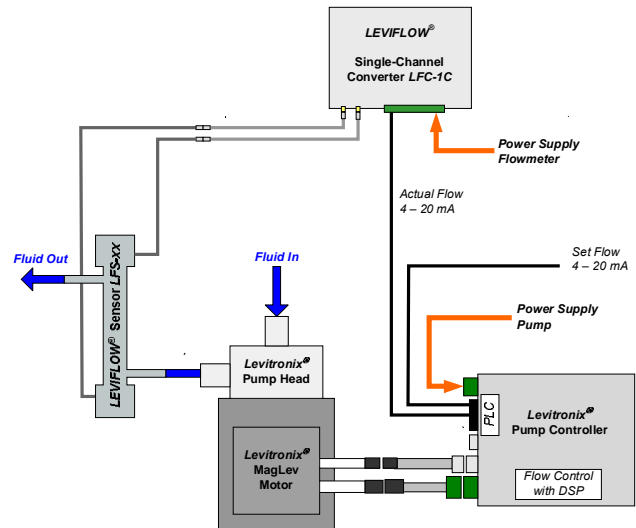


Figure 5: Flow control setup with BPS-600 pump system and LEVIFLOW® flowmeters

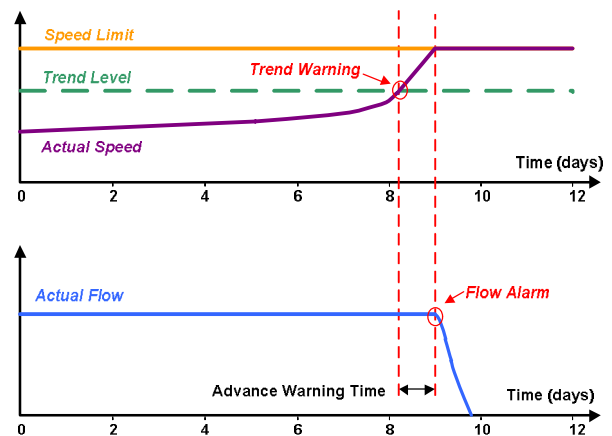


Figure 6: Dynamic Condition Trending (DCT)

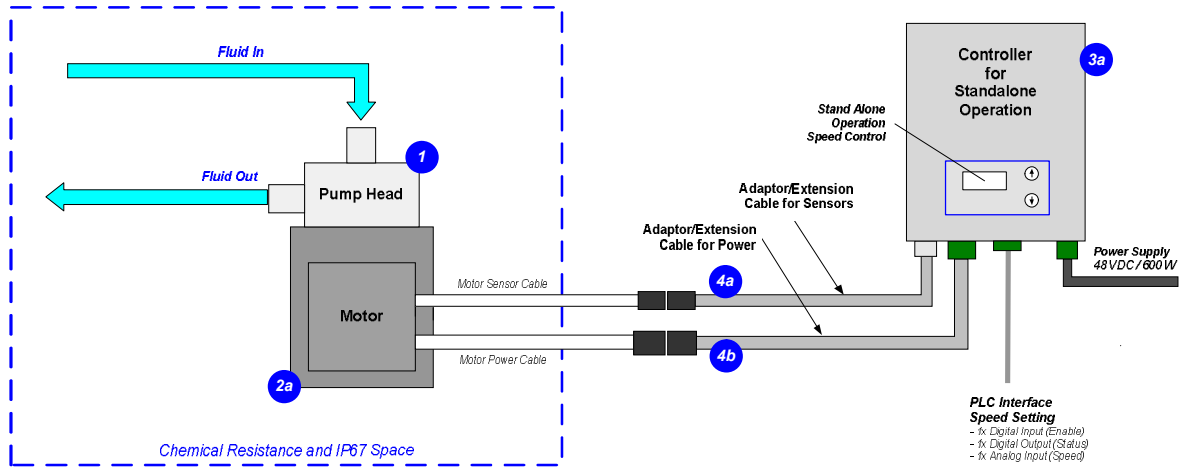


Figure 7: System configuration for standalone operation (Speed setting with integrated user panel)

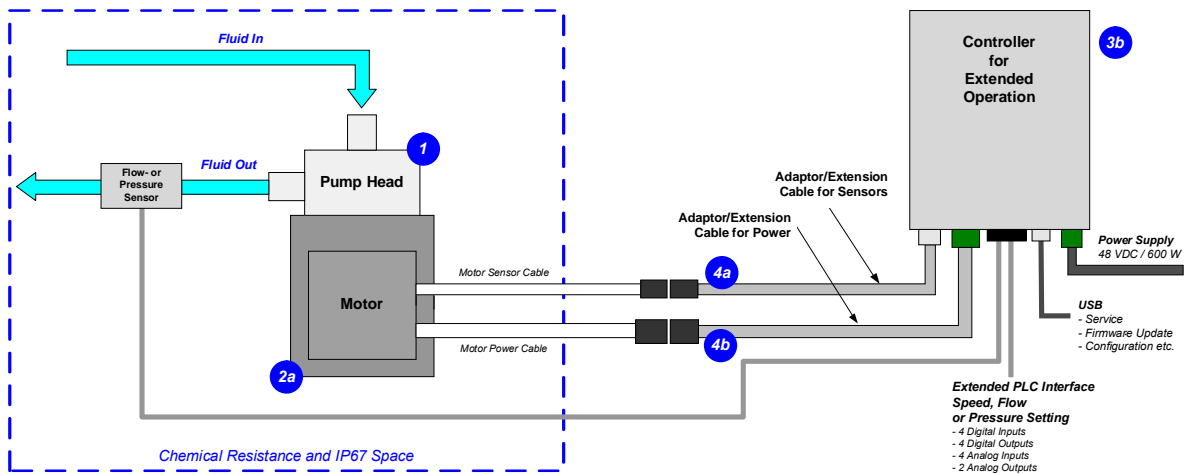


Figure 8: Extended operation (flow or pressure control) with extended controller

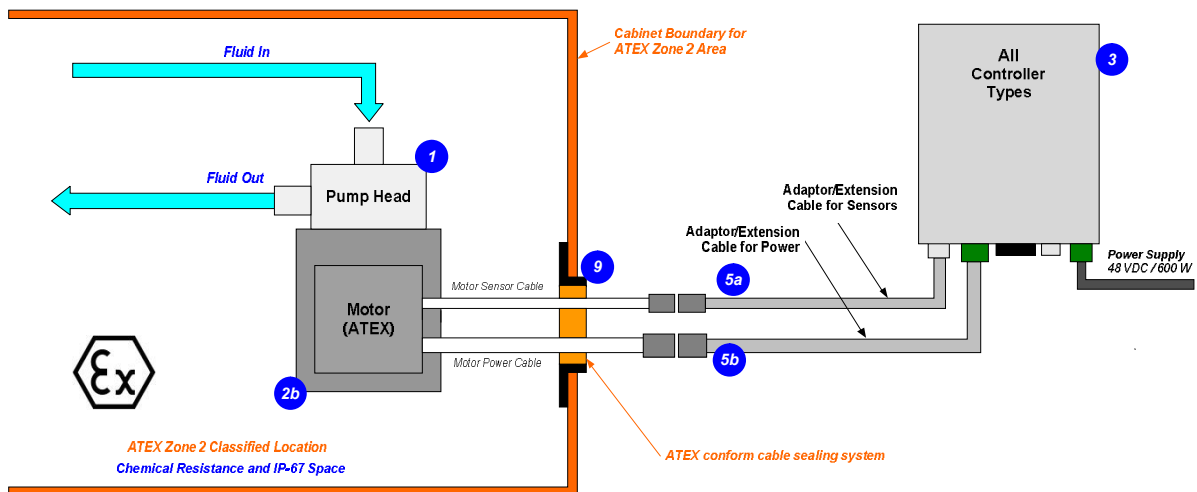


Figure 9: System Configuration for ATEX / IECEx applications

DIMENSIONS OF MAIN COMPONENTS

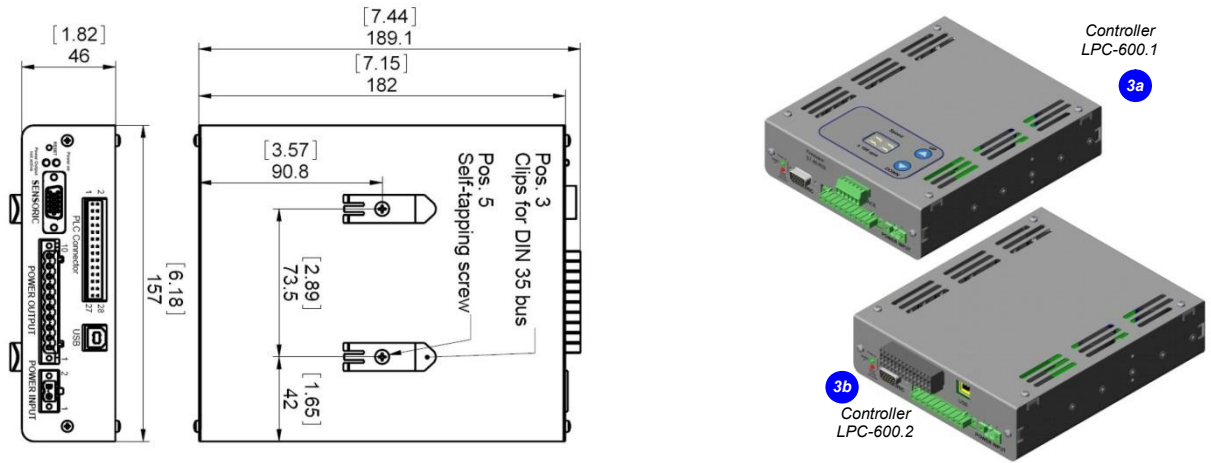


Figure 10: Dimensions of controllers LPC-600.1 and LPC-600.2

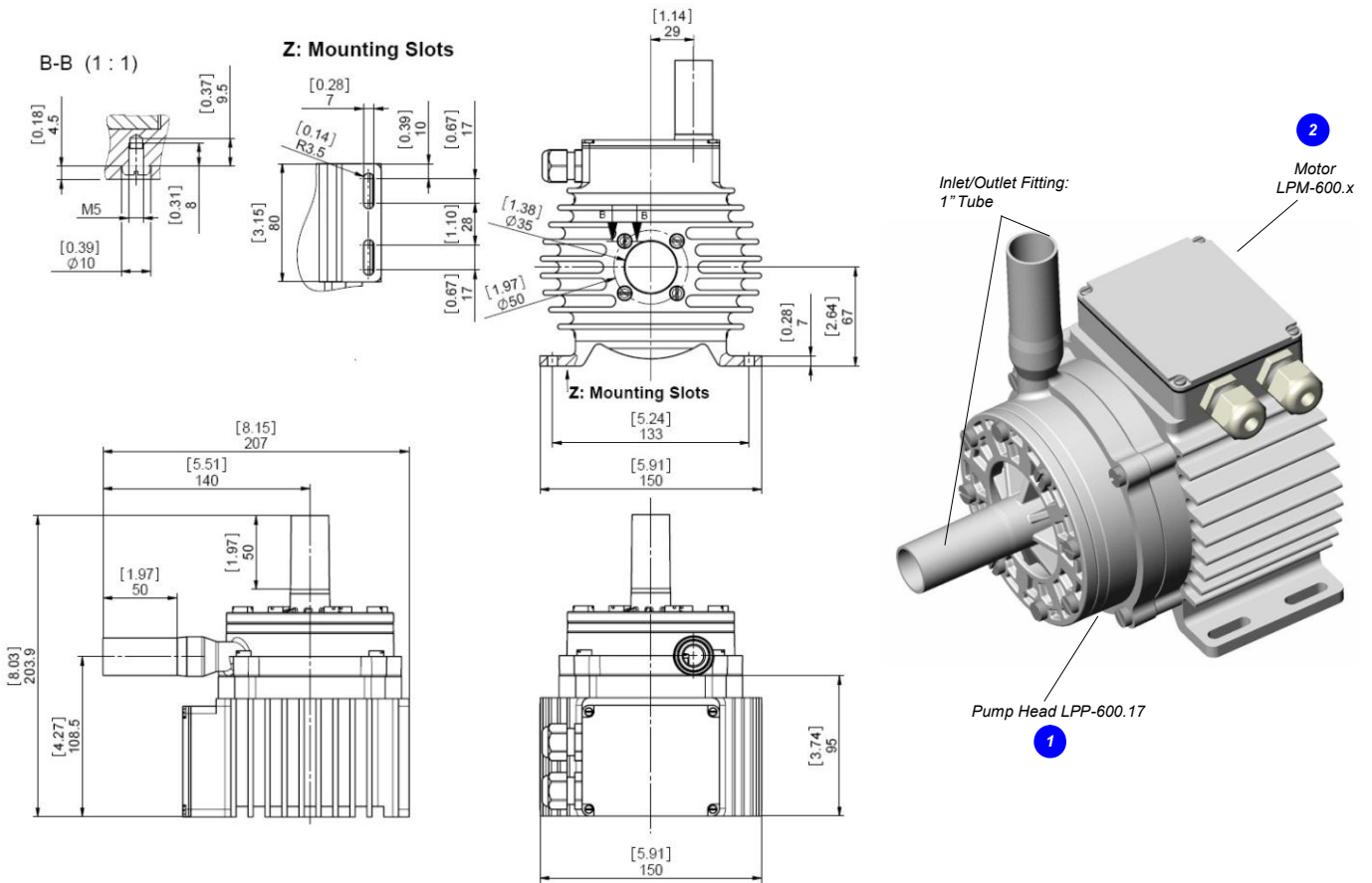


Figure 11: Dimensions of motor with pump head



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Bearingless Pump System BPS-600 (PFA) MagLev Pumps for Ultrapure Fluid Handling

System Name	Article #	Pump Head	Motor	Controller	Note
BPS-600.23	100-90660	LPP-600.17	LPM-600.2	LPC-600.1	Adaptor/Extension (0.5 - 10m) cables according to Table 3 (position 4a and 4b) have to be ordered as separate article with specified length. Certifications: CE, IECCE CB scheme, ETL (NRTL).
BPS-600.24	100-90661		LPM-600.2	LPC-600.2	
BPS-600.26 (ATEX)	100-90663		LPM-600.4 (ATEX)	LPC-600.1	Adaptor/Extension (0.5 - 10m) cables according to Table 3 (Position 5a and 5b) have to be ordered as separate article with specified length. ATEX Cable Sealing System can be ordered according to Table 4. Certifications: CE, IECCE CB scheme, ETL (NRTL), ATEX and IECEx.
BPS-600.27 (ATEX)	100-90664		LPM-600.4 (ATEX)	LPC-600.2	

Table 1: Standard system configurations

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1	Pump Head	LPP-600.17	100-90553	Impeller / Pump Housing Sealing Ring / Fittings	PFA / PFA Kalrez® perfluoroelastomer 1 / Tube 1"
				Max. Flow / Max. Pressure Max. Viscosity	75 liters/min (20 gallons/min) / 3.2 bar / (46 psi) 100 cP
				Max. Liquid Temp.	90°C / 194°F
2a	Motor	LPM-600.2	100-10025	Housing	ETFE (chem. resistant) coated Aluminum (IP67 without connectors)
				Cable / Connectors	2x 3m cables with FEP jacket / 2x circular (AMP types)
2b	Motor (ATEX / IECEx)	LPM-600.4	100-10038	ATEX / IECEx Marking	CE II 3G Ex nA IIC T5 Gc, CE II 3D Ex tc IIC T100°C Dc
				Cable / Connectors	2x 3m cables with FEP jacket / 2x circular (M23, IP67)
3a	Standalone Controller (User Panel)	LPC-600.1	100-30005 <small>(Controller with power supply cable and Enable connector incl. in 100-90315)</small>	Voltage / Power	48V DC / 600 W
				Interfaces for Standalone Controller	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)
				Standard Firmware	D6.25
3b	Extended Controller (PLC and USB)	LPC-600.2	100-30004 <small>(Controller with power supply cable and PLC connector incl. in 100-90314)</small>	Interfaces for Extended Controller	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
				Standard Firmware	D6.48
				USB interface (for service and system monitoring)	

Table 2: Specification of standard components (Note 1: Kalrez® is a registered trademark of DuPont Dow Elastomers)

Pos.	Component	Article Name		Article #		Characteristics	Value / Feature
		Sensor Cable	Power Cable	Sensor	Power		
4a 4b	Extension Adaptor Cable for Sensor (a) and Power (b) Wires	MCAS-600.1-05 (0.5m)	MCAP-600.1-05	190-10122	190-10118	Jacket Material Connector Types Connector Material	PVC Circular AMP to D-SUB Plastics (PA)
		MCAS-600.1-30 (3m)	MCAP-600.1-30	190-10123	190-10119		
		MCAS-600.1-50 (5m)	MCAP-600.1-50	190-10124	190-10120		
		MCAS-600.1-70 (7m)	MCAP-600.1-70	190-10101	190-10102		
		MCAS-600.1-100 (10m)	MCAP-600.1-100	190-10125	190-10121		
5a 5b	Extension Adaptor Cable for Sensor (a) and Power (b) Wires	MCAS-600.3-05 (0.5m)	MCAP-600.3-05	190-10158	190-10154	Jacket Material Connector Types Connector Material	PVC Circular M23 (IP-67) to D-SUB Metallic - Nickel coated
		MCAS-600.3-30 (3m)	MCAP-600.3-30	190-10159	190-10155		
		MCAS-600.3-50 (5m)	MCAP-600.3-50	190-10130	190-10129		
		MCAS-600.3-70 (7m)	MCAP-600.3-70	190-10160	190-10156		
		MCAS-600.3-100 (10m)	MCAP-600.3-100	190-10161	190-10157		

Table 3: Specification of adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
6a	Air Cooling Module	ACM-600.2	190-10140	Material / Connection Port Air Pressure / Consumption	PP (+ 40% Talkum) / NPT 1/2" ~1 - 3 bar (14 - 43 psi) / 100 Liter/min @ 1 bar (14.5 psi)
6b	Air Cooling Module	ACM-600.3 (ATEX)	190-10410	Material / Connection Port Air Pressure	PP EL-S (black, conductive additive for ATEX applications) / NPT 1/2" ~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)	190-10407	Specification	PP cable jacket with circular M12 connector (PP) to open wires
		FCC-1.1-100 (10 m)	190-10408		
8 (A-D)	Impeller Exchange Kits	IEK-600.1	100-90515	Impeller LPI-600.2 (A) O-Ring (B) Pump / Motor (C) Exchange Tool IET-3.1 (D)	PFA O-Ring, Kalrez, 72.62x3.53 PVDF, 8pcs M6x25 / PVDF, 4pcs M6x25 POM-C
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	AC/DC Power Supply	TSP 600-148-M <small>(M = Modified Levitronix design from Traco)</small>	100-40013 <small>(Traco ID Number: T1068-01A)</small>	Voltage / Power Output Voltage Input	48 VDC / 600 W 85 - 265 VAC (automatic detection)
				Certification or Standards	CB, UL, CSA, Semi F47
11	Screw Set	Screw Set SS+PTFE	100-90412	Number/Dimensions Material	12 pcs M6x25 Stainless Steel+ PTFE coating Needed to increase maximum static pressure of pump head.

Table 4: Specification of accessories

Levitronix® MagLev Pump Technology
Better Pumps for Better Yield!

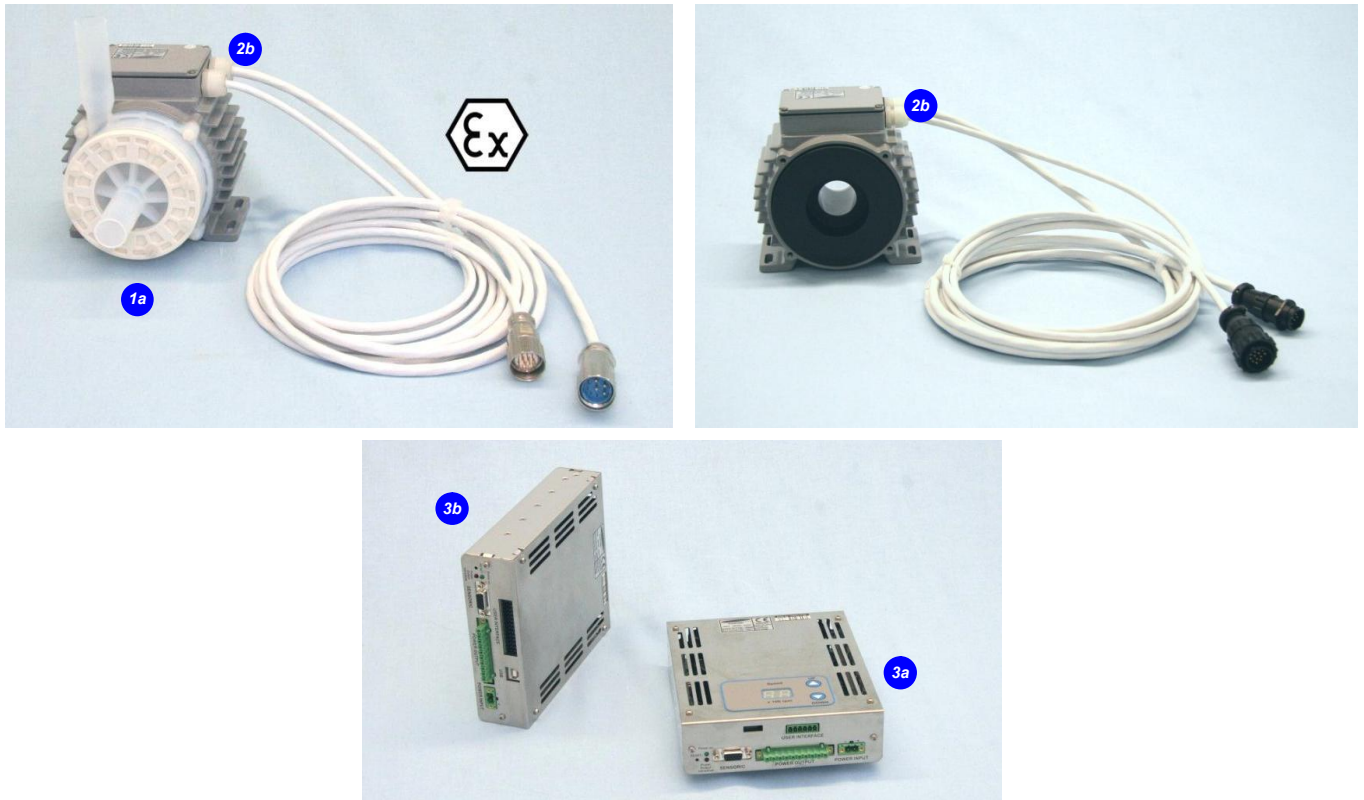


Figure 12: Pump system BPS-600 with standard components



Figure 13: Accessories

**Levitronix[®] MagLev Pump Technology
Better Pumps for Better Yield!**



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Bearingless Pump System BPS-600 (PFA) MagLev Pumps for Ultrapure Fluid Handling

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.



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