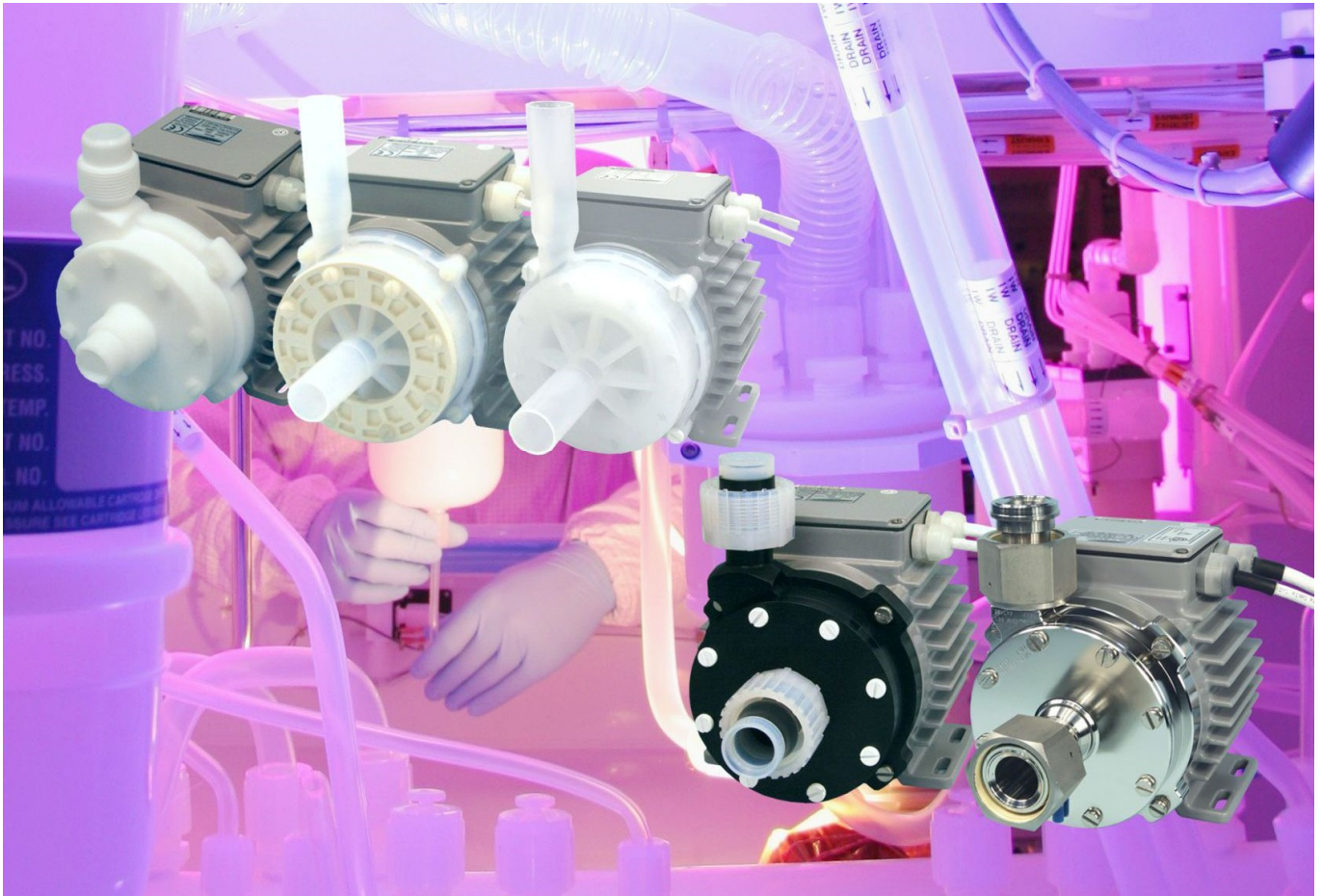


Better Pumps for Better Yield!



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

BPS-600

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

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

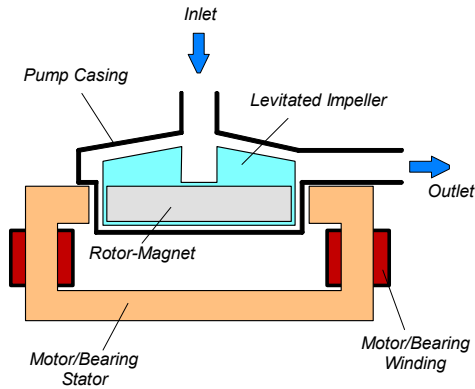


Figure 1: Schematic of the main elements of the MagLev centrifugal pump.

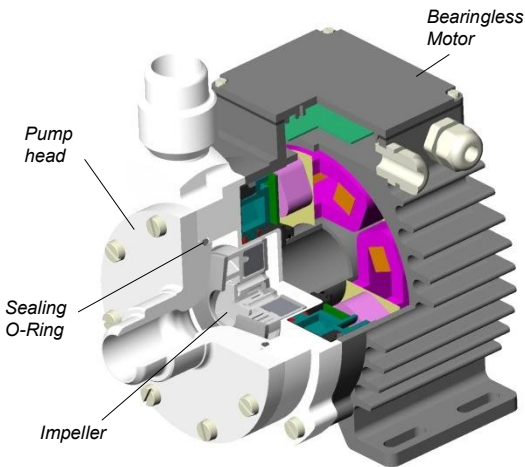


Figure 2: MagLev pump motor with pump head.

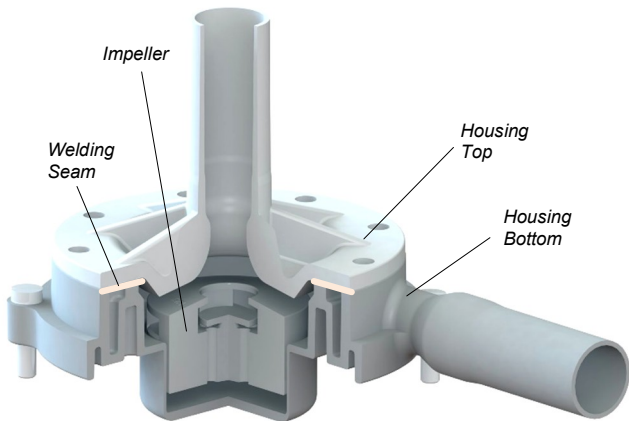


Figure 3: Sealless pump head (welded).

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 standard impeller and pump casing are both fabricated from chemical-resistant high purity fluorocarbon resins (PFA and PTFE). Together with the rotor magnet they make up the pump head.

Various designs of pump heads are offered to address specific applications. Besides of the classic housing design with an O-ring (see Figure 2) a sealless PFA pump head with welded housing (see Figure 3) is available. Two material version with conductive PTFE or Stainless Steel are offered for solvent applications.

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 T5 (< 100 °C = 212 °F) for maximum liquid temperature of 90 °C / 194 °F.
- Ex 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

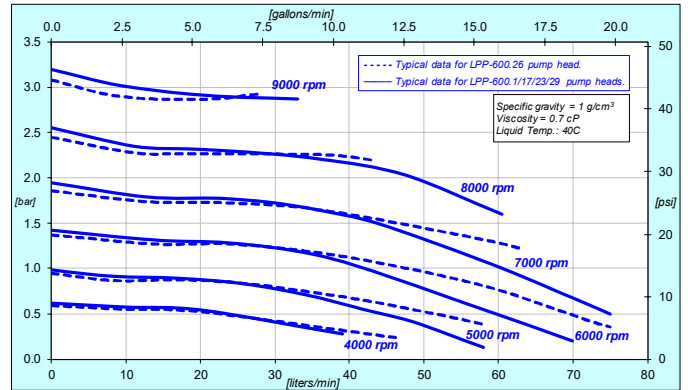


Figure 4: Pressure/flow curves (typical data)

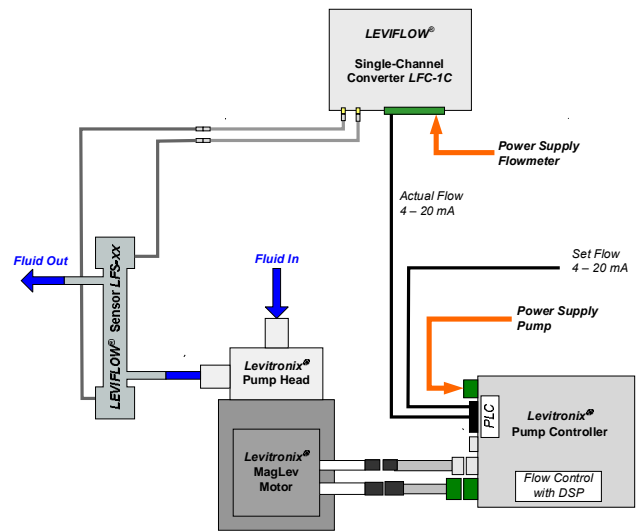


Figure 5: Flow control setup with BPS-600 pump system and LEVIFLOW® flowmeters

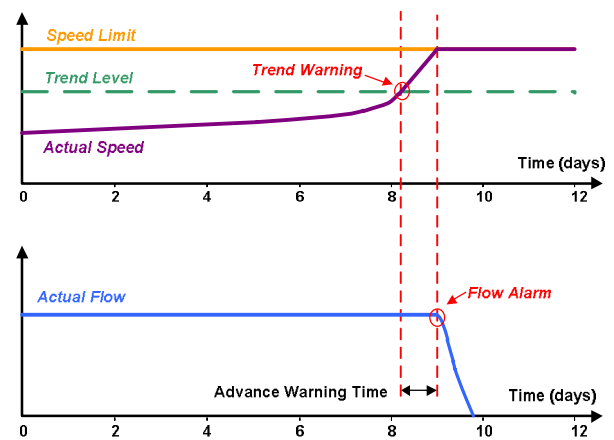


Figure 6: Dynamic Condition Trending (DCT)

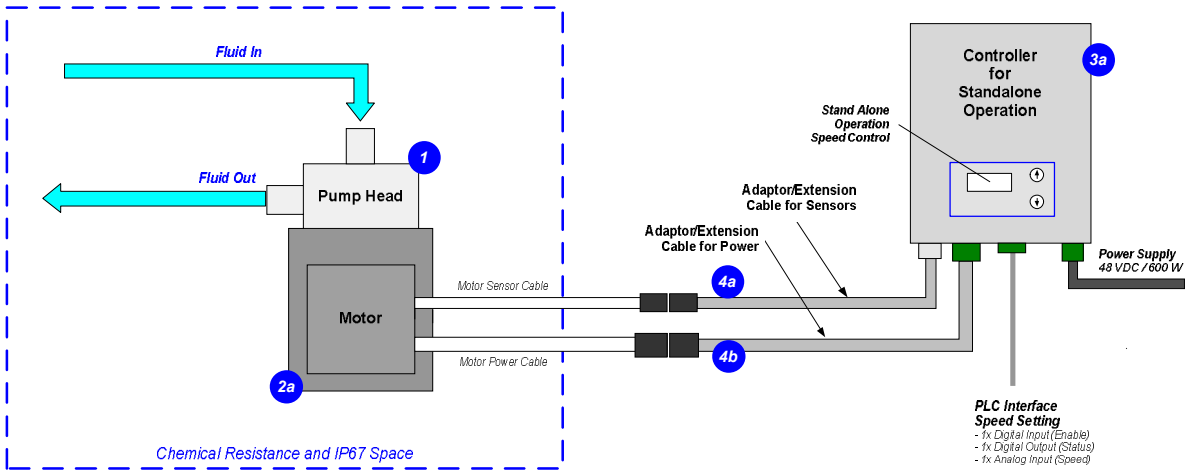


Figure 7: System configuration for standalone operation (Speed setting with integrated user panel)

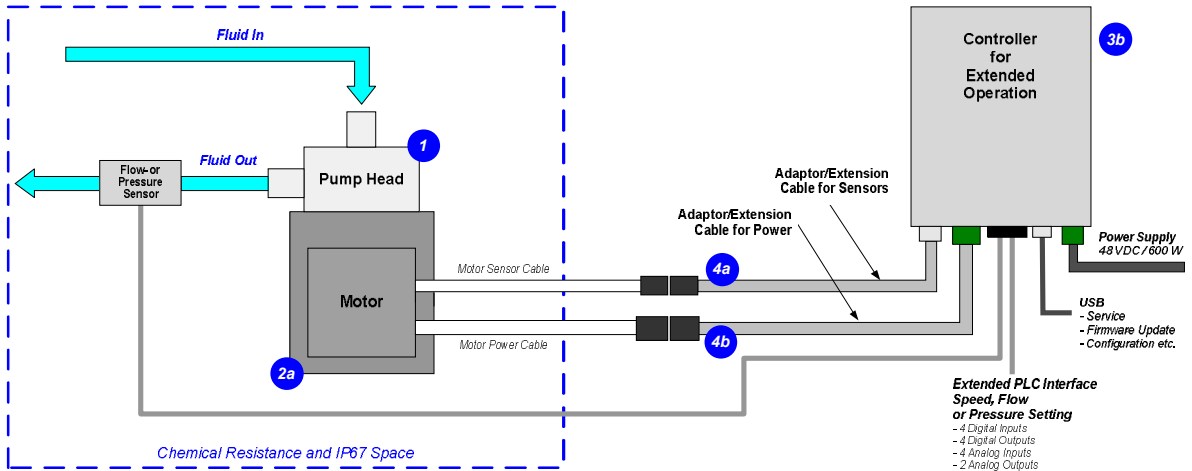


Figure 8: Extended operation (flow or pressure control) with extended controller

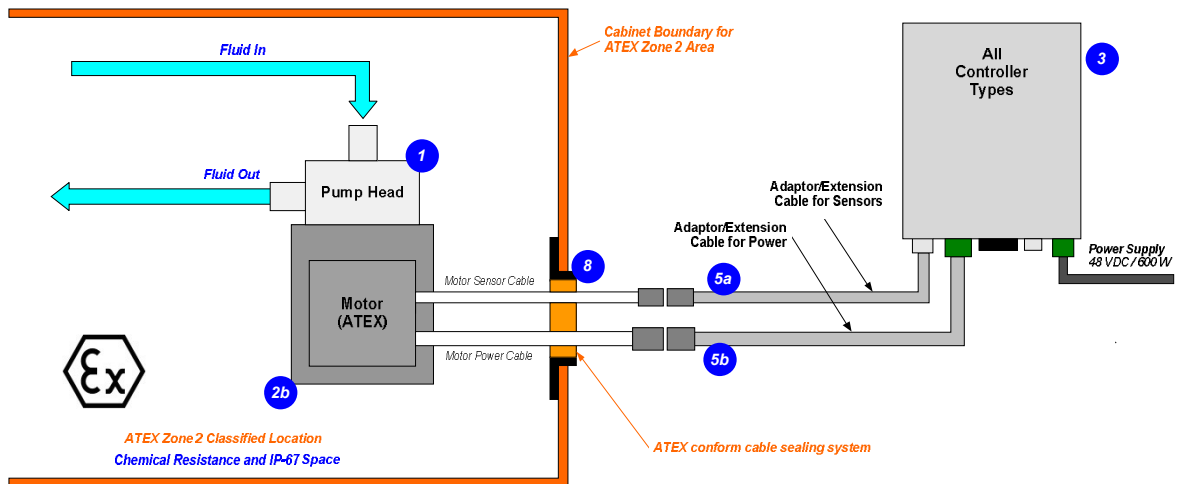


Figure 9: System Configuration for ATEX / IECEx applications

DIMENSIONS OF MAIN COMPONENTS

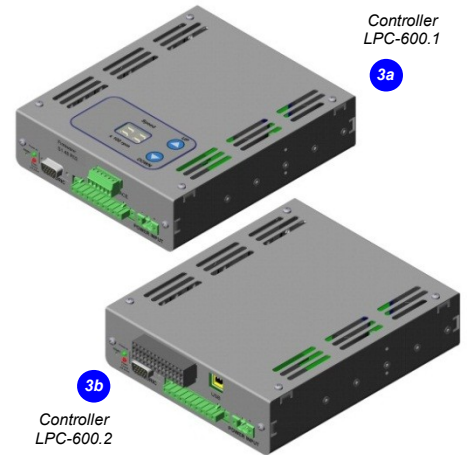
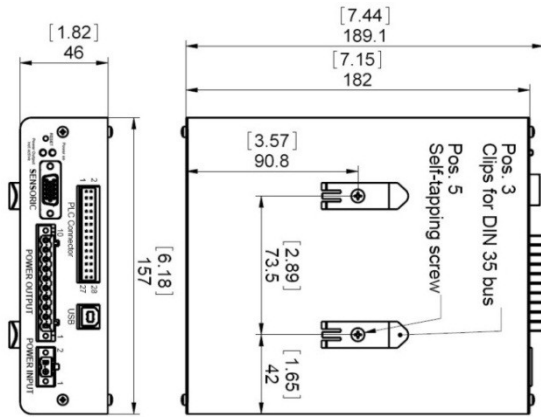
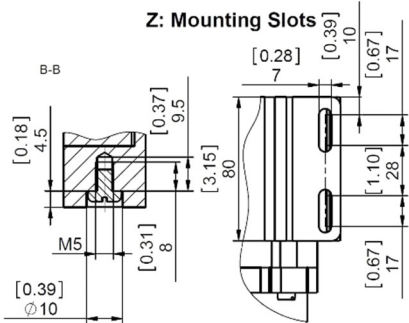
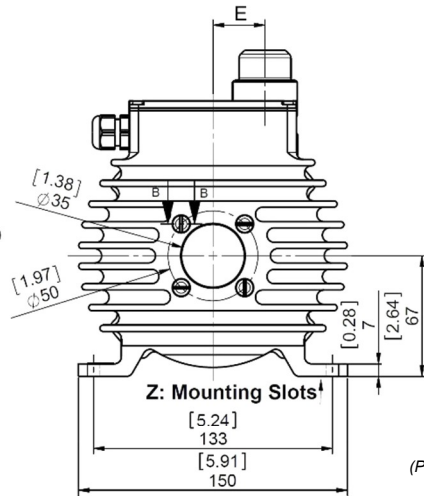
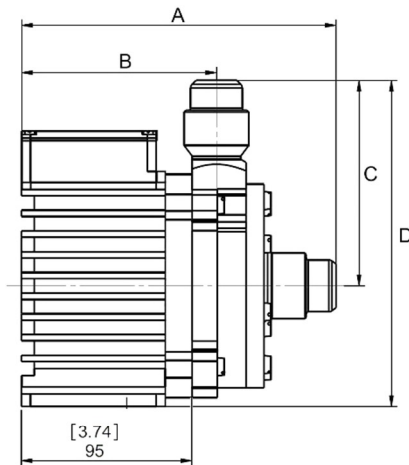


Figure 10: Dimensions of controllers LPC-600.1 and LPC-600.2



mm [inch]	LPP-600.1	LPP-600.17	LPP-600.29	LPP-600.23	LPP-600.26
A	175 [6.89]	202 [7.96]	201.9 [7.95]	197.5 [7.78]	189.3 [7.45]
B	108.5 [4.27]	108.5 [4.27]	108.5 [4.27]	108.5 [4.27]	109.3 [4.30]
C	141.1 [4.49]	140 [5.51]	140 [5.51]	127.5 [5.02]	114.1 [4.49]
D	181 [7.13]	207 [8.15]	207 [8.15]	194.5 [7.66]	108.1 [7.13]
E	29 [1.14]	29 [1.14]	29 [1.14]	29 [1.14]	29 [1.14]
Inlet Outlet	Flaretek 1"	Tube 1"	Tube 1"	FM Pillar 1"	VCR® 1"

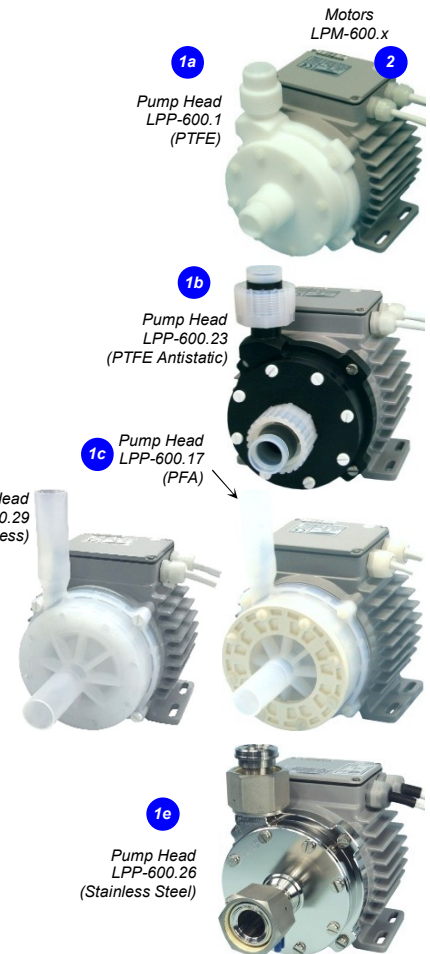


Figure 11: Basic dimensions of motor with pump head
(Non-tolerated dimensions are for reference only)



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Bearingless Pump System BPS-600 Family MagLev Pumps for Ultrapure Fluid Handling

System Name	Article #	Pump Head	Motor	Controller	Note
BPS-600.1 / 2 BPS-600.23 / 24 BPS-600.59 / 58	100-90171 / 72 100-90660 / 62 100-91431 / 12	LPP-600.1 (PTFE) LPP-600.17 (PFA) LPP-600.29 (PFA, Welded)	LPM-600.2 LPM-600.2 LPM-600.2	LPC-600.1 / 2 LPC-600.1 / 2 LPC-600.1 / 2	Adaptor/Extension (0.5 - 10m) cables according to Table 3 (position 4a and 4b) have to be ordered as separate article. Certifications: CE, IECEx CB scheme, ETL (NRTL).
BPS-600.5 / 6 (ATEX) BPS-600.26 / 27 (ATEX) BPS-600.60 / 61 (ATEX)	100-90356 / 57 100-90663 / 64 100-91432 / 33	LPP-600.1 (PTFE) LPP-600.17 (PFA) LPP-600.29 (PFA, Welded)	LPM-600.4 (ATEX) LPM-600.4 (ATEX) LPM-600.4 (ATEX)	LPC-600.1 / 2 LPC-600.1 / 2 LPC-600.1 / 2	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, IECEx CB scheme, ETL (NRTL), ATEX and IECEx.
BPS-600.46 / 47 (ATEX)	100-91106 / 07	LPP-600.23 (PTFE Antistatic)	LPM-600.4 (ATEX)	LPC-600.1 / 2	
BPS-600.51 / 52 (ATEX)	100-91322 / 23	LPP-600.26 (Stainless Steel)	LPM-600.12 (ATEX)	LPC-600.1-07 / 2-07	

Table 1: Standard system configurations

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a 1b	Pump Heads	LPP-600.1 (PTFE) ³	100-90242	Impeller / Pump Housing Sealing Ring / Fittings Max. Flow / Max. Pressure Max. Viscosity / Liquid Temp.	PFA / PTFE for (a) and PFA / PTFE+CFR for (b) for solvent applications FFPM perfluoroelastomer / Flaretek 1" for (a), Pillar FM 1" for (b) 75 liters/min (20 gallons/min) / 3.2 bar (46 psi) 100 cP / 90 °C (194 °F)
1c		LPP-600.17 (PFA) ³	100-90553	Impeller / Pump Housing Sealing Ring / Fittings	PFA / PFA for wet part, PP+GF30 for reinforcing lid FFPM perfluoroelastomer / Tube 1"
1d		LPP-600.29 (PFA)	100-91403	Impeller / Pump Housing Sealing / Fittings Max. Viscosity	PFA / PFA Welded housing (no O-ring) / Tube 1" 20 cP
1e		LPP-600.26 (Stainless Steel)	100-91321	Impeller / Pump Housing Sealing Ring / Fittings Max. Flow / Max. Pressure Max. Viscosity / Liquid Temp.	Stainless Steel Unfilled FFPM / VCR® 1" ² 75 liters/min (20 gallons/min) / 3.1 bar (45 psi) 30 cP / 90 °C (194 °F)
2a	Motor	LPM-600.2	100-10025	Housing Cable / Connectors	ETFE (chem. resistant) coated Aluminum (IP67 without connectors) 2x 3m cables with FEP jacket / 2x circular (AMP types)
2b 2c	Motor (ATEX / IECEx)	LPM-600.4 LPM-600.12 ¹	100-10038 100-10149	ATEX / IECEx Marking Cable / Connectors	CE ² II 3G Ex nA IIC T5 Gc, CE ² II 3D Ex tc IIIC T100°C Dc 2x 3m cables with FEP jacket / 2x circular (M23, IP67)
3a	Standalone Controller (User Panel)	LPC-600.1 LPC-600.1-07 ¹	100-90315 100-30089 (Power cable and PLC connector included.)	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	For LPC-600.1: D6.25 For LPC-600.1-07: D7.25
3b	Extended Controller (PLC and USB)	LPC-600.2 LPC-600.2-07 ¹	100-90314 100-30090 (Power cable and PLC connector included.)	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 4 analog inputs 2 with 4-20mA, 2 with 0-10 V - up to 2 analog outputs 0 - 5 V
				USB interface (for service and system monitoring)	
				Standard Firmware	For LPC-600.2: D6.48 For LPC-600.2-07: D7.48

Table 2: Specification of standard components

Note 1: Pump head LPP-600.26 operates with this motor and controller combinations only. Note 2: VCR® is a registered trademark of Swagelok. Note 3: Versions with Pillar FM 1" fittings available.

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

Table 3: Specification of standard adaptor/extension cables

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
6a 6b	Air Cooling Module	ACM-600.2 ACM-600.3 (ATEX)	190-10140 190-10410	Material Connection Port / Air Pressure	ACM-600.2: PP (+ Talkum) ACM-600.3: PP EL-S (conductive for ATEX) 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
8a 8b (A-D)	Impeller Exchange Kits	IEK-600.1 (LPP-600.1/17) IEK-600.7 (LPP-600.23)	100-90515 100-90984	Impeller (A) / O-Ring (B) Pump/Motor Screws (C) Exchange Tool IET-3.1 (D)	a) PFA (LPI-600.2) / O-Ring, FFPM, 72.62x3.53 mm a) 8/4pcs M6x25 PVDF b) 6pcs M6x25 SS+PTFE / 4pcs M6x25 SS 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 (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
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 heads LPP-600.1/17

Table 4: Specification of standard 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!**

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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