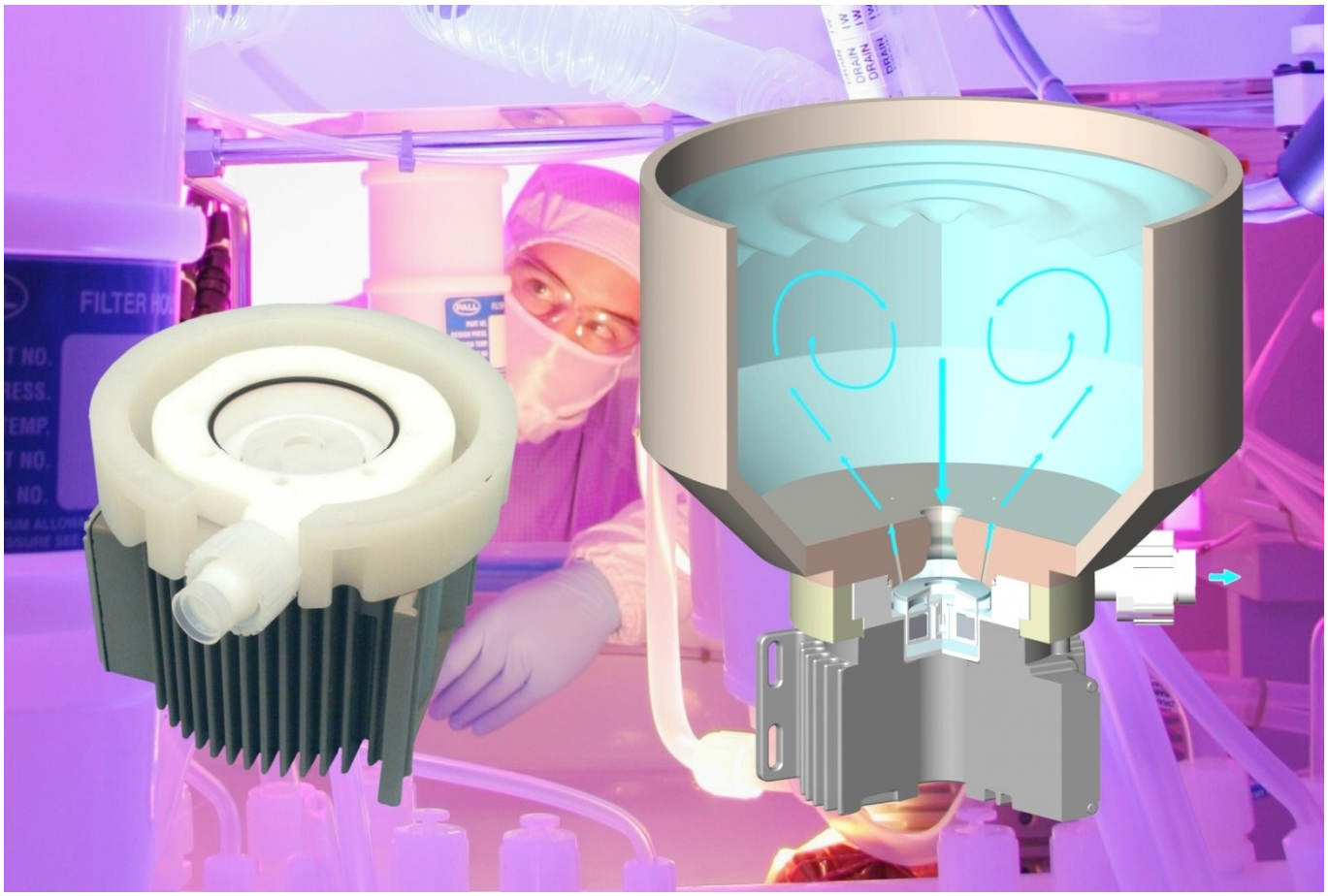
High Purity Pumping and Mixing with One Single Device!



No Seals, No Bearings, No Particle Contamination!

PTM-2000

4.1 bar (59.5 psi)	*120 lpm (32 gpm)*
Typical Tank Size	*400 liters (106 gallons)*

LEVITRONIX®
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MagLev Pump Tank Mixer System PTM-2000
Pumping and Mixing with One Single Device

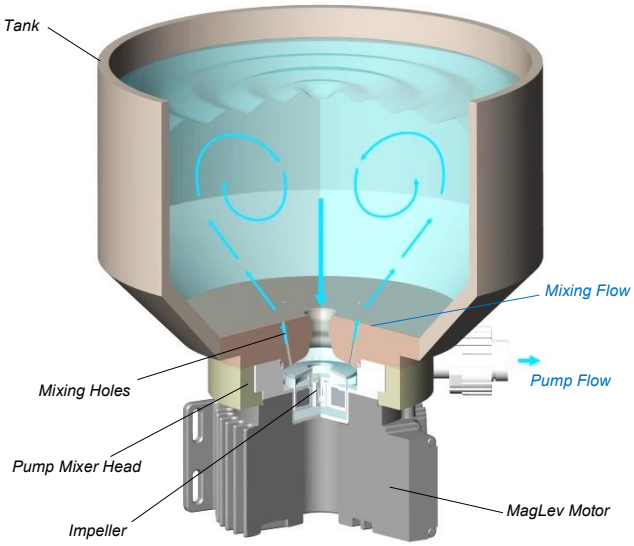

Figure 1: *Concept of the MagLev pump tank mixer.*

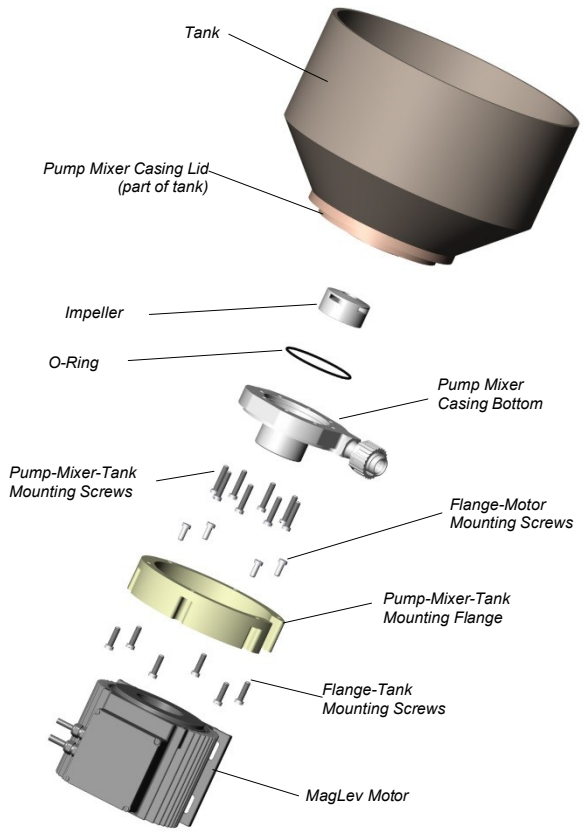

Figure 2: *Main elements of the pump tnk mixer*

REVOLUTIONARY MAGNETICALLY LEVITATED CENTRIFUGAL PUMP

The *PTM-2000* pump mixer is a revolutionary device, which combines mixing and pumping in one device (see *Figure 1*). The system has no bearings to wear out, or seals to fail. Based on the principles of magnetic levitation, an impeller is suspended, contact-free, inside a sealed casing and is driven by the magnetic field of the motor. The impeller and casing are both fabricated from chemical-resistant high purity fluorocarbon resins. Fluid flow rate and pressure are precisely controlled by electronically regulating the impeller speed. The mixing flow depends on the impeller speed, and on the number and size of the mixing holes (see *Figure 3*).

Figure 1 and *Figure 2* illustrate the concept of the system. The pump mixer head comes delivered with an impeller, casing bottom and a flange to mount the head to the tank. Design specifications for the casing lid, which is part of the tank, can be requested at *Levitronix®*.

SYSTEM BENEFITS

- Compact mixing and pumping with one single device.
- 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.
- CMP slurry handling.
- Solar cell production.
- Flat panel display manufacturing.
- Hard-disk fabrication.
- Printer ink handling.
- Pharmaceutical production.

Levitronix® MagLev Pumping and Mixing Technology
Better Pumps and Mixers for Better Yield!

STAND-ALONE SYSTEM CONFIGURATION

The stand-alone configuration of the *PTM-2000* system consists of a controller with an integrated user panel allowing the operator to set the speed manually (*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 analog signal (see specification for *Position 3a* in *Table 2*).

EXTENDED SYSTEM CONFIGURATION

The extended version of the *PTM-2000* 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.

Precise ultrapure flow control systems can be realized with the *PTM-2000* 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 4*. 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 5*).

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 Ex area. One option is an Ex certified cable sealing system as listed in *Table 4* (see *Pos. 8*) and shown in *Figure 12*.

The ATEX/IECEx motors have also a Japan and Korean Ex certification and marking.

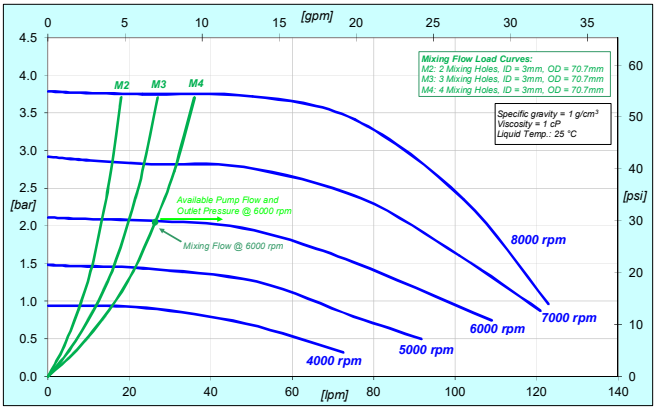

Figure 3: *Pressure/flow curves of CPM-2000.1 pump mixer head*

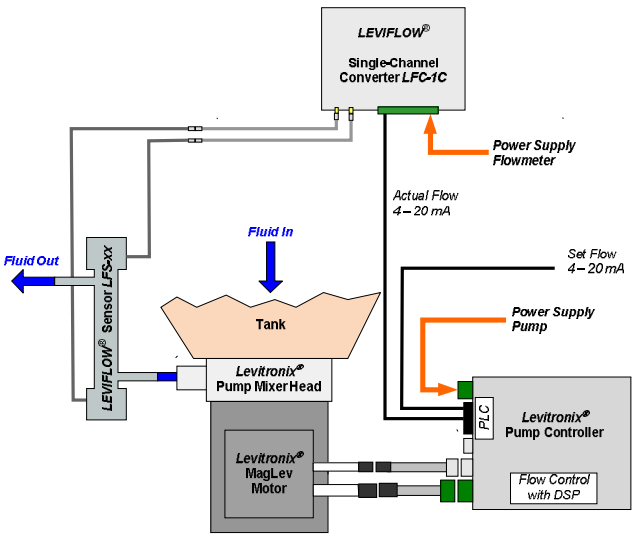

Figure 4: *Flow control setup with PTM-2000 system and LEVIFLOW® flowmeters*

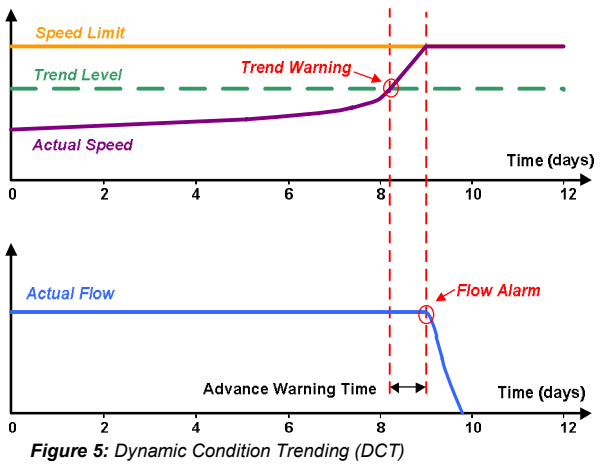

Figure 5: *Dynamic Condition Trending (DCT)*

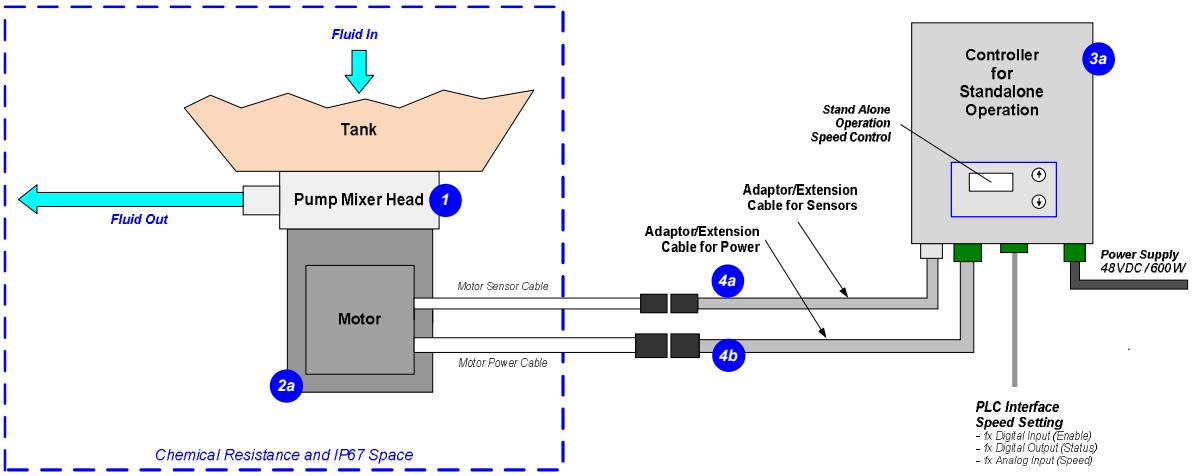

Figure 6: *System configuration for standalone operation (Speed setting with integrated user panel)*

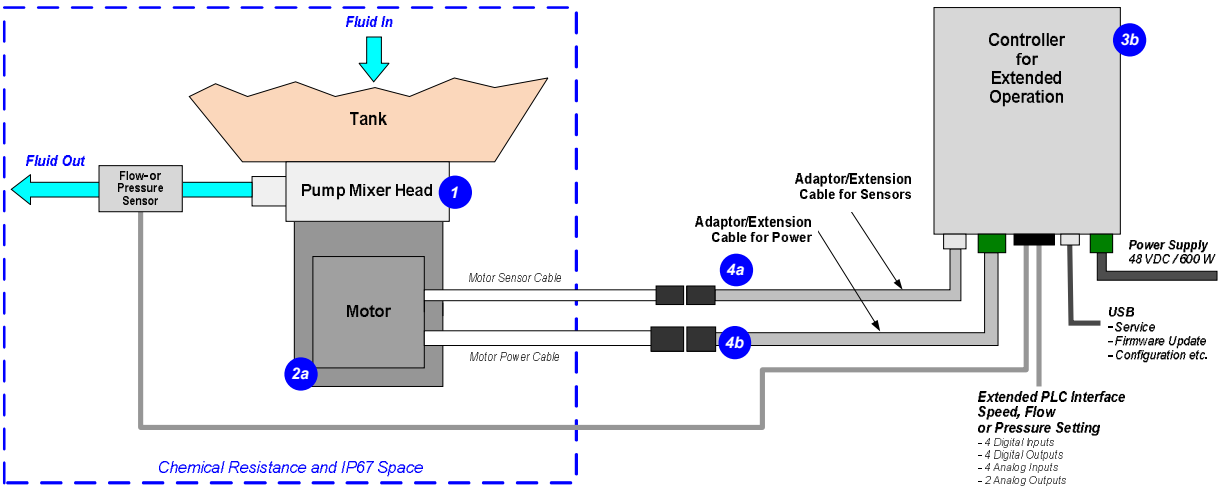

Figure 7: *Extended operation (flow or pressure control) with extended controller*

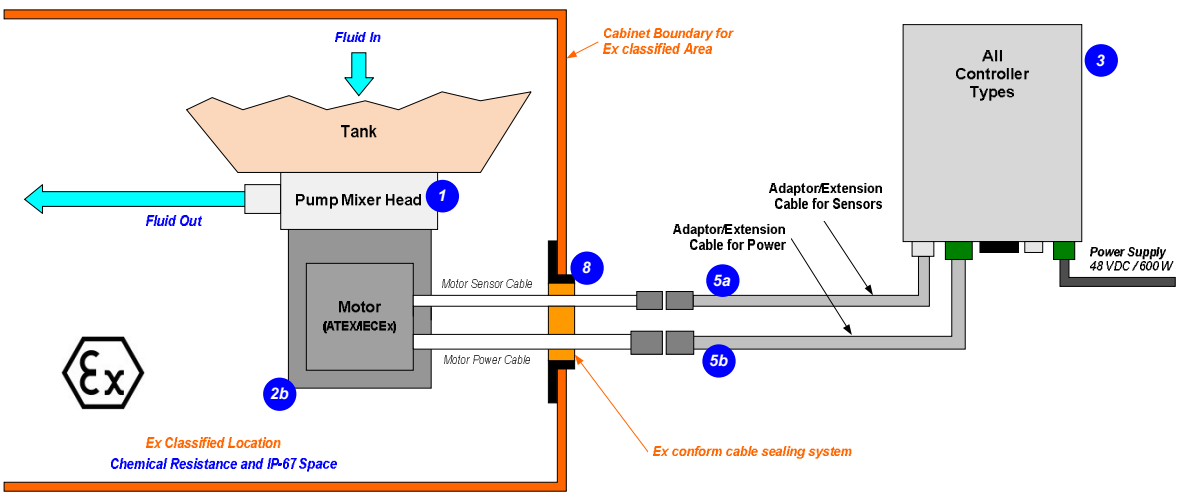

Figure 8: *System Configuration for ATEX / IECEx applications*

DIMENSIONS OF MAIN COMPONENTS

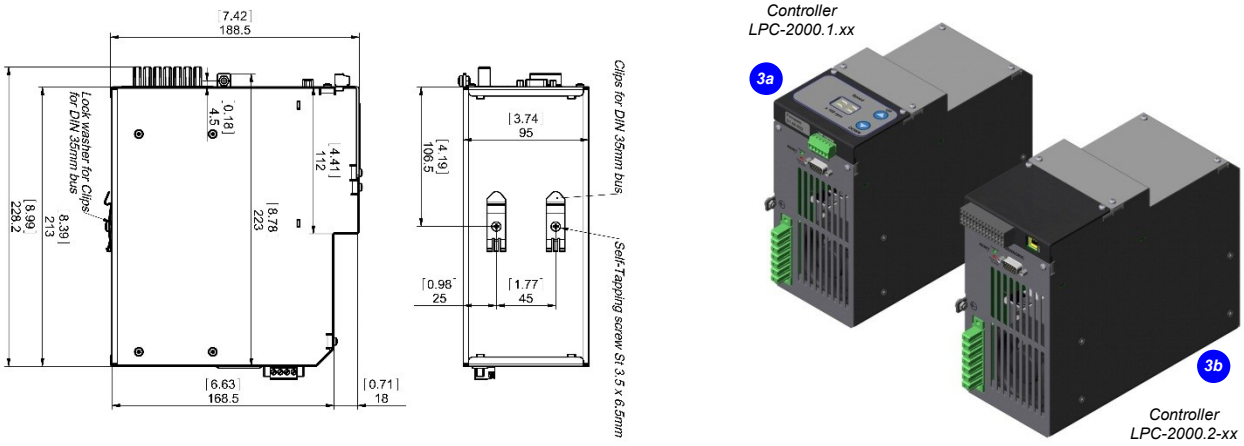

Figure 9: *Dimensions of controllers LPC-2000.1 and LPC-2000.2*
Note 1: Non-tolerated dimensions are for reference only.

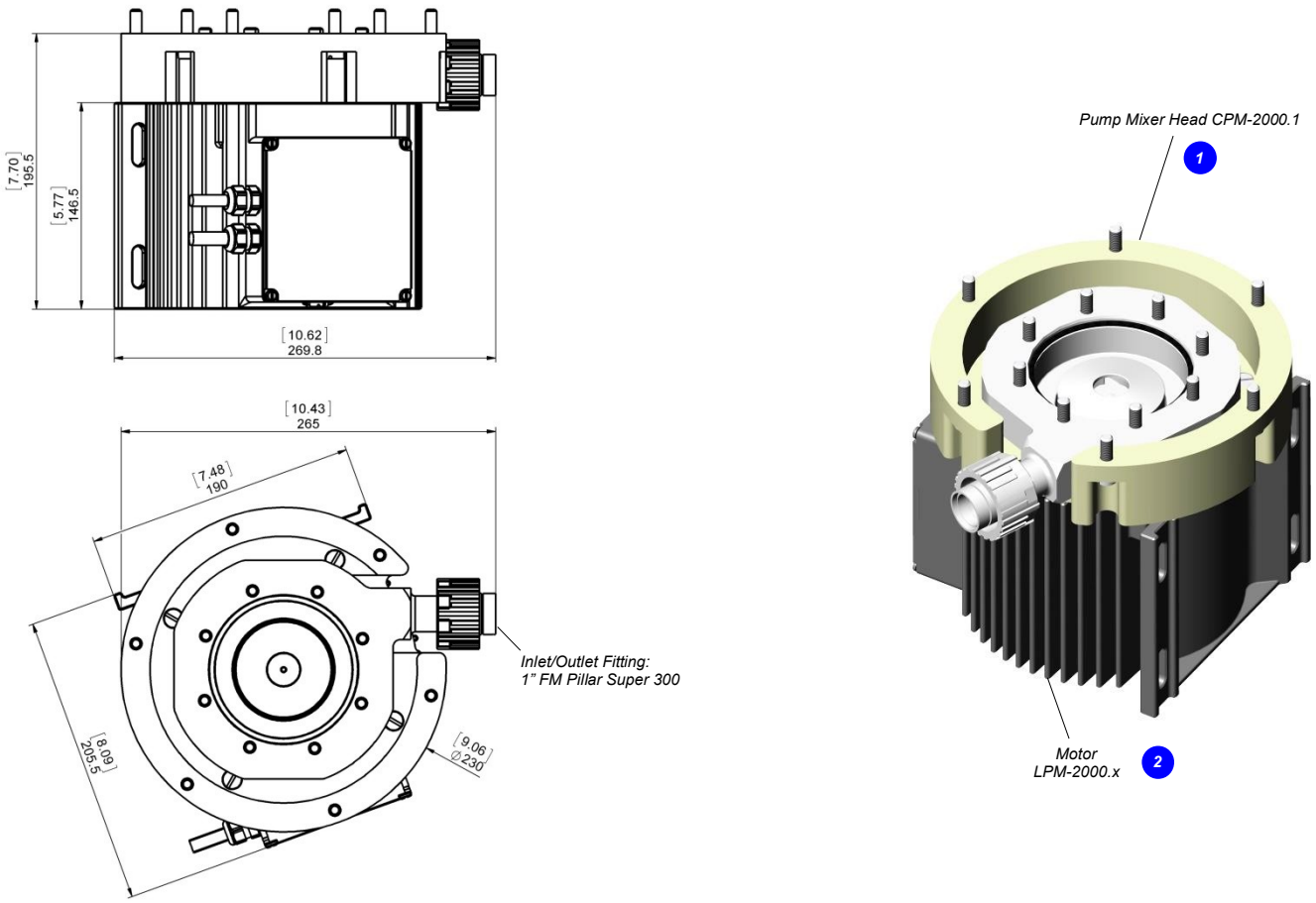

Figure 10: *Basic dimensions of motor LPM-2000 with pump mixer head CPM-2000.1*
Note 1: Non-tolerated dimensions are for reference only.

System Name	Article #	Pump Mixer Head	Motor	Controller	Note
PTM-2000.1	100-90937	CPM-2000.1	LPM-2000.2	LPC-2000.1-01	*Adaptor/Extension (0.5 - 10m) cables according to (position 4a and 4b) have to be ordered as separate article with specified length.*
PTM-2000.2	100-90938		LPM-2000.2	LPC-2000.2-01	*Certifications: CE, IECEE CB scheme, ETL (NRTL).* [1]
PTM-2000.4 (ATEX)	100-90940		LPM-2000.8	LPC-2000.1-01	*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 (Position 8).*
PTM-2000.5 (ATEX)	100-90941		LPM-2000.8	LPC-2000.2-01	*Certifications: CE, IECEE CB scheme, ETL (NRTL), ATEX and IECEx, Japan and Korean Ex certification.* [1]

***Table 1:** Standard system configurations*
Note 1: Certifications have been done in the context with the BPS-2000 pump system.

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1	Pump Mixer Head	CPM-2000.1	100-90936	Impeller / Pump Housing Sealing Ring Fittings / Mounting Flange	*PFA / PTFE* *FFPM perfluoroelastomer* *Pillar Super 300 FM 1" / PVDF*
				Max. Flow Max. Diff.-Pressure Max. Liquid Temp.	*120 liters/min / 32 gallons/min* *4.1 bar / 59.5 psi* *90°C / 194°F*
				Interface to Tank	*Detailed design guideline can be requested at Levitronix®.*
2a	Motor	LPM-2000.2	100-10050	Housing	*ETFE (chemical resist.) coated Alu., waterproofed (IP67 without connectors)*
				Cable / Connectors	*2x 3m cables with FEP jacket / 2x circular (AMP types)*
2b	Motor (ATEX, IECEx)	LPM-2000.8	100-10060	ATEX/IECEx Marking [1]	CE cULus Ex II 3G Ex ec h IIC T5 Gc CE cULus Ex II 3D Ex h tc IIIC T100°C Dc
				Cable / Connectors	*2x 3m cables with FEP jacket / 2x circular (M23, IP67)*
3a	Standalone Controller (User Panel)	LPC-2000.1-01 ("High Flow")	100-30018 (Supply and Enable connector included)	Voltage / Power Housing Rating	*1 or 3 x 200-240 V AC ±10% / 2kW @ 50/60Hz IP20*
				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	E1.25 (standard firmware for "High Flow")
3b	Extended Controller (PLC and USB)	LPC-2000.2-01 ("High Flow")	100-30021 (Supply 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 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	E1.48 (standard firmware for "High Flow")

***Table 2:** Specification of standard components*
Note 1: ATEX/IECEx motors are also certified and marked for Japan and Korean Ex.

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)	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-2000.1-05 MCAP-2000.1-30 MCAP-2000.1-50 MCAP-2000.1-70 MCAP-2000.1-100	190-10122 190-10123 190-10124 190-10101 190-10125	190-10208 190-10210 190-10211 190-10205 190-10212	Jacket Material Connector Types Connector Material	*PVC* *Circular AMP to D-SUB (a)/COMBICON (b)* *Plastics (PA)*
5a 5b	Extension Adaptor Cable for Sensor (a) and Power (b)	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-2000.3-05 MCAP-2000.3-30 MCAP-2000.3-50 MCAP-2000.3-70 MCAP-2000.3-100	190-10158 190-10159 190-10130 190-10160 190-10161	190-10219 190-10221 190-10222 190-10223 190-10224	Jacket Material Connector Types Connector Material	*PVC* *Circular M23 (IP-67) to D-SUB (a)/COMBICON (b)* *Metallic – Nickel coated*

***Table 3:** Specification of adaptor/extension cables*

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature	
6a	Air Cooling Module	ACM-4.2	190-10139	Material / Connection Port Air Pressure	*PP (+ 40% Talkum) / NPT 1/4"* *~1 - 3 bar (14 – 43 psi)*	
6b	Air Cooling Module	ACM-4.3	190-10243	Material	*PP-EL-S with conductive additive for operation with ATEX motor*	
7a	Fan Cooling Module	FCM-2000.1	190-10390	Housing / Cable Spec. Supply Spec. / IP Rating	*PP (+ 20% Talkum) white / PP jacket, 3m, circular sealed M12 connector (PP).* *24 VDC, 33.5 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-E)	Impeller Exchange Kit" ("High Flow")	IEK-2000.6 (for CPM-2000)	100-90943	Impeller (A)../..O-Ring (B) Pump-Mixer-Tank Screws (C) Flange-Tank Screws (D) Flange-Motor Screws (E) Imp. Exchange Tool IET-3.1 (F)	*LPI-2000.2 in PFA / O-Ring FFPM, 98.02 x 3.53* *8 pieces M8x40, Stainless Steel with PTFE coating* *4 pieces M8x20, Stainless Steel with PTFE coating* *6 pieces M8x30, Stainless Steel with PTFE coating* *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.*

***Table 4:** Specification of accessories*

Figure 11: *Pump system PTM-2000 with standard components*

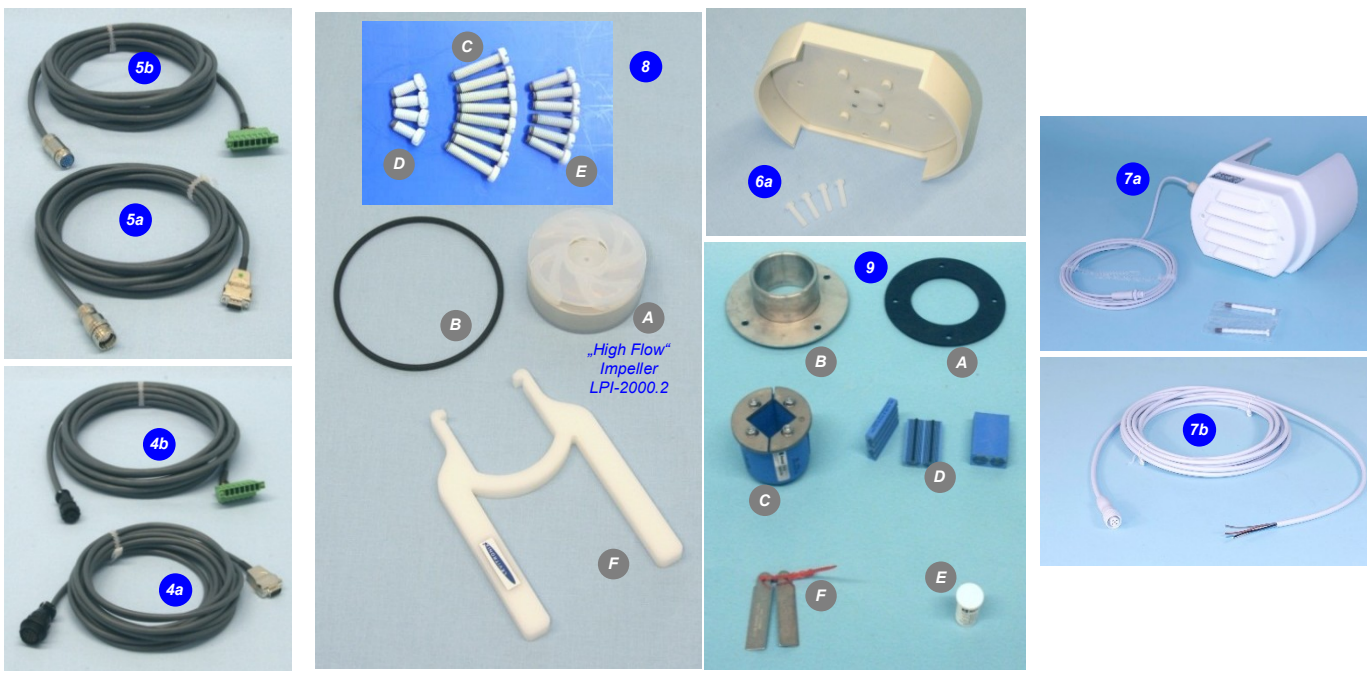

Figure 12*: Accessories*

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.

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PL-4055-00, Rev03, DCO# 22-264 *First Release: 29-Sep-2015* *Last Update: 05-Jan-2023*