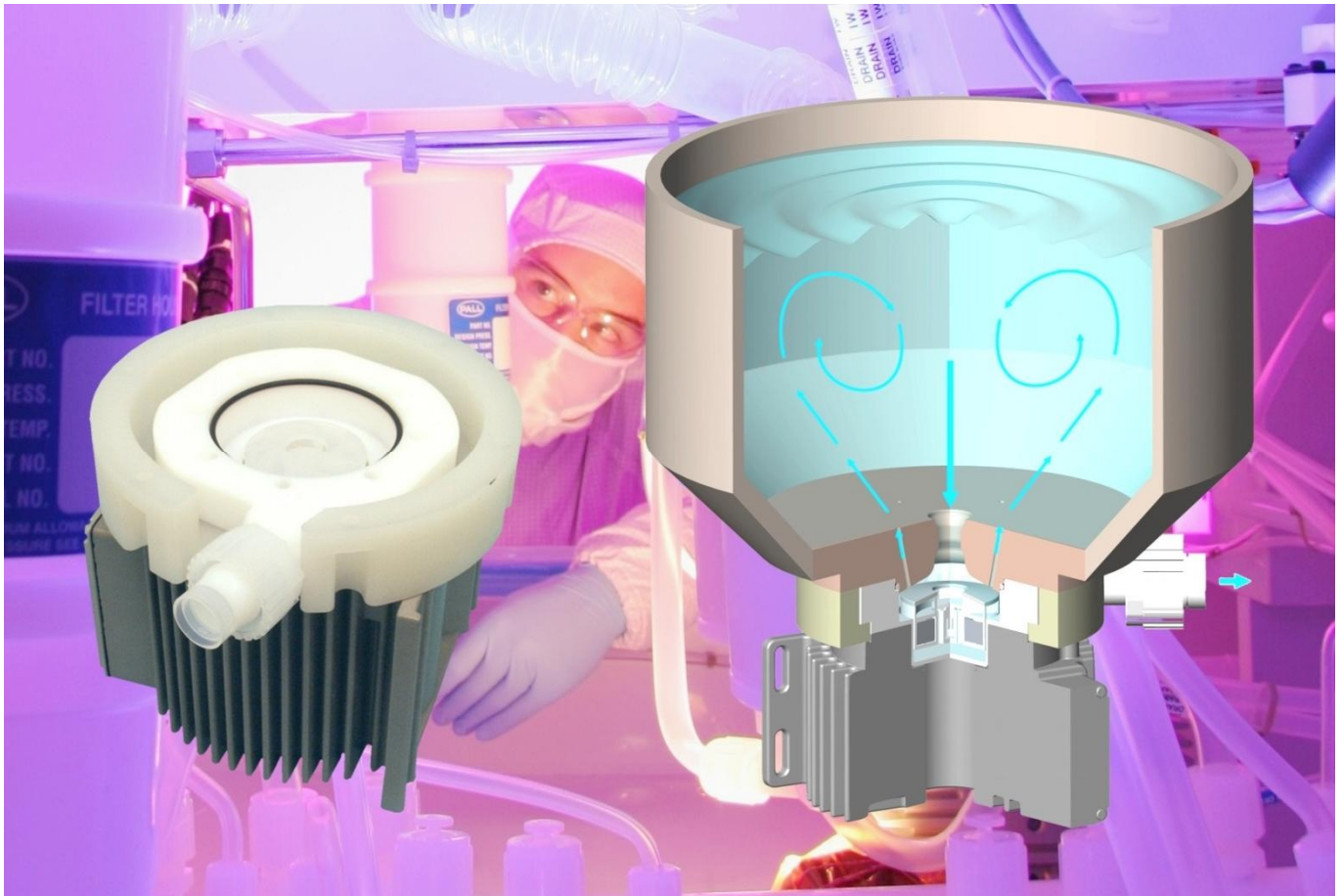


**High Purity Pumping and Mixing
 with One Single Device!**



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

PTM-2000

4.1 bar (59.5 psi)
 Typical Tank Size

140 lpm (37 gpm)
 400 liters (106 gallons)

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

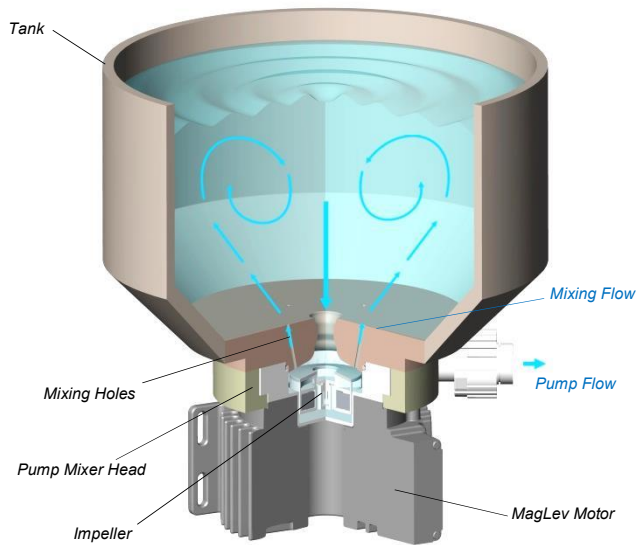


Figure 1: Concept of the MagLev pump tank mixer.

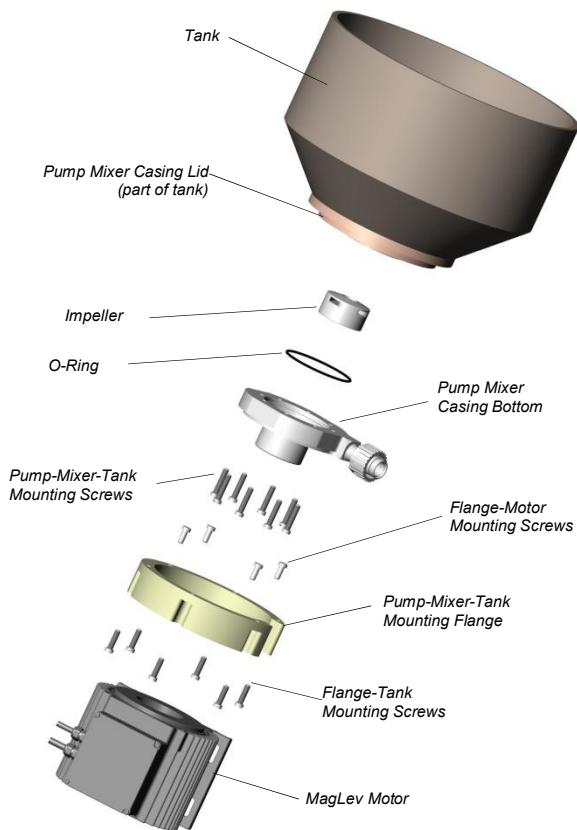


Figure 2: Main elements of the pump tank mixer

**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.

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.

- 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.
- Ex marking of motor with pump head:
 - CE Ex II 3G Ex c nAc IIC 110°C (T4)
 - CE Ex II 3D Ex c t IIC T110°C IP67
- 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.

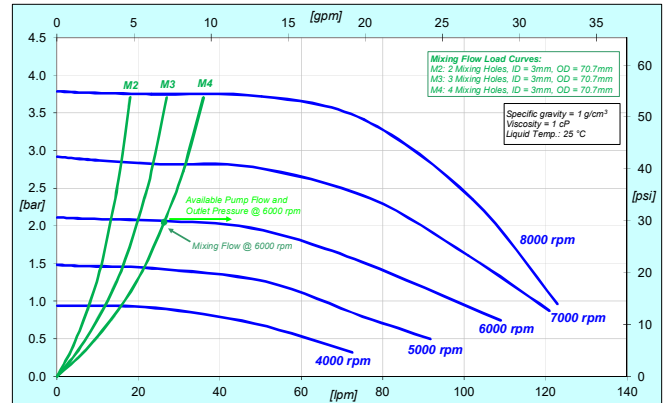


Figure 3: Pressure/flow curves of CPM-2000.1 pump mixer head

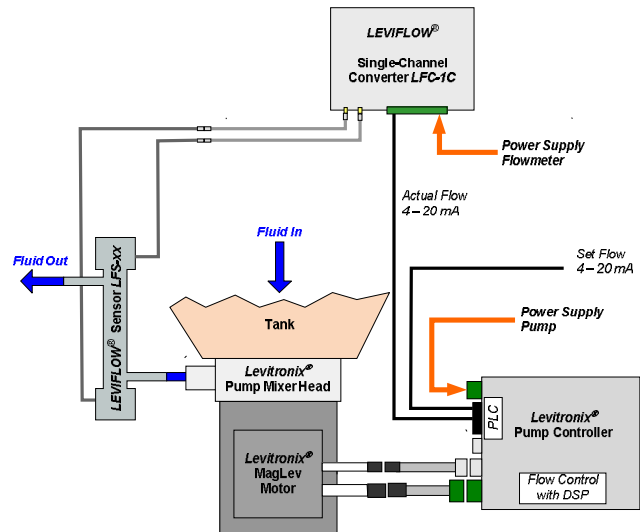


Figure 4: Flow control setup with PTM-2000 system and LEVIFLOW® flowmeters

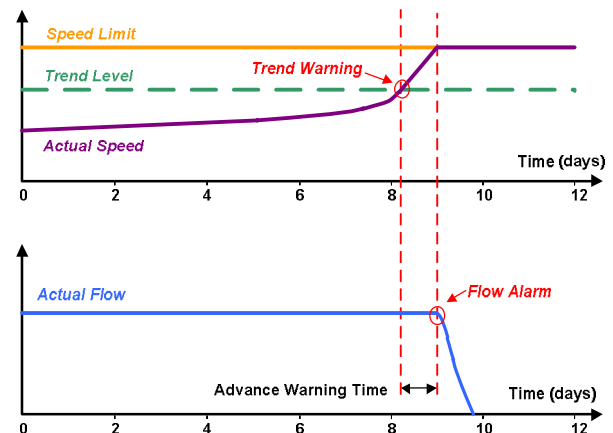


Figure 5: Dynamic Condition Trending (DCT)

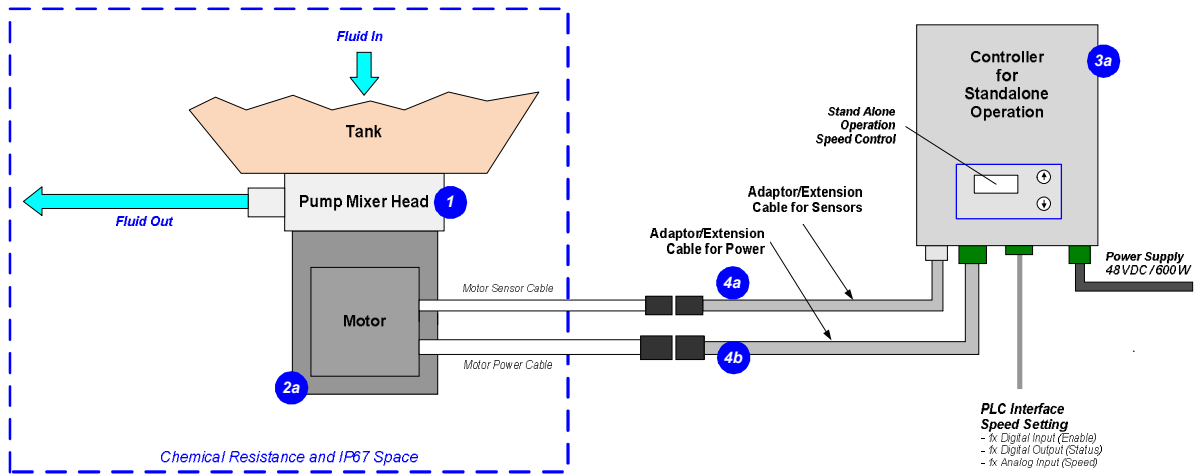


Figure 6: System configuration for standalone operation (Speed setting with integrated user panel)

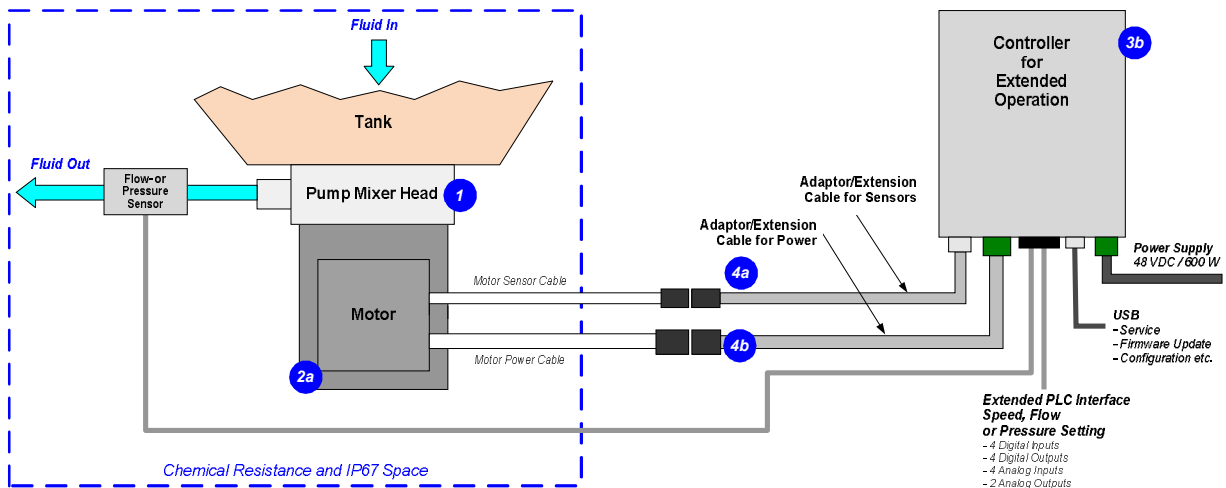


Figure 7: Extended operation (flow or pressure control) with extended controller

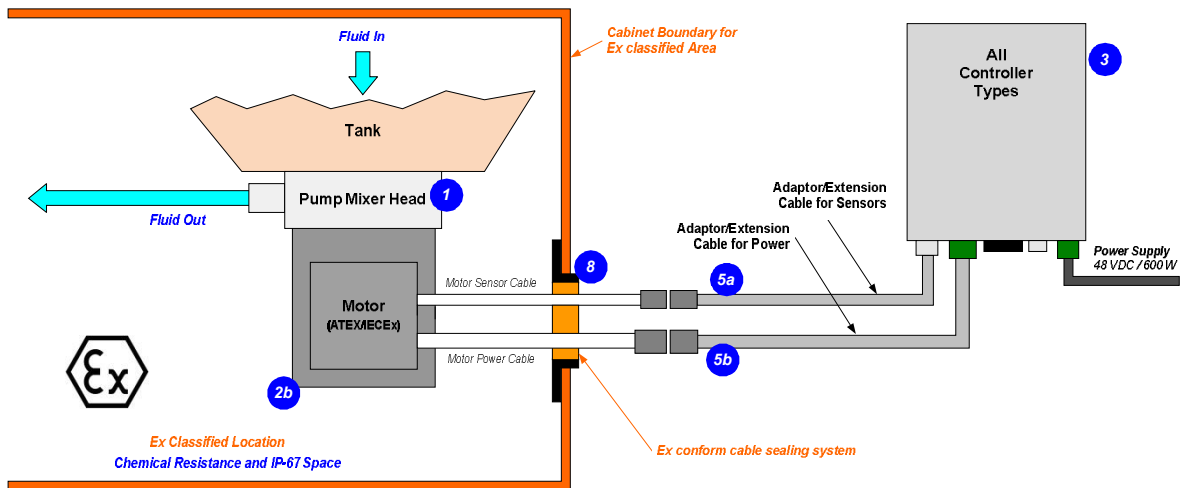


Figure 8: System Configuration for ATEX / IECEx applications

DIMENSIONS OF MAIN COMPONENTS

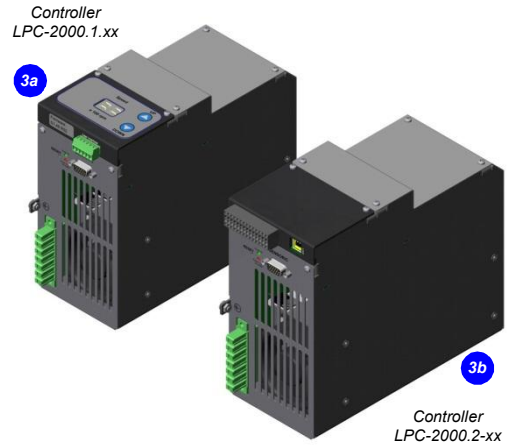
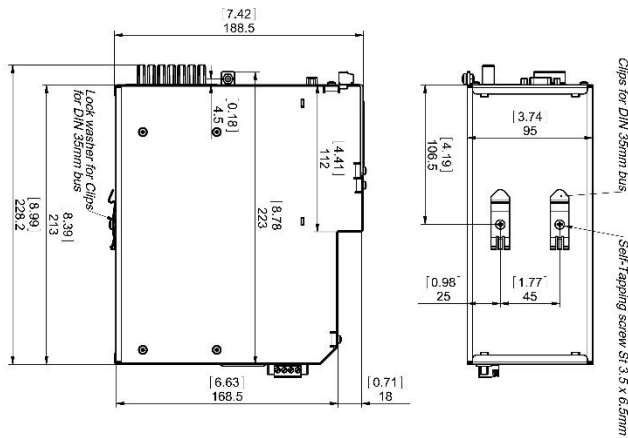


Figure 9: Dimensions of controllers LPC-2000.1 and LPC-2000.2

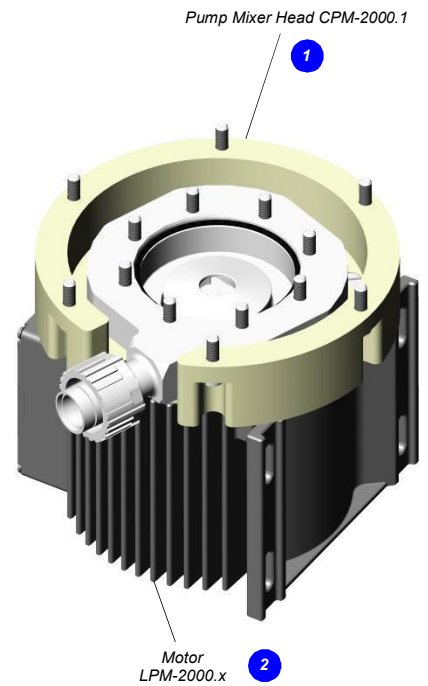
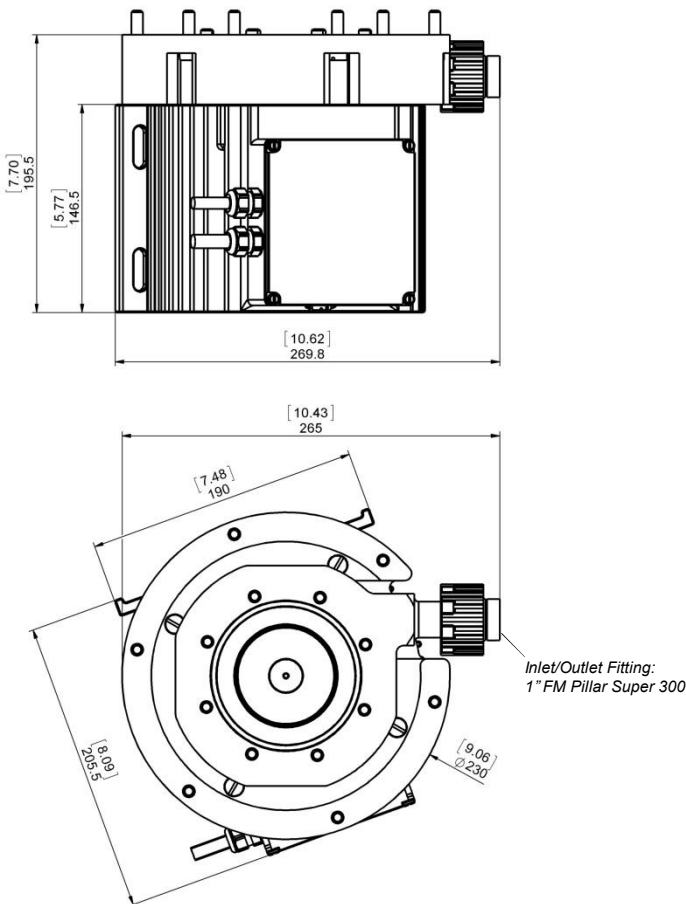


Figure 10: Basic dimensions of motor LPM-2000 with pump mixer head CPM-2000.1

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. Certifications: CE, IECEx CB scheme, ETL (NRTL). ¹
PTM-2000.2	100-90938		LPM-2000.2	LPC-2000.2-01	
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). Certifications: CE, IECEx CB scheme, ETL (NRTL), ATEX and IECEx. ¹
PTM-2000.5 (ATEX)	100-90941		LPM-2000.8	LPC-2000.2-01	

Table 1: Standard system configurations
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 Kalrez® perfluoroelastomer ¹ Pillar Super 300 FM 1" / PVDF
				Max. Flow Max. Diff.-Pressure Max. Liquid Temp.	140 liters/min / 37 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 Cable / Connectors	ETFE (chemical resist) coated Alu., waterproofed (IP67 without connectors) 2x 3m cables with FEP jacket / 2x circular (AMP types)
2b	Motor (ATEX, IECEx)	LPM-2000.8	100-10060	ATEX/IECEx Marking Cable / Connectors	CE II 3G Ex c nAc IIC 110°C (T4) CE II 3D Ex c tc IIIC T110°C IP67 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 / Current / Power	1 x 200-240 V AC ±10% / 1 x 12.7 - 10.6 A ±10% / 2kW @ 50/60Hz 3 x 200-240 V AC ±10% / 3 x 8.1 - 6.8 A ±10% / 2kW @ 50/60Hz
				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
				Standard Firmware	E1.48 (standard firmware for "High Flow")
				USB interface (for service and system monitoring)	

Table 2: Specification of standard components
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)	MCAS-600.1-05 (0.5m)	MCAP-2000.1-05	190-10122	190-10208	Jacket Material Connector Types Connector Material	PVC Circular AMP to D-SUB (a)/COMBICON (b) Plastics (PA)
		MCAS-600.1-30 (3m)	MCAP-2000.1-30	190-10123	190-10210		
		MCAS-600.1-50 (5m)	MCAP-2000.1-50	190-10124	190-10211		
		MCAS-600.1-70 (7m)	MCAP-2000.1-70	190-10101	190-10205		
		MCAS-600.1-100 (10m)	MCAP-2000.1-100	190-10125	190-10212		
5a 5b	Extension Adaptor Cable for Sensor (a) and Power (b)	MCAS-600.3-05 (0.5m)	MCAP-2000.3-05	190-10158	190-10219	Jacket Material Connector Types Connector Material	PVC Circular M23 (IP-67) to D-SUB (a)/COMBICON (b) Metallic - Nickel coated
		MCAS-600.3-30 (3m)	MCAP-2000.3-30	190-10159	190-10221		
		MCAS-600.3-50 (5m)	MCAP-2000.3-50	190-10130	190-10222		
		MCAS-600.3-70 (7m)	MCAP-2000.3-70	190-10160	190-10223		
		MCAS-600.3-100 (10m)	MCAP-2000.3-100	190-10161	190-10224		

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, Kalrez®, 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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