

PuraLev® Pump Console for Life Science Applications



LCO-2000

For PuraLev® 2000SU
PuraLev® 2000MU

Advanced Ultrapure Fluid Handling!

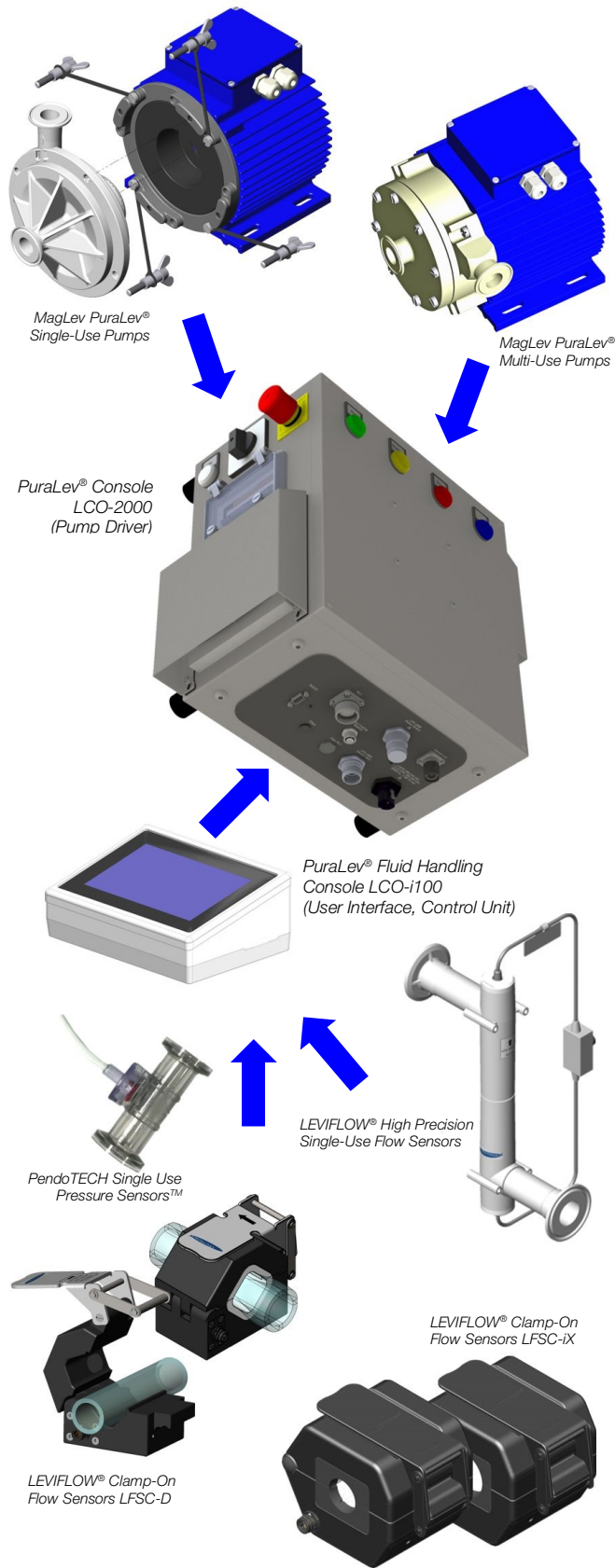


Figure 1: Component connectivity of PuraLev® fluid handling console

INTRODUCTION

The *PuraLev*® console system integrates *Levitronix*® MagLev pumps with *LEVIFLOW*® ultrasonic flow sensors and adds a sophisticated user interface with enhanced connectivity features. The system allows various operating modes including stand-alone pumping with flow monitoring or flow control, pressure monitoring and control with up to three pressure sensors and temperature monitoring.

The *PuraLev*® console *LCO-2000* contains the pump controller to drive the *PuraLev*® 2000 pump motor, an integrated fan cooling system and safety components. The housing is made out of stainless steel with a water protection design (IP54).

The console *LCO-2000* can be controlled by the *LCO-i100* console, which features an embedded PC with a 7" multi-touch screen and comes with software for flow control, configuration and monitoring of various sensors. Various integrated sensor signal converter circuits allow connection of *LEVIFLOW*® single-use and clamp-on flow sensors, and single-use pressure and temperature sensors from suppliers such as *PendoTECH*.

SYSTEM BENEFITS

- Precise flow monitoring or control.
- Integrated signal converters for pressure & temperature monitoring.
- Precise pressure limitation to avoid potential tube ruptures.
- Plug and play stand-alone functionality.
- Intuitive user interface with 7" color multi-touch.
- Data collection capabilities.
- Easily configurable and customizable by software.

APPLICATIONS

- Fluid transfer and recirculation in upstream and downstream bioprocessing.
- Single-use and multi-use components available.
- Ideal for RG2+ agents and toxic products due to inherent maximum pressure limitation.
- Depth filtration, ultrafiltration, diafiltration, sterile filtration.
- Mixing, blending, dilution and filling.

STAND-ALONE PUMP SYSTEM CONFIGURATION

With the standard stand-alone pump system configuration, as illustrated in *Figure 5*, the speed of the pump can be set manually and the flow can be monitored with a *LEVIFLOW*[®] flow sensor. The mode of operation can be easily switched to a flow control setup, where the flow is set manually on the 7" multi-touch screen of the *LCO-i100* and is controlled by the integrated PC.

The USB interface on the front side facilitates software updates or data collection for debugging with a USB stick.

The console comes with an intuitive software, which, in combination with the touch screen, simplifies the usage, configuration and monitoring of the system.

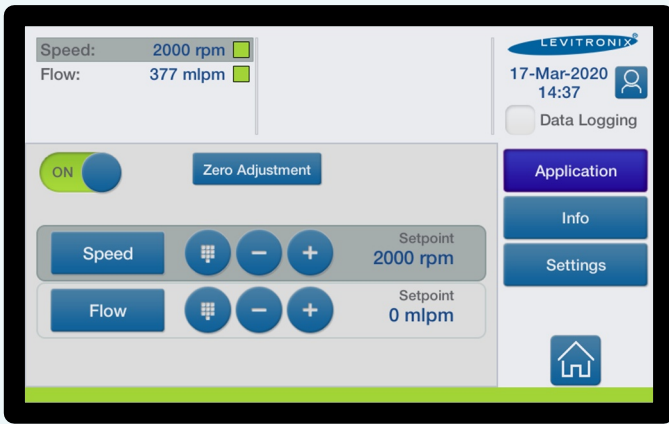


Figure 2: Start-up menu of touch screen

ADVANCED FLUID HANDLING CONFIGURATION

Figure 6 illustrates the extended monitoring capabilities of the *PuraLev*[®] console for advanced fluid handling applications such as depth filtration, ultrafiltration, diafiltration, sterile filtration or pressure control for filling stations.

The *PuraLev*[®] console *LCO-i100* includes 2 flow sensor connections and 3 gauge amplifiers for connecting up to 3 single-use pressure sensors and an additional circuit for the connection of a temperature sensor.

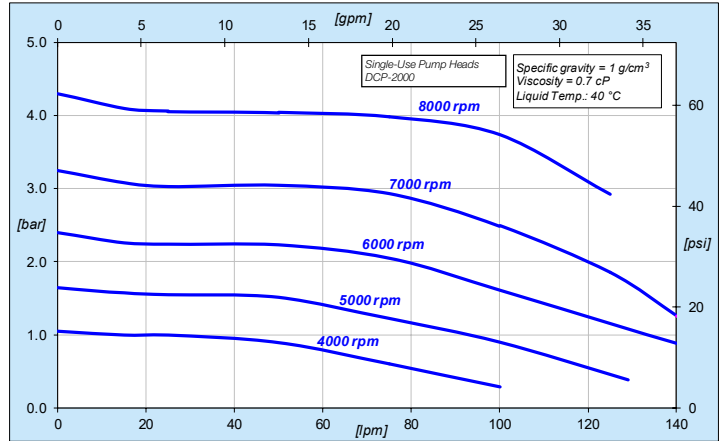


Figure 3: Pressure/flow curves with *PuraLev*[®] 2000SU

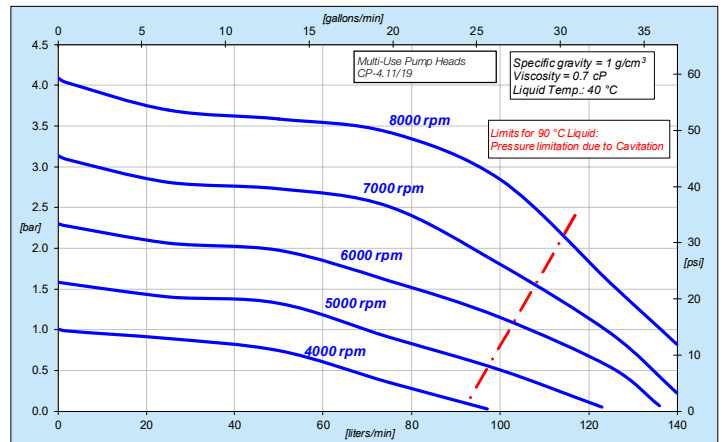


Figure 4: Pressure/flow curves with *PuraLev*[®] 2000MU

SYSTEM CONFIGURATIONS

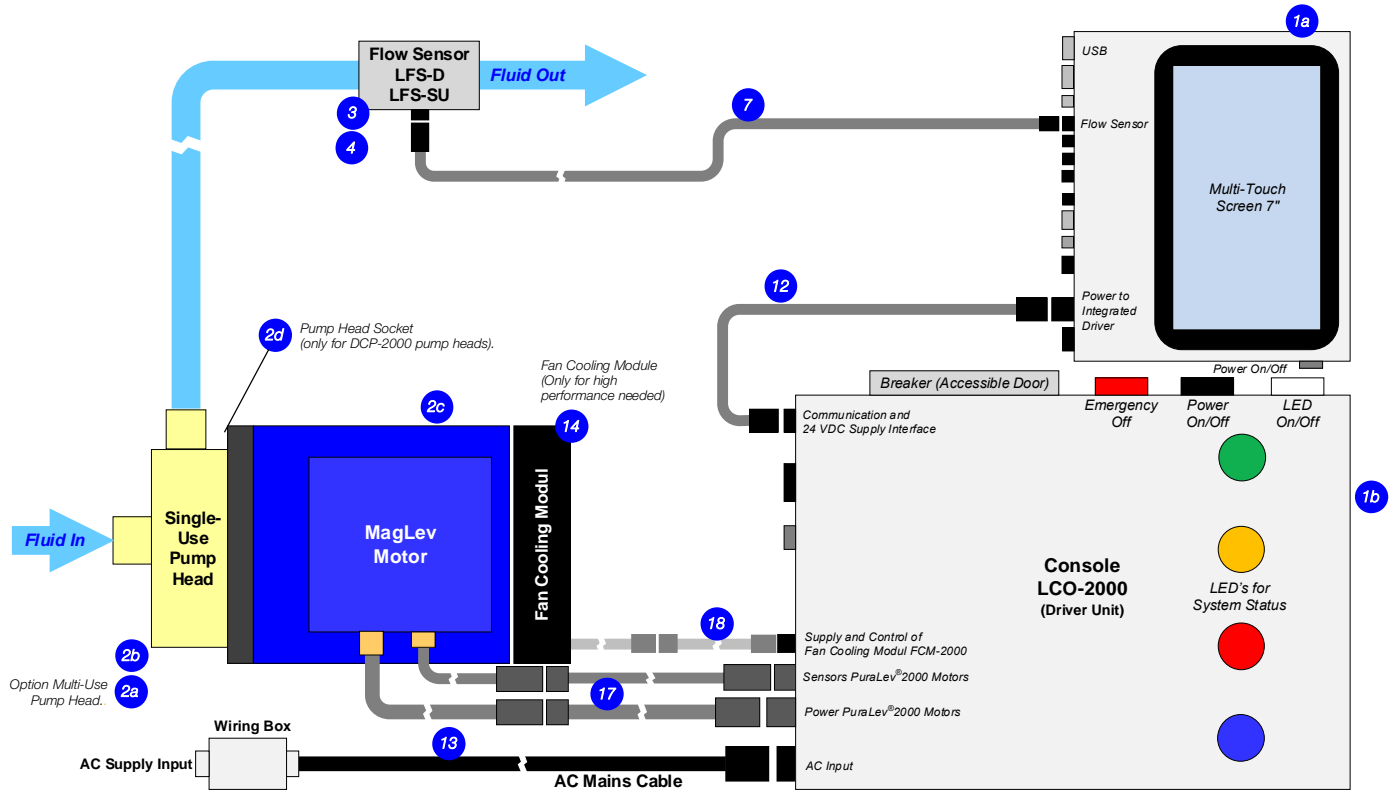


Figure 5: Stand-alone pump system configuration of LCO-2000 console with LCO-i100 as user interface with flow control or flow monitoring

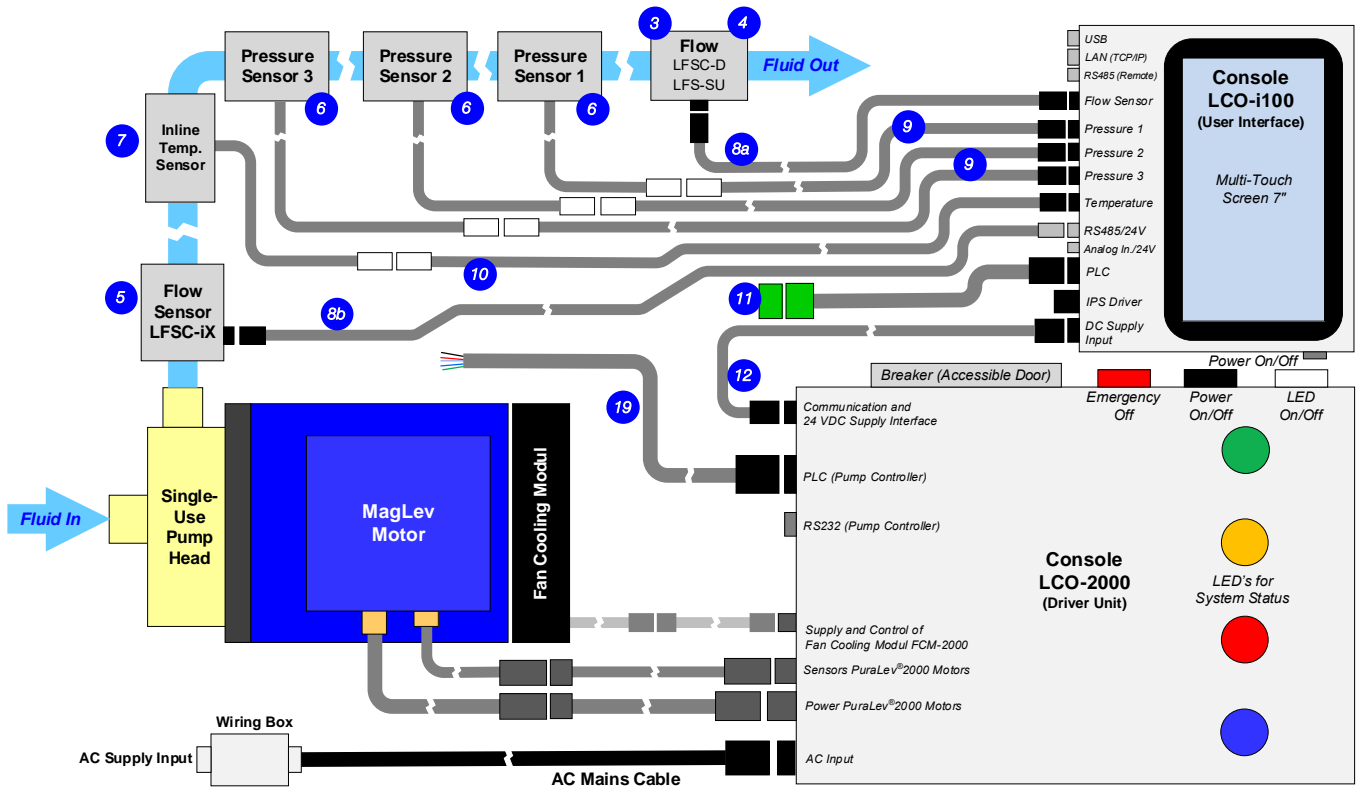


Figure 6: Extended configuration of console LCO-2000 with LCO-i100 as user interface for advanced fluid handling

DIMENSIONS AND INTERFACES

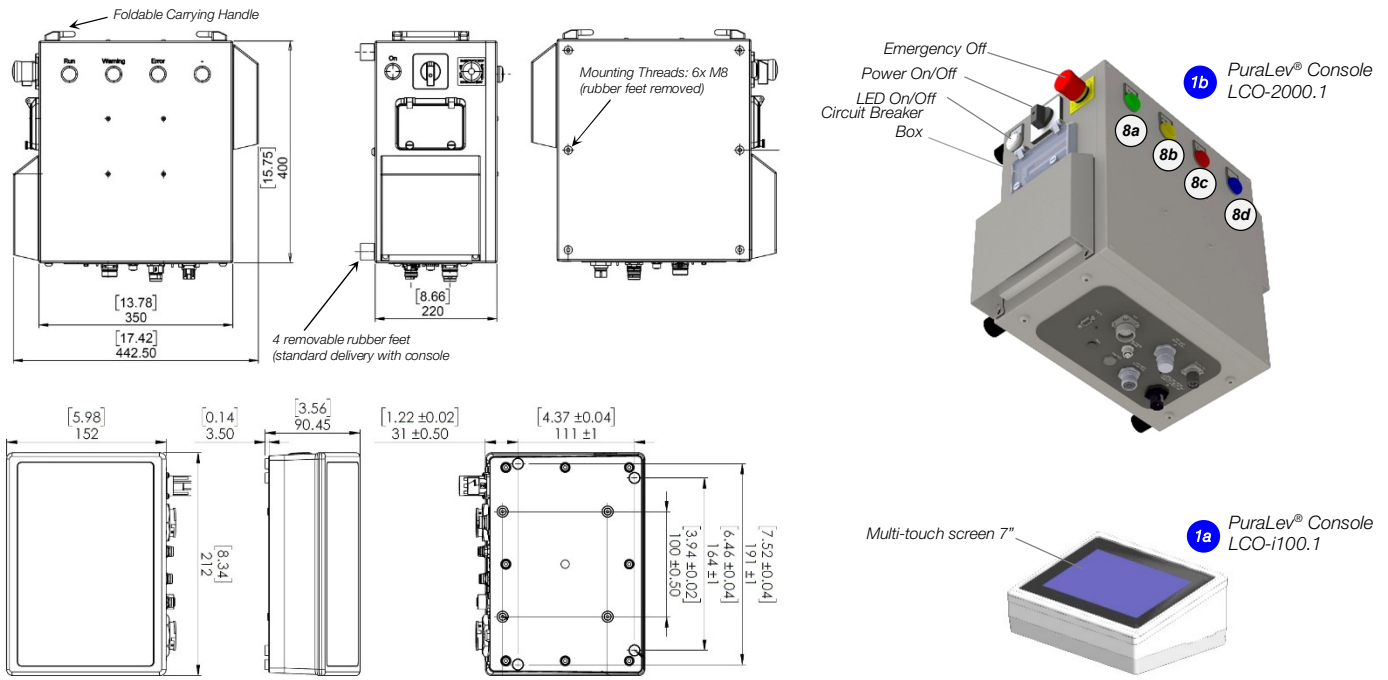
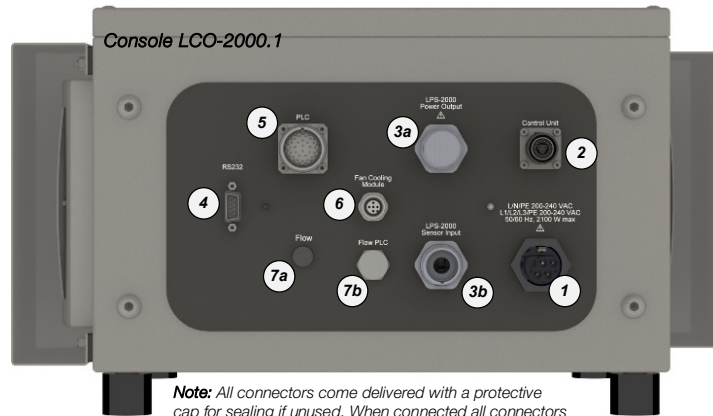
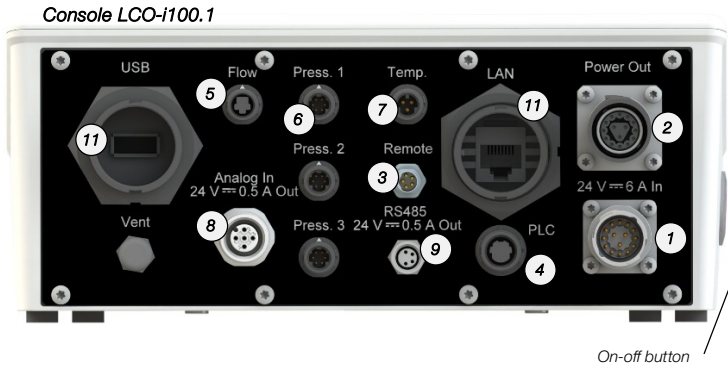


Figure 7: Dimensions (in mm and [inch]) of PuraLev® console LCO-2000.1 and LCO-i100.1 (Dimensions without tolerances are for reference only)

Note: All connectors come delivered with a protective cap for sealing if unused. When connected all connectors are at least IP66 rated.



Note: All connectors come delivered with a protective cap for sealing if unused. When connected all connectors are minimum P66 rated.

#	Interface Connector	Description	Specification/Purpose/Note
1	DC Supply Connector	Single phase DC connection.	24 VDC input with RS232 for LCO-2000. Software configurable Autoresume function ¹ . 3-pin connector.
2	IPS Driver	Power connector for IPD-30 and IPD-100 drivers.	Not needed in LCO-2000 context.
3 ¹	Remote	RS485 for future purposes.	Not active.
4	PLC	Remote control. Configurable designations.	2x digital outputs (outputs software configurable to 24VDC ¹), 2x digital inputs, 1 analog output (4-20 mA), 1x analog input (4-20mA) Note: All signals isolated.
5	Flow Sensor LEVIFLOW®	Connection of flow sensors from the LFS-SU and LFSC-D series.	Circular 6 pin snap-in connector.
6a	Pressure Sensor 1	Connection for 3 single-use pressure sensors 1, 2 and 3.	Needs adaptor cable (see Table 6). Circular 6 pin snap-in connector.
6b	Pressure Sensor 2		
6c ¹	Pressure Sensor 3		
7	Temperature Sensor	Connection for 1 single-use temperature sensor.	Needs adaptor cable (see Table 6). Circular 6 pin snap-in connector.
8	Analog In 24VDC Out	Multi purpose sensor input.	Current input 4-20 mA, 24 VDC supply.
9 ¹	RS485 24VDC Output	Sensor input for new clamp-on flow sensors LFSC-IX.	RS485 bus with 24 VDC supply..
10	LAN Interface	TCP/IP Modbus	For connection to OPC devices
11	USB Interface	Connection of USB stick.	Purpose: Data collection and software update.

#	Interface Connect.	Description	Specification/Purpose/Note
1	AC Supply Connector	AC connection.	1 x 200-240 V AC / 2.1kW @ 50/60Hz or 3 x 200-240 V AC / 2.1kW @ 50/60Hz
2	Control Unit	Communication to LCO-i100	RS232 interface with 24VDC supply.
3a	Motor Power PuraLev® 2000	Power connector for LPM-2000 motors.	M23 metallic connector.
3b	Motor Sensor PuraLev® 2000	Sensor connector for LPM-2000 motors.	M23 metallic connector.
4	RS232	RS232 to internal controller. For operation without LCO-i100.	For remote control with serial interface or Levitronix® Service Software with PC.
5	PLC	PLC of internal controller. For operation without LCO-i100.	4x digital output, 4x digital input, 1 analog output (5V), 1 analog input (10V), 1 analog input (4-20mA), 24VDC supply output.
6	FAN Connector	For Fan Cooling Module FCM-2000.1	24 VDC supply and speed control of motor cooling fan.
7a	Flow	Not connected.	For future purposes.
7b	Flow PLC	Not connected.	For future purposes.
8a	LED 1 - Green	Run	Motor is running.
8b	LED 2 - Yellow	Warning	A warning has occurred.
8c	LED 3 - Red	Error	Error indication.
8d	LED 4 - Blue	Not assigned.	Free configurable for future use.

Figure 8: Interfaces of PuraLev® console LCO-2000.1 and LCO-i100.1 (Note 1: Not available on units older than 2018/19.)

ORDER INFORMATION

Pos.	Component	Article Name	Article #	Characteristics	Value / Feature
1a	PuraLev® Console (User Interface)	LCO-i100.1-01	100-30501	Supply Voltage / Power Housing Rating / Weight Interfaces LCO-2000 Interface Certifications	24 VDC with 50W or 160 W supply (Supply available on LCO-2000 console) IP65 ³ / 1.6 kg Multi-touch screen 7", 3 pressure sensors, 2 flow sensors, 1 temperature sensor PLC, LAN, USB RS232 interface with supply from LCO-2000 console. CE, IEC60947-2, ETL (NRTL) listed ²
1b	PuraLev® Console (Drive Unit)	LCO-2000.1-01	100-30503	Supply Voltage / Power ¹ Housing Rating / Weight Interfaces Pump Motors Certifications	1 x 200 – 240 ± 10% / 2.1kW, 50/60 Hz 3 x 200 – 240 ± 10% / 2.1kW, 50/60 Hz IP54 / 15.8 kg RS232 Interface to LCO-i100 (incl. 24VDC supply), fan cooling module (see Table 6), RS232 and PLC for operation without LCO-100. PuraLev® 2000 motors CE, IEC60947-2, ETL (NRTL) listed

Table 1: Basic specifications of standard LCO-2000 console with user interface console LCO-i100
 Note 1: AC mains cable to be ordered separately according to Table 6. Note 2: Not available on units older than 2018/19. Note 3: Designed and tested for IP66. IP40 rating for consoles older than 2018/19.

Pos.	Component ²	Article Name	Article #	Characteristics	Value / Feature
2a	Multi-Use Pump Head	CP-4.11 (with drain port) CP-4.19 (no drain port)	100-90245 100-90458	Wet Materials / Fittings Max. Flow / Max. Diff.-Pressure Sterilization Methods	PVDF, PFA and EPDM (FDA, USP Class VI, BSE/TSE/animal-free) / Triclamp 1" 140 liters/min (37 gallons/min) / 4.1 bar (59.5 psi) CIP (clean in place), SIP (steam in place), Autoclaving
2b	Single-Use Pump Head	DCP-2000.2 ¹ (Needs pump head socket mounted on motor)	100-90889	Wet Materials Max. Flow / Max. Diff.-Pressure Sterilization Methods	Polypropylene (FDA, USP Class VI, BSE/TSE/animal-free) / Triclamp 1" 140 liters/min (37 gallons/min) / 4.3 bar (62.4 psi) Gamma radiation up to 40 kGy.
2c	Motor	LPM-2000.7	100-10059	Housing Cable / Connectors	Epoxy (anti-corrosive) coated aluminum, waterproof (IP67) 2x 3m cables with PVC jacket / 2x circular (M23, IP-67)
2d	Pump Head Socket	PHS-2000.2	100-90891	Mounting Type / Material	Mounting with 4x 25mm screws, anodized aluminum

Table 2: Specification of standard pump motors and single-use pump heads compatible with LCO-2000 console
 Note 1: Gamma irradiated options available. Note 2: See Levitronix® technical brochures of PuraLev® 2000SU and PuraLev® 2000MU for more detailed specifications

Pos.	Component	Article Name	Article #	Fitting	Wet Material	Note
3a	LEVIFLOW® Single-Use Flow Sensors	LFS-20SU.1-Z (80 lpm) ² LFS-20SU-Z-SC1 (80 lpm) ²	100-30483 100-30464	Triclamp 1"	Polypropylene (FDA, USP Class VI, BSE/TSE/Animal free) Gamma stable for up to 40 kGy.	See Levitronix® technical brochure of LFS-SU single-use sensor series for more detailed specifications or other sizes.

Table 3: Specification of LEVIFLOW® single-use high-precision (1% accuracy of reading) flow sensors compatible with LCO-i100 in context with LCO-2000 console
 Note 1: All flow sensors available with gamma irradiation option (see LEVIFLOW® SU product literature for more details). Note 2: Needs LCO-i100 console software LCO V1.04 R12 or higher.

Pos.	Component	Article Name	Article #	Calibrated Liquid	Tubing	Tube: ID x OD	Note
4a	LEVIFLOW® Clamp-On Flow Sensors LFSC-D	LFSC-22D-005 (80 lpm) LFSC-30D-001 (160 lpm)	100-30391 100-30414	Water @ 20°C/37°C	Silicone, C-Flex® ¹	3/4" x 1" 1" x 13/8"	See Levitronix® technical brochure of LFSC-D or LFSC-iX clamp-on sensor series for detailed specifications or other sizes.
5a	LEVIFLOW® Clamp-On Flow Sensors LFSC-iX	LFSC-i25X-001 (80 lpm) LFSC-i35X-001 (160 lpm)	100-30480 100-30481	Water @ 20°C/37°C	Silicone, C-Flex® and TPE	3/4" x 1" 1" x 13/8"	Default activated calibration set is Silicone at 37°C liquid temperature.

Table 4: Specification of LEVIFLOW® clamp-on flow sensors compatible with LCO-i100 in context with LCO-2000 console.
 Note 1: C-Flex® is a registered trademark of Saint Gobain Performance Plastics, 2015. All rights reserved.

Pos.	Component	Article Name	Article #	Fittings	Specification	Wet Material	Note
6	PendoTECH Single-Use Pressure Sensor	PREPS-N-1-1	190-10374	1" Sanitary Clamp	Pressure range: -0.48 to 5.2 bar	Polysulfone	See PendoTECH literature for more detailed specifications.
7	Single-Use Temperature Sensor	--	--	Barb, Dip. Probe	Temp. range: 0 – 70°C	Polysulfone Stainless steel	Contact Levitronix® for more information.

Table 5: Specification of single-use pressure and temperature sensors compatible with LCO-i100 console

Pos.	Component	Article Name	Part #	Characteristics	Special Feature / Description
8a	LEVIFLOW® Interconnect Cable	LFI-C.1-30 (3m)	190-10308	Cable Jacket Material Main Purpose	PVC Connection between sensor and console
8b	IP Cable Signal 4 Wires	ICS-3.1-30 (3m)	190-10447	Cable Jacket Material Main Purpose	PUR Connection between LFSC-iX flow sensors and console.
9	Pressure Sensor Adaptor Cable	LPE-1.1-30 (3m)	190-10354	General Specifications Main Purpose	Circular console connector, watertight on console side. Connection of single-use pressure sensors to console.
10	Temperature Sensor Adaptor Cable	LTE-1.1-30 (3m)	190-10353	General Specifications Main Purpose	Circular console connector, watertight on console side. Connect single-use temperature sensors to console. For barb sensors and dip probe.
11	IPS Cable Signal 12 Wires	ICS-2.1-50 (5 m)	190-10347	Cable Material / Wires Connection In / Connection Out Main Purpose	PVC jacket / 12x 0.14 mm ² and shielding Connector with screw type plug for open wire connection / Circular Hirose type General connection to PLC of LCO-i100 console.
12	IP Adaptor Cable Hybrid	ICH-1.2-03 (0.3 m) ICH-1.2-08 (0.8 m) ICH-1.2-30 (3 m)	190-10384 190-10385 190-10329	General Specifications Main Purpose Special Note	Circular console and driver side connector, watertight. Connection of LCO-i100 to LCO-2000 0.3 m length for mounting LCO-i100 on front side of LCO-2000 and 0.8 m for top side.
13	AC Mains Cables (for Console power supply)	AMC-3.3-60 (6 m, 1/3-Phase)	190-10442	Cable Material / Wires Cable Specifications Wiring Box (C) Specifications	PVC jacket (A) / 4x AWG14 (2.5 mm ²) IP68 connector (B) on console side, IP67 wiring box for 1 or 3 phase wiring IP67 and UL508A / Materials: PC, PUR, PA, SS / Size: 120x80x86 mm
14	Fan Cooling Module	FCM-2000.1	190-10390	Housing / Cable Spec. Supply Spec. / IP Rating	PP (+ 20% Talkum) white / PVC jacket, 3m, circular connector on console side. 24 VDC, 33.5 W / IP-65 (fan is IP68 rated).
15	Console Mounting Kit	CMK-1.2	190-10443	Parts Specifications Purpose	(A) Mounting adaptor LCO-i100, (B) Mounting adaptor LCO-2000, Mounting screws Mounting LCO-i100 on front or top side of LCO-2000 console.
16	Console Mounting Kit	CMK-2.1	190-10411	Parts Specifications Purpose	(A) 2 mounting feets and mounting screws. Vertical bottom mounting of LCO-2000 console.
17	Adaptor/Extension Cable Power / Sensor	MCIP-600.1-30/MCIS-600.1-30 (3m) MCIP-600.1-50/MCIS-600.1-50 (5m) MCIP-600.1-70/MCIS-600.1-70 (7m)	190-10361 / 62 190-10365 / 67 190-10366 / 68	Cable Material / Connectors Purpose	PVC jacket / circular to circular connector Extension of motor cables (power and sensors).
18	FCM Interconnect Cable	FCC-1.2-30 (3m) ¹	190-10414	Cable Material / Connectors Purpose	PP jacket / circular to circular connector Extension of fan cooling module cable.
19	LCO Adaptor Cable (for PLC)	LSE-1.1-50 (5m)	190-10417	Cable Material / Wires Connection In / Connection Out Main Purpose	PVC jacket / 12x 0.12 mm ² and shielding Open wire / Circular metallic type General connection to PLC of LCO-2000 console (remote without LCO-i100)

Table 6: Specification of cables and other accessories



Figure 9: LCO-2000 console with compatible motors and pump heads

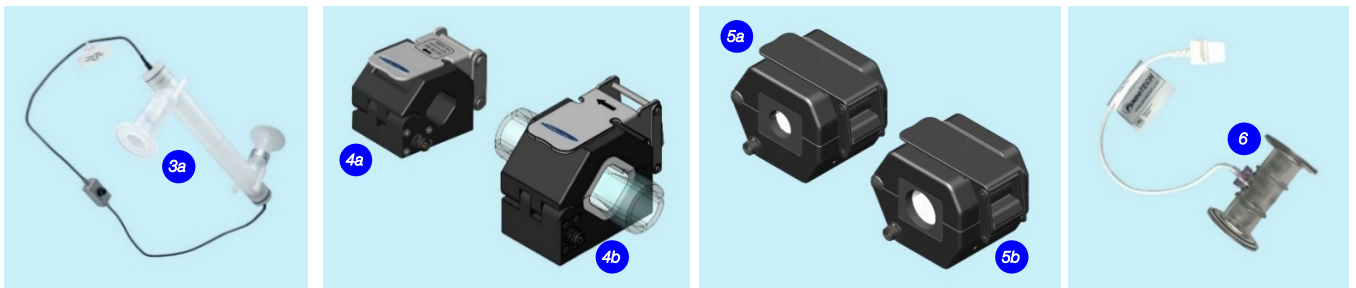


Figure 10: Sensors compatible with LCO-i100 user interface console (in context with LCO-2000 console)



Figure 11: Accessories (cables and others)

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 or the PuraLev® consoles to the market.



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