

## ***Ultraclean Flow Measurement!***



## **LEVIFLOW™ Clamp-On Sensor LFSC-12** **For Flexible Tubing**

**Flow Range:** 0 – 10 l/min

**Levitronix® Ultrasonic Flowmeters**  
**High Purity Non-Invasive Fluid Handling!**

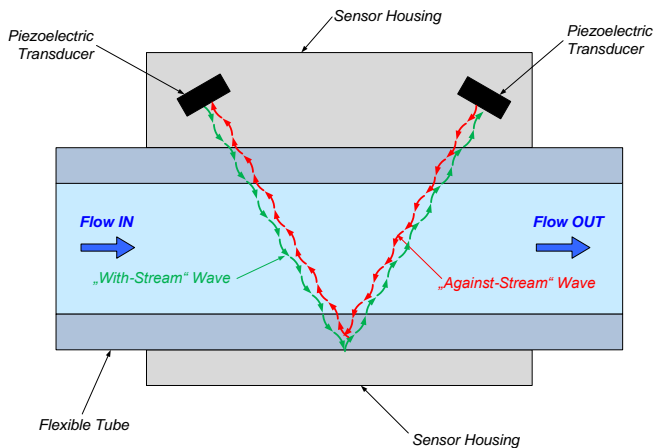


Figure 1: Operating principle ultrasonic clamp-on flowmeter sensor

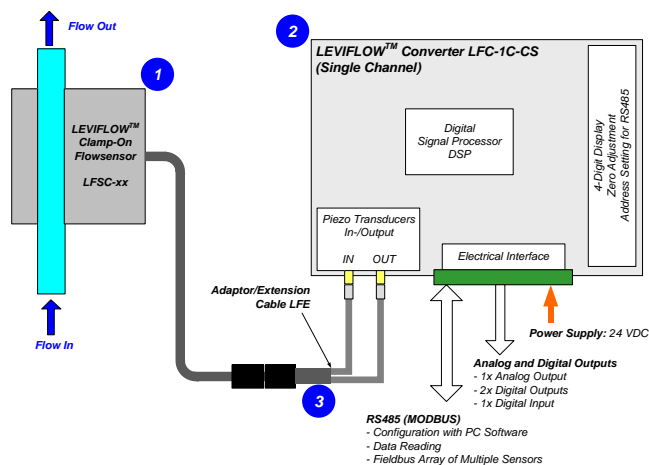


Figure 2: Standard clamp-on flowmeter system configuration

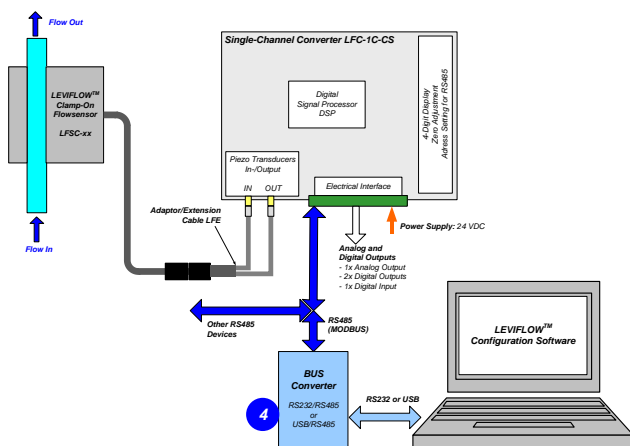


Figure 3: System configuration for usage with LEVIFLOW™ configuration software

## INTRODUCTION

The LEVIFLOW™ clamp-on flowmeter is designed for non-invasive flow measurements of high purity fluids with flexible tubing. Figure 1 illustrates the operating principle. Two piezoelectric transducers, mounted in the sensor housing, generate and receive an ultrasonic wave. The wave going in direction of the flow (with-stream wave) is accelerated and the wave going against the flow direction (against-stream wave) is slowed down. The two waves are processed by a signal converter. The difference of the transit time of both waves is proportional to the velocity of the fluid.

The standard configuration of the LEVIFLOW™ clamp-on flowmeters (Figure 2) consists of a flow sensor and a converter with a digital signal processor (DSP) for processing the sensor signals. The LFSC-12 can measure a flow up to 10 l/min. Various signals (analog output, digital input and digital output) are provided and can be configured with a PC software. A two wire RS485 bus allows arrays of multiple flowmeters. In addition, the sensor value is shown on a 4-digit display. For debugging, data collection and configuration with a PC the LEVIFLOW™ Configuration Software is available at Levitronix<sup>®</sup> together with a USB to RS485 adaptor (see Figure 3).

## SYSTEM BENEFITS

- No contamination due to non-invasive measurement
- No moving parts -> no particle generation
- Improved bubble robustness due to DSP technology
- Flow control together with Levitronix<sup>®</sup> MagLev Pumps
- Easy configurable flow sensor parameters (PC software)
- Low pressure loss
- High turn down ratio
- Low disposable costs (tubing cost only)

## APPLICATIONS

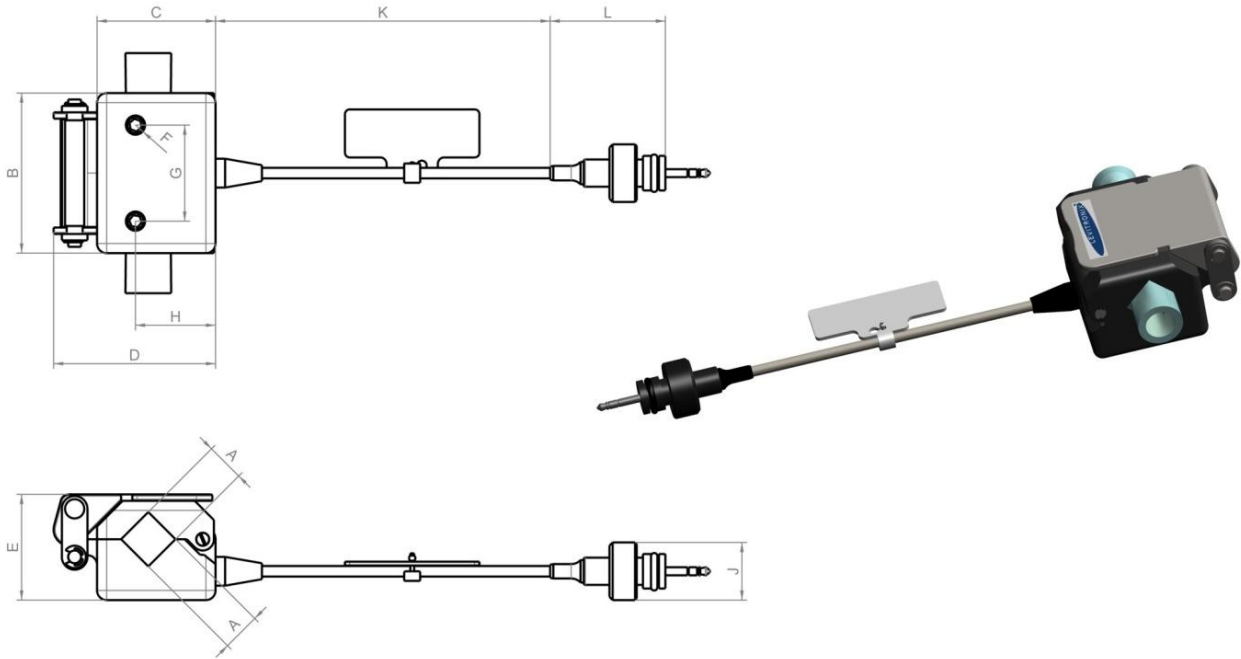
- High purity liquid processes
- Sterile non-invasive flow measurement in Pharmaceutical manufacturing
- Biotech processes
- Flow control in combination with Levitronix<sup>®</sup> MagLev pump systems
- Single-use disposable applications

**SPECIFICATIONS OF SENSOR**

Characteristics		Specification
Flow Range [l/min]		0 – 10
Clamp Shape Length in [mm]		12
Accuracy for Flow < 10% of Full Scale	Flow Range [lpm]	0 – 1
	Accuracy [lpm]	± 0.1
Accuracy for Flow > 10% of Full Scale	Flow Range [lpm]	1 – 10
	Accuracy of Reading	± 10%
Weight [g]		230
Pressure Drop Coefficient C $\Delta P = C \times Q^2$ , (for water) Q = Flow [l/min], $\Delta P$ = Press. Drop [kPa = mbar]		0.092
Usable Flexible Tubing Dimensions	ID	3/8" = 9.5 mm
	OD	9/16" = 14.3 mm
	Wall thickness	3/32" = 2.4 mm

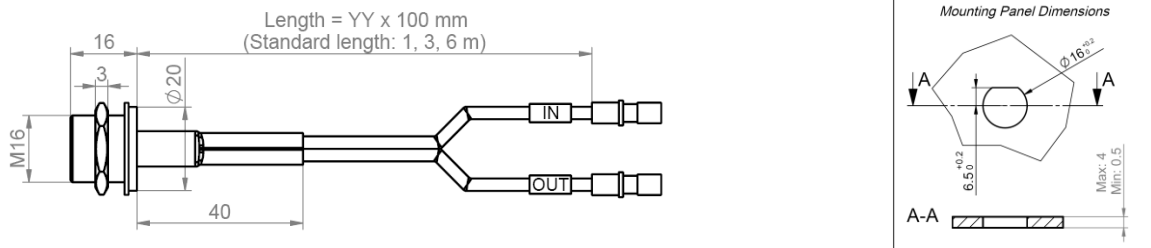
Characteristics		Specification
Usable Tube Material (others on request)	C-Flex: Clear, ADCF Formulation 374	
Fluid Temperature	Normal range: 10 – 60 °C ( 50 – 140 °F )	
Ambient Temperature	0 – 40 °C (32 - 104 °F)	
Maximum Fluid Pressure	4 bar (maximum pressure of tube might limit this value)	
Kinematic Viscosity	0.7 – 10 mm <sup>2</sup> /s (0.7 – 10 cSt)	
Sound Speed	1300 – 1700 m/s (others on request)	
IP Classification	IP-65	
Allowed Cleaning	Wiping with IPA or water	
Cable Jacket Material	PVC	
Standard Cable Length	3m with extension cables for length variation (other length on request and at minimum order quantities)	
Electrical Connectors	Audio type with IP-65 connector cover	

**Table 1:** Specifications of sensor (All data based on water at 37 °C with zeroing after clamping)



Dimensions in [mm]										
A	B	C	D	E	F	G	H	I	J	K
12	50	37	50.6	33	M6 x 8	30	25	36	∅18	3000

**Figure 4:** Dimension for LFSC-12 clamp-on sensor

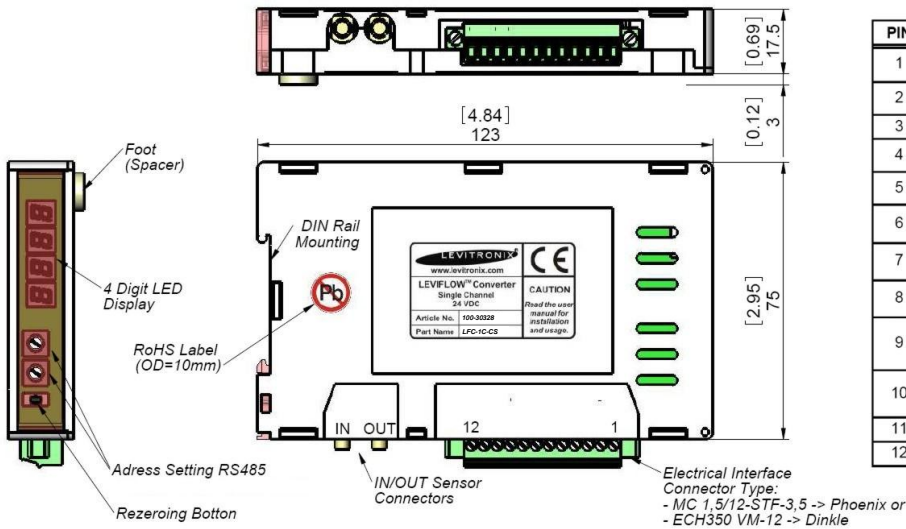


**Figure 5:** Dimensions of extension/adaptor cables LFE-B.1

**SPECIFICATIONS OF CONVERTER**

Characteristics	Single Channel Converter Type LFC-1C
Power Supply Current / Start Current	24 VDC ± 10% 150 mA / 4.4 A, 2 ms max.
Ambient Temp Humidity Range	0 – 40 °C (32 – 104 °F) 30 - 85% R.H. (no condensation)
Enclosure Classification and Material	IP-20 (indoor use), ABS
Interfaces (see Figure 6 for detailed PIN designation and electrical specification)	- RS485 -> MODBUS protocol -> max. array of 99 channels - 1x Analog Output 4 – 20mA (0 – 20mA configurable) - 2x Digital Outputs: Flow Alarm, Measurement Error, Volume Counter Pulse, Volume Counter Alarm, Flow as Frequency or Bubble Detection (default: normally open) - 1x Digital Input: Volume Counter Reset or Zero Adjust - 4 Digit display (flow rate, error codes), re-zero button - Address potentiometers for RS485 address setting
Configuration Parameters (Available and configurable with RS485/USB converter and configuration software)	Viscosity, Low Cutoff, Dampening constant (filter) Full scale setting, Linearization (15 points) Alarm Outputs (High and Low Alarm) Volume Counter Settings
Weight	130 g
Dimensions	123 x 75 x 17.5 mm (see Figure 6 for details)
Mounting	DIN rail

**Table 2:** Specification of converter LFC-1C-CS



**Figure 6:** Dimensions and layout of interfaces of single channel converter LFC-1C-CS

**ORDER INFORMATION**

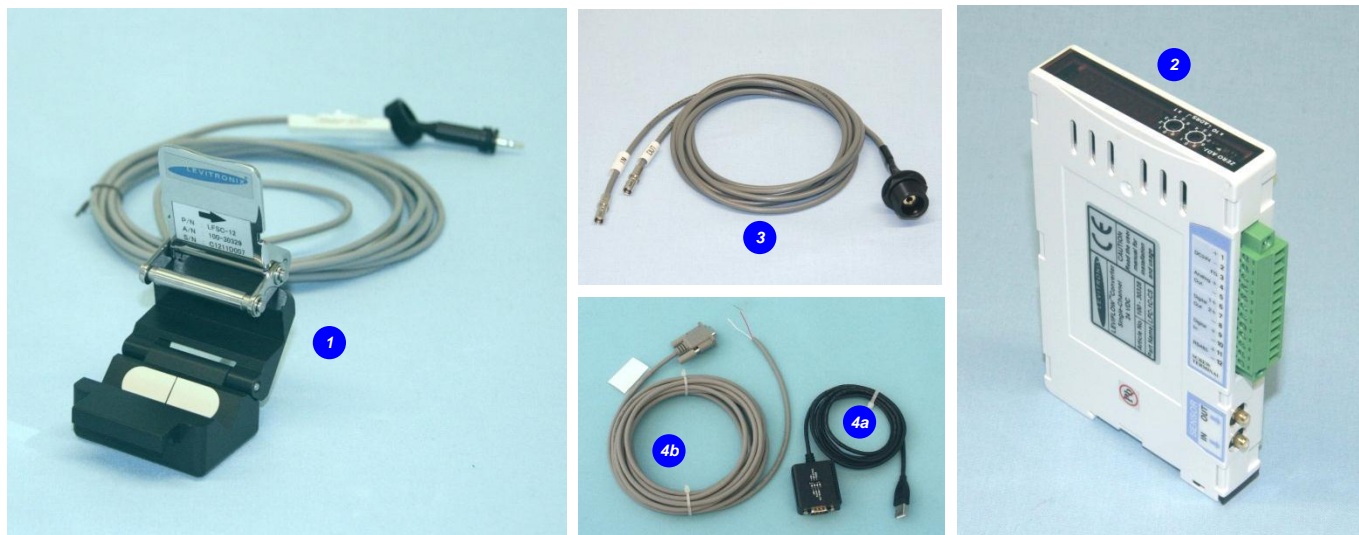


Figure 7: LEVIFLOW™ flowmeter components

Pos.	Part Name	Article #	Clamp Shape	Calibrated Fluid/Temp.		For Tubing	Flow Range	Tube ID x OD	Cable Length/Jacket	Connector	Note
1	LFSC-12	100-30329	12mm	Water	37 °C	C-Flex	0 – 10 lpm	3/8"=9.5 mm x 9/16"=14.7 mm	3 m PVC	Audio type connector with IP-65 connector housing	Sensor specific parameter for converter calibration are delivered on a tag attached to the flowsensor.

Table 3: Standard flow sensor configurations (for Biotech applications)

Pos.	Article Name	Part #	Description	Interfaces
2	LFC-1C-CS	100-30328	Single Channel Converter	Analog Output (4 – 20 mA), 2x Digital Output, 1x Digital Input, RS485 (MODBUS) protocol

Table 4: LEVIFLOW™ converter for clamp-on sensor

Pos.	Article Name	Part #	Features	Special Feature / Description
3	LFE-B.1-10 LFE-B.1-30 LFE-B.1-60	190-10202 190-10203 190-10204	Cable length: 1 m, PVC Cable length: 3 m, PVC Cable length: 6 m, PVC	Wallmountable connector for cabinet mounting
4a	EX-1303	100-30318	USB-RS485/RS422 Adaptor	For PC communication with converters over RS485 bus
4b	RS485 Cable	100-30319	D-SUB Connector with Open-End Cable	For wiring, when used with EX-1303

Table 5: Accessories

Pos.	Part Name	Part #	Flow Sensor	Flow	For Tube	Cable Length/Jacket	Converter	Note
5b	LFSC-12 +LFC-1C-CS	100-90629	LFSC-12	0 – 10 lpm (Water @ 37 °C)	C-Flex	3m PVC	LFC-1C-CS	Converter is delivered with sensor, tubing material and fluid specific calibration parameters stored.  Extension cables to be ordered as separate article with specified length (see Table 5)

Table 6: Flowmeter sets – flowsensor with converter

## 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 medical and industrial markets. The company is ISO 13485 and ISO 9001 certified. Production and quality control facilities are located in Switzerland. In addition, the Levitronix® is committed to bring other highly innovative products like the LEVIFLOW™ flowmeter series to the market.



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