

# LS32-1500 Liquid Flow Meter

## Compact Flow Meter for Low Flow Rates

- Liquid flow rates up to 40 ml/min
- 20 ms response time
- Excellent repeatability
- High chemical compatibility



### Product Summary

The LS32-1500 enables precise, non-invasive measurements of dynamic liquid flow rates up to 40 ml/min bi-directionally. Excellent biocompatibility is ensured by the exclusive use of high-performance stainless steel, PTFE and PEEK for the wetted parts. The flow path of the LS32-1500 liquid flow sensor is formed by an especially thin-walled, straight tube which assures excellent sensitivity.

### Interface Options

#### Digital

- I2C-Bus

For more information on communication, please refer to page 2 of this document.

## 1 Sensing Performance

Table 1: Performance of LS32-1500 (all data for medium H<sub>2</sub>O, 23°C, 1 bar<sub>abs</sub> unless otherwise noted)

Parameter	LS32-1500	Unit
Full scale flow rate	40	ml/min
Sensor output limit <sup>a</sup>	65	ml/min
Accuracy <sup>b</sup> (whichever error is larger)	5	% of measured value
	0.25	% of full scale
Repeatability <sup>b</sup> (whichever error is larger)	0.5	% of measured value
	0.025	% of full scale
Temperature coefficient (additional error per °C; whichever is larger)	0.25	% measured value / °C
	0.00625	% full scale / °C
Mounting orientation sensitivity <sup>c</sup>	<0.1	% of full scale
Flow detection response time $\tau_{63}$	20	ms
Response time on power-up	25	ms
Operating temperature	+5...+50 (+41...+122)	°C (°F)
Ambient storage temperature <sup>d</sup>	-10...+60 (+14...+140)	°C (°F)
Recommended maximum operating pressure	12 (175)	bar (psi)
Burst pressure	25 (360)	bar (psi)

<sup>a</sup>Flow rate at which the sensor output saturates, see section 2 for performance specification between full scale and saturation point.

<sup>b</sup>Accuracy respectively repeatability below  $\pm 20$  ml/min. See the charts in section 2 for the accuracy respectively repeatability specifications between  $\pm 20$  ml/min and full scale.

<sup>c</sup>Maximum additional offset when flow channel is vertical.

<sup>d</sup>Non-condensing, flow path empty.

## 2 Specifications Charts

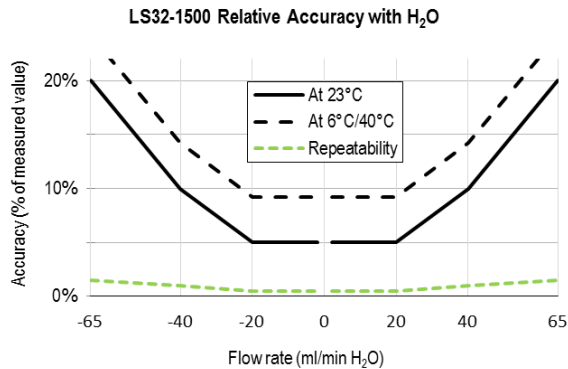


Figure 1: Sensor accuracy and repeatability (% of measured value) across the sensor's flow range

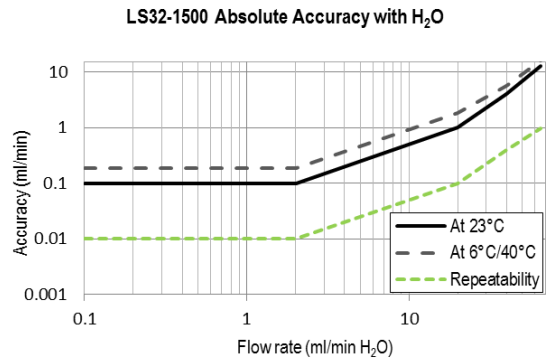


Figure 2: Sensor accuracy and repeatability (ml/min) across the sensor's flow range

## 3 Communication with the Sensor

The OEM flow sensor LS32-1500 shows bidirectional, linear transfer characteristics. The product comes fully calibrated for water.

Digital sampling time, 16 bit	74 ms
Digital sampling time, 9 bit	1 ms

### 3.1 Electrical Specifications

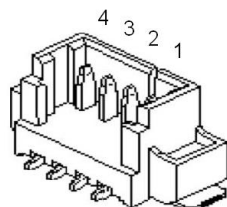
Table 2: DC Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
Power supply DC, VDD		4.0	5.0	6	V
Operating current	VDD = 4.0-5.5 V		5.1		mA

### 3.2 Electrical Connector and Sensor Pinout

Connector Type: PCB Header Molex 4 Pin Vertical  
Art.-No. 0533980471.

Pin	
1	SCL (bi-directional)
2	VDD
3	GND
4	SDA



### 3.3 Digital Communication via I<sup>2</sup>C-Bus

Digital communication between a master and the LS32-1500 sensor runs via the standard I<sup>2</sup>C-interface. The physical interface consists of two bus lines, a data line (SDA) and a clock line (SCL) which need to be connected via pull-up resistors to the bus voltage of the system. By default, the I<sup>2</sup>C address is set to 64 (hexadecimal: 40, binary: 1000000).

These lines can be used on 3.3V or 5.0V level with a clock frequency of 100 kHz. For the detailed specifications of this I<sup>2</sup>C communication, please refer to specific I<sup>2</sup>C Application Notes from Sensirion.

## 4 Fluidic Connection

Table 3: Fluidic Specifications and Pressure Rating

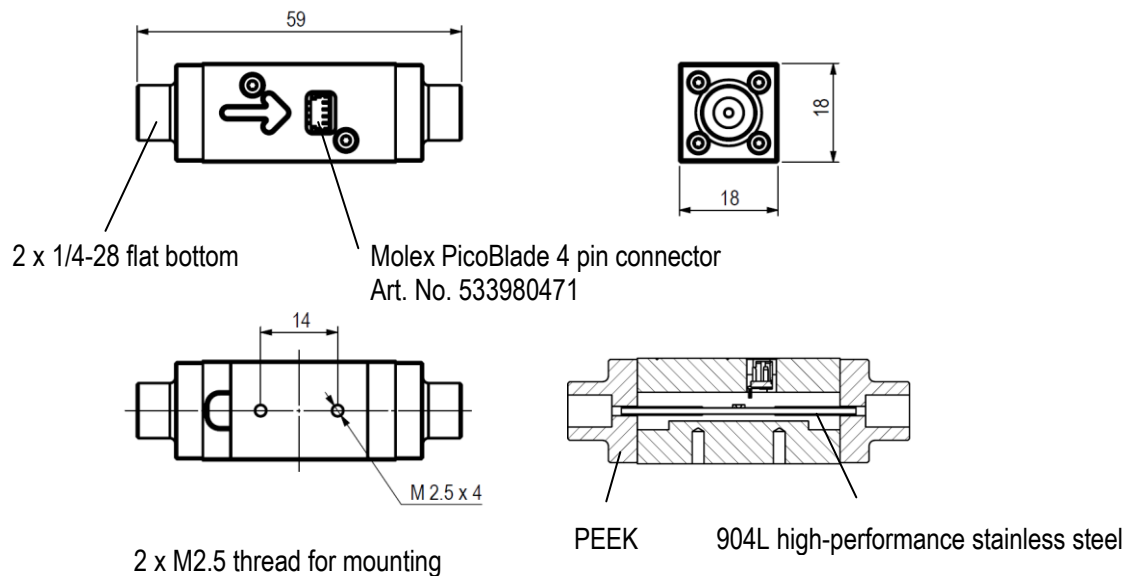
Parameter	LS32-1500
Wetted materials:	
<ul style="list-style-type: none"> <li>Internal sensor tube material</li> </ul>	904L high-performance stainless steel
<ul style="list-style-type: none"> <li>Fitting material</li> </ul>	PEEK
<ul style="list-style-type: none"> <li>Sealing material</li> </ul>	PTFE
Fluid connector ports (Fittings)	1/4-28 flat bottom 1/8" OD tubing (recommended: min. 2 mm ID)
Pressure drop (at 40 ml/min, H <sub>2</sub> O, 23°C)	2.15 mbar
Total internal volume	~70 µl

For more information on the fluidic connection please find: "Application Note Sensor Ports and Tubing Connections" in the Download Center on our homepage.

## 5 Mechanical Specifications

Table 4: Mechanical Specifications

Parameter	LS32-1500
Largest dimensions	59 x 18 x 18 mm
Total mass	~30 g
Inner diameter flow channel	1.5 mm



All dimensions in mm

## 6 Ordering Information

Standard shipment includes only the sensor, neither cables nor fluidic connection material. Preassembled 4-pin Molex to pigtail ribbon cables (Molex 4-pol Type no. 51021-0400, 30 cm) can be ordered optionally.

Product	Article No	MOQ	Packaging Unit
LS32-1500 40 ml/min	1-101127-01	10	10
4-pin Molex to pigtail ribbon cable, 30 cm	1-101121-01	10	n/a