

# LG01-2000Axxx

## Liquid Flow Switch and Bubble Detector

- Detection of low liquid flow in the ml-Range
- Totally non invasive
- Ultra fast response time of 100 ms



## 1 Introduction LG01

The LG01 Liquid Flow Switch enables detection of flow of liquid in the range of ml/min. The output signal is 5V when the flow rate is higher than the specified Flow Switch Limit and 0V below this limit or when air or bubbles are found inside the sensors flow channel instead of liquid.

Excellent chemical resistance and bio-compatibility are ensured: The flow path of the LG01 Liquid Flow Switch is formed by a simple, straight glass capillary.

## 2 Sensing Performance

Table 1: Model specific performance of LG01-2000Axxx  
(all data for medium H<sub>2</sub>O, 20°C, 1 bar<sub>abs</sub> unless otherwise noted)

Parameter	LG01-2000A090	LG01-2000A005	
Maximum Flow Rate	50	220	ml/min
Flow Switch Limit	4.5	0.25	ml/min
Accuracy <sup>a</sup> of Switching Point	±10	±10	%
Switching Hysteresis	±5	±5	%
Mounting Orientation Sensitivity <sup>b</sup>	+2	+14	%
Flow Detection Response Time	50		ms
Response Time On Power-Up	120		ms
Operating Temperature	+10...+50		°C
Ambient storage temperature	-10...+60		°C

### 2.1 Operation with other Liquids than Water

Due to the measurement principle the LG01 flow switch characteristics is changing with the thermal properties of the liquid. For aqueous solutions the data above is a good approximation.

For hydrocarbon liquids such as oil, fuel, solvents and so on the *Flow Switch Limit* is increased by the factors below.

Table 2: Increase of Flow Switch Level for LG01-2000Axxx using hydrocarbon liquids

Parameter	LG01-2000A090	LG01-2000A005	
Approximate Multiplication Factor for Flow Switch Limit	2	5.5	

A *Maximum Flow Rate* of 250 ml/min and more is possible with hydrocarbon liquids for all LG01-2000Axxx models.

<sup>a</sup> Better available on request.

<sup>b</sup> Shift of switching point if not mounted in normal position (which is horizontal flow channel) but with vertical flow channel.

### 3 Electrical and Mechanical Specifications

#### 3.1 Electrical Specifications

An electrical voltage output indicates flow above (5 V) or below (0 V) the Flow Switch Limit and/or air or bubbles inside the sensors flow channel. The product comes fully calibrated for water – for volume applications flow calibration for other media is available on request-

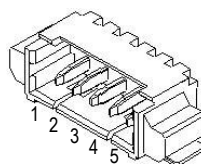
Table 3: DC Characteristics.

Parameter	Conditions	Min.	Typ.	Max.	Units
Power Supply DC, VDD		5	7	12 <sup>a</sup>	V
Operating Current	V <sub>DD</sub> = 9 V, no load		6.8		mA
Voltage Output High	Flow>Flow Switch Limit and <u>no air</u>		5		V
Voltage Output Low	Flow<Flow Switch Limit or <u>air found</u>		0		V

#### 3.2 Electrical Connector and Pinout

Connector type on PCB: 5 pin Molex PCB Header 53261-0590. Mating connector: Molex 51021-0500.

Pin	
1	do not connect
2	do not connect
3	VDD
4	GND
5	Voltage Output



#### 3.3 Mechanical Specifications and Pressure Rating

Attention Fragile	
Forces introduced by stiff fluid connection lines as well as connecting the fittings without suitable tools causes stress on the internal thin-walled glass capillary. This can cause it to break! Test for leakage every time after new connections are made.	<b>!</b>

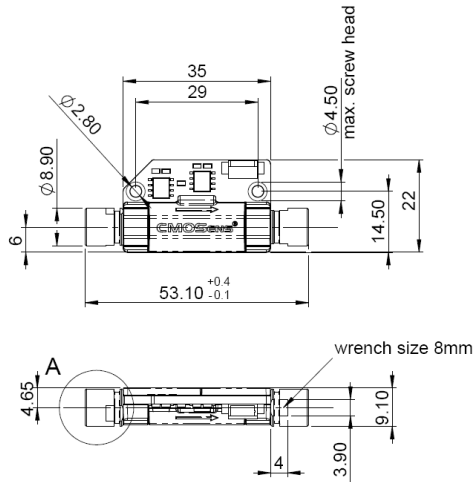
Inside the LG01 flow sensors a highly sensitive microsensors-chip is mounted on the outside of a straight glass capillary and allows to measure the flow through the wall (US Patent 6,813,944 B2) using a thermal principle.

Table 4: Mechanical Specifications and Pressure Rating

Parameter	LG01-2000
Fluid Connector Ports (Fittings)	¼-28 for 1/16" or 1/8" OD plastic tubing <sup>a</sup>
Wetted Materials:	
<ul style="list-style-type: none"> <li>Internal Sensor Capillary Material</li> </ul>	Borosilicate Glass 3.3 (Duran®)
<ul style="list-style-type: none"> <li>Fitting Material</li> </ul>	100% PEEK™ (polyetheretherketone)
<ul style="list-style-type: none"> <li>Additional Sealing Material</li> </ul>	ETFE(Tefzel®)
Overpressure Resistance	<b>3 bar</b> 40 psi
Maximum Pressure Drop (at max. flow rate)	1 mbar
Internal Sensor Capillary, Inner Diameter	1.8 mm
Total Internal Volume	<90 µl
Total Mass	6 g

<sup>a</sup> For fluid connection material use flat bottom ¼-28 standard components e.g. IDEX parts P-200/P-300. Various adapters e.g. to Barb connectors are available from company Value Plastics as well.

## 4 Physical Dimensions



## 5 Connectivity Kit

The optional LG01 connectivity kit contains material for electrical and fluidic connections.

- Assembled flat ribbon cable, 30 mm (1-100482-01)
- 2x barb adapter to connect ID 1.6 mm (1/16") tubing (Value Plastics ABR004-J1A-2)
- 2x barb adapter to connect ID 3.2 mm (1/8") tubing (Value Plastics ABR013-J1A-1)

## 6 Ordering Information

The LG01 flow sensors can be ordered for OEM volume applications.

Product	Article Number
LG01-2000A090	1-100796-01
LG01-2000A005	1-100797-01
LG01 Connectivity Kit	1-100814-01

## 7 Important Notices

### 7.1 Warning, personal injury

**Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.**

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

### 7.2 ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.

### 7.3 Warranty

SENSIRION warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall repair and/or replace this product, in SENSIRION's discretion, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;
- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from

SENSIRION's faulty design, material, or workmanship;

- the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

This warranty does not apply to any equipment which has not been installed and used within the specifications recommended by SENSIRION for the intended and proper use of the equipment. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH HEREIN, SENSIRION MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT. ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY EXCLUDED AND DECLINED.

SENSIRION is only liable for defects of this product arising under the conditions of operation provided for in the data sheet and proper use of the goods. SENSIRION explicitly disclaims all warranties, express or implied, for any period during which the goods are operated or stored not in accordance with the technical specifications.

SENSIRION does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer's applications by customer's technical experts. Recommended parameters can and do vary in different applications.

SENSIRION reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

Copyright© 2001-2009, SENSIRION.

CMOSens® is a trademark of Sensirion

All rights reserved.

PEEK™ is a trademark of Victrex PLC

Teflon® and Tefzel® are registered trademarks of DuPont Corporation

Duran® is a trademark of the SCHOTT-Group

## 7.4 RoHS and WEEE Statement

The LG01 product family complies with requirements of the following directives:

EU Directive 2002/96/EC on waste electrical and electronic equipment(**WEEE**), OJ13.02.2003; esp. its Article 6 (1) with Annex II.

EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (**RoHS**), OJ 13.02.2003; esp. its Article 4.



## Headquarter and Subsidiaries

SENSIRION AG  
Laubisruetistr. 50  
CH-8712 Staefa ZH  
Switzerland

phone: +41 44 306 40 00  
fax: +41 44 306 40 30  
[info@sensirion.com](mailto:info@sensirion.com)  
[www.sensirion.com](http://www.sensirion.com)

Sensirion AG (Germany)  
phone: +41 44 927 11 66  
[info@sensirion.com](mailto:info@sensirion.com)  
[www.sensirion.com](http://www.sensirion.com)

Sensirion Inc., USA  
phone: +1 805 409 4900  
[info\\_us@sensirion.com](mailto:info_us@sensirion.com)  
[www.sensirion.com](http://www.sensirion.com)

Sensirion Japan Co. Ltd.  
phone: +81 3 3444 4940  
[info@sensirion.co.jp](mailto:info@sensirion.co.jp)  
[www.sensirion.co.jp](http://www.sensirion.co.jp)

Sensirion Korea Co. Ltd.  
phone: +82 31 345 0031 3  
[info@sensirion.co.kr](mailto:info@sensirion.co.kr)  
[www.sensirion.co.kr](http://www.sensirion.co.kr)

Sensirion China Co. Ltd.  
phone: +86 755 8252 1501  
[info@sensirion.com.cn](mailto:info@sensirion.com.cn)  
[www.sensirion.com.cn](http://www.sensirion.com.cn)

To find your local representative, please visit [www.sensirion.com/contact](http://www.sensirion.com/contact)