LG16 Liquid Flow Meter Series

Compact Liquid Flow Meter for OEM Applications

- Flow rates up to 10000 µl/min for water and up to 80 ml/min for hydrocarbons
- Resolution down to sub nl/min
- Media separated, pressures up to 200 bar
- Digital I²C interface



Product Summary

The LG16 Liquid Flow Meter series enables fast, media separated measurements of very low liquid flow rates below 5000 µl/min. This product line is especially suited for OEM volume applications requiring small sized components with high performance at low cost.

Excellent chemical resistance and bio-compatibility are ensured: The flow path of the LG16 Liquid Flow Sensor is formed by a straight-through glass capillary and end fittings. There are no obstructions in the flow path.

For more information on communication, please refer to section 3 of this document.

Benefits of Sensirion's CMOSens® Technology

- High reliability and long-term stability
- Industry-proven technology with a track record of more than 15 years
- Designed for mass production
- Optimized for low cost
- Low signal noise

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THE SENSOR COMPANY

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1 Sensor Performance

Sensor Performance

Parameter	LG16-0025D	LG16-0150D	LG16-043xD	LG16-1000D	LG16-2000D	Units
H_2O full scale flow rate	1.50	7	80	1000	5000	µl/min
H_2O sensor output limit[a]	1.70	8	120	1100	5500[d]	µl/min
Accuracy below full scale (whichever error is larger)	10 0.5	5.0 0.3	5.0 0.15	5.0 0.2	5.0 0.2	% of m.v.[b] % of full scale
Repeatability below full scale (whichever error is larger)	<1 0.06	0.5 0.05	0.5 0.01	0.5 0.02	0.5 0.02	% of m.v. % of full scale
Temperature coefficient (additional error / °C; whichever is larger)	0.15 0.007	0.09 0.005	0.13 0.003	0.1 0.004	0.1 0.004	% m.v. / °C % full scale / °C
Mounting orientation sensitivity[c]	-	<0.4	<0.4	1.0	1.5	% of full scale

[a]Flow rate at which the sensor output saturates. See section 2 for performance between full scale and saturation point.
[b]Measured value
[c]Maximum additional offset when mounted vertically
[d]Extended range up to 10500 ul/min, see Specification Charts for details

Table 1: Model specific performance of LG16 (all data for medium H_2O, 23 °C, 1 bar_{abs} unless otherwise noted)

Parameter	LG16-0150D	LG16-043xD	LG16-1000D	Unit
IPA full scale flow rate	70	500	10'000	µl/min
				ml/min
IPA sensor output limit[a]	100	600	11'000	µl/min
				ml/min
Accuracy below full scale (whichever error is larger)	20 0.3	20 1	20 1	% of m.v.[b] % of full scale
Repeatability below full scale (whichever error is larger)	1 0.01	1 0.05	1 0.05	% of m.v. % of full scale
Temperature coefficient (additional error / °C; whichever is larger)	0.4	0.5 0.025	0.4 0.02	% m.v. / °C % full scale / °C

Table 2: Model specific performance of LG16 series (all data for medium IPA, 23 °C, 1 bar_{abs} unless otherwise noted)

1.1 Specification Charts

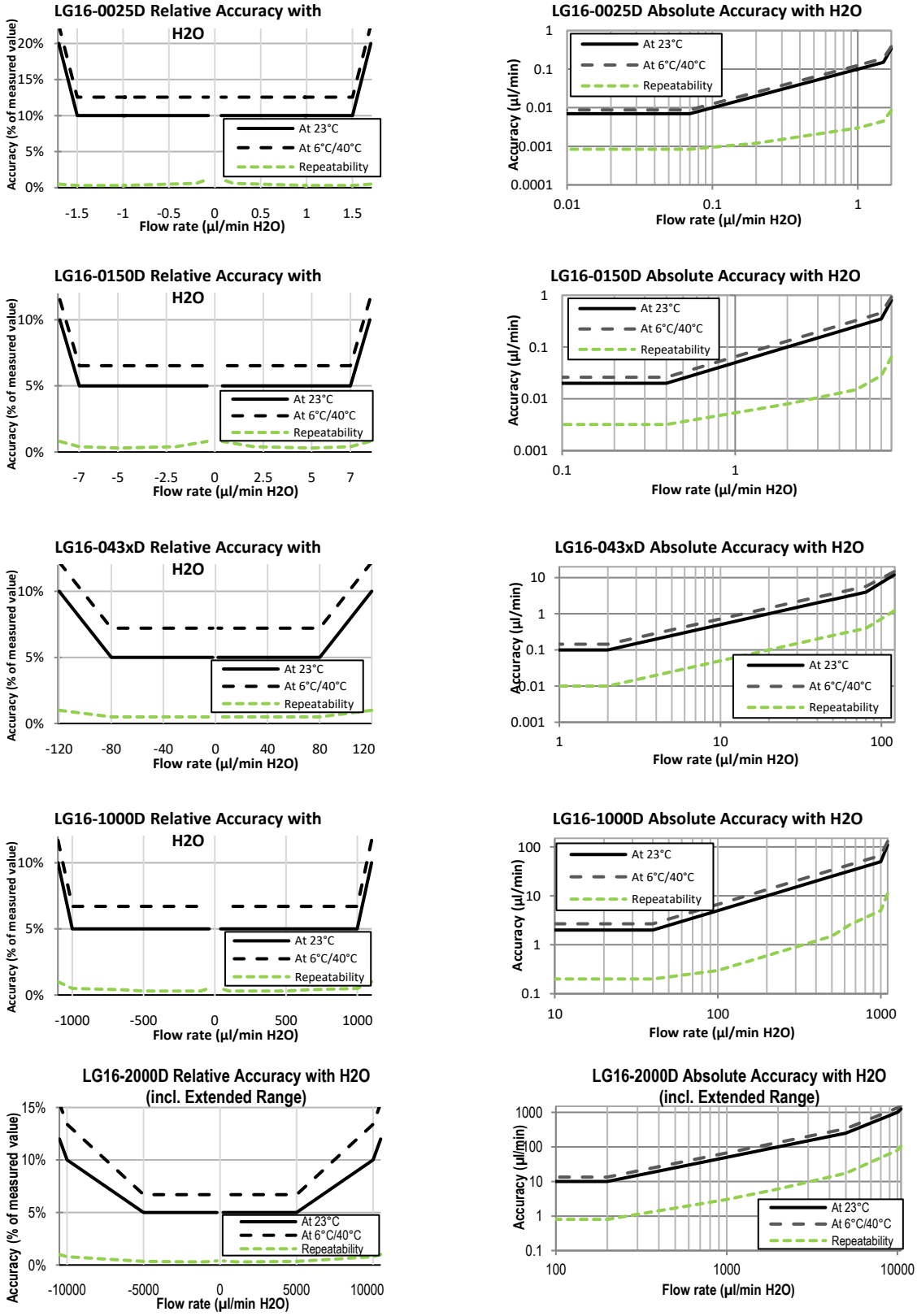


Figure 1: Flow meter accuracy and repeatability across the flow range. Relative error in % of measured value (left column) and absolute error in µl/min (right column) for H2O.

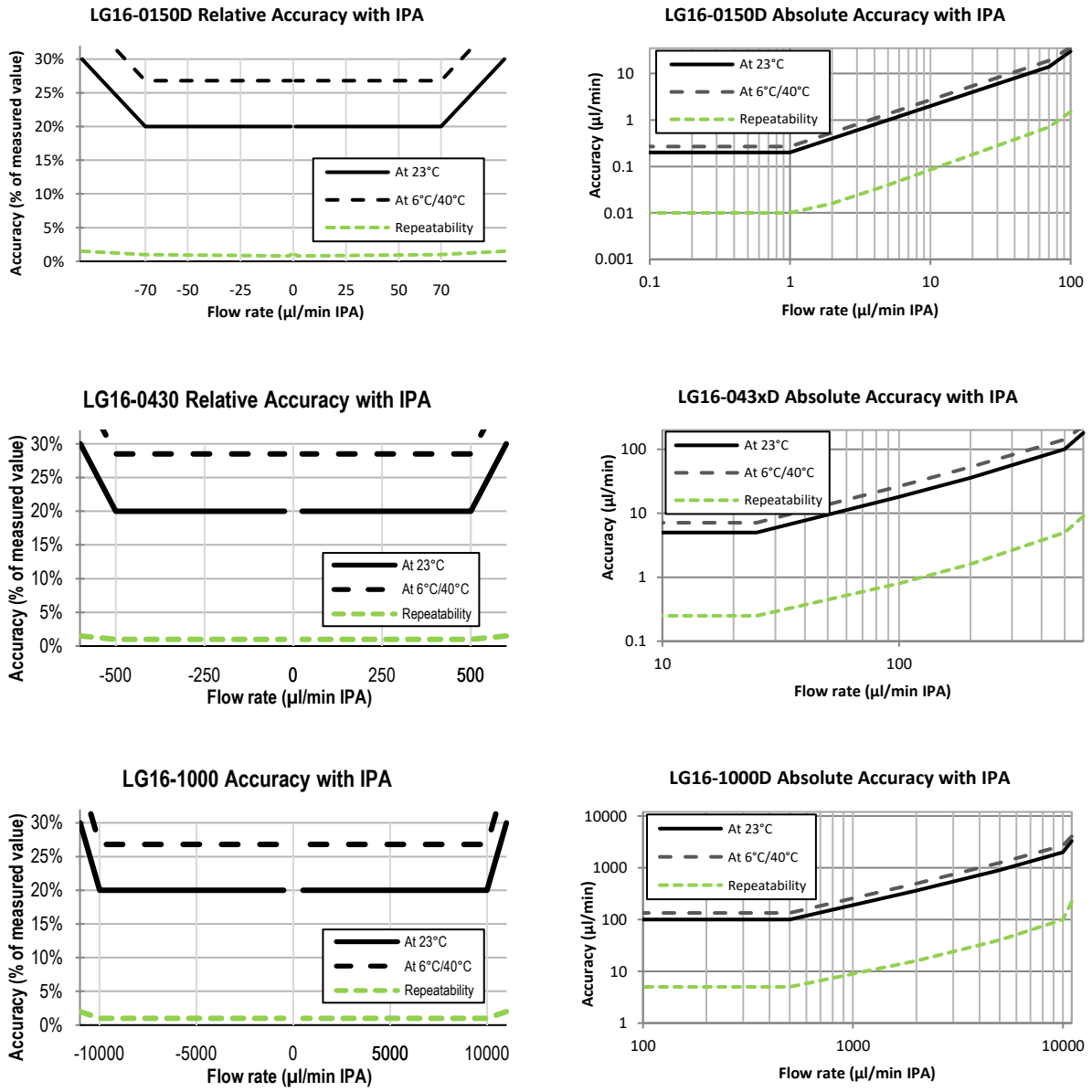


Figure 2: Flow meter accuracy and repeatability across the flow range. Relative error in % of measured value (left column) and absolute error in µl/min (right column) for IPA

2 Specifications

2.1 Electrical Specifications

Parameter	Symbol	Min.	Typical	Max.	Units	Comments
Supply Voltage DC	VDD	4.0	5.0	12.0	V	Use 9 V max. for best performance
Operating current	IDD		6.8		mA	VDD = 4.0-12.0 V

Table 3: DC Characteristics

2.2 Timing Specifications

Parameter	Symbol	Min.	Typical	Max.	Units	Comments
Power-up time	t_{PU}			120	ms	Time to sensor ready
Flow detection response time			40		ms	Response time to flow changes (τ_{63})
I²C SCL frequency	f_{I2C}		100	400	kHz	
Readout frequency		12.5	200	1000	Hz	Depending on Resolution setting. Sampling time for 9 bit resolution: 1 ms, for 16 bit resolution: 74 ms.

Table 4: Timing specifications

2.3 Absolute Minimum and Maximum Ratings

Parameter	Rating	Unit
Operating temperature	+10 … +50	°C
Short term storage temperature[a]	-10 … +60	°C
Maximum supply voltage	12	V

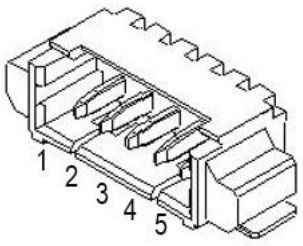
[a] Flow path empty. Short term storage refers to temporary conditions during e.g. transport.

Table 5: Absolute minimum and maximum ratings

2.4 Electrical Connector and Pinout

Connector Type: 5-pin Molex PCB Header 53261-0571 (right angle); Mating connector Molex 51021-0500.

Pin	
1	SDA (bi-directional)
2	SCL
3	VDD
4	GND
5	n/a, leave floating



3 Sensor Output Signal Description

3.1 Switching between calibration fields

Different calibrations are available in calibration fields (CF) on some versions of the flow meter. The factory default is CF0. If the medium to be measured is different to the factory default calibration field, this has to be changed using the Sensirion Viewer Software or using digital commands via the I^2C interface. The H_2O extended range calibration is only available on the LG16-2000D (S/N 1940-00000 and up). To convert the 16 bit signed integer number (two's complement number ranging from -32768…32768) into a physical value, it has to be divided by the respective scale factor (for example: liquid flow in µl/min = sensor output ÷ scale factor).

Sensor	CF0 (default)	Scale Factor	CF1	Scale Factor	CF2	Scale Factor
LG16-0025D	H2O	19 $(nl/min)^{-1}$				
LG16-0150D	H2O	4 $(nl/min)^{-1}$	IPA	300 $(µl/min)^{-1}$		
LG16-043xD	H2O	270 $(µl/min)^{-1}$	IPA	50 $(µl/min)^{-1}$		
LG16-1000D	H2O	29 $(µl/min)^{-1}$	IPA	2 $(µl/min)^{-1}$		
LG16-2000D	H2O	5 $(µl/min)^{-1}$			H2O Ext. Range	3 $(µl/min)^{-1}$

Table 6: Available calibrations on CF0, CF1 and CF2

4 Communication Interface Description

4.1 Digital Communication via I²C-Bus

Digital communication between a master and the LG16 sensor runs via the standard I²C-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 I2C 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 I²C communication, please refer to specific I²C Application Notes from Sensirion.

5 Fluidic Specification and Connections

Parameter	LG16-0025D	LG16-0150D	LG16-0430D	LG16-0431D	LG16-1000D	LG16-2000D
Wetted Materials:						
Internal sensor tube material	Quartz Glass (Fused Silica)				Borosilicate Glass 3.3	
Fitting material	PEEK					
Sealing material	None				FEP	
Fluid connector ports (Fittings)	UNF 6-40 for 1/32" OD tubing VICI® Nanovolume™ compatible			UNF 1/4-28 flat-bottom ports for 1/16" or 1/8" OD plastic tubing[a]		
Pressure drop (at full scale flow rate, H2O, 23°C)	1 bar	3 mbar	1 mbar		<1 mbar	<1 mbar
Pressure drop (at full scale flow rate, IPA, 23°C)	n.a.	60 mbar	7 mbar		5 mbar	2 mbar
Total internal volume	1 µl	1.5 µl	5 µl		25 µl	80 µl

[a]1/8" OD tubing with 2 mm minimum ID is recommended for the LG16-2000D.

Table 7: Fluidic Specifications and Pressure Rating

For more information on the fluidic connection please find: "Sensor Fluidic Ports and Tubing Connections" in the Download Center on our webpage (www.sensirion.com/liquidflow-download).

6 Mechanical Specifications

Parameter	LG16-0025D	LG16-0150D	LG16-0430D	LG16-0431D	LG16-1000D	LG16-2000D
Largest dimensions	53 x 22 x 9 mm					54 x 22 x 9 mm
Total mass	6 g					
Inner diameter d	25 µm	150 µm	430 µm		1.0 mm	1.8 mm
Maximum recommended operating pressure	200 bar		100 bar	30 bar	15 bar	
Burst pressure	400 bar		200 bar	80 bar	30 bar	

Table 8: Mechanical specifications and pressure rating

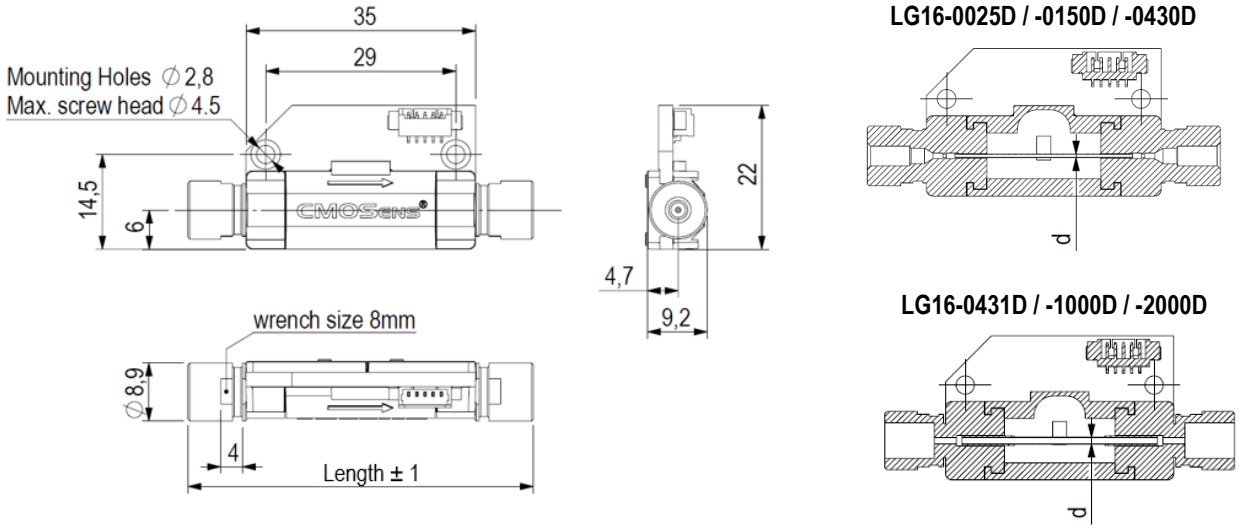


Figure 3: Drawings for all LG16 sensor variants (all dimensions in mm). The *Length* parameter is specified in Table 8 and is 53 mm for all variants except LG16-2000D, for which *Length* = 54 mm. The different cross-sections shown in the left panel correspond to variants with either coned fluidic ports or flat-bottom fluidic ports.

Attention Fragile	
Mechanical shocks and connecting to the fittings without suitable tools leads to stress on the internal thin walled glass capillary and can cause it to break. • While tightening the fittings, fix the fluidic ports position with a wrench. • Test for leakage after every time new connections are made.	!

7 Ordering Information

Standard shipment includes only the sensor, neither cables for electrical connection nor fluidic connection material are included. Preassembled 5-pin Molex to pigtail ribbon cables (Molex 1.25 mm Pitch Receptacle Type 51021-0500 (PicoBlade™ 51021), 30 cm) can be ordered optionally. For evaluation and testing, connectivity kits including cables and fluidic fittings are available.

Product	Calibration		Article Number	MOQ	Packaging Unit
	H2O	IPA			
LG16-0025D 1500 nl/min	●		1-100428-01	25	25
LG16-0150D 7000 nl/min	●	●	1-100410-01	25	25
LG16-0430D 80 ul/min	●	●	1-100853-02	25	25
LG16-0431D 80 ul/min, 1/4-28 ports	●	●	3.000.334	25	25
LG16-1000D 1000 ul/min	●	●	1-100406-01	25	25
LG16-2000D 5 ml/min (10 ml/min)	●		1-100404-01	25	25

Ribbon Cable for LG01/LG16 30cm	n/a	n/a	1-100482-01	25	n/a
LG16/LG01 Connectivity Kit UNF 1/4-28 (for LG16-0431D, -1000D, -2000D, -2000D)	n/a	n/a	1-100814-01	25	n/a
LG16 Connectivity Kit UNF 6-40 coned (for LG16-0150D, -0430D)	n/a	n/a	1-101691-01	25	n/a

8 REACH, RoHS, and WEEE

The LG16 series complies with requirements of the following directives and regulations:

- EU Directive 1907/2006/EC concerning Registration, Evaluation, Authorization and Restriction of Chemicals (**REACH**)
- EU Directive 2002/65/EC on the restriction of certain hazardous substances in electric and electronic equipment (**RoHS**), OJ01.01.2011
- EU Directive 2002/96/EC on waste electrical and electronic equipment (**WEEE**), OJ13.02.2003; esp. its Article 6 (1) with Annex II.

9 Important Notices

9.1 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.

9.2 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.
See application note “ESD, Latchup and EMC” for more information.

9.3 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.

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Revision History of the LG16 Series Datasheet

Revision	Date	Changes Chapter	Description
9	Nov 2026	1, 6	Correction IPA accuracy graphs. Correction LG16-2000D dimensions. Remove LG16-2000(HC-)D information due to EOL.
8	Jan 2020	5	Product names updated and connectivity kits added, editorial changes
7	Sept 2019	All	Introduced LG16-0431D. Extended range for LG16-2000D
6	Sept 2018	all	Removal analog LG16 versions. Update: layout. Correction: various small bugfixes.