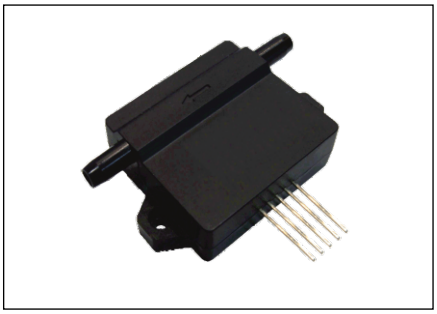
MEMS Liquid Flow Sensors

Model LF2000 Series

Features

- Liquid flow rates up to 25 mL/min
- High accuracy of ±2.5% reading
- Wide dynamic range with 100:1 turndown
- Excellent reliability



Description

The LF2000 series liquid flow sensors are manufactured using the proprietary MEMS flow sensing and package technology. The sensors are designed with both thermal time-of-flight (TOF) and calorimetric sensing principle. It measures flow rate up to 25 mL/min in water and provide bi-directional option.

The packaging enclosure is made of the chemically inert and thermally stable polycarbonate material. The maximum over pressure rating is 5 bar (73 psi).

The sensor can be further customized for the range, package as well as user interfaces.

1. Sensor Performance

1.1 Specifications

All data unless otherwise noted apply for calibration with distilled water at 20°C, 101.325 kPa gague pressure.

Model	LF2000	
Full Scale Flow Rate	±10, ±15, ±20, ±25, or customer specified	mL/min
Turn-down Ratio	100:1	
Accuracy	± 2.5% reading or ±0.15% FS whichever is greater	
Repeatability	± 0.5	% Reading
Offset Stability	± 0.1	% FS
Supply Voltage (V_S)	3.6 ~ 6	Vdc
Power Consumption	60	mW
Current Draw	12	mA
Response Time T_{63}	40	ms
Output	Analog; Digital with I^2C	
Maximum Pressure	0.5	MPa
Operating Temperature	5 ~ 50	°C

1.2 Additional Specifications

Pins Out	5 Pin, 2.54 mm centers, 0.635 mm square	
Calibration	Distilled water @ 20 °C, 101.325 kPa	
Packaging material	Polycarbonate	
Dimensions	62 x 52 x 12.8	mm^3
Weight	15	g
Srorage Temperature[1]	-10 ~ +60	°C

[1] No icing inside the flow path.

2. User Interface

2.1 Pin Definition

The LF2000 series provide a 5 pin interface. The pin layout and definition are indicated in Figure 2.1 and Table 2.1 respectively.

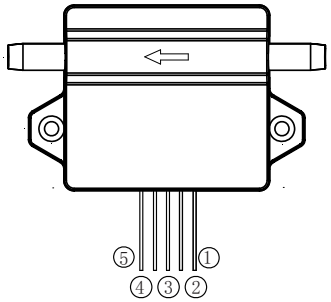


Figure 2.1 Pin configuration

Pin	Definition
1	SCL (I^2C clock)
2	GND (groud)
3	Vcc (DC supply)
4	Vout (analog voltage output)
5	SDA (I^2C data)

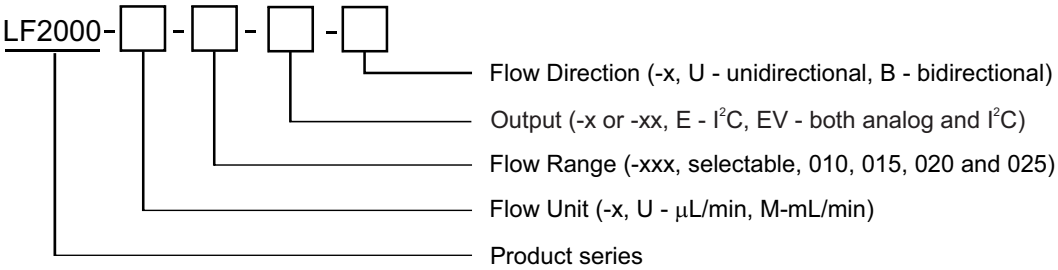
Table 2.1 Pin definition

2.2 Pin Description

VCC and **GND**: the LF2000 requires a power supply of 3.6~6 Vdc. The voltage is internally regulated for the circuitry. Therefore, there is no special requirements for the external power supply.
SDA and **SCL:** I^2C communication data and clock pins. For detailed description, please refer to the document, LiquidFlowSensor-I^2C-CommunicationProtocol-V1.0.0.pdf.

3. Ordering Guide

The sensor part number is composed of the model number and suffix indicating the full scale flow rate, output format as well as the flow direction. Refer to the followings for details.



4. Mechanical Dimensions and Mountings

The LF2000 has a dimension of 62 x 52 x 12.8 mm^3. The dimension is illustrated in Figure 3.1.

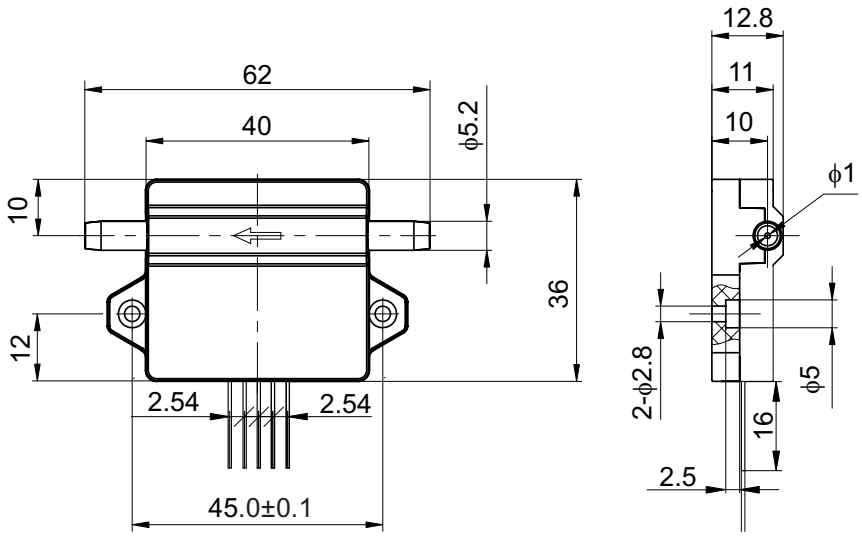


Figure 3.1: Mechanical dimensions of the LF2000.

Important Notices

Wetted Materials and Compatibility

The sensor body is made of medical compatible plastics. The sensor chip comprises of silicon, silicon nitride and silicon dioxide and the sensor chip surfaces are passivated with silicon nitride and silicon dioxide. The electronic sealing is provided by RTV (room temperature vulcanizing) silicone sealant WR-704 composed of $HOCH_3(SiO)_n CH_3H$.

Cautions for Handling and Installations

The product at the time of shipment is fully inspected for product quality and meets all safety requirements. Additional safety measures during handling and installation should be applied. To prevent ESD (electrostatic discharge) damage and /or degradation, take customary and statutory ESD precautions when handling. Do power the product with the correct polarity, voltage and amperage. All precautions and measures for electrical voltage handling must apply. The product sealing is ensured to work under working pressure of 0.5MPa and is leakage proof before the shipment. But cautions and further leakage test are important at installation as well since any leakage may cause severe safety issues.

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