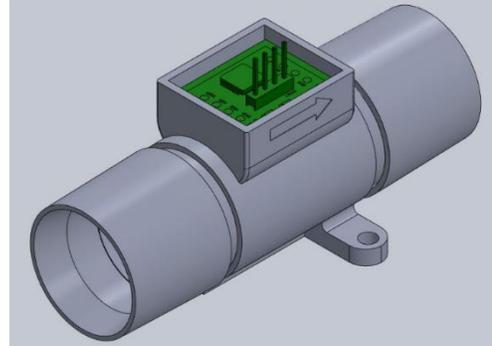


MEMSIC Digital Gas Flow Sensor

MFM2070U

FEATURES

- Low Pressure Drop Flow Sensor
- High Accuracy +/-2.5% Reading
- Calibrated and Temperature Compensated for Air
- Low Power Consumption
- Digital I2C
- Made for Medical Applications
- Calibrated for Air, and O2



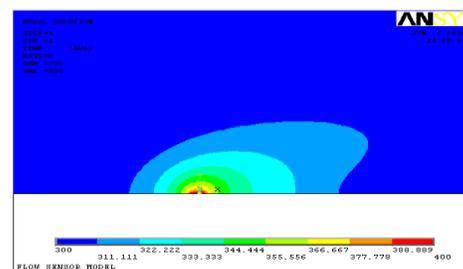
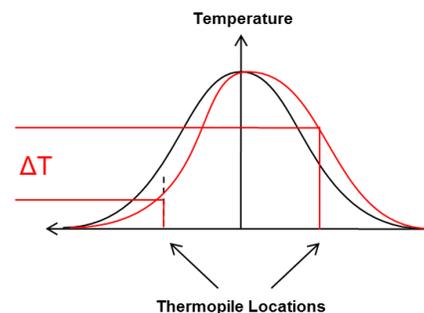
DESCRIPTION

MEMSIC MFM2000 series is a gas flow sensor with low pressure drop capable of measuring medical gases up to 70 lpm. It is configured to be customizable with different flow inlet and outlet configurations.

THEORY OF OPERATION

The flow rate is detected by the MEMS thermal mass flow sensor. The sensor chip, produced in MEMSIC proprietary CMOS compatible technology, is composed of a central heater source (micro heater) and two temperature sensors (thermopiles), which are placed symmetrically upstream and downstream of the micro-heater. If no gas flows over the sensor surface, the symmetric thermopiles measure the same rise in temperature, resulting in the same output voltage of the two thermopiles. If a non-zero gas flows from the inlet to the outlet of the meter, the velocity of a fully-developed laminar air flow unbalances the temperature profile around the heater and heat is transferred from upstream thermopiles to the downstream thermopiles, causing a change in the voltages of the thermopiles. Larger gas flow rates result in larger asymmetry in the profile.

Gas Flow →



Information furnished by MEMSIC is believed to be accurate and reliable. However, no responsibility is assumed by MEMSIC for its use, or for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of MEMSIC.

FLOW PERFORMANCE

Measurements performed with air at 23 °C, 1 Atm, 50% RH, at 3.3V DC power supply, unless otherwise specified. Calibration conditions for standard liters per minute slm: 20 °C, 1013mbar.

Parameter	Condition	Min	Typical	Max	Unit
Flow Range	Calibration gas: Air	0.07		70	SLM
Calibrated Temperature Range		0		50	°C
Operating Temperature Range		-40	10	85	°C
Storage Temperature Range		-40		105	°C
Accuracy	25 °C		+/-2.5		% Reading
Temperature Error	0-50 °C			0.1	% Reading /°C
Resolution	I2C		15		bit
Sampling Time			7.5		ms
Power Consumption	@ Recommended Heater Power at zero Flow			7.0	mA
	PD			650	uA
Pressure Drop	Max flow without mesh			120	Pa
	Max flow(with mesh screen) ¹			400	Pa
Operating Pressure Range	Absolute	0.7		1.3	Bar
Operating Overpressure	Gauge		+/-0.2		Bar
Averaging	10 frames running window averaging				
Wetted Materials	PES (Medical grade: biocompatible; ISO 10993 or USP Class VI), FR4, Silicon Nitrite, Silicon, Epoxy, Gold.				
Standards	RoHS, REACH, ISO15001, ISO10993-1, ISO10993-5,UL94 V0, IEC				

ELECTRICAL SPECIFICATIONS (VDD=3.3V, TA=25C, UNLESS OTHERWISE NOTED)

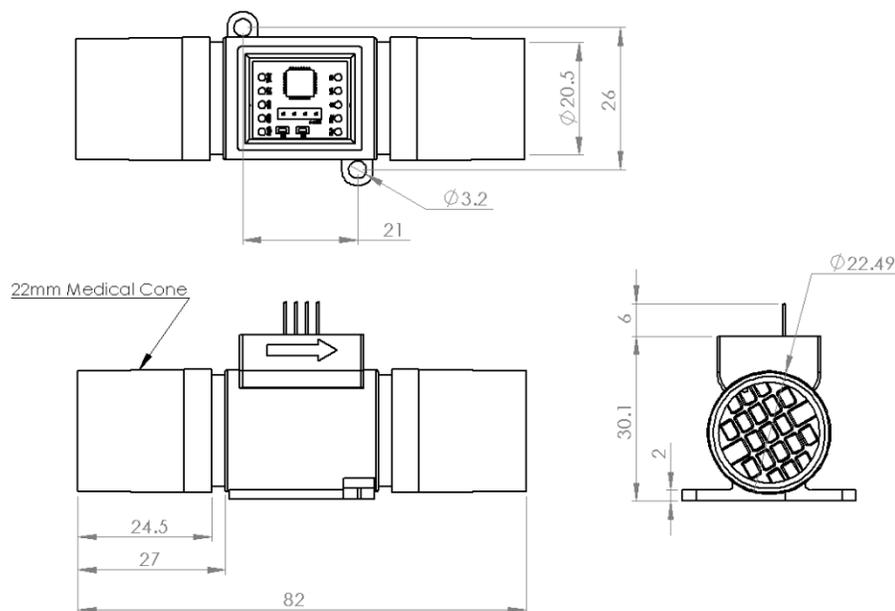
Parameter	Condition	Min	Typical	Max	Unit
Supply DC Voltage	DC	2.7	3.3	5.5	V
Power Consumption	@ Recommended Heater Power at zero Flow			7.0	mA
	PD			650	uA
Data format Scaling Factor	User read count value from register 0, then multiply by 2.5 to get actual flow rate in sccm.		2.5		sccm

¹ Mesh screens helps to reduce flow turbulence created by less than ideal inlet/outlet conditions such as sudden expansion, contractions and elbows.

MECHANICAL SPECIFICATIONS

Specification	Condition	Min	Typical	Max	Unit
Burst Pressure	Over ambient	1			Bar

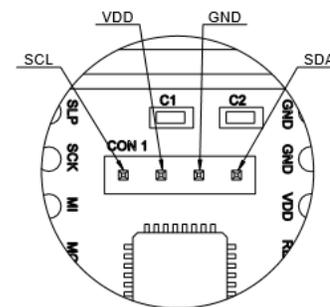
DIMENSIONS: (UNIT:MM)



Note: Drawing not to scale

CONNECTOR PIN DESCRIPTION

Pin	Name	Description
1	SCL	Series Clock Line
2	VDD	Digital power supply, reference voltage for SPI interface(2.7V-5.5V)
3	GND	Connect to ground
4	SDA	Series Data Line



EXTERNAL INTERFACE

SCL and SDA line must be connected to VDD with about 4.7k Ohm pull-up resistor in series, the range of VDD is 2.7-5.5V, and calibration of the MFM2000 is performed at a voltage of 3.3V.

