

# MEMS HANDHELD FLOW METER

HMF2000 series

## HMF2000系列全电子 手持式气体质量流量计 用户手册 (VA.1.04)



Siargo Ltd.

Please read this manual for ensuring correct use of this product. Make the manual available for easy access.

HMF2000 series

用户手册 • User manual ■ ■ ■

### RESTRICTION ON USE • 使用注意

1. This product is manufactured for onsite gas flow measurement or monitor in an instrumentation. It can be used for inline gas flow inspection. Do not alter any hardware and software of the product. Any modifications might cause damage and unexpected events.

本产品用于现场测量和检测各类仪器的气路中的多种气体流量，亦可检测现场管道中的气体流量。请勿变更或改动本产品的任何硬件和软件部分，以免造成不必要之损坏。

2. All practices for electronic device safety should apply.  
使用时，请遵循一般电子产品使用的安全注意事项。

### ⚠ SAFETY PRECAUTION • 安全注意事项

1. The product can be utilized to measure and/or monitor gas flow for the stated gases and flow rates of instrumentation or inline gas delivery. It is particularly designed for the dynamic range of these applications. Please do not use for other purposes, such as corrosive gases. Otherwise the product may not function properly or even can be damaged. Please contact the manufacturer for further information.

本产品可用于测试本手册所述的气体和流量，特别是能满足仪器仪表行业要求及特定的工业气体环境。请勿使用于其他无关之场合，特别是腐蚀性气体，以免造成不必要的损坏。

2. The operational environments of the product are illustrated in the section of product.  
产品的性能和使用环境请参见“产品技术参数”章节。
3. Operation, storage, and maintenance of the product must strictly follow the instructions illustrated in this user manual. Otherwise, unpredicted damage and even injuries or other severe situations could be induced.  
产品的使用、存储和维护请严格遵循本产品说明书的相关章节。
4. Before using the product, the user should read this user manual completely and in details so that the user can well understand all the important instructions.  
在使用本产品前，请认真阅读本说明书。

The HMF2000 handheld mass flow meter is designed and manufactured for onsite measurement for gas flowrate with multiple gas options and large dynamic range using the proprietary MEMS mass flow sensing technology. The product is particularly suitable for applications in instrumentation and inline gas monitor where the multiple gas measurements specially the low flowrate measurement is required. This manual provides the instructions for proper use of the products, including operation, maintenance and storage. For further customization or other product related questions, please contact the manufacturer.

HMF2000系列手持式气体质量流量计是专门为仪器仪表及在线检测大量程多种气体精密测定和检测设计的。产品采用了MEMS流量芯片测量专利技术,具有超大测量量程和极低流速测量的能力。从而可用于特别是类似于色谱仪、大气采样等仪器仪表及气体在线应用,已保证定期检查和系统的正常运行。本手册提供了产品的使用、维护和储存等详细说明。进一步的问题可与生产商直接联系。

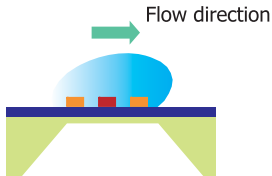
Features • 产品特点

- ◆ Multiple gas mass flow measurement a handheld form factor
  - ◆ Gas selection with front key board for Air, O<sub>2</sub>, Ar, H<sub>2</sub> and He
  - ◆ Excellent for instrumentation testing and onsite gas flow rate monitor
  - ◆ MEMS mass flow sensing technology with temperature and pressure compensation
  - ◆ High sensitivity for low flow measurement, and models cover different flowrate applications
  - ◆ Instant flowrate, totalizer, and via easily accessible interface
  - ◆ Split gas ration for gas chromatography mass spectrometers
  - ◆ Record, data access with front keyboard for data safety
  - ◆ Portability design with battery operation
- 
- ◆ 手持式多种气体质量流量测量
  - ◆ 前置用户键盘可选择空气、氧气、氩气、氢气和氦气
  - ◆ 适用于仪器仪表检测, 现场流量测控等多种用途
  - ◆ MEMS流量芯片测量技术, 无需附加温度压力补偿
  - ◆ 极灵敏的低流速测量能力;多种流量段测量型号可选
  - ◆ 瞬时流量、累积流量等可易选择测量方式
  - ◆ 专门为气相色谱设置的分流比测试模式
  - ◆ 前置键方便即时记录、设置、数据读取等
  - ◆ 便携式, 低功耗电池供电

Applications • 应用

 气相色谱 GC-MS	 大气采样 Air sampler	 制药 Pharmaceutic
 仪器仪表 Instrumentation	 化工 Chemical	 泄漏检测 Leak detection
 空调送风 HVAC	 科研 Research	 过程控制 Process control
 实验室 Laboratory		

Working principle • 工作原理



HMF2000 series handheld mass flow meter measures gas mass flowrate with option for selectable gases using the proprietary MEMS calorimetric mass flow sensor that is installed in the flow channel forming a plate that serves as an additional flow conditioner from the boundary layer configuration resulting in a laminar flow. The mass flow measurement is established as the fluid carries heat away from the heater causing the redistribution of the temperature field. Accurate flow speed is obtained by calibration with the standard fluid at the preset conditions.

HMF2000系列手持式气体质量流量计采用MEMS量热式流量芯片专利技术,可精准测量相应流道中的气体质量流量。MEMS流量芯片在特殊设计的流道中封装在一个平板上,使之形成一个边界层,从而重新分布的层流态能精准地测量并使测量具有优良的重复性。如图所示,流体流经流量芯片时,使围绕芯片的温度场发生变化,通过对温度场的测量和在标准条件下的校准,达到精准测量的目的。

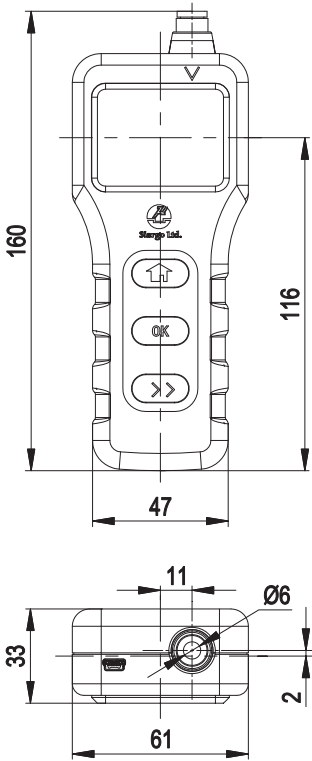
Specifications • 技术参数

Mass Flow Rate • 流量范围	0 ~ 1000	sccm
Accuracy • 精度	±(2+0.5FS)	%
Response time • 响应时间	8	msec
Turn-down ratio • 量程比	>100:1	
Power supply • 电源	6F22 battery • 方形电池6F22	
	External 6~12Vdc • 外部电源6~12Vdc	
User interface • 用户界面	Front keyboard • 前置按键	
Operational temperature • 工作温度	0 ~ 50	°C
Storage temperature • 存储温度	-10 ~ 80	°C
Max. Working Pressure • 最大工作压力	0.4	MPa
Safety rating • 安全防护	IP40	
Mechanical Connection • 机械接口	6mm One-touch connector • 6mm快速接口	
Dimension • 体积	160×61×33	mm <sup>3</sup>
Weight • 重量	200	g

Description • 产品说明



Dimensions • 外形尺寸

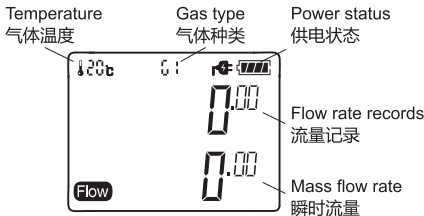


Menu operation · 操作说明

8.1 Interface illustration · 用户界面

The display includes *mass flow rate, flow rate records, gas temperature, gas type and power status*. *Mass flow rate* can be recorded by pressing the “OK” key. The gas type can be selected via button operations.

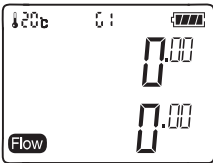
液晶显示包含瞬时流量、流量记录、气体温度、气体种类和供电状态。瞬时流量可通过按“确认键”存储到流量记录。不同测量气体可通过相应的按键操作进行切换。



8.2 Operation · 操作说明

The following contents describe the details for each steps. Please read carefully before process.  
以下内容说明了本流量计的各项功能，在使用本流量计前请仔细阅读。

8.2.1 Power on and power off · 开关机



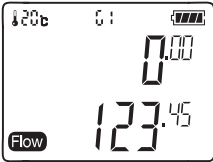
Press the “Home” key for 2 seconds, the meter will be powered on and the display as shown will be on.

长按“主菜单键”2秒后，流量计将显示如左图。

The meter can also be powered off by pressing the “Home” key for 2 seconds.

在开机状态下, 长按“主菜单键”2秒, 可进行关机。

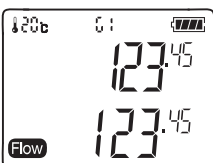
8.2.2 Mass flow rate measurement · 瞬时流量测量



The meter will show the instant mass flow rate in the display whenever the meter is connected to a flow channel and flow is present. The unit of mass flow rate is sccm.

当流量计连接到被测气道并有气流通过时候，流量计将显示当前气体的瞬时流量。瞬时流量的单位为sccm。

8.2.3 Record current mass flow rate · 记录当前流量值



Press the “OK” key, the current flow rate will be recorded and displayed in the recorded line.

按“确认键”可将当前流量值记录下来并显示在记录区。

The recorded value will be refreshed when pressing the “Record” key again.

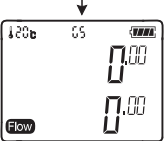
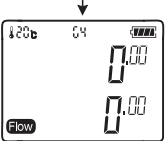
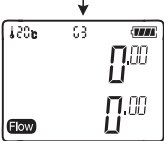
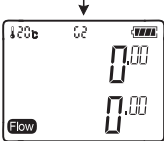
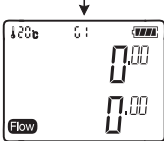
再次按“确认键”，会重新记录当前流量值并将原记录覆盖。

8.2.4 Gas selection · 气体种类切换



The desired measurement gas can be selected via button operations, see detailed in the *button operations flow chart*. The gases can be measured are Air, O<sub>2</sub>, Ar, H<sub>2</sub>, and He, see below for detailed.

可通过按键操作在不同被测气体间切换，详细的操作参见按键操作流程图。本流量计提供5种气体测量，分别为空气、氧气、氩气、氢气和氦气，详见下图。



8.2.5 Gas split ratio · 气体分流比



a, Open the gas split ratio function;

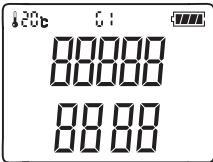
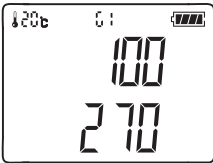
先打开气体分流比功能；

b, Connect the meter to the GC gas column flow and when it stabilizes, press “OK” key;

将流量计与色谱柱连接，待其稳定后，按“确认键”，将该流量记录下来；

c, Then re-connect the meter to the split vent and press “Shift” key, the gas split ratio will be shown, and you can dial the split vent until a desired ratio is reached.

然后将流量计连接到色谱分流出口，待其稳定后，按“选择键”，流量计将显示分流比。这是可调节分流出口流量直到显示达到所需的分流比。



For example, if the ratio is 1.00:2.70, the display will be 100:270.

分流比为放大100倍显示，例如1.00:2.70，显示值为100:270。

If the split ratio is larger than 1:1, an error message of “88888:8888 will be displayed.

如果分流比大于1:1，则显示为88888:8888（错误提示）。

8.2.6 Offset calibration • 零点校准



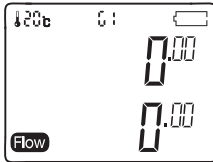
Ensure there is no flow in the flow channel, then choose offset calibration to “Yes”, the offset will be measured and saved. You can calibrate the offset for each kind of gases.

**Attention:** Please ensure there is no flow in the flow channel when you calibrate the offset.

设置零点校准为“**Yes**”流量计可进行自动零点校准。零点校准的目的是为了减小流量计内部芯片因为温度变化及气体污染等因素造成零点漂移现象。可以对5种气体分别进行零点校准。

**注意：**校准零点时候请确保气体通道中无任何气体流动。

8.2.7 Power Status • 供电状态



There will be external power or battery shown on the LCD. When the “battery status” shows blank on the display, please switch to external power mode of exchange a new battery as soon as possible.

根据供电状态不同,显示为外供电或电池供电.当电池电量即将耗尽时,右上角的电池电量图标显示如左图,请及时切换为外供电工作模式或更换电池。

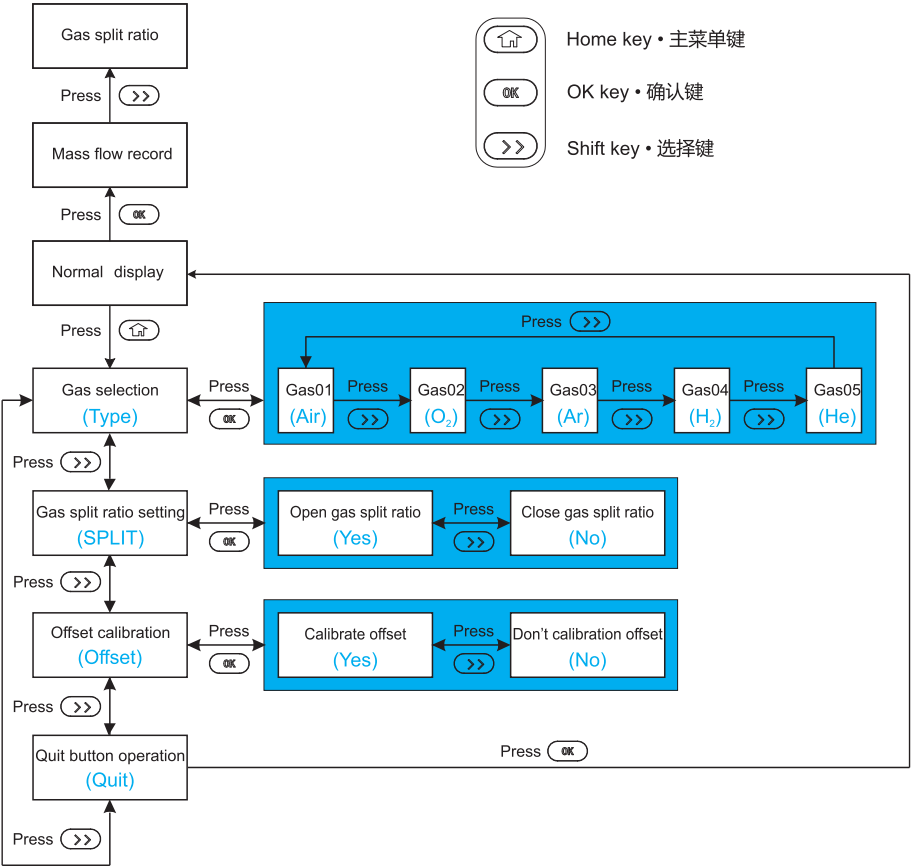
8.2.8 Sleep mode • 休眠模式/自动关机

When there is no flow and the meter is idled for more than 5 minutes, the meter will be automatically turned into a sleep mode.

You can turn it on by pressing the “Home” key for 2 seconds.

当连续5分钟检测不到流量变化,且无任何按键操作时,流量计会自动进入休眠模式。

长按“主菜单键”2秒可从休眠中唤醒。



Button operations flow chart • 按键操作流程图

Parts in Package • 产品清单

HMF2000 handheld mass flow meter • HMF2000手持式气体质量流量计	1
User manual • 用户手册	1
QC certificate • 检验合格证	1

Safety and Maintenance • 安全和维护

10.1 Safety Precautions • 安全使用

The product is designed for use for air speed measurement. For updates of the product certification information, please contact manufacturer. Use for other gases such as extreme corrosive and toxic agents may cause the product malfunctioning or even severe damages. The product sealing is ensured to work under working pressure of 0.4MPa. The power supply for this product is 6F22 battery or 6~12V external power, all precautions and measures for electrical voltage handling should apply.

本产品可用于指定气体的测量，若有任何安全方面的问题请与厂家联系。请勿用于腐蚀性气体或有毒气体的测量，否则将可能会带来无法预期的后果。有关一般电器使用的安全事项均可参照执行。

**Attention:** any alternation and/or improper use of the product without the permission of the manufacturer can cause unpredicted damages and even injuries or other severe situations. Manufacturer or any of its employees, subsidiaries shall not be hold and indemnified against such consequences due to such circumstances via improper use of the product.

注意: 请勿更改产品的结构和元器件。厂商将不对由此而造成的后果承担任何责任。

10.2 Maintenance • 维护

**Attention:** without prior permission of the manufacturer, please do not attempt to alter any parts of the product as it may cause unrecoverable damages. If there are questions or doubts, please contact manufacturer immediately before further actions.

All maintenance of the sensor should be performed by trained and certified personnel by manufacturer.

产品的所有维护工作应由厂商或其授权维修商完成。

Customer Service and Order • 联系方式及订货

In case of questions, and or product supports, please contact customer service at the address listed below. We will respond your request in a timely fashion and will work with you toward your complete satisfaction.

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