AMS2106 Digital Gas Mass Flow Meter

Key Features:

Intergrated Mass flow and temperature measurement

- Measurement Range 0~200L/min
- Good repeatability
- Support multiple gas measurement
- Configurable parameters
- Standard Modbus-RTU communication
- Segment code screen display
- Battery or 9~24V DC power supply
- Default NPT 1/2 connection, interface can be customized according to customer needs

Product Summary

AMS2106 is a thermal mass flow sensor that calculates the mass flow of the measured gas by measuring the change in resistance. The sensor adopts the self-developed MEMS mass flow chip, which is intuitive, accurate, stable, and has features of high and low temperature resistance, good linearity, and fast response time.

The relevant performance and parameters of AMS2106 are strictly tested and calibrated before delivery.

Applications

AMS2106 is used to monitor the mass flow of air, Nitrogen, Oxygen, Argon, Carbon Dioxide and other dry, clean and non-corrosive gases (except flammable and explosive gases). It can be widely used in university scientific research, fire protection, environmental monitoring, tobacco, smart agriculture, food, medicine and other industries.

1 AMS2106 Outlook and Pinout

1.1 Outlook and Working Interface

Figure 1 shows the appearance and working interface of AMS2106, including the sensor air duct. The working interface includes a segment code screen and operation buttons. The content shows on the segment code screen includes the Modbus communication address of the flowmeter, gas temperature, battery, cumulative flow and instantaneous flow. The buttons include up, menu and down buttons. The sensor air duct is below the working interface, including the air in and air out. The arrows on the air ducts indicate the direction of gas flow required by the sensor.

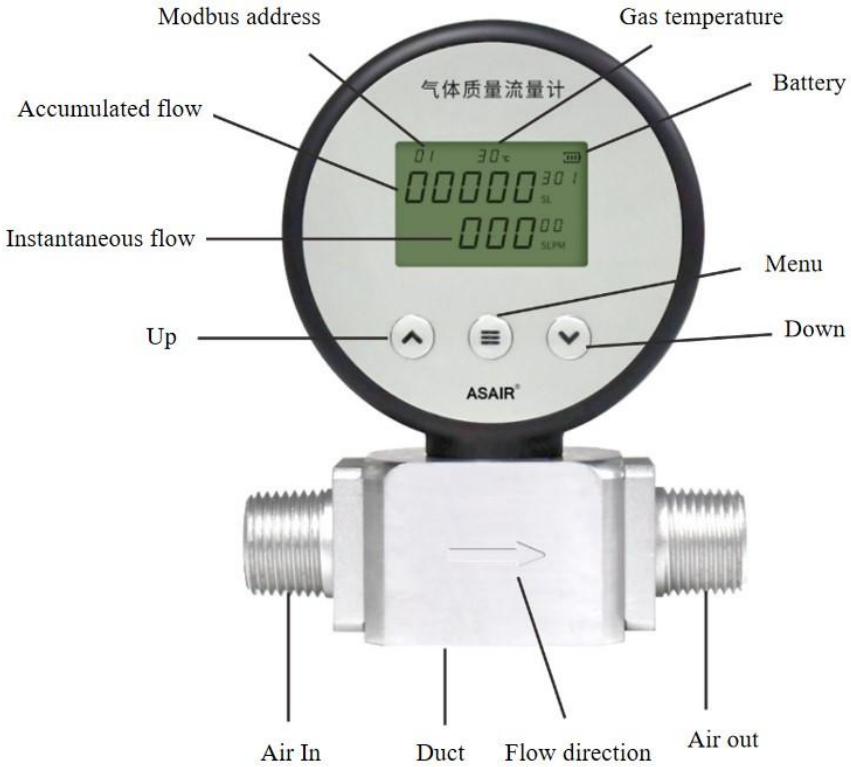

Figure 1 AMS2106

1.2 Pinout

Figure 2 Pinout

Color	Pinout name and definition
Black(thick)	Shielded wire
White	RS485 B-
Red	VCC(9～24V DC)
Green	RS485 A+
Black(thin)	GND

Table 1 Pinout definition

2 Technical Parameters

Specifications	Description
Measurement range	0～200L/min（Standard）
Accuracy	±3%FS
Repeatability	0.5%FS
Response time	≤ 2s
Power supply	3pcs AA batteries or external power supply 9～24V DC
Output signal	RS485
Display	segment code screen
Unit	Cumulative flow: SL (L, standard condition)） Instantaneous flow: SLPM (L/min, standard condition)
Max work pressure	0.8MPa
Pressure loss	≤2000Pa
Standard calibration gas	Air (standard condition)
Pinout	Type-C
Power consumption	≤50mW
Connector	NPT 1/2
Weight	280g

Note: Standard condition means 25℃， 1atm

Table 2 Technical Parameters

3 Dimension

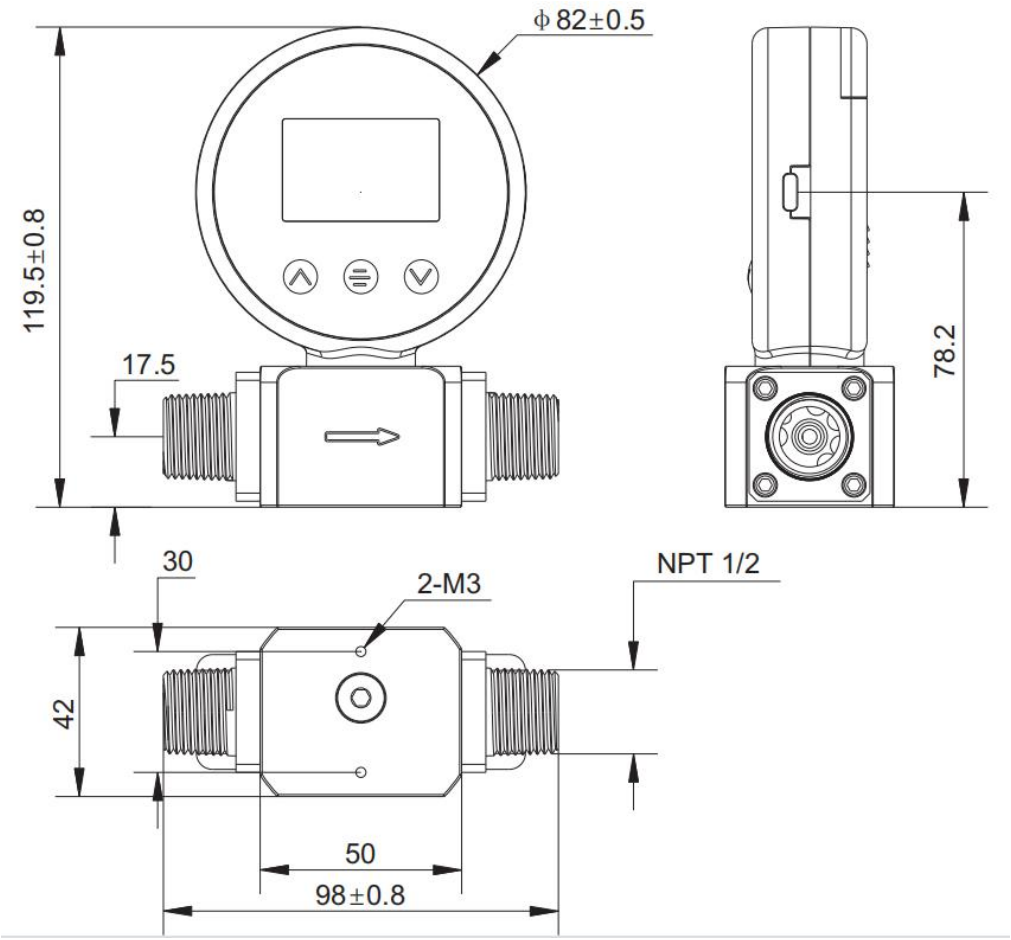

Figure 3 Dimension (unit:mm tolerance:±0.2 mm)

4 Communication Protocol

4.1 Protocol Description

AMS2106 is equipped with a Modbus communication interface with Type-C wire, and uses the Modbus-RTU protocol to provide rules for bidirectional communication between the master unit and one or more units (AMS2106), allowing the master unit to access and get AMS2106 data information. The main unit is the computer that can read and write data through Modbus Poll software.

After the master-slave unit establishes communication, the master unit can read and write from the internal register of the slave unit by addressing, that is, the master unit can obtain the measured value and status information by reading the register, and can also respond to the data contained in the register by writing back.

4.2 Communication Protocol

4.2.1 Protocol Parameters

Modbus-RTU uses the RS-485 interface as the hardware carrier. Please refer to Table 3 for detailed communication parameters.

Parameters	
Protocol format	RTU
Communication speed	9600bps
Initial bits	1bit
Data bits	8bits
Stop bits	1bit
Even or Odd number check	No
Max bits	255

Table 3 Modbus Parameters

The sending and receiving format of each character is shown in Figure 4 (initial with D0, total 10 bits).

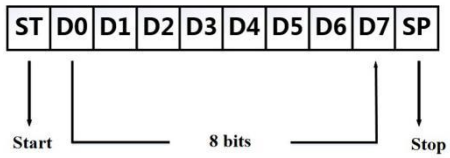

Figure 4 Modbus format

4.2.2 Function Code

The device address of the Modbus message contains 8 bits (in RTU mode), and the function code length is also 8 bits. The function code in the message frame can realize the read and write operation of the digital quantity and analog quantity of the slave unit by the master unit. The two most commonly used function codes in AMS2106 are 03 and 06. For the data types and functions corresponding to the 03 and 06 function codes, see Table 4.

Function Code	Name	Data format	Function
03	Read holding register	Integer	Read the value of a holding register
06	Preset Single Register	Integer	Write a specific hexadecimal value to a holding register

Table 4 03 and 06 function code

5 Register

There are multiple registers in AMS2106, information such as instantaneous flow, accumulated flow, and sensor temperature can be obtained by reading the value of the register. Please refer to Table 5 for the register value corresponding to each parameter.

Name	Description	Register (decimal)	Modbus(hex)	Magnification
Instantaneous flow	Instantaneous flow of AMS2106(r)	0	0x0000	100
Accumulated flow	Accumulated flow of AMS2106 (r)	1～2	0x0001(high 16 bits) 0x0002 (low 16 bits)	1000
Temperature	Temperature of sensor in AMS2106 (r)	3	0x0003	1
Reserved register	\	4～47、51～52、54	0x0004～0x002F、0x0033 0x0034、0x0036	1
Flow meter model	Model Number of this flow meter(r)	48	0x0030	1
Software version	Software version of AMS2106(r)	49	0x0031	1
Flow unit	Flow unit of AMS2106(w/r)	50	0x0032	1
Flow meter address	Flow meter address of AMS2106(w/r)	53	0x0035	1
Accumulated flow reset	Write 1 to clear the total accumulated flow(w)	55	0x0037	1

Table 5 Register format

Note: The accumulated flow register is high byte first and low byte last; (r) means to read register data with 03 function code, (w) means to use 06 function code to write register data; when the flow unit address is 0, it means the unit is m^3, when it is 1, the unit is L.

6 Interface operation

6.1 Set Modbus Communication Address

Set the communication address of the flow meter. Press the Menu key to enter the menu page (CH01), press the menu key again to enter the subpage, press the up key or the down key to set the corresponding communication address of the flow meter, and press the menu key to return to the menu page (CH01).

6.2 Set Baud Rate

When in the menu page (CH01), press the down key to jump to the menu page (CH02), press the menu key to enter the subpage, press the up key or the down key to set the corresponding baud rate of the machine. Press the menu key to return to the menu page (CH02). The default baud rate of AMS2106 is 9600bps.

6.3 Set Temperature Unit

When in the menu page (CH02), press the down key to jump to the menu page (CH03), press the menu key once to enter the sub-page, press the up key or the down key to set the corresponding temperature unit of the machine. Press the menu key to return to the menu page (CH03). The AMS2106 currently only supports Celsius display and does not support Fahrenheit.

6.4 Set Flow Unit

When in the menu page (CH03), press the down key to jump to the menu page (CH04), press the menu key once to enter the subpage, press the up key or the down key to set the corresponding flow unit of the machine. Press the menu key to return to the menu page (CH04). The factory default setting is SLPM (L/min).

6.5 Setting to Clear the Accumulated Flow

When in the menu page (CH04), press the down key once to jump to the menu page (CH05), press the menu key once enter the subpage, press the up key or the down key to display the cumulative flow: 00000.000, press the menu key to return Menu page (CH05), clear the accumulated flow.

6.6 Exit Parameter Setting

Menu page (CH05), press the down key once to jump to the menu page (End), press the menu key once to exit to the working interface.

7 Operation and Maintenance

7.1 Precautions

In order to achieve high accuracy and the best working state, it is recommended to follow the battery power indicator at the upper right corner. When icon appears with only one battery, it means that the power is very low and the battery must be replaced in time. Also, be careful not to turn the display above the sensor air duct more than 180° to avoid damage to the sensor.

Before and after the sensor is installed, a straight pipe of more than 30cm must be ensured. Do not install the sensor in an elbow to avoid affecting the measurement accuracy.

7.2 Normal Problems

Problems	Reasons	Solutions
The main interface is not displayed	1. The battery is out of power 2. The battery is installed wrongly 3. Display failure 4. Damaged adapter	1. Use new battery 2. Reinstall the batteries correctly 3. Check if any damage on the display 4. Change adapter
Instantaneous flow display before measurement is not zero	1. The valve of the installation pipeline is not closed tightly 2. The installed pipeline is leaking	1. Check whether the valve of the installation pipeline is tightly closed 2. Check whether the installed pipeline is leaking
No flow record	1.The installed pipe is blocked 2. There is no airflow in the installed pipeline	1. Check whether there is any foreign body blockage in the installed pipeline 2. Confirm whether the valve of the installation pipeline is open and whether there is air flow in the pipeline
Traffic record reduction	1. Blocking 2. The sensor is contaminated	1. Check whether the air inlet and outlet are blocked or any other objects 2. Clean or replace the sensor
Communication is abnormal	1. Wiring error 2. The baud rate setting is incorrect 3. RS485 does not work properly	1. Correct wiring according to the manual 2. Correctly set the baud rate of the host computer to 9600bps 3. Confirm that the RS485-RS232 converter is working properly

Table 6 Normal problems

8 Warning and Personal Injuiry

Do not use this product in safety protection devices or emergency stop equipment, and in any other application where personal injury may result from failure of this product unless there is a specific purpose or authorization for use. Refer to the product data sheet and application guide before installing, handling, using or maintaining this product. Failure to follow the recommendations could result in death or serious personal injury. Aosong will not be liable for all compensation for personal injury and death arising therefrom, and exempts any claims that may arise from Aosong's managers and employees, as well as affiliated agents, distributors, etc., including: various costs, claims fees, attorney fees, etc.

9 Packing List

Name	Quantity
AMS2106	1
Type-C cable	1
User Manual	1
Certificate	1
Adapter(12.6V/1A) (optional)	1

Table 7 Packing List

10 Warranty

Guangzhou Aosong Electronics Co., Ltd. Offers warranty for its products as shown in Table 8 (from the date of delivery), based on the technical specifications in the datasheet published by the company.

Name	Warranty
AMS2106 mass flow meter	12 monthes
Cable and other accessories	6 monthes

Table 8 Warranty Description

Guangzhou Aosong Electronics Co., Ltd is only responsible for products that are defective when used in applications that meet the technical conditions of the product. Aosong does not make any guarantees and warranties for the application of the product in special scenarios that are not recommended. At the same time, Aosong does not make any commitment to the reliability of the product applied to other non-company supporting products or circuits.

This manual is subject to change at any time without notice.

The final interpretation right of this product belongs to Guangzhou Aosong Electronics Co., Ltd.