XGZF6000 Gas Mass Flow Meter

FEATURES

- High precision and resolution with internal temperature compensation
- High sensitivity and high resolution
- Reliable quality, stable performance, and low cost
- LCD display, RS485 communication
- Configurable parameters via buttons
- Over-range alarm indicator light reminder function
- Standard G or NPT thread for easy installation.

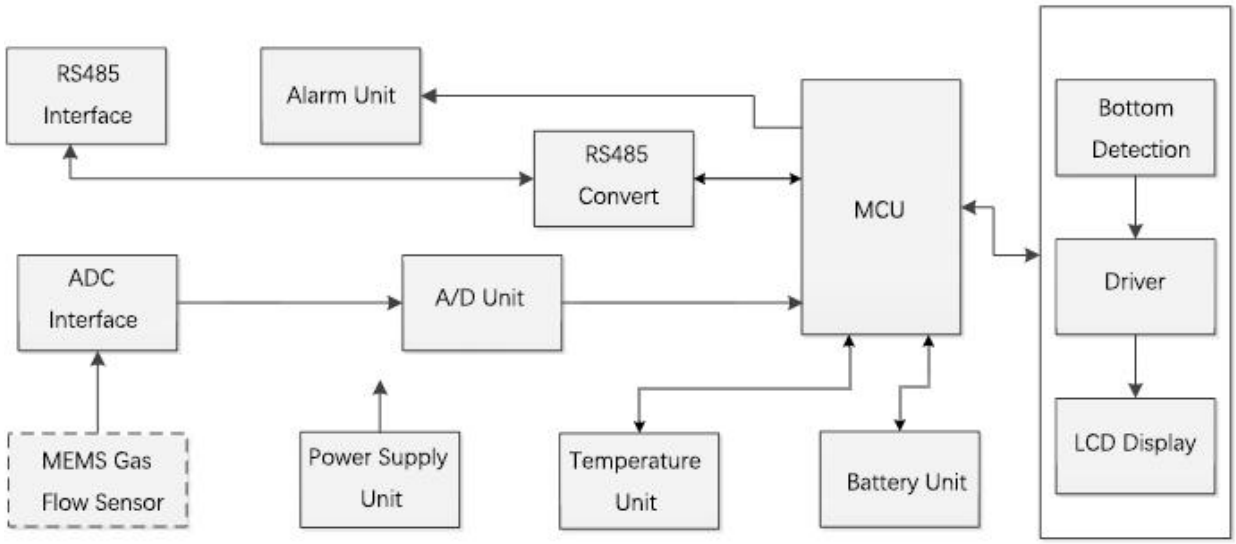
APPLICATIONS

- Industrial automation
- Medical equipment
- Climate and environmental monitoring
- Instrumentation
- Automobile manufacturing
- Chemical, welding, electromechanical, agricultural, etc.

INTRODUCTION

The XGZF6000 is a gas mass flow meter developed by CFSensor, featuring MEMS flow sensor technology and an LCD display for instantaneous gas flow, accumulated flow, and auxiliary alarms. Based on thermodynamic principles, it utilizes the company's proprietary MEMS flow sensor chip to calculate gas mass flow through a unique algorithm based on the temperature difference generated by flowing gas. This manual serves as the operating instructions for the current finalized product, and CFSensor can also design and customize products according to customer requirements.

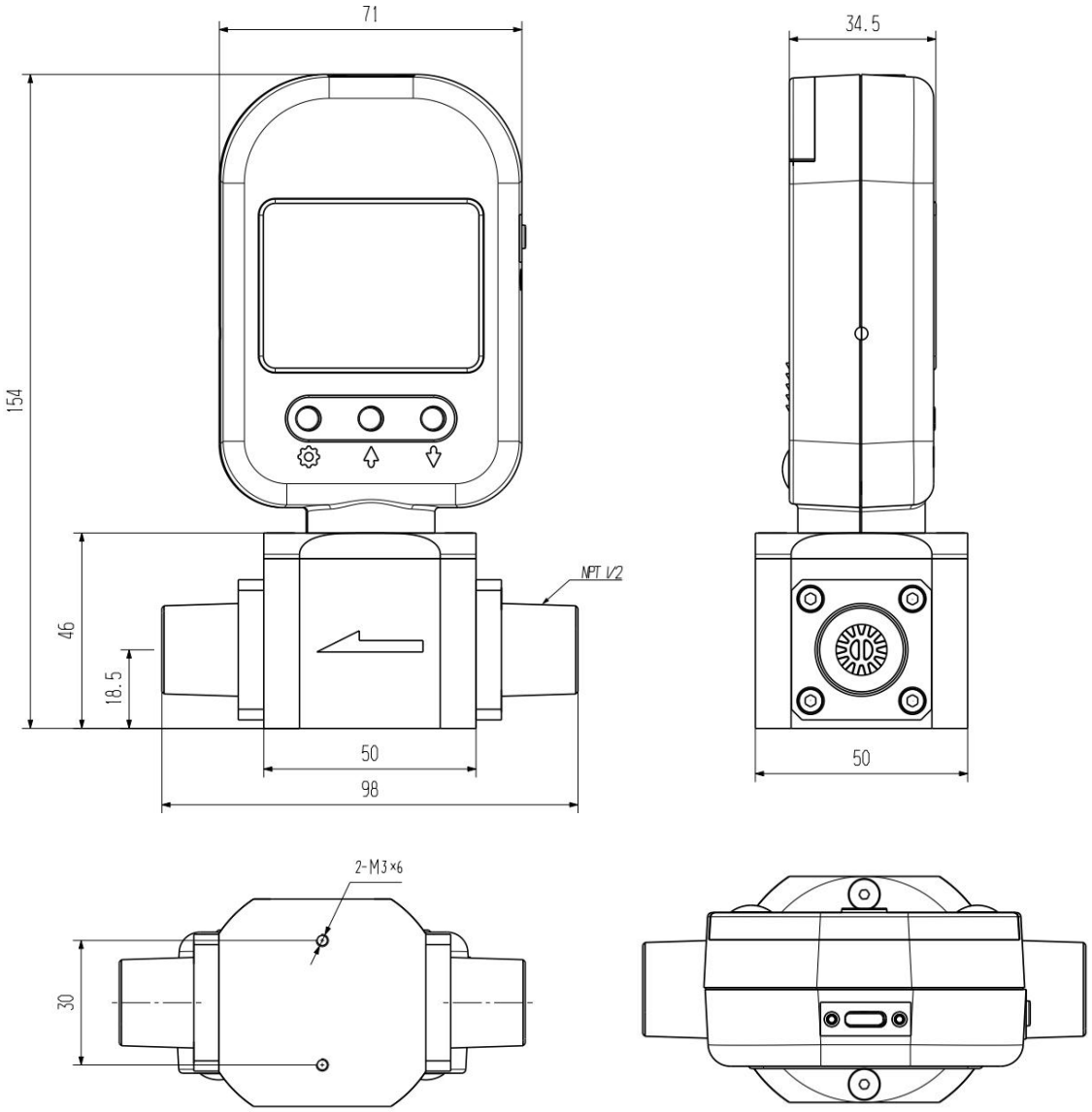
BLOCK DIAGRAM



SPECIFICATION

Item	Parameter	Unit
Range	0 ~ 5...200	L/Min
Accuracy	±2.5	%Span
Response	⩽2	s
Power Supply	12 ~ 24(or 4x AA Batteries)	V
Consumption	⩽10	mW
Display	LCD	
Display Unit	Instantaneous flow:L/Min, Accumulated flow: m³	
Resolution	Communication:0.001; Display: 0.01	
Max Pressure	200	kPa
Working Temperature	-10 ~ +60	℃
Working Current	< 30	mA
Electronic Connection	USB-Type-C	
Flow Port	DN15-NPT1/2	
Function	Maximum accumulated flow setting and reset, maximum accumulated flow alarm; instantaneous flow high/low alarm; instantaneous flow zero calibration; buzzer on/off; battery level display; temperature display on/off; automatic black screen low-power mode	

DIMENSION (Unit:mm Unspecified Tolerances:±1.0mm)



ORDER GUIDE

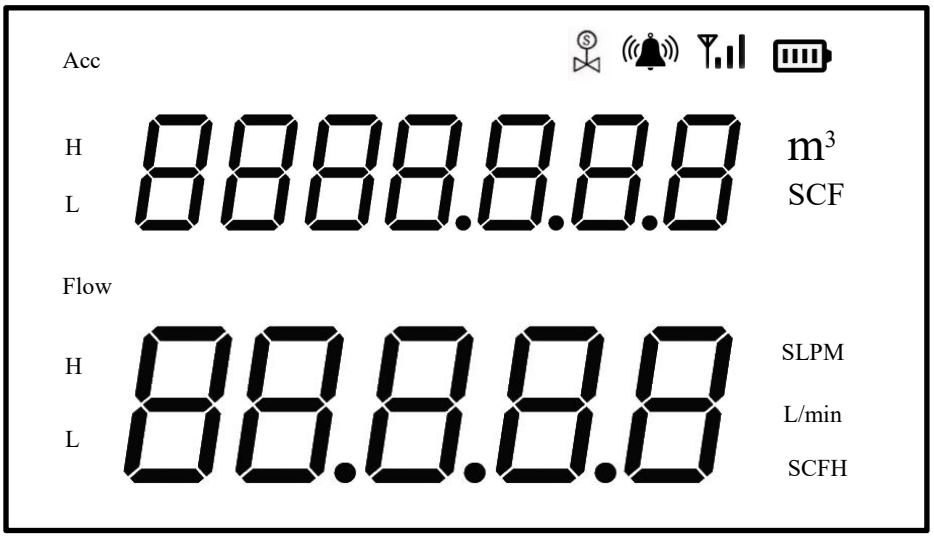
XGZF6-200 - D - A- G2-12-X

- Reserved Code （for customized）
- Port Diameter(6: Ø6mm 12:Ø12mm)
- Thread Type(G2: G1/2 G4: G1/4 G3: G3.8 N2: NPT1/2)
- Gas Media(A:Air C:CO2 O:oxygen N:nitrogen)
- Signal (D: RS485)
- Flow Range(200: 200L/M)
- Catalog(XGZF6: Flow Meter Products)

USE INSTRUCTION

1 Menu Description

Menu: Including Acc: accumulated amount, Flow: instantaneous flow, valve switch, alarm bell, wireless communication mode, power supply status and other menus, the overall layout is as follows:



Button: Left side of the panel: Power on/off

Front of panel SETUP: UP button:▲, DOWN button:▼

2 Operation Instruction

（1）Power On

Power on the device, the lower section of the LCD screen displays the instantaneous flow value measured by the current flow sensor, and the upper section displays the accumulated total flow value measured by the flow sensor before the last shutdown; when the keys are not pressed within 7 minutes, all the section codes will be off, and the LCD screen will be turned off automatically to enter the low-power state; If there is an upward '▲' or downward '▼' button is pressed, the LCD will be lit up and the flow rate value will be displayed normally.

（2）Value Check

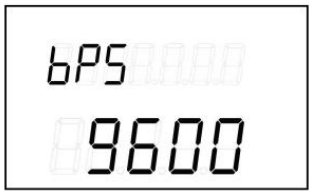
Press the 'S' key (left button) briefly to display in sequence:

①View the maximum alarm value for the set instantaneous flow rate (stable display H ***, H 200 is the default upper limit);

②View the minimum alarm value for the set instantaneous flow rate (stable display L ***, L 000 is the default lower limit);

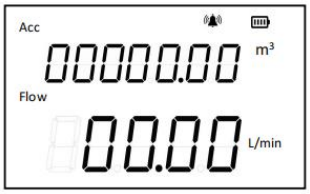
③ View the maximum alarm value for the set accumulated total flow (stable display H *******,H 50000 is the default upper limit)

④ View the set Modbus address (stable display Addr ***, default address Addr 255)



⑤ View the set RS485 communication baud rate (stable display bps ****, default baud rate bps 9600)

⑥Check whether to display the temperature (stable display - ℃ YES, the default display temperature __ ℃,YES for displaying the temperature, NO for not displaying the temperature)

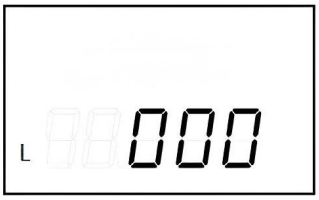


⑦Returns the current instantaneous flow value and accumulated total flow value read from the sensor (displayed in real time according to the sensor's data)

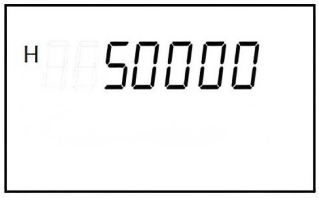
（3）Setting

Press the ‘ ⚙ ’ button (left button) for more than 2 seconds and then release it (i.e., long press) to display as following first item below will be displayed, and then press the setup key (left button) once briefly to display the next item in turn.

①Setting the maximum alarm value of instantaneous flow rate [blinking display, at this time, short press the ‘▲’ key (the middle button) the maximum alarm value of instantaneous flow rate plus 1, short press the ‘▼’ key (the right button) the maximum alarm value of instantaneous flow rate minus 1, press the When pressing ‘▲’ or ‘▼’ key and not releasing it, the maximum value of instantaneous flow rate alarm will be increased or decreased rapidly].

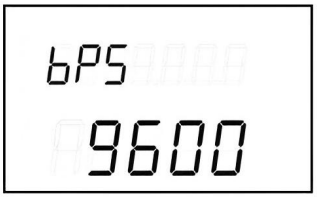


②Setting the minimum alarm value of instantaneous flow rate [blinking display, at this time, short press ‘▲’ key (the middle button) the minimum alarm value of instantaneous flow rate will be increased by 1, short press ‘▼’ key (the right button) the minimum alarm value of instantaneous flow rate will be decreased by 1, pressing the When the key ‘▲’ or ‘▼’ is not released, the minimum alarm value of instantaneous flow rate will be increased or decreased rapidly].



③Setting the maximum alarm value of accumulated total flow [flashing display, at this time, short press '▲' key (middle button) the maximum alarm value of total flow will be increased by 1, short press '▼' key (right button) the maximum alarm value of total flow will be decreased by 1, press the When pressing '▲' or '▼' key and not releasing it, the maximum alarm value of total flow will be increased or decreased rapidly].

④ Modbus address set [blinking display, at this time short press '▲' key (middle button) Modbus address value plus 1, short press '▼' key (right button) Modbus address value minus 1, press the Modbus address value will increase or decrease rapidly when '▲' or '▼' key is not released]; Default address is 255, address setting range 001-255



⑤Setting RS485 communication baud rate bps [blinking display, at this time a short press of the '▲' key (middle button) or a short press of the '▼' key for a while (right button) baud rate in 4800, 9600, 19200, 38400, 57600, 115200 (11520 is displayed on the screen), the default baud rate is 9600, baud rate modification must be shut down to restart the flow meter device.

⑥Setting whether to display the temperature or not [blinking display, at this time a short press of the '▲' key (middle button) or a short press of the '▼' key (right button) YES and NO to switch between, YES means displaying the temperature, NO means not displaying the temperature, the default is YES

⑦Returns the current instantaneous flow value and accumulated total flow value read from the sensor (displayed in real time according to the sensor's data)

3 Function Setting

（1）, Buzzer alarm enable/disable setting. Do not power on first, at the same time press the left two keys [setup key ⚙ and '▲' key] do not release, and then power on, and then release the two keys, you can enable / disable the buzzer alarm function, the LCD screen on the segment display/clear the logo🔔

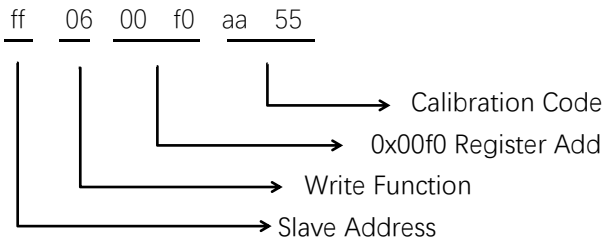
（2）, Calibrate the instantaneous flow rate value to zero. Don't power on first, press the right two keys ['▲' key and '▼' key] at the same time, don't release, then power on, then release the two keys, you can carry out the instantaneous flow rate value calibration zero;

（3）, Clear the accumulated total flow (clear the total). Don't turn on the power first, don't release after pressing the left and right two keys [Setting key⚙ and '▼' key] at the same time, then turn on the power, then release the two keys, you can carry out the total flow rate value clearing zero

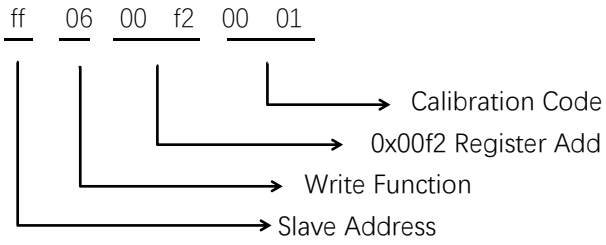
4 RS485 Communication

(1) Write to single register

①Instantaneous flow rate value to zero

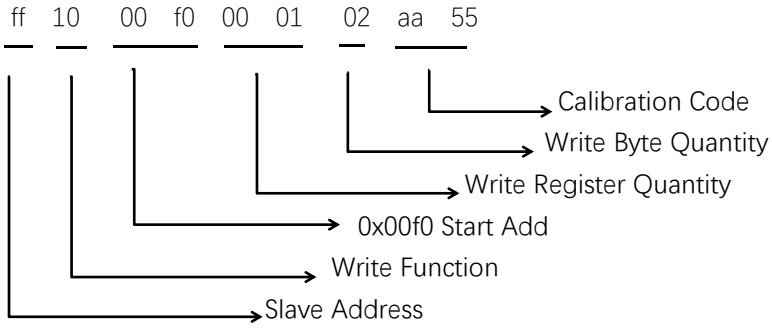


②Accumulated flow rate value to zero

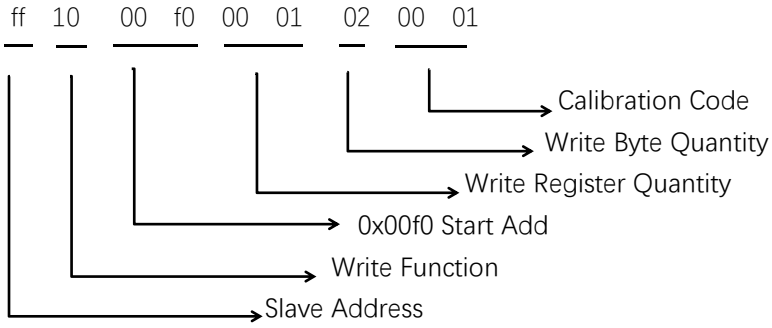


(2) Write to multi-register

①Instantaneous flow rate value to zero



②Accumulated flow rate value to zero

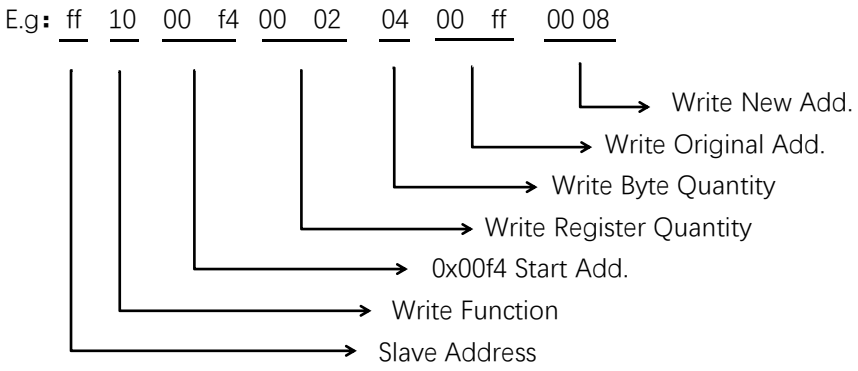


③Instantaneous and Accumulated flow rate value to zero synchronously

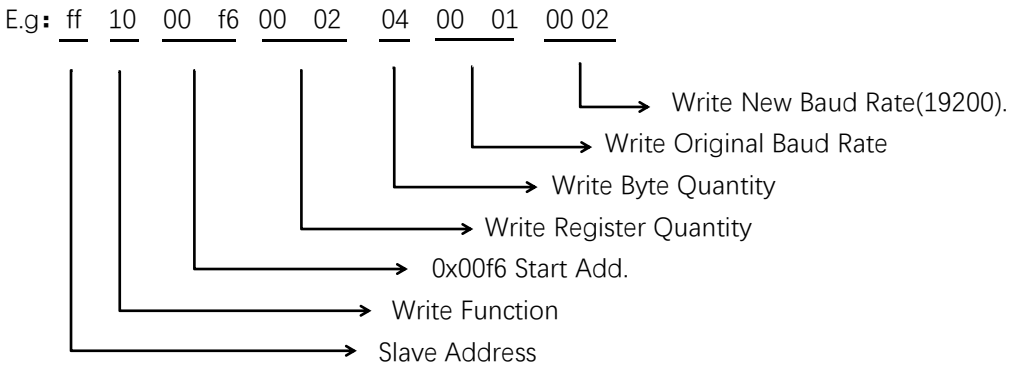
Same with above, Write ff 10 00 f0 00 02 04 aa 55 00 01, the Instantaneous and Accumulated flow rate value to zero synchronously

5 Address&Baud rate Modify

①**Modify Modbus_Addr**: when data is written to ff 10 00 f4 00 02 04 00 ** (original address) 00 ** (preset address).(** indicates any 2-digit hexadecimal number);



②**Modify the baud rate**: when data is written to ff 10 00 f6 00 02 04 00 0* (original baud rate) 00 0* (new baud rate). (* denotes any hexadecimal digit; set RS485 communication baud rate: 0 is 4800, 1 is 9600, 2 is 19200, 3 is 38400, 4 is 57600, 5 is 115200)



RS485 COMMUNICATION

The flowmeter communicates with RS485 and supports the standard ModBus communication protocol.

1 PIN Definition

Wire Name	Wire Colour	Wire Definition
VCC	Red	Input Power Supply (+)
GND	Black	Input Power Supply (-)
RS485B	Green	RS485 Digital Signal B
RS485A	White	RS485 Digital Signal A
USB Type-C Connection Communication Cable USB-C-100		

2 Communication Protocol

Based on the universal ModBus protocol, it can work both in stand-alone mode and in multi-machine networking mode.

(1) **Parameter**

Parameter	Protocol Format
	RTU
Baud rate	9600bps
Start bit	1 bit
Data bit	8bit
Stop bit	1bit
Parity check	none
Bit time	104.2us
Character time	1.042ms

Each character is sent and received as following format (lowest valid bit of data D0 first, RTU mode, 10 bits):

Star	D0	D1	D2	D3	D4	D5	D6	D7	Stop
Start bit	8 bit data bit								Stop bit

(2) **Message Frame**

Start Bit	Device ID	Function	Data	CRC Check	Close
T1-T2-T3-T4	8bit	8bit	X....8Bit	16Bit	T1-T2-T3-T4

(3) **Communication Format** (RTU data format)

The device address field of the message frame contains 8 Bit (RTU). The possible slave device addresses are 0 to 255 (decimal), and the address range for a single device is 1 to 255, with address 0 used as the broadcast address to make it recognisable to all slave devices. The master device communicates with the slave device by placing the address of the slave device to be contacted into the address field in the message. When a slave device sends a response message, it puts its own address into the address field of the response so that the master device knows which device is responding.

①**Write Register** (Function code=0x06)

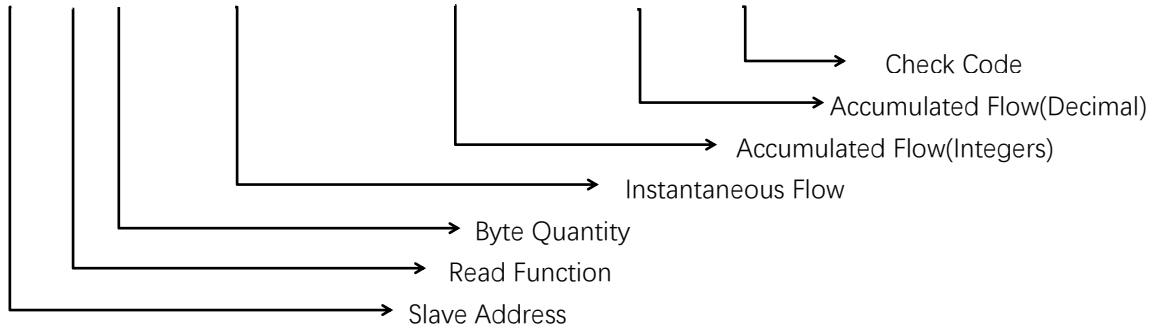
Check Message Frame		Response Message Frame	
Slave Device ID	0xff	Slave Device ID	0xff
Function Code	0x06	Function Code	0x06
Register First Add	0x00f0/240	Register First Add	0x00f0/240
Data	****	Data	**** (Same with Check data)
CRC Check	****	CRC Check	**** (Same with CRC check)
When the Check message and the Response message are the same, it means that the communication is normal, and the instantaneous flow value is zero-checked when aa55 write to register 0x00f0 , and accumulated flow value is zero-checked when 0001 write to register 0x00f2.			

②**Read Register**（Function code=0x03）

Check Message Frame		Response Message Frame	
Slave Device ID	0xff/255	Slave Device ID	0xff/255
Function Code	0x03	Function Code	0x03
Register First Add	0x0002/0002	Bits QTY	0x0A
Data	0005	Data 1	Instantaneous flow 16bit（high bit）
CRC Check	****	Data 2	Instantaneous flow 16bit（low bit）
		Data 3	Accumulated flow 16bit Integers（high bit）
		Data 4	Accumulated flow 16bit Integers（low bit）
		Data 5	Accumulated flow 16bit decimals
		CRC Check	****

Response message frame， e.g Receive Data as below

ff 03 0a 00 00 00 01 00 00 00 88 00 12 CB 50



③**Write Multi-Register**（Function code=0x10）

Check Message Frame		Response Message Frame	
Slave Device ID	0xff/255	Slave Device ID	0xff/255
Function Code	0x03	Function Code	0x03
Register Add(high bit)	0x00/00	Register Add(high bit)	0x00
Register Add(lowbit)	0xf0/240	Register Add(lowbit)	0x3A
Write Data QTY(high)	0x00	Write Data QTY(high)	0x00
Write Data QTY(low)	0x05	Write Data QTY(low)	0x05
Byte QTY	0x0A	Check Code	
Preset Data(high)			
Preset Data(low)			
Preset Data(high)			
Preset Data(low)			
.....			
Check Sum			

Parameter Instruction

Current Instantaneous flow	0x0002∽0x0003	Modify	Prohibited
		Read	Allowed
Data Type	UINT16		
Description	0x0002∽0x0003 constitutes a UINT16 unsigned integer number representing the current gas flow rate: Flow rate V = value(0x0002)*65536+value(0x0003) The value of V is the flow rate (base unit) * 1000 Example: the current unit is L/min flow value is 35.65, then the value obtained through modbus is 35.65*1000=35650		
Current Accumulated flow	0x0004∽0x0006	Modify	Prohibited
		Read	Allowed
Data Type	UINT32+UINT16		
Description	V1=value(0x0004)*65536+value(0x0005); V2=value(0x0006) Total volume V=V1*1000+V2. Where V1 is 32 bits, representing the integer part of the current total flow, and V2 is 16 bits, representing the fractional part of the current total flow. Example: the current total flow is 1234.256m3, then the value obtained through modbus is 1234*1000+256=1234256.		
Instantaneous flow zero calibration	0x00f0/240	Modify	Allowed
		Read	Prohibited
Data Type	0xaa55		
Description	1、By Button Refer to Operation Instruction 2、By Write Code Refer to RS485 Communication Note:Ensure that the airflow in the flowmeter pipe is stationary when performing this operation.		
Accumulated flow zero calibration	0x00f2/242	Modify	Allowed
		Read	Prohibited
Data Type	0x0001		
Description	3、By Button Refer to Operation Instruction 4、By Write Code Refer to RS485 Communication		

【 SAFETY NOTES 】

- Do not use these meters under any circumstances in which the range of their ratings, environment conditions or other specifications are exceeded. Using the sensors in any way which causes their specifications to be exceeded may generate abnormally high levels of heat, emit smoke, etc., resulting in damage to the circuitry and possibly causing an accident.
- Before connecting a connector, check the pin layout by referring to the connector wiring diagram, specifications diagram, etc., and make sure that the connector is connected properly. Take note that mistakes made in connection may cause unforeseen problems in operation, generate abnormally high levels of heat, emit smoke, etc., resulting in damage to the circuitry.
- Do not use any pressure sensor which has been disassembled or remodeled.
- Protection circuit recommended.

The possible failure mode is either open or short of the output transistor.
An ecess heat is the cause for short mode failure. For any important and serious application in terms of safety, add protection circuit or any other protection method.

- Various safety equipment and safety equipment
- Traffic light
- Security crime prevention equipment
- Equipment concerning control and safety of trains, cars, etc.
- Applications such as temperature control using sensor output etc.

- If it is expected that malfunction of each sensor may cause injury to persons or serious expansion damage, be sure to implement safety measures such as double safety circuit.

【 WARRANTY 】

The information in this sheet has been carefully reviewed and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Furthermore, this information does not convey to the purchaser of such devices any license under the patent rights to the manufacturer. CFSensor reserves the right to make changes without further notice to any product herein. CFSensor makes no warranty, representation or guarantee regarding the suitability of its product for any particular purpose, nor does CFSensor assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Typical parameters can and do vary in different applications. All operating parameters must be validated for each customer application by customer's technical experts. CFSensor does not convey any license under its patent rights nor the rights of others.

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