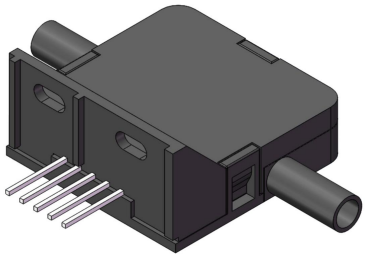
XGZF3000 AIR FLOW SENSOR

FEATURES

- MEMS mass gas flow technology
- Wide range from 100 to 3000SCCM
- Analog or Digital output optional
- Unidirectional and bidirectional flow optional
- Low working voltage optional
- Fast Response
- High sensitivity&accuracy
- Reliable and stable performance



APPLICATIONS

- Portable Ventilator, Household Oxygen Generator
- CPAP Device
- Anesthesia for childbirth
- Critical care equipment
- HVAC
- Air purifier
- Environmental climate monitoring
- Fuel cell control and
- More applications for air flow control and measurement

INTRODUCTION

The XGZF3000 series measures the flow of gases in flow channels according to the thermodynamic principle and is capable of measuring non-corrosive gases such as air, oxygen and nitrogen with high accuracy. The built-in MEMS thermal sensor chip and high performance CMOS microprocessor, combined with a unique calibration program, can output real-time accurate flow signals.

ELECTRONIC PERFORMANCE

Unless otherwise specified, measurements were taken with a supply voltage of (8～24)VDC (Default: 12 VDC) Vdc at a temperature of 0±1℃ and humidity ranging from 40％～60％RH

Specifications		Min.	Typ.	Max	Unit
Accuracy	≤1000SCCM	-	-	±1.5	%FS
	> 1000SCCM&≤2000SCCM	-	-	±2.5	
	> 2000SCCM	-	-	±3.5	
Offset Drift		-	0.2	-	%FS
Resolution		-	0.1	-	%FS
Range①		0~100/200...600/1000/1500/2000/3000			SCCM
Response Time②	Standard Version		50		ms
	Fast Version		10		ms
I2C Interface	Clock Pulse Frequency③		-	100	KHz
	Input Voltage(Low Level)④	-	-	0.5	
	Input Voltage(High Level)④	4	-	5.5	
	Output Voltage(Low Level)④	-	-	0.5	
	Output Voltage(High Level)③④	4	-		
Working Voltage	Standard Version	8	12	24	V
	Low Voltage	4.75	5	5.25	V
Working Current		5	15	30	mA
Working Pressure		-	-	0.2	MPa
Compensation Temp.		0	-	50	℃
Working Temp.		-20	-	65	℃
Storage Temp.		-40	-	85	℃
Pressure Drop		-	-	1000	Pa
Electronic Interface		2.54mm -5 PIN			
Materials		Silicon, epoxy resin, nylon resin (PA66) + glass fibre			℃

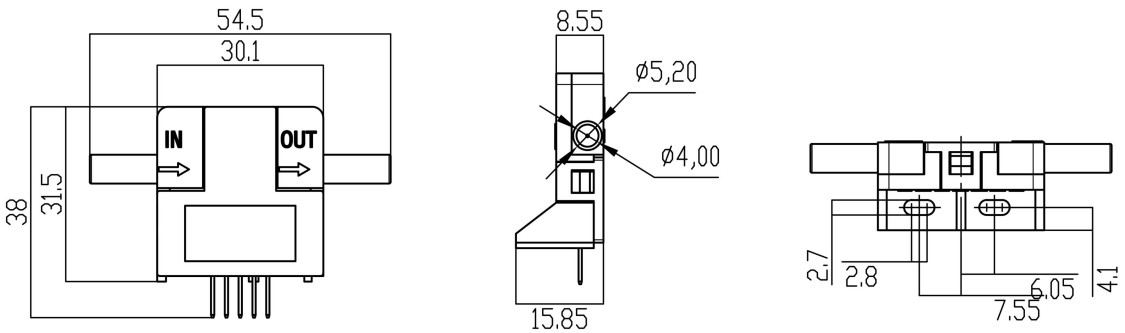
① Range 0 - (100 to 3000SCCM) customizable

② The different response times correspond to different output stability, choose version base on your request.

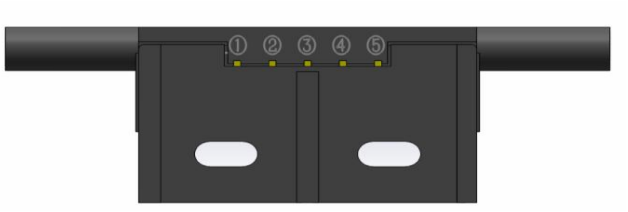
③ This specification is for digital output only

④ The SDA/SCL was internally pulled up to 5V, no external pull-up resistor is required.

DIMENSION (Unit:mm Unspecified Tolerances:±0.25mm)



PIN CONNECTION&DEFINITION



2.54mm 5 Pin Dubond Latch Connector

Analog Output PIN Definition

1	2	3	4	5
NC	NC	GND	VIN	Vout

Digital Output PIN Definition

1	2	3	4	5
SCL	SAD	GND	VIN	NC

ORDER GUIDE

XGZ F 3 202 F L B - A0545 - A

XGZ	Company Product Part Code
F	Flow Sensor
3	3000 Series
202	Range: 2000SCCM
F	Default: Standard Version; F: Fast Response Version
L	Default: 8V ~24Vdc Power Supply; L: 5V±0.01Vdc Power Supply
B	Default: Unidirectional; B:Bidirectional
A0545	Output Type: A0545: Analog,0.5 ~4.5V; A1050: Analog 1.0 ~5.0V; D: Digital(I2C)
A	Media A : Air N: Nitrogen O:O2

RANGE EXAMPLE

Test Condition: VIN=12±0.01VDC, Ta=25℃; RH: 40%<RH<60% Max. Working Temp. Range: -25℃ to +85℃

P/N	Range	Unit
XGZF3012	0-100	SCCM
XGZF3022	0-200	SCCM
XGZF3032	0-300	SCCM
XGZF3042	0-400	SCCM
XGZF3052	0-500	SCCM
XGZF3062	0-600	SCCM
XGZF3102	0-1000	SCCM
XGZF3152	0-1500	SCCM
XGZF3202	0-2000	SCCM
XGZF3302	0-3000	SCCM

FLOW CALCULATION

Analog Output

XGZF3102-A0545-A(Unidirectional)

Flow rate = [(Vout - 0.5 V)/4 V] x full scale flow rate

For example: XGZF3102-A-A, when reading the output voltage of 2.5V,

The Instantaneous flow rate is [(2.5V - 0.5V)/4V x 1000 SCCM] = 500 SCCM

XGZF3102-B-A0545-A(Bidirectional)

Flow rate = [(Vout - 0.5 V)/2 V] x full scale flow rate

For example: XGZF3102-B-A0545-A, when reading the output voltage of 1.0V,

The Instantaneous flow rate is [(1.0V - 2.5V)/2V x 1000 SCCM] = -750 SCCM

Digital Output

XGZF3102-D-A(Unidirectional)

Flow rate = [I2C output reading]/proportionality factor K

Example: XGZF3102-D-A, when reading output 5055

Instantaneous flow rate is [5055]/10 = 505.5 SCCM

K Full Scale Range	K
100SCCM≤ flow rate < 500SCCM	100
500SCCM≤ flow rate≤3000SCCM	10

XGZF3022-B-D-A(Bidirectional)

Flow rate = [I2C output reading]/proportionality factor K

Example: XGZF3022-B-D-A, when reading output 15306

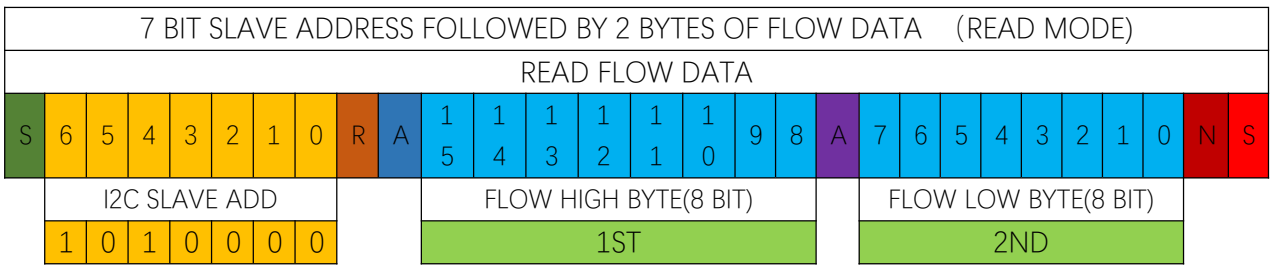
Instantaneous flow rate is [15306]/100 = 153.06 SCCM

K Full Scale Range	K
100SCCM≤ flow rate < 300SCCM	100
300SCCM≤ flow rate≤3000SCCM	10

I2C PROTOCOL

The I2C protocol is a standard protocol for the exchange of information between integrated circuits or functional units; the I2C bus uses a data line (SDA), plus a clock line (SCL) to complete the transmission of data and the expansion of peripheral devices. the I2C bus has three data transmission speeds: standard, fast mode and high speed mode. The standard is 100 Kbps and the fast mode is 400 Kbps (this sensor only supports the standard mode transmission speed). The addressing of the individual nodes is soft addressing, which saves on chip select lines. The standard addressing byte SLAM is 7 bits and can address 127 units. The default I2C address is **0x50**

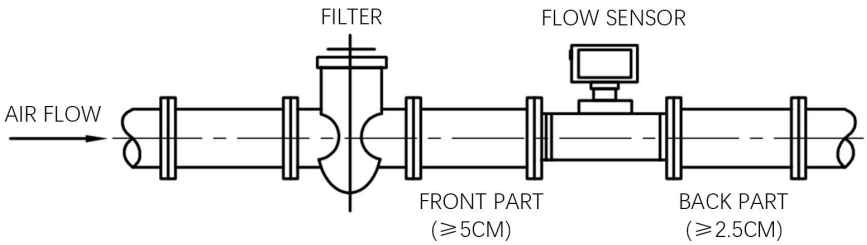
I2C Read FLOW Data Communication Format



- S: START Condition
- 6: SLAVE Address Bit
- R: READ Bit(Read=1)
- A: ACK from SLAVE
- 15: Date Bit
- A: ACK from Master
- N: NACK from Master
- S: STOP Condtlon

The flow data is divided into 2 bytes, the first byte is the high byte of the flow data, the second byte is the low byte of the flow data, the flow data is K (see airflow calculation formula) times the actual flow rate. The default unit of flow data is mL/M (mililitres/minute), for example, when K=100, read the hexadecimal data as 03E8, then convert to decimal current actual flow rate is 10.00mL/M.

INSTALLATION NOTES



For XGZF3000 series installation, as above show, the recommended pipe length is the first 10 and 5, that is, the inlet pipe length is 10 times the product diameter, and the outlet pipe length is 5 times the diameter; the product is installed concentrically, which is reliable and firm; the airflow direction is consistent with the product indication direction; The pin connection needs to correspond to the product pin definition to ensure correct operation after power on.

OPERATION NOTES

1. The product can be used normally only when it is suitable for the environment defined in this specification
2. Pay attention to the gas flow direction sign during installation, and the connection and leak detection should be carried out in accordance with the corresponding regulations.
3. During the use of the product, it is prohibited to install pipelines, clean pipelines or other improper operations that introduce a large amount of impurities at the same time; it may cause damage to the product.
4. If the gas medium contains water vapor and impurities, it may cause the sensor's sensitivity characteristics to decrease or damage.
5. Pay attention to the positive and negative poles of the power supply. If the positive and negative poles are connected reversely, the internal circuit of the sensor may be burned out and the normal use of the product will be affected.

【 SAFETY NOTES 】

Using these sensors products may malfunction due to external interference and surges, therefore, please confirm the performance and quality in actual use. Just in case, please make a safety design on the device (fuse, circuit breaker, such as the installation of protection circuits, multiple devices, etc.), so it would not harm life, body, property, etc even a malfunction occurs.

To prevent injuries and accidents, please be sure to observe the following items:

- The driving current and voltage should be used below the rated value.
- Please follow the terminal connection diagram for wiring. Especially for the reverse connection of the power supply, it will cause an accident due to circuit damage such as heat, smoke, fire, etc.
- In order to ensure safety, especially for important uses, please be sure to consider double safety circuit configuration.
- Do not apply flow above the maximum applied flow. In addition, please be careful not to mix foreign matter into the flow medium. Otherwise, the sensor will be discarded, or cause an accident.
- Be careful when fixing the product and connecting the gas inlet. Otherwise, accidents may occur due to sensor scattering and the blowing out of the media.
- Because the sensor PIN is sharp, please be careful not to hurt your body when using it.

【 WARRANTY 】

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CODE: Digital output for reading flow sensor module standard programs

```
//Read flow sensor code example
//SDA，SCL corresponds to IO interface of Microcontrollers respectively
//Master send 0xA1 to Slave，Slave send back 2 bytes to Master

#include"IIC_Master.h"
#define SDA PA0
#define SCL PA1
Unsigned int IIC_RX_Buf[2];
bit ErrorBit;
void I2C_Init(void)
{
   SDA_INPUT=0; //Program initialization sets the SDA pin to output
   SCL_INPUT=0; //Program initialization sets the SCL   pin to output
   SDA=1;
   SCL=1;
}
Void I2C_Start(void)
{
   SDA=1;
   Delay_Us(20);
   SCL=1;
   Delay_Us(20);
   SDA=0;
   Delay_Us(20);
   SCL=0;
   Delay_Us(20);
}

//-------------------------------------------------------------------------
void I2C_Stop(void)
{
   SCL=0;
   Delay_Us(20);
   SDA=0;
   Delay_Us(20);
```

```
    SCL=1;
    Delay_Us(20);
    SDA=1;
    Delay_Us(20);

}
//------------------------------------------------------------------------------
-
void I2C_ACK(void)
{
    SDA=0;
    Delay_Us(20);
    SCL=1;
    Delay_Us(20);
    SCL=0;
    Delay_Us(20);
}
//------------------------------------------------------------------------------
-
void I2C_NoAck(void)
{
    SDA=1;
    Delay_Us(20);
    SCL=1;
    Delay_Us(20);
    SCL=0;
    Delay_Us(20);
}
//------------------------------------------------------------------------------
-
Unsigned int I2C_ReadByte(void)
{
    Unsigned int ucValue=0;
    Unsigned int ucIndex;

    SDA=1;
    Delay_Us(20);
    SDA_INPUT=1; // Set SDA PIN as input
    Delay_Us(20);
    for ( ucIndex = 0; ucIndex < 8; ucIndex++ )
    {
        ucValue <<= 1;
        SCL=0;
        Delay_Us(20);
```

```
        SCL=1;
        Delay_Us(20);
        if(IIC_DAT==1) // IIC_DAT, to read the level of the SDA pin after setting the SDA as an input
        { ucValue = ucValue |0x01;}
        else
        { ucValue = ucValue & 0xfe;}
        Delay_Us(20);
        SCL=0;
        Delay_Us(20);
    }
    SDA_INPUT=0; //Set SDA as output
    Delay_Us(20);
    return ucValue;
}
//------------------------------------------------------------------------------
void I2C_WriteByte( unsigned int ucData )
{
    u8 i;
    for( i = 0; i < 8; i++ )
    {
        SCL=0;
        Delay_Us(20);
        if((ucData & 0x80) == 0x80)
        {
            SDA=1;
            Delay_Us(20);
        }
        else
        {
            SDA=0;
            Delay_Us(20);
        }

        SCL=1;
        Delay_Us(20);

        SCL=0;
        Delay_Us(20);
        ucData <<= 1;

    }
    SCL=1;
    Delay_Us(20);
    ErrorBit = IIC_DAT;
```

```
    Delay_Us(20);
    SCL=0;
    Delay_Us(20);
}

void iic_master_proc(void)
{
    Unsigned int count=2,i;
    I2C_Init() ;
    I2C_Start();
    I2C_WriteByte(0xa1); //write address 0xA1
    for(i = 0;i < count;i++)
    {
        IIC_RX_Buf[i] = I2C_ReadByte();
        if(i < (count -1)) I2C_ACK();
        else                I2C_NoAck();
    }
    I2C_Stop();

}
```