Flow Sensor

FR03

Version ：1.1

Issue Date：2022.02.16

Zhengzhou Winsen Electronic Technology Co., Ltd

Statement

Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &etc, please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

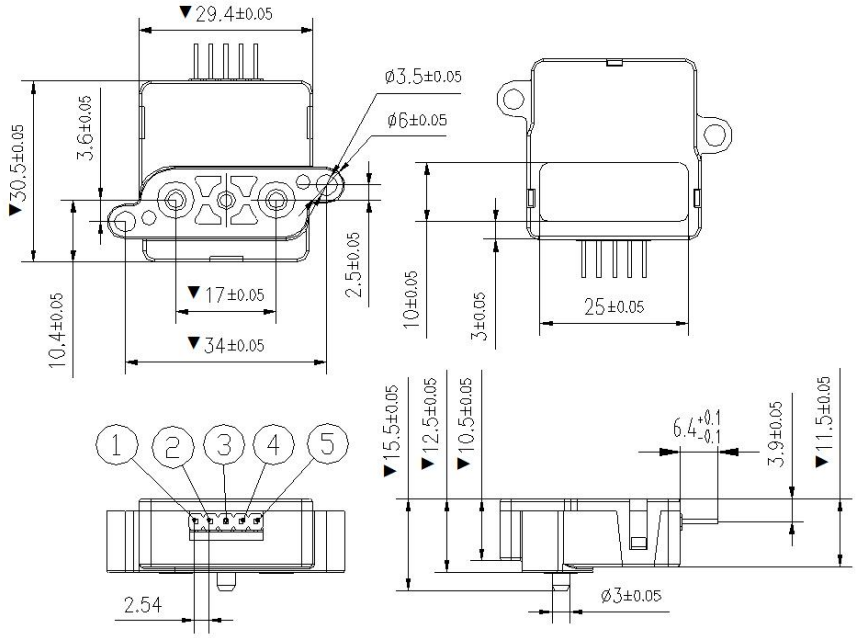
Zhengzhou Winsen Electronics Technology CO., LTD

1.Profile：

FR03 flow sensor is an upgrading developed from F1013 . It adopts MEMS Thermal principle to monitor the flow of pipeline gas medium. This product adopts low pressure loss design and is widely used for all kinds of gas measurement.

2. Features：

- ✧ High sensitivity;
- ✧ Very low pickup flow;
- ✧ High Accuracy;
- ✧ Low voltage loss;
- ✧ Modular design;
- ✧ High measurement repeatability;
- ✧ Suitable for customization of various products



3.Technical Parameters：

3.1Structure Parameters

3.2Electrical Index

Model No.	FR03
Full Scale(SLM)	0.2/0.3/0.4/0.5
Drift diameter	DN3
Output Mode	Linearity 0.5V ~ 4.5V(Customized)
Output impedance	200Ω
Working Voltage	DC5V ~ 14V
Working Current	≤10mA
Accuracy	±(2+0.5FS)%
Repeatability	0.50%

Output Drift	0.12%/℃				
△Pmax	≤600Pa				
Working Pressure	Customized				
Working Temperature	0℃ ~ 50℃				
Storage Temperature	-20℃ ~ 80℃				
Measurement Medium	Dry and clean non-corrosive gas				
Electrical interface	2.54mm-5P PIN or PH2.0-5P Terminal（Optional）				
Calibration mode	Air Calibration（20℃、101.325kPa）				
PIN Definition	①	②	③	④	⑤
			GND	VCC	OUT

3.2 Calibration

The flow sensor of our company adopts standard condition and air calibration by default. If the user has special requirements, calibrate according to the customer's requirements.

3.2.1 Standard Condition：

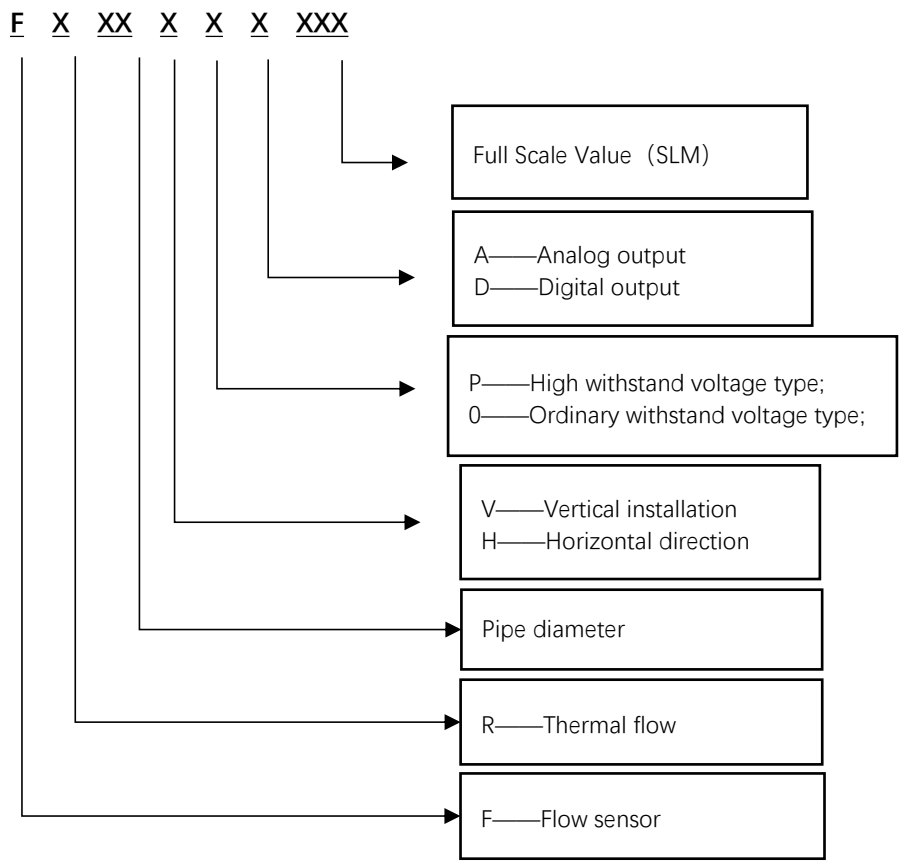
Temperature :0℃， Air Pressure: 101.325kPa

SCCM：Standard mL/min SLM：Standard L/min

3.2.2Manufacture Environment：

Manufactured and calibrated in environment with temperature of 22±2℃,Purify and（30%～35%）RH.

4.Naming Rules



5. Output Calculation

Actual flow=full scale * (sensor actual output voltage-zero output voltage) / (full scale output voltage-zero output voltage)

For example: the sensor full scale is 0.5 SLM, the sensor zero output voltage is 1V and full scale output voltage is 5V, and the actual output is 2.5V.

Then the actual flow=0.5 SLM * (2.5V – 1V)/(5V- 1V) = 0.1875SLM

6.Cautions

6.1 The gas used must be purified to avoid dust, liquid and oil stain. If necessary, a filtering device can be installed in the gas circuit.

6.2 The medium used must be dry and clean non-corrosive gas.

6.3 The pressure of the medium used shall not exceed 1.2 times of the maximum working pressure of the product.

6.4 In order to ensure the measurement accuracy of the sensor, it is recommended to install a straight pipe section at least 5 times the nominal diameter at the inlet of the sensor and at least 3 times the nominal diameter at the outlet.

7.Fault Diagnosis

7.1 Preliminary inspection

7.1.1 Check the opening of air source and inlet.

7.1.2 Ensure the correct connection of communication lines.

7.1.3 Check whether the medium pressure and ambient temperature meet the product technical indicators.

7.2 Fault Check

No.	Symptoms	Possible Causes	Solutions
1	No signal output in case of no ventilation	Sensor damage	Return for Maintenance
	Output 10-12v without ventilation	Reverse terminal insertion	Check whether the terminal is inserted correctly
2	Without ventilation, the output deviation at zero point exceeds the maximum tolerance	Zero Point Drift	Zero Point Calibration/ Return for Maintenance
3	No signal output during ventilation	Reversed air inlet installation	Replace the installation direction
		Sensor damage	Return for maintenance
4	Flow out of tolerance during ventilation	Output Drift	Return for maintenance
		Incorrect reference standard	Use mass flow method or higher accuracy flow meters for testing

8. Disclaimer

Our company is not responsible for the damage caused by the following circumstances:

- Natural disasters.
- Misoperation or unreasonable use.
- Operate or store in unsuitable or harsh environment.
- Unauthorized modification or disassembly of products.
- Violent means lead to product damage.

9. Appendix

Target gas flow = Sensor Reading Value ×Conversion coefficient

Target Gas	Code (SEMI52-0302)	Specific Heat (calorie/gram℃)	Density (gram/L0℃)	Conversion coefficient
He	001	1.242	0.179	1.420
Ne	002	0.246	0.900	1.431
Ar	004	0.125	1.784	1.420
Xe	006	0.038	5.858	1.431
H_2	007	3.422	0.090	1.010
Air	008	0.240	1.293	1.001
CO	009	0.249	1.250	1.000
HBr	010	0.086	3.610	0.999
HCl	011	0.191	1.627	0.988

HF	012	0.348	0.893	1.001
N_2	013	0.249	1.25	1.000
O_2	015	0.220	1.427	0.981
NO	016	0.238	1.339	0.978
F_2	018	0.197	1.695	0.931
Cl_2	019	0.115	3.163	0.858
H_2S	022	0.228	1.520	0.802
CO_2	025	0.202	1.964	0.739
NO_2	026	0.192	2.052	0.737
CH_4	028	0.532	0.715	0.722
NH_3	029	0.501	0.760	0.719
SO_2	032	0.149	2.858	0.687
AsH_3	035	0.117	3.478	0.673
C_2H_4	038	0.366	1.251	0.597
C_2H_2	042	0.405	1.162	0.596
BF_3	048	0.178	3.025	0.508
C_2H_6	054	0.424	1.342	0.482
B_2H_6	058	0.502	1.235	0.441
CF_4	063	0.166	3.964	0.420
C_3H_4	068	0.363	1.787	0.421
C_3H_6	069	0.366	1.877	0.411
C_3H_8	089	0.399	1.967	0.358
C_4H_6	093	0.352	2.413	0.322
CCl_4	101	0.130	6.860	0.306
C_4H_8	104	0.372	2.503	0.299
C_4H_{10}	117	0.404	2.650	0.261
C_2H_6	136	0.340	2.055	0.392
CH_3O	176	0.328	1.430	0.584
C_5H_{12}	240	0.392	3.219	0.217