# Flow Sensor

# FR03H

Version ：1.1

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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.

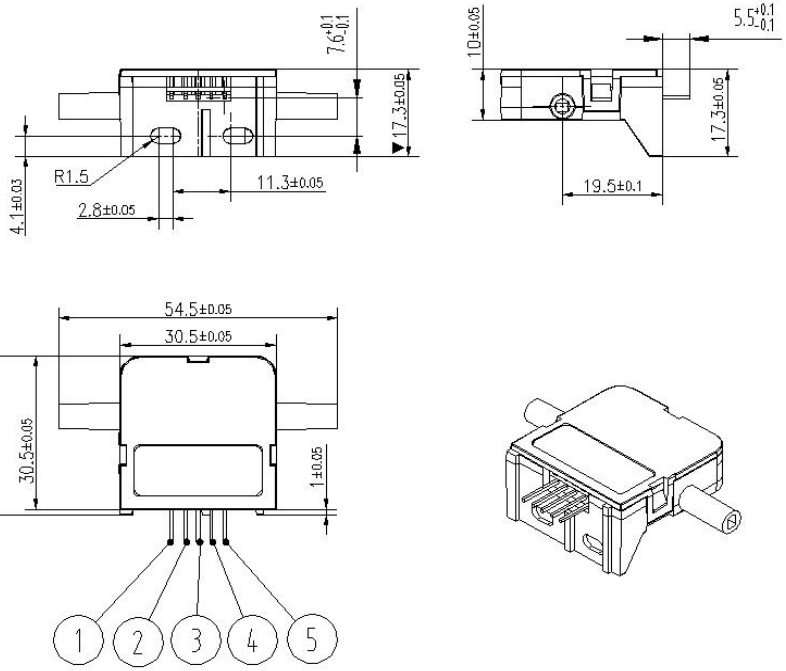
Zhengzhou Winsen Electronics Technology CO., LTD

## 1.Profile：

FR03H flow sensor is an upgrading developed from F1012 . 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：

### 3.1 Structure Parameters

### 3.2 Electrical Index

| Model NO. | FR03H |
|---|---|
| Full Scale(SLM) | 1/2/3/4/5 |
| Drift diameter | DN3 |
| Output Mode | Linearity 0.5V ~ 4.5V(Customization Service) |
| 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 | ≤200kPa | | | | |
| Working Temperature | 0℃ ~ 50℃ | | | | |
| Storage Temperature | -20℃ ~ 80℃ | | | | |
| Measurement Medium | Dry and clean non-corrosive gas | | | | |
| Electrical interface | 2.54mm-5P Pin or PH2.0-5PTerminal（Optional） | | | | |
| Calibration mode | ISO3mm | | | | |
| PIN Definition | Air Calibration（20℃、101.325kPa） | | | | |
| Working Pressure | ① | ② | ③ | ④ | ⑤ |
| | | OUT | VCC | GND | |

### 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：

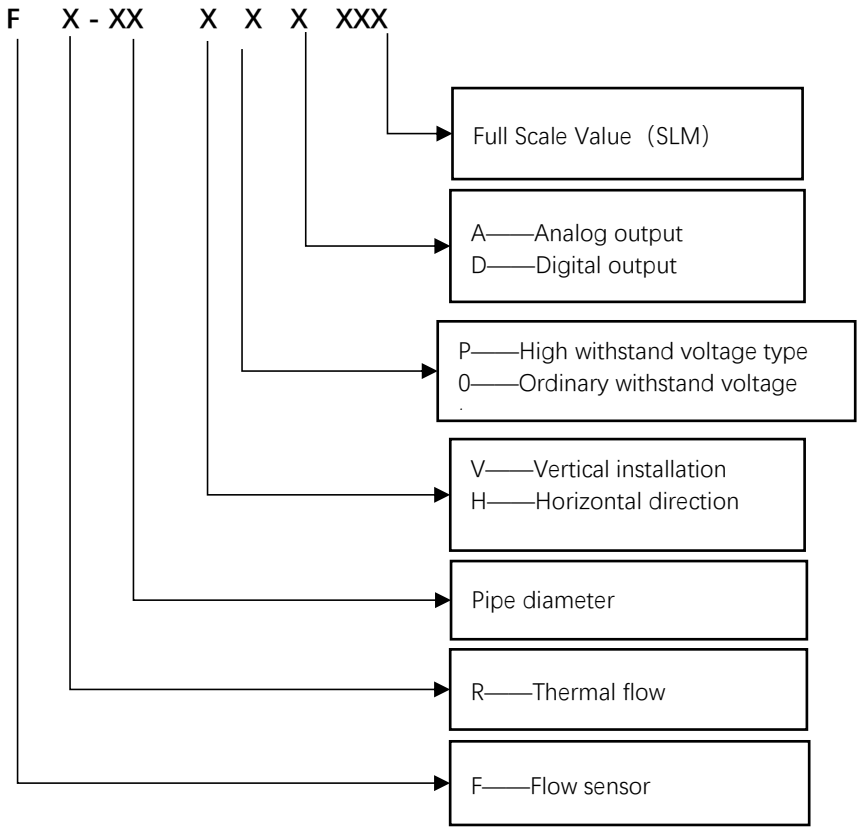
Temperature :0℃， Air Pressure: 101.325kPa

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 2 SLM, the sensor zero output voltage is 0.5V and full scale output voltage is 4.5V, and the actual output is 2.5V.

Then the actual flow=2 SLM * (2.5V – 0.5V)/(4.5V- 0.5V) = 0.75SLM

## 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.
- Incorrect operation 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 |