

SPECIFICATION

Product Name: Ultrasonic Flow Sensor

Sensor Item No.: Gasboard-7500K-OAQ

Version: V1.0

Date: August 02, 2020

Revision

No.	Version	Content	Reviser	Date
1	V1.0	First Edition	Una Zhan	2020-8-02

Ultrasonic Flow Sensor Module Gasboard-7500K-OAQ



Applications

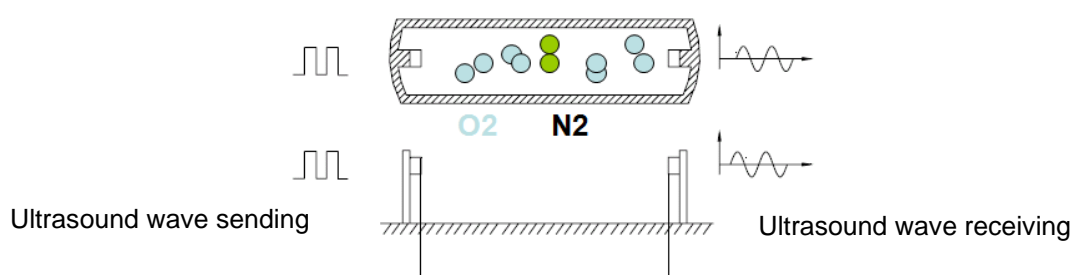
- Digital Gas Analysis and Detection Instrument
- Particle Counter
- Measurement the Flow of Clean Gas

Description

The Gasboard-7500K-OAQ ultrasonic flow sensor is an high performance-cost-ratio sensor for measuring gas flow. Based on the mature ultrasonic detecting technology, this sensor has great performances of self-calibration, maintenance-free, no drift. This sensor also has full range matrix temperature compensation, can detect the gas flow more accurately, very functional in digital gas analysis and detection instrument, particle counter and other air monitoring equipment.

Working Principle

Principle of ultrasonic flow detection: when ultrasonic wave is propagating in the fluid, it is affected by the fluid velocity and carries the flow velocity information. The flow velocity can be measured by detecting the received ultrasonic signal, so as to obtain the flow rate. Ultrasonic flow measurement has the characteristics of not impeding fluid flow.



Features

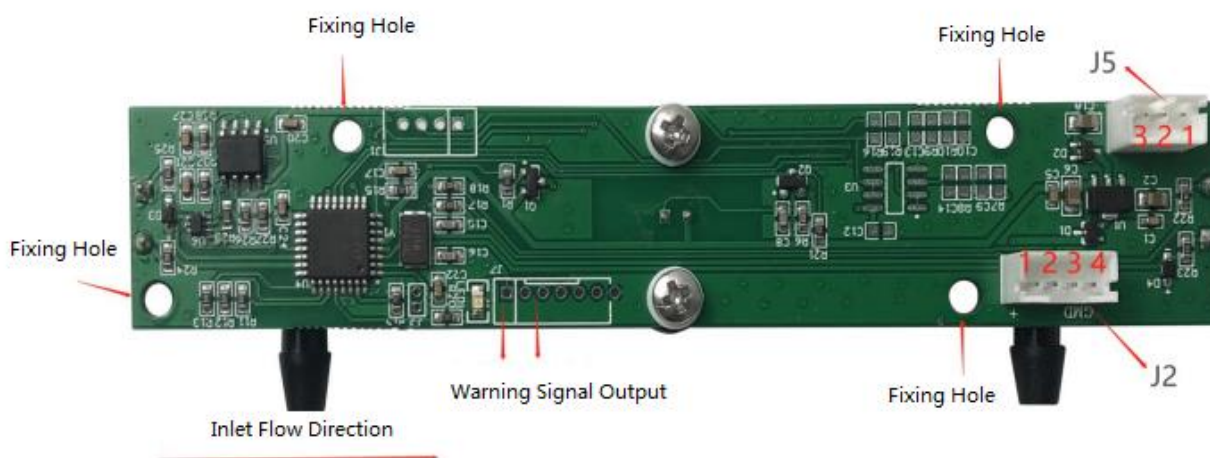
- ✧ Measure air flow rate 0~20L/min
- ✧ Full scale matrix temperature and humidity compensation
- ✧ Quick response, stable measurement, high accuracy
- ✧ Self-calibration, maintenance-free, no drift
- ✧ Perfect EMC performance, long life span

Specification

Ultrasonic Flow Sensor Specification	
Detect Principle	Ultrasonic Technology
Detection Range	0~20L/min ^①
Detection Accuracy	±3% or ±0.3L/min (Condition: 5~45℃)
Resolution	0.01L/min
Response Time	≤0.3S
Work Condition	-20~60℃; 0~95%RH (Non-condensing)
Storage Condition	-20~60℃; 0~95%RH (Non-condensing)
Work Voltage	DC 4.75V-12.5V, Ripple Wave <50mV
Average Work Current	≤35mA
Communication Interface	UART_TTL(5V)
Product Size	W120*H30*D22 mm
Life Span	≥5 Years

Remark^① Working condition flow, under current temperature, volume flow under current pressure.

Pin Definition



Drawing1_Gasboard-7500K-OAQ Pin Definition

Pin Definition List

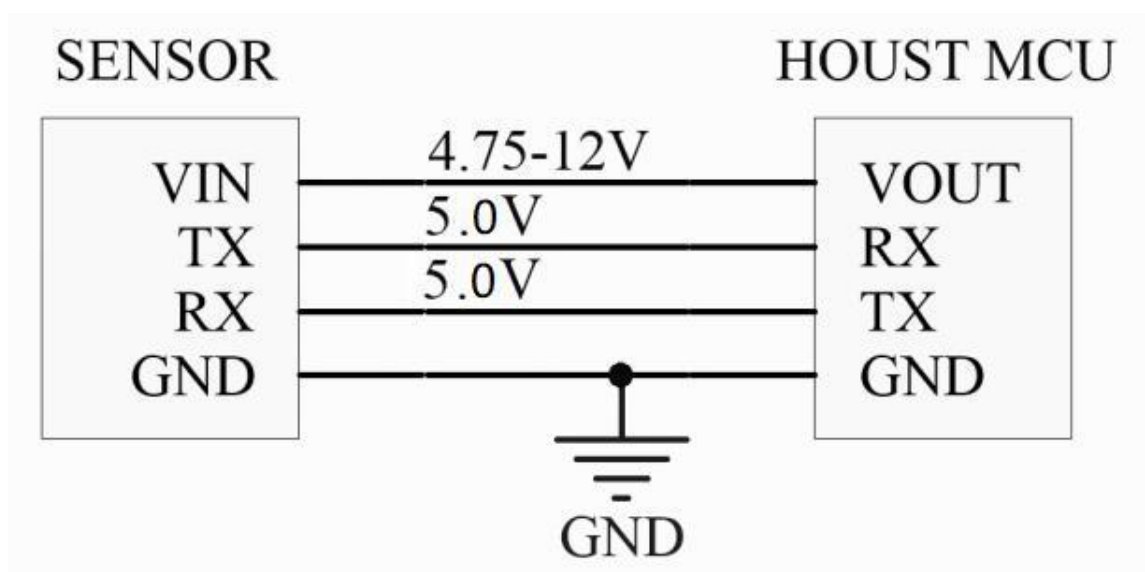
J5			J2		
NO	Pin	Description	NO	Pin	Description
1	Vcc	External Power Supply Input Pin, 4.75-12.6V	1	Vcc	External Power Supply Input Pin, 4.75-5.0V
2	NC	No Definition	2	Rx	UART-Rx Receiving (5V)
3	GND	Power Supply Input	3	Tx	UART-Rx Sending (5V)
			4	GND	Power Supply Output

Connectors Type

Port	Terminal	Connector	Pitch
J2	PH2.0-4A	PH2.0-4P	2.0mm
J5	PH2.0-3A	PH2.0-3P	2.0mm

Reference Circuit

Application Scenarios: UART TTL 5 V Output



Drawing 2 UART Communication Connection Circuit

Communication Protocol

UART Communication Protocol

1. Protocol Overview

- 1) Baud Rate: 9600, Data Bits: 8, Stop Bits: 1, Parity: No, Flow Control: No
- 2) The protocol data are hexadecimal data. For example, "46" is [70] in decimal;
- 3) [xx] is single byte data(unsigned,0-255); In double byte, the high byte is in front of low byte;
- 4) The default is active sending, and the sending cycle is 0.5 seconds. If you need to read more other data, send the corresponding command directly to the host, and the host responds immediately.

2. Serial Communication Protocol Format

PC Send Format

Start Symbol	Length	Order No	Data 1	Data n	Check Sum
HEAD	LEN	CMD	DATA1	DATA _n	CS
11H	XXH	XXH	XXH	XXH	XXH

Protocol Format Description

Protocol Format	Description
Start Symbol	PC sending is fixed to [11H], module response is fixed to[16H]
Length	Length of frame byte, =data length+1 (include CMD+DATA)
Order No	Directive number
Data	Read or written data, the length is variable
Check Sum	The sum of data accumulation, =256-(HEAD+LEN+CMD+DATA)

3. Serial Protocol Order Number List

No	Function Name	Order No
1	Read the measurement result	0x01
2	Read the software version number	0x1E
3	Inquiry instrument serial number	0x1F

4. Detailed Description

4.1 Read the Measurement Result

Send : 11 01 01 ED

Response : 16 09 01 DF1-DF8 [CS]

Function : Read the measurement result

Description :

Flow Value = (DF3*256 + DF4) /100 (L/min)

Temperature Value = (DF5*256 + DF6) /10 (°C)

(Remarks: The gas temperature value is the gas temperature in the gas chamber of the sensor)

Notice: DF7-DF8 reserve

Remark: The default is active sending. The sensor can also output the value automatically without sending the command.

When send 11 01 07 E7, can change active data sending mode to request-response mode.

Communication Protocol

Response Example:

Response: 16 09 01 00 00 01 1B 00 C2 00 1E 33

Instruction :

Hexadecimal Convert into Decimal: 01 1B is 1 27; 00 C2 is 0 194

Flow Value= $(1*256+27)/100=2.83$ (L/min)

Temperature Value= $(0*256+194)/10=19.4$ (°C)

4.2 Read the Software Version Number

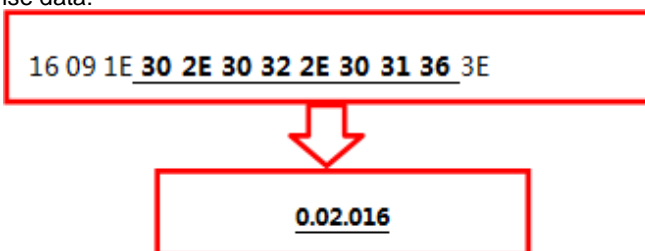
Send : 11 01 1E D0

Response : 16 09 01 DF1-DF8 [CS]

Function : Read the software version number

Instruction : DF1-DF8 refers to the ASCII code of particular version number

For Example: When module version number is 0.02.016, response data:



4.3 Inquiry Instrument Serial Number

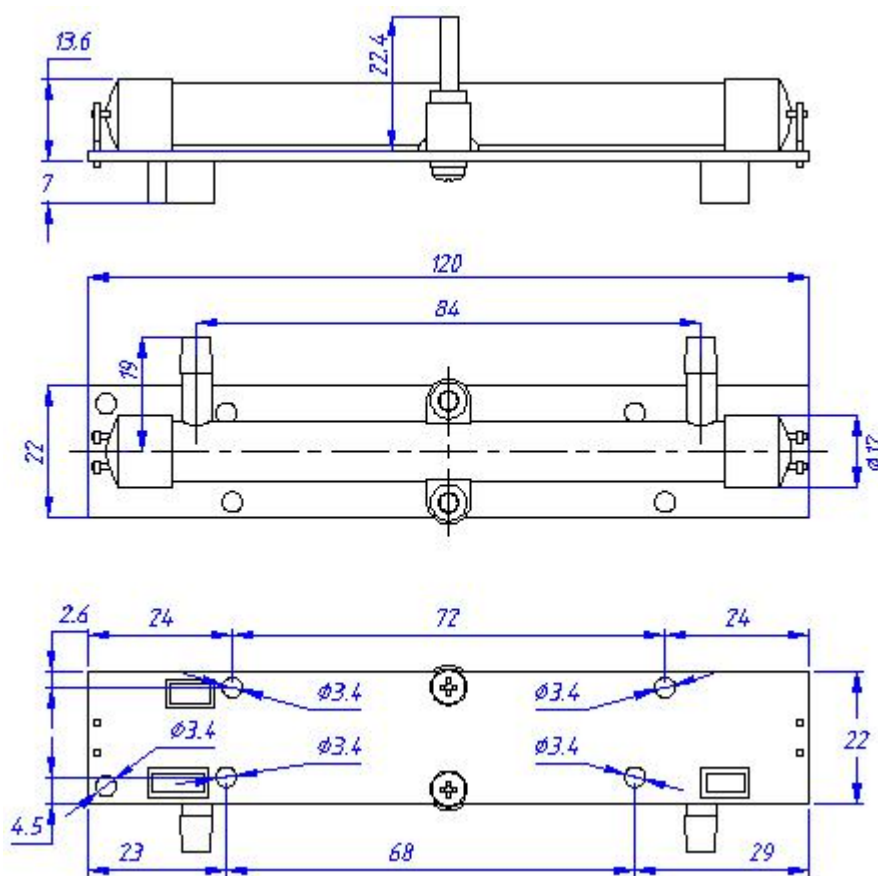
Send : 11 01 1F CF

Response : 16 0B 1F (SN1) (SN2) (SN3) (SN4) (SN5) [CS]

Function : Read version number for module firmware

Explanation : Instrument serial number of output software. SNn range is 0~9999, 5 integer type constitute 20 serial number

Dimension

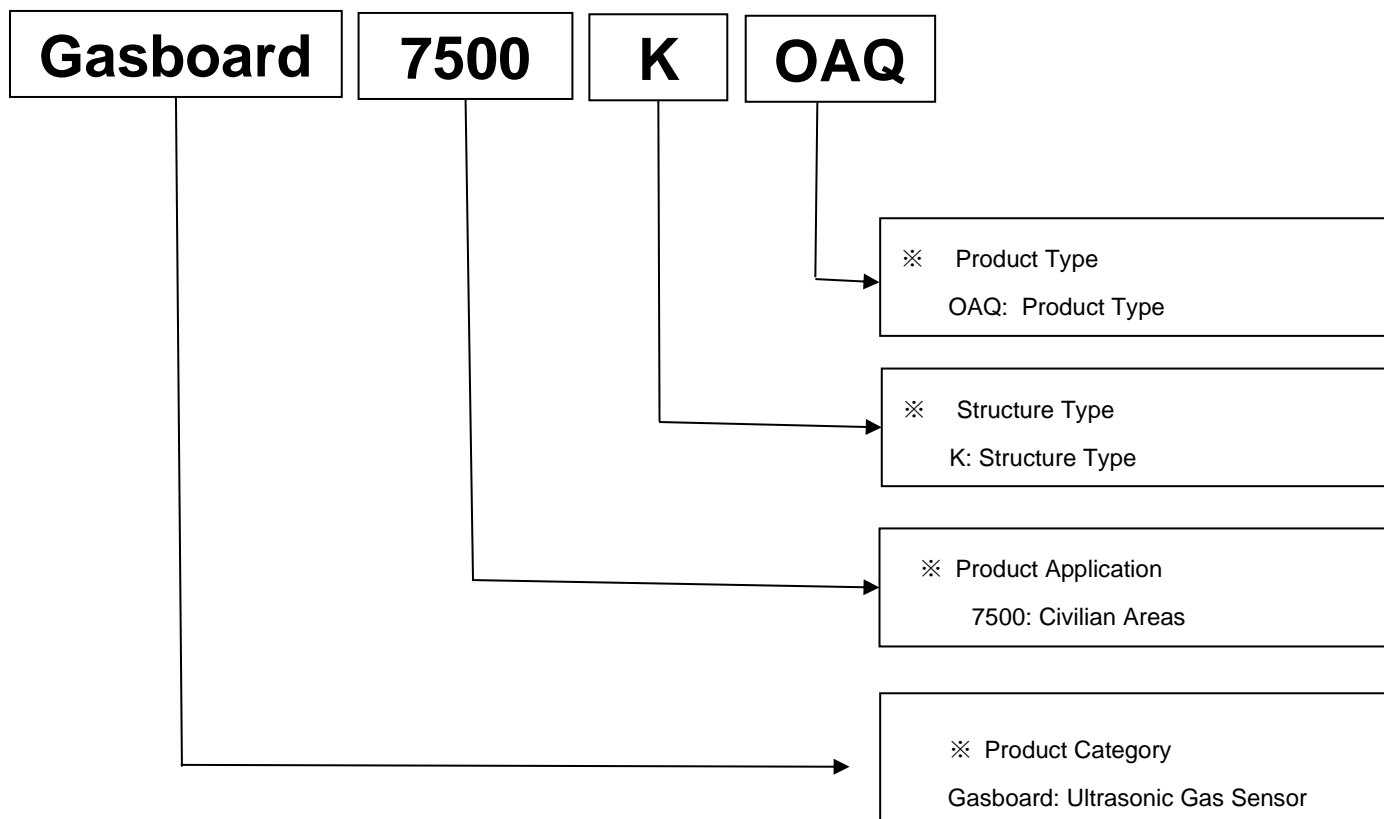


Drawing 3 (Unit:mm, Tolerance: ± 0.2 mm)

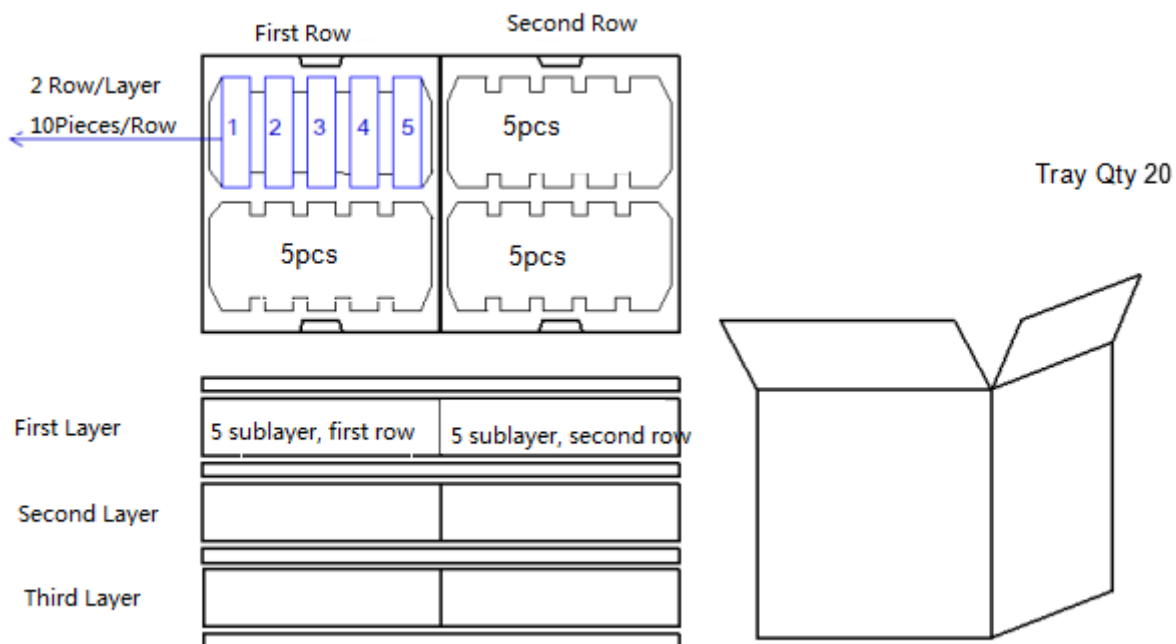
Reliability Testing

Item	Requirement	Criterion	Sample (n) Failed (c)
Flow Performance	Indoor temperature requirement: $25\pm 2^{\circ}\text{C}$, humidity (50±10) %RH, after the sensor connect with serial port and power on, switch over the flow in 3L/min、5L/min、8L/min respectively to make measurement of oxygen concentration and accuracy.	Make new tests in different oxygen flow, all can meet deviation criterion.	n=70 c=0
Low Temperature Storage	Storing the sensor for 96H with no power under $-20^{\circ}\text{C}\pm 2^{\circ}\text{C}$ environment condition, then test the measuring deviation under normal temperature condition.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	n=0 c=0
Low Temperature Operation	Indoor temperature requirement: $-10\pm 2^{\circ}\text{C}$, test the measuring deviation of sensor under normal temperature condition after operating for 96H with electricity.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	
High temperature Storage	Storing the sensor for 96H with no power under $60^{\circ}\text{C}\pm 2^{\circ}\text{C}$ environment condition, then test the measuring deviation under normal temperature condition.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	
High Temperature Operation	Indoor temperature requirement: $50\pm 2^{\circ}\text{C}$, test the measuring deviation of sensor under normal temperature condition after operating for 96H with electricity.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	
High-low Temperature Shock	Keep the sensor under -20°C for 60 mins, then switch it to 60°C in 10s and stay for another 60 mins, this is one cycle. Totally 10 cycles with the sensor power off.	After staying under normal temperature condition for 2hours, the sensor accuracy should meet the specification standard.	
High Temp &Humidity	Keep the sensor under high temp & humidity ($40\pm 2^{\circ}\text{C}$, 95%RH), after working under rated voltage for 500H, test the measuring deviation under normal temperature condition.	After staying under normal temperature condition for 2hours, the sensor accuracy should meet the specification standard.	n=2 c=0
Salt Spray Test	Standard: GB/T2423.17, place the sensor in the salt fog box under 35°C and spray it with Nacl solution (concentration is 5%) for 24 hours, then flushing it with distilled water and drying it with airflow.	Keep the sensor under standard environment more than 1h and less than 2h, it should no appearance defect, no corrosion.	
Vibration Test	Bare sensor should bear the specified vibration test in X/Y/Z direction, frequency range 10~55~10Hz/min, amplitude 1.5mm, scan circulation 2 hours.	No appearance defect after vibration test, the sensor can meet basic performance test standard.	n=4 c=0
Package Drop Test	Drop height: setting the height as specified weight according to standard GB/T 4857.18. Making the drop test according to the GB/T4857.5 standard. Test sequence is one corner, three edges, six sides.	No appearance defect after drop test, no components fall off, the sensor should work normally.	n=1 ctn c=0

Product Code Instruction



Packing Information



Qty/Layer	Small Tray Qty	Big Tray Qty	Sensor per Carton	Carton Dimension	Packing Material
20 pcs	5 Layers	3 Layers	300pcs	W395 * L320 * H470mm	Anti-static Plastic Tray

User Attention

Please pay attention to below:

- (1) Install the sensor as far away as possible from the heat source and heat dissipation outlet of the compressor, and install the sensor as close as possible to the air outlet.
- (2) In order to ensure reliability and long service life, do not use or store the sensor in a place where the temperature is higher than the rated temperature, and do not use the sensor in an environment where the voltage is higher than the rated voltage of the sensor.
- (3) Without necessary compensations, please do not use the sensor in the environments of high humidity water steam, abnormal pressure, and low temperature.
- (4) The product shall not be used or stored in a place with corrosive gas, especially hydrogen sulfide gas, acid, alkali, salt or similar. The products stored in the warehouse should be stored in normal temperature and humidity, and avoid direct sunlight.
- (5) When there is a problem with the Cubic's products, please contact Cubic team in time; the sensor must not be disassembled privately, and Cubic will not bear any consequences if it is damaged by disassembled privately.

Consultancy & After-sales Service

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