

## HUM AF 2 7 0 3--Gas Flow, Relative Humidity and Temperature--Integrated Module Transducer



- The small, simple HUMAF2703 all-in-one module is based on MEMS technology (microelectromechanical systems)
- Conveniently connected to the catheter
- Gas flow measurement range: -300--300SCCM <sup>(1)</sup>
- Good interchangeability within +/-5 SCCM, +/- 3% RH, +/- 0.3°C
- Gas flow accuracy does not drift with temperature
- Digital output interface (I<sup>2</sup>C), high resolution

### Product Introduction

The HUMAF2703 is a professional, fully-calibrated plug-and-play module integrating gas flow, humidity, and temperature sensors with unique design. Specifically engineered for OEM applications requiring reliable and precise measurements in medical and HVAC fields, it features universal digital I<sup>2</sup>C communication protocols for direct connection to main MCUs. Its simplified four-pin connector delivers an optimal cost-performance ratio while maintaining technical sophistication.

### characteristic

- The product is lead free, chromium (6<sup>+</sup>), cadmium and mercury free, and complies with RoHS regulations
- Can accurately measure bidirectional gas flow, temperature and humidity
- High reliability and long-term stability

### application area

- 医疗工业
- 家用电器
- HVAC

### Performance Parameter

maximum rating

Rated specifications	symbol	numeric value	unit
Storage temperature	T <sub>stg</sub>	-40--+85	°C
Power supply voltage (peak) <sup>(2)</sup>	V <sub>CC</sub>	3.7	V <sub>dc</sub>
Pressure measurement range	P	101.3+/-50	kPa
Humidity measurement range <sup>(3)</sup>	RH	5---99	%RH
Temperature measurement range	T <sub>a</sub>	-30---+85	°C
maximum surge current	I <sub>avg</sub>	100	mA
@3.3V <sub>dc</sub> maximum power consumption	P <sub>d</sub>	165	mW

(1) SCCM: Standard state m/min (gas) @T=20°C P=101.3 kPa

(2) Peak condition: less than 10% of working time

Condensation <sup>(3)</sup> should be avoided

## HUM AF 2 7 0 3--Gas flow, relative humidity and temperature--Transmitter measurement characteristics range in the integrated module

@V<sub>cc</sub>=3.3VdcT=20°C, P=101.3kPa, RH=55% (standard conditions for testing)

specifications	symbol	least value	representative value	crest value	unit
Gas flow measurement range <sup>1</sup>	AF	-300		300	SCCM
Flow accuracy <sup>2</sup>			+/- (1.6FR + 0.8FS)		%
Flow resolution			+/-0.01		SCCM
Read the response time of the flow value			5		ms
Humidity measurement range	RH	0		100	%RH
Relative humidity accuracy (10% --95%RH) <sup>3</sup>			+/-3	+/-5	%RH
Relative humidity resolution			+/-0.1		%RH
Temperature measurement range	T <sub>o</sub>	-30		85	°C
Temperature accuracy (-10--+40°C)			+/-0.3	+/-0.5	°C
temperature resolution			+/-0.1		°C
preheating time	t <sub>w</sub>		350		ms
Flow time constant(63% of the measured signal) <sup>4</sup>	τ		1		s
Humidity time constant(63% of the measured signal) <sup>5</sup>	τ		3		s
Temperature time constant (63% of the measured signal)	τ		10		s

For <sup>1</sup> gas flow range expansion to 1000SCCM, please consult

<sup>2</sup> Accuracy =+/- (percentage of flow FR+ percentage of full scale FS)

<sup>3</sup> Gas flow rate greater than 100SCCM

<sup>4</sup> Gas flow from 0-100SCCM is effective

<sup>5</sup> Relative humidity from 33---76%RH

### electrical character

specifications	symbol	least value	representative value	crest value	unit
Power supply voltage (1)	V <sub>dd</sub>	3	3.3	3.7	V <sub>dc</sub>
supply current	I <sub>avg</sub>		35	50	mA
SCL frequency	F			100	kHz

(1) For the power supply voltage of 5.5V<sub>DC</sub>, please consult

### Digital Signaling Transmission Specifications

HUMAF is a slave module that transmits data signals in accordance with the I<sup>2</sup>C communication protocol standard. The data format can be modified according to customer requirements.

- HUMAF from module address

Each module (controlled machine) is assigned a unique address: **0x55**

From the module (controlled machine) address is composed of 7 address bits and one read/write flag (R/W), its format is: **0xAB**( read permission ) and **0xAA**( write permission )

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- protocol

order	code
obligate	0x0
Gas flow reading	0x2A
Temperature readings	0x34
Humidity read	0x47



"0" (write) (n Bytes + Response)

▨ Master machine to controlled machine    A = Answer bit (low SDA)

The mouth is controlled by the main control machine    A= Non-response bit (high SDA)

S= initial condition

P= stop condition



a slight pause in reading    (n bytes + response)

$$CRC8 = (dataMSB \text{ XOR } dataLSB) - 1$$

### Data Transfer

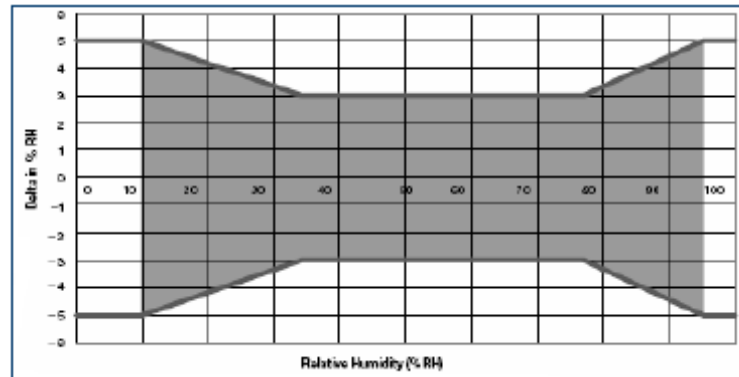
gas-flow rate	least value	representative value	crest value
Limit value (SCCM)	-350.0		+350.0
Limits (data)	0XF254		0x0DAC
Resolution (SCCM)		0.1	
Resolution (data)		1	
Refresh period (ms)		20	
temperature	least value	representative value	crest value
extreme (°C)	-30.0		+85.0
Limits (data)	0xFED4		0x0352
resolution ratio (°C)		0.1	
Resolution (data)		1	
Refresh period (ms)		100	
humidity	least value	representative value	crest value
Limit value (% RH)	0.0		+100.0
Limits (data)	0x0000		0x03E8
resolution ratio (°C)		0.1	
Resolution (%RH)		1	
Refresh period (ms)		100	

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### Error in Humidity at 2, 3°C

The sensor has the highest measurement accuracy at 10-95%RH,

Exceeding this range (<10% or> 95% RH, including condensation) will not affect the reliability of the HUMAF2703 sensor.

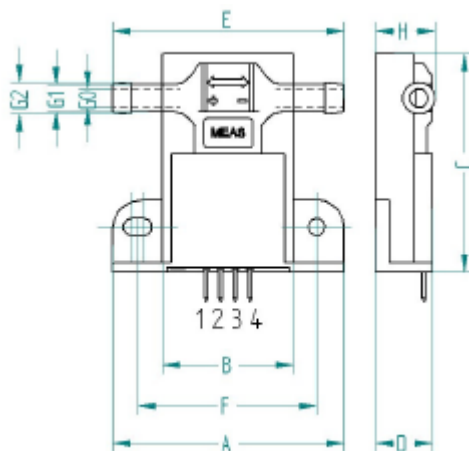


#### Component Exterior Shape and Dimensions

#### Foot position functional distribution

foot position	function
1	SCL-Data clock
2	SDA— data address
3	the earth
4	source

#### HUMAF2703 External dimensions



Dim	Typ (mm)
A	40.3
B	22.9
C	38
D	10
E	40.3
F	31.25
G0	3.2
G1	4.8
G2	5.6
H	10.4

- 对于板对板装配, 建议用波峰焊或铬铁焊
- 引脚间距 : 2.54 mm

## **HUM AF 2 7 0 3--Gas Flow, Relative Humidity and Temperature--Integrated Module Transducer**

### **Reliability Tests**

Resist the effects of nature and chemicals

- HUMAF2703 contains an anti-static protection circuit (ESD) up to  $\pm 15\text{kV}$ , indirect electrostatic discharge.
- HUMAF2703 anti-EMC interference.
- HUMAF2703 has input polarity protection

Additional tests: The sensor can work normally under harsh chemical conditions, such as salt spray, SO<sub>2</sub> (0.5%), H<sub>2</sub>S (0.5%), O<sub>3</sub>, NO<sub>x</sub>, NO, CO, CO<sub>2</sub>, softener, soap, toluene, acid (H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, HCl), HMDS, insecticide, cigarette smoke, and some gases cannot be listed one by one

- HUMAF2703 is not sensitive to light

### **Credit for Purchase**

**HUMAF2703 : HPP830A001**

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