Siargo Ltd.

AM1000 Series

SIARGO SENSING PRODUCTS

MEMS Environmental Meter

(VA.4)

CE

MEMS Environmental Meter

AM1000 Series

The products are designed for air flow velocity measurement in a closed conduit or open space, with optional temperature and humidity sensing data. The sensing elements are made on a specially designed MEMS structure that enhances the measurement accuracy, response time and lowers the power consumption. The RS485 (Modbus), I²C and Bluetooth LE (reversed) options are ready for networking or remote communication. The formality is particularly in favor for residential HVAC or smart home applications.

The product is fully customizable for flow range and user interface and can be packaged into a complete meter with local display or with standalone battery power unit.

Specifications

Model	AM1000	AM1100	
Flow range [1]	0 ~ 30		m/s
Accuracy	±2.5		%FS
Repeatability	±1.0		%
Flow resolution (Digital)	0.001		m/s
Flow output shift	±0.12		%/°C
Temperature		-10 ~ 60	°C
Temperature accuracy		±0.5	%
Temperature resolution		0.04	%
Humidity		0~100	%RH
Humidity accuracy		±2.0	%RH
Response time	10		msec
Output [2]	0.5 ~ 4.5 Vdc linear; RS485 (Modbus), I^2C		
Output (reserved) [2]	LCD display, 4 ~20 mA, Bluetooth LE		
Electrical interface	5 color coded cable, 0.5m		
Power supply [3]	8 ~ 24		Vdc
Supply current	<15		mA
Working temperature	-10 ~ 60		°C
Storage temperature	-20 ~ 80		°C
Calibration	Air, 20°C, 1.0 bar		
EMC	EN 61326-1/2/3		

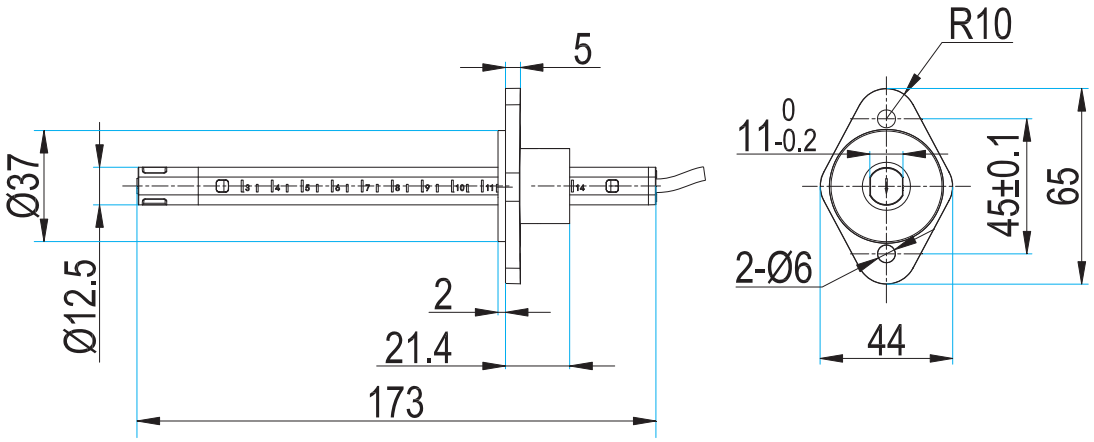
Note: 1. Flow range is selectable from 0~3.....0~30 m/sec; for higher flow rate options, please contact the manufacturer.
2. 0.5 ~ 4. 5 Vdc analog output / 4 ~ 20 mA current outputs correspond to flow velocity, while RS485 / bluetooth LE output flow velocity, humidity and temperature.
3. Battery power is optional.

Additional Specifications (relative humidity)

Model	AM1100	
Resolution	0.04	%RH
Accuracy		
20 ~ 80 %RH	±2.0	%RH
0~20; 80~100%RH	±5.0, max.	%RH
Response time		
63%; 25~75%RH	5	sec
Long term drifting	0.5	%RH/year
Temperature coefficient*		
0 ~ 80°C	-0.15	%/°C

*Note: The humidity measurement is fully temperature compensated for 0~ 80°C.

Mechanical Dimensions



(Unit:mm)

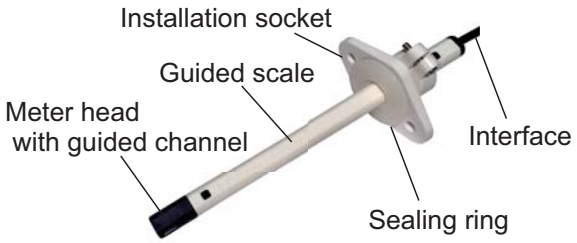
Pin Definition*

Pin Color	Definition
Red	VCC, power supply
Black	GND, ground
Yellow	RS485A / SCL (I^2C)
Blue	RS485B / SDA (I^2C)
Green	Vout, analog output

* Please contact Siargo for other models.

Installation

(1) The parts are illustrated as below:



(2) Opens space measurement:

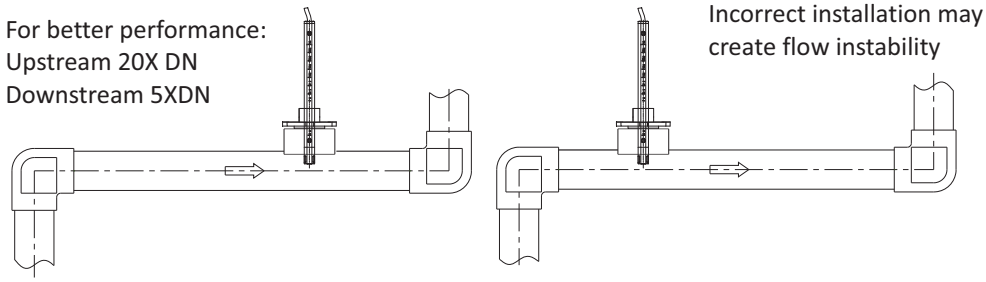
(2-1) The flow speed measured would be only for the direction where the meter head is pointed.

(2-2) The meter is not directional dependent for the installation, horizontal, vertical or any other direction shall not alter the performance of the accuracy of the reading.

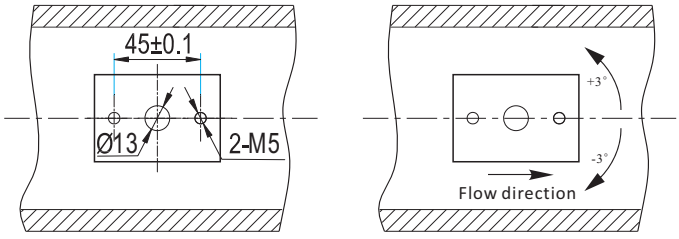
(3) Online measurement:

(3-1) Make sure there is no any hazardous gases present in the flow channel.

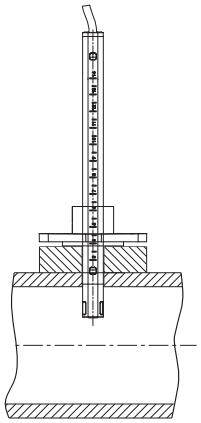
(3-2) The meter should be installed avoiding valves, sharp turns and other obstacles possibly presented in the system for flow instability.

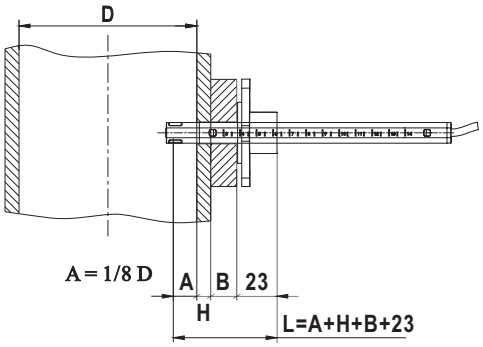


(3-3) Prepare the installation hole in the flow channel (13mm), and the installing base as below:



(3-4) Install the sensor, the flow measurement direction indicated on the sensor should align with the flow direction in the flow channel. Adjust the probe depth in the flow channel according to the measurement





Calculation of the probe depth, *L*

$L = 1/8D+H+B+23$

where D is the flow channel diameter
H is the flow channel wall thickness
B is the base height.

Product Selection

The sensor part number is composed of the model number and suffix indicating the full scale flow rate, output format as well as the calibration gas. Refer to the followings for details.

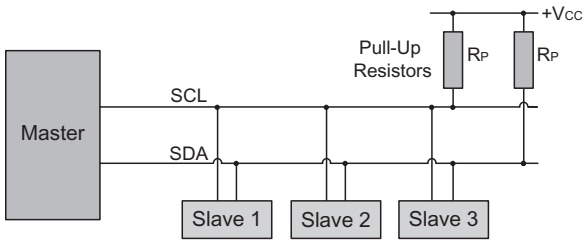
AM□-□-□-□

- □: Additional (D - Local display with LCD; Null - without display)
- □: Output[2] (A - 4 ~ 20 mA(reserved); B - RS485; E - I^2C; T - Bluetooth LE(reserved); V - Analog output; Options: B, E, V, BV, EV)
- □: Max. Flow velocity[1] (Selectable: 3, 5, 10, 15, 20, 30)
- □: Product Model Name (1000 - Flow velocity only model; 1100 - Temperature/humidity integrated model)

1. Max. flow velocity number only, for example, 10 meaning maximum flow velocity of 10 m/sec.
2. 4 ~ 20mA and bluetooth are reserved.

I²C Communication

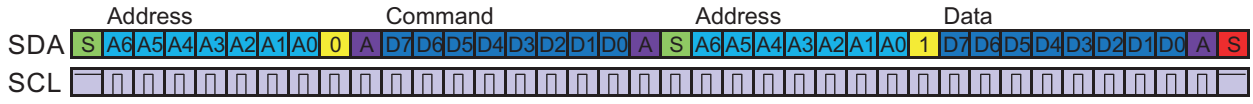
1. I²C Connection



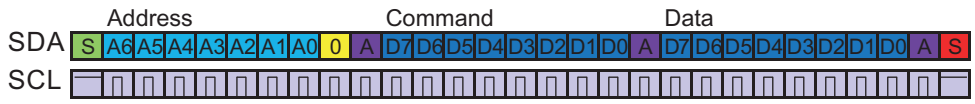
Vcc: 3.0 ~ 5.5 Vdc
Rp: 1.0 ~ 10.0 kΩ
I²C bus clock frequency: 100 kHz

2. I²C Read and Write Sequences

I2C Read - Slave responds to Master with data



I2C Write - Master sends data to Slave



Notes

Bit	Name	Description
S	Start bit	Master pulls SDA from high to low while SCL remains high.
S	Stop bit	Master allows SDA to float from low to high while SCL remainshigh.
A	ACK	
1	Read(1Bit)	
0	Write(1Bit)	
A6	Address	7 bits, the 7 Most Significant bits of the first transmitted byte. Default address 0x01.
D7	Data bit	8 bits

3. I²C Commands description

Command Byte (Hex)	Length	Command Name	Read [1]	Write [2]	Notes
02H	12	Read/Write the Sensor SN	◎	●	ASCII
03H	4	Read flow velocity	◎		Int32/1000 flow rate unit
05H	1	Read/Write the I²C address	◎	◎	Bit7 ~ Bit1 can be set [3]
32H	2	Read temperature	◎		Int16/100 ℃
33H	2	Read humidity	◎		Int16/100 %RH

1) ◎ means the commands is available for any user.
2) ● means the commands is available only for the manufacturer.
3) The address is set with Bit7~Bit1， For instance, 08H means address of 4.
4) When reading information, add 80H to the command byte. For instance, Read flow rate command is 83H.

Application Notes

This series of products are designed for acquiring the basic environmental data of air speed, temperature and humidity for better sensing and control scheme in applications such as smart residential HVAC system, environmental process probe, wind speed metering, gas flow media process monitor and control.

The air speed is calibrated with Siargo's proprietary system that has been correlated with data acquired in a wind tunnel for open space air speed and/or sonic nozzle for enclosed conduits with high precision. The special designed installation accessories shipped together with the product allow the easy installation for the best performance. Please follow the installation guide to ensure the accuracy of the data acquisition.

For the measurement in an enclosed conduit, the meter blockage effects have been calculated and compensated. However, for the open space air speed measurement, the blockage may not be completely eliminated as it shall be dependent on the actual measurement configuration. Various test indicated that the blockage of the meter in an open space measurement may lead to a lower reading if the measured flow shall be laminar such as a wind tunnel, but in a turbulent condition, such an effect is much smaller.

Safety and Maintenance

Safety Precautions

The sensors cannot be used for gas metrology of fluoride or fluoride containing gases. For updates of the product certification information, please contact manufacturer or visit www.Siargo.com. Use for other gases such as extreme corrosive and toxic may cause the product malfunctioning or even severe damages The product sealing is ensured to work under working pressure of 20 kPa and is leakage proof before the shipment. But cautions and further leakage test are important at installation as well since any leakage could cause severe safety issue. The power supply for this product is a lithium battery, all precautions and measures for electrical voltage handling must apply.

Attention: any alternation and/or improper use of the product without the permission of the manufacturer can cause unpredicted damages and even injuries or other severe situations. Siargo or any of its employees, subsidiaries shall not be hold and indemnified against such consequences due to such circumstances via improper use of the product.

Maintenance

Attention: without prior permission of the manufacturer, please do not attempt to alter any parts of the product as it may cause unrecoverable damages. If there are questions or doubts, please contact manufacturer immediately before further actions.

All maintenance of the sensor should be performed by trained and certified personnel by Siargo.

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Appendix: Revision History

Revision A.4 (July 2017):

- Added the working temperature, output shift, resolutions, etc. (Specifications);
- Added the I^2C selection (Specifications, Product selection and I^2C communication).

Revision A.3 (April 2017):

- Added the notes for various output signals (Specifications);
- Corrected the storage temperature (Specifications);
- Added product selection;
- Revised contact information;
- Added the revision history (Appendix).

Revision A.2 (March 2017):

- Revised the installing information.