

Air velocity, Air temperature, Air humidity  
Real time data monitoring, MODBUS/RS485

# ANEMOMETER

Model : FSM-PBMS-15

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## 1.FEATURES

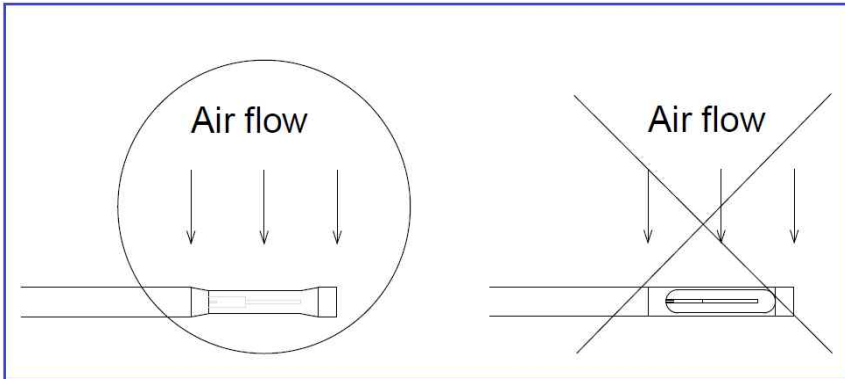
* Specially designed and engineered for "Painting Booth Air Flow Monitoring".
* De facto standard thermal mass type anemometer.
* Field proven humidity sensor ASIC.
* Rugged aluminum case.
* MODBUS/RTU protocol, industrial monitoring open standard.
* Isolated and doubly protected RS485 circuits.
* Two rotary switches for easy MODBUS address setting.
* Wide power supply range, default 24V, 12V ~ 30V range, to accommodate voltage drop with long power distribution.
* Power consumption monitoring.
* Air flow velocity , m/sec.
* Air temperature , °C.
* Air humidity , %RH.

## 2.General specification

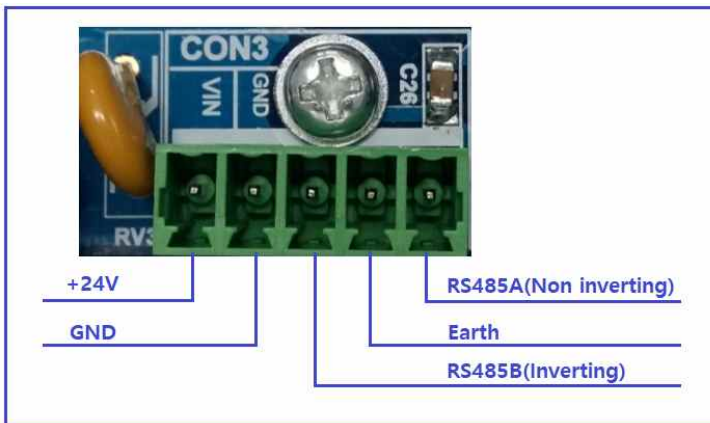
Air velocity sensor	Measurement range : 0 ~ 3 m/sec, Accuracy : +- 0.01 m/sec
Humidity sensor	Measurement range : 5 ~ 100 %RH, Accuracy : +- 2%RH
Temperature sensor	Measurement range : -40 ~ +120°C, Accuracy : +- 0.4°C
Power	DC24V/60mA, DC12V~DC30V
Data interface	RS485/MODBUS/RTU
Data samplig period	Minimum 0.5sec.
Operating temperature	0 ~ 50°C.
Operating humidity	0 ~ 80%RH
Weight	380g
Outer dimension	Body : 93 x 69 x 58mm , Sensor head : 8pi x 145mm

### 3. Installation guide

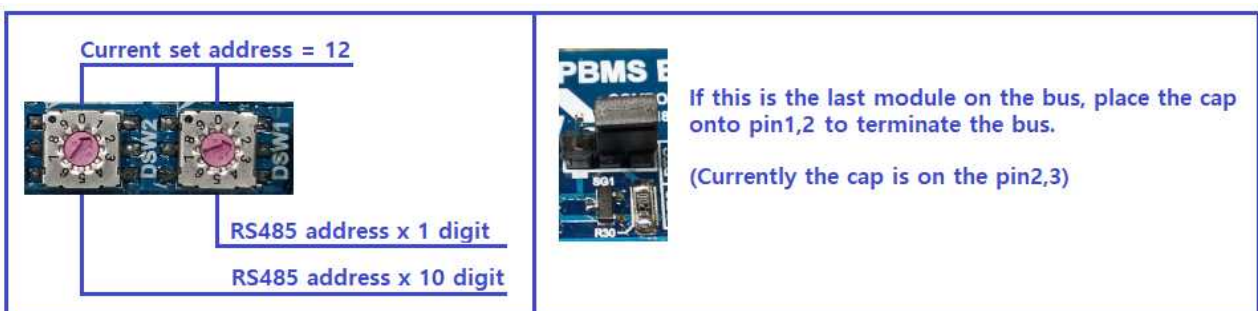
#### \* Sensor head direction



#### \* Electrical connection



#### \* Address setting & bus termination



#### \* Paint Booth specific caution

To prevent any paint particles attaches at the sensor header surface, Install anemometer as far as if possible from the painting nozzle.

## 4. Data interface

### \* Interface Specification

Electrical	EIA RS485
Method	2 line, Half duplex, asynchronous
Address	1 ~ 99
Speed	9600 bps
Data	8 bit
Start	1 bit
Stop	1 bit
Parity	none
Protocol	MODBUS RTU
MODBUS Function	3, 8

### \* Query & Response timing

Anemometer starts sending the first response byte after 5 msec later to the query.

That means the master receives the first response byte 6 msec later after the query in 9600bps.

Anemometer does not respond to the query if there is any error in the query.

### \* Query & Response format

- Query example to the address = 4 with fun=3

Addr	Cmd	Start addr High	Start addr Low	Reg cnt High	Reg cnt Low	CRC High	CRC Low
0x04	0x03	0x01	0x03	0x00	0x09	0x74	0x65

- Response example from the address = 4 to fun=3.

Addr	Cmd	Number of data bytes	data	CRC High	CRC Low
0x04	0x03	0x12	01 03 00 00 00 00 C4 4E B5 41 6B 5D 83 42 9C 44 4C 3F	0x08	0x1F

- 01 03 <- Returns received start address
- 00 00 00 00 = 0.00000000 <- velocity
- C4 4E B5 41 = 22.663460 <- temperature
- 6B 5D 83 42 = 65.682457 <- Humidity
- 9C 44 4C 3F = 0.79792190 <- consumption current

-float type variable encoding in the response.

Anemometer place a 4 byte float type variable into the frame with the little endian system rule.

For example, in the case of a float type number 12.345

Addr	+0	+1	+2	+3
Content	0x1f	0x85	0x45	0x41

- Query example to the address = 4 with fun=8, the diagnostic loop back test command

Addr	Cmd	Data	CRC High	CRC Low
0x04	0x08	any data, max 20 bytes	CRCH	CRCL

- Response example from the address = 4 to fun=8, the diagnostic loop back test command

Addr	Cmd	Data	CRC High	CRC Low
0x04	0x08	Received data	CRCH	CRCL

- Anemometer returns received frame without any change if the function no is 8, the diagnostic loop back test command.

### \* CRC Calculation

```
//-----
// Low byte of 16bit return value is CRC high
// High byte of 16bit return value is CRC low
//-----
```

WORD **CRC16**(BYTE\* gd, BYTE gdlen)

```
{
  BYTE j;
  WORD reg_crc = 0xFFFF;
  while(gdlen--)
  {
    reg_crc ^= *gd++;
    for(j=0;j<8;j++)
    {
      if(reg_crc & 0x01)
        reg_crc=(reg_crc>>1)^0xA001;
      else
        reg_crc=reg_crc>>1;
    }
  }
  return reg_crc;
}
```