

PM2.5 Particle Counter

Description

The PM2.5/10 Particle Counter is designed for environmental monitoring in industrial, commercial and institutional buildings. The unit provides accurate readings of particle counts in two important sizes, 2.5µm and 10µm. The sensor uses the laser light scattering method which is not subject to drift or sensor contamination. A fixed volume of air is pumped through the sensor and suspended particulate matter in a given unit volume of air is totalized into two bins, one for particles of 2.5µm and another for larger 10 micron sizes. The results are reported in µg/m³ of air with all data available over the RS485 port for integration into large systems. It Supports multiple protocols over both RS485 and Ethernet:Modbus over Ethernet,Bacnet over Ethernet,Bacnet MSTP over RS485 and Modbus RTU over RS485.

The fan can be disabled between readings to extend the life of the sensor by adjusting a Modbus register/ bacnet variable. The fan runs for one minute, takes a reading and then goes off for the user defined period which is adjustable from one minute to as long as 250 minutes between readings.



PM2.5/10-D



PM2.5/10-W

Highlights

- Accurate : Laser scatter method, particles are sized with a resolution of 0.3 µm.
- User defined sampling period prolongs sensor life.
- Fast Response : response time less than 10 seconds
- LCD display with backlight for keypad setup and troubleshooting
- High resolution: Particle diameter resolution of 2.5 µm
- Supports Modbus protocol over Ethernet, Supports Bacnet protocol over Ethernet
- Supports Bacnet MSTP protocol over RS485, Supports Modbus RTU protocol over RS485

Specifications

Measurement parameters	PM2.5, PM10
Range	0.0-999.9 µg / m³
Power supply voltage	12-24V +/- 10%, AC or DC, 2 watt typical
Output Signal Type	Jumper select: 4-20mA, 10V, 5V
Output Signal Drive	> 500Ω for ma mode, 75ma max output drive for voltage mode
Operating Temp	-20~+50°C, 0-95% non condensing

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Communications	Modbus protocol over Ethernet
	Bacnet protocol over Ethernet
	Bacnet MSTP protocol over RS485
	Modbus RTU protocol over RS485
Plastic Housing	Flammability rating UL 94V0 file,E194560,halogen free
Air pressure	86KPa~110KPa
Response time	1s
Minimum resolution of particle	< 2.5 μ m
Counting yield	70%@0.3 μ m ;98%@0.5 μ m
Relative error	Maximum of $\pm 15\%$ and $\pm 10\mu$ g/m3
Display	130x80 dot matrix, backlit
Life Span	Default setting of 50% duty cycle equates to 2 years sensor life 25% duty cycle projects to 4 years sensor life 10% duty cycle works out to 10 years

Note: PM2.5 is particulate matter <2.5 μ m in diameter; PM10 is particulate matter <10 μ m in diameter.

Part Number Scheme

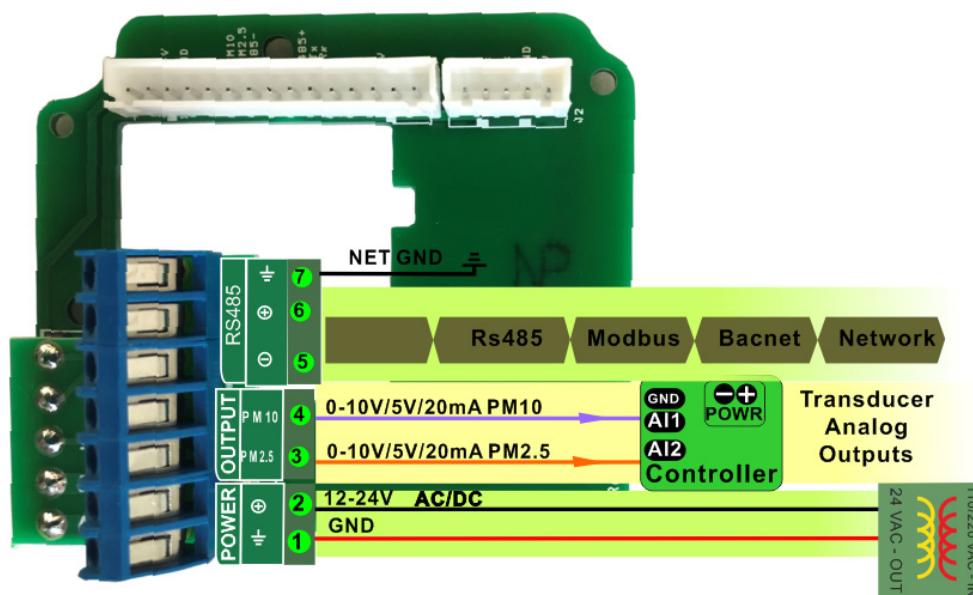
PM2.5/10 - D - 150

Code	Description
PM2.5/10	PM2.5/10 Particle Counter

Code	Module
D	Duct Mount
W	Wall Mount

Code	Pitot Length
100	4"
150	6"
200	8"
250	10"
300	12"
*	Other custom lengths are available, no minimum order

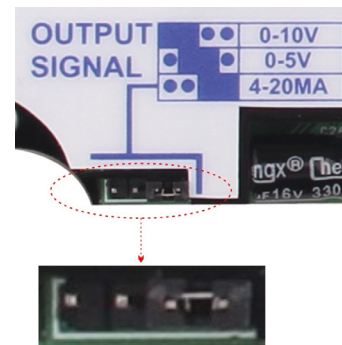
Wiring Diagram



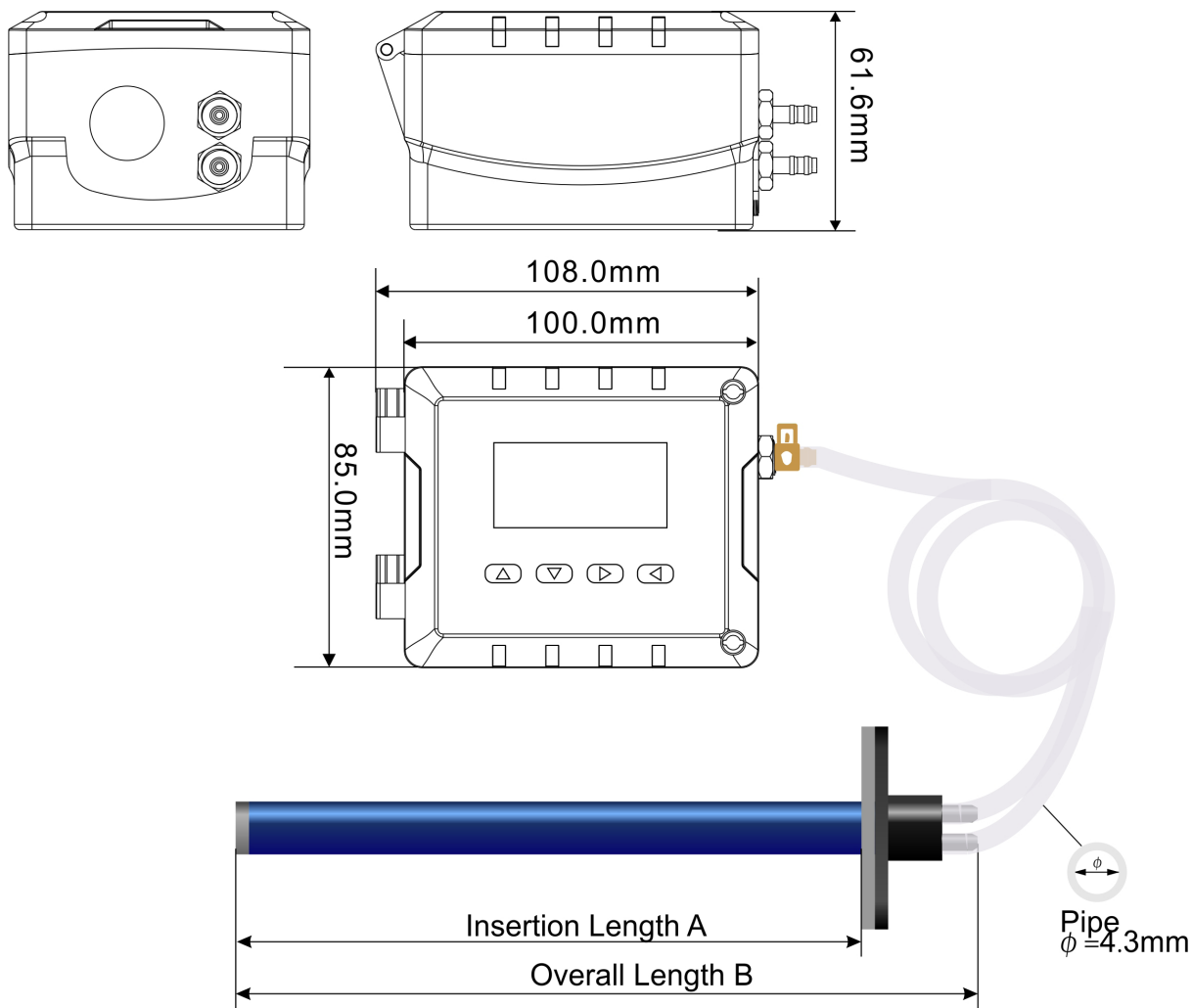
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Output Jumper Settings

In this mode the device acts as a traditional transducer where it sends out three analog signals, all you need to do is to set this one single jumper to the appropriate signal type: 4-20mA, 0-10V, or 0-5V.



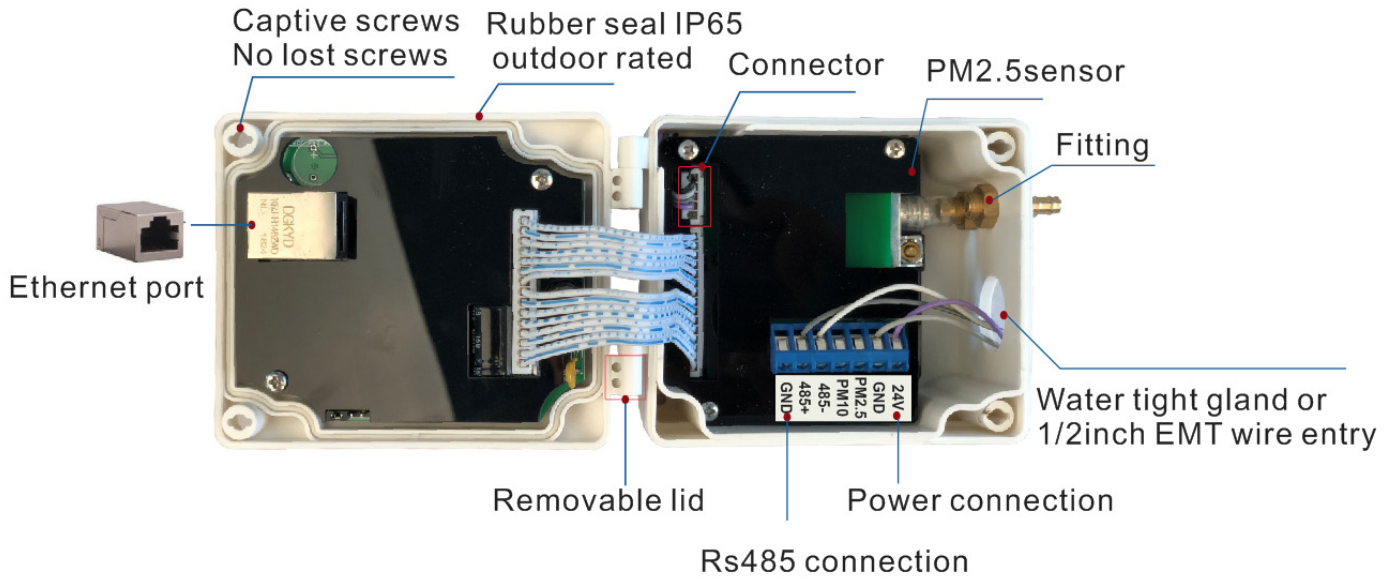
Dimension



Insertion Length A (mm)	Overall Length B (mm)
150	193
200	243
250	293
300	343
1000	1043

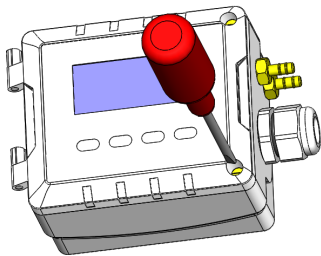
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Internal View

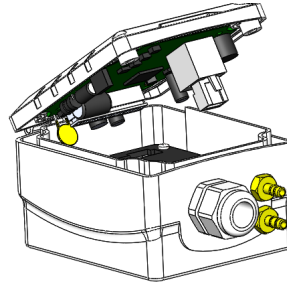


Mounting Installation

1) Unfasten screw at cover, turn the captive screw 1/2 turn till it pops out.

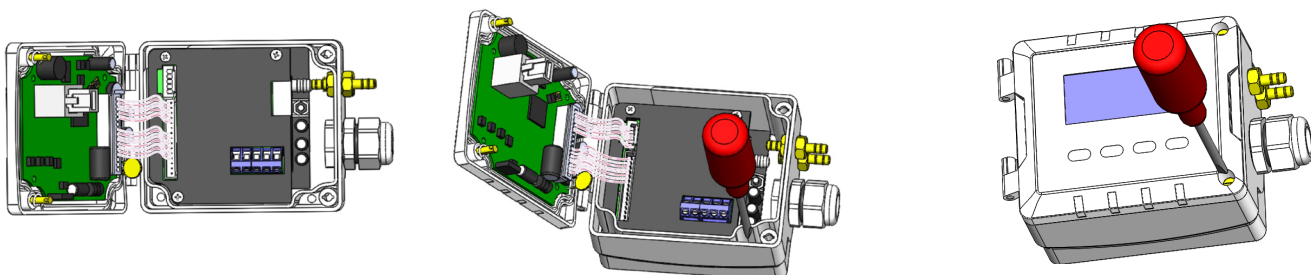


2) Rotate the captive screws with a flat screw driver. These screws are spring loaded and will pop out of their holding position when lined up with a slot in the cover.



3) When the screws pop up you can raise the lid, you may need to pry the lid off a little with the screw driver if the captive screws are a tight fit.

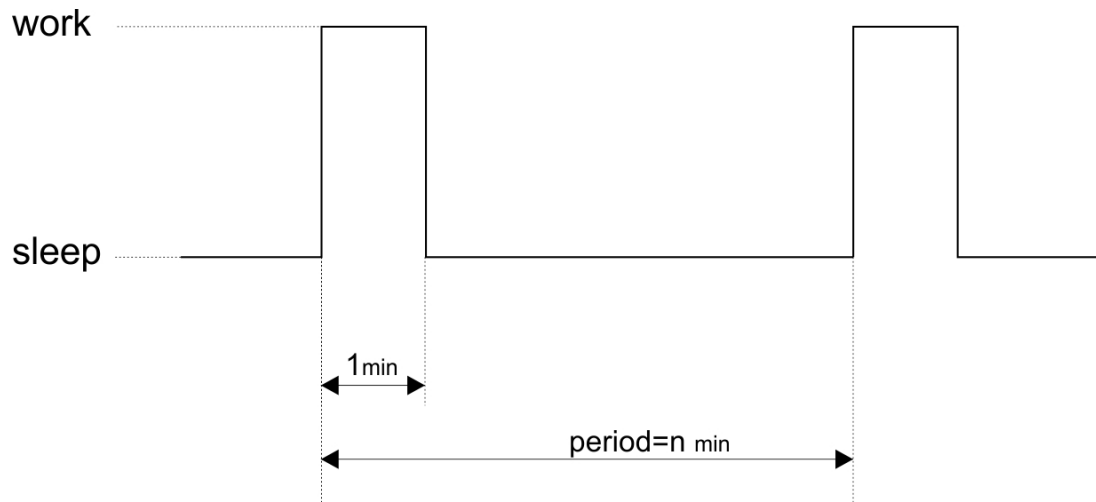
4) Re-fasten screw at cover.



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Work Period Setting

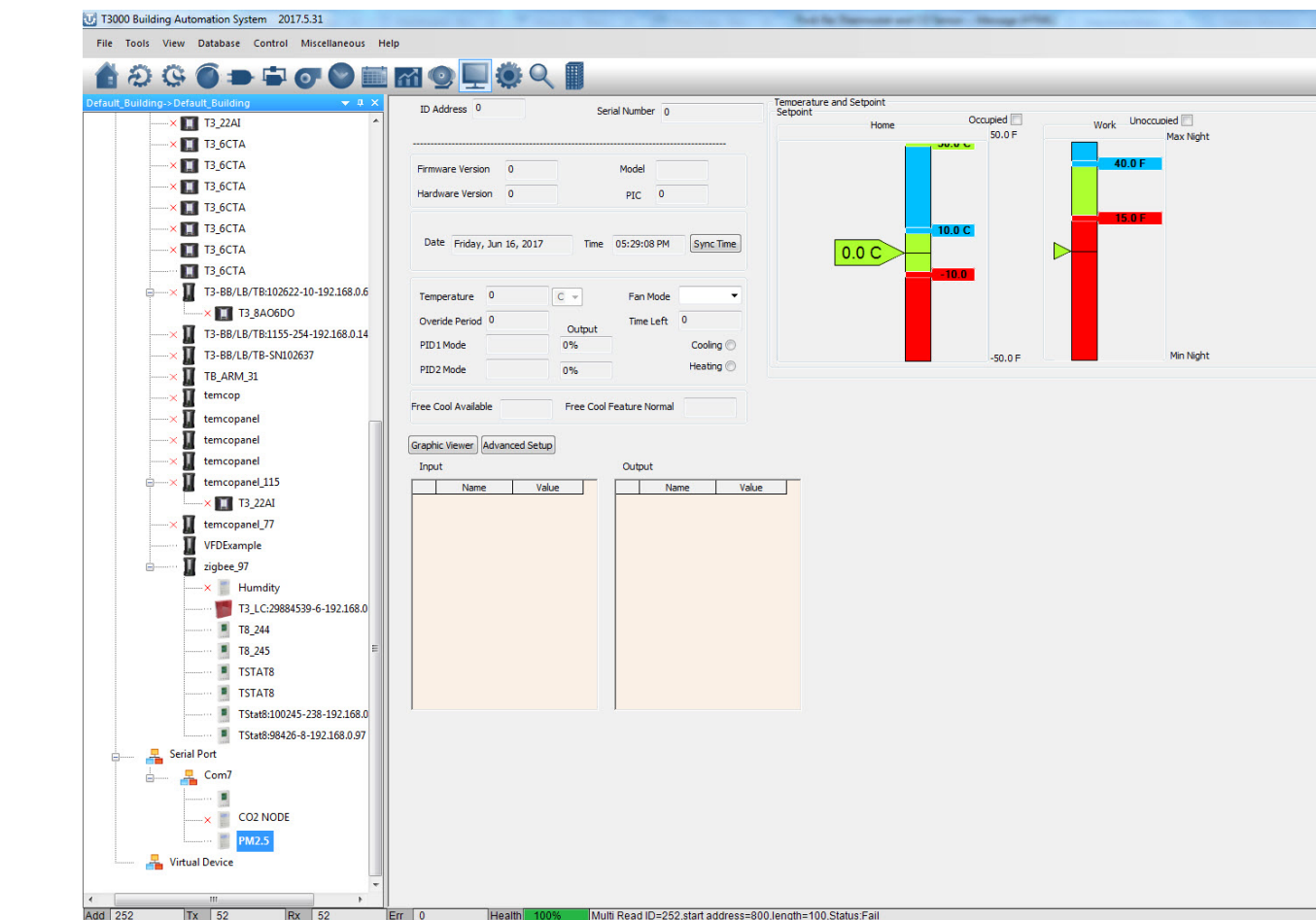
Available range of PM2.5 work period setting is 0~30min,default 0(Modbus Register list 104).
When the setting value is n ,PM2.5 works for 1 minute,the sleep time is $(n-1)$ min.



T3000 Operation

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- The screenshot shows the T3000 Building Automation System interface. A 'T3000 Scanning' dialog box is open in the foreground, displaying the message 'T3000 is scanning, please wait...' and an 'Exit' button. Below the message is a table with the following data:
- | Scanning Mode | Skip | Status | Reply | Notes |
|---------------|------|----------|-------|--------------------|
| Ethernet Scan | No | Wait | 11 | Receive reply : 10 |
| COM7 9600 | No | Finished | 0 | Scan finished |
| COM7 19200 | No | Wait | 0 | |
| COM7 38400 | No | Wait | 0 | |
| COM7 57600 | No | Wait | 0 | |
| COM7 115200 | No | Wait | 0 | |
- The background interface includes a menu bar (File, Tools, View, Database, Control, Miscellaneous, Help) and a toolbar with various icons. The main window is titled 'Default_Building>Default_Building' and contains several control panels, including 'Temperature and Setpoint' with a bar chart showing 'Home' and 'Work' status, and 'Occupied' status with a temperature of 50.0 F. A 'T3000 Scanning' dialog box is overlaid on the main window, displaying the message 'T3000 is scanning, please wait...' and an 'Exit' button. Below the message is a table with the following data:

4. Click  to see the status of the Tstat8. This window will display setpoints, temperature, inputs and outputs.



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Modbus Register List

PM2.5 uses MODBUS protocol to communicate with others. Below is modbus the register list .

Address	Register and Description
0 to 3	Serial Number -4 byte value. Read-only
4 to 5	Software Version –2 byte value. Read-only
6	ADDRESS. Modbus device address
7	Product Model. This is a read-only register that is used by the microcontroller to determine the product
8	Hardware Revision. This is a read-only register that is used by the microcontroller to determine the hardware Rev
9	PIC firmware version
10	'Plug n Play' address, used by the network master to resolve address conflicts. See VC code for algorithms
15	Bau - Baudrate, 0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
16	Firmware Update Register, used to show the status of firmware updates
21	Protocol switch. 3 = MODBUS,0=MSTP.
17-39	Blank, for future use
40 to 45	reg40, MAC address, read only normally
46	reg46, IP mode. 0=static IP; 1= DHCP
47 to 48	reg47, upper two bytes of IP address
49 to 50	reg49, lower two bytes of IP address
51 to 52	reg51, right two bytes of SUBNET MASK address
53 to 54	reg53, left two bytes of SUBNET MASK address
55 to 56	reg55, right two bytes of GATEWAY address
57 to 58	reg57, left two bytes of GATEWAY address
59	reg59, 0, TCP server, (NO USE)
60	reg60, listen port at TCP server mode
61~75	buffer mirror for changing to a new IP address, copy of reg 46 to 60
76	write 1 to set the ghost settings to the system and start new settings, then clear the ghost registers.
93	Enable for MAC setting. It should be set as 1 before write the new MAC to the MAC registers(100-105), and it will be cleared automatically after setting the MAC address.
94~99	Spare
100	pm2.5 value. ug/m3
101	pm10 value. ug/m3
102	AQI
103	AQI LEVEL. 0 = Good,1=Moderate,2=pool for some,3=unhealthy,4=more unhealthy,5=hazardous.
104	the work period. 0 = work all the time. 1~30 minutes.
105	the pm2.5 sensor id
106	Spare

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107	the pm2.5 sensor status. 0 = offline,1=online
108	Spare
109	the main display set . bit0:PM25,bit1:pm10,bit2:AQI,
110	the scroll display set. bit0:sensor status,bit1:rx/tx,bit2:baudrate,bit3:aqi level.
111	main display switch time.1~254 seconds.
112	the pm2.5 offset
113	the pm10 offset
114	the pm2.5 filter
115	the pm10 filter
116	PM output auto or manual 0: auto 1:manual
117	PM output mode 1: 0-10V 2:0-5V 3:4-20mA
118	PM2.5 Min Range
119	PM2.5 Max Range
120	PM10 Min Range
121	PM10 Max Range

Bacnet Register list

PM2.5 uses Bacnet protocol to communicate with others. Below is the Bacnet register list.

Variable	Variable and Description
0	Spare
1	SerialNumber LowByte
2	SerialNumberHighByte
3	SoftWare Version
4	ID Address
5	Product Model
6	Instance
7	Station number
8	Uart BaudRate.0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
9	Update
10	Protocol. 0=MSTP,3= MODBUS
11~19	Spare
20	OffSet_P25
21	OffSet_P10
22~25	Spare
26	Filter_Pm25
27	Filter_Pm10
28~35	Spare
36	Air Quality Index

Input	Input and Description
0~4	Spare
5	PM2.5
6	PM10