CO2-Humidity-Temp Transmitter w/ Bacnet

Description

The CO2 sensor with Humidity & Temp transmitters are designed for environmental monitoring and controlling in industrial, commercial and other buildings. These transmitters can be used for indoor C02, temperature and humidity monitoring. The modbus interface provides easy setup and integration into large systems.

CO2-D1

CO2-W1

CO2-C1

Highlights

- High performance sensing elements, temperature compensated, stable
- RS485 for direct digital reading on all models, Ethernet option available for Duct/Wall types
- Easy troubleshooting with pluggable sensors and backplate
- Transducer outputs are jumper selectable: 4-20mA, 0-5V or 0-10V
- LCD display with backlight on all models
- Automatic background calibration, default CO2 value: 40000 ppm
- Enthalpy, its calculated automatically and available in the register list and display

Specifications

Sensing	CO2		HUM		TEMP	
	Conditions	Value	Conditions	Value	Conditions	Value
Range	–	0 – 40'000 ppm	–	0 %RH – 95 %RH	–	- 20°C – 60°C
Accuracy	0 ppm – 5'000 ppm	± (30 ppm + 3%MV)	25°C, 0 – 95 %RH	± 5 %RH	0 – 50°C	± (0.5°C + 0.023 × (T [°C] – 25°C))
Repeatability	0 ppm – 5'000 ppm	± 10 ppm	–	± 0.1%RH	–	± 0.1°C
Response time	τ63%	60 s	τ63%	> 90 s	τ63%	> 60 s
Accuracy drift over lifetime	400 ppm – 5'000 ppm ASC field-calibration algorithm activated and SCD40 in environment allowing for ASC, or FRC field-calibration algorithm applied.	± 50 ppm	–	< 0.25 %RH / year	–	< 0.03 °C / year

1 Default conditions of T = 25°C, humidity = 50 %RH, p = 1013 mbar.
2 Deviation to a high-precision reference. Accuracy is fulfilled by > 90% of the sensors after calibration. Rough handling, shipping and soldering reduces the accuracy of the sensor. Full accuracy is restored with FRC or ASC recalibration features. Accuracy is based on tests with gas mixtures having a tolerance of ± 1.5%.
3 RMS error of consecutive measurements at constant conditions. Repeatability is fulfilled by > 90% of the sensors.
4 Time for achieving 63% of a respective step function. Response time depends on the operating mode, design-in and environment of the sensor in the final application. The specified response time represents ideal design-in situation and high performance mode operation.CO2 concentration 400 ppm regularly.
5 CO2 concentrations < 400 ppm may result in sensor drifts when ASC is activated. For proper function of ASC field-calibration algorithm SCD40 has to be exposed to air with
CO2 concentration 400 ppm regularly.

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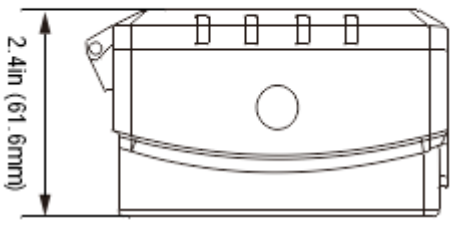
Models	CO2-D1	CO2-W1	CO2-Node
Typical Application	Duct	Wall, outside	Wall mount indoors
Outputs	3	3	3
Output Signal Type	Jumper select: 4-20mA, 10V, 5V		
Output Signal Drive	> 500Ω for ma mode, 75ma max output drive for voltage mode		
RS485 ports	2	2	1
Power	15-24V +/- 10%, AC or DC , 2 watt typical		
Operating Temp	-30~+70C, 0-95% non condensing		
Plastic Housing	Flammability rating UL 94V0 file E194560, plastic is halogen free		
Display	130x80 dot matrix, backlit		4 leds
Control Features	Master/Gateway Mode		N/A

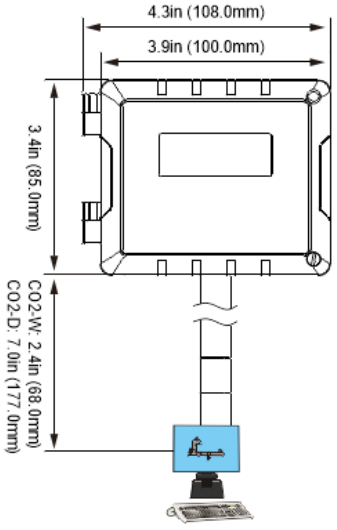
Design-in of the SCD40 in final application and the environment impacts the accuracy of the RH/T sensor. Heat sources have to be considered for optimal performance.
Please use integrated on-board RH/T compensation algorithm to account for the actual design-in.
7Deviation to a high-precision reference. Accuracy is fulfilled by > 90% of the sensors after calibration.
8 RH/T sensor component is capable of measuring up to T = 120°C. However, measuring at T > 70°C might result in permanent damage of the sensor module.

Note:
1. The default setting for the transducers is 0 to 10V, over the range 0 to 100 Degrees C. If you're using the 10V transducer output signal, the sensor needs to be powered with at least 15V AC or DC.
2.For application not using the 10V transducer output signal, using 4-20ma signal, 0-5V transducers, or Modbus/Ethernet only, in this case you can use 12V AC or DC.

Dimensions

CO2-D1 & CO2-W1





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Part Number Scheme

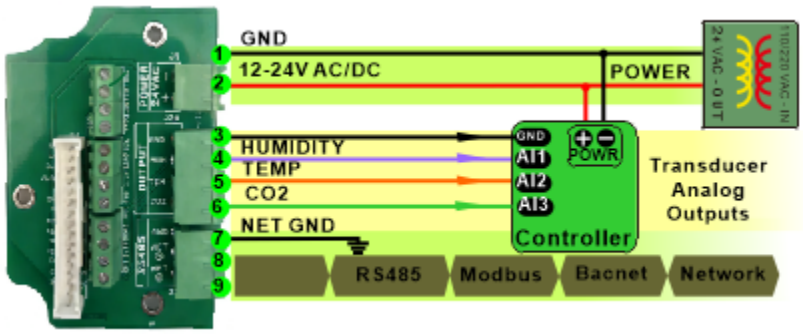
CO2 - D1

Code	Description
CO2	CO2 Sensor

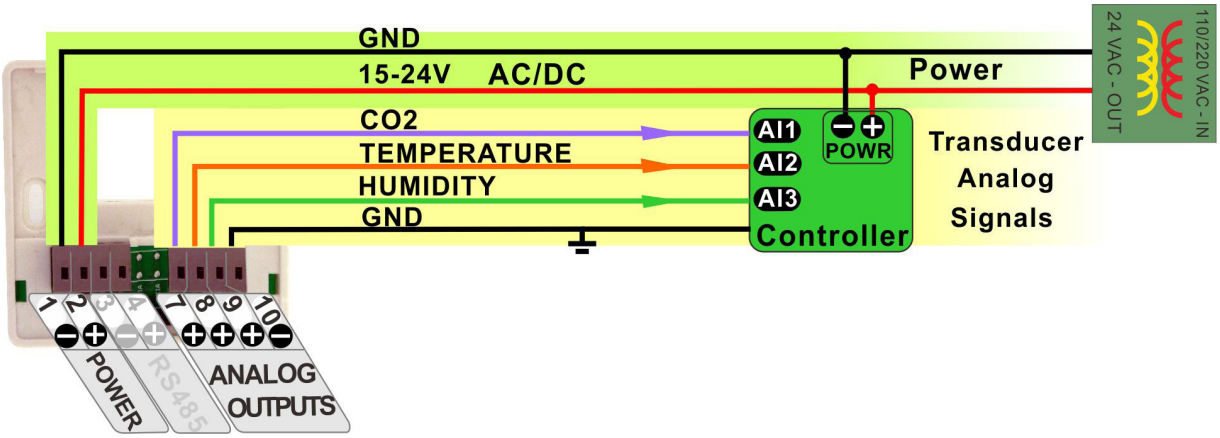
Code	Module
D1	Duct Mount
W1	Wall Mount
C1	2 Meter Cable
N	CO2 Node
LCD	With LCD

Wiring Diagram

HUM-D1/HUM-C1



CO2-N



The next diagram shows the CO2-N working in the RS485 network; the node quantity can be up to 255 units. A group of sensors distributed through the building can cooperate friendly through net. The RS485 network is available for transmitting the same values digitally to other controllers.

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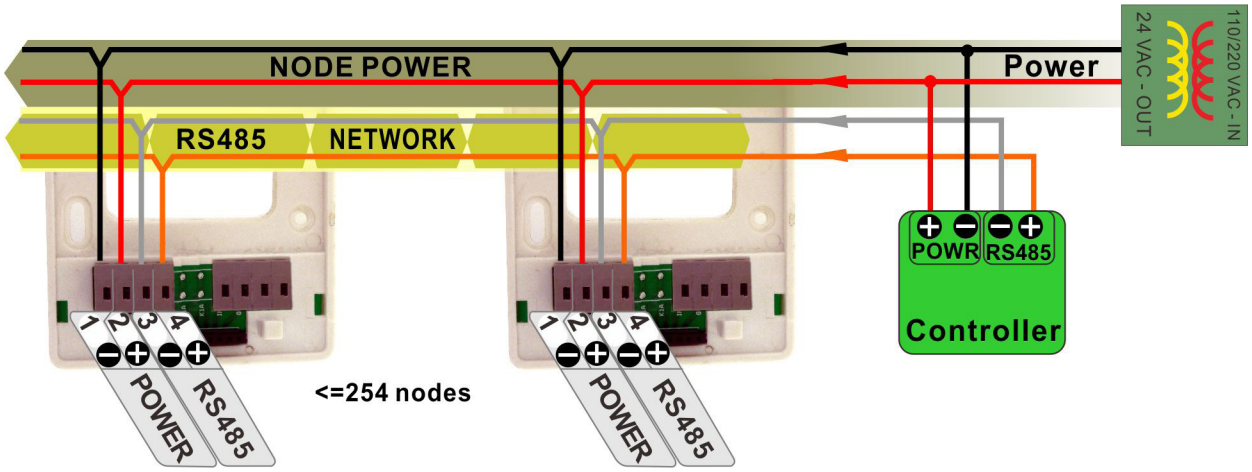
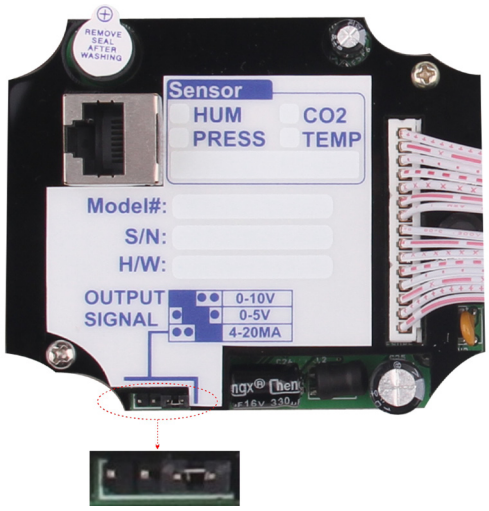


The diagram below shows the wiring connection for the usual transducer mode of operation for the CO2-D1 duct mount and CO2-W1wall mount style sensors. The transducer outputs connect to a master controller using traditional analog output signals. The RS485 network is available for transmitting the same values digitally to other controllers in the system by connecting to the RS485 network at Pins8 and 9.

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.



CO2-Humidity-Temp Transmitter w/ Bacnet

Introduction to Power over Ethernet (POE)Power over Ethernet (POE) is a technologythat enables the simultaneous transmissionof data and electricity over Ethernet cables.Here is an introduction to it: Working Principle:The POE power supply system mainly consists of a Power Sourcing Equipment(PSE) and a Powered Device (PD). The PSE is responsible for injecting electricity into the Ethernet cable, typically installed in devices such as network switches. The PDon the other hand, is a device capable of receiving electricity, such as wirelessaccess points and IP cameras. The PSE identifies whether a device is a POE- supported device by detecting itscharacteristics.Once confirmed, it suppliesthe corresponding amount of electricityaccording to the PD's requirements. Power Supply Methods:Mid-span Powering: A POE injector isadded in the middle of the Ethernet cableto iniect electricity into the cable withoutaffecting data transmission. This methodis suitable for existing network cablingand does not require the replacement ofswitches and other devices.End-span Powering: A switch with POEfunctionality is used to directly transmitboth electricity and data to the powereddevice. This method is convenient forcentralized management andmaintenance and is a more commonpower supply method.Advantages Simplified Cabling: Only one Ethernetcable is needed to transmit both dataand electricity simultaneously, reducingthe laying of power cables and loweringthe cost and complexity of cabling. Flexibility and Convenience: It enablesconvenient power supply to devices inthe network, without being restricted bythe location of power outlets, making iteasier for device installation andmovement.Safety and Reliability: The POE powersupply system has functions such asovercurrent and overvoltage protectionensuring the safe operation of devicesAt the same time,it also reducespotential safety hazards such as electrical fires.

CO2-Humidity-Temp Transmitter w/ Bacnet

Modbus Register List

CO2-Humidity-Temp Transmitter w/Bacnet uses MODBUS protocol to communicate with others.Below is the Modbus register list.

Address	Bytes	Register Description
1...2	2	Lower 2 bytes of the serial number
2..3	2	Upper 2 bytes of the serial number
4	1	firmware version lower byte. eg. FW version=10.12, so lower byte=12AND high byte=10. Fixed.
5	1	firmware version upper byte. eg. FW version=10.12, so lower byte=12AND high byte=10. Fixed.
6	1	Modbus device address default:254
7	1	Product ID,Fixed
8	1	Hardware version
9	1	spare
10	1	spare
14	1	sensor type,Bit0=co2,Bit1=Hum,Bit2=Temp, Bit3=Pressure
15	1	Baudrate Setting:0=9600bps,1=19200bps,2=38400bps,3=57600bps,4=115200bps,default:11.5kbaud
16	1	Firmware Update Register,used to show the status of firmware updates
21	1	Protocol switch.3=MODBUS,0=MSTP. Defualt:Modbus
17....39	23	spare
40 to 45	6	reg40,MAC,address,read only normally
46	1	reg46,IP mode 0=static IP; 1=DHCP default:static
47 to 48	2	reg47,upper two bytes of IP address default:192.168
49 to 50	2	reg49, upper two bytes of IP address default:0.34
51 to 52	2	reg51,right two bytes of SUBNET MASK address
53 to 54	2	reg53,left two bytes of SUBNET MASK address
55 to 56	2	reg55,right two bytes of GATEWAY address
57 to 58	2	reg57,left two bytes of GATEWAY address
59	1	reg59,0,TCP server,(NO USE)
60	1	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	1	write 1 to set the ghost setting to the system and start new settings, then clear the ghost registers
93	1	Enable for MAC setting.It should be set as 1 before write the new MAC to the MACregisters(100-105),and it will be cleared automatically after setting the MAC address
94...199	7	Reserved for future
200	1	Temperature sensor selection,0=external,1=internal.Read only,it will be set to 1 if the humidity module exists

CO2-Humidity-Temp Transmitter w/ Bacnet

Address	Bytes	Register Description
201	1	Select the unit of temperature to display on LCD.0=degree Celsius.1=degree Fahrenheit
202	1	The value of on board temperature sensor,the unit is degree Celsius.The resolution is 0.1 degree
203	1	The value of on board temperature sensor,the unit is degree Fahrenheit.The resolution is 0.1 degree
204	2	The value of external temperature sensor,the unit is degree Celsius.The resolution is 0.1 degree
205	2	The value of external temperature sensor,the unit is degree Fahrenheit.The resolution is 0.1 degree
206	2	The temperature offset for calibrating the internal temperature.The resolutin is 0.1degree
207	2	Relative humidity.The resolution is 0.1%
208	2	Read only.The real frequency read from the humidity module,unuse
209	1	Read only.The number of the calibration table points.
210	1	Internal CO2 sensor selection.The value is 1 as default.1=MAYBE_OGM200;2=MAYBE_TEMCO_CO2;3=OGM200;4=TEMCO_CO2
211	2	The CO2 ppm value of internal CO2 sensor
212	2	The CO2 ppm offset for calibrating internal CO2 sensor
213	2	The setpoint value of fair alarm for internal CO2 sensor
214	2	The setpoint poor of fair alarm for internal CO2 sensor
215..468	2*254	The CO2 ppm value of the external CO2 sensors if there are/is CO2 nodes connect to it
469..722	2*254	The CO2 ppm offset for calibrating external CO2 sensor
723..976	2*254	The setpoint value of fair alarm for external CO2 sensor
977..1230	2*254	The setpoint value of poor alarm for external CO2 sensor
1231	2	reserve
1232	1	The filter of CO2 sensor
1234	1	Enable/Disable the password for the menu system operation.0=Disable 1=Enable
1235	1	The second digital of the password.Should be from 0 to 9
1236	1	The third digital of the password.Should be from 0 to 9
1237	1	The fourth digital of the password.Should be from 0 to 9
1238	1	The century of the real time clock
1239	1	The year of the real time clock
1240	1	The month of the real time clock
1241	1	The date of the real time clock
1242	1	The weekday of the real time clock
1243	1	The hour of the real time clock
1244	1	The minute of the real time clock

Address	Bytes	Register Description
1245	1	The secod of the real time clock
1246	1	Alarm auto/manual control.Bit7: 0=auto,1=manual;1=pre_ alarm;bit1:1=continuous_alarm;bit(1:0):00 =stop_alarm
1247	1	The alarm output turn on time,<=20 seconds.
1248	1	The alarm output turn off time,<=20 seconds.
1249	1	Alarm output delay time.It delays the alarm output when the alarm is triggered.It is 5 seconds as default.
1250	1	Analog output auto/manual control.Bit 0 directs sto temperature output, Bit 1 directs to humidity output,Bit 2 directs to CO2 output.0=Auto,1=Manual.
1251	2	The manual value of temperature
1252	2	The manual value of humidity
1253	2	The manual value of CO2
1254	1	Analog output mode,read only,select by jumper.1=0-10V,2=0-5V,3=4-20mA
1255	2	The lowest value of temperature for analog output
1256	2	The Heighest value of temperature for analog output
1257	2	The Lowest value of humidity for analog output
1258	2	The Heighest value of humidity for analog output
1259	2	The lowest value of CO2 for analog output
1260	2	The Heighest value of CO2 for analog output
1261	1	Reserve
1262	1	The period for the LCD backlight keep on.The backlight turns on when key is triggered and turns off the it expires.
1263	1	Enable/Disable the plug-play feature of the external nodes.0=disable 1=enable
1264	1	The number of CO2 sensors connect to the unit. includes the internal CO2 sensor
1265	1	Set 1 to reset the scan table
1266..1270	1*5	The first CO2 node sensors information.Normally it is the unit itself
		register 1266:the modbus ID of the CO2 sensor
		register1267..1270:the serial number of the CO2 sensor
1271..1275	1*5	The secod CO2 node information.Normally,it is the first external CO2 node
1276..1280	1*5	The third CO2 node information.
...		
...		
2531..2535	1*5	The 254th CO2 node information
3000	1	The internal temperature filter
3001	1	The external temperature filter
3002	1	The humidity filter
3003	1	The humidity sensor version

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Address	Bytes	Register Description
3004	2	The humidity sensor serial number
3005	1	The humidity sensor factory calibrate point number
3006	1	The humidity sensor calibrate table select 0=factory 1=user table
3007..3026	2*254	factory calibrate table.Register3007:The 1st Calibrate point,Frequency,Register3029: The 1st Calibration point.Frequency
3027	1	user calibration table point number
3028..3047	2*254	user calibrate table. Register3028:The 1st Calibrate point RH,Frequency,Register3029: The 1st Calibration point.Frequency
3049	2	The dew point.In degree C
3050	2	The dew point . In degree F
3051	2	The Lowest value of dew point for analog output
3052	2	The heighest value of dew point for analog output
3053	2	Partial pressure of water at saturation at given temperature [hPa]
3054	2	Mixing Ratio,the mass of water over the mass of dry gas[g/kg]
3055	2	Enthalpy of the air,[KJ/kg]
3056	2	The external temperature offset
3057	2	The user table humidity offset
3058	2	The default table humidity offset
3066	2	The analog output value of humidity(0.01ma/0.01v)
3067	2	The analog output value of temperature
3068	2	The analog output value of CO2

CO2-Humidity-Temp Transmitter w/ Bacnet

Bacnet

CO2-Humidity-Temp Transmitter w/Bacnet uses Bacnet protocol to communicate with others.Below is the Bacnet register list.

Backed Object	Variable and Description
Variable1	Serial Number Low Byte
Variable2	Serial Number High Byte
Variable3	SoftWare Version
Variable4	Device ID
Variable5	Product Model
Variable6	Instance
Variable7	Station number
Variable8	Uart BaudRate.0=9.6kbaud,1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud
Variable9	Update
Variable10	Protocol
Variable11	Auto/Manual
Variable12	Dew point
Variable13	Pws
Variable14	Lowest ratio
Variable15	Enthalpy
Variable16	OffSet CO2
Variable17	Filter Temperature
Variable18	OffSet CO2
Variable22	Filter Humidity
Variable23	Filter Temperature
Variable24	Filter CO2
Variable28	Temperature Unit.0=C,1=F
Variable29	OutMode.1=0-10v,2=0-5v,3=4-20mA
Variable30	Output1 Lowest Range
Variable31	Output1 Hightest Range
Variable32	Output2 Lowest Range
Variable33	Output2 Hightest Range
Variable34	Output3 Lowest Range
Variable35	Output3 Hightest Range

CO2-Humidity-Temp Transmitter w/ Bacnet

	Input and Description
Input1	Temperature
Input2	Humidity
Input3	CO2

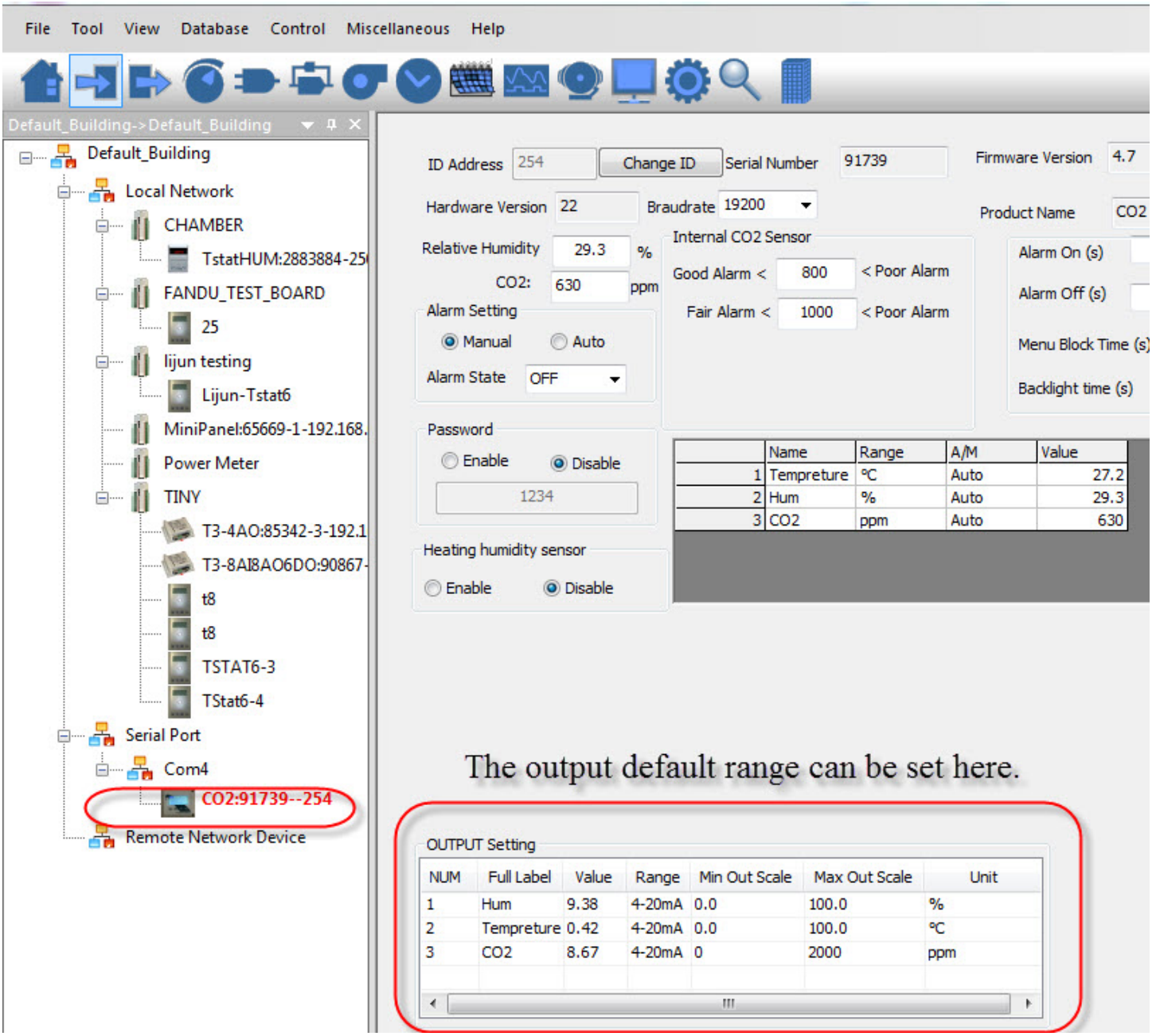
	Output and Description
Output1	Humidity/Analog output
Output2	Temperature Analog output
Output3	CO2 Analog output

CO2-Humidity-Temp Transmitter w/ Bacnet

Voltage & Current Formula

The max and min value are the range max and min value, the range can be set by the customer.
Default Temperature Range: 0-1000 (0-100.0C)
Default Humidity Range: 0-1000 (0-100.0% rH)
Default CO2 Range: 0-3000ppm

Also the temperature, humidity, CO2 range value can be set by T3000 software, here follow the screen shot from T3000.



CO2-Humidity-Temp Transmitter w/ Bacnet

Formula for Analog Outputs	
0-10V Output	Temperature(C)=[Voltage * (High_T - Low_T) + 10 * Low_T] /100
	Temperature(F)=(DegC)*9/5+32
	Humidity=[Voltage * (High_H - Low_H)+10 * Low_H)/100
	CO2=Voltage * (High_C-Low_C)/10+Low
0-5V Output	Temperature(C)=[Voltage * (High_T - Low_T) + 5 * Low_T] /50
	Temperature(F)=(DegC)*9/5+32
	Humidity=[Voltage * (High_H - Low_H) + 5 * Low_H)/50
	CO2=Voltage * (High_C - Low_C)/5+Low_C
4-20mA	Temperature(C)=(Current-4) * (High_T - Low_T) + Low_T/10
	Temperature(F)=(DegC)*9/5+32
	Humidity=(Current-4) x (High_H - Low_H) + Low_H/10
	CO2=(Current-4) x (High_C - Low_C)/16 + Low_C

Register List

CO2-D1, CO2-W1 without network	High_T=R286 High_H=R288 High_C=R290 Low_T=R285 Low_H=R287 Low_C=R289
CO2-D1, CO2-W 1with network	High_T=R1256 High_H=R1258 High_C=R1260 Low_T=R1254 Low_H=R1257 Low_C=R1259

For example
1. Product: CO2-D1
2. Output range: 0-10V output (Adjust jumper to select 0-10V in PCB board)
3. The default settings R285 = 0 and R286 = 1000, that means the default output scale is 0C-100.0C, and they can be set by customer.
4. Measuring temperature output voltage: 7.8V
5. Temperature(C)=[Voltage * (High_T - Low_T) + 10 * Low_T] /100
=[7.8 * (1000-0) + 10 * 0]/100
=78C

CO2-Humidity-Temp Transmitter w/ Bacnet

Instrument Operation

7.1)There are four keys. The first and second keys are used to increase and decrease the value and select the up down list. When click the third key, it will be back to the previous view layer. And click the forth key,it will switch to the next item.


Increase value or select up list


Decrease value or select down list


Back or return

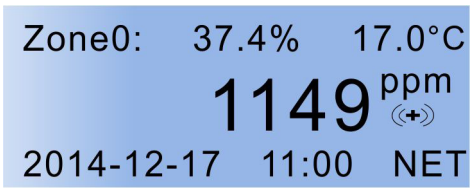

Next or confirm

Menu display chart

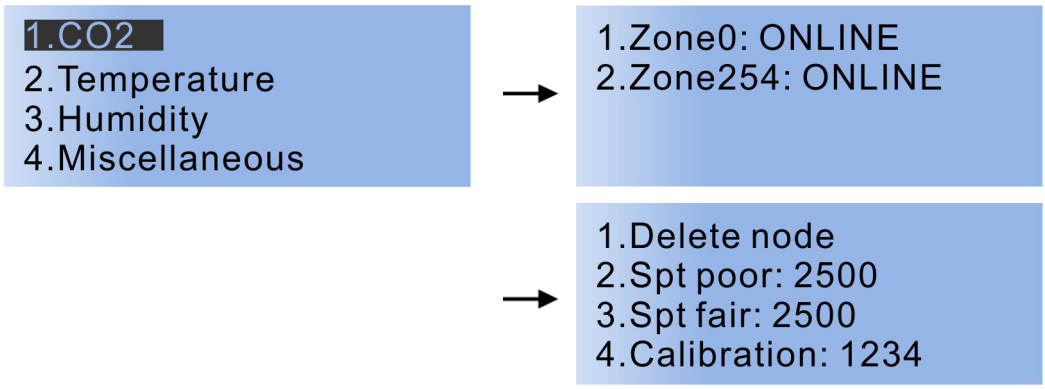
The following value was taken as an example so you can understand it well.

CO2	Zone 0: Zone 254:	1. Delete node 2. Spt poor: 2500 3. Spt fair: 2500 4. Calibration: 1294
Temperature	1. Int: 23.0°C 2. Ext: 18.2°C 3. Unit: °C/ °F 4. Sensor disp.: Ext./Int.	
Humidity	1. Calibration: 34.9% 2. Heat: ON/OFF	
Miscellaneous	1. Modus ID: 251 2. Date: 2014-12-17 3. Time: 11:00 4. Ring on time: 2 5. Ring off time: 2 6. Baudrate: 19200 7. Factory reset 8. Use password: Yes/No 9. Password	

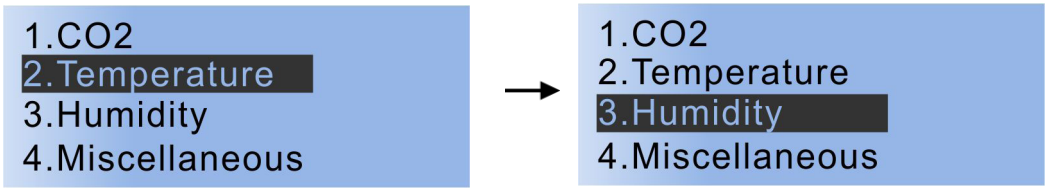
a.Normal state:



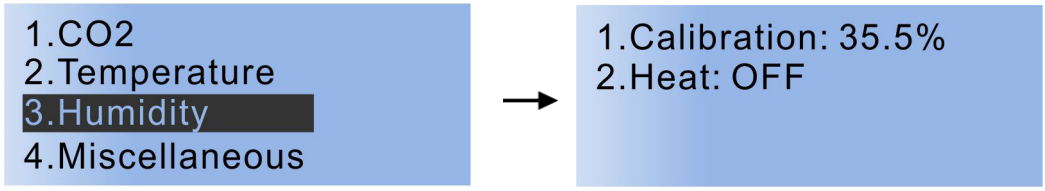
b.Please press ▶, it will switch to menu view as the following picture shows. Continue to press ▶ and it will go into the CO2 list. Press ▶ again, into the zone0's list.



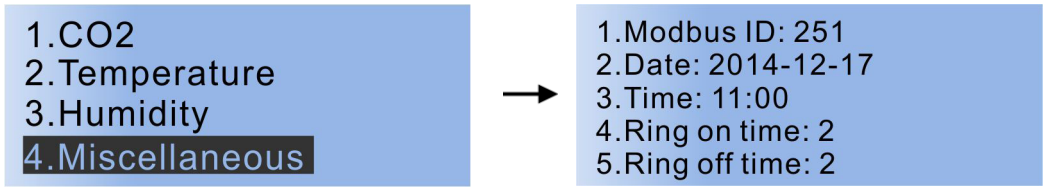
c. Please press ◀, come back to the menu column. Press ▲ or ▼, and select Temperature, then press ▶, go into the temperature list.



d. Please press ◀, come back to the menu column. Press ▲or ▼, and select Humidity, while press ▶, go into the humidity list.



e. Please press ◀, come back to the menu column. Press ▲ or ▼, and select Miscellaneous, continue to press ▶, go into the miscellaneous list.



f. When everything is set, after a while, it will switch to the normal state as step as displayed.

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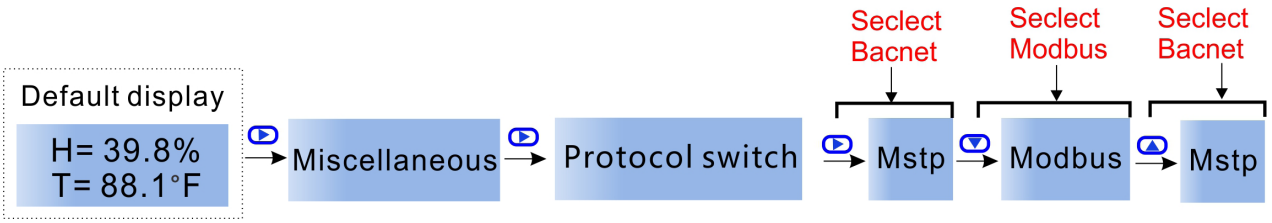
Modbus/Bacnet switch

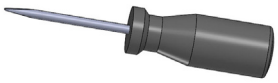
To select the protocol as Modbus or Bacnet,Press ▶ to choose Miscellaneous,then press ▶ to choose Protocol switch,press ▼ ,it reads Mstp,which means you have seclected Bacnet ;if you want to switch to Modbus,press ▼ , or ▲ back to Bacnet.



Or you can check the Bacnet Resgister List,No.9: Protocol switch. 0 = MODBUS,1=MSTP.

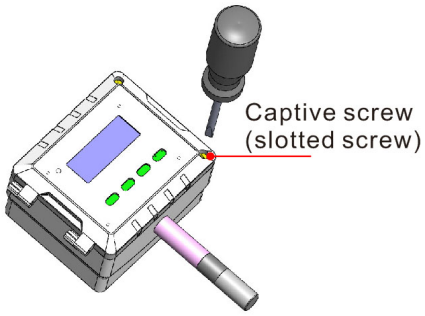
Mounting Installation

1) Slotted screwdriver.

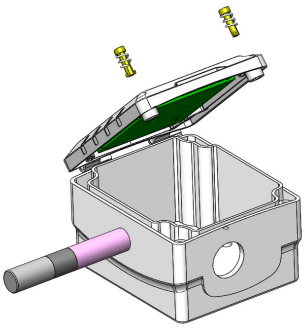


Captive screw (slotted screw)

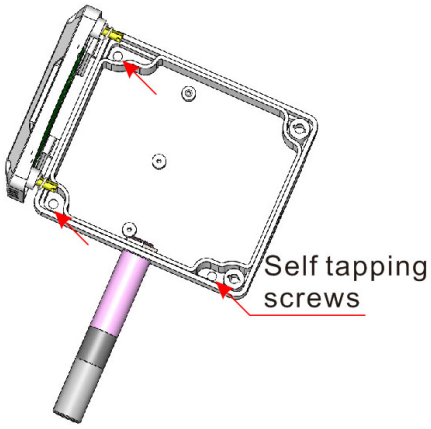
2) Unfasten screw at cover, turn the captive screw 1/2 turn till it pops out.

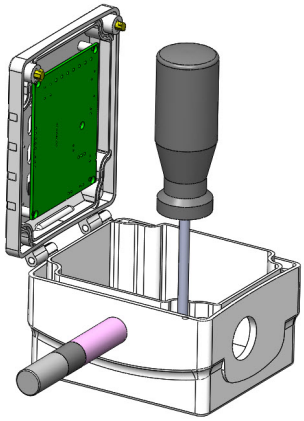


3) Open the cover.

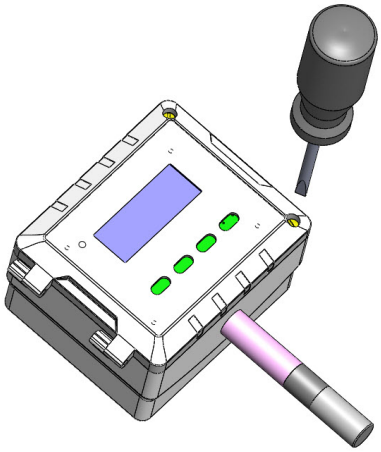


4) There are three small holes as red arrows showed below inside the box for fastening self tapping screws drilling the hole in the duct with a template





5) Re-fasten screw at cover.



CO2-Humidity-Temp Transmitter w/ Bacnet

Accessories

CO2-W1

This new Transmittier brings with it the incorpoation of CO2 Monitoring. When the External CO2 Sensor is attactched,the transmittier can process and display detailed information about the current CO2 count.

You can set the alarm setpoints in the menu using buttons or RS485.There are two alarm setpoints:

1. Fair alarm: the alarm output will be turned on for the ALARM_ON seconds, then be turned off for ALARM_OFF seconds, and go on on-off-on-off .
2. Poor alarm: the alarm output will be turned and kept it on.

AND there are two types of the CO2-W we have, one with ethernet and the other without ethernet.

1)ALARM_ON, you can set it in the register1247 with ethernet or register152 without ethernet.

2)ALARM_OFF, you can set it in the register1248 with ethernet or register153 without ethernet.

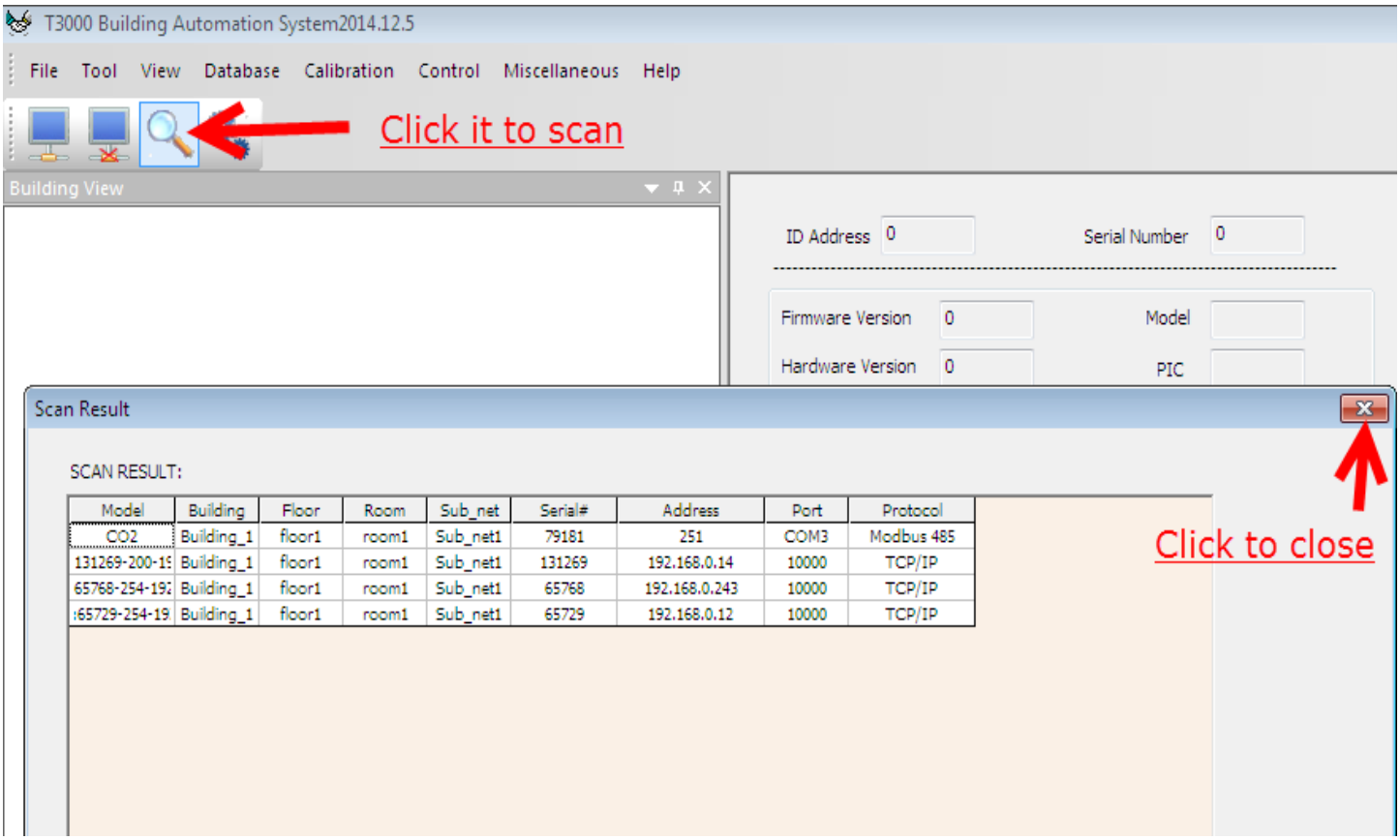
3)Fair setpoint you can set it in the register213 with ethernet or register 155 without ethernet.

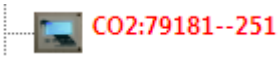
4)Poor setpoint you can set it in the register214 with ethernet or register156 without ethernet.

CO2-D1/W1 in T3000 Operation

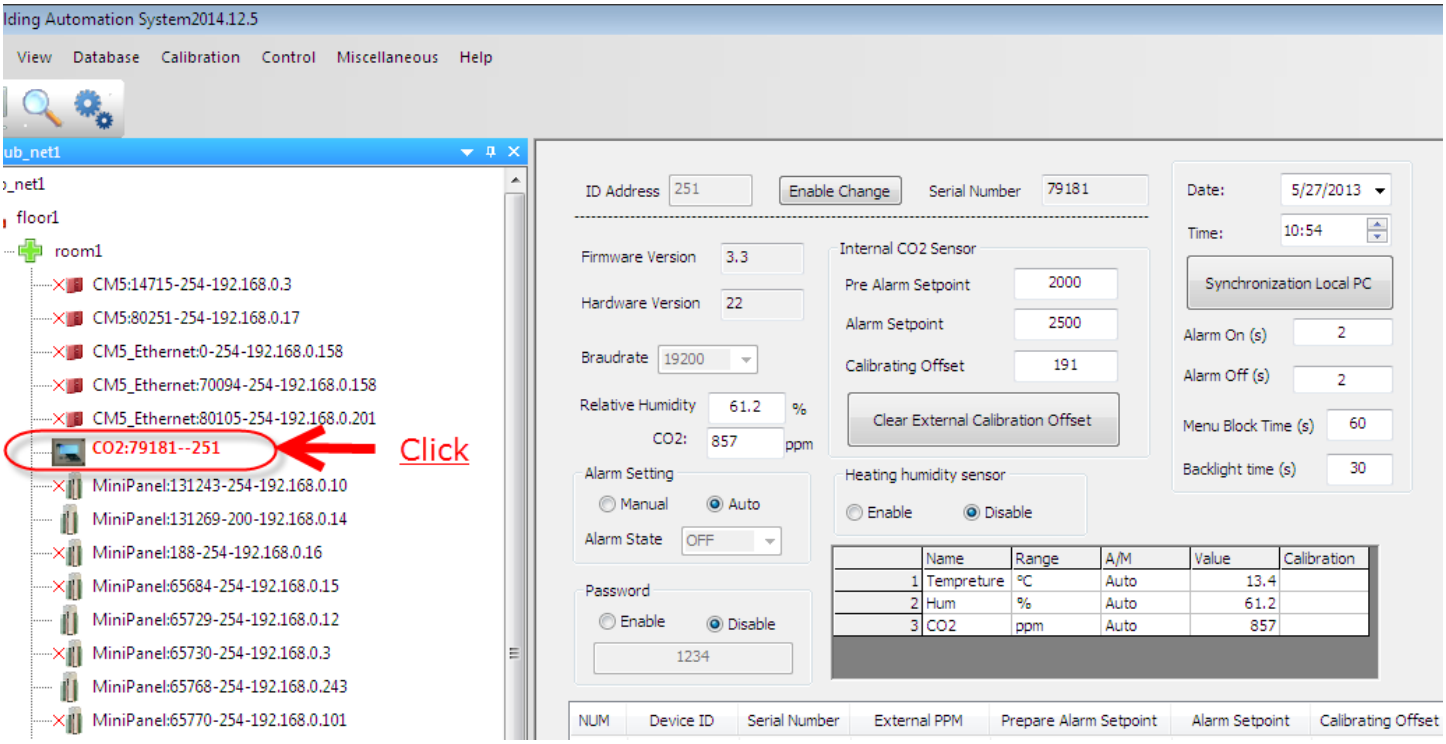
1). Connect CO2 to PC by RS485 and start T3000 software.

2). Click the button  to scan, the following view will appear and close it as the picture indicates.



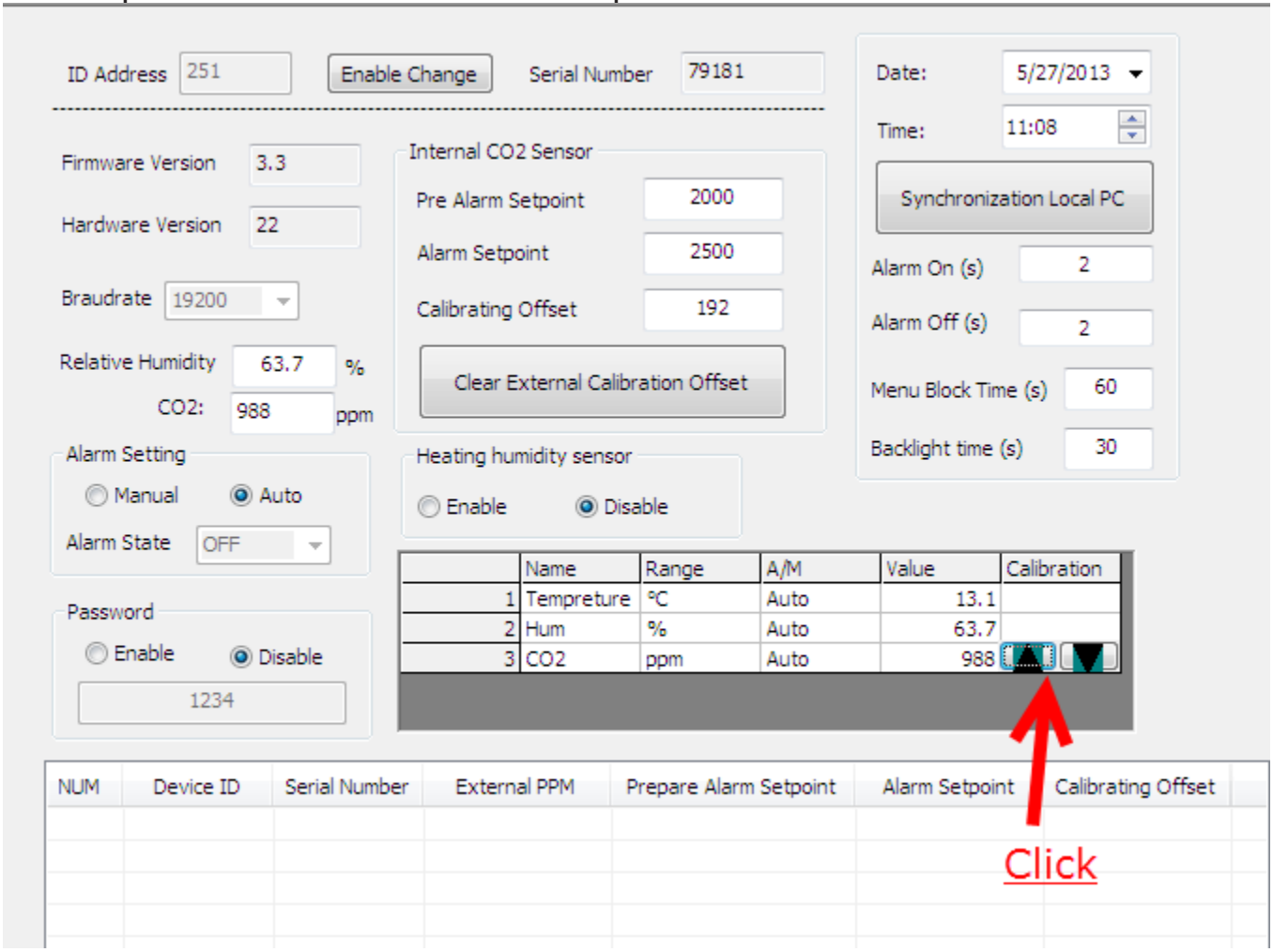
3). Click CO2 log 

and the T3000 will show all the information of CO2.

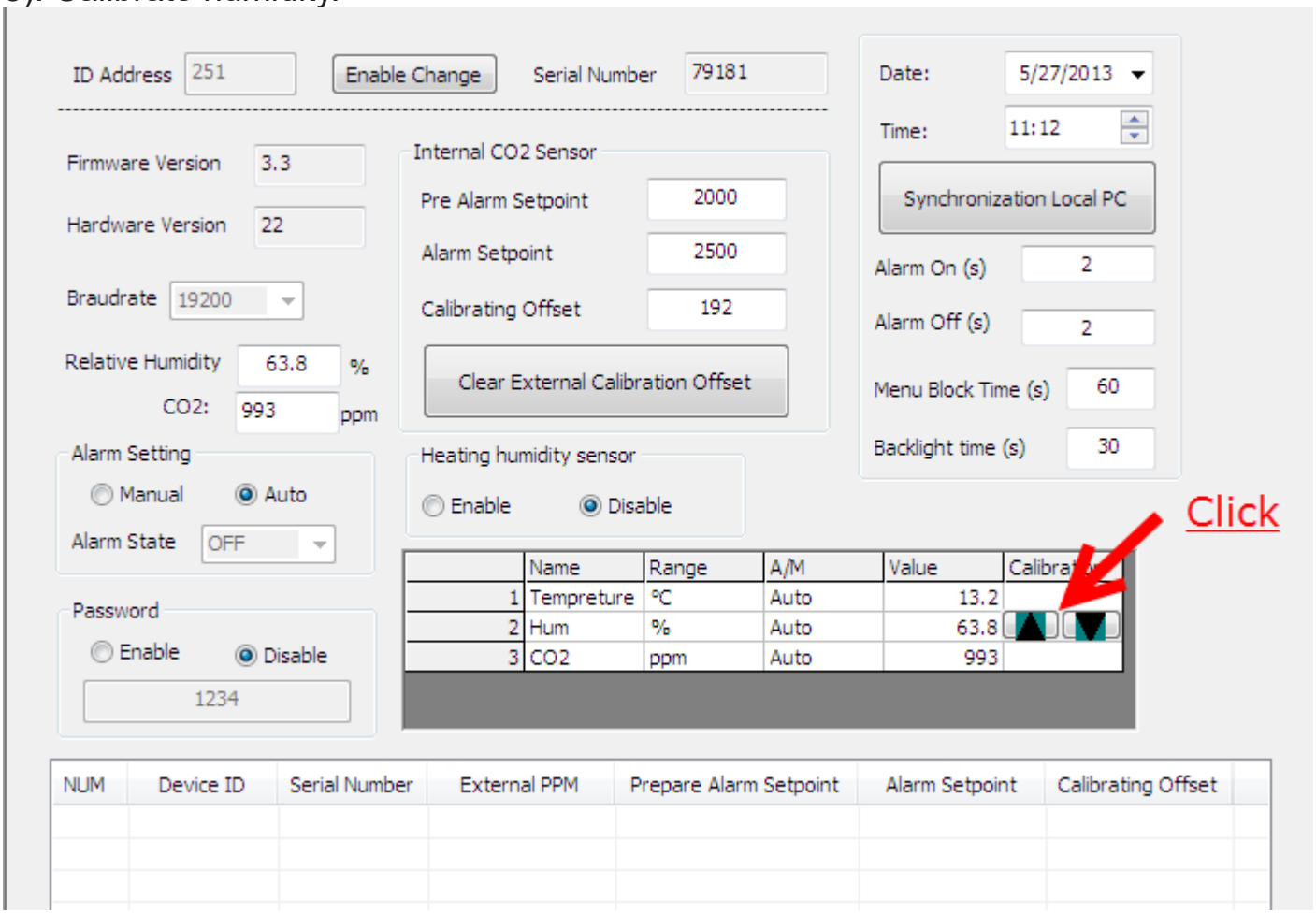


4). Calibrate CO2

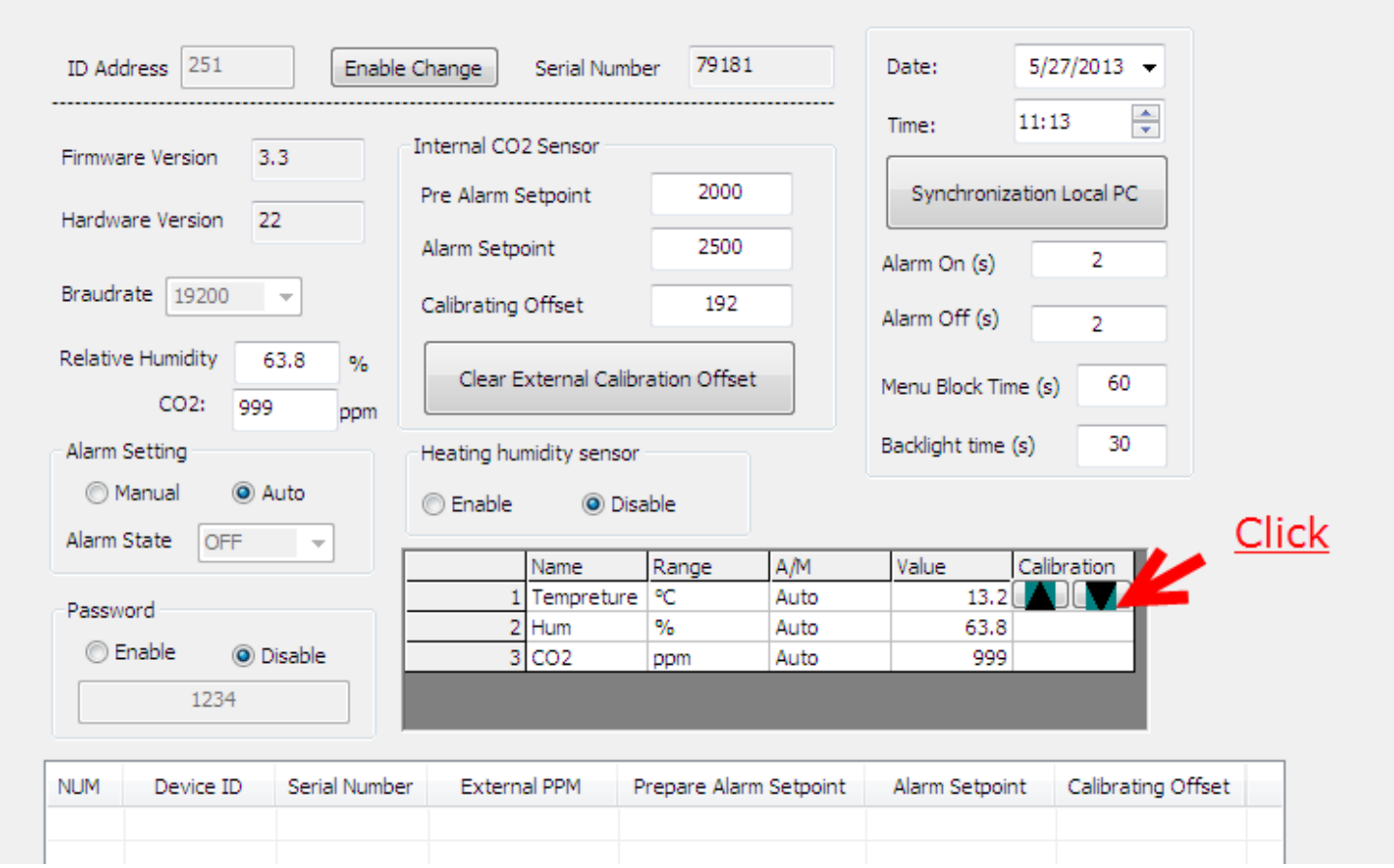
Press up arrow to increase value while press down arrow to decrease.



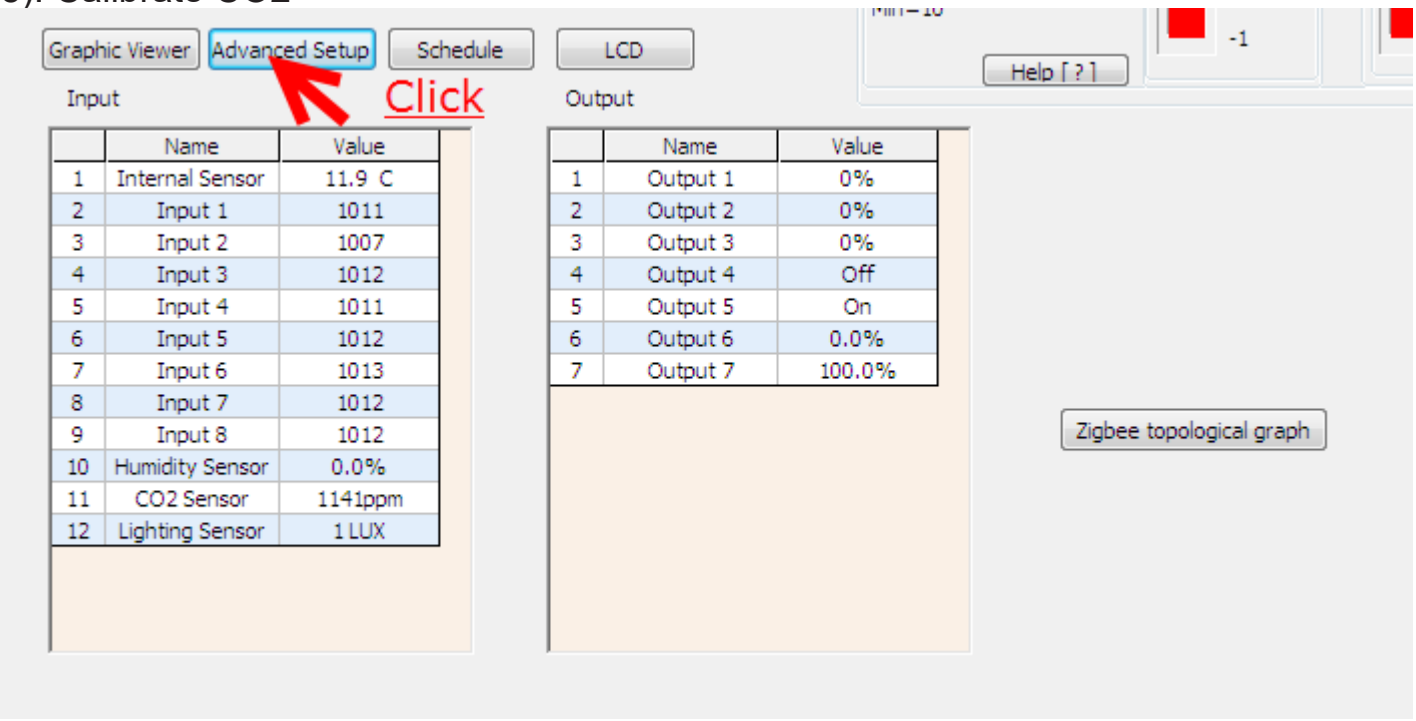
5). Calibrate humidity.



6). Calibrate temperature.



5). Calibrate CO2



	Name	Value
1	Internal Sensor	11.9 C
2	Input 1	1011
3	Input 2	1007
4	Input 3	1012
5	Input 4	1011
6	Input 5	1012
7	Input 6	1013
8	Input 7	1012
9	Input 8	1012
10	Humidity Sensor	0.0%
11	CO2 Sensor	1141ppm
12	Lighting Sensor	1 LUX

	Name	Value
1	Output 1	0%
2	Output 2	0%
3	Output 3	0%
4	Output 4	Off
5	Output 5	On
6	Output 6	0.0%
7	Output 7	100.0%

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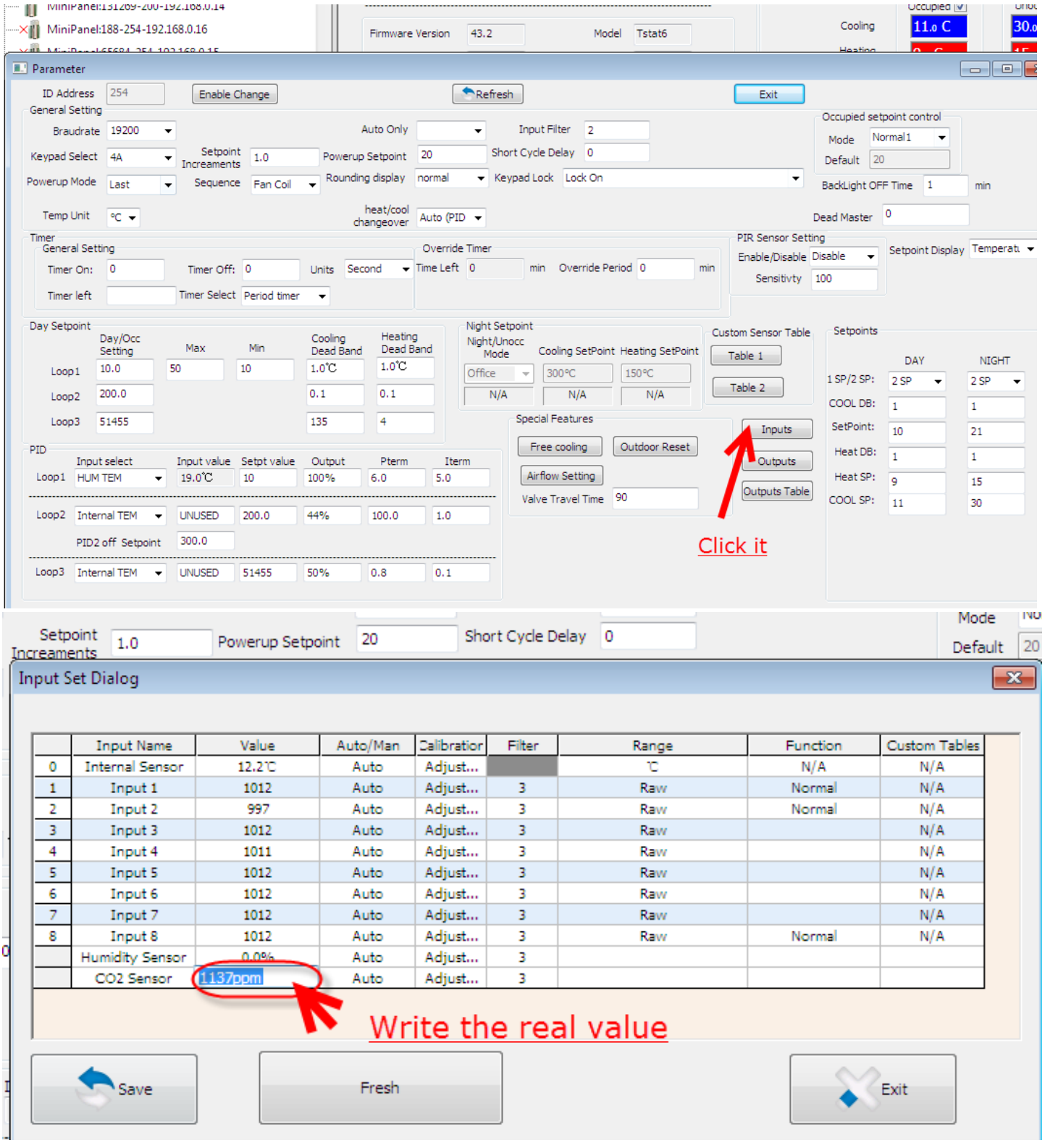
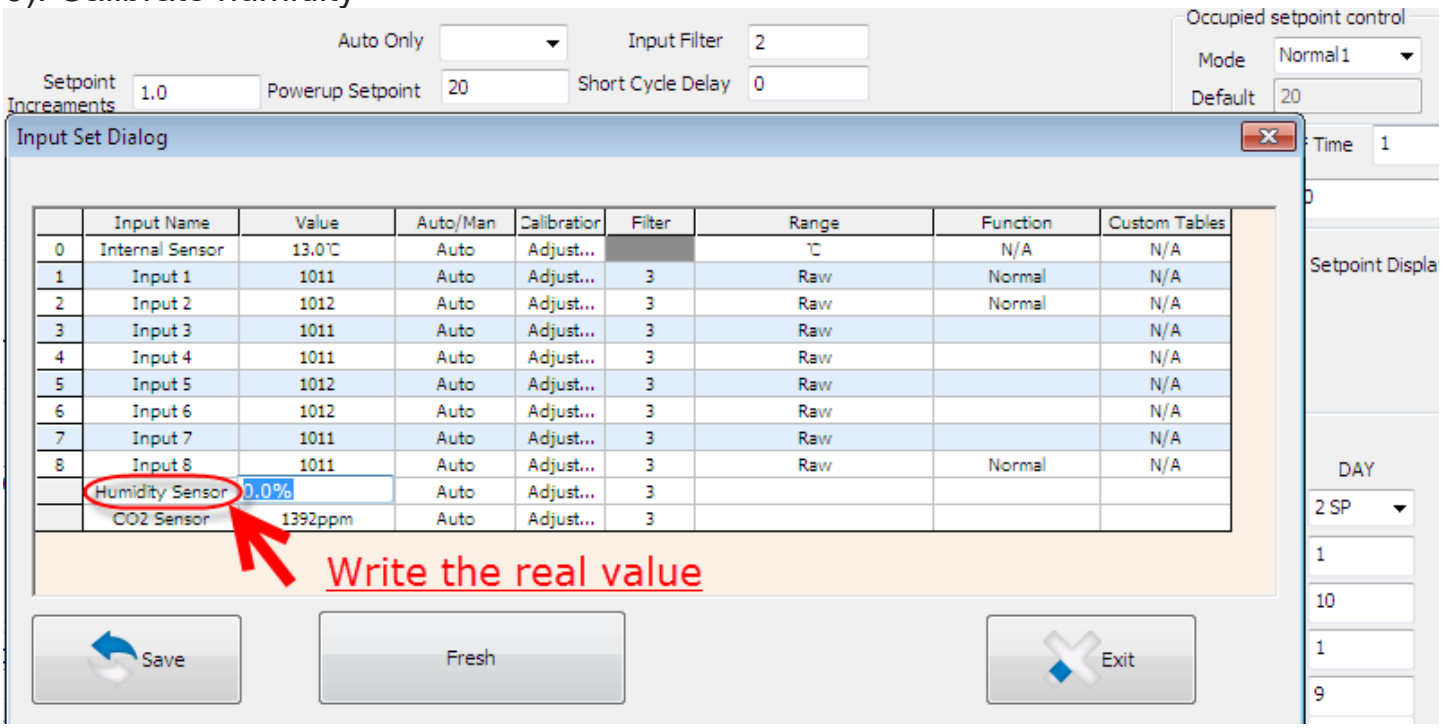
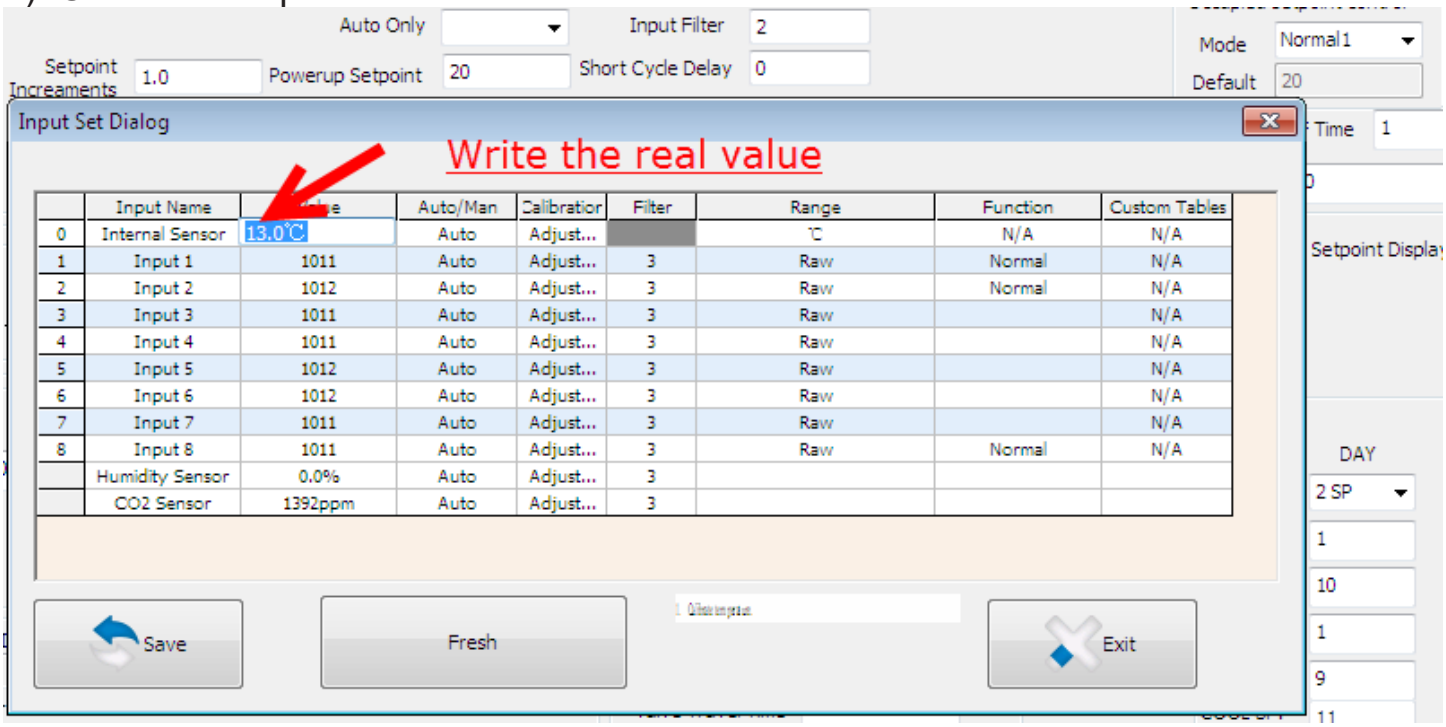


6). Calibrate humidity



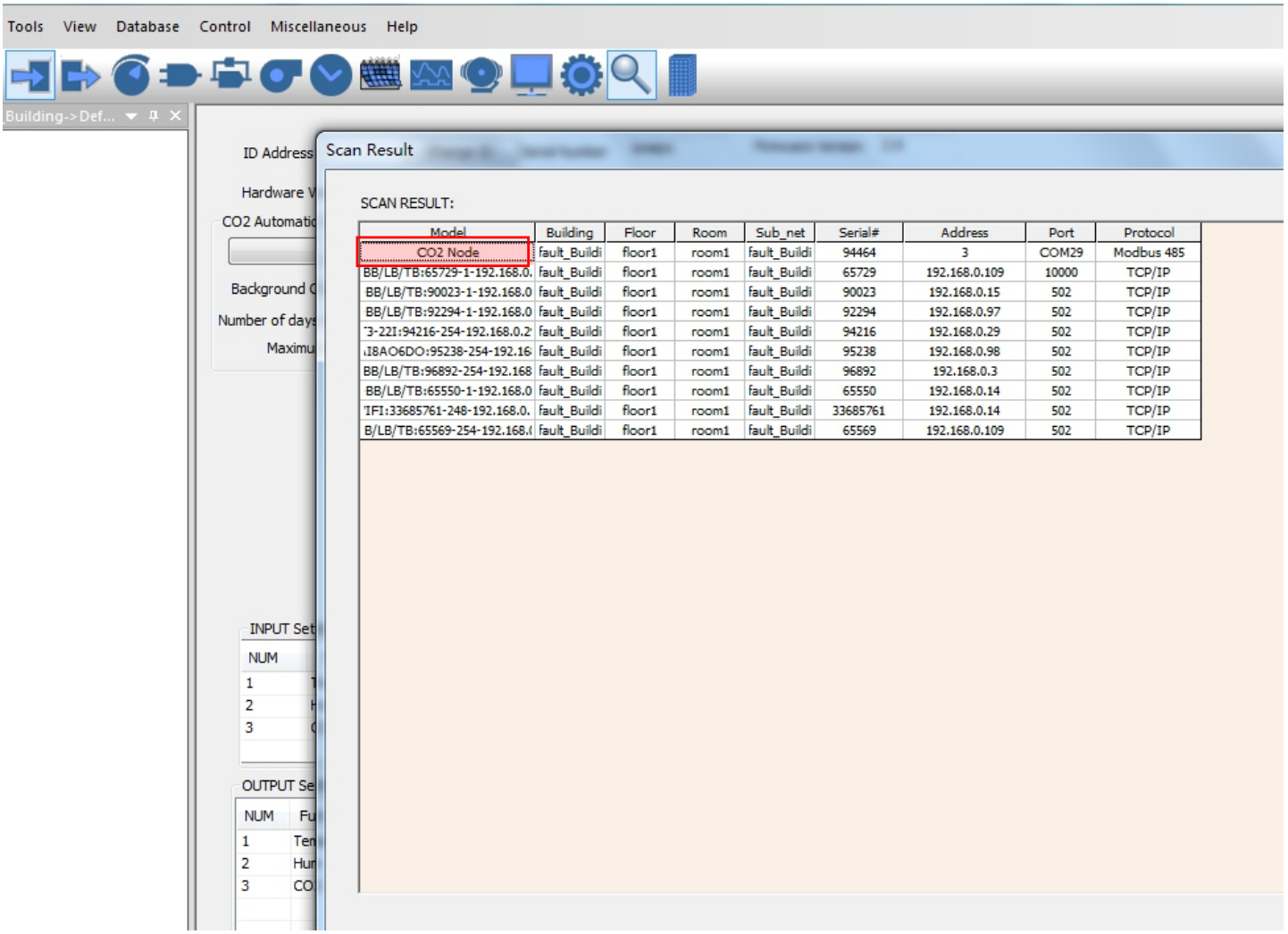
7). Calibrate temperature.



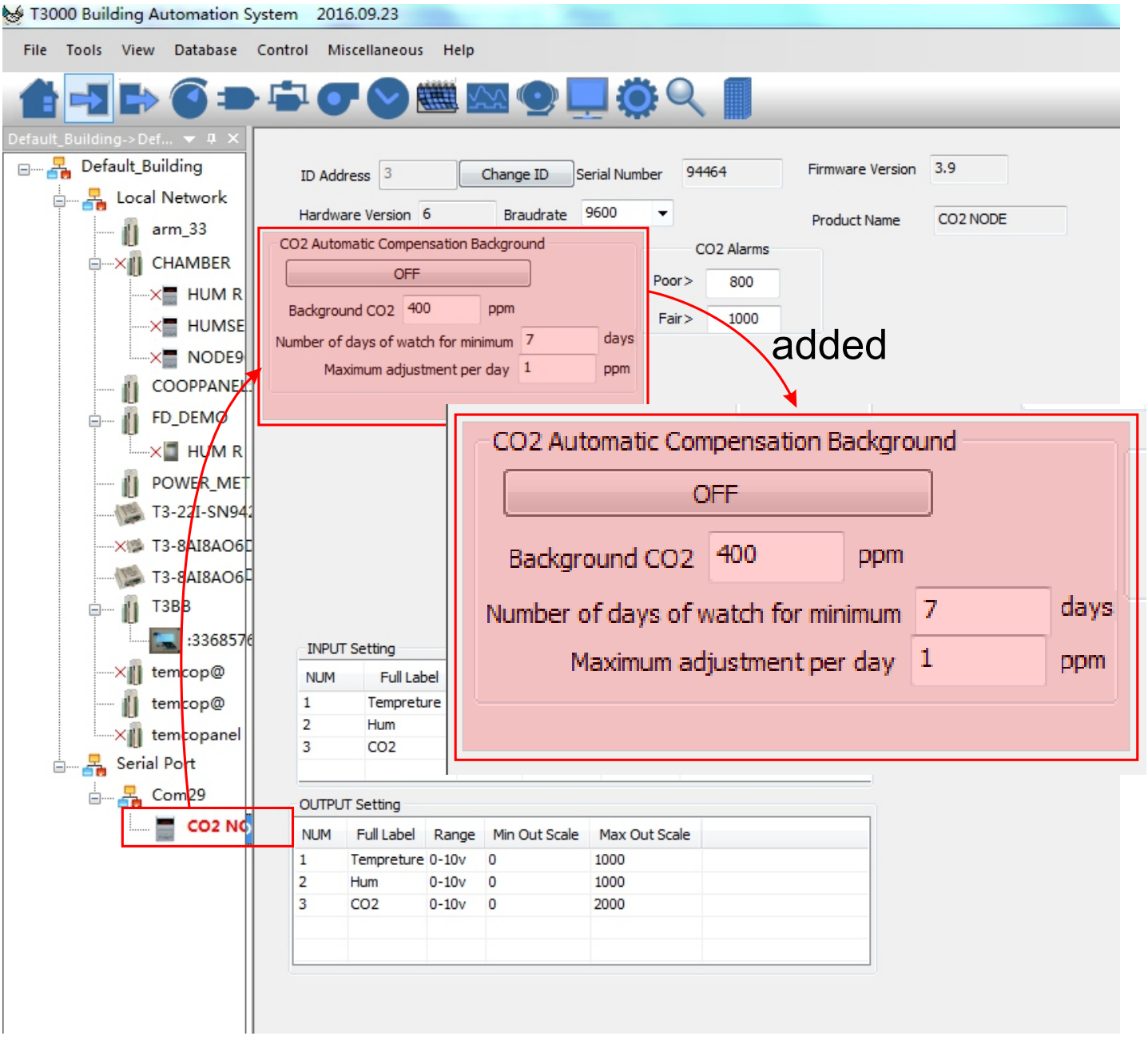
CO2-N in T3000 Operation

1). Connect CO2-N to PC by RS485.

2). Open T3000 and it show the following view.Click the button  to scan, the following view will appear and close it as the picture indicates.



3). The following view shows Background calibration for C02-N added.

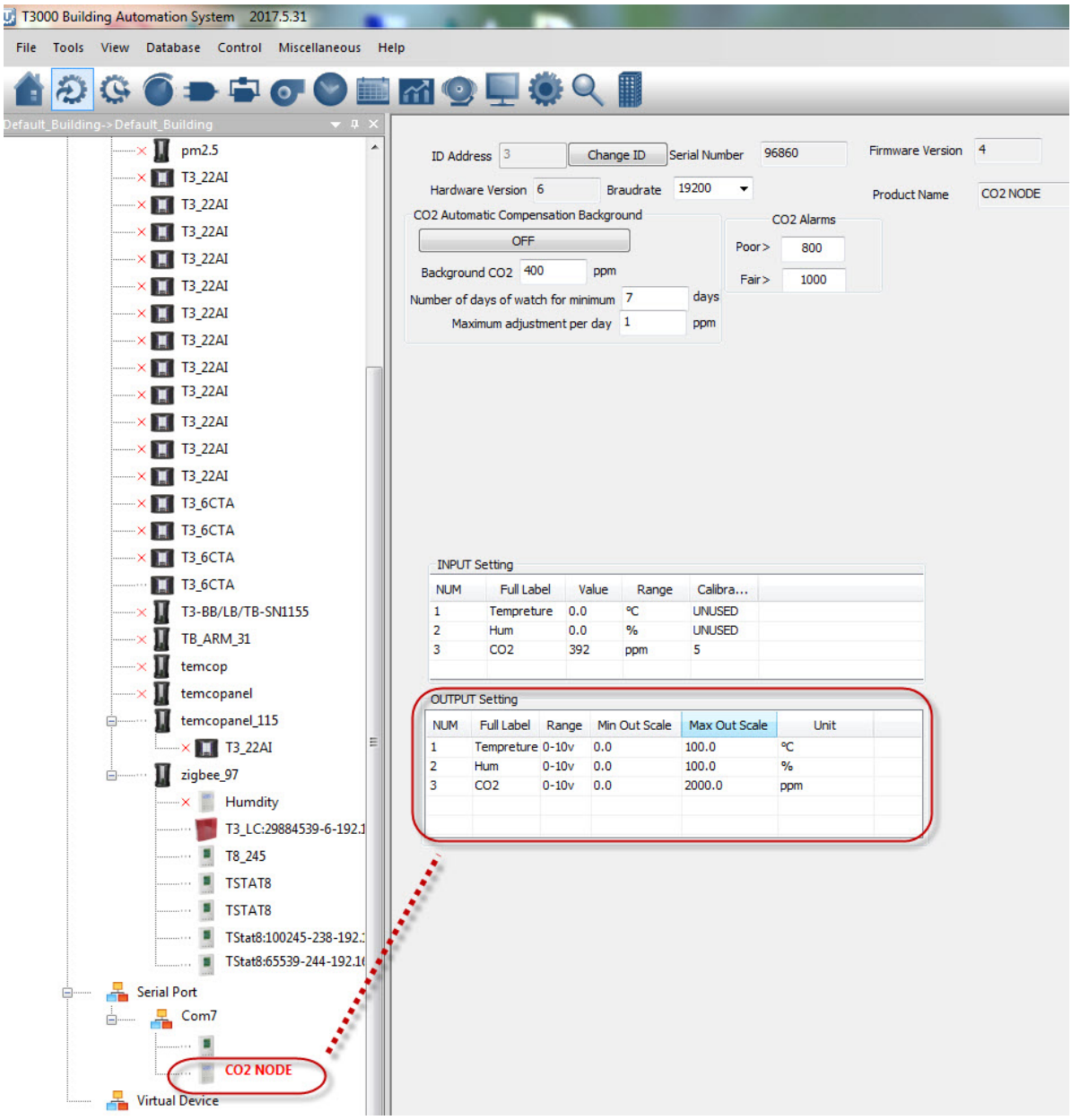


CO2-Humidity-Temp Transmitter w/ Bacnet

3). You can use the t3000 to set the configuration. The following view shows how to set up the span of the analog outputs.

1.We have a jumper on the background of the PCB, you can set it to 0~10V,0~5V or 4 ~20mA.

2.Set the range. For example,If the temperature is 20.0 c, the range you set the min out scale 0, the max out scale 1000(100.0 degree c), then the output= 20.0 / (100.0 – 0 . 0) * 10V = 2V.



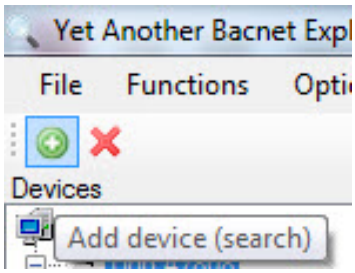
3.Also,you can use the modbus poll to configure it.

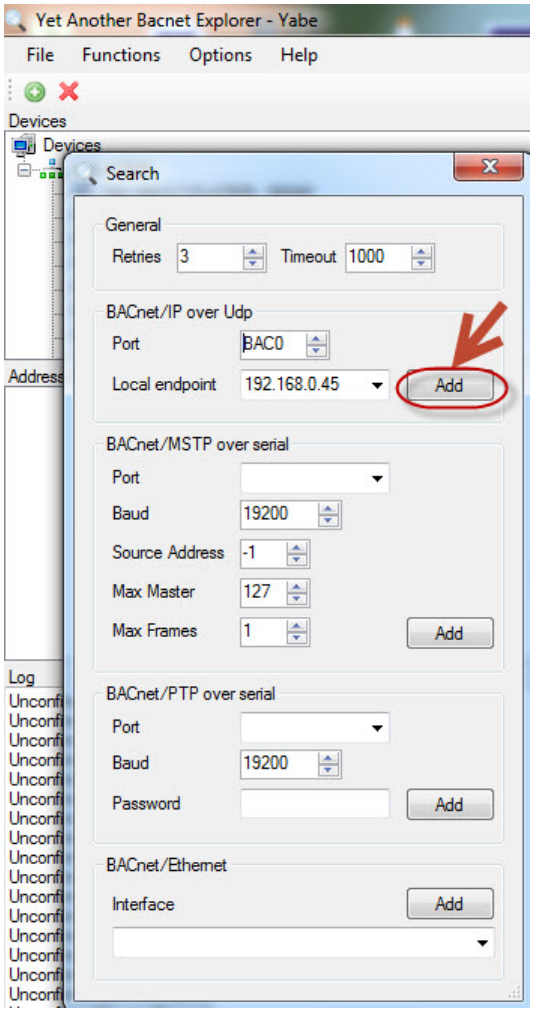
127	1	analog output mode, change it by setting the jumper (J20) on the board, read only
128	2	the minimum value of temperature directs to the analog output
129	2	the maximum value of temperature directs to the analog output
130	2	the minimum value of humidity directs to the analog output
131	2	the maximum value of humidity directs to the analog output
132	2	the minimum value of co2 directs to the analog output
133	2	the maximum value of co2 directs to the analog output
		e.g. co2 output: if the co2 ppm is 1000, the (minimum value, maximum value) = (0, 3000), then
		1. setting J20 to select 0V-10V output mode, so the co2 output is about ((1000ppm / (3000ppm - 0ppm)) * (10V - 0V)) + 0V = 3.3V
		2. setting J20 to select 0V-5V output mode, so the co2 output is about ((1000ppm / (3000ppm - 0ppm)) * (5V - 0V)) + 0V = 1.65V
		3. setting J20 to select 4mA-20mA output mode, so the co2 output is about ((1000ppm / (3000ppm - 0ppm)) * (20mA - 4mA)) + 4mA = 9.3mA

CO2-Humidity-Temp Transmitter w/ Bacnet

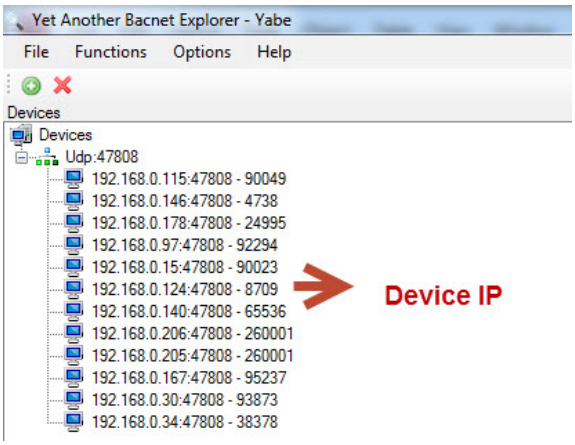
Connecting to the device using Bacnet

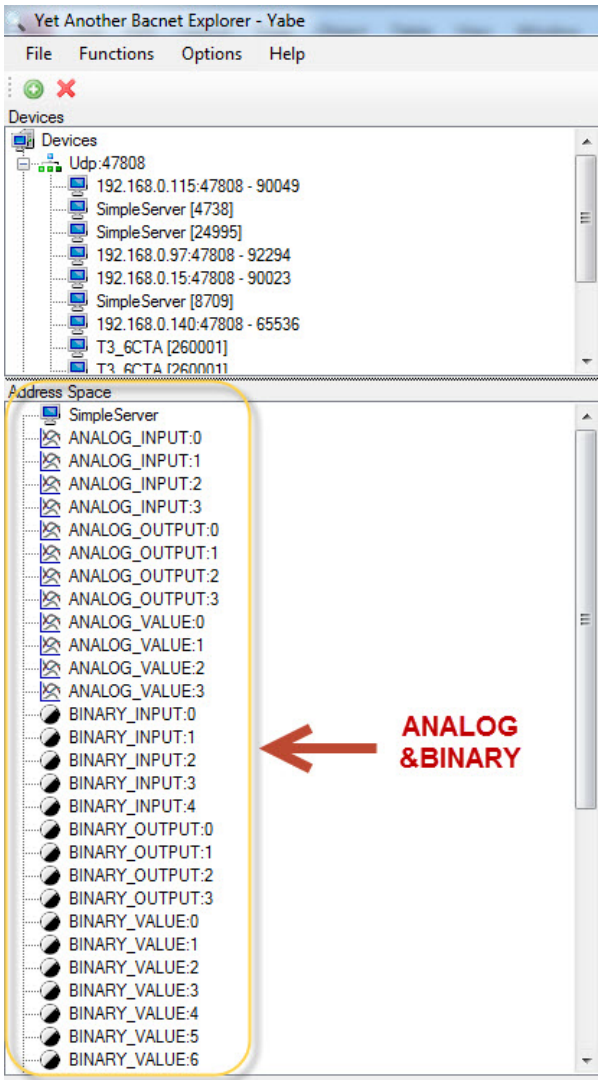
The device can be connected using Bacnet.Below are the steps:
Step1.Download Yabe software as the link:*https://tinyurl.com/ycrt9jep* and install it.
Step2.Connect the device to the computer,select Bacnet protocol.Start the Yabe software,add the device.



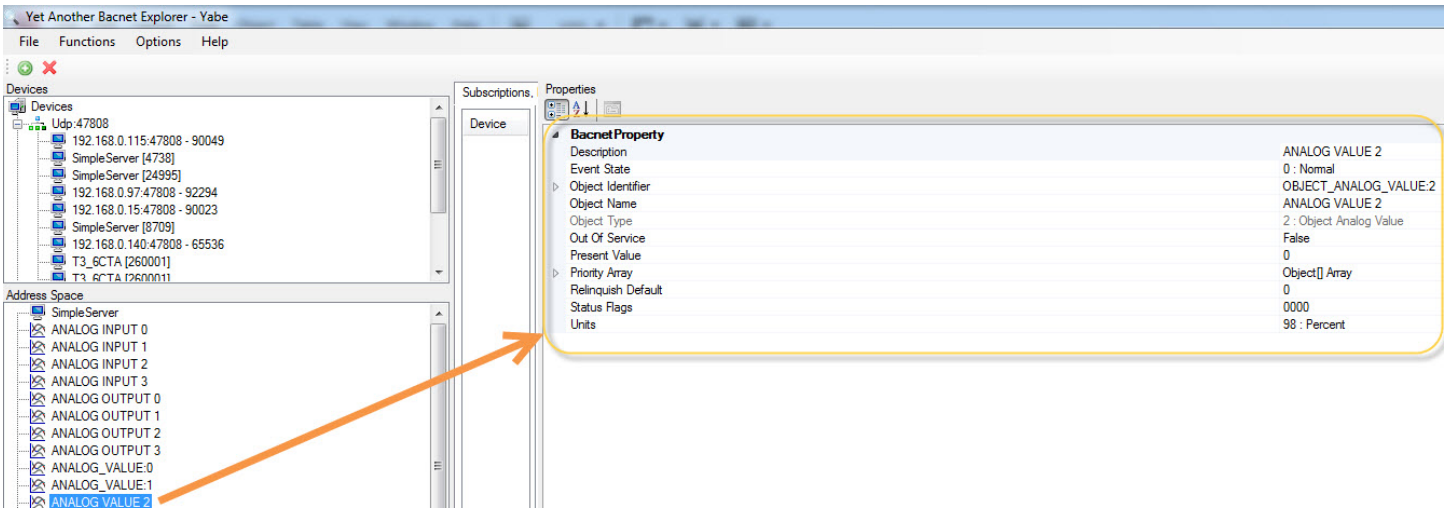


Step3.You can find your device IP as below.Double click the left mouse button,you can find your device and the bacnet information in the “Adress Space” tab.





Step4.In the “Address Space” tab,click the “ANALOG_VALUE” ,it will show the information of “log ANALOG_VALUE”in the BacnetProperty tab. And it ‘s the same with “ANALOG_OUTPUT” and other items.



CO2-Humidity-Temp Transmitter w/ Bacnet

Address	Bytes	CO2-D1&CO2-W1 Without Ethernet Register Description
0..1	2	Lower 2 bytes of the serial number
2..3	2	Upper 2 bytes of the serial number
4	1	firmware version lower byte. eg. FW version = 10.12, so lower byte = 12 AND high byte = 10. Fixid.
5	1	firmware version upper byte. eg. FW version = 10.12, so lower byte = 12 AND high byte = 10. Fixed.
6	1	Default Modbus device address=254
7	1	Product ID, Fixed.
8	1	Hardware version
9	1	spare
10	1	spare
11	1	Time zone
12	1	Baudrate Setting: 0 = 9600bps, 1 = 19200bps,2=38400bps,3=57600bps,4=115200bps
13	1	day lighting switch, 0 =disable day lighting feature, 1= enable
14	1	spare
15	1	reset flash. The unit will clear all configs to zero if this register being set to 0x55 = 85
16	1	Firmware Update Register, used to show the status of firmware updates
17 to 20	4	spare
21	1	Protocol switch. 3 = MODBUS,0=MSTP.
22~39	18	spare
40 to 45	6	reg40, MAC address, read only normally. (they can be written if write the regsiter 93 to 1 first, for the default setting before out of the factory.)
46	1	reg46, IP mode. 0=static IP; 1= DHCP
47 to 48	2	reg47, upper two bytes of IP address
49 to 50	2	reg49, lower two bytes of IP address
51 to 52	2	reg51, right two bytes of SUBNET MASK address
53 to 54	2	reg53, left two bytes of SUBNET MASK address
55 to 56	2	reg55, right two bytes of GATEWAY address
57 to 58	2	reg57, left two bytes of GATEWAY address
59	1	reg59, 0, TCP server, (NO USE)
60	1	reg60, listen port at TCP server mode
61 to 75		buffer mirror for changing to a new IP address, copy of reg 46 to 60
76	1	write 1 to set the ghost settings to the system and start new settings, then clear the ghost registers.
91	1	Set 1 manual to write configurations to flash
92	1	Period of write configurations to flash if configurations changed without setting register to 1. counter by second.
93	1	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 to 99	7	Reserved for future.
100 to 105	6	reg100, MAC address, read only normally. (they can be written if write the regsiter 93 to 1 first, for the default setting before out of the factory.)
106	1	reg106, IP mode. 0=static IP; 1= DHCP

CO2-Humidity-Temp Transmitter w/ Bacnet

Address	Bytes	CO2-D1&CO2-W1 Without Ethernet Register Description
111 to 112	2	reg111, right two bytes of SUBNET MASK address
113 to 114	2	reg113, left two bytes of SUBNET MASK address
115 to 116	2	reg115, right two bytes of GATEWAY address
117 to 118	2	reg117, left two bytes of GATEWAY address
119	1	reg119, 0, TCP server, (NO USE)
120	1	reg120, listen port at TCP server mode
121 to 135	1	buffer mirror for changing to a new IP address, copy of reg 106 to 120
136	1	write 1 to set the ghost settings to the system and start new settings, then clear the ghost registers.
137 to 171	40	Reserved
172	1	scan command< =6 start scan>/LHN add
173	1	subnet <add =1rs485 =2zigbee =4all> /LHN add
174	1	NTP command< =6,start ntp >/LHN add
175 to 178	4	Time Server0 ipaddress
179 to 182	4	Time Server1 ipaddress
183 to 186	4	Time Server2 ipaddress
187 to 190	4	Time Server3 ipaddress
191 to 194	4	Time Server4 ipaddress
195 to 198	4	Time Server5 ipaddress
199	1	Time Sync result: 0-Fail 1-Sucessful
200	1	Temperature sensor selection, 0=external, 1=internal. Read only, it will be set to 1 if the humidity module exists.
201	1	Select the unit of temperature to display on LCD. 0=degree Celsius, 1=degree Fahrenheit
202	2	The value of on board temperature sensor, the unit is degree Celsius. The resolution is 0.1 degree.
203	2	The value of on board temperature sensor, the unit is degree Fahrenheit. The resolution is 0.1 degree.
204	2	The value of external temperature sensor, the unit is degree Celsius. The resolution is 0.1 degree.
205	2	The value of external temperature sensor, the unit is degree Fahrenheit. The resolution is 0.1 degree.
206	2	The temperature offset for calibrating the internal temperature. The resolution is 0.1 degree.
207	2	Relative humidity. The resolution is 0.1%
208	2	Read only. The real frequency read from the humidity module, unuse.
209	1	Read only. The number of the calibration table points.
210	1	Internal CO2 sensor selection. The value is 1 as default.
211	2	The co2 ppm value of internal co2 sensor.
212	2	The co2 ppm offset for calibrating internal co2 sensor.
213	2	The setpoint value of fair alarm for internal co2 sensor.
214	2	The setpoint value of poor alarm for internal co2 sensor.
215 to 468	2*254	The co2 ppm value of the external co2 sensors if there are/is co2 nodes connect to it.
469 to 722	2*254	The co2 ppm offset for calibrating external co2 sensors.
723 to 976	2*254	The setpoint value of fair alarm for external co2 sensors.