

# 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 CO2, temperature and humidity monitoring. The modbus interface provides easy setup and integration into large systems. In addition, both CO2-D and CO2-W have an ethernet port.



## 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 except 'the Node'
- Automatic background calibration, default CO2 value: 400 ppm
- CO2 D/W style featured as pluggable sensor module with stainless steel sintered filter
- Enthalpy, its calculated automatically and available in the register list and display

### CO2-N-TH Highlights:

CO2-N-TH is indoor wall mount CO2, Temp & Hum sensor  
High performance sensing elements, temperature compensated, stable

### CO2-N-X Highlights:

CO2-N-X is indoor wall mount CO2 sensor  
Good quality and low cost

### CO2-N-TH & CO2-N-X:

Modbus RS485 with 0-5V, 0-10V and 4-20mA outputs, support Bacnet MS/TP

Available in red and white, other colors optional

Red/yellow/green LED shows the quality and safety of the air, and blue LED shows good communication



## Specifications

| Sensing            | CO2                       | HUM                   | TEMP                 |
|--------------------|---------------------------|-----------------------|----------------------|
| Sensor Type        | Dual Beam NDIR            | Capacitive            | 10k thermister       |
| Range              | 3,000 ppm, adjustable     | 0-100% Non-Condensing | -40~150°C(-60~340°F) |
| Accuracy           | ±70 ppm or ±5% of reading | 5% @25°C, 20~80%      | < ±0.5°C @ 25°C      |
| Drift              | <50ppm / yr full scale    | < 0.5% RH / year      |                      |
| Display Resolution | 1ppm                      | 0.1% RH               | 0.1Deg               |

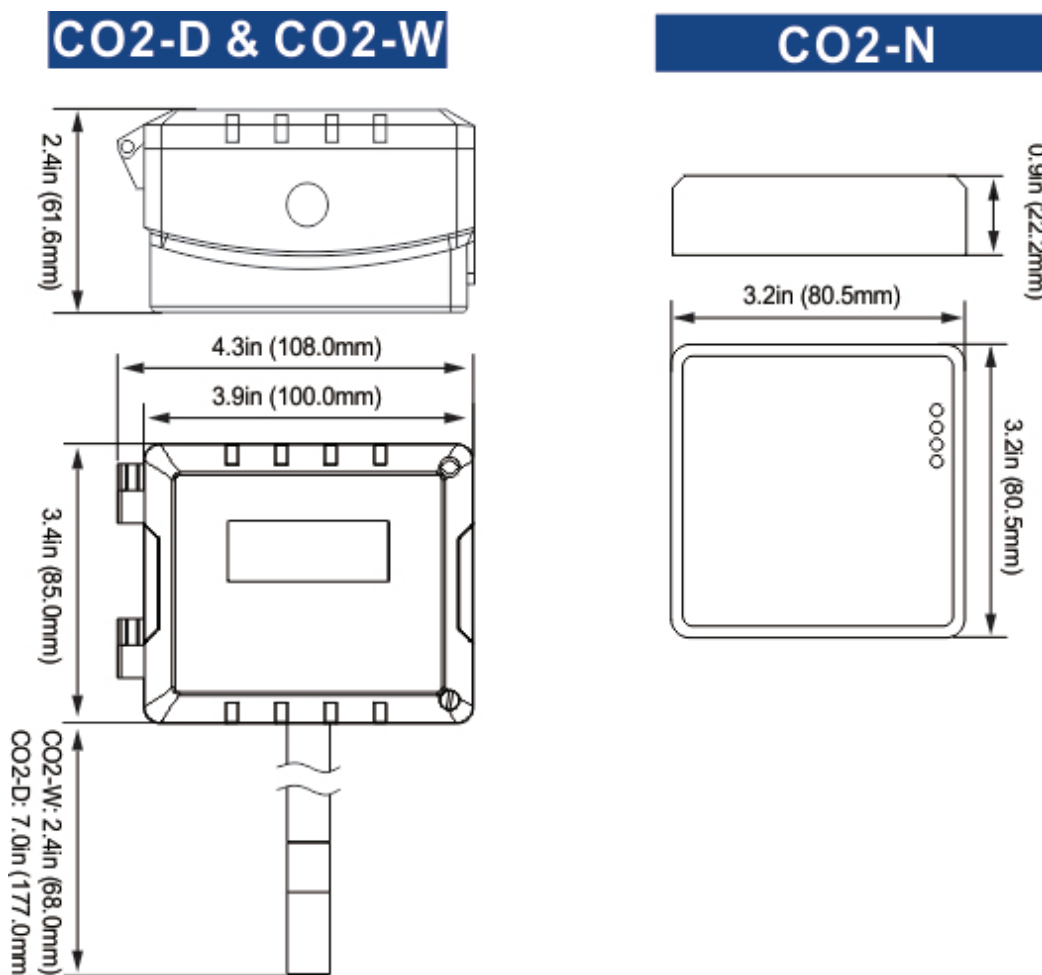
## CO2-Humidity-Temp Transmitter w/ Bacnet

| Models                 | CO2-D                                                             | CO2-W         | CO2-Node           | Tstat6-CO2         |
|------------------------|-------------------------------------------------------------------|---------------|--------------------|--------------------|
| Typical Application    | Duct                                                              | Wall, outside | Wall mount indoors | Wall mount indoors |
| Outputs                | 3                                                                 | 3             | 3                  | 2                  |
| Output Signal Type     | Jumper select: 4-20mA, 10V, 5V                                    |               |                    | 10V & 5V           |
| Output Signal Drive    | > 500Ω for ma mode, 75ma max output drive for voltage mode        |               |                    | 75ma @10V          |
| RS485 ports            | 2                                                                 | 2             | 1                  | 1                  |
| Ethernet Modbus TCP/IP | CO2-D-E                                                           | CO2-W-E       | not available      | not available      |
| 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             | 2x8char            |
| Control Features       | Master/Gateway Mode                                               |               | N/A                | Same as Tstat6     |

### 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-Humidity-Temp Transmitter w/ Bacnet

## Part Number Scheme

Co2 - D - T

| Code | Description |
|------|-------------|
| CO2  | CO2 Sensor  |

| Code | Module     |
|------|------------|
| D    | Duct Mount |
| W    | Wall Mount |
| N    | CO2 Node   |

| Code | Option                 |
|------|------------------------|
| X    | CO2 only               |
| TH   | Temperature & Humidity |

| Product | Model | Temp | Hum | CO2 | RS485 | Ethernet | Pitot |
|---------|-------|------|-----|-----|-------|----------|-------|
| CO2-D   | -TH-E | ✓    | ✓   | ✓   | ✓     | ✓        | ✓     |
|         | -X-E  | x    | x   | ✓   | ✓     | ✓        | ✓     |
| CO2-W   | -TH-E | ✓    | ✓   | ✓   | ✓     | ✓        | x     |
|         | -X-E  | x    | x   | ✓   | ✓     | ✓        | x     |
| CO2-N   | -X    | x    | x   | ✓   | ✓     | x        | x     |
|         | -TH   | ✓    | ✓   | ✓   | ✓     | x        | x     |

CO2 - N - TH - W

| Code | Description |
|------|-------------|
| CO2  | CO2 Sensor  |

| Code | Module   |
|------|----------|
| N    | CO2 Node |

| Code | Option                 |
|------|------------------------|
| W    | White Enclosure        |
| O    | Other Colors Optional* |

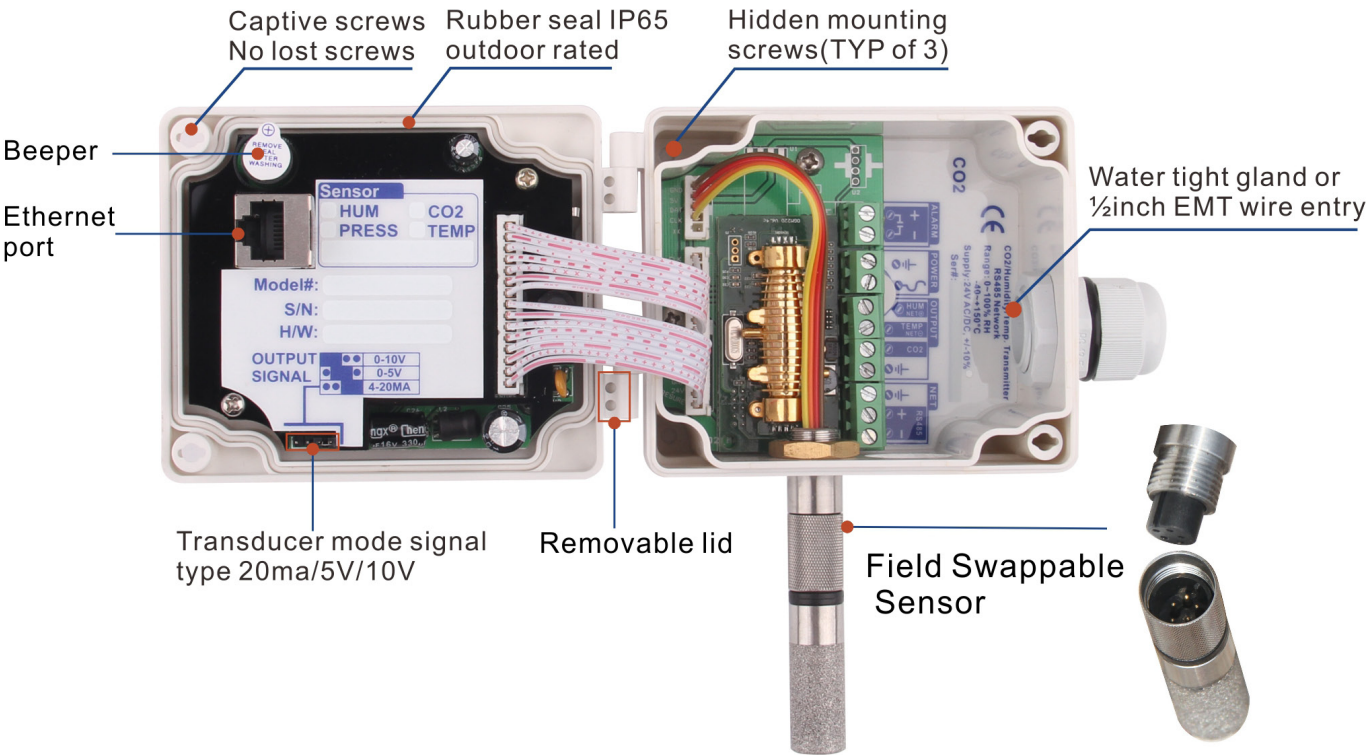
| Code | Option             |
|------|--------------------|
| X    | RS485              |
| TH   | Temp & Hum & RS485 |

\* MOQ: 100pcs

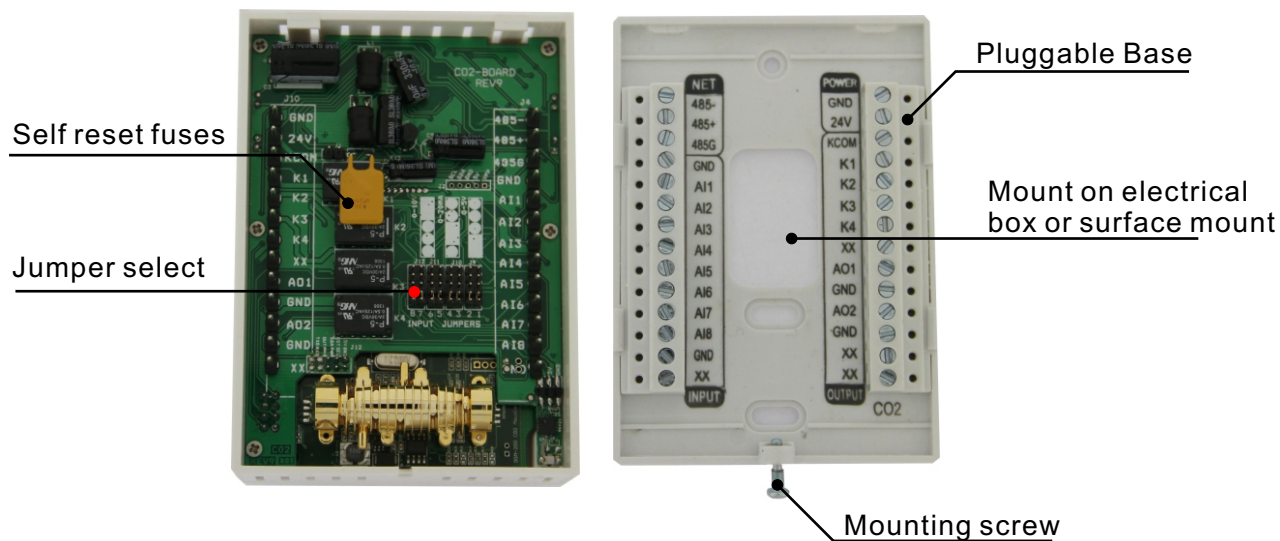
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## Product Highlights

### CO2-W & CO2-D



### Tstat6 -CO2





# CO2-Humidity-Temp Transmitter w/ Bacnet

## Register List

### Modbus

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

| Address   | Bytes | 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. Fixed.                                                                        |
| 5         | 1     | firmware version upper byte. eg. FW version = 10.12, so lower byte = 12 AND 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 = 115200 bps, default:115.2kbaud                                                               |
| 16        | 1     | Firmware Update Register, used to show the status of firmware updates                                                                                                     |
| 21        | 1     | Protocol switch. 3 = MODBUS, 0=MSTP. Default: 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, lower 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 settings 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 MAC registers(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.                                                       |
| 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, unused.                                                                                                      |
| 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 value of poor 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 sensors.                                                                                                                  |
| 723..976  | 2*254 | The setpoint value of fair alarm for external CO2 sensors.                                                                                                                |
| 977..1230 | 2*254 | The setpoint value of poor alarm for external CO2 sensors.                                                                                                                |
| 1231      | 2     | Reserve                                                                                                                                                                   |
| 1232      | 1     | The filter of CO2 sensor.                                                                                                                                                 |
| 1233      | 1     | Enable/Disable the password for the menu system operation. 0=Disable, 1=Enable.                                                                                           |
| 1234      | 1     | The first digital of the password. Should be from 0 to 9.                                                                                                                 |
| 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.                                                                                                                                         |

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|      |   |                                                                                                                                                          |
|------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                       |
| 1245 | 1 | The second of the real time clock.                                                                                                                       |
| 1246 | 1 | Alarm auto/manual control. Bit7: 0 = auto, 1 = manual; bit0: 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 to 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=4-20mA, 2=0-5V, 3=0-10V                                                                               |
| 1255 | 2 | The Lowest value of temperature for analog output.                                                                                                       |
| 1256 | 2 | The Highest value of temperature for analog output.                                                                                                      |
| 1257 | 2 | The Lowest value of humidity for analog output.                                                                                                          |
| 1258 | 2 | The Highest value of humidity for analog output.                                                                                                         |
| 1259 | 2 | The Lowest value of co2 for analog output.                                                                                                               |
| 1260 | 2 | The Highest 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-and-play feature of the external nodes. 0=disalbe, 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 information. Normally it is the unit itself.<br>register1266: the modbus ID of the co2 sensor.<br>register1267..1270: the serial number of the co2 sensor. |
| 1271..1275  | 1*5     | The second 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.                                                                                                                                                  |
| 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 table. 1 = user table.                                                                                                |
| 3007~3026   | 2 * 254 | factory calibrate table. Register3007:The 1st Calibration point. Frequency,Register 3008:The 1st Calibration point. RH.                                                       |
| 3027        | 1       | user calibrate table point number.                                                                                                                                            |
| 3028~3047   | 2 * 254 | user calibrate table. Register3028:The 1st Calibration point. RH,Register 3029: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 Highest 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 / 0.01 V) |
| 3067 | 2 | the analog output value of temperature.               |
| 3068 | 2 | the analog output value of CO2.                       |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## Bacnet

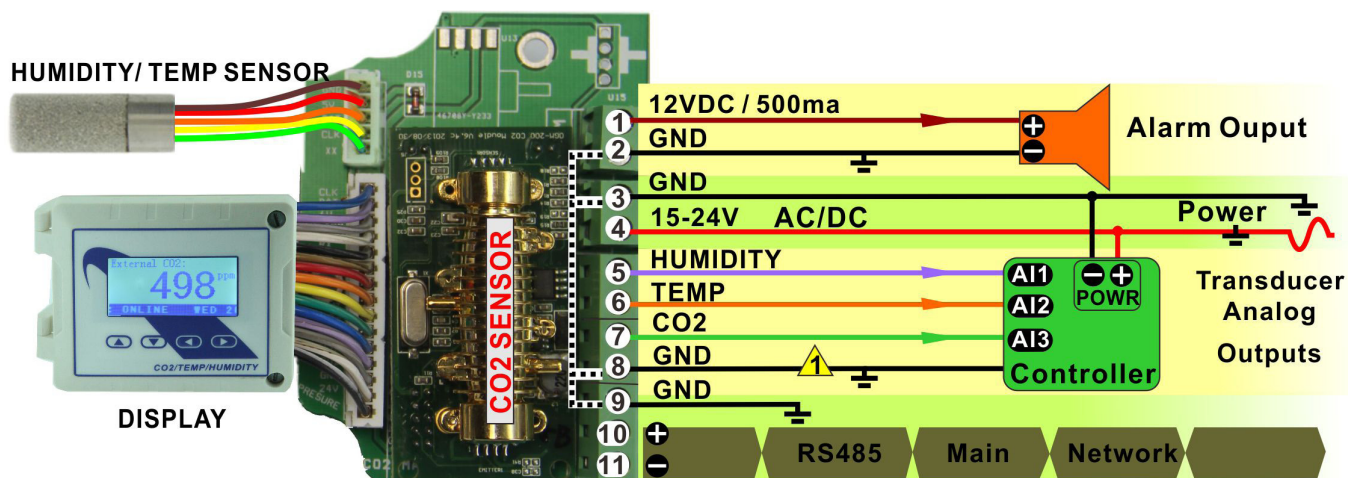
CO2-Humidity-Temp Transmitter w/Bacnet uses Bacnet protocol to communicate with others. Below is the Bacnet register list.

| Backed Object          | variable and Description                                                   |
|------------------------|----------------------------------------------------------------------------|
| Varialbe1              | SerialNumberLowByte                                                        |
| Varialbe2              | SerialNumberHighByte                                                       |
| Varialbe3              | SoftWare Version                                                           |
| Varialbe4              | Device ID                                                                  |
| Varialbe5              | Product Model                                                              |
| Varialbe6              | Instance                                                                   |
| Varialbe7              | Station number                                                             |
| Varialbe8              | Uart BaudRate.0=9.6kbaud, 1=19.2kbaud 2=38.4kbaud 3=57.6kbaud 4=115.2kbaud |
| Varialbe9              | Update                                                                     |
| Varialbe10             | Protocol                                                                   |
| Varialbe11             | Auto/Manual                                                                |
| Varialbe12             | dew point                                                                  |
| Varialbe13             | Pws                                                                        |
| Varialbe14             | Lowest Ratio                                                               |
| Varialbe15             | Enthalpy                                                                   |
| Varialbe16             | OffSet Humdity                                                             |
| Varialbe17             | OffSet Tempeature                                                          |
| Varialbe18             | OffSet CO2                                                                 |
| Varialbe22             | Filter Humdity                                                             |
| Varialbe23             | Filter Temperature                                                         |
| Varialbe24             | Filter CO2                                                                 |
| Varialbe28             | Temperature Unit .0 = C, 1 =F                                              |
| Varialbe29             | OutMode. 1=0-10V, 2=0-5V, 3=4-20mA                                         |
| Varialbe30             | Output1 Lowest Range                                                       |
| Varialbe31             | Output1 Hightest Range                                                     |
| Varialbe32             | Output2 Lowest Range                                                       |
| Varialbe33             | Output2 Highest Range                                                      |
| Varialbe34             | Output3 Lowest Range                                                       |
| Varialbe35             | Output3 Highest Range                                                      |
| Input and Description  |                                                                            |
| Input1                 | Temperature                                                                |
| Input2                 | Humidity                                                                   |
| Input3                 | CO2                                                                        |
| Output and Description |                                                                            |
| Output1                | Humidity Analog output                                                     |
| Output2                | Temperature Analog output                                                  |
| Output3                | CO2 Analog output                                                          |

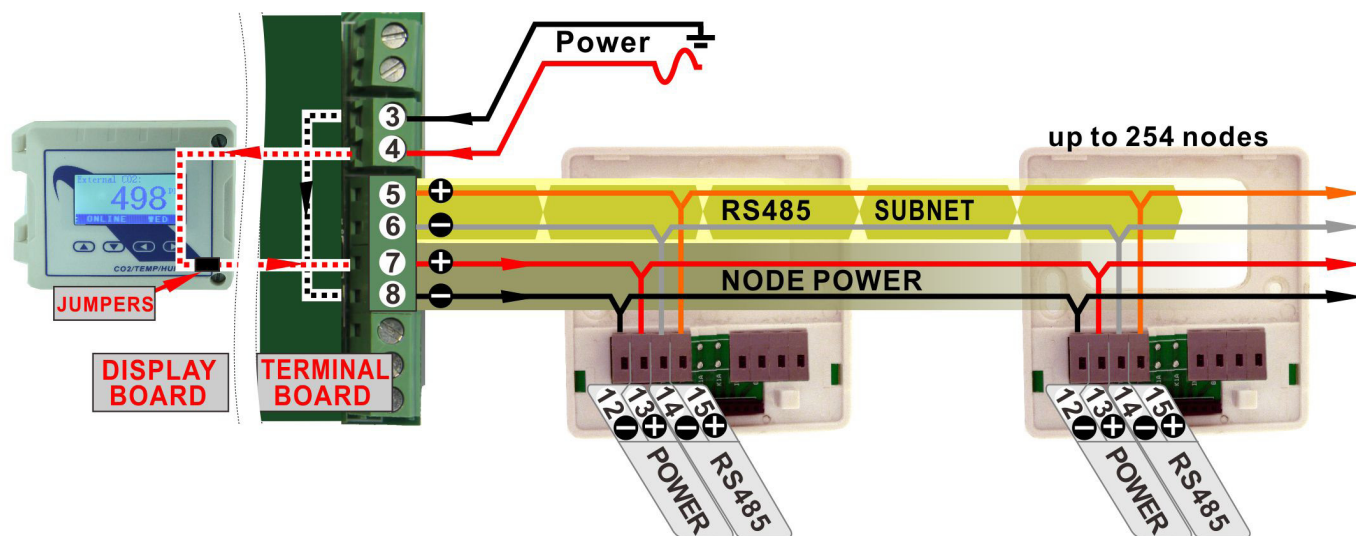
# CO2-Humidity-Temp Transmitter w/ Bacnet

## Wiring diagram for CO2-D duct and CO2-W wall mount style

The diagram below shows the wiring connection for the usual transducer mode of operation for the CO2-D duct mount and CO2-W wall 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 Pins 10 and 11.



The next diagram shows the wiring connection in 'Master' mode where the device operates as a gateway to a subnetwork of slave sensors. This is a special mode of operation and most users needn't to be concerned about the details of this feature. The main RS485 network is still available on pins 10 and 11 for connecting to



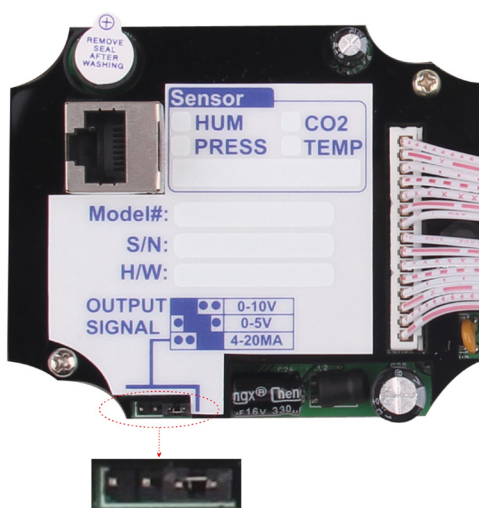
other masters in the system as above, but the transducer analog signals are not available now, instead we now have a second RS485 port which can be used to poll a subnetwork of remote RS485 CO2 sensors. The unit acts as a modbus slave on the main network and a master on the subnetwork. Power to the nodes can be run from Pins 5 and 6 along with the RS485 cable, in this case power makes its way through the display board and jumpers as shown with the dotted lines. If there are more than five

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or so sensor nodes it will be best to power the nodes directly from the power supply. If more than one power supply is used in the system, be extra careful to keep all grounds consistent from one node to the next or else ground loops can damage the sensor. The Duct and Wall mount version of the sensor have two modes of operation, transducer mode and RS485 Master mode. For most applications the sensor will be used in the 'transducer mode' which is the default setting. In this mode the device acts as a traditional transducer where it sends out three analog signals proportional to the humidity, temperature and CO2 readings.

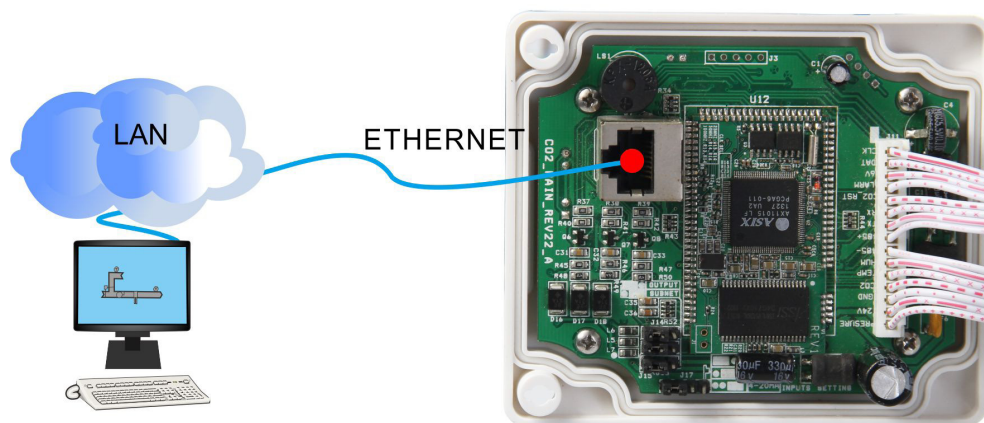
### Output Jumper settings

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.



### Ethernet Wiring

For Ethernet option, CO2-D/W has two choices, with and without, here we show a photo about how to connect with Ethernet.

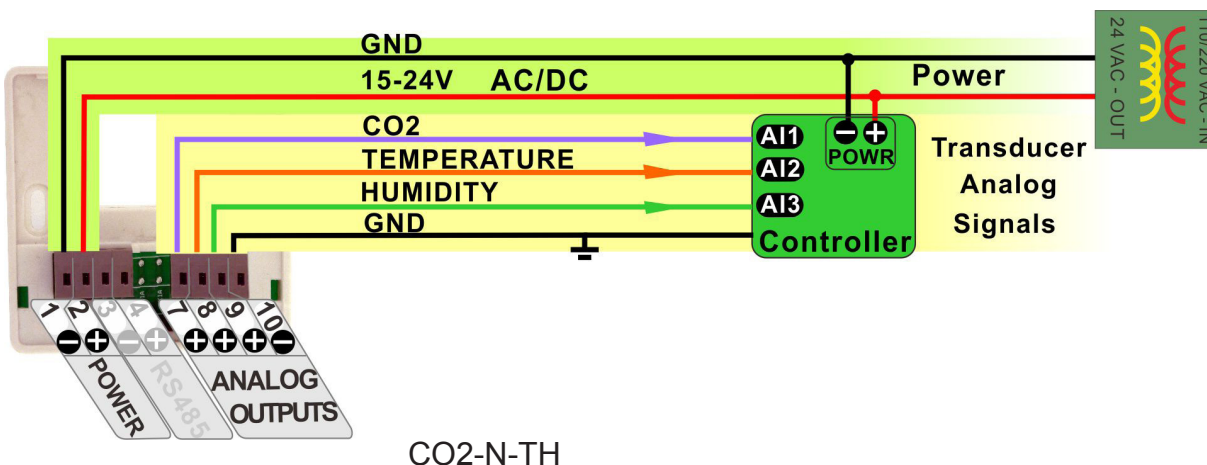


### Wiring diagram for CO2-N-TH & CO2-N-X

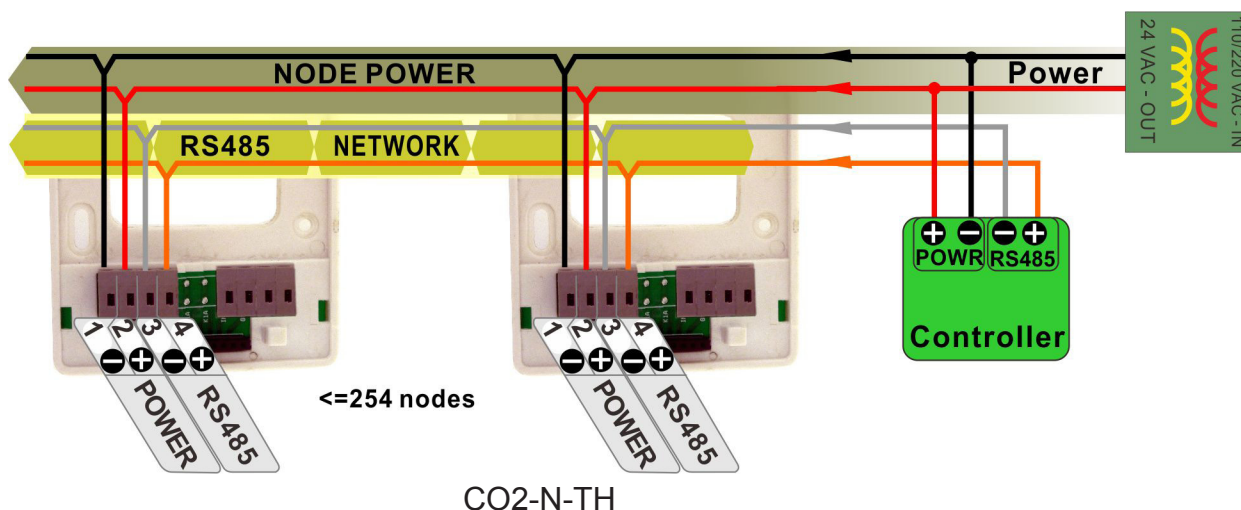
The diagram below shows the wiring connection for the usual transducer mode of operation for the CO2-N-TH. The transducer outputs is connected to a master controller using the traditional analog output signals while CO2-N-X only have power and RS485 network, without temperature and humidity sensors.



## CO2-Humidity-Temp Transmitter w/ Bacnet



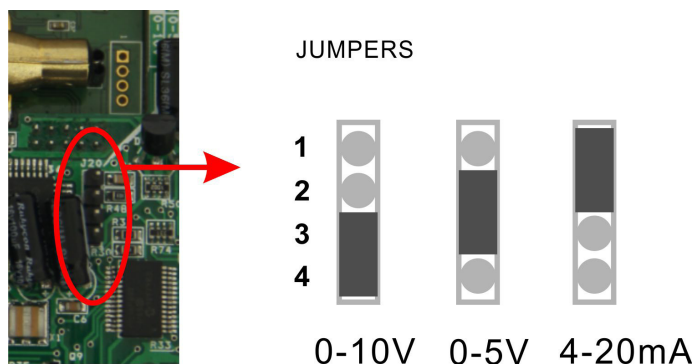
The next diagram shows the CO2-N working in the RS485 network; the node quantity can be up to 255 units. A group of sensors distributed through the building can cooperate friendly through net. The RS485 network is available for transmitting the same values digitally to other controllers.



For CO2-N-TH, in this mode the device acts as a traditional transducer where it sends out three analog signals which is humidity, temperature and CO2 readings. All you need to do is to set this one single jumper to the appropriate signal type: 4-20mA, 0-10V, or 0-5V, while for it doesn't have temperature and humidity analog signals for CO2-N-X.

### Jumper settings for CO2-N-TH & CO2-N-X

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

## 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.

The screenshot displays the T3000 software interface. On the left, a tree view shows the 'Default\_Building' structure with various devices. A red circle highlights the 'CO2:91739--254' device under the 'Remote Network Device' section. The main panel shows configuration settings for this device.

**Device Configuration Settings:**

- ID Address: 254 (Change ID button)
- Serial Number: 91739
- Firmware Version: 4.7
- Hardware Version: 22
- Baudrate: 19200
- Product Name: CO2
- Relative Humidity: 29.3 %
- CO2: 630 ppm
- Internal CO2 Sensor: Good Alarm < 800 < Poor Alarm, Fair Alarm < 1000 < Poor Alarm
- Alarm Setting: Manual (selected), Auto (radio button), Alarm State: OFF
- Password: 1234 (Enable/Disable buttons)
- Heating humidity sensor: Enable (radio button), Disable (selected)
- Alarm On (s), Alarm Off (s), Menu Block Time (s), Backlight time (s)

**Output Data Table:**

|   | Name       | Range | A/M  | Value |
|---|------------|-------|------|-------|
| 1 | Tempreture | °C    | Auto | 27.2  |
| 2 | Hum        | %     | Auto | 29.3  |
| 3 | CO2        | ppm   | Auto | 630   |

**OUTPUT Setting Table:**

| NUM | Full Label | Value | Range  | Min Out Scale | Max Out Scale | Unit |
|-----|------------|-------|--------|---------------|---------------|------|
| 1   | Hum        | 9.38  | 4-20mA | 0.0           | 100.0         | %    |
| 2   | Tempreture | 0.42  | 4-20mA | 0.0           | 100.0         | °C   |
| 3   | CO2        | 8.67  | 4-20mA | 0             | 2000          | ppm  |

The output default range can be set here.

## 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-D, CO2-W with-out network | High_T=R286    High_H=R288    High_C=R290<br>Low_T=R285    Low_H=R287    Low_C=R289       |
| CO2-D, CO2-W with network     | High_T=R1256    High_H=R1258    High_C=R1260<br>Low_T=R1254    Low_H=R1257    Low_C=R1259 |
| CO2-Node                      | High_T=R129    High_H=R131    High_C=R133<br>Low_T=R128    Low_H=R130    Low_C=R132       |

For example

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

# CO2-Humidity-Temp Transmitter w/ Bacnet

a. Normal state:

Zone0: 37.4% 17.0°C  
**1149** ppm  
2014-12-17 11:00 NET

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.

1.CO2  
2.Temperature  
3.Humidity  
4.Miscellaneous



1.Zone0: ONLINE  
2.Zone254: ONLINE



1.Delete node  
2.Spt poor: 2500  
3.Spt fair: 2500  
4.Calibration: 1234

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

1.CO2  
**2.Temperature**  
3.Humidity  
4.Miscellaneous



1.CO2  
2.Temperature  
**3.Humidity**  
4.Miscellaneous

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

1.CO2  
2.Temperature  
**3.Humidity**  
4.Miscellaneous



1.Calibration: 35.5%  
2.Heat: OFF

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

1.CO2  
2.Temperature  
3.Humidity  
**4.Miscellaneous**



1.Modbus ID: 251  
2.Date: 2014-12-17  
3.Time: 11:00  
4.Ring on time: 2  
5.Ring off time: 2

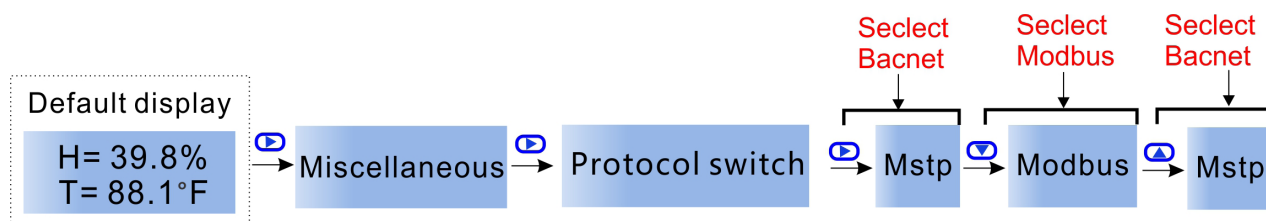
f. When everything is set, after a while, it will switch to the normal state as step as displayed.



# CO2-Humidity-Temp Transmitter w/ Bacnet

## Modbus/Bacnet switch

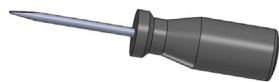
To select the protocol as Modbus or Bacnet, Press  to choose Miscellaneous, then press  to choose Protocol switch, press , it reads Mstp, which means you have selected Bacnet ;if you want to switch to Modbus, press , or  back to Bacnet.



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

## Mounting Installation

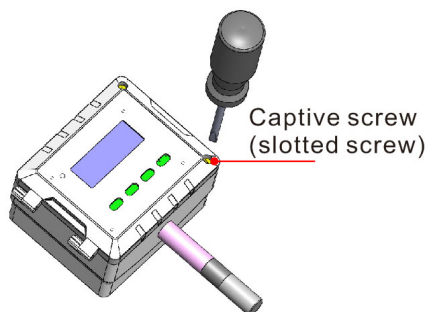
1) Slotted screwdriver.



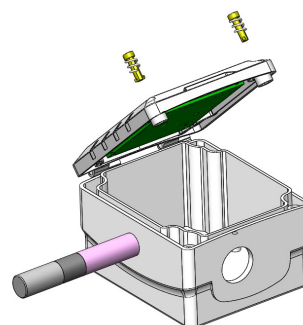
Captive screw (slotted screw)



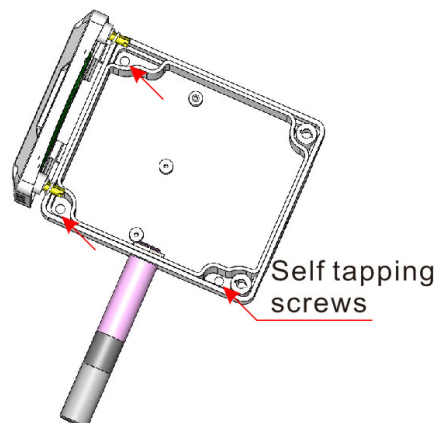
2) Unfasten screw at cover, turn the captive screw 1/2 turn till it pops out.



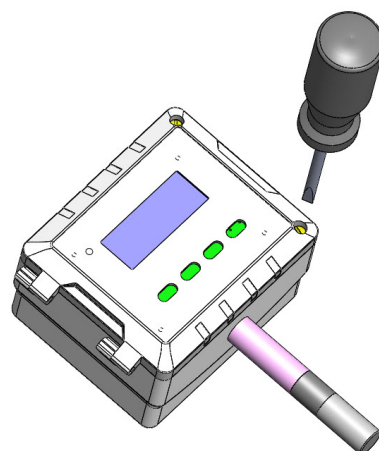
3) Open the cover.



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-W



This new Transmitter brings with it the incorporation of CO2 Monitoring. When the External CO2 Sensor is attached, the transmitter 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-N



This External CO2 Sensor uses the sensor module to calculate the current CO2 levels and uses a simple "Red/Yellow/Green" LED display to show the quality and safety of the air. When connected to the transmitter, it will display detailed information about the current CO2 count. It can also accurately monitor temperature.

### External Alarm



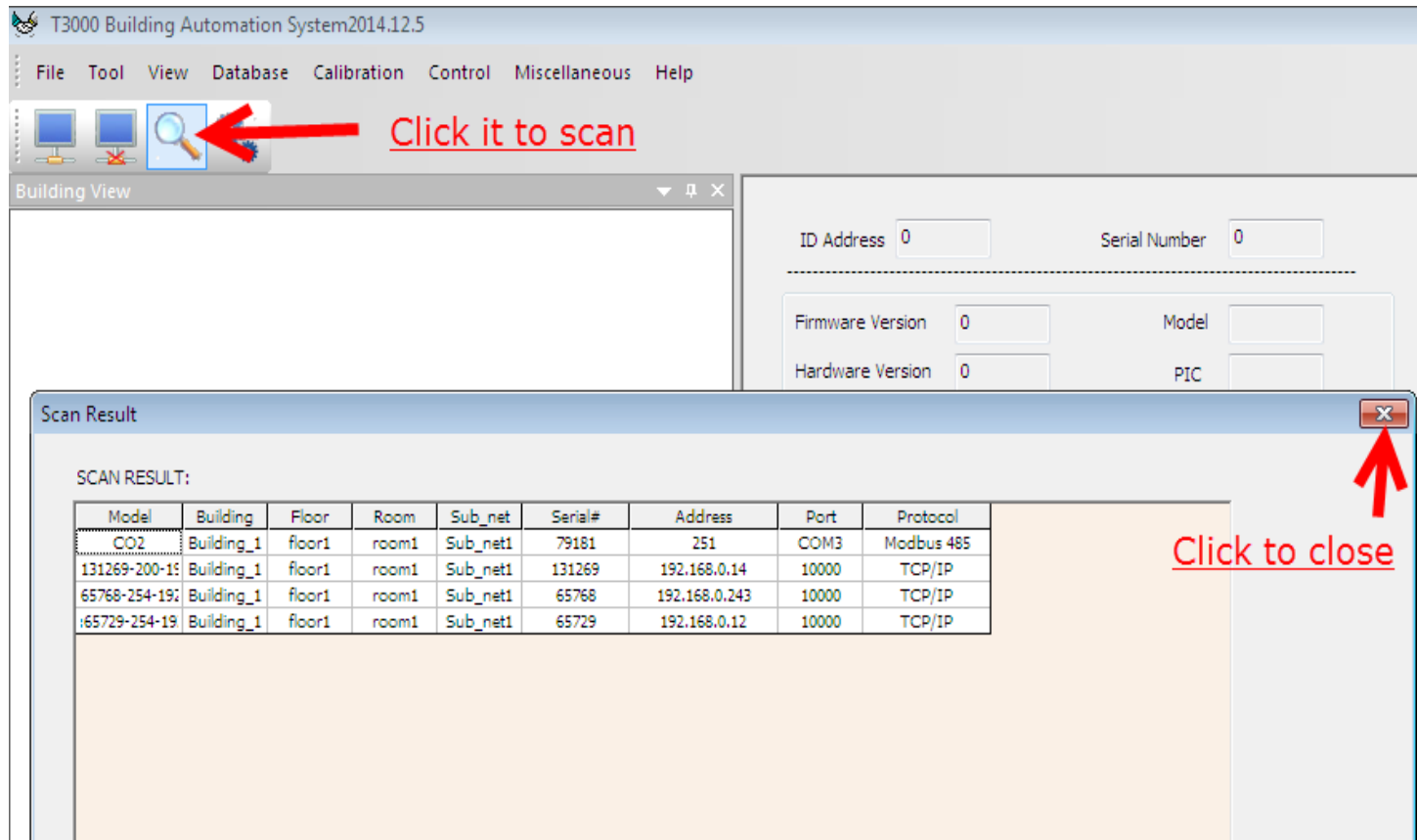
Connected to the transmitter, this external alarm will sound and flash a red light when the CO2 levels become "POOR". It can be connected with CO2-D, CO2-W.

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-D/W 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.



## CO2-Humidity-Temp Transmitter w/ Bacnet

3). Click CO2 log  **CO2:79181--251** and the T3000 will show all the information of CO2.

ilding Automation System2014.12.5

View Database Calibration Control Miscellaneous Help

ub\_net1

ub\_net1

floor1

room1

- CM5:14715-254-192.168.0.3
- CM5:80251-254-192.168.0.17
- CM5\_Ethernet:0-254-192.168.0.158
- CM5\_Ethernet:70094-254-192.168.0.158
- CM5\_Ethernet:80105-254-192.168.0.201
- CO2:79181--251**  **Click**
- MiniPanel:131243-254-192.168.0.10
- MiniPanel:131269-200-192.168.0.14
- MiniPanel:188-254-192.168.0.16
- MiniPanel:65684-254-192.168.0.15
- MiniPanel:65729-254-192.168.0.12
- MiniPanel:65730-254-192.168.0.3
- MiniPanel:65768-254-192.168.0.243
- MiniPanel:65770-254-192.168.0.101

ID Address: 251  Serial Number: 79181

Date: 5/27/2013  
Time: 10:54

Firmware Version: 3.3  
Hardware Version: 22  
Baudrate: 19200  
Relative Humidity: 61.2 %  
CO2: 857 ppm

Internal CO2 Sensor  
Pre Alarm Setpoint: 2000  
Alarm Setpoint: 2500  
Calibrating Offset: 191

Alarm Setting  
☐ Manual ☒ Auto  
Alarm State: OFF

Heating humidity sensor  
☐ Enable ☒ Disable

Menu Block Time (s): 60  
Backlight time (s): 30

|   | Name       | Range | A/M  | Value | Calibration |
|---|------------|-------|------|-------|-------------|
| 1 | Tempreture | °C    | Auto | 13.4  |             |
| 2 | Hum        | %     | Auto | 61.2  |             |
| 3 | CO2        | ppm   | Auto | 857   |             |

Alarm On (s): 2  
Alarm Off (s): 2

Password: 1234

| NUM | Device ID | Serial Number | External PPM | Prepare Alarm Setpoint | Alarm Setpoint | Calibrating Offset |
|-----|-----------|---------------|--------------|------------------------|----------------|--------------------|
|-----|-----------|---------------|--------------|------------------------|----------------|--------------------|

## CO2-Humidity-Temp Transmitter w/ Bacnet

### 4). Calibrate CO2

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

ID Address   Serial Number

Firmware Version   
Hardware Version   
Baudrate   
Relative Humidity  %  
CO2:  ppm

Internal CO2 Sensor  
Pre Alarm Setpoint   
Alarm Setpoint   
Calibrating Offset

Date:   
Time:   
  
Alarm On (s)   
Alarm Off (s)   
Menu Block Time (s)   
Backlight time (s)

Alarm Setting  
☐ Manual ☒ Auto  
Alarm State   
Password  
☐ Enable ☒ Disable

Heating humidity sensor  
☐ Enable ☒ Disable

|   | Name        | Range | A/M  | Value | Calibration                                                                                                                                                                 |
|---|-------------|-------|------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Temperature | °C    | Auto | 13.1  |                                                                                                                                                                             |
| 2 | Hum         | %     | Auto | 63.7  |                                                                                                                                                                             |
| 3 | CO2         | ppm   | Auto | 988   |   |

| NUM | Device ID | Serial Number | External PPM | Prepare Alarm Setpoint | Alarm Setpoint | Calibrating Offset |
|-----|-----------|---------------|--------------|------------------------|----------------|--------------------|
|     |           |               |              |                        |                |                    |
|     |           |               |              |                        |                |                    |
|     |           |               |              |                        |                |                    |
|     |           |               |              |                        |                |                    |

  
Click



## CO2-Humidity-Temp Transmitter w/ Bacnet

### 5). Calibrate humidity.

ID Address

Serial Number

Firmware Version

Hardware Version

Baudrate

Relative Humidity  %

CO2:  ppm

Alarm Setting  
☐ Manual ☒ Auto  
Alarm State

Password  
☐ Enable ☒ Disable

Internal CO2 Sensor  
Pre Alarm Setpoint   
Alarm Setpoint   
Calibrating Offset

Heating humidity sensor  
☐ Enable ☒ Disable

Date:

Time:

Alarm On (s)

Alarm Off (s)

Menu Block Time (s)

Backlight time (s)

|   | Name        | Range | A/M  | Value | Calibration                                                                         |
|---|-------------|-------|------|-------|-------------------------------------------------------------------------------------|
| 1 | Temperature | °C    | Auto | 13.2  |                                                                                     |
| 2 | Hum         | %     | Auto | 63.8  |  |
| 3 | CO2         | ppm   | Auto | 993   |                                                                                     |

| NUM | Device ID | Serial Number | External PPM | Prepare Alarm Setpoint | Alarm Setpoint | Calibrating Offset |
|-----|-----------|---------------|--------------|------------------------|----------------|--------------------|
|     |           |               |              |                        |                |                    |
|     |           |               |              |                        |                |                    |
|     |           |               |              |                        |                |                    |

Click

## CO2-Humidity-Temp Transmitter w/ Bacnet

### 6). Calibrate temperature.

ID Address

Serial Number

Firmware Version

Hardware Version

Baudrate

Relative Humidity  %

CO2:  ppm

Alarm Setting

☐ Manual ☒ Auto

Alarm State

Password

☐ Enable ☒ Disable

Internal CO2 Sensor

Pre Alarm Setpoint

Alarm Setpoint

Calibrating Offset

Heating humidity sensor

☐ Enable ☒ Disable

Date:

Time:

Alarm On (s)

Alarm Off (s)

Menu Block Time (s)

Backlight time (s)

|   | Name       | Range | A/M  | Value | Calibration                   |
|---|------------|-------|------|-------|-------------------------------|
| 1 | Tempreture | °C    | Auto | 13.2  | <input type="text" value=""/> |
| 2 | Hum        | %     | Auto | 63.8  | <input type="text" value=""/> |
| 3 | CO2        | ppm   | Auto | 999   | <input type="text" value=""/> |

| NUM | Device ID | Serial Number | External PPM | Prepare Alarm Setpoint | Alarm Setpoint | Calibrating Offset |
|-----|-----------|---------------|--------------|------------------------|----------------|--------------------|
|     |           |               |              |                        |                |                    |



[Click](#)

# CO2-Humidity-Temp Transmitter w/ Bacnet

## TSTAT6-CO2 in T3000 Operation

- 1). Connect TSTAT6-CO2 to PC by RS485.
- 2). Open T3000 and it show the following view.

T3000 Building Automation System 2014.12.5

File Tool View Database Calibration Control Miscellaneous Help

Building View

Sub\_net1

floor1

room1

- CM5:14715-254-192.168.0.3
- CM5:80251-254-192.168.0.17
- CM5\_Ethernet:0-254-192.168.0.158
- CM5\_Ethernet:70094-254-192.168.0.158
- CM5\_Ethernet:80105-254-192.168.0.201
- CO2:79181--251
- MiniPanel:131243-254-192.168.0.10
- MiniPanel:131269-200-192.168.0.14
- MiniPanel:188-254-192.168.0.16
- MiniPanel:65684-254-192.168.0.15
- MiniPanel:65729-254-192.168.0.12
- MiniPanel:65730-254-192.168.0.3
- MiniPanel:65768-254-192.168.0.243
- MiniPanel:65770-254-192.168.0.101
- Pressure Sensor:80145--254
- T3-PT10:-1--254

ID Address 0 Serial Number 0

Firmware Version 0 Model

Hardware Version 0 PIC

Humidity

Date Monday, Dec 15, 2014 Time 10:37:02 AM Sync Time

Temperature 0 Fan Mode ON

Override Period 0 Output Time Left 0

PID1 Mode Cooling

PID2 Mode Heating

Free Cool Available Free Cool Feature Normal

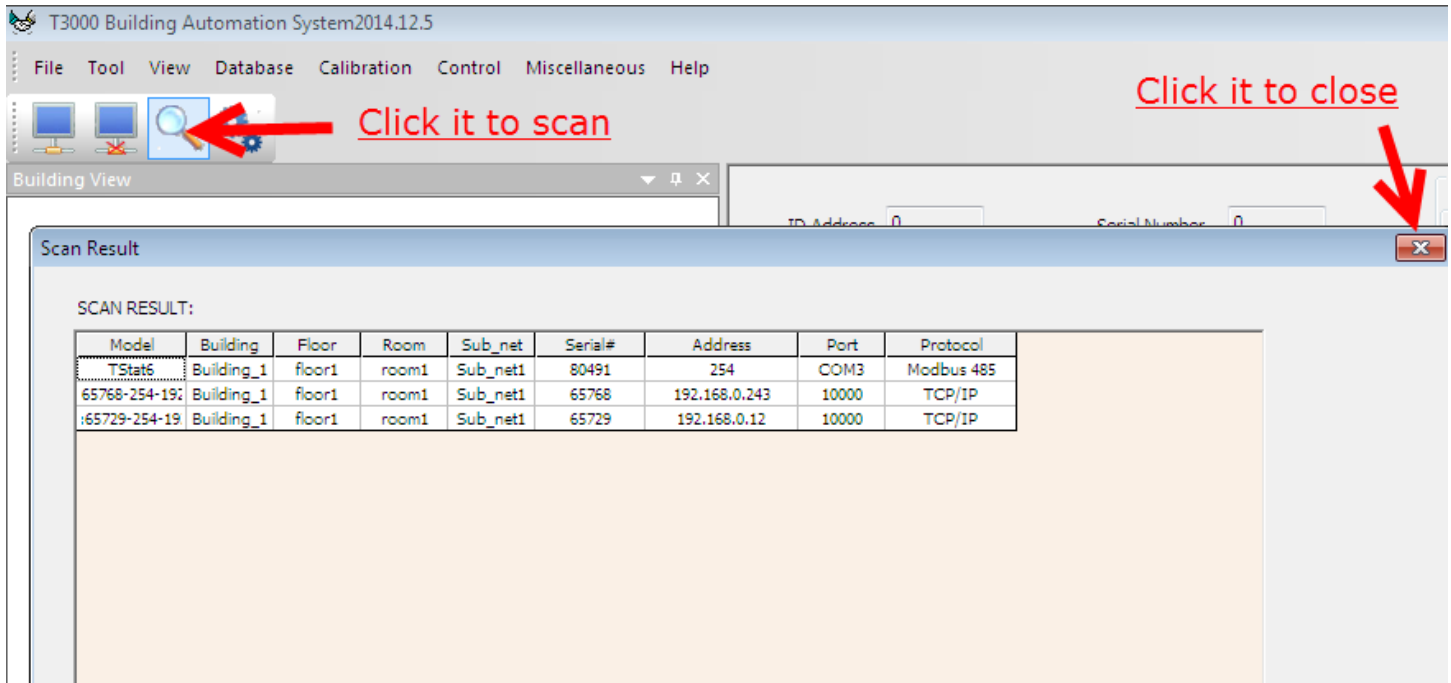
Graphic Viewer Advanced Setup Schedule Display

Input Output

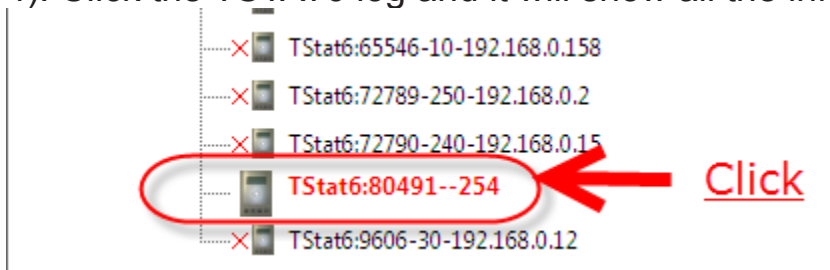
| Input Name | Input Value | Output Name | Output Value |
|------------|-------------|-------------|--------------|
|            |             |             |              |

## CO2-Humidity-Temp Transmitter w/ Bacnet

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



4). Click the TSTAT6 log and it will show all the information of TSTAT6.



# CO2-Humidity-Temp Transmitter w/ Bacnet

ID Address254Serial Number80491

Firmware Version43.2Modeltstat6Hardware Version9PIC20

Humidity0.0%DateMonday, Dec 15, 2014Time10:41:58 AMSync Time

Temperature12.4°CFan ModeOverride Period0Output100%Time Left0PID1 ModeHEATING 3CoolingPID2 ModeCOOLING 244%HeatingFree Cool AvailableNoFree Cool Feature Normal

Graphic ViewerAdvanced SetupScheduleLCD

|    | Name            | Value   |
|----|-----------------|---------|
| 1  | Internal Sensor | 12.4 C  |
| 2  | Input 1         | 1012    |
| 3  | Input 2         | 1012    |
| 4  | Input 3         | 1012    |
| 5  | Input 4         | 1012    |
| 6  | Input 5         | 1012    |
| 7  | Input 6         | 1013    |
| 8  | Input 7         | 1012    |
| 9  | Input 8         | 1012    |
| 10 | Humidity Sensor | 0.0%    |
| 11 | CO2 Sensor      | 1649ppm |
| 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% |

Temperature and Setpoint

Setpoint

DAYOccupied11.0 CHeating9.0 CSet Point10.0 CMax=50

NIGHTUnoccupied30.0 C15.0 C21.0 C

Current Temperature12.4 C

40-1

40-1

Min=10Help

Zigbee topological graph



## CO2-Humidity-Temp Transmitter w/ Bacnet

### 5). Calibrate CO2

Graphic Viewer **Advanced Setup** Schedule LCD

Help [ ? ]

Input

|    | 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   |

Output

|   | 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% |

Zigbee topological graph

# CO2-Humidity-Temp Transmitter w/ Bacnet

MiniPanel:131.209-200-192.168.0.14

MiniPanel:188-254-192.168.0.16

MiniPanel:155.204-254-192.168.0.15

Firmware Version43.2

ModelTstat6

Cooling11.0 C

Heating30.0 C

Parameter

ID Address254

Enable Change

Refresh

Exit

General Setting

Baudrate19200

Auto Only

Input Filter2

Keypad Select4A

Setpoint Increments1.0

Powerup Setpoint20

Short Cycle Delay0

Powerup ModeLast

SequenceFan Coil

Rounding displaynormal

Keypad LockLock On

Temp Unit°C

heat/cool changeoverAuto (PID)

Occupied setpoint control

ModeNormal1

Default20

BackLight OFF Time1 min

Dead Master0

Timer

General Setting

Timer On:0

Timer Off:0

UnitsSecond

Override Timer

Time Left0 min

Override Period0 min

Timer left

Timer SelectPeriod timer

PIR Sensor Setting

Enable/DisableDisable

Sensitivity100

Setpoint DisplayTemperature

Day Setpoint

Day/Occ Setting

Max

Min

Cooling Dead Band

Heating Dead Band

Loop110.050101.0°C1.0°C

Loop2200.00.10.1

Loop3514551354

Night Setpoint

Night/Unocc Mode

Cooling SetPoint

Heating SetPoint

Office

300°C

150°C

N/A

N/A

N/A

Custom Sensor Table

Table 1

Table 2

Setpoints

DAY

NIGHT

1 SP/2 SP:2 SP2 SP

COOL DB:11

SetPoint:1021

Heat DB:11

Heat SP:915

COOL SP:1130

PID

Input select

Input value

Setpt value

Output

Pterm

Item

Loop1HUM TEM19.0°C10100%6.05.0

Loop2Internal TEMUNUSED200.044%100.01.0

PID2 off Setpoint300.0

Loop3Internal TEMUNUSED5145550%0.80.1

Special Features

Free cooling

Outdoor Reset

Airflow Setting

Valve Travel Time90

Inputs

Outputs

Outputs Table

Setpoint Increments1.0

Powerup Setpoint20

Short Cycle Delay0

ModeDefault

Default20

Input Set Dialog

|   | Input Name      | Value   | Auto/Man | Calibration | Filter | Range | Function | Custom Tables |
|---|-----------------|---------|----------|-------------|--------|-------|----------|---------------|
| 0 | Internal Sensor | 12.2°C  | Auto     | Adjust...   |        | °C    | N/A      | N/A           |
| 1 | Input 1         | 1012    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
| 2 | Input 2         | 997     | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
| 3 | Input 3         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 4 | Input 4         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 5 | Input 5         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 6 | Input 6         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 7 | Input 7         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 8 | Input 8         | 1012    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
|   | Humidity Sensor | 0.0%    | Auto     | Adjust...   | 3      |       |          |               |
|   | CO2 Sensor      | 1137ppm | Auto     | Adjust...   | 3      |       |          |               |

Write the real value

Save

Fresh

Exit

- 26 -

## CO2-Humidity-Temp Transmitter w/ Bacnet

### 6). Calibrate humidity

Auto Only  Input Filter  Occupied setpoint control  
Setpoint Increments  Powerup Setpoint  Short Cycle Delay  Mode  Normal1  
Default

Input Set Dialog

|   | Input Name      | Value   | Auto/Man | Calibration | Filter | Range | Function | Custom Tables |
|---|-----------------|---------|----------|-------------|--------|-------|----------|---------------|
| 0 | Internal Sensor | 13.0°C  | Auto     | Adjust...   |        | °C    | N/A      | N/A           |
| 1 | Input 1         | 1011    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
| 2 | Input 2         | 1012    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
| 3 | Input 3         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 4 | Input 4         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 5 | Input 5         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 6 | Input 6         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 7 | Input 7         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 8 | Input 8         | 1011    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
|   | Humidity Sensor | 0.0%    | Auto     | Adjust...   | 3      |       |          |               |
|   | CO2 Sensor      | 1392ppm | Auto     | Adjust...   | 3      |       |          |               |

Write the real value

### 7). Calibrate temperature.

Auto Only  Input Filter  Mode  Normal1  
Setpoint Increments  Powerup Setpoint  Short Cycle Delay  Default

Input Set Dialog

|   | Input Name      | Value   | Auto/Man | Calibration | Filter | Range | Function | Custom Tables |
|---|-----------------|---------|----------|-------------|--------|-------|----------|---------------|
| 0 | Internal Sensor | 13.0°C  | Auto     | Adjust...   |        | °C    | N/A      | N/A           |
| 1 | Input 1         | 1011    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
| 2 | Input 2         | 1012    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
| 3 | Input 3         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 4 | Input 4         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 5 | Input 5         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 6 | Input 6         | 1012    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 7 | Input 7         | 1011    | Auto     | Adjust...   | 3      | Raw   |          | N/A           |
| 8 | Input 8         | 1011    | Auto     | Adjust...   | 3      | Raw   | Normal   | N/A           |
|   | Humidity Sensor | 0.0%    | Auto     | Adjust...   | 3      |       |          |               |
|   | CO2 Sensor      | 1392ppm | Auto     | Adjust...   | 3      |       |          |               |

Write the real value

# CO2-Humidity-Temp Transmitter w/ Bacnet

## 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.

Tools View Database Control Miscellaneous Help

Building->Def... ▾

ID Address Hardware V CO2 Automatic Background C Number of days Maximu

INPUT Set NUM 1 2 3

OUTPUT Set NUM Fu 1 Ten 2 Hum 3 CO

Scan Result

SCAN RESULT:

| Model                       | Building     | Floor  | Room  | Sub_net      | Serial#  | Address       | Port  | Protocol   |
|-----------------------------|--------------|--------|-------|--------------|----------|---------------|-------|------------|
| CO2 Node                    | fault_Buildi | floor1 | room1 | fault_Buildi | 94464    | 3             | COM29 | Modbus 485 |
| BB/LB/TB:65729-1-192.168.0. | fault_Buildi | floor1 | room1 | fault_Buildi | 65729    | 192.168.0.109 | 10000 | TCP/IP     |
| BB/LB/TB:90023-1-192.168.0. | fault_Buildi | floor1 | room1 | fault_Buildi | 90023    | 192.168.0.15  | 502   | TCP/IP     |
| BB/LB/TB:92294-1-192.168.0. | fault_Buildi | floor1 | room1 | fault_Buildi | 92294    | 192.168.0.97  | 502   | TCP/IP     |
| 3-221:94216-254-192.168.0.2 | fault_Buildi | floor1 | room1 | fault_Buildi | 94216    | 192.168.0.29  | 502   | TCP/IP     |
| 18A06DO:95238-254-192.16    | fault_Buildi | floor1 | room1 | fault_Buildi | 95238    | 192.168.0.98  | 502   | TCP/IP     |
| BB/LB/TB:96892-254-192.168  | fault_Buildi | floor1 | room1 | fault_Buildi | 96892    | 192.168.0.3   | 502   | TCP/IP     |
| BB/LB/TB:65550-1-192.168.0. | fault_Buildi | floor1 | room1 | fault_Buildi | 65550    | 192.168.0.14  | 502   | TCP/IP     |
| IFI:33685761-248-192.168.0. | fault_Buildi | floor1 | room1 | fault_Buildi | 33685761 | 192.168.0.14  | 502   | TCP/IP     |
| B/LB/TB:65569-254-192.168.1 | fault_Buildi | floor1 | room1 | fault_Buildi | 65569    | 192.168.0.109 | 502   | TCP/IP     |

## CO2-Humidity-Temp Transmitter w/ Bacnet

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

T3000 Building Automation System 2016.09.23

File Tools View Database Control Miscellaneous Help

Default\_Building->Def...

Local Network

- arm\_33
- CHAMBER
  - HUM R
  - HUMSE
  - NODE9
- COOPANEL
- FD\_DEMO
- HUM R
- POWER\_MET
- T3-221-SN942
- T3-8AI8AO6
- T3-8AI8AO6
- T3B8
- :3368576
- temcop@
- temcop@
- temcopanel

Serial Port

Com29

CO2 NO

ID Address 3 Change ID Serial Number 94464 Firmware Version 3.9

Hardware Version 6 Braudrate 9600 Product Name CO2 NODE

CO2 Automatic Compensation Background

OFF

Background CO2 400 ppm

Number of days of watch for minimum 7 days

Maximum adjustment per day 1 ppm

CO2 Alarms

Poor> 800

Fair> 1000

added

CO2 Automatic Compensation Background

OFF

Background CO2 400 ppm

Number of days of watch for minimum 7 days

Maximum adjustment per day 1 ppm

INPUT Setting

| NUM | Full Label |
|-----|------------|
| 1   | Tempreture |
| 2   | Hum        |
| 3   | CO2        |

OUTPUT Setting

| NUM | Full Label | Range | Min Out Scale | Max Out Scale |
|-----|------------|-------|---------------|---------------|
| 1   | Tempreture | 0-10v | 0             | 1000          |
| 2   | Hum        | 0-10v | 0             | 1000          |
| 3   | CO2        | 0-10v | 0             | 2000          |

## 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 =  $20.0 / (100.0 - 0.0) * 10V = 2V$ .

The screenshot shows the T3000 Building Automation System software interface. On the left, a tree view displays the system hierarchy, including various sensors and actuators. The 'CO2 NODE' is highlighted under the 'Virtual Device' section. On the right, the configuration panel for the 'CO2 NODE' is visible. It includes fields for ID Address (3), Serial Number (96860), Firmware Version (4), Hardware Version (6), and Baudrate (19200). The 'CO2 Automatic Compensation Background' is set to OFF. The 'Background CO2' is 400 ppm. The 'Number of days of watch for minimum' is 7 days, and the 'Maximum adjustment per day' is 1 ppm. The 'CO2 Alarms' section shows 'Poor >' at 800 and 'Fair >' at 1000. Below these settings are two tables: 'INPUT Setting' and 'OUTPUT Setting'. The 'OUTPUT Setting' table is highlighted with a red box.

| NUM | Full Label | Value | Range | Calibra... |
|-----|------------|-------|-------|------------|
| 1   | Tempreture | 0.0   | °C    | UNUSED     |
| 2   | Hum        | 0.0   | %     | UNUSED     |
| 3   | CO2        | 392   | ppm   | 5          |

| NUM | Full Label | Range | Min Out Scale | Max Out Scale | Unit |
|-----|------------|-------|---------------|---------------|------|
| 1   | Tempreture | 0-10v | 0.0           | 100.0         | °C   |
| 2   | Hum        | 0-10v | 0.0           | 100.0         | %    |
| 3   | CO2        | 0-10v | 0.0           | 2000.0        | ppm  |



## CO2-Humidity-Temp Transmitter w/ Bacnet

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 $((1000\text{ppm} / (3000\text{ppm} - 0\text{ppm})) * (10\text{V} - 0\text{V})) + 0\text{V} = 3.3\text{V}$       |
|     |   | 2. setting J20 to select 0V-5V output mode, so the co2 output is about $((1000\text{ppm} / (3000\text{ppm} - 0\text{ppm})) * (5\text{V} - 0\text{V})) + 0\text{V} = 1.65\text{V}$        |
|     |   | 3. setting J20 to select 4mA-20mA output mode, so the co2 output is about $((1000\text{ppm} / (3000\text{ppm} - 0\text{ppm})) * (20\text{mA} - 4\text{mA})) + 4\text{mA} = 9.3\text{mA}$ |

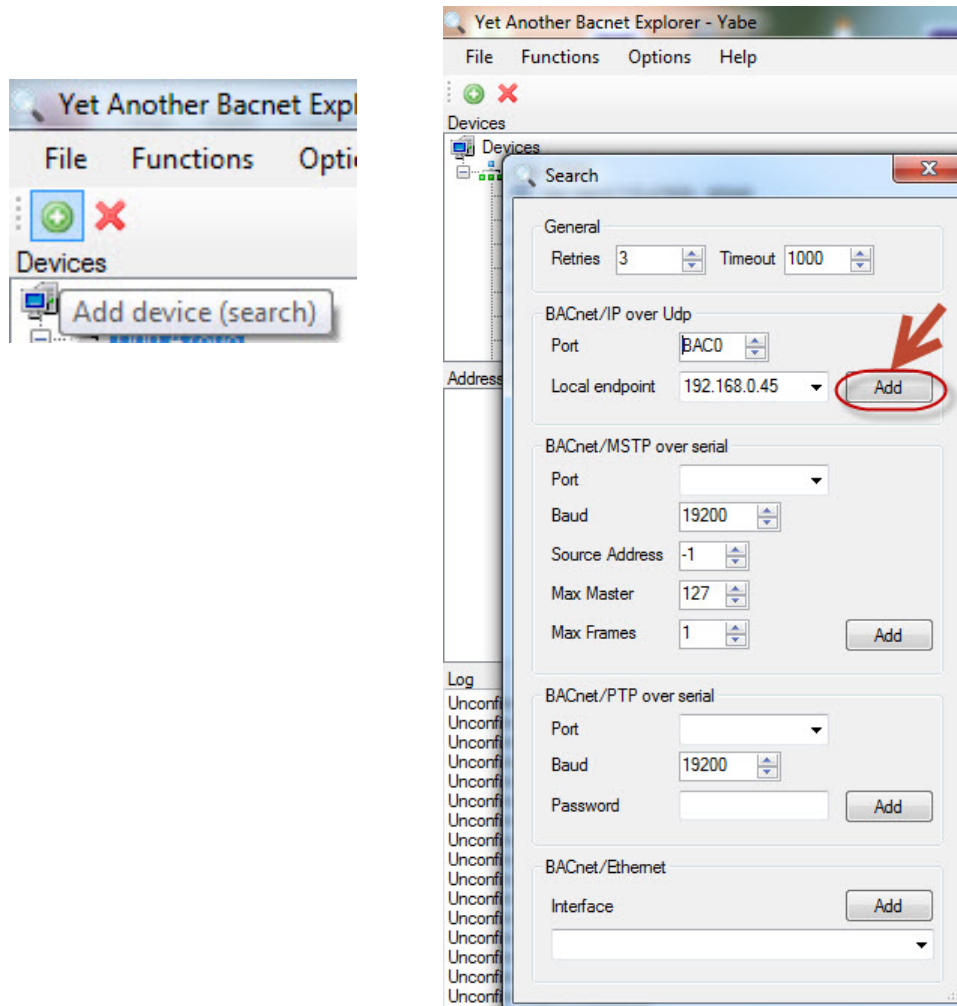
# CO2-Humidity-Temp Transmitter w/ Bacnet

## Connecting to the device using Bacnet

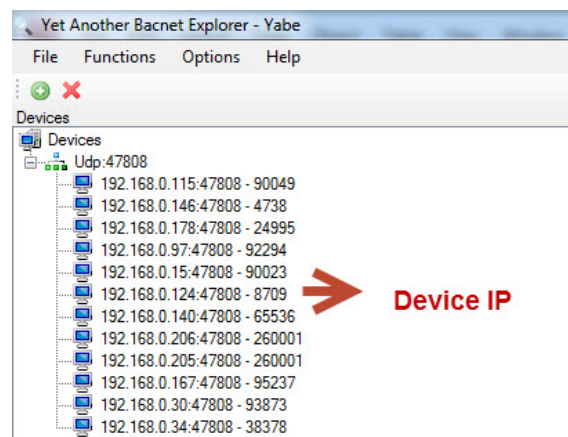
The device can be connected using Bacnet. Below are the steps:

Step1. Download Yabe software as the link: <https://tinyurl.com/ycrt9jep> and install it.

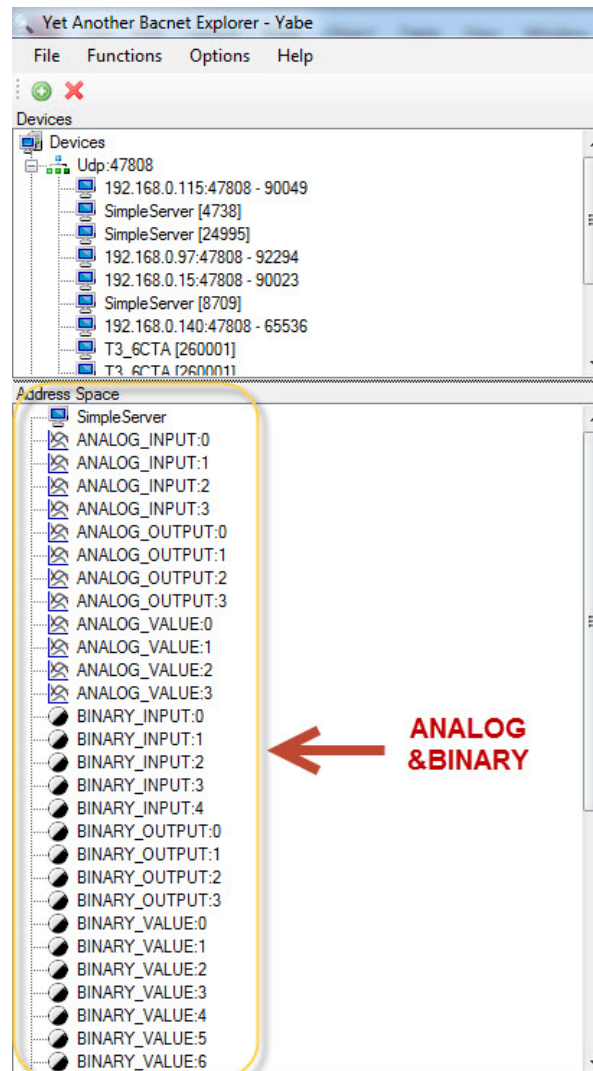
Step2. Connect the device to the computer, select Bacnet protocol. Start the Yabe software, add the device.



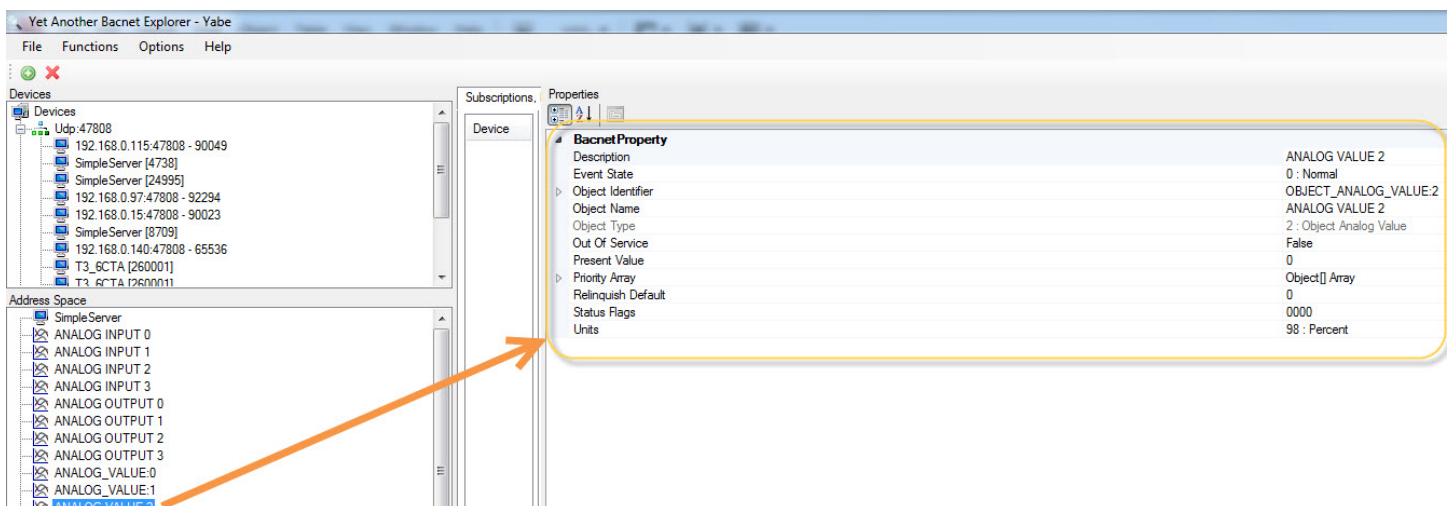
Step3. You can find your device IP as below. Double click the left mouse button, you can find your device and the bacnet information in the "Address Space" tab.



# CO2-Humidity-Temp Transmitter w/ Bacnet



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

## CO2-D&CO2-W without Ethernet

| Address    | Bytes | Register Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 200 to 239 | 2*40  | The continuous_alarm ppm setpoint of external co2 sensor. Support 50 external nodes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 240 to 279 | 2*40  | The ppm offset for calibrating the external co2 sensor ppm. Support 50 external nodes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 280        | 1     | "Analog output auto or manual.<br>Bit0 for temperature, 0 = auto, means the output value according to the temperature read from sensor; 1 = manual, means the output value according to the value set in output_manual_value_temp (register 321).<br>Bit1 for humidity, 0 = auto, means the output value according to the humidity read from sensor; 1 = manual, means the output value according to the value set in output_manual_value_humidity (register 322).<br>Bit2 for co2, 0 = auto, means the output value according to the co2 read from sensor; 1 = manual, means the output value according to the value set in output_manual_value_co2 (register 323)." |
| 281        | 2     | output_manual_value_temp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 282        | 2     | output_manual_value_humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 283        | 2     | output_manual_value_co2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 284        | 1     | the output mode, (0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 285        | 2     | the minimum degree of temperature range corresponding to the temperature output(0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 286        | 2     | the maximum degree of temperature range corresponding to the temperature output(0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 287        | 2     | the minimum percent of humidity range corresponding to the humidity output(0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 288        | 2     | the maximum percent of humidity range corresponding to the humidity output(0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 289        | 2     | the minimum ppm of co2 range corresponding to the co2 output(0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 290        | 2     | the maximum ppm of co2 range corresponding to the co2 output(0-5V,0-10V,4-20mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 291        | 1     | INFO_BYTE, TBD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 292        | 1     | RS485 Baudrate, 0 = 9600, 1 = 19200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 293        | 1     | RTC second, from 0 to 59.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 294        | 1     | RTC minute, from 0 to 59.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 295        | 1     | RTC hour, from 0 to 23.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 296        | 1     | RTC day, from 1 to 31.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 297        | 1     | RTC week, from 0 to 6, 0 = Sunday.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 298        | 1     | RTC month, from 1 to 12.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 299        | 2     | RTC year, from 0 to 99 (2000 to 2099).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 300        | 1     | The password to log in the menu system. 1=Enable. 0=Disable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 301        | 1     | The first password character, from '0' to '9'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 302        | 1     | The second password character, from '0' to '9'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 303        | 1     | The third password character, from '0' to '9'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 304        | 1     | The fourth password character, from '0' to '9'.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 305        | 2     | Menu block time. The menu will back to idle state after this seconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 306        | 2     | Backlight keep time. The backlight will turn off after this seconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 307        | 1     | External node plus&play. 1=Enable, 0=Disable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 308        | 1     | Device number in the scan database, include the master unit itself.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 309        | 1     | Set 1 to clear the scan database                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 310 to 314 | 5     | First device of the database, the display unit take it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|            |       | 5 bytes: 1st = address, 2nd..5th = serial number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-D&CO2-W without Ethernet

| Address    | Bytes | Register Description                                      |
|------------|-------|-----------------------------------------------------------|
| 315 to 319 | 5     | Second device of the database, the first external sensor. |
|            |       | 5 bytes: 1st = address, 2nd..5th = serial number          |
|            |       | If the address is 0 or 255, that means not device behind. |
| 320 to 324 | 5     | ...                                                       |
| ...        | 5     | ...                                                       |
| ...        | 5     | ...                                                       |
| 510        | 5     | The end of the database                                   |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-D-E&CO2-W-E with Ethernet

| Address    | Bytes | 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. Fixed.                                                                        |
| 5          | 1     | firmware version upper byte. eg. FW version = 10.12, so lower byte = 12 AND high byte = 10. Fixed.                                                                        |
| 6          | 1     | Modbus device address                                                                                                                                                     |
| 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                                                                                                                               |
| 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

## CO2-D-E&CO2-W-E with Ethernet

| Address    | Bytes | 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-Successful                                                                               |
| 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, unused.                                                |
| 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.                                                          |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-D-E&CO2-W-E with Ethernet

| Address     | Bytes | Register Description                                                                                                                                     |
|-------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 977 to 1230 | 2*254 | The setpoint value of poor alarm for external co2 sensors.                                                                                               |
| 1231        | 2     | The value to eliminate the pulse of the co2 ppm.                                                                                                         |
| 1232        | 1     | The filter to make the ppm value smoothly, it is 5 as default.                                                                                           |
| 1233        | 1     | Enable/Disable the password for the menu system operation. 0=Disable, 1=Enable.                                                                          |
| 1234        | 1     | The first digital of the password. Should be from 0 to 9.                                                                                                |
| 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.                                                                                                                       |
| 1245        | 1     | The second of the real time clock.                                                                                                                       |
| 1246        | 1     | Alarm auto/manual control. Bit7: 0 = auto, 1 = manual; bit0:1 = 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 to 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=4-20mA, 2=0-5V, 3=0-10V                                                                               |
| 1255        | 2     | The minimum value of temperature for analog output.                                                                                                      |
| 1256        | 2     | The minimum value of temperature for analog output.                                                                                                      |
| 1257        | 2     | The minimum value of humidity for analog output.                                                                                                         |
| 1258        | 2     | The minimum value of humidity for analog output.                                                                                                         |
| 1259        | 2     | The minimum value of co2 for analog output.                                                                                                              |
| 1260        | 2     | The minimum value of co2 for analog output.                                                                                                              |
| 1261        | 1     | The period for the menu system to stay at the submenu. It goes to the main menu when it expires in the submenu.                                          |
| 1262        | 1     | The period for the LCD backlight keep on. The backlight turns on when key is triggered, and turns off when it expires.                                   |
| 1263        | 1     | Enable/Disable the plug-and-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.                                                                                                                           |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-D-E&CO2-W-E with Ethernet

| Address      | Bytes | Register Description                                                          |
|--------------|-------|-------------------------------------------------------------------------------|
| 1266 to 1270 | 1*5   | The first co2 node information. Normally it is the unit itself.               |
|              |       | register1266: the modbus ID of the co2 sensor.                                |
|              |       | register1267..1270: the serial number of the co2 sensor.                      |
| 1271 to 1275 | 1*5   | The second co2 node information. Normally, it is the first external co2 node. |
| 1276 to 1280 | 1*5   | The third co2 node information.                                               |
| ...          |       |                                                                               |
| ...          |       |                                                                               |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-Node Registers

| Address  | Bytes | Register Description                                                                                                                    |
|----------|-------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 0 to 3   | 4     | Serial Number - 4 byte value. Read-only                                                                                                 |
| 4 to 5   | 2     | Software Version – 2 byte value. Read-only                                                                                              |
| 6        | 1     | ADDRESS. Modbus device address                                                                                                          |
| 7        | 1     | Product Model. This is a read-only register that is used by the microcontroller to determine the product                                |
| 8        | 1     | Hardware Revision. This is a read-only register that is used by the microcontroller to determine the hardware rev                       |
| 9        | 1     | PIC firmware version                                                                                                                    |
| 10       | 1     | PLUG_N_PLAY_ADDRESS, 'plug n play' address, used by the network master to resolve address conflicts. See VC code for algorithms         |
| 15       | 1     | Base address selection.0 = Protocol address,1 = PLC address.                                                                            |
| 16       | 1     | Firmware Update Register, used to show the status of firmware updates                                                                   |
| 17 to 99 |       | Blank, for future use                                                                                                                   |
| 100      | 2     | adc value of co2 voltage output, not used, read only                                                                                    |
| 101      | 2     | adc value of temperature voltage output, not used, read only                                                                            |
| 102      | 2     | adc value of humidity voltage output, not used, read only                                                                               |
| 103      | 2     | adc value of co2 current output, not used, read only                                                                                    |
| 104      | 2     | adc value of temperature current output, not used, read only                                                                            |
| 105      | 1     | adc value of humidity current output, not used, read only                                                                               |
| 106      | 2     | adc value of on board thermistor sensor, read only                                                                                      |
| 107      | 2     | adc value of on board light sensor, read only                                                                                           |
| 108      | 2     | co2 value (ppm). It will be calibrated if write to it.                                                                                  |
| 109      | 2     | co2 calibration offset. User can change it to calibrate the co2 ppm. It will be changed also if user write the data to register co2 ppm |
| 110      | 1     | Delta value for eliminating the pulse ppm value. The default value is 200.                                                              |
| 111      | 2     | Filter times, make the ppm value go smooth. The default value is 5.                                                                     |
| 112      | 2     | The fair alarm ppm setpoint of co2 sensor.                                                                                              |
| 113      | 2     | The poor alarm ppm setpoint of co2 sensor.                                                                                              |
| 114      | 1     | co2 alarm status:                                                                                                                       |
|          |       | 0b'xxxx 1xxx': co2 poor                                                                                                                 |
|          |       | 0b'xxxx 01xx': co2 fair                                                                                                                 |
|          |       | 0b'xxxx 001x': co2 good                                                                                                                 |
| 115      | 1     | the version number of humidity sensor                                                                                                   |
| 116      | 2     | the relative humidity                                                                                                                   |
| 117      | 2     | the frequency value read from humidity sensor, read only                                                                                |
| 118      | 1     | the number of calibration points of the humidity sensor                                                                                 |
| 119      | 2     | degree celsius temperature value of the humidity sensor                                                                                 |
| 120      | 2     | degree fahrenheit temperature value of the humidity sensor                                                                              |
| 121      | 2     | celsius degree temperature value of the on board thermistor sensor                                                                      |
| 122      | 2     | fahrenheit degree temperature value of the on board thermistor sensor                                                                   |
| 123      | 2     | the offset for calibrating the on board thermistor sensor                                                                               |
| 124      | 1     | select the temperature direct to analog output:                                                                                         |
|          |       | 0: on board thermistor sensor, default setting                                                                                          |

# CO2-Humidity-Temp Transmitter w/ Bacnet

## CO2-Node Registers

| Address | Bytes | Register Description                                                                                                                                                                     |
|---------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 125     | 1     | select the temperature unit direct to analog output:                                                                                                                                     |
|         |       | 0: degree celsius                                                                                                                                                                        |
|         |       | 1: degree fahrenheit, default setting                                                                                                                                                    |
| 126     | 2     | Lighting value, for feature                                                                                                                                                              |
| 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 $((1000\text{ppm} / (3000\text{ppm} - 0\text{ppm})) * (10\text{V} - 0\text{V})) + 0\text{V} = 3.3\text{V}$       |
|         |       | 2. setting J20 to select 0V-5V output mode, so the co2 output is about $((1000\text{ppm} / (3000\text{ppm} - 0\text{ppm})) * (5\text{V} - 0\text{V})) + 0\text{V} = 1.65\text{V}$        |
|         |       | 3. setting J20 to select 4mA-20mA output mode, so the co2 output is about $((1000\text{ppm} / (3000\text{ppm} - 0\text{ppm})) * (20\text{mA} - 4\text{mA})) + 4\text{mA} = 9.3\text{mA}$ |
| 500     |       | co2 automatic compensation background enable or disable. 0 = Disable, 1 = Enable                                                                                                         |
| 501     |       | "Background CO2", default is 400ppm, minimum is 390, max is 500. "                                                                                                                       |
| 502     |       | Maximum adjustment per day" default is 1ppm, max is 10 ppm, minimum is 1                                                                                                                 |
| 503     |       | "Number of days to watch for minimum" , default is 7 days. Max is 30 days. Minimum is 2 days.                                                                                            |
| 505     |       | co2 background calibration offset                                                                                                                                                        |