Triple MODBUS CO2 temperature and Humidity Sensor Wall mounted Transmitter

Description

This sensor gives information concerning carbon dioxide (CO2) concentration levels, temperature and humidity, important elements in air quality monitoring
The outdoor CO2 level serves as a baseline for comparison to indoor CO2 concentration.

Ventilation guidelines, such as ASHRAE, recommend indoor CO2 levels not to exceed the surrounding outdoor concentration by 600 ppm. Also, LEED guidelines suggest providing an alarm when the indoor CO2 level exceeds the outdoor level by 530 ppm, or 1,000 ppm absolute. Reliable correlation between indoor and outdoor CO2 levels can only be achieved by measuring both.

Features

- NDIR Dual, long life, reliability. No calibration required
- Indoor Air quality measurement
- Temperature measurement
- Relative Humidity measurement
- **Unique MAC Address** identifier for remote control and web applications
- Configurable Modbus parameters (address, baudrate, parity…) remotely and by RS232 connection console (default: 16dec, 9600,1,even)

Application Areas

- HVAC applications for building management
- Offices, dwellings, Hotels
- Museums
- Commercial shops, Retail
- Home air quality control

Technical Specifications

CO2 specification	
Measurement Principle	NDIR -Non dispersive infrared technology-
Sensor Type	**Dual Beam** Dual wavelenght
Measurement Range	400 – 4000 ppm CO2 by volume
Resolution	< 20 ppm CO2
Accuracy	± 5% of reading
Pressure Dependence	0.13 % of reading per mm Hg
Response Time	< 3 minutes for a 90% step change
Warm up Time	< 30 seconds operational < 15 minutes full accuracy

Default thresholds * *model reference product EN232533:*

PPM1	●	Level1: green x < 500 ppm
PPM2	✱	Level 2: green flashing when 500 ≤ ppm < 700 ppm
PPM3	●	Level 3: yellow when 700 ≤ ppm < 1200 ppm
PPM4	✱	Level 4: yellow flashing when 1200 ≤ ppm < 1800
PPM5	●	Level 5: red when 1800 ≤ ppm < 2500
PPM6	✱	Level 6: red flashing when ppm ≥ 2500 ppm

Hysteresis for the threshold/level values:

Levels 1,2,3: ± 30 ppm
Levels 4,5,6: ± 80 ppm

Electrical Specifications	
Power supply	24 Vdc (7-28 Vdc)
Power consumption	14-45 mW
OUTPUT	**MODBUS RTU** EIA-485 physical layer
Operating Temperature	0 ~ +40º C
Storage Temperature	-20 ~ + 50 ºC
Operating Humidity	0 ~ 95% non-condensing
Electrical connection	screw terminals max. 1.5 mm2

General Specifications	
Regulatory Compliance	CE Mark: EMC 2004/108/EC, RoHS 2011/65/EU, WEEE
	EN61000-6-2, EN61000-6-3
Casing Material	ABS UL94-V0
IP Housing	IP20 –EN62208
Housing color	White
Dimensions box	80x80x25 mm (3.15x3.15x0.98 ")
Weight	0.089 kg

Humidity	
sensing principle	capacitive
Measuring Range	0 to 100% RH
Accuracy Typ.	± 3% (0% ≤ rH ≤ 80%)
resolution min.	0.2 %

Temperature	
sensing principle	capacitive
Measuring Range	- 20ºC to +50ºC
Accuracy Typ.	± 0.3ºC (- 10ºC ≤ ta ≤ +85ºC)
resolution min.	0.08ºC

MODBUS

MODBUS REGISTERS			
INPUT REGISTERS [100…110]		**HOLDING REGISTERS [100…122]**	
Unsigned integer 16 bits i.e. if **protocol-message address counts** from 0		Unsigned integer 16 bits i.e. if **device address counts** from 1 (401001 is identified by address 101)	
100	CO2 measured value	**100**	CO2 measured value
101	Time reference	**101**	Time reference
102	Last measurement value before the current (reg 100)	**102**	Last measurement value before the current (reg 100)
103	Maximum value measured since start-up	**103**	Maximum value measured since start-up
104	Minimum value measured since start-up	**104**	Minimum value measured since start-up
105	MAC0 *	**105**	SetPoint (PID VERSION, if no PID this value is set to 0)
106	MAC1	**106**	**Modbus Address** (16 as default) range [1..247] if the set value is out of range the register is set to 1
107	MAC2 *** Bytes of the MAC address format** MAC0-MAC1-MAC1-MAC3-MAC4-MAC5 *(EUI-48 format)*	**107**	**Baudrate** 2400 9600 (default) 19200 *If other different value from last ones is entered or not integer value the device writes the default baudrate: 9600 bps*
108	MAC3	**108**	**Stop bits** 1:1 (default) 2:2
109	MAC4	**109**	**Parity** 0: None 1: Even (default) 2: odd
110	MAC5	**115**	Last measured Humidity value (Integer value)
		116	Last measured temperature value (Integer value)
		117	Last measured Humidity sensor value (Integer value) **%RH= [122&123] x 100**
		118	Last measured Temperature sensor value (Integer value) **º C = [120&121] x 100**
		120 & 121	Last Measured temp value in IEEE-754 **float big endian –***single precision 4 bytes – Swap Words* *Example: if the number were 1,2345678 in hex 0x3f9e0651 then the transmitted number will be* *120: 0x0651* *121: 0x3f9e*
		122 & 123	Last measured humidity value in IEEE-754 **float big endian** - *single precision 4 bytes – Swap Words*

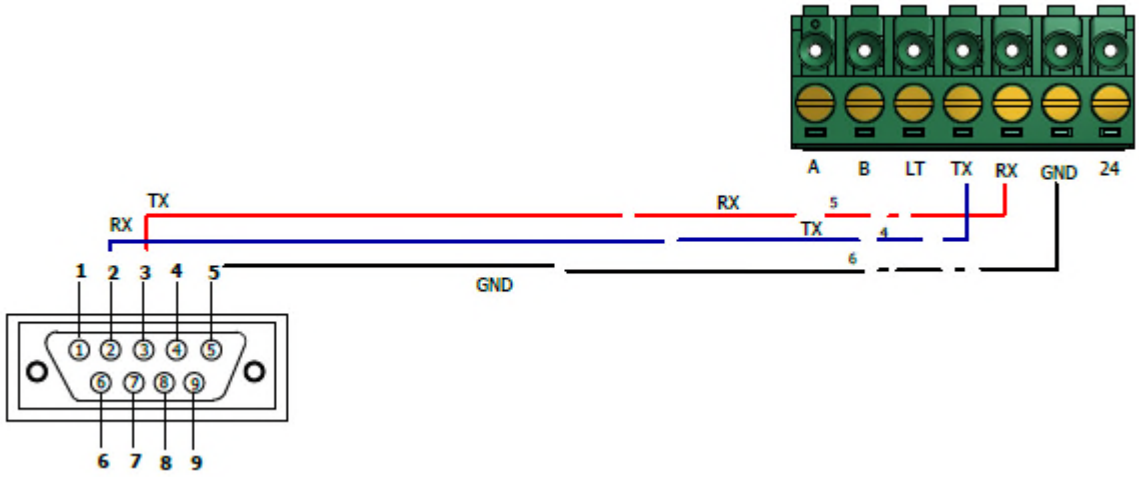
To modify the MODBUS communication parameters setting -STEPS:

Make a local RS232 connection with the sensor. Terminal connections are described below:

The parameters of the RS-232 port are:

Baud rate 9600 bps
Parity: None
Stop bits: 1
No handshake.

These parameters can't be modified
The cable to connect to the sensor is a NULL MODEM CABLE. The user must connect in the other side to PC to serial connector: Pins 5 GND, 2 RX, 3 TX – DE-9 male connector or use a Serial-USB adaptor if the PC doesn't use Serial female connection. The connections must follow the next diagram:



** if you don't have serial port in your PC you can acquire this USB-RS232 cable from this website:*

http://www.ftdichip.com/Products/Cables/USBRS232.htm
http://www.ftdichip.com/Support/Documents/DataSheets/Cables/DS_USB_RS232_CABLES.pdf

Additionally to see the internal menu' options the user needs a basic program console like this when you can download and install:

http://bit.ly/Teraterm-console

Main Menu

```
CO2 Sensor 400-4000ppm
FW: MDS.21.03.01.20.NO_PID.NO_TH
==================================
MAC: d8-80-39-e1-46-a4

Select an option
[1] MODBUS settings
[2] LED levels configuration
[4] Show measurements
[5] Show config
[6] Reset to default configuration
[7] Analog outputs
[8] Digital outputs
[q] Quit
>>
```

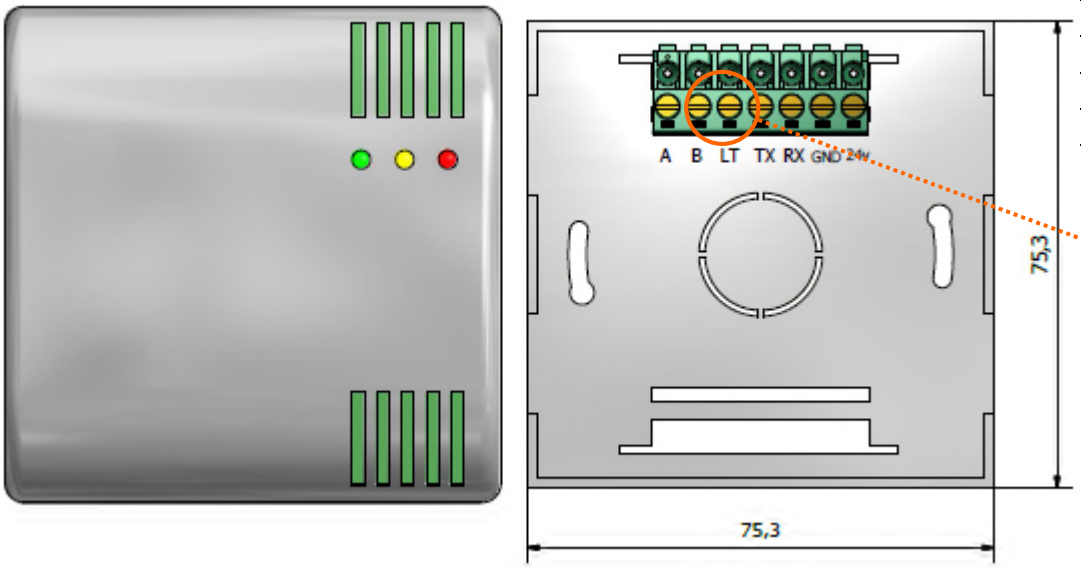
Factory default setting selection

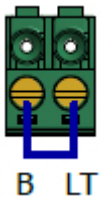
```
Reset ALL parameters to default values
[Y] YES
[N] NO

[q] Quit
>>
```

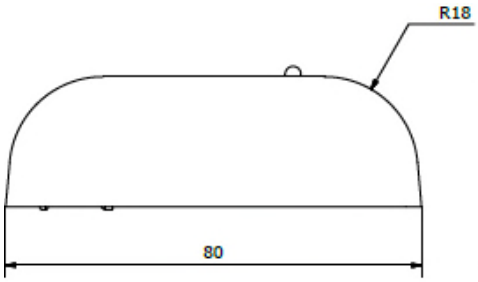
Installation Diagram – Housing Dimensions (mm)

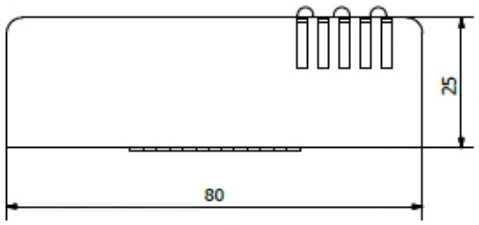
PIN	Señal
1	A-RS485
2	B-RS485
3	LT line terminal resistor
4	Tx RS232 console
5	Rx console input
6	GND
7	24V dc

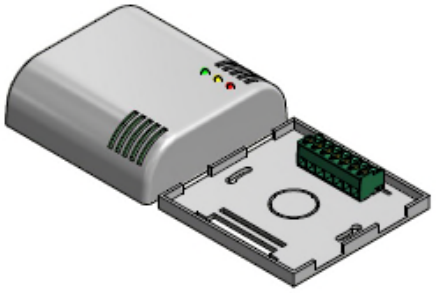




Bridge pins
Line Termination Resistor 120 Ohms







Warnings & Troubleshooting Considerations:

When start up if all LEDs are permanently ON means: ● ● ●
Wrong CO2 measurements, faulty module, CO2 module ERROR COMMUNICATION!

⇒ Also a bridge between the LT&B terminal is strongly recommended!

Ordering Info Codes

Product Name	Reference
NBB-MICO2TH30 Triple MODBUS CO2 temperature and humidity sensor	**EN231530**
NBB-MICO2TH32 Triple MODBUS CO2 temperature and humidity sensor with signalling traffic LEDs	**EN232533**