



Description

This sensor gives information concerning carbon dioxide (CO₂) concentration levels, important element 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.

Additionally in some agriculture procedures and greenhouse installations the control of CO₂ concentration is mandatory

Features

- NDIR Dual, long life, reliability. No calibration required
- Outdoor Air quality measurement
- Air quality measurement in swimming pools
- Configurable Analog OUTPUT - Scaling function

Application Areas

- HVAC applications for building management
- swimming pools
- greenhouse –agriculture
- dust areas

Technical Specifications

CO ₂ specification	
Measurement Principle	NDIR -Non dispersive infrared technology-
Sensor Type	Dual Beam Dual wavelength
Measurement Range	400 – 4000 ppm CO ₂ by volume
Resolution	< 20 ppm CO ₂
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

Electrical Specifications	
Power supply	24 Vdc (7-28 Vdc)
Power consumption	14-45 mW
OUTPUT	Analog 0-10v Linear 0ppm-0v/4000ppm-10v Configurable by RS232 connection console
Operating Temperature	0 ~ +40° C
Storage Temperature	-20 ~ + 50 °C
Operating Humidity	0 ~ 95% non-condensing
Electrical connection	3x cable 0.5 mm ²

General Specifications	
Regulatory Compliance	CE Mark: EMC 2004/108/EC, RoHS 2011/65/EU, WEEE EN61000-6-2, EN61000-6-3
Casing Material	Fiberglass reinforced polycarbonate Filter: Polyethylene
IP Housing	IP66 –EN62208
IP Sensor Filter	IP55
Housing color	Grey RAL 7035
Dimensions box	100x100x60 mm (3.94x3.94x2.36")
Filter large	106.50 mm (4.19")
Weight	0.373 kg

SENSOR CONFIGURATION & PARAMETRIZATION

With these instructions the user will configure the outputs and some parameters of the sensor/controller: range and scaling output function, current/voltage format range of the analogue magnitude, thresholds, state of the relay, hysteresis, baudrate, MODBUS address, trigger value and state of the digital output (NO/NC)...

The magnitude assignment of the digital and analogue output is configurable, this means that the digital output could be the temperature, analogue output the humidity and vice versa. Also the analogue output could be in current and in voltage.

To modify and configure the internal parameters of the sensor/controller we need to make a local RS232 connection with the device.

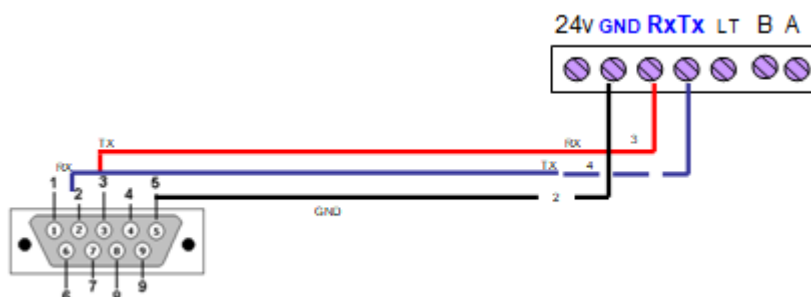
Terminal connections are described below:

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

Factory default setting selection

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

[q] Quit
>>
```

```
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
>>
```

ANALOGUE MAGNITUDE SELECTION

Select option [7] from the main Menu.

In our example we have the CO2 NDIR measurement magnitude

```
Select sensor to AN1 output [CO2 NDIR]
[1] CO2 NDIR
[2] VOC
[3] Temp
[4] Relative humidity
[5] None

[q] Quit
>>4
```

```
Select CO2 output parameters
[0] Output Sensor [CO2ppm NDIR]
[1] Output type V/I [V]
[2] Output Range (0..10V) [0.00 .. 10.00]
[3] Input Range (ppm/ppb/°C/RH) [0.00 .. 4000.00]
[s] Save analog CO2 output 1

[q] Quit
>>
```

Every time that the user change of menu with the “q” key, he has to save the change by “s” key

Once the user selects the magnitude the range by default is established as 0 to 100%, 0° to 50°C to temperature and 0 to 4000 ppm for the CO2

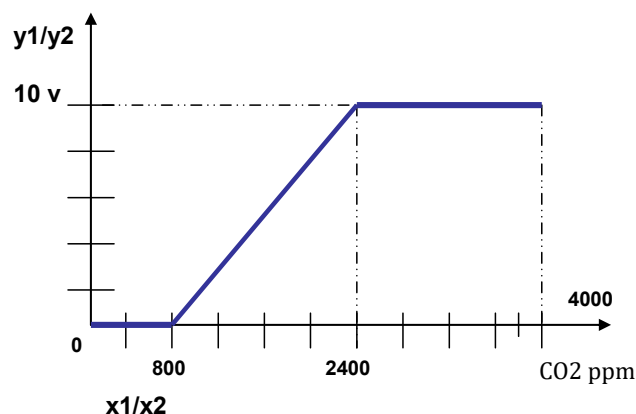
If the user wants another values he could makes a manual setting regarding input parameters like 600ppm to 1500ppm (x1/x2) and also output voltage range (y1/y2) like 2v to 5v

```
Select analog 1 output, output range [2.00 .. 5.00]
[1] 0..10 V [default]
[2] 0..5 V
[3] MANUAL SETTING (Y1/Y2)

[q] Quit
>>
```

```
Select analog 1 output, input range [800.00 .. 2400.00]
[1] [0..4000 ppm] [default]
[2] [0..2500 ppm]
[3] MANUAL SETTING (X1/X2)

[q] Quit
>>
```



On this example (*see the figure*) we makes a setting of the humidity assigning 800ppm to 0 volts and 2400ppm to 10 volts output

```
Introduce X1 Value [0..4000 ppm]
[q] Quit
>>800

Introduce X2 Value [0..4000 ppm]
[q] Quit
>>2400
```

```
Select CO2 output parameters
[0] Output Sensor [CO2ppm NDIR]
[1] Output type V/I [V]
[2] Output Range (0..10V) [0.00 .. 10.00]
[3] Input Range (ppm/ppb/°C/RH) [800.00 .. 2400.00]
[s] Save analog CO2 output 1

[q] Quit
>>s
```

Digital Output configuration

Select the [8] option on the main menu for Digital configuration and you will see the following menu options:

```
[1] Trigger Value [800.000000]
[2] Histeresys [100.000000]
[3] Initial Value [400.000000]
[4] NO/NC [NO]
[5] Magnitude [CO2]
[s] Save Digital output configuration
[q] Quit
>>
```

On this example (*see the figure*) we will assign the digital output to the CO2 measured with the following configuration:

NO normal open contact, initial value of 400ppm, hysteresis of the trigger 100 ppm and trigger event to 800ppm

Also as you check you can select NO normal open contact or NC normal close contact configuration

```
Set digital output magnitude [CO2]
[1] NOT_ASSIGNED
[2] HUMIDITY
[3] TEMPERATURE
[4] CO2

[q] Quit
>>4
```

```
Set digital output NO/NC [NO]
[1] NO
[2] NC

[q] Quit
>>1
```

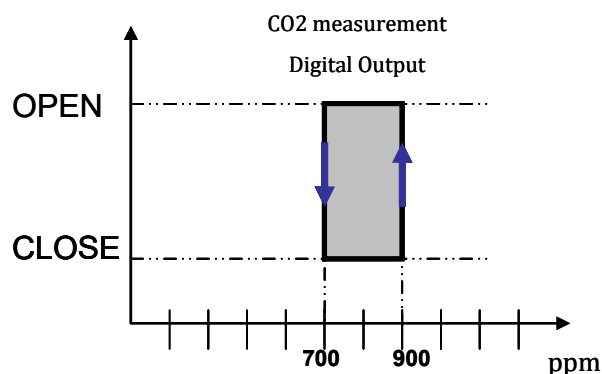
```
Set Digital output initial value value (float) [400.000000]
Initial value value:
>>400
```

```
Set Digital output histeresys value (float) [100.000000]
Histeresys value:
>>100
```

```
Set Digital output trigger value (float) [800.000000]
Trigger value:
>>800
```

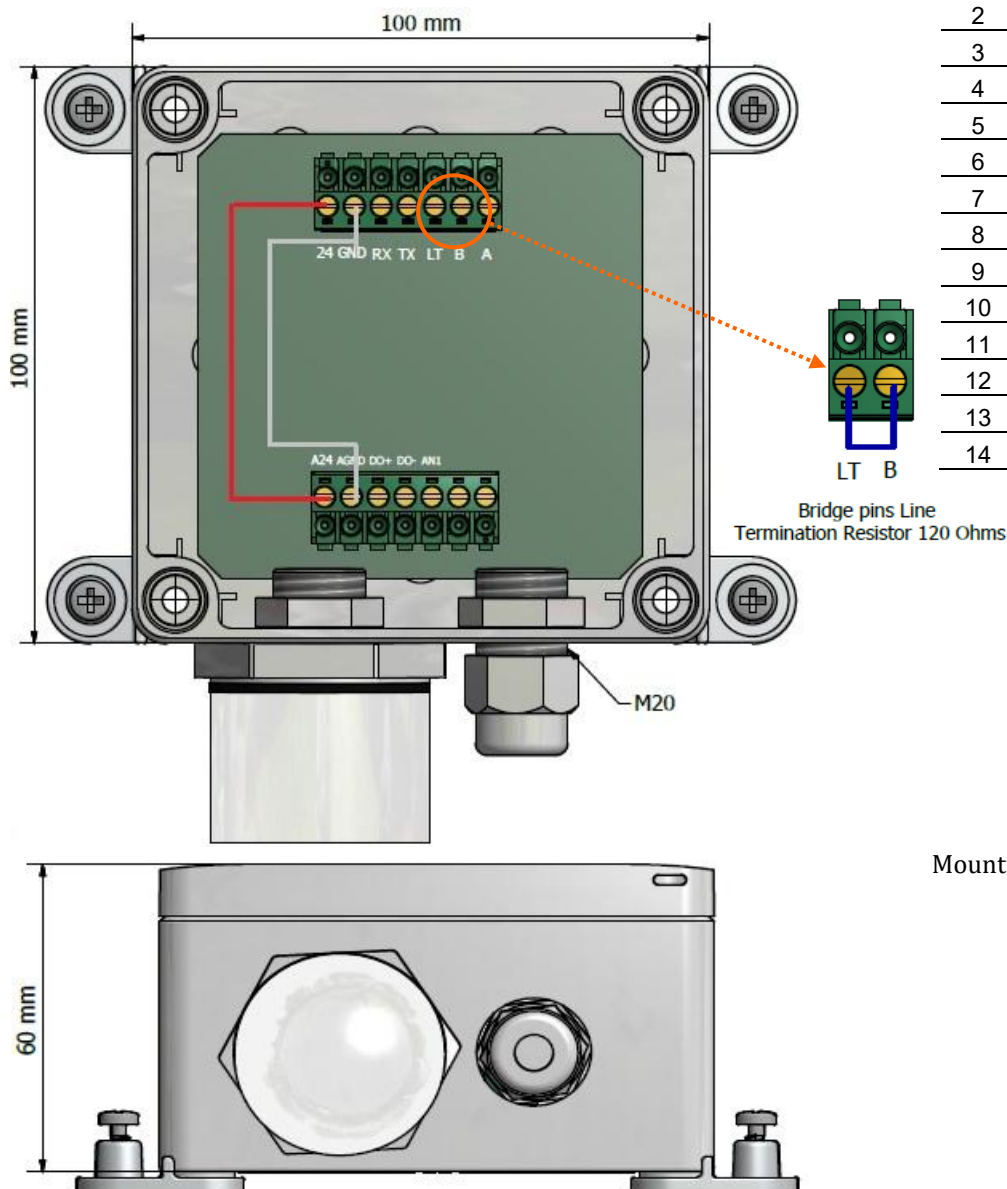
```
Digital Output configuration

[1] Trigger Value [800.000000]
[2] Histeresys [100.000000]
[3] Initial Value [400.000000]
[4] NO/NC [NO]
[5] Magnitude [CO2]
[s] Save Digital output configuration
[q] Quit
>>
```



CO2 Analog Outdoor Sensor

Installation Diagram – Cabling - Dimensions



PIN	Signal
1	24Vdc
2	GND
3	Rx
4	Tx
5	LT Termination Resistor 120 Ohms
6	B – RS485
7	A – RS485
8	A-24Vdc
9	A-GND
10	DO +
11	DO -
12	AN1 (CO2 signal)
13	(not used)
14	(not used)

Accessories (included)



Mounting Flags for Wall mounted

4

Installation Notes:



- ⇒ The installer has to bridge the 24Vdc and GND pins between the both connectors (upper/lower connector) to work with digital and analogue output if he wants an isolated connection. By default the sensor has a non isolated connection. 24V and GND are not connected internally
- ⇒ The digital output is free potential and supports only 150mA
- ⇒ Also a bridge between the LT&B terminal is strongly recommended!

Ordering Info Codes

Product Name	Reference
DPF-AOC02 CO2 Analogue Sensor for outdoor use (400-4000ppm)	EN025105