

## 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
- Outdoor Air quality measurement
- Air quality measurement in swimming pools
- Temperature measurement
- Relative Humidity measurement
- **Unique MAC Address** identifier for remote control and web applications
- Configurable baudrate by console, 9600 bps by default
- Configurable physical MODBUS Address by serial console (default 16)

## 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	<b>Dual Beam</b> Dual wavelength
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	●	Level 1: 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	<b>MODBUS RTU</b> EIA-485 physical layer
Operating Temperature	0 ~ +40° C
Storage Temperature	-20 ~ + 50 °C
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		Temperature	
sensing principle	capacitive	sensing principle	capacitive
Measuring Range	0 to 100% RH	Measuring Range	- 20°C to +50°C
Accuracy Typ.	± 3% (0% ≤ rH ≤ 80%)	Accuracy Typ.	± 0.3°C (- 10°C ≤ ta ≤ +85°C)
resolution min.	0.2 %	resolution min.	0.08°C

## MODBUS

MODBUS REGISTERS	
INPUT REGISTERS [100...110]	HOLDING REGISTERS [100...122]
Unsigned integer 16 bits i.e. if <b>protocol-message address counts</b> from 0	Unsigned integer 16 bits i.e. if <b>device address counts</b> from 1 (401001 is identified by address 101)
<b>100</b> CO2 measured value	<b>100</b> CO2 measured value
<b>101</b> Time reference	<b>101</b> Time reference
<b>102</b> Last measurement value before the current (reg 100)	<b>102</b> Last measurement value before the current (reg 100)
<b>103</b> Maximum value measured since start-up	<b>103</b> Maximum value measured since start-up
<b>104</b> Minimum value measured since start-up	<b>104</b> Minimum value measured since start-up
<b>105</b> MAC0 *	<b>105</b> SetPoint (PID VERSION, if no PID this value is set to 0)
<b>106</b> MAC1	<b>106</b> <b>Modbus Address</b> (16 as default) range [1..247] if the set value is out of range the register is set to 1
<b>107</b> MAC2 * <b>Bytes of the MAC address format</b> MAC0-MAC1-MAC1-MAC3-MAC4-MAC5 (EUI-48 format)	<b>107</b> <b>Baudrate</b> 2400 9600 (default) 19200 38400 57600 <i>If other different value from last ones is entered or not integer value the device writes the default baudrate: 9600 bps</i>
<b>108</b> MAC3	<b>108</b> <b>Stop bits</b> 1:1 (default) 2:2
<b>109</b> MAC4	<b>109</b> <b>Parity</b> 0: None 1: Even (default) 2: odd
<b>110</b> MAC5	<b>110</b> <b>WRITE REG</b> Usually is set to 0 value If this register is set to 1 the latest MODBUS registers is saved and return to 0 value (as default)
	<b>111</b> PID value
	<b>115</b> Last measured Humidity value (Integer value)
	<b>116</b> Last measured temperature value (Integer value)
	<b>117</b> Last measured Humidity sensor value (Integer value) $\%RH = (125 * [102]) / (65536) - 6$
	<b>118</b> Last measured Temperature sensor value (Integer value) $^{\circ}C = (175,72 * [103]) / (65536) - 46,85$
	<b>120 &amp; 121</b> Last Measured temp value in IEEE-754 <b>float big endian</b> -single precision 4 bytes - Swap Words <i>Example: if the number were 1,2345678 in hex 0x3f9e0651 then the transmitted number will be</i> <i>120: 0x0651</i> <i>121: 0x3f9e</i>
	<b>122 &amp; 123</b> Last measured humidity value in IEEE-754 <b>float big endian</b> - single precision 4 bytes - Swap Words

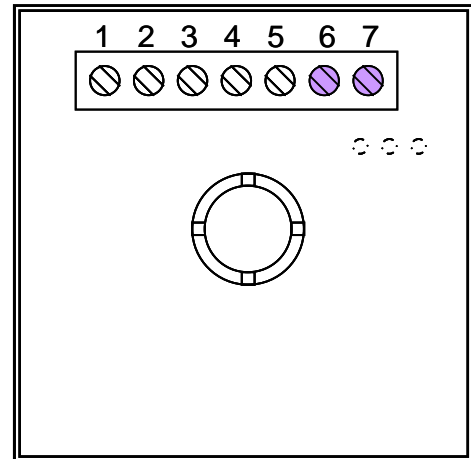
To modify remotely the MODBUS setting -STEPS:

1. Write the registers 106, 107, 108, 109 to the desired value
2. Set the 110 register to 1 value and at this moment the new configuration is taken and the MODBUS configuration is reset to the new
3. This last register 110 is turn automatically to 0 value.

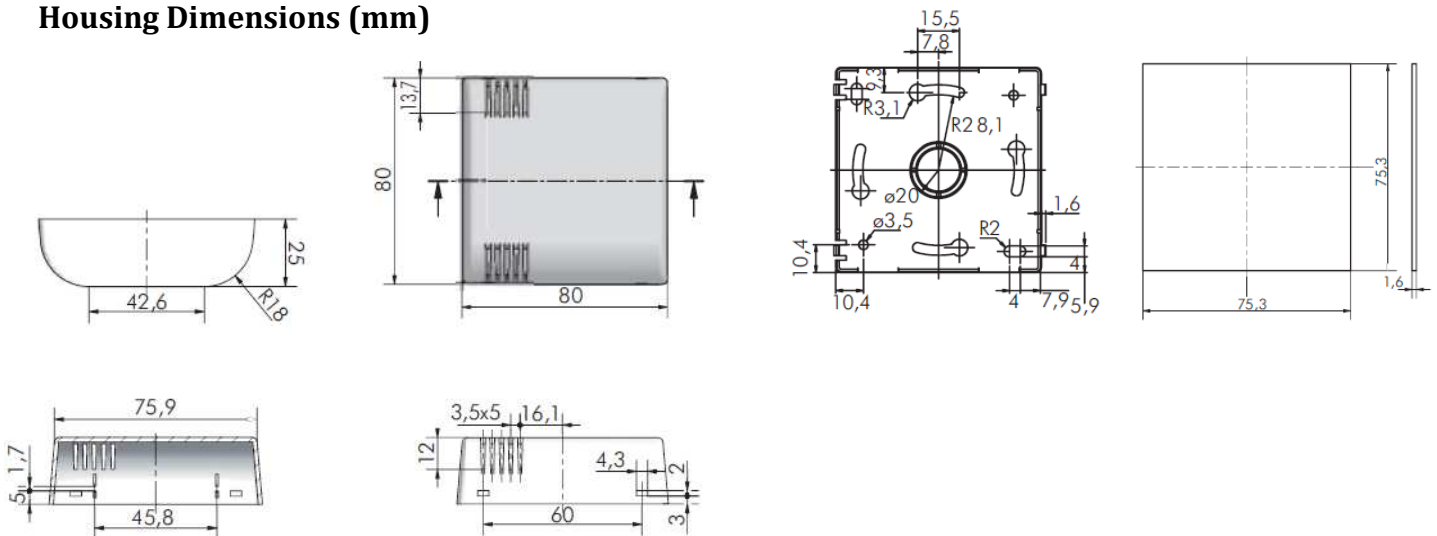
## Installation Diagram – Upper connector

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

## Back plate View



## Housing Dimensions (mm)



## Warnings & Troubleshooting Considerations:



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

## Ordering Info Codes

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

