



# Senseair CO2 Temperature and Relative Humidity Sensor User Manual

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# Senseair

Senseair CO2 Temperature and Relative Humidity Sensor

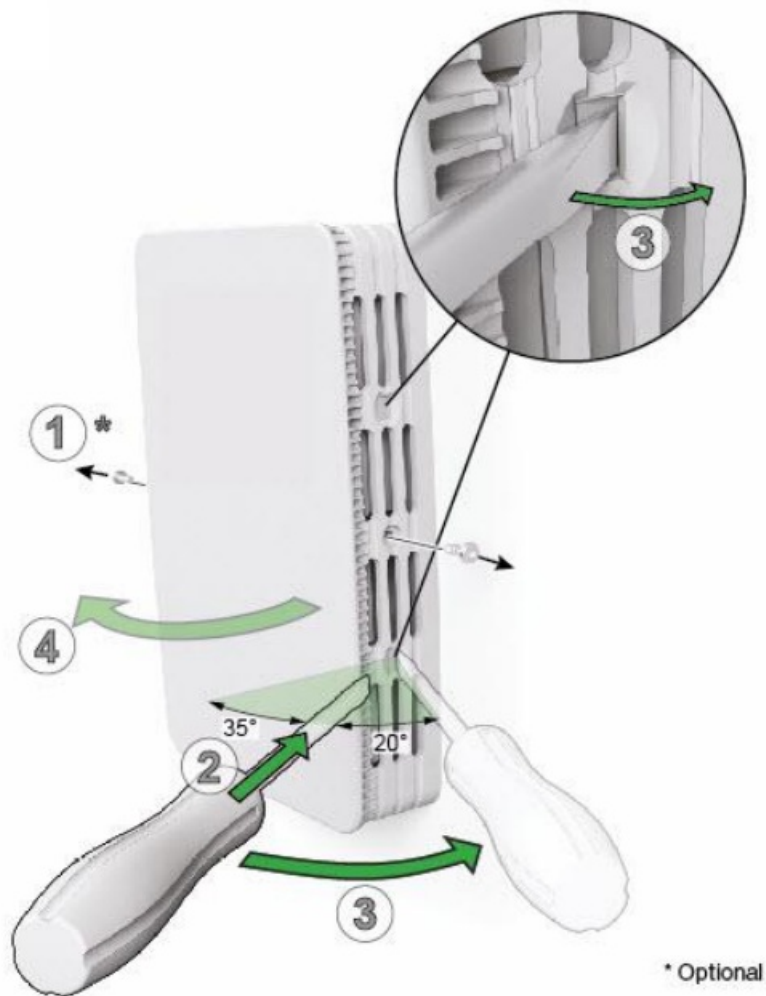


## **General**

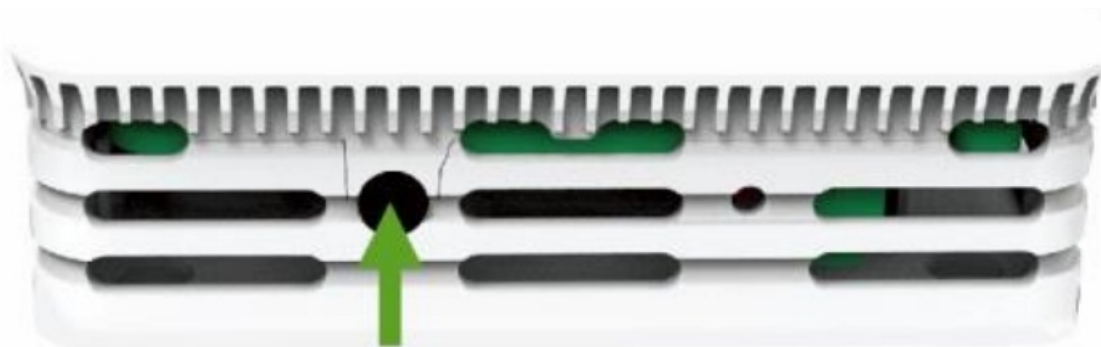
TSENSE VAV No Disp for wall mounting measures indoor air carbon dioxide concentration, temperature, and relative humidity in rooms. The unit connects to Direct Digital Control (DDC). Linear outputs are pre-programmed as CO<sub>2</sub>, temperature, and relative humidity controllers. Output parameters can be modified from PC (Windows) software UIP (version 5 or higher) and USB communication cable, alternative via Modbus or BACnet.

## **Opening of housing**

## **Installation Manual**

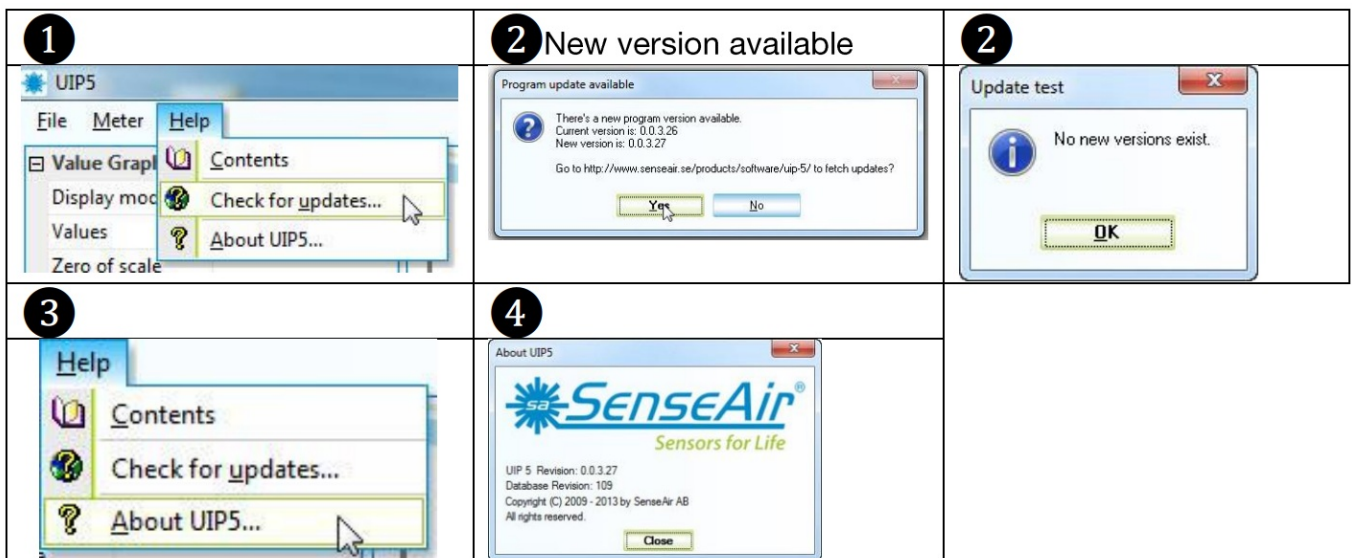


Download software UIP5 [senseair.com](https://senseair.com)



Connection to PC via a phone jack Connect Interface cable USB- 3.5mm Art.no.:00-0-0070

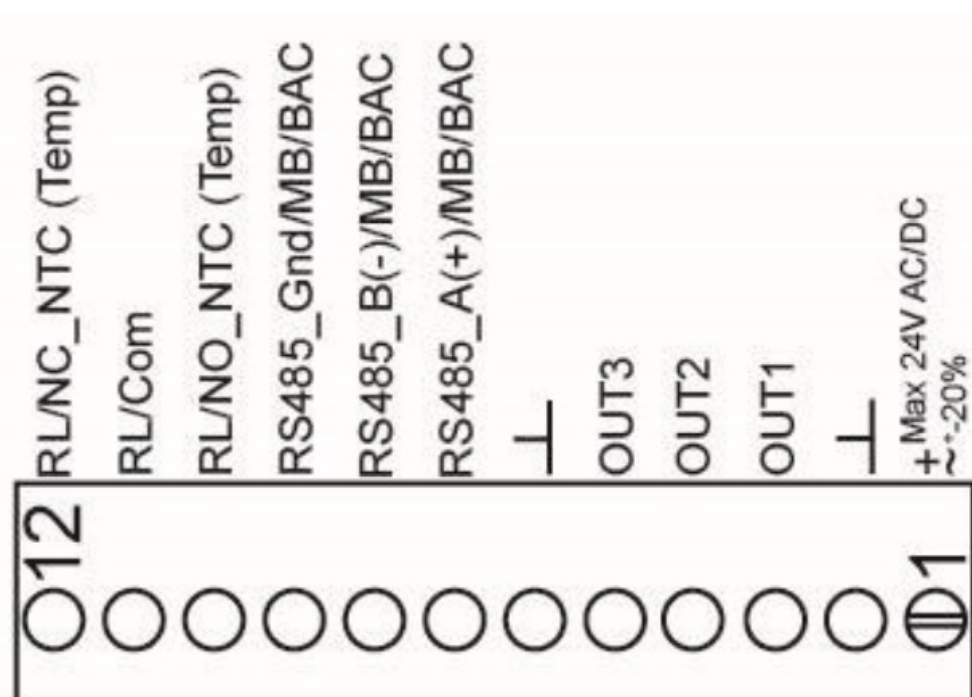
**Check for updates**



## Output configurations

Terminal	Default output	Default output range	Outputs of this sensor	Output ranges of this sensor
OUT1 CO <sub>2</sub> : Temperature: Relative Humidity:	0 - 10 VDC	600 - 900ppm 22 - 23°C 75 - 85%	See label	See label
OUT2 CO <sub>2</sub> :	0 - 10 VDC	0 - 2000ppm	See label	See label
OUT3 Temp:	0 - 10 VDC	0 - 50°C	See label	See label
Relay CO <sub>2</sub> :	0 - 10 VDC	900 - 1000ppm	See label	See label

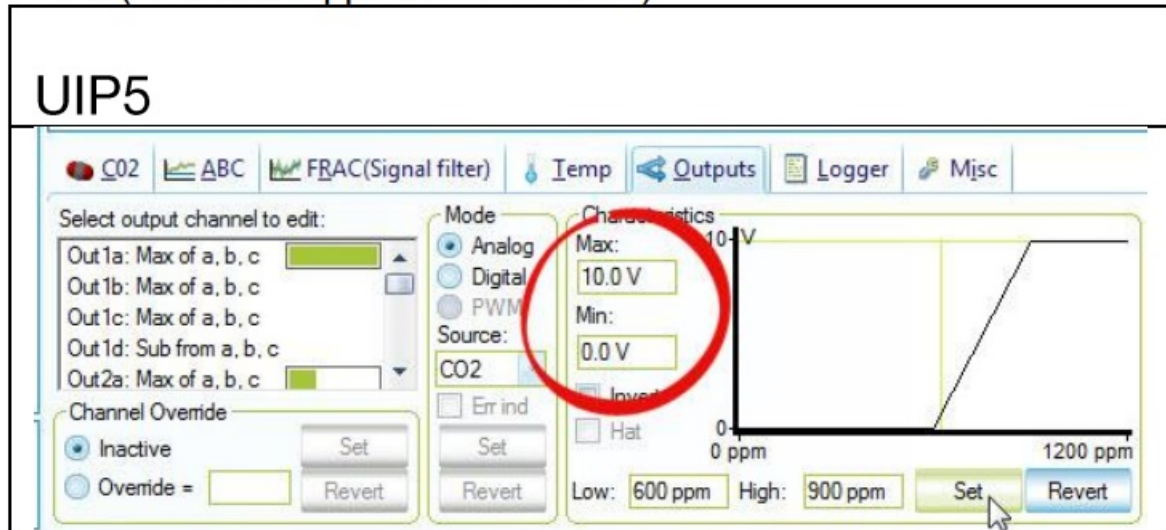
Table 1. Default output configurations of tSENSE VAV No Disp



The sensor is supplied with 0- 10VDC linear analog outputs for Out(1), Out(2), and Out(3) (see table 1). Alternative output ranges can be configured via PC software UIP (version 5 or later). See information at [senseair.com](http://senseair.com)

Out1/Out2/Out3 e.g Each output consists of four blocks. Each block has nine source options. OUT1 (OUT2/ OUT3/(Relay)) is the largest (Max of a, b, c) demand from Proportional-bands.

Max (the same approach with “Min”)



- $OUT1 = \text{Max of Out1\_a/ Out1\_b/ Out1\_c minus (sub)}$
- $Out1\_d \text{ 5V (Out1o)} - 0V \text{ (Out1\_d Disabled)} = 5V \Rightarrow OUT1=5V$

The (e.g.) VAV valve opens from minimum set-point position with full opened state at the maximum set-point.

$U_{Out} = 0V$ if space has the value:	$U_{Out}$ will be increased if space has the value:	$U_{Out} = 10V$ if space has the value:
$CO_2 \leq 600\text{ppm}$ and $Temp \leq 22^\circ C$ and $RH \leq 75\%RH$ (Out1_d = Disabled)	$600\text{ppm} \leq CO_2 < 900\text{ppm}$ or $22^\circ C \leq Temp < 23^\circ C$ or $75\%RH \leq RH < 85\%RH$ (Out1_d = Disabled)	$CO_2 > 900\text{ppm}$ or $Temp > 23^\circ C$ or $RH > 85\%$ (Out1_d = Disabled)

e.g. Temp protection (Out1\_d) Enabled

Out1_a $CO_2: 1205\text{ppm} \Rightarrow 10V$	Out1_b $Temp: 16.4^\circ C \Rightarrow 0V$	Out1_c $Humidity: 80\%RH \Rightarrow 5V$	Out1_d $Temp: 16.4^\circ C \Rightarrow 10V$ NOTE! (sub) (Temp protection)
--	---	---	--

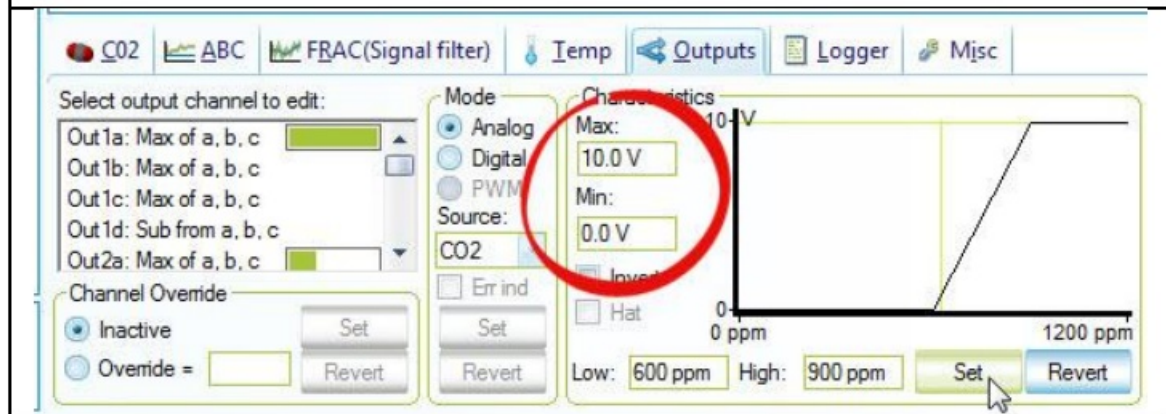
## Voltage range

Max (the same approach with “Min”)



Max (the same approach with “Min”)

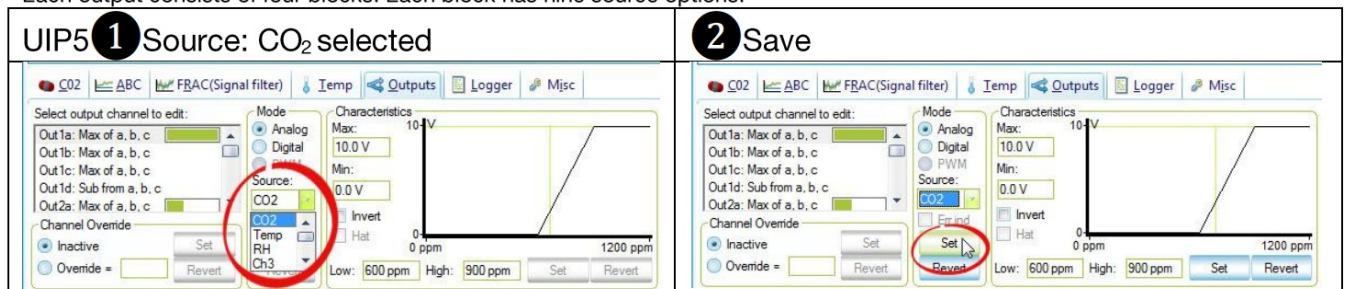
## UIP5



### Select source

Each output consists of four blocks. Each block has nine source options.

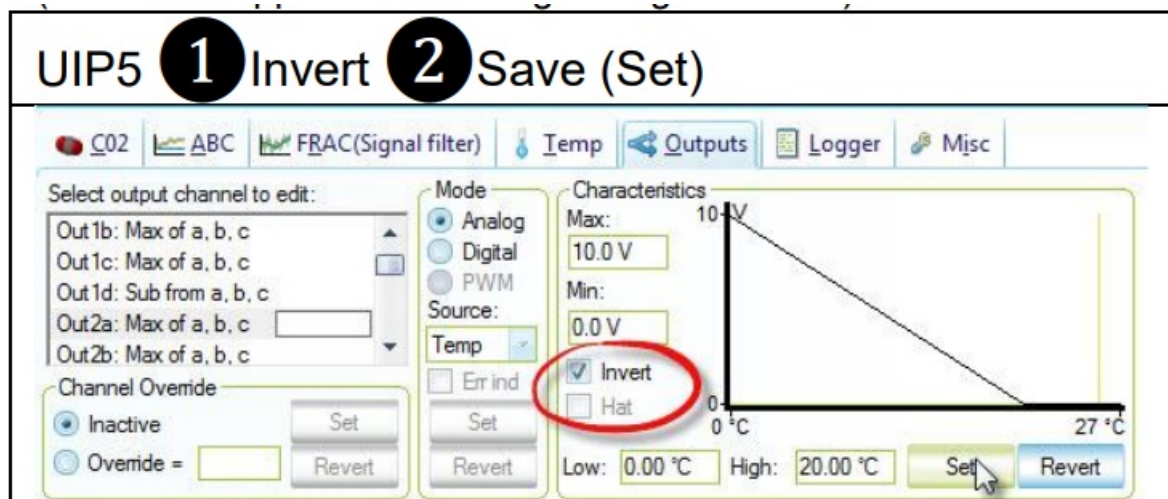
Each output consists of four blocks. Each block has nine source options.



### Types

### Analogue/Analogue Invert

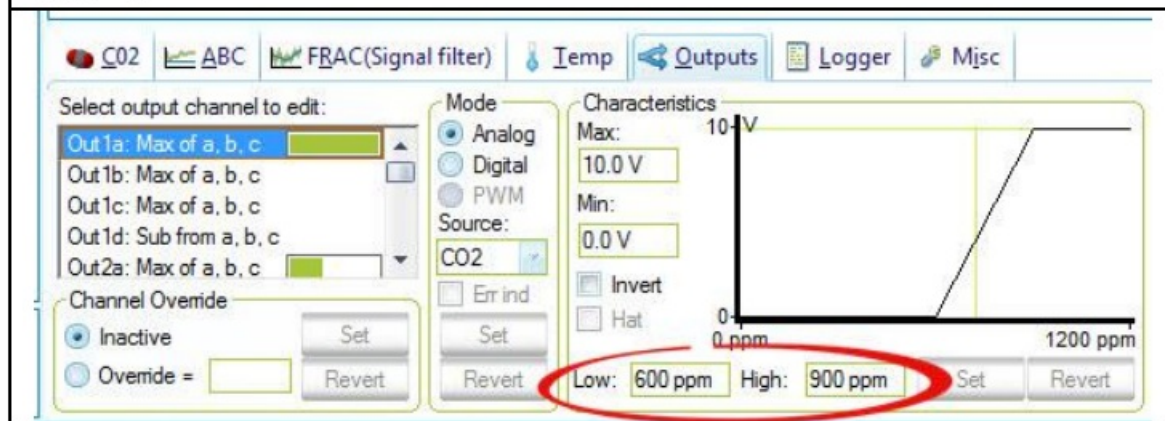
(The same approach with “Digital/Digital Invert”)



### Proportional-band settings

Low (the same approach as “High”)

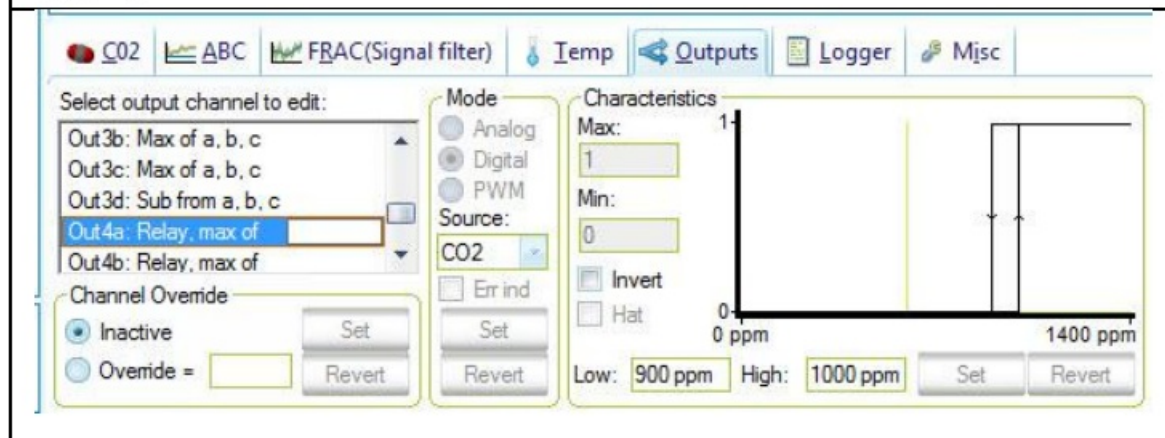
## UIP5



## Outputs

Relay

## UIP5



## Communication settings

Address/Baudrate UIP5 Address

1	2	3																																
<div> <div>Meter information</div> <table border="1"> <tr><td>Vendor Name</td><td>SenseAir AB</td></tr> <tr><td>Product Code</td><td>tSENSE</td></tr> <tr><td>Serial Number</td><td>0xFFFFFFFF</td></tr> <tr><td>Firmware</td><td>0x66010A</td></tr> <tr><td>Type ID</td><td>402</td></tr> <tr><td>Map Version</td><td>69</td></tr> <tr><td>Network Address</td><td>10</td></tr> <tr><td>Error Flags</td><td></td></tr> </table> </div>	Vendor Name	SenseAir AB	Product Code	tSENSE	Serial Number	0xFFFFFFFF	Firmware	0x66010A	Type ID	402	Map Version	69	Network Address	10	Error Flags		<div> <div>Meter information</div> <table border="1"> <tr><td>Vendor Name</td><td>SenseAir AB</td></tr> <tr><td>Product Code</td><td>tSENSE</td></tr> <tr><td>Serial Number</td><td>0xFFFFFFFF</td></tr> <tr><td>Firmware</td><td>0x66010A</td></tr> <tr><td>Type ID</td><td>402</td></tr> <tr><td>Map Version</td><td>69</td></tr> <tr><td>Network Address</td><td>12</td></tr> <tr><td>Error Flags</td><td></td></tr> </table> </div>	Vendor Name	SenseAir AB	Product Code	tSENSE	Serial Number	0xFFFFFFFF	Firmware	0x66010A	Type ID	402	Map Version	69	Network Address	12	Error Flags		<div> <div>Change Network Address?</div> <div>Are you sure you want to change meter network id from 10 to 12?</div> <div> <div>Yes</div> <div>No</div> </div> </div>
Vendor Name	SenseAir AB																																	
Product Code	tSENSE																																	
Serial Number	0xFFFFFFFF																																	
Firmware	0x66010A																																	
Type ID	402																																	
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Type ID	402																																	
Map Version	69																																	
Network Address	12																																	
Error Flags																																		

## UIP5 Baudrate

1	2	3
<div> <div>CR2</div> <div> <div>Select property to edit:</div> <div> <div>Temperature Unit (C/F)</div> <div>RS-485 parity (reset to activate new or RS-485 stop bits (reset to activate new RS-485 baudrate (reset to activate new Altitude))</div> </div> </div> <div> <div>Property value</div> <div> <div>Select: 9600</div> <div>Set</div> <div>Revert</div> </div> </div> </div>	<div> <div>Property value</div> <div> <div>Select:</div> <div> <div>19200</div> <div>9600</div> <div>19200</div> <div>38400</div> <div>57600</div> </div> </div> </div>	<div> <div>Property value</div> <div> <div>Select: 9600</div> <div> <div>Set</div> <div>Revert</div> </div> </div> </div>

## NOTE!

- UIP baudrate : RS-485 baudrate if tSENSE VAV No Disp is connected via phone jack (see fig. 2).
- UIP baud rate = RS-485 baud rate if tSENSE VAV No Disp is connected via screw terminal (see fig. 3).
- To change settings via UIP requires Reset (Power OFF- Power ON) to execute them.

## Connect meter

1	2
<div> <div>UIP5</div> <div> <div>File</div> <div>Meter</div> <div>Help</div> </div> <div> <div>Connect to any (Ctrl+d)</div> <div>Connect...</div> <div>Disconnect From Meter (Ctrl+d)</div> <div>Connection configuration...</div> <div>Allow S8 connections for session</div> </div> </div>	<div> <div>Connection to meter</div> <div> <div>Interface types selection:</div> <div> <div><input type="checkbox"/> I2C</div> <div><input checked="" type="checkbox"/> ModBus</div> <div><input type="checkbox"/> SA-Bus</div> </div> </div> <div> <div>Address Mode</div> <div> <div><input checked="" type="radio"/> Any Address</div> <div><input type="radio"/> Specified Address: 104</div> <div><input type="radio"/> Scan All</div> <div><input type="radio"/> Scan From: 104</div> </div> </div> <div> <div>Connect</div> <div>Cancel</div> </div> </div>



### 3 Information

UIP5

FileMeterHelp

Meter Values

CO2 Value	609 ppm
Relative Humidity	42.6 %
Temperature	23.8 °C

Value Graph (Alt+g)

Display mode	All data
Values	CO2 Value; Relative Humidity; Temperature
Zero of scale	
Lock scale	LockOnZoom
Number of points	397 (397)

Log to file

Start/stop	Start
Log file	C:\Program Files\SenseAir\UIP5\LogData\log.txt
On start	New file (timestamp)
Save from	Now
Values	CO2 Value; Relative Humidity; Temperature
Log file size	

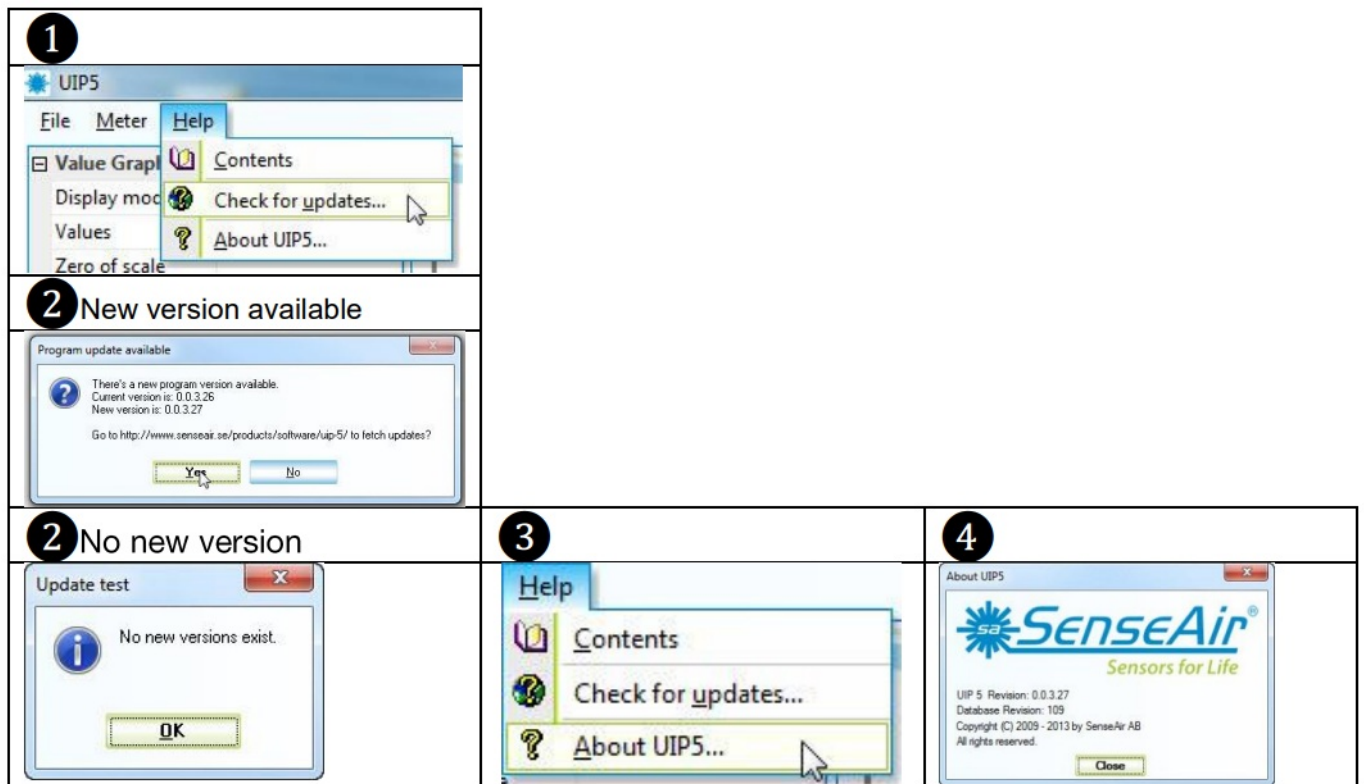
Connection

Interface	ModBus
Port	COM14 - USB Serial Port
Network Address	254
Synchronization	Not supported
Period	5000 ms

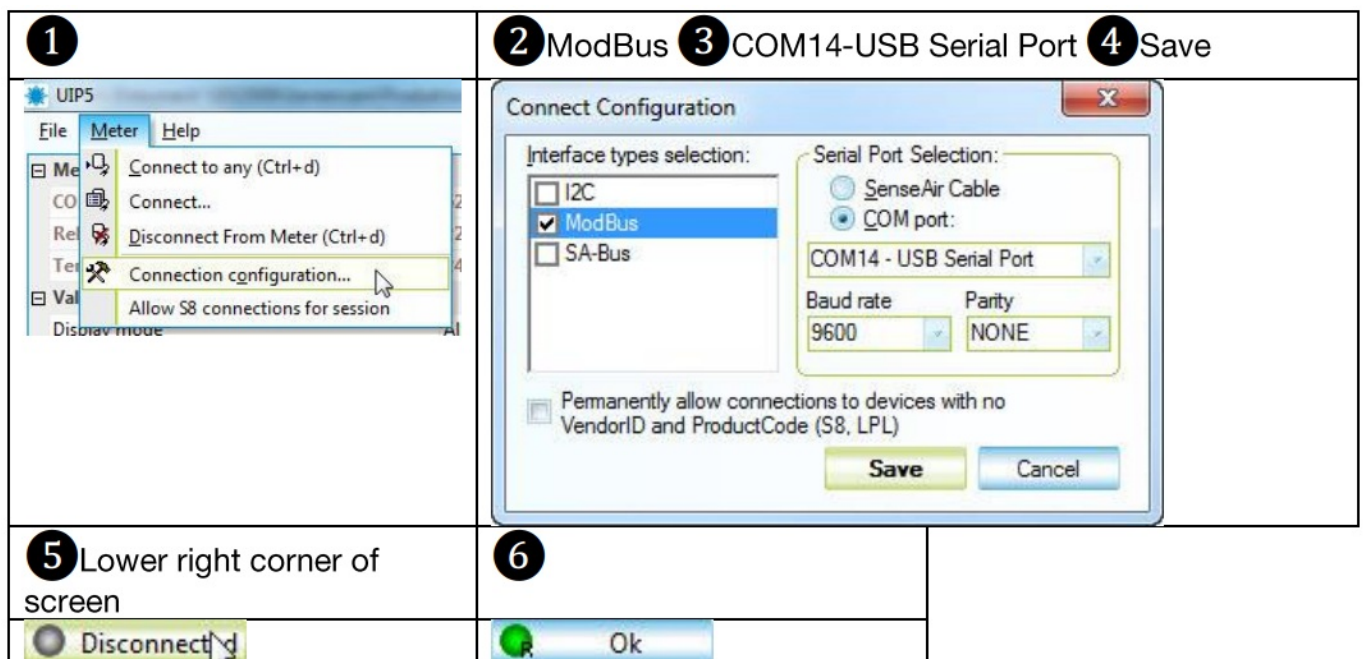
Meter information

Vendor Name	SenseAir AB
Product Code	tSENSE
Serial Number	0x030DA676
Firmware	0x66010B
Type ID	402
Map Version	71
Network Address	10
Error Flags	

Check for updates



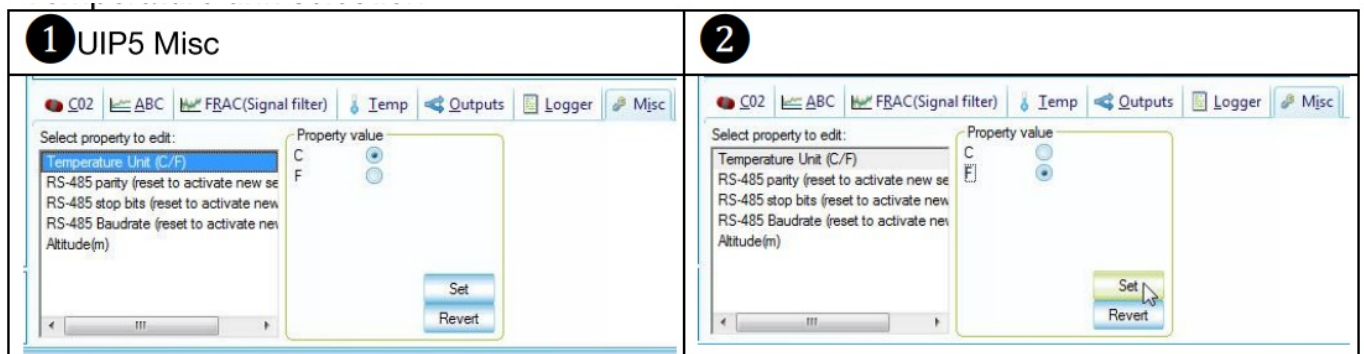
## Connection configurations



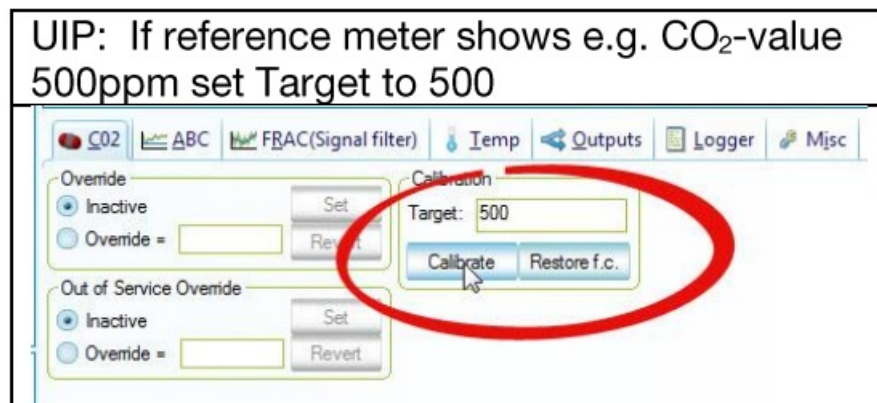
- UIP baudrate + RS-485 baudrate if tSENSE VAV No Disp is connected via phone jack (see fig. 2).
- UIP baudrate = RS-485 baudrate if tSENSE VAV No Disp is connected via screw terminal (see fig. 3).
- To change settings via UIP requires Reset (Power OFF – Power ON) to execute them.

## Measured values

### Temperature unit selection



- Calibration options cO2
- Zero ca/Background/Target cal



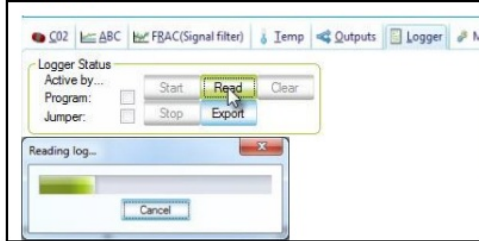
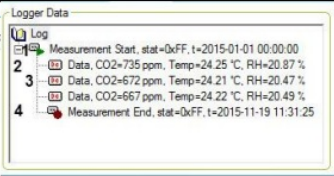
### Background calibration button

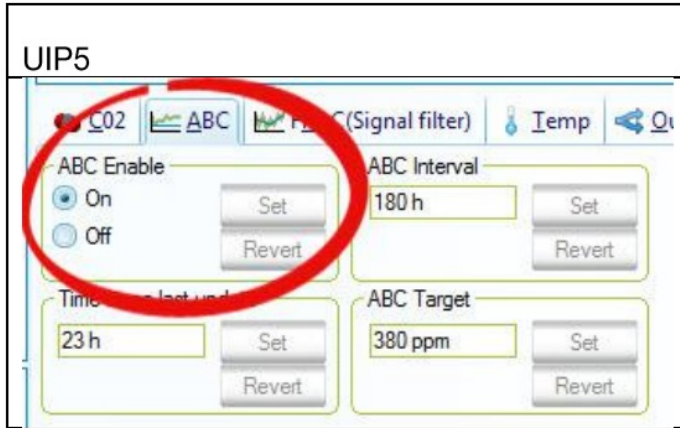
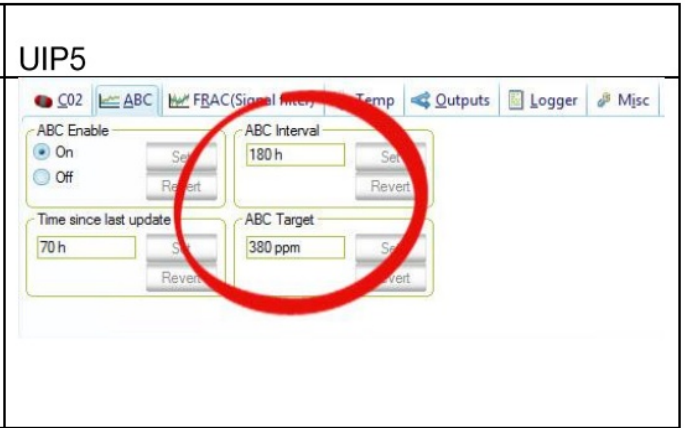


### ABC

#### Enable/Disable

ABC period (ABC target/ Altitude/ Restore cal)

<b>1</b> Start to Read Log Data from sensor	<b>2</b>
	<div data-bbox="608 163 943 338">  </div> <div data-bbox="959 163 1482 403"> <p>1 Measurement Start. Record added by UIP for compatibility between UIP and other sensor types. Status = dummy value Timestamp = dummy value</p> <p>2 Oldest data record in log, average values for 15 minutes</p> <p>3 Average values for 15 minutes after point 2</p> <p>4 Measurement end. Record added to readout by UIP Status = dummy value Timestamp = time log was read from sensor</p> </div>


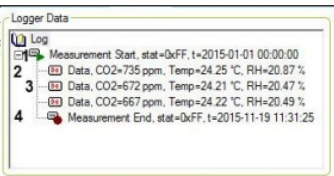
<b>UIP5</b> 	<b>UIP5</b> 
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## Automatic system test

A full system test is executed automatically at every power-up. Sensor probes are checked constantly during an operation against failure by checking valid dynamic measurement ranges. System checks return error bytes to RAM. Error codes are available by connecting the sensors to a PC with a special USB cable (art.no. O0-0-0070) connected (see fig. 2). Error codes are shown in software UIP (version 5 or higher) at “Meter information – Error Flags”

## UIP Logger

### Alternative 1

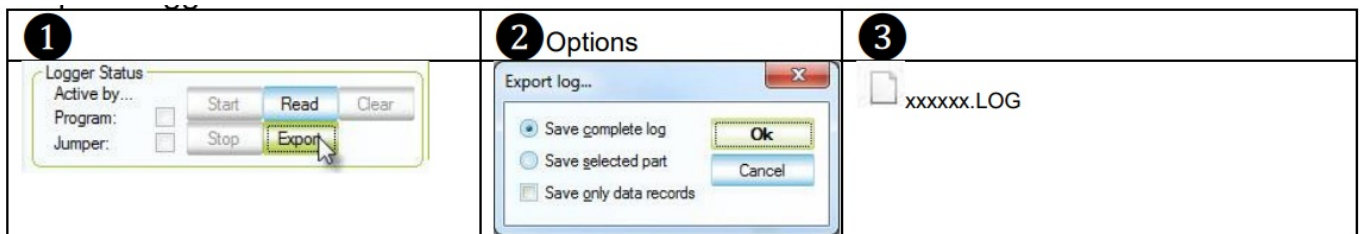
<b>1</b> Start to Read Log Data from sensor	<b>2</b>
	<div data-bbox="608 1462 943 1637">  </div> <div data-bbox="959 1462 1482 1702"> <p>1 Measurement Start. Record added by UIP for compatibility between UIP and other sensor types. Status = dummy value Timestamp = dummy value</p> <p>2 Oldest data record in log, average values for 15 minutes</p> <p>3 Average values for 15 minutes after point 2</p> <p>4 Measurement end. Record added to readout by UIP Status = dummy value Timestamp = time log was read from sensor</p> </div>

## NOTE!

The log consists of 15 min averages, 672 (4 x 24h x 7d) data points for each value. tSENSE has no real-time clock (no timestamps in the sensors log). If the sensor has not been powered on continuously, time between data points can be much longer than 15 minutes. Timestamps in UIP log file are added by UIP. Chart 24h and Week (7 days) plots use data from the same log.

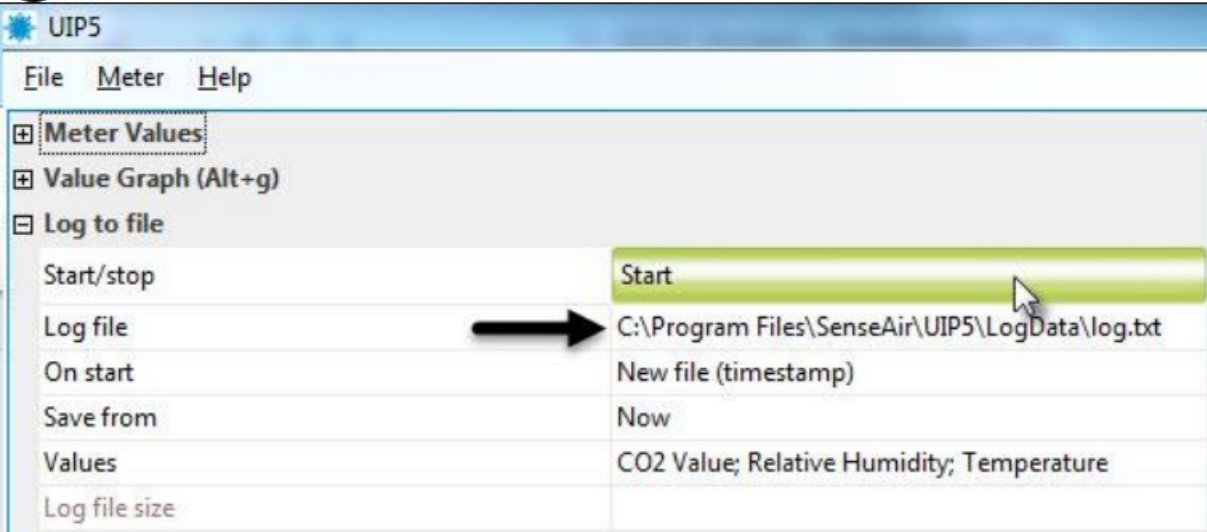

## Export Logger Data





## Alternative 2

Log to file

<b>1</b>	Start log to file on PC																
																	
<b>2</b>																	
																	
<b>3</b>																	
<table border="1"> <thead> <tr> <th>Time</th> <th>Offset ÅmsÅ</th> <th>Temperature ÅOCÅ</th> <th>CO2 Value ÅppmÅ</th> <th>Relative Humidity Å&amp;Å</th> </tr> </thead> <tbody> <tr> <td>2015-11-17 13:11:58</td> <td>9149974</td> <td>685.00</td> <td>24.36</td> <td>24.36</td> </tr> <tr> <td>2015-11-17 13:12:03</td> <td>9154919</td> <td>685.00</td> <td>24.31</td> <td>24.36</td> </tr> </tbody> </table>			Time	Offset ÅmsÅ	Temperature ÅOCÅ	CO2 Value ÅppmÅ	Relative Humidity Å&Å	2015-11-17 13:11:58	9149974	685.00	24.36	24.36	2015-11-17 13:12:03	9154919	685.00	24.31	24.36
Time	Offset ÅmsÅ	Temperature ÅOCÅ	CO2 Value ÅppmÅ	Relative Humidity Å&Å													
2015-11-17 13:11:58	9149974	685.00	24.36	24.36													
2015-11-17 13:12:03	9154919	685.00	24.31	24.36													

## Error codes and action plans

Red LED indicates that one or several error codes are active.





Bit #	Error code	Error description	Suggested action
0	CO <sub>2</sub> sensor Com. error	No ability to communicate with CO <sub>2</sub> sensor module.	Try to restart sensor by power OFF/ON. Contact local distributor.
1	CO <sub>2</sub> sensor CO <sub>2</sub> measure error	CO <sub>2</sub> measurement error.	Try Background calibration (see fig. 4 and 5). Contact local distributor. <i>See Note 1!</i>
2	T sensor T measure error	Temp measurement error.	Try to restart sensor by power OFF/ON.  Contact local distributor.
3	RH/T sensor com error	No ability to communicate with RH/T sensor module.	
4	RH/T sensor RH measure error	RH measurement error.	
5	RH/T sensor T measure error	Temp measurement error, sensor will use CO <sub>2</sub> sensor temperature if RH/T Temperature is unavailable. S_Temp will be set to NTC_Temp.	
6			
7			
8	Output config. error	Error in output configuration. Output is still updated, i.e. can be 0-10V	Check connections and loads of outputs. Check detailed settings and configuration with UIP software version 5 or later.  Contact local distributor.

**Table 2: Error codes and action plans**

1. Occurs if the probe is out of range, at very high CO<sub>2</sub> values. Error code resets measured values return to normal. May also indicate the need for zero point caliber normal and error code remains, the sensor can be a defect or the connection
2. If several errors are detected at the same time, different error code numbers into one single error code!
3. Sensor accuracy is defined at continuous operation (at least three (3) weeks:


4. **Maintenance**

5. TSENSE VAV No Disp is maintenance-free. Internal self-adjusting calibration normal long-term drift. To secure the highest accuracy, a time interval of five yea between CO2 calibrations, unless some special situations have occurred.
6. The software can be downloaded free at [www.senseair.com](http://www.senseair.com) USB-cable and a zero calibration kit can be ordered from Sinclair.
7. Check can be done on site without interfering with a ventilation system.

8. **Cleaning (exterior only)**

9. Use mild detergent (no harsh chemicals) and wipe dry with a dry cloth.

**Documents / Resources**

	<p><a href="#">Senseair CO2 Temperature and Relative Humidity Sensor</a> [pdf] User Manual CO2 Temperature and Relative Humidity Sensor, Relative Humidity Sensor, Humidity Sensor</p>
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**References**

- [Air quality & Gas sensing technology from Senseair](#)