

# User Manual



## *tSENSE VAV Disp*

CO<sub>2</sub>-, temperature- and  
relative humidity transmitter



### General

*tSENSE VAV* for wall mounting measures indoor air carbon dioxide concentration, temperature and relative humidity in rooms. *tSENSE VAV* is available with colour touch display (LCD).

The unit connects to Direct Digital Control (DDC).

Linear outputs are pre-programmed as CO<sub>2</sub>-, temperature- and relative humidity transmitter.

Measuring ranges can be modified via touch display, from PC (Windows) software UIP (version 5 or higher) and USB communication cable, alternative via Modbus or BACnet.

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## Opening of housing

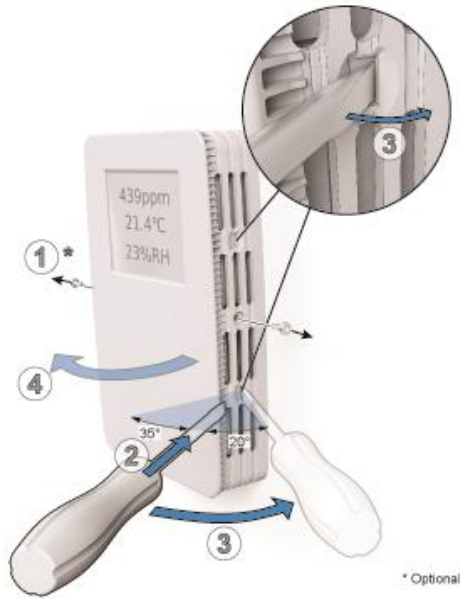


Figure 1

## Download of software UIP5

[senseair.se/products/software/uip-5/](http://senseair.se/products/software/uip-5/)

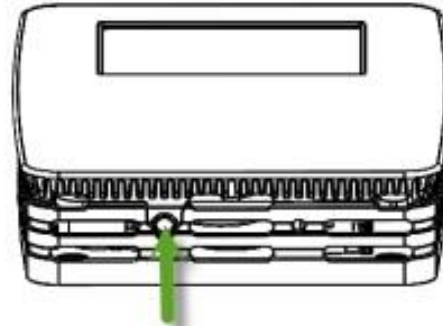


Figure 2: Connection to PC via phone jack  
Connect Interface cable USB – 3.5mm,  
Art. No.: 00-0-0070

## Enter PIN code

			<b>0</b> Power ON by bild																																		
PIN1 Access to display settings. Delivered product: <b>Code Off</b> PIN2 Access to meter settings. Delivered product: <b>2001</b>  See page 24 PIN codes																																					
<b>1</b>	<b>2</b> NOTE! PIN1 code <b>OFF</b>	<b>3</b> PIN2 code	<b>4</b>																																		
<table border="1"> <tr><td>CO<sub>2</sub></td><td>429ppm</td></tr> <tr><td>Temperature</td><td>23.1°C</td></tr> <tr><td>Humidity</td><td>21%RH</td></tr> <tr><td colspan="2" style="text-align: center;"></td></tr> </table>	CO <sub>2</sub>	429ppm	Temperature	23.1°C	Humidity	21%RH			<table border="1"> <tr><td>CO<sub>2</sub></td><td>Screen</td></tr> <tr><td>Temperature</td><td>Settings</td></tr> <tr><td>Humidity</td><td>«</td></tr> </table>	CO <sub>2</sub>	Screen	Temperature	Settings	Humidity	«	<table border="1"> <tr><td>Enter PIN</td><td colspan="2">2001</td></tr> <tr><td></td><td>2</td><td>3</td></tr> <tr><td></td><td>5</td><td>6</td></tr> <tr><td></td><td>8</td><td>9</td></tr> <tr><td>Del</td><td>0</td><td>«</td></tr> </table>	Enter PIN	2001			2	3		5	6		8	9	Del	0	«	<table border="1"> <tr><td>Meter</td></tr> <tr><td>Measurements</td></tr> <tr><td>Outputs</td></tr> <tr><td>Misc</td><td>«</td></tr> </table>	Meter	Measurements	Outputs	Misc	«
CO <sub>2</sub>	429ppm																																				
Temperature	23.1°C																																				
Humidity	21%RH																																				
CO <sub>2</sub>	Screen																																				
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	5	6																																			
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Del	0	«																																			
Meter																																					
Measurements																																					
Outputs																																					
Misc	«																																				
	<b>2</b> NOTE! PIN1 code <b>ON</b>	<b>3</b>																																			
	<table border="1"> <tr><td>Enter PIN</td><td colspan="2">0000</td></tr> <tr><td>1</td><td>2</td><td>3</td></tr> <tr><td>4</td><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td><td>9</td></tr> <tr><td>Del</td><td></td><td>«</td></tr> </table>	Enter PIN	0000		1	2	3	4	5	6	7	8	9	Del		«	<table border="1"> <tr><td>CO<sub>2</sub></td><td>Screen</td></tr> <tr><td>Temperature</td><td>Settings</td></tr> <tr><td>Humidity</td><td>«</td></tr> </table>	CO <sub>2</sub>	Screen	Temperature	Settings	Humidity	«														
Enter PIN	0000																																				
1	2	3																																			
4	5	6																																			
7	8	9																																			
Del		«																																			
CO <sub>2</sub>	Screen																																				
Temperature	Settings																																				
Humidity	«																																				

## Output configurations

Terminal	Default output	Default output range	Outputs of this sensor	Output ranges of this sensor
OUT(1) CO <sub>2</sub> : Temperature: Relative Humidity:	0 – 10VDC	600 – 900ppm 22 – 23°C 75 – 85%	See label	See label
OUT(2) CO <sub>2</sub> :	0 – 10VDC	0 – 2000ppm	See label	See label
OUT(3) Temp:	0 – 10VDC	0 – 50°C	See label	See label
Relay CO <sub>2</sub> :	0 – 10VDC	900 – 1000ppm	See label	See label

Table 1. Default output configurations of *iSENSE VAV*

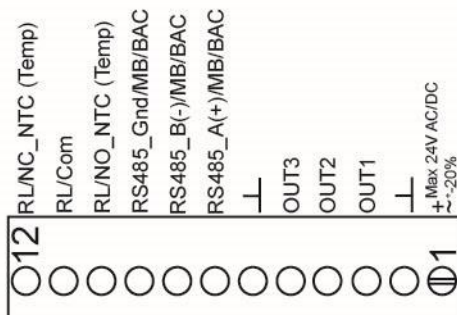


Figure 3: Screw Terminal

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

## Outputs

### Out1/Out2/Out3

<p><b>1</b></p> <p>CO<sub>2</sub> 429ppm Temperature 23.1°C Humidity 21%RH</p>	<p><b>2</b></p> <p>CO<sub>2</sub> Screen Temperature Settings Humidity</p>	<p><b>3</b> PIN1: OFF</p> <p>Enter PIN 2001</p> <table border="1"> <tr><td>2</td><td>3</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>8</td><td>9</td></tr> <tr><td>Del</td><td>0 «</td></tr> </table>	2	3	5	6	8	9	Del	0 «	<p><b>4</b> Outputs</p> <p>Meter Measurements Outputs Misc</p>
2	3										
5	6										
8	9										
Del	0 «										
<p><b>5</b> Out1</p> <p>Out1 10.0V Out2 4.8V Out3 4.8V Relay 1(active)</p>	<p><b>6</b></p> <p>Out1_a CO2 Out1_b Temp Out1_c RH Out1_d Temp</p>	<p><b>7</b></p> <p>Max 10.0V Min 0.0V Source CO2 0V 0ppm 900ppm Type Analog Low 600ppm High 900ppm</p>									

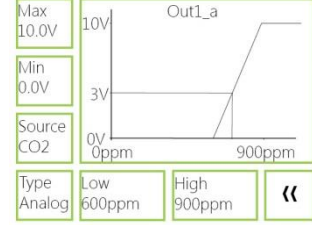
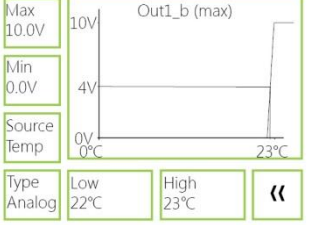
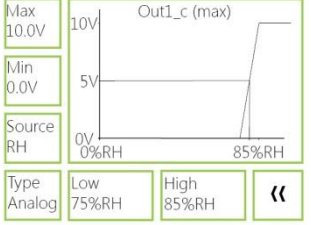
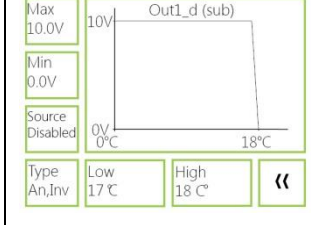
**e.g.**

The voltage level of OUT1 is the result of the *largest* demand from Proportional-bands.

Out1\_a/Out1\_b/Out1\_c => OUT1

The voltage level of the one of Out1\_a, Out1\_b or Out1\_c which has the highest voltage level provides the voltage level of OUT1.

*The values below are default values.*

<b>Out1Standard</b> Out1_a CO2 Out1_b Temp Out1_c RH Out1_d Disabled «		<b>Out1_a:</b> CO <sub>2</sub> has a Proportional-band of 600–900ppm <b>Out1_b:</b> Temp has a Proportional-band of 22–23°C <b>Out1_c:</b> RH has a Proportional-band of 75–85%RH <b>Out1_d:</b> Disabled  <b>NOTE!</b> Possibility to set measurement range (“Low” and “High”) higher (out of range) than what is possible to measure.	
<b>Out1_a</b> CO <sub>2</sub> = 714ppm =>3V	<b>Out1_b</b> Temp = 22.4°C =>4V	<b>Out1_c</b> Humidity = 80%RH=>5V	<b>Out1_d</b> Disabled
			
Max 10.0V Min 0.0V Source CO2 Type Analog Low 600ppm High 900ppm «	Max 10.0V Min 0.0V Source Temp Type Analog Low 22°C High 23°C «	Max 10.0V Min 0.0V Source RH Type Analog Low 75%RH High 85%RH «	Max 10.0V Min 0.0V Source Disabled Type An,Inv Low 17°C High 18°C «

5V (Out1\_c) – 0V (Out1\_d Disabled) = 5V => OUT1

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

*The values below are default values.*

Voltage on OUT1 = 0V if measured values are:	Voltage on OUT1 will increase if measured values are:	Voltage on OUT1 = 10V if measured values are:
CO <sub>2</sub> ≤ 600ppm <i>and</i> Temp ≤ 22°C <i>and</i> RH ≤ 75%RH (Out1_d = Disabled)	600ppm ≤ CO <sub>2</sub> < 900ppm <i>or</i> 22°C ≤ Temp < 23°C <i>or</i> 75%RH ≤ RH < 85%RH (Out1_d = Disabled)	CO <sub>2</sub> > 900ppm <i>or</i> Temp > 23°C <i>or</i> RH > 85% (Out1_d = Disabled)

**Voltage on OUT1 = 0V** if: the measured CO<sub>2</sub>-value is less than, or equal with, 600ppm **and** the measured temperature value is less than, or equal with, 22°C **and** the relative humidity value less than, or equal with, 75%.

**Voltage on OUT1 will increase** if: the measured CO<sub>2</sub>-value is between 600ppm and 900ppm **or** the measured temperature value is between 22°C and 23°C **or** the measured relative humidity value is between 75% and 85%.

**Voltage on OUT1 = 10V** if: the measured CO<sub>2</sub>-value is higher than 900ppm **or** the measured temperature value is higher than 23°C **or** the measured relative humidity value is higher than 85%.

Temp protection (Out1\_d) Enabled

<b>Out1_a</b> CO <sub>2</sub> : 1205ppm (higher than set "High" 900ppm) => 10V	<b>Out1_b</b> Temp: 16.4°C (lower than set "Low" 22°C) => 0V	<b>Out1_c</b> Humidity: 80%RH => 5V	<b>Out1_d</b> Temp: 16.4°C (lower than set "Low" 17°C) => 10V <b>See Note!</b>
Type Analog Low 600ppm High 900ppm «	Type Analog Low 22°C High 23°C «	Type Analog Low 75%RH High 85%RH «	Type An,Inv Low 17°C High 18°C «

10V (Out1\_a) – 10V (Out1\_d) = 0V (OUT1).

The voltage level of the one of Out1\_a, Out1\_b or Out1\_c which has the highest voltage level is in this case 10V (Out1\_a), **minus** 10V (the voltage level of Out1\_d) provides the voltage level of OUT1 which is 0V.

Despite high value of CO<sub>2</sub> (1205ppm), OUT1 is 0V (no signal to ventilation system to start), because of low value of Out\_b (16.4°C) when temperature protection Out1\_d is Enabled.

**NOTE!**

Out\_d (sub) in display picture: (sub) = subtraction, (Temperature protection)

Voltage range

**Max voltage limit** can be changed, in steps of 0.1V, from set Min voltage limit *plus* 0.1V to 10.0V

**Min voltage limit** can be changed, in steps of 0.1V, from 0.0V to set Max voltage limit *minus* 0.1V

<b>1</b> 	<b>2</b> 	<b>3</b> 	<b>4</b> 
<b>5</b> Out2 	<b>6</b> Out2_a 	<b>7</b> Max 	<b>8</b> 10.0V, 9.9V..5.0V.. 
<b>9</b> 	<b>10</b> 	<b>UIP5</b> 	

### Select source

There are eight sources to choose among: CO<sub>2</sub> (Ch0), Temp. (Ch1), Relative Humidity (Ch2) and Ch3 to 7 (contains no data) plus the Disable-button.

<p><b>7</b> Source</p>	<p><b>8</b></p>	<p><b>9</b></p>	<p><b>10</b></p>
------------------------	-----------------	-----------------	------------------

<p>UIP5 <b>1</b> Source: CO<sub>2</sub> selected</p>	<p><b>2</b> Save</p>
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### Types

Analogue/Analogue Invert (Analogue Invert is usable e.g. temp. protection page 6)

<p><b>7</b> Analogue</p>	<p><b>8</b></p>	<p><b>9</b></p>	<p><b>10</b> Analogue invert</p>
--------------------------	-----------------	-----------------	----------------------------------

<p>UIP5 <b>1</b> Invert <b>2</b> Save (Set)</p>	
---	--

### Digital/Digital Invert

<p><b>10</b> Digital</p>	<p><b>10</b> Digital Invert</p>
--------------------------	---------------------------------

### Measure range settings

#### CO<sub>2</sub>:

**Low value** can be changed, in steps of 100ppm, **from** 0ppm **to** set High value *minus* 100ppm.

**High value** can be changed, in steps of 100ppm, **from** set Low value *plus* 100ppm.

(SenseAir guarantees accuracy  $\pm 30\text{ppm} \pm 3\%$  of reading, in the measurement range 0 — 2000ppm).

#### Temperature:

**Low value** can be changed, in steps of 1°C, **from** 0°C **to** set High value *minus* 1°C.

**High value** can be changed, in steps of 1°C, **from** set Low value *plus* 1°C.

(SenseAir guarantees accuracy  $\pm 1.0^\circ\text{C}$  of reading, at the operating temperature range: 0 — 50°C)

#### Relative Humidity:

**Low value** can be changed, in steps of 1%, **from** 0% **to** set High value *minus* 1%.

**High value** can be changed, in steps of 1%, **from** set Low value *plus* 1%.

(SenseAir guarantees accuracy  $\pm 5\text{RH}$  of reading at 20 — 80%RH. Operating humidity range: 0 — 95%)

#### NOTE!

Possibility to, in software, set measurement range higher (out of range) than what is possible to measure.

e.g. CO<sub>2</sub>

<p><b>1</b></p>	<p><b>2</b></p>	<p><b>3</b></p>	<p><b>4</b></p>
<p><b>5</b> Out2</p>	<p><b>6</b> Out2_a</p>	<p><b>7</b> Low 600ppm</p>	<p><b>8</b> 600, 500...400ppm</p>
<p><b>9</b> Low 400ppm</p>	<p><b>10</b></p>	<p><b>UIP5</b></p>	



# Outputs

## Relay

<p><b>5</b> Relay</p> <table border="1"> <tr><td>Out1</td><td>10.0V</td></tr> <tr><td>Out2</td><td>4.8V</td></tr> <tr><td>Out3</td><td>4.8V</td></tr> <tr><td>Relay_a</td><td>1(active)</td></tr> </table> <p></p>	Out1	10.0V	Out2	4.8V	Out3	4.8V	Relay_a	1(active)	<p><b>6</b></p> <table border="1"> <tr><td>Relay_a</td><td>CO2</td></tr> <tr><td>Relay_b</td><td>Disabled</td></tr> <tr><td>Relay_c</td><td>Disabled</td></tr> <tr><td>Relay_d</td><td>Disabled</td></tr> </table> <p></p>	Relay_a	CO2	Relay_b	Disabled	Relay_c	Disabled	Relay_d	Disabled	<p><b>7</b> Type Digital</p> <p>Max 1 Min 0 Source CO2 Low 900ppm High 1000ppm</p> <p></p>	<p><b>8</b></p> <p>Type Dig,Inv</p> <p>Digital Digital invert</p> <p></p>
Out1	10.0V																		
Out2	4.8V																		
Out3	4.8V																		
Relay_a	1(active)																		
Relay_a	CO2																		
Relay_b	Disabled																		
Relay_c	Disabled																		
Relay_d	Disabled																		
<p><b>9</b></p> <p>Type Dig,Inv</p> <p>Digital Digital invert</p> <p></p>	<p><b>10</b></p> <p>Max 1 Min 0 Source CO2 Type Low High Dig,Inv 900ppm 1000ppm</p>	<p>UIP5</p>																	

# Communication settings

## Protocol

When the sensors RS-485 Protocol parameter is set to "Auto", the sensor selects protocol depending on the protocol used on the network it is connected to. After power on, the sensor then listens to the traffic on the RS-485 network. If the sensor detects valid BACnet, or Modbus messages, the sensor will start to use the detected protocol.

<p><b>1</b></p>	<p><b>2</b></p>	<p><b>3</b></p>	<p><b>4</b></p>
<p><b>5</b> RS-485</p>	<p><b>6</b></p>	<p><b>7</b></p>	<p><b>8</b></p>
<p><b>9</b> NOTE!</p>			
<p><b>UIP5</b> <b>1</b> Misc</p>	<p><b>2</b></p>	<p><b>3</b></p>	

## Address/Baudrate

**Address** can be changed from 1 to 253

**Baudrate** can be chosen as either 9600, 19200, 38400, 57600, 76800 or 115200

<p><b>5</b> RS-485</p>	<p><b>6</b></p>	<p><b>7</b></p>	<p><b>8</b></p>
<p><b>9</b> NOTE!</p>	<p><b>UIP5 Address 1</b></p>	<p><b>2</b></p>	<p><b>3</b></p>
<p><b>UIP Baudrate 1</b> Misc</p>	<p><b>2</b></p>	<p><b>3</b></p>	

### NOTE!

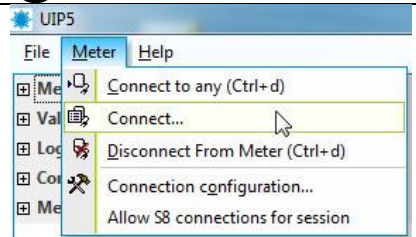
UIP baudrate  $\neq$  RS-485 baudrate if *tSENSE VAV* is connected via *phone jack* (see fig. 2).

UIP baudrate = RS-485 baudrate if *tSENSE VAV* is connected via *screw terminal* (see fig. 3).

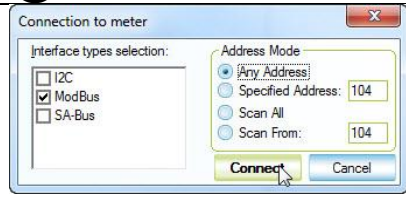
To change settings via UIP requires Reset (Power OFF – Power ON) to execute them.

## Connect meter

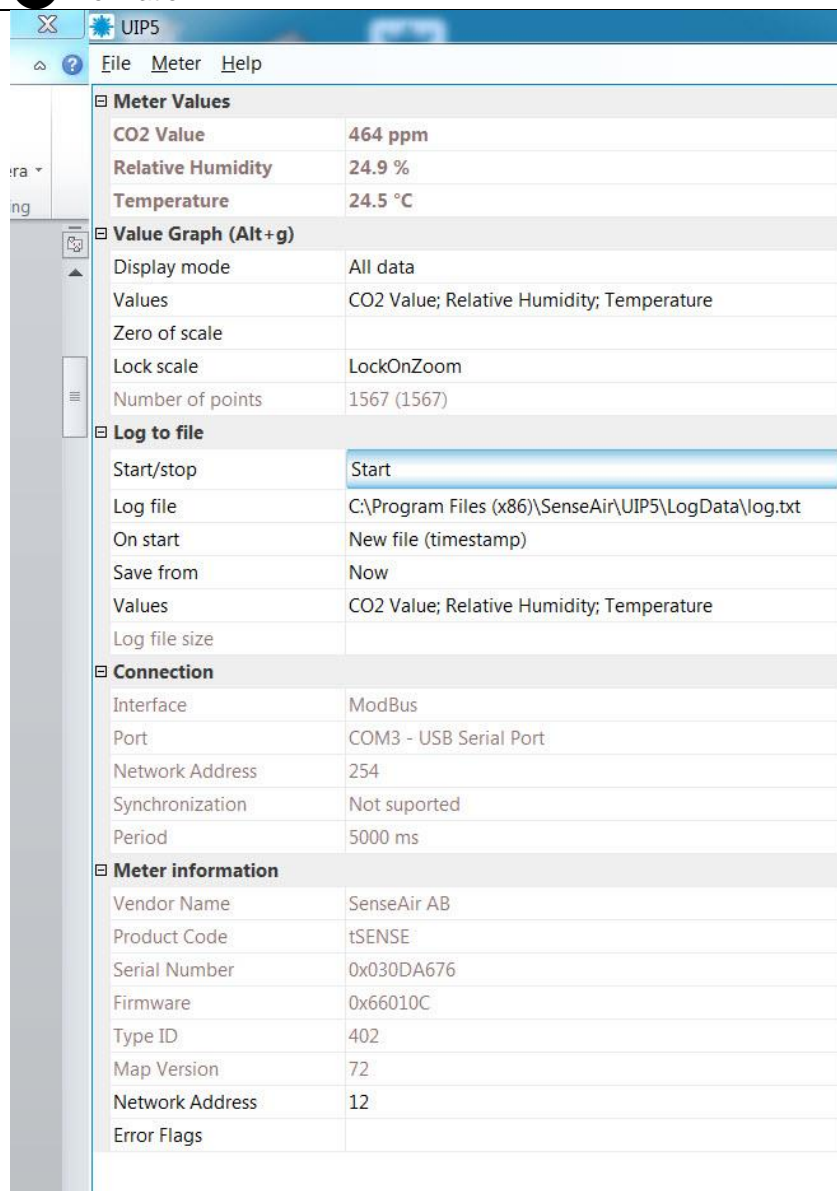
**1**



**2**



**3 Information**



Meter Values	
CO2 Value	464 ppm
Relative Humidity	24.9 %
Temperature	24.5 °C

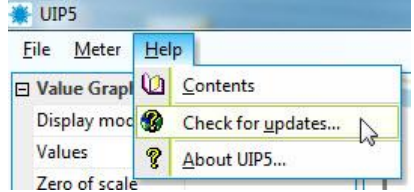
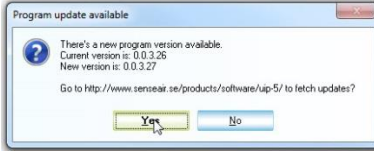

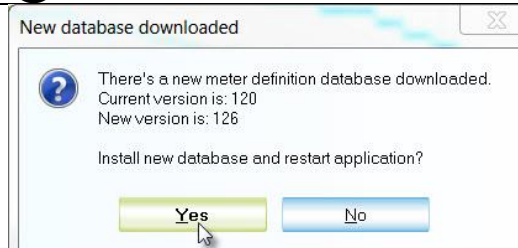
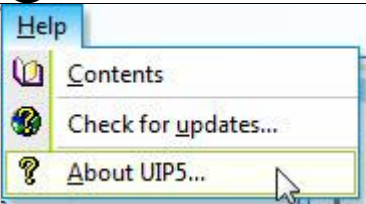
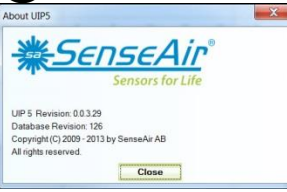
Value Graph (Alt+g)	
Display mode	All data
Values	CO2 Value; Relative Humidity; Temperature
Zero of scale	
Lock scale	LockOnZoom
Number of points	1567 (1567)

Log to file	
Start/stop	Start
Log file	C:\Program Files (x86)\SenseAir\UIP5\LogData\log.txt
On start	New file (timestamp)
Save from	Now
Values	CO2 Value; Relative Humidity; Temperature
Log file size	

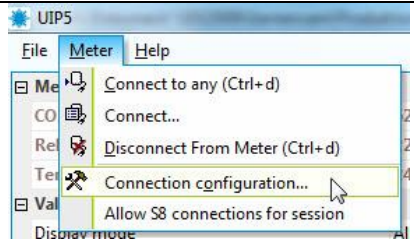
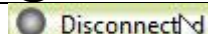
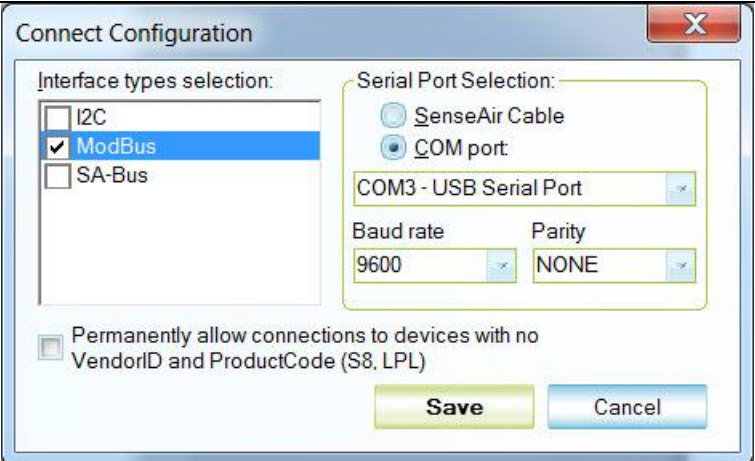

Connection	
Interface	ModBus
Port	COM3 - USB Serial Port
Network Address	254
Synchronization	Not supported
Period	5000 ms

Meter information	
Vendor Name	SenseAir AB
Product Code	tSENSE
Serial Number	0x030DA676
Firmware	0x66010C
Type ID	402
Map Version	72
Network Address	12
Error Flags	

## Check for updates

<p><b>1</b></p> 	<p><b>2</b> New version available</p> 	<p><b>2</b> No new version</p> 
<p><b>2</b> New database downloaded</p> 	<p><b>3</b></p> 	<p><b>4</b></p> 

## Connection configurations

<p><b>1</b></p> 	<p><b>2</b> ModBus <b>3</b> COM13-USB Serial Port <b>4</b> Save</p>		
<p><b>5</b> Lower right corner of screen</p> 			
<p><b>6</b></p> 			


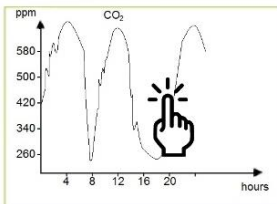


### NOTE!

UIP baudrate  $\neq$  RS-485 baudrate if *tSENSE VAV* is connected *via phone jack* (see fig. 2).  
 UIP baudrate = RS-485 baudrate if *tSENSE VAV* is connected *via screw terminal* (see fig. 3).

To change settings via UIP requires Reset (Power OFF – Power ON) to execute them.

## Measured values

CO<sub>2</sub>/Temperature/Humidity

<p><b>1</b></p> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">CO<sub>2</sub></div> <div style="border: 1px solid black; padding: 2px;">429ppm</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Temperature</div> <div style="border: 1px solid black; padding: 2px;">23.1°C</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Humidity</div> <div style="border: 1px solid black; padding: 2px;">21%RH</div> </div> <div style="text-align: center; margin-top: 5px;">  </div>	<p><b>2</b></p> <div style="text-align: center;"> <p>CO<sub>2</sub></p> <p style="font-size: 2em;">429</p> <p>ppm</p> </div>	<p><b>3</b></p> <div style="text-align: center;">  </div>	<p><b>4</b></p> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">CO<sub>2</sub></div> <div style="border: 1px solid black; padding: 2px;">429ppm</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Temperature</div> <div style="border: 1px solid black; padding: 2px;">23.1°C</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Humidity</div> <div style="border: 1px solid black; padding: 2px;">21%RH</div> </div> <div style="text-align: center; margin-top: 5px;">  </div>
<p><b>5</b></p> <div style="text-align: center;"> <p>CO<sub>2</sub></p> <p style="font-size: 1.5em;">429ppm</p> <p>Temperature</p> <p style="font-size: 1.5em;">23.1°C</p> <p>Humidity</p> <p style="font-size: 1.5em;">21%RH</p> </div>	<p><b>6</b></p> <div style="text-align: center;"> <p>CO<sub>2</sub></p> <p style="font-size: 2em;">429</p> <p>ppm</p> </div>	<p><b>7</b></p> <div style="text-align: center;"> <p>Temperature</p> <p style="font-size: 2em;">23.1</p> <p>°C</p> </div>	<p><b>8</b></p> <div style="text-align: center;"> <p>Humidity</p> <p style="font-size: 2em;">21.0</p> <p>%RH</p> </div>
<p><b>9</b></p> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">CO<sub>2</sub></div> <div style="border: 1px solid black; padding: 2px;">429ppm</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Temperature</div> <div style="border: 1px solid black; padding: 2px;">23.1°C</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Humidity</div> <div style="border: 1px solid black; padding: 2px;">21%RH</div> </div> <div style="text-align: center; margin-top: 5px;">  </div>			

## Display settings

### Limits

CO<sub>2</sub>/(Temperature)/(Humidity)

CO<sub>2</sub> Yellow/Red limit (Temp./Humidity same method as for CO<sub>2</sub> limit settings)

### CO<sub>2</sub>

**Yellow limit** can be changed, in steps of 100ppm, **from** 0ppm **to** set Red limit *minus* 100ppm.

**Red limit** can be changed, in steps of 100ppm, **from** set Yellow limit *plus* 100ppm.

### Temperature:

**Yellow limit** can be changed, in steps of 1°C (1.8°F), **from** -99°C (-146.2°F) **to** set Red limit *minus* 1°C (1.8°F)

**Red limit** can be changed, in steps of 1°C (1.8°F), **from** set Yellow limit *plus* 1°C (1.8°F).

### Relative Humidity:

**Yellow limit** can be changed, in steps of 1%, **from** 0% **to** set Red limit *minus* 1%,

**Red limit** can be changed, in steps of 1%, **from** set Yellow limit *plus* 1%.

### NOTE!

Possibility to, in software, set display limits higher (out of range) than what is possible to measure.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b> 100,200...700ppm
CO <sub>2</sub> red limit 1000ppm RH yellow limit 70%RH	CO <sub>2</sub> red limit 1000ppm	RH yellow limit 70%RH	

### Chart 24h/Week

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
			CO <sub>2</sub> Chart      Week
			24h

## Screen settings

<b>1</b>	<b>2</b>
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>CO<sub>2</sub></span> <span>429ppm</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Temperature</span> <span>23.1°C</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Humidity</span> <span>21%RH</span> </div> <div style="text-align: center; border-bottom: 1px solid black;"> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>CO<sub>2</sub></span> <span>Screen</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Temperature</span> <span>Settings</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Humidity</span> <span></span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>

## Brightness

Brightness can be changed, in steps of 2%, **from 0% to 10%**, in steps of 10%, **from 10% to 100%**

Energy save brightness can be changed, in steps of 2%, **from 0% to 10%**, in steps of 10%, **from 10% to 40%**

<b>3</b>	<b>4</b> 10, 20,...50%	<b>5</b>
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Brightness</span> <span>10%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Background</span> <span>Normal</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Display Scheme</span> <span>Active</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Toggle</span> <span>Ind area</span> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Brightness</span> <span>50%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>-</span> <span>+</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Energy save brightness</span> <span></span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>-</span> <span>+</span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Brightness</span> <span>50%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>-</span> <span>+</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Energy save brightness</span> <span>0%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>-</span> <span>+</span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>

## Background

<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Brightness</span> <span>50%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Background</span> <span>Normal</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Display Scheme</span> <span>Active</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Toggle</span> <span>Ind area</span> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Background color</span> <span>Invert</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Normal</span> <span>Invert</span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Background color</span> <span>Invert</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Normal</span> <span>Invert</span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px; background-color: black; color: white;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Brightness</span> <span>50%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Background</span> <span>Invert</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Sleep Scheme</span> <span>Active</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Toggle</span> <span>Ind area</span> <span>«</span> </div> </div>

## Screensaver, Time setting

Display Scheme Interval can be changed, in steps of 1s, **from 3s to 10s**.

NOTE! Set Sleep Interval to 10s => display light is OFF in 50s (60s minus 10s)

<b>3</b>	<b>4</b>	<b>5</b> 3,4,5...10 s	<b>6</b> 50 s
<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Brightness</span> <span>50%</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Background</span> <span>Normal</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Display Scheme</span> <span>Active</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Toggle</span> <span>Ind area</span> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Display Scheme Interval</span> <span></span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Active</span> <span></span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Energy save</span> <span></span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Interval</span> <span></span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>Sleep Interval</span> <span>10s</span> </div> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black;"> <span>-</span> <span>+</span> </div> <div style="text-align: right; border-bottom: 1px solid black;"> <span>«</span> </div> </div>	



### Toggle (Time and CO<sub>2</sub> and/or Temperature and/or Humidity)

Toggle time

Toggle time can be changed, in steps of 1s, from 1s to 99s.

<p><b>3</b></p> <p>Brightness 50%</p> <p>Background Normal</p> <p>Display Scheme Interval</p> <p>Toggle Ind area «</p>	<p><b>4</b></p> <p>Toggle Time 3s - +</p> <p>CO<sub>2</sub> X</p> <p>Temperature X</p> <p>Humidity X «</p>	<p><b>5</b></p> <p>Toggle Time 3s - +</p> <p>CO<sub>2</sub> X</p> <p>Temperature X</p> <p>Humidity X</p>	<p><b>6</b></p> <p>Brightness 50%</p> <p>Background Normal</p> <p>Display Scheme Interval</p> <p>Toggle Ind area</p>
<p><b>7</b></p> <p>CO<sub>2</sub> Screen</p> <p>Temperature Settings</p> <p>Humidity</p>	<p><b>8</b></p> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21.0%RH</p> <p><i>SenseAir</i></p>	<p><b>9</b></p> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21.0%RH</p> <p><i>SenseAir</i></p>	<p><b>10</b> 3 s</p> <p>CO<sub>2</sub> 429 ppm</p>
<p><b>11</b> 3 s</p> <p>Temperature 23.1 °C</p>	<p><b>12</b> 3 s</p> <p>Humidity 21.0 %RH</p>	<p><b>13</b></p> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21.0%RH</p> <p><i>SenseAir</i></p>	

### Toggle CO<sub>2</sub> and/or Temperature and/or Humidity

<p><b>3</b></p> <p>Brightness 50%</p> <p>Background Normal</p> <p>Display Scheme Interval</p> <p>Toggle Ind area «</p>	<p><b>4</b></p> <p>Toggle Time 3s - +</p> <p>CO<sub>2</sub></p> <p>Temperature</p> <p>Humidity X «</p>	<p><b>5</b></p> <p>Toggle Time 3s - +</p> <p>CO<sub>2</sub></p> <p>Temperature X</p> <p>Humidity X</p>	<p><b>6</b></p> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21.0%RH</p>
<p><b>7</b> Will NOT show up</p> <p><del>CO<sub>2</sub> 429 ppm</del></p>	<p><b>8</b> 3 s</p> <p>Temperature 23.1 °C</p>	<p><b>9</b> 3 s</p> <p>Humidity 21.0 %RH</p>	

## Meter settings

### Meter information

<p><b>1</b></p> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21%RH</p> <p></p> <p></p>	<p><b>2</b></p> <p>CO<sub>2</sub> Screen</p> <p>Temperature Settings</p> <p>Humidity</p> <p></p> <p>«</p>	<p><b>3</b></p> <p>Enter PIN 2001</p> <table border="1"> <tr> <td></td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td>5</td> <td>6</td> </tr> <tr> <td></td> <td>8</td> <td>9</td> </tr> <tr> <td>Del</td> <td>0</td> <td>«</td> </tr> </table>		2	3		5	6		8	9	Del	0	«
	2	3												
	5	6												
	8	9												
Del	0	«												
<p><b>4</b></p> <p>Meter </p> <p>Measurements</p> <p>Outputs</p> <p>Misc «</p>	<p><b>5</b></p> <p>Meter info RS-485</p> <p>PIN1 PIN2</p> <p>Reset</p> <p>«</p>	<p><b>6</b></p> <p>Meter information</p> <table border="1"> <tr> <td>Meter status</td> <td>0x0</td> </tr> <tr> <td>Version</td> <td>1.07</td> </tr> <tr> <td>Serial Number</td> <td>0x30DA676</td> </tr> <tr> <td>Type ID</td> <td>402</td> </tr> <tr> <td>Map Version</td> <td>72</td> </tr> </table> <p></p>	Meter status	0x0	Version	1.07	Serial Number	0x30DA676	Type ID	402	Map Version	72		
Meter status	0x0													
Version	1.07													
Serial Number	0x30DA676													
Type ID	402													
Map Version	72													

### Temperature unit (°C/°F)

<p><b>4</b></p> <p>Meter </p> <p>Measurements</p> <p>Outputs</p> <p>Misc «</p>	<p><b>5</b></p> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21%RH</p> <p>«</p>	<p><b>6</b></p> <p>Temperature offset</p> <p>Temperature unit</p> <p></p> <p>«</p>	<p><b>7</b></p> <p>Temperature Units °F</p> <p>Celsius Fahrenheit</p> <p></p> <p>«</p>
<p><b>UIP5 1 Misc</b></p>		<p><b>2</b></p>	

## Calibration options CO<sub>2</sub>

Zero cal/Background/Target cal

(Same display procedure for the three options. See Note!)

<p><b>4</b></p>	<p><b>5</b></p>	<p><b>6</b></p>	<p><b>7</b></p>
<p><b>8</b></p>	<p><b>9</b></p>	<p><b>10</b></p>	<p><b>11</b></p>
<p>UIP: If reference meter shows e.g. CO<sub>2</sub>-value 500ppm set Target to 500</p>			
<p>Background calibration button</p> <p><b>1</b> Press 15s, until...</p>	<p><b>2</b> Green LED blinks twice</p>		

### NOTE!

**Zero Calibration:** procedure requires calibration gas with CO<sub>2</sub> value 0ppm

Zero Calibration Kit is used to zero calibrate CO<sub>2</sub> sensors. The unit produces CO<sub>2</sub> free air from ambient air.

**Background Calibration:** uses ABC (Automatic Baseline Correction) target, default value is 380ppm, as calibration target. (Background Calibration button as option.)

**Target Calibration (Background CO<sub>2</sub> level):** default value is 400ppm.

e.g. The ABC requires that the sensor is exposed to fresh air (at background level of CO<sub>2</sub> at least once per ABC period). If sensor is operated in environments that never reaches the background level, it might still be possible to benefit from ABC function by adjusting target level.

## ABC

Enable/Disable

<p><b>1</b></p>	<p><b>2</b></p>	<p><b>3</b></p>	<p><b>4</b></p>
<p><b>5</b></p>	<p><b>6</b></p>	<p><b>7</b></p>	<p><b>8</b> Activate ABC</p>
<p><b>9</b> Save</p>	<p>UIP5</p>		

**ABC:** the function makes the sensor automatically adjust for any drifts in sensor reading due to e.g.:

- calibration misalignment due to vibration/shock from transportation and/or installation
- component aging
- dust accumulation
- degradation of reflective surfaces in the optical system

The ABC makes use of the fundamental fact that there is a background level of CO<sub>2</sub> in the atmosphere that is fairly constant, currently close to 400ppm<sub>vol</sub>, and that for many applications the CO<sub>2</sub> level will reach the background level at some points in time.

### NOTE!

For the ABC time counter to work properly, the electrical power supply to the sensor needs to be continuously ON for at least four (4) hours.

ABC period (ABC target / Altitude / Restore cal)  
 (Same display procedure for the four options See Note!)

<p><b>5</b></p>	<p><b>6</b></p>	<p><b>7</b> See NOTE!</p>	<p><b>8</b></p>
<p><b>9</b></p>	<p><b>10</b> 180, 181, 240hours</p>	<p><b>11</b> Save</p>	<p><b>12</b></p>
<p><b>13</b></p>	<p><b>1 4</b></p>	<p><b>UIP5</b></p>	

**NOTE!**

The ABC period is default set to 180 hours, which means that the sensor will make an adjustment once a week.






Temperature/Humidity Offset

<p><b>5</b></p>	<p><b>6</b></p>	<p><b>7</b> 0.0...-0.1...-2.5°C</p>	
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## Automatic system test

A full system test is executed automatically at every power-up. Sensor probes are checked constantly during operation against failure by checking valid dynamic measurement ranges.

System checks returns error bytes to RAM. Error codes are available by connecting the sensors to a PC with a special USB cable (art.No. 00-0-0070) connected (see fig. 2). Error codes are shown in software UIP (version 5 or higher) and in the display at "Meter status"

<p><b>1</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21%RH</p>   </div> <div style="width: 45%; border-left: 1px solid black;"> <p>CO<sub>2</sub> Screen</p> <p>Temperature Settings</p> <p>Humidity</p> <p style="text-align: right;">«</p> </div> </div>	<p><b>2</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>CO<sub>2</sub> 429ppm</p> <p>Temperature 23.1°C</p> <p>Humidity 21%RH</p>   </div> <div style="width: 45%; border-left: 1px solid black;"> <p>Enter PIN 2001</p> <table border="1" style="width: 100%; text-align: center;"> <tr><td>2</td><td>3</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>8</td><td>9</td></tr> <tr><td>Del</td><td>0</td></tr> <tr><td></td><td>«</td></tr> </table>  </div> </div>	2	3	5	6	8	9	Del	0		«	<p><b>3</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>CO<sub>2</sub> Screen</p> <p>Temperature Settings</p> <p>Humidity</p> <p style="text-align: right;">«</p> </div> <div style="width: 45%; border-left: 1px solid black;"> <p>Meter</p> <p>Measurements</p> <p>Outputs</p> <p>Misc «</p> </div> </div>	<p><b>4</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Meter Info RS-485</p> <p>PIN1 PIN2</p> <p>Reset</p> <p style="text-align: right;">«</p> </div> <div style="width: 45%; border-left: 1px solid black;"> <p><b>5</b></p> <p>Meter information</p> <table border="1" style="width: 100%; text-align: left;"> <tr><td>Meter status</td><td>0x0</td></tr> <tr><td>Version</td><td>1.03</td></tr> <tr><td>Serial Number</td><td>0x30DA676</td></tr> <tr><td>Type ID</td><td>402</td></tr> <tr><td>Map Version</td><td>69</td></tr> </table> <p style="text-align: right;">«</p> </div> </div>	Meter status	0x0	Version	1.03	Serial Number	0x30DA676	Type ID	402	Map Version	69
2	3																						
5	6																						
8	9																						
Del	0																						
	«																						
Meter status	0x0																						
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## Error codes and action plans

Error symbol (a wrench appears when 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. <i>See Note 2!</i>

Table 2: Error codes and action plans.

### NOTE!

1: Occurs if probe is out of range, at very high CO<sub>2</sub> values. Error code resets automatically when measured values returns to normal. May also indicate need of zero point calibration. If CO<sub>2</sub> values are normal and error code remains, the sensor can be defect or the connections to it are broken.

2: Even if there is an error in the configuration parameters for the output, and this error code is present in the status of the tSENSE VAV, the actual voltage on the output may be somewhere in the range 0-10V. There is no error control that for example sets the output to some pre-defined level (like 0V) in case of parameter error, rather the output will be undefined but in the range 0 – 10V.

If several errors are detected at the same time, different error code numbers will be added together into one single error code!

Sensor accuracy is defined at continuous operation (at least three (3) weeks after installation).

## PIN codes

<b>1</b>	<b>2</b> PIN1 Off	<b>3</b> PIN2	<b>4</b>																																					
<table border="1"> <tr><td>CO<sub>2</sub></td><td>429ppm</td></tr> <tr><td>Temperature</td><td>23.1°C</td></tr> <tr><td>Humidity</td><td>21%RH</td></tr> <tr><td colspan="2" style="text-align: center;"></td></tr> </table>	CO <sub>2</sub>	429ppm	Temperature	23.1°C	Humidity	21%RH			<table border="1"> <tr><td>CO<sub>2</sub></td><td>Screen</td></tr> <tr><td>Temperature</td><td>Settings</td></tr> <tr><td>Humidity</td><td>«</td></tr> </table>	CO <sub>2</sub>	Screen	Temperature	Settings	Humidity	«	<table border="1"> <tr><td>Enter PIN</td><td colspan="2">2001</td></tr> <tr><td></td><td>2</td><td>3</td></tr> <tr><td></td><td>5</td><td>6</td></tr> <tr><td></td><td>8</td><td>9</td></tr> <tr><td>Del</td><td>0</td><td>«</td></tr> </table>	Enter PIN	2001			2	3		5	6		8	9	Del	0	«	<table border="1"> <tr><td>Meter</td><td></td></tr> <tr><td>Measurements</td><td></td></tr> <tr><td>Outputs</td><td></td></tr> <tr><td>Misc</td><td>«</td></tr> </table>	Meter		Measurements		Outputs		Misc	«
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## Create PIN code for access to display settings (PIN1)

<b>5</b> PIN1	<b>6</b> PIN1 Code Off...	<b>7</b> PIN(1) Code On	<b>8</b> Create PIN(1) Code																																																																		
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## Create PIN code for access to meter settings (PIN2)

5 PIN2	6 Create PIN2 Code	7 Save	8
<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 2px;">Meter info</div> <div style="border: 1px solid black; padding: 2px;">RS-485</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">PIN1</div> <div style="border: 1px solid black; padding: 2px;">PIN2</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px;">Reset</div> <div style="font-size: 2em;">⏪</div> </div>	<p style="font-size: 0.8em;">Pin code for access to settings</p> <p>PIN 1 0 0 0</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> </div> <div style="display: flex; justify-content: flex-end; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Save</div> <div style="font-size: 2em;">⏪</div> </div>	<p style="font-size: 0.8em;">Pin code for access to display settings</p> <p>PIN 1 0 0 0</p> <p>On</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> </div> <div style="display: flex; justify-content: flex-end; margin-top: 10px;"> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">⏪</div> </div>	<p style="font-size: 0.8em;">Pin code for access to settings</p> <p>PIN 1 0 0 0</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> <div style="font-size: 2em;">+</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> <div style="font-size: 2em;">-</div> </div> <div style="display: flex; justify-content: flex-end; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Save</div> <div style="font-size: 2em;">+</div> </div>

## Maintenance

*tSENSE VAV* is maintenance free. Internal self-adjusting calibration function takes care of normal long term drift. To secure highest accuracy, a time interval of five years is recommended between CO<sub>2</sub> calibrations, unless some special situations have occurred.

Software can be downloaded free at [senseair.com](http://senseair.com).

USB-cable and zero calibration kit can be ordered from SenseAir.

Check can be done on site without interfering with ventilation system.



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