

User manual

tSENSE EFA

CO₂- and temperature transmitter



General

tSENSE EFA for wall mounting measures indoor air carbon dioxide concentration, temperature and relative humidity in rooms. *tSENSE EFA* is available with or without colour touch display (LCD).

The unit connects to Direct Digital Control (DDC).

Linear outputs are pre-programmed as CO₂-, temperature- and relative humidity transmitter. Measuring ranges can be modified 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

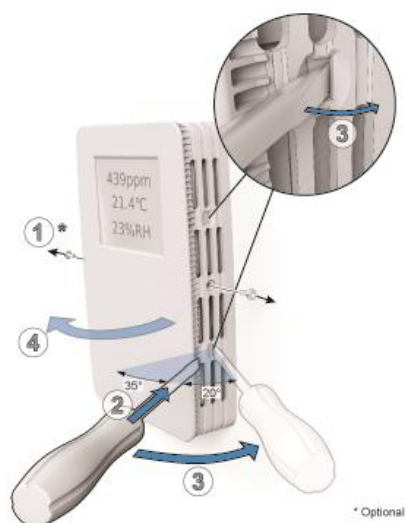


Figure 1

Download of software UIP

senseair.se/products/software/uiip-5/

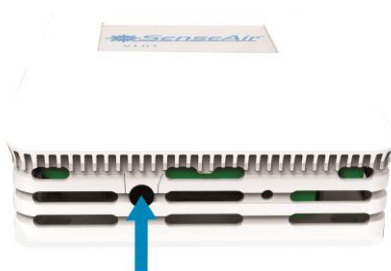
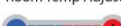


Figure 2: Connection to PC via phone jack

Connect Interface cable USB – 3.5mm Art.no.:00-0-0070

Enter PIN code

Power ON 	1 24.6°C CO₂ 441ppm Room Temp Adjust  	2PIN1: 1111 Enter PIN1111  <table><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>	2	3	5	6	8	9	Del	0		«	3 CO₂ Screen Temperature Settings Humidity  «
2	3												
5	6												
8	9												
Del	0												
	«												
4PIN2: 2001 Enter PIN2001  <table><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>	2	3	5	6	8	9	Del	0		«	5 Meter Measurements Outputs Misc «		
2	3												
5	6												
8	9												
Del	0												
	«												

Output Configurations

Terminal	Default Output	Default Output Range	Outputs of this sensor	Output Ranges of this sensor
OUT(1)	2 - 10 VDC	0 - 3000ppm CO ₂	See label	See label
OUT(2)	2 - 10 VDC	0 - 50°C	See label	See label
OUT(3)	2 - 10 VDC	? Ch7	See label	See label

Table 1. Default output configurations of **iSENSE EFA**

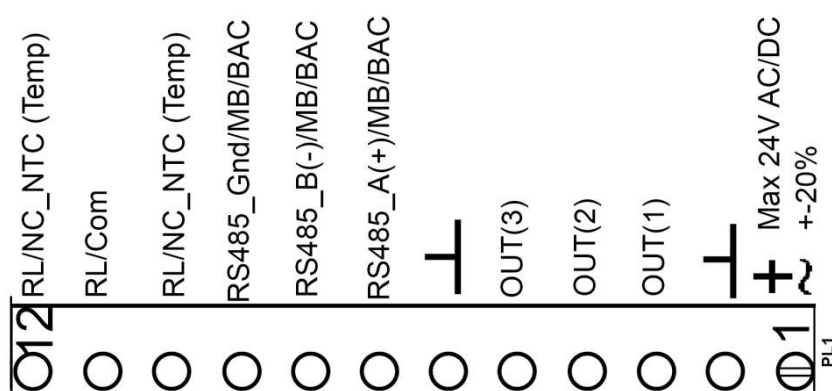


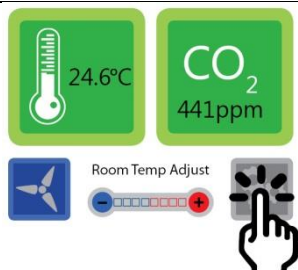
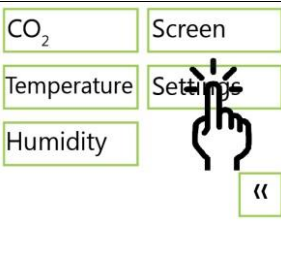
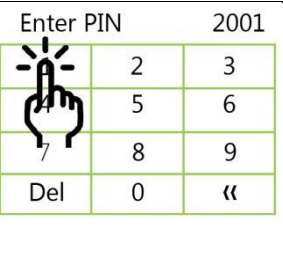
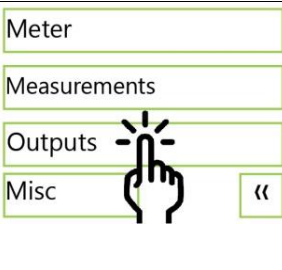
Figure3: Screw Terminal

Connect the sensor to PC with the connect interface cable USB – 3.5mm Art.no.: 00-0-0070

The sensor is supplied with 0 - 10VDC linear outputs for Out(1), Out(2) and Out(3) (see Table 1). Alternative output ranges can be configured with PC software UIP (version 5 or higher). See information at senseair.com.

Outputs

Out1/Out2/Out3

①	②	③	④ Outputs
			

Voltage range

Max (the same approach with "Min")

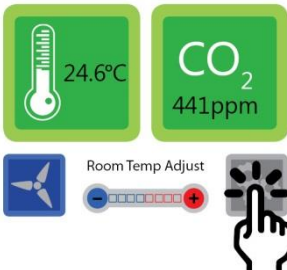
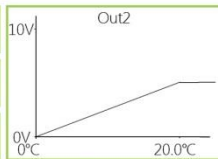
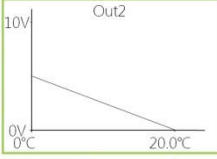
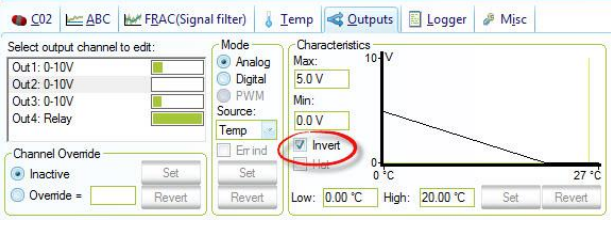
5 Out2 Out1 10.0V Out2 4.8V Out3 4.8V Relay 1(active) «	6 Out2 Temp «	7 Max Source Temp Type Low 0°C High 50°C «	8 10.0V, 9.9V..5.0V.. Max limit 5.0V «
9 Max limit 5.0V «	10 Max 5.0V Min 0.0V Source Temp Type Low 0°C High 50°C «	UIP5 	

Select source

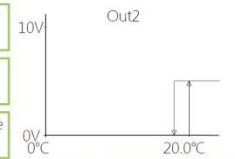
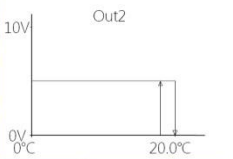
7 Source Max 5.0V Min 0.0V Source Temp Type Low 0°C High 50°C «	8 Source CO2 CO2 Temp RH Ch3 Ch4 Ch5 Ch6 Ch7 Disable «	9 Source CO2 CO2 Temp RH Ch3 Ch4 Ch5 Ch6 Ch7 Disable 	10 Max 5.0V Min 0.0V Source CO2 Type Low 0ppm High 2000ppm
UIP5 1 Source CO ₂ selected 		2 Set (Save) 	

Types

Analogue/Analogue Invert

1 	2 CO ₂ Screen Temperature Settings Humidity 	3 Enter PIN 2001  <table border="1"> <tr><td>2</td><td>3</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>7</td><td>8</td></tr> <tr><td>Del</td><td>0</td></tr> <tr><td></td><td>«</td></tr> </table>	2	3	5	6	7	8	Del	0		«	4 Outputs Meter Measurements Outputs  Misc «														
2	3																										
5	6																										
7	8																										
Del	0																										
	«																										
5 Out2 <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</td><td>1(active)</td></tr> </table> 	Out1	10.0V	Out2	4.8V	Out3	4.8V	Relay	1(active)	6 Out2  Temp «	7 Analogue <table border="1"> <tr><td>Max</td><td>5.0V</td></tr> <tr><td>Min</td><td>0.0V</td></tr> <tr><td>Source</td><td>Temp</td></tr> </table>  <table border="1"> <tr><td>Low</td><td>0.0°C</td></tr> <tr><td>High</td><td>20.0°C</td></tr> <tr><td></td><td>«</td></tr> </table> 	Max	5.0V	Min	0.0V	Source	Temp	Low	0.0°C	High	20.0°C		«	8 Type An,Inv <table border="1"> <tr><td>Analog</td><td>Analog invert </td></tr> <tr><td>Digital</td><td>Digital invert</td></tr> </table> «	Analog	Analog invert 	Digital	Digital invert
Out1	10.0V																										
Out2	4.8V																										
Out3	4.8V																										
Relay	1(active)																										
Max	5.0V																										
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High	20.0°C																										
	«																										
Analog	Analog invert 																										
Digital	Digital invert																										
9 Type An,Inv <table border="1"> <tr><td>Analog</td><td>Analog invert</td></tr> <tr><td>Digital</td><td>Digital invert</td></tr> </table> 	Analog	Analog invert	Digital	Digital invert	10 Analogue invert <table border="1"> <tr><td>Max</td><td>5.0V</td></tr> <tr><td>Min</td><td>0.0V</td></tr> <tr><td>Source</td><td>Temp</td></tr> </table>  <table border="1"> <tr><td>Type</td><td>Low</td><td>High</td></tr> <tr><td>An,Inv</td><td>0.0°C</td><td>20.0°C</td></tr> <tr><td></td><td></td><td>«</td></tr> </table>	Max	5.0V	Min	0.0V	Source	Temp	Type	Low	High	An,Inv	0.0°C	20.0°C			«	UIP5 1 Invert 2 Save (Set) 						
Analog	Analog invert																										
Digital	Digital invert																										
Max	5.0V																										
Min	0.0V																										
Source	Temp																										
Type	Low	High																									
An,Inv	0.0°C	20.0°C																									
		«																									

Digital/Digital Invert

10 Digital <table border="1"> <tr><td>Max</td><td>5.0V</td></tr> <tr><td>Min</td><td>0.0V</td></tr> <tr><td>Source</td><td>Temp</td></tr> </table>  <table border="1"> <tr><td>Type</td><td>Low</td><td>High</td></tr> <tr><td>Digital</td><td>18.0°C</td><td>20.0°C</td></tr> <tr><td></td><td></td><td>«</td></tr> </table>	Max	5.0V	Min	0.0V	Source	Temp	Type	Low	High	Digital	18.0°C	20.0°C			«	10 Digital Invert <table border="1"> <tr><td>Max</td><td>5.0V</td></tr> <tr><td>Min</td><td>0.0V</td></tr> <tr><td>Source</td><td>Temp</td></tr> </table>  <table border="1"> <tr><td>Type</td><td>Low</td><td>High</td></tr> <tr><td>Dig,Inv</td><td>18.0°C</td><td>20.0°C</td></tr> <tr><td></td><td></td><td>«</td></tr> </table>	Max	5.0V	Min	0.0V	Source	Temp	Type	Low	High	Dig,Inv	18.0°C	20.0°C			«
Max	5.0V																														
Min	0.0V																														
Source	Temp																														
Type	Low	High																													
Digital	18.0°C	20.0°C																													
		«																													
Max	5.0V																														
Min	0.0V																														
Source	Temp																														
Type	Low	High																													
Dig,Inv	18.0°C	20.0°C																													
		«																													

Measure range settings

Low (the same approach with "High")

5 Out2 Out1 10.0V Out2 4.8V Out3 4.8V Relay 1(active) «	6 Out2 Temp «	7 Low 600ppm Max 5.0V Min 0.0V Source CO2 Type Analog Low 600ppm High 900ppm «	8 600, 550...400ppm Low 400ppm + «
9 Low 400ppm - + «	10 Out2 Max 5.0V Min 0.0V Source CO2 Type Low 400ppm High 900ppm «	UIP5 Select output channel to edit: Out1: 0-10V Out2: 0-10V Out3: 0-10V Out4: Relay Channel Override Inactive Override = Mode Analog Digital PWM Source: CO2 Err ind Hat Characteristics Max: 5.0 V Min: 0.0 V Invert Low: 400 ppm High: 900 ppm Set Revert	

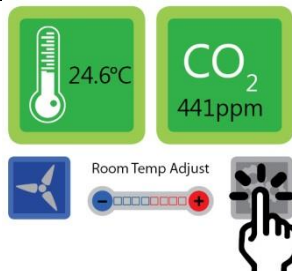
Outputs

Relay

5 Relay Out1 10.0V Out2 4.8V Out3 4.8V Relay 1(active) «	6 Relay CO2 «	7 Type Digital Max 1 Min 0 Source CO2 Type Low 900ppm High 1000ppm «	8 Type Dig,Inv Digital Digital invert «
9 Type Dig,Inv Digital Digital invert «	10 Relay Max 1 Min 0 Source CO2 Type Low 900ppm High 1000ppm «	UIP5 Select output channel to edit: Out1: 0-10V Out2: 0-10V Out3: 0-10V Out4: Relay Channel Override Inactive Override = Mode Analog Digital PWM Source: CO2 Err ind Hat Characteristics Max: 1 Min: 0 Invert Low: 900 ppm High: 1000 ppm Set Revert	

Communication settings

Address/Baudrate

1 	2 CO₂ Screen Temperature Settings Humidity	3 Enter PIN 2001 <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	4 Meter Measurements Outputs Misc
2	3										
5	6										
8	9										
Del	0										
5 RS-485 Meter info RS-485 PIN1 PIN2 Reset	6 Address 10 Baudrate 9600 Parity None Stop bits 1	7 Address 12 -	8 Address 12 - +								
9 NOTE! Meter info RS-485 PIN1 PIN2 Reset											

UIP Address

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

UIP Baudrate

1 Select property to edit: Property value Temperature Unit (C/F) RS-485 parity (even/odd/no parity) RS-485 stop bits (1/2) RS-485 baud rate (9600/19200/38400/57600) Select: 9600	2 Property value Select: 19200 9600 19200 38400 57600	3 Property value Select: 9600 Set Revert
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NOTE!

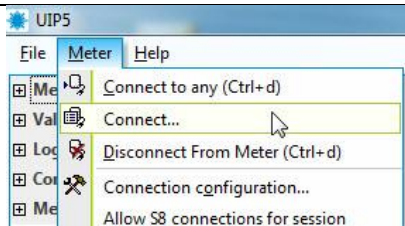
UIP baudrate $\neq$ RS-485 baudrate if *tSENSE (Disp)* is connected *via phone jack* (see fig. 2).

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

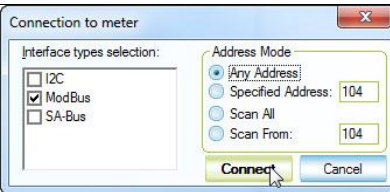
Change communication settings via UIP requires Reset (Power OFF – Power ON) to be executed.

Connect meter

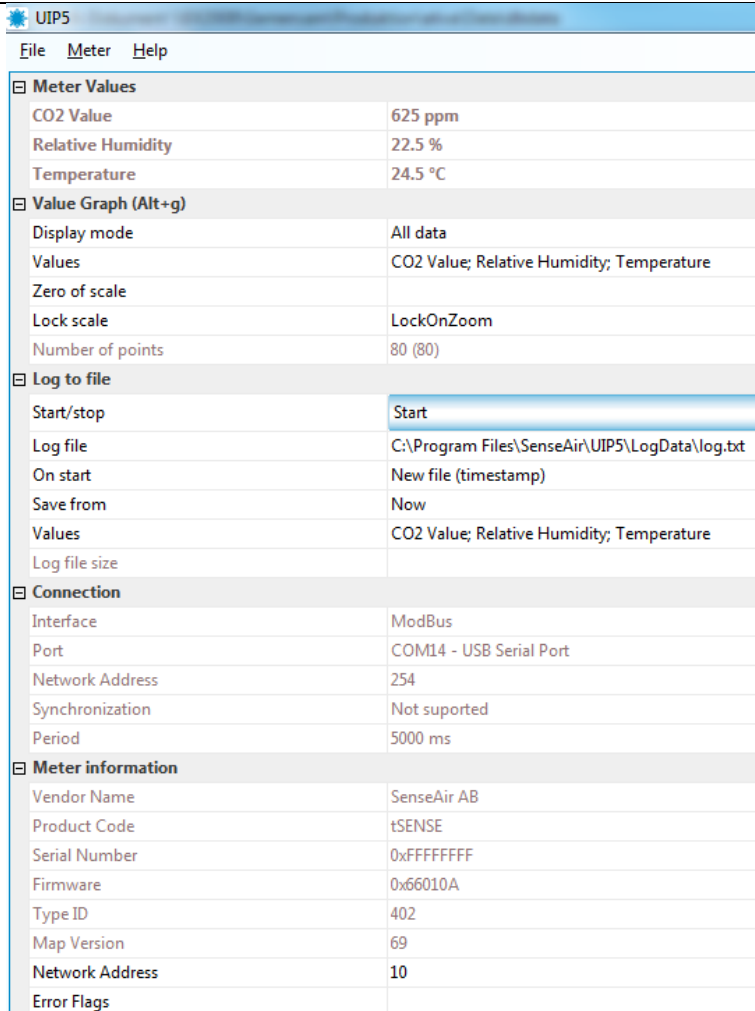
1 Connect meter



2



Information



Meter Values	
CO2 Value	625 ppm
Relative Humidity	22.5 %
Temperature	24.5 °C

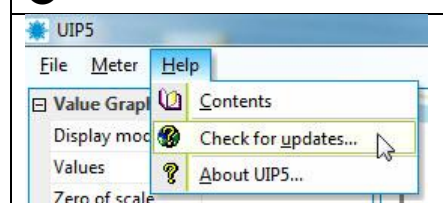
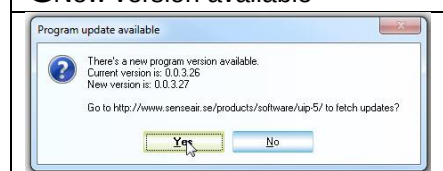
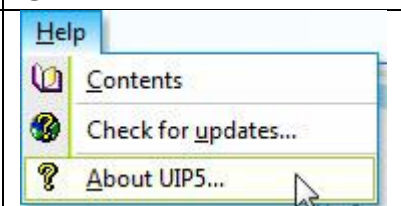
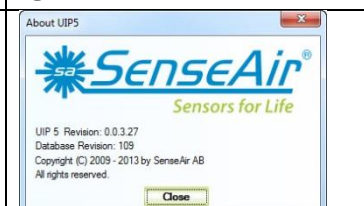
Value Graph (Alt+g)	
Display mode	All data
Values	CO2 Value; Relative Humidity; Temperature
Zero of scale	
Lock scale	LockOnZoom
Number of points	80 (80)

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	

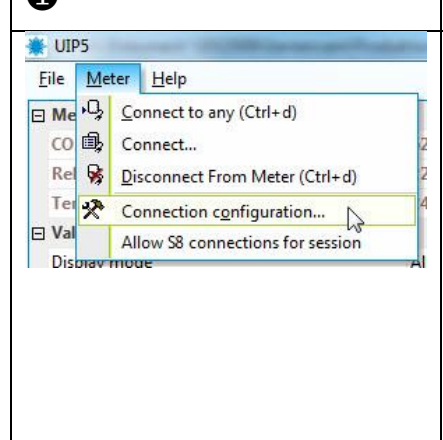
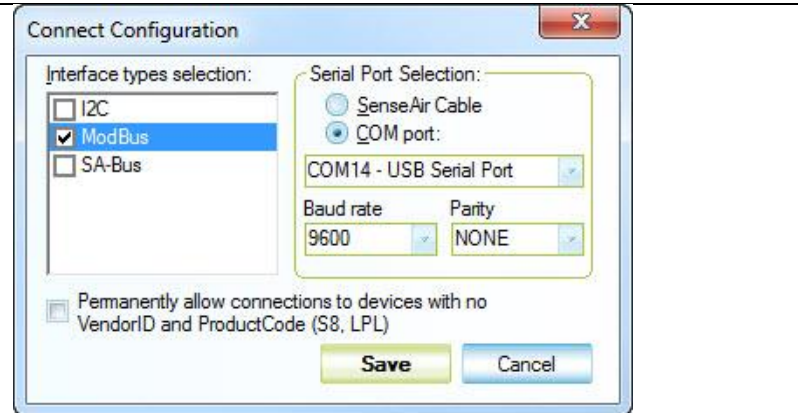
Connection	
Interface	ModBus
Port	COM14 - USB Serial Port
Network Address	254
Synchronization	Not supported
Period	5000 ms

Meter information	
Vendor Name	SenseAir AB
Product Code	tSENSE
Serial Number	0xFFFFFFFF
Firmware	0x66010A
Type ID	402
Map Version	69
Network Address	10
Error Flags	

Check for updates

1 			
2 New version available 			
2 	3 	4 	

Connection configurations

1 	2 ModBus 3 COM14-USB Serial Port 4 Save		
			
5 Lower right corner of screen 	6 		

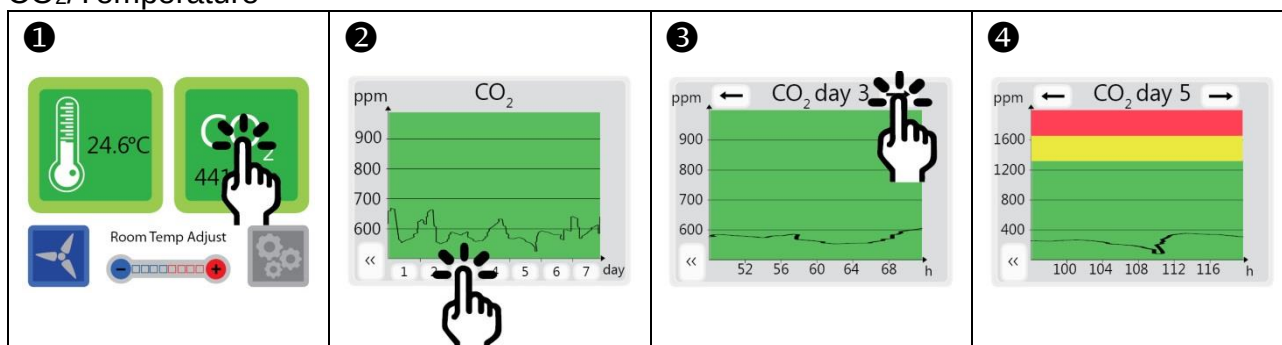
NOTE!

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

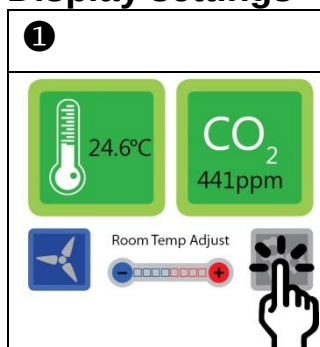
Change communication settings via UIP requires Reset (Power OFF – Power ON) to be executed.

Measured values

CO₂/Temperature



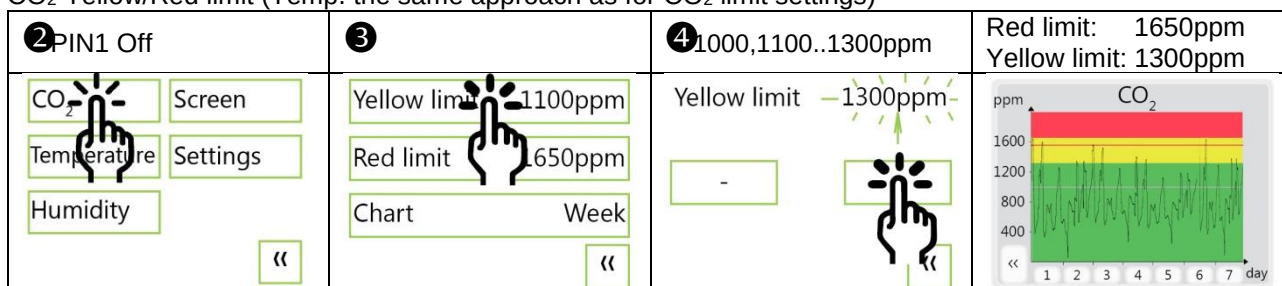
Display settings



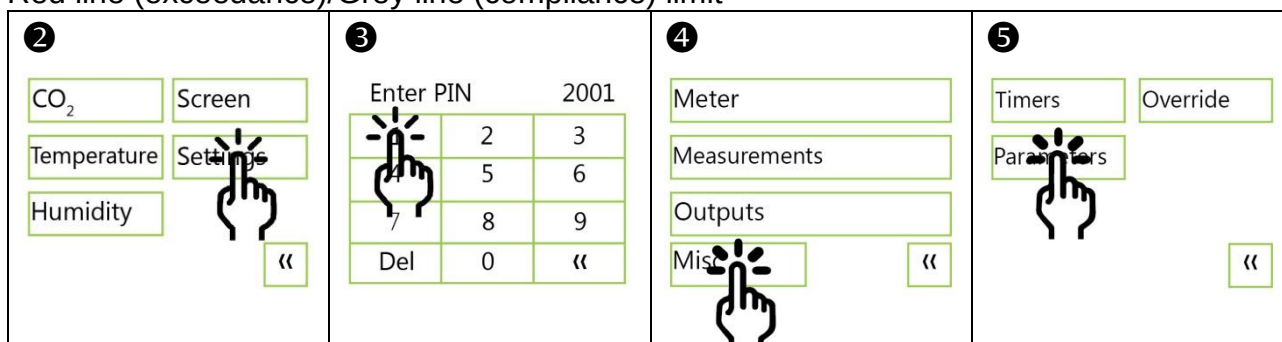
Limits

CO₂/(Temperature)

CO₂ Yellow/Red limit (Temp. the same approach as for CO₂ limit settings)



Red line (exceedance)/Grey line (compliance) limit



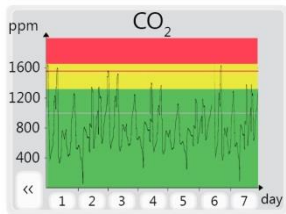
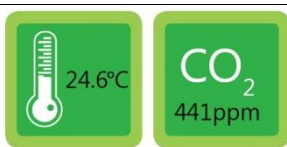
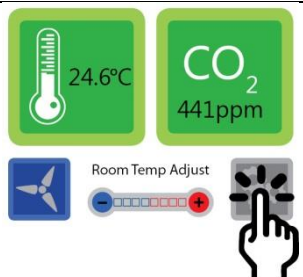
6 CO2peak ind CO2 Chart Temp Chart  	7 CO2chart grey line CO2chart grey line  	8 CO2grey line Disabled Grey line limit  	9 CO2chart grey line Enabled Disable  
10 CO2chart grey line Enabled Disable Enable 	11 CO2grey line Enabled Grey line limit 900ppm  	12 600, 700..1000ppm Grey line limit 1000ppm -  	Grey line limit: 1000ppm Red line limit: 1500ppm 

Chart 24h/Week

1   	2 CO2  Screen Temperature Settings Humidity 	3 Yellow limit 1300ppm Red limit 1650ppm Chart 24h  	4 CO ₂ Chart Week 24h  
--	--	---	---

Screen settings

1 	2 PIN1 Off CO₂ Screen Temperature Settings Humidity «
---	--

Brightness

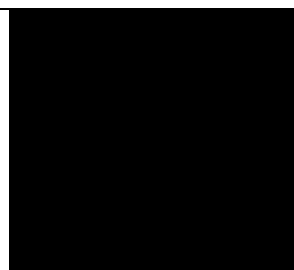
3 Brightness 10% Background Normal Display Scheme Active Toggle Ind area «	4 10, 20,...50% Brightness 50% - + Energy save brightness 0% - + «	5 Brightness 50% - + Energy save brightness 0% - + «
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Background

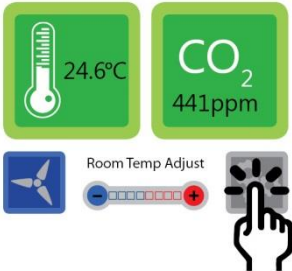
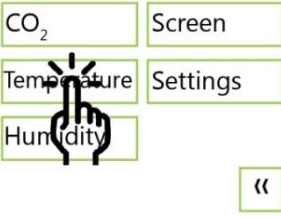
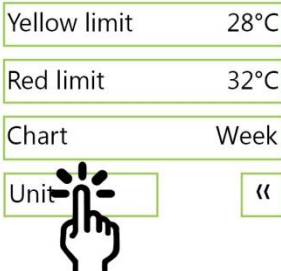
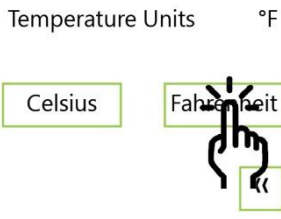
3 Brightness 50% Background Normal Display Scheme Active Toggle Ind area «	4 Background color Invert Normal Invert «	5 Background color Invert Normal Invert «	6 Brightness 50% Background Invert Sleep Scheme Active Toggle Ind area «
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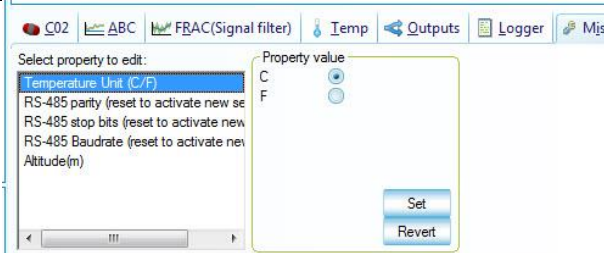
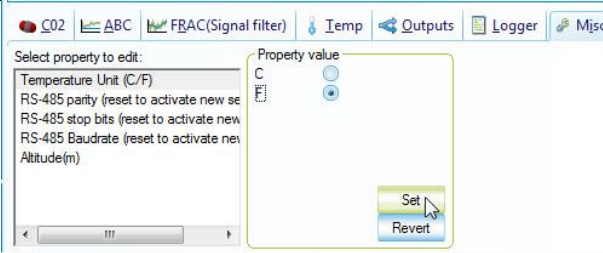
Screensaver, Time setting

Interval

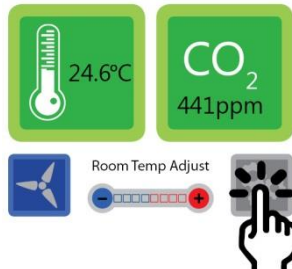
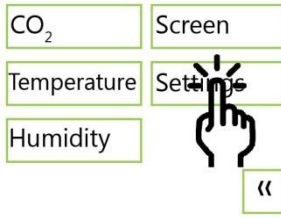
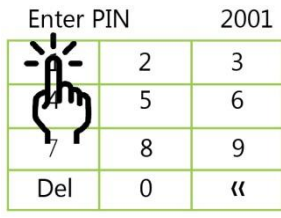
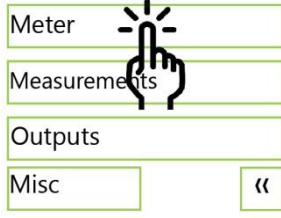
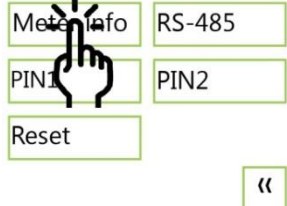
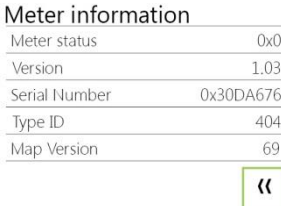
3 Brightness 50% Background Normal Display Scheme Active Toggle Ind area «	4 Display Scheme Interval Active Energy save Interval «	5 3,4,5...10 s Sleep Interval 10s - + «	6 50 s 
--	---	--	--

Temperature unit (°C/°F)

① 	② 	③ 	④ 
--	--	---	--

① UIP5 Miscellaneous 	② 
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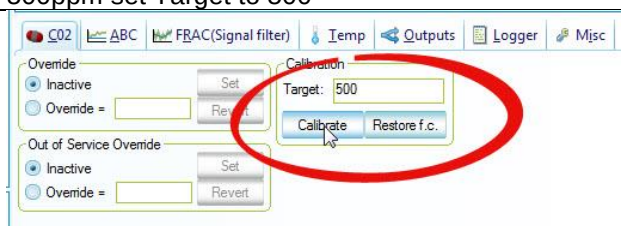
Meter information

① 	② 	③ 	④ 
⑤ 	⑥ 		

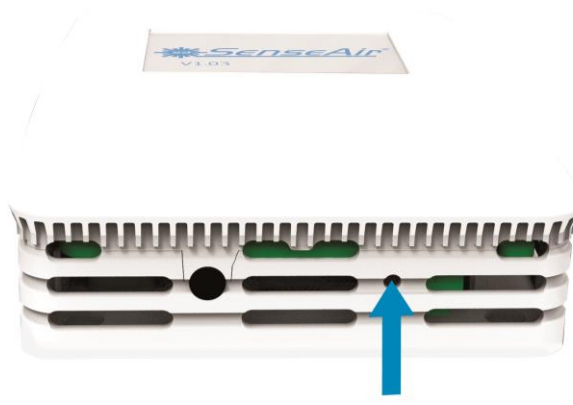
Calibration options CO₂

4	5
Meter	CO ₂ 429ppm
Measurement 	Temperature 23.1°C
Outputs	Humidity 21%RH
Misc «	«

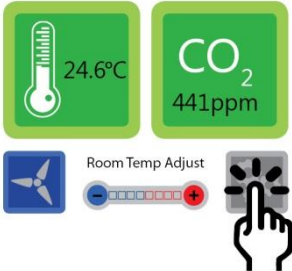
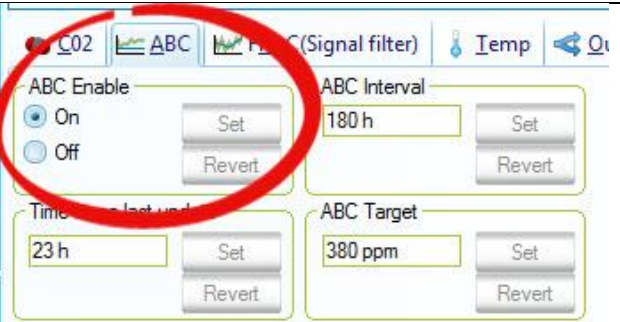
Zero cal/Background/Target cal

6	7	8	9
 Zero cal ABC Background Altitude Target cal Restore cal «	Start zero calibration cycle?  Yes No Zero calibration use 0ppm CO₂ calibration target, calibration cycle takes ~5s «	Zero calibration active 	Verifying 
10	11	UIP: If reference meter shows e.g. CO ₂ -value 500ppm set Target to 500	
Zero calibration succeeded	Zero cal ABC Background Altitude Target cal Restore cal 		

Background calibration button

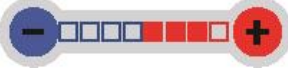
1 Press for 15s, until...	2 green LED blinks twice
	

ABC Enable/Disable

1 	2 CO₂ Screen Temperature Settings Humidity «	3 (PIN1 Off) Enter PIN 2001 <table border="1"> <tr> <td>2</td> <td>3</td> </tr> <tr> <td>5</td> <td>6</td> </tr> <tr> <td>7</td> <td>9</td> </tr> <tr> <td>Del</td> <td>«</td> </tr> </table>	2	3	5	6	7	9	Del	«	4 Meter Measurements Outputs Misc «
2	3										
5	6										
7	9										
Del	«										
5 CO₂ 429ppm Temperature 23.1°C Humidity 21%RH «	6 Zero cal ABC Background Altitude Target cal Restore cal «	7 ABC Inactive ABC period 80hours ABC target 380ppm «	8 ABC Active Enable Disable Save new ABC state? Yes No «								
9 Save ABC Active Enable Disable Save new ABC state? «	UIP 										

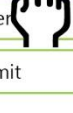
Timers Fan

Room Temp Adjust
(the same approach as for Fan settings)

4 Meter Measurements Outputs Mis  «	5 Timer  Override Para  s «	6 Room Temp Adjust Tim5 Tim6  «	7 61, 62...90min Period Timer7 61min  Timebase 0.1s 1s 1min «
8 Period: 90min Timebase: 1min	One step (click) =x°C/F (depends on control system settings)	1, 2, 3...89min	90min after adjusting Back to init value
Period Timer7 90min - + Timebase 1min 0.1s 1s 1min «	 24.6°C  CO₂ 441ppm  Room Temp Adjust 		

Parameters

CO2peak ind Enable/Disable **?!/** CO2peak period/ CO2peak limit
(The same approach as for CO2peak ind settings)

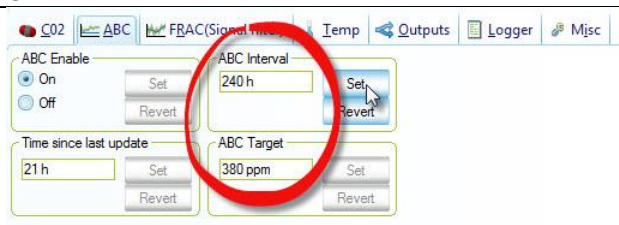
4 Meter Measurements Outputs Misc  «	5 Timers Parameters  Override «	6 CO2peak ind  CO2 Chart Temp Chart «	7? CO2peak ind  Inactive CO2peak per  20.0min CO2peak limit 2000ppm «
8 CO2peak indicat Active Disable  «			

CO2/Temp Chart

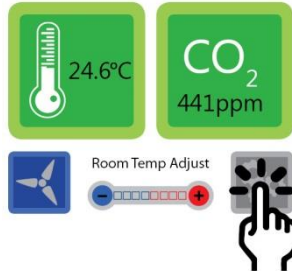
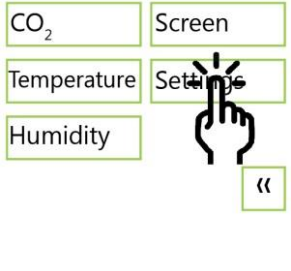
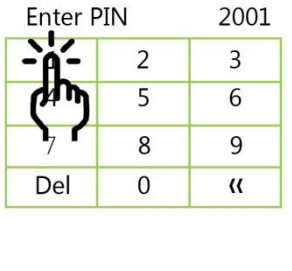
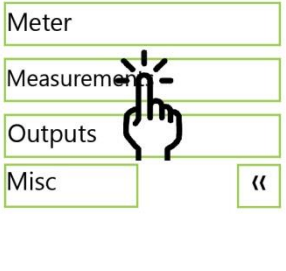
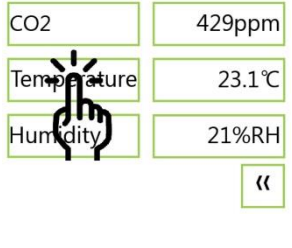
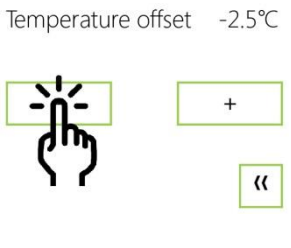
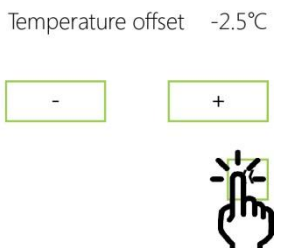
CO2/Temp Chart

1 24.6°C CO₂ 441ppm Room Temp Adjust	2 CO₂ Screen Temperature Settings Humidity «	3 Enter PIN 2001 2 3 5 6 8 9 Del 0 «	4 Meter Measurements Outputs Misc «
5 Timers Override Parameters «	6 CO2peak ind CO2 Chart Temp Chart «	7 CO2grey line Disabled Grey line limit - «	8 CO2grey line Enabled Disable Enable «
9 CO2grey line Enabled Disable Enable	10 CO2grey line Enabled Grey line limit 900ppm «	11 Save Grey line limit 1000ppm - «	12 Grey line limit 1000ppm - +

ABC period (ABC target/Altitude (msl)/Restore cal)

4 Meter Measurements Outputs Misc	5 CO₂ 429ppm Temperature 23.1°C Humidity 21%RH	6 Zero cal Background Target cal ABC Altitude Restore cal	7 ABC Active ABC period 180hours ABC target 380ppm
8 ABC period 180 hours - + Save new ABC period? Yes No	9 ABC period 240 hours - + Save new ABC period? Yes No	10 180, 181, 240hours ABC period 240 hours - + Save new ABC period? Yes No	11 save Saving ABC period 
12 Verifying 	13 ABC period set to 240 hours	14 Zero cal Background Target cal ABC Altitude Restore cal	
UIP 			

Offset Temperature

① 	② 	③ 	④ 
⑤ 	⑥ 	⑦ 	

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".

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 ₂ sensor Com. error	No ability to communicate with CO ₂ sensor module.	Try to restart sensor by power OFF - power ON. Contact local distributor.
1	CO ₂ sensor CO ₂ measure error	CO ₂ measurement error.	Try Background calibration ("Calibration options CO ₂ " p.16). Contact local distributor. <i>See Note 1!</i>
2	T sensor T measure error	Temp measurement error.	Try to restart sensor by power OFF - power 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 ₂ 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 higher. Contact local distributor.
9	Memory error	One or several bytes of sensors parameter memory (settings) are corrupt	Try to restart sensor by power OFF/ON Contact local distributor.

Table 2: Error codes and action plans.

NOTE!

Occurs if probe is out of range, at very high CO₂ values. Error code resets automatically when measured values returns to normal. May also indicate need of zero point calibration. If CO₂ values are normal and error code remains, the sensor can be defect or the connections to it are broken.

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).

Maintenance

tSENSE EFA is maintenance free. Internal self-adjusting calibration (ABC) function takes care of normal long term drift. To secure highest accuracy, a time interval of five years is recommended between CO₂ calibrations, unless some special situations have occurred.

Software can be downloaded free at www.senseair.com.
USB-cable and zero calibration kit can be ordered from SenseAir.

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

Directives

This product is in accordance with the
EMC 2004/108/EC, 92/31/EEG, RoHS 2011/65/EU
including amendments by the CE-marking Directive 93/68/EEC
The product fulfils the following demands:

EN 61000-4-2 level 2,
EN 61000-4-3 level 2,
EN 61000-4-4 level 4,
EN 61000-4-6,
EN 61000-4-8 level 4,
EN 55022 class B



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