

User Manual

tSENSE

CO₂-, temperature- and relative humidity transmitter



Table of contents	Page
General	1
Display menu	2
Measured values	2
CO ₂ /Temperature/Humidity.....	2
Limit settings	2
CO ₂ /Temperature/Humidity.....	2
Display appearance	3
CO ₂ /Temperature/Humidity Char.....	3
Brightness.....	3
Background.....	3
Sleep scheme.....	4
Toggle.....	4
Temperature unit selection.....	5
Output configurations	6
Download software	7
Self-diagnostics	10
Error codes and action plans	10
Opening of housing	11
Maintenance	11
Warranty and limitation	12

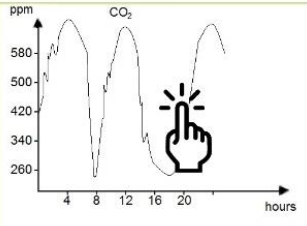
General

tSENSE for wall mounting measures indoor air carbon dioxide concentration, temperature and relative humidity in rooms. **tSENSE** is available with or without 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 later) and USB communication cable, alternative via Modbus or BACnet.

MEASURED VALUES CO₂/Temperature/Humidity

0  V0.00	1 <table border="1"> <tr> <td>CO₂</td> <td>429ppm</td> </tr> <tr> <td>Temperature</td> <td>23.1°C</td> </tr> <tr> <td>Humidity</td> <td>21%RH</td> </tr> </table> 	CO ₂	429ppm	Temperature	23.1°C	Humidity	21%RH	2 <table border="1"> <tr> <td>CO₂</td> <td>429ppm</td> </tr> <tr> <td>Tempe</td> <td>23.1°C</td> </tr> <tr> <td>Humidity</td> <td>21%RH</td> </tr> </table> 	CO ₂	429ppm	Tempe	23.1°C	Humidity	21%RH	3 429 ppm
CO ₂	429ppm														
Temperature	23.1°C														
Humidity	21%RH														
CO ₂	429ppm														
Tempe	23.1°C														
Humidity	21%RH														
4 	5 = 1 <table border="1"> <tr> <td>CO₂</td> <td>429ppm</td> </tr> <tr> <td>Temperature</td> <td>23.1°C</td> </tr> <tr> <td>Humidity</td> <td>21%RH</td> </tr> </table> 	CO ₂	429ppm	Temperature	23.1°C	Humidity	21%RH	6 429ppm 23.1°C 21%RH							
CO ₂	429ppm														
Temperature	23.1°C														
Humidity	21%RH														

LIMIT SETTINGS CO₂/(Temperature)/(Humidity)

1 <table border="1"> <tr> <td>CO₂</td> <td>429ppm</td> </tr> <tr> <td>Temperature</td> <td>23.1°C</td> </tr> <tr> <td>Humidity</td> <td>21%RH</td> </tr> </table> 	CO ₂	429ppm	Temperature	23.1°C	Humidity	21%RH	2 Enter PIN 123 <table border="1"> <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>0</td> <td><<</td> </tr> </table>	1	2	3	4	5	6	7	8	9	Del	0	<<	3 <table border="1"> <tr> <td>CO₂</td> <td>Screen</td> </tr> <tr> <td>Temperature</td> <td>PIN</td> </tr> <tr> <td>Humidity</td> <td></td> </tr> </table> <<	CO ₂	Screen	Temperature	PIN	Humidity		4 <table border="1"> <tr> <td>Orange limit</td> <td>600ppm</td> </tr> <tr> <td>Red limit</td> <td>1000ppm</td> </tr> <tr> <td>Chart</td> <td>24h</td> </tr> </table> <<	Orange limit	600ppm	Red limit	1000ppm	Chart	24h
CO ₂	429ppm																																
Temperature	23.1°C																																
Humidity	21%RH																																
1	2	3																															
4	5	6																															
7	8	9																															
Del	0	<<																															
CO ₂	Screen																																
Temperature	PIN																																
Humidity																																	
Orange limit	600ppm																																
Red limit	1000ppm																																
Chart	24h																																

CO₂ Orange/Red limit (Temp./Humidity Orange/Red limit: same method as CO₂ Orange/Red limit)

5 100,200,300ppm... Orange limit → 700ppm - + <<	6 Orange limit 700ppm - +	7 <table border="1"> <tr> <td>Orange limit</td> <td>700ppm</td> </tr> <tr> <td>Red limit</td> <td>1000ppm</td> </tr> <tr> <td>Chart</td> <td>24h</td> </tr> </table>	Orange limit	700ppm	Red limit	1000ppm	Chart	24h	8 = 4 <table border="1"> <tr> <td>CO₂</td> <td>Screen</td> </tr> <tr> <td>Temperature</td> <td>PIN</td> </tr> <tr> <td>Humidity</td> <td></td> </tr> </table> <<	CO ₂	Screen	Temperature	PIN	Humidity	
Orange limit	700ppm														
Red limit	1000ppm														
Chart	24h														
CO ₂	Screen														
Temperature	PIN														
Humidity															

DISPLAY APPEARANCE

CO₂/Temperature/Humidity Chart 24h/Week

5 Orange limit 600ppm Red limit 1000ppm Chart 24h  <<	6 CO ₂ Chart 24h 24h Week  <<	7 Orange limit 600ppm Red limit 1000ppm Chart Week 	8 = 4 CO ₂ Screen Temperature PIN Humidity <<
--	--	---	---

Brightness/Background/Sleep Scheme/Toggle

1 CO ₂ 429ppm Temperature 23.1°C Humidity 21%RH 	2 CO ₂ 429ppm Temperature 23.1°C Humidity 21%RH  	3 Enter PIN 123 <table border="1"> <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>0</td> <td><<</td> </tr> </table> 	1	2	3	4	5	6	7	8	9	Del	0	<<	4 CO ₂ Screen Temperature PIN Humidity  <<
1	2	3													
4	5	6													
7	8	9													
Del	0	<<													

Brightness

5 Brightness 10% Background Normal Sleep Scheme Asleep Toggle <<	6 10, 20,...100% Brightness 20% - 	7 Brightness 20% - + 	8 = 5 Brightness 20% Background Normal Sleep Scheme Asleep Toggle <<
--	---	---	--

Background

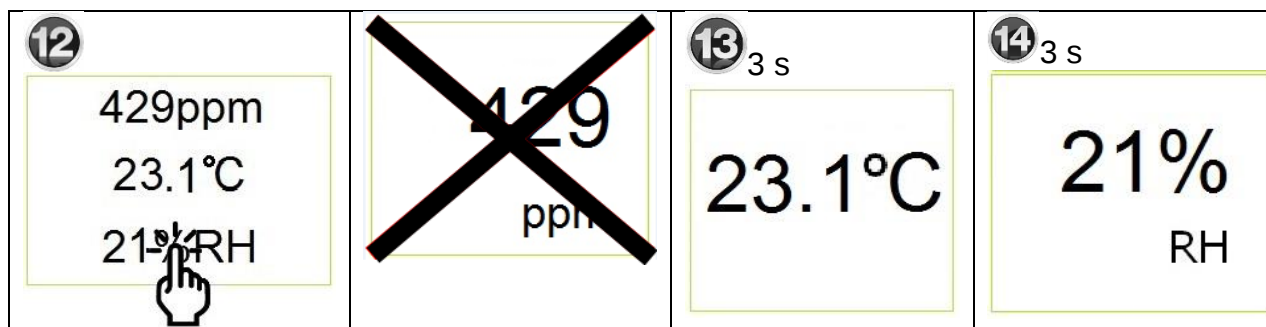
5 Brightness 10% Background Normal Sleep Scheme Asleep Toggle <<	6 Background color Normal Normal 	7 Brightness 10% Background Invert Sleep Scheme Asleep Toggle 	8 = 5 CO ₂ Screen Temperature PIN Humidity <<
--	--	---	---

Sleep scheme

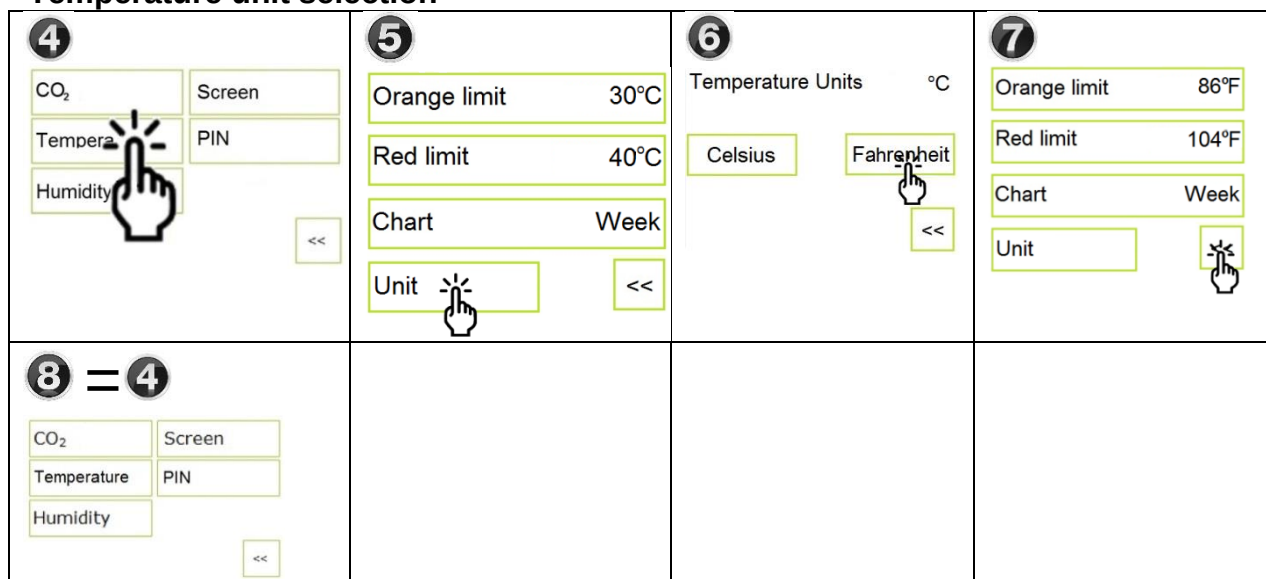
5 Brightness 10% Background Normal Sleep Scheme Asleep Toggle <<	6 Sleep Scheme Interval Awake Asleep Interval <<	7 3,4,5...10 s Sleep Interval 10s - +	8 Sleep Interval 10s - +
9 Sleep Scheme Interval Awake Asleep Interval	10 = 5 Brightness 10% Background Normal Sleep Scheme Interval Toggle <<	11 = 4 CO₂ Screen Temperature PIN Humidity	12 = 1 CO₂ 429ppm Temperature 23.1°C Humidity 21%RH 

Toggle time

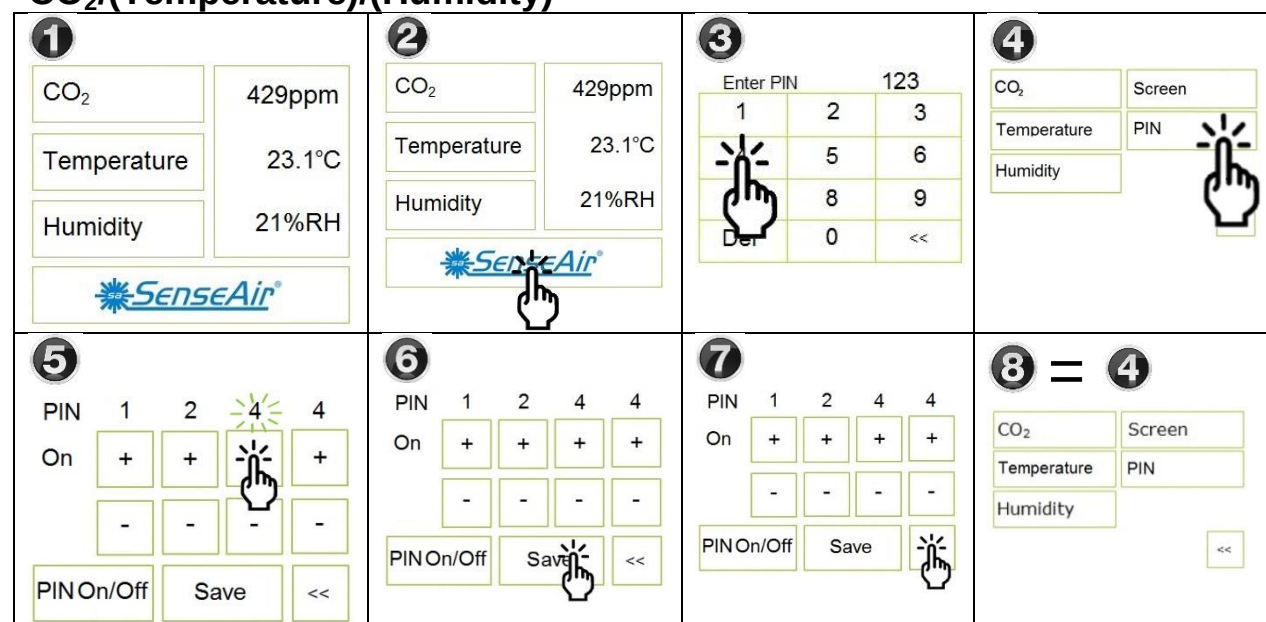
4 CO₂ Screen Temperature PIN Humidity <<	5 Brightness 10% Background Normal Sleep Scheme Interval Toggle <<	6 Toggle Time 3s CO₂ X Temperature X Humidity X <<	7 Toggle Time 3s - + CO₂ Temperature Humidity
8 Toggle Time 3s - + CO₂ X Temperature X Humidity X <<	9 = 5 Brightness 10% Background Normal Sleep Scheme Interval Toggle <<	10 CO₂ Screen Temperature PIN Humidity	11 CO₂ 429ppm Temperature 23.1°C Humidity 21%RH 



Temperature unit selection



Change PIN code CO₂/(Temperature)/(Humidity)



Output Configurations

Terminal	Default Output	Default Output Range	Outputs of this sensor	Output Ranges of this sensor
OUT(1)	0 - 10 VDC	0 - 2000ppm CO ₂	See label	See label
OUT(2)	0 - 10 VDC	0 - 50°C	See label	See label
OUT(3)	0 - 10 VDC	0 - 100%RH	See label	See label

Table 1. Default output configurations of *tSENSE*

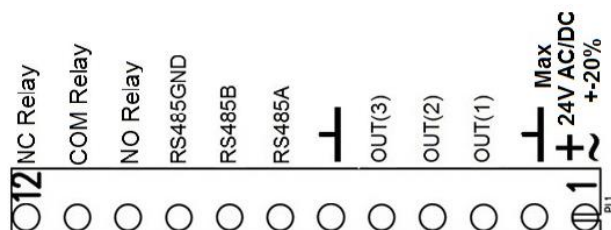


Figure 1: Plint

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 later). See information at www.senseair.com.

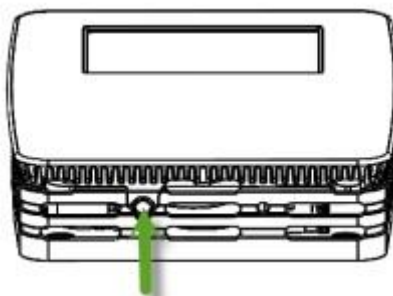
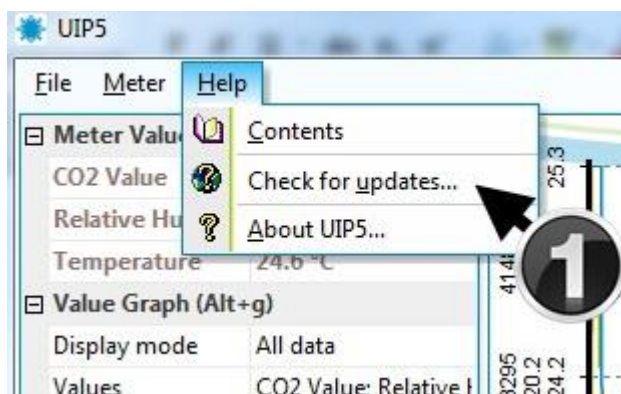


Figure 2: Connection to PC.

Download software UIP5

Download software UIP (version 5 or later) at www.senseair.se/products/software/uiip-5/

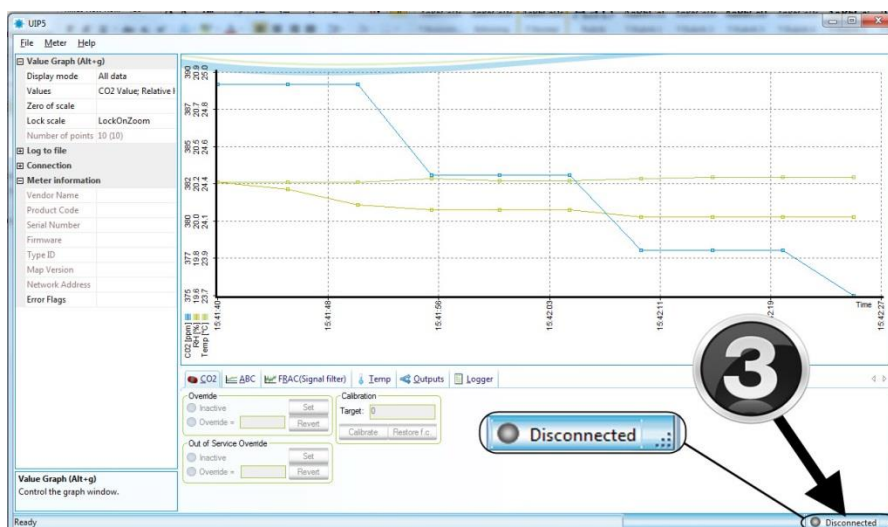
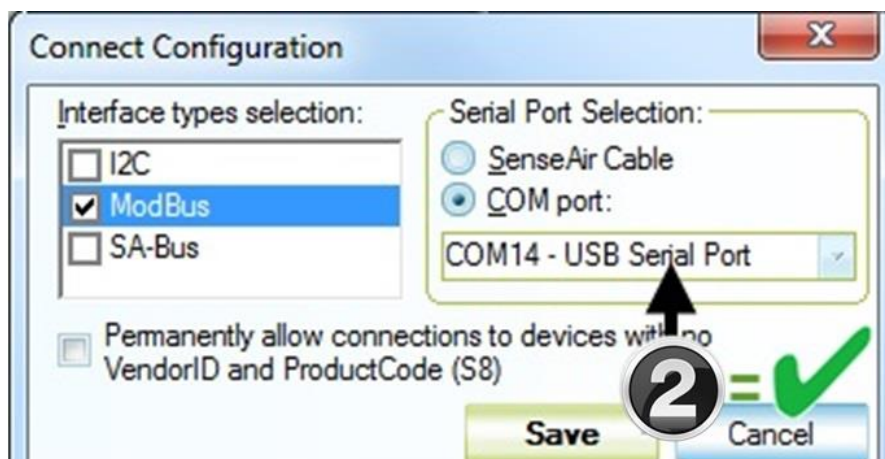
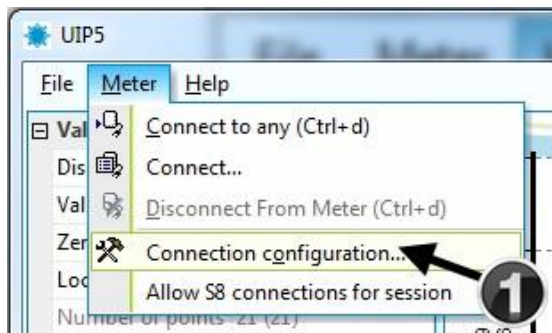
Check for updates



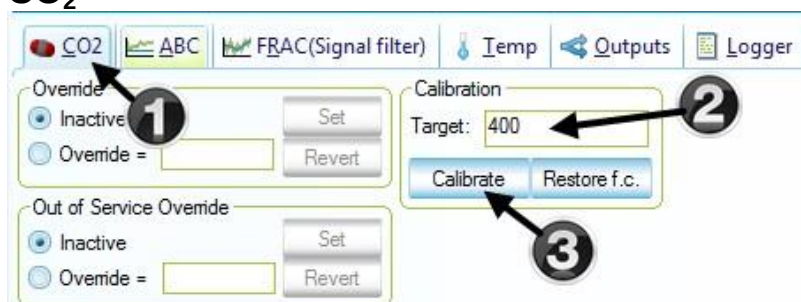
Run until...

For more information see *Help* in the UIP5 program.

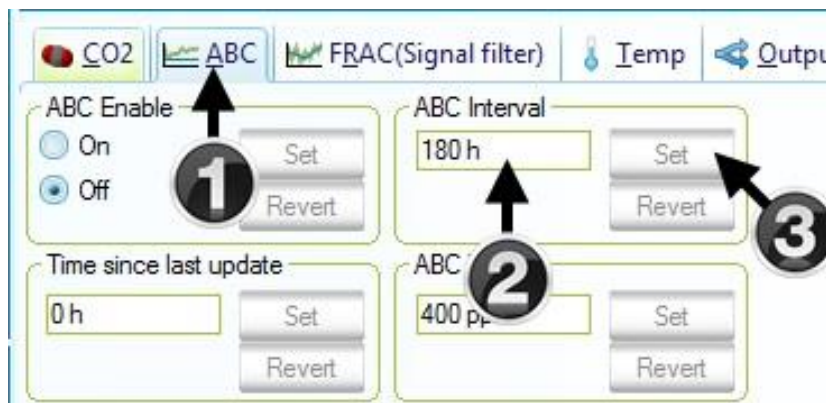
Connection configurations



CO₂



ABC



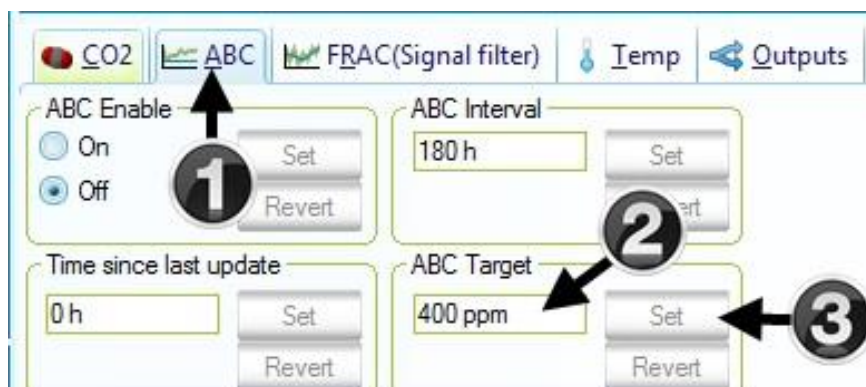
CO2 ABC FRAC(Signal filter) Temp Outputs

ABC Enable
☐ On
☒ Off **1**

ABC Interval
 180 h **3**

Time since last update
 0 h

ABC **2**
 400 ppm



CO2 ABC FRAC(Signal filter) Temp Outputs

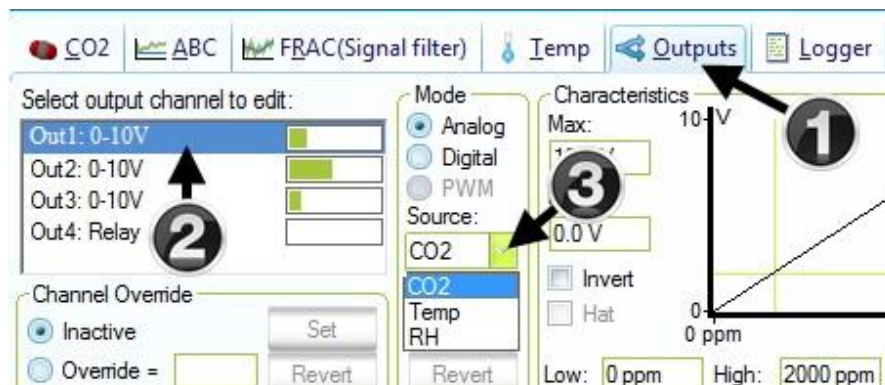
ABC Enable
☐ On
☒ Off **1**

ABC Interval
 180 h

Time since last update
 0 h

ABC Target **2**
 400 ppm **3**

Outputs



CO2 ABC FRAC(Signal filter) Temp Outputs Logger

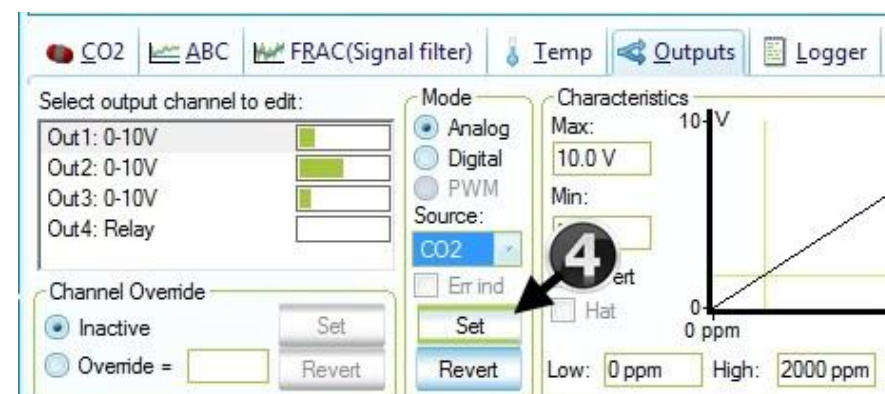
Select output channel to edit:
 Out1: 0-10V **2**
 Out2: 0-10V
 Out3: 0-10V
 Out4: Relay

Channel Override
☒ Inactive
☐ Override =

Mode
☒ Analog
☐ Digital
☐ PWM

Source:
 CO2 **3**
 CO2
 Temp
 RH

Characteristics
 Max: 10.0 V **1**
 Min: 0.0 V
 Low: 0 ppm High: 2000 ppm



CO2 ABC FRAC(Signal filter) Temp Outputs Logger

Select output channel to edit:
 Out1: 0-10V
 Out2: 0-10V **2**
 Out3: 0-10V
 Out4: Relay

Channel Override
☒ Inactive
☐ Override =

Mode
☒ Analog
☐ Digital
☐ PWM

Source:
 CO2
 CO2
 Temp
 RH

Characteristics
 Max: 10.0 V
 Min: 0.0 V
 Low: 0 ppm High: 2000 ppm

4

Self-diagnostics

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. All EEPROM updates, initiated by the sensor itself and by external connections are checked by subsequent memory read back and data comparisons.

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 later).

Error codes and action plans

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/ON. Contact local distributor.
1	CO ₂ sensor CO ₂ measure error	CO ₂ measurement error, see Error Status at address 0x1E for detailed information.	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 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.	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.

Note 1. 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.

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

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

Opening of housing

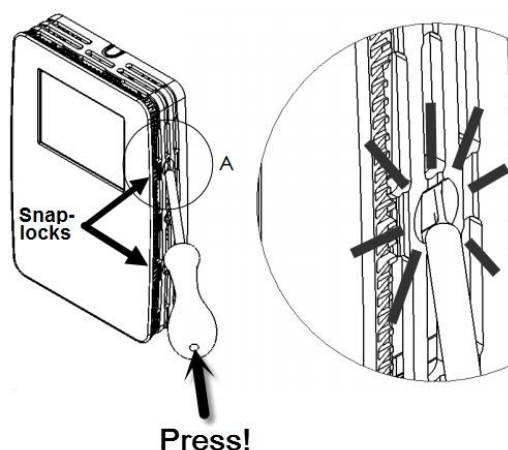


Figure 3

Maintenance

tSENSE 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 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. For change of control parameters and re-calibration (CO₂, temperature and relative humidity) this PC tool has to be used.

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

Background calibration

Press button (in hole to the right in bottom) >15s until green LED blinks twice.

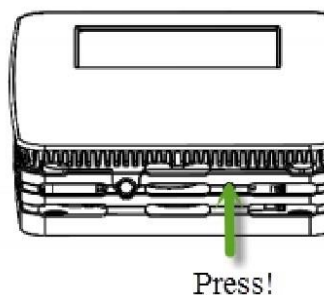


Figure 4: Background calibration button

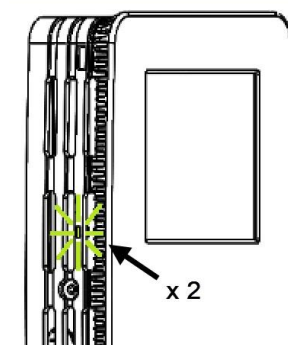


Figure 5: Background calibration LED

WARRANTY AND LIMITATION OF LIABILITY

1. SenseAir warrants that for a period of sixty (60) months following receipt by Buyer the Product supplied by SenseAir to Buyer will be, under normal use and care, free from defects in workmanship or material and to be in material conformity with SenseAir's specifications. Units returned to SenseAir for warranty repairs shall be shipped to SenseAir, at Buyer's expense, according to SenseAir's instruction. Within ninety (90) days of the receipt of product, SenseAir shall replace or repair such units and shall ship them to Buyer's designated return destination freight pre-paid.

2. Warranty Limitations. This warranty does not extend to any unit that has been subject to misuse, neglect or accident; that has been damaged by causes external to the unit; that has been used in violation of SenseAir's instructions; that has been affixed to any non-standard Accessory attachment; or that has been modified, disassembled, or reassembled by anyone other than SenseAir.

3. The retailer is not responsible for any consequential loss or damages, which may occur by reason of purchase and use of this product. The warranty is, in any event, strictly limited to the replacement/repair of the product.

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



SenseAir® AB (headquarter)

Stationsgatan 12
Box 96
820 60 Delsbo

Phone: +46-(0)653 - 71 77 70
Fax: +46-(0)653 - 71 77 89
E-mail: info@senseair.com
Web site: www.senseair.com



BACnet on *tSENSE*

Table of contents:

1.	Revision information	2
2.	General	2
3.	BACnet protocol services and object types supported	2
4.	BACnet objects	3
	Appendix A: Conformance statement	15

1. Revision information

Table 1: Document revisions

Rev.	Date:	Author	Status
1.00	Feb 21, 2014	LN/EN	

2. General

The purpose of this document is to describe implemented BACnet functionality and available BACnet objects on tSENSE. The reader of this document is assumed to have basic knowledge about the BACnet protocol. Information about BACnet can be found at www.bacnet.org.

3. BACnet protocol services and object types supported

This chapter describes protocol services and object types implemented in the sensor.

3.1. Protocol services supported

Read property

Used to read object properties. All object properties are readable.

Read property multiple

Works as “Read property” but makes it possible to read several properties in one request.

Write property

It is possible to change some properties by using “Write property”. It is only possible to write one object property at a time. Properties that can be written are marked “RW” (Read/Write) in the Object descriptions. When writing: “Present Value” to AI, AV, BI and BV objects, OOS has to be set to “true” for the object, otherwise the sensor will not accept the “write” command. OOS is always writable for these objects.

Device Communication Control (DCC)

Possibility for other devices to stop the sensor from responding to requests sent to it (no password is needed).

The sensor will only respond to “DCC enable communication” and “Reinitialize device” after receiving DCC disable.

The sensor can be returned to normal working state by sending “DCC enable”, “Reinitialize device” or by power cycling.

Reinitialize Device

By sending “Reinitialize Device” with the parameter “COLD START” the sensor will reboot itself (no password is needed).

WHO-IS

After receiving “Who-Is” the sensor will answer with “I-Am” next time it becomes the bus master. “Who-Is” can be used to identify devices connected to the network. At start-up the sensor will also send “I-Am” to make it easy to detect new sensors on the network.

3.2. Object types supported

The sensor supports following object types: Analog Input (AI), Analog Value (AV), Binary Input (BI), Binary Value (BV) and Device. Table below gives an overview of available objects.

BACnet Objects Table

Object Type	Object Identifier	Object Name	Range	BACnetEngineeringUnits	Default
Device		SenseAir BACnet transmitter	0 - 4194302		
Analog Inputs	AI-1	CO2	0 - 3000	parts-per-million (96)	
	AI-2	Temperature	0 - 50	degrees-Celsius (62)	
	AI-3	Relative humidity	0 - 100	percent-relative-humidity (29)	
	AI-4	CO2 output voltage	0 - 10	volts (5)	
	AI-5	Temp output voltage	0 - 10	volts (5)	
	AI-6	RH output voltage	0 - 10	volts (5)	
Analog Values	AV-1	MAC address	0 - 127	No units	104
	AV-2	Baud rate	9600 - 57600	No units	9600
	AV-3	ABC period	0 - 65535	hours (71)	180
	AV-4	Reserved			
	AV-5	Temperature offset	-50 - 50	degrees-Celsius (62)	0
	AV-6	RH offset	-100 - 100	percent-relative-humidity (29)	0
	AV-7	Relay setpoint	0 - 3000	parts-per-million (96)	900
	AV-8	Relay hysteresis	0 - 3000	parts-per-million (96)	100
	AV-9	CO2 output setpoint	0 - 3000	parts-per-million (96)	0
	AV-10	CO2 output pband	1 - 3000	parts-per-million (96)	2000
	AV-11	CO2 output min	0 - 10	volts (5)	0
	AV-12	CO2 output max	0 - 10	volts (5)	10
	AV-13	Temp output setpoint	0 - 50	degrees-Celsius (62)	0
	AV-14	Temp output pband	0.01 - 50	degrees-Celsius (62)	50
	AV-15	Temp output min	0 - 10	volts (5)	0
	AV-16	Temp output max	0 - 10	volts (5)	10
	AV-17	RH output setpoint	0 - 100	percent-relative-humidity (29)	0
	AV-18	RH output pband	0.01 - 100	percent-relative-humidity (29)	100
	AV-19	RH output min	0 - 10	volts (5)	0
	AV-20	RH output max	0 - 10	volts (5)	10
Binary Inputs	BI-1	Relay state	0/1	OFF/ON	
Binary Values	BV-1	ABC state	0/1	OFF/ON	

All objects are described in detail in chapter 4.

4. BACnet objects

Description of the sensors BACnet objects.

Device Object

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	Default = 669104, default Object Identifier number is Vendor Identifier number x 1000 + MAC address. Changing MAC will also change Object Identifier number. After writing desired Object Identifier number to the sensor. The Object Identifier will no longer be based on Vendor Id and MAC address.	RW
Object Name	CharacterString	Default "tSENSE 104": default Object Name is "tSENSE" followed by sensors MAC address. When changing MAC address, Object Name will also change. After writing a custom Object Name the MAC address will no longer be part of the Object Name.	RW ¹
Object Type	BACnetObjectType	Device (8)	RO
System Status	BACnetDeviceStatus	Operational (0)	RO
Vendor Name	CharacterString	"SenseAir"	RO
Vendor Identifier	Unsigned16	669	RO
Model Name	CharacterString	"tSENSE"	RO
Firmware Revision	CharacterString	"1.0"	RO
Application Software Version	CharacterString	"1.0"	RO
Location	CharacterString	"Default Location"	RW ¹
Description	CharacterString	"SenseAir BACnet transmitter"	RW ¹
Protocol Version	Unsigned	1	RO
Protocol Revision	Unsigned	12	RO
Protocol Services Supported	BACnetServicesSupported	RP, RPM, WP, DCC, RD, WHO_IS	RO
Protocol Object Types Supported	BACnetObjectTypesSupported	AI, AV, BI, BV, DEVICE	RO
Object List	BACnet ARRAY[N] of BACnetObjectIdentifier		RO
Max APDU Length Accepted	Unsigned	480	RO
Segmentation Supported	BACnetSegmentation	No-segmentation (3)	RO
APDU Timeout	Unsigned	3000	RO
Number Of APDU Retries	Unsigned	3	RO
Max Master	Unsigned	127	RW
Max Info Frames	Unsigned	1	RO
Device Address Binding	List of BACnetAddressBinding	Empty	RO
Database Revision	Unsigned	0	RO

¹ Length of character strings must be less than 32 bytes

Analog inputs

AI-1 CO2

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-input, 1	RO
Object Name	CharacterString	"AI-1"	RO
Object Type	BACnetObjectType	analog-input (0)	RO
Present Value	REAL	0 - 2000	RW
Description	CharacterString	"CO2 Level"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal	RO
Reliability	BACnetReliability	no-fault-detected(0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	parts-per-million (96)	RO

AI-2 Temperature

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-input, 2	RO
Object Name	CharacterString	"AI-2"	RO
Object Type	BACnetObjectType	analog-input (0)	RO
Present Value	REAL	0.0 - 50	RW
Description	CharacterString	"Temperature"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal	RO
Reliability	BACnetReliability	no-fault-detected(0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	degrees-Celsius (62)	RO

AI-3 Relative Humidity

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-input, 3	RO
Object Name	CharacterString	"AI-3"	RO
Object Type	BACnetObjectType	analog-input (0)	RO
Present Value	REAL	0.0 - 100.0	RW
Description	CharacterString	"Relative Humidity"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal	RO
Reliability	BACnetReliability	no-fault-detected(0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	percent-relative-humidity (29)	RO

AI-4 Out1 (CO2 output)

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-input, 4	RO
Object Name	CharacterString	"AI-4"	RO
Object Type	BACnetObjectType	analog-input (0)	RO
Present Value	REAL	0.0 – 10volt	RW
Description	Character String	"CO2 out voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	Normal	RO
Reliability	BACnetReliability	no-fault-detected(0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

AI-5 Out2 (Temp output)

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-input, 5	RO
Object Name	CharacterString	"AI-5"	RO
Object Type	BACnetObjectType	analog-input (0)	RO
Present Value	REAL	0.0 - 10V	RW
Description	CharacterString	"Temp out voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEvent State	Normal	RO
Reliability	BACnetReliability	no-fault-detected(0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	Volts (5)	RO

AI-6 Out3 (RH output)

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-input, 6	RO
Object Name	CharacterString	"AI-6"	RO
Object Type	BACnetObjectType	analog-input (0)	RO
Present Value	REAL	0.0 - 10V	RW
Description	CharacterString	"RH out voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal	RO
Reliability	BACnetReliability	no-fault-detected (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

Analog values

AV-1 MAC address

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnet ObjectIdentifier	analog-value, 1	RO
Object Name	CharacterString	"AV-1"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	Default = 104, range 0 - 127, address 0 is usually used by the BACnet router.	RW
Description	CharacterString	"MAC address"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	no-units (95)	RO

AV-2 Baud

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 2	RO
Object Name	CharacterString	"AV-2"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	Default = 9600 When writing baud only values 9600, 19200, 38400 and 57600 are accepted, writing other values will have no effect, but sensor will respond with write property ack	RW
Description	CharacterString	"Baud rate"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	no-units (95)	RO

AV-3 ABC period

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 3	RO
Object Name	CharacterString	"AV-3"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	180	RW
Description	CharacterString	"ABC period"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	hours (71)	RO

AV-4 Reserved

AV-5 Temp offset

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 5	RO
Object Name	CharacterString	"AV-5"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0	RW
Description	CharacterString	"Temp offset"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	degrees-Celsius (62)	RO

AV-6 RH offset

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 6	RO
Object Name	CharacterString	"AV-6"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0	RW
Description	CharacterString	"RH offset"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	percent-relative-humidity (29)	RO

AV-7 Relay CO2 setpoint

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 7	RO
Object Name	CharacterString	"AV-7"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	900	RW
Description	CharacterString	"Relay CO2 setpoint"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	parts-per-million (96)	RO

AV-8 Relay CO2 hysteresis

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 8	RO
Object Name	CharacterString	"AV-8"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	100	RW
Description	CharacterString	"Relay CO2 hysteresis"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	parts-per-million (96)	RO

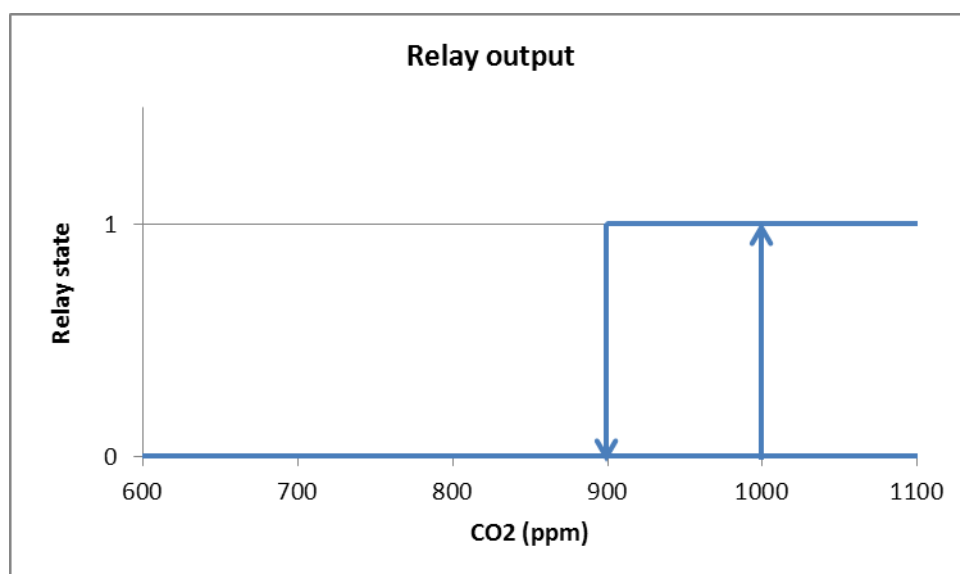


Figure 1, Relay output configured with setpoint = 900 and hysteresis = 100

AV-9 CO2 output RDB (regulator deadband)

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 9	RO
Object Name	CharacterString	"AV-9"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0	RW
Description	CharacterString	"CO2 output setpoint"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	parts-per-million (96)	RO

AV-10 CO2 output PRC (proportional regulator gain constant)

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 10	RO
Object Name	CharacterString	"AV-10"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	2000	RW
Description	CharacterString	"CO2 output prop gain"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	parts-per-million (96)	RO

AV-11 CO2 output min voltage

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 11	RO
Object Name	CharacterString	"AV-11"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0	RW
Description	CharacterString	"CO2 output min voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

AV-12 CO2 output max voltage

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 12	RO
Object Name	CharacterString	"AV-12"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	10.0	RW
Description	CharacterString	"CO2 output max voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

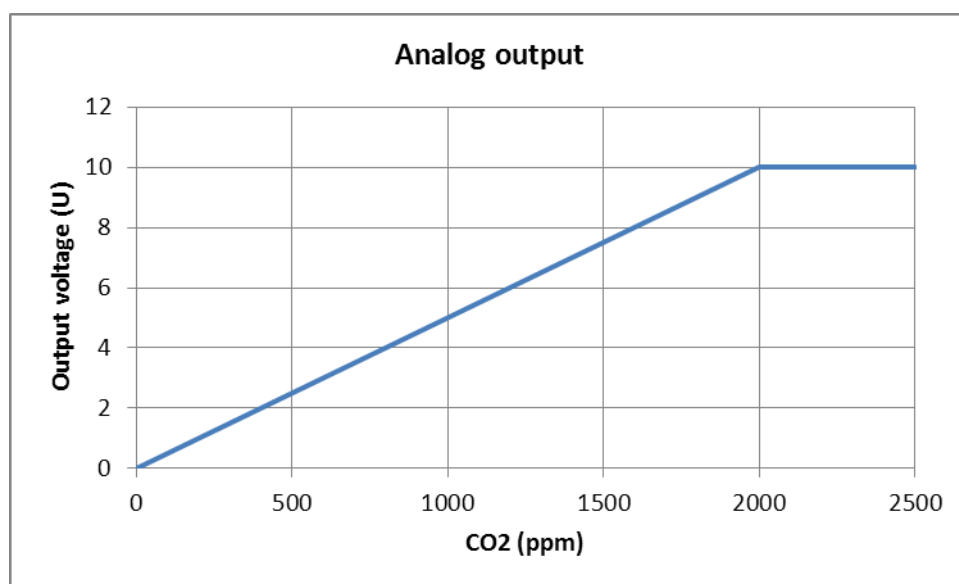


Figure 2, Out1 configured with RDB = 0, PRC = 2000, min voltage = 0 and max voltage = 10

AV-13 Temperature output RDB

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 13	RO
Object Name	CharacterString	"AV-13"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0	RW
Description	CharacterString	"Temp output setpoint"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	degrees-Celsius (62)	RO

AV-14 Temperature output PRC

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 14	RO
Object Name	CharacterString	"AV-14"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	50	RW
Description	CharacterString	"Temp output prop gain"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	degrees-Celsius (62)	RO

AV-15 Temperature output min voltage

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 15	RO
Object Name	CharacterString	"AV-15"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0	RW
Description	CharacterString	"Temp output min voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

AV-16 Temperature output max voltage

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 16	RO
Object Name	CharacterString	"AV-16"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	10.0	RW
Description	CharacterString	"Temp output max voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

AV-17 RH output RDB

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 17	RO
Object Name	CharacterString	"AV-17"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0.0	RW
Description	CharacterString	"RH output setpoint"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	percent-relative-humidity (29)	RO

AV-18 RH output PRC

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 18	RO
Object Name	CharacterString	"AV-18"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	50.0	RW
Description	CharacterString	"RH output prop gain"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	percent-relative-humidity (29)	RO

AV-19 RH min voltage

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 19	RO
Object Name	CharacterString	"AV-19"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	0.0	RW
Description	CharacterString	"RH output min voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

AV-20 RH max voltage

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	analog-value, 20	RO
Object Name	CharacterString	"AV-20"	RO
Object Type	BACnetObjectType	analog-value (2)	RO
Present Value	REAL	10.0	RW
Description	CharacterString	"RH output max voltage"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Units	BACnetEngineeringUnits	volts (5)	RO

Binary input

BI-1 Relay state

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	binary-input, 1	RO
Object Name	CharacterString	"BI-1"	RO
Object Type	BACnetObjectType	binary-input (3)	RO
Present Value	BACnetBinaryPV	See figure 1	RW
Description	CharacterString	"Relay CO2 output"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW
Polarity	BACnetPolarity	normal (0)	RO

Binary values

BV-1 ABC state (on/off)

Property	Property data type	Comment/Default value	Read/Write
Object Identifier	BACnetObjectIdentifier	binary-value, 1	RO
Object Name	CharacterString	"BV-1"	RO
Object Type	BACnetObjectType	binary-value (5)	RO
Present Value	BACnetBinaryPV	active (1)	RW
Description	CharacterString	"ABC state"	RO
Status Flags	BACnetStatusFlags	FFFF	RO
Event State	BACnetEventState	normal (0)	RO
Out Of Service	BOOLEAN	FALSE	RW

Appendix A: Conformance statement

Vendor Name: SenseAir

Product Name: tSENSE

Product Model Number: -

Application Software Version:

Firmware Revision:

BACnet Protocol Revision: 12

Product description: CO2, Temperature and Humidity sensor

BACnet Standardized Device Profile:
BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported:
DS-RP-B, DS-RPM-B, DS-WP-B, DM-DDB-B, DM-DCC-B

Standard Object Type Supported:
See object table, no proprietary objects or properties.

Data Link Layer Options: MS/TP master, baud rates: 9600, 19200, 38400, 57600

Device address binding: Static device binding not supported (no client functionality)

Character Sets Supported: ANSI X3.4

The product and product specification are subject to change without notice. Contact SenseAir to confirm that the information in this product description is up to date.

SenseAir® AB

Box 96
Stationsgatan 12
SE- 82060 Delsbo
Sweden

Phone: +46(0)653 - 71 77 70
Fax: +46(0)653 - 71 77 89
E-mail: info@senseair.com
Web page: www.senseair.com

SenseAir® North America Inc.

29030 SW Town Center Loop East
Suite 202 - #169
Wilsonville, OR 97070
USA

Phone: +1-520-349-7686
E-mail: infoamerica@senseair.com
Web page: www.senseair.com

SenseAir® Chengdu Gas Sensors Co. Ltd

The first floor of No. 8, Xingke, South Road
Jiniu Hi-Tech, Industrial Park
Post code 610036
Chengdu, China

Phone: +86-028 - 875 928 85
Fax: +86-028 - 875 923 37
E-mail: info@senseair.asia
Web page: www.senseair.asia