# AMUN 716 KNX Room Air Sensor
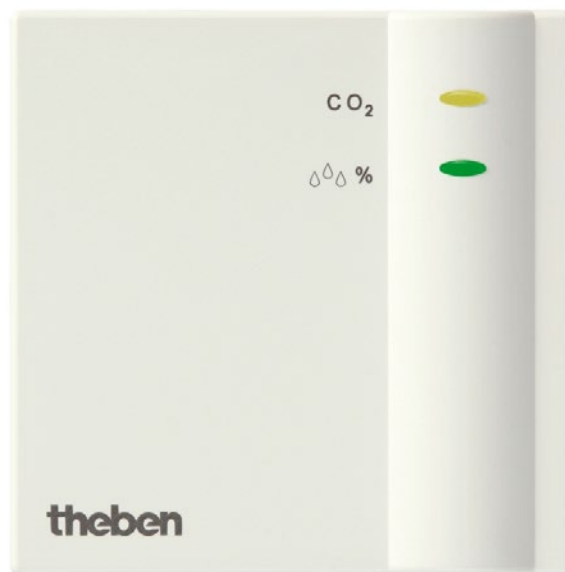


| AMUN 716 KNX | 716 9 200 |

# Contents

# 1　Functional characteristics

Amun 716 is a combined sensor for $CO_2$, temperature and humidity measurement (relative humidity).

It is designed to monitor air quality in conference/meeting rooms, offices, schools/ kindergartens, passive or low energy houses and living rooms without controlled ventilation.

## 1.1　Operation

The device does not have to be operated manually.

The LED and the switch for the physical address are accessible when cover is removed. If necessary, the switch can be reached with a thin screwdriver via the upper ventilation slot.

**CAUTION: Do not drop the device!**
Severe shocks reduce the accuracy of the highly sensitive CO2 sensor.

## 1.2　Benefits

- Combined measurement of temperature, humidity and CO2 content in one device.
- Power supply via bus connection, no mains power required.

# 2 Technical data

## 2.1 Technical data

| | |
|---|---|
| Power supply: | Bus voltage |
| Permitted operating temperature: | 0 °C ... + 45°C |
| Current draw from bus voltage: | Max. 12 mA |
| Bus connection: | via bus terminal |
| Protection class: | III in accordance with EN 60730-1 |
| Protection rating: | IP 20 in accordance with EN 60529 |
| Dimensions of device: | LxWxH 74 x 74 x 30,8 (mm) |

**Measuring ranges:**

| | |
|---|---|
| $CO_2$ | 300 – 9999 ppm |
| Humidity: | 1 – 100 % |
| Temperature: | 0 – 40 °C |

**Accuracy:**

| | |
|---|---|
| CO2 | 300-1000 ppm: +/- 120 ppm<br>1000-2000 ppm: +/- 250 ppm<br>2000-5000 ppm: +/- 300 ppm |
| Humidity: | +/- 5 % |
| Temperature: | +/- 1 °C (depending on installation) |

# 3 Amun 716 V1.0 application program

## 3.1 Selection in the product database

| Manufacturer | THEBEN AG |
|---|---|
| **Product family** | Phys. sensors |
| **Product type** | Room air sensor |
| **Program name** | *Amun 716 CO2; Amun V17 relative humidity and temperature* |

The ETS database can be found on our download page: http://www.theben.de

**Table 1**

| Number of communication objects: | 27 |
|---|---|
| Number of group addresses: | 128 |
| Number of associations: | 128 |

## 3.2  Communication objects

**Table 2: Overview**

| No. | Function | Object name | Type & DPT | K | L | S | T |
|-----|----------|-------------|------------|---|---|---|---|
| 0 | Physical value | $CO_2$ value | 2 byte 9.008 | ✓ | ✓ | | ✓ |
| 1 | Physical value | relative humidity | 1 byte 5.001 | ✓ | ✓ | | ✓ |
| 2 | Physical value | Temperature value | 2 byte 9.001 | ✓ | ✓ | | ✓ |
| 3 | Switching | | 1 bit 1.001 | | | | |
| | Valuator | $CO_2$ threshold 1 | 1 byte 5.001 5.010 | ✓ | ✓ | | ✓ |
| | Priority | | 2 bit 2.001 | | | | |
| 4 | input | Lock $CO_2$ threshold 1 | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 5 | Switching | | 1 bit 1.001 | | | | |
| | Valuator | $CO_2$ threshold 2 | 1 byte 5.001 5.010 | ✓ | ✓ | | ✓ |
| | Priority | | 2 bit 2.001 | | | | |
| 6 | input | Lock $CO_2$ threshold 2 | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 7 | Switching | | 1 bit 1.001 | | | | |
| | Valuator | $CO_2$ threshold 3 | 1 byte 5.001 5.010 | ✓ | ✓ | | ✓ |
| | Priority | | 2 bit 2.001 | | | | |
| 8 | input | Lock $CO_2$ threshold 3 | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 9 | Value for ventilation actuator | Ventilation of $CO_2$ | 5.001 | ✓ | ✓ | | ✓ |
| 10 | input | Lock ventilation of $CO_2$ | 1 bit 1.001 | ✓ | ✓ | ✓ | ✓ |
| | | | | K | L | S | T |

Continuation:

| No. | Function | Object name | Type & DPT | Flags | | | |
|---|---|---|---|---|---|---|---|
| | | | | K | L | S | T |
| 11 | Scene control | $CO_2$ scenes | 1 byte 18.001 | ✓ | ✓ | | ✓ |
| 12 | input | Lock $CO_2$ scenes | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 13 | switch | Humidity threshold 1 | 1 bit 1.001 | ✓ | ✓ | | ✓ |
| | Valuator | | 1 byte 5.001 5.010 | | | | |
| | Priority | | 2 bit 2.001 | | | | |
| 14 | input | Lock humidity threshold 1 | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 15 | switch | Humidity threshold 2 | 1 bit 1.001 | ✓ | ✓ | | ✓ |
| | Valuator | | 1 byte 5.001 5.010 | | | | |
| | Priority | | 2 bit 2.001 | | | | |
| 16 | input | Lock humidity threshold 2 | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 17 | switch | Humidity threshold 3 | 1 bit 1.001 | ✓ | ✓ | | ✓ |
| | Valuator | | 1 byte 5.001 5.010 | | | | |
| | Priority | | 2 bit 2.001 | | | | |
| 18 | input | Lock humidity threshold 3 | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 19 | Value for ventilation actuator | Ventilating relative humidity | 1-byte 5.001 5.010 | ✓ | ✓ | | ✓ |
| 20 | input | Lock ventilating relative humidity | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 21 | Scene control | Relative humidity scenes | 1 byte 18.001 | ✓ | ✓ | | ✓ |
| 22 | input | Lock relative humidity scenes | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| | | | | K | L | S | T |

Continuation:

| No. | Function | | Object name | Type & DPT | Flags | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | K | L | S | T |
| 23 | switch | | Temperature threshold | 1 bit 1.001 | ✓ | ✓ | | ✓ |
| | Valuator | | | 1 byte 5.001 5.010 | | | | |
| | Priority | | | 2 bit 2.001 | | | | |
| 24 | input | | Lock temperature threshold | 1 bit 1.001 | ✓ | ✓ | ✓ | |
| 25 | Value for ventilation actuator | | highest active ventilation value | 1 byte 5.010 | ✓ | ✓ | | ✓ |
| 26 | Switching On/Off | | LEDs for CO2 and humidity | 1 bit 1.001 | ✓ | | ✓ | |
| | | | | | K | L | S | T |

Table 3: Communication flags

| Flag | Name | Application |
|---|---|---|
| C | Communication | Object can communicate |
| R | Read | Object status can be viewed (ETS / display etc.) |
| W | Write | Object can receive |
| T | Transmit | Object can send |

### 3.2.1 Description of objects

- **Object 0 "*$CO_2$ value*"**

This object sends the $CO_2$ content
measured by the sensor (if sending via configuration is permitted).

- **Object 1 "*relative humidity value*"**

This object sends the current relative humidity
measured by the sensor (if sending via configuration is permitted).

- **Object 2 "*Temperature value*"**

This object sends the temperature
currently being measured by the sensor (if sending via configuration is permitted).

- **Object 3 "*Threshold 1 $CO_2$*"**

Output object for the first $CO_2$ threshold.
See Overview table.

- **Object 4 "*Lock threshold 1 $CO_2$* "**

Lock object for the first $CO_2$ threshold.

- **Object 5 "*Threshold 2 $CO_2$*"**

Output object for the second $CO_2$ threshold.
See Overview table.

- **Object 6 "*Lock threshold 2 $CO_2$* "**

Lock object for the second $CO_2$ threshold.

- **Object 7 "*Threshold 3 $CO_2$*"**

Output object for the third $CO_2$ threshold.
See Overview table.

- **Object 8 "*Lock threshold 3 $CO_2$ "***

Lock object for the third $CO_2$ threshold.

- **Object 9 "*Ventilation of $CO_2$***"

Actuating value for ventilation actuator (1 byte telegram).
This object is used if ventilation is only to be activated by the $CO_2$ content, such as in conference rooms.
Important: The configuration of the input as a percentage value or as number from 0 to 255 is irrelevant for the ventilation actuator.

- **Object 10 "*Lock $CO_2$ ventilation***"

Lock object for $CO_2$ dependent ventilation
1 = Lock
0 = Enable

- **Object 11 "*CO₂scenes*"**

Transmits the $CO_2$ dependent scene retrieval code

**Table 4**

| Scene no. | Retrieval code | | Scene no. | Retrieval code | |
|---|---|---|---|---|---|
| | Hex | Dec | | Hex | Dec |
| 1 | $00 | 0 | 33 | $20 | 32 |
| 2 | $01 | 1 | 34 | $21 | 33 |
| 3 | $02 | 2 | 35 | $22 | 34 |
| 4 | $03 | 3 | 36 | $23 | 35 |
| 5 | $04 | 4 | 37 | $24 | 36 |
| 6 | $05 | 5 | 38 | $25 | 37 |
| 7 | $06 | 6 | 39 | $26 | 38 |
| 8 | $07 | 7 | 40 | $27 | 39 |
| 9 | $08 | 8 | 41 | $28 | 40 |
| 10 | $09 | 9 | 42 | $29 | 41 |
| 11 | $0A | 10 | 43 | $2A | 42 |
| 12 | $0B | 11 | 44 | $2B | 43 |
| 13 | $0C | 12 | 45 | $2C | 44 |
| 14 | $0D | 13 | 46 | $2D | 45 |
| 15 | $0E | 14 | 47 | $2E | 46 |
| 16 | $0F | 15 | 48 | $2F | 47 |
| 17 | $10 | 16 | 49 | $30 | 48 |
| 18 | $11 | 17 | 50 | $31 | 49 |
| 19 | $12 | 18 | 51 | $32 | 50 |
| 20 | $13 | 19 | 52 | $33 | 51 |
| 21 | $14 | 20 | 53 | $34 | 52 |
| 22 | $15 | 21 | 54 | $35 | 53 |
| 23 | $16 | 22 | 55 | $36 | 54 |
| 24 | $17 | 23 | 56 | $37 | 55 |
| 25 | $18 | 24 | 57 | $38 | 56 |
| 26 | $19 | 25 | 58 | $39 | 57 |
| 27 | $1A | 26 | 59 | $3A | 58 |
| 28 | $1B | 27 | 60 | $3B | 59 |
| 29 | $1C | 28 | 61 | $3C | 60 |
| 30 | $1D | 29 | 62 | $3D | 61 |
| 31 | $1E | 30 | 63 | $3E | 62 |
| 32 | $1F | 31 | 64 | $3F | 63 |

- **Object 12 "*Lock CO₂ vent*"**

Lock object for the $CO_2$ scenes.
1 = Lock
0 = Enable

- **Object 13 "*Humidity threshold 1*"**

Output object for the first humidity threshold.
See Overview table.

- **Object 14 "*Lock humidity threshold 1*"**

Lock object for the first $CO_2$ humidity threshold.

- **Object 15 "*Humidity threshold 2*"**

Output object for the second humidity threshold.
See Overview table.

- **Object 16 "*Lock humidity threshold 2*"**

Lock object for the second $CO_2$ humidity threshold.

- **Object 17 "*Humidity threshold 3*"**

Output object for the third humidity threshold.
See Overview table.

- **Object 18 "*Lock humidity threshold 3*"**

Lock object for the third $CO_2$ humidity threshold.

- **Object 19 "Ventilating relative humidity"**

Actuating value for ventilation actuator (1 byte telegram).
This object is used if ventilation is only to be activated by the relative humidity, such as in a conservatory.

Important: The configuration of the input as a percentage value or as number from 0 to 255 is irrelevant for the ventilation actuator.

- **Object 20 "Lock ventilating relative humidity"**

Lock object for humidity dependent ventilation
1 = Lock
0 = Enable

- **Object 21 "*Relative humidity scenes*"**

Sends the humidity dependent scene retrieval code .
See above, Table 4.

- **Object 22 "*Lock relative humidity scenes*"**

Lock object for the humidity scenes.
1 = Lock
0 = Enable

- **Object 23 "*Temperature threshold*""**

Output object for the temperature threshold.
See Overview table.

- **Object 24 "Lock temperature threshold""**

Lock object for humidity dependent ventilation
1 = Lock
0 = Enable

- **Object 25 "Highest active ventilation value"**

Actuating value for ventilation actuator (1 byte telegram).
This object is used if ventilation is to be activated by $CO_2$ content
and relative humidity.

The actuating values of object 9 and object 19 are monitored and the highest actuating is
always sent.

Important: The configuration of the input as a percentage value or as number from 0 to 255 is
irrelevant for the ventilation actuator.

- **Object 26 "LEDs for CO2 and humidity"**

Activates or deactivates the LEDs to display the $CO_2$ and humidity thresholds.
This option is applied on the *Measured values* parameter page.

0 = Switch LEDs off completely
1 = Operate LEDs.

## *3.3  Parameters*

### 3.3.1  Overview

**Table 5**

| Name | Description |
|---|---|
| *Measured values* | Settings for sending $CO_2$ content, relative humidity and temperature |
| *CO $_2$ thresholds* | Setting the 3 $CO_2$ thresholds |
| *Thresholds 1, 2, 3 $CO_2$* | Setting of response to exceeding or not reaching the relevant $CO_2$ threshold. |
| *Ventilating $CO_2$* | Setting of ventilation speed depending on $CO_2$ content |
| *CO$_2$ scenes* | Setting of scene numbers to be sent depending on $CO_2$ content |
| *Humidity thresholds* | Setting of the 3 humidity thresholds |
| *Humidity thresholds 1, 2, 3* | Setting of response to exceeding or not reaching the relevant humidity threshold. |
| *Ventilating humidity* | Setting of ventilation speed depending on relative humidity |
| *Humidity scenes* | Setting of scene numbers to be sent depending on relative humidity |
| *Temperature threshold* | Setting of temperature threshold and reaction to exceeding or under-running. |

### 3.3.2 The Measured values *parameter page*

**Table 6**

| Designation | Values | Application |
|---|---|---|
| $CO_2$ content sends on change in | *not due to a change* | only send cyclically (if enabled) |
| | *100 ppm*<br>*200 ppm*<br>*300 ppm*<br>*500 ppm* | Send if the value has changed since the last transmission by the selected amount |
| Send $CO_2$ content cyclically | *do not send cyclically*<br>*every minute*<br>*every 2 minutes*<br>*every 3 minutes*<br>*…*<br>*every 30 minutes*<br>*every 45 minutes*<br>*every 60 minutes* | How often should the current measured value be resent? |
| Send humidity value in the event of a change in … | *not due to a change* | only send cyclically (if enabled) |
| | *2 %*<br>*3 %*<br>*5 %*<br>*10%* | Send if the value has changed since the last transmission by the selected amount |
| Send humidity value cyclically | *do not send cyclically*<br>*every minute*<br>*every 2 minutes*<br>*every 3 minutes*<br>*…*<br>*every 30 minutes*<br>*every 45 minutes*<br>*every 60 minutes* | How often should the current measured value be resent? |
| LEDs for CO2 and humidity | *always off* | The LEDs are not used |
| | *always on* | The LEDs display the current thresholds. |
| | *switchable via object 26* | If necessary, the LEDs can be activated or switched off via a switching command to object 26. Typical application: Switch LEDs off overnight with a timer. |
| Transmit temperature in the event of change of | *not due to a change* | only send cyclically (if enabled) |
| | *0.5 °C, 1.0 °C*<br>*1.5 °C, 2.0 °C*<br>*2.5 °C* | Send if the value has changed since the last transmission by the selected amount |

Continuation:

| Designation | Values | Application |
|---|---|---|
| *Send temperature cyclically* | *do not send cyclically*<br>*every minute*<br>*every 2 minutes*<br>*every 3 minutes*<br>*…*<br>*every 30 minutes*<br>*every 45 minutes*<br>*every 60 minutes* | At what time interval are the cyclic telegrams to be sent again? |
| *Temperature calibration in 0.1°C stages (-64..64)* | manual input: - 64 .. 64 | Adjustment to temperature measurement if sent temperature deviates from actual temperature.<br>Example: Temperature = 20°C<br>sent temperature = 21°C<br>Adjustment value<br>= 10 (i.e. 10 x 0.1°C) |

### 3.3.3 The *$CO_2$* threshold parameter page

**Essential condition for setting thresholds:**
*Threshold 1* must always be smaller then threshold 2 and *threshold 2* smaller than *threshold 3*.

**Table 7**

| Designation | Values | Application |
|---|---|---|
| $CO_2$ threshold 1<br>(in 10 ppm) | manual input: 50 .. 255 | Input of first $CO_2$ threshold value in 10 ppm.<br>**Example:**<br>**50 is equivalent to 500 ppm** |
| Hysteresis | *100 ppm*<br>*200 ppm*<br>*300 ppm*<br>*500 ppm* | The hysteresis prevents frequent switching after small changes in measured values.<br>See accessories: Hysteresis |
| $CO_2$ threshold 2<br>(in 10 ppm) | manual input: 50 .. 255 | Input of second $CO_2$ threshold |
| Hysteresis | see above | see above |
| $CO_2$ threshold 3<br>(in 10 ppm) | manual input: 50 .. 255 | Input of third $CO_2$ threshold |

### 3.3.4  The *1, 2, 3 CO$_2$* thresholds parameter pages

The parameters are identical for all three CO$_2$ thresholds.
Threshold 1 is given as an example.

**Table 8**

| Designation | Values | Application |
|---|---|---|
| Telegram type for CO$_2$ threshold 1 | *Switching command* | The threshold sends: Switching telegrams |
| | *Priority* | Priority telegrams |
| | *Value as percentage* | A percentage value **Important:** See appendix [Fan control](#) |
| | *Value from 0 to 255* | Any desired value between 0 and 255 |
| If CO$_2$ threshold 1 is exceeded | *no telegram* *send following telegram once* *send cyclically* | Response to exceeding threshold |
| Telegram | | What is sent if the threshold is exceeded or under-run? The parameter values depend on the the type of telegram selected: |
| | *Switch-on command* *Switch-off command* | With *switching command* |
| | *no priority* *OFF (up)* *ON (down)* | With *priority* |
| | *0%, 5%, 10%, 15%, 20%, 25%* *30%, 35%, 40%, 45%, 50%* *55%, 60%, 65%, 70%, 75%* *80%, 85%, 90%, 95%, 100%* | With *percentage value* |
| | manual input: 0 .. 255 | With *Value from 0 to 255* |
| If CO$_2$ threshold 1 is under-run | *no telegram* *send following telegram once* *send cyclically* | Response to under-running threshold |
| Telegram | see above | see above |
| Cycle time for CO$_2$ threshold 1 (if available) | *every minute, every 2 minutes* *every 3 minutes, every 5 minutes* *every 10 minutes, every 15 minutes* *every 20 minutes, every 30 minutes* *every 45 minutes, every 60 minutes* | At what time interval are the cyclic telegrams to be sent again? |

Continuation:

| Designation | Values | Application |
|---|---|---|
| Behaviour when setting the lock | *Ignore lock* | This threshold cannot be locked |
| | *do not send* | The threshold will not send as long as the lock object is set |
| | *as with under-run threshold* | When setting the lock object, the threshold sends the same telegram as with threshold under-run. |
| | *as with exceeded threshold* | When setting the lock object, the threshold sends the same telegram as with exceeding the threshold. |
| Behaviour when cancelling the lock | *do not send* | no reaction |
| | *update* | send current status |

### 3.3.5 The *ventilation CO$_2$threshold* parameter page

**Table 9**

| Designation | Values | Application |
|---|---|---|
| *Send given value:* | *(Input as number from 0 to 255)* *(Input as percentage)* | Input format for fan control. This setting is not relevant for the actuator. |
| *if CO$_2$ smaller threshold 1* | manual input 0..255 or 0..100 % | Setting of desired ventilation speeds depending on CO$_2$ content. |
| *if CO$_2$ between threshold 1 and 2* | manual input 0..255 or 0..100 % | |
| *if CO$_2$ between threshold 2 and 3* | manual input 0..255 or 0..100 % | |
| *if CO$_2$ greater threshold 3* | manual input 0..255 or 0..100 % | |
| *Behaviour when setting the lock* | *Ignore lock* *do not send* *send following value* | This threshold cannot be locked The threshold will not send as long as the lock object is set Send a value when setting lock object. |
| *Value if locked* | *0%, 5%, 10%, 15%, 20%, 25% 30%, 35%, 40%, 45%, 50% 55%, 60%, 65%, 70%, 75% 80%, 85%, 90%, 95%, 100%* | Value to be sent when the lock object is set |
| *Behaviour when cancelling the lock* | *do not send* *update* | no reaction send current fan actuating value |

### 3.3.6 The *CO$_2$scenes* parameter page

Send given scene if:

**Table 10:**

| Designation | Values | Application |
|---|---|---|
| *CO$_2$ smaller threshold 1* | *Scene 1 .. scene 64* | Setting of scene numbers to be sent depending on CO$_2$ content. |
| *CO$_2$ between threshold 1 and 2* | *Scene 1 .. scene 64* | |
| *CO$_2$ between threshold 2 and 3* | *Scene 1 .. scene 64* | |
| *CO$_2$ greater threshold 3* | *Scene 1 .. scene 64* | |
| *Behaviour when setting the lock* | *Ignore lock* | The scene object cannot be locked |
| | *do not send* | The scene object will not send as long as the lock object is set |
| | *send scene* | Send a value when setting lock object. |
| *scene if locked* | *Scene 1 .. scene 64* | Scene to be sent when the lock object is set |
| *Behaviour when cancelling the lock* | *do not send* <br> *update* | no reaction <br> send current scene |

### 3.3.7  The humidity threshold  *parameter page*

**Essential condition for setting thresholds:**
*Threshold 1* must always be smaller then threshold 2 and *threshold 2* smaller than *threshold 3*.

**Table 11**

| Designation | Values | Application |
|---|---|---|
| *Relative humidity threshold 1 (in %)* | Manual input 0 ..0.100 | Input of the first humidity threshold value in percent. |
| *Hysteresis* | *1 %, 2 %, 3 %* <br> *5 %, 7 %, 10 %* | The hysteresis prevents frequent switching after small changes in measured values. See accessories: Hysteresis |
| *Relative humidity threshold 2 (in %)* | Manual input 0 ..0.100 | Input of the second humidity threshold value in percent. |
| *Hysteresis* | *1 %, 2 %, 3 %* <br> *5 %, 7 %, 10 %* | see above. |
| *Relative humidity threshold 3 (in %)* | Manual input 0 ..0.100 | Input of the third humidity threshold value in percent. |
| *Hysteresis* | *1 %, 2 %, 3 %* <br> *5 %, 7 %, 10 %* | see above. |

### 3.3.8  The *1, 2, 3 humidity* thresholds parameter pages

**Table 12**

| Designation | Values | Application |
|---|---|---|
| Telegram type for humidity threshold 1 | *Switching command*<br><br>*Priority*<br><br>*Value as percentage*<br><br><br><br>*Value from 0 to 255* | The threshold sends:<br>Switching telegrams<br><br>Priority telegrams<br><br>A percentage value<br>**Important:** See appendix<br>Fan control<br><br>Any value<br>between 0 and 255 |
| If humidity threshold 1 is exceeded | *no telegram*<br>*send following telegram once*<br>*send cyclically* | Response to exceeding threshold |
| Telegram | <br><br><br><br><br><br>*Switch-on command*<br>*Switch-off command* | What is sent if the threshold is exceeded or under-run?<br>The parameter values depend on the type of telegram selected:<br>With *switching command* |
| | *no priority*<br> *OFF (up)*<br> *ON (down)* | With *priority* |
| | *0%, 5%, 10%, 15%, 20%, 25%*<br>*30%, 35%, 40%, 45%, 50%*<br>*55%, 60%, 65%, 70%, 75%*<br>*80%, 85%, 90%, 95%, 100%* | With *percentage value* |
| | manual input: 0 .. 255 | With *Value from 0 to 255* |
| If humidity threshold 1 is under-run | *no telegram*<br>*send following telegram once*<br>*send cyclically* | Response to under-running threshold |
| Telegram | see above | see above |
| Cycle time for humidity threshold 1 (if available) | *every minute, every 2 minutes*<br>*every 3 minutes, every 5 minutes*<br>*every 10 minutes, every 15 minutes*<br>*every 20 minutes, every 30 minutes*<br>*every 45 minutes, every 60 minutes* | At what time interval are the cyclic telegrams to be sent again? |

Continuation:

| Designation | Values | Application |
|---|---|---|
| Behaviour when setting the lock | *Ignore lock* | This threshold cannot be locked |
| | *do not send* | The threshold will not send as long as the lock object is set |
| | *as with under-run threshold* | When setting the lock object, the threshold sends the same telegram as with threshold under-run. |
| | *as with exceeded threshold* | When setting the lock object, the threshold sends the same telegram as with exceeding the threshold. |
| Behaviour when cancelling the lock | *do not send* | no reaction |
| | *update* | send current status |

### 3.3.9 The Humidity ventilation *parameter page*

**Table 13**

| Designation | Values | Application |
|---|---|---|
| *Send given value:* | *(Input as number from 0 to 255)* *(Input as percentage)* | Input format for fan control. This setting is not relevant for the actuator. |
| *if relative humidity is less than threshold 1* | manual input 0..255 or 0..100 % | Ventilation speeds depending on relative humidity |
| *if relative humidity between thresholds 1 and 2* | manual input 0..255 or 0..100 % | |
| *if relative humidity between thresholds 2 and 3* | manual input 0..255 or 0..100 % | |
| *if relative humidity is greater than threshold 3* | manual input 0..255 or 0..100 % | |
| *Behaviour when setting the lock* | *Ignore lock* | This threshold cannot be locked |
| | *do not send* | The threshold will not send as long as the lock object is set |
| | *send following value* | Send a value when setting lock object. |
| *Value if locked* | *0%, 5%, 10%, 15%, 20%, 25% 30%, 35%, 40%, 45%, 50% 55%, 60%, 65%, 70%, 75% 80%, 85%, 90%, 95%, 100%* | Value to be sent when the lock object is set |
| *Behaviour when cancelling the lock* | *do not send* *update* | no reaction send current fan actuating value |

### 3.3.10      The Relative humidity scenes*parameter page*

Send given scene if:

**Table 14:**

| Designation | Values | Application |
|---|---|---|
| *relative humidity is less than threshold 1* | *Scene 1 .. scene 64* | Setting of scene numbers to be sent depending on relative humidity |
| *relative humidity between thresholds 1 and 2* | *Scene 1 .. scene 64* | |
| *relative humidity between thresholds 2 and 3* | *Scene 1 .. scene 64* | |
| *relative humidity is greater than threshold 3* | *Scene 1 .. scene 64* | |
| *Behaviour when setting the lock* | *Ignore lock* | The scene object cannot be locked |
| | *do not send* | The scene object will not send as long as the lock object is set |
| | *send scene* | Send a value when setting lock object. |
| *scene if locked* | *Scene 1 .. scene 64* | Scene to be sent when the lock object is set |
| *Behaviour when cancelling the lock* | *do not send* | no reaction |
| | *update* | send current scene |

### 3.3.11 Temperature threshold *parameter page*

| Designation | Values | Application |
|---|---|---|
| Temperature threshold | 1 °C ... 40 °C<br>Default value = 15 °C | Input of desired temperature threshold in °C |
| Hysteresis | 1.0 °C, 1.5 °C<br>2.0 °C, 2.5 °C | The hysteresis prevents frequent switching after small temperature changes.<br>See accessories: Hysteresis |
| Telegram type for temperature threshold | *Switching command*<br>*Priority*<br>*Value as percentage*<br>*Value from 0 to 255* | The threshold sends:<br>Switching telegrams<br>Priority telegrams<br>Any percentage value<br>Any value<br>between 0 and 255 |
| If temperature threshold is under-run | *no telegram*<br>*send following telegram once*<br>*send cyclically* | Response to exceeding threshold |
| Telegram | | What is sent if the threshold is exceeded or under-run?<br>The parameter values depend on the type of telegram selected: |
| | *Switch-on command*<br>*Switch-off command* | With *switching command* |
| | *no priority*<br> *OFF (up)*<br> *ON (down)* | With *priority* |
| | *0%, 5%, 10%, 15%, 20%, 25%*<br>*30%, 35%, 40%, 45%, 50%*<br>*55%, 60%, 65%, 70%, 75%*<br>*80%, 85%, 90%, 95%, 100%* | With *percentage value* |
| | manual input: 0 .. 255 | With *Value from 0 to 255* |
| If temperature threshold under-run | *no telegram*<br>*send following telegram once*<br>*send cyclically* | Response to under-running threshold |
| Telegram | see above | see above |
| Cycle time for temperature threshold<br>(if available) | *every minute, every 2 minutes*<br>*every 3 minutes, every 5 minutes*<br>*every 10 minutes, every 15 minutes*<br>*every 20 minutes, every 30 minutes*<br>*every 45 minutes, every 60 minutes* | At what time interval are the cyclic telegrams to be sent again? |

Continuation:

| Designation | Values | Application |
|---|---|---|
| Behaviour when setting the lock | *Ignore lock* | This threshold cannot be locked |
| | *do not send* | The threshold will not send as long as the lock object is set |
| | *as with under-run threshold* | When setting the lock object, the threshold sends the same telegram as with threshold under-run. |
| | *as with exceeded threshold* | When setting the lock object, the threshold sends the same telegram as with exceeding the threshold. |
| Behaviour when cancelling the lock | *do not send* | no reaction |
| | *update* | send current status |

theben

# 4 Typical applications:

## 4.1 Control of air quality via CO$_2$ dependent ventilation

A fan will provide fresh air if the CO$_2$ content exceeds the set thresholds.

### 4.1.1 Devices

- Amun 716 KNX (716 9 200)
- FCA 1 (492 0 200)

### 4.1.2 Overview



Obj. 9 ————————————→ Obj. 0

**Figure 1**

### 4.1.3 Objects and links

**Table 15**

| No. | Amun 716 KNX Object name | No. | FCA 1 Object name | Comments |
|---|---|---|---|---|
| 9 | *CO2 ventilation* | 0 | *Actuating value for fan* | Ventilation control depending on CO$_2$ content. |

## 4.1.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

**Amun 716**

The standard values can be used here.
The desired ventilation speeds are set on the *CO2 ventilation* parameter page. See accessories:
Fan control.

**Table 16: FCA 1**

| Parameter page | Parameters | Setting |
|---|---|---|
| *General* | *Supported function* | *Ventilation* |

## 4.2 Control of air quality via $CO_2$ and humidity dependent ventilation

A fan will provide fresh air if the humidity or $CO_2$ content exceeds the set thresholds.

### 4.2.1 Devices

- Amun 716 KNX (716 9 200)
- FCA 1 (492 0 200)

### 4.2.2 Overview



**Figure 2**

### 4.2.3 Objects and links

**Table 17**

| No. | Amun 716 KNX Object name | No. | FCA 1 Object name | Comments |
|---|---|---|---|---|
| 25 | Highest active ventilation value | 0 | Actuating value for fan | Fan control dependent on $CO_2$ and relative humidity |

## 4.2.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

**Amun 716**

The standard values can be used here.
The desired ventilation speeds are set on the *Ventilation of CO$_2$* and *Humidity ventilation* parameter pages. See accessories: Fan control

**Table 18: FCA 1**

| Parameter page | Parameters | Setting |
|---|---|---|
| *General* | *Supported function* | *Ventilation* |

## *4.3  Control of air quality plus 3 stage manual fan control*

A fan will provide fresh air if the humidity or $CO_2$ content exceeds the set thresholds.
There is a choice of 3 manual fan stages (forced operation mode).
A 4-way sensor interface is used here (TA 4).

Button layout:

| Channel / button 1 | Start forced stage 1 |
|---|---|
| Channel / button 2 | Start forced stage 2 |
| Channel / button 3 | Start forced stage 3 |
| Channel / button 4 | Restore automatic operation |

After reset or restoration of bus power the fan operates in automatic mode, i.e. depending on $CO_2$ content and humidity.
If any of buttons 1…3 are pressed, FCA 1 switches to forced operation and assumes the associated fan stage configured in TA 4.
Automatic mode can be restored using button 4.

### 4.3.1  Devices

- Amun 716 KNX (716 9 200)
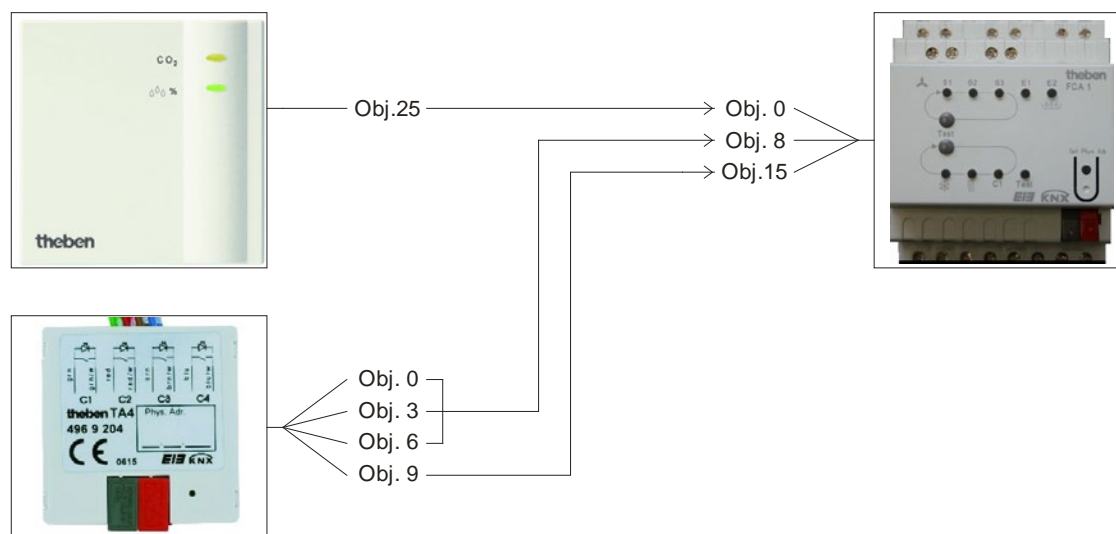- FCA 1 (492 0 200)
- TA 4 (496 9 204)

### 4.3.2  Overview



**Figure 3**

### 4.3.3 Objects and links

**Table 19**

| No. | Amun 716 KNX | No. | FCA 1 | Comments |
|-----|--------------|-----|-------|----------|
|     | Object name  |     | Object name | |
| 25 | Highest active ventilation value | 0 | Actuating value for fan | Fan control dependent on $CO_2$ and relative humidity |

**Table 20:**

| No. | TA 4 | No. | FCA 1 | Comments |
|-----|------|-----|-------|----------|
|     | Object name |     | Object name | |
| 0 | Channel 1 Valuator | 8 | Forced fan stage | Manual stage 1 in forced operation mode |
| 3 | Channel 2 Valuator | | | Manual stage 2 in forced operation mode |
| 6 | Channel 3 Valuator | | | Manual stage 3 in forced operation mode |
| 9 | Channel 4 switching | 15 | Fan auto/forced mode | Automatic mode: Fan is controlled by Amun 716. |

### 4.3.4  Important parameter settings

Standard or customer-defined parameter settings apply to unlisted parameters.

**Amun 716**

The standard values can be used here.
The desired ventilation speeds are set on the *Ventilation of* $CO_2$ and *Humidity ventilation*
parameter pages.

**Table 21: FCA 1**

| Parameter page | Parameters | Setting |
|---|---|---|
| *General* | *Supported function* | *Ventilation* |
|  | *Switch fans between auto and forced* | *via object auto/forced,* **Forced = 0** |

**Table 22: TA 4**

| Parameter page | Parameters | Setting |
|---|---|---|
| Channel 1..3 | *Channel function* | *Switch/key* |
|  | *Object type* | *Value 0.. 255 (1 byte)* |
|  | *Response to rising edge* | *desired ventilation speed for each forced stage* |
|  | *Response to falling edge* | *None* |
| Channel 4 | *Channel function* | *Switch/key* |
|  | *Object type* | *Switching (1-bit)* |
|  | *Response to rising edge* | *On* |
|  | *Response to falling edge* | *None* |
|  | *Response after restoration of the bus supply* | *None* |

## *4.4 Dew point alarm for cooling system*

A RAM 713 FC room thermostat and an FCA 1 fan coil actuator control
a cooling system.
Once humidity has reached a set threshold value (80 %), an alarm telegram is sent to prevent
further cooling and an increase in humidity

### 4.4.1 Devices

- Amun 716 KNX (716 9 200)
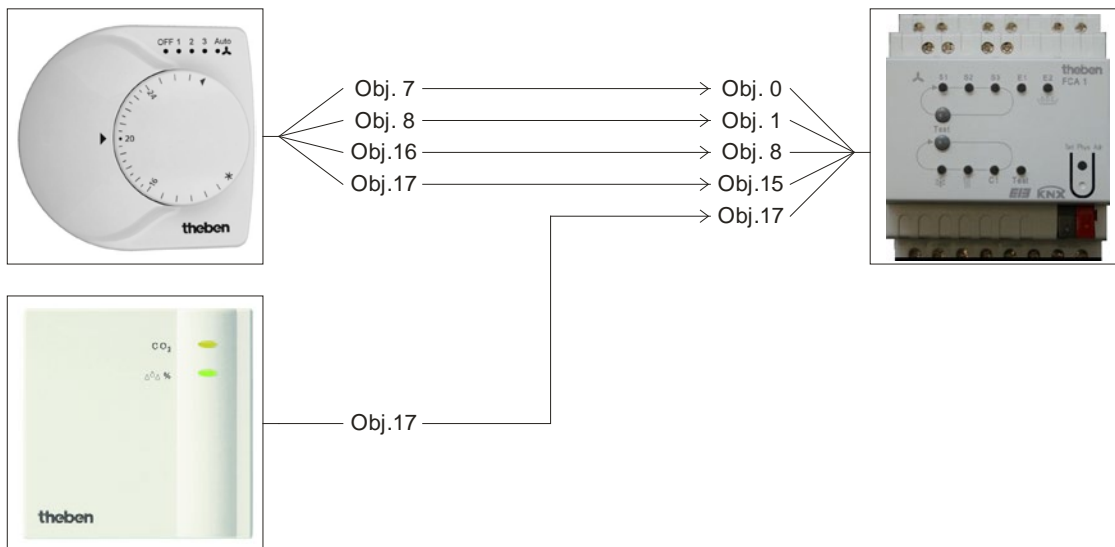- FCA 1 (492 0 200)
- RAM 713 FC

### 4.4.2 Overview



**Figure 4**

### 4.4.3 Objects and links

**Table 23**

| No. | Amun 716 KNX Object name | No. | FCA 1 Object name | Comments |
|---|---|---|---|---|
| 17 | *Humidity threshold 3* | 17 | *Dew point alarm* | Do not cool any further, humidity is too high. |

**Table 24: Links**

| No. | RAM 713 FC Object name | No. | FCA 1 Object name | Comments |
|---|---|---|---|---|
| 7 | *Heating control variable* | 0 | *Heating control variable* | FCA receives the heating and cooling control variables from RAM 713 S |
| 8 | *Cooling control variable* | 1 | *Cooling control variable* | |
| 16 | *Forced fan stage* | 8 | *Forced fan stage* | % value for forced mode |
| 17 | *Fan forced/auto mode* | 15 | *Fan Forced = 1 / Auto = 0* | Trigger for forced mode |

### 4.4.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

**Table 25: Amun 716**

| Parameter page | Parameters | Setting |
|---|---|---|
| *Humidity thresholds* | *Relative humidity threshold 3 (in %)* | 80 % |
| | *Hysteresis* | *5 %* |
| *Humidity threshold 3* | *Telegram type for humidity threshold 3* | *Switching command* |
| | *If humidity threshold 3 exceeded* | *send following telegram once* |
| | *Telegram* | *Switch-on command* |
| | *If humidity threshold 3 under run* | *Switch-off command* |

**Table 26: FCA 1**

| Parameter page | Parameters | Setting |
|---|---|---|
| *General* | *Supported function* | *Heating and cooling* |
| | *System type* | *4-pipe system* |
| | *Type of controller used* | *Remote controller* |
| *Heating valve* | *Type of valve* | *2-point* |
| *Cooling valve* | *Type of valve* | *2-point* |

**Table 27: RAM 713 FC**

| Parameter page | Parameters | Setting |
|---|---|---|
| *Settings* | *Device type* | *RAM 713 Fan Coil* |
| *Control* | *Fan coil system used* | *4-pipe system* |
| *Operation mode* | *Objects for determining the operation mode* | *alt.: Comfort, night, frost* |

# 5  Appendix

## 5.1  Hysteresis

The hysteresis determines the difference between switching on and off value.
With the Amun 716 it is unilaterally negative.

Without hysteresis, the threshold control would switch on and off continuously provided the actual value is within the setpoint value range.
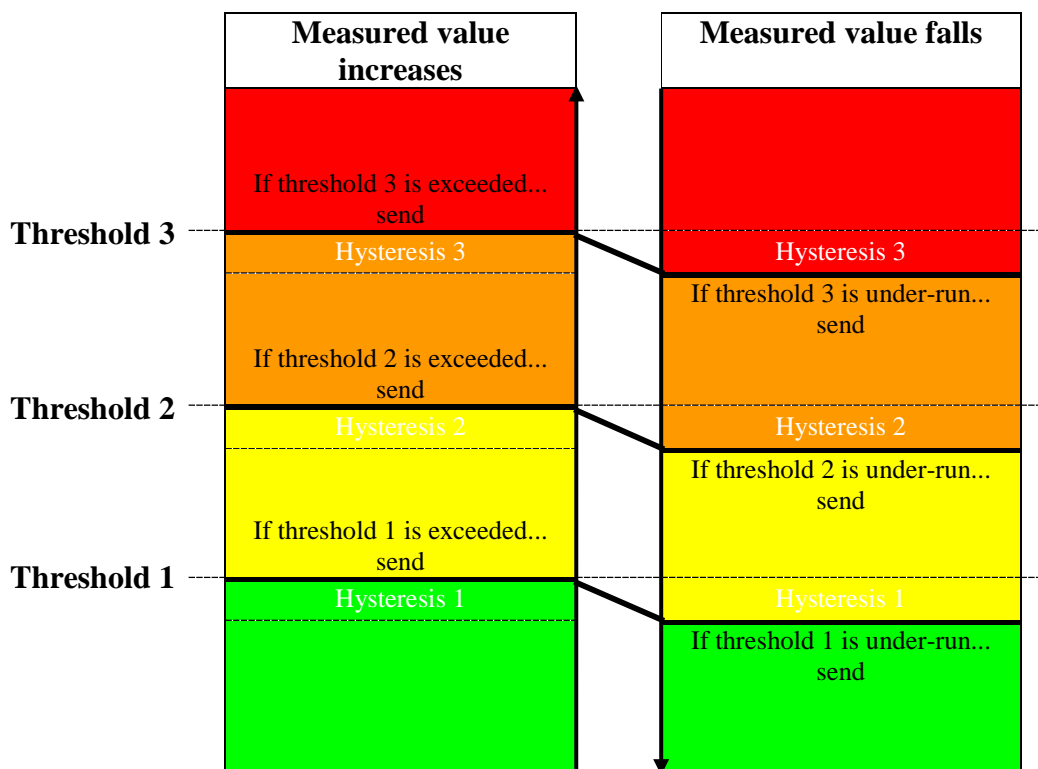
**Example $CO_2$ threshold:**
Threshold 1 = 500 ppm, hysteresis = 100 ppm.
The threshold is exceeded if the actual value rises to, or above, 500 ppm.
It is under run if the actual value falls below the "hysteresis setpoint value"
i.e. 500 ppm – 100 ppm = 400 ppm drops.

## 5.2  Switching behaviour of thresholds for $CO_2$ and humidity



The telegram of the last exceeded/under run threshold is sent.
If several thresholds are exceeded from one measurement cycle to the next then the telegrams are sent at an increasing value (from thresholds 1-3) whereas with cyclical sending, only the telegram for the last exceeded threshold is sent cyclically. The same applies with falling values.

## 5.3  Fan control

Note the following for fan control using percentage values:

Amun sends a percentage value as the control variable for each threshold.
This control variable (in accordance with the set threshold value) is transferred to the fan coil actuator as a fan stage between 0 and 3.

**Important:** The sent control variable should always be higher than the threshold setting of the fan coil actuator.

**Example:**

| Threshold value for Fan stage | Set values for Amun 716 | Recommended values for FCA 1 |
|---|---|---|
| 1 | 20 % | 10 % |
| 2 | 50 % | 40 % |
| 3 | 80 % | 70 % |

If fan stage 2 is selected using the button, the relevant object
(object 9 or 19) sends the control variable 50 %.
As the threshold value for stage 2 in the fan coil actuator is set at 40 % , the received control variable of 50 % is clearly allocated to fan stage 2 and accepted by the fan.

## 5.4  Relative humidity

Relative humidity is a measurement for the saturation of air with water vapour.
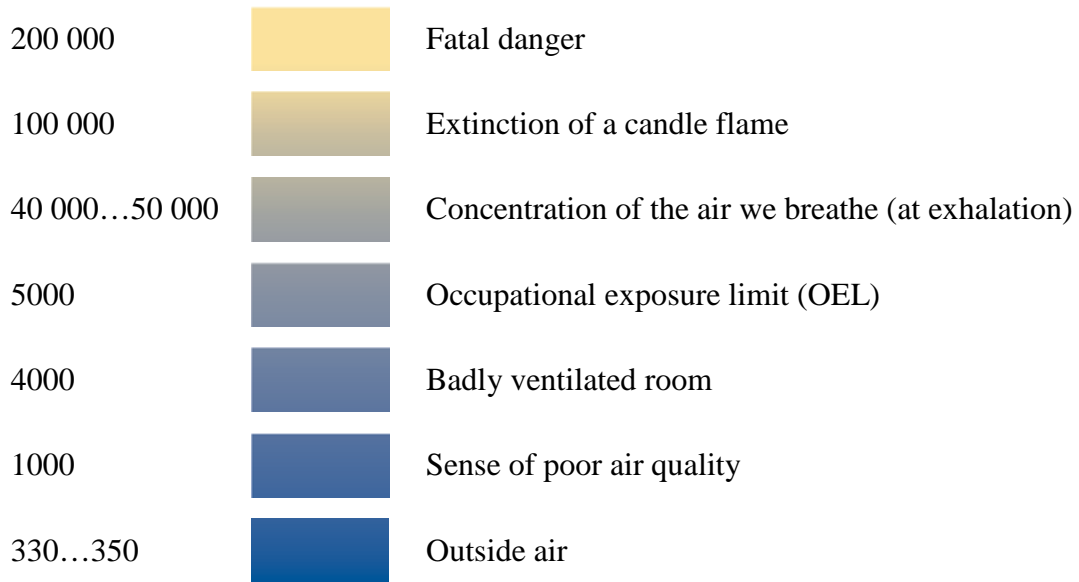This is expressed as the relationship to the maximum amount absorbed at the corresponding temperature.

**Example:** A relative humidity of 60 % means that the air contains 60 % of the maximum absorbable amount of water vapour.
At 100 % the air is completely saturated and cannot absorb any more humidity.

Condensation or mist are produced if the volume of available water vapour exceeds this 100 % threshold .

The ability of air to absorb water vapour depends on temperature.
Warm air can absorb more water vapour than cold air.

## 5.5 $CO_2$ guide values

| | | |
|---|---|---|
| 200 000 | | Fatal danger |
| 100 000 | | Extinction of a candle flame |
| 40 000…50 000 | | Concentration of the air we breathe (at exhalation) |
| 5000 | | Occupational exposure limit (OEL) |
| 4000 | | Badly ventilated room |
| 1000 | | Sense of poor air quality |
| 330…350 | | Outside air |

All values in ppm (parts per million)