KNX AQS/TH

Indoor Sensor

Technical Specifications and Installation Instructions
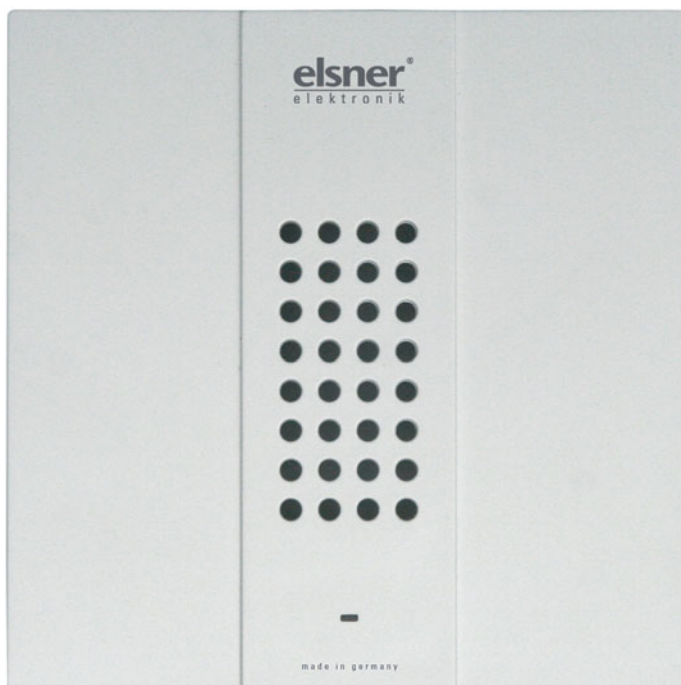
1. Description

The **Indoor Sensor KNX AQS/TH** measures the room CO_2 concentration, the temperature und air humidity and calculates the dew point. The sensor can receive external values for temperture, humidity and CO_2 via the bus and process them with the own data to overall values (mixed values, e. g. room average).

The **KNX AQS/TH** provides eleven switching outputs with adjustable threshold values. The switching outputs and further communication objects can be linked by AND and OR logic gates. Additionally, an integrated actuating variable comparator can compare and output values that are received via communication objects.

Integrated PI controllers allows for control of a ventilation (depending on CO_2 concentration and air humidity) and a heating/cooling system (depending on temperature). The sensor can can emit a warning to the bus as soon as the area of optimum comfort (according to DIN 1946) is left.

Functions:
- Measurement of **CO_2 concentration** of the air, of **temperature** and **air humidity** (absolute, relative), calculation of the dew point
- **Mixed values** from own measured values and external values (proportions can be set in percentage)
- **PI controller for heating** (one or two step) and **cooling** (one or two step) depending on temperature
- **PI controller for ventilation** depending on humidity and CO2 concentration: dehumidification/humidification (one step) or dehumidification (one or two step)
- **11 switching outputs** with adjustable threshold values (Threshold values can be set by parameter or via communication objects)
- **8 AND and 8 OR logic gates** with each 4 inputs. Every switching incident as well as 8 logic inputs (in the form of communication objects) may be used as inputs for the logic gates. The output of each gate may optionally be configured as 1 bit or 2 x 8 bits
- **2 actuating variable comparators** for output of minimum, maximum or avarage values. Each with 5 inputs (for values received via communication objects)

Configuration is made using the KNX software ETS. The **programme file** (format VD), the data sheet and the manual can be downloaded from the Elsner Elektronik homepage on **www.elsner-elektronik.de** in the "Service" menu.

1.0.1. Measurement of carbon dioxide in the air

The CO_2 concentration in the air is indicated in parts per million (ppm). 1000ppm correspond to 0.1%. From this value on humans perceive the room air as „used".

CO_2 concentration (ppm)	
200.000	Humans are not capable to survive (fatal concentration)
100.000	Candle will go out
40.000 bis 50.000	Exhaled air
5.000	Maximum admissible value at work place (MAC value)
4.000	Insufficiently ventilated room
1.000	"Bad air" is perceived
330 bis 350	Outside air

1.1. Technical specifications

Housing	Plastic material
Colour	White matt
Mounting	In-wall (in junction box Ø 70 mm, 36 mm deep, box is included in scope of delivery)
Protection category	IP 50
Dimensions	Cover approx. 94 × 94 (W × H, mm), mounting depth approx. 8 mm
Weight	approx. 105 g (including box and cover)
Ambient temperature	Operation -10…+50°C, Storage -20…+60°C
Ambient air humidity	approx. 95% rF, avoid bedewing
Operating voltage	KNX bus voltage
Bus current	max. 10 mA
Data output	KNX +/- Bus terminal plug
BCU type	own micro controller
PEI type	0
Group addresses	max. 254
Allocations	max. 254
Communication objects	227
Measurement range CO_2	0…2000 ppm
Resolution (CO2)	1 ppm
Accuracy *(CO2)	± 50 ppm ± 3% of the measured value±
Measurement range temperature	-10…+50°C
Resolution (temperature)	0.1°C
Accuracy* (temperature)	± 0.4°C at 25°C
Measurement range humidity	0…95%
Resolution (humidity)	0.1%
Accuracy* (humidity)	± 5% R. H.

* Please consider the notes on Accuracy of the measurement, Seite 5

The following standards have been considered for the evaluation of the product in terms of electro magnetic compatibility:
- EN 50090-2-2: 1996/A2:2007
- EN 61000-6-1: 2007
- EN 61000-6-3: 2007

The product has been tested for the above mentioned standards by an accredited EMV laboratory.

1.1.1. Accuracy of the measurement

Measurement variations from sources of interference (see chapter *Installation position*) must be corrected in the ETS in order to ensure the specified accuracy of the sensor (offset). To ensure a correct CO_2 measurement, the device must be installed in a wind-proof socket.

The indiceted accuracy of the CO_2 measurement will be achieved after a run-in period of 24 hours (without interruption of the bus voltage) if the sensor has been in contact with fresh air (350…450 ppm) at least once in this period.
After this, the CO_2 sensor will recalibrate every two weeks by defining the lowest measured value captured during that period (without interruption of the bus voltage) as a reference for fresh air.
The guarantee the accuracy on a sustained basis, the sensor should be provided with fresh air at least once in two weeks. This occurs normally during room ventilation.

2. Installation and commissioning

2.1. Notes on installation

Installation, inspection, commissioning and troubleshooting of the device must only be carried out by a competent electrician.

Disconnect all lines to be assembled, and take safety precautions against accidental switch-on.

The device is exclusively intended for appropriate use. With each inappropriate change or non-observance of the instructions for use, any warranty or guarantee claim will be void.

After unpacking the device, check immediately for any mechanical damages. In case of transport damage, this must immediately notified to the supplier.

If damaged, the device must not be put into operation.

If an operation without risk may supposedly not be guaranteed, the device must be put out of operation and be secured against accidental operation.

The device must only be operated as stationary system, i.e. only in a fitted state and after completion of all installation and start-up works, and only in the environment intended for this purpose.

Elsner Elektronik does not assume any liability for changes in standards after publication of this instruction manual.

2.2. Installation position

The **KNX AQS/TH** is flush mounted in a distribution box (Ø 70 mm, 36 mm deep) and covered. Box and cover are supplied.

> **May be installed and operated in dry interior rooms only.**
> **Avoid condensation.**

For monitoring of the CO_2 content of the room air choose an installation position in height of head (standing or sitting, according to utilization of room). The CO_2 concentration in indoor rooms is highest near the floor and decreases towards the ceiling.

When selecting an installation location, please ensure that the measurement results are affected as little as possible by external influences. Possible sources of interference include:
• Direct sunlight
• Drafts from windows and doors
• Draft from ducts which lead from other rooms or from the outside to the junction box in which the sensor is mounted
• Warming or cooling of the building structure on which the sensor is mounted, e.g. due to sunlight, heating or cold water pipes
• Connection lines and ducts which lead from warmer or colder areas to the sensor

Measurement variations from such sources of interference must be corrected in the ETS in order to ensure the specified accuracy of the sensor (offset).

To ensure a correct CO_2 measurement, the device must be installed in a windproof socket.
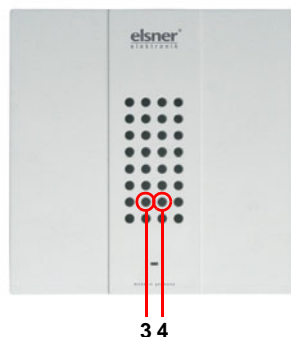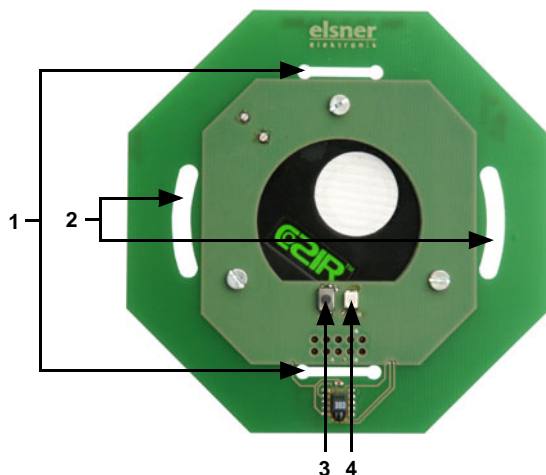
2.3. Delivery scope and assembly

1x *Cover with punches*

2x *Device screw Ø 3,2 mm × 15 mm*

1x *Board with sensor electronic and connection plugs (bus black-red, axiliary voltage white-yellow)*

1x *Distribution box Ø 70 mm, 36 mm deep*

2.3.1. Front view sensor board

1   2

3 4   3 4

1   *Grooves for attachment of cover*
2   *Oblong holes for fastening with distribution box*
3   *Programming button for teaching the device, can also be operated when cover is clamped on (see right)*
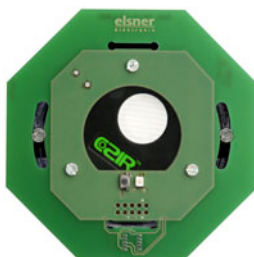4   *Programming LED*

2.3.2. Rear view sensor board
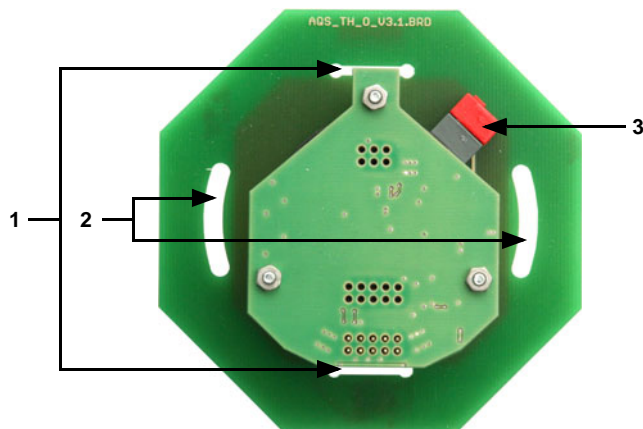
1   Grooves for attachment of cover
2   Oblong holes for fastening with distribution box
3   KNX terminal BUS +/-

2.4. Installation

The future orientation is determined by fitting the box:

Screw holes on left and right   ➔Logo on top of board   ➔Logo on top of cover

First, mount the box and connection lead

Subsequently, connect the bus +/- (connector black-red) to the intended terminal of the sensor board.

Screw the sensor board in the box. Now clamp the cover with the snap taps in the grooves of the board.

2.5. Notes on assembly and operation

Sensor must not be exposed to water (rain) or dust. This could result in the electronic being damaged. A relative air humidity of 95% must not be exceeded. Avoid bedewing.