



KNX AQS/TH-UP basic

Combined Indoor Sensor

Technical specifications and installation instructions



1. Description

The **Indoor Sensor KNX AQS/TH-UP basic** measures CO₂ concentration, temperature and humidity and calculates the dew point. The sensor can receive external measured values via the bus and process them with the own data to overall values (mixed values, e. g. room average).

The **KNX AQS/TH-UP basic** 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 CO₂ concentration and air humidity) and a heating/cooling system (depending on temperature). The **KNX AQS/TH-UP basic** can emit a warning to the bus as soon as the area of optimum comfort (according to DIN 1946) is left.

The housing is completed with a frame of the switching series installed in the building and thus merges with the interior.

Functions:

- Measurement of **CO₂ 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. Setting of target value for day, night and frost/heat protection (while windows are open)
- **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 average 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. Scope of delivery

- Housing with display, buttons and sensor board
- CO₂ sensor unit
- Base plate

You will need *in addition* (not supplied):

- Socket Ø 60 mm, 42 mm deep
- Frame (for element 55 x 55 mm), suitable for the switching programme used in the building

1.1. Technical specifications

Housing	Plastic material (partly lacquered)
Colours	<ul style="list-style-type: none"> • White glossy (similar to RAL 9016 Traffic White) • Aluminium matt • Anthracite matt • Stainless steel • Special colours on request
Mounting	In-wall (in socket Ø 60 mm, 42 mm deep)
Protection category	IP 20
Dimensions	Housing approx. 55 x 55 (W x H, mm), mounting depth approx. 15 mm, base plate approx. 71 x 71 (W x H, mm)
Total weight	approx. 72 g
Ambient temperature	Operation -10...+50°C, storage -20...+60°C
Ambient air humidity	max. 95% R. H., 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	229
CO ₂ measurement range	0...2000 ppm
CO ₂ resolution	1 ppm
CO ₂ accuracy*	± 50 ppm ± 3% of the measured value
Temperature measurement range	-10...+50°C
Temperature resolution	0.1°C
Temperature accuracy*	± 0.4°C at 25°C
Humidity measurement range	0...95%
Feuchtigkeit resolution	0.1%
Feuchtigkeit accuracy	± 5% R. H.

* Mind the notes on *Accuracy of the measurement*, page 4

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 CO₂ measurement, the device must be installed in a windproof socket.

The indicated **accuracy of the CO₂ 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 CO₂ 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.

When **measuring temperature**, the self-heating of the device is considered by the electronics. The heating is compensated by reducing the measured temperature by the self-heating of 1.8°C. The indicated indoor temperature measured value approaches the actual room temperature during a 2 hours heating period.

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 **Indoor Sensor KNX AQS/TH-UP basic** will be installed concealed within a socket (Ø 60 mm, 42 mm deep).



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

For monitoring of the CO₂ content of the room air choose an installation position in height of head (standing or sitting, according to utilization of room). The CO₂ 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 CO₂ measurement, the device must be installed in a windproof socket.

2.3. Composition

2.3.1. Housing

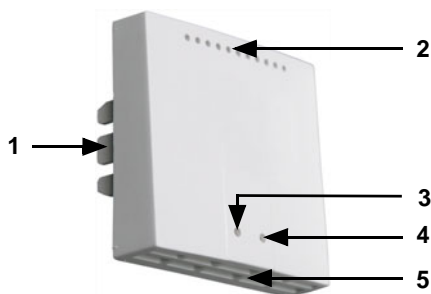


Fig. 1

- 1 Notches
- 2 Air circulation holes
- 3 Push button
- 4 Programming LED (recessed)
- 5 Programming button (recessed) for teaching instrument
- 6 Push button
- 7 Air circulation holes (BOTTOM)

2.3.2. Rear view of sensor board with connections

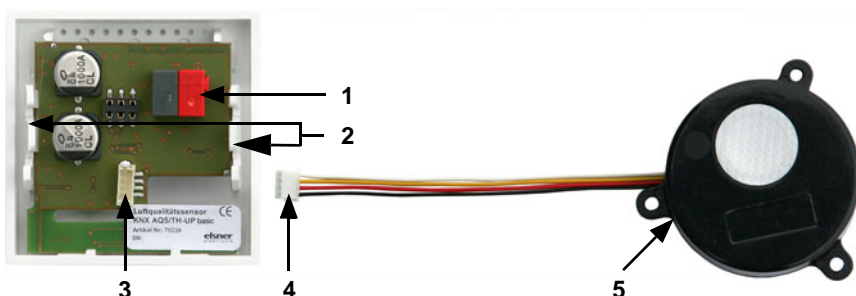


Fig. 2

- 1 KNX terminal BUS +/-
- 2 Notches
- 3 Slot for CO₂ sensor unit
- 4 Plug of CO₂ sensor unit
- 5 CO₂ sensor unit

2.4. Assembly of the sensor

First of all fit the windproof socket with connection. Also seal inlet pipes to avoid infiltration.



Place the CO₂ sensor unit in the socket. The side with the sensor membrane must face to front.

Fig. 3

Screw the base plate onto the socket and position the frame of the switching programme. Connect the CO₂ sensor unit and the bus line +/- (black-red plug) to the terminals provided on the board.

Pin the sensor with the notches on to the metal frame, so that sensor and frame are fixed.

2.5. Notes on mounting and commissioning

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.

After the bus voltage has been applied, the device will enter an initialisation phase lasting 5 seconds. During this phase no information can be received via the bus.