KNX AQS-UP basic

Air Quality Sensor

Article numbers 70224 (white), 70225 (aluminium), 70226 (anthracite), 70227 (stainless steel)

elsner elektronik

Installation and Adjustment

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

This manual is amended periodically and will be brought into line with new software releases. The change status (software version and date) can be found in the contents footer. If you have a device with a later software version, please check **www.elsner-elektronik.de** in the menu area "Service" to find out whether a more up-to-date version of the manual is available.

Clarification of signs used in this manual

Safety advice.

Safety advice for working on electrical connections, components, etc.

DANGER! ... indicates an immediately hazardous situation which will lead to death or severe injuries if it is not avoided.

WARNING! ... indicates a potentially hazardous situation which may lead to death or severe injuries if it is not avoided.

CAUTION! ... indicates a potentially hazardous situation which may lead to trivial or minor injuries if it is not avoided.

ATTENTION! ... indicates a situation which may lead to damage to property if it is not avoided.

ETS In the ETS tables, the parameter default settings are marked by underlining.

1. Description

The **Air Quality Sensor KNX AQS-UP basic** measures the CO_2 concentration in the room. The sensor can receive an external CO_2 value via the bus and process it with the own data to an overall value (mixed value, e.g. room average).

The **KNX AQS-UP basic** provides four 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.
An integrated PI controllers allows for control of ventilation depending on CO_2 concentration.

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

Functions:

- Measurement of **CO_2 concentration** of the air
- **Mixed value** from own measured value and external value (proportions can be set in percentage)
- **PI controller for ventilation** depending on CO_2 concentration: dehumidification/humidification (one step) or dehumidification (one or two step)
- **4 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 **product file** can be downloaded from the Elsner Elektronik website on **www.elsner-elektronik.de** in the "Service" menu.

1.0.1. Scope of delivery

- Housing with display, buttons and sensor board
- CO_2 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	• 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	133
CO_2 measurement range	0...2000 ppm
CO_2 resolution	1 ppm
CO_2 accuracy*	± 50 ppm ± 3% of the measured value

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

The product conforms with the provisions of EU guidelines.

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 windproof socket.

The indicated **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. Installation notes

Installation, testing, operational start-up and troubleshooting should only be performed by an electrician.

CAUTION!
Live voltage!
There are unprotected live components inside the device.

- National legal regulations are to be followed.
- Ensure that all lines to be assembled are free of voltage and take precautions against accidental switching on.
- Do not use the device if it is damaged.
- Take the device or system out of service and secure it against unintentional use, if it can be assumed, that risk-free operation is no longer guaranteed.

The device is only to be used for its intended purpose. Any improper modification or failure to follow the operating instructions voids any and all warranty and guarantee claims.

After unpacking the device, check it immediately for possible mechanical damage. If it has been damaged in transport, inform the supplier immediately.

The device may only be used as a fixed-site installation; that means only when assembled and after conclusion of all installation and operational start-up tasks and only in the surroundings designated for it.

Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

2.2. Installation position

The **Air Quality Sensor KNX AQS-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 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:

- 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

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. Composition

2.3.1. Housing

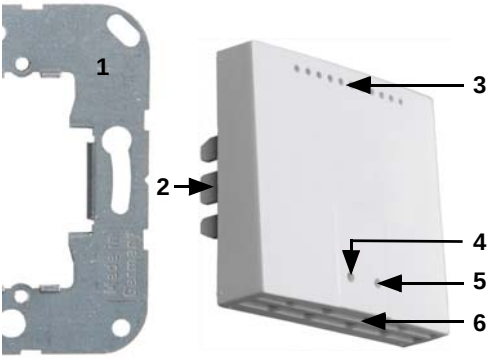

Fig. 1
1 Base plate
2 Notches
3 Air circulation holes
4 Programming LED (recessed)
5 Programming button (recessed) for teaching instrument
6 Air circulation holes (BOTTOM)

2.3.2. Rear view of sensor board with connections

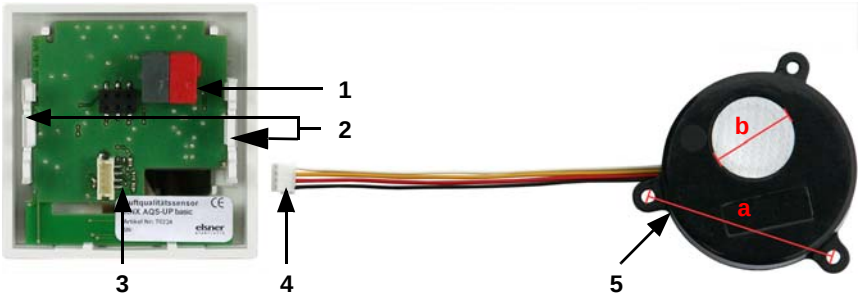

Fig. 2

1 KNX terminal BUS +/-
2 Notches
3 Slot for CO_2 sensor unit
4 Plug of CO_2 sensor unit
5 CO_2 sensor unit

Length of cable approx. 110 mm
a Hole centre distance approx. 43 mm
b Diameter of diaphragm approx. 18 mm

2.4. Assembly of the sensor

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

Place the CO_2 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 CO_2 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

Never expose the device to water (e.g. rain) or dust. This can damage the electronics. You must not exceed a relative humidity of 95%. Avoid condensation.

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

3. Transfer protocol

Units:

CO_2 content in ppm
Variables in %

3.1. List of all communications objects

Abbreviation flags:

C Communication
R Read
W Write
T Transfer
U Update

No.	Name	Function	DPT	Flags
0	Software version	readable	217,001	C R T
2	CO2 sensor malfunction	Output	1,001	C R T
98	Outside CO2 reading	Input	9,008	C W
99	Inside CO2 Internal reading	Output	9,008	C R T
100	Total CO2 reading	Output	9,008	C R T
101	CO2 maximum value request	Input	1,017	C W
102	Maximum CO2 reading	Output	9,008	C R T
103	Reset CO2 maximum value	Input	1,017	C W
104	CO2 threshold value 1: Absolute value	Input/Output	9,008	C R W T U
105	CO2 threshold value 1: (1:+ | 0:-)	Input	1,002	C W
106	CO2 threshold value 1: Switching delay from 0 to 1	Input	7,005	C W
107	CO2 threshold value 1: Switching delay from 1 to 0	Input	7,005	C W
108	CO2 threshold value 1: Switching output	Output	1,001	C R T
109	CO2 threshold value 1: Switching output block	Input	1,002	C W
110	CO2 threshold value 2: Absolute value	Input/Output	9,008	C R W T U
111	CO2 threshold value 2: (1:+ | 0:-)	Input	1,002	C W
112	CO2 threshold value 2: Switching delay from 0 to 1	Input	7,005	C W

No.	Name	Function	DPT	Flags
113	CO2 threshold value 2: Switching delay from 1 to 0	Input	7,005	C W
114	CO2 threshold value 2: Switching output	Output	1,001	C R T
115	CO2 threshold value 2: Switching output block	Input	1,002	C W
116	CO2 threshold value 3: Absolute value	Input/Output	9,008	C R W T U
117	CO2 threshold value 3: (1:+ | 0:-)	Input	1,002	C W
118	CO2 threshold value 3: Switching delay from 0 to 1	Input	7,005	C W
119	CO2 threshold value 3: Switching delay from 1 to 0	Input	7,005	C W
120	CO2 threshold value 3: Switching output	Output	1,001	C R T
121	CO2 threshold value 3: Switching output block	Input	1,002	C W
122	CO2 threshold value 4: Absolute value	Input/Output	9,008	C R W T U
123	CO2 threshold value 4: (1:+ | 0:-)	Input	1,002	C W
124	CO2 threshold value 4: Switching delay from 0 to 1	Input	7,005	C W
125	CO2 threshold value 4: Switching delay from 1 to 0	Input	7,005	C W
126	CO2 threshold value 4: Switching output	Output	1,001	C R T
127	CO2 threshold value 4: Switching output block	Input	1,002	C W
128	CO2 controller: Blocking object	Input	1,002	C W
129	CO2 controller: Target value	Input/Output	9,008	C R W T
130	CO2 controller: Target value (1:+ | 0:-)	Input	1,002	C W
131	CO2 controller: Control variable ventilation (stage 1)	Output	5,001	C R T
132	CO2 controller: Control variable ventilation (stage 2)	Output	5,001	C R T
133	CO2 controller: Ventilation 1 status (1=ON | 0=OFF)	Output	1,001	C R T
134	CO2 controller: Ventilation 2 status (1=ON | 0=OFF)	Output	1,001	C R T
135	Comparator 1 actuating variable: Input 1	Input	5,010	C W

No.	Name	Function	DPT	Flags
136	Comparator 1 actuating variable: Input 2	Input	5,010	C W
137	Comparator 1 actuating variable: Input 3	Input	5,010	C W
138	Comparator 1 actuating variable: Input 4	Input	5,010	C W
139	Comparator 1 actuating variable: Input 5	Input	5,010	C W
140	Comparator 1 actuating variable: Output	Output	1,001	C R T
141	Comparator 1 actuating variable: Block	Input	1,002	C W
142	Comparator 2 actuating variable: Input 1	Input	5,010	C W
143	Comparator 2 actuating variable: Input 2	Input	5,010	C W
144	Comparator 2 actuating variable: Input 3	Input	5,010	C W
145	Comparator 2 actuating variable: Input 4	Input	5,010	C W
146	Comparator 2 actuating variable: Input 5	Input	5,010	C W
147	Comparator 2 actuating variable: Output	Output	1,001	C R T
148	Comparator 2 actuating variable: Block	Input	1,002	C W
149	AND logic 1: 1-bit switching output	Output	1,002	C R T
150	AND logic 1: 8-bit output A	Output	5,010	C R T
151	AND logic 1: 8-bit output B	Output	5,010	C R T
152	AND logic 1: Block	Input	1,002	C W
153	AND logic 2: 1-bit switching output	Output	1,002	C R T
154	AND logic 2: 8-bit output A	Output	5,010	C R T
155	AND logic 2: 8-bit output B	Output	5,010	C R T
156	AND logic 2: Block	Input	1,002	C W
157	AND logic 3: 1-bit switching output	Output	1,002	C R T
158	AND logic 3: 8-bit output A	Output	5,010	C R T
159	AND logic 3: 8-bit output B	Output	5,010	C R T
160	AND logic 3: Block	Input	1,002	C W
161	AND logic 4: 1-bit switching output	Output	1,002	C R T
162	AND logic 4: 8-bit output A	Output	5,010	C R T
163	AND logic 4: 8-bit output B	Output	5,010	C R T
164	AND logic 4: Block	Input	1,002	C W

No.	Name	Function	DPT	Flags
165	AND logic 5: 1-bit switching output	Output	1,002	C R T
166	AND logic 5: 8-bit output A	Output	5,010	C R T
167	AND logic 5: 8-bit output B	Output	5,010	C R T
168	AND logic 5: Block	Input	1,002	C W
169	AND logic 6: 1-bit switching output	Output	1,002	C R T
170	AND logic 6: 8-bit output A	Output	5,010	C R T
171	AND logic 6: 8-bit output B	Output	5,010	C R T
172	AND logic 6: Block	Input	1,002	C W
173	AND logic 7: 1-bit switching output	Output	1,002	C R T
174	AND logic 7: 8-bit output A	Output	5,010	C R T
175	AND logic 7: 8-bit output B	Output	5,010	C R T
176	AND logic 7: Block	Input	1,002	C W
177	AND logic 8: 1-bit switching output	Output	1,002	C R T
178	AND logic 8: 8-bit output A	Output	5,010	C R T
179	AND logic 8: 8-bit output B	Output	5,010	C R T
180	AND logic 8: Block	Input	1,002	C W
181	OR logic 1: 1-bit switching output	Output	1,002	C R T
182	OR logic 1: 8-bit output A	Output	5,010	C R T
183	OR logic 1: 8-bit output B	Output	5,010	C R T
184	OR logic 1: Block	Input	1,002	C W
185	OR logic 2: 1-bit switching output	Output	1,002	C R T
186	OR logic 2: 8-bit output A	Output	5,010	C R T
187	OR logic 2: 8-bit output B	Output	5,010	C R T
188	OR logic 2: Block	Input	1,002	C W
189	OR logic 3: 1-bit switching output	Output	1,002	C R T
190	OR logic 3: 8-bit output A	Output	5,010	C R T
191	OR logic 3: 8-bit output B	Output	5,010	C R T
192	OR logic 3: Block	Input	1,002	C W
193	OR logic 4: 1-bit switching output	Output	1,002	C R T
194	OR logic 4: 8-bit output A	Output	5,010	C R T
195	OR logic 4: 8-bit output B	Output	5,010	C R T
196	OR logic 4: Block	Input	1,002	C W
197	OR logic 5: 1-bit switching output	Output	1,002	C R T
198	OR logic 5: 8-bit output A	Output	5,010	C R T
199	OR logic 5: 8-bit output B	Output	5,010	C R T
200	OR logic 5: Block	Input	1,002	C W
201	OR logic 6: 1-bit switching output	Output	1,002	C R T
202	OR logic 6: 8-bit output A	Output	5,010	C R T
203	OR logic 6: 8-bit output B	Output	5,010	C R T
204	OR logic 6: Block	Input	1,002	C W

No.	Name	Function	DPT	Flags
205	OR logic 7: 1-bit switching output	Output	1,002	C R T
206	OR logic 7: 8-bit output A	Output	5,010	C R T
207	OR logic 7: 8-bit output B	Output	5,010	C R T
208	OR logic 7: Block	Input	1,002	C W
209	OR logic 8: 1-bit switching output	Output	1,002	C R T
210	OR logic 8: 8-bit output A	Output	5,010	C R T
211	OR logic 8: 8-bit output B	Output	5,010	C R T
212	OR logic 8: Block	Input	1,002	C W
213	Logic input 1	Input	1,002	C W
214	Logic input 2	Input	1,002	C W
215	Logic input 3	Input	1,002	C W
216	Logic input 4	Input	1,002	C W
217	Logic input 5	Input	1,002	C W
218	Logic input 6	Input	1,002	C W
219	Logic input 7	Input	1,002	C W
220	Logic input 8	Input	1,002	C W
221	Logic input 9	Input	1,002	C W
222	Logic input 10	Input	1,002	C W
223	Logic input 11	Input	1,002	C W
224	Logic input 12	Input	1,002	C W
225	Logic input 13	Input	1,002	C W
226	Logic input 14	Input	1,002	C W
227	Logic input 15	Input	1,002	C W
228	Logic input 16	Input	1,002	C W

4. Parameter setting

4.1. Behaviour on power failure/ restoration of power

Behaviour following a failure of the bus power supply:

The device sends nothing.

Behaviour on bus restoration of power and following programming or reset:

The device sends all outputs according to their send behaviour set in the parameters with the delays established in the "General settings" parameter block. The "Software version" communications object is sent once after 5 seconds.

4.2. General settings

Set the basic data transfer characteristics and select whether or not malfunction objects should be sent.

Send delay after power-up and programming for:	
Measured values	5 s • ... • 2 h
Threshold values and switching outputs	5 s • ... • 2 h
Controller objects	5 s • 10 s • ... • 2 h
Logic outputs	5 s • 10 s • ... • 2 h
Maximum telegram quota	• 1 message per second • ... • 5 messages per second • ... • 20 messages per second
Use CO2 malfunction object	Yes • No

4.3. CO2 measured value

Use **Offsets** to adjust the readings to be sent.

Offset in ppm	-100...100; 0

The unit can calculate a **mixed value** from its own reading and an external value. Set the mixed value calculation if desired.

Use external reading	Yes • No
Ext. Reading proportion of the total reading	5% • 10% • ... • 50% • ... • 100%
Send internal and total reading	• never • periodically • On change • on change and periodically
From change of *(if sent on change)*	2% • 5% • 10% • 25% • 50% (relative to the last reading)
Send cycle *(if sent periodically)*	5 s • ... • 2 h

Note: if an external portion is used, all of the following settings (threshold values, etc.) are related to the overall reading!

The **maximum readings** can be saved and sent to the bus. Use the "Reset CO_2 max. value" object to reset the value to the current reading.

Use maximum value	Yes • No

Note: The values are not retained after a reset.

4.4. CO2 threshold values

Activate the threshold values that you want to use here. The **Sensor KNX AQS-UP basic** provides three four threshold values for carbon dioxide.

Use threshold value 1/2/3/4	Yes • No

Table of CO2 values:

1000 ppm corresponds to 0.1% CO2 content.

300 ... 500 ppm	Fresh air
1500 ... 3000 ppm	"Stale" air
5000 ppm	Maximum allowable concentration

4.4.1. Threshold value 1, 2, 3, 4: CO2

Threshold value

Set the threshold values directly in the application program using parameters, or define them via the bus using a communications object.

Threshold value setpoint using parameter:

Set the threshold values and hysteresis directly.

Threshold value setpoint using	**Parameter** • Communications object
Threshold value in ppm	0...5000; 1200
Hysteresis of the threshold value in %	0 ... 50; 20

Threshold value setpoint using a communications object:

Beforehand, enter how the threshold value will be received from the bus. Basically, a new value can be received, or simply a command to increase or decrease.

During initial commissioning, a threshold value must be defined which will be valid until the 1st communication of a new threshold value. For units which have already been taken into service, the last communicated threshold value can be used. Basically, a temperature range is given in which the threshold value can be changed (object value limit).

A set threshold value will be retained until a new value or a change is transferred. The current value is saved in EEPROM, so that this is retained in the event of a power supply failure and will be available once the power supply is restored.

Threshold value setpoint using	Parameter • **Communications object**
The last communicated value should be retained	• never • after restoration of power • after restoration of power and programming
Start threshold value in ppm valid till 1st communication	0...5000; 1200

Object value limit (min) in ppm	0...5000
Object value limit (max) in ppm	0...5000
Type of threshold change	Absolute value • Increase/decrease
Step size *(upon increase/decrease change)*	1 • 2 • 5 • 10 • 20 • 50 • 100 • 200
Hysteresis of the threshold value in %	0 ... 50; 20

Switching output

Set the behaviour of the switching output when a threshold value is exceeded/undercut. The output switching delay can be set using objects or directly as a parameter.

When the following conditions apply, the output is (LV = Threshold value)	• LV above = 1 |LV - hysteresis below = 0 • LV above = 0 |LV - hysteresis below = 1 • LV below = 1 |LV + hysteresis above = 0 • LV below = 0 |LV + hysteresis above = 1
Delays can be set via objects (in seconds)	No • Yes
Switching delay from 0 to 1 *(when delay is not set using objects)*	None • 1 s • 2 s • 5 s • 10 s • ... • 2 h
Switching delay from 1 to 0 *(when delay is not set using objects)*	None • 1 s • 2 s • 5 s • 10 s • ... • 2 h
Switching output sends	• on change • on change to 1 • on change to 0 • on change and periodically • on change to 1 and periodically • on change to 0 and periodically
Send cycle *(is only sent if "periodically" is selected)*	5 s • 10 s • 30 s... • 2 h

Block

The switching output can be blocked using an object. Define specifications here for the behaviour of the output when blocked.

Use switching output block	No • Yes
Analysis of the blocking object	• At value 1: block | At value 0: release • At value 0: block | At value 1: release
Blocking object value before 1st communication	0 • 1
Behaviour of the switching output	
With blocking	• Do not send message • send 0 • send 1
On release (with 2 seconds release delay)	[Dependent on the "Switching output sends" setting]

The behaviour of the switching output on release is dependent on the value of the parameter "Switching output sends" (see "Switching output")

Switching output sends on change	• Do not send message • Send switching output status
Switching output sends on change to 1	• Do not send message • If switching output = 1 ➔ send 1
Switching output sends on change to 0	• Do not send message • If switching output = 0 ➔ send 0
Switching output sends on change and periodically	Send switching output status
Switching output sends on change to 1 and periodically	If switching output = 1 ➔send 1
Switching output sends on change to 0 and periodically	If switching output = 0 ➔send 0

4.5. CO2 PI control

If you activate air quality control, you can use the following settings to define control type, target values, and ventilation.

Use control	**Yes** • No

General control

The **Sensor KNX AQS-UP basic** can be used to control one or two-stage ventilation.

Type of control	• One-stage ventilation • Two-stage ventilation

Configure a block for the ventilation control using the blocking object.

Behaviour of the blocking object with value	• 1 = Block | 0 = release • 0 = block | 1 = release
Blocking object value before 1st communication	0 • 1

Determine when the current control settings are to be sent to the bus. Periodic transmission is safer if a message does not reach a recipient. You may also set up periodic monitoring using an actuator with this setting.

Actuating variable comparator	• on change • on change and periodically
Send cycle (*is only sent if "periodically" is selected)*	5 s • ... • 5 min • ... • 2 h

The status object shows the current status of the output variable (0 = OFF, >0 = ON) and can for example be used for visualisation.

Send status object(s)	• on change • on change to 1 • on change to 0 • on change and periodically • on change to 1 and periodically • on change to 0 and periodically
Send cycle (*is only sent if "periodically" is selected)*	5 s • ... • 5 min • ... • 2 h

Controller target value

The target values can be set directly in the application program using parameters, or be defined via the bus using a communications object.

Target value setting using parameter:

Set the target value directly.

Target value setpoint using	**Parameter** • Communications object
Target value in ppm	400…5000; 800

Setting a target value via communications object:

Enter how the target value will be received from the bus in advance. Basically, a new value can be received, or simply a command to increase or decrease.

During initial commissioning, a target value must be provided which will be valid until the 1st communication of a new target value. For units which have already been taken into service, the last communicated target value can be used. Basically, an air humidity range is given in which the target value can be changed (object value limit).

A set target value will be retained until a new value or a change is transferred. The current value is saved in EEPROM, so that this is retained in the event of a power supply failure and will be available once the power supply is restored.

Threshold value setpoint using	Parameter • **Communications object**
The last communicated value should be retained	• never • after restoration of power • after restoration of power and programming
Start target value in ppm valid till 1st communication *(not upon saving the target value after programming)*	400... 5000; 800
Object value limit (min) in 0.1°C	400…5000; 400
Object value limit (max) in 0.1°C	400…5000; 1500
Type of threshold change	Absolute value • Increase/decrease
Step size in ppm *(upon increase/decrease change)*	1 • 2 • 5 • ... • 20 • ... • 100 • 200

Ventilation control

Depending on the control mode, one and/or two setting sections for the ventilation stages are displayed.

For two-stage ventilation, the target value difference between the two stages must be defined, i.e. the target value which, when exceeded, triggers the switch to the 2nd stage.

Target value difference between levels 1 and 2 Stage in ppm *(for stage 2 only)*	100...4000; <u>400</u>

Determine the deviation from the target value at which the maximum variable value is reached, i.e. the point at which maximum output is used.
The reset time shows how quickly the control responds to deviations from the target value. In case of a short reset time, the control responds with a fast increase of the variable. In case of a long reset time, the control responds somewhat less urgently and needs longer until the necessary variable for the target value deviation is reached.
You should set the time appropriate to the ventilation system at this point (follow the manufacturer's instructions).

Maximum control variable is reached at target value/actual difference of (in ppm)	100...4000; <u>100</u>
Reset time in minutes	1...255; <u>10</u>

Now determine what should be sent when the control is blocked.
On release, the control variable follows the rule again.

When blocked, the variable shall	• <u>not be sent</u> • send a specific value
Value *(if a value is sent for one 1-bit object)*	<u>0</u> • 1
Value (in %) *((if a value is sent for an 8-bit object))*	<u>0</u>...100

4.6. Variable comparator

The two integrated control variable comparators can output maximum, minimum and median values.

Use comparator 1/2	<u>No</u> • Yes

4.6.1. Control variable comparator 1/2

Determine what the control variable comparator should output, and activate the input objects to be used. Send behaviour and blocks can also be set.

Output delivered	• Maximum value • Minimum value • Average value
Use input 1/2/3/4/5	No • Yes
Output sends	• on change of output • on change of output and periodically • when receiving an input object • when receiving an input object and periodically
Send cycle *(is only sent if "periodically" is selected)*	5 s • 10 s • 30 s • ... • 5 min • ... • 2 h
From change of *(is only sent if "on change" is selected)*	1% • 2% • 5% • 10% • 20% • 25%
Analysis of the blocking object	• at value 1: block | at value 0: release • at value 0: block | at value 1: release
Blocking object value before 1st communication	0 • 1
Behaviour of the switching output	
With blocking	• do not send message • Send value
Sent value in %	0 ... 100
on release, output is sent (with 2 seconds release delay)	• the current value • the current value after receipt of an object

4.7. Logic

Activate the logic inputs and assign object values up to 1st communication. Then, activate the required logic outputs.

Use logic inputs	No • **Yes**
Object value prior to 1. communication for:	
Logic input 1... 16	0 • 1

AND logic

Logic 1/2/3/4/5/6/7/8	not active • active

OR logic

Logic 1/2/3/4/5/6/7/8	not active • active

4.7.1. AND and/or OR logic 1/2/3/4/5/6/7/8

AND- and OR logic gates provide the same setting options. Assign the inputs to a switching event and set the send behaviour.

1. / 2. / 3. / 4. Input	• do not use • all switching events which are available to the sensor (see *AND logic connection inputs*, page 22)
Logic output sends	• one 1-bit object • two 8-bit objects

If the logic output sends one 1-bit object:

Logic output sends	**one 1 bit object**
if logic = 1 ➔ object value	1 • 0
if logic = 0 ➔ object value	0 • 1

If the logic output sends two 8-bit objects:

Logic output sends	**two 8 bit objects**
Type of objects	• Value (0 ... 255) • Percent (0% ... 100%) • Angle (0°... 360°) • Scenario load (0 ... 127)
if logic = 1 ➔ object A value	Setting dependent on "type of object"
if logic = 0 ➔ object A value	Setting dependent on "type of object"
if logic = 1 ➔ object B value	Setting dependent on "type of object"
if logic = 0 ➔ object B value	Setting dependent on "type of object"

Send behaviour	• on change of logic • on change of logic to 1 • on change of logic to 0 • on change of logic and periodically • on change of logic to 1 and periodically • on change of logic to 0 and periodically • on change of logic + receipt of object • on change of logic + receipt of object and periodically
Send cycle *(is only sent if "periodically" is selected)*	5 s • 10 s • 30 s • 1 min • ... • 2 h

Block

Logic outputs can also be blocked using objects.

Analysis of the blocking object	• at value 1: block | at value 0: release • at value 0: block | at value 1: release
Blocking object value before 1st communication	0 • 1

Behaviour of the switching output	
With blocking	• do not send message • send value for logic = 0 • send value for logic = 1

Behaviour on release of the switching output is dependent on send behaviour

Value of the parameter "Send behaviour":	Settings options "Behaviour of the switching output on release":
on change of logic	• do not send message • send value for current logic status
on change of logic to 1	• do not send message • if logic = 1 ➔ send value for 1
on change of logic to 0	• do not send message • if logic = 0 ➔ send value for 0
on change of logic and periodically	send value for current logic status (no selection)
on change of logic to 1 and periodically	if logic = 1 ➔ send value for 1 (no selection)
on change of logic to 0 and periodically	if logic = 0 ➔ send value for 0 (no selection)
on change of logic and receipt of object	• do not send message • Status object/s send/s
on change of logic and receipt of object and periodically	send value for current logic status (no selection)

4.7.2. AND logic connection inputs

do not use
Logic input 1
Logic input 1 inverted
Logic input 2
Logic input 2 inverted
Logic input 3
Logic input 3 inverted
Logic input 4
Logic input 4 inverted
Logic input 5
Logic input 5 inverted
Logic input 6
Logic input 6 inverted
Logic input 7
Logic input 7 inverted
Logic input 8
Logic input 8 inverted
Logic input 9
Logic input 9 inverted

Logic input 10
Logic input 10 inverted
Logic input 11
Logic input 11 inverted
Logic input 12
Logic input 12 inverted
Logic input 13
Logic input 13 inverted
Logic input 14
Logic input 14 inverted
Logic input 15
Logic input 15 inverted
Logic input 16
Logic input 16 inverted
CO2 sensor malfunction = ON
CO2 sensor malfunction = OFF
Switching output CO2 1
Switching output CO2 1 inverted
Switching output CO2 2
Switching output CO2 2 inverted
Switching output CO2 3
Switching output CO2 3 inverted
Switching output CO2 4
Switching output CO2 4 inverted
CO2 controller status ventilation 1
CO2 controller status ventilation 1 inverted
CO2 controller status ventilation 2
CO2 controller status ventilation 2 inverted

4.7.3. Connection inputs of the OR logic

The OR logic connection inputs correspond to those of the AND logic. In addition the following inputs are available for the OR logic:

AND logic 1
AND logic output 1 inverted
AND logic output 2
AND logic output 2 inverted
AND logic output 3
AND logic output 3 inverted
AND logic output 4
AND logic output 4 inverted
AND logic output 5
AND logic output 5 inverted
AND logic output 6
AND logic output 6 inverted
AND logic output 7
AND logic output 7 inverted
AND logic output 8

AND logic output 8 inverted

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