Technical manual

Application Description – Air Quality Sensor

General Information

The device is intended for use in the following tasks: monitoring air quality in building systems technology (schools, offices, hotels, conference venues, etc.), data transmission, and control via a bus system. The device is suitable for operation according to the listed technical specifications. The device is only suitable for use in dry rooms. The device is not suitable for safety-related tasks, such as emergency doors, fire protection devices, fermentation cellars, etc.

The room climate control GS 70.00 KNX can send the following data to the KNX bus or has the following functions:

Particulate Matter (PM):	Value Output, Control (Step and PI Control)
Volatile Organic Compounds (VOC):	Value Output, Control (Step and PI Control)
Relative Humidity:	Value Output, Control (Step and PI Control)
Temperature:	Value Output, Heating/Cooling Control (2-Point and PI Control) Alarms
Dew Point:	Value Output, Alarm
Air Pressure:	Value Output
Variable Air Volume (VAV):	Value Output, Control (PI Control only)

Please refer to the product's user manual for information on the function, operation, and installation of the room climate control.

Please note and consider the resolutions of the 2-byte data type (refer to the KNX specification).

Table of contents

Application Program

Manufacturer: Hugo Müller GmbH & Co KG, Karlstraße 90, D-78054 VS-Schwenningen
Program Name: ETS App TS10 GS10 GS20 GS70 knx
Installation: Add the device to your device list and open a new project. The ETS database is available for download on our website:

https://www.hugo-mueller.de/en/downloads/knx-product-database/

Technical Specifications

Connection voltage	via KNX bus voltage
Bus current	max. 25 mA (min. 25V)
Bus system	KNX
Sensors	particulate matter, VOC, relative humidity, temperature, dew point, air pressure
Particulate matter measurement range	0...50 µg/m³ - PM 2.5
VOC	0...5,000 µg/m³
Relative humidity measurement range	0...100%
Temperature measurement range	0...50°C
Absolute air pressure measurement range	300-1100 hPa
Protection class	IP 20 according to DIN EN 60529
Ambient temperature	0°C...+50°C
Certification mark	CE
Enclosure	self-extinguishing thermoplastic
Enclosure dimensions	80.5 x 80.5 x 17 mm
Mounting type	wall-mounted
Connection type	push-in terminal

Technical modifications reserved

Übersicht Parameter

Parameter	Subcategory Parameter	Description
Global Settings	Global Settings	General Settings: Enable - Disable, Send Operating State (including cycle time), Request Status (active/inactive, request with) Delayed transmission after bus voltage restoration in seconds.
Fine Particulate Matter	Fine Particulate Matter Sensor	Fine Particulate Matter Sensor Settings: Enable - Disable, Send Measurement Values, Measurement Correction, Report Sensor Errors, External Measurement.
	Fine Particulate Matter Controller	Fine Particulate Matter Controller Settings: Type (inactive, single-stage, two-stage, three-stage, PI), Control Variables (output format, switch and cyclical transmission), Threshold 1,2,3, Switch Command below/above Threshold, Control Variable, Lock Object
VOC	VOC Sensor	VOC Sensor Settings: Enable - Disable, Send Measurement Values, Measurement Correction, Report Sensor Errors, External Measurement.
	VOC Controller	VOC Controller Settings: Type (inactive, single-stage, two-stage, three-stage, PI), Control Variables (output format, switch and cyclical transmission), Threshold 1,2,3, Switch Command below/above Threshold, Control Variable, Lock Object
Relative Humidity	Relative Humidity Sensor	Relative Humidity Sensor Settings: Enable - Disable, Send Measurement Values, Measurement Correction, Report Sensor Errors, External Measurement.
	Relative Humidity Controller	Relative Humidity Controller Settings: Type (inactive, single-stage, two-stage, three-stage, PI), Control Variables (output format, switch and cyclical transmission), Hysteresis (symmetrical), Threshold 1,2,3, Switch Command below/above Threshold, Control Variable, Lock Object
Temperature	Temperature Sensor	Temperature Sensor Settings: Enable - Disable, Send Measurement Values, Measurement Correction, Report Sensor Errors, External Measurement.
	Temperature Alarms	Frost and Heat Alarm Settings: Enable - Disable, Send Measurement Values according to defined procedure and defined values.
	Temperature Controller	Temperature Controller Settings: Type (inactive, heating, cooling, heating & cooling), various Control Variables (additional stage and reference).
	Dew Point Alarm	Dew Point Alarm Settings: Enable - Disable, Send Measurement Values, Hysteresis (symmetrical), Switch Command on Alarm.
Air Pressure	Air Pressure Sensor	Air Pressure Sensor Settings: Enable - Disable, Send Measurement Values, Measurement Correction, Report Sensor Errors, External Measurement.
VAV Controller		VAV Controller Settings: Enable and Disable the various active PI controllers, Send Control Values according to defined procedure and defined values.

Kommunikationsobjekte

Nummer	Name	Function Text	Object Size	Flags	Datapoint type
1	Send '0' in operation	Output	1 Bit	--CT--	DPT_Boolean
1	Send '1' in operation	Output	1 Bit	--CT--	DPT_Boolean
2	Request status	Input	1 Bit	-WC---	DPT_Trigger
3	operating hours counter[s]	Output (read only)	4 Bytes	--CT--	DPT_signed value, time lag (s)
4	Request operating hours counter	Input	1 Bit	-WC---	DPT_Trigger
103	PM: particulate matter value [µg/m3]	Output	2 Bytes	--CT--	DPT_Value Air Quality
105	PM: request PM value	Input	1 Bit	-WC---	DPT_Trigger
106	PM: sensor error	Output	1 Bit	--CT--	DPT_Bool
108	PM: min value	Output	2 Bytes	--CT--	DPT_Value_AirQuality
109	PM: max value	Output	2 Bytes	--CT--	DPT_Value_AirQuality
110	PM: request min/max values	Input	1 Bit	-WC---	DPT_Trigger
111	PM: reset min/max values	Input	1 Bit	-WC---	DPT_Trigger
67	PMC: Particulate matter external value 1 [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
68	PMC: Particulate matter external value 2 [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
69	PMC: Control value (0...255)	Output	1 Byte	--CT--	DPT_Value_1_Ucount
69	PMC: Control value (0...100%)	Output	1 Byte	--CT--	DPT_Scaling
69	PMC: Scene (1...64)	Output	1 Byte	--CT--	DPT_SceneNumber
70	PMC: Control value level 1 (switching object)	Output	1 Bit	--CT--	DPT_Switch
70	PMC: Control value level 1 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
71	PMC: Control value level 2 (switching object)	Output	1 Bit	--CT--	DPT_Switch
71	PMC: Control value level 2 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
72	PMC: Control value level 3 (switching object)	Output	1 Bit	--CT--	DPT_Switch
72	PMC: Control value level 3 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
73	PMC: Base set point [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
75	PMC: Blocking object level 1	Input	1 Bit	-WC---	DPT_Enable
76	PMC: Blocking object level 2	Input	1 Bit	-WC---	DPT_Enable
77	PMC: Blocking object level 3	Input	1 Bit	-WC---	DPT_Enable
78	PMC: Blocking object	Input	1 Bit	-WC---	DPT_Enable
78	PMC: Blocking object	Input	1 Bit	-WC---	DPT_Enable

48	PMCMP: Particulate matter value 1 [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
49	PMCMP: Particulate matter value 2 [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
50	PMCMP: Particulate matter comparator output	Output	1 Bit	--CT--	DPT_Enable
5	PM-Sensor Alarm: Too low voltage	Output	1 Bit	--CT--	DPT_Bool
112	VOC: VOC value [µg/m3]	Output	2 Bytes	--CT--	DPT_Value_AirQuality
114	VOC: request VOC value	Input	1 Bit	-WC---	DPT_Trigger
115	VOC: sensor error	Output	1 Bit	--CT--	DPT_Bool
116	VOC: calibration	Input	1 Bit	-WC---	DPT_Start
117	VOC: min value	Output	2 Bytes	--CT--	DPT_Value_AirQuality
118	VOC: max value	Output	2 Bytes	--CT--	DPT_Value_AirQuality
119	VOC: request min/max values	Input	1 Bit	-WC---	DPT_Trigger
120	VOC: reset min/max values	Input	1 Bit	-WC---	DPT_Trigger
79	VOCC: VOC external value 1 [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
80	VOCC: VOC external value 2 [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
81	VOCC: control value (0...255)	Output	1 Byte	--CT--	DPT_Value_1_Ucount
81	VOCC: control value (0...100%)	Output	1 Byte	--CT--	DPT_Scaling
81	VOCC: scene (1...64)	Output	1 Byte	--CT--	DPT_SceneNumber
82	VOCC: control value level 1 (switching object)	Output	1 Bit	--CT--	DPT_Switch
82	VOCC: control value level 1 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
83	VOCC: control value level 2 (switching object)	Output	1 Bit	--CT--	DPT_Switch
83	VOCC: control value level 2 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
84	VOCC: control value level 3 (switching object)	Output	1 Bit	--CT--	DPT_Switch
84	VOCC: control value level 3 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
85	VOCC: base set point [µg/m3]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
87	VOCC: blocking object level 1	Input	1 Bit	-WC---	DPT_Enable
88	VOCC: blocking object level 2	Input	1 Bit	-WC---	DPT_Enable
89	VOCC: blocking object level 3	Input	1 Bit	-WC---	DPT_Enable
90	VOCC: blocking object	Input	1 Bit	-WC---	DPT_Enable
90	VOCC: blocking object	Input	1 Bit	-WC---	DPT_Enable
121	rH: humidity value [%]	Output	2 Bytes	--CT--	DPT_Value_AirQuality
122	rH: humidity value (1 byte) [%]	Output	1 Byte	--CT--	DPT_Scaling
123	rH: request humidity value	Input	1 Bit	-WC---	DPT_Trigger
124	rH: sensor error	Output	1 Bit	--CT--	DPT_Bool
126	rH: min value	Output	2 Bytes	--CT--	DPT_Value_AirQuality

127	rH: max value	Output	2 Bytes	--CT--	DPT_Value_AirQuality
128	rH: request min/max values	Input	1 Bit	-WC---	DPT_Trigger
129	rH: reset min/max values	Input	1 Bit	-WC---	DPT_Trigger
91	RHC: humidity external value 1 [%]	Input	1 Byte	-WC---	DPT_Scaling
92	RHC: external humidity value 2 [%]	Input	1 Byte	-WC---	DPT_Scaling
93	RHC: control value (0...255)	Output	1 Byte	--CT--	DPT_Value_1_Ucount
93	RHC: control value (0...100%)	Output	1 Byte	--CT--	DPT_Scaling
93	RHC: scene (1...64)	Output	1 Byte	--CT--	DPT_SceneNumber
94	RHC: control value level 1 (switching object)	Output	1 Bit	--CT--	DPT_Switch
94	RHC: control value level 1 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
95	RHC: control value level 2 (switching object)	Output	1 Bit	--CT--	DPT_Switch
95	RHC: control value level 2 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
96	RHC: control value level 3 (switching object)	Output	1 Bit	--CT--	DPT_Switch
96	RHC: control value level 3 (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
97	RHC: base set point [%]	Input	2 Bytes	-WC---	DPT_Value_AirQuality
98	RHC: base set point (1 byte) [%]	Input	1 Byte	-WC---	DPT_Scaling
99	RHC: blocking object level 1	Input	1 Bit	-WC---	DPT_Enable
100	RHC: blocking object level 2	Input	1 Bit	-WC---	DPT_Enable
101	RHC: blocking object level 3	Input	1 Bit	-WC---	DPT_Enable
102	RHC: blocking object	Input	1 Bit	-WC---	DPT_Enable
102	RHC: blocking object	Input	1 Bit	-WC---	DPT_Enable
51	HUMCMP: Absolute humidity value 1 [g/m3]	Input	2 Bytes	-WC---	DPT_Value_Humidity
51	HUMCMP: Relative humidity value 1 [%]	Input	1 Byte	-WC---	DPT_Scaling
52	HUMCMP: Temperature value 1 [°C]	Input	2 Bytes	-WC---	DPT_Value_Temp
53	HUMCMP: Absolute humidity value 2 [g/m3]	Input	2 Bytes	-WC---	DPT_Value_Humidity
53	HUMCMP: Relative humidity value 2 [%]	Input	1 Byte	-WC---	DPT_Scaling
54	HUMCMP: Temperature value 2 [°C]	Input	2 Bytes	-WC---	DPT_Value_Temp
55	HUMCMP: Humidity comparator output	Output	1 Bit	--CT--	DPT_Enable
130	T: temperature value [°C]	Output	2 Bytes	--CT--	DPT_Value_Temp
132	T: request temperature value	Input	1 Bit	-WC---	DPT_Trigger
133	T: sensor error	Output	1 Bit	--CT--	DPT_Bool
135	T: temperature min value	Output	2 Bytes	--CT--	DPT_Value_Temp
136	T: temperature max value	Output	2 Bytes	--CT--	DPT_Value_Temp
137	T: request min/max temperature values	Input	1 Bit	-WC---	DPT_Trigger

138	T: reset min/max temperature values	Input	1 Bit	-WC---	DPT_Trigger
16	T: heat alarm	Output	1 Bit	--CT--	DPT_Switch
17	T: frost alarm	Output	1 Bit	--CT--	DPT_Switch
18	RTC: external temperature value 1	Input	2 Bytes	-WC---	DPT_Value_Temp
19	RTC: external temperature value 2	Input	2 Bytes	-WC---	DPT_Value_Temp
20	RTC: comfort temperature	Input	2 Bytes	-WC---	DPT_Value_Temp
21	RTC: standby setback when heating	Input	2 Bytes	-WC---	DPT_Value_Temp
22	RTC: eco setback when heating	Input	2 Bytes	-WC---	DPT_Value_Temp
23	RTC: standby increment when cooling	Input	2 Bytes	-WC---	DPT_Value_Temp
24	RTC: eco increment when cooling	Input	2 Bytes	-WC---	DPT_Value_Temp
25	RTC: current set point temperature	Output	2 Bytes	--CT--	DPT_Value_Temp
26	RTC: comfort temperature +/- 0,1K	Input	1 Bit	-WC---	DPT_UpDown
27	RTC: comfort temperature +/- 0,5K	Input	1 Bit	-WC---	DPT_UpDown
28	RTC: standby setback when heating +/- 0,1K	Input	1 Bit	-WC---	DPT_UpDown
29	RTC: eco setback when heating +/- 0,1K	Input	1 Bit	-WC---	DPT_UpDown
30	RTC: standby increment when cooling +/- 0,1K	Input	1 Bit	-WC---	DPT_UpDown
31	RTC: eco increment when cooling +/- 0,1K	Input	1 Bit	-WC---	DPT_UpDown
32	RTC: HVAC Mode: 1=comf, 2=stdb, 3=eco	Input	1 Byte	-WC---	DPT_HVACMode
33	RTC: HVAC Mode: 1=comf, 2=stdb, 3=eco	Output	1 Byte	--CT--	DPT_HVACMode
34	RTC: comfort mode enable	Input	1 Bit	-WC---	DPT_Trigger
35	RTC: standby mode enable	Input	1 Bit	-WC---	DPT_Trigger
36	RTC: eco mode enable	Input	1 Bit	-WC---	DPT_Trigger
37	RTC: status heating	Output	1 Bit	--CT--	DPT_Switch
38	RTC: status cooling	Output	1 Bit	--CT--	DPT_Switch
39	RTC: control value main level heating	Output	1 Byte	--CT--	DPT_Value_1_Ucount
39	RTC: control value main level heating	Output	1 Byte	--CT--	DPT_Scaling
39	RTC: control value main level heating	Output	1 Bit	--CT--	DPT_Switch
39	RTC: control value main level heating	Output	1 Bit	--CT--	DPT_Switch
40	RTC: control value extra level heating	Output	1 Byte	--CT--	DPT_Value_1_Ucount
40	RTC: control value extra level heating	Output	1 Byte	--CT--	DPT_Scaling
40	RTC: control value extra level heating	Output	1 Bit	--CT--	DPT_Switch
40	RTC: control value extra level heating	Output	1 Bit	--CT--	DPT_Switch
41	RTC: control value main level cooling	Output	1 Byte	--CT--	DPT_Value_1_Ucount
41	RTC: control value main level cooling	Output	1 Byte	--CT--	DPT_Scaling

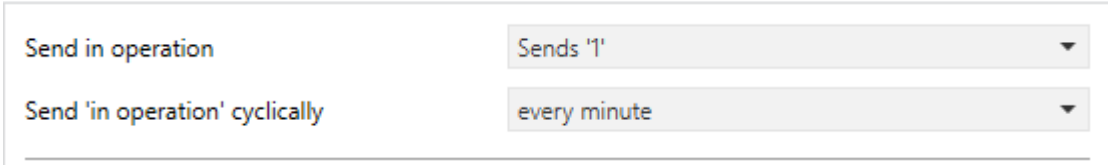
41	RTC: control value main level cooling	Output	1 Bit	--CT--	DPT_Switch
41	RTC: control value main level cooling	Output	1 Bit	--CT--	DPT_Switch
42	RTC: control value extra level cooling	Output	1 Byte	--CT--	DPT_Value_1_Ucount
42	RTC: control value extra level cooling	Output	1 Byte	--CT--	DPT_Scaling
42	RTC: control value extra level cooling	Output	1 Bit	--CT--	DPT_Switch
42	RTC: control value extra level cooling	Output	1 Bit	--CT--	DPT_Switch
43	RTC: guide value [°C]	Input	2 Bytes	-WC---	DPT_Value_Temp
44	RTC: blocking object heating	Input	1 Bit	-WC---	DPT_Enable
45	RTC: blocking object cooling	Input	1 Bit	-WC---	DPT_Enable
46	RTC: blocking object extra level heating	Input	1 Bit	-WC---	DPT_Enable
47	RTC: blocking object extra level cooling	Input	1 Bit	-WC---	DPT_Enable
56	DEWP: dew point temperature [°C]	Output	2 Bytes	--CT--	DPT_Value_Temp
57	DEWP: dew point alarm enabled (switching object)	Output	1 Bit	--CT--	DPT_Switch
57	DEWP: dew point alarm enabled (priority)	Output	2 Bit	--CT--	DPT_Switch_Control
57	DEWP: dew point alarm enabled (0...100%)	Output	1 Byte	--CT--	DPT_Scaling
57	DEWP: dew point alarm enabled (0...255)	Output	1 Byte	--CT--	DPT_Value_1_Ucount
57	DEWP: dew point alarm enabled scene (1...64)	Output	1 Byte	--CT--	DPT_SceneNumber
58	DEWP: request dew point temperature	Input	1 Bit	-WC---	DPT_Trigger
59	P: absolute air pressure [Pa]	Output	2 Bytes	--CT--	DPT_Value_Pres
60	P: relative air pressure [Pa]	Output	2 Bytes	--CT--	DPT_Value_Pres
61	P: air pressure sensor error	Output	1 Bit	--CT--	DPT_Bool
62	P: request absolute air pressure	Input	1 Bit	-WC---	DPT_Trigger
63	P: request relative air pressure	Input	1 Bit	-WC---	DPT_Trigger
64	VAVC: control value (0...255)	Output	1 Byte	--CT--	DPT_Value_1_Ucount
64	VAVC: control value (0...100%)	Output	1 Byte	--CT--	DPT_Scaling
65	VAVC: external object (0…100%)	Input	1 Byte	-WC---	DPT_Scaling
66	VAVC: blocking object	Input	1 Bit	-WC---	DPT_Enable

Communicationflags

Flag	Name	Meaning
C	Communication	Object can communicate
R	Read	Object status can be queried (ETS, display, etc.)
W	Write	Object can receive values
T	Transfer	Object can send values
U	Update	Object can request a value from another bus participant. The response is interpreted as a write command and updates the value of the communication object. Typically used to query current values from external sensors after bus voltage restoration.

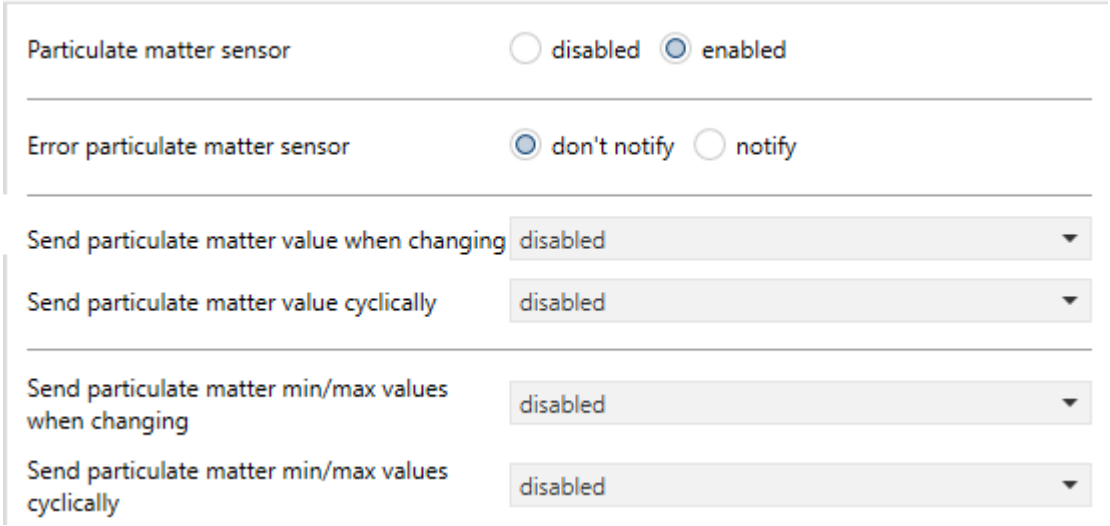
1. Globale Settings

(Picture shows changed basic settings)



Description	Options	Description
Send 'In Operation'	Inactive, Sends '0', Sends '1'	No response, Sends 'In Operation' (0 or 1) in an adjustable cycle (see following parameter)
Cycle Time [s]	Every minute - once a day	Setting of the transmission interval for sending the 'In Operation' status in seconds
Transmission Delay after Bus Voltage Recovery in ...s	2 to 255 seconds	Setting for the transmission delay after bus voltage recovery in seconds

2. Particulate matter sensor



TVOC assessment

Level	Concentration [µg/m³]	Hygienic rating	Recommendation
1	< 300	uncritical	target value
2	300 – 1.000	still uncritical	ventilation / airing recommended
3	1.000 – 3.000	remarkable	intensified ventilation recommened
4	3.000 – 10.000	critical	intensified ventilation necessary
5	10.000 – 25.000	unacceptable	intense ventilation necessary

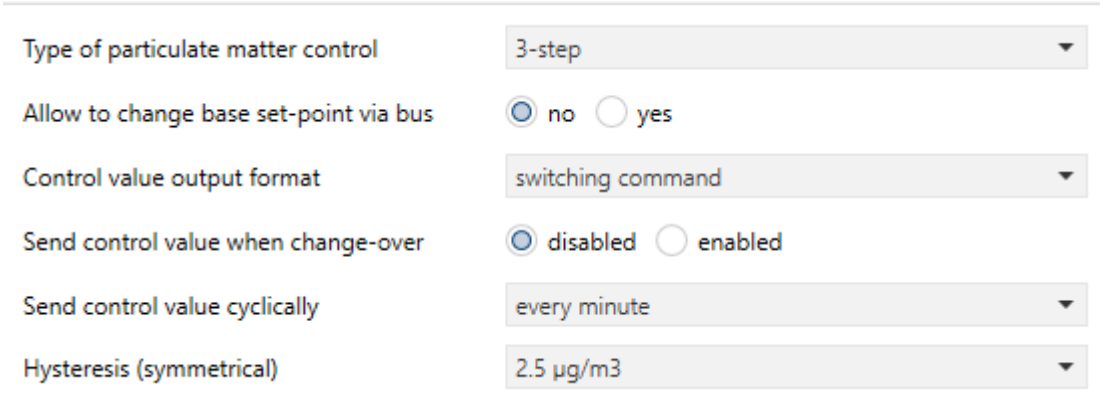
Source:
Bundesgesundheitsblatt – Gesundheitsforschung Gesundheitsschutz 2007, 50:990–1005, Springer Medizin Verlag 2007. (DOI 10.1007/s00103-007-0290-y)

Particulate matter referance value

	$PM_{2,5}$
Annual avarage value (*EU-policy 2008/50/EG*)	from 2020: 20 µg/m³
Annual avarage value(*WHO*)	10 µg/m³
24h avarage value (*WHO*)	25 µg/m³

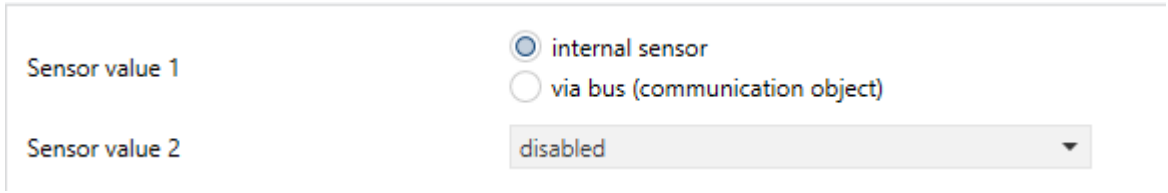
Designation	Options			Description
Particulate matter Sensor	Inactive			Particulate matter Sensor deactivated
	Active	Error particulate matter Sensor	Report	If no new measured values are provided by the sensor for more than 10 minutes, the sensor error is reported.
			Do not report	No output of sensor errors.
		Calibration via bus	No	No reaction
			Yes	Allow calibration via bus.
		Send particulate matter value on change	Inactive	No response.
			For a change of 0.5 - 10.0 µg/m³.	Sending the current measured value if it has changed from the last transmission by at least the set value.
		Send particulate matter value cyclically	Inactive	No reaction.
			Every inute – once a day	Sending the current measured value according to the set cycle
		Send fine dust min/max values on change	Inaktiv	No reaction.
			For a change of 0.5 - 10.0 µg/m³.	Sending the current min/max value if it has changed from the last transmission by at least the set value.
		Send particulate min/max values cyclically	Inactive	No reaction.
			Every minute – once a day	Sending the current min/max value according to the set cycle.

3. Particulate matter control



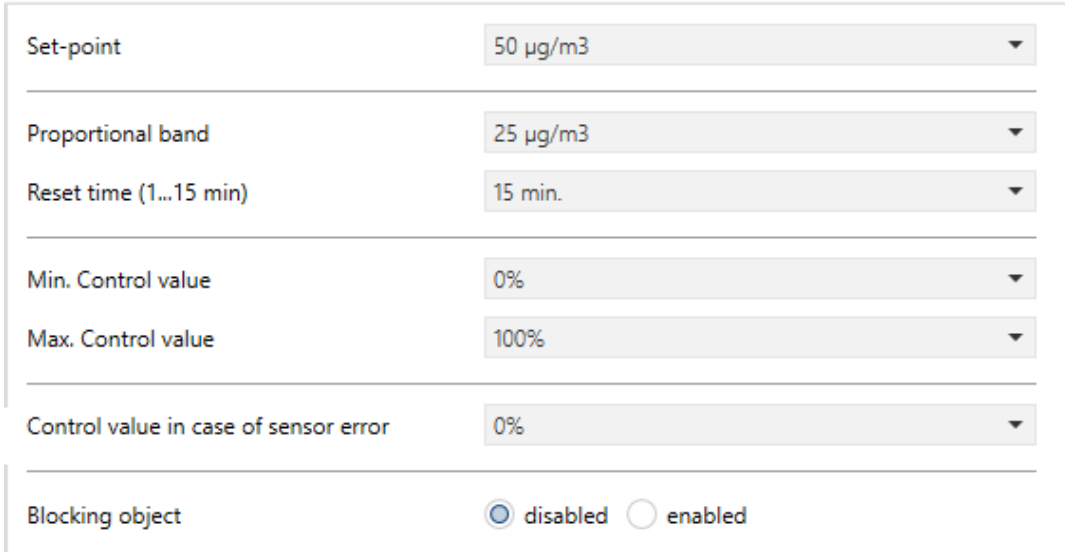
Designation	Options		Description
Control type	Disabled 1-step 2-step 3-step PI		Relative humidity control disabled. One threshold available – see description chapter 5.2. Two thresholds available – see description chapter 5.2. Three thresholds available – see description chapter 5.2. PI-Control – see description chapter 5.3.
	Control value output format	Switching command Priority Percent Byte Scene	A switching telegram is sent. There is one object available for every stage. A priority telegram is sent. There is one object available for every stage. A percentage value is sent. All steps are sending via one object. A byte value is sent. All steps are sending via one object. A scene value is sent. All steps are sending via one object.
	Send control value when change-over	Disabled Enabled	No function. When exceeding or falling below a threshold, a defined object is sent.
	Send control value when changing (*PI control only*)	Disabled If change above 1 – 25%.	No function. If there is a change, the recent control value is sent.
	Send control value cyclically	Disabled Every minute up to once a day	No function. Cyclic sending of the recent control value.
	Hysteresis (symmetrical) (*single-stage, two-stage, three-stage*)	0.5 - 10.0 µg/m³.	The hysteresis can prevent a frequent switching for fast and small changing values.
Allow to change base set point via bus	No Yes		Does not allow changes of base set point via bus. Allows changes of base set point via bus.

3.1 Particulate matter – Actual value recording



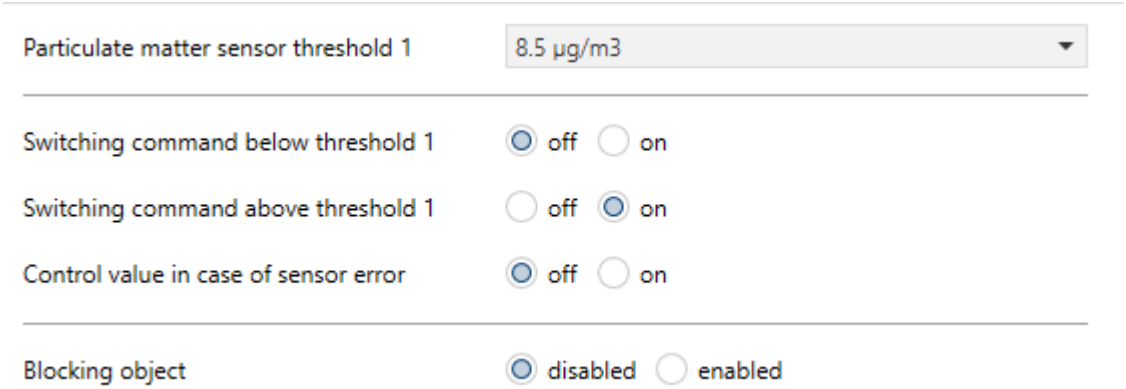
Designation	Options	Description
Sensor Value 1	Internal sensor, Over bus (communication object)	Value of the internal fine dust sensor is used. Value sent over the bus (communication object) is used.
Sensor Value 2	Inactive, Internal sensor, Over bus (communication object)	No reaction. Value of the internal fine dust sensor is used. Value sent over the bus (communication object) is used.

3.2 PI-Control for particulate matter



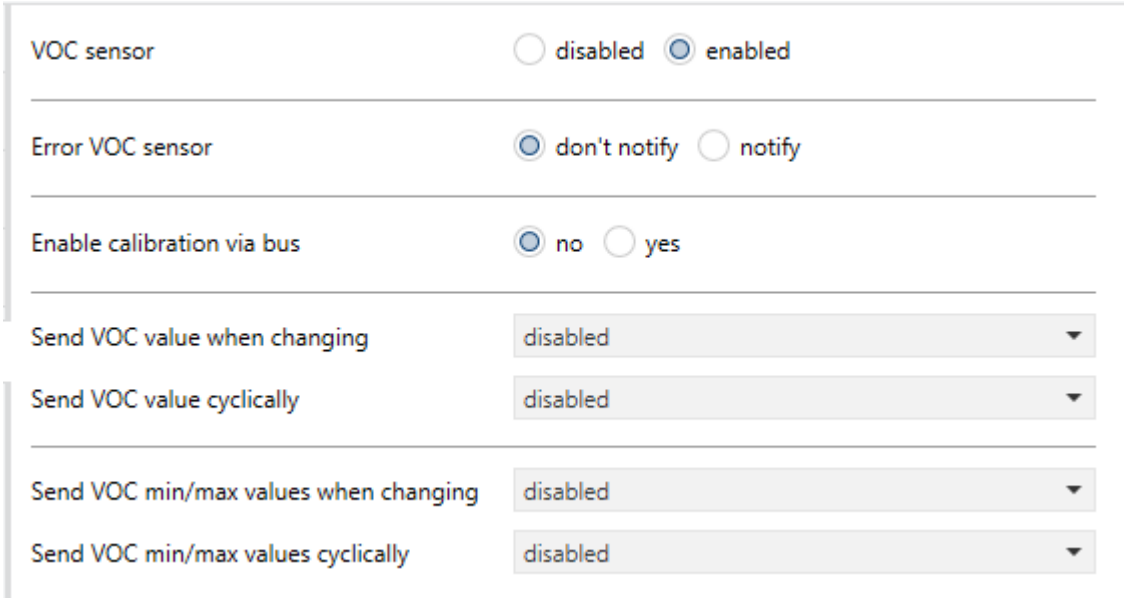
Designation	Options		Description
Set point	5-50 µg/m³.		Definition of the setpoint.
Proportional band	100 to 2000 ppm		Definition of the proportional band.
Reset time (15…240 min.)	15 to 240 Min.		Definition of the reset time.
Min. control value	0% to 95%		Definition of the minimal control value. The control value is limited to this minimum value.
Max. control value	5% to 100%		Definition of the maximum control value. The control value is limited to this maximum value.
Control value in case of sensor error	0% to 100%		Definition of the control value in case of sensor error.
Blocking object	Inactive Active		No function. If the blocking object is activated, the reception of an external object can prevent the sending of the manipulated variable. Thereby an undesirable starting of actors can be prevented.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. A switching command is sent when blocking.
	Percent when blocking (0…100%)	Selection: 0 to 100%	Definition of the percentage value when blocking.

3.3 Switching commands / priority particulate matter - thresholds 1/2/3



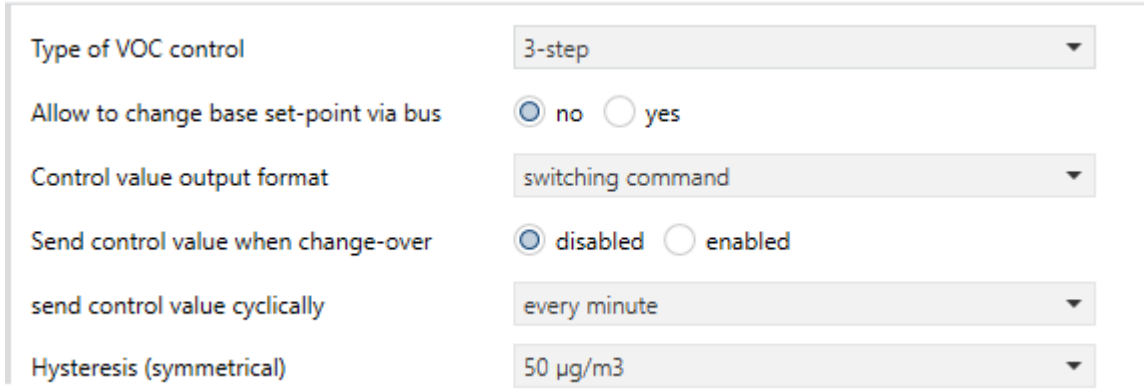
Designation	Options		Description
Particulate matter threshold 1/2/3	2-25 µg/m³.		Definition of threshold 1, 2 or 3 for the particulate matter value.
Switching command below threshold 1/2/3	off on		No function below threshold 1/2/3. Switching command below threshold 1/2/3.
Switching command above threshold 1/2/3	off on		No function above threshold 1/2/3. Switching command below threshold 1/2/3.
Control value in case of sensor error	off on		No function in case of sensor error. Switching command in case of sensor error.
Blocking object	Disabled Enabled		No function.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. A switching command is sent when blocking.
	Switching command when blocking	off on	Definition of the switching command when blocking.

4. VOC Sensor



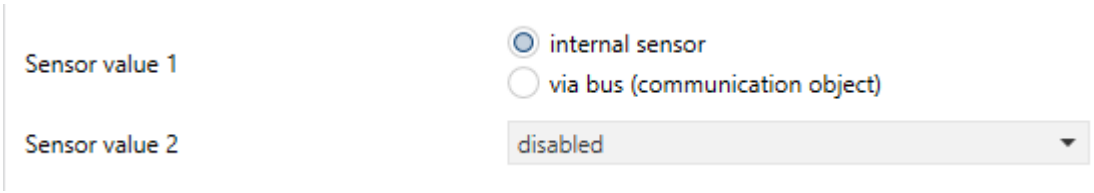
Designation	Options			Description
VOC Sensor	Inactive Active	Error VOC Sensor	Report Do not report	VOC Sensor deactivated If no new measured values are provided by the sensor for more than 10 minutes, the sensor error is reported. No output of sensor errors.
		Calibration via bus	No Yes	No reaction Allow calibration via bus.
		Send VOC value on change	Inactive For a change of 0.5 - 10.0 µg/m³.	No response. Sending the current measured value if it has changed from the last transmission by at least the set value.
		Send VOC value cyclically	Inactive Every minute – once a day	No reaction. Sending the current measured value according to the set cycle
		Send VOC min/max values on change	Inactive For a change of 10 - 500 µg/m³.	No reaction. Sending the current min/max value if it has changed from the last transmission by at least the set value.
		Send particulate min/max values cyclically	Inactive Every minute – once a day	No reaction. Sending the current min/max value according to the set cycle.

5. VOC Control



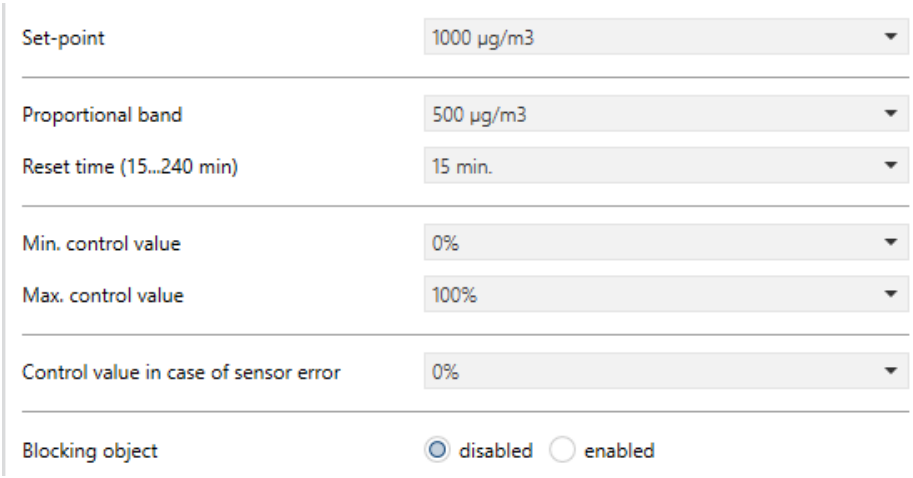
Designation	Options		Description
Set point	400 to 2000 ppm		Definition of the setpoint.
Proportional band	100 to 2000 ppm		Definition of the proportional band.
Reset time (15…240 min.)	15 to 240 Min.		Definition of the reset time.
Min. control value	0% to 95%		Definition of the minimal control value. The control value is limited to this minimum value.
Max. control value	5% to 100%		Definition of the maximum control value. The control value is limited to this maximum value.
Control value in case of sensor error	0% to 100%		Definition of the control value in case of sensor error.
Blocking object	Inactive Active		No function. If the blocking object is activated, the reception of an external object can prevent the sending of the manipulated variable. Thereby an undesirable starting of actors can be prevented.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. A switching command is sent when blocking.
	Percent when blocking (0…100%)	Selection: 0 to 100%	Definition of the percentage value when blocking.

5.1 VOC Control – Actual value source



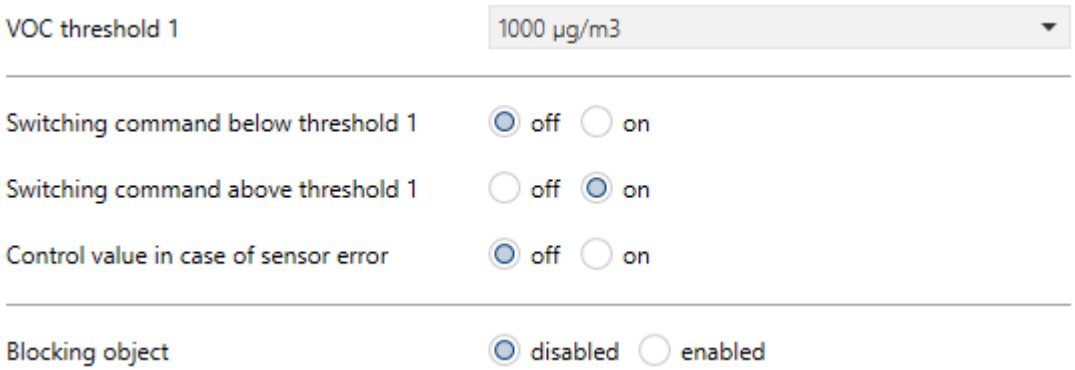
Designation	Options	Description
Sensor value 1	Internal sensor Via bus (communication object)	Value of the internal humidity sensor is used. Value which is sent via bus (communication object) is used.
Sensor value 2	Disabled Internal sensor Via bus (communication object)	No function. Value of the internal humidity sensor is used. Value which is sent via bus (communication object) is used.

5.2 PI-Control for VOC



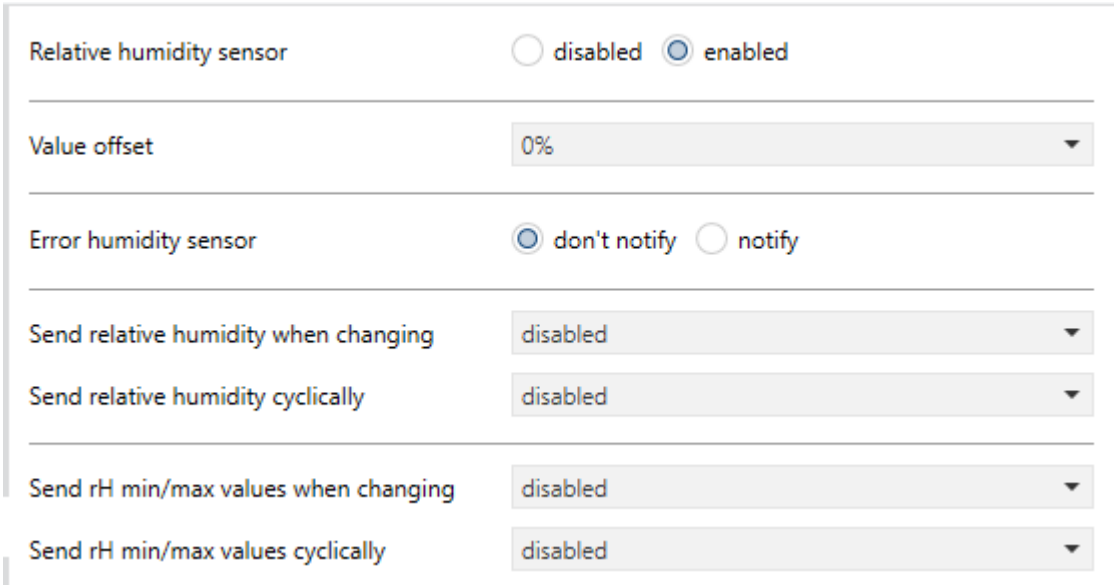
Designation	Options		Description
Set point	100-3000 µg/m³.		Definition of the setpoint.
Proportional band	100 to 1000 µg/m³.		Definition of the proportional band.
Reset time (15…240 min.)	15 to 240 Min.		Definition of the reset time.
Min. control value	0% to 95%		Definition of the minimal control value. The control value is limited to this minimum value.
Max. control value	5% to 100%		Definition of the maximum control value. The control value is limited to this maximum value.
Control value in case of sensor error	0% to 100%		Definition of the control value in case of sensor error.
Blocking object	Inactive Active		No function. If the blocking object is activated, the reception of an external object can prevent the sending of the manipulated variable. Thereby an undesirable starting of actors can be prevented.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. A switching command is sent when blocking.
	Percent when blocking (0…100%)	Selection: 0 to 100%	Definition of the percentage value when blocking.

5.3 Switching commands and priority VOC control – Threshold 1/ 2/ 3



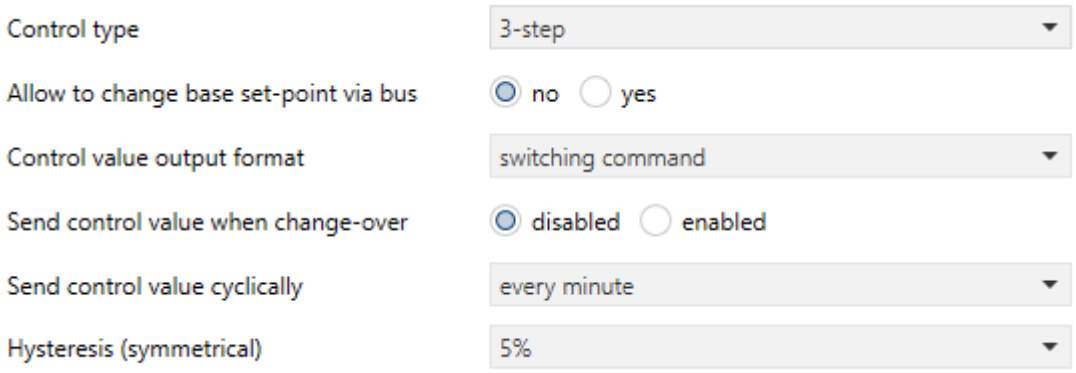
Designation	Options		Description
VOC threshold 1/2/3	100-3000 µg/m³.		Definition of threshold 1, 2 or 3 for the particulate matter value.
Switching command below threshold 1/2/3	off on		No function below threshold 1/2/3. Switching command below threshold 1/2/3.
Switching command above threshold 1/2/3	off on		No function above threshold 1/2/3. Switching command below threshold 1/2/3.
Control value in case of sensor error	off on		No function in case of sensor error. Switching command in case of sensor error.
Blocking object	Disabled Enabled		No function.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. A switching command is sent when blocking.
	Switching command when blocking	off on	Definition of the switching command when blocking.

6. Relative humidity sensor



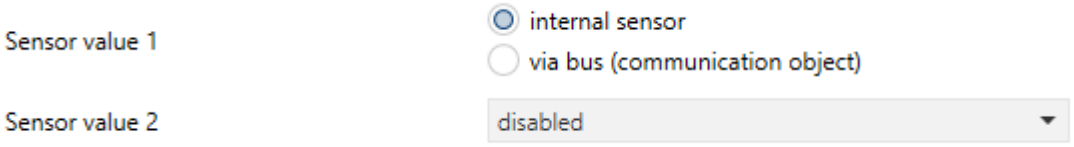
Designation	Options			Description
Relative humidity sensor	Inactive Active	Error humidity sensor	notify don't notify	Relative humidity sensor disabled. If there are no new values provided from the sensor for more than 10 minutes, the sensor failure will be reported. No sensor errors will be reported.
		Send relative humidity when changing	Disabled If change above 1% – 25%	No function. The new value is sent if the difference between old and new value is above the defined sending threshold.
		Send relative humidity cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent value.
		Send rH min/max values when changing	Disabled If change above 1% – 25%	No function. The min/max value is sent if the difference between old and new value is above the defined sending threshold
		Send rH min/max values cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the min/max values.
Value offset	-5% to +5% ppm			The value is adjusted by this offset. A correction might be necessary in different causes. (e.g. sensor is placed at an unfavorable position, next to a window).

7. Relative humidity control



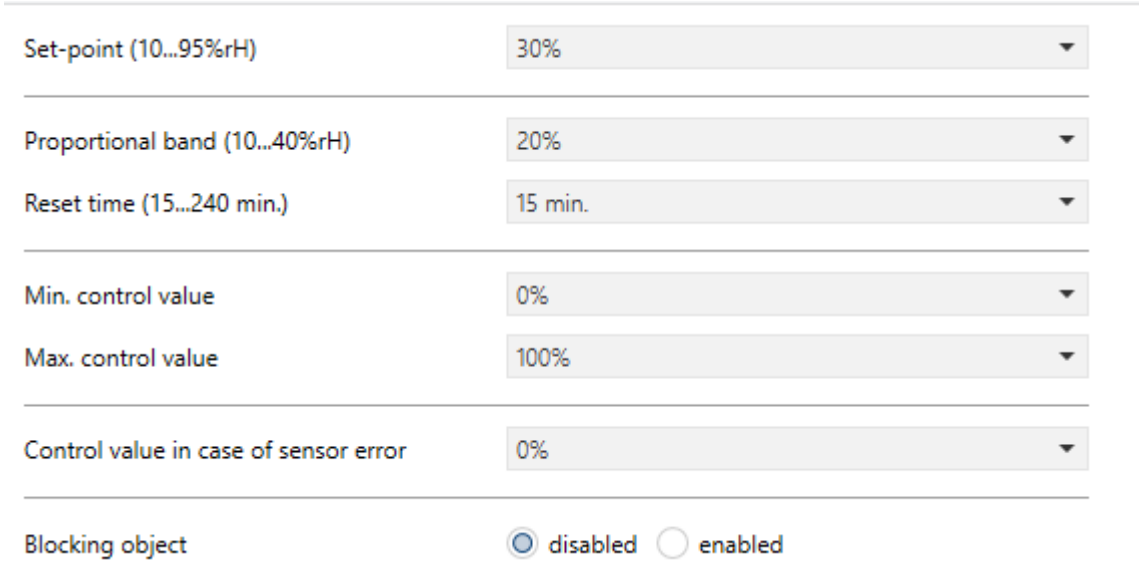
Designation	Options		Description	
Control type	Disabled 1-step 2-step 3-step PI		Relative humidity control disabled. One threshold available – see description chapter 5.2. Two thresholds available – see description chapter 5.2. Three thresholds available – see description chapter 5.2. PI-Control – see description chapter 5.3.	
	Control value output format	Switching command Priority Percent Byte Scene	A switching telegram is sent. A priority telegram is sent. A percentage value is sent. A byte value is sent. A scene value is sent.	There is one object available for every stage. There is one object available for every stage. All steps are sending via one object. All steps are sending via one object. All steps are sending via one object.
	Send control value when change-over	Disabled Enabled	No function. When exceeding or falling below a threshold, a defined object is sent.	
	Send control value when changing (*PI control only*)	Disabled If change above 1% … 25%	No function. If there is a change, the recent control value is sent.	
	Send control value cyclically	Disabled Every two minutes up to once a day	No function. Cyclic sending of the recent control value.	
	Hysteresis (symmetrical) (*single-stage, two-stage, three-stage*)	1% to 10%	The hysteresis can prevent a frequent switching for fast and small changing values.	
Allow to change base set point via bus	No Yes		Does not allow changes of base set point via bus. Allows changes of base set point via bus.	

7.1 Relative humidity control – Actual value source



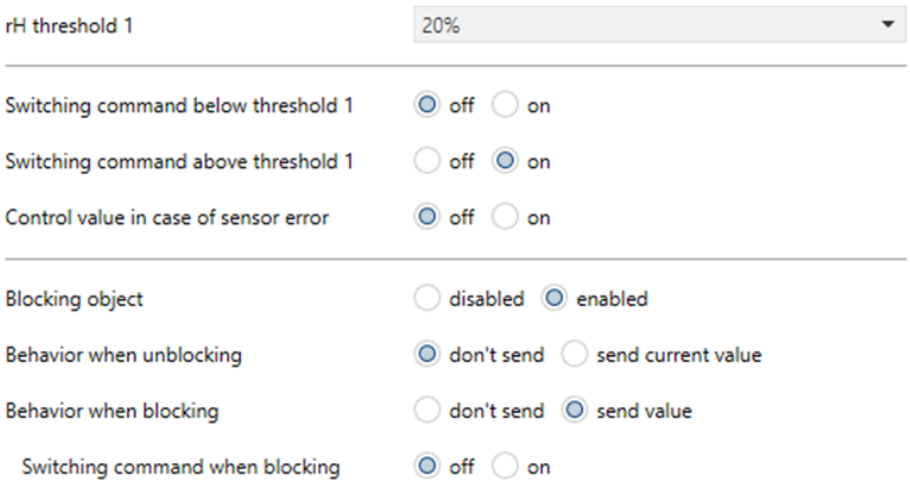
Designation	Options	Description
Sensor value 1	Internal sensor Via bus (communication object)	Value of the internal humidity sensor is used. Value which is sent via bus (communication object) is used.
Sensor value 2	Disabled Internal sensor Via bus (communication object)	No function. Value of the internal humidity sensor is used. Value which is sent via bus (communication object) is used.

7.2 PI-Control for relative humidity



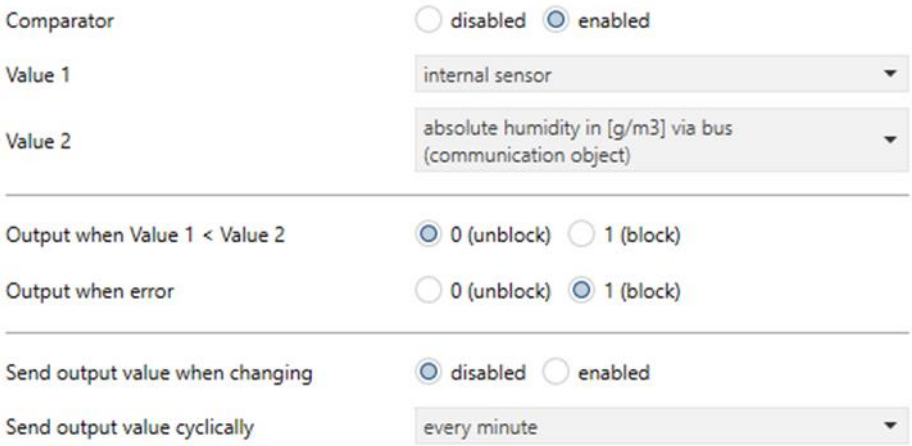
Designation	Options		Description
Set point	10% to 95% relative humidity		Definition of the set point.
Proportional band	10% to 40% relative humidity		Definition of the proportional band.
Reset time	15 to 240 min.		Definition of the reset time.
Min. control value	0% to 95%		Definition of the minimal control value. The control value is limited to this minimum value.
Max. control value	5% to 100%		Definition of the maximum control value. The control value is limited to this maximum value.
Control value in case of sensor error	0% to 100%		Definition of the control value in case of sensor error.
Blocking object	Disabled Enabled		No function. If the blocking object is activated, the reception of an external object can prevent the sending of the manipulated variable. Thereby an undesirable starting of actors can be prevented.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. The recent value is sent when blocking.
	Percent when blocking	Selection: 0% to 100%	Definition of the percentage value when blocking.

7.3 Switching commands and priority relative humidity control – Threshold 1 / 2 / 3



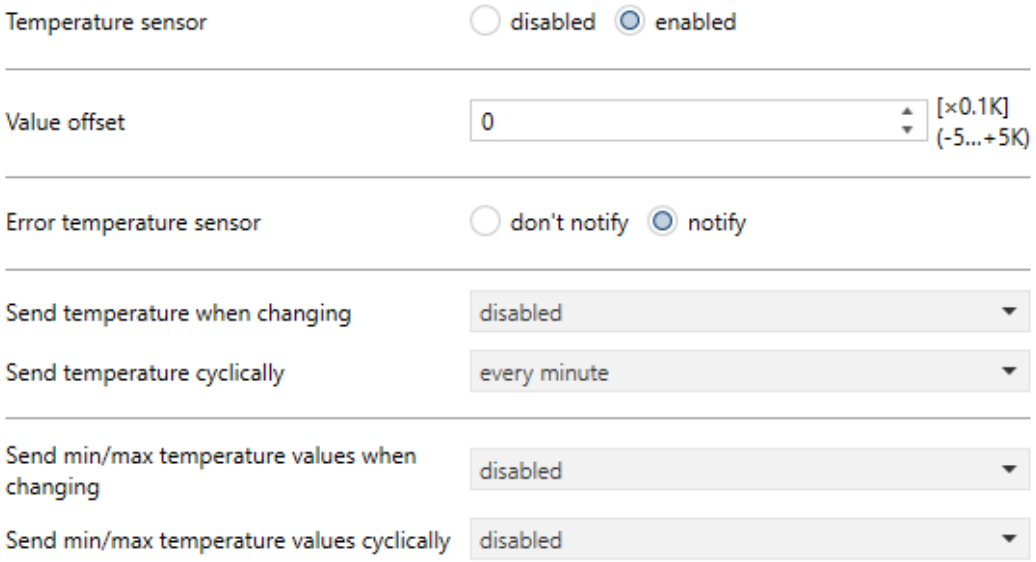
Designation	Options		Description
rF threshold 1/2/3	20% to 50%		Definition of threshold 1, 2 or 3 for the relative humidity value.
Switching command below threshold 1/2/3	off on		If measured value is below threshold 1/2/3, switching command will not be send. If measured value is below threshold 1/2/3, switching command will be send.
Switching command above threshold 1/2/3	off on		If measured value is above threshold 1/2/3, switching command will not be send. If measured value is above threshold 1/2/3, switching command will be send.
Control value in case of sensor error	off on		If sensor error, a switching command will not be send. If sensor error, a switching command will be send.
Blocking object	Disabled Enabled		No function.
	Behavior when unblocking	Don't send Send recent value	There is no control value sent when unblocking. The recent value is sent when unblocking.
	Behavior when blocking	Don't send Send value	There is no control value sent when blocking. A switching command is sent when blocking.
	Switching command when blocking	off on	Definition of the switching command when blocking.

8. Humidity comparator



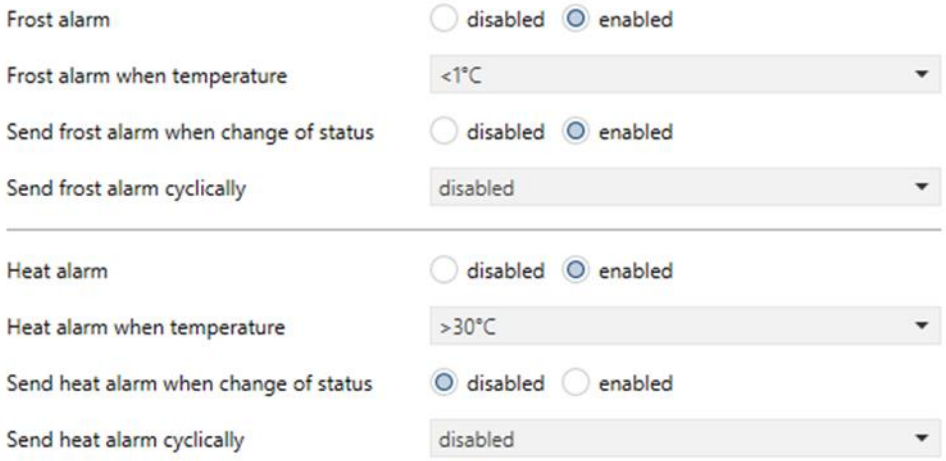
Designation	Options		Description
Comparator	Disable Enable		No function. If comparator is enabled two rH values can be compared and selected which has a higher priority.
	Value 1 / 2	Internal Sensor Absolute humidity in [g/m³] via bus Relative humidity in [%] and temperature in [°C] via bus	Internal Sensor is used. Absolute humidity value via bus and a single communication object is used. Relative humidity and temperature value via bus and two communication objects is used
	Output when Value 1 < Value 2	0 1	Unblock Block
	Output when error	0 1	Unblock Block
	Send output when changing	Disabled Enabled	No function. Output value is sent when changing
	Send output value cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent value.

9. Temperature sensor



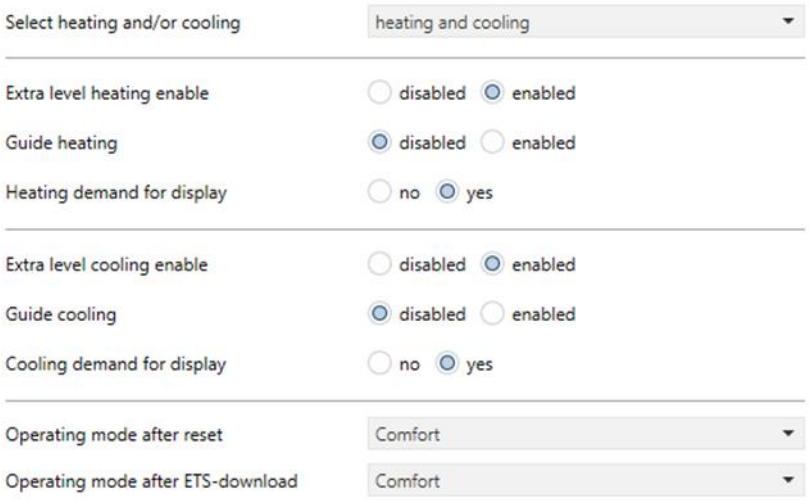
Designation	Options			Description
Temperature Sensor	Disabled Enabled			Temperature sensor disabled. If there are no new values provided from the sensor for more than 10 minutes, a sensor failure will be reported.
		Error Temperature sensor	Notify Don't notify	No report on sensor failure.
		Send temperature when changing	Disabled Change from 0,1 K – 10,0 K	No function. The new value is sent if the difference between old and new value is above the defined sending threshold.
		Send temperature cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent value.
		Send min/max temperature values when changing	Disabled If change above 0,1K – 10,0K	No function. The min/max values are sent if the difference between old and new value is above the defined sending threshold
		Send min/max temperature values cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the min/max values.
Value offset	-5 K to + 5 K			The value is adjusted by this offset. A correction might be necessary in different causes. (e.g. sensor is placed at an unfavorable position, next to a window.

10. Temperature alarms



Designation	Options		Description
Frost alarm	Disabled Enabled		No function. If the alarm function is activated an alarm in the form of an object is sent when the temperature falls below a defined temperature threshold for frost alarm.
	Frost alarm when temperature	< 1 °C to < 10 °C	When falling below the defined temperature the object frost alarm is sent.
	Send frost alarm when change of status	Disabled Enabled	No function. If there is a change the recent control value is sent.
	Send frost alarm cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent control value.
Heat alarm	Disabled Enabled		No function. If the alarm function is activated an alarm in the form of an object is sent when the temperature exceeds a defined temperature threshold for heat alarm.
	Heat alarm when temperature	> 20 °C to > 30 °C	When exceeding the defined temperature, the object heat alarm is sent.
	Send heat alarm when change of status	Disabled Enabled	No function. If there is a change the recent control value is sent.
	Send heat alarm cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent control value.

11. Temperature Control



PI control: A PI control is a constant control that comprises a proportional part (P-part) and an integral share (I-share). The size of the P-part is indicated in Kelvin, the I-share in minutes. At a constant PI control, the manipulated variables are operated in proportional steps up to a maximum value.

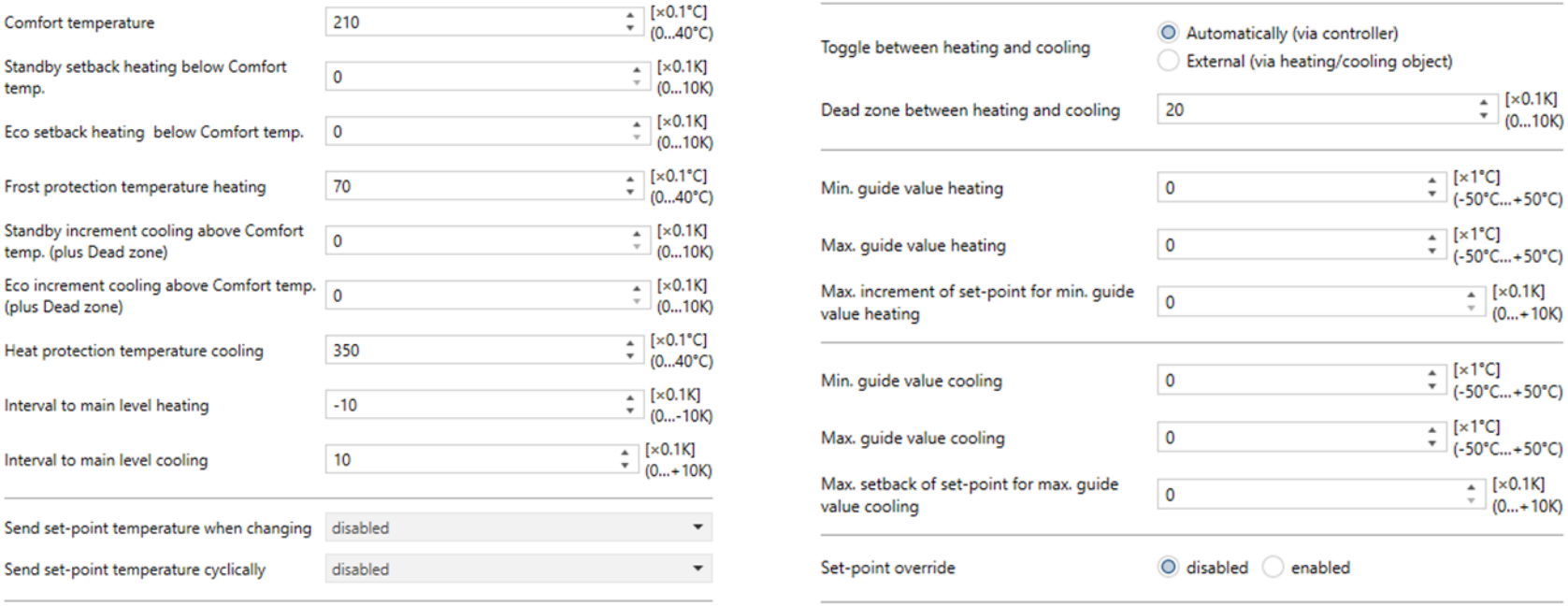
2-stage-control: A two-stage control only sends two conditions for the manipulated variable, on and off. The control turns on when falling below a desired temperature and turns off when exceeding it. Set point and switching hysteresis are defined in advance.

Main level and Extra level: In addition to the main level (e.g. underfloor heating) an extra level (e.g. electric heating) can be helpful for slow systems controlled by main level. This can shorten in the mentioned example the slow heat-up phase of an underfloor heating. You can choose between a PI or two-stage controller for the additional object.

Designation	Options		Description
Select heating and/or cooling	Disabled Heating Cooling Heating and cooling		Temperature controller disabled. Operating mode: Heating only. Operating mode: Cooling only. Operating mode: Heating and cooling.
	Extra level heating / Extra level cooling	Disabled Enabled	Extra level heating / cooling disabled. In addition to the main level (e.g. underfloor heating) an extra level (e.g. electric heating) can be helpful for lazy systems. It can shorten the slow heat-up phase of an underfloor heating. You can choose between a PI or two-stage controller for the additional object.
	Guide heating / Guide cooling	Disabled Enabled	Guide heating / cooling disabled. With the parameter guiding it is possible to adjust the set point linearly depending on any reference variable which is captured through an external sensor. In general, an outdoor temperature reset control is realized. With an appropriate parameterization, the constant raising or lowering of the set value is possible. The parameterization is carried-out together with the definition of the set points.
	Heating demand for display / Cooling demand for display	No Yes	Status object is disabled. This object is a status object to send the status of heating / cooling (active or not). It can be used to visualize the status on a display.
	Operating mode after reset	Comfort Eco Standby Frost-/heat protection Last (saved)	Active Operating mode after rest: comfort Active Operating mode after rest: Eco Active Operating mode after rest: Standby Active Operating mode after rest: Frost-/ heat protection Active Operating mode after rest: activates the last saved one

	Operating mode after ETS-download	Comfort Eco Standby Frost-/heat protection	Active Operating mode after ETS download: comfort Active Operating mode after ETS download: Eco Active Operating mode after ETS download: Standby Active Operating mode after ETS download: Frost-/ heat protection

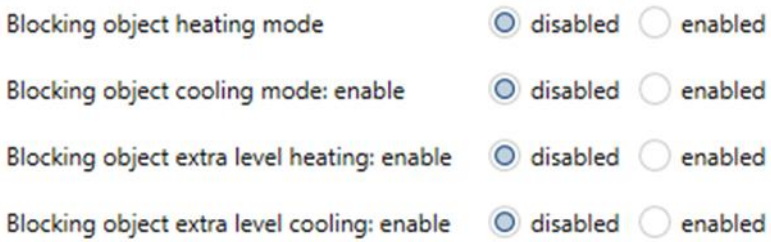
11.1 Temperture control – set points



Designation	Options		Description
Comfort temperature	0° to 40°C	In 0,1 °C Steps	Definition of the comfort temperature.
Standby setback heating below Comfort temp.	0 K to 10 K	In 0,1 K Steps	Definition of the value by which the comfort temperature is to be lowered for standby temperature in Kelvin.
Eco setback heating below Comfort temp.	0 K to 10 K	In 0,1 K Steps	Definition of the value by which the comfort temperature is to be lowered for eco temperature in Kelvin.
Frost protection temperature heating	0° to 40°C	In 0,1 °C Steps	Definition of the frost protection temperature for heating.
Standby increment cooling above Comfort temp. (plus Dead Zone)	0 K to 10 K	In 0,1 K Steps	Definitions of the cooling temperature in standby mode above the comfort temperature, plus Dead Zone
Eco increment cooling above Comfort temp. (plus Dead Zone)	0 K to 10 K	In 0,1 K Steps	Definitions of the cooling temperature in eco mode above the comfort temperature, plus Dead Zone
Heat protection temperature cooling	0° to 40°C	In 0,1 °C Steps	Definition of the heat protection temperature for cooling.
Interval to main level heating	0 K to -10 k	In 0,1 K Steps	Difference between man level heating temperature and extra level heating temperature
Interval to main level cooling	0 K to 10 k	In 0,1 K Steps	Difference between main level cooling temperature and extra level cooling temperature
Send set-point temperature when changing	Disabled Enabled		No function. If there is a change the recent control value is sent.

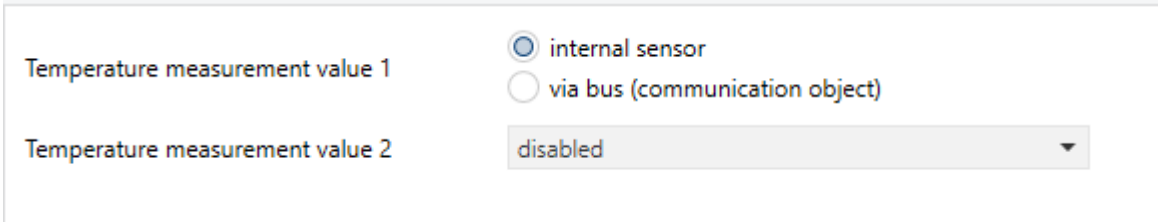
Send set-point temperature cyclically	Disabled Every minute – once a day		No function. Cyclic Sending of the recent control value.
Toggle between heating and cooling	Automatically (via controller) External (via heating/cooling object)		Automatically toggle between heating and cooling External heating/cooling object is used.
Dead zone between heating and cooling	0 to 10K	In 0,1 K Steps	Definition of the dead zone between heating and cooling. Recent value < Set point = Heating Recent value > Set point + dead zone = Cooling
Min. guide value heating / cooling	- 50°C to +50°C	In 1°C Steps	Lower guide value for heating / cooling
Max. guide value heating / cooling	- 50°C to +50°C	In 1°C Steps	Upper guide value for heating / cooling
Max. increment / setback of set-point for min. / max. guide value heating / cooling	0 K to 10 K	In 1K Steps	Incrementation / setback of when the guide value is reached
Set-point override	Disabled Enabled		No function. Allows to override the setpoint via communication object.

11.2 Temperature Control – blocking objects



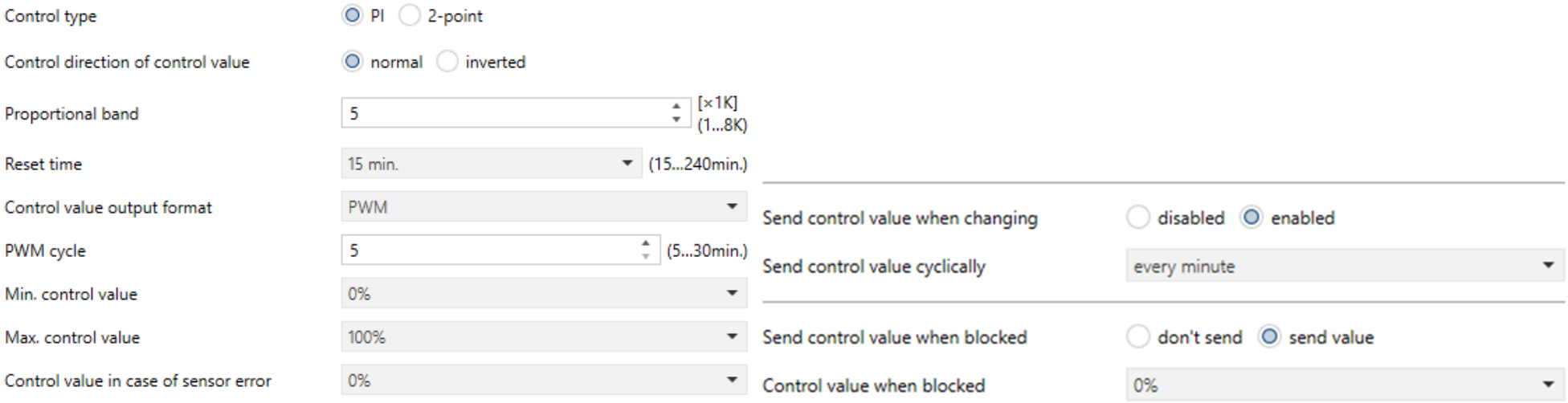
Designation	Options	Description
Blocking object Heating/cooling mode	Disabled	Blocking object disabled.
	Enabled	If the blocking object is activated, the reception of an external object can prevent the sending of the manipulated variable. Thereby an undesirable starting of actors can be prevented (e.g. do not heat if a window is open).
Blocking object Extra level heating/cooling: enable	Disabled	Blocking object disabled.
	Enabled	If the blocking object is activated, the reception of an external object can prevent the sending of the manipulated variable. Thereby an undesirable starting of actors can be prevented (e.g. do not heat if a window is open).

11.3 Temperature Control – Actual value source



Designation	Options	Description
Temperature measurement value 1	Internal sensor Via bus (communication object)	Value of the internal temperature sensor is used. Value which is sent via bus (communication object) is used.
Temperature measurement value 2-4	Disabled Internal sensor Via bus (communication object)	No function. Value of the internal temperature sensor is used. Value which is sent via bus (communication object) is used.

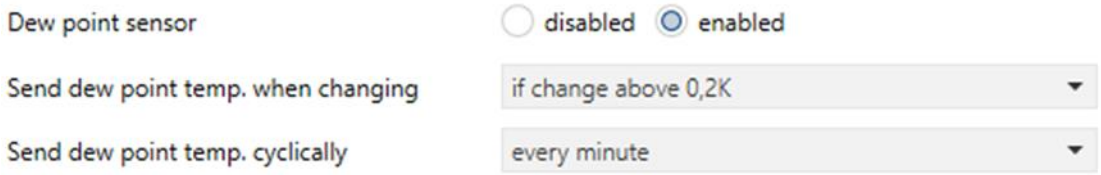
11.4 Temperature ontrol – Main level and extra level heating / cooling



Designation	Options			Description
Control type	PI control			Selection of control type.
		Proportional band	1 to 8 K	
		Reset time	15 to 240 Min.	
		Control value output format	Percent Byte PWM	Definition of the control value output format.
		PWM cycle	5 to 30 Min.	Depending on the output format the cycle is defined in percent, byte or minutes.
		Min. control value	0% to 95% 0 to 240 Byte	Depending on the output format the minimum control value is defined in percent or byte here.
		Max. control value	5% to 100% 0 to 255 Byte	Depending on the output format the maximum control value is defined in percent or byte here.
		Control value in case of sensor error	0% to 100% 0 to 255 Byte	Depending on the output format the control value is defined in percent or byte here.
		Send control value when changing	Disabled Enabled	No function. If there is a change the recent control value is sent.
	2-point	Hysteresis (symmetrical)	0,5 K to 5 K	The hysteresis can prevent a frequent switching for fast and small changing values.
		Control value in case of sensor error	Off On	In case of sensor error, the value „off“ is sent. In case of sensor error, the value „on“ is sent.
		Send control value when change-over	Disabled Enabled	No function. In the event of a changeover (change), the current manipulated variable is sent.

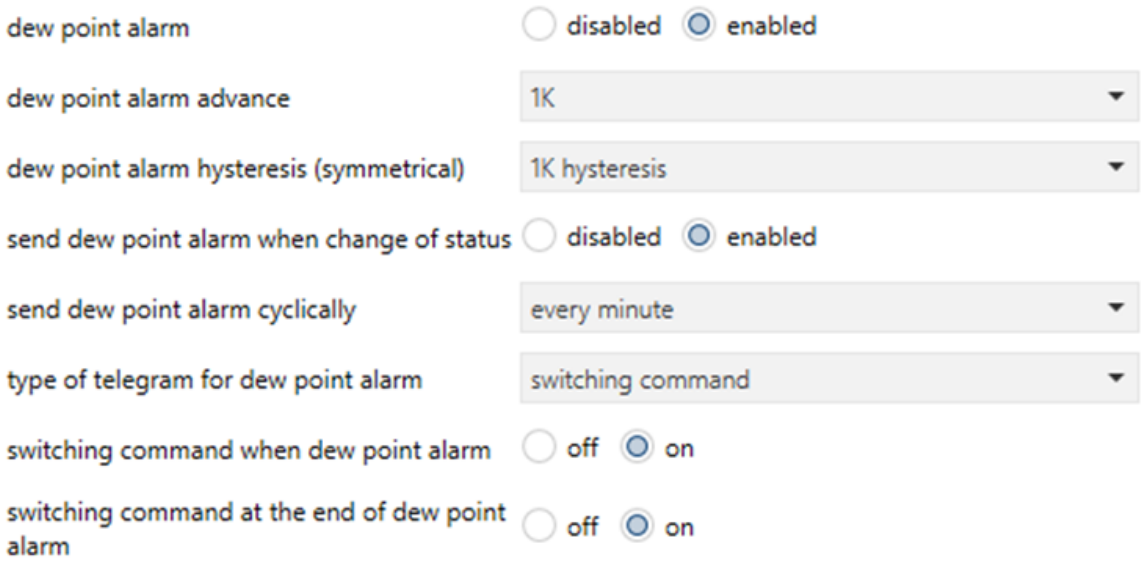
Control direction of control value	Normal Inverted	
Send control value cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent control value.
Send control value when blocked	Don´t send Send value	No function. Control value is sent.
Control value when blocked	0 – 100%	Percentage value when blocked

12. Dew Point temperature



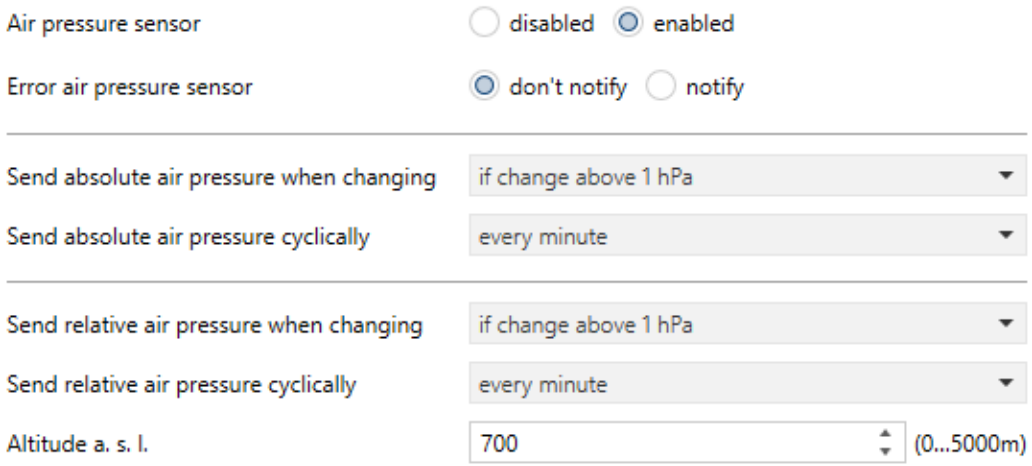
Designation	Options		Description
Dew point sensor	Disabled Enabled		No function. Sending of the recent condition.
Send dew point temperature when changing	Disabled If change above …	 0,1 K bis 10 K	No function. If there is a change the recent control value is sent.
Send dew point temperature cyclically	Disabled	 every minute - once a day	No function. Cyclic sending of the recent control value.

13. Dew Point alarm



Designation	Options	Description
Dew point alarm	Disabled Enabled	No function. If the alarm function is activated an alarm in form of an object is sent when the defined dew point is exceeded or fallen below.
Dew point alarm advance	Without 1K to 5K	The dew point alarm can be initiated in advance with a defined offset.
Dew point alarm hysteresis (symmetrical)	Without hysteresis Hysteresis 1 K to 5 K	No function. If there is a change, the recent control value is sent.
Send dew point alarm when change of status	Disabled Enabled	No function. Upon change of status dew point alarm is sent.
Send dew point alarm cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent control value.
Type of telegram for dew point alarm	Switching command Priority Percent Byte Scene	Definition of the type of telegram which is used.
value when dew point alarm	Depending on the type of telegram	Definition of the value that is sent when the dew point alarm starts.
value at the end of dew point alarm	Depending on the type of telegram	Definition of the value that is sent when the dew point alarm ended.

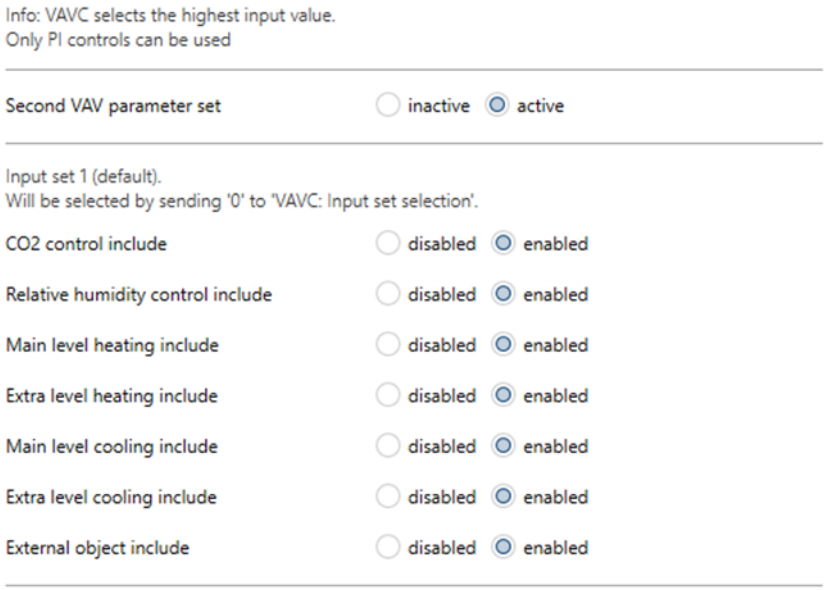
14. Air pressure sensor

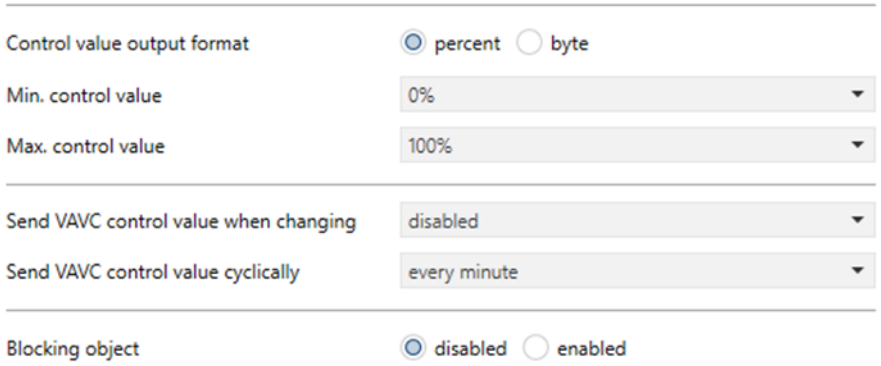


Designation	Options		Description
Air pressure sensor	Disabled Enabled		Temperature sensor disabled. If there are no new values provided from the sensor for more than 10 minutes, the sensor failure will be reported.
	Error air pressure Sensor	Notify Don't notify	No sensor failures are reported.
	Send absolute air pressure when changing	Disabled If change above 1 hPa – 50 hPa	No function. The new value is sent if the difference between old and new value is above the defined sending threshold.
	Send absolute air pressure cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent value.
	Send relative air pressure when changing	Disabled If change above 1 hPa – 50 hPa	No function. The new value is sent if the difference between old and new value is above the defined sending threshold.
	Send relative air pressure cyclically	Disabled Every minute – once a day	No function. Cyclic sending of the recent value.
	Altitude a. s. l.	0 m to 5000 m	Settings for the calculation of the relative air pressure.

15. VAV Control- Configuration VAVC

Function of the VAV control:
The highest value of all activated PI controls of the values from CO_2, relative humidity and temperature is sent in one object.





Designation	Options		Description
Second VAV parameter set	Inactive Active		No function. Parameter of a second VAV controller can be set.
CO_2 control include	Disabled Enabled		No function. Sending of the CO_2 PI controller values if they are valid.
Relative humidity control include	Disabled Enabled		No function. Sending of the relative humidity PI controller values if they are valid.
Main level heating include	Disabled Enabled		No function. Sending of the main level PI controller values if they are valid.
Main level cooling Include	Disabled Enabled		No function. Sending of the main level cooling PI controller values if they are valid.
Control value output format	Percent Byte		Definition of the output format (percent or byte) for the manipulated variable.
	Min. control value	Percent: 0% to 95% Byte: 0 to 240	Definition of the output format (percent or byte) of the control value.
	Max. control value	Percent: 5% to 100% Byte: 10 to 255	The values of the PI controllers are limited to the minimum value.
Send VAVC control value when changing	Disabled If change above	 Percent: 1% to 25% Byte: 1 to 50	No function. The values of the PI controllers are limited to the maximum value.
Send VAVC control value	Disabled		No function.

cyclically	Every minute – once per day		Cyclic sending of the recent value.
Blocking object	Disabled Enabled		No function.
	Behavior when unblocking	Don’t send Send current value	No function. Send current value when unblocking.
	Behavior when blocking	Don’t send Send value	No function. Send value when blocking.