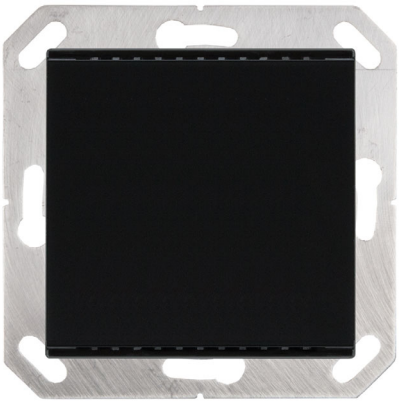
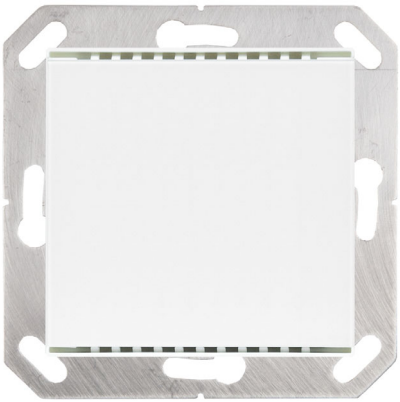
KNX T-UP gl
Temperature Sensor

Item numbers 70631 (black), 70632 (pure white)





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 **Sensor KNX T-UP gl** measures the room temperature. The indoor sensor can receive an external measured value via the bus and process it with own data to an overall temperature value (mixed value).

The **KNX T-UP gl** provides adjustable threshold values. The threshold value 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. The sensor has integrated PI controller for a heating/cooling system.

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

Functions:

- Measurement of **temperature**
- **Mixed values** from own measured value 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. Control according to separate target values or basic target temperature
- **Threshold values** can be adjusted per parameter or via communication objects: 3 × temperature
- **4 AND and 4 OR logic gates** with each 4 inputs. Every switching incident as well as 16 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 5. The **product file** can be downloaded from the ETS online catalogue and the Elsner Elektronik website on **www.elsner-elektronik.de** in the “Service” menu.

1.0.1. Scope of delivery

- Housing
- 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	Real glass, plastic
Colours	• similar to RAL 9005 jet black • similar to RAL 9010 pure white
Mounting	In-wall (wall mounting in socket Ø 60 mm, 42 mm deep, resp. cavity wall socket for hole Ø 68 mm)
Protection category	IP 20
Dimensions	Housing approx. 55 x 55 (W x H, mm), mounting depth approx. 8 mm, base plate approx. 71 x 71 (W x H, mm)
Total weight	approx. 50 g
Ambient temperature	Operation 0…+50°C, storage -10…+60°C
Ambient air humidity	max. 95% RH, 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	152
Temperature measurement range	0…+50°C
Temperature resolution	0.1°C

The product conforms with the provisions of EU guidelines.

1.1.1. Accuracy of the measurement

Measurement variations from permanent sources of interference (see chapter *Installation position*) can be corrected in the ETS in order to ensure the specified accuracy of the sensor (offset).

When **measuring temperature**, the self-heating of the device is considered by the electronics. The heating is compensated by the software.

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 **Sensor KNX T-UP gl** is made for wall mounting in a socket (Ø 60 mm, 42 mm deep).

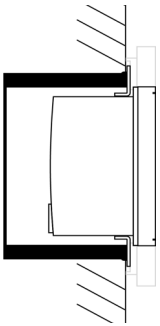


Fig. 1: Sectional drawing.
*The **Sensor KNX T-UP gl** fits into a standard socket (Ø 60 mm, depth 42 mm).*

The frame is not included!

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

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 permanent sources of interference can be corrected in the ETS in order to ensure the specified accuracy of the sensor (offset).

2.3. Composition

2.3.1. Housing

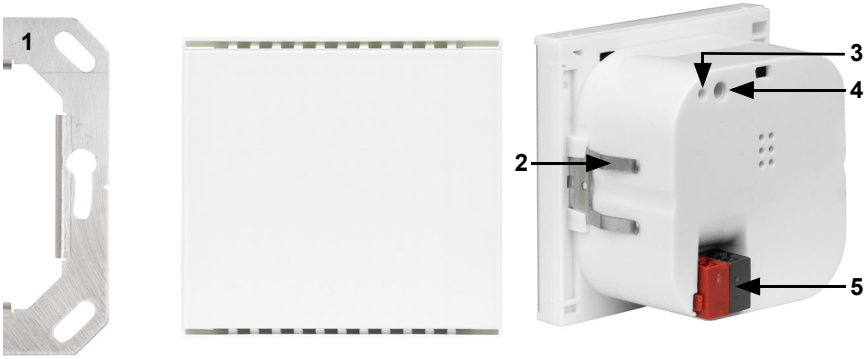


Fig. 2
1 Base plate
2 Catches
3 Programming LED (recessed)
4 Programming button (recessed) for teaching device
5 KNX terminal BUS +/-

2.4. Assembly of the sensor

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

Screw the base plate onto the socket and position the frame of the switching programme. Connect the bus line +/- to the black-red plug.
Pin the housing with the notches on to the metal frame, so that device and frame are fixed. The device has to be inserted such that the bus terminal faces down (see Fig. 2). This is necessary for a correct temperature measurement.

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. Addressing of the device at the bus

The device is supplied with the bus address 15.15.255. You can program another address into the ETS by overwriting the 15.15.255 address or by teaching via the programming button.

4. Transfer protocol

Units:

Temperatures in degrees Celsius
Air humidity in %
Absolute air humidity in g/kg and/or g/m^3
Variables in %

4.1. List of all communications objects

Abbreviation flags:

C Communication
R Read
W Write
T Transfer
U Update

No	Text	Function	Flags	DPT Typ	Size
0	Software version	readable	R-CT	[217.1] DPT_Version	2 Bytes
1	Temperature sensor malfunction	Output	R-CT	[1.1] DPT_Switch	1 Bit
3	External measured value for temperature	Input	-RC-	[9.1] DPT_-Value_Temp	2 Bytes
4	Internal measured value for temperature	Output	R-CT	[9.1] DPT_-Value_Temp	2 Bytes
5	Total measured value for temperature	Output	R-CT	[9.1] DPT_-Value_Temp	2 Bytes
6	Request min./max. temperature measured value	Input	-RC-	[1.17] DPT_Trigger	1 Bit
7	Minimum measured value for temperature	Output	R-CT	[9.1] DPT_-Value_Temp	2 Bytes
8	Maximum measured value for temperature	Output	R-CT	[9.1] DPT_-Value_Temp	2 Bytes
9	Reset min./max. measured value for temperature	Input	-RC-	[1.17] DPT_Trigger	1 Bit
10	Temp. thresholdV 1: Absolute value	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
11	Temp. thresholdV 1: (1:+ | 0:-)	Input	-RC-	[1.2] DPT_Bool	1 Bit

No	Text	Function	Flags	DPT Typ	Size
12	Temp. thresholdV 1: Switching delay from 0 to 1	Input	-RC-	[9.010] DPT_Value_Time	2 Bytes
13	Temp. thresholdV 1: Switching delay from 1 to 0	Input	-RC-	[9.010] DPT_Value_Time	2 Bytes
14	Temp. thresholdV 1: Switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
15	Temp. thresholdV 1: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
16	Temp. thresholdV 2: Absolute value	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
17	Temp. thresholdV 2: (1:+ | 0:-)	Input	-RC-	[1.2] DPT_Bool	1 Bit
18	Temp. thresholdV 2: Switching delay from 0 to 1	Input	-RC-	[9.010] DPT_Value_Time	2 Bytes
19	Temp. thresholdV 2: Switching delay from 1 to 0	Input	-RC-	[9.010] DPT_Value_Time	2 Bytes
20	Temp. thresholdV 2: Switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
21	Temp. thresholdV 2: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
22	Temp. thresholdV 3: Absolute value	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
23	Temp. thresholdV 3: (1:+ | 0:-)	Input	-RC-	[1.2] DPT_Bool	1 Bit
24	Temp. thresholdV 3: Switching delay from 0 to 1	Input	-RC-	[9.010] DPT_Value_Time	2 Bytes
25	Temp. thresholdV 3: Switching delay from 1 to 0	Input	-RC-	[9.010] DPT_Value_Time	2 Bytes
26	Temp. thresholdV 3: Switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
27	Temp. thresholdV 3: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
29	Temp.control: HVAC mode (priority 1)	Input	-RC-	[20.102] DPT_HVACMode	1 Byte
30	Temp.control: HVAC mode (priority 2)	Input / Output	RWCT	[20.102] DPT_HVACMode	1 Byte
31	Temp.control: Mode frost/heat protection activt.	Input / Output	RWCT	[1.1] DPT_Switch	1 Bit
32	Temp.control: Block (On when value = 1)	Input	-RC-	[1.1] DPT_Switch	1 Bit
33	Temp.control: Current setpoint	Output	R-CT	[9.1] DPT_-Value_Temp	2 Bytes

No	Text	Function	Flags	DPT Typ	Size
34	Temp.control: Switch. (Heating = 0 | Cooling = 1)	Input	-RC-	[1.1] DPT_Switch	1 Bit
35	Temp.control: Setpoint Comfort heating	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
36	Temp.control: Setpoint Comfort heat.(1:+ | 0:-)	Input	-RC-	[1.1] DPT_Switch	1 Bit
37	Temp.control: Setpoint Comfort cooling	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
38	Temp.control: Setpoint Comfort cool.(1:+ | 0:-)	Input	-RC-	[1.1] DPT_Switch	1 Bit
39	Temp.control: Basic 16-bit setpoint shift	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
40	Temp.control: Setpoint Standby heating	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
41	Temp.control: Setpoint Standby heat.(1:+ | 0:-)	Input	-RC-	[1.1] DPT_Switch	1 Bit
42	Temp.control: Setpoint Standby cooling	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
43	Temp.control: Setpoint Standby cool. (1:+ | 0:-)	Input	-RC-	[1.1] DPT_Switch	1 Bit
44	Temp.control: Setpoint Eco heating	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
45	Temp.control: Setpoint Eco heating (1:+ | 0:-)	Input	-RC-	[1.1] DPT_Switch	1 Bit
46	Temp.control: Setpoint Eco cooling	Input / Output	RWCT	[9.1] DPT_-Value_Temp	2 Bytes
47	Temp.control: Setpoint Eco cooling (1:+ | 0:-)	Input	-RC-	[1.1] DPT_Switch	1 Bit
48	Temp.control: Control variable heating (level 1)	Output	R-CT	[5.1] DPT_Scaling	1 Byte
49	Temp.control: Control variable heating (level 2)	Output	R-CT	[5.1] DPT_Scaling	1 Byte
50	Temp.control: Control variable cooling (level 1)	Output	R-CT	[5.1] DPT_Scaling	1 Byte
51	Temp.control: Control variable cooling (level 2)	Output	R-CT	[5.1] DPT_Scaling	1 Byte
52	Temp.control: Status Heat. level 1 (1=ON|0=OFF)	Output	R-CT	[1.1] DPT_Switch	1 Bit

No	Text	Function	Flags	DPT Typ	Size
53	Temp.control: Status Heat. level 2 (1=ON|0=OFF)	Output	R-CT	[1.1] DPT_Switch	1 Bit
54	Temp.control: Status Cool. level 1 (1=ON|0=OFF)	Output	R-CT	[1.1] DPT_Switch	1 Bit
55	Temp.control: Status Cool. level 2 (1=ON|0=OFF)	Output	R-CT	[1.1] DPT_Switch	1 Bit
56	Temp.control: Comfort extension status	Input / Output	RWCT	[1.1] DPT_Switch	1 Bit
57	Temp.control: Comfort Extension time	Input	RWCT	[7.5] DPT_TimePeri-odSec	2 Bytes
58	Temperature control: Variable for 4/6-way valve	Output	R-CT	[5.1] DPT_Scaling	1 Byte
131	CO2 control: Act. variable ventila-tion (1.stage)	Output	R-CT	[5.1] DPT_Scaling	1 Byte
133	CO2 control: Status ventilation (1=ON | 0=OFF)	Output	R-CT	[1.1] DPT_Switch	1 Bit
134	CO2 control: Status ventilation 2 (1=ON | 0=OFF)	Output	R-CT	[1.1] DPT_Switch	1 Bit
135	Actuating variable comparator 1: Input 1	Input	-RC-	[5.1] DPT_Scaling	1 Byte
136	Actuating variable comparator 1: Input 2	Input	-RC-	[5.1] DPT_Scaling	1 Byte
137	Actuating variable comparator 1: Input 3	Input	-RC-	[5.1] DPT_Scaling	1 Byte
138	Actuating variable comparator 1: Input 4	Input	-RC-	[5.1] DPT_Scaling	1 Byte
139	Actuating variable comparator 1: Input 5	Input	-RC-	[5.1] DPT_Scaling	1 Byte
140	Actuating variable comparator 1: Output	Output	R-CT	[5.1] DPT_Scaling	1 Byte
141	Actuating variable comparator 1: Block	Output	-RC-	[1.2] DPT_Bool	1 Bit
142	Actuating variable comparator 2: Input 1	Input	-RC-	[5.1] DPT_Scaling	1 Byte
143	Actuating variable comparator 2: Input 2	Input	-RC-	[5.1] DPT_Scaling	1 Byte
144	Actuating variable comparator 2: Input 3	Input	-RC-	[5.1] DPT_Scaling	1 Byte
145	Actuating variable comparator 2: Input 4	Input	-RC-	[5.1] DPT_Scaling	1 Byte
146	Actuating variable comparator 2: Input 5	Input	-RC-	[5.1] DPT_Scaling	1 Byte

No	Text	Function	Flags	DPT Typ	Size
147	Actuating variable comparator 2: Output	Output	R-CT	[5.1] DPT_Scaling	1 Byte
148	Actuating variable comparator 2: Block	Output	-RC-	[1.2] DPT_Bool	1 Bit
149	AND logic 1: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
150	AND logic 1: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
151	AND logic 1: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
152	AND logic 1: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
153	AND logic 2: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
154	AND logic 2: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
155	AND logic 2: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
156	AND logic 2: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
157	AND logic 3: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
158	AND logic 3: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
159	AND logic 3: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
160	AND logic 3: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
161	AND logic 4: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
162	AND logic 4: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
163	AND logic 4: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
164	AND logic 4: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
181	OR logic 1: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
182	OR logic 1: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
183	OR logic 1: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
184	OR logic 1: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit

No	Text	Function	Flags	DPT Typ	Size
185	OR logic 2: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
186	OR logic 2: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
187	OR logic 2: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
188	OR logic 2: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
189	OR logic 3: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
190	OR logic 3: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
191	OR logic 3: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
192	OR logic 3: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
193	OR logic 4: 1 bit switching output	Output	R-CT	[1.1] DPT_Switch	1 Bit
194	OR logic 4: 8 bit output A	Output	R-CT	[5] 5.xxx	1 Byte
195	OR logic 4: 8 bit output B	Output	R-CT	[5] 5.xxx	1 Byte
196	OR logic 4: Switching output block	Input	-RC-	[1.2] DPT_Bool	1 Bit
200	Logic input 1	Input	-RC-	[1.2] DPT_Bool	1 Bit
201	Logic input 2	Input	-RC-	[1.2] DPT_Bool	1 Bit
202	Logic input 3	Input	-RC-	[1.2] DPT_Bool	1 Bit
203	Logic input 4	Input	-RC-	[1.2] DPT_Bool	1 Bit
204	Logic input 5	Input	-RC-	[1.2] DPT_Bool	1 Bit
205	Logic input 6	Input	-RC-	[1.2] DPT_Bool	1 Bit
206	Logic input 7	Input	-RC-	[1.2] DPT_Bool	1 Bit
207	Logic input 8	Input	-RC-	[1.2] DPT_Bool	1 Bit
208	Logic input 9	Input	-RC-	[1.2] DPT_Bool	1 Bit
209	Logic input 10	Input	-RC-	[1.2] DPT_Bool	1 Bit

No	Text	Function	Flags	DPT Typ	Size
210	Logic input 11	Input	-RC-	[1.2] DPT_Bool	1 Bit
211	Logic input 12	Input	-RC-	[1.2] DPT_Bool	1 Bit
212	Logic input 13	Input	-RC-	[1.2] DPT_Bool	1 Bit
213	Logic input 14	Input	-RC-	[1.2] DPT_Bool	1 Bit
214	Logic input 15	Input	-RC-	[1.2] DPT_Bool	1 Bit
215	Logic input 16	Input	-RC-	[1.2] DPT_Bool	1 Bit

5. Parameter setting

5.1. 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.

5.2. 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 temperature malfunction object	Yes • No

5.3. Temperature value

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

Offset in 0,1°C	-50…50; 0

The unit can calculate a **mixed value** from its own reading and an external value. Set the mixed value calculation if desired. If an external value is used, all of the following settings are referred to the total value.

Use external reading	Yes • No
Ext. Reading proportion of the total reading	5% • 10% • ... • 50% • ... • 100%
All of the following settings are referred to the total value.	
Send internal and total reading	• never • periodically • on change • on change and periodically
From change of *(if sent on change)*	0,1°C • 0,2°C • 0,5°C • ... • 5,0°C
Send cycle *(if sent periodically)*	5 s • 10 s • ... • 2 h

The **minimum and maximum readings** can be saved and sent to the bus. Use the „Reset temperature min/max. value“ objects to reset the values to the current readings. The values are not retained after a reset.

Use minimum/maximum value	Yes • No

5.4. Temperature threshold values

Activate the required temperature threshold values. The menus for setting the threshold values are displayed.

Use threshold value 1/2/3	Yes • No

5.4.1. Threshold value 1, 2, 3

Threshold value

Set, in which cases **threshold values** received via object are to be retained. The parameter is only taken into consideration if the setting via object is activated below. Please note that the setting "After power supply restoration and programming" should not be used for the initial start-up, as the factory settings are always used until the first communication (setting via objects is ignored).

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

Threshold value setting via parameter:

Set the threshold values and hysteresis directly.

Threshold value setting via	**Parameter** • Communication objects
Threshold value in 0.1°C	-300 ... 800; 200

Threshold value setting via a communication object:

Define, how the threshold value is to 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 first communication with 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, so that it is retained in the event of a power supply failure and will be available once the power supply is restored.

Threshold value setting via	Parameter • **Communication objects**
The value communicated last shall be maintained	• never • after power supply restoration • after power supply restoration and programming
Start threshold value in 0.1°C valid until first communication	-300 ... 800; 200
Object value limit (min) in 0.1°C	-300...800
Object value limit (max) in 0.1°C	-300...800
Type of threshold value change	Absolute value • Increase/decrease
Increment *(upon increase/decrease change)*	0,1 °C • ... • 5°C, 1°C

Set the **hysteresis** independent of the type of threshold value specification.

Hysteresis in % of the threshold value	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 (TV = Threshold value)	• TV above = 1 | TV - hyst. below = 0 • TV above = 0 | TV - hyst. below = 1 • TV below = 1 |TV + hyst. above = 0 • TV below = 0 |TV + hyst. above = 1
Delays can be set via objects (in seconds)	No • Yes

Switching delay from 0 to 1 *(If delay can be set via objects: valid until 1st communication)*	None • 1 s • 2 s • 5 s • 10 s • ... • 2 h
Switching delay from 1 to 0 *(If delay can be set via objects: valid until 1st communication)*	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
Cycle *(only if sending periodically is selected)*	5 s • 10 s • 30 s... • 2 h

Block

The switching output can be blocked using an object.

Use switching output block	No • Yes

If the block is activated, define specifications here for the behaviour of the output when blocked.

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	
On block	• 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

5.5. Temperature PI control

Activate the control if you want to use it.

Use control	No • Yes

General control

Set, in which cases **setpoint values and extension time** received via object are to be retained. The parameter is only taken into consideration if the setting via object is activated below. Please note that the setting "After power supply restoration and programming" should not be used for the initial start-up, as the factory settings are always used until the 1st communication (setting via objects is ignored).
.

For an adequate regulation of the indoor temperature, comfort, standby, eco and building protection modes may be used.
Comfort when present,
Standby during short absences,
Eco as a night-time mode and
Frost/heat protection (building protection) during longer absences.

The settings for the temperature control include the set point temperatures for the individual modes. Objects are used to determine which mode is to be selected. A change of mode may be triggered manually or automatically (e.g. by a timer, window contact).

The **mode** may be switched with two 8 bit objects of different priority. Objects
„... HVAC mode (Prio 2)“ for switching in everyday operation and
„... HVAC mode (Prio 1)“ for central switching with higher priority.
The objects are coded as follows:
0 = Auto
1 = Comfort
2 = Standby
3 = Eco
4 = Building Protection

Alternatively, you can use three objects, with one object switching between eco and standby mode and the two others activating comfort mode and frost/heat protection mode respectively. The comfort object blocks the eco/standby object, and the frost/heat protection object has the highest priority. Objects
„... Mode (1: Eco, 0: Standby)“,
„... comfort activation mode" and
„... frost/heat protection activation mode"

Switch mode via	• two 8 Bit objects (HVAC Modes) • three 1 bit objects

Select the **mode to be activated after reset** (e.g. power failure, reset of the line via the bus) (Default).
Then configure a temperature control **block** via the blocking object.

Mode after reset	• Comfort • Standby • Eco • Building protection
Behaviour of the blocking object with value	• 1 = Block | 0 = release • 0 = block | 1 = release
Blocking object value before 1st communication	0 • 1

Specify when the current **control variables** of the controller are to be **sent** to the bus. Periodic sending is safer, in case a message does not reach a recipient. You may also set up periodical monitoring by the actuator with this setting.

Send control variable	• on change • on change and periodically
from change (in % absolute)	1...10; 2
Cycle *(if sent periodically)*	5 s • ... • 5 min • ... • 2 h

The **status object** reports the current status of the control variables (0% = OFF, >0% = ON) and may for example be used for visualisation, or to switch off the heating pump as soon as the heating is switched off.

Send status objects	• 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
Cycle *(if sent periodically)*	5 s • ... • 5 min • ... • 2 h

Then define the **type of control**. Heating and/or cooling may be controlled in two levels.

Type of control	• Single level heating • Dual-level heating • Single-level cooling • Single-level heating + single-level cooling • Dual-level heating + single-level cooling • Dual-level heating + dual-level cooling

General set point values

You may enter separate set point values for each mode or use the comfort set point as a basic value.
If you are using the controls for both heating *and* cooling, you may also select the setting "separately with switching object". Systems used for cooling in the summer and for heating in the winter can thus be switched from one to the other.
If you are using the basic value, only the deviation from the comfort set point value is listed for the other modes (e. g., 2°C less for standby mode).

Preserve modified set points after mode change	No • Yes
Setting the nominal values	• separate with switching object • separate without switching object • with comfort set point as a basis

The grades for the set point changes is predefined. Modifications may only remain active temporarily (do not save) or remain saved even after voltage recovery (and programming). This also applies to a comfort extension.

Grading for set point changes (in 0.1 °C)	1... 50; 10
Saving set point value(s)	not • after voltage recovery • after voltage recovery and programming

The control may be manually reset to comfort mode from eco, or night mode. This allows the user to maintain the daily nominal value for a longer time, e.g. when having guests. The duration of this comfort extension period is set. After the comfort extension period is terminated, the system returns to eco mode.

Comfort extension time in seconds (can only be activated from eco mode)	1...36000; 3600

Set point Comfort

Comfort mode is usually used for daytime mode when people are present. A starting value is defined for the comfort set point as well as a temperature range in which the nominal value may be modified.

Initial heating/cooling set point (in 0.1 °C) valid till 1st communication *not upon saving the set point value after programming*	-300...800; 210

If set point values are entered separately:

Min. object value heating/cooling (in 0.1 °C)	-300...800; 160
Max. object value heating/cooling (in 0.1 °C)	-300...800; 280

If the comfort setpoint value is used as a basis:

If the comfort setpoint value is used as a basis, the reduction/increment of the value is set.

Starting heating/cooling setpoint (in 0.1 °C) valid until 1st communication	-300…800; 210
Minimum base setpoint (in 0.1°C)	-300…800; 160
Maximum base setpoint (in 0.1°C)	-300…800; 280
Reduction by up to (in 0.1°C)	1…100; 50
Increase by up to (in 0.1°C)	1…100; 50

If the comfort setpoint is used as the basis without a switching object, a dead zone is specified for the control mode "heating *and* cooling" to avoid direct switching from heating to cooling.

Dead zone between heating and cooling in 0,1°C *(only if both heating AND cooling are used)*	1…100; 50

Standby setpoint

Standby mode is usually used for daytime mode when people are absent.

If setpoint values are entered separately:

A starting setpoint value is defined as well as a temperature range in which the setpoint value may be changed.

Starting heating setpoint (in 0.1 °C) valid until 1st communication	-300…800; 180
Starting heating setpoint (in 0.1 °C) valid until 1st communication	-300…800; 240
Min. object value heating/cooling (in 0.1 °C)	-300…800; 160
Max. object value heating/cooling (in 0.1 °C)	-300…800; 280

If the comfort setpoint value is used as a basis:

If the comfort setpoint value is used as a basis, the reduction/increment of the value is set.

Reduce heating setpoint (in 0.1°C) *(for heating)*	0…200; 30
Increase cooling setpoint (in 0.1°C) *(for cooling)*	0…200; 30

Eco setpoint

Eco mode is usually used for night mode.

If setpoint values are entered separately:

A starting setpoint value is defined as well as a temperature range in which the setpoint value may be changed.

Starting heating setpoint (in 0.1 °C) valid until 1st communication	-300…800; 160
Starting cooling setpoint (in 0.1 °C) valid until 1st communication	-300…800; 280
Min. object value heating/cooling (in 0.1 °C)	-300…800; 160
Max. object value heating/cooling (in 0.1 °C)	-300…800; 280

If the comfort setpoint value is used as a basis:

If the comfort setpoint value is used as a basis, the reduction/increment of the value is set.

Reduce heating setpoint (in 0.1°C) *(for heating)*	0…200; 50
Increase cooling setpoint (in 0.1°C) *(for cooling)*	0…200; 60

Setpoint values for frost/heat protection (building protection)

The building protection mode is for example used as long as windows are opened for ventilation. Setpoints for frost protection (heating) and heat protection (cooling) are determined which may not be modified from outside (no access via operating devices etc.). The building protection mode may be activated with delay, which allows you to leave the building before the controls switch to frost/heat protection mode.

Setpoint frost protection (in 0.1°C)	-300…800; 70
Activation delay	less than • 5 s • ... • 5 min • ... • 2 h
Setpoint heat protection (in 0.1°C)	-300…800; 350
Activation delay	none • 5 s • ... • 5 min • ... • 2 h

General control variables

This setting appears for the control types "Heating *and* Cooling" only. Here, you can decide whether to use a common control variable for heating and cooling. If the 2nd level has a common control variable, you also determine the control mode of the 2nd level here.

For heating and cooling	• separate control variables are used • common control variables are used for Level 1 • common control variables are used for Level 2 • common control variable are used for Level 1+2

Use control variable for 4/6-way valve *(only for common control variables in level 1)*	No • Yes
Control type *(for level 2 only)*	• 2-point-control • PI control
Control variable of the 2nd Level is on *(only for level 2 with 2 point controlling)*	• 1 bit object • 8 bit object

When using the control variable for a 4/6 way valve, the following applies:
0%...100% heating = 66%...100% control variable
OFF = 50% control variable
0%...100% cooling = 33%...0% control variable

5.5.1. Heating control level 1/2

If a heating control mode is configured, one or two setting sections for the heating levels are displayed.

In the 1st level, heating is controlled by a PI control, which allows to either enter control parameters or select predetermined applications.

In the 2nd level (therefore only in case of 2-level heating), heating is controlled via a PI or a 2-point-control.
In level 2, the setpoint difference between the two levels must also be specified, i.e. below which setpoint deviation the second level is added.

Setpoint difference between 1st and 2nd level (in 0.1°C) *(for level 2)*	0...100; 40
Control type *(for level 2, no common control variables)*	• 2-point-control • PI control
Control variable is a *(for level 2 with 2-point controlling, no common control variables)*	• 1 bit object • 8 bit object

PI control with control parameters:

This setting allows individual input of the parameters for PI control.

Control type	**• PI control**
Setting of the controller by	**• Controller parameter** • specified applications

Specify the deviation from the setpoint value at which the maximum control variable value is reached, i.e. the point at which maximum heating power is activated.
The reset time shows how quickly the controller responds to deviations from the setpoint value. In case of a short reset time, the control responds with a fast increase of the control variable. In case of a long reset time, the control responds somewhat less

urgently and needs longer until the necessary control variable for the setpoint value deviation is reached.
You should set the time appropriate to the heating system at this point (observe manufacturer's instructions).

Maximum control variable is reached at setpoint/actual difference of (in °C)	1...5
Reset time (in min.)	1...255; 30

Now specify what should be sent when the control is blocked. Set a value greater 0 (=OFF) to receive a basic heating level, e.g. for floor heating.
On release, the control variable follows the rule again.

When blocked, the control variable shall	• not be sent • send a specific value
Value (in %) *(if a value is sent)*	0...100

In case of a common control variable for heating and cooling, 0 is always transmitted as a fixed value.

PI control with predetermined application:

This setting provides fixed parameters for frequent applications.

Control type	• **PI control**
Setting of the controller by	• Controller parameter • **specified applications**
Application	• Warm water heating • Floor heating • Convection unit • Electric heating
Maximum control variable is reached at setpoint/actual difference of (in °C)	Warm water heating: 5 Floor heating: 5 Convection unit: 4 Electric heating: 4
Reset time (in min.)	Warm water heating: 150 Floor heating: 240 Convection unit: 90 Electric heating: 100

Now specify what should be sent when the control is blocked. Set a value greater 0 (=OFF) to receive a basic heating level, e.g. for floor heating.
On release, the control variable follows the rule again.

When blocked, the control variable shall	• not be sent • send a specific value
Value (in %) *(if a value is sent)*	0...100

In case of a common control variable for heating and cooling, 0 is always transmitted as a fixed value.

2-point-control (only level 2):

2-point-control is used for systems which are only set to ON or OFF.

Control type *(is determined at a higher level for common control variables)*	• **2-point-control**

Enter the hysteresis that prevents frequent on/off switching of temperatures in the threshold range.

Hysteresis (in 0.1°C)	0...100; 20

If separate control variables are used, select whether the control variable of the 2nd level is a 1 bit object (on/off) or an 8 bit object (on with percentage/off).

Control variable is a	• 1 bit object • 8 bit object
Value (in %) *(for 8 bit object)*	0...100

Now specify what should be sent when the control is blocked. Set a value greater 0 (=OFF) to receive a basic heating level, e.g. for floor heating. On release, the control variable follows the rule again.

When blocked, the control variable shall	• not be sent • send a specific value
Value (in %) *only if a value is sent*	0...100

5.5.2. Cooling control level 1/2

If a cooling control mode is configured, one or two setting sections for the cooling levels are displayed.

In the 1st level, cooling is controlled by a PI control in which either control parameters can be entered or predetermined applications can be selected.

In the 2nd level (therefore only for 2-level cooling), cooling is controlled via a PI or a 2-point-control.
In level 2, the setpoint deviation between the two levels must also be specified, i.e. above which setpoint value deviation the second level is added.

Setpoint difference between 1st and 2nd level (in 0.1°C) *(for level 2)*	0...100; 40
Control type *(for level 2, no common control variables)*	• 2-point-control • PI control
Control variable is a *(for level 2 with 2-point controlling, no common control variables)*	• 1 bit object • 8 bit object

PI control with control parameters:

This setting allows individual input of the parameters for PI control.

Control type	• **PI control**
Setting of the controller by	• **Controller parameter** • specified applications

Specify the deviation from the setpoint value which reaches maximum variable value, i.e. the point at which maximum cooling power is activated.
The reset time shows how quickly the controller responds to deviations from the setpoint value. In case of a short reset time, the control responds with a fast increase of the control variable. In case of a long reset time, the control responds somewhat less urgently and needs longer until the necessary control variable for the setpoint value deviation is reached. You should set the time appropriate to the cooling system at this point (observe manufacturer's instructions).

Maximum control variable is reached at setpoint/actual difference of (in °C)	1...5
Reset time (in min.)	1...255; 30

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

When blocked, the control variable shall	• not be sent • send a specific value
Value (in %) *(if a value is sent)*	0...100

In case of a common control variable for heating and cooling, 0 is always transmitted as a fixed value.

PI control with predetermined application:

This setting provides fixed parameters for a cooling ceiling

Control type	• **PI control**
Setting of the controller by	• Controller parameter • **specified applications**
Application	• Cooling ceiling
Maximum control variable is reached at setpoint/actual difference of (in °C)	Cooling ceiling: 5
Reset time (in min.)	Cooling ceiling: 30

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

When blocked, the control variable shall	• not be sent • send a specific value
Value (in %) *(if a value is sent)*	0...100

2-point-control (only level 2):

2-point-control is used for systems which are only set to ON or OFF.

Control type *is determined at a higher level for common variables*	• **2-point-control**

Enter the hysteresis that prevents frequent on/off switching of temperatures in the threshold range.

Hysteresis (in 0.1°C)	0...100; 20

If separate control variables are used, select whether the control variable of the 2nd level is a 1 bit object (on/off) or an 8 bit object (on with percentage/off).

Control variable is a	• 1 bit object • 8 bit object
Value (in %) *(for 8 bit object)*	0...100

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

When blocked, the control variable shall	• not be sent • send a specific value
Value (in %) *(if a value is sent)*	0...100

In case of a common control variable for heating and cooling, 0 is always transmitted as a fixed value.

5.6. Variable comparator

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

Use comparator 1/2	No • Yes

5.6.1. 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
From change of *(is only sent if "on change" is selected)*	1% • 2% • 5% • 10% • 20% • 25%

Send cycle *(is only sent if "periodically" is selected)*	5 s • 10 s • 30 s • ... • 5 min • ... • 2 h
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

5.7. Logic

The device has 16 logic inputs, four AND- and four OR-logic gates.

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

Use logic inputs	Yes • No
Object value before 1st communication for	
- Logic input 1	0 • 1
- Logic input ...	0 • 1
- Logic input 16	0 • 1

Activate the required logic outputs.

AND logic

AND logic 1	not active • active
AND logic ...	not active • active
AND logic 4	not active • active

OR logic

OR logic 1	not active • active
OR logic ...	not active • active
OR logic 4	not active • active

5.7.1. AND logic 1-4 and OR logic outputs 1-4

The same setting options are available for AND and OR logic.

Each logic output may transmit one 1 bit or two 8 bit objects. Determine what the out put should send if logic = 1 and = 0.

1. / 2. / 3. / 4. Input	• do not use - Logic inputs 1...16 - Logic inputs 1...16 inverted • all switching events that the device provides (see *Connection inputs of the AND/OR logic*)
Output type	• a 1-Bit-object • two 8-bit objects

If the **output type is a 1-bit object**, set the output values for the various conditions.

Output value if logic = 1	1 • 0
Output value if logic = 0	1 • 0

If the **output type is two 8-bit objects**, set the type of object and the output values for the various conditions.

Object type	• Value (0...255) • Percent (0...100%) • Angle (0...360°) • Scene call-up (0...127)
Output value object A if logic = 1	0 ... 255 / 100% / 360° / 127; 1
Output value object B if logic = 1	0 ... 255 / 100% / 360° / 127; 1
Output value object A if logic = 0	0 ... 255 / 100% / 360° / 127; 0
Output value object B if logic = 0	0 ... 255 / 100% / 360° / 127; 0

Set the output send pattern.

Send pattern	• 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+object receipt • on change of logic+object receipt and periodically
Send cycle *(if sent periodically)*	5 s • 10 s • ... • 2 h

Block

If necessary, activate the block for the logic output and set what a 1 or 0 at the block input means and what happens in the event of a block.

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 first call	0 • 1
Behaviour of switching output	
On block	• Do not send message • Transmit block value [see above, Output value if blocking active]
On release (with 2 seconds release delay)	[send value for current logic status]

5.7.2. Connection inputs of the AND logic

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
Temperature sensor malfunction = ON
Temperature sensor malfunction = OFF
Switching output temperature 1
Switching output temperature 1 inverted
Switching output temperature 2
Switching output temperature 2 inverted
Switching output temperature 3
Switching output temperature 3 inverted
Comfort temperature controller active
Comfort temperature controller inactive
Eco temperature controller active
Eco temperature controller inactive
Standby temperature controller active
Standby temperature controller inactive
Temperatur controller frost/heat active
Temperatur controller frost/heat inactive
Temp. control status heating 1
Temp. control status heating 1 inverted
Temp. control status heating 2
Temp. control status heating 2 inverted
Temp. control status cooling 1
Temp. control status cooling 1 inverted
Temp. control status cooling 2
Temp. control status cooling 2 inverted

5.7.3. 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

Elsner Elektronik GmbH Control and Automation Engineering
Sohlengrund 16
75395 Ostelsheim
Germany
Phone +49 (0) 70 33 / 30 945-0 info@elsner-elektronik.de
Fax +49 (0) 70 33 / 30 945-20 www.elsner-elektronik.de