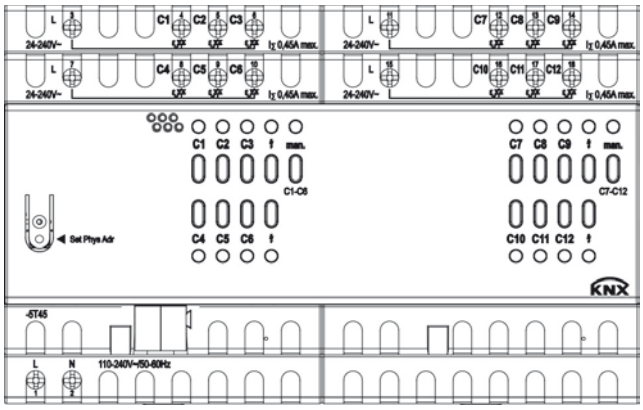
KNX Manual
Heating and control actuators
GVA-6K KNX
GVA-12K KNX



GVA-6K KNX	108408
GVA-12K KNX	108409

Contents

1 Contents

2 Functional characteristics

- 6/12-way heating actuator
- With 6/12 temperature controllers (P/PI) for heating and cooling
- For controlling 6/12 thermal actuators 24 V - 230 V AC in 2/4 groups with 3 outputs and 450 mA each
- With short-circuit and overload protection
- Continuous or switching actuating value selectable
- Valve protection function can be deactivated
- With the modes: comfort, standby, night as well as frost/heating protection
- Change over to summer mode possible
- LED switching status indicator for each channel
- Manual operation on the device (even without bus voltage)

2.1 Operation

Each module has a manual button.
When manual mode is activated, the device can only be operated with the buttons; bus telegrams are not implemented.

A button and an LED are available for each channel.
The LEDs show the current state of the output.

In standard operation:

Case 1, channel is off:
Pressing the channel button switches on the output for 5 **minutes**.
Case 2, channel is already on:
Pressing the channel button switches the output off for 5 **seconds**.

During this time (5 minutes. or 5 seconds), bus telegrams are ignored.
The device then returns to normal operation.

In manual mode with the manual button or *Manual* object:

In the manual mode, the buttons can be used to switch the channels on or off as desired.
The time limits for normal operation (5 min and 5 s) do not apply in this case.

If the "manual" function is selected, the associated LED lights up.
The channel status will be frozen and can only be changed via the channel buttons.
Bus telegrams will not be executed anymore.

The "Manual" state will be cancelled during a mains failure.
After manual operation has been cancelled, already received bus events will not be executed again.

3 Technical data

Operating voltage KNX	Bus voltage, ≤ 4 mA
Operating voltage	110–240 V AC
Frequency	50 – 60 Hz
Standby output	0.3 W / 0.5 W[1]
Width	4 TE / 8 TE[2]
Type of installation	DIN-rail
Number of channels	6 /12[3]
Connection type	Screw terminals
Max. cable cross-section	Solid: 0.5 mm² (Ø 0.8) to 4 mm² | strand with crimp terminal: 0.5 mm² to 2.5 mm²
Output	Triac C1-C3: I_{Σ} 0.45 A max. C4-C6: I_{Σ} 0.45 A max. C7-C9: I_{Σ} 0.45 A max. C10-C12: I_{Σ} 0.45 A max.
Switch output	Floating
Voltage output	24 V AC – 240 V AC
Suitable for SELV	Yes, if all channels switch SELV
Switching different external phases	Possible
Ambient temperature	-5 °C–+45 °C
Protection rating	IP 20
Protection class	II in accordance with EN 60 730-1

[1] GVA-12K KNX
[2] GVA-12K KNX
[3] GVA-12K KNX

4 The application programme "GVA-12K KNX"

4.1 Selection in the product database

Manufacturer	GARO AB
Product family	Heating actuators
Product type	GVA-6K KNX, GVA-12K KNX
Program name	GVA-12K KNX

Table 1

Number of communication objects	163
Number of group addresses	254
Number of associations	255

4.2 Communication objects

The objects are divided into channel-related and common objects

4.2.1 Channel- and module-related objects

Table 2

No.	Object name	Function	Length DPT	Flags			
				C	R	W	T
0	*Channel H1*	*Base setpoint*	2 byte 9.001	✓	✓	✓	-
		Switching actuating value	1 bit 1.001	✓	✓	✓	-
		Continuous actuating value	1 byte 5.001	✓	✓	✓	-
1	*Channel H1*	*Manual setpoint offset*	2 byte 9.002	✓	✓	✓	-
2	*Channel H1*	*Actual value*	2 byte 9.001	✓	✓	✓	-
		Block valve protection	1 bit 1.003	✓	✓	✓	-
3	*Channel H1*	*Current actuating value*	1 byte 5.001	✓	✓	-	✓
		Operating mode preset	1 byte 20.102	✓	✓	✓	-
4	*Channel H1*	*Presence*	1 bit 1.018	✓	✓	✓	-
5	*Channel H1*	*Window position*	1 bit 1.019	✓	✓	✓	-
6	*Channel H1*	*current operating mode*	1 byte 20.102	✓	✓	-	✓
7	*Channel H1*	*Heating actuating value*	1 byte 5.001	✓	✓	-	✓
		Heating and cooling actuating value	1 byte 5.001	✓	✓	-	✓
8	*Channel H1*	*Cooling actuating value*	1 byte 5.001	✓	✓	-	✓
9	*Channel H1*	*Heating = 0, Cooling = 1*	1 bit 1.100	✓	✓	✓	-
		Forced operation mode	1 bit 1.003	✓	✓	✓	-
10	*Channel H1*	*Current setpoint*	2 byte 9.001	✓	✓	✓	✓
11	*Channel H1*	*Report actual value failure*	1 bit 1.005	✓	✓	-	✓
		Report actuating value failure	1 bit 1.005	✓	✓	-	✓

Continuation:

No.	Object name	Function	Length DPT	Flags			
				C	R	W	T
12	*Channel H2*	*Base setpoint*	2 byte 9.001	✓	✓	✓	-
		Switching actuating value	1 bit 1.001	✓	✓	✓	-
		Continuous actuating value	1 byte 5.001	✓	✓	✓	-
13	*Channel H2*	*Manual setpoint offset*	2 byte 9.002	✓	✓	✓	-
14	*Channel H2*	*Actual value*	2 byte 9.001	✓	✓	✓	-
		Block valve protection	1 bit 1.003	✓	✓	✓	-
15	*Channel H2*	*Current actuating value*	1 byte 5.001	✓	✓	-	✓
		Operating mode preset	1 byte 20.102	✓	✓	✓	-
16	*Channel H2*	*Presence*	1 bit 1.018	✓	✓	✓	-
17	*Channel H2*	*Window position*	1 bit 1.019	✓	✓	✓	-
18	*Channel H2*	*current operating mode*	1 byte 20.102	✓	✓	-	✓
19	*Channel H2*	*Heating actuating value*	1 byte 5.001	✓	✓	-	✓
		Heating and cooling actuating value	1 byte 5.001	✓	✓	-	✓
20	*Channel H2*	*Cooling actuating value*	1 byte 5.001	✓	✓	-	✓
21	*Channel H2*	*Heating = 0, Cooling = 1*	1 bit 1.100	✓	✓	✓	-
		Forced operation mode	1 bit 1.003	✓	✓	✓	-
22	*Channel H2*	*Current setpoint*	2 byte 9.001	✓	✓	✓	✓
23	*Channel H2*	*Report actual value failure*	1 bit 1.005	✓	✓	-	✓
		Report actuating value failure	1 bit 1.005	✓	✓	-	✓
24	*Channel H3*	*Base setpoint*	2 byte 9.001	✓	✓	✓	-
		Switching actuating value	1 bit 1.001	✓	✓	✓	-
		Continuous actuating value	1 byte 5.001	✓	✓	✓	-
25	*Channel H3*	*Manual setpoint offset*	2 byte 9.002	✓	✓	✓	-
26	*Channel H3*	*Actual value*	2 byte 9.001	✓	✓	✓	-
		Block valve protection	1 bit 1.003	✓	✓	✓	-

Continuation:

No.	Object name	Function	Length DPT	Flags			
				C	R	W	T
27	*Channel H3*	*Current actuating value*	1 byte 5.001	✓	✓	-	✓
		Operating mode preset	1 byte 20.102	✓	✓	✓	-
28	*Channel H3*	*Presence*	1 bit 1.018	✓	✓	✓	-
29	*Channel H3*	*Window position*	1 bit 1.019	✓	✓	✓	-
30	*Channel H3*	*current operating mode*	1 byte 20.102	✓	✓	-	✓
31	*Channel H3*	*Heating actuating value*	1 byte 5.001	✓	✓	-	✓
		Heating and cooling actuating value	1 byte 5.001	✓	✓	-	✓
32	*Channel H3*	*Cooling actuating value*	1 byte 5.001	✓	✓	-	✓
33	*Channel H3*	*Heating = 0, Cooling = 1*	1 bit 1.100	✓	✓	✓	-
		Forced operation mode	1 bit 1.003	✓	✓	✓	-
34	*Channel H3*	*Current setpoint*	2 byte 9.001	✓	✓	✓	✓
35	*Channel H3*	*Report actual value failure*	1 bit 1.005	✓	✓	-	✓
		Report actuating value failure	1 bit 1.005	✓	✓	-	✓
36	*Channel H4*	*Base setpoint*	2 byte 9.001	✓	✓	✓	-
		Switching actuating value	1 bit 1.001	✓	✓	✓	-
		Continuous actuating value	1 byte 5.001	✓	✓	✓	-
37	*Channel H4*	*Manual setpoint offset*	2 byte 9.002	✓	✓	✓	-
38	*Channel H4*	*Actual value*	2 byte 9.001	✓	✓	✓	-
		Block valve protection	1 bit 1.003	✓	✓	✓	-
39	*Channel H4*	*Current actuating value*	1 byte 5.001	✓	✓	-	✓
		Operating mode preset	1 byte 20.102	✓	✓	✓	-
40	*Channel H4*	*Presence*	1 bit 1.018	✓	✓	✓	-
41	*Channel H4*	*Window position*	1 bit 1.019	✓	✓	✓	-
42	*Channel H4*	*current operating mode*	1 byte 20.102	✓	✓	-	✓

Continuation:

No.	Object name	Function	Length DPT	Flags			
				C	R	W	T
43	*Channel H4*	*Heating actuating value*	1 byte 5.001	✓	✓	-	✓
		Heating and cooling actuating value	1 byte 5.001	✓	✓	-	✓
44	*Channel H4*	*Cooling actuating value*	1 byte 5.001	✓	✓	-	✓
45	*Channel H4*	*Heating = 0, Cooling = 1*	1 bit 1.100	✓	✓	✓	-
		Forced operation mode	1 bit 1.003	✓	✓	✓	-
46	*Channel H4*	*Current setpoint*	2 byte 9.001	✓	✓	✓	✓
47	*Channel H4*	*Report actual value failure*	1 bit 1.005	✓	✓	-	✓
		Report actuating value failure	1 bit 1.005	✓	✓	-	✓
48	*Channel H5*	*Base setpoint*	2 byte 9.001	✓	✓	✓	-
		Switching actuating value	1 bit 1.001	✓	✓	✓	-
		Continuous actuating value	1 byte 5.001	✓	✓	✓	-
49	*Channel H5*	*Manual setpoint offset*	2 byte 9.002	✓	✓	✓	-
50	*Channel H5*	*Actual value*	2 byte 9.001	✓	✓	✓	-
		Block valve protection	1 bit 1.003	✓	✓	✓	-
51	*Channel H5*	*Current actuating value*	1 byte 5.001	✓	✓	-	✓
51	*Channel H5*	*Operating mode preset*	1 byte 20.102	✓	✓	✓	-
52	*Channel H5*	*Presence*	1 bit 1.018	✓	✓	✓	-
53	*Channel H5*	*Window position*	1 bit 1.019	✓	✓	✓	-
54	*Channel H5*	*current operating mode*	1 byte 20.102	✓	✓	-	✓
55	*Channel H5*	*Heating actuating value*	1 byte 5.001	✓	✓	-	✓
		Heating and cooling actuating value	1 byte 5.001	✓	✓	-	✓
56	*Channel H5*	*Cooling actuating value*	1 byte 5.001	✓	✓	-	✓
57	*Channel H5*	*Heating = 0, Cooling = 1*	1 bit 1.100	✓	✓	✓	-
		Forced operation mode	1 bit 1.003	✓	✓	✓	-
58	*Channel H5*	*Current setpoint*	2 byte 9.001	✓	✓	✓	✓

Continuation:

No.	Object name	Function	Length DPT	Flags			
				C	R	W	T
59	*Channel H5*	*Report actual value failure*	1 bit 1.005	✓	✓	-	✓
		Report actuating value failure	1 bit 1.005	✓	✓	-	✓
60	*Channel H6*	*Base setpoint*	2 byte 9.001	✓	✓	✓	-
		Switching actuating value	1 bit 1.001	✓	✓	✓	-
		Continuous actuating value	1 byte 5.001	✓	✓	✓	-
61	*Channel H6*	*Manual setpoint offset*	2 byte 9.002	✓	✓	✓	-
62	*Channel H6*	*Actual value*	2 byte 9.001	✓	✓	✓	-
		Block valve protection	1 bit 1.003	✓	✓	✓	-
63	*Channel H6*	*Current actuating value*	1 byte 5.001	✓	✓	-	✓
		Operating mode preset	1 byte 20.102	✓	✓	✓	-
64	*Channel H6*	*Presence*	1 bit 1.018	✓	✓	✓	-
65	*Channel H6*	*Window position*	1 bit 1.019	✓	✓	✓	-
66	*Channel H6*	*current operating mode*	1 byte 20.102	✓	✓	-	✓
67	*Channel H6*	*Heating actuating value*	1 byte 5.001	✓	✓	-	✓
		Heating and cooling actuating value	1 byte 5.001	✓	✓	-	✓
68	*Channel H6*	*Cooling actuating value*	1 byte 5.001	✓	✓	-	✓
69	*Channel H6*	*Heating = 0, Cooling = 1*	1 bit 1.100	✓	✓	✓	-
		Forced operation mode	1 bit 1.003	✓	✓	✓	-
70	*Channel H6*	*Current setpoint*	2 byte 9.001	✓	✓	✓	✓
71	*Channel H6*	*Report actual value failure*	1 bit 1.005	✓	✓	-	✓
		Report actuating value failure	1 bit 1.005	✓	✓	-	✓
72	*H1 – H6*	*Summer mode ON/OFF*	1 bit 1.003	✓	✓	✓	-
73	*H1 – H3*	*Overcurrent/short circuit H1-H3*	1 bit 1.005	✓	✓	-	✓
74	*H4 – H6*	*Overcurrent/short circuit H4-H6*	1 bit 1.005	✓	✓	-	✓
75	*H1 – H6*	*Highest actuating value*	1 byte 5.001	✓	✓	-	✓

Continuation:

No.	Object name	Function	Length DPT	Flags			
				C	R	W	T
76	*H1 – H6*	*Pump ON/OFF*	1 bit 1.001	✓	✓	-	✓
77	*H1 – H6*	*Outdoor temperature*	2 byte 9.001	✓	✓	✓	-
78	*H1 – H6*	*Manual*	1 bit 1.001	✓	✓	✓	✓
79	*H1 – H6*	*Outside temperature failure*	1 bit 1.005	✓	✓	-	✓
158	*H7 – H12*	*Outside temperature failure*	1 bit 1.005	✓	✓	-	✓
80-157	*Channels H7-H12 (GVA-12K KNX)*						

4.2.2 Common objects

Table 3:

No.	Object name	Function	Type DPT	Flags			
				C	R	W	T
250	*Version of bus coupling unit*	*send*	14 byte 16.001	✓	✓	-	✓
251	*Firmware version 1*	*send*	14 byte 16.001	✓	✓	-	✓
252	*Firmware version 2*	*send*	14 byte 16.001	✓	✓	-	✓

4.2.3 Description of objects

The function of the channel, i.e. *heating actuator* or *heating controller* determines the type and function of the objects.

4.2.3.1 Objects for the heating actuator function

- **Object 0** ***"Continuous actuating value, switching actuating value"***

The actuating value receives data from the room thermostat for the corresponding valve.
It can either be continuous (0-100%) or switching (ON/OFF) depending on the configuration.

- **Objects 1**

Not used.

- **Objects 2 "*Block valve protection*"**

Blocks the valve protection function.

- **Object 3** ***"Current actuating value"***

Reports the actual value of the actuating value generated for the channel.

- **Objects 4, 5, 6, 7, 8, 9, 10**

Not used.

- **Object 11** ***"Report actuating value failure"***

Present only if, on the *Configuration options* parameter page, the parameter *Monitor the actuating value = yes*.

If monitoring is selected, the room thermostat must receive an actuating-value telegram regularly.
Recommendation: To ensure trouble-free operation, the cyclical transmission time to the room thermostat should be no longer than half the monitoring time.
Example: Monitoring time 30 min, cyclical transmission time to thermostat less than or equal to 15 min.

If no new actuating value is received within the configured monitoring time, failure of the room thermostat is assumed and an emergency programme is started.
See emergency programme parameter page.

This function can be selected or deactivated individually for each channel.
The monitoring time is set jointly for all channels on the *Channel H1-H6 monitoring* page.

4.2.3.2 Objects for the heating controller function

- **Object 0** ***"Base setpoint"***

The Base setpoint value is first specified via the application at start-up and stored in the "Base setpoint" object.
It can be reset at any time using object 0 (limited by minimum or maximum valid setpoint).
The object can be written to without restriction.

- **Object 1** ***"Manual setpoint offset***

Offsetting set temperature:
The object receives a temperature difference as DPT 9.002. The desired room temperature (current setpoint) can be adjusted from the base setpoint by this difference.
The following applies in comfort mode (heating):
Current setpoint (obj. 10) = base setpoint + manual setpoint offset (obj. 1)

Values beyond the configured range (*maximum or minimum valid setpoint on the setpoints parameter page*) are limited to the highest or lowest value.

Note:
The offset is always in relation to the set *base setpoint* and
not to the current setpoint.
See also: Determination of the setpoint

- **Object 2** ***"Actual value"***

Receives the current room temperature for the control.

- **Object 3** ***"Operating mode"***

1 byte object. One of 4 operating modes can be directly activated.
1 = Comfort, 2 = Standby, 3 = Night,
4 = Frost protection (heat protection)
If another value is received (0 or >4) the comfort operation mode is activated.
The details in brackets refer to cooling mode.

- **Object 4** ***"Presence"***

The status of a presence detector (e.g. push button, motion detector) can be received via this object.
1 on this object activates the comfort operating mode.

- **Object 5** ***"Window"***

The status of a window contact can be received via this object.
1 on this object activates the frost / heat protection operating mode.

- **Object 6** ***"Current operating mode"***

Transmits the current operation mode as a 1 byte value (see table).
The transmission behaviour can be set on the *Operating mode* parameter page.

Table 4: Coding of HVAC operating modes:

Value	Operating Mode
1	Comfort
2	Standby
3	Night
4	Frost protection/heat protection

- **Object 7** *"Heating actuating value, heating and cooling actuating value"*

Sends the current heating actuating value (0...100%), or heating or cooling if the *Output of cooling actuating value* parameter has been set to *Together with heating actuating value*.

- **Object 8** *"Cooling actuating value"*

Sends the cooling actuating value or switching command to control a cooling surface, fan coil unit etc.
The send format DPT 5.001 or DPT 1.001 depends on the selected *Type of control* (continuous or switching) on the *Cooling control* page.

Note:
Object 8 is not available:
- With the setting *Heating control only* (*Settings* parameter page), as cooling function is not available.
- If *Changeover between heating and cooling → via object* is selected and *Output of cooling actuating value* is set to *Together with heating actuating value* (*Cooling control* parameter page).

- **Object 9** *"Changeover between heating and cooling or forced operation"*

The function of the object depends on the setting of the *Change over between heating and cooling* parameter on the *Cooling control* parameter page.

Table 5

Change over between heating and cooling	
Automatic	*Via object*
Forced operation. The direction of action of the force telegram is adjustable. Standard: 1 = activate force 0 = end force.	This object is used in 2-pipe heating/cooling systems or if automatic switching between heating and cooling is not required. The cooling operation is forced via 1 and the heating operation via 0.

- **Object 10** *"Current setpoint"*

Sends the current setpoint in DPT 9.001 format to the bus.

- **Object 11** *"Actual value failure"*

Sends a 1 if no valid actual value was received during the monitoring time.

- **Objects 12-71**

Objects for channels H2-H6.

4.2.3.3 Common objects

- **Object 72** *"Summer mode"*

When 1 is set for the object, all channels configured for it are switched over to the summer mode and heating no longer takes place.
A valve protection programme can also optionally be executed in the summer mode.

- **Object 73** *"Overcurrent/short circuit H1-H3"*

Reports overload or short circuit on channels H1, H2, H3.
0 = No error
1 = Overload or short circuit on at least one of the 3 channels H1-H3

- **Object 74** *"Overcurrent/short circuit H4..H6"*

0 = No error
1 = Overload or short circuit on at least one of the 3 channels H4-H6

- **Object 75** *"Highest actuating value"*

This object is available if at least 1 channel was configured as a continuous controller.
The actuating values for the channels are continuously compared with each other and only the highest current value is sent to this object.
The current heat requirement of the system is thus constantly reported to the heating boiler, which then adapts its output to the actual requirement.

Whether a channel is taken into account for determining the highest actuating value can be selected individually for each channel. For example, insignificant rooms can be ignored for the heat requirement.

- **Object 76** *"Pump"*

Control of the supply pump. This object is used jointly for all channels of a module.

- **Object 77** *"Outside temperature"*

Receives the outside temperature.

- **Objects 78, 158** *"Manual"*

Puts the device in manual mode or sends the status of the manual operation.

Table 6

Telegram	Meaning	Explanation
0	Auto	All channels can be operated via the bus as well as via the buttons.
1	Manual	The channels can only be operated via the buttons on the device. Bus telegrams will not work.

The duration of the manual mode, i.e. *operation of the manual button* is adjustable on the *General* parameter page.

After manual operation has been cancelled, already received bus events will not be executed again. The "Manual" state will be reset in the event of a mains failure.

- **Object 79** *"Outside temperature failure"*

0 = No error
1 = Error: Outside temperature no longer being received.

- **Object 250** "*Version of bus coupling unit*"

For diagnostic purposes only.

Sends the bus coupling unit software version after reset or download.
Can also be read out via the ETS.

Format: **A**xx **H**yy **V**zzz

Code	Meaning
xx	00 .. FF = Version of application without dividing point (14 = V1.4, 15 = V1.5 etc.).
yy	Hardware version 00..99
zzz	Firmware version 000..999

EXAMPLE: A12 H00 V09
- ETS application version 1.2
- Hardware version $00
- Firmware version $09

- **Object 251, 252** "*Firmware version 1.2*"

For diagnostic purposes only.

Sends the firmware versions of the device after reset or download.
Can also be read out via the ETS.

The version is issued as an ASCII character string.
Format: **M**xx **H**yy **V**zzz

Code	Meaning
xx	01 .. FF = Module code (hexadecimal).
yy	Hardware version 00..99
zzz	Firmware version 000..999

EXAMPLE: M15 **H**00 **V**011
- Module $15 = GVA-6K KNX
- Hardware version V00
- Firmware version V11

4.3 Parameters

4.3.1 Parameter pages

The heating actuator has 6 or 12 identical channels that can be configured individually as actuator or controller.

Table 7

Function	Description
General	General settings
Channel H1 Configuration options	Selection as heating controller / heating actuator and activation of additional functions.
Settings	Standard/user-defined control.
Heating control	Control parameters, installation type etc. for heating mode.
Setpoints	Base setpoint, lowering, frost protection etc.
Cooling control	Control parameters, installation type etc. for cooling mode.
Cooling setpoints	Dead zone, standby, heat protection etc.
Operating Mode	Operating mode after reset, presence sensor etc.
Channel characteristics	Parameters for actuator control.
Emergency programme	Response to failure of the actuating value or the actual value.
Force	Response in forced operation.
Monitoring channel H1-H6 or H7-H12	Monitoring of actuating value, actual value, outside temperature.
Pump	Pump control.

4.3.2 General

Table 8

Designation	Values	Description
Device type	***GVA-6K KNX..*** *GVA-12K KNX..*	Select device type.
Function of the manual button	*applies for 24 hours or until reset via object blocked* ***applies until reset via object*** *applies for 30 minutes or until reset via object* *applies for 1 hour or until reset via object* *applies for 2 hours or until reset via object* *applies for 4 hours or until reset via object* *applies for 8 hours or until reset via object* *applies for 12 hours or until reset via object*	Determines how long the device works manually and how this is ended. In manual mode, the channels can only be switched on and off via the buttons on the device. See also: Object_78
Manual operation of the channels	***enabled*** *blocked*	The channels can be operated via the buttons on the device. No manual operation, the buttons on the device are blocked..

4.3.3 Parameters for the heating actuator

4.3.3.1 Channel H1 Configuration options

Table 9

Designation	Values	Description
Channel function		Should the channel be used as an actuator or controller?
	Heating actuator	The channel receives its actuating value from an external room thermostat.
	Heating controller	The channel receives the room temperature over the bus and generates the actuating value independently by means of an internal controller. See chapter: Parameters for the heating actuator
Type of actuating value		The channel processes:
	switching..	ON/OFF telegrams.
	continuous..	Percent telegrams 0-100%
Include in summer mode	***no***	Should the channel remain off in the summer mode?
	yes	
Activate valve protection		This function prevents the valve from seizing and is executed if the valve position has not changed for 7 days. When this function is executed, the valve is moved to the opposite position for 6 minutes.
	no	No valve protection.
	yes	Valve protection is active.
Valve protection block telegram		Valve protection is:
	1 = Block (standard)	blocked with a 1.
	0 = Block	blocked with a 0.

Continuation:

Designation	Values	Description
Monitor actuating value	***no*** *yes.*.	Should whether the room thermostat regularly transmits an actuating value being monitored? A thermostat malfunction can be detected quickly in this way and an emergency programme started.
Activate force function	***no*** *yes.*.	No forced-operation function. Opens the Force parameter page.

4.3.3.2 Channel characteristics

Table 10

Designation	Values	Description
Time for one actuation cycle	*2, 3, 5, 7,* ***10****, 15, 20, 30 min*	For "*continuous*" actuating value. An actuation cycle consists of a switching-on and a switching-off process and forms a PWM period. Examples: - Actuating value = 20%, - Time = 10 min means: switched on for 2 min during the actuating cycle of 10 min (i.e. 20% of actuating cycle) and switched off for 8 min. - Actuating value = 70% / time = 10 min means: 7 min on / 3 min off. See appendix: PWM cycle
Actuator direction of operation	***Standard: 1 = Open valve*** *Inverted: 0 = Open valve*	Standard. Valve closed when de-energised. Special inverted valve types. Valve open when de-energised.
Minimum actuating value	***0%****, 5%, 10%, 20%, 30%*	Lowest permissible actuating value
Maximum actuating value	*50%, 60%, 70%, 80%,* ***90%****, 100%*	Highest permissible actuating value. A highest value of 90% extends the service life of thermal actuators. A highest value of 100% reduces the number of switching cycles

Continuation:

Designation	Values	Description
Actuating value when value violates the min/max. actuating value		Restriction when a room thermostat receives an actuating value that is less than the minimum actuating value:
	0% and/or 100%	Actuate channel with 0% or 100%
	Use set actuating values	Restrict values to maximum and minimum actuating values. For example, maintaining a minimum actuating value of 10% can be practical for the correct base temperature of an underfloor heating.
	0 = 0%, otherwise use set actuating values	If the received actuating value is = 0, accept this value and close the valve. Other values are restricted in acc. with the configured minimum and maximum actuating values: Received values > *0%* and < *min. actuating value* are replaced with the minimum actuating value. In the same way, values > max. actuating value are replaced with the set maximum actuating value.
	< Min. actuating value = 0%, otherwise scale.	Actuating values below the minimum actuating values are interpreted as 0%. Values above are scaled in proportion to the range between the min. actuating value and 100%.
Send current actuating value	*With change of 1%, 2%, 3%,* ***5%****, 7%, 10%, 15%*	After what percentage change[4] in the actuating value is the new value to be transmitted?

[4] Change since last transmission.

Continuation:

Designation	Values	Description
Send current actuating value cyclically	***not cyclical, only in the event of change***, *every 2 min, every 3 min every 5 min, every 10 min, every 15 min, every 20 min, every 30 min, every 45 min, every 60 min*	Send when or at what interval?
Take channel H1 into account for highest actuating value	*no* ***yes***	Should the actuating value for channel 1 be used for determining the highest actuating value of all channels?
Take channel H1 into account for pump control	*no* ***yes***	Should the supply pump be switched on in case of heat requirement in channel 1?

4.3.3.3 Emergency programme

Response to actuating value loss to ensure frost protection or minimum comfort in event of control failure.

Table 11

Designation	Values	Description
Actuating value for emergency programme is	***fixed***	The valve is energised by a fixed actuating value continuously. See below: *Fixed emergency programme in winter mode.*
	Outside temperature dependent	Energy-savings setting: The valve is energised on the basis of the outside temperature and in this way is opened only when it is really necessary.
Actuating value for emergency programme is ***fixed***		
Fixed emergency programme in winter mode	*0%, 10%,* ***20%*** *30%, 40%, 50%*	Fixed actuating value that should replace the actuating value of the thermostat until it is available again.
Actuating value for emergency programme is ***temperature-dependent***		
Emergency programme active when outside temperature below	*5 °C* ***10 °C*** *15 °C*	If the outside temperature drops below the said value, the valve opens.
Max. actuating value in emergency programme	*10%, 20% 30%,* ***40%****, 50%*	What should be the maximum heating level in the emergency programme?
Fixed emergency programme with failure of outside temperature.	*0%, 10%,* ***20%*** *30%, 40%, 50%*	Fixed valve setting if neither the actuating value nor the outside temperature can be received.

4.3.3.4 Force

Table 12

Designation	Values	Description
Actuating value in forced-operation mode	***0%** to 100% in increments of 10%*	Set actuating value to control the valve in forced-operation mode. This is not restricted by the minimum or the maximum actuating value.
Forced-operation telegram	***1 = Forced operation (standard)***	Forced operation is activated with an ON telegram
	0 = Forced operation	Inverted: Forced operation is activated with an OFF telegram

4.3.4 Parameters for the heating controller

4.3.4.1 Channel H1 Configuration options

Table 13

Designation	Values	Description
Channel function		Should the channel be used as an actuator or controller?
	Heating actuator	The channel receives its actuating value from an external room thermostat.
	Heating controller	The channel receives the room temperature over the bus and calculates the actuating value independently by means of an internal controller. See chapter: Parameters for the heating actuator
Include in summer mode	***no***	Should the channel remain off in the summer mode?
	yes	
Execute valve protection		This function prevents the valve from seizing and is executed if the valve position has not changed for 7 days. When this function is executed, the valve is moved to the opposite position for 6 minutes.
	always	Valve protection is permitted at any time.
	Only in comfort mode *only in standby mode* *only in night mode*	Valve protection is permitted only during the operating mode selected here.
Monitor actual value	***no***	No monitoring.
	yes	The actual value (room temperature) is monitored and an emergency programme can be configured.
Activate force function	***no***	No forced-operation function.
	yes	Opens the Force parameter page.

4.3.4.2 Settings

Table 14

Designation	Values	Description
Control	***Standard***	For simple applications (heating control only).
	User-defined	Enables selection of control functions.
Control functions used		User-defined control.
	Heating control only	Heating mode only.
	Heating and cooling	An additional cooling system will be controlled (object 8).

4.3.4.3 Heating control

Table 15

Designation	Values	Description
Setting the control parameters	***Via installation type***	Standard application
	User-defined	Professional use: P/PI control self-configure
Installation type		PI controller with:
	Radiator heating system	Integrated time = 90 minutes Bandwidth = 2.5 k
	Underfloor heating	Integrated time = 30 h Bandwidth = 4 k
transmission of heating actuating value	*at change by 1%* *at change by 2%* *at change by 3%* ***at change by 5%*** *at change by 7%* *at change by 10%* *at change by 15%*	After what percentage change[5] in the actuating value is the new value to be transmitted. Small values increase control accuracy but also the bus load.
Cycl. transmission of heating actuating value	***not cyclical, only in the event of change*** *every 2 min, every 3 min* *every 5 min, every 10 min* *every 15 min, every 20 min* *every 30 min, every 45 min* *every 60 min,*	How often is the current heating actuating value to be sent (regardless of changes)?

[5]Change since last transmission.

Continuation:

Designation	Values	Description
User-defined parameter		
Proportional band of heating controller	*1 K, 1.5 K,* ***2 K****, 2.5 K, 3 K* *3.5 K, 4 K, 4.5 K* *5 K, 5.5 K, 6 K* *6.5 K, 7 K, 7.5 K* *8 K, 8.5 K*	Professional setting for adapting control response to the room. Small values cause large changes in actuating values, larger values cause finer actuating value adjustment.
Integrated time of the heating control	*pure P controller* *15 min, 30 min, 45 min* *60 min, 75 min, 90 min* *105 min, 120 min, 135 min* *150 min, 165 min, 180 min* *195 min, 210 min, 4 h, 5 h,* ***10 h*** *15 h, 20 h, 25 h, 30 h, 35 h*	The integrated time determines the response time of the control. It establishes the increase by which the actuating value from the controller is raised in addition to the P share. The I share remains active for as long as there is a control deviation. The I share is added to the P share.

4.3.4.4 Setpoints

Table 16

Designation	Values	Description
Base setpoint after loading the application	*18 °C, 19 °C, 20 °C,* ***21 °C****, 22 °C, 23 °C, 24 °C, 25 °C*	Output setpoint for temperature control.
Reduction in standby mode (during heating)	*0.5 K, 1 K,* ***1.5 K*** *2 K, 2.5 K, 3 K 3.5 K, 4 K*	Example: With a base setpoint of 21 °C in the heating mode and a reduction of 2 K, controls HM 6 T with a setpoint of 21 – 2 = 19 °C.
Reduction in night mode (during heating)	*3 K, 4 K,* ***5 K*** *6 K, 7 K, 8 K*	By what value should the temperature be reduced in night mode?
Setpoint for frost protection mode (during heating)	*3 °C, 4 °C,* ***5 °C*** *6 °C, 7 °C, 8 °C 9 °C, 10 °C*	Preset temperature for frost protection mode in heating mode (Heat protection applies in cooling mode).
Setpoint offset only applies	*Only in comfort mode* *With comfort and standby mode* ***With comfort, standby and night mode***	The setpoint offset: Is only considered in the selected mode and is ineffective in all operation modes.

Continuation:

Designation	Values	Description
Current setpoint in comfort mode		Feedback of current setpoint via the bus:
	Sends actual value (heating < > cooling)	The setpoint actually being used for control is always sent (= Current setpoint). **Example** with Base setpoint 21 °C and Dead zone 2 K: During heating and cooling, 21 °C and base setpoint + dead zone are sent respectively (21 °C + 2 K = 23 °C)
	Send average value between heating and cooling	Same value in comfort mode during both heating and cooling mode, i.e.: Base setpoint + half dead zone is transmitted to prevent occupants from being confused. **Example** with Base setpoint 21 °C and dead zone of 2 K: Mean value= 21°+1 K =22 °C Although control takes place at 21 °C or 23 °C
cycl. transmission of current setpoint		How often should the currently valid setpoint be sent?
	Not cyclical, only in the event of change	Only send in the event of a change.
	every 2 min *every 3 min* *every 5 min* *every 10 min* *every 15 min* *every 20 min* *every 30 min* *every 45 min* *every 60 min*	Send cyclically
LIMITS		
Maximum valid setpoint offset	*+/- 1 K, +/- 2 K, +/- 3 K, +/- 4 K,* ***+/- 5 K***	Limits the possible setting range for the setpoint offset function. Applicable for the received values above object 1 (manual setpoint offset).

Continuation:

Designation	Values	Description
Minimum valid base setpoint	*5 °C, 6 °C, 7 °C, 8 °C, 9 °C,* ***10 °C****, 11 °C, 12 °C, 13 °C, 14 °C, 15 °C,16 °C 17 °C, 18 °C, 19 °C, 20 °C*	If a base setpoint received by object 0 is lower than the set value, it will be limited to this value.
Maximum valid base setpoint	*20 °C, 21 °C, 22 °C 23 °C, 24 °C, 25 °C 27 °C, 30 °C,* ***32 °C***	If a base setpoint received by object 0 is higher than the set value, it will be limited to this value.

4.3.4.5 Cooling control

Table 17

Designation	Values	Description
Setting the control parameters	***Via installation type***	Standard application
	User-defined	Professional use: Configure P/PI controller yourself
Installation type	***Cooling surface***	PI controller with: Integrated time = 240 minutes Bandwidth = 5 k
	Fan coil unit	Integrated time = 180 minutes Bandwidth = 4 k
User-defined control parameter		
Proportional band of the cooling control	*1 K, 1.5 K, 2 K, 2.5 K, 3 K* *3.5 K,* ***4 K****, 4.5 K* *5 K, 5.5 K, 6 K* *6.5 K, 7 K, 7.5 K* *8 K, 8.5 K*	Professional setting for adapting control response to the room. Large values cause finer changes to the actuating value with the same control deviation and more precise control than smaller values.
Integrated time of the cooling control	*pure P controller*	See appendix temperature control
	15 min, 30 min, 45 min *60 min, 75 min, 90 min* *105 min, 120 min, 135 min* *150 min, 165 min,* ***180 min*** *195 min, 210 min, 4 h, 5 h, 10 h* *15 h, 20 h, 25 h, 30 h, 35 h*	Only for PI controller: The integrated time determines the response time of the control. It establishes the increase by which the actuating value from the controller is raised in addition to the P share. The I share remains active for as long as there is a control deviation. The I share is added to the P share.
transmission of cooling actuating value	*at change by 1%* *at change by 2%* *at change by 3%* ***at change by 5%*** *at change by 7%* *at change by 10%* *at change by 15%*	After what percentage change[6] in the actuating value is the new value to be transmitted. Small values increase control accuracy and also the bus load.
Cycl. transmission of cooling actuating value	***Not cyclical, only in the event of change*** *every 2 min, every 3 min* *every 5 min, every 10 min* *every 15 min, every 20 min* *every 30 min, every 45 min* *Every 60 min*	How often is the current cooling actuating value to be sent (regardless of changes)?

[6]Change since last transmission.

Continuation:

Designation	Values	Description
Change over between heating and cooling	***Automatic***	GVA-6K KNX automatically switches to cooling mode when the actual temperature is above the setpoint.
	via object	The cooling mode can only be activated on the bus via object 9 (1= cool). Cooling mode remains off for as long as this object is not set.
Output of the cooling actuating value[7]	***on separate object (object 8)***	For 4-pipe systems: The heating actuating value is sent to object 7 and the cooling actuating value to object 8.
	Together with heating actuating value (object 7)	For 2-pipe systems: The actuating value is always sent to object 7, independent of whether heating or cooling mode is active.

[7] Only when changeover between heating and cooling via object.

4.3.4.6 Cooling setpoints

Table 18

Designation	Values	Description
Dead zone between heating and cooling[8]	*1 K* ***2 K*** *3 K* *4 K* *5 K* *6 K*	Specifies the buffer zone between setpoints for heating and cooling mode. The dead zone is expanded through hysteresis in switching (2 point) control. See glossary: Dead zone
Increase in standby mode (during cooling)	*0 K, 0.5 K, 1 K,* ***1.5 K*** *2 K, 2.5 K, 3 K* *3.5 K, 4 K, 5 K*	The standby temperature is increased in the cooling mode
Increase in night mode (during cooling)	*3 K, 4 K,* ***5 K*** *6 K, 7 K, 8 K*	See increase in standby mode
setpoint for heat protection mode (during cooling)	***42 °C (does not represent heat protection)*** *29 °C, 30 °C, 31 °C* *32 °C, 33 °C, 34 °C* *35 °C*	Heat protection represents the maximum permitted temperature for the controlled room. It performs the same function during cooling as the frost protection mode during heating, i.e. saving energy while prohibiting non-permitted temperatures.

[8] Depending on type of control:
"+ *Heating hysteresis*" or
"+ *Heating hysteresis* + *cooling hysteresis*"

4.3.4.7 Operating Mode

Table 19

Designation	Values	Description
Operating mode after reset	*Frost protection* *Temperature reduction at night* ***Standby*** *Comfort*	Operating mode after start-up or reprogramming
Type of presence sensor (to obj. 4)	 ***Presence detectors*** *Presence button*	The presence sensor activates comfort operating mode. Operating type comfort provided the presence object is set. 1. If the operation mode object (object 3) is called up again after setting the presence object the new operating mode will be accepted and the state of the presence object ignored. 2. If the presence object is set during night/frost mode, it is reset after the configured comfort extension has expired (see below). 3. The presence object is not reported on the bus
Comfort extension by presence button in night mode	*none* *30 min* *1 hour* *1.5 hours* ***2 Hours*** *2.5 Hours* *3 Hours* *3.5 Hours*	Telegrams from presence button are not considered. Party switching: This allows the GVA-6K KNX to change via the presence object from night/frost mode to comfort mode again for a set length of time. The time limit is omitted if the device was previously in standby mode. Comfort operation is only cleared with the next manual or bus controlled change of operation mode.

Continuation:

Designation	Values	Description
Cycl. transmission of current operating mode	***not cyclical, only in the event of change*** *every 2 min, every 3 min* *every 5 min, every 10 min* *every 15 min, every 20 min* *every 30 min, every 45 min* *Every 60 min*	How often should the current operating mode be sent?

4.3.4.8 Channel characteristics

Table 20

Designation	Values	Description
Channel processes actuating value for	***Heating***	Only for heating and cooling mode and *Output of cooling actuating value = to separate object*. Channel responds to the heating actuating value
	Cooling	Channel responds to the cooling actuating value
	Heating or cooling	Only for heating and cooling mode and *Output of cooling actuating value = together with heating actuating value*. Channel responds to the actuating value independently of the parameter
Time for one actuation cycle	*2, 3, 5, 7,* ***10****, 15, 20, 30 min*	For "*continuous*" actuating value. An actuation cycle consists of a switching-on and a switching-off process and forms a PWM period. Examples: - Actuating value = 20%, - Time = 10 min means: switched on for 2 min during the actuating cycle of 10 min (i.e. 20% of actuating cycle) and switched off for 8 min. - Actuating value = 70%, time = 10 min means: 7 min on / 3 min off. See appendix: PWM cycle
Actuator direction of operation	***Standard: 1 = Open valve***	Standard. Valve closed when de-energised.
	Inverted: 0 = Open valve	Special inverted valve types. Valve open when de-energised.
Minimum actuating value	***0%****, 5%,* ***10%****, 20%, 30%*	Lowest permissible actuating value

Continuation:

Designation	Values	Description
Maximum actuating value	*50%, 60%, 70%, 80%, 90%,* ***100%***	Highest permissible actuating value. A highest value of 90% extends the service life of thermal actuators. A maximum value of 100% reduces the number of switching cycles.
Actuating value when value violates the min/max. actuating value		Restriction when a room thermostat receives an actuating value that is less than the minimum actuating value:
	0% and/or 100%	Actuate channel with 0% or 100%
	Use set actuating values	Restrict values to maximum and minimum actuating values. For example, maintaining a minimum actuating value of 10% can be practical for the correct base temperature of an underfloor heating.
	0 = 0%, otherwise use set actuating values	If the received actuating value is = 0, accept this value and close the valve. Other values are restricted as per the configured minimum and maximum actuating values.
	< Min. actuating value = 0%, otherwise scale.	Actuating values below the minimum actuating values are interpreted as 0%. Values above are scaled in proportion to the range between the min. actuating value and 100%.
Take channel H1 into account for highest actuating value	*no* ***yes***	Should the actuating value for channel 1 be used for determining the highest actuating value of all channels?
Take channel H1 into account for pump control	*no* ***yes***	Should the supply pump be switched on in case of heat requirement in channel 1?

4.3.4.9 Channel H1- H6 monitoring

Central settings for monitoring the actuating value (heating actuator), actual value (heating controller) and outside temperature (emergency programme).

Table 21

Designation	Values	Description
Monitoring time	*5 min* *10 min* *20 min* ***30 min*** *60 min*	Start emergency programme if the relevant data were not received within the configured time.
Status of monitoring	***Report only in the event of malfunction*** *Always report*	Do not send any telegrams during normal operation, only in the event of failure. Status will also be sent when there is no fault.
Send status cyclically	***no*** *yes*	Send status messages cyclically?
Cycle time	*every 2 min, every 3 min* *every 5 min, every 10 min,* *every 15 min, every 20 min,* ***every 30 min***	At what interval should the status be sent?

4.3.4.10 H1-H6, H7-H12 pump

Table 22

Designation	Values	Description
Only switch on pump when at least	*one input variable > 0%*	Strategy for pump control. Standard. The pump is switched on as soon as the input variable of a channel is over 0%.
	a valve is really open	As above, however, the pump will always be switched off when, due to the PWM cycle, all vents are closed.
Switch-off delay for pump	*No switch-off delay*	switch off immediately
	2 min, 3 min, 5 min, 7 min, ***10 min****, 15 min, 20 min, 30 min*	continue running for a set length of time.
Send pump control cyclically	***no, only in the event of change*** *cyclically and in the event of change*	How should the switch command for the pump to be sent?
Send highest actuating value cyclically (If continuous actuating value used)	***no, only in the event of change***	do not send cyclically.
	cyclically and in the event of change	On change (ON-OFF, OFF-ON) and send cyclically.
Cycle time	*every 2 min, every 3 min every 5 min, every 10 min, every 15 min, every 20 min,* ***every 30 min***	At what interval should the switch telegram for the pump be sent?

5 APPENDIX

5.1 Determining the current operating mode

The current setpoint can be adjusted to the relevant requirements via the choice of operating mode. The operating mode can be specified by objects 3..5.

The current operating mode can be specified as follows:

Table 23

Operating mode preset Object 3	Presence Object 4	Window status Object 5	current operating mode (object 6)
any	any	1	Frost/heat protection
any	1	0	Comfort
Comfort	0	0	Comfort
Standby	0	0	Standby
Night	0	0	Night
Frost/heat protection	0	0	Frost/heat protection

5.1.1 Determination of the setpoint

5.1.1.1 Setpoint calculation in heating mode

See also: Base setpoint and current setpoint

Table 24: Current setpoint during heating

Operating Mode	Current setpoint
Comfort	Base setpoint +/- setpoint offset
Standby	Base setpoint +/- setpoint adjustment – reduction in standby mode
Night	Base setpoint +/- setpoint offset – reduction in standby mode
Frost/heat protection	configured setpoint for frost protection mode

Example:
Heating in comfort mode.

Parameter page	Parameter	Setting
Setpoints	*Base setpoint after loading the application*	*21 °C*
	Reduction in standby mode (during heating)	*2 K*
	Maximum valid setpoint offset	*+/- 2 K*

The setpoint was previously increased by 1 K via object 1.

Calculation:

Current setpoint = base setpoint + setpoint offset
= 21 °C + 1 K
= 22 °C

If operation is switched to standby mode, the current setpoint is calculated as follows:

Current setpoint = base setpoint + setpoint offset – reduction in standby mode
= 21 °C + 1 K – 2 K
= 20 °C

5.1.1.2 Setpoint calculation in cooling mode

Table 25: Current setpoint during cooling

Operating Mode	Current setpoint
Comfort	Base setpoint + Setpoint offset + dead zone
Standby	Base setpoint + setpoint offset + dead zone + increase in standby mode
Night	Base setpoint + setpoint offset + dead zone + increase in night mode
Frost/heat protection	configured setpoint for heat protection mode

Example:
Cooling in comfort mode.

The room temperature is too high, the device has switched to cooling mode

Parameter page	Parameter	Setting
Setpoints	*Base setpoint after loading the application*	*21 °C*
	Maximum valid setpoint offset	*+/- 2 K*
Cooling setpoints	*Dead zone between heating and cooling*	*2 K*
	Increase in standby mode (during cooling)	*2 K*

The setpoint was previously lowered by 1 K via object 1.

Calculation:

Current setpoint = base setpoint + setpoint offset + dead zone
= 21 °C - 1 K + 2 K
= 22 °C

Changing to standby mode causes a further increase in the setpoint (energy saving) and results in the following setpoint.
setpoint = base setpoint + setpoint offset + dead zone + increase in standby mode
= 21 °C - 1 K + 2 K + 2 K
= 24 °C

5.2 Setpoint offset

The current setpoint can be adjusted via object 1 *manual setpoint offset.*
In this case, the setpoint is changed by sending the desired offset to object 1.
This involves the differential (may be preceded by a minus sign) being sent in EIS5 format to object 1.

The differential between the setpoint offset and Base setpoint is sent by object 10 at each change (e.g. -1.00).

The offset limits are set on the *setpoints* parameter page via the *Maximum valid setpoint offset* parameter.

The offset is always in relation to the Base setpoint and not the current setpoint.

Example Base setpoint of 21 °C:

If a value of 2.00 is received by object 1, the new setpoint is calculated as follows:
21 °C + 2.00 K = 23.00 °C.
To then bring the setpoint to 22 °C, the differential to the programmed base setpoint (here 21 °C) is resent, in this case 1.00 K (21 °C + 1.00 K = 22 °C)

5.3 Base setpoint and current setpoint

The **base setpoint** is the standard temperature for the comfort mode and the reference temperature for reduction in standby and night modes.
The programmed base setpoint (see base setpoint after downloading the application) is stored in object 0 and can be changed at any time via the bus by sending a new value to object 0 (EIS5).

The **current setpoint** is the value that actually is used for control. It is the result of all the reductions or increases associated with the operating mode and implemented by the control function.

Example:
At a base setpoint of 22 °C and a reduction in night mode of 4 K, the current setpoint (in night mode) is: 22 ºC - 4 K = 18 ºC. During the day (in comfort mode), the current setpoint is 22 °C (provided that the cooling mode is not active).

The formation of the current setpoint on the basis of the base setpoint can be observed in the block diagram on the next page:
The base setpoint, specified via object 0, is on the left.
The current setpoint is on the right, i.e. the value upon which the room temperature is effectively controlled.

As you can see in the block diagram, the current setpoint depends on the operating mode and the control function. selected.

The base setpoint limits prevent an incorrect base setpoint from being specified to object 0. These are the following parameters:

- Minimum valid base setpoint
- Maximum valid base setpoint

If because of a setpoint offset the setpoint is outside the programmed values for frost and heat protection, it is restricted to these values by the safety limits.

See also: Setpoint calculation.

5.4 Short-circuit and overcurrent shutdown

The channel blocks H1-H3 or H4-H6 and H7-H9 or H10-H12 are always protected by a reversible safety device whose state is monitored.

After the safety device trips, all 3 channels are shut off for 20 seconds, the LED indicating a malfunction flashes at a frequency of 5 Hz and the corresponding "Overcurrent / short circuit" object is set.
Following this, all 3 channels are switched on in succession for testing.
If the safety device trips again, the associated channel is switched off, the channel LED flashes at a frequency of 5 Hz, the "Overcurrent / short circuit" object for the affected group remains set (obj. 73 and 74)
Operation of the other channels remains unaffected.

If the safety device does not trip again when tested, it is assumed that an overload occurred. The LED indicating a malfunction is illuminated continuously, the "Overcurrent / short circuit" object for the associated group is reset (obj. 73 and 74).
Operation of all 3 channels remains unaffected.

If no further malfunction occurs during the next 24 hours in this condition, the LED indicating a malfunction goes out.
If 1-4 malfunctions occur again during the 24 hours following the initial overload, the LED remains on 24 hours again.
If more than 5 malfunctions occur during the 24 hours following the initial overload, all 3 channels are switched off, the LEDs for the channels flash at a frequency of 2 Hz, the LED indicating a malfunction is illuminated continuously, the "Overcurrent / short circuit" object is set.

5.5 Load distribution, connection of devices

By combining 3 channels on one safety device (see above), it is also possible to distribute loads asymmetrically over the 3 channels as long as the total current of 0.45 A is not exceeded.

Example:
C1 = 0.025 A,
C2 = 0.025 A,
C3 = 0.4 A
is permissible.

Brief inrush current levels of up to 0.75 A per group are permissible (max. 10 s).

Depending on the ambient temperature and air circulation at the installation location, the safety device may trip in the event of longer-lasting current loads between 0.45 A and 0.75 A per group.

5.6 Conversion of percentages to hexadecimal and decimal values

Table 26

Percentage value	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Hexadecimal	00	1a	33	4D	66	80	99	B3	CC	E6	FF
Decimal	00	26	51	77	102	128	153	179	204	230	255

All values from 00 to FF hex. (0 to 255 dec.) are valid.