KNX manual
EU 1 KNX, EU 1 S RF KNX
Heating actuator
Flush-mounted

EU 1 KNX 4942542

EU 1 S RF KNX KNX 4941642

2022-06-01

theben

Contents

1 IMPORTANT WARNINGS!

Danger of electric shock!

- The EU 1 S RF KNX device does not have basic insulation around the terminals and plug connection!
- The inputs carry mains voltage!
- When connecting the inputs or before any intervention at one of the inputs, interrupt the 230 V supply of the device.
- Protect against accidental contact during installation.
- Maintain a minimum distance of 3 mm from live parts or use additional insulation, e.g. separating strips/walls.
- Do not remove the insulation from the unused inputs.
- Do not cut off the conductors of the unused inputs.
- Do not connect mains voltage (230 V) or other external voltages to the inputs!
- During installation, ensure there is adequate insulation between mains voltage (230 V) and bus or inputs (min. 5.5 mm).

2 Function description

- Heating actuator for controlling electric heaters, switching 230 V AC
- No KNX room thermostat needed: Flexible use as a heating actuator or heating controller.
- Can also be used purely as an additional heating stage, depending on the actuating value and actual value from an (external) main controller.
- Flush-mounted installation
- Continuous or switching actuating value selectable

3 Operation

Channel H1 can be configured as a heating actuator, room thermostat, or as a pure additional stage.

The device has 2 external inputs for push buttons, switches, etc.
Input I2 can also be used as a temperature input.

The inputs can either be used as independent binary inputs or for **direct control**.

ⓘ If channel H1 is used as a room thermostat, the inputs can be used for the window contact and room temperature detection if required.

In this case, the inputs are internally connected directly to the room thermostat.
This requires the following settings:
Channel H1, Channel function = room thermostat
Use window contact at I1 for the controller = yes[1]
Use temperature sensor at I2 for the controller = yes[2]

ⓘ The communication objects for I1 and I2 are still available even with direct control.

See chapter *Typical applications*.

[1] At the room thermostat, the object *Window setting* is hidden.
[2] At the room thermostat, the object *Receive actual value room temperature* is hidden.

4 Technical data

4.1 EU 1 KNX

Operating voltage	KNX bus voltage
Bus current KNX	5 mA
Type of connection	Screw terminals | bus connection: KNX bus terminal
Type of installation	Flush-mounting
L x W x D	48.6 x 44.4 x 32.3 mm
Max. cable cross-section	Solid: 0.5 mm² (Ø 0.8 mm) to 4 mm² Stranded wire with ferrule: 0.5 mm² to 2.5 mm²
Number of channels	1
Contact gap	< 3 mm (µ contact)
Switch output	Floating, 1 NO contact 16 A
Suitable for SELV	Yes
Number of binary inputs	2
Ambient temperature	−5 °C ... +45 °C

4.2 EU 1 S RF KNX

Operating voltage	230 – 240 V AC, 50 – 60 Hz
Standby output	< 0.4 W
Type of connection	Terminal screws
Type of installation	Flush-mounting
L x W x D	48.6 x 44.4 x 24.9 mm
Max. cable cross-section	Solid: 0.5 mm² (Ø 0.8 mm) to 4 mm² Stranded wire with ferrule: 0.5 mm² to 2.5 mm²
Number of channels	1
Contact gap	< 3 mm (µ contact)
Switch output	Floating, 1 NO contact 10 A
Suitable for SELV	no
Number of binary inputs	2
Ambient temperature	−5 °C ... +45 °C
Radio standard	KNX
Transmission frequency	868.3 MHz
Transmission power	< 10 mW
Free field range	Up to 100 m
Coding	FSK (Frequency Shift Keying)
Transceiver type	bidirectional

5 General information about KNX Secure

ETS5 Version 5.5 and higher support secure communication in KNX systems. A distinction is made between secure communication via the IP medium using KNX IP Secure and secure communication via the TP and RF media using KNX Data Secure. The following information refers to KNX Data Secure.

In the ETS catalogue, KNX products supporting "KNX Secure" are clearly marked.

As soon as a "KNX-Secure" device is included in the project, the ETS requests a project password. If no password is entered, the device is included with Secure Mode deactivated. However, the password can also be entered or changed later in the project overview.

5.1 Start-up with "KNX Data Secure"

For secure communication, the FDSK (Factory Device Setup Key) is required. If a KNX product supporting "KNX Data Secure" is included in a line, the ETS requires the input of the FDSK. This device-specific key is printed on the device label and can either be entered by keyboard or read by using a code scanner or notebook camera.

Example of FDSK on device label:

After entering the FDSK, the ETS generates a device-specific tool key. The ETS sends the tool key to the device to be configured via the bus. The transmission is encrypted and authenticated with the original and previously entered FDSK key. Neither the tool key nor the FDSK key are sent in plain text via the bus.
After the previous action, the device only accepts the tool key for further communication with the ETS.
The FDSK key is no longer used for further communication, unless the device is reset to the factory setting: In this case, all set safety-related data will be deleted.
The ETS generates as many runtime keys as needed for the group communication you want to protect. The ETS sends the runtime keys to the device to be configured via the bus.
Transmission takes place by encrypting and authenticating them via the tool key. The runtime keys are never sent in plain text via the bus.

The FDSK is saved in the project and can be viewed in the project overview.
All keys for this project can also be exported (backup).

During project planning, it can be defined subsequently which functions/objects are to communicate securely. All objects with encrypted communication are identified by the "Secure" icon in the ETS.

5.2 Start-up without "KNX Data Secure"

Alternatively, the device can also be put into operation without KNX Data Secure. In this case, the device is unsecured and behaves like any other KNX device without KNX Data Secure function.

To start up the device without KNX Data Secure, select the device in the 'Topology' or 'Devices' section and set the 'Secure start-up' option in the 'Properties' area of the 'Settings' tab to 'Disabled'.

6 The application programmes EU 1 KNX, EU 1 S RF KNX

6.1 Selection in the product database

Manufacturer	Theben AG
Product family	Heating, ventilation, air conditioning
Product type	Heating actuators
Programme name	EU 1 EU 1 S RF KNX

Number of communication objects	28
Number of group addresses	254
Number of associations	255

ⓘ The ETS database can be found on our website: www.theben.de/downloads

6.2 Overview of communication objects

6.2.1 Objects for the heating actuator/controller/additional stage

No.	Name	Function	Length	R	W	C	T	DPT
1	H1 - Receive	Continuous actuating value	1 byte	R	W	C	-	5.001
		Switching actuating value	1 bit	R	W	C	-	1.001
		Receive setpoint value main controller	2 bytes	R	W	C	-	9.001
		Base setpoint	2 bytes	R	W	C	-	9.001
		Receive setpoint value	2 bytes	R	W	C	-	9.001
2	H1 - Receive	Manual setpoint offset	2 bytes	R	W	C	-	9.002
3	H1 - Receive	Receive actual value main controller	2 bytes	R	W	C	-	9.001
		Receive actual value room temperature	2 bytes	R	W	C	-	9.001
4	H1 - Send	Current actuating value	1 byte	R	-	C	T	5.001
	H1 - Receive	Operating mode preselection	1 byte	R	W	C	-	20.102
	H1 - Receive	Operating mode main controller	1 byte	R	W	C	-	20.102
5	H1 - Receive	Presence	1 bit	R	W	C	-	1.018
6	H1 - Receive	Window setting	1 bit	R	W	C	-	1.019
7	H1 - Send	Current operating mode	1 byte	R	-	C	T	20.102
8	H1 - Send	Additional stage actuating value (1 byte)	1 byte	R	-	C	T	5.001
		Cooling actuating value (1 byte)	1 byte	R	-	C	T	5.001
		Heating actuating value (1 byte)	1 byte	R	-	C	T	5.001
9	H1 - Send	Feedback heating active (> 0%)	1 bit	R	-	C	T	1.001
		Feedback additional stage heating active (> 0%)	1 bit	R	-	C	T	1.001
		Feedback cooling active (> 0%)	1 bit	R	-	C	T	1.001
10	H1 - Receive	Receive floor temperature actual value	2 bytes	R	W	C	-	9.001
11	H1- Send/receive	Current setpoint	2 bytes	R	W	C	T	9.001
12	H1 - Send	Report room temperature failure	1 bit	R	-	C	T	1.005
		Report actuating value loss	1 bit	R	-	C	T	1.005
13	H1 - Receive	Forced operation	1 bit	R	W	C	-	1.003
14	H1 - Send	Report floor temperature failure	1 bit	-	-	C	T	1.005
15	H1 - Send	Excess temperature	1 bit	R	-	C	T	1.001
31	H1 - Receive	Heating interruption ON/OFF	1 bit	R	W	C	-	1.003
		Cooling interruption ON/ OFF	1 bit	R	W	C	-	1.003
36	H1 - Receive	Receive outside temperature actual value	2 bytes	R	W	C	-	9.001
37	H1 - Send	Report outside temperature failure	1 bit	R	-	C	T	1.005

6.2.2 External inputs: Switch/button function

No.	Object name	Function	Length	R	W	C	T	DPT
41	*I1.1 - Send*	*Switching*	1 bit	R	W	C	T	1.001
		Priority	2 bit	R	-	C	T	2.001
		Send percentage value	1 byte	R	-	C	T	5.001
		Send value	1 byte	R	-	C	T	5.010
42	*I1.2 - Send*	*Switching*	1 bit	R	W	C	T	1.001
		Priority	2 bit	R	-	C	T	2.001
		Send percentage value	1 byte	R	-	C	T	5.001
		Send value	1 byte	R	-	C	T	5.010
45	*I1 - Receive*	*Block = 1*	1 bit	-	W	C	-	1.001
		Block = 0	1 bit	-	W	C	-	1.003
51-55	I2 (details: see I1)							

6.2.3 External inputs: Dimming function

No.	Object name	Function	Length	R	W	C	T	DPT
41	*I1 - Send*	*Switching*	1 bit	R	W	C	T	1.001
42	*I1 - Send*	*Brighter/darker*	4 bit	R	-	C	T	3.007
		Brighter	4 bit	R	-	C	T	3.007
		Darker	4 bit	R	-	C	T	3.007
43	*I1.1 - Send*	*Switching*	1 bit	R	W	C	T	1.001
		Priority	2 bit	R	-	C	T	2.001
		Send percentage value	1 byte	R	-	C	T	5.001
		Send value	1 byte	R	-	C	T	5.010
45	*I1 - Receive*	*Block = 1*	1 bit	-	W	C	-	1.001
		Block = 0	1 bit	-	W	C	-	1.003
51-55	Channel I2 (details: see channel I1)							

6.2.4 External inputs: Blinds function

No.	Object name	Function	Length	R	W	C	T	DPT
41	*I1 - Send*	*Step/stop*	1 bit	R	-	C	T	1.010
42	*I1 - Send*	*UP/DOWN*	1 bit	R	W	C	T	1.008
		UP	1 bit	R	-	C	T	1.008
		DOWN	1 bit	R	-	C	T	1.008
43	*I1.1 - Send*	*Switching*	1 bit	R	W	C	T	1.001
		Priority	2 bit	R	-	C	T	2.001
		Send percentage value	1 byte	R	-	C	T	5.001
		Height % [3]	1 byte	R	-	C	T	5.001
		Send value	1 byte	R	-	C	T	5.010
		2 byte 9.x	2 bytes	R	-	C	T	9.xxx
		4 byte 14.x	4 bytes	R	-	C	T	14.xxx
44	*I1.2 - Send*	*Slat %* [4]	1 byte	R	-	C	T	5.001
45	*I1 - Receive*	*Block = 1*	1 bit	-	W	C	-	1.001
		Block = 0	1 bit	-	W	C	-	1.003
51-55	Channel I2 (details: see channel I1)							

6.2.5 External inputs: Temperature input function (I2 only)

No.	Object name	Function	Length	R	W	C	T	DPT
51	*I2 - Send*	*Actual value for temperature*	2 byte	R	-	C	T	9.001

6.2.6 External inputs: Window contact function

No.	Object name	Function	Length	R	W	C	T	DPT
41	*I1 - Send*	*Window contact*	1 bit	R	-	C	T	1.001
45	*I1 - Send*	*Block = 1*	1 bit	-	W	C	-	1.001
		Block = 0	1 bit	-	W	C	-	1.003
51	*I2 - Send*	*Window contact*	1 bit	R	-	C	T	1.001
55	*I2 - Receive*	*Block = 1*	1 bit	-	W	C	-	1.001
		Block = 0	1 bit	-	W	C	-	1.003

[3] Upon double-click with object type = *Height % + slat %*
[4] Upon double-click with object type = *Height % + slat %*

6.3 Description of communication objects

6.3.1 Objects for the heating actuator function

Object 1 Continuous actuating value, switching actuating value
Receive object
Receives the actuating value from the room thermostat.
It can either be continuous (0-100%) or switching (ON/OFF), depending on the configuration.

Objects 2-3
Not used.

Object 4 Current actuating value
Send object.
Reports the value of the actuating value generated for the channel.
In case of restoration of the bus supply, 0% will be sent

Objects 5-11
Not used.

Object 12 Actuating value loss
Send object.
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 program is started.
See ***Emergency program*** parameter page.

The monitoring time is set on the ***Emergency program*** page.

Object 13 Forced operation
Receive object.
The direction of action of the force telegram is adjustable.
Standard:
1 = activate force
0 = end force.

ⓘ After reset or download, forced operation is always deactivated.

Object 15 Excess temperature
Send object.
Reports overheating of the device.
1 = error
0 = no error

Object 31 Heating interruption On/Off
Receive object.
0 = normal heating mode.
1 = there is no more heating (e.g. during summer time).

Object 36 Actual value outside temperature
Receive object.
Receives the outside temperature for the emergency program (if used)

Object 37 Outside temperature failure
Send object.
Sends a 1 if no valid value was received during the monitoring time.

6.3.2 Objects for the room thermostat function

Object 1 Base setpoint/Setpoint value
Receive object.

Parameter *Use operating modes*[5]	Object function	Description
No	*Setpoint value*	Setpoint value for control (limited by *minimum* or *maximum valid setpoint*).
Yes	*Base setpoint*	The base setpoint is first specified via the application at start-up and stored in the *Base setpoint* object. It can be reset at any time using *Base setpoint* object (limited by *minimum* or *maximum valid base setpoint*).

The object can be overwritten without restriction.

Object 2 Manual setpoint offset
Receive object.
Offsetting set temperature:
The object receives a temperature difference as DPT 9.002. The desired room temperature (current setpoint value) can be adjusted against the base setpoint by this difference.
The following applies in comfort mode (heating):
Current setpoint = base setpoint + manual setpoint offset

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

Comment:
The offset always refers to the set base setpoint and not to the current setpoint value.
See also: *Determination of the setpoint value*

The object is hidden if no operating modes are used.

Object 3 Actual value room temperature
Receive object.
Receives the current room temperature for the control.

[5] Parameter page ***Configuration options***

Object 4 Operating mode preselection
Receive object.
Only available if operating modes are used (see parameter
Use operating modes on the parameter page ***Configuration options***.
1 byte object. Can be used to directly activate one of 4 operating modes.
1 = Comfort, 2 = Standby, 3 = Night, 4 = frost protection (heat protection)
If another value is received (0 or >4), comfort operating mode will be activated.
The details in brackets refer to cooling mode.

The object is hidden if no operating modes are used.

Object 5 Presence
Receive object.
The status of a presence detector (e.g. push button, motion detector) can be received via this object.
1 on this object activates comfort operating mode.

The object is hidden if no operating modes are used.

Object 6 Window setting
Receive object.
The status of a window contact can be received via this object.
1 on this object activates the frost/heat protection operating mode or the setpoint value for frost/heat protection if no operating modes are used

The object is hidden if a window contact at I1 is used for the controller.
See ***Configuration options*** parameter page.

Object 7 Current operating mode
Send object.
Transmits the current operating mode as a 1 byte value (see table).
The transmission behaviour can be set on the ***Operating mode*** parameter page.

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

The object is hidden if no operating modes are used.

Object 8 Heating actuating value, cooling actuating value
Send object.
Sends the current heating (0...100%) or cooling actuating value, depending on the control function used.
In case of restoration of the mains or bus supply, 0% will be sent.

Object 9 Feedback heating active or cooling active (>0%)
Send object.
Sends the status of the control, depending on the control function used.
0 = actuating value 0%, 1 = actuating value >0%

Object 10 Actual value floor temperature

Receive object.
If the floor temperature restriction is used and the source is not the sensor at I2, then the floor temperature is received via this object as DPT9.001.
The object can be monitored, associated parameters on page ***Emergency program***

Object 11 Current setpoint

Send object.
Sends the current temperature setpoint as DPT 9.001.

Object 12 Room temperature failure

Send object.
Sends 1 if no valid room temperature was received on object 3 during the monitoring time, or a sensor error was detected at I2.

Object 13 Forced operation

Receive object.
The direction of action of the force telegram is adjustable.
Standard:
1 = activate force
0 = end force.

ⓘ After download, forced operation is always deactivated.

Object 14 Floor temperature failure

Send object.
If the floor temperature restriction is used and the source is not the sensor at I2, then the failure is reported via this object when detecting a sensor error.

Object 15 Excess temperature

Send object.
Reports overheating of the device when the diagnostic messages are activated.
1 = error
0 = no error

Object 31 Heating or cooling interruption ON/OFF

Receive object.
1 on the object puts the channel into heating or cooling interruption and it is no longer heated/cooled.
During summer mode, a valve protection program can also be executed optionally.

Object 32-35
Not used.

Object 36 Actual value outside temperature
Receive object.
Receives the outside temperature for the emergency program (if used)

Object 37 Outside temperature failure
Send object.
Sends 1 if no valid outside temperature was received on object 36 during the monitoring time. 0 = no error
1 = error: Outside temperature can no longer be received.

6.3.3 Objects for the additional stage heating function

Object 1 Setpoint value main controller
Receive object.
Receives the actual setpoint value of the main controller.
See also: Parameter *Difference between main stage and additional stage* on the parameter page ***Additional stage heating***.

Object 3 Actual value main controller
Receive object.
Receives the current room temperature measured by the main controller.
See also: Parameter *Difference between main stage and additional stage* on the parameter page ***Additional stage heating***.

Object 4 Operating mode main controller
Receive object.
Receives the current operating mode of the main controller.
1 = Comfort, 2 = Standby, 3 = Night,
4 = Frost protection.

Object 8 Additional stage actuating value
Send object.
Sends the current heating actuating value (0...100%)
In case of restoration of the mains or bus supply, 0% will be sent.

Object 9 Feedback additional stage heating active (> 0%)
Send object.
Sends the status of the control.
0 = actuating value 0%, 1 = actuating value >0%

Object 12 Room temperature failure
Send object.
Sends 1 if no valid room temperature was received by the main controller during the monitoring time.

Object 13 Forced operation
Receive object.
The direction of action of the force telegram is adjustable.
Standard:
1 = activate force
0 = end force.

ⓘ After download, forced operation is always deactivated.

Object 15 Excess temperature

Send object.
Reports overheating of the device when the diagnostic messages are activated.
1 = error
0 = no error

Object 31 Heating interruption ON/OFF

Receive object.
1 on the object puts the channel into heating interruption and it is no longer heated.

Object 32-35

Not used.

Object 36 Actual value outside temperature

Receive object.
Receives the outside temperature for the emergency program (if used)

Object 37 Outside temperature failure

Send object.
Sends 1 if no valid outside temperature was received on object 36 during the monitoring time. 0 = no error, 1 = error: Outside temperature can no longer be received.

6.3.4 Objects for the external inputs: Switch function

Object 41: Channel I1.1
Send object.
First output object of the channel (first telegram).
4 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value.

Object 42: Channel I1.2
Send object.
Second output object of the channel (second telegram).
4 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value.

Object 45: Channel I1 block = 1, or block = 0
Receive object.
The channel is blocked via this object.
The acting direction of the block object and behaviour when the block is set or cancelled can be configured.

Objects 51-55
Objects for channel I2

6.3.5 Objects for the external inputs: Push button function

Object 41: Channel I1.1
Send object.
First output object of the channel (first telegram).
4 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value.

Object 42: Channel I1.2
Send object.
Second output object of the channel (second telegram).
4 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value.

Object 45: Channel I1 block = 1, or block = 0
Receive object.
The channel is blocked via this object.
The acting direction of the block object and behaviour when the block is set or cancelled can be configured.

Objects 51-55
Objects for channel I2

6.3.6 Objects for the external inputs: Dimming function

Object 41: Channel I1.1 switching
Send object.
Switches the dimmer on and off.

Object 42: Channel I1.1 brighter, darker, brighter/darker
Send object.
4-bit dimming commands.

Object 43: Channel I1.1 switching, priority, percentage..
Send object.
Output object for the additional function with double-click.
4 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value.

Object 45: Channel I1 block = 1, or block = 0
Receive object.
The channel is blocked via this object.
The acting direction of the block object and behaviour when the block is set or cancelled can be configured.

Objects 51-55
Objects for channel I2

6.3.7 Objects for the external inputs: Blinds function

Object 41: Channel I1 step/stop
Send object.
Sends step/stop commands to the blind actuator.

Object 42: Channel I1 UP/DOWN, UP, DOWN
Send object.
Sends operating commands to the blind actuator.

Object 43: Channel I1.1 switching, priority, percentage.., height %
Send object.
Output object for the additional function with double-click.
5 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value, height %.

Object 44: Channel I1.1 slat %
Send object.
Slat telegram for positioning the blinds upon double-click (together with object height %, with *object type = height + slat*).

Object 45: Channel I1 block = 1, or block = 0
Receive object.
The channel is blocked via this object.
The acting direction of the block object and behaviour when the block is set or cancelled can be configured.

Objects 51-55
Objects for channel I2

6.3.8 Objects for the external inputs: Temperature input function

Object 51: Channel I2 actual value for temperature[6]
Send object.
Sends the temperature measured at input I2 (remote sensor or floor temperature sensor).

6.3.9 Objects for the external inputs: Window contact function

Object 41: Channel I1 window contact 1
Send object.
First output object of the channel (first telegram).
4 telegram formats can be set:
Switching ON/OFF, priority, send percentage value, send value.

Object 45: Channel I1 block = 1, or block = 0
Receive object.
The channel is blocked via this object.
The acting direction of the block object and behaviour when the block is set or cancelled can be configured.

Objects 51-55
Objects for channel I2

[6] The temperature input function is only possible with input I2.

6.4 Parameter pages overview

The device consists of one general block and 3 main functional blocks.

Parameter page	Description
General	Activation of binary inputs
Channel H1	
Configuration options	Selection as heating controller / heating actuator / additional stage and activation of further functions.
Actual value at I2	Adjustment and transmission behaviour
Operating mode	Operating mode after reset, presence sensor etc.
Heating control	Control parameters, installation type etc. for heating mode.
Heating setpoint values	Base setpoint, lowering, frost protection etc.
Cooling control	Control parameters, installation type etc. for cooling mode.
Cooling setpoints	Standby, heat protection etc.
Force	Response in forced operation.
Diagnostic messages	Transmitting behaviour excess temperature object
Emergency program	Response to failure of actuating value or actual value. Settings of the monitoring function.
Window contact at I1	Direction of action and transmission behaviour of the window contact
External inputs I1, I2	
Configuration options	Function of the input, debounce time, number of telegrams, block function, etc. Additionally in the case of I2: Selection of the temperature sensor, temperature calibration, etc.
Switch object 1, 2	Object type, transmission behaviour, etc. can be set for each object individually.
Push button object 1, 2	Object type, transmission behaviour, etc. can be set for each object individually.
Dimming	Type of control.
Blinds	Type of control.
Double-click	Additional telegrams for *Dimming* and *Blinds*.
Window contact	Direction of action, cycl. Transmission, etc.

6.5 General parameters

Designation	Values	Description
Use binary inputs	*No*	No function.
	Yes	2 binary inputs are available.

6.6 Parameters for the heating actuator

6.6.1 Configuration options

Designation	Values	Description
Description	*Without contents*	A labelling of the main page and associated objects can be defined, max. 40 characters
Channel function	***Heating actuator***	Should the channel be used as an actuator or controller? The channel receives its actuating value from an external room thermostat.
	Room thermostat	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
	Additional stage heating	The channel receives the setpoint value and the room temperature from the main controller over the bus and generates the actuating value independently by means of an internal controller.
Type of actuating value	*switching..*	The channel processes: ON/OFF telegrams.
	continuous..	Percent telegrams 0–100%
Monitor actuating value	***no*** *Yes..*	Should be monitored whether the room thermostat regularly transmits an actuating value? In this way, a thermostat malfunction will be detected quickly and an emergency program will be started.
Activate force function	***no***	no force function.
	Yes..	Opens the Force parameter page.
PWM period (for emergency program and forced operation)[7]	***10 min*** *15 min* *20 min* *30 min*	With "continuous" actuating value. One actuation cycle comprises one ON and one OFF process and forms a PWM period. Examples: - Actuating value = 20%, - Time = 10 min

[7] Also applies to emergency program and forced operation.

Designation	Values	Description
		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
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 maximum 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% or 100%	Actuate channel with 0% or 100%
	use set actuating values	Restrict values to maximum and minimum actuating value. 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 according to the configured minimum and maximum actuating value: Received values > *0%* and < min. *actuating value* are replaced by the minimum actuating value. In the same way, values > max. actuating value are replaced by the set maximum actuating value.

Designation	Values	Description
	< min. actuating val. = 0%, otherwise scale.	Actuating values below the minimum actuating value are executed at 0%. Values above are scaled in proportion to the range between min. actuating value and 100%.
Send current actuating value	*at change of 1%, 2%, 3%,* **5%**, *7%, 10%, 15%*	After what percentage change[8] in the actuating value is the new value to be transmitted?
Send current actuating value cyclically	***not cyclically, 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?
Activate diagnostic messages	***no*** *yes*	No messages Activates the diagnostic messages parameter page

[8] Change since last transmission.

6.6.2 Force

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

6.6.3 Diagnostic messages

Designation	Values	Description
Send excess temperature cyclically	***no*** *yes*	When should sending take place
Cycle time	*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 at what interval?

6.6.4 Emergency program

Designation	Values	Description
Actuating value for emergency program is	***fixed***	The valve is permanently energised with a fixed actuating value. See below: *Fixed emergency program in winter mode*.
	Outside temperature dependent	Energy saving setting: The valve is energised depending on the outside temperature and only opened if it is really necessary.
Actuating value for emergency program is ***fixed***		
Fixed emergency program 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 program is ***outside temperature dependent***		
Emergency program active when outside temperature below	*5 °C* ***10 °C*** *15 °C*	If the outside temperature drops below the set value, the valve opens.
Max. actuating value in emergency program	*10%, 20%* *30%,* ***40%****, 50%*	What should be the maximum heating level in the emergency program?
Fixed emergency program in case of failure of outside temperature.	*0%, 10%,* ***20%*** *30%, 40%, 50%*	Fixed valve setting if neither actuating value nor outside temperature can be received.
Actuating value, outside temperature		
Monitoring time	*5 min, 10 min, 20 min,* ***30 min****, 60 min*	Monitoring time of the respective object, attention, if only sensor at I2, the monitoring time is fixed at 5 min
Send status cyclically	***no***	No cyclical transmission in case of failure
	only in the event of malfunction	Only failure is sent cyclically
	always	Status is always sent cyclically
Cycle time	*every 2 min* *every 3 min* *every 5 min* *every 10 min* *every 15 min* *every 20 min* *every 30 min*	Pattern in which cyclical transmission takes place

ⓘ For the PWM period, here also applies the setting on the parameter page ***Configuration options.***

6.7 Parameters for the room thermostat

6.7.1 Configuration options

Designation	Values	Description
Description	*Without contents*	A labelling of the main page and associated objects can be defined, max. 40 characters
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.
	Room thermostat	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
	Additional stage heating	The channel receives the setpoint value and the room temperature from the main controller over the bus and generates the actuating value independently by means of an internal controller.
Use window contact at I2 for the controller	***no*** *yes*	Internal linking of the window contact at I1 with the controller
Use temperature sensor at I2 for the controller	***no*** *yes*	Internal linking of the temperature sensor at I2 with the controller
Use operating modes	***no*** *yes*	The controller can be operated without operating modes, it is only controlled via the setpoint value
Use floor temperature restriction	***no*** *yes*	When reaching, the floor temperature shall be restricted When using the floor temperature restriction, it is recommended to activate the monitoring. However, it is not a safety temperature limiting function!
Use sensor at I2	***Room temperature*** *Floor temperature*	If the temperature sensor is linked internally, you can select whether the sensor is used for the floor temperature or the room temperature. Only possible in heating mode
Control function used	***Heating*** *Cooling*	Select heating or cooling function
Monitor actual values	***no***	No monitoring.
	Yes	The actual values (room

Designation	Values	Description
		temperature, floor temperature and outside temperature) are monitored and an emergency program can be configured.
Activate force function	***no*** *Yes*..	no force function. Activates the Force parameter page.
Time for one actuation cycle (PWM period)[9]	***10 min*** *15 min* *20 min* *30 min*	With "continuous" actuating value. An actuation cycle consists of a switch-on and a switch-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
Minimum actuating value	**0%**, *5%, 10%, 20%, 30%*	With continuous control: Smallest permissible actuating value
Maximum actuating value	*50%, 60%, 70%, 80%,* **90%**, *100%*	With continuous control: Highest permissible actuating value. A maximum 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:

[9] Also applies to emergency program and forced operation.

Designation	Values	Description
	0% or 100%	Actuate channel with 0% or 100%
	use set actuating values	Restrict values to maximum and minimum actuating value. 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 according to the configured minimum and maximum actuating value: Received values > *0%* and < min. *actuating value* are replaced by the minimum actuating value. In the same way, values > max. actuating value are replaced by the set maximum actuating value.
	< min. actuating val. = 0%, otherwise scale.	Actuating values below the minimum actuating value are executed at 0%. Values above are scaled in proportion to the range between min. actuating value and 100%.
Activate diagnostic messages	***no***	No messages
	yes	Activates the diagnostic messages parameter page

If the actuating value is limited by the parameters *Minimum* or *Maximum Actuating Value*, then these limitations are only effective on the output.
The objects send the actuating value that was actually requested by the controller.
Example:
Minimum actuating value 30%
Maximum actuating value 60%
Current heating actuating value e.g. 80%: The outputs are limited to 60%.
80% will be sent to the bus.

6.7.2 Actual value at I2

Only available if *Use temperature sensor at I2 for the controller = yes* has been selected

Designation	Values	Description
Temperature calibration	*-5…5K*	Offset used to adjust the measured actual value at I2
Send temperature in the event of change of	*Not due to a change 0.2K, 0.3K,* ***0.5K****, 0.7K, 1K, 1.5K, 2K*	After which change in temperature is the new value to be transmitted?
Send temperature cyclically	***do not send cyclically****, every min, 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 temperature be sent?

6.7.3 Operating mode

Only available if *Use operating modes = yes* has been selected

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		The presence sensor activates the comfort operating mode
	Presence detector	Comfort operating mode as long as the presence object is set.
	Presence button	If, after the presence object has been set, the operating mode default object is sent again, the new operating mode is accepted and the state of the presence object will be ignored. If the presence object is set during night/frost mode, it is reset after the configured comfort extension has expired[10] (see below). The presence object is not reported back on the bus

[10] Exception: If a window is opened (window object = 1), the room thermostat switches to frost protection mode

Designation	Values	Description
Comfort extension by presence button in night mode	*30 min* *1 hour* *1.5 hours* ***2 hours*** *2.5 Hours* *3 hours* *3.5 hours*	Party switching: This allows the controller 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 mode is only cleared with the next manual or bus controlled change of the operating mode.
Cycl. transmission of current operating mode	*not cyclically, 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?

6.7.4 Heating control

Designation	Values	Description
Type of control	***Continuous*** *2-point*	The control type can be selected
Continuous control		
Setting the control parameters	***Via installation type*** *user-defined*	Standard application Professional use: Configure P/PI controller yourself
Installation type	***Radiator heating*** *Underfloor heating*	PI controller with: Integration time = 90 minutes Bandwidth = 2.5 K Integration time = 30 h Bandwidth = 4 K
Sending of heating actuating value	*at change of 1%* *at change of 2%* *at change of 3%* ***at change of 5%*** *at change of 7%* *at change of 10%* *at change of 15%*	After what percentage change[11] in the actuating value is the new value to be transmitted? Small values increase control accuracy, but also the bus load.
Cycl. Sending of heating actuating value	***not cyclically, 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)?
User-defined parameter		
Proportional band of the room thermostat	*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 the control response to the room. Small values cause large changes in actuating values, larger values cause finer actuating value adjustment.

[11] Change since last transmission

Designation	Values	Description
Integration time of the room thermostat	*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 integration time determines the response time of the control. It establishes the increase by which the output actuating value 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.
2-point control		
Hysteresis of 2-point controller	*0.4 K, 0.6 K, 0.8 K,* ***1 K****,* *1.6 K*	Selection of the hysteresis of the 2-point controller, which is centred on the setpoint value.
Recirculation of hysteresis after switching point	*None,* *0.1 K/min,* *0.2 K/min,* *0.3 K/min*	After each switching point, the hysteresis is returned towards the setpoint by the configured value

6.7.5 Heating setpoint values

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, 26 °C, 27 °C, 28 °C, 29 °C, 30 °C, 31 °C, 32 °C*	Output setpoint for temperature control.
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 received base setpoint (obj. *base setpoint*) is lower than the value set here, 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 received base setpoint (obj. *base setpoint*) is higher than the value set here, it will be limited to this value.
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 value of 21 °C in heating mode and a reduction of 2 K, the device controls 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).
Maximum valid setpoint offset	*+/- 1 K, +/- 2 K, +/- 3 K, +/- 4 K,* ***+/- 5 K***	Limits the possible setting range for the setpoint offset function. Applies to values received via *Manual setpoint offset* object.
Setpoint offset 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 modes, and is ineffective in all other modes.
Maximum floor temperature	*24 °C, 26 °C, 28 °C,* ***30 °C****, 32 °C, 34 °C, 36 °C, 38 °C, 40 °C*	When reaching, the floor temperature is restricted

Designation	Values	Description
cycl. transmission of current setpoint		How often should the currently valid setpoint be sent?
	not cyclically, 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

6.7.6 Cooling control

Designation	Values	Description
Type of control	***Continuous*** 2-point	The control type can be selected
Continuous control		
Setting the control parameters	***Via installation type*** *user-defined*	Standard application Professional use: Configure P/PI controller yourself
Installation type	***Cooling surface*** *Fan coil unit*	PI controller with: Integration time = 240 minutes Bandwidth = 5 K Integration time = 180 minutes Bandwidth = 4 K
user-defined control parameter		
Proportional band of the cooling 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 the 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.
Integration time of the cooling controller	*pure P controller* *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*	See appendix: Temperature control Only for PI controller: The integration time determines the response time of the control. It establishes the increase by which the output actuating value 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 of 1%* *at change of 2%* *at change of 3%* ***at change of 5%*** *at change of 7%* *at change of 10%* *at change of 15%*	After what percentage change[12] in the actuating value is the new value to be transmitted. Small values increase the control accuracy, but also the bus load.

[12] Change since last transmission.

Designation	Values	Description
Cycl. Transmission of cooling actuating value	***not cyclically, 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)?
2-point control		
Hysteresis of 2-point controller	*0.4 K, 0.6 K, 0.8 K,* ***1 K****, 1.6 K*	Selection of the hysteresis of the 2-point controller, which is centred on the setpoint value.
Recirculation of hysteresis after switching point	*None,* *0.1 K/min,* *0.2 K/min,* *0.3 K/min*	After each switching point, the hysteresis is returned towards the setpoint by the configured value

6.7.7 Cooling setpoints

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, 26 °C, 27 °C, 28 °C, 29 °C, 30 °C, 31 °C, 32 °C*	Output setpoint for temperature control.
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 received base setpoint (obj. *base setpoint*) is lower than the value set here, 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 received base setpoint (obj. *base setpoint*) is higher than the value set here, it will be limited to this value.
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 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 (i.e. virtually no 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 frost protection mode during heating, e.g. saves energy while prohibiting non-permitted temperatures.
Maximum valid setpoint offset	*+/- 1 K, +/- 2 K, +/- 3 K, +/- 4 K,* ***+/- 5 K***	Limits the possible setting range for the setpoint offset function. Applies to values received via *Manual setpoint offset* object.
Setpoint offset 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 modes, and is ineffective in all other modes.
cycl. transmission of current setpoint		How often should the currently valid setpoint be sent?

Designation	Values	Description
	not cyclically, 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

6.7.8 Force

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

6.7.9 Diagnostic messages

Designation	Values	Description
Send excess temperature cyclically	***no*** *yes*	When should sending take place
Cycle time	*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 at what interval?

6.7.10 Emergency program

Designation	Values	Description
Actuating value for emergency program is	***fixed***	The valve is permanently energised with a fixed actuating value. See below: *Fixed emergency program in winter mode*.
	Ambient temperature dependent	Energy saving setting: The valve is energised depending on the outside temperature and only opened if it is really necessary.
Actuating value for emergency program is ***fixed***		
Fixed emergency program 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 program is ***outside temperature dependent***		
Emergency program active when outside temperature below	*5 °C* ***10 °C*** *15 °C*	If the outside temperature drops below the set value, the valve opens.
Max. actuating value in emergency program	*10%, 20%* *30%,* ***40%****, 50%*	What should be the maximum heating level in the emergency program?
Fixed emergency program in case of failure of outside temperature.	*0%, 10%,* ***20%*** *30%, 40%, 50%*	Fixed valve setting if neither actuating value nor outside temperature can be received.
Room actual value, floor actual value, outside temperature		
Monitoring time	*5 min, 10 min, 20 min,* ***30 min****, 60 min*	Monitoring time of the respective object, attention, if only sensor at I2, the monitoring time is fixed at 5 min
Send status cyclically	***no***	No cyclical transmission in case of failure
	only in the event of malfunction	Only failure is sent cyclically
	always	Status is always sent cyclically
Cycle time	*every 2 min* *every 3 min* *every 5 min* *every 10 min* *every 15 min* *every 20 min* *every 30 min*	Pattern in which cyclical transmission takes place

ⓘ For the PWM period, here also applies the setting on the parameter page ***Configuration options***.

ⓘ If the floor temperature fails, the control will be interrupted (actuating value=0%)

6.7.11 Window contact at I1

Only available if *Use window contact at I1 for the controller = yes*

Designation	Values	Description
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s, 5 s, 10 s*	In order to avoid disruptive switching due to bouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1 s) can be used as a switch-on delay
Type of connected window contact	***Window open = contact closed*** *Window open = contact open*	Set the type of connected contact.
Activate block function	***no*** *yes*	No block function. Show parameters for the block function.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = Cancel block 1 = block 0 = block 1 = cancel block
Response when the block is set	***Ignore block***	The block function is ineffective with this telegram.
	No response	Do not respond when the block is set.
	As with input = 0	Respond, as with window status = closed.
	As with input = 1	Respond, as with window status = open.
Response when cancelling the block	***no response*** *update*	Do not respond when the block is cancelled. Send update telegram.
Send window status cyclically	***no*** *yes, always* *only with closed window* *only with open window*	When should cyclical sending take place?
Cycle time for sending cyclically	*every min* *every 2 min* *every 3 min* *every 5 min* *every 10 min* *every 15 min* *every 20 min* ***every 30 min*** *every 60 min*	At what interval should the transmission take place?
Response after restoration of the bus supply	***None*** Update (after approx. 5 s) Update (after approx. 10 s) Update (after approx. 15 s) *Update (after approx. 20 s)*	Do not send Send update telegram

6.8 Parameters for additional stage heating

6.8.1 Configuration options

Designation	Values	Description
Description	*Without contents*	A labelling of the main page and associated objects can be defined, max. 40 characters
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
	Additional stage heating	The channel receives the setpoint value and the room temperature of the main controller over the bus and generates the actuating value independently by means of an internal controller.
Use operating modes	***no***	The controller can be operated without operating modes, it is only controlled via the setpoint value
	yes	The operating mode in which the additional stage is active can be selected (page ***Additional stage***)
Monitor main controller actual values	***no***	No monitoring.
	yes	The actual values (room temperature and outside temperature) are monitored and an emergency program can be configured.
Activate force function	***no***	no force function.
	yes..	Activates the Force parameter page.
PWM period[13]	***10 min*** *15 min* *20 min* *30 min*	With "continuous" actuating value. An actuation cycle consists of a switch-on and a switch-off

[13] Also applies to emergency program and forced operation.

Designation	Values	Description
		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
Minimum actuating value	**0%**, *5%*, *10%*, *20%*, *30%*	With continuous control Smallest permissible actuating value
Maximum actuating value	*50%*, *60%*, *70%*, *80%*, **90%**, *100%*	With continuous control Highest permissible actuating value. A maximum 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	*0% or 100%* *use set actuating values*	Restriction when a room thermostat receives an actuating value that is less than the minimum actuating value: Actuate channel with 0% or 100% Restrict values to maximum and minimum actuating value. For example, maintaining a minimum actuating value of 10% can be practical for the correct base temperature of an underfloor heating.

Designation	Values	Description
	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 according to the configured minimum and maximum actuating value: Received values > *0%* and < min. *actuating value* are replaced by the minimum actuating value. In the same way, values > max. actuating value are replaced by the set maximum actuating value.
	< min. actuating val. = 0%, otherwise scale.	Actuating values below the minimum actuating value are executed at 0%. Values above are scaled in proportion to the range between min. actuating value and 100%.
Activate diagnostic messages	***no***	No messages
	yes	Activates the diagnostic messages parameter page

6.8.2 Additional stage heating

Designation	Values	Description
Difference between main stage and additional stage	*0K, 0.5K, 1K, 1.5K,* ***2K****, 2.5K, 3K, 3.5K, 4K*	The setpoint value of the additional stage is calculated from the difference and the received setpoint value of the main stage.
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*	Setting for adapting the control response to the room. Large values cause finer changes to the actuating value at the same control deviation and a more precise control.
Additional stage is active in the following operating modes[14] *Comfort* *Standby* *Night* *Frost protection*	 *no* **yes** *no* ***yes*** *no* ***yes*** *no* ***yes***	 Additional stage is active in selected operating mode
Sending of heating actuating value	*at change of 1%* *at change of 2%* *at change of 3%* ***at change of 5%*** *at change of 7%* *at change of 10%* *at change of 15%*	After what percentage change[15] in the actuating value is the new value to be transmitted. Small values increase control accuracy, but also the bus load.
Cycl. Sending of heating actuating value	***not cyclically, 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)?

[14] If *Use operating modes = yes* on page ***Configuration options***
[15] Change since last transmission

6.8.3 Force

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

6.8.4 Diagnostic messages

Designation	Values	Description
Send excess temperature cyclically	***no*** *yes*	When should sending take place
Cycle time	*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 at what interval?

6.8.5 Emergency program

Designation	Values	Description
Actuating value for emergency program is	***fixed***	The valve is permanently energised with a fixed actuating value. See below: *Fixed emergency program in winter mode*.
	Ambient temperature dependent	Energy saving setting: The valve is energised depending on the outside temperature and only opened if it is really necessary.
Actuating value for emergency program is ***fixed***		
Fixed emergency program 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 program is ***outside temperature dependent***		
Emergency program active when outside temperature below	*5 °C* ***10 °C*** *15 °C*	If the outside temperature drops below the set value, the valve opens.
Max. actuating value in emergency program	*10%, 20%* *30%,* ***40%****, 50%*	What should be the maximum heating level in the emergency program?
Fixed emergency program in case of failure of outside temperature.	*0%, 10%,* ***20%*** *30%, 40%, 50%*	Fixed valve setting if neither actuating value nor outside temperature can be received.
Actual value main controller, outside temperature		
Monitoring time	*5 min, 10 min, 20 min,* ***30 min****, 60 min*	Monitoring time of the respective object, attention, if only sensor at I2, the monitoring time is fixed at 5 min
Send status cyclically	***no***	No cyclical transmission in case of failure
	only in the event of malfunction	Only failure is sent cyclically
	always	Status is always sent cyclically
Cycle time	*every 2 min* *every 3 min* *every 5 min* *every 10 min* *every 15 min* *every 20 min* *every 30 min*	Pattern in which cyclical transmission takes place

ⓘ For the PWM period, here also applies the setting on the parameter page ***Configuration options***.

6.9 Parameters for external inputs I1, I2

6.9.1 Input I1, I2: Switch function

Designation	Values	Description
Description	***Without contents***	A labelling of the main page and associated objects can be defined, max. 40 characters
Function	***Switch..*** *Push button..* *Dimming..* *Blinds..* *Window contact..*	Desired use.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s, 5 s, 10 s*	In order to avoid disruptive switching due to bouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1 s) can be used as a switch-on delay
Activate block function	***no*** *yes*	No block function. Show parameters for the block function.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = Cancel block 1 = block 0 = block 1 = cancel block
Send cyclically	*every min* *every 2 min* *every 3 min* *...* ***every 30 min*** *every 45 min* *every 60 min*	Common cycle time for all 3 output objects of the channel.
Number of telegrams	***one telegram*** *two telegrams*	Each channel has 2 output objects and can thus send up to 2 different telegrams.

6.9.1.1 Switch objects 1, 2

Each of the 2 objects can be configured individually on its own parameter page.

Designation	Values	Description	
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)*	Telegram type for this object.	
Send if input = 1	*no* ***yes***	Send if voltage is present at the input?	
Telegram	*With object type = switching 1 bit*		
	ON *OFF* *INVERT*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)	
	With object type = priority 2 bit		
		Function	Value
	inactive	Priority inactive (no control)	0 (00_{bin})
	ON	Priority ON (control: enable, on)	3 (11_{bin})
	OFF	Priority OFF (control: disable, off)	2 (10_{bin})
	With object type = value 0-255		
	*0-**255***	Any value between 0 and 255 can be sent.	
	With object type = percentage value 1 byte		
	*0-**100%***	Any percentage value between 0 and 100% can be sent.	
Send if input = 0	*no* ***yes***	Send if no voltage is present at the input?	
Telegram	See above: Same object type as *Send if input = 1*		
Send cyclically	***no*** *yes, always* *only if input = 1* *only if input = 0*	When should cyclical sending take place? The cycle time is set on the main parameter page of the channel.	
Response after restoration of the bus supply[16]	***none*** *update (after approx. 5 s)* *update (after approx. 10 s)* *update (after approx. 15 s)* *update (after approx. 20 s)*	Do not send. Send update telegram immediately or with delay.	
Response when the block is set	***Ignore block***	The block function is ineffective with this telegram.	

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Designation	Values	Description
	no response *as with input = 1* *as with input = 0*	Do not respond when the block is set. Respond as with rising edge. Respond as with falling edge.
Response when cancelling the block	***no response*** *update*	Do not respond when the block is cancelled. Send update telegram.

If a channel is blocked, no telegrams will be sent cyclically.

6.9.2 Input I1, I2: Push button function

6.9.2.1 Configuration options

Designation	Values	Description
Function	*Switch..* *Push button..* *Dimming..* *Blinds..* *Window contact..*	Desired use.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s, 5 s, 10 s*	In order to avoid disruptive switching due to bouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1 s) can be used as a switch-on delay
Connected push button	***NO contact*** *Opening contact*	Set the type of connected contact.
Long button push starting at	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to clearly differentiate between long and short button push. If the button is pressed for at least as long as the set time, then a long button push will be registered.
Time for double-click	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to differentiate between a double-click and 2 single clicks. Time period in which the second click must begin, in order to recognise a double-click.
Send cyclically	*every min* *every 2 min* *every 3 min* *...* ***every 30 min*** *every 45 min* *every 60 min*	Common cycle time for all 2 output objects of the channel.
Number of telegrams	***one telegram*** *two telegrams*	Each channel has 2 output objects and can thus send up to 2 different telegrams.
Activate block function	***no*** *yes*	No block function. Show parameters for the block function.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = Cancel block 1 = block 0 = block 1 = cancel block

6.9.2.2 Push button objects 1, 2

Designation	Values	Description
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)*	Telegram type for this object.
Send after short operation	***do not send*** *Send telegram*	Respond to short button push?
Telegram	*With object type = switching 1 bit*	
	ON *OFF* *INVERT*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)
	With object type = priority 2 bit	
		Function / Value
	inactive	Priority inactive (no control) / 0 (00_{bin})
	ON	Priority ON (control: enable, on) / 3 (11_{bin})
	OFF	Priority OFF (control: disable, off) / 2 (10_{bin})
	With object type = value 0-255	
	*0-**255***	Any value between 0 and 255 can be sent.
	With object type = percentage value 1 byte	
	*0-**100%***	Any percentage value between 0 and 100% can be sent.
Send after long operation	***do not send*** *Send telegram*	Respond to long button push?
Telegram	See above: Same object type as with short operation.	
Send after double-click	***do not send*** *Send telegram*	Respond to double-click?
Telegram	See above: Same object type as with short operation.	
Send cyclically	***no*** *yes*	The cycle time is set on the main parameter page of the channel.
Response after restoration of the bus	***none***	Do not send.

Designation	Values	Description
supply[17]	*As after short (after approx. 5s)* *As after short (after approx. 10 s)* *As after short (after approx. 15 s)* *As after short (after approx. 20 s)* *As after long (after approx. 5s)* *As after long (after approx. 10 s)* *As after long (after approx. 15 s)* *As after long (after approx. 20 s)* *As after double-click (after approx. 5s)* *As after double-click (after approx. 10 s)* *As after double-click (after approx. 15 s)* *As after double-click (after approx. 20 s)*	Send update telegram immediately or with delay. The value to be sent depends on the value configured for long button push, short button push or double-click.
Response when the block is set	***Ignore block*** *no response* *as with short* *as with long* *as with double-click*	The block function is ineffective with this telegram. Do not respond when the block is set. Respond as with a short button push. Respond as with a long button push. Respond as with a double-click.
Response when cancelling the block	***no response*** *as with short* *as with long* *as with double-click*	Do not respond when the block is cancelled. Respond as with a short button push. Respond as with a long button push. Respond as with a double-click.

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6.9.3 Input I1, I2: Dimming function

6.9.3.1 Configuration options

Designation	Values	Description
Channel function	*Switch..* *Push button..* ***Dimming..*** *Blinds..* *Window contact..*	The input controls a dimming actuator,
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s, 5 s, 10 s*	In order to avoid disruptive switching due to bouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1 s) can be used as a switch-on delay
Activate block function	***no*** *yes*	No block function. Show block function parameter page.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = Cancel block 1 = block 0 = block 1 = cancel block
Long button push starting at	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to clearly differentiate between long and short button push. If the button is pressed for at least as long as the set time, then a long button push will be registered.
Double-click additional function	***no*** *yes*	No double-click function The ***Double-click*** parameter page is displayed.
Time for double-click	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to differentiate between a double-click and 2 single clicks. Time period in which the second click must begin, in order to recognise a double-click.

6.9.3.2 Double-click parameter page

Designation	Values	Description
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)*	Telegram type for this object.
Telegram	*With object type = switching 1 bit*	
	ON *OFF* *INVERT*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)
	With object type = priority 2 bit	
		Function: Value
	inactive	Priority inactive (no control): 0 (00_{bin})
	ON	Priority ON (control: enable, on): 3 (11_{bin})
	OFF	Priority OFF (control: disable, off): 2 (10_{bin})
	With object type = value 0-255	
	*0-**255***	Any value between 0 and 255 can be sent.
	With *object type = percentage value 1 byte*	
	*0-**100%***	Any percentage value between 0 and 100% can be sent.
Send cyclically	***do not send cyclically*** *every min* *every 2 min* *every 3 min* *...* *every 45 min* *every 60 min*	How often should it be resent?
Response after restoration of the bus supply[18]	***none*** *As with double-click (after approx. 5 s)* *As with double-click (after approx. 10 s)* *As with double-click (after approx. 15 s)* *As with double-click (after approx. 20 s)*	Do not send. Send update telegram immediately or with delay. The value to be sent depends on the value configured for double-click.

[18] EU 1 S RF KNX: restoration of the mains supply

Designation	Values	Description
Response when the block is set	***Ignore block***	The block function is ineffective with this telegram.
	no response	Do not respond when the block is set.
	as with double-click	Respond as with a double-click.
Response when cancelling the block	***no response***	Do not respond when the block is cancelled.
	as with double-click	Respond as with a double-click.

6.9.3.3 Dimming parameter page

Designation	Values	Description
Response to long/short		The input distinguishes between a long and a short button push, and can thus carry out 2 functions.
	One button operation	The dimmer is operated with a single push button. Short button push = ON/OFF Long button push = brighter/darker release = stop With the other variants, the dimmer is operated using 2 buttons (rocker).
	brighter/ON	Short button push = ON Long button push = brighter Release = stop
	brighter/INVERT	Short button push = ON/OFF Long button push = brighter Release = stop
	darker/OFF	Short button push = OFF Long button push = darker Release = stop
	darker/INVERT	Short button push = ON/OFF Long button push = darker Release = stop
Increment for dimming		With a long button push, the dimming value is:
	100%	Increased (or decreased) until the button is released.
	50% *25%* *12.5%* *6%* *3%* *1.5%*	Increased by the selected value (or reduced)
Response after restoration of the	***none***	Do not respond.

Designation	Values	Description
bus supply[19]	*after approx. 5 s ON* *after approx. 10 s ON* *after approx. 15 s ON* *after approx. 20 s ON* *after approx. 5 s OFF* *after approx. 10 s OFF* *after approx. 15 s OFF* *after approx. 20 s OFF*	Switch on dimmer with delay Switch off dimmer with delay
Response when the block is set	***Ignore block***	The block function is ineffective with this telegram.
	no response	Do not respond when the block is set.
	ON	Switch on dimmer
	OFF	Switch off dimmer
Response when cancelling the block	***no response***	Do not respond when the block is cancelled.
	ON	Switch on dimmer
	OFF	Switch off dimmer

[19] EU 1 S RF KNX: restoration of the mains supply

6.9.4 Input I1, I2: Blinds function

6.9.4.1 Configuration options

Designation	Values	Description
Activate channel	***no*** *yes*	Use input?
Channel function	*Switch..* *Push button..* *Dimming..* ***Blinds..*** *Window contact..*	The input controls a blinds actuator.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s, 5 s, 10 s*	In order to avoid disruptive switching due to bouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1 s) can be used as a switch-on delay.
Activate block function	***no*** *yes*	No block function. Show ***Block function*** parameter page.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = Cancel block 1 = block 0 = block 1 = cancel block
Long button push starting at	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to clearly differentiate between long and short button push. If the button is pressed for at least as long as the set time, then a long button push will be registered.
Double-click additional function	*no* ***yes***	No double-click function The ***Double-click*** parameter page is displayed.
Time for double-click	***300 ms****, 400 ms* *500 ms, 600 ms* *700 ms, 800 ms* *900 ms, 1 s*	Serves to differentiate between a double-click and 2 single clicks. Time period in which the second click must begin, in order to recognise a double-click.

6.9.4.2 Double-click parameter page

Designation	Values	Description
Object type	***Switching (1 bit)*** *Priority (2 bit)* *Value 0-255* *Percentage value (1 byte)* *Height % + slat %*	Telegram type for this object.
Telegram	*With object type = switching 1 bit*	
	ON *OFF* *INVERT*	Send switch-on command Send switch-off command Invert current state (ON-OFF-ON etc.)
	With object type = priority 2 bit	
	inactive *ON* *OFF*	Function: Priority inactive (no control) — Value: 0 (00_{bin}) Function: Priority ON (control: enable, on) — Value: 3 (11_{bin}) Function: Priority OFF (control: disable, off) — Value: 2 (10_{bin})
	With object type = value 0-255	
	*0-**255***	Any value between 0 and 255 can be sent.
	With object type = percentage value 1 byte	
	*0-**100%***	Any percentage value between 0 and 100% can be sent.
	With object type = height % + slat %	
	Height	Upon double-click 2 telegrams are sent simultaneously: Desired height of blinds
	Slat	Desired slat position.
Send cyclically	***do not send cyclically*** *every min* *every 2 min* *every 3 min* *...* *every 45 min* *every 60 min*	How often should it be resent?
Response after restoration of the	***none***	Do not send.

Designation	Values	Description
bus supply[20]	*As after double-click (after approx. 5 s)* *As after double-click (after approx. 10 s)* *As after double-click (after approx. 15 s)* *As after double-click (after approx. 20 s)*	Send update telegram immediately or with delay. The value to be sent depends on the value configured for double-click.
Response when the block is set	***Ignore block*** *no response* *as with double-click*	The block function is ineffective with this telegram. Do not respond when the block is set. Respond as with a double-click.
Response when cancelling the block	***no response*** *as with double-click*	Do not respond when the block is cancelled. Respond as with a double-click.

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6.9.4.3 Blinds parameter page

Designation	Values	Description
Operation		The input distinguishes between a long and a short button push, and can thus carry out 2 functions.
	One button operation	The blinds are operated with a single button. Short button push = step. Long button push = move.
	DOWN	Short button push = step. Long button push = lower.
	UP	Short button push = step. Long button push = raise.
Movement is stopped by	*Releasing the button* ***Short operation***	How is the stop command to be triggered?
Response after restoration of the mains or bus supply	***none***	Do not respond.
	after approx. 5 s UP *after approx. 10 s UP* *after approx. 15 s UP* *after approx. 20 s UP*	Raise blinds with delay
	after approx. 5 s DOWN *after approx. 10 s DOWN* *after approx. 15 s DOWN* *after approx. 20 s DOWN*	Lower blinds with delay
Response when the block is set	***Ignore block***	The block function is ineffective with this telegram.
	no response	Do not respond when the block is set.
	UP	Raise blinds
	DOWN	Lower blinds
Response when cancelling the block	***no response***	Do not respond when the block is cancelled.
	ON	Raise blinds
	OFF	Lower blinds

6.9.5 Input I1, I2: window contact function

6.9.5.1 Configuration options

Designation	Values	Description
Function	*Switch..* *Push button..* *Dimming..* *Blinds..* ***Window contact..***	Desired use.
Debounce time	*30 ms,* ***50 ms,*** *80 ms* *100 ms, 200 ms,* *1 s, 5 s, 10 s*	In order to avoid disruptive switching due to bouncing of the contact connected to the input, the new status of the input is only accepted after a delay time. Larger values (≥ 1 s) can be used as a switch-on delay
Send cyclically	*every min* *every 2 min* *every 3 min* *...* ***every 30 min*** *every 45 min* *every 60 min*	Common cycle time for all 3 output objects of the channel.
Activate block function	***no*** *yes*	No block function. Show parameters for the block function.
Block telegram	***Block with 1 (standard)*** *Block with 0*	0 = Cancel block 1 = block 0 = block 1 = cancel block

6.9.5.2 Window contact

Designation	Values	Description
Telegram when contact closed	***On*** Off	Set switching status.
Telegram when contact open	*On* *Off*	Is set automatically.
Send cyclically	***no*** *yes, always* *only if input = 1* *only if input = 0*	When should cyclical sending take place? The cycle time is set on the main parameter page of the channel.
Response after restoration of the bus supply[21]	***none*** *update (after approx. 5 s)* *update (after approx. 10 s)* *update (after approx. 15 s)* *update (after approx. 20 s)*	Do not send. Send update telegram immediately or with delay.
Response when the block is set	***Ignore block*** *no response* *as with input = 1* *as with input = 0*	The block function is ineffective with this telegram. Do not respond when the block is set. Respond as with rising edge. Respond as with falling edge.
Response when cancelling the block	***no response*** *update*	Do not respond when the block is cancelled. Send update telegram.

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6.9.6 Input I2: Temperature input function[22]

6.9.6.1 Configuration options

Designation	Values	Description
Channel function	*Switch..* *Push button..* *Dimming..* *Blinds..* ***Temperature input***	The input is connected to a temperature sensor
Temperature calibration	*-5..5K*	Correction value for temperature measurement if sent temperature deviates from the actual ambient temperature.
Send temperature in the event of change of	*not due to a change*	Only send cyclically (if enabled)
	0.2 K *0.3 K* ***0.5 K*** *0.7 K* *1 K* *1.5 K* *2 K*	Send if the value has changed by the selected amount since the last transmission.
Send temperature cyclically	***do not send cyclically*** *every min,* *every 2 min* *every 3 min* *...* *every 45 min* *every 60 min*	How often should the current measured value be resent?

Applicable sensor types:
temperature sensor UP (9070496)
remote sensor IP65 (9070459)
floor sensor (9070321)

[22] The temperature input function is only possible with input I2.

7 Typical applications

These application examples are designed to aid planning and are not to be considered an exhaustive list.
They can be supplemented and extended as desired.

For detailed comfort and control functions, the RAMSES 718 P KNX manual can be consulted.

7.1 Simple control with one channel as heating actuator

Channel H1 is configured as heating actuator.

Control is accomplished by a RAMSES 718 P room thermostat.
Summer mode (heating interruption) is triggered manually with a switch. Presence and window status are detected by a presence detector and a window contact.

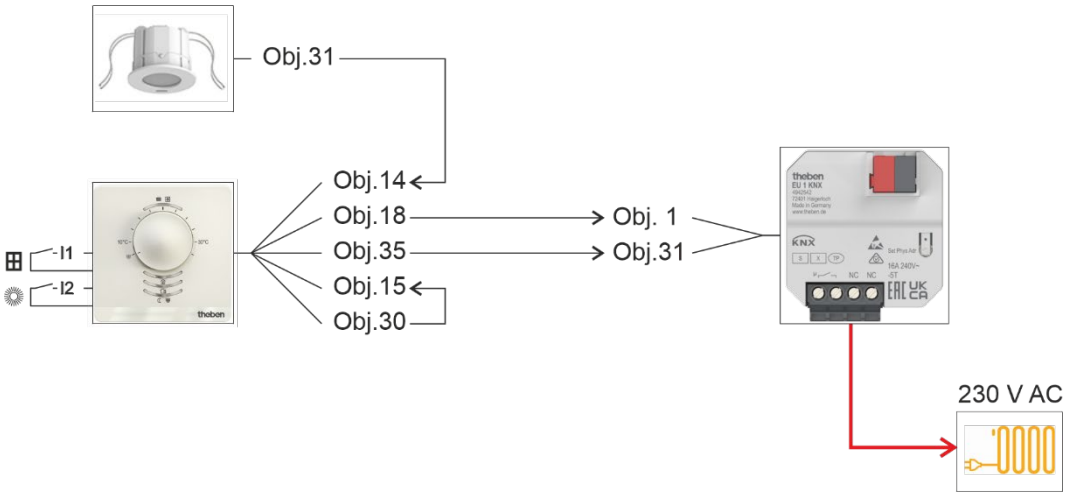
For the window contact and the switch for summer/winter mode, 2 external inputs of the RAMSES 718 P are used.

The heating pump is controlled by a SU 1 switching actuator.

7.1.1 Devices

- EU 1 KNX (Order no. 4942542)
- RAMSES 718 P (Order no. 7189210)
- SU 1 (Order no. 4942520)
- PlanoSpot 360 KNX (Order no .2039101)

7.1.2 Overview



7.1.3 Objects and links

No.	PlanoSpot 360 Object name	No.	RAMSES 718 P Object name	Comment
31	Channel C4.1 – presence	14	Presence	Presence signal. Starts comfort mode.

No.	RAMSES 718 P Object name	No.	EU 1 KNX Object name	Comment
18	Heating actuating value	1	Continuous actuating value	Actuating value for channel H1
35	Channel I2.1 – switching	31	Heating interruption ON/OFF	Changeover between summer/winter mode.

No.	RAMSES 718 P Object name	No.	RAMSES 718 P Object name	Comment
30	Channel I1.1 Switching	15	Window status	Connect status of window contact at I1 with RTC window status input object.

7.1.4 Important parameter settings

Standard or customer-defined parameter settings apply to unlisted parameters.

PlanoSpot 360

Parameter page	Parameters	Setting
General	*Channel 4 function – presence*	*active..*
Channel C4 – presence – objects	*Telegram type C4.1*	*Switch command*

RAMSES 718 P

Parameter page	Parameters	Setting
Parameter block RTC		
RTC setting	*Control*	*Only heating control*
Heating control	*Type of control*	*continuous*
Parameter block External inputs		
Channel 1	*Activate channel*	*On*
	Channel function	*Switch*
Switch object 1	*Object type*	*Switching (1 bit)*
	Send if input = 1	*yes*
	Telegram	*On*
	Send if input = 0	*yes*
	Telegram	*Off*
Channel 2	*Activate channel*	*On*
	Channel function	*Switch*
Switch object 1	*Object type*	*Switching (1 bit)*
	Send if input = 1	*yes*
	Telegram	*On*
	Send if input = 0	*yes*
	Telegram	*Off*

EU 1 KNX, channel H1

Parameter page	Parameters	Setting
Configuration options	*Channel function*	*Heating actuator*
	Type of actuating value	*continuous*

7.2 Simple control with one channel as room thermostat

Channel H1 is configured as a room thermostat and is used as a heating actuator with integrated room thermostat.

The external inputs of the EU 1 KNX are directly connected internally to the controller[23]:
E1 → window contact.
E2 → actual temperature value, e.g. with temperature sensor UP (Order no. 9070496).

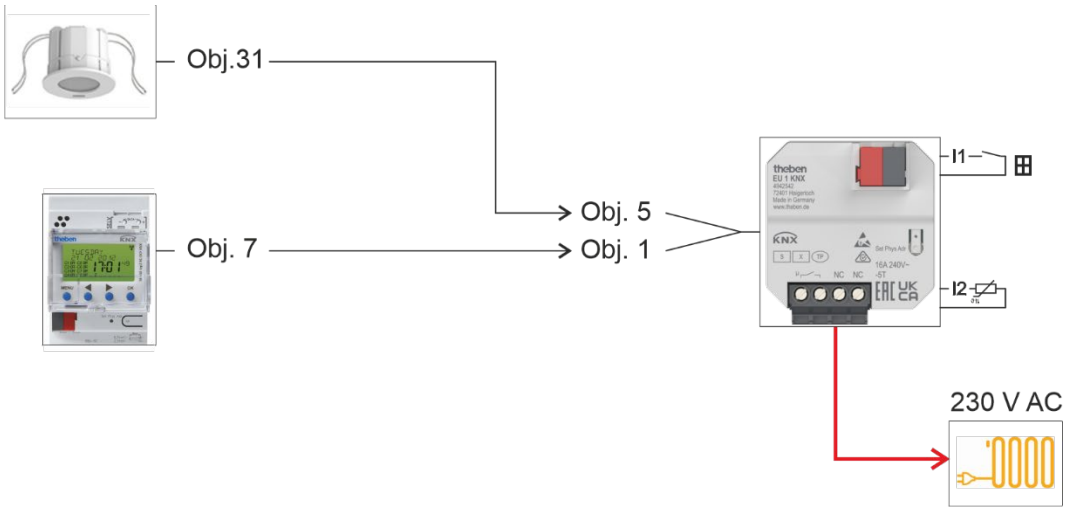
Presence is detected by a presence detector.

The setpoint is sent from a TR 648 top2 time switch.

7.2.1 Devices

- EU 1 KNX (Order no. 4942540)
- PlanoSpot 360 KNX (Order no. 2039101)
- TR 648 top2 RC-DCF (Order no. 6489210)
- Temperature sensor, e.g. Order no. 9070496

7.2.2 Overview



[23] No object linking required. See below: *Important parameter settings*

7.2.3 Objects and links

No.	PlanoSpot 360 Object name	No.	EU 1 KNX Object name	Comment
31	Channel C4.1 – presence	5	Presence	Presence signal. Starts comfort mode.

No.	TR 648 top2 Object name	No.	EU 1 KNX Object name	Comment
7	C1.1 switching channel – temperature in °C	1	Base setpoint	Base setpoint

7.2.4 Important parameter settings

Standard or customer-defined parameter settings apply for unlisted parameters.

PlanoSpot 360:

Parameter page	Parameters	Setting
General	*Channel 4 function – presence*	*active..*
Channel C4 – presence – objects	*Telegram type C4.1*	*Switch command*

EU 1 KNX:

Parameter page	Parameters	Setting
Channel H1		
Configuration options	*Channel function*	*Room thermostat*
	Use window contact at I1 for the controller	*yes*
	Use temperature sensor at I2 for the controller	*yes*

TR 648 top2:

Parameter page	Parameters	Setting
Switching channel C1	*Telegram type C1.1*	*Temperature [°C]*
	As with clock -> ON	*20 °C*
	With clock -> OFF	*16 °C*

8 Appendix

8.1 Determining the current operating mode

The current setpoint can be adjusted to the relevant requirements by selecting the operating mode.
The operating mode can be specified via the objects *operating mode preselection, presence* and *window position*.

The current operating mode can be specified as follows:

Object *Operating mode preselection*	Object *Presence*	Object *Window setting*	current operating mode
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

8.2 Priorities in operating mode selection

In principle the following applies: The last instruction overwrites the previous one.

Exception: Frost mode via window contact has priority over all other operating modes.

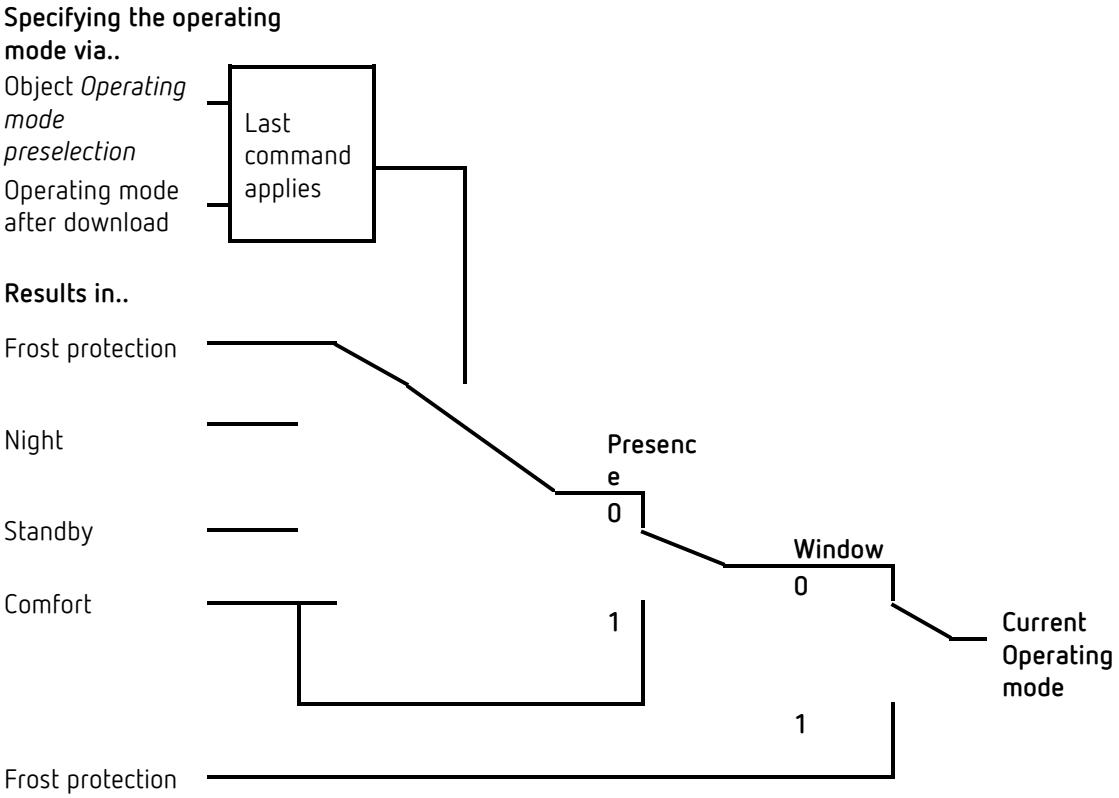
Upon selection of the *presence button* parameter, the following also applies:
If a new operating mode is received on the object with the set presence object (*operating mode preselection)*, it will be accepted and the presence object will be reset
(only with presence button).

Reception of the same operating mode as prior to the presence status
(e.g. via cycl. sending) is ignored.

If the *presence object* is set during night/frost mode, it will be reset after the configured comfort extension has expired.

If the *presence object* is set during standby mode, the comfort operating mode is accepted without time restriction.

Determining the operating mode when using a presence detector



8.3 Base setpoint and current setpoint value

The **base setpoint** value is the standard temperature for comfort operating mode and the reference temperature for reduction in standby and night operating modes.
The configured base setpoint (see *base setpoint after downloading the application*) is stored in object *base setpoint* and can be changed via the bus at any time.

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

Example:
With a basic setpoint of 22 °C and a reduction in night mode of 4 K, the current setpoint (in night mode) is: 22 °C − 4 K = 18 °C.
During the day (in comfort mode) the current setpoint is 22 °C (if cooling mode is not active).

The current setpoint depends on the operating mode and on the selected control function.

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

8.4 Determination of the setpoint value

8.4.1 Setpoint calculation in heating mode

Current setpoint during heating

Operating mode	Current setpoint
Comfort	Base setpoint +/- setpoint offset
Standby	Base setpoint +/- setpoint offset – Reduction in standby mode
Night	Base setpoint +/- setpoint offset – Reduction in night mode
Frost/heat protection	Configured setpoint for frost protection mode

Example:
Heating in comfort mode.

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

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

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

8.4.2 Setpoint calculation in cooling mode

Current setpoint during cooling

Operating mode	Current setpoint
Comfort	Base setpoint + setpoint offset
Standby	Base setpoint + setpoint offset + increase in standby mode
Night	Base setpoint + setpoint offset + increase in night mode
Frost/heat protection	Configured setpoint for heat protection mode

Example:
Cooling in comfort mode.

Parameter page	Parameters	Setting
Setpoint values	*Base setpoint after loading the application*	*21 °C*
	Maximum valid setpoint offset	*+/- 2 K*
Cooling setpoints	*Increase in standby mode (during cooling)*	*2 K*

The setpoint was previously lowered via object *setpoint offset* by -1 K.

Calculation:

Current setpoint
= base setpoint + setpoint offset
= 21 °C – 1 K
= 20 °C

Changing to standby mode causes a further increase of the setpoint (energy saving), which results in the following setpoint:
Setpoint value
= base setpoint + setpoint offset + increase in standby mode
= 21 °C – 1 K + 2 K
= 22 °C

8.5 Setpoint offset

The current setpoint can be adjusted via object *manual setpoint offset*.
In this case, the setpoint is changed by sending the desired offset to the object.
For this, the difference (may be preceded by a minus sign) is sent as DPT 9.002 to the object *manual setpoint offset*.

The offset limits are defined on the ***Heating setpoint values*** or ***Cooling setpoints*** parameter page via the *Maximum valid setpoint offset* parameter.

The offset always refers to the base setpoint and not to the current setpoint.

Example Base setpoint of 21 °C:

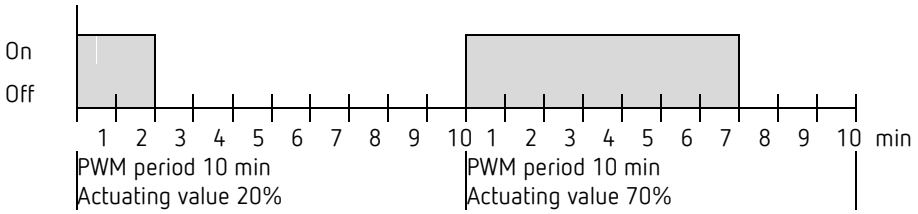
If a value of 2 is received by object *manual setpoint offset*, the new setpoint is calculated as follows:
21 °C + 2 K = 23 °C.
In order to afterwards bring the setpoint to 22 °C, the difference to the configured base setpoint (here 21 °C) is resent, in this case 1 K (21 °C + 1 K = 22 °C)

8.6 PWM cycle

8.6.1 Basic principle

In order to achieve e.g. a heating output of 50%, the 50% actuating value is converted into switch-on/switch-off cycles.
The actuator is switched on for 50% of the time and switched off for 50% of the time over a fixed period (10 minutes in our example).

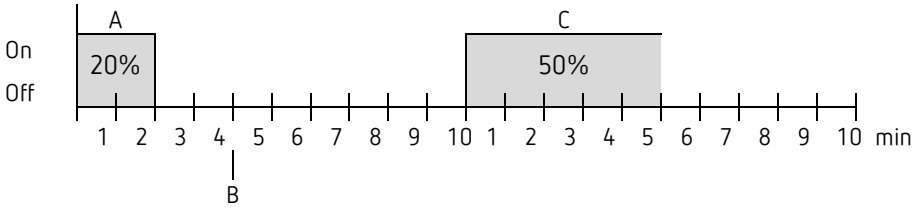
Example: 2 different turn-on times of 2 and 7 minutes indicate the implementation of 2 different actuating values, that is once 20% and once 70% during a PWM period of 10 minutes.



8.6.2 Response to changes in actuating value

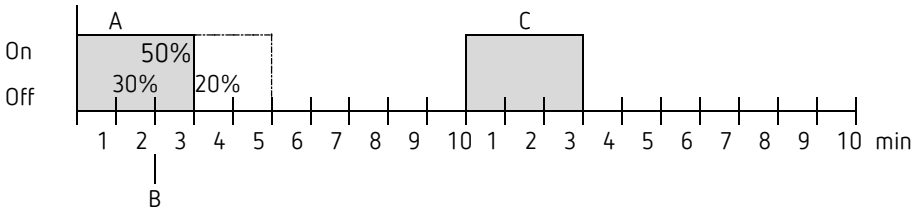
Every change in the actuating value is immediately transferred to the PWM cycle, in order to respond to changes in the quickest possible time.

Example 1:
The last actuating value was 20% (A).
A new actuating value of 50% is received during the cycle (B).
The output does not switch on again until the entire cycle time has elapsed. The next cycle is executed at 50% (C).

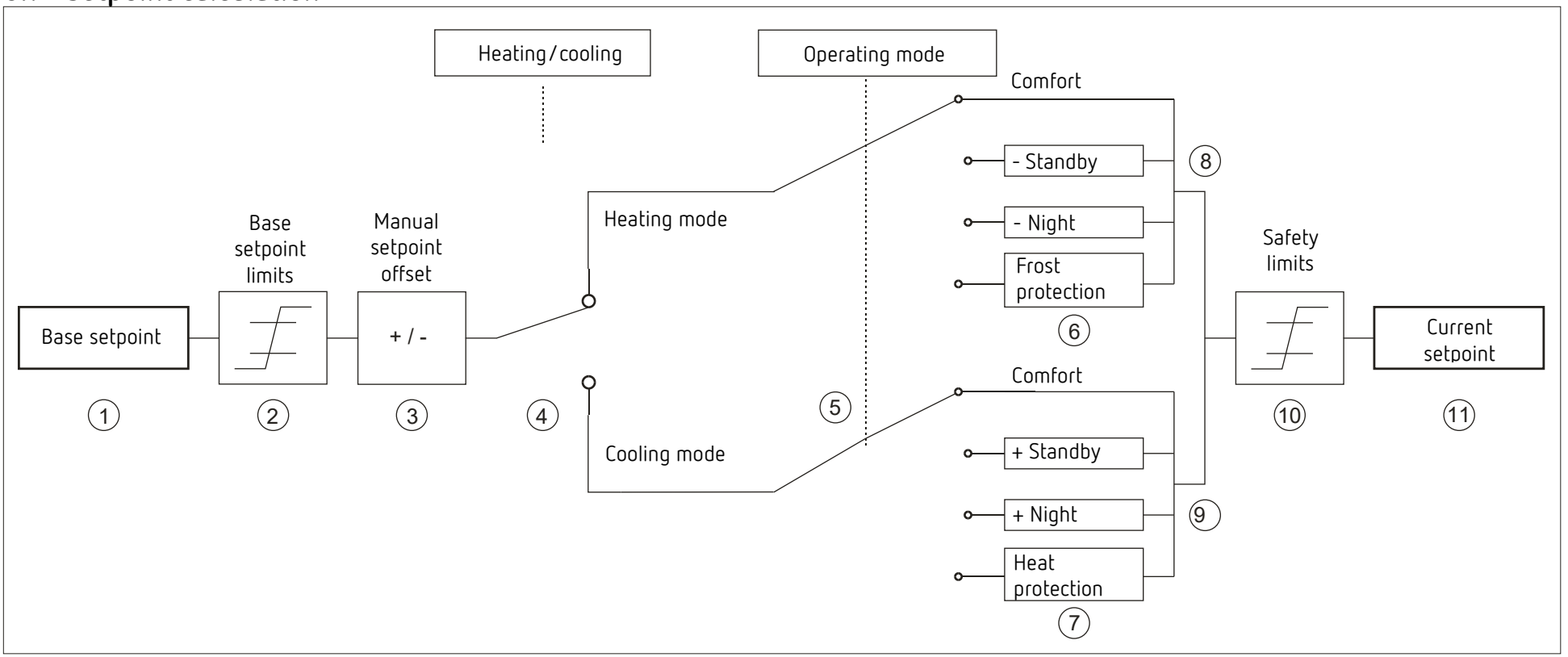


If the rated turn-on time for the current cycle has already been exceeded while receiving the new actuating value, the output is immediately switched off and the new actuating value is executed during the next cycle.

Example 2:
The last actuating value was 50% (A)
A new actuating value of 30% is received during the cycle (B).
The output is switched off after completing 30% of the PWM cycle and thus the new actuating value is already executed.



8.7 Setpoint calculation



1 Preset base setpoint
2 Max. and min. valid base setpoints
3 Manual setpoint offset
4 Heating mode or cooling mode
5 Selection of operating mode by object
6 The setpoint is replaced by the setpoint for frost protection mode
7 The setpoint is replaced by the setpoint for heat protection mode
8 Setpoint after reductions caused by the operating mode
9 Setpoint after increases caused by the operating mode
10 The limits for frost and heat protection must be adhered to
11 Current setpoint after increases, reductions and limits caused by the operation