0705 CO Room Temperature Controller H+C 803001

Use of the application program

Product family: Heating, Air conditioning, Ventilation

Product type: Controller
Manufacturer: Siemens

Name	**Room Temperature Controller UP 237K**
Design:	**DELTA i-system**

Color	Order no.
titanium white	5WG1 237-2KB11
aluminum metallic	5WG1 237-2KB31

Name	**Room Temperature Controller UP 254K**
Design:	**DELTA style**

Color	Order no.
titanium white/ metallic silver	5WG1 254-2KB13
platinum metallic	5WG1 254-2KB43

Contents overview

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GAMMA *instabus*

Application program description

August 2012

0705 CO Room Temperature Controller H+C 803001

1. Start-up

To start up a controller using the ETS (Engineering Tool Software), the controller with the matching DELTA frame must be plugged into a Bus Transceiver Module (BTM) UP 117, which provides the power supply for the controller and for data transfer via the KNX bus. After pulling out the rotary button for shifting the nominal value, the recesses for the start-up key and the controller's start-up LED are visible.
Note:
The Bus Transceiver Module UP 117 and the corresponding DELTA frame are not included in the controller as delivered and must be ordered as extras.

The ETS as of version 3.0 f is used to select the application program, allocate specific parameters and addresses and transfer these to the room temperature controller UP 237K and UP 254K.

Note:
The communication objects and parameters are not the same for the objects and parameters in the application programs for the room thermostats UP 237, UP 252 and UP 254, nor for the multi-function key UP 231. You must take this into account when replacing an older controller (including bus coupler) by a new UP 237K controller or a UP 254K with Bus Transceiver Module.

2. Functional overview

The "0705 CO Room Temperature Controller H+C 803001" application program supports the following functions:

- Toggling between automatic and manual mode and using the key to toggle room mode,
- Nominal value shift or setting in C° via the rotary button,
- Status display using LEDs:
  - Display (green) for manual mode, as well as the current room mode (comfort, pre-comfort, energy saving and protection modes),
  - Display (red/yellow), whether the heating or cooling valve is open,
  - Display (red) for dew point alarm and open window.
- Room thermostat, variable as:
  - heating only, cooling only, heating and cooling,

  each of these selectable as
  - heating with two-step control,
  - heating with PI control,
  - heating with PI control and sequence control (e.g. for underfloor and radiator heating),
  - cooling with two-step control,
  - cooling with PI control,
  - cooling with PI control and sequence control . (e.g. for cooling cover and forced air cooler).

Room thermostat includes the following partial functions:

- room temperature measurement using the internal temperature sensor with offset setting,
- room temperature measurement using an external temperature sensor with offset setting,
- computation of actual current room temperature (internal and external sensors weighted),
- for setpoint value shift: basic setpoint value via parameter setting and/or via bus,
- for setpoint value shift: computation of current setpoint room temperature from basic setpoint value and shift,
- timed suspension of energy saving or protection mode (comfort extension),
- comfort mode is toggled via the bus by presence sensing,
- dew point mode can be activated via the bus,
- analysis of window states via the bus,
- frost protection/heat protection is reported via the bus,
- PI control for heating/cooling with constant controller output (in %) or switched controller output (on/off).
- separate or joint controller output for heating and cooling,
- separate controller outputs for basic and supplementary stages with 2-step heating and cooling,
- Sense toggling and scaling of the controller output for heating/cooling possible,
- Maximum and minimum controller output for heating/cooling possible,
- Mode (controller status) readable via the bus

3. Room temperature control

3.1. Constant PI controller

Depending on your wishes, you can adjust exclusively for "Heating" or exclusively for "Cooling" or for "Heating and Cooling". The room temperature is separately adjustable for heating and cooling and can, at your discretion, be controlled through a two-step controller or a constant PI controller or a constant PI controller with sequential control. Sequential control should be used, for example, if a room has both underfloor heating and radiator heating (see "Sequential Control" section). You can also vary whether the control is switchable between two room modes (comfort and protection modes), three room modes (comfort, energy-saving and protection

modes) or four room modes (comfort, pre-comfort, energy-saving and protection mode).
With constant PI control, the proportional range and reset time are variable in a further range. The controller status computed from the actual and nominal room temperature values can be transferred as a constant control value (EIS 6) in the range 0...100% or as a PWM on/off command (EIS 1) via the KNX bus.

3.2. Two-step controller

Alternatively, a two-step control is available for the constant PI controller. The two-step controller is enabled only in discrete time intervals, in order to determine the current actuator variable, unless the nominal value is changed. The cycle time and hysteresis for the 2-step controller are variable.
The two-step controller is easily configurable and can be used with controls in which slight room temperature fluctuations are permitted.

3.3. Actual value computation

Internal temperature sensor
The thermostat contains an integrated, compensated temperature sensor to record the room temperature in the range from 0 °C to +40 °C with a resolution of 0.1 °C. This actual value, internal to the controller, can be compensated for environmental factors by means of a variable offset (e.g. when fitting in a cold outside wall). The measured temperature value, corrected as necessary via the integrated sensor, can be sent via a proprietary object. A configurable "Hysteresis" prevents very small temperature fluctuations from leading constantly to new actual values.

External temperature sensor
The controller also has an additional object for the temperature value measured by an external temperature sensor. This object can send "Read Criteria" cyclically if necessary to the corresponding external temperature sensor object, so that this then transfers the current value. However, in theory, an external sensor should send any temperature change automatically. A variable offset can also be assigned to the external temperature value.
After a bus voltage failure, the external temperature value that was pictured in the parameter "basic nominal and actual external sensor value on restart". This means that the program has a meaningful start value immediately the bus voltage is restored.

Room temperature - actual value
From the temperatures of the integrated and external sensors, the program computes the current actual value for room temperature, taking into account a configurable "Weighting". From the "Weighting", the program determines what percentage of the externally measured temperature value is included in the computation of the actual temperature value.
The actual room temperature computed in this manner can be read at any time from a proprietary object or sent automatically with a change of a configurable value, or even cyclically.

3.4. Setpoint value setting/Setpoint value computation

Setpoint value setting
Controllers for heating and cooling are supplied with a rotary button to vary the setpoint value. A rotary button for direct setting of the setpoint value in the range of 16 to 26C° is delivered with the controller. If need be, the rotary button for varying the setpoint value can be exchanged for direct setpoint value setting and changed in the "Functions, objects" window from "Setpoint value setting" to "directly in C°".

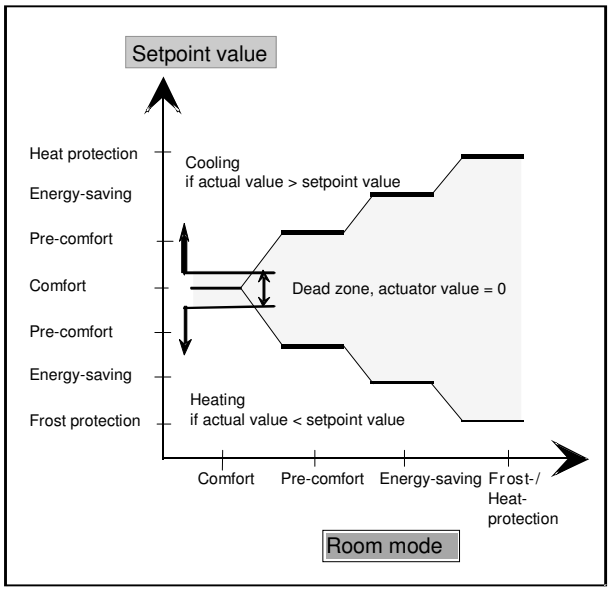
Setpoint value computation
In a setpoint value shift, the current setpoint value is determined from the current room mode and a setpoint value shift to be included as necessary.
The basic setpoint value can be matched on a sliding scale to the relevant outside temperature either via the corresponding object or set to a fixed value via a parameter. If the basic setpoint value is set via the corresponding object, then the basic value is stored automatically and in a manner such that it cannot be lost if the bus voltage fails.
You use the rotary button to move the basic setpoint value stipulated by the user of the room to a higher or lower value, where the range of the movement is variable. A shift or change of the setpoint value is sent immediately.

3.5. Room operating modes

Comfort mode
The corresponding LED displays this room mode at the upper edge of the controller. The setpoint value in room mode does not depend on whether heating or cooling is active. It equates either to the value in C° set directly on the controller display or to that computed from the basic setpoint value and the set setpoint value shift.
If when in the comfort mode the actual room temperature value is within the symmetrical dead zone around the setpoint value for comfort mode (see picture 1), then the room is neither heated nor cooled (both actuator valves are closed), i.e. the dead zone contributes to energy saving and also ensures that the heating and cooling valves are never open simultaneously. Therefore, the

0705 CO Room Temperature Controller H+C 803001

actual room temperature can also vary upwards or downwards from the nominal comfort zone by half the value of the symmetrical dead zone.



Picture 1: Setpoint values and dead zone

Pre-comfort mode
The corresponding LED displays this room mode in the upper edge of the controller. The setpoint value in "Pre-comfort" room mode depends on whether heating or cooling is active. With heating, the setpoint pre-comfort mode value equals the basic setpoint value minus the pre-comfort mode temperature drop and with cooling, the basic setpoint value plus the pre-comfort mode temperature rise, in each case plus or minus the set setpoint value shift (see picture 1). The values for fall and rise in pre-comfort mode are varied using parameters in the "Temperature, Setpoint Values" window.

Energy-saving mode:
The corresponding LED displays the room mode in the upper edge of the controller. The setpoint value in "Energy-saving" room mode depends on whether heating or cooling is active. When heating is active the setpoint energy-saving mode value equals the basic setpoint value minus the energy-saving mode temperature drop. When cooling is active the setpoint energy-saving mode value equals the basic setpoint value plus the energy-saving mode temperature rise. In either case the value is plus or minus the set setpoint value shift (see picture 1). The values for fall and rise in energy-saving mode are varied using parameters in the "Temperature, Setpoint Values" window.

Protection mode (Frost protection/Heat protection)
The corresponding LED displays this room mode in the upper edge of the controller. Frost or heating protection is activated, for example, by an open window. The setpoint value in this mode depends exclusively on whether heating or cooling is active. In heating, the setpoint value in the "Temperature, Setpoint Values" window equals the "Frost Protection" value variable by means of a parameter and in cooling the "Heat Protection" value, again variable by means of a parameter.

Permanent protection mode
If you want to switch the room thermostat permanently to protection mode (e.g. during a holiday), then the special communication object "Permanent Protection Mode" is available for this purpose. If the room "Protection Mode" is switched on via this object, then it can only be switched off again by this object. Key operations and telegrams from timers, presence detectors and window contacts which act on the "normal" "Protection Mode" object are ignored while the "Permanent Protection Mode" object is switched on. If "Permanent Protection Mode" is switched on, then the Protection Mode display LED occults slowly (2 seconds ON, 0.5 seconds OFF). If "Permanent Mode" is switched off by telegram, then the room thermostat reverts automatically to the mode that was active before "Permanent Mode" was switched on. If a telegram ordering a changeover to a different mode was received during "Permanent Protection Mode", then this mode is buffered and activated after "Permanent Mode" is ended.

Window opening/closing
The window status analysis allows the controller to respond to the opening of windows or doors. For this purpose, up to four window objects can be assigned. These are interlinked in the controller via a logical OR function. If one or more of the window objects are set to logical One, then there is a switch to protection mode, i.e. the setpoint room temperature value is set to frost protection value for heating and to heat protection value for cooling. If at least one window is open, then this is also displayed by illumination of the corresponding LED at the left edge of the controller. Changing to the frost protection or to the heating protection value leads usually to immediate closure of the heating or cooling valve. In this context, the waste of heating or cooling energy with the window open is avoided.
The present mode is saved if a window is opened. If all windows are closed again (i.e. all window objects are again at logical Zero), then there is a change to the saved mode (which existed before the window was

opened). If a telegram to change to a different mode has been received via the bus while the window was open (e.g. from a timed program), then this mode is buffered and the change to this mode is made after all windows are closed.
Another parameter controls whether the opening of a window should lead immediately or only after 30 seconds to a switch to protection mode, so that, if need be, there is no response to a window open for a short time.

Comfort mode - extension
If "Energy Saving Mode" or "Protection Mode" was switched on while operating without presence detectors and with the windows closed (e.g. via a telegram from a timer program), then Comfort Mode can be switched on by tapping the "Comfort Mode" key for a limited time (variable "Comfort extension"). Activated "Comfort Extension" is indicated by slow occulting (2 seconds ON; 0.5 seconds OFF).
Tapping the buttons again during a running comfort extension always restarts this. After the pictured comfort extension has ended, the program reverts to the preceding room mode (energy saving or protection mode). If a telegram ordering a change to a different mode is received during a running "Comfort Extension", then the new mode is buffered and switched to the new mode only after ending of the comfort extension.
Early ending of a running comfort extension with automatic reversion to the stored mode is possible at any time by holding the key down (e.g. ≥ 1 second, but < 3 seconds). The time from which pressing the key becomes "holding down" is variable using a parameter in the "Functions, Objects" window.

Dew point mode
If, in cooling mode with a cooling cover, the controller responds to the dew point monitor fixed to it, then it switches internally to "dew point" mode. For this purpose, the cooling cover valve is closed completely while the dew point alarm is present. "Dew point Mode" on is indicated by illumination of the corresponding LED on the left edge of the controller.
When dew point mode is switched on, telegrams ordering a switch to room mode are not executed, but are buffered and executed after dew point mode has ended. If the key is pressed while dew point mode is switched on, this is also ignored.

Automatic/Manual mode
The operating states are normally controlled in "Automatic Mode" by telegram via a timer, a time schedule or the base station of a building automation system. However, there is the option to set a desired room mode permanently by hand with the controller key. For this, the windows must be closed and "Permanent Protection Mode" must not be switched on.
Tapping the key always toggles between the first two room modes that the controller recognizes (see the "Room Modes" parameter in the "Room Modes" window and, based on the chosen setting, between comfort and pre-comfort mode or between comfort and energy saving mode. This control operates only if 3 or 4 modes have been selected in the "Room Mode" parameters. Moreover, tapping starts a "Comfort Extension" if energy saving or protection mode are active.
Holding (e.g. ≥ 1 second but < 3 seconds) the key down while a comfort extension is running ends this at any time and returns you to the mode before the comfort extension began.
Holding the key down for a long time (≥ 3s) switches from automatic to "Manual Mode". If the green LED directly to the right of the key is illuminated, this indicates that "Manual Mode" is activated. In "Manual Mode" any room mode can be activated permanently via the key and no longer changed by a bus telegram ordering a mode switch. If manual mode is activated, then each time the key is tapped, the light display for the current mode steps each time to the next mode symbol until the extreme right or left position is reached, before moving back again. If the key is not tapped again during a dwell time of approx. 3 seconds, then the indicated mode is activated and this is reported via the bus. This ensures that, when the room mode is changed manually, only the final mode and not all room modes selected in the interim are sent.
If the key is held down in "Manual Mode for a long time (≥ 3 seconds), then this causes a change to automatic mode and at the same time to comfort mode. The LED indicating "Manual Mode" then goes out.

Presence detector
The controller includes an optional object for the "Presence" status for use in rooms with a presence detector. If a "Presence=ON" telegram is received, then the current room mode is stored and comfort mode switched on. If a "Presence=OFF" telegram is then received, then the controller reverts to the stored room mode. If a telegram is received to switch to a different room mode while in "Presence=ON", this is buffered and is only effective when the object value "0" is received via the presence object.
If a window is opened with "Presence=ON", then "Protection MODE" is activated while a window remains open.
If "Manual Mode" is switched on, then telegrams from the presence detector are ignored.

Operation with 4 room modes
In automatic mode without presence detector, tapping the key toggles between "Pre-comfort mode" and

"Comfort mode" (e.g. when entering and leaving the room). If the room mode has been switched to "Energy-saving Mode" or "Protection Mode" via a telegram, tapping the key also switches to "Comfort Mode", albeit for a limited time (the variable "Comfort extension"). Tapping the buttons again during a running comfort extension always restarts this. After the pictured comfort extension has ended, the program reverts to the preceding room mode (energy saving or protection mode). Ending a running comfort extension by reverting to the previous room mode by holding down the key is also possible at any time.
By holding down the key for a long time (≥ 3 seconds), the user of the room changes to "Manual Mode" and tapping on the key switches permanently to any other possible room mode. Holding the key down again for a long time enables the user of the room to revert to "Automatic Mode", whereupon "Comfort Mode" is switched on again.
In automatic mode with presence detector, tapping or holding down the key has no effect. If a "Presence - ON" telegram is received, then the current room mode is stored and comfort mode switched on. A "Presence=OFF" telegram causes reversion to the stored room mode, unless this has been overwritten meanwhile by a telegram with a different room mode.
Holding down the key for a long time switches on "Manual Mode" and tapping the key then activates any of the possible modes permanently. In manual mode, presence detector telegrams are ignored, i.e. presence telegrams do not cause a switch to a different mode.

Operation with 3 room modes
In automatic mode without presence detector, tapping the key toggles between "Energy-saving mode" and "Comfort mode" (e.g. when entering and leaving the room). If the room mode has been switched to "Protection Mode" via a telegram, tapping the key also switches to "Comfort Mode", albeit for a limited time (the variable "Comfort extension"). Tapping the buttons again during a running comfort extension always restarts this. After the pictured comfort extension has ended, the program reverts to the preceding room mode (protection mode). Ending a running comfort extension by reverting to the previous room mode by holding down the key is also possible at any time.
By holding down the key for a long time (≥ 3 seconds), the user of the room changes to "Manual Mode" and tapping on the key switches permanently to any other possible room mode. Holding the key down again for a long time enables the user of the room to revert to "Automatic Mode", whereupon "Comfort Mode" is switched on again.
In automatic mode with presence detector, tapping or holding down the key has no effect. If a "Presence - ON" telegram is received, then the current room mode is stored and comfort mode switched on. A "Presence=OFF" telegram causes reversion to the stored room mode, unless this has been overwritten meanwhile by a telegram with a different room mode.
Holding down the key for a long time switches on "Manual Mode" and tapping the key then activates any of the possible modes permanently. In manual mode, presence detector telegrams are ignored, i.e. presence telegrams do not cause a switch to a different mode.

Operation with 2 room modes
In automatic mode without presence detector, tapping the key switches from "Protection Mode" to "Comfort Mode" for a limited time (the variable "Comfort extension").
By holding down the key for a long time (≥ 3 seconds), the user of the room changes to "Manual Mode" and tapping on the key switches permanently to either of the two possible room modes. Holding the key down again for a long time enables the user of the room to revert to "Automatic Mode", whereupon "Comfort Mode" is switched on again.
In automatic mode with presence detector, tapping or holding down the key has no effect. If a "Presence - ON" telegram is received, then the current room mode is stored and comfort mode switched on. A "Presence=OFF" telegram causes reversion to the stored room mode, unless this has been overwritten meanwhile by a telegram with a different room mode.
Holding down the key for a long time switches on "Manual Mode" and tapping the key then activates either of the two possible modes permanently. In manual mode, presence detector telegrams are ignored, i.e. presence telegrams do not cause a switch to a different mode.

3.6. Mode change via the bus

1-bit objects
Four 1-bit objects are always available for switching and reporting room mode. For switching to comfort, pre-comfort, energy-saving or protection mode, a single ON command via the corresponding 1-bit object will suffice. After a delay of approx. 3 seconds, the status objects are updated, i.e. all objects are sent automatically, if the switching status has changed by the switch to the new room mode. OFF commands are not analyzed via the corresponding 1-bit objects. The previous mode is kept in order to ensure a defined operating state. A mode change by telegram will only be displayed via the relevant LED and accepted by the controller after approx. 3 seconds.
The "Frost Alarm" and "Heating Alarm" states and the "Heating/Cooling" mode will be determined by the controller independently and sent via these objects. In 2-

0705 CO Room Temperature Controller H+C 803001

wire systems with a heat exchanger and an actuator valve, in which either cold or hot water flows through the network, however, the controller must be switched to the current mode in each case via the bus and the "Heating/Cooling" object.
The controller can be switched on and off with another 1-bit object.

8-bit objects
You use a parameter in the "Functions, Objects" window to set whether the room mode should also be switched both via an 8-bit object and the current room mode be sent via an 8-bit status object. In each case, the following mode is assigned the following object values:
1 = Comfort mode
2 = Pre-comfort mode
3 = Energy-saving mode
4 = Protection mode.
If a telegram with a value other than 1...4 or with a mode value that is not available at the controller is received via this 8-bit object, then the telegram is discarded as invalid.
Another parameter in the "Functions, Objects" window sets whether an 8-bit "Controller mode" object should be available on older controllers for compatibility reasons. Both the room mode and the controller mode can be changed and polled via this object. The individual bits of this 8-bit object have the following meanings:

Bit 0: 1 = Comfort mode ON
Bit 1: 1 = Pre-comfort mode ON
Bit 2: 1 = Energy-saving mode ON
Bit 3: 1 = Protection mode ON
Bit 4: 1 = Dew point alarm
Bit 5: 1 = Heating mode, 0 = Cooling mode
Bit 6: 1 = Controller OFF, 0 = Controller ON
Bit 7: 1 = Frost/Heating alarm:

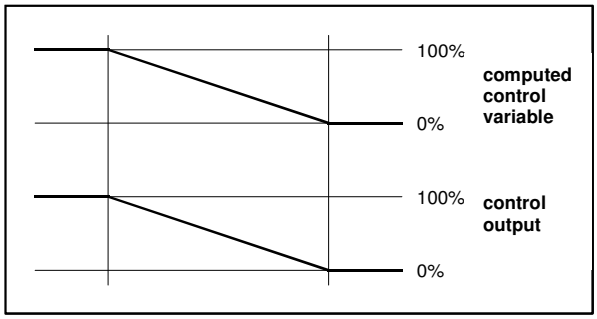
The following table explains which bit combination corresponds to which operating state.

	Bit number							
Operating state	7	6	5	4	3	2	1	0
Heating, Comfort mode	0	**1**	**1**	0	0	0	0	**1**
Heating, Pre-comfort mode	0	**1**	**1**	0	0	0	**1**	0
Heating, Energy-saving mode	0	**1**	**1**	0	0	**1**	0	0
Heating, Protection mode	0	**1**	**1**	0	**1**	0	0	0
Frost alarm	**1**	**1**	**1**	x	x	x	x	x
Cooling, Comfort mode	0	**1**	**0**	0	0	0	0	**1**
Cooling, Pre-comfort mode	0	**1**	**0**	0	0	0	**1**	0
Cooling, Energy-saving mode	0	**1**	**0**	0	0	**1**	0	0
Cooling, Protection mode	0	**1**	**0**	0	**1**	0	0	0
Heat alarm	**1**	**1**	**0**	x	x	x	x	x
Dew point alarm	x	**1**	**0**	**1**	x	x	x	x
Controller Off	0	**0**	0	0	0	0	0	0

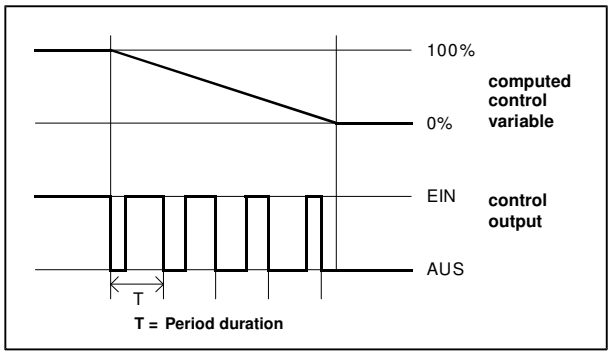
0705 CO Room Temperature Controller H+C 803001

3.7. Control value output

In a constant PI controller, you can vary whether the control value for heating or cooling is restricted to an upper and/or lower threshold (see picture 4) and whether it should be output normally or inverted (in which case, the inverted output corresponds to a sense reversal of the parameter; the inverted output is, say, needed for thermal drives that are open in the unpowered state) (see pictures 5 and 6). You can vary the percentage of the computed control output from which the control value output goes to "ON" or to "OFF" (see pictures 7 and 8). You can also vary whether the parameter must be transferred as a constant percentage value (see picture 2) or as an ON/OFF command.
When outputting On/Off commands, the control parameter is converted into PWM switching commands (see picture 3). The cycle time needed for this changeover (period T) is variable.

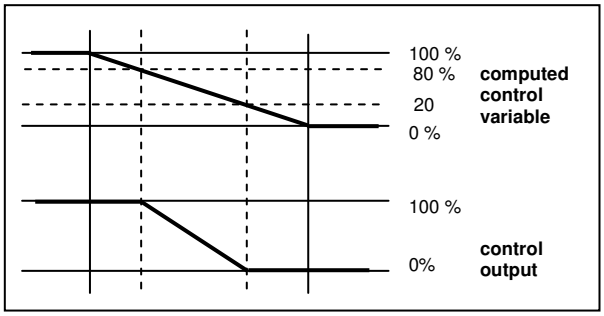


Picture 2: Constant control value output



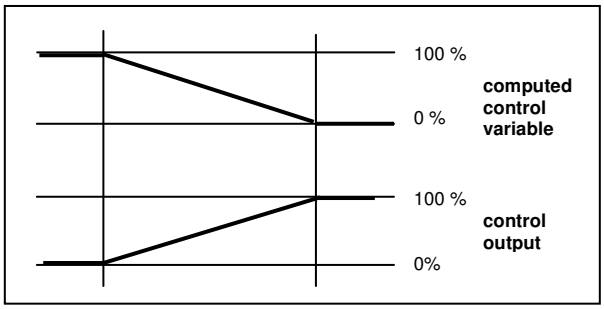
Picture 3: Switching control value output

Example:
Maximum control variable: 80%
Minimum control variable: 20%



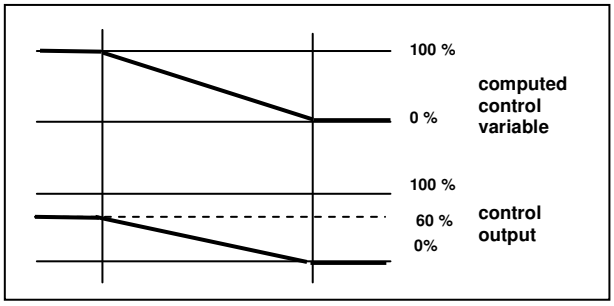
Picture 4: Max. and min. control variable settings

Example:
Control variable direction/scaling: -100% (inverted)



Picture 5: direction/scaling setting control variable: -100% (inverted)

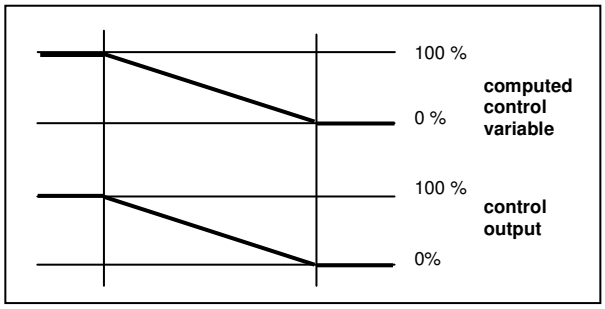
Example:
Control variable direction/scaling: 60%



Picture 6: direction/scaling setting control variable: 60%

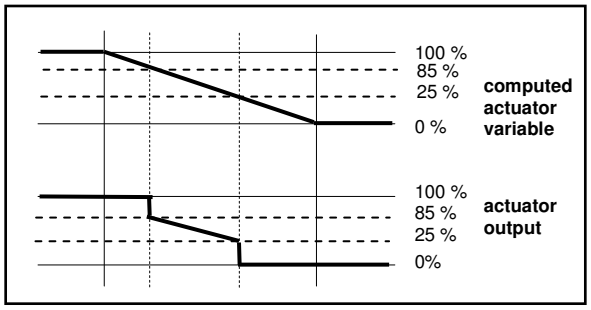
0705 CO Room Temperature Controller H+C 803001

Example:
Valve open completely over: 100%
Valve closed completely below: 1%



Picture 7: Valve open completely over 100%/: closed below 1%

Example:
Valve open completely over: 85%
Valve closed completely below: 25%

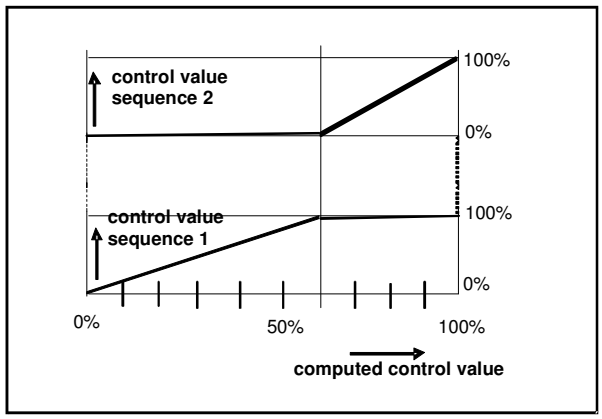


Picture 8: Valve open completely over 85% closed below 25%

3.8. Sequential control

If a room can be heated in two different ways (e.g. with underfloor and radiator heating), then it is recommended that both heat sources are not controlled by the thermostat in parallel, but in series, i.e. sequentially. If the room temperature is below the nominal value, then the underfloor heating valve is opened first. If this is fully open and it is still not warm enough, then the radiator valve is also opened. However, if it is too warm in the room, the radiator valve is closed gradually first and only then is the underfloor heating valve closed.

With the controllers, you can vary whether the heating and/or cooling should be controlled sequentially or not. If control is sequential, then the "internal" parameter computed by the controller is converted to two output values (sequence 1 parameter and sequence 2 parameter). In this case, you can set from which internal parameter sequence 2 begins (see picture 9).



Picture 9: Parameters for sequential control

3.9. Behavior after downloading/bus voltage restoration

After a download of the application program or of addresses and parameters, the controller is switched on and the room mode set in the "Room Mode" window via the "Room Mode" parameter activated.
If there is a bus voltage failure, the controller status and the room mode then extant are saved automatically. If the controller was switched off at the time of a bus voltage failure, then it also remains switched off after the bus voltage is restored. Whether the room mode extant at the time of the bus voltage failure is reproduced on its restoration depends on the chosen parameter settings.

0705 CO Room Temperature Controller H+C 803001

4. Communication objects

Maximum number of group addresses: 250
Maximum number of assignments: 250

Note

Number and type of available communication objects may vary, depending on the parameter settings.

Obj	Object name	Function	Type	Flag
0	Temperature, actual value internal sensor (C°)	send	2 Byte	CRTU
1	Temperature, actual value ext. sensor (C°)	receive/send	2 Byte	CRWTU
2	Temperature, actual value int. + ext. sensor (C°)	send	2 Byte	CRTU
3	Base setpoint (C°)	receive/send	2 Byte	CRWTU
4	Setpoint adjustment (Kelvin)	send	2 Byte	CRTU
5	Temperature, setpoint value (C°)	send	2 Byte	CRTU
6	Comfort mode	On/Off	1 bit	CRWTU
7	Pre-comfort mode	On/Off	1 bit	CRWTU
8	Economy mode	On/Off	1 bit	CRWTU
9	Protection mode	On/Off	1 bit	CRWTU
10	Permanent protection mode	On/Off	1 bit	CRWTU
11	Automatic	On/Off	1 bit	CRWTU
12	Thermostat	On/Off	1 bit	CRWTU
13	Heating / cooling	1 = Heating, 0 = Cooling	1 bit	CRWTU
14	Frost alarm	On/Off	1 bit	CRTU
15	Heat alarm	On/Off	1 bit	CRTU
16	Dew point alarm	On/Off	1 bit	CRWTU
17	Window 1	1=Up/0=Down	1 bit	CRWTU
18	Window 2	1=Up/0=Down	1 bit	CRWTU
19	Window 3	1=Up/0=Down	1 bit	CRWTU
20	Window 4	1=Up/0=Down	1 bit	CRWTU
21	Presence	On/Off	1 bit	CRWTU
22	Status extended comfort mode	On/Off	1 bit	CRTU
23	Room mode	1 ... 4	1 Byte	CWTU
24	Status room mode	1 ... 4	1 Byte	CRT
25	Controller-Status (Eberle)	8-bit status	1 Byte	CRWTU
26	Controller-Status (RHCC)	16-bit status	2 Byte	CRWTU
27	Heating / cooling, control value switching	On/Off	1 bit	CRT
27	Heating / cooling, control value continuous	0...100%	1 Byte	CRT
27	Heating, control value switching	On/Off	1 bit	CRT
27	Heating, control value continuous	0...100%	1 Byte	CRT
28	Heating, control value sequence 2	0...100%	1 Byte	CRT
29	Cooling, control value switching	On/Off	1 bit	CRT
29	Cooling, control value continuous	0...100%	1 Byte	CRT
30	Cooling, control value sequence 2	0...100%	1 Byte	CRT

Obj	Object name	Function	Type	Flag
0	Temperature, actual value internal sensor (C°)	send	2 Byte	CRTU
This object contains the current temperature actual value, which is measured via the sensor integrated with the controller. The measured value can be corrected (calibrated) as required via a configurable offset.				
1	Temperature, actual value ext. sensor (C°)	receive/send	2 Byte	CRWTU
This object is available only if the "External Temperature Sensor" parameter in the "Temperature, Actual Value" window is set to "Yes". This contains the current actual temperature value for the external sensor. The received value can be corrected (calibrated) as required via a configurable offset. Read telegrams are also sent to the external temperature sensor via this object, in order that its current value can be returned to said object. After a bus voltage failure, the value set in the parameter "Basic nominal and actual external sensor values on restart" in the "Room Mode" window is used. The default setting is 22C°.				
2	Temperature, actual value int. + ext. sensor (C°)	send	2 Byte	CRTU
This object is available only if the parameter "External Temperature Sensor" in the "Temperature, Actual Value" window is set to "Yes". It contains the current temperature actual value for the controller. This value is computed from the values measured by the internal and external sensors and sent with a change automatically, if need be taking into account the configured weighting.				
3	Base setpoint (C°)	receive/send	2 Byte	CRWTU
This object is available only if the parameter "Nominal Value Setting" in the "Functions, Objects" window is set to "above nominal value shift". This object reads the basic nominal value and changes it via the bus by means of a telegram. After a bus voltage failure, the value set in the parameter "Basic nominal and actual external sensor values on restart" in the "Room Mode" window is used. The default setting is 22C°. If a value was received from the relevant communication object before the bus voltage failure, this value is used.				

0705 CO Room Temperature Controller H+C 803001

4	Setpoint adjustment	send	2 Byte	CRTU
This object is available only if the parameter "Nominal Value Setting" in the "Functions, Objects" window is set to "above nominal value shift". This object sends any change to the nominal value shift (in degrees Kelvin) If "Protection Mode" is active, nominal value shift does not work. In this case, there are fixed nominal values stored for In heating and cooling respectively.				
5	Temperature, setpoint value (C°)	send	2 Byte	CRTU
This object contains the current room temperature nominal value, which is computed taking into account the basic nominal value, mode and shift as required or directly from the control wheel.				
6	Comfort mode	On/Off	1 bit	CRWTU
This object switches the "Comfort" room mode on via the bus. If an ON telegram is received, "Comfort Mode" is switched on and the earlier active mode switched off automatically.				
7	Pre-comfort mode	On/Off	1 bit	CRWTU
This object is available only if the controller can activate 4 room modes. This object switches on "Pre-comfort mode" (formerly: Standby mode) via the bus. If an ON telegram is received, "Pre-comfort Mode" is switched on and the earlier active mode switched off automatically.				
8	Economy mode	On/Off	1 bit	CRWTU
This object is available only if the controller can activate 3 or 4 room modes. This object switches on "Energy-saving mode" (formerly: Night mode) via the bus. If an ON telegram is received, "Energy-saving Mode" is switched on and the earlier active mode switched off automatically.				
9	Protection mode	On/Off	1 bit	CRWTU
This object switches "Protection Mode" (frost/heating protection) on via the bus. If an ON telegram is received, "Protection Mode" is switched on and the earlier active mode switched off automatically.				
10	Permanent Protection Mode	On/Off	1 bit	CRWTU
This object is available only if the parameter "Permanent Protection Mode Object" in the "Functions, Objects" window is set to "Yes". This object switches the controller permanently into "Protection Mode" (Frost/Heat protection) (e.g. if you are away on holiday for a long time). It cannot then be switched into a different mode by any other mode object from a time schedule, a timer or a presence detector. On receiving an ON telegram, "Permanent Protection Mode" is switched on. On receiving an OFF telegram, "Permanent Protection Mode" is switched off.				

11	Automatic	On/Off	1 bit	CRWTU
This object indicates whether the controller is in automatic or manual mode. You also use this object to switch into automatic mode. Automatic mode is switched on with receipt of an ON telegram. Reception of an OFF telegram is not analyzed.				
12	Thermostat	On/Off	1 bit	CRWTU
This object switches the controller on and off. If the controller is set to "Heating and Cooling", then both controllers are switched on and off together.				
13	Heating/Cooling	1 = Heating, 0 = Cooling	1 bit	CRWTU
This object indicates whether the controller is in heating mode or in cooling mode. If the status changes, it is sent automatically. In 2-wire systems, this object toggles the controller between heating and cooling operation via the bus.				
14	Frost alarm	On/Off	1 bit	CRTU
If the measures temperature falls below the frost alarm threshold, "Frost alarm = ON" is sent automatically.				
15	Heat alarm	On/Off	1 bit	CRTU
If the measured temperature exceeds the heat alarm threshold, "Heat alarm = ON" is sent automatically.				
16	Dew point alarm	On/Off	1 bit	CRWTU
In cooling mode, this object receives a dew point alarm sent by a dew point monitor and indicates it via the corresponding LED. A received dew point alarm switches the controller to "Dew point Mode" and closes the cooling valve while the dew point alarm is present.				
17	Window 1	1 = open / 0 = close	1 bit	CRWTU
This object is available only if the parameter "Permanent Protection Mode Object" in the "Functions, Objects" window is set to "Yes". The Presence detector status is received via this object. If the object value = "1" (Window open), the room thermostat switches to "Protection Mode" and remains in this mode as long as the object value is = "1" for one of the window objects.				
18	Window 2	1 = open / 0 = close	1 bit	CRWTU
This object is available only if the parameter "Permanent Protection Mode Object" in the "Functions, Objects" window is set at least to "2". The Window 2 status is received via this object. If the object value = "1" (Window open), the room thermostat switches to "Protection Mode" and remains in this mode as long as the object value is = "1" for one of the window objects.				
19	Window 3	1 = open / 0 = close	1 bit	CRWTU
This object is available only if the parameter "Permanent Protection Mode Object" in the "Functions, Objects" window is set at least to "3". The Window 3 status is received via this object. If the object value = "1" (Window open), the room thermostat switches to "Protection Mode" and remains in this mode as long as the object value is = "1" for one of the window objects.				

0705 CO Room Temperature Controller H+C 803001

20	Window 4	1 = open /0 = close	1 bit	CRWTU
This object is available only if the parameter "Permanent Protection Mode Object" in the window "Functions, Objects" parameter is set to "4". The Window 4 status is received via this object. If the object value = "1" (Window open), the room thermostat switches to "Protection Mode" and remains in this mode as long as the object value is = "1" for one of the window objects.				
21	Presence	On/Off	1 bit	CRWTU
This object is available only if the parameter "Presence Object" in the "Functions, Objects" window is set to "Yes". If this object is available, then the controller does **not** respond to being tapped. If a telegram with the object value "1" is received via this object, then "Comfort Mode" is switched on and remains switched on until a telegram with the object value "0" is received via this object. The mode which is switched in when "Presence=OFF" is determined by the number or modes that the controller can activate. A telegram received via the bus during "Presence=ON" to switch the mode to Energy Saving or "Protection Mode" is buffered and executed only when "Presence=OFF". If one or more windows are opened during "Presence=ON", then the controller switches to "Protection Mode" for as long as at least one window is open.				
22	Status extended comfort mode	On/Off	1 bit	CRTU
This object is available only if the parameter "Object Status Comfort Extension" in the "Room Mode" window is set to "Yes". The controller reports via this object that "Comfort extension" mode has been switched on or off.				
23	Room mode	1 ... 4	1 Byte	CWTU
This object is available only if the parameter "8-bit object room mode/Objects" in the window "Functions, Objects" parameter is set to "Yes". This object changes the room mode independently of the received value. The following classifications apply: 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protection mode. If a telegram with a value other than 1...4 or with a mode value that is not available at the controller is received via this 8-bit object, then the telegram is discarded as invalid.				
24	Status room mode	1 ... 4	1 Byte	CRT
This object is available only if the parameter "8-bit object room mode/Objects" in the window "Functions, Objects" parameter is set to "Yes". This object reports the current room mode after a room mode change. The following classifications apply to the transferred value: 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protection mode.				

25	Controller status (Eberle)	8-bit status	1 Byte	CRWTU
This object is available only if the parameter "8-bit object controller status (Eberle)" in the "Functions, Objects" window is set to "Yes". It contains the current controller status, which is sent automatically with status changes and can also be toggled via the room and controller modes. The individual bits have the following meanings: Bit 0: 1 = Comfort mode ON Bit 1: 1 = Pre-comfort mode ON Bit 2: 1 = Energy-saving mode ON Bit 3: 1 = Protection mode ON Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller OFF, 0 = Controller ON Bit 7: 1 = Frost/Heating alarm (depending on value from bit 5)				
26	Controller status (RHCC)	16-bit status	2 Byte	CRWTU
This object is available only if the parameter "16-bit object controller status (RHCC)" in the "Functions, Objects" window is set to "Yes". It contains the current controller status, which is sent automatically with status changes and can also be toggled via the room and controller modes. The individual bits have the following meanings: Bit 7: 1 = Heating mode disabled Bit 8: 1 = Heating mode, 0 = Cooling mode Bit 11: 1 = Cooling mode disabled Bit 12: 1 = Dew point alarm Bit 13: 1 = Frost alarm Bit 14: 1 = Heat alarm Bits: 0, 1, 2, 3, 4, 5, 6, 9, 10 and 15 are locked to the value = 1. *Note:* *Behavior as in KNX manual description, DPT 22.101.*				
27	Heating/Cooling, control value switching	On/Off	1 bit	CRT
This object is available only if the parameter "Operating mode controller" in the "Operating mode controller" window is set to "Heating + Cooling", parameter “Control value output” is set to “on common object” and the parameter “Type of control value output” in the “Heating / cooling, valve” window is set to “switching (1-bit)”. This object then sends the control parameter as an On/Off switching command in both heating and cooling modes.				

0705 CO Room Temperature Controller H+C 803001

27	Heating/Cooling, control value continuous	0...100%	1 Byte	CRT
This object is available only if the parameter "Operating mode controller" in the "Operating mode controller" window is set to "Heating + Cooling", parameter “Control value output” is set to “on common object” and the parameter “Type of control value output” in the “Heating / cooling, valve” window is set to “continuous (8-bit)”. This object then sends the control parameter as a percentage value in both heating and cooling modes.				
27	Heating, control value switching	On/Off	1 bit	CRT
This object is available only if the parameter set to "Heating" in the "Operating mode controller" window and the “Type of control value output” in the “Heating, valve” window is set to “switching (1-bit)”. This object then sends the control parameter as an On/Off switching command in heating mode.				
27	Heating, control value continuous	0...100%	1 Byte	CRT
This object is available only if the parameter set to "Heating" in the "Operating mode controller" window and the “Type of control value output” in the “Heating, valve” window is set to “continuous (8-bit)”. In heating mode with PI control, this object sends the control parameter as a percentage value and in PI control with the sequential control, the controller's "internal" control value.				
28	Heating, control value sequence 2	0...100%	1 Byte	CRT
This object is available only if the parameter set to "Heating" or “Heating + cooling”, parameter is set to “PI - control” and the parameter “Sequence control” is set to “with sequence control” in the "Operating mode controller" window. In heating mode with sequential control, the control parameter for the second sequence is sent via this object as a percentage value				
29	Cooling, control value switching	On/Off	1 bit	CRT
This object is available only if the parameter set to "Cooling" in the "Operating mode controller" window and the “Type of control value output” in the “Cooling, valve” window is set to “switching (1-bit)”. This object then sends the control parameter as an On/Off switching command in cooling mode.				
29	Cooling, control value continuous	0...100%	1 Byte	CRT
This object is available only if the parameter set to "Cooling" in the "Operating mode controller" window and the “Type of control value output” in the “Cooling, valve” window is set to “continuous (8-bit)”. In cooling mode with PI control, this object sends the control parameter as a percentage value and in PI control with the sequential control, the controller's "internal" control value.				
30	Cooling, control value sequence 2	0...100%	1 Byte	CRT
This object is available only if the parameter set to "Cooling" or “Heating + cooling”, parameter is set to “PI - control” and the parameter “Sequence control” is set to “with sequence control” in the "Operating mode controller" window. In cooling mode with sequential control, the actuator variable for the second sequence is sent via this object as a percentage value.				

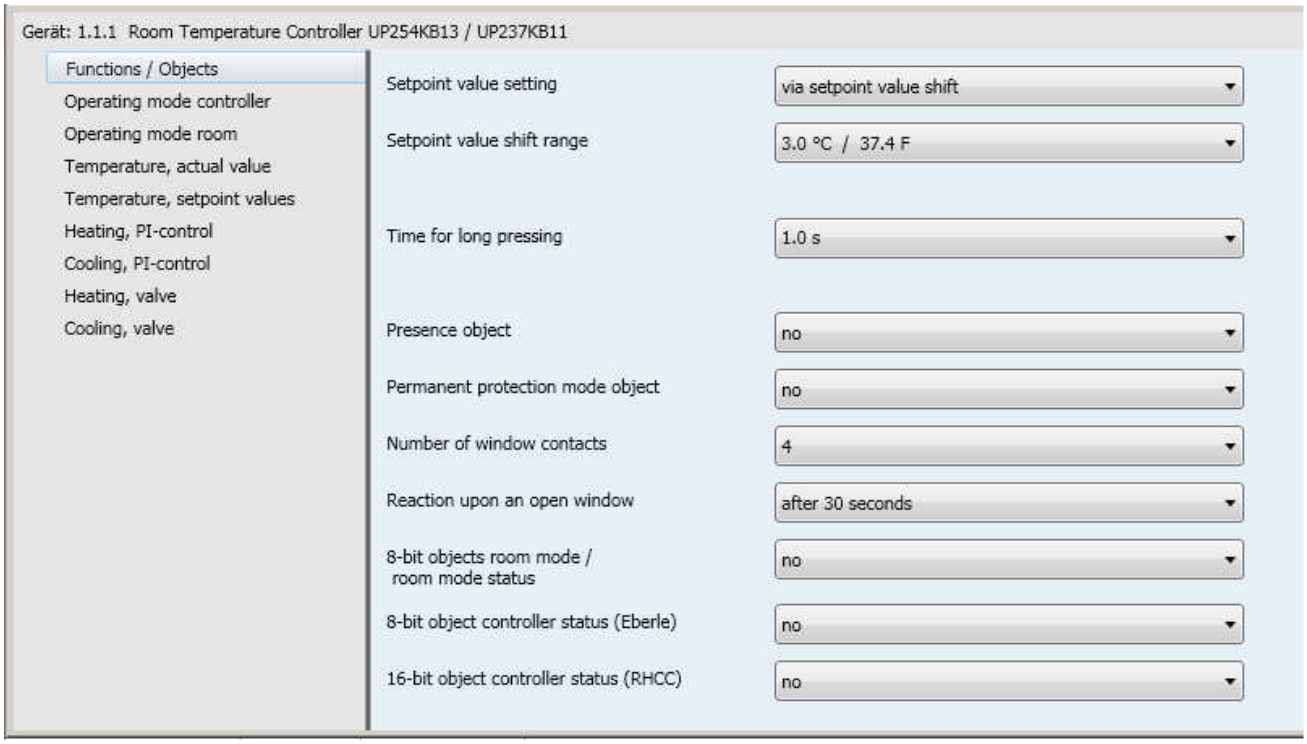
5. Parameter

Note

Number and description of the visible windows and parameters can vary, because they are controlled via the parameter settings. This is why another window can appear, if there is no space available for additional parameters owing to dynamic overlay effects in the first window.

0705 CO Room Temperature Controller H+C 803001

5.1. "Functions / Objects" parameter window



Parameter	Settings
Setpoint value setting	directly in C° **via setpoint value shift**
This parameter specifies whether the nominal room temperature control value should be adjustable in C° directly on the controller or whether the basic nominal value on the controller should be set movably to a lower or higher value. Note: Ensure that the correct control wheel for the chosen parameter setting is placed on the controller.	
Setpoint value shift range	±2.0ºK; **±3.0ºK**; ±4.0ºK; ±5.0ºK
This parameter is visible only if the previous parameter "Nominal value setting" is set to "Via nominal value shift". This parameter specifies by how many degrees Kelvin the basic nominal value can be shifted to a higher or lower temperature.	
Time for long pressing	0.5 seconds 0.75 seconds **1.0 seconds**
This parameter determines the point from which pressing the key is assessed as "holding down".	

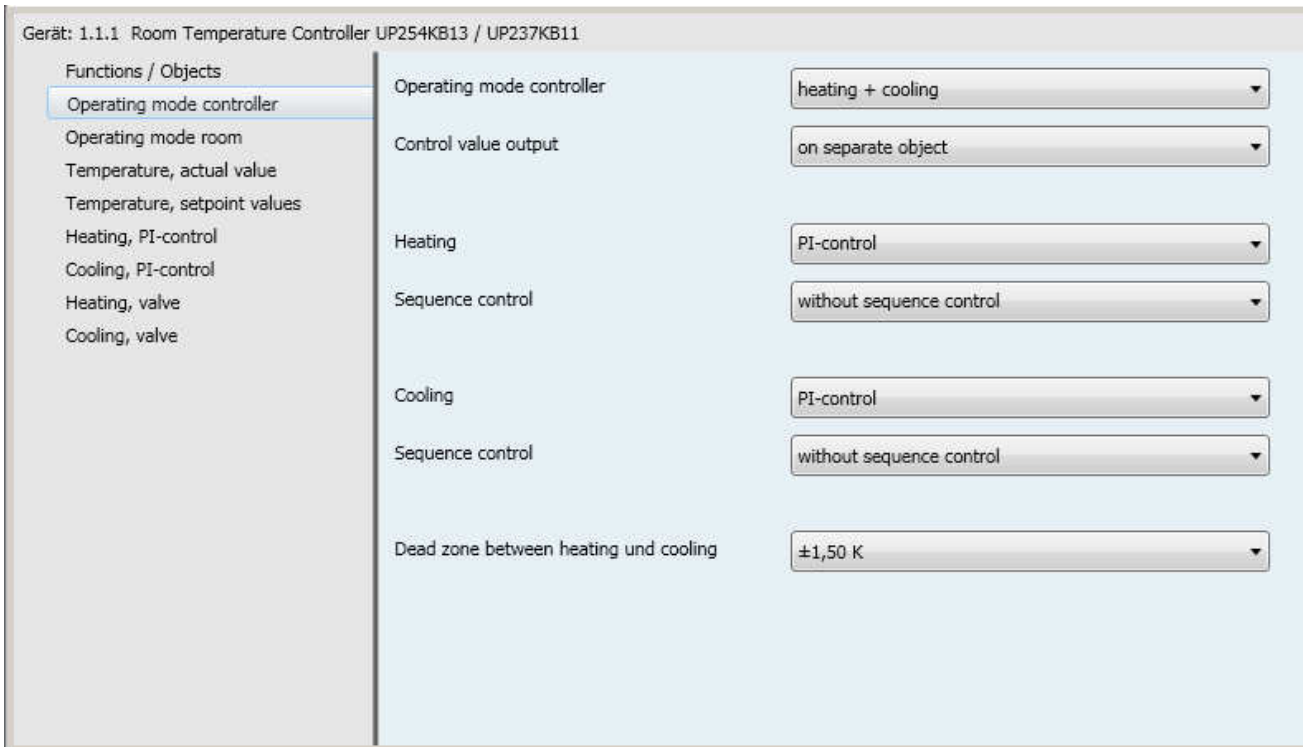
Parameter	Settings
Presence object	**no** yes
This specifies whether the "Presence" communication object should be added or not.	
Permanent protection mode object	**no** yes
This specifies whether the "Permanent Protection Mode" communication object should be added, through which the controller can be switched permanently to room "Protection Mode".	
Number of window contacts	**0**; 1; 2; 3; 4
This parameter specifies how many windows and doors with a window contact the room contains. The relevant number of "Window Contact" communication objects, whose status is linked logically in the controller via an OR function, is then added.	
Reaction upon an open window	Immediately **after 30 seconds**

0705 CO Room Temperature Controller H+C 803001

Parameter	Settings
This parameter is visible only if the previous parameter "Number of window contacts" is not set to "0". This parameter specifies the time intervals for analyzing the window status. The "Window open" state means that the nominal room temperature value, depending on the setting, is set either immediately or only after 30 seconds to the frost protection value in heating mode and in cooling mode to the heating protection value and protection mode is activated.	
8-bit objects room mode / room mode status	**no** yes
This specifies whether the two communication objects "Room mode" and "Room mode status" should be added. The value transferred with this object is used to set the room mode and to report the current room mode. The following classifications apply to this: 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protection mode.	
8-bit object controller status (Eberle)	**no** yes
This specifies whether the "Controller status (Eberle)" communication object should be added. You use this object to set the controller and room mode or to report its status. The following classifications apply to this: Bit 0: 1 = Comfort mode ON Bit 1: 1 = Pre-comfort mode ON Bit 2: 1 = Energy-saving mode ON Bit 3: 1 = Protection mode ON Bit 4: 1 = Dew point alarm ON Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller OFF, 0 = Controller ON Bit 7: 1 = Frost/Heating alarm ON (based on value from bit 5)	
16-bit object controller status (RHCC)	**no** yes
This specifies whether the "Controller status (RHCC)" communication object should be added. You use this object to set the controller and room mode or to report its status. The following classifications apply to this: Bit 7: 1 = Heating mode disabled Bit 8: 1 = Heating mode, 0 = Cooling mode Bit 11: 1 = Cooling mode disabled Bit 12: 1 = Dew point alarm Bit 13: 1 = Frost alarm Bit 14: 1 = Heat alarm Bits: 0, 1, 2, 3, 4, 5, 6, 9, 10 and 15 are locked to the value = 1.	

0705 CO Room Temperature Controller H+C 803001

5.2. "Operating mode controller" parameter window

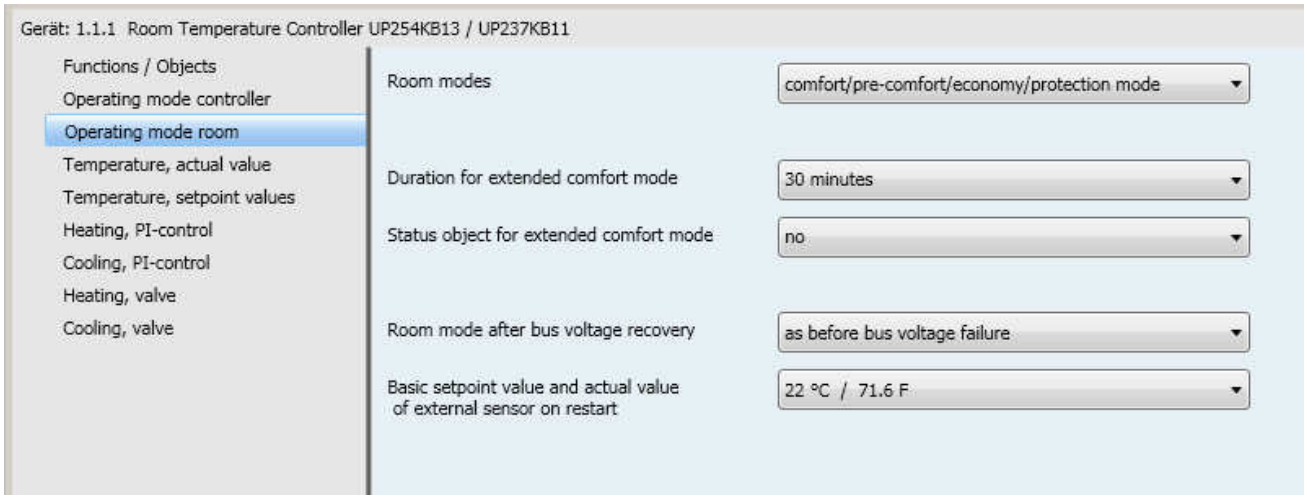


Parameter	Settings
Operating mode controller	heating; cooling; **heating + cooling;**
This specifies whether the controller is used for both heating and cooling or only for heating or only for cooling.	
Control value output	on common object; **on separate object**
This parameter is visible only if heating + cooling is selected. This parameter specifies whether the actuator variable output is placed on a common or separate object.	
Heating	with two level control; **PI control;**
This specifies how the heating is to be controlled.	
Sequence control	**without sequence control** with sequence control
This parameter is visible only if PI control is selected. This specifies whether sequential control is active during heating.	

Parameter	Settings
Cooling	with two level control; **PI control;**
This specifies how the cooling is to be controlled.	
Sequence control	**without sequence control** with sequence control
This parameter is visible only if PI control is selected. This specifies whether sequential control is active during cooling.	
Dead zone between heating and cooling	±0.25ºK; ±0.5ºK; ±0.75ºK; ±1.0ºK; **±1.5ºK**;
This parameter is visible only if the room is both heated and cooled. This parameter sets the dead zone between heating and cooling. The dead zone is half above and half below the nominal value for comfort mode respectively. First, it should prevent constant switching between heating and cooling modes for minor temperature fluctuations. Second, it contributes to energy saving: as long as the room temperature is inside the dead zone, the room is neither heated nor cooled.	

0705 CO Room Temperature Controller H+C 803001

5.3. "Operating mode room" parameter window

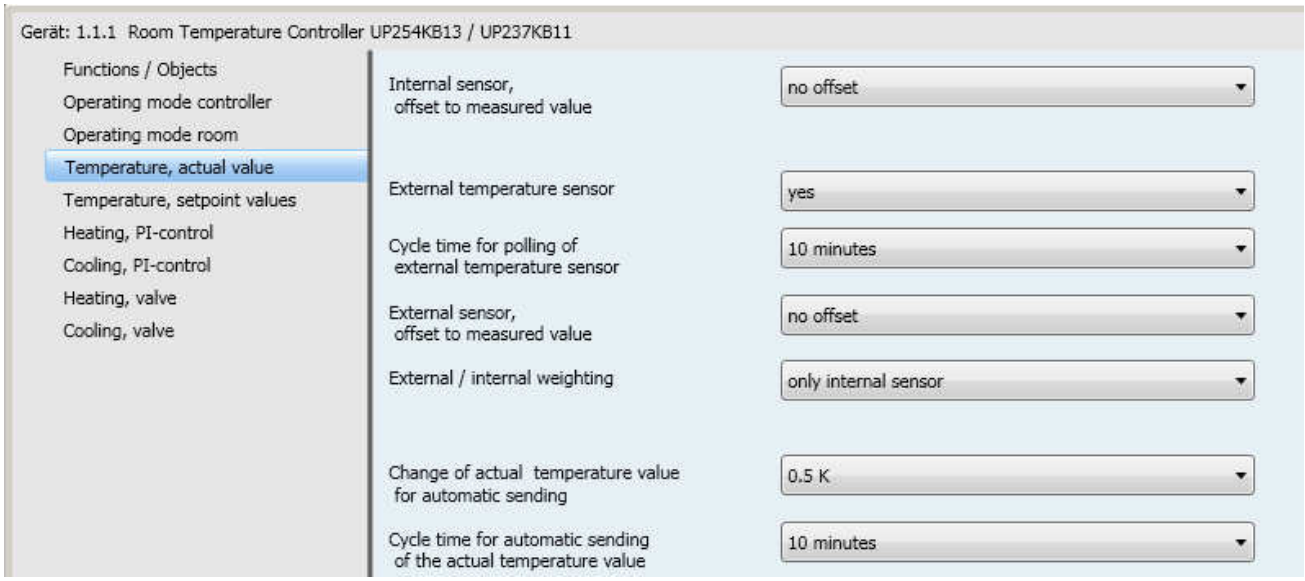


Parameter	Settings
Room modes	comfort/protection modes; comfort/economy/protection mode **comfort/pre-comfort/ economy/protection mode**
This parameter specifies between which room modes there should be a distinction for room temperature control.	
Duration for extended comfort mode	10; 15; 20; **30;** 45; 60; 90; 120 minutes
The comfort extension duration equals the value chosen here. If "Energy-saving mode" or "Protection mode" is activated and the key on the controller is then tapped, based then on the time set here, this changes from "Energy-saving mode" or "Protection mode" into "Comfort mode". After the set comfort extension time has ended, "Energy-saving mode" or "Protection mode" is reactivated. If the key is tapped again during a running comfort extension, the comfort energy time is restarted.	
Status object for extended comfort mode	**no** yes
This specifies whether the "Comfort extension status" communication object should be added. This object reports that the controller has been switched by a presence detector or its key from energy-saving mode to comfort mode or back from comfort mode to energy-saving mode.	
Room mode after bus voltage recovery	**as before bus voltage failure;** comfort mode; pre-comfort mode; energy-saving mode; protection mode

Parameter	Settings
This parameter specifies which room mode is activated automatically after bus voltage is restored. If "As before bus voltage failure" was selected, then the stored room mode is re-activated when the bus voltage is restored. The possible selection is dependent on the parameter "Room modes".	
Basic setpoint value and actual value of external sensor on restart	16C°, 17C°, 18C°, 19C°, 20C°, 21C°, **22C°**, 23C°, 24C°, 25C°, 26C°
This specifies which value must be used as basic nominal value and external measured value, in order that the program has meaningful start values immediately on restart (after download or bus voltage restoration). If the basic nominal value is changed by the corresponding object, then the saved value is accepted as the start value on bus voltage failure. Note: If the basic nominal value is not changed through the relevant object by telegram, then the basic nominal value set at this point also applies for normal operation of the controller	

0705 CO Room Temperature Controller H+C 803001

5.4. "Temperature, Actual Value" parameter window

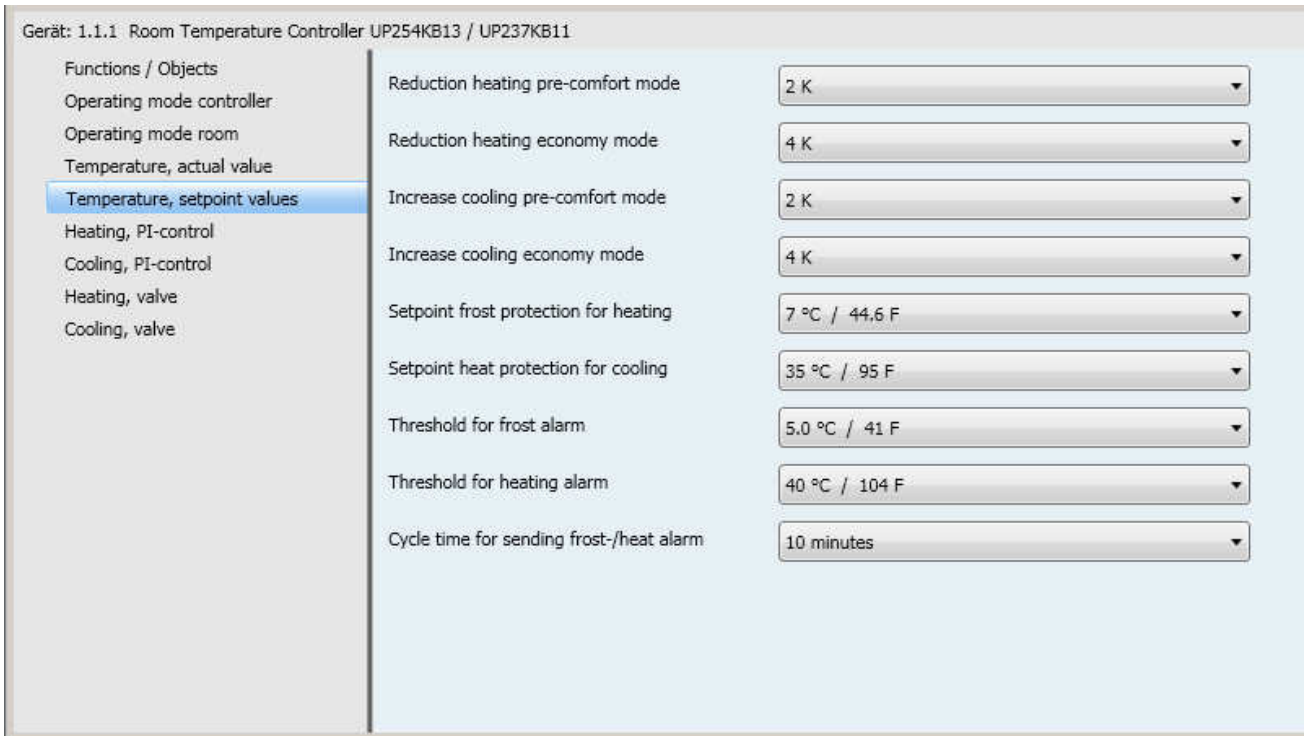


Parameter	Settings
Internal sensor, offset to measured value	10K... +0,1K; **no offset** -0,1K…-10,0K;
You use the offset to compensate or calibrate the measured value computed by the internal sensor for environmental factors (e.g. a cold wall).	
External temperature sensor	**no** yes
This specifies whether the room temperature is also measured at another point in the room. If this object is set to "Yes", then the communication object "Temperature/ Actual external sensor value" is added.	
Cycle time for polling of external temperature sensor	5; 6; 7; 8; 9; **10** ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 minutes; disabled
This parameter is visible only if the previous parameter "External temperature sensor" is set to "Yes". This specifies the time interval in which the external measured value should be polled.	
External sensor, offset to measured value	+10K... +0,1K; **no offset** -0,1K…-10,0K;
This parameter is visible only if the previous parameter "External temperature sensor" is set to "Yes". You use the offset to compensate or calibrate the measured value received by the external sensor for environmental factors (e.g. a cold wall).	

Parameter	Settings
External / internal weighting	only external sensor 90%/10% 80%/20% 70%/30% 60%/40% 50%/50% 40%/60% 30%/70% 20%/80% 10%/90% **only internal sensor**
This parameter is visible only if the previous parameter "External temperature sensor" is set to "Yes". This parameter specifies in what ratio (weighting) the measured values from the external and internal sensors are used to compute the current actual value. The first value corresponds to the external sensor weighting.	
Change of actual temperature value for automatic sending	0.1K; 0.2K ; 0.3K; 0.4K; **0.5K**; 0.6K; 0.7K; 0.8K; 0.9K; 1.0K; 1.2K; 1.5K; 1.8K; 2.0K; 2.5K; 3.0K; 3.5K; 4.0K; 4.5K; 5.0K; disabled
This specifies by how much the actual value should have changed for it to be resent automatically.	
Cycle time for automatic sending of the actual temperature value	5; 6; 7; 8; 9; **10** ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 minutes; disabled
This specifies the time interval at the end of which the actual value, as well as automatic sending on change, should be resent.	

0705 CO Room Temperature Controller H+C 803001

5.5. "Temperature, setpoint values" parameter window



Parameter	Settings
Reduction heating pre-comfort mode	1ºK; **2ºK**; 3ºK; 4ºK
This parameter is visible only if the controller can activate 4 room modes. This parameter specifies by what value the nominal room temperature value should be lowered, if there is a switch in heating mode from "Comfort Mode" to "Pre-comfort Mode".	
Reduction heating economy mode	1ºK; **2ºK**; 3ºK; 4ºK; 5ºK; 6ºK
This parameter is visible only if the controller can activate 3 or 4 room modes. This parameter specifies by what value the nominal room temperature value should be lowered, compared with the nominal value in "Comfort Mode", if there is a switch to "Energy-saving Mode".	
Increase cooling pre-comfort mode	1ºK; **2ºK**; 3ºK; 4ºK
This parameter is visible only if the controller can activate 4 room modes. This parameter specifies by what value the nominal room temperature value should be raised, if there is a switch in cooling mode from "Comfort Mode" to "Pre-comfort Mode".	
Increase cooling economy mode	1ºK; **2ºK**; 3ºK; 4ºK; 5ºK; 6ºK

Parameter	Settings
This parameter is visible only if the controller can activate 3 or 4 room modes. This parameter specifies by what value the nominal room temperature value should be raised, compared with the nominal value in "Comfort Mode", if there is a switch to "Energy-saving Mode".	
Setpoint frost protection for heating	5°C; 6°C; **7°C**; 8°C; 9°C; 10°C
This parameter specifies the nominal value for frost protection mode. Frost protection mode is activated, for example, if the status "Window open" is received and the controller is in heating mode.	
Setpoint heat protection for cooling	30°C; 31°C; 32°C; 33°C; 34°C; **35°C**; 36°C; 37°C; 38°C; 39°C; 40°C
This parameter specifies the nominal value for "heat protection" mode. Heating protection mode is activated, for example, if the status "Window open" is received and the controller is in cooling mode.	
Threshold for frost alarm	not valid; 0°C. 0.5°C; 1.0°C; 1.5°C; 2.0°C; 2.5°C; 3.0°C; 3.5°C; 4.0°C; 4.5°C; **5.0°C**
The controller reports "Frost alarm" if the set temperature in this case is reached or falls below this level.	

0705 CO Room Temperature Controller H+C 803001

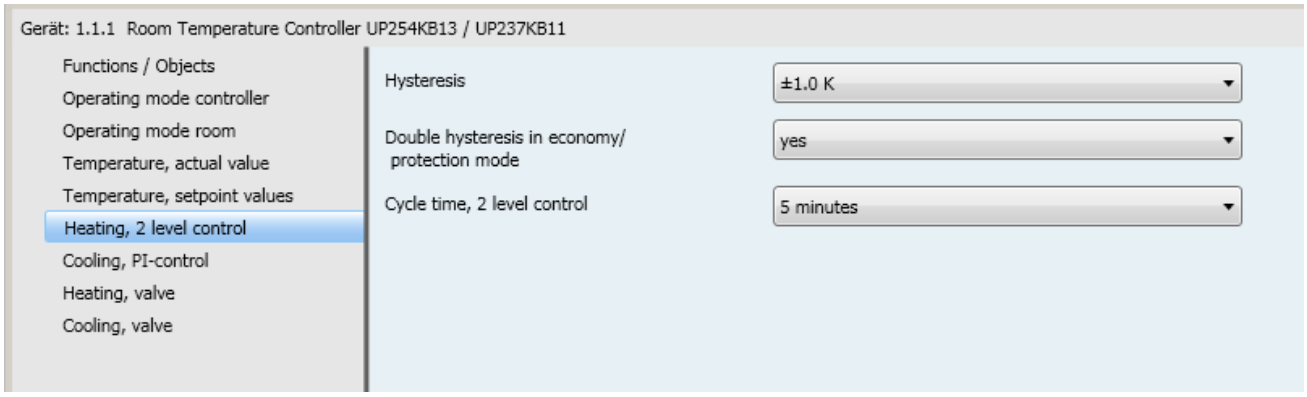
Parameter	Settings
Threshold for heating alarm	not valid; 35°C; 36°C; 37°C; 38°C; 39°C; **40°C**; 41C°; 42C°; 43C°; 44C°; 45C°
This parameter specifies from which temperature the controller reports "Heat alarm".	

Parameter	Settings
Cycle time for sending frost-/heat alarm	5; 6; 7; 8; 9; **10**; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 minutes; disabled
This determines the send interval time for both frost and heating alarms. In addition to automatic sending, this sends the "Frost alarm" object cyclically e.g. every 10 minutes.	

5.6. Heating, 2 level control

Note:

Parameters and function of the "Cooling, 2 level control window" are the same as those for this window.



Parameter	Settings
Hysteresis	+/-0.1K; +/-0.2K; +/-0.3K; +/-0.4K; +/-0.5K ; +/-0.6K; +/-0.7K; **+/-1.0K**; +/-1.2K; +/-1.5K; +/-1.7K; +/-2.0K; +/-2.2K; +/-2.5K;
In this case, the switching hysteresis of the two point controller is set for heating mode. The smaller the hysteresis is, the more precise must be compliance with the nominal room temperature value, and the switching frequency of the controller increased.	
Double hysteresis in economy / protection mode	no **yes**

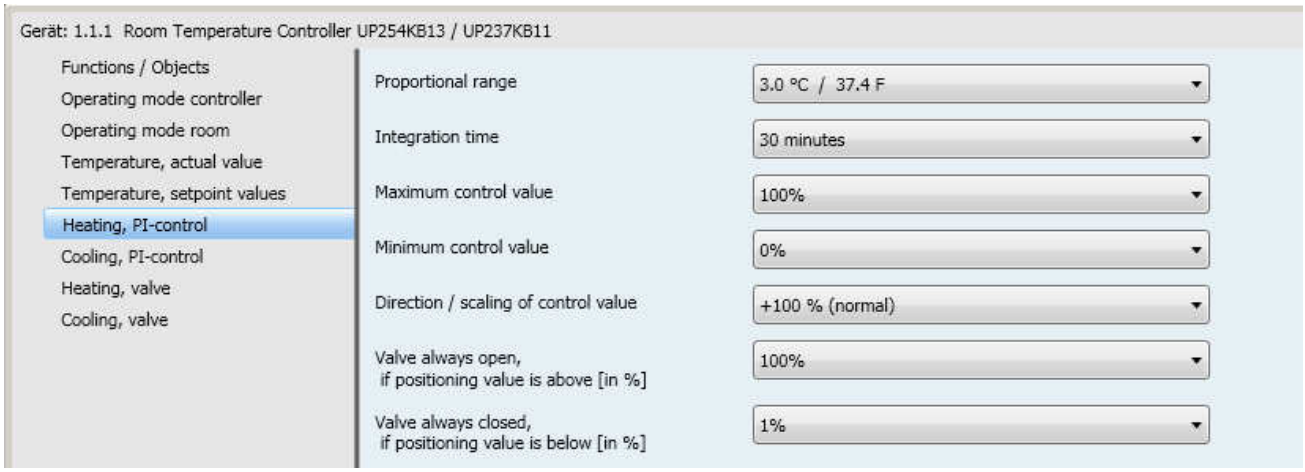
Parameter	Settings
With this, you can specify in energy-saving or frost protection mode, fluctuations (hysteresis) in room temperature of twice the size are allowed, in order to save additional heat energy. This applies only to two point control.	
Cycle time, 2 level control	0.5; 1; 2; 3; 4; **5**; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 minutes
This specifies the time interval, after which the two point controller is reactivated (i.e. the two-point control is implemented, for example, only every 5 minutes). Hysteresis and cycle time have an effect on how far the room temperature can deviate from its nominal value.	

0705 CO Room Temperature Controller H+C 803001

5.7. Heating, PI control

Note:

Parameters and function of the "Cooling / PI control window" are the same as those for this window.



Parameter	Settings
Proportional range	1.0 K; 1.1 K; 1.2 K; 1.3 K; 1.4 K; 1.5 K; 1.6 K; 1.7 K; 1.8 K; 2.0 K; 2.2 K; 2.5 K; **3.0 K**; 3.5 K; 4.0 K ; 4.5 K; 5.0 K;
This parameter sets the proportional range of the PI controller for heating mode. A proportional range of 3K means that a control deviation of 3K results in an actuator variable change of 100%.	
Integration time	1. 5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; **30;** 40; 50; 60; 90; 120 minutes
This parameter specifies the PI controller reset time for heating mode. A reset time of 30 minutes means that within this time the I-component equals the P-component.	
Maximum control value	0%; 1%; 2 %; 3%; 4%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; **100%** ;
This parameter can set an upper threshold for the heating actuator parameter. From this value onwards, the actuator variable output is set to 100%.	
Minimum control value	**0%** ; 1%; 2 %; 3%; 4%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%;

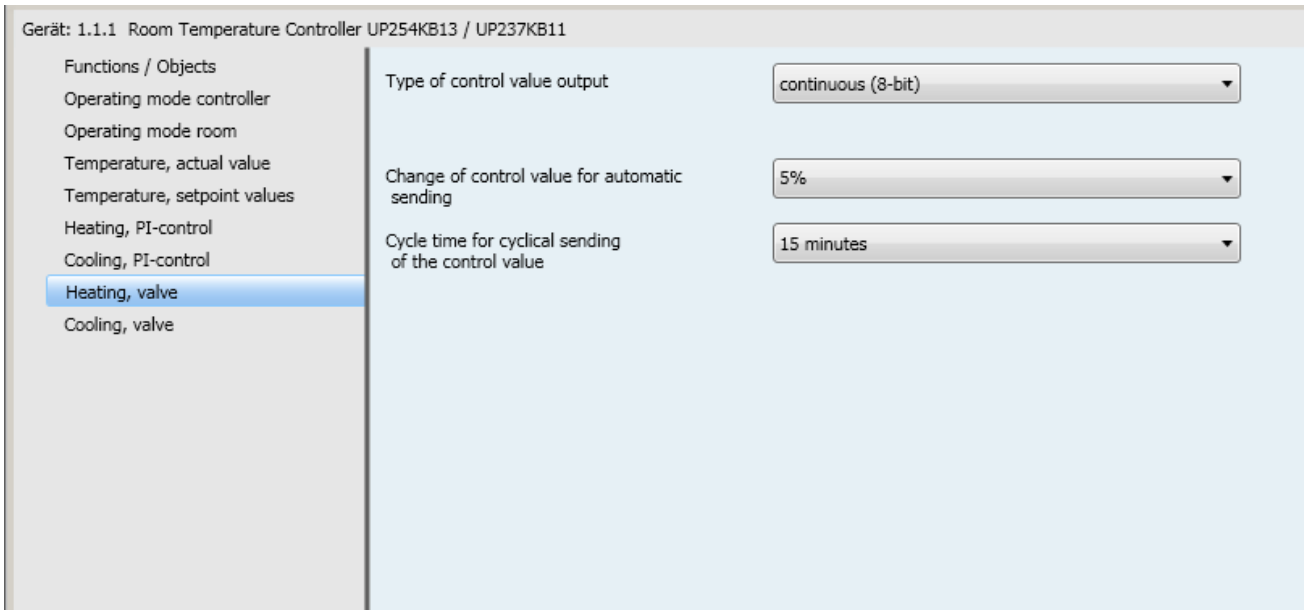
Parameter	Settings
This parameter can set a lower threshold for the computed heating actuator parameter. From this value onwards, the actuator variable output is set to 0%.	
Direction / scaling of control value	+1%...+95%; **+100% (normal);** -1%... -95%; -100% (inverted)
This parameter specifies in which form the actuator parameter should be output. In the setting "100% (normal)", the controller assumes that, with an actuator variable of +100%, the valve is open. However, if the valve is, say, closed at 100%, the sense of the actuator variable must be reversed (inverted). Reducing the percentage achieves a compression (scaling) of the actuator parameter. The setting is dependent on the type of valve or actuator used.	
Valve always open, if positioning value is above [in %]	40%; 50%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 98%; **100**%
This specifies from which actuator variable percentage its output is always at "ON". In order to reduce the switching frequency, the valve characteristics can be adapted for this purpose.	
Valve always closed, if positioning value is below [in %]	**1**% ; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%
This specifies up to which actuator variable percentage its output is always at "OFF". In order to reduce the switching frequency, the valve characteristics can be adapted for this purpose.	

0705 CO Room Temperature Controller H+C 803001

5.8. Heating, valve

Note:

Parameters and function of the "Cooling, valve" window are the same as those for this window.

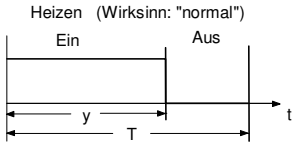


Parameter	Settings
Type of control value output	**continuous (8-bit)** switching (1-bit)
This parameter specifies whether the actuator variable is output via a 1-bit or an 8-bit object.	
Change of control value for automatic sending	1%; 2 %; 3%; 4%; **5%**; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%;
This parameter specifies from which control value change the heating control value should be sent automatically. This parameter is available only for a continuous control value output.	
Cycle time for cyclical sending of the control value	not valid; 5; 6; 7; 8; 9; 10; 12; **15**; 17; 20; 25; 30; 40; 50; 60; 90; 120 minutes
This specifies the time interval at the end of which the heating actuator variable, as well as automatic sending on change, should be resent. This parameter is available only for a constant actuator variable output.	

0705 CO Room Temperature Controller H+C 803001

Parameter	Settings
Pulse with modulation period time	1; 2; 3; 4; 5; 6; 7; 8; 9; **10**; 12; 15; 20; 25; 30 minutes

This parameter is visible only if the type of control value output has been configured to switching (1-bit).
This parameter specifies the pulse width modulation period for the switching control parameter output in heating mode. The control value also equals the key ratio (time ratio) between "ON (1)" and "OFF (0)" within a period.

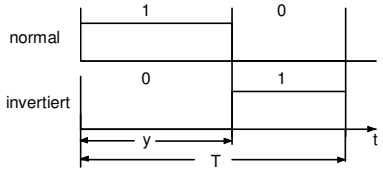


y: Actuator variable in % of period duration
T: Period of the actuator variable output

Note: With thermo-drives, you should note that the period is not chosen to be less than the sum of the thermo-drive heating up and cooling down times.

Direction of the control value	**normal;** inverted

This parameter is visible only if the type of control value output has been configured to switching (1-bit).
This parameter specifies in which form the actuator parameter should be output. In "normal" setting, the actuator parameter is output according to the computed actuator parameter. With the "inverted" setting, the actuator parameter sense is reversed.



T: Actuator variable output period
y: Computed actuator variable

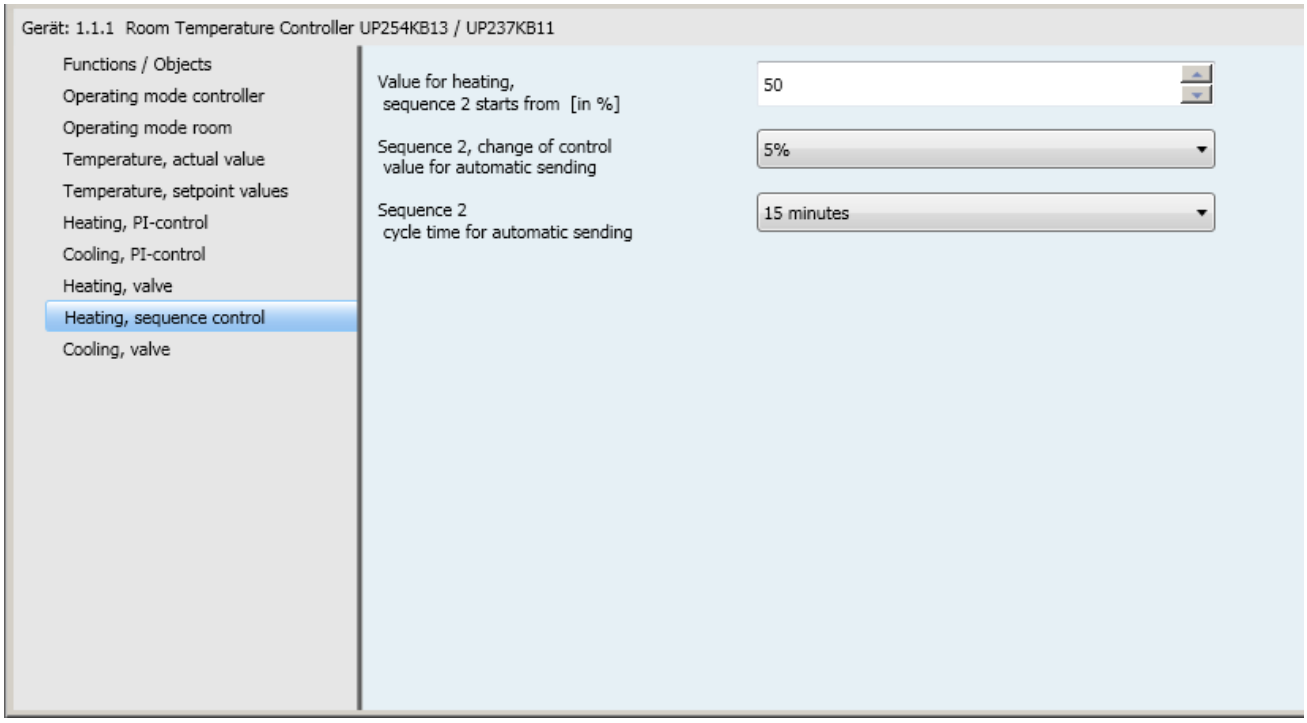
The setting for this parameter is dependent on the valve type used (whether open or closed when no flow) and the actuator.

0705 CO Room Temperature Controller H+C 803001

5.9. Heating, sequence control

Note:

Parameters and function of the "Cooling, sequence control" window are the same as those for this window.



Parameter	Settings
Value for heating, sequence 2 starts from [in %]	5...95 **50**
This parameter specifies from which computed heating control value output sequence 2 should begin.	
Sequence 2, change of control value for automatic sending	1% ; 2% 3%; 4%; **5%**; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%. 50%
This parameter specifies from which control value change the control value "Heating, control value sequence 2" should be sent.	
Sequence 2 cycle time for automatic sending	not valid; 5; 6; 7; 8; 9; 10; 12; **15**; 17; 20; 25; 30; 40; 50; 60; 90; 120 minutes
This specifies the time interval at the end of which the heating control value, as well as automatic sending on change, should be resent.	

Space for notes