12 S1 Temperature Control 210B04

Use of the application program

Product family: Heating, air conditioning, ventilation
Product type: Thermostat
Manufacturer: Siemens

Name: Temperature controller UP 237
DELTA i-system, titanium white
Order no.: 5WG1 237-2AB11

Name: Temperature controller UP 237
DELTA i-system, carbon metallic
Order no.: 5WG1 237-2AB21

Name: Temperature controller UP 237
DELTA i-system, aluminium metallic
Order no.: 5WG1 237-2AB31

Name: Temperature controller UP 252
DELTA profil, pearl grey
Order no.: 5WG1 252-2AB03

Name: Temperature controller UP 252
DELTA profil, titanium white
Order no.: 5WG1 252-2AB13

Name: Temperature controller UP 252
DELTA profil, anthracite
Order no.: 5WG1 252-2AB23

Name: Temperature controller UP 252
DELTA profil, silver
Order no.: 5WG1 252-2AB73

Name: Temperature controller UP 253
DELTA ambiente, arctic white
Order no.: 5WG1 253-2AB03

Name: Temperature controller UP 253
DELTA ambiente, cosmos grey
Order no.: 5WG1 253-2AB13

Name: Temperature controller UP 253
DELTA ambiente, royal blue
Order no.: 5WG1 253-2AB23

Name: Temperature controller UP 254
DELTA style,
titanium white / metallic silver
Order no.: 5WG1 254-2AB13

Name: Temperature controller UP 254
DELTA style,
basalt black / metallic silver
Order no.: 5WG1 254-2AB23

Contents

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1. Functional description

1.1. General

The temperature controller can be used as a two-level controller or a continuous controller (PI controller) for pure heating or cooling mode, for combined heating and cooling mode as well as two-level heating or cooling.
The application program compares the actual temperature measured by the temperature controller with the required setpoint temperature and calculates the associated control value.
This control value is then either transferred as a switching command (ON/OFF) to actuators (e.g. binary output UP 562) to control the electrothermal valve drives or as a positioning command (0-100%) to control the valve actuators.
The clear and self-explanatory operator interface contains 5 LEDs to display the current operating state, a presence button for toggling between comfort and standby mode as well as a rotary switch for adjusting the base setpoint value.
The functional description is structured according to the components of a control system:
- Closed loop control (controller)
- Operating modes
- Actual value
- Setpoint
- Control value output

1.2. Closed loop control

The closed loop control of the room temperature is carried out with a digital PI controller whose control function is mathematically reproduced by a PI algorithm i.e. an arithmetic process.
The properties of a PI controller are mainly determined by the proportional coefficient (KP) and the integration time (Tn). These two variables can be entered via the parameter window for closed loop control in a limited framework that is sufficient for the majority of applications. Since however a great deal of experience is required to set a controller, it is possible to set the type of heating or cooling instead of using the control parameters. The correct control parameters are then automatically assigned.
The controller can be used for pure heating mode, pure cooling mode, combined heating and cooling as well as for 2-level heating or cooling (see Diagrams 1 ... 3 in the chapter “Diagrams”).
For the function of heating and cooling, the controller is either in the heating or cooling mode. The control value of the inactive mode is switched to 0% (OFF). The toggling between heating and cooling can be carried out manually via the bus (communication object no. 4) or automatically.
When toggling is carried out automatically (adjustable), the parameter “Dead zone between heating and cooling” is taken into consideration.

Note:

The value selected for the dead zone between heating and cooling mode (see “Setpoint”) may not be too small as otherwise continuous toggling between heating and cooling could occur.

1.2.1. Controller status

The current controller status is stored in a byte and automatically sent via communication object no. 9 “Status” when the following events occur:

when switching on
on bus voltage recovery
after each change of the operating mode
when the status of the frost alarm bit changes

The controller status can also be read out manually.

1.2.2. Behaviour on voltage failure / commissioning / fault

Behaviour on bus voltage failure
On failure of the bus voltage, no actions are carried out by the controller. Continuous EIB valve drives maintain their position. The behaviour of switching valve drives (OPEN/CLOSED) can be set via the switch actuator.

Behaviour on bus voltage recovery
On bus voltage recovery, all the LEDs light up briefly one after the other. The controller then switches to standby mode and requests the current states of the communication objects after approx. 40 seconds. The requested operating mode is set and the current setpoint is determined.
The relevant control value is calculated from the current setpoint and the measured actual temperature and then issued.

Commissioning
The first time the controller is switched on, it behaves in the same way as on bus voltage recovery.

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Behaviour in the event of a fault
If a suitable application has not been loaded, the LEDs continue to light up one after the other in intervals of 5 seconds. If the upper three LEDs light up at the same time, data transmission to the bus is disrupted.

1.3. Operating modes

The controller has 5 basic operating modes. A unique "Setpoint" for heating and cooling is assigned to each of these modes. The states are displayed at the device via LEDs.

Comfort mode
In comfort mode, the room temperature is always regulated to the "current setpoint". This is a combination of the "base setpoint" and the "setpoint adjustment" of the setpoint by –5 to +5 Kelvin which can be set via the rotary switch on the front panel of the controller. The base setpoint is a communication object and can therefore be modified via the EIB during operation e.g. so that the setpoint of the room temperature can be adjusted in the summer depending on the external temperature (summertime compensation). As the base setpoint is stored in the EEPROM, it should only be changed once per day. (The service life of the EEPROM is approx. 10,000 write cycles).
The operating mode "Comfort" is indicated on the front panel of the controller by a green LED under the following pictogram:

If the presence button is pressed in this operating mode, the "Standby" mode is selected.
It is possible to switch at any time via a bus telegram from the "Comfort" mode to "Standby" or "Night/Holiday" mode. This type of bus telegram can be sent by a bus push button for controlling operating modes, a timer or a PC with visualisation software or a time program.
If a presence detector is installed in a room, a telegram for toggling to another operating mode only takes effect if the detector has reported "no presence". If required the telegram is stored temporarily in the controller.

Standby mode
In standby mode, the room temperature is lowered by e.g. 2°C (value can be set) for heating mode compared to the current setpoint for comfort mode or increased by approx. 2°C (value can be set) for cooling mode. On the one hand, energy is saved for short periods (several hours) when the room is not occupied and on the other hand, the reduction or increase by e.g. 2°C can be quickly corrected when the room is occupied again.
The "Standby" mode is indicated on the front panel of the controller by a green LED under the following pictogram:

If the presence button is pressed in this operating mode, the "Comfort" mode is selected.
It is possible to switch at any time via a bus telegram from the "Standby" mode to "Comfort" or "Night/Holiday" mode.
If a presence detector is installed in a room and presence is detected, the controller is switched to "Comfort" mode until presence is no longer detected.

Night mode
In "Night/Holiday" mode, the room temperature is lowered by e.g. 4°C (value can be set) for heating mode compared to the current setpoint for comfort mode or increased by e.g. 4°C (value can be set) for cooling mode. On the one hand, energy is saved for a long period (one night or several days) when the room is not in use and on the other hand, the room does not fall below the dew point threshold in heating mode.
The "Night/Holiday" mode is indicated on the front panel of the controller by a green LED under the following pictogram:

If the presence button is pressed in this operating mode, the controller switches to extended comfort mode for 30 minutes (interval can be set). After 30 minutes, the controller automatically reverts to "Night/Holiday" mode. This enables the central toggling of all controllers to "Night/Holiday" mode but enables people that wish to continue working to continually set the room to the comfort temperature for 30 minutes.
If a presence detector is installed in a room, the "Night/Holiday" mode is only selected if no presence has been detected.

Frost/heat protection
This is used to switch off the heating or cooling when a critical temperature is reached (the room is freezing or excessively hot).
The opening of a window that is monitored by a window contact leads to the controller switching to "Frost protection" while in heating mode or "Heat protection" while in cooling mode. In "Frost protection" mode, the setpoint of the room temperature is lowered to e.g.

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+ 7°C while the temperature is raised to e.g. + 35°C in "Heat protection" mode (values can be set). This reduction or increase of the setpoint causes the heating or cooling valve to close immediately. On the one hand, any waste of energy is prevented. On the other hand, it guarantees that the controller remains active and the room cannot become freezing or heat up.
The "Frost/heat protection" mode is indicated by a red LED on the front panel of the controller next to the following pictogram:

Pressing the presence button in this mode has no effect. Telegrams for toggling between operating modes also have no function. If the window is closed again, the controller automatically reverts to the set mode before the window was opened.
If several window contacts are to effect the same controller, they should either be connected electrically in series or linked logically via a logic module to a common "Frost/heat protection" object.
It is not possible to switch to "Frost/heat protection" either manually or via a time program as the opening and closing of a window could lead to the thermostat switching to another operating mode. If you wish to lower the temperature for a longer period in unoccupied rooms below the normal setpoint for night mode, you can modify the base setpoint for comfort mode accordingly and then switch to night mode.

Dew point mode
If cooling is carried out via a cooling ceiling and the dew point detector that is installed on the cooling ceiling is addressed, the thermostat switches to "Dew point mode" and closes the valve of the cooling ceiling for the duration of the dew point alarm.
The "Dew point mode" is indicated on the front panel of the thermostat by a yellow LED next to the following pictogram:

Pressing the presence button in this mode has no effect. Telegrams for toggling between operating modes also have no function.

Extended comfort mode
See "Night/Holiday" mode.

Anti-tamper protection
When activated, it is possible to prevent any interference via the operator interface.

1.4. Actual value

The actual temperature is recorded by the temperature controller via the integrated temperature sensor.
The measuring range, resolution and accuracy of the temperature measurement are given in the technical product information.
The actual temperature is automatically sent via communication object no. 6 "Actual temperature value" when the following events occur:
- when switching on
- on bus voltage recovery
- after each change in the actual temperature (e.g. by 0.5 K, value can be set)

The actual temperature can also be read out manually.
The actual temperature that is applied to the control algorithm (see "Closed loop control") can be manually adjusted i.e. the measured value can be increased or reduced by a specific value (can be set).

1.5. Setpoints

The current setpoint temperature i.e. the setpoint temperature which is used to regulate the temperature is dependent on the base setpoint, the manual setpoint adjustment at the rotary switch as well as the selected operating mode.
The setpoint temperature is automatically sent via communication object no. 5 "Setpoint" when the following events occur:
- when switching on
- on bus voltage recovery
- each time the operating mode is changed
- when the manual setpoint adjustment is operated (rotary switch)

The setpoint temperature can also be read out manually.

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1.6. Control value output

The control values that are calculated by the control algorithm are issued via the communication objects. It is possible to choose between a continuous output (EIS 6) and a switching output (EIS 1) of the control value using parameters.

Continuous output of the control value
(see Diagram 4 under “Diagrams”)
The output of the calculated control value is carried out as quasi-analogue with a resolution of 8 bit.
Separate upper and lower limits for the control value output can be set for heating and cooling and the value can also be inverted (can be set).
Note: Inverting the value means that the function of the control value output is reversed.

Switching output of the control value
(see Diagram 5 under “Diagrams”)
The output of the calculated control value is carried out via pulse width modulation, whereby the pulse duty factor between “ON” and “OFF” corresponds to the calculated control value.
The cycle time (period T) of the switching control value can be set.

2. Communication objects and parameters

2.1. Assigning parameters for heating

2.1.1. Heating: Communication objects

no.	Function	Object name	Type
01.01.002	12 S1 Temperature Control 210B04		
0	On / Off	Comfort mode	1 Bit
1	On / Off	Night mode	1 Bit
2	On / Off	Frost/heat protection	1 Bit
3	On / Off	Dew point mode	1 Bit
4	On / Off	Button	1 Bit
5	Actual setpoint	Setpoint	2 Byte
6	Sensor internal	Actual temperature value	2 Byte
7	continuous	Control value heating	1 Byte
8	1=System heats	Message	1 Bit
9	8-bit Status	Status	1 Byte
10	Base-setpoint in °C	Base-setpoint	2 Byte

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flags
0	On / Off	Comfort mode	1 Bit	CWTU
The “Comfort” mode is selected via this object. In heating mode, the setpoint is increased or reduced to a comfortable level. The telegram can be sent e.g. by a presence detector or a timer.				
1	On / Off	Night mode	1 Bit	CWTU
The “Night” mode is selected via this object. In heating mode, the setpoint in rooms that are unoccupied for long periods (e.g. over night or at the weekend) is increased or reduced to a set level. The telegram can be sent e.g. by a timer.				
2	On / Off	Frost/heat protection	1 Bit	CWTU
The “Frost/heat protection” mode is selected via this object. The setpoint is reduced or increased until the room is protected from excessive cooling or overheating. The toggling can be activated e.g. via a window contact when the window is opened.				
3	On / Off	Dew point mode	1 Bit	CWTU
The “Dew point” mode is selected via this object. The heating (and cooling) is switched off unconditionally. The telegram can be sent e.g. by a dew point sensor in a cooling ceiling.				

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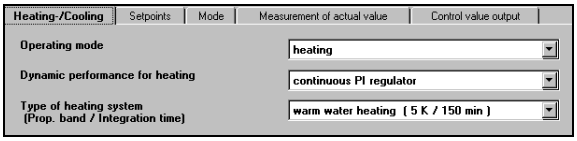
Obj	Function	Object name	Type	Flags
4	On / Off	Button	1 Bit	CRWTU
The status of the presence button is sent on the bus via this object. The value can also be modified via the bus. Object value “1”: switched to comfort mode with the presence button Object value “0”: presence button is reset The object is sent automatically if the button status changes (the presence button is pressed) or when night mode is started or ended.				
5	Actual setpoint	Setpoint	2 Byte	CRT
This object contains the current setpoint which is used to regulate the temperature instantaneously. The value is sent with a resolution of 0.08 K. The object is automatically sent if the room temperature changes or after bus voltage recovery.				
6	Sensor internal	Actual temperature value	2 Byte	CRT
This object contains the current actual temperature value that is sent automatically by the controller when there is a change. See also the parameters for measuring the room temperature.				
7	Continuous	Control value heating	1 Byte	CRT
The control value for the heating mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
8	1 = System heats	Message	1 Bit	CRT
The signal that energy is required for heating is sent via this object. The telegrams are sent automatically. This is carried out cyclically every 2, 10 or 40 minutes depending on the parameter setting “Cycle time for automatic sending” or if the status changes or each time the controller toggles between heating and cooling mode or after a BCU reset (once the bus voltage has been applied or the application has been programmed). Object value “1”, if object “Heat” > 0 Object value “0”, if object “Heat” = 0 The telegram can be used e.g. for controlling the inlet pump. **Note:** The object is only accessible if the parameter “Operating mode” is set to “heating” or “cooling”.				
9	8-bit Status	Status	1 Byte	CRT
This object contains the current controller status which is automatically sent after a change in the status. The individual bits have the following meaning: Bit 0: 1 = Comfort mode On Bit 1: 1 = Standby mode On Bit 2: 1 = Night mode On Bit 3: 1 = Frost/heat protection mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				

Obj	Function	Object name	Type	Flags
10	Base setpoint in °C	Base setpoint	2 Byte	CRTU
This object is used to modify the base setpoint that is preset in the parameter setting via the bus (e.g. dependent on the external temperature or summer/wintertime). The accuracy is 1°C, as in the parameter setting. As the previous value is overwritten in the EEPROM after a change, this value should not be modified more than once a day, in order to avoid errors in the EEPROM.				

2.1.2. Heating: Parameters



Parameters	Settings
Operating mode	**heating** cooling heating and cooling 2-level heating 2-level cooling
This parameter is used to activate the heating and cooling function. The following settings are possible: “heating”: only the heating function is active “cooling”: only the cooling function is active “heating and cooling”: both the heating and cooling function are active (e.g. air conditioning system) “2-level heating”: heating function with basic and additional levels is active “2-level cooling”: cooling function with basic and additional levels is active	
Dynamic performance for heating	**continuous PI regulator** switching PI regulator continuous 2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the heating system and determines which data format is used to send the control value on the bus.	
Type of heating system (Prop. band / Integration time)	**warm water heating (5 K / 150 min)** floor heating (5 K/240 min) electric heating (4 K/ 100 min) air convector (4 K/90 min) Split Unit (4 / 90 min) via control parameter
This parameter is used to adapt the PI algorithm via field values from various heating systems. If the setting “via control parameter” is selected, the control parameters can be set directly.	

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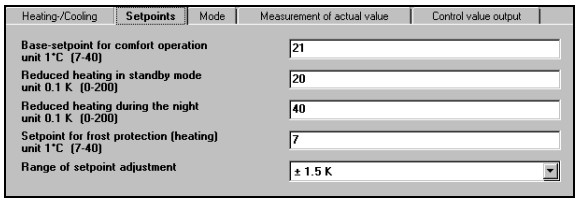
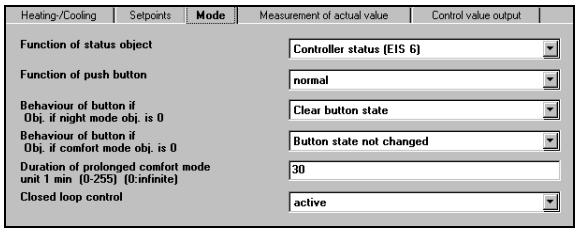
2.1.3. Setpoints: Parameters



Parameters	Settings
Base setpoint for comfort operation unit 1°C (7-40)	**21**
This parameter is used to calculate the setpoint values. The setpoints for comfort, standby and night mode are based on this value i.e. all these setpoints can be adjusted via this parameter. This value has the same meaning as the object "Base setpoint" whereby the object has a higher priority (see also the description for object no. 10).	
Reduced heating in stand-by mode unit 0.1 K (0-200)	**20**
The temperature reduction for standby mode in the "heating" setting can be defined via this parameter. Note: The temperature reduction is calculated as follows: Value x 0.1 [Kelvin]:(20 x 0.1 K = 2 K temperature reduction).	
Reduced heating during the night unit 0.1 K (0-200)	**40**
The temperature reduction for night mode in the "heating" setting can be defined via this parameter. Note: The temperature reduction is calculated as follows: Value x 0.1 [Kelvin]:(40 x 0.1 K = 4 K temperature reduction).	
Setpoint for frost protection (heating) unit 1°C (7-40)	**7**
The opening of a window that is monitored by a window contact causes the controller to switch to "Frost protection" in heating mode. If "Frost protection" has been detected, the setpoint of the room temperature is lowered to the value that is set here (default is 7°C). On the one hand, it prevents the energy for heating from being wasted and on the other hand, it guarantees that the controller remains active and the room cannot cool down or heat up. The "Frost/heat protection" mode is indicated on the front panel of the controller by a red LED next to a corresponding pictogram.	
Range of setpoint adjustment	0 (passive) ± 0.5 K; ± 1.0 K; **± 1.5 K** ± 2.0 K; ± 2.5 K; ± 3.0 K; ± 3.5 K; ± 4.0 K; ± 4.5 K; ± 5.0 K
The step width of the setpoint adjustment per notch of the rotary switch is set via this parameter. The selected value applies to both an upward (+) or downward (-) adjustment.	

2.1.4. Mode: Parameters



Parameters	Settings
Function of status object	**Controller status (EIS 6)** Comfort mode (EIS 1) Standby mode (EIS 1) Night mode (EIS 1) Frost/heat protection (EIS 1) Dew point mode (EIS 1) Heating mode (EIS 1) Controller inactive mode (EIS 1) Frost alarm (EIS 1)
This parameter defines which status information is sent in the "Status" object.	
Function of push button	**normal** Button disabled
The function of the presence button can be disabled via this parameter. In the setting "normal", the controller reacts to a push button action depending on the parameter settings. In the setting "Button disabled", the controller ignores all push button actions.	
Behaviour of button if night mode obj. is 0	**Clear button state** Button state restore
This parameter determines whether the previous push button state is restored or deleted when night mode has ended. The controller can thus revert to comfort mode after night reduction if this mode was previously activated via a push button action.	
Behaviour of button if comfort mode obj. is 0	**Button state not changed** Clear button state
This parameter specifies whether the push button state should be deleted via the object "Comfort mode" once comfort mode has ended. It is therefore possible for an external presence detector to reset any set presence both via the bus and the presence button.	
Duration of prolonged comfort mode unit 1 min (0-255) (0:infinite)	**30**
If the presence button is pressed while in night mode or presence is reported by a presence detector, the comfort temperature is activated for the period set in this parameter.	
Closed loop control	**active** inactive
This parameter switches the closed loop control on or off.	

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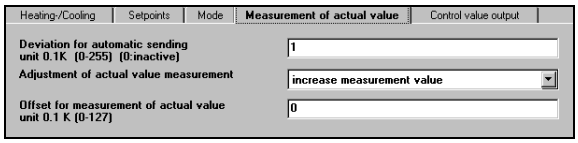
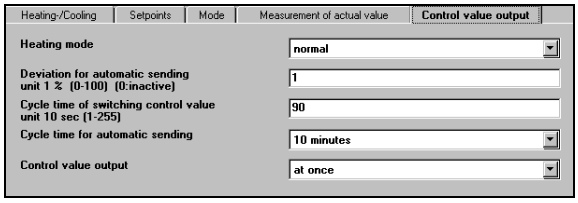
2.1.5. Measurement of actual value: Parameters



Parameters	Settings
Deviation for automatic sending unit 0.1 K (0-255) (0:inactive)	**1**
The room temperature is sent automatically if it changes by the set value.	
Adjustment of actual value measurement	**increase measurement value** decrease measurement value
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the room temperature that is measured externally is e.g. lower than the actual temperature in the controller, the setting “decrease measurement value” must be selected.	
Offset for measurement of actual value unit 0.1 K (0-127)	**0**
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the differential between the external measuring device and the temperature that is measured internally is e.g. 2°C, the value 20 must be entered here.	

2.1.6. Control value output: Parameters



Parameters	Settings
Heating mode	**normal** inverted
In the setting “normal”, the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Deviation for automatic sending unit 1 % (0-100) (0: inactive)	**1**
If the control value changes by the value that is set here, it is sent to the valve drive.	
Cycle time of switching control value unit 10 sec (1-255)	**90**
This parameter sets the period i.e. the interval in which a closed loop control is carried out via pulse width modulation (pulse duty factor: ON / OFF time). Note: The cycle time is calculated as follows: Value x 10 sec (90 x 10 sec = 900 sec cycle time).	
Cycle time for automatic sending	inactive 2 minutes **10 minutes** 40 minutes
In addition to being sent automatically, the control value is sent after a change according to the time base that is set here.	
Control value output	**at once** limited to 1 telegram per minute
This parameter enables the automatic sending of the control value after a change to be limited to one telegram per minute. It is a good idea to filter telegrams if small proportional ranges are operated in larger projects so that the amount of telegrams on the bus is reduced.	

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2.2. Assigning parameters for cooling

2.2.1. Cooling: Communication objects

	no.	Function	Object name	Type
	01.01.002	12 S1 Temperature Control 210B04		
	0	On / Off	Comfort mode	1 Bit
	1	On / Off	Night mode	1 Bit
	2	On / Off	Frost/heat protection	1 Bit
	3	On / Off	Dew point mode	1 Bit
	4	On / Off	Button	1 Bit
	5	Actual setpoint	Setpoint	2 Byte
	6	Sensor internal	Actual temperature value	2 Byte
	7	1=System cools	Message	1 Bit
	8	continuous	Control value cooling	1 Byte
	9	8-bit Status	Status	1 Byte
	10	Base-setpoint in °C	Base-setpoint	2 Byte

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flags
0	On / Off	Comfort mode	1 Bit	CWTU
The “Comfort” mode is selected via this object. In cooling mode, the setpoint is increased or reduced to a comfortable level. The telegram can be sent e.g. by a presence detector or a timer.				
1	On / Off	Night mode	1 Bit	CWTU
The “Night” mode is selected via this object. In cooling mode, the setpoint in rooms that are unoccupied for long periods (e.g. over night or at the weekend) is increased or reduced to a set level. The telegram can be sent e.g. by a timer.				
2	On / Off	Frost/heat protection	1 Bit	CWTU
The “Frost/heat protection” mode is selected via this object. The setpoint is reduced or increased until the room is protected from excessive cooling or overheating. The toggling can be activated e.g. via a window contact when the window is opened.				
3	On / Off	Dew point mode	1 Bit	CWTU
The “Dew point” mode is selected via this object. The cooling mode is switched off unconditionally. The telegram can be sent e.g. by a dew point sensor in a cooling ceiling.				
4	On / Off	Button	1 Bit	CRWTU
The status of the presence button is sent on the bus via this object. The value can also be modified via the bus. Object value “1”: switched to comfort mode with the presence button Object value “0”: presence button is reset The object is sent automatically if the button status changes (the presence button is pressed) or when night mode is started or ended.				
5	Actual setpoint	Setpoint	2 Byte	CRT
This object contains the current setpoint which is used to regulate the temperature instantaneously. The value is sent with a resolution of 0.08 K. The object is automatically sent if the room temperature changes or after bus voltage recovery.				
6	Sensor internal	Actual temperature value	2 Byte	CRT
This object contains the current actual temperature value that is sent automatically by the controller when there is a change. See also the parameters for measuring the room temperature.				
7	1 = System cools	Message	1 Bit	CRT
The signal that energy is required for cooling is sent via this object. The telegrams are sent automatically (cyclically) if the status changes or after bus voltage recovery. Object value “1”, if object “Cool” > 0 Object value “0”, if object “Cool” = 0 The telegram can be used e.g. for controlling the inlet pump. **Note:** The object is only accessible if the parameter “Operating mode” is set to “heating” or “cooling”.				
8	Continuous	Control value cooling	1 Byte	CRT
The control value for the cooling mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
9	8-bit Status	Status	1 Byte	CRT
This object contains the current controller status which is automatically sent after a change in the status. The individual bits have the following meaning: Bit 0: 1 = Comfort mode On Bit 1: 1 = Standby mode On Bit 2: 1 = Night mode On Bit 3: 1 = Frost/heat protection mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				
10	Base setpoint in °C	Base setpoint	2 Byte	CWTU
This object is used to modify the base setpoint that is preset in the parameter setting via the bus (e.g. dependent on the external temperature or summer/wintertime). The accuracy is 1°C, as in the parameter setting. As the previous value is overwritten in the EEPROM after a change, this value should not be modified more than once a day, in order to avoid errors in the EEPROM.				

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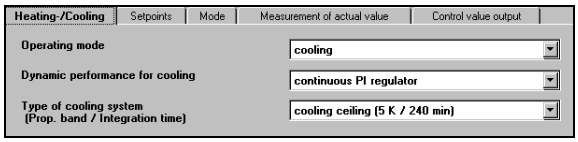
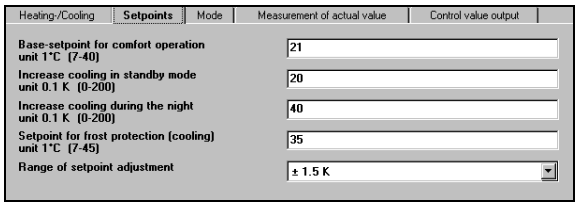
2.2.2. Cooling: Parameters



Parameters	Settings
Operating mode	heating **cooling** heating and cooling 2-level heating 2-level cooling
This parameter is used to activate the heating and cooling function. The following settings are possible: “heating”: only the heating function is active “cooling”: only the cooling function is active “heating and cooling”: both the heating and cooling function are active (e.g. air conditioning system) “2-level heating”: heating function with basic and additional levels is active “2-level cooling”: cooling function with basic and additional levels is active	
Dynamic performance for cooling	**continuous PI regulator** switching PI regulator continuous 2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the cooling system and determines which data format is used to send the control value on the bus.	
Type of cooling system (Prop. band / Integration time)	air convector (4 K/90 min) Split Unit (4 / 90 min) **cooling ceiling (5 K / 240 min)** via control parameter
This parameter is used to adapt the PI algorithm via field values from various cooling systems. If the setting “via control parameter” is selected, the control parameters can be set directly.	

2.2.3. Setpoints: Parameters



Parameters	Settings
Base setpoint for comfort operation unit 1°C (7-40)	**21**
This parameter is used to calculate the setpoint values. The setpoints for comfort, standby and night mode are based on this value i.e. all these setpoints can be adjusted via this parameter. This value has the same meaning as the object “Base setpoint” whereby the object has a higher priority (see also the description for object no. 10).	
Increase cooling in standby mode unit 0.1 K (0-200)	**20**
The temperature increase for standby mode in the “cooling” setting can be defined via this parameter. Note: The temperature increase is calculated as follows: Value x 0.1 [Kelvin]:(20 x 0.1 K = 2 K temperature increase).	
Increase cooling during the night unit 0.1 K (0-200)	**40**
The temperature increase for night mode in the “cooling” setting can be defined via this parameter. Note: The temperature increase is calculated as follows: Value x 0.1 [Kelvin]:(40 x 0.1 K = 4 K temperature increase).	
Setpoint for heat protection (cooling) unit 1°C (7-45)	**35**
The opening of a window that is monitored by a window contact causes the controller to switch to “Heat protection” in cooling mode. If “Heat protection” has been detected, the setpoint of the room temperature is increased to the value that is set here (default is 35°C). On the one hand, it prevents the energy for cooling from being wasted and on the other hand, it guarantees that the controller remains active and the room cannot cool down or heat up. The “Frost/heat protection” mode is indicated on the front panel of the controller by a red LED next to a corresponding pictogram.	
Range of setpoint adjustment	0 (passive) ± 0.5 K; ± 1.0 K; **± 1.5 K** ± 2.0 K; ± 2.5 K; ± 3.0 K; ± 3.5 K; ± 4.0 K; ± 4.5 K; ± 5.0 K
The step width of the setpoint adjustment per notch of the rotary switch is set via this parameter. The selected value applies to both an upward (+) or downward (-) adjustment.	

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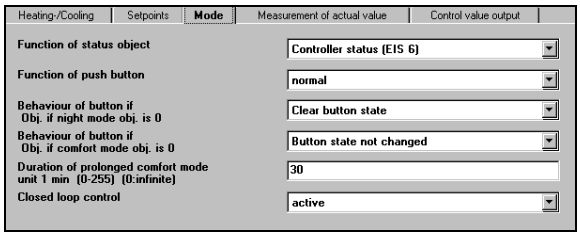
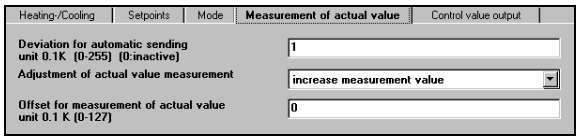
2.2.4. Mode: Parameters



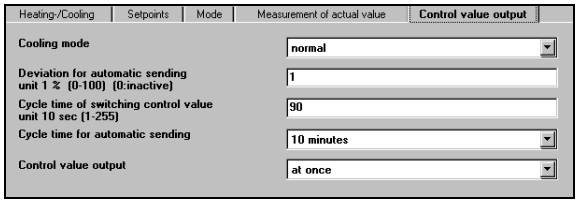
Parameters	Settings
Function of status object	**Controller status (EIS 6)** Comfort mode (EIS 1) Standby mode (EIS 1) Night mode (EIS 1) Frost/heat protection (EIS 1) Dew point mode (EIS 1) Heating mode (EIS 1) Controller inactive mode (EIS 1) Frost alarm (EIS 1)
This parameter defines which status information is sent in the “Status” object.	
Function of push button	**normal** Button disabled
The function of the presence button can be disabled via this parameter. In the setting “normal”, the controller reacts to a push button action depending on the parameter settings. In the setting “Button disabled”, the controller ignores all push button actions.	
Behaviour of button if night mode obj. is 0	**Clear button state** Button state restore
This parameter determines whether the previous push button state is restored or deleted when night mode has ended. The controller can thus revert to comfort mode after night reduction if this mode was previously activated via a push button action.	
Behaviour of button if comfort mode obj. is 0	**Button state not changed** Clear button state
This parameter specifies whether the push button state should be deleted via the object “Comfort mode” once comfort mode has ended. It is therefore possible for an external presence detector to reset any set presence both via the bus and the presence button.	
Duration of prolonged comfort mode unit 1 min (0-255) (0:infinite)	**30**
If the presence button is pressed while in night mode or presence is reported by a presence detector, the comfort temperature is activated for the period set in this parameter.	
Closed loop control	**active** inactive
This parameter switches the closed loop control on or off.	

2.2.5. Measurement of actual value: Parameters



Parameters	Settings
Deviation for automatic sending unit 0.1 K (0-255) (0:inactive)	**1**
The room temperature is sent automatically if it changes by the set value.	
Adjustment of actual value measurement	**increase measurement value** decrease measurement value
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the room temperature that is measured externally is e.g. lower than the actual temperature in the controller, the setting “decrease measurement value” must be selected.	
Offset for measurement of actual value unit 0.1 K (0-127)	**0**
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the differential between the external measuring device and the temperature that is measured internally is e.g. 2°C, the value 20 must be entered here.	

2.2.6. Control value output: Parameters



Parameters	Settings
Cooling mode	**normal** inverted
In the setting “normal”, the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Deviation for automatic sending unit 1% (0-100) (0: inactive)	**1**
If the control value changes by the value that is set here, it is sent to the valve drive.	

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Parameters	Settings
Cycle time of switching control value unit 10 sec (1-255)	**90**
This parameter sets the period i.e. the interval in which a closed loop control is carried out via pulse width modulation (pulse duty factor: ON / OFF time). Note: The cycle time is calculated as follows: Value x 10 sec (90 x 10 sec = 900 sec cycle time).	
Cycle time for automatic sending	inactive 2 minutes **10 minutes** 40 minutes
In addition to being sent automatically, the control value is sent after a change according to the time base that is set here.	
Control value output	**at once** limited to 1 telegram per minute
This parameter enables the automatic sending of the control value after a change to be limited to one telegram per minute. It is a good idea to filter telegrams if small proportional ranges are operated in larger projects so that the amount of telegrams on the bus is reduced.	

2.3. Assigning parameters for heating and cooling

2.3.1. Heating and cooling: Communication objects

no.	Function	Object name	Type
01.01.002	12 S1 Temperature Control 210B04		
0	On / Off	Comfort mode	1 Bit
1	On / Off	Night mode	1 Bit
2	On / Off	Frost/heat protection	1 Bit
3	On / Off	Dew point mode	1 Bit
4	On / Off	Button	1 Bit
5	Actual setpoint	Setpoint	2 Byte
6	Sensor internal	Actual temperature value	2 Byte
7	continuous	Control value heating	1 Byte
8	continuous	Control value cooling	1 Byte
9	8-bit Status	Status	1 Byte
10	Base-setpoint in °C	Base-setpoint	2 Byte

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flags
0	On / Off	Comfort mode	1 Bit	CWTU
The “Comfort” mode is selected via this object. In heating and cooling mode, the setpoint is increased or reduced to a comfortable level. The telegram can be sent e.g. by a presence detector or a timer.				
1	On / Off	Night mode	1 Bit	CWTU
The “Night” mode is selected via this object. In heating and cooling mode, the setpoint in rooms that are unoccupied for long periods (e.g. over night or at the weekend) is increased or reduced to a set level. The telegram can be sent e.g. by a timer.				
2	On / Off	Frost/heat protection	1 Bit	CWTU
The “Frost/heat protection” mode is selected via this object. The setpoint is reduced or increased until the room is protected from excessive cooling or overheating. The toggling can be activated e.g. via a window contact when the window is opened.				
3	On / Off	Dew point mode	1 Bit	CWTU
The “Dew point” mode is selected via this object. The heating (and cooling) is switched off unconditionally. The telegram can be sent e.g. by a dew point sensor in a cooling ceiling.				

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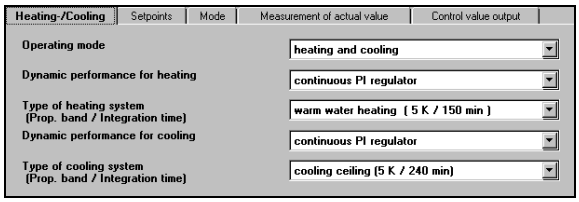
Obj	Function	Object name	Type	Flags
4	On / Off	Button	1 Bit	CRWTU
The status of the presence button is sent on the bus via this object. The value can also be modified via the bus. Object value “1”: switched to comfort mode with the presence button Object value “0”: presence button is reset The object is sent automatically if the button status changes (the presence button is pressed) or when night mode is started or ended.				
5	Actual setpoint	Setpoint	2 Byte	CRT
This object contains the current setpoint which is used to regulate the temperature instantaneously. The value is sent with a resolution of 0.08 K. The object is automatically sent if the room temperature changes or after bus voltage recovery.				
6	Sensor internal	Actual temper-ature value	2 Byte	CRT
This object contains the current actual temperature value that is sent automatically by the controller when there is a change. See also the parameters for measuring the room temperature.				
7	Continuous	Control value heating	1 Byte	CRT
The control value for the heating mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
8	Continuous	Control value cooling	1 Byte	CRT
The control value for the cooling mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
9	8-bit Status	Status	1 Byte	CRT
This object contains the current controller status which is automatically sent after a change in the status. The individual bits have the following meaning: Bit 0: 1 = Comfort mode On Bit 1: 1 = Standby mode On Bit 2: 1 = Night mode On Bit 3: 1 = Frost/heat protection mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				
10	Base setpoint in °C	Base setpoint	2 Byte	CWTU
This object is used to modify the base setpoint that is preset in the parameter setting via the bus (e.g. dependent on the external temperature or summer/wintertime). The accuracy is 1°C, as in the parameter setting. As the previous value is overwritten in the EEPROM after a change, this value should not be modified more than once a day, in order to avoid errors in the EEPROM.				

2.3.2. Heating and cooling: Parameters



Parameters	Settings
Operating mode	heating cooling **heating and cooling** 2-level heating 2-level cooling
This parameter is used to activate the heating and cooling function. The following settings are possible: “heating”: only the heating function is active “cooling”: only the cooling function is active “heating and cooling”: both the heating and cooling function are active (e.g. air conditioning system) “2-level heating”: heating function with basic and additional levels is active “2-level cooling”: cooling function with basic and additional levels is active	
Dynamic performance for heating	**continuous PI regulator** switching PI regulator continuous 2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the heating system and determines which data format is used to send the control value on the bus.	
Type of heating system (Prop. band / Integration time)	**warm water heating (5 K / 150 min)** floor heating (5 K/240 min) electric heating (4 K/ 100 min) air convector (4 K/90 min) Split Unit (4 / 90 min) via control parameter
This parameter is used to adapt the PI algorithm via field values from various heating systems. If the setting “via control parameter” is selected, the control parameters can be set directly.	
Dynamic performance for cooling	**continuous PI regulator** switching PI regulator continuous 2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the cooling system and determines which data format is used to send the control value on the bus.	

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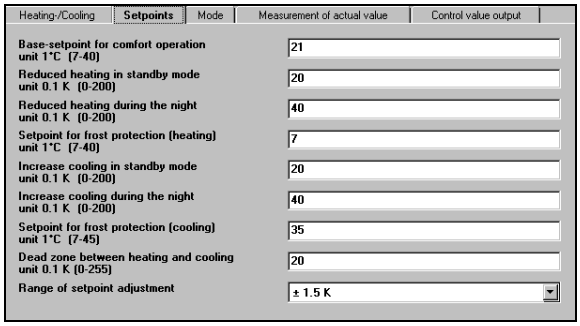
Parameters	Settings
Type of cooling system (Prop. band / Integration time)	air convector (4 K/90 min) Split Unit (4 / 90 min) **cooling ceiling (5 K / 240 min)** via control parameter
This parameter is used to adapt the PI algorithm via field values from various cooling systems. If the setting "via control parameter" is selected, the control parameters can be set directly.	

2.3.3. Setpoints: Parameters



Parameters	Settings
Base setpoint for comfort operation unit 1°C (7-40)	**21**
This parameter is used to calculate the setpoint values. The setpoints for comfort, standby and night mode are based on this value i.e. all these setpoints can be adjusted via this parameter. This value has the same meaning as the object "Base setpoint" whereby the object has a higher priority (see also the description for object no. 10).	
Reduced heating in stand-by mode unit 0.1 K (0-200)	**20**
The temperature reduction for standby mode in the "heating" setting can be defined via this parameter. Note: The temperature reduction is calculated as follows: Value x 0.1 [Kelvin]:(20 x 0.1 K = 2 K temperature reduction).	
Reduced heating during the night unit 0.1 K (0-200)	**40**
The temperature reduction for night mode in the "heating" setting can be defined via this parameter. Note: The temperature reduction is calculated as follows: Value x 0.1 [Kelvin]:(40 x 0.1 K = 4 K temperature reduction).	

Parameters	Settings
Setpoint for frost protection (heating) unit 1°C (7-40)	**7**
The opening of a window that is monitored by a window contact causes the controller to switch to "Frost protection" in heating mode. If "Frost protection" has been detected, the setpoint of the room temperature is lowered to the value that is set here (default is 7°C). On the one hand, it prevents the energy for heating from being wasted and on the other hand, it guarantees that the controller remains active and the room cannot cool down or heat up. The "Frost/heat protection" mode is indicated on the front panel of the controller by a red LED next to a corresponding pictogram.	
Increase cooling in standby mode 0,1 K (0-200)	**20**
The temperature increase for standby mode in the "cooling" setting can be defined via this parameter. Note: The temperature increase is calculated as follows: Value x 0.1 [Kelvin]:(20 x 0.1 K = 2 K temperature increase).	
Increase cooling during the night unit 0.1 K (0-200)	**40**
The temperature increase for night mode in the "cooling" setting can be defined via this parameter. Note: The temperature increase is calculated as follows: Value x 0.1 [Kelvin]:(40 x 0.1 K = 4 K temperature increase).	
Setpoint for heat protection (cooling) unit 1°C (7-45)	**35**
The opening of a window that is monitored by a window contact causes the controller to switch to "Heat protection" in cooling mode. If "Heat protection" has been detected, the setpoint of the room temperature is increased to the value that is set here (default is 35°C). On the one hand, it prevents the energy for cooling from being wasted and on the other hand, it guarantees that the controller remains active and the room cannot cool down or heat up. The "Frost/heat protection" mode is indicated on the front panel of the controller by a red LED next to a corresponding pictogram.	
Dead zone between heating and cooling unit 0.1 K (0-255)	**20**
It is necessary to set an insensitive zone in the operating mode "heating and cooling" when the setting "automatic" is selected for the parameter "Switch between heating/cooling". Note: The value selected for the dead zone between heating and cooling mode may not be too small as otherwise continuous toggling between heating and cooling could occur.	
Range of setpoint adjustment	0 (passive) ± 0.5 K; ± 1.0 K; **± 1.5 K** ± 2.0 K; ± 2.5 K; ± 3.0 K; ± 3.5 K; ± 4.0 K; ± 4.5 K; ± 5.0 K
The step width of the setpoint adjustment per notch of the rotary switch is set via this parameter. The selected value applies to both an upward (+) or downward (-) adjustment.	

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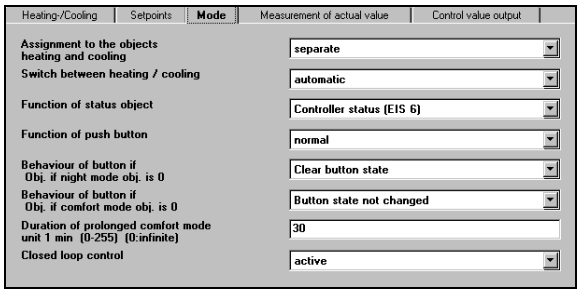
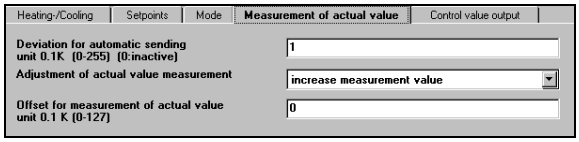
2.3.4. Mode: Parameters



Parameters	Settings
Assignment of the objects heating and cooling	**separate** both on object heating (special fct.)
This parameter determines the output objects that are used for issuing the control values. In the setting “separate”, the control value for heating is output via the object “Heating” and the control value for cooling is output via the object “Cooling”. If the setting “both on object heating” is selected, both control values are output via the object “Heating”. The object “Cooling” is not used in this case.	
Switch between heating/cooling	**automatic** with object heating/cooling
In the operating mode “heating and cooling”, toggling takes place either automatically depending on the room temperature or “manually” via the bus (object “Heating/cooling”).	
Function of status object	**Controller status (EIS 6)** Comfort mode (EIS 1) Standby mode (EIS 1) Night mode (EIS 1) Frost/heat protection (EIS 1) Dew point mode (EIS 1) Heating mode (EIS 1) Controller inactive mode (EIS 1) Frost alarm (EIS 1)
This parameter defines which status information is sent in the “Status” object.	
Function of push button	**normal** Button disabled
The function of the presence button can be disabled via this parameter. In the setting “normal”, the controller reacts to a push button action depending on the parameter settings. In the setting “Button disabled”, the controller ignores all push button actions.	

Parameters	Settings
Behaviour of button if night mode obj. is 0	**Clear button state** Button state restore
This parameter determines whether the previous push button state is restored or deleted when night mode has ended. The controller can thus revert to comfort mode after night reduction if this mode was previously activated via a push button action.	
Behaviour of button if comfort mode obj. is 0	**Button state not changed** Clear button state
This parameter specifies whether the push button state should be deleted via the object “Comfort mode” once comfort mode has ended. It is therefore possible for an external presence detector to reset any set presence both via the bus and the presence button.	
Duration of prolonged comfort mode unit 1 min (0-255) (0:infinite)	**30**
If the presence button is pressed while in night mode or presence is reported by a presence detector, the comfort temperature is activated for the period set in this parameter.	
Closed loop control	**active** inactive
This parameter switches the closed loop control on or off.	

2.3.5. Measurement of actual value: Parameters



Parameters	Settings
Deviation for automatic sending unit 0.1 K (0-255) (0:inactive)	**1**
The room temperature is sent automatically if it changes by the set value.	
Adjustment of actual value measurement	**increase measurement value** decrease measurement value
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the room temperature that is measured externally is e.g. lower than the actual temperature in the controller, the setting “decrease measurement value” must be selected.	
Offset for measurement of actual value unit 0.1 K (0-127)	**0**
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the differential between the external measuring device and the temperature that is measured internally is e.g. 2°C, the value 20 must be entered here.	

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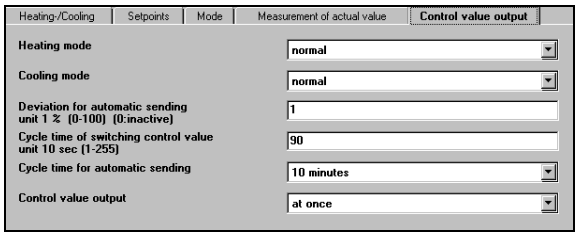
2.3.6. Control value output: Parameters



Parameters	Settings
Heating mode	**normal** inverted
In the setting “normal”, the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Cooling mode	**normal** inverted
In the setting “normal”, the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Deviation for automatic sending unit 1 % (0-100) (0: inactive)	**1**
If the control value changes by the value that is set here, it is sent to the valve drive.	
Cycle time of switching control value unit 10 sec (1-255)	**90**
This parameter sets the period i.e. the interval in which a closed loop control is carried out via pulse width modulation (pulse duty factor: ON / OFF time). Note: The cycle time is calculated as follows: Value x 10 sec (90 x 10 sec = 900 sec cycle time).	
Cycle time for automatic sending	inactive 2 minutes **10 minutes** 40 minutes
In addition to being sent automatically, the control value is sent after a change according to the time base that is set here.	
Control value output	**at once** limited to 1 telegram per minute
This parameter enables the automatic sending of the control value after a change to be limited to one telegram per minute. It is a good idea to filter telegrams if small proportional ranges are operated in larger projects so that the amount of telegrams on the bus is reduced.	

2.4. Assigning parameters for 2-level heating

2.4.1. 2-level heating: Communication objects

no.	Function	Object name	Type
01.01.002	12 S1 Temperature Control 210B04		
0	On / Off	Comfort mode	1 Bit
1	On / Off	Night mode	1 Bit
2	On / Off	Frost/heat protection	1 Bit
3	On / Off	Dew point mode	1 Bit
4	On / Off	Button	1 Bit
5	Actual setpoint	Setpoint	2 Byte
6	Sensor internal	Actual temperature value	2 Byte
7	continuous	Control value basic heating	1 Byte
8	continuous	Control value of additional heating	1 Byte
9	8-bit Status	Status	1 Byte
10	Base-setpoint in °C	Base-setpoint	2 Byte

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flags
0	On / Off	Comfort mode	1 Bit	CWTU
The “Comfort” mode is selected via this object. In heating mode, the setpoint is increased or reduced to a comfortable level. The telegram can be sent e.g. by a presence detector or a timer.				
1	On / Off	Night mode	1 Bit	CWTU
The “Night” mode is selected via this object. In heating mode, the setpoint in rooms that are unoccupied for long periods (e.g. over night or at the weekend) is increased or reduced to a set level. The telegram can be sent e.g. by a timer.				
2	On / Off	Frost/heat protection	1 Bit	CWTU
The “Frost/heat protection” mode is selected via this object. The setpoint is reduced or increased until the room is protected from excessive cooling or overheating. The toggling can be activated e.g. via a window contact when the window is opened.				
3	On / Off	Dew point mode	1 Bit	CWTU
The “Dew point” mode is selected via this object. The heating is switched off unconditionally. The telegram can be sent e.g. by a dew point sensor in a cooling ceiling.				

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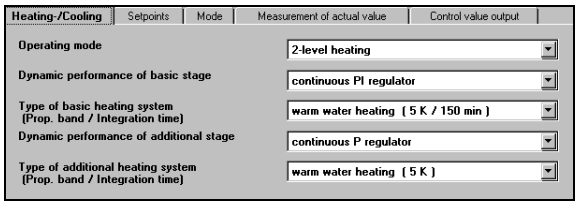
Obj	Function	Object name	Type	Flags
4	On / Off	Button	1 Bit	CRWTU
The status of the presence button is sent on the bus via this object. The value can also be modified via the bus. Object value “1”: switched to comfort mode with the presence button Object value “0”: presence button is reset The object is sent automatically if the button status changes (the presence button is pressed) or when night mode is started or ended.				
5	Actual setpoint	Setpoint	2 Byte	CRT
This object contains the current setpoint which is used to regulate the temperature instantaneously. The value is sent with a resolution of 0.08 K. The object is automatically sent if the room temperature changes or after bus voltage recovery.				
6	Sensor internal	Actual tempera-ture value	2 Byte	CRT
This object contains the current actual temperature value that is sent automatically by the controller when there is a change. See also the parameters for measuring the room temperature.				
7	Continuous	Control value basic heating	1 Byte	CRT
The control value for the basic level in the 2-level heating mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
8	Continuous	Control value of additional heating	1 Byte	CRT
The control value for the additional level in the 2-level heating mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
9	8-bit Status	Status	1 Byte	CRT
This object contains the current controller status which is automatically sent after a change in the status. The individual bits have the following meaning: Bit 0: 1 = Comfort mode On Bit 1: 1 = Standby mode On Bit 2: 1 = Night mode On Bit 3: 1 = Frost/heat protection mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				
10	Base setpoint in °C	Base setpoint	2 Byte	CWTU
This object is used to modify the base setpoint that is preset in the parameter setting via the bus (e.g. dependent on the external temperature or summer/wintertime). The accuracy is 1°C, as in the parameter setting. As the previous value is overwritten in the EEPROM after a change, this value should not be modified more than once a day, in order to avoid errors in the EEPROM.				

2.4.2. 2-level heating: Parameters



Parameters	Settings
Operating mode	heating cooling heating and cooling **2-level heating** 2-level cooling
This parameter is used to activate the heating and cooling function. The following settings are possible: “heating”: only the heating function is active “cooling”: only the cooling function is active “heating and cooling”: both the heating and cooling function are active (e.g. air conditioning system) “2-level heating”: heating function with basic and additional levels is active “2-level cooling”: cooling function with basic and additional levels is active	
Dynamic performance of basic stage	**continuous PI regulator** switching PI regulator continuous 2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the heating system and determines which data format is used to send the control value on the bus.	
Type of basic heating system (Prop. band / Integration time)	**warm water heating (5 K / 150 min)** floor heating (5 K/240 min) electric heating (4 K/ 100 min) air convector (4 K/90 min) Split Unit (4 / 90 min) via control parameter
This parameter is used to adapt the PI algorithm via field values from various heating systems. If the setting “via control parameter” is selected, the control parameters can be set directly.	
Dynamic performance of additional stage	**continuous PI regulator** switching PI regulator continuous 2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the heating system and determines which data format is used to send the control value on the bus.	

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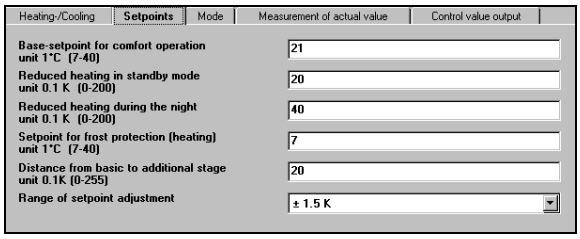
Parameters	Settings
Type of additional heating system (Prop. band / Integration time)	**warm water heating (5 K / 150 min)** floor heating (5 K/240 min) electric heating (4 K/ 100 min) air convector (4 K/90 min) Split Unit (4 / 90 min) via control parameter
This parameter is used to adapt the PI algorithm via field values from various heating systems. If the setting "via control parameter" is selected, the control parameters can be set directly.	

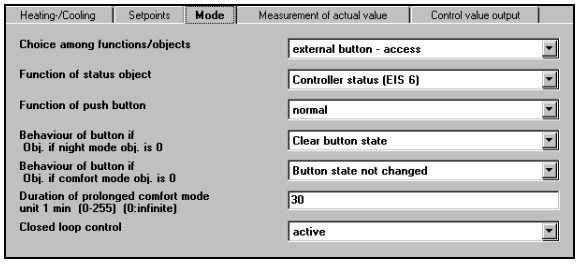
2.4.3. Setpoints: Parameters



Parameters	Settings
Base setpoint for comfort operation unit 1°C (7-40)	**21**
This parameter is used to calculate the setpoint values. The setpoints for comfort, standby and night mode are based on this value i.e. all these setpoints can be adjusted via this parameter. This value has the same meaning as the object "Base setpoint" whereby the object has a higher priority (see also the description for object no. 10).	
Reduced heating in stand-by mode unit 0.1 K (0-200)	**20**
The temperature reduction for standby mode in the "heating" setting can be defined via this parameter. Note: The temperature reduction is calculated as follows: Value x 0.1 [Kelvin]⊗20 x 0.1 K = 2 K temperature reduction).	
Reduced heating during the night unit 0.1 K (0-200)	**40**
The temperature reduction for night mode in the "heating" setting can be defined via this parameter. Note: The temperature reduction is calculated as follows: Value x 0.1 [Kelvin]⊗40 x 0.1 K = 4 K temperature reduction).	

Parameters	Settings
Setpoint for frost protection (heating) unit 1°C (7-40)	**7**
The opening of a window that is monitored by a window contact causes the controller to switch to "Frost protection" in heating mode. If "Frost protection" has been detected, the setpoint of the room temperature is lowered to the value that is set here (default is 7°C). On the one hand, it prevents the energy for heating from being wasted and on the other hand, it guarantees that the controller remains active and the room cannot cool down or heat up. The "Frost/heat protection" mode is indicated on the front panel of the controller by a red LED next to a corresponding pictogram.	
Distance from basic to additional stage unit 0.1 K (0-255)	**20**
This parameter determines whether the starting point of the additional level is below or above the setpoint of the basic level for 2-level heating or cooling.	
Range of setpoint adjustment	0 (passive) ± 0.5 K; ± 1.0 K; **± 1.5 K** ± 2.0 K; ± 2.5 K; ± 3.0 K; ± 3.5 K; ± 4.0 K; ± 4.5 K; ± 5.0 K
The step width of the setpoint adjustment per notch of the rotary switch is set via this parameter. The selected value applies to both an upward (+) or downward (-) adjustment.	

2.4.4. Mode: Parameters



Parameters	Settings
Choice among functions/ objects	**external button – access** lockable additional stage
Due to space restrictions in the controller, it is only possible to use the object "External button" or "Lockable additional stage" for 2-level operation. **Note:** The parameter can only be accessed for 2-level operation.	

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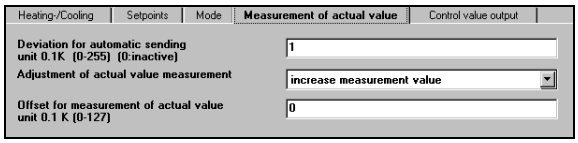
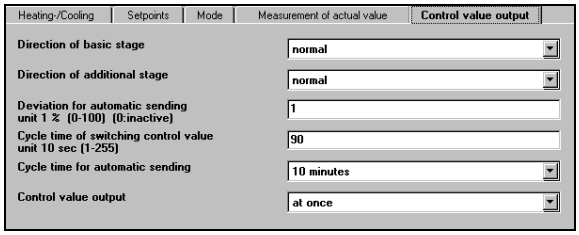
Parameters	Settings
Function of status object	**Controller status (EIS 6)** Comfort mode (EIS 1) Standby mode (EIS 1) Night mode (EIS 1) Frost/heat protection (EIS 1) Dew point mode (EIS 1) Heating mode (EIS 1) Controller inactive mode (EIS 1) Frost alarm (EIS 1)
This parameter determines which status information is sent in the "Status" object.	
Function of push button	**normal** Button disabled
The function of the presence button can be disabled via this parameter. In the setting "normal", the controller reacts to a push button action depending on the parameter settings. In the setting "Button disabled", the controller ignores all push button actions.	
Behaviour of button if night mode obj. is 0	**Clear button state** Button state restore
This parameter determines whether the previous push button state is restored or deleted when night mode has ended. The controller can thus revert to comfort mode after night reduction if this mode was previously activated via a push button action.	
Behaviour of button if comfort mode obj. is 0	**Button state not changed** Clear button state
This parameter specifies whether the push button state should be deleted via the object "Comfort mode" once comfort mode has ended. It is therefore possible for an external presence detector to reset any set presence both via the bus and the presence button.	
Duration of prolonged comfort mode unit 1 min (0-255) (0:infinite)	**30**
If the presence button is pressed while in night mode or presence is reported by a presence detector, the comfort temperature is activated for the period set in this parameter.	
Closed loop control	**active** inactive
This parameter switches the closed loop control on or off.	

2.4.5. Measurement of actual value: Parameters



Parameters	Settings
Deviation for automatic sending unit 0.1 K (0-255) (0:inactive)	**1**
The room temperature is sent automatically if it changes by the set value.	
Adjustment of actual value measurement	**increase measurement value** decrease measurement value
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the room temperature that is measured externally is e.g. lower than the actual temperature in the controller, the setting "decrease measurement value" must be selected.	
Offset for measurement of actual value unit 0.1 K (0-127)	**0**
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the differential between the external measuring device and the temperature that is measured internally is e.g. 2°C, the value 20 must be entered here.	

2.4.6. Control value output: Parameters



Parameters	Settings
Direction of basic stage	**normal** inverted
In the setting "normal", the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Direction of additional stage	**normal** inverted
In the setting "normal", the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	

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Parameters	Settings
Deviation for automatic sending in unit 1 % (0-100) (0: inactive)	**1**
If the control value changes by the value that is set here, it is sent to the valve drive.	
Cycle time of switching control value unit 10 sec (1-255)	**90**
This parameter sets the period i.e. the interval in which a closed loop control is carried out via pulse width modulation (pulse duty factor: ON / OFF time). Note: The cycle time is calculated as follows: Value x 10 sec (90 x 10 sec = 900 sec cycle time).	
Cycle time for automatic sending	Inactive 2 minutes **10 minutes** 40 minutes
In addition to being sent automatically, the control value is sent after a change according to the time base that is set here.	
Control value output	**at once** limited to 1 telegram per minute
This parameter enables the automatic sending of the control value after a change to be limited to one telegram per minute. It is a good idea to filter telegrams if small proportional ranges are operated in larger projects so that the amount of telegrams on the bus is reduced.	

2.5. Assigning parameters for 2-level cooling

2.5.1. 2-level cooling: Communication objects

no.	Function	Object name	Type
01.01.002	12 S1 Temperature Control 210B04		
0	On / Off	Comfort mode	1 Bit
1	On / Off	Night mode	1 Bit
2	On / Off	Frost/heat protection	1 Bit
3	On / Off	Dew point mode	1 Bit
4	On / Off	Button	1 Bit
5	Actual setpoint	Setpoint	2 Byte
6	Sensor internal	Actual temperature value	2 Byte
7	continuous	Control value basic cooling	1 Byte
8	continuous	Control value of additional cooling	1 Byte
9	8-bit Status	Status	1 Byte
10	Base-setpoint in °C	Base-setpoint	2 Byte

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flags
0	On / Off	Comfort mode	1 Bit	CWTU
The “Comfort” mode is selected via this object. In cooling mode, the setpoint is increased or reduced to a comfortable level. The telegram can be sent e.g. by a presence detector or a timer.				
1	On / Off	Night mode	1 Bit	CWTU
The “Night” mode is selected via this object. In cooling mode, the setpoint in rooms that are unoccupied for long periods (e.g. over night or at the weekend) is increased or reduced to a set level. The telegram can be sent e.g. by a timer.				
2	On / Off	Frost/heat protection	1 Bit	CWTU
The “Frost/heat protection” mode is selected via this object. The setpoint is reduced or increased until the room is protected from excessive cooling or overheating. The toggling can be activated e.g. via a window contact when the window is opened.				
3	On / Off	Dew point mode	1 Bit	CWTU
The “Dew point” mode is selected via this object. The cooling is switched off unconditionally. The telegram can be sent e.g. by a dew point sensor in a cooling ceiling.				

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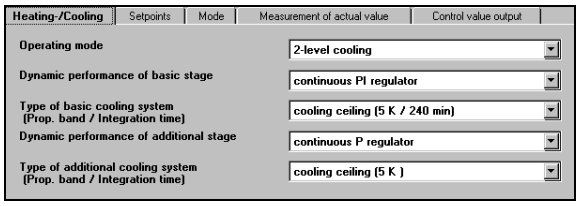
Obj	Function	Object name	Type	Flags
4	On / Off	Button	1 Bit	CRWTU
The status of the presence button is sent on the bus via this object. The value can also be modified via the bus. Object value “1”: switched to comfort mode with the presence button Object value “0”: presence button is reset The object is sent automatically if the button status changes (the presence button is pressed) or when night mode is started or ended.				
5	Actual setpoint	Setpoint	2 Byte	CRT
This object contains the current setpoint which is used to regulate the temperature instantaneously. The value is sent with a resolution of 0.08 K. The object is automatically sent if the room temperature changes or after bus voltage recovery.				
6	Sensor internal	Actual value temperature	2 Byte	CRT
This object contains the current actual temperature value that is sent automatically by the controller when there is a change. See also the parameters for measuring the room temperature.				
7	Continuous	Control value basic cooling	1 Byte	CRT
The control value for the basic level in the 2-level cooling mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
8	Continuous	Control value of additional cooling	1 Byte	CRT
The control value for the additional level in the 2-level cooling mode is issued via this object. The object type is defined in the parameter setting “Control value output”.				
9	8-bit Status	Status	1 Byte	CRT
This object contains the current controller status which is automatically sent after a change in the status. The individual bits have the following meaning: Bit 0: 1 = Comfort mode On Bit 1: 1 = Standby mode On Bit 2: 1 = Night mode On Bit 3: 1 = Frost/heat protection mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				
10	Base setpoint in °C	Base setpoint	2 Byte	CWTU
This object is used to modify the base setpoint that is preset in the parameter setting via the bus (e.g. dependent on the external temperature or summer/wintertime). The accuracy is 1°C, as in the parameter setting. As the previous value is overwritten in the EEPROM after a change, this value should not be modified more than once a day, in order to avoid errors in the EEPROM.				

2.5.2. 2-level cooling: Parameters



Parameters	Settings
Operating mode	heating cooling heating and cooling 2-level heating **2-level cooling**
This parameter is used to activate the heating and cooling function. The following settings are possible: “heating”: only the heating function is active “cooling”: only the cooling function is active “heating and cooling”: both the heating and cooling function are active (e.g. air conditioning system) “2-level heating”: heating function with basic and additional levels is active “2-level cooling”: cooling function with basic and additional levels is active	
Dynamic performance of basic stage	**continuous PI regulator** switching PI regulator continuous2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the cooling system and determines which data format is used to send the control value on the bus.	
Type of basic cooling system (Prop. band / Integration time)	air convector (4 K/90 min) Split Unit (4 / 90 min) **cooling ceiling (5 K / 240 min)** via control parameter
This parameter is used to adapt the PI algorithm via field values from various cooling systems. If the setting “via control parameter” is selected, the control parameters can be set directly.	
Dynamic performance of additional stage	**continuous PI regulator** switching PI regulator continuous2 level regulator switching 2 limits regulator
This parameter is used to select a control algorithm for the cooling system and determines which data format is used to send the control value on the bus.	
Type of additional cooling system (Prop. band / Integration time)	air convector (4 K/90 min) Split Unit (4 / 90 min) **cooling ceiling (5 K / 240 min)** via control parameter
This parameter is used to adapt the PI algorithm via field values from various cooling systems. If the setting “via control parameter” is selected, the control parameters can be set directly.	

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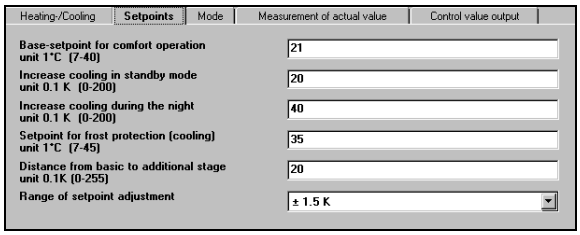
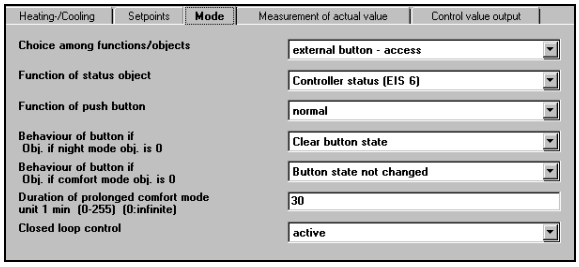
2.5.3. Setpoints: Parameters



Parameters	Settings
Base setpoint for comfort operation unit 1°C (7-40)	**21**
This parameter is used to calculate the setpoint values. The setpoints for comfort, standby and night mode are based on this value i.e. all these setpoints can be adjusted via this parameter. This value has the same meaning as the object "Base setpoint" whereby the object has a higher priority (see also the description for object no. 10).	
Increase cooling in standby mode unit 0.1 K (0-200)	**20**
The temperature increase for standby mode in the "cooling" setting can be defined via this parameter. Note: The temperature increase is calculated as follows: Value x 0.1 [Kelvin]:(20 x 0.1 K = 2 K temperature increase).	
Increase cooling during the night unit 0.1 K (0-200)	**40**
The temperature increase for night mode in the "cooling" setting can be defined via this parameter. Note: The temperature increase is calculated as follows: Value x 0.1 [Kelvin]:(40 x 0.1 K = 4 K temperature increase).	
Setpoint for heat protection (cooling) unit 1°C (7-45)	**35**
The opening of a window that is monitored by a window contact causes the controller to switch to "Heat protection" in cooling mode. If "Heat protection" has been detected, the setpoint of the room temperature is increased to the value that is set here (default is 35°C). On the one hand, it prevents the energy for cooling from being wasted and on the other hand, it guarantees that the controller remains active and the room cannot cool down or heat up. The "Frost/heat protection" mode is indicated on the front panel of the controller by a red LED next to a corresponding pictogram.	
Distance from basic to additional stage unit 0.1 K (0-255)	**20**
This parameter determines whether the starting point of the additional level is below or above the setpoint of the basic level for 2-level heating or cooling.	
Parameters	**Settings**
Range of setpoint adjustment	0 (passive) ± 0.5 K; ± 1.0 K; **± 1.5 K** ± 2.0 K; ± 2.5 K; ± 3.0 K; ± 3.5 K; ± 4.0 K; ± 4.5 K; ± 5.0 K
The step width of the setpoint adjustment per notch of the rotary switch is set via this parameter. The selected value applies to both an upward (+) or downward (-) adjustment.	

2.5.4. Mode: Parameters



Parameters	Settings
Choice among functions/ objects	**external button - access** lockable additional stage
Due to space restrictions in the controller, it is only possible to use the object "External button" or "Lockable additional stage" for 2-level operation. **Note:** The parameter can only be accessed for 2-level operation.	
Function of status object	**Controller status (EIS 6)** Comfort mode (EIS 1) Standby mode (EIS 1) Night mode (EIS 1) Frost/heat protection (EIS 1) Dew point mode (EIS 1) Heating mode (EIS 1) Controller inactive mode (EIS 1) Frost alarm (EIS 1)
This parameter defines which status information is sent in the "Status" object.	
Function of push button	**normal** Button disabled
The function of the presence button can be disabled via this parameter. In the setting "normal", the controller reacts to a push button action depending on the parameter settings. In the setting "Button disabled", the controller ignores all push button actions.	

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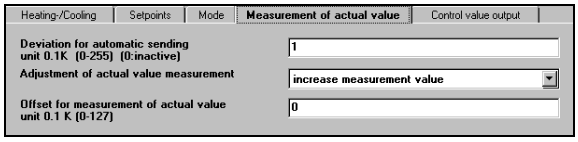
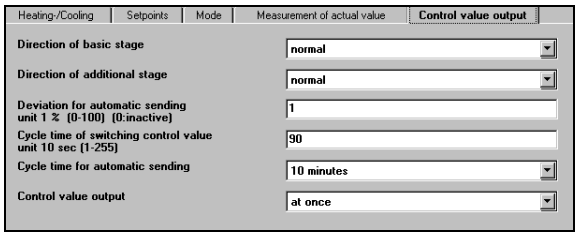
Parameters	Settings
Behaviour of button if night mode obj. is 0	**Clear button state** Button state restore
This parameter determines whether the previous push button state is restored or deleted when night mode has ended. The controller can thus revert to comfort mode after night reduction if this mode was previously activated via a push button action.	
Behaviour of button if comfort mode obj. is 0	**Button state not changed** Clear button state
This parameter specifies whether the push button state should be deleted via the object “Comfort mode” once comfort mode has ended. It is therefore possible for an external presence detector to reset any set presence both via the bus and the presence button.	
Duration of prolonged comfort mode unit 1 min (0-255) (0:infinite)	**30**
If the presence button is pressed while in night mode or presence is reported by a presence detector, the comfort temperature is activated for the period set in this parameter.	
Closed loop control	**active** inactive
This parameter switches the closed loop control on or off.	

2.5.5. Measurement of actual value: Parameters



Parameters	Settings
Deviation for automatic sending unit 0.1 K (0-255) (0:inactive)	**1**
The room temperature is sent automatically if it changes by the set value.	
Adjustment of actual value measurement	**increase measurement value** decrease measurement value
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the room temperature that is measured externally is e.g. lower than the actual temperature in the controller, the setting “decrease measurement value” must be selected.	
Offset for measurement of actual value unit 0.1 K (0-127)	**0**
If the room temperature that is measured externally deviates from the actual temperature in the controller, an adjustment can be made here. If the differential between the external measuring device and the temperature that is measured internally is e.g. 2°C, the value 20 must be entered here.	

2.5.6. Control value output: Parameters



Parameters	Settings
Direction of basic stage	**normal** inverted
In the setting “normal”, the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Direction of additional stage	**normal** inverted
In the setting “normal”, the closed loop control assumes that the valve is open at a control value of 100%. Various types of valves can therefore be adapted.	
Deviation for automatic sending unit 1 % (0-100) (0: inactive)	**1**
If the control value changes by the value that is set here, it is sent to the valve drive.	
Cycle time of switching control value unit 10 sec (1-255)	**90**
This parameter sets the period i.e. the interval in which a closed loop control is carried out via pulse width modulation (pulse duty factor: ON / OFF time). Note: The cycle time is calculated as follows: Value x 10 sec (90 x 10 sec = 900 sec cycle time).	
Cycle time for automatic sending	inactive 2 minutes **10 minutes** 40 minutes
In addition to being sent automatically, the control value is sent after a change according to the time base that is set here.	
Control value output	**at once** limited to 1 telegram per minute
This parameter enables the automatic sending of the control value after a change to be limited to one telegram per minute. It is a good idea to filter telegrams if small proportional ranges are operated in larger projects so that the amount of telegrams on the bus is reduced.	

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3. Diagrams

3.1. PI controller in heating/cooling mode

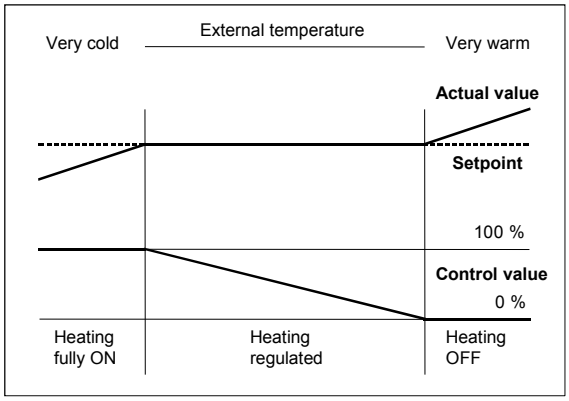

Diagram 1: PI controller in heating mode

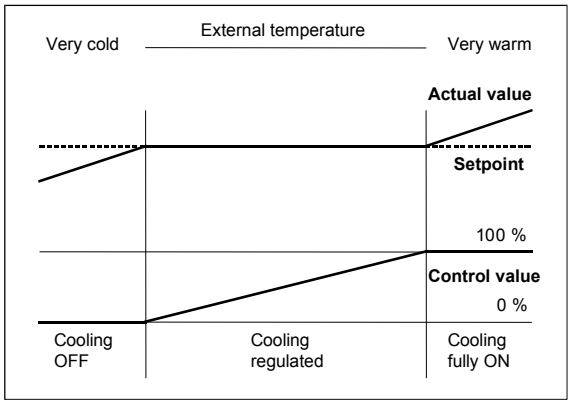

Diagram 2: PI controller in cooling mode

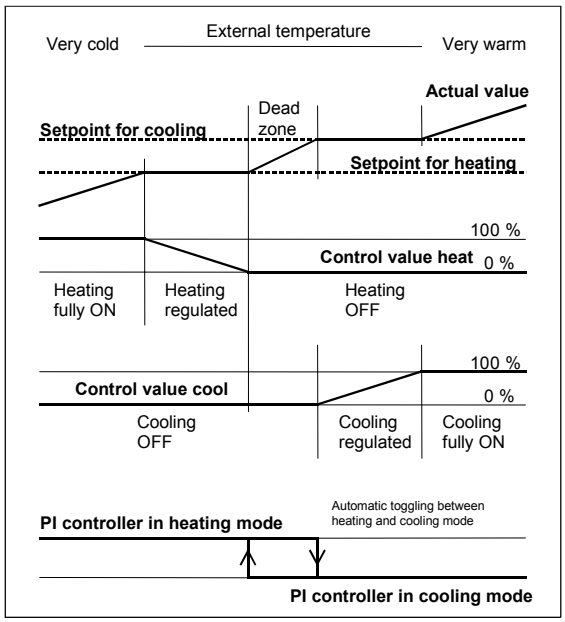

Diagram 3: PI controller in heating and cooling mode with automatic toggling

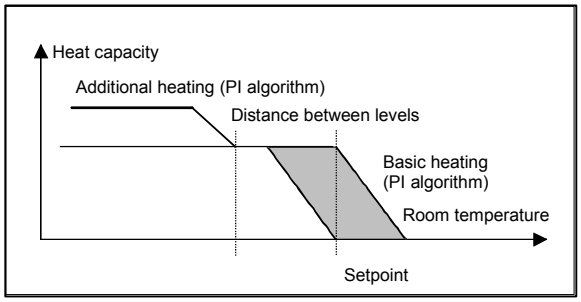

Diagram 4: PI controller in 2-step heating mode

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3.2. Control value output

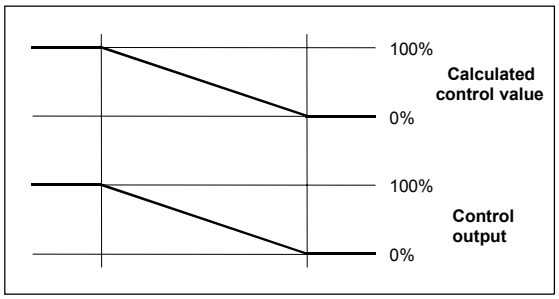


Diagram 5: Continuous output of the control value

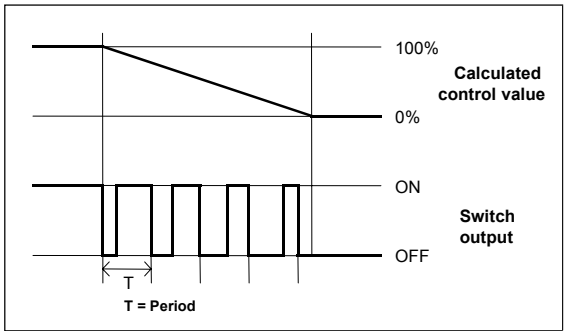
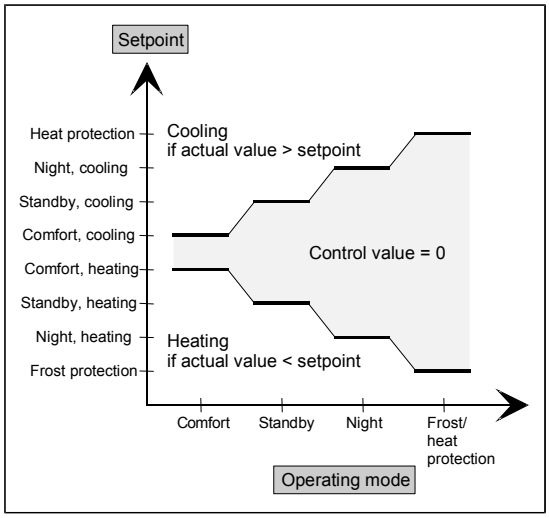


Diagram 6: Switching output of the control value

3.3. Setpoints of the operating modes



Space for notes

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