

20 S2 Room temperature controller 904401**Use of the application program**

Product family: Heating, Air conditioning, Ventilation
Product type: Thermostat
Manufacturer: Siemens
Name: Room temperature controller IKE 250
DELTA millennium
Order no.: 5WG1 250-8AB01

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1. Functional description

1.1. Functional overview

The application program "20 S2 Room temperature controller 904401" has several function blocks which can be combined with each other in different ways to make the following functions available:

- Room temperature control (heat, heat/cool, service station) with the subfunctions:
 - calculation of the setpoint value (dependent on the current operating state),
 - temperature measurement via the internal and external temperature sensor,
 - calculation of the actual value (evaluated by the internal and external sensor, temperature offset),
 - timed-out removal of night reduction (extended comfort mode),
 - PI control for heating/cooling with continuous output of control values (in %) or switching output of control values (On/Off),
 - additional two-point control for heating at the same setpoint value as for PI control (can be used for example for simultaneous floor and radiator heating),
 - additional output of a switching command to open or close a ventilation flap: the flap is only opened for comfort mode and closed for all other operational modes,
 - no room temperature control when used as a "service station".
- Status display via LEDs
 - display of operational states,
 - display of setpoint adjustment,
 - display of three additional information values (object values) by the flashing of LEDs.

1.2. Control elements

The room temperature controller has four push buttons which can be used to carry out the required settings. The "Comfort" and "Standby" buttons are used to toggle between these two states. A long operation (longer than 5 s) of the "Comfort" push button enables the user to change (scroll function) between the four controller states: comfort, standby, night and frost/heat protection modes. The state is displayed via the corresponding LED. The two "Setpoint adjustment" buttons enable the setpoint temperature to be increased or reduced by a set value. This is possible in the "Comfort", "Standby" and "Night reduction" modes. The function and display of "Setpoint adjustment" are deactivated in the "Frost protection" mode.

1.3. Room temperature control

It is only possible to control the room temperature by heating or heating/cooling. The operational states of comfort, standby, night and frost/heat protection are available for this.

The application program compares the actual temperature (actual value) recorded by the temperature controller with the required setpoint temperature (setpoint value) and then calculates the associated control value.

1.3.1 PI controller

The room temperature control is carried out by a PI controller. The characteristics of the PI controller are mainly determined by the proportional band and the reset time. Both these variables can be entered individually for heating and cooling in the relevant parameter window.

Limitation of the integral-action component

The integral-action component can be limited using parameters. This limitation ensures that the total of the integral-action component and the proportional component never exceeds 100%. This means that the control output reacts immediately to a small difference in the setpoint.

Handling of the integral-action component for "Controller Off"

The integral-action component is reduced with a reset time modified by factor 10 and a system deviation of 1 K.

Handling of the integral-action component for "Window Open"

As for the setting "Controller Off", the integral-action component is reduced but in this case it is also saved as the controller uses a new setpoint (heat or frost protection) for the setting "Window Open". If "Window Closed" is selected, the saved and partially or fully reduced component is written back into the controller. The control value thus only changes slightly when a window is opened temporarily.

1.3.2 Two-point controller

The temperature controller has two separate control functions – a PI controller and a two-point controller. The two-point controller only becomes active at discrete intervals apart from when there is a change in the setpoint value. The duration of this cycle can be selected. No new setpoint is calculated between these intervals. The setpoint of the two-point controller is calculated from the setpoint of the PI controller plus an adjustable offset. The hysteresis of the two-point controller can likewise be assigned parameters. In the "Cool" operating mode, the

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two-point controller is always switched off. The additional two-point controller can be used e.g. for regulating the valve of a floor heating system while the PI controller is used to control the radiator valves in the same room.

1.3.3 Calculation of actual value

Internal sensor

The temperature controller IKE 250 contains an integrated, calibrated temperature sensor for detecting the room temperature in a range between 0°C and +40°C with a resolution of 0.1°C. This internal actual value can be adapted to environmental influences (e.g. cold exterior wall) by means of an adjustable offset. If required, corrections can be made to the temperature value that is measured via the internal sensor and it can be read or sent via a unique object. A parameterisable "Hysteresis" permanently prevents very small temperature fluctuations from becoming new actual values.

External sensor

The temperature controller IKE 250 has an additional object for the temperature value that is measured by an external temperature sensor. If required, this object can send "Read signals" to the corresponding object of the external sensor so that it transfers the actual value. Fundamentally an external sensor should however automatically send each change in temperature. An adjustable offset can also be assigned to the external temperature value. In the event of a bus voltage failure, the temperature controller stores the last received external temperature value so that the program has a sensible starting value immediately on bus voltage recovery and does not need to request this externally first.

Actual value

The program determines the current actual temperature value using the temperature values of the internal and external sensors as well as a parameterisable "Weighting" function. Using this function, it is determined what percentage of the external temperature is used when calculating the actual temperature value.

The actual temperature value can be read at any time via a unique object or sent automatically when there is a change in a parameterisable value.

1.3.4 Calculation of setpoint value

Base setpoint value

The setpoint value is determined from the current operational mode, the base setpoint value and if required a setpoint adjustment which must be taken into consideration.

The base setpoint is specified via the corresponding object but can also be set to a fixed value via a parameter which can then no longer be modified by the object. If there is a setpoint selection via the corresponding object, the value is automatically stored in the EEPROM in the event of bus voltage failure.

Setpoint adjustment

The specified base setpoint can be shifted manually via setpoint adjustment either 2 steps upwards or downwards. The resulting value is described as an "Internal base setpoint". The setpoint adjustment is calculated from the number of steps up or down and from the parameterised change (steepness) per step (e.g. 1.5 Kelvin/step). 5 discrete setpoint adjustment values are produced (e.g. -3, -1.5, 0, +1.5, +3 Kelvin). Each change in the setpoint adjustment is automatically sent. If a value is received via the setpoint adjustment object, the resulting step is calculated and the corresponding LED is triggered. If the received value does not correspond exactly to one of the five discrete values, then the next possible discrete value is selected, displayed and sent back.

1.3.5 Operational modes

Comfort mode

This operational mode is displayed by the "Comfort" LED. The setpoint for comfort mode is dependent on whether the heating or cooling mode is active. If the heating mode is active, the setpoint corresponds to the internal base setpoint whereas for the cooling mode, the setpoint consists of the internal base setpoint and the parameterisable dead zone (if the controller is only assigned parameters for heating, the dead zone has no effect). If the actual value of the room temperature lies above the "Internal base setpoint" but still below the "Internal base setpoint plus dead zone" (thus within the dead zone), the room is neither heated nor cooled (both valves are closed) i.e. the dead zone contributes to saving energy and moreover ensures that the heating and cooling valves are never open at the same time.

It is possible to toggle between the "Standby" and "Comfort" modes by pressing the "Comfort" button. If the "Night" mode is active, it is also possible to switch over to "Comfort" mode whereby a "Comfort mode extension" can be set according to time. Pressing the "Comfort" button again restarts the extended comfort period from the beginning. If the "Standby" button is pressed, the comfort mode extension is stopped prematurely. Once the set time period has elapsed and the extended comfort mode has been stopped by a push button action, the program reverts to the "Night" mode.

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Standby mode

This operational mode is displayed by the "Standby" LED. The setpoint for "Standby" mode is dependent on whether the heating or cooling mode is active. When the heating mode is active, the setpoint corresponds to the internal base setpoint minus the temperature reduction for "Standby" mode whereas for cooling mode, the setpoint consists of the internal base setpoint, the dead zone and the rise in temperature for "Standby" mode. It is possible to adjust the values for the rise and fall in temperature for "Standby" mode. By pressing the right outer "Standby" button, it is possible to switch from "Comfort" mode to "Standby" mode. However, it is only possible to switch back to "Night" mode from "Comfort mode extension" by pressing the same button.

Night mode

This operational mode is displayed by the "Night" LED. The setpoint for "Night" mode is dependent on whether the heating or cooling mode is active. When the heating mode is active, the setpoint corresponds to the internal base setpoint minus the reduction for "Night" operation whereas for the cooling mode, the setpoint consists of the internal base setpoint, the dead zone and the increase for "Night" mode. It is possible to set the values for the reduction and increase for "Night" mode. It is only possible to toggle in this mode via a command telegram "Night mode On" or as a result of the stopping or end of the extended comfort mode.

Frost/heat protection mode

This operational mode is displayed by the "Frost protection" LED. The setpoint in this mode is dependent on whether the heating or cooling mode is active. When the heating mode is selected, the setpoint corresponds to the adjustable value for "Frost protection" and when the cooling mode is active, it corresponds to the adjustable value for "Heat protection". It is only possible to toggle in this operational mode via a received command telegram "Frost/heat protection On" or via a received status telegram "Window Open".

Changing the operational state manually

The control of the operational states is normally carried out via a timer, a time program or the control station of a building automation system. Using this special function, it is however possible to change the operational state of the controller manually using the push button for switching to comfort mode. To do this, the push button must be pressed for longer than 5 seconds. The 4 possible operational modes are displayed cyclically one after the other (the corresponding LED lights up). The operational state that is displayed when the push button is released then becomes active.

Status of the windows

The evaluation of the window states enables the controller to react when the windows are opened. The controller has two window objects for this purpose. If one or both of the window objects are set to logic "1", the mode is switched to "Frost/heat protection" i.e. the room temperature setpoint is set for heating to the value for frost protection and is set for cooling to the value for heat protection.

When a window is opened, the currently active operational mode is stored. If all the windows are closed again (i.e. both windows are set to logic "0"), then the mode is switched back to the stored operational state (before the window was opened). An additional parameter controls whether the opening of a window leads immediately or only after a specified time period to toggling to "Frost/heat protection" mode, so that if necessary there is no reaction to a window being opened briefly.

Presence

The controller contains in addition an object for the status "Presence" that can however only be used for the heating mode (not for heat/cool). If the object value "1" is received via this object, the program is switched to "Comfort" mode. If the object value "0" is received, the program switches to "Standby" mode.

If "Presence" is reported via the presence object and a command telegram is received for switching the controller to "Night" mode, this command is stored temporarily and only becomes effective if the object value "0" has been received via this presence object (this corresponds to a termination of the extended comfort mode).

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1.3.6 Status objects

The room temperature controller IKE 250 has an 8-bit status object for setting or detecting the operational mode. The respective bit states of the 8-bit status object are also available via eight 1-bit objects. An "On" switching command to the respective 1 bit object is sufficient for toggling between comfort, night, standby and frost protection modes. After a delay of approx.

2 seconds, the status objects are updated i.e. all the objects are automatically sent whose switching state has been changed by toggling to the new operational mode. If during the changeover the current operational mode is switched off and the new one is switched on, the period between these two operations must be less than 2 seconds. If the previous operational mode is only switched off, (or several bits in the 8 bit status object are set to the operational mode), the operating system is always switched to "Standby" mode in order to guarantee a defined operating state. A change in the operational mode is always displayed immediately via the corresponding LED, however it is only accepted after approx. 2 seconds.

The frost alarm and heat/cool states are determined by the controller itself. The operational mode is always stored in the event of a bus voltage failure and reproduced on bus voltage recovery. Each time the controller IKE 250 is assigned new or different parameters, the initial starting value of the operational mode can be set.

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 = Heat mode, 0 = Cool mode
- Bit 6: 1 = Controller On, 0 = Controller Off
- Bit 7: 1 = Frost alarm

Structure of the 8-bit status object:

Operational state	Bit								Hex value
	7	6	5	4	3	2	1	0	
Heat, comfort mode	0	1	1	0	0	0	0	1	61
Heat, standby mode	0	1	1	0	0	0	1	0	62
Heat, night mode	0	1	1	0	0	1	0	0	64
Heat, frost protection mode	0	1	1	0	1	0	0	0	68
Frost alarm	1	1	1	x	x	x	x	x	(E0)
Cool, comfort mode	0	1	0	0	0	0	0	1	41
Cool, standby mode	0	1	0	0	0	0	1	0	42
Cool, night mode	0	1	0	0	0	1	0	0	44
Cool, frost protection mode	0	1	0	0	1	0	0	0	48
Cool, dew point alarm	0	1	0	1	0	0	0	0	50
Controller Off	0	0	0	0	0	0	0	0	00

1.4. LED display

Types of display

The room temperature controller IKE 250 has 9 LEDs. Using these LEDs, it is possible to display the operating state of the controller and the current setpoint adjustment.

The controller uses four LEDs for displaying its operating state which represent the four states of frost protection, night operation, standby and comfort mode.

Only one operating state can be active at one time. In the "Frost protection" mode, there is no display of the setpoint adjustment as it is regulated according to the fixed, preselected setpoint value for frost protection. Up to three external object values can be displayed by the flashing of any LED. The flashing function thus takes precedence over the basic function of the LED (e.g. always ON) i.e. if the respective object takes on the value "1", the LED begins to flash. If the value becomes "0" again, the LED lights up as before. (Note: If the controller is switched off, the LEDs still flash).

Fault initialisation or internal error

The LEDs of the room temperature controller IKE 250 form a run light during initialisation that is extinguished once the initialisation has been run. If a fault occurs, the run light lights up until the problem has been resolved. If there is a fault in the application hardware (e.g. reset of the application hardware due to a lightning strike in the immediate vicinity), the fault is likewise displayed by the run light.

The fault is resolved by disconnecting and reconnecting the bus.

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2. Communication objects and parameters

Maximum number of group addresses: 45
 Maximum number of associations: 45

2.1. Configuration: Parameters

Cooling	2-Point-Controller	LEDs			
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Operating mode	heating and cooling				
Sending of all 1-bit status values at initialization	No				
Enable all buttons	No				
Button to decrease setpoint enabled	Yes				
Button to increase setpoint enabled	Yes				
Push button standby enabled	Yes				
Button comfort enabled	Yes				

Parameters	Settings
Operating mode	only heating heating and cooling service station
The operating mode of the room temperature controller is set via this parameter. The parameter windows and the object types in the object list change automatically according to the setting.	
Sending of all 1-bit status values at initialization	No Yes
It can be determined here whether all the 1-bit status values are sent after each initialization process. However if "Yes" is selected, attention should be paid to the busload!	
Enable all buttons	Yes No
Using this parameter, the 4 push buttons of the controller can be enabled altogether ("Yes") or individually ("No"). If "No" is selected, the parameter window changes and the 4 buttons are displayed individually in the parameter window.	
Button to decrease setpoint enabled	Yes No
Button to increase setpoint enabled	Yes No
The buttons for "Setpoint reduction" and "Setpoint increase" can be individually enabled or disabled with this parameter. If the push buttons are disabled, the setpoint can only be increased or decreased via the corresponding object.	
Push button standby enabled	Yes No
Using this parameter, the "Standby" button can be enabled or disabled. If the button is disabled, it is only possible to switch to the "Standby" mode via the corresponding object or via the scroll function of the "Comfort" button.	

Parameters	Settings
Button comfort enabled	Yes No

The "Comfort" button can be enabled or disabled via this parameter. If the button is disabled, it is only possible to switch to "Comfort" mode via the corresponding object. The scroll function of the "Comfort" mode and the comfort extension mode are also not available when the button is disabled.

2.2. Temperature: Parameters

Cooling	2-Point-Controller	LEDs			
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Ratio of sensor extern / intern	only sensor intern				
Offset for actual value of internal sensor	No offset				
Offset for actual value of external sensor	No offset				
Deviation for automatic sending of the actual value of temperature	0.2 K				
Cycle time for automatical sending of actual value temperature	10 minutes				
Cycle time for a temperature request to the external sensor	10 minutes				
Hysteresis of actual value temperature	+/- 0.05 K				

Parameters	Settings
Ratio of sensor extern / intern	only sensor extern 90% / 10% 80% / 20% 70% / 30% 60% / 40% 50% / 50% 40% / 60% 30% / 70% 20% / 80% 10% / 90% only sensor intern

Via this parameter, it is possible to select what proportion (weighting) of the actual values of the external and internal sensor is used to calculate the total actual value. The first value corresponds to the weighting of the external sensor while the second value refers to the weighting of the internal sensor.

Offset for actual value of internal sensor	+10 K; +8.0 K; +7.0 K; +6.5 K; +6.0 K; +5.5 K; +5.0 K; +4.5 K; +4.0 K; +3.5 K; +3.0 K; +2.5 K; +2.0 K; +1.5 K; +1.2 K; +1.0 K; +0.8 K; +0.6 K; +0.5 K; +0.4 K; +0.3 K; +0.2 K; +0.1 K; No offset -10 K; -8.0 K; -7.0 K; -6.5 K; -6.0 K; -5.5 K; -5.0 K; -4.5 K; -4.0 K; -3.5 K; -3.0 K; -2.5 K; -2.0 K; -1.5 K; -1.2 K; -1.0 K; -0.8 K; -0.6 K; -0.5 K; -0.4 K; -0.3 K; -0.2 K; -0.1 K;
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It is possible to adapt the actual value of the internal sensor to the environmental influences (e.g. cold wall) via the offset.

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Parameters	Settings
Offset for actual value of external sensor	+10 K; +8.0 K; +7.0 K; +6.5 K; +6.0 K; +5.5 K; +5.0 K; +4.5 K; +4.0 K; +3.5 K; +3.0 K; +2.5 K; +2.0 K; +1.5 K; +1.2 K; +1.0 K; +0.8 K; +0.6 K; +0.5 K; +0.4 K; +0.3 K; +0.2 K; +0.1 K; no offset -10 K; -8.0 K; -7.0 K; -6.5 K; -6.0 K; -5.5 K; -5.0 K; -4.5 K; -4.0 K; -3.5 K; -3.0 K; -2.5 K; -2.0 K; -1.5 K; -1.2 K; -1.0 K; -0.8 K; -0.6 K; -0.5 K; -0.4 K; -0.3 K; -0.2 K; -0.1 K;
	It is possible to adapt the actual value of the external sensor to the environmental influences (e.g. cold wall) via the offset.
Deviation for automatic sending of the actual value of temperature	0.1 K; 0.2 K ; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 0.9 K; 1.0 K; 1.2 K; 1.5 K; 1.8 K; 2.0 K; 2.5 K; 3.0 K; 3.5 K; 4.0 K; 4.5 K; 5.0 K; inactive
	It is possible to set here the temperature adjustment of the actual value which causes the actual value to be sent automatically.
Cycle time for automatical sending of actual value temperature	5; 6; 7; 8; 9; 10 ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; inactive
	In this parameter the time interval is defined in which the actual value should be sent in addition to being sent automatically when there is a change.
Cycle time for a temperature request to the external sensor	5; 6; 7; 8; 9; 10 ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; inactive
	The time interval for the query of the external actual value is set here.
Hysteresis of actual value temperature	+/- 0.01 Kelvin +/- 0.03 Kelvin +/- 0.05 Kelvin +/- 0.07 Kelvin
	A hysteresis can be set via this parameter. It prevents slight temperature fluctuations producing new actual values.

2.3. Frost Alarm: Parameters

Cool	2-Point-Controller	LEDs			
Configuration	Temperature	Frost Alarm	Controller General	Controller General 2	Heat
Value for frost alarm				5.0 °C	
Cycle time for the sending of a frost alarm				10 min.	

Parameters	Settings
Value for frost alarm	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 temperature at which the controller sends a frost alarm can be defined in this parameter.	
Cycle time for sending of a frost alarm	5; 6; 7; 8; 9; 10 ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; inactive
The transmission repetition rate for the frost alarm can be set here. In addition to being sent automatically when there is a change, the frost alarm is sent cyclically e.g. every 10 minutes.	

2.4. Assigning parameters for heat / cool

2.4.1 Heat / Cool: Communication objects

Phys.Addr.	Program			
no.	Function	Object name		Type
01.01.018	20 S2 Room temperature controller	904401		
4	Sensor intern + sensor extern	Actual temperature value		2 Byte
5	Actual value of int. sensor	Actual temperature value int. sensor		2 Byte
6	Actual value of ext. sensor	Actual temperature value ext. sensor		2 Byte
7	Base-setpoint in °C	Base-setpoint		2 Byte
8	Adjustment in Kelvin	Setpoint adjustment		2 Byte
9	Actual setpoint	Setpoint		2 Byte
10	8-bit Status	Status		1 Byte
11	On / Off	Comfort		1 Bit
12	On / Off	Standby		1 Bit
13	On / Off	Night reduction		1 Bit
14	On / Off	Frost protection		1 Bit
15	On / Off	Dew point alarm		1 Bit
16	1=Heating / 0=Cooling	Heating / Cooling		1 Bit
17	On / Off	Pi-controller		1 Bit
18	On / Off	Frost alarm		1 Bit
19	continuous	Control value heating		1 Byte
20	continuous	Control value cooling		1 Byte
21	1=Open / 0=Closed	Ventilating flap		1 Bit
22	Switching	Control value of additional 2-point-controller		1 Bit
23	1=Open / 0=Closed	Window contact I		1 Bit
24	1=Open / 0=Closed	Window contact II		1 Bit
...

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

Obj	Function	Object name	Type	Flag
4	Sensor intern + Sensor extern	Actual tempera- ture value	2 Byte	CTUR
This object contains the current total actual temperature value. The value is sent automatically when there is a change.				
5	Actual value of int. sensor	Actual tempera- ture value int. sensor	2 Byte	CTUR
This object contains the current actual temperature value of the internal sensor.				
6	Actual value of ext. sensor	Actual tempera- ture value ext. sensor	2 Byte	CTURW
This object contains the current actual temperature value of the external sensor. Cyclical read telegrams can also be sent via this object to the external temperature sensor so that it returns its current actual value.				
7	Base setpoint in °C	Base-setpoint	2 Byte	CWTUR
The base setpoint can be modified by external adjustment telegrams via this object.				
Note: If the base setpoint is to be modified via this object, it is a good idea to select the parameter setting "value at voltage failure is to be saved" in the parameter window "Controller general 2". The controller thus has this value at its disposal immediately on bus voltage recovery.				
8	Adjustment in Kelvin	Setpoint adjustment	2 Byte	CWTUR
Each change in the setpoint adjustment is sent via this object. If a value is received via the object for setpoint adjustment, the program calculates the resulting discrete value (step). If the received value does not correspond to one of the 5 discrete values, then the next possible value is accepted, displayed and returned.				
9	Actual setpoint	Setpoint	2 Byte	CTUR
This object contains the actual setpoint value for the room temperature. The setpoint is dependent on the current operating mode (e.g. standby mode).				

Obj	Function	Object name	Type	Flag
10	8-bit Status	Status	1 Byte	CWTUR
This object contains the current status of the controller which is sent automatically when there is a change in the state. 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 = Heat mode, 0 = Cool mode				
Bit 6: 1 = Controller On, 0 = Controller Off				
Bit 7: 1 = Frost alarm				
11	On / Off	Comfort	1 Bit	CWTUR
Using this object, the "Comfort" operating mode can be set via the bus. On receipt of an "On" signal, the "Comfort" mode is switched on and the previously active operating mode is switched off.				
If the controller is set to "Night" mode, it is possible to activate the comfort mode extension via this object.				
12	On / Off	Standby	1 Bit	CWTUR
Using this object, the "Standby" operating mode can be set via the bus. On receipt of an "On" signal, the "Standby" mode is switched on and the previously active mode is switched off.				
If the controller is set to "Comfort mode extension", it is only possible to switch to "Standby" mode via this object.				
13	On / Off	Night reduction	1 Bit	CWTUR
Using this object, the "Night reduction" operating mode (night mode) can be set via the bus.				
On receipt of an "On" signal, the "Night reduction" mode is switched on and the previously active operating mode is switched off.				
14	On / Off	Frost protection	1 Bit	CWTUR
Using this object, the "Frost protection" mode can be set via the bus. On receipt of an "On" signal, the "Frost protection" mode is switched on and the previously active operating mode is switched off.				
15	On / Off	Dew point alarm	1 Bit	CWTUR
A dew point alarm that has been sent by a dew point sensor can be received via this object and displayed via an LED.				

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Obj	Function	Object name	Type	Flag
16	1 = Heating / 0 = Cooling	Heating / Cooling	1 Bit	CTUR
	This object indicates whether the controller is in heating or cooling mode. If there is a change in the status, it is sent automatically.			
17	On / Off	PI-controller	1 Bit	CWTUR
	It is possible to switch the PI controller on or off via this object.			
18	On / Off	Frost alarm	1 Bit	CTUR
	The frost alarm is sent automatically if the measured temperature falls below the set value.			
19	continuous	Control value heating	1 Byte	CTUR
	The control value of the heating mode is given via this object. The object type is determined in the parameter setting "Type of control value". If the setting "Heating mode: Off" is selected when assigning parameters, this object does not appear in the object list.			
20	continuous	Control value cooling	1 Byte	CTUR
	The control value of the cooling mode is given via this object. The object type is determined in the parameter setting "Type of control value". If the setting "Cooling mode: Off" is selected when assigning parameters, this object does not appear in the object list.			
21	1 = Open / 0 = Closed	Ventilating flap	1 Bit	CTUR
	A switching command can be given to a ventilating flap using this object. The object only functions if the cooling mode is active. The flap is opened when the controller is set to "Comfort" mode while in cooling mode or if the "Dew point alarm" has been set (a "1" is sent). It is closed when the controller is no longer in this mode. An active window object (value = "1") also causes the flap to close. If the cooling mode has not been assigned, the object does not appear in the object list.			
22	Switching	Control value of additional 2-point-controller	1 Bit	CTUR
	The control value of the additional two-point controller is displayed via this object.			
23	1 = Open/ 0 = Closed	Window contact I	1 Bit	CWTUR
24	1 = Open/ 0 = Closed	Window contact II	1 Bit	CWTUR
	The status of the windows can be received via these two objects. If the object value = "1" (window open), the room temperature controller switches to "Frost/heat protection" mode and remains in this mode until the object value of window contact I or II is equal to "1".			

2.4.2 Controller general : Parameters

Cooling	2-Point-Controller	LEDs			
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Setpoint frost protection for heating	7 °C				
Setpoint for heat protection (cooling mode)	35 °C				
Standby-time heating reduction	2 K				
Night-time heating reduction	4 K				
Standby-time cooling increase	2 K				
Night-time cooling increase	4 K				
Setpoint adjustment per push button action	1.0 K				
Duration for extended comfort mode	60 minutes				
Evaluation of the window open time	after 30 seconds				
Assignment of control values to objects heating and cooling	seperate				

Parameters	Settings
Setpoint frost protection for heating	5°C; 6°C; 7°C; 8°C; 9°C; 10°C
Setpoint for heat protection (cooling mode)	30°C; 31°C; 32°C; 33°C; 34°C; 35°C; 36°C; 37°C; 38°C; 39°C; 40°C
Standby-time heating reduction	1 K; 2 K; 3 K; 4 K; 5 K;
Night-time heating reduction	1 K; 2 K; 3 K; 4 K; 5 K;
Standby-time cooling increase	1 K; 2 K; 3 K; 4 K; 5 K;

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Parameters	Settings
Night-time cooling increase	1 K; 2 K; 3 K; 4 K ; 5 K;
	This parameter is used to determine what value the setpoint temperature should be increased by if the operating mode switches from "Comfort" mode to "Night" mode while in cooling mode.
Setpoint adjustment per push button action	0.2 K; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 0.9 K; 1.0 K ; 1.2 K; 1.5 K; 1.8 K; 2.0 K; 2.2 K; 2.5 K;
	In this parameter the step width of the setpoint adjustment can be set per push button action. The specified value applies both to an adjustment upwards (+) and downwards (-).
Duration for extended comfort mode	60 min. 90 min. 120 min. inactive continuous
	The duration of the comfort mode extension is set in this parameter. If the "Night" mode is active and the "Comfort" button is pressed, the operating mode switches from "Night" mode to "Comfort" mode according to the time that is specified here. Once the time specified for the extended comfort mode has elapsed, the "Night" mode is reactivated. If the button is pressed again while the comfort mode extension is still active, the comfort period begins again. Pressing the "Standby" button ends the comfort mode extension.
Evaluation of the window open time	at once after 30 sec.
	The time frame for the evaluation of the window status is specified in this parameter as either immediately or after 30 seconds. Depending on the setting selected, the status "Window Open" causes the setpoint in heating mode to be set to the value for frost protection and in cooling mode to be set to the value for heat protection.
Assignment of control values to objects heating and cooling	both on object heating (special fkt.) separate
	It can be defined here whether the output of the control values is carried out via the respective objects (object 19 for control values for heat and object 20 for control values for cool) or globally via the object for heat (19).

2.4.3 Controller general 2: Parameters

Cooling	2-Point-Controller	LEDs			
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Internal control mode (look at controller description)	I-part is not limited				
Duration for cyclical sending of control values	10 minutes				
Dead zone between heating und cooling	3.0 K				
Dead zone of controller	0.1 K				
Maximum control deviation	10.0 K				
Base-setpoint and actual value of external sensor at restart	22 °C				
Operating mode after parameterizing	frost protection mode				

Parameters	Settings
Internal control mode (look at controller description)	I-part is limited I-part is not limited
	The integral-action component of the internal PI controller can be limited with this parameter i.e. the total of the integral-action component and the proportional component never exceeds 100%. This means that the control output reacts immediately to a small difference in the setpoint.
Duration for cyclical sending of control values	5; 6; 7; 8; 9; 10 ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; inactive
	It is possible to specify the time interval for sending the control values in addition to them being sent automatically when there is a change.
Dead zone between heating and cooling	0.5 K; 0.6 K; 0.7 K; 0.8 K; 1.0 K; 1.2 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; 5.5 K; 6.0 K; 6.5 K; 7.0 K; 7.5 K; 8.0 K; 8.5 K; 9.0 K; 9.5 K; 10.0 K
	The dead zone between heat and cool is set in this parameter. The dead zone should prevent the controller from continuously switching between heating and cooling mode when there are slight temperature fluctuations.
Dead zone of controller	0.1 K ; 0.2 K; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 1.0 K; 1.2 K; 1.5 K; 2.0 K; 2.5 K
	The dead zone of the controller is set in this parameter. If the control deviation (i.e. the differential between setpoint value and actual value) is less than the value preselected by the dead zone, the controller remains inactive.
Maximum control deviation	0.5 K; 1.0 K; 2.0 K; 3.0 K; 4.0 K; 5.0 K; 6.0 K; 7.0 K; 8.0 K; 9.0 K; 10.0 K
	This parameter limits the control deviation to an adjustable value in order to avoid excessive fluctuations (e.g. for the setting "Window Open", the setpoint falls to the value for frost protection).

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Parameters	Settings
Base-setpoint and actual value of extern sensor at restart	5 °C; 10 °C; 13 °C; 15 °C; 16 °C; 17 °C; 18 °C; 19 °C; 20 °C; 21 °C; 22 °C ; 23 °C; 24 °C; 25 °C; 27 °C; 30 °C; value at voltage failure is to save
This parameter is used to specify which value the base set-point and the external actual value should accept so that the program has sensible starting values immediately on restart (bus voltage recovery). In the setting "value at voltage failure is to save", the basic setting for the first initialisation after the bus coupler has been programmed is 22°C. In general, it is only advisable to select this parameter setting if the basic set-point can be modified by external adjustment telegrams (via object 7).	

Operating mode after parameterizing

frost protection mode
night mode
standby mode
Comfort mode

It can be selected in this parameter which operating mode the program starts with after each (new) assignment of parameters.

2.4.4 Heat / Cool: Parameters (with continuous control value output)

The function and parameters of the parameter window "Cool" are identical to "Heat".

Cooling	2-Point-Controller	LEDs
Configuration	Temperature	Frost alarm
		Controller general
		Controller general 2
		Heating
Heating mode	On	
Proportional band	4.0 K	
Integration time	30 minutes	
Type of control value output	switching (1 bit)	
Maximum control value	100%	
Minimum control value	0%	
Direction of the control value	normal	
Always On from	100 % of control value	
Always Off until	1 % of control value	
Period duration of control value output	10 minutes	

Parameters	Settings
Heating mode	On Off
The heating mode can be switched on or off manually via this parameter. If "Off" is selected, all the parameters in this parameter window and object 19 in the object list are no longer displayed.	

Parameters	Settings
Proportional band	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
The proportional band of the PI controller is set via this parameter. A proportional band of 4 K means that a control deviation of 4 K leads to a change in the control value by 100%.	
Integration time	5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30 ; 40; 50; 60; 90; 120 min.; inactive
The integration time of the PI controller is specified via this parameter. An integration period of e.g. 10 minutes means that during this time the same size adjustment of the control value is carried out by the proportional component.	
Type of control value output	continuous (8 bit) switching (1 bit)
The type of control value output can be defined in this parameter. If "continuous (8 bit)" is selected, the output corresponds to the calculated control value with a resolution of 8 bit. When "switching (1 bit)" is selected, the output of the control value is carried out by "pulse width modulation" whereby the pulse factor between "On" and "Off" corresponds to the calculated control value. In the setting "switching (1 bit)", the parameter window changes and additional parameters are displayed. The object type of object 19 "Control value heat" changes from 1 byte to 1 bit.	
Maximum control value	0%; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
An upper limiting value for the control value can be set via this parameter.	
Minimum control value	0%; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
A lower limiting value for the control value can be set via this parameter.	

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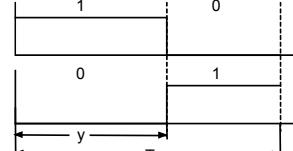
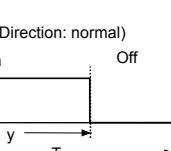
Parameters	Settings
Direction and scale of the control value	+1%; +2%; +3%; +5%; +7%; +10%; +15%; +20%; +30%; +40%; +50%; +60%; +70%; +80%; +85%; +90%; +95%; +100% (normal) - 1%; - 2%; - 3%; - 5%; - 7%; - 10%; - 15%; - 20%; - 30%; - 40%; - 50%; - 60%; - 70%; - 80%; - 85%; - 90%; - 95%; - 100%; (inverted)
The format of the control value output is defined in this parameter. In the setting "100% (normal)", the controller assumes that the valve is open when the control value is +100%. If however the valve is closed, the control value must be reversed (inverted). By reducing the percentage figure, a compression (scaling) of the control value is achieved. It is therefore possible for example to control various types of valves.	
Change of control value for automatic sending	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%;
It can be determined in this parameter which control value change causes the control value to be sent automatically.	

2.4.5 Heat / Cool: Parameters (with switching control value output)

Cooling	2 Point Controller	LEDs			
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Heating mode	On				
Proportional band	4.0 K				
Integration time	30 minutes				
Type of control value output	continuous (8 bit)				
Maximum control value	100%				
Minimum control value	0%				
Direction and scale of the control value	+ 100 % (normal)				
Change of control value for automatic sending	1%				

Parameters	Settings
Heating mode	On Off
The heating mode can be switched on or off via this parameter. If "Off" is selected, all the parameters in this parameter window and object 19 in the object list are no longer displayed. There is no control value output for heat.	
Proportional band	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
The proportional band of the PI controller is set via this parameter. A proportional band of 4 K means that a control deviation of 4 K leads to a change in the control value by 100%.	
Integration time	5; 6; 7; 8; 9; 10 ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; inactive
The integration time of the PI controller is specified via this parameter. An integration period of e.g. 10 minutes means that during the time the same size adjustment of the control value is carried out by the proportional component.	
Type of control value output	continuous (8 bit) switching (1 bit)
The type of control value output can be defined in this parameter. If "continuous (8 bit)" is selected, the output corresponds to the calculated control value with a resolution of 8 bit. When "switching (1 bit)" is selected, the output of the control value is carried out by "pulse width modulation" whereby the pulse factor between "On" and "Off" corresponds to the calculated control value. In the setting "switching (1 bit)", the parameter window changes and additional parameters are displayed. The object type of object 19 "Control value heat" changes to 1 bit.	
Maximum control value	0%; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100% ;
An upper limiting value for the control value can be set via this parameter.	
Minimum control value	0% ; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
A lower limiting value for the control value can be set via this parameter.	

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Parameters	Settings
Direction of the control value	normal inverted
The format of the control value output is defined in this parameter. If "normal" is selected, the output of the control value is carried out according to the calculated control value. In the "inverted" setting, the direction of the control value is reversed.	
	
T : Period duration of the control value output y : Calculated control value	
The setting in this parameter is dependent on the type of valve or actuator that is used.	
Always On from	1%; 5%; 10%; 20%; 30%; 40%; 50%; 60%; 70%; 80%; 90%; 95%; 99%; 100% of control value
It is specified here what percentage of the control value output is always "On".	
Always Off until	1%; 5%; 10%; 20%; 30%; 40%; 50%; 60%; 70%; 80%; 90%; 95%; 99%; 100% of control value
It is specified here what percentage of the control value output is always "Off".	
Period duration of control value output	10s (Bus load! Actuator!); 30s (Bus load! Actuator!); 1min. (take care of Actuator); 2min. (take care of Actuator); 3min. (take care of Actuator); 4min. (take care of Actuator); 5min. (take care of Actuator); 6; 7; 8; 10 ; 12; 15; 20; 25; 30; 35; 40; 60; 90; 120; 150; 180 min.
This parameter determines the period duration of the control value output. The control value corresponds to the pulse factor (time factor) between "On (1)" and "Off (0)" within the period.	
	
y : Control value as % of the period duration T : Period duration of the control value output	
Caution: The period duration should not be shorter than the switching time of the two-point valves. Attention should also be paid to the bus load when selecting the settings 10s and 30s.	

2.5. Assigning parameters for only heating

2.5.1 Only heating: Communication objects

Phys.Addr.	Program		
no.	Function	Object name	Type
01 01.018	20 S2 Room temperature controller	904401	
 4	Sensor intern + sensor extern	Actual temperature value	2 Byte
 5	Actual value of int. sensor	Actual temperature value int. sensor	2 Byte
 6	Actual value of ext. sensor	Actual temperature value ext. sensor	2 Byte
 7	Base-setpoint in °C	Base-setpoint	2 Byte
 8	Adjustment in Kelvin	Setpoint adjustment	2 Byte
 9	Actual setpoint	Setpoint	2 Byte
 10	8-bit Status	Status	1 Byte
 11	On / Off	Comfort	1 Bit
 12	On / Off	Standby	1 Bit
 13	On / Off	Night reduction	1 Bit
 14	On / Off	Frost protection	1 Bit
 15	On / Off	2-Point-controller	1 Bit
 16	Yes / No	Presence	1 Bit
 17	On / Off	PI-controller	1 Bit
 18	On / Off	Frost alarm	1 Bit
 19	continuous	Control value heating	1 Byte
 22	Switching	Control value of additional 2-point-controller	1 Bit
 23	1=Open / 0=Closed	Window contact I	1 Bit
 24	1=Open / 0=Closed	Window contact II	1 Bit
---	---	---	---

Note:-

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

Obj	Function	Object name	Type	Flag
4	Sensor intern + sensor extern	Actual tempera- ture value	2 Byte	CTUR
This object contains the current total actual temperature value. The value is sent automatically when there is a change.				
5	Actual value of int. sensor	Actual tempera- ture value int. sensor	2 Byte	CTUR
This object contains the current actual temperature value for the internal sensor.				
6	Actual value of ext. sensor	Actual tempera- ture value ext. sensor	2 Byte	CWTUR
This object contains the current actual temperature value of the external sensor. Cyclical read telegrams can also be sent via this object to the external temperature sensor so that it returns its current actual value.				

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Obj	Function	Object name	Type	Flag
7	Base-setpoint in °C	Base-setpoint	2 Byte	CWTUR
The base setpoint can be modified by external adjustment telegrams via this object. Note: If the base setpoint is to be modified via this object, it is a good idea to select the parameter setting "value at voltage failure is to be saved" in the parameter window "Controller general 2". The controller thus has this value at its disposal immediately on bus voltage recovery.				
8	Adjustment in Kelvin	Setpoint adjustment	2 Byte	CWTUR
Each change in the setpoint adjustment is sent via this object. If a value is received via the object for setpoint adjustment, the program calculates the resulting discrete value (step). If the received value does not correspond to one of the 5 discrete values, then the next possible value is accepted, displayed and returned.				
9	Actual setpoint	Setpoint	2 Byte	CTUR
This object contains the actual setpoint value for the room temperature. The setpoint is dependent on the current operating mode (e.g. standby mode).				
10	8-bit Status	Status	1 Byte	CWTUR
This object contains the current status of the controller which is sent automatically when there is a change in the state. 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 = Heat mode, 0 = Cool mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				
11	On / Off	Comfort	1 Bit	CWTUR
Using this object, the "Comfort" operating mode can be set via the bus. On receipt of an "On" signal, the "Comfort" mode is switched on and the previously active operating mode is switched off. If the controller is set to "Night" mode, it is possible to activate the comfort mode extension via this object.				
12	On / Off	Standby	1 Bit	CWTUR
Using this object, the "Standby" operating mode can be set via the bus. On receipt of an "On" signal, the "Standby" mode is switched on and the previously active operating mode is switched off. If the controller is set to "Comfort mode extension", it is only possible to switch to "Standby" mode via this object.				

Obj	Function	Object name	Type	Flag
13	On / Off	Night reduction	1 Bit	CWTUR
Using this object, the "Night reduction" operating mode (night mode) can be set via the bus. On receipt of an "On" signal, the "Night reduction" mode is switched on and the previously active operating mode is switched off. It is only possible to switch the controller to this mode via this object and not using push buttons except if the comfort mode extension is deactivated.				
14	On / Off	Frost protection	1 Bit	CWTUR
Using this object, the "Frost protection" mode can be set via the bus. On receipt of an "On" signal, the "Frost protection" mode is switched on and the previously active operating mode is switched off. It is only possible to switch the controller to this mode via this object and not using push buttons.				
15	On / Off	2-Point controller	1 Bit	CWTUR
It is possible to switch the two-point controller on or off via this object.				
16	Yes / No	Presence	1 Bit	CWTUR
The "Comfort" mode is switched on via this object and remains switched on until a telegram with the value "0" is received via the object. Any telegrams that are previously received via the bus for switching the controller to "Standby" or "Night" mode are stored temporarily and only carried out at this point. This object is only available for the configuration "only heating".				
17	On / Off	PI controller	1 Bit	CWTUR
It is possible to switch the PI controller on or off via this object.				
18	On / Off	Frost alarm	1 Bit	CTUR
The "Frost alarm" is sent automatically if the measured temperature falls below the set value for the frost alarm.				
19	Continuous	Control value heating	1 Byte	CTUR
The control value of the heating mode is given via this object. The object type is determined in the parameter setting "Type of control value".				
22	Switching	Control value of additional 2-point controller	1 Bit	CTUR
The control value of the additional two-point controller is displayed via this object.				
23	1 = Open / 0 = Closed	Window contact I	1 Bit	CWTUR
24	1 = Open / 0 = Closed	Window contact II	1 Bit	CWTUR
The status of the windows can be received via these two objects. If the object value = 1 (window open), the room temperature controller switches to "Frost/heat protection" mode and remains in this mode until the object value of window contact I or II is equal to 1.				

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2.5.2 Controller general : Parameters

2-Point-Controller		LEDs			
Configuration	Temperature	Frost Alarm	Controller General	Controller General 2	Heat
Setpoint for frost protection (heating mode)	7 °C				
Standby-time heating reduction	2 K				
Night-time heating reduction	4 K				
Setpoint adjustment per push button action	1.0 K				
Length of time for comfort mode extension	60 min.				
Evaluation of the window open time	after 30 sec.				
Internal control mode (look at controller description)	I-part is not limited				
Length of time for cyclical sending of control values	10 min.				
Dead zone of controller	0.1 K				
Maximum control deviation	10.0 K				

Parameters	Settings
Setpoint frost protection for heating	5°C; 6°C; 7°C; 8°C; 9°C; 10°C
The setpoint for frost protection is given using this parameter. If the actual room temperature value falls below the setpoint in heating mode, the controller switches to the "Frost protection" mode. The "Frost protection" mode is also activated if the status "Window Open" is received when the controller is in heating mode.	
Standby-time heating reduction	1 K; 2 K; 3 K; 4 K; 5 K;
This parameter is used to determine what value the setpoint temperature should be decreased by if the operating mode switches from "Comfort" mode to "Standby" mode while in heating mode.	
Night-time heating reduction	1 K; 2 K; 3 K; 4 K; 5 K;
This parameter is used to determine what value the setpoint temperature should be decreased by if the operating mode switches from "Comfort" mode to "Night" mode while in heating mode.	
Setpoint adjustment per push button action	0.2 K; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 0.9 K; 1.0 K; 1.2 K; 1.5 K; 1.8 K; 2.0 K; 2.2 K; 2.5 K;
In this parameter the step width of the setpoint adjustment can be set per push button action. The specified value applies both to an adjustment upwards (+) and downwards (-).	

Parameters	Settings
Duration for extended comfort mode	5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30; 40; 50; 60 ; 90; 120 min.; inactive continuous
The duration of the comfort mode extension is set in this parameter. If the "Night" mode is active and the "Comfort" button is pressed, the operating mode switches from "Night" mode to "Comfort" mode according to the time that is specified here. Once the time specified for the extended comfort mode has elapsed, the "Night" mode is reactivated. If the button is pressed again while the comfort mode extension is still active, the comfort period begins again. Pressing the "Standby" button ends the comfort mode extension.	
Evaluation of the window open time	at once after 30 sec.
The time frame for the evaluation of the window status is specified in this parameter. The status "Window Open" causes the setpoint in heating mode to be set to the value for frost protection either immediately or after 30 seconds.	
Internal control mode (look at controller description)	I-part is limited I-part is not limited
The integral-action component can be limited with this parameter i.e. the total of the proportional component and the integral-action component never exceeds 100%. This means that the control output reacts immediately to a small difference in the setpoint.	
Duration for cyclical sending of control values	5; 6; 7; 8; 9; 10 ; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; inactive
It is possible to specify here the time interval for sending the control values in addition to them being sent automatically when there is a change.	
Dead zone of controller	0.1 K; 0.2 K; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 1.0 K; 1.2 K; 1.5 K; 2.0 K; 2.5 K;
The dead zone of the controller is set in this parameter. If the control deviation (i.e. the differential between setpoint value and actual value) is less than the value preselected by the dead zone, the controller remains inactive.	
Maximum control deviation	0.5 K; 1.0 K; 2.0 K; 3.0 K; 4.0 K; 5.0 K; 6.0 K; 7.0 K; 8.0 K; 9.0 K; 10.0 K
This parameter limits the control deviation to an adjustable value in order to avoid excessive fluctuations (e.g. for the setting "Window Open", the setpoint falls to the value for frost protection).	

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2.5.3 Controller general 2: Parameters

2-Point-Controller	LEDs				
Configuration	Temperature	Frost alarm	Controller General	Controller General 2	Heat
Base-setpoint and actual value of extern sensor at restart			22 °C		
Operating mode after parameterising			frost protection mode		

Parameters	Settings
Base-setpoint and actual value of extern sensor at restart	5 °C; 10 °C; 13 °C; 15 °C; 16 °C; 17 °C; 18 °C; 19 °C; 20 °C; 21 °C; 22 °C ; 23 °C; 24 °C; 25 °C; 27 °C; 30 °C; value at voltage failure is to save
Operating mode after parameterizing	frost protection mode night mode standby mode Comfort mode

This parameter is used to specify which value the base setpoint and the external actual value should accept so that the program has sensible starting values immediately on restart (bus voltage recovery). In the setting "value at voltage failure is to be saved", the basic setting for the first initialisation after the bus coupler has been programmed is 22°C. In general, it is only advisable to select this parameter setting if the basic setpoint can be modified by external adjustment telegrams (via object 7).

It can be selected in this parameter which operating mode the program starts with after each (new) assignment of parameters.

2.5.4 Heat: Parameters
(with continuous control value output)

2-Point-Controller	LEDs				
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Heating mode	On				
Proportional band	4.0 K				
Integration time	30 minutes				
Type of control value output	continuous (8 bit)				
Maximum control value	100%				
Minimum control value	0%				
Direction and scale of the control value	+ 100 % (normal)				
Change of control value for automatic sending	1%				

Parameters	Settings
Heating mode	On Off
The heating mode can be switched on or off via this parameter. If "Off" is selected, all the parameters in this parameter window and object 19 in the object list are no longer displayed. There is no control value output for heat.	
Proportional band	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;
The proportional band of the PI controller is set via this parameter. A proportional band of 4 K means that a control deviation of 4 K leads to a change in the control value by 100%.	
Integration time	5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30 ; 40; 50; 60; 90; 120 min.; inactive
The integration time of the PI controller is specified via this parameter. An integration period of e.g. 10 minutes means that during this time the same size adjustment of the control value is carried out by the proportional component.	
Type of the control value output	continuous (8 bit) switching (1 bit)
The type of control value output can be defined in this parameter. If "continuous (8 bit)" is selected, the output corresponds to the calculated control value with a resolution of 8 bit. When "switching (1 bit)" is selected, the output of the control value is carried out by "pulse width modulation" whereby the pulse factor between "On" and "Off" corresponds to the calculated control value. In the setting "switching (1 bit)" the parameter window changes and additional parameters are displayed. The object type of object 19 "Control value heat" changes from 1 byte to 1 bit.	
Maximum control value	0%; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
An upper limiting value for the control value can be set via this parameter.	
Minimum control value	0%; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
A lower limiting value for the control value can be set via this parameter.	

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Parameters	Settings
Direction and scale of the control value	+1%; +2%; +3%; +5%; +7%; +10%; +15%; +20%; +30%; +40%; +50%; +60%; +70%; +80%; +85%; +90%; +95%; +100% (normal) -1%; -2%; -3%; -5%; -7%; -10%; -15%; -20%; -30%; -40%; -50%; -60%; -70%; -80%; -85%; -90%; -95%; -100%; (inverted)
The format of the control value output is defined in this parameter. In the setting "100% (normal)", the controller assumes that the valve is open when the control value is +100%. If however the valve is closed, the control value must be reversed (inverted). By reducing the percentage figure, a compression (scaling) of the control value is achieved. The setting is dependent on the type of valve or actuator that is used.	
Chance of control for automatic sending	1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%;
It can be determined in this parameter which control value change causes the control value to be sent automatically.	

2.5.5 Heat: Parameters (with switching control value output)

2-Point-Controller		LEDs			
Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
Heating mode	On				
Proportional band	4.0 K				
Integration time	30 minutes				
Type of control value output	switching (1 bit)				
Maximum control value	100%				
Minimum control value	0%				
Direction of the control value	normal				
Always On from	100 % of control value				
Always Off until	1 % of control value				
Period duration of control value output	10 minutes				

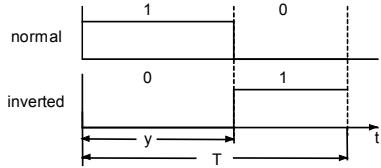
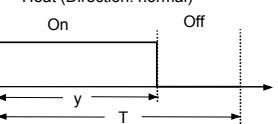
Parameters	Settings
Heating mode	On Off
The heating mode can be switched on or off via this parameter. If "Off" is selected, all the parameters in this parameter window and object 19 in the object list are no longer displayed. There is no control value output for heat.	

Parameters	Settings
Proportional band	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;
The proportional band of the PI controller is set via this parameter. A proportional band of 4 K means that a control deviation of 4 K leads to a change in the control value by 100%.	
Integration time	5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30 ; 40; 50; 60; 90; 120 min.; inactive
The integration time of the PI controller is specified via this parameter. An integration period of e.g. 10 minutes means that during this time the same size adjustment of the control value is carried out by the proportional component.	
Type of the control value output	continuous (8 bit) switching (1 bit)
The type of control value output can be defined in this parameter. If "continuous (8 bit)" is selected, the output corresponds to the calculated control value with a resolution of 8 bit. When "switching (1 bit)" is selected, the output of the control value is carried out by "pulse width modulation" whereby the pulse factor between "On" and "Off" corresponds to the calculated control value. In the setting "switching (1 bit)" the parameter window changes and additional parameters are displayed. The object type of object 19 "Control value heat" changes from 1 byte to 1 bit.	
Maximum control value	0%; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
An upper limiting value for the control value can be set via this parameter.	
Minimum control value	0% ; 1%; 2%; 3%; 5%; 7%; 10%; 15%; 20%; 25%; 30%; 35%; 40%; 45%; 50%; 55%; 60%; 65%; 70%; 75%; 80%; 85%; 90%; 95%; 100%
A lower limiting value for the control value can be set via this parameter.	

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Parameters	Settings
Direction of the control value	normal inverted
	The format of the control value output is defined in this parameter. If "normal" is selected, the output of the control value is carried out according to the calculated control value. In the "Inverted" setting, the direction of the control value is reversed.
	 <p>T : Period duration of the control value output y : Calculated control value</p>
	The setting in this parameter is dependent on the type of valve or actuator that is used.
Always On from	1%; 5%; 10%; 20%; 30%; 40%; 50%; 60%; 70%; 80%; 90%; 95%; 99%; 100%; of control value
	It is specified here what percentage of the control value output is always "On".
Always Off until	1%; 5%; 10%; 20%; 30%; 40%; 50%; 60%; 70%; 80%; 90%; 95%; 99%; 100%; of control value
	It is specified here what percentage of the control value output is always "Off".
Period duration of control value output	10s (Bus load! Actuator!); 30s (Bus load! Actuator!); 1min. (take care of Actuator); 2min. (take care of Actuator); 3min. (take care of Actuator); 4min. (take care of Actuator); 5min. (take care of Actuator); 6; 7; 8; 10 ; 12; 15; 20; 25; 30; 35; 40; 60; 90; 120; 150; 180 min.
	This parameter determines the period duration of the control value output. The control value corresponds to the pulse factor (time factor) between "On (1)" and "Off (0)" within the period.
	 <p>Heat (Direction: normal) On Off y : Control value as % of the period duration T : Period duration of the control value output</p>
	Caution: The period duration should not be shorter than the switching time of the two-point valves. Attention should also be paid to the bus load when selecting the settings 10s and 30s.

2.6. 2-Point Controller: Parameters

Configuration	Temperature	Frost alarm	Controller general	Controller general 2	Heating
2-Point-Controller					LEDs
Hysteresis of additional 2-Point-controller	+/- 0.5 K				
Cycle time 2-point-controller	5 minutes				
Offset for setpoint	No offset				

Parameters	Settings
Hysteresis of additional 2-point controller	+/-0.1 K; +/-0.2 K; +/-0.3 K; +/-0.4 K; +/-0.5 K ; +/-0.6 K; +/-0.7 K; +/-1.0 K; +/-1.2 K; +/-1.5 K; +/-1.7 K; +/-2.0 K; +/-2.2 K; +/-2.5 K;
	The switching hysteresis of the two-point controller is set here. It should reduce the switching frequency of the controller.
Cycle time of 2-point controller	2; 3; 4; 5 ; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min.; continuous
	Once the time interval set in this parameter has elapsed, the two-point controller is reactivated (i.e. the two-step control is only implemented e.g. every 10 minutes).
Offset for setpoint	-4.0 K; -3.5 K; -3.0 K; -2.5 K; -2.0 K; -1.5 K; -1.0 K; -0.5 K; No offset ; +0.5 K; +1.0 K; +1.5 K; +2.0 K; +2.5 K; +3.0 K; +3.5 K;
	The two-point controller uses the setpoint value of the PI controller. The setpoint can be adjusted via the offset so that it can be changed.

2.7. Assigning parameters to the service station

2.7.1 Service station: Communication objects (without calculation of setpoint value)

Phys.Addr.	Program	Object name	Type
1		20 S2 Room temperature controller 904401	
4	4	Sensor intern + sensor extern	Actual value temperature
5	5	Actual value of int. sensor	Actual temperature value int. sensor
6	6	Actual value of ext. sensor	Actual temperature value ext. sensor
8	8	Adjustment in Kelvin	Setpoint adjustment
10	10	8-bit Status	Status
11	11	On / Off	Comfort
12	12	On / Off	Standby
13	13	On / Off	Night reduction
14	14	On / Off	Frost protection
17	17	On / Off	Controller (Tableau)
18	18	On / Off	Frost alarm
...

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Note:

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

Obj	Function	Object name	Type	Flag
4	Sensor intern + Sensor extern	Actual value temperature	2 Byte	CTUR
This object contains the current actual temperature value. The value is sent automatically when there is a change.				
5	Actual value of int. sensor	Actual temperature value int. sensor	2 Byte	CTUR
This object contains the current actual temperature value of the internal sensor.				
6	Actual value of ext. sensor	Actual temperature value ext. sensor	2 Byte	CWTUR
This object contains the current actual temperature value of the external sensor. Cyclical read telegrams can also be sent via this object to the external temperature sensor so that it returns its current actual value.				
8	Adjustment in Kelvin	Setpoint adjustment	2 Byte	CWTUR
Each change in the setpoint adjustment is sent via this object. If a value is received via the object for setpoint adjustment, the program calculates the resulting discrete value (step). If the value received does not correspond to one of the 5 discrete values then the next possible value is accepted, displayed and returned.				
10	8-bit Status	Status	1 Byte	CWTUR
This object contains the current status of the controller which is sent automatically when there is a change in the state. 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 On				
Bit 4: 1 = Dew point alarm				
Bit 5: 1 = Heat mode, 0 = Cool mode				
Bit 6: 1 = Controller On, 0 = Controller Off				
Bit 7: 1 = Frost alarm				
11	On / Off	Comfort	1 Bit	CWTUR
Using this object, the "Comfort" operating mode can be set via the bus. On receipt of an "On" signal, the "Comfort" mode is switched on and the previously active operating mode is switched off.				
If the controller is set to "Night" mode, it is possible to activate the comfort mode extension via this object.				
12	On / Off	Standby	1 Bit	CWTUR
Using this object, the "Standby" operating mode can be set via the bus. On receipt of an "On" signal, the "Standby" mode is switched on and the previously active operating mode is switched off.				
If the controller is set to "Comfort mode extension", it is only possible to switch to "Standby" mode via this object.				

Obj	Function	Object name	Type	Flag
13	On / Off	Night reduction	1 Bit	CWTUR
Using this object, the "Night reduction" operating mode (night mode) can be set via the bus.				
On receipt of an "On" signal, the "Night reduction" mode is switched on and the previously active operating mode is switched off. It is only possible to switch the controller to this mode via this object and not using push buttons except if the comfort mode extension is deactivated.				
14	On / Off	Frost protection	1 Bit	CWTUR
Using this object, the "Frost protection" operating mode can be set via the bus. On receipt of an "On" signal, the "Frost protection" mode is switched on and the previously active operating mode is switched off.				
It is only possible to switch the controller to this mode via this object and not using push buttons.				
17	On / Off	Controller (tableau)	1 Bit	CWTUR
It is possible to switch the panel on or off via this object.				
18	On / Off	Frost alarm	1 Bit	CTUR
The frost alarm is sent via this object as soon as the measured temperature falls below the set value for the frost alarm.				

2.7.2 Status parameter: Parameters (without calculation of setpoint value)

Configuration	Temperature	Frost alarm	Status parameter	LEDs
Calculate setpoint (additional objects are necessary)	No			
Setpoint adjustment per push button action	1.0 K			
Duration for extended comfort mode	60 minutes			
Base-setpoint and actual value of external sensor at restart	22 °C			
Operating mode after parameterizing	frost protection mode			

Parameters	Settings
Calculate setpoint (additional objects are necessary)	No Yes
It is possible to specify in this parameter whether the temperature controller should only be operated as a service station or should also carry out its own setpoint calculation.	
Setpoint adjustment per push button action	0.2 K; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 0.9 K; 1.0 K ; 1.2 K; 1.5 K; 1.8 K; 2.0 K; 2.2 K; 2.5 K;
In this parameter the step width of the setpoint adjustment can be set per push button action. The specified value applies both to an adjustment upwards (+) and downwards (-).	

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Parameters	Settings
Duration for extended comfort mode	5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30; 40; 50; 60 ; 90; 120min. inactive continuous
	The duration of the comfort mode extension is set in this parameter. If the "Night" mode is active and the "Comfort" button is pressed, the operating mode switches from "Night" mode to "Comfort" mode according to the time that is specified here. Once the time specified for the extended comfort mode has elapsed, the "Night" mode is reactivated. If the button is pressed again while the comfort mode extension is still active, the comfort period begins again. Pressing the "Standby" button ends the comfort mode extension.
Base setpoint and actual value of extern sensor at restart	5 °C; 10 °C; 13 °C; 15 °C; 16 °C; 17 °C; 18 °C; 19 °C; 20 °C; 21 °C; 22 °C ; 23 °C; 24 °C; 25 °C; 27 °C; 30 °C; value at voltage failure is to save
	This parameter is used to specify which value the base set-point and the external actual value should accept so that the program has sensible starting values immediately on restart (bus voltage recovery). In the setting "value at voltage failure is to save", the basic setting for the first initialisation after the bus coupler has been programmed is 22°C. In general, it is only advisable to select this parameter setting if the basic set-point can be modified by external adjustment telegrams (via object 7).
Operating mode after parameterizing	frost protection mode night mode standby mode Comfort mode
	It can be selected in this parameter which operating mode the program starts with after each (new) assignment of parameters.

2.7.3 Service station: Communication objects (with calculation of setpoint value)

Phys.Addr.	Program	Object name	Type
no.	Function		
01.01.018	20 S2 Room temperature controller 904401		
4	Sensor intern + sensor extern	Actual temperature value	2 Byte
5	Actual value of int. sensor	Actual temperature value int. sensor	2 Byte
6	Actual value of ext. sensor	Actual temperature value ext. sensor	2 Byte
7	Base-setpoint in °C	Base-setpoint	2 Byte
8	Adjustment in Kelvin	Setpoint adjustment	2 Byte
9	Actual setpoint	Setpoint	2 Byte
10	8-bit Status	Status	1 Byte
11	On / Off	Comfort	1 Bit
12	On / Off	Standby	1 Bit
13	On / Off	Night reduction	1 Bit
14	On / Off	Frost protection	1 Bit
15	On / Off	Dew point alarm	1 Bit
16	1=Heating / 0=Cooling	Heating / Cooling	1 Bit
17	On / Off	Controller (Tableau)	1 Bit
18	On / Off	Frost alarm	1 Bit
23	1=Open / 0=Closed	Window contact I	1 Bit
24	1=Open / 0=Closed	Window contact II	1 Bit
...

Note:

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

Obj	Function	Object name	Type	Flag
4	Sensor intern + Sensor extern	Actual temperature value	2 Byte	CTUR
This object contains the current total actual temperature value. The value is sent automatically when there is a change.				
5	Actual value of int. sensor	Actual temperature value int. sensor	2 Byte	CTUR
This object contains the current actual temperature value of the internal sensor.				
6	Actual value of ext. sensor	Actual temperature value ext. sensor	2 Byte	CWTUR
This object contains the current actual temperature value of the external sensor. Cyclical read telegrams can also be sent via this object to the external temperature sensor so that it returns its current actual value.				

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Obj	Function	Object name	Type	Flag
7	Base setpoint in °C	Base setpoint	2 Byte	CWTUR
The base setpoint can be modified by external adjustment telegrams via this object.				
Note: If the base setpoint is to be modified via this object, it is a good idea to select the parameter setting "value at voltage failure is to be saved" in the parameter window "Controller general 2". The controller thus has this value at its disposal immediately on bus voltage recovery.				
8	Adjustment in Kelvin	Setpoint adjustment	2 Byte	CWTUR
Each change in the setpoint adjustment is sent via this object. If a value is received via the object for setpoint adjustment, the program calculates the resulting discrete value (step). If the received value does not correspond to one of the 5 discrete values, then the next possible value is accepted, displayed and returned.				
9	Actual setpoint	Setpoint	2 Byte	CTUR
This object contains the actual setpoint value for the room temperature. The setpoint is dependent on the current operating mode (e.g. standby mode).				
10	8-bit Status	Status	1 Byte	CWTUR
This object contains the current status of the controller which is sent automatically when there is a change in the state. 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 = Heat mode, 0 = Cool mode Bit 6: 1 = Controller On, 0 = Controller Off Bit 7: 1 = Frost alarm				
11	On / Off	Comfort	1 Bit	CWTUR
Using this object, the "Comfort" operating mode can be set via the bus. On receipt of an "On" signal, the "Comfort" mode is switched on and the previously active operating mode is switched off. If the controller is set to "Night" mode, it is possible to activate the comfort mode extension via this object.				

Obj	Function	Object name	Type	Flag
12	On / Off	Standby	1 Bit	CWTUR
Using this object, the "Standby" operating mode can be set via the bus. On receipt of an "On" signal, the "Standby" mode is switched on and the previously active operating mode is switched off. If the controller is set to "Comfort mode extension", it is only possible to switch to "Standby" mode via this object.				
13	On / Off	Night reduction	1 Bit	CWTUR
Using this object, the "Night reduction" operating mode (night mode) can be set via the bus. On receipt of an "On" signal, the "Night reduction" mode is switched on and the previously active operating mode is switched off. It is only possible to switch the controller to this mode via this object and not using push buttons except if the comfort mode extension is deactivated.				
14	On / Off	Frost protection	1 Bit	CWTUR
Using this object, the "Frost protection" operating mode can be set via the bus. On receipt of an "On" signal, the "Frost protection" mode is switched on and the previously active operating mode is switched off. It is only possible to switch the controller to this mode via this object and not using push buttons.				
15	On / Off	Dew point alarm	1 Bit	CWTUR
A dew point alarm can be received via this object.				
16	1 = Heating / 0 = Cooling	Heating / Cooling	1 Bit	CTUR
This object indicates whether the controller is in heating or cooling mode. If there is a change in the status, it is sent automatically.				
17	On / Off	Controller (Tableau)	1 Bit	CWTUR
The panel can be switched on or off via this object.				
18	On / Off	Frost alarm	1 Bit	CTUR
The "Frost alarm" is sent via this object as soon as the measured temperature falls below the set value for the frost alarm.				
23	1 = Open / 0 = Closed	Window contact I	1 Bit	CWTUR
24	1 = Open / 0 = Closed	Window contact II	1 Bit	CWTUR
The status of the windows can be received via these two objects. If the object status = 1 (window open), the room temperature controller switches to "Frost/heat protection" mode and remains in this mode until the object value of window contact I or II is equal to 1.				

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2.7.4 Status parameter: Parameters (with calculation of setpoint value)

Configuration	Temperature	Frost alarm	Status parameter	Status parameter 2	LEDs
Calculate setpoint (additional objects are necessary)	Yes				
Setpoint frost protection for heating	7 °C				
Setpoint for heat protection (cooling mode)	35 °C				
Standby-time heating reduction	2 K				
Night-time heating reduction	4 K				
Standby-time cooling increase	2 K				
Night-time cooling increase	4 K				
Setpoint adjustment per push button action	1.0 K				
Duration for extended comfort mode	60 minutes				
Evaluation of the window open time	after 30 seconds				

Parameters	Settings
Calculate setpoint (additional objects are necessary)	No Yes
It is possible to specify in this parameter whether the temperature controller should only be operated as a service station or should also carry out its own setpoint calculation.	
Setpoint frost protection for heating	5°C; 6°C; 7°C; 8°C; 9°C; 10°C
The setpoint for frost protection is given using this parameter. If the actual room temperature value falls below the setpoint in heating mode, the controller switches to the "Frost protection" mode. The "Frost protection" mode is also activated if the status "Window Open" is received when the controller is in heating mode.	
Setpoint for heat protection (cooling mode)	30°C, 31°C, 32°C, 33°C, 34°C, 35°C, 36°C, 37°C, 38°C, 39°C, 40°C
The setpoint for heat protection is given using this parameter. If the actual room temperature value falls below the setpoint in cooling mode, the controller switches to the "Heat protection" mode. The "Heat protection" mode is also activated if the status "Window Open" is received when the controller is in cooling mode.	
Standby-time heating reduction	1 K; 2 K; 3 K; 4 K; 5 K;
This parameter is used to determine what value the setpoint temperature should be decreased by if the operating mode switches from "Comfort" mode to "Standby" mode while in heating mode.	
Night-time heating reduction	1 K; 2 K; 3 K; 4 K; 5 K;
This parameter is used to determine what value the setpoint temperature should be decreased by if the operating mode switches from "Comfort" mode to "Night" mode while in heating mode.	

Parameters	Settings
Standby-time cooling increase	1 K; 2 K; 3 K; 4 K; 5 K;
This parameter is used to determine what value the setpoint temperature should be increased by if the operating mode switches from "Comfort" mode to "Standby" mode while in cooling mode.	
Night-time cooling increase	1 K; 2 K; 3 K; 4 K; 5 K
This parameter is used to determine what value the setpoint temperature should be increased by if the operating mode switches from "Comfort" mode to "Night" mode while in cooling mode.	
Setpoint adjustment per push button action	0.2 K; 0.3 K; 0.4 K; 0.5 K; 0.6 K; 0.7 K; 0.8 K; 0.9 K; 1.0 K; 1.2 K; 1.5 K; 1.8 K; 2.0 K; 2.2 K; 2.5 K
In this parameter the step width of the setpoint adjustment can be set per push button action. The specified value applies both to an adjustment upwards (+) and downwards (-).	
Duration for extended comfort mode	5; 6; 7; 8; 9; 10; 12; 15; 17; 20; 25; 30; 40; 50; 60; 90; 120 min. inactive continuous
The duration of the comfort mode extension is set in this parameter. If the "Night" mode is active and the "Comfort" button is pressed, the operating mode switches from "Night" mode to "Comfort" mode according to the time that is specified here. Once the time specified for the extended comfort mode has elapsed, the "Night" mode is reactivated. If the button is pressed again while the comfort mode extension is still active, the comfort period begins again. Pressing the "Standby" button ends the comfort mode extension.	
Evaluation of the window open time	at once after 30 sec.
The time frame for the evaluation of the window status is specified in this parameter as either immediately or after 30 seconds. Depending on the setting selected, the status "Window Open" causes the setpoint in heating mode to be set to the value for frost protection and in cooling mode to be set to the value for heat protection.	

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2.7.5 Status parameter 2: Parameters (with calculation of setpoint value)

Configuration	Temperature	Frost alarm	Status parameter	Status parameter 2	LEDs
Dead zone between heating and cooling	5.0 K				
Base-setpoint and actual value of extern sensor at restart	22 °C				
Operating mode after parameterizing	frost protection mode				

Parameters	Settings
Dead zone between heating and cooling	0.5 K; 0.6 K; 0.7 K; 0.8 K; 1.0 K; 1.2 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 ; 5.5 K; 6.0 K; 6.5 K; 7.0 K; 7.5 K; 8.0 K; 8.5 K; 9.0 K; 9.5 K; 10.0 K
The dead zone between heat and cool is set in this parameter. The dead zone should prevent the controller from continuously switching between heating and cooling mode when there are slight temperature fluctuations.	
Base-setpoint and actual value of extern sensor at restart	5 °C; 10 °C; 13 °C; 15 °C; 16 °C; 17 °C; 18 °C; 19 °C; 20 °C; 21 °C; 22 °C ; 23 °C; 24 °C; 25 °C; 27 °C; 30 °C; value at voltage failure is to save
This parameter is used to specify which value the base set-point and the external actual value should accept so that the program has sensible starting values immediately on restart (bus voltage recovery). In the setting "value at voltage failure is to be saved", the basic setting for the first initialisation after the bus coupler has been programmed is 22°C. In general, it is only advisable to select this parameter setting if the basic setpoint can be modified by external adjustment telegrams (via object 7).	
Operating mode after parameterizing	frost protection mode night mode standby mode Comfort mode
It can be selected in this parameter which operating mode the program starts with after each (new) assignment of parameters.	

2.8. Assigning parameters to LEDs

2.8.1 LED display: Communication objects

Phys.Addr.	Program			Type
	no.	Function	object name	
<input checked="" type="checkbox"/> ...-...-...		20 S2 Room temperature controller	904401	
---	---	---	---	---
<input checked="" type="checkbox"/> 25	LED-display	Display object 1		1 Bit
<input checked="" type="checkbox"/> 26	LED-display	Display-object 2		1 Bit
<input checked="" type="checkbox"/> 27	LED-display	Display-object 3		1 Bit

Note:

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

Obj	Function	Object name	Type	Flag
25	LED display	Display object 1	1 Bit	CWTUR
26	LED display	Display object 2	1 Bit	CWTUR
27	LED display	Display object 3	1 Bit	CWTUR

Via these objects, the LEDs that display the operational state can also be assigned the task of displaying the status of additional objects. The status display is indicated by the flashing of the LED and overlays the display of the operating state.

20 S2 Room temperature controller 904401**2.8.2 LEDs: Parameters**

Configuration	Temperature	Frost alarm	Status parameter	Status parameter 2	LEDs
Winking of the setpoint adjustment-LED	No				
Superposed LED blinking(I)	No				
Superposed LED blinking(II)	No				
Superposed LED blinking(III)	No				

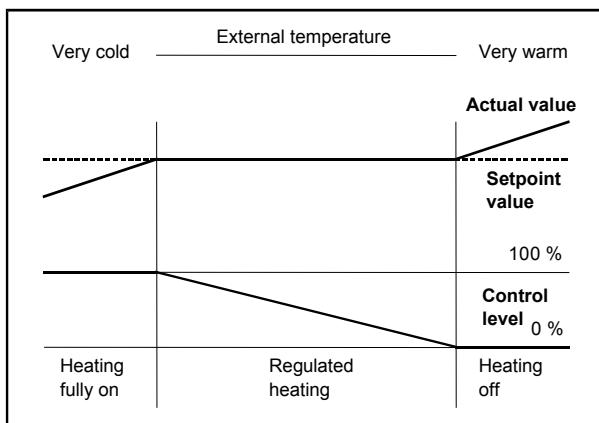
Parameters	Settings
Winking of the setpoint adjustment LED	No via object via object (inverted)
Using this parameter, the LED which displays the current setpoint adjustment can be assigned an object whose ON or OFF state is displayed by the flashing of the current LED for setpoint adjustment.	
If one of the settings "via object ..." is selected, the parameter window changes automatically and an additional parameter "Object number" appears where the selected LED can be assigned an object.	
Superposed LED blinking (I)	No Yes
Superposed LED blinking (II)	No Yes
Superposed LED blinking (III)	No Yes
In addition to the object whose status is displayed by the LED, a further object can be assigned to the LED using these parameters, whose ON or OFF state is displayed by the flashing of the LED.	
When the setting "Yes" is selected, the parameter window changes and the additional parameters "LED" and "Object number" appear. An LED can be selected in the "LED" parameter while the selected LED can be assigned an object in the "Object number" parameter.	

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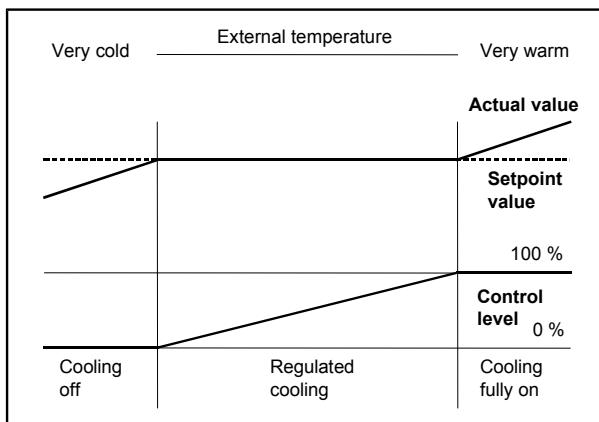
3. Diagrams

3.1. PI controller in heat / cool mode

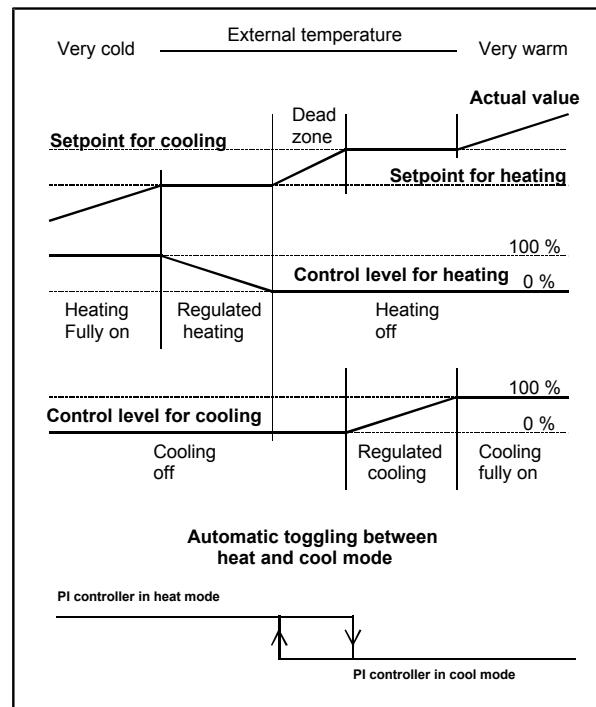
PI controller in heat mode



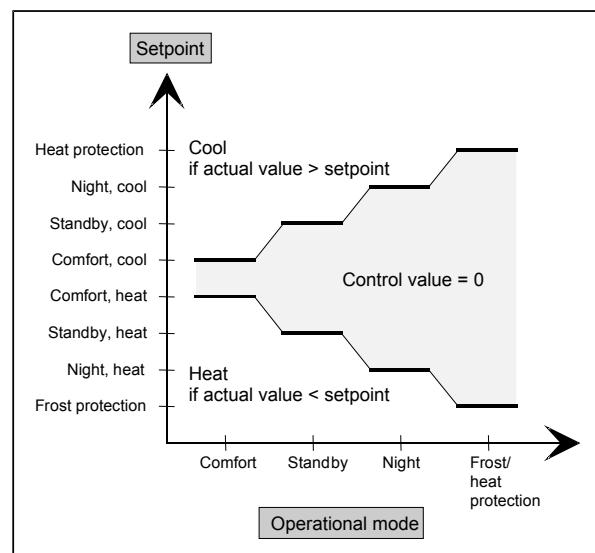
PI controller in cool mode



PI controller in heat and cool mode with automatic toggling



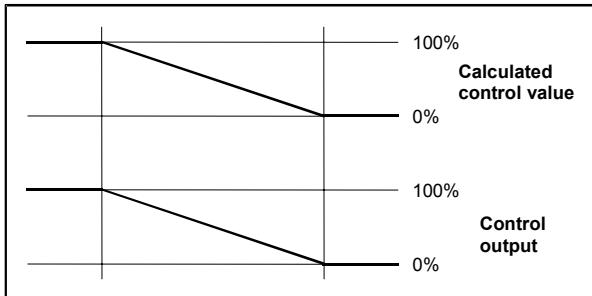
3.2. Setpoint values of operational modes



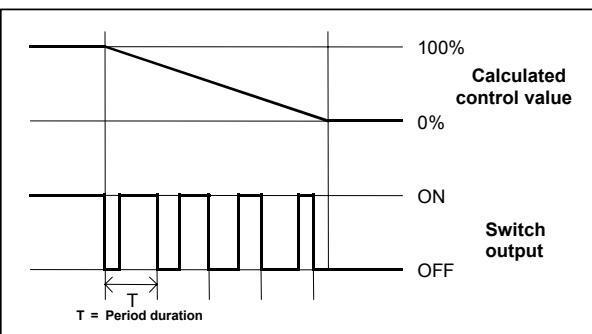
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3.3. Control value output

Continuous output of control value

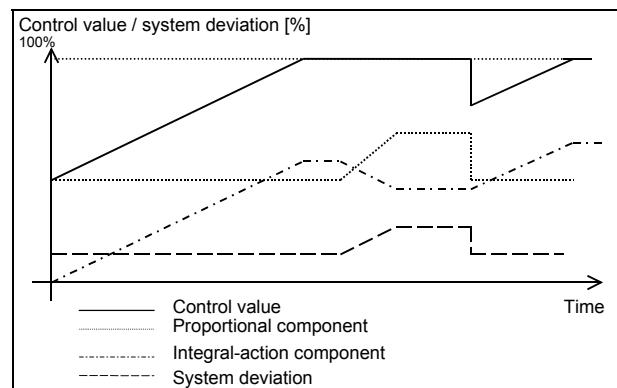


Switching output of control value



3.4. Limitation of the integral-action component

with limitation of integral-action component



without limitation of integral-action component

