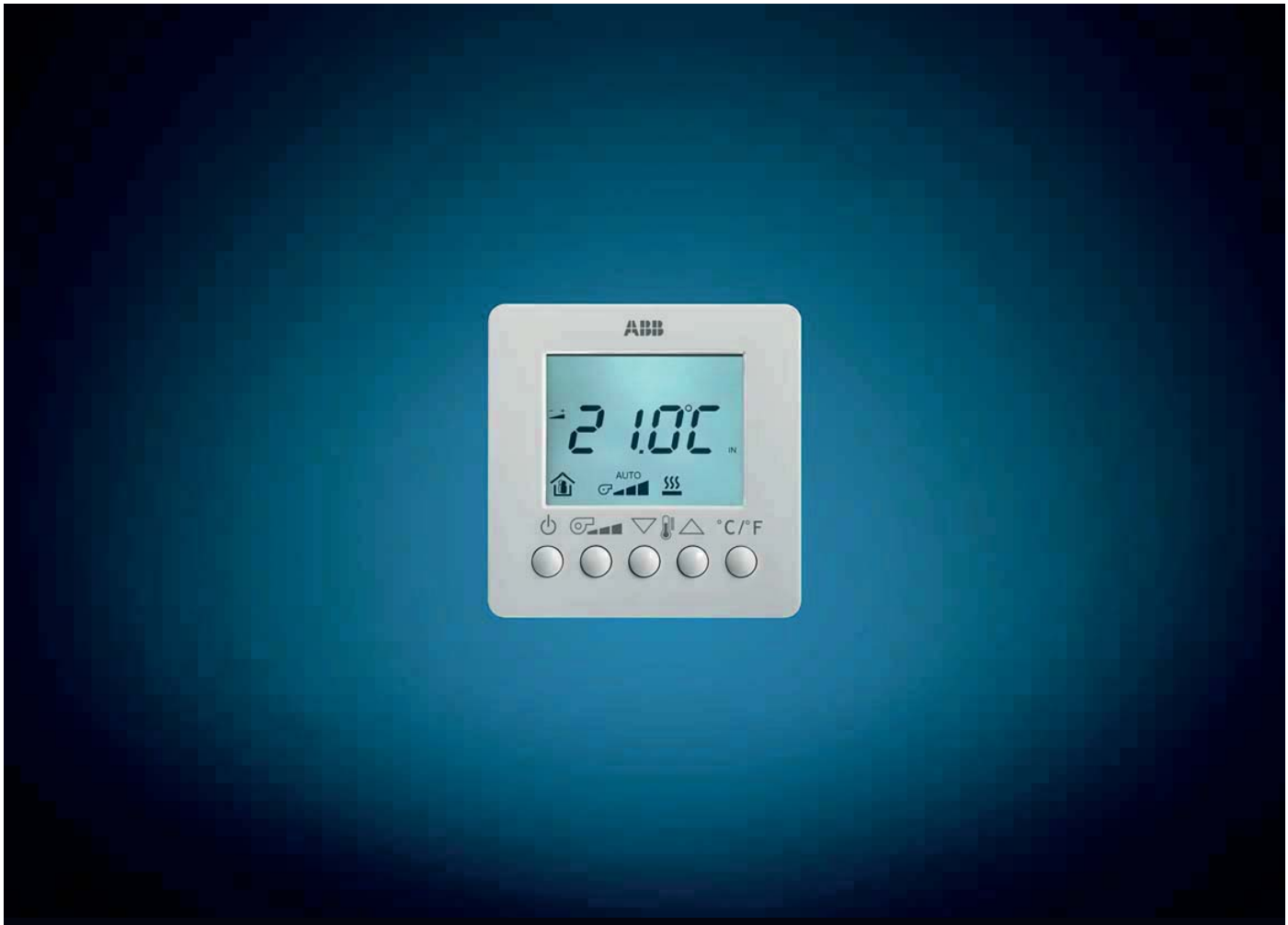

Intelligent Installation Systems

ABB i-bus® KNX
Room Thermostat Fan Coil with Display 6138/11-xx-500
Product Manual

Power and productivity
for a better world™

Contents and document history

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This manual describes the function of the room temperature controller with display using the "Display, Operate, Control Fan Coil/1.2" application program.
We reserve the right to make technical change and cannot accept responsibility for errors.

Limitation of liability
The contents of this document have been carefully checked to ensure that they conform to the hardware and software, but it is impossible to exclude all deviation. Therefore, we cannot accept any liability. Any corrections required will be made in future versions of this manual.
Please inform us of any suggestions for improvement.

1 General

The Fan Coil ambient temperature controller with display is a continuous KNX ambient temperature controller for fan convectors in 2 and 4-pipe systems. It measures the current ambient temperature (actual value) and sends a continuous manipulated variable (0 - 100%) to a fan coil actuator to maintain the desired ambient temperature. The device operates in both heating and cooling mode.

Hotel management systems can directly access the Fan Coil ambient temperature controller with display via KNX and trigger controllers in the room. The fan speed can also be selected manually with buttons (forced operation). This makes it possible to adjust the hotel room temperature as required by the customer or guest.

The device can be linked to the functions of the RM/S master room controller and FCA/S fan coil actuator via the KNX.

This manual contains detailed information on the Fan Coil ambient temperature controller with display, its installation and programming. The operation of the device is explained using examples.

The manual is divided into the following sections:

Section 1 General

Section 2 Technology

Section 3 Commissioning

Section 4 Planning and Application

Section A Appendix

1.1 Overview of Product and Functions

The Fan Coil ambient temperature controller with display records the current room temperature and controls the heating and/or cooling. It also controls 2 and 4-pipe Fan Coil units and conventional air-conditioners.

The device is surface-mounted without a frame and is available in white and aluminium-silver.

The display is backlighted for easier reading.

The device supports all functions for international hotel applications. It can operate with the following operating modes: heating/cooling, heating only and cooling only.

The ambient temperature controller is fitted with push-switches and an LC display to show the current operating modes and values. The ambient temperature controller is very easy and intuitive to operate with the use of international symbols on the push-switches and in the display. The device has five push-switches:

- ON/OFF, comfort/standby switch
- Temperature up
- Temperature down
- Fan stage adjustment
- Switch display of units °C/°F

The sensor is a surface-mounted device and does not require a cover frame. A bus terminal is included for connection to the ABB i-bus®. A separate bus coupling unit is not required. The Fan Coil ambient temperature controller with display does not require an auxiliary power supply. The Engineering Software Tool (ETS from version ETS°2°V1.3a) is used to assign the physical address and set the parameters using a VD2 file, which is also imported for use with ETS°3.

Note
The pictures of the parameter window in this manual correspond to the ETS 3 parameter windows.

2 Technology

The Fan Coil ambient temperature controller with display records the current room temperature and controls the heating and/or cooling. It also controls 2 and 4-pipe Fan Coil units and conventional air-conditioners.

The ambient temperature controller is fitted with push-switches and an LC display to show the current operating modes and values.

The device is surface-mounted without a frame and is available in white and aluminium-silver.

A bus terminal is included for connection to the KNX. A separate bus coupling unit is not required.

2.1 Technical data

Power supply	- Bus voltage	21...30 V DC over the bus
	- Current consumption	Type. 10 mA
Connections	- KNX	Bus terminal
	- Temperature sensors	Accuracy of temperature sensor +/- 0.3 K (can be calibrated by parameters) Sensor type: NTC
Control and display elements	- LCD display	The LCD can be lighted if required. Use the "Lighting Display" parameter. This allows the LCD lighting to be always on or always off, or to be lighted after pushing a switch and remain on for 5 seconds.
	- "ON/OFF“ put-switch [ON/OFF comfort/standby optional]	If freezing protection is not activated: ambient temperature control is switched to freezing protection. "OFF" shown on display. If freezing protection is activated: ambient temperature control operates in the mode that it would have had without being switched off. If the optional ON/Off comfort/standby operating mode is selected, the device switches between comfort and standby when a push-switch is pressed briefly, and switches OFF if the switch is pressed for a longer period (> 500 ms). In night mode the settemperatur can be manipulated till the next change of operating mode happens.
	- "Temperature up" push-switch	When a push-switch is pressed, the set temperature is changed by a configurable value (0.1K / 0.2K / **0.5K** / 1K). The display is switched to "Set Temperature". The actual temperature is displayed again 5 seconds after the last push-switch actuation, if this has been configured. If the optional mode "Enable extended button press for switching heating/cooling set value" is enabled, the device switches to the heating set value when the switch is pressed and held (1s).
	- "Temperature down“ push-switch	When a push-switch is pressed, the set temperature is changed by a configurable value (0.1K / 0.2K / **0.5K** / 1K). The display is switched to "Set Temperature". The actual temperature is displayed again 5 seconds after the last push-switch actuation, if this has been configured. If the optional mode "Enable extended switch press for switching heating/cooling set value" is enabled, the device switches to the heating set value when the switch is pressed and held (1s).

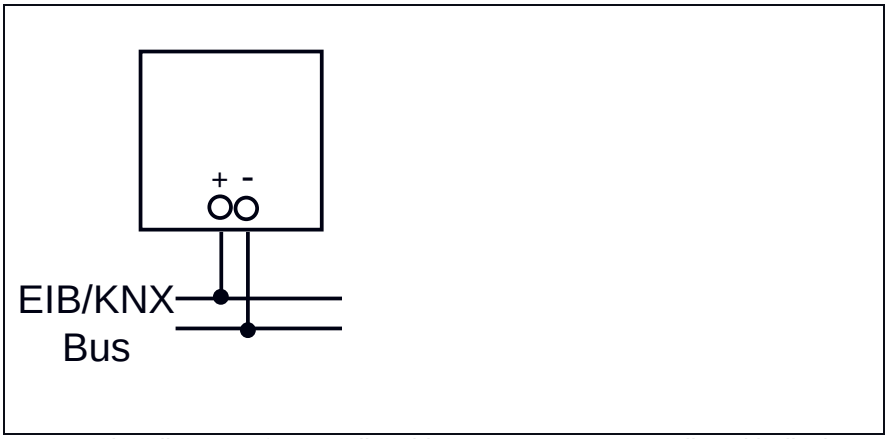
	- "fan stage adjustment"	When the switch is pressed, the device runs through the sequence "1 2 3 Auto 0 1 ..." starting from the current fan stage. If the fan is set to automatic, this is deactivated when the switch is first pressed and the next fan stage is activated-
	- °F/°C switching	This push-switch switches the display between °C and °F.
Protection	- IP 20	Acc. to DIN EN 60529
Protection class	- III	Acc. to DIN EN 61140
Insulation category	- overvoltage category III - pollution severity 2	Acc. to DIN EN 60664-1 Acc. to DIN EN 60664-1
Temperature range	- Use - Storage - Transport	- 5°C...+45°C -25°C...+55°C -25°C...+70°C
Ambient condition	- maximum relative humidity - Maximum air pressure	93% non-condensing equivalent to 2000 m
Type, case, design	- AP device with integrated bus coupler (no additional supply voltage)	
	- Dimensions HxWxD	Case: 81x81x20 mm Display: 51x39 mm
	- Colour	white, aluminium-silver
	- Device labels	function symbols on the case - ON/OFF - fan switching - temperature up - temperature down - °F/°C switching
	- Fire classification V0 - RoHs-compliant and halogen-free	
Installation	- monoblock device, bus connection - surface-mounted installation with holder (design part)	
Licence	- KNX acc. to EN 50 090-1, -2	
CE marking	- acc. to EMC and Low-Voltage Directives	

Application program	**Quantity Communication objects**	**Max. quantity Group addresses**	**Max. quantity Allocations**
Fan Coil displays controls adjustments/1.2	47	254	255

Note ETS 2 V 1.3 or higher is required for programming.
The application program is in ETS 2 / ETS 3 at ABB/Heating, Air-conditioning, Ventilation/Thermostat.

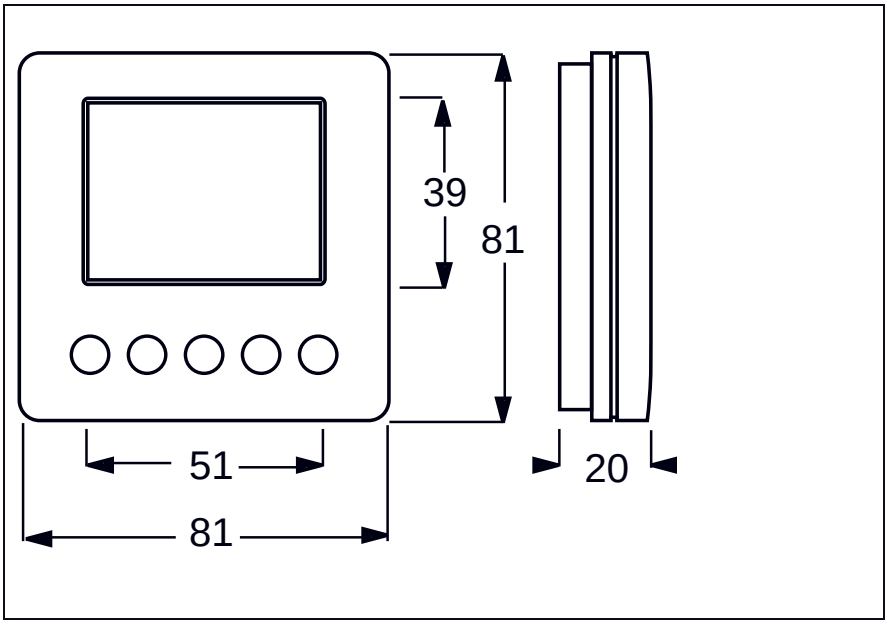
Note: The device does not support the close function of a project or the KNX device in the ETS. If access to all devices of the project is blocked by a BA password (ETS 2) or a BCU key (ETS 3), it will not have any effect on this device. It can still be read and programmed.

2.2 Connection diagram



Connection diagram of Fan Coil ambient temperature controller with display

2.3 Dimensional drawing



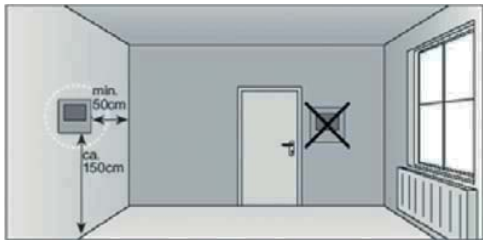
Dimensional drawing of Fan Coil ambient temperature controller with display

2.4 Assembly and installation

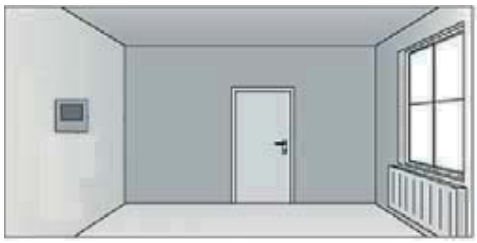
The Fan Coil with display ambient temperature controller is a surface-mounted device (AP) with an integrated bus coupler. The device operates without additional supply voltage. It can be installed on flush-mounted sockets (UP) (VDE, China, British Standard).

Selection of a suitable installation location for the controller and suitable parameter settings are essential for good temperature detection.

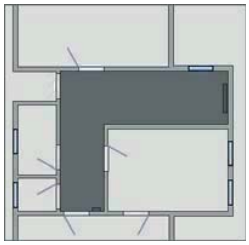
- The ambient temperature controller should be installed approximately 150 cm above the floor and 50 cm from the door frame.



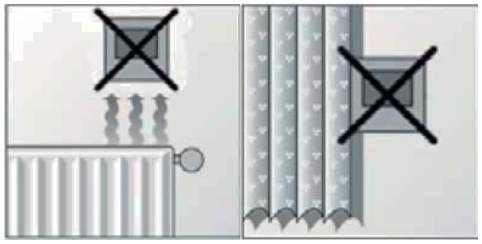
- The ambient temperature controller should be installed on a wall opposite the radiator.



- The radiator and the ambient temperature controller must not be separated by corners in the room.

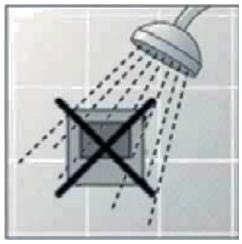


- An ambient temperature controller should not be installed near a radiator or behind curtains.

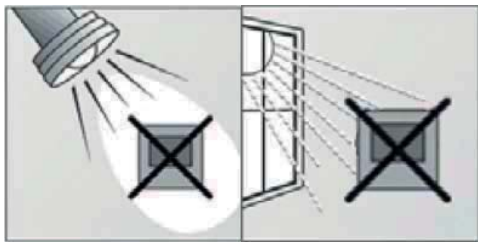


- It should also not be installed on an exterior wall - low outside temperatures will influence the temperature regulation.

- The ambient temperature controller must not be exposed to direct contact with liquids.



- Temperature regulation will also be affected by exposure to heat from electrical appliances and direct sunlight on the ambient temperature controller.



Requirements for commissioning

A PC with ETS (ETS 2 V1.3a or higher) and a connection to the ABB i-bus®, e.g. over a KNX interface, is required to commission the device.

The device is ready for operation once it is connected to the bus voltage. Auxiliary voltage is not required.

The device must be installed and commissioned by a qualified electrician only. The relevant standards, directives, regulations and requirements for planning and installation of electrical systems must be observed.

- The device must be protected from moisture, dirt and damage during transport, storage and operation.
- The device must be operated in accordance with the specified technical data only.

Delivery status

The device is delivered with the physical address 15.15.255. Application program, group addresses and parameters must be loaded during commissioning.

Assigning the physical address

The physical address, group address and parameters are assigned in the ETS.

Cleaning

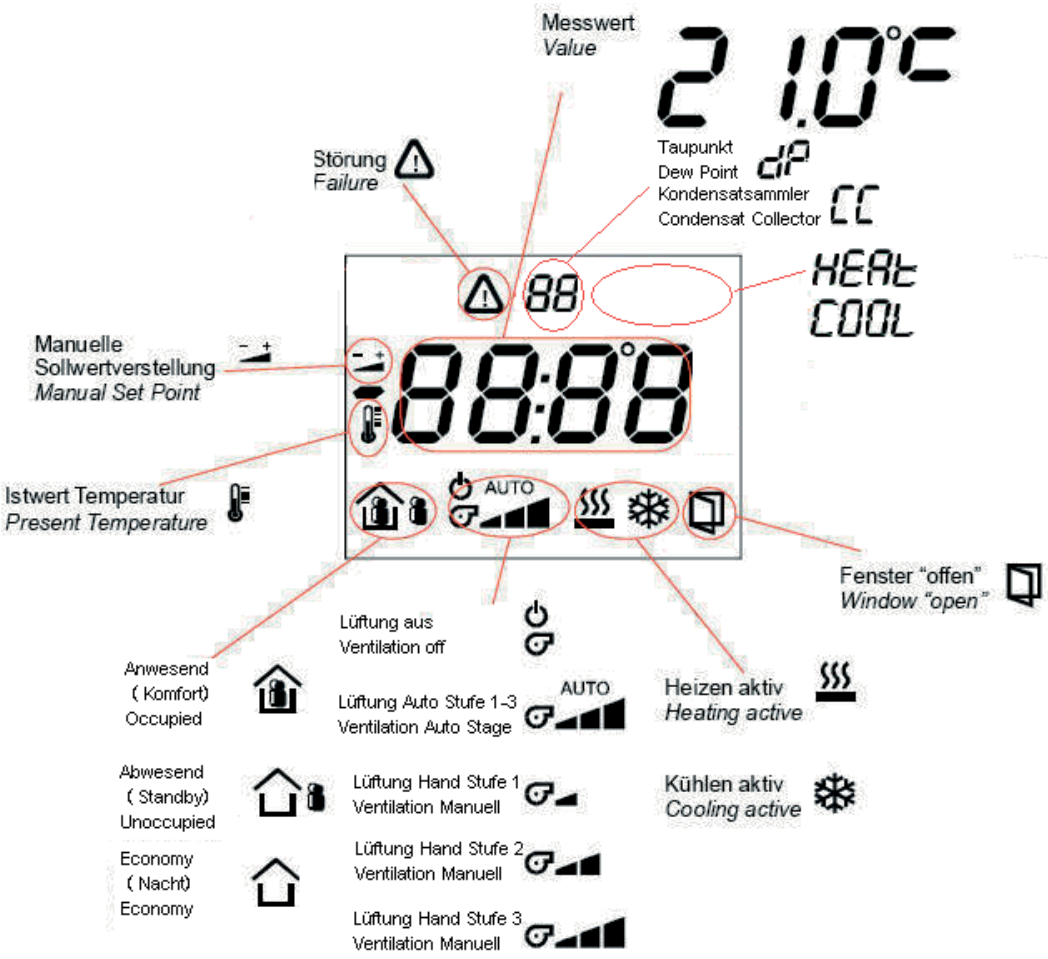
The device can be cleaned with a dry cloth if it is dirty. If this is not sufficient, use a cloth lightly moistened with a detergent solution. Never use aggressive cleaners or solvents.

Maintenance

The device is maintenance-free. It must not be repaired by third parties if it is damaged, such as in transport and/or storage. The guarantee is cancelled if the device is opened.

The device must be accessible at all times for operation, testing, inspection, maintenance and repair (acc. to DIN VDE 0100-520).

2.5 Operation and display



Messages

Internal Temp error	IA	– Fault in internal temperature sensor
External Temp error	EA	– Update of external temperature not received ->
Outdoor Temp error	OA	– Update of outside temperature not received ->
Actuator error	AA	– Update of actuator not received ->
Dewpoint	dP	– Dewpoint alarm
Condensate alarm	CA	– Condensate collector alarm
Error value	EU	– Value outside permissible range received – Value is rejected
Heating setpoint adjustment:		Display of HEAT and heating symbol
Cooling setpoint adjustment:		Display of COOL and cooling symbol

If the actual temperature is permanently displayed (standard), the set temperature is displayed by the symbol "Manual setpoint adjustment".

The firmware status is shown in the display after a voltage reset.

3 Commissioning

3.1 Application program for the ambient temperature controller

The Fan Coil Display Operate Control/1.2 application program for the Fan Coil ambient temperature controller with display controls the device for heating, cooling or heating and cooling. The ETS shows different parameters and communication objects depending in the functions selected in the "Control Function in Use" parameter.

A "2-point control", a "PWM control", a "Continuous control" or a "Fan Coil Actuation" can be implemented for heating and/or cooling in all controller functions. A supplementary stage for heating and also for cooling can also be actuated.

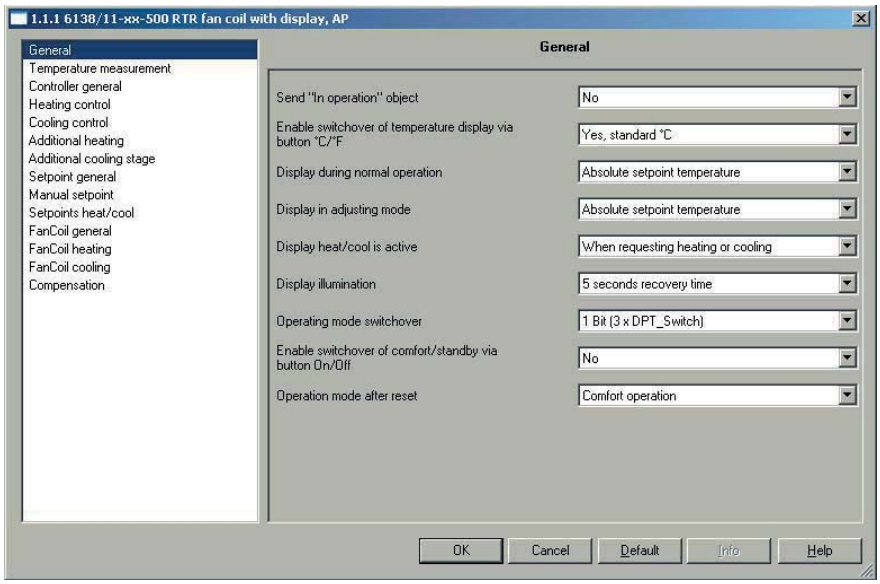
A temperature value can also be received by an additional temperature sensor via the KNX for improved temperature control in larger rooms. The measured value is then applied to the ambient temperature control with a defined weighting.

The ambient temperature controller can be operated with dependent or individual setpoints. Dependent setpoints mean that the setpoints in standby and night mode are always based on the basic setpoint, and with individual setpoints a separate setpoint can be set for every operating mode. (See also page 93 in Section 4.4 Setpoints at Planning and Application.)

The ambient temperature controller with display has summer compensation to save energy and to maintain a reasonable temperature difference when entering an air-conditioned building. A winter compensation function can also be activated to maintain a pleasant temperature in rooms with large areas of window during cold weather. (See also page 98 in Section 4.6 Compensation at Planning and Application.)

3.2 Parameters

3.2.1 Parameter window "General"



Send "In operation" object

Options:
- **No**
- Send value “0” cyclic
- Send value “1” cyclic

The "In operation" object reports to the bus that the device is operating correctly. This periodic message can be monitored by an external device. The following parameters are shown:

transmission period in s [1...65.535]

Options: - 1...**60**...65.535

The period at which the "In operation" object sends a message periodically is set here.

Enable switchover of temperature display via button °C/°F

Options:
- **Yes, standard °C**
- Yes, standard °F
- No, standard °C
- No, standard °F

This parameter enables the °C/°F push-switch. The user can then switch the temperature display from °C to °F. The temperature is always converted from °C to °F in the Fan Coil ambient temperature controller with display, because only °C values can be sent to the KNX.

If the "No" setting has been made, the °C/°F push-switch has no function and the user cannot change the display.

Display during normal operation

Options:
- No temperature display
- **Absolute setpoint temperature**
- Relative setpoint temperature (+/-K)
- Current setpoint

Use this parameter to specify what information is displayed in the temperature sensor mode. The current temperature, the current setpoint, the relative current setpoint (adjustable setpoint) or no temperature can be displayed.

Display in adjusting mode

Options:
- **Absolute setpoint temperature**
- Relative setpoint temperature (+/-K)

Use this parameter to specify what information is displayed in the adjustment mode. The setpoint temperature or the relative current setpoint (adjusted setpoint) can be displayed.

Display heat/cool is active

Options:
- If operating mode is active
- **When requesting heating or cooling**

The heat/cool parameter shows the configuration either for "When requesting heating or cooling" or "If operating mode is active". The initial setting shows only heat or cool, if the system is actually heating or cooling.

Display illumination

Options:
- Always On
- Always Off
- **5 seconds recovery time**

Use this parameter to set the LCD backlighting. It can be on at all times, off at all times, or it switches off automatically 5 s after an actuation.

Note:
If the 1-bit communication object "lighting" receives an On message, the backlighting remains on until an Off message is received.

Operating mode switchover

Options:
- 1 Bit (3 x DPT_Switch)
- **1 Byte (2 x DPT_HVACmode)**

Switching operating mode defines whether the ambient temperature controller has three 1-bit communication objects, "Comfort/Standby", "Night Mode" or "Freezing/Heat Protection", or two 1-byte communication objects for switching operating mode.

If an ON message is received by the Comfort/Standby object in 1-bit switching operating mode, the Comfort operating mode is activated.
If an OFF message is received Standby mode is activated.
If an ON message is received by the Night Mode object, night operating mode is activated. An OFF message deactivates Night Mode.
Freezing/Heat Protection mode is also activated with an ON message and deactivated with an OFF message.

If an ON message is received by multiple objects, Freezing/Heat Protection has a higher priority than Comfort Mode. Night reduction has a higher priority than Comfort Mode.

When switching operating mode via 1 byte two 1-byte communication objects are available.
Note: the two 1-byte communication objects have different behaviour when receiving a message. One object evaluates received messages "normally". This means, for example, if a comfort telegram is received, the room thermostat switches to comfort mode. If a night telegram is received, the ambient temperature controller switches to night mode. This object is controlled, for example, by time switches.
The second object can "overwrite" the first object temporarily. This means, for example, if a Freezing/Heat Protection telegram is received, the ambient temperature controller switches to Freezing or Heat Protection mode.
If freezing or heat protection is reset by another message, the ambient temperature controller activates the operating mode pending at the "normal" object. As a result, it is capable of noting operating modes.

The following applies to the 1-byte communication object:
0 = Auto
1 = Comfort
2 = Standby
3 = Night
4 = Freezing/Heat Protection
5 – 255 = not allowed

Enable switchover of comfort/standby via button On/Off

Options: Yes
No

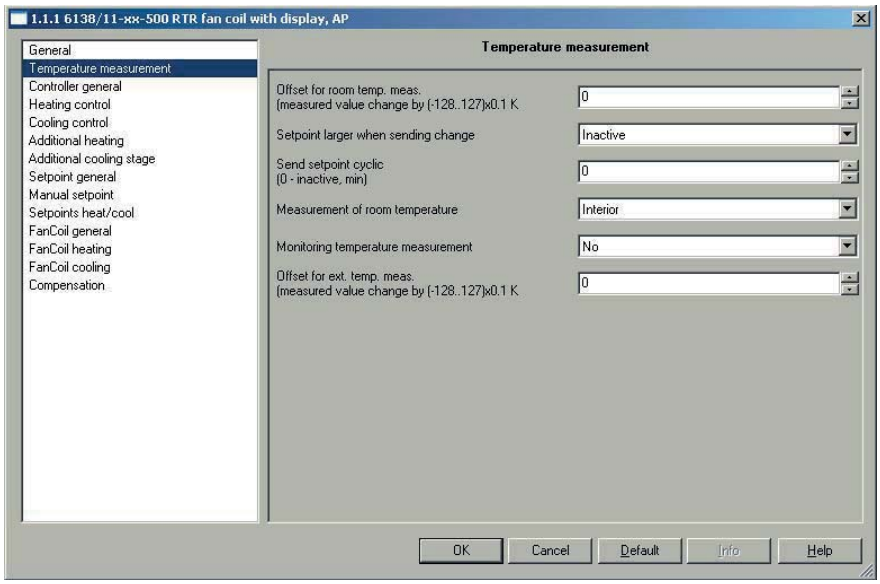
Use this parameter to enable switching between operating modes with the ON/OFF switch. If "No"*, ...* is set here, the push-switch is used for switching the device on and off by pushing and holding (500 ms), if "Yes" is set, the operating mode can be switched from Comfort to Standby and vice versa by pushing and releasing the push-switch and the device is switched off by pushing and holding it (> 500ms). If the device is switched off and switched on with the ON/OFF push-switch, Comfort mode is set.

Operation mode after reset

Options:
- **Comfort operation**
- Standby
- Night mode
- Frost/heat protection

This parameter specifies the mode activated after resetting the temperature sensor or after commissioning. Comfort mode is default, however Standby, Night mode or Frost/heat Protection can also be selected.

3.2.2 "Temperature Measurement" parameter window



Offset for room temp. meas.
(measured value changed by (-128..127)x0.1 K)

Options:
- -128
- …
- **0**
- …
- 127

Value range –128..127 corresponds to –12.8K..12.7K

If the actual temperature is recorded internally, it may be falsified by an additional internal heat source, e.g. bus or network coupler. The falsified value can be adjusted with the setting "calibration value for ambient temperature measurement".

Setpoint larger when sending change

Options:
- **Inactive**
- 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

If this parameter is set to a difference, the associated 2-byte communication object "Current temperature" sends its current temperature whenever this parameter changes.

Send setpoint cyclic (0 – inactive, min)

Options: - **0** .. 60

If the current value is to be sent cyclically independent of a change, the parameter "Send setpoint cyclic" must be set to a time. This may be necessary, for instance, with a higher-level boiler that expects to receive setpoints and current values within a certain time period. If values are not received, a predefined supply line temperature is set that is no longer oriented on actual demand.

Measurement of room temperature

Options:
- **Interior**
- Exterior
- Interior and exterior

This parameter is used to set the measurement of the current temperature. It can be measured "Interior," "Exterior" or "Interior and Exterior". Internal measurement means that the temperature is taken directly from the room thermostat. For external measurements, an additional temperature sensor is used and is sent to the room thermostat via 2-byte communication object. If you are measuring current temperature internally and externally, the room thermostat determines the current temperature from the combination of temperature values defined in the "Emphasis internal/external" parameter. An additional sensor may need to be added for larger spaces.

Weighting interior / exterior

Options:
- 10% / 90%
- 20 % / 80 %
- 30 % / 70 %
- 40 % / 60 %
- 50 % / 50 %
- 60 % / 40 %
- 70 % / 30 %
- 80 % / 20 %
- 90 % / 10 %

The "Weighting interior / exterior" specifies whether the internal temperature sensor for the ambient temperature controller is included in the control. If, for instance, the parameter is set to 60%, the current temperature is 60% of the temperature measured internally and 40% of the value obtained externally.

Monitoring temperature measurement

Options:
- Yes
- **No**

The "Monitoring temperature measurement" parameter defines whether the internal and, if connected, external temperature sensors are to be monitored.

Control value at temp. measuring error

Options:
- Final value
- 0 %
- 10 %
- 20 %
- 30 %
- 40 %
- 50 %
- 60 %
- 70 %
- 80 %
- 90 %
- 100 %

In case of error the device output uses the specified value to run an emergency function.

Monitoring time exterior temperature (0 – inactive, min)

Options: - 0 / 1 / … / 10 / ... / 60

If the "Monitoring temperature measurement" parameter is set to "yes", the time within which the external temperature sensor must send a message to the bus is set here.

Monitoring time exterior temperature (0 – inactive, min)

Options: - 0 / 1 / …/ 10 / … / 60

If the "Monitoring temperature measurement" parameter is set to "yes", the time within which the outside temperature sensor must send a message to the bus is set here.

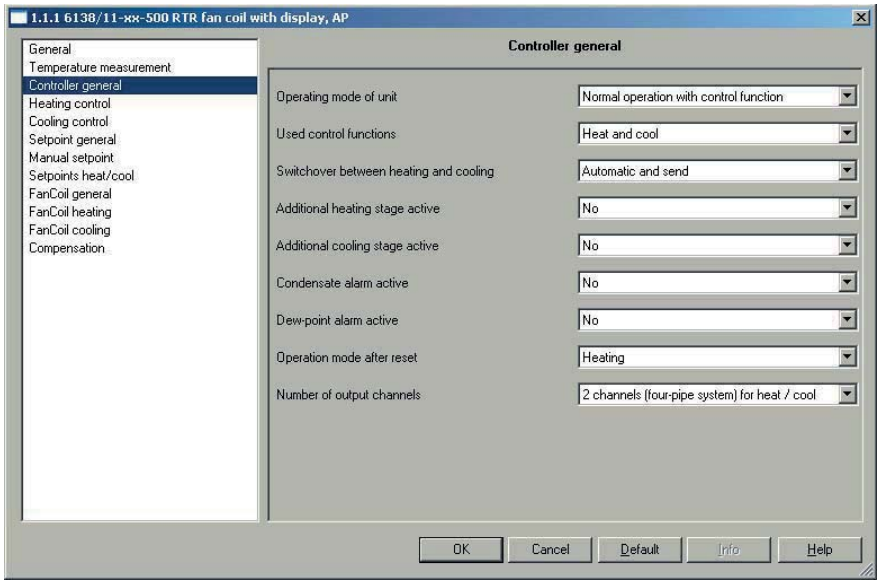
Offset for ext. temp. meas.
(measured value changes by (-128..127)x0,1 K)

Options:
- -128
- …
- **0**
- …
- 127

Value range –128..127 corresponds to –12.8K..12.7K

The measured outside temperature can be adjusted with this parameter. This means that if the outside temperature is falsified by heat or cooling effects at the temperature sensor, the measured value can be adjusted up or down.

3.2.3 Parameter window "Controller general"



Operating mode of unit

Options: - **Normal operation with control function**

- Ext. input, only operating and display function

The control function of the device is deactivated in the "Ext. input, only operating and display function" setting. The device is used to

1. control another unit, such as switching on and off, setpoint input, fan stage, °C/°F switching
2. display, such as current temperature
3. recording current temperature

All unwanted communication objects and parameters are not shown.

The user cannot see whether it is normal mode or branch.

Used control functions

Options: - Heating
- Cooling
- **Heat and cool**

The parameter "Used control functions" allows you to define the functionality of the room thermostat. You can choose between "Heating" or "Cooling" functions, or use it for both "Heat and cool". Once you have selected a function, only the parameters and communication objects required for that function are shown. This setting is only shown if the operating mode of the device is set to normal mode with control function.

Switchover between heating and cooling

Options:
- **Automatic**
- Automatic and send
- Exterior

You can switch between heating and cooling automatically in the room thermostat. To do so, select the "Automatic" option. This ensures that the room thermostat checks the configured setpoints for heating and cooling. The option "Automatic and send" also allows you to switch automatically. In addition, a toggle telegram is sent and can be analysed by other room thermostats. The "Exterior" option allows you to switch via an associated 1-bit communication object.

Additional heating stage active

Options:
- Yes
- **No**

In specific instances such as when using underfloor heating, it may be necessary to install a quick additional stage for the heat control in order to warm up the room rapidly. When the ambient temperature controller is set to "Yes", it has a second heating system with switching control (1-bit) or continuous control (1-byte).
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

Additional cooling stage active

Options:
- Yes
- **No**

In specific instances, it may be necessary to install a quick additional stage in the cooling control in order to cool off the room rapidly. When the ambient temperature controller is set to "Yes", it has a second cooling system with switching control (1-bit) or continuous control (1-byte) 100%.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Condensate alarm active

Options: - Yes
- **No**

If the parameter "Condensate alarm active" is activated, the room thermostat has a 1-bit communication object that can be used to send telegrams from a container for condensate water. When an ON telegram arrives, the room thermostat changes to the heat protection mode. Heat protection is deactivated when an OFF telegram is received. This prevents condensate, which can collect during cooling, from overflowing the condensate container.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.
If a condensate collector alarm is detected, it is shown in the display (fault symbol plus abbreviation).
The frost protection object is sent in the event of a condensate alarm if the flag is set to send. If the condensate alarm is corrected and there is no dewpoint alarm, the device switches from heat protection back to the operating mode from the "operating mode after reset and Off" parameter.

Dew-point alarm active

Options: - Yes
- **No**

If the parameter "Dew-point alarm active" is activated, the room thermostat has a 1-bit communication object that can be used to send telegrams from a dew point sensor. When an ON telegram arrives, the room thermostat changes to the heat protection mode. Heat protection is deactivated when an OFF telegram is received. This prevents the condensate that forms during incipient condensation when cooling is switched on from causing damage.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.
If a dewpoint alarm is detected, it is shown in the display (fault symbol plus abbreviation).
The frost protection object is sent in the event of a dewpoint alarm if the flag is set to send. If the dewpoint alarm is corrected and there is no condensate collector alarm, the device switches from heat protection back to the operating mode from the "operating mode after reset and Off" parameter.

Operation mode after reset

Options:
- **Heating**
- Cooling
- Dependent on object “switchover heat / cool”

This parameter specifies the mode activated after resetting the temperature sensor or after commissioning,
if heating/cooling switching is set to external.

Heating is preset, otherwise the operating mode can depend on the value of the heating/cooling object. The device queries the value of the object over the bus during initialisation.

Note:

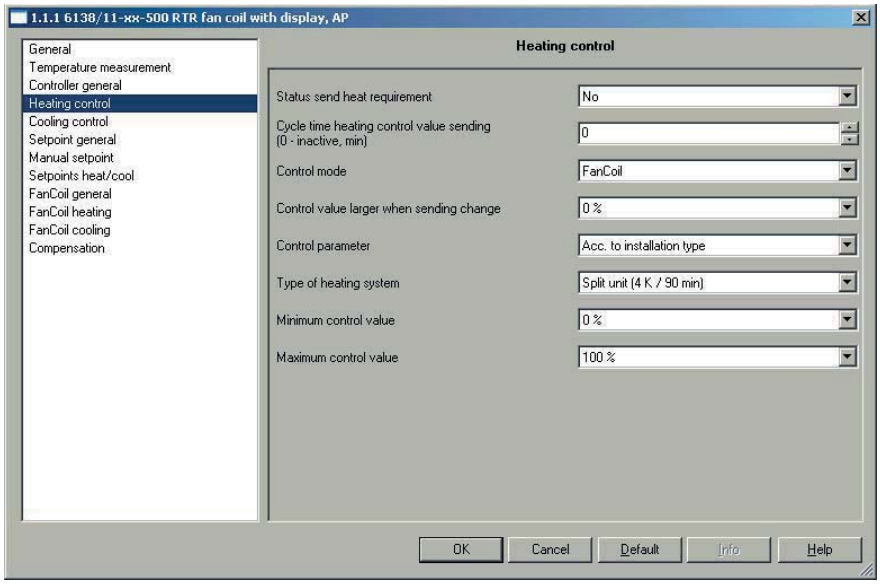
The selection option "Dependent on object switchover heat / cool" is only shown if the "switching between heating and cooling" is set to "Exterior".

Number of output channels

Options:
- 1 channel (dual pipe system) for heat / cool
- **2 channels (four-pipe system) for heat / cool**

If the "used control functions" parameter has been selected, it can be used to specify whether a separate communication object or a common communication object for heating or cooling is provided for the control value. The setting "1 channel (dual pipe system) for heat / cool" is required for dual pipe systems and the setting "2 channels (four-pipe system) for heat / cool" is required for four-pipe systems.

3.2.4 Parameter window "Heating control"



Status send heat requirement

Options: - Yes
- **No**

If you set the "Status send heat requirement" to "yes", the ambient temperature controller will send an ON telegram via the relevant 1-bit communication object once it is in heating mode. If the room thermostat is in the "insensitive range" between heating and cooling or in cooling mode, the thermostat sends an OFF telegram via the status heating object.
This parameter is only available if the "Heating" or "Heat and cool" control functions are set.

Cycle time heating control value sending (0 - inactive, min)

Options: - **0** / 1 / … / 60

The room thermostat can send the control value, even if the value remains unchanged. This is often required since the connected actuator otherwise assumes that the room thermostat is no longer available. This enables the actuator to activate its force-position control, which is only deactivated when a new control value is received.
The cycle time for automatic sending of the control value is adjustable from 1 to 60 min. Cyclic sending can also be disabled (setting 0).
This parameter is only available if the "Heating" or "Heat and cool" control functions are set.

Control mode

Options:
- 2-step
- PWM
- Continuous
- **FanCoil**

This function allows you to specify the mode of control. You can select "2-step control", "PWM control", "Continuous control" or "FanCoil actuation" (see also page 87 and following).
This parameter is only available if the "Heating" or "Heat and cool" control functions are set.

Note: the fan can be set with a push-switch in Fan Coil only. The push-switch has no function with other control types and fan stage display is hidden.

Hysteresis

Options:
- 0.0 K
- 0.1 K
- 0.2 K
- 0.3 K
- 0.4 K
- …
- **1.0 K**
- …
- 2.0 K

Set a hysteresis value to ensure that the valve does not constantly switch with each minor under and overshoot when using 2-step control of the actuator. The hysteresis value lies around the setpoint. For example, if the setpoint is 21 °C and the hysteresis is 1 K, the room thermostat only sends an "on" signal at 21.5 °C and an "off" signal at 20.5 °C.
This parameter is only available if "2-step control" is set as the control type.

Invert heating

Options:
- Yes
- **No**

"Invert heating" is used to adjust the direction of control action of the control value to "de-energised open" or "de-energised closed" valves.
This parameter is only available if "2-step control" is set as the control type.

Control value larger when sending change

Options:
- **0%**
- 1 %
- …
- 5 %
- …
- 15 %

The parameter "Control value larger when sending change" can be used to influence the bus load. This setting is configured in percentages. The higher the selected value, the fewer the control value telegrams sent by the room thermostat. However, the value should not be set too high to ensure the control works properly. A value of 5% will generally provide good control results.
This parameter is only available if the "Heating" or "Heat and cool" control functions are set and the "Heating" control type is set to "Continuous" or "FanCoil".

Control parameter

Options:
- **Acc. to installation type**
- free parameterization

This parameter allows you to configure the control based on the type of system in use. The "Acc. to installation type" setting displays predefined values for the different system types that most frequently provide good control results. The setting "free parameterization" can be used to individually update the proportional range and readjust time. Proper knowledge in the field of control technology is required to use " free parameterization ".
This parameter is only available if the "Heating" or "Heat and cool" control functions are set and the heating control type is set to "PWM", "Continuous" or "FanCoil".

Type of heating system

Options:
- Warm water heating (1.5 K / 100 min)
- Electric heating (1.5 K/50 min)
- Floor heating (4 K/200 min)
- **Split unit (4 K / 90 min)**

The "Type of heating system" parameter enables you to select the heating system in use with predefined control parameters.
This parameter is only available if the "Heating" or "Heat and cool" control functions are set, the heating control type is set to "PWM", "Continuous" or "FanCoil" and the control parameter is set to "via system type".

Proportional range (Xp)

Options:
- 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
- 5.5 K

…
- 10.0 K

The proportional range stands for the P amount of controller. It varies around the setpoint and can be used to influence control speed with a PI controller. The smaller the configured value, the faster it reacts to the control. This value should not be configured too low, in order to avoid risk of overshoot.
This parameter is only available if "free parameterization" is set as the control parameter.

Readjust time

Options:
- 0 min
-10 min.
- 20 min.
- …
- **90 min**
- …
- 240 min

The readjust time stands for the I amount of a controller. The integral amount has the effect of moving the room temperature slowly toward and finally to the setpoint. Depending on the system type used, the readjust time has to have different values. In general, the more inactive the overall system, the larger the readjust time.
This parameter is only available if "free parameterization" is set as the control parameter.

Minimum control value

Options:
- **0** %
- 5%
- 10 %
- 15 %
- 20 %
- 25 %
- 30 %

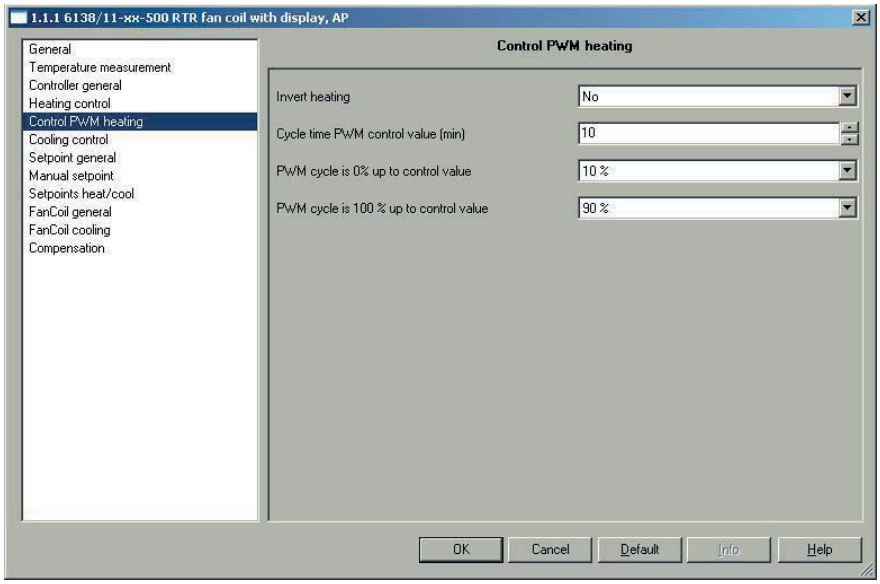
This parameter is required if the ambient temperature controller with constant control regulates a continuous actuator or a fan coil.
To prevent switching with control variables that are too small, the parameter "minimum control value" can be set to a value so that the actuator only switches on at larger control values.
This parameter is only available if the "Heating" or "Heat and cool" control functions are set and the "Heating" control type is set to "Continuous" or "FanCoil".

Maximum control value

Options:
- 70%
- 75%
- 80 %
- 85 %
- 90 %
- 95 %
- **100** %

This parameter is required if the ambient temperature controller with constant control regulates a continuous actuator or a fan coil.
To prevent switching with control values that are too high, the parameter "maximum control value" can be set to a value so that the actuator switches off at lower control values.
This parameter is only available if the "Heating" or "Heat and cool" control functions are set and the "Heating" control type is set to "Continuous" or "FanCoil".

3.2.5 Parameter window "Controller PWM heating"



Invert heating

Options: - Yes
- **No**

"Invert heating" is used to adjust the direction of control action of the control value to "de-energised open" or "de-energised closed" valves.

Cycle time PWM control value (min)

Options: - 1 / 2 / … / **10** / … /60

With PWM control, the actuator switches the valve drive depending on the control value. The control thereby checks the "Cyclic time of the PWM control value".
Example: for a cyclic time of 10 min. and a control value of 60%, the valve gear is switched on for 6 min. and off for 4 min.
Basically, the following applies for cyclic time: the more inactive the entire system, the higher the cyclic time you can set.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "PWM".

PWM cycle is 0% up to control value

Options:
- 0%
- 5 %
- …
- **10 %**
- …
- 30 %

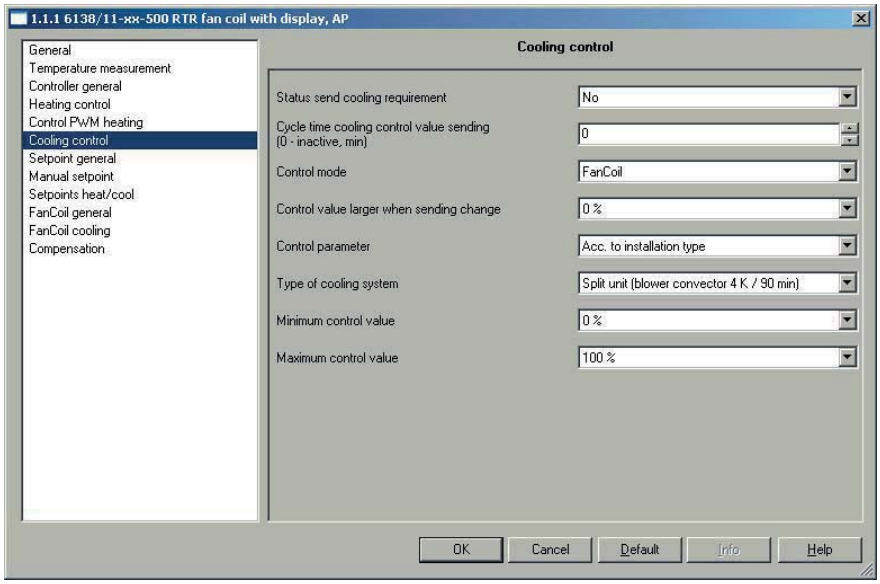
If the control value is very small for PWM control, the switch-on period for the actuator might not be sufficient to put in motion the connected thermoelectric valve gear. A valve drive opens or closes by warming or cooling an expansion element. However, it always takes time for the element to heat up or cool off sufficiently to allow the valve to be opened or closed. As a result, the valve might not even open with very small control values.
The parameter "PWM cycle is 0% up to control value" can be used to prevent switching with control values that are too small. This parameter allows you to configure the control value at which the actuator switches on.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "PWM".

PWM cycle is 100% up to control value

Options:
- 70%
- 75 %
- …
- **90 %**
- …
- 100 %

If the control value is very large for PWM control, the switch-off period for the actuator might not be sufficient to put in motion the connected thermoelectric valve gear. A valve drive opens or closes by warming or cooling an expansion element. However, it always takes time for the element to heat up or cool off sufficiently. As a result, the valve might not even close with very large control values.
The parameter "PWM cycle is 100% down to an output value" can be used to prevent switching with control values that are too large. It also sets the control value from which the actuator switches off.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "PWM".

3.2.6 Parameter window "Cooling control"



Status send cooling requirement

Options: - Yes
- **No**

If you set the "Status send cooling requirement" to "Yes", the room thermostat will send an ON telegram via the relevant 1-bit communication object once it is in cooling mode. If the ambient temperature controller is in the "insensitive range" between heating and cooling or in cooling mode, the thermostat sends an OFF telegram via the status heating object.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Cycle time cooling control value sending (0 - inactive, min)

Options: - **0** / 1 / 2 / … / 60

The room thermostat can send the control value, even if the value remains unchanged. This is often required since the connected actuator otherwise assumes that the room thermostat is no longer available. This enables the actuator to activate its force-position control, which is only deactivated when a new control value is received.
The cycle time for automatic sending is adjustable. Cyclic sending can also be disabled.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the control type is set to "2-step control", "Continuous" or "FanCoil".

Control mode

Options:
- 2-step
- PWM
- Continuous
- **FanCoil**

This function allows you to specify the type of control. You can choose from 2-step control, PWM control, Continuous control or FanCoil control. This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Hysteresis

Options:
- 0.0 K
- 0.1 K
- 0.2 K
- 0.3 K
- …
- **1.0 K**
- …
- 2.0 K

Set a hysteresis value to ensure that the valve does not constantly switch with each minor under and overshoot when using 2-point control of the actuator. The hysteresis value lies around the setpoint. For example, if the setpoint is 26 °C and the hysteresis is 1 K, the room thermostat when cooling sends only an "on" signal at 25.5 °C and an "off" signal at 26.5 °C. This parameter is only available if "2-step control" is set as the control type.

Invert cooling

Options:
- Yes
- **No**

"Invert cooling" is used to adjust the direction of control action of the control value to "de-energised open" or "de-energised closed" valves. This parameter is only available if "2-step control" is set as the control type.

Control value larger when sending change

Options:
- **0%**
- 1 %
- …
- 5%
- …
- 15 %

The parameter "Control value larger when sending change" can be used to influence the bus load. This setting is configured in percentages. The higher the selected value, the fewer the control value telegrams sent by the room thermostat. However, the value should not be set too high to ensure the control works properly. A value of 5% will generally provide good control results.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "Continuous" or "FanCoil".

Control parameter

Options:
- **Acc. to installation type**
- free parameterization

This parameter allows you to configure the control based on the type of system in use. The "Acc. to installation type" setting displays predefined values for the different system types that most frequently provide good control results. The setting "free parameterization" can be used to individually update the proportional range and readjust time. Proper knowledge in the field of control technology is required to use "free parameterization".
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "PWM", "Continuous" or "FanCoil".

Type of cooling system

Options:
- Cool ceiling (5 K / 240 min)
- **Split unit (blower convector 4 K / 90 min)**

The "Type of cooling" parameter enables you to select the cooling system in use with predefined control parameters.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "PWM", "Continuous" or "FanCoil".

Proportional range (Xp)

Options:
- 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
- 5.5 K
- 6.0 K
- 6.5 K
- 7.0 K
- 8.0 K
- 9.0 K
- 10.0 K

The proportional range stands for the P amount of controller. It varies around the setpoint and can be used to influence control speed with a PI controller. The smaller the configured value, the faster it reacts to the control. This value should not be configured too low, in order to avoid risk of overshoot.
This parameter is only available if "free parameterization" is set as the control parameter.

Readjust time (Tn)

Options:
- 0 min
-10 min.
- 20 min.
- …
- **90** min
- …
- 240 min

The readjust time stands for the I amount of a controller. The integral amount has the effect of moving the room temperature slowly toward and finally to the setpoint. Depending on the system type used, the readjust time has to have different values. In general, the more inactive the overall system, the larger the readjust time.
This parameter is only available if "free parameterization" is set as the control parameter.

Minimum control value

Options:
- **0%**
- 5%
- 10 **%**
- 15 %
- 20 %
- 25 %
- 30 %

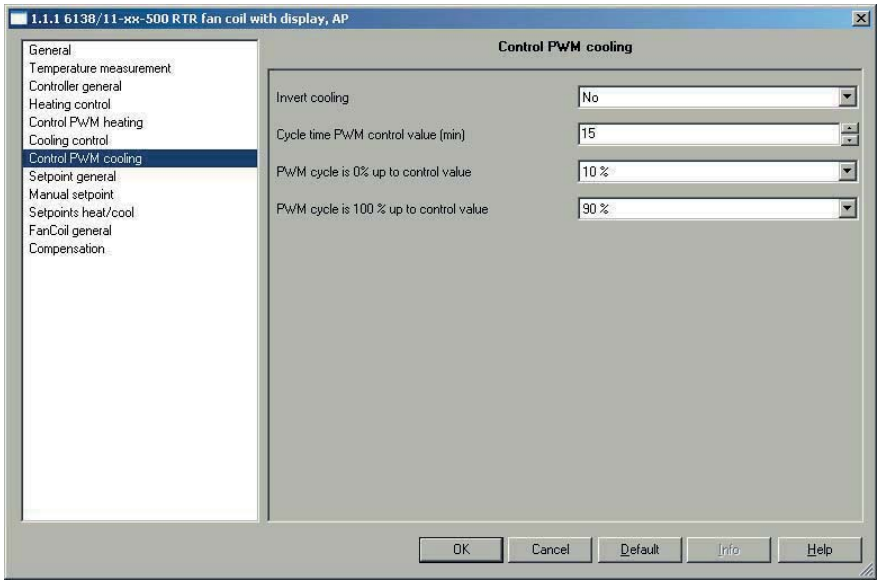
This parameter is required if the ambient temperature controller with constant control regulates a continuous actuator or a fan coil.
To prevent switching with control variables that are too small, the parameter "minimum control value" can be set to a value so that the actuator only switches on at larger control values.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "Continuous" or "FanCoil".

Maximum control value

Options:
- 70%
- 75%
- 80 %
- 85 %
- 90 %
- 95 %
- **100 %**

This parameter is required if the ambient temperature controller with constant control regulates a continuous actuator or a fan coil.
To prevent switching with control values that are too high, the parameter "maximum control value" can be set to a value so that the actuator switches off at lower control values.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "Continuous" or "FanCoil".

3.2.7 Parameter window "Control PWM cooling"



Invert cooling

Options: - Yes
- **No**

"Invert cooling" is used to adjust the direction of control action of the control value to "de-energised open" or "de-energised closed" valves.

Cycle time PWM control value (min)

Options: - 0 / 1 / 2 / … / **10** / … / 60

With PWM control, the actuator switches the valve drive depending on the control value. The control thereby checks the "Cyclic time of the switching control value".
Example: for a cyclic time of 10 min. and a control value of 60%, the valve gear is switched on for 6 min. and off for 4 min.
Basically, the following applies for cyclic time: the more inactive the entire system, the higher the cyclic time you can set.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "PWM".

PWM cycle is 0% up to control value

Options:
- 0%
- 5 %
- …
- **10** %
- …
- 30 %

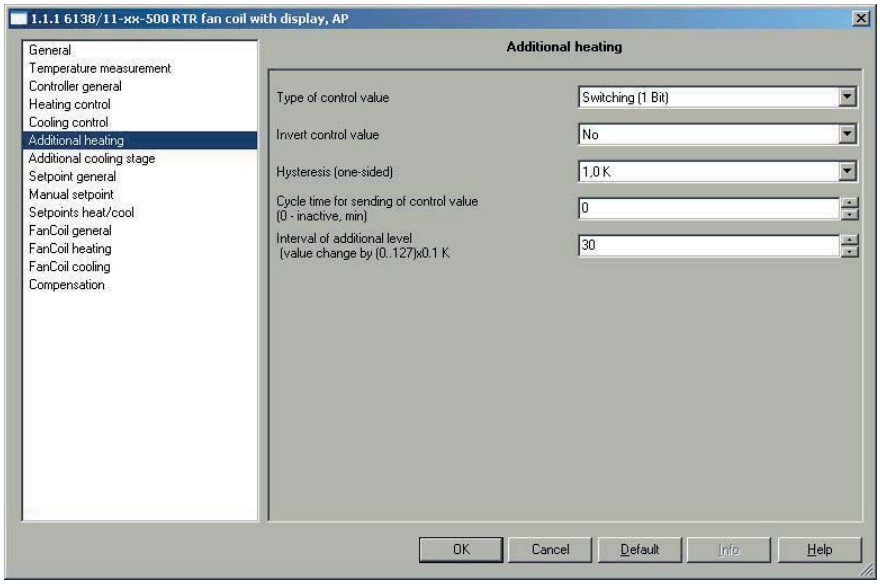
If the control value is very small for PWM control, the switch-on period for the actuator might not be sufficient to put in motion the connected thermoelectric valve gear. A valve drive opens or closes by warming or cooling an expansion element. However, it always takes time for the element to heat up or cool off sufficiently to allow the valve to be opened or closed. As a result, the valve might not even open with very small control values.
The parameter "PWM cycle is 0% up to control value" can be used to prevent switching with control values that are too small. This parameter allows you to configure the control value at which the actuator switches on. This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "PWM".

PWM cycle is 100% up to control value

Options:
- 70%
- 75 %
- …
- **90** %
- …
- 100 %

If the control value is very large for PWM control, the switch-off period for the actuator might not be sufficient to put in motion the connected thermoelectric valve gear. A valve drive opens or closes by warming or cooling an expansion element. However, it always takes time for the element to heat up or cool off sufficiently. As a result, the valve might not even open with very large control values.
The parameter "PWM cycle is 100% up to an output value" can be used to prevent switching with control values that are too large. This parameter allows you to configure the control value at which the actuator switches on. This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "PWM".

3.2.8 Parameter window "Additional heating"



Type of control value

Options: - Continuous (1 Byte)
- **Switching (1 Bit)**

The additional stage for heating can transmit a 1-bit or 1-byte sized control value. If "switching 1-Bit" is selected, the additional stage controls a switching control (1-bit) via a 1-bit communication object, e.g., a thermoelectric actuator that controls a switch actuator. If "Continuous 1-Bit" is selected, the additional stage provides continuous control (1-bit) via a 1-bit communication object, e.g., an electrical drive or an actuator with integrated pulse width modulation.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

Invert control value

Options: - Yes
- **No**

"Invert cooling" is used to adjust the direction of control action of the control value to "de-energised open" or "de-energised closed" valves.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

Hysteresis (one-sided)

Options:
- 0.0 K
- 0.1 K
- 0.2 K
- 0.3 K
- …
- **1.00 K**
- …
- 2.00 K

The parameters "Interval of additional level" and "Hysteresis (one-sided)" enable you to specify when the additional stage switches on and off. For example, if the setpoint for the additional stage is 18 °C and the hysteresis is 0.5 K (one-sided), the additional stage will switch on at 18 °C and off at 18.5 °C.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

Cycle time for sending of control value (0 - inactive, min)

Options: - **0** / 1 / 2 / … / 60

The room thermostat can send the control value, even if the value remains unchanged. This is often required since the connected actuator otherwise assumes that the room thermostat is no longer available. This enables the actuator to activate its force-position control, which is only deactivated when a new control value is received.
The cycle time for automatic sending is adjustable. Cyclic sending can also be disabled.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

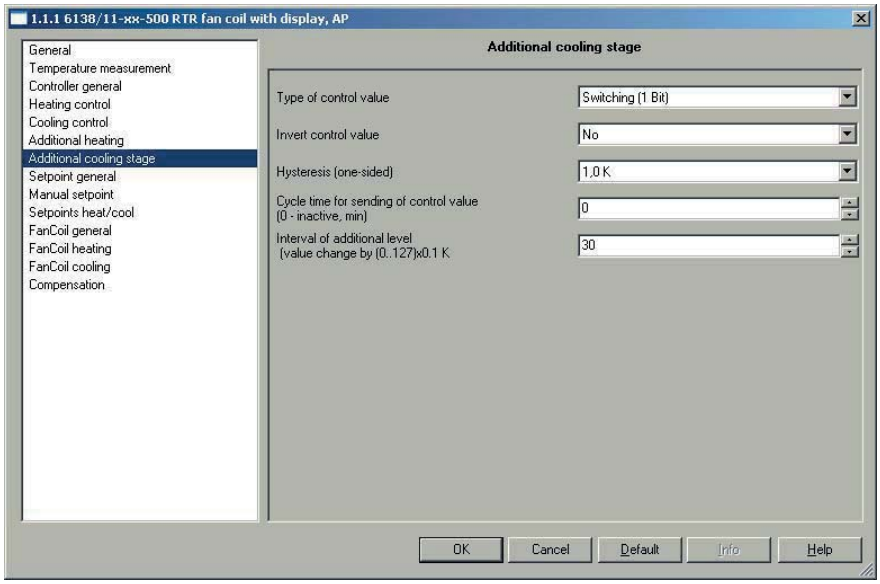
Interval of additional level (values changed by (0..127)x0.1 K)

Options:
- 0
- …
- **30**
- …
- 127

Value range 0..127 corresponds to 0K..12.7K

This parameter allows you to specify the setpoint of the additional stage for heating. The setpoint refers to the base setpoint for heating (comfort temperature for heating) for the basic stage.
Example: the basic setpoint for heating is set to 21 °C. When the temperature falls below 18 °C, additional heating should be switched on so that the room heats up again rapidly. In this event, set the parameter "Stage gap for the basic stage to additional stage" to 3 K. This may be necessary after automatic night setback, if the user wishes to use the room immediately (e.g., the bathroom early in the morning).
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

3.2.9 Parameter window "Additional cooling stage"



Type of control value

Options: - Continuous (1 Byte)
- Switching (1 Bit)

The additional stage for cooling can transmit a 1-bit or 1-byte sized control value. If "Switching 1-Bit" is selected, the additional stage controls a switching control (1-bit) via a 1-bit communication object, e.g., a thermoelectric actuator that controls a switch actuator. If "Continuous 1-Bit" is selected, the additional stage provides continuous control (1-byte) via a 1-byte communication object, e.g., an actuator with integrated pulse width modulation.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Invert control value

Options: - Yes
- **No**

The control value is adjusted to "de-energised open" or "de-energised closed" valves via the direction of control action of the controller.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Hysteresis (one-sided)

Options:
- 0.0 K
- 0.1 K
- 0.2 K
- 0.3 K
- …
- **1.0 K**
- …
- 2.00 K

The parameters "Interval of additional level" and "Hysteresis (one-sided)" enable you to specify when the additional stage switches on and off. For example, if the setpoint for the additional stage is 29 °C and the hysteresis is 0.5 K (one-sided), the additional stage switches on at 29 °C and off at 28.5 °C.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Cycle time for sending of control value (0 - inactive, min)

Options: - **0** / 1 / 2 / … / 60

The room thermostat can send the control value, even if the value remains unchanged. This is often required since the connected actuator otherwise assumes that the room thermostat is no longer available. This enables the actuator to activate its force-position control, which is only deactivated when a new control value is received.
The cycle time for automatic sending is adjustable. Cyclic sending can also be disabled.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

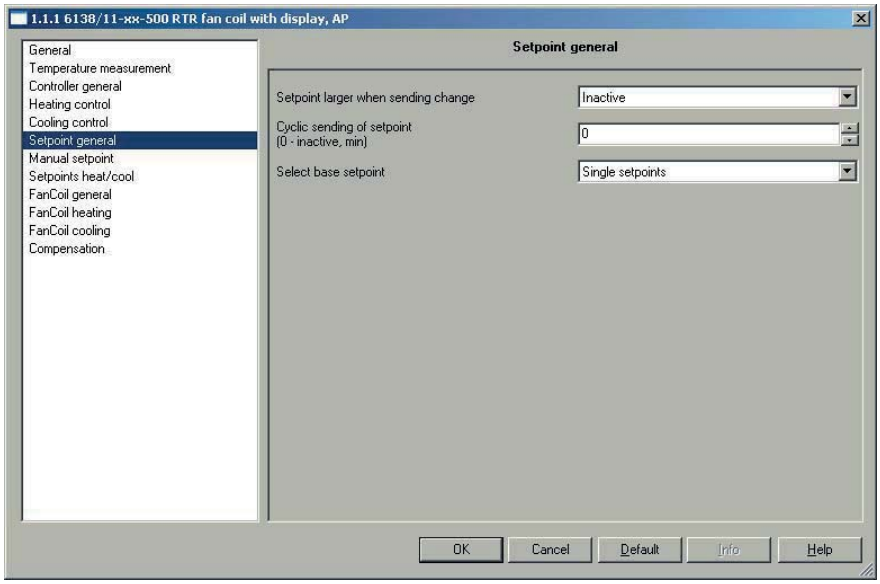
Interval of additional level (values changed by (0..127)x0.1 K)

Options:
- 0
- …
- **30**
- 127

Value range 0..127 corresponds to 0K..12.7K

This parameter allows you to specify the setpoint of the additional stage for cooling. The setpoint refers to the base setpoint for cooling (comfort temperature for cooling) for the basic stage.
Example: the basic setpoint for cooling is set to 26 °C. When the temperature rises above 29 °C, additional cooling should be switched on so that the room cools off again rapidly. In this event, set the parameter "Stage gap for the basic stage to additional stage" to 3 K.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

3.2.10 Parameter window "Setpoint general"



Setpoint larger when sending change

Options:
- **Inactive**
- 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

If this parameter is set to a difference, the associated 2-byte communication object "Setpoint temperature" sends its current temperature whenever this parameter changes more than the specified difference.

Cyclic sending of setpoint (0 – inactive, min)

Options: - **0** / 1 / 2 / … / 60

If the setpoint is to be sent cyclically independent of a change, the parameter "Cyclic sending of setpoint" must be set to a time. This may be necessary, for instance, with a higher-level boiler that expects to receive setpoints and current values within a certain time period. If values are not received, a predefined supply line temperature is set that is no longer oriented on actual demand.

Select base setpoint

Options:
- **Dependent setpoints**
- Single setpoints

The "Select base setpoint" option defines whether the room thermostat refers to "Dependent setpoints" or to "Single setpoints".
Dependent setpoints mean that a comfort temperature (base setpoint) is defined and other setpoints such as temperature at standby or automatic night setback refer to this point.
The standby temperature 2 K is set lower than the comfort temperature (base setpoint). At a comfort temperature of 21 °C this means a standby temperature of 19 °C. If you raise the comfort temperature to 22 °C by manually moving the setpoint, the standby temperature is automatically changed to 20 °C.
The setting "Single setpoints" allows you to choose a separate temperature on the room thermostat for each setpoint; the room thermostat always refers to this setting in the respective operating mode.
Example: the standby temperature is set permanently at 19 °C. If you raise the comfort temperature from 21 °C to 22 °C by manually moving the setpoint, the standby temperature does not change.

Reference base setpoint

Options:
- **Setpoint heating**
- Setpoint cooling
- Mid skip zone

If "Dependent setpoints" were selected with "Heat and cool" controller function and selection of base setpoint, this parameter can be used to define whether the base setpoint refers to comfort temperature for heating, cooling or the average temperature between "Heat and cool" (see also page 95, Section 4.4.3 Minimum distance).
"Setpoint heating" is the default setting. In regions where the cooling function is more important, it is recommended that you change this parameter to "Setpoint cooling". This makes it easier to set the room thermostat and raise the cooling setpoint (standby temperature cooling and automatic night setback).
This parameter is only available if the "Heat and cool" control functions are set.

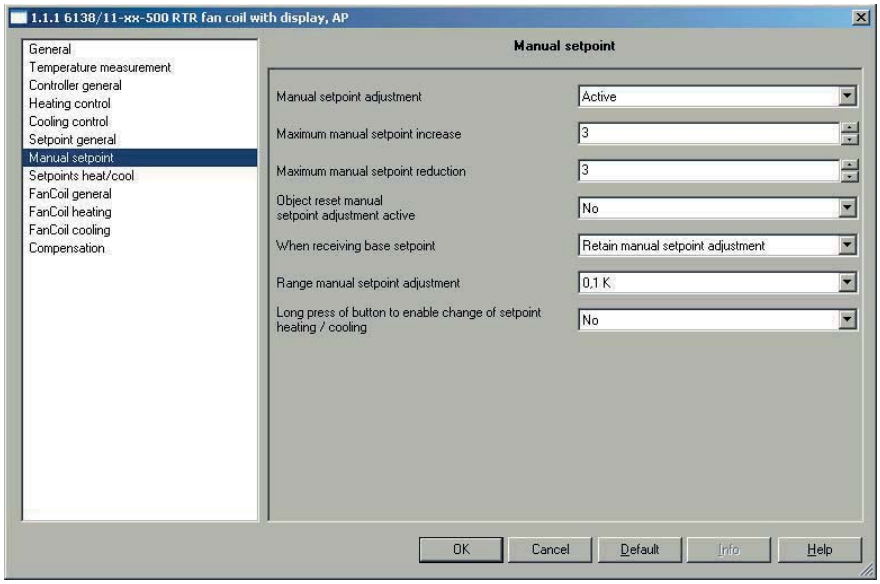
Manual setpoint adjustment at reset of change from night / to night

Options: - **Yes**
- No

If this parameter is set to "Yes", the setpoint offset is automatically reset when switching operating modes from night and to night.

If a setpoint is adjusted manually, the increase or reduction of the setpoint can be cancelled if the operating mode is changed, e.g. on receipt of a telegram from a timer. This means that if the parameter is set to "Yes", the manually adjusted setpoint will be rejected if the operating mode changes and it will be reset to the setpoint preset in the parameter.

3.2.11 Parameter window "Manual setpoint"



Manual setpoint adjustment

Options: - Disabled
- **Actice**

This parameter allows end users to adjust the configured setpoint during commissioning. The settings "... manual increase and reduction of the setpoint" is used to specify how high or low the setpoint can be moved. The value that is parameterised for manually configuring the setpoint is an amount that fluctuates around the setpoint.
Example: with a comfort temperature of 21 °C and a manual setpoint adjustment of +/- 3 K, users can select any temperature from 18 °C to 24 °C.

Maximum manual setpoint increase

Options:
- 0 K
- 1 K
- 2 K
- **3 K**
- 4 K
- 5 K
- 6 K
- 7 K
- 8 K
- 9 K
- 10 K

If you wish to prevent an excessive temperature increase by the manual setpoint setting, the upper range of the manual setpoint preset can be limited with the parameter "Maximum manual setpoint increase".
Example: with a comfort heating temperature of 21 °C and a manual setpoint adjustment of +/- 3 K, users can select any temperature from 18 °C to 24 °C. If the comfort temperature can be increased to a maximum of 22 °C, enter "1 K" under the parameter "Max. increase of setpoint".

Maximum manual setpoint reduction

Options:
- 0 K
- 1 K
- 2 K
- **3 K**
- 4 K
- 5 K
- 6 K
- 7 K
- 8 K
- 9 K
- 10 K

If you wish to prevent an excessive temperature reduction by the manual setpoint setting, the lower range of the manual setpoint preset can be limited with the parameter "Maximum manual setpoint reduction".
Example: with a comfort cooling temperature of 26 °C and a manual setpoint adjustment of +/- 3 K, users can select any temperature from 23 °C to 29 °C. If the comfort temperature can be reduced to a maximum of 25 °C, enter "1 K" under the parameter "Max. reduction of setpoint".

Object reset of manual setpoint adjustment active

Options:
- Yes
- **No**

This parameter releases a 1-bit communication object that upon receipt of an ON telegram can be used manually reset the setpoint adjustment. This is required, for instance, if a central function is triggered that is intended to reset all the room thermostats to their default settings. All manual setpoint adjustments are rest for both "dependent" setpoints and "individual" setpoints.

When receiving base setpoint

Options:
- **Retain manual setpoint adjustment**
- Reset manual setpoint adjustment

If a new base setpoint is received by the ambient temperature controller via KNX telegram after manually adjusting the setpoint, the ambient temperature controller can also reset the manually adjusted setpoint. The behaviour of the ambient temperature controller when receiving a base setpoint value can be configured via this parameter. The manually configured setpoint is either reset or remains unchanged. This refers to all setpoints for "dependent" setpoints and the base setpoint that was received for "individual" setpoints, e.g. "heating setpoint comfort mode".

Range manual setpoint adjustment

Options:
- 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

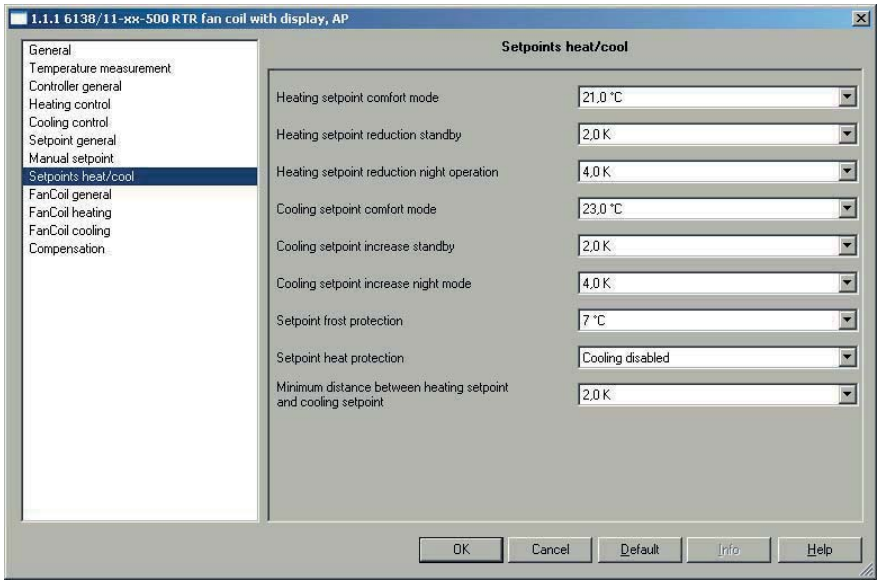
The user can adjust the preset setpoint as required with the two push-switches, "increase" and "reduce". The parameter "Jump displacement manual setpoint adjustment" is used to define how many K the presetpoint is to be increased or reduced when a push-switch is pressed.

Long press of button to enable change of setpoint heating / cooling

Options:
- Yes
- **No**

If the parameter is set to "Yes", the user can press and hold the "Temperature up" push-switch (approx. 1 s) to switch to the heating setpoint and press and hold the "temperature down" push-switch to switch to the cooling setpoint.

3.2.12 Parameter window "Setpoint heat/cool"



Heating setpoint comfort mode

Options:
- 16.0 °C
- 16.5 °C
- …
- **21.0 °C**
- …
- 31.0 °C

The "Heating setpoint comfort mode" specifies the individual comfort temperature for the heating mode. This parameter is only available if the "Heating" or "Heat and cool" control functions are used, in which the setpoints "Dependent setpoints" (tab "Setpoints general") have been selected and the reference of the base setpoint has been set to "Base setpoint heating".

Heating setpoint reduction standby

Options:
- 0.5 K
- 1.0 K
- …
- **2 K**
- …
- 8.0 K

The setting "Heating setpoint reduction standby" allows you to specify the number of degrees Kelvin that the comfort temperature is lowered during standby operation.
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Dependent setpoints".

Heating setpoint reduction night operation

Options:
- 0.5 K
- 1.0 K
- …
- **4 K**
- …
- 8.0 K

The setting "Heating setpoint reduction night operation" allows you to specify the number of degrees Kelvin that the comfort temperature is lowered during night mode.
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "dependent setpoints".

Heating setpoint standby mode

Options:
- 14.0 °C
- 14.5 °C
- …
- **19.0 °C**
- …
- 29.0 °C

"Heating setpoint for standby mode" specifies the individual standby temperature for heating mode. The temperature value specified does not depend on the specified "Heating setpoint comfort mode".
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "individual setpoints".

Heating setpoint night mode

Options:
- 10.0 °C
- 10.5 °C
- …
- **15.0 °C**
- …
- 25.0 °C

The “Heating setpoint night mode" specifies the individual temperature during the night for heating mode. The temperature value specified does not depend on the specified "Heating setpoint comfort mode".
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Individual setpoints".

Cooling setpoint comfort mode

Options:
- 16.0 °C
- 16.5 °C
- …
- **23.0 °C**
- …
- 31.0 °C

The "Cooling setpoint comfort mode" specifies the individual comfort temperature for the cooling mode. This parameter is only available if the "Cooling" or "Heat and cool" control functions are used, in which the setpoints "dependent setpoints" (tab "Setpoints general") have been selected.

Cooling setpoint increase standby

Options:
- 0.5 K
- 1.0 K
- …
- **2 K**
- …
- 8.0 K

The setting "Cooling setpoint increase standby" allows you to specify the number of degrees Kelvin that the comfort temperature is increased during standby operation.
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Dependent setpoints".

Cooling setpoint increase night mode

Options:
- 0.5 K
- 1.0 K
- …
- **4 K**
- …
- 8.0 K

"Cooling setpoint increase night mode" allows you to specify the number of degrees Kelvin that the comfort temperature is raised during night operation.
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Dependent setpoints".

Cooling setpoint standby mode

Options:
- 21.0 °C
- 21.5 °C
- …
- **25.0 °C**
- …
- 36.0 °C

"Cooling setpoint for standby mode" specifies the individual standby temperature for cooling mode. The temperature value specified does not depend on the specified "Cooling setpoint comfort mode".
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Individual setpoints".

Cooling setpoint night mode

Options:
- 23.0 °C
- 23.5 °C
- …
- **27.0 °C**
- …
- 38.0 °C

"Cooling setpoint night mode" specifies the individual temperature during the night for cooling mode. The temperature value specified does not depend on the specified "Cooling setpoint comfort mode".
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Individual setpoints".

Minimum distance between heating setpoint and cooling setpoint

Options:
- 0.0 K
- 0.5 K
- ...
- **2 K**
- ...
- 7.5 K

The comfort temperature for cooling can be adjusted with "Minimum distance between heating and cooling". The cooling setpoint increases for standby and night mode are based on this value.
If, for instance, with a comfort temperature (base setpoint) of 21 °C you want to cool at 26 °C in comfort mode, you have to set a dead zone of 5 K (see also page 95 Section 4.4.3 Minimum distance).
This parameter is only available if the parameter "Selection of base setpoint" (tab "Setpoint general") is set to "Dependent setpoints".

Setpoint frost protection

Options:
- 0 °C
- 1 °C
- …
- **7 °C**
- …
- 15 °C

The setpoint for frost protection is the temperature that may not be undershot during the frost protection mode. If the current temperature undershoots the configured value, the ambient temperature controller triggers a control value telegram that causes the relevant heating actuator to heat up the room to prevent damage to the heating system from frost-related cooling.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used.

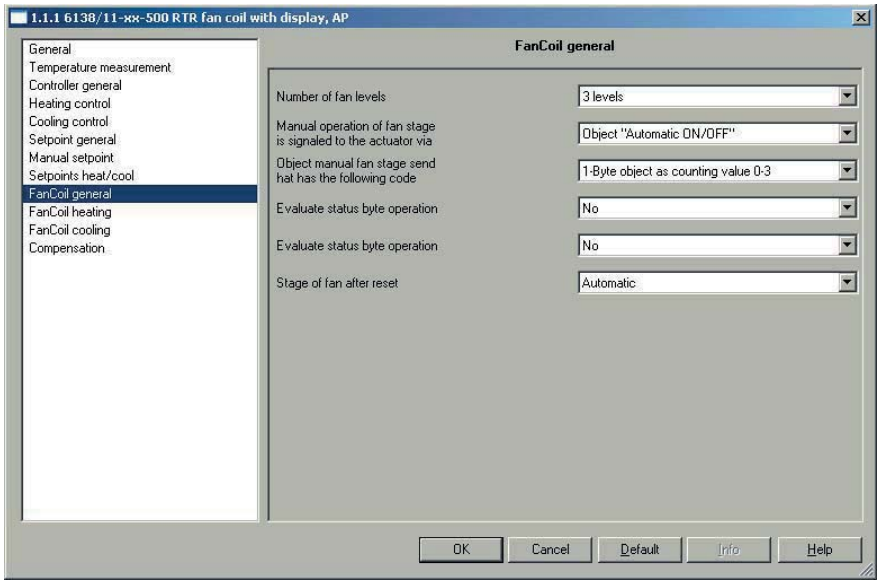
Setpoint heat protection

Options:
- 30.0 °C
- 30.5 °C
- …
- …
- 44.0 °C
- **Cooling disabled**

The setpoint for heat protection is the temperature that may not be overshot during heat protection mode. If the current temperature overshoots the configured value, the ambient temperature controller triggers a control value telegram that causes the relevant cooling unit to cool the room to prevent damage from heat build-up.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used.

Note:
At the setpoint 99.9 °C is sent at "Cooling disabled".

3.2.13 Parameter window "FanCoil general"



Number of fan levels

Options:
- 1 level
- 2 levels
- **3 levels**

The parameter "Number of fan levels" allows you to specify the number of fan stages that should be controlled for a fan coil actuator. You can select from one, two or three stages. The ambient temperature controller always provides a 1-byte communication object (see object: "Send manual fan level" has the following coding) and also provides exactly as many 1-bit communication objects as the number of fan stages selected. Most importantly, the number selected must match the actual number of fan stages. An actuator is therefore actuated either by the 1-byte communication object or the 1-bit communication object.

Manual operation of the fan stage is signaled to the actuator via

Options:
- **Object "Automatic ON/OFF**..."
- Object "Manual ON/OFF..."

This specifies which object sends the information to the actuator or whether the fan stage is being manually operated by the user. he only difference between the objects is the coding.

"Automatic ON/OFF" = 1, if manual operation is not enabled

"Manual ON/OFF" = 1, if manual operation is not enabled

Object manual fan stage send has the following code

Options:
- 1-Byte object as constant value 0-100%
- **1-Byte object as counting value 0-3**
- 1-Bit Values

If the user has made a manual fan stage switch, it can be sent to the KNX. The parameter "Manual fan stage send has the following code" can be used to enable a 1-byte object or three 1-bit objects.

The selected fan stage can be sent via the 1-byte object as a counter value from 0 to 3 (0=no manual switch) or the continuous value from 0 to 100 %. The continuous values for output are specified by the settings in the threshold values for the specific stage.

When 1-bit values are selected, a 1-bit communication object is available for every fan stage. If the fan stage is manually switched, an OB telegram is sent via the corresponding object. An OFF telegram is sent if the manual switch is cancelled.

Evaluate status byte operation

Options:
- Yes
- **No**

If this parameter is set to "Yes", the ambient temperature controller can analyse a stage status message that is received by a fan-coil actuator. This releases a 1-byte communication object that is used to evaluate the stage at which the fan coil actuator is activated.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "FanCoil".

Evaluate status byte operation

Options:
- Yes
- **No**

If this parameter is set to "Yes", the ambient temperature controller can analyse an operating status message that is received by a fan-coil actuator. 1-bit communication object is enabled which is used to evaluate whether the fan coil actuator is currently in operation. If a fault is detected, it is indicated by the fault symbol in the display.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "FanCoil".

Send cycle time of actuator in s (1 ..65,535)

Options: 1 / 2 / … / **120** / … / 65.535

If the "Status byte operation" object is enabled and connected to the corresponding communication object of the fan coil actuator, the ambient temperature controller expects a cyclic transmission of the operating status of the linked fan coil actuator. If a message from the actuator is not sent within the monitoring time "Send cycle time of actuator in s" at least once, the ambient temperature controller automatically shows the fault display. The cycle time of the actuator should therefore be set to ensure that a telegram is sent at least twice during "Send cycle time of actuator in s".

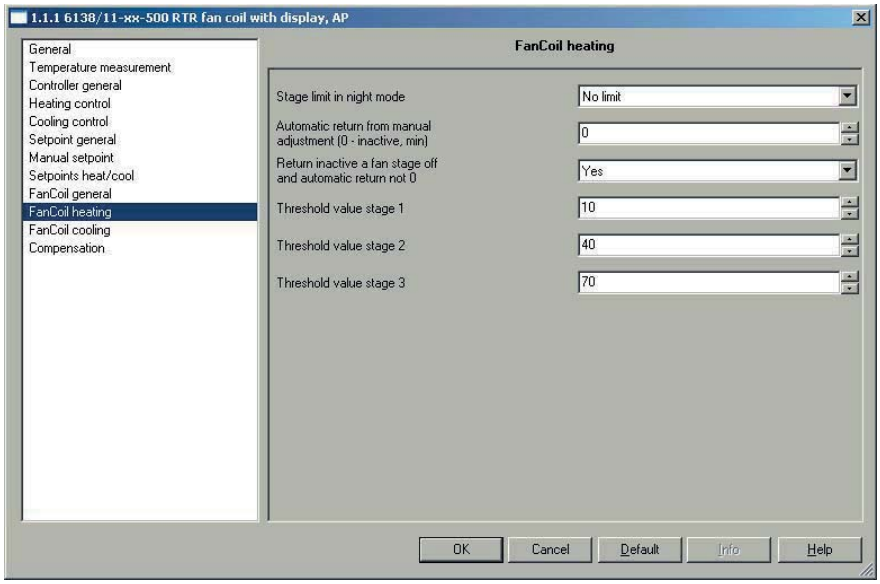
Stage of fan after reset

Options:
- Off
- Stage 1
- Stage 2
- Stage 3
- **Automatic**

The parameter "Stage of fan after reset and after off" is used to prevent undefined states after a reset or switching off the ambient temperature controller. It specifies whether the fan switches on the first, second or third stage, switches off or switches to automatic mode.

Note: automatic mode means that the fan coil actuator switches the fan stages based on the received 1-byte control value.

3.2.14 Parameter window "FanCoil heating"



Stage limit in night mode

Options:
- **No limit**
- Fan Off
- Stage 1
- Stage 2

If the device is used in an environment such as a hotel room, it may be desirable to limit the fan stages during the night to reduce the noise.
The parameter "Stage limit in night mode" is used for this. If the parameter is set to stage 1, the fan will not use more that the first stage when night mode is enabled. This will apply even if the transmitted control value requests a higher fan stage.

Automatic return from manual adjustment (0 - inactive, min)

Options: - **0** / 1 / 2 / … / 60

If "Manual stage switching" was performed by the user, this action can be reset via onsite operation of the ambient temperature controller. However, a time can also be input after which the ambient temperature cancels the "Manual stage switching" and switches back to automatic stage switching mode.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "FanCoil".

Return inactive a fan stage of and automatic return not 0

Options:
- **Yes**
- No

If the user has manually changed the stage to "switch off", the ambient temperature controller can also be set so that it does not return to automatic switching at the end of the "manual switching period" but rather remains switched off.
This parameter is only available if the "Heating" or "Heat and cool" control functions are used and the heating control type is set to "FanCoil".

Threshold value stage 1

Options:
- 0%
- **10** %
- …
- 50 %
- …
- 100 %

Threshold value stage 1 specifies the magnitude of the control value required to switch the ambient temperature controller to fan stage 1.
The threshold can be defined in percentages. Make sure that the threshold for stage 1 is not set higher than the threshold for stage 2 (if available).
This parameter is only available if the "Heating" or "Heat and cool" control functions are used, the heating control type is set to "FanCoil" and the number of fan stages is min. "1 stage"..

Threshold value stage 2

Options:
- 0%
- 10 %
- …
- **40** %
- …
- 100 %

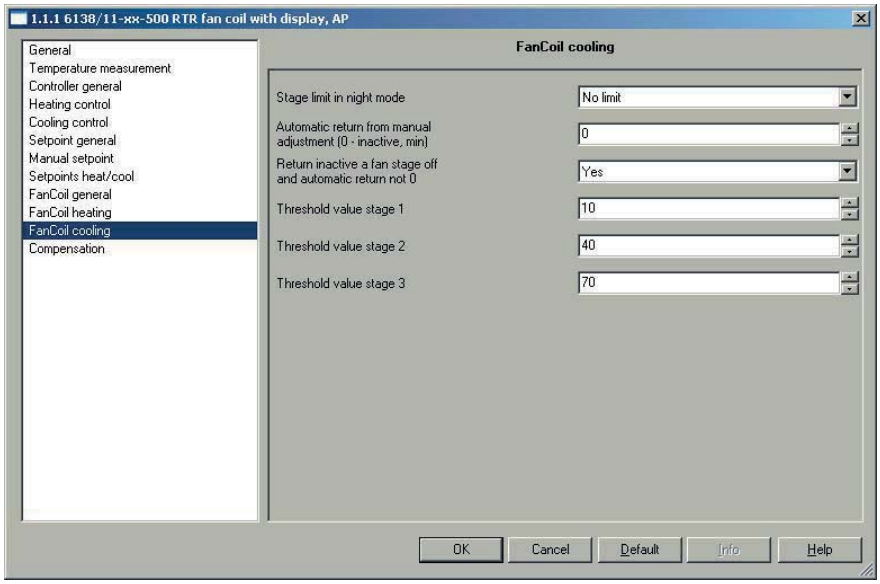
Threshold value stage 2 specifies the magnitude of the control value required to switch the ambient temperature controller from fan stage 1 to fan stage 2. The threshold can be defined in percentages. Make sure that the threshold for stage 1 is not set higher than the threshold for stage 2 (if available)
This parameter is only available if the "Heating" or "Heat and cool" control functions are used, the heating control type is set to "FanCoil" and the number of fan stages is min. "2 stage".

Threshold value stage 3

Options:
- 0%
- 10 %
- …
- **70** %
- …
- 100 %

Threshold value stage 3 specifies the magnitude of the control value required to switch the ambient temperature controller from fan stage 2 to fan stage 3. The threshold can be defined in percentages. Make sure that the threshold for stage 3 is not set higher than the threshold for stage 3 (if available).
This parameter is only available if the "Heating" or "Heat and cool" control functions are used, the heating control type is set to "FanCoil" and the number of fan stages is min. "3 stage".

3.2.15 Parameter window "FanCoil cooling"



Step limit in night mode

Options:
- **No limit**
- Fan Off
- Stage 1
- Stage 2

If the device is used in an environment such as a hotel room, it may be desirable to limit the fan stages during the night to reduce the noise.
The parameter "Step limit in night mode" is used for this. If the parameter is set to stage 1, the fan will not use more that the first stage when night mode is enabled. This will apply even if the transmitted control value requests a higher fan stage.

Automatic return from manual adjustment (0 - inactive, min)

Options: - **0** / 1 / 2 / … / 60

If "Manual stage switching" was performed by the user, this action can be reset via onsite operation of the ambient temperature controller. However, a time can also be input after which the ambient temperature cancels the "Manual stage switching" and switches back to automatic stage switching mode.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "FanCoil".

Return inactive a fan stage off and automatic return not 0

Options:
- **Yes**
- No

If the user has manually changed the stage to "Switch off", the ambient temperature controller can also be set so that it does not return to automatic switching at the end of the "Manual switching period" but rather remains switched off.
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used and the cooling control type is set to "FanCoil".

Threshold value stage 1

Options:
- 0%
- **10** %
- …
- 50 %
- …
- 100 %

Threshold value stage 1 specifies the magnitude of the control value required to switch the ambient temperature controller to fan stage 1.
The threshold can be defined in percentages. Make sure that the threshold for stage 1 is not set higher than the threshold for stage 2 (if available).
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used, the heating control type is set to "FanCoil" and the number of fan stages is min. "1 stage".

Threshold value stage 2

Options:
- 0%
- 10 %
- …
- **40** %
- …
- 100 %

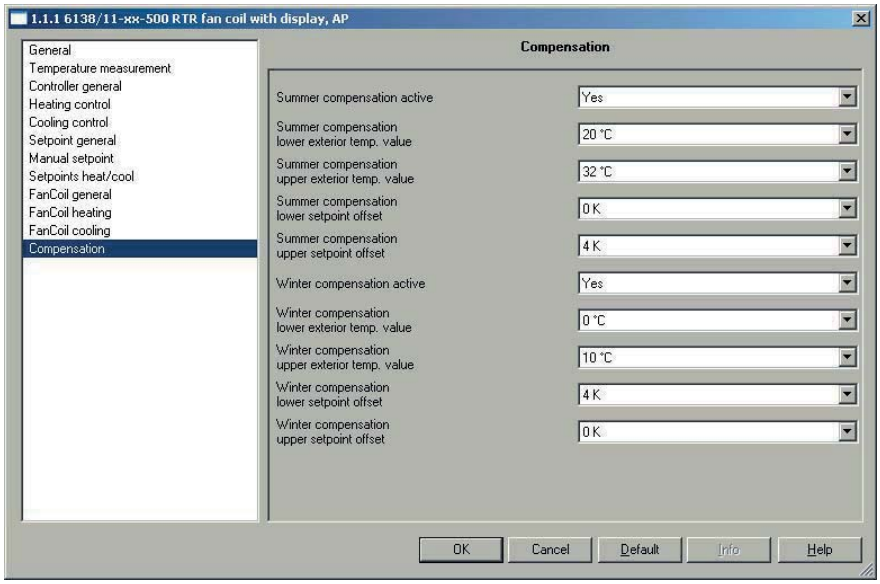
Threshold value stage 2 specifies the magnitude of the control value required to switch the ambient temperature controller from fan stage 1 to fan stage 2. The threshold can be defined in percentages. Make sure that the threshold for stage 2 is not set higher than the threshold for stage 3 (if available).
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used, the cooling control type is set to "FanCoil" and the number of fan stages is min. "2 stages".

Threshold value stage 3

Options:
- 0%
- 10 %
- …
- **70** %
- …
- 100 %

Threshold value stage 3 specifies the magnitude of the control value required to switch the ambient temperature controller from fan stage 2 to fan stage 3. The threshold can be defined in percentages. Make sure that the threshold for stage 3 is not set higher than the threshold for stage 3 (if available).
This parameter is only available if the "Cooling" or "Heat and cool" control functions are used, the heating control type is set to "FanCoil" and the number of fan stages is min. "3 stages".

3.2.16 Parameter window "Compensation"



Summer compensation active

Options:
- Yes
- **No**

To save energy and to maintain a reasonable temperature differential when entering an air-conditioned building, you should adjust the room temperature in relation to external temperature (summer compensation).
Raising the room temperature does not, however, mean that you heat up the room. Rather the adjustment is intended to allow the room temperature without cooling to increase to a specified value. This prevents an air-conditioner from continuing to try to reduce the ambient temperature to 24 °C at an outside temperature of 35 °C. This function can only be used together with an external temperature sensor. If no external temperature sensor is in use, set the parameter to "No".
CO is shown in the display when compensation is enabled.

Summer compensation lower exterior temp. value

Options:
- 9 °C
- 10 °C
- …
- **20°C**
- …
- 31: 40°C

This specifies the lower outside temperature from which compensation should be enabled because of a high outside temperature.

Summer compensation upper exterior temp. value

Options:
- 9 °C
- 10 °C
- …
- **32°C**
- …
- 31: 40°C

This specifies the upper outside temperature from which compensation should be enabled because of a high outside temperature.

Summer compensation lower setpoint offset

Options:
- **0 K**
- 1 K
- 2 K
- …
- 10 K

The "lower setpoint offset" specifies how many K the setpoint should be increased during summer compensation if the "lower exterior temperature" is reached.

Typical values for summer compensation are
- 20 °C: lower outside temperature
- 32 °C: upper outside temperature
- 0 K: lower setpoint offset
- 4 K: upper setpoint offset

This means that a floating setpoint increase from 0 to 4 K will be implemented if the outside temperature increases from 20 °C to 32 °C.

Summer compensation upper setpoint offset

Options:
- 0 K
- 1 K
- 2 K
- …
- **4 K**
- …
- 10 K

The "upper setpoint offset" specifies how many K the setpoint should be increased during summer compensation if the "upper exterior temperature" is reached.

Typical values for summer compensation are
- 20 °C: lower outside temperature
- 32 °C: upper outside temperature
- 0 K: lower setpoint offset
- 4 K: upper setpoint offset

This means that a floating setpoint increase from 0 to 4 K will be implemented if the outside temperature increases from 20 °C to 32 °C.

Winter compensation active

Options:
- Yes
- **No**

To improve comfort and to maintain a reasonable temperature differential when entering a room with a large window area, you should increase the room temperature depending on the outside temperature in winter (winter compensation).
This function can only be used together with an external temperature sensor. If no external temperature sensor is in use, set the parameter to "No".
CO is shown in the display when compensation is enabled.

Winter compensation lower exterior temp. value

Options:
- -10 °C
- -9 °C
- …
- **0 °C**
- …
- 21 °C

This specifies the lower outside temperature up to which the setpoint should be corrected (winter compensation) because of an excessively low outside temperature.

Winter compensation upper exterior temp. value

Options:
- -10 °C
- -9 °C
- …
- **10 °C**
- …
- 21 °C

This specifies the upper outside temperature from which the setpoint should be corrected (winter compensation) because of an excessively low outside temperature.

Winter compensation lower setpoint offset

Options:
- 0 K
- 1 K
- 2 K
- …
- **4 K**
- …
- 10 K

The "lower setpoint offset" specifies how many K the setpoint should be increased during winter compensation if the "lower exterior temperature" is reached.

Typical values for winter compensation are
- 0 °C: lower outside temperature
- 10 °C: upper outside temperature
- 4 K: lower setpoint offset
- 0 K: upper setpoint offset

This means that a floating setpoint increase from 0 to 4 K will be implemented if the outside temperature falls from 10 °C to 0 °C.

Winter compensation upper setpoint offset

Options:
- **0 K**
- 1 K
- 2 K
- …
- 10 K

The "upper setpoint offset" specifies how many K the setpoint should be increased during winter compensation if the "upper exterior temperature" is reached.

Typical values for winter compensation are
- 0 °C: lower outside temperature
- 10 °C: upper outside temperature
- 4 K: lower setpoint offset
- 0 K: upper setpoint offset

This means that a floating setpoint increase from 0 to 4 K will be implemented if the outside temperature falls from 10 °C to 0 °C.

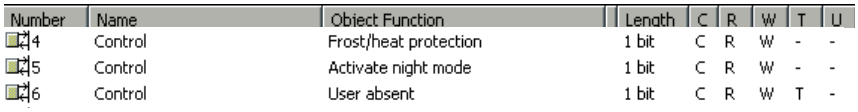
3.3 Communication objects

3.3.1 General

Number	Name	Object Function	Length	C	R	W	T	U
0	In Operation	General	1 bit	C	-	-	T	-
1	General	Unit On/Off	1 bit	C	R	W	T	-
2	General	Switch °C/°F display unit	1 bit	C	R	W	-	-
3	General	Illumination On/Off	1 bit	C	-	W	-	-

No.	Function	Object name	Data type	Flags
0	**In Operation**	**General**	**1 Bit EIS1 DPT 1.001**	**K, Ü**
Sends the object value "0" or "1" to the bus cyclically. Object value and cycle time can be set in the parameters. The telegram can be used for life-beat monitoring of the device, e.g. by a monitoring block.				
1	**Unit On/Off**	**General**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
The controller is activated via this 1-bit communication object when an ON telegram is received and deactivated when an OFF telegram is received. It can receive and send, Switching the controller on and off is the same as actuating the ON/OFF switch on the device. When the device is switched off OFF is shown on the display, but the controller setpoint is switched to a parameterisable temperature setpoint and the fan switches off immediately. 0: switch off device or device is switched off 1: switch on device or device is switched on				
2	**Switch °C/°F display unit**	**General**	**1 bit EIS1 DPT 1.001**	**K, S, L**
This 1-bit communication object can be used to switch the units display between °C and °F. If the object receives an ON telegram the display switches to °F. If an OFF telegram is received the display changes to °C. This data item forms the 1-bit KNX object and can be sent and received. The communication object is always visible. 0: display in °C 1: display in °F				
3	**Ilumination On/Off**	**General**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
The object enables switching the display lighting on and off via the bus. 0: lighting Off 1: lighting On Note: Automatic mode is enabled after receipt of an OFF telegram.				

3.3.2 Control system



Number	Name	Object Function	Length	C	R	W	T	U
4	Control	Frost/heat protection	1 bit	C	R	W	-	-
5	Control	Activate night mode	1 bit	C	R	W	-	-
6	Control	User absent	1 bit	C	R	W	T	-

No.	Function	Object name	Data type	Flags
4	**Frost/heat protection**	**Control**	**1 Bit EIS1 DPT 1.001**	**K, S, L**

This data item forms the 1-bit object of KNX for switching operating modes (frost and heat protection). It can be received only.

For example, binary inputs that record information from window contacts to notify the ambient temperature controller that a window is open or closed can send their current status to the frost and heat protection object. When receiving an ON telegram, the room thermostat activates frost protection mode; when an OFF telegram is received, frost protection mode is deactivated and the current mode is changed.

The "window" symbol is shown in the display when frost/heat protection is enabled.

0: Frost/Heat Protection Off

1: Frost/Heat Protection On

5	**Activate night mode**	**Control**	**1 Bit EIS1 DPT 1.001**	**K, S, L**

This 1-bit communication object can be used to switch the room thermostat to night mode when an ON telegram is received. An OFF telegram deactivates night mode. This communication object can be used, e.g., by time switches to send information.

This data item forms the 1-bit object of KNX for switching operating modes (night mode). It can be received only, because a manual switch to night mode on site is not possible.

In night mode the parameterisable setpoint "night mode" is enabled and the fan stage is limited to a parameterisable value.

0: night mode Off

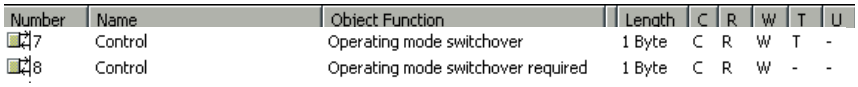
1: night mode On

6	**User absent**	**Control**	**1 Bit EIS1 DPT 1.001**	**K, Ü, S, L**

This 1-bit communication object switches the room thermostat between comfort and standby modes. When an ON telegram is received, comfort mode is activated; when an OFF telegram is received, standby mode is activated.

This data item forms the 1-bit object of KNX for switching operating modes (comfort / standby). It can be received and sent.

0: control system is in Standby mode
1: control system is in Comfort mode



Number	Name	Object Function	Length	C	R	W	T	U
7	Control	Operating mode switchover	1 Byte	C	R	W	T	-
8	Control	Operating mode switchover required	1 Byte	C	R	W	-	-

No.	Function	Object name	Data type	Flags
7	**Operating mode switchover**	**Control**	**1 byte** **DPT_HVAC Mode**	**K, Ü, S, L**

This data item forms the 1-bit object of KNX (DPT_HVAC_MODE) for switching operating modes. All operating modes of the above 1-bit objects can be set with the 1-byte object. The data item can be received and sent. The selection of whether switching is via three 1-bit objects or two 1-byte objects (OMN / OMO) is defined by application parameters (see above).

This 1-byte communication object can be used to switch between comfort, standby, night and frost/heat protection modes. The object evaluates received telegrams as "normal". This means, for example, if a comfort telegram is received, the room thermostat switches to comfort mode. If a night telegram is received, the room thermostat switches to night mode. This object is controlled, for example, by time switches.

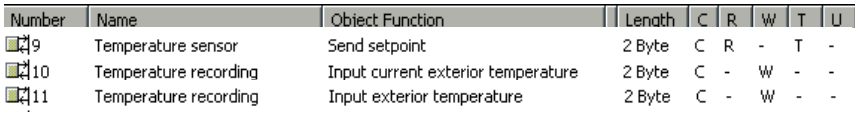
The following provisions apply for the object:

0: Auto
1: Comfort
2: Standby
3: Night
4: Frost/Heat Protection
5 – 255: not permitted

No.	Function	Object name	Data type	Flags
8	**Operating mode switchover required**	**Control**	**1 byte** **DPT_HVAC Mode**	**K, Ü, L**

This data item corresponds to the **operating mode switching 1 byte** function, where it overrides the OMN (Operation Mode Normal vs. Operation Mode Overwrite).

This 1-byte communication object can temporarily "overwrite" the previous 1-byte mode object. This means, for example, if a frost/heat protection telegram is received, the ambient temperature controller switches to frost or heat protection mode. If the frost or heat protection is reset by the receipt of another telegram, the ambient temperature controller enables the operating mode on the "normal" 1-byte operating mode object. As a result, it is capable of noting operating modes. This object is controlled, for example, by binary inputs that record information from window contacts.
The following provisions apply for the object:
0 = Auto
1 = Comfort
2 = Standby
3 = Night
4 = Freezing/Heat Protection
5 – 255 = not permitted



Number	Name	Object Function	Length	C	R	W	T	U
9	Temperature sensor	Send setpoint	2 Byte	C	R	-	T	-
10	Temperature recording	Input current exterior temperature	2 Byte	C	-	W	-	-
11	Temperature recording	Input exterior temperature	2 Byte	C	-	W	-	-

No.	Function	Object name	Data type	Flags
9	**Send setpoint**	**Temperature sensor**	**2 byte**	**K, Ü, L**
This data item forms the 2-byte object of KNX for the current temperature. The temperature is measured in the "temperature sensor" application and can be weighted with an external input temperature (object *input for external current temperature*). It can be sent only. Must be cyclic and be able to send on change.				
10	**Input current exterior temperature**	**Temperature recording**	**2 byte**	**K, S**
A temperature value from an additional sensor can be received via this 2-byte communication object. By parameterising the controller properly, the received value can also be included in the controller and weighted, if necessary. This data item forms the 2-byte object of KNX for the current external temperature. It can be received only.				
11	**Input exterior temperature**	**Temperature recording**	**2 byte**	**K, S**
This data item forms the 2-byte object of KNX for outside temperature recording. It can be received only. This object is relevant for summer and winter compensation (summer compensation in accordance with DIN 1946). The temperature from which the summer or winter compensation is applied can be adjusted by application parameters (see above). Behaviour with setpoint adjustment by user: The adjust setpoint is displayed to the user. The permitted adjustment range is moved accordingly.				

3.3.3 Setpoints

Number	Name	Object Function	Length	C	R	W	T	U
12	Control	Current setpoint cooling	2 Byte	C	R	W	T	-
13	Control	Current setpoint heating	2 Byte	C	R	W	T	-
14	Control	Base setpoint	2 Byte	C	R	W	-	-
23	Control	Reset of local operation	1 bit	C	-	W	-	-

(Dependent setpoints)

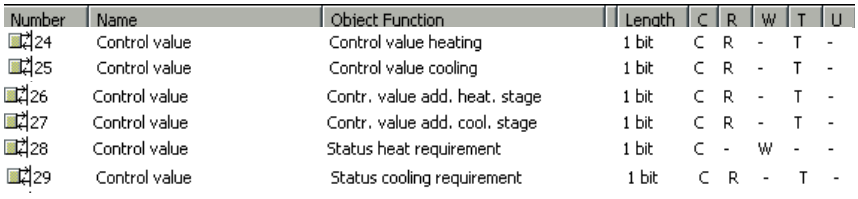
Number	Name	Object Function	Length	C	R	W	T	U
12	Control	Current setpoint cooling	2 Byte	C	R	W	T	-
13	Control	Current setpoint heating	2 Byte	C	R	W	T	-
15	Control	Heating setpoint comfort	2 Byte	C	R	W	-	-
16	Control	Heating setpoint standby	2 Byte	C	R	W	-	-
17	Control	Heating setpoint night mode	2 Byte	C	R	W	-	-
18	Control	Setpoint frost protection	2 Byte	C	R	W	-	-
19	Control	Cooling setpoint comfort	2 Byte	C	R	W	-	-
20	Control	Cooling setpoint standby	2 Byte	C	R	W	-	-
21	Control	Cooling setpoint night mode	2 Byte	C	R	W	-	-
22	Control	Setpoint heat protection	2 Byte	C	R	W	-	-
23	Control	Reset of local operation	1 bit	C	-	W	-	-

(Individual setpoints)

No.	Function	Object name	Data type	Flags
12	**Current setpoint cooling**	**Control**	**2 byte**	**K, Ü, S, L**
This data item forms the 2-byte KNX object and can be sent and received. It is relevant for setpoint management and for calibration of setpoint offsets between devices. This object is used for displaying the current setpoint, e.g. for display and diagnostics.				
13	**Current setpoint heating**	**Control**	**2 byte**	**K, Ü, S, L**
This data item forms the 2-byte KNX object and can be sent and received. It is relevant for setpoint management and for calibration of setpoint offsets between devices. This object is used for displaying the current setpoint, e.g. for display and diagnostics.				
14	**Base setpoint**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the dependent setpoint preset has been set in the parameters. This data item forms the 2-byte base setpoint KNX object and can be received. It is relevant for the concept of the dependent setpoint adjustment and is not used with absolute setpoints. It can also be used to reset the manual on-site adjustment if this function is parameterised. The setpoint is qualified via application parameters if "heating and cooling" is selected. The base setpoint can then be defined as BSW heating, BSW cooling or centre of dead zone. If only heating or only cooling is enabled, the BSP corresponds to the selected operating mode.				
15	**Heating setpoint comfort**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				
16	**Heating setpoint standby**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				

17	**Heating setpoint night mode**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				
18	**Setpoint frost protection**	**Control**	**2 byte**	**K, S, Ü, L**
Object is always visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute and relative setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				
19	**Cooling setpoint comfort**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				
20	**Cooling setpoint standby**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				
21	**Cooling setpoint night mode**	**Control**	**2 byte**	**K, S, Ü, L**
Object is visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled.				
22	**Setpoint heat protection**	**Control**	**2 byte**	**K, S, Ü, L**
Object is always visible if the individual setpoint preset has been set in the parameters. This data item forms the 2-byte KNX object and can be received. It is relevant for absolute and relative setpoint management. When a setpoint for an operating mode is received, the corresponding setpoint is automatically enabled. Value 99.9 means heat protection = off.				
23	**Reset of local operation**	**Control**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
This 1-bit communication object is enabled, if the proper parameter has been set to "yes". This object resets the comfort setpoint to the parameterised value. This data item forms the 1-byte KNX object and can be received only. Manual operation is reset when a "1" is received.				

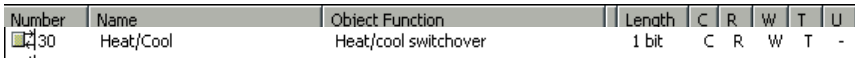
3.3.4 Control value



Number	Name	Object Function	Length	C	R	W	T	U
24	Control value	Control value heating	1 bit	C	R	-	T	-
25	Control value	Control value cooling	1 bit	C	R	-	T	-
26	Control value	Contr. value add. heat. stage	1 bit	C	R	-	T	-
27	Control value	Contr. value add. cool. stage	1 bit	C	R	-	T	-
28	Control value	Status heat requirement	1 bit	C	-	W	-	-
29	Control value	Status cooling requirement	1 bit	C	R	-	T	-

No.	Function	Object name	Data type	Flags
24	**Control value heating**	**Control value**	**1 byte / 1 bit**	**K, Ü, L**
2 channel (4-pipe system) This data item forms the 1-byte or 1-bit KNX object and can be sent only. This object is the control value for heating. In fan coil systems with only one output channel it is the "heating/cooling" object in which the internal allocation is controlled by the external operating mode switching (see index 6). When acting as a branch the control value is received via this object.				
25	**Control value cooling**	**Control value**	**1 byte / 1 bit**	**K, Ü, L**
This data item forms the 1-byte or 1-bit KNX object and can be sent only. This object is the control value for cooling. This object is used with 2 channels (4-pipe system) only. When acting as a branch the control value is received via this object.				
26	**Contr. value add. heat. stage**	**Control value**	**1 byte / 1 bit**	**K, Ü, L**
This data item forms the 1-byte or 1-bit KNX object and can be sent only. This object is the control value for the heating additional stage (switching or quasi continuous).				
27	**Contr. value add. cool. stage**	**Control value**	**1 byte / 1 bit**	**K, Ü, L**
This data item forms the 1-byte or 1-bit KNX object and can be sent only. This object is the control value for the cooling additional stage (switching or quasi continuous).				
28	**Status heat requirement**	**Control value**	**1 bit**	**K, S, Ü, L**
This data item acts as an output and provides information on whether the cooling output is currently enabled (including in the switched-off phases of a PWM cycle). This information can be useful for visualisation.				
29	**Status cooling requirement**	**Control value**	**1 bit**	**K, S, Ü, L**
This data item acts as an output and provides information on whether the cooling output is currently enabled (including in the switched-off phases of a PWM cycle). This information can be useful for visualisation.				

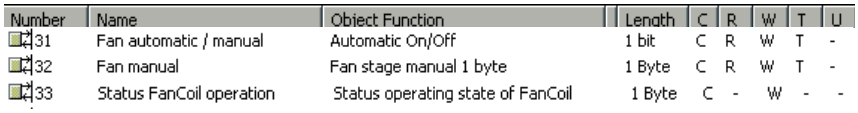
3.3.5 Heating / cooling



Number	Name	Object Function	Length	C	R	W	T	U
30	Heat/Cool	Heat/cool switchover	1 bit	C	R	W	T	-

No.	Function	Object name	Data type	Flags
24	**Control value heating**	**Control value**	**1 byte / 1 bit**	**K, Ü, L**
1 channel (2-pipe system) This data item forms the 1-byte or 1-bit KNX object and can be sent only. This object is the control value for heating and cooling. In fan coil systems with only one output channel it is the "heating/cooling" object in which the internal allocation is controlled by the external operating mode switching (see index 6). When acting as a branch the control value is received via this object.				
30	**Heat/Cool switchover**	**Heat/Cool**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
This data item forms the 1-bit KNX object. It can be received and sent. If the RTR switches the operating mode, the object is sent if the corresponding parameter has been set to "automatic and send". In the event of external switching the operating mode is switched by a different bus device (such as a fan coil 2-line system). After the switching a separate output object or the same output object can be used (depending on the number of output channels with "heating and cooling"). 0: cooling 1: heating				

3.3.6 Fan automatic / manual



Number	Name	Object Function	Length	C	R	W	T	U
31	Fan automatic / manual	Automatic On/Off	1 bit	C	R	W	T	-
32	Fan manual	Fan stage manual 1 byte	1 Byte	C	R	W	T	-
33	Status FanCoil operation	Status operating state of FanCoil	1 Byte	C	-	W	-	-

No.	Function	Object name	Data type	Flags
31	**Automatic on/off**	**Fan automatic / manual**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**

If a fan coil actuator is tripped by the ambient temperature controller, the individual fan stages are typically switched automatically by the room thermostat. However, users can select a stage manually. When the stage is specified manually, the 1-bit communication object triggers an ON telegram and when manual mode is deactivated, an OFF telegram is sent. This enables you to notify a second control unit that a stage has been set manually.

The 1-bit object can also receive and analyse telegrams sent from other control points.

This data item forms the 1-bit KNX object and can be sent and received. When switching to manual operation and sending a fan stage via the display, manual mode is enabled. Automatic mode is re-enabled with this data item after automatic return after a parameterisable time. For example, if an automatic return is not to be parameterised, the RTR can be reset externally to the controlling operation via this object.

Note: the coding of this object is matched to ABB actuators. A link to other manufacturers may make it necessary to use the alternative object "manual switching on/off".

0: the user must set the fan stage (0-3) manually.
1: the fan stage is set to "auto"

31	**Manual on/off**	**Fan automatic / manual**	**1 bit**	**K, S, Ü, L**

See description of "Automatic switching on/off"

The object is visible if it is enabled in the parameters.

0: the fan stage is set to "auto"
1: the user must set the fan stage (0-3) manually.

No.	Function	Object name	Data type	Flags
32	**Fan stage manual 1 byte**	**Fan manual**	**1 byte**	**K, S, Ü, L**

The object is visible alternatively to 1-bit objects 34-36.

The device sets the fan stage actuator to manual mode with this object.

The object has two possible codings, which can be set alternately in the parameters.

Coding 1: 1 byte continuous value (0...100%)

Coding 2: 1 byte counter value, value range 0...3

33	**Status operating state of FanCoil**	**Status FanCoil operation**	**1 byte**	**K, S**

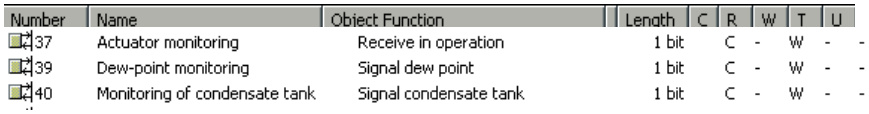
This 1-byte communication object can be used by the room thermostat to receive information about the status of the fan coil actuator. It can evaluate whether stage 1, 2, 3, etc. or no stage was activated.

Number	Name	Object Function	Length	C	R	W	T	U
31	Fan automatic / manual	Automatic On/Off	1 bit	C	R	W	T	-

Nummer	Funktion	Name	Länge	K	L	S	Ü	A
31	Manuell Ein/Ausschalten	Lüfter Automatik / Manuell	1 bit	K	L	S	Ü	A
34	FanCoil Stufe 1 schalten	Lüfter Manuell	1 bit	K	L	S	Ü	A
35	FanCoil Stufe 2 schalten	Lüfter Manuell	1 bit	K	L	S	Ü	A
36	FanCoil Stufe 3 schalten	Lüfter Manuell	1 bit	K	L	S	Ü	A

No.	Function	Object name	Data type	Flags
34	**Switch fan coil stage 1**	**Fan manual**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
This 1-bit communication object can be used to send an ON telegram, if the first fan stage is to be switched on. An OFF telegram is sent, if the first fan stage is no longer to be switched on. This data item forms the 1-bit KNX object and can be sent and received.				
35	**Switch fan coil stage 2**	**Fan manual**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
This 1-bit communication object can be used to send an ON telegram, if the second fan stage is to be switched on. An OFF telegram is sent, if the third fan stage is no longer to be switched on. This data item forms the 1-bit KNX object and can be sent and received.				
36	**Switch fan coil stage 3**	**Fan manual**	**1 Bit EIS1 DPT 1.001**	**K, S, Ü, L**
This 1-bit communication object can be used to send an ON telegram, if the third fan stage is to be switched on. An OFF telegram is sent, if the third fan stage is no longer to be switched on. This data item forms the 1-bit KNX object and can be sent and received.				

3.3.7 Monitoring



Number	Name	Object Function	Length	C	R	W	T	U
37	Actuator monitoring	Receive in operation	1 bit	C	-	W	-	-
39	Dew-point monitoring	Signal dew point	1 bit	C	-	W	-	-
40	Monitoring of condensate tank	Signal condensate tank	1 bit	C	-	W	-	-

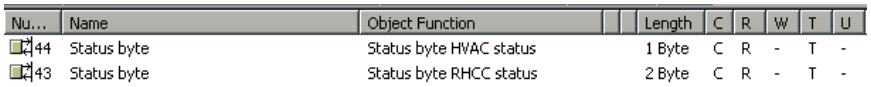
No.	Function	Object name	Data type	Flags
37	**Receive in operation**	**Actuator monitoring**	**1 bit**	**K, S**
The object is visible if the corresponding parameter is set to "yes". This object monitors the cyclic sending of the actuator "In use" communication object. If monitoring is triggered, the "fault" symbol (plus text display) is shown on the display (it disappears automatically).				
39	**Signal dew point**	**Dew-point monitoring**	**1 Bit EIS1 DPT 1.001**	**K, S**
This 1-bit communication object should be used to send telegrams from a dew point sensor that, for example, is connected to a binary input. If the object receives an ON telegram, heat protection is enabled; if the object receives an OFF telegram, heat protection is disabled. This data item forms the 1-byte KNX object and can be received only. The action depends on the parameterisation.				
40	**Signal condensate tank**	**Monitoring of condensate tank**	**1 Bit EIS1 DPT 1.001**	**K, S**
This 1-bit communication object should be used to send telegrams from a dew point sensor that, for example, is connected to a binary input. If the object receives an ON telegram, heat protection is enabled; if the object receives an OFF telegram, heat protection is disabled. This data item forms the 1-byte KNX object and can be received only. The action depends on the parameterisation.				

3.3.8 Alarm temperature

Number	Name	Object Function	Length	C	R	W	T	U
41	Alarm temperature	Report failure of current temp.	1 bit	C	R	-	T	-
42	Alarm temperature	Report failure of ext. temp.	1 bit	C	R	-	T	-

No.	Function	Object name	Data type	Flags
41	**Report failure of current temp**	**Alarm temperature**	**1 Bit EIS1 DPT 1.001**	**K, Ü, L**
This data item forms the 1-bit KNX object and can be sent only. It is sent if there is no more CURRENT temperature measurement and the correct control system is in danger as a result.				
42	**Report failure of ext. temp.**	**Alarm temperature**	**1 Bit EIS1 DPT 1.001**	**K, Ü, L**
The refers to object 11 "External temperature input - temperature recording". This data item forms the 1-bit KNX object and can be sent only. It is sent if there is no more CURRENT temperature measurement and the correct control system is in danger as a result.				

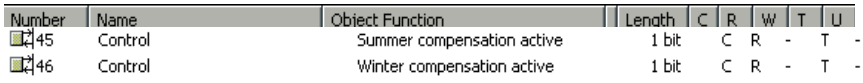
3.3.9 Status byte



Nu...	Name	Object Function		Length	C	R	W	T	U
44	Status byte	Status byte HVAC status		1 Byte	C	R	-	T	-
43	Status byte	Status byte RHCC status		2 Byte	C	R	-	T	-

No.	Function	Object name	Data type	Flags
43	**Status byte RHCC status**	**Status byte**	**2 byte** **DPT 22.101**	**K, Ü, L**
KNX status byte DPT 22.101 Bit 0 failure message of CURRENT temperature recording Coding: 0 no fault in CURRENT temperature recording Coding: 1 fault in CURRENT temperature recording Bit 8 heating/cooling mode display Coding: 0 cooling mode Coding: 1 heating mode				
44	**Status byte HVAC status**	**Status byte**	**2 byte** **DPT_HVAC Status**	**K, Ü, L**
The communication object transfers the current state of the ambient temperature controller to the bus. The individual bits have the following meanings: Bit 0: comfort operation Bit 1: standby mode Bit 2: night mode Bit 3: frost/detection enabled Bit 4: dewpoint Bit 5: heating/cooling mode display Coding: 0 cooling mode Coding: 1 heating mode Bit 6: controller state Bit 7: frost alarm				

3.3.10 Compensation



Number	Name	Object Function	Length	C	R	W	T	U
45	Control	Summer compensation active	1 bit	C	R	-	T	-
46	Control	Winter compensation active	1 bit	C	R	-	T	-

No.	Function	Object name	Data type	Flags
45	**Summer compensation active**	**Control**	**1 bit**	**K, S, Ü, L**
Summer compensation enabled is reported via this 1-bit communication object. This is always the case if the outside temperature exceeds the values specified in the summer compensation parameters. This data item forms the 1-bit KNX object and can be sent and received. 0: summer compensation disabled 1: summer compensation enabled				
45	**Winter compensation active**	**Control**	**1 bit**	**K, S, Ü, L**
Winter compensation enabled is reported via this 1-bit communication object. This is always the case if the outside temperature falls below the values specified in the winter compensation parameters. This data item forms the 1-bit KNX object and can be sent and received. 0: winter compensation disabled 1: winter compensation enabled				

3.3.11 Fan stage - state

No.	Function	Object name	Data type	Flags
47	**State stage 1**	**Fan coil operation state**	**1 Bit EIS1 DPT 1.001**	**K, S**
This 1-bit communication object can be used by the ambient temperature controller to receive information about the status of the fan coil actuator. It can evaluate whether stage 1 or no stage was activated.				
48	**State stage 2**	**Fan coil operation state**	**1 Bit EIS1 DPT 1.001**	**K, S**
This 1-bit communication object can be used by the ambient temperature controller to receive information about the status of the fan coil actuator. It can evaluate whether stage 2 or no stage was activated.				
49	**State stage 3**	**Fan coil operation state**	**1 Bit EIS1 DPT 1.001**	**K, S**
This 1-bit communication object can be used by the ambient temperature controller to receive information about the status of the fan coil actuator. It can evaluate whether stage 3 or no stage was activated.				

3.4 Special operating states

Behaviour after reset

The behaviour after reset can be set for the operating mode, the operating type and the fan stage.

Heating, cooling and the state of the object "switching heating/cooling" can be selected for the operating mode. When it is set to "depending on object "switching heating/cooling"", the object state is queried via the bus when switching on or after a reset.

Comfort mode is default after reset, however Standby, Night mode or Frost/Heat Protection can also be selected.

The active fan stage after reset can be stage 1, 2 or 3. If no stage is to be active after reset, select the setting "Off". The setting "Automatic" switches on the fan stage in accordance with the current control value.

4 Planning and use

This section contains tips and application examples for practical application of the device.

4.1 Operating modes

The ambient temperature controller has he following four operating modes:

– Frost protection mode (with heating): ambient temperature control is disabled; heating is only on if the ambient temperature has fallen so far the heating system may be in danger of freezing.
Heat protection mode (with cooling): ambient temperature control is disabled; cooling is on only if the ambient temperature has risen so far that it is virtually impossible to use the room.

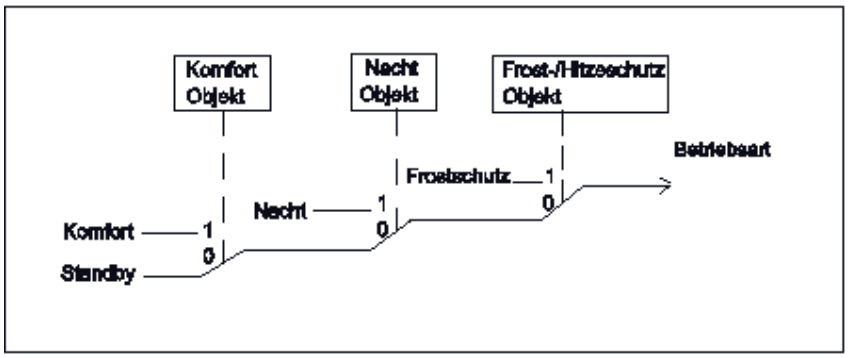
– Comfort mode (heating and cooling): the setpoint for the ambient temperature is set to a value that enables "normal usage" of the area at a pleasant temperature.

– Standby mode (heating): the ambient temperature is reduced (e.g. during temporary absence) to save heating costs but the comfort temperature can be restored quickly when necessary.
Standby mode (cooling): the ambient temperature is increased (e.g. during temporary absence) to save energy costs but the comfort temperature can be restored quickly when necessary.

– Night mode (heating and cooling): during the night areas are not used for extended periods; the ambient temperature is reduced to a value appropriate for the night and the comfort setpoint can be restored relatively quickly in the morning.

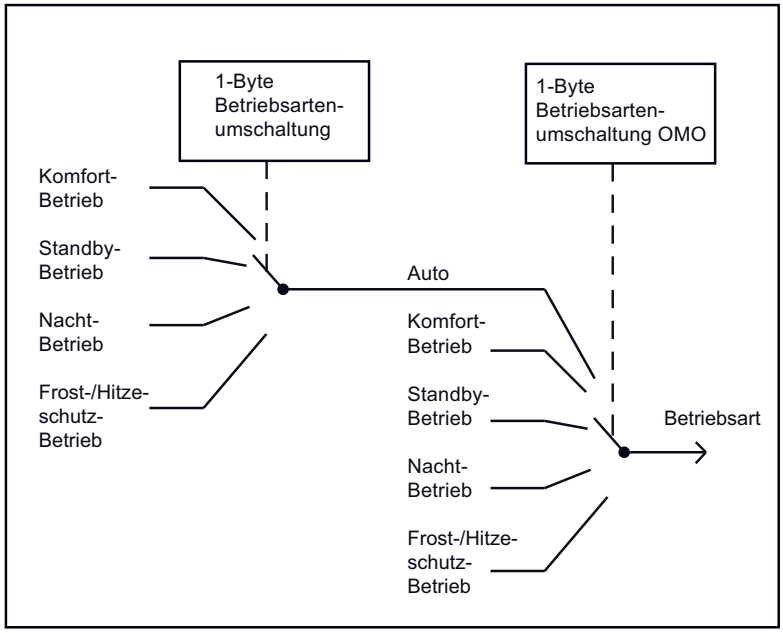
For switching between the operating modes switching telegrams (parameter "operating mode switching": "1 bit (3x)") or 1-byte value telegrams (parameter "operating mode switching": "1 byte (2x)") are used (see also drawings of operating modes on page 83, Section Operating mode switching).

4.1.1 Operating mode switching 1 bit



The frost/heat protection has the top priority, i.e. in this case switching to a different operating mode is disabled. Frost/heat protection must be disabled first, e.g. by closing an open window. Night mode has the next higher priority, followed by comfort mode. If none of the above three operating modes are enabled, the ambient temperature controller is in standby mode.

4.1.2 Operating mode switching 1 byte



When switching operating mode via 1 byte two 1-byte communication objects are available.

The two 1-byte communication objects have different behaviour when receiving a telegram. An object evaluates received telegrams as "normal" (operating mode switching). This means, for example, if a comfort telegram is received, the room thermostat switches to comfort mode. If a night telegram is received, the ambient temperature controller switches to night mode. This object is controlled, for example, by time switches.

The second object)"operating mode switching OMO") may "overwrite" the first temporarily. This means, for example, if a frost/heat protection telegram is received, the ambient temperature controller switches to frost or heat protection mode. If the frost or heat protection is reset by the receipt of another telegram, the ambient temperature controller enables the operating mode on the "normal" object. As a result, it is capable of noting operating modes. This object is controlled, for example, by binary inputs that record information from window contacts.

The following apply to both 1-byte communication objects:

0	= auto ("operating mode switching OMO" only)
1	= comfort
2	= standby
3	= night
4	= frost/heat protection
5 – 255	= not permitted

4.2 Temperature measurement

The ambient temperature controller with display can record the temperature with an internal sensor. Values can also be received from an external sensor or an outside temperature sensor via communication objects. Receipt of the values can be monitored and possibly calibrated. The functions are explained in more detail below.

4.2.1 Internal temperature recording

The device has an internal temperature sensor. The measured value is sent to the controller as a current value. The value is also shown on the display at the same time ("display in normal operation": "current actual value").

The measured temperature can also be sent over the bus with the 2-byte communication object "send current value - temperature sensor" to, for example, display as a visualisation. The transmission is done depending on the parameter "send current value on change up" and "send current value cyclically". Both parameters are disabled by default. This means that if the current temperature is to be sent, at least one setting must be enabled.

The setting "send current value on change up" has the advantage that even the smallest changes of the measured temperature, adjustable from 0.1 K to 1.0 K, are sent over the bus. The disadvantage is that, for example, the setting 0.1 K and a large number of ambient temperature controllers in one installation increases the bus load.

The parameter "send current value cyclically" has the advantage that the current value is sent continuously, even if the measured value does not change. The disadvantage is that fast changes may not be registered, because the cycle time has been set too large. However, it should also not be set too small to prevent excessive bus loading.

4.2.2 External temperature recording

In areas such as open plan offices it can be difficult to control the temperature with only a single ambient temperature controller. We recommend subdividing such areas into zones with additional temperature sensors.

The parameter "ambient temperature measurement" must be set to "internal" and "external" to enable the temperature value of the additional temperature sensor to be integrated. Then the internally and externally measured temperatures can also be weighted. The weighting settings depend on the local conditions. If the ambient temperature controller and the additional temperature sensor are equally distant from the radiators (flat radiators), the setting "50%/50%" should give good control results.

4.2.3 Monitoring

The "Monitoring temperature measurement" parameter defines whether the internal and external temperature sensors are to be monitored. This means that the ambient temperature controller must receive at least one telegram with the current temperature on the associated communication object within a configurable time ("monitoring time for external temperature" and "monitoring time for outside temperature").

If a telegram is not received within the monitoring time, the ambient temperature controller will assume that the sensor for the outside temperature or external temperature is faulty or no longer connected to the bus.

The room temperature controller will stop controlling and will send a predefined control value ("control value for temperature measurement error") to prevent the room from overcooling or overheating. The control value is transmitted until the ambient temperature controller receives a temperature telegram over the bus again and the control is enabled again.

4.2.4 Adjustment

If the measured temperature is falsified, for example by the internal heat of the bus coupler, an "ambient temperature adjustment value" can be set.

If an additional external temperature sensor has been enabled and the measured value is falsified by cold or heat influences, an adjustment value can also be set.

4.3 Controller

The ambient temperature controller can be used for heating only, cooling only or for heating and cooling.

If the ambient temperature controller is to be used for heating and cooling, it can switch automatically from heating to cooling and cooling to heating. The controller automatically detects whether it must send a control value for heating or cooling. If automatic switching is not wanted, switching between heating and cooling can be done by an external, central controller using the 1-bit object "switchover heating/cooling. In this setup, the heat and cooling icons are continuously displayed in the respective mode. The object is enabled by the parameter "switching between heating and cooling".

The control value that is sent for heating and/or cooling can be sent on a common communication object "control value heating/cooling" or two separate communication objects "control value heating" or "control value cooling". If a common object is used, it may be necessary to inform the actuator whether the control value refers to heating or cooling. The parameter "switchover between heating and cooling" can be enabled with the setting "automatic and send" a 1-bit communication object "switchover heating/cooling". If heating operating mode is enabled, a "1" is sent to the bus and if cooling operating mode is enabled, a "0" is sent.

A common communication object for heating and cooling is required to actuate 2-pipe systems, i.e. heating and cooling modes use the same pipes. Two single communication objects are used in 4-pipe systems, which have separate pipes for heating and cooling.

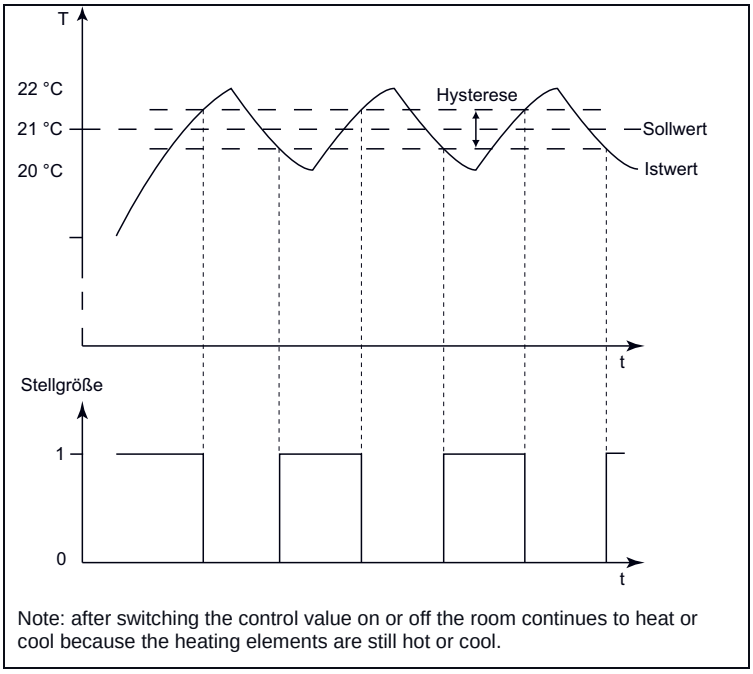
The parameter "number of output channels" defines whether an object ("1 channel (2-pipe system) for heating and cooling") or two objects ("2 channels (4-pipe system) for heating and cooling") are to be shown.

Separate control types can be parameterised for heating and cooling. One of the following control types can be selected:

- 2-point
- PWM
- continuous
- Fan Coil

The individual control types are described below in more detail.

4.3.1 2-point controller



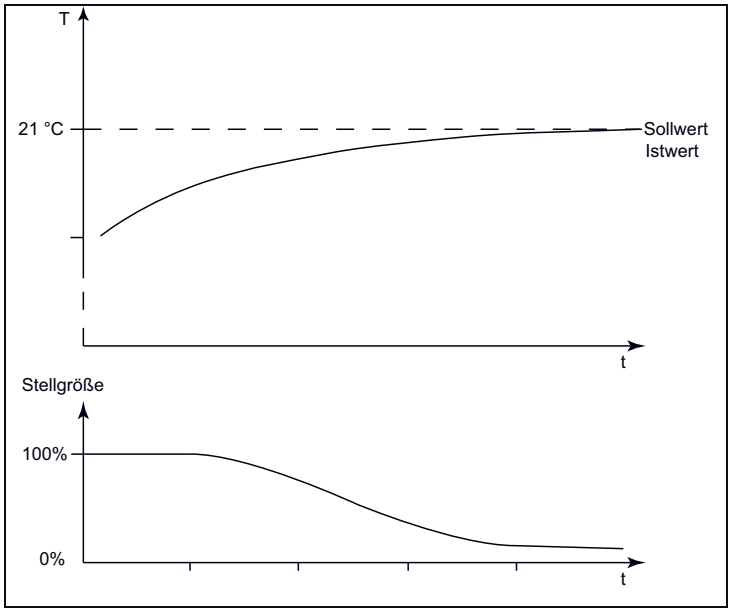
Note: after switching the control value on or off the room continues to heat or cool because the heating elements are still hot or cool.

A 2-point controller has two output states, which switch depending on the current value. If the current value is above the parameterised setpoint (22 °C at 21 °C setpoint), the control value "0" is sent to the bus.
If the current value is below the parameterised setpoint (20 °C at 21 °C), the control value "1" is sent.

A 2-point controller is recommended if the control value is only required to switch between the two states ON and OFF, such as an electrothermal valve connected to a switching actuator. A 2-point controller can deal with control deviations with large changes of the command variables, but never comes to rest.

2-point controllers always have an integrated hysteresis, which varies around the setpoint, to prevent fast oscillations of the output states.
The hysteresis can be parameterised in different magnitudes. For example, if the setpoint in heating mode is 21 °C and the hysteresis is 1.0 K, the controller switches on if the temperature falls below 20.5 °C and off if it exceeds 21.5 °C. The "hysteresis" parameter depends on how fast the heating can heat up the room and how fast the cooling can cool the room and also on the sensitivity to temperature of the people in the room.
The hysteresis should not be set too small, because a switching actuator will be continuously opening and closing. The hysteresis must also not be too great, because the temperature variations in the room will be too large.

4.3.2 Continuous controller



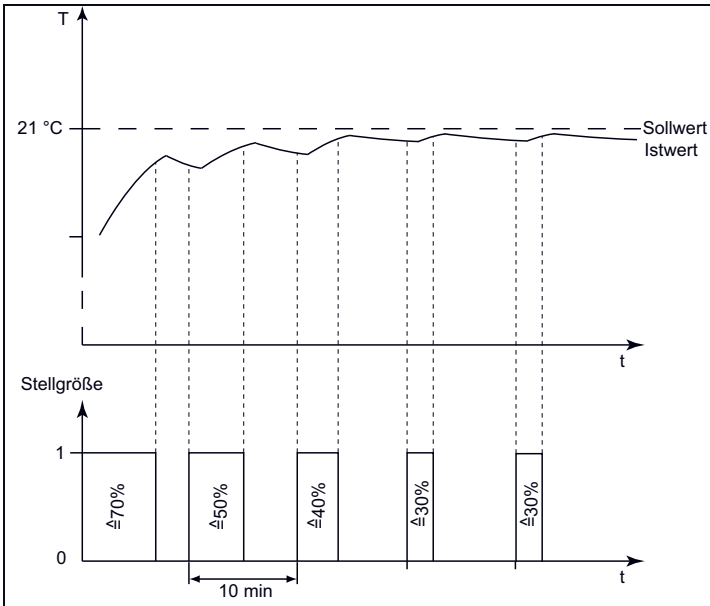
A continuous controller has a continuously changing control value, which can take values between 0 and 100%. With the KNX the control value signal is converted to a 1-byte value, i.e. the control value of 0% corresponds to the value "0" and the control value 100% corresponds to the value "255".

Devices such as electromotor actuators can be controlled by a continuous controller with a 1-byte control value. They convert the received value directly to the valve position with an integrated motor. This enables optimum control.

The 1-byte control value of a continuous controller can also be sent to KNX heating actuators, which convert the 1-byte signal to a PWM value. This can be used to control electrothermal valves. It may be useful to restrict the dynamic range, because electrothermal valves required a certain time to open and close (see also page 90, Section 4.3.3 PWM controller). This is done with the parameters "minimum control value" and "maximum control value". For example, if a maximum control value of 80% is preset, the controller always automatically sends the value 255 if a control value of 204 is exceeded.

To prevent unnecessary bus loading the magnitude of the control value can be set to enable it to be sent on the bus. The setting is a percentage value. The transmission of the control value is determined by a cycle time if it has not changed. The cycle time should be set too small (e.g. every 10 min).

4.3.3 PWM controller



Note: after switching the control value on or off the room continues to heat or cool because the heating elements are still hot or cool.

The PWM controller has the same continuous control as a continuous controller. The only difference is that with a PWM controller the 1-byte control value (0...255) is converted to a on/off ratio (0 and 1). For example, if a control value of 70% is output, the make time will be 7 minutes and the break time 3 minutes at a default cycle time of 10 minutes.

This transfers the advantages of continuous control (control to the desired setpoint, no oscillations) to drives that are designed for on/off signals only, such as electrothermal drives.

The "PWM control value cycle time" can be adjusted to optimise the control properties of the heating or cooling system. The type of heating or cooling and the actuator must be considered to set the cycle time appropriately. The following recommendations can be used:

a) electrothermal actuator

   It takes 2-3 minutes to open an electrothermal valve fully.
   A cycle time shorter than 15 minutes is therefore not reasonable.

b) underfloor heating

   The time of constant of underfloor heating is very large.
   A cycle time of 20 minutes is therefore sufficient.

c) hot-water heating

   Electrothermal drives are commonly used. A cycle time of 15 minutes gives very good control results.

d) electrical convector heating

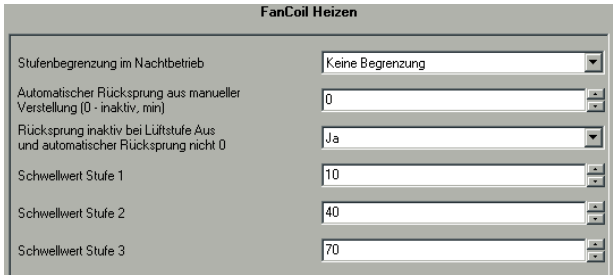
   Cycle times between 10 and 15 minutes, depending on the electric heating and room conditions, are recommended.

4.3.4 Fan Coil

If fan coil is selected under "control types", the control values are output in the same way as described at continuous controllers.

A fan coil also has the option of controlling fan stages using a 1-byte or three 1-bit communication objects with a fan coil actuator.

Switching fan stages will heat or cool a room faster.

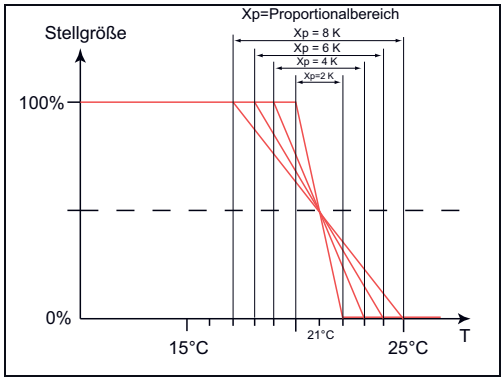


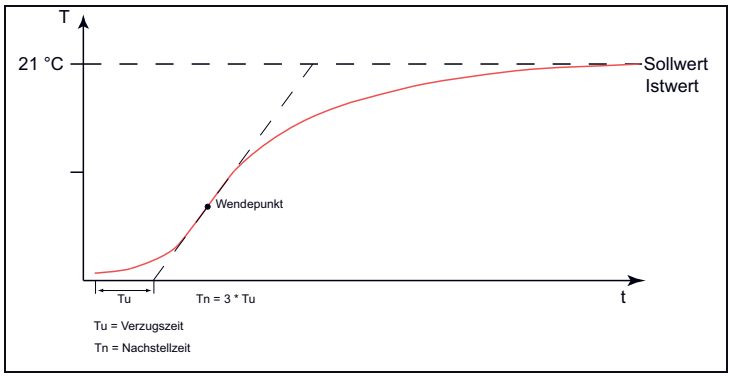
The fan stage that is to be enabled at which control value is defined on a separate tab, "fan coil heating" or "fan coil cooling". Note that the threshold values must not overlap, i.e. the stage 1 threshold value must always be less that the stage 2 threshold value, which in turn must be less than the stage 3 threshold value.

4.3.5 Control parameters with PWM and continuous controller (fan coil)

With continuous control behaviour and switching PWM controllers the preset control parameters can be used via the installation type of the heating or air-conditioning system. If different parameters are required, they are set by free parameterisation. Free parameterisation should only be used if the user has sufficient experience in control technology.

The setting "free parameterisation" can be used to set the "proportional range (Xp)" and the "readjust time (Tn)". The proportional range is above and below the specified setpoint and determines the speed of the control. The readjust time is three times the delay time (the delay time is determined by the inflectional tangent of the heating curve of the room. With both settings the slower the overall system the greater the values required.





4.3.6 Two-stage heating and cooling

In specific instances such as when using underfloor heating, it may be necessary to install a quick additional stage for the heat control in order to warm up the room rapidly. When the room thermostat is pre-set to "supplementary-stage heating enabled", it has a second heating system with switching control (1-bit) or a "quasi-continuous" control, which is controlled with the 1-byte values 0% and 100%.

The parameters "gap of additional stage" and "Hysteresis (one-sided)" enable you to specify when the additional stage switches on and off.
For example, if the setpoint is 18 °C and the hysteresis 0.5 K (one-sided) for the additional stage, the controller switches on at 18 °C and off at 18.5 °C.

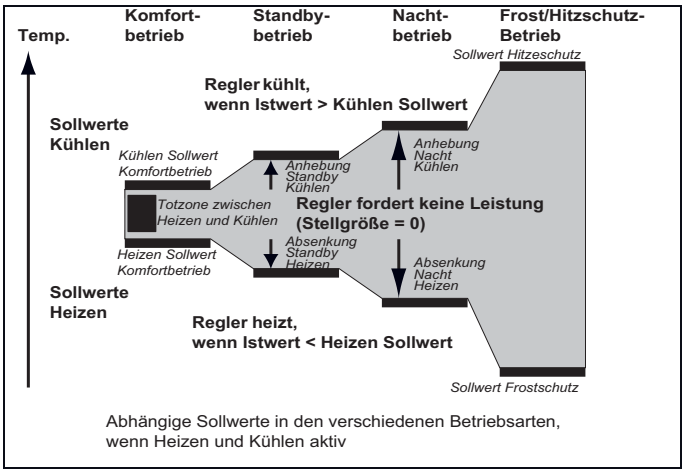
The same settings as for the additional stage heating also apply for the additional stage cooling, except that for cooling an additional cooling stage is activated if an adjustable temperature is exceeded to cool the room faster.

Because some actuators close (open without power) at a 1-bit value of "1" or a 1-byte value of "255" and open at "0", the direction of the control value can be changed with "invert control value".

4.4 Setpoints

The ambient temperature controller can be operated with dependent or individual setpoints. The two options are explained in more detail below.

4.4.1 Dependent setpoints



Abhängige Sollwerte in den verschiedenen Betriebsarten, wenn Heizen und Kühlen aktiv

Dependent setpoints have two base setpoints, one for heating ("heating setpoint comfort mode") and one for cooling ("cooling setpoint comfort mode").

The settings "...reduction standby/night mode" and "… reduction standby/night mode" refer to the base setpoint. This means that, for example, if "heating setpoint comfort mode" is set to 21 °C and 2 K has been set for "heating setpoint reduction standby", the heating setpoint is reduced 2 K to 19 °C in standby mode. If 4 K is specified for "heating setpoint reduction night mode", the heating setpoint in night mode is 17 °C.

The dependence of the setpoints is retained even after a manual setpoint adjustment. For example, if the user manually adjusts the setpoint of the specified temperature "heating setpoint comfort mode" up by 1 K to 22 °C, this value is reduced 2 K to 20 °C when standby mode is activated. In night mode the value is reduced by 4 K, making the setpoint 18 °C.

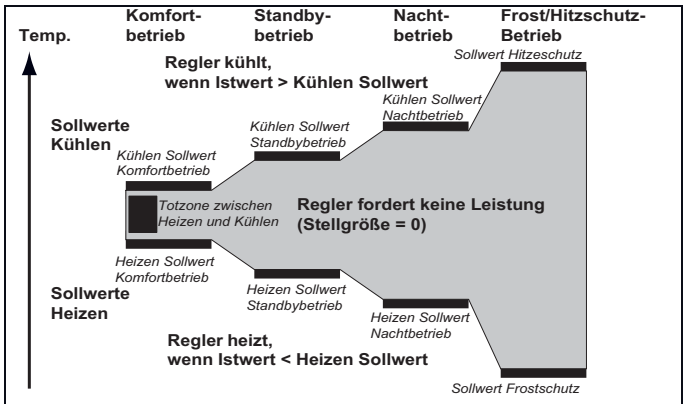
The user can manually change the parameterised setpoints with the two push-switches "increase temperature" and "reduce temperature". Push and hold the "increase temperature" push-switch (approx. 1 s) to switch between "heating setpoint comfort mode" and "cooling setpoint comfort mode" in the heating setpoint and the "reduce temperature" push-switch in the cooling setpoint.

The two setpoints for heating and cooling can be changed as much as desired over the bus, even without the ETS. A 2-byte temperature value must be sent to the communication object "base setpoint - control". The value is saved as "heating setpoint comfort mode" or "cooling setpoint comfort mode" depending on whether heating or cooling is currently enabled. The received values are written to the device memory and are retained even after a bus power failure and restoration. New base setpoints can also be sent to the device in the event of changes in room usage, such as by visualisation. A new parameterisation is not required.

The base setpoint reference is taken into account with a manual adjustment and dependent setpoints. This specifies whether the base setpoint refers to the comfort temperature for heating, cooling or the mid-range temperature between heat and cool.

"Setpoint heating" is the default setting. In regions where the cooling function is more important, it is recommended that you change this parameter to "Setpoint cooling". This makes it easier to set the ambient temperature controller and raise the cooling setpoints (standby temperature cooling and automatic night setback).

4.4.2 Individual setpoints



Individuelle Sollwerte in den verschiedenen Betriebsarten, wenn Heizen und Kühlen aktiv

If individual setpoints are used, individual setpoints are parameterised for every operating mode ("heating setpoint comfort mode", "heating setpoint standby", "heating setpoint night mode", "cooling setpoint comfort mode", "cooling setpoint standby" and "cooling setpoint night mode").

In contrast to the dependent setpoints, the individual setpoints are retained even after a manual setpoint adjustment. For example, if the user manually adjusts the setpoint of the specified temperature "heating setpoint comfort mode" up or down, the parameterised value "heating setpoint standby" is always called when standby mode is enabled. This means that only the fixed setpoints for the individual operating modes are called.

The user can manually change the parameterised setpoints with the two push-switches "increase temperature" and "reduce temperature". Push and hold the "increase temperature" push-switch (approx. 1 s) to switch between "heating setpoint comfort mode" and "cooling setpoint comfort mode" in the heating setpoint and the "reduce temperature" push-switch in the cooling setpoint.

The parameterised setpoints for can be changed as much as desired for any operating mode over the bus, even without the ETS. A 2-byte temperature value must be sent to the corresponding communication object "setpoint heating comfort", "setpoint heating standby", "setpoint heating night mode", "setpoint frost protection", "setpoint cooling comfort", "setpoint cooling standby", "setpoint cooling night mode" or "setpoint heat protection". The received values are written to the device memory and are retained even after a bus power failure and restoration. New setpoints can also be sent to the device in the event of changes in room usage, such as by visualisation. A new parameterisation is not required.

4.4.3 Minimum distance

The adjustable parameter "minimum distance between heating and cooling" is enabled with both dependent and individual setpoints.

The minimum distance is always between "heating setpoint comfort mode" and "cooling setpoint comfort mode". It acts as a buffer zone to prevent the two setpoints from overlapping.

Example:

Individual setpoints are selected. "Heating setpoint comfort mode" is set to 21 °C and "cooling setpoint comfort mode" is set to 26 °C. The dead zone between heating and cooling is 3 K. If the heating setpoint is moved up, the dead zone is also moved up. If the adjustment exceeds a temperature of 23 °C, "cooling setpoint comfort mode" is also adjusted up to ensure that there is always a minimum distance of 3 K between heating and cooling.

If the cooling setpoint is moved down, the dead zone is also moved down. If the adjustment exceeds a temperature of 24 °C, "heating setpoint comfort mode" is also adjusted down to ensure that the minimum distance is also retained in this case.

4.5 Fan Coil general

Ventilator convectors, also referred to as blower convectors or fan coil units, are used for decentralised heating and cooling. They are mounted in the room and supplied by a central heating and cooling system. A distinction is made between 2-pipe and 4-pipe systems (see also page 87, Section 4.3 Controller). A fan coil unit has multi-stage fans that enable fast adjustment of room temperature as required by the user. The Fan Coil ambient temperature controller with display can actuate up to three fan stages manually or automatically.

The fan stagers can be actuated in three ways:

- with 1-bit values,
  i.e. a separate 1-bit communication object "fan coil stage ... switch" is available. This is required for "normal" switching actuators. (If KNX switching actuators and fan coil units are used, note the connection instructions of the fan coil unit.)
- with a 1-byte object as count value 0-3,
  i.e. there is a 1-byte communication object "fan stage manual 1 byte“, which is linked to a corresponding communication object of a fan coil actuator. Here the values are
  0 = OFF
  1 = stage 1
  2 = stage 2
  3 = stage 3
- with a 1-byte object as continuous value 0-100%,
  i.e. there is a 1-byte communication object "fan stage manual 1 byte“, which is linked to a corresponding communication object of a fan coil actuator. When a stage is manually switched, the stage fast values are transmitted, which are set on the heating or cooling tab. In heating mode the fast values for heating, in cooling mode the fast values for cooling. The parameters of the fan coil actuator must be appropriately configured to ensure that the fan coil unit also switches the fan stages.

The parameter "evaluate status byte fan stage" can be enabled by a 1-byte communication object "state fan coil operating state", which is linked to a corresponding object of a fan coil actuator. The fan coil ambient temperature controller is able to evaluate which fan stage in the fan coil actuator is actually enabled. The display shows the value of the communication object (0 = OFF, 1 = stage 1, 2 = stage 2, 3 = stage 3).

The parameter "status byte evaluate operation" enables a 1-bit communication object "receive in operation - actuator monitoring". Cyclic telegrams can be received and evaluated at this object by the fan coil actuator. This enables the ambient temperature controller to check that the fan coil actuator is still operating and can be actuated. If the fan coil actuator indicates a problem and cannot send cyclic telegrams, the ambient temperature controller indicates this by showing the "fault" symbol in the display. If the fault in the fan coil actuator is corrected and cyclic telegrams are being received again, the "fault" in the display disappears and the ambient temperature controller operates "normally" again.

When adjusting the cycle time "in operation" in the fan coil actuator, note that it must be at least twice as large as the monitoring time in the ambient temperature controller ("send cycle time of actuator in s"). A reasonable cycle time for the actuator is approx. 60 s with a monitoring time of 120 s in the ambient temperature controller.

For example, to prevent excessive noise during the night in hotel rooms, a "stage limitation in night mode" can be set. This means that only the specified fan stage or lower will be used in night mode. When switching to another operating mode all fan stages can still be used.

A limitation can be set to "stage 1" or "stage 2" or the fan can be completely disabled with the parameter "stage restriction in night mode".

4.6 Compensation

The fan coil ambient temperature controller with display has summer compensation and winter compensation modes. Both are explained in detail below.

4.6.1 Summer compensation

To save energy and to maintain the temperature differential when entering an air-conditioned building, you should adjust the room temperature in relation to the external temperature in summer (summer compensation in accordance with DIN 1946). The ambient temperature is increased by adjusting "cooling setpoint comfort mode".

Raising the room temperature does not, however, mean that you heat up the room. Rather the adjustment is intended to allow the room temperature without cooling to increase to a specified value. This prevents an air-conditioner from continuing to try to reduce the ambient temperature to 24 °C at an outside temperature of 35 °C.

However, an external temperature sensor that sends its measured values to the KNX and therefore can be evaluated by the ambient temperature controller with display is required to enable summer compensation.

The following parameters are available for summer compensation

- "summer compensation at lower outside temperature",
- "summer compensation at higher outside temperature",
- "summer compensation at lower setpoint offset" and
- "Summer compensation at upper setpoint offset".

The lower and upper outside temperature value specifies from and up to which temperature a setpoint should be corrected.

The lower and upper setpoint offset specifies how many K the setpoint should be adjusted during summer compensation in the parameters or by the user.

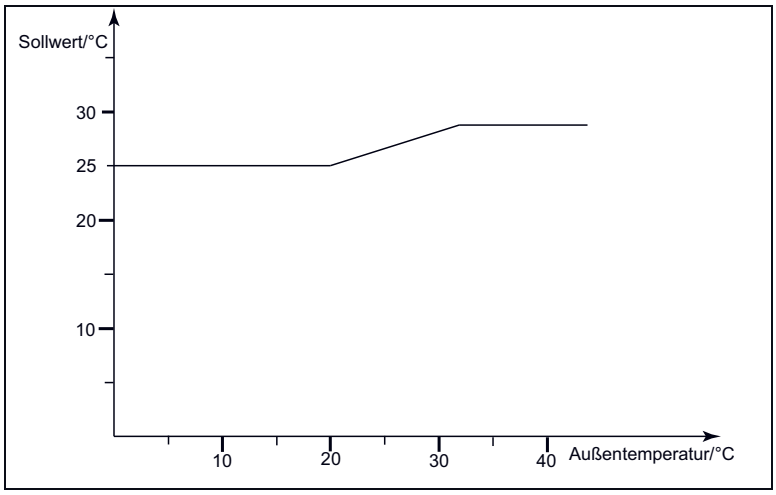
Typical values for summer compensation are

- 20 °C: lower outside temperature
- 32 °C: upper outside temperature
- 0 K: lower setpoint offset
- 4 K: upper setpoint offset

This means that a floating setpoint increase from 0 to 4 K will be implemented if the outside temperature increases from 20 °C to 32 °C.

Example:

Parameters for "cooling setpoint comfort" 25 °C are defined in the bottom graph. With rising outside temperature the parameterised setpoint is adjusted from an outside temperature of 20 °C from 25 °C to 29 °C. The 29 °C is reached at an outside temperature of 32 °C. From there the setpoint is no longer increased as the outside temperature continues to rise.



Note:

CO is shown in the display of the ambient temperature controller with active compensation.

4.6.2 Winter compensation

To improve comfort and to maintain a reasonable temperature differential when entering a room with a large window area, you should increase the room temperature depending on the outside temperature in winter (winter compensation). The ambient temperature is increased by adjusting "heating setpoint comfort mode".

Similarly to summer compensation, an external temperature sensor that sends its measured values to the KNX and therefore can be evaluated by the ambient temperature controller with display is required to enable winter compensation.

The following parameters are available for winter compensation

- "winter compensation lower temperature",
- "winter compensation upper outside temperature",
- "winter compensation lower setpoint offset" and
- "winter compensation upper setpoint offset".

The lower and upper outside temperature value specifies from and up to which temperature a setpoint should be corrected.

The lower and upper setpoint offset specifies how many K the setpoint should be adjusted during winter compensation in the parameters or by the user.

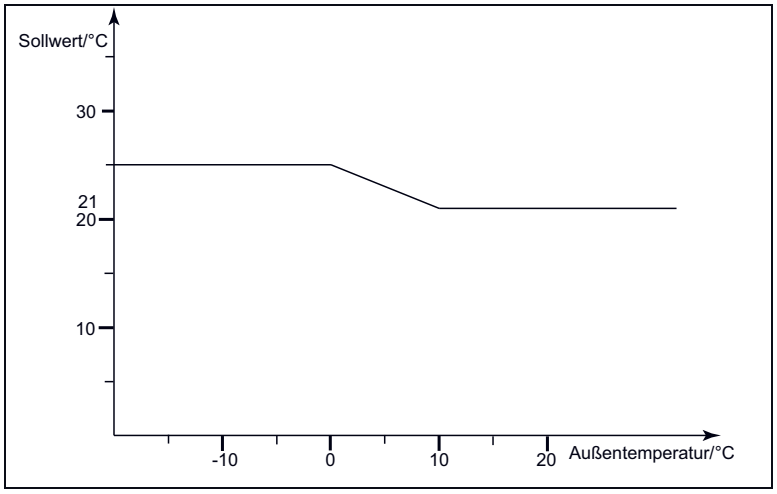
Typical values for winter compensation are

- 0 °C: lower outside temperature
- 10 °C: upper outside temperature
- 4 K: lower setpoint offset
- 0 K: upper setpoint offset

This means that a floating setpoint increase from 0 to 4 K will be implemented if the outside temperature falls from 10 °C to 0 °C.

Example:

Parameters for "heating setpoint comfort" 21 °C are defined in the bottom graph. With falling outside temperature the parameterised setpoint is adjusted from an outside temperature of 10 °C from 21 °C to 25 °C. The 25 °C is reached at an outside temperature of 0 °C. From there the setpoint is no longer increased as the outside temperature continues to fall.



Note:

CO is shown in the display when compensation is enabled.

Contact us

A member
of the ABB Group

Busch-Jaeger Elektro GmbH
P.O.Box
58505 Lüdenscheid

Freisenbergstraße 2
58513 Lüdenscheid
Germany

www.Busch-Jaeger.com
info.bje@de.abb.com

Central sales service:
Phone: +49 (2351) 956-0
Fax: +49 (2351) 956-1380

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