3-fold Busch-triton® switch sensor with thermostat, FM

Type: 6326-xx-101

The application module is placed on a flush-mounted bus coupler.

The 3-fold switch sensor can for example send telegrams for switching, dimming, shutter control, value or ventilation control to EIB actuators. The three rockers can be used together with the auxiliary push button to operate the thermostat.

The following information can be shown in the integrated display.

- current room temperature
- current setpoint temperature
- operation mode

Each operating element has a status LED as well as a backlit labelling field.

Technical data

Power supply	– EIB	24 V DC, via the bus line
Operating and display elements	– 3 rockers	
	– 3 two-colour LEDs	red / green
	– 3 backlit labelling fields	
Connections	– Flush-mounted bus coupler	10-pole plug connector
Type of protection	– IP 20, EN 60 529 mounted on the bus coupler	
Ambient temperature range	– Operation	- 5 °C … 45 °C
	– Storage	-25 °C … 55 °C
	– Transport	-25 °C … 70 °C
Design	– Busch-triton®	
Colour	– amber obsidian palladium titanium platinum bronze studio white, matt alabaster/studio white hansa blue cobalt blue diamond black alpine white light grey champagne metallic	
Mounting	– latched onto flush-mounted bus coupler	
Dimensions	– 97 x 90 mm (H x W)	
Weight	– 0.07 kg	
Certification	– EIB-certified	
CE norm	– in accordance with the EMC guideline and the low voltage guideline	

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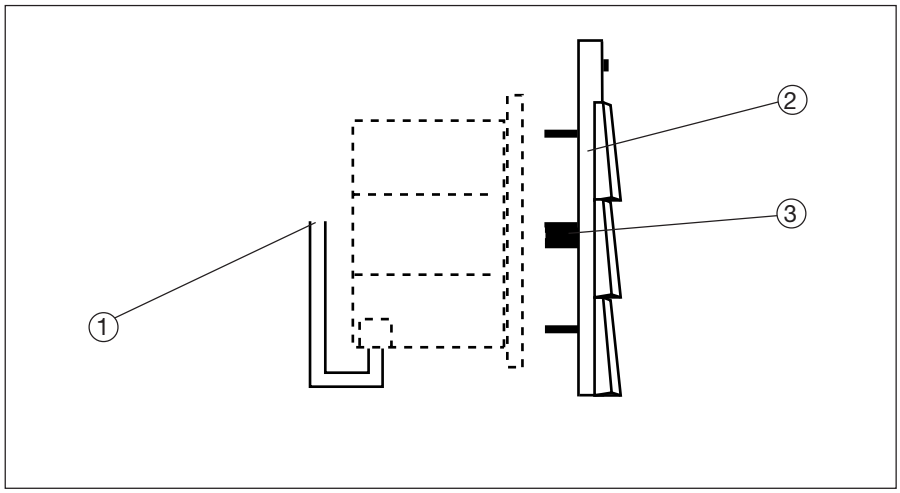
Application programs	Number of communication objects	Max. number of group addresses	Max. number of associations
Switch Dim. Shutter Value Vent. Heat Cool /2	15	26	26

Circuit diagram



1 Bus terminal

2 Application module
3 10-pole plug

Note

When installing two Busch-triton® switch sensors horizontally, a distance of 112 mm is recommended (using 2 flush-type spacers, e.g. 2 x Kaiser spacers 91).

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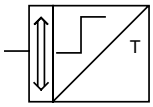
Switch Dim. Shutter Value Vent. Heat Cool /2



Selection in ETS2

– ABB
  └Heating
    └Thermostat triton

– ABB
  └Push Button triton
    └Push button, 3-fold with thermostat

The application program is intended for the 3-fold Busch-triton® switch sensor with thermostat application module.

The Busch-triton® switch sensor acts as a thermostat and can be used simultaneously for switching, dimming, shutter control, sending 1 byte values and/or ventilation control. Depending on the parameter settings of the three rockers, different communication objects are displayed or hidden.

There is a common parameter “Push button action interpreted as long from” for all the rockers that are used for dimming, shutter control or ventilation control. The value that is set here determines how long a push button must be pressed for the switch sensor to detect a long switch operation. The default setting is 400 ms.

The Busch-triton® switch sensor normally operates in “switch sensor” mode. In this mode, it is possible to send 1 byte values or send switching commands that were defined during commissioning for controlling the lighting, the shutters or the ventilation.

If the auxiliary push button is pressed, the Busch-triton® switch sensor functions as a thermostat. The three rockers can now be used for setting the thermostat functions. The device automatically reverts to the “switch sensor” mode approx. 5 s after the last operation.

LCD

In the “switch sensor” mode, the current room temperature and the current mode of the thermostat are indicated by default on the display. It is possible to display the current setpoint or actual value using the parameter “Display of temperature in sensor mode”. Alternatively, the temperature display can also be permanently switched off with the setting “no temperature displayed”.

If the “thermostat” mode is selected using the auxiliary push button, the current setpoint and the operation mode of the thermostat appear in the display. The unit (°C) and the LEDs also start to flash. The current setpoint is displayed for each operation mode (comfort mode, night operation or frost/heat protection) for the thermostat function.

If frost/heat protection is activated for example during normal operation, the display indicates the current setpoint.

If the parameter “Setpoint heat protection” on the “Setpoints” parameter page is set to “Cooling disabled” and an “On” telegram is received at the “Frost/heat protection” object when the cooling is switched on, then the display only indicates the “Off” state instead of the current setpoint.

Switch

In the default setting of the Busch-triton® switch sensor, there is a switch function with a 1 bit communication object available for each rocker. The rocker then toggles when it is operated.

The parameter “Working mode of the rocker” determines which value the switch sensor sends when the left or the right side of the rocker is pressed.

Dim

If the operation mode of the rocker is set to “dimming sensor”, the rocker has the communication objects “Rocker ... short” for switching and “Rocker ... long” for dimming.

When carrying out a switching operation, the switch sensor does not distinguish between whether the rocker is pressed briefly on the left side, the right side or in the middle. In this case it always toggles.

For dimming, it is determined via the parameter “Dimming direction” which side of the rocker must be pressed and held down in order to dim up or down. When the rocker is released, the switch sensor sends the telegram “Stop dimming”.

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Shutter

If the operation mode of the rocker is set to “shutter sensor”, the switch sensor sends “Move shutter up/down” telegram when it is pressed for a long period. If it is pressed for a short period, it sends telegrams to stop shutter movement or for step-by-step lamella adjustment.

The parameter “Shutter direction” determines which side of the rocker must be pressed in order to raise or lower the shutter.

With the parameter “Automatic shading”, it is possible to integrate the shutters in the cooling system. To do so, the parameter must be changed from the default setting “inactive” to “Send ON telegram” or “Send OFF telegram”. The sending of an “On” or “Off” telegram is dependent on the type of shutter actuator used. Normally, a shutter is always lowered with an “On” telegram (see also “Heat and cool”).

Value

If the operation mode of the rocker is set to “value”, the switch sensor sends 1 byte values when the rockers are pressed.

The parameter “Rocker ... value (0..255)” determines which value is sent when the left or right push button is pressed.

Ventilation

If the operation mode of the rocker is set to “ventilation sensor”, the switch sensor reads the 1 byte value from the bus when the rocker is pressed and indicates it as a percentage in the display. After further switch operations, the current setpoint is increased or reduced in 5% steps. The new value is sent approx. 3 s after the last operation.

The parameter “Lower value for ventilation” and “Upper value for ventilation” specify the setpoint range for ventilation control which can be adjusted via the rockers.

The parameter “Direction of operation” determines which side of the rocker raises or lowers the value.

LED backlighting

The backlit text fields indicate the functions of the rockers even in the dark. The text field and the status LEDs can be switched on or off depending on the parameters assigned. The backlighting can be switched off via rocker 3 in the “thermostat” mode or via the “Night operation” communication object.

The LEDs can be selected for use as an orientation light or for status display with the parameter “LED operation mode”.

If used as an orientation light, the colour of each LED can be set separately.

Control

Three control functions “heat and cool”, “heat” and “two-step heating” can be set. Once the control function has been selected, the parameters required for further settings are made available.

Using the auxiliary push button, it is possible to switch to the “thermostat” mode. The following are defined in this mode:

- upper rocker for changing the setpoint temperatures,
- middle rocker for toggling between comfort or standby mode; for activation/deactivation of party mode during night operation; for manual surpression of frost/heat protection (comfort extension),
- lower rocker for switching the backlighting on or off.

If the parameter “Manual operation of control unit” is set to “disabled”, it is not possible to change to the “thermostat” mode. This setting is a good idea in functional buildings.

The thermostat has four operating modes. The frost protection mode has the highest priority i.e. if this mode is active, it is not possible to switch to another mode. The frost protection mode must be deactivated again first e.g. by closing an open window. The comfort mode has the next highest priority followed by night operation. If none of these three modes is active, the thermostat is set to standby mode (see also the diagram of the operating modes on the next page).

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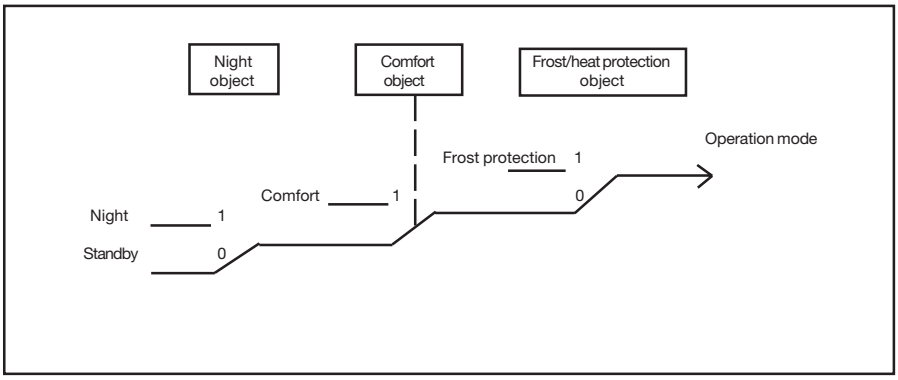

It is possible to disable or limit the adjustment of setpoints via the parameter “Range for manual setting of the setpoint”. In addition, upward or downward adjustment can be limited or prevented via the parameters “Max. increase...” or “Max. reduction of setpoint”. A setpoint adjustment affects all the setpoints that are dependent on the comfort temperature. For example, if the standby temperature is increased by 1°C, all the setpoints for comfort mode, night operation and standby in heat and cool mode are likewise increased by 1°C. The setpoints for frost and heat protection cannot be modified manually.

The base setpoint can also be changed as often as required via the bus. A 2 byte telegram value must be sent to the “Base setpoint” object. The current base setpoint can for example be read out from a visualisation device.

Party mode (comfort extension)

It is possible to recall a party mode i.e. the user is able to select a comfort extension period during night operation when the switch sensor is in thermostat mode. The party mode can be activated by pressing the right side of rocker 2 (changes into comfort mode). Once the party time has elapsed, the thermostat reverts to night operation.

During the party mode, the symbols for night operation and comfort mode are indicated in the display. By pressing the left side of rocker 2, the party mode can be manually reset to night reduction.

If required, this function can also be used for the temporary deactivation of heat and frost protection. As in the case of night operation, the comfort mode is selected for the set period. The function is switched on and off in the same way. During this comfort extension period, the symbols for frost protection and comfort are indicated in the display.

Heat and Cool

The following setpoint values can be set for heat mode: “Base setpoint in °C (16..35)”, “Reduced heating in standby mode in K (1..8)”, “Reduced heating during the night in K (1..12)” and “Setpoint frost protection in °C”.

The comfort temperature for cool mode can be set via the parameter “Insensitive range between heat and cool in K (1-10)”. The setpoint settings for standby mode and night operation then refer to this value: “Increased cooling in standby mode in K (1..8)” and “Increased cooling during night in K (1..12)”.

If the base setpoint is for example set at 22°C and the room is to be cooled in comfort mode at 25°C, it is necessary to select an insensitive zone of 3°C. If the room is then to be cooled in standby mode at 27°C, the value must be increased by 2°C. Cooling the room during night operation with a minimum temperature of 29°C requires this value to be increased by 4°C.

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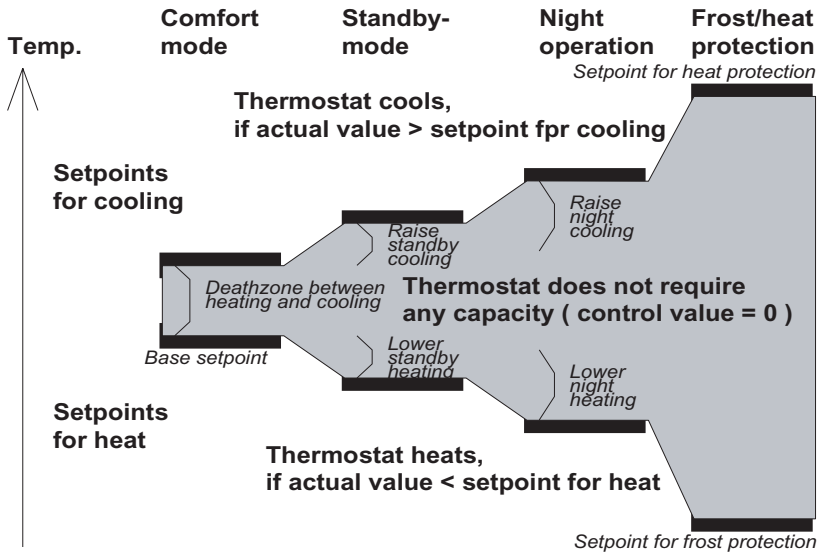

Setpoints in the various operation medes, if heating and colling are active

It is possible to preselect a setpoint for heat protection which enables the room to be cooled despite the window being open. If heat protection is not required, the cooling mode can be disabled. In this case, the receipt of an "On" telegram at the frost/heat protection object causes the value 51°C to be output via the setpoint object instead of the current setpoint. The display in the thermostat mode then indicates "OFF".

The thermostat automatically toggles between heat and cool. If this is not required, this can be carried out using external, central control via the object "Heat/cool". In this setting, the symbols for heat or cool are permanently visible for the duration of the relevant operation mode.

In order to prevent the room from warming up in cooling mode due to sunlight, at least one rocker can carry out automatic shading by lowering the shutter. The setpoint is set via the parameter "Automatic shading ...". This parameter must also be activated for the shutter sensors which are to be used for shading (see also "Shutter").

Temperature setpoint values, actual values or temperature differences can be sent to a display or visualisation device. It is possible to set which value is sent and/or read out using the parameter "Choice of current temp., setpoint and difference between act. temp. and setpoint". The sending of temperature differences is only intended for the heating control functions.
So that the bus is not put under load unnecessarily, the sending of the temperature values can be limited to a specific degree of change or time period.

If the measured temperature value is invalidated by the bus or mains coupler generating their own heat, the user can set an "Offset for temperature measurement".

In order to be able to address the various control systems for heating and cooling, the Busch-triton® switch sensor can be assigned parameters for continuous or switching control. In the case of the switching control mode, it is also possible to select whether the control is two-step or by pulse width modulation.

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The preset control parameters about the type of heating or cooling system can be used for continuous control and switching PWM control. If other control parameters are required, these can be set individually via more detailed parameters. A certain level of experience in control technology is required in order to use this option.

The continuous controller gives its control value to a 1 byte object. The minimum or maximum control value of the controller can be adapted for specific control valves that do not use the complete dynamic range (0...255) because their own dynamic range only extends from 25 to 180. The dynamic range of the system (thermostat + control valve) is thus increased. The control value “0” is sent in order to close the control valve.

To prevent unnecessary bus loads, it is possible to select what size the change of the control valve must be before it may be sent on the bus. The setting is a percentage value. The sending of the control value is also limited by a cyclic interval e.g. every 10 minutes.

In the case of a switching PWM controller, the output value of the controller (0...255) is converted into an ON/OFF function. For example, if a control value of 70% is to be produced, the ON time will be 7 minutes and the OFF time will be 3 minutes with a preselected cyclic interval of 10 minutes. The dynamic range can also be limited here as for the continuous controller.

In order to optimise the control characteristics of the heating or cooling system, the “Cyclic time of the switching control value” can be defined. When setting the cyclic time, it is important to consider the type of heating or cooling as well as the valve drive that is being used. The following recommendations can therefore be used:

a) Thermal control valve
   It takes approx. 2-3 minutes to open an electrothermal valve completely. It is therefore not a good idea to set a shorter cyclic time than 15 minutes.

b) Floor heating
   The time constant of a floor heating system is very large. A cyclic time of 20 minutes is therefore sufficient.

c) Warm water heating
   This type of heating makes frequent use of electrothermal drives. A cyclic time of 15 minutes produces excellent control-action results.

d) Electric heating
   Cyclic times between 10 and 15 minutes are recommended, depending on the electric heating system and the conditions in the room.

If a two-step controller is used for heating or cooling control, it is possible to select different sizes for the hysteresis which fluctuates by the setpoint value. If the setpoint for heating mode lies at 20°C and the hysteresis is set at 0.5 K, then the controller switches on at 19.5°C and switches off again at 20.5°C. The selected hysteresis is then orientated to how quickly the heating or cooling system can warm up or cool down the room and how sensitive the customer is to the temperature. The hysteresis should not be too small as otherwise the valve drive continually opens and closes. It should also not be too large as there is a relatively high level of temperature fluctuation in the room.

The parameter “Reduction of hysteresis” serves to increase the accuracy of the controller. If this parameter is active, the hysteresis will be reduced e.g. by 0.1 K every minute until it reaches 0 K. The temperature fluctuations are effectively reduced during the control phase due to the reduction of the hysteresis. If the hysteresis is to be reduced, a setting smaller than one fifth of the hysteresis is recommended.

e.g. hysteresis 0.5 K =>
reduction < 0.1 K/min

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The thermostat is able to detect thermal shocks. Using this thermal shock detection, it is possible to establish (under certain conditions) without window contacts, whether a window has been opened. The heating goes into frost protection mode for a set period.

The mounting position of the controller and the suitable selection of parameter settings are decisive in ensuring a good level of detection. When assigning the parameters, you should start with the largest possible setting for thermal shock e.g. -0.8 K in 1min. If the setting is not sufficient for detection, the parameter should gradually be reduced. These two points should however be noted:

– Opening the door can also lead to a thermal shock.
– The controller cannot detect whether the window has been closed again. It switches to frost protection mode for the set period and then reverts to the previous operation mode.

In specific cases (floor heating), it may be necessary to install a quick-acting additional heating system in order to heat the room up rapidly. In the “two-step heating” mode, the thermostat offers a second heating system which can be regulated via switching control (1 bit) or continuous control with 1 byte values 0% to 100%.
The parameters “Setpoint difference of basic heating to additional heating” and “Hysteresis (one-sided)”are used to determine when the additional heating is switched on and off. As for the basic heating, unnecessary bus loads can be avoided by assigning a suitable cyclic time for the control value.

As some valve drives close with a 1 byte value of “255” or a 1 bit value of “1” and open with other values, the “Mode of control output” can also be inverted.

In the case of voltage failure, it can also be selected which operation mode the thermostat should have after bus voltage recovery. The thermostat also sends its current data on the bus such as control values, current setpoint and actual value.

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Communication objects
for switch sensor, heat and cool and switching control

No.	Type	Object name	Function
0	1 bit	Rocker 1	Telegr. switch
1	1 bit	Rocker 2	Telegr. switch
2	1 bit	Rocker 3	Telegr. switch
3	1 bit	Operation mode	Comfort mode
4	1 bit	Operation mode	Night operation
5	1 bit	Operation mode	Frost/heat protection
7	1 bit	Control value	Heating (switching)
8	1 bit	Control value	Cool (switching)
9	2 byte	Base setpoint	Telegr. temperature
10	2 byte	Current temperature	Room temperature

Communication objects
for dimming sensor

No.	Type	Object name	Function
0	1 bit	Rocker 1 short	Telegr. switch
1	1 bit	Rocker 2 short	Telegr. switch
2	1 bit	Rocker 3 short	Telegr. switch
...			
12	4 bit	Rocker 1 long	Telegr. dimming
13	4 bit	Rocker 2 long	Telegr. dimming
14	4 bit	Rocker 3 long	Telegr. dimming

Communication objects
for shutter sensor

No.	Type	Object name	Function
0	1 bit	Rocker 1 long	Telegr. move shutter Up-Down
1	1 bit	Rocker 2 long	Telegr. move shutter Up-Down
2	1 bit	Rocker 3 long	Telegr. move shutter Up-Down
...			
12	4 bit	Rocker 1 short	Telegr. lamella adj./stop
13	4 bit	Rocker 2 short	Telegr. lamella adj./stop
14	4 bit	Rocker 3 short	Telegr. lamella adj./stop

Communication objects
for value function

No.	Type	Object name	Function
0	1 bit	Rocker 1	Telegr. value
1	1 bit	Rocker 2	Telegr. value
2	1 bit	Rocker 3	Telegr. value
...			

Communication objects
for ventilation sensor

No.	Type	Object name	Function
0	1 bit	Rocker 1	Value ventilation
1	1 bit	Rocker 2	Value ventilation
2	1 bit	Rocker 3	Value ventilation
...			

Communication objects
for continuous control

No.	Type	Object name	Function
...			
7	1 byte	Control value	Heating (continuous)
8	1 byte	Control value	Cool (continuous)
...			

Communication objects
for two-step heating (switching)

No.	Type	Object name	Function
...			
7	1 bit	Control value	Heating (switching)
8	1 bit	Control value	Additional heating (switching)
...			

Communication objects
for two-step heating (continuous)

No.	Type	Object name	Function
...			
7	1 byte	Control value	Heating (continuous)
8	1 byte	Control value	Additional heating (continuous)
...			

Communication objects
for current setpoint value

No.	Type	Object name	Function
...			
11	2 byte	Current setpoint	Telegr. temperature
...			

Communication objects
for temperature difference
(if cooling is inactive)

No.	Type	Object name	Function
...			
11	2 byte	Difference of temp.	Telegr. temperature
...			

Communication objects
for toggling between differences in temperature for heating
(if cooling is inactive)

No.	Type	Object name	Function
...			
6	1 bit	Heat/cool	Telegr. temperature
...			

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Parameters
The default setting for the values is **printed in bold type.**

General:	
– Used control functions	**Heating and cooling** Heating 2-step heating
– Manual operation of control unit	**enabled** disabled
only if manual operation is enabled:	
– Party mode (comfort enlargement)	inactive 30 min **1 h** 1.5 h 2 h 2.5 h 3 h 3.5 h 4 h
– Frost/heat mode surpressable (comfort enlargement)	enabled **disabled**
– Display of temperature in sensor mode	**Current temperature** Current setpoint no temperature displayed
– Switching off all the status LEDs	with text field LEDs **disabled**
– Behaviour of text field LEDs	always off **control only via rocker 3** switched off in night mode always on
only if manual operation is disabled:	
– Behaviour of text field LEDs	always off switched off in night mode **always on**
– Switching off of the LCD lighting	with text field LEDs **disabled**
– Push button action interpreted as long from	300 ms / **400 ms** / 600 ms / 700 ms / 800 ms / 900 ms
– Operation mode after reset	**Standby** Comfort mode Night Frost/heat protection

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Separate for each rocker:	
– Operation mode of rocker	**Switch sensor** Dimming sensor Shutter sensor Value Ventilation sensor
for switch sensor:	
– Working mode of the rocker	**TOGGLE** left = OFF, right = ON left = ON, right = OFF
for dimming sensor:	
– Dimming direction	**left = darker, right = brighter** left = brighter, right = darker
for shutter sensor:	
– Shutter direction	**left = down, right = up** left = up, right = down
– Automatic shading (see also at setpoints)	**inactive** Send ON telegram Send OFF telegram
for switch, dimming and shutter sensor:	
– Operation mode of LED	Orientation light **Shows object value of object no. ...**
for display of object value:	
– Colour of LED	OFF = green, ON = red **OFF = red, ON = green**
for orientation light:	
– Colour of LED	always off always red **always green**
for value function:	
– Rocker left - value (0..255)	**0**
– Rocker right - value (0..255)	**255**
– Operation mode of LED	**Orientation light** Operation of the rocker
for operation of the rocker:	
– Colour of LED	left = green, right = red **left = red, right = green**
for orientation light:	
– Colour of LED	always off always red **always green**
for ventilation sensor:	
– Direction of operation	**left = down, right = up** left = up, right = down
– Lower value for ventilation	**0%** / 10% / ... / 90%
– Upper value for ventilation	10% / 20% / ... / **100%**
– Operation mode of LED	**Orientation light**
for orientation light:	
– Colour of LED	always off always red **always green**

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Room temperature:	
– Choice of current temp., setpoint and difference between act. temp. and setpoint	Current temp. and setpoint only sendable **Sendable and readable current temp.** Sendable and readable current setpoint Difference of temp. (if cooling is inactive)
only if the current value is available:	
– Change of current temperature for automatic sending	inactive at 0.2 K **at 0.4 K** at 0.6 K at 0.8 K at 1.0 K at 1.2 K at 1.4 K at 1.6 K at 1.8 K at 2.0 K
only if the current setpoint is available:	
– Send current setpoint if changes	inactive **active**
only if the temp. difference is available:	
– Change of current temperature for automatic sending	**at 0.2 K**
– Cyclic time for automatic sending of current temperature	inactive every 3 min every 5 min every 10 min every 15 min **every 30 min** every 60 min
– Offset for temperature measurement (-128 ... 127) x 0.1 K	**0**
Setpoints:	
– Base setpoint in °C (16..35)	**21 °C**
– Reduced heating in standby mode in K (1..8)	**2**
– Reduced heating during the night in K (1..12)	**4**
– Setpoint frost protection in °C	**7**
– Automatic shading (is only active on rockers with shutter mode)	**current temp. > comfort setpoint heating + 2K** current temp. > comfort setpoint heating + 4K current temp. > comfort setpoint heating + 6K current temp. > comfort setpoint heating + 8K
only for heat and cool control function:	
– Insensitive range between heat and cool in K (1..10)	**2**
– Increased cooling in standby mode in K (1..8)	**2**
– Increasing cooling during night in K (1..12)	**4**

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– Setpoint heat protection	**Cooling disabled** 30 °C 35 °C 40 °C 44 °C
– Toggle between heat and cool	**automatically** via Object heat/cool
Thermal shock	
– Thermal shock detection (only active at heating)	**inactive** -0.4 K / min -0.6 K / min -0.8 K / min
only for active thermal shock detection:	
– Behaviour after thermal shock	**Frost protection**
– Duration of frost protection	10 min / **20 min** / 30 min / 60 min
Heating / Cooling	
– Output of control value	continuous **switching**
only for switching control value:	
– Control type	Two-step control **PWM-Control**
only for PWM control:	
– Control parameter	**by installation type** more detailed
only for heating:	
– Type of heating	**Warm water heating (1.5 K/100 min)** Electrical heating (1.5 K/50 min) Floor heating (4 K/200 min)
only for cooling:	
– Type of cooling	**Cool ceiling (5 K/240 min)** Fan unit (4 K/90 min) SplitUnit (4 K/90 min)
only for more detailed control parameter:	
– Proportional range	**1.5 K** / 2 K / 2.5 K / 3 K / 4 K / 5 K / 6 K / 8 K / 10 K
– Readjust time in min. (0..255)	**100**
– Cyclic time of the switching control value	3 min / 5 min / 10 min / **15 min** / 20 min / 30 min
– PWM cycle is 0 % up to an output value (0..75)	**25**
– PWM cycle is 100 % down to an output value (180..255)	**230**
only for two-step control:	
– Hysteresis	0.3 K / **0.5 K** / 0.7 K / 1.0 K / 1.5 K
– Reduction of hysteresis	**inactive** 0.2 K/min 0.1 K/min 0.066 K/min 0.05 K/min 0.04 K/min 0.033 K/min 0.029 K/min
– Cyclic time for automatic sending	every 3 min every 5 min every 10 min every 15 min **every 30 min** every 60 min

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only for continuous control:	
– Control parameter	**by installation type** more detailed
only for heating:	
– Type of heating	**Warm water heating (1.5 K/100 min)** Electrical heating (1.5 K/50 min) Floor heating (4 K/200 min)
only for cooling:	
– Type of cooling	**Cool ceiling (5 K/240 min)** Fan unit (4 K/90 min) SplitUnit (4 K/90 min)
only for more detailed control parameter:	
– Proportional range	**1.5 K** / 2 K / 2.5 K / 3 K / 4 K / 5 K / 6 K / 8 K / 10 K
– Readjust time in min. (0..255)	**100**
– Minimum control value (0 ... 75)	**0**
– Maximum control value (180 ... 255)	**255**
– Change for automatic sending of control value	2 % / **5 %** / 10 %
– Cyclic time for automatic sending of control value	every 3 min every 5 min every 10 min every 15 min **every 30 min** every 60 min
– Mode of control output	**normal** inverted
Additional heating	
– Setpoint difference of basic heating to additional heating	1 K / **2 K** / 3 K
– Hysteresis (one-sided)	0.3 K / 0.5 K / 0.7 K / **1.0 K** / 1.5 K
– Cyclic time for automatic sending of control output	**inactive** like basic heating
– Type of control output	continuous (1 Byte : 0% or 100%) **switching (1 Bit)**
– Mode of control output	**normal** inverted
– Control	**active** inactive
Manual setpointing	
– Range for manual setting of the setpoint	disabled +/- 1 K **+/- 3 K** +/- 5 K
– Max. increase of setpoint at heating	0 K / 1 K / 2 K / **3 K** / 4 K / 5 K
only for heat and cool:	
– Max. reduction of setpoint at cooling	0 K / 1 K / 2 K / **3 K** / 4 K / 5 K