User Manual

PBlock KNX Keypad / Thermostat
MM2-PB-xxxx-yy-1zz

PM_MM2_PB_V1 (PBLOCK)

1. Product Description

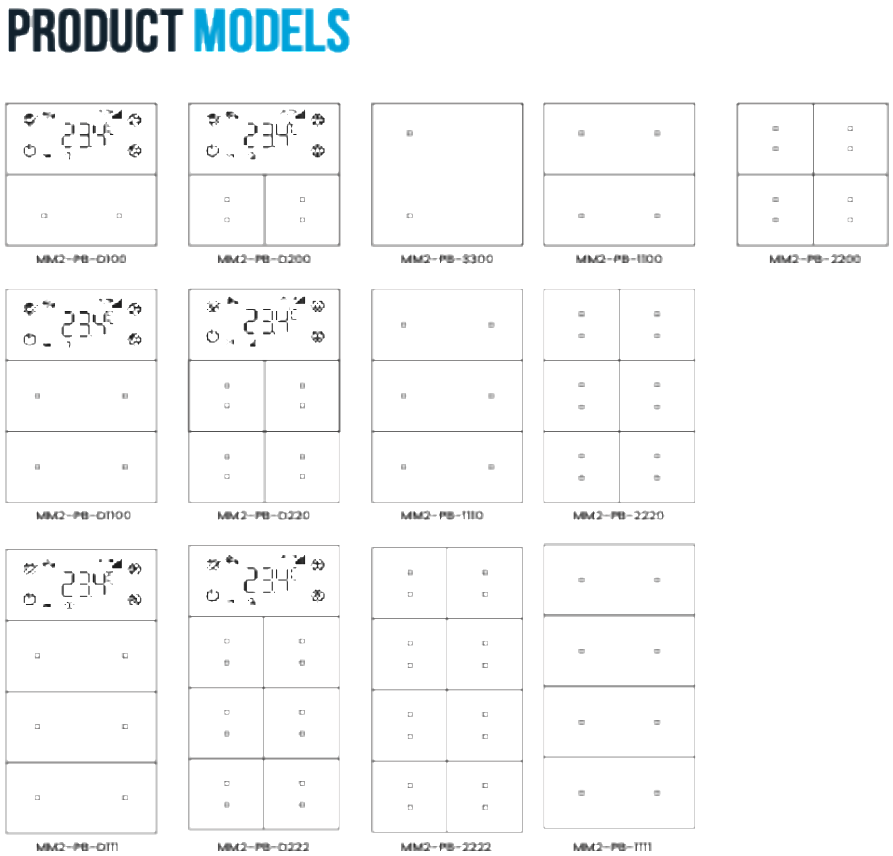
The MM2-PB-xxxx-yy-1zz product group defines a family of KNX push-button keypads. This product family consists of models offered in three different size options and supporting up to eight independent buttons. A temperature sensor and thermostat function are provided as standard on all models. Display-equipped models feature an LCD touch screen on the upper section, while selected variants additionally include indoor air quality and humidity sensors. To enhance tactile feedback, the device is equipped with an acoustic buzzer that provides audible confirmation. The buttons are fitted with multi-colour status indicators on both sides,

each side being independently programmable. The device is equipped with a comprehensive set of features designed to meet the automation requirements of a single space.

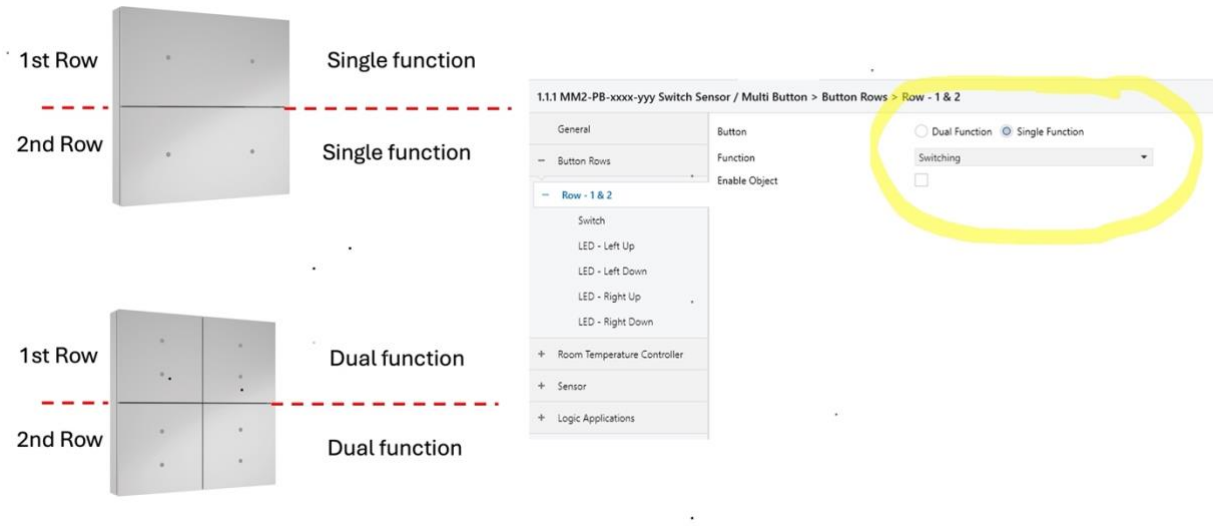
The device is mounted onto a standard round electrical wall box (Ø 67 mm - EN 60670-1) using the adapter supplied in the package. Installation must be carried out by a qualified electrician or a competent specialist in accordance with the installation diagram. ETS version 5 or later is required for commissioning and configuration of the device. The required device library (KNX product data) can be obtained online or from the manufacturer's website. Commissioning must be performed exclusively by KNX-qualified professionals.

1.1 Product Models

The product code is defined in the format MM2-PB-xxxx-yy-1zz. The configuration details within the code represent the button count and hardware configuration of the product. Color and surface finish codes can be found in the order codes section.



On buttons based on models “Single function” or “Dual function” in a row. See picture below



(Display-equipped and additional sensor variants are available depending on the selected configuration.)

1.2 Product Accessories

No external accessories are available for this product. The adapter required for installation in a standard round mounting box is included in the product package. The keypad is mounted by snapping it onto this adapter.

1.3 Technical Specifications

Supply Voltage: 21–30 VDC
KNX Current Consumption: 10 mA
KNX Mode: TP-S Mode
Connection: KNX connection terminal
Protection Class: IP20 (Indoor)
Mounting: Flush mounting (standard mounting box)

Temperature Ranges:

- Operation: −5…+45 °C
- Storage: −25…+55 °C

Dimensions (W × H × D):

- 80 × 80 × 35 mm
- 80 × 120 × 35 mm

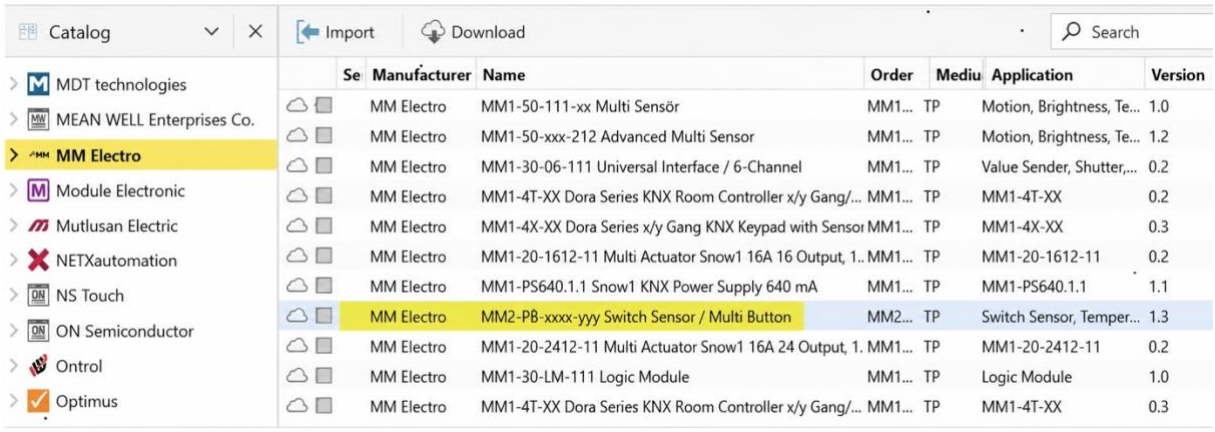
- 80 × 160 × 35 mm

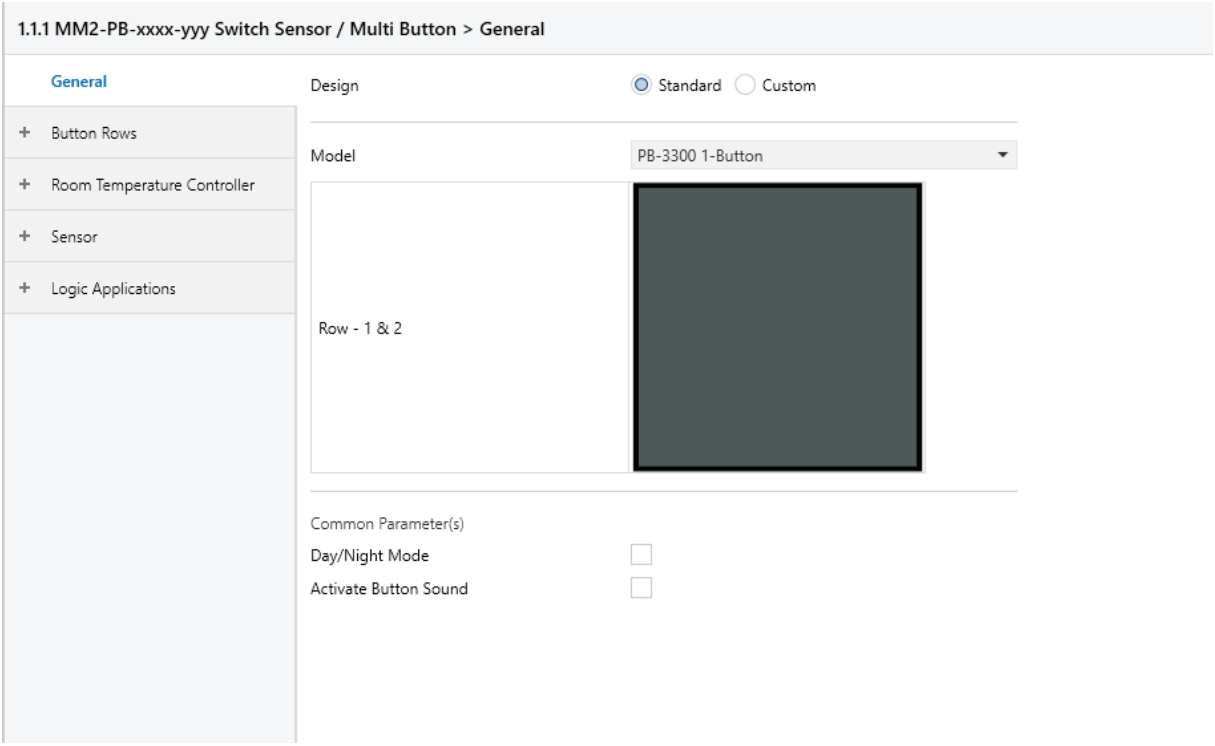
Weight (Net – Gross):

- 80 × 80: 85 g – 122 g
- 80 × 120: 113 g – 160 g
- 80 × 160: 142 g – 200 g

Housing: ABS V2
Certificate: CE

2. Device Parameters





2.1 General

2.1.1 Design

The product offers two main design options: **Standard** and **Custom**. The configuration of the product can be defined according to these design options based on customer needs and project requirements.

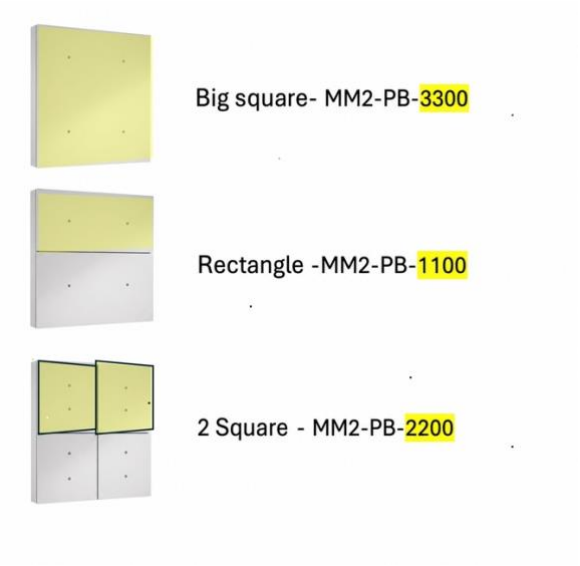
2.1.1.1 Standard

The standard section includes predefined configurations and is determined by the ordered product code. This configuration method enables the product to be ordered quickly and efficiently and to be used directly without additional customization.

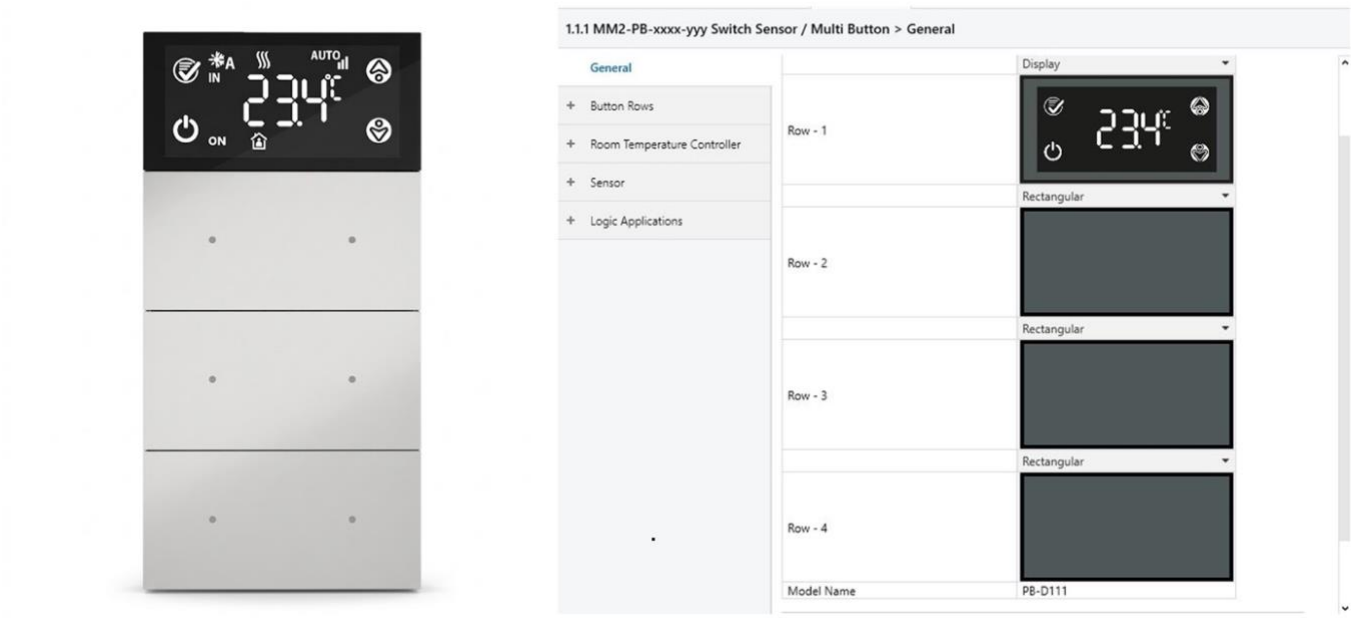
2.1.1.2 Custom

The custom version is a configuration option that can be tailored to the customer's project-specific or individual requirements. This option allows detailed adjustments—such as button layout and similar parameters—to be defined within the scope of a custom order.You can set some models as "custom", like 1111, D111 etc.

About buttons;



A custom Example MM2-PB-D111

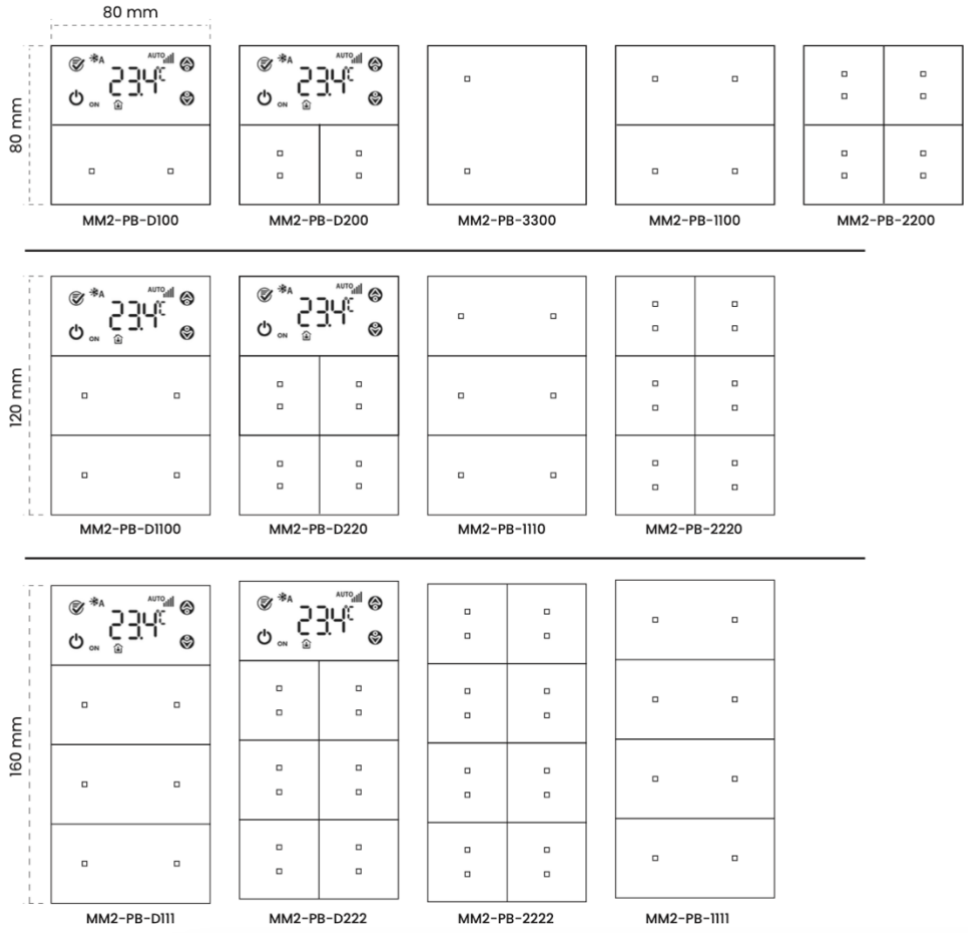


2.1.1.2.1 Model

In the standard configuration, the product code is selected from the available list and the system is automatically configured accordingly. The product code defines the technical specifications and supported functions of the selected model.

2.1.1.2.2 Base

Within a custom order, the physical characteristics of the product—such as size and button arrangement—are defined by selecting from the available options list. This approach enables the product to be optimized for specific usage scenarios and spatial requirements.



2.1.2 Common Parameters

2.1.2.1 Day / Night Mode

This parameter is used to adjust the brightness level of the status LEDs on the device. The user can increase or decrease the LED brightness via the relevant communication object by sending an “On” or “Off” command. In day mode, the LEDs operate at a higher brightness level, while in night mode they operate at a reduced brightness to minimize eye strain and keep ambient illumination at a low level. This approach contributes to energy savings while providing a more comfortable user experience.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
1	General	Day \ Night Mode	Input	1bit	1.024	C	-	W	-

Table 1: Day / Night Communication Section Objects

2.1.2.2 Activate Button Sound

This parameter determines whether an audible feedback is generated when the device buttons are pressed. When the feature is enabled, a short sound is produced each time a button is pressed, confirming that the input has been successfully detected. The parameter is typically configured using “Yes” or “No” options. When “Yes” is selected, the audible feedback is active; when “No” is selected, no sound is generated. This feature is particularly

useful in scenarios where tactile feedback is limited, as it enhances user interaction and confirmation.

2.1.2.3 Control RTC with Row – 2

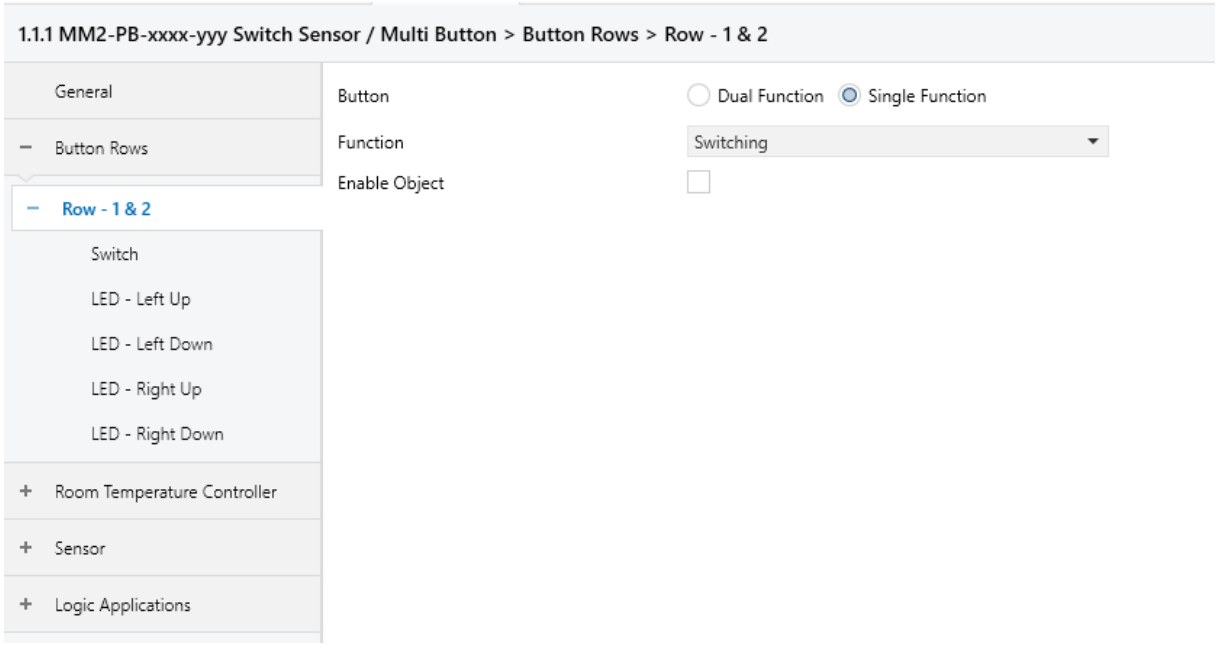
When this parameter is enabled, the functions of the following four buttons on the thermostat display are also assigned to the buttons on Row–2:

Menu Button – (No: 8) Programmable Button – (No: 6) Selection Button (▲) – (No: 1) Selection Button (▼) – (No: 1)

In this case, the buttons on Row–2 and these buttons on the display operate in parallel; the same command is sent regardless of which side is used.
When the parameter is disabled, the Row–2 buttons can be configured independently and used for functions other than the thermostat controls.

2.2 Button Rows

Programming of buttons will be made row by row.



2.2.1 Button

2.2.1.1 Single Function

This parameter is used to use buttons on same row with same function.

2.2.1.2 Dual Function

This parameter is used to use seperated functions for each button.

2.2.2 Enable Object

This parameter is used to enable/disable function of the button by Group Object Enable.

2.2.2.1 Enable with

The "Enable With" object is used to determine the method of using this object. If “OFF Telegram” is selected, the chan- nel becomes Enable when the value “0” is sent to the event object (Enable) of the relevant channel; If “ON Telegram” is selected, the channel is activated by sending “1” value to the same object.

2.2.2.2 Initial Positions

It is the option where the Enabled or Disabled selection is made when the device starts to work.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Enable	Input	1bit	1.003	C	-	W	-

Table 2: Enable Communication Object

2.2.3 Function

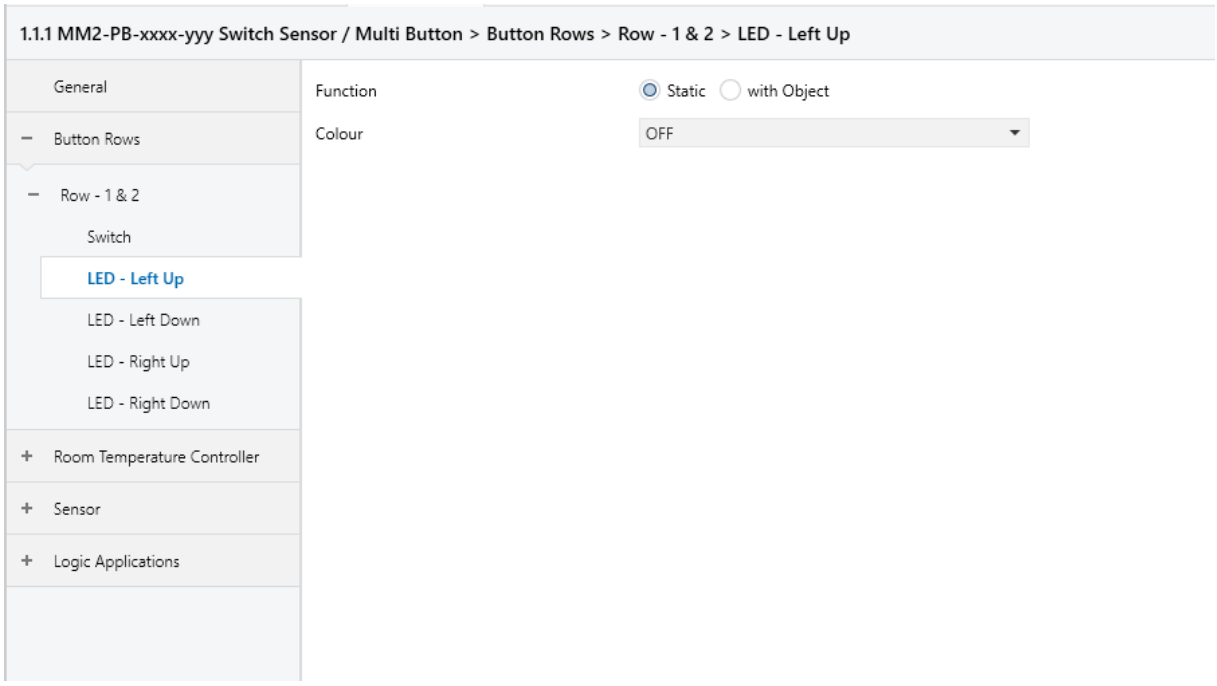
2.2.3.1 LED-X

2.2.3.1.1 Function

You can use this setting to enable or disable LED control. The "Enable" option turns on the LED feature, allowing the LEDs to operate with the selected color and other settings.

2.2.3.1.1.1 Static

In this mode, the LED remains continuously on in the selected color and does not require any external control object. The LED state is fixed based on the settings configured via ETS.

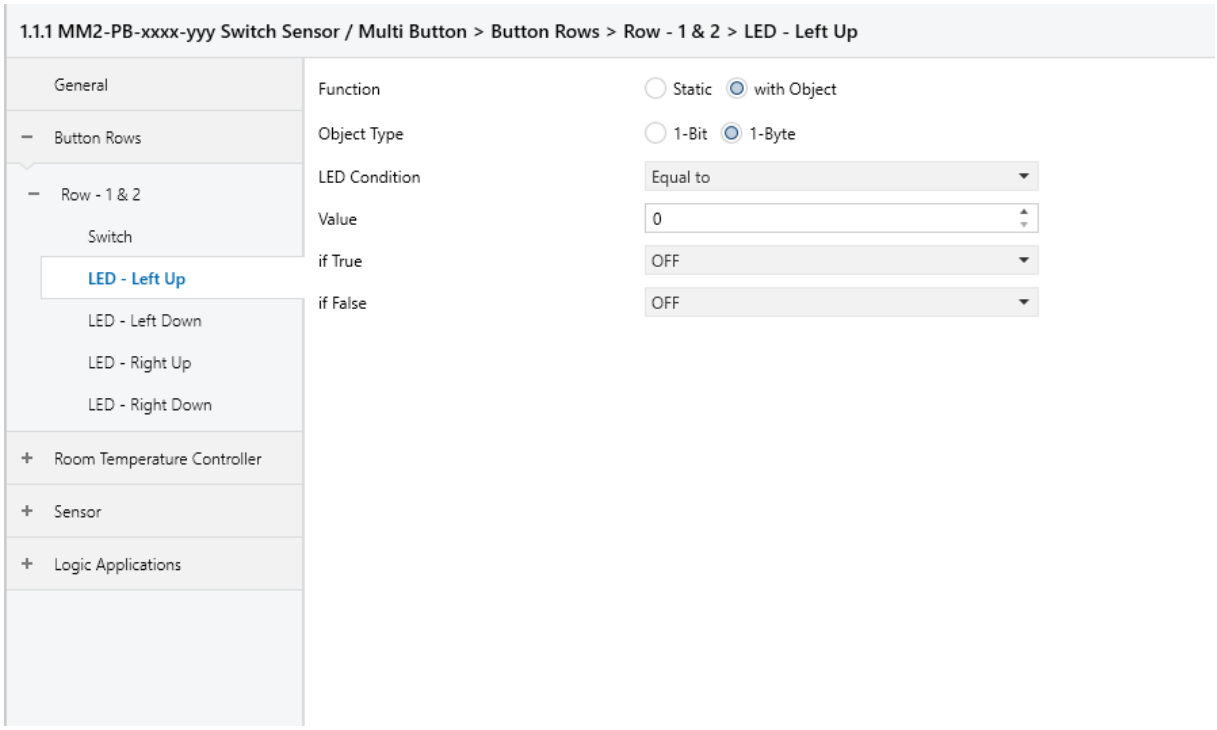


2.2.3.1.1.1.1 Color

This parameter is used to customize the visual appearance of the LED by selecting its color. The available color options are Off, Red, Green, Blue, Yellow, Purple, Turquoise, and White. The color selected from the drop-down menu directly defines the visual state of the LED.

2.2.3.1.1.2 By Object Information

In this mode, the LED turns on or off based on information received via a group address. LED control is performed through a communication object linked in ETS.



2.2.3.1.1.2.1 Object Type

The object type used to define the LED operating conditions is selected here. The “1 Bit” option is typically used for simple status information and allows the LED to be controlled with only two states (on/off). The “1 Byte” option, on the other hand, provides a wider value range and higher precision using eight-bit data, enabling the LED to be controlled according to more complex conditions.

2.2.3.1.1.2.2 LED condition

This parameter defines the condition under which the LED becomes active. The “Equal” option activates the LED when the incoming value equals the defined value. The “Greater” option turns the LED on when the value exceeds the specified threshold. The “Less” option activates the LED when the value is below the defined threshold. The “Between Value 1 and Value 2” option allows the LED to turn on when the incoming value falls within the specified range.

2.2.3.1.1.2.3 Value

In this field, the numerical value required for the condition that determines whether the LED will be active is entered. The entered value is evaluated together with the selected LED state to define the LED behavior.

2.2.3.1.1.2.4 If True

This parameter defines the color in which the LED will illuminate when the condition is met. Available options include Off, Red, Green, Blue, Yellow, Purple, Turquoise, and White. This setting determines the visual feedback provided by the LED when the defined condition is fulfilled.

2.2.3.1.1.2.5 If False

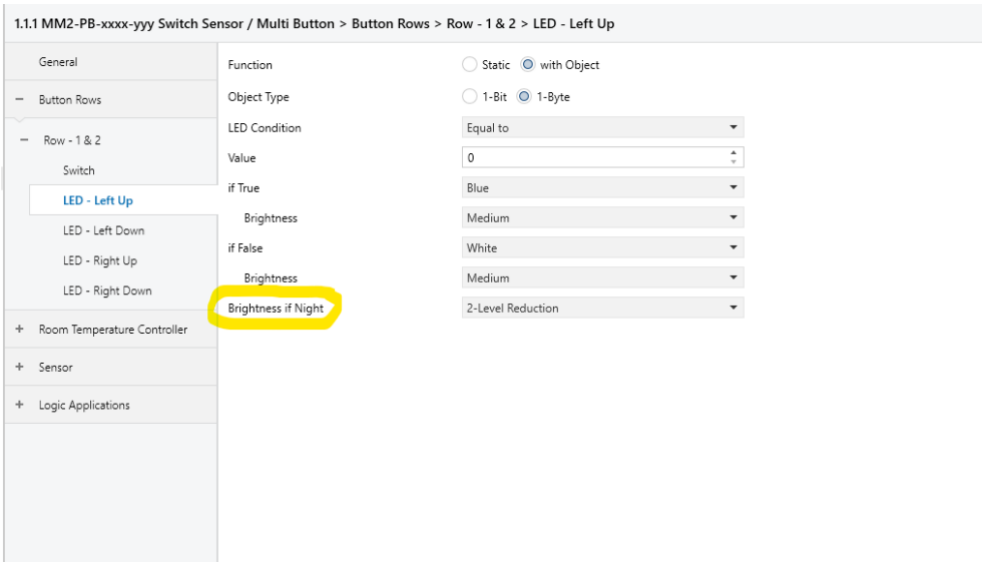
This parameter is used to define the LED color when the specified condition is not met. Available color options include Off, Red, Green, Blue, Yellow, Purple, Turquoise, and White. When the condition is false, the LED can be set to illuminate in one of these colors. This setting allows the user to customize the visual feedback provided by the LED when the condition is not fulfilled.

2.2.3.1.1.2.5.1 Brightness

This parameter is used to adjust the brightness level of the LED. The selected setting defines the brightness at which the LED will operate.

2.2.3.1.1.2.5.2 Brightness If Night

This parameter is used to adjust the brightness level of the LEDs on the device according to night mode. It operates in conjunction with the Day/Night Mode feature. Based on the information received from the relevant communication object, the brightness level selected from the list is automatically applied.



No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	LED Input	Input	1bit	1.002	C	-	W	-
				1byte	5.010	C	-	W	-

2.2.3.2 Switching

Switching refers to the on, off, or state change operations of the device. Users can perform various actions by pressing the buttons briefly or by holding them down for a longer duration.

2.2.3.2.1 Short Press

A short press refers to the action triggered when the user presses a button briefly. This action is typically used to turn the device on, turn it off, or change its current state. When the relevant button is pressed, the selected telegrams are sent via the associated communication object. On, Off, or Toggle (On/Off) options can be selected. For example, when “Toggle On/Off” is selected, the device state changes with each press; the first press sends an “On” telegram, the second press sends an “Off” telegram, and this cycle continues.

2.2.3.2.2 Long Press Detection

Long press detection refers to the actions triggered when a button is pressed and held for a defined period. This function enables a different command to be sent compared to a short press. When this parameter is enabled, the following sub-parameters become available.

2.2.3.2.2.1 Long Press

Long press refers to the action performed when the button is held down for the configured duration.

2.2.3.2.2.2 Long Press Duration

This parameter defines the duration required for a long press to be detected. The user can select a value between 250 ms and 10 s from the list.

2.2.3.2.2.3 Long Press Communication Object

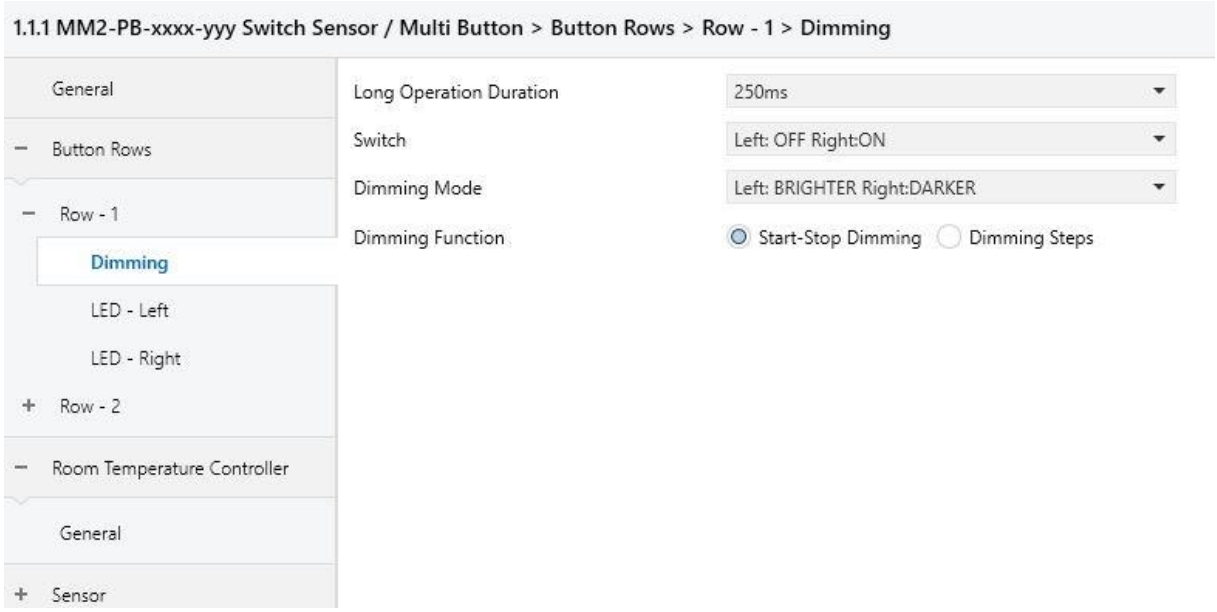
This parameter defines the communication object used during the long press action. It allows short press and long press actions to be distinguished via separate group addresses.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Switch	Input/Output	1bit	1.001	C	-	W	T
x	Row – x	Long Press	Input/Output	1bit	1.001	C	-	W	T

Table 4: Switching Communication Object

2.2.3.3 Dimming

Dimming is the process used to adjust the light level. The user can increase or decrease the lighting level by pressing the button briefly or holding it down. The dimming operation can be customized using various parameters.



2.2.3.3.1 Long Operation Duration

This parameter defines the minimum duration required to initiate the dimming process during a long press. When the user holds the button for at least this duration, the dimming operation is triggered. For example, if this duration is set to 2 seconds, dimming will start when the button is held for a minimum of 2 seconds.

2.2.3.3.2 Switch

This parameter defines the switching commands sent during the dimming operation. When the user presses the button, the selected command is transmitted over the bus. On, Off, or Toggle (On/Off) options can be selected. For example, when “Toggle On/Off” is selected, the device state changes with each press; the first press sends an “On” telegram, the second press sends an “Off” telegram, and this cycle continues.

2.2.3.3.1.3 Dimming Mode

This parameter defines the mode in which the dimming operation is performed. When “Brighten” is selected, the light level increases with each press. When “Dim” is selected, the light level decreases. In “Toggle Brighten/Dim” mode, the operation alternates between increasing and decreasing the light level with each press.

2.2.3.3.4 Dimming Function

2.2.3.3.4.1 Dimming Control

In this mode, the dimming process starts when the button is pressed and stops when the button is released. While the user keeps the button pressed, the light brightness increases or decreases accordingly. Once the button is released, the dimming process is terminated.

2.2.3.3.4.2 Dimming Step

In this mode, dimming is performed in predefined steps. At each step, the light brightness is changed by a specified percentage. Each time the user presses the button, the light level is increased or decreased according to the selected step percentage.

2.2.3.3.4.2.1 Step Code

This parameter defines the percentage step applied during the dimming process. Each step is configured to change the light brightness by the defined percentage. For example, when a 12.5% step is selected, the light level is increased or decreased by 12.5% with each dimming action.

2.2.3.3.4.3 Button Mode

This parameter defines the button behavior during the dimming process. It determines how dimming is performed when the button is pressed briefly or held down. For example, in long-press mode, dimming continues as long as the button is pressed and stops when the button is released.

2.2.3.3.4.3.1 Short-Switching Long Dimming

In this mode, short press actions correspond to switching functions, while long press actions correspond to dimming functions.

2.2.3.3.4.3.1.1 Cyclical

When this parameter is selected, the dimming step value is applied periodically during a long press as long as the button remains pressed. When the button is held down for an extended period, the dimming process continues uninterrupted, and the dimming step value is repeatedly applied at defined intervals. This allows the user to gradually approach or move away from the desired lighting level.

2.2.3.3.4.3.1.2 Dimming Repetition Duration

This parameter defines the time interval at which dimming steps are repeated during the dimming process. The specified duration indicates how long each dimming step is applied.

2.2.3.3.4.3.2 Short: Dimming Long Switching

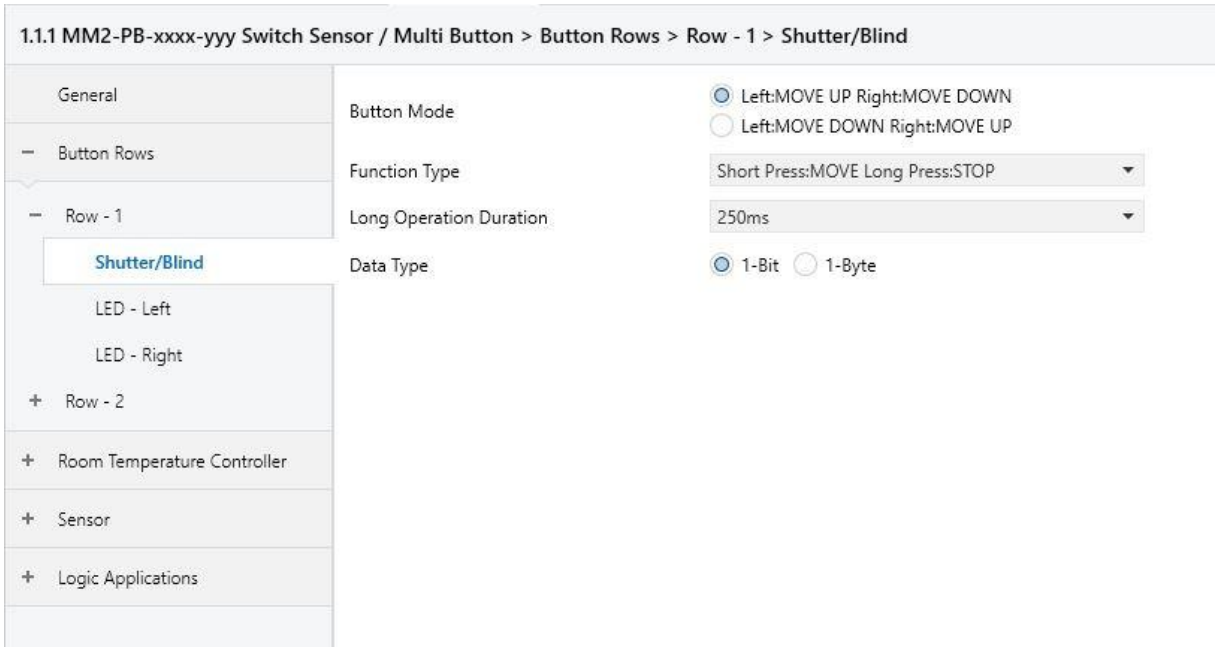
In this mode, short press actions correspond to dimming functions, while long press actions correspond to switching functions.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Switch	Input/Output	1bit	1.001	C	-	W	T
x	Row – x	Dimming	Output	3bit	3.007	C	-	-	T

Table 5: Dimming Communication Object

2.3.4 Shutter / Blind

Shutter control enables the electronic operation of motorized curtains, blinds, or sunshades. This function allows users to open and close the shutters, move them to a specific position, or adjust the amount of light entering the interior space. Shutter control is a core function commonly used in home automation and smart building systems and is typically operated via push buttons or remote control devices.



2.3.4.1 Button Mode

This parameter defines the movement commands to be sent during shutter control. When the user presses the button, the selected command is transmitted via the corresponding data

path. For example, when “UP” is selected, pressing the button causes the shutter to move upward. When the "Up/Down Changer" option is selected, each button press alternates the shutter movement between upward and downward directions.

2.3.4.2 Function Type

This parameter determines how the button behaves for short and long press actions. Depending on the selected function type, different commands are sent based on the press duration. For example, when “Short Press: MOVE / Long Press: STOP” is selected, a short press causes the shutter to move, while holding the button stops the movement. When “Press: MOVE, Release: STOP” is selected, the shutter starts moving in the defined direction as soon as the button is pressed, and when the button is released, a stop command is sent via the Stop/Step communication object to terminate the movement.

2.3.4.3 Long Operation Duration

This parameter defines the minimum duration required for a long press action to be detected. When the user holds the button pressed for the defined time, the long press action is triggered.

2.3.4.3.1 Data Type

This parameter defines the data type of the commands to be sent. It specifies how shutter control commands are encoded and transmitted via the communication bus.

2.3.4.3.2 Move Down

Defines the data value to be sent in order to move the shutter downward. This value represents the signal code used to initiate downward movement of the shutter.

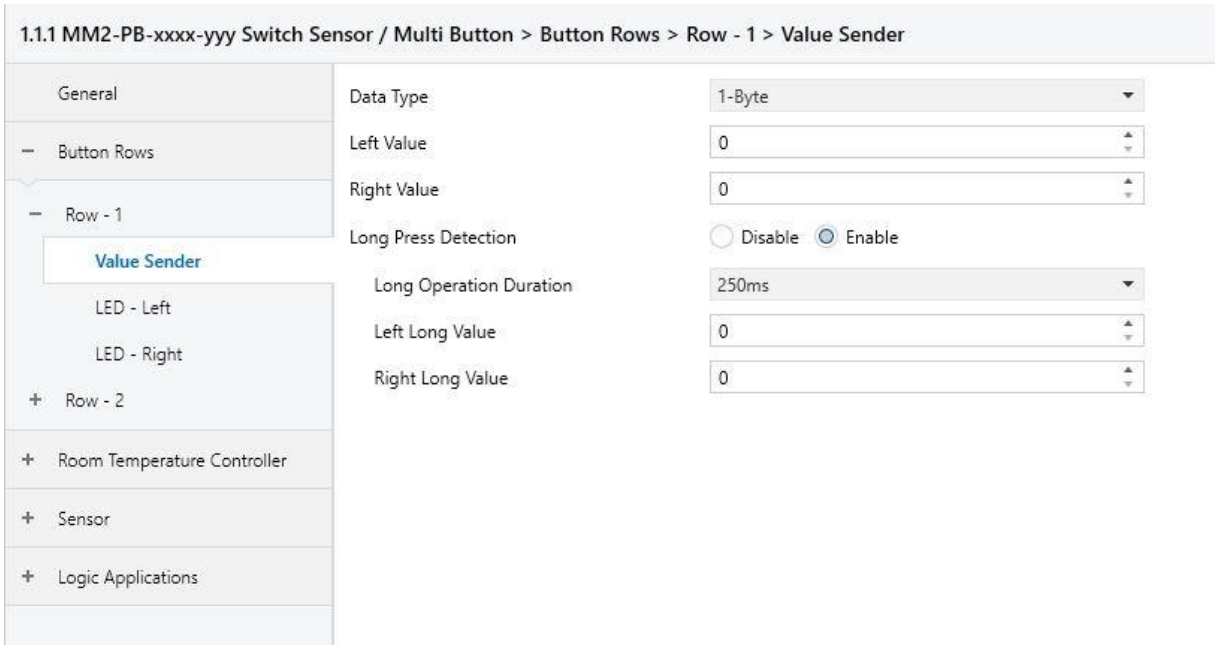
2.3.4.3.3 Move Up

Defines the data value to be sent in order to move the shutter upward. This value represents the signal code used to initiate upward movement of the shutter.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Move	Input/Output	1bit	1.008	C	-	W	T
				1byte	5.010	C	-	W	T
x	Row – x	Stop/Step	Input/Output	1bit	1.007	C	-		T

Table 6: Shutter Communication Object

2.3.5 Value Sender



2.3.5.1 Data Type

Defines the data type of the value to be sent. The selected data type determines the size and transmission format of the data packet.

2.3.5.2 Value

The value to be sent is selected from a drop-down list or entered manually, depending on the selected output data type.

2.3.5.3 Long Press Detection

Long press detection refers to actions that are triggered when the button is pressed and held for a defined period. This feature allows different commands to be sent for short press and long press actions.

2.3.5.3.1 Long Operation Duration

Defines the minimum duration required to detect a long press action. When the user holds the button for at least this duration, the long press action is triggered. For example, if the duration is set to 2 seconds, the “Send Value” long press action starts when the button is held for at least 2 seconds.

2.3.5.3.2 Long Value

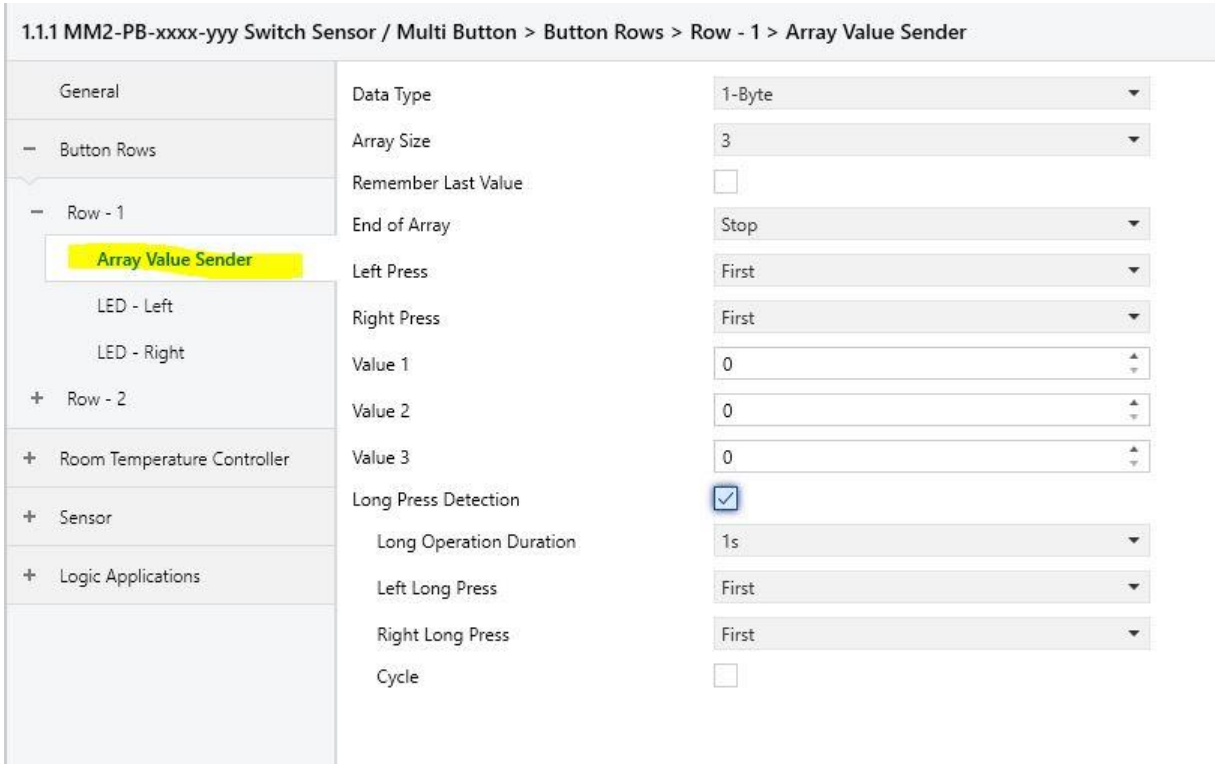
Defines the value to be sent when a long press action is detected. This value is transmitted over the bus when the long press is triggered.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Value	Output	1byte	5.010	C	-	-	T
				2byte	7.001	C	-	-	T
				2byte	9.001	C	-	-	T

Table 7: Value Sender Communication Object

2.3.6 Send Array Value

The Send Array Value function refers to transmitting multiple values as an array over the bus. This feature allows multiple values obtained from different devices or sensors to be sent to the control system simultaneously.



2.3.6.1 Data Type

Defines the data type of each element within the array. The selected data type determines the size and transmission format of each data packet.

2.3.6.2 Array Values

Defines how many elements the array will contain. The user specifies the total number of values to be sent using this parameter.

2.3.6.3 Remember Last Value

Determines whether the device remembers the last value sent. This allows the last transmitted value to be retained when the device is restarted or under similar conditions.

2.3.6.4 End of Array

Defines the behavior of the function when the end of the array is reached. If “Stop” is selected, the operation stops at the last value. If “Loop” is selected, the sequence restarts from the first value.

2.3.6.5 Press

This parameter defines the action to be executed during a short press operation.

- **First:** Sends the first value defined in the array.
- **Previous:** Sends the value preceding the current value.
- **Next:** Sends the value following the current value.
- **Last:** Sends the last value defined in the array.

2.3.6.6 Value X

This parameter defines the specific value of each element within the array. The configured values depend on the array size and the selected data type. Value fields become visible according to the array length. For example, if the Size of Array is 4, Value 4 be- comes visible.

2.3.6.7 Long Press Detection

This parameter enables or disables the long press detection function. A long press refers to actions triggered when the button is held down for a defined period, allowing a different command to be sent compared to a short press.

2.3.6.7.1 Long Operation Duration

Defines the minimum time the button must be pressed in order to be recognized as a long press.

2.3.6.7.2 X Long Press

This parameter defines the action to be executed during a long press operation. This option becomes visible only when the **Long Press Detection** parameter is set to *Enabled*. The selectable actions are identical to those defined in **2.3.6.5 Press Action**.

2.3.6.7.3 Cycle

When this parameter is enabled, the defined **Long Press** action is repeated periodically as long as the button remains pressed.

2.3.6.7.3.1 Repetition Duration

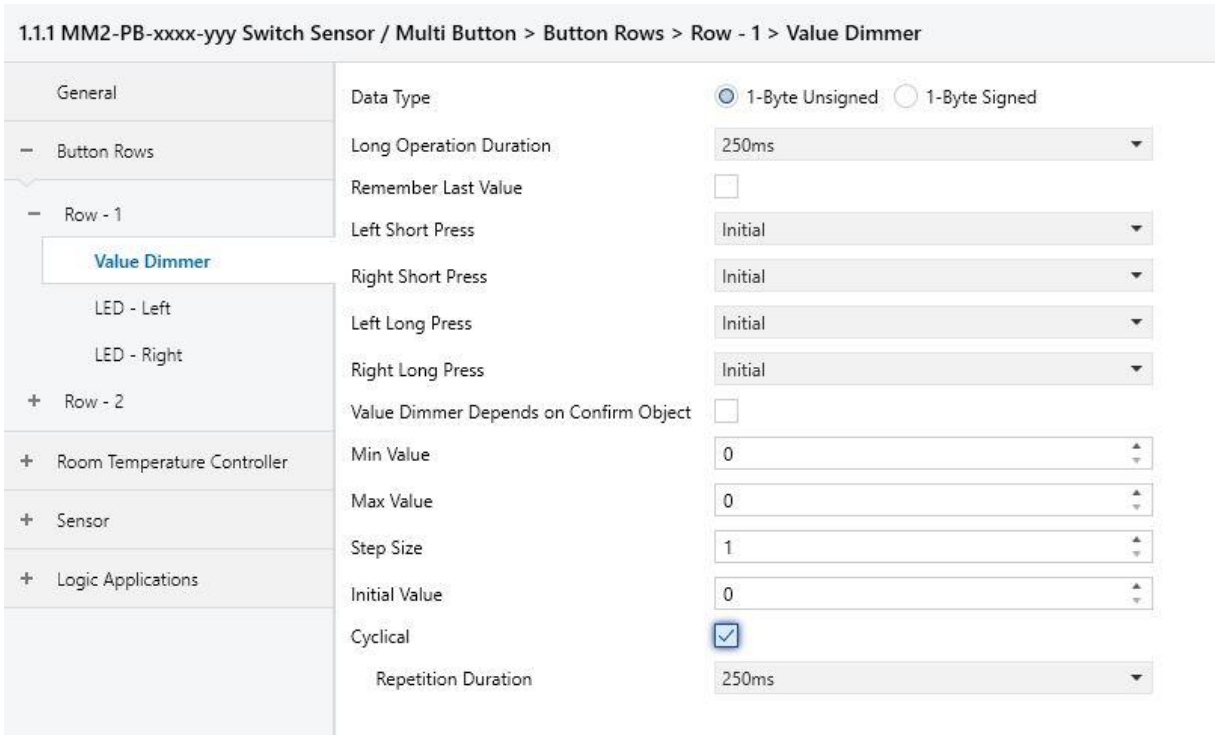
Defines the time interval at which button actions are repeated during a long press operation.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Value	Output	1byte	5.010	C	-	-	T
				2byte	7.001	C	-	-	T
				2byte	9.001	C	-	-	T

Table 8: Array Value Sender Communication Object

2.3.7 Value Dimmer

Value dimmer is a function that controls an output by gradually increasing or decreasing the value within a defined range. This function is typically used to adjust light levels or similar analog control elements. The user can define how the control operates and between which values it changes through the available parameters.



2.3.7.1 Data Type

Defines the data type used by the Stepwise Value Sending function.

2.3.7.2 Long Operation Duration

Defines the minimum duration required to detect a long press operation.

2.3.7.3 Remember Last Value

This parameter defines whether the Stepwise Value Sending function remembers the last transmitted value. When enabled, the device continues from the last value after a restart or power interruption. When disabled, it starts from the predefined initial value.

2.3.7.4 Short Press X

This parameter defines the action to be executed during a short press operation:

- **Initial:** Sends the predefined initial value of the device.
- **Minimum:** Sends the defined minimum value (e.g. 0%).
- **Step Down:** Decreases the value by the configured step amount with each press.
- **Step Up:** Increases the value by the configured step amount with each press.
- **Maximum:** Sends the defined maximum value (e.g. 100%).
- **Do Not Send Telegram :** No value is sent when the button is pressed.

2.3.7.5 Long Press X

This parameter defines the action to be executed during a long press operation. The selectable actions are identical to those defined in **2.3.7.4 Short Press X**.

2.3.7.6 Value Dimmer Depends on Confirm Object

When this parameter is enabled, the value dimmer operates based on the "Value Dimmer Confirmation Object." The value dimmer occurs with the value received from the relevant communication object. Press actions are executed ba- sed on the value from the confirmation object. If no value is received from the confirmation object, the value dimmer function stops.

2.3.7.7 Min Value

This parameter defines the lowest value to which the dimmer function can be adjusted.

2.3.7.8 Max Value

This parameter defines the highest value to which the dimmer function can be adjusted.

2.3.7.9 Step Size

This parameter defines how much the dimmer function increases or decreases the value during each operation.

2.3.7.10 Initial Value

This parameter defines the initial value sent by the dimmer function during first operation.

2.3.7.11 Cyclical

When this parameter is enabled, the defined **Long Press** action is repeated periodically for as long as the button remains pressed during a long press operation.

2.3.7.11.1 Repetetion Duration

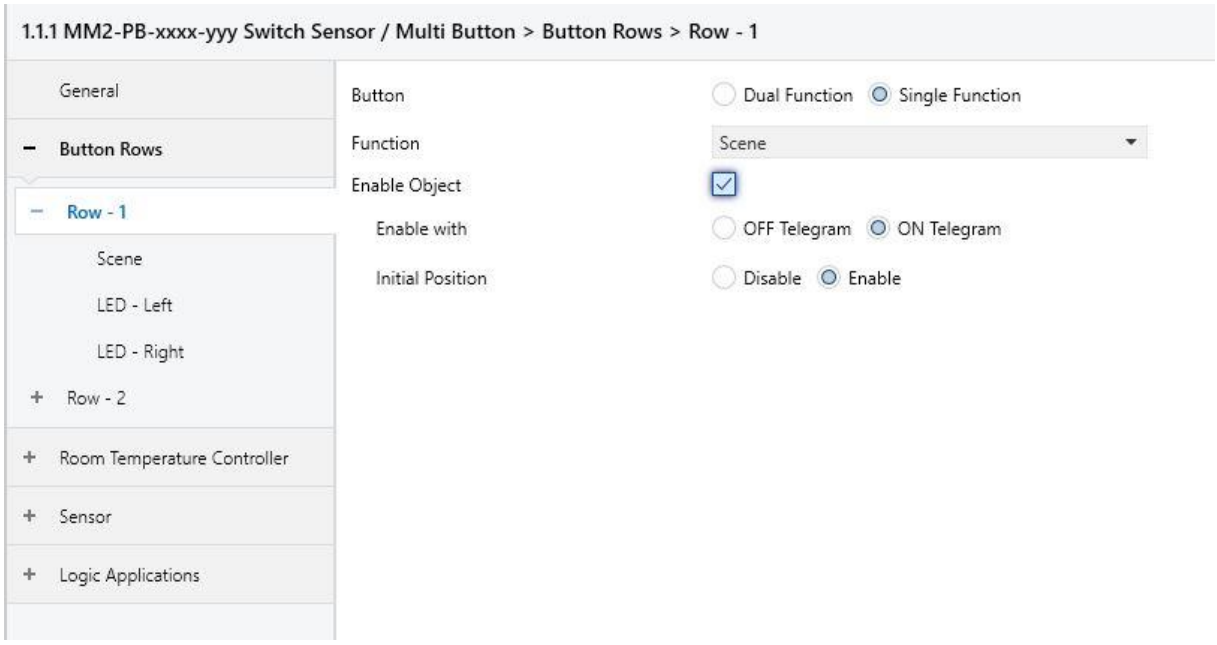
Defines the time interval at which button actions are repeated during a long press operation.

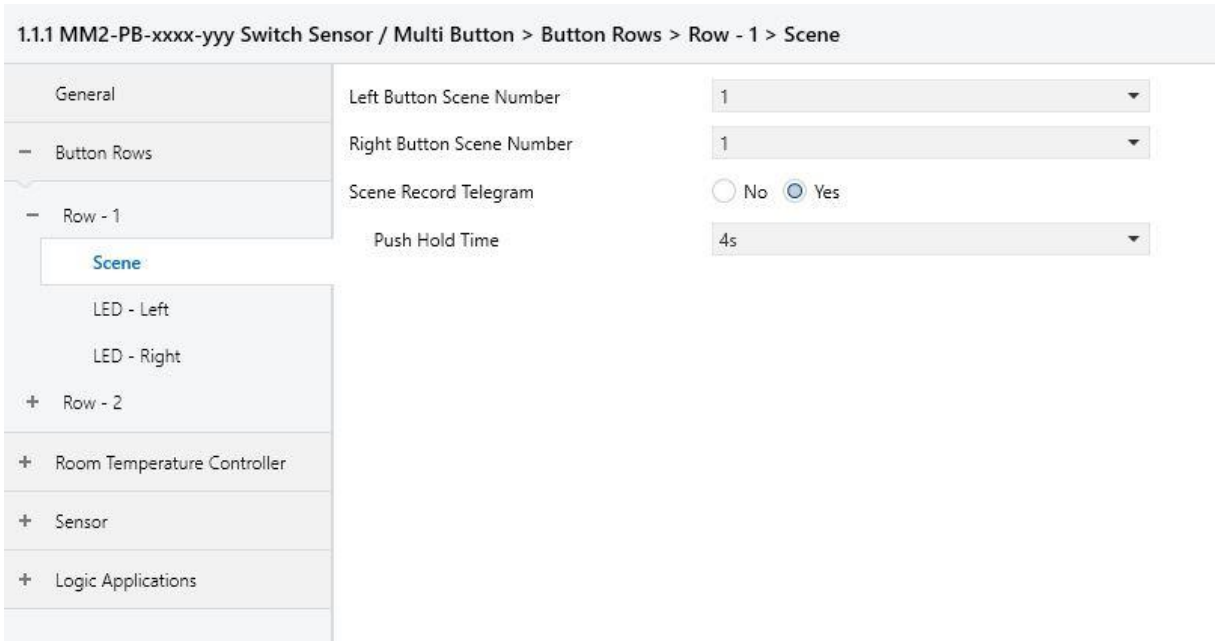
No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Confirm	Input	1byte	5.010	C	-	W	-
				1byte	6.010	C	-	W	-
x	Row – x	Value	Output	1byte	5.010	C	-	-	T
				1byte	6.010	C	-	-	T

Table 9: Value Dimmer Communication Object

2.3.8 Scene

A scene is a programmed state in home automation and building management systems that allows multiple devices to be controlled through a single command using a predefined combination. A scene is created by combining specific settings of devices such as lighting, blinds, heating and cooling systems, and similar equipment. This enables users to control multiple devices simultaneously by pressing a single button or sending a single command in order to create a desired atmosphere or operating condition.





2.3.8.1 X Button Scene Number

This parameter defines the scene number to be recalled when the corresponding button is pressed. The defined scene activates a predefined state of lighting, blinds, or other automation devices. For example, when the scene number is set to **1**, pressing the corresponding button activates **Scene 1**.

2.3.8.2 Scene Record Telegram

This parameter defines whether the scene (scene save) telegram is sent. The scene save telegram allows the current system state to be stored as a scene.

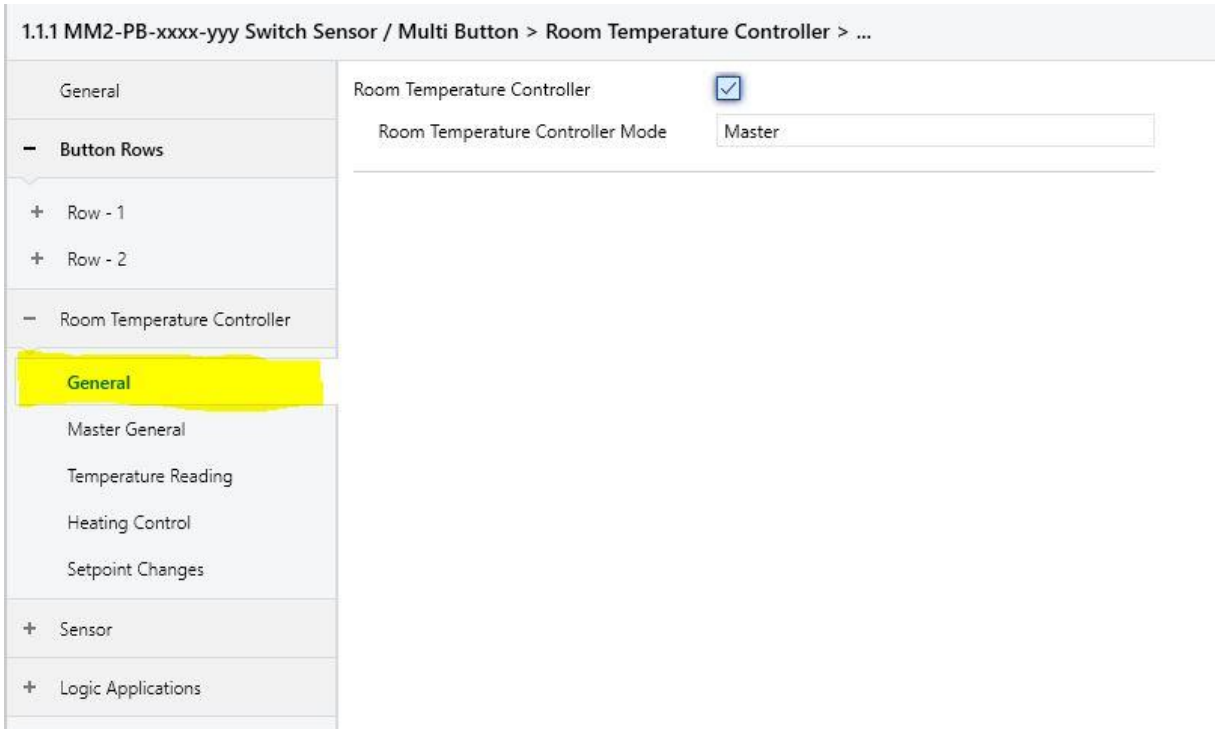
2.3.8.2.1 Push Hold Time

This parameter defines the required duration for which the corresponding button must be pressed to send the scene save telegram. When the button is held for the defined period, the current state is saved as a scene.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	Row – x	Scene	Output	1byte	18.001	C	-	-	T

Table 10: Scene Communication Object

3 Room Temperature Controller (RTC)



3.1 General

The Room Thermostat general function is provided with the MM2-PB- (PBlock KNX Keypad / Thermostat) device. The availability of this function depends on the status of the related parameter; unless the checkbox is enabled, the corresponding communication objects are not displayed. The Room Thermostat (RTC) function supports two operating modes: **master mode** and **slave mode**.

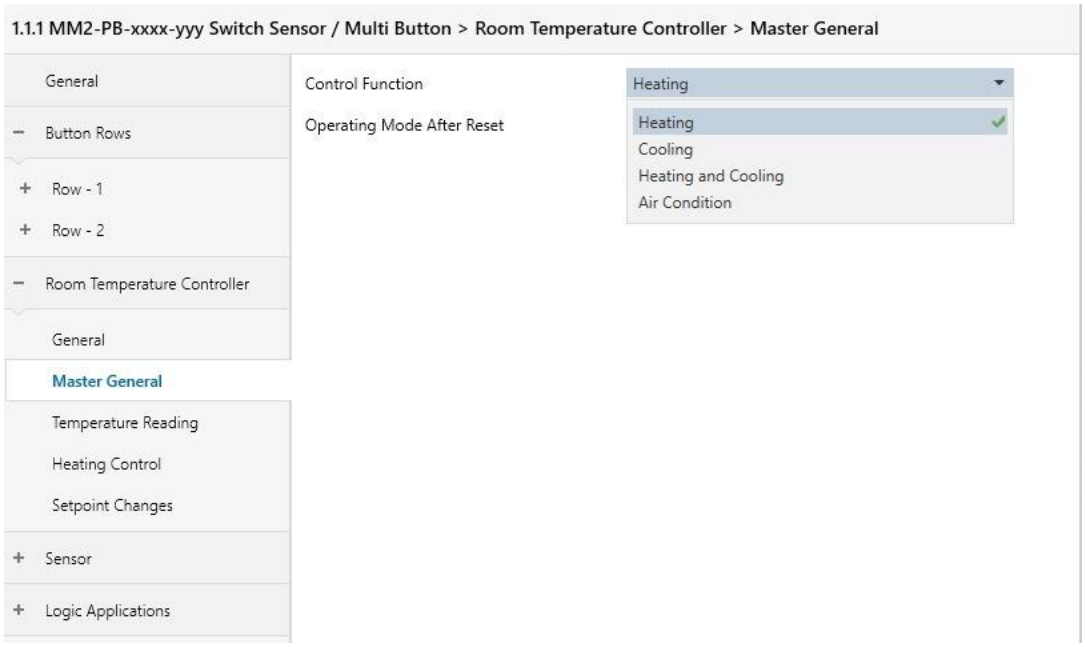
No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
110	RTC-General	HVAC Operating Mode	Bidirectional	1byte	20.102 HVAC Mode	C	R	W	T
111	RTC-General	Comfort Operating Mode Select	Bidirectional	1bit	1.001 switch	C	R	W	T
112	RTC-General	Standby Operating Mode Select	Bidirectional	1bit	1.0011 switch	C	R	W	T
113	RTC-General	ECO Operating Mode Select	Bidirectional	1bit	1.001 switch	C	R	W	T
114	RTC-General	Protection Operating Mode Select	Bidirectional	1bit	1.001 switch	C	R	W	T
115	RTC-General	Forced Operating Mode	Input	1byte	20.102 HVAC Mode	C	-	W	-
116	RTC-General	Presence Detector Input	Input	1bit	1.001 switch	C	-	W	-
117	RTC-General	Window Contact Input	Input	1bit	1.001 switch	C	-	W	-
118	RTC-General	RTC Controller RHCC Status	Output	2bytes	22.101RHCC Status	C	R	-	T
119	RTC-General	Controller HVAC Status	Output	1byte	20.102 HVAC Mode	C	R	-	T

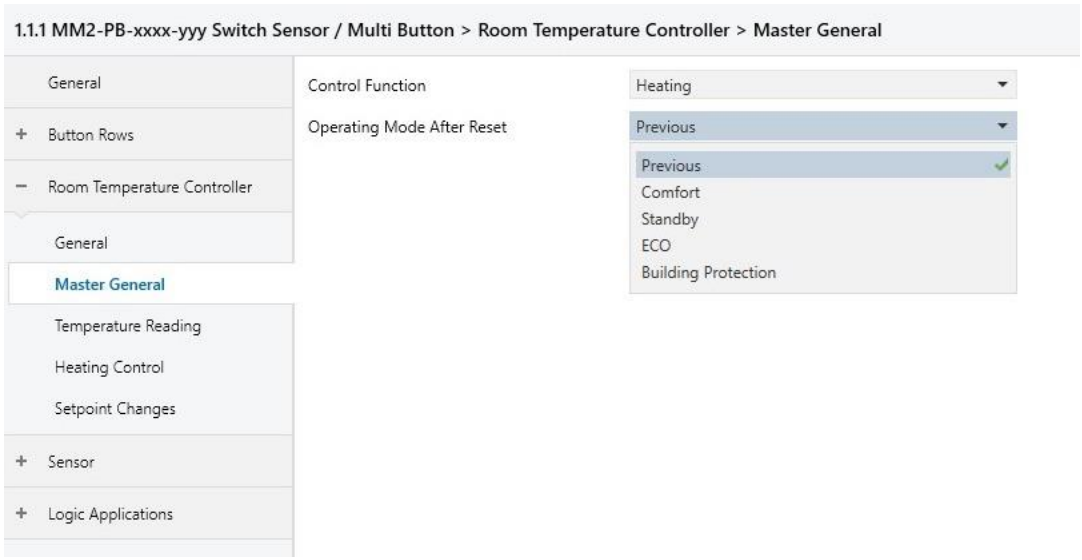
Table 11: RTC-1 Communication Object

3.2 Master General

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
100	RTC-Master	Send Configuration to slave	Output	4bytes	12.001counter pulses	C	R	-	T
101	RTC-Master	Sync Fan Configuration to slave	Bidirectional	1byte	5.010 counter pulses	C	R	W	T
102	RTC-Master	Fan Speed Request	Input	1byte	5.010 counter pulses	C	-	W	
103	RTC-Master	Confirmed Fan Speed Status	Output	1byte	5.010 counter pulses	C	R	-	T
104	RTC-Master	Request HVAC Control Mode AC Master	Input	1byte	20.105 HVAC Control Mode	C	-	W	-
105	RTC-Master	Confirm HVAC Control Mode AC Master	Output	1byte	20.105 HVAC Control Mode	C	R	-	T
106	RTC-Master	Request Fan Auto	Input	1bit	1.001 switch	C	-	W	
107	RTC-Master	Confirm Fan Auto	Output	1bit	1.001 switch	C	R	-	T

Table 12: RTC-2 Communication Object





In display-equipped (with screen) models, master mode is activated by selecting the relevant parameters; non-display models (without screen) cannot be programmed as slave devices. Master mode is used when the RTC operates either independently or together with at least one RTC device programmed as a slave. In this mode, the device that determines the control decision is selected as the master. Information influencing the control decision is provided by RTC devices programmed as slaves, and feedback information is transmitted from the master device to the slave devices. For master–slave communication established between MM2-PB-xxxx-yy-1zz devices, configuration data and values are exchanged bidirectionally via the relevant communication objects (100–101).

Note:
If both the master and slave devices are not from the MM2-PB-xxxx-yy-1zz series, master–slave pairing is performed using the RTC master and slave communication objects.

3.2.1 Control Function

This section defines the control zones in which the RTC function operates (Heating–Cooling). The RTC can be configured as heating only, cooling only, heating and cooling, or as an air-conditioning controller. This selection should be made based on the heating and cooling elements used in the system. After the control mode is selected, the appropriate value selection parameters are configured to ensure proper management of these elements.

3.2.1.1 Heating

Selected for systems with only heating elements. It operates by calculating the difference between the measured room temperature and the set value, then sends the necessary information to the output. Multiple heating elements can be controlled by selecting an additional heating zone.

3.2.1.2 Cooling

Selected for systems with only cooling elements. It operates by calculating the difference between the measured room temperature and the set value, then sends the necessary information to the output. Multiple cooling elements can be controlled by selecting an additional cooling zone.

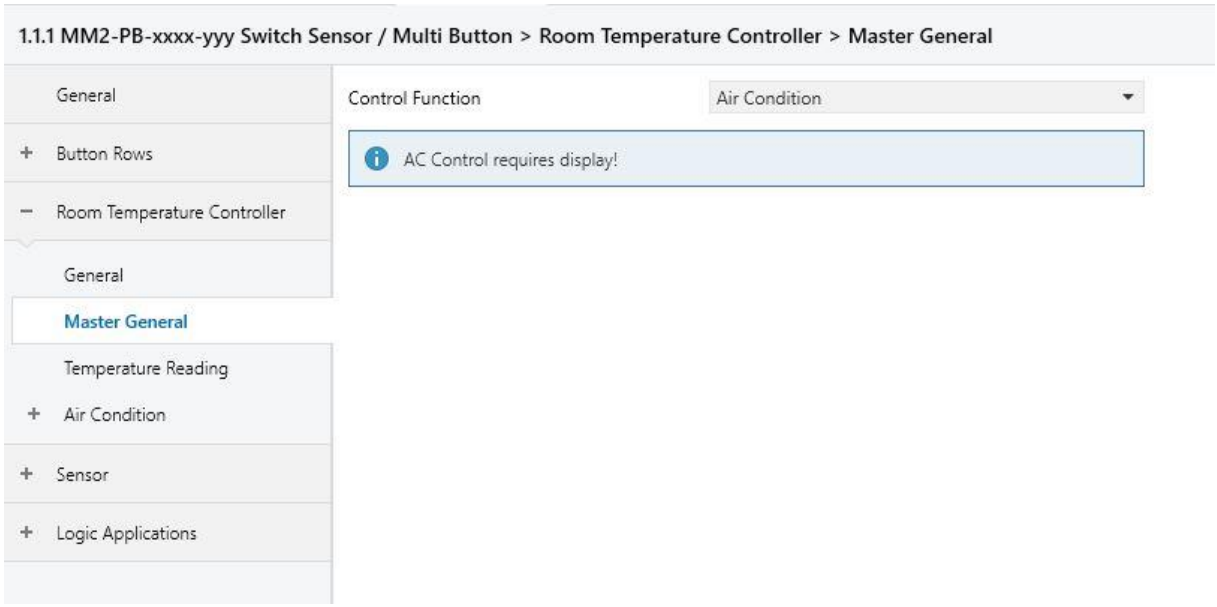
3.2.1.3 Heating and Cooling

Selected for systems with both heating and cooling elements. It operates by calculating the difference between the measured room temperature and the set value, then sends the information to either the heating or cooling zone of the RTC based on the need.

The automatic mode is the mode where the RTC function determines which zone it should be in according to the environmental conditions. (See Setpoint changes) (see 3.4 Set Point Change)

3.2.1.4 Air Conditioning

In systems that include only air-conditioning control, the MM2-PB-xxxx-yy-1zz RTC function is configured as an air-conditioning controller. The air-conditioning controller can be programmed as heating only, additional heating, cooling only, additional cooling, heating and cooling, or air-conditioning only (RTC AC control).



The RTC supports four different operating modes: **comfort**, **standby**, **eco**, and **protection**. Comfort and protection modes are always accessible to the user. Away and economy modes are parameter-dependent; based on the status of the related checkbox, the RTC determines the operating mode either through selections made on the display or via information received from the bus line.

- **Comfort Mode:** Operates according to the comfort setpoint temperature of the controlled area.
- **Standby and Eco Mode:** Provides energy savings by shifting the comfort setpoint positively or negatively depending on the heating or cooling mode. The offset value can be configured via parameters (see 3.4 Setpoint Changes). In eco mode, this offset value is set higher to achieve increased energy efficiency.
- **Protection Mode:** Represents the RTC off mode. All outputs remain inactive until the ambient temperature reaches a critical level for the controlled zone.

The RTC operating mode can be changed either via the display or through the bus line.

Note:
When determining the operating mode, the priority table is applied; the priority order is evaluated from left to right.

3.2.2 HVAC Operating Modes for User

The RTC can operate in four different modes: Comfort, Standby, Eco/Night, and Protection. Comfort and Protection modes are always accessible by the user. Away and Eco modes are parametric and depend on the status of the control box, determining the operation mode based on information received from the RTC screen or the bus line.

Forced mode	Window Contact	Presence Input	Local/Bus	HVAC Status
Auto	No Alarm	Absence	Comfort	Comfort
Auto	No Alarm	Absence	Standby	Standby
Auto	No Alarm	Absence	Eco/Night	Eco/Night
Auto	No Alarm	Absence	Protection	Protection
Auto	No Alarm	Presence	-	Comfort
Auto	Alarm	-	-	Protection
Comfort	-	-	-	Comfort
Standby	-	-	-	Standby
Eco/Night	-	-	-	Eco/Night
Protection	-	-	-	Protection

Table 13: RTC-3 Communication Object

Auto:0, Comfort:1, Standby:2, Eco/Night:3, Protection:4

- **Forced Mode:** Forced mode is the communication object with the highest priority when determining the operating mode. If the operating mode set via forced mode is not automatic, values received from other objects in the priority table are ignored. When forced mode is switched back to automatic, the operating mode returns to its previous state.
- **Window Contact:** This communication object has the second highest priority in the priority table. As long as the window contact value is 0 (closed), the system proceeds to the next object in the priority table and the window contact does not influence the operating mode. When the window contact value is 1 (open), the system switches to protection mode, a window icon is displayed on the screen, and values from lower-priority objects in the table are ignored.
- **Presence Information:** This control mode has the third priority in the priority table. When a value of 1 (active) is received on this communication object, the function becomes active, the system switches to comfort mode, and values from lower-priority objects are disregarded. When a value of 0 (inactive) is received, the operating mode returns to its previous state, and the next object in the priority table is evaluated.
- **Local / Bus:** This is the control method with the lowest priority in the priority table. The operating mode is selected either via the device display or through values received from the relevant communication object on the bus line.

Note:
When forced mode is set to *Auto*, data is requested from the window contact and presence input objects.

3.2.2.1 Operating Mode After Device Reset

When the RTC starts operating, it begins in the operating mode selected in the parameters. If **Previous** is selected, the RTC remembers the last active operating mode and continues operation in this mode after startup.

3.2.3 RHCC Feedback

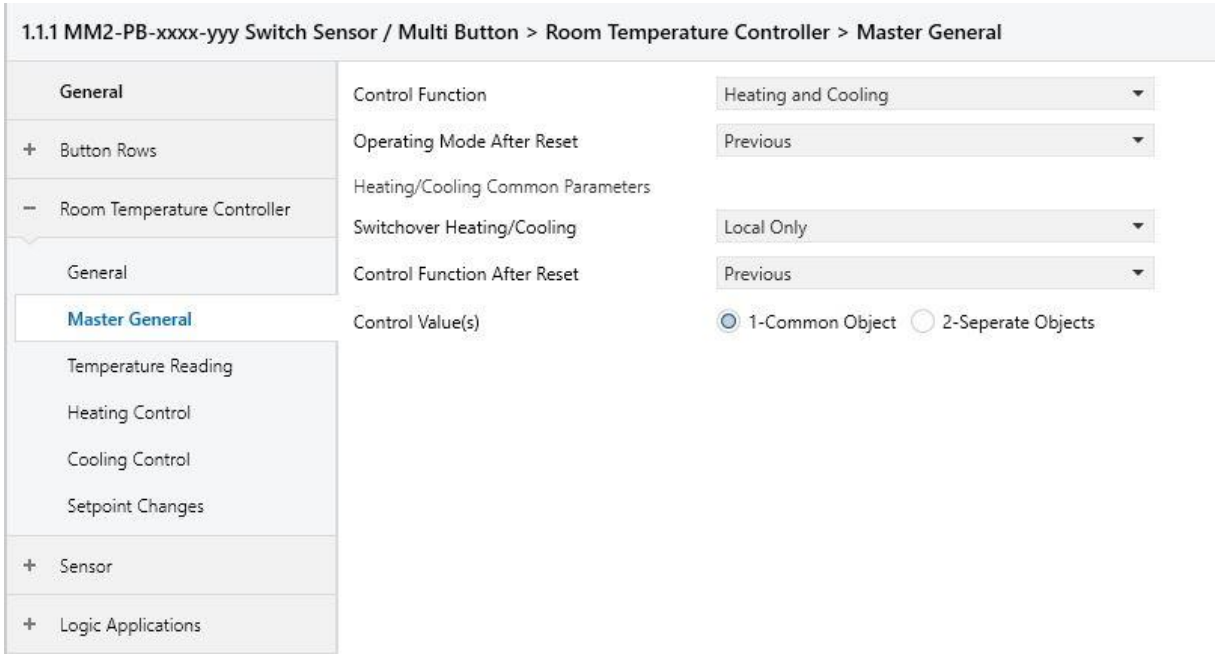
This communication object provides information in accordance with the RHCC (Room Heating and Cooling Controller) status specification, including the heating/cooling operating mode, active or inactive operation status, and any errors related to the actual temperature measurement.

3.2.3.1 HVAC Controller Status

This communication object transmits the RTC operating mode (comfort, standby, economy/night), the active control zone (heating or cooling), and the active or inactive status of the RTC via the bus line.

Bit No	Function	Value
B0	Comfort	0 = false 1 = true
B1	Standby	0 = false 1 = true
B2	Night	0 = false 1 = true
B3	Frost/Heat Prtoection	0 = false 1 = true
B4		
B5	Heat/Cool	0 = cooling 1 =heating
B6	Controller Status	0 = inactive 1 = active
B7		

3.2.4 Heating/Cooling Common Parameters



No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
128	RTC- Heating/Cooling	HVAC Control Mode Input	Input	1byte	20.105 HVAC Control Mode	C	-	W	-
129	RTC- Heating/Cooling	HVAC Control Mode Status	Output	1byte	20.105 HVAC Control Mode	C	R	-	T
130	RTC- Heating/Cooling	HVAC Changeover Mode Input	Input	1byte	20.107 Changeover Mode	C	-	W	-
131	RTC- Heating/Cooling	HVAC Changeover Mode Status	Output	1byte	20.107 Changeover Mode	C	R	-	T
132	RTC- Heating/Cooling	Heating Cooling Select	Input	1bit	1.100 Heating / Cooling	C	-	W	-
138	RTC- Heating/Cooling	Heating Cooling Select Status	Output	1bit	1.100 Heating / Cooling	C	R	-	T

Table 14: RTC-4 Communication Object

3.2.4.1 Switchover Heating Cooling

This section defines the parameters that determine how the RTC switches between heating and cooling modes.

3.2.4.1.1 Local Only

When this option is selected, switching between heating and cooling modes can be performed only via the buttons on the device display. In this mode, the active control mode cannot be changed via the bus line

3.2.4.1.2 Only From Bus

When this option is selected, switching between heating and cooling modes can be performed only via the bus line. In display-equipped models, when this option is active, the mode selection menu is not shown on the display.

3.2.4.1.3 Via Bus and Local

In this mode, heating and cooling modes can be changed both via the device display and through the bus line. While this option is active, mode switching communication objects are available, and the mode selection menu can be accessed on the display.

3.2.4.2 Control Mode on Device Reset

This parameter defines the control mode in which the RTC starts operating after a restart.

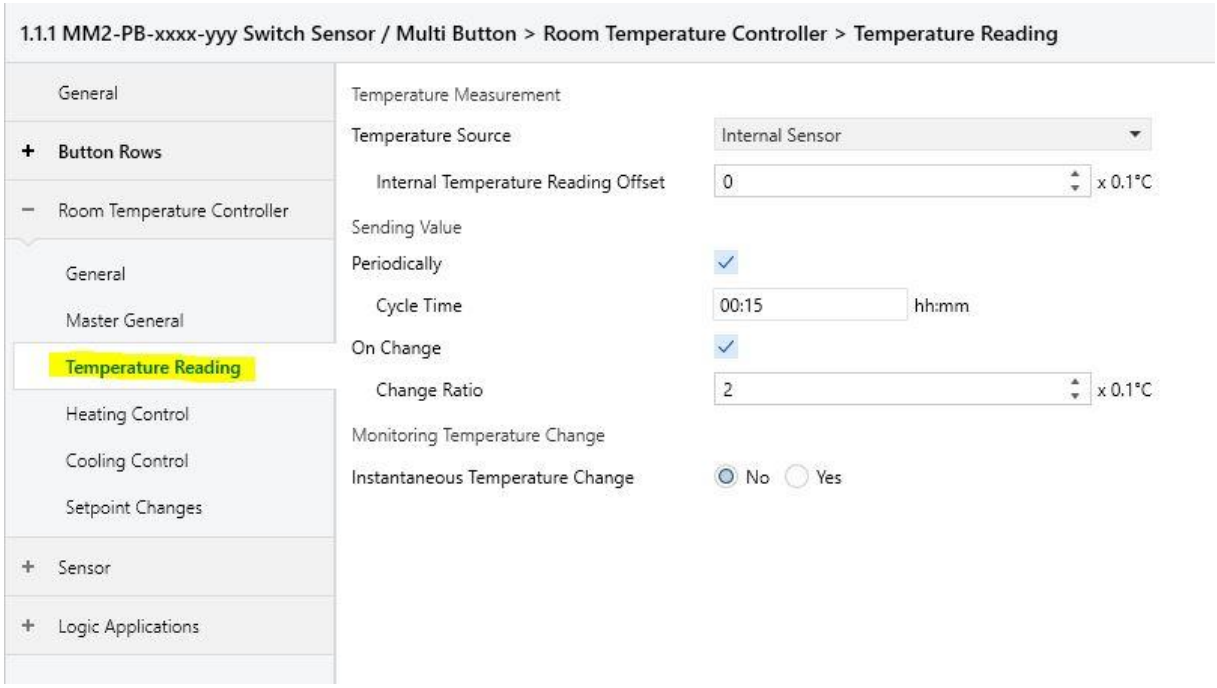
- **Previous:** The RTC remembers the control mode that was active before the restart and starts operating in that mode.
- **Heating:** The RTC ignores the previous control mode and starts in heating mode.
- **Cooling:** The RTC ignores the previous control mode and starts in cooling mode.
- **Automatic:** The RTC ignores the previous control mode and starts in automatic mode; it compares the ambient temperature with the setpoint and determines the appropriate operating mode accordingly.

3.2.4.3 Control Value(s)

This parameter defines how many communication objects are used to transmit the control values calculated by the RTC.

- **1 Common Object:**
  When this option is selected, the control value is transmitted via a single communication object. The RTC sends the calculated value for heating or cooling through the same object. This option is suitable for systems where heating and cooling do not operate simultaneously, such as two-pipe FCU systems. In this configuration, the control value cannot be separated for heating and cooling zones; the control type selected for the heating zone also applies to the cooling zone. Additional zones are not applicable in this context; however, different control types can be used for additional heating and cooling zones.
- **2 Separate Objects:**
  When this option is selected, the control value is transmitted via two separate communication objects. The RTC selects the appropriate object based on whether heating or cooling mode is active, while the unused object always transmits an off or 0% value. This option is suitable for systems capable of simultaneous heating and cooling, such as four-pipe FCU systems. In this configuration, control values for heating and cooling zones can be configured independently.
-

3.3 Temperature Reading



No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
122	RTC- Temperature Reading	Internal Temperature	Output	2bytes	9.001 Temperature (°C)	C	R	-	T
123	RTC- Temperature Reading	Actual Temperature Error	Output	1bit	1.005 Alarm	C	-	-	T
124	RTC- Temperature Reading	External Temperature	Input	2bytes	9.001 Temperature (°C)	C	-	W	-
125	RTC- Temperature Reading	Temperature Output	Output	2bytes	9.001 Temperature (°C)	C	R	-	T
126	RTC- Temperature Reading	Fault Temperature Reading	Output	1bit	9.001 Temperature (°C)	C	R	-	T
127	RTC- Temperature Reading	Instantenous Temperature Change	Output	1bit	1.005 Alarm	C	R	-	T

Table 15: RTC-5 Communication Object

3.3.1 Temperature Measurement

3.3.1.1 Temperature Source

The RTC function can obtain ambient temperature information using the internal temperature sensor of the MM2-PB-xxxx-yy-1zz device, by using temperature data received from the bus line, or by combining both sources. The temperature source to be used is selected via parameters.

3.3.1.1.1 Internal Sensor

When this option is selected, the internal temperature sensor of the MM2-PB-xxxx-yy-1zz device is used as the ambient temperature source. The measured temperature value is directly used in RTC calculations and can be conditioned via parameters (offset adjustment).

In case of a sensor fault, the RTC function stops in its current state and transmits an alarm message to the bus line via the corresponding communication object.

3.3.1.1.1.1 Internal Temperature Reading Offset

This parameter allows positive or negative adjustment of the temperature measured by the sensor. The entered value is multiplied by 0.1 and added to the measured ambient temperature.

3.3.1.1.2 External Sensor

This option uses the ambient temperature value received from the bus line as the temperature source. A positive or negative offset can be applied to the received temperature value via parameters. The entered value is multiplied by 0.1 and added to the measured ambient temperature.

3.3.1.1.2.1 External Temperature Reading Offset

This adjusts the ambient temperature value received from the bus line by adding or subtracting a value. The entered value is multiplied by ‘0.1’ and added to the measured ambient temperature.

3.3.1.1.2.1.1 Monitoring Time

The RTC expects ambient temperature data at certain intervals. This interval is selected from the parameter. If the temperature data is not received within the specified time interval in the parameter, the RTC considers there is an error in reading the ambient temperature, broadcasts an alarm object, and the RTC function stops at its last state.

Note

Selecting a duration of 00:00 indicates that monitoring is not performed. The RTC does not expect periodic data flow

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3.3.1.1.2.2 Both of Them

When this option is selected, the RTC uses a combination of the internal temperature sensor of the MM2-PB-xxxx-yy-1zz device and the temperature data received from the bus line as the ambient temperature source. Both sources can be conditioned independently via parameters. The bus temperature data is monitored periodically; if no data is received within the defined period, the RTC function stops in its current state and transmits an alarm message to the bus line via the corresponding communication object.

3.3.1.1.2.2.1 Weight

This determines the ratio of the combined sensor and bus line data. The proportion of data from the sensor is specified as a percentage, and the remaining portion is calculated from the data received from the bus line to obtain the combined ambient temperature data.

Example
Weight %80 - Internal (20°C) - External (25°C) = Weight Temperature = 20 * 0.8 + 25 * 0.2 = 21°C

3.3.2 Sending Value Method

3.3.2.1 Periodically

This parameter defines how frequently the calculated ambient temperature value is transmitted to the bus line based on the selected temperature source.

3.3.2.1.1 Cycle Time

The calculated ambient temperature value is transmitted to the bus line periodically at the defined time interval.

Note:
If the ambient temperature cannot be calculated due to an error, the temperature value is not transmitted periodically to the bus line.

3.3.2.2 On Change

This parameter enables sending the value to the bus line when the data received from the selected source changes by the defined amount. When the measured value changes by the configured threshold, the updated value is transmitted via the corresponding communication object.

3.3.2.2.1 Change Ratio

The value defined in this parameter is multiplied by **0.1** to calculate the effective change threshold. The calculated ambient temperature is compared with the previous measured value. If the difference is equal to or greater than the calculated threshold, the current ambient temperature is sent to the bus line.

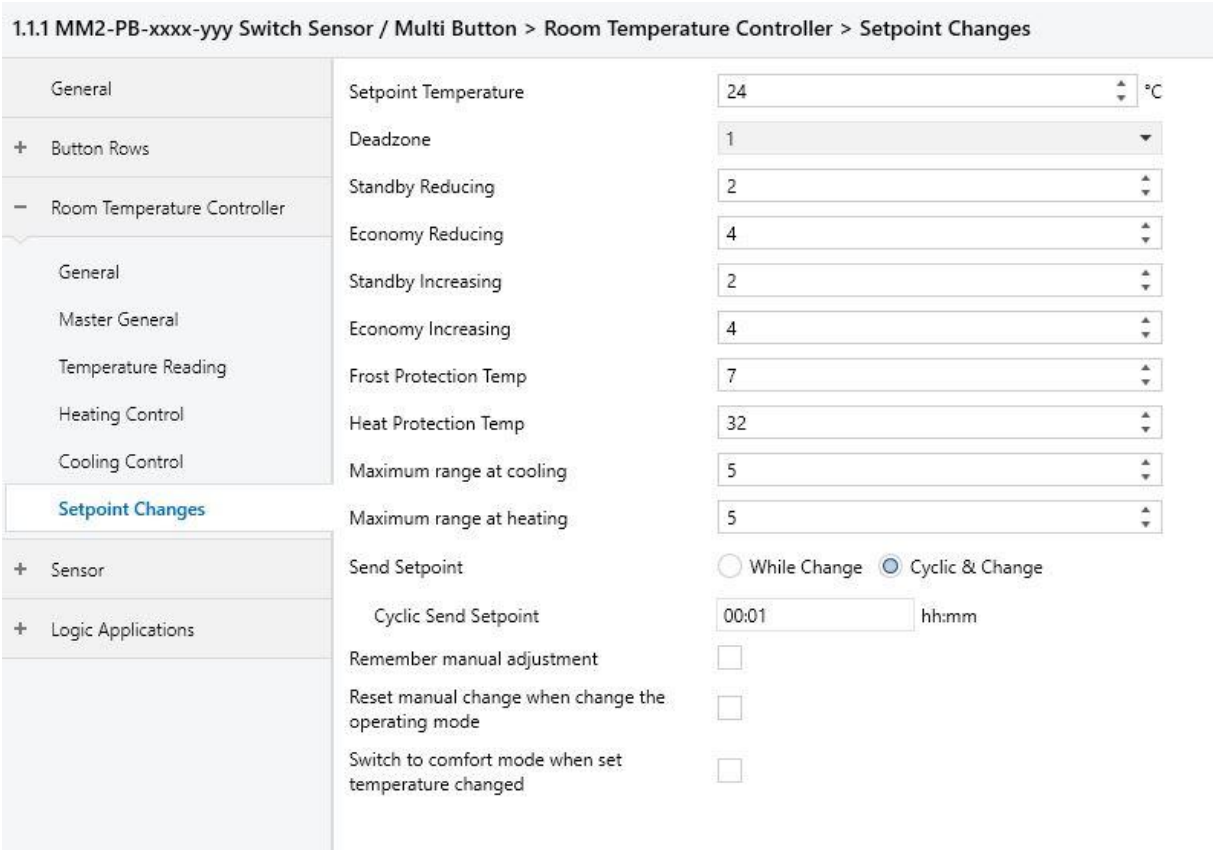
3.3.3 Monitoring Temperature Change

3.3.3.1 Instantenous Temperature Change

- **No:** Instant temperature change is not monitored.
- **Yes:** Instant temperature change is monitored. If a temperature change equal to or greater than the defined value occurs within the specified time period, an alarm value is sent to the bus line via the corresponding communication object.

3.4 Setpoint Changes

This section is used to configure the RTC set temperature settings. Through the parameters, the dead zone for heating–cooling transition (if automatic mode is available) is defined; temperature increase and decrease values for economy and standby modes are configured; and critical set temperatures for frost protection and overheating protection modes are specified.



No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
120	RTC- Setpoint	Set Temperature Output	Output	2bytes	9.001 temperature(°C)	C	R	-	T
121	RTC- Setpoint	Set Temperature Request	Output	2bytes	9.001 temperature(°C)	C	-	W	T

Table 16: RTC-6 Communication Object

3.4.1 Temperature Set Value

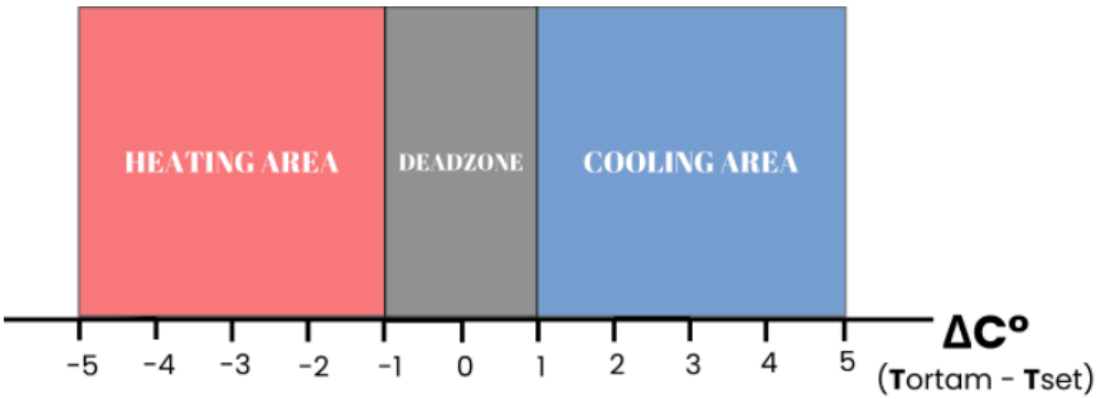
This parameter defines the set temperature value used by the MM2-PB-xxxx-yy-1zz device at initial startup. If the **Remember Manual Adjustment** parameter is not enabled, the device starts with the value defined in the parameters. If enabled, the last user-defined set temperature is applied.

3.4.2 Dead Zone

This parameter is used when heating–cooling transition operates in automatic mode. The dead zone represents the minimum temperature difference required between the set temperature and the ambient temperature for a mode change to occur. When the RTC function starts while within the dead zone, this area is ignored and the operating zone is determined based on the difference between ambient and set temperatures. When the temperature difference changes, the dead zone is taken into account again in the evaluation.

Note:
This parameter is valid only when the control function is set to **heating and cooling**. It is not active if only heating or only cooling is selected.

Example of heating-cooling zone transition with a 1°C dead zone.



3.4.3 Standby Reducing

When the RTC is operating in the heating zone and the standby mode is activated, it specifies the reduction value for the setpoint. Standby mode is indicated on the screen with an icon. If the 'switch to comfort mode when set temperature changed' parameter is not selected, the setpoint value can be changed while in standby mode. While in standby mode, the heating-cooling zone (if in automatic mode) may change. If selected, setpoint changes are not allowed in standby mode; when the setpoint is changed, the RTC will switch to comfort mode.

3.4.4 Economy Reducing

When the RTC is operating in the heating zone and the economy mode is activated, it specifies the reduction value for the setpoint. Economy mode is indicated on the screen with an icon. If the 'switch to comfort mode when set temperature changed' parameter is not selected, the setpoint value can be changed while in economy mode. While in economy mode, the heating-cooling zone (if in automatic mode) may change. If selected, setpoint changes are not allowed in economy mode; when the setpoint is changed, the RTC will switch to comfort mode. (The reduction in setpoint value in economy mode is generally greater than in standby mode.)

3.4.5 Standby Increasing

When the RTC operates in the cooling zone and standby mode is activated, this parameter defines the amount by which the set temperature is increased. Standby mode is indicated by an icon on the display. If the **Switch to Comfort Mode When Temperature Set Value Changes** parameter is not enabled, the set temperature can be adjusted while in standby mode. While standby mode is active, the heating–cooling zone may change if automatic mode is used. If the parameter is enabled, set temperature changes are not permitted in standby mode; when a set temperature change is attempted, the RTC switches to comfort mode.

3.4.6 Economy Increasing

When the RTC operates in the cooling zone and economy mode is activated, this parameter defines the amount by which the set temperature is increased. Economy mode is indicated by an icon on the display. If the **Switch to Comfort Mode When Temperature Set Value Changes** parameter is not enabled, the set temperature can be adjusted while in economy mode. While economy mode is active, the heating–cooling zone may change if automatic mode is used. If the parameter is enabled, set temperature changes are not permitted in economy mode; when a set temperature change is attempted, the RTC switches to comfort mode.

3.4.7 Frost Protection Temp

This parameter defines the critical temperature threshold for frost protection. When the RTC operates in the heating zone, outputs remain inactive until the calculated ambient temperature reaches the defined critical threshold. This condition represents the RTC off state; however, a critical threshold must be defined to prevent damage to the controlled area (such as damage to furnishings or freezing of water in pipes). When the measured ambient temperature reaches the critical threshold, the RTC performs heating until the ambient temperature rises above the threshold.

3.4.8 Heat Protection Temp

This parameter defines the critical threshold for overtemperature protection. When the RTC operates in the cooling zone, outputs remain inactive until the calculated ambient temperature reaches the defined threshold. This mode represents the RTC off state; however, the critical threshold is defined to prevent damage to the controlled area. When the measured ambient temperature reaches the critical threshold, the RTC performs cooling until the ambient temperature falls below the threshold.

3.4.9 Maximum Range at Cooling

This parameter defines the adjustable range of the set temperature in the cooling zone. The defined value represents the number of steps allowed in the positive and negative directions from the initial set temperature.

Example:
Maximum Range in Cooling: 5 °C
Temperature: 24 °C
Cooling Range: 19 °C … 24 °C … 29 °C

3.4.10 Maximum Range at Heating

This parameter defines the adjustable range of the set temperature in the heating zone. The defined value represents the number of steps allowed in the positive and negative directions from the initial set temperature.

3.4.11 Send Setpoint

The set temperature can be transmitted to the bus line when required. This can be done using two different methods:

- **While Change:** The value is sent to the bus line whenever the set temperature changes. (The set temperature can be read from the bus line at any time.)

- **Cyclic and Change :** The set temperature is sent to the bus line at the defined interval regardless of whether a change has occurred. Additionally, if a change in set temperature occurs, the value is transmitted to the bus line immediately, independent of the periodic interval.

3.4.12 Remember Manual Adjustment

When this parameter is enabled, the device remembers the last set temperature configured by the user after a restart and starts operating with that value. If the parameter is disabled, the device starts operating with the initial set temperature value defined in the parameters.

3.4.13 Reset Manuel Change when Change the Operating Mode

This parameter defines how the reference set temperature is determined when the operating mode changes. When the parameter is enabled, the initial set temperature value is used as a reference when the operating mode changes, and the temperature is increased or decreased depending on the heating or cooling zone. When the parameter is disabled, the set temperature of the new operating mode is calculated based on the current set temperature value.

Example:
(Initial set value: 24 °C, Current set value: 26 °C, Zone: Heating, Standby reduction: 2 °C)

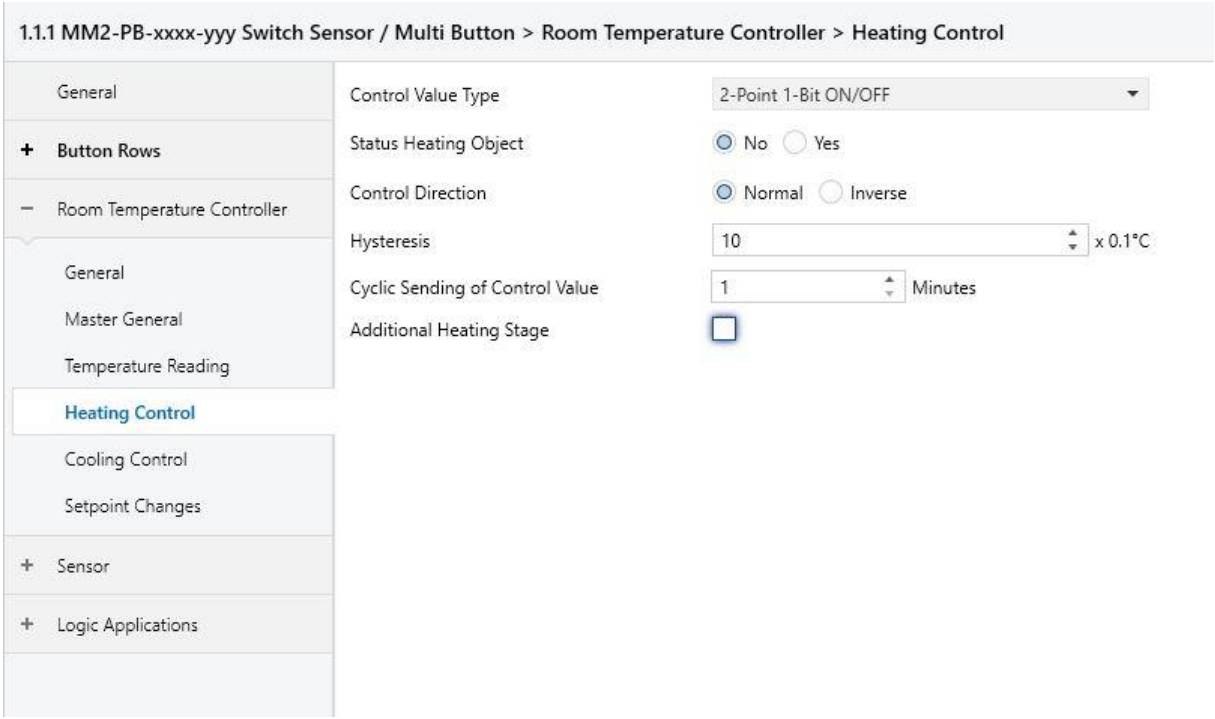
3.4.14 Switch to Comfort Mode when Set Temperature Changed

When this parameter is enabled, if the set temperature value is changed via the display or the bus line while the operating mode is standby or economy, the operating mode is automatically switched to comfort mode. If required, the mode can later be switched back to standby or economy. Since the set temperature cannot be changed in protection mode, switching to comfort mode does not occur in this state. When the parameter is disabled, changing the set temperature via the display or bus line does not alter the active operating mode; only the set temperature for standby or economy modes is updated.

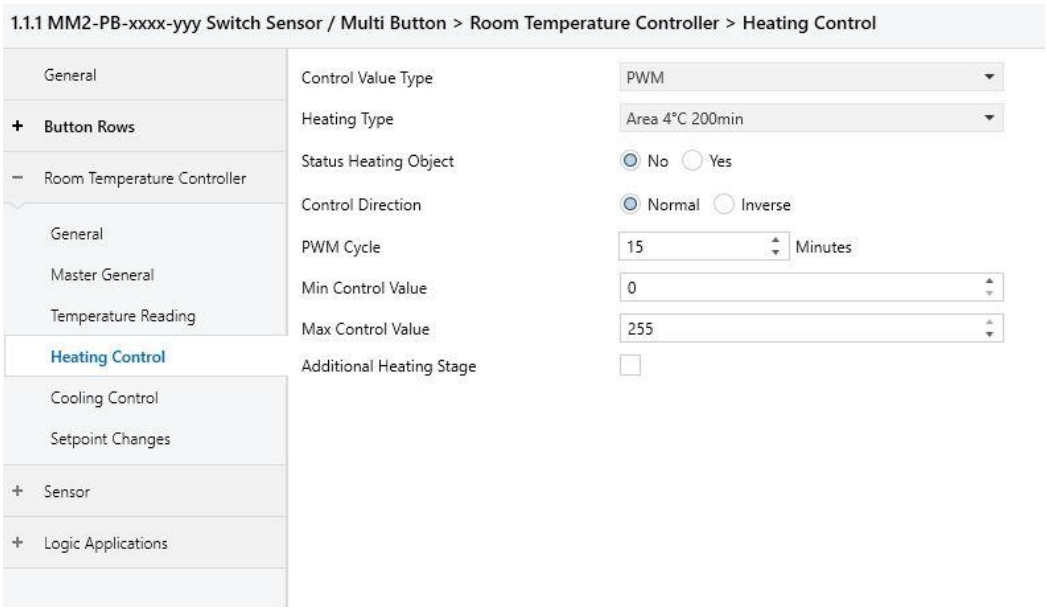
3.5 Control Values

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
133	RTC- Heating/Cooling	Heating Cooling Control Value	Output	1bit/1byte	1.001 switch /5.001 percentage	C	-	-	T
134	RTC- Heating	Heating Control Value	Output	1bit/1byte	1.001 switch /5.001 percentage	C	-	-	T
135	RTC- Heating	Addittional Heating Stage	Output	1bit/1byte	1.001 switch /5.001 percentage	C	-	-	T
136	RTC- Cooling	Cooling Control Value	Output	1bit/1byte	1.001 switch /5.001 percentage	C	-	-	T
137	RTC- Cooling	Addittional Cooling Stage	Output	1bit/1byte	1.001 switch /5.001 percentage	C	-	-	T
139	RTC- Heating	Heating Status	Output	1bit	1.001 switch	C	-	-	T
140	RTC- Cooling	Cooling Status	Output	1bit	1.001 switch	C	-	-	T

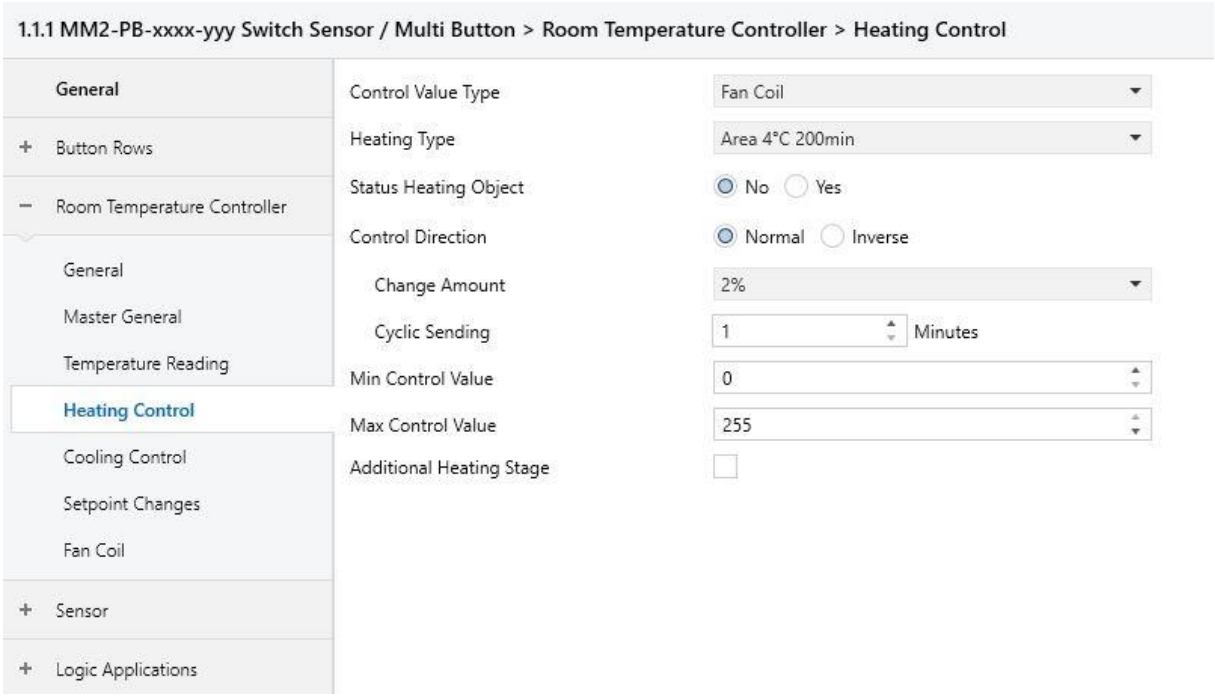
Table 17: RTC-7 Communication Object



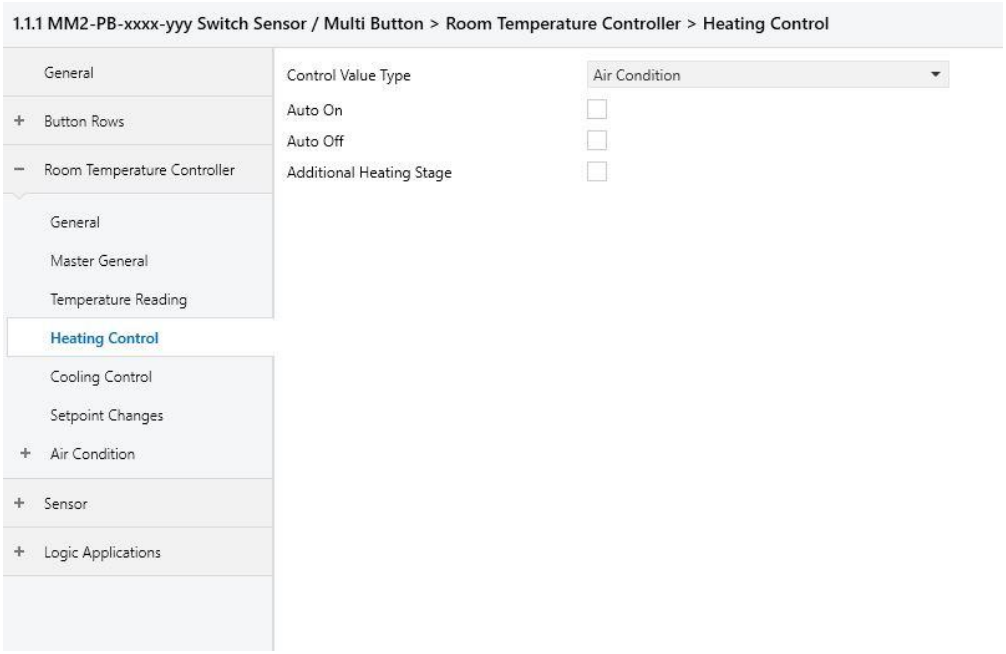
- **2-Point 1-Bit On/Off:** Two-point control is the most basic control method. When the room temperature drops below the set temperature minus the hysteresis value, the thermostat switches on; when it rises above the set temperature plus the hysteresis value, the thermostat switches off. On and off commands are transmitted on the bus line as 1-bit commands.
- **2-Point 1-Byte 0–100%:** This control type also follows the two-point control principle; however, the on and off commands are transmitted as 1-byte values (0% / 100%).
- **PI PWM On/Off:** This control type uses a PI controller. The output is transmitted as a 1-bit command. The calculated control value is converted into a pulse-width modulation (PWM) signal and applied to the output.



- **PI Continuous 0–100%:** This PI controller continuously adjusts the output value between 0% and 100% to compensate for the difference between the actual temperature and the set temperature. This ensures precise regulation of the room temperature to the setpoint. The control value is transmitted on the bus line as a 1-byte value (0–100%). To reduce bus traffic, the control value is transmitted only when a defined percentage change occurs compared to the previously sent value. The control value can also be transmitted cyclically if required.
- **Fan Coil:** The fan coil controller operates using continuous PI control logic. In addition, it enables separate control of the fan within the fan coil unit (for example, fan speed levels 1–5).



- **Air Conditioning:** Air conditioning control is used to bring the ambient temperature to a defined setpoint and maintain it at that level. The thermostat evaluates the difference between the ambient temperature and the set temperature and sends on or off commands to the air-conditioning unit. To ensure precise temperature control, the system periodically adjusts the operating mode (heating or cooling) and fan speed of the air-conditioning unit. This control type maximizes comfort while improving energy efficiency.



3.5.1 2-Point 1 Bit On/Off – 1 Byte 0–255

The 2-Point 1 Bit On/Off – 1 Byte 0–255 control type provides a simple and effective control mechanism by evaluating specific parameters according to whether the RTC is operating in heating or cooling mode. This control type generates an output signal based on the calculated ambient temperature, the hysteresis value, and the configured setpoint temperature. When the system moves outside the defined temperature range (hysteresis), it generates and transmits an output value of either 1 bit or, depending on the selected parameter, 1 byte (0–255) via the bus line.

- **1 Bit On/Off Parameter:** When selected, an **On** or **Off** value is transmitted via a 1-bit communication object.
- **1 Byte 0–255 Parameter:** When selected, a value of **0** or **255** is transmitted via a 1-byte communication object.

3.5.1.1 Status Heating Object

When the RTC operates in the heating zone, this object works in conjunction with the control value. If the control value is positive, a value of **1 (ON)** is sent to the bus line via the corresponding communication object. When the control value becomes inactive (for example, when the setpoint temperature is reached), a value of **0 (OFF)** is transmitted to the bus line.

3.5.1.2 Status Cooling Object

When the RTC operates in the cooling zone, this object works in conjunction with the control value. If the control value is positive, a value of **1 (ON)** is sent to the bus line via the corresponding communication object. When the control value becomes inactive (for example, when the setpoint temperature is reached), a value of **0 (OFF)** is transmitted to the bus line.

3.5.1.3 Control Direction

The control direction can be changed parametrically. By default, when the control value is active, the following values are transmitted:

- **1 Bit Object:** 1 (ON)
- **1 Byte Object:** 255

Using this parameter, the control direction can be inverted. In this case, when the control value is active, the transmitted values are:

- **1 Bit Object:** 0 (OFF)
- **1 Byte Object:** 0

When the control value is inactive, the corresponding communication objects transmit:

- **1 Bit Object:** 1 (ON)
- **1 Byte Object:** 255

3.5.1.4 Hysteresis

3.5.1.4.1 Heating Control Hysteresis

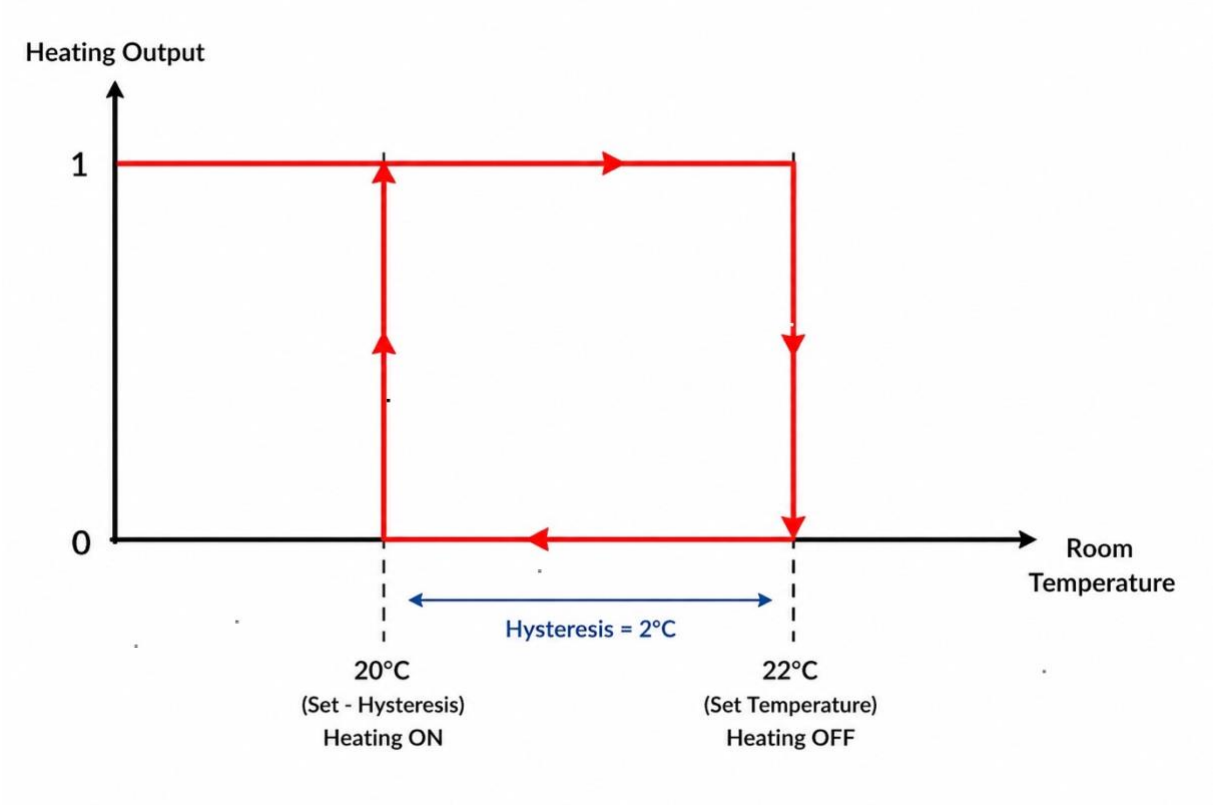
The hysteresis behavior for the heating zone is defined as follows:

- **Activation condition:** The heating output activates when the calculated room temperature is lower than or equal the desired set Temperature.
- **Deactivation condition:** The heating output remains active until the ambient temperature reaches the set temperature. Once the set temperature is reached, the output is deactivated.
- **Reactivation:** After deactivation, the system waits for the ambient temperature to drop to the hysteresis set threshold. When the ambient temperature falls below this value, the heating output is reactivated.

Example:

- **Set Temperature (Theating):** 22 °C

- **Hysteresis:** 2 °C
- **Heating output deactivation:** Room temperature ≥ 22 °C
- **Reactivation threshold:** Room temperature < 20 °C (22 °C − 2 °C)



3.5.1.4.2 Cooling Control Hyseteresis

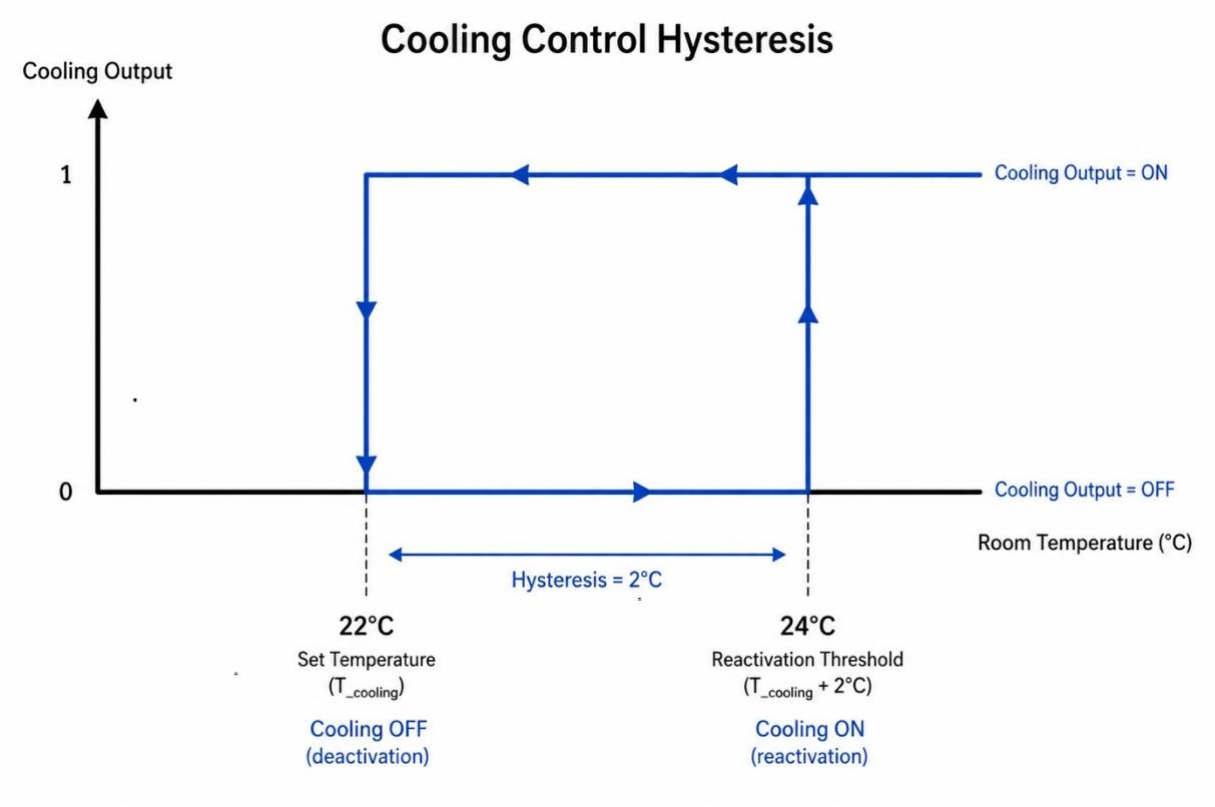
The hysteresis behavior for the cooling zone is defined as follows:

- **Activation condition:** The cooling output activates when the calculated room temperature is higher than or equal the desired set Temperature.
- **Deactivation condition:** The cooling output remains active until the ambient temperature reaches the set temperature. Once the set temperature is reached, the output is deactivated.
- **Reactivation:** After deactivation, the system will wait until the room temperature exceeds the hysteresis threshold to reactivate the cooling output.

Example:

- **Set Temperature (Tcooling):** 22 °C
- **Hysteresis:** 2 °C
- **Cooling output deactivation:** Room temperature ≤ 22 °C

- **Reactivation threshold:** Room temperature > 24 °C (22 °C + 2 °C)



3.5.1.5 Cyclic Sending Control Value

This parameter enables periodic transmission of the calculated control value to the bus line. In this section, the time interval at which the control value is sent to the bus line is defined. During the specified interval, the value is transmitted via the corresponding communication object.

Note:
Any change in the control value is transmitted to the bus line regardless of the periodic sending parameter. If a change occurs in the heating–cooling zone, the control value is reset.

3.5.2 Common Parameters For PI Controlled Value Types

Proportional Component (P):
This component considers the instantaneous difference (error) between the room temperature and the configured setpoint. The larger the error value, the greater the response generated by the control output. As the error decreases, the response speed of the control output is reduced proportionally. This ensures a more stable control behavior as the system approaches the target temperature.

Integral Component (I):
This component takes into account the accumulated error over time. The error value is continuously monitored; if the control value generated by the PI controller does not reduce

the error at the expected rate, the integral component increases the control output, allowing the system to approach the setpoint in a more stable and controlled manner.

3.5.2.1 Heating / Cooling Type

The response magnitude and response speed of the PI controller are configurable via parameters and directly affect the performance of the heating and cooling elements used in the system, user comfort, and energy efficiency. Predefined PI controller sets may be available within the parameters (e.g. area, convector, fan coil). If required, the PI controller parameters can also be freely configured by the user.

- **Area (4 °C – 200 min):** The PI controller generates a control output designed to achieve a temperature change of 4 °C within 200 minutes. During this period, the controller uses both proportional and integral components to balance the system's response speed and control output, resulting in a more stable and accurate system response.
- **Convector (1.5 °C – 100 min):** The PI controller generates a control output designed to achieve a temperature change of 1.5 °C within 100 minutes.
- **Free Configuration:** This option allows the user to manually define the P and I values, providing greater flexibility and enabling fine-tuning according to the specific requirements of a system or application.

Proportional Gain (P):
The proportional gain generates the control signal by multiplying the temperature error by a defined coefficient. The error value is calculated by multiplying the temperature difference by 0.1.

$P = Kp \times e(t)$

Here, **Kp** is a constant coefficient. For example, if the temperature error is 2 °C and Kp is set to 0.1, the proportional control output will be 0.2.

Integral Gain (I):
The integral gain takes into account the accumulated error over time. It is defined in minutes, and the control signal is generated by multiplying the integral of the error by a defined coefficient.

$I = Ki \times \int_0^t e(\tau)\, d\tau$

Here, **Ki** is a constant coefficient defined in minutes and determines the rate at which the error accumulates over time.

3.5.2.2 Status Heating Object / Status Cooling Object

This parameter indicates whether the system is actively performing heating or cooling based on the current operating zone.

- **Yes:** When selected, the control value is evaluated. If the control value is positive, the RTC sends a **1-bit (ON)** value to the bus line via the corresponding communication object. When the setpoint is reached, the RTC changes the operating zone, or the RTC is switched off, the value becomes **0** and a **0 (OFF)** value is sent to the bus line.
- **No:** When selected, no feedback is transmitted to the bus line based on the control value.

PI Control Value Limits

The limits of the PI control value are defined parametrically. Based on user requirements, the performance of heating and cooling elements, and energy efficiency objectives, the control value can be operated within a desired range. The PI controller scales the calculated control value, generated within the range of 0–255, to the minimum and maximum limits defined here, and PWM control is performed accordingly.

- **Minimum Control Value:** Defines the lowest value that the control output can take. If the PI controller attempts to set the control value to 0, the minimum value defined in the parameter is sent to the bus line instead.

Note:
If a value greater than 0 is defined for this parameter, the control value is always actively transmitted.

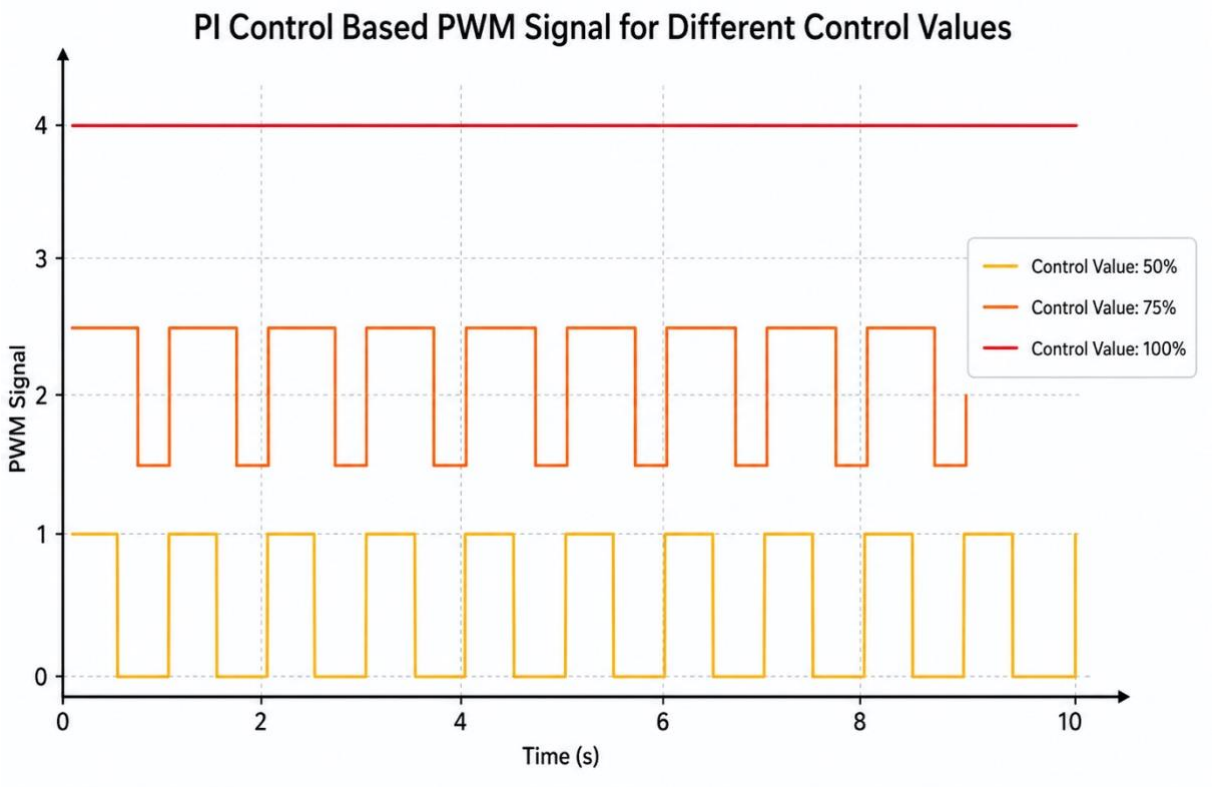
- **Maximum Control Value:** Defines the highest value that the control output can take. If the PI controller attempts to set the control value to 100, the maximum value defined in the parameter is sent to the bus line instead.

3.5.2.3 PWM

The PI (Proportional–Integral) PWM (Pulse Width Modulation) control type is used to regulate the room temperature precisely to the configured setpoint. This control type

converts the control value calculated by the PI controller into a 1-bit (on/off) command using the pulse width modulation (PWM) method.

- **PWM (Pulse Width Modulation):** Enables the device to operate at the desired power level by switching the control signal on and off at defined time intervals.
- The control value calculated by the PI controller is converted into a pulse width over a defined time period. For example, if the calculated value is 30%, the signal remains on for 30% of the time and off for 70%.



3.5.2.4 PWM Cycle

When the control value percentage is converted into a PWM signal, the PWM cycle defines the durations of the on and off phases. For example, a 40% control value within a 15-minute PWM cycle represents an **On** phase of six minutes and an **Off** phase of nine minutes.

3.5.3 PI Continuous / Fancoil

The PI controller adjusts the output value between 0% and 100% to match the difference between the calculated ambient temperature and the setpoint, ensuring that the room temperature reaches the desired value with high precision. The calculated control value is transmitted to the bus line as a 1-byte value (0%–100%).

3.5.3.1 Change Amount

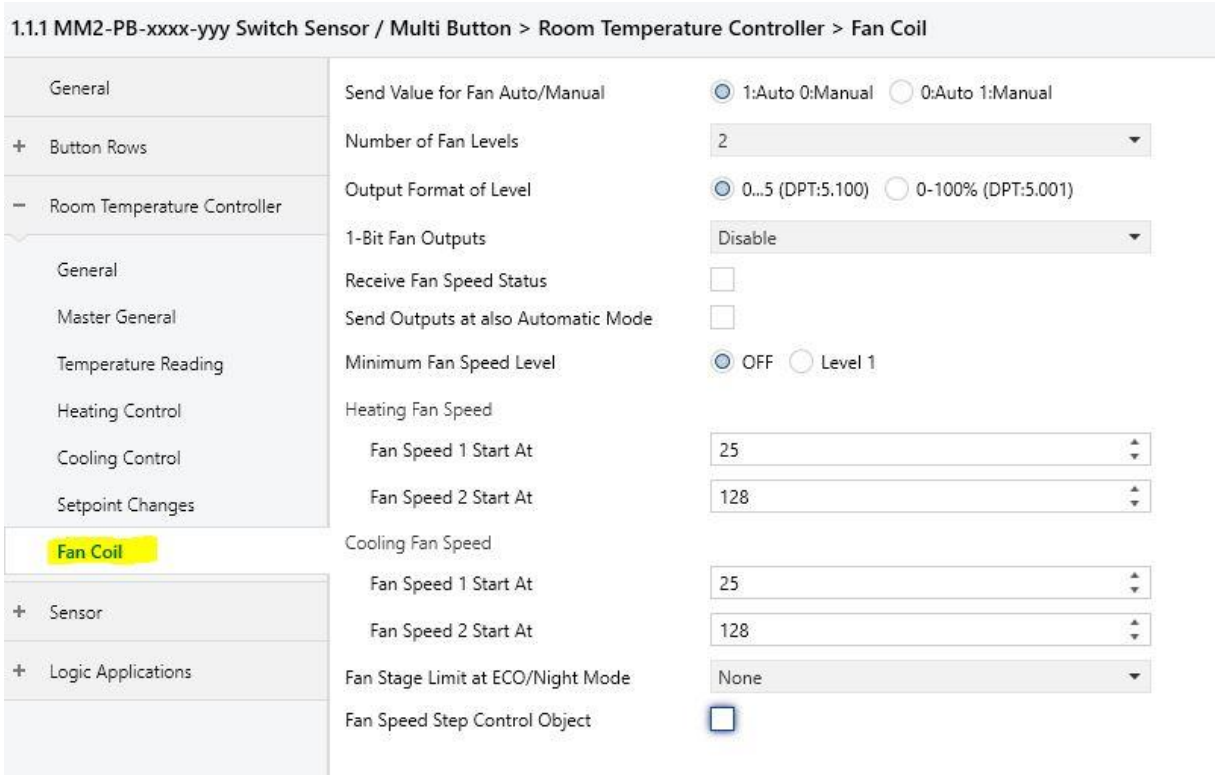
To reduce the load on the bus line, the control value is transmitted only when a defined percentage change relative to the previously sent value occurs, and additionally on a periodic basis.

- **2% – 5% – 10%:** Each time the control value is calculated, it is compared with the previously transmitted value. If the difference exceeds the percentage of the maximum control value defined in the parameter, the new value is sent to the bus line. Smaller changes are not transmitted.
- **Only cyclic:** The control value is transmitted to the bus line only at the interval defined by the parameter; the magnitude of change is ignored.

Note:
When a change occurs in the heating or cooling zone of the RTC, if the control value is transmitted via a single communication object, a value of **0** is sent to that object. If the control value is transmitted via two communication objects, a value of **0** is sent to the communication object of the previous mode.

3.5.4 Fan Coil (Heating / Cooling)

Fan coil units are devices used to heat or cool a space and typically consist of a fan and a heat exchanger (coil). In KNX systems, fan coil unit control can be implemented using a PI (Proportional–Integral) control algorithm to achieve more precise and efficient temperature regulation.



No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
170	RTC- Fan Coil	Fan Speed Auto Control	Bidirectional	1bit	1.001 switch	C	-	W	T
172	RTC- Fan Coil	Fan Speed Auto Control Status	Output	1bit	1.001 switch	C	R	-	T
173	RTC- Fan Coil	Fan Speed Set	Output	1byte	5.100 fan stage (0..255) 5.001 percentage	C	-	-	T
174	RTC- Fan Coil	Fan Speed 1	Output	1bit	1.001 switch	C	-	-	T
175	RTC- Fan Coil	Fan Speed 2	Output	1bit	1.001 switch	C	-	-	T
176	RTC- Fan Coil	Fan Speed 3	Output	1bit	1.001 switch	C	-	-	T
177	RTC- Fan Coil	Fan Speed 4	Output	1bit	1.001 switch	C	-	-	T
178	RTC- Fan Coil	Fan Speed 5	Output	1bit	1.001 switch	C	-	-	T
179	RTC- Fan Coil	Fan Speed Step Control	Input	1bit	1.001 switch	C	-	W	-
180	RTC- Fan Coil	Fan Speed Status	Input	1byte	5.100 fan stage (0..255) 5.001 percentage	C	-	W	-

Table 18: RTC-8 Communication Object

3.5.4.1 Send Value for Fan Auto/Manual

The fan stage of the fan coil unit can be set to automatic or manual mode. In automatic mode, the selected fan stage is indicated on the display with the label **“auto”**, and the PI control value is evaluated according to the fan stage threshold values defined in the parameters. In manual mode, the fan stage is determined by the user via the display or by data received from the bus line. In this case, the PI control value is ignored, and the fan continues to operate at the selected stage until it is switched back to automatic mode.

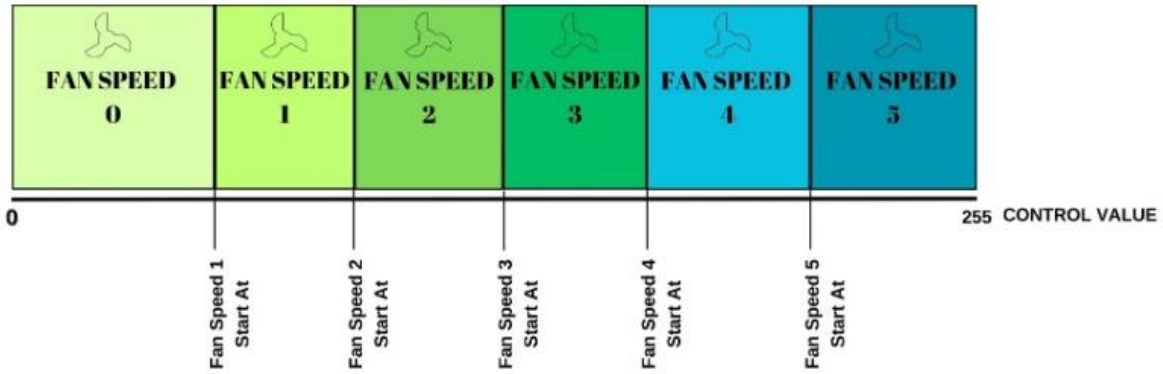
The selection between automatic and manual fan mode is performed via a 1-bit value (**On / Off**) and is configured parametrically.

- **1: Automatic / 0: Manual:** When this option is selected, the RTC switches the fan stage to automatic mode with a **1 (ON)** signal and to manual mode with a **0 (OFF)** signal.
- **0: Automatic / 1: Manual:** When this option is selected, the RTC switches the fan stage to automatic mode with a **0 (OFF)** signal and to manual mode with a **1 (ON)** signal.

3.5.4.2 Number of Fan Level

This parameter defines the number of fan stages available on the fan coil unit used in the system. The number of stages can be selected as **2, 3, or 5**. Threshold values are defined for the selected stages. When the fan operates in automatic mode, the fan stage corresponding to the control value calculated by the PI controller is transmitted to the bus line.

Note:
If the minimum fan speed level is set to **1**, the fan stage cannot be set to **0**.



3.5.4.3 Output Format of Level

This parameter defines the format in which the calculated or manually selected fan stage value is transmitted to the bus line. The transmitted data type varies depending on the selected representation of the fan stage and is configured via this parameter.

- **0..5 (DPT 5.100):** When selected, the fan stage is transmitted to the bus line as a 1-byte **DPT 5.100 (fan stage)** data type.
- **0..100% (DPT 5.010):** When selected, the fan stage is transmitted to the bus line as a 1-byte **DPT 5.010 (percentage)** data type in accordance with KNX standard values.

Fan Stage	DPT 5.100 Value
Fan Speed 0	0
Fan Speed 1	1
Fan Speed 2	2

Fan Stage	DPT 5.100 Value
Fan Speed 0	0
Fan Speed 1	1
Fan Speed 2	2
Fan Speed 3	3

Fan Stage	DPT 5.100 Value
Fan Speed 0	0
Fan Speed 1	1
Fan Speed 2	2
Fan Speed 3	3
Fan Speed 4	4
Fan Speed 5	5

Fan Stage	DPT 5.010 Value
Fan Speed 0	0
Fan Speed 1	128
Fan Speed 2	255

Fan Stage	DPT 5.010 Value
Fan Speed 0	0
Fan Speed 1	85
Fan Speed 2	170
Fan Speed 3	255

Fan Stage	DPT 5.010 Value
Fan Speed 0	0
Fan Speed 1	51
Fan Speed 2	102
Fan Speed 3	153
Fan Speed 4	204
Fan Speed 5	255

3.5.4.4 1-Bit Fan Outputs

The fan speed level is transmitted separately to the bus line via communication objects with a 1-bit data length, configured parametrically. When this parameter is enabled, the RTC

sends the active fan level in manual or automatic mode as **1 (ON)** and inactive levels as **0 (OFF)** via the 1-bit communication objects. The method used to transmit the fan level information depends on the selected configuration and the fan coil unit type.

- **Disabled:** Fan level information is not transmitted via 1-bit communication objects.
- **Only active levels:** When selected, only the active fan level sends an **ON** status, while inactive levels transmit **OFF**.
  Example:
  In a three-speed fan coil system, if speed level 2 is active, **OFF** is sent for levels 1 and 3, and **ON** is sent for level 2 (if a change occurs).
- **All levels:** When selected, the active level and all lower levels transmit **ON**, while higher levels transmit **OFF** to the bus line (if a change occurs).
  Example:
  In a five-speed fan coil unit, if speed level 3 is active, levels 1, 2, and 3 transmit **ON**, while levels 4 and 5 transmit **OFF**.

3.5.4.5 Recieve Fan Speed Status

When this parameter is enabled, the fan speed feedback communication object is taken into account. In manual mode, the fan speed sent by the RTC depends on the value received from the feedback object, and this value is considered correct. If the value received from the feedback object differs from the value sent by the RTC, the RTC displays the fan speed according to the received feedback value.

When this parameter is disabled, the corresponding communication object is hidden and the fan speed operates without feedback. In this case, the RTC does not evaluate whether the transmitted fan speed is applied and is only responsible for sending the fan speed value to the bus line.

Note:
This parameter can be used when the fan speed is not transmitted to the bus line in automatic mode. Therefore, when this parameter is enabled, the **“send fan speed also in automatic mode”** parameter is disabled.

3.5.4.6 Send Output at Also Automatic Mode

When operating in automatic mode, the RTC can either transmit the fan speed to the bus line or only indicate that it is in automatic mode. This behavior is defined parametrically.

- **Enabled:** The fan speed corresponding to the PI controller output range is transmitted to the bus line using the data type selected in the parameters.
- **Disabled:** While in automatic mode, the RTC does not transmit fan speed information to the bus line and only reports that it is operating in automatic mode.

3.5.4.7 Minimum Fan Speed Level

The minimum fan speed level can be set to **0** or **1**. When the minimum fan speed level is set to **1**, the **0th level** is not displayed in the fan menu and cannot be selected in manual mode. In automatic mode, and when fan speed values are transmitted to the bus line, the fan speed level remains set to **1** until the **fan speed level 2 start value** threshold is reached.

3.5.4.8 Fan Stage Limit at ECO/Night Mode

When the RTC is switched to **ECO** operation mode, it can limit the fan speed to provide energy savings and improved comfort. This option is parametrically configurable, and the fan speed can be limited according to the number of levels supported by the fan coil unit.

- **None:** Fan speed is not limited.
- **0–1–2–3–4:** Fan speed can be limited to the desired level based on the fan coil unit's number of speed levels. (For a five-speed unit: 0–1–2–3–4; for a three-speed unit: 0–1–2; for a two-speed unit: 0–1.)

When fan speed is limited in eco/night mode and the PI controller calculates a value above the limit, this value is not transmitted to the bus line; instead, the maximum allowed fan speed is sent. If the calculated value is below the limit, that value is transmitted. In manual mode, the fan speed menu remains selectable up to the defined limit.

Note:
If the **Minimum Fan Speed Level** parameter is set to **"1"**, the fan speed limit cannot be set to **0**.

3.5.4.9 Fan Speed Step Control Object

The fan speed change can be managed via a single communication object with a 1-bit data length. If this parameter is selected, the corresponding communication object becomes visible. The object will increase the fan speed stage upon receiving ON information and decrease it upon receiving OFF information. (In a 3-stage system, if the 2nd stage is Enable, ON information will switch to the 3rd stage, and OFF information will switch to the 1st stage.)

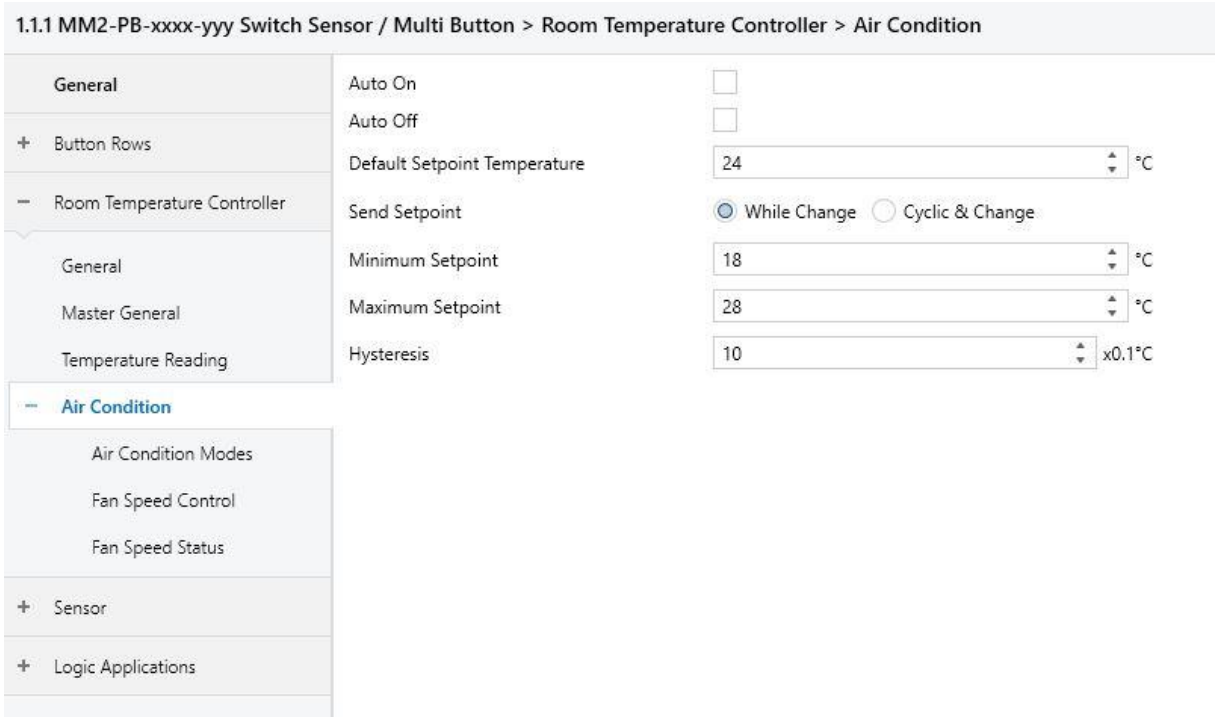
Note

When the fan speed is at the maximum value, ON information will not change the stage, and similarlydecrease it further.

3.5.5 Air Conditioning

The MM2-PB-xxxx-yy-1zz can be used as an air-conditioning controller; this option should be selected according to the system conditions. In the temperature-controlled area, the air conditioner can be configured as heating-only, cooling-only, heating and cooling, heating auxiliary zone, or cooling auxiliary zone. The RTC communicates with the air conditioner via the AC interface and operates as an air-conditioning thermostat. In this operating mode, the RTC provides functions such as sending the set temperature to the air conditioner, supplying ambient temperature information, defining the fan speed level, selecting automatic or manual fan operation, and managing five operating modes (automatic, heating, cooling, fan, and dehumidification).

Note:
If the air conditioner is the only heating and cooling element in the space, the RTC can be configured exclusively as an air-conditioning controller (see 3.2 Master General). In this case, RTC operating modes are not available.



No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
141	RTC–AirCondition	Climate On-Off	Output	1 bit	1.001 Switch	C	-	-	T
143	RTC–AirCondition	Climate Setpoint	Output	2 bytes	9.001 temperature(°C)	C	-	-	T
146	RTC–AirCondition	Climate Heat Cool Select	Output	1 bit	1.001 Switch	C	-	-	T
148	RTC–AirCondition	HVAC Conrol Mode Output	Output	1 byte	20.105 HVAC Control Mode	C	-	-	T
149	RTC–AirCondition	HVAC Conrol Mode Status	Input	1 byte	20.105 HVAC Control Mode	C	-	W	T
155	RTC–AirCondition	Fan Speed Value	Output	1 byte	5.001 Percentage	C	-	-	T
156	RTC–AirCondition	Fan Speed Step Control	Input	1 bit	1.001 Switch	C	-	W	-
157	RTC–AirCondition	Fan Speed Auto	Output	1 bit	1.001 Switch	C	-	-	T
158	RTC–AirCondition	Fan Speed 1	Output	1 bit	1.001 Switch	C	-	-	T
159	RTC–AirCondition	Fan Speed 2	Output	1 bit	1.001 Switch	C	-	-	T
160	RTC–AirCondition	Fan Speed 3	Output	1 bit	1.001 Switch	C	-	-	T
161	RTC–AirCondition	Fan Speed 4	Output	1 bit	1.001 Switch	C	-	-	T
162	RTC–AirCondition	Fan Speed 5	Output	1 bit	1.001 Switch	C	-		T
163	RTC–AirCondition	Fan Speed Status	Input	1 byte	5.001 Percentage	C	-	W	-
164	RTC–AirCondition	Fan Speed Auto Status	Input	1 bit	1.001 Switch	C	-	W	-
165	RTC–AirCondition	Fan Speed 1 Status	Input	1 bit	1.001 Switch	C	-	W	-
166	RTC–AirCondition	Fan Speed 2 Status	Input	1 bit	1.001 Switch	C	-	W	-
167	RTC–AirCondition	Fan Speed 3 Status	Input	1 bit	1.001 Switch	C	-	W	-
168	RTC–AirCondition	Fan Speed 4 Status	Input	1 bit	1.001 Switch	C	-	W	-
169	RTC–AirCondition	Fan Speed 5 Status	Input	1 bit	1.001 Switch	C	-	W	-

Table 19: RTC-9 Communication Object

3.5.5.1 Auto On/Off

The RTC can send automatic on, automatic off, or both automatic on and off telegrams to the climate system in the selected area. This option is parameterizable.

Auto On: In automatic on mode, the RTC sends an ON telegram to the climate system based on the calculated room temperature, setpoint, and hysteresis values.

Auto OFF: In automatic off mode, the RTC sends an OFF telegram to the climate system based on the calculated room temperature, setpoint, and hysteresis values.

3.5.5.1.1 Default Setpoint Temperature

When the RTC is configured exclusively as an air-conditioning controller, this parameter defines the set temperature value sent to the air conditioner at startup. The defined value is transmitted to the bus line when a change occurs; optionally, it can also be transmitted periodically by configuring a time interval.

3.5.5.1.2 Minimum/Maximum Setpoint

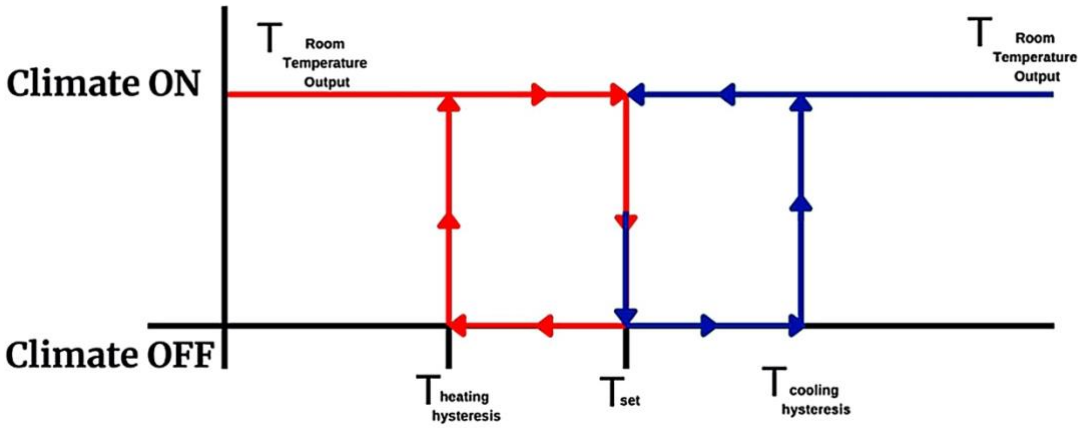
In systems where the air conditioner and the RTC control multiple heating elements, different set temperature ranges can be defined. If the set temperature determined by the RTC exceeds the maximum limit defined for the air conditioner, the maximum set value is sent to the air conditioner via the corresponding communication object. If the set temperature falls below the minimum limit, the minimum value is transmitted via the same communication object.

Note:
The setpoint range must be defined in accordance with the specifications of the air-conditioning unit used.

3.5.5.1.3 Hysteresis

If the air conditioner is programmed to operate in automatic enabled, automatic disabled, or automatic enabled/disabled modes, the hysteresis value is defined via this parameter.

Example:
In a system where both automatic enabled and automatic disabled modes are selected, the RTC keeps the air conditioner running until the set temperature is reached. Once the set temperature is reached, the air conditioner is switched off. In heating mode, the RTC allows the ambient temperature to drop by the defined hysteresis value before reactivating the air conditioner. In cooling mode, the RTC waits for the ambient temperature to rise by the defined hysteresis value.

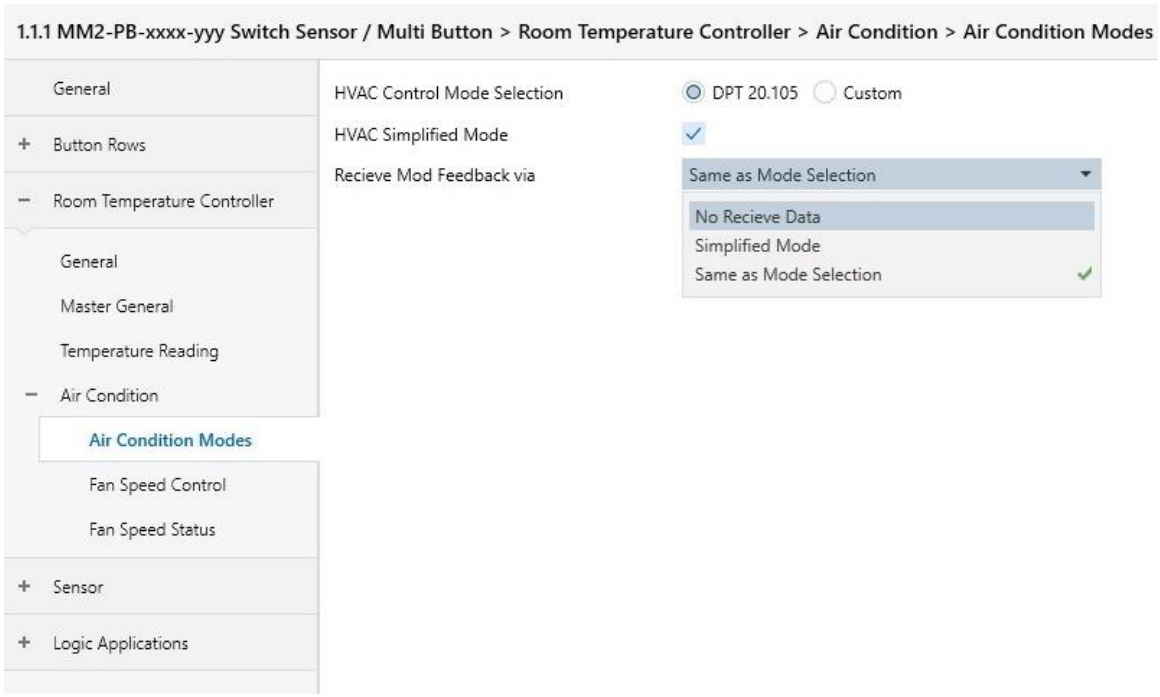


Note:
Even if automatic modes are selected, the air conditioner can be switched on or off manually; however, when the defined on/off thresholds are reached, the RTC automatically takes control of the air conditioner.

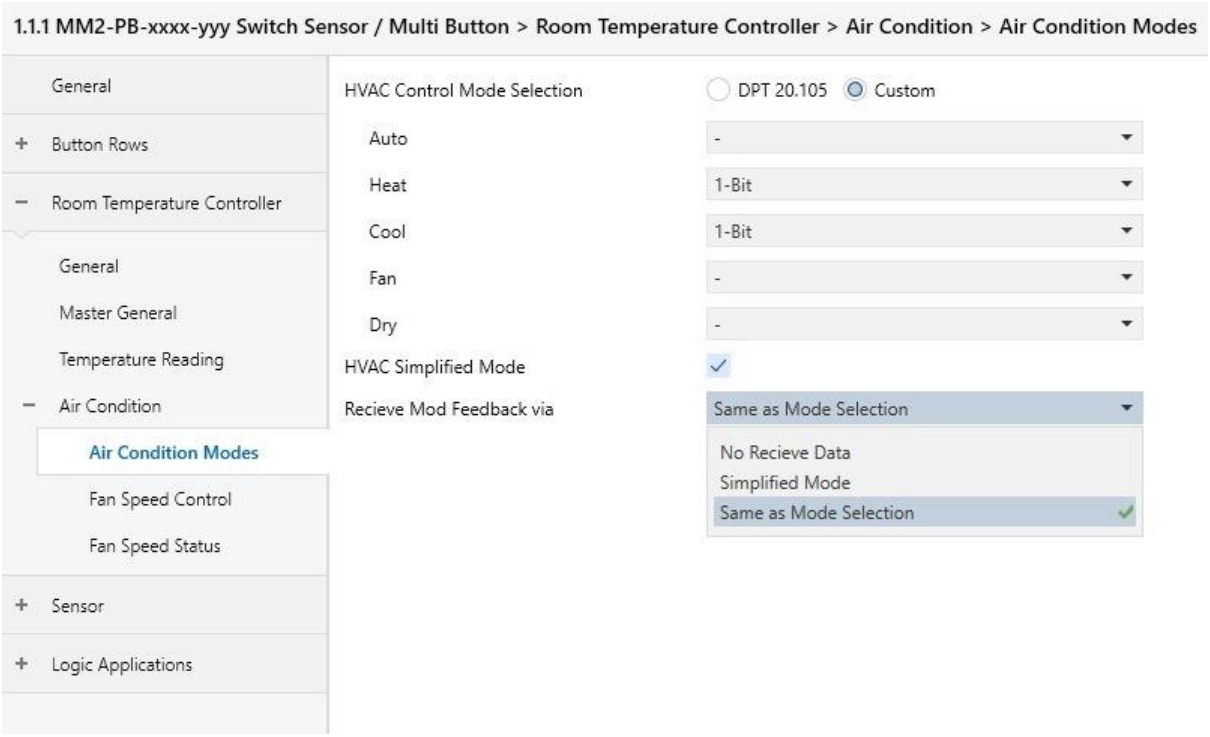
3.5.5.2 Air Conditioning Modes

3.5.5.2.1 HVAC Control Mode Selection

The RTC supports five different air-conditioning control modes. Information related to these modes can be transmitted to the bus line, received from the bus line, and displayed on the screen. The values to be transmitted and received are defined parametrically. Desired values can be configured by the user, or KNX-defined standard values can be exchanged via the relevant communication objects.



- **DPT 20.105:** When this option is selected, all supported air-conditioning modes are transmitted and received using KNX-defined fixed 1-byte values.
- **Custom 1 bit:** When this option is selected, air-conditioning control modes are transmitted and received with a 1-bit data length. If the parameter is set to 1 bit, a 1-bit transmission communication object becomes visible on the RTC for each selected mode. An **ON** value sent via this object indicates that the corresponding mode is active.
- **Custom 1 byte:** When this option is selected, air-conditioning control modes can be transmitted using a 1-byte data length. For each selected mode, communication objects for 1-byte transmission become visible. A parameter field is provided to define the value sent to the bus line when the mode becomes active; the entered value is transmitted as a 1-byte value when the mode is enabled.



Mode	Data	Data Type
Auto	0	20.105 HVAC Control Mode
Heat	1	20.105 HVAC Control Mode
Cool	3	20.105 HVAC Control Mode
Fan Only	9	20.105 HVAC Control Mode
Dry	14	20.105 HVAC Control Mode

3.5.5.2.2 Basic HVAC Modes

If only heating and cooling modes are used in RTC air-conditioning control, the simplified HVAC mode can be selected. When this parameter is enabled, a communication object with a data length of 1 bit becomes visible. When the RTC switches to heating mode, a **1 (ON)** value is sent via this communication object; in cooling mode, a **0 (OFF)** value is transmitted.

3.5.5.2.3 Recieve Mod Feedback via

The source from which the air-conditioning mode feedback is received is defined parametrically. Mode feedback may be disabled, obtained via the simplified mode, or derived from the values sent by the RTC itself.

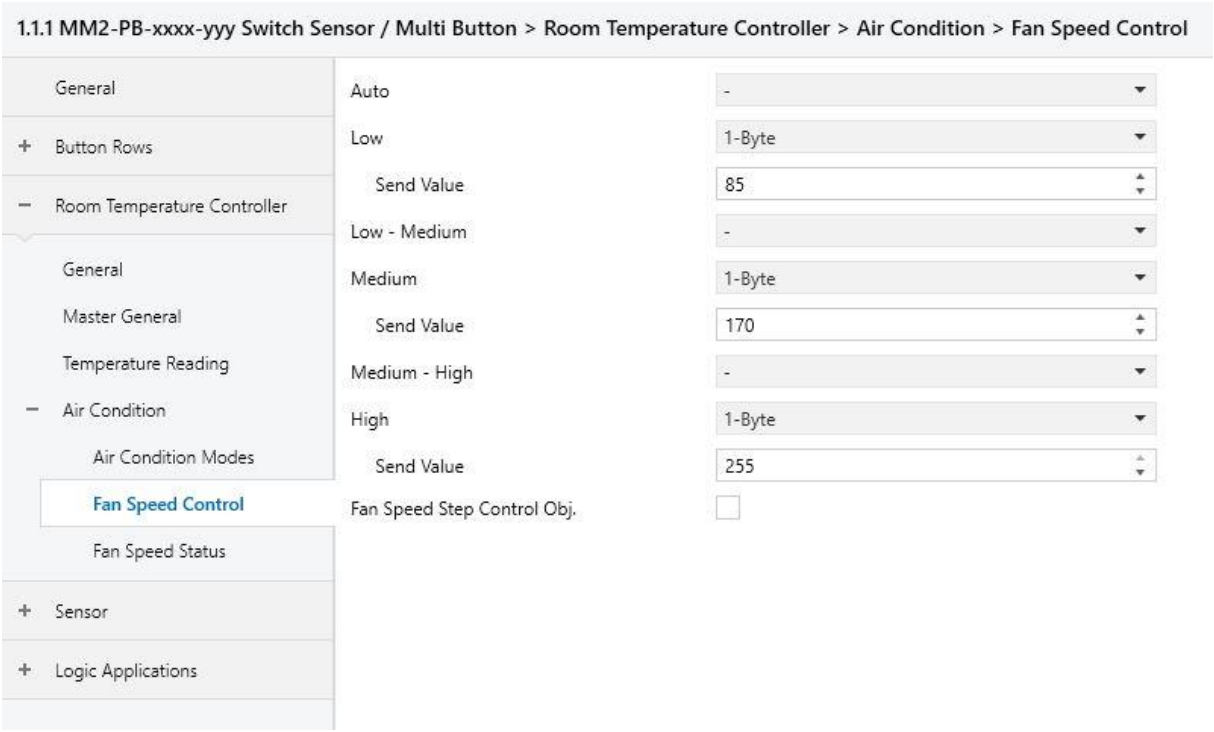
- **No Receive Data:** The RTC does not receive any feedback regarding the air-conditioning mode. In this case, the communication object for feedback is not displayed.

- **Simplified Mode:** The RTC receives the air-conditioning mode feedback via a 1-bit communication object in simplified mode. When selected, the corresponding communication object becomes visible. A received **ON** value indicates heating mode, while an **OFF** value indicates cooling mode.

Note:
If simplified mode is selected as the feedback source while it is not active, simplified mode is automatically enabled.

- **Same as Mode Selection:** The RTC accepts the values and data types it sends to the air conditioner as feedback at the same time. If the air-conditioning mode is selected as **DPT 20.105**, feedback is received from the corresponding communication object using the same values. If a custom configuration is selected, feedback communication objects become visible with the same data types as those defined for sending values. The RTC determines the operating mode based on the values received from these objects.

3.5.5.3 Fan Speed Control



3.5.5.3.1 Fan Stages

The RTC can send fan speed information to the air conditioner in up to five steps. If the air conditioner supports an automatic fan level, the automatic mode can also be transmitted. Each fan speed step can be individually configured in terms of data type and transmitted

value. The RTC sends the selected fan speed to the bus line using the data type and value defined here.

Fan speed levels can be selected as **Automatic, Low, Low-Medium, Medium, Medium-High, High**, and the data type and value for each level can be customized.

- **None:** The fan speed level is not selectable and is not displayed in the user interface.
- **1 Bit:** The fan speed level is transmitted via a 1-bit communication object. A value of **1 (ON)** indicates that the corresponding fan speed is active.
- **1 Byte:** When selected, the value required to activate the fan speed level is defined. When the fan speed is selected, this value is sent to the bus line via a 1-byte communication object.
- **Both:** When selected, the fan speed level is transmitted via both 1-bit and 1-byte communication objects. A specific value is defined for the 1-byte data type.

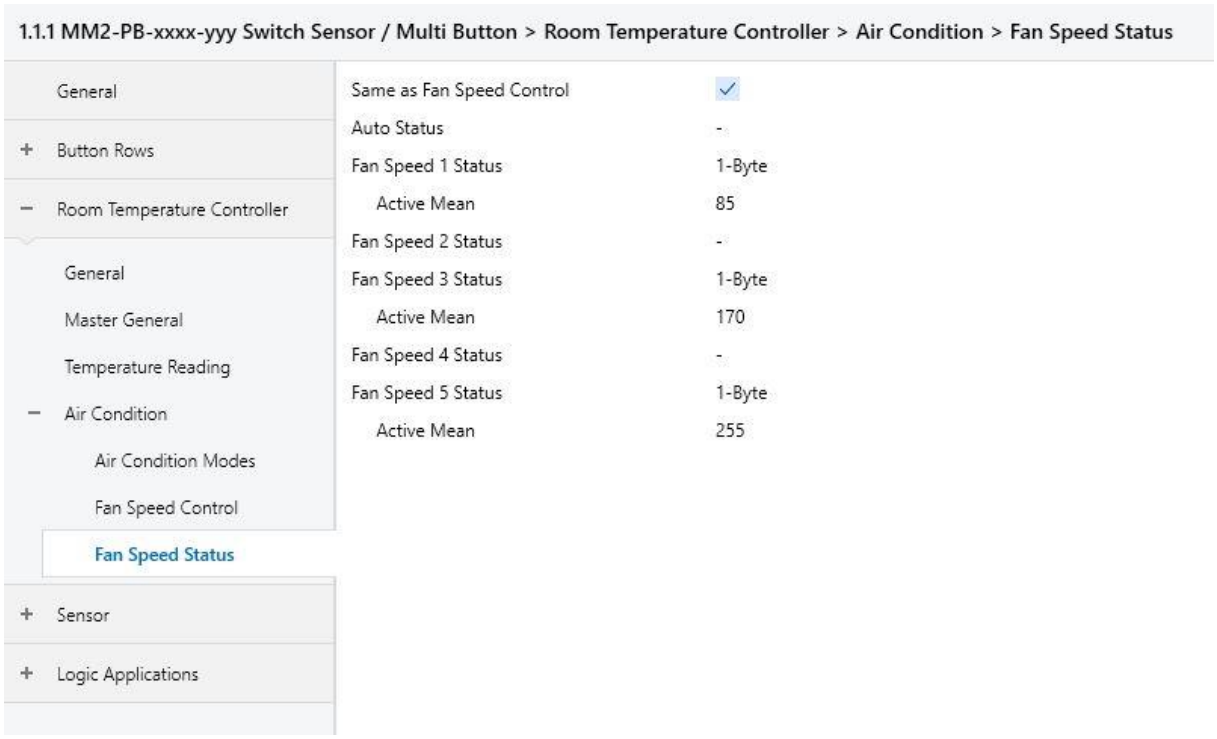
3.5.5.3.2 Fan Speed Step Control Object

Fan speed levels can be changed step by step via a single communication object with a data length of 1 bit. When this parameter is enabled, the corresponding communication object becomes visible.

- **ON:** Increases the fan speed level.
- **OFF:** Decreases the fan speed level.

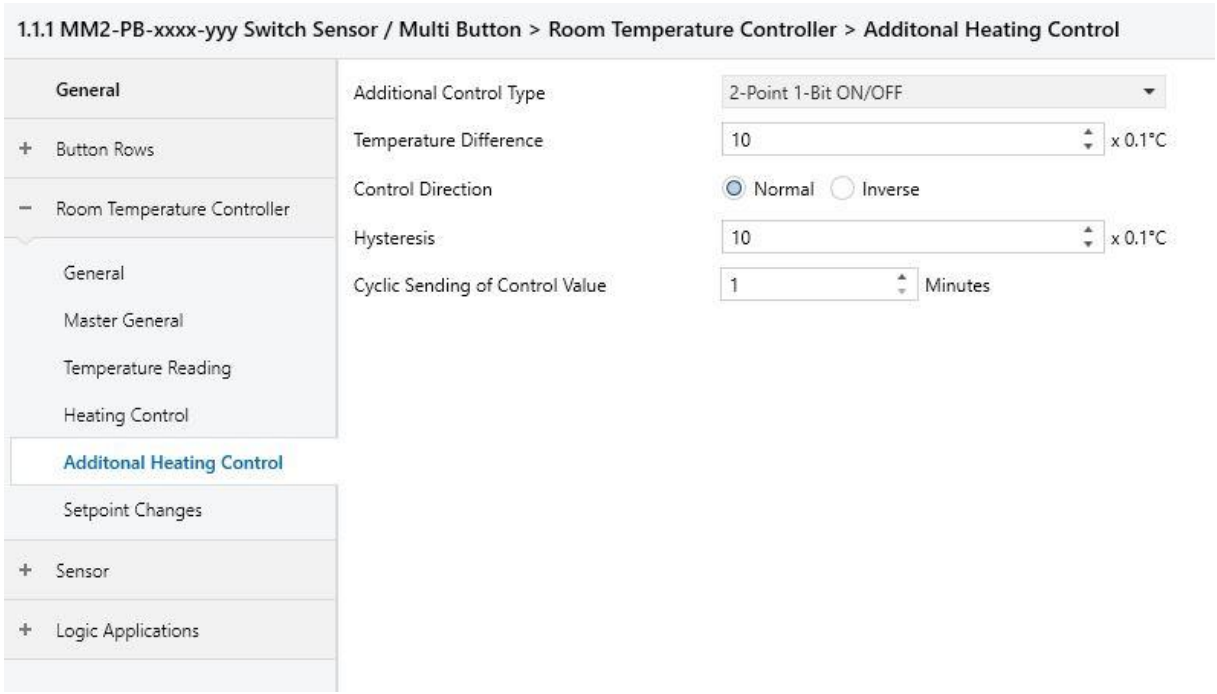
3.5.5.3.3 Fan Speed Status

The fan speed feedback received from the air-conditioning unit can be customized and configured parametrically. This feedback can be received in the desired data length and format. In addition, if required, the RTC can synchronize the fan speed feedback received from the air-conditioning unit with the fan speed commands sent by the RTC. This parameter is used when the fan speed values are received exactly as transmitted by the air-conditioning unit.



3.6 Additional Heating / Cooling Control

The RTC can be configured to operate in additional heating or cooling zones. These zones are selected when a secondary heating element is present in the heating zone or a secondary cooling element is present in the cooling zone. Additional zones can be activated when the primary heating or cooling element is insufficient to reach the set temperature or when a faster response is required. These settings are configured via the additional zone parameters.



3.6.1 Additional Control Types

In this section, all control types supported by the RTC can be selected. The selection is made according to the type of the secondary heating or cooling element. The RTC calculates the control value based on the temperature difference between the ambient temperature and the setpoint and generates the appropriate output accordingly.

- **2-Point 1-Bit, ON/OFF:**
  Two-point control is the simplest control type. When the room temperature falls below the set temperature minus the hysteresis value, the thermostat switches on; when it rises above the set temperature plus the hysteresis value, the thermostat switches off. On and off commands are transmitted as 1-bit signals.

- **2-Point 1-Byte, 0/100%:**
  This control type is also based on the two-point control principle. However, the on and off commands are transmitted as 1-byte values (0% / 100%).

- **PI Continuous, 0–100%:**
  The PI controller adjusts the output value between 0% and 100% to minimize the difference between the measured value and the setpoint, ensuring precise temperature control. The control value is transmitted to the bus line as a 1-byte value (0%–100%). To reduce bus load, the control value is transmitted only when a defined percentage change relative to the previously transmitted value occurs. The control value can also be transmitted cyclically.

- **PI PWM, On/Off:**
  This control type is also based on a PI controller; however, the output is generated as a 1-bit command. The calculated control value is converted into a pulse width modulation (PWM) signal to perform on/off control.

- **Fan Coil:**
  The fan coil controller operates similarly to the PI continuous controller. In addition, it enables independent control of the fan within the fan coil unit (e.g. fan speed levels 1–5).

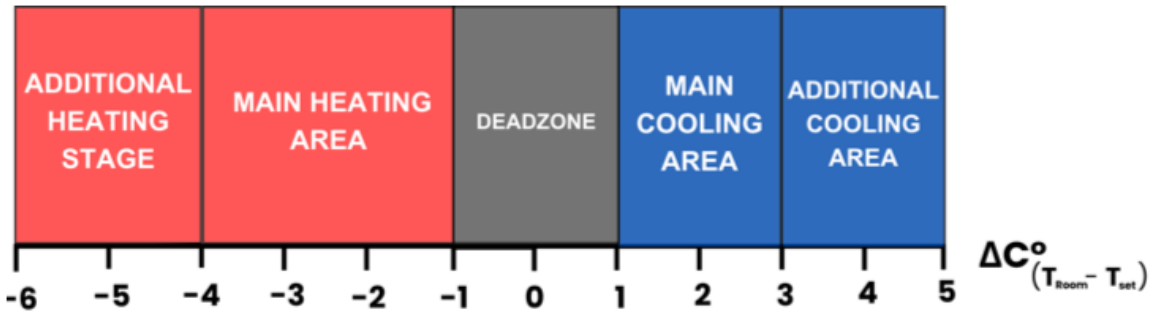
- **Air Conditioning:**
  Air-conditioning control is used to bring the ambient temperature to the defined setpoint and maintain it at that level. The thermostat evaluates the difference between the ambient temperature and the set temperature and sends on/off commands to the air-conditioning unit accordingly. To ensure precise temperature control, the system periodically adjusts the operating mode (heating or cooling) and fan speed of the air-conditioning unit. This control type maximizes comfort while increasing energy efficiency.

Note:
For fan coil and air-conditioning control types, the main zone and the additional zone cannot be configured with the same control type. If the main zone is configured as fan coil, the

additional zone cannot be fan coil. Likewise, if the main zone is configured as air conditioning, the additional zone cannot be configured as air conditioning.

3.6.2 Temperature Difference

The activation timing of the additional zone is determined based on the temperature difference between the main zone setpoint and the ambient temperature, and this value is configured parametrically. The defined temperature difference specifies the threshold at which the additional zone becomes active.

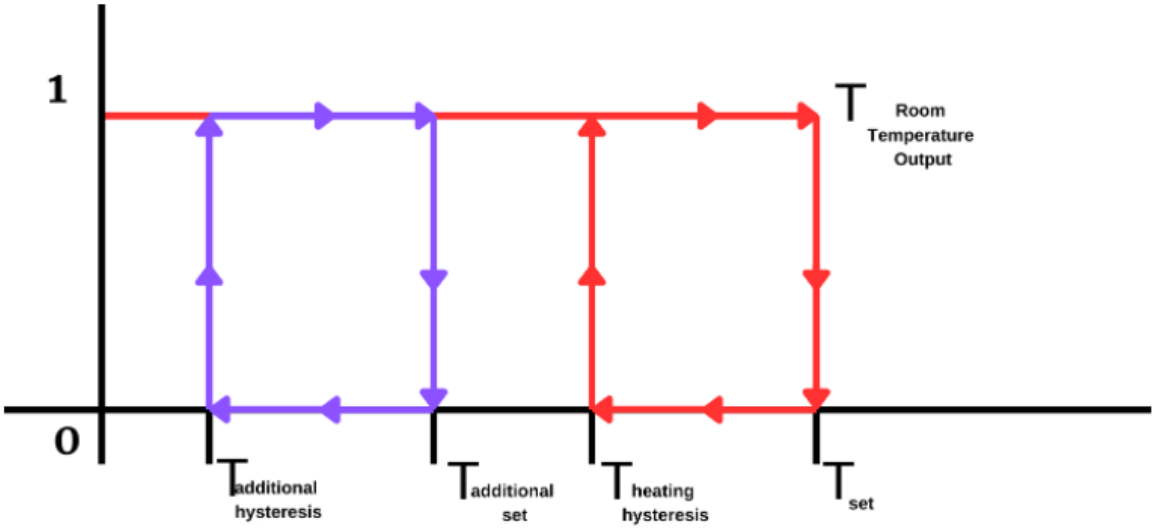


Note:
If the additional zone set temperature difference is set to **0**, the main zone and the additional zone are activated simultaneously.

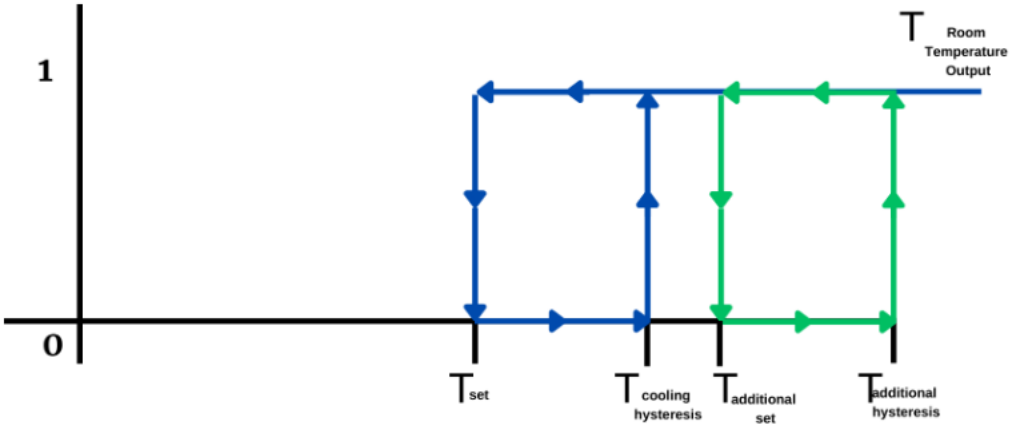
3.6.3 Additional Stage Hysteresis

When the required temperature difference for activating the additional zone is reached, the RTC activates the additional zone. The additional zone controls the environment until the temperature difference defined in the parameters is eliminated, after which it is deactivated. Subsequently, the system enters a standby state for the duration defined by the hysteresis value. Depending on the heating or cooling zone, the additional zone is reactivated when the ambient temperature increases or decreases by the hysteresis value.

Hysteresis Operation for Additional Heating Zone

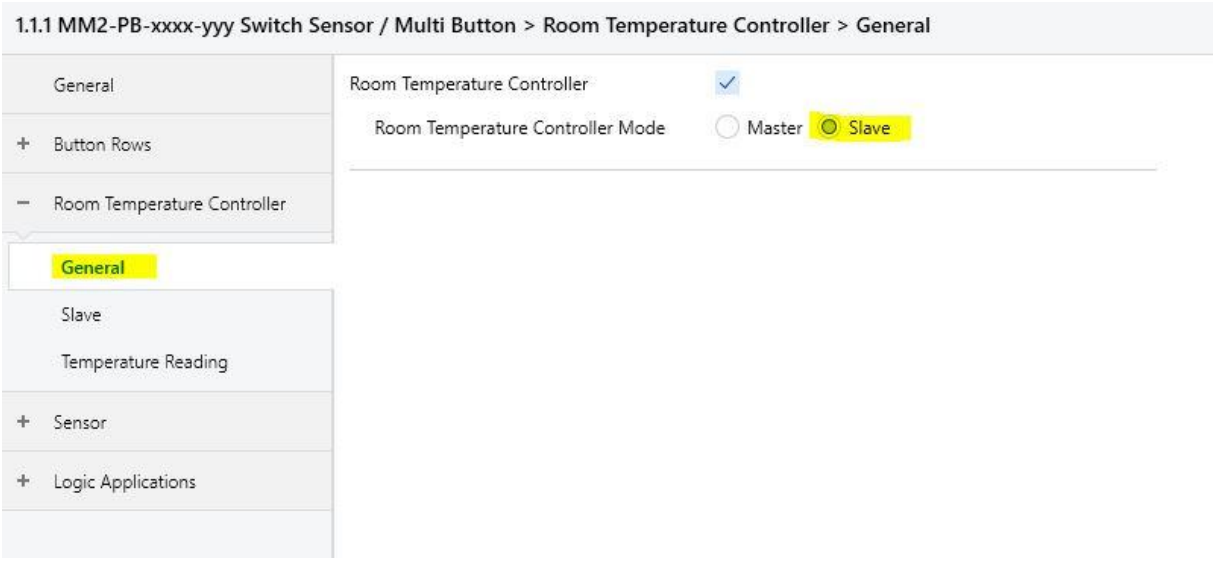


Hysteresis Operation for Additional Cooling Zone

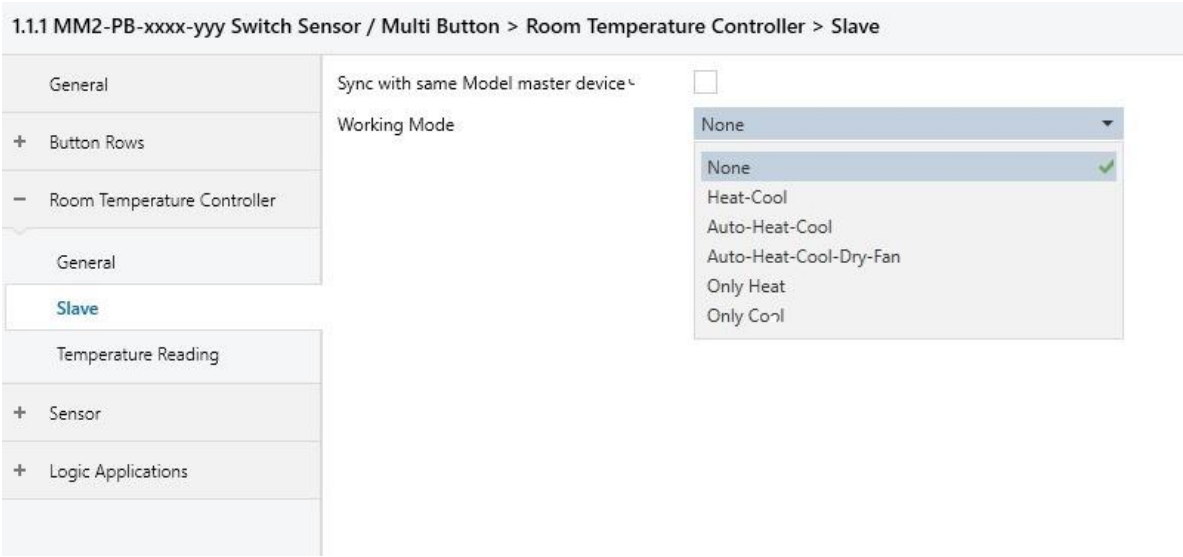


3.7 SLAVE

If the same space is to be controlled by more than one thermostat, the RTC can be programmed as a slave device connected to a master device. In this operating mode, the RTC transmits setpoint temperature, operating mode, active zone (heating or cooling), ambient temperature, window contact status, occupancy information, fan speed level, and fan automatic/manual mode information to the master device via the bus line, and receives feedback from the master device.



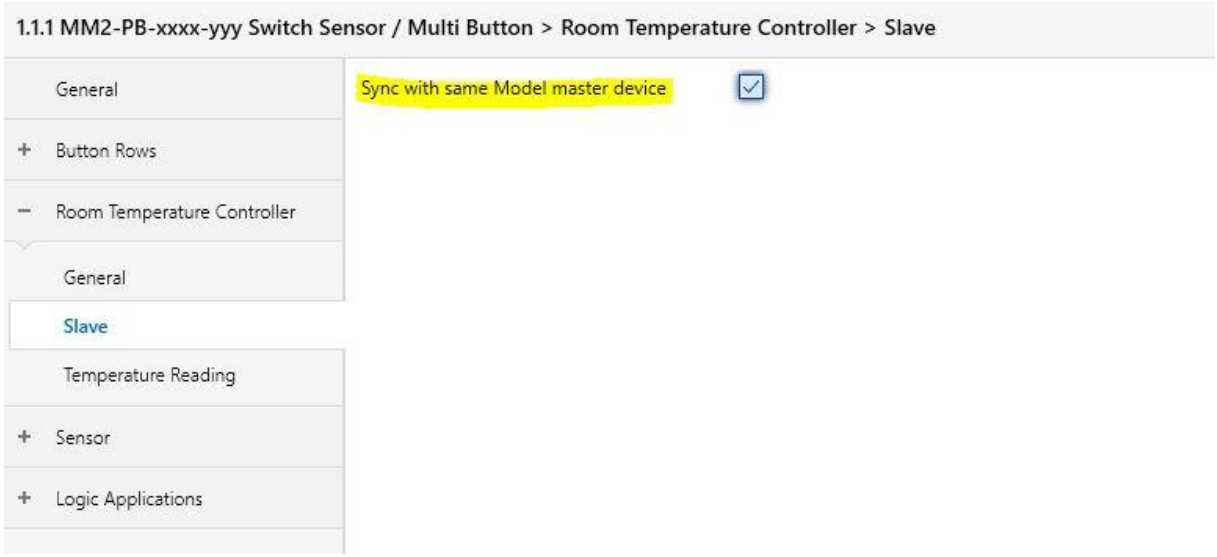
Note:
Non-display models of the MM2-PB-xxxx-yy-1zz series cannot be programmed as slave devices.



3.7.1 Synchronization with the Same Model Master Device

If both the master and slave devices belong to the MM2-PB-xxxx-yy-1zz series, the configurations made on the master device can be transferred to the slave device via the relevant communication objects. This ensures optimal and consistent communication

between the master and slave devices.



Group Object 100

Packet 0 Configuration

Bit Nr	Properties	Bit Count	Description	
1	AutoSelectable	1	Automatic mode selectable	Function Menu
2	HeatSelectable	1	Heat mode selectable	
3	CoolSelectable	1	Cool mode selectable	
4	FanSelectable	1	Fan mode selectable	
5	DrySelectable	1	Dry mode selectable	
6	FunctionSelected	6	Number of selected function	
7	FunctionSelected			
8	FunctionSelected			
9	FunctionSelected			
10	FunctionSelected			
11	FunctionSelected			
12	HeatingSelected	1	Auto with Heat	
13	CoolingSelected	1	Auto with Cool	
14	ComfortSelectable	1	Comfort selectable	HVAC Menu
15	StandbySelectable	1	Standby selectable	
16	EconomySelectable	1	Economy selectable	
17	BuildProtetictionSelectable	1	BuildProtection selectable	
18	ShowAllFanStage	1	For air conditioning, it is used to open all fan stages and switch between the Enable ones	FAN Menu
19	FanAutoSelectable	1	FanAuto selectable	
20	OffSelectable	1	FanOff selectable	
21	Fan1Selectable	1	Fan1 selectable	
22	Fan2Selectable	1	Fan2 selectable	
23	Fan3Selectable	1	Fan3 selectable	
24	Fan4Selectable	1	Fan4 selectable	
25	Fan5Selectable	1	Fan5 selectable	
26	Reserved	5	Reserved area	
27	Reserved			
28	Reserved			
29	Reserved			
30	Reserved			
31	PacketID	1	For this packet, the PacketID is 0	
32	Sign	1	For this packet, the SignID is 1	

Note

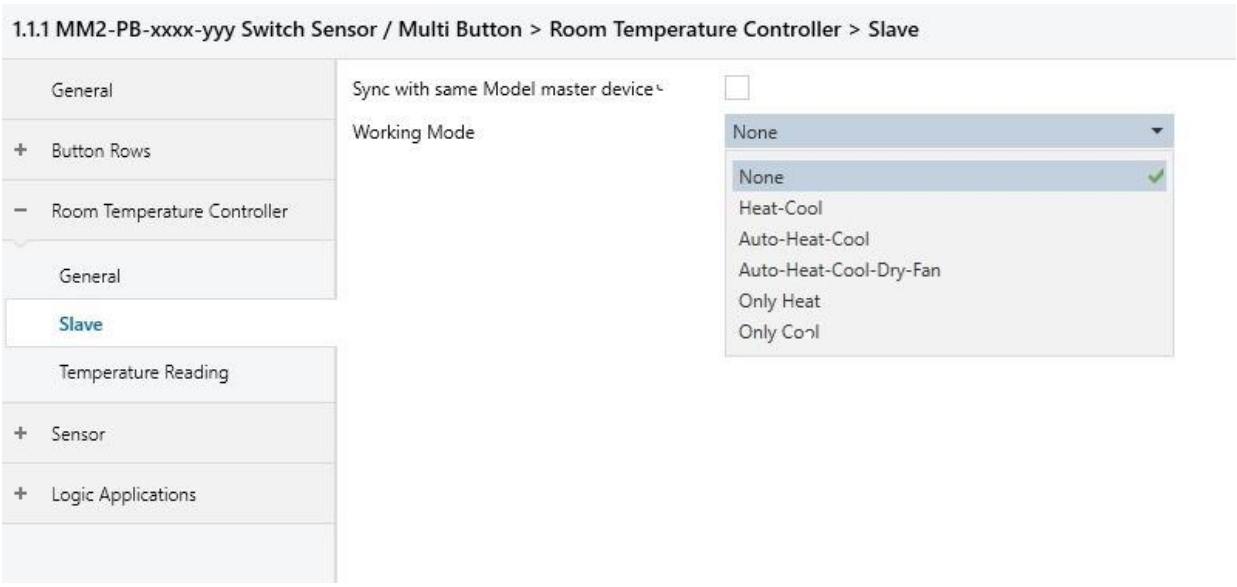
When a the bus group object is read, it initially returns a value of 0. After 500 ms, it sends packet1 and packet2 from the same object on If there are any changes in the packet values, only the updated packet values are sent on the bus.

Group Object 101

Value	Object Function	Description
0	FanOff	Fan Stage 0
1	Fan1	Fan Stage 1
2	Fan2	Fan Stage 2
3	Fan3	Fan Stage 3
4	Fan4	Fan Stage 4
5	Fan5	Fan Stage 5
6	FanNone	Fan menu closed, only for slave
10	FanAutoOff	Fan Stage Automatic 0
11	FanAuto1	Fan Stage Automatic 1
12	FanAuto2	Fan Stage Automatic 2
13	FanAuto3	Fan Stage Automatic 3
14	FanAuto4	Fan Stage Automatic 4
15	FanAuto5	Fan Stage Automatic 5
16	FanAuto	Fan Stage only auto

Table 21: RTC-11 Communication Object

3.7.2 Working Mode



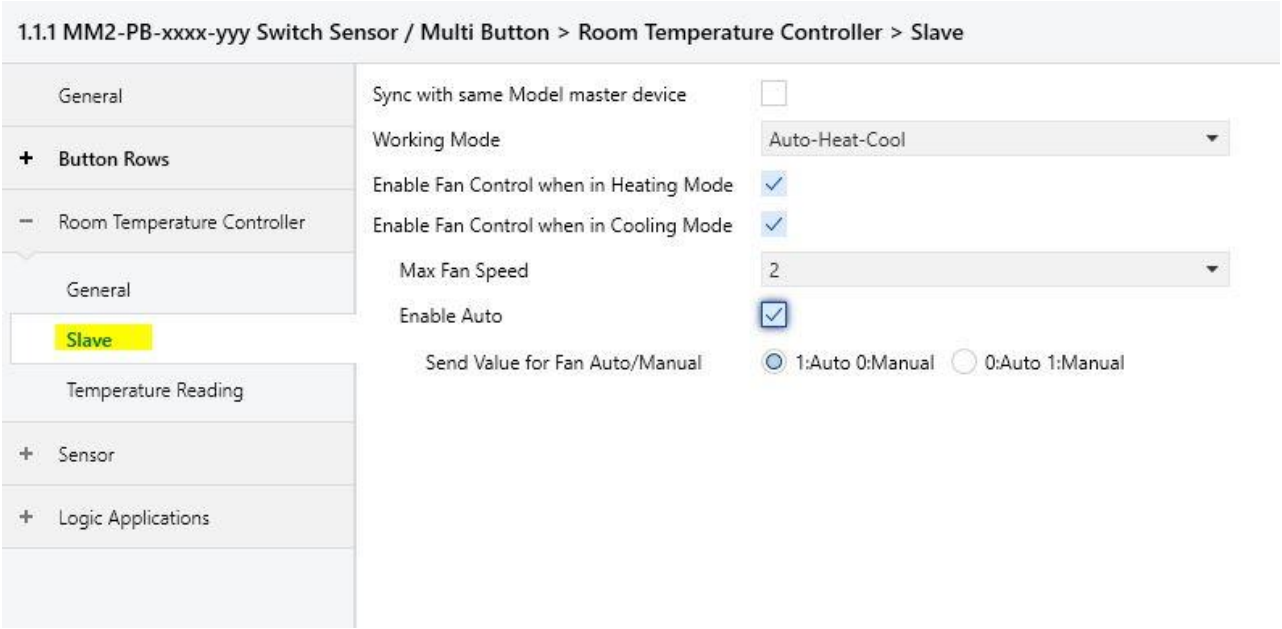
When operating in slave mode, the RTC can transmit the heating–cooling zone information to the bus line or receive it from the bus line. If the master RTC supports automatic heating–cooling zone switching, the **automatic / heating / cooling** option can be selected in this section. If the master device does not support automatic mode, the **heating / cooling** option is selected instead.

If the master device controls an air-conditioning system and additional operating modes are used, **heating**, **cooling**, **fan**, and **dry mode** modes can be selected here. These selections directly affect the corresponding communication objects and display menus.

Note:
When operating in slave mode, the RTC always transmits the heating–cooling zone information to the bus line with a data length of 1 bit.

3.7.3 Enable Fan Control in Heating Mode

The RTC can operate the ventilation (fancoil, air conditioning) system when in heating mode. The fan configuration can be synchronized with the master device using these parameters.



3.7.4 Enable Fan Control in Cooling Mode

While the RTC operates in the cooling zone, it can control ventilation systems such as fan coil units or air-conditioning systems. Through these parameters, the fan configuration can be synchronized with the master device.

3.7.5 Max Fan Speed

This parameter defines the maximum fan speed level of the controlled ventilation system. The fan levels defined here are selectable by the user via the display.

3.7.6 Enable Auto

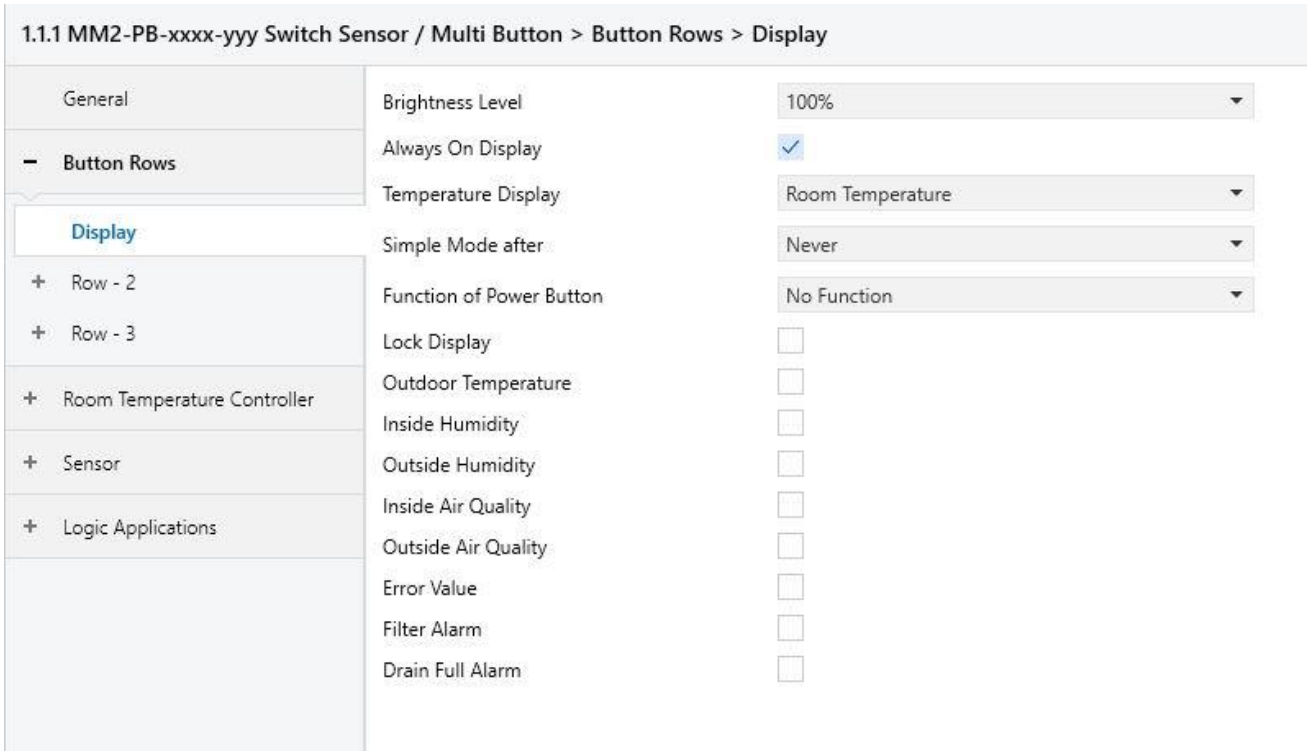
This parameter defines whether automatic mode is enabled for the fan speed. If the master device performs automatic fan control, this option is enabled. The transmitted and received values for the automatic fan level are then configured accordingly.

- **1: Automatic, 0: Manual:**
  Automatic mode is enabled by transmitting a **1 (ON)** value with a data length of 1 bit, and the same value is used for feedback.
- **0: Automatic, 1: Manual:**
  Automatic mode is enabled by transmitting a **0 (OFF)** value with a data length of 1 bit, and the same value is used for feedback.

3.7.7 Temperature Reading

Note:
This function is identical to the RTC Master **Temperature Reading** function (see 3.3 Temperature Reading).

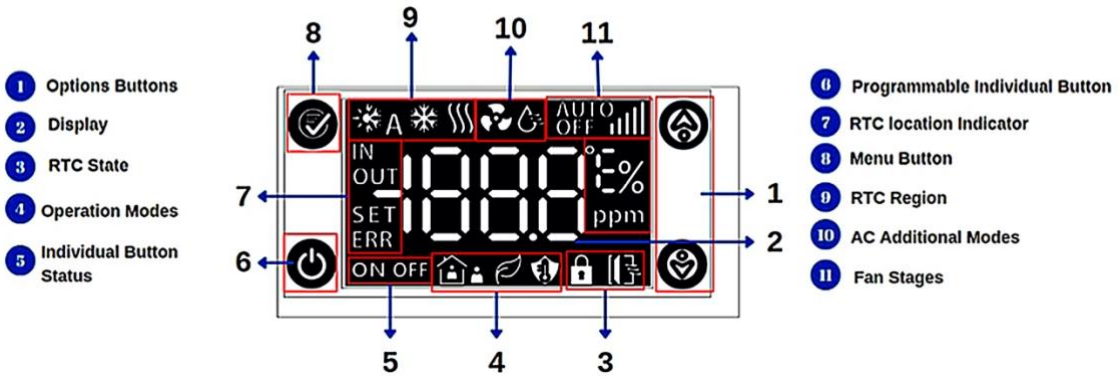
3.8 Display



3.8.1 Brightness Level

This parameter defines the brightness level of the display. The display brightness is adjusted according to the selected percentage value. A value of 100% represents maximum brightness, while 25% represents the lowest brightness level.

3.8.2 Always-On Display



This parameter determines whether the display remains permanently on. When enabled, the display stays on continuously at the configured brightness level. When disabled, a timeout period is defined for the display backlight. After the specified duration, the display turns off and is reactivated upon the next touch. Each time the display is activated, the timeout counter is reset and the display turns off again after the defined period.

The display can cyclically show either the set temperature, the calculated room temperature, or both pieces of infor- mation. This selection is parameterized. The set temperature can be changed using the selection buttons without the need to enter any menu. When the RTC menu button is pressed, the display shows the following menus in sequence if configured from parameters or if they can be controlled: “Fan Menu,”“Operation Mode Menu,”“RTC Operating Area,” “Air Conditioning Additional Modes,” and “RTC Additional Indicators” (including external temperature, internal humi- dity, external humidity, indoor air quality, outdoor air quality, error, error value, filter alarm, filter alarm reset, drainage full alarm).

The RTC screen includes a programmable button (6), and the button feedback (5) can be monitored on the screen.

The RTC operating area (9) is displayed on the screen. When determining the area, four icons can light up: Heating only (heating icon lights up alone), Cooling only (snowflake icon lights up alone), Automatic mode in the heating area (both automatic and heating icons light up), and Automatic mode in the cooling area (both automatic and snowflake icons light up).

.Menus that are not controlled, not permitted, or not available in the system are not displayed on the screen and are skipped automatically.

3.8.3 Temperature Display

This section defines which temperature value is displayed on the screen. The set temperature, ambient temperature, or both can be selected. When both values are selected, the display alternates between the set temperature and ambient temperature at the defined interval. The set temperature represents the value defined in the RTC parameters. Communication object “Temperature Set Value (Object 21)” displays its value when the RTC parameter is inactive. When the RTC function is active, the RTC set temperature is displayed.

3.8.4 Function of the Power Button

The lower-left area of the display can operate as a customizable button. This button can be configured to toggle between comfort and protection operating modes or can be disabled entirely. This selection is parameter-based.

- **No Function:** The button is disabled; the icon and related communication objects are not displayed.

- **Comfort/Protection Mode Selection:** Toggles between comfort and protection modes. Each press switches the active mode.

Note:
This parameter is valid only when the RTC function is active. When the RTC function is inactive, the button has no function because no RTC operating mode is available.

- **Individual Toggle Button:** The button can be programmed as an independent input. In this mode, communication objects become available for sending and receiving 1-bit values. The on/off icons on the display are updated via the feedback object.

3.8.5 Lock Display

This parameter disables user control via the display. When a value of **1 (ON)** is received on the relevant communication object, the display is locked and user interaction is disabled. When a value of **0 (OFF)** is received, the display becomes controllable again. A lock icon is

displayed on the screen while the display is locked.

3.8.6 Outdoor Temperature

This parameter defines whether the outdoor temperature information is displayed on the screen. When enabled, the outdoor temperature is shown on the display. The **“Out”** indicator is displayed, and the temperature value is shown in **Celsius (°C)**.

3.8.7 Inside Humidity

This parameter defines whether the indoor humidity level is displayed on the screen. When enabled, the indoor humidity value is shown. The **“In”** indicator appears on the display, and the value is shown as a percentage (**%**).

3.8.8 Outside Humidity

This parameter defines whether the outdoor humidity level is displayed on the screen. When enabled, the outdoor humidity value is shown. The **“Out”** indicator appears on the display, and the value is shown as a percentage (**%**).

3.8.9 Inside Air Quality

This parameter defines whether the indoor air quality information is displayed on the screen. When enabled, the indoor air quality value is shown. The **“In”** indicator appears on the display, and the value is shown in **ppm**.

3.8.10 Outside Air Quality

This parameter defines whether the outdoor air quality information is displayed on the screen. When enabled, the outdoor air quality value is shown. The **“Out”** indicator appears on the display, and the value is shown in **ppm**.

3.8.11 Error Information

When this option is enabled, error status information is displayed in the screen menus. If an error code is available, the error code is displayed while the **“Err”** icon blinks. If no error code is available, only the **“Err”** icon blinks.

3.8.11.1 Error Code

The error code is displayed numerically on the screen. Error codes up to a decimal value of **1999** can be displayed.

3.8.12 Filter Alarm

An alarm message is displayed when the filter needs to be cleaned or replaced. When this option is enabled, the filter alarm is monitored. When an alarm occurs, the **“fil”** indicator appears in the screen menus and the **“Err”** icon blinks.

3.8.12.1 Filter Reset

This communication object is used to reset the filter alarm. When the filter alarm is active, a button for resetting the filter is displayed in the lower-left corner of the screen. Pressing and holding this button sends a **1-bit value of 1 (ON)** to the bus line to reset the filter.

3.8.13 Drain Full Alarm

An alarm message is displayed when the drain tank is full. When this option is enabled, the drain level alarm is monitored. When an alarm occurs, the **“Ful”** indicator appears in the screen menus and the **“Err”** icon blinks.

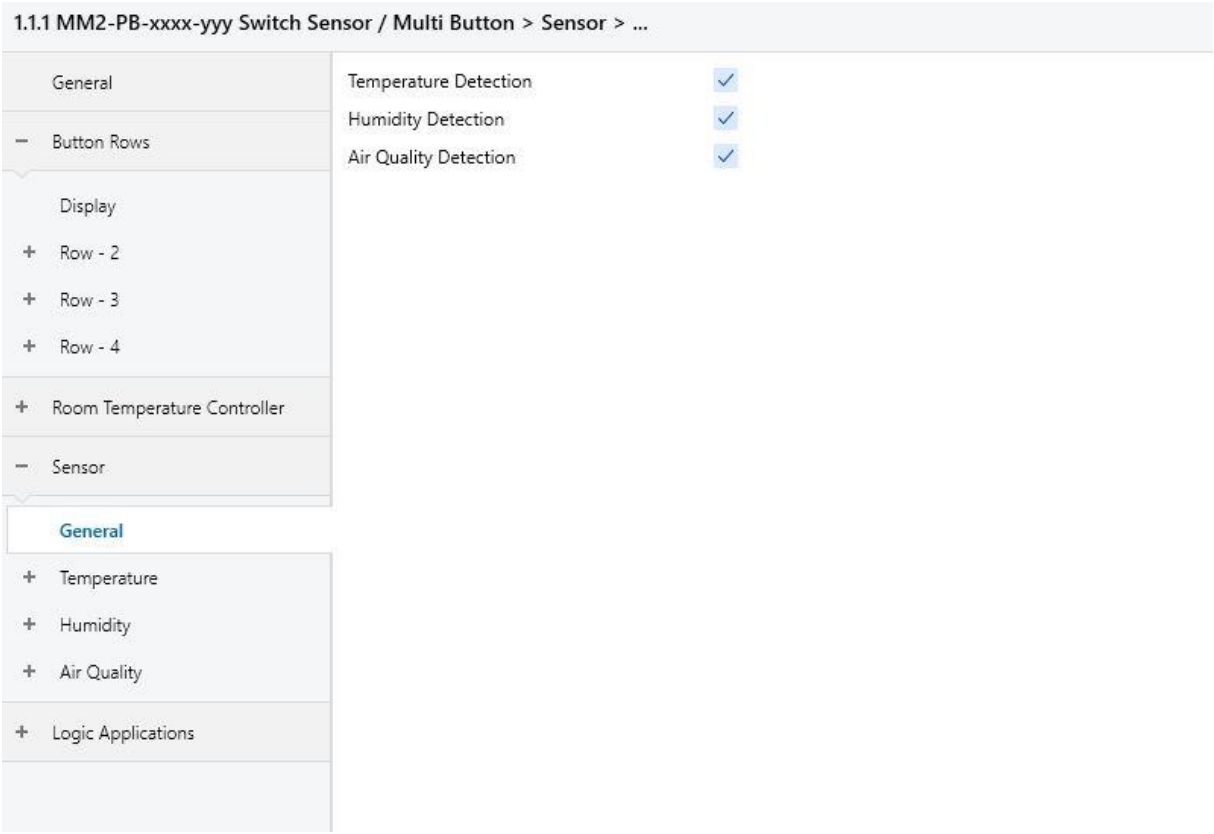
3.8.14 Display Unit

This communication object defines the unit used to display temperature values on the screen.

- **0:** Celsius
- **1:** Fahrenheit

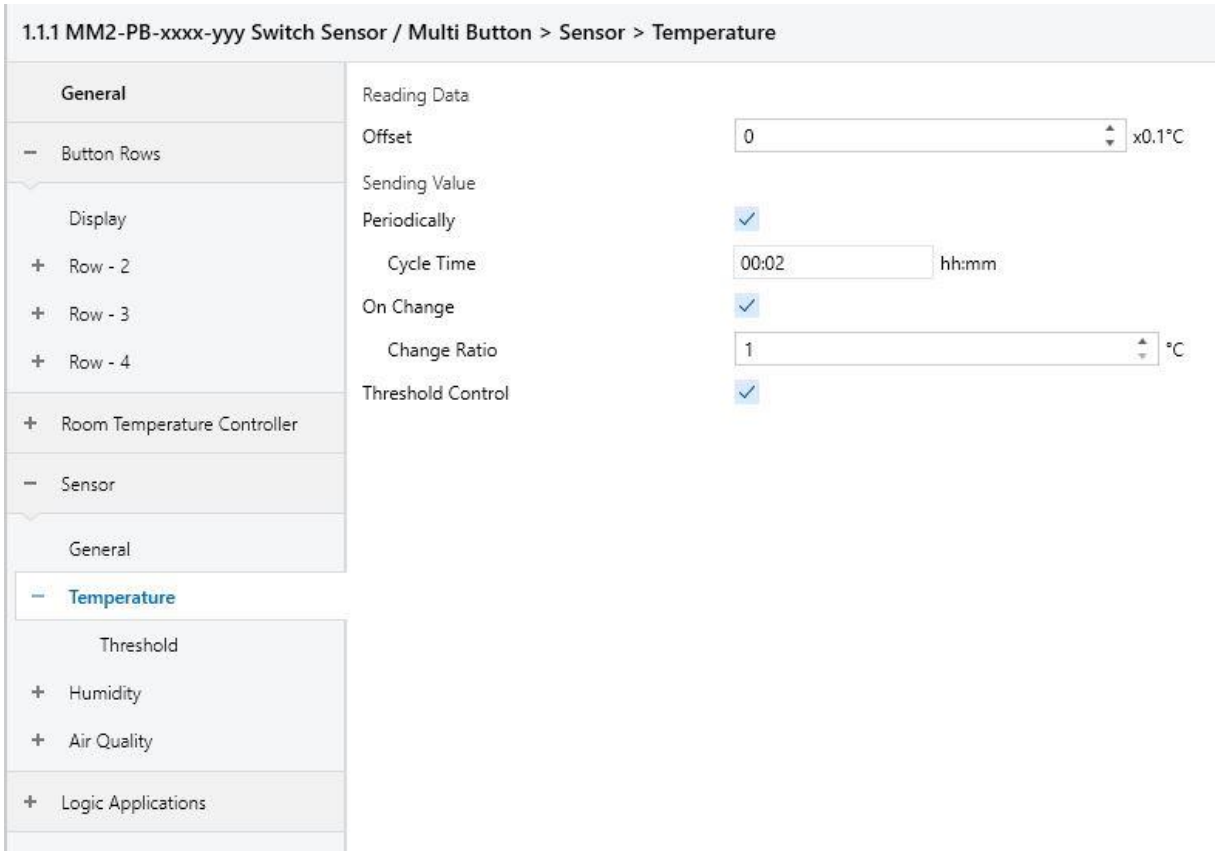
When set to **1 (ON)**, temperatures are displayed in Fahrenheit; when set to **0 (OFF)**, temperatures are displayed in Celsius. After an RTC restart, temperature values are displayed in Celsius by default.

4 Sensor



4.1 Temperature Detection

The integrated temperature sensor built into the device is used to measure the ambient temperature level. The measured temperature value is utilized both in temperature detection processes and within the RTC (Room Thermostat) functions.



4.1.1 Offset

Due to the mounting position of the device being higher on the wall, the temperature measured by the internal sensor may differ from the perceived ambient temperature. This difference can be compensated by comparing the measured value with external or portable thermometers and applying an offset value. The offset range is defined as **(-128…0…128) × 0.1**, allowing temperature adjustment between **-12.8 °C and +12.7 °C**. The default value is **0 °C**.

4.1.2 Sending Value Method

Two different methods can be used to transmit the measured temperature value to the KNX bus. If neither method is enabled, the current temperature value is returned as a **Response** via the same communication object when a **Read** request is received on that object.

4.1.2.1 Periodically

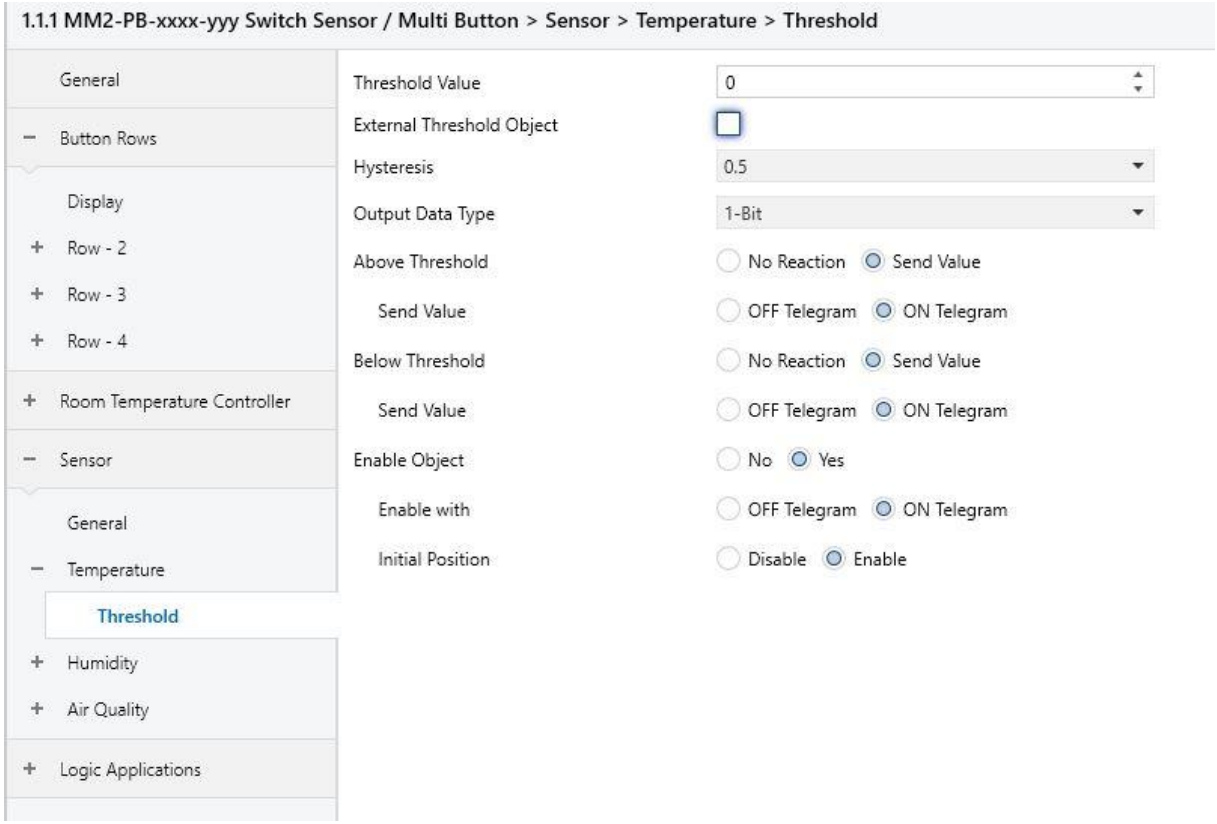
The measured temperature value is transmitted periodically to the bus line at intervals defined parametrically by the user. This interval can be set between **2 and 255 minutes**. The default value is **2 minutes**.

4.1.2.2 Change Amount

When the temperature value changes by more than the amount defined parametrically by the user (**between 1 and 50 °C**), the current temperature value is transmitted to the bus line. The default value is **1 °C**.

4.1.3 Threshold

This section allows defining a temperature threshold so that specific actions can be triggered when the measured temperature exceeds or falls below this threshold.



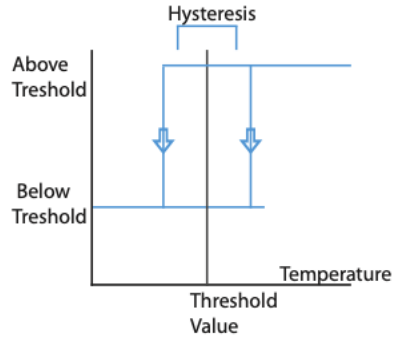
4.1.3.1 Threshold Value

The temperature threshold to be monitored is defined using this parameter. The default threshold value is **23 °C**.

4.1.3.2 External Threshold Object

When this parameter is enabled, the threshold value can be changed externally via the KNX bus using the **Temperature Threshold Value** communication object.

4.1.3.3 Hysteresis



This parameter defines the total tolerance range around the specified threshold value. A value between **0.5 °C and 10 °C** can be selected. For a threshold crossing to occur, the measured temperature must exceed the hysteresis range around the threshold. For example, if the threshold is set to **23 °C** and the hysteresis is set to **2 °C**, threshold actions are triggered when the measured temperature drops below **22 °C** or rises above **24 °C**.

4.1.3.4 Output Data Type

This parameter defines the data type used to transmit the decision resulting from the threshold evaluation to the bus line. Depending on the application, one of the following options can be selected: **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** mode.

4.1.3.5 Above Threshold

This parameter defines the action to be executed when the room temperature exceeds the tolerance-adjusted threshold value. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the **“Threshold Status”** is sent to the bus line.

4.1.3.6 Below Threshold

This parameter defines the action to be executed when the room temperature falls below the tolerance-adjusted threshold value. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the **“Threshold Status”** is transmitted to the bus line.

4.1.3.7 Enable Object

This parameter is used to fully enable or completely disable the Temperature Sensor Threshold Control function. **“No”** or **“Yes”** can be selected. The default value is **“No”**. When enabled, the related sub-parameters and the **“230 – Temperature Enable Input”** active/passive communication object become visible.

4.1.3.8 Enable Value

“OFF Command” indicates that the function is activated when a 1-bit **0 (zero)** command is received, while **“ON Command”** indicates activation when a 1-bit **1 (one)** command is received. The default value is **“ON Command”**.

4.1.3.9 Initial Positions

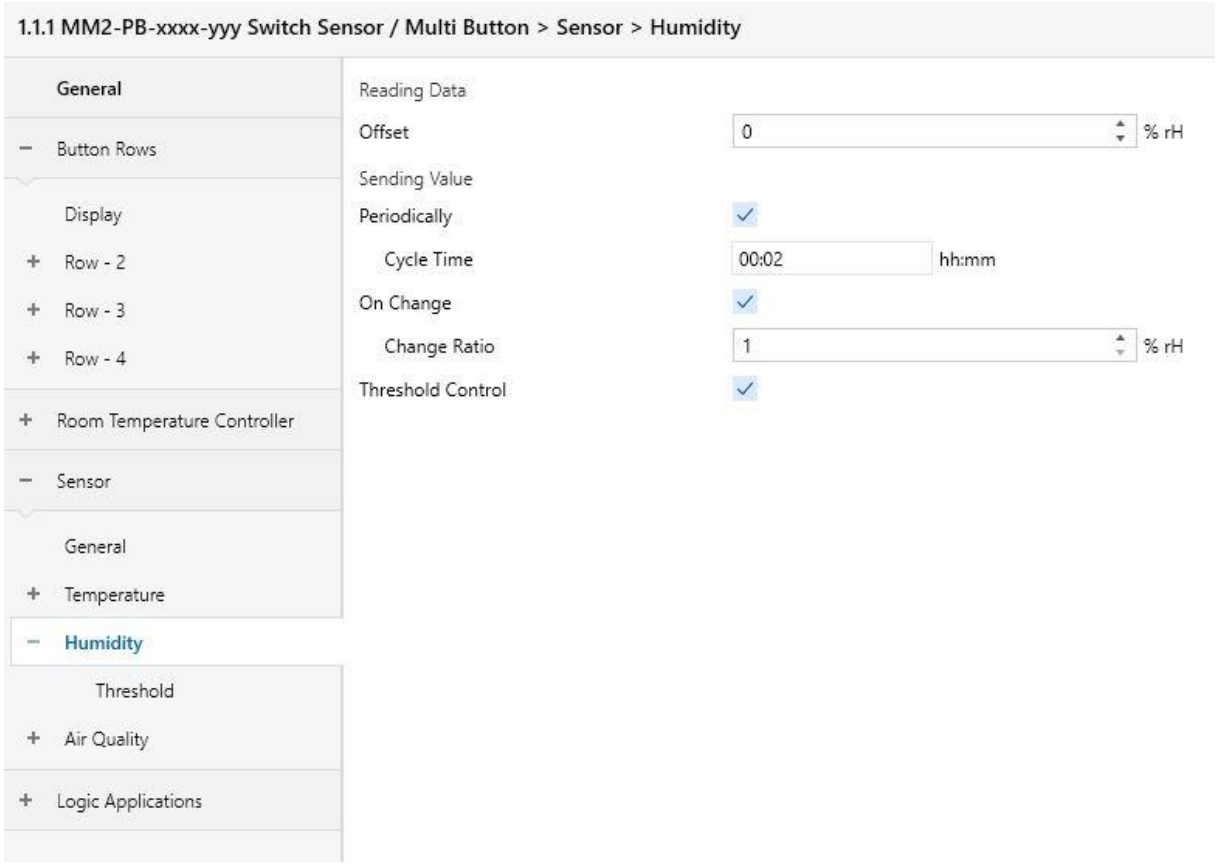
This parameter defines the state of the device at startup. If **“Active”** is selected, the function starts operating immediately when the device is powered on. Otherwise, the **Temperature Detection** function does not start immediately after startup.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
230	Temperature	Enable Input	Input	1-bit	1.003 Enable	C	-	W	-
231	Temperature	Value Output	Output	2 byte	9.001 Temperature	C	R	-	T
232	Temperature	Treshold Value	Output	2 byte	9.001 Temperature	C	R	-	T
			Input/Output	2 byte	9.001 Temperature	C	R	W	T
233	Temperature	Treshold Status	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	17.001 Scene Nr	C	-	-	T
				2-byte	20.102 HVAC Mode	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T

Table 23: Temperature Communication Section Objects

4.2 Humidity Sensor

This function is used to transmit the relative humidity value measured by the device’s internal humidity sensor to the KNX bus line.



4.2.1 Offset

Due to its installation position, the internal humidity sensor may measure values that differ from the perceived ambient humidity. To compensate for this difference, an offset value can be applied. The offset can be adjusted between **–50 and +50**. The default value is **0%**.

4.2.2 Sending Value

Two different methods can be used to transmit humidity information to the KNX bus line. If neither method is selected, the current humidity value is returned as a **Response** via the same communication object when a **Read** request is received.

4.2.2.1 Periodically

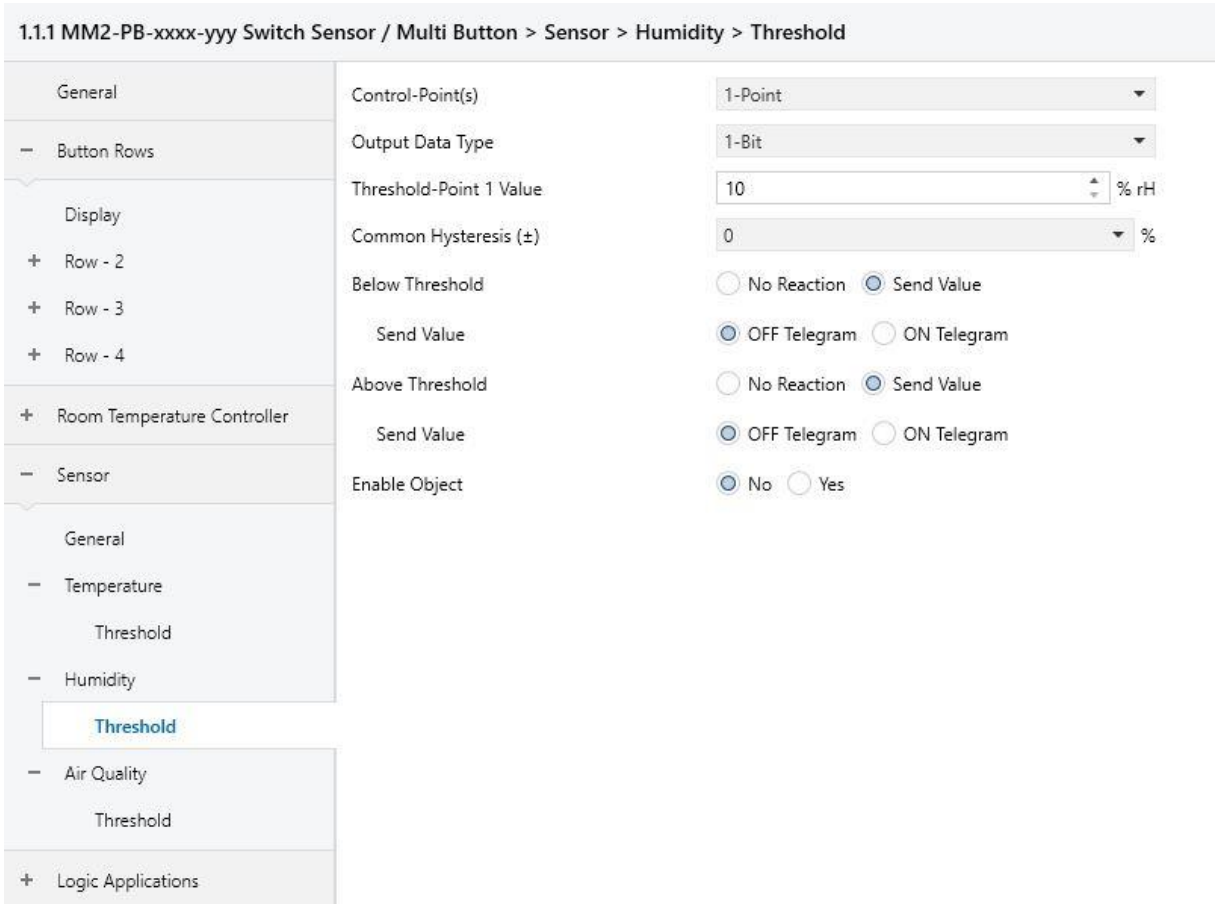
Defines the transmission interval of the measured humidity value via the **“7 – Humidity”** communication object. The interval can be set between **2 and 255 minutes**. The default value is **2 minutes**.

4.2.2.2 Change Amount

When the humidity value changes by more than the amount defined parametrically by the user (**1%–100%**), the current humidity value is transmitted to the bus line. The default value is **1**.

4.2.3 Threshold Control

This parameter enables threshold-based processing for the measured humidity value. Actions can be triggered when the defined threshold is exceeded or fallen below. **“Passive”** or **“Active”** can be selected. When activated, the related sub-parameters become visible.



4.2.3.1 Hysteresis

This parameter defines the total tolerance range around the defined threshold value. A value between **2% and 50%** can be selected. Threshold activation is one-sided and operates in the negative direction.
For example, if the threshold value is set to **50%** and the hysteresis to **10%**, the above-threshold state is activated at **50%**, and the below-threshold state is activated when the humidity drops to **45%**.

4.2.3.2 Output Data Type

Defines the data type used to transmit the decision resulting from the threshold evaluation to the bus line. One of the following options can be selected: **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”**.

4.2.3.3 Enable Object

This parameter is used to fully enable or disable the Humidity Sensor Threshold Control function. **“No”** or **“Yes”** can be selected. The default value is **“No”**. When enabled, the related sub-parameters and the **“250 – Humidity Enable Input”** active/passive communication object become visible.

4.2.3.4 Enable Value

“OFF Command” indicates that the function is activated when a 1-bit **0 (zero)** command is received, while **“ON Command”** indicates activation when a 1-bit **1 (one)** command is received. The default value is **“ON Command”**.

4.2.3.5 Initial Positions

This parameter defines the state of the device at startup. When **“Active”** is selected, the function becomes operational immediately when the device is powered on. Otherwise, the **Humidity Detection** function does not start immediately after startup.

4.2.3.6 Control Point

This parameter allows the humidity value to be monitored using **1**, **2**, or **3** different control points and enables transmission of the appropriate data to the corresponding communication object based on the evaluation result.

4.2.3.6.1 Control Point 1

4.2.3.6.1.1 Threshold Value Point 1

When control point 1 is enabled, a value between **10 and 90** can be entered in this parameter to perform threshold control.

4.2.3.6.1.2 Below Threshold

This parameter defines the action to be executed when the current humidity value falls below the tolerance-adjusted threshold value. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the values defined under **“1-bit”**, **“1-byte”**, **“1-**

byte Percentage”, **“HVAC”**, or **“Scene”** parameters are transmitted to the bus line as the **“Threshold Status”**.

4.2.3.6.1.3 Above Threshold

This parameter defines the action to be executed when the current humidity value exceeds the tolerance-adjusted threshold value. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the values defined under **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** parameters are transmitted to the bus line as the **“Threshold Status”**.

4.2.3.6.2 Control Point 2

4.2.3.6.2.1 Threshold Point 2 Value

When control point 2 is enabled, this parameter defines the percentage increment added on top of threshold point 1. One of the values **10%, 20%, 30%, 40%, 50%, or 60%** can be selected to create the second threshold point.
For example, if threshold point 1 is set to **40%** and this parameter is set to **20%**, threshold point 2 is defined as **60%**.

4.2.3.6.2.2 Between Threshold Point 1 and 2

This parameter defines the action to be executed when the current humidity value remains between tolerance-adjusted threshold point 1 and threshold point 2. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the value defined under one of the **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** parameters is transmitted to the bus line as the **“Threshold Status”**.

4.2.3.6.2.3 Above Threshold Value 2

This parameter defines the action to be executed when the current humidity value exceeds the tolerance-adjusted **Threshold Point 2**. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the value entered for one of the **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** parameters is transmitted to the bus line as the **“Threshold Status.”**

4.2.3.6.3 Control Point 3

4.2.3.6.3.1 Threshold Point 3 Value

This parameter becomes visible when Control Point 3 is enabled. It defines the additional percentage value to be added on top of **Threshold Point 2**. One of the values **10%, 20%, 30%, 40%, 50%**, or **60%** can be selected to configure the threshold control.
For example, if **Threshold Point 2** is set to **60%** and this parameter is set to **20%**, **Threshold Point 3** is defined as **80%**.

4.2.3.6.3.2 Between Threshold Point 2 and 3

This parameter defines the action to be executed when the current humidity value is between the tolerance-adjusted **Threshold Point 2** and **Threshold Point 3**. When **"No Action"** is selected, no command is transmitted. When **"Send Value"** is enabled, the values entered for the **"1-bit"**, **"1-byte"**, **"1-byte Percentage"**, **"HVAC"**, or **"Scene"** parameters are transmitted to the bus line as the **"Threshold Status."**

4.2.3.6.3.3 Above Threshold Point 3

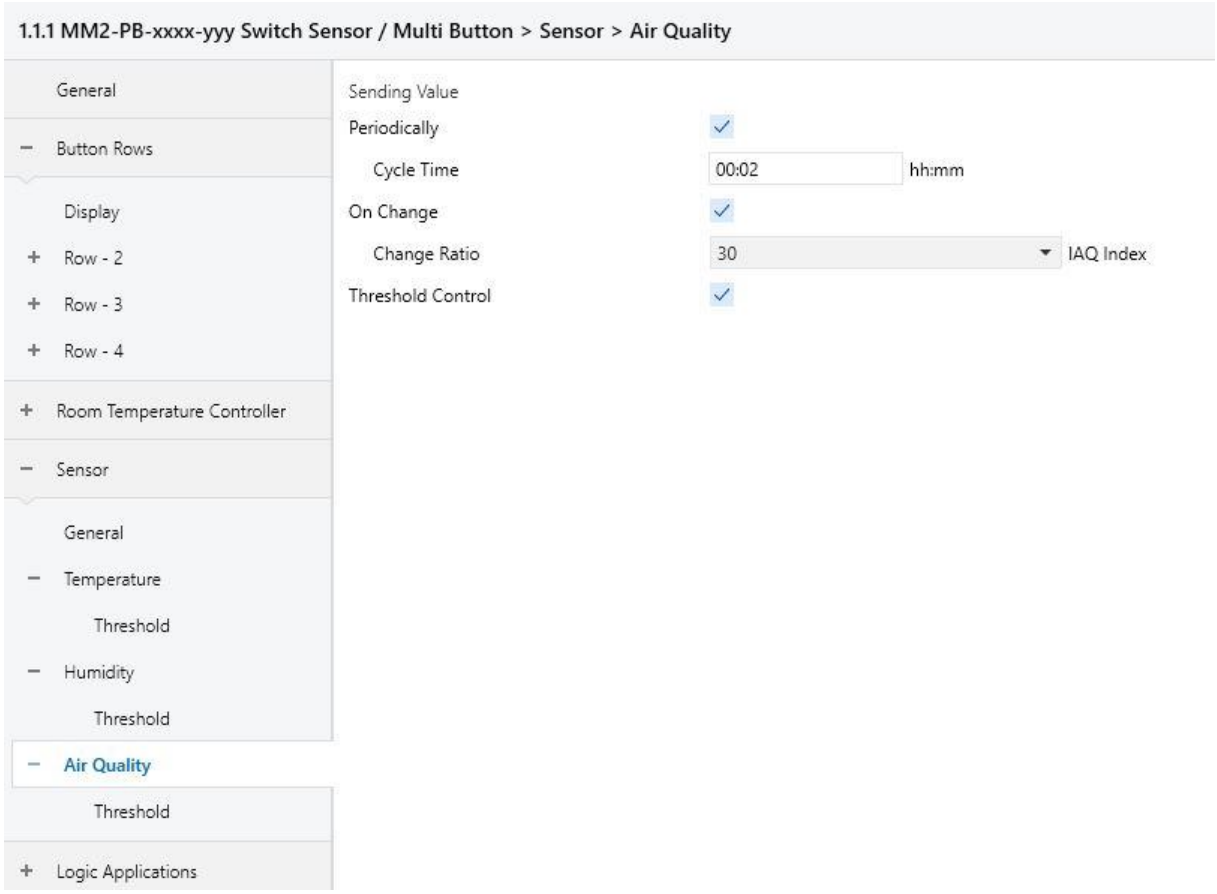
This parameter defines the action to be executed when the current humidity value exceeds the tolerance-adjusted **Threshold Point 3**. When **"No Action"** is selected, no command is transmitted. When **"Send Value"** is enabled, the value entered for one of the **"1-bit"**, **"1-byte"**, **"1-byte Percentage"**, **"HVAC"**, or **"Scene"** parameters is transmitted to the bus line as the **"Threshold Status."**

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
250	Humidity	Enable Input	Input	1-bit	1.003 Enable	C	-	W	-
251	Humidity	Sensor Output	Output	2-byte	9.007 Humidity	C	R	-	T
252	Humidity	Treshold Status	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	17.001 Scene Nr	C	-	-	T
				2-byte	20.102 HVAC Mode	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T

Table 24: Humidity Communication Section Objects

4.3 Air Quality Detection

This function is used to transmit the relative air quality value measured by the device's internal air quality sensor to the KNX bus line.



4.3.1 Value Transmission

Two different methods can be used to transmit air quality information to the KNX bus. If neither method is selected, the current air quality value is returned as a **Response** via the same communication object when a **Read** request is received.

4.3.1.1 Periodically

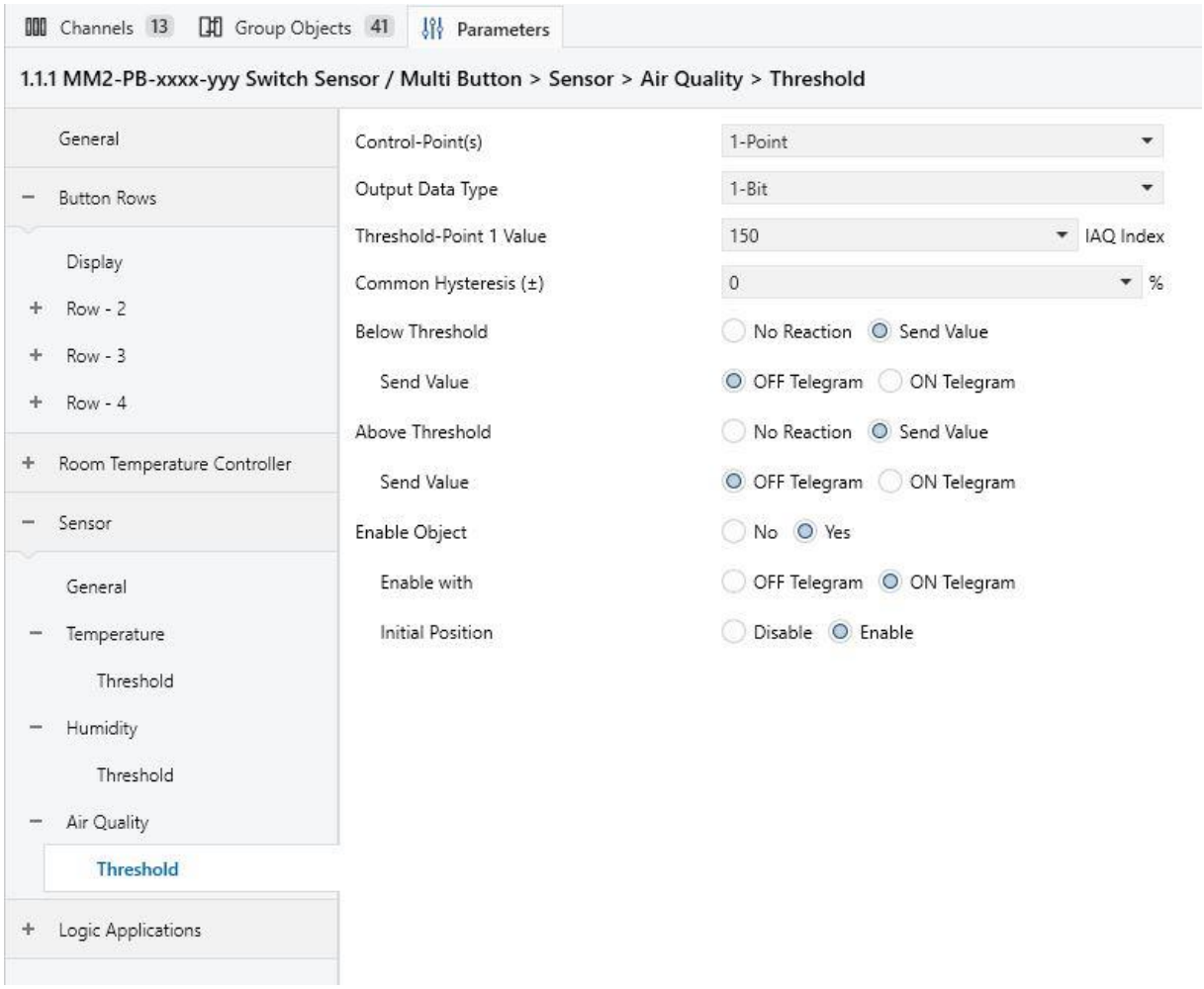
Defines the transmission interval of the measured air quality value via the **“Air Quality”** communication object. The interval can be set between **2 and 255 minutes**. The default value is **2 minutes**.

4.3.1.2 Change Amount

When the air quality value changes by more than the amount defined parametrically by the user (**50 ppm – 500 ppm**), the current air quality value is transmitted to the bus line. The default value is **100**.

4.3.2 Threshold Control

This parameter enables threshold-based processing for the measured air quality value. Actions can be triggered when the defined threshold is exceeded or fallen below. **“Passive”** or **“Active”** can be selected. When activated, the related sub-parameters become visible.



4.3.2.1 Hysteresis

This parameter defines the total tolerance range around the defined threshold value. A value between **2% and 50%** can be selected. For a threshold crossing to occur, the defined hysteresis range around the threshold value must also be exceeded. The hysteresis behavior operates in a one-sided, negative direction, similar to the humidity application.

4.3.2.2 Output Data Type

Defines the data type used to transmit the decision resulting from the threshold evaluation to the bus line. One of the following options can be selected: **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”**.

4.3.2.3 Enable Object

This parameter is used to fully enable or completely disable the Air Quality Sensor Threshold Control function. **“No”** or **“Yes”** can be selected. The default value is **“No”**. When enabled, the related sub-parameters and the **“270 – Air Quality Enable Input”** active/passive communication object become visible.

4.3.2.4 Enable Value

“OFF Command” indicates that the function is activated when a 1-bit **0 (zero)** command is received, while **“ON Command”** indicates activation when a 1-bit **1 (one)** command is received. The default value is **“ON Command”**.

4.3.2.5 Initial Positions

This parameter defines the state of the device at startup. If **“Active”** is selected, the air quality detection function starts operating immediately when the device is powered on. Otherwise, the **Air Quality** function does not start immediately after startup.

4.3.2.6 Control Points

This parameter allows air quality data to be evaluated using **1, 2, or 3 different control points**, and enables the appropriate result of this evaluation to be transmitted to the corresponding communication object.

4.3.2.6.1 Control Point 1

4.3.2.6.1.1 Threshold Point 1 Value

When control point 1 is enabled, a value between **100 and 2000** is entered via this parameter to perform threshold control. The entered value is used as the first threshold point.

4.3.2.6.1.2 Below Threshold

This parameter defines the action to be executed when the current air quality value falls below the tolerance-adjusted threshold value 1. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the values entered for **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** are transmitted to the bus line as the **“Threshold Status”**.

4.3.2.6.1.3 Above Threshold

This parameter defines the action to be executed when the current air quality value exceeds the tolerance-adjusted threshold value 1. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the values entered for **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** are transmitted to the bus line as the **“Threshold Status”**.

4.3.2.6.2 Control Point 2

4.3.2.6.2.1 Threshold Point 2 Value

When control point 2 is enabled, this parameter defines the additional value added on top of threshold point 1. A value between **100 and 2000** is entered to define the second threshold. For example, if threshold point 1 is **1000 ppm** and the value entered here is **500**, threshold point 2 is defined as **1500 ppm**.

4.3.2.6.2.2 Between Threshold Point 1 and 2

This parameter defines the action to be executed when the current air quality value lies between tolerance-adjusted threshold values 1 and 2. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the value entered for **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** is transmitted to the bus line as the **“Threshold Status”**.

4.3.2.6.2.3 Above Threshold Point 2

This parameter defines the action to be executed when the current air quality value exceeds the tolerance-adjusted threshold value 2. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the value entered for **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** is transmitted to the bus line as the **“Threshold Status”**.

4.3.2.6.3 Control Point 3

4.3.2.6.3.1 Threshold Point 3 Value

When control point 3 is enabled, this parameter defines the additional value added on top of threshold point 2. A value between **100 and 2000** is entered to define the third threshold. For example, if threshold point 2 is **1500 ppm** and the value entered here is **300**, threshold point 3 is defined as **1800 ppm**.

4.3.2.6.3.2 Between Point 2 and Point 3

This parameter defines the action to be executed when the current air quality value lies between tolerance-adjusted threshold values 2 and 3. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the values entered for **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** are transmitted to the bus line as the **“Threshold Status”**.

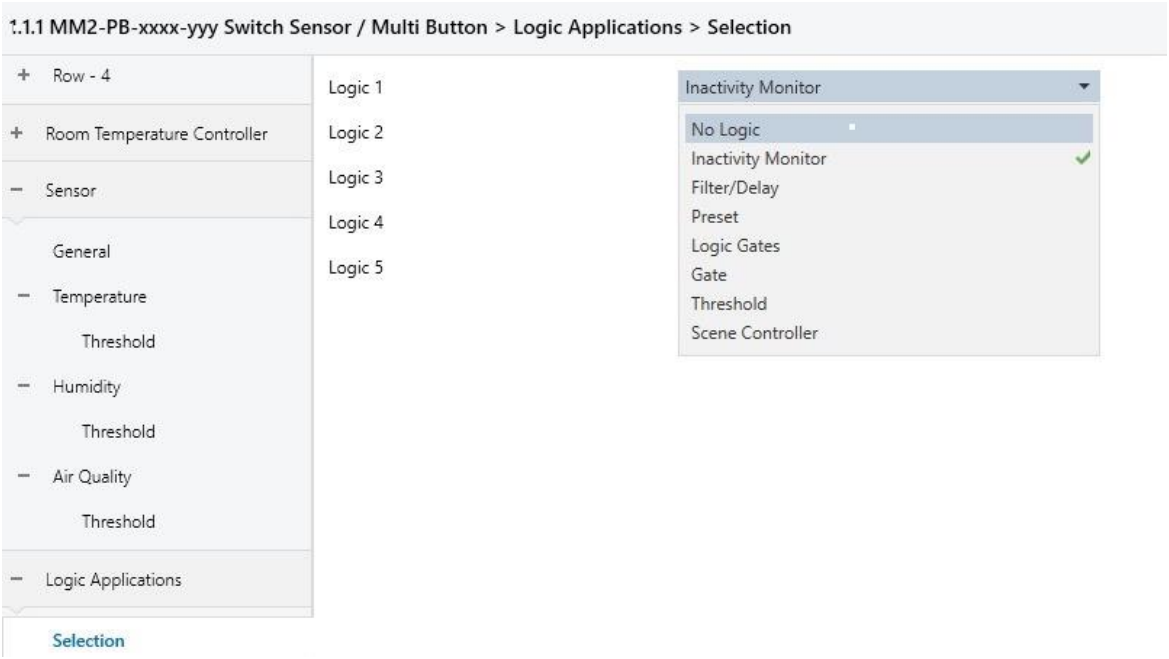
4.3.2.6.3.3 Above Threshold Point 3

This parameter defines the action to be executed when the current air quality value exceeds the tolerance-adjusted threshold value 3. When **“No Action”** is selected, no command is transmitted. When **“Send Value”** is enabled, the value entered for **“1-bit”**, **“1-byte”**, **“1-byte Percentage”**, **“HVAC”**, or **“Scene”** is transmitted to the bus line as the **“Threshold Status”**.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
271	Air Quality	Enable Input	Input	1-bit	1.003 Enable	C	-	W	-
272	Air Quality	Sensor Output (VOC Index)	Output	2-byte	7.001 Pulses	C	R	-	T
273	Air Quality	Sensor Output (ppm)	Output	2 byte	9.008 Air Quality	C	R	-	T
273	Air Quality	Threshold Status	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	17.001 Scene Nr	C	-	-	T
				2-byte	20.102 HVAC Mode	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T

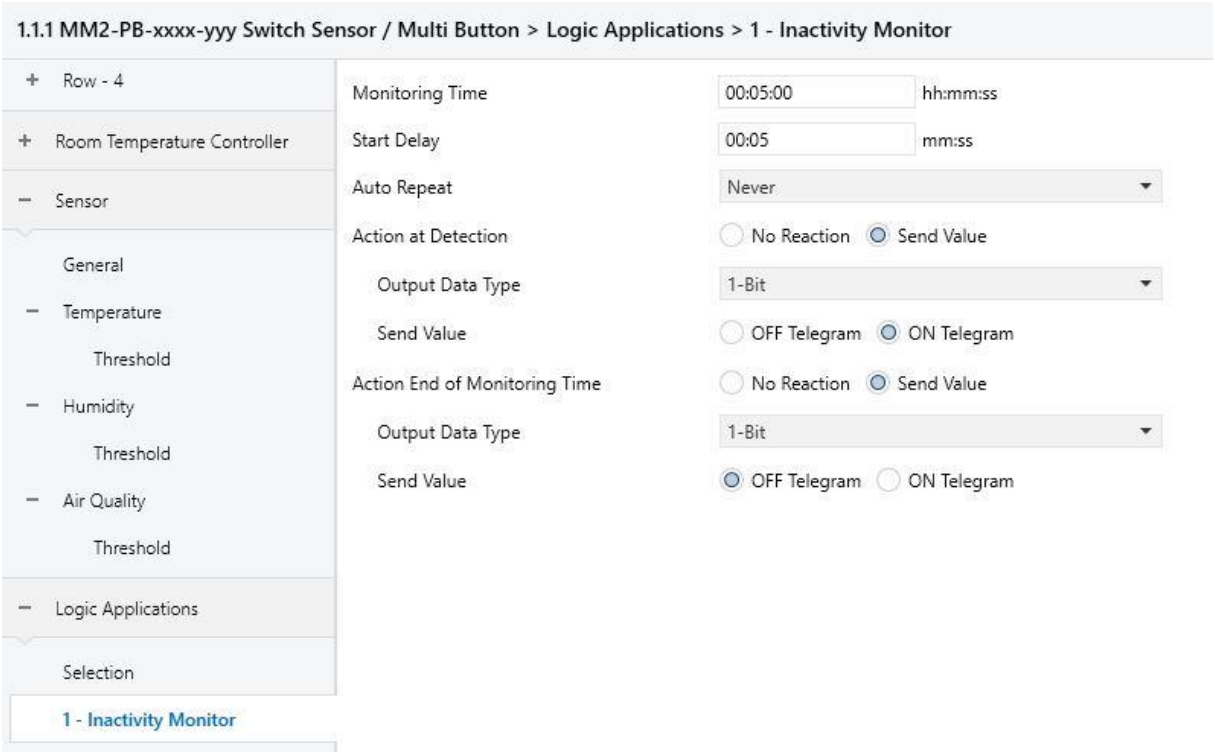
Table 25: Air Quality Communication Section Objects

5 Logic Operations



5.1 Inactivity Detection (detection of No-movement)

Inactivity Detection is a function designed to monitor whether movement occurs within a defined area during a specified period. If movement is detected during the monitoring period, a movement status is transmitted and the process is completed. If no movement is detected until the end of the monitoring period, the situation is evaluated as **inactivity** and the corresponding status information is sent. This function can be used in hotel room automation scenarios or for security purposes to monitor movement within a specific area.



5.1.1 Monitoring Time

This parameter defines the duration during which movement is monitored. If no movement information is received from the **Movement Information** communication object during the defined period, the system evaluates the situation as inactivity. The observation period is initiated via the **"Start Observation Function"** communication object. The duration can be set between **10 and 65536 seconds**. The default value is **300 seconds**.

5.1.2 Start Delay

This parameter is used to define a preliminary delay before the device starts inactivity detection. The delay duration can be set between **0 and 255 seconds**. The default value is **5 seconds**.

5.1.3 Auto Continue

Under normal operation, the observation function performs a single monitoring cycle. After the start delay, the system waits for movement information from the **Movement Information** communication object during the observation period, and at the end of this period a **“Stop”** telegram is transmitted.
If **two observation cycles** are selected from the drop-down list and no movement is detected at the end of the first cycle, a new **“Start”** telegram is automatically sent via the **“Start/Stop”** communication object and a second observation period begins immediately without delay. At the end of the second observation period, output information is generated based on the detected condition and a **“Stop”** telegram is transmitted.
When **five cycles** are selected, the observation process is repeated five times. If **“Until motion is detected”** is selected, the observation function continuously and automatically restarts monitoring until movement information is received from the **Movement Information** communication object.

5.1.4 Output Data Type

This parameter defines the data type of the information generated as a result of the observation. Depending on the application, one of the following options can be selected: **“1-bit”**, **“1-byte Counter Pulses”**, **“1-byte Percentage”**, **“Scene”**, **“HVAC”**, or **“2-byte Temperature”**.

5.1.5 Action at Detection

This parameter determines whether an action is performed when movement is detected. If **“No Command”** is selected, no command is transmitted. If **“Send Value”** is selected, the defined value is sent to the bus line.

5.1.6 Action End of Monitoring Time

This parameter defines the action to be performed if no movement is detected by the end of the observation period. If no action is required, **“No Command”** is selected. If a value is to be transmitted, **“Send Value”** is selected.

5.1.7 Send Value

When the **“Send Value”** option is enabled, the value to be transmitted to the bus line is defined by this parameter. The entered value must be compatible with the selected **Output Data Type**.

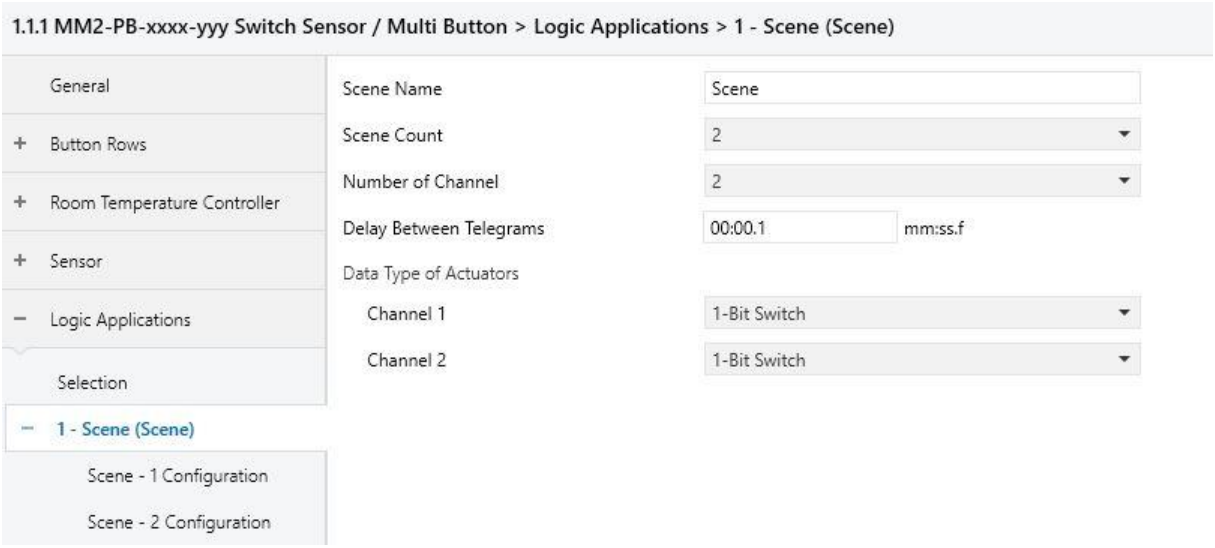
No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	LA- x I Inactivity Monitor	Start/Stop Monitoring	Input	1-bit	1.010 Start/Stop	C	R	W	T
x	LA- x I Inactivity Monitor	Movement Input	Input	1-bit	1.001 Switch	C	R	-	T
x	LA- x I Inactivity Monitor	Action at Detection	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	17.001 Scene Nr	C	-	-	T
				2-byte	20.102 HVAC Mode	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T
x	LA- x I Inactivity Monitor	Action End of Monitoring Time	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	17.001 Scene Nr	C	-	-	T
				2-byte	20.102 HVAC Mode	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T

Table 26: Logic Applications - Inactivity Monitor Communication Section Objects

5.2 Scene Controller

The scene controller is an application that sends predefined values to **n** outputs, each of which may use different data types. One or more scenes can be assigned to the same output group. If required, users can be granted permission to store new values for scenes.

5.2.1 General Parameters



5.2.1.1 Scene Name

This field is used to define the name of the scene. The scene name allows easy identification and distinction between scenes. Examples include **“Meeting Mode”** or **“Evening Lighting”**.

5.2.1.2 Scene Count (Number of Scenes)

This parameter allows selection of a value between **1 and 8**. The selected value defines the total number of scenes that can be configured on the module.

5.2.1.3 Actuator Number (Number of Channels)

This parameter allows selection of a value between **1 and 8**. It defines the number of actuators controlled within each scene. Actuators are the devices controlled when a scene is triggered (e.g. lights, blinds).

5.2.1.4 Duration Between Send Telegram (Delay Between Commands)

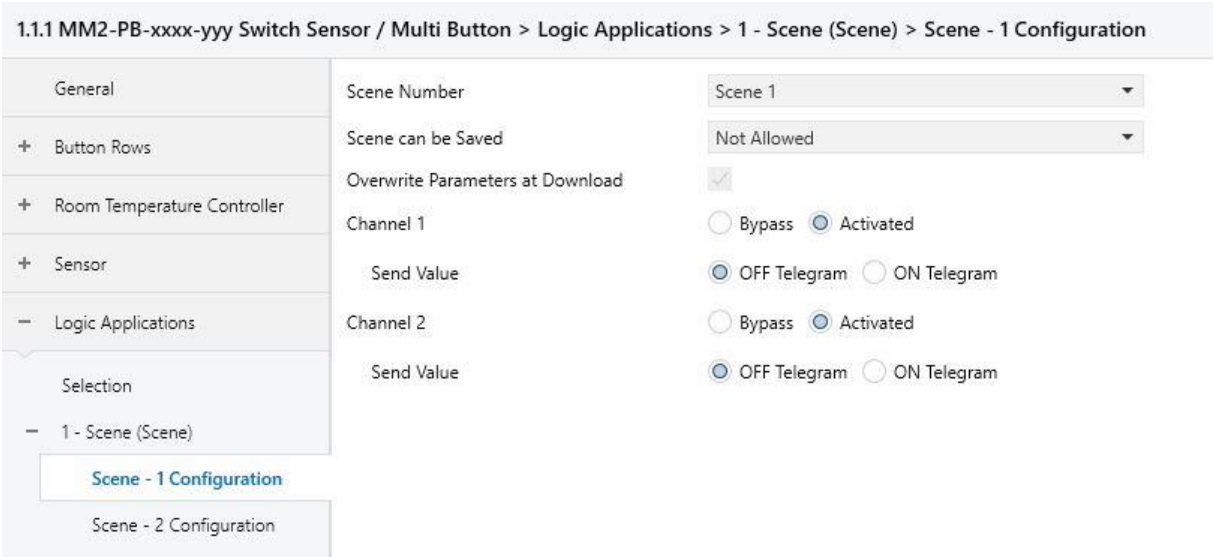
This parameter defines the delay between commands sent to each actuator when a scene is triggered. A value between **0.1 seconds and 10.0 seconds** can be entered. For example, a delay of **0.5 seconds** results in commands being sent to actuators at half-second delay.

5.2.1.5 Data Type Actuators

This parameter defines the data type used for each channel. Each data type corresponds to a specific device or function type.
For example:

- **1-bit Switch:** Can be used for switching lights on and off.
- **1-byte Percentage:** Defines the brightness level of a dimmable light.

5.2.2 Scene X Configuration

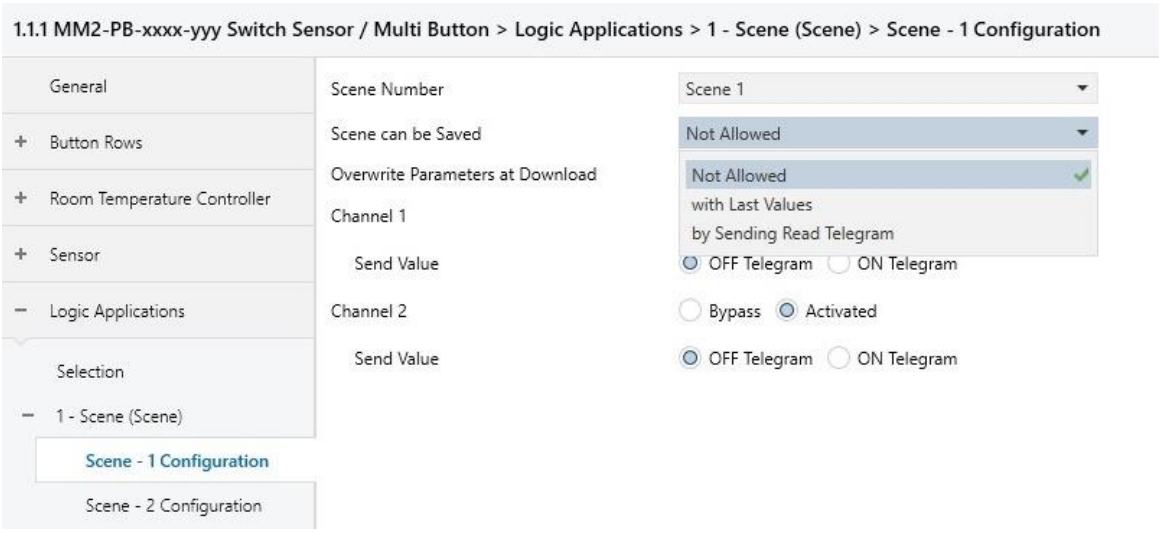


5.2.2.1 Scene Number

This parameter allows selection of a value between **1 and 64**. The selected value defines the scene number and determines the ordering of scenes within the system.

5.2.2.2 Scene can be Saved

This parameter defines the method used to store scene values. One of the following options can be selected: **"Save," "Save Last Values," or "Send Read Telegrams."**



- **Not Allowed:** When selected, the scene can only be recalled and no new values can be stored.

- **With Last values:** The most recent values received by "Status" communication objects are stored in memory.

- **By Sending read telegram:** When *Send Read Commands* is selected, the responses to **Read** commands sent at **500 ms** intervals are stored as the current scene values.

5.2.2.3 Overwrite Parameters at Download

When this option is enabled, existing parameters are overwritten while new scene settings are being loaded. This feature is useful when updating scene configurations and replacing current parameter values with new scene settings.

5.2.2.4 Channel X

Two operating options are available for each channel.

5.2.2.4.1 Activated

When this option is selected, the corresponding channel is activated when the scene is triggered.

5.2.2.4.1.1 Send Value

This parameter defines the value to be transmitted for each channel when the scene is triggered. The transmitted value is configured according to the data type of the connected actuator. For example, the brightness level of a lighting group can be set as a percentage, or a shutter/blind can be moved to a specific position.

5.2.2.4.2 Bypass

When this option is selected, the corresponding channel is skipped when the scene is triggered and no action is performed.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T	U
x	LA- x I Scene	Light Scene Number	Input	1-bit	18.001 Scene C.	C	-	W	-	-
	LA- x I Scene	Channel -x Output	Output	1-bit	1.001 Switch	C	-	-	T	-
				1-bit	1.008 Up/Down	C	-	-	T	-
				1-byte	5.010 UCount	C	-	-	T	-
				1-byte	5.001 Percentage	C	-	-	T	-
				2-byte	9.001 Temperature	C	-	-	T	-
	LA- x I Scene	Channel -x Status	Output	1-bit	1.001 Switch	C	-	W	-	U
				1-bit	1.008 Up/Down	C	-	W	-	U
				1-byte	5.010 UCount	C	-	W	-	U
				1-byte	5.001 Percentage	C	-	W	-	U
				2-byte	9.001 Temperature	C	-	W	-	U

Table 27: Logic Applications - Scene Communication Section Objects

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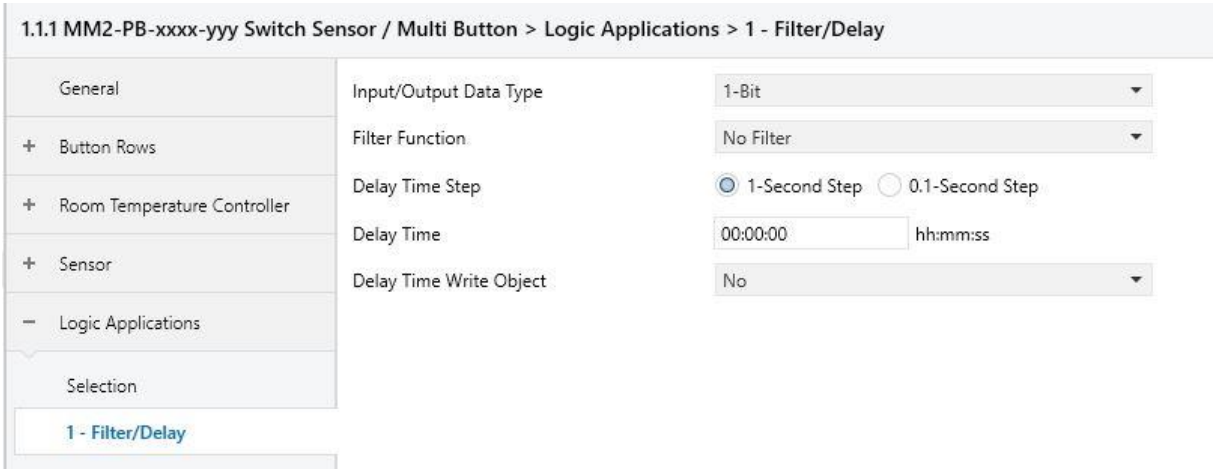
5.3 Filter / Delay

This function transmits the information received from the input object to the bus line after a defined delay, provided that the information meets the specified criteria (defined parametrically or via the bus line).



5.3.1 Input / Output Data Type

This parameter defines the data types used for the device's input and output. Different data types are used to ensure compatibility with various applications and devices.

5.3.2 Delay Time Step

This parameter defines whether the delay time is adjusted in **1-second** steps or **0.1-second** steps.

5.3.3 Delay Time

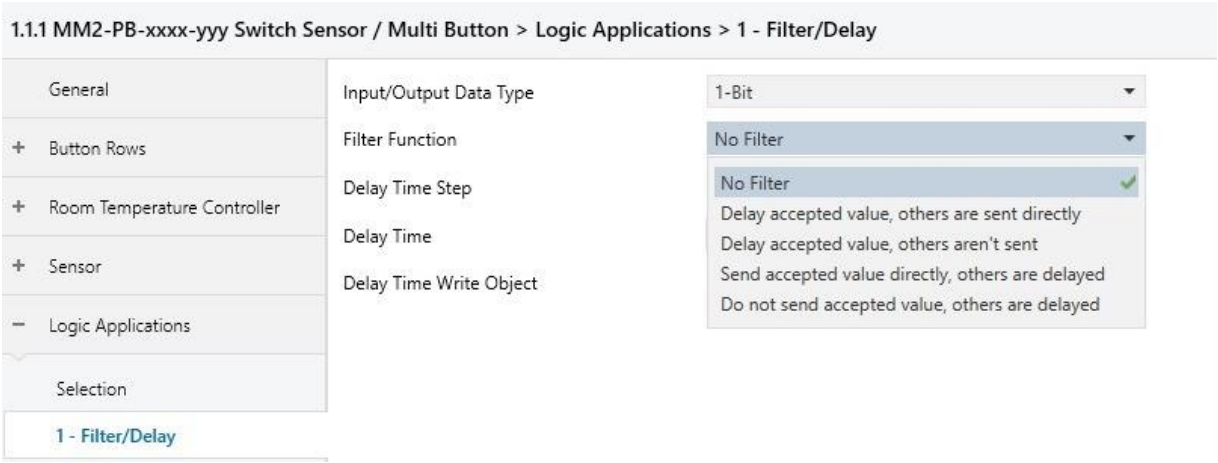
This parameter allows the delay time to be defined manually. A value between **1 and 6000 seconds** can be entered. This duration defines how long the device waits before responding after a trigger event.

5.3.4 Delay Time Write Object

This parameter defines whether the delay time write object is enabled and specifies the data type used for this object.

5.3.5 Filter Function

This parameter defines the filtering function to be applied. Based on the selected filtering method, values can be delayed, transmitted immediately, or completely blocked.



5.3.5.1 No Filter

When this option is selected, no filtering is applied. All values are transmitted directly to the bus line without any delay or evaluation.

5.3.5.2 Delay accepted value, others are sent directly

Values that meet the defined filter criteria are transmitted with a delay. Values that do not meet the criteria are sent to the bus line immediately without delay.

5.3.5.3 Delay accepted value, others aren’t sent

Values that meet the filter criteria are delayed before processing. Values that do not meet the criteria are not transmitted to the bus line.

5.3.5.4 Send accepted value directly, others are delayed

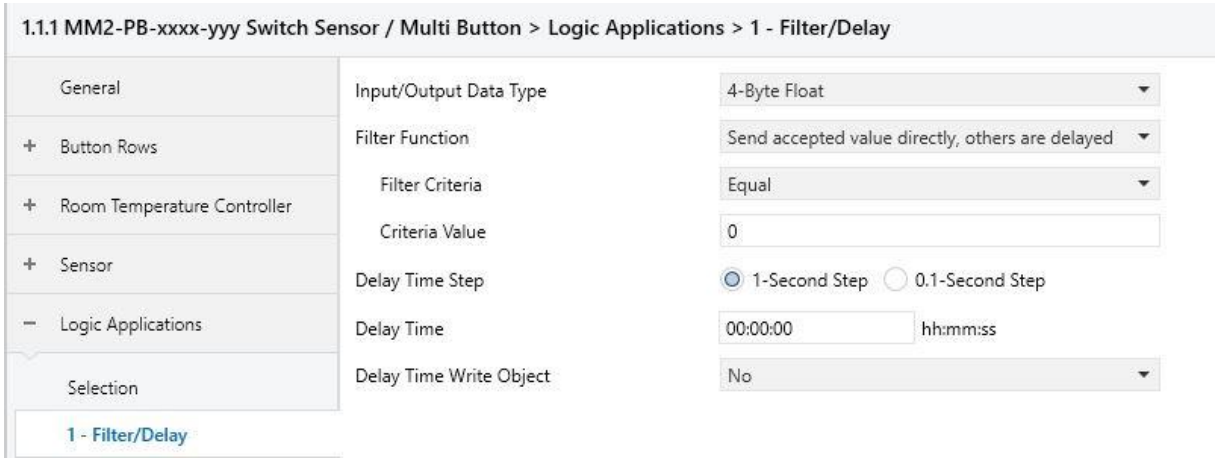
Values that meet the filter criteria are transmitted to the bus line immediately. Values that do not meet the criteria are transmitted after the defined delay.

5.3.5.5 Do not send accepted value, others are delayed

Values that meet the filter criteria are not transmitted to the bus line. Values that do not meet the criteria are transmitted after the defined delay period.

5.3.6 Filter Criteria

This parameter defines the comparison criterion used during the filtering process.



5.3.6.1 Equal

Checks whether the value is equal to the defined criterion value.

5.3.6.2 Greater Than

Checks whether the value is greater than the defined criterion value.

5.3.6.3 Less Than

Checks whether the value is less than the defined criterion value.

5.3.6.4 Greater Than or Equal

Checks whether the value is greater than or equal to the defined criterion value.

5.3.6.5 Less Than or Equal

Checks whether the value is less than or equal to the defined criterion value.

5.3.7 Criteria Value

This parameter allows the criterion value used for comparison to be entered manually. The value depends on the selected data type. For example, for a **1-bit Switch** data type the value can be **0** or **1**, while for a **1-byte** data type the value can range between **0 and 255**.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	LA – x I Filter/Delay	Input	Input	1-bit	1.001 Switch	C	-	W	-
				1-byte	5.010 Counter P.	C	-	W	-
				1-byte	5.001 Percentage	C	-	W	-
				1-byte	6.010 Counter P.	C	-	W	-
				1-byte	7.001 Pulses	C	-	W	-
				2-byte	8.001 Pulses	C	-	W	-
				2-byte	9.001 Temperature	C	-	W	-
				4-byte	12.001 Pulses	C	-	W	-
				4-byte	13.001 Counter P.	C	-	W	-
				4-byte	4-byte Float Value	C	-	W	-
				2-byte	9.001 Temperature	C	-	-	T
x	LA – x I Filter/Delay	Output	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 Counter P.	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	6.010 Counter P.	C	-	-	T
				1-byte	7.001 Pulses	C	-	-	T
				2-byte	8.001 Pulses	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T
				4-byte	12.001 Pulses	C	-	-	T
				4-byte	13.001 Counter P.	C	-	-	T
				4-byte	4-byte Float Value	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T
x	LA – x I Filter/Delay	Delay Time	Input / Output	2-byte	7.004 Time 100ms	C	R	W	T
				2-byte	7.005 Time s	C	R	W	T

Table 28: Logic Applications - Filter Delay Communication Section Objects

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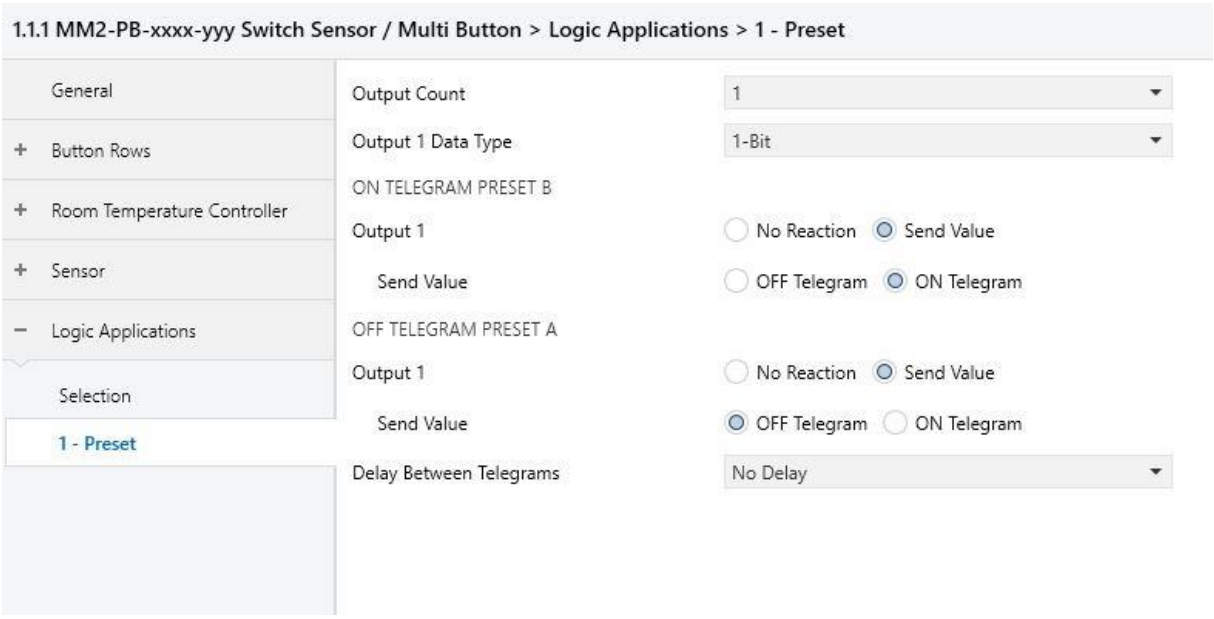
5.4 Preset

Preset is a function that enables a device to operate using a predefined set of settings or configurations. These settings define how the device should behave under specific conditions

in advance. The preset function allows the device to automatically apply these predefined settings when a specific condition is met or when a triggering event occurs.



5.4.1 Output Count

This parameter defines the number of outputs to be used in the application. A selectable number of outputs between **1 and 4** can be configured.

5.4.2 On Telegram Preset

This section defines the actions to be performed by the selected outputs when an **“On”** telegram is received from the input group object.

5.4.2.1 Output x

This parameter defines the value to be sent for output **“x”**. One of the following data types can be selected: **1-bit**, **1-byte**, **2-byte Unsigned**, **2-byte Signed**, **2-byte Float**.

5.4.3 Off Command Preset

This section defines the actions to be performed by the selected outputs when an **“Off”** telegram is received from the input group object.

5.4.3.1 Output x

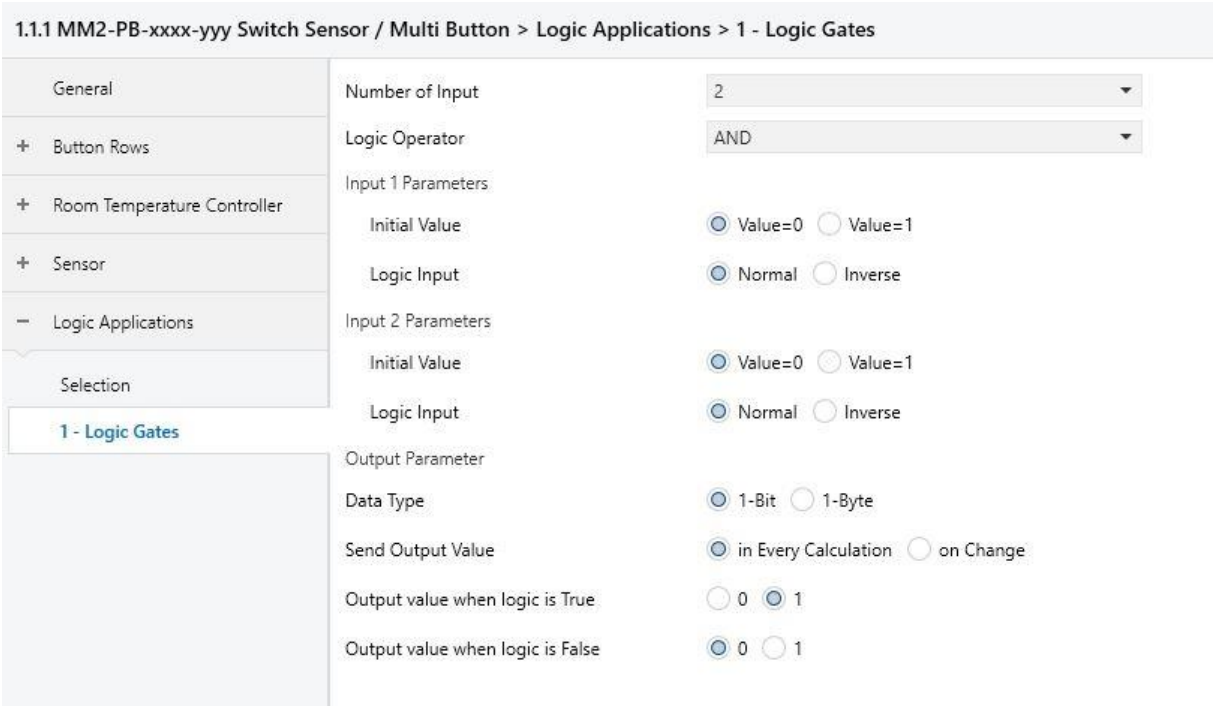
This parameter defines the value to be sent for output **“x”**. One of the following data types can be selected: **1-bit**, **1-byte**, **2-byte Unsigned**, **2-byte Signed**, **2-byte Float**.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	LA- x I Preset	Call Preset	Input	1-bit	1.022 Scene	C	-	W	-
x	LA- x I Preset	Output - x	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T
				2-byte	7.001 Pulses	C	-	-	T
				2-byte	8.001 Pulses	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T

Table 29: Logic Applications - Preset Communication Section Objects

5.5 Logic Gates

Logic Gates are applications in which the result is generated by processing one or more inputs according to standard logical functions.



5.5.1 Number of Inputs

This parameter defines the number of input signals connected to the logic gate. Depending on the selected number of inputs, the appropriate logic gate type is automatically determined. For example, when a single input is selected, a **NOT** gate is used, whereas **AND**, **OR**, and other multi-input logic gates are used when two or more inputs are selected.

5.5.2 Logic Operator

This parameter defines the operating principle of the logic gate. For example, the **AND** operator sets the output to true only when all inputs are true, while the **OR** operator sets the output to true when any one of the inputs is true. When multiple inputs are used (e.g. a three-input configuration), the logical result of input 1 and input 2 is calculated first, then this result is processed together with input 3 through another logic gate, and the final result defines the **Output** value.

5.5.3 Input X Parameters

5.5.3.1 Data Type

This parameter defines the data type of the input signal. The **1-bit** data type is used for simple on/off signals, while the **1-byte** data type is preferred for applications requiring wider value ranges.

5.5.3.2 Logic Input

This parameter defines whether the input signal is processed logically as **normal** (direct) or **inverted (inverse)**. In normal mode, the signal is processed as received, while in inverse mode the signal is logically inverted before processing.

5.5.3.3 Initial Value

This parameter defines the initial value of the input signal. It represents the default value assigned to the input when the device is powered on or restarted.

5.5.4 Output Parameters

5.5.4.1 Data Type

This parameter defines the data type of the output signal. The **1-bit** data type is used for simple on/off signals, while the **1-byte** data type allows transmission of wider value ranges.

5.5.4.2 Send Output Value

This parameter defines when the output value is transmitted to the bus line.

- **After Change:** The output value is transmitted only when it changes.

- **Each Calculation:** The output value is transmitted after every calculation.

5.5.4.3 Output Value (Logic True)

This parameter defines the value assigned to the output when the logical result is **true**.

- For **1-bit** data type, **1 (On)** or **0 (Off)** can be selected.
- For **1-byte** data type, a value between **0 and 255** can be entered.

5.5.4.4 Output Value (Logic False)

This parameter defines the value assigned to the output when the logical result is **false**.

- For **1-bit** data type, **1 (On)** or **0 (Off)** can be selected.
- For **1-byte** data type, a value between **0 and 255** can be entered.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	LA- x I Logic Gate	Input - x	Input	1-bit	1.001 Switch	C	-	W	-
x	LA- x I Logic Gate	Output	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 UCount	C	-	-	T

Table 30: Logic Applications - Logic Gate Communication Section Objects

5.6 Gate

The Gate logic function evaluates input signals according to predefined rules and generates an output signal accordingly. This function is used for logical operations and signal management. Gate functions provide flexible control by supporting operation with different data types.

5.6.1 Input / Output Data Type

This parameter defines the data type used by the Gate logic function. The selected data type determines how input and output signals are processed and transmitted.

5.6.2 Enable Object Value

This parameter defines the behavior of the control object used to enable or disable the Gate function.

5.6.2.1 Normal

The Gate function operates according to the normal (direct) value of the control input.

5.6.2.2 Inverted

The Gate function operates according to the inverted (inverse) value of the control input.

5.6.3 Initial Value Of Enable Object

This parameter defines whether the Gate function is enabled or disabled when the device starts up.

5.6.3.1 Enabled

The Gate function is enabled at device startup.

5.6.3.2 Blocked

The Gate function is disabled (passive) at device startup.

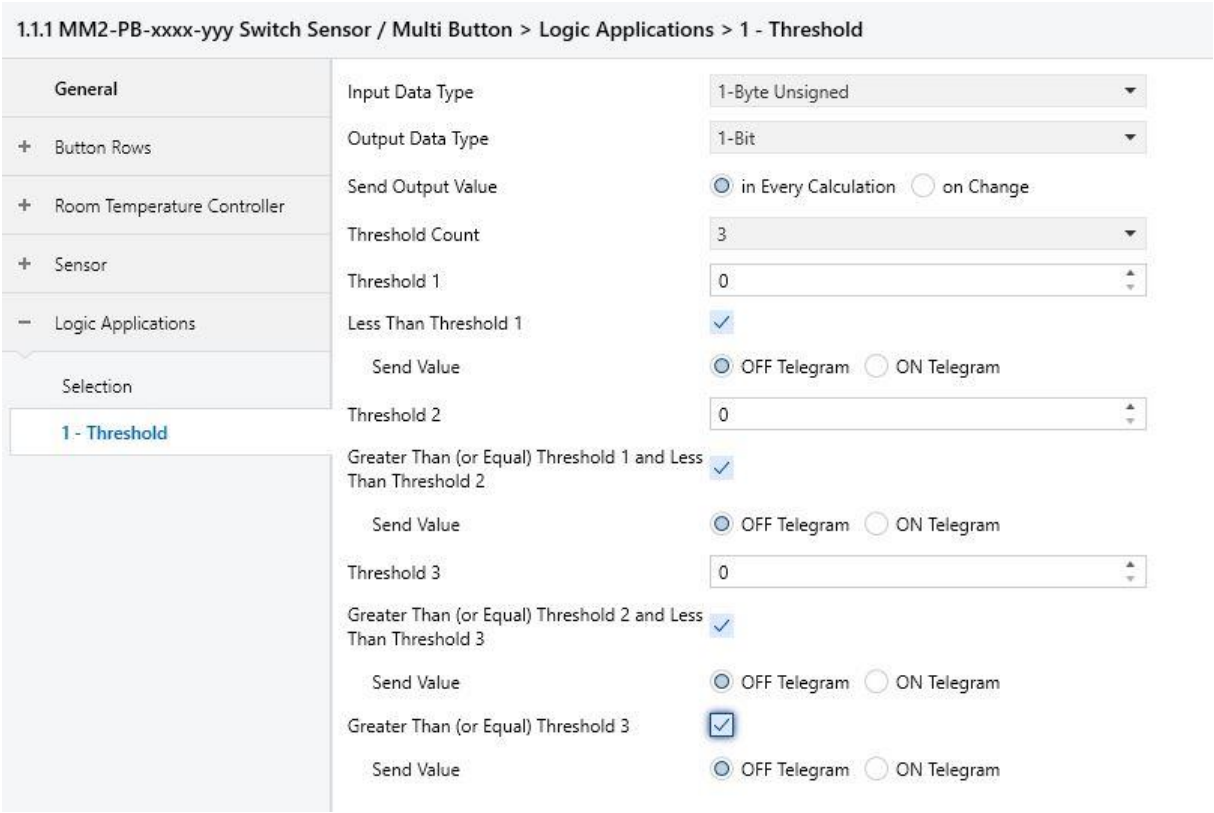
5.6.4 Send Last Value When Gate Is Enabled

When this option is enabled, the last value received by the related input object is automatically transmitted to the output as soon as the Gate function allows it.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	LA – x I Gate	Input	Input	1-bit	1.001 Switch	C	-	W	-
				3-bit	3-bit Controlled	C	-	W	-
				1-byte	5.010 Counter P.	C	-	W	-
				1-byte	5.001 Percentage	C	-	W	-
				1-byte	6.010 Counter P.	C	-	W	-
				2-byte	8.001 Pulses	C	-	W	-
				2-byte	9.001 Temperature	C	-	W	-
x	LA – x I Gate	Output	Output	1-bit	1.001 Switch	C	-	-	T
				3-bit	3-bit Controlled	C	-	-	T
				1-byte	5.010 Counter P.	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	6.010 Counter P.	C	-	-	T
				2-byte	8.001 Pulses	C	-	-	T
				2-byte	9.001 Temperature	C	-	-	T
x	LA – x I Gate	Control Input	Input	1-bit	1.003 Enable	C	-	W	-

Table 31: Logic Applications - Gate Communication Section Objects

5.7 Threshold



5.7.1 Input Data Type

The **Threshold Control** function evaluates input data based on defined threshold values and transmits output data according to predefined rules as a result of this evaluation. This function can be flexibly configured using different data types and multiple threshold values.

5.7.2 Output Data Type

This parameter defines the data type used for transmitting the output value.

5.7.3 Send Output Value

This parameter defines under which conditions the output value is transmitted to the bus line.

5.7.3.1 Each Calculation

The output value is transmitted to the bus line after every calculation.

5.7.3.2 On Change

The output value is transmitted to the bus line only when a change occurs as a result of the calculation.

5.7.4 Threshold Count (Number of Thresholds)

This parameter defines the number of threshold values to be used.

5.7.5 If the Number of Thresholds Is 1

5.7.5.1 Threshold 1

This parameter defines the threshold value according to the selected input data type.

5.7.5.2 Less Than Threshold

When this option is selected, the defined action is executed when the input value falls below the configured threshold value.

5.7.5.2.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.5.3 Greater Than (or Equal) Threshold

When this option is selected, the defined action is executed when the input value is equal to or exceeds the configured threshold value.

5.7.5.3.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.6 If the Number of Thresholds Is 2

5.7.6.1 Threshold 1

This parameter defines the first threshold value according to the selected input data type.

5.7.6.2 Less Than Threshold 1

When this option is selected, the defined action is executed when the input value falls below the first threshold value.

5.7.6.2.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.6.3 Threshold 2

This parameter defines the second threshold value according to the selected input data type.

5.7.6.4 Greater Than (or Equal) Threshold 1 and Less than Threshold 2

When this option is selected, the defined action is executed when the input value is equal to or greater than the first threshold and lower than the second threshold.

5.7.6.4.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.6.5 Greater Than (or Equal) Threshold 2

When this option is selected, the defined action is executed when the input value is equal to or exceeds the second threshold value.

5.7.6.5.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.7 If the Number of Thresholds Is 3

5.7.7.1 Threshold 1

This parameter defines the first threshold value according to the selected input data type.

5.7.7.2 Input Below Threshold 1

When this option is selected, the defined action is executed when the input value falls below the first threshold value.

5.7.7.2.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.7.3 Threshold 2

This parameter defines the second threshold value according to the selected input data type.

5.7.7.4 Greater Than (or Equal) Threshold 1 and Less than Threshold 2

When this option is selected, the defined action is executed when the input value is equal to or greater than the first threshold and lower than the second threshold.

5.7.7.4.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

5.7.7.5 Threshold 3

This parameter defines the third threshold value according to the selected input data type.

5.7.7.6 Greater Than (or Equal) Threshold 2 and Less than Threshold 3

When this option is selected, the defined action is executed when the input value is equal to or greater than the second threshold and lower than the third threshold.

5.7.7.6.1 Send Value Enter a value based on the output data type This parameter defines the value to be transmitted according to the selected output data type.

5.7.7.7 Greater Than (or Equal) Threshold 3

When this option is selected, the defined action is executed when the input value is equal to or exceeds the third threshold value.

5.7.7.7.1 Send Value

This parameter defines the value to be transmitted according to the selected output data type.

No	Name	Object Function	Direction	Length	Data Type	C	R	W	T
x	LA – x I Threshold	Input	Input	1-byte	5.010 Counter P.	C	-	W	-
				1-byte	5.001 Percentage	C	-	W	-
				1-byte	6.010 Counter P.	C	-	W	-
				2-byte	7.001 Pulses	C	-	W	-
				2-byte	8.001 Pulses	C	-	W	-
				2-byte	9.001 Temperature	C	-	W	-
				4-byte	12.001 Pulses	C	-	W	-
				4-byte	13.001 Counter P.	C	-	W	-
				4-byte	4-byte Float Value	C	-	W	-
x	LA – x I Threshold	Output	Output	1-bit	1.001 Switch	C	-	-	T
				1-byte	5.010 Counter P.	C	-	-	T
				1-byte	5.001 Percentage	C	-	-	T
				1-byte	6.010 Counter P.	C	-	-	T

Table 32: Logic Applications - Threshold Communication Section Objects

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ADDRESS:CUMHURİYET MAH. ŞAİR MEHMET AKİF ERSOY SK. NO: 32 İÇ KAPI NO: 1
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