1 Product Description

MM-20-xx-211 is a KNX-compatible automation device designed to combine multiple application functions within a single unit. Switching, valve control, blind/shutter control, 3-point motor control, and fan coil control can all be handled through one device. The product family includes models with 4, 8, 12, 16, and 24 contact outputs. Each contact is equipped with an independently supplied latching relay rated up to 16A and capable of responding to inrush current demands. All models offer the same functional structure, while the number of available functions increases in proportion to the number of contacts.

Button layout:

1-) Programming Address Area
2-) Programming Indicator
3-) Programming Button
4-) KNX Line Connection
5-) Output Status Indicators
6-) Manual Mode Button and Indicator
7-) Function Control Buttons
8-) Function Status Indicator
9-) Output Terminals with Independent Inputs

1.1 Product Models

MM-20-04-211
KNX Combo Actuator 4 Ch on-off, switching, blind/shutter, fcu, valve actuator 16A, Nightsky2 serie *

MM-20-08-211
KNX Combo Actuator 8 Ch on-off, switching, blind/shutter, fcu, valve actuator 16A, Nightsky2 Serie *

MM-20-12-211
KNX Combo Actuator 12 Ch on-off, switching, blind/shutter, fcu, valve actuator 16A, Nightsky2 Serie *

MM-20-16-211
KNX Combo Actuator 16 Ch on-off, switching, blind/shutter, fcu, valve actuator 16A, Nightsky2 Serie *

MM-20-24-211
KNX Combo Actuator 24 Ch on-off, switching, blind/shutter, fcu, valve actuator 16A, Nightsky2 Serie *

1.2 Installation and Connection Diagrams

The combo actuator is designed for installation on a DIN rail inside an electrical panel. Thanks to its concealed spring mounting structure, there is no need to pull any release latch during removal. To mount the device on the rail, first place the upper part onto the rail, then push the lower part toward the rail until a click is heard. To remove the device, first press it

downward, then pull the lower part toward yourself to release it from the rail, and finally lift it upward.

1.2.1 Mounting and Installation

The device must only be installed inside an electrical panel and only by personnel authorized in KNX automation systems.

Notes for authorized personnel: The device is installed inside the electrical panel. Phase connections must be made as indicated on the device. All necessary electrical safety precautions must be taken before and during installation. Considering its IP protection class, the device should not be used in humid or dusty environments.

The device can be mounted on a 35 mm DIN rail as follows: after hanging the upper part onto the rail, push the lower part toward the rail until a click sound is heard. To remove the device from the rail, first push it downward, then pull the lower part toward yourself to release it, and finally lift it slightly upward to detach it from the mounting point.

Before making the power supply and KNX bus connections, make sure that the mains supply is switched off and that all other required safety measures have been taken. Follow the electrical installation regulations applicable in your country. After checking the mains voltage and verifying that there is no short circuit on the KNX line, make the connections as shown in the diagram. Once power is applied, observe the status indicators. When the device is powered from the KNX line, it performs its startup sequence and becomes ready for operation. Different device types may require different connection methods.

The connection capacities and wiring methods for each model are shown below:
(Graph)

A sample connection diagram is provided below. The following points should be considered during wiring:
- Channels are identified by numbers. The numbering sequence increases from top to bottom and from left to right.

- For functions using more than one contact, such as fan coil, blind, or motor control, wiring must be carried out in accordance with the connection diagram of the connected device in order to avoid possible phase conflicts.

- Fan coil wiring does not include heating and/or cooling valve actuators; these actuators may be connected separately in accordance with their technology and based on the connection table above.

1.3 Technical Specifications

(Spec Table)

2 Manual Operation

Never open the device enclosure. There are no components inside the device that can be serviced by the user or the installer. Opening the cover or removing the warranty label will

void the product warranty. For cleaning dust or similar dirt, use a dry cloth and clean only the front surface.

By factory default, all channels are programmed for blind/shutter operation. Manual operation is also preset for blind/shutter control. However, if required, all channels can also be configured as contact modules. In order to use the manual control functions of the device, the KNX connection must be completed and the line must be active. Manual operation of the device may be restricted through parameters (refer to General Settings).

Manual symbol and status indicator.
Long press: Enter manual mode or exit manual mode
Short press: Change the selected channel while in manual mode

On button: On, Up, or Increase button

Off button: Off, Down, or Decrease button

Channel selection indicators
If flashing: Indicates the channel(s) selected in manual mode

Channel status indicators:
Upper LED: Indicates that the channel is in On, Open, or third fan speed state
Middle LED: Indicates that the channel(s) are operating at second fan speed
Lower LED: Indicates that the channel is in Off, Close, or first fan speed state
If none of the LEDs are on, it means the Fan Coil is in the off position.

Press the hand symbol on the front panel of the device for approximately 1 second. The LED next to the symbol will light up. If it does not light up, check the KNX line and its power supply; manual mode may also have been disabled through the parameters.

Once the device enters manual mode, the channel selection indicators corresponding to the first function block begin to flash. For contact mode, LED no. 1 flashes; for blind/shutter, 3-point valve, or 2-speed fan coil functions, LEDs no. 1 and 2 flash; for 3-speed fan coil, LEDs no. 1, 2, and 3 flash. At this point, a short press on the manual symbol moves to the next function block, while a long press exits manual mode.

2.1 Changing the Basic Operating Function of the Device

The device is factory-programmed so that all channels operate in blind/shutter control mode. However, if required, this can be changed so that all channels operate as contacts instead. This feature cannot be used on commissioned devices for safety reasons. While the device is in manual mode, keep pressing the Manual button briefly until you reach the last channel. One more short press will take you to the basic function selection section. At this stage, the odd-numbered channel selection indicators on the upper row and the even-numbered indicators on the lower row start flashing in sequence; this indicates that all channels are currently set to blind/shutter mode. By pressing and holding the Off button, the device can be switched to “all relay” mode. In this case, all LEDs will flash simultaneously. If the On button is pressed and held instead, the device will switch to “all shutter” mode. After selecting the new operating mode, you must press and hold the Manual button to exit manual mode and save the setting.

The device will set all contacts to the Off position and prepare itself for the new operating mode. If, while in the function selection stage, you press the Manual button briefly, the settings will not be saved and the device will proceed to the first function block.

2.2 Control by Function Blocks

After the installation is completed and the parameters are defined in ETS, all function blocks can also be controlled manually. Switch the device to manual mode and select the channel or channels you want to operate. For contact control, the position can be set by briefly pressing the On or Off buttons. To raise or open a blind/shutter, press and hold the On button; to stop the movement, press it briefly. For movement in the opposite direction, use the Off button. A 3-point controlled valve actuator is operated in the same way. For fan coil control, the channel status indicators will light according to the type of fan coil: in units using a single output, one of the three LEDs will light, while in stepped fan coil types, all active outputs will light. If none of the indicators are on, the fan speed is zero. The On button is used to increase the fan speed, while the Off button is used to decrease it or eventually switch it off completely.

Warnings:

• Since manual mode gives full control to the operator, all operations must be carried out by authorized personnel. Commands received from the KNX bus, including the Safety object, are ignored.
• By applying ETS parameters, the device may exit manual mode automatically after a timeout, and this can also be configured (see general parameters).
• Status information related to changes made in manual mode is transmitted to the KNX bus via the communication objects.
• During normal operation, the fan coil function works in automatic mode. When the device is switched to manual mode, the fan coil control also switches to manual operation. After exiting manual mode, the Automatic Fan Speed command must be sent in order for the fan coil devices to continue operating automatically.

3 Device Parameters

ETS5 or a later version is required for commissioning the device. If the recommended product language in the Settings section of the software is set to English, all product parameters and settings will be displayed in English. The explanations below are based on the English menu.

The MM Combo Actuator product family in the Nightsky2 series is provided in a single library file (knxprod). The latest version of this file can be downloaded from our website. Once the library file is imported into the ETS project, the settings can be configured.

3.1 General Parameters

(Graph 1)

First, the correct channel count must be selected according to the model of the device being commissioned. If a model different from the actual device is selected, commissioning problems will occur.

(Graph 2)

After selecting the device model, the remaining settings can then be configured:

3.1.1 Start-Up Delay
This parameter is used to define the time the device will wait after being energized before starting its initialization process and transmitting its current status information. It is used to distribute the overall startup sequence of the system over time. A value between 3 and 255 seconds can be entered.

3.1.2 Allow Manual Operation
This setting is used to enable or disable the Manual Operation function described in the third section. It can be set to Active or Passive. The default value is “Active”.

3.1.2.1 Manual Operation Timeout
This parameter defines how long a device that is allowed to operate manually will remain in manual mode. The available options are Never, 5, 60, and 240 minutes. If a time value is selected, the device exits manual mode automatically when that period ends.

3.1.3 Safety Priority Input for Contacts
This object is used to determine the position of the contacts according to the status of a safety object. It shows or hides the Safety Priority Communication Object (No. 6). The visibility of the “Safety Priority Reactions” option in the Contact function settings depends on whether this option is enabled.

3.1.4 Wind Alarm Input for Blind/Shutter
This object is used to determine the position of blind/shutter devices according to the status of the Wind Alarm object. It shows or hides the Wind Alarm Communication Object (No. 7). The visibility of the “Wind Alarm Status” option in the Blind/Shutter function settings depends on whether this option is enabled.

General Communication Objects of the Device:

(Table Graph)

• **Manual Control Status:** Through this 1-bit status object, the device reports whether it has entered or exited manual mode.
• **Stop Manual Control:** A 1-bit value sent through this object forces the device to exit manual mode.
• **Request Output Status Values:** Upon receiving a 1-bit request from central control or monitoring systems, the device transmits the current states of all its status outputs.
• **Central Contact Input:** This is the central movement object connection for contacts. Participation is assigned individually for each contact.
• **Central Blind/Shutter Move Input:** Used for central movement control of blind/shutter devices. Participation is assigned separately for each blind/shutter function.
• **Central Blind/Shutter Stop Input:** Used for centrally stopping blind/shutter devices. Participation is assigned separately for each blind/shutter function.
• **Safety Priority Input for Contacts:** Explained above.
• **Wind Alarm Input for Blind/Shutter:** Explained above.

3.2 Channel Configuration

The second and final tab under the general settings is the channel configuration section. Functions are assigned to the channels here. These assignments are repeated in groups of four channels.

Blind/Shutter: Uses two contacts. The remaining two contacts can be assigned as the same function, 3-Point Controlled Valve, or Contact.
Contact: Uses one output. If FB1 is selected as Contact, FB2 is also automatically defined as Contact. For the other two contacts, Contact, Blind/Shutter, or 3-Point Controlled Valve functions can be selected.
2-Speed Fan Coil: Uses two contacts. The remaining two contacts can be assigned as 3-Point Controlled Valve, Blind/Shutter, or Contact.
3-Speed Fan Coil: Uses three contacts. The remaining channel is set only as Contact.

As shown on the screen, the assignments are displayed descriptively according to the selected configuration. The middle tab is shaped based on the channel assignments made:

(Graph)

4 Device Functions

4.1 Contact Parameters

This is the function that opens or closes one output according to the received command. The parameters are shown below:

(Graph)

4.1.1 Channel Type

This is the parameter used to define the default operating principle of the output contact. The default setting is Normally Open. When an ON command is received by the channel, the contact closes; when an OFF command is received, the contact opens. In the Normally Closed setting, the command behavior is reversed. The status information always remains fixed: if the contact is closed, the value is 1; if the contact is open, the value is 0. The status indication on the device itself also reflects the actual contact state, showing 1 for closed and 0 for open.

4.1.2 Position When the KNX Bus Fails

This parameter defines whether the device should change its position when the KNX bus power is interrupted. The available options are Current Position, Open Contact, and Closed Contact. The default value is Current Position. In applications where long interruptions may occur, selecting Open Contact may be recommended.

4.1.3 Safety Priority Position

This parameter defines how the device responds to commands sent via communication object number 6. The available options are Current Position, Open Contact, and Closed Contact. The default value is Current Position. If one of the other options is selected, the Safety Priority End Action parameter becomes available, where a further preference can be defined using the same options.

4.1.3.1 At the End of Safety Priority

This parameter is used to define what action the relevant channel will take when the value 0 is received via communication object number 6 after the alarm condition ends. The available options are Current Position, Open Contact, Closed Contact, and Return to Previous Position.

4.1.4 Receive 8-bit Data

This setting allows the contact to change its position not only by 1-bit data but also by 1-byte data. It is generally used for controlling heating/cooling valves that operate with thermostats sending 1-byte values. When this option is marked as “Yes”, an additional row appears where the threshold value can be defined. If the value received from the threshold input is equal to or greater than the specified threshold, the output becomes active. If the incoming value is lower than the threshold, the output becomes passive. Thermal or solenoid valve connections in fan coil applications can also be configured in this way.

4.1.4.1 Threshold (Included)

If the value received from the threshold input is equal to or greater than the specified threshold, the output becomes active on Normally Open channels. On Normally Closed channels, the output becomes passive. If the incoming value is lower than the threshold, the behavior is reversed according to the contact type. Thermal or solenoid valve connections in fan coil applications are also made in this way.

4.1.5 Status Information Transmission

The device can send its current position through the Contact Status communication object at the time of operation. The status information may be transmitted only when the contact output changes position, or every time a command is received even if the contact position does not change. This preference is defined here.

4.1.6 Control via Central Contact Input

This parameter determines whether the relevant contact will respond to the Central Contact Input object number 3. If “Yes” is selected, the contact will also operate according to the commands sent through object number 3.

4.1.7 Scenarios

This parameter is used to define the positions that the contact will take in response to 1-byte Scenario commands. When the Scenarios option is set to “Yes”, a tab named “Scenarios” appears under Contact Parameters in the middle section. When this tab is opened, the following screen is displayed:

(Graph)

4.1.8 Time Function

This section is used to configure time-dependent operations for the contact output. If such functions are required, “Yes” must be selected. In this case, a tab named **“Time Function”** appears under **Contact Parameters** in the middle section. When this tab is opened, the following screen is displayed:

(Graph)

The default setting is **“No Function”**. The other available options are explained below. In order to activate the contact output while disabling the time functions, a 1-bit **On** command can be sent through the **“Permanent On”** communication object. When an **Off** command is sent through this object, the time functions resume operation with the next command.

4.1.8.1 Delay

This parameter is used when a delay is required before executing an **On** or **Off** command

received by the device. Separate values can be entered for **On Command Delay** and **Off Command Delay**, within a range of 0 to 6500 seconds. If a command in the opposite direction is received before the delay period has expired, the delay process for that direction starts instead.

4.1.8.2 Staircase Timer

This function is used to switch the contact automatically to the **Off** position after a defined period following an **On** command. The lighting duration can be set between 1 and 6500 seconds.

4.1.8.3 Flash

This function makes the contact output remain **Active (On)** for a defined period and **Passive (Off)** for another defined period, repeating this cycle continuously. It is generally used for warning lights or audible alert devices.

(Table graph)
(Table graph)
(Table Graph)

• **Contact:** This object is used to switch the contact to short circuit or open circuit by means of a 1-bit value sent through this object.
• **Contact Position:** This object indicates the current state of the contact by means of a 1-bit value.
• **Contact Threshold Input:** This object is used to switch the contact to short circuit or open circuit by means of a 1-byte value sent through this object.
• **Contact Permanent On:** This object appears on channels where a time function is assigned. For normally open channels, sending a value of **1** to this object forces the contact into short circuit independently of the time function. For normally closed channels, the same is achieved by sending **0**. With other values, the channel continues in its last state.
• **Contact Logic AND Input; Contact Logic OR Input; Contact Logic TOGGLE Input:** These objects work together with the **Contact** object and use a 1-bit value to modify the output logically.
• **Contact Scene:** According to the 1-byte scene number sent through this object, the contact is switched to the state defined in the relevant channel parameter.

4.2 Blind/Shutter

Blind or shutter functions are controlled through two contacts. The important point is that only one output may be active at any given time. The device ensures this by software. Since blind functions use two contacts, the odd-numbered contacts on the upper row must be connected for the opening direction, while the even-numbered contacts on the lower row must be connected for the closing direction. The triangular arrangement of the LED status indicators on the device is also intended to make the movement directions easier to understand. The Blind/Shutter parameters are as follows:

(Graph)

4.2.1 Travel Time

This parameter is used to enter the time, in seconds, required for the blind or shutter to move

from the fully closed position to the fully open position. A value between 1 and 6500 seconds can be selected, and the default value is 60 seconds. This information is used for two purposes: first, to request and monitor the blind position as a percentage (%0: fully open, %100: fully closed); second, to ensure energy isolation by setting the output contacts to passive at the end of this period, with an additional 10% time margin.

4.2.2 Slat Adjustment

This function is used for venetian blinds or similar devices with adjustable slats. Such devices can control not only the blind position but also the slat angle. When **Slat Adjustment** is set to **Active**, the additional **Slat Step Time** parameter becomes available. In this parameter, the duration of each slat adjustment step is selected from the list. In order to perform slat adjustment, the device remains active through the **Stop/Step** object for the specified time.

4.2.2.1 Slat Step Time

This parameter is used to define the duration of the slat adjustment step from the list provided. The device remains active through the **Stop/Step** object for the selected period in order to perform the slat adjustment.

4.2.3 Control via Central Blind/Shutter Input

This option allows the blind function to also operate through communication objects 4 and 5. If required, this option must be set to **Active**.

4.2.4 Scenes

This function is used to define the positions that the blind/shutter will take in response to 1-byte Scene commands. When the **Scenes** option is set to **Yes**, a tab named **"Scenes"** appears under **Blind/Shutter Parameters** in the middle section. When this tab is opened, the following screen is displayed:

(Graph)

Each blind module can be assigned to operate in up to 5 scenes. In the **Scene Number** field, the value expected from the **Blind/Shutter Scene** communication object is selected, while in the **Scene Position** field, the position that the contact will take in that scene is defined. For example, if the blind is required to move downward in Scene 2, the settings should be: **Scene Number x: Scene 2**, **Scene Position x: Down**.

An example set of communication objects for a Blind/Shutter function is given below:

(Table Graph)
(Table Graph)

• **Move:** This is a 1-bit movement object. An **On** command sends a command in the closing direction, while an **Off** command sends a command in the opening direction.
• **Stop/Step:** In order to stop a blind motor while it is moving, a value of **1** or **0** is expected through this object. In addition, for blinds with slat adjustment, commands received through this object are also used for slat control. An incoming **On** command adjusts the slats in the darkening direction, while an **Off** command adjusts them in the lighting direction.
• **Blind/Shutter Scene:** This is the object through which 1-byte Scene information is received. Scene-related movements are explained in the parameters section.
• **Move to Position:** By sending a 1-byte command through this object, the blind can be

moved to the desired position. A value of **100%** means fully closed.
• **Position Status:** This communication object reports the calculated current position of the blind. The current position is transmitted when movement stops.

4.3 3-Point Controlled Valve

These valve actuators receive commands through separate inputs in order to open or close the fluid flow, similar to blind/shutter control. Since these valve motors use two contacts, the odd-numbered contacts on the upper row must be connected for the opening direction, while the even-numbered contacts on the lower row must be connected for the closing direction. The parameters for 3-Point Valve Control are as follows:

(Graph)

4.3.1 Direction Change Delay

This parameter is used to define the waiting time between commands in the opening and closing directions of the valve actuator. A value between **250 ms** and **1000 ms** can be selected from the list. This delay is added to ensure that the actuator fully stops its current movement before starting in the opposite direction.

4.3.2 Travel Time

This is the field where the time required for the valve to move from the fully closed position to the fully open position is entered. A value between **1 and 6500 seconds** can be defined. All percentage-based position changes of the valve are calculated according to this duration.

4.3.3 Valve Name

This parameter is used to define whether the valve is intended for heating or cooling fluid control. It also determines the name of the communication object.

The communication objects are as follows:

(Table Graph)

• **Valve Heating Control Value; Valve Cooling Control Value:** A 1-byte value sent through this object is used to drive the valve to the required position.
• **Valve Status Information:** This object is used to monitor the current position of the valve.

P.S: When the device is energized, it attempts to set the initial position to **CLOSED** by activating the closing contact for the duration of the configured travel time. It then activates the relevant output in the required direction in order to reach the incoming Control Value.

4.4 2-Step Fan Coil

Fan coil units are mechanical devices used in heating and cooling systems, providing room conditioning through the circulation of treated fluid inside the unit. The device contains a motor for air circulation, and this motor can operate at different speed levels. Although fan coils most commonly have 3 speed levels, the number may vary between 2 and 5. This device directly supports the speed control of 2-speed and 3-speed fan coil units. According to the hot and cold water circuits passing through them, fan coil units are referred to as either 2-pipe or 4-pipe systems. The valves of these pipe circuits must also be controlled. Thermal, solenoid, or 3-point valve actuators operating at 230V can be connected to any suitable channel of the device.

The opening parameters of the Fan Coil page are as follows:

(Graph)

4.4.1 Fan Start Delay

This parameter defines the delay before the fan coil starts operating. Its main purpose is to avoid discomfort at startup. In most applications, water flow and fan operation begin at the same time, but it takes a certain amount of time for the valve to open and for the hot or cold water to circulate through the unit. During this period, the fan coil may blow unconditioned air. To prevent this, an additional delay between 0 and 255 seconds can be set.

4.4.2 Fan Acceleration Time

Fan motors contain internal electronic circuits that regulate their speed. These circuits allow the motor to operate at slower stages than normal, and especially at lower speeds it may take some time for the motor to reach the desired speed. The process of reaching the target speed is referred to as **acceleration**, and the shortest required period is defined as the **Acceleration Time**. This parameter determines the minimum time the motor must remain at a given speed. This duration applies only during the initial startup of the motor.

4.4.3 Fan Speed Output

There are two types of staged fan operation. The first and most common type is the model in which only one output is activated for each speed stage, while the others remain open contact. In this case, at low fan speed the first speed output is **On** and the others are **Off**; at medium speed the second output is **On** and the others are **Off**; and at high speed the third output is **On** and the others are **Off**.

The second operating model is the **cumulative output model**. In this type, for low fan speed the first speed output is **On** and the others are **Off**; for medium fan speed the first and second outputs are **On** and the remaining output is **Off**; and for high fan speed all three outputs are **On**. In this model, the electrical requirements of the fan coil unit must be taken into account. If all stages are supplied from the same phase, the contact supplies must also be connected from the same phase. The default setting is **One Output for Each Stage**.

4.4.4 Fan Speed Change Delay

This parameter defines the waiting time between two fan speeds in order to prevent possible electrical issues during switching. It can be selected as **0, 250, 500, or 5000 ms**. During this interval, all contacts of the function remain open circuit, after which the new speed stage is activated.

4.4.5 Fan Automatic Mode Input

In order for the fan speed to be adjusted automatically according to the received heating or cooling control value, a 1-bit **Auto/Manual** signal is required. This parameter defines the meaning of that 1-bit signal. If the received value for automatic operation is **1**, then **Automatic = 1, Manual = 0** must be selected; otherwise the opposite option must be chosen.

4.4.6 Number of Control Inputs

Thermostats generate control values according to the required amount of heating or cooling. Depending on the application type, these control values may come from a single object or from two separate objects. If the number of control inputs is set to **1**, the fan can operate

automatically according to the value between 0 and 255 received through the **Fan Coil Heating/Cooling Control Value** communication object.

In systems where heating and cooling control values are handled through two separate objects, an additional preference line is added to determine which input will be processed: **Control Input Selection: "Higher Value" or "According to Heating/Cooling Mode"**. In normal applications, at most one of the heating or cooling control values is positive. In other words, when heating is active, the cooling value is zero, and vice versa. For this reason, selecting **Higher Value** effectively also allows the operating mode to be determined.

If **According to Heating/Cooling Mode** is selected instead, an additional communication object named **Heating/Cooling Mode Selection** is added. The device decides automatic fan speed operation according to the information received from this 1-bit DPT **1.100 cooling/heating** data type. If this value is **1 = heating**, the device operates according to the **Fan Coil Heating Control Value**; if it is **0 = cooling**, it operates according to the **Fan Coil Cooling Control Value**.

4.4.7 Automatic Fan Speed Values

In order for the device to switch fan speeds automatically, threshold values are required for the control input. The incoming control value is converted into the corresponding fan speed according to the thresholds defined in this section. Under normal conditions, the expected relationship is:
0 < Fan 1 < Fan 2 < 256.
If the values are not entered in this order, the software will sort them automatically. However, the recommended method is to enter the values in the correct sequence.

4.4.8 Hysteresis

This is the method used to prevent unnecessary switching between fan speeds. It is based on adding hysteresis values to the **Automatic Fan Speed Values** defined above, creating holding zones between speed levels so that the current speed is maintained within a certain range.

4.5 3-Step Fan Coil

Fan coil units are mechanical devices used in heating and cooling systems, providing room conditioning through the circulation of treated fluid inside the unit. The device contains a motor for air circulation, and this motor can operate at different speed levels. Although fan coils most commonly have 3 speed levels, the number may vary between 2 and 5. This device directly supports the speed control of 2-speed and 3-speed fan coil units. According to the hot and cold water circuits passing through them, fan coil units are referred to as either 2-pipe or 4-pipe systems. The valves of these pipe circuits must also be controlled. Thermal, solenoid, or 3-point valve actuators operating at 230V can be connected to any suitable channel of the device.

The opening parameters of the Fan Coil page are as follows:

(Graph)

4.5.1 Fan Start Delay

This parameter defines the delay before the fan coil starts operating. Its purpose is to prevent discomfort during startup. In most applications, water flow and fan operation begin at the same time, but it takes a certain amount of time for the valve to open and for the hot or cold

water to circulate through the unit. During this period, the fan coil may blow unconditioned air. To avoid this, an additional delay between 0 and 255 seconds can be set.

4.5.2 Fan Acceleration Time

Fan motors include internal electronic circuits that regulate their speed. Thanks to these circuits, the motor can operate at stages lower than its normal speed. Especially at low speed levels, it may take some time for the motor to reach the target speed. The process of reaching the target speed is referred to as **acceleration**, and the minimum time required for this is called **Acceleration Time**. This parameter determines the minimum time the motor must remain at any selected speed.

4.5.3 Fan Speed Output

There are two types of staged fan operation. The first and most common type is the model in which only one output is activated for each speed stage, while the others remain open contact. In this case, at low fan speed the first speed output is **On** and the others are **Off**; at medium speed the second output is **On** and the others are **Off**; and at high speed the third output is **On** and the others are **Off**.

The second operating model is the **cumulative output model**. In this type, for low fan speed the first speed output is **On** and the others are **Off**; for medium fan speed the first and second outputs are **On** and the remaining output is **Off**; and for high fan speed all three outputs are **On**. In this model, the electrical requirements of the fan coil unit must be taken into account. If all stages are supplied from the same phase, the contact supplies must also be connected from the same phase. The default setting is **One Output for Each Stage**.

4.5.4 Fan Speed Change Delay

This parameter defines the interval left between two speed levels in order to avoid possible electrical issues during switching. A value between 0 and 1000 ms can be selected in 250 ms steps. During this time, all contacts of the function remain open circuit, after which the device switches to the new speed.

4.5.5 Fan Automatic Mode Input

In order for the fan speed to be adjusted automatically according to the received heating or cooling control value, a 1-bit **Auto/Manual** signal is required. This parameter defines the meaning of that 1-bit signal. If the received value for automatic operation is **1**, then **Automatic = 1, Manual = 0** must be selected; otherwise the opposite option should be chosen.

4.5.6 Number of Control Inputs

Thermostats generate control values according to the required level of heating or cooling demand. Depending on the application, these control values may be received from a single object or from two separate objects. If the number of control inputs is set to **1**, the fan can operate automatically according to the 0–255 value received through the **“Fan Coil Heating/Cooling Control Value”** communication object. In systems where heating and cooling control values are handled through two separate objects, an additional selection line is added in order to determine which input will be processed: **Control Input Selection: “Higher Value”** or **“According to Heating/Cooling Mode”**. In standard applications, only one of the heating or cooling control values is positive at a time. In other words, when heating is active, the cooling value is zero, and vice versa. For this reason, selecting **Higher Value**

also makes it possible to determine the operating mode. If **According to Heating/Cooling Mode** is selected, an additional communication object named **"Heating/Cooling Mode Selection"** is added. The device decides the automatic fan speed operation according to the information received through this 1-bit DPT **"1.100 cooling/heating"** data type. If this value is **1 = heating**, the device operates according to the **Fan Coil Heating Control Value**; if it is **0 = cooling**, it operates according to the **Fan Coil Cooling Control Value**.

4.5.7 Automatic Fan Speed Values

In order for the device to switch fan speeds automatically, threshold values must be defined for the control input. The incoming control value is converted into the appropriate speed according to the thresholds specified in this section. Under normal conditions, the expected order is **0 < Fan 1 < Fan 2 < Fan 3 < 256**. If the values are not entered in this order, the software will sort them automatically. However, the recommended method is to enter them in the correct sequence from the beginning.

4.5.8 Hysteresis

This is the method used to prevent unnecessary switching between fan speeds. It is based on adding hysteresis values to the **Automatic Fan Speed Values** defined above, thereby creating holding zones between speeds where the current operating stage is maintained.

4.5.9 Fan Speed Data Type

The data type used for fan speeds is 1-byte and it can be transmitted in two different formats. The first is **DPT 5.100**, in which the fan speeds are represented by values such as **0, 1, 2, 3**. The requested or current fan speed is expressed through these values. The second format is **DPT 5.001**, where the value is transmitted between **0–255** (or **0–100%**). According to standard KNX functionality for three-speed fan control, if the 1-byte value received through the fan speed communication object falls within **(1–33)%**, **(1–85)10**, or **(1–55)16**, the device operates at the first speed; if it falls within **(34–66)%**, **(86–170)10**, or **(56–AA)16**, it operates at the second speed; and if it falls within **(67–100)%**, **(171–255)10**, or **(AB–FF)16**, it operates at the third speed. As speed status feedback, one of the valid values **(0, 85, 170, 255)10** is transmitted.

4.5.10 Fan Speed at Start-Up

This section defines how the fan will operate when the device starts up. If **"Automatic"** is selected, the fan begins operating automatically according to the incoming heating or cooling control values. If **"Manual"** is selected, an additional line appears where the starting position can be defined:

(Graph)

The appropriate value is selected from this list. **"Keep Position"** means the device continues from its previous position, while the other options force it to move to the selected position.

4.5.11 Fan Speed When the KNX Bus Fails

This parameter defines what the fan position will be when the KNX bus is interrupted, until the bus becomes active again and new information is received. The available list is the same as above.

4.5.12 Action When Window Opens

When a 1-bit **ON** command is received from the KNX bus through the **"Fan Coil Window**

Open” communication object, the device is informed that a window or door has been opened. This allows the fan speed to be adjusted manually. While the window or door remains open, the fan speed may either be changed or left unchanged, depending on the selected preference. When a 1-bit **OFF** command is sent to the same communication object, the fan speed returns to its previous position.

(Graph)
(Graph)

• **Fan Coil Automatic Mode On/Off; Fan Coil Manual Mode On/Off:** These objects are used to switch the device into automatic or manual mode by means of a 1-bit value.
• **Fan Coil Heating/Cooling Control Value; Fan Coil Heating Control Value; Fan Coil Cooling Control Value:** The 1-byte value received through these objects determines at which stage the device will operate.
• **Fan Coil Heating/Cooling Mode Selection:** This object is used to determine which value from the xx1 and xx2 objects will be processed. The device mode can be selected as Heating or Cooling.
• **Fan Coil Window Open:** This object is used to trigger the window-open condition of the device.
• **Fan Coil Automatic Mode Status; Fan Coil Manual Mode Status:** These objects provide information about which control mode the device is currently operating in.
• **Fan Coil On/Off Status:** This object provides information on whether the device is operating or not.
• **Fan Coil Heating/Cooling Mode Status:** This object indicates whether the device is operating in Heating or Cooling mode.
• **Fan Coil Speed Set:** This object switches the device into manual mode and allows stage control while in manual mode. It operates with 1-byte values.
• **Fan Coil Speed Status:** This is the feedback object that indicates at which stage the device is currently operating.