
# ZoningBOX 6 / ZoningBOX 4

## Ducted Air Zoning Actuator for 6 / 4 Zones

**ZCL-ZB6**
**ZCL-ZB4**

Application program version: [2.1]
User manual edition: [2.1]_a

www.zennio.com

USER MANUAL

# CONTENTS

# DOCUMENT UPDATES

| Version | Changes | Page(s) |
|---|---|---|
| [2.1]_a | **Changes in the application program:**<br>• New parameter for advanced current control | 32 |
| [2.0]_a | **Changes in the application program:**<br>• New operating mode: positional control.<br>• Optimisation of the global setpoint temperature calculation.<br>• Optimisation of the fan speed control.<br>• Sending of indication objects on voltage is recovery.<br>• New Heartbeat functionality. | - |

# 1 INTRODUCTION

## 1.1 ZoningBOX 6 / ZoningBOX 4

ZoningBOX 6 and ZoningBOX 4 from Zennio are two versatile KNX actuators intended for the climate management of rooms (or zones) where the air flow inputs are regulated through motorised gates or grilles.

The most outstanding features of the device are:

- **6 or 4 output channels** for the connection of the motorised grilles (at 12V or 24V) of up to six or four zones.
- **Manual control** over the different grilles through the on-board push buttons.
- **LED indication** of the output channels status and for error notification**.**
- **Zoning module**, responsible for managing the logic between the external thermostats, the HVAC machine and the grille control module.
- **Heartbeat** or periodical “still-alive” notification.

The control orders addressed to the HVAC machine will be sent to the KNX bus as communication objects, so they can be managed by specific interfaces, depending on the HVAC machine type.

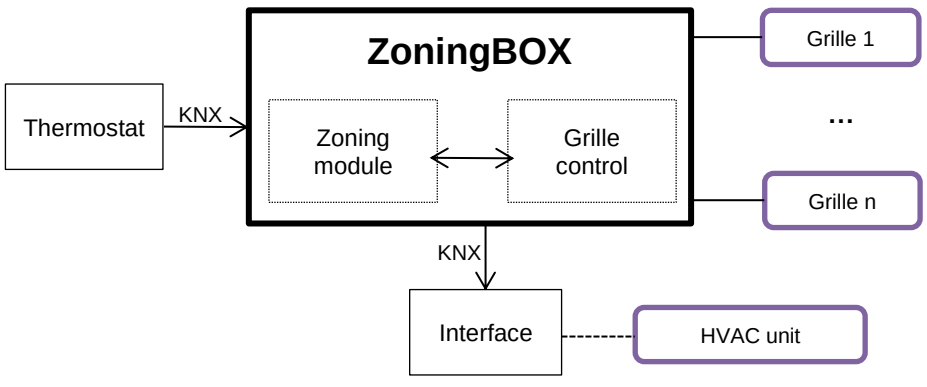
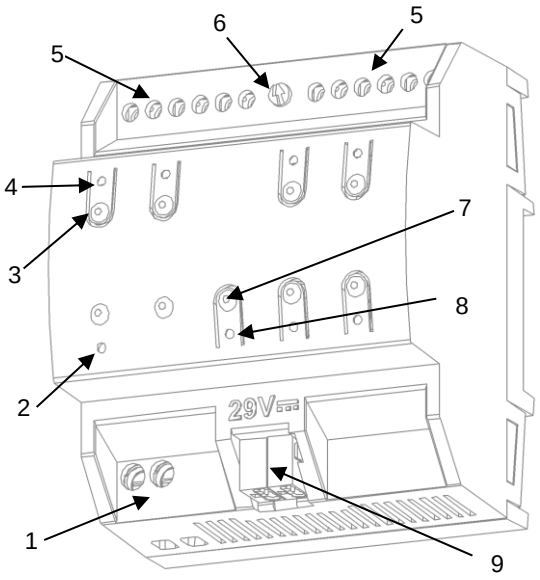



**Figure 1.** ZoningBOX Architecture

## 1.2 INSTALLATION

ZoningBOX connects to the KNX bus through the on-board KNX connector. Once the device is provided with power from the KNX bus, both the individual address and the associated application program may be downloaded.




1. **230V power input.**
2. **Power indicator LED.**
3. **Grille control pushbutton.**
4. **Grille status LED indicator.**
5. **Grille output channels.**
6. **12/24V switch.**
7. **Prog./Test pushbutton.**
8. **Prog./Test LED.**
9. **KNX Connection.**

**Figure 2.** Element diagram (ZoningBOX 6)

The main elements of the device are described next.

- **Prog./Test Pushbutton (7)**: a short press on this button sets the device into the programming mode, making the associated LED (3) light in red.

  **Note**: if this button is held while plugging the device into the KNX bus, the device will enter into **safe mode**. In such case, the LED will blink in red every 0.5 seconds.

- **Output channels (5)**: output ports for the insertion of the stripped cables of the grilles being controlled by the actuator. Please secure the connection by means of the on-board screws.

- **Phase and neutral inputs (1)**: ports for the connection of the voltage cables (phase and neutral) that will power the grilles during operation.

- **Voltage selector 12V / 24V (6)**: switch for the selection of the grille type (12V or 24V).

To get detailed information about the technical features of this device, as well as on the installation and security procedures, please refer to the corresponding **Datasheet**, bundled with the original device packaging and also available at www.zennio.com.

## 1.3 START-UP AND POWER LOSS

Depending on the configuration, some specific actions may be performed during the device start-up. For example, the integrator can set whether the grilles should switch to a particular state and whether the device should send certain objects to the bus after the power recovery, as explained later in this document.

On the other hand, when a bus power failure takes place, ZoningBOX will interrupt any pending actions, and will save its state so it can be recovered once the power supply is restored.

# 2 CONFIGURATION

## 2.1 GENERAL

After importing the corresponding database in ETS and adding the device into the topology of the desired project, the configuration process begins by entering the Parameters tab of the device.

**Important**:

- *The subsequent sections of this document usually refer to the output channels as grilles, although up to two grilles can be connected to the same output channel as long as they are the same model. In such case, for practical purposes please consider them as a sole grille*.
- *This document and its figures are generally referred to ZoningBOX 6. However, note that all functions are entirely analogous in ZoningBOX 4.*

### ETS PARAMETERISATION

The only parameterisable screen available by default is "General". From this screen it is possible to activate/deactivate all the required functionality.

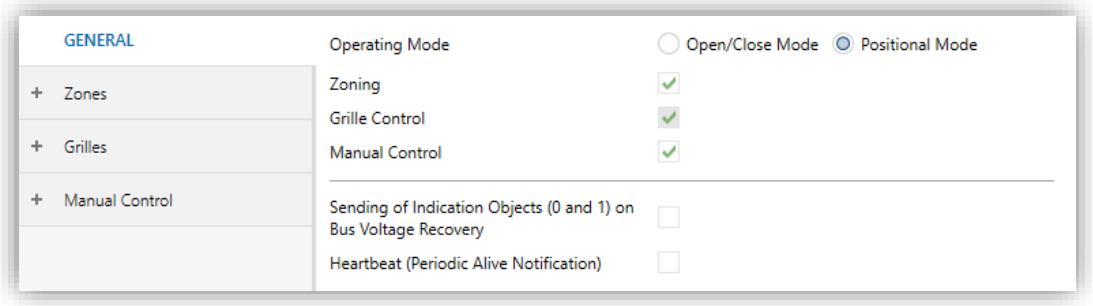



**Figure 3**. General Screen

- **Operating Mode** [*Open/Close Mode* / *Positional Mode*][1]: sets the control mode. When *Positional mode* is selected, the "Grille Control" sub-tab under "Zoning" tab is displayed on the left menu. See section 2.2.2 for more details.

[1] The default values of each parameter will be highlighted in this document, as follows: [*default*/*rest of options*].

- **Zoning** [*disabled*/*enabled*]: enables o disables the “Zones” tab on the left menu. See section 2.2 for more details.

- **Grille Control** [*enabled*]: enables o disables the “Grilles” tab on the left menu. See section 2.3 for more details.

- **Manual Control** [*disabled*/*enabled*]: enables o disables the “Manual Control” tab on the left menu. See section 0 for more details.

- **Sending of Indication Objects (0 and 1) on Bus Voltage Recovery** [*disabled*/*enabled*]: this parameter lets the integrator activate two new communication objects (“**Reset 0**” and “**Reset 1**”), which will be sent to the KNX bus with values “0” and “1” respectively whenever the device begins operation (for example, after a bus power failure). It is possible to parameterise a certain **delay** [*0…255*] to this sending.

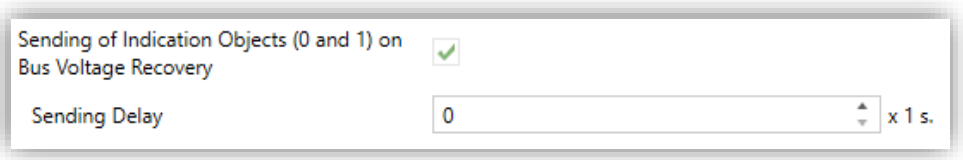



**Figure 4.** Sending of Indication objects on bus voltage recovery

- **Heartbeat (Periodical Alive Notification)** [*disabled*/*enabled*]: this parameter lets the integrator incorporate a one-bit object to the project (“**[Heartbeat] Object to Send ‘1’**”) that will be sent periodically with value “1” to notify that the device is still working (*still alive*).

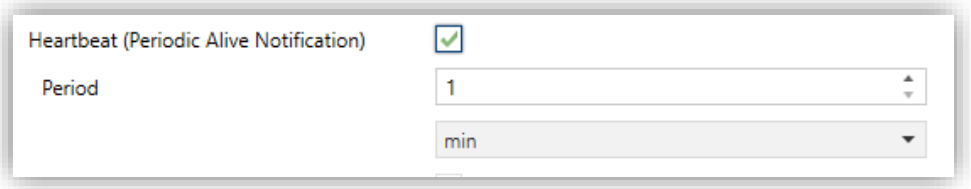



**Figure 5**. Heartbeat (Periodical Alive Notification).

**Note**: *The first sending after download or bus failure takes place with a delay of up to 255 seconds, to prevent bus overload. The following sendings match the period set*.

## 2.2 ZONES

ZoningBOX incorporates a zoning logic module responsible for communicating with the external thermostats, the HVAC unit and the grille control module, which in sum makes it possible to perform an independent climate control in the rooms (or zones) of an installation equipped with air ducts (and air flow outputs towards the different zones through motorised gates or grilles).

### 2.2.1 CONFIGURATION

ZoningBOX 6 / 4 can control **up to 12 climate zones**, which can be grouped into **one or two groups**, depending on whether there is **one or two HVAC units** in the installation.

The state of each zone is defined in terms of the following:

- **On/Off state**, i.e., enable or disable the room.
- **Temperature setpoint**, i.e., the desired target temperature for the room.
- **Reference temperature**, i.e., the current temperature in the room.
- **Control signal** from the thermostat.

One communication object is provided for the reception of each of the above values, being it possible to link these objects with those from the **room thermostat**.

**Switching a zone off** (i.e., disabling that zone) implies that the corresponding grille will be automatically closed and that the setpoint of such zone will not be considered by the zoning module. Nevertheless, it will still store any further setpoint values received from the thermostat, which will be applied once the zone is switched on.

On the other hand, in parameters it is possible to set the specific behaviour (under the heating or cooling modes) for the particular situation of having **only one grille open**:

- **HVAC Control**: the control signal received from the external thermostat will be applied directly over the HVAC unit (with no logic involved), and the grille will remain open. As soon as another grille is opened, the normal grille control will be resumed. This option is the recommended one for the **heating** mode.

**Note**: *even if the HVAC unit has been configured to remain always on (see below), in this case the unit will be switched on or off according to the control signal received from the thermostat*.

- **Grille Control**: the actuator will keep controlling the grille normally, according to the thermostat control signal.

- **Adjust Setpoint**: the grille will remain open and the HVAC unit on, although it will be possible to increase or decrease the current setpoint by a certain value when only one grille remains open. This option is recommended for the **cooling** mode.

ZoningBOX 6 / 4 permits one **bypass** to be set for each enabled zone group, avoiding overpressures in the air ducts, for example if all grilles are closed. Setting from how many closed grilles are to be forced open is also possible.

Depending on which control mode is selected:

- **Open/Close Mode:** bypass can only be set if it physically exists in the installation.

- **Positional Mode:** bypass can be set when the installation is equipped with it or, if it does not, the option is given for a zone to be configured as a bypass.

At the moment all zones are disabled, the HVAC will be switched off, and last open grille will remain open for a delay since the HVAC is switched off. If there is a bypass, bypass grill will be the last open one.

Moreover, it is also possible to apply an additional **delay before the HVAC unit can be switched on** again. This prevents the machine from being switched on and off too often, which may reduce its durability and cause unnecessary energy consumptions.

**Note**: *the above configuration can be particularised for each HVAC unit in case there are two groups*.

Finally, the following functions are also available within the general configuration of the zoning module:

- **Scenes**: see section 2.2.6.

- **Grilles Maintenance**: ZoningBOX can perform maintenance actions to prevent seize and dust in the grilles. This consists in automatically opening the grille once it is found to have been closed for more than one week. After thirty seconds it gets closed again.

## ETS PARAMETERISATION

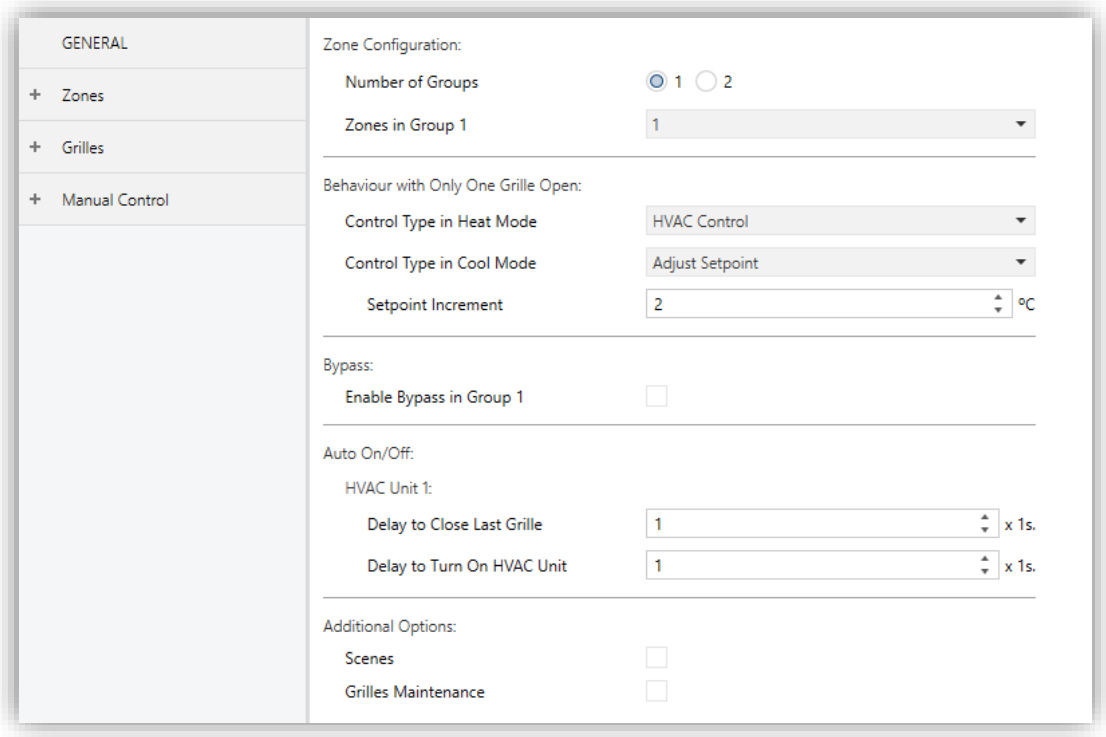



**Figure 6**. Zones – Configuration

Once the zoning module has been activated in the General tab (see section 2.1), the tab tree will show a new entry named Zones. The general parameters of the zone control are contained in the Configuration window:

- **Number of Groups** [*1 / 2*]: depending on whether all the zones belong to the same group (i.e., they are associated to the same HVAC unit) or not. For each group, the following objects will be available:

  - "**[Unit x] On/Off HVAC Unit**": one-bit object that will be sent whenever ZoningBOX determines HVAC unit "x" must be switched on or off. This object must be grouped with the analogous object of the HVAC unit interface.

- "**[Unit x] On/Off HVAC Unit (Status)**": one-bit object to receive feedback about the on/off state of HVAC unit "x". This object must be grouped with the analogous object of the HVAC unit interface.

- "**[Unit x] Global Temperature Setpoint**": 2-Byte object that will be sent whenever the temperature setpoint for HVAC unit "x" changes. This object must be grouped with the analogous object of the HVAC unit interface, so the HVAC unit adopts the new setpoint.

- **Zones in Group** [*1…12*]: defines the number of zones in group "n". Note that the total number of zones cannot exceed twelve, regardless of the number of groups.


**Figure 7**. Zoning - Zone Configuration

The following objects are provided for each zone:

- "**[Group n] [Zi] Disable/Enable Zone**": one-bit object for the reception of the requests to enable or disable the zone (from a user interface in the room).

- "**[Group n] [Zi] Setpoint Temperature**": 2-Byte object for the reception of the temperature setpoint (i.e., as set in the room thermostat) of the zone.

- "**[Group n] [Zi] Reference Temperature**": 2-Byte object for the reception of the ambient temperature in the zone (i.e., as measured by a sensor).

- "**[Group n] [Zi] Control Signal from Thermostat**": one-bit or 1-Byte object for the reception of the control variable of the zone thermostat.

- "**[Group n] [Gi] [Control] Grille Control**": one-bit or 1-Byte object that will be sent when the grille corresponding of the zone needs to be opened or closed. This is typically to be grouped with the analogous object in the Grilles module (see section 2.3).

- "**[Group n] [Gi] [Control] Grille Status**": one-bit or 1-Byte object for receiving the feedback of the grille status. This is typically to be grouped with the analogous object in the Grilles module (see section 2.3).

- **Control Type in Heat Mode** [*HVAC Control / Grille Control / Adjust Setpoint*]: defines the behaviour of the system when there is only one open grille left under heat mode.

- **Control Type in Cool Mode** [*HVAC Control / Grille Control / Adjust Setpoint*]: defines the behaviour of the system when there is only one open grille left under cool mode.

  The option "Adjust Setpoint" entails configuring an additional parameter:

  - **Setpoint Decrement/Increment** [*1…2…5ºC*]: sets the increment (in the cooling mode) or the decrement (in the heating mode), between 1º and 5º, that should be applied over the setpoint.

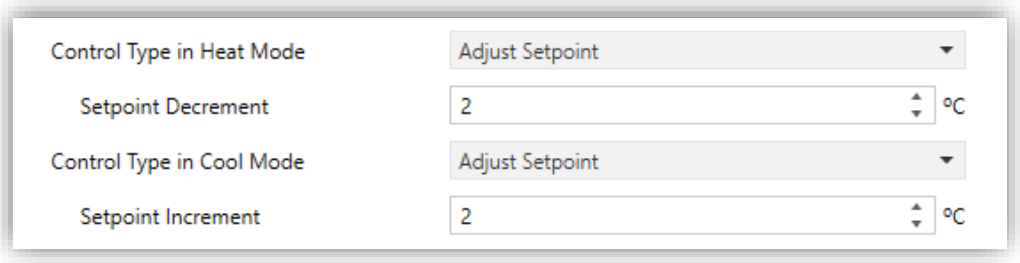



**Figure 8**. Zoning - Behaviour with only one grille open

- **Enable Bypass in Group "n"** [*disabled/enabled*]: enables/disables the possibility of controlling the valve of a bypass.

  - **Open if nº of Open Grilles is Less than or Equal to** [*1...m*] (m = number of grilles configured in group n): sets how many grilles, at least, must remain open so the bypass is not forced to be open as well.

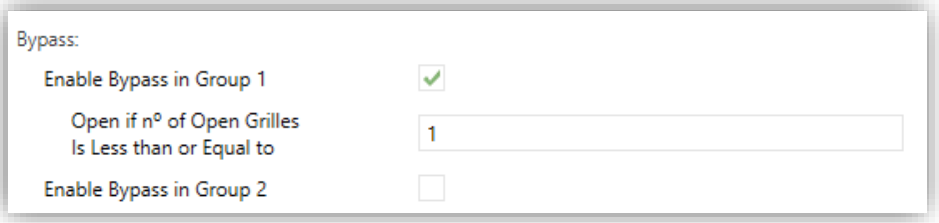



**Figure 9**. Zoning – Bypass

The parameters in this part depend on the Operating Mode:

Open/Close Mode: If enabled, the "**[Unit x] Bypass**" one-bit object will be available, which must be linked to the analogous object of the interface that controls such valve.

Positional Mode: the option to set the bypass as an extra grill of the installation or as a specific area of the installation will be displayed.

- **Bypass Mode** [*Damper mode / Zone Mode*]: defines the operational bypass mode when positional mode is enabled.

  When "Damper mode" is selected, the **Desired Position** [*0…100 %*] parameter will be displayed. It defines which position the bypass will take when the open condition is met. Also, the "**[Unit x] Bypass**" 1-Byte object will be available, so it can be linked to the analogous object of the interface that controls such valve.


**Figure 10.** Bypass – Damper mode

Selecting "Zone Mode" the following parameters will be displayed:

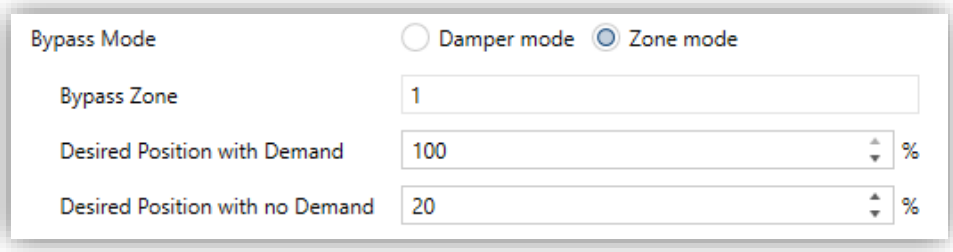



**Figure 11**. Bypass – Zone mode

- **Bypass Zone** [*1…m*] (m = number of grilles configured in group n): sets the zone which will actuate as bypass.
- **Desired Position with Demand** [*0…100%*]: opening of the grill which actuates as bypass when it is an enabled zone and with demand.

- **Desired Position with no Demand** [*0…20…100%*]: opening of the grill actuates as bypass when it is close because it is enabled and has no demand or is disabled.

For each HVAC unit (1-2), it is also possible to configure:

- **Delay to Close Last Grille / Bypass** [*0…1…255 s*]: sets a time delay prior to closing the last grille or the bypass after switching off the HVAC unit.

- **Delay to Turn On HVAC Unit** [*0…1…255 s*]: sets a time delay before the HVAC unit can be switched back on in case of opening a grille. This avoids successively starting and stopping the unit, and the consequent energy consumption.

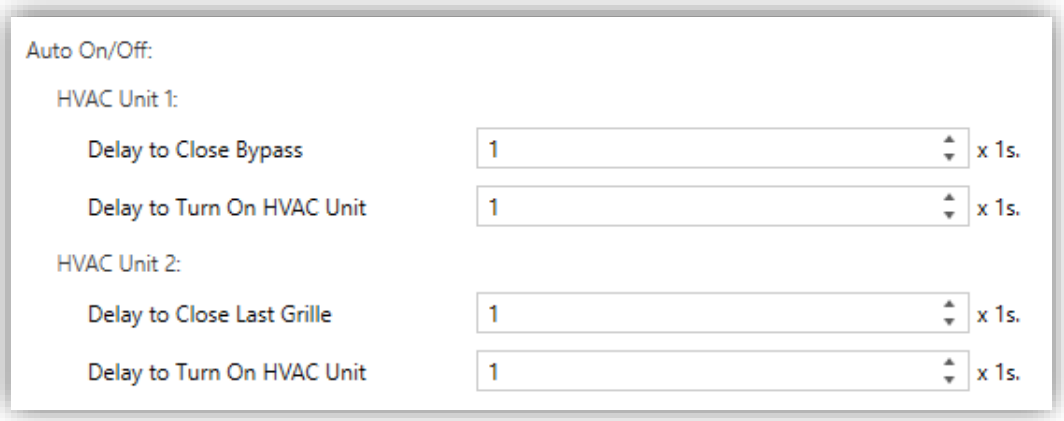



**Figure 12.** Zoning - Auto On/Off

Additional options:

- **Scenes**: enables/disables the scenes management. See section 2.2.6.

- **Grilles Maintenance**: enables the grille maintenance function for long inactivity periods.

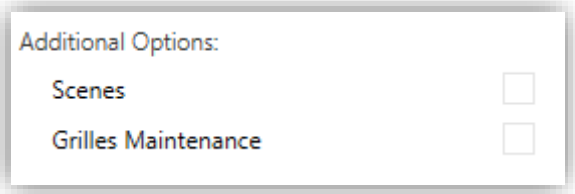



**Figure 13.** Zoning - Additional Options

### 2.2.2 GRILLE CONTROL

This tab sets the opening states depending on control variable values.

#### ETS PARAMETERISATION

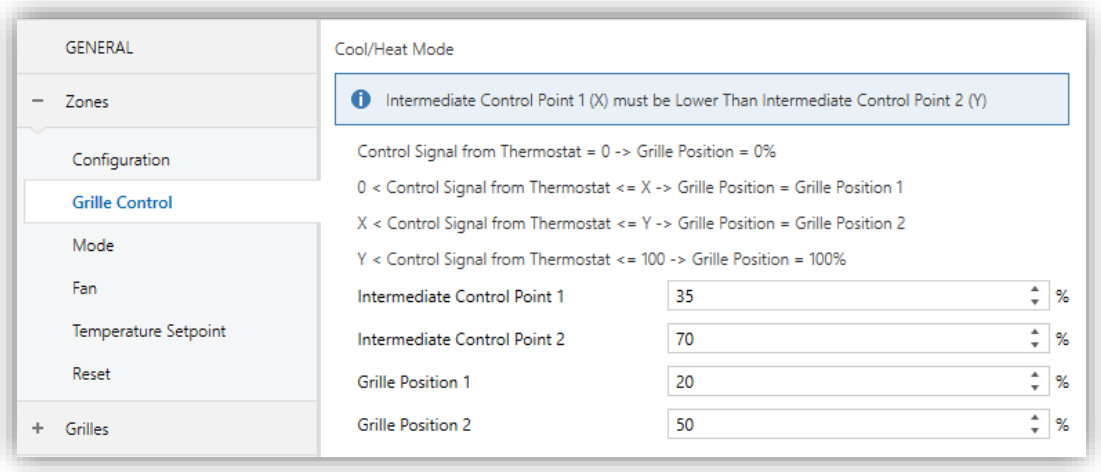



**Figure 14 –** Grill Control

- **Intermediate Control Point 1** [*0…35…100%*]**:** sets a limit under which every control order received with a value between 0% and **Intermediate Control Point 1,** will implies an opening value of **Grille Position 1** [*0…20…100%*].

- **Intermediate Control Point 2** [*0…75…100%*]: sets a limit so every order received between **Intermediate Control Point 1** and **Intermediate Control Point 2** will implies an opening value of **Grille Position** [*0…50…100%*].

  Every order with a value above **Intermediate Control Point 2** will implies an opening value of 100%.

**Note**: *Improper values in the above parameters may cause undesired behaviours.*

### 2.2.3 MODE

Each HVAC unit works necessarily under one of the following operation modes at a time, which therefore is applied to all zones included in its group:

- **Heating**: the unit will generate hot air to warm the zones. The grille control will be intended to make the local reference temperature reach the zone setpoint temperature.
- **Cooling**: the unit will generate cold air to refrigerate the zones. The grille control will be intended to make the local reference temperature fall under the zone setpoint temperature.
- **Fan**: the unit will generate an air flow at the ambient temperature. The grilles of the enabled zones will remain open.
- **Dry**: the unit will generate a dry air flow to reduce the ambient humidity. The grilles of the enabled zones will remain open as in Fan mode.

The operation mode of the HVAC unit will depend on the user needs. Therefore, ZoningBOX incorporates specific **input objects** for each group of zones, which can be linked to the above elements. It also incorporates **output objects** (status objects) to be linked with the gateways of the HVAC units, so whenever ZoningBOX receives a mode change order, it can be forwarded to the corresponding HVAC unit.

The following diagram illustrates this configuration.

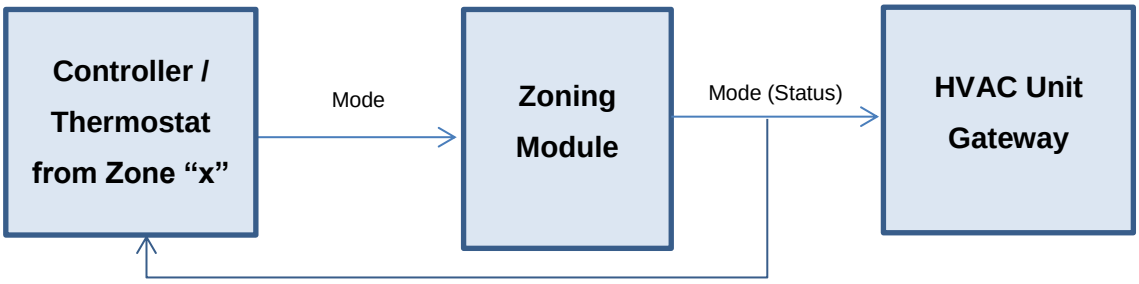



**Figure 15.** Mode control

The involved mode selection objects can be of different types:

- **Individual control (one bit)**: one binary object is provided per mode, together with their corresponding status objects.

- **Joint mode (one byte)**: a 1-Byte object is provided together with the corresponding status object, coded according to the following table.

| Mode | KNX Value |
|---|---|
| Heating | 1 |
| Cooling | 3 |
| Fan | 9 |
| Dry Air | 14 |

**Table 1** Modes

- **Simplified mode (one bit)**: a one-bit object is provided to allow simple changeovers between Cooling (value “0”) and Heating (value “1”). In case the Fan and Dry modes are activated through the above controls, the status object of this one will show the value “0”.

Every time a mode switchover takes place, all the enabled status objects will be sent, no matter if the HVAC unit is on or off.

By default, the HVAC unit is assumed to be in the Cooling mode.

## ETS PARAMETERISATION

The Mode configuration screen allows enabling the different mode control objects available.

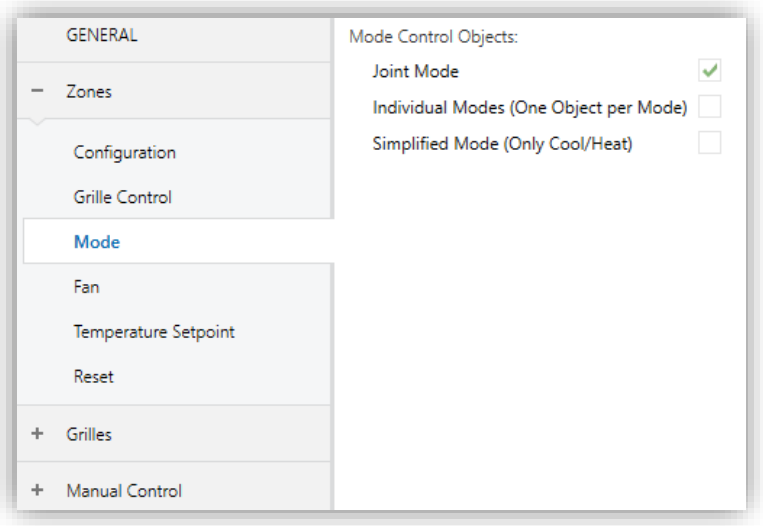



**Figure 16.** Zoning - Mode

- Joint Mode: enables the “[Unit x] Mode” and “[Unit x] Mode (Status)” 1-Byte objects.

- **Individual Modes**: enables the "**[Unit x] Cool Mode**", "**[Unit x] Heat Mode**", **"[Unit x] Fan Mode**" and "**[Unit x] Dry Mode**" one-bit objects, as well as their corresponding status objects.

- Simplified Mode: enables the "[Unit x] Simplified Mode" and "[Unit x] Simplified Mode (Status)" one-bit objects.

Please refer to the previous pages for the values accepted or sent by these objects.

### 2.2.4 FAN

ZoningBOX can handle **two or three different fan speeds**, which is set in parameters for each HVAC unit. Fan control can be settled as automatic control or manual control.

- **Automatic control**, the fan speed is calculated depending on number of in demand zones and a ponderation factor for each zone.

- **Manual control**, the user can directly take part in the selection of the desired speed through a set of communication objects of different types.

When both control modes are allowed, an object is provided to switch from one mode to the other.

Regarding the **manual control**, the communication objects that permit commuting the fan speed are of the following types and, in any case, are conditioned by the number of fan speeds allowed:

- **One-bit objects (one per speed)**, which activate a particular speed level on the reception of the value "1".

- **Step-control objects**: one-bit objects for increasing or decreasing the speed level sequentially, either **cyclically** (a further step once reaching the maximum level activates the minimum level again) or not.

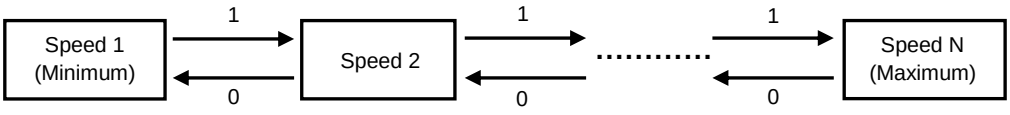



**Figure 17.** Non-cyclic step control

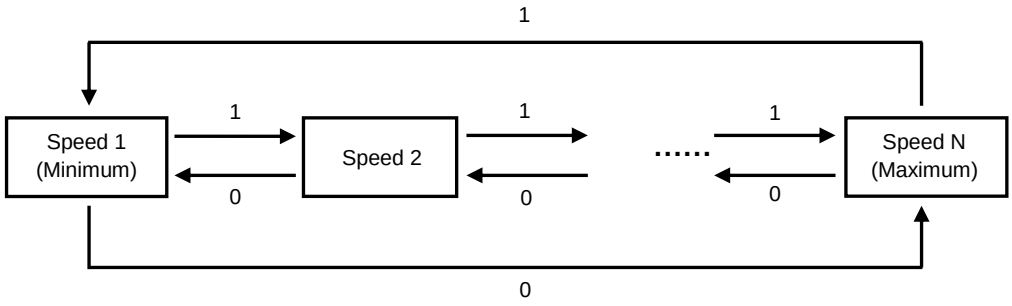



**Figure 18.** Cyclic step control

The "Off" state may be interpreted by the HVAC gateway as a switch-off order or as an order to switch to the automatic fan control, depending on its configuration.

- **One-byte enumerated object**: the speed switch will take place upon the arrival of the proper integer value (1, 2, 3).

| Object Value | Fan Speed |
|---|---|
| 0 | Ignore order |
| 1 | 1 |
| 2 | 2 |
| >2 | Ignore order |

**Table 2.** Enumerate control for two speeds

| Object Vale | Fan Speed |
|---|---|
| 0 | Ignore order |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| >3 | Ignore order |

**Table 3.** Enumerate control for three speeds

- **Percentage object**: the speed switch will take place upon the arrival of the proper percentage value; according to the KNX standard.

| Percentage Object Value | DPT_Scaling Value | Fan Speed |
|---|---|---|
| **0** | 0 | Ignore order |
| **1 – 50%** | 1 - 128 | 1 |
| **51 – 100 %** | 129 - 255 | 2 |

**Table 4** Percentage fan control – two speeds

| Percentage Object Value | DPT_Scaling Value | Fan Speed |
|---|---|---|
| **0** | 0 | Ignore Order |
| **1 – 33%** | 1 - 85 | 1 |
| **34 – 67%** | 86 - 170 | 2 |
| **68 – 100%** | 171 - 255 | 3 |

**Table 5.** Percentage fan control – three speeds

For all the aforementioned objects (with the exception of the step-control object) **an analogous status object** is available, making it possible to request the current fan speed at any time, even during the automatic control.

On the other hand, the air flow generated by each HVAC unit can **be limited according to the number of open grilles**. Therefore, it is possible to parameterise:

- Whether the minimum fan speed (speed 1) should be forced if the number of open grilles is found to be lower than a certain value and a speed fan level above speed fan level 1 (speed 2 or higher) has been settled through object.

- Only under a three-speed configuration: whether the medium fan speed (speed 2) should be forced if the number of open grilles is found to be lower than a certain value (different from the above one) and also, a fan speed level higher than speed fan level 2 (speed 3) has been settled through object. In case a fan speed level lower than fan speed 2 (speed 1) is settled by object, the final speed will be speed 1.

  In both cases, if a speed level is settled over the set level, when grilles number open will be higher than threshold to force a certain speed, the request speed will be stablished.

## ETS PARAMETERISATION

The options that can be parameterised from the Fan tab are:

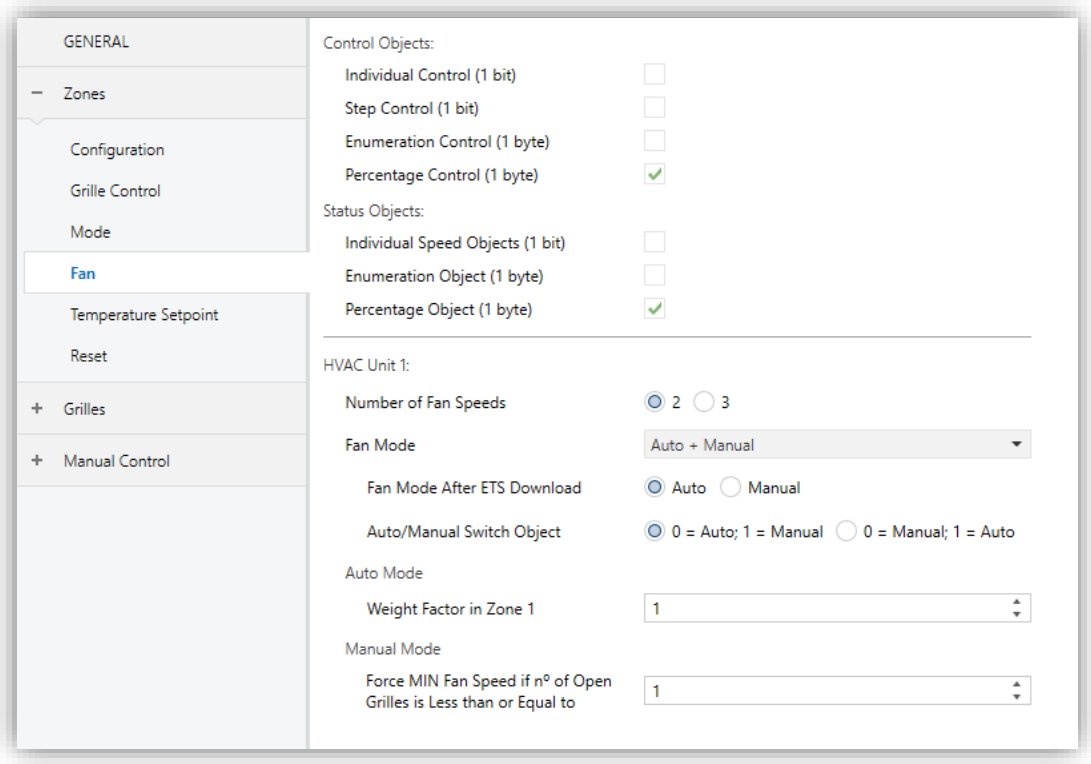



**Figure 19.** Zones – Fan

### CONTROL OBJECTS

- **Individual Control (1 bit)** [*disabled*/*enabled*]: enables one binary object for each fan speed level available in each HVAC unit (either two or three; see below):
  - Two speeds: "**[Unit x] Fan: Speed Minimum**" and "**[Unit x] Fan: Speed Maximum**".
  - Three speeds: as above, plus "**[Unit i] Fan: Speed Intermediate**".

  To trigger a particular speed, it is necessary to send the value "1" through its corresponding object.

- **Step Control (1 bit)** [*disabled*/*enabled*]: enables the "**[Unit x] Fan: Step Control**" binary object, intended to increase (value "1") and to decrease (value "0") then fan speed.

- **Type** [*No cyclic / Cyclic*]: indicates whether the step control will be cyclic or not.

- **Enumeration Control (1 byte)** [*disabled/enabled*]: enables the **"[Unit x] Fan: Enumerated Control**" 1-Byte object, which represents each fan level by integer values between 0 and 3 (or 0 and 2, when corresponding).

- **Percentage Control (1 byte)** [*disabled/enabled*]: enables the "**[Unit x] Fan: Percentage Control**" object, intended for the reception of the fan speed levels as percentage values, according to Table 4 y Table 5.

**STATUS OBJECTS**

- **Individual Speed Objects (1 bit)** [*disabled/enabled*]: enables one binary object per fan speed available.

- **Enumeration Object (1 byte)** [*disabled/enabled*]: enables the "**[Unit x] Fan: Speed Enumeration (Status)**" 1-Byte object, which will adopt values between 0 and 3 (or 0 and 2) depending on the current fan speed.

- **Percentage Object (1 byte)** [*disabled/enabled*]: enables the "**[Unit x] Fan: Speed Percentage**" object, which will adopt percentage values according to Table 4 y Table 5.

**HVAC UNIT "x"**

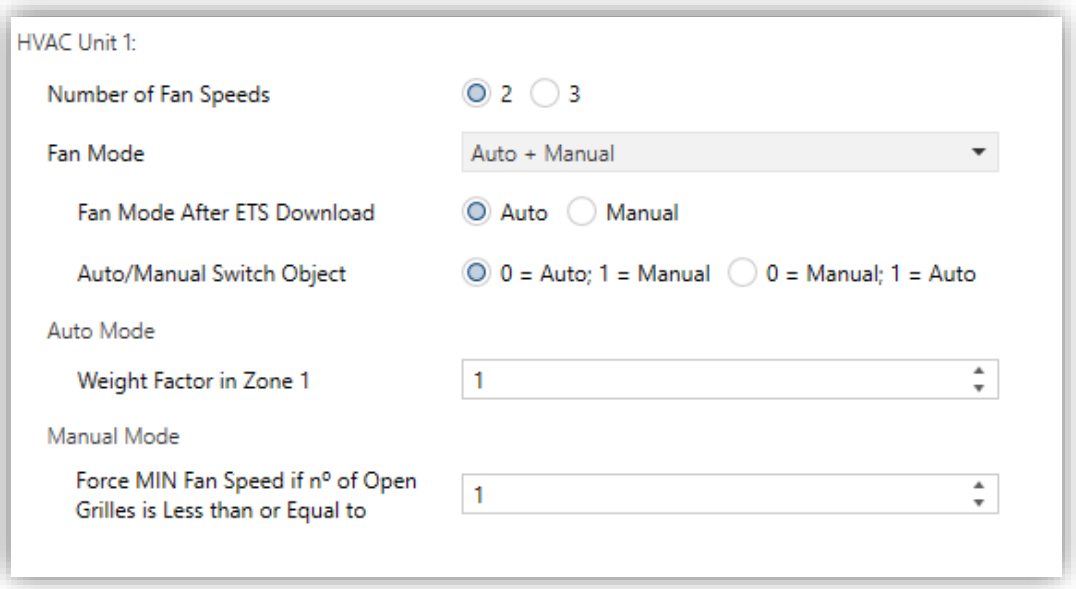



**Figure 20 – Fan – Unit HVAC**

- **Number of Fan Speeds** [*2 / 3*]: sets how many fan speed levels are implemented in the HVAC unit.

- **Fan Mode** [*Auto / Manual / Auto + Manual*]. The behaviour and parameters of each option are explained in the following sections:

  - **Fan Mode After ETS Download:** [*Auto / Manual*].

  - **Auto / Manual Switch Object** [*0 = Auto; 1 = Manual*/*0 = Manual; 1 = Auto*]: sets the particular values that will switch from one control mode to the other, if received through object "**[Unit x] Fan: Auto / Manual**". The object "**[Unit x] Fan: Auto / Manual (Status)**" will save the value of the active mode.

- **Weight Factor in Zone i** [*0…1…99*]: influence which each zone will have when calculating the fan speed automatically. This value can be change through the object "**[Group n] [Gi] Weight Factor**". (Only enabled with **automatic fan mode**.)

- **Force MIN Fan Speed if nº of Open Grilles is Less than or Equal to** [*0…1…12*]: sets the minimum number of grilles (minus one) that must remain open before the fan speed can be set to levels greater than the minimum. The value "0" disables this function. (Only enabled with **manual fan mode**.)

- **Force MED Fan Speed if nº of Open Grilles is Less than or Equal to** [*0…1…12*]: sets the minimum number of grilles (minus one) that must remain open before the fan speed can be set to levels greater than the intermediate. The value "0" disables this function. This is only available for three-level configurations. (Only enabled with **manual fan mode**.)

### 2.2.5 TEMPERATURE SETPOINT

The global temperature setpoint ($T_{GSP}$, i.e., the temperature setpoint to be sent to the HVAC unit) takes into account the different local setpoints ($T_{LSPi}$) from the zones that make up its group, the reference temperature of each zone ($T_{REFi}$), the return temperature ($T_{RET}$) and the active mode. This calculation consists in:

- Heating Mode: $T_{GSP} = T_{RET} + \mathrm{Max}\left(0, \mathrm{RInt}\left(\mathrm{Max}\left(T_{LSP_i} - T_{REF_i}\right)\right)\right)$

- Cool Mode: $\mathrm{T_{GSP}} = \mathrm{T_{RET}} - \mathrm{Max}\left(0, \mathrm{RInt}\left(\mathrm{Max}(\mathrm{T_{REF_i}} - \mathrm{T_{LSP_i}})\right)\right)$

***Example 1 – Heating mode**:*

- *Return Temp. to the unit ($T_{RET}$) = 19ºC*
- *Zone 1 → Reference Temp. ($T_{REF1}$): 21ºC; Setpoint Temp. ($T_{LSP1}$): 25ºC*
- *Zone 2 → Reference Temp. ($T_{REF2}$): 20ºC; Setpoint Temp. ($T_{LSP2}$): 26,5ºC*

*Global Setpoint Temperature calculate ($T_{GSP}$):*

$$T_{GSP} = T_{RET} + Max\left(0, RInt\left(Max\left(\left(T_{LSP_1} - T_{REF_1}\right), \left(T_{LSP_2} - T_{REF_2}\right)\right)\right)\right)$$

$$T_{GSP} = 19 + Max\left(0, RInt\left(Max\left((25 - 21), (26{,}5 - 20)\right)\right)\right)$$

$$T_{GSP} = 19 + Max\left(0, RInt(6{,}5)\right) = 19 + Max(0{,}7)$$

$$\boldsymbol{T_{GSP} = 26ºC}$$

***Example 2 – Cool mode**:*

- *Return Temp. to the unit ($T_{RET}$) = 26ºC*
- *Zone 1 → Reference Temp. ($T_{REF1}$): 28ºC; Setpoint Temp. ($T_{LSP1}$): 25ºC*
- *Zone 2 → Reference Temp. ($T_{REF2}$): 29ºC; Setpoint Temp. ($T_{LSP2}$): 23ºC*

*Global Setpoint Temperature calculate ($T_{GSP}$):*

$$T_{GSP} = T_{RET} - Max\left(0, RInt\left(Max\left(\left(T_{REF_1} - T_{LSP_1}\right), \left(T_{REF_2} - T_{LSP2}\right)\right)\right)\right)$$

$$T_{GSP} = 26 - Max\left(0, RInt\left(Max\left((28 - 25), (29 - 23)\right)\right)\right)$$

$$T_{GSP} = 26 - Max\left(0, RInt(6)\right) = 26 - Max(0{,}6)$$

$$\boldsymbol{T_{GSP} = 20ºC}$$

**Note**: Global temperature setpoint will be not calculated if Dry Air mode or Fan mode are activated.

Once the global setpoint has been calculated, the following corrections will be applied in order (only in the **Cooling** and **Heating** modes), if configured, every time the setpoint of any of the zones changes.

- Temperature range.

  If enabled in parameters, the temperature setpoint will be restricted to an upper ($T_{max}$) and a lower ($T_{min}$) restriction, so that $T_{min} \leq T_{GSP} \leq T_{max}$.

  The first correction applied in the process consists in truncating $T_{GSP}$ to comply with this parameterisation. An object is available to disable or re-enable this functionality dynamically, as well as two more objects to modify the limits originally parameterised.

- Temperature offset

  Finally, if configured, $T_{GSP}$ will be applied an additional offset (of up to 2.5 ºC), only in the heating or cooling modes. This offset is intended to ask the A/C unit an extra effort, so in the heating mode its value will be added to $T_{GSP}$, while in the cooling mode it will be subtracted from $T_{GSP}$.

## ETS PARAMETERISATION

The options that, for each HVAC unit, can be parameterised from the Temperature Setpoint screen are:

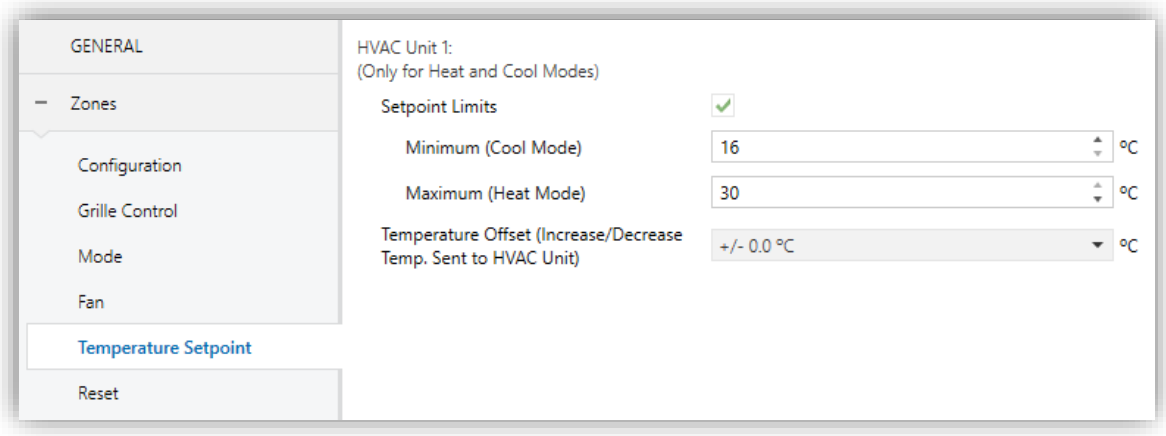



**Figure 21.** Zoning - Setpoint Temperature

- **Temperature Range** [*disabled/enabled*]: enables the global setpoint restriction in the groups:

  - **Minimum (Cool Mode)** [*16…30 ºC*]: minimum global setpoint allowed to be sent to the HVAC unit.

  - **Maximum (Heat Mode)** [*16…30 ºC*]: maximum global setpoint allowed to be sent to the HVAC unit.

  This function involves the following objects: "**[Unit x] Setpoint Limits**" (to activate or deactivate the temperature range restriction at any time) as well as "**[Unit x] Minimum (Cool Mode)**" and "**[Unit x] Maximum (Heat Mode)**" (to modify the lower and upper limits dynamically).

- **Temperature Offset (Increase/Decrease temp. Sent to HVAC Unit)** [*+/-0,0 / +/-0,5 / +/-1,0 / +/-1,5 / +/-2,0 / +/-2,5*]: sets the value of the increment (in the heating mode) or the decrement (in the cooling mode) to be applied over the global setpoint.

The global setpoint temperature is calculated from the value assigned to the following objects (as stated at the beginning of this section):

- "**[Goup n] [Zi] Setpoint Temperature**": Setpoint temperature of each zone ($T_{LSPi}$)

- "**[Group n] [Zi] Reference Temperature**": Reference temperature of each zone ($T_{REFi}$)

- "**[Unit x] Return Temperature**": Return temperature to the unit ($T_{RET}$).

- "**[Unit x] Global Temperature Setpoint**": Setpoint temperature of the climate control system ($T_{GSP}$).

### 2.2.6 SCENES

It is possible to define up to six scenes in parameters, whose execution (on the reception of the corresponding scene number from the bus) will consist in setting a different HVAC mode and/or a specific fan speed level. It is also possible to define the zone group (i.e., the HVAC unit) each scene will apply to.

**Note**: *ZoningBOX does not support scene saving*.

## ETS PARAMETERISATION

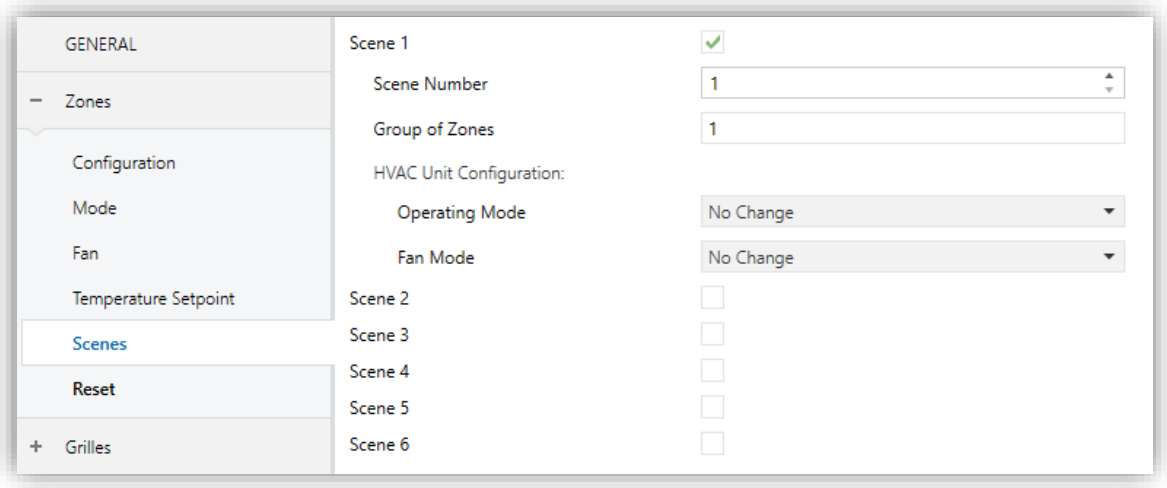



**Figure 22.** Zoning - Scenes

After having enabled the Scenes function from the Configuration tab (see section 2.2.1), the "**Scenes**" object will become available, together with the following parameters:

- **Scene n** [*disabled/enabled*]: enables or disables scene "n" (up to six).
  - **Scene number** [*1…64*]: value that will trigger the execution of the scene, if received through the "**Scenes**" object.
  - **Group of Zones** [*1/2*]: zone group (1 or 2, if two groups have been parameterised; see section 2.2.1) the scene execution will apply to.
  - **Operating Mode** [*No Change / Heat / Cool / Fan / Dry*]: HVAC mode to be set on the execution of the scene.
  - **Fan Mode** [*No Change / Auto / Manual*]: HVAC mode to be set on the execution of the scene. This parameter is only available if "Auto + Manual" is selected as the fan mode in the **Fan** section (see 2.2.4).

    The latter ("Manual") entails configuring an additional parameter:

- **Fan Speed** [*No Change / Minimum / Intermediate / Maximum*]: fan speed level to be set on the execution of the scene (the actual options will depend on the fan configuration; see section 2.2.4).

### 2.2.7 RESET

The Reset function allows sending certain objects (either status writings or status requests) to the KNX bus after a bus failure or a download from ETS.

- **Sending the grille control objects**: this option is intended to let ZoningBOX send the corresponding grille control objects after a reset:
  - [Group n] [Gy] [Control] Grille Control.
- **Sending the status objects of the HVAC unit**: this option is intended to let ZoningBOX send the interface of the HVAC unit the last known status. To that end, the following status objects are sent to the KNX bus are:
  - [Unit x] On/Off HVAC Unit.
  - [Unit x] Global Temperature Setpoint.
  - [Unit x] Mode (Status)
  - [Unit x] Heat Mode (Status)
  - [Unit x] Cool Mode (Status)
  - [Unit x] Fan Mode (Status)
  - [Unit x] Dry Mode (Status)
  - [Unit x] Simplified Mode (Status)
  - [Unit x] Fan: Speed Percentage (Status)
  - [Unit x] Fan: Speed Enumeration (Status)
  - [Unit x] Fan: Speed Minimum (Status)
  - [Unit x] Fan: Speed Intermediate (Status)
  - [Unit x] Fan: Speed Maximum (Status)
- **Sending status requests**: this option is intended to let ZoningBOX learn the status of the installation during the start-up. To that end, ZoningBOX sends reading requests through the following objects:
  - [Group n] [Zi] Enable/Disable Zone.
  - [Group n] [Zi] Setpoint Temperature.
  - [Group n] [Zi] Reference Temperature.
  - [Group n] [Zi] Control Signal from Thermost.
  - [Group n] [Gi] [Control] Grille Status.
  - [Unit x] Setpoint Limits
  - [Unit x] Minimum (Cool Mode)
  - [Unit x] Maximum (Heat Mode)
  - [Unit x] Return Temperature
  - [Unit x] Mode
  - [Unit x] Heat Mode
  - [Unit x] Cool Mode
  - [Unit x] Fan Mode
  - [Unit x] Dry Mode
  - [Unit x] Simplified Mode.
  - [Unit x] Fan: Speed Percentage (Status)
  - [Unit x] Fan: Speed Enumeration (Status)
  - [Unit x] Fan: Speed Minimum (Status)
  - [Unit x] Fan: Speed Intermediate (Status)
  - [Unit x] Fan: Speed Maximum (Status)
  - [Unit x] On/Off HVAC Unit (Status)

**Note**: *enabling the last two options together (status and status requests) may cause contradictory situations if their delays are not properly configured. It is advisable to send the status requests prior to any other sending*.

## ETS PARAMETERISATION

The Reset tab (available by default after enabling the Zoning function from the General tab; see section 2.1) provides the following parameters:

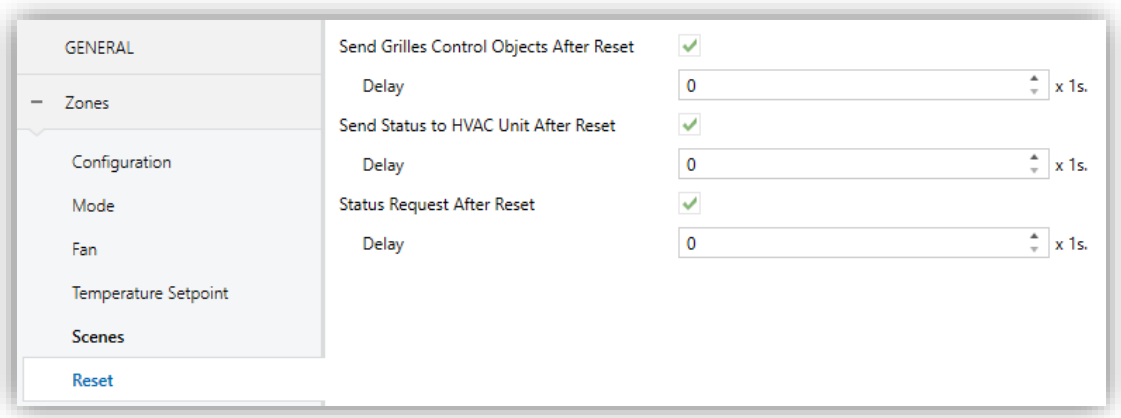



**Figure 23.** Zoning - Reset

- **Send Grilles Control Objects After Reset** [*disabled*/*enabled*]: sets whether the grille control objects should be sent to the KNX bus after a reset.
  - **Delay** [*0…255 s*]: time before sending the objects, after the start-up.
- **Send Status to HVAC Unit After Reset** [*disabled*/*enabled*]: sets whether the status objects of the HVAC unit should be sent to the KNX bus after a reset.
  - **Delay** [*0…255 s*]: time before sending the objects, after the start-up.
- **Status Request After Reset** [*disabled*/*enabled*]: sets whether to send or not the status reading requests to the KNX bus after the reset.
  - **Delay** [*0…255 s*]: time before sending the objects, after the start-up.

## 2.3 GRILLES

### 2.3.1 CONFIGURATION

This module is in charge of managing the motorised grilles that let the air flow enter the zones, when corresponding. Please refer to the **Datasheet**, bundled with the original device packaging and also available at www.zennio.com, for details on the technical requirements to ensure compatibility with each particular grille model

It is important to take into account the following remarks:

- Prior to any other action, it is necessary to set the proper grille voltage (24V or 12V) in the **voltage switch** located on the front of the device.
- ZoningBOX operates its outputs (and therefore the grilles) sequentially, i.e., one by one – not at the same time.
- Each output in ZoningBOX will control a sole zone and therefore a sole grille. If two grilles are installed in the same zone, they will be also jointly controllable by the same output, as long as they are the same model.
- There are two control modes depending on **operation mode** enabled (see section 2.1 for more details). When *Open/Close Mode* is enabled, grille control is performed by measuring their current demands, which allows detecting when they reach their target position (i.e., their end-of-stroke position). Nevertheless, an additional time can be parameterised, to allow further motion after the theoretical detection of the target position. Furthermore, if *Positional Mode* is enabled, grill control is performed by combining a current demand control plus a time control, which is based on reaching a target point applying current a time proportional to the desired position from a known position.

After a download or a bus failure, every output will be sent the order to open the grilles, so their position synchronises with their status. During synchronisation, the grille status will not be sent to the bus – it will be sent once the grilles stop, depending on the initial position that may have been parameterised.

## ETS PARAMETERISATION

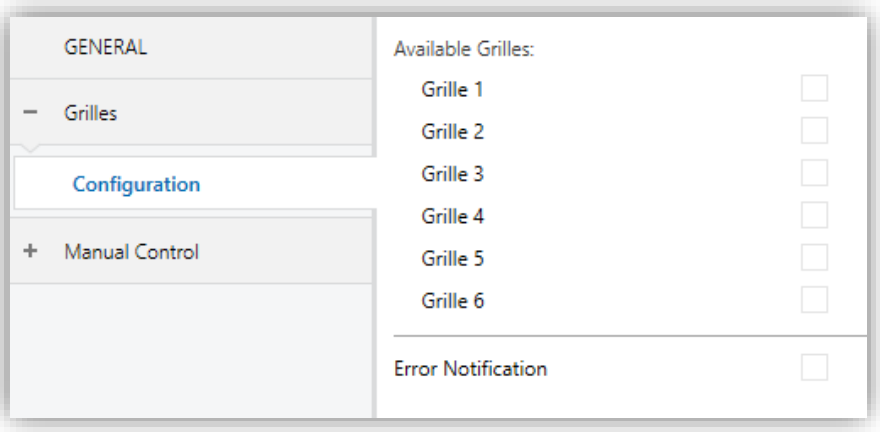



**Figure 24.** Grilles - Configuration

After enabling Grille Control from the General parameter screen (see section 2.1), the following options will be available for configuration:

- **Grille "y"** [*disabled*/*enabled*]: sets how many grilles (i.e., zones) will be controlled by the device, up to six. By enabling a grille, the following objects will become available:

  - "**[Gy] [Actuator] Grille Position**", one-bit object (or one-Byte for positional control) which should be sent the grill control signal. This object is typically to be grouped together with the corresponding object of the Zones module (see section 2.2.1).

  - "**[Gy] [Actuator] Grille Status**", one-bit object (or one-Byte for positional control) which will report the current state of the grille whenever it changes. This object is typically to be grouped together with the analogous one of the Zones modules (see section 2.2.1).

- **Error Notification** [*disabled*/*enabled*]: enables o disables the "Error Notification" tab on the left menu. See section 2.3.3.

### 2.3.2 GRILLE

The configuration of a grille entails setting up the following options:

- An **opening time** for the connected grille (**positional mode** exclusive).

- A **closing time** for the connected grille (**positional mode** exclusive).
- An **additional time**, to *force* further motion once the end-of-stroke position has been reached.
- The **initial position**, which will be adopted by the grille after a bus power failure or at the end of an ETS download.
- The **Advance Current Control.** If it is enabled, it will be possible to set which current increment over the nominal value determines the grill movement end.

> **Important:** *Its use is not recommended except for exceptional cases where advanced control of the ZoningBOX is necessary*.

## ETS PARAMETERISATION

Once a specific grille has been enabled (see section 2.3.1), the following options will be available:

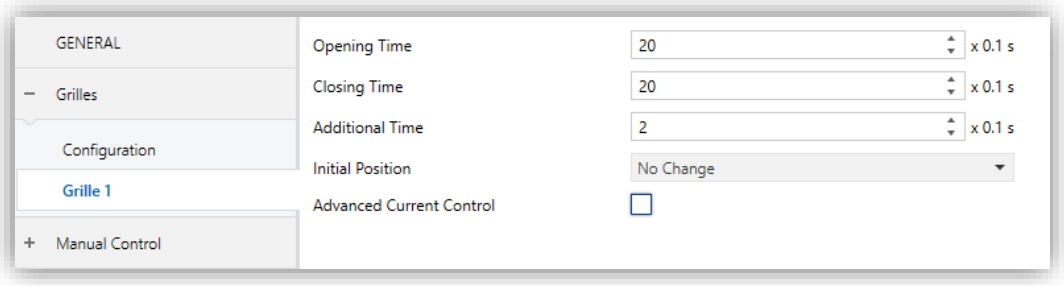



**Figure 25.** Grilles - Grille "y"

- **Opening Time** [*0…20…255 s*]: determines the time it takes for the connected grille to open (**positional mode** exclusive).
- **Closing Time** [*0…20…255 s*]: determines the time it takes for the connected grille to close (**positional mode** exclusive).
- **Additional Time** [*0…2…255*]: sets an extra time to extend the motion of the grille once the end-of-stroke position has been detected. The available range is 0 to 255 tenths of a second.

- **Initial Position** [*No Change / Open / Close / Position*]: sets the action to be performed by the grille after the start-up of the device. If "Position" is selected, exclusive for **positional mode**, the following parameter will be displayed:

  - **Initial Position Value** [*0…50…100 %*]: grille desired position at initialization.

- **Advance Current Control** [*disabled/enabled*]: it enables the option of set an advance current control. If it is enables, the follow parameter will be show:

  - **Current Increment for Cut-Off** [*25…120…150 mA*]: increase over the nominal value of the current that should determine the end of the movement of the grid.

> **Important:** *Its use is not recommended except for exceptional cases where advanced control of the ZoningBOX is necessary*.

### 2.3.3 ERROR NOTIFICATION

Enabling the error notification function allows ZoningBOX to report certain error events through the KNX bus:

- **Connection error**: it will be reported when either an open circuit or a short-circuit is detected in an output (i.e., in the grille wiring). When this happens, ZoningBOX interrupts the power supply to the output. The persistence of the error will be checked whenever a new request to operate the grille is received.

- **Overload**: this error is reported in case ZoningBOX detects the current demand is higher than expected during the synchronisation process (see section 2.3), which happens when more than two grilles are wired to the same output. Although the output will still respond to any position change requests, issues may be expected during the grille motion.

- **Maximum Safety Time**: this error takes place in case ZoningBOX considers the grille is taking too much time to complete motion, i.e., to reach the end-of-stroke position. In such case, the grille will be stopped.

- **Power supply failure**: this is reported in case the input voltage differs from 230 VAC. In such case, grille operation is immediately interrupted.

- **Overheating**: this is reported in the unlikely event that ZoningBOX detectes an internal temperature of 75º C or more. In such case, all grilles will remain stopped until it lowers back to 65º C or less.

Note that the first three errors are reported per grille (one object is provided per enabled grille), while the latter two are not (a sole object is provided for each error, with independence of the number of grilles).

In addition, Zoning always informs about errors via the available LEDs on each output, if any of the following errors have occurred: power supply failure, connection error (short-circuit and open circuit error), overload error.

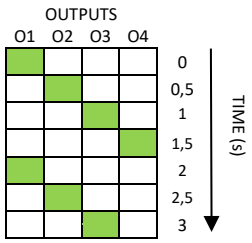
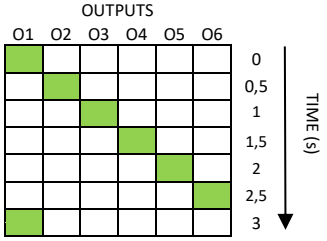
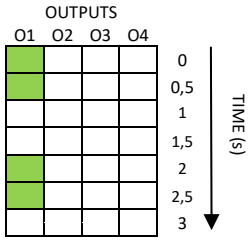
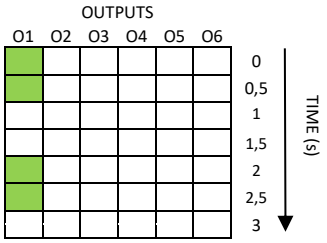
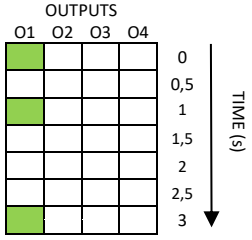
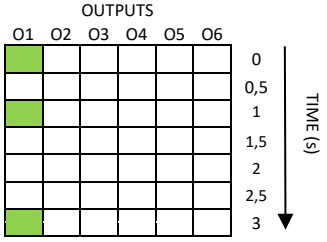
| ERROR | LEDS DESCRIPTION | VISUAL NOTIFICATION ZoningBOX 4 | VISUAL NOTIFICATION ZoningBOX 6 |
|---|---|---|---|
| **Power Supply** | LED of each output blinks (during 1 second) sequentially. |   |   |
| **Connection** | LED of the output affected by a short circuit or open circuit blinks every second. |   |   |
| **Overload** | Two blinks of 0.5 seconds and 2 seconds rest on the LED of the affected output. |   |   |

**Table 6.** Visual notification in case of error detection.

**Note**: *while Test On mode is active, only the connection error will be notified through LED as an aid to testing the installation. If a serious error occurs, as power supply or overheating failure, it will be notified after Test On mode finishes*.

## ETS PARAMETERISATION

Once the Error Notification function has been enabled in the Configuration screen (see section 2.3.1), a specific checkbox will be available per error type, which lets the integrator select which errors are required to be reported to the KNX bus.

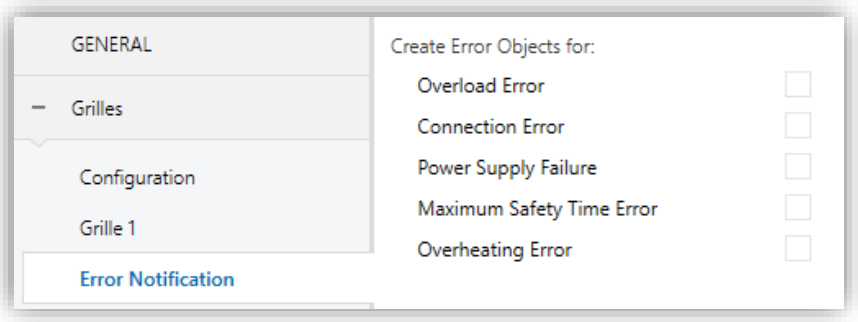



**Figure 26.** Error Notification

- **Overload Error** [*disabled/enabled*]: enables the overload error objects ("**[Gy] Overload Error**", one per grille), which are sent with value "1" as soon as the overload error is detected in the corresponding grille and with value "0" when the error is over.

- **Connection Error** [*disabled/enabled*]: enables the connection error objects ("**[Gy] Connection Error**", one per grille), which behaves analogously as above.

- **Maximum Safety Time Error** [*disabled/enabled*]: enables the maximum safety time error objects ("**[Gy] Max. Safety Time Error**", one per grille), which behaves analogously as above.

- **Power Supply Failure** [*disabled/enabled*]: enables the "**[Grille Control] Power Supply Failure**" object, which is sent with value "1" when ZoningBOX detects an abnormal voltage input. It will be sent with value "0" once this situation is over.

- **Overheating Error** [*disabled/enabled*]: enables the "**[Grille Control] Overheating Error**" object, which is sent with value "1" when ZoningBOX

detects the internal temperature is abnormally high. It will be sent with value "0" once this situation is over.

The error objects are sent periodically (every thirty seconds) while their value is "1". However, once they adopt the value "0" they are only sent once.

**Note**: *leaving these checkboxes disabled implies that these errors will not be reported to the KNX bus. However, ZoningBOX will still monitor them and perform the corresponding actions in case of detection*.

## 2.4 MANUAL CONTROL

ZoningBOX allows manually operating the the grilles hrough the respective pushbuttons on the top of the device (one push button per grille).

Contrary to other Zennio devices, ZoningBOX only provides manual operation in **Test On mode** (for testing purposes during the configuration of the device). This control mode allows direct control over the outputs with independence of the configuration and of the grille states, although some safety restrictions apply, as explained below.

Entering the **Test On mode** (unless disabled by parameter) is done by long-pressing the Prog./Test button (for at least three seconds), until the LED is no longer red and turns yellow. From that moment, once the button is released, the LED light will remain green to confirm that the device has switched to the Test On mode. After that, if the button is pressed again, the LED will turn yellow – and then off once the button is released, which means the device has left the Test On mode. Note that it will also leave this mode if a bus power failure takes place

Once in the Test On mode, any orders from the KNX that may affect the grilles **will be ignored** and no **status objects** will be sent either. Grille operation in the Test On mode is performed as follows:

- The **first push** on the button will close the relay corresponding to the opening of the grille, which will keep moving until the button is released.
- When the same button is **pressed again**, the grille will invert its motion and will keep closing until the button is released.

For safety reasons, entering the Test On mode will not be possible while the connection error, the power supply error or the overheating error are active (see section 2.3.3). Moreover, whenever one button is being pressed, the device will ignore any other buttons pressed simultaneous

From ETS it is possible to configure whether the manual control should be available. In such case, a binary object destined to lock or unlock the manual control in runtime can be activated as well.

**Important**: *the device is delivered from factory with all outputs disabled, but with the manual control (Test On) enabled*.

## ETS PARAMETERISATION

The **Manual Control** is configured from the Configuration tab itself under Manual Control, as long as this function has been enabled in General (see section 2.1)

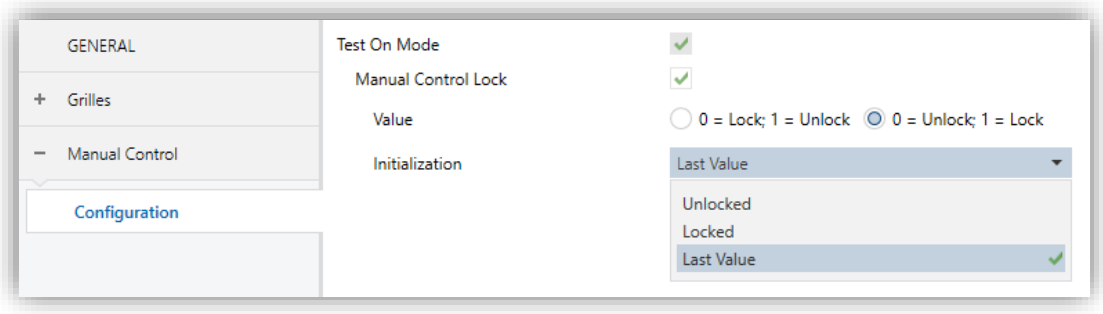



**Figure 27.** Manual Control

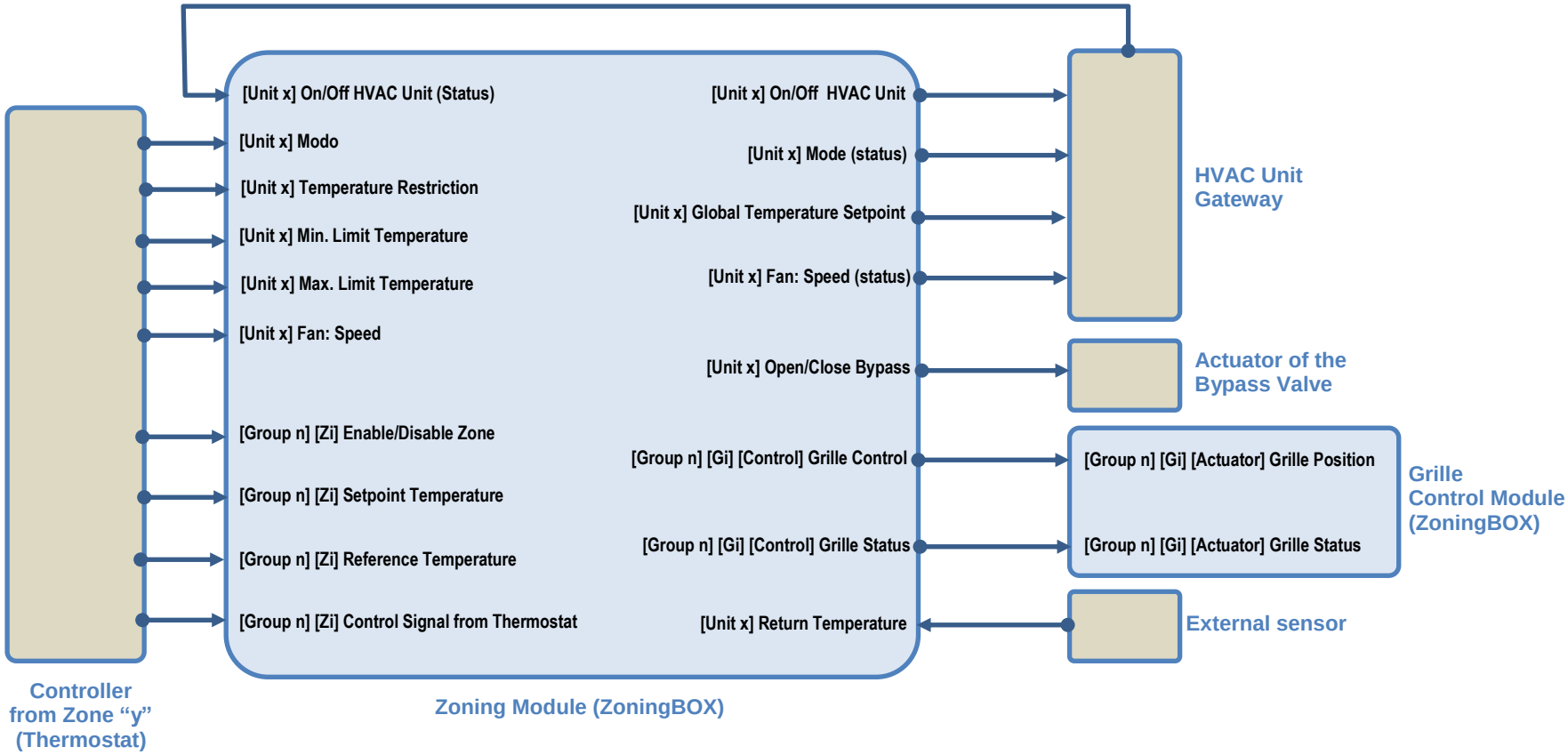
As the only manual control mode available in this device is the Test On mode, it will get enabled simply by enabling the manual control function. Thus, only one parameter must be parameterised:

- **Manual Control Lock** [*disabled*/*enabled*]: provides an optional procedure for locking the manual control in runtime. When this checkbox is enabled, object "**Manual Control Lock**" turns visible, as well as two more parameters:

  - **Value** [*0 = Lock; 1 = Unlock* / *0 = Unlock; 1 = Lock*]: defines whether the manual control lock/unlock should take place respectively upon the reception (through the aforementioned object) of values "0" and "1", or the opposite.

  - **Initialization** [*Unlocked* / *Locked* / *Last Value*]: sets how the lock state of the manual control should remain after the device start-up (after an ETS download or a bus power failure); (default option; on the very first start-up, this will be Unlocked).

# ANNEX I. INTERACTION BETWEEN MODULES



# ANNEX II. COMMUNICATION OBJECTS

- **"Functional range"** shows the values that, with independence of any other values permitted by the bus according to the object size, may be of any use or have a particular meaning because of the specifications or restrictions from both the KNX standard or the application program itself.

| Number | Size | I/O | Flags | Data type (DPT) | Functional Range | Name | Function |
|---|---|---|---|---|---|---|---|
| 1 | 1 Bit | | C - - T - | DPT_Trigger | 0/1 | Reset 0 | Voltage Recovery -> Sending of 0 |
| 2 | 1 Bit | | C - - T - | DPT_Trigger | 0/1 | Reset 1 | Voltage Recovery -> Sending of 1 |
| 3 | 1 Bit | I | C - W - - | DPT_Switch | 0/1 | Manual Control Lock | 0 = Lock; 1 = Unlock |
| | 1 Bit | I | C - W - - | DPT_Switch | 0/1 | Manual Control Lock | 0 = Unlock; 1 = Lock |
| 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48 | 1 Bit | I | C - W T U | DPT_Enable | 0/1 | [Group x] [Zx] Disable/Enable Zone | 0 = Disable; 1 = Enable |
| 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49 | 2 Bytes | I | C - W T U | DPT_Value_Temp | -273.00º - 670433.28º | [Group x] [Zx] Setpoint Temperature | Setpoint Temperature |
| 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50 | 2 Bytes | I | C - W T U | DPT_Value_Temp | -273.00º - 670433.28º | [Group x] [Zx] Reference Temperature | Reference Temperature |
| 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51 | 1 Bit | I | C - W T U | DPT_Switch | 0/1 | [Group x] [Zx] Control Signal from Thermostat | 0/1 |
| | 1 Byte | I | C - W T U | DPT_Scaling | 0% - 100% | [Group x] [Zx] Control Signal from Thermostat | 0...100% |
| 52, 55, 58, 61, 64, 67, 70, 73, 76, 79, 82, 85 | 1 Bit | O | C R - T - | DPT_OpenClose | 0/1 | [Group x] [Gx] [Control] Grille Control | 0 = Open; 1 = Close |
| | 1 Byte | O | C R - T - | DPT_Scaling | 0% - 100% | [Group x] [Gx] [Control] Grille Control | 0…100% |
| 53, 56, 59, 62, 65, 68, 71, 74, 77, 80, 83, 86 | 1 Bit | I | C - W T U | DPT_OpenClose | 0/1 | [Group x] [Gx] [Control] Grille Status | 0 = Open; 1 = Closed |
| | 1 Byte | I | C - W T U | DPT_Scaling | 0% - 100% | [Group x] [Gx] [Control] Grille Status | 0…100% |
| 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87 | 1 Byte | I | C - W T U | DPT_DecimalFactor | | [Group x] [Gx] Weight Factor | 0…99 |
| 88, 121 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] On/Off HVAC Unit | 0 = Off; 1 = On |
| 89, 122 | 1 Bit | I | C - W T U | DPT_Switch | 0/1 | [Unit x] On/Off HVAC Unit (Status) | 0 = Off; 1 = On |
| 90, 123 | 1 Byte | I | C - W T U | DPT_HVACContrMode | 0=Auto 1=Heat 3=Cool 9=Fan 14=Dry | [Unit x] Mode | HVAC Mode |
| 91, 124 | 1 Byte | O | C R - T - | DPT_HVACContrMode | 0=Auto | [Unit x] Mode (Status) | HVAC Mode State |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 1=Heat<br>3=Cool<br>9=Fan<br>14=Dry | | |
| 92, 125 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Heat Mode | 0 = Ignored; 1 = Activate Heat Mode |
| 93, 126 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Heat Mode (Status) | 0 = Off; 1 = On |
| 94, 127 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Cool Mode | 0 = Ignored; 1 = Activate Cool Mode |
| 95, 128 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Cool Mode (Status) | 0 = Off; 1 = On |
| 96, 129 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Fan Mode | 0 = Ignored; 1 = Activate Fan Mode |
| 97, 130 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Fan Mode (Status) | 0 = Off; 1 = On |
| 98, 131 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Dry Mode | 0 = Ignored; 1 = Activate Dry Mode |
| 99, 132 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Dry Mode (Status) | 0 = Off; 1 = On |
| 100, 133 | 1 Bit | I | C - W T U | DPT_Heat_Cool | 0/1 | [Unit x] Simplified Mode | 0 = Cool; 1 = Heat |
| 101, 134 | 1 Bit | O | C R - T - | DPT_Heat_Cool | 0/1 | [Unit x] Simplified Mode (Status) | 0 = Cool; 1 = Heat |
| 102, 135 | 2 Bytes | O | C R - T - | DPT_Value_Temp | -273.00º - 670433.28º | [Unit x] Global Temperature Setpoint | Setpoint to HVAC Unit |
| 103, 136 | 1 Bit | I | C - W T U | DPT_Enable | 0/1 | [Unit x] Setpoint Limits | 0 = Disabled; 1 = Enabled |
| 104, 137 | 2 Bytes | I | C - W T U | DPT_Value_Temp | -273.00º - 670433.28º | [Unit x] Minimum (Cool Mode) | Minimum in Range |
| 105, 138 | 2 Bytes | I | C - W T U | DPT_Value_Temp | -273.00º - 670433.28º | [Unit x] Maximum (Heat Mode) | Maximum in Range |
| 106, 139 | 2 Bytes | I | C - W T U | DPT_Value_Temp | -273.00º - 670433.28º | [Unit x] Return Temperature | Return Temp. from External Sensor |
| 107, 140 | 1 Byte | I | C - W T U | DPT_Scaling | 0% - 100% | [Unit x] Fan: Percentage Control | Min = 1 - 50%; Max = 51 - 100% |
| | 1 Byte | I | C - W T U | DPT_Scaling | 0% - 100% | [Unit x] Fan: Percentage Control | Min = 1 - 33%; Med = 34 - 67%; Max = 68 - 100% |
| 108, 141 | 1 Byte | O | C R - T - | DPT_Scaling | 0% - 100% | [Unit x] Fan: Speed Percentage (Status) | Min = 33%; Med = 67%; Max = 100% |
| | 1 Byte | O | C R - T - | DPT_Scaling | 0% - 100% | [Unit x] Fan: Speed Percentage (Status) | Min = 50%; Max = 100% |
| 109, 142 | 1 Bit | I | C - W T U | DPT_Step | 0/1 | [Unit x] Fan: Step Control | 0 = Decrease; 1 = Increase |
| 110, 143 | 1 Byte | I | C - W T U | DPT_Fan_Stage | 0 - 255 | [Unit x] Fan: Enumeration Control | 1 = Min.; 2 = Max. |
| | 1 Byte | I | C - W T U | DPT_Fan_Stage | 0 - 255 | [Unit x] Fan: Enumeration Control | 1 = Min.; 2 = Med.; 3 = Max. |
| 111, 144 | 1 Byte | O | C R - T - | DPT_Fan_Stage | 0 - 255 | [Unit x] Fan: Speed Enumeration (Status) | 1 = Min.; 2 = Med.; 3 = Max. |
| | 1 Byte | O | C R - T - | DPT_Fan_Stage | 0 - 255 | [Unit x] Fan: Speed Enumeration (Status) | 1 = Min.; 2 = Max. |
| 112, 145 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Fan: Speed Minimum | 0 = Ignored; 1 = On |
| 113, 146 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Fan: Speed Intermediate | 0 = Ignored; 1 = On |
| 114, 147 | 1 Bit | I | C - W T U | DPT_Ack | 0/1 | [Unit x] Fan: Speed Maximum | 0 = Ignored; 1 = On |
| 115, 148 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Fan: Speed Minimum (Status) | 0 = Off; 1 = On |
| 116, 149 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Fan: Speed Intermediate (Status) | 0 = Off; 1 = On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 117, 150 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Fan: Speed Maximum (Status) | 0 = Off; 1 = On |
| 118, 151 | 1 Bit | I | C - W T U | DPT_Switch | 0/1 | [Unit x] Fan: Auto/Manual | 0 = Manual; 1 = Auto |
| | 1 Bit | I | C - W T U | DPT_Switch | 0/1 | [Unit x] Fan: Auto/Manual | 0 = Auto; 1 = Manual |
| 119, 152 | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Fan: Auto/Manual (Status) | 0 = Auto; 1 = Manual |
| | 1 Bit | O | C R - T - | DPT_Switch | 0/1 | [Unit x] Fan: Auto/Manual (Status) | 0 = Manual; 1 = Auto |
| 120, 153 | 1 Bit | O | C R - T - | DPT_OpenClose | 0/1 | [Unit x] Bypass | 0 = Open; 1 = Close |
| | 1 Byte | O | C R - T - | DPT_Scaling | 0% - 100% | [Unit x] Bypass | 0...100% |
| 154 | 1 Byte | I | C - W - - | DPT_SceneNumber | 0 - 63 | Scenes | 0 - 63 (Run Scene 1 - 64) |
| 167, 172, 177, 182, 187, 192 | 1 Bit | I | C - W - - | DPT_OpenClose | 0/1 | [Gx] [Actuator] Grille Position | 0 = Open; 1 = Close |
| | 1 Byte | I | C - W - - | DPT_Scaling | 0% - 100% | [Gx] [Actuator] Grille Position | 0 … 100 % |
| 168, 173, 178, 183, 188, 193 | 1 Bit | O | C R - T - | DPT_OpenClose | 0/1 | [Gx] [Actuator] Grille Status | 0 = Open; 1 = Closed |
| | 1 Byte | O | C R - T - | DPT_Scaling | 0% - 100% | [Gx] [Actuator] Grille Status | 0 … 100 % |
| 169, 174, 179, 184, 189, 194 | 1 Bit | O | C R - T - | DPT_Alarm | 0/1 | [Gx] Overload Error | 0 = No Error; 1 = Error |
| 170, 175, 180, 185, 190, 195 | 1 Bit | O | C R - T - | DPT_Alarm | 0/1 | [Gx] Connection Error | 0 = No Error; 1 = Error |
| 171, 176, 181, 186, 191, 196 | 1 Bit | O | C R - T - | DPT_Alarm | 0/1 | [Gx] Max. Safety Time Error | 0 = No Error; 1 = Error |
| 197 | 1 Bit | O | C R - T - | DPT_Alarm | 0/1 | [Grille Control] Power Supply Failure | 0 = No Error; 1 = Error |
| 198 | 1 Bit | O | C R - T - | DPT_Alarm | 0/1 | [Grille Control] Overheating Error | 0 = No Error; 1 = Error |
| 207 | 1 Bit | | C - - T - | DPT_Trigger | 0/1 | [Heartbeat] Object to Send '1' | Sending of '1' Periodically |

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