KLIC-DA v2

KNX/DAIKIN Altherma Gateway

ZCLDAV2

USER MANUAL

Application Program Version: [1.1]
User Manual Version: [1.1]_a

www.zennio.com

CONTENTS

DOCUMENT UPDATES

Version	Changes	Page(s)
[1.1]_a	**Changes in the application program:** • Compatibility with the climate control mode "Room thermostat". • Change in the climate temperature range from [5-55] to [5-65]. • Optimisation of the logic functions.	11, 26, 30, 33
[1.0]_c	**Changes in the user manual:** • Clarification on error *CJ-02*	
[1.0]_b	**Changes in the user manual:** • Correction of the description of the object "[AC] Unit Malfunction"	

1 INTRODUCTION

1.1 KLIC-DA V2

KLIC-DA v2 from Zennio is a gateway that provides **full-duplex** communication between the KNX home automation system and **Daikin Altherma** systems through the 2-wire gateway provided.

Because of this **bidirectional** communication, the Altherma system can be controlled from the home automation system in the same manner as it is through its own controls. Moreover, the actual status of the unit can be monitored and periodically sent to the KNX bus to inform other devices.

KLIC-DA v2 from Zennio is the ideal solution for the integration of Altherma climate systems into a KNX domotic environment.

Daikin Altherma is an integral solution for climate control. Although mainly based on the heat pump technology, Altherma systems can optionally perform cooling as well, therefore providing the user with heating, air-conditioning and domestic hot water. Depending on the structure of the system (e.g.: location of the external unit, integration or not of the hydrobox within the same unit, etc.) and on whether A/C is required or not, different Altherma systems are available.

KLIC-DA v2 application program focuses on controlling **Altherma**. An Altherma system consists of a series of elements (an external unit, a hydrobox, an internal unit, the user interfaces, etc.), and the specific “P1/P2” communication bus, which allows the user interfaces (typically, one acting as the ***main*** control and the other as an ***additional*** control) communicate to each other and to the Altherma system.

KLIC-DA v2 is meant to **replace the aforementioned additional** interface, and thus to communicate only to the main interface and not to the Altherma system directly. Morever, KLIC DA v2 is compatible with **models CA, CB and Altherma 3** of Altherma system hydrobox.

For the correct operation of the KLIC-DA v2, the Altherma unit must be configured with the following settings:

- Main zone -> Control -> Leaving water or room thermostat.

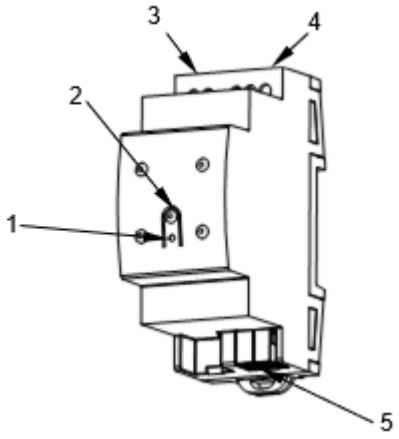
- Main zone -> Setpoint mode -> Fixed.
- Space heating/cooling -> Number of zones-> Single zone.
- Tank -> Heat up mode -> Reheat only.

Note: *only the main interface interacts with the Altherma system. Any order from or to the additional interface will reach the main interface too.*

The main functions performed by the KLIC-DA v2 are:

- **Bidirectional control** of Daikin Altherma units through P1/P2 2-wire connection provided.
- Control of the main functions of **domestic hot water management** (DHW): On/Off, temperature setpoint or booster mode.
- Control of the main functions of **climate system**: On/Off, temperature setpoint or mode configuration.
- Control and monitoring of the **ambient temperature** status for the climate system for **room thermostat** control: setpoint temperature and indoor temperature.
- **Error management** to handle specific error codes from the Altherma system itself as well as any KLIC-DA v2 communication issues that may arise.
- Simultaneous monitoring of **multiple indicators** (temperature setpoints, actuator states, sensors…) reported by the Altherma system.
- **Two analogue-digital inputs**, for the connection of temperature probes, motion detectors or binary pushbuttons or switches.
- Up to **five scenes**.
- 10 customisable, multi-operation **logic functions**.
- **Heartbeat** or periodical “still-alive” notification.

1.2 INSTALLATION



1.- Programming LED.

2.- Programming button.

3.- 2-wire communication with Altherma unit (P1/P2).

4.- Analogue-digital inputs.

5.- KNX bus conector.

Figure 1. Element diagram.

KLIC-DA v2 connects to the KNX bus via the corresponding built-in terminal (5). Once the device is provided with power from the KNX bus, both the physical address and the KLIC-DA v2 application program can be downloaded.

This device does not need any external power as it is entirely powered through the KNX bus.

The remaining elements are described next.

- **Prog./Test button (2)**: a short press on this button will set the device into the programming mode, making the associated LED (1) light in red.

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

- **Analogue-Digital Inputs (4)**: input ports for the stripped cables of external elements such as switches, motion detectors, temperature probes, etc.

- **P1/P2 communication (3)**: 2-wire connection that will connect KLIC-DA v2 to Altherma P1/P2 bus. Therefore, these wires are intended to be connected to the corresponding connectors in the PCB board of the internal unit.

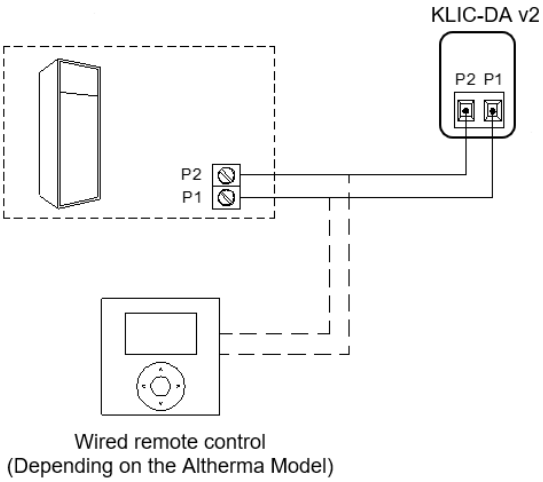


Figure 2. Connection to the P1/P2 bus

As shown in Figure 2, KLIC-DA v2 needs to be installed as additional user control. In the installation always it is necessary to have a wire remote Daikin control acting as the main user control, so it needs to be configured as "**At Unit**" under "**User Interface Location**".

Notes:

- *In Altherma 3 model, the main user interface is integrated in the hydrobox unit.*
- *Altherma system must be reset after KLIC-DA v2 installation.*

For detailed information about the technical features of KLIC-DA v2, as well as on security and installation procedures, please refer to the device **Datasheet**, bundled within the original packaging of the device and also available at www.zennio.com.

1.3 START-UP AND POWER LOSS

Depending on the configuration, some specific actions will be performed during the device start-up. The integrator may set up an initial status to be sent to the A/C unit after the bus power recovery, and whether certain objects should be sent to the bus after the power recovery, as described in later sections.

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

Note: *during the initialization process, some states might be received before the initial configuration is established.*

2 CONFIGURATION

As stated in section 1.1, the KLIC-DA v2 application program is only compatible with Altherma systems running under an **LWT control** or **room thermostat** and with **only one climate zone**.

The main functionality of KLIC-DA v2 is listed next.

2.1 GENERAL

The general configuration of the device consists in enabling the specific functionalities that will be required during normal operation:

- **Heartbeat** or periodical “still-alive” notification.
- **Inputs**: see section 2.9.
- **Logic functions**: see section 2.10.
- **AC gateway**: see section 2.2.

The latter entails all functions specific to KLIC-DA v2, all the functions related to interfacing with the Altherma unit and to the management of the domestic hot water and climate control system.

ETS PARAMETERISATION

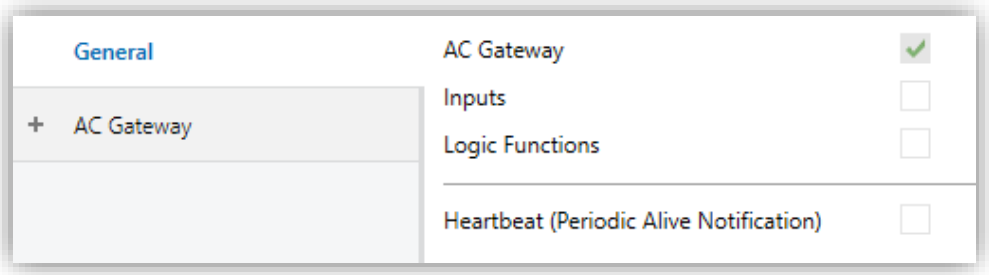


Figure 3. General.

After importing the corresponding database in ETS and adding the device into the topology of the desired project, the configuration process begins by right-clicking into the device and selecting Edit parameters

The General screen is shown in the first place, containing the following parameters:

- **A/C Gateway** [*enabled*][1]: enables the "A/C Gateway" tab in the tree on the left. For more information, see section 2.2.

- **Inputs** [*disabled/enabled*]: enables or disables the "Inputs" tab in the tree on the left, depending on whether the device will or will not be connected any external accessories. For more information, see section 2.9.

- **Logic Functions** [*disabled/enabled*]: enables or disables the "Logic Functions" tab in the tree on the left. For more information, see section 2.10.

- **Heartbeat (Periodic Alive Notification)**: this parameter lets the integrator incorporate a 1-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*).

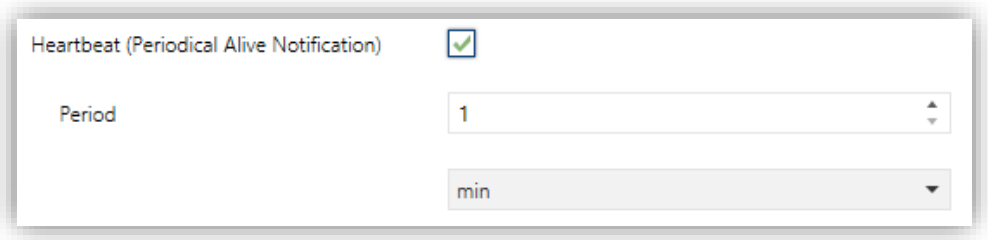


Figure 4. Heartbeat.

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.*

Regardless of the above parameters, the following several **error objects** are available by default (see section 2.8).

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

2.2 A/C GATEWAY

2.2.1 CONFIGURATION

KLIC-DA v2 enables control and monitoring an Altherma unit in the same way it would be through the wired remote control it is provided with.

Through the KNX bus, KLIC-DA v2 can be sent orders to control the following basic functions of the Altherma unit:

- **Domestic hot water management (DHW)**:
  - **On/Off** state of the DHW function.
  - **Temperature setpoint** of the DHW tank, which can be modified between [30-60] ºC**.**
  - **On/Off state of the Booster mode**.
- **Climate control:**
  - **On/Off** state of the climate function.
  - **Climate temperature setpoint**, which can be modified between [5-65] ºC.
  - **Operation mode control**, which enables the change to cooling or to heating mode.
- **Room thermostat control:**
  - **Room temperature setpoint,** which can be modified between [12-35] ºC.
  - **Indoor temperature**, which can be modified between [-5-50] ºC.

Moreover, KLIC-DA v2 enables several advanced functions to be set:

- **Configuration of the hydrobox model** employed, CA, CB and Altherma 3 model are available.
- **Initial configuration**, which sets the desired initial parameters for the state of the DHW, climate and room thermostat control after programming or restarting the device.

- **Scenes**, which defines specific climate control presets, to be sent to the machine on the reception of scene orders from the KNX bus.
- **Additional statuses** of temperatures, actuators, energy and flow rate.
- **Setpoint limits**, to restrict the range for the temperature setpoint of DHW, climate and/or room thermostat control.
- **Automatic off**, which enables an automatic and temporary switch-off of the DHW and/or climate control (after a pre-established delay, if desired) when the communication object associated to this function is triggered due to a certain event.
- **Operation time**, provides in hours and/or seconds the Altherma unit operating time.

These functionalities imply changes in the state of the Altherma unit, which therefore notifies KLIC-DA v2 periodically about the current state. When KLIC-DA v2 is notified about a change, it updates the **status objects** and sends them to the KNX bus. In addition, KLIC-DA v2 provides an **error management** function (see section 2.8), which enables the sending of messages to the KNX bus in case the Altherma unit reports any errors.

ETS PARAMETRISATION

The Configuration window under A/C Gateway provides the following parameters:

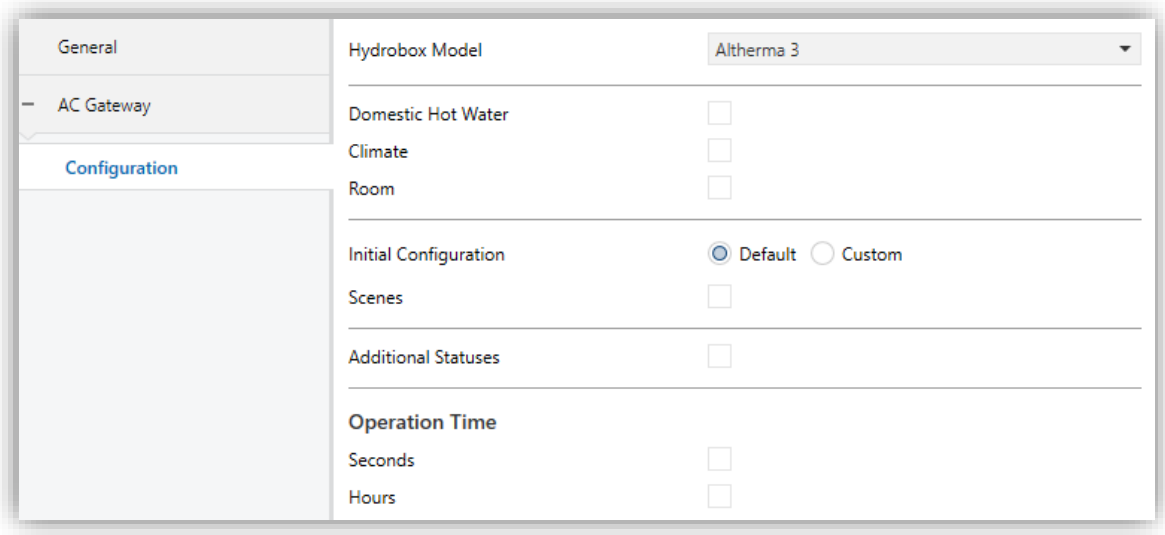


Figure 5. A/C Gateway. Configuration.

HYDROBOX MODEL

- **Hydrobox model** [*Altherma 3 / CA / CB*]: sets the model of the controlled hydrobox.

  Note: *this parameter must be configured according to the controlled hydrobox model, in order not to cause an abnormal control or behaviour of the air machine.*

DOMESTIC HOT WATER

- **Domestic hot water** [*disabled/enabled*]: enables domestic hot water functionality. See section 2.3.

CLIMATE

- **Climate** [*disabled/enabled*]: enables climate functionality. See section 2.4.

ROOM

- **Room** [*disabled/enabled*]: enables room thermostat control. See section 2.5.

INITIAL CONFIGURATION

- **Initial Configuration**: sets the desired initial state that KLIC-DA v2 will send the Altherma unit after programming or restarting the device:
  - [*Default*]: the initial state will be the last one KLIC-DA v2 is aware of.
  - [*Custom*]: see section 2.6.

SCENES

- **Scenes** [*disabled/enabled*]**:** sets up different scenes (up to 5), consisting each of them in a set of orders to be sent to the Altherma unit upon the reception of scene trigger values through the KNX bus. See section 2.7.

ADDITIONAL STATUSES

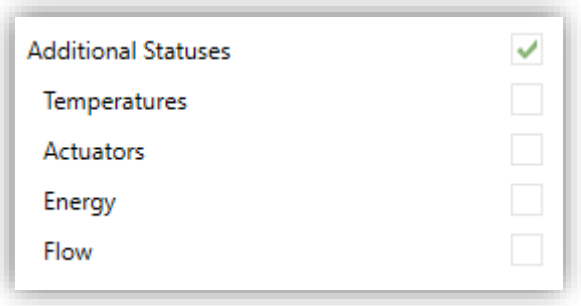


Figure 6. A/C Gateway. Configuration. Additional Statuses

- **Additional statuses** [*disabled*/*enabled*]: enables several statuses related to Altherma system.

  - **Temperatures** [*disabled*/*enabled*]: which enables or disables the supervision of several temperature indicators.

    - "**[Temperature] DHW Tank**": 2-Byte object that reflects the current temperature of the DHW tank, as reported by the Altherma system.
    - "**[Temperature] Outdoor**": 2-Byte object that reflects the current outdoor temperature, as reported by the Altherma system.
    - "**[Temperature] Leaving Water**": 2-Byte object that reflects the current temperature of the leaving water flow, as reported by the Altherma system.
    - "**[Temperature] Leaving Water (PHE)**": 2-Byte object that reflects the current temperature of the plate heat exchanger (PHE) leaving water flow, as reported by the Altherma system.
    - "**[Temperature] Inlet Water**": 2-Byte object that that reflects the current temperature of the inlet water flow, as reported by the Altherma system.
    - "**[Temperature] Refrigerant**": 2-Byte object that reflects the current temperature of the refrigerant, as reported by the Altherma system.

  - **Actuators** [*disabled*/*enabled*]: which enables or disables the supervision of various indicators related to the operational condition of the actuators (pump, compressor, etc.) in the Altherma system.

- "**[Actuators] Pump**": 1-Bit object that reflects the status of the pump ("1" = turned on; "0" = turned off).

- "**[Actuators] Compressor**": 1-Bit object that reflects the status of the compressor ("1" = turned on; "0" = turned off).

- "**[Actuators] BUH: Step 1**": 1-Bit object that reflects the status of the Backup Heater Step 1 ("1" = turned on; "0" = turned off).

- "**[Actuators] BUH: Step 2**": 1-Bit object that reflects the status of the Backup Heater Step 2 ("1" = turned on; "0" = turned off).

➢ **Energy** [*disabled*/*enabled*]: which enables or disables the supervision of various indicators related to the power consumption/production.

- "**[Energy] Consumption – Total**": 4-Byte object that reflects the total energy consumption (in kWh) till now, as reported by the Altherma system.

- "**[Energy] Consumption – Climate: Cooling**": 4-Byte object that reflects the total energy consumption (in kWh) to date in the cooling circuit, as reported by the Altherma system.

- "**[Energy] Consumption – Climate: Heating**": 4-Byte object that reflects the total energy consumption (in kWh) to date in the heating circuit, as reported by the Altherma system.

- "**[Energy] Consumption – DHW**": 4-Byte object that reflects the total energy consumption (in kWh) to date in the DHW circuit, as reported by the Altherma system.

- "**[Energy] Production – Total**": 4-Byte object that reflects the total energy production (in kWh) till now, as reported by the Altherma system.

- "**[Energy] Production – Climate: Cooling**": 4-Byte object that reflects the total energy production (in kWh) to date in the cooling circuit, as reported by the Altherma system.

- "**[Energy] Production – Climate: Heating**": 4-Byte object that reflects the total energy production (in kWh) to date in the heating circuit, as reported by the Altherma system.

- "**[Energy] Production – DHW**": 4-Byte object that reflects the total energy production (in kWh) to date in the DHW circuit, as reported by the Altherma system.

➢ **Flow** [*disabled/enabled*]: which enables or disables the supervision of the water flow.

- "**Flow Rate**": 2-Byte object that reflects the current water flow rate (in litres per hour, according to the KNX standard; note that the actual user interface of the Altherma system may use other units), as reported by the Altherma system.

Notes:

➢ *Depending on the hydrobox model selected some additional status may not be available.*

➢ *Energy indicators are not updated when its status changes. In order to have these energy values updated, a request must be done from wired control of Altherma system.*

OPERATING TIME

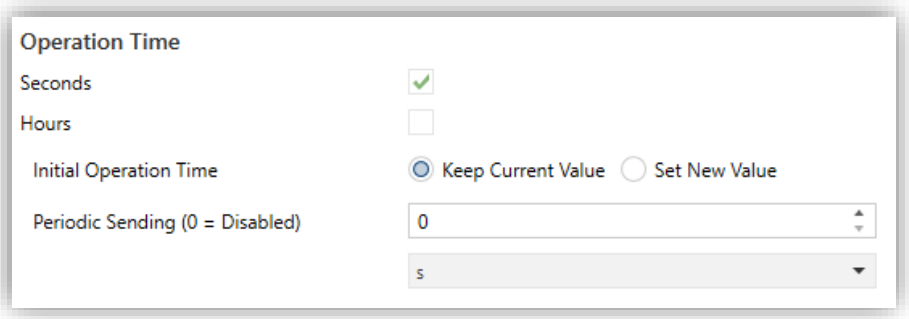


Figure 7. A/C Gateway. Configuration. Operation Time.

The operating time of the A/A machine in hours and/or seconds can be known.

The available parameters in ETS are:

- **Seconds** [*disabled/enabled*]**:** enables the 2-Byte object **"[AC] Operating time (s)".** This object can be read and overwritten during executing time.

- **Hours** [*disabled/enabled*]**:** enables the 4-Byte object "**[AC] Operating time (h)**". This object can be read and overwritten during executing time.

  - **Initial Operation Time,** two options are available:

    - [*Keep current value*]: keeps the previous value.

    - [*Set new value*]: establishes an initial operating time **value** [*[0…3600][s] / [0…65535][h]*].

  - Periodic **Sending** [*[0…3600][s] / [0…65535][min/h]*]**:** operating time retransmission period. If set to "0" the periodic send is disabled.

When operating time object reaches its maximum value (65535h), it will be sent through KNX bus (in spite of the fact that the periodical sending has not been configured) and it will keep this value until the user reset it.

2.3 DOMESTIC HOT WATER (DHW)

If Domestic hot water management is enabled in "Configuration" (see section 2.2.1), the next objects will be available:

- "**[DHW] On/Off**": 1-Bit object that will make KLIC-DA v2 turn on the domestic hot water function if a "1" is received from the KNX bus, while one "0" will make it turn the function off.

- "**[DHW] On/Off (Status)**": 1-Bit object that reflects whether the DHW function is on (value "1") or off (value "0").

- "**[DHW] Operating (Status)**": 1-Bit object that shows whether the domestic hot water tank is in operation (value "1") or not (value "0"). Note that the tank will never be in operation if the DHW function itself has not been turned on.

- "**[DHW] Temperature**": 2-Byte object that sets the desired setpoint temperature for the domestic hot water tank between the range [30-60]ºC.

  Notes:

  - *To work properly, DHW reheat mode should be set from the main controller.*
  - *The maximum temperature range will be the same as the one configured on the machine.*
  - *A X.Y value will be rounded to X.0 if [Y < 5] or to X.5 if [Y ≥ 5].*

- "**[DHW] Temperature (Status)**": 2-Byte object that reflects the current setpoint temperature of the DHW tank.

- "**[DHW] Booster Mode On/Off**": 1-Bit object that will make KLIC-DA v2 switch on the Booster mode of the DHW tank if a "1" is received from the KNX bus, while one "0" will make it turn this mode off.

  Note: *the commands to activate/deactivate the Booster mode are only sent if the DHW function is active*.

- "**[DHW] Booster Mode On/Off (Status)**": one-bit object that reflects whether the Booster Mode is currently on (value "1") or off (value "0").

ETS PARAMETRISATION

After Domestic hot water management has been activated in in the "Configuration" parameters screen (see section 2.2.1), a new tab named **Domestic hot water** is displayed with the following parameters:

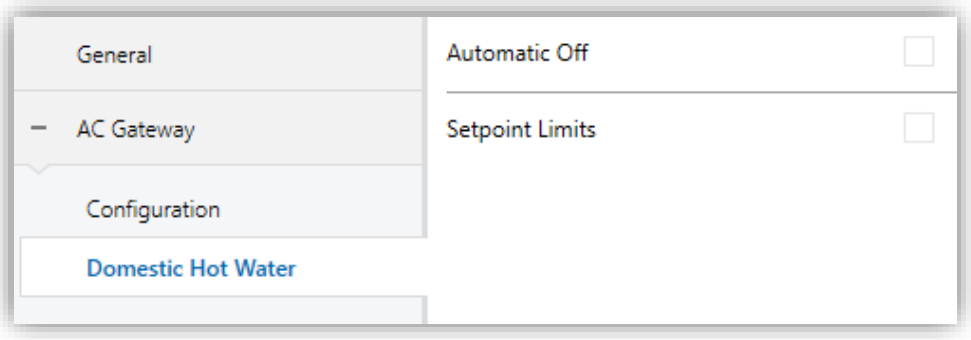


Figure 8. A/C Gateway. Domestic hot water management.

AUTOMATIC OFF

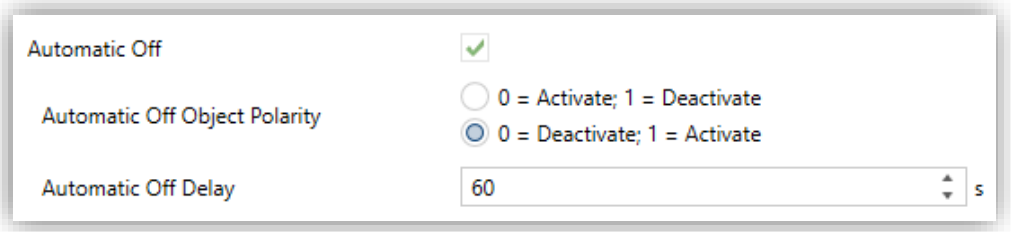


Figure 9. A/C Gateway. Domestic hot water. Automatic Off.

- **Automatic Off** [*disabled/enabled*]**:** enables "**[DHW] Automatic Off**" and "**[DHW] Automatic Off (Status)**" binary objects, which let performing a temporary switch-off of the DHW by sending it a value of "1" and a later switch-on by sending it a value of "0". This control object will be typically linked to a window sensor or a similar event trigger. Automatic off will be also active if the DHW is previously in off state, so, the unit will not be able of being on until this situation finishes.

During the temporary switch-off state, KLIC-DA v2 will still monitor any control orders being received (DHW setpoint), so they can be applied once it leaves such state.

- **Automatic Off Object Polarity** [*0 = Activate; 1 = Deactivate / 0 = Deactivate; 1 = Activate*]: sets the polarity of the above object.

- **Automatic Off Delay** [*1…60…3600*] [*s*]: sets the time KLIC-DA v2 waits before switching the DHW to off. Any switch-off order received during the delay will abort the time count. This delay can be changed at run time using the object "**[DHW] Automatic Off: Delay**". Sending the value "0" disables the automatic shutdown functionality.

SETPOINT LIMITS

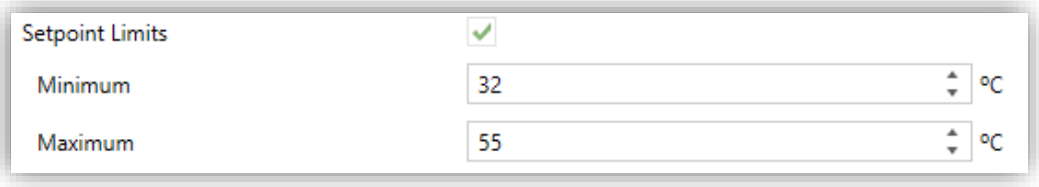


Figure 10. A/C Gateway. Configuration. Setpoint limits.

- **Setpoint Limits** [*disabled/enabled*]: enables the range of the DHW temperature setpoint to be restricted, provided that the limits are still within the predefined limits of the Altherma unit. When KLIC-DA v2 receives an order to send the Altherma unit a setpoint which is greater or lower than the configured limits, it will actually send the limit value.

  - **Minimum** [*30…32…60*] [*ºC*]: sets the lower limit.

  - **Maximum** [*30…55…60*] [*ºC*]: sets the upper limit.

Once these limits are enabled, several objects to modify them at run time will be available. The values of this objects will be restricted to an interval which is defined by the absolute limits established by the A/C unit (30ºC to 60ºC).

- "**[DHW] Temperature Setpoint: Lower Limit**": 2-Byte object that enables the lower limit to be changed at run time.

- "**[DHW] Temperature Setpoint: Lower Limit (Status)**": 2-Byte object with the lower limit current value.

- "**[DHW] Temperature Setpoint: Upper Limit**": 2-Byte object that enables the upper limit to be changed at run time.

- "**[DHW] Temperature Setpoint: Upper Limit (Status)**": 2-Byte object with the upper limit current value.

Notes:

- *If [Minimum] ≥ [Maximum], limits will not be taken in account. In this case, default values will be used.*

- *These parameters only can be set as integer values in ETS. However, at run time the associated objects allow decimal values.*

2.4 CLIMATE CONTROL

If Climate is enabled in Configuration (see section 2.2.1), the next objects will be available:

- "**[Climate] On/Off**": 1-Bit object that will make KLIC-DA v2 turn on the climate control function when a "1" is received from the KNX bus, while one "0" will make it turn the climate control function off.

- "**[Climate] On/Off (Status)**": 1-Bit object that reflects whether the climate system is currently on (value "1") or off (value "0").

- "**[Climate] Operating (Status)**": 1-Bit object that shows whether the climate system is in operation (value "1") or not (value "0").

- "**[Climate] Temperature Setpoint**": 2-Byte object that sets the desired setpoint temperature for the climate system. In case the value received through this object exceeds the allowed setpoint range, the Altherma system itself will truncate it to the minimum or maximum values, notifying afterwards the effective change to KLIC-DA v2.

- "**[Climate] Temperature Setpoint (Status)**": 2-Byte object that reflects the current setpoint temperature of the climate system.

  Note: *A X.Y value will be rounded to X.0 if [Y < 5] or to X.5 if [Y ≥ 5].*

- "**[Climate] Mode**": 1-Bit object that will make KLIC-DA v2 switch the current operation mode of the climate system to **Cooling** (value "0") or to **Heating** (value "1").

  Note: *although available from the main user control, the "automatic" mode cannot be activated from KLIC-DA v2. If a mode switch order is received from the KNX bus, KLIC-DA v2 will ensure that the automatic mode gets deactivated in the climate system.*

- "**[Climate] Mode (Status)**": 1-Bit object that reflects the currently active operation mode ("0" = Cooling; "1" = Heating), no matter if the automatic mode has been set or not from the main user control.

ETS PARAMETRISATION

When Climate has been activated in the Configuration parameters screen, the following drop-down lists will be available for the selection of the specific functions required.

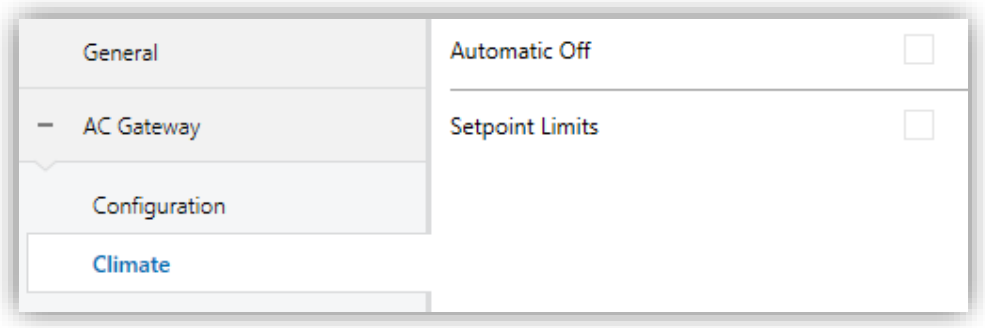


Figure 11. A/C Gateway. Climate.

AUTOMATIC OFF

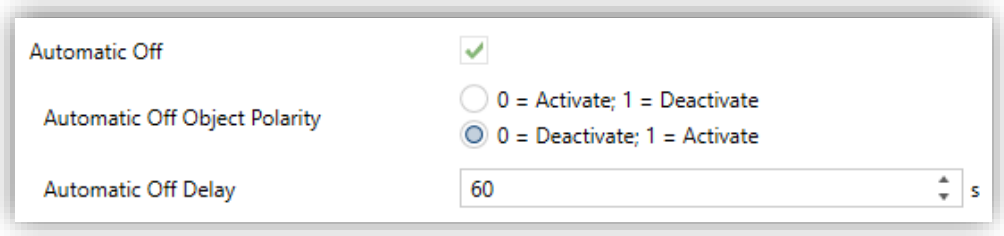


Figure 12. A/C Gateway. Climate. Automatic Off.

- **Automatic Off** [*disabled/enabled*]**:** enables "**[Climate] Automatic Off**" and "**[Climate] Automatic Off (Status)**" binary objects, which let performing a temporary switch-off of the DHW by sending it a value of "1" and a later switch-on by sending it a value of "0". This control object will be typically linked to a window sensor or a similar event trigger. Automatic off will be also active if the DHW is previously in off state, so, the unit will not be able of being on until this situation finishes.

  During the temporary switch-off state, KLIC-DA v2 will still monitor any control orders being received (DHW setpoint), so they can be applied once it leaves such state.

  - **Automatic Off Object Polarity** [*0 = Activate; 1 = Deactivate / 0 = Deactivate; 1 = Activate*]: sets the polarity of the above object.

- **Automatic Off Delay** [*1…60…3600*] [*s*]: sets the time KLIC-DA v2 waits before switching the DHW to off. Any switch-off order received during the delay will abort the time count. This delay can be changed at run time using the object "**[Climate] Automatic Off: Delay**". Sending the value "0" disables the automatic shutdown functionality.

SETPOINT LIMITS

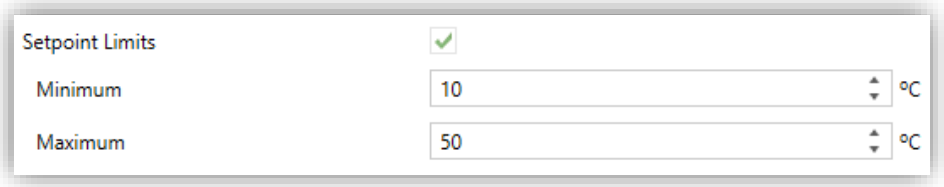


Figure 13. A/C Gateway. Climate. Setpoint limits.

- **Setpoint Limits** [*disabled/enabled*]: enables the restriction the range of the Climate temperature setpoint, provided that the limits are still within the predefined limits of the Altherma unit. It must be taken into account that both upper and lower limit will apply to Cooling and Heating mode. The application program stores the values of the limits for each mode, so when a change of mode occurs, the corresponding limits are applied and their states are received. When KLIC-DA v2 receives an order to send the Altherma unit a setpoint which is greater or lower than the configured limits, it will actually send the limit value.

  - **Minimum** [*5…10…65*] [*ºC*]: sets the lower limit.
  - **Maximum** [*5…50…65*] [*ºC*]: sets the upper limit.

Once these limits are enabled, several objects to modify them at run time will be available. The values of this objects will be restricted to an interval which is defined by the absolute limits established by the A/C unit (5ºC to 65ºC).

- "**[Climate] Temperature Setpoint: Lower Limit**": 2-Byte object that enables the lower limit to be changed at run time.

- "**[Climate] Temperature Setpoint: Lower Limit (Status)**": 2-Byte object with the lower limit current value.

- "**[Climate] Temperature Setpoint: Upper Limit**": 2-Byte object that enables the upper limit to be changed at run time.

- "**[Climate] Temperature Setpoint: Upper Limit (Status)**": 2-Byte object with the upper limit current value.

Notes:

- *If [Minimum] ≥ [Maximum], limits will not be taken in account. In this case, default values will be used.*

- *These parameters only can be set as integer values in ETS. However, at run time the associated objects allow decimal values.*

2.5 ROOM THERMOSTAT CONTROL

If Room is enabled in Configuration (see section 2.2.1), the next objects will be available:

- "**[Room] Temperature Setpoint**": 2-Byte object that sets the desired setpoint temperature in the range [12-35] ºC.

  Note: *decimal values are accepted with the following criteria:*

  - *X,0 is set if decimal part is in the range [0-25].*
  - *X,5 is set if decimal part is in the range [26-75].*
  - *(X+1),0 is set if decimal part is in the range [76-99].*

- "**[Room] Indoor Temperature**": 2-Byte object that sets the room temperature to the unit in the range [-5-50] ºC. This object can be linked in the same group address as the temperature object of one of the inputs enabled as temperature probe.

- "**[Room] Indoor Temperature (Status)**": 2-Byte object that reflects the current indoor temperature of the room.

ETS PARAMETRISATION

When Room has been activated in the Configuration parameters screen, the following drop-down list will be available for the selection of the specific functions required.

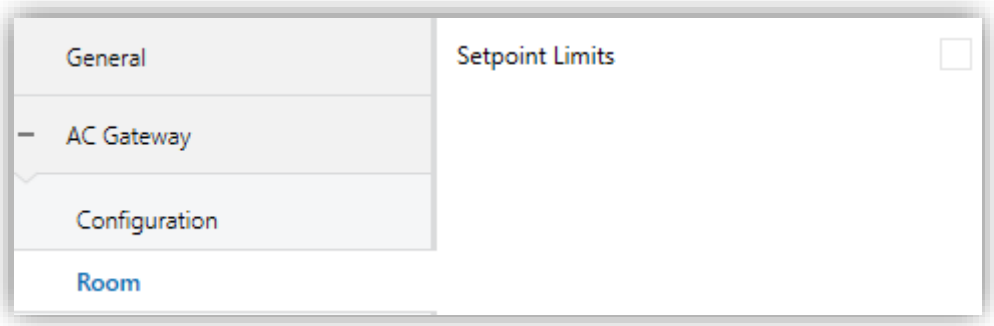


Figure 14. A/C Gateway. Room.

SETPOINT LIMITS

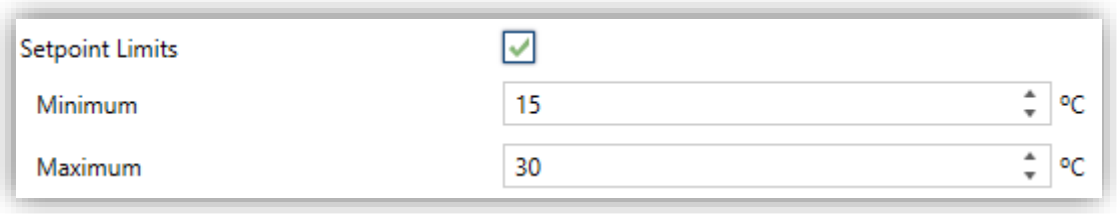


Figure 15. A/C Gateway. Room. Setpoint limits.

- **Setpoint Limits** [*disabled/enabled*]: enables the restriction the range of the Room temperature setpoint, provided that the limits are still within the predefined limits of the Altherma unit. It must be taken into account that both upper and lower limit will apply to Cooling and Heating mode. The application program stores the values of the limits for each mode, so when a change of mode occurs, the corresponding limits are applied and their states are received. When KLIC-DA v2 receives an order to send the Altherma unit a setpoint which is greater or lower than the configured limits, it will actually send the limit value.

  - **Minimum** [*12…15…35*] [*ºC*]: sets the lower limit.
  - **Maximum** [*12…30…35*] [*ºC*]: sets the upper limit.

Once these limits are enabled, several objects to modify them at run time will be available. The values of this objects will be restricted to an interval which is defined by the absolute limits established by the A/C unit (12ºC to 35ºC).

- "**[Room] Temperature Setpoint: Lower Limit**": 2-Byte object that enables the lower limit to be changed at run time.
- "**[Room] Temperature Setpoint: Lower Limit (Status)**": 2-Byte object with the lower limit current value.
- "**[Room] Temperature Setpoint: Upper Limit**": 2-Byte object that enables the upper limit to be changed at run time.
- "**[Room] Temperature Setpoint: Upper Limit (Status)**": 2-Byte object with the upper limit current value.

Notes:

- *If [Minimum] ≥ [Maximum], limits will not be taken in account. In this case, default values will be used.*
- *These parameters only can be set as integer values in ETS. However, at run time the associated objects allow decimal values.*

2.6 INITIAL CONFIGURATION

The custom initial configuration sets the desired status that KLIC-DA v2 will send the Altherma unit after downloading or restarting the device. This status is defined in terms of DHW (On/Off, booster mode and temperature setpoint), climate (On/Off, mode and temperature setpoint) and/or room (temperature setpoint).

In addition, it is possible to activate an initial sending of this status to the KNX bus.

ETS PARAMETRISATION

After selecting "Custom" for the **Initial Configuration** option under the "Configuration" tab (see section 2.2.1), a new tab named "Initial Configuration" is displayed with the following parameters:

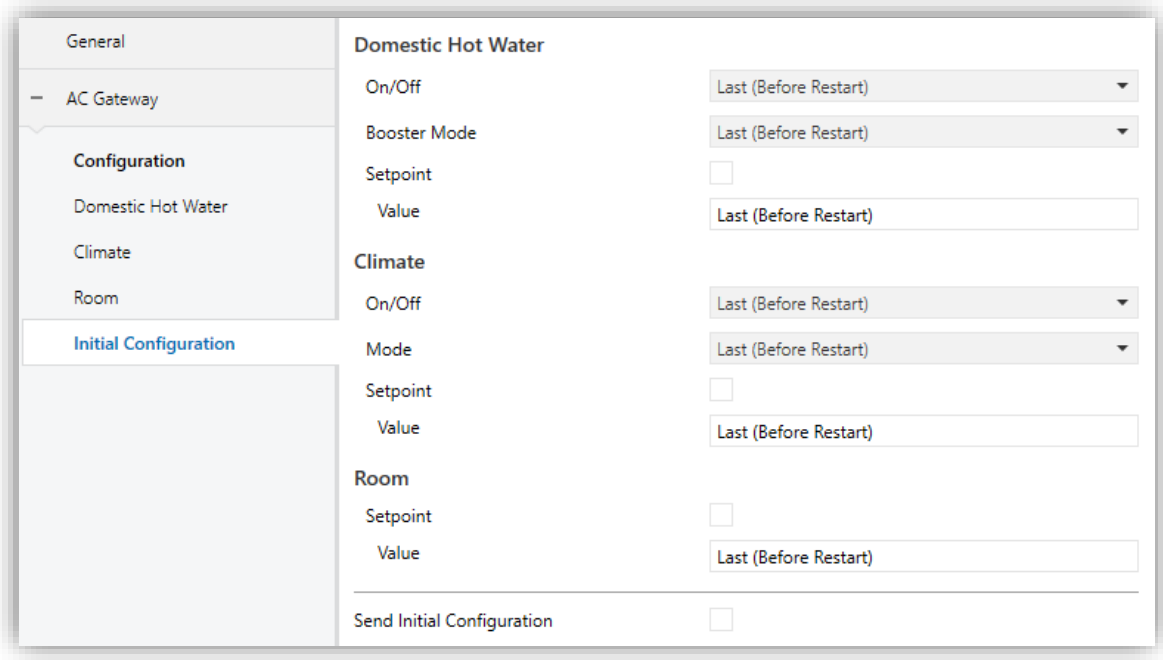


Figure 16. A/C Gateway. Initial configuration.

- **Domestic hot water:**
  - **On/Off** [*Last (before restart) / On / Off*].
  - **Booster Mode:** [*Last (before restart) / On / Off*].
  - **Setpoint** [*disabled/enabled*]**:**

- **Value:**

  - [*Last (before restart)*]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains disabled.
  - [*30…50…60*] ºC.

  Note: *this initial setpoint value may be modified by the setpoint limits during runtime.*

- **Climate:**

  - **On/Off** [*Last (before restart) / On / Off*].
  - **Mode:** [*Last (before restart) / Heating / Cooling*].
  - **Setpoint** [*disabled/enabled*]**:**

    - **Value:**

      - [*Last (before restart)*]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains disabled.
      - [*5…25…65*] ºC.

      Note: *this initial setpoint value may be modified by the setpoint limits during runtime.*

- **Room:**

  - **Setpoint** [*disabled/enabled*]**:**

    - **Value:**

      - [*Last (before restart)*]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains disabled.
      - [*12…25…35*] ºC.

- **Send initial configuration** [*disabled/enabled*]: If enabled, the status objects will be sent to the KNX bus after applying the parametrized **delay** [*7…3600*], in seconds.

Notes:

- *Even if this option is not enabled, the status objects may be sent to the KNX bus if the initial configuration differs from the current status of the Altherma machine.*

- *The delay parametrized in initial configuration sending is approximate, due to it starts to be counted when the communication between KLIC-DA v2 and Altherma unit is confirmed.*

2.7 SCENES

The Scenes function defines a set of statuses (in terms of DHW, climate and room thermostat) that KLIC-DA v2 will send to the Altherma unit whenever it receives the corresponding scene values from the KNX bus.

ETS PARAMETRISATION

After enabling this function (see section 2.2.1), a new tab named “Scenes” will be incorporated to the tab tree. It sets up different scenes (up to 5), consisting each of them in a set of orders to be sent to the Altherma unit upon the reception, through the KNX bus and by means of the Scenes object, of the corresponding scene value (decreased by 1, according to the KNX standard).

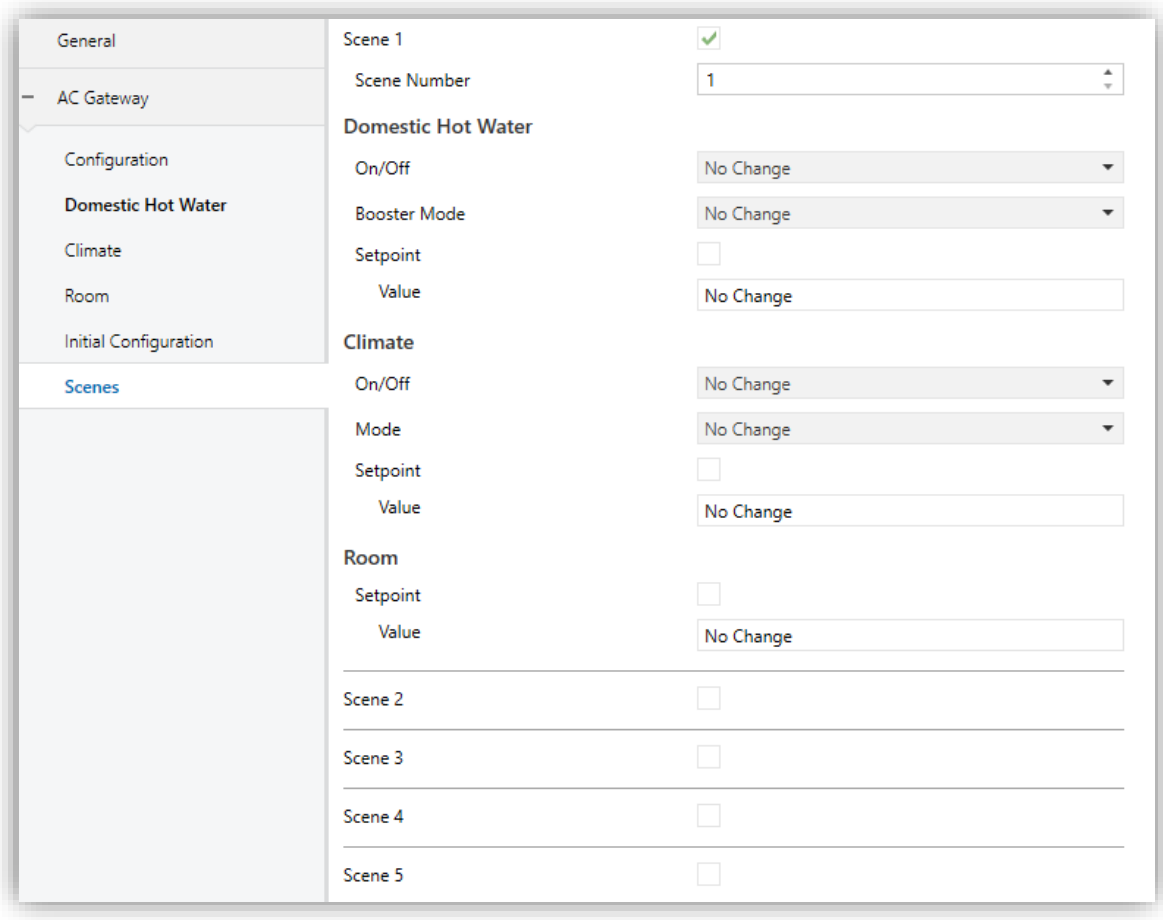


Figure 17. A/C Gateway. Scenes.

For every enabled scene, the particular parameters that should be configured are:

- **Scene number** [*1…64*]: sets the scene number that, upon reception through the object **"[AC] Scene"** (decreased by one), will trigger the corresponding orders, as defined next:

  - **Domestic hot water:**

    - **On/Off** [*No change / On / Off*].
    - **Booster Mode:** [*No change / On / Off*].
    - **Setpoint** [*disabled/enabled*]**:**
      - Value:
        - [*No change*]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains disabled.
        - [*30…50…60*] ºC.

        Note: *this initial setpoint value may be modified by the setpoint limits during runtime.*

  - **Climate:**

    - **On/Off** [*No change / On / Off*].
    - **Mode:** [*No change / Heating / Cooling*].
    - **Setpoint** [*disabled/enabled*]**:**
      - Value:
        - [*No change*]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains disabled.
        - [*5…25…65*] ºC.

        Note: *this initial setpoint value may be modified by the setpoint limits during runtime.*

  - **Room:**

    - **Setpoint** [*disabled/enabled*]**:**
      - Value:

- [*No change*]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains disabled.
- [*12…25…35*] ºC.

Note: *this initial setpoint value may be modified by the setpoint limits during runtime.*

2.8 ERROR HANDLING

KLIC-DA v2 is able to report the following error events:

- **Internal Communication error**: error in the communication process between KLIC-DA v2 and the Altherma unit.

  There is a LED notification, by which the LED on the device will light green when internal communication error is active.

- **Altherma systems errors:** errors reported by the A/C unit itself. KLIC-DA v2 can notify the KNX bus about the reported error code, although referring to the specific documentation of the Altherma machine is advisable in order to obtain further information.

No additional parameter configuration is required for this function. The following communication objects will be available:

- "**[AC] Internal Error: Communication**": 1-Bit object that reflects whether there are (value "1") or not (value "0") any errors in the communication with the P1/P2 bus. This type of error may be due to an interruption of the communication with the main user control (i.e., more than three seconds –after the initial communication sequence– with no reception of valid frames addressed to the additional control), or to the existence of multiple additional controls in the P1/P2 bus (KLIC-DA v2 is supposed to replace the additional control).

  Note: *if two or more additional user controls are found to exist in the P1/P2 bus, KLIC-DA v2 will report a communication error and will then require that the Altherma system is switched off prior to removing the unneeded additional control. Note that once it has been removed and the Altherma system is back on, it is also necessary to restart KLIC-DA v2 to clear the communication error* and make it send the value "0" to the KNX bus.

- "**[AC] Unit Error: Active Error**"**:** 1-Bit object that reflects whether Altherma itself has informed about an error in the system (value "1"). When such situation is over, or if no error has been reported by the Altherma system, this object will have the value "0".

- "**[AC] Unit Malfunction**": 1-Bit object that reflects whether Altherma itself reports a warning (value "1"). When such situation is over, this object will have the value "0".

- "**[AC] Unit Error: Error Code**": 14-byte object to report the malfunction code that wired control provides when a malfunction takes place in Altherma system.

Whenever any of the above objects changes its value, KLIC-DA v2 will automatically send it to the KNX bus.

Note: *In case of having a malfunction that prevents the measurement of the values which are visualized in wired control, these measurements will be displayed without a specific value ("--,-"). However, a high negative value will be received through the bus. Due to its inconsistency, implicitly notifies that a malfunction related with this measurement is taking place.*

2.9 INPUTS

KLIC-DA v2 incorporates **2 analogue/digital inputs**, each configurable as a:

- **Binary Input**, for the connection of a pushbutton or a switch/sensor.
- **Temperature Probe**, for the connection of a temperature sensor from Zennio.
- **Motion Detector**, for the connection of a motion detector from Zennio.

2.9.1 BINARY INPUT

Please refer to the "**Binary Inputs**" user manual, available in the KLIC-DA v2 product section, at the Zennio website (www.zennio.com).

2.9.2 TEMPERATURE PROBE

Please refer to the "**Temperature Probe**" user manual, available in the KLIC-DA v2 product section, at the Zennio website (www.zennio.com).

2.9.3 MOTION DETECTOR

Please refer to the "**Motion Detector**" user manual, available in the KLIC-DA v2 product section, at the Zennio website (www.zennio.com).

2.10 LOGIC FUNCTIONS

This module makes it possible to perform numeric and binary operations with incoming values received from the KNX bus, and to send the results through other communication objects specifically enabled for this purpose.

KLIC-DA v2 can implement **up to 10 different and independent functions**, each of them entirely customisable and consisting in **up to 4 consecutive operations each**.

The execution of each function can depend on a configurable **condition**, which will be evaluated every time the function is **triggered** through specific, parameterizable communication objects. The result after executing the operations of the function can also be evaluated according to certain **conditions** and afterwards sent (or not) to the KNX bus, which can be done every time the function is executed, periodically or only when the result differs from the last one.

Please refer to the "**Logic Functions**" user manual (available in the KLIC-DA v2 product section at the Zennio homepage, www.zennio.com) for detailed information about the functionality and the configuration of the related parameters.

ANNEX I. 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	[Heartbeat] Object to Send '1'	Sending of '1' Periodically
4, 8	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Ix] Current Temperature	Temperature Sensor Value
5, 9	1 Bit	O	C R - T -	DPT_Alarm	0/1	[Ix] Overcooling	0 = No Alarm; 1 = Alarm
6, 10	1 Bit	O	C R - T -	DPT_Alarm	0/1	[Ix] Overheating	0 = No Alarm; 1 = Alarm
7, 11	1 Bit	O	C R - T -	DPT_Alarm	0/1	[Ix] Probe Error	0 = No Alarm; 1 = Alarm
12, 18	1 Bit	I	C - W - -	DPT_Enable	0/1	[Ix] Input Lock	0 = Unlock; 1 = Lock
13, 19	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Short Press] 0	Sending of 0
	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Short Press] 1	Sending of 1
	1 Bit	I	C - W T -	DPT_Switch	0/1	[Ix] [Short Press] 0/1 Switching	Switching 0/1
	1 Bit		C - - T -	DPT_UpDown	0/1	[Ix] [Short Press] Move Up Shutter	Sending of 0 (Up)
	1 Bit		C - - T -	DPT_UpDown	0/1	[Ix] [Short Press] Move Down Shutter	Sending of 1 (Down)
	1 Bit		C - - T -	DPT_UpDown	0/1	[Ix] [Short Press] Move Up/Down Shutter	Switching 0/1 (Up/Down)
	1 Bit		C - - T -	DPT_Step	0/1	[Ix] [Short Press] Stop/Step Up Shutter	Sending of 0 (Stop/Step Up)
	1 Bit		C - - T -	DPT_Step	0/1	[Ix] [Short Press] Stop/Step Down Shutter	Sending of 1 (Stop/Step Down)
	1 Bit		C - - T -	DPT_Step	0/1	[Ix] [Short Press] Stop/Step Shutter (Switched)	Switching of 0/1 (Stop/Step Up/Down)
	4 Bit		C - - T -	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0xD (Inc. by 100%) ... 0xF (Inc. by 1%)	[Ix] [Short Press] Brighter	Increase Brightness
	4 Bit		C - - T -	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%)	[Ix] [Short Press] Darker	Decrease Brightness

					0x8 (Stop) 0xD (Inc. by 100%) ... 0xF (Inc. by 1%)		
	4 Bit		C - - T -	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0xD (Inc. by 100%) ... 0xF (Inc. by 1%)	[Ix] [Short Press] Brighter/Darker	Switch Bright/Dark
	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Short Press] Light On	Sending of 1 (On)
	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Short Press] Light Off	Sending of 0 (Off)
	1 Bit	I	C - W T -	DPT_Switch	0/1	[Ix] [Short Press] Light On/Off	Switching 0/1
	1 Byte		C - - T -	DPT_SceneControl	0-63; 128-191	[Ix] [Short Press] Run Scene	Sending of 0 - 63
	1 Byte		C - - T -	DPT_SceneControl	0-63; 128-191	[Ix] [Short Press] Save Scene	Sending of 128 - 191
	1 Bit	I/O	C R W T -	DPT_Switch	0/1	[Ix] [Switch/Sensor] Edge	Sending of 0 or 1
	1 Byte		C - - T -	DPT_Value_1_Ucount	0 - 255	[Ix] [Short Press] Constant Value (Integer)	0 - 255
	1 Byte		C - - T -	DPT_Scaling	0% - 100%	[Ix] [Short Press] Constant Value (Percentage)	0% - 100%
	2 Bytes		C - - T -	DPT_Value_2_Ucount	0 - 65535	[Ix] [Short Press] Constant Value (Integer)	0 - 65535
	2 Bytes		C - - T -	9.xxx	-671088.64 - 670433.28	[Ix] [Short Press] Constant Value (Float)	Float Value
14, 20	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Ix] [Short Press] Shutter Status (Input)	0% = Top; 100% = Bottom
	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Ix] [Short Press] Dimming Status (Input)	0% - 100%
15, 21	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Long Press] 0	Sending of 0
	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Long Press] 1	Sending of 1
	1 Bit	I	C - W T -	DPT_Switch	0/1	[Ix] [Long Press] 0/1 Switching	Switching 0/1
	1 Bit		C - - T -	DPT_UpDown	0/1	[Ix] [Long Press] Move Up Shutter	Sending of 0 (Up)
	1 Bit		C - - T -	DPT_UpDown	0/1	[Ix] [Long Press] Move Down Shutter	Sending of 1 (Down)
	1 Bit		C - - T -	DPT_UpDown	0/1	[Ix] [Long Press] Move Up/Down Shutter	Switching 0/1 (Up/Down)
	1 Bit		C - - T -	DPT_Step	0/1	[Ix] [Long Press] Stop/Step Up Shutter	Sending of 0 (Stop/Step Up)
	1 Bit		C - - T -	DPT_Step	0/1	[Ix] [Long Press] Stop/Step Down Shutter	Sending of 1 (Stop/Step Down)
	1 Bit		C - - T -	DPT_Step	0/1	[Ix] [Long Press] Stop/Step Shutter (Switched)	Switching of 0/1 (Stop/Step Up/Down)

	4 Bit		C - - T -	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0xD (Inc. by 100%) ... 0xF (Inc. by 1%)	[Ix] [Long Press] Brighter	Long Pr. -> Brighter; Release -> Stop
	4 Bit		C - - T -	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0xD (Inc. by 100%) ... 0xF (Inc. by 1%)	[Ix] [Long Press] Darker	Long Pr. -> Darker; Release -> Stop
	4 Bit		C - - T -	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0xD (Inc. by 100%) ... 0xF (Inc. by 1%)	[Ix] [Long Press] Brighter/Darker	Long Pr. -> Brighter/Darker; Release -> Stop
	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Long Press] Light On	Sending of 1 (On)
	1 Bit		C - - T -	DPT_Switch	0/1	[Ix] [Long Press] Light Off	Sending of 0 (Off)
	1 Bit	I	C - W T -	DPT_Switch	0/1	[Ix] [Long Press] Light On/Off	Switching 0/1
	1 Byte		C - - T -	DPT_SceneControl	0-63; 128-191	[Ix] [Long Press] Run Scene	Sending of 0 - 63
	1 Byte		C - - T -	DPT_SceneControl	0-63; 128-191	[Ix] [Long Press] Save Scene	Sending of 128 - 191
	1 Bit	O	C R - T -	DPT_Alarm	0/1	[Ix] [Switch/Sensor] Alarm: Breakdown or Sabotage	1 = Alarm; 0 = No Alarm
	2 Bytes		C - - T -	9.xxx	-671088.64 - 670433.28	[Ix] [Long Press] Constant Value (Float)	Float Value
	2 Bytes		C - - T -	DPT_Value_2_Ucount	0 - 65535	[Ix] [Long Press] Constant Value (Integer)	0 - 65535
	1 Byte		C - - T -	DPT_Scaling	0% - 100%	[Ix] [Long Press] Constant Value (Percentage)	0% - 100%
	1 Byte		C - - T -	DPT_Value_1_Ucount	0 - 255	[Ix] [Long Press] Constant Value (Integer)	0 - 255
16, 22	1 Bit		C - - T -	DPT_Trigger	0/1	[Ix] [Long Press/Release] Stop Shutter	Release -> Stop Shutter
17, 23	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Ix] [Long Press] Dimming Status (Input)	0% - 100%

	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Ix] [Long Press] Shutter Status (Input)	0% = Top; 100% = Bottom
24	1 Byte	I	C - W - -	DPT_SceneNumber	0 - 63	[Motion Detector] Scene Input	Scene Value
25	1 Byte		C - - T -	DPT_SceneControl	0-63; 128-191	[Motion Detector] Scene Output	Scene Value
26, 55	1 Byte	O	C R - T -	DPT_Scaling	0% - 100%	[Ix] Luminosity	0-100%
27, 56	1 Bit	O	C R - T -	DPT_Alarm	0/1	[Ix] Open Circuit Error	0 = No Error; 1 = Open Circuit Error
28, 57	1 Bit	O	C R - T -	DPT_Alarm	0/1	[Ix] Short Circuit Error	0 = No Error; 1 = Short Circuit Error
29, 58	1 Byte	O	C R - T -	DPT_Scaling	0% - 100%	[Ix] Presence State (Scaling)	0-100%
30, 59	1 Byte	O	C R - T -	DPT_HVACMode	1=Comfort 2=Standby 3=Economy 4=Building Protection	[Ix] Presence State (HVAC)	Auto, Comfort, Standby, Economy, Building Protection
31, 60	1 Bit	O	C R - T -	DPT_Switch	0/1	[Ix] Presence State (Binary)	Binary Value
	1 Bit	O	C R - T -	DPT_Start	0/1	[Ix] Presence: Slave Output	1 = Motion Detected
32, 61	1 Bit	I	C - W - -	DPT_Window_Door	0/1	[Ix] Presence Trigger	Binary Value to Trigger the Presence Detection
33, 62	1 Bit	I	C - W - -	DPT_Start	0/1	[Ix] Presence: Slave Input	0 = Nothing; 1 = Detection from slave device
34, 63	2 Bytes	I	C - W - -	DPT_TimePeriodSec	0 - 65535	[Ix] Presence: Waiting Time	0-65535 s.
35, 64	2 Bytes	I	C - W - -	DPT_TimePeriodSec	0 - 65535	[Ix] Presence: Listening Time	1-65535 s.
36, 65	1 Bit	I	C - W - -	DPT_Enable	0/1	[Ix] Presence: Enable	According to parameters
37, 66	1 Bit	I	C - W - -	DPT_DayNight	0/1	[Ix] Presence: Day/Night	According to parameters
38, 67	1 Bit	O	C R - T -	DPT_Occupancy	0/1	[Ix] Presence: Occupancy State	0 = Not Occupied; 1 = Occupied
39, 68	1 Bit	I	C - W - -	DPT_Start	0/1	[Ix] External Motion Detection	0 = Nothing; 1 = Motion detected by an external sensor
40, 45, 50, 69, 74, 79	1 Byte	O	C R - T -	DPT_Scaling	0% - 100%	[Ix] [Cx] Detection State (Scaling)	0-100%
41, 46, 51, 70, 75, 80	1 Byte	O	C R - T -	DPT_HVACMode	1=Comfort 2=Standby 3=Economy 4=Building Protection	[Ix] [Cx] Detection State (HVAC)	Auto, Comfort, Standby, Economy, Building Protection
42, 47, 52, 71, 76, 81	1 Bit	O	C R - T -	DPT_Switch	0/1	[Ix] [Cx] Detection State (Binary)	Binary Value
43, 48, 53, 72, 77, 82	1 Bit	I	C - W - -	DPT_Enable	0/1	[Ix] [Cx] Enable Channel	According to parameters
44, 49, 54, 73, 78, 83	1 Bit	I	C - W - -	DPT_Switch	0/1	[Ix] [Cx] Force State	0 = No Detection; 1 = Detection
84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98,	1 Bit	I	C - W - -	DPT_Bool	0/1	[LF] (1-Bit) Data Entry x	Binary Data Entry (0/1)

99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115							
116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131	1 Byte	I	**C - W - -**	DPT_Value_1_Ucount	0 - 255	[LF] (1-Byte) Data Entry x	1-Byte Data Entry (0-255)
132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147	2 Bytes	I	**C - W - -**	DPT_Value_2_Ucount	0 - 65535	[LF] (2-Byte) Data Entry x	2-Byte Data Entry
148, 149, 150, 151, 152, 153, 154, 155	4 Bytes	I	**C - W - -**	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] (4-Byte) Data Entry x	4-Byte Data Entry
156, 157, 158, 159, 160, 161, 162, 163, 164, 165	1 Bit	O	**C R - T -**	DPT_Bool	0/1	[LF] Function x - Result	(1-Bit) Boolean
	1 Byte	O	**C R - T -**	DPT_Value_1_Ucount	0 - 255	[LF] Function x - Result	(1-Byte) Unsigned
	2 Bytes	O	**C R - T -**	DPT_Value_2_Ucount	0 - 65535	[LF] Function x - Result	(2-Byte) Unsigned
	4 Bytes	O	**C R - T -**	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] Function x - Result	(4-Byte) Signed
	1 Byte	O	**C R - T -**	DPT_Scaling	0% - 100%	[LF] Function x - Result	(1-Byte) Percentage
	2 Bytes	O	**C R - T -**	DPT_Value_2_Count	-32768 - 32767	[LF] Function x - Result	(2-Byte) Signed
	2 Bytes	O	**C R - T -**	9.xxx	-671088.64 - 670433.28	[LF] Function x - Result	(2-Byte) Float
166	1 Byte	I/O	**C R W T U**	DPT_SceneControl	0-63; 128-191	[AC] Scene	0 - 63 (Execute 1 - 64); 128 - 129 (Save 1 - 64)
167	1 Bit	I	**C - W - -**	DPT_Switch	0/1	[DHW] On/Off	0 = Off; 1 = On
168	1 Bit	O	**C R - T -**	DPT_Switch	0/1	[DHW] On/Off (Status)	0 = Off; 1 = On
169	1 Bit	O	**C R - T -**	DPT_Bool	0/1	[DHW] Operating (Status)	0 = Not Operating; 1 = Operating
170	2 Bytes	I	**C - W - -**	DPT_Value_Temp	-273.00º - 670433.28º	[DHW] Temperature Setpoint	[30 ... 60] ºC
171	2 Bytes	O	**C R - T -**	DPT_Value_Temp	-273.00º - 670433.28º	[DHW] Temperature Setpoint (Status)	[30 ... 60] ºC
172	2 Bytes	I	**C - W - -**	DPT_Value_Temp	-273.00º - 670433.28º	[DHW] Temperature Setpoint: Lower Limit	[30 ... 60] ºC
173	2 Bytes	O	**C R - T -**	DPT_Value_Temp	-273.00º - 670433.28º	[DHW] Temperature Setpoint: Lower Limit (Status)	[30 ... 60] ºC
174	2 Bytes	I	**C - W - -**	DPT_Value_Temp	-273.00º - 670433.28º	[DHW] Temperature Setpoint: Upper Limit	[30 ... 60] ºC
175	2 Bytes	O	**C R - T -**	DPT_Value_Temp	-273.00º - 670433.28º	[DHW] Temperature Setpoint: Upper Limit (Status)	[30 ... 60] ºC
176	1 Bit	I	**C - W - -**	DPT_Switch	0/1	[DHW] Booster Mode	0 = Off; 1 = On
177	1 Bit	O	**C R - T -**	DPT_Switch	0/1	[DHW] Booster Mode (Status)	0 = Off; 1 = On
178	1 Bit	I	**C - W - -**	DPT_Switch	0/1	[DHW] Automatic Off	0 = Deactivate; 1 = Activate
	1 Bit	I	**C - W - -**	DPT_Switch	0/1	[DHW] Automatic Off	0 = Activate; 1 = Deactivate
179	1 Bit	O	**C R - T -**	DPT_Switch	0/1	[DHW] Automatic Off (Status)	0 = Deactivated; 1 = Activated

	1 Bit	O	C R - T -	DPT_Switch	0/1	[DHW] Automatic Off (Status)	0 = Activated; 1 = Deactivated
180	2 Bytes	I	C - W - -	DPT_TimePeriodSec	0 - 65535	[DHW] Automatic Off: Delay	[0...3600] s (0 = Disabled)
181	1 Bit	I	C - W - -	DPT_Switch	0/1	[Climate] On/Off	0 = Off; 1 = On
182	1 Bit	O	C R - T -	DPT_Switch	0/1	[Climate] On/Off (Status)	0 = Off; 1 = On
183	1 Bit	O	C R - T -	DPT_Bool	0/1	[Climate] Operating (Status)	0 = Not Operating; 1 = Operating
184	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Climate] Temperature Setpoint	[5 ... 65] ºC
185	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Climate] Temperature Setpoint (Status)	[5 ... 65] ºC
186	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Climate] Temperature Setpoint: Lower Limit	[5 ... 65] ºC
187	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Climate] Temperature Setpoint: Lower Limit (Status)	[5 ... 65] ºC
188	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Climate] Temperature Setpoint: Upper Limit	[5 ... 65] ºC
189	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Climate] Temperature Setpoint: Upper Limit (Status)	[5 ... 65] ºC
190	1 Bit	I	C - W - -	DPT_Heat_Cool	0/1	[Climate] Mode	0 = Cooling; 1 = Heating
191	1 Bit	O	C R - T -	DPT_Heat_Cool	0/1	[Climate] Mode (Status)	0 = Cooling; 1 = Heating
192	1 Bit	I	C - W - -	DPT_Switch	0/1	[Climate] Automatic Off	0 = Deactivate; 1 = Activate
	1 Bit	I	C - W - -	DPT_Switch	0/1	[Climate] Automatic Off	0 = Activate; 1 = Deactivate
193	1 Bit	O	C R - T -	DPT_Switch	0/1	[Climate] Automatic Off (Status)	0 = Deactivated; 1 = Activated
	1 Bit	O	C R - T -	DPT_Switch	0/1	[Climate] Automatic Off (Status)	0 = Activated; 1 = Deactivated
194	2 Bytes	I	C - W - -	DPT_TimePeriodSec	0 - 65535	[Climate] Automatic Off: Delay	[0...3600] s (0 = Disabled)
195	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Temperature Setpoint	[12 ... 35] ºC
196	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Temperature Setpoint: Lower Limit	[12 ... 35] ºC
197	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Temperature Setpoint: Lower Limit (Status)	[12 ... 35] ºC
198	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Temperature Setpoint: Upper Limit	[12 ... 35] ºC
199	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Temperature Setpoint: Upper Limit (Status)	[12 ... 35] ºC
200	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Indoor Temperature	[-5 ... 50] ºC
201	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Room] Indoor Temperature (Status)	[-5 ... 50] ºC
202	4 Bytes	I/O	C R W T -	DPT_LongDeltaTimeSec	-2147483648 - 2147483647	[AC] Operating Time (s)	Operation Time in Seconds
203	2 Bytes	I/O	C R W T -	DPT_TimePeriodHrs	0 - 65535	[AC] Operating Time (h)	Operation Time in Hours
204	1 Bit	O	C R - T -	DPT_Bool	0/1	[AC] Internal Error: Communication	Unable to Set AC Communication
205	1 Bit	O	C R - T -	DPT_Alarm	0/1	[AC] AC Unit Error: Active Error	AC Unit Error
206	1 Bit	O	C R - T -	DPT_Alarm	0/1	[AC] AC Unit Malfunction	AC Unit Malfunction
207	14 Bytes	O	C R - T -	DPT_String_ASCII		[AC] AC Unit Error: Error Code	See AC Unit Manual

208	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Temperature] DHW Tank	Current DHW Tank Temperature
209	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Temperature] Outdoor	Current Outdoor Temperature
210	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Temperature] Leaving Water	Current Leaving Water Temperature
211	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Temperature] Leaving Water (PHE)	Current Leaving Water (Plate Heat Exchanger) Temperature
212	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Temperature] Inlet Water	Current Inlet Water Temperature
213	2 Bytes	O	C R - T -	DPT_Value_Temp	-273.00º - 670433.28º	[Temperature] Refrigerant	Current Refrigerant Temperature
214	1 Bit	O	C R - T -	DPT_Switch	0/1	[Actuator] Pump	Status of Pump
215	1 Bit	O	C R - T -	DPT_Switch	0/1	[Actuator] Compressor	Status of Compressor
216	1 Bit	O	C R - T -	DPT_Switch	0/1	[Actuator] BUH: Step 1	Status of Back Up Heater: Step 1
217	1 Bit	O	C R - T -	DPT_Switch	0/1	[Actuator] BUH: Step 2	Status of Back Up Heater: Setp 2
218	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Consumption - Total	Electrical Energy Consumption to Date
219	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Consumption - Climate: Cooling	Electrical Energy Consumption to Date
220	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Consumption - Climate: Heating	Electrical Energy Consumption to Date
221	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Consumption - DHW	Electrical Energy Consumption to Date
222	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Production - Total	Energy Production to Date
223	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Production - Climate: Cooling	Energy Production to Date
224	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Production - Climate: Heating	Energy Production to Date
225	4 Bytes	O	C R - T -	DPT_ActiveEnergy_kWh	-2147483648 - 2147483647	[Energy] Production - DHW	Energy Production to Date
226	2 Bytes	O	C R - T -	DPT_Value_Volume_Flow	-670760 - 670760	Flow Rate	Current Water Flow Rate

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