



KLIC-TS

KNX – AB Gateway for Toshiba AC Units

ZCL-TS

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

www.zennio.com

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DOCUMENT UPDATES

Version	Changes	Page(s)
[2.1]_a	Changes in the application program: <ul style="list-style-type: none">• Internal optimisation.	-
[2.0]_a	Changes in the application program: <ul style="list-style-type: none">• Internal optimisation.• Optimisation of logic functions module.	-
[1.1]_a	Changes in the application program: <ul style="list-style-type: none">• Optimisation of modules: binary inputs, motion detector, temperature probe and logic functions.	-

1 INTRODUCTION

1.1 KLIC-TS

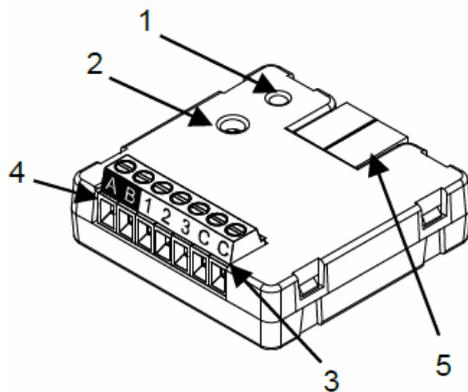
KLIC-TS from Zennio is a gateway that provides full-duplex communication between the KNX home automation system and **Toshiba air-conditioning** systems through connection wires provided by the latter.

Because of this **bidirectional** communication, the air conditioning 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.

The most outstanding features of KLIC-TS are:

- **Bidirectional control** of Toshiba A/C units through the connection wires **AB** provided by Toshiba (15 VDC).
- Control of the **main functions** of the A/C unit: On/Off, temperature, mode of operation, fan speed, position of the flaps, etc.
- **Error management** to handle specific error codes from the A/C unit itself as well as any communication issues that may arise.
- Up to **five scenes**.
- **Three analogue-digital inputs**, for the connection of temperature probes, motion detectors or binary pushbuttons or switches.
- 10 customisable, multi-operation **logic functions**.
- **Heartbeat** or periodical “still-alive” notification.

1.2 INSTALLATION



1. Prog./Test LED indicator
2. Prog./Test button
3. Analogue/digital inputs
4. Terminal connection RWB.
5. KNX connector

Figure 1. Element scheme.

KLIC-TS 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-TS 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 (3):** input ports for the stripped cables of external elements such as switches, motion detectors, temperature probes, etc.
- **Terminal connection, AB (4):** wires that will connect KLIC-TS to the A/C unit. The other end of the cable, therefore, is intended to be connected to the corresponding connectors in the PCB board of the internal unit.

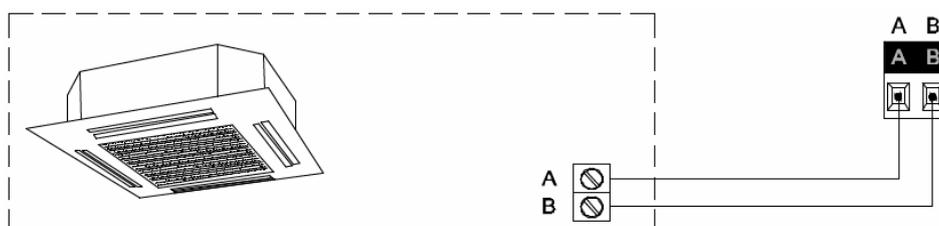


Figure 2. Connecting KLIC-TS to the A/C unit.

Important: *if intending to control the A/C unit both through its incorporated wired remote control and through KLIC-TS, it must be taken into account that orders sent from the wired control will have a higher priority than those sent through KLIC-TS. In addition, certain parameterisations made in the device can be ignored.*

For detailed information about the technical features of KLIC-TS, as well as on security and installation procedures, please refer to the device **Datasheet**, bundled in the device packaging 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.

2 CONFIGURATION

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.**
- **Logic functions.**
- **A/C gateway.**

The latter entails all functions specific to KLIC-TS, i.e., all the functions related to interfacing with the A/C unit and to the management of the climate control system.

ETS PARAMETERISATION

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.

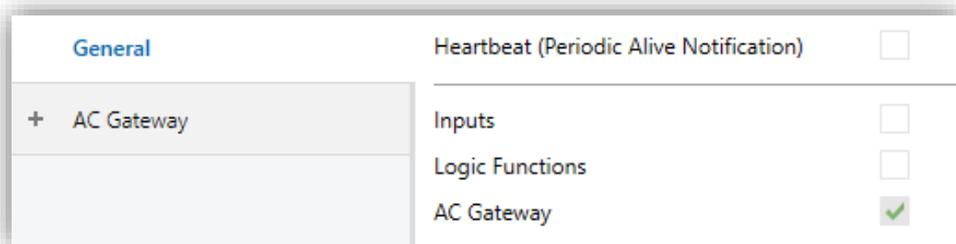


Figure 3. General

- **Heartbeat (Periodic Alive Notification)** [*disabled/enabled*]¹: 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*).

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

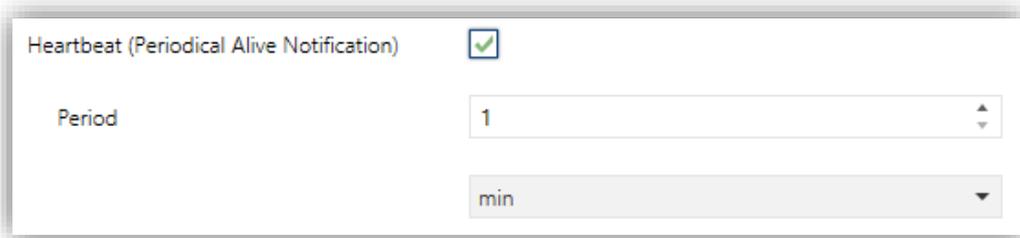


Figure 4 Heartbeat.

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.

- **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 0.
- **Logic Functions** [*disabled/enabled*]: enables or disables the “Logic Functions” tab in the tree on the left. For more information, see section 2.3.
- **A/C Gateway** [*enabled*]: enables the “A/C Gateway” tab in the tree on the left. For more information, see section 2.4.

Regardless of the above parameters, the following objects are available by default:

- **“[AC] On/Off”** and **“[AC] On/Off (Status)”**: switches on (value “1”) and off (value “0”) the A/C unit or reading the current status, respectively.
- **“[AC] Temperature Setpoint”** and **“[AC] Temperature Setpoint (Status)”**: sets the desired temperature setpoint or reading the current value, respectively. See section 2.4.1 for further options.
- **“[AC] Reference Temperature (Status)”**: receives values of temperature that the A/C unit are taken in account in order to execute the control of temperature. See section 2.4.1 for further options.
- **“[AC] Mode”** and **“[AC] Mode (Status)”**: sets the desired operation mode (either Automatic, Heating, Cooling, Fan or Dry) or reading the current mode, respectively. See section 2.4.1 for further options.
- **“[AC] Speed: Percentage Control”** and **“[AC] Speed: Percentage Control (Status)”**: establishes desired fan speed. See section 2.4.1 for further options.

- Several **error objects**. See section 2.4.4.
- “[AC] Operating Time”: reads operating hours of the A/C unit. See section 2.4.1 for further options.

2.2 INPUTS

KLIC-TS incorporates **three 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 from Zennio.
- **Motion Detector**, for the connection of a motion detector from Zennio.

2.2.1 BINARY INPUT

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

2.2.2 TEMPERATURE PROBE

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

2.2.3 MOTION DETECTOR

It is possible to connect motion detectors from Zennio to the input ports of KLIC-TS.

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

2.3 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-TS 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, parameterisable 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-TS product section at the Zennio homepage, www.zennio.com) for detailed information about the functionality and the configuration of the related parameters.

2.4 A/C GATEWAY

2.4.1 CONFIGURATION

KLIC-TS enables the control and monitoring an air-conditioning unit in the same way it would be through the wired remote control it is provided with.

Through the KNX bus, KLIC-TS can be sent orders to control the following basic functions of the air conditioning unit:

- **On/Off** switch of the air-conditioning unit.
- **Operation mode**: automatic, heating, cooling, fan and dry.
- **Temperature setpoint**, which can be modified within a specific range of values, depending on the capabilities of the specific A/C unit being controlled.
- **Fan speed**: three fan speeds.
- **Control of flaps (or vanes) positioning**: direct positioning, swing movement and standby function, depending on the A/C unit.

Moreover, KLIC-TS enables several advanced functions to be configured:

- **Setpoint limits**: to restrict the range for the temperature setpoint.
- **External reference temperature**: which enables an object to use an external reference temperature, provided by a temperature probe.
- **Filter**: which enables to know the filter status of the A/C Unit.
- **Operating time**: provides the A/C unit operating time in hours and/or seconds.
- **Automatic off**, which enables an automatic and temporary switch-off of the unit (after a pre-established delay, if desired) when the communication object associated to this function is triggered due to a certain event.
- **Initial configuration**: which sets the desired initial parameters for the state of the A/C unit after programming or restarting the device.
- **Scenes**, which defines specific climate control sendings, to be sent to the machine on the reception of scene orders from the KNX bus.

These functionalities imply changes in the state of the A/C unit, which therefore notifies KLIC-TS periodically about the current state. When KLIC-TS is notified about a change, it updates the **status objects** and sends them to the KNX bus. In addition, KLIC-TS provides an **error management** function (see section 2.4.4), which sends messages to the KNX bus in case the A/C unit reports any errors.

ETS PARAMETRIZATION

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

Section	Parameter	Value / Option
OPERATION MODES	Simplified Mode (Only Cooling/Heating)	<input type="checkbox"/>
	FLAPS	<input type="checkbox"/>
FAN	Individual Object for Automatic Fan	<input type="checkbox"/>
	TEMPERATURE SETPOINT	<input type="checkbox"/>
REFERENCE TEMPERATURE	External Reference Temperature Object	<input type="checkbox"/>
	FILTER	<input type="checkbox"/>
OPERATING TIME	Seconds	<input type="checkbox"/>
	Hours	<input checked="" type="checkbox"/>
	Initial Operation Time	<input checked="" type="radio"/> Keep Current Value <input type="radio"/> Set Value
	Periodic Sending (0 = Disabled)	60 min
AUTOMATIC OFF	Automatic Off	<input type="checkbox"/>
INITIAL CONFIGURATION	Initial Configuration	<input checked="" type="radio"/> Default <input type="radio"/> Custom
SCENES	Scenes	<input type="checkbox"/>

Figure 5. A/C Gateway Configuration

OPERATION MODES

KLIC-TS enables to control the A/C unit operating mode through the following objects, available by default:

- “[AC] Mode”: 1-Byte object to select the A/C unit operation mode. There will be only taken in account values that are appropriated with some of available modes in Toshiba units, which are represented in Table 1
- “[AA] Mode (status)”: 1-Byte object to check the A/C unit operating mode status.

Object Value	A/C unit mode
0	Auto
1	Heating
3	Cooling
9	Fan only
14	Dry

Table 1. A/C unit operating modes.

Additionally, a simplified mode can be configured to select Cooling and Heating mode.

- **Simplified Mode (Only Cooling/Heating)** [*disabled/enabled*]: in addition to the “[AC] Mode” and “[AC] Mode (Status)” 1-Byte objects, available by default, it is possible to commute and to verify the current operation mode through the following 1-Bit objects, which get enabled after activating this parameter:
 - “**Simplified Mode**”, which switches to Cooling mode when a "0" is received and to the Heating mode when a "1" is received.
 - “**Simplified Mode (Status)**”, which will send a value of “0” when the mode switches to Cooling or to Dry, or a value of “1” when it switches to Heating. Fan and Automatic mode are not reflected in the value of this object.

FLAPS

Figure 6. A/C Gateway. Configuration. Flaps

- **Flaps** [*disabled/enabled*]: determines the percentage control type which will be applied in flaps. Flaps position can be controlled through the 1-Byte object “[AC] Flaps: Percentage Control” and its **related** status object, “[AC] Flaps: Percentage Control (Status)”. The total number of positions is five:

Control Values	Status Value	Position Sent to the Unit
1-20%	20%	Position 1
21-40%	40%	Position 2
41-60%	60%	Position 3
61-80%	80%	Position 4
81-100%	100%	Position 5

Table 2. Flap position (five positions).

In addition, KLIC-TS enables the activation **swing function** (so the flaps oscillate continuously for better distribution of the airflow). The value “0%” of the “[AC] Flaps: Percentage Control” and “[AC] Flaps: Percentage Control (Status)” objects, will be reserved for triggering such function and reporting whether it is currently active, respectively.

- **Individual Object for Swing** [*disabled/enabled*]: 1-Bit objects “[AA] Flaps: Swing” and “[AA] Flaps: Swing (Status)” activate swing function and informs the currently state, respectively.

The parameter **Swing object polarity** [*0 = Swing On; 1 = Swing Off / 0 = Swing Off; 1 = Swing On*] is available to set the polarity of the enabled objects.

Besides, KLIC-TS enables the activation **standby function** in case of being available in the unit:

- **Standby Object** [*disabled/enabled*]: sets whether the A/C unit incorporates the **standby function**. If enabled, the objects "[AC] Flaps: Standby" and "[AC] Flaps: Standby (Status)" will be used for triggering such function and reporting whether it is currently active, respectively. When this function is deactivated, flaps will go to position 5 in heating mode, and to position 1 in the rest of the modes. Moreover, the **polarity** of this parameter [*0 = Standby Off; 1 = Standby On / 0 = Standby On; 1 = Standby Off*] can be selected.

FAN

The Fan Speeds function sends the A/C unit orders to switch the ventilation speed along the available levels. To that end, KLIC-TS provides a **percentage** control.

The number of Fan Speeds of KLIC-TS will be always **three levels**. This determines the values of the "[AC] Fan: Percentage Control" and "[AC] Fan: Percentage Control (Status)" 1-Byte objects, which set and read the fan speed, respectively. The following table show the percentage values that correspond to each of the available fan speeds:

Control Values	Status Value	Level Sent to the Unit
1-33%	33%	1 (minimum)
34-66%	66%	2
67-100%	100%	3 (maximum)

Table 3. Fan speed (three levels).

In addition, KLIC-TS can activate the **automatic fan speed mode**, in case fan mode is not active. The value 0% of the "[AC] Fan: Percentage Control" and "[AC] Fan: Percentage Control (Status)" objects, will be reserved for triggering such function and reporting whether it is currently active, respectively.

- **Individual Object for Automatic Speed** [*disabled/enabled*]: 1-Bit objects "[AA] Speed: Automatic" and "[AA] Speed: Automatic (Status)" activate automatic speed and informs the currently state, respectively. Moreover, the polarity of this parameter can be selected:
 - **Automatic Speed Object Polarity** [*0 = Automatic On; 1 = Automatic Off / 0 = Automatic Off; 1 = Automatic On*]: sets the polarity of the above objects.

TEMPERATURE SETPOINT

TEMPERATURE SETPOINT	
Setpoint Limits	<input checked="" type="checkbox"/>
Minimum (Cooling/Auto/Dry Mode)	18 °C
Maximum (Heating/Auto Mode)	30 °C

Figure 7. A/C Gateway. Configuration. Temperature setpoint.

The following objects to control and supervise setpoint temperature will be available by default:

- “[AC] Temperature Setpoint”[●]: 2-Byte object that selects decimal temperature values that belong to the range [10°C - 32°C].
- “[AC] Temperature Setpoint (Status)”[●]: 2-Byte object that provides the Temperature setpoint status.

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

Status object will be updated to the last setpoint temperature value received by the A/C unit after a complete communication cycle and will be sent to KNX bus every time that its value changes.

Setpoint limits can be configured by parameter:

- **Setpoint Limits** [*disabled/enabled*]: restricts the range of the temperature setpoint (from below in the Cooling, Dry and Auto modes and from above in the Heating and Auto modes), provided that the limits are still within the predefined limits of the A/C unit. When KLIC-TS receives an order to send the A/C unit a setpoint, which is greater (or lower) than the configured limits, it will actually send the limit value.
 - **Minimum (Cooling / Auto / Dry Mode)** [10...18...32] [°C]: sets the upper limit.
 - **Maximum (Heating / Auto Mode)** [10...30...32] [°C]: sets the lower 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.

- “[AC] Temperature Setpoint: Lower Limit”: 2-Byte object to change the lower limit at run time.
- “[AC] Temperature Setpoint: Lower Limit (Status)”: 2-Byte object with the lower limit current value.
- “[AC] Temperature Setpoint: Upper Limit”: 2-Byte object to change the upper limit at run time.
- “[AC] 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 Auto mode due to the incongruity. 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.*

REFERENCE TEMPERATURE

It is available by default the object “[AC] Reference Temperature (Status)”, which informs the temperature that the A/C Unit use as reference to do the temperature control. In addition, is possible to configure the next option:

- **External Reference Temperature Object** [*disabled/enabled*]: enables a 2-Byte object “[AC] External Reference Temperature” which will receive the temperature values provided by an external temperature probe and these values will be employed by the A/C unit to control the temperature (instead of employing its internal values).

If during 3 minutes, no temperature values are received, values of the internal probe will be recuperated again to execute temperature control, in the same way as it will be controlled if KLIC-TS was configured disabling this option. If a new external temperature value is received, the control will be again executed by using this external value. The values that can be received in this

object are include in [0-70] °C (if different values are received, they will be ignored).

FILTER

- **Filter Objects** [*disabled/enabled*]: enables 1-Bit objects “[AC] Filter (Status)” and “[AC] Filter: Reset”. “[AC] Filter (Status)” will send to the bus KNX the value “1” to indicate that the filter needs to be cleaned. Once the filter is cleaned, the alarm has to be reset through the object “[AC] Filter: Reset” sending the value “0” or “1”.

OPERATING 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:**
 - [*Keep current value*]: option enabled by default, which keep the previous value.
 - [*Set value*]: establishes an initial operating time value.
- **Periodic Sending** [*0...60...1440*][min] / [*0...1...24*][h]: resending period of operating time.

When operating time object reaches its maximum value, it will be send 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.

AUTOMATIC OFF

Figure 8. A/C Gateway. Configuration. Automatic off.

- **Automatic Off** [[disabled/enabled](#)]: enables the binary objects “[AC] Automatic Off” and “[AC] Automatic Off (Status)”, which lets performing a temporary switch-off of the A/C unit by sending it a value of “1” and a later switch-on by sending it a value of “0”. This object will be typically linked to a window sensor or a similar event trigger. Automatic off will be also active if the unit 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-TS will still monitor any control orders being received (setpoint, fan speed, etc.), 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-TS waits before switching the AC machine off. Any switch-off order received during the delay will abort the time count. This delay can be modified at runtime through the object “[AC] Automatic Off Delay”. The sending of the value “0” disables the automatic off functionality.

Note: *switch-on orders sent to the A/C unit from a wireless control, have a higher priority than the Auto Off mode.*

INITIAL CONFIGURATION

- **Initial Configuration:** sets the desired initial state that KLIC-TS will send the A/C unit after programming or restarting the device:
 - [[Default](#)]: the initial state will be the last one KLIC-TS is aware of.

- [*Custom*]: see section 2.4.2.

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 A/C unit upon the reception of scene trigger values through the KNX bus. See section 2.4.3.

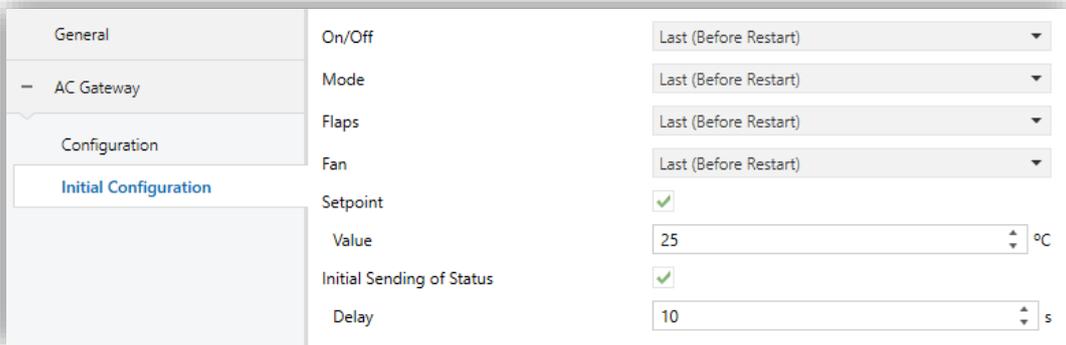
2.4.2 INITIAL CONFIGURATION

The custom initial configuration sets the desired status that KLIC-TS will send the A/C unit after downloading or restarting the device. This status is defined in terms of on/off, mode, fan speed, flaps position and 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** under the “Configuration” tab (see section 2.4.1), a new tab named “Initial Configuration” is displayed with the following parameters:



General	On/Off	Last (Before Restart)
AC Gateway	Mode	Last (Before Restart)
Configuration	Flaps	Last (Before Restart)
Initial Configuration	Fan	Last (Before Restart)
	Setpoint	<input checked="" type="checkbox"/>
	Value	25 °C
	Initial Sending of Status	<input checked="" type="checkbox"/>
	Delay	10 s

Figure 9. A/C Gateway. Initial Configuration.

- **On/Off** [*Last (before restart) / On / Off*].
- **Mode** [*Last (before restart) / Automatic / Heating / Cooling / Fan / Dry*].

Note: if fan mode is selected, setpoint temperature and automatic fan speed cannot be selected.

- **Flaps** [[Not Available](#)]. The following options will only be available if you enable **Flaps** in the “Configuration” AC Gateway tab (see section 2.4.1): [[Last \(before restart\)](#) / [Swing](#) / 1 / 2 / 3 / 4 / 5].
- **Fan** [[Last \(before restart\)](#) / 1 / 2 / 3].
- **Setpoint** [[disabled/enabled](#)]:
 - **Value:**
 - [[Last \(before restart\)](#)]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains “[disabled](#)”.
 - [[10...25...30](#)] [°C].

Note: *this initial setpoint value may be modified by the setpoint limits during runtime.*
- **Initial Sending of Status** [[disabled/enabled](#)]: If enabled, the status objects will be sent to the KNX bus after applying the parametrized **delay** [[0...10...3600](#)][s].

Note: *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 A/C machine.*

2.4.3 SCENES

The Scenes function defines a set of statuses (in terms of On/Off, mode, fan speed, etc.) that KLIC-TS will send to the A/C unit whenever it receives the corresponding scene values from the KNX bus.

ETS PARAMETRISATION

After enabling this function (see section 2.4.1), a new tab named “Scenes” will be incorporated to the tab tree. It can be configured with different scenes (up to 5), consisting each of them in a set of orders to be sent to the A/C unit upon the reception, through the KNX bus and by means of the “[**AC**] **Scene**” object, of the corresponding scene value (decreased by 1, according to the KNX standard).

Scene	Enabled	Scene Number	On/Off	Mode	Flaps	Fan	Setpoint	Value
Scene 1	<input checked="" type="checkbox"/>	1	No Change	No Change	No Change	No Change	<input type="checkbox"/>	No Change
Scene 2	<input type="checkbox"/>							
Scene 3	<input type="checkbox"/>							
Scene 4	<input type="checkbox"/>							
Scene 5	<input type="checkbox"/>							

Figure 10. 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 “[AC] Scene” object (decreased by one), will trigger the corresponding orders, as defined next.
 - **On/Off** [No change / On / Off]. If “No change” is selected, the machine will retain the last state before scene reception.
 - **Mode** [Last (before restart) / Automatic / Heating / Cooling / Fan / Dry].
- Note:** if fan mode is selected, setpoint temperature and automatic fan speed cannot be selected.
- **Flaps** [Not Available]. The following options will only be available if you enable **Flaps** in the “Configuration” AC Gateway tab (see section 2.2.1): [No change / Swing / 1 / 2 / 3 / 4 / 5].
 - **Fan** [No change / 1 / 2 / 3].
 - **Setpoint** [disabled/enabled]:

➤ **Value:**

- [[No change](#)]: the value of the setpoint temperature will be kept. Only available if the **Setpoint** parameter remains “disabled”.
- [[16...25...32](#)] [°C].

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

2.4.4 ERROR HANDLING

KLIC-TS is capable of managing two error types:

- **Internal error:** error in the communication process between KLIC-TS and the A/C unit. So, the LED of the KLIC-TS will shine in green when “**internal error: communication**” is activated, and will turn off when this error disappears.
- **Errors in the A/C unit:** errors reported by the A/C unit itself. KLIC-TS can notify the KNX bus about the reported error code, although referring to the specific documentation of the A/C unit is advisable in order to obtain further information.

ETS PARAMETRISATION

The error handling function does not entail any parameter configuration. The following objects are available by default:

- Internal error object:
 - “[AC] Internal Error: Communication”: 1-Bit object which indicates that, no response of the A/C unit is received when the initial connection is sent several times.

In case the error is detected, the corresponding object will be sent (once) with a value of “1” to the KNX bus. Once the error is over, the object will be sent (once) with a value of “0”.

- Errors in the A/C unit:
 - “[AC] AC Unit Error: Active Error”: 1-Bit object which indicates there is an error in A/C unit.

- “[AC] AC Unit Error: Error Code”: 14-Byte object which provides error code.

In case the A/C unit reports an error, the former object will send a value of “1”, while the latter will report the corresponding error code. Once the error is over, the binary object will send a value of “0”. Please refer to the user manual of the A/C unit for details about the error codes.

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
2, 6, 10	2 Bytes	O	CR-T-	DPT_Value_Temp	-273.00° - 670433.28°	[Ix] Current Temperature	Temperature Sensor Value
3, 7, 11	1 Bit	O	CR-T-	DPT_Alarm	0/1	[Ix] Overcooling	0 = No Alarm; 1 = Alarm
4, 8, 12	1 Bit	O	CR-T-	DPT_Alarm	0/1	[Ix] Overheating	0 = No Alarm; 1 = Alarm
5, 9, 13	1 Bit	O	CR-T-	DPT_Alarm	0/1	[Ix] Probe Error	0 = No Alarm; 1 = Alarm
14, 20, 26	1 Bit	I	C-W--	DPT_Enable	0/1	[Ix] Input Lock	0 = Unlock; 1 = Lock
15, 21, 27	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-WT-	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-WT-	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	CRWT-	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
16, 22, 28	2 Bytes		C--T-	9.xxx	-671088.64 - 670433.28	[Ix] [Short Press] Constant Value (Float)	Float Value
	1 Byte	I	C-W--	DPT_Scaling	0% - 100%	[Ix] [Short Press] Shutter Status (Input)	0% = Top; 100% = Bottom
17, 23, 29	1 Byte	I	C-W--	DPT_Scaling	0% - 100%	[Ix] [Short Press] Dimming Status (Input)	0% - 100%
	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-WT-	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%) ...	[Ix] [Long Press] Brighter	Long Pr. -> Brighter; Release -> Stop

				0x7 (Dec. by 1%) 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] [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-WT-	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	CR-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
18, 24, 30	1 Bit		C--T-	DPT_Trigger	0/1			[Ix] [Long Press/Release] Stop Shutter	Release -> Stop Shutter
19, 25, 31	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
32	1 Byte	I	C-W--	DPT_SceneNumber	0 - 63			[Motion Detector] Scene Input	Scene Value
33	1 Byte		C--T-	DPT_SceneControl	0-63; 128-191			[Motion Detector] Scene Output	Scene Value
34, 63, 92	1 Byte	O	CR-T-	DPT_Scaling	0% - 100%			[Ix] Luminosity	0-100%

35, 64, 93	1 Bit	O	CR-T-	DPT_Alarm	0/1	[Ix] Open Circuit Error	0 = No Error; 1 = Open Circuit Error
36, 65, 94	1 Bit	O	CR-T-	DPT_Alarm	0/1	[Ix] Short Circuit Error	0 = No Error; 1 = Short Circuit Error
37, 66, 95	1 Byte	O	CR-T-	DPT_Scaling	0% - 100%	[Ix] Presence State (Scaling)	0-100%
38, 67, 96	1 Byte	O	CR-T-	DPT_HVACMode	1=Comfort 2=Standby 3=Economy 4=Building Protection	[Ix] Presence State (HVAC)	Auto, Comfort, Standby, Economy, Building Protection
39, 68, 97	1 Bit	O	CR-T-	DPT_Switch	0/1	[Ix] Presence State (Binary)	Binary Value
	1 Bit	O	CR-T-	DPT_Start	0/1	[Ix] Presence: Slave Output	1 = Motion Detected
40, 69, 98	1 Bit	I	C-W--	DPT_Window_Door	0/1	[Ix] Presence Trigger	Binary Value to Trigger the Presence Detection
41, 70, 99	1 Bit	I	C-W--	DPT_Start	0/1	[Ix] Presence: Slave Input	0 = Nothing; 1 = Detection from slave device
42, 71, 100	2 Bytes	I	C-W--	DPT_TimePeriodSec	0 - 65535	[Ix] Presence: Waiting Time	0-65535 s.
43, 72, 101	2 Bytes	I	C-W--	DPT_TimePeriodSec	0 - 65535	[Ix] Presence: Listening Time	1-65535 s.
44, 73, 102	1 Bit	I	C-W--	DPT_Enable	0/1	[Ix] Presence: Enable	According to parameters
45, 74, 103	1 Bit	I	C-W--	DPT_DayNight	0/1	[Ix] Presence: Day/Night	According to parameters
46, 75, 104	1 Bit	O	CR-T-	DPT_Occupancy	0/1	[Ix] Presence: Occupancy State	0 = Not Occupied; 1 = Occupied
47, 76, 105	1 Bit	I	C-W--	DPT_Start	0/1	[Ix] External Motion Detection	0 = Nothing; 1 = Motion detected by an external sensor
48, 53, 58, 77, 82, 87, 106, 111, 116	1 Byte	O	CR-T-	DPT_Scaling	0% - 100%	[Ix] [Cx] Detection State (Scaling)	0-100%
49, 54, 59, 78, 83, 88, 107, 112, 117	1 Byte	O	CR-T-	DPT_HVACMode	1=Comfort 2=Standby 3=Economy 4=Building Protection	[Ix] [Cx] Detection State (HVAC)	Auto, Comfort, Standby, Economy, Building Protection
50, 55, 60, 79, 84, 89, 108, 113, 118	1 Bit	O	CR-T-	DPT_Switch	0/1	[Ix] [Cx] Detection State (Binary)	Binary Value
51, 56, 61, 80, 85, 90, 109, 114, 119	1 Bit	I	C-W--	DPT_Enable	0/1	[Ix] [Cx] Enable Channel	According to parameters
52, 57, 62, 81, 86, 91, 110, 115, 120	1 Bit	I	C-W--	DPT_Switch	0/1	[Ix] [Cx] Force State	0 = No Detection; 1 = Detection
121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152	1 Bit	I	C-W--	DPT_Bool	0/1	[LF] (1-Bit) Data Entry x	Binary Data Entry (0/1)
153, 154, 155, 156, 157, 158, 159, 160, 161, 162,	1 Byte	I	C-W--	DPT_Value_1_Ucount	0 - 255	[LF] (1-Byte) Data Entry x	1-Byte Data Entry (0-255)

163, 164, 165, 166, 167, 168							
169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184	2 Bytes	I	C-W--	DPT_Value_2_Ucount	0 - 65535	[LF] (2-Byte) Data Entry x	2-Byte Data Entry
				DPT_Value_2_Count	-32768 -32767		
				DPT_Value_Tempo	-273.00 - 670433.28		
185, 186, 187, 188, 189, 190, 191, 192	4 Bytes	I	C-W--	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] (4-Byte) Data Entry x	4-Byte Data Entry
193, 194, 195, 196, 197, 198, 199, 200, 201, 202	1 Bit	O	CR-T-	DPT_Bool	0/1	[LF] Function x - Result	(1-Bit) Boolean
	1 Byte	O	CR-T-	DPT_Value_1_Ucount	0 - 255	[LF] Function x - Result	(1-Byte) Unsigned
	2 Bytes	O	CR-T-	DPT_Value_2_Ucount	0 - 65535	[LF] Function x - Result	(2-Byte) Unsigned
	4 Bytes	O	CR-T-	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] Function x - Result	(4-Byte) Signed
	1 Byte	O	CR-T-	DPT_Scaling	0% - 100%	[LF] Function x - Result	(1-Byte) Percentage
	2 Bytes	O	CR-T-	DPT_Value_2_Count	-32768 - 32767	[LF] Function x - Result	(2-Byte) Signed
	2 Bytes	O	CR-T-	9.xxx	-671088.64 - 670433.28	[LF] Function x - Result	(2-Byte) Float
203	1 Byte	I/O	CRWTU	DPT_SceneControl	0-63; 128-191	[AC] Scene	0 - 63 (Run 1 - 64); 128 - 191 (Save 1 - 64)
204	1 Byte	I	C-W--	DPT_HVACContrMode	0=Auto 1=Heat 3=Cool 9=Fan 14=Dry	[AC] Mode	0 = Automatic; 1 = Heating; 3 = Cooling; 9 = Fan; 14 = Dry
205	1 Byte	O	CR-T-	DPT_HVACContrMode	0=Auto 1=Heat 3=Cool 9=Fan 14=Dry	[AC] Mode (Status)	0 = Automatic; 1 = Heating; 3 = Cooling; 9 = Fan; 14 = Dry
206	1 Bit	I	C-W--	DPT_Heat_Cool	0/1	[AC] Simplified Mode	0 = Cooling; 1 = Heating
207	1 Bit	O	CR-T-	DPT_Heat_Cool	0/1	[AC] Simplified Mode (Status)	0 = Cooling; 1 = Heating
208	1 Bit	I	C-W--	DPT_Switch	0/1	[AC] On/Off	0 = Off; 1 = On
209	1 Bit	O	CR-T-	DPT_Switch	0/1	[AC] On/Off (Status)	0 = Off; 1 = On
210	1 Bit	O	CR-T-	DPT_Bool	0/1	[AC] Internal Error: Communication	Unable to Set AC Communication
212	1 Bit	O	CR-T-	DPT_Alarm	0/1	[AC] AC Unit Error: Active Error	AC Unit Error
213	14 Bytes	O	CR-T-	DPT_String_ASCII		[AC] AC Unit Error: Error Code	See AC Unit Manual
214	1 Byte	I	C-W--	DPT_Scaling	0% - 100%	[AC] Fan: Percentage Control	0% = Automatic; [0.4...33.3]% = S1; [33.8...66.6]% = S2; [67.1...100]% = S3
215	1 Byte	O	CR-T-	DPT_Scaling	0% - 100%	[AC] Fan: Percentage Control (Status)	Automatic = 0%; S1 = 33.3%; S2 = 66.7%; S3 = 100%

216	1 Bit	I	C - W - -	DPT_Enable	0/1	[AC] Fan: Automatic	0 = Automatic Off; 1 = Automatic On
	1 Bit	I	C - W - -	DPT_Enable	0/1	[AC] Fan: Automatic	0 = Automatic On; 1 = Automatic Off
217	1 Bit	O	CR - T -	DPT_Enable	0/1	[AC] Fan: Automatic (Status)	0 = Automatic Off; 1 = Automatic On
	1 Bit	O	CR - T -	DPT_Enable	0/1	[AC] Fan: Automatic (Status)	0 = Automatic On; 1 = Automatic Off
218	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[AC] Flaps: Percentage Control	0% = Swing; [0.4...20]% = P1; [20.4...40]% = P2; [40.4...60]% = P3; [60.4...80]% = P4; [80.4...100]% = P5
219	1 Byte	O	CR - T -	DPT_Scaling	0% - 100%	[AC] Flaps: Percentage Control (Status)	Swing= 0%; P1 = 20%; P2 = 40%; P3 = 60%; P4 = 80%; P5 = 100%
220	1 Bit	I	C - W - -	DPT_Switch	0/1	[AC] Flaps: Swing	0 = Swing Off; 1 = Swing On
	1 Bit	I	C - W - -	DPT_Switch	0/1	[AC] Flaps: Swing	0 = Swing On; 1 = Swing Off
221	1 Bit	O	CR - T -	DPT_Switch	0/1	[AC] Flaps: Swing (Status)	0 = Swing Off; 1 = Swing On
	1 Bit	O	CR - T -	DPT_Switch	0/1	[AC] Flaps: Swing (Status)	0 = Swing On; 1 = Swing Off
222	1 Bit	I	C - W - -	DPT_Switch	0/1	[AC] Flaps: Standby	0 = Standby Off; 1 = Standby On
	1 Bit	I	C - W - -	DPT_Switch	0/1	[AC] Flaps: Standby	0 = Standby On; 1 = Standby Off (Pos. 1)
223	1 Bit	O	CR - T -	DPT_Switch	0/1	[AC] Flaps: Standby (Status)	0 = Standby Off; 1 = Standby On
	1 Bit	O	CR - T -	DPT_Switch	0/1	[AC] Flaps: Standby (Status)	0 = Standby On; 1 = Standby Off
224	1 Bit	O	CR - T -	DPT_Boo	0/1	[AC] Filter (Status)	0 = No Alarm; 1 = Alarm
225	1 Bit	I	C - W - -	DPT_Trigger	0/1	[AC] Filter: Reset	Reset Filter Status
226	1 Bit	I	C - W - -	DPT_Switch	0/1	[AC] Automatic Off	0 = Deactivate; 1 = Activate
	1 Bit	I	C - W - -	DPT_Switch	0/1	[AC] Automatic Off	0 = Activate; 1 = Deactivate
227	1 Bit	O	CR - T -	DPT_Switch	0/1	[AC] Automatic Off (Status)	0 = Deactivated; 1 = Activated
	1 Bit	O	CR - T -	DPT_Switch	0/1	[AC] Automatic Off (Status)	0 = Activated; 1 = Deactivated
228	2 Bytes	I	C - W - -	DPT_TimePeriodSec	0 - 65535	[AC] Automatic Off Delay	[0...3600]s (0 = Disabled)
229	2 Bytes	O	CR - T -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Reference Temperature (Status)	Effective Control Temperature (°C)
230	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] External Reference Temperature	[0...70]°C
231	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Temperature Setpoint	[10...32]°C
232	2 Bytes	O	CR - T -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Temperature Setpoint (Status)	[10...32]°C
233	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Temperature Setpoint: Lower Limit	[10...32]°C
234	2 Bytes	O	CR - T -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Temperature Setpoint: Lower Limit (Status)	[10...32]°C
235	2 Bytes	I	C - W - -	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Temperature Setpoint: Upper Limit	[10...32]°C

236	2 Bytes	O	CR-T-	DPT_Value_Temp	-273.00° - 670433.28°	[AC] Temperature Setpoint: Upper Limit (Status)	[10...32]°C
237	4 Bytes	I/O	CRWT-	DPT_LongDeltaTimeSec	-2147483648 - 2147483647	[AC] Operating Time (s)	Time in Seconds
238	2 Bytes	I/O	CRWT-	DPT_TimePeriodHrs	0 - 65535	[AC] Operating Time (h)	Time in Hours

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