CHORUSMART GEWISS

KNX Thermo ICE Thermostat (surface-mounting)

GW 16976CB
GW 16976CL
GW 16976CN
GW 16976CT

Technical Manual

Contents

1 Introduction

This manual describes the functions of the “**KNX Thermo ICE Thermostat (surface-mounting)**” (GW16976CB - GW16976CN - GW16976CT) device and how they are set and configured with the aid of the ETS configuration software.

2 Application

The KNX THERMO ICE (surface-mounting) manages the temperature of the room where it's installed, and can also manage a humidification/dehumidification system alongside the temperature control system, or intervene on the temperature control system to regulate the Humidity in the air.
The temperature and Humidity are regulated by commanding - via the KNX BUS - the KNX actuators that control the heating or cooling elements (including the fan coils or actuators dedicated to those elements - e.g. GWA9140, GWA9141) or the humidification/dehumidification elements.
The thermostat can work in “stand alone” control mode to autonomously manage the temperature control system (or parts of it), whereas in combination with a master device (e.g. a KNX timed thermostat or the Smart Gateway) it can work in “slave” control mode and create multi-zone temperature control systems. The thermostat can also be used in “hotel” mode, limiting its functions and the modifications that can be made locally by the user by means of a simplified interface.
The setpoint values used by the thermostat are the ones configured via ETS, and they can be modified locally and via the BUS (if these options were enabled during the ETS configuration).
The device supports KNX Data Secure: this technology enhances the security of a KNX installation both during start up and during normal operation, thanks to the exchange of encrypted telegrams.

<u>The thermostat offers:</u>

- 2 functioning types: heating and cooling, with independent control algorithms;
- 4 HVAC operating modes: OFF (frost protection / high temperature protection), Economy, Precomfort and Comfort;
- 4 regulation temperatures for heating (Teconomy, Tprecomfort, Tcomfort, Tantigelo);
- 4 regulation temperatures for cooling (Teconomy, Tprecomfort, Tcomfort, Thigh temperature protection);
- 3 control modes: stand alone, slave (if combined with a master device) or hotel (Slave with a simplified graphic interface);
- 2 control types: HVAC or Setpoint;
- 2 control stages: single stage (with single switching command) or dual stage (with dual switching command, for systems with a high degree of thermal inertia);
- control algorithms for 2-pipe or 4-pipe systems (first stage): 2 points (ON/OFF command or 0%-100%), proportional PI (PWM type control or continuous), fan coil (max. 3 speeds or continuous control 0%-100%);
- control algorithms (second stage): 2 points (ON/OFF command or 0%-100%);
- 1 input that can be configured for an NTC external temperature sensor (e.g: floor heating protection sensor).

The thermostat has a backlit display with white LEDs, with sensitive rear-projected areas on a plate. It requires an external 110-230V AC power supply and has a built-in sensor for measuring the temperature and ambient humidity (the values are sent on the BUS with a parameterised frequency or following a variation) and a proximity sensor to activate the backlighting when the user approaches the device.

<u>The device can be configured with the ETS software to carry out the following functions:</u>

Temperature control
- at 2 points, with ON/OFF commands or 0%-100% commands;
- proportional integral control, with PWM commands or continuous regulation (0%-100%).

Fan coil management
- fan coil speed control, with ON/OFF 3-speed selection commands or continuous regulation (0%-100%).
- management of 2-way or 4-way systems, with ON/OFF commands or continuous regulation (0%-100%).

Operating mode setting

- via the BUS, with distinct 1-bit objects (OFF, ECONOMY, PRECOMFORT, COMFORT);
- via the BUS, with 1-byte objects.

Operating setpoint definition
- via the BUS, with 2-byte objects.

Temperature measurement
- with the built-in sensor;
- with a combination of built-in sensor/external sensor KNX/external sensor NTC , with the definition of the relative weights.

Relative humidity measurement
- with the built-in sensor;
- with a combination of built-in sensor/external sensor KNX , with the definition of the relative weights;
- setting of up to 5 Relative humidity thresholds, with BUS commands sent when the threshold is exceeded and restored:
  - 1 bit, 2 bit, 1 byte commands to act on the humidification/dehumidification system;
  - HVAC mode commands to get feedback from the heating/cooling system;
  - setpoint values to get feedback from the heating/cooling system;
- calculation of the specific humidity;
- Thermal comfort status indicator.

Underfloor probe
- setting of threshold value for floor temperature alarm.

Temperature control for specific zones
In “slave” or “hotel” control mode:
- with the operating mode received by the master device, and the use of a local setpoint ;
- with the setpoint value received by the master device, and the local temperature differential.

In “stand alone” control mode:
- with the local selection of the operating mode and setpoints;
- with the local selection of the operating setpoint.

Scenes
- memorisation and activation of 8 scenes (value 0 - 63)

Other functions
- definition of the setpoint (OFF, ECONOMY, PRECOMFORT, COMFORT) via the BUS;
- definition of the operating setpoint via the BUS;
- setting of the functioning type (heating/cooling) via the BUS;
- transmission of the status information (mode, type), measured temperature and humidity, and current setpoint on the BUS;
- management of the status information arriving from the commanded actuator;
- management of the window status information for temporarily switching off the thermostat;
- AND/NAND/OR/NOR/XOR/XNOR logic operations with up to 8 logic inputs;
- Dewpoint;
- management of the display parameters.

2.1 Association limits

Maximum number of group addresses:	254
Maximum number of associations:	254

This means that up to 254 group addresses can be defined, and up to 254 associations can be made (between communication objects and group addresses).

3 “Information” menu

Like every KNX device, this one requires first of all the programming of the physical or individual address during the initial start-up. This is not done by pressing a push-button and dedicated programming LED, as is the case with most devices, but directly from the menu of the touchscreen display of the ICE thermostat.
This menu shows, in a graphic format, how to access the “PrG” page for activating the programming mode for the KNX physical address.

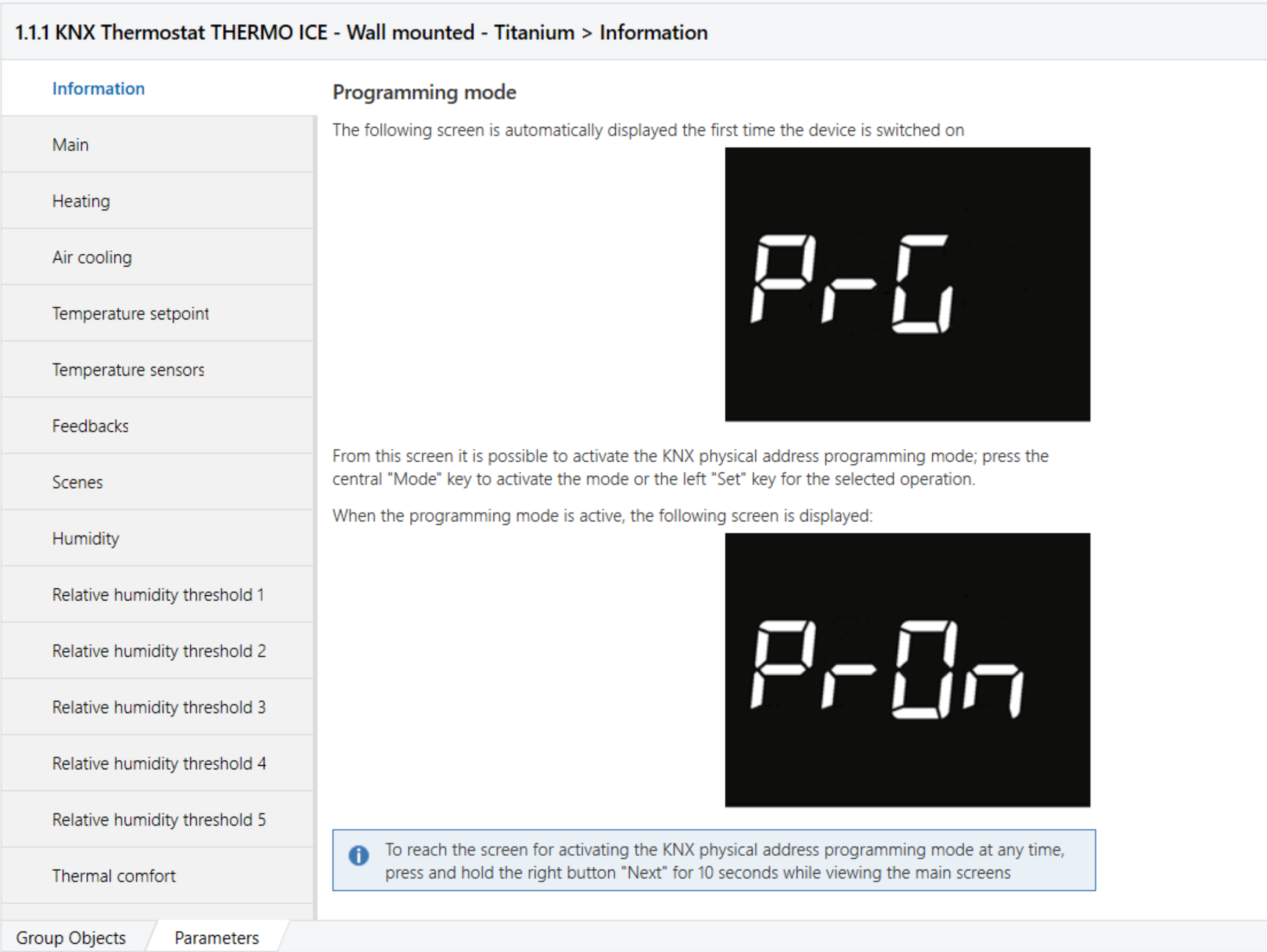


Fig 3.1 – “Information” menu

When the device starts up, the display will automatically show “**PrG**”, indicating that the first thing to do is program the thermostat with the physical address.

To confirm, press the central “Mode” button key and then program the physical address.

Physical address programming mode can be accessed (e.g. if it needs to be changed) by pressing and holding the right-hand button key “Next” for 10 seconds while on any of the main pages (Temperature, Humidity, Time, Fan speed). To quit programming mode, press the green SET push-button.

➢ **For more information about the programming of the physical or individual address of the KNX device, see paragraph 18.2*.***

4 “Main” menu

The ***Main*** menu contains the parameters for enabling the various functions implemented by the device, and for setting the main operating parameters.

Figure 4.1 shows the structure of the menu:

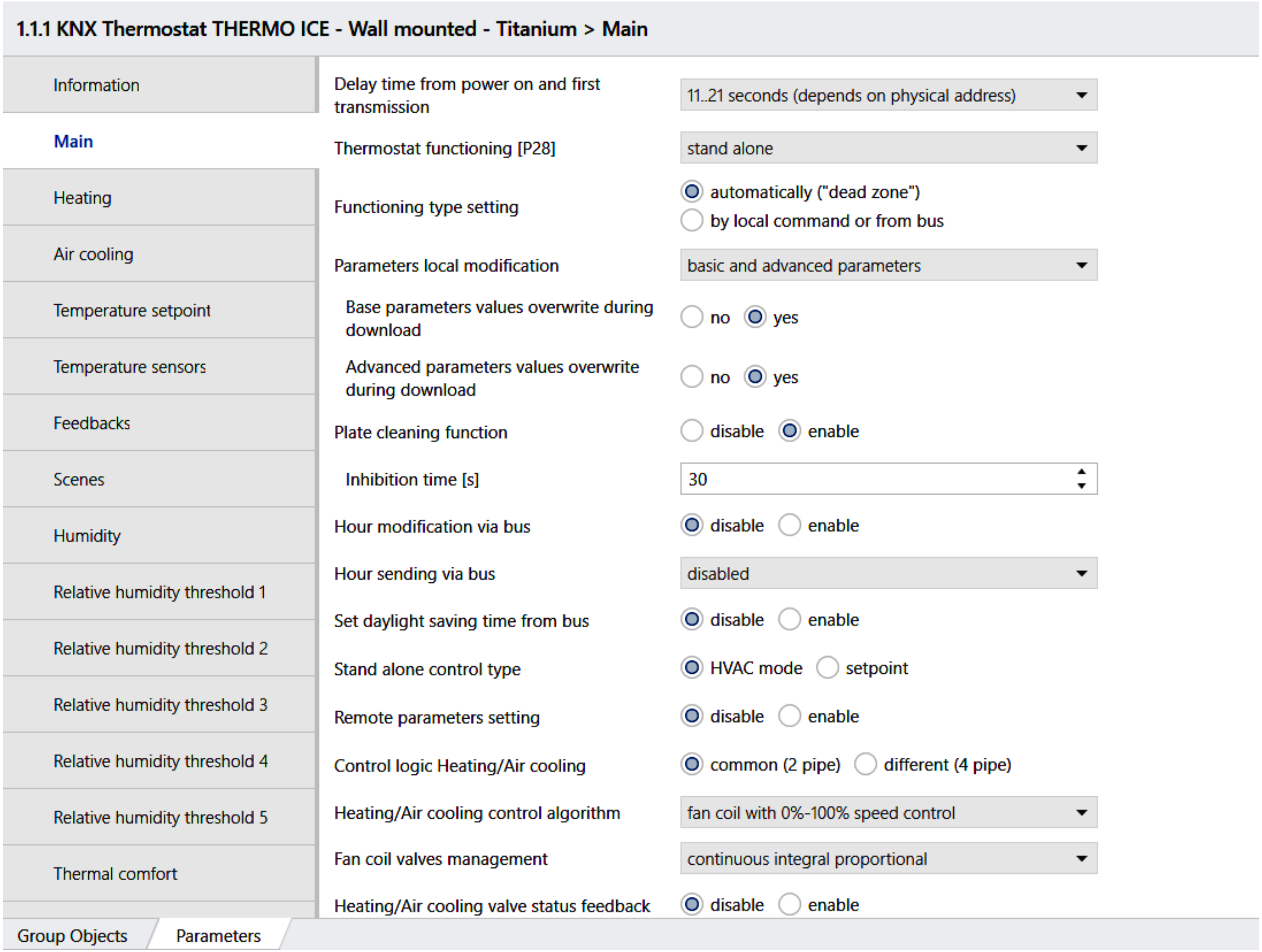


Fig. 4.1 – “Main” menu

4.1 Parameters of the

4.1.1 Delay time from power on and first transmission

To ensure that, with several devices in the line, the telegrams sent by the various devices do not collide when the BUS voltage is reset, you can define a time limit after which the device can transmit the telegrams on the BUS following a BUS voltage failure/reset. The **“4.1.1 Delay time from power on and first transmission”** parameter is used to define this delay.
The values that can be set are:

- **11..21 seconds (depending on physical address)** **(default value)**
- 5..9 seconds (depending on physical address)
- 11 seconds
- 13 seconds
- 15 seconds
- 17 seconds
- 19 seconds
- 21 seconds
- 0 seconds (no delay)

If the values **11..21 seconds (depending on physical address) 5..9 seconds (depending on physical address)** are set, the device automatically calculates the transmission delay on the basis of an algorithm that examines the physical address of the device itself; the values indicated (11/21 or 5/9) indicate the minimum and maximum limits of the value range that can be calculated.

Note that this parameter therefore merely sets a delay for transmitting the telegrams in the first few seconds after the first switch-on. It does not in any way hamper the user's interaction with the graphic interface of the device.

The delay following the reset of the 230V supply rather than just the BUS voltage may be different even if the same value is set, because in the first case the device must actually start up while in the second it might already be active if the 230V supply hasn't failed.

4.1.2 Thermostat functioning

The **"Thermostat functioning [P28]"** parameter defines the function of the thermostat inside the KNX temperature control system. The values that can be set are:

- ***Stand Alone*** ***(default value)***
  The device autonomously manages the temperature control system (or part of it) without the aid of the timed thermostats connected to it, that control parts of the system. With this configuration, there is a single temperature control centre for the room.
  If this value is selected, the **"Stand Alone control type"** and **"Remote parameters setting"** parameters are displayed.

- *slave*
  The device is configured so it can manage the temperature control system with the aid of a "master" device such as a timed thermostat. With this configuration, the device does not control the entire system but only a part of it (a "zone"); there is a "master" device in the system that controls its functioning type and mode In this case, the thermostat controls the temperature of the room where it is located, but it is the "master" device that decides the operation set by the user. The HVAC mode of the device cannot be modified locally.
  If this value is selected, the **"Master/Slave control type"**, **"Temporary setpoint forcing via bus"** and **"Allow local switching off"** parameters are displayed, along with the ***Functioning type input*** (Data Point Type: 1.100 DPT_Heat/Cool) and ***Enabling Slave function*** (Data Point Type: 1.003 DPT_Enable) communication objects.

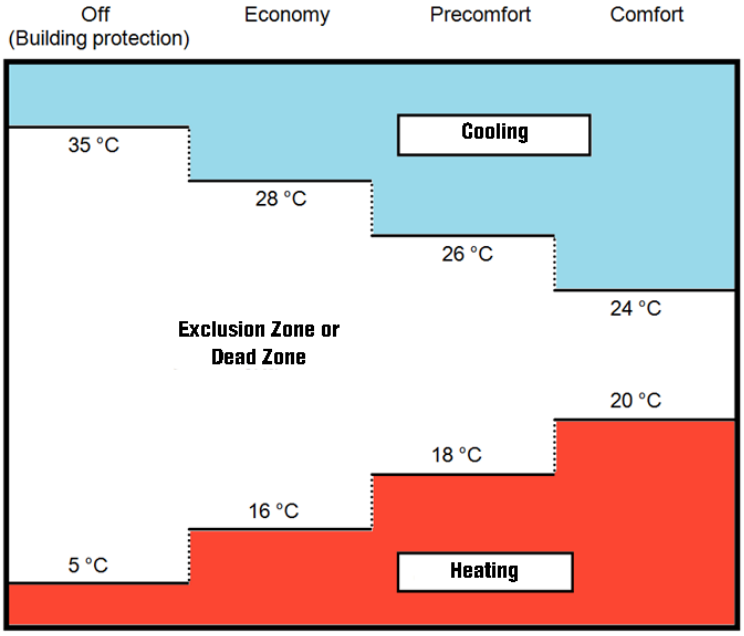
- *hotel (simplified slave mode)*
  The device has the same operating characteristics as in *slave* mode, but with an even simpler graphic interface and thermostat usage limits in keeping with the functioning type in a hotel context. A single, central button key is used to move between the thermostat pages to personalise the temperature setpoint (and also the fan speed setpoint if the control algorithm is of the fan coil type). The thermostat can also be switched off, or returned to automatic control. It is not possible to access the menus to configure the parameters (whether standard or advanced) in this mode. If this value is selected, the same parameters and objects as for functioning type *slave* are made visible.

For the purpose of simplicity, the word "*slave*" will be used in the following paragraphs to refer to both the "*slave"* and "*hotel"* (*slave simplified)* operating modes. In terms of the operating concept, these two modes both overlap with "*stand alone"* mode. *hotel* mode will be explicitly referred to only when it is necessary to indicate the differences - i.e. any specific functions that it alone has.

The L'Communication objects ***Enabling Slave function*** modifies - via a BUS telegram - the operating mode of the thermostat: *stand alone* (value 0) or *slave/slave simplified* (value 1).

4.1.3 Functioning type setting

The device functioning type temperature control (heating/cooling) can be managed either manually or autonomously (by the device itself). The manual method can be managed via the local navigation menu or BUS commands that allow switching between types, changing the dedicated parameter. The automatic method is based on the principle of an interdiction area, or "dead zone", i.e. the temperature gap between the setpoints of the HVAC heating and cooling modes (see figure below), allowing the automatic switching from one functioning type to the other.



The above figure shows that as long as the measured temperature is below the setpoint for Heating, the functioning type is HEATING; in the same way, if the measured value is higher than the setpoint for Cooling, then the functioning type is COOLING. If the measured value is within the interdiction area, the functioning type remains as before. The functioning type HEATING → COOLING switching point corresponds to the setpoint of the cooling HVAC mode. Likewise, the switch COOLING → HEATING is made in conjunction with the heating setpoint. In any case, a functioning type can be forced via the local menu or via a BUS command.

Regardless of the set functioning type (stand alone or slave), the **"Functioning type setting"** parameter can be used to define how the functioning type is modified. The values that can be set are:

- Automatically ("dead zone")
- **By local command or from BUS** **(default value)**

If the operating type is slave, the l'Communication objects ***Enable dead zone*** (Data Point Type: 1.003 DPT_Enable) is visualised in order to enable the dead zone if necessary.

Only if the dead zone is disabled via a BUS command on the Object ***Enable dead zone*** or via the device menu (*Heat/Cool/Auto)* will the active functioning type remain the one set in that moment; it can then be modified via a BUS command on the Object ***Functioning type input*** (Data Point Type: 1.100 DPT_Heat/Cool), via the menu, or via Scenes. In the case of Scenes, refer to the specific paragraph. Scene can also memorise the activation status of the dead zone and therefore re-enable its activation if necessary.

4.1.4 Parameters local modification and Base parameters values overwrite during download

The **“Parameters local modification”** parameter is used to enable or otherwise the modification of the thermostat operating parameters via the relative local menu. The values that can be set are:

- disabled
- **basic parameters only** **(default value)**
- basic and advanced parameters

➢ *Refer to the “User Manual” where you can see the structure of the local navigation menu and the various access levels (basic/advanced) that can be reached using the command push-buttons on the device itself.*

If the value **basic parameters only** is selected, the user can only access the basic SET menu.

If **basic and advanced parameters** is selected, the user can access both the basic SET menu and the advanced one.

The **“Base parameters values overwrite during download”** parameter defines whether or not the value of the parameters that can also be modified from the basic SET menu of the device should be overwritten following a subsequent download of the ETS application software. The values that can be set are:

- no
- **yes** **(default value)**

By setting **no**, the parameter values are saved in a non-volatile memory and reset when the device is relaunched. In this case, the values of the parameters that can be modified from the basic SET menu and received via ETS will be ignored and the ones modified via the device menu will remain valid.

The **“Advanced parameters values overwrite during download”** parameter defines whether or not the value of the parameters that can also be modified from the advanced SET menu of the device should be overwritten following a subsequent download of the ETS application software. The values that can be set are:

- no
- **yes** **(default value)**

By setting **no**, the parameter values are saved in a non-volatile memory and reset when the device is relaunched. In this case, the values of the parameters that can be modified from the advanced SET menu and received via ETS will be ignored and the ones modified via the device menu will remain valid.

4.1.5 Plate cleaning function

The **“Plate cleaning function”** parameter enables the inhibition of the capacitive sensors to allow the technopolymer surface to be cleaned. The values that can be set are:

- disable
- **enable** **(default value)**

If **enable** is selected, the **“Inhibition time [s]”** parameter is displayed, along with the l’Communication objects ***Plate cleaning function*** (Data Point Type: 1.010 DPT_Start).

The **“Inhibition time [s]”** parameter defines the sensor inhibition period. The values that can be set are:

- from 10 to 240 in steps of 1 **(default value 30)**

While the cleaning function is active, all the push-buttons and the circular slider are deactivated, and the Inhibition time [s] countdown is shown on the display.

The exact cleaning function activation and deactivation moments are signalled to the user via a special sound effect (used only with this function) and a special light effect (also used only with this function) on the backlighting of the touch push-buttons and the slider.

There are two ways of activating the Plate cleaning function:

1. *Manual activation*:

Enabling

- Touch the north sector of the circular slider and the MODE button key > 3 seconds simultaneously (regardless of the order)

- You will hear a short beep (if the acoustic signal for the Plate cleaning function is enabled)
- The touch push-buttons will flash simultaneously (if the light signal for the Plate cleaning function is enabled)
- The flashing will stop and the countdown will be shown on the display

Disabling

- Timeout Inhibition time [s]
- You will hear a short beep (if the acoustic signal for the Plate cleaning function is enabled)
- The touch push-buttons will flash simultaneously (if the light signal for the Plate cleaning function is enabled)
- The flashing will stop and the previous feedbacks will again be shown on the display

2. *Activation via BUS commands*:

The l'Communication objects ***Plate cleaning function*** *(1.010 DPT_Start)*can be used to start the timed activation of the cleaning function via a BUS command with the logic value "1". The function is automatically deactivated when the time set in the **"Inhibition time [s]"** parameter has elapsed, or it can be deactivated with a BUS command with the logic value "0". The arrival of a BUS command with the logic value "1" and active timing leads to the resetting of the sensor inhibition time.

4.1.6 Hour modification via BUS

The **"Hour modification via bus"** parameter can be used to enable the modification of the time via BUS telegrams. The values that can be set are:

- **disable (default value)**
- enable

If **enable** is selected, the l'Communication objects ***Time input*** (Data Point Type: 10.001 DPT_TimeOfDay) is visualised, allowing the device to receive the values for the day of the week and the time from the BUS. The information about the day of the week is not used by the device.

When the BUS or auxiliary voltage is restored, the status read command (read request) should be sent via the Object ***Time input*** in order to update the time shown.

The thermostat, in fact, does not keep the time information up to date following a power supply failure; at the next restart, the time shown will be the one active when the power supply was lost. If the failure lasts for some time therefore, the time data must be reset manually via the menu, or sent to the ***Time input*** (Data Point Type: 10.001 DPT_TimeOfDay) communication object via the KNX BUS.

The **"Hour sending via bus"** parameter is used to enable or disable the transmission of the current day and time set on the device to other devices in the KNX system.

The values that can be set are:

- **disabled (default value)**
- periodically
- after a blockout
- after a blockout or a local change
- after a blockout, local change or periodically

If any value other than disabled is selected, the l'Communication objects ***Time sending*** (Data Point Type: 10.001 DPT_TimeOfDay) is visualised, allowing the transmission of the day and time on the BUS according to the criteria set for the parameter in question. The information about the day of the week is not sent by the device.

Setting the transmission of the day and time *after the failure of the KNX BUS**, the device sends the BUS telegrams with the current time and day when the BUS voltage is reset.

*ATTENTION: if the KNX BUS voltage failure coincides with a 230V AC power supply failure, the day and time information will not be sent because it might not be correct.

The information transmitted or received via the Hour (Time) field of DPT_TimeOfDay always includes any possible increase (+1h) due to the application of daylight saving time (Summer Time / Daylight saving time **-** DST).

Setting the transmission *after a local change*, the device will send the new values on the BUS when a modification is made to the day/time on the device itself (via the local SET navigation menu - see "Command push-buttons and local menu" in the User Manual. If the time is modified following the arrival of a sull'Object ***Time input*** BUS telegram, the update is not signalled by the thermostat to avoid repetitions.

Setting *periodically*, the device sends the values with the frequency defined by the value set in the **"Hour sending period"** parameter.

The parameter can have the following values:

- 6 hours
- 12 hours
- 1 day
- 2 days
- 3 days
- 4 days
- 5 days
- 6 days
- **1 week (default value)**

To automatically change the time during the switch from daylight saving time to standard time, there is a specific communication objects that indicates which system is being used.

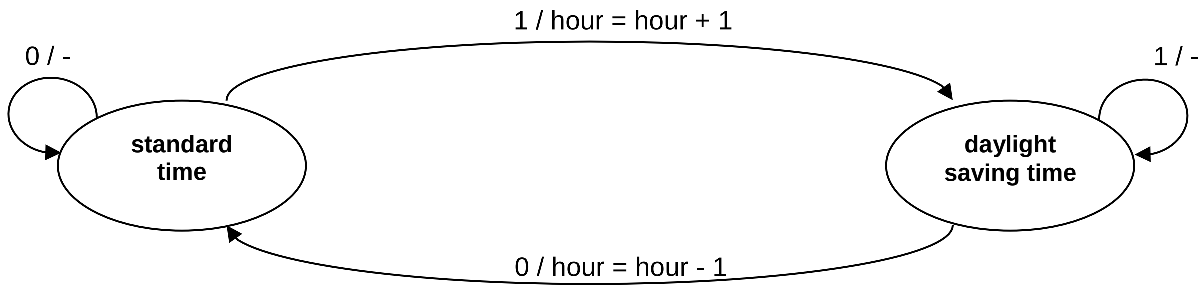
The **“Set daylight saving time from bus”** parameter is used to enable and visualise the communication objects ***Daylight saving time input*** (Data Point Type: 1.001 DPT_Switch), which the device uses to obtain information about the status of the time system being used. The values that can be set are:

- **disable(default value)**
- enable

If **enable** is selected, the communication objects ***Daylight saving time input*** and the **“Object ""Daylight saving time"" value at ETS download”** parameter are visualised, defining the current time system when the application is downloaded. The values that can be set are:

- **standard time (default value)**
- daylight saving time

Time is managed as follows: on the switch from standard time to daylight saving time, the device automatically adds one hour to the set time; on the switch from daylight savingtime to standard time, the device automatically subtracts one hour from the set time. These addition and subtraction operations only take place with the switching from one system to the other, not every time the status information is received via the object. Value “1” corresponds to daylight saving time, value “0” to standard time.



“object value” / “operation to be carried out”

If the device time is modified locally or via a BUS telegram, the device does not make any change to the new set time.

4.1.7 Master/Slave control type orstand alone

If the device acts as a slave (or simplified slave), it can be controlled by the master device via a single setpoint or by changing the active HVAC mode. The **“Master/Slave control type”** parameter is used to set the type of control that the master device has on the thermostat. The values that can be set are:

- **HVAC mode (default value)**
- setpoint

If **HVAC mode** is selected, the **“Commands format for HVAC mode remote setting”** e **“HVAC mode setpoint modification via bus”** parameters are displayed.

If is selected **setpoint**, the parameter is displayed **“Change the functioning setpoint via bus through”**.

If the device functions as "stand alone", it is possible to define whether only one operating setpoint should be managed or whether the operation should be managed via the HVAC modes.

The **“Stand alone control type”** parameter sets the control type to be used. The values that can be set are:

- **HVAC mode (default value)**
- setpoint

4.1.8 Remote parameters setting

Even if the device functions as stand alone, it can still receive various commands from remote units via the BUS. The **"Remote parameters setting"** parameter visualises the various configuration items for remote thermostat control. The values that can be set are:

- **disable(default value)**
- enable

If **enable** is selected, the **"Commands format for HVAC mode remote setting"** and **"HVAC mode setpoint modification via bus"** parameters are displayed (if the control type is HVAC mode) or the **"Change the functioning setpoint via bus through"** parameter (if the control type is setpoint), along with the **"Temporary setpoint forcing via bus", "Reset temporary setpoint forcing via bus"** and **"Functioning type"** parameters.

The **"Commands format for HVAC mode remote setting"** parameter defines the format of the communication objects used for the remote control of the thermostat HVAC modes. The values that can be set are:

- 1 bit
- **1 byte (default value)**
- both

If **1 byte** or **both** is selected, the communication objects ***HVAC mode input*** (Data Point Type: 20.102 DPT_HVACMode) is visualised so the remote device can change the HVAC mode via a single command.

If **1 bit** or **both** is selected, the **"Priority between objects for HVAC mode remote setting"** parameter and the ***HVAC mode input off***, ***HVAC mode input economy***, ***HVAC mode input precomfort***, ***HVAC mode input comfort*** (Data Point Type: 1.003 DPT_Enable) communication objects are visualised so the relative HVAC mode can be activated.
If the control type is ***setpoint*** on the other hand, only one communication objects is visualised, allowing the thermostat to be switched off (and switched back on) via the KNX BUS: ***Setpoint OFF input*** (Data Point Type: 1.003 DPT_Enable). If this communication objects receives the value 1 (enable), it triggers the switch to the thermostat OFF status; vice versa, the value 0 (disable) brings the device back to normal operation *setpoint*.

The **"Priority between objects for HVAC mode remote setting"** parameter defines whether there is any priority between the communication objects dedicated to remote HVAC mode setting. The values that can be set are:

- *disable*

  The 1-bit communication objects ***HVAC mode input off***, ***HVAC mode input economy***, ***HVAC mode input precomfort***, ***HVAC mode input comfort*** and the 1 byte HVAC mode ***mode input*** all have the same priority; it is the last command received that determines the HVAC mode to be activated. This means that the arrival of the value "0" on the communication objects of 1 bit that activated a certain HVAC mode is ignored, and that mode remains active. With this setting, the priority between the various device functions and the different communication objects used for setting the HVAC mode is as follows:

Function/Object	Size	Priority	
Reactivation after manual switch-off (if reactivation is manual and via remote commands)	-	1	low
Local operating mode change (Mode button key)	-	2	
Scene	1 byte	2	
HVAC mode input (Setpoint input)	1 byte (2 byte)	2	
HVAC mode input comfort	1 bit	2	
HVAC mode input precomfort	1 bit	2	
HVAC mode input economy	1 bit	2	
HVAC mode input off	1 bit	2	
Reactivation after manual switch-off (if reactivation is only manual)		3	
Manual switch-off		4	
window contact function via BUS	-	5	high

- ***enable*** **(default value)**

  The communication objects of 1 bit ***HVAC mode input off***, ***HVAC mode input economy***, ***HVAC mode input precomfort***, ***HVAC mode input comfort*** and the one of 1 byte HVAC mode ***mode input*** all have different priorities; the command with the highest priority is the one that determines the HVAC mode to be activated. This setting visualises the **“Reception 1 bit mode with priority > actual”**, **“Reception 1 bit mode with priority < actual”** parameters, and the priority between the various device functions and the different communication objects used for the HVAC mode setting is as follows:

Function/Object	Size	Priority	
Reactivation after manual switch-off (if reactivation is manual and via remote commands)	-	1	low
Local operating mode change (Mode button key)	-	2	
Scene	1 byte	2	
HVAC mode input (Setpoint input)	1 byte (2 byte)	2	
HVAC mode input comfort	1 bit	3	
HVAC mode input precomfort	1 bit	4	
HVAC mode input economy	1 bit	5	
HVAC mode input off	1 bit	6	
Reactivation after manual switch-off (if reactivation is only manual)		7	
Manual switch-off		8	
Window contact function via BUS	-	9	high

The 1 bit mode setting objects all have a higher priority than the mode setting object of 1 byte; this is due to the fact that, by enabling both mode-setting possibilities, the 1-bit objects can be used to fix the mode if particular events occur.

Naturally there is also a command execution priority between the 1 bit mode setting objects, especially because if only the 1 bit format is defined for the operating mode setting but several objects are enabled, it is necessary to determine which of them has the highest priority in order to define the active device operating mode.

As several 1 bit objects can be enabled at the same time, we can define the behaviour of the device if a communication objects with a higher priority than the one currently active is received; this is done via the **“Reception 1 bit mode with priority > actual”** parameter. In the same way, we can define the behaviour of the device if a communication objects with a lower priority than the one currently active is received; this is done via the **“Reception 1 bit mode with priority < actual”** parameter.

The values that can be set for the **“Reception 1 bit mode with priority > actual”** parameter are:

- **keep lower priority objects value** **(default value)**
- deactivate object with lower priority

If **keep lower priority objects value** is selected and a 1-bit HVAC mode activation command with a higher priority than the currently active one is received, the mode of the new object will be set but the activation status of objects with a lower priority will be maintained.

Vice versa, if **deactivate object with lower priority** is selected and a 1-bit HVAC mode activation command with a higher priority than the currently active one is received, the mode of the new object will be set and the activation status of objects with a lower priority will be set at 0 (deactivated).

The values that can be set for the **"Reception 1 bit mode with priority < actual"** parameter are:

- **update object value (default value)**
- ignore command

If **update object value** is selected and a 1-bit HVAC mode activation command with a lower priority than the currently active one is received, the mode of the new object will not be set but its activation status will be stored.

Vice versa, if **ignore command** is selected and a 1-bit HVAC mode activation command with a lower priority than the currently active one is received, the new command will be ignored (as if it had not been received).

The **"HVAC mode setpoint modification via bus"** parameter is used to enable the communication objects needed to define the setpoints of each device mode via a BUS telegram. The values that can be set are:

- **disable (default value)**
- enable absolute value setting [°C]
- enable absolute value setting (K)
- enable absolute value setting [°F]
- enable increase/decrease step regulation

Selecting **enable absolute valute setting** visualises the following communication objects:

- ***Heating anti-freeze setpoint input***
- ***Heating economy setpoint input***
- ***Heating precomfort setpoint input***
- ***Heating comfort setpoint input***
- ***Air-cooling high temp. protection setpoint input***
- ***Air-cooling economy setpoint input***
- ***Air-cooling precomfort setpoint input***
- ***Air-cooling comfort setpoint input***

(Data Point Type: 9.001 DPT_Value_Temp se °C, 9.002 DPT_Value_Tempd se K e *9.027 DPT_Value_Temp_F* se °F) , with which the setpoints of each device operating mode can be defined via the BUS.

Selecting **enable increase/decrease step regulation** visualises the following communication objects:

- ***Heating anti-freeze setpoint regulation***
- ***Heating economy setpoint regulation***
- ***Heating precomfort setpoint regulation***
- ***Heating comfort setpoint regulation***
- ***Air-cooling high temp. protection setpoint regulation***
- ***Air-cooling economy setpoint regulation***
- ***Air-cooling precomfort setpoint regulation***
- ***Air-cooling comfort setpoint regulation***

(Data Point Type: 1.007 DPT_Step) , with which the setpoints of each mode can be regulated.

Every time the value "1" is received, the associated setpoint will be increased by the value defined in the **"Setpoint regulation step [0.1 °C]"** parameter; if the value "0" is received, the setpoint will be reduced by the value of **"Setpoint regulation step [0.1 °C]"**.

The **"Setpoint regulation step [0.1 °C]"** parameter defines the increase/decrease step of the setpoints associated with the HVAC modes following the arrival of a command on the relative regulation objects. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 5)**

Regardless of whether the mode setpoints are modified via the local menu or with a remote BUS command, if the stand alone control type or master/slave is HVAC mode, there is a value setting limit between the setpoints belonging to the same operating type. This limit is determined as follows:

- 10°C $< T_{economy} < T_{precomfort} < T_{comfort} <$ 35°C in heating ("T" indicates the general value of the mode setpoint)
- 10°C $< T_{comfort} < T_{precomfort} < T_{economy} <$ 35°C in cooling ("T" indicates the general value of the mode setpoint)

Furthermore, if the dead zone is active, the following constraint must also be respected:

- $T_{comfort\ heating} < T_{comfort\ cooling}$ - 1°C ("T" indicates the general value of the mode setpoint)

These constraints must also be respected when the setpoint value received via the BUS lies outside the range defined by the above formula, bringing the setpoint close to the limit value.

If the stand alone or master/slave control type is setpoint, there is a value setting limit that must be respected by the various setpoints belonging to the same operating type. It is determined as follows:

- 10°C $< T_{funzionamento} <$ 35°C in both heating and cooling ("T" indicates the general value of the setpoint)

Furthermore, if the dead zone is active, the following constraint must also be respected:

- $T_{funzionamento\ heating} < T_{funzionamento\ cooling}$ - 1°C ("T" indicates the general value of the setpoint)

These constraints must also be respected when the setpoint value received via the BUS lies outside the range defined by the above formula, bringing the setpoint close to the limit value.

The **"Change the functioning setpoint via bus through"** parameter is used to select the format of the communication objects via which the operating setpoint is modified when the control type is setpoint. The values that can be set are:

- **absolute value setting [°C]** **(default value)**
- absolute value setting (K)
- absolute value setting [°F]
- increase/decrease step regulation

Selecting **absolute valute setting** visualises the communication objects ***Setpoint input*** (Data Point Type: *9.001 DPT_Value_Temp* se °C, *9.002 DPT_Value_Tempd* se K e *9.027 DPT_Value_Temp_F* if °F), with which the device operating setpoint can be defined via the BUS.

Selecting **increase/decrease step regulation** visualises the **"Setpoint regulation step [0.1 °C]"** parameter and the communication objects ***Setpoint regulation*** (Data Point Type: 1.007 DPT_Step) with which the device operating setpoint can be regulated. Every time the value "1" is received, the operating setpoint will be increased by the value defined in the **"Setpoint regulation step [0.1 °C]"** parameter; if the value "0" is received, the setpoint will be reduced by the value of **"Setpoint regulation step [0.1 °C]"**.
The **"Setpoint regulation step [0.1 °C]"** parameter defines the increase/decrease step of the operating setpoint following the arrival of a command on the relative regulation objects. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 5)**

Apart from the local push-buttons, the current setpoint can also be temporarily forced via the BUS (regardless of whether the control type is HVAC mode or setpoint) via a specific communication objects. The **"Temporary setpoint forcing via bus"** parameter is used to enable the oject via which the device receives the temporary setpoint regulation commands. The values that can be set are:

- **disable** **(default value)**
- enable increase/decrease step regulation

Selecting **enable increase/decrease step regulation** visualises the communication objects ***Setpoint temporary forcing regulation*** (Data Point Type: *1.007 DPT_Step*).

If the value “1” is received on this object, the current setpoint will be temporarily increased by the value defined in the **“Setpoint temporary forcing regulation step [0.1 °C]”** parameter.

If the value “0” is received on this object, the current setpoint will be temporarily reduced by the value defined in the **“Setpoint temporary forcing regulation step [0.1 °C]”** parameter.

The **“Setpoint temporary forcing regulation step [0.1 °C]”** parameter defines the increase/decrease step of the current setpoint following the arrival of a command on the relative regulation object. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 5)**

The **“Reset temporary setpoint forcing via bus”** parameter enables the object via which the device receives the command to eliminate the temporary forcing of the setpoint or the fan speed (in fan coil operation). The values that can be set are:

- **disable** **(default value)**
- enable

Selecting **enable** visualises the communication objects ***Setpoint temporary forcing reset*** (Data Point Type: *1.002 DPT_Bool*).
If the value “1” or “True” is received on this object, the manual forcing will be eliminated and the current setpoint will be returned to the ETS configuration value. In the case of fan coil operation, AUTO mode will be restored to manage the fan speed if a fixed speed has been manually set (forcing the operation mode to MANUAL).

The **“Set functioning type”** parameter is used to enable a specific communication objects for remote parameters setting (the same priority as for local modification). The values that can be set are:

- disable
- **enable** **(default value)**

If **enable** is selected, the object ***Functioning type input*** (Data Point Type: 1.100 DPT_Heat/Cool) is visualised for the remote modification of the functioning type and, if the functioning type is automatically modified (dead zone), the object ***Enable dead zone*** (Data Point Type: 1.003 DPT_Enable) is visualised to enable or disable the dead zone. When the dead zone is disabled via a BUS command on the object ***Enable dead zone***, the active functioning type remains the one set automatically; it can be modified via the local menu or with a BUS command on the object ***Functioning type input***.

If the device operation is slave, it is not possible to modify the HVAC mode locally (if the slave control type is HVAC mode) or modify the operating setpoint above a certain limit (if the slave control type is setpoint). There are some applications, such as the hotel one, where the thermostat is required to act as a slave and the client can only change the operating setpoint slightly or switch the device off completely. Device switch-off requires the setting of HVAC OFF mode (if the slave control type is HVAC mode), or the definition of the setpoint for BUILDING PROTECTION (if the slave control type is setpoint); this function is activated by pressing the MODE button key.

The **“Allow local switching off”** parameter is used to enable this function. The values that can be set are:

- **disable** **(default value)**
- enable

Selecting **enable** visualises the **“Reactivate device by”** parameter that defines which condition permits the deactivation of device switch-off via the local menu. The values that can be set are:

- **local control only** **(default value)**
- local and remote control

Setting **Local control only**, all the remote commands received from the master device and that involve changing the HVAC mode or modifying the operating setpoint are suspended and only implemented when local switch-off has been deactivated. Setting **local and remote control**, all the remote commands that involve changing the HVAC mode or modifying the operating setpoint are implemented and cause the deactivation of local switch-off. In any case, the switch from slave to stand alone or vice versa, via a BUS command or the local menu, deactivates this function.

If the device is "stand alone", the device can always be “switched off” (BUILDING PROTECTION setpoint definition) by pressing the MODE button key. As in the case of slave, the device can be switched off via the commands, or else via the local menu if the **“Allow local switching off”** parameter is enebled. The **“Reactivate device by”** parameter defines which condition permits the deactivation of device switch-off via the local menu.

4.1.9 Heating/Cooling control logics and algorithms

The device uses an autonomous control logic based on various control algorithms. Given the different types of temperature control system, a single solenoid valve control object can be used for both the heating and cooling systems, or there can be one specific object for each of the two functioning types.

The **“Controlo logic Heating/Air cooling”** parameter defines whether the system control logic (and therefore the control communication objects) is shared by heating and cooling or separated. The values that can be set are:

- Common (2 pipe)
- **Different (4 pipe)** **(default value)**

If **Common (2 pipe)** is selected, the **“Heating/Air cooling control algorithm”** and **“Heating/Air cooling valve status feedback”** parameters are displayed.

If **Different (4 pipe)** is selected, the **“Heating control algorithm”** and **“Air cooling control algorithm”** parameters are displayed.

The **“Heating control algorithm”** parameter defines the control algorithm used for the heating system. The values that can be set are:

- **two points ON-OFF** **(default value)**
- two points 0%-100%
- integral proportional PWM
- continuous proportional integral
- fan coil with ON-OFF speed control (ON-OFF)
- fan coil with 0%-100% speed control (0-100%)

If is selected **two points ON-OFF**, the parameter is visualised **“Regulation differential [tenths of °C] [P12]”** in the menu**Heating** along with communication objects ***Heating valve switch*** (Data Point Type: 1.001 DPT_Switch) the via which the device sends the command telegrams.

If is selected the **two points 0%-100%**, parameter is visualised **“Regulation differential [tenths of °C] [P12]”** in the menu **Heating** along withcommunication objects ***% command valve heating*** (Data Point Type: 5.001 DPT_Scaling) the via which the device sends the command telegrams.

If is selected the **integral proportional PWM** and parameters are visualised **“Select heating system”**, **“Proportional band [P23]”**, **“Integration time [P24]”** in **“Cycle time [P10]”** the menu**Heating** along with communication objects ***Heating valve switch*** (Data Point Type: 1.001 DPT_Switch) the via which the device sends the command telegrams.

If is selected the **continuous proportional integral** and parameters are visualised **"Select heating system"**, **"Proportional band [P23]"**, **"Integration time [P24]"** in **"Min % variation for continuous sending [P11]"** the menu **Heating** along withcommunication objects ***% command valve heating*** (Data Point Type: 5.001 DPT_Scaling) the via which the device sends the command telegrams..

If **fan coil with ON-OFF speed control (ON-OFF)** is selected, the **"Fan coil valve management"**, **"Regulation differential valve [tenths of °C] [P13]"** or **"Select heating system"**, **"Operation limit fan coil [tenths of °C] [P26]"**, **"Proportional band [P23]"**, **"Integration time [P24]"** and **"Min % variation for continuous sending [P11]"** parameters are visualised (depending on the set valve management type **- two points ON-OFF / 0%-100%** or **continuous proportional integral** respectively), along with **"Fan coil speed number", "Regulation differential speed 1...3", "Speed 1...3 inertia time (seconds)"** and **"Fan coil speed status feedback"** in the **Heating** menu.

If **fan coil with 0%-100% speed control (0-100%)** is selected, the **"Fan coil valve management"**, **"Regulation differential valve [tenths of °C] [P13]"** or **"Select heating system"**, **"Proportional band [P23]"**, **"Integration time [P24]"** and **"Min % variation for continuous sending [P11]"** parameters are visualised (depending on the set valve management type **- two points ON-OFF / 0%-100%** or **continuous proportional integral** respectively), along with **"Operation limit fan coil [tenths of °C] [P26]", "Proportional band [P23]"**, **"Integration time [P24]"** and **"Min % variation for continuous sending [P11]"** for the fan and **"Fan coil speed status feedback"** in the **Heating** menu.

The **"Air cooling control algorithm"** parameter defines the control algorithm used for the cooling system. The values that can be set are:

- **two points ON-OFF (default value)**
- two points 0%-100%
- integral proportional PWM
- continuous proportional integral
- fan coil with ON-OFF speed control (ON-OFF)
- fan coil with 0%-100% speed control (0-100%)

If is selected **two points ON-OFF**, the parameter is visualised **"Regulation differential [tenths of °C] [P12]"** in the menu**Cooling** along with communication objects ***Air cooling valve switch*** (Data Point Type: 1.001 DPT_Switch) the via which the device sends the command telegrams.

If is selected **two points 0%-100%** the parameter is visualised **"Regulation differential [tenths of °C] [P12]"** in the menu **Cooling** along with communication objects ***% command valve air cooling*** (Data Point Type: 5.001 DPT_Scaling)the via which the device sends the command telegrams.

If is selected the **integral proportional PWM** and parameters are visualised **"Select air cooling system"**, **"Proportional band [P23]"**, **"Integration time [P24]"** in **"Cycle time [P10]"** the menu**Cooling** along with communication objects ***Air cooling valve switch*** (Data Point Type: 1.001 DPT_Switch) the via which the device sends the command telegrams.

If is selected the **continuous proportional integral** and parameters are visualised **"Select air cooling system"**, **"Proportional band [P23]"**, **"Integration time [P24]"** in **"Min % variation for continuous sending [P11]"** the menu **Cooling** along with communication objects ***% command valve air cooling*** (Data Point Type: 5.001 DPT_Scaling)the via which the device sends the command telegrams.

If is selected, the **fan coil with ON-OFF speed control (ON-OFF)**, or and parameters are visualised **"Fan coil valve management"**, **"Regulation differential valve [tenths of °C] [P13]"** (depending **"Select air cooling system"**, **"Operation limit fan coil [tenths of °C] [P26]", "Proportional band [P23]"**, **"Integration time [P24]"** on **"Min % variation for continuous sending [P11]"** the set management type **two points ON-OFF / 0%-100%** - or respectively) **continuous proportional integral**), **"Fan coil speed number", "Regulation differential speed 1...3", "Speed 1...3 inertia time (seconds)"** along with **"Fan coil speed status feedback"** and in the menu.**Cooling**.

If **fan coil with 0%-100% speed control (0-100%)** is selected, the **"Fan coil valve management"**, **"Regulation differential valve [tenths of °C] [P13]"** or **"Select air cooling system"**, **"Proportional band [P23]"**,

“Integration time [P24]” and **“Min % variation for continuous sending [P11]”** parameters are visualised (depending on the set valve management type - **two points ON-OFF / 0%-100%** or **continuous proportional integral** respectively), along with **”Operation limit fan coil [tenths of °C] [P26]”, “Proportional band [P23]”**, **“Integration time [P24]”** and **“Min % variation for continuous sending [P11]”** for the fan and **“Fan coil speed status feedback”** in the **Cooling** menu.

If the Heating/Cooling control logic is"2-pipe", the **“Heating/Air cooling control algorithm”** parameter defines the control algorithm used for both the heating system and the cooling system, given that there is a shared control logic. The values that can be set are:

- **two points ON-OFF (default value)**
- two points 0%-100%
- integral proportional PWM
- continuous proportional integral
- fan coil with ON-OFF speed control (ON-OFF)
- fan coil with 0%-100% speed control (0-100%)

If **two points ON-OFF** is selected, the **Heating** and **Cooling** menus will display the **“Regulation differential [tenths of °C] [P12]”** parameter and the communication objects ***Heating/cooling valve switch*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams.

If **two points 0%-100%**, is selected, the **Heating** and **Cooling** menus will display the **“Regulation differential [tenths of °C] [P12]”** parameter and the communication objects ***% command valve heating/cooling*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams.

If **integral proportional PWM** is selected, the **Heating** and **Cooling** menus will display **“Select heating system** (**cooling** nel menu **Cooling)”**, **“Proportional band [P23]”**, **“Integration time [P24]”** and **“Cycle time [P10]”** parameters along with the communication objects ***Heating/cooling valve switch*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams.

If **continuous proportional integral** is selected, the **“Select heating system** (**cooling** in the **Cooling menu)”**, **“Proportional band [P23]”**, **“Integration time [P24]”** and **“Min % variation for continuous sending [P11]”** parameters will be displayed in the **Heating** and **Cooling** menus, along with the communication objects ***% command valve heating/cooling*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams.

If **fan coil with ON-OFF speed control (ON-OFF)** is selected, the **“Fan coil valves management”**, **“Regulation differential valve [tenths of °C] [P13]”** or **“Select heating system”**(**“…cooling**” in the Cooling menu), **“Operation limit fan coil [tenths of °C] [P26]”**, **“Proportional band [P23]”**, **“Integration time [P24]”** and **“Min % variation for continuous sending [P11]”** (depending on the set management type - **two points ON-OFF / 0%-100%** or **continuous proportional integral** respectively), **Fan coil speed number”, “Regulation differential speed 1...3”, “Speed 1...3 inertia time (seconds)”** and **“Fan coil speed status feedback”** parameters will be visualised in the **Heating** and **Cooling** menus.

If **fan coil with 0%-100% speed control (0-100%)** is selected, the **“Fan coil valves management”**, **“Regulation differential valve [tenths of °C] [P13]”** or **“Select heating system” (“…cooling” in the Cooling menu)**, **“Proportional band [P23]”**, **“Integration time [P24]”** and **“Min % variation for continuous sending [P11]”** (depending on the set valve management type - **two points ON-OFF / 0%-100%** or **continuous proportional integral** respectively), **“Operation limit fan coil [tenths of °C] [P26]”**, **“Proportional band [P23]”**, **“Integration time [P24]”** and **“Min % variation for continuous sending [P11]”** (for the fan) and **“Fan coil speed status feedback”** parameters will be visualised in the **Heating and Cooling** menus.

If the control algorithm is **fan coil**, the format of the heating/cooling solenoid valve commands (2-way and 4-way system) is not linked to that of the fan coil speed control algorithm. The **“Fan coil valves management”** parameter defines the solenoid valve control logic when the selected algorithm is "fan coil". The values that can be set are:

- **two points ON-OFF (default value)**

- two points 0%-100%
- continuous proportional integral

Selecting **two points ON-OFF** visualises the communication objects ***Heating/cooling valve switch*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams to the solenoid valve.

Selecting **two points 0%-100%** visualises the communication objects ***% command valve heating/cooling*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams to the solenoid valve.

Selecting **continuous proportional integral** visualises the communication objects ***% command valve heating/cooling*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams to the solenoid valve.

The **"Heating/Air cooling valve status feedback"** parameter allows you to enable the device to receive feedback from the actuator that commands the heating/cooling solenoid valve. In this way, the device can receive the telegram stating that the solenoid valve has been switched over, and repeat the command if the switching did not effectively take place. The values that can be set are:

- disable
- **enable (default value)**

If **disable**, is selected, the **"Commands repetition period with disabled feedback"** parameter is displayed.

If **enable** is selected, the communication objects ***Heating/Air cooling valve status feedback*** (Data Point Type: 1.001 DPT_Switch) is visualised if the valve control algorithm is **two points ON-OFF** , or ***Heating valve % feedback/cooling*** (Data Point Type: 5.001 DPT_Scaling) if the valve control algorithm is **two points 0%-100%** or **continuous proportional integral**.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via the object ***Heating/Air cooling valve status feedback*** or ***Heating valve % feedback/cooling*** for an update of the status of the heating/cooling solenoid valve. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the actuators.

If feedback is enabled, the device sends the switching command to the solenoid valve and then waits for one minute (on its internal clock) for the actuator to send confirmation of the effective switching; if this does not happen, it sends the command to the solenoid valve once every minute until it receives confirmation of correct switching. It may be that, during normal temperature control operation, the actuator status is changed by an entity outside the thermostat which forces and modifies its status. In this case, the device repeats the valve switching command to realign the actuator status with the one determined by the thermostat control logic, triggering the process of confirmation standby and repeated command until confirmation is received.

With solenoid valve status feedback disbabled, it may be useful to cyclically repeat the command to the actuator that manages the solenoid valve so that, if the first command telegram gets lost, one of the subsequent ones will sooner or later be received.

The **"Commands repetition period with disabled feedback"** parameter defines the cyclical transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes (default value)**

If the control algorithm selected for Heating, Cooling or Heating/Cooling is **fan coil with ON-OFF speed control (ON-OFF),** the ***V1 fan switching heating***, ***V1 fan switching cooling***, ***V2 fan switching heating,V2 fan switching cooling***, ***V3 fan switching heating*** and ***V3 fan switching cooling*** (Data Point Type: 1.001 DPT_Switch) communication objects are also made available to control the first, second and third fan coil speed respectively. Alternatively, there are the communication objects that allow you to command the activation of the three speeds with a % value, **Heating fan speed %** and **Cooling fan speed %** (Data Point Type: 5.001 DPT_Scaling)**.**

Using these communication objects, the command of the three speeds will be sent via the predefined values, as indicated in the table below.

	Number of configured fan coil speeds		
Current value Vx	1	2	3
0 = fan OFF	0% (0)	0% (0)	0% (0)
V1	100% (255)	50% (128)	33% (85)
V2	-	100% (255)	66% (170)
V3	-	-	100% (255)

Table: % values (and on scale 0-255) sent for ON-OFF fan speed command with Object Type: 5.001 DPT_Scaling.

The transmission of the fan speed command will include all the group objects that may be connected to a group address. Of course, the information sent with 1 bit or 1 byte objects will be the same.

If the control algorithm selected for Heating, Cooling or Heating/Cooling is **fan coil with 0%-100% speed control (0-100%)**, only the communication objects ***Heating fan speed %*** **e** ***Cooling fan speed %*** (Data Point Type: 5.001 DPT_Scaling) is made available, via which the device sends the command telegrams for regulating the fan speed.

If the control algorithm selected for Heating, Cooling or Heating/Cooling is **fan coil with ON-OFF speed control (ON-OFF)** or **fan coil with 0%-100% speed control (0-100%)**, the fan coil speed can be directly modified via BUS commands. The **"Fan coil speed modification via bus"** parameter enables the modification of the fan coil speed via the BUS. The values that can be set are:

- **disable (default value)**
- enable

Selecting **enable** visualises the communication objects ***Fan coil mode input*** (Data Point Type: 1.001 DPT_Switch), ***Heating fan coil speed % input*** and ***Air-cooling fan coil input speed %*** (Data Point Type: 5.001 DPT_Scaling.

The communication objects ***Fan coil mode input*** is used to receive the fan coil mode selection commands:

- when the value "1" is received, the speed is defined autonomously by the device (AUTO fan coil mode) on the basis of the various modes configured as explained in the Algoritmi di controlloControl algorithms section
- when the value "0" is received, the fan coil mode switches to MANUAL

If the control algorithm configured is **fan coil with ON-OFF speed control**, the switch from AUTO to MANUAL is made with the automatic setting of speed 1; once the mode is MANUAL, each time the "0" value is received, the next speed is selected. Regardless of the status, the value "1" returns the mode to AUTO. To activate the selected speed when the fan coil is in MANUAL mode, the hysteresis of the first regulation differential must be met, whatever speed is selected.

If the control algorithm configured is **fan coil with 0%-100% speed control**, the switch from AUTO to MANUAL is made by maintaining the value previously defined by the algorithm in automatic mode until the value is changed by the user. Once the mode is MANUAL, when the value "0" is received for the first time the fan speed will switch to the first 10% step after that of the current % [$v\%_{t1}$ = (int($v\%_{t0}$ / 10)*10) + 10]. Every time the value

“0” is subsequently received, the speed % value will be increased by 10%. Regardless of the status, the value “1” switches the mode to AUTO. To activate the fan at the required speed when the fan coil is in MANUAL, the defined fan speed intervention threshold must be exceeded.

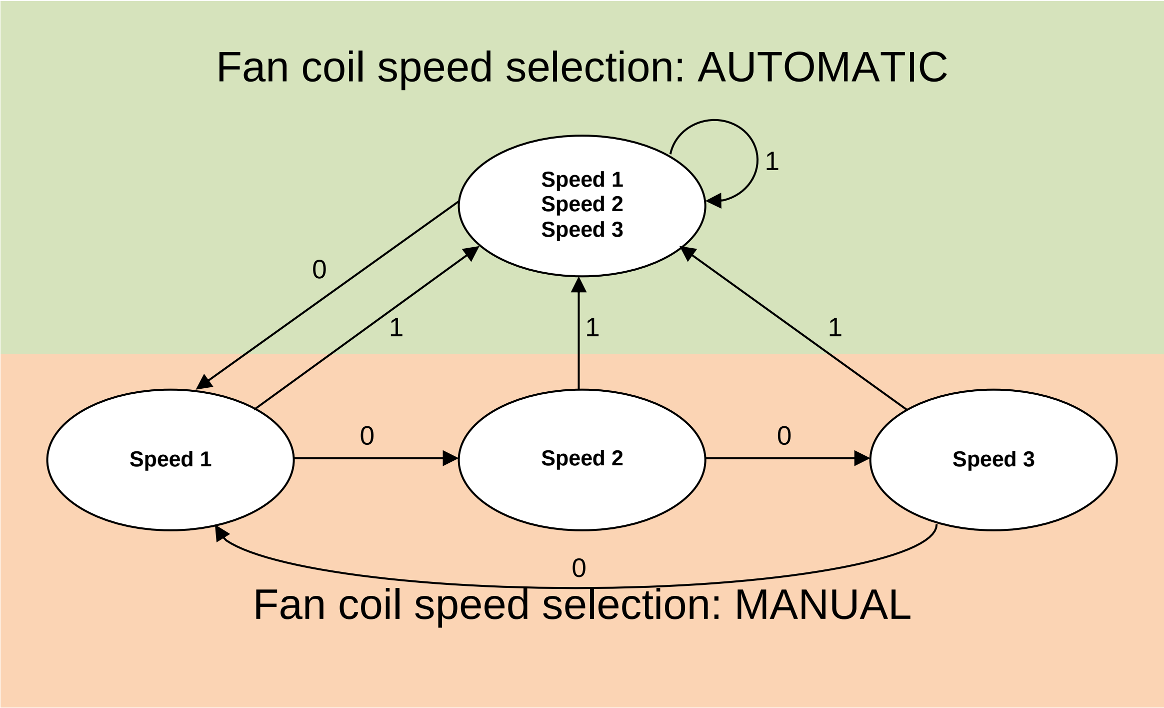
The switch from MANUAL to AUTO in both speed regulation modes is made by immediately reassessing the speed value according to the algorithm. The new speed will be commanded and notified if it has changed in the case of 3-speed management, or if the variation between the previous manually set value and the one calculated automatically exceeds the value of **“Min % variation for continuous sending [P11]”** in the case of continuous 0-100% speed regulation.

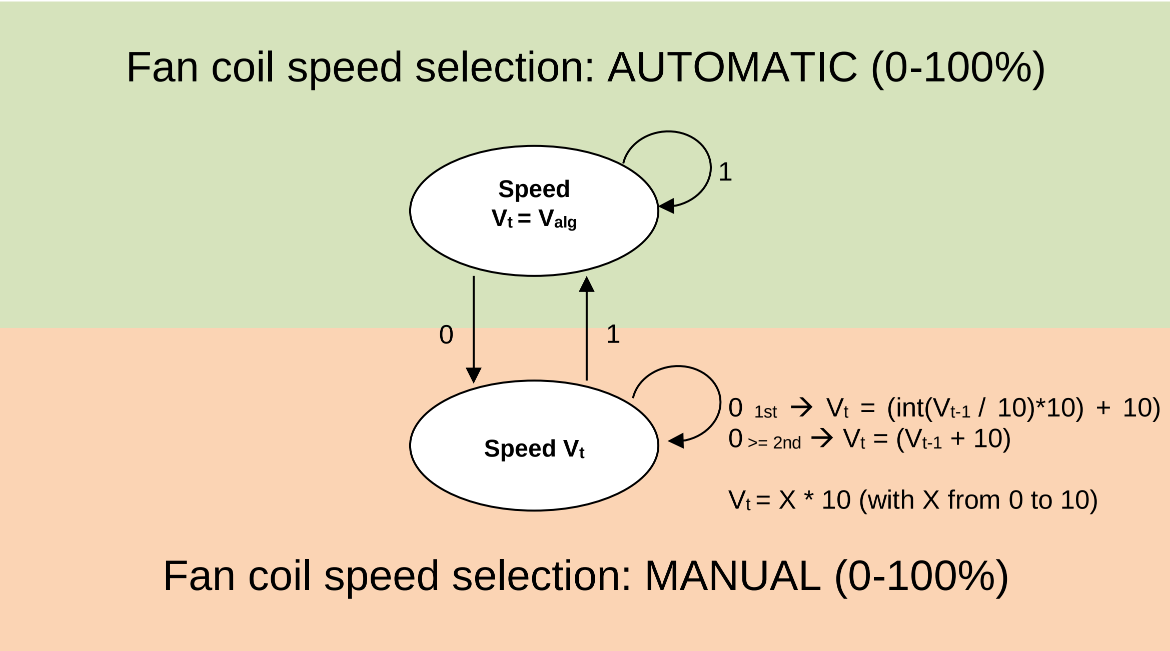
If the control algorithm configured is **fan coil with ON-OFF speed control** or **fan coil with 0%-100% speed control (0-100%),** and the **“Fan coil speed modification via bus”** parameter is enabled, the ***Heating fan coil speed % input*** and ***Air-cooling fan coil input speed %*** (Data Point Type: 5.001 DPT_Scaling) communication objects are made available for modifying the fan speed if the mode is MANUAL. If the mode is AUTO, they will be ignored and not even saved. With 3-speed fan regulation, this value is interpreted differently according to the number of speeds set (refer to the table below). With 0-100% regulation, the value is taken as it is, without any reworking.

	Number of configured fan coil speeds		
% value received (value on scale 0-255)	***1***	***2***	***3***
0% (0)	OFF	OFF	OFF
from 1% (1) to 33% (85)	v1	v1	v1
from 34% (86) to 50% (128)	v1	v1	v2
from 51% (129) to 66% (170)	v1	v2	v2
from 67% (171) to 100% (255)	v1	v2	v3

*Table: Interpretation of the Object **Heating/Air-cooling fan coil speed % input** value for 3-speed regulation.*

The following flow charts sum up the concept (on the arrows you can see the value of the KNX telegram received on ***Fan coil mode input (1=Automatic/0=Manual)***):





When the BUS or auxiliary voltage is reset, the fan coil mode is the one that was active prior to the power failure.

If the active operating type is modified and the new functioning type is still "fan coil", the fan coil speed (automatic or manual) will remain as set beforehand; otherwise, AUTOMATIC mode is set again.

If the control algorithm selected for Heating, Cooling or Heating/Cooling is **fan coil with ON-OFF speed control (ON-OFF)** or **fan coil with 0%-100% speed control (0-100%)**, the fan coil speed control mode can be signalled. The **"Fan coil mode (automatic/manual) feedback"** parameter enables the communication objects ***Fan coil mode report (1=Automatic/0=Manual)***, via which the device sends a BUS telegram to signal the control mode of the fan coil speed (manual/automatic). The values that can be set are:

- **disable (default value)**
- enable

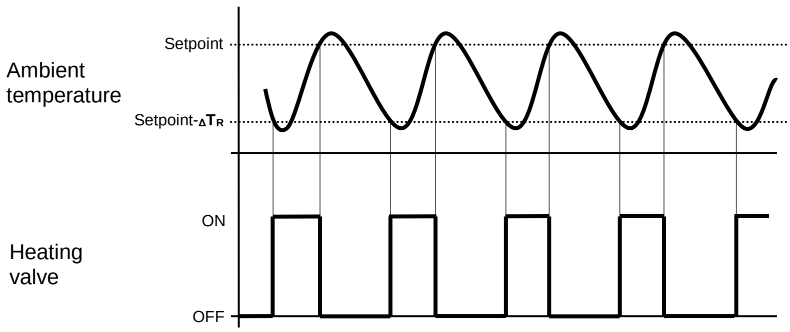
Selecting **enable** visualises the communication objects ***Fan coil mode report (1=Automatic/0=Manual)***, used to transmit the information. When the fan coil speed control mode changes from MANUAL to AUTOMATIC, the device sends a telegram via the BUS with the logic value “1”; when the fan coil speed control mode changes from AUTOMATIC to MANUAL, the device sends a “0” on the BUS. If this function is activated, the fan coil mode signal is always transmitted on the BUS before the sending of the objects that command and signal the effective speed value (both 1 bit and 1 byte objects).

4.2 Control algorithms

Regardless of whether the control logic is shared by the two functioning types or is separate, depending on the algorithm selected the logic is as follows:

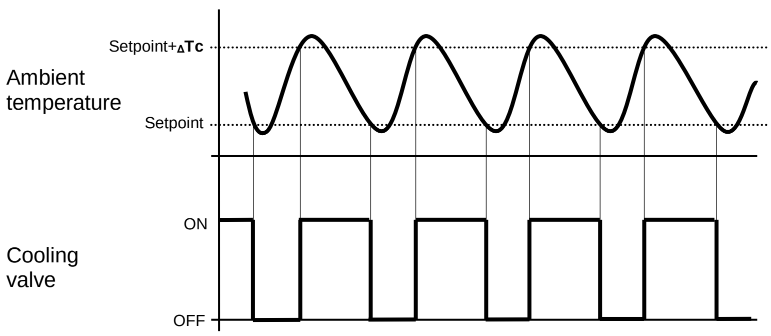
4.2.1 Two points ON-OFF

The algorithm used for managing the temperature control system is the classic type, called "2-point control". This type of control involves the switch-on and switch-off of the temperature control system following a hysteresis cycle. This means there isn't a single threshold that discriminates between system ON and system OFF, but two.



When the measured temperature is lower than the value "setpoint-**ΔTR**" (where **ΔTR** identifies the value of the heating regulation differential), the device activates the heating system by sending the relative BUS command to the actuator that manages it. When the measured temperature reaches the defined setpoint value, the device deactivates the heating system by sending the relative BUS command to the actuator that manages it.

This diagram clearly shows that there are two decision thresholds for activating and deactivating the heating system. The first is the value "setpoint-**ΔTR**", below which the device switches the system on; the second is the defined setpoint value, above which the device switches the system off.



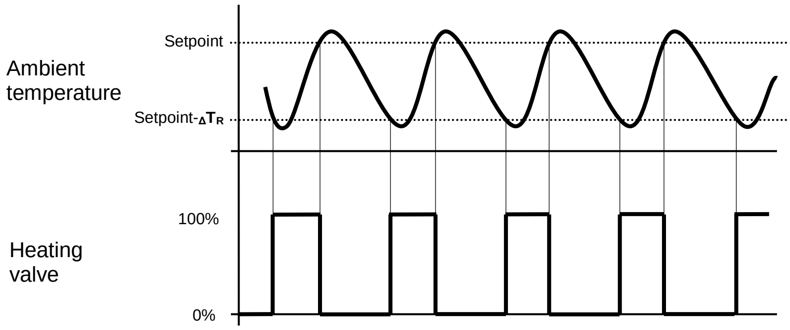
When the measured temperature is higher than the value "setpoint+**ΔTc**" (where **ΔTc** identifies the cooling regulation differential), the device activates the cooling system by sending the relative BUS command to the actuator that manages it. When the measured temperature reaches the defined setpoint value, the device deactivates the cooling system by sending the relative BUS command to the actuator that manages it.

This diagram clearly shows that there are two decision thresholds for activating and deactivating the cooling system. The first is the defined setpoint value, below which the device switches the system off; the second is the value "setpoint+**ΔTc**", above which the device switches the system on.

To avoid the continuous switching of the solenoid valves, the next ON command following an OFF-ON-OFF sequence can only be sent if at least 2 minutes have elapsed.

4.2.2 Two points 0% - 100%

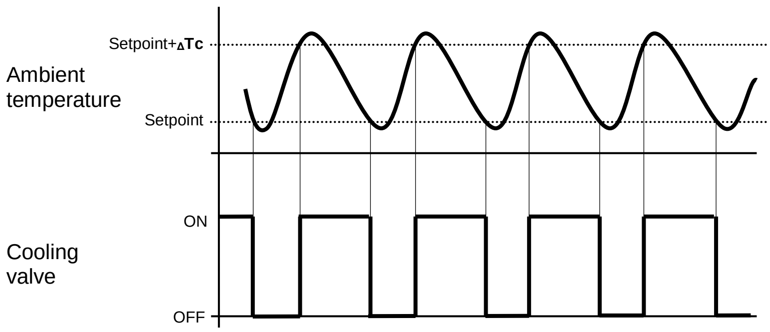
The algorithm used for managing the temperature control system is the classic type, called "2-point control". This type of control involves the switch-on and switch-off of the temperature control system following a hysteresis cycle. This means there isn't a single threshold that discriminates between system ON and system OFF, but two.



When the measured temperature is lower than the value “setpoint-**ΔT_R**“ (where **ΔT_R** identifies the value of the heating regulation differential), the device activates the heating system by sending the relative BUS percentage command to the actuator that manages it. When the measured temperature reaches the defined setpoint value, the device deactivates the heating system by sending the relative BUS percentage command to the actuator that manages it.

This diagram clearly shows that there are two decision thresholds for activating and deactivating the heating system. The first is the value “setpoint-**ΔT_R**“, below which the device switches the system on; the second is the defined setpoint value, above which the device switches the system off.

To avoid the continuous switching of the solenoid valves, the next 100% command following a 0%-100%-0% transition can only be sent if at least 2 minutes have elapsed.



When the measured temperature is higher than the value “setpoint+**ΔT_C**“ (where **ΔT_C** identifies the value of the cooling regulation differential), the device activates the cooling system by sending the relative BUS command to the actuator that manages it. When the measured temperature reaches the defined setpoint value, the device deactivates the cooling system by sending the relative BUS command to the actuator that manages it.
This diagram clearly shows that there are two decision thresholds for activating and deactivating the cooling system. The first is the defined setpoint value, below which the device switches the system off; the second is the value “setpoint+**ΔT_C**“, above which the device switches the system on.

4.2.3 Integral proportional PWM

The algorithm used to manage the temperature control system allows you to drastically reduce the times subject to thermal inertia and introduced by the 2-point control, called PWM control. This type of control involves the modulation of the impulse duty-cycle (represented by the temperature control system activation time) on the basis of the difference between the defined setpoint and the measured temperature. Two components are needed to calculate the output function: the proportional component and the integral component.

$$\mathrm{u}(t) = K_p e(t) + K_i \int_0^t e(\tau)\, d\tau$$

Proportional component

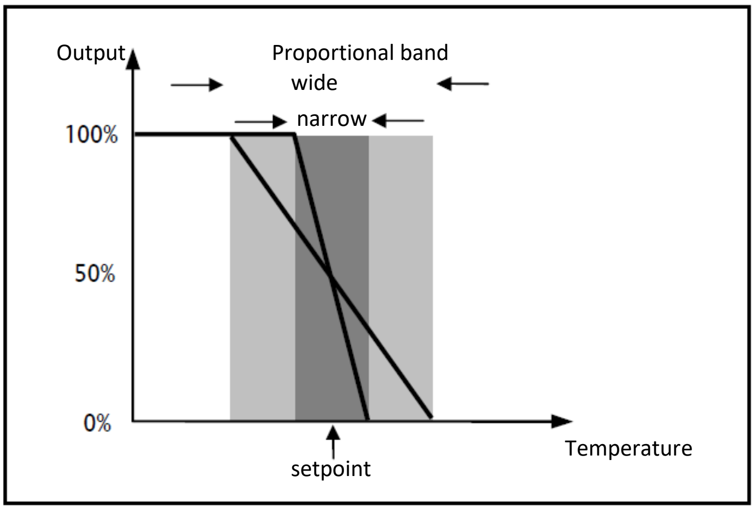
In the proportional component, the output function is proportional to the error (difference between setpoint and measured temperature).

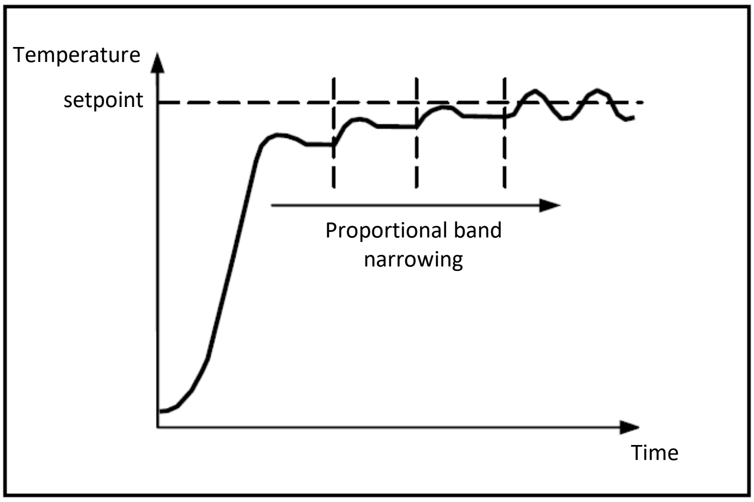
$$P_{\mathrm{out}} = K_p\, e(t)$$

Once the Proportional band [P23] has been defined, the duty-cycle varies between 0% and 100% within that band; outside the band, the duty-cycle will be maximum or minimum depending on the reference limit.

The width of the Proportional band [P23] determines the extent of the response to the error. If the band is too “narrow”, the system oscillates because it's highly reactive; if it's too “wide”, the control system is slow. The ideal situation is when the Proportional band [P23] is as narrow as possible without causing oscillations.

The diagram below shows the effect of narrowing the Proportional band [P23] as far as the oscillation point of the output function. A wide Proportional band [P23] appears as a straight line in the control, but with an initial error between the setpoint and the real perceptible temperature. As the band gradually becomes narrower, the temperature approaches the reference value (setpoint) until it becomes unstable and begins to oscillate around the value.





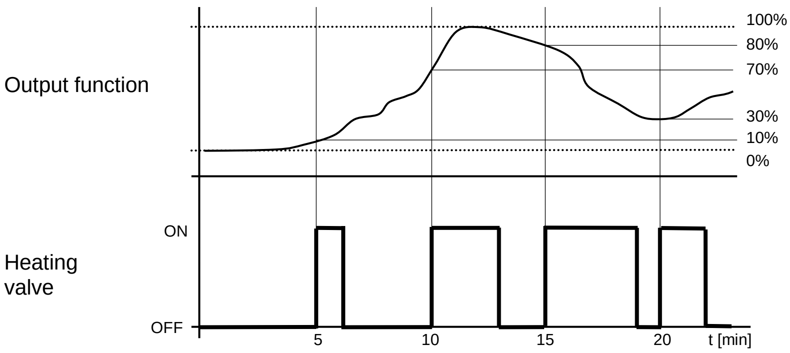
Integral component

The contribution of the integral period is proportional to the error (difference between setpoint and measured temperature) and its duration. The integral is the sum of the instantaneous error for every moment of time, and it provides the accumulated offset that should have been corrected previously. The accumulated error is then added to the regulator output.

$$I_{\mathrm{out}} = K_i \int_0^t e(\tau)\, d\tau$$

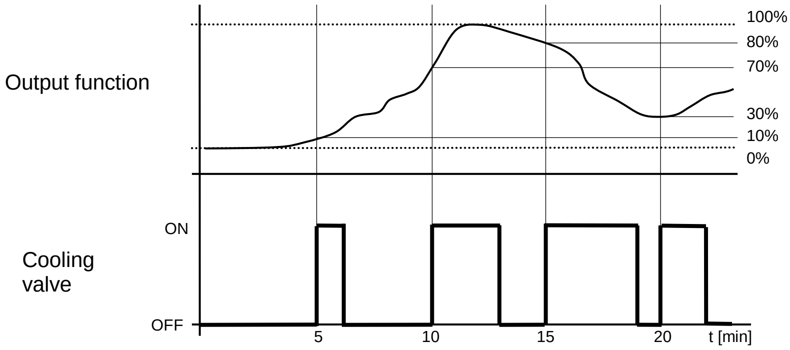
The integral period speeds up the process dynamics towards the setpoint and eliminates the residuals of the stationary error status that arises with a pure proportional controller.

Integration time [P24] is the parameter that determines the action of the integral component. The longer the Integration time [P24], the slower the modification of the output and hence the slower the system response. If the time is too short, the threshold value will be exceeded (overshoot) and the function will oscillate around the setpoint.



The device keeps the heating system switched on for a Cycle time [P10] percentage that depends on the output function of the proportional integral control; the device regulates the heating system continuously, modulating the system ON and OFF times with a duty-cycle (shown on the right, along the vertical axis) that depends on the value of the output function and is calculated at every time gap equal to the Cycle time [P10]. The Cycle time [P10] is only re-initialised if the mode (cooling/heating) changes, whereas nothing changes after a modification of the reference setpoint; in this case, there is an immediate reassessment of the output function and therefore of the ON/OFF status of the system within the Cycle time [P10].

With this type of algorithm, there is no longer a hysteresis cycle on the heating device, so the inertia times (system heating and cooling times) introduced by the 2-point control are eliminated. This produces energy savings because the system does not remain switched on when it's not needed and, once the required temperature has been reached, it continues to provide small heat contributions to compensate for the environmental heat dispersion.



As the diagram shows, the device keeps the cooling system switched on for a Cycle time [P10] percentage that depends on the output function of the proportional integral control; the device regulates the cooling system continuously, modulating the system ON and OFF times with a duty-cycle (shown on the right, along the vertical axis) that depends on the value of the output function and is calculated at every time gap equal to the Cycle time [P10]. The Cycle time [P10] is only re-initialised if the mode (cooling/heating) changes, whereas nothing changes after a modification of the reference setpoint; in this case, there is an immediate reassessment of the output function and therefore of the ON/OFF status of the system within the Cycle time [P10].

With this type of algorithm, there is no longer a hysteresis cycle on the cooling device, so the inertia times (system cooling and heating times) introduced by the 2-point control are eliminated. This produces energy savings because the system does not remain switched on when it's not needed and, once the required temperature has been reached, it continues to provide small contributions of cold air to compensate for the environmental heat contribution.

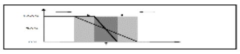
4.2.4 Continuous proportional integral

The algorithm used to manage the temperature control system allows you to drastically reduce the times subject to thermal inertia and introduced by the 2-point control, called continuous control. This type of control involves the continuous control of the difference between the measured temperature and the fixed setpoint, and therefore the sending of the commands for the modulation of the temperature control system power. Two components are needed to calculate the output function: the proportional component and the integral component.

$$u(t) = K_p e(t) + K_i \int_0^t e(\tau)\, d\tau$$

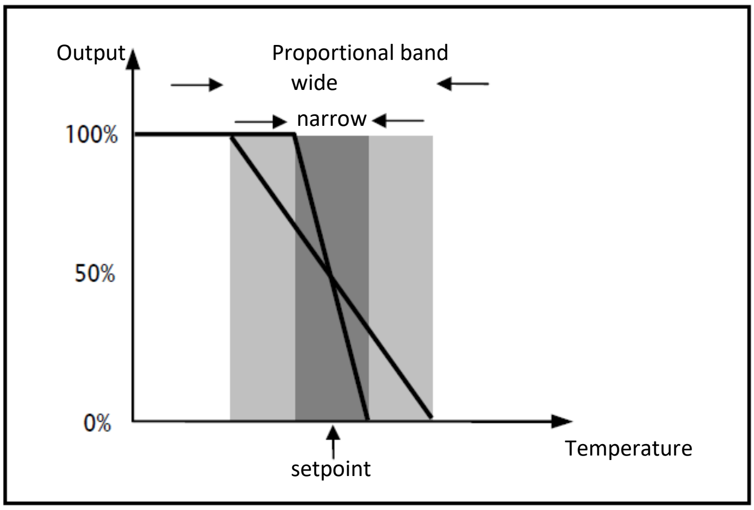
Proportional component

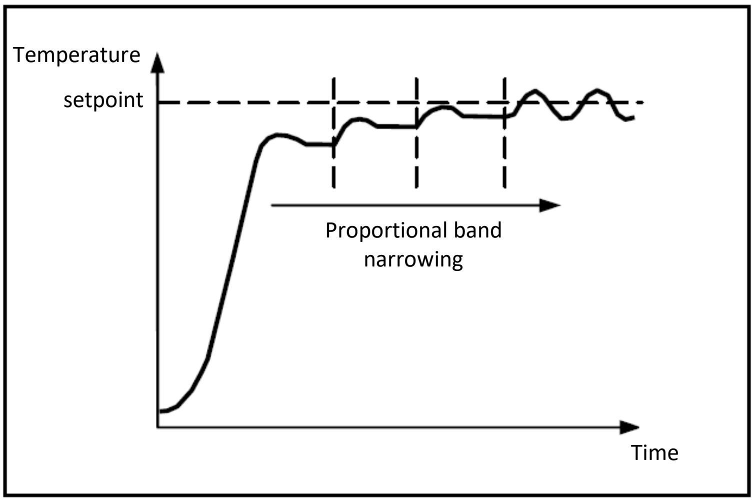
In the proportional component, the output function is proportional to the error (difference between setpoint and measured temperature).



Once the Proportional band [P23] has been defined, the output varies between 0% and 100% within that band; outside the band, the output will be at the maximum power or the minimum power depending on the reference limit.
The width of the Proportional band [P23] determines the extent of the response to the error. If the band is too “narrow”, the system oscillates because it's highly reactive; if it's too “wide”, the control system is slow. The ideal situation is when the Proportional band [P23] is as narrow as possible without causing oscillations.

The diagram below shows the effect of narrowing the Proportional band [P23] as far as the oscillation point of the output function. A wide Proportional band [P23] appears as a straight line in the control, but with an initial error between the setpoint and the real perceptible temperature. As the band gradually becomes narrower, the temperature approaches the reference value (setpoint) until it becomes unstable and begins to oscillate around the value.





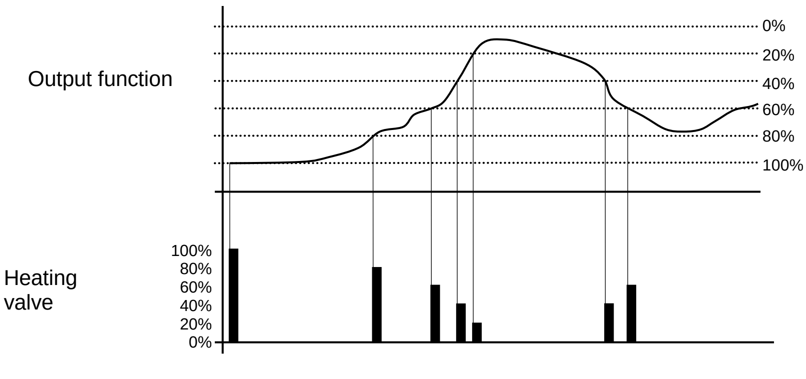
Integral component

The contribution of the integral period is proportional to the error (difference between setpoint and measured temperature) and its duration. The integral is the sum of the instantaneous error for every moment of time, and it provides the accumulated offset that should have been corrected previously. The accumulated error is then added to the regulator output.

$$I_{\text{out}} = K_i \int_0^t e(\tau)\, d\tau$$

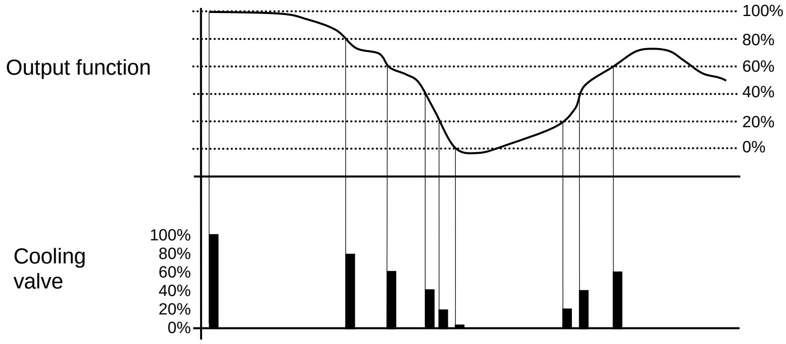
The integral period speeds up the process dynamics towards the setpoint and eliminates the residuals of the stationary error status that arises with a pure proportional controller.

Integration time [P24] is the parameter that determines the action of the integral component. The longer the Integration time [P24], the slower the modification of the output and hence the slower the system response. If the time is too short, the threshold value will be exceeded (overshoot) and the function will oscillate around the setpoint.



As can be seen in the figure, the device sends the commands to the actuator that manages the heating system on the basis of the output function of the proportional integral control; along the vertical axis, the 0% - 100% interval of the output function of the proportional integral control is divided into different levels with a distance equal to the value defined by the **“Min % variation for continuous sending [P11]”** parameter (in the figure, the value is **20%**) and the device continuously regulates the heating system by sending percentage solenoid valve activation values (shown along the vertical axis) that depend on the intersection of the output function value calculated with a specific level. In this way, the KNX BUS will not be saturated with continuous telegrams.

With this type of algorithm, there is no longer a hysteresis cycle on the heating device, so the inertia times (system heating and cooling times) introduced by the 2-point control are eliminated. This produces energy savings because the system does not remain switched on when it's not needed and, once the required temperature has been reached, it continues to provide small heat contributions to compensate for the environmental heat dispersion.



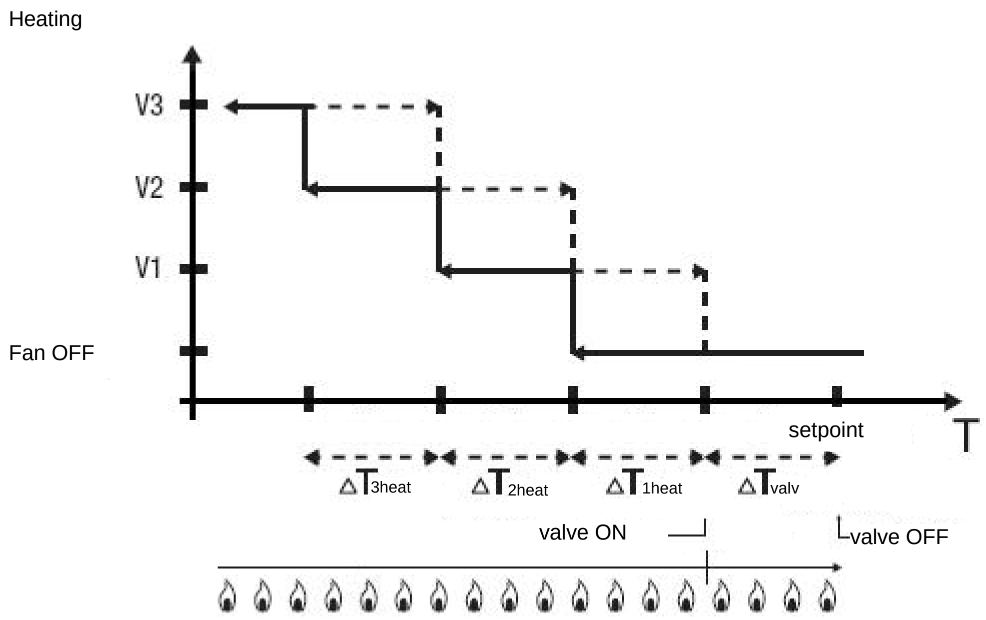
As can be seen in the figure, the device sends the commands to the actuator that manages the cooling system on the basis of the output function of the proportional integral control; along the vertical axis, the 0% - 100% interval of the output function of the proportional integral control is divided into different levels with a distance equal to the value defined by the **“Min % variation for continuous sending [P11]”** parameter (in the figure, the value is **20%**) and the device continuously regulates the cooling system by sending percentage solenoid valve activation values (shown along the vertical axis) that depend on the intersection of the output function value calculated with a specific level. In this way, the KNX BUS will not be saturated with continuous telegrams.

With this type of algorithm, there is no longer a hysteresis cycle on the cooling device, so the inertia times (system cooling and heating times) introduced by the 2-point control are eliminated. This produces energy savings because the system does not remain switched on when it's not needed and, once the required temperature has been reached, it continues to provide small contributions of cold air to compensate for the environmental heat contribution.

4.2.5 Fan coil with ON-OFF speed control (ON-OFF)

The type of control applied if enebled is selected for the **fan coil with ON-OFF speed control (ON-OFF)** algorithm is similar to the 2-point control explained in the previous sections - i.e. fan coil speed activation/deactivation on the basis of the difference between the defined setpoint and the measured temperature.

The basic difference compared with the 2-point algorithm is that, in this case, there isn't a single stage in which the hysteresis cycle is run (fixing the speed ON and OFF thresholds), but there may be three (depending on the Fan coil speed number). In short, this means that each stage corresponds to a speed, and when the difference between the measured temperature and the defined setpoint determines the activation of a certain speed, it can't be activated until the other two have been deactivated.



The figure shows fan coil speed control with three operating stages and two-point fan coil valve management (**ON-OFF** or **0-100%**) with regards heating. The charts shows that each stage has a hysteresis cycle, and each speed is associated with two thresholds that determine its activation and deactivation.

The thresholds are determined by the values set for the various regulation differentials, and can be summarised as follows:

- Speed V1 (1st stage): the speed is turned on when the temperature value is lower than the value "setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$" and turned off when the temperature value reaches the value "setpoint-ΔT_{valv}" (or the "setpoint" value if $\Delta T_{1\ heat}$=0). The first speed is also turned off when a higher speed needs to be activated
- Speed V2 (2nd stage): the speed is turned on when the temperature value is lower than the value "setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$" and turned off when the temperature value reaches the value "setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$". The second speed is also deactivated when speed V3 needs to be activated
- Speed V3 (3rd stage): the speed is turned on when the temperature value is lower than the value "setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$-$\Delta T_{3\ heat}$" and turned off when the temperature value reaches the value "setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$"

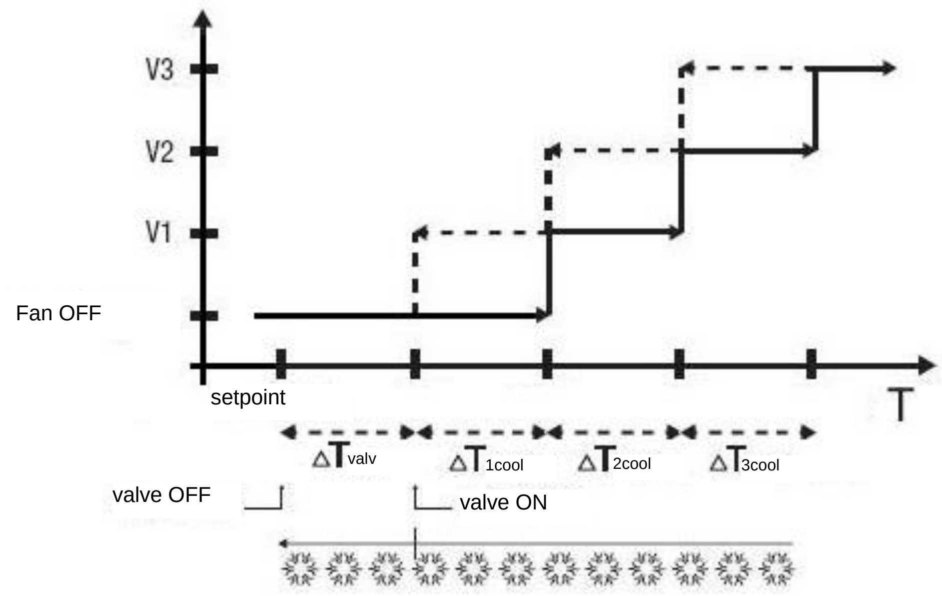
The heating solenoid valve is regulated on the basis of the management configured.

In the case of two-point fan coil valve management (**ON-OFF** or **0-100%)**, note that when the measured temperature is lower than the value "setpoint-ΔT_{valv}", the thermostat sends the activation command to the solenoid valve that manages the heating system; on the other hand, the solenoid valve is deactivated when the measured temperature reaches the defined setpoint value. In this way, the heating of the fan coil can also be exploited for irradiation, without any speed being activated.

In the case of fan coil valve management in **continuous proportional integral** mode, note that the thermostat begins the continuous regulation (with the setpoint as its reference) by sending the activation commands to the solenoid valve that manages the heating system on the basis of the values of the function used for continuous PI control.

Exploiting the fan action delay due to the "setpoint-ΔT_{valv}-$\Delta T1_{heat}$" threshold, and in particular ΔT_{valv} (where ΔT_{valv} is the result of the valve regulation differential or the Operation limit fan coil [tenths of °C] [P26] for two points ON-OFF / 0%-100% or continuous proportional integral management respectively), the heating of the fan coil can also be exploited for irradiation, without any speed being activated.

Air conditioning



The figure shows fan coil speed control with three operating stages and two-point fan coil valve management (**ON-OFF** or **0-100%**) with regards cooling. The charts shows that each stage has a hysteresis cycle, and each speed is associated with two thresholds that determine its activation and deactivation. The thresholds are determined by the values set for the various regulation differentials, and can be summarised as follows:

- Speed V1 (1st stage): the speed is turned on when the temperature value is higher than the value "setpoint+ΔT_{valv}+$\Delta T_{1\ cool}$" and turned off when the temperature value reaches the value "setpoint+ΔT_{valv}" (or the "setpoint" value if $\Delta T_{1\ cool}$=0). The first speed is also turned off when a higher speed needs to be activated
- Speed V2 (2nd stage): the speed is turned on when the temperature value is higher than the value "setpoint+ΔT_{valv}+$\Delta T_{1\ cool}$+$\Delta T_{2\ cool}$" and turned off when the temperature value reaches the value "setpoint+ΔT_{valv}+$\Delta T_{1\ cool}$". The second speed is also deactivated when speed V3 needs to be activated
- Speed V3 (3rd stage): the speed is turned on when the temperature value is higher than the value "setpoint+ΔT_{valv}+$\Delta T_{1\ cool}$+$\Delta T_{2\ cool}$+$\Delta T_{3\ cool}$" and turned off when the temperature value reaches the value "setpoint+ΔT_{valv}+$\Delta T_{1\ cool}$+$\Delta T_{2\ cool}$"

The heating solenoid valve is regulated on the basis of the management configured.

In the case of two-point fan coil valve management (**ON-OFF** or **0-100%**), note that when the measured temperature is higher than the value "setpoint+ΔT_{valv}", the thermostat sends the activation command to the solenoid valve that manages the cooling system; on the other hand, the solenoid valve is deactivated when the measured temperature reaches the defined setpoint value. In this way, the cooling of the fan coil can also be exploited for irradiation, without any speed being activated.

In the case of fan coil valve management in **continuous proportional integral** mode, note that the thermostat begins the continuous regulation (with the setpoint as its reference) by sending the activation commands to the solenoid valve that manages the cooling system on the basis of the values of the function used for continuous PI control.

Exploiting the fan action delay due to the "setpoint+ΔT_{valv}-$\Delta T1_{heat}$" threshold, and in particular ΔT_{valv} (where ΔT_{valv} is the result of the valve regulation differential or the Operation limit fan coil [tenths of °C] [P26] for wo points ON-OFF / 0%-100% or continuous proportional integral management respectively), the cooling of the fan coil can also be exploited for irradiation, without any speed being activated.

To avoid continuous switching, the thermostat can wait up to 2 minutes before sending the activation command to the actuator that controls the temperature control system (in the case of fan coil valve management in two points ON-OFF or 0-100% mode) or to the actuator channels that command the three fan coil speeds.

For the same reason, in the case of valve management with the continuous PI algorithm, the valve opening variation percentage is checked before sending the continuous activation command to the actuator that manages the temperature control system.

Both figures refer to three-stage fan coil speed control, as the descriptions are complete. For two-stage or single-stage control, the logic is the same but not all the speeds are controlled.

4.2.6 Fan coil with 0%-100% speed control (0-100%)

The operating principle of the algorithm that regulates continuous speed control is the same as for valve regulation with the continuous proportional integral algorithm.

This type of control involves the continuous control of the difference between the measured temperature and the fixed setpoint, and therefore the sending of the commands for the modulation of the temperature control system fan speed. Two components are needed to calculate the output function: the proportional component and the integral component. For the details of the algorithm, refer to the relative section. All the information holds true, with just one exception: the value regulated by this algorithm is no longer the opening of the valve, but the speed of the fan. To allow the operating mode that guarantees valve opening before fan activation, the start of continuous fan speed control can be delayed by checking the intervention threshold (**ΔT_{vent}**) Operation limit fan coil [tenths of °C] [P26].

The heating solenoid valve is regulated on the basis of the management configured.

In the case of two-point fan coil valve management (**ON-OFF** or **0-100%**), note that when the measured temperature is lower than the value “setpoint-ΔT_{valv}”, the thermostat sends the activation command to the solenoid valve that manages the heating system; on the other hand, the solenoid valve is deactivated when the measured temperature reaches the defined setpointvalue. Thanks to the delay introduced by the intervention threshold Operation limit fan coil [tenths of °C] [P26], (which in practice shifts the reference of the continuous fan speed control of “setpoint-ΔT_{valv}-ΔT_{vent}”), the heating of the fan coil can also be exploited for irradiation, without fan speed regulation being activated.

In the case of fan coil valve management in **continuous proportional integral** mode, note that the thermostat begins the continuous regulation (with the setpoint as its reference) by sending the activation commands to the solenoid valve that manages the heating system on the basis of the values of the function used for continuous PI control. Thanks to the delay introduced by the intervention threshold Operation limit fan coil [tenths of °C] [P26] (which in practice shifts the reference of the continuous fan speed control of “setpoint-ΔT_{vent}”), the heating of the fan coil can also be exploited for irradiation, without fan speed regulation being activated.
The cooling solenoid valve is regulated on the basis of the management configured.

In the case of two-point fan coil valve management (**ON-OFF** or **0-100%**), note that when the measured temperature is higher than the value “setpoint+ΔT_{valv}”, the thermostat sends the activation command to the solenoid valve that manages the cooling system; on the other hand, the solenoid valve is deactivated when the measured temperature reaches the defined setpointvalue. Thanks to the delay introduced by the intervention threshold Operation limit fan coil [tenths of °C] [P26], which in practice shifts the reference of the continuous fan speed control of “setpoint+ΔT_{valv}+ΔT_{vent}”, the of the fan coil heating can also be exploited for irradiation, without fan speed regulation being activated.

In the case of fan coil valve management in **continuous proportional integral** mode, note that the thermostat begins the continuous regulation (with the setpoint as its reference) by sending the activation commands to the solenoid valve that manages the cooling system on the basis of the values of the function used for continuous PI control. Thanks to the delay introduced by the intervention threshold Operation limit fan coil [tenths of °C] [P26], which in practice shifts the reference of the continuous fan speed control of “setpoint+ΔT_{vent}”, the cooling of the fan coil can also be exploited for irradiation, without fan speed regulation being activated.

To coordinate the action of the fan with the opening of the valve, pay attention to the threshold values defined to delay the various interventions. Otherwise it may be difficult to guarantee that fan speed activation is always delayed in relation to the opening of the valve.

5 “Heating” menu

The **Heating** menu contains the characteristic parameters of the load control algorithms for the heating system. The parameters in this window vary dynamically according to the setting made in the **Main** menu.

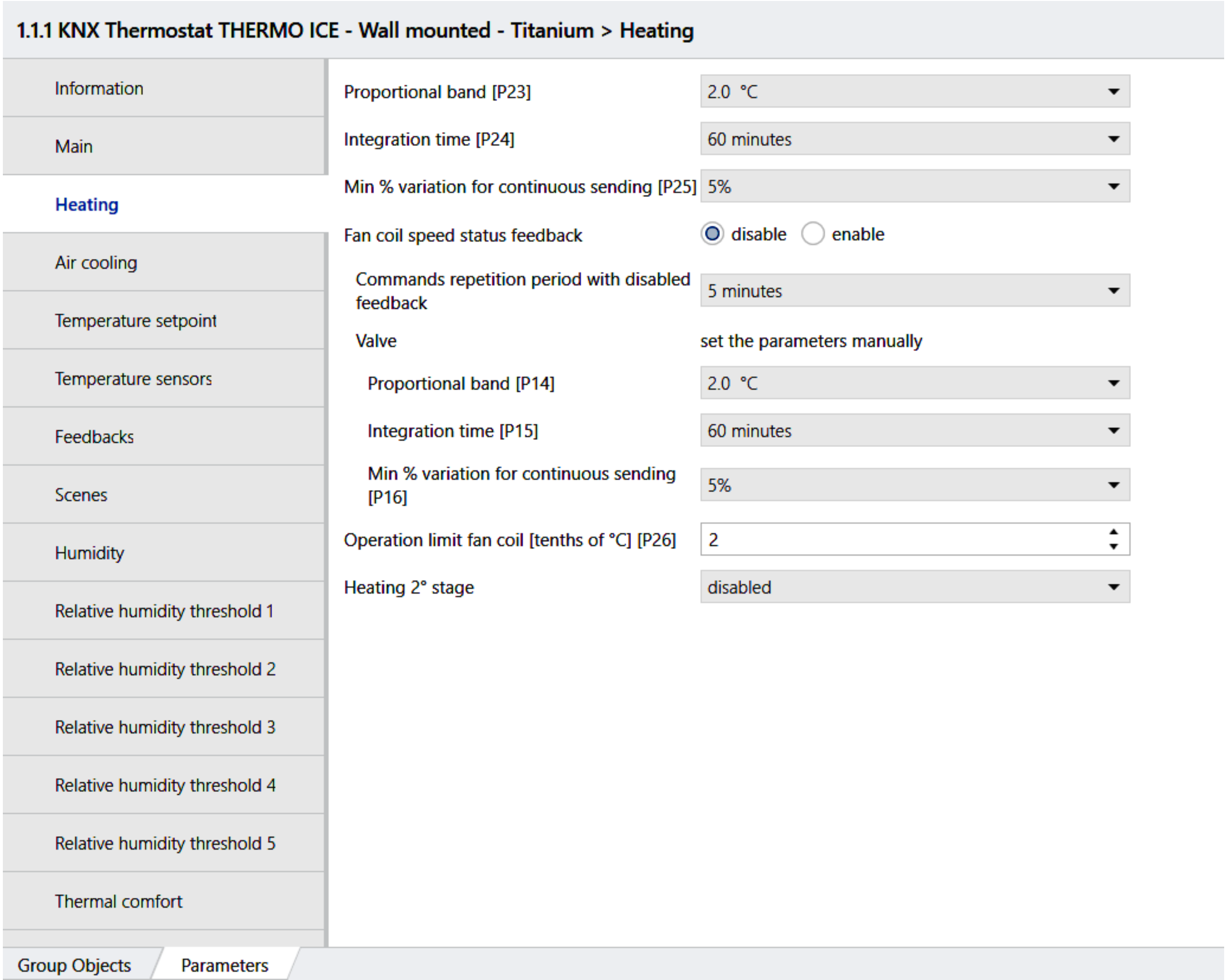


Fig. 5.1 – “Heating” menu

5.1 *Parameters of the*

The parameters shown in this window will depend on the settings of the parameters in the **Main** menu with regards the Heating system.

5.1.1 Regulation parameters for the heating valve

The **“Regulation differential [tenths of °C] [P12]”** parameter sets the value of the regulation differential of the **two points ON-OFF** or **two points 0%-100%** control algorithm for heating (already explained in the Algoritmi di controlloControl algorithms section) which, subtracted from the defined setpoint value, determines the value of the threshold above which the heating system is activated in two-point control mode. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

The **“Select heating system”** parameter automatically sizes the operating parameters (Proportional band [P23] and Integration time [P24]) of the proportional integral algorithm according to the heating system selected. The values that can be set are:

- hot water heating
- **floor heating (valore di default)**
- fan coil
- electrical heating
- set the parameters manually

If **hot water heating** is selected, the **“Proportional band [P8]”** and **“Integration time [P9]”** parameters will be visible (but not modifiable) and will show the values **3.5°C** and **150 minutes**.

If **floor heating** is selected, the **“Proportional band [P8]”** and **“Integration time [P9]”** parameters will be visible (but not modifiable) and will show the values **3.5°C** and **240 minutes**.

If **fan coil** is selected, the **“Proportional band [P8]”** and **“Integration time [P9]”** parameters will be visible (but not modifiable) and will show the values **3.0°C** and **90 minutes**.

If **electrical heating** is selected, the **“Proportional band [P8]”** and **“Integration time [P9]”** parameters will be visible (but not modifiable) and will show the values **3.0°C** and **100 minutes**.

If **set the parameters manually** is selected, the **“Proportional band [P8]”** and **“Integration time [P9]”** parameters will be visible and modifiable.

It's not necessary to save the **“Select heating system”** parameter in the memory.

The **“Proportional band [P8]”** parameter sets the width of the Proportional band [P23] of the **integral proportional PWM** or **continuous proportional integral** control algorithm for heating (already explained in the Algoritmi di controlloControl algorithms section) which, subtracted from the defined setpoint value, determines the lower limit of the Proportional band [P23] used for proportional integral control. The values that can be set are:

- 1.0°C
- 1.5°C
- **2.0°C (default value)**
- 2.5°C
- 3.0°C
- 3.5°C
- 4.0°C
- 4.5°C
- 5.0°C
- 5.5°C
- 6.0°C
- 6.5°C
- 7.0°C
- 7.5°C
- 8.0°C
- 8.5°C
- 9.0°C
- 9.5°C
- 10.0°C

The **“Integration time [P9]”** parameter sets the contribution of the integral action in proportional integral control (see the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 minute to 250 minutes in steps of 1, plus the “no integral” value (0) **60 (default value)**

If **no integral** is selected, the integral component is zero and the effect of pure proportional control is obtained.

The **“Cycle time [P10]”** parameter sets the value of the period in which the device carries out PWM modulation, modifying the duty-cycle. The values that can be set are:

- 5 minutes
- 10 minutes
- 15 minutes
- **20 minutes (default value)**
- 30 minutes
- 40 minutes
- 50 minutes
- 60 minutes

The **“Min % variation for continuous sending [P11]”** parameter sets minimum variation value for the command percentage value (in relation to the last command sent) for generating the transmission of the command itself. The values that can be set are:

- 1%
- 2%
- 3%
- 4%
- **5% (default value)**
- 10%
- 20%

Basically, this value also determines the number of proportional sub-bands within which the device defines the power value to be sent to the system (see the Algoritmi di controlloControl algorithms section). There is no fixed number of proportional sub-bands, as it depends on the value set for this item.

5.1.2 Regulation parameters for the fan coil heating valve

If the control algorithm is "fan coil", the format of the heating/solenoid valve commands (4-way system) is not linked to that of the fan coil speed control algorithm. The **“Fan coil valve management”** parameter defines the solenoid valve control logic when the selected algorithm is "fan coil". The values that can be set are:

- **two points ON-OFF (default value)**
- two points 0%-100%
- continuous proportional integral

Selecting **two points ON-OFF** visualises the communication objects ***Heating valve switch*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams.

Selecting **two points 0%-100%** visualises the communication objects ***% command valve heating*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams.

Selecting **continuous proportional integral** visualises the communication objects ***% command valve heating*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams to the solenoid valve.

The **“Regulation differential valve [tenths of °C] [P13]”** parameter sets the value of the regulation differential of the two-point control of the solenoid valve for fan coil operation (already explained in the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

The **“Proportional band [P14]”**, **“Integration time [P15]”**, **“Min % variation for continuous sending [P16]”** parameters set, respectively, the Proportional band [P23] width, the contribution of the integral action and the value of the minimum variation of the command percentage value (in relation to the last command sent) for generating the transmission of the command of the **continuous proportional integral** control algorithm for heating. For the details of the permitted values, refer to the parameters listed above to see the operating mode without fan coil management (par. 5.1.1).

In the case of fan coil valve management in **continuous proportional integral** mode and **fan coil with ON-OFF speed control** (and in any case with **fan coil with 0%-100% speed control),**, the **“Operation limit fan coil [tenths of °C] [P26]”** parameter will be visualised.

The **“Operation limit fan coil [tenths of °C] [P26]”** parameter defines the fan coil intervention threshold without the activation of the fan. It therefore allows you to set the delay for fan activation in relation to valve activation, basically shifting the reference of the fan speed control (see the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

5.1.3 Regulation parameters for the fan coil speed

The fan coil speed configuration parameters change according to the setting made for the **Heating control algorithm** parameter in the **Main** menu.

5.1.3.1 3-speed ON/OFF fan speed management

In the case of 3-speed ON/OFF fan speed management, the following parameters are available.

The **“Fan coil speed number”** parameter sets the number of stages for fan coil speed control on the basis of the type of fan coil used. The values that can be set are:

- 1

Setting this value, the number of stages for controlling the fan coil speeds is 1. The **“Regulation differential speed 1 [tenths of °C] [P17]”** and **“Speed 1 inertia time (seconds) [P20]”** parameters are visualised, along with the ***V1 fan switching heating*** (Data Point Type: 1.001 DPT_Switch) and ***Heating fan speed %*** (Data Point Type: 5.001 DPT_Scaling) communication objects, to control the first (and only) fan coil speed.

- 2

Setting this value, the number of stages for controlling the fan coil speeds is 2. The **“Regulation differential speed 1 [tenths of °C] [P17]”**, **“Regulation differential speed 2 [tenths of °C] [P18]”**, **“Speed 1 inertia time (seconds) [P20]”** and **“Speed 2 inertia time (seconds) [P21]”** parameters are visualised, along with the ***V1 fan switching heating*** and ***V2 fan switching heating*** (Data Point Type: 1.001 DPT_Switch) and ***Heating fan speed %*** (Data Point Type: 5.001 DPT_Scaling) communication objects, to control the first and second fan coil speed respectively.

- **3 (default value)**

Setting this value, the number of stages for controlling the fan coil speeds is 3. The **“Regulation differential speed 1 [tenths of °C] [P17]”**, **“Regulation differential speed 2 [tenths of °C] [P18]”**, **“Regulation differential speed 3 [tenths of °C] [P19]”**, **“Speed 1 inertia time (seconds) [P20]”**, **“Speed 2 inertia time (seconds) [P21]”** and **“Speed 3 inertia time (seconds) [P22]”** parameters are visualised, along with the ***V1 fan switching heating***, ***V2 fan switching heating*** and ***V3 fan switching heating*** (Data Point Type: 1.001 DPT_Switch) and ***Heating fan speed %*** (Data Point Type: 5.001 DPT_Scaling) communication objects, to control the first, second and third fan coil speeds respectively.

The **“Regulation differential speed 1 [tenths of °C] [P17]”** parameter sets the value of the regulation differential of the first speed of the **fan coil with ON-OFF speed control (ON-OFF)** control algorithm for heating (already explained in the Algoritmi di controlloControl algorithms section). This value, subtracted from the value “setpoint-ΔT_{valv}”, determines the threshold value below which fan coil speed 1 is activated. The values that can be set are:

- from 0 to 20 in steps of 1 **(default value 2)**

Setting the value **0** produces the condition “$\Delta T_{1\ heat}=\Delta T_{valv}$”, so the speed 1 activation threshold value is “setpoint-ΔT_{valv}” and the deactivation value is “setpoint”.

The **“Regulation differential speed 2 [tenths of °C] [P18]”** parameter sets the value of the regulation differential of the first speed of the **fan coil with ON-OFF speed control (ON-OFF)** control algorithm for heating (already explained in the Algoritmi di controlloControl algorithms section). This value, subtracted from the value “setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$”, determines the threshold value below which fa coil speed 2 is activated. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

The **“Regulation differential speed 3 [tenths of °C] [P19]”** parameter sets the value of the regulation differential of the first speed of the **fan coil with ON-OFF speed control (ON-OFF)** control algorithm for heating (already explained in the Algoritmi di controlloControl algorithms section). This value, subtracted from the value “setpoint-ΔT_{valv}-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$”, determines the threshold value below which fan coil speed 3 is activated. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

When, according to the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the device has to activate any speed and speed 1 is already active, a delay can be inserted between the moment when speed 1 deactivation feedback is received (or the moment when the speed 1 deactivation command is sent, if fan coil speed feedback is disbabled) and the moment when the activation command for the new speed is sent. The **“Speed 1 inertia time (seconds) [P20]”** parameter defines the extent of the delay between speed 1 deactivation and the activation of the new speed. The values that can be set are:

- from **0 (default value)** to 10, in steps of 1

When, according to the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the device has to activate any speed and speed 2 is already active, a delay can be inserted between the moment when speed 2 deactivation feedback is received (or the moment when the speed 2 deactivation command is sent, if fan coil speed feedback is disabled) and the moment when the activation command for the new speed is sent. The **“Speed 2 inertia time (seconds) [P21]”** parameter defines the extent of the delay between speed 1 deactivation and the activation of the new speed. The values that can be set are:

- from **0 (default value)** to 10, in steps of 1

When, according to the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the device has to activate any speed and speed 3 is already active, a delay can be inserted between the moment when speed 3 deactivation feedback is received (or the moment when the speed 3 deactivation command is sent, if fan coil speed feedback is disbabled) and the moment when the activation command for the new speed is sent. The **“Speed 3 inertia time (seconds) [P22]”** parameter defines the extent of the delay between speed 3 deactivation and the activation of the new speed. The values that can be set are:

- from **0 (default value)** to 10, in steps of 1

The definition of the inertia times is useful for maintaining the good condition of the fan coil, because the fact of turning off the power supply to the motor (turning off the actuator) of a fan coil speed does not guarantee that current is no longer circulating in the winding, and the instantaneous supply of power to another winding could damage the fan coil (simultaneous powering of multiple windings).

5.1.3.2 0-100% fan speed management with continuous PI control

If fan speed management is 0-100% with continuous PI control, the following parameters are available along with the communication objects ***Heating fan speed %*** (Data Point Type: 5.001 DPT_Scaling) via which the device sends the command telegrams for regulating the fan coil speed.

The **“Proportional band [P23]”** parameter sets the width of the Proportional band [P23] of the or **continuous proportional integral** control algorithm for (already explained in the Algoritmi di controlloControl algorithms section) which, subtracted from the defined setpoint value, determines the lower limit of the Proportional band [P23] used for proportional integral control. The values that can be set are:

- 1.0°C
- 1.5°C
- **2.0°C (default value)**
- 2.5°C
- 3.0°C
- 3.5°C
- 4.0°C
- 4.5°C
- 5.0°C
- 5.5°C
- 6.0°C
- 6.5°C
- 7.0°C
- 7.5°C
- 8.0°C
- 8.5°C
- 9.0°C
- 9.5°C
- 10.0°C

The **“Integration time [P24]”** parameter sets the contribution of the integral action in proportional integral control (see the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 minute to 250 minutes in steps of 1, plus the “no integral” value (0) **60 (default value)**

If **no integral** is selected, the integral component is zero and the effect of pure proportional control is obtained.

The **“Min % variation for continuous sending [P25]”** parameter sets minimum variation value for the command percentage value (in relation to the last command sent) for generating the transmission of the command itself. The values that can be set are:

- 1%
- 2%
- 3%
- 4%
- **5% (default value)**
- 10%
- 20%

Basically, this value also determines the number of proportional sub-bands within which the device defines the power value to be sent to the system (see the Algoritmi di controlloControl algorithms section). There is no fixed number of proportional sub-bands, as it depends on the value set for this item.

5.1.4 Valve status feedback parameters

The **“Heating valve status feedback”** parameter allows you to enablethe device to receive feedback from the actuator that commands the heating solenoid valve. In this way, the device can receive the telegram stating that the solenoid valve has been switched over, and repeat the command if the switching did not effectively take place. The values that can be set are:

- disable
- **enable (default value)**

If **disable** is selected, the **“Commands repetition period with disabled feedback”** parameter is displayed. If **enable** is selected, the communication objects ***Heating valve status feedback*** (Data Point Type: 1.001 DPT_Switch) is visualised if the valve control algorithm is **two points ON-OFF** or **integral proportional PWM**, or ***Heating valve % feedback*** (Data Point Type: 5.001 DPT_Scaling) if the valve control algorithm is **two points 0%-100%** or **continuous proportional integral**.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via theobject ***Heating valve status feedback*** or ***Heating valve % feedback*** for an update of the status of the heating solenoid valve. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the actuators.
If feedback is enabled, the device sends the switching command to the solenoid valve and then waits for one minute (on its internal clock) for the actuator to send confirmation of the effective switching; if this does not happen, it sends the command to the solenoid valve once every minute until it receives confirmation of correct switching. It may be that, during normal temperature control operation, the actuator status is changed by an entity outside the thermostat which forces and modifies its status. In this case, the device repeats the valve switching command to realign the actuator status with the one determined by the thermostat control logic, triggering the process of confirmation standby and repeated command until confirmation is received. In the same way, if the control algorithm is working in heating mode and feedback is received that the cooling valve has been activated, the algorithm is immediately suspended and the cooling valve deactivation command is sent (triggering the process of confirmation standby and repeated command until confirmation is received) until the anomaly is resolved.

In the particular case of the continuous proportional integral control algorithm, the feedback received may differ from the command sent by about ± 2% (±6 units on a scale of 255). In this way, if the actuator that controls the valve sends a value differing slightly from the one requested by the thermostat (for reasons of approximation), operation is still guaranteed and the process of periodically sending the command is not triggered.

With cooling solenoid valve status feedback heating disbabled, it may be useful to cyclically repeat the command to the actuator that manages the solenoid valve so that, if the first command telegram gets lost, one of the subsequent ones will sooner or later be received.

The **“Commands repetition period with disabled feedback”** parameter defines the cyclical transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes (default value)**

5.1.5 Fan speed status feedback parameters

If the control algorithm is "fan coil", the possibility to receive feedback about fan coil speed activation status is even more important than valve feedback. By enabling feedback, the device is always aware of the status of the speeds it commands; in fact, if a command is sent to the actuator that manages a certain speed and the actuator does not send the thermostat confirmation of effective command execution within one minute, the device sends the command again every minute until correct confirmation is received from the actuator.

As the system does not always have actuators specifically dedicated to the fan coil, with mechanically interlocked outputs, it is necessary implement the logic interlock function at firmware level so that a fan coil speed other than the current one can only be activated if the correct feedback about current speed deactivation has been received (provided that speed feedback is enabled). As long as the thermostat does not receive the active speed deactivation feedback, it does not send the command to activate the new speed as this would mean multiple fan coil windings being powered at the same time, causing the fan coil to break.

The **"Fan coil speed status feedback"** parameter allows you to enable the device to receive feedback from the actuator that commands the fan coil speeds. The values that can be set are:

- disable
- **enable (default value)**

If **disable** is selected, the **"Commands repetition period with disabled feedback"** parameter is displayed. Selecting **enable** visualises the following communication objects: ***Heating fan V1 status feedback***, ***Heating fan V2 status feedback*** *and* ***Heating fan V3 status feedback*** (Data Point Type: 1.001 DPT_Switch) and ***Heating fan speed % feedback*** (Data Point Type: 5.001 DPT_Scaling) in the case of ON-OFF speed control, whereas continuous speed control visualises the communication objects ***Heating fan speed % feedback*** (Data Point Type: 5.001 DPT_Scaling) only.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via the objects ***Heating fan V1 status feedback***, ***Heating fan V2 status feedback***, ***Heating fan V3 status feedback*** or ***Heating fan speed % feedback*** for an update of the fan coil speed activation status. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the actuators.

If fan coil feedback is disbabled, and only with the **ON-OFF (3-speed)** fan speed control algorithm using the 1 bit ***V1 fan switching heating***, ***V2 fan switching heating, V3 fan switching heating*** (Data Point Type: 1.001 DPT_Switch) communication objects, for every speed activation command it is necessary to send deactivation commands for the non-active speeds. In the same way, every speed deactivation command must be sent together with deactivation commands for the other speeds. This is not necessary if the byte object with % value (***Heating fan speed %***) activation command is used.

The **"Commands repetition period with disabled feedback"** parameter defines the cyclical fan coil speed transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes (default value)**

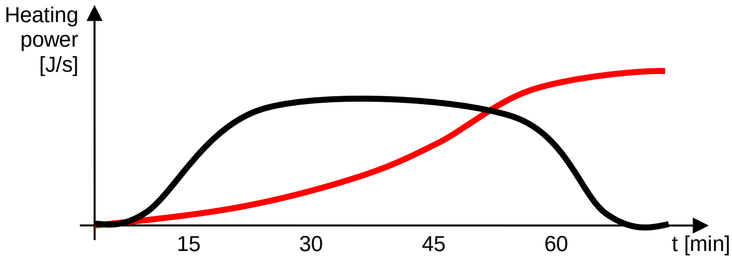
In the particular case of **fan coil with ON-OFF speed control (ON-OFF)**, the commands are repeated on all the speed communication objects.

If the communication objects ***Heating fan speed % feedback*** (Data Point Type: 5.001 DPT_Scaling) is used, the feedback received may differ from the command sent by about ± 2% (±6 units on a scale of 255). In this way, if the actuator that controls the fan speed sends a value differing slightly from the one requested by the thermostat (for reasons of approximation), operation is still guaranteed and the process of periodically sending the command is not triggered.

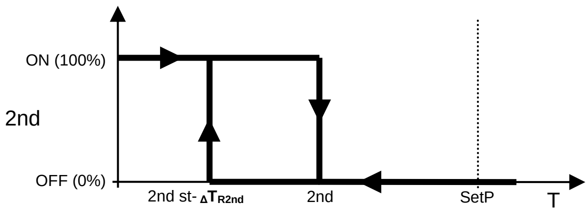
In the case of speed control with the ON-OFF (3-speed) algorithm, the use of the commands with the relative feedback on bit communication objects with ON-OFF value (***Heating fan V1 (V2, V3) status feedback***) is always recommended. This is because the misalignment between the % fan coil command values and those returned with the relative status feedback may be greater than the ± 2% limit value (±6 units on a scale of 255) used to evaluate the retransmission of the speed command. The use of both types of communication object to receive the fan speed status is considered a configuration error. If the relative commands are not connected as well, an error will therefore be signalled.

5.1.6 Second stage heating

Some heating systems (e.g. floor heating) have a very marked inertia level and take a long time to bring the room temperature into line with the required setpoint. To reduce this inertia, another heating system with less inertia is often installed to help the main system to heat the room when the difference between setpoint and measured temperature is particularly high. This system, known as "2nd stage", helps to heat the room during the initial phase and then stops working when the setpoint-temperature difference can be managed more quickly.



The second stage control algorithm can only be of the 2-point type (either ON-OFF or 0%-100%, as preferred), and the second stage intervention thresholds are as follows:



When the measured temperature is lower than the value “2° st- $\Delta T_{R2nd\ st}$” (where $\Delta T_{R2nd\ st}$ identifies the value of the regulation differential for Heating 2° stage), the device activates 2nd stage heating by sending the relative BUS command to the actuator that manages it. When the measured temperature reaches the “2nd st” value (defined by Setpoint-Operation limit 2° stage [tenths of °C]), the device deactivates 2nd stage heating by sending the relative BUS command to the actuator that manages it.

This diagram clearly shows that there are two decision thresholds for activating and deactivating 2nd stage heating. The first is the value “2nd st- $\Delta T_{R2nd\ st}$”, below which the device activates the system; the second is the value “2nd st”, above which the device deactivates the system.

The **“Heating 2° stage”** parameter enables and defines the control algorithm for 2nd stage heating. The values that can be set are:

- **disabled** **(default value)**
- enable two points control ON-OFF
- enable two points control 0%-100%

Selecting any value other than **disabled**, the **“Operation limit 2° stage [tenths of °C]”**, **“Regulation differential 2° stage [tenths of °C] [P27]”** e **“Heating 2° stage feedback”** parameters will be displayed. Selecting **enable 2 points control ON-OFF** visualises the communication objects ***Heating 2° stage switching*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams. Selecting **enable 2 points control 0%-100%**, visualises the communication objects ***% command 2° stage heating*** (Data Point Type: 5.001 DPT_Scaling) , via which the device sends the command telegrams.

The **“Operation limit 2° stage [tenths of °C]”** parameter defines the 2nd stage heating intervention threshold. The value set for this parameter, when subtracted from the setpoint currently in use, determines the upper limit (**2nd St** in the chart above) beyond which 2nd stage operation is deactivated. The values that can be set are:

- from **10 (default value)** to 100, in steps of 1

The **“Regulation differential 2° stage [tenths of °C] [P27]”** parameter sets the value of the regulation differential of the Heating 2° stage control algorithm which, subtracted from the “setpoint-intervention limit” value, determines the value of the threshold (**2nd st-** $_{\Delta}T_{R2nd\ st}$ in the chart above) below which the 2° heating system is activated in 2-point control. The values that can be set are:

- from 1 to 20 in steps of 1 (default value 2)

As for the standard heating algorithm, the **“Heating 2° stage feedback”** parameter allows you to enable the device to receive feedback from the actuator that commands 2nd stage heating. In this way, the device can receive the switching telegram from the actuator and repeat the command if the switching did not effectively take place. The values that can be set are:

- disable
- **enable (default value)**

If **disable** is selected, the **“Command repetition time 2° stage without feedback”** parameter is displayed. If **enable** is selected, the communication objects ***Heating 2° stage feedback*** (Data Point Type: 1.001 DPT_Switch) is visualised if the 2nd stage control algorithm is **two points ON-OFF**, or ***Heating 2° stage valve % feedback*** (Data Point Type: 5.001 DPT_Scaling) if the control algorithm is **two points 0%-100%**.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via theobject ***Heating 2° stage feedback*** or ***Heating 2° stage valve % feedback*** for an update of the second stage di heating status. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the actuators.

With feedback enabled, the device sends the switching command and then waits for one minute (on its internal clock) for the actuator to send confirmation of the effective switching; if this does not happen, it sends the command once every minute until it receives confirmation of correct switching. It may be that, during normal temperature control operation, the status of the actuator that manages the 2nd stage is changed by an entity outside the thermostat which forces and modifies its status. In this case, the device repeats the switching command to realign the status of the actuator with the one determined by the control logic, triggering the process of waiting for confirmation and repeating the command until the confirmation is received.

With 2nd stage cooling status feedback heating disbabled, it may be useful to cyclically repeat the command to the actuator so that, if the first command telegram gets lost, one of the subsequent ones will sooner or later be received. The **“Command repetition time 2° stage without feedback”** parameter defines the cyclical transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes (default value)**

6 “Air-Cooling” menu

The **Air-Cooling** menu contains the characteristic parameters of the load control algorithms for the cooling system. The parameters in this window vary dynamically according to the setting made in the **Main** menu.

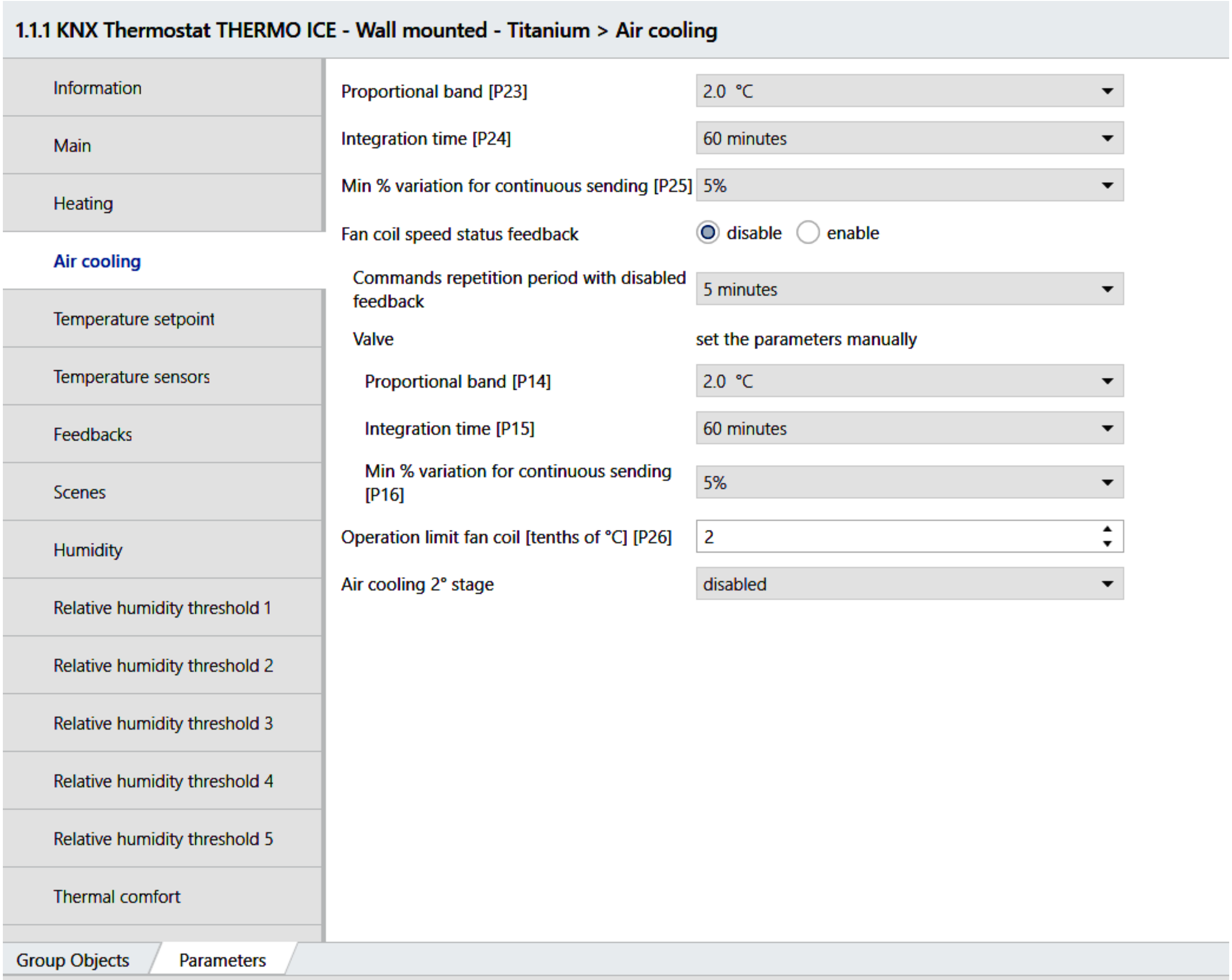


Fig. 6.1 – “Air-Cooling” menu

6.1 *Parameters of the*

The parameters shown in this window will depend on the settings of the parameters in the **Main** menu with regards the Cooling system.

6.1.1 **Regulation parameters for the cooling** valve

The **“Regulation differential [tenths of °C] [P12]”** parameter sets the value of the regulation differential of the **two points ON-OFF**or **two points 0%-100%**control algorithm for cooling (already explained in the Algoritmi di controlloControl algorithms section) which, subtracted from the defined setpoint value, determines the value of the threshold above which the cooling system is activated in two-point control mode. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

The **"Select air cooling system"** parameter automatically sizes the operating parameters (Proportional band [P23] and Integration time [P24]) of the proportional integral algorithm according to the cooling system selected. The values that can be set are:

- **ceiling cooling (default value)**
- fan coil
- set the parameters manually

If **ceiling cooling** is selected, the **"Proportional band [P8]"** and **"Integration time [P9]"** parameters will be visible (but not modifiable) and will show the values **5.0°C** and **240 minutes**.

If **fan coil** is selected, the **"Proportional band [P8]"** and **"Integration time [P9]"** parameters will be visible (but not modifiable) and will show the values **4.0°C** and **90 minutes**.

If **set the parameters manually** is selected, the **"Proportional band [P8]"** and **"Integration time [P9]"** parameters will be visible and modifiable.

It's not necessary to save the **"Select air cooling system"** parameter in the memory.

The **"Proportional band [P8]"** parameter sets the width of the Proportional band [P23] PWM of the **integral proportional PWM** or **continuous proportional integral** control algorithm for cooling (already explained in the Algoritmi di controlloControl algorithms section) which, subtracted from the defined setpoint value, determines the lower limit of the Proportional band [P23] used for proportional integral control. The values that can be set are:

- 1.0°C
- 1.5°C
- **2.0°C** **(default value)**
- 2.5°C
- 3.0°C
- 3.5°C
- 4.0°C
- 4.5°C
- 5.0°C
- 5.5°C
- 6.0°C
- 6.5°C
- 7.0°C
- 7.5°C
- 8.0°C
- 8.5°C
- 9.0°C
- 9.5°C
- 10.0°C

The **"Integration time [P9]"** parameter sets the contribution of the integral action in proportional integral control (see the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 minute to 250 minutes in steps of 1, plus the value "no integral" (0) **(default value 60)**

If **no integral** is selected, the integral component is zero and the effect of pure proportional control is obtained.

The **"Cycle time [P10]"** parameter sets the value of the period in which the device carries out PWM modulation, modifying the duty-cycle. The values that can be set are:

- 5 minutes
- 10 minutes
- 15 minutes
- 20 minutes
- **30 minutes (default value)**
- 40 minutes
- 50 minutes
- 60 minutes

The **"Min % variation for continuous sending [P11]"** parameter sets minimum variation value for the command percentage value (in relation to the last command sent) for generating the transmission of the command itself. The values that can be set are:

- 1%
- 2%
- 3%
- 4%
- **5% (default value)**
- 10%
- 20%

Basically, this value also determines the number of proportional sub-bands within which the device defines the power value to be sent to the system (see the Algoritmi di controlloControl algorithms section). There is no fixed number of proportional sub-bands, as it depends on the value set for this item.

6.1.2 Regulation parameters for the fan coil cooling valve

If the control algorithm is "fan coil", the format of the cooling/solenoid valve commands (4-way system) is not linked to that of the fan coil speed control algorithm. The **"Fan coil valve management"** parameter defines the solenoid valve control logic when the selected algorithm is "fan coil". The values that can be set are:

- **two points ON-OFF (default value)**
- two points 0%-100%
- continuous proportional integral

Selecting **two points ON-OFF** visualises the communication objects ***Air cooling valve switch*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams.

Selecting **two points 0%-100%** visualises the communication objects ***% command valve air cooling*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams.

Selecting **continuous proportional integral** visualises the communication objects ***% command valve air cooling*** (Data Point Type: 5.001 DPT_Scaling), via which the device sends the command telegrams to the solenoid valve.

The **"Regulation differential valve [tenths of °C] [P13]"** parameter sets the value of the regulation differential of the two-point control of the solenoid valve for fan coil operation (already explained in the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

The **"Proportional band [P14]"**, **"Integration time [P15]"**, **"Min % variation for continuous sending [P16]"** parameters set, respectively, the Proportional band [P23] width, the contribution of the integral action and the value of the minimum variation of the command percentage value (in relation to the last command sent) for generating the transmission of the command of the **continuous proportional integral** control algorithm for cooling. For the details of the permitted values, refer to the parameters listed above to see the operating mode without fan coil management (par. 6.1.1).

In the case of fan coil valve management in mode and **continuous proportional integral** (**fan coil with ON-OFF speed control** and in any case with **fan coil with 0%-100% speed control** the parameter will be visualised **“Operation limit fan coil [tenths of °C] [P26]”**.

The **“Operation limit fan coil [tenths of °C] [P26]”** parameter defines the fan coil intervention threshold without the activation of the fan. It therefore allows you to set the delay for fan activation in relation to valve activation, basically shifting the reference of the fan speed control (see the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

6.1.3 Regulation parameters for the fan coil speed

The fan coil speed configuration parameters change according to the setting made for the **Air cooling control algorithm** parameter in the **Main** menu.

6.1.3.1 3-speed ON/OFF fan speed management

In the case of 3-speed ON/OFF fan speed management, the following parameters are available.

The **“Fan coil speed number”** parameter sets the number of stages for fan coil speed control on the basis of the type of fan coil used. The values that can be set are:

- 1

Setting this value, the number of stages for controlling the fan coil speeds is 1. The **“Regulation differential speed 1 [tenths of °C] [P17]”** and **“Speed 1 inertia time (seconds) [P20]”** parameters are visualised. In this case, the value set for the **“Air cooling control algorithm”** item in the **Main** menu will enable the ***V1 fan switching cooling*** (Data Point Type: 1.001 DPT_Switch) and **Cooling fan speed %** (Data Point Type: 5.001 DPT_Scaling) communication objects, to control the first (and only) fan coil speed.

- 2

Setting this value, the number of stages for controlling the fan coil speeds is 2. The **“Regulation differential speed 1 [tenths of °C] [P17]”**, **“Regulation differential speed 2 [tenths of °C] [P18]”**, **“Speed 1 inertia time (seconds) [P20]”** and **“Speed 2 inertia time (seconds) [P21]”** parameters are visualised. In this case, the value set for the **“Air cooling control algorithm”** item in the **Main** menu will enable the ***V1 fan switching cooling*** and ***V2 fan switching cooling*** (Data Point Type: 1.001 DPT_Switch) and **Cooling fan speed %** (Data Point Type: 5.001 DPT_Scaling) communication objects, to control the first and second fan coil speeds respectively.

- **3 (default value)**

Setting this value, the number of stages for controlling the fan coil speeds is 3. The **“Regulation differential speed 1 [tenths of °C] [P17]”**, **“Regulation differential speed 2 [tenths of °C] [P18]”**, **“Regulation differential speed 3 [tenths of °C] [P19]”** , **“Speed 1 inertia time (seconds) [P20]”**, **“Speed 2 inertia time (seconds) [P21]”** and **“Speed 3 inertia time (seconds) [P22]”** parameters are visualised. In this case, the value set for the **“Air cooling control algorithm”** item in the menu **Main** will enable the and and communication objects ***V1 fan switching cooling***, ***V2 fan switching cooling*** to ***V3 fan switching cooling*** (Data Point Type: 1.001 DPT_Switch) control **Cooling fan speed %** (Data Point Type: 5.001 DPT_Scaling) control the first, second and third fan coil speeds respectively.

The **“Regulation differential speed 1 [tenths of °C] [P17]”** parameter sets the value of the regulation differential of the first speed of the **fan coil with ON-OFF speed control (ON-OFF)** control algorithm for cooling (already explained in the Algoritmi di controlloControl algorithms section). This value, added to the "setpoint+ΔT_{valv}" value, determines the threshold value above which fan coil speed 1 is activated. The values that can be set are:

- from 0 to 20 in steps of 1 **(default value 2)**

Setting the value **0** obtains the condition "$\Delta T_{1\ cool} = \Delta T_{valv}$" for which the value of the speed 1 activation threshold is "setpoint+ΔT_{valv}" and the off value is "setpoint".

The **"Regulation differential speed 2 [tenths of °C] [P18]"** parameter sets the value of the regulation differential of the first speed of the **fan coil with ON-OFF speed control (ON-OFF)** control algorithm for cooling (already explained in the Algoritmi di controlloControl algorithms section). This value, added to the "setpoint+$\Delta T_{valv}+\Delta T_{1\ cool}$" value, determines the threshold value above which fan coil speed 2 is activated. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

The **"Regulation differential speed 3 [tenths of °C] [P19]"** parameter sets the value of the regulation differential of the first speed of the **fan coil with ON-OFF speed control (ON-OFF)** control algorithm for cooling (already explained in the Algoritmi di controlloControl algorithms section). This value, added to the "setpoint+$\Delta T_{valv}+\Delta T_{1\ cool}+\Delta T_{2\ cool}$" value, determines the threshold value above which fan coil speed 3 is activated. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

When, according to the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the device has to activate any speed and speed 1 is already active, a delay can be inserted between the moment when speed 1 deactivation feedback is received (or the moment when the speed 1 deactivation command is sent, if fan coil speed feedback is disbabled) and the moment when the activation command for the new speed is sent. The **"Speed 1 inertia time (seconds) [P20]"** parameter defines the extent of the delay between speed 1 deactivation and the activation of the new speed. The values that can be set are:

- from **0 (default value)** to 10, in steps of 1

When, according to the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the device has to activate any speed and speed 2 is already active, a delay can be inserted between the moment when speed 2 deactivation feedback is received (or the moment when the speed 2 deactivation command is sent, if fan coil speed feedback is disbabled) and the moment when the activation command for the new speed is sent. The **"Speed 2 inertia time (seconds) [P21]"** parameter defines the extent of the delay between speed 1 deactivation and the activation of the new speed. The values that can be set are:

- from **0 (default value)** to 10, in steps of 1

When, according to the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the device has to activate any speed and speed 3 is already active, a delay can be inserted between the moment when speed 3 deactivation feedback is received (or the moment when the speed 3 deactivation command is sent, if fan coil speed feedback is disbabled) and the moment when the activation command for the new speed is sent. The **"Speed 3 inertia time (seconds) [P22]"** parameter defines the extent of the delay between speed 3 deactivation and the activation of the new speed. The values that can be set are:

- from **0 (default value)** to 10, in steps of 1

6.1.3.2 0-100% fan speed management with continuous PI control

If fan speed management is 0-100% with continuous PI control, the following parameters are available along with the communication objects ***Cooling fan speed %*** (Data Point Type: 5.001 DPT_Scaling) via which the device sends the command telegrams for regulating the fan coil speed.

The **“Proportional band [P23]”** parameter sets the width of the Proportional band [P23] of the or **continuous proportional integral** control algorithm for (already explained in the Algoritmi di controlloControl algorithms section) which, subtracted from the defined setpoint value, determines the lower limit of the Proportional band [P23] used for proportional integral control.

The values that can be set are:

- 1.0°C
- 1.5°C
- **2.0°C (default value)**
- 2.5°C
- 3.0°C
- 3.5°C
- 4.0°C
- 4.5°C
- 5.0°C
- 5.5°C
- 6.0°C
- 6.5°C
- 7.0°C
- 7.5°C
- 8.0°C
- 8.5°C
- 9.0°C
- 9.5°C
- 10.0°C

The **“Integration time [P24]”** parameter sets the contribution of the integral action in proportional integral control (see the Algoritmi di controlloControl algorithms section). The values that can be set are:

- from 1 minute to 250 minutes in steps of 1, plus the value “no integral” (0) **(default value 60)**

If **no integral** is selected, the integral component is zero and the effect of pure proportional control is obtained.

The **“Min % variation for continuous sending [P25]”** parameter sets minimum variation value for the command percentage value (in relation to the last command sent) for generating the transmission of the command itself. The values that can be set are:

- 1%
- 2%
- 3%
- 4%
- **5% (default value)**
- 10%
- 20%

Basically, this value also determines the number of proportional sub-bands within which the device defines the power value to be sent to the system (see the Algoritmi di controlloControl algorithms section). There is no fixed number of proportional sub-bands, as it depends on the value set for this item.

6.1.4 Valve status feedback parameters

The **“Air cooling valve status feedback”** parameter allows you to enablethe device to receive feedback from the actuator that commands the cooling solenoid valve. In this way, the device can receive the telegram stating that the solenoid valve has been switched over, and repeat the command if the switching did not effectively take place. The values that can be set are:

- disable
- **enable** **(default value)**

If **disable**, is selected, the **“Commands repetition period with disabled feedback”** parameter is displayed. If **enable** is selected, the communication objects ***Air cooling valve status feedback*** (Data Point Type: 1.001 DPT_Switch) is visualised if the valve control algorithm is **two points ON-OFF** or **integral proportional PWM**, or ***Air cooling valve % feedback*** (Data Point Type: 5.001 DPT_Scaling) if the valve control algorithm is **two points 0%-100%** or **continuous proportional integral**.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via theobject ***Air cooling valve status feedback*** or ***Air cooling valve % feedback*** for an update of the status of the cooling solenoid valve. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the valves.

If feedback is enabled, the device sends the switching command to the solenoid valve and then waits for one minute (on its internal clock) for the actuator to send confirmation of the effective switching; if this does not happen, it sends the command to the solenoid valve once every minute until it receives confirmation of correct switching. It may be that, during normal temperature control operation, the actuator status is changed by an entity outside the thermostat which forces and modifies its status. In this case, the device repeats the valve switching command to realign the actuator status with the one determined by the thermostat control logic, triggering the process of confirmation standby and repeated command until confirmation is received. In the same way, if the control algorithm is working in cooling mode and feedback is received that the heating valve has been activated, the algorithm is immediately suspended and the heating valve deactivation command is sent (triggering the process of confirmation standby and repeated command until confirmation is received) until the anomaly is resolved.

In the particular case of the continuous proportional integral control algorithm, the feedback received may differ from the command sent by about ± 2% (±6 units on a scale of 255). In this way, if the actuator that controls the valve sends a value differing slightly from the one requested by the thermostat (for reasons of approximation), operation is still guaranteed and the process of periodically sending the command is not triggered.

With cooling solenoid valve status feedback cooling disbabled, it may be useful to cyclically repeat the command to the actuator that manages the solenoid valve so that, if the first command telegram gets lost, one of the subsequent ones will sooner or later be received. The **“Commands repetition period with disabled feedback”** parameter defines the cyclical transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes** **(default value)**

6.1.5 Fan speed status feedback parameters

If the control algorithm is "fan coil", the possibility to receive feedback about fan coil speed activation status is even more important than valve feedback. By enabling feedback, the device is always aware of the status of the speeds it commands; in fact, if a command is sent to the actuator that manages a certain speed and the actuator does not send the thermostat confirmation of effective command execution within one minute, the device sends the command again every minute until correct confirmation is received from the actuator.

As the system does not always have actuators specifically dedicated to the fan coil, with mechanically interlocked outputs, it is necessary implement the logic interlock function at firmware level so that a fan coil speed other than the current one can only be activated if the correct feedback about current speed deactivation has been received (provided that speed feedback is enabled). As long as the thermostat does not receive the active speed deactivation feedback, it does not send the command to activate the new speed as this would mean multiple fan coil windings being powered at the same time, causing the fan coil to break. The **"Fan coil speed status feedback"** parameter allows you to enable the device to receive feedback from the actuator that commands the fan coil speeds. The values that can be set are:

- disable
- **enable (default value)**

If **disable** is selected, the **"Commands repetition period with disabled feedback"** parameter is displayed, along with the following communication objects: ***Air cooling fan V1 status feedback**, **Air cooling fan V2 status feedback, Air cooling fan V3 status feedback*** (Data Point Type: 1.001 DPT_Switch) and ***Air cooling fan speed % feedback*** (Data Point Type: 5.001 DPT_Scaling) in the case of ON-OFF speed control, whereas continuous speed control visualises the communication objects ***Air cooling fan speed % feedback*** (Data Point Type: 5.001 DPT_Scaling) only.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via the object ***Air cooling fan V1 status feedback**, **Air cooling fan V2 status feedback**, **Air cooling fan V3 status feedback*** or ***Air cooling fan speed % feedback*** for an update of the fan coil speed activation status. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the actuators.

If fan coil feedback is disbabled, and only with the **ON-OFF (3 velocità)** fan speed control algorithm using the 1 bit ***V1 fan switching cooling***, ***V2 fan switching cooling, V3 fan switching cooling*** (Data Point Type: 1.001 DPT_Switch)**,** communication objects, for every speed activation command it is necessary to send deactivation commands for the non-active speeds. In the same way, every speed deactivation command must be sent together with deactivation commands for the other speeds. This is not necessary if the with value % () activation command object is byte used (***Cooling fan speed %***).

The **"Commands repetition period with disabled feedback"** parameter defines the cyclical fan coil speed transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes (default value)**

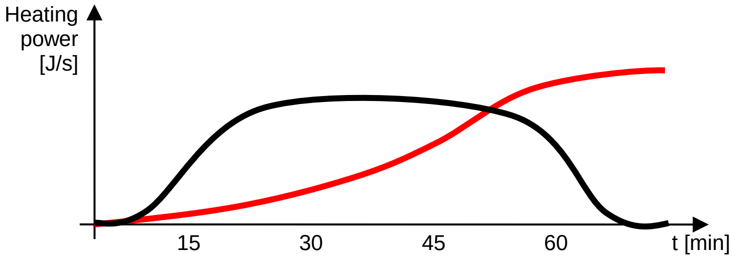
In the particular case of the **fan coil with ON-OFF speed control (ON-OFF)** algorithm, the commands are repeated on all the speed communication objects.

If the communication objects ***Air cooling fan speed % feedback*** (Data Point Type: 5.001 DPT_Scaling) is used, the feedback received may differ from the command sent by about ± 2% (±6 units on a scale of 255). In this way, if the actuator that controls the fan speed sends a value differing slightly from the one requested by the thermostat (for reasons of approximation), operation is still guaranteed and the process of periodically sending the command is not triggered.

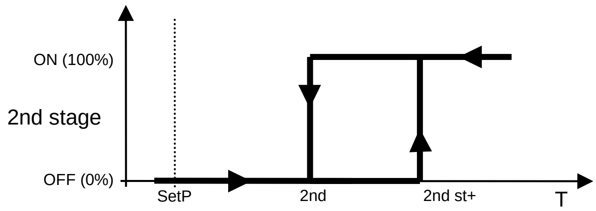
In the case of speed control with the ON-OFF (3-speed) algorithm, the use of the commands with the relative feedback on bit communication objects with ON-OFF value (***Air cooling fan V1 (V2, V3) status feedback***) is always recommended. This is because the misalignment between the % fan coil command values and those returned with the relative status feedback may be greater than the ± 2% limit value (±6 units on a scale of 255) used to evaluate the retransmission of the speed command. The use of both types of communication object to receive the fan speed status is considered a configuration error. If the relative commands are not connected as well, an error will therefore be signalled.

6.1.6 Second stage cooling

Some cooling systems have a very marked inertia level and take a long time to bring the room temperature into line with the required setpoint. To reduce this inertia, another cooling system with less inertia is often installed to help the main system to cool the room when the difference between setpoint and measured temperature is particularly high. This system, known as "2nd stage", helps to cool the room during the initial phase and then stops working when the setpoint-temperature difference can be managed more quickly.



The second stage control algorithm can only be of the 2-point type (either ON-OFF or 0%-100%, as preferred), and the second stage intervention thresholds are as follows:



When the measured temperature is higher than the value "2nd st+ $\Delta T_{C2nd\ st}$" (where $\Delta T_{C2nd\ st}$ identifies the value of the regulation differential for 2nd stage cooling), the device activates 2nd stage cooling by sending the relative BUS command to the actuator that manages it, When the measured temperature reaches the "2nd st" value (defined by Setpoint+Operation limit 2° stage [tenths of °C]), the device deactivates 2nd stage cooling by sending the relative BUS command to the actuator that manages it.

This diagram clearly shows that there are two decision thresholds for activating and deactivating 2nd stage cooling. The first is the value "2nd st+ $\Delta T_{C2nd\ st}$", above which the device activates the system; the second is the value "2nd st" below which the device deactivates the system.

The **"Air cooling 2° stage"** parameter is used to enable and define the control algorithm for second stage cooling. The values that can be set are:

- **disabled** **(default value)**
- enable 2 points control ON-OFF
- enable 2 points control 0%-100%

Selecting any value other than **disabled**, the **"Operation limit 2° stage [tenths of °C]"**, **"Regulation differential 2° stage [tenths of °C] [P27]"** e **"Air cooling 2° stage feedback"** parameters will be displayed. Selecting **enable 2 points control ON-OFF** visualises the communication objects ***Air cooling 2° stage switching*** (Data Point Type: 1.001 DPT_Switch), via which the device sends the command telegrams. Selecting **enable 2 points control 0%-100%**, visualises the communication objects ***% command 2° stage air cooling*** (Data Point Type: 5.001 DPT_Scaling) , via which the device sends the command telegrams.

The **"Operation limit 2° stage [tenths of °C] (decimi di °C)"** parameter defines the 2nd stage cooling intervention threshold. The value set for this parameter, when subtracted from the setpoint currently in use, determines the lower limit (**2nd St** in the chart above) beyond which 2nd stage operation is deactivated. The values that can be set are:

- from **10 (default value)** to 100, in steps of 1

The **“Regulation differential 2° stage [tenths of °C] [P27]”** parameter sets the value of the regulation differential of the 2nd stage cooling control algorithm which, added to the “setpoint+intervention limit” value, determines the value of the threshold (**2nd st+ $_{\Delta}T_{C2nd\ st}$** in the chart above) above which the 2nd stage cooling system is activated in 2-point control. The values that can be set are:

- from 1 to 20 in steps of 1 **(default value 2)**

As for the standard cooling algorithm, the **“Air cooling 2° stage feedback”** parameter allows you to enable the device to receive feedback from the actuator that commands 2nd stage cooling. In this way, the device can receive the switching telegram from the actuator and repeat the command if the switching did not effectively take place. The values that can be set are:

- disable
- **enable (default value)**

If **disable** is selected, the **“Command repetition time 2° stage without feedback”** parameter is displayed. If **enable** is selected, the communication objects ***Air cooling 2° stage feedback*** (Data Point Type: 1.001 DPT_Switch) is visualised if the 2nd stage control algorithm is **two points ON-OFF**, or ***Air cooling 2° stage feedback*** (Data Point Type: 5.001 DPT_Scaling) if the control algorithm is **two points 0%-100%**.

When the BUS or auxiliary voltage is reset, the device does not send the status read command (read request) via theobject ***Air cooling 2° stage feedback*** or ***Air cooling 2° stage feedback*** for an update of the second stage di cooling activation status. This is not necessary because, at the restart, the protection procedure sends the OFF or 0% command to the actuators via the dedicated communication objects. In the subsequent moments, the device will send the new status (in line with the evaluation made by the temperature control algorithm configured) to the actuators.

With feedback enabled, the device sends the switching command and then waits for one minute (on its internal clock) for the actuator to send confirmation of the effective switching; if this does not happen, it sends the command once every minute until it receives confirmation of correct switching. It may be that, during normal temperature control operation, the status of the actuator that manages the 2nd stage is changed by an entity outside the thermostat which forces and modifies its status. In this case, the device repeats the switching command to realign the status of the actuator with the one determined by the control logic, triggering the process of waiting for confirmation and repeating the command until the confirmation is received.
With 2nd stage cooling status feedback cooling disbabled, it may be useful to cyclically repeat the command to the actuator so that, if the first command telegram gets lost, one of the subsequent ones will sooner or later be received. The **“Command repetition time 2° stage without feedback”** parameter defines the cyclical transmission frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes (default value)**

7 “Setpoint temperature” menu

The Temperature setpoint menu contains the parameters for configuring the setpoint values of the various temperature control modes of the two functioning types.

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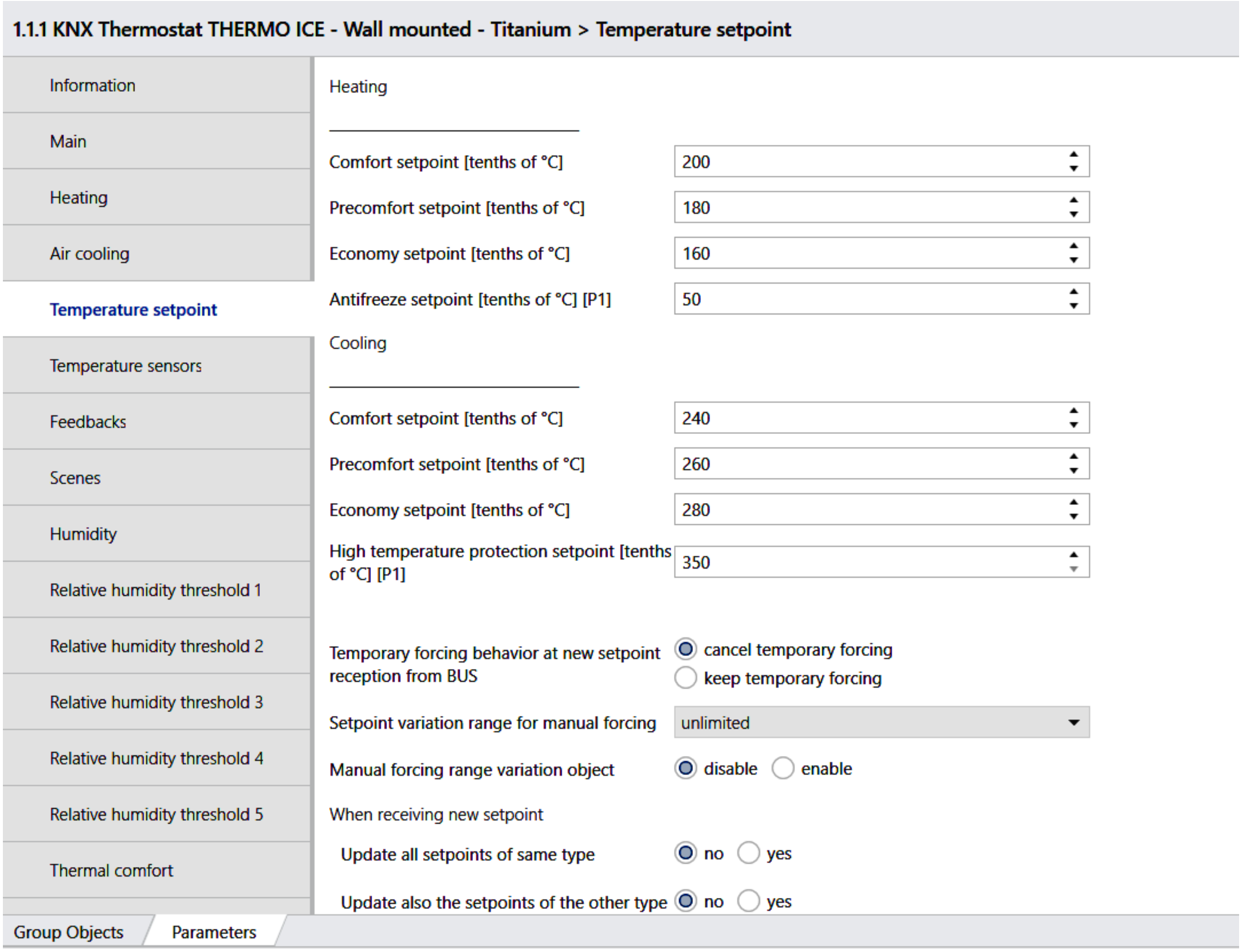


Fig. 7.1 – “Setpoint temperature” menu

7.1 Parameters of the

7.1.1 Parameters for Heating

The **“Comfort setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for COMFORT mode in HEATING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 200)**

Remember that, when setting this value, there is a constraint that it must be greater than the value set for the **“Precomfort setpoint [tenths of °C]”** item of heating operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote setpoint control is enabled, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Precomfort setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for PRECOMFORT mode in HEATING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 180)**

Remember that, when setting this value, there is a constraint that it must be between the value set for **“Comfort setpoint [tenths of °C]”** and the one set for **“Economy setpoint [tenths of °C]”** in heating operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote control is enabled, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Economy setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for ECONOMY mode in HEATING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 160)**

Remember that, when setting this value, there is a constraint that it must be between the value set for **“Precomfort setpoint [tenths of °C]”** and the one set for **“Antifreeze setpoint [tenths of °C] [P1]”** in heating operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote enebled control is setpoint, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Functioning setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is setpoint, defines the operating setpoint value in HEATING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 200)**

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote setpoint control is enabled, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Antifreeze setpoint [tenths of °C] [P1]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for OFF mode in HEATING operation. The values that can be set are:

- from 20 to 100 in steps of 1 **(default value 50)**

Remember that, when setting this value, there is a constraint that it must be less than the value set for the **“Economy setpoint [tenths of °C]”** item of heating operation.
In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote enebled control is setpoint, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Antifreeze setpoint after manual switching off [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is setpoint, defines the setpoint value for HEATING operation when the device (in slave mode) is switched off manually by the user. The values that can be set are:

- from 20 to 100 in steps of 1 **(default value 50)**

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu.

7.1.2 Parameters for Cooling

The **“Comfort setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for COMFORT mode in COOLING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 240)**

Remember that, when setting this value, there is a constraint that it must be less than the value set for the **“Precomfort setpoint [tenths of °C]”** item of cooling operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote enebled control is setpoint, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Precomfort setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for PRECOMFORT mode in COOLING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 260)**

Remember that, when setting this value, there is a constraint that it must be between the value set for **“Comfort setpoint [tenths of °C]”** and the one set for **“Economy setpoint [tenths of °C]”** in cooling operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote enebled control is setpoint, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Economy setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for ECONOMY mode in COOLING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 280)**

Remember that, when setting this value, there is a constraint that it must be between the value set for **“Precomfort setpoint [tenths of °C]”** and the one set for **“High temperature protection setpoint [tenths of °C]”** in cooling operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote setpoint control is enabled, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Functioning setpoint [tenths of °C]”** parameter, visible if the Stand alone control type or master/slave is setpoint, defines the operating setpoint value in COOLING operation. The values that can be set are:

- from 101 to 349 in steps of 1 **(default value 240)**

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote setpoint control is enabled, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“High temperature protection setpoint [tenths of °C] [P1]”** parameter, visible if the Stand alone control type or master/slave is HVAC mode, defines the setpoint value for OFF mode in COOLING operation. The values that can be set are:

- from 350 to 400 in steps of 1 **(default value 350)**

Remember that, when setting this value, there is a constraint that it must be greater than the value set for the **“Economy setpoint [tenths of °C]”** item of cooling operation.

In any case, this value can always be changed by the user via the relative parameter of the local device navigation menu and, if remote setpoint control is enabled, it can also be modified by means of a BUS telegram on the relative communication objects.

The **“Antifreeze setpoint after manual switching off [tenths of °C] [P1]”** parameter, visible if the control type stand alone or master/slave is setpoint, defines the setpoint value for COOLING operation when the device (in slave mode) is switched off manually by the user. The values that can be set are:

- from 350 to 400 in steps of 1 **(default value 350)**

7.1.3 Shared parameters

Remember that the setpoint values can always be changed by the user via the relative parameters of the local device navigation menu.

Whenever a setpoint is modified from the local device menu, any possible forcing active in that moment will always be annulled.

Given that the setpoint values can be modified from remote too (regardless of the Master/Slave control type or stand alone), if temporary forcing is applied to a setpoint and the value of that setpoint is received on the BUS, the device can behave in two different ways: it can apply the forcing to the new value (in terms of temperature variation, not absolute value) or annul the forcing and maintain the new value only.

EXAMPLE:
If the setpoint in Comfort/Heating mode is 21 and a temporary forcing of +0.5°C is active (active setpoint 21.5°C):

- if the device receives a new setpoint value equal to 22°C and forcing is maintained, the new active setpoint will be 22.5°C (the mode setpoint becomes 22°C)
- if the device receives a new setpoint value equal to 22°C and forcing is annulled, the new active setpoint will be 22°C (the mode setpoint becomes 22°C)

The **“Temporary forcing behavior at new setpoint reception from BUS”** parameter sets the behaviour to be adopted in the above condition. The values that can be set are:

- **cancel temporary forcing (default value)**
- keep temporary forcing

The circular slider can be used to temporarily force the current setpoint in order to personalise the room temperature. The adjustment range around the current setpoint can be limited however (this setting is made when configuring the device). The **“Manual forcing range”** parameter sets the maximum variation of the current setpoint value on the device for its temporary forcing via local commands. The values that can be set are:

- ± 0.0°C (no variation)
- ± 0.1°C
- …
- **± 3.0 °C (default value if slave)**
- …
- ± 5.0°C
- **unlimited (default value if stand alone)**

This value is expressed in °C; if the measure unit of the display is °F, the variation range will be converted into Fahrenheit (e.g. ± 3.0°C → ± 37.4°F). In both cases, the maximum possible variation is the one defined by this parameter (or by the object via the BUS). Selecting "unlimited", there are no setpoint regulation limits (apart from those regarding the setpoint of the functioning type).

The setpoint variation range can be modified via the BUS, using the relative communication objects. The **“Manual forcing range variation object”** parameter allows you to enable thecommunication objects ***Setpoint***

regulation range setting (Data Point Type: 9.001 DPT_Value_Temp) for setting - via the BUS - the value of the setpoint regulation range for temporary forcing. The values that can be set are:

- **disable (default value)**
- enable

Selecting **enable** visualises the communication objects ***Setpoint regulation range setting***. If this communication objects receives a telegram setting the setpoint variation range with a value lower than 0°C, the value is limited to 0 for reasons of safety; values above 5°C will be interpreted as an unlimited range.

Manual setpoint forcing is reset every time a modification is made to the current HVAC mode or functioning type (regardless of whether the device is in slave or stand alone mode).

On the other hand, manual setpoint forcing is maintained if the thermostat is switched off due to a 230V power failure (the thermostat detects the power failure and saves its status - complete with forcing - so it can be reset at the next start-up). In the same way, the forcing isn't lost when a KNX BUS drop/failure is detected and the connection is subsequently restored.

Modifying the setpoint of a certain HVAC mode for a specific functioning type (if the stand alone control type or master/slave is HVAC mode) or the operating setpoint (if the stand alone control type or master/slave is setpoint), it may be useful to make the same change to the setpoint of the same mode or the operating setpoint of the opposite functioning type (especially if the device functioning type is modified automatically via the “dead” zone).

EXAMPLE: setpoint Comfort heating= 20°C and setpoint Comfort Cooling = 24°C. If a setpoint Comfort heating value of 21.5°C is received, then the setpoint Comfort Cooling will be automatically modified and set at 25.5°C.

The parameter that allows you to enable the simultaneous modification of the same mode for the two different functioning types is **“Temporary forcing behavior at new setpoint reception from BUS-Update also the setpoints of the other type”**. The possible values are:

- **no (default value)**
- yes

In the same way, if the Stand alone control type or master/slave is HVAC mode, it may be useful to modify the setpoints of the same functioning type (apart from OFF mode) when a modification is made to any one of them (including OFF mode). If setpoint Comfort, Precomfort, Economy are modified, whether in heating or cooling, it will not be possible to make the same modification to the setpoint of OFF mode, but the reverse is possible (a change to the OFF mode setpoint can be applied to the former three).

EXAMPLE: setpoint Comfort heating= 20°C, setpoint Precomfort heating = 18°C and etpoint Economy heating= 16°C. If a setpoint Comfort heating value of 21.5°C is received, the setpoint Precomfort heating will automatically become 19.5°C and the setpoint Economy heating will become 17.5°C. As indicated above, the OFF mode setpoint will remain unaltered.

The parameter that allows you to enable the simultaneous modification of the setpoints of the same functioning type is **“Temporary forcing behavior at new setpoint reception from BUS - Update all setpoints of the same type”**. The possible values are:

- **no (default value)**
- yes

If both modifications are enabled, the modification of one setpoint automatically modifies those of all the other modes in both heating and cooling.

8 “Temperature Sensors” menu

The **Temperature sensors** menu contains the parameters for configuring the operation of the built-in device sensor and two potential external sensors: a external sensor KNX and an external sensor NTC.

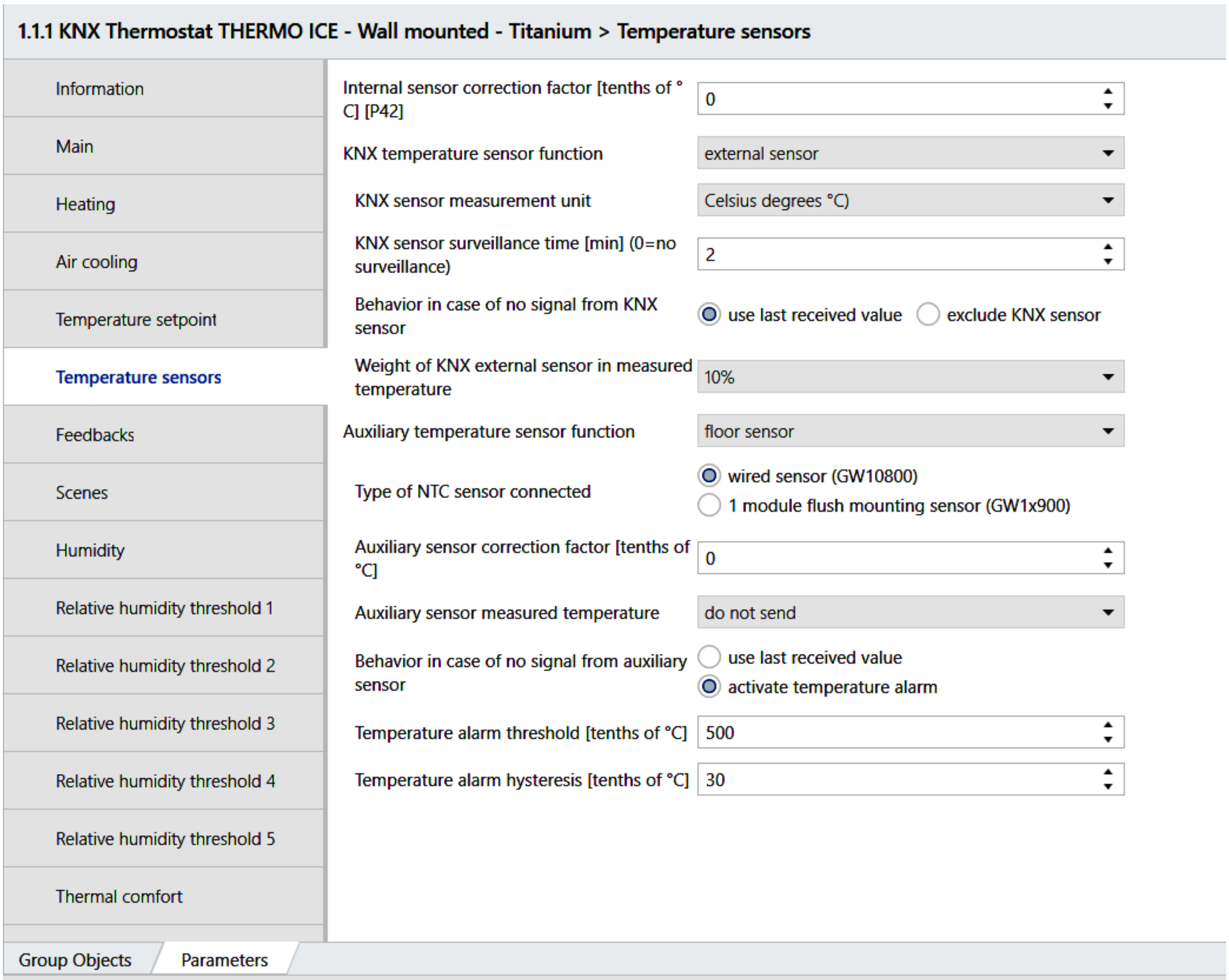


Fig. 8.1 – “Temperature sensors” menu

8.1 Parameters of the

8.1.1 Parameters of the built-in sensor

The **“Internal sensor correction factor [tenths of °C] [P42]”** parameter sets the correction factor to be applied to the temperature value measured by the built-in device sensor, to eliminate the heat contribution generated by the device itself or the installation site. The values that can be set are:

- from -50 to + 50 in steps of 1.0 **(default value)**

8.1.2 Parameters of the external sensor KNX

The "**KNX temperature sensor function"** parameter allows you to enable a communication objects for measuring the room temperature or the floor temperature, and therefore the configuration items. The values that can be set are:

- **disabled** **(default value)**
- external sensor
- floor sensor

Selecting **external sensor** visualises the **"KNX sensor measurement unit"**, **"Weight of KNX external sensor in measured temperature"**, **"KNX sensor surveillance time [min] (0=no surveillance)"** and **"Behavior in case of no signal from KNX sensor"** parameters, along with the communication objects ***KNX external sensor input*** for receiving the measured temperature from the external sensor.

Selecting **floor sensor** visualises the **"KNX sensor measurement unit"**, **"Temperature alarm threshold [tenths of °C]"**, **"Temperature alarm hysteresis [tenths of °C]"**, **"KNX sensor surveillance time [min] (0=no surveillance)"** and **"Behavior in case of no signal from KNX sensor"** parameters, along with the communication objects ***KNX floor sensor input*** for receiving the measured temperature from the external sensor.

In any case, when the BUS or auxiliary voltage is reset, the device immediately updates the value received from the KNX temperature sensor (external or floor), sending the status read command (read request) via the object ***KNX external sensor input*** or ***KNX floor sensor input*** and storing the value received.

Even if the function is enabled in the ETS parameters, check that the relative communication objects ***KNX external sensor input*** or ***KNX floor sensor input*** is connected to a valid group address before considering it enabled.

The **"KNX sensor measurement unit"** (or **"KNX sensor measurement unit"**) parameter sets the measure unit for decoding the information received via the communication objects ***KNX external sensor input*** (or ***KNX floor sensor input***). The values that can be set are:

- **Celsius degrees [°C]** **(default value)**
- Kelvin degrees (K)
- Fahrenheit degrees [°F]

The value set for this parameter determines the coding of the communication objects ***KNX external sensor input*** (or ***KNX floor sensor input***): *9.001 DPT_Value_Temp* if the value is **Celsius degrees [°C]**, *9.002 DPT_Value_Tempd* if the value is **Kelvin degrees (K)** or *9.027 DPT_Value_Temp_F* if the value is **Fahrenheit degrees [°F]**.

The communication objects ***KNX external sensor input*** (or ***KNX floor sensor input***) input will be limited to protect any values that may be incoherent with the normal usage limits declared (operating temperature: -5°C to +45°C; regulation range: 0°C to +45°C). Input values outside the range -5°C to +50°C will therefore be filtered and will assume the value of the relative maximum or minimum limit exceeded.

Once you have enabled the external sensor KNX, the measured temperature will be determined not solely by the sensor built into the device but by the weighted average between the value measured by the built-in sensor and the one measured by the external sensor KNX.
The **"Weight of KNX external sensor in measured temperature"** parameter defines the impact of the value measured by the external sensor KNX when calculating the measured temperature, ranging from minimum 10% to maximum 100% (measured value external sensor = Measured temperature). The complete formula for the temperature calculation is:

$T_{measured} = T_{external\ sensor} \times Impact_{external\ sensor} + T_{device\ sensor} \times (100\% - Impact_{external\ sensor})$

The parameter can assume the following values:

- from **10% (default value)** to 100% in steps of 10%

The **“KNX external sensor monitoring time [min] (0= no monitoring)”** parameter defines the monitoring time of the external sensor KNX. It can assume the following values:

- from 0 to 10 in steps of 1 **(default value 2)**

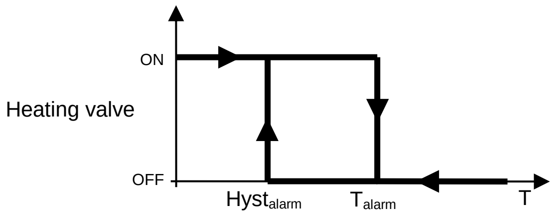
If **0** is selected, there is no monitoring on the object enebled for the external sensor input. The significance of the monitoring time is: if the telegram with the measured value is not received periodically within the set monitoring time, the device will behave in different ways depending on the setting of the **“Behavior in case of no signal from KNX sensor”** parameter.
This parameter can assume the following values:

- **use last received value** **(default value)**
- exclude KNX sensor

If **exclude KNX sensor** is selected, the contribution of the KNX sensor in the measured temperature calculation is annulled.

The **“Temperature alarm threshold [tenths of °C]”** parameter defines the limit floor temperature above which the device blocks heating because the pipe temperature is too high and may cause damage (temperature alarm). The floor temperature value is received via the communication objects ***KNX floor sensor input.***
The values that can be set are:

- from 150 to 1000 in steps of 1 **(default value 500)**



The **“Temperature alarm hysteresis [tenths of °C]”** parameter sets the hysteresis threshold of the floor temperature alarm which, subtracted from the temperature alarm threshold value, determines the value below which the heating system is reactivated. The values that can be set are:

- from 10 to 100 in steps of 1 **(default value 30)**

The **“KNX sensor surveillance time [min] (0=no surveillance)”** parameter defines the monitoring time of the KNX external sensor (floor). It can assume the following values:

- from 0 to 10 in steps of 1 **(default value 2)**

If **0** is selected, there is no monitoring on the object enebled for the external sensor input. The significance of the monitoring time is: if the telegram with the measured value is not received periodically within the set monitoring time, the device will behave in different ways depending on the setting of the **“Behavior in case of no signal from KNX sensor”** parameter. This parameter can assume the following values:

- use last received value
- **activate temperature alarm** **(default value)**

8.1.3 Parameters of the auxiliary sensor

The **“Auxiliary temperature sensor function”** parameter configures the auxiliary input for connecting an NTC temperature sensor for measuring the room temperature or floor temperature. The values that can be set are:

- **disabled** **(default value)**

- external sensor
- floor sensor

If **external sensor** is selected, the **"Type of NTC sensor connected"**, **"Auxiliary sensor correction factor [tenths of °C]"**, **"Weight of auxiliary sensor in measured temperature"**, **"Behavior in case of no signal from auxiliary sensor"** and **"Auxiliary sensor measured temperature"** parameters are displayed.

If **floor sensor** is selected, the **"Type of NTC sensor connected"**, **"Auxiliary sensor correction factor [tenths of °C]"**, **"Temperature alarm threshold [tenths of °C]"**, **"Temperature alarm hysteresis [tenths of °C]"**, **"Behavior in case of no signal from auxiliary sensor"** and **"Auxiliary sensor measured temperature"** parameters are displayed.

Different types of temperature sensors can be connected to the device. Given the different characteristics of each transducer, the **"Type of NTC sensor connected"** is used to define which of the possible sensors is connected to the device contacts, so it can interface correctly with the sensor itself. The values that can be set are:

- **wired sensor (GW10800)** **(default value)**
- 1 module flush mounting sensor (GW1x900)

Once you have enabled the auxiliary sensor input for the external temperature sensor, the measured temperature will be determined not solely by the sensor built into the device but by the weighted average between the value measured by the built-in sensor, the possible contribution of the external sensor KNX, and the value measured by the NTC auxiliary external sensor.

The **"Weight of auxiliary sensor in measured temperature"** parameter defines the impact of the value measured by the auxiliary external sensor when calculating the measured temperature, ranging from minimum 10% to maximum 100% (measured value external sensor = measured temperature).

The complete formula for the temperature calculation is:

$T_{measured} = T_{external\ sensor\ KNX} \times Impact_{external\ sensor\ KNX} + T_{external\ sensor\ (auxiliary)} \times Impact_{external\ sensor\ (auxiliary)} + T_{device\ sensor} \times (100\% - Impact_{external\ sensor\ (auxiliary)} - Impact_{external\ sensor})$.

If both external sensors (KNX and auxiliary) are enabled, the sum of the impact values must obviously not exceed 100%; this means that if the impact of the KNX sensor is 30%, the maximum impact of the auxiliary sensor is 70%.

The parameter can assume the following values:

- from **10% (default value)** to 100% in steps of 10%

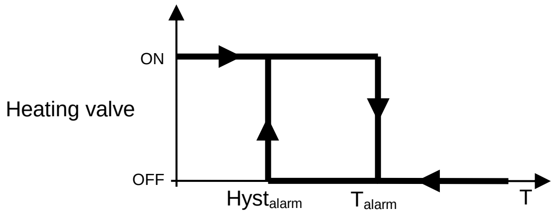
The auxiliary external sensor is always connected to the device, so in this case there is no sensor monitoring time. Any potential malfunctioning of the NTC sensor can be detected however, and the **"Behavior in case of no signal from auxiliary sensor"** parameter can be used to define how the device should react. This parameter can assume the following values:

- **use last received value** **(default value)**
- exclude auxiliary sensor

If **exclude auxiliary sensor** is selected, the contribution of the NTC sensor in the measured temperature calculation is annulled.

The **"Temperature alarm threshold [tenths of °C]"** parameter defines the limit floor temperature above which the device blocks heating because the pipe temperature is too high and may cause damage (temperature alarm). The floor temperature value is measured with the NTC sensor connected to the device on the contacts of the auxiliary sensor input. The values that can be set are:

- from 150 to 1000 in steps of 1 **(default value 500)**



The **“Temperature alarm hysteresis [tenths of °C]”** parameter sets the hysteresis threshold of the floor temperature alarm which, subtracted from the temperature alarm threshold value, determines the value below which the heating system is reactivated. The values that can be set are:

- from 10 to 100 in steps of 1 **(default value 30)**

The auxiliary external sensor is always connected to the device, so in this case there is no sensor monitoring time. Any potential malfunctioning of the NTC sensor can be detected however, and the **“Behavior in case of no signal from auxiliary sensor”** parameter can be used to define how the device should react. This parameter can assume the following values:

- use last received value
- **activate temperature alarm** **(default value)**

The **“Auxiliary sensor measured temperature”** parameter defines the conditions for sending the temperature value measured by the NTC sensor connected to the device. The values that can be set are:

- **do not send** **(default value)**
- sending only on request
- sending on variation
- sending on period
- sending on variation and on period

Selecting any value other than **do not send** will visualise the communication objects ***Auxiliary sensor measured temperature*** and the **“Measure unit”** parameter.

Selecting **sending on variation** or **sending on variation and on period** will also visualise the **“Minimum variation for sending value [± 0.1 °C]”** parameter, whereas selecting **sending on period** or **sending on variation and on period** will also visualise the **“Temperature sending period [minutes]”** parameter.

If **sending only on request** is selected, no new parameter is enebled because the temperature value is not sent spontaneously by the device; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the measured temperature value.

The **“Measure unit”** parameter sets the measure unit for coding and sending the information via the communication objects ***Auxiliary sensor measured temperature***. The values that can be set are:

- **Celsius degrees [°C]** **(default value)**
- Kelvin degrees (K)
- Fahrenheit degrees [°F]

The value set for this parameter determines the coding of the communication objects ***Auxiliary sensor measured temperature***: *9.001 DPT_Value_Temp* if the value is **Celsius degrees [°C]**, *9.002 DPT_Value_Tempd* if the value is **Kelvin degrees (K)**, or *9.027 DPT_Value_Temp_F* if the value is **Fahrenheit degrees [°F]**.
The **“Minimum variation for sending value [± 0.1 °C]”** parameter, visible if the auxiliary sensor temperature setting is sending on change, defines the minimum temperature variation (in relation to the last temperature value sent) for triggering the spontaneous transmission of the new value measured by the NTC sensor. The values that can be set are:

- from 1 to 10 in steps of 1 **(default value 5)**

The **“Temperature sending period [minutes]”** parameter, visible if the auxiliary sensor temperature is sent periodically, defines the frequency for spontaneously transmitting the measured temperature signalling telegrams. The values that can be set are:

- from 1 to 255 in steps of 1 **(default value 5)**

In the event of a floor temperature alarm (triggered by either the external sensor KNX or the auxiliary sensor), the “Heating” icon will flash.

9 “Feedbacks” menu

The**Feedbacks** menu contains the parameters for setting the transmission conditions for the Feedbacks that the device sends via BUS telegrams.

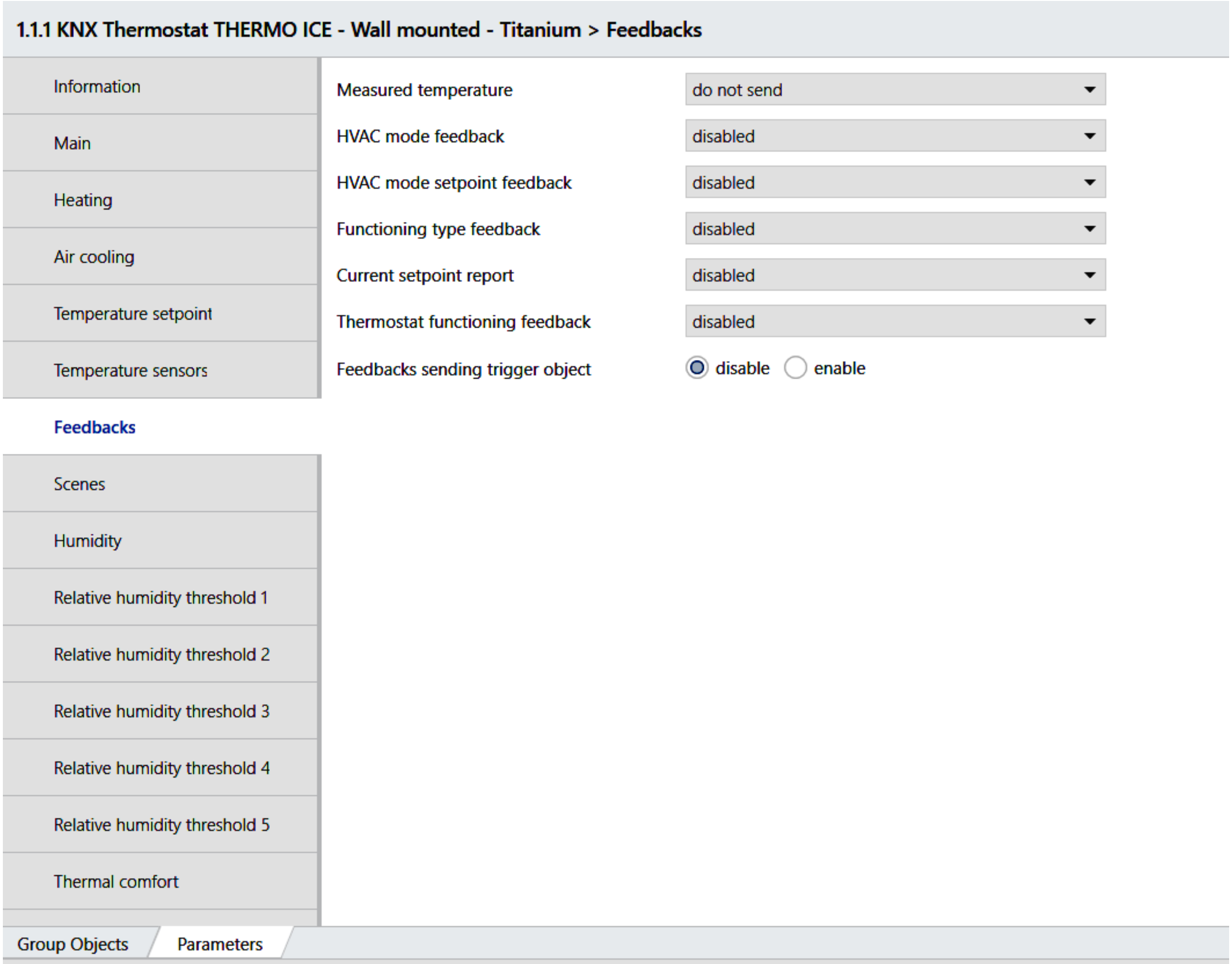


Fig. 9.1 – “Feedbacks” menu

9.1 Parameters of the

9.1.1 Measured temperature

The **“Measured temperature”** parameter defines the transmission conditions for the temperature value measured by the device (which may or may not be influenced by the external sensor). The values that can be set are:

- **do not send** **(default value)**
- sending only on request
- sending on variation
- sending on period
- sending on variation and on period

Selecting any value other than **do not send**, will visualise the communication objects ***Measured temperature*** and the parameter**"Measure unit"**.

Selecting **sending on variation** or **sending on variation and on period** will also visualise the **"Minimum variation for sending value [± 0.1 °C]"** parameter, whereas selecting **sending on period** or **sending on variation and on period** will also visualise the **"Temperature sending period [minutes]"** parameter.

If **sending only on request** is selected, no new parameter is enebled because the temperature value is not sent spontaneously by the device; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the measured temperature value.

The **"Measure unit"** parameter sets the measure unit for coding and sending the information via the communication objects ***Measured temperature***. The values that can be set are:

- **Celsius degrees [°C] (default value)**
- Kelvin degrees (K)
- Fahrenheit degrees [°F]

The value set for this parameter determines the coding of the communication objects ***Measured temperature***: *9.001 DPT_Value_Temp* if the value is **Celsius degrees [°C]**, *9.002 DPT_Value_Tempd* if the value is **Kelvin degrees (K)** or *9.027 DPT_Value_Temp_F* if the value is **Fahrenheit degrees [°F]**.

The **"Minimum variation for sending value [± 0.1 °C]"** parameter, visible if the temperature setting is sending on change, defines the minimum temperature variation (in relation to the last temperature value sent) for triggering the spontaneous transmission of the new value measured. The values that can be set are:

- from 1 to 10 in steps of 1 **(default value 5)**

The **"Temperature sending period [minutes]"** parameter, visible if the temperature is sent periodically, defines the frequency for spontaneously transmitting the measured temperature signalling telegrams. The values that can be set are:

- from 1 to 255 in steps of 1 **(default value 5)**

9.1.2 HVAC mode feedback

The **"HVAC mode feedback"** parameter, visible if the Master/Slave control type or stand alone is HVAC mode, allows you to enable and set the format of the BUS telegrams used by the device to signal the HVAC mode currently active. The values that can be set are:

- **disabled (default value)**
- 1 bit
- 1 byte
- both

If **1 bit** or **both** is selected, the **"1 bit HVAC mode"** parameter is visualised along with the communication objects ***HVAC mode feedback off***, ***HVAC mode feedback economy***, ***HVAC mode feedback precomfort*** and ***HVAC mode feedback comfort*** (Data Point Type: 1.003 DPT_Enable) that signal the active HVAC mode. When a mode is effectively active, this status is signalled via a BUS telegram on the object associated with the new mode and, at the same time, mode deactivation is signalled on the object associated with the mode that was previously active. There is no situation where several active temperature control modes are signalled.

If **1 byte** or **both** is selected, the **"1 byte HVAC mode"** parameter is visualised along with the communication objects ***HVAC mode feedback*** (Data Point Type: 20.102 DPT_HVACMode) for signalling the active HVAC mode.

The **“1 bit HVAC mode”** parameter sets the transmission conditions for operating mode feedbacks via the communication objects ***HVAC mode feedback off***, ***HVAC mode feedback economy***, ***HVAC mode feedback precomfort*** and ***HVAC mode feedback comfort*** of 1 bit. The values that can be set are:

- on demand only
- **sending on change** **(default value)**

If **on demand only** is selected, the operating mode feedbacks is not sent spontaneously by the device via the communication objects ***HVAC mode feedback off***, ***HVAC mode feedback economy***, ***HVAC mode feedback precomfort*** and ***HVAC mode feedback comfort*** of 1 bit; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the information about the status of the operating mode for the object that the request was made on. This means that, when there is a status read request on one of the objects listed above, the device responds with the status of that mode (activated/deactivated) and not with the status of the mode set on the device (which is what happens for the object byte).

If **sending on change** is selected, the operating mode feedbacks is sent spontaneously by the device via the communication objects ***HVAC mode feedback off***, ***HVAC mode feedback economy***, ***HVAC mode feedback precomfort*** and ***HVAC mode feedback comfort*** of 1 bit, every time there is a change to the mode. This means that, every time the device HVAC mode is modified, it signals the activation of the new mode via the communication objects associated with it and signals the deactivation of the previously active mode via the communication objects associated with that mode.

When the BUS or auxiliary voltage is reset, it's a good idea to send the value of all the 1 bit objects in order to update any devices that may be connected.

The **“1 byte HVAC mode mode”** parameter sets the transmission conditions for HVAC mode feedbacks via the communication objects ***HVAC mode feedback*** of 1 byte. The values that can be set are:

- on demand only
- **sending on change** **(default value)**

If **on demand only** is selected, the HVAC mode feedbacks is not sent spontaneously by the device via the communication objects ***HVAC mode feedback*** of 1 byte; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), indicating the HVAC mode set.

If **sending on change** is selected, the HVAC mode feedbacks is sent spontaneously by the device via the communication objects ***HVAC mode feedback*** of 1 byte, every time the mode is changed.

When the BUS or auxiliary voltage is reset, it's a good idea to send the indication of the active mode in order to update any devices that may be connected.

9.1.3 Functioning type feedbacks

The **“Functioning type feedbacks”** parameter enables and sets the transmission conditions for the feedbacks of the functioning type (Heating/Cooling) set on the device, via a BUS telegram on the communication objects ***Functioning type feedback*** (Data Point Type: 1.100 DPT_Heat/Cool). The values that can be set are:

- **disabled** **(default value)**
- sending only on request
- sending on variation

If **sending only on request** is selected, the feedbacks of the functioning type set on the device is not sent spontaneously by the device via the communication objects ***Functioning type feedback***; only in the case of a status read request (ead request) will the device send the user a telegram in response to the command received (response), indicating the functioning type set.

If **sending on variation** is selected, the feedbacks of the functioning type set on the device is sent spontaneously by the device via the communication objects ***Functioning type feedback***, every time the functioning type is changed.

When the BUS or auxiliary voltage is reset, it's a good idea to send the indication of the active functioning type in order to update any devices that may be connected.

9.1.4 Functioning setpoint feedback

The **"Functioning setpoint feedback"** parameter, visible if the Master/Slave control type or stand alone is setpoint, allows you to enable and set the transmission conditions for the feedbacks of the operating setpoint value (the one stored, NOT taking into account any temporary forcing that may be active) set on the device, via a BUS telegram on the communication objects ***Functioning setpoint feedback*** (Data Point Type: 9.001 DPT_Temp se Object in °C, 9.002 DPT_Tempd if Object in K e *9.027 DPT_Value_Temp_F* se Object in °F). The values that can be set are:

- **disabled** **(default value)**
- send object [°C] on demand only
- send object (K) on demand only
- send object [°F] on demand only
- send object [°C] on variation only
- send object (K) on variation only
- send object [°F] on variation only

If **send object [°C] on demand only**, **send object (K) on demand only** or **send object [°F] on demand only** is selected, the feedbacks of the operating setpoint active on the device is not sent spontaneously by the device via the communication objects ***Functioning setpoint feedback***; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), indicating the operating setpoint defined.

If **send object [°C] on variation only**, **send object (K) on variation only** or **send object [°F] on variation only** is selected, the feedbacks of the operating setpoint active on the device is sent spontaneously by the device via the communication objects ***Functioning setpoint feedback***, every time the operating setpoint is changed (NOT following temporary forcing). When the BUS or auxiliary voltage is reset, it's a good idea to send the indication of the active operating setpoint in order to update any devices that may be connected.

If the device is in building protection mode (following manual switch-off or the opening of the window contact), the operating setpoint is not updated with the setpoint building protection value (only the current setpoint is updated).

9.1.5 Current setpoint report

The **"Current setpoint report"** parameter enables and sets the transmission conditions for the feedbacks of the current setpoint value (taking into account any temporary forcing that may be active) set on the device, via a BUS telegram on the communication objects ***Current setpoint report*** (Data Point Type: 9.001 DPT_Temp se Object in °C, 9.002 DPT_Tempd if Object in K e *9.027 DPT_Value_Temp_F* se Object in °F).
The values that can be set are:

- **disabled** **(default value)**
- Send object [°C] on demand only
- send object (K) on demand only
- Send object [°F] on demand only
- send object [°C] on variation only
- Send object (K) on variation only
- Send object [°F] on variation only

If **send object [°C] on demand only**, **send object (K) on demand only** or **send object [°F] on demand only** is selected, the feedbacks of the active setpoint is not sent spontaneously by the device via the communication objects ***Current setpoint report***; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), indicating the setpoint defined.
If **send object [°C] on variation only**, **send object (K) on variation only** or **send object [°F] on variation only** is selected, the feedbacks of the active setpoint is sent spontaneously by the device via the communication objects ***Current setpoint report***, every time the setpoint is changed (also following temporary forcing). When the BUS or auxiliary voltage is reset, it's a good idea to send the indication of the active setpoint in order to update any devices that may be connected.

9.1.6 Thermostat functioning feedback

The **"Thermostat functioning feedback"** parameter allows you to enable and set the transmission conditions for the feedbacks of the thermostat functioning type (Stand alone/Slave) set on the device, via a BUS telegram on the communication objects ***Thermostat functioning feedback*** (Data Point Type: 1.001 DPT_Switch). The logic value "1" corresponds to SIMPLIFIED SLAVE/SLAVE operation; the logic value "0" corresponds to STAND ALONE operation.
The values that can be set are:

- **disabled** **(default value)**
- sending only on request
- sending on variation

If **sending only on request** is selected, the feedbacks of the thermostat functioning type is not sent spontaneously by the device via the communication objects ***Thermostat functioning feedback***; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), indicating the thermostat functioning type.
If **sending on variation** is selected, the feedbacks of the functioning type set on the device is sent spontaneously by the device via the communication objects ***Thermostat functioning feedback***, every time the functioning type is changed. When the BUS or auxiliary voltage is reset, it's a good idea to send the indication of the thermostat functioning type in order to update any devices that may be connected.

9.1.7 HVAC mode setpoint feedback

The **"HVAC mode setpoint feedback"** parameter, visible if the Master/Slave control type or stand alone is HVAC mode, allows you to enable the transmission of the HVAC mode setpoint value via the objects ***Heating anti-freeze setpoint feedback***, ***Heating economy setpoint feedback***, ***Heating precomfort setpoint feedback***, ***Heating comfort setpoint feedback***, ***Air cond. high temp. protection setpoint feedback***, ***Air cooling economy setpoint feedback***, ***Air cooling precomfort setpoint feedback*** and ***Air cooling comfort setpoint feedback*** (Data Point Type: 9.001 DPT_Temp if Object in °C, 9.002 DPT_Tempd if Object in K or *9.027 DPT_Value_Temp_F* if Object in °F).
The values that can be set are:

- **disabled** **(default value)**
- Send object [°C] on demand only
- send object (K) on demand only
- Send object [°F] on demand only
- send object [°C] on variation only
- Send object (K) on variation only
- Send object [°F] on variation only

If **send object [°C] on demand only**, **send object (K) on demand only** or **send object [°F] on demand only** is selected, the feedbacks of the HVAC mode setpoint is not sent spontaneously by the device via the communication objects ***Heating anti-freeze setpoint feedback***, ***Heating economy setpoint feedback***, ***Heating precomfort setpoint feedback***, ***Heating comfort setpoint feedback***, ***Segnalazione setpoint protezione alte temp. condiz.***, ***Air cooling economy setpoint feedback***, ***Air cooling precomfort setpoint***

feedback and ***Air cooling comfort setpoint feedback***; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), indicating the setpoint of the HVAC mode associated with the object.

If **send object [°C] on variation only**, **send object (K) on variation only** or **send object [°F] on variation only** is selected, the fedbacks of the HVAC mode setpoint is sent spontaneously by the device via the communication objects ***Heating anti-freeze setpoint feedback***, ***Heating economy setpoint feedback***, ***Heating precomfort setpoint feedback***, ***Heating comfort setpoint feedback***, ***Air cond. high temp. protection setpoint feedback***, ***Air cooling economy setpoint feedback***, ***Air cooling precomfort setpoint feedback*** and ***Air cooling comfort setpoint feedback***, every time the functioning type is changed. When the BUS or auxiliary voltage is reset, it's a good idea to send the feedbacks of the mode setpoints in order to update any devices that may be connected.

9.1.8 Setpoint OFF mode feedback

The **"Setpoint OFF mode feedback"** parameter, visible if the Master/Slave control type or stand alone is *setpoint*, allows you to enable and set the transmission conditions for the feedbacks with which the device signals if OFF mode is active via a BUS telegram on the communication objects ***Setpoint OFF mode feedback*** (Data Point Type: 1.003 DPT_Enable).
The values that can be set are:

- **disabled** **(default value)**
- sending only on request
- sending on variation

If **sending only on request** is selected, the feedbacks for OFF mode status is not sent spontaneously by the device via the communication objects ***Setpoint OFF mode feedback***; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), indicating the OFF mode status.

If **sending on variation** is selected, the feedbacks for OFF mode status is sent spontaneously by the device via the communication objects ***Setpoint OFF mode feedback***, every time the status changes.

When the BUS or auxiliary voltage is reset, it's a good idea to send the indication of the OFF mode status in order to update any devices that may be connected.

9.1.9 Feedback sending trigger object

The **"Feedbacks sending trigger object"** parameter allows you to enable the input object ***Feedbacks sending trigger*** (Data Point Type: 1.017 DPT_Trigger). When this object receives a BUS telegram with the logic value "0" or "1", the device automatically sends all the feedbacks in the **Feedbacks, Temperature sensors** and **Humidity** menus if they are set with "enebled sending on change" (including the "periodically" option).

- **disable** **(default value)**
- enable

10 “Scenes” menu

Scenes function allows a certain stored condition to be repeated when the Scene execution command is received.

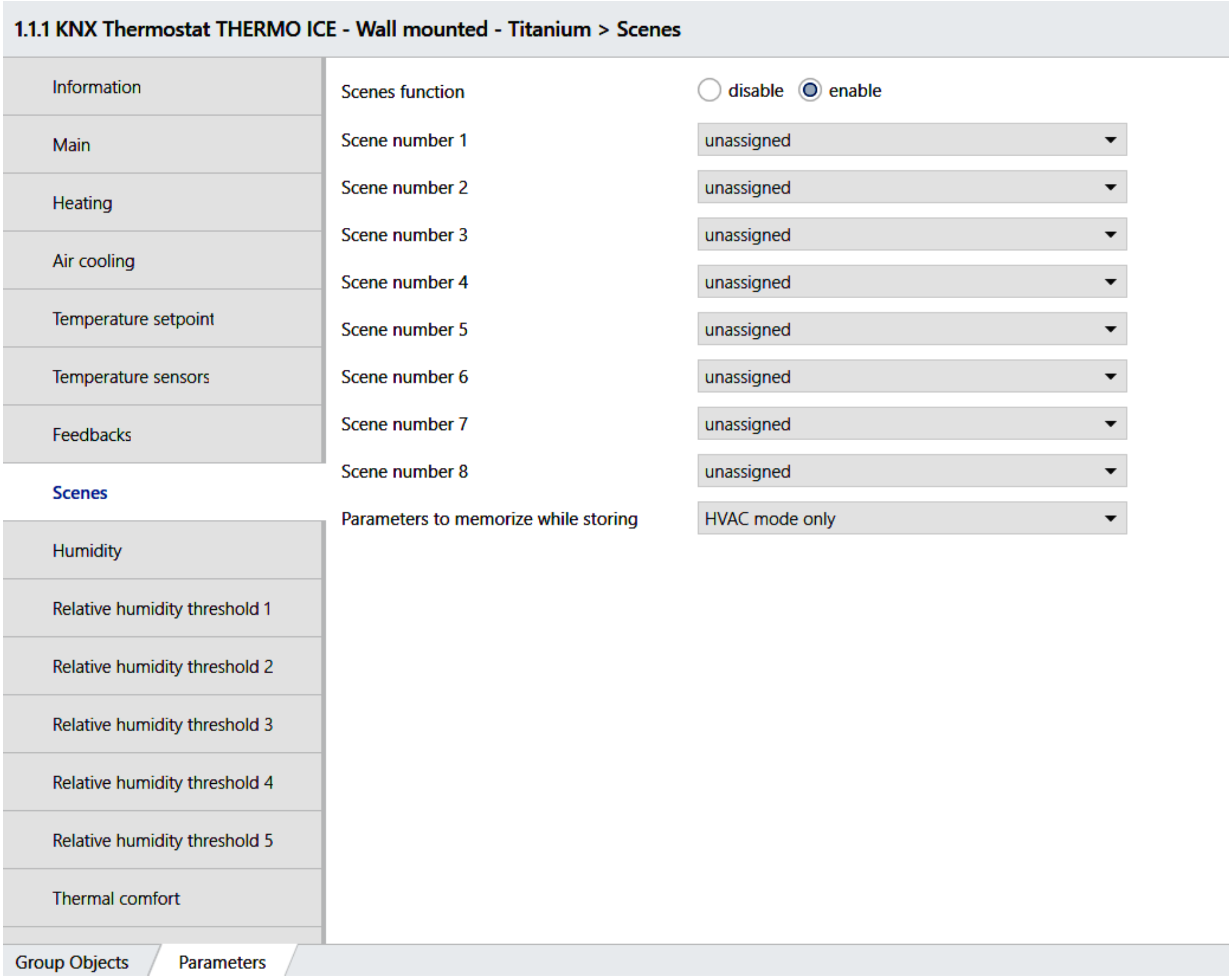


Fig. 10.1 – “Scenes” menu

10.1 Parameters of the

10.1.1 Scenes function

The **“Scenes function”** parameter activates and configures the function, visualising the various function configuration parameters and the relative communication objects ***Thermostat scene*** (Data Point Type: 18.001 DPT_SceneControl).

Scenes function can send two possible commands to the device:

- scene execution - i.e. a command to adopt a certain condition
- scene learning - i.e. a command to store the current status (in the moment when the command is received) of various device operating parameters defined at the time of configuration

This function provides 8 scenes, so the device can store/reproduce 8 different conditions for the operating parameters. The values that can be set are:

- **disable (default value)**
- enable

If **enable** is selected, the **“Scene number 1”**, **“Scene number 2”**, **“Scene number 3”**, **“Scene number 4”**, **“Scene number 5”**, **“Scene number 6”**, **“Scene number 7”**, **“Scene number 8”** and **“Parameters to memorize while storing”** parameters are visualised, along with the communication objects ***Thermostat scene*** via which the scenes execution/storage telegrams are received.

10.1.2 Scene number n (1 ≤ n ≤ 8)

The **“Scene number i”** (1 ≤ n ≤ 8) parameters set the numerical value to identify (and therefore execute/store) the n-th scene. The possible values are:

- **not assigned (default value)**
- 0, 1..63

10.1.3 Parameters to memorize while storing

Given that the thermostat has various operating parameters which can change while it's working, the **“Parameters to memorize while storing”** parameter is used to configure which one should be stored during scene learning in order to then be repeated following an execution command.

If the Master/Slave control type or stand alone is "HVAC mode”, the values that can be set are:

- **HVAC mode only (default value)**
- HVAC mode and functioning type
- HVAC mode, functioning type and forcing

If the Master/Slave control type or stand alone is “setpoint”, the values that can be set are:

- **setpoint only (default value)**
- setpoint and functioning type
- setpoint, functioning type and forcing

The forcing of the setpoint resulting from the activation of a scene (as for forcing manually set by the user or via the BUS) is maintained if the thermostat is switched off due to a 230V power supply failure (the thermostat detects the power failure and saves its status - complete with forcing - so it can be reset at the next start-up). In the same way, the forcing isn't lost when a KNX BUS drop/failure is detected and the connection is subsequently restored.

In *setpoint* and *HVAC* modes, the OFF status is considered a valid status for learning requests, so thermostat switch-off can be associated with any scene.

If functioning type learning is enebled and a scene learning command is received, this setting will be saved if the functioning type is set automatically via the dead zone. When a scene execution request arrives, the dead zone is reactivated even if it was disabled prior to the command.

The configuration of the scenes is independent for the two modes (Setpoint and HVAC), so all the parameters are duplicated.

11 "Humidity" menu

The **Humidity** menu contains the parameters for configuring the operation of the built-in Humidity sensor and a possible external sensor KNX. The structure of the menu is as follows:

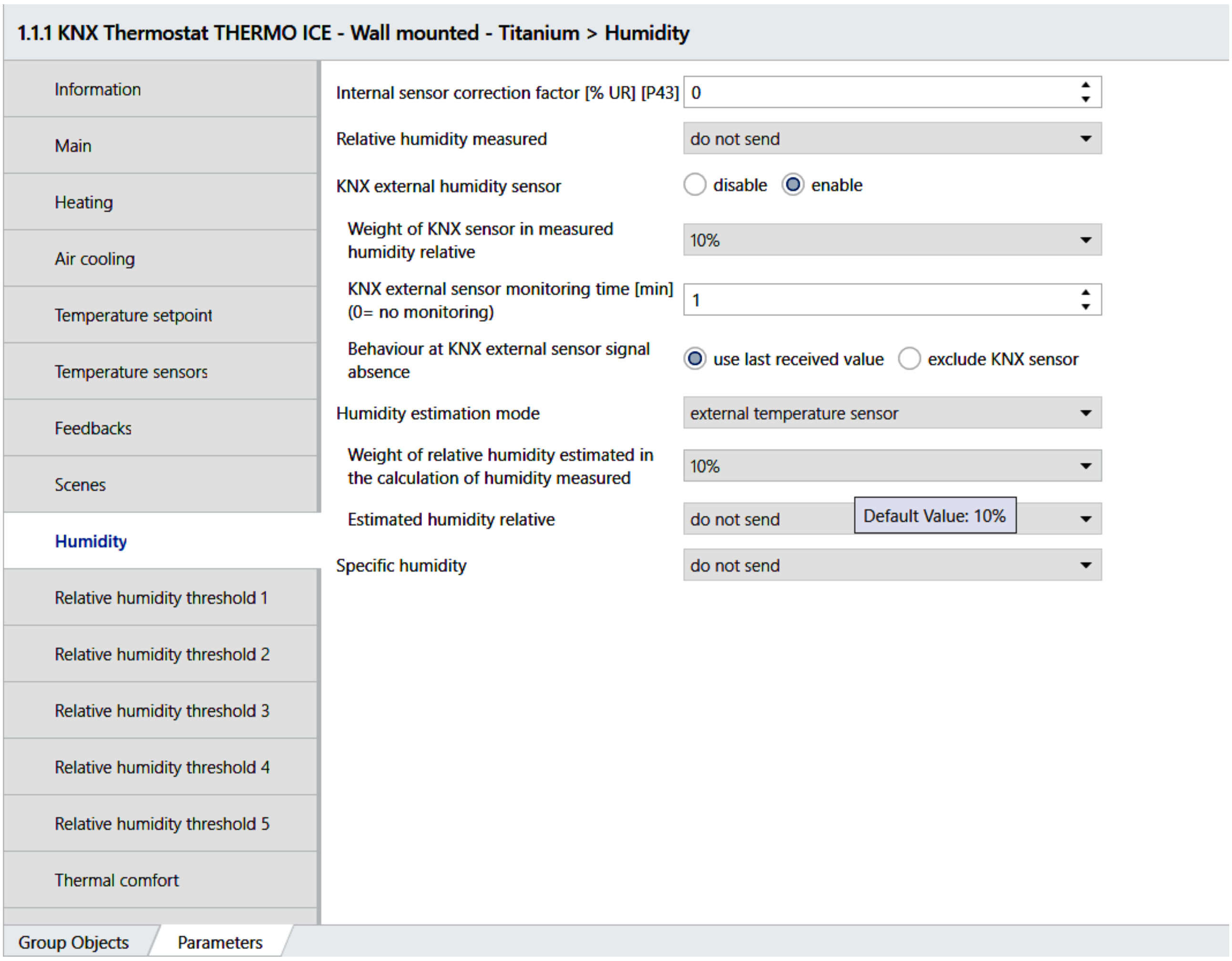


Fig. 11.1 – "Humidity" menu

11.1 Parameters of the

11.1.1 Internal sensor correction factor [% UR]

The **"Internal sensor correction factor [% UR] [P43]"** parameter sets the correction factor to be applied to the measured relative humidity value detected by the built-in sensor. The values that can be set are:

- from -10 to +10 in steps of 1 **(default value 0)**

11.1.2 Measured relative humidity

The "**Measured relative humidity"** parameter defines which event triggers the transmission of the bject ***Measured relative humidity*** (Data Point Type: 9.007 DPT_Value_Humidity) on the BUS.
The parameter can assume the following values:

- **do not send** **(default value)**
- sending only on request
- sending on variation
- sending on period
- sending on variation and on period

Selecting any value other than **do not send**, the communication objects ***Measured relative humidity*** will be displayed.
Selecting **sending on variation** or **sending on variation and on period** visualises the **"Minimum variation for sending value [% RH]"** parameter, whereas selecting **sending on period** or **sending on variation and on period** visualises the **"Value repetition time [minutes]"** parameter.

If **sending only on request** is selected, no new parameter is enebled because the humidity value is not sent spontaneously by the device; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the measured humidity value.

The **"Minimum variation for sending value [% RH]"** parameter, visible if the humidity setting is sending on change, defines the minimum humidity variation (in relation to the last humidity value sent) for triggering the spontaneous transmission of the new value measured. The values that can be set are:

- ± 1%
- ± 2%
- **± 5%** **(default)**
- ± 10%

The **"Value repetition time [minutes]"** parameter, visible if the humidity value is sent periodically, defines the frequency for spontaneously sending the measured relative humidity signalling telegrams. The values that can be set are:

- from 1 to 255 in steps of 1 **(default value 5)**

Note that the value sent with the object ***Measured relative humidity*** might not be determined solely by the measured relative humidity value detected by the built-in sensor; it could be the weighted average of the relative humidity values available. For more details, refer to the "KNX external humidity sensor" and "Humidity estimation mode" paragraphs.

11.1.3 KNX external humidity sensor

The **"KNX external humidity sensor"** parameter can assume the following values:

- **disable** **(default value)**
- enable

Selecting **enable** visualises the communication objects ***Humidity external sensor input*** (Data Point Type: 9.007 DPT_Value_Humidity) and the parameters **"Weight of KNX sensor in measured humidity relative"**, **"KNX external sensor monitoring time [min] (0= no monitoring)"** and **"Behaviour at KNX external sensor signal absence"**.
When the BUS or auxiliary voltage is reset, the device immediately updates the value received from the KNX humidity sensor, sending the status read command (read request) via the object ***Humidity external sensor input*** and storing the value received.

Even if the function is enabled in the ETS parameters, check that the relative communication objects ***Humidity external sensor input*** is connected to a valid group address before considering it enabled.

The communication objects ***Humidity external sensor input*** input will be limited to protect any values that may be incoherent with the normal usage limits declared (operating Humidity: max 93% Rh (non-condensative);

humidity regulation range: 20 - 90%). Input values outside the range 0% - 100% will therefore be filtered and will assume the value of the relative maximum or minimum limit exceeded.

Once you have enebled the external sensor KNX,, the measured relative humidity will be determined not solely by the sensor built into the device but by the weighted average between the value measured by the built-in sensor and the one measured by the external sensor KNX. The **“Weight of KNX sensor in measured humidity relative”** parameter defines the impact of the value measured by the external sensor KNX when calculating the humidity, ranging from minimum 10% to maximum 100% (measured value external sensor = measured relative humidity).

The complete formula for the measured relative humidity calculation is:

$RH_{measured} = RH_{external\ sensor} \times Impact_{external\ sensor} + RH_{device\ sensor} \times (100\% - Impact_{external\ sensor})$

The parameter can assume the following values:

- from 0% to 100% in steps of 10% **(default value 10%)**

The **“KNX external sensor monitoring time [min] (0= no monitoring)”** parameter defines the monitoring time of the external sensor KNX. It can assume the following values:

- from 0 to 10 in steps of 1 **(default value 2)**

If **0** is selected, there is no monitoring on the object enebled for the external sensor input. The significance of the monitoring time is: if the telegram with the measured value is not received periodically within the set monitoring time, the device will behave in different ways depending on the setting of the **“Behaviour at KNX external sensor signal absence”** parameter. This parameter can assume the following values:

- **use last received value** **(default value)**
- exclude KNX sensor

If **exclude KNX sensor** is selected, the contribution of the external sensor KNX in the measured relative humidity calculation is annulled.

11.1.4 Humidity estimation mode

The **“Humidity estimation mode”** parameter allows you to enable the function for estimating the relative humidity value on the basis of the temperature value measured by another temperature sensor (i.e. in a different point from where the thermostat is installed). The references for calculating this estimate are the temperature and humidity values measured by the thermostat, so the absolute humidity must be the same for the two points considered (they must therefore be located in the same room).

The **“Humidity estimation mode”** parameter can assume the following values:

- **disable** **(default value)**
- external temperature sensor
- auxiliary temperature sensor

For the humidity estimation mode calculation, the measured temperature values obtained by the KNX or auxiliary sensor must be valid, otherwise the estimate will not be calculated. In practice, the humidity estimation mode function will be considered disabled.

Once the relative humidity estimate has been enabled in another point, the measured relative humidity may be determined not only by the sensor built into the device and/or the KNX sensor, but by the weighted average between the relative humidity values available. The **“Weight of relative humidity estimated in the calculation of humidity measured”** parameter determines the impact of the value estimated in the measured relative humidity calculation, ranging from minimum 10% to maximum 100% (estimated value external sensor = measured relative humidity).

The complete formula for the measured relative humidity calculation is:

$RH_{measured} = RH_{estimated} \times Impact_{Humidity\ stimata} + RH_{external\ sensor} \times Impact_{external\ sensor} + RH_{device\ sensor} \times (100\% - Impact_{Humidity\ estimated} - Impact_{external\ sensor})$

If both external humidity values (from the KNX BUS and the estimated value) are enabled, the sum of the impact values must obviously not exceed 100%; this means that if the impact of the value from the KNX sensor is 30%, the maximum impact of the estimated humidity is 70%. In this case, the relative humidity value measured directly by the thermostat will have no effect on the measured humidity value.

The parameter can assume the following values:

- from 0% to 100% in steps of 10% **(default value 10%)**

The "**Humidity estimation mode"** parameter defines which event triggers the transmission of the object ***Humidity estimation mode*** (Data Point Type: 9.007 DPT_Value_Humidity) on the BUS. The parameter can assume the following values:

- **do not send (default value)**
- sending only on request
- sending on variation
- sending on period
- sending on variation and on period

Selecting any value other than **do not send**, the communication objects ***Humidity estimation mode*** will be displayed.
Selecting **sending on variation** or **sending on variation and on period** visualises the **"Minimum variation for sending value [% RH]"** parameter, whereas selecting **sending on period** or **sending on variation and on period** visualises the **"Value repetition time [minutes]"** parameter.

If **sending only on request** is selected, no new parameter is enebled because the humidity value is not sent spontaneously by the device; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the estimated humidity value.

The **"Minimum variation for sending value [% RH]"** parameter, visible if the humidity setting is sending on change, defines the minimum humidity variation (in relation to the last humidity value sent) for triggering the spontaneous transmission of the new value measured. The values that can be set are:

- ± 1%
- ± 2%
- **± 5% (default)**
- ± 10%

The **"Value repetition time [minutes]"** parameter, visible if the humidity value is sent periodically, defines the frequency for spontaneously sending the measured relative humidity signalling telegrams. The values that can be set are:

- from 1 to 255 in steps of 1 **(default value 5)**

11.1.5 Specific Humidity

The device can calculate the specific humidity of the room where it is installed. This is done using the following calculations:

$$Vapour\ pressure = 6.11 \times 10^{\frac{7.5 \times Temperature\ [°C]}{237.7 + Temperature\ [°C]}}$$

$$Atmospheric\ pressure = 0.9877^{\frac{Height\ a.s.l.[m]}{100}}$$

$$Mixture\ ratio = \frac{622 \times Vapour\ pressure}{Atmospheric\ pressure - Vapour\ pressure}$$

$$Specific\ humidity = \frac{Mixture\ ratio\ \times Relative\ humidity}{100}$$

We use X for the specific humidity in kg / kg a.s., and knowing that the vapour pressure equation is as follows:

$$Pv = \frac{p * X}{0.622 + X}$$

where p = 101325 Pa

we can obtain:

$$X = \frac{Pv * 0.622}{p - Pv}$$

The **"Specific Humidity"** parameter defines any possible conditions for sending the specific humidity value measured. The parameter can assume the following values:

- **do not send** **(default value)**
- sending only on request
- sending on variation
- sending on period
- sending on variation and on period

Selecting any value other than **do not send** the will be displayed communication objects ***Humidity specifica*** (Data Point Type: 14.005 DPT_Value_Amplitude).

Selecting **sending on variation** or **sending on variation and on period** visualises the **"Minimum variation for sending value [g/Kg]"** parameter, whereas selecting **sending on period** or **sending on variation and on period** visualises the **"Value repetition time [minutes]"** parameter.

If **sending only on request** is selected, no new parameter is enebled because the humidity value is not sent spontaneously by the device; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the specific humidity value.

The **"Minimum variation for sending value [g/Kg]"** parameter, visible if the specific humidity setting is sending on change, defines the minimum specific humidity variation (in relation to the last specific humidity value sent) for triggering the spontaneous transmission of the new value measured. The values that can be set are:

- ± 1g/kg
- ± 2g/kg
- **± 5g/kg** **(default)**
- ± 10g/kg

The **"Value repetition time [minutes]"** parameter, visible if the specific humidity value is sent periodically, defines the frequency for spontaneously sending the specific humidity signalling telegrams. The values that can be set are:

- from 1 to 255 in steps of 1 **(default value 5)**

12 “Relative humidity threshold X” menu

The device allows you to configure 5 relative humidity thresholds, associating each one with the transmission of various BUS commands when the threshold values are exceeded. All 5 thresholds are identical so, for the sake of simplicity, the operation and dedicated parameters are summarised in this paragraph, indicating the reference threshold with a general “x” (1...5).

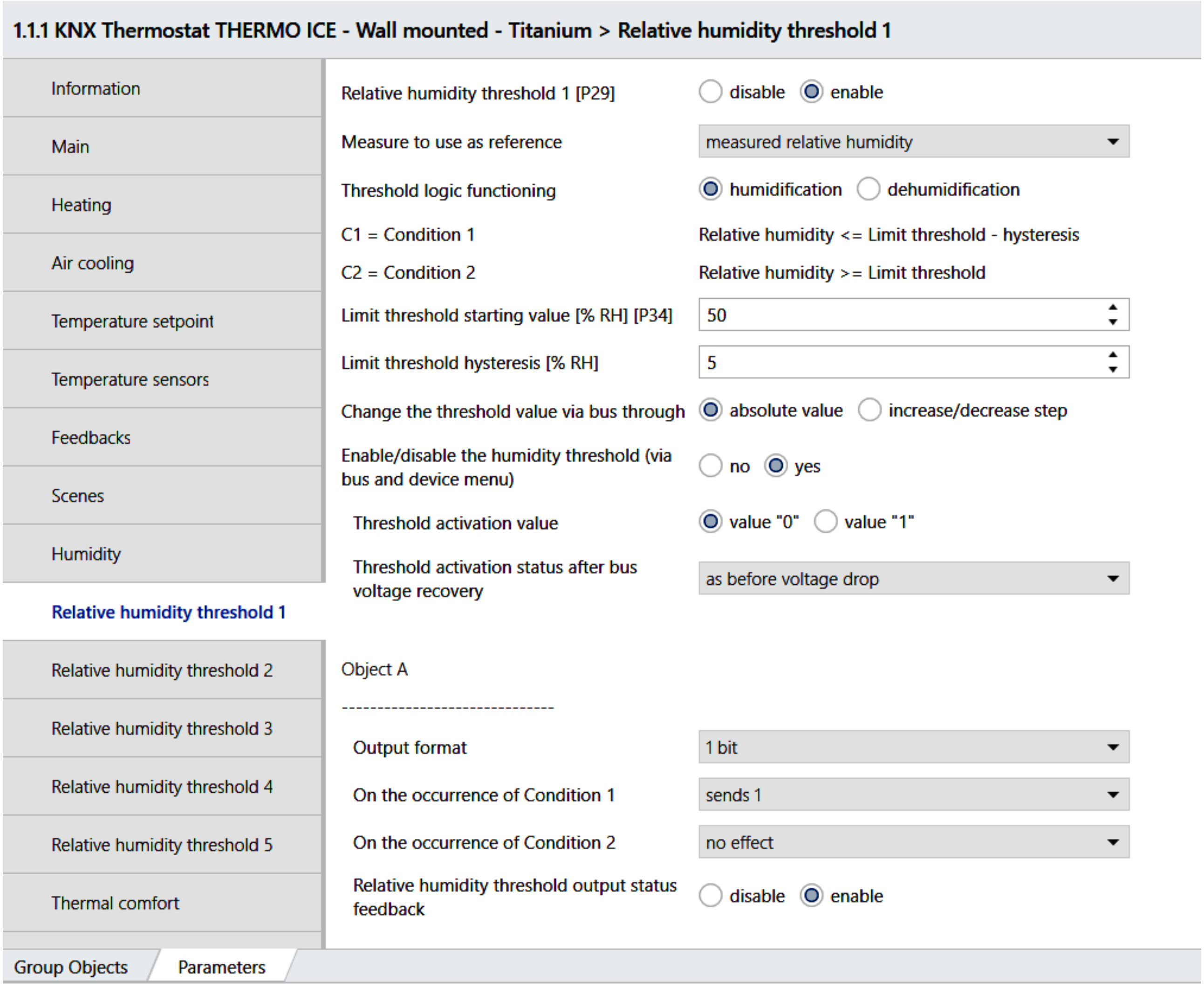


Fig. 12.1 – “Relative humidity threshold X” menu

12.1 Parameters of the

12.1.1 Relative humidity threshold X

The **“Relative humidity threshold X [P29/P30/P31/P32/P33]”** parameter activates and configures the function, visualising the various function configuration parameters and the communication objects. The values that can be set are:

- **disable** **(default value)**
- enable

Selecting **enable** visualises the configuration parameters and the communication objects ***Relative humidity threshold 1 feedback X*** (Data Point Type: 9.007 DPT_Value_Humidity). The telegrams are sent via this object following a BUS request, spontaneously at each threshold variation, and when the BUS or auxiliary voltage is reset.

12.1.2 Measure to use as reference

The **"Measure to use as reference"** parameter allows you to select which of the two Relative humidity values available (measured or estimated) should be used for the hysteresis control. The values that can be set are:

- **Measured relative humidity** **(default value)**
- KNX sensor relative humidity
- Humidity estimation mode

Note that the measured relative humidity value may be determined not solely by the relative humidity effectively measured by the built-in sensor; it could be the weighted average of the relative humidity values available. For more details, refer to the "KNX external humidity sensor" and "Humidity estimation mode" paragraphs.

If **Humidity estimation mode** or **KNX sensor relative humidity** is selected but this function has not been enabled in the **Humidity** menu, then measured relative humidity will be used for the threshold hysteresis control.

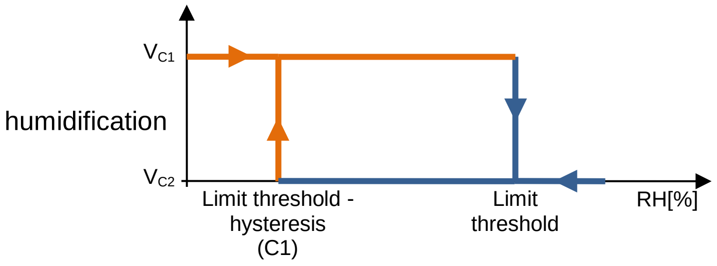
12.1.3 Threshold logic functioning

The **"Threshold logic functioning"** parameter defines the type of hysteresis to be adopted, and therefore the hysteresis limit values. The parameter can assume the following values:

- **umidificazione** **(default value)**
- deumidificazione

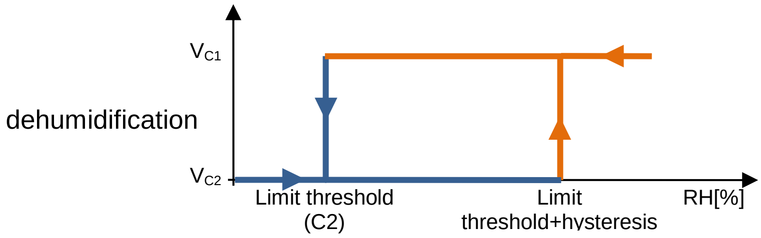
If **umidificazione** is selected, the two conditions are defined in the following way:

- Condition 1 = Relative humidity ≤ Limit threshold – Hysteresis
- Condition 2 = Relative humidity ≥ Limit threshold



When the reference relative humidity is lower than value C1 (Limit threshold-hysteresis"), the device sends the command associated with Condition 1; when the reference relative humidity reaches value C2 (Limit threshold), the device sends the command associated with Condition 2.

By selecting **dehumidification**, the two conditions will be defined as follows:



- Condition 1 = Relative humidity ≥ Limit threshold + Hysteresis
- Condition 2 = Relative humidity ≤ Limit threshold

When the reference relative humidity is higher than value C1 (Limit threshold+hysteresis"), the device sends the command associated with Condition 1; when the reference relative humidity reaches value C2 (Limit threshold), the device sends the command associated with Condition 2.

12.1.4 Limit threshold starting value [%UR]

The **"Limit threshold starting value [%UR] [P34/P35/P36/P37/P38]"** parameter sets the initial value of the limit threshold associated with the relative humidity threshold X (that can be modified via the BUS if necessary, using the dedicated communication objects, or from the local menu). The parameter can assume the following values:

- from 0 to 100 in steps of 1 **(default value 50)**

The **"Limit threshold hysteresis [% RH]"** parameter sets the hysteresis value that, when added to or subtracted from the limit threshold, helps define the second limit value for sending the commands. This parameter can assume the following values:

- from 1 to 20 in steps of 1 **(default value 5)**

12.1.5 Change the threshold via BUS

The **"Change the threshold value via bus through"** parameter defines the format of the communication objects needed to set the limit threshold via a BUS telegram. The values that can be set are:

- **absolute value** **(default value)**
- increase/decrease step

Selecting **absolute value** visualises the object ***Relative humidity threshold X value input*** (Data Point Type: 9.007 DPT_Value_Humidity), via which the limit threshold can be directly modified.

Selecting **increase/decrease step** visualises the **"Threshold regulation step via bus [%]"** parameter and the object ***Relative humidity threshold X value regulation*** (Data Point Type: 1.007 DPT_Step).

If the value "1" is received on this object, the limit threshold value will be increased by the value defined in the **"Threshold regulation step via bus [%]"** parameter; if the value "0" is received on this object, the limit threshold value will be temporarily decreased by the value defined in the **"Threshold regulation step via bus [%]"** parameter.

The **"Threshold regulation step via bus [%]"** parameter defines the increase/decrease step of the limit threshold value following the arrival of a command on the relative regulation object. The values that can be set are

- from 1 to 20 in steps of 1 **(default value 5)**

12.1.6 Enable/disable the Humidity threshold (via BUS and device menu)

The **"Enable/disable the humidity threshold (via bus and device menu)"** parameter allows you to enable the possibility to activate and deactivate the relative humidity threshold X via the parameter in the local thermostat menu and/or via a dedicated communication objects. The parameter can assume the following values:

- **no (default value)**
- yes

If **yes** is selected, the ***Relative humidity threshold X enabling*** (Data Point Type:1.002 DPT_Bool) and ***Relative humidity threshold X enabling status*** (Data Point Type:1.003 DPT_Enable) communication objects are visualised, to receive the threshold activation commands and signal the threshold activation status, along with the **"Threshold activation value"** and **"Threshold activation status after bus voltage recovery"** parameters. The humidity threshold can therefore be enabled/disabled via the BUS or via the relative parameter in the local menu of the device.

The threshold enabling status is sent via the dedicated object at device start-up, on the arrival of a status read command (read request), and with every variation (triggered by a BUS command or via the local menu).

The **"Threshold activation value"** parameter determines which logic value received via the communication objects ***Relative humidity threshold X enabling*** will activate the relative humidity threshold X; the arrival of the opposite value will deactivate the threshold. The possible values are:

- value "0"
- **value "1" (default value)**

The **"Threshold activation status after bus voltage recovery"** parameter sets the Relative humidity threshold X status following a BUS voltage reset. The possible values are:

- disabled
- enabled
- **as before voltage drop (default value)**

12.1.7 Send communication objects on the basis of Conditions 1/2

For each threshold, up to 4 different objects (distinguished by the letters A, B, C and D) can be sent, depending on the occurrence of conditions 1 and 2. object A is always enebled, but the **"Object z"** parameter (where z indicates the object associated with the threshold, between **A** and **D)** can be used to enable a new object to be sent. The parameter can assume the following values:

- **disable (default value)**
- enable

If **enable** is selected, the object ***Relative humidity threshold X object Z*** (where z indicates the object associated with the threshold, between **A** and **D)** is visualised along with the **"Output format"**, **"On the occurrence of Condition 1"** and **"On the occurrence of Condition 2"** parameters, grouped together in the **Object z** sub-set (where z indicates the object associated with the channel, between **A** and **D)**.

The **"Output format"** parameter is used to set the format and code of the BUS telegram that will be sent by the device. The values that can be set are:

- **1 bit (default value)**
- 2 bit
- 1 byte unsigned
- 1 byte signed

- 1 byte percentage
- 1 byte HVAC mode
- 2 byte unsigned
- 2 byte signed
- 2 byte setpoint [°C]
- 2 byte setpoint [K]
- 2 byte setpoint [°F]

Depending on the value set for this item, the values that can be set for the **"On the occurrence of Condition 1"** and **"On the occurrence of Condition 2"** parameters will change.

The **"On the occurrence of Condition 1"** parameter sets the command or value to be sent when Condition 1 occurs.

The **"On the occurrence of Condition 2"** parameter sets the command or value to be sent when Condition 2 occurs.

- If the output format is **1 bit**, the Communication objects ***Relative humidity threshold X object Z*** (Data Point Type: 1.001 DPT_Switch) is visualised along with the **"Relative humidity threshold output status feedback"** parameter. The values that can be set for the two parameters above are:

  - **no effect** **(default value when cond 2 occurs)**
  - send 0
  - **send 1** **(default value when cond 1 occurs)**

  The **"Relative humidity threshold output status feedback"** parameter is used to enable and visualise the l'Communication objects ***Relative humidity threshold X output status feedback Z*** (Data Point Type: 1.001 DPT_Switch). When this object is enabled, the command on the object ***Relative humidity threshold X object Z*** will be repeated if the status received on the object ***Relative humidity threshold X output status feedback Z*** doesn't coincide with the command. If the feedback is not received, the same object will be sent a read request two seconds after sending the command, and they cyclically after 60 seconds if there is still no response.

  The parameter can assume the following values:

  - disable
  - **enable** **(default value)**

  Selecting **enable** visualises the communication objects ***Relative humidity threshold X output status feedback Z***. Every time the BUS or auxiliary voltage is reset in this case, the device sends a status read command (read request) on this object to update the thermostat about the status of the connected devices, but only if condition C1 or C2 has occurred (otherwise, no request is sent).

  Selecting **disable** visualises the **"Object Commands cyclical repetition"** parameter.

- If the output format is **2 bit**, the communication objects ***Relative humidity threshold X object Z*** (Data Point Type: 2.001 DPT_Switch_Control) is visualised. The values that can be set for the two parameters above are:

  - **no effect** **(default value with condition 2)**
  - **sends active forcing on (down)** **(default value with condition 1)**
  - sends active forcing on(up)
  - sends deactivate forcing

- If the output format is **1 byte unsigned**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 5.010 DPT_Value_1_Ucount) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **value sending** **(default value with cond 1)**

If **value sending** is set, the value to be sent can be defined via the new parameter displayed **"Value (0 .. 255)"**, which can assume the following values:

- from **0 (default value)** to 255, in steps of 1

- If the output format is **1 byte signed**, the is visualisedCommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 6.010 DPT_Value_1_Count) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **value sending** **(default value with cond 1)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed (**"Value (-128 .. 127)"**), which can assume the following values:

  - from -128 to 127 in steps of 1 **(default value 0)**

- If the output format is **1 byte percentage**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 5.001 DPT_Scaling) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **value sending** **(default value with cond 1)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed **"Value (0% .. 100%)"**, which can assume the following values:

  - from **0 (default value)** to 100, in steps of 1

- If the output format is **1 byte HVAC mode**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 20.102 DPT_HVACMode) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - sends auto
  - **sends comfort** **(default value with cond 1)**
  - sends precomfort
  - sends economy
  - sends off (building protection)
  - sends actual HVAC mode ± offset
  - sends referenced HVAC mode ± offset

If **sends actual HVAC mode ± offset** is selected, the **"Offset (-3 .. +3)"** parameter is visualised and the output value will be the current HVAC mode plus the offset (the order of the various modes is: comfort, precomfort, economy, off); if device operation is setpoint, no output value is sent.

If **sends referenced HVAC mode ± offset** is selected, the **"Offset (-3 .. +3)"** parameter is visualised along with the communication objects ***Relative humidity threshold X object Z status*** (Data Point Type: 20.102 DPT_HVACMode). In this case, the output value will be the HVAC mode received via the object ***Relative humidity threshold X object Z status*** , plus the offset (the order of the various modes is: comfort, precomfort, economy, off). If nothing has ever been received on the reference oject, the initial value is equal to "comfort". Every time the BUS or auxiliary voltage is reset, the device sends a status read command (read request) on the object ***Relative humidity threshold X object Z status*** to update the thermostat about the status of the connected devices.

EXAMPLE: to switch from "comfort" mode to "economy" mode, the offset must be "+2". The set is not circular so, once the limit values ("comfort" or "off") have been reached, the calculation is ended even if the offset defined is greater than the value effectively applied to reach the limit value.

The **“Offset (-3 .. +3)”** parameter sets the offset to be applied to the current or reference HVAC mode to obtain the value to be sent via the object ***Relative humidity threshold X object Z***. The possible values are:

- from -3 to +3 in steps of 1 **(default value +1)**

- If the output format is **2 byte unsigned**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 7.001 DPT_Value_2_Ucount) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **value sending** **(default value with cond 1)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed (**“Value (0 .. 65535)”**), which can assume the following values:

  - from **0 (default value)** to 65535, in steps of 1

- If the output format is **2 byte signed**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 8.001 DPT_Value_2_Count) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **value sending** **(default value with cond 1)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed **“Value (-32768 .. +32767)”**, which can assume the following values:

  - from -32768 to +32767 in steps of 1 **(default value 0)**

- If the output format is **2 byte setpoint [°C]**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 9.001 DPT_Value_Temp) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **sends current setpoint ± offset** **(default value with cond 1)**
  - sends referenced setpoint ± offset

  If **sends current setpoint ± offset** is selected, the **“Offset [0.1 °C] (-300 .. +300)”** parameter is visualised and the output value will be the current device setpoint plus the offset.

  If **sends referenced setpoint ± offset** is selected, the **“Offset [0.1 °C] (-300 .. +300)”** parameter is visualised along with the communication objects ***Relative humidity threshold X object Z status*** (Data Point Type: 9.001 DPT_Value_Temp). In this case, the output value will be the setpoint received via the object ***Relative humidity threshold X object Z status*** , plus the offset. If nothing has ever been received on the reference object, the initial value is equal to “20°C”.

  Every time the BUS or auxiliary voltage is reset, the device sends a status read command (read request) on the object ***Relative humidity threshold X object Z status*** to update the thermostat about the status of the connected devices.

  The **“Offset [0.1 °C] (-300 .. +300)”** parameter sets the offset to be applied to the current or reference setpoint to obtain the value to be sent via the object ***Relative humidity threshold X object Z***. The possible values are:

  - from -300 to +300 in steps of 1 **(default value +10)**

- If the output format is **2 byte setpoint [K]**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 9.002 DPT_Value_Tempd) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **sends current setpoint ± offset** **(default value with cond 1)**
  - sends referenced setpoint ± offset

  If **sends current setpoint ± offset** is selected, the **"Offset [0.1 °C] (-300 .. +300)"** parameter is visualised and the output value will be the current device setpoint plus the offset.

  If **sends referenced setpoint ± offset** is selected, the **"Offset [0.1 °C] (-300 .. +300)"** parameter is visualised along with the communication objects ***Relative humidity threshold X object Z status*** (Data Point Type: 9.002 DPT_Value_Tempd). In this case, the output value will be the setpoint received via the object ***Relative humidity threshold X object Z status*** , plus the offse. If nothing has ever been received on the reference object, the initial value is equal to "293 K".

  Every time the BUS or auxiliary voltage is reset, the device sends a status read command (read request) on the object ***Relative humidity threshold X object Z status*** to update the thermostat about the status of the connected devices.

  The **"Offset [0.1 °C] (-300 .. +300)"** parameter sets the offset to be applied to the current or reference setpoint to obtain the value to be sent via the object ***Relative humidity threshold X object Z***. The possible values are:

  - from -300 to +300 in steps of 1 **(default value +10)**

- If the output format is **2 byte setpoint [°F]**, the is visualisedcommunication objects ***Relative humidity threshold X object Z*** (Data Point Type: 9.027 DPT_Value_Temp_F) The values that can be set for the two parameters above are:

  - **no effect** **(default value with cond 2)**
  - **sends current setpoint ± offset** **(default value with cond 1)**
  - sends referenced setpoint ± offset

  If **sends current setpoint ± offset** is selected, the **"Offset [0.1 °C] (-300 .. +300)"** parameter is visualised and the output value will be the current device setpoint plus the offset.

  If **sends referenced setpoint ± offset** is selected, the **"Offset [0.1 °C] (-300 .. +300)"** parameter is visualised along with the communication objects ***Relative humidity threshold X object Z status*** (Data Point Type: 9.027 DPT_Value_Temp_F). In this case, the output value will be the setpoint received via the object ***Relative humidity threshold X object Z status*** , plus the offset. If nothing has ever been received on the reference object, the initial value is equal to "68°F".

  Every time the BUS or auxiliary voltage is reset, the device sends a status read command (read request) on the object ***Relative humidity threshold X object Z status*** to update the thermostat about the status of the connected devices.

  The **"Offset [0.1 °C] (-300 .. +300)"** parameter sets the offset to be applied to the current or reference setpoint to obtain the value to be sent via the object ***Relative humidity threshold X object Z***. The possible values are:

  - from -300 to +300 in steps of 1 **(default value +10)**

The object ***Relative humidity threshold X object Z*** is sent upon request, spontaneously (sending on change of the current C1 or C2 condition), periodically (if cyclical repetition is enabled) and with a BUS or auxiliary voltage reset if condition C1 or C2 has been verified (otherwise, no value is sent). When the threshold is disabled, the sending of telegrams associated with conditions C1 and C2 is inhibited, but any possible change or feedback of the threshold value is still executed.

The **“Object Commands cyclical repetition”** parameter (if visualised) allows you to enable the periodical sending of the output value. The possible values are:

- **disable** **(default value)**
- enable

If **enable** is selected, the **“Commands repetition period”** parameter is visualised to set the command repetition frequency. The values that can be set are:

- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes** **(default)**

13 “Thermal comfort” menu

The **Thermal comfort** menu contains the parameters that allow you to enable and configure the Thermal comfort signalling for the room, based on the relative humidity and measured temperature.

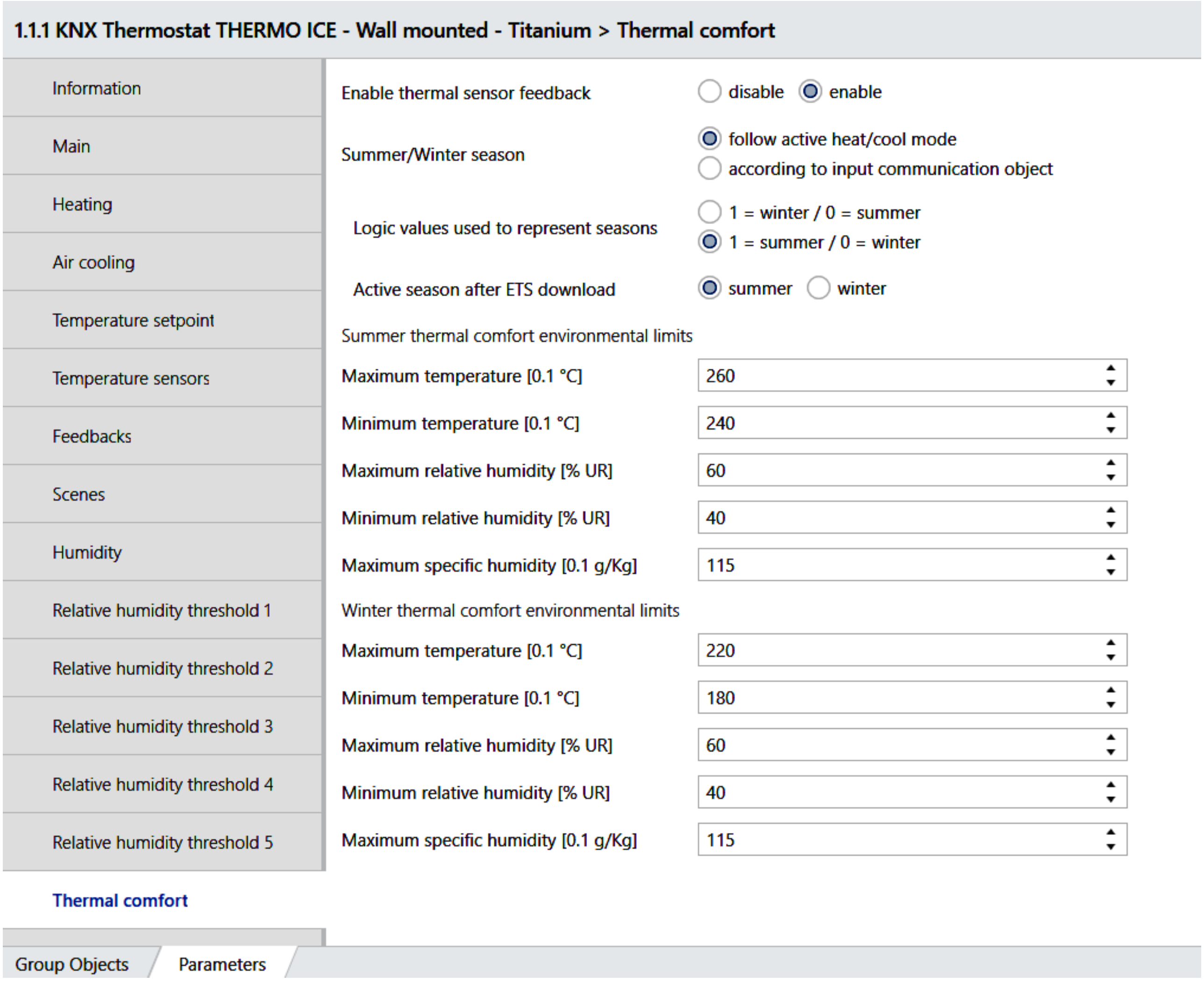


Fig. 13.1 – “Thermal comfort” menu

13.1 Parameters of the

13.1.1 Enable thermal sensor feedback

The **“Enable thermal sensor feedback”** parameter enables this function, displaying the configuration parameters. The possible values are:

- **disable** **(default value)**
- enable

If **enable** is selected, all the objects and parameters relating to the Thermal comfort signalling function will be displayed.

13.1.2 Summer/Winter season

To determine the thermal comfort status, it is necessary to define the current season (summer or winter); the **"Summer/Winter season"** parameter sets the mode for defining the season. The possible values are:

- **follow active heat/cool mode (default)**
- according to input communication object

If **follow active heat/cool mode** is selected, the season - summer or winter - will be deduced from the functioning type currently active on the device: summer if the active functioning type is cooling, winter if it's heating.

If **according to input communication object** is selected, the object ***Season selection input*** (Data Point Type 1.002 DPT_Bool) is displayed along with the **"Logic values used to represent seasons"** and **"Active season after ETS download"** parameters. With this setting, the season - summer or winter - depends on the value of the communication object.

The **"Logic values used to represent seasons"** parameter defines which logic value received via the communication objects ***Season selection input*** is associated with summer and which with winter. The possible values are:

- 1 = winter / 0 = summer
- **1 = summer / 0 winter (default value)**

The **"Active season after ETS download"** parameter preselects the season after the ETS download. The possible values are:

- **summer (default value)**
- winter

The setting is valid until a value is received on the object ***Season selection input***.

13.1.3 Limit conditions for comfort in summer/winter

A comfort condition in the room will depend on the current relative humidity and temperature values; if both values fall within the limit range, then the environment is defined as "comfortable".

The limit temperature and humidity values must be defined for both summer and winter, in order to consider the environment as "comfortable".

The maximum temperature in summer or winter (depending on the sub-group that the parameter belongs to) is defined with the **"Maximum temperature [0.1 °C]"** parameter, which can assume the following values:

- from 200 to 400 in steps of 1 **(default value for summer 260, default value for winter 220)**

The minimum temperature in summer or winter (depending on the sub-group that the parameter belongs to) is defined with the **"Minimum temperature [0.1 °C]"** parameter, which can assume the following values:

- from 200 to 400 in steps of 1 **(default value for summer 240, default value for winter 180)**

The maximum relative humidity in summer or winter (depending on the sub-group that the parameter belongs to) is defined with the **"Relative humidity massima [% UR]"** parameter, which can assume the following values:

- from 50 to 95 in steps of 1 **(default value 60)**

The minimum relative humidity in summer or winter (depending on the sub-group that the parameter belongs to) is defined with the **"Relative humidity minima [% UR]"** parameter, which can assume the following values:

- from 10 to 45 in steps of 1 **(default value 40)**

The maximum specific humidity in summer or winter (depending on the sub-group that the parameter belongs to) is defined with the **"Humidity specifica massima [0.1 g/kg]"** parameter, which can assume the following values:

- from 50 to 220 in steps of 1 **(default value 115)**

Once the limit values have been defined, the environment is comfortable if all three conditions indicated below are observed:

- Minimum temperature ≤ Current temperature ≤ Maximum temperature
- Minimum Relative humidity ≤ Current Relative humidity ≤ Maximum Relative humidity
- Current specific Humidity ≤ Maximum specific Humidity

The object ***Thermal comfort feedback*** (Data Point Type 1.002 DPT_Bool) allows the comfort status of the room where the device is installed to be sent on the BUS. If the three conditions are all respected ("comfortable" environment), the oject assumes the logic value "1"; otherwise, the value is "0".

The value of the object is sent on request, spontaneously (sending on change) and when the BUS voltage is reset.

14 “Dewpoint” menu

“Dewpoint” or dewpoint temperature is the temperature at which the air needs to be cooled in order to reach saturation point, where condensation occurs (Relative humidity 100%). This menu allows you to configure the use of the communication objects to send the calculated dewpoint temperature via the BUS and manage the monitoring of a threshold for sending an alarm signal via a configurable output.
The determination of the Dewpoint uses the relative humidity and temperature values measured by the thermostat (values of average weight, that may or may not be affected by the KNX external and/or auxiliary sensors). This calculation assumes constant water vapour pressure and content.
The menu is as follows:

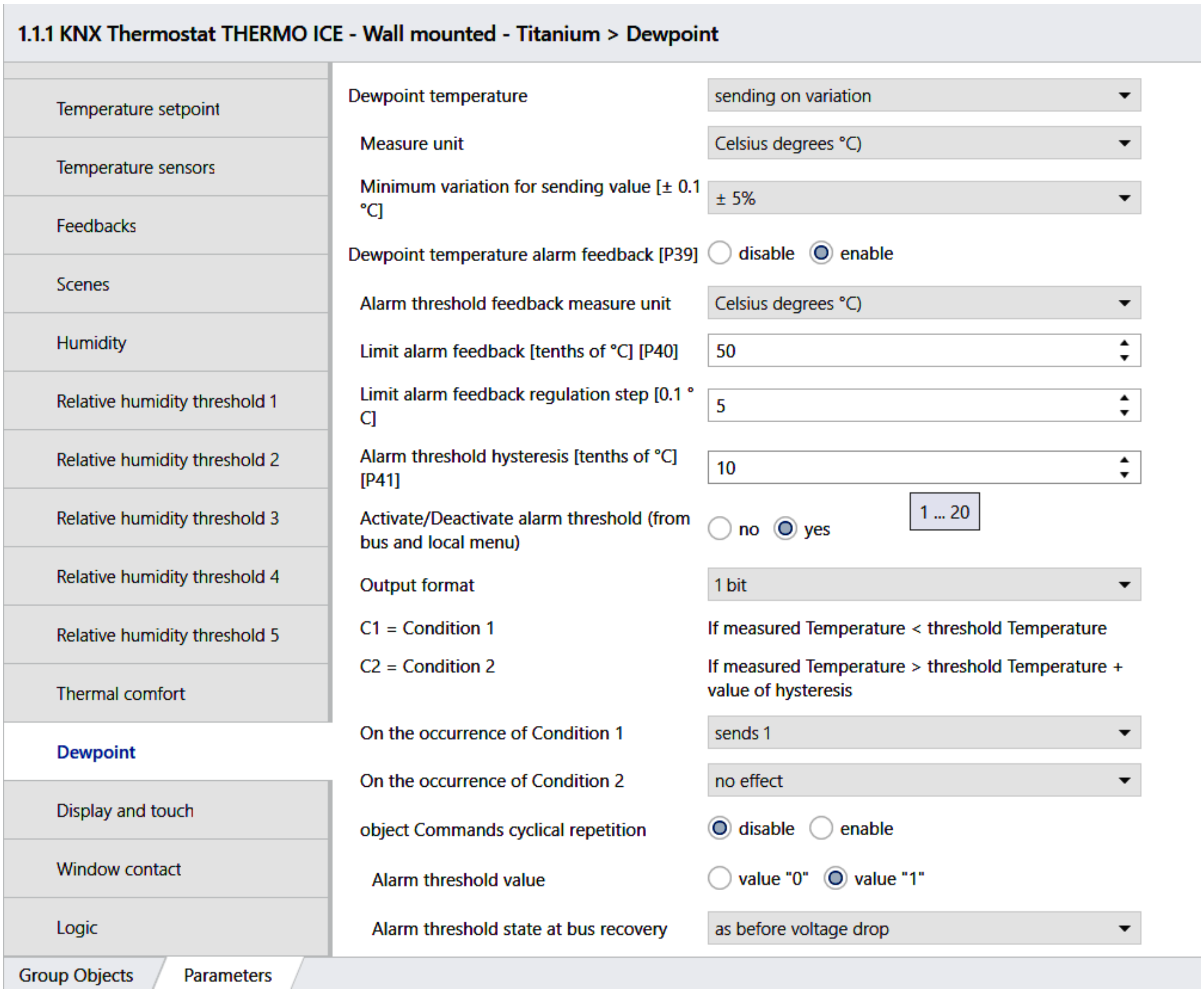


Fig. 14.1 – “Dewpoint” menu

14.1 Parameters of the

14.1.1 Dewpoint temperature

The **“Dewpoint temperature”** parameter defines the conditions for sending the Dewpoint temperature value calculated by the device. The values that can be set are:

- **do not send** **(default value)**
- sending only on request

- sending on variation
- sending on period
- sending on variation and on period

Selecting any value other than **do not send** will visualise the communication objects ***Dewpoint temperature*** and the **"Measure unit"** parameter.

Selecting **sending on variation** or **sending on variation and on period**, will also visualise the parameter **"Minimum variation for sending value [± 0.1 °C]"** whereas selecting **sending on period** or **sending on variation and on period** will also visualise the parameter **"Feedback sending period [minutes]"**.

If **sending only on request** is selected, no new parameter is enebled because the dewpoint temperature value is not sent spontaneously by the device; only in the case of a status read request (read request) will the device send the user a telegram in response to the command received (response), giving the dewpoint temperature value calculated.

The **"Measure unit"** parameter sets the measure unit for coding and sending the information via the communication objects ***Dewpoint temperature***. The values that can be set are:

- **Celsius degrees [°C]** **(default value)**
- Kelvin degrees (K)
- Fahrenheit degrees [°F]

The value set for this parameter determines the coding of the communication objects ***Dewpoint temperature***: *9.001 DPT_Value_Temp* if the value is **Celsius degrees [°C]**, *9.002 DPT_Value_Tempd* if the value is **Kelvin degrees (K)**, or *9.027 DPT_Value_Temp_F* if the value is **Fahrenheit degrees [°F]**.

The **"Minimum variation for sending value [± 0.1 °C]"** parameter, visible if the temperature setting is sending on change, defines the minimum temperature variation (in relation to the last temperature value sent) for triggering the spontaneous transmission of the new value calculated. The values that can be set are:

- from 1 to 10 in steps of 1 **(default value 5)**

The **"Feedback sending period [minutes]"** parameter, visible if the temperature value is sent periodically, defines the frequency for spontaneously sending the dewpoint temperature signalling telegrams. The values that can be set are:

- from 1 to 255 in steps of 1 **(default value 5)**

14.1.2 Dewpoint alarm

The **"Dewpoint temperature alarm feedback [P39]"** parameter activates and configures an alarm threshold for sending a BUS command when the "alarm detected" and "alarm ended" conditions arise. The values that can be set are:

- **disable** **(default value)**
- enable

Selecting **enable** visualises the communication objects ***Dewpoint alarm threshold feedback, Dewpoint temperature alarm output*** and ***Dewpoint alarm regulation limit***. The format of the first two objects changes according to the configuration of the function. If the alarm signal threshold is enabled, all the configuration parameters will be displayed as well.

The **"Alarm threshold feedback measure unit"** parameter sets the measure unit for coding and sending the information via the communication objects ***Dewpoint alarm threshold feedback***. The values that can be set are:

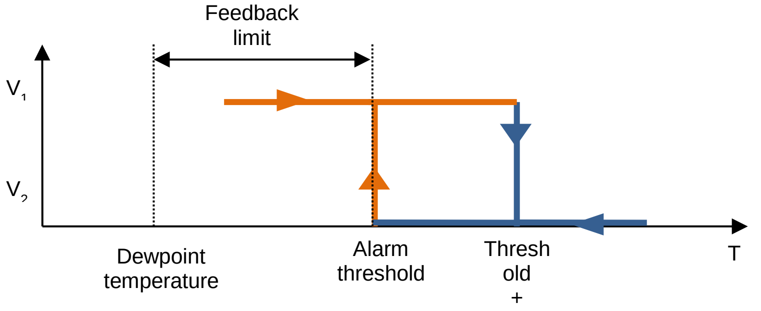
- **Celsius degrees [°C]** **(default value)**

- Kelvin degrees (K)
- Fahrenheit degrees [°F]

The value set for this parameter determines the coding of the communication objects ***Dewpoint alarm threshold feedback***: *9.001 DPT_Value_Temp* if the value is **Celsius degrees [°C]**, *9.002 DPT_Value_Tempd* if the value is **Kelvin degrees (K)** or *9.027 DPT_Value_Temp_F* if the value is **Fahrenheit degrees [°F]**. The conditions for spontaneously sending the feedback are: every time the feedback limit via BUS is changed and every time the alarm threshold changes by at least 0.5°C in relation to the last value sent.

The alarm threshold is the measured temperature value defined as the dewpoint temperature plus the value set as the feedback limit. The calculation is therefore: **Alarm threshold = Dewpoint temperature + Feedback limit**

This means the alarm threshold depends on two variables: the dewpoint temperature and the feedback limit.



When the measured temperature falls below the **Alarm threshold**, the device can be configured to send a command; another command can be sent when the measured temperature exceeds the **Alarm threshold** value plus a **hysteresis** value.

The purpose of the feedback limit is to see when the dewpoint temperature is being reached.

The initial limit value is defined by the **"Limit alarm feedback [tenths of °C] [P40]"** parameter (which sets the safety offset) plus the **Dewpoint temperature** value, which together give the **Alarm threshold**. This value is configured in tenths of °C, and can assume the following values:

- from 0 to 100 in steps of 1 **(default value 50)**

This parameter can be regulated dynamically via the BUS, on the dedicated communication objects ***Dewpoint alarm regulation limit*** (Data Point Type: 1.007 DPT_Step).

The **"Limit alarm feedback regulation step [0.1 °C]"** parameter defines the increase/decrease step of the **Limit alarm feedback** value following the arrival of a command on the relative regulation object. This value is configured in tenths of °C, and can assume the following values:

- from 1 to 20 in steps of 1 **(default value 5)**

If the value "1" is received on this object, the **Limit alarm feedback** value will be increased by the value defined in the **"Limit alarm feedback regulation step [0.1 °C]"** parameter. If the value "0" is received on this object, the limit threshold value will be decreased by the value defined in the **"Limit alarm feedback regulation step [0.1 °C]"** parameter.

The **"Alarm threshold hysteresis [tenths of °C] [P41]"** parameter defines the hysteresis value which, added to the **Alarm threshold** value, helps define the second limit value for sending the alarm end command. This parameter can assume the following values:

- from 1 to 20 in steps of 1 **(default value 10)**

The **“Activate/Deactivate alarm threshold (from bus and local menu)**” parameter allows you to enable the possibility to activate and deactivate the alarm threshold via the parameter in the local thermostat menu and/or via a dedicated communication objects. The parameter can assume the following values:

- **no** **(default value)**
- yes

If **yes** is selected, the ***Enabling dewpoint temperature alarm threshold*** (Data Point Type:1.002 DPT_Bool) and ***Enabling state dewpoint temperature alarm threshold*** (Data Point Type:1.003 DPT_Enable) communication objects are visualised, to receive the threshold activation commands and signal the threshold activation status, along with the **“Threshold activation value”** and **“Alarm threshold state at bus recovery”** parameters. The alarm threshold can therefore be enabled/disabled via the BUS or via the relative parameter in the local menu of the device.

The threshold enabling status is sent via the dedicated object at device start-up, on the arrival of a status read command (read request), and with every variation (triggered by a BUS command or via the local menu).

The **“Threshold activation value”** parameter determines which logic value received via the communication objects ***Enabling dewpoint temperature alarm threshold*** will activate the alarm; the arrival of the opposite value will deactivate the threshold. The possible values are:

- value “0”
- **value “1”** **(default value)**

The **“Alarm threshold state at bus recovery”** parameter sets the alarm threshold status following a BUS voltage reset. The possible values are:

- disabled
- enabled
- **as before voltage drop** **(default value)**

For the alarm threshold, two different objects can be sent depending on the alarm start “**If measured Temperature < threshold Temperature**” and end “**If measured Temperature > threshold Temperature + value of hysteresis”** conditions. The sending of an object when the two conditions arise can be independently enebled or disabled. On the other hand, the format of the object sent will have one configuration for both conditions.

The **“Output format”** parameter is used to set the format and code of the BUS telegram that will be sent by the device. The values that can be set are:

- **1 bit** **(default value)**
- 2 bit
- 1 byte unsigned
- 1 byte signed
- 1 byte percentage
- 1 byte HVAC mode
- 2 byte unsigned
- 2 byte signed

Depending on the value set for this item, the values that can be set following the activation of the **“If measured Temperature < threshold Temperature”** and **“If measured Temperature > threshold Temperature + value of hysteresis”** parameters will change.

The **“If measured Temperature < threshold Temperature”** parameter allows you to enable the sending of a value following the detection of the alarm start condition.
The **“If measured Temperature > threshold Temperature + value of hysteresis”** parameter allows you to enable the sending of a value following the detection of the alarm end condition.

- If the output format is **1 bit**, the communication objects ***Dewpoint temperature alarm output*** (Data Point Type: 1.001 DPT_Switch) is visualised. The values that can be set for the two parameters above are:

    - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
    - value "0"
    - **value "1"** **(default value for Tmeas < Tthreshold)**

- If the format of the object to be sent is **2 bit**, the communication objects ***Dewpoint temperature alarm output*** (Data Point Type: 2.001 DPT_Switch_Control) is visualised. The values that can be set for the two parameters above are:

    - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
    - **sends active forcing on(down)** **(default value for Tmeas < Tthreshold)**
    - sends active forcing on(up)
    - sends deactivate forcing

- If the format of the object to be sent is **1 byte unsigned**, the communication objects ***Dewpoint temperature alarm output*** (Data Point Type: 5.010 DPT_Value_1_Ucount) is visualised. The values that can be set for the two parameters above are:

    - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
    - **value sending** **(default value for Tmeas < Tthreshold)**

  If "value sending" is selected, the value to be sent can be defined via the new parameter displayed **"Value (0 .. 255)"**, which can assume the following values:

    - from **0 (default value)** to 255, in steps of 1

- If the format of the object to be sent is **1 byte signed**, the communication objects ***Dewpoint temperature alarm output*** (Data Point Type: 6.010 DPT_Value_1_Count) is visualised. The values that can be set for the two parameters above are:

    - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
    - **value sending** **(default value for Tmeas < Tthreshold)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed (**"Value (-128 .. 127)"**), which can assume the following values:

    - from -128 to 127 in steps of 1 **(default value 0)**

- If the output format is **1 byte percentage**, the is visualisedcommunication objects ***Dewpoint temperature alarm output*** (Data Point Type: 5.001 DPT_Scaling) The values that can be set for the two parameters above are:

    - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
    - **value sending** **(default value for Tmis < Tthreshold)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed (**"Value (0% .. 100%)"**), which can assume the following values:

    - from **0 (default value)** to 100, in steps of 1

- If the output format is **1 byte HVAC mode**, the is visualisedcommunication objects ***Dewpoint temperature alarm output*** (Data Point Type: 20.102 DPT_HVACMode) The values that can be set for the two parameters above are:

    - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
    - sends auto

- **sends comfort** **(default value for Tmeas < Tthreshold)**
- sends precomfort
- sends economy
- sends off (building protection)

- If the output format is **2 byte unsigned**, the is visualisedcommunication objects ***Dewpoint temperature alarm output*** (Data Point Type: 7.001 DPT_Value_2_Ucount) The values that can be set for the two parameters above are:

  - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
  - **value sending** **(default value for Tmeas < Tthreshold)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed (**"Value (0 .. 65535)"**), which can assume the following values:

  - from **0 (default value)** to 65535, in steps of 1

- If the output format is **2 byte signed**, the is visualisedcommunication objects ***Dewpoint temperature alarm output*** (Data Point Type: 8.001 DPT_Value_2_Count) The values that can be set for the two parameters above are:

  - **no effect** **(default value for Tmeas > Tthreshold + Hysteresis)**
  - **value sending** **(default value for Tmeas < Tthreshold)**

  If **value sending** is set, the value to be sent can be defined via the new parameter displayed (**"Value (-32768 .. +32767)"**), which can assume the following values:

  - from -32768 to +32767 in steps of 1 **(default value 0)**

The object ***Dewpoint temperature alarm output*** is sent upon request, spontaneously when the alarm condition and reset occur (**Tmeas < Tthreshold** and **Tmeas > Tthreshold + Hysteresis** respectively), periodically (if cyclical repetition is enabled), and when the BUS or auxiliary voltage is reset, only if the alarm or reset condition is verified (otherwise, no value is sent). When the threshold is disabled, the sending of telegrams associated with the two conditions is inhibited, but any possible change or feedback of the threshold value is still executed.

The **"Object Commands cyclical repetition"** parameter allows you to enable the periodical sending of the output value. The possible values are:

- **disable** **(default value)**
- enable

If **enable** is selected, the **"Commands repetition period"** parameter is visualised to set the command repetition frequency. The values that can be set are:

- no repetition
- 1 minute
- 2 minutes
- 3 minutes
- 4 minutes
- **5 minutes** **(default)**

15 "Display and touch" menu

All the icons on the thermostat display are listed below.

The following table summarises the meaning of the display icons:

Icon	Function	ON (fixed)	Flashing
	Functioning type: heating	Functioning type heating active	Floor temperature alarm in progress.
	Functioning type: cooling	Functioning type cooling attivo	
	Fan coil management: speed active and automatic-manual fan coil mode	Fan always ON. Speed indication (3 segments on the right switch on, up to the active speed); if no segment is active, the fan coil is OFF.(A) ON for automatic fan coil speed operating mode	No/incorrect arrival of fan coil (fan) speed feedback. If the set speed is waiting to be activated (manually or via an algorithm), the relative segment will flash.
	Measured temperature/ Measured relative humidity/Indicates the time/Indicates the fan coil speed with % value/ Indicates the parameter name/ Indicates the parameter values/ Countdown for cleaning function	Temperature value/Measured relative humidity value/Time of day/Parameter name (P 1 …P N)/Parameter value/Visualise the countdown for the plate cleaning Inhibition time [s]	Flashes during manual setpoint forcing and during HVAC / SETPOINT mode selection. Flashes when viewing humidity if the external sensor di humidity monitoring time has expired
	Temperature Measure unit/Relative humidity/Fan coil speed	Temperature in Celsius degrees [°C] or Fahrenheit degrees [°F]/Relative humidity (%)	
	Active HVAC mode (OFF = building protection)/building protection operation	Active HVAC mode/Setpoint building protection active	OFF flashing for manual switch-off (slave function) or window open.
	Indication of manual setpoint forcing active	The segment is ON if the setpoint is temporarily forced	

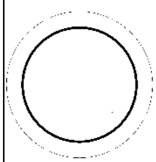
The slider and command push-buttons are also backlit, and the colour changes depending on the context; when a specific function is not active, the push-buttons are blue and the display segments are white.

If **"Thermostat functioning" (Control type)** is configured as *hotel* (*mode operation: slave (simplified)*), the device also modifies the button key for permitting the switch between idle pages and thermostat switch-off mode. In *hotel* operating mode, the device impedes user access to the parameter configuration menu (both Standard and Advanced) and offers a simplified user interface with just a central push-button (Mode) and the circular slider for directly and easily regulating the required temperature, fan speed (if the control algorithm is "fan coil") and thermostat switch-off.

15.1 Standard operating mode (stand alone or slave)

The user is offered standard operating mode when the **"Thermostat functioning"** parameter is configured as *stand alone* or *slave*.

The following table summarises the behaviour of the push-button backlighting depending on the active function:

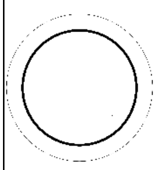
Push-button	Function	ON (fixed)	Flashing
	HVAC mode change/Confirmation of selected parameter modification/Parameter modification confirmation request	Usually ON (fixed), blue.	The icon flashes blue, indicating a value storage request (via the pressing of the MODE push-button) when a parameter value has been modified
	Selection of pages or parameters	Usually ON (fixed), blue.	
	SET menu activation	Usually ON (fixed), blue. The icon turns green, indicating the SET or PROG menu activation phase.	
	Activation of the heating or cooling system	On the temperature page, the slider turns red to indicate that the control algorithm is intervening on the heating system; the slider remains coloured even if the heating valve is disabled in that particular moment (e.g. PWM). The slider turns purple (red+blue) to indicate that the control algorithm is intervening on the cooling system; the slider remains coloured even if the cooling valve is disabled in that particular moment (e.g. PWM). On the humidity page, the slider turns purple (red+blue) to indicate that the control algorithm is intervening on the humidification or dehumidification system (there is no colour distinction for the two functions). As there are five configurable thresholds, it is sufficient that condition 1 (C1) has arisen for at least one of them in order for the contribution of that threshold to trigger the activation of the slider until the relative condition 2 (C2) occurs.	On the temperature page, the slider flashes if the heating/cooling system feedback (depending on which of the two is active) transmission is missing or incorrect. This signal does not distinguish between no/incorrect feedback for the first or second stage On the humidity page, the slider flashes if the feedback (if available) transmission to the commands sent is missing or incorrect for even just one of the thresholds

15.2 Hotel operating mode (simplified slave)

The simplified operating mode is offered to the user when the **“Thermostat functioning”** parameter is configured as *hotel (operating mode: slave (simplified)*).

In simplified operating mode, the icons for the active HVAC mode are disabled with both HVAC mode and setpoint control.

The following table summarises the behaviour of the push-button backlighting depending on the active function:

Push-button	Function	ON (fixed)	Flashing
	Used to call up the idle pages in order. Temperature setpoint modification and fan speed modification (reset of automatic mode, and thermostat switch-off)	Usually ON (fixed), blue	
	No dedicated function	Usually OFF	
	No dedicated function	Usually OFF	
	Modification of the temperature setpoint and fan speed values from OFF, 0% to 100% and AUTO.	On the temperature page, the slider turns red to indicate that the control algorithm is intervening on the heating system; the slider remains coloured even if the heating valve is disabled in that particular moment (e.g. PWM). The slider turns purple (red+blue) to indicate that the control algorithm is intervening on the cooling system; the slider remains coloured even if the cooling valve is disabled in that particular moment (e.g. PWM). On the humidity page, the slider turns purple (red+blue) to indicate that the control algorithm is intervening on the humidification or dehumidification system (there is no colour distinction for the two functions). As there are five configurable thresholds, it is sufficient that condition 1 (C1) has arisen for at least one of them in order for the contribution of that threshold to trigger the activation of the slider until the relative condition 2 (C2) occurs.	On the temperature page, the slider flashes if the heating/cooling system feedback (depending on which of the two is active) transmission is missing or incorrect. This signal does not distinguish between no/incorrect feedback for the first or second stage On the humidity page, the slider flashes if the feedback (if available) transmission to the commands sent is missing or incorrect for even just one of the thresholds

15.3 Parameters of the

The configuration menu for the display and touch push-button parameters in ETS is as follows.

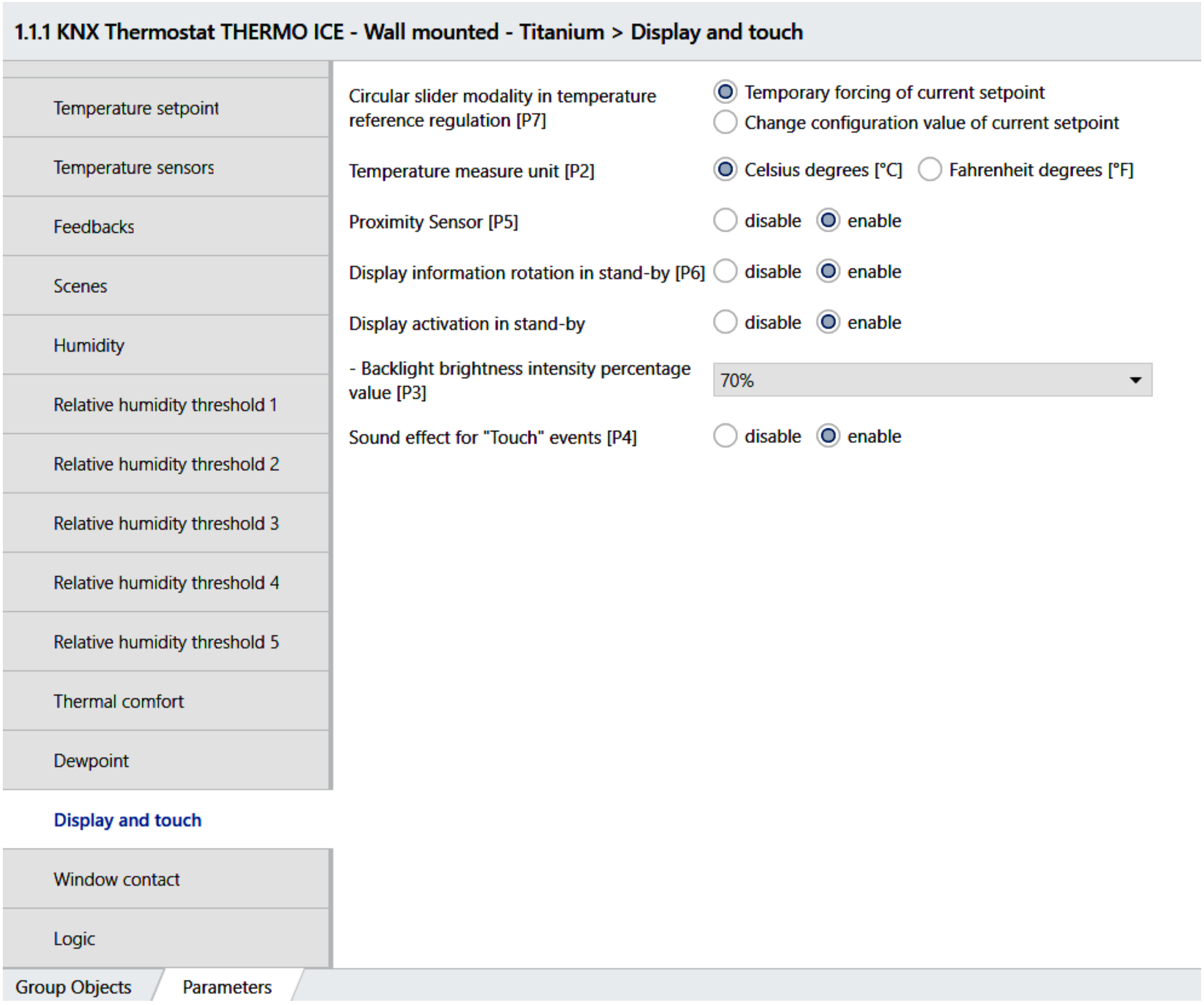


Fig. 15.1 – “Display and touch push-buttons” menu

15.3.1 Circular slider function for reference temperature regulation

The **“Circular slider modality in temperature reference regulation [P7]”** parameter modifies the function of the circular slider for regulating the reference temperature during normal device operation.

The values that can be set are:

- Temporary forcing of current setpoint
- Change configuration value of current setpoint

When the parameter assumes the value **Temporary forcing of current setpoint,** the reference temperature can be temporarily altered by touching the circular slider during normal device operation. This temporary variation - called "forcing" - is managed via the modes already described in chapter 7 “**Temperature setpoint menu”**.

When the parameter assumes the value **Change configuration value of current setpoint**, the intervention of the user directly modifies the configuration of the reference temperature (setpoint) of the current setpoint or HVAC mode. This change is regulated with the modes and limits already explained in chapter 7 **“Temperature setpoint menu”**. If this mode is set, and the Stand alone control type is setpoint, the item **SetP** relating to the modification of the single operating setpoint will be hidden in the standard parameters because it is redundant.

On the other hand, the items of the modification of the HVAC mode setpoint (Tcomf, Tprecomf, Teco) will remain available for the specific modification of the setpoint of the modes that are not active in that moment.

The default value of this parameter changes according to the control type and the thermostat functioning type configured.

When the thermostat is configured with **stand alone** operation, the default value will be **Temporary forcing of current setpoint** if the configured control type is HVAC mode, but if the control type is setpoint then the default value will be **Change configuration value of current setpoint**. This means that whenever the **Stand alone control type** parameter is changed, this parameter will also be changed to ensure coherency with its default value.

When the thermostat is configured with **slave** operation, the default value will be **Temporary forcing of current setpoint** whatever the Master/Slave control type (HVAC mode or setpoint), and the parameter will be read-only (it cannot be modified).

	Stand alone	**Slave**
HVAC	Temporary forcing of current setpoint	Temporary forcing of current setpoint
Setpoint	Change configuration value of current setpoint	Temporary forcing of current setpoint

Table summarising the default values of the **"Circular slider modality in temperature reference regulation"** parameter.

15.3.2 Temperature measurement unit

The **"Temperature measure unit [P2]"** parameter defines the measurement unit of the temperature shown on the display. The values that can be set are:

- **Celsius degrees [°C] (default value)**
- Fahrenheit degrees [°F]

15.3.3 Proximity sensor

In stand-by, the thermostat display shows the information for the "page" (thermostat/clock/Relative humidity/fan speed) visualised before the switch to stand-by, with 10% backlighting intensity. The backlighting of the slider and touch push-buttons is deactivated; it turns on when the user approaches the plate, and then turns off automatically after a certain period of inactivity (energy saving) - the device in fact has a proximity sensor that activates the backlighting of the touch push-buttons when the user approaches the technopolymer plate.

The proximity sensor can be activated/deactivated via the **"Proximity Sensor [P5]"** parameter.

With the sensor deactivated, the backlighting comes on when a sensitive area (push-buttons or circular slider) is touched; in this case, the user's touch is not considered for the purposes of the function of that area of the plate, but merely to "wake-up" the device.

15.3.4 Display information rotation in stand-by

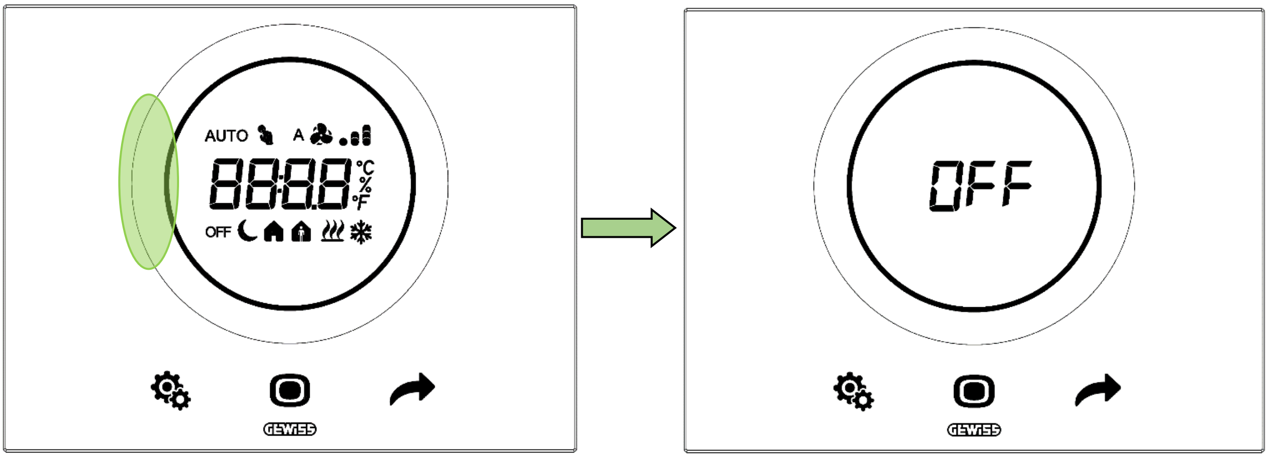
When the device quits the stand-by condition, the page visualised is always the "Thermostat" one, regardless of the visualisation set for stand-by.

The backlight switches off automatically after 30 seconds of user inactivity (no push-button/slider touch); when the backlight is deactivated, only the display remains enabled, showing the information relating to the thermostat, clock and relative humidity page visualised prior to stand-by. If timeout occurs while viewing the fan speed page, the device switches to idle and shows the thermostat page.

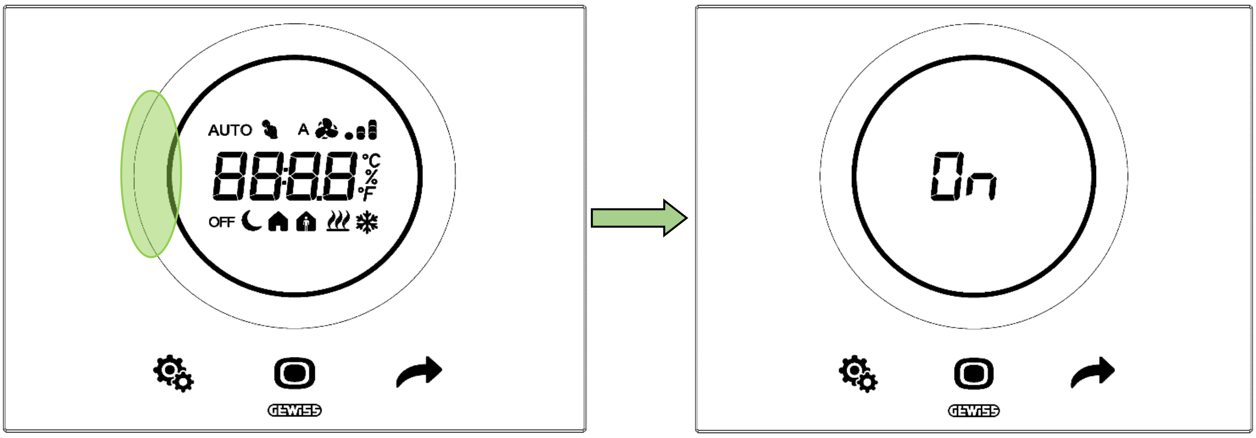
For easy use, in stand-by the user can force the alternated visualisation of the temperature / humidity values and the current time via the **"Display information rotation in stand-by [P6]"** parameter; if it is enabled, each item of information will be displayed for 3 seconds.

15.3.5 Display in stand-by

At any moment, the user can deactivate the light signal of the measured temperature/Humidity/current time in stand-by using a specific sequence of button keys or using the **"Display in stand-by"** parameter in ETS to set the complete deactivation of the display in stand-by locally, press any point of the left-hand sector of the touch circular slider for at least 3 seconds; the display will show the word "OFF", indicating that the display itself is about to be deactivated. The relative parameter can still be accessed from the SET menu of the device however.



To reactivate the signal in stand-by, repeat the procedure; in this case, the word "On" will appear.



To sum up, the behaviour of the display when entering/quitting stand-by is as follows:

PARAMETER CONFIGURATION	DISPLAY STATUS		
	Entering standby	In standby	Quitting standby
Display in stand-by=deactivated	"Thermostat" page "Fan speed" page "Humidity" page "Clock" page	OFF	"Thermostat" page
Display in stand-by=activated **Display rotation=deactivated**	"Thermostat" page "Fan speed" page	"Thermostat" page "Thermostat" page	"Thermostat" page

	"Humidity" page "Clock" page	"Humidity" page "Clock" page	
Display in stand-by=activated **Display rotation=activated**	"Thermostat" page "Fan speed" page "Humidity" page "Clock" page	Alternation of "Thermostat", "Humidity" and "Clock" pages	"Thermostat" page

15.3.6 Backlight brightness intensity percentage value

The brightness intensity of the backlighting for the display and touch push-buttons can be defined by the user via the **"Backlight brightness intensity percentage value [P3]"** parameter, selecting the percentage value for the light when it's switched on. The values that can be set are:

- from 30% to 100% in steps of 10% **(default value 80%)**

15.3.7 Sound effect for "Touch" events

The **"Sound effect for "Touch" events [P4]"** parameter allows you to enable a sound effect for every touch detected by the capacitive sensor. The values that can be set are:

- disable
- **enable** **(default value)**

If **enable** is selected, each touch on the touch push-buttons will produce a *click* sound, whereas a prolonged touch ("SET" and "MODE" button keys) will produce a *beep breve*.

The light and sound signal associated with the start and end of the plate cleaning function is always active, whatever the setting of the **"Sound effect for "Touch" events"** parameter.

16 “Window contact” menu

The detection of the window contact status is used for energy saving purposes.
This particular function allows you to force the device to OFF mode (if the remote control type is HVAC) or set setpoint BUILDING PROTECTION (when the remote control type is setpoint) when the window is opened, and reactivate normal operation when the window is closed again. This command has a higher priority than all the other remote commands (even if the device is a slave), including 1 bit modes.
The menu is as follows:

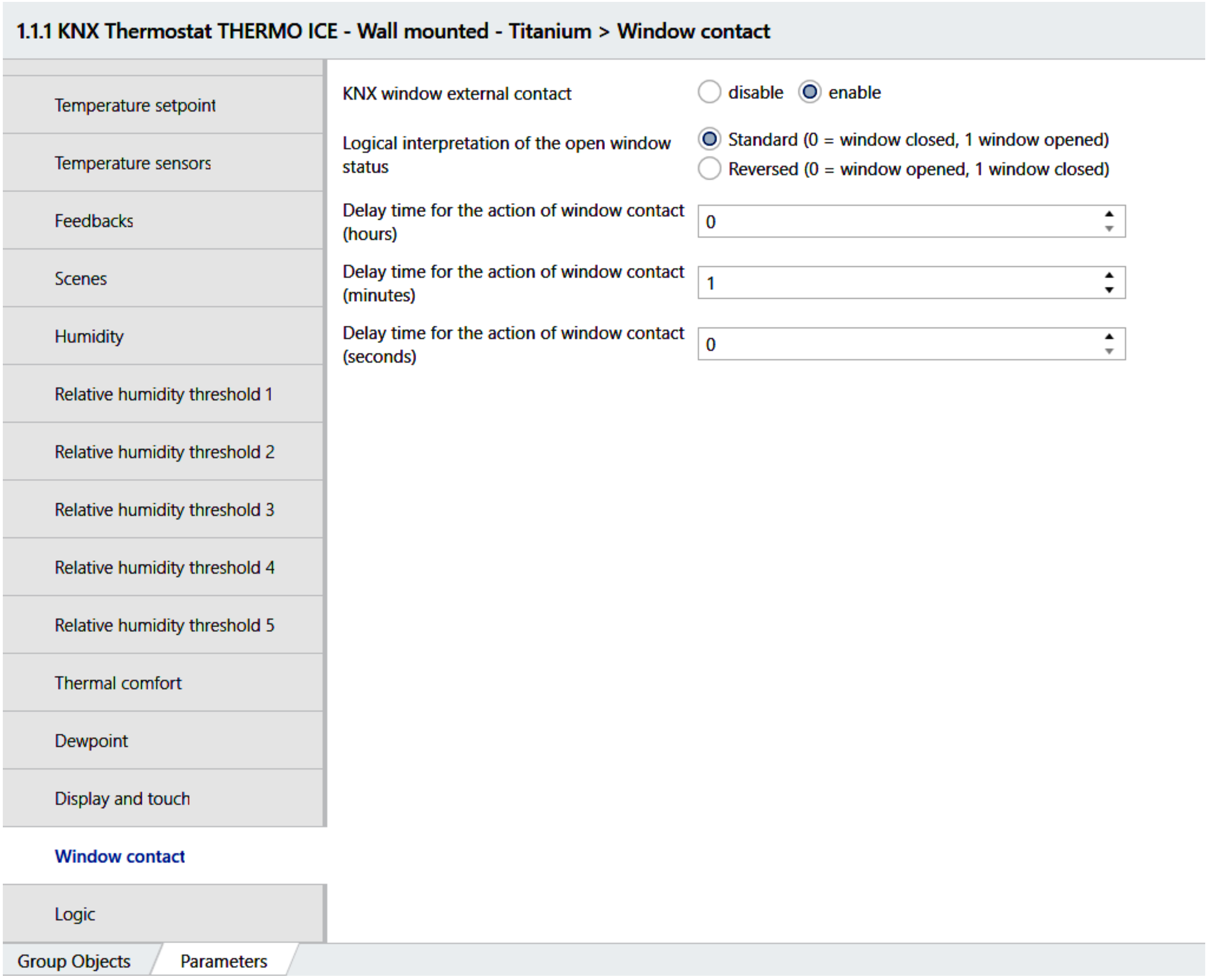


Fig. 16.1 – “Window contact” menu

16.1 Parameters of the

16.1.1 KNX window external contact

The “**KNX window external contact**” parameter allows you to enable a communication objects for detecting the window open/closed status, with the relative configuration items. The values that can be set are:

- **disable** **(default value)**
- enable

If **enable** is selected, the **“Logical interpretation of the open window status”** and **“Delay time for the action of window contact”** parameters are visualised, along with the communication objects ***Window contact status***

input (Data Point Type: 1.019 DPT_Window_Door) for receiving information about the window contact status via the BUS.

The communication objects standard assumes the value “1” when the window is OPEN, and “0” when the window is CLOSED, but the parameter below can be used to invert this interpretation logic **.**

16.1.2 Logical interpretation of the open window status

The **“Logical interpretation of the open window status”** parameter inverts the interpretation of the data field of the communication objects “Window contact” (Data Point Type: 1.019 DPT_Window_Door), choosing one of the following options:

- **Standard (0 = window closed, 1 window opened) (default value)**
- Reversed (0 = window opened, 1 window closed)

Even if the function is enabled in the ETS parameters, check that the relative communication objects ***Window contact status input*** is connected to a valid group address before considering it enabled.

In any case, the device immediately updates the window status detected by the dedicated KNX sensor as soon as the BUS or auxiliary voltage is reset. The device then sends the status read command (read request) via the communication object ***Window contact status input,*** storing the value received and reacting as necessary. If there is no response from the sensor, the default value - **window closed** - is used.

16.1.3 Delay time for the action of window contact

The **“Delay time for the action of window contact (hours), (minutes), (seconds)”** parameters define a delay for the execution of the action following a detected change in the window contact status.
If an incoming telegram indicates that the window is open, the thermostat waits for the time specified in the **“Delay time for the action of window contact”** ” parameters **before** switching to OFF or BUILDING PROTECTION mode. In the same way, if the telegram indicates that the window is closed, the thermostat waits for the same time before resetting the previous operating mode.

The window contact action delay time is applied by specifying the hours, minutes and seconds in the relative parameters, which can assume the following values:

- **Delay time for the action of window contact (hours):** from **0** to 11 **(default value 0)**
- **Delay time for the action of window contact (minutes):** from 0 to 59 **(default value 1)**
- **Delay time for the action of window contact (seconds):** from **0** to 59 **(default value 0)**

17 “Logic” menu

The **Logic** menu contains the parameters for configuring the logic operation to be carried out, defining the relative objects as well. This function can be very useful, for example, for activating the pump/boiler when at least one zone valve is open.

The basic structure of the menu is as follows:

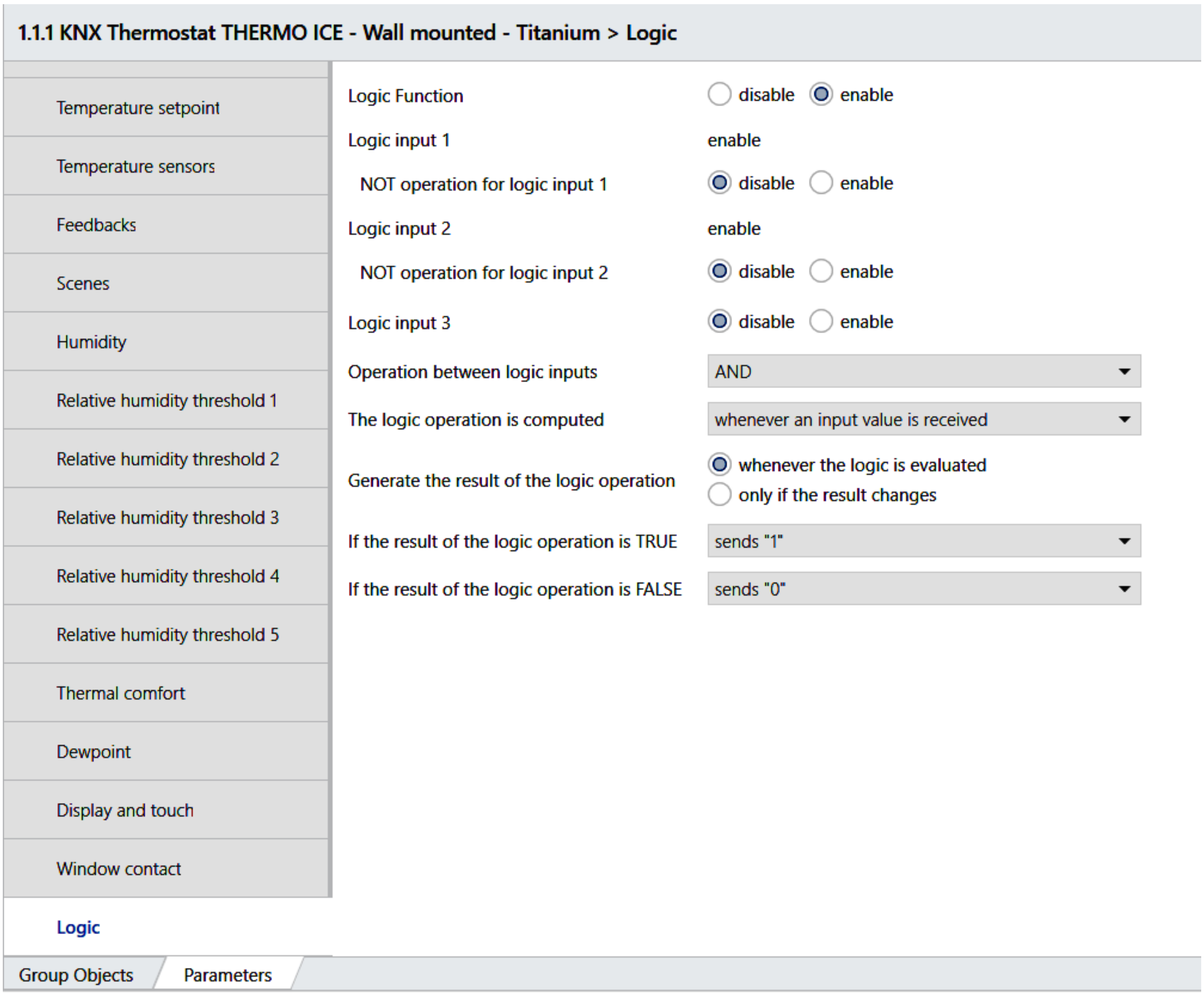


Fig. 17.1 – “Logic” menu

17.1 Parameters of the

17.1.1 Logic function

The **“Logic function”** parameter is used to enable the function and visualise the configuration parameters. The values that can be set are:

- **disable** **(default value)**
- enable

If **enable** is selected, the configuration parameters of the function are visualised.

17.1.2 Logic input “ì” (with ì = 1..8)

The Logic operation can have up to 8 inputs; the **“Logic input 1”**, … **“Logic input 8”** parameters are used to enable each input that you want to use for the Logic operation. The values that can be set for the parameters listed above are:

- **disabled** **(default value)**
- enebled

Selecting **enebled** visualises the communication objects ***Logic input 1*** … ***Logic input 8*** (Data Point Type:1.002 DPT_Bool) via which the device receives the input values of the Logic function, along with the **“NOT operation for logic input 1”** … **“NOT operation for logic input 8”** parameter (depending on which Logic input is enebled).

17.1.3 NOT operation for Logic input “ì”

The value of the logic inputs can be denied via the **“NOT operation for logic input 1”** … **“NOT operation for logic input 8”** parameters (whose visibility depends on the number of logic inputs enabled). These parameters can assume the following values:

- **disable** **(default value)**
- enable

17.1.4 Operation between logic inputs

The logic operation to be carried out between the logic inputs is defined via the **“Operation between logic inputs”** parameter, which can assume the following values:

- **AND** **(default value)**
- OR
- NAND
- NOR
- XOR
- XNOR

17.1.5 The logic operation is computed

The condition that generates the calculation of the selectedlogic operation can be determined via the **“The logic operation is computed”** parameter. The values that can be set are:

- **whenever an input value is received** **(default value)**

The logic is calculated whenever an input value is eceived, regardless of whether the new value is the same as the previous one, or different.

- if at least one input value changes status

The logic is calculated whenever an input value is received only if the new value is different from the previous one.

- periodically

The logic is calculated at fixed time intervals, whether or not new input values have been received.

Selecting **periodically** visualises the **“Calculation period”** parameter, which sets the time gap for calculating the logic. The values that can be set are:

- from **1 second (default value)** to 255 seconds, in steps of 1

17.1.6 Generate the result of the logic operation

The result of the logic operation is transmitted on the KNX BUS via the communication objects ***Logic operation output*** (Data Point Type:1.002 DPT_Bool); the conditions for sending the telegram associated with the result of the logic operation are defined via the **“Generate the result of the logic operation”** parameter, which can assume the following values:

- **whenever the logic is evaluated (default value)**

The telegrams are sent every time the logic is calculated, regardless of whether the result of the new calculation is the same as the previous result, or different.

- only if the result changes

The telegrams are only sent if the result of the new calculation is different from the previous result.

17.1.7 If the result of the logic operation is TRUE/FALSE

The result of the logic operation can assume the value “true” or “false”; for each value, you can define whether or not to send a signalling telegram via the communication objects ***Logic operation output***.
The **“If the result of the logic operation is TRUE”** parameter activates the transmission of the signalling of the “true” result, whereas the **“If the result of the logic operation is FALSE”** parameter sends the signalling of the “false” result. These parameters can assume the following values:

- do not send comandi bus
- **send “0” (default value for a FALSE result)**
- **send “1” (default value for a TRUE result)**

When the BUS or auxiliary voltage is reset, the device sends the status read requests (read request) on the objects ***Logic input 1*** … ***Logic input 8*** in order to be updated about the current values of the inputs. Until all the input statuses are known, the device will not send any telegram via the object ***Logic operation output***; it will send the status read request for the input logic once per minute until the value is received.

18 Device start-up procedure

When the device is started up, the firmware version loaded on the microprocessor is shown on the display. This screen will disappear after 3 seconds and the device will assume its normal (idle) operating mode.

To see the firmware version again when the device is powered and working normally, go to the PROG status and refer to the dedicated item.

Note that, at start-up, the transmission of any telegram on the BUS will be blocked until the standby time defined in the "**Delay time from power on and first transmission**" section has elapsed. This transmission standby time may therefore run out during the start-up procedure, or it may continue during the subsequent phases (PROG or RUN) enabled manually by the user or automatically by the normal start-up procedure.

18.1 Factory Reset

When the firmware version is being displayed (only during the device start-up phase), a long press on the MODE/ENTER button key will run a "factory reset" if the reset has been confirmed by the user.

When the pressure on the MODE/ENTER button key is detected, the timeout is paused and this automatically causes the firmware version display page to disappear. If the pressure on the MODE/ENTER button key is released before reaching the time needed to access the factory reset procedure, the operation will be annulled and the firmware version page will be displayed again for the remaining time.

A long press on the MODE/ENTER button key (> 10 seconds) activates the "factory Reset" procedure: the letters "RES" will appear on the display, the MODE/ENTER and NEXT button keys will turn blue, and the SET button key will turn green. The pressing of the MODE/ENTER button key confirms the reset operation and the display shows the word "donE" for 2 seconds before the device is reactivated. If SET is pressed, the operation is annulled and the device returns to the firmware version screen while it is being reactivated.

If the TIMEOUT period (30 seconds) elapses without the user pressing the button keys, the visualisation of the factory reset procedure is deactivated and the device returns to the firmware version screen while it is being reactivated.

After a factory Reset, all the factory parameters are reset along with the physical factory address, and the FDSK (Factory Default Setup Key) is reactivated.

18.2 Procedure for activating the physical address or KNX individual address programming mode: "PROG" status

If the device has no physical or individual address configured, the physical address programming launch screen be displayed after the visualisation of the firmware version. This screen - "**PrG**" - can only be annulled by pressing the **SET** button key (green) or confirmed by pressing **MODE/ENTER** (blue).

Once the programming mode has been activated on the display, the message "**PrOn**" will appear (or "**buS**" if a BUS voltage failure is detected).

Following a manual attempt to activate programming mode and the detection of a BUS connection fault (or the lack of voltage with the BUS connected), a message will appear to say that it is impossible to access programming mode; a specific “**buS**” malfunctioning warning will appear on the screen (in place of “**PrOn**”), then the previous page (“**PrG**”) will return. The error message is displayed for 3 seconds, then it disappears automatically. If a BUS failure is detected while the programming mode is active (message “**PrOn**” on the screen), the device again displays the “**buS**” malfunctioning warning and then automatically quits "programming mode active" status.

Note that the same message - “PrOn” - that indicates the activation of the physical address programming mode also appears on the display when the mode is activated via the BUS with a specific telegram sent by the ETS application (device LED - ON). In the same way (and in keeping with normal manual management), the deactivation of the mode via the BUS (device LED - OFF) will take you back to the previous message - “PrG” - indicating that activation status has been abandoned. These two messages will be displayed cyclically if a telegram is sent via ETS to execute the alternated activation of this mode (device LED - FLASHING). With the programming mode deactivated, the thermostat returns to RUN status and visualises the main temperature page (quitting PROG status) when SET is pressed or as a result of inactivity (timeout).
Physical address programming mode can only be quit by a direct action on the device (the pressing of the **SET** button key (green)) or a device reset caused by ETS (a reset or restart command following the programming of the physical address/configuration parameters).

Accessing the programming of the KNX physical address and viewing the firmware version of the device after a restart

Once the device start-up phase has ended, the physical address programming page can be called up and the firmware version displayed by accessing **PROG** status. To access **PROG** status, press and hold the **NEXT** button key (> 10 seconds) while the device is in **RUN** status. For safety reasons, this function is not available if the device is in *hotel* mode.

In this status, the KNX physical address programming mode can be activated and the device information can be viewed; in particular, the firmware versions loaded on the microcontrollers on the device are visualised.

The **NEXT** button key can be used to call up the various “PrG” and “InFo” pages in sequence, whereas the CIRCULAR slider enables you to move on to the next page or back to the previous one.

Programming mode cannot be accessed if the thermostat is configured in Hotel mode

19 ETS programming error feedback

The device can detect various programming errors and signal them on the display:

Detected error	Information on the display
The constraints between the setpoints of the various HVAC modes belonging to the same functioning type are not respected: • 10°C < $T_{economy}$ < $T_{precomfort}$ < $T_{comfort}$ < 35°C in heating • 10°C < $T_{comfort}$ < $T_{precomfort}$ < $T_{economy}$ < 35°C in cooling or if the control type is setpoint, the constraints are • 10°C < $T_{operation}$ < 35°C in both heating and cooling	ER1
The Setpoint of the HVAC modes are outside the maximum range • The setpoint of comfort/economy/precomfort are not between 10°C and 35°C • The freeze protection setpoint is not between 2°C and 10°C • The high temperature protection setpoint is not between 35°C and 40°C or if the control type is setpoint • The operating setpoint is not between 10°C and 35°C • The freeze protection setpoint is not between 2°C and 10°C • The high temperature protection setpoint is not between 35°C and 40°C	ER2
For every HVAC mode, the difference between the setpoint for heating and cooling is less than 1°C (only if the dead zone is enabled via ETS).	ER3
Connection error on the communication objects dedicated to sending commands to the actuation devices (valves and fan coils): • if a separate control logic is enabled but command objects of the heating and cooling solenoid valves are connected in the same group address • if there is no coherency between the fan coil speed connections. If fan coil management is enabled , at least one of the two types of command object (bit or byte %) must be connected. In particular, the 1 bit command objects for the fan coil speeds can be connected to the same address or to different addresses, but it is important to maintain the coherency between the pairs: in practice, if the two objects for commanding heating and cooling speed 1 are connected to two addresses that are the same, then the same must also apply for the pairs for speeds 2 and 3. In the same way, if they are connected to two different addresses then also the pairs for speeds 2 and 3 must be connected to two different addresses. If a solenoid valve (whether heating or cooling) is connected, the relative speed must also be connected, and vice versa. In shared logic, if the fan speeds are connected for heating then they must also be connected for cooling, and vice versa. • if second stage is active but the command objects for the relative solenoid valves are not connected • if second stage is active for both functioning types and the command objects are connected to the same address (in second stage, the control logic is always separate).	ER4
The total of the impact values of the external temperature probes (KNX and auxiliary) exceeds 100%	ER5
The total of the impact value of the external humidity probe (KNX) and that of estimated humidity exceeds 100%	ER6
Connection error on the communication objects dedicated to feedback (enabled via ETS) received from the actuation devices (valves and fan coils): • if valve feedback is enabled, the valve command is connected but its feedback is not connected • if fan coil speed feedback is enabled, the speed 1 command is connected but its feedback is not connected	ER7

• if fan coil speed feedback is enabled, the speed 2 command is connected but its feedback is not connected • if fan coil speed feedback is enabled, the speed 3 command is connected but its feedback is not connected • if fan coil speed feedback is enabled, the speed % command is connected but its feedback is not connected • if second stage is enebled and second stage feedback is enabled, the command is connected but its feedback is not connected	
Connection failure error on the communication objects external temperature sensor with the function enabled	ER8
Connection failure error on the communication objects humidity with the function enabled	ER9
Error involving the effective enabling of the KNX external or auxiliary temperature sensors as required for the humidity estimation mode function	ER10

If several errors are detected, the one with the lowest index is signalled on the display.

When at least one “ERxx” error has been detected and signalled on the display, the information remains on the display and the temperature control and humidity control functions are blocked because these errors are critical for device operation. The user can quit the error visualisation page by pressing the NEXT button key, but this page will continue to be visualised along with the normal standard operation status pages (temperature, humidity, time and fan speed) as long as the error remains. It can therefore be viewed again by manually swapping the pages using the NEXT button key, or during the automatic switching of the pages (if enabled in configuration). Once the inactivity timeout has elapsed, the error visualisation page is presented as a single fixed page. The error is no longer visualised and can only be resolved by downloading the ETS application again with the necessary configuration corrections.

Note that, as long as the thermostat configuration error feedback remains, the temperature control and humidity control functions are blocked to avoid any possible system malfunctioning or unwanted device reactions. To reset correct thermostat operation, it's essential to resolve the error, correcting the configuration via the ETS software or, if possible, directly via the parameter configuration menu of the device.

20 Device malfunctioning error feedback

During normal operation, the device can detect certain malfunctions not resulting directly from its configuration, but which may prevent it from working properly. These malfunctions are signalled as operating errors on the display:

Malfunction detected	Information on the display
Warning of lack of KNX BUS connection. This malfunction blocks all communication on the BUS, and therefore all temperature control or humidity management functions, etc. The KNX BUS connection must be checked to reset correct operation	buS 

Once the error has been detected and signalled on the display, the information remains on the display and the temperature control and humidity control functions are blocked because this type of error is critical for device operation. The user can quit the error visualisation page by pressing the NEXT button key, but this page will continue to be visualised along with the normal standard operation status pages (temperature, humidity, time and fan speed) as long as the error remains. It can therefore be viewed again by manually swapping the pages using the NEXT button key, or during the automatic switching of the pages (if enabled in configuration). Once the inactivity timeout has elapsed, the error visualisation page is presented as a single fixed page.

The error will only stop being displayed when the condition linked to it is no longer detected. To ensure that this condition cannot arise again, it may be necessary to call in the installation technician.

21 Device malfunctioning warning feedback

During normal operation, the device can also detect certain malfunctions not resulting directly from its configuration, but which may prevent it from working properly. These malfunctions are signalled as warnings on the display:

Malfunction detected	Information on the display
Warning of internal board communication malfunctioning. This malfunction may jeopardise the normal operation of the built-in temperature and humidity sensors, along with the circular slider. Visualised if the impact of the built-in temperature sensors and humidity is other than 0%	Wr.1 
Warning of auxiliary temperature sensor malfunctioning. Visualised if the sensor is enebled	Wr.2 

“Wr.X” warning feedbacks is feedbacks regarding malfunctioning due to internal or external causes. The level of criticality depends largely on the configuration of the device itself, as well as the cause that generated the warning message.

When at least one malfunctioning warning is signalled on the display, the message remains. The user can quit the warning visualisation page by pressing the NEXT button key, but this page will continue to be visualised along with the normal standard operation status pages (temperature, humidity, time and fan speed) as long as the reason for the warning remains. It can therefore be viewed again by manually swapping the pages using the NEXT button key, or during the automatic switching of the pages (if enabled in configuration). Once the inactivity time-out has elapsed, the warning visualisation page (unlike the “ERxx” or “buS” error visualisation pages) is not presented as a single fixed page. In the same way, the temperature control and humidity control functions may not be blocked when a warning is visualised; this will depend, in fact, on the type of cause that led to the visualisation of this page.

The warning will only stop being displayed when the condition linked to it is no longer detected. To ensure that this condition cannot arise again, it may be necessary to call in the installation technician. Only some of these malfunction warnings can be temporarily resolved with a configuration change via ETS, disabling the component that generated the malfunction if possible.

21.1 Feedback from external devices

Apart from the internal device feedbacks, the display can also show a series of feedbacks messages and indications from a remote device.

Malfunction detected	Information on the display
Malfunctioning warning from an external device (e.g. condensate monitoring status, only valid for compatible devices such as GWA9140, GWA9141). Detected via the dedicated input object ***Warning 3 input feedback***	Wr.3

	
Malfunctioning warning from an external device. Detected via the dedicated input object ***Warning 4 input feedback***	Wr.4 
Malfunctioning warning from an external device. Detected via the dedicated input object ***Warning 5 input feedback***	Wr.5 
Malfunctioning warning from an external device. Detected via the dedicated input object ***Warning 6 input feedback***	Wr.6 

Four communication objects are therefore available for this function:

- ***Warning 3 input feedback***
- ***Warning 4 input feedback***
- ***Warning 5 input feedback***
- ***Warning 6 input feedback***

(Data Point Type: 1.001 DPT_Switch)

When the value 1 (On) is received on these objects, the thermostat displays the relative message Wr.3, Wr.4, Wr.5 and Wr.6 until the value 0 (Off) is received. The management and visualisation modes of feedbacks from the BUS are the same as for internal Wr.1 and Wr.2 feedbacks.
A typical example of the use of these objects is with fan coil actuators (GWA9140, GWA9141); via these objects, the following feedbacks can be shown on the display:

- Condensate monitoring status
- auxiliary temperature sensor malfunctioning
- heating mode with heating blocked / Cooling mode with cooling blocked
- Filter replacement
- Test mode active

21.2 Feedback of ETS download in progress

During the download of the ETS application, the display shows the message "**EtS.d**" and every operation requiring the pressing of the button keys or the use of the circular slider is inhibited. At the end of the download, the device is restarted with the normal procedure explained in the Procedura di avvio del dispositivo Device start-up procedure section.

22 Communication objects

The following tables summarise all the communication objects with their specific ID numbers, names and functions displayed in ETS, plus a brief description of the function and the type of Datapoint.

Output communication objects

#	Object name	Object function	Description	Datapoint type
3	Send time	Time sending	Sends the time of day updates (note that the "day of the week" field is not significant)	10.001 DPT_TimeOfDay
23	Heating valve switch	On/Off	Sends the heating solenoid valve (1st stage) activation/deactivation commands	1.001 DPT_Switch
23	Heating/cooling valve switch	On/Off	Sends the heating/cooling solenoid valve activation/deactivation commands	1.001 DPT_Switch
23	% command valve heating	% value	Sends the percentage commands to the heating solenoid valve (1st stage)	5.001 DPT_Scaling
23	% command valve heating/cooling	% value	Sends the percentage commands to the heating/cooling solenoid valve	5.001 DPT_Scaling
25	V1 fan switching heating	On/Off	Sends the heating fan coil speed 1 activation/deactivation commands	1.001 DPT_Switch
26	V2 fan switching heating	On/Off	Sends the heating fan coil speed 2 activation/deactivation commands	1.001 DPT_Switch
27	V3 fan switching heating	On/Off	Sends the heating fan coil speed 3 activation/deactivation commands	1.001 DPT_Switch
31	Heating 2° stage switching	On/Off	Sends the heating solenoid valve (2nd stage) activation/deactivation commands	1.001 DPT_Switch
31	% command 2° stage heating	% value	Sends the percentage commands to the heating solenoid valve (2nd stage)	5.001 DPT_Scaling
33	Air cooling valve switch	On/Off	Sends the cooling solenoid valve (1st stage) activation/deactivation commands	1.001 DPT_Switch
33	% command valve air cooling	% value	Sends the percentage commands to the cooling solenoid valve (1st stage)	5.001 DPT_Scaling
35	V1 fan switching cooling	On/Off	Sends the cooling fan coil speed 1 activation/deactivation commands	1.001 DPT_Switch
36	V2 fan switching cooling	On/Off	Sends the cooling fan coil speed 2 activation/deactivation commands	1.001 DPT_Switch

37	V3 fan switching cooling	On/Off	Sends the cooling fan coil speed 3 activation/deactivation commands	1.001 DPT_Switch
41	Air cooling 2° stage switching	On/Off	Sends the cooling solenoid valve (2nd stage) activation/deactivation commands	1.001 DPT_Switch
41	% command 2° stage air cooling	% value	Sends the percentage commands to the cooling solenoid valve (2nd stage)	5.001 DPT_Scaling
44	Fan coil mode report	Automatic/ Manual	Sends feedbacks about fan coil speed automatic/manual mode	1.001 DPT_Switch
46	Auxiliary sensor measured temperature	°C value	Sends the temperature values (in degrees Celsius) measured by the NTC sensor connected to the auxiliary sensor input	9.001 DPT_Temp
46	Auxiliary sensor measured temperature	K value	Sends the temperature values (in Kelvin) measured by the NTC sensor connected to the auxiliary sensor input	9.002 DPT_Tempd
46	Auxiliary sensor measured temperature	°F value	Sends the temperature values (in degrees Fahrenheit) measured by the NTC sensor connected to the auxiliary sensor input	9.027 DPT_Temp_F
47	Measured temperature	°C value	Sends the temperature values (in degrees Celsius) calculated by the device	9.001 DPT_Temp
47	Measured temperature	K value	Sends the temperature values (in Kelvin) calculated by the device	9.002 DPT_Tempd
47	Measured temperature	°F value	Sends the temperature values (in degrees Fahrenheit) calculated by the device	9.027 DPT_Temp_F
48	HVAC mode feedback	Eco/Precom/Comf/Off	Sends feedback about the set HVAC mode	20.102 DPT_HVACMode
48	Functioning setpoint feedback	°C value	Sends the operating setpoint values (in degrees Celsius)	9.001 DPT_Temp
48	Functioning setpoint feedback	K value	Sends the operating setpoint values (in Kelvin)	9.002 DPT_Tempd
48	Functioning setpoint feedback	°F value	Sends the operating setpoint values (in degrees Fahrenheit)	9.027 DPT_Temp_F
49	Setpoint OFF mode feedback	Enable/ Disable	Sends feedback about the activation status of the SETPOINT (building protection) mode	1.003 DPT_Enable communication objects
49	HVAC mode feedback off	Enable/ Disable	Sends feedback about the activation status of the HVAC off (building protection) mode	1.003 DPT_Enable communication objects
50	HVAC mode feedback economy	Enable/ Disable	Sends feedback about the activation status of the HVAC economy mode	1.003 DPT_Enable communication objects
51	HVAC mode feedback precomfort	Enable/ Disable	Sends feedback about the activation status of the HVAC precomfort mode	1.003 DPT_Enable communication objects
52	HVAC mode feedback comfort	Enable/ Disable	Sends feedback about the activation status of the HVAC comfort mode	1.003 DPT_Enable communication objects

53	Functioning type feedback	Heating/Cooling	Sends feedback about the set functioning type	1.100 DPT_Heat/Cool
54	Heating anti-freeze setpoint feedback	°C value	Sends the setpoint values for HVAC off mode in heating (in degrees Celsius)	9.001 DPT_Temp
54	Heating anti-freeze setpoint feedback	K value	Sends the setpoint values for HVAC off mode in heating (in Kelvin)	9.002 DPT_Tempd
54	Heating anti-freeze setpoint feedback	°F value	Sends the setpoint values for HVAC off mode in heating (in degrees Fahrenheit)	9.027 DPT_Temp_F
55	Heating economy setpoint feedback	°C value	Sends the setpoint values for HVAC economy mode in heating (in degrees Celsius)	9.001 DPT_Temp
55	Heating economy setpoint feedback	K value	Sends the setpoint values for HVAC economy mode in heating (in Kelvin)	9.002 DPT_Tempd
55	Heating economy setpoint feedback	°F value	Sends the setpoint values for HVAC economy mode in heating (in degrees Fahrenheit)	9.027 DPT_Temp_F
56	Heating precomfort setpoint feedback	°C value	Sends the setpoint values for HVAC precomfort mode in heating (in degrees Celsius)	9.001 DPT_Temp
56	Heating precomfort setpoint feedback	K value	Sends the setpoint values for HVAC precomfort mode in heating (in Kelvin)	9.002 DPT_Tempd
56	Heating precomfort setpoint feedback	°F value	Sends the setpoint values for HVAC pre-comfort mode in heating (in degrees Fahrenheit)	9.027 DPT_Temp_F
57	Heating comfort setpoint feedback	°C value	Sends the setpoint values for HVAC comfort mode in heating (in degrees Celsius)	9.001 DPT_Temp
57	Heating comfort setpoint feedback	K value	Sends the setpoint values for HVAC comfort mode in heating (in Kelvin)	9.002 DPT_Tempd
57	Heating comfort setpoint feedback	°F value	Sends the setpoint values for HVAC comfort mode in heating (in degrees Fahrenheit)	9.027 DPT_Temp_F
58	Air cond. high temp. protection setpoint feedback	°C value	Sends the setpoint values for HVAC off mode in cooling (in degrees Celsius)	9.001 DPT_Temp
58	Air cond. high temp. protection setpoint feedback	K value	Sends the setpoint values for HVAC off mode in cooling (in Kelvin)	9.002 DPT_Tempd
58	Air cond. high temp. protection setpoint feedback	°F value	Sends the setpoint values for HVAC off mode in cooling (in degrees Fahrenheit)	9.027 DPT_Temp_F
59	Air cooling economy setpoint feedback	°C value	Sends the setpoint values for HVAC economy mode in cooling (in degrees Celsius)	9.001 DPT_Temp
59	Air cooling economy setpoint feedback	K value	Sends the setpoint values for HVAC economy mode in cooling (in Kelvin)	9.002 DPT_Tempd
59	Air cooling economy setpoint feedback	°F value	Sends the setpoint values for HVAC economy mode in cooling (in degrees Fahrenheit)	9.027 DPT_Temp_F

60	Air cooling precomfort setpoint feedback	°C value	Sends the setpoint values for HVAC precomfort mode in cooling (in degrees Celsius)	9.001 DPT_Temp
60	Air cooling precomfort setpoint feedback	K value	Sends the setpoint values for HVAC precomfort mode in cooling (in Kelvin)	9.002 DPT_Tempd
60	Air cooling precomfort setpoint feedback	°F value	Sends the setpoint values for HVAC precomfort mode in cooling (in degrees Fahrenheit)	9.027 DPT_Temp_F
61	Air cooling comfort setpoint feedback	°C value	Sends the setpoint values for HVAC comfort mode in cooling (in degrees Celsius)	9.001 DPT_Temp
61	Air cooling comfort setpoint feedback	K value	Sends the setpoint values for HVAC comfort mode in cooling (in Kelvin)	9.002 DPT_Tempd
61	Air cooling comfort setpoint feedback	°F value	Sends the setpoint values for HVAC comfort mode in cooling (in degrees Fahrenheit)	9.027 DPT_Temp_F
62	Current setpoint report	°C value	Sends the active setpoint values (in degrees Celsius)	9.001 DPT_Temp
62	Current setpoint report	K value	Sends the active setpoint values (in Kelvin)	9.002 DPT_Tempd
62	Current setpoint report	°F value	Sends the active setpoint values (in degrees Fahrenheit)	9.027 DPT_Temp_F
63	Thermostat functioning feedback	Slave/Stand alone	Sends the feedbacks about thermostatslave or stand alone operation	1.001 DPT_Switch
67	Measured relative humidity	RH% value	Sends the relative humidity values calculated by the device	9.007 DPT_Value_Humidity
68	Specific humidity	Value in g/Kg	Sends the specific humidity values (in grams per kilogram)	14.005 DPT_Value_Amplitude

70	82	94	106	118	Relative humidity threshold X enabling status	Enabled /Disabled	Sends the feedbacks about the enabling/disabling status of the relative humidity threshold X	1.003 DPT_Enable communication objects
72	84	96	108	120	Relative humidity threshold X feedback	RH% value	Sends the current value of the relative humidity threshold X	9.007 DPT_Value_Humidity
73	85	97	109	121	Relative humidity threshold X object A	1/0 value	Sends the 1/0 values associated with output A of the relative humidity threshold X	1.001 DPT_Switch
73	85	97	109	121	Relative humidity threshold X object A	On/Off forcing	Sends the 2-bit values associated with output A of the relative humidity threshold X	2.001 DPT_Switch_Control
73	85	97	109	121	Relative humidity threshold X object A	0..255 value	Sends the unsigned values (0...255) associated with output A of the relative humidity threshold X	5.010 DPT_Value_1_Ucount
73	85	97	109	121	Relative humidity threshold X object A	-128.. +127 value	Sends the signed values (-128...127) associated with output A of the relative humidity threshold X	6.010 DPT_Value_1_Count
73	85	97	109	121	Relative humidity threshold X object A	0% .. 100% value	Sends the percentage values (0%...100%) associated with output A of the relative humidity threshold X	5.001 DPT_Scaling

73	85	97	109	121	Relative humidity threshold X object A	Modo HVAC (com/precom /eco/off)	Sends the HVAC modes (comfort/precomfort/economy/off) associated with output A of the relative humidity threshold X	20.102 DPT_HVAC_Mode
73	85	97	109	121	Relative humidity threshold X object A	0..65535 value	Sends the unsigned values (0...65535) associated with output A of the relative humidity threshold X	7.001 DPT_Value_2_Ucount
73	85	97	109	121	Relative humidity threshold X object A	-32768..32767 value	Sends the signed values (-32768...32767) associated with output A of the relative humidity threshold X	8.001 DPT_Value_2_Count
73	85	97	109	121	Relative humidity threshold X object A	Setpoint value in °C	Sends the setpoint values (in degrees Celsius) associated with output A of the relative humidity threshold X	9.001 DPT_Value_Temp
73	85	97	109	121	Relative humidity threshold X object A	Setpoint value in K	Sends the setpoint values (in Kelvin) associated with output A of the relative humidity threshold X	9.002 DPT_Value_Tempd
73	85	97	109	121	Relative humidity threshold X object A	Setpoint value in °F	Sends the setpoint values (in degrees Fahrenheit) associated with output A of the relative humidity threshold X	9.027 DPT_Value_Temp_F
75	87	99	111	123	Relative humidity threshold X object B	1/0 value	Sends the 1/0 values associated with output B of the relative humidity threshold X	1.001 DPT_Switch
77	89	101	113	125	Relative humidity threshold X object C	1/0 value	Sends the 1/0 values associated with output C of the relative humidity threshold X	1.001 DPT_Switch
79	91	103	115	127	Relative humidity threshold X object D	1/0 value	Sends the 1/0 values associated with output D of the relative humidity threshold X	1.001 DPT_Switch
130	Thermal comfort status feedback					1=comfortable / 0=uncomfortable	Sends the feedbacks about the current thermal comfort status	1.002 DPT_Bool
139	Logic operation output					Logic	Logic function output	1.002 DPT_Bool
142	Heating fan speed %					% value	Sends the percentage commands to the heating fan coil	5.001 DPT_Scaling
144	Cooling fan speed %					% value	Sends the percentage commands to the cooling fan coil	5.001 DPT_Scaling
146	Humidity estimation mode					RH% value	Sends the values of humidity estimation mode in another point via its temperature value	9.007 DPT_Value_Humidity
147	Dewpoint temperature (°C)					°C value	Sends the Dewpoint temperature values (in degrees Celsius)	9.001 DPT_Temp
147	Dewpoint temperature (K)					K value	Sends the Dewpoint temperature values (in Kelvin)	9.002 DPT_Tempd
147	Dewpoint temperature (°F)					°F value	Sends the Dewpoint temperature values (in degrees Fahrenheit)	9.027 DPT_Temp_F
152	Dewpoint alarm threshold feedback [°C]					°C value	Sends the Dewpoint temperature alarm threshold values (in degrees Celsius)	9.001 DPT_Temp
152	Dewpoint alarm threshold feedback [K]					K value	Sends the Dewpoint temperature alarm threshold values (in Kelvin)	9.002 DPT_Tempd
152	Dewpoint alarm threshold feedback [°F]					°F value	Sends the Dewpoint temperature alarm threshold values (in degrees Fahrenheit)	9.027 DPT_Temp_F

154	Enabling dewpoint temperature alarm threshold status	Enabled/ Disabled	Sends the feedbacks about the enabling/disabling status of the Dewpoint temperature alarm threshold	1.003 DPT_Enable communication objects
155	Dewpoint temperature alarm output	1/0 value	Sends the 1/0 values associated with the Dewpoint temperature alarm output	1.001 DPT_Switch
155	Dewpoint temperature alarm output	On/Off forcing	Sends the 2-bit values associated with the Dewpoint temperature alarm output	2.001 DPT_Switch_Control
155	Dewpoint temperature alarm output	0..255 value	Sends the unsigned values (0..255) associated with the Dewpoint temperature alarm output	5.010 DPT_Value_1_Ucount
155	Dewpoint temperature alarm output	-128.. +127 value	Sends the signed values (-128..127) associated with the Dewpoint temperature alarm output	6.010 DPT_Value_1_Count
155	Dewpoint temperature alarm output	0% .. 100% value	Sends the percentage values (0%..100%) associated with the Dewpoint temperature alarm output	5.001 DPT_Scaling
155	Dewpoint temperature alarm output	HVAC mode (com/precom/ eco/off)	Sends the HVAC modes (comfort/precomfort/economy/off) associated with the Dewpoint temperature alarm output	20.102 DPT_HVAC_Mode
155	Dewpoint temperature alarm output	0..65535 value	Sends the unsigned values (0..65535) associated with the Dewpoint temperature alarm output	7.001 DPT_Value_2_Ucount
155	Dewpoint temperature alarm output	-32768..32767 value	Sends the signed values (-32768..32767) associated with the Dewpoint temperature alarm output	8.001 DPT_Value_2_Count

The object variants highlighted in blue in the table above are not shown for objects B (objects 75/87/99/111/123), C (objects 77/89/101/113/125), D (object 79/91/103/115/127), but are still present.

Input communication objects

#	Object name	Object function	Description	Datapoint type
1	Time input	Time update	Receives the time of day updates (the "day of the week" information is not used by the device)	10.001 DPT_TimeOfDay
2	Daylight saving time input	1 = daylight saving time 0 = standard time	Receives the updates about the current time convention	1.001 DPT_Switch
4	Plate cleaning	Activate/Deactivate	Activates/deactivates the touch sensor inhibition function for Plate cleaning	1.001 DPT_Switch
5	Enabling Slave function	Enable/Disable	Receives the Enabling Slave function commands	1.003 DPT_Enable communication objects
6	HVAC mode input	Eco/Precom/Comf/Off	Receives the HVAC mode setting commands	20.102 DPT_HVACMode
6	Setpoint input	°C value	Receives the operating setpoint values (in degrees Celsius)	9.001 DPT_Temp
6	Setpoint input	K value	Receives the operating setpoint values (in Kelvin)	9.002 DPT_Tempd
6	Setpoint input	°F value	Receives the operating setpoint values (in degrees Fahrenheit)	9.027 DPT_Temp_F
6	Setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the operating setpoint value	1.007 DPT_Step
7	Setpoint temporary forcing regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the temporarysetpoint forcing value	1.007 DPT_Step
8	Setpoint OFF input	Enable/Disable	Receives the enabling commands for setpoint OFF (building protection) mode	1.003 DPT_Enable communication objects
8	HVAC mode input off	Enable/Disable	Receives the enabling commands for HVAC OFF (building protection) mode	1.003 DPT_Enable communication objects
9	HVAC mode input economy	Enable/Disable	Receives the enabling commands for HVAC economy mode	1.003 DPT_Enable communication objects
10	HVAC mode input precomfort	Enable/Disable	Receives the enabling commands for HVAC precomfort mode	1.003 DPT_Enable communication objects
11	HVAC mode input comfort	Enable/Disable	Receives the enabling commands for HVAC comfort mode	1.003 DPT_Enable communication objects
12	Functioning type input	Heating/Cooling	Receives the functioning type setting commands	1.100 DPT_Heat/Cool
13	Enable dead zone	Enable/Disable	Receives the enabling commands for automatic functioning type setting (dead zone)	1.003 DPT_Enable communication objects
14	Heating anti-freeze setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the setpoint value for HVAC off mode in heating	1.007 DPT_Step
14	Setpoint input antigelo heating	°C value	Receives the setpoint values for HVAC off mode in heating (in degrees Celsius)	9.001 DPT_Temp

14	Setpoint input antigelo heating	K value	Receives the setpoint values for HVAC off mode in heating (in Kelvin)	9.002 DPT_Tempd
14	Setpoint input antigelo heating	°F value	Receives the setpoint values for HVAC off mode in heating(in degrees Fahrenheit)	9.027 DPT_Temp_F
15	Heating economy setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step step commands for the setpoint value for HVAC economy mode in heating	1.007 DPT_Step
15	Heating economy setpoint input	°C value	Receives the setpoint values for HVAC economymode in heating(in degrees Celsius)	9.001 DPT_Temp
15	Heating economy setpoint input	K value	Receives the setpoint values for HVAC economy mode in heating (in Kelvin)	9.002 DPT_Tempd
15	Heating economy setpoint input	°F value	Receives the setpoint values for HVAC economymode in heating(in degrees Fahrenheit)	9.027 DPT_Temp_F
16	Heating precomfort setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step step commands for the setpoint value for HVAC precomfort mode in heating	1.007 DPT_Step
16	Setpoint input precomfort heating	°C value	Receives the setpoint values for HVAC precomfortmode in heating(in degrees Celsius)	9.001 DPT_Temp
16	Setpoint input precomfort heating	K value	Receives the setpoint values for HVAC precomfort mode in heating (in Kelvin)	9.002 DPT_Tempd
16	Setpoint input precomfort heating	°F value	Receives the setpoint values for HVAC precomfortmode in heating(in degrees Fahrenheit)	9.027 DPT_Temp_F
17	Heating comfort setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step step commands for the setpoint value for HVAC comfort mode in heating	1.007 DPT_Step
17	Heating comfort setpoint input	°C value	Receives the setpoint values for HVAC comfortmode in heating(in degrees Celsius)	9.001 DPT_Temp
17	Heating comfort setpoint input	K value	Receives the setpoint values for HVAC comfort mode in heating (in Kelvin)	9.002 DPT_Tempd
17	Heating comfort setpoint input	°F value	Receives the setpoint values for HVAC comfortmode in heating(in degrees Fahrenheit)	9.027 DPT_Temp_F
18	Air-cooling high temp. protection setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the setpoint value for HVAC off mode in cooling	1.007 DPT_Step
18	Air-cooling high temp. protection setpoint input	°C value	Receives the setpoint values for HVAC off mode in cooling(in degrees Celsius)	9.001 DPT_Temp
18	Air-cooling high temp. protection setpoint input	K value	Receives the setpoint values for HVAC off mode in cooling (in Kelvin)	9.002 DPT_Tempd
18	Air-cooling high temp. protection setpoint input	°F value	Receives the setpoint values for HVAC off mode in cooling(in degrees Fahrenheit)	9.027 DPT_Temp_F

19	Air-cooling economy setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step step commands for the setpoint value for HVAC economy mode in cooling	1.007 DPT_Step
19	Air-cooling economy setpoint input	°C value	Receives the setpoint values for HVAC economymode in cooling(in degrees Celsius)	9.001 DPT_Temp
19	Air-cooling economy setpoint input	K value	Receives the setpoint values for HVAC economy mode in cooling (in Kelvin)	9.002 DPT_Tempd
19	Air-cooling economy setpoint input	°F value	Receives the setpoint values for HVAC economymode in cooling(in degrees Fahrenheit)	9.027 DPT_Temp_F
20	Air-cooling precomfort setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step step commands for the setpoint value for HVAC precomfort mode in cooling	1.007 DPT_Step
20	Air-cooling precomfort setpoint input	°C value	Receives the setpoint values for HVAC precomfortmode in cooling(in degrees Celsius)	9.001 DPT_Temp
20	Air-cooling precomfort setpoint input	K value	Receives the setpoint values for HVAC precomfort mode in cooling (in Kelvin)	9.002 DPT_Tempd
20	Air-cooling precomfort setpoint input	°F value	Receives the setpoint values for HVAC precomfortmode in cooling(in degrees Fahrenheit)	9.027 DPT_Temp_F
21	Air-cooling comfort setpoint regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the setpoint value for HVAC comfort mode in cooling	1.007 DPT_Step
21	Air-cooling comfort setpoint input	°C value	Receives the setpoint values for HVAC comfortmode in cooling(in degrees Celsius)	9.001 DPT_Temp
21	Air-cooling comfort setpoint input	K value	Receives the setpoint values for HVAC comfort mode in cooling (in Kelvin)	9.002 DPT_Tempd
21	Air-cooling comfort setpoint input	°F value	Receives the setpoint values for HVAC comfortmode in cooling(in degrees Fahrenheit)	9.027 DPT_Temp_F
22	Setpoint regulation range setting	°C value	Receives the maximum setpoint regulation range (in degrees Celsius)	9.001 DPT_Temp
24	Heating valve status feedback	on/off status	Receives feedback about the activation status of the heating first stage solenoid valve	1.001 DPT_Switch
24	Heating valve % feedback	% value	Receives feedback about the activation status of the heating first stage solenoid valve	5.001 DPT_Scaling
24	Heating/Air cooling valve status feedback	on/off status	Receives feedback about the activation status of the heating/cooling solenoid valve	1.001 DPT_Switch
24	Heating/air cooling valve % feedback	% value	Receives feedback about the activation status of the heating/cooling solenoid valve	5.001 DPT_Scaling
28	Heating fan V1 status feedback	on/off status	Receives feedback about the activation status of the heating fan coil (speed 1)	1.001 DPT_Switch

29	Heating fan V2 status feedback	on/off status	Receives feedback about the activation status of the heating fan coil (speed 2)	1.001 DPT_Switch
30	Heating fan V3 status feedback	on/off status	Receives feedback about the activation status of the heating fan coil (speed 3)	1.001 DPT_Switch
32	Heating 2° stage feedback	on/off status	Receives feedback about the activation status of the heating second stage solenoid valve	1.001 DPT_Switch
32	Heating 2° stage valve % feedback	% value	Receives feedback about the activation status of the heating second stage solenoid valve	5.001 DPT_Scaling
34	Air cooling valve status feedback	on/off status	Receives feedback about the activation status of the cooling first stage solenoid valve	1.001 DPT_Switch
34	Air cooling valve % feedback	% value	Receives feedback about the activation status of the cooling first stage solenoid valve	5.001 DPT_Scaling
38	Air cooling fan V1 status feedback	on/off status	Receives feedback about the activation status of the cooling fan coil (speed 1)	1.001 DPT_Switch
39	Air cooling fan V2 status feedback	on/off status	Receives feedback about the activation status of the cooling fan coil (speed 2)	1.001 DPT_Switch
40	Air cooling fan V3 status feedback	on/off status	Receives feedback about the activation status of the cooling fan coil (speed 3)	1.001 DPT_Switch
42	Air cooling 2° stage feedback	on/off status	Receives feedback about the activation status of the cooling second stage solenoid valve	1.001 DPT_Switch
42	Air cooling 2° stage valve % feedback	% value	Receives feedback about the activation status of the cooling second stage solenoid valve	5.001 DPT_Scaling
43	Fan coil mode input	Automatic/Manual	Receives the commands for automatic or manual fan coil speed selection mode	1.001 DPT_Switch
45	KNX external sensor input	°C value	Receives the values from the external sensor KNX (in degrees Celsius)	9.001 DPT_Temp
45	KNX external sensor input	K value	Receives the values from the external sensor KNX (in Kelvin)	9.002 DPT_Tempd
45	KNX external sensor input	°F value	Receives the values from the external sensor KNX (in degrees Fahrenheit)	9.027 DPT_Temp_F
45	KNX floor sensor input	°C value	Receives the values from the KNX external sensor (in degrees Celsius)	9.001 DPT_Temp
45	KNX floor sensor input	K value	Receives the values from the KNX external sensor (in Kelvin)	9.002 DPT_Tempd
45	KNX floor sensor input	°F value	Receives the values from the KNX external sensor (in degrees Fahrenheit)	9.027 DPT_Temp_F
64	Feedbacks sending trigger	Sends feedbacks	Receives the trigger commands for feedbacks transmission	1.017 DPT_Trigger
65	Thermostat scene	Execute/Store	Receives the scene execution/storage commands for the thermostat function	18.001 DPT_SceneControl
66	Humidity external sensor input	RH% value	Receives the relative humidity values from the KNX external humidity sensor	9.007 DPT_Value_Humidity

69	81	93	105	117	Relative humidity threshold X enabling	0=enable 1=disable	Receives the enabling/disabling commands relative humidity threshold X	1.002 DPT_Bool
69	81	93	105	117	Relative humidity threshold X enabling	1=enable 0=disable	Receives the enabling/disabling relative humidity threshold X commands	1.002 DPT_Bool
71	83	95	107	119	Relative humidity threshold 1 value regulation	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the relative humidity threshold X value	1.007 DPT_Step
71	83	95	107	119	Relative humidity threshold X value input	RH% value	Receives the relative humidity threshold X values	9.007 DPT_Value_Humidity
74	86	98	110	122	Relative humidity threshold X object A status	HVAC mode (com/ precom/ eco/ off)	Receives the reference HVAC modes (comfort/precomfort/economy/off) for calculating the output A associated with the relative humidity threshold X	20.102 DPT_HVAC_Mode
74	86	98	110	122	Relative humidity threshold X object A status	Setpoint in °C	Receives the values (in degrees Celsius) of the reference setpoint for calculating the output A associated with the relative humidity threshold X	9.001 DPT_Temp
74	86	98	110	122	Relative humidity threshold X object A status	Setpoint in K	Receives the values (in Kelvin) of the reference setpoint for calculating the output A associated with the relative humidity threshold X	9.002 DPT_Tempd
74	86	98	110	122	Relative humidity threshold X object A status	Setpoint in °F	Receives the values (in degrees Fahrenheit) of the reference setpoint for calculating the output A associated with the relative humidity threshold X	9.027 DPT_Temp_F
74	86	98	110	122	Relative humidity threshold X output A status feedback	on/off status	Receives feedback about the activation status of the output A associated with the elative humidity threshold X	1.001 DPT_Switch
76	88	100	112	124	Relative humidity threshold X object B status	HVAC mode (com /precom/ eco/ off)	Receives the reference HVAC modes (comfort/precomfort/economy/off) for calculating the output B associated with the relative humidity threshold X	20.102 DPT_HVAC_Mode

76	88	100	112	124	Relative humidity threshold X object B status	Setpoint in °C	Receives the values (in degrees Celsius) of the reference setpoint for calculating the output B associated with the relative humidity threshold X	9.001 DPT_Temp
76	88	100	112	124	Relative humidity threshold X object B status	Setpoint in K	Receives the values (in Kelvin) of the reference setpoint for calculating the output B associated with the relative humidity threshold X	9.002 DPT_Tempd
76	88	100	112	124	Relative humidity threshold X object B status	Setpoint in °F	Receives the values (in degrees Fahrenheit) of the reference setpoint for calculating the output B associated with the relative humidity threshold X	9.027 DPT_Temp_F
76	88	100	112	124	Relative humidity threshold X object B status	on/off status	Receives feedback about the activation status of the output B associated with the relative humidity threshold X	1.001 DPT_Switch
78	90	102	114	126	Relative humidity threshold X object C status	HVAC mode (com /precom /eco /off)	Receives the reference HVAC modes (comfort/precomfort/economy/off) for calculating the output C associated with the relative humidity threshold X	20.102 DPT_HVAC_Mode
78	90	102	114	126	Relative humidity threshold X object C status	Setpoint in °C	Receives the values (in degrees Celsius) of the reference setpoint for calculating the output C associated with the relative humidity threshold X	9.001 DPT_Temp
78	90	102	114	126	Relative humidity threshold X object C status	Setpoint in K	Receives the values (in Kelvin) of the reference setpoint for calculating the output C associated with the relative humidity threshold X	9.002 DPT_Tempd
78	90	102	114	126	Relative humidity threshold X object C status	Setpoint in °F	Receives the values (in degrees Fahrenheit) of the reference setpoint for calculating the output C associated with the relative humidity threshold X	9.027 DPT_Temp_F
78	90	102	114	126	Relative humidity threshold X object C status	on/off status	Receives feedback about the activation status of the output C associated with the relative humidity threshold X	1.001 DPT_Switch

80	92	104	116	128	Relative humidity threshold X object D status	HVAC mode (com/precom/eco/off)	Receives the reference HVAC modes (comfort/precomfort/economy/off) for calculating the output D associated with the relative humidity threshold X	20.102 DPT_HVAC_Mode
80	92	104	116	128	Relative humidity threshold X object D status	Setpoint in °C	Receives the values (in degrees Celsius) of the reference setpoint for calculating the output D associated with the relative humidity threshold X	9.001 DPT_Temp
80	92	104	116	128	Relative humidity threshold X object D status	Setpoint in K	Receives the values (in Kelvin) of the reference setpoint for calculating the output D associated with the relative humidity threshold X	9.002 DPT_Tempd
80	92	104	116	128	Relative humidity threshold X object D status	Setpoint in °F	Receives the values (in degrees Fahrenheit) of the reference setpoint for calculating the output D associated with the relative humidity threshold X	9.027 DPT_Temp_F
80	92	104	116	128	Feedback for D output status of relative humidity x threshold	on/off status	Receives feedback about the activation status of the output D associated with the relative humidity threshold X	1.001 DPT_Switch
129	Season selection input					1=summer 0=winter	Receives the commands for the seasonal setting for the environmental comfort thresholds	1.002 DPT_Bool
129	Season selection input					1=winter 0=summer	Receives the commands for the seasonal setting for the environmental comfort thresholds	1.002 DPT_Bool
131	Logic input 1					Logic function input	Logic function input	1.002 DPT_Bool
132	Logic input 2					Logic function input	Logic function input	1.002 DPT_Bool
133	Logic input 3					Logic function input	Logic function input	1.002 DPT_Bool
134	Logic input 4					Logic function input	Logic function input	1.002 DPT_Bool
135	Logic input 5					Logic function input	Logic function input	1.002 DPT_Bool
136	Logic input 6					Logic function input	Logic function input	1.002 DPT_Bool
137	Logic input 7					Logic function input	Logic function input	1.002 DPT_Bool
138	Logic input 8					Logic function input	Logic function input	1.002 DPT_Bool
140	Window contact status input					Standard (Coding 0 = window closed, 1 = window open)	Receives information about the window contact status via the BUS	1.019 DPT_Window_Door

140	Window contact status input	Inverted (Coding 0 = window open, 1 = window closed)	Receives information about the window contact status via the BUS	1.019 DPT_Window_Door
141	Setpoint temporary forcing reset	1 = True 0 = False	If the value “1” or “True” is received on this object, manual setpoint forcing is eliminated. In the case of fan coil operation, AUTO mode will be reset to manage the fan speed if the speed has been forced in MANUAL mode	1.002 DPT_Bool
143	Heating fan speed % feedback	Valore %	Receives feedback about the % speed of the fan coil in heating	5.001 DPT_Scaling
145	Air cooling fan speed % feedback	Valore %	Receives feedback about the % speed of the fan coil in cooling	5.001 DPT_Scaling
148	Heating fan coil speed % input	Valore %	Receives the speed of the fan coil working in heating. The value is set if the thermostat is in MANUAL mode	5.001 DPT_Scaling
149	Air-cooling fan coil input speed %	Valore %	Receives the speed of the fan coil working in cooling. The value is set if the thermostat is in MANUAL mode	5.001 DPT_Scaling
151	Dewpoint alarm regulation limit	1 = Increase 0 = Decrease	Receives the increase/decrease step commands for the Limit alarm feedback dewpoint temperature value	1.007 DPT_Step
153	Enabling dewpoint temperature alarm threshold	0=enable 1=disable	Receives the enabling/disabling commands for the Dewpoint temperature alarm threshold	1.002 DPT_Bool
156	Warning 3 input feedback	Activate/Deactivate	Activates/deactivates the visualisation of warning 3 feedback (Wr.3) on the display	1.001 DPT_Switch
157	Warning 4 input feedback	Activate/Deactivate	Activates/deactivates the visualisation of warning 3 feedback (Wr.4) on the display	1.001 DPT_Switch
158	Warning 5 input feedback	Activate/Deactivate	Activates/deactivates the visualisation of warning 3 feedback (Wr.5) on the display	1.001 DPT_Switch
159	Warning 6 input feedback	Activate/Deactivate	Activates/deactivates the visualisation of warning 3 feedback (Wr.6) on the display	1.001 DPT_Switch

code 70194303

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