CONTROL YOUR LIVING SPACE

Application manual

Touch&See

Control and display unit

EK-EC2-TP

Contents

1. Scope of the document

This application manual describes application details for the A1.0 release of the ekinex® KNX "*Touch&See"* control and display unit EK-EC2-TP.

The document is aimed at the system configurator as a description and reference of device features and application programming. For installation, mechanical and electrical details of the device please refer to the technical description datasheet.

Application manual and application programs for ETS are available for download at www.ekinex.com.

Item	*File name (## = release)*	*Version*	*Device rel.*	*Update*
Technical datasheet	STEKEC2TP_EN.pdf	1.0	A1.0	08 / 2014
Application manual	MAEKEC2TP_EN.pdf	0.9		09 / 2014
Application program	APEKEC2TP##.knxprod	1.0		08 / 2014

You can access the most up-to-date version of the full documentation for the device using following QR code:

2. Product description

The ekinex® Touch&See control and display unit (from now on shortened as "*T&S"*) is a wall-mount device for control and display of KNX bus functions with an integrated bus communication module.

Through the 3.5" touch-screen and the graphical user interface, the user can control KNX actuators and display information from KNX sensors and devices in an esay and intuitive way.

The device also has the functions of a complete chrono-thermostat based on the ambient temperature sensing of other KNX devices.

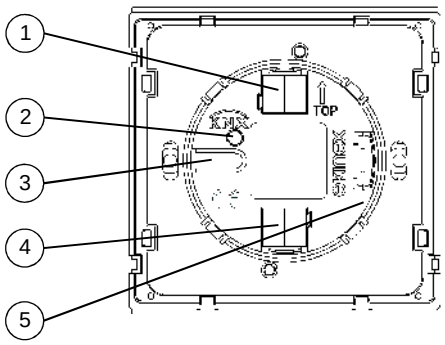
The device requires, besides the connection to the KNX bus, an auxiliary SELV 30VDC power supply, usually available in common double-output KNX power supply units.

For further technical information, please also refer to the product datasheet STEKEC1TP_EN.pdf available on the ekinex website www.ekinex.com.

3. Switching, display and connection elements

The device is equipped on the back side with:

- a programming pushbutton and a programming LED
- plug terminals for the KNX bus line connection
- plug terminals for the connection of the auxiliary power supply
- a slot for a micro SD card



1) 30 Vdc auxiliary power supply plug
2) Programming LED
3) Programming pushbutton
4) KNX bus plug
5) Micro SD card insertion slot

On the front side, the central part of the device surface is the touch-screen display; in the upper left corner, a sensor for ambient light is placed.

4. Configuration

The exact functionality of the device depends on the software settings.

In order to configure and commission the device, the ETS4 tool (or later releases) is required together with the proper ekinex® application program APEKEC2TP.knxprod. This latter can be downloaded from the ekinex® website www.ekinex.com, either as a single file or as part of the complete database of ekinex® products.

The application program allows the configuration of all working parameters for the device.

The device-specific application program has to be loaded into ETS or, as alternative, the whole ekinex® product database can be loaded; at this point, all the instances of the selected device type can be added to the project.

For every single device, ETS allows to set the operating parameters individually for each of the device functions as described in detail in the following chapters.

The configuration can, and usually will, be performed completely offline; the actual transfer of the programmed configuration to the device takes place in the commissioning phase.

Product code	EAN	ETS application software (## = release)	Communication objects (max nr.)	Group adresses (max nr.)
EK-EC2-TP	8018417181054	APEKEC2TP##.knxprod	320	320

Configuration and commissioning of KNX devices require specialized skills. To acquire these skills, you should attend training courses at a training center certified by KNX.

For further information: www.knx.org

4.1 Firmware upgrade

If a new firmware for the device should be made available by ekinex, either to add new features or to correct possible errors in the present firmware, the device allows the system integrator to perform a firmware upgrade through a Micro SD card.

The firmware upgrade should only be performed by a qualified KNX technician.

After the upgrade, the device loses its configuration and therefore the previous configuration needs to be reprogrammed through the ETS tool. Before attempting a fimware upgrade, make sure that you have the latest KNX project at hand with a working configuration for the device.

The procedure is as follows:

- remove all power supplies from the device, i.e. both the red-black and the white-yellow connector plugs;
- download the file for the most recent firmware upgrade from the ekinex website;
- format a Micro SD card, of size of up to 2GB, with a FAT32 format;
- from a PC, using an external USB Micro SD card reader (if the PC should not be equipped with an integrated reader), unpack the downloaded file and copy the two extracted files on the root of the Micro SD card;
- insert the card in the slot on the back side of the T&S;
- insert only the auxiliary power supply connector (white-yellow);
- look at the display; at the end of the process, a message "*Firmware upload to version 1.x OK. Remove SD card*" should appear;
- remove the Micro SD card and the aux power supply connector plug; re-insert the connector plug and verify that the device starts correctly.

Once the device has correctly restarted, the red-black KNX bus connector can be reinserted and the device functions can be reprogrammed (with the same configuration as before) through the ETS tool.

In order to verify which firmware release is currently loaded on the device, enter the *Settings* option page and select *Firmware version*.

5. Commissioning

After the device has been configured within the ETS project according to user requirements, the commissioning of the device requires the following activities:

- electrically connect the device, as described in the product datasheet, to the bus line on the final network or through a purposely setup network for programming;
- apply power to the bus;

- switch the device operation to programming mode by pressing the programming pushbutton located on the back side of the housing. In this mode of operation, the programming LED is turned on steady;
- upload the configuration (including the physical address) to the device with the ETS program.

At the end of the upload, the operation of the device automatically returns to normal mode; in this mode the programming LED is turned off. Now the device is programmed and ready for use on the bus.

6. Device customization

The graphics and images used for the splash screen and the pushbuttons are preloaded on the device, but they can be replaced with customized images. These customized images can be copied on a Micro SD card from a PC and then loaded on the *T&S* by placing the SD card in the slot on the back of the device.

The images have to be in the .PNG format (*Portable Network Graphics*) with the names and maximum sizes described in the table below; images having different parameters are not loaded.

Image destination	Dimension in pixels	Max. size in KBytes	File name
Background	320 x 240	128	`backimg.png`
Pushbutton icon	111 x 111	8	`Icon#.png` (# = 01…08)

The procedure to load customized images into the device is as follows:

- remove all power supplies from the device, i.e. both the red-black and the white-yellow connector plugs;
- format a Micro SD card, of size of up to 2GB, with a FAT32 format;
- from a PC, using an external USB Micro SD card reader (if the PC should not be equipped with an integrated reader), copy the files of the desired images on the root of the Micro SD card;
- insert the card in the slot on the back side of the T&S;
- insert only the auxiliary power supply connector (white-yellow);
- look at the display; at the end of the process, a message "*Images upload OK. Remove SD card*" should appear;
- remove the Micro SD card and the aux power supply connector plug; re-insert the connector plug and verify that the device starts correctly;
- re-insert the KNX bus connector plug.

Once the customized images have been loaded, they have yet to be selected in order to appear at their respective places.

6.1 Background image

The default background image for the splash screen carries the ekinex® brand logo. In order to replace it, after the desired image has been loaded as described above, follow the steps below:

- open the device application program in ETS4;
- under the menu *General*, item *Background image*, select the option *other (copied from SD card)*.

For further details about screen settings, please refer to the chapter describing general display settings.

6.2 Pushbutton icons

The default image for a pushbutton is a blank image; the system integrator can then select either one of the preloaded icons or one of the customized icons loaded as described above.

To change the image assigned to a pushbutton, follow the steps below:

- Open the device project in ETS4;
- make sure that the desired pushbutton page is enabled by setting the option *Page configuration* / *Pushbuttons 1,2,3 and 4* (or respectively *Pushbuttons 5,6,7 and 8*) to *enabled*;
- under the menu item *Pushbuttons 1,2,3 and 4* (or respectively *Pushbuttons 5,6,7 and 8*) / *Text and Icons*, for each item *Icon 1 pushbutton <x>* choose the desired custom icon between *Icon01...Icon08.*

The custom images can only be assigned as Icon 1 (main icon), not as “modifier” / double icon (like arrow or dot double markers).

7. Function description

7.1 General description

The *T&S* control and display unit is a multi-functional room controller that allows to interact from a single location with many KNX sensors, actuators and devices for building automation.

The device offers the following configurable functions:

- Pushbutton switch with several features:
  - simple ON/OFF controller
  - transmission of timed sequences of up to 8 Communication Objects of different types;
  - dimming control of lighting devices;
  - control of shutters, blinds and venetian blinds;
- Event programmer (up to 10 scheduled events);
- Ambient temperature controller and chrono-thermostat;
- Control of Multimedia devices;
- Display of date and time either from the internal Real-time Clock or from other KNX devices;
- Display of meteorological values (temperature, wind speed, rain detection, humidity, light intensity...) from a KNX sensor or meteo station;
- Display of alarm messages, both generated inside the device (sensor failure, missing value reception etc.) or outside (max. 20 messages);
- Ambient light sensor;
- Management of up to 3 open window switches;
- Simulation of presence (with max. 16 communication objects);
- Parameter modification lock with password protection;
- Configurable backlight function;
- Temporary lock function for screen cleaning.

All functions involving switching and dimming of loads are performed through control of other actuators connected to the bus.

Following chapters will describe the features and operations which are specific of the device; details about features consisting on the command of external devices or display of information from external sources will be described within the context of the configuration procedure.

7.2 Virtual pushbuttons

Two screens are available, each of them with 4 square pushbuttons; the screens are similar to a conventional ekinex pushbutton unit such as the EK-EA2-TP. Each pushbutton has a set of indicators corresponding to the LED indicators of the conventional units.

The features and capabilities of the virtual pushbuttons are almost exactly the same as those of the conventional EK-EA2-TP units. The most remarkable exception is that, since the activation happens through the touch-screen rather than physical pushbuttons, the only input events handled are Short and Long press; Key On / Key Off are not handled.

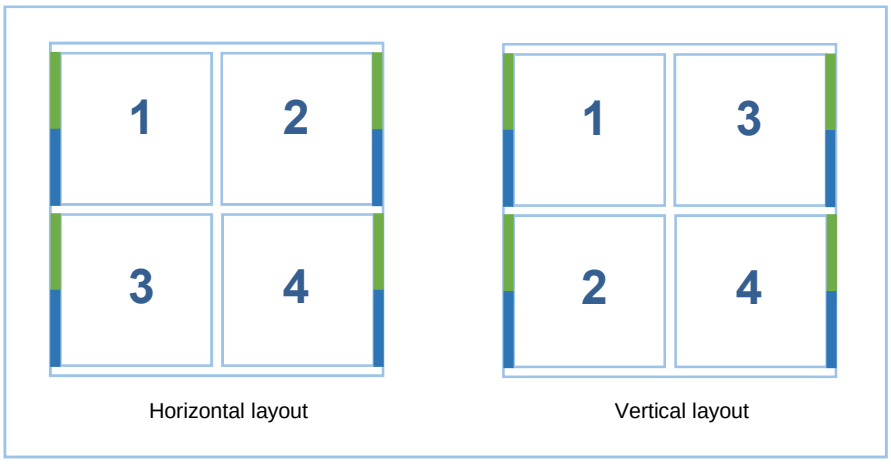
For the sake of clarity and readability, the pushbutton features are described concisely in this manual; for a more detailed description, please refer to the manual of the EK-EA2-TP units.

7.2.1 Pushbutton and LED indicator layout

The ETS application program allows two layout patterns; the difference between the two patterns lies in the number assigned to the pushbuttons.

The meaning of the different numbering schemes becomes apparent when the pushbuttons are used in the coupled configuration. For instance, if pushbuttons 1 and 2 are configured as coupled, with the horizontal layout they are drawn on the screen as a single, large pushbutton surface on the top half of the screen; similarly for pushbuttons 3 and 4. If the vertical layout is selected, the large pushbutton would be displayed vertically on the left half of the screen.

If two pushbuttons are coupled, the pushbuttons belonging to other pair can still be configured as independent.



When all pushbuttons are configured as independent, the layout configuration has no particular graphical meaning; however, since it affects the numbering assignment, particular care must be taken that the assigned functions match the actual position of the pushbutton as intended.

At the side of each pushbutton surface, two colored areas are displayed (green and blue) that resemble the LED indicators used in the conventional ekinex® KNX EK-EA2-TP pushbutton units; these areas will be referred to as LEDs for brevity.

The LEDs can be configured individually, regardless whether the pushbuttons are independent or coupled.

The LED activation can be configured as follows:

- Fixed value (always On or always Off);
- LED On when the corresponding pushbutton is pressed. With this option, an additional off delay can be specified when the pushbutton is released;
- status from the bus through a communication object. With this option, the LED can be set as flashing (with different choices for On/Off times) when active; furthermore, the active condition can be inverted with respect to the value of the communication object (LED On when the OC value is Off and vice-versa).

7.2.2 Pushbutton texts and icons

The surface of each pushbutton can be customized with up to one text string and two icons, of which one represents the function of the pushbutton (e.g. light switching, heating, blinds control) and the other represents the action of the whole pushbutton or of the corresponding side (e.g. increment or decrement, raise or lower, on or off).

A library of graphical images, exactly matching those used for the conventional pushbutton units, is available and configurable through the ETS ap plication program; these images are listed, together with the selection codes used in the ETS application, in the appendix to this manual.

It is also possible to load and display icons customized by the system integrator: please refer to the "*Device customization*" section for details.

7.2.3 Pushbutton coupling

The pushbuttons can be configured in the following two modes:

- *single* or *independent* mode: each of the pushbuttons has its own independent parameters and operates on different communication objects;
- *coupled* mode: two pushbuttons are grouped for a common function, with a common set of parameters and communication objects.

Only pushbuttons belonging to the same pair (i.e. 1 - 2 and 3 - 4) can be coupled; it is possible to configure some pushbuttons as independent and the others as coupled.

7.2.4 Independent pushbutton functions

Each independent pushbutton can be configured for one of the following functions:

1. *Send values or sequences*

   A short- or long-press event on the pushbutton triggers the transmission of a configurable value or sequence of up to 8 values.

   The values can be either logic or numeric, each of different type and size.

   If a single value is used, it can optionally be transmitted periodically.

2. *Dimming*

   This mode is used together with KNX dimming actuators. On a short press, the device sends to the actuator an on or off switching telegram; on a long press, a telegram to command the intensity variation is transmitted (until release).

3. *Shutter or venetian blinds*

   This mode is used together with KNX actuators for shutters or blinds.

Shutters and venetian blinds have two kinds of movement, namely full-stroke or stepwise; the device can be configured to send the appropriate telegrams to control the actuator in both modes.

Configuration options are as follows:

- If *toggle* mode is enabled, the direction of the commands associated to each pushbutton press (raise or lower) is inverted between subsequent activations; otherwise, the pushbutton only activates movement in one configured direction.
- If *venetian blinds* mode is enabled, the device transmits a *"step*" command on a short press and a "*full stroke up / down*" command on a long press; otherwise, the commands sent are *"full stroke up / down*" on a short press and a "*stop*" on a long press.

4. *Scene*

   This mode is used together with any KNX device that supports the "scene" functions.

   The device can send either "*Scene select*" or "*Scene learn*" commands on short or long presses. The options are as follows:

   - Select a specified scene on a short press, and command to store the current setting as a specified scene on a long press;
   - Select a specified scene on a short press, and a different specified scene on a long press.

7.2.5 Coupled pushbutton functions

Each pair of coupled pushbuttons can be configured for one of the following functions (onli the diffrences from the independent pushbutton setting are highlighted):

1. *Switching*

   Both pushbuttons act on the same communications object. Unlike the independent mode, the communication object can only be a single 1-bit (on-off switch) object; the system integrator can choose which of the pushbuttons is associated to the On or to the Off switching action.

2. *Dimming*

   The system integrator can choose which of the pushbuttons is associated to the "*raise*" or "*lower*" action; these actions are associated to a long press. The increment / decrement action is stopped as soon as the pushbutton is released.

   On a short press on the "*lower*" pushbutton, the device sends an "off" telegram and vice-versa.

3. *Shutter or venetian blinds*

   Opposite actions (open / raise vs. close / lower) are automatically assigned to the two pushbuttons in the pair; the system integrator can choose which of the pushbuttons is associated to the respective action.

   It is also possible to set the *venetian blinds* mode, just as for independent pushbuttons.

In coupled mode, the *Scene* function is not available.

7.2.6 Cyclic transmission

The transmission of a telegram can be configured, for many of the available functions, to be triggered at regular intervals, not just when the associated value changes.

This behavior, also called *Cyclic transmission*, can be separately configured for the two states associated to a same pushbutton: for instance, when the associated communication object is “On”, the “On” value could be transmitted every minute, while the “Off” value could be transmitted only once after a transition.

For PBs set in independent mode, the cyclic transmission is available only if the communication object has a single group address assigned to it.

7.2.7 Lock function

For each PB, both in independent and coupled modes, a lock function can be enabled which allows to inhibit the change of value of the associated communication object.

Both the activation and the deactivation of the lock state are performed by writing a value in the lock communication object (which is made available by enabling the function during device configuration); in the locked state, the PB is effectively disabled. The lock state can optionally be inverted with respect to the value of the locking command.

Two distinct values (or no value change) can be specified to be assigned to the communication object upon entering or exiting the locked state.

The lock state to be set after a bus recovery can also be specified.

7.3 Timer

The Timers feature allows to transmit a telegram of a configurable type and value at scheduled moments of the day.

Timers can be programmed by the end user of the device; a configurable number of up to 10 timers can be made available to the user. A name (up to 28 characters long) can be assigned to each timer.

The parametrization of a timer requires that a *Profile* is assigned to each day of the week. Each timer has seven scheduling profiles available (named P1 to P7), so that each day of the week can have a different profile.

Each profile includes up to 3 recurrencies of the timer event; each recurrency has a different, configurable, time of day for activation.

Each timer can be configured to be possibly enabled or disabled through a bus telegram.

Timer events can be used to perform simple scheduled functions which have daily periodicity, like e.g. a garden sprinkler system; the telegram transmitted by the timer would then activate a corresponding operation on the actuator. For operations which require events of different type, such as an additional explicit “Off” command after a certain duration, two different timers – one for activation, the other for deactivation – could be assigned to the same task.

The screen control elements for timers will be described in detail in the user interface section.

7.4 Chrono-thermostat function

7.4.1 External sensors

The T&S unit can be used as an ambient temperature regulator by supplying temperature measurement values through other sensor devices connected on the KNX bus.

Up to 4 sensors can be connected; the device performs an arithmetic average between all considered values, allowing to effectively filter local perturbations e.g. from heat sources or drafts close to on of the sensors.

The ekinex® EK-EA2-TP and EK-EB2-TP pushbutton units are equipped with an integrated temperature sensor; they are therefore an ideal complement to be used together with the T&S unit. To this purpose, **it is crucial that the pushbutton units used for sensing be mounted on non-perimetral walls at a minimal height of 1.5 m from the floor**.

An internal timeout on bus reception of temperature data guarantees that the control algorithms are correctly performed; if a required value has not been received within the timeout period, it is excluded from the computation for the average value. If none of the values from the configured sensors is received, the control algorithm gives up control; an alarm is issued, which is shown on the side bar of the screen pages and recorded with the time stamp of the time and date when the failure occurred.

The currently measured value for ambient temperature is displayed at the top of the side bar and is therefore visible in all the main pages.

When the thermostatic functions are enabled, one value for relative humidity and one for the air quality (CO_2 concentration) can be acquired through communication objects; these data are only used for display in the chronothermostat page. Relative humidity can optionally be acquired with a 1-Byte (DPT 5.001) or 2-Byte (DPT 9.007) format; CO_2 concentration has a 2-Byte format (DPT 9.008) in ppm (parts per million) units.

7.4.2 Applications

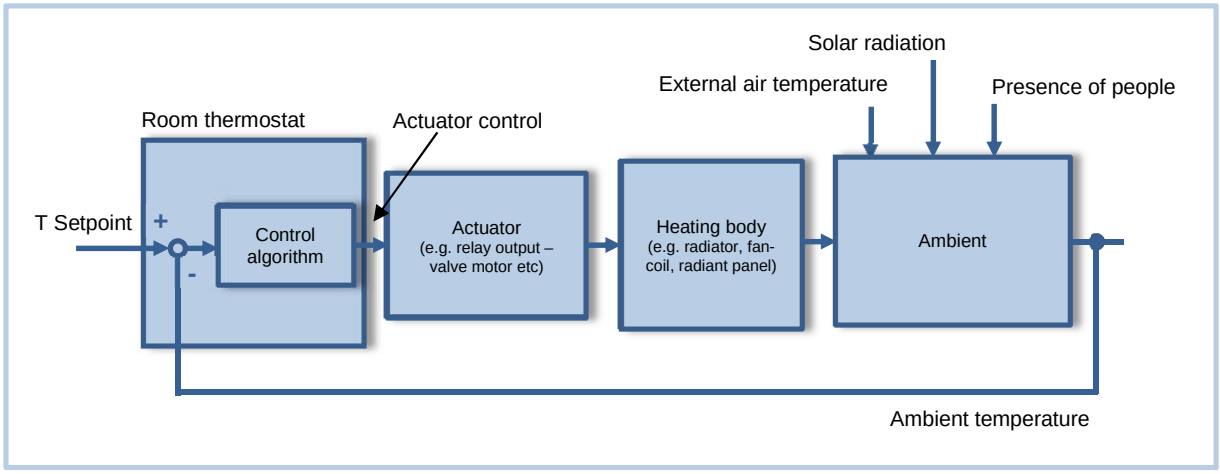
The chronothermostat is suitable for following applications:

- **radiators**, **electrical heaters** and **radiant floors**, with following output control options:
  - 2-point with hysteresis, On-Off type output;
  - Proportional-Integral, On-Off type or PWM continuous output
- **fan coils**, with following output control options:
  - On-Off fan control with 1 to 3 stages;
  - continuous fan speed control
  - control of 2-pipe or 4-pipe systems

7.4.3 Control algorithms

The picture below shows the components of a common generic control system for ambient temperature. The room thermostat measures the actual temperature of the air mass and constantly compares it to the setpoint value[1].

[1] Throughout this manual, the terms “desired value” or “setpoint value” are used interchangeably.



The control algorithm, basing on the difference between the setpoint and measured temperature values, processes a command value which can be of analog or On/Off type; the command is represented by a CO that is transmitted via bus, either periodically or event based, to a KNX actuator device.

The output of the actuator device is the driving variable of the control system, which can be e.g. a flow rate of water or air. The control system realized by the room thermostat is of feedback type, namely the algorithm takes into account the effects on the system in order to change the control action on the same entity.

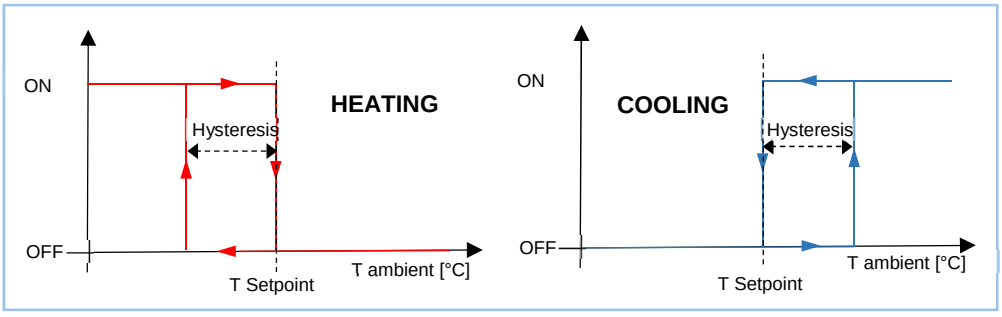
The device offers following temperature control algorithms:

- Two-point control with hysteresis
- Continuous P-I controller (with analogue output)
- Continuous P-I controller with PWM output

These algorithms will be detailed in the following sections.

7.4.3.1 Two-point control with hysteresis

This control algorithm, which is also known as On/Off, is the most classic and popular. The control provides for the on / off switching of the system following a hysteresis loop, i.e. two threshold levels are considered for the switching instead of a single one.



Heating mode: when the measured temperature is lower than the value of the difference [`Setpoint – Hysteresis`], whereby "`Hysteresis`" identifies the differential adjustment of the boilers, the device activates the heating system by sending a message or KNX telegram to the actuator that handles the heating system; when the measured temperature reaches the desired temperature (`Setpoint`), the device disables the heating system by sending another message. In this way, there are two decision thresholds for activation and deactivation of the heating, the first being the level [`Setpoint – hysteresis`] below which the device

activates the system, whereas the second is the desired temperature above which which the heating system is deactivated.

Cooling mode: When the measured temperature is higher than the value of the difference [`Setpoint – Hysteresis`], the device activates the air conditioning system by sending a message or KNX telegram to the actuator that handles it; when the measured temperature falls below the desired temperature (`Setpoint`), the device turns off the air conditioning system by sending another message.

In the application program, two different parameters are available for the hysteresis value for heating and cooling: the values usually differ depending on the system type and its inertia.

In order to optimize energy saving[2], the value of the desired temperature setting can be made to vary between different values, depending on several types of events which are set during configuration or selected by the user:

- manual corrections of the desired temperature;
- hourly or daily scheduling;
- forcing of the operating mode by an external supervisor device;
- presence of people;
- opening of windows or doors.

7.4.3.2 Continuous Proportional-Integral control

The continuous proportional-integral (P-I) controller uses an analog control variable to modulate the output of the heating – cooling system.

A detailed explanation of the P-I controller and its parameters is supplied in the appendix section; it will be assumed that the reader is familiar with the parameters described therein.

The application program allows to set following parameter combination when continuous mode is selected:

Terminal type	Proportional band [K]	Integral time [min]
Radiators	5	150
Electrical heaters	4	100
Fan-coils	4	90
Floor radiant panels	5	240
Other type	Custom [0 ... 25.5]	Custom [0 ... 255]

The following are guidelines for the choice of parameters for a proportional-integral regulator.

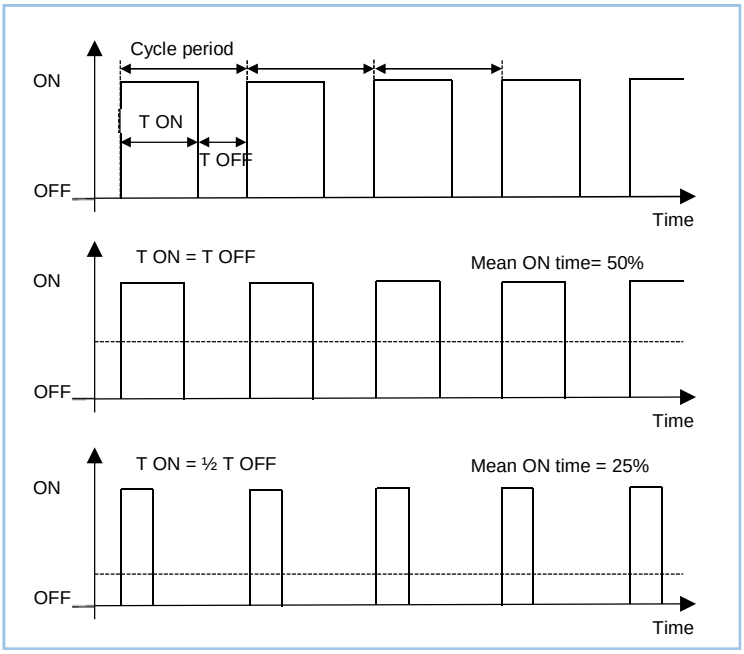
- **Cycle time**: The cycle time should be chosen at least one order of magnitude (10 times) higher than the approximate characteristic time constants of the ambient; for systems with low inertia, such as air convection heating and cooling, short periods (10-15 minutes or lower, compatibly with the capabilities and performance of the heating / cooling system) should be chosen to avoid wide fluctuations in temperature.
- **Proportional Band**: a narrow P.B. yields quick settling time to setpoint, but broad and continuous fluctuations in ambient temperature. A wide P.B, conversely, yields small to practically no oscillations of ambient temperature, but a slightly larger settling time.

[2] For each additional degree of room temperature, the energy dispersion towards the outside environment - and consequently also the energy consumption - increases by approximately 6%

- **Integral time**: a short I.T. yields short settling time but continuous oscillations around the setpoint; a long I.T. yields longer settling time but no oscillations.

7.4.3.3 PWM-output Proportional-Integral control

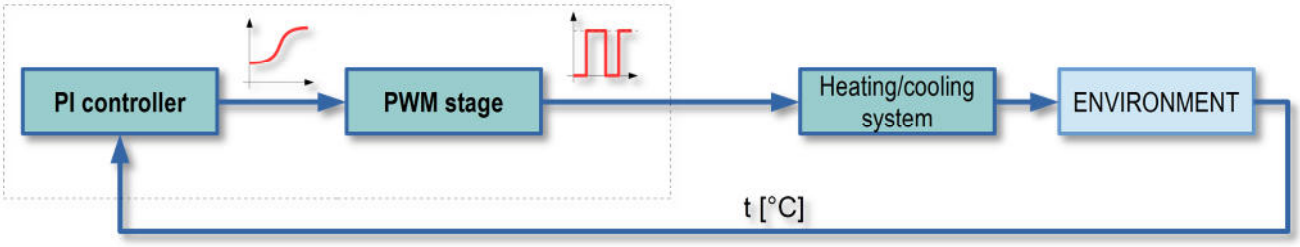
The proportional-integral PWM (Pulse Width Modulator) controller uses an analog control variable to modulate the duration of the time intervals in which a binary output is in the On or Off state. The controller operates in a periodic manner over a cycle, and in each period it maintains the output to the On value for a time proportional to the value of the control variable. As shown in the figure, by varying the ratio between the ON time and the OFF time, the average time of activation of the output varies, and consequently the average intake of heating or cooling power supplied to the environment.



This type of controller is well suited for use with On/Off type actuators, such as relays and actuators for zone valves, which are less expensive (both for electrical and mechanical components) than proportional actuators. A distinctive advantage of this type of controller, compared with the raw On/Off controller already described, is that it eliminates the inertia characteristics of the system: it allows significant energy savings, because you avoid unnecessary interventions on the system introduced by the 2-point control with hysteresis and it only provides the power required to compensate for losses in the building.

Every time the user or the supervisor changes the desired temperature setpoint, the cycle time is interrupted, the control output is reprocessed and the PWM restarts with a new cycle: this allows the system to reach its steady state more quickly.

It must be highlighted that this type of controller is still based on an analog control block such as the P-I regulator just described (or possibly other analog regulator blocks): the difference lies entirely in the regulator output stage. As a matter of fact, the PWM regulator can be described as an analog controller followed by an analog-to-PWM output converter stage:



If the characteristic time constant (i.e. inertia) of the controlled system is large enough compared to the PWM, it can be considered to inherently act as an effective low-pass filter for the controlled variable; therefore, the presence of the PWM output stage can be practically ignored from a control point of view.

The application program, in addition to the parameters relating to the P-I part of the controller (already described in the previous paragraph), allows to choose the duration of the cycle period (from 5 to 240 minutes) for the PWM part. For systems with low inertia, such as air-convected heating and conditioning, short periods (10-15 minutes) should be chosen in order to avoid excessive fluctuations in temperature.

7.4.3.4 Fan control for Fan-coil units

For the control of fan-coil units, the device allows to differentiate the controls of the heat exchanger and the fan; here, the heat exchanger is considered as the “actual” heating / cooling system, whereas the fan is controlled as an additional “attribute” of the main system.

The heat exchanger is controlled by the already described 2-point hysteresis algorithm; this applies to both the case of one-way valve (2-pipe system) and two-way valve (4-pipe system). The only precaution is that, normally, the threshold values will be made to match those of the thresholds of the first activation of the fan, as described below[3].

Fans can be controlles either in stages (with On-Off outputs) or in continuous mode; these will be described in the next paragraphs.

Several further parameters can be set, regardless of the type of fan control (if applicable):

- Startup and shutdown delays (which are independent) for the fan with respect to the control output state;
- (only in heating mode) the capability of starting the fan only if the water temperature is above a minimum value[4];
- the capability of inhibiting the start of the fan through a bus telegram.

7.4.3.5 Fan-coils with On/Off fan speed control

The multi-stage fan control is similar to the 2-point control with hysteresis described in the previous section. The speed of the fan is chosen basing on the difference between the set point and the actual measured temperature. The substantial difference from the described 2-points algorithm is that, in this case, there can

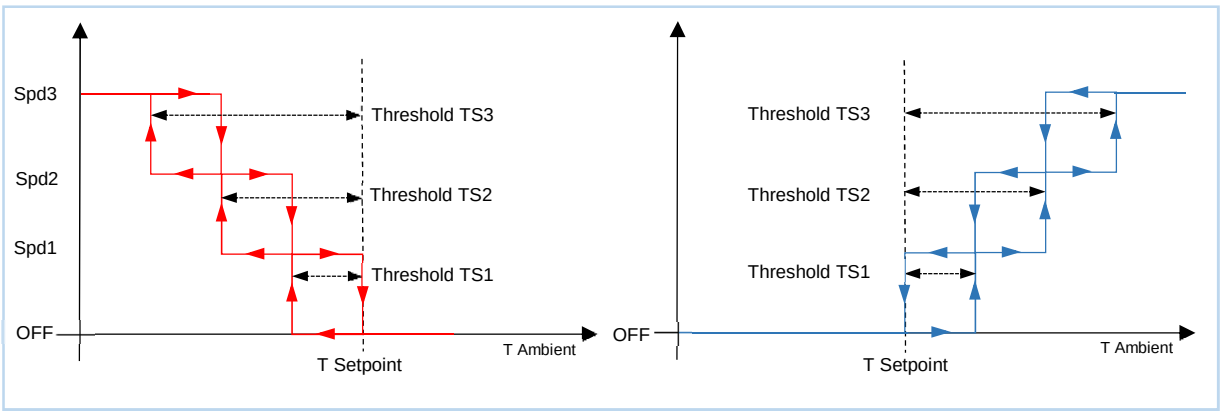
[3] This allows to prevent the formation of wall soiling caused by the circulation of water in the exchanger in absence of convective heat exchange.

[4] If the temperature value is not received, or in the case of a value corresponding to a faulty probe, the data is ignored and the fan is started.

be up to three stages (depending the number of available fan speeds); a different hysteresis threshold exists for each stage transition.

At a given stage, i.e. speed setting, a threshold causes the switching to a higher speed (or none, for the highest stage) while the other causes the switching to a lower speed (or off, for the lowest stage). Usually, but not inherently, a same threshold value will be used for both transitions that lead to each speed from the adjacent ones.

Following pictures should help clarify the mechanism:



The left diagram refers to the speed control of the fan-coil (with 3-stage operation) in heating mode.

Note that the thresholds are always expressed in terms of the Setpoint Temperature; a further threshold level exists which is not highlighted in the picture, that is, Threshold TS0, at level T = $T_{setpoint}$ (i.e. $T_{setpoint} - T_{threshold} = 0$).

The thresholds values are specified in the application program, and their effect can be summarized as follows:

Speed (Stage)	*Activated when*	*Deactivated when*
1	$T_{setpoint} - T_{threshold} > TS1$	$T_{setpoint} - T_{threshold} < 0$
2	$T_{setpoint} - T_{threshold} > TS2$	$T_{setpoint} - T_{threshold} < TS1$
3	$T_{setpoint} - T_{threshold} > TS3$	$T_{setpoint} - T_{threshold} < TS2$

The right part of the diagram refers to the system in cooling mode; the operation is very similar, so it will not be described in details.

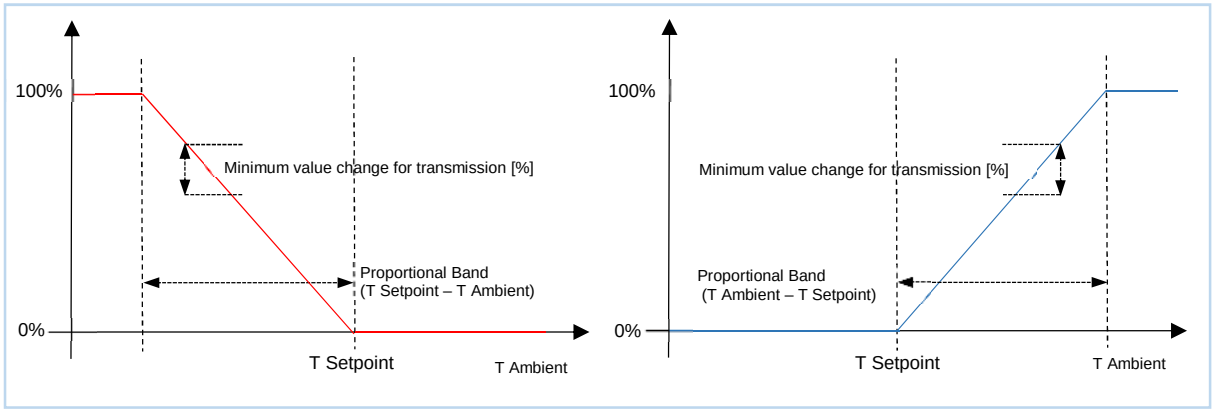
The transition between speeds is guaranteed to occur in such a way that the control lines for all speeds other than the selected one are deactivated before switching is performed.

The more comprehensive case of a 3-speed fan is described above; options for 2-speed or 1-speed fans, for which the operation is completely similar, are also available.

It should be noted that in applications where both heating and cooling modes are active, the thresholds of the speeds are the same in the two modes of operation.

7.4.3.6 Fan-coil with continuous speed control

In this type of control, the output speed level can assume values expressed as a percentage (1 Byte - DPT 5.001 percentage).



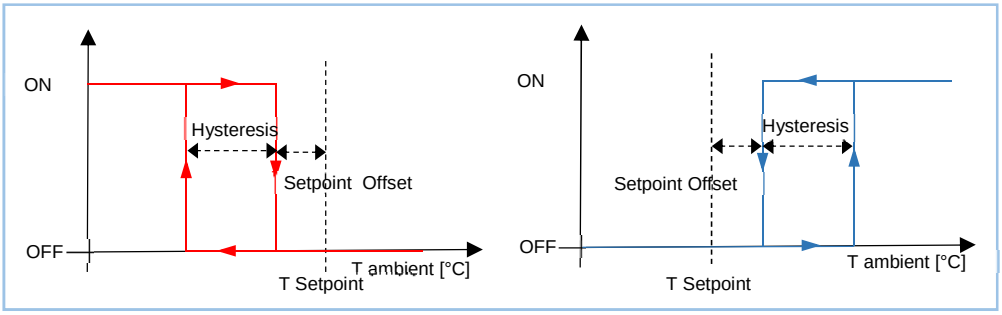
The application program provides the Proportional Band parameter that takes the same value for both heating and cooling: this parameter determines the proportionality of the intervention of the fan.

A further parameter is the minimal change in the control value (in %) required to trigger its transmission on the bus; this allows to limit the generated bus traffic.

7.4.3.7 Control for auxiliary heating / cooling system

Some heating / cooling systems, such as the radiant floor panels (with the exclusion of the so called "dry" versions, in which the water circuits are not embedded in a concrete slab), show a very large response inertia; this is mostly due to the fact that a relevant part of building mass is involved in the thermal exchange.

In order to improve response time for start-up or ambient temperature transients, auxiliary systems with substantially lower inertia are used in support of the main system whenever the difference between setpoint and measured temperatures becomes significant.



The auxiliary – also called “second-tier” – system, in the initial stage, contributes to heat / cool the environment and then stops its action when the difference between the setpoint and the measured temperature is lower and can be addressed by the system with higher inertia.

The control algorithm used for the second-tier system is the 2-point On/Off control with hysteresis.

As usual, only the operation in Heating mode will be described; the Cooling mode operation is the same but reversed.

When the measured temperature is lower than the value of the lower threshold (Desired temperature - Setpoint Offset - hysteresis), the device activates the auxiliary heating; when the rising measured temperature reaches the value of the higher threshold (Desired temperature - Setpoint Offset), the auxiliary heating system is turned off.

7.4.4 Operating modes

The T&S unit has four predefined operating modes:

- comfort;
- standby;
- economy;
- building protection.

Each of these operating modes identifies a different temperature setpoint (for heating; there is a separate setpoint set for cooling), which can be assigned through the ETS program.


Comfort


Economy


Standby


Building protection
(anti-ice or overheating protection)

Each of these setpoints is accessible through communication objects (except in automatic mode); the setpoints can therefore be changed locally through the user interface (refer to the chapter describing the user interface) or remotely via the communication objects. The only exception is represented by the building protection setpoint, which can not be modified locally by the user: this parameter is related to the safe operation in the protection of system components (particularly in heating mode). This parameter must therefore be configured in advance through ETS or can be changed, if necessary, by another supervisor device via the bus.

7.4.5 Daily – weekly scheduler

The internal daily – weekly scheduler can be programmed to perform a setpoint switching between two operating modes at the programmed times of day.

The choices of operating modes that can be associated with the scheduler are

- comfort and standby
- comfort and economy

The alternation between comfort and standby modes is more suited for rooms with frequent occupancy and / or with control systems having a large inertia; vice-versa, an alternation between comfort and economy modes is more suited for spaces with infrequent presence and / or low-inertia control systems.

Seven different hourly profiles, labeled P1 to P7, are available; each of them can be assigned to one or several week days.

Each hourly profile contains up to 3 comfort-mode periods, each with a definable starting and ending time of day; outside of these periods, the other operating mode is set according to configuration.

The setpoint value which has been set according to the program schedule may be temporarily modified by the end user (limited to a configurable deviation) through the chronothermostat page of the user interface. The mode of operation can also be temporarily changed by the user; the modification lasts until the next mode change event triggered by the scheduler. For details about how to perform these changes, please refer to the section of the manual dedicated to the user interface.

Several features can have influence on the value of the current operating mode: the following table lists them in order of priority (higher first).

Window open contact
HVAC mode forcing
Presence detection
Hourly scheduler
(User setting)

The override status is visible in the sideband of each screen, where the text indicating the current operating mode is displayed flashing.

The currently programmed mode can also be sent to other devices on the bus that should act as "slaves" via a communication object.

7.4.6 Seasonal mode switching (Heating / Cooling)

The switch between heating and cooling mode can take place in 3 ways:

1. manually, by user command, through the coresponding screen page;
2. automatically, through a command from the internal logic of the device;
3. automatically, through a command from the KNX bus.

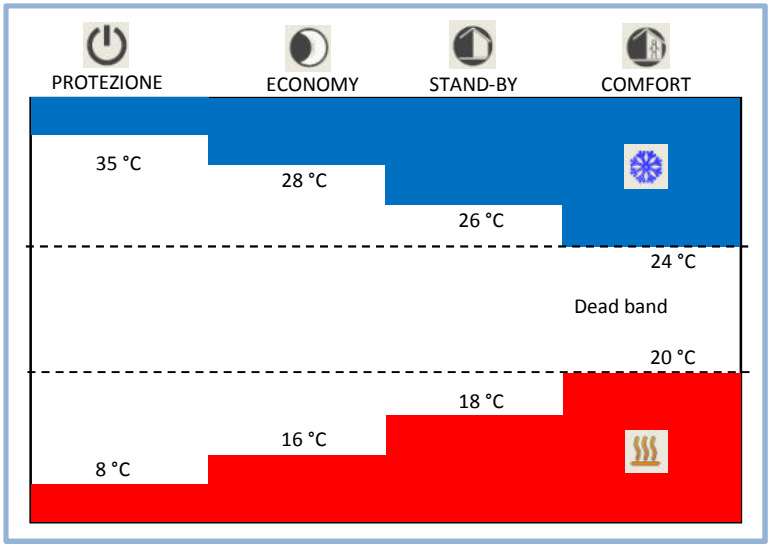
7.4.6.1 Manual switching

Mode 1 is suitable for installations with a small number of temperature control devices installed. If the devices have been configured for this purpose, the user performs the switching manually on the display panel of the Touch & See ("master" unit for switching); the device transmits on the bus the output communication object which provides for the switching of other thermostats ("slave" appliances) connected with the matching group address.

7.4.6.2 Switching through internal logic

Mode 2 is suitable for applications with heating / cooling systems with a 4-pipe configuration (e.g. fan-coils or radiant ceiling panels). Also in this case the information can be transmitted on the bus through an output communication object; the difference with respect to the manual mode is that the switching is performed automatically by the machine, basing on the values of current temperature and setpoint. In this mode, the manual switching by the user is inhibited.

The automatic switching is achieved by introducing a dead band as shown in the following figure.



The figure shows that, as long as the actual measured temperature below the heating mode setpoint, the heating mode is selected; similarly, if the value is greater than the cooling setpoint, then cooling mode is selected. If the value is within the dead band, the operation mode remains unchanged until the value itself passes over the threshold value associated with the opposite mode.

In order to avoid inconsistencies between the different configured temperature levels, unlike in other switching mechanisms, the values of the 4 + 4 threshold levels are not exposed through communication objects.
A single communication object is made available (which corresponds to the comfort setpoint in heating mode): all other values are consistently computed according to the value of this single parameter.

7.4.6.3 Switching through a KNX telegram

In Mode 3, the switching command comes from the KNX bus, i.e. from another “master” KNX device, such as a room thermostat. The Touch & See unit in this case behaves as a "slave"appliance: the switching takes place by means of an input communication object. In this mode, manual switching by the user is inhibited.

7.4.7 Window switch management

Window switch management is an optional feature, oriented to energy saving, which becomes available only if the chrono-thermostat function is enabled.

Whenever a condition of opened window is detected, the operating mode is forced to “building protection “ and it remains forced as long as the open window condition is active. The program provides a time delay parameter for detection, in order to discriminate between an occasional short-term opening (e.g. to provide air exchange in the room) from an unintentional opening that justifies the power-saving function to be recalled.

The operating mode determined from Window switch management has priority on all operating mode settings imposed by the scheduler, by the presence detection feature and by external forcing through an HVAC supervisor.

The physical detection of window openings is normally performed through KNX-interfaced switches; their output should consist of 1-bit communication objects that should be matched with the corresponding objects

in the *Touch&See*. These can be of any polarity (On when opened or On when closed); they are evaluated with an internal logical OR operation, so that the activation of any single contact triggers the window open condition.

7.4.8 Presence detection

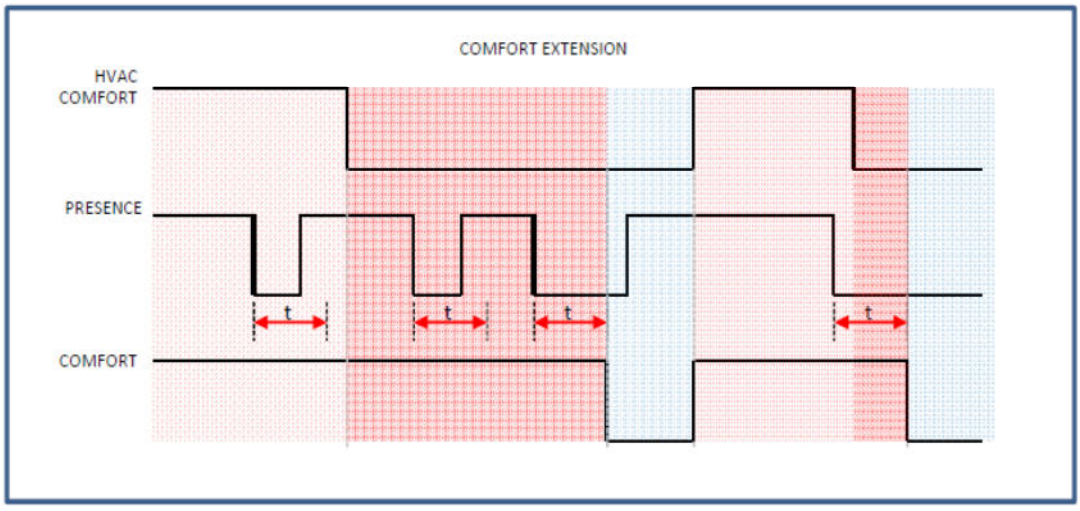
The presence or occupancy detection function includes a set of optional features, aimed at energy saving, which become available only if the chrono-thermostat function is enabled.

The physical detection of presence is normally performed through KNX-interfaced sensors; their output should consist of 1-bit communication objects that should be matched with the corresponding objects in the *Touch&See*. These can be of any polarity (On when presence is detected or On when NO presence is detected); the configured communication objects are evaluated with an internal logical OR operation, so that the activation of any single sensor triggers the presence detection.

As a general operating mode, the presence detection can be used to extend the duration of the "*Comfort*" mode period if (and for only as long as) people are present in a room, or vice versa to bring the end of the period forward in case no people are present. The resulting possibilites are the following three: extension of the comfort period, shortening of the comfort period, or their combination. These possibilities will be described in the following paragraphs.

7.4.8.1 Extension of the comfort period.

The function is only active if the current mode is *Comfort*; if during this period presence is detected, the operating mode remains set on *Comfort* even if either the hourly scheduler or the user request to change mode to *Economy* or *Standby*. Once presence is not detected for a period longer than a configurable time, the operation mode requested by the scheduler is restored.

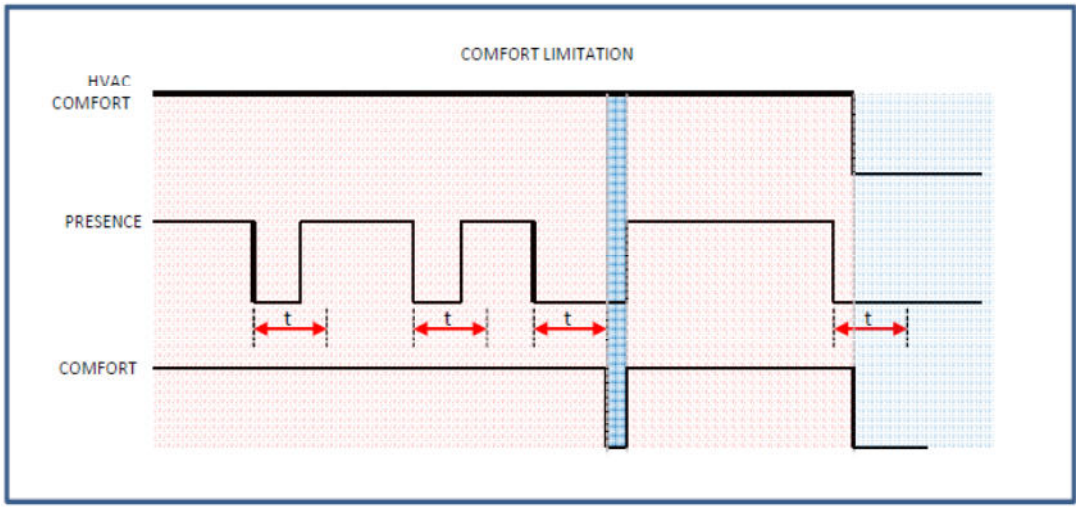


The diagram shows that, even if it is presence is detected during a period in which the operating mode set by the scheduler is not *Comfort*, no mode change happens until the next mode switch to *Comfort* requested by the scheduler.

As previously illustrated in the priority table, if external mode forcing is used, this has priority over the mode requested by the presence detection; in turn, window opening maintains precedence over all other mode transition mechanisms.

7.4.8.2 Shortening of the comfort period.

The function is only active if the current mode is *Comfort*; if, during this period, no presence is detected for a time longer than a configured duration, the operating mode is changed to either *Standby* or *Economy* as chosen. The destination mode can be configured independently from the mode used for the hourly scheduler.



As previously illustrated in the priority table, if external mode forcing is used, this has priority over the mode requested by the presence detection; in turn, window opening maintains precedence over all other mode transition mechanisms.

7.4.8.3 Extension and shortening of the comfort period.

This mode is a combimation of the previous two, and therefore operates in the very same way as already described.

7.4.9 Scene management

This feature is used in conjunction with KNX devices that support the same function. If the chrono-thermostat function is enabled, 8 independent scene settings are made available for temperature control; each scene has its own code and corresponds to one of the usual operating modes (*Comfort*, *Standby*, *Economy*, *Building protection*). A further option available is *Automatic mode*, which refers to the activation of the hourly scheduler: if the thermostat is in manual mode, and an *Automatic mode* scene is recalled, the hourly programming is activated. If the learning function is enabled, the reception of a “Scene learn” command causes the current operating mode to be stored in association with the transmitted scene code.

7.4.10 Function activation via bus

Three binary (1-bit) communication objects are available to enable or disable following temperature control functions:

- auxiliary heating;
- auxiliary cooling;
- fan control.

Upon reception of a disable telegram from the bus, the control outputs for heating / cooling and auxiliary fan control are automatically lowered or brought to the closed position (0%). The disable condition persists even after the bus recovery following a power failure.

7.5 Multimedia Control

The Multimedia Control page allows to interact from a more convenient location with a KNX Multimedia playback device.

Each control element on the page corresponds to one ore more communication objects which can be linked to the control objects on the playback device. The *Auto-off* and *Equalizer* functions, which can be individually enabled in the ETS configuration, have their own setting pages which can be recalled through the corresponding icons.

In the *Auto-off* page, the *Auto-off* function can be activated or deactivated, and the auto-off time can be set.

In the *Equalizer* page, the intensity for each of the three bands Bass – Mid – Treble can be individually set.

The screen control elements for the multimedia control page will be described in detail in the user interface section.

7.6 Real-time clock

The device is equipped internally with a battery buffered Real-Time Clock (RTC); when both bus and auxiliary power are not present, internal date and time are maintained for a sufficiently long period of time.

The internal clock can be made available as a reference for other devices on the bus through the corresponding Communication Objects; similarly, the T&S can be configured in such a way as to make use of other time and date reference sources from other devices on the bus.

7.7 Meteo data display

The Meteo page displays on a single page all the meteo-related information coming from sensors on several devices on the bus or from a single KNX-interfaced meteo station.

The meteo page is specifically intended to be used for display of outdoor environmental data; data supplied by indoor ambient sensors, at least as far as temperature and relative humidity are concerned[5], are meant to be displayed in their reserved places in the chrono-thermostat page (besides obviously being based on own distinct Communication Objects). However, since all values are based on generically accessible Communication Objects, nothing prevents from using the meteo page - in particular applications – to display the ambient conditions of an internal room.

7.8 Alarms

Two categories of alarms are defined:

- Externally generated alarms. A maximum of 20 alarms can be defined, each of them with a corresponding dedicated Communication Object (DPT 1.005 alarm). The associated text and alarm trigger condition can be configured in the ETS application program;
- Internally generated alarms. This category groups all internal or external sensor malfunction; external sensors, when enabled, are considered as malfunctioning either when a “failure” telegram is

[5] According to their prevailing use, the Atmospheric pressure is only displayed in the Meteo page, while the Communication Object$_2$ concentration index is only displayed in the indoor ambient page (chronothermostat).

received or when no information is received within a configurable timeout. Timeout durations are configurable in the ETS application program.

Please verify that all following parameters are correctly set in order to activate the corresponding alarm functions:

- *Date and time ⇒ Date and time timeout (Date and time synchronization = from bus)*
- *Thermostat ⇒ Configuration ⇒ Sensors timeout*
- *Meteo ⇒ Configuration ⇒ Sensors timeout*

The timeout alarms on failed update can be disabled by setting the value 0 (00:00:00) for the timeout duration.

The screen page for the alarm list is always enabled, in order to allow the display of internally generated alarms; enabling the alarm page in the page configuration section actually allows external alarms to be also displayed in the same page.

The screen control elements for the alarm page will be described in detail in the user interface section.

7.9 Light sensor

Like conventional ekinex® pushbutton units, the *Touch&See* is equipped with an ambient brightness sensor.

The value measured from the sensor, if so configured, can be used by the device for the correction of the display backlight intensity: a higher ambient brightness means an automatical reduction in backlight intensity.

The brightness value can be transmitted on the bus at regular intervals, as well as whenever there is a variation in value higher than a defined threshold. These conditions are not alternative and therefore they can be activated together if required.

Two independent threshold levels can be defined for the brightness: a corresponding Communication Object signals when each threshold is crossed, either rising or falling (as configured).

An hysteresis value (from 5% to 40%) can be associated to both thresholds; when a signal is active, a cyclical transmission of the value can be programmed. These two settings are common to both thresholds.

7.10 Open-window contacts

Up to 4 communication objects are available to be connected to open window contacts, whose value can be configured to be either active when (the window is) open or active when closed. A distinctive name can be assigned to each one of them.

A status icon appears in the side bar on every page when at least one of the contacts is open; an indication of which contact is active can be displayed with a long press on the icon.

The window contacts also play a relevant part among the energy saving features: if the thermostat function is enabled, the device can be configured to switch to protection mode whenever an open window is detected.

7.11 Presence simulation

Presence simulation is a feature that automatically carries out ordinary daily operations like switching lights or raising and lowering blinds, according to a pre-recorded sequence, when the building is not occupied.

Up to 16 Communication Objects (DPT 1.001 switch) can be defined and associated to the actuator functions that have to take part in the sequence. These Communication Objects are continuously monitored[6] and their activities stored for a period of time of the whole last week (older recordings are discarded).

When the *Presence simulation* is activated, the system starts reproducing the changes of state for the involved objects in real time, starting from one week before the activation moment. If the activation lasts for a longer time, the sequence is reiterated.

The simulation can be activated either by the end user, through the command on the corresponding page, or through a Communication Object (this feature can be disabled).

7.12 Password-protected lock

A password protected lock function allows to inhibit most commands while allowing the free display of all pages. Any locked screen command can be temporarily unlocket for activation by providing a 4-digit password, which has to be defined through the ETS application during configuration.

When the lock is active, following pages are still completely controllable by the user:

- Multimedia
- Pushbuttons
- Timer (settings page): the user is still allowed to activate and deactivate the pre-programmed events, though he can't access the page for the activation time settings.

This feature is particularly aimed at non-residential buildings in order to prevent unintended modifications to the preset profiles, e.g. for the chrono-thermostat scheduling or the operating mode.

7.13 Screen standby settings

Two different modes can be defined for the screen when it remains inactive for a period of time, each with its own set of parameters. These modes can be linked to the ambient brightness level.

The two modes are as follows:

- *Standby* – after a configurable inactivity period, the screen displays either one of the standard pages or one of several predefined images. The image or the page can be selected durign configuration;
- *Low power mode* - after a further (configurable) inactivity period, the display brightness is reduced to a configurable value.

If the *low-power* mode is active, the behavior at the user's touch must also be configured: in order to prevent unintended commands, the first touch can be configured to only activate the backlight.

7.14 Screen lock for cleaning

A reserved page is provided in order to allow the cleaning of the screen without causing unwanted operations: upon entering this page, the touch screen remains unresponsive for a few seconds (a countdown is displayed).

[6] In order to limit storage space, the state of monitored objects is sampled every 5 minutes and the changes are detected. This means that the switching times are not fully accurate (which is appropriate for the intended use) and also that shorter activation periods may not be detected at all.

8. User interface

8.1 Interface pages

The user interface of the *T&S* is made of several main pages, displayed in sequence or directly accessed, that can be enabled or disabled according to the functions of interest.

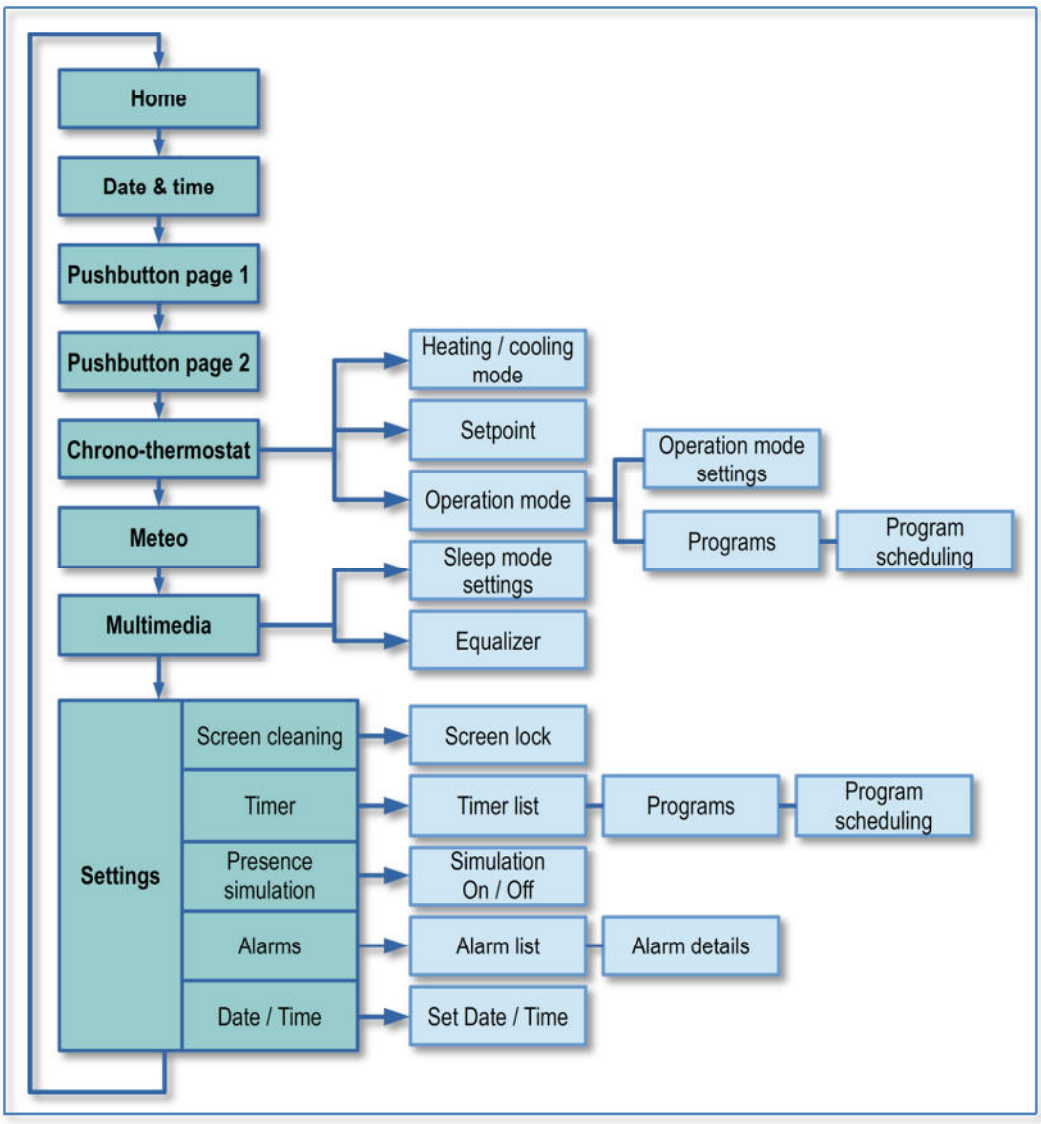
The available pages are:

- Chrono-thermostat
- Load switching (2 pages);
- Calendar;
- Meteo;
- Multimedia;
- Service features (timers, alarms).

The graphic elements like background images or command button icons can be chosen during parametrization from an internal image library; additionally, custom images can be loaded into the device using a Micro SD card as described in a previous chapter.

8.2 Structure of interface pages

The following picture shows the navigation structure for the interface pages of the T&S unit. All available pages are shown; some of these pages can be disabled if the respective functions are not required, either for the lack of corresponding devices on the KNX network or for the limitation of the device features according to the intended application.



The actions which are actually effective on each page may depend on the availability of devices equipped with corresponding sensors or actuators on the KNX network.

In the present listing, a complete set of pages is shown; the pages which are not enabled in the device configuration will not be displayed.

The transition between main pages (shown in a darker color in the picture) is made by swiping with a finger on the touch-screen from left to right or vice-versa.

A short press (i.e. tapping with a finger on a screen element) is used to select icons, menu entries or option values; a long press (i.e. keeping the finger on the element for a longer time) activates the sub-pages, shown in lighter color in the picture, for settings and parameter display.

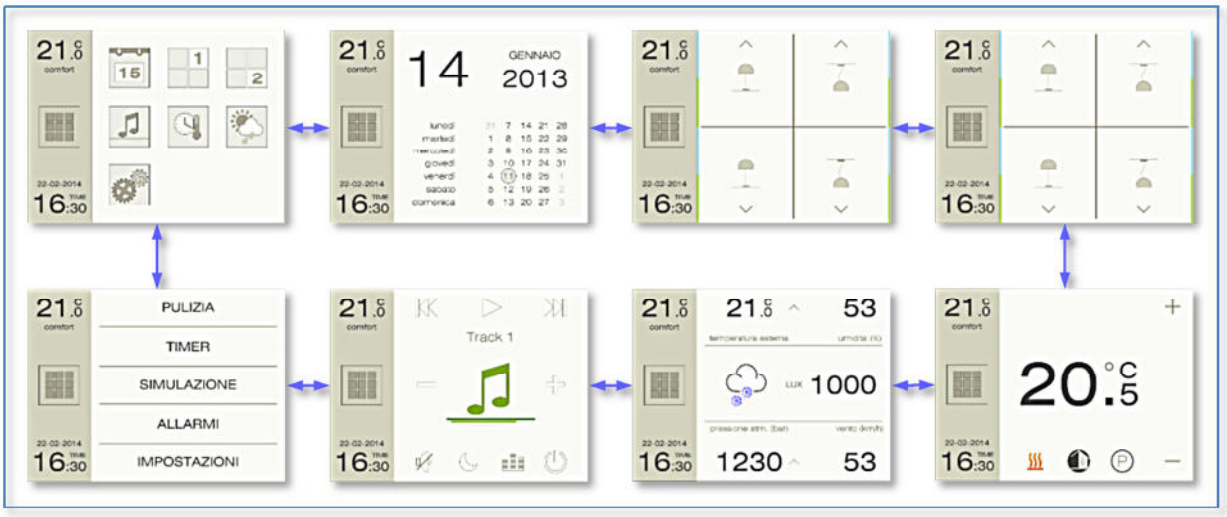
For the pushbutton pages, depending on the selected configuration, a short or long press on the virtual pushbuttons on the screen causes different behaviours and different telegrams to be sent on the KNX bus. For instance, the short and long press have particular meanings when the pushbuttons are configured for the control of dimmers or blind / shutter actuators.

As a general rule, in the subpages for settings, when an entry is selected with a short press, the “+” and “-“ buttons change the activation state or the value of the corresponding parameter. By pressing the “OK” button, the changes are confirmed and saved in memory, while pressing the back arrow key “←” returns to the previous page canceling all changes.

8.2.1 Sequence of main pages

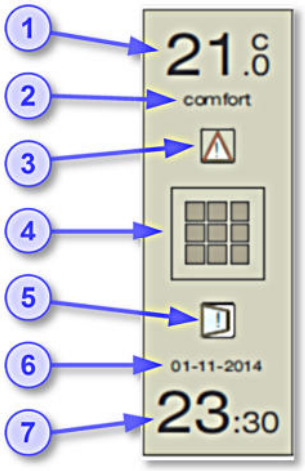
Following sections describe how to navigate between the different pages of the user interface; the operation of each single page will be described in subsequent chapters.

The picture below shows the complete set of main screen pages for all features of the device.



8.3 Side column

The side column appears in all main pages.



1. Ambient temperature
2. Operating mode
3. Alarms active
4. Shortcut to Home screen
5. Windows open
6. Date
7. Time

The side column displays the ambient temperature, measured as the average of up to 4 sensors; this information is only shown if the Chrono-thermostat function has been enabled.

The standard unit is Celsius degrees [°C]; display can be set to Fahrenheit degrees [°F] through the ETS application.

The value of external temperature is shown in the Meteo screen, provided that the Meteo page is configured as active.

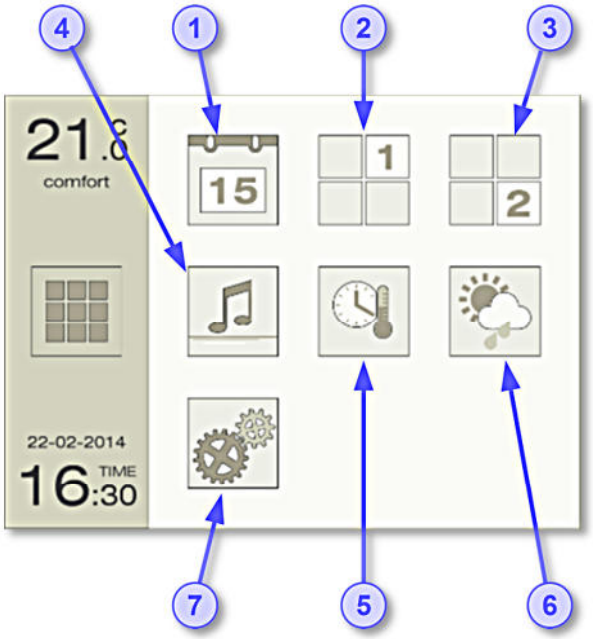
The operating mode (*comfort, standby, economy* or *protection*) flashes when a forcing condition is activated by from a supervisor device or presence detection. This information is only shown if the Chrono-thermostat function has been enabled.

The *Alarms* icon indicates the presence of one or more alarms: a log press on the icon takes to the alarm list display page.

A short press on the central icon takes to the "*Home*" menu page, where all other pages can be accessed directly.

The *Open windows* icon, if shown, shows that a window or door contact – connected through a communication object – is active, therefore the corresponding window / door is open; a long press on the icon takes to the display page that shows which of the max. 4 available contacts is open.

8.4 Home menu page



1. Calendar page
2. Pushbutton page #1
3. Pushbutton page #1
4. Multimedia control page
5. Chrono-thermostat setting page
6. Meteo page
7. Settings page

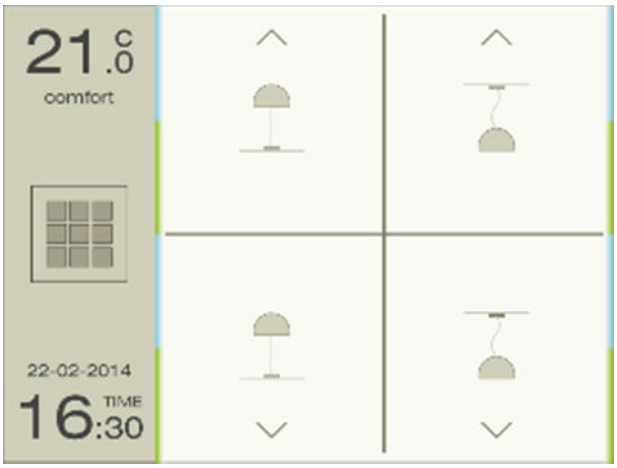
A short press on any of the icons takes to the corresponding page; only the icons corresponding to pages enabled in the device configuration are shown.

8.5 Calendar page

The calendar page displays the current time and date and the calendar of current month.

This page has no command areas for user operation (except for the sidebar and the swipe-activated page change).

8.6 Pushbutton pages

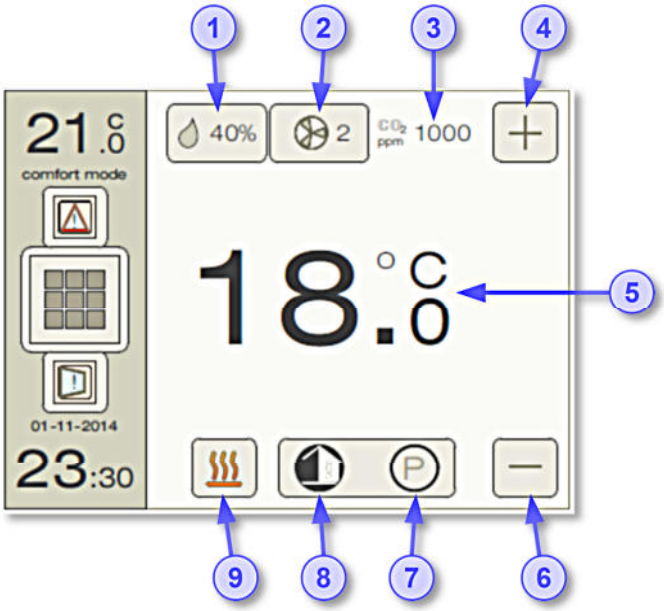


The pushbutton page page displays four pushbutton surfaces, or less if some of them are configured as coupled.

If the pushbuttons are all configured as independent, each of the square surfaces corresponds to an activation point (for an independent function); if some of the pushbuttons are coupled, each quadrant still corresponds to an activation point, but their functions are linked and bound to common communication objects according to configuration.

This page has no other command areas for user operation (except for the sidebar and the swipe-activated page change).

8.7 Chrono-thermostat page



1. Ambient relative humidity [%]
2. Fan-coil fan current speed
3. Communication Object$_2$ concentration [ppm]
4. Pushbutton *Raise*
5. Current Setpoint for ambient temperature
6. Pushbutton *Lower*
7. Operating mode indication (comfort / standby / economy / protection)
8. Indicator for chrono program active
9. Heating / Cooling mode

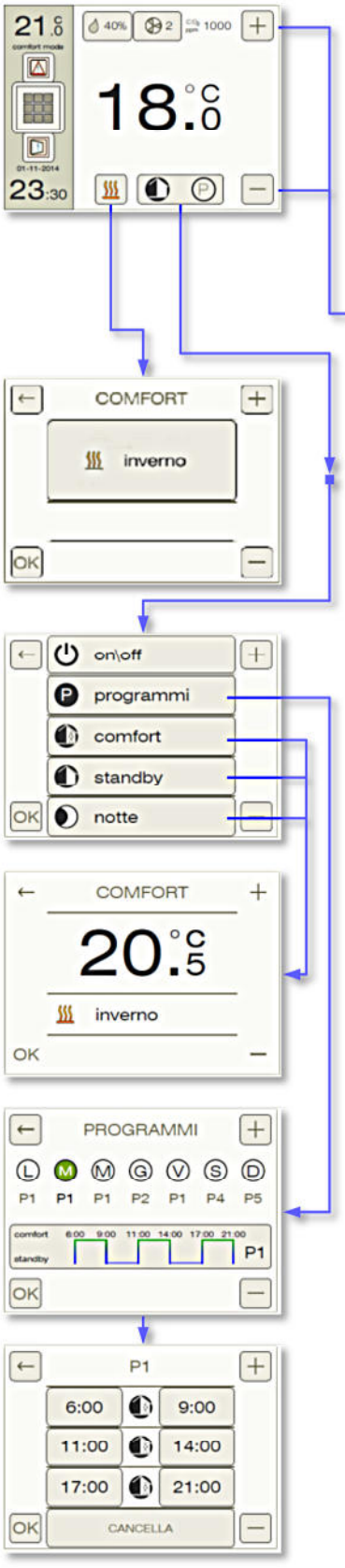
A long press on the *Heating / Cooling mode* icon takes to the corresponding selection page.

A long press on the area that includes both the *Operating mode* icon and the *Chrono program* icon takes to the respective setting pages.

The following table shows the different icons that can appear in the page:

	Heating mode on		Operating mode: Comfort
	Cooling mode on		Operating mode: Standby
	Operating mode: manual		Operating mode: Economy
	Scheduling (shown: inactive)		Operating mode: Building protection

8.7.1 Chrono-thermostat subpages



Chrono-thermostat main page:

A short press on buttons (+) or (-) takes to the *Manual setpoint* subpage.
A long press on the bottom icons takes respectively to:

- the *Heating / cooling mode* switch subpage;
- the *Operation mode* subpage (and following subpages for program scheduling)

Manual setpoint:

A short press on buttons (+) or (-) increases / decreases the setpoint value by 0.1 °C.
A short press on the time period field and then on buttons (+) or (-) increases / decreases the end of the setpoint forcing period by 15 min.

Heating / cooling (season) mode:

The current mode is shown; a short press on buttons (+) or (-) switches to the other mode.

Operation mode:

The current operation mode is highlighted; to change, select desired mode and confirm with a short press on "OK" or cancel with a short press on "←"

A long press on any mode field takes to the setpoint setting for that mode;

A long press on the "Program" field takes to the program setting subpage.

Operation mode setpoint:

A short press on buttons (+) or (-) increases / decreases the setpoint value by 0.1 °C.

The setpoint value is relative to the respective mode and season.

Programs:

A short press selects the day of the week; a short press on buttons (+) or (-) changes the program number assigned to the selected day (P1..P7).

A long press on the field that shows the currently selected profile takes to the *Program scheduling* subpage.

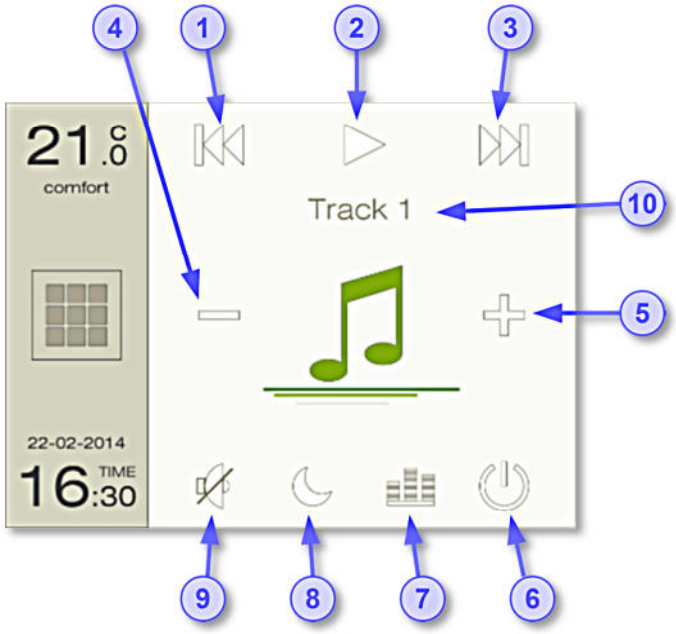
Program scheduling:

Each program can have up to 3 time periods during which the assigned operation mode is "*comfort*"; during the rest of the time, the operation mode is "*standby*".

The start and end time for each period can be set by selecting the respective field and acting on the (+) and (-) buttons; the time is changed in 15-minute intervals.

By pressing the "*Delete*" button on a selected field, the corresponding period is deactivated.

8.8 Multimedia page



1. Rewind / Previous track
2. Play / Stop
3. Forward / Next track
4. Lower volume
5. Raise volume
6. Off
7. Equalizer
8. Sleep (Auto-off) mode
9. Mute
10. Title of current track

The Multimedia page allows the user to control the main functions of a remote multimedia playback device connected on the KNX bus and compliant to the standard KNX multimedia control functions.

The *Auto-off* and *Equalizer* icons take to the respective settings pages, which are enabled according to the configuration in the ETS application program.

8.8.1 Multimedia subpages

Multimedia main page:

A long press on the bottom icons takes respectively to:

- the *Sleep mode* subpage;
- the *Equalizer* subpage.

Sleep mode:

A short press on the "Active" field and then on buttons (+) or (-) toggles the activation of the sleep mode (auto-off).

A short press on the time field and then on buttons (+) or (-) increases / decreases the auto-off time by 15 min.

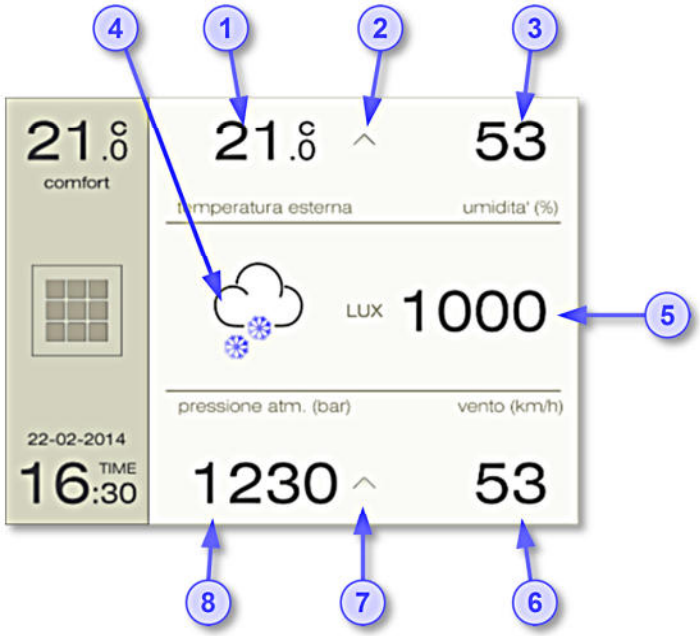
Equalizer:

A short press selects the band (Bass, Middle, Treble) to be changed;

A short press on buttons (+) or (-) increases / decreases the tone value of the selected band.

By pressing the "OK" button, the changes are confirmed and saved in memory, while pressing the back arrow key "←" returns to the previous page canceling all changes.

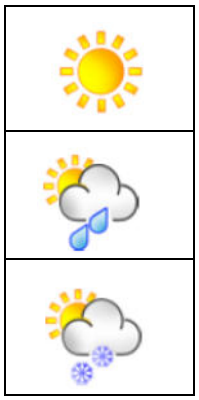
8.9 Meteo display page



1. Outer temperature
2. Trend for outer temperature (arrow pointing up or down)
3. Relative humidity (%)
4. Indicator of current general meteo condition
5. Ambient brightness (in lux)
6. Wind speed (in km/h o m/s)
7. Trend for atmospheric pressure (arrow pointing up or down)
8. Atmospheric pressure (in bar)

The graphic indicator icon for general meteo condition combines the information from the outdoor light, rain and temperature sensor.

The possible states that are represented are the following:


Day - Clear

Day - Rain

Day - Snow


Night - Clear

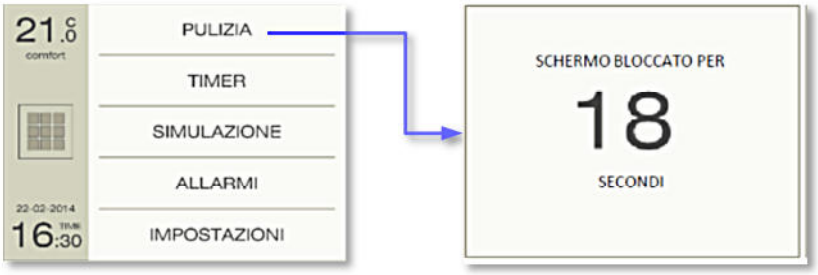

Night - Rain


Night - Snow

8.10 Settings page

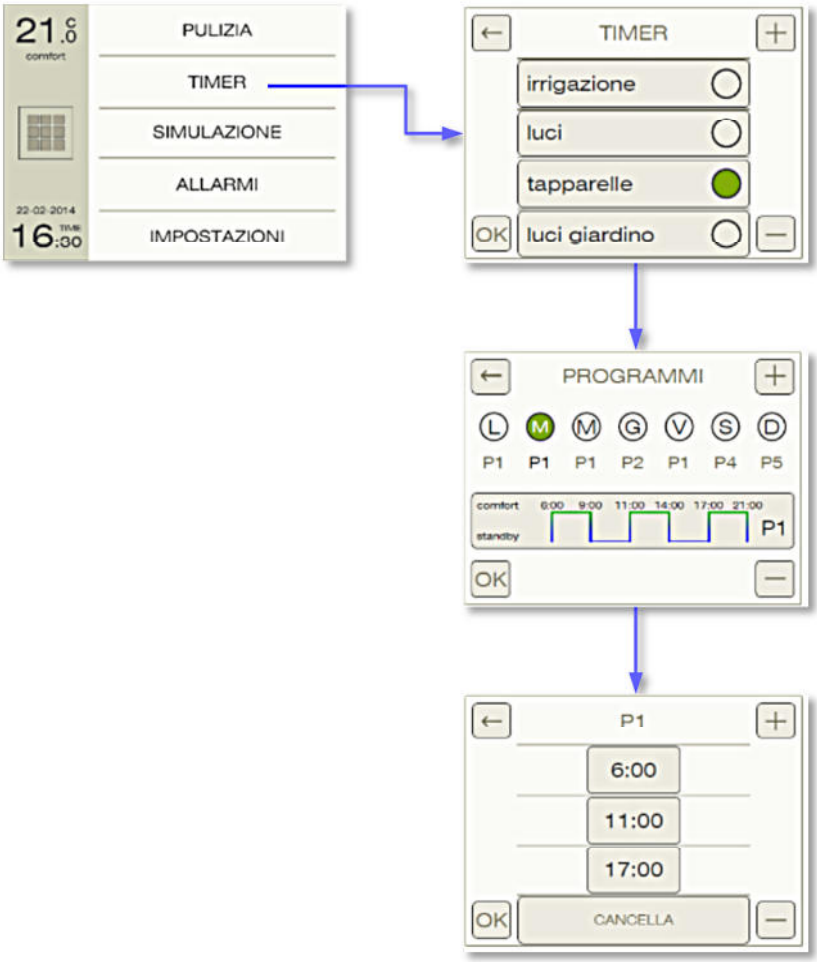
The *Settings* page shows a list of items, all of which take to the corresponding function subpage.

8.10.1 Settings subpages: Screen cleaning lock



The *Screen cleaning* page remains displayed for a few seconds without taking any input from the user; this allows to clean the touch-screen surface without issuing any unwanted command.

8.10.2 Settings subpages: Timer



Timer list:

A short press selects the timer to be changed;

a short press on buttons (+) or (-) activates / deactivates the selected timer.

A long press on an entry takes to the parametrization page for the profile of the respective timer.

Programs:

A short press selects the day of the week; a short press on buttons (+) or (-) changes the program number assigned to the selected day (P1..P7).

A long press on the field that shows the currently selected profile takes to the *Program scheduling* subpage.

Program scheduling:

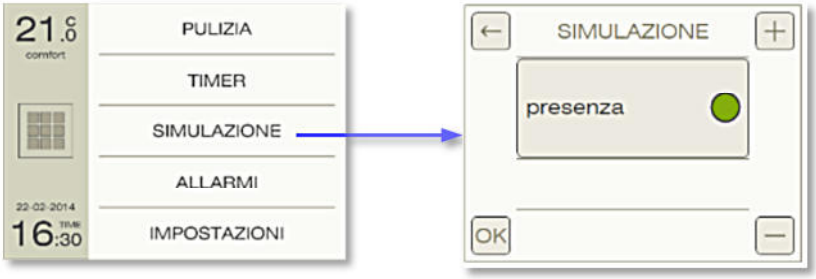
The event associated to each program can be triggered at up to 3 times of the day.

The time for each activation can be set by selecting the respective field and acting on the (+) and (-) buttons; the time is changed in 15-minute intervals.

By pressing the "*Delete*" button on a selected field, the corresponding time is deactivated.

By pressing the “OK” button, the changes are confirmed and saved in memory, while pressing the back arrow key “←” returns to the previous page canceling all changes.

8.10.3 Settings subpages: Presence simulation



Simulation:

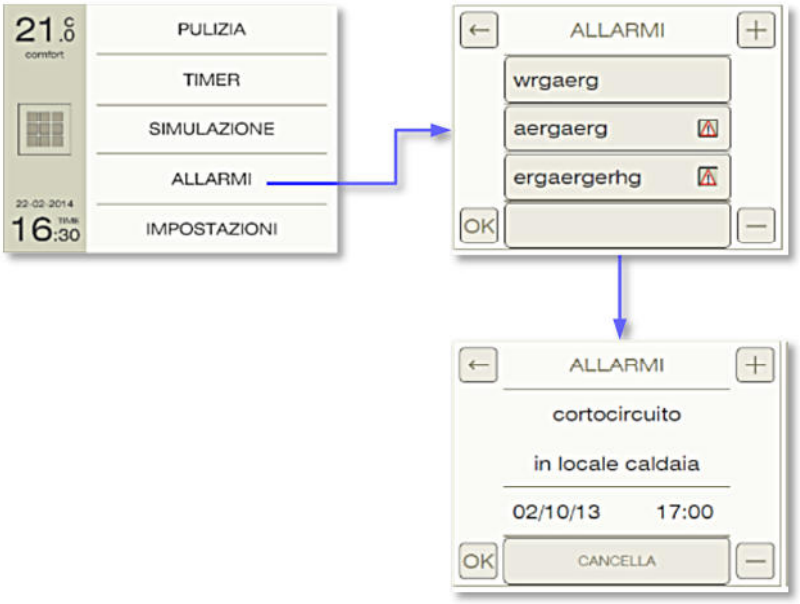
A short press on the “Presence” field and then on buttons (+) or (-) toggles the activation of the simulation.

By pressing the “OK” button, the changes are confirmed and saved in memory, while pressing the back arrow key “←” returns to the previous page canceling all changes.

8.10.4 Settings subpages: Alarms

The *Alarm list* page shows the list of the latest 40 issued alarms.

Each alarm in the list is displayed with a short descriptive test and with an icon summarizing the source of the alarm (external or internally generated for timeout or sensor failure), the activity state (still active or ceased) and the acknowledgement by the user.



Alarm list:

A short press on (+) or (-) scrolls the alarm list;

a long press on an alarm entry takes to the *Alarm details* page.

Alarm details:

A short press on (+) or (-) displays the next / previous alarm in the alarm list (without going back to previous page);

a short press on the “*Delete*” button removes the alarm from the list (provided it’s no longer active);

a short press on the “*OK*” button marks the alarm as acknowledged by the user;

the back arrow “←” returns to the alarm list page.

The possible icon configurations for alarm are shown in the following table:

Icon	Source		Active	Acknowledged
	External	Internal		
	●		●	
	●			
	●		●	●
	●			●
		●	●	
		●		
		●	●	●
		●		●

8.10.5 Settings subpages: Settings

The *Settings* / *Settings* page in turn shows a list of items, all of which take to the corresponding function subpage.

8.10.6 Settings subpages: Settings / Date and time settings

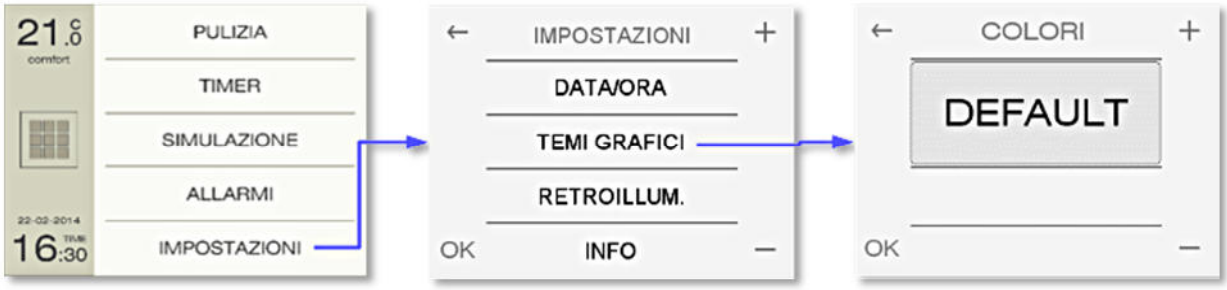
Date and time setting:

A short press on one of the date time field selects the corresponding value, which can then be changed with the (+) or (-) buttons.

By pressing the “OK” button, the changes are confirmed and saved in memory, while pressing the back arrow key “←” returns to the previous page canceling all changes.

8.10.7 Settings subpages: Settings / Graphical themes

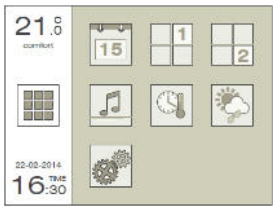
Different graphical themes, i.e. color combinations for the screen presentation, can be selected from the *Settings* page, under the *Theme* entry.



The displayed theme can be changed with the (+) and (-) buttons.

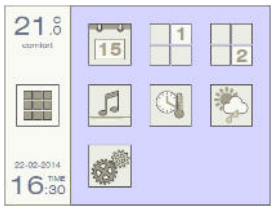
The available combinations are shown in the following table.

Default

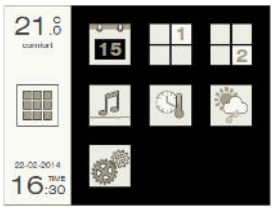


Colors-1

Colors-2

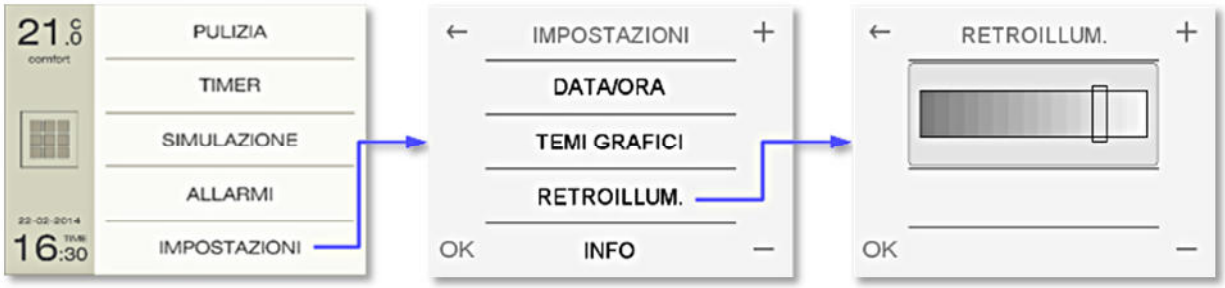


Colors-3



Colors-4

8.10.8 Settings subpages: Settings / Backlight



The backlight value can be changed with the (+) and (-) buttons.

8.10.9 Settings subpages: Settings / Info

The info page displays the current device version and possibly other device identifier information.

9. General settings

The configuration of the T&S unit, like most KNX devices, heavily depends on what other devices are deployed and active on the KNX bus; it is important for the configuration to be correctly performed starting from the general parameters which involve the device-level functions and the set of required features (and correponding) pages.

9.1 General

Under this menu, following settings are available:

- language for displayed screen texts
- units for temperature in screens, in Celsius [°C] or Fahrenheit [°F] degrees;
- background image shown at startup and also as a screensaver
- password for page locking function
- format used in the display of numeric values
- activation of the menu for window contact settings

 Background image A	 Background image B	 Background image C
 Background image D	 Background image E	

Some text elements that appear in the user interface, such as the name identifiers for window contacts, alarms generated externally to the device, timed events and pushbutton functions, must be configured separately in the appropriate menus in the application program. These texts are a further element of personalization of the device and are independent from the international language selected.

Parameter name	*Conditions*	*Values*
Language		**English** / German / French / Italian / other (copied from SD card)
	The parameter sets the language of the text displayed on the scren pages. To load other languages, refer to the section on how to load from the SD card.	

Background image code		**Background image A** / Background image B / Background image C / Background image D / Background image E / other (copied from SD card)
	To load other background images, refer to the section on how to load from the SD card.	
Decimal separator		**dot** / comma
	Decimal separator used for the display of nuemric data	
Temperature display unit		**celsius** / fahrenheit
Window sensors		**disabled** / enabled
	If this parameter (and also the chronothemostat function) is enabled, windowws sensors are used in determining the temperature control operation mode.	
Use password		**no** / yes
Delay after bus voltage recovery		hh:mm:ss:fff (**00:00:04:000**)
	The parameter sets the delay between the moment the bus operation is restored and the moment at which the device begins to transmit data. This delay must be carefully planned to prevent that, after a reset following a switch-on of the bus, all devices simultaneously begin to send telegrams, causing an excessive occupation of the available band.	

9.2 Date and time

This menu allows to configure following parameters:

- *Date and time synchronization through the internal device clock (RTC - Real Time Clock).* With this setting, the unit can act as a Master and supply other devices on the bus with the reference date and time values through the appropriate communication objects.

> *If this setting is selected, every time a new configuration is downloaded from ETS, correct time and date must be set by the user in the dedicated screen page. Refer to the chapter that describes the user interface for details.*

- *Date and time synchronization via bus-received telegram.* With this setting, the internal RTC clock is not used; all activities that require time synchronization expect the date and time to be correctly updated from the bus through the appropriate communication objects.

> *The firmware of the device monitors the state of the periodic update of date and time information from the bus; a timeout for the maximum update delay must be specified. If no update is received within the timout period, an alarm condition is notified in the Alarms page of the interface.*

- *Date / Time datapoint type (DPT).* The type of communication objects for Date and Time, whether they are updated internally ot through the bus, have following three options available:
  - DPT [19.001] *Date/time* (8 Bytes) – represents both date and time;
  - DPT [11.001] *Date* (3 Bytes) – represents date only;
  - DPT [10.001] *Time of day* (3 Bytes) – represents time only.

For internally generated time, all three communication objects are available at the same time; for external time, the choice is between the first object or the latter two objects.

- *Date / time field format*. This setting determines the display format of date and time information in the side band of the screen and, if enabled, in the Calendar page.

Parameter name	***Conditions***	***Values***
Date separator		. , : - / (*default:* /)
	Separator used for screen information display.	
First day of week		**Lunedì** / Domenica
Date format		**gg mm aaaa** / mm gg aaaa
	Format used for screen information display.	
Time separator		. , : - / (*default:* :)
	Separator used for screen information display.	
Use 12 o 24 hours clock		**24 ore** / 12 ore
	Format used for screen information display.	
Use leading zero		**no** / yes

Date and time synchronization		**internal** / from bus
Daylight saving time	Date and time synchronization = internal	**no** / yes
	If the internal RTC is used, this setting activates the DST switching at the standard officially defined days of the year.	
Send to bus	Date and time synchronization = internal	**no** / yes
Cyclic repetition time	Date and time synchronization = internal	hh:mm:ss (**01:00:00**)
Date and time object dimension	Date and time synchronization = from bus	**8 bytes** / 2x3 bytes
Date and time timeout	Date and time synchronization = from bus	0...65535 minutes [**1440** minutes]
	The required reception of date and time information from the bus is monitored; if no information is received for a time interval longer than the specified timeout, an internal alarm is issued. *The monitoring function can be deactivated by setting the timeout to 0 minutes.*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Date and time	Date and time synchronization = from bus Date and time object dimension = 8 byte	8 Bytes	C-W--	[19.001] date time	1
	Date and time synchronization = internal Send to bus = yes		CR-T-		4
Date	Date and time synchronization = from bus Date and time object dimension = 2x3 byte	3 Bytes	C-W--	[11.001] date	2
	Date and time synchronization = internal Send to bus = yes		CR-T-		5
Time	Date and time synchronization = from bus Date and time object dimension = 2x3 byte	3 Bytes	C-W--	[10.001] time of day	3
	Date and time synchronization = internal Send to bus = yes		CR-T-		6

9.3 Internal sensors

Parameter name	*Conditions*	*Values*
Light sensor		disabled / **enabled**
Sensor value multiplier (0÷255) x 0,1		0 ... 255 [**10**]
Minimum change value to send [Lux]		0.0... 670760.0 [**50**]
	0 means no values are sent	
Transmission interval		hh:mm:ss (**00:05:00**)
	00:00:00 means no values are sent cyclically	
Threshold 1		**not active** / below / above
Value [Lux]	Threshold 1 = below or above	0.0 ... 670760.0 [**500**]
Threshold 2		**not active** / below / above
Value [Lux]	Threshold 2 = below or above	0.0... 670760.0 [**500**]
Hysteresis	Threshold 1 = below or above Threshold 2 = below or above	5% / 10% / **15%** / 20% / 25% / 30% / 35% / 40%
Cyclic transmission interval	Threshold 1 = below or above Threshold 2 = below or above	never / 1 minute / 2 minutes / 3 minutes / 5 minutes / 7 minutes / **10 minutes** / 15 minutes / 20 minutes / 30 minutes / 45 minutes / 60 minutes / 90 minutes / 120 minutes
Backlight intensity correction		**disabled** / enabled
	Links the backlight intensity to the brightness level measured by the sensor.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Brightness value	Light sensor = enabled	2 Bytes	CR-T-	[9.004] lux (Lux)	7
Light control threshold 1	Light sensor = enabled Threshold 1 = below or above	1 Bit	CR-T-	[1.001] switch	8
Light control threshold 2	Light sensor = enabled Threshold 2 = below or above	1 Bit	CR-T-	[1.001] switch	9

9.4 Window sensor

Parameter name	*Conditions*	*Values*
Number of sensors	General / Window sensors = enabled	1 ... 4 [**1**]
Sensor *x*	General / Window sensors = enabled	**NC (normally closed)** NO (normally open)
	NC is ON when the window is CLOSED, Off otherwise; *NO is ON when the window is OPEN, Off otherwise.*	
Name of window sensor *x*	General / Window sensors = enabled	ASCII text, max. 28 characters
	The strings are static, i.e. they do not change according to the general language setting of the device. *If the Unicode (UTF-8) character encoding is used, the available string size might be smaller.*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Window contact *x*	General / Window sensors = enabled Number of sensors >= *x*	1 Bit	C-W--	[1.019] window/door	231...234

9.5 Pages configuration

Following parameters enable the corresponding screen pages; they also enable the related functions and communication objects.

Parameter name	*Conditions*	*Values*
Date and time		disabled / **enabled**
	Enables the Calendar screen page.	
Pushbuttons 1, 2, 3 and 4		disabled / **enabled**
	Enables the first Pushbutton screen page.	
Pushbuttons 5, 6, 7 and 8		disabled / **enabled**
	Enables the second Pushbutton screen page.	
Multimedia		disabled / **enabled**
	Enables the screen page for the control of Multimedia devices.	
Thermostat		disabled / **enabled**
	Enables the Chrono-thermostat screen page.	
Meteo		disabled / **enabled**
	Enables the screen page for meteo information.	
Timers		disabled / **enabled**
	Enables the access to timer settings in the Service screen page.	
Presence simulation		disabled / **enabled**
	Enables the access to Presence Simulation parameters in the Service screen page	
Alarms		disabled / **enabled**
	Enables the display of external alarms in the Alarm page. *The display of the Alarms that are generated internally to the device is always enabled.*	

9.6 Display

Parameter name	*Conditions*	*Values*
Standby mode activation delay		hh:mm:ss (**00:01:00**)
Standby action		**none** / show page / show background only
Standby page	Standby action = show page	home / date and time / pushbuttons 1, 2, 3 and 4 / pushbuttons 5, 6, 7 and 8 / multimedia / **thermostat** / meteo
Low power mode activation delay		hh:mm:ss (**00:02:00**)
Display brightness		**off** / 2% / 5% / 10% / 15% / 20% / 25% / 30%
Behavior at the touch		**only backlight** / backlight on and goto page
Page	Behavior at the touch = backlight on and goto page	home / date and time / **pushbuttons 1, 2, 3 and 4** / pushbuttons 5, 6, 7 and 8 / multimedia / thermostat / meteo

9.7 Pushbuttons 1,2,3,4 / 5,6,7,8

Two menus are available, for “Pushbuttons 1, 2, 3 and 4” and “Pushbuttons 5, 6, 7 and 8” respectively; since their structure is exactly the same, they will be described together.

In this and the following chapters, it will be tacitly implied that, for the menu and communication objectsto appear, the respective pages are enabled in the *Pages configuration* menu.

In order to correctly define the result of the settings made with the following parameters, the placement selected with the “pushbutton pairing” parameter (horizontal or vertical) must be taken into account.

9.7.1 Configuration

Parameter name	*Conditions*	*Values*
Pushbutton pairing		**horizontal** / vertical
Pushbuttons 1(5) and 2(6)		disabled / **independent** / coupled
	If the “coupled” option is selected, the paired pushbuttons will be displayed as a single pushbutton surface without separation line.	
Pushbutton 1(5)	Pushbuttons 1(5) and 2(6) = independent	disabled / **enabled**
Pushbutton 1(5) - Type	Pushbuttons 1(5) and 2(6) = independent, Pushbutton 1(5) = enabled	**send values or sequences** dimming shutter or venetian blind scene
Pushbutton 2(6)		disabled / enabled / **copy parameters from pushbutton 1(5)**
	If the option “copy parameters from pushbutton” is selected, all settings of the source pushbutton will be used for the destination pushbutton; for this latter one, though, a set of own communication objects will be activated.	
Pushbutton 2(6) - Type	Pushbuttons 1(5) and 2(6) = independent, Pushbutton 2(6) = enabled	**send values or sequences /** dimming / shutter or venetian blind / scene
Pushbutton 1 and 2 (5 and 6) - Type	Pushbuttons 1(5) and 2(6) = coupled	switching / **dimming** / shutter or venetian blind
Pushbuttons 3(7) and 4(8)		disabled / **independent** / coupled / copy parameters from pushbuttons 1(5) and 2(6)
	If the option “copy parameters from pushbutton” is selected, all settings of the source pushbuttons will be used for the corresponding destination pushbuttons. For this latter ones, though, a set of own communication objects will be activated.	
Pushbutton 3(7)	Pushbuttons 3(7) and 4(8) = independent	disabled / **enabled**

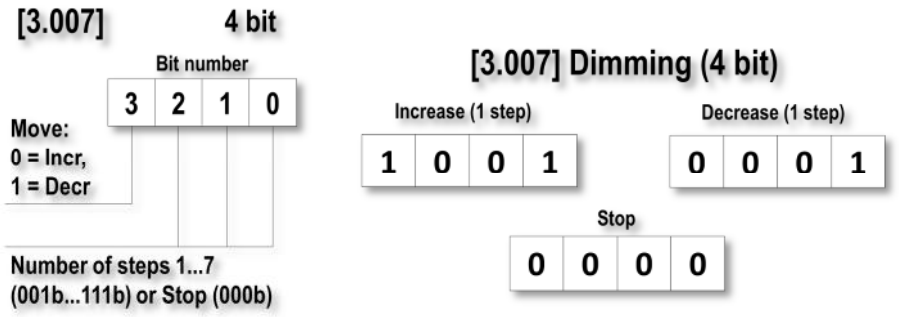
Pushbutton 3(7) - Type	Pushbuttons 3(7) and 4(8) = independent, Pushbutton 3(7) = enabled	**send values or sequences /** dimming / shutter or venetian blind / scene
Pushbutton 4(8)		disabled / enabled / **copy parameters from pushbutton 3(7)**
	If the option "copy parameters from pushbutton" is selected, all settings of the source pushbutton will be used for the destination pushbutton; for this latter one, though, a set of own communication objects will be activated.	
Pushbutton 4(8) - Type	Pushbuttons 3(7) and 4(8) = independent, Pushbutton 4(8) = enabled	**send values or sequences /** dimming / shutter or venetian blind / scene
Pushbutton 3 and 4 (7 and 8) - Type	Pushbuttons 3(7) and 4(8) = coupled	switching / **dimming** / shutter or venetian blind

9.7.1.1 Independent: send values or sequences

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton *x* – Switching status *[type]*, object *n*	Pushb. *x* and *y* = independent Pushbutton *x* = enabled Type = send values or sequences	*according to configuration* (**1-bit**)	CRWTU	*according to configuration* (**[1.001] switch**)	14, 28, 46, 60, 78, 92, 110, 124
	Up to 8 objects can be defined for binding with the same event. *The listed CO numbers are those referring to object nr.1; the COs for each subsequent object are following in sequence.* *To obtain the CO numbers for object number n, just add (n-1) to the listed numbers.* *E.g.: COs associated to input 3A (of Rocker 3) have numbers from 81 to 89. The number of CO nr. 5 is therefore 81+(5-1) = 85.* ***The size and type of the individual objects can be configured as described in following sections**.*				

9.7.1.2 Independent: dimming

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton *x* – Switching command	Pushb. *x and y* = independent Pushbutton *x* = enabled Type = dimming	1 bit	CRWTU	[1.001] switch	22, 36, 54, 68, 86, 100, 118, 132
	Send a command to a dimming actuator to switch the light on or off. *The command is triggered by a short press on the input.* *The value sent can be a fixed value or it can be toggled at each input activation.*				

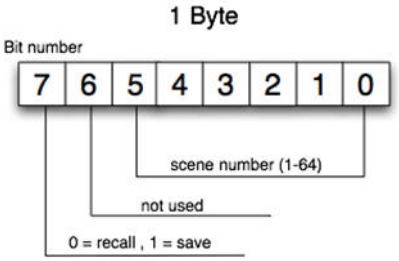
Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton *x* – Dimming up / down / stop command	Pushb. *x and y* = independent Pushbutton *x* = enabled Type = dimming	4 bit	CR-T-	[3.007] dimming control, [3.008] blind control	23, 37, 55, 69, 87, 101, 119, 133
	Send a command to a dimming actuator to change dimming intensity (brighter or darker). *Three values are used which mean start increase, start decrease or stop the change.*  *Increase/decrease values are sent when a long press action occurs and stop value on press release.* *The value sent can be a fixed value or it can be toggled at each input activation.* *If the dimming command is used to control an actuator for shutters or blinds, the type of the used communication object is DPT 3.008 (blind control)whose values are "open" and "close".*				

9.7.1.3 Independent: shutter or venetian blind

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton *x* – Dedicated Stop command	Pushb. *x and y* = independent Pushbutton *x* = enabled Type = shutter or venetian blind	1 bit	CRWTU	[1.017] trigger	22, 36, 54, 68, 86, 100, 118, 132
	Immediately stop any movement of the blind. The object is sent on release after a long press (if the venetian blind mode is disabled).				
Pushbutton *x* – Stop-step up / down command	Pushb. *x and y* = independent Pushbutton *x* = enabled Type = shutter or venetian blind **Venetian blind mode = enabled**	1 bit	CR-T-	[1.007] step	24, 38, 56, 70, 88, 102, 120, 134
	Increase or decrease the opening of the blind stepwise, or interrupt an ongoing movement. *The object is sent on release after a short press (if the venetian blind mode is enabled).*				
Pushbutton *x* – Move up / down command	Pushb. *x and y* = independent Pushbutton *x* = enabled Type = shutter or venetian blind	1 bit	CRWTU	[1.008] up/down	25, 39, 57, 71, 89, 103, 121, 135
	Move the blind to fully open or fully closed position. *The object is sent either on first press (if the venetian blind mode is disabled) or on long press (if the venetian blind mode is enabled)*				

9.7.1.4 Independent: scene

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton *x* – Scene number	Pushb. *x and y* = independent Pushbutton *x* = enabled Type = scene	1 Byte	CR-T-	[17.*] Scene number [18.*] Scene control	26, 40, 58, 72, 90, 104, 122, 136

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
	Store or recall a scene. The lowest 6 bits in the byte form the code of the scene, while the highest bit is the operation code (store or recall). 				

9.7.1.5 Coupled: switch

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbuttons *x and y* – Switching command	Pushb. *x and y* = coupled Type = switch	1-bit	CRWTU	[1.001] switch	22, 36, 54, 68

9.7.1.6 Coupled: dimming

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbuttons *x and y* – Switching command	Pushb. *x and y* = coupled Type = dimming	1 bit	CRWTU	[1.001] switch	22, 36, 54, 68
	See notes as for independent command.				
Pushbuttons *x and y* – Dimming up / down / stop command	Pushb. *x and y* = independent or single Type = dimming	4 bit	CR-T-	[3.007] dimming control, [3.008] blind control	23, 37, 55, 69
	See notes as for independent command.				

9.7.1.7 Coupled: shutter or venetian blind

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbuttons *x and y* – Dedicated Stop command	Pushb. *x and y* = coupled Type = shutter or venetian blind **Venetian blind mode = disabled**	1 bit	CRWTU	[1.017] trigger	22, 54, 86, 118
	See notes as for independent command.				
Pushbuttons *x and y* – Stop-step up / down command	Pushb. *x and y* = coupled Type = shutter or venetian blind **Venetian blind = enabled**	1 bit	CR-T-	[1.007] step	24, 56, 88, 120
	See notes as for independent command.				
Pushbuttons *x and y* – Move up / down command	Pushb. *x and y* = coupled Type = shutter or venetian blind	1 bit	CRWTU	[1.008] up/down	25, 57, 89, 121
	See notes as for independent command.				

9.7.2 Pushbutton X (Independent mode)

Parameter name	*Conditions*	*Values*
Lock function	-	enabled / **disabled**
	Enables or disables the capability of locking the input through a remote command (telegram).	

9.7.2.1 Independent: Lock function enabled

Parameter name	*Conditions*	*Values*
Lock function – Invert lock device signal	Lock function = enabled Pushbutton *x* = Independent	**not inverted** / inverted
	Allows to interpret a "lock activate" telegram as unlock and vice-versa. *This feature allows to bind the lock command to values of signals having an opposite polarity.*	
Lock function – Lock after bus recovery	Lock function = enabled Pushbutton *x* = Independent	**no** / yes
	If active, after returning from a bus failure or power-off the device will retain the lock status it had before. Otherwise (in the default case), the device will restart in the non-locked condition.	
Lock function – Behavior at locking	Lock function = enabled Pushbutton *x* = Independent	*see table below*
Lock function – Behavior at unlocking	Lock function = enabled Pushbutton *x* = Independent	*see table below*

When the lock function is enabled, for each input or channel a behaviour can be defined to be followed when the locking or unlocking command is received.

The details will be listed in the following sections; the different behaviours are summarized in the table below.

Channel mode	*Input type*	*Behaviour at locking*	*Behaviour at unlocking*
independent	send values or sequences	**none** as close or short press as open or long press	
coupled	switching	**none** off on toggle	**none** off on as previous
independent	dimming		
coupled			
independent	scene	none send first scene send second scene	
independent	shutter or venetian blind	none up down	
coupled			

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton X – Lock command	Lock function = enabled Pushbutton *x* = Independent	1 bit	C-W--	[1.003] enable	13, 27, 45, 59, 77, 91, 109, 123

9.7.2.2 Independent: send values or sequences

This menu allows to define single values or value sequences to be transmitted at the long or short press of independent pushbuttons. The sequences can be made of up to 8 communication object of different types and with different values corresponding to a short or long press.

If only one object is selected for transmission, one or both its values can be configured to be sent cyclically with a desired period.

The entries assigned to "Object *n*" are repeated so many times as the number of configured objects according to the *Number of Communication Objects* parameter.

Parameter name	*Conditions*	*Values*
Number of communication objects		1...8 [**1**]
	Number of communication objects configured in association with the button event.	
Long press time		hh:mm:ss:fff (**00:00:03:000**)
	Minimum push time for a press in order to be recognized as a long press.	
Lock function – Behaviour at locking	Type= send values or sequences Pushbutton *x* = Independent	**none** as close or short press as open or long press
	Allows to perform the operation associated to the specified event when a locking command is received.	
Lock function – Behaviour at unlocking	Type= send values or sequences Pushbutton *x* = Independent	**none** as close or short press as open or long press
	Allows to perform the operation associated to the specified event when an unlocking command is received.	
Object n – Send delay	Type= send values or sequences Pushbutton *x* = Independent	hh:mm:ss:ff (**00:00:00:00**)
	Delay before the object is transmitted on the bus. *By defining a delay after the event occurs and before the object value is sent, it is possible to associate a time defined sequence of values to an input event.*	
Object n – Send cyclically	**Number of communication objects = 1** Type= send values or sequences Pushbutton *x* = Independent	**none** off / value 1 on / value 2 both on and off / both values
	Defines which of the values, if any, must be cyclically retransmitted whenever activated. *This parameter is only available if only one comm. object is associated to the event.*	
Object n – Cyclic sending interval	**Number of communication objects = 1** **Send cyclically ≠ none** Type= send values or sequences Pushbutton *x* = Independent	hh:mm:ss (**00:02:00**)

	Interval between cyclical transmissions. *This parameter is only available if only one comm. object is associated to the event.*	
Object n – Communication object dimension	Type= send values or sequences Pushbutton *x* = Independent	**1 bit value** 2 bits value 1 byte unsigned value 1 byte percentage 1 byte signed value 2 bytes unsigned value 2 bytes signed value 2 bytes floating value
	Defines size and type of the values to be sent when an event occurs.	
Object n – Reaction to short press	Type= send values or sequences Pushbutton *x* = Independent **send dimension = 1 bit value**	none on off **toggle**
	Type= send values or sequences Pushbutton *x* = Independent **send dimension = 2 bit value**	none disable enable off / up **enable on / down** enable off / up ↔ disable enable on / down ↔ disable enable off / up ↔ enable on / down
	Type= send values or sequences Pushbutton *x* = Independent **send dimension = *any byte value***	none **send value 1** send value 2 send value 1 ↔ send value 2
	Value change behaviour caused by a Short Press event	
Object n – Reaction to long press	Type= send values or sequences Pushbutton *x* = Independent **send dimension = 1 bit value**	**none** on off toggle
	Type= send values or sequences Pushbutton *x* = Independent **send dimension = 2 bit value**	none **disable** enable off / up enable on / down enable off / up ↔ disable enable on / down ↔ disable enable off / up ↔ enable on / down
	Type= send values or sequences Pushbutton *x* = Independent **send dimension = *any byte value***	**none** send value 1 send value 2 send value 1 ↔ send value 2
	Value change behaviour caused by a Long Press event	
Object n – Value 1	Type= send values or sequences Pushbutton *x* = Independent **send dimension = *any byte value***	0...255 (1 byte unsigned value) 0…100 (1 byte percentage) -128...127 (1 byte signed value) 0...65535 (2 bytes unsigned value) -32768... 32767 (2 bytes signed value) -671088.64...670760.96 (2 bytes floating value) *default (all): **0***
	First value available for association in send events	
Object n – Value 2	Type= send values or sequences Pushbutton *x* = Independent **send dimension = *any byte value***	*same as for value 1*
	Second value available for association in send events	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbutton *X* – Switching status *[type]* Object *n*	Pushbutton *x* = Independent Type = send values or sequences	*see table below*	CRWTU	*see table below*	14, 28, 46, 60, 78, 92, 110, 124
	The listed CO numbers are those referring to object nr.1; the COs for each subsequent object are following in sequence. *To obtain the CO numbers for object number n, just add (n-1) to the listed numbers.* *E.g.: COs associated to pushbutton 3 have numbers from 46 to 53. The number of CO nr. 5 is therefore 46+(5-1) = 50.*				

Sizes and DPTs are as follows:

Size	*DPT*
1 bit	[1.001] switch
2 bits	[2.*] 1-bit controlled
1 byte unsigned	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-byte
1 byte percentage	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-byte
1 byte signed	[6.*] 8-bit signed value
2 bytes unsigned	[7.*] 2-byte unsigned value
2 bytes signed	[8.*] 2-byte signed value
2 bytes floating	[9.*] 2-byte float value

9.7.2.3 Independent: dimming

This menu allows to define commands to be issued to a dimming actuator, for the control of either a lighting device or a shutter or curtain actuator.

In default mode, a short pressure is associated with the brightness decrease (close) or increase (open) command; in toggle mode, a short press automatically switches between off and on. A long pressure can be associated in both modes to brightness increase, decrease, or toggling between the two.

Parameter name	***Conditions***	***Values***
Long press time	Type = dimming Pushbutton *x* = Independent	hh:mm:ss:ff (**00:00:03:00**)
	Minimum push time for a press in order to be recognized as a long press.	
Toggle mode		**disabled**/enabled
	When enabled, causes the short press to toggle the on-off status of the destination CO; otherwise, a fixed status can be assigned to the short press.	
Short / Long action	**Modo toggle = disabled** Type= dimming Pushbutton *x* = Independent	**off / darker** on / brighter off / darker ↔ brighter on / darker ↔ brighter
	Defines the function to be assigned to the long and short press.	
Reaction to long press	**Toggle mode = enabled** Type= dimming Pushbutton *x* = Independent	**darker** brighter darker ↔ brighter
	Defines the function to be assigned to the long press. If the toggle mode is enabled, the Short press action is already defined as toggle.	

Send cyclically	Type= dimming Pushbutton *x* = Independent	**none** off / value 1 on / value 2 both off and on / both values
	Defines which of the values, if any, must be cyclically retransmitted whenever activated.	
Cyclic sending interval	**Send cyclically ≠ none** Type= dimming Pushbutton *x* = Independent	hh:mm:ss (**00:02:00**)
	Interval between cyclical transmissions.	
Lock function – Behaviour at locking	**Lock function = enabled** Type= dimming Pushbutton *x* = Independent	**none** off on toggle
	Value to be assigned to the object when a locking command is received.	
Lock function – Behaviour at unlocking	**Lock function = enabled** Type= dimming Pushbutton *x* = Independent	**none** off on as previous
	Value to be assigned to the object when an unlocking command is received.	

9.7.2.4 Independent: shutter or venetian blind

Following table shows the different commands that can be assigned to pushbuttons.

	Short press		**Long press**	
	Toggle disabled	Toggle enabled	Toggle disabled	Toggle enabled
"Venetian blinds" mode disabled	Full raise	Alternatively Full raise / Full lower	Stop if in movement	
	Full lower			
"Venetian blinds" mode enabled	Raise step or Stop	Alternatively Raise step or Stop / Lower step or Stop	Full raise	Alternatively Full raise / Full lower
	Lower step or Stop		Full lower	

Parameter name	***Conditions***	***Values***
Long press time	Type= shutter or venetian blind Pushbutton *x* = Independent	hh:mm:ss:ff (**00:00:03:00**)
	Minimum push time for a press in order to be recognized as a long press.	
Toggle mode	Type= shutter or venetian blind Pushbutton *x* = Independent	**disabled**/enabled
	When enabled, causes each subsequent press to invert the direction of movement; otherwise, a fixed direction can be assigned.	
Up / down action	**Toggle mode = disabled** Type= shutter or venetian blind Pushbutton *x* = Independent	**up** / down
	Defines the movement direction to be assigned to the button press.	
Venetian blind mode	Type= shutter or venetian blind Pushbutton *x* = Independent	**disabled**/enabled
	If blinds mode is enabled, the device sends "full movement" telegrams on long press and "step" telegrams on short press; if it is disabled, the device sends "full movement" telegrams on long press and "stop" telegrams on short press.	

Lock function – Behaviour at locking	**Lock function = enabled** Type= shutter or venetian blind Pushbutton *x* = Independent	**none** up down
	Operation to perform when a locking command is received.	
Lock function – Behaviour at unlocking	**Lock function = enabled** Type= shutter or venetian blind Pushbutton *x* = Independent	**none** up down
	Operation to perform when an unlocking command is received.	

9.7.2.5 Independent: scene

This function allows to either recall a scene or switch between 2 alternative scene with a short press of a pushbutton.

Learning mode can also be enabled: in this case, a short press recalls the scene with the configured code while a long press sends a “learn scene” command on the bus.

Parameter name	***Conditions***	***Values***
First scene number	Type= scene Pushbutton *x* = Independent	1..63 (**1**)
	Main scene number to be assigned to button press. It is named “first” for the case that an alternative scene number is used.	
Learning mode	Type= scene Pushbutton *x* = Independent	**disabled** / enabled
	When enabled, a long key press can be used to program the selected scene by storing the current parameters.	
Long press time	**Learning mode = enabled** Type= scene Pushbutton *x* = Independent	hh:mm:ss:ff (**00:00:03:000**)
	Minimum push time for a press in order to be recognized as a long press.	
Scene activation	**Learning mode = disabled** Type= scene Pushbutton *x* = Independent	**send first scene only** toggle between two scenes
	Allows the key to be used to alternate between two different scenes.	
Second scene number	**Scene activation = toggle between two scenes** Type= scene Pushbutton *x* = Independent	1..63 (**2**)
	Alternate scene number to be assigned to button press.	
Lock function – Behaviourat locking	**Lock function = enabled** Type= scene Pushbutton *x* = Independent	**none** send first scene send second scene
	Specifies the behavior when a lock command is received. ***If the second scene is selected, learning mode must be disabled for this behaviour to become active.***	
Lock function – Behaviour at unlocking	**Lock function = enabled** Type= scene Pushbutton *x* = Independent	**none** send first scene send second scene
	Specifies the behavior when an unlock command is received. ***If the second scene is selected, learning mode must be disabled for this behaviour to become active.***	

9.7.3 Pushbuttons X and Y (Coupled mode)

9.7.3.1 Coupled mode

In coupled mode, two states or opposite actions bound to a same command (and based on the same communication objects) can be assigned to two coupled pushbuttons.

> *In order to correctly define the result of the settings made with the following parameters, the placement selected with the "pushbutton pairing" parameter (horizontal or vertical) must be taken into account.*

Parameter name	*Conditions*	*Values*
Lock function	Pushbuttons *x* and *y* = coupled	**disabled**/enabled
	Enables or disables the capability of locking the input through a remote command (telegram).	

9.7.3.2 Coupled mode: Lock function enabled

Parameter name	*Conditions*	*Values*
Lock function – Invert lock device signal	Lock function = enabled Pushbuttons *x* and *y* = coupled	**non invertito**/invertito
	Specifica se il segnale di blocco dispositivo ricevuto dal bus debba essere interpretato in maniera invertita, ossia ad es. blocco dispositivo attivo quando yes riceve un comando "off" tramite object di comunicazione. *Questa caratteristica è utile in quanto l'attivazione del blocco dispositivo può essere legata ad un object di comunicazione relativo allo stato di altre entità, che hanno una logica opposta.*	
Lock function – Lock after bus recovery	Lock function = enabled Pushbuttons *x* and *y* = coupled	**no**/yes
	Se attivo, al ritorno della tensione di bus (ossia alla riaccensione) il dispositivo manterrà lo stato di blocco, attivo o non attivo, che aveva allo spegnimento. In caso contrario, il dispositivo ripartirà sempre in condizione sbloccata (impostazione di default).	
Lock function – Behavior at locking	Lock function = enabled Pushbuttons *x* and *y* = coupled	*see table below*
Lock function – Behavior at unlocking	Lock function = enabled Pushbuttons *x* and *y* = coupled	*see table below*

The details will be listed in the following sections; for a table summarizing the different behaviours, please refer to the corresponding section about the independent channels.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*Nr. Ogg. Com.*
Pushbuttons (X) and (X+1) – Lock command	Lock function = enabled Pushbuttons *x* and *y* = coupled	1 bit	C-W--	[1.003] enable	13, 45, 77, 109

9.7.3.3 Coupled mode: Switching

The two states of a 1-bit binary command can be assigned to two coupled pushbuttons.

With this function, no difference is made between a long and a short press action.

Parameter name	*Conditions*	*Values*
Pushbuttons use	Type= switching Pushbuttons *x* and *y* = coupled	***x* on, *y* off** *x* off, *y* on
Send cyclically	Type= switching Pushbuttons *x* and *y* = coupled	none **off / value 1** on / value 2 both off and on / both values
	Defines which of the values, if any, must be cyclically retransmitted whenever activated.	
Cyclic sending interval	**Send cyclically ≠ none** Type= switching Pushbuttons *x* and *y* = coupled	hh:mm:ss (**00:02:00**)
	Interval between cyclical transmissions	
Lock function – Behaviour at locking	**Lock function = enabled** Type= switching Pushbuttons *x* and *y* = coupled	**none** on off toggle
	Value to be assigned to the object when a locking command is received.	
Lock function – Behaviour at unlocking	**Lock function = enabled** Type= switching Pushbuttons *x* and *y* = coupled	**none** on off as previous
	Value to be assigned to the object when an unlocking command is received.	

9.7.3.4 Coupled mode: Dimming

In coupled mode, a short press action is associated with the switching of the load, toggled between On and Off, regardless what pushbutton is pressed; a long press action is associated with an increase / decrease of intensity, whereas the assignment to respective pushbuttons can be specified.

In order to correctly define the result of the settings made with the following parameters, the placement selected with the "pushbutton pairing" parameter (horizontal or vertical) must be taken into account.

Parameter name	*Conditions*	*Values*
Long press time	Type= dimming Pushbuttons *x* and *y* = coupled	hh:mm:ss:ff (**00:00:03:000**)
	Minimum push time for a press in order to be recognized as a long press.	
Pushbuttons use	Type= dimming Pushbuttons *x* and *y* = coupled	**(X) increases, (X+1) decreases** (X) decreases, (X+1) increases
	Defines the action to be assigned to a long press. *The short press action is automatically assigned to On / Off switching.*	
Send cyclically	Type= dimming Pushbuttons *x* and *y* = coupled	**none** off / value 1 on / value 2 both off and on / both values
	Defines which of the values, if any, must be cyclically retransmitted whenever activated.	
Cyclic sending interval	**Send cyclically ≠ none** Type= dimming Pushbuttons *x* and *y* = coupled	hh:mm:ss (**00:02:00**)
	Interval between cyclical transmissions	

Lock function – Behaviour at locking	Lock function = enabled Type= dimming Pushbuttons *x* and *y* = coupled	**none** off on toggle
	Value to be assigned to the object when a locking command is received.	
Lock function – Behaviour at unlocking	Lock function = enabled Type= dimming Pushbuttons *x* and *y* = coupled	**none** off on as previous
	Value to be assigned to the object when an unlocking command is received.	

9.7.3.5 Coupled mode: Shutter or venetian blind

Following table shows the different commands that can be assigned to pushbuttons.

	Short press		**Long press**	
	Pushbutton (X)	Pushbutton (X+1)	Pushbutton (X)	Pushbutton (X+1)
"Venetian blinds" mode **disabled**	Full raise	Full lower	Stop if in movement	
	Full lower	Full raise		
"Venetian blinds" mode **enabled**	Raise step or Stop	Lower step or Stop	Full raise	Full lower
	Lower step or Stop	Raise step or Stop	Full lower	Full raise

In order to correctly define the result of the settings made with the following parameters, the placement selected with the "pushbutton pairing" parameter (horizontal or vertical) must be taken into account.

Parameter name	***Conditions***	***Values***
Long press time	Type= shutter or venetian blind Pushbuttons *x* and *y* = coupled	hh:mm:ss:ff (**00:00:03:00**)
	Minimum push time for a press in order to be recognized as a long press	
Pushbuttons use	Type= shutter or venetian blind Pushbuttons *x* and *y* = coupled	(X) up, (X+1) down (X) down, (X+1) up
	Defines the action to be assigned to each pushbutton.	
Venetian blinds mode	Type= shutter or venetian blind Pushbuttons *x* and *y* = coupled	**disabled**/enabled
Lock function – Behaviour at locking	**Lock function = enabled** Type= shutter or venetian blind Pushbuttons *x* and *y* = coupled	**none** up down
Lock function – Behaviour at unlocking	**Lock function = enabled** Type= shutter or venetian blind Pushbuttons *x* and *y* = coupled	**none** up down

9.7.4 LEDs pushbutton X and X+1

This menu contains the configuration parameters for the LEDs:.

The following configuration parameters are repeated for each of the available LED.

The LED configuration is independent from the pushbutton configuration as independent or coupled; the LEDs, though, are only displayed if the corresponding pushbutton is enabled.

Parameter name	*Conditions*	*Values*
Green LED *X* *or* Blue LED *X*		fixed / **when contact closed** / status from bus
	Specifies whether the LED has a fixed state, should be activated when the corresponding pushbutton is pressed, or should be activated through a communication object from the bus.	
Always	Green/Blue LED X = fixed	**off** / on
	Fixed status of the LED	
Off delay	Green/Blue LED X = when contact closed	hh:mm:ss:ff (**00:00:02:00**)
	Delay before switching off after the associated pushbutton is no longer activated.	
Blinking	Green/Blue LED X = status from bus	**no** / yes
Signal from bus	Green/Blue LED X = status from bus	**not inverted** / inverted
	Specifies whether the LED status from the bus should be inverted, i.e. LED on when an "off" command is received on the communication object.	
Blinking period / type	Green/Blue LED X = status from bus Blinking = yes	0.25 seconds on – 0.25 seconds off, 0.25 seconds on – 0.75 seconds off, 0.5 seconds on – 0.5 seconds off, 0.75 seconds on – 0.25 seconds off, 0.5 seconds on – 1.5 seconds off, **1 second on – 1 second off**, 1.5 seconds on – 0.5 seconds off, 1 second on – 3 seconds off, 2 seconds on – 2 seconds off, 3 seconds on – 1 second off
	Specifies the duration of the "on" and "off" states for blinking	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Pushbutton X – LED green command	LED green X = status from bus	1 bit	CRWTU	[1.001] switch	41, 43, 73, 75, 105, 107, 137, 139
Pushbutton X – LED blue command	LED blue X = status from bus	1 bit	CRWTU	[1.001] switch	42, 44, 74, 76, 106, 108, 138, 140

9.7.5 Texts and Icons

Following parameters are independent from how the pushbuttons are configured (as independent or coupled).

The custom graphical elements associated with a pushbutton are only displayed if the corresponding pushbutton is enabled.

The device contains a comprehensive library of graphic symbols matching the syle of those used in other exinex® wall mounted devices.

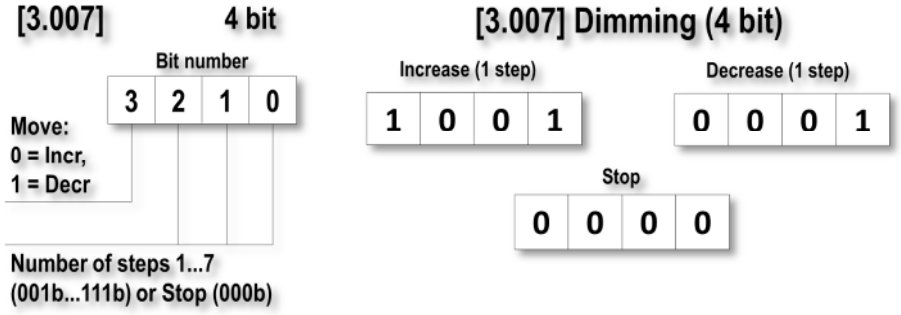
For the choice of the most suitable icon or symbol, please refer to the Table of symbols listed in the Appendix.

Parameter name	*Conditions*	*Values*
Text pushbutton X		(*maximum 28 characters*)
	The maximum length of each text string is 28 characters in standard ASCII code. If the Unicode (UTF-8) character encoding is used, the available string size might be smaller. *The strings are static, i.e. they do not change according to the general language setting of the device.*	
Text position pushbutton X		**up** / middle / down
	Specifies the positioning of text on the surface of the pushbutton. The position of the text should not interfere with Icon #1and Icon #2 in case the standard graphic symbols are also required.  *For instance, in the above picture the custom text should be placed in the bottom position..*	
Icon 1 pushbutton X		(*see list in Appendix)* Default: **00 – no symbol**
	This icon is shown in the center position on the pushbutton surface and usually represents the main function of the pushbutton.	
Icon 2 pushbutton X		(*see list in Appendix)* Default: **ZZ - no symbol**
	This icon is shown in the top/bottom position on the pushbutton surface (or on the sides, according to configuration) and usually represents the actions of the pushbutton activation points.	

9.8 Multimedia

Parameter name	*Conditions*	*Values*
Sleeping mode		enabled / **disabled**
	Enables the user control that allows to start the sleeping (auto-off) mode; when activated, the multimedia player device is powered off after an inactivity period that can be set either by the user (see description of the user interface) or through a communication object..	
Equalizer		enabled / **disabled**
	Enable the access to Equalizer settings from the Multimedia page.	

All following communication objects are standard KNX objects for the control of multimedia devices; please refer to the KNX standard documentation for further details if required.

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Multimedia main power		1 Bit	CR-T-	[1.001] switch	309
Multimedia skip		1 Bit	CR-T-	[1.007] step	310
Multimedia fast forward / backward		4 Bit	CR-T-	[3.007] dimming control	311
	When the Fast Forward or Rewind buttons are activated, the commands sent to the multimedia playback device are 4-bit telegrams of the same structure as those used for the control of dimming actuators. *Three values are used which correspond to Start FF ("Increase"), Start REW ("Decrease"), Stop FF/REW ("Stop").* *The start commands are transmitted as the pushbutton is pressed; the stop command is transmitted as the pushbutton is released.* 				
Multimedia play-stop		1 Bit	CR-T-	[1.010] pay/stop	312
Multimedia volume step		1 Bit	CR-T-	[1.007] step	313
Multimedia mute		1 Bit	CR-T-	[1.003] enable	314

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Multimedia text		N Byte	C-W--	[16.000] char string (ASCII) [16.001] char string (ISO 8859-1)	315
	Text used as input to the Touch&See device and displayed as Track title.				
Multimedia sleep enable	Sleeping mode = enabled	1 Bit	CR-T-	[1.003] enable	316
Multimedia sleep time	Sleeping mode = enabled	1 Byte	CR-T-	[7.006] time (min)	317
Multimedia bass step	Equalizer = enabled	1 Bit	CR-T-	[1.007] step	318
Multimedia treble step	Equalizer = enabled	1 Bit	CR-T-	[1.007] step	319
Multimedia balance step	Equalizer = enabled	1 Bit	CR-T-	[1.007] step	320

9.9 Thermostat

9.9.1 Configuration

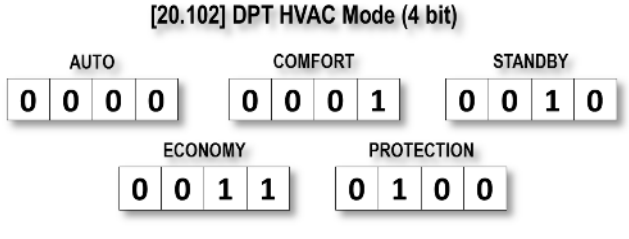
This menu allows the configuration of all parameters related to the temperature control functions, among which:

- Selection of temperature sensors
- Configuration of ambient sensors for information to be displayed in the Meteo page (e.g. Relative Humidity, CO2 concentration
- Presence detection
- Selection of the control algorithm and heating / cooling mode switching
- Selection of the type of scheduler
- Configuration of operating modes
- Configuration of the scene function for temperature control

Parameter name	*Conditions*	*Values*
Sensors timeout		hh:mm:ss (**00:05:00**)
	The device monitors the periodic update of sensor values. If any of the configured values is not updated within the timeout period, the system uses the remaining ones; if no updated values are available, control is interrupted. In all above cases, an alarm is issued. *Refer to the description section for details.* *To deactivate data update monitoring, set the timeout to 0 (00:00:00).*	
Additional temp. sensor 1		**enabled**
	This value cannot be changed since at least one sensor is required.	
Additional temp. sensor 2		**disabled** / enabled
	Additional configured sensors are evaluated through an arithmetic average.	
Additional temp. sensor 3		**disabled** / enabled
	See previous parameter	
Additional temp. sensor 4		**disabled** / enabled
	See previous parameter	
Humidity sensor		**disabled** / enabled
	Information from this sensor is displayed in the Chrono-thermostat page; the sensor is supposed to measure an indoor humidity value: for the outdoor humidity sensor, please refer to the Meteo page.	
Communication object dimension	Humidity sensor = enabled	**1 byte (DPT 5.001)** 2 byte (DPT 9.007)
	Both data types represent percentages; see the description of corresponding communication objects for details.	
Air quality sensor		**disabled** / enabled
	Information from this sensor is displayed in the Chrono-thermostat page.	
Presence detection		**disabled** / enabled
	For the detailed configuration of the presence detection function please refer to the Presence detection configuration menu, described below.	
Thermostat function		**heating** / cooling / both heating and cooling

Parameter name	*Conditions*	*Values*
Heating / cooling switch over	Thermostat function = both heating and cooling	**manual** / from bus / automatic
Heating / cooling repetition time	Heating / cooling switch over = manual *or* automatic	hh:mm:ss (**00:15:00**)
	If the heating / cooling mode is set by this device, the system-wide value can be updated by sending the local (master) value periodically. A value of 0 (00:00:00) means cyclic transmission is disabled.	
Chrono-thermostat modes		**comfort-standby** comfort-economy
	Selects the mode pairs used by the time programmer.	
Setpoint cyclic sending		**disabled** / enabled
	The setpoint that is sent cyclically is the actual one, resulting from either the manual setting or the automatic setting from the time programmer. The actual Setpoint also includes the effect of the window contacts and presence detection (if the corresponding functions have been enabled).	
Transmission repetition time	Setpoint cyclic sending = enabled	hh:mm:ss (**00:15:00**)
Max manual temperature change		not allowed, ± 1°C, ± 2°C, **± 3°C**, ± 4°C, ± 5°C, ± 6°C, ± 7°C, ± 8°C, ± 9°C, ± 10°C
	Defines the maximum setpoint variation that is allowed for the manual setting.	
Max setpoint temperature change		not allowed, ± 1°C, ± 2°C, ± 3°C, ± 4°C, ± 5°C, ± 6°C, ± 7°C, ± 8°C, **± 9°C**, ± 10°C
	Defines the maximum setpoint variation that is allowed when defining operating modes.	
Send HVAC mode		**disabled** / enabled
	If enabled, the information about the current operating mode can be transmitted to other devices on the bus which act as "slaves".	
Transmission repetition time	Send HVAC mode = enabled	never, 1 minute ... 120 minutes (*variable intervals*) *Default:* **10 minutes**
Fan		**disabled** / enabled
	Enables the fan management function for e.g. fan-coils.	
Scenes function		**disabled** / enabled
	Enables the scene management function.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Additional temp. sensor 1	*Always active*	2 Bytes	C-W--	[9.001] temperature (°C)	205
Additional temp. sensor 2	Additional temp. sensor 2 = enabled	2 Bytes	C-W--	[9.001] temperature (°C)	206

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Additional temp. sensor 3	Additional temp. sensor 3 = enabled	2 Bytes	C-W--	[9.001] temperature (°C)	207
Additional temp. sensor 4	Additional temp. sensor 4 = enabled	2 Bytes	C-W--	[9.001] temperature (°C)	208
Humidity sensor	Humidity sensor = enabled	2 Bytes	C-W--	[5.001] percentage (0..100%) [9.007] percentage (%)	209
Air quality sensor	Air quality sensor = enabled	2 Bytes	C-W--	[9.008] parts/million (ppm)	210
Actual setpoint		2 Bytes	CR-T-	[9.001] temperature (°C)	243
Heating/cooling status out	Thermostat function = both heating and cooling Heating / cooling switch over = manual or automatic	1 Bit	CR-T-	[1.100] heating/cooling	225
	This object transmits the information about the heating or cooling status set by the device as a master.				
Heating/cooling status in	Thermostat function = both heating and cooling Heating / cooling switch over = from bus	1 Bit	C-W--	[1.100] heating/cooling	226
	This object receives the information about the heating or cooling status set by a supervisor device on the but when this device is configured as a slave. *This information is used both for display and by the internal control stages.*				
HVAC mode in		1 Bit	C-W--	[20.102] HVAC mode	240
HVAC forced mode in		1 Bit	C-W--	[20.102] HVAC mode	241
HVAC mode out	Send HVAC mode = enabled	1 Bit	CR-T-	[20.102] HVAC mode	242
	The bits in positions 5..8 are reserved. 				

9.9.2 Heating

Through the *Heating* menu following operations can be performed:

- set algorithm type and internal control parameters;
- enable an auxiliary heating system and set its control parameters;
- enable operation of window contacts

For a same heating / cooling system, the internal program of the device has two different control loops for heating and for cooling.
If both control loops have to be based on the same parameters, the values of these parameters should be input in both cooling and heating sections of the configuration program.

In the following table, the condition *Thermostat function = "heating" or "heating and cooling"* is tacitly implied.

Parameter name	***Conditions***	***Values***
Comfort temperature setpoint [°C]		0...50°C [**21**]
Standby temperature setpoint [°C]		0...50°C [**18**]
	For a correct operation, it is required that *Standby temperature setpoint < Comfort temperature setpoint.*	
Economy temperature setpoint [°C]		0...50°C [**16**]
	For a correct operation, it is required that *Economy temperature setpoint < Standby temperature setpoint.*	
Building protection temperature setpoint [°C]		2...10°C [**7**]
Control type		continuous PWM (pulse width modulation) **2 points hysteresis**
Range	Control type = 2 points hysteresis	0,2 K / 0,3 K / **0,4 K** / 0,5 / 0,6 K 0,8 K / 1 K / 1,5 K / 2 K / 2,5 K / 3 K
Control transmission repetition time	Control type = continuous	hh:mm:ss (**00:00:00**)
	Interval between periodic transmissions of the control value. This interval must be chosen as a compromise between control response speed and bus occupation. *A value of 00:00:00 disables periodic transmission.*	
Control transmission change of value [%]	Control type = continuous	0...100% [**10**]
	Minimum change required in the control value in order to trigger a new transmission. *This parameter is additional to Control transmission repetition time; these mechanisms can be used together.*	

Parameter name	*Conditions*	*Values*
PWM cycle time	Control type = PWM (pulse width modulation)	5...240 minutes [**15 minutes**]
Heating system	Control type = continuous *or* PWM (pulse width modulation)	radiant panels (5 K / 240 minutes), **radiators (5 K / 150 minutes)**, electric (4 K / 100 minutes), fancoils (4 K / 90 minutes), other
Proportional band [0,1 K]	Control type = continuous *or* PWM (pulse width modulation) Heating system = other	0...255 [**40**]
	The parameter value is expressed in tenths of °C. *This parameter allows to select a customized value for the Proportional band in continuous or PWM control algorithms. Please refer to the corresponding chapter for a detailed description of this parameter; be sure to refer to a technician qualified on HVAC system to determine the most suitable value.* ***An incorrect value for this parameter can cause unwanted oscillations of the controlled temperature**.*	
Integral time [min]	Control type = continuous *or* PWM (pulse width modulation) Heating system = other	0...255 [**90**]
	This parameter allows to select a customized value for the Integral time in continuous or PWM control algorithms. Please refer to the corresponding chapter for a detailed description of this parameter; be sure to refer to a technician qualified on HVAC system to determine the most suitable value. ***An incorrect value for this parameter can cause instabillity of the controlled temperature or excessive delay in reaching the setpoint value**.*	
Additional heating		**disabled** / enabled
Disabled from bus	Additional heating = enabled	**no** / yes
	Enables activation and deactivation of the heating function through a bus telegram.	
Setpoint offset	Additional heating = enabled	0.2...3 K [**0.6 K**]
	The distance from the setpoint of the activation threshold for the additional heating; refer to the section describing the additional heating / cooling systems for details.	
Use window sensors to activate building protection mode	*General* / window sensors = enabled	**no** / yes
	The number of active sensors and their polarity can be configured in the Window Sensors menu.	
Wait time before activating	*General* / window sensors = enabled Use window sensors to activate building protection mode = yes	hh:mm:ss (**00:05:00**)
	The delay is only applied to the transition between closed and open window.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Setpoint comfort heating		2 Bytes	CRWTU	[9.001] temperature (°C)	211

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Setpoint standby heating		2 Bytes	CRWTU	[9.001] temperature (°C)	213
Setpoint economy heating		2 Bytes	CRWTU	[9.001] temperature (°C)	215
Setpoint building protection heating		2 Bytes	CRWTU	[9.001] temperature (°C)	217
Heating out command	Control type = 2-point hysteresis *or* PWM (pulse width modulation)	1 Bit	CR-T-	[1.001] switch	219
	Control type = continuous	1 Byte		[5.001] percentage (0..100%)	
	If the operating mode is set to "both heating and cooling" but the HVAC system only has one actuator (e.g. a 2-pipe system fan-coil with a 1-way valve switching a single heat exchanger), both this communication object and the corresponding one for cooling have to be connected to the same group address (the one also used by the actuator).				
Additional heating output command	Additional heating = enabled	1 Bit	CR-T-	[1.001] switch	220
Additional heating enable	Additional heating = enabled; Disabled from bus = yes	1 Bit	C-W--	[1.003] enable	223

9.9.3 Cooling

Through the *Cooling* menu following operations can be performed:

- set algorithm type and internal control parameters;
- enable an auxiliary heating system and set its control parameters;
- enable operation of window contacts

For a same heating / cooling system, the internal program of the device has two different control loops for heating and for cooling.
If both control loops have to be based on the same parameters, the values of these parameters should be input in both cooling and heating sections of the configuration program.

In the following table, the condition *Thermostat function = "cooling" or "heating and cooling"* is tacitly implied.

Parameter name	***Conditions***	***Values***
Comfort temperature setpoint [°C]		0...50°C [**23**]
Standby temperature setpoint [°C]		0...50°C [**26**]
	For a correct operation, it is required that *Standby temperature setpoint > Comfort temperature setpoint.*	
Economy temperature setpoint [°C]		0...50°C [**28**]
	For a correct operation, it is required that *Economy temperature setpoint > Standby temperature setpoint.*	
Building protection temperature setpoint [°C]		30...50°C [**36**]
Control type		continuous PWM (pulse width modulation) **2 points hysteresis**
Range	Control type = 2 points hysteresis	0,2 K / 0,3 K / **0,4 K** / 0,5 / 0,6 K 0,8 K / 1 K / 1,5 K / 2 K / 2,5 K / 3 K
Control transmission repetition time	Control type = continuous	hh:mm:ss (**00:00:00**)
	Interval between periodic transmissions of the control value. This interval must be chosen as a compromise between control response speed and bus occupation. *A value of 00:00:00 disables periodic transmission.*	
Control transmission change of value [%]	Control type = continuous	0...100% [**10**]
	Minimum change required in the control value in order to trigger a new transmission. *This parameter is additional to Control transmission repetition time; these mechanisms can be used together.*	
PWM cycle time	Control type = PWM (pulse width modulation)	5...240 minutes [**15 minutes**]

Parameter name	*Conditions*	*Values*
Cooling system	Control type = continuous *or* PWM (pulse width modulation)	radiant panels (5 K / 240 minutes), **fancoils (4 K / 90 minutes),** other
Proportional band [0,1 K]	Control type = continuous *or* PWM (pulse width modulation) Cooling system = other	0...255 [**40**]
	The parameter value is expressed in tenths of °C. *This parameter allows to select a customized value for the Proportional band in continuous or PWM control algorithms. Please refer to the corresponding chapter for a detailed description of this parameter; be sure to refer to a technician qualified on HVAC system to determine the most suitable value.* ***An incorrect value for this parameter can cause unwanted oscillations of the controlled temperature***.	
Integral time [min]	Control type = continuous *or* PWM (pulse width modulation) Cooling system = other	0...255 [**90**]
	This parameter allows to select a customized value for the Integral time in continuous or PWM control algorithms. Please refer to the corresponding chapter for a detailed description of this parameter; be sure to refer to a technician qualified on HVAC system to determine the most suitable value. ***An incorrect value for this parameter can cause instabillity of the controlled temperature or excessive delay in reaching the setpoint value***.	
Additional cooling		**disabled** / enabled
Disabled from bus	Additional cooling = enabled	**no** / yes
	Enables activation and deactivation of the heating function through a bus telegram	
Setpoint offset	Additional cooling = enabled	0.2...3 K [**0.6 K**]
	The distance from the setpoint of the activation threshold for the additional cooling; refer to the section describing the additional heating / cooling systems for details.	
Use window sensors to activate building protection mode	*General* / window sensors = enabled	**no** / yes
	The number of active sensors and their polarity can be configured in the Window Sensors menu.	
Wait time before activating	*General* / window sensors = enabled Use window sensors to activate building protection mode = yes	hh:mm:ss (**00:05:00**)
	The delay is only applied to the transition between closed and open window.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Setpoint comfort cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	212
Setpoint standby cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	214
Setpoint economy cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	216

Setpoint building protection cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	218
Cooling out command	Control type = 2-point hysteresis *or* PWM (pulse width modulation)	1 Bit	CR-T-	[1.001] switch	221
	Control type = continuous	1 Byte		[5.001] percentage (0..100%)	
	If the operating mode is set to "both heating and cooling" but the HVAC system only has one actuator (e.g. a 2-pipe system fan-coil with a 1-way valve switching a single heat exchanger), both this communication object and the corresponding one for cooling have to be connected to the same group address (the one also used by the actuator).				
Additional cooling output command	Additional cooling = enabled	1 Bit	CR-T-	[1.001] switch	222
Additional cooling enable	Additional cooling = enabled; Disabled from bus = yes	1 Bit	C-W--	[1.003] enable	224

9.9.4 Fan

The control type for the fan e.g. in a fan-coil unit can be enabled and parametrized in the *fan* menu.

If the flow of the heat exchanger battery is not controlled, the configuration of the setpoint values for the different operating modes is enough to set up the control system; if the flow of the heat exchanger battery is intercepted, either by a one- or two-way valve (2- or 4-pipe systems), the *Control type* parameters in the *Heating* and *Cooling* menus should also be correctly set.

In the following table, the condition *Thermostat / Configuration / Fan = "enabled"* is tacitly implied.

Parameter name	*Conditions*	*Values*
Fan function		**heating** cooling both heating and cooling
Control type		**1 speed** 2 speed 3 speed continuous regulation
Thereshold first speed [0,1 K]		0...255 [**10**]
	The parameter value is expressed in tenths of °C. *If Fan function = both heating and cooling, the threshold value applies to both modes.*	
Thereshold second speed [0,1 K]	Control type = 2 speed	0...255 [**20**]
	The parameter value is expressed in tenths of °C. *If Fan function = both heating and cooling, the threshold value applies to both modes.* *For a correct operation, it is required that Threshold 2nd speed > Threshold 1st speed.*	
Thereshold third speed [0,1 K]	Control type = 3 speed	0...255 [**30**]
	The parameter value is expressed in tenths of °C. *If Fan function = both heating and cooling, the threshold value applies to both modes.* *For a correct operation, it is required that Threshold 3rd speed > Threshold 2nd speed.*	
Proportional band [0,1 K]	Control type = continuous regulation	0...255 [**30**]
	The parameter value is expressed in tenths of °C. *If Fan function = both heating and cooling, the parameter value applies to both modes.*	
Minimum change of value to send [%]	Control type = continuous regulation	2...40 [**10**]
Use flow probe to start fan	Fan function = heating *or* both heating and cooling	**no** / yes
Min. water temp. to start fan [°C]	Use flow probe to start fan = yes	0...255 [**35**]
	The parameter is used only if Fan function = "Heating" or "both heating and cooling", and in the latter case only when the device is operating in heating mode.	

Fan controller disable from bus		**no** / yes
	Enables activation and deactivation of the fan function through a bus telegram.	
Disable signal	Fan controller disable from bus = yes	**not inverted** / inverted
Fan on delay		**0 s**, 10 s, 20 s, 30 s, 1 min, 1,5 min, 2 min, 2,5 min, 3 min, 4 min, 5 min, 6 min, 8 min, 10 min, 12 min
	A delay at fan start can be configured to allow the heat exchanger to reach the final temperature before starting convection.	
Fan off delay		**0 s**, 10 s, 20 s, 30 s, 1 min, 1,5 min, 2 min, 2,5 min, 3 min, 4 min, 5 min, 6 min, 8 min, 10 min, 12 min
	A delay at fan stop can be configured to allow the heat exchanger to cool down before stopping the fan, thus preventing battery overheating.	

Object name	***Conditions***	***Size***	***Flags***	***DPT***	***C.O. nr.***
Fans speed continuous	Control type = continuous regulation	1 Byte	CR-T-	[5.001] percentage (0..100%)	227
Fans speed 1	Control type = 1, 2 or 3 speed	1 Bit	CR-T-	[1.001] switch	227
Fans speed 2	Control type = 2 or 3 speed	1 Bit	CR-T-	[1.001] switch	228
Fans speed 3	Control type = 3 speed	1 Bit	CR-T-	[1.001] switch	229
Water temperature threshold for fan start	Use flow probe to start fan = yes	2 Bytes	C-W--	[9.001] temperature (°C)	11
Fans controller disable	Fan controller disable from bus = yes	1 Bit	C-W--	[1.002] boolean	230

9.9.5 Presence detection

In this menu the energy spare features based on presence detection can be configured.

In the following table, the condition *Thermostat* / *Configuration* / *Presence detection* = *"enabled"* is tacitly implied.

Parameter name	*Conditions*	*Values*
Presence sensors use		**comfort extension** / comfort limitation / comfort extension and comfort limitation
Max absence time before switching HVAC mode		hh:mm:ss (**00:15:00**)
	The switching delay only affects the transition from occupancy to non-occupancy state.	
Switch between modes	Presence sensors use = comfort limitation or comfort extension and comfort limitation	**comfort-standby** comfort-economy
	The switching delay only affects the transition from occupancy to non-occupancy state. *The selection made with this parameter is independent from the mode pairs selected for the chronothermostat function (Thermostat / Configuration / Chronothermostat modes).*	
Number of sensors		1...4 [**1**]
	The occupancy state is determined by the logical OR combination of all enabled sensors: if at least 1 sensor is active then presence is detected.	
Sensor *X*		**NC (normally closed)** NO (normally open)
	NC (normally closed): the sensor signal value is "On" when presence is detected, "Off" otherwise; vice-versa for NO.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Presence sensor *X*		1 Bit	C-W--	[1.018] occupancy	236, 237, 238, 239

9.9.6 Scenes function

In this menu the scene setting and learning features can be configured.

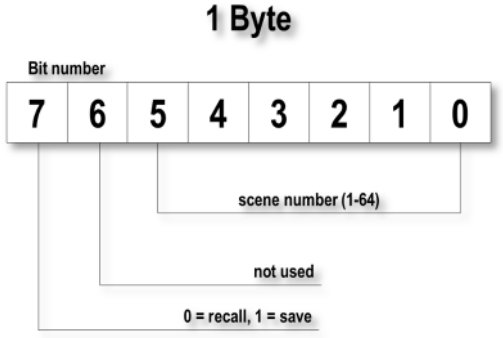
In the following table, the condition *Thermostat / Configuration / Scenes function = "enabled"* is tacitly implied.

> *Please pay attention to the value of the "Download overwrites" parameter. Downloading a new or modified configuration from ETS, particularly on a system which is already installed and in operation, can lead to the loss of the stored scene settings.*

Parameter name	*Conditions*	*Values*
Download overwrites		**disabled** / enabled
	If the value is "enabled", the operating modes are replaced with those configured under "HVAC mode"; otherwise they are left unchanged.	
Scene X		**disabled** / enabled
Scene number	Scene X = enabled	1...64 [**1**]
HVAC mode	Scene X = enabled	auto / **comfort** / standby / economy / building protection
Activation delay	Scene X = enabled	hh:mm:ss:ff (**00:00:00:00**)
	When a scene setting telegram is received, the actual mode switch is performed after the specified delay.	
Learning mode	Scene X = enabled	**disabled** / enabled

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
HVAC scene number		1 Byte	C-W--	[17.001] scene number [18.001] scene control	235

Stores or recalls a stored scene.



9.10 Meteo

The *Meteo* configuration menu allows to select which objects will be displayed in the *Meteo* page.

If any object selected for display can not be received, unwanted alarms might be generated. It is recommended to select only actually available objects.

In the following table, the condition *Pages Configuration / Meteo = "enabled"* is tacitly implied.

Parameter name	*Conditions*	*Values*
Temperature		yes/**no**
Rain		yes/**no**
Wind		yes/**no**
Communication object dimension	Wind = yes	**Scala intensità (DPT 20.014)** m/s (DPT 9.005) km/h (DPT 9.028)
	L'unità di misura visualizzata nella pagina grafica è congruente con il type di datapoint scelto.	
Humidity		yes/**no**
Communication object dimension	Humidity = yes	**1 byte (DPT 5.001)** 2 byte (DPT 9.007)
Atmospheric pressure		yes/**no**
Brightness		yes/**no**
	Il dato di luminosità è rappresentato da una variabile analogica.	
Twilight		yes/**no**
	Il dato è rappresentato da una variabile binaria.	
Sensors timeout		hh:mm:ss (**00:05:00**)
	Il sistema di controllo interno al dispositivo effettua il monitoraggio ciclico dello stato di aggiornamento dei valori dei sensori allo scadere del Timeout impostato. Nel caso non venga ricevuto aggiornamento del value da parte di tutte le variabili selezionate, viene notificata la segnalazione di allarme nella pagina grafica degli Allarmi del dispositivo. Per disattivare la funzione di controllo, impostare il timeout a 00:00:00.	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Outside temperature	Temperature = yes	2 byte	C-W--	[9.001] temperature (°C)	244
Rain	Rain = yes	1 bit	C-W--	[1.002] boolean	245

Wind speed	Wind = yes	1 byte 2 byte	C-W--	[20.014] wind force scale (0..12) [9.005] speed (m/s) [9.028] wind speed (km/h)	246
External humidity	Humidity = yes	1 byte 2 byte	C-W--	[5.001] percentage (0..100%) [9.007] percentage (%)	247
Atmospheric pressure	Atmospheric pressure = yes	2 byte	C-W--	[9.006] pressure (Pa)	248
External brightness	Brightness = yes	2 byte	C-W--	[9.004] lux (Lux)	249
Twilight	Twilight = yes	1 bit	C-W--	[1.002] boolean	250

9.11 Service

9.11.1 Service - Timers

The *Service* / *Timers* menu allows to set the parameters for each of the 10 definable events, which can be assigned to the program scheduler.

These parameters include:

- a descriptive text to be displayed in the timer page
- type, size and value of the communication object to be sent as a programmed event;
- the option of enabling or disabling the event through a bus telegram.

In the following table, the condition *Pages Configuration* / *Timers* = *"enabled"* is tacitly implied.

Parameter name	***Conditions***	***Values***
Timer X		enabled / **disabled**
Text	Timer X = enabled	(*maximum 28 characters*)
	The maximum length of each text string is 28 characters in standard ASCII code. If the Unicode (UTF-8) character encoding is used, the available string size might be smaller. The strings are static, i.e. they do not change according to the general language setting of the device.	
Object dimension	Timer X = enabled	*see table below*
Value to send	Timer X = enabled	*Depending on the value type – see table below*
Enabled from bus	Timer X = enabled	yes / **no**
Behavior on bus on	Enabled from bus = yes	**disabled**, enabled, as previous*
	** for timers from 2 to 10 only.*	

Available types and value ranges depending on the type are as follows:

Size	*Value range*
1 bit	on/**off**
2 bits	**disable** - enable off/up - enable on/down
1 byte unsigned	0...255 [**0**]
1 byte percentage	0...100 [**1**]
1 byte signed	-128...127 [**0**]
2 bytes unsigned	0...65535 [**0**]
2 bytes signed	-32768...32767 [**0**]
2 bytes floating	-671088,64...670760,96 [**0**]
Scene	1...64 [**1**]

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Timer X – command <*type*>		*see table*	CR-T-	*see table*	289, 290, 291, 292, 293, 294, 295, 296, 297, 298
Timer X – enable		1 Bit	C-W--	[1.003] enable	299, 300, 301, 302, 303, 304, 305, 306, 307, 308

Value types are as follows:

Size	*DPT*
1 bit	[1.001] switch
2 bits	[2.008] direction control 1
1 byte unsigned	[5.010] counter pulses (0..255)
1 byte percentage	[5.001] percentage (0..100%)
1 byte signed	[6.001] percentage (-128..127%), [6.010] counter pulses (-128..127)
2 bytes unsigned	[7.001] pulses
2 bytes signed	[8.001] pulses difference
2 bytes floating	[9.0xx]
Scene	[17.001] scene number

9.11.2 Presence simulation

In the following table, the condition *Pages Configuration / Presence simulation= "enabled"* is tacitly implied.

Parameter name	*Conditions*	*Values*
Presence simulation Communication Objects number		1...16 [**1**]
Activate from bus		**no** / yes

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Presence simulation X	Presence simulation Communication Objects number >= X	1 bit	CRWTU	[1.001] switch	272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287
	Each of the communication objects must be associated through its group address to teh corresponding communication objects of the actuators which are used to put the presence simulation to effect. *These group can normally be the same that are used for the "regular" control of the same actuators.*				
Presence simulation activation	Activate from bus = yes	1 bit	C-W--	[1.001] switch	288

9.11.3 Alarms

In the following table, the condition *Pages Configuration / Alarms= "enabled"* is tacitly implied.

La pagina grafica Allarmi visualizza sia gli Allarmi generati da eventi esterni, che vengono configurati nella scheda di Service, sia Allarmi generati internamente al dispositivo per guasto dei sensori integrati o timeout nell'aggiornamento degli oggetti di comunicazione relativi ai sensori esterni.
Mantenendo disabilitata la pagina grafica Allarmi non verranno esposti gli oggetti di comunicazione per gli Allarmi esterni ma sarà sempre possibile visualizzare gli Allarmi generati internamente al dispositivo (se i timeout non sono disabilitati con valori = 00:00:00).

Parameter name	*Conditions*	*Values*
Allarme X		**disabled** / enabled
Testo	Allarme X = enabled	Testo di 28 caratteri ASCII massimo
	Nella pianificazione della configurazione del dispositivo occorre tenere presente che yes tratta di stringhe statiche, independenti dalla lingua impostata per il dispositivo. Utilizzando la codifica dei caratteri Unicode (UTF-8) la lunghezza massima del testo può differire dai valori indicati.	
Condizione d'allarme	Allarme X = enabled	**falso** / vero
	Condizione d'allarme = vero: l'allarme è considerato entrante quando l'object di comunicazione corrispondente a 1 Bit assume value = 1; *Condizione d'allarme = falso: l'allarme è considerato entrante quando l'object di comunicazione corrispondente a 1 Bit assume value = 0.*	

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*C.O. nr.*
Alarm X	Alarm X = enabled	1 bit	C-W- -	[1.005] alarm	252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271

10. Appendix

10.1 Summary of KNX communication objects

Object name	*Conditions*	*Size*	*Flags*	*DPT*	*CO nr.*
Date and time	Date and time synchronization = from bus Date and time object dimension = 8 byte	8 Bytes	C-W--	[19.001] date time	1
Date	Date and time synchronization = from bus Date and time object dimension = 2x3 byte	3 Bytes	C-W--	[11.001] date	2
Time	Date and time synchronization = from bus Date and time object dimension = 2x3 byte	3 Bytes	C-W--	[10.001] time of day	3
Date and time	Date and time synchronization = internal Send to bus = yes	8 Bytes	CR-T-	[19.001] date time	4
Date	Date and time synchronization = internal Send to bus = yes	3 Bytes	CR-T-	[11.001] date	5
Time	Date and time synchronization = internal Send to bus = yes	3 Bytes	CR-T-	[10.001] time of day	6
Brightness value	Light sensor = enabled	2 Bytes	CR-T-	[9.004] lux (Lux)	7
Light control threshold 1	Light sensor = enabled Threshold 1 = below or above	1 Bit	CR-T-	[1.001] switch	8
Light control threshold 2	Light sensor = enabled Threshold 2 = below or above	1 Bit	CR-T-	[1.001] switch	9
Water temperature threshold for fan start	Use flow probe to start fan = yes	2 Bytes	C-W--	[9.001] temperature (°C)	11
Pushbutton X – Lock command	Lock function = enabled Pushbutton *x* = Independent	1 bit	C-W--	[1.003] enable	13 27 45 59 77 91 109 123
Pushbuttons (X) and (X+1) – Lock command	Lock function = enabled Pushbuttons *x* and *y* = coupled	1 bit	C-W--	[1.003] enable	13 45 77 109
Pushbutton *X* – Switching status *[type]* Object *1...8*	Pushbutton *x* = Independent Type = send values or sequences	*see table in Note 1*	CRWTU	*see table in Note 1*	14..21 28..35 46..53 60..67 78..85 92..99 110..117 124..131
Pushbutton *x* – Switching command	Pushb. *x and y* = independent Type = dimming	1 bit	CRWTU	[1.001] switch	22 36 54 68 86 100 118 132

Pushbuttons *x and y* – Switching command	Pushb. *x and y* = coupled Type = switch	1-bit	CRWTU	[1.001] switch	22 36 54 68
Pushbuttons *x and y* – Switching command	Pushb. *x and y* = coupled Type = dimming	1 bit	CRWTU	[1.001] switch	22 36 54 68
Pushbutton *x* – Dedicated Stop command	Pushb. *x and y* = independent Type = shutter or venetian blind	1 bit	CRWTU	[1.017] trigger	22 36 54 68 86 100 118 132
Pushbuttons *x and y* – Dedicated Stop command	Pushb. *x and y* = coupled Type = shutter or venetian blind **Venetian blind mode = disabled**	1 bit	CRWTU	[1.017] trigger	22 54 86 118
Pushbutton *x* – Dimming up / down / stop command	Pushb. *x and y* = independent Type = dimming	4 bit	CR-T-	[3.007] dimming control, [3.008] blind control	23 37 55 69 87 101 119 133
Pushbuttons *x and y* – Dimming up / down / stop command	Pushb. *x and y* = independent or single Type = dimming	4 bit	CR-T-	[3.007] dimming control, [3.008] blind control	23 37 55 69
Pushbutton *x* – Stop-step up / down command	Pushb. *x and y* = independent Type = shutter or venetian blind Venetian blind mode = enabled	1 bit	CR-T-	[1.007] step	24 38 56 70 88 102 120 134
Pushbuttons *x and y* – Stop-step up / down command	Pushb. *x and y* = coupled Type = shutter or venetian blind Venetian blind mode = enabled	1 bit	CR-T-	[1.007] step	24 56 88 120
Pushbutton *x* – Move up / down command	Pushb. *x and y* = independent Type = shutter or venetian blind	1 bit	CRWTU	[1.008] up/down	25 39 57 71 89 103 121 135
Pushbuttons *x and y* – Move up / down command	Pushb. *x and y* = coupled Type = shutter or venetian blind	1 bit	CRWTU	[1.008] up/down	25 57 89 121
Pushbutton *x* – Scene number	Pushb. *x and y* = independent Type = scene	1 Byte	CR-T-	[17.*] Scene number [18.*] Scene control	26 40 58 72 90 104 122 136
Pushbutton *x* – LED green command	LED green X = status from bus	1 bit	CRWTU	[1.001] switch	41 43 73 75 105 107 137 139

Pushbutton *x* – LED blue command	LED blue X = status from bus	1 bit	CRWTU	[1.001] switch	42 44 74 76 106 108 138 140
Additional temp. sensor 1	*Always active*	2 Bytes	C-W--	[9.001] temperature (°C)	205
Additional temp. sensor 2	Additional temp. sensor 2 = enabled	2 Bytes	C-W--	[9.001] temperature (°C)	206
Additional temp. sensor 3	Additional temp. sensor 3 = enabled	2 Bytes	C-W--	[9.001] temperature (°C)	207
Additional temp. sensor 4	Additional temp. sensor 4 = enabled	2 Bytes	C-W--	[9.001] temperature (°C)	208
Humidity sensor	Humidity sensor = enabled	2 Bytes	C-W--	[5.001] percentage (0..100%) [9.007] percentage (%)	209
Air quality sensor	Air quality sensor = enabled	2 Bytes	C-W--	[9.008] parts/million (ppm)	210
Setpoint comfort heating		2 Bytes	CRWTU	[9.001] temperature (°C)	211
Setpoint comfort cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	212
Setpoint standby heating		2 Bytes	CRWTU	[9.001] temperature (°C)	213
Setpoint standby cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	214
Setpoint economy heating		2 Bytes	CRWTU	[9.001] temperature (°C)	215
Setpoint economy cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	216
Setpoint building protection heating		2 Bytes	CRWTU	[9.001] temperature (°C)	217
Setpoint building protection cooling		2 Bytes	CRWTU	[9.001] temperature (°C)	218
Heating out command	Control type = 2-point hysteresis *or* PWM (pulse width modulation)	1 Bit	CR-T-	[1.001] switch	219
	Control type = continuous	1 Byte		[5.001] percentage (0..100%)	
Additional heating output command	Additional heating = enabled	1 Bit	CR-T-	[1.001] switch	220
Cooling out command	Control type = 2-point hysteresis *or* PWM (pulse width modulation)	1 Bit	CR-T-	[1.001] switch	221
	Control type = continuous	1 Byte		[5.001] percentage (0..100%)	
Additional cooling output command	Additional cooling = enabled	1 Bit	CR-T-	[1.001] switch	222
Additional heating enable	Additional heating = enabled; Disabled from bus = yes	1 Bit	C-W--	[1.003] enable	223
Heating/cooling status out	Thermostat function = both heating and cooling Heating / cooling switch over = manual or automatic	1 Bit	CR-T-	[1.100] heating/cooling	225
Heating/cooling status in	Thermostat function = both heating and cooling Heating / cooling switch over = from bus	1 Bit	C-W--	[1.100] heating/cooling	226
Fans speed continuous	Control type = continuous regulation	1 Byte	CR-T-	[5.001] percentage (0..100%)	227
Fans speed 1	Control type = 1, 2 or 3 speed	1 Bit	CR-T-	[1.001] switch	227
Fans speed 2	Control type = 2 or 3 speed	1 Bit	CR-T-	[1.001] switch	228

Fans speed 3	Control type = 3 speed	1 Bit	CR-T-	[1.001] switch	229
Fans controller disable	Fan controller disable from bus = yes	1 Bit	C-W--	[1.002] boolean	230
Window contact *x*	General / Window sensors = enabled Number of sensors >= *x*	1 Bit	C-W--	[1.019] window/door	231 232 233 234
Presence sensor *X*		1 Bit	C-W--	[1.018] occupancy	236 237 238 239
HVAC mode in		1 Bit	C-W--	[20.102] HVAC mode	240
HVAC forced mode in		1 Bit	C-W--	[20.102] HVAC mode	241
HVAC mode out	Send HVAC mode = enabled	1 Bit	CR-T-	[20.102] HVAC mode	242
Actual setpoint		2 Bytes	CR-T-	[9.001] temperature (°C)	243
HVAC scene number		1 Byte	C-W--	[17.001] scene number [18.001] scene control	235
Outside temperature	Temperature = yes	2 byte	C-W--	[9.001] temperature (°C)	244
Rain	Rain = yes	1 bit	C-W--	[1.002] boolean	245
Wind speed	Wind = yes	1 byte 2 byte	C-W--	[20.014] wind force scale (0..12) [9.005] speed (m/s) [9.028] wind speed (km/h)	246
External humidity	Humidity = yes	1 byte 2 byte	C-W--	[5.001] percentage (0..100%) [9.007] percentage (%)	247
Atmospheric pressure	Atmospheric pressure = yes	2 byte	C-W--	[9.006] pressure (Pa)	248
External brightness	Brightness = yes	2 byte	C-W--	[9.004] lux (Lux)	249
Twilight	Twilight = yes	1 bit	C-W--	[1.002] boolean	250
Alarm *x*	Alarm X = enabled	1 bit	C-W--	[1.005] alarm	252 ... 271
Presence simulation *x*	Presence simulation Communication Objects number >= *x*	1 bit	CRWTU	[1.001] switch	272 ... 287
Presence simulation activation	Activate from bus = yes	1 bit	C-W--	[1.001] switch	288
Timer X – command <*type*>		*see table in note 2*	CR-T-	*see table in note 2*	289 ... 298
Timer X – enable		1 Bit	C-W--	[1.003] enable	299 ... 308
Multimedia main power		1 Bit	CR-T-	[1.001] switch	309
Multimedia skip		1 Bit	CR-T-	[1.007] step	310
Multimedia fast forward / backward		4 Bit	CR-T-	[3.007] dimming control	311
Multimedia play-stop		1 Bit	CR-T-	[1.010] pay/stop	312
Multimedia volume step		1 Bit	CR-T-	[1.007] step	313
Multimedia mute		1 Bit	CR-T-	[1.003] enable	314

Multimedia text		N Byte	C-W--	[16.000] char string (ASCII) [16.001] char string (ISO 8859-1)	315
Multimedia sleep enable	Sleeping mode = enabled	1 Bit	CR-T-	[1.003] enable	316
Multimedia sleep time	Sleeping mode = enabled	1 Byte	CR-T-	[7.006] time (min)	317
Multimedia bass step	Equalizer = enabled	1 Bit	CR-T-	[1.007] step	318
Multimedia treble step	Equalizer = enabled	1 Bit	CR-T-	[1.007] step	319
Multimedia balance step	Equalizer = enabled	1 Bit	CR-T-	[1.007] step	320

(Note 1) Sizes and DPTs are as follows:

Size	*DPT*
1 bit	[1.001] switch
2 bits	[2.*] 1-bit controlled
1 byte unsigned	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-byte
1 byte percentage	[4.*] character [5.*] 8-bit unsigned value [20.*] 1-byte
1 byte signed	[6.*] 8-bit signed value
2 bytes unsigned	[7.*] 2-byte unsigned value
2 bytes signed	[8.*] 2-byte signed value
2 bytes floating	[9.*] 2-byte float value

(Note 2) Sizes and DPTs are as follows:

Size	*DPT*
1 bit	[1.001] switch
2 bits	[2.008] direction control 1
1 byte unsigned	[5.010] counter pulses (0..255)
1 byte percentage	[5.001] percentage (0..100%)
1 byte signed	[6.001] percentage (-128..127%), [6.010] counter pulses (-128..127)
2 bytes unsigned	[7.001] pulses
2 bytes signed	[8.001] pulses difference
2 bytes floating	[9.0xx]
Scene	[17.001] scene number

10.2 Summary of symbols for pushbutton customization

00 – no symbol	 AA – buzzer	 AB – electrical load	 AC – do not disturb
 AD – garage door	 AE – gate	 AF – barrier	 AG – pedestrian entrance
 AH – irrigation	 AI – floor lamp	 AL – wall lamp	 AM – ceiling lamp
 AN – spotlight	 AO – staircase lighting	 AP – outdoor lighting	 AQ – lighting (generic)
 AR – dimming	 AS – make up room	 AT – sound system	AU – off
 AV – on	 AZ – shutters, venetian blinds	 BA – indoor curtain	 BB – outdoor curtain

 BC – mobile electrical load	 BD –comfort scene	 BE –irrigation scene	 BF – lighting scene
 BG – outdoor lighting scene	 BH – manual scene	 BI – night scene	 BL – scene off
 BM – scene on	 BN – shutters up scene	 BO – shutters down scene	 BP – curtains up scene
 BQ – curtains down scene	 BR – party scene	 BS – presence scene	 BT – standby scene
 BU – door lock	 BV – unlock	 BZ – lock	 CA – room service
 CB – service	 CC – differently able	 CD – rescue	 CE – loudspeaker

 CF – temperature	 CG –temperature increase	 CH – temperature decrease	 CI – fan
 CL – fan speed 1	 CM – fan speed 2	 CN – fan speed 3	CO – increase (solid arrow)
CP – decrease (solid arrow)	 CQ – increase (empty arrow)	CR – decrease (empty arrow)	

ZZ – no symbol	 ZV – upper plus	 ZU – lower plus	ZT – upper minus
ZS – lower minus	ZR – simple arrow up	ZQ – simple arrow down	ZP – empty arrow up
 ZO – empty arrow down	ZN – solid arrow up	ZM – solid arrow down	 ZL – upper empty circle

 ZI – lower empty circle	 ZH – upper solid circle	 ZG – lower solid circle	ZF – upper triple empty circle
ZE – lower triple empty circle	ZD – upper triple solid circle	ZC – lower triple solid circle	 ZB – left triple empty circle
 ZA – right triple empty circle	 VZ – upper triple solid circle	 VV – right triple solid circle	

10.3 Summary of system alarms

Codice allarme	Descrizione
100	Timeout of Date and time information
101	Bus Timeout
102	Timeout of temperature sensor for fan start
103	
104	
105	
106	Timeout of indoor humidity sensor
107	
108	
109	
110	Timeout of air quality sensor (CO2)
111	
112	
113	
114	Timeout of outdoor temperature sensor
115	Timeout of rain sensor
116	Timeout of wind speed sensor
117	Timeout of outdoor relative humidity sensor
118	Timeout of outdoor atmospheric pressure sensor
119	Timeout of outdoor brightness sensor
120	Timeout of outdoor twilight sensor
121	Timeout of external indoor temperature sensor
137	Failure of integrated brightness sensor
138	Failure of integrated temperature sensor
155	Failure of temperature sensor for fan start
159	Failure of indoor relative humidity sensor
163	Failure of air quality sensor (CO2)
167	Failure of outdoor temperature sensor
168	Failure of outdoor rain sensor
169	Failure of outdoor win speed sensor
170	Failure of outdoor relative humidity sensor
171	Failure of outdoor atmospheric pressure sensor
172	Failure of outdoor brightness sensor
173	Failure of outdoor twilight sensor

A failure alarm from an external sensor is generated upon reception of a “failure” telegram; a timeout alarm is triggered when no value telegram is received within a configured period.

10.4 The time-continuous P-I (Proportional – Integral) controller

The proportional-integral (PI) controller is described by the following equation:

$$\text{controlling variable}(t) = Kp \times \text{error}(t) + Ki \times \int_0^t \text{error}(\tau)d\tau$$

where:

- *error(t) = (Setpoint - Measured temperature) (for heating)*
  (Measured temperature - Setpoint) (for cooling)
- K_p *= proportional constant*
- K_i *= integral constant*

The controlling variable is composed of a term that depends proportionally from the error and a term which depends on the integral of the error.

In the following discussion, in order to focus on the illustration of the controller sysem, it will be assumed for clarity that there is a direct proportional relationship between the output of the controller (controlling variable) and the measured variable (ambient temperature); therefore, we can simply express the controlling variable directly in terms of ambient temperature.
For the same reason, according to the superposition theorem (thus assuming the systems are linear) all external heat contributions mentioned in the description of the complete system (heat exchange with external air, solar radiation...) will be assumed as null.

In practical systems, further quantities are used:

$$Proportional\ Band\ PB\ [\%] = \frac{100}{Kp}$$

$$Integral\ Time\ Ti\ [min] = \frac{Kp}{Ki}$$

Dimensionally, with the given formulas, the proportional band PB is a percentage, or a pure number, while T_i is a time.

10.4.1.1 Continuous Proportional-Integral control

The above definition of the proportional band does a little more than to shift the focus on the relative proportion between variables; more intuitively, it can be said that ***the [dimensionless] proportional band expresses, in percentage, how large the error value is with respect to the controlling variable***, and therefore (with our approximations) to the controlled value. Another way to state this is that the PB tells us how large an error we have to accept for a given ouput result[7].

It is worth noting that the above meaning is not the most desirable, because a better indication would come from the ratio between the error value and the setpoint (desired value).

There is a slightly different way, though, to define PB, that makes it useful in another sense.

[7] This consideration is obviously referred to the proportional part of the controller alone.

Actual systems are of course not ideal; for one, the output of a real controller has a limited range for the output value, dictated by physical or design limits. If we express the error value not in terms of the generic value of the controlling variable, but rather of the value corresponding to its maximum allowable span, we could define it as follows:

$$Proportional\ Band\ PB\ [K] = \frac{CVmax}{Kp}$$

The [non-dimensionless] proportional band is the error value that determines the maximum allowable value of the output (output at 100%).

The “non-dimensionless” clause reflects the fact that we are no longer considering a ratio between values, but rather a given value for a variable - the error value - in an assigned (and known) condition of the system. CV_{max} is the limit output value for the controller[8], which is a given for the particular system; with our previous assumptions, for our intents we will identify CV_{max} in our examples with the ambient temperature.

Since the error value is the difference between two temperature values in °C, dimensionally it will be expressed in K (Kelvin).

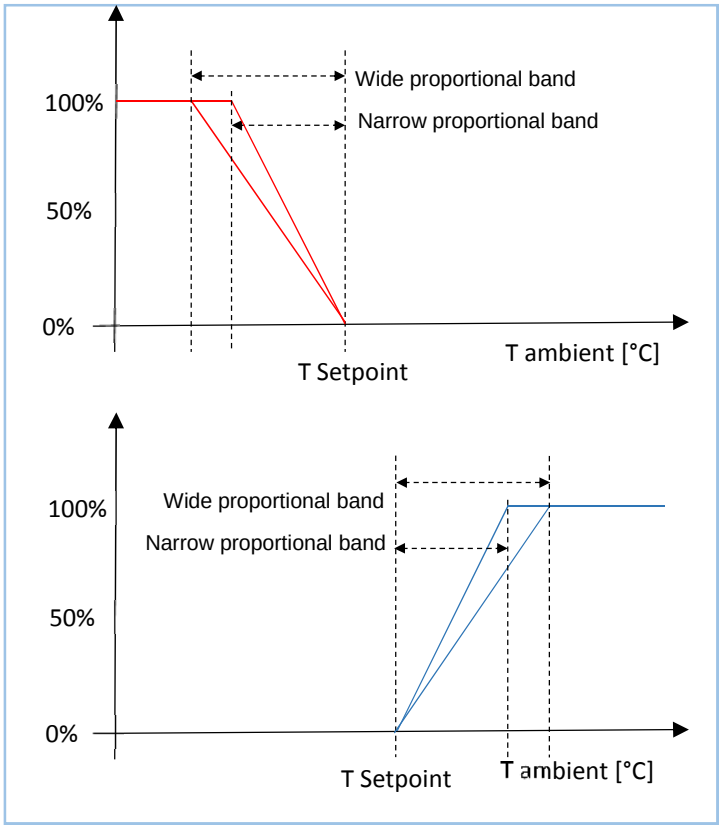
This is the *technical* definition of PB that we will use from here on in this manual.

The PB defined in this fashion supplies the additional indication of *maximum error value that the controller can handle before reaching saturation*, and therefore deviate from the linear behavior described by the present theory.

It is important to note that, **regardless of which of the two definition is chosen, the proportional band parameter has the same physical meaning**.

As shown in the figure, a regulator with proportional band of small value tends to provide higher values of the control variable for small errors with respect to a regulator with proportional band of higher value.

[8] which we will assume to take on positive values only, given the nature of the systems in subject.



Example. If a controller (in heating mode) provides a 100% control output when the Setpoint is 20°C and the measured temperature is 15°C[9], it would have a proportional band of 5 K;
in cooling mode, when e.g. the Setpoint is 24°C, the same controller would provide a 100% control output if the measured temperature is ≥ 29°C.

10.4.1.2 Continuous P-I control: Integral time

A qualitative definition of the Integral Time TI is as follows:

The integral time is the time required for the integral term to reach the same value as the proportional term, for any given error value constant in time.

In order to easily understand this definition, it is better to consider the controller as purely proportional or purely integral in turn.

Example: consider a heating controller with a 100% output value of 36°C, and whose proportional part has a value of 4 K for the proportional band. Now consider the integral term alone, driven by the same 4 K value: the Integral Time would be the time it takes the output to reach 36°C.

The same calculation obviously holds for any other value of the error; e.g. a smaller error would mean a lower output should be reached, but also a proportionally reduced output increase rate, so the total time (the Integral Time) would remain unchanged.

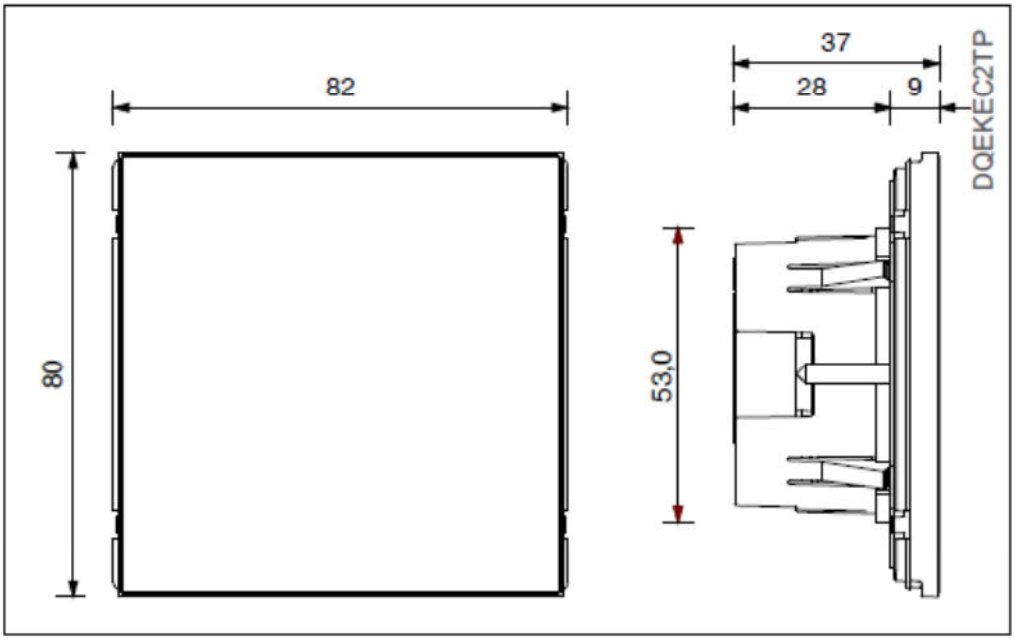
[9] for practical purposes, we could write “15°C or lower”; in this latter case, the output would theoretically have to supply more than 100%, though of course this would make no practical sense.

In a steady-state system, where the proportional term does not change, the Integral term causes the output value to progressively move towards the setpoint value, until it is finally reached. For this reason, the Integral time is also often called *Reset Time*.

In HVAC systems, a purely proportional controller is not able to guarantee that the Setpoint condition is attained. an integral action should therefore always be introduced.

10.5 Technical characteristics

Caratteristica	Value
Description and product code	Touch&See EK-EC2-TP
Device type	KNX S-mode bus device
Communication type	standard KNX TP1
Use	indoor dry rooms
Environmental conditions	• Working temperature: - 5 … + 45°C • Storage temperature: - 25 … + 55°C • Transport temperature: - 25 … + 70°C • Relative humidity: 95% non condensing
Power supply	SELV 30 Vdc through KNX bus
Current consumption	40 mA
Auxiliary power supply	SELV 30 Vdc
Auxiliary power current consumption	120 mA
Display	Touch display TFT with backlight, size 3,5” (320 x 240 pixel), 65.536 colors
Integrated sensors	Brightness
Standby power source	Buffer battery to keep RTC power
Housing	Plastic material
Mounting	Wall-mounted on round flush-mounted wall box, diam. 60 mm
Protection degree	IP20 (according to EN 60529)
Climatic classification	3K5
Mechanical classification	3M2 (according to EN 50491-2)
Insulation class	III (according to EN 60664-1)
Pollution degree	2 (according to IEC 60664-1)
Regulation compliance	• KNX • CE marking: The product complies to the Low Voltage Directive (2006/95/CE) and to the EMC directive (2004/108/CE). • Tests carried out according to EN 50491-5-1:2010, EN 50491-5-2:2010
Weight	125 g
Dimensions (WxHxD)	82 x 80 x 37 mm



10.6 Warning

- Installation, electrical connection, configuration and commissioning of the device can only be carried out by qualified personnel.
- Opening the housing of the device causes the immediate end of the warranty period.
- ekinex® KNX defective devices must be returned to the manufacturer at the following address: SBS S.p.A. Via Circonvallazione s / n, I-28010 Miasino (NO) Italy.

10.7 Other information

- This application manual is aimed at installers, system integrators and planners
- For further information on the product, please contact the ekinex® technical support at the e-mail address: support@ekinex.com or visit the website www.ekinex.com
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