

WEEKLY PROGRAMMING DIGITAL CHRONOTHERMOSTAT WITH REMOTE BOILER CONTROL (OpenTherm® compatible) AND REMOTE MANAGEMENT VIA GSM



APPLICATION

The digital chronothermostat Brahma Kronos series integrates the functions of room temperature control and remote control of home heating system in a single interface, specially designed to make available all its functionalities in intuitive mode.

Control of the heating system is complete, allowing to manage advanced features such as solar thermal panels (if supported by the thermoregulation board).

It is possible to choose between different modes of thermoregulation, even using an external probe (connected to the boiler) for climatic compensation.

Weekly programming is particularly versatile because it provides 4 temperature levels settable and no restriction number of time slots per day, consisting of individual intervals equal to a quarter of an hour and can be viewed on the appropriate graph of the daily program.

The communication between the thermostat and the control board of the boiler takes place by means of a two-wire cable; the data are exchanged with the communication protocol compatible OpenTherm™ v3.0 Smart Power Mode - Medium Power.

GENERAL TECHNICAL DATA

- Brahma design
- graphic LCD 128x64 pixel
- backlight timer 20 seconds
- LED for diagnostics/signaling
- 7 variable function keys
- weekly programming
- 4 temperature levels (T0, T1, T2, T3)
- resolution (0,5°C temperature set)
- resolution (0,1°C temperature read)
- minimum interval programming: 15 minutes
- SELV insulation (Safety Extra Low Voltage)
- Bipolar connection, non-polarized
- OpenTherm™ protocol v3.0 Smart Power Mode – Medium Power
- serial interface RS-232 (5 wires) for external GSM modem

TECHNICAL DATA OF THE CHRONOTHERMOSTAT

Operating temperature: -0°C +50°C

Humidity: 95% maximum at 40°C

Power supply: low voltage (3V), obtained from communication with the boiler control board

Protection degree: IP30

Dimensions: 140x90x32 mm

Compliance: directive 2014/30/CE (EMC)

Temperature controls classes in accordance with the delegated regulation (EU) No 811/2013:

Class 1, Kronos OT11 used in ON/OFF operation.

Class 5, Kronos OT11 used in modulating operation.

Class 6, Kronos OT11 used with outside temperature compensation.

Weight: 170 g

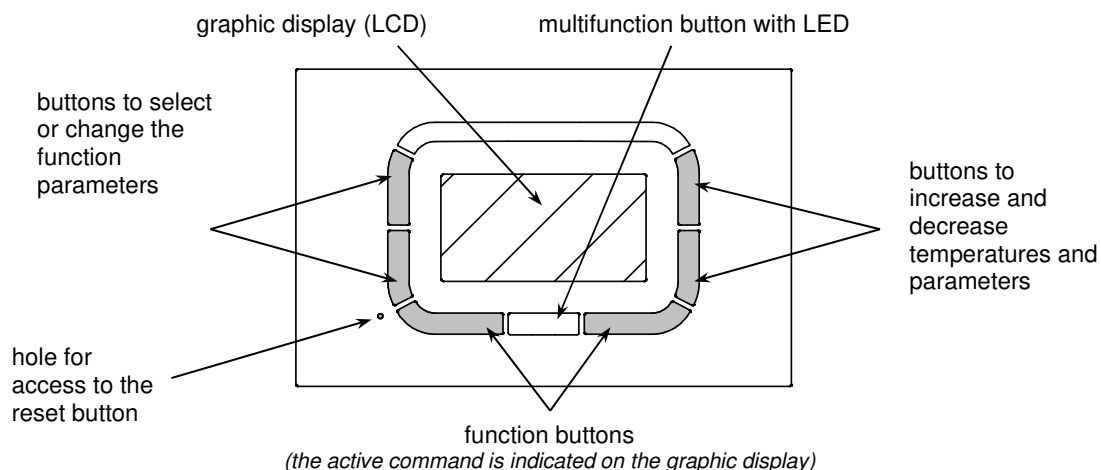


Figure 1: description of the remote control unit

INSTRUCTION FOR USE

The Kronos OT11 provides the user with a graphic LCD dot-matrix, a series of buttons in silicon rubber, and an LED indicator located below a button plastic transparent to display the parameters and interact with the heating system. Figure 1.

The buttons have any versatile utilization depending on the selected menu.

The use of buttons is facilitated by the indications with text, icons and other graphics that appear on the display.

The vertical buttons on the left of the display are typically used to navigate the setup menu or to select the parameters.

The vertical buttons on the right of the display are used to vary temperature and the classical function increase / decrease (+ / -).

To facilitate the change of set values, the long press of these buttons accelerates the increase or decrease.

The horizontal buttons at the bottom serve to confirm or cancel the settings, or to enter and exit the submenus.

The center button is used for special functions as the unlock of the boiler.

Under the center button there is an LED:

- LED with color red continuous: error or no communication with the boiler;
- LED with color red intermittent: boiler lockout;
- LED with color yellow intermittent: anomaly;
- LED with color green continuous: the chronothermostat is resuming work after a power failure.

The most frequently used functions by the user are available in the main menu.

It is possible to quickly browse through the pages to set, for example, environment temperature or the domestic hot water temperature.

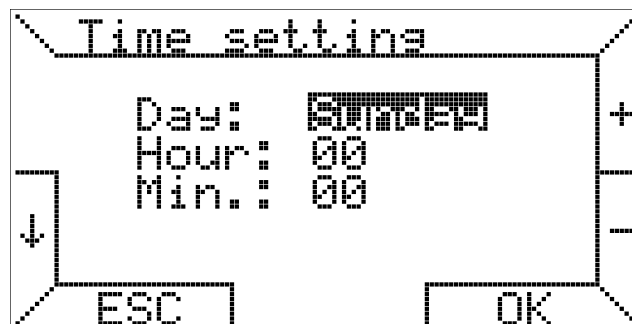
The first time or after a reset of the Kronos, appears the language menu, as shown in the figure below.

Pushing button OK, you confirm the selection.

This choice can be changed later, if necessary, through the "SETTING MENU".



Then the current time can be entered.

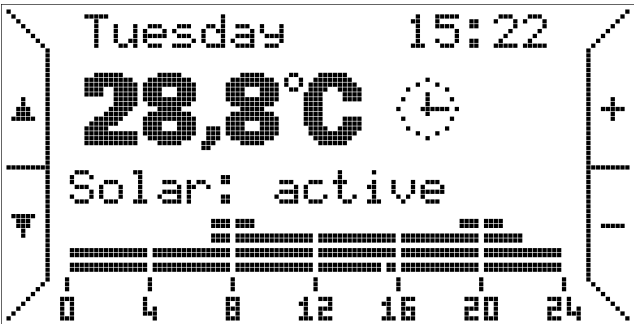


Also in this case the buttons to the left allow you to select the various menu items, while the right buttons are used to change the values, the OK button stores the settings while the ESC button allows you to continue without changing the data time.

If you press ESC, the subsequent reconnection of the chronothermostat (for example power down) you will again be prompted to select the language and set the current time.

BASE FUNCTION
FIRST LEVEL MENU

When the chronothermostat is connected to a thermoregulation board, the following screen appears on the display.
If the thermoregulation board is not compatible, you will receive an error message.



In the figure the main screen. Above are shown the day of the week and the current time, these indications are intermittent if they are not updated.
Below there is an indication of the temperature measured (measurement every 10 seconds);
Beside, an icon indicates the function of thermoregulation currently active: in this case the image of a clock indicating the automatic operation.

Correspondence between icons and operation modes:

	Automatic	Temperature control environment according to the weekly program set by the user. Program seen as a graph of the current day. Domestic hot water operation enabled.
	Manual	Temperature control environment in accordance with a user-selected temperature (thermostat function). Domestic hot water operation enabled.
	Vacation	Temperature control at a fixed temperature for a number of days set by the user. Domestic hot water operation enabled.
	Summer	Temperature control environment disable. Summer ventilation can be activated manually. Domestic hot water operation enabled.
	Standby	Temperature control environment disable. Demand hot water operation disabled.

In “automatic mode”, the cronothermostat performs the temperature control program was set for the current day, the graph is visible at the bottom of the display.
The graph is divided into time intervals of 15 minutes, corresponding to a pixel horizontally, and in the four programmable temperature levels.

Near the icon of the operation mode other icons may appear. If the boiler is turned on appears flame symbol, different sizes depending on the modulation level of the flame (🔥 🔥 🔥 🔥). If it present a lockout or a fault appear

symbols (🔴 , !) respectively and if it is not present the connection icon appears symbol (?). No icon appears in the visualization if the boiler is in stand-by and has no problem.

Under the indication of the ambient temperature may be present, in addition, a line of text that provides information to the user in special cases, such as the presence of error or the status of additional functions such as management of a system of solar panels integrated with the boiler and managed by the thermoregulation board.

Here there are the messages that may appear, alongside with their meanings:

Starting...	Kronos is in the process of connection to the boiler.
Modem connected	Kronos correctly connected to the GSM modem.
Solare: standby	Solar thermal system active and working correctly in the standby state.
Solar: active	Solar thermal system active and working correctly with solar pump active.
Solar: boiler	Solar thermal system active and working correctly, integrated with the boiler.
Solar: disinf.	Solar thermal system active and working correctly with the tank disinfection procedure active.
Ambient probe error	Room temperature sensor on Kronos damaged.
Solar: fault	There is an anomaly in the solar thermal or part of the boiler that manages the solar thermal system.
Modem error	Communication error between Kronos and the GSM modem
Fault code xxx	There is an anomaly or a lockout on the boiler. Code xxx .
Comm. error	Communication error between Kronos and boiler.
Error ID xx	The Kronos fails to correctly interpret of information sent from the boiler.

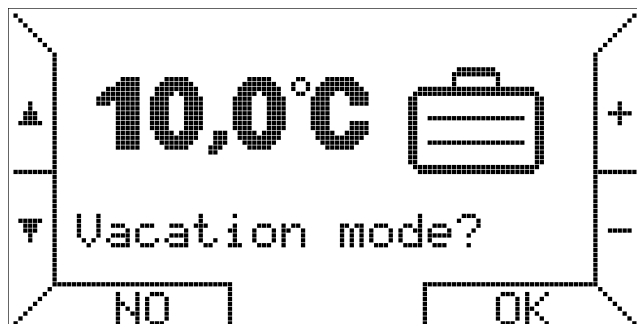
Note: Please refer to the thermoregulation board's documentation for detailed description of the fault codes and error codes.

The buttons on the right, marked with + and -, allow to vary the temperatures required for the automatic program (T0, T1, T2, T3). Instead, in “manual mode” (icon 🖐️) allow to vary the corresponding temperature.
Pushing the buttons on the left, marked with arrows, you can browse the pages of first level menu.
Pushing the button ▼, the following display appears.



Pushing the buttons +/- you can vary the temperature and pushing the button you activate the “manual mode”.

Another option selectable by the first level menu is the “vacation mode”, which allows to maintain the desired temperature for a configurable number of days, so as to optimize power consumption in case of absence of the users.



In the same view to activate the "vacation mode" you can enter the desired temperature, the temperature value can also be changed later when the "vacation mode" is active. Pushing button OK you can select the number of days you want up to the maximum value of 99.

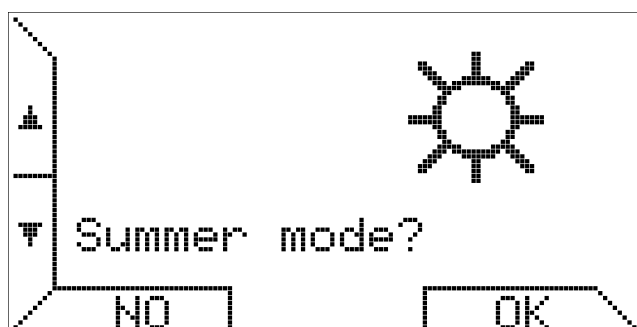


Pushing ESC or OK buttons without selecting the number of days, "vacation mode" will not be active, and the cronothermostat will return to the previous operating mode.

The "vacation mode" has a timer function and the day counter decrements by one at midnight, the number of days remaining is shown on the display when the mode is active.

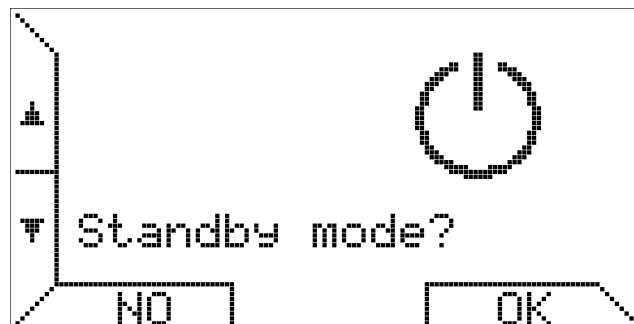
At the end of this time, when the counter is cleared, the cronothermostat switches to "automatic mode" and follow the weekly program has been set.

Pushing again button ▼, you can activate the "summer mode", which is active demand hot water but not environment thermoregulation.



The management of the cronothermostat by the user is much simplified. The functions are not distinct between the functions relating to boiler and functions relating to thermoregulation.

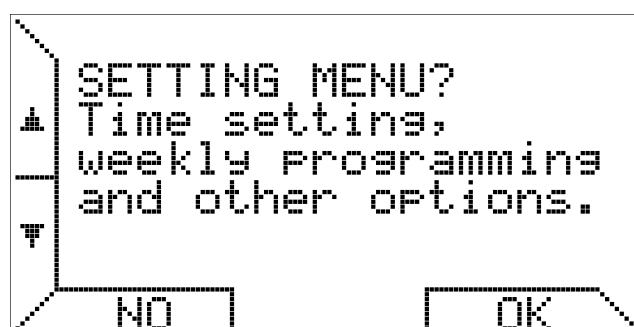
Pushing again button ▼ you switch to another option:



This option allows you to turn off the system (temperature control environment and demand hot water operation are disabled).

The first level menu is circular, all the screens described above are accessible by pushing the reverse button ▲.

Pushing again button ▼ is proposed the sub-menu "SETTING MENU"



In "SETTING MENU" are set the calendar, the mode of thermoregulation and a weekly schedule. The "SETTING MENU" is described in a separate paragraph below.

Pushing again button ▼ you enter the menu for setting the setpoint temperature of the domestic water.



This menu page is only available if the boiler operates the domestic water. Below, the page shows the minimum and maximum limits, set on the thermoregulation board.

Pushing again button ▼ you enter the menu for setting the setpoint temperature of the circuit heating:



Below, the page shows the minimum and maximum limits set on the thermoregulation board.

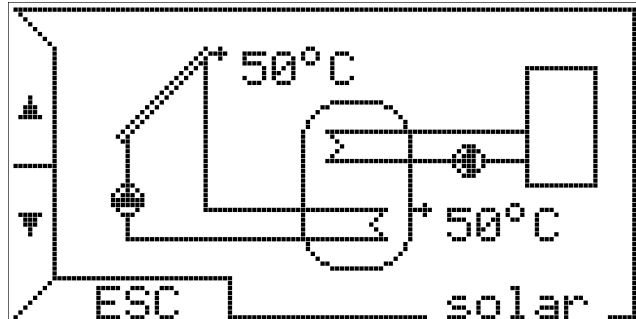
The temperature represents the maximum value that the heating set-point can be taken in termoregulation proportional mode and compensation mode. For more details see the following paragraph, in particular the description of the submenu "Heating control".

Pushing again button ▼ is proposed the submenu "PARAMETERS MENU"



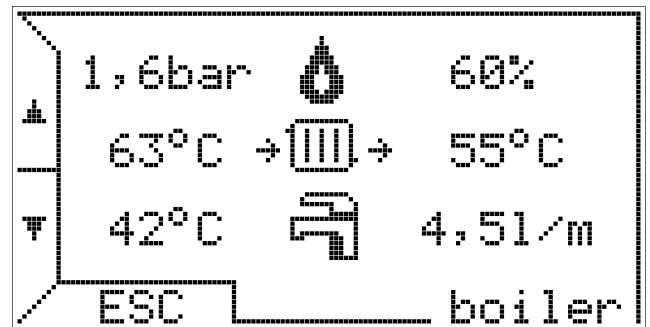
The submenu "PARAMETERS MENU" (described in the relevant section) allows you to see the parameters of the boiler and allows you to manage advanced functions, such as transparent parameters (TSP), unlock and water filling (if provided).

If the boiler supports the integration of solar panels, the next screen is relative to the operation of solar thermal. (If the solar function is not active is displayed, however, the boiler panel described below.)

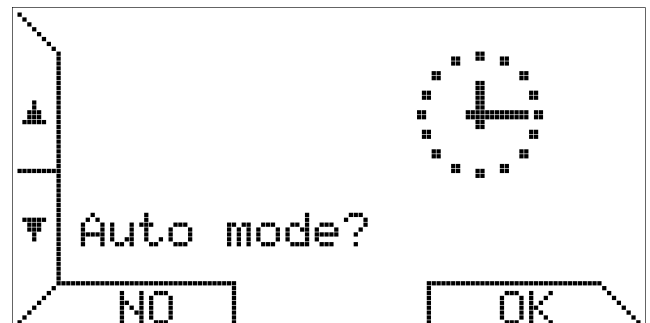


This menu has a frame fixed. The options previously seen remain displayed for 20 seconds, then the display returns to the main screen, which depends on the chosen operation mode. (manual, automatic, estate, vacation, off). In this option, however, if the user does not push ESC or not push ▼ or ▲, the crhono thermostat continues to show the control panel with its solar collector and accumulation temperatures and pump status.

Similar applies to the next screen, the control panel of the boiler.



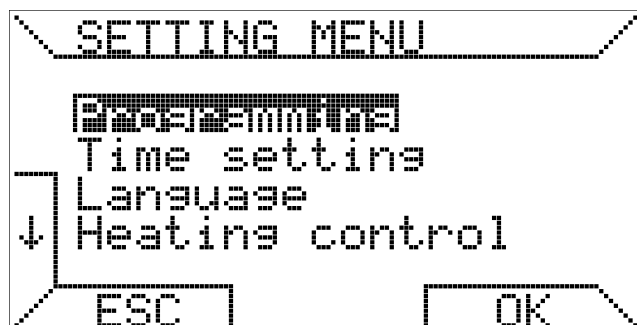
This screen displays the main information on the boiler. In the first line appears the system pressure, the flame symbol , if the boiler is turn on, and the percentage of flame modulation. In case of lockout or anomaly appears the symbols (STOP o !) and the error code for diagnostic. In the second line appears the circuit heating temperatures (left) and return temperature (right). In the last line appears the DHW temperature and the DHW flow rate in liters per minute. Pushing again the button ▼ you return to the first option.



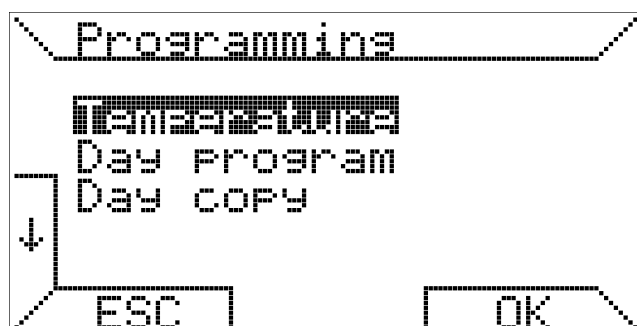
In case it is already active the automatic mode, it is indifferent push NO or OK.

MANAGEMENT CHRONOTHERMOSTAT SETTING MENU

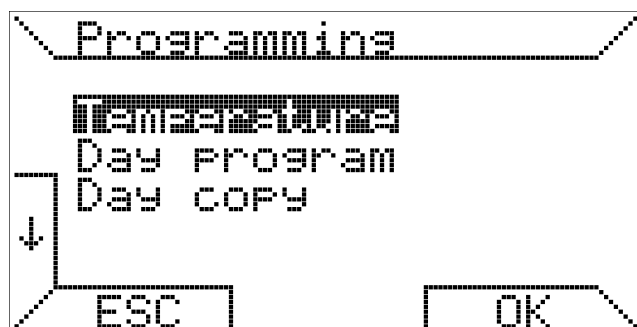
This section describes the submenu "SETTING MENU"
This submenu allows you to manage temperature control environment, the weekly program, the time setting and the language choosing.



Selecting the option "Programming" you enter in weekly program dedicated submenu.



Choosing the option "Temperature" you enter in the screen setting of the four temperature levels T0, T1, T2 and T3.

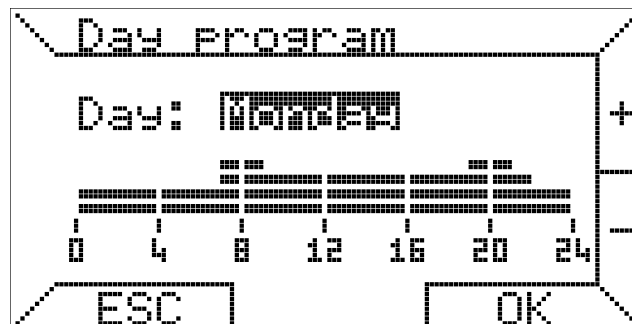


To select the temperature level is necessary to push the buttons $\downarrow$ e $\uparrow$, instead to vary the temperature value it is necessary to push + e -.

On the right side of the screen is shown the relative position of the current setpoint temperature value with respect to minimum values (5 °C) and maximum value (30 °C).

The higher temperature is associated with T3 and the lowest temperature with T0, the chronothermostat meets the following constraint: $T0 \leq T1 \leq T2 \leq T3$ and automatically resizes the temperatures.

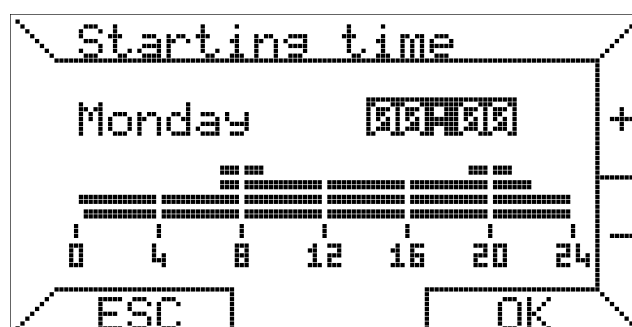
Choosing the option "Day program" you enter in the following screen.



At the top of the screen you select the day, and at the bottom of the screen displays the day program. Pressing the + and - buttons you can select the day.

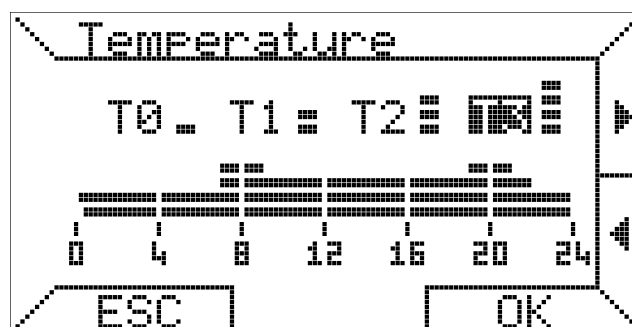
For example, suppose you want to program the day "Monday", pressing OK button you enter the scheduling of time slots.

The time slots are programmed in three steps: initial time, temperature and final time.

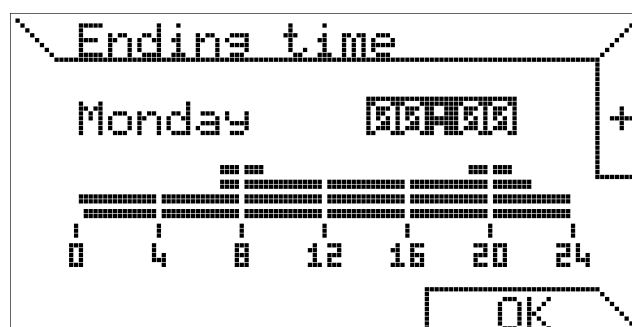


In the first step is set the starting time by pushing the + and - buttons at intervals of at least 15 minutes and you confirm pushing OK.

However, if you want to quit the programming of the selected day, push ESC.

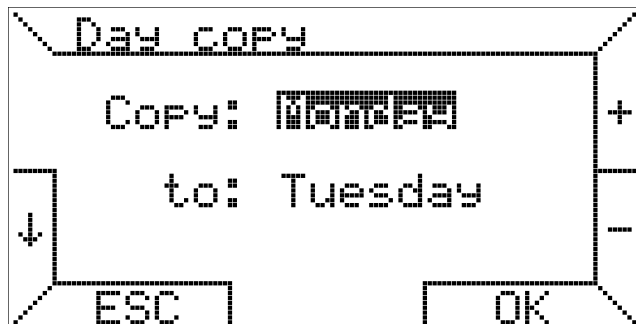


In the second step, pushing the $\leftarrow$ and $\rightarrow$ you select which of the four programmed temperatures will be associated to the time slot. Pushing OK you confirm the level of temperature and pushing ESC you return in the first step.



In the third step you select the ending time. The final time can not be less than initial time, selecting two coincident values for initial time and final time, the daily schedule is not changed.

The last item on the "Programming" menu allows you to copy the program day to another day.

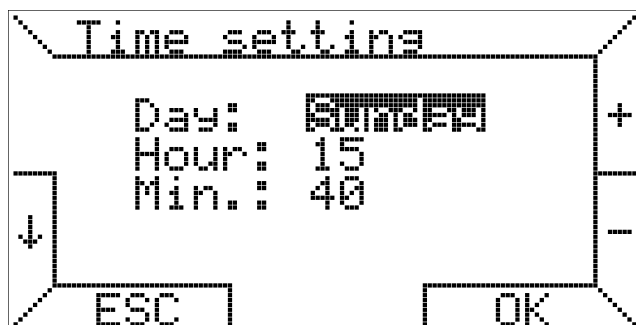


At the top you select the source day in the lower you select the destination day, You can also copy a program of the day all week and have the same program every day, to do this select as target the "ALL".

When you press OK, a message confirms your copy of the program.

Completed the description of the "Programming menu", we return to describe the sub menu "SETTING MENU".

The "Time setting" submenu on the "SETTING MENU" allows adjustment of the current time and day of the week.



Pushing the $\downarrow$ and $\uparrow$ buttons you select the item you want to change, while pushing the + and - buttons you change the value.

Pushing the OK button, you confirm the changes.

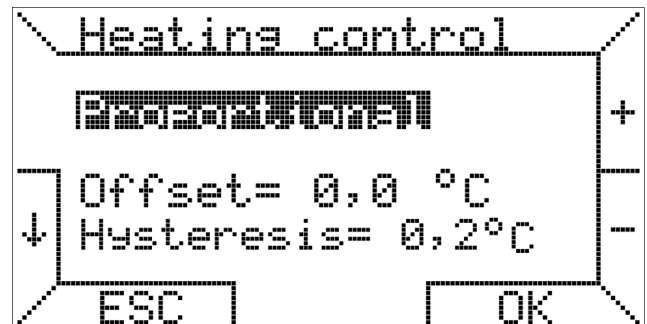
The "Language" submenu on the "SETTING MENU" allows set the language of texts on the chronothermostat.



As seen above, this setting is required when you first start or after a reset of the chronothermostat, then it can be changed at will.

The last item, "Heating Control" of the "SETTING MENU", concerns the method used by the chrothermostat for controlling room temperature.

It is a regulation that requires a specific knowledge of the heating system installed and is reserved, therefore, for advanced users: make changes without knowledge of the techniques of temperature control is not recommended.



The chronothermostat allows you to choose among four methods of temperature control environment:

- Proporzional
- On/Off
- Outside temperature compensation
- Outside temperature compensation with mix

Proporzional

Selecting proportional mode, the temperature setpoint of the system is modulated depending of the difference between the set room temperature and measured room temperature.

Only if the measured room temperature T_a is lower than the programmed temperature $T_{ap} + \text{hysteresis}$, then the heating setpoint T_i will be proportional to the difference between T_a and T_{ap} according to the following rule

if $T_a \leq T_{ap} - 1 + \text{offset}$ then $T_i = \text{max}$

if $T_{ap} - 1 + \text{offset} < T_a < T_{ap} + 1 + \text{offset}$
then $T_i = (\text{max} / 2) \times (T_{ap} - T_a + 1 + \text{offset})$

if $T_a \geq T_{ap} + 1 + \text{offset}$ then $T_i = 0$

when

T_i circuit heating setpoint.

T_{ap} room temperature setpoint.

T_a room temperature measured **offset** correction value (settable),

hysteresis avoids frequent switching off and on again.

offset is a correction value.

max maximum circuit heating setpoint (set by the user).

Is defined, in practice, a proportional band of width 2°C between the temperatures.

$T_{ap} - 1 + \text{offset}$ (which corresponds $T_i = \text{max}$),

$T_{ap} + 1 + \text{offset}$ (which corresponds $T_i = 0$)

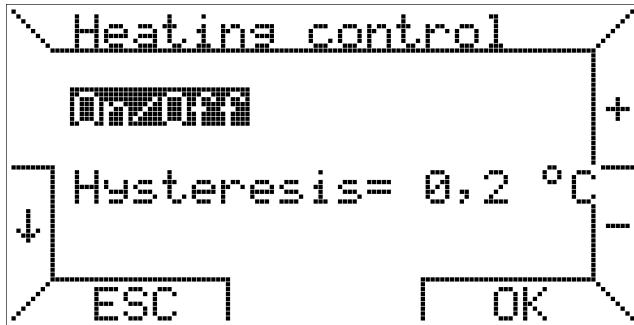
and centered in $T_{ap} + \text{offset}$.

The offset, is set from 0 to 1°C , the offset centers the band so that in correspondence of $T_a = T_{ap}$, you obtain the setpoint of circuit heating desideratum.

With the default offset = 0, the band has a width of 2°C and is centered in T_{ap} .

If the measured room temperature T_a reaches the set room temperature $T_{ap} + \text{hysteresis}$ then the heating set-point T_i will be forced to 0, thus leading to the boiler burner switching off. The next restart will happen when T_a drops

below T_{ap} . The hysteresis value can be set from 0 to 1° C (default 0.2 ° C).



On/Off

This mode is similar to that used by the thermostats with clean contact.

Set the hysteresis value, between 0 and 1 ° C (default 0.2 ° C), the temperature control takes place according to the following rule:

if $T_a \leq T_{ap} - \text{hysteresis}$ then $T_i = \text{max}$

if $T_a \geq T_{ap} + \text{hysteresis}$ then $T_i = 0$

when

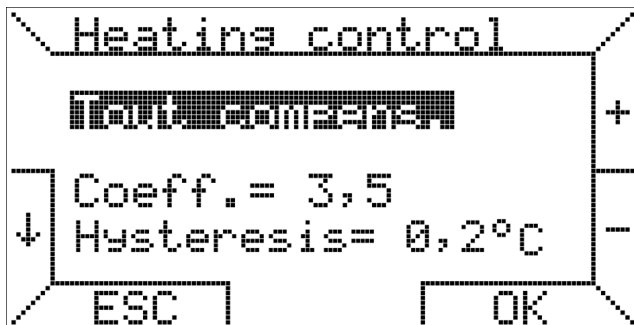
T_i circuit heating setpoint.

T_{ap} room temperature setpoint.

T_a room temperature measured.

offset correction value (settable),

max maximum circuit heating setpoint (set by the user).



Outside temperature compensation

If the boiler is equipped for measuring the outside temperature (T_{out}), you can choose the weather compensation as a mode of thermoregulation.

In this case you can set the coefficient of dispersion hc (heating curves) for external temperature compensation: the range is 0.5 to 3.5.

The chronothermostat calculates the setpoint temperature of the circuit heating according to the formula:

$$T_i = (T_{ap} - T_e) \cdot hc + T_{ap}$$

when

T_i circuit heating setpoint.

T_{ap} room temperature setpoint.

T_e external temperature measured

hc dispersion coefficient

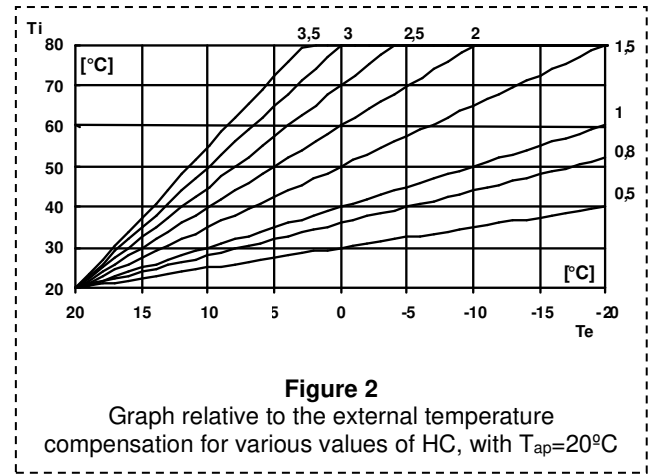
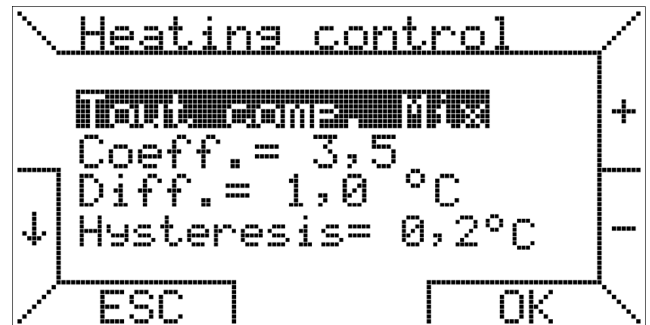


Figure 2

Graph relative to the external temperature compensation for various values of HC, with $T_{ap}=20^\circ\text{C}$

In this formula correspond to the curves shown in Fig. 2.

If the measured room temperature T_a reaches the set room temperature $T_{ap} + \text{hysteresis}$ then the heating set-point T_i will be forced to 0, thus leading to the boiler burner switching off. The next restart will happen when T_a drops below T_{ap} . The hysteresis value can be set from 0 to 1° C (default 0.2 ° C).



Outside temperature compensation with mix

This method of temperature control is the same climatic compensation just described with a correction dependent on the ambient temperature.

The ambient temperature acts as a "feedback" to improve environmental comfort.

To avoid that the ambient temperature deviates too much from the desired value, it is possible to set the differential d , in a range between 0 and 5 ° C so that:

if $T_{ap} - T_a > d$ then $T_i = \text{max}$

when

T_i circuit heating setpoint.

T_{ap} room temperature setpoint.

T_a room temperature measured.

max maximum circuit heating setpoint (set by the user).

d differential (set by the user).

If the measured room temperature T_a reaches the set room temperature $T_{ap} + \text{hysteresis}$ then the heating set-point T_i will be forced to 0, thus leading to the boiler burner switching off. The next restart will happen when T_a drops below T_{ap} . The hysteresis value can be set from 0 to 1° C (default 0.2 ° C).

MANAGEMENT SYSTEM PARAMETERS MENU

The submenu "PARAMETERS MENU" allows you to remotely manage the boiler.
Pushing the ↓ and ↑ buttons, you scroll through the various items.

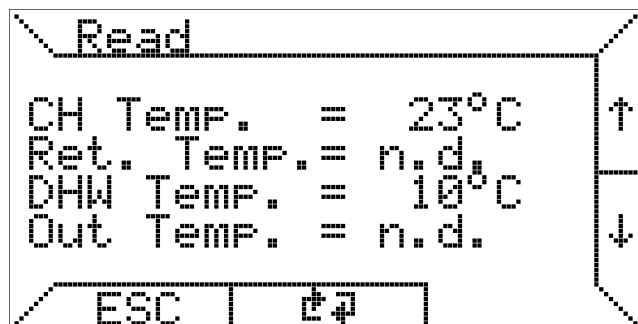
First page:



Second page:



The first item "Read" allows you to read the parameters of the system remotely.
Pushing the OK button is activated the first page of reading parameters.



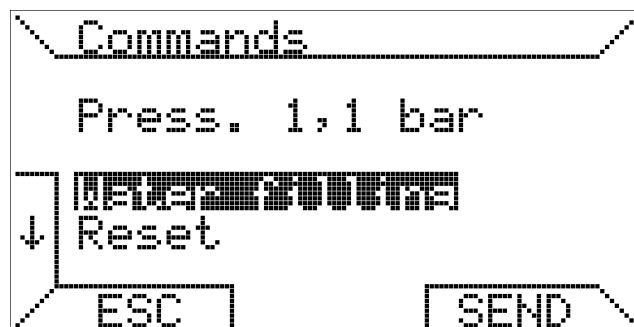
The parameters are active if the thermoregulation board manages the corresponding parameters.
The parameters are specific of OpenTherm protocol and to understand the meaning is necessary to know the protocol OpenTherm.
The parameters available, in different pages, are the following:

CH Temp.	Circuit heating temperature (°C)
Ret. Temp.	Return water temperature (°C)
DHW Temp.	DHW temperature (°C)
Out Temp.	Outside temperature (°C)
Exhaust T.	Boiler exhaust temperature (°C)
Mod. level	Relative modulation level (%)
CH Press.	Water pressure in CH circuit (bar)

DHW Flow	Water flow rate in DHW circuit. (l/m)
Fault flgs	Fault flags
Fault code	OEM fault code
TSP max	Number of transparent-slave-parameters
FHB max	Max. dimension fault-history buffer
Slave cfg.	Slave configuration flags
Slave sta.	Slave status flags
Master sta.	Master status flags
CH OT S.P.	Control setpoint circuit heating (°C)
Solar cfg.	Solar configuration
Solar sta.	Solar status
Storage	Solar storage temperature (°C)
Collector	Solar collector temperature (°C)

The values displayed are updated regularly by the chrothermostat every few seconds.
To force loading you can press the middle button transparent and get an instant update
Pushing ESC instead to return to the main menu.

The second item on the "PARAMETERS MENU" allows you to send commands to the boiler.

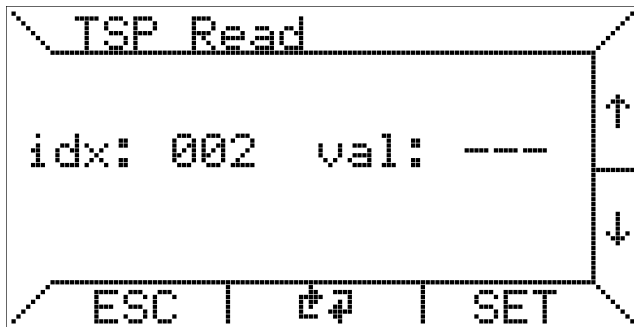


As shown in screen above, pushing the "Water filling" you can load the hydraulic system, monitoring the pressure, if the thermoregulation board manage it.
In case of lockout of the boiler, in addition, you can send a request for remote reset, choosing the "Reset" and press ENTER.

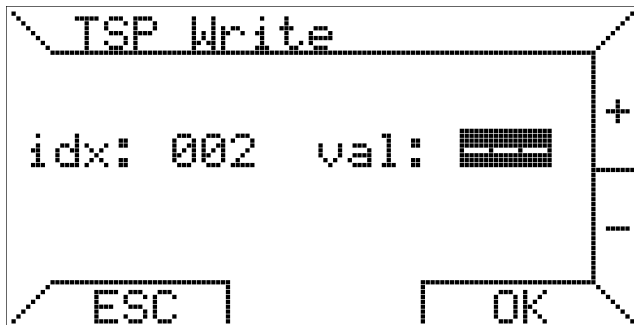
The remote reset is a safety function, the actual reset of the boiler is subject to the control of the safety logic board.
You can also unlock the boiler from the main screen (automatic mode, manual mode, etc.), Pressing the transparent button.

The third item concerns of the transparent parameters (TSP).

This function depends on the board connected to the chrothermostat, therefore, please refer to the board's documentation for detailed description and the use of these parameters. The number of TSP depends of the thermoregulation board, the chronothermostat supports a maximum of 255 TSP (idx 001 to 255).

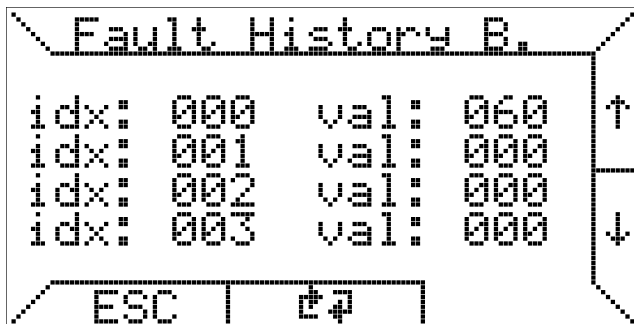


The chronothermostat provides the functions of reading and writing of the TSP, as shown above. Pushing the ↑ and ↓ buttons, you can move the index "idx" and pushing SET button the next page appears.



On this page using the + and - buttons, you can enter the desired value of the TSP. If the thermoregulation board does not provide the writing of this TSP (read only) changes will not take effect.

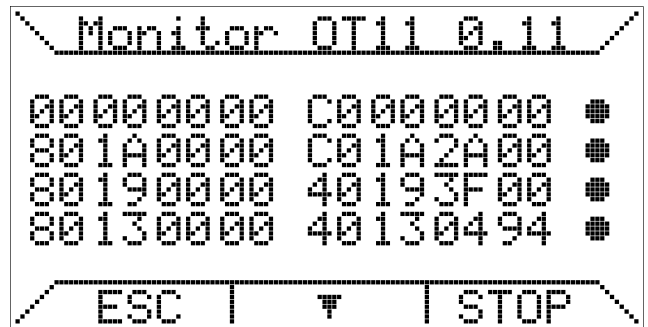
The fourth items in the "PARAMETERS MENU" allows the consultation of the "Fault History Buffer" (FHB) of the boiler, i.e. the storage the lock codes which may be useful for diagnostics.



This function cannot be managed of the thermoregulation board.

The values are displayed in groups of four per page and you can scroll through pages with ↑ and ↓ buttons. The chronothermostat also provides in this case the maximum number of parameters 255, with idx ranging from 000 to 254.

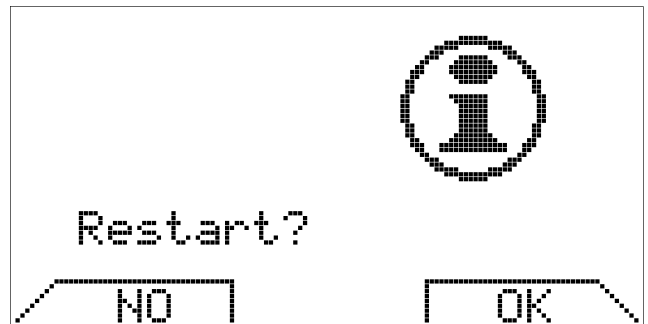
The last items of the "PARAMETERS MENU", contained in the second menu page, are typically used for technical work on the chronothermostat.



In particular, "OT monitor" is dedicated to the diagnosis of OpenTherm communication, as it makes visible the data exchanged between chronothermostat and thermoregulation board (master side).

In particular, next to the data, the following symbols appear:

- '.' correct data exchange
- 'T' timeout RX error
- 'R' RX error
- '?' generic error (unknown)
- 'P' parity error
- 'E' syntax error



Through the "Restart" command is possible to reconfigure the chronothermostat after interventions hardware / software occurred without disconnecting the power adapter on thermoregulation.

Pushing the button "Restart" is equivalent to disconnect the connector of communication.

The submenu "RS232 Monitor" is shown in the following section, remote management via GSM-SMS.

REMOTE MANAGEMENT VIA GSM-SMS

Connecting a GSM modem

The Kronos OT11 chronothermostat allows the user to remotely manage some functions of the heating system by sending and receiving SMS messages.

The boiler responds at the set number in case of anomaly status and lockout status. In order to use the GSM network is necessary to connect external GSM modem;

The GSM modem must have its own power supply and must be connected to kronos OT11 with a dedicated cable.

To install the GSM modem, refer to the instructions provided by the manufacturer of the modem itself.

WARNING!

To avoid connecting the signal ground GND of the serial cable!

Necessary to isolate the casing of the GSM modem, if this is connected electrically to the signal GND.

WARNING!

The GSM modem must be equipped with a SIM card active and able to send and receive SMS; before inserting the SIM in the modem, you must disable any PIN code request,
You can only send SMS from numbers with international prefix Italian ("+39").
At this date, the GSM function is only for Italy.
On request, the GSM function can be implemented to operate in other states.

TECHNICAL DATA SERIAL COMMUNICATION

- protocol RS-232
- baud-rate 2400 bit/s
- use of AT commands according to standard GSM 07.07 and 07.05
- use of 5 conductors (TX, RX, GND, DSR, CTS)

SIGNAL	CRONO (DTE)	MODEM (DCE)	
	CON. 8 POLES Tiye Molex 90327-0308 (J2 on pcb)	CONN. DB9	D-SUB 15 CONN. 15 POLES
TX (CT103)	7	3	2
RX (CT104)	8	2	6
GND	2	5	9
DSR	5	6	7
CTS	6	8	11

Table 1: Correspondence between the connector pins of the serial cable.

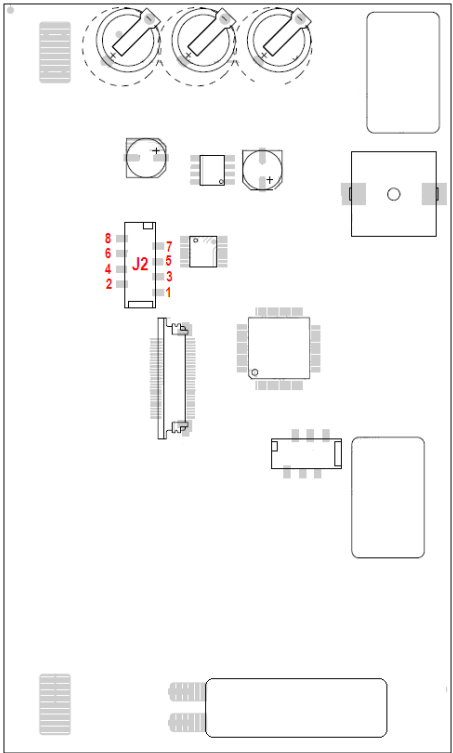
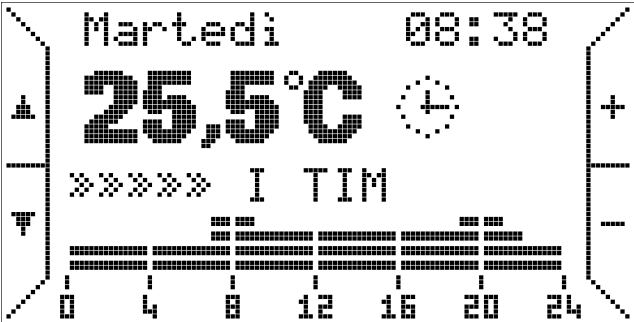


Figure 3 Position connector J2 on C.S. for connection with a GSM modem

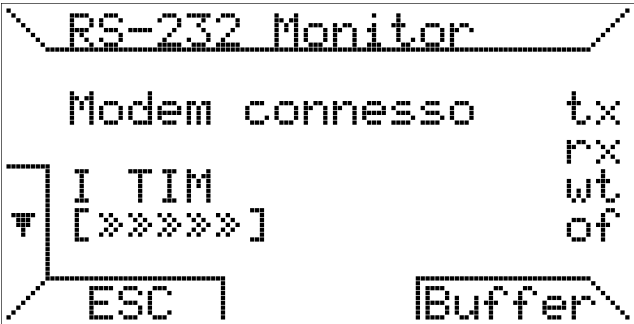
Displaying modem status

In the line on central text of LCD display you can check the status of the modem.
Particularly in the initial phase, if the modem is detected, if the SIM card is active and the GSM network is present, the screen will "automatically" appears as follows:

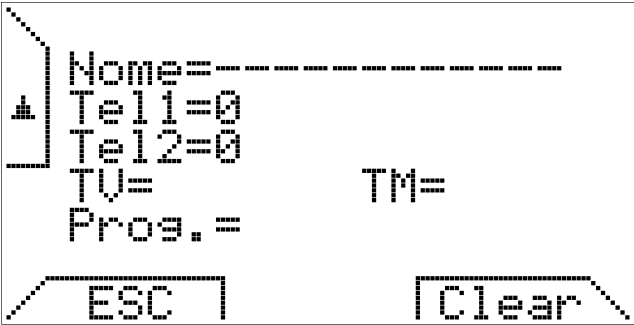


in addition to the usual information, there is shown the GSM signal level (0 to 5 "levels") and the name of the operator.

More information on communication with the modem can be viewed by entering the submenu "RS232 Monitor" located in "Menu parameters".
In the first page shows the status of the modem, the serial communication (right), the name of the GSM operator and the level of the signal.



Pushing the "Buffer" you can view the data exchanged between the chronothermostat and modem, for diagnostic operations.



INTERNAL ENERGY STORE AND USE OF BATTERIES

The chronothermostat is provided with an internal energy store which can compensate for a power cut-off for a few hours; in this way the user will not have to set the current time, room temperatures and week program again.

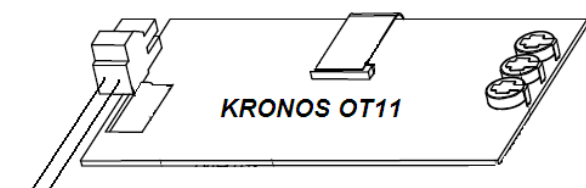
However, the internal energy store consumption time varies depending on the room temperature and humidity, as well as on the ageing of components. In order for the internal energy store to be fully effective, the chronothermostat must have been correctly energized for a couple of days at least without interruption.

Please note that on restoration of the power supply (and of serial communication), the boiler control board takes on the heating and DHW set-point values: any modification of these parameters should therefore be stored by the boiler control board itself. If frequent and/or long cut-offs of the boiler power supply are expected, it is possible to avoid losing chronothermostat data by installing two alkaline batteries type AAA LR03 1,5V into the appropriate slot on the fixing base. In this way, the additional internal energy store, made by new batteries, enables to preserve data for a period even longer than one year under no power supply conditions. It is advisable not to keep batteries inside the chronothermostat for a long time during normal operation (power supply presence) to prevent any battery liquid leakage from damaging the chronothermostat itself. Finally, please note that Kronos OT11 does not provide any information about the presence of batteries or their charging status.

WARNINGS ABOUT THE BACKLIGHT

The display backlight is obtained from the reserve described in the previous paragraph. It is possible, therefore, that in case of newly connected chronothermostat the brightness is minimal or absent because of insufficient internal charge: this must not alarm as they are just a few hours of connection, because the backlight to begin to be efficient. You can, if desired, to remedy this temporary lack of backlighting installing alkaline batteries, making sure the polarity and following the instructions in the previous paragraph.

OPENTHERM CONNECTION TO THE BOILER



OpenTherm connection to the boiler

INSTALLATION INSTRUCTIONS

Respect National and European standards (EN 60335-1/pr EN50165) regarding electrical safety.

Before turning on, check the cables, incorrect wiring may damage the devices and compromise safety.

Connect and disconnect the control system only in the absence of voltage.

Avoid exposing the system to dripping water.

INSTALLING THE CHROTHERMOSTAT ON THE WALL

First step, remove the cover containing the electronic board by pushing the appropriate button trapezoid, that says "PUSH", located on the lower unit and rotating the cover itself up, until it is fully removed, as shown in figure 4.

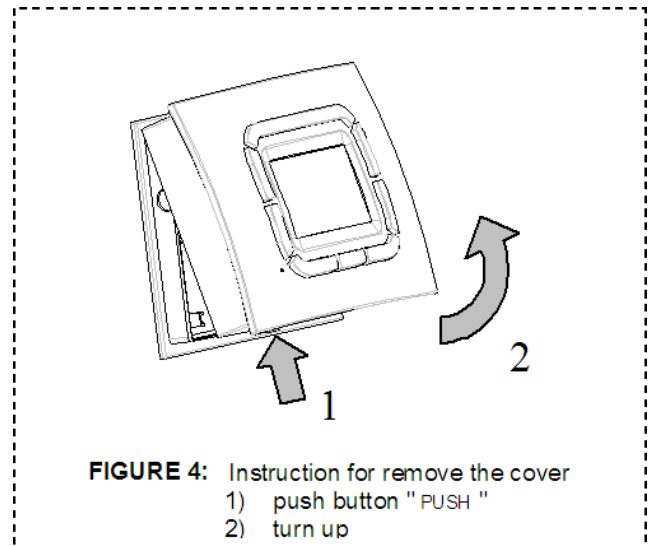


FIGURE 4: Instruction for remove the cover

- 1) push button "PUSH"
- 2) turn up

For the fixing on the wall is possible to use many holes provided on the bottom of the base, in this case, see figure 5. Then is possible to wire the circuit board unit using the appropriate terminal, regardless of the polarity (the two conductors can be exchanged). It is recommended to use a twisted pair cable (example H03RR-F o H03VV-F) size between 0,5 mm² and 2,5 mm², the length should not exceed 50m. The resistance of each conductor, in any case, should not exceed 5 Ω.

In environments with electromagnetic interference it is recommended to use a shielded twisted pair cable.

DEFINITION OF TEMPERATURE CONTROLS CLASSES IN ACCORDANCE WITH THE DELEGATED REGULATION EU No 811/2013

In accordance with the delegated regulation (EU) No 811/2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling; for Kronos OT11 the following temperature control classes are defined.

Class I: Setting the method of temperature control ON/OFF. The class I assigns a percentage value equal to 1% as a contribution to seasonal space heating energy efficiency.

Class V: Setting the method of temperature control PROPORTIONAL. The class V assigns a percentage value equal to 3% as a contribution to seasonal space heating energy efficiency.

Class VI: Setting the method of temperature control with OUTSIDE TEMPERATURE COMPENSATION or OUTSIDE TEMPERATURE COMPENSATION WITH MIX. The class VI assigns a percentage value equal to 4% as a contribution to seasonal space heating energy efficiency.



NOTES CONCERNING DISPOSAL OPERATIONS

The device contains electronic components and must not be disposed of as a domestic waste. For the disposal operation refer to the local rules concerning special waste.

DIMENSIONS FIXINGS

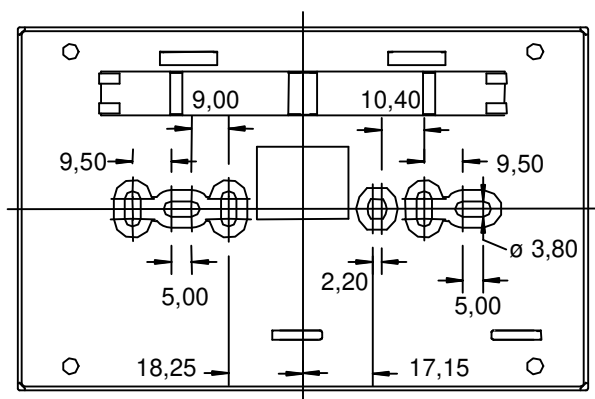


Figure 5: fixing holes of the base, back view

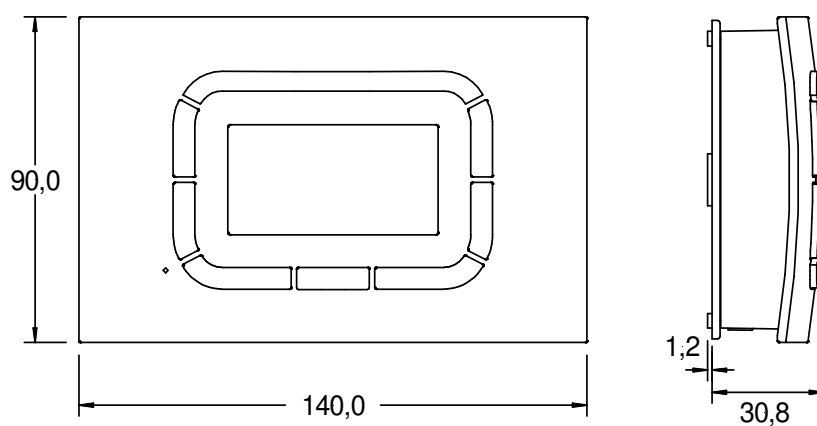


Figure 6: external dimension



NOTE

Kronos OT11 is available in white, shown on page 1, or black, as the image.

ATTENTION: Company BRAHMA S.p.A. takes no responsibility for any damage resulting from Customer's tampering with the device.

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