

# Installation, use and programming manual

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## Direct Digital Controller

Robur gas absorption units  
management and operation control





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NOTE

**Read the warnings contained in this manual carefully;** they give important information regarding safe installation, operation and maintenance: **keep this manual safe for all further consultation.**  
The manufacturer may not be held responsible for any damage arising from improper, incorrect or unreasonable use of the appliance.

## 1 GENERAL WARNINGS

This manual is an integral and essential part of the product and must be delivered to the end user.

**The installation of the Direct Digital Controller must be carried out by professionally qualified personnel**, in compliance with current regulations and according to the manufacturer's instructions, as incorrect installation may cause damage to persons, animals or things (or directly to the component), for which the manufacturer cannot be held responsible.

"Professionally qualified personnel" is defined as those possessing specific technical competence in the sector of electrical systems.

This device must be used only for the purposes for which it has been expressly designed. Any other use must be considered inappropriate and therefore dangerous.

The manufacturer is exempt from any contractual or extra-contractual responsibility for damage caused by errors of installation, use and in any case the non-observance of the instructions supplied by the manufacturer itself.

In the event of failure and/or poor operation of the Direct Digital Controller, do not attempt to repair it under any circumstances; any repair must be carried out solely by a ROBUR Technical Assistance Centre, using only original replacement parts.

The non-observance of the foregoing warnings may compromise the safety of the device.

It is not possible to install the Direct Digital Controller and the GA – GAHP and Prontoclima series of gas absorption units correctly without consulting the Installation Manual included with the UNIT and the Installation and Programming Instructions which follow.

## 1.1 GENERAL INFORMATION

The Direct Digital Controller is a device that is applicable as a panel, and which is able to show, on a backlit graphical LCD display of 128x64 pixels, all the status, operating and error conditions of each individual unit to which it is linked. The DDC (Direct Digital Controller) controls water thermostating by controlling the switch-on and switch-off of the units connected to it.

The Digital Panel can support and manage up to 32 modules (16 for heating and 16 for cooling) where module refers to the ability of a machine to produce cooled or hot water; therefore the ACF 60-00 comprises a module for the production of chilled water, and the AY 00-120 and GAHP-A each comprise a module for the production of hot water; on the other hand, the GAHP-AR and the GAHP-GS/WS comprise two modules, one for the production of chilled water, the other for hot water (see table below).

The Direct Digital Controller, on the other hand, is able to manage a single prontosistema heater/heater-chiller.

The Direct Digital Controller is, in addition, able to manage several plant configurations for the production of hot and/or chilled water, in particular:

1. 1 plant for the production of chilled water (**cold plant**). For example it is possible to connect up to a maximum of 16 ACF 60-00 which correspond to a maximum of 16 chilling modules; OR:
2. 1 plant for the production of hot water (**hot plant**). For example it is possible to connect up to a maximum of 16 GAHP-A or ACF 00-120 which correspond to a maximum of 16 heating modules; OR:
3. 2 independent plants, one to produce chilled water, the other to produce hot water (4-line configuration) able to run simultaneously (**one cold plant and one hot plant, independent**). It is therefore possible to manage both plants described in points 1 and 2, for a maximum of 16 modules for heating; for example, this is useful for installations with AHU fitted with a post-heating exchanger which works at the same time as the cooling OR:
4. 1 plant for **alternate** production (summer/winter) of hot or chilled water (**2-line hot-cold plant**). This is a two-line plant that, for example, in the winter serves the heating network and in the summer serves the cooling network. For example it is possible to connect up to a maximum of 16 GAHP-AR or AYF 60-119/2 which correspond to a maximum of 16 heating modules for chilling and 16 modules for heating.

To create high output plants it is also possible to connect two or three DDCs together in order to control up to 64 or 96 modules (up to 32 units may be linked to each DDC).



## NOTE

The Direct Digital Controller can manage modules of the ACF60 and AY00-119 type equipped with S61 and S70 electronic boards respectively.

- GAHP-A = 1 "hot" module
- GAHP-AR = 2 modules (1 "cold" + 1 "hot")
- GAHP-GS/WS = 2 modules (1 "cold" + 1 "hot")
- GA HR = 1 "cold" module (the "hot" module of the recuperator is not managed by the control system)
- ACF 60-00 = 1 "cold" module
- AYF 60-119/2 = 2 modules (1 "cold" + 1 "hot")
- AYF 60-119/4 = 2 modules (1 "cold" + 1 "hot")
- AY 00-120 = 1 "hot" module

### Domestic hot water (DHW) production plant control

The DDC is also capable of controlling a plant including the production of hot domestic water, by installing one or more optional RB100 or RB200 devices (Robur Box).

#### Definitions

**Generator:** general term indicating machines for the production of hot and/or chilled water. In the text they are also referred to as machines or units.

**Robur generator:** generator (heat pump, boiler or refrigerator) produced by Robur. All types of Robur generator can be directly managed from the Robur Direct Digital Controller (DDC) using the CANBus communication bus.

**Third party generator:** generator (usually a boiler or refrigerator) not produced by Robur, which cannot be directly managed from the DDC via the CANBus and thus requires an additional interface device (Robur Box RB200).

**Network ID:** unique identification number identifying a Robur generator on the CANBus BUS, a Direct Digital Controller (DDC), the valve service of an RB100 device, or each of the services provided by an RB200. It acts as an address for the data communication network; it must be set to a different value for each generator, DDC or RB100/RB200 device present. For RB200 devices a base network ID is set, then the system automatically assigns from this a network ID for each configured service.

In the documentation it is also referred to as a CAN ID or, when referred to Robur generators, unit ID or machine ID.

**Base plant part:** this term refers to the portion of the plant including all generators, excluding those which can be hydraulically separated via a specific three-way valve.

**Separable plant part:** this term refers to the part of the plant which can be hydraulically separately from the base plant part and run independently to provide a type of service for Domestic Hot Water (DHW).

This part of the system can be in two distinct states, on the basis of the position of the hydraulic separation motorised valve:

- **Separate:** in this status, the generators from the separable part of the plant are managed together with those of the base plant, in order to satisfy the request for the separable DHW service.
- **Included:** in this state the generators from the separable part of the plant are managed together with those of the base part, to satisfy heating and/or base DHW services; in particular the generators are made available if at least the heating request is active; in the presence of only the base DHW request, the generators on the separable part of the plant are not used.

**Separate plant part:** variant of the separable part of the plant, which has no three-way separation valve; it is therefore permanently sectioned off from the base plant part.

**Base DHW service:** domestic hot water service obtained with the base plant part.

**Separable/separate DHW service:** domestic hot water service obtained with the separable/separate plant part.

**Base group:** set of generators on the base plant part.

**Separable/separate group:** set of generators on the separable/separate plant part.

**Plant ID:** identification number between 0 and 15, set by a specific parameter in the Robur generators to indicate that they belong to a given plant, understood as the hydraulic circuit they are connected to. One or more plant IDs (cold plant ID and/or hot plant ID) must be set on the RB200 device if this manages third party generators.

**NOTE:** The plant ID does not vary between the base and separable/separate plant parts. To indicate on which part of the plant a Robur generator is found we use another parameter to be set on it (group to which the unit belongs); to indicate on which part of the plant a Third Party generator managed via an RB200 device is found, we use a parameter to be set on that device.

The RB100 and RB200 devices are used to interface requests for different types of services from one or more external control systems with the DDC.

The inputs for the service requests available on each RB100 and RB200 interface device are the following:

**Cooling service request:** when this input signal is enabled, the equipment sends a request to the DDC so that the latter can drive the switching on of the cold modules present on the plant and can manage them in order to meet the request appropriately;

**Heating service request:** when this input signals is enabled, the equipment sends a request to the DDC so that the latter can drive the switching on of the hot modules present on the plant and can manage them in order to meet the request appropriately;

**DHW0 and DHW1 service request:** when one of these input signal is enabled, the equipment sends a request to the DDC so that the latter can drive the switching on of the hot modules present on the plant and can manage them in order to meet the domestic hot water request appropriately. In particular, each of these inputs can be configured to make separable or base domestic water requests; it is also possible to enable both inputs and therefore manage two DHW service requests at the same time.

The basic DHW service is normally used to provide a DHW service at circuit temperatures that are compatible with Robur GAHP high efficiency heat pumps.

The separable or separate DHW service is normally used to provide a DHW service (complete or integrating the base DHW service) which requires higher circuit temperatures, which are not compatible with the GAHP heat pump units, therefore delivered by conventional heat generators (boilers) installed on the separable or separate part of the plant.

RB100 and RB200 devices can also control the three-way valve used to hydraulically separate the separable plant part from the base part.

#### **Control of alternate hot/cold 2 line production plant with generation side or 4-line user side manifolds**

Using the RB100 or RB200, the DDC is also able to control a three-way valve used to hydraulically commute the plant for operation in either heating or cooling. The valve is useful in the following two cases:

- Plant with two line generation (for example in the case of GAHP-AR units) and distribution to four-line services (for example underfloor heating and fan coil cooling).
- Plant with four line generation (use of only cold and only hot units mounted on separate manifolds) and distribution to two-line services (for example heating and cooling both served by the same fan coils).

**NOTE:** installation of only cold or only hot units on separate manifolds is not compulsory, but can be done for specific reasons: for example, during the summer to allow the production of domestic hot water with heat pumps and at the same time the production of cold water for cooling.

**NOTE:** RB100 has only one valve control output, while RB200 has two outputs. Therefore, if you need to manage both the separation valve and the cooling/heating commutation valve using an RB100 device, you will need two; if you use the RB200 on the other hand, you will need only one device.

**Control of plant with third party boilers and/or chillers**

Using the optional device RB200, the DDC can also control plants which include not only Robur units, but also third party generators (boilers and/or chillers). The RB200 is used to interface these generators through specific input and output signals; at this point, the DDC can control the system by switching on or off all the available units, including third party ones.

**NOTE:** these functions are not available on the RB100.

**Control of other plant parts**

Again thanks to the use of the optional RB200, the DDC can control the operation of different types of water pump needed to implement different plant layouts, as well as acquire the temperature of the manifolds on the different branches of the plant through temperature probes connected to the RB200. The use of manifold probes makes the system configurations supported by the control system more flexible.

**NOTE:** these functions are not available on the RB100.

**Control system expandability using RB200 devices**

When one or more RB200 devices are added to a system comprising DDCs and Robur heating or chilling modules, the following rules apply:

1. On any system, also with maximum expansion (three DDCs, 48 heating modules and 48 chilling modules) it is possible to add an RB200 device used fully, i.e.:
  - with the heating, cooling and DHW requests enabled
  - with all water pump, temperature probe and valve services enabled
  - with both the third party generator service enabled; however it must be considered that every third party generator occupies a heating or chilling module, which must therefore be included in the calculation of the total number of modules
2. It is also possible to add up to seven more RB200 devices, used only to manage other third party generators, again considering that every generator occupies a heating or chilling module, to be included in the calculation of the total.

**NOTE**

For further information concerning:

- Domestic hot water (DHW) production plant control
- Control of alternate hot/cold 2 line production plant with generation side or 4-line user side manifolds
- Control of plant with third party boilers and/or chillers
- Control of other plant parts
- Control system expandability using RB100 or RB200 devices
- Installation and use of RB100 or RB200 devices

Please consult the installation and user booklet of the RB 100 (code D-LBR468) and the RB 100 applications booklet (code D-LBR467), or RB 200 device (code D-LBR632) and the Applications Manual (code D-LBR630), according to the type of device used.



## 2 QUICK GUIDE FOR THE USER

### 2.1 GENERAL CHARACTERISTICS OF THE DIRECT DIGITAL CONTROLLER

The Direct Digital Controller is a device that is applicable as a panel, and which is able to show, on a backlit graphic LCD display of 128x64 pixels, all the status, operating and error conditions of each individual unit to which it is linked. The DDC (Direct Digital Controller) controls water thermostating by controlling the switch-on and switch-off of the units connected to it.

The following elements are present on the front of the panel:

- **Graphic display** on which all the parameters necessary to control, program and configure the plants managed by the DDC are shown (see detail A in Figure 1).
- **Selector knob (Encoder):** the instrument with which it is possible to interact with the DDC. It allows the operator to select options, set parameters etc. (see detail B in Figure 1).
- **RS 232 serial port** for connecting the DDC to a PC (see detail C in Figure 1).

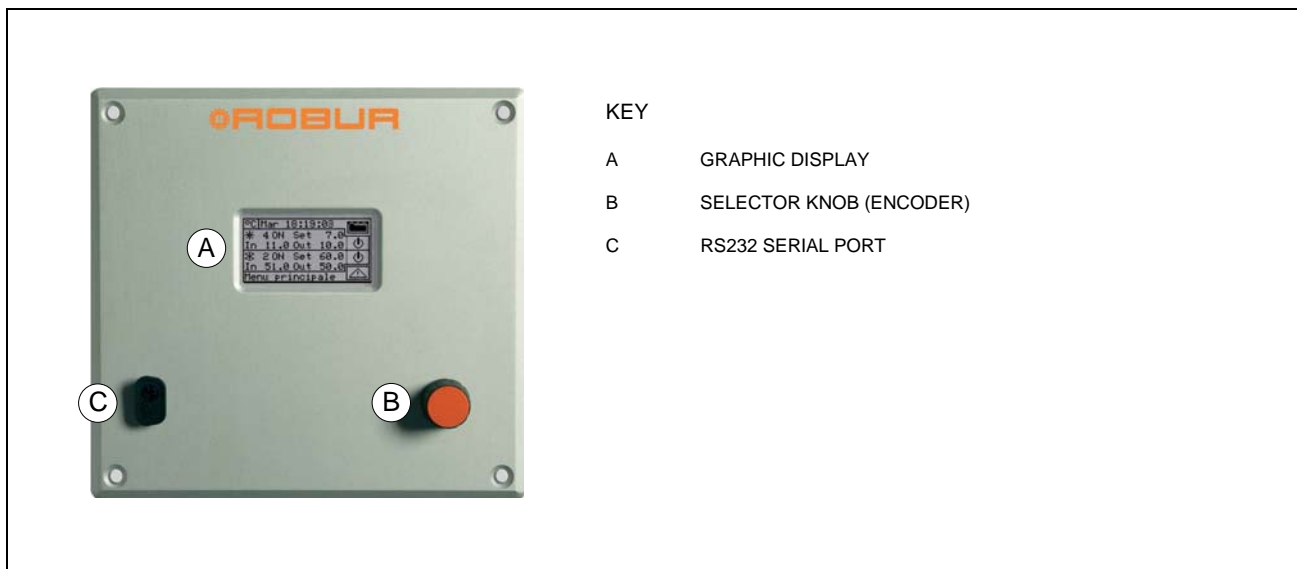





Figure 1 – FRONT VIEW OF DIRECT DIGITAL CONTROLLER.



## 2.2 MAIN SCREEN



The Direct Digital Controller is equipped with a backlit LCD graphic display (128x64 pixels), able to display the operating conditions of the plants and each individual unit to which it is linked.

The Direct Digital Controller's display, during normal operation, allows the following parameters to be viewed:


- Zone 1** The upper zone of the display which shows, upon activation, the time, day and symbol of the unit of measurement used to display inlet and outlet water temperatures of each plant controlled.



In case services for the production of domestic hot water are configured, the  icon is shown on top right side; its selection/press permits to display the operation parameters of the heating/cooling plant () or of the domestic hot water plant (.

- Zone 2** This zone contains the symbol , to indicate that it refers to the plant operating parameters for the production of chilled water. In the initial screen, upon first activation of the DDC, the message "PLANT NOT CONFIG" appears. During the operation, the water inlet/outlet temperature values and the set point value are shown (if the plant is ON).  appears on the right, allowing access to the "Plant control" menu; A: plant status ON/OFF; B: plant ID code (0-15).



- Zone 3** This zone contains the symbol , indicating that it refers to the plant operating parameters for the production of hot water as concerns the heating plant. In the initial screen, upon first activation of the DDC, the message "PLANT NOT CONFIG" appears. During operation, inlet/outlet water temperatures of the plant and the set point value are displayed (if the plant is ON). The  icon on the right of the display allows access to the "Plant control" menu;

A: ON/OFF status of plat; B: plant identification code (0-15).

- Zone 4** The last row displays a message that briefly describes the icon on which the cursor is positioned. The  icon allows access to the "error" menu; the icon permits to access to the "Main menu".

- Zone 5** The symbol  is shown to indicate that the zone contains the displaying of the operation parameters of the hot water production plant for the base DHW service (production of domestic hot water making use of the units on the base plant part with possibility of carrying out the production at the same time with the heating service). During the operation, the water inlet/outlet temperature values and the set point value are shown (if the plant is ON).  appears on the right, allowing access to the "Base DHW Plant control" menu; A: plant status ON/OFF; B: plant ID code (0-15).

If this kind of DHW service is not configured, caption "SERV. NOT CONFIGURED" is shown.

- Zone 6** The symbol  is shown to indicate that the zone contains the displaying of the operation parameters of the hot water production plant for the separable DHW service (production of domestic hot water making use of the units on the splitting plant part with alternating DHW/heating service or with DHW service only). During the operation, the water inlet/outlet temperature values and the set point value are shown (if the plant is ON).  appears on the right, allowing access to the "Separable DHW Plant control" menu; A: plant status ON/OFF; B: plant ID code (0-15).

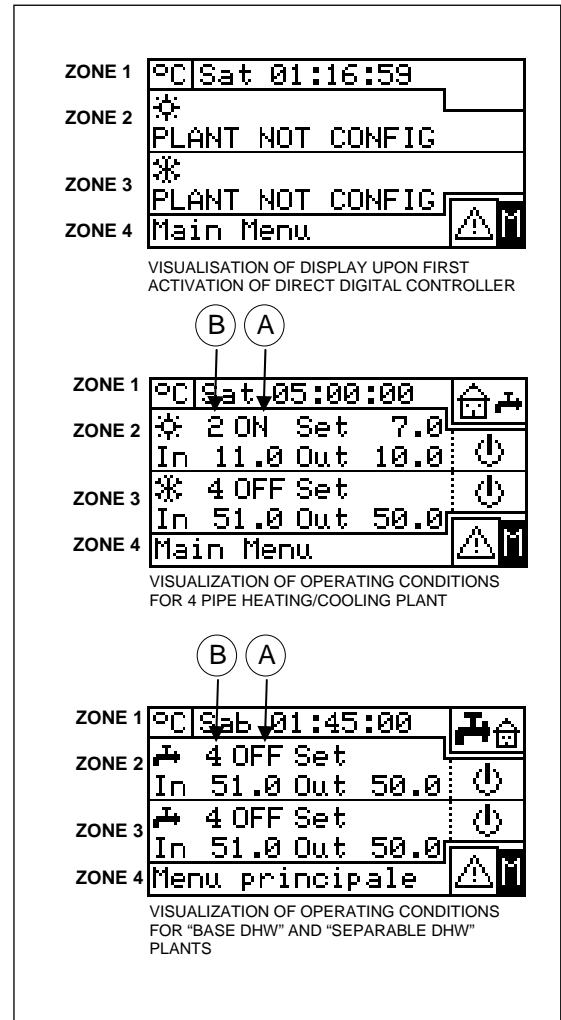


Figure 2 - EXAMPLES OF MAIN SCREEN

NOTE

If this kind of DHW service is not configured, caption "SERV. NOT CONFIGURED" is shown.

The symbols used to represent the heating and/or cooling plant are the following:

- ☼ Sun: represents the chilled water production plant (COOLING);
- ❄ Snowflake: represents the hot water production plant (HEATING).


The main screen of the DDC, **according to the type of plant configured**, may appear as follows:

<p>PLANTS NOT CONFIGURED</p>	<p>ONLY CONDITIONING PLANT CONFIGURED</p>	<p>ONLY HEATING PLANT CONFIGURED</p>
<p>HEATING AND DOMESTIC HOT WATER PLANTS CONFIGURED</p>	<p>COOLING AND HEATING PLANTS CONFIGURED FOR CONTEMPORARY OPERATION (4 pipes)</p>	<p>COOLING AND HEATING PLANTS CONFIGURED FOR CONTEMPORARY OPERATION ; DHW SYSTEM CONFIGURED</p>
<p>COOLING AND HEATING PLANTS CONFIGURED FOR ALTERNATING OPERATION</p>	<p>COOLING AND/OR HEATING PLANTS CONFIGURED FOR ALTERNATING OPERATION</p>	<p>ONLY DOMESTIC HOT WATER PLANT CONFIGURED</p>

**NOTE**

If the set point is configured on inlet water, the inlet water set point is displayed below it (In).

In the event of errors occurring in the units of the plant(s), the following signals are given:

- The  symbol flashes;
- The display illumination flashes;
- The device (if ON) emits an intermittent beep (see Paragraph 3.4.2.4 - "Alarm Beeper" on page 49).

**WARNING**

- 1 – The DDC's display reverts to the main screen after 30 minutes of inactivity (no operation of encoder).
- 2 – The backlighting of the display is switched off after 15 minutes of inactivity (see also Paragraph 3.4.2.5 - "Display Options", on page 50).
- 3 – If the encoder is turned or pressed while the display's backlight is flashing, it stops flashing, and starts flashing again after 25 seconds of inactivity, if the error conditions persist.

In all other screens the display's illumination flashes.

**2.3 USING THE ENCODER**

The main user interface for management, programming and control of the DDC is the knob located on the front of the Direct Digital Controller (the encoder).

The operations that may be performed with the encoder can be summarised as follows:

- 1 - Rotate the encoder in a clockwise or anticlockwise direction to position the cursor on the icons to be selected on the display or to modify the value of a numerical field.
- 2 - Press the encoder to access the menu selected or to confirm the operation being carried out.

Each time instructions in this manual indicate that an icon, parameter etc. should be selected, it is necessary to carry out the two operations described above.



ROTATING THE ENCODER



PRESSING THE ENCODER

## 2.4 COOLING/HEATING SERVICE CONTROL MENU

Select the icon from the main screen, concerning the service to be controlled, to access the “Plant control” menu. In this screen, on the basis of the configuration carried out, it is possible to select and manage the buttons that switch on the cooling/heating plants.

The figure below shows how the “Plant control” menu screen appears to give an example of configuration.

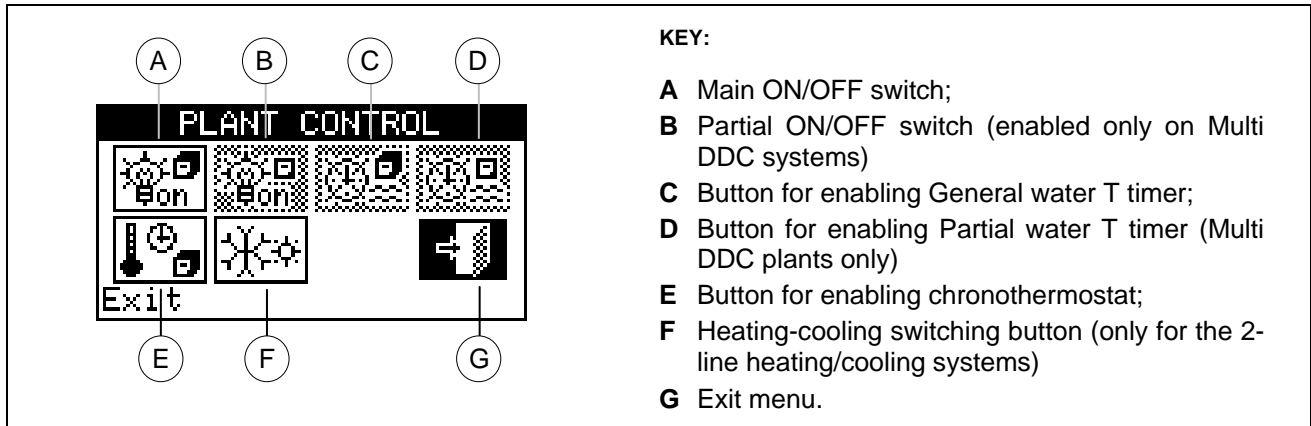






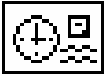





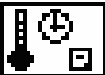





















Figure 3 – EXAMPLE OF COOLING/HEATING PLANT CONTROL SCREEN

	<p><b>Main ON/OFF switch of cooling/heating services.</b> It permits to switch on/off the controlled service(s) (cooling and heating or 2-pipe cooling/heating).</p> <ul style="list-style-type: none"> <li>▪ To <b>switch on</b> the service(s) , turn the knob and position the cursor on  and then press the same. The button will appear thus  to indicate that the switch has been closed (ON).</li> <li>▪ To <b>switch off</b> the service(s), turn the knob and position the cursor on  and then press the same. The button will appear thus  to indicate that the switch has been opened (OFF).</li> </ul> <p>The symbol  indicates that the button has been disabled and that it is not possible to select it. The switch will not affect the switching on of the plant.</p>
	<p><b>Group ON/OFF switch.</b> Use this button to switch on or off only the units that are directly managed by the specific DDC. <b>This button is enabled only for Multi DDC plants (i.e. plants that are managed by several Direct Digital Controllers);</b> the activation of those units requires, however, that the main ON/OFF switch present only on the master DDC is enabled.</p> <ul style="list-style-type: none"> <li>▪ To <b>enable</b> on the units controlled by the DDC, turn the knob to position the cursor on , and press the knob. The button will appear thus  to indicate that the switch has been closed (ON).</li> <li>▪ To <b>disable</b> the units controlled by the DDC, turn the knob to position the cursor on , and press the knob. The button will appear thus , indicating that the switch has been opened (OFF).</li> </ul> <p>The symbol  indicates that the button has been disabled and that it is not possible to select it.</p> <p>The switch does not affect the switching on of the units.</p>

	<p>Button for enabling/disabling <b>General water T timer</b>. It enables/disables the use of the switching-on timing for all the units.</p> <ul style="list-style-type: none"> <li>To <b>disable</b> the general water T timer turn the knob and position the cursor on  then press the knob. The button will appear thus , indicating that the water T timer has been disabled and that the corresponding switch will be closed (ON status).</li> <li>To <b>enable</b> the general water T timer turn the knob and position the cursor on  and then press the knob. The button will appear thus , indicating that the water T timer has been enabled. The corresponding switch will be closed or opened according to whether the time falls within a programmed timer cycle (see Paragraph 3.4.1.1.1.3 , programming the general water T timer).</li> </ul> <p>The symbol  indicates that the button has been disabled and that it is not possible to select it (switch with ON status).</p>
	<p>Button for enabling/disabling <b>Partial water T timer (button enabled only for Multi DDC plants)</b>. This button allows the user to choose whether to program a switch-on time or not only for the units managed by the individual DDC.</p> <ul style="list-style-type: none"> <li>To <b>disable</b> the partial water T timer, turn the knob to position the cursor on  and press the knob. The button will appear thus , indicating that the partial water T timer has been disabled and the corresponding switch will be closed (ON status). The partial water T timer is in any case disabled if the General water T timer is disabled.</li> <li>To <b>enable</b> the partial water T timer, turn the knob and position the cursor on  then press the knob. The button will appear thus , indicating that the Partial water T timer has been enabled. The corresponding switch will be closed or opened according to whether the time falls within a programmed Partial water T timer cycle (see Paragraph 3.4.1.1.1.4 for the programming the Partial water T timer).</li> </ul> <p>The symbol  indicates that the button has been disabled and that it is not possible to select it (switch with ON status).</p>
	<p>Chronothermostat <b>activation/deactivation</b> button;</p> <p>This button is enabled in one of the following due cases and assumes different functions, described below:</p> <p>1- The room chronothermostat is active depending on the internal room probe (ambT mode or equivalent, CUSTOM mode and "ChronT" active). In this case:</p> <ul style="list-style-type: none"> <li>To <b>disable</b> the chronothermostat, turn the knob and position the cursor on  and then press the same. The button takes on the following aspect  indicating that the chronothermostat has been deactivated and the corresponding switch is closed (ON status), i.e. the system <b>DOES NOT</b> regulate the internal room temperature).</li> <li>To <b>enable</b> the chronothermostat, turn the knob and position the cursor on  and then press the same. The button will appear thus , indicating that the chronothermostat is enabled. The corresponding switch will be opened or closed depending whether the room temperature satisfies the active room set-point on the basis of chronothermostat programming. This means the system regulates the internal room temperature on the basis of chronothermostat programming (for further information see paragraph 3.4.1.2.3 "Chronothermostat").</li> </ul>

	<p>2- The room thermostat is active based on the climatic curve and external temperature probe (WCmp mode or equivalent equivalent, CUSTOM mode and “WCmp” function active) and the climatic curve function is enabled in the user level menu “<b>Enabling of climatic curve</b>” (see paragraph 3.4.1.1.1.2).</p> <p>In this case, by pressing the knob repeatedly with the cursor positioned on the chronothermostat activation/deactivation button, the symbol assumes the different aspects in sequence to which the following modes correspond:</p> <ul style="list-style-type: none"> <li>•  the room temperature set-point is that active on the bases of the programming set on the chronothermostat.</li> <li>• : the room temperature set-point is always T3 (maximum level of the heating or cooling service)</li> <li>•  the room temperature set-point is always T2 (average level of the heating or cooling service)</li> <li>• : the room temperature set-point is always T1 (minimum level of the heating or cooling service)</li> </ul> <p><b>NOTE:</b> continuing to press the knob, the sequence is repeated.</p> <p>Note that the climatic curve function remains active in all modes stated above; therefore in this case the system <b>ALWAYS</b> regulates the internal room temperature, based on the climatic curve. The change affects only the choice of the value of the room temperature set-point value.</p> <p>If neither of the two cases stated above exists, the button takes on the  aspect to indicate that it is disabled. The system does not regulate the internal room temperature.</p>
	<p>COOLING/HEATING switch button (<b>button present for 2 line hot/cold plants only</b>);</p> <ul style="list-style-type: none"> <li>▪ To change to <b>Cooling</b> turn the knob to position the cursor on  then press the knob. The button will appear thus , indicating that the plant will be enabled for cooling operation.</li> <li>▪ To change to <b>Heating mode</b> turn the knob to position the cursor on  then press the knob. The button will appear thus , indicating that the plant will be enabled for <b>heating</b> operation.</li> </ul>
	<p>Heating/cooling priority selection button for GAHP-GS/WS module (<b>button only present on 4-line hot/cold plants with units of the GAHP-GS/WS type</b>);</p> <ul style="list-style-type: none"> <li>▪ To give priority to <b>Cooling</b> turn the knob and position the cursor on  then press the knob. The button will appear thus , indicating that priority will be given to cooling operation for the GAHP-GS/WS units.</li> <li>▪ To give priority to <b>Heating</b> turn the knob to position the cursor on  then press the knob. The button will appear thus , indicating that priority will be given to <b>heating</b> operation for the GAHP-GS/WS Units.</li> </ul> <p>For further information on the use of this button, consult the operation and maintenance manual of the GAHP-GS/WS unit.</p>

NOTE

According to the configuration carried out, some of the buttons may be disabled. (status always ON). For further details, consult Paragraph “**On/off command configuration**” on page 103.




**NOTE**

As concerns the heating service, the switching off does not necessarily involve the switching off of the units. In fact, if also one or more DHW production services are configured, the units can start to meet the DHW requests. In order to ensure the real switching off of the plant, switch off also the DHW service(s), as indicated in paragraph 2.5 "BASE AND SEPARABLE DHW SERVICE CONTROL MENU" on page 15.



## 2.5 BASE AND SEPARABLE DHW SERVICE CONTROL MENU

To access the “DHW Plant control” menu, follow the indications given below:

- 1 - Select the  icon from the initial screen and press the knob to gain access to the screen displaying the base and separable DHW service operation parameters.
- 2 - Select the  symbol positioned above to gain access to “**Base DHW control**” menu (see “Zone 5” Figure 2 on page 6).
- 3 - Select the  symbol positioned below to gain access to “**Separable DHW control**” menu (see “Zone 6” Figure 2 on page 6).
- 4 - In both cases (“Base DHW control” and “Separable DHW control”) the screen shown in Figure 4 will be displayed on the screen.
- 5 - The switching on of the Units of which use is made to produce domestic hot water requires also a request coming from the RB100 or RB200; the button in position ON is not sufficient by itself to switch on the units of the DHW group. The base or separable DHW services each require a specific request; for more information please consult the installation and use booklet of the RB 100 (code D-LBR468) and the RB 100 applications booklet (code D-LBR467), or the installation and use booklet of the RB 200 (code D-LBR632) and the applications manual (code D-LBR630), according to the type of device used.

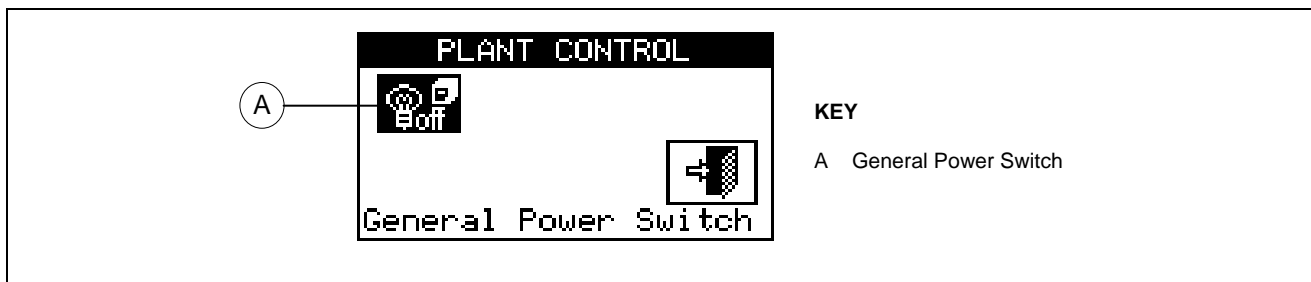








Figure 4 – EXAMPLE OF BASE OR SEPARABLE DHW SERVICE CONTROL SCREEN

	<p><b>Base or separable DHW service ON/OFF switch.</b> Used to switch the corresponding DHW service ON/OFF.</p> <ul style="list-style-type: none"> <li>▪ To <b>switch on</b> the plant, turn the knob and position the cursor on  then press the knob. The button will appear thus  to indicate that the switch has been closed (ON).</li> <li>▪ To <b>disable</b> the plant, turn the knob and position the cursor on  and then press the same. The button will appear thus  to indicate that the switch has been opened (OFF).</li> </ul> <p>The  symbol indicates that the button cannot be selected. The switch does not affect the switching on of the units. The “milled” icon is shown only on the Slave DDC in case of Multi-DDC configuration, and the switching On/Off of the corresponding DHW service can occur only on the Master DDC. The “button” on the Slave DDC reflect the status of the Master DDC button.</p>
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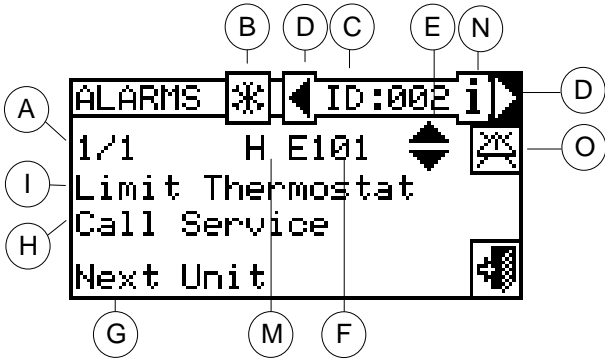
Switching off the DHW service does not necessarily imply that the units are switched off. If also the heating service is configured, the units may come on to satisfy this request. In order to ensure the real switching off of the plant, switch off also the heating service, as indicated in paragraph 2.4 “COOLING/HEATING SERVICE CONTROL MENU” on page 11.

## 2.6 ALERTS MENU

This menu allows the user to visualise any anomalies in the units of the plant(s).



To access the alerts menu, select  from the main screen.

The figure below indicates the alerts menu screen.



The screenshot shows the Alerts Menu interface. At the top, it displays 'ALARMS' with a plant icon, a scroll bar, and 'ID:002 i'. Below this, it shows '1/1 H E101' with a scroll bar and a bell icon. The main text area contains 'Limit Thermostat' and 'Call Service'. At the bottom, it says 'Next Unit' with a scroll bar. Callout letters A through O are placed around the screen to identify specific UI elements.

**KEY:**









- A** Sequential number of events in progress for selected unit;
- B** System identification symbol;  for cooling plant,  for heating plant;
- C** Indication of machine ID;
- D** Scroll arrows to change which unit's events are displayed;
- E** Vertical scroll arrows: these allow the user to view the events that have occurred on the unit;
- F** Indication of event code (Error: E, Warning: W);
- G** String describing the position in which the cursor is;
- I** Text describing event;
- H** String describing the action to be carried out to solve the event that occurred;
- M** Anomaly regards:
  - **C**: conditioning module;
  - **H**: heating module;
  - **B**: electronic board.
- N** Access to the "unit information" of the selected unit;
- O** Access to the "unit alarms reset" of the selected unit

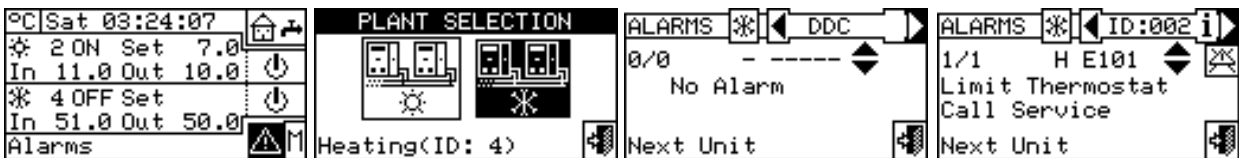
NOTE: the letters C and H will not be displayed for GAHP-GS/WS

Figure 5 – EXAMPLE OF ALERTS MENU SCREEN


The alerts menu shows the **events underway**: it is possible to view the type of event (warning or error) for each machine type.

Instructions to access the alerts menu:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - From the main menu, select .
- 3 - Select the plant in which the events occurred:  for two-line cooling/heating plants,  for hot water production plants, or  for chilled water production plants. The  symbol that appears next to a plant icon indicates that anomalies are present in that plant.
- 4 - To search for the unit in which errors have occurred select  (detail "D" in Figure 5). If no error has occurred, the message "No error" appears.
- 5 - Use the vertical scroll arrows  (detail "E" in Figure 5) to view all the events present on the unit.



The row of screenshots shows the following steps: 1. Main menu showing system status (PC Sat 03:24:07, 2 ON Set 7.0, In 11.0 Out 10.0, 4 OFF Set, In 51.0 Out 50.0, Alarms). 2. Plant Selection screen showing 'Heating(ID: 4)' selected. 3. Alerts menu for 'DDC' showing '0/0' and 'No Alarm'. 4. Alerts menu for 'ID:002 i' showing '1/1 H E101' and 'Limit Thermostat Call Service'.

The  key allows the user to access the "MACHINE MANAGEMENT" menu in order to perform an error reset, if necessary.

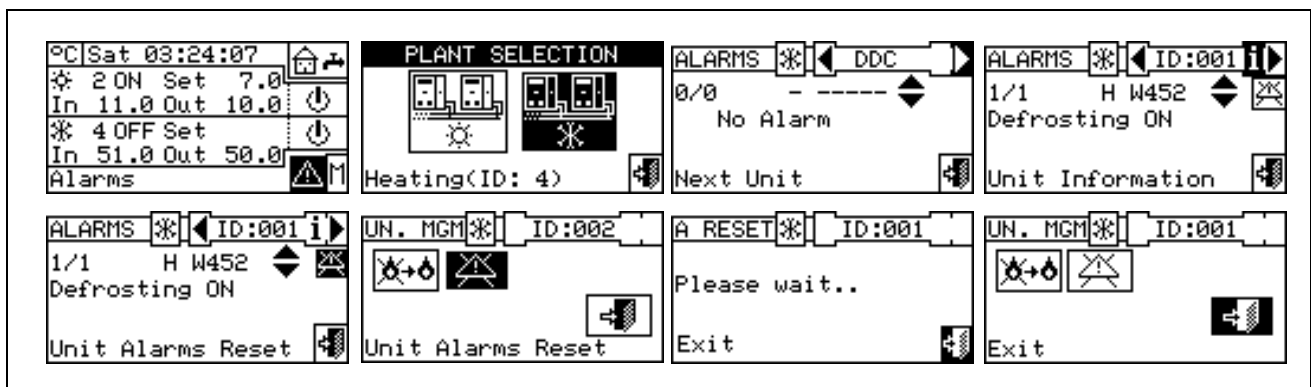
The button **i** allows to access the "INFORMATION MENU" related with the selected unit.

## 2.7 ERROR RESET

This option allows the user to reset the anomalies present in the unit selected (with the exception of flame control unit arrest).

To carry out an error reset, follow the instructions below:

- 1 - Select from the initial screen to access the alerts menu.
- 2 - Select the plant in which the events occurred: for the cooling plant, for the heating plant, or if the DDC is configured to manage a 2 line hot/cold plant.  
The symbol that appears next to a plant icon indicates that anomalies are present in that plant.
- 3 - Select to view the screen that relates to the unit where the error has occurred.
- 4 - Select to access to the "INFORMATION MENU" related to the selected unit.
- 5 - Select to access the MACHINE MANAGEMENT menu directly.
- 6 - Position the cursor on and press the knob to carry out an error reset.
- 7 - Wait for the operation to be performed. If the operation is successful, the message "OK" appears on the display.
- 8 - To exit, select .



NOTE

An error reset does not reset the flame control unit. To reset the flame control unit is necessary to move with the cursor on and press the knob.

WARNING

Error resets for which the message "Contact Technical Assistance" appears must only be carried out by qualified personnel











NOTE

It is not possible to reset errors on third party machines.

## 2.8 FLAME CONTROL UNIT RESET

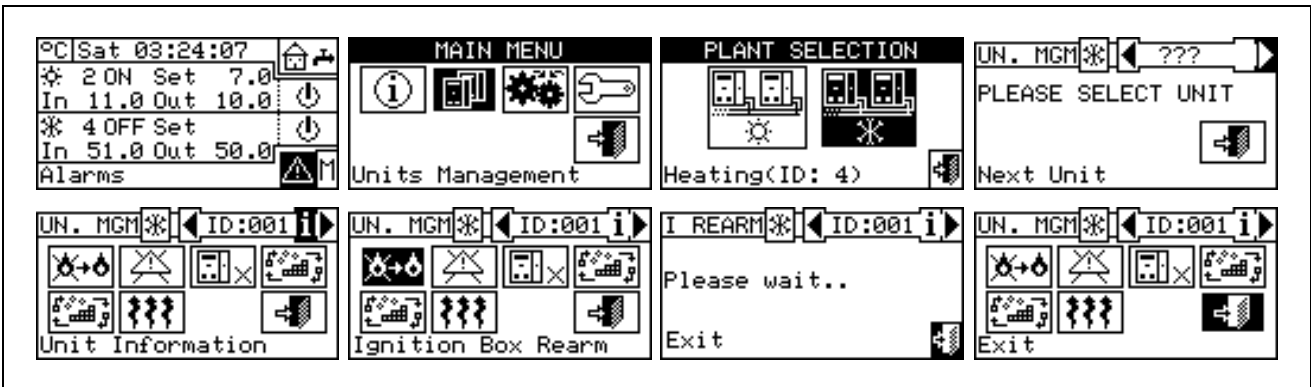
This option allows the user to reset the flame control unit of the unit selected in the event of arrest of the burner.


To carry out a reset of the flame control unit if the burner ceases to function, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - From the main menu, select  to enter the Machine Management menu.
- 3 - Select the plant (   or  if the DDC is configured to manage only one hot/cold plant).
- 4 - Select the unit by using  or . The unit's identification number is shown between the arrows.
- 5 - Select  to access to the "INFORMATION MENU" related to the selected unit.
- 6 - Position the cursor on  and press the knob to carry out a reset of the flame control unit.
- 7 - Wait for the operation to be performed. If the operation is successful, the message "OK" appears on the display.
- 8 - To exit, select .


**NOTE**

By law it is possible to execute max. 5 flame reset attempts within a 15 min period. If you exceed this number, the function is disabled and further attempts can only be executed directly on the affected unit, as described in the relative manual.



The flame control unit can be reset also by accessing the "Errors" menu  from the initial screen (for more details see paragraph 2.7 ERROR RESET on page 17).


**NOTE**






The errors reset can also be done from this menu: position the cursor on  then press the knob to carry out the reset of the trouble of the selected unit.

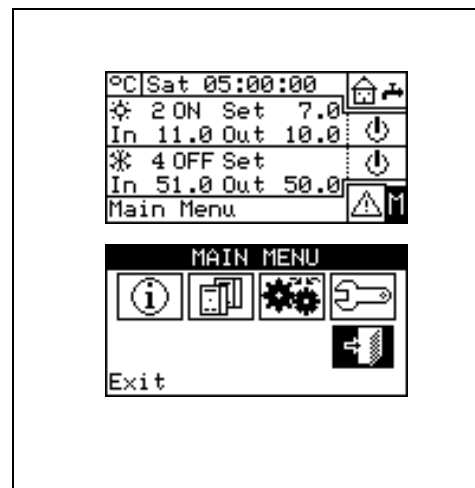
**It is not possible to reset the flame control unit on third party machines.**

### 3 FUNCTIONS OF THE DIRECT DIGITAL CONTROLLER

#### 3.1 MAIN MENU

To access the main menu from the initial screen, select .  
 The main menu consists of 5 sections, as indicated in the figure on the right:

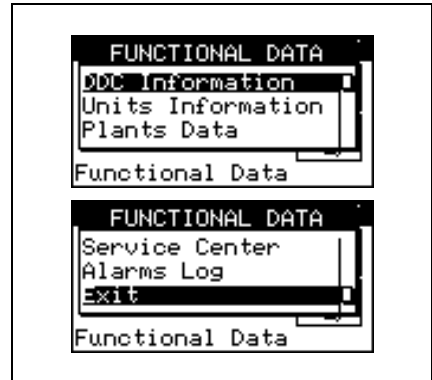
-  Functional data.
-  Machine Management
-  User Settings
-  Installation (see Installation" Section)
-  Exit



### 3.2 FUNCTIONAL DATA

The menu “Functional data” provides access to a scrolling menu that allows the user to access all information regarding the plants and the machines managed by the DDC. The options in this submenu are listed below:

- DDC information
- Units information
- Plants data
- Service Centre
- Alarms Log
- Exit

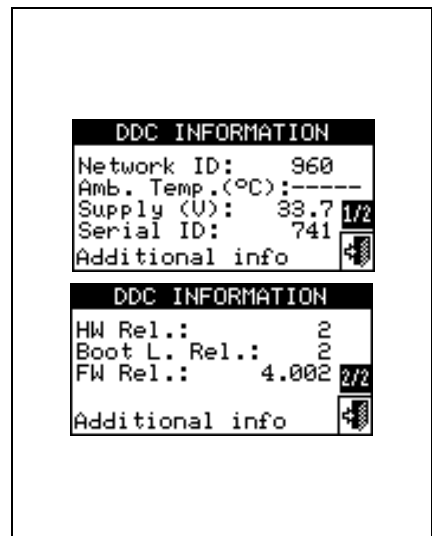


#### 3.2.1 DDC INFORMATION

By gaining access to two screens, some data concerning the DDC can be displayed: Network ID assigned to the DDC, environmental temperature (displayed if an environmental sensor is connected), power supply voltage, serial ID. The second screen contains HW revision, revision of Boot Loader FW, revision of application FW.

To access “**DDC data**”, follow the instructions below:

- 1 - Select from the initial screen to gain access to the main menu.
- 2 - Select to gain access to the “Functional data” menu;
- 3 - Turn the knob to select the “DDC Information” menu, and press the knob to access the menu.
- 4 - Select “1/2” to move to the second screen. To go back to the first screen, select “2/2”.
- 5 - To exit, select .

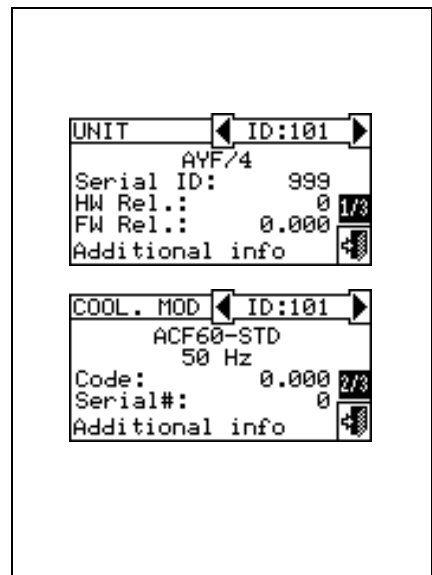


#### 3.2.2 UNITS INFORMATION

By means of two or three screens some specific data concerning the units can be displayed (machine type, serial ID of the unit board, revisions of the HW and FW electronics) as well as other detailed data concerning the module or the two modules that build up the unit (detailed denomination of the module, its primary and secondary main codes, separated by a “.”, then, the serial number).

To access to the “**Units information**” menu, follow the instructions below:

- 1 - Select from the initial screen to gain access to the main menu.
- 2 - Select to gain access to the “Functional data” menu;
- 3 - Turn the knob to select the “Units information” menu, then press the knob to gain access.
- 4 - Select the unit making use of or . The network ID of the selected unit is indicated between the arrows; the first screen (“1/3”, or “1/2”) containing the unit data is shown.
- 5 - Select “1/3” or “1/2” to move to the second screen, containing the data of the first module.
- 6 - If the unit consists of two modules, select “2/3” to move to the third screen, containing the data of the second module.



7 - Select "3/3" (or "2/2" in case of unit consisting of one module only) to go back to the first screen

8 - To exit, select

When viewing third party boilers or chillers managed via the Robur Box RB200, the first screen shows the generic indication "Third Party Machine" and the serial ID, Hardware and Firmware version of the RB200 device managing the boiler or chiller; the second screen shows a more detailed description of the type of boiler or chiller (with or without water pump control, with or without error reading) and the value of the corresponding configuration parameter set on the RB200.

### 3.2.3 PLANTS

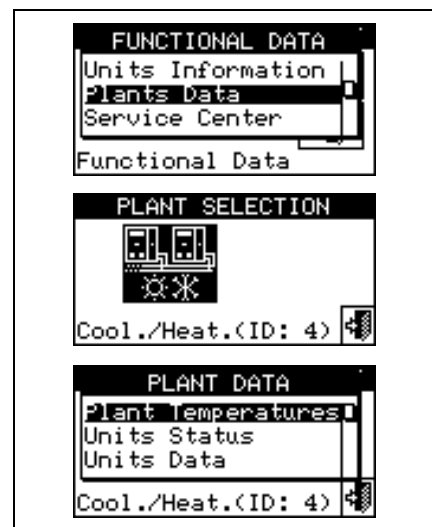
When the machines have been configured (see Section 4, "INSTALLATION"), it is possible to view the functional data of the plants managed. To enter the plants submenu, select "Plants" from the drop-down menu.

To view the operating data of the plants, select the desired icon. If two plants have been configured, two icons will appear: one for the hot

plant, shown by the icon, and one for the cold plant, shown by the icon.

Select the plant for which the operating data is desired. A drop-down menu will allow the user to select which data to view:

- Plant temp.
- Machine status
- Machine data
- Exit



#### 3.2.3.1 Plant temperatures

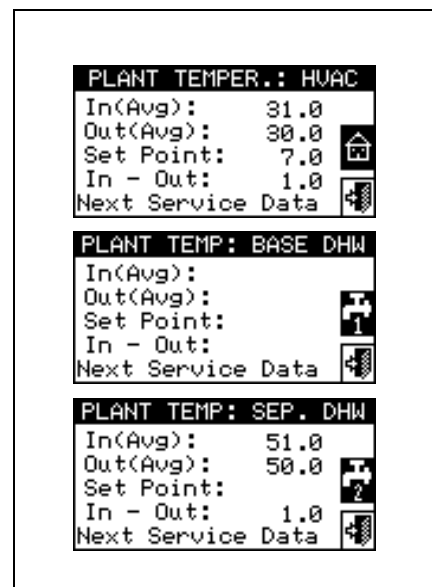
The displaying concerns the temperature of water at inlet to/outlet from the plant, the value of the set point temperature and the difference of temperature between inlet and outlet of the cooling plant or base domestic hot water plant (base DHW) (if configured) or separate domestic hot water plant (separable/separated DHW) (if configured).

Select to move to the screen concerning the base DHW plant ( will appear).

Select to move to the screen concerning the separable DHW plant ( will appear).

Select to move to the screen concerning the cooling plant ( will appear)

To exit, select .







NOTE

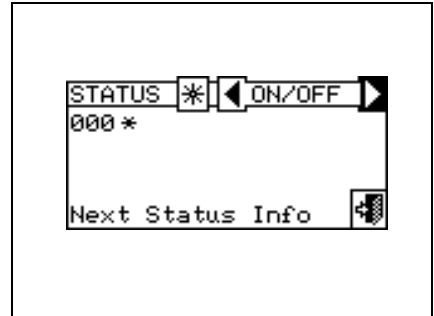
For a given temperature, if this is read by the manifold probe (managed via the RB200) rather than by calculating the average of the machine probes, the indication between brackets will read "(probe)" and not "(average)".


**3.2.3.2 Machine status**

The “**Machine status**” menu provides a complete overview of the units operating correctly and those where errors have arisen. Each unit is identified by its network ID.



Two screens are present: “ACTIVATION” and “ERRORS”. Next to the machine ID, in the “ON” screen, the following symbols appear:

- 1 -  if the machine is on.
- 2 - If the unit is off, no symbol appears next to the machine ID.
- 3 -  if the machine has been excluded from the plant via the options in the Units management menu.
- 4 -  if the unit is carrying out a Defrosting cycle. Option only for GAHP-A and GAHP-AR units.
- 5 -  if the unit is off because it has reached temperature or thermostating limit values.







Select  to visualise for which units errors or warnings have occurred. If an error has occurred in the machine, the letter E will appear next to the unit’s ID.



In the “Error” screen next to the machine ID, the following symbols appear:

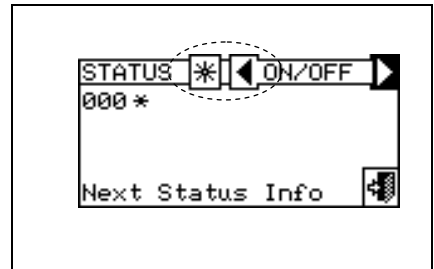
- 1 - **E** if an error has occurred in the machine;
- 2 -  if a warning has occurred for the machine;
- 3 -  (“off-line”) if there are connection problems between the machine and the DDC (the off-line may be due to various causes: the machine is not powered, there are problems on the connection cable, the machine board is malfunctioning and cannot communicate with the DDC);
- 4 - If no error has occurred in the machine, no symbol will appear next to the machine ID.










For two-line hot/cold plants, i.e. plants for the production of hot/chilled water, the symbols  or  apply.

Select  to view the screens relating to modules dedicated to the production of chilled water ( is displayed).

Select  to view the screens relating to modules dedicated to the production of hot water ( is displayed).



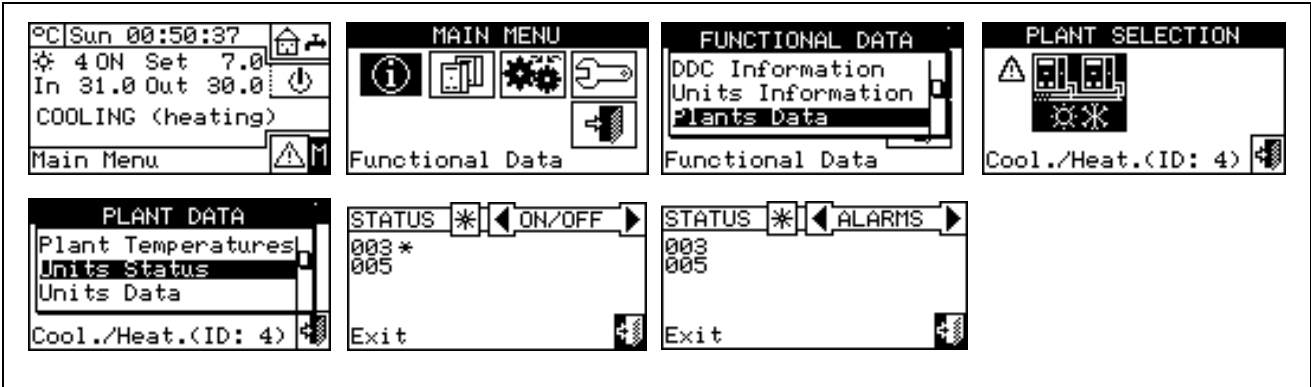
To access the menu, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the “Functional data” menu.
- 3 - Turn the knob to select the “Plants” menu, and press the knob to enter the menu.
- 4 - Select the plant for which to view the machine status:  for two-line cooling/heating plants,  for hot water production plants, or  for chilled water production plants. The  symbol next to the plant icon indicates an anomaly.
- 5 - Turn the knob to select the “Machine status” menu and press the knob to access the menu.
- 6 - Select  to move to the Errors screen: next to the identification number of each unit (ID = machine), the letter E indicates that an error is present.



7 - On both screens, a machine ID can be selected by turning the knob and, pressing it, access can be gained directly to the “Machine information” menu.

8 - To exit, select



NOTE

Warning: having carried out the machines configuration, each time it is switched on the DDC searches for the configured units. Any units not found are considered to be “off-line”.

### 3.2.3.3 Machine data

In this menu the user may view typical machine operating data according to the plant selected ( or or ).

The parameters that may be viewed are:

- Temperatures
- Operating time
- Ignitions Number
- Defrostings number
- Inversions Number
- Other data



#### Temperatures

An overview of all the operating temperatures of the machine selected. The machine’s ID is indicated between the two arrows and . To view the operating temperatures of another unit, select .


Which temperatures may be viewed depends on the type of machine selected (AY, ACF GAHP-GS/WS etc.). A list of the temperatures that may be viewed on the screen is provided below.


- 1- **In** Unit inlet water temperature;
- 2- **Out** Unit outlet water temperature;
- 3- **Ext** External air temperature,
- 4- **Cnd** Condenser temperature;
- 5- **Gen** High generator temperature;
- 6- **Eva** Evaporator temperature;
- 7- **TA1 TA2** Auxiliary probes.
- 8- **Mix** Air/gas mixture temperature
- 9- **Fumi** Temperature of the flue gas
- 10- **GenF** Temperature of the generator fins

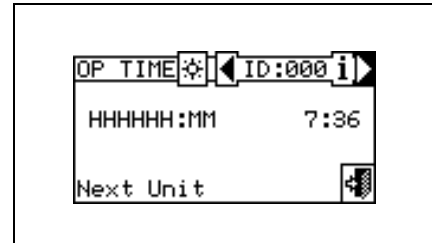
To exit, select .

**It is not possible to view the operating temperatures of third party machines.**

**Operating Time**


This screen shows the time that the machine has been operating in hours and minutes. To view the operating time of another unit, select .

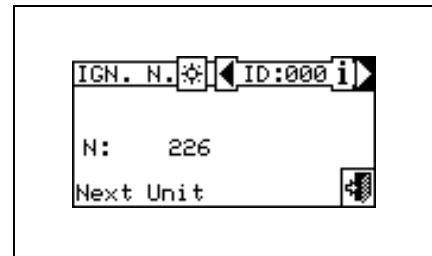
To exit, select .



**Ignitions Number**


This screen indicates the number of times the unit has been switched on.

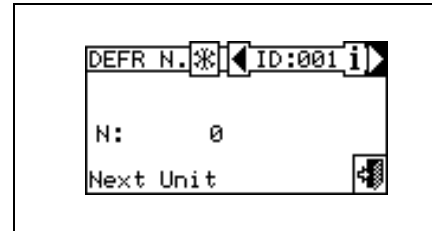
To exit, select .



**Defrostings number**


This screen indicates the number of defrosting cycles of the unit (GAHP A-AR plants only).

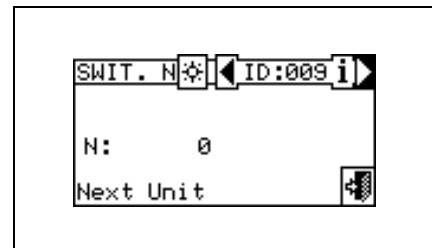
To exit, select .




**Inversions number**


Reports the number of times the unit has been inverted (GAHP-AR units only).

To exit, select .

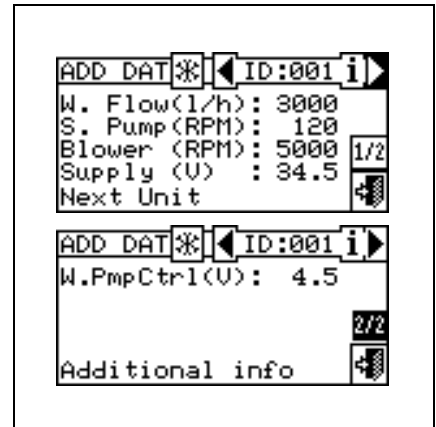


### Other data

Indicates other data relative to the machine selected. To display the data of another unit, select  to show the second screen 1/2; 2/2 to pass from the second to the first screen.


To exit, select .

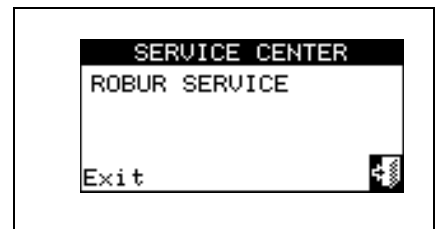
**It is not possible to view other data concerning third party machines.**



### 3.2.4 TECHNICAL ASSISTANCE

This screen gives information about the nearest Technical Assistance Centre. See Paragraph 4.4.1.12 **Technical assistance information** regarding the programming of technical assistance information.

To exit, select .



**3.2.5 EVENT HISTORY**

In this screen, it is possible to view all the parameters that characterise a warning or error event. All the events are in chronological order from latest to earliest, and the times at which the event occurred and ended are shown. For each event the following information is given, as shown in Figure 6: date, time, machine ID, error or warning code, indication of which module (if required: “C” = Cooling, “H” = Heating) generated the event. The ON indication regards the time the warning or error event arose, while the OFF indication regards the time it ended. In addition, in the central area of the display there is a brief description of the type of event that occurred.

All the events that occur are memorised in the Event history menu.

Figure 6 shows the Event history menu screen.

**KEY:**

- A Date event detected;
- B Time event detected;
- C Indicator of number of events: the first number indicates the chronological order of the event being viewed; the second indicates the total number of events memorized by the DDC;
- D Vertical scroll arrows. Use these to scroll through the events that have occurred in the system in chronological order;
- E Event status: **ON** refers to the moment that the event occurred; **OFF** refers to the moment that it ended;
- F Numerical code describing the type of event;
- G Text describing the function highlighted by the cursor.
- H Text describing the event.
- I ID of machine or DDCs present where the event displayed occurred;
- L Origin of the anomaly:
  - C : cooling module;
  - H: heating module;
  - B: electronic board.

NOTE: the letters C and H are not displayed for GAHP-GS/WS units.

Figure 6 – EXAMPLE OF EVENT HISTORY MENU SCREEN

Instructions for accessing the **event history** list follow:

- 1 - From the main menu, select
- 2 - Select to access the “Functional data” menu.
- 3 - Turn the knob to select the “Event history” menu, and press the knob to access the menu.
- 4 - Position the cursor on the vertical scroll arrows (see detail “D” in Figure 6) to scroll through the events, from latest to earliest.
- 5 - To exit, select .

### 3.3 UNITS MANAGEMENT

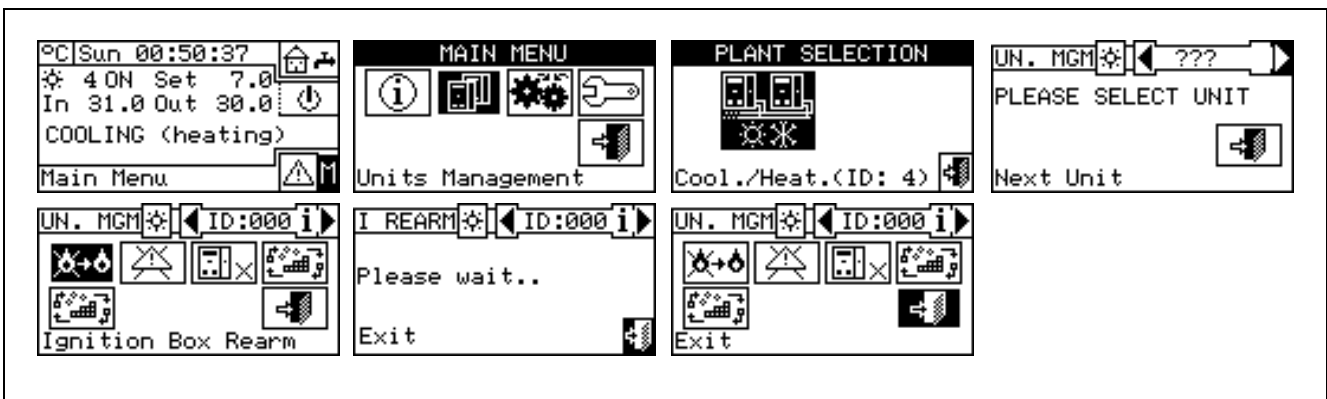
The menu allows the user to carry out certain operations upon the units controlled by the DDC. Each machine has a screen associated with it in the “Units management” menu, which contains 5 icons that allow the unit to be managed.

	<b>Flame control unit reset:</b> this option allows the flame control unit of the selected machine to be reset in the event of arrest.
	<b>Error reset:</b> this option allows anomalies present in the selected unit to be reset (except in the case of arrest of the flame control unit).
	<b>Machine exclusion:</b> this option allows the selected machine to be excluded from the plant.
	<b>Modify set of parameters:</b> this option allows the parameters set on the machine’s electronic board to be modified. For a list of the parameters, consult the installation manual of the unit.
	<b>Default set of parameters:</b> this option allows the default parameters memorised in the machine’s electronic board to be reset.
	<b>Manual defrosting:</b> The option allows the defrosting cycle to be carried out for the selected unit (GAHP-a and GAHP-AR only).

#### 3.3.1 FLAME CONTROL UNIT RESET

To carry out a reset of the flame control unit if the burner ceases to function, follow the instructions below:

- 1 - Select from the initial screen to gain access to the main menu.
- 2 - From the main menu, select .
- 3 - Select the plant (, or if the DDC is configured to manage only one hot/cold plant).
- 4 - Select the machine, using or . The unit’s identification number is shown between the arrows.
- 5 - Position the cursor on and press the knob to carry out a reset of the flame control unit.
- 6 - Wait for the operation to be performed. If the operation is successful, the message “OK” appears on the display.
- 7 - To exit, select .












NOTE

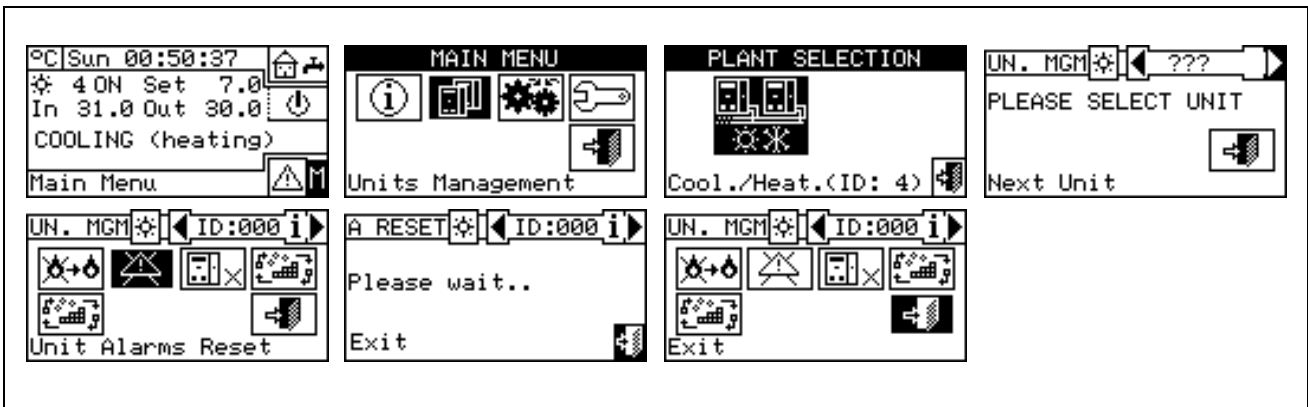
It is not possible to reset the flame control unit on third party machines.

**3.3.2 ERROR RESET**

To carry out an error reset, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - From the main menu, select .
- 3 - Select the plant (  ,  or  if the DDC is configured to manage only one hot/cold plant).
- 4 - Select the machine, using  or . The unit's identification number is shown between the arrows.
- 5 - Position the cursor on  and press the knob to carry out an error reset.
- 6 - Wait for the operation to be performed. If the operation is successful, the message "OK" appears on the display.

To exit, select .



NOTE













The reset does not perform a flame control unit reset.

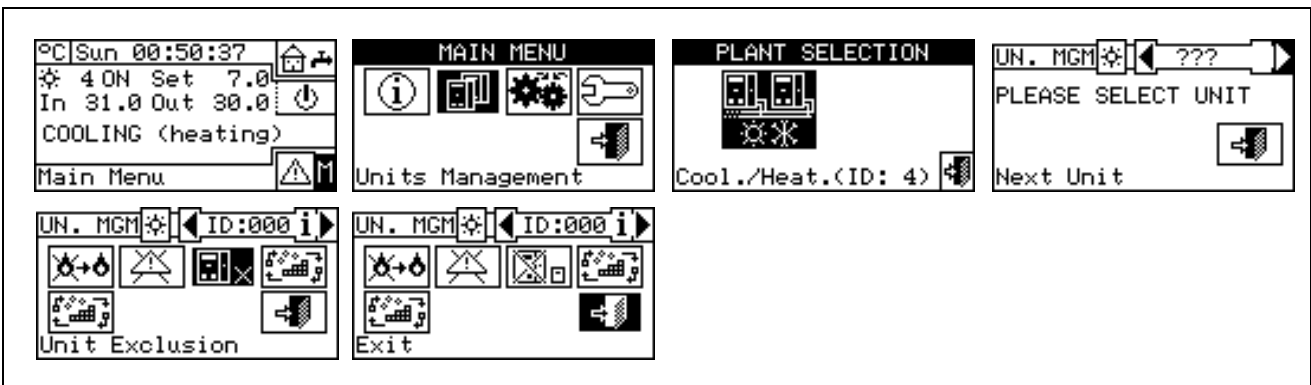
NOTE

**It is not possible to reset errors on third party machines.**

### 3.3.3 UNIT EXCLUSION

To exclude the unit from the plant, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - From the main menu, select .
- 3 - Select the plant (  or  if the DDC is configured to manage only one hot/cold plant).
- 4 - Select the machine, using  or . The unit's identification number is shown between the arrows.
- 5 - Position the cursor on  and press the knob to exclude the machine from the plant. Wait for the operation to be performed. The  symbol indicates that the machine is now excluded from the plant.  
To include the unit in the plant again, select  and press the knob. The  symbol indicates that the machine is now excluded from the plant.
- 6 - To exit, select .



#### NOTE

When a machine is excluded, the DDC considers it unusable. In addition, any anomalies are not signalled.

### 3.3.4 EDIT SET PARAMETERS (Technical Assistance Centres only)

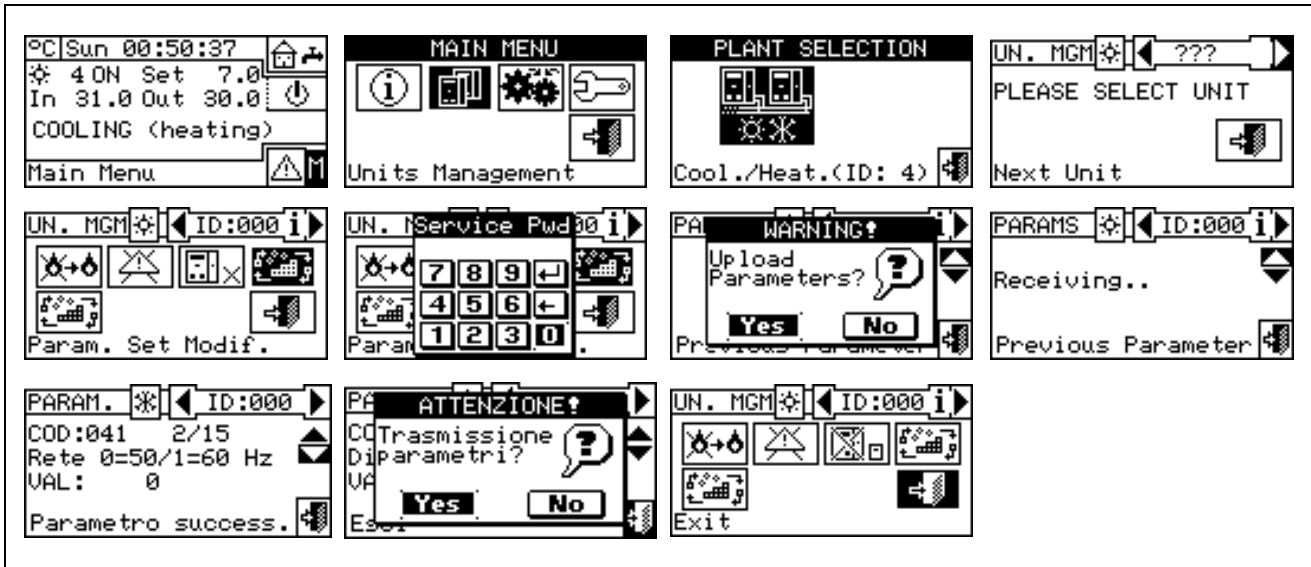
This option allows the modification of some parameters that are set on the machine's built-in electronic board. The Direct Digital Controller communicates with the machine's electronic board and receives information regarding the parameters set on it. Via the DDC, the operator may modify some of these parameters and transmit them again to the machine's built-in electronic board.

The option is protected by an installer password.

The figure below shows an example of a modification to the parameters, and the sequence of operations to perform in relation to the screens shown on the display.

#### NOTE

**It is not possible to carry out the "modify set parameters" operation on third party machines.**

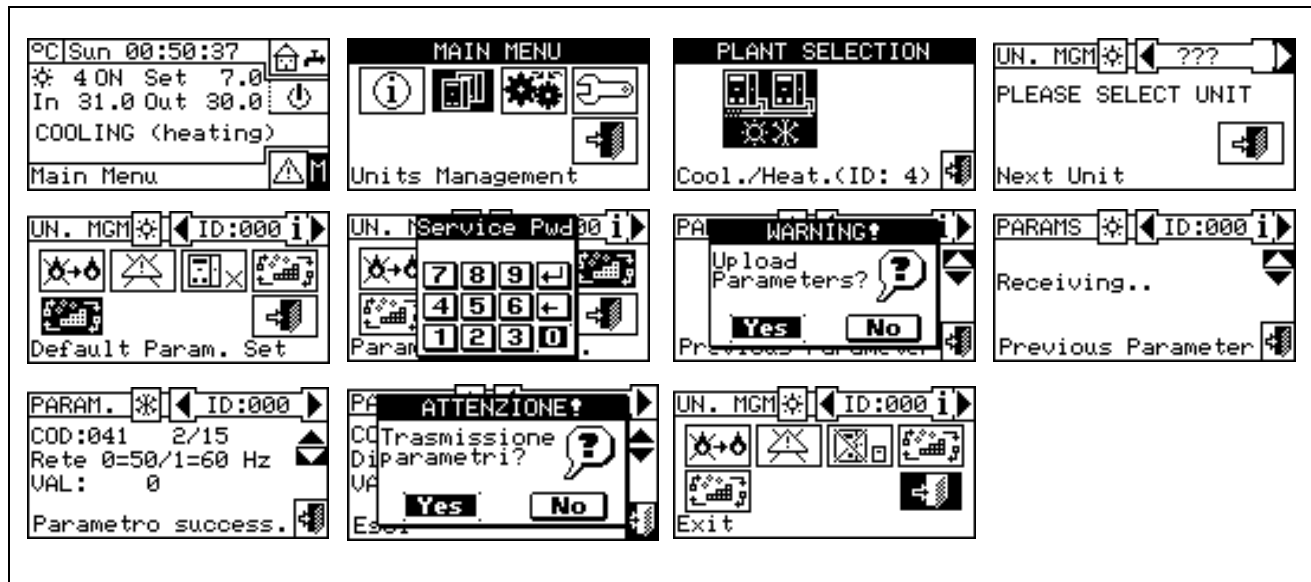


**3.3.5 SET DEFAULT PARAMETERS (Technical Assistance Centres only)**

The option allows the user to restore, via the DDC, the **factory settings** memorised on the built-in electronic board of the machine.

The Direct Digital Controller communicates with the electronic board and receives information regarding the **default parameters** (factory settings) set on it (warning: the default parameters are read-only, i.e. cannot be modified). Via the DDC, the operator may modify some of these parameters and transmit them again to the machine's electronic board. The parameters transmitted are used by the board for operation of the unit but this transmission will have no influence on the default settings memorised on board the machine.

The option is protected by an installer password.



**NOTE**

It is not possible to carry out the "set default parameters" operation on third party machines.

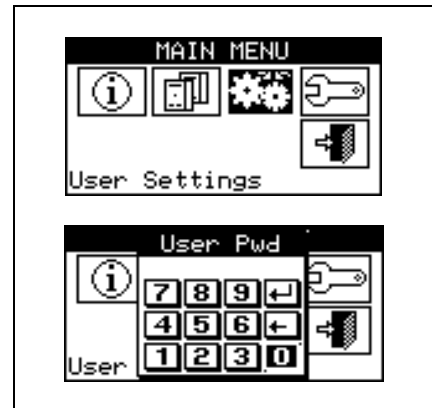


### 3.4 USER SETTINGS

From the main menu, select . If requested, enter the user password on the numerical keypad that appears on the screen and then select to confirm. If the wrong password is entered, the display reverts to the main menu screen.

Accessing this menu allows the following parameters to be consulted/set:

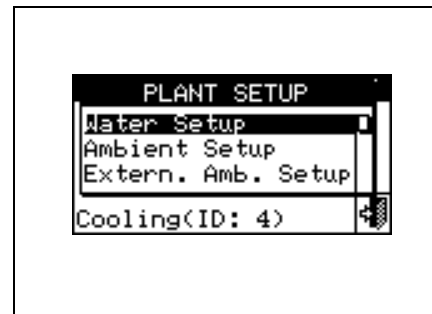
- 3.4.1 plants
- 3.4.2 PREFERENCES
- 3.4.3 Exit



#### 3.4.1 PLANTS

PLANTS Select "Plants" from the dropdown menu. Select the or or plant in function of the type of configured plant. Access is gained to a scroll menu containing the parameters that can be set:

- 3.4.1.1 Water Setup
- 3.4.1.2 Ambient Setup
- 3.4.1.3 External ambient setup



##### 3.4.1.1 Water Setup

The following paragraphs describe the operating logic of the Direct Digital Controller to allow the operator to set the water parameters correctly, such as set point temperature, differential, and number of steps.

###### 3.4.1.1.1 Cooling/Heating


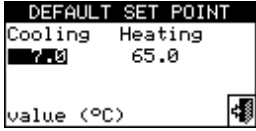
The options that may be set in this menu, for the cooling/heating services, are:

- 3.4.1.1.1.1 Default set point
- 3.4.1.1.1.2 Enabling of climatic curve
- 3.4.1.1.1.3 General water T timer
- 3.4.1.1.1.4 Partial water T timer

###### 3.4.1.1.1.1. Default set point










This screen displays the water set point temperatures for cooling and/or heating operation according to the type of plant configured.

	<p>Plant for production of chilled water. The set point represents the desired temperature for water leaving the machine if, in the System installation, thermostating has been set on the outlet water; if the opposite applies, the temperature set point represents the desired temperature for the machine's inlet water.</p>	
	<p>Plant for production of hot water. The set point represents the desired temperature for water leaving the machine if, in the System installation, thermostating has been set on the outlet water; if the opposite applies, the temperature set point represents the desired temperature for the machine's inlet water.</p>	

	<p>Plant for alternate production of hot or chilled water.</p> <p>Cooling set point: water temperature when the plant produces chilled water.</p> <p>Heating set point: water temperature when the plant produces hot water.</p> <p>The two set points described above may refer to outlet or inlet water, according to the settings, which may be different from one another, configured in the installer menu.</p>	
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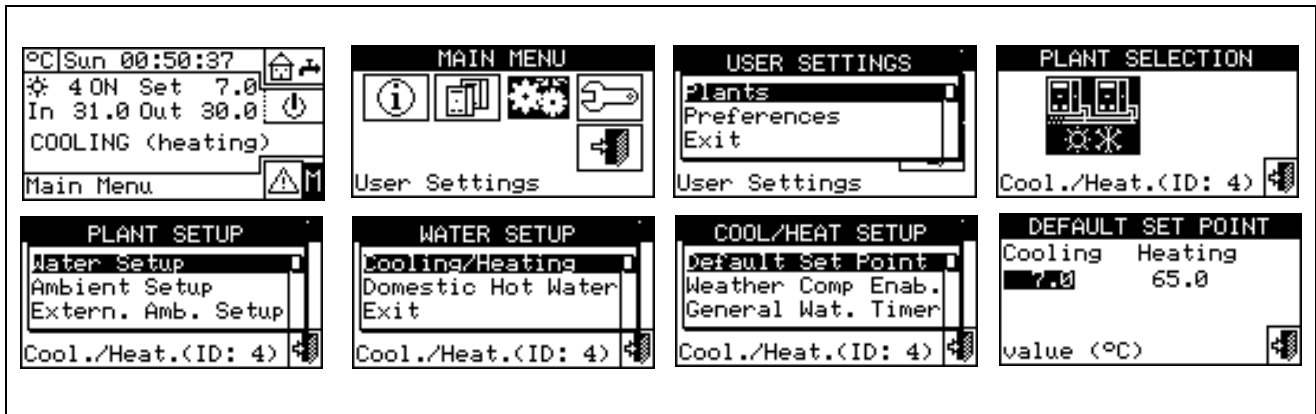
**Configuring set point temperature.**

In order to set the set point temperature for the heating and/or cooling services, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the "User settings" menu.
- 3 - If requested, enter the user password on the numerical keypad that appears on the display.
- 4 - Select "Plants" from the drop-down menu.
- 5 - Select the plant for which the set point temperature is to be set:  for two-line cooling/heating plants,  for hot water production plants, or  for chilled water production plants.
- 6 - Select "Water setup" from the drop-down menu.
- 7 - Select "Cooling" or "Heating" from the drop-down menu
- 8 - Select "Default set point" from the drop-down menu.
- 9 - Position the cursor on the temperature value to modify: for cold-only plants , only the value of the set point temperature in cooling mode appears (Cooling). For hot-only plants , only the value of the set point temperature in heating mode appears (Heating). For two-line hot-cold plants , set point temperatures for both heating and cooling mode appear (Cooling and Heating).
- 10 - Press the knob to allow the change of the selected value.
- 11 - Turn the knob to modify the value.
- 12 - Press the knob to confirm the set value.
- 13 - To exit, select .

**NOTE**

The default set point is used when the general water T timer cycles are disabled. Otherwise the set point used at any given moment is that defined in the active water T timer cycle (see Paragraph 3.4.1.1.1.3 - "General water T timer").



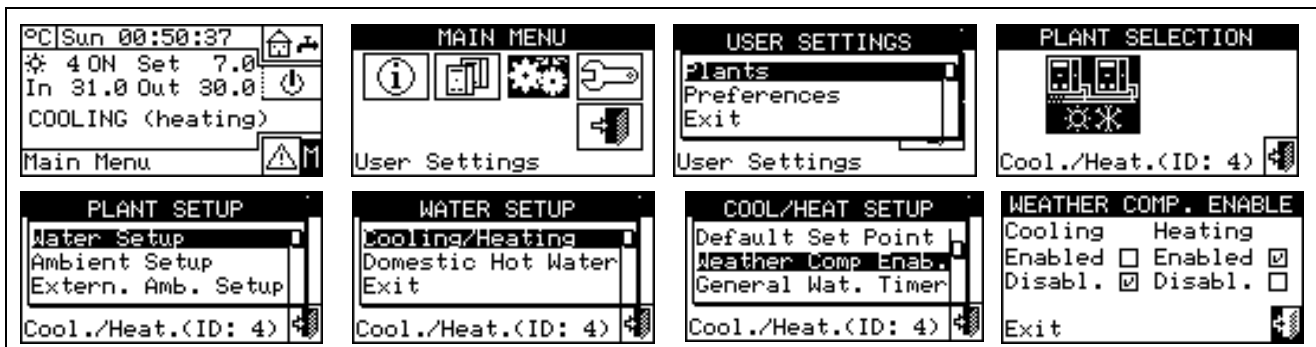
**3.4.1.1.1.2. Enabling of climatic curve**

To enable the climatic curves for the heating and/or cooling services, follow the instructions given:

- 1 - Select from the initial screen to gain access to the main menu.
- 2 - Select to access the “User settings” menu.
- 3 - If requested, enter the user password on the numerical keypad that appears on the display.
- 4 - Select “Plants” from the drop-down menu.
- 5 - Select the plant for which the climatic curve is to be enabled: for two-line cooling/heating plants, for hot water production plants, or for chilled water production plants.
- 6 - Select “Water setup” from the drop-down menu.
- 7 - Select “Cooling” or “Heating” or “Cool./Heat” from the drop-down menu.
- 8 - Select “Enab. Clim. Curve” from the drop down menu. Turn the knob and select the desired item.
- 9 - Turn the knob and select the desired item. Press the knob to enable/disable the climatic curve. The  symbol indicates that the climatic curve is enabled; the  symbol indicates that the climatic curve has been disabled.
- 10 - To exit, select .

NOTE

The climatic curve can only be enabled if an operating mode has been chosen that allows it (see paragraph “On/off command configuration” on page 103).  
 If the climatic curve is enabled, the water set point is variable and is calculated by the DDC according to the set climatic curve, the external temperature and the requested room temperature.  
 If the climatic curve is disabled, the corresponding default water set point will be used (see paragraph 3.4.1.1.1.1).

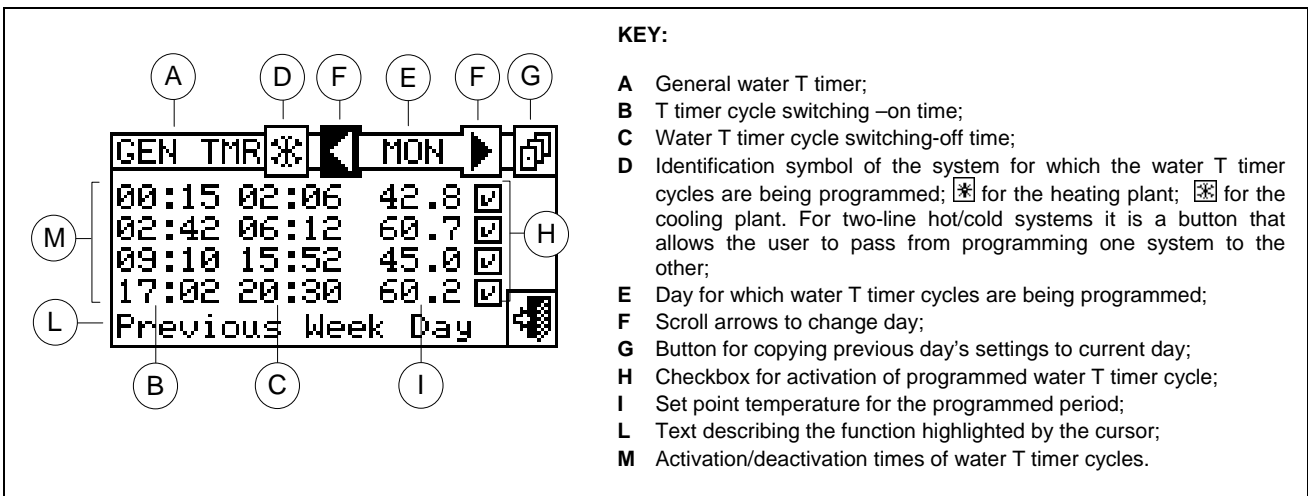


**3.4.1.1.1.3. General water T timer**

This option allows the user to manage the “General water T timer” operating mode of the plant as concerns the heating and cooling services. It allows the user to select up to 4 plant activation time intervals, within which it is possible to define a water set point temperature. Up to 4 daily water T timer cycles can be programmed, to which it is possible to associate 4 different temperature levels. It is possible to enable/disable each water T timer cycle programmed without cancelling it by operating on the  fields as described below. This programming may be different for each of the seven days of the week and for the cooling and heating services.

**Programming general water T timer cycles**

Figure 7 shows how the DDC’s display appears while the general water T timer cycles are programmed.



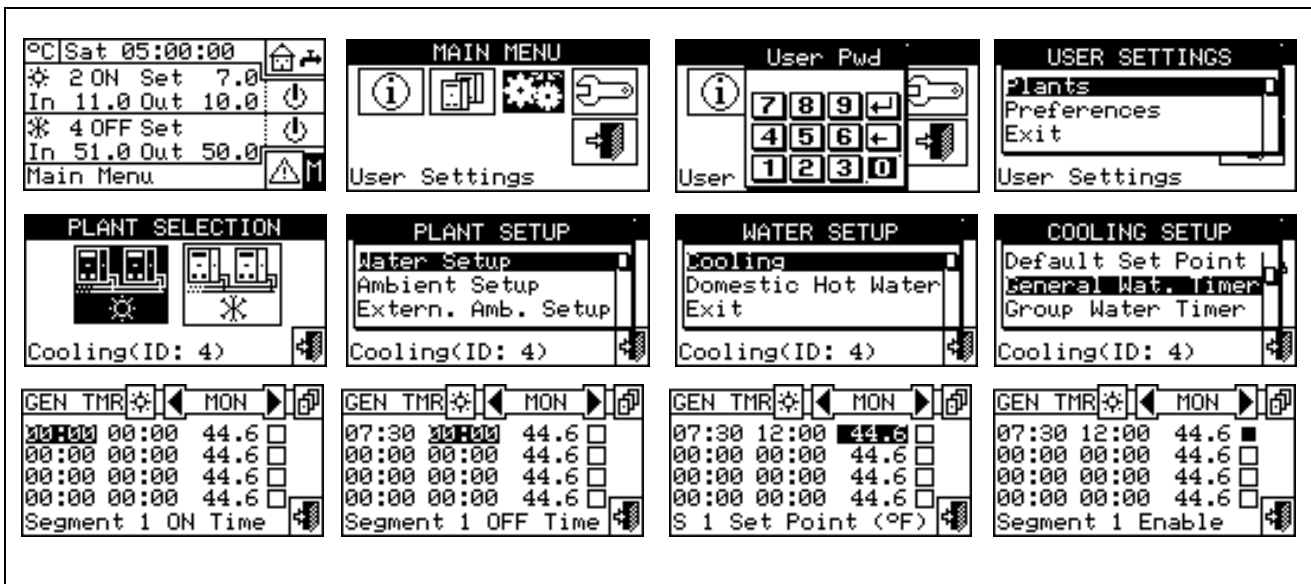
**Figure 7 – PROGRAMMING SCREEN FOR GENERAL WATER T TIMER CYCLES**

For plants managed by several Direct Digital Controllers, it is only possible to program the General water T timer cycles from the DDC designated as the Master DDC.

In order to program the switching-on T timer cycles for a typical day, follow the instructions below:

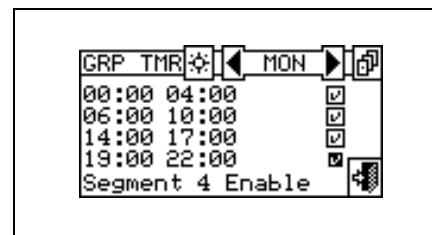
1. Select from the initial screen to gain access to the main menu.
2. Select to access the “User settings” menu.
3. If requested, enter the user password on the numerical keypad that appears on the display.
4. Select “Plants” from the drop-down menu.
5. Select the plant for which the partial water T timer cycles are to be programmed: for two-line cooling/heating plants, for the heating plant, for the cooling plant.
6. Select “Water setup” from the drop-down menu.
7. Select “Cooling” or “Heating” from the drop-down menu
8. Select “General Water Timer” from the drop-down menu.
9. Position the cursor on the activation time of the first water T timer cycle and press the knob. Turn the knob to select the activation time of the first timer cycle and press the knob to confirm. The cursor moves automatically to the deactivation time of the first timer cycle. Proceed in the same way to program the deactivation time of the first timer cycle.
10. Set the water set-point temperature for the programmed timer cycle. Press the knob to modify the temperature value once the cursor is positioned on the number. Turn the knob to modify the value. Press the knob to confirm.
11. The cursor moves automatically to  for the activation of the timer cycle programmed. Press the knob to enable the timer cycle. The  symbol indicates that the timer cycle that has just been programmed has

- been enabled. NOTE: a water T timer cycle may be disabled at any moment by pressing . The symbol indicates that the water T timer cycle programmed has been disabled.
12. Proceed in the same way, repeating steps 9 – 10 - 11 for the programming of any further timer cycles required.
  13. Once the desired timer cycles have been programmed, it is possible to pass to the following day by selecting the arrow at the top right . The previous day's program may be copied for the current day by selecting , or the water T timer cycles required for the new day may be programmed.
  14. To exit, select .
- If a programming anomaly occurs, appropriate alert messages are displayed:
- Water T timer cycle with zero (or "negative") duration.
  - Water T timer cycle in conflict with another timer cycle.



### 3.4.1.1.4. Partial water T timer

Partial water T timer This option may be programmed for **Multi DDC plants only**, and allows the user to select up to 4 operating timer cycles for each day of the week. This programming may be different for each of the seven days of the week, and for the cooling and heating services.



#### WARNING

The partial water T timers control **only** the machines directly managed by a specific DDC. Therefore, according to the number of DDCs present in the plant, two situations may arise:









- **The plant is controlled by a single DDC.** The DDC is defined as Master DDC by default and it is possible to use **ONLY** the general water T timer.
- **The plant is controlled by more than one DDC (MASTER and SLAVE).** In this case only one of the DDCs installed is defined as the Master DDC. Via this DDC it is possible to program the general water T timer to control the entire plant, and the partial water T timer to control the units that are managed directly by the Master DDC. On the Slave DDCs it is possible to program the partial water T timer for the purposes of controlling only the machines connected to the DDC in question. The group of machines managed by any given DDC operates at the intersection between the general water T timer cycles and partial water T timer cycles set on it. If, for example, a 0-10 general water T timer cycle has been set on the Master DDC, and on a Slave DDC a 6-12 partial water T timer cycle, the units managed by the Slave DDC may have ON status only between 6 and 10.

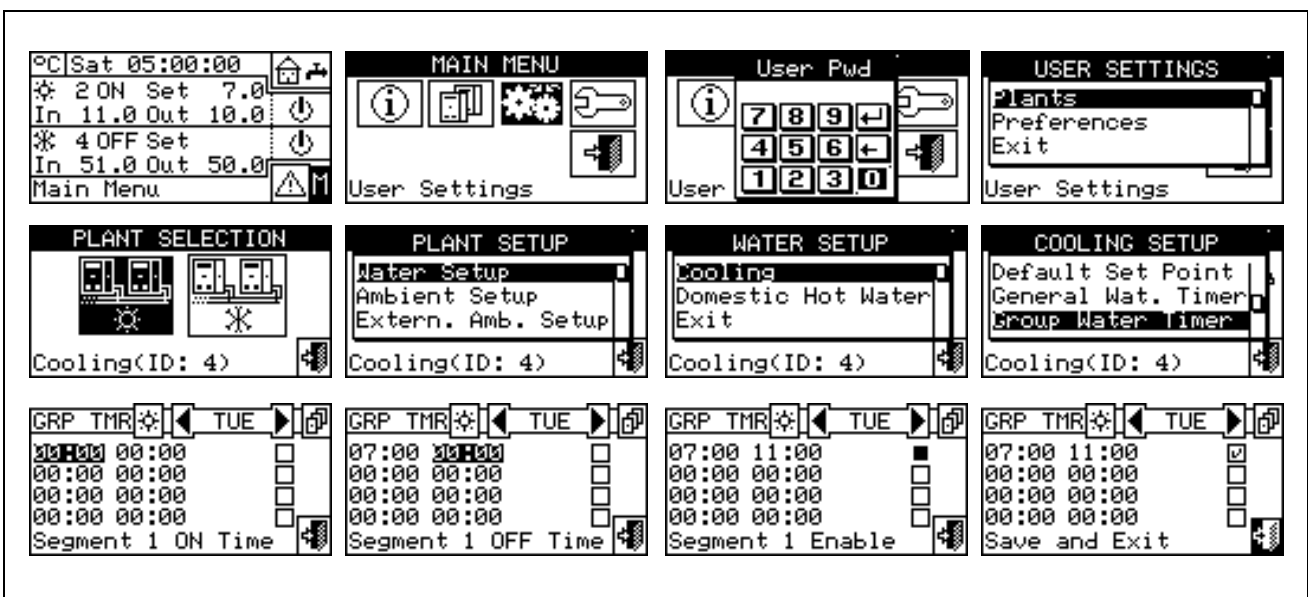
**Programming partial water T timer cycles**

**Programming of the partial water T timer cycles affects only plants managed by several Direct Digital Controllers.**

In this case, on the Master plant DDC it is possible to program the general water T timer cycles of the overall plant and the partial water T timer cycles of all the units directly managed by the same Master DDC. On each Slave DDC it is possible to program the partial water T timer cycles from that Slave DDC.

To program the water T timer cycles for a typical day, follow the instructions below.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the "User settings" menu.
- 3 - If requested, enter the user password on the numerical keypad that appears on the display.
- 4 - Select "Plants" from the drop-down menu.
- 5 - Select the plant for which the partial water T timer cycles are to be programmed:  for two-line cooling/heating plants,  for hot water production plants, or  for chilled water production plants.
- 6 - Select "Water setup" from the drop-down menu.
- 7 - Select "Cooling" or "Heating" from the drop-down menu.
- 8 - Select "Group Water Timer" from the drop-down menu.
- 9 - Position the cursor on the activation time of the first water T timer cycle and press the knob. Turn the knob to select the activation time of the first timer cycle and press the knob to confirm. The cursor moves automatically to the deactivation time of the first timer cycle. Proceed in the same way to program the deactivation time of the first timer cycle.
- 10 - The cursor moves automatically to  for the activation of the timer cycle programmed. Press the knob to enable the timer cycle. The  symbol indicates that the timer cycle that has just been programmed has been enabled.
- 11 - Proceed in the same way, repeating steps 1-3 for the programming of any further timer cycles required.
- 12 - Once the desired timer cycles have been programmed, it is possible to pass to the following day by selecting the arrow at the top right . The previous day's program may be copied for the current day by selecting , or the water T timer cycles required for the new day may be programmed.
- 13 - To exit, select .



## NOTE

At any given moment, the set point used is the one set for the General water T timer cycle active at that moment, or the default set point if general water T timer cycles are disabled.

It is not possible to use the General water T timer cycles at the same time as the climatic curve mode.

### 3.4.1.1.2 Domestic hot water

The options that may be set in this menu, for the domestic hot water production services, are:

3.4.1.1.2.1 *Base plant water timer* (for base DHW service)

3.4.1.1.2.2 *Separable plant water timer* (for separable DHW service)

#### 3.4.1.1.2.1. Base plant water timer

This option permits to manage the “**Base plant water timer**” operation mode of the base service of domestic hot water. It allows the user to select up to 4 plant activation time intervals, within which it is possible to define a water set point temperature.

## NOTE

The water T timer cycles and the relevant set point are taken in consideration ONLY if, on the RB100 or RB200 device (absolutely necessary for the domestic hot water control) the “Type of set point inlet for the domestic hot water” parameter is set as “digital with set point on Digital Control Panel”.

For more information please consult the installation and user booklet of the RB 100 (code D-LBR468) and the RB 100 applications booklet (code D-LBR467), or the installation and user booklet of the RB 200 device (code D-LBR632) and the Applications Manual (code D-LBR630), according to the type of device used.

Up to 4 daily water T timer cycles can be programmed, to which it is possible to associate 4 different temperature levels. It is possible to enable/disable each water T timer cycle programmed without cancelling it by operating on the  fields as described below. This programming may be different for each of the seven days of the week.

**Base plant timer programming**

Figure 8 shows as the DDC display appears when programming the base plant water T timer cycles.

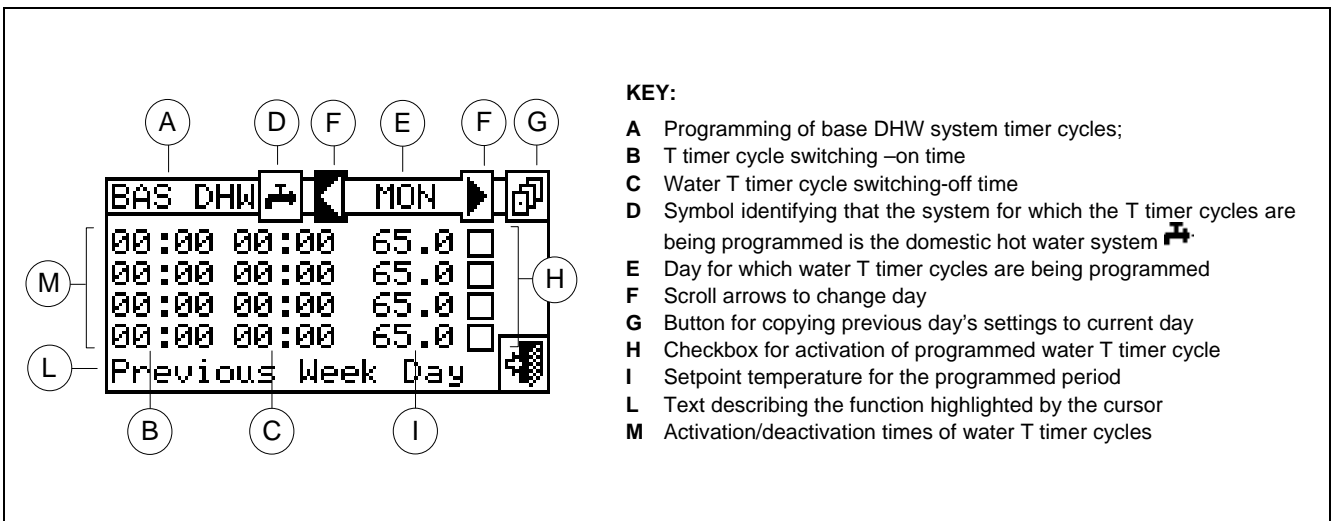


Figure 8 – SCREEN FOR THE PROGRAMMING OF THE BASE PLANT T TIMER CYCLES

In case of plants managed by several DDC, the programming of the water T timer cycles can be carried out only by the DDC defined as Master.

In order to program the switching-on T timer cycles for a typical day, follow the instructions below:

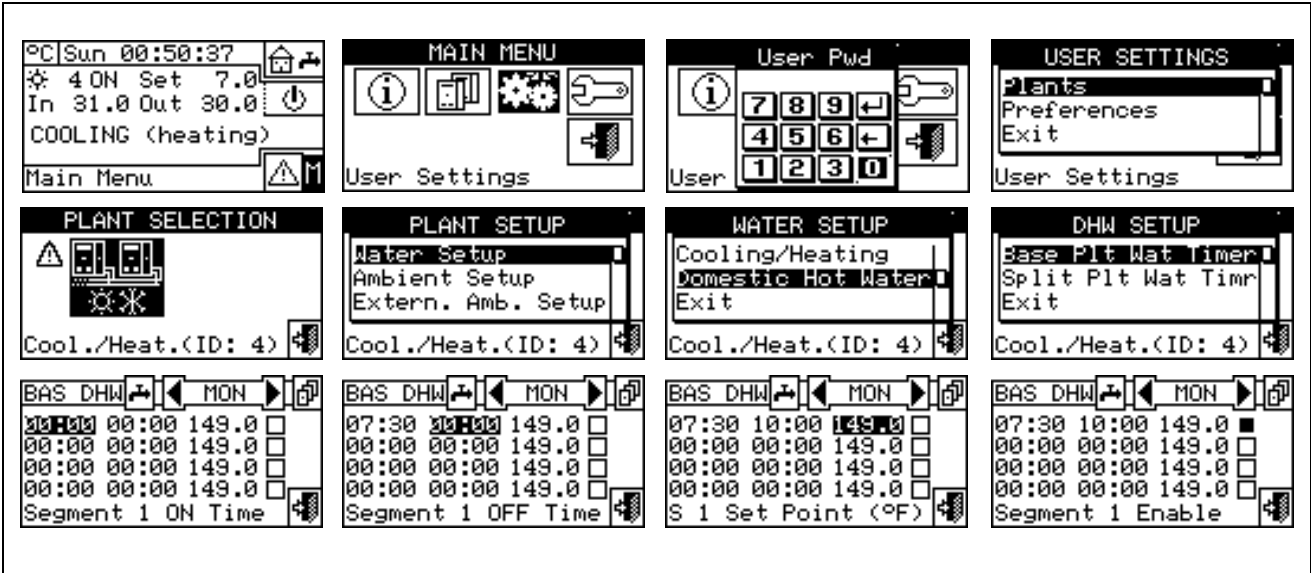
1. Select from the initial screen to gain access to the main menu.
2. Select to access the “User settings” menu.
3. If requested, enter the user password on the numerical keypad that appears on the display.
4. Select “Plants” from the drop-down menu.
5. Select the plant for which the partial water T timer cycles are to be programmed: for two-line cooling/heating plants, for hot water production plants, or for chilled water production plants.
6. Select “Water setup” from the drop-down menu.
7. Select “Domestic hot water” from the drop-down menu.
8. Select “Base plt wat timer” from the drop-down menu.
9. Position the cursor on the activation time of the first water T timer cycle and press the knob. Turn the knob to select the activation time of the first timer cycle and press the knob to confirm. The cursor moves automatically to the deactivation time of the first timer cycle. Proceed in the same way to program the deactivation time of the first timer cycle.
10. Set the water set-point temperature for the programmed timer cycle. Press the knob to modify the temperature value once the cursor is positioned on the number. Turn the knob to modify the value. Press the knob to confirm.
11. The cursor moves automatically to  for the activation of the timer cycle programmed. Press the knob to enable the timer cycle. The  symbol indicates that the timer cycle that has just been programmed has been enabled. NOTE: a water T timer cycle may be disabled at any moment by pressing . The  symbol indicates that the water T timer cycle programmed has been disabled.
12. Proceed in the same way, repeating steps 9 – 10 - 11 for the programming of any further timer cycles required.
13. Once the desired timer cycles have been programmed, it is possible to pass to the following day by selecting the arrow at the top right . The previous day’s program may be copied for the current day by selecting , or the water T timer cycles required for the new day may be programmed.



14. To exit, select

If a programming anomaly occurs, appropriate alert messages are displayed:

- Water T timer cycle with zero (or “negative”) duration.
- Water T timer cycle in conflict with another timer cycle.



### 3.4.1.1.2.2. Separable plant water timer

This option permits to manage the “**Separable plant water T timer cycles**” operation mode of the separable service for the production of domestic hot water . It allows the user to select up to 4 plant activation time intervals, within which it is possible to define a water set point temperature.

NOTE

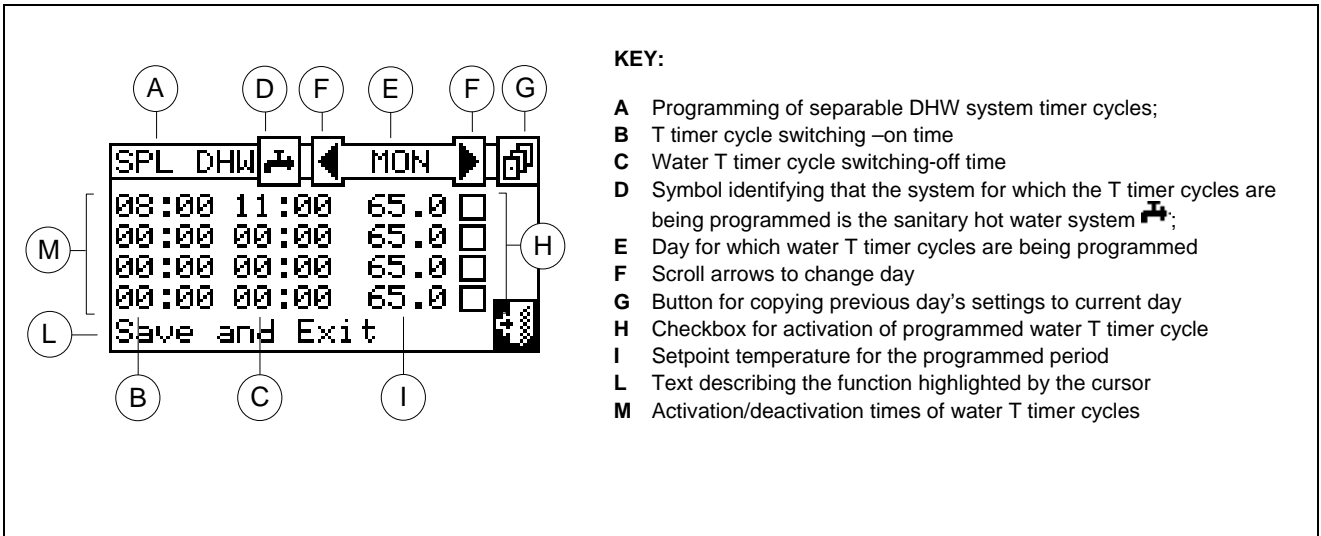
The water T timer cycles and the relevant set point are taken in consideration ONLY if, on the RB100 or RB200 device (absolutely necessary for the domestic hot water control) the “Type of set point inlet for the domestic hot water” parameter is set as “digital with set point on Digital Control Panel”.

For more information please consult the installation and user booklet of the RB 100 (code D-LBR468) and the RB 100 applications booklet (code D-LBR467), or the installation and user booklet of the RB 200 device (code D-LBR632) and the Applications Manual (code D-LBR630), according to the type of device used.

Up to 4 daily water T timer cycles can be programmed, to which it is possible to associate 4 different temperature levels. It is possible to enable/disable each water T timer cycle programmed without cancelling it by operating on the  fields as described below. This programming may be different for each of the seven days of the week.

**Separable plant T timer cycle programming.**

Figure 9 indicates how the DDC display appears when programming the separable plant water T timer cycles.



**Figure 9 – SCREEN FOR THE PROGRAMMING OF THE PROGRAMMABLE PLANT T TIMER CYCLES**

In case of plants managed by several DDC, the programming of the water T timer cycles can be carried out only by the DDC defined as Master.

In order to program the switching-on T timer cycles for a typical day, follow the instructions below:

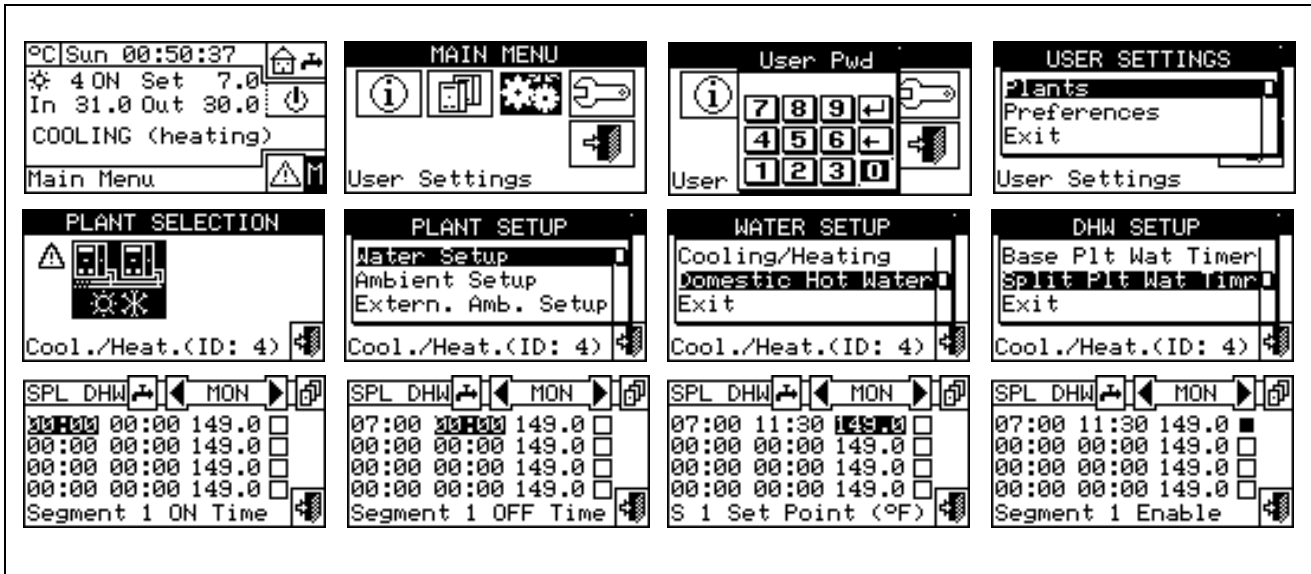
1. Select from the initial screen to gain access to the main menu.
2. Select to access the “User settings” menu.
3. If requested, enter the user password on the numerical keypad that appears on the display.
4. Select “Plants” from the drop-down menu.
5. Select the plant for which the partial water T timer cycles are to be programmed: for two-line cooling/heating plants, for hot water production plants, or for chilled water production plants.
6. Select “Water setup” from the drop-down menu.
7. Select “Domestic hot water” from the drop-down menu.
8. Select “Split plant water timer” from the drop-down menu
9. Position the cursor on the activation time of the first water T timer cycle and press the knob. Turn the knob to select the activation time of the first timer cycle and press the knob to confirm. The cursor moves automatically to the deactivation time of the first timer cycle. Proceed in the same way to program the deactivation time of the first timer cycle.
10. Set the water set-point temperature for the programmed timer cycle. Press the knob to modify the temperature value once the cursor is positioned on the number. Turn the knob to modify the value. Press the knob to confirm.
11. The cursor moves automatically to  for the activation of the timer cycle programmed. Press the knob to enable the timer cycle. The  symbol indicates that the timer cycle that has just been programmed has been enabled. NOTE: a water T timer cycle may be disabled at any moment by pressing . The  symbol indicates that the water T timer cycle programmed has been disabled.
12. Proceed in the same way, repeating steps 9 – 10 - 11 for the programming of any further timer cycles required.

13. Once the desired timer cycles have been programmed, it is possible to pass to the following day by selecting the arrow at the top right . The previous day's program may be copied for the current day by selecting , or the water T timer cycles required for the new day may be programmed.

14. To exit, select .

If a programming anomaly occurs, appropriate alert messages are displayed:

- Water T timer cycle with zero (or "negative") duration.
- Water T timer cycle in conflict with another timer cycle.



### 3.4.1.2 Ambient Setup

Via this menu, the user may set all the parameters necessary if ambient thermostating is used (internal ambient temperature of the environment to be heated/cooled). It is necessary to connect an ambient temperature sensor, supplied as an optional extra, for this operating mode. To gain access to the "Environment setting" menu, first configure the consent in "AmbT" mode or "WCmp" (climatic curve) mode (for further information, refer to paragraph "On/off command configuration" on page 103).

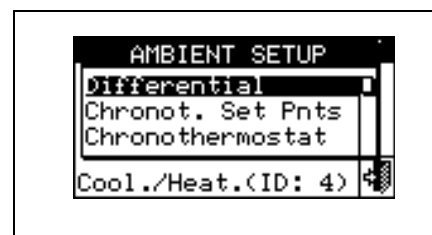
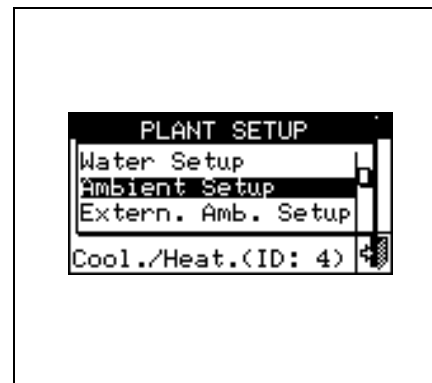
The parameters that may be programmed for this operating condition are:

- 3.4.1.2.1 *Differential*
- 3.4.1.2.2 *Chronothermostat set points*
- 3.4.1.2.3 *Chronothermostat*

#### 3.4.1.2.1 Differential

This screen shows the differential value set for heating and/or cooling operation according to the type of plant configured.






**NOTE:** this setting is only available in ambT mode; it is disabled in WCmp mode.



#### Programming of differential

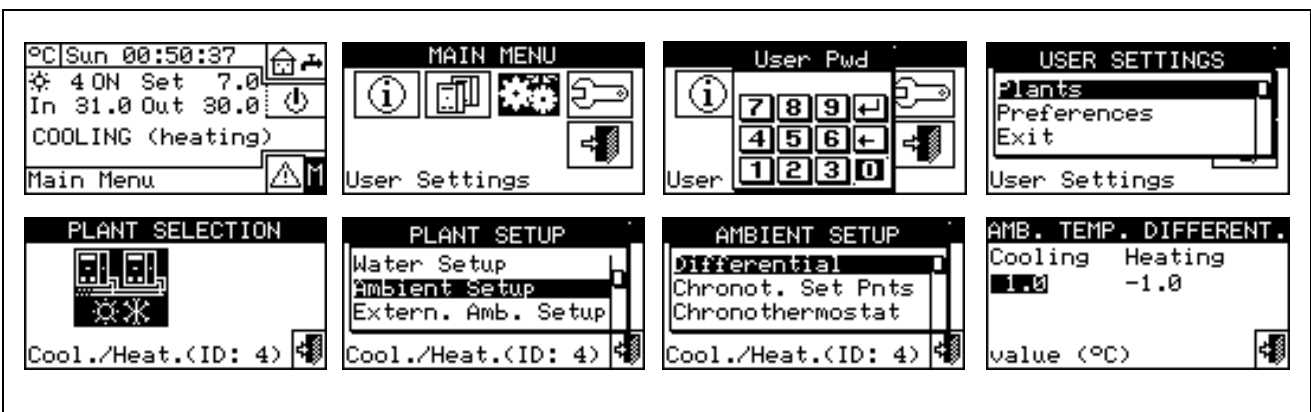
To set the value or values of the ambient air temperature differential, proceed as follows.

- 1 - Select from the initial screen to gain access to the main menu.

- 2 - Select  to access the "User settings" menu.
- 3 - Enter, if requested, the user password on the numerical keypad that appears on the display.
- 4 - Select "Plants" from the drop-down menu.
- 5 - Select the appropriate icon:  for two-line cooling/heating plants,  for hot water production plants, or  for chilled water production plants.
- 6 - Select "Ambient Setup" from the drop-down menu.
- 7 - Select "Differential" from the drop-down menu.
- 8 - Position the cursor on the value to modify (Cooling or Heating).
- 9 - Press the knob to allow the change of the selected value.
- 10 - Turn the knob to modify the differential value.
- 11 - Press the knob to confirm the set value.
- 12 - To exit, select .

**NOTE**

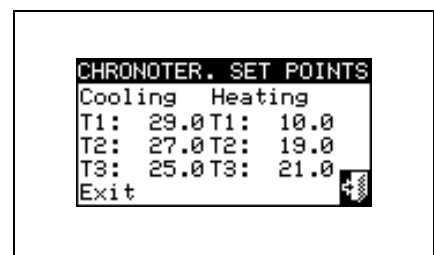
The recommended values for the ambient temperature differential are 1°C (1,8°F) for cooling and -1°C (-1,8°F) for heating.



**3.4.1.2.2 Chronothermostat set points**

Up to 3 temperature levels may be programmed. The 3 temperature levels refer to the air temperature in the environment to be cooled or heated.



**NOTE:** T1 corresponds to the minimum service level (lower temperature in heating mode, higher temperature in cooling mode) consequently it is possible only to set values that respect these conditions (heating:  $T1 \leq T2 \leq T3$ ; cooling:  $T3 \leq T2 \leq T1$ ).



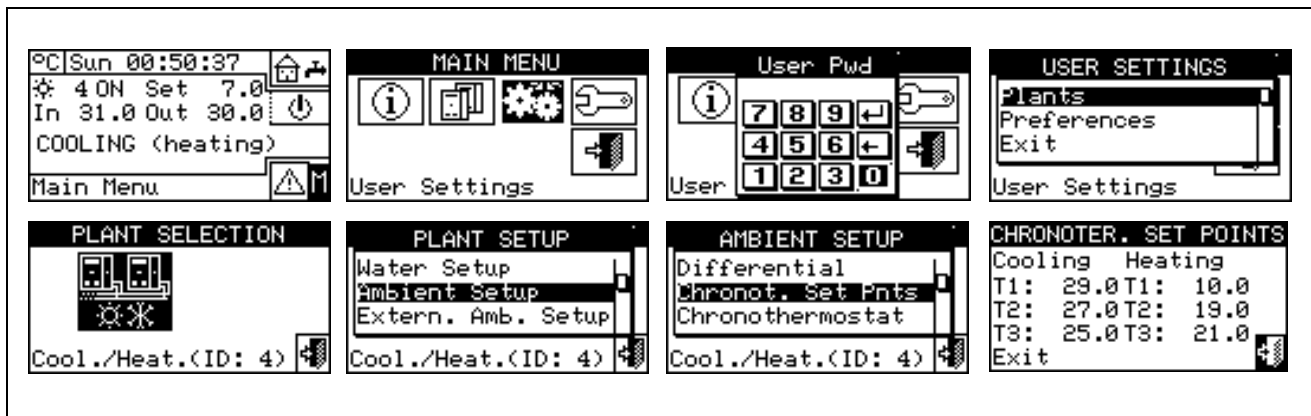
**Programming chronothermostat set points**

This option allows the user to set three ambient temperature values for operation in COOLING mode and three ambient temperature values for operation in HEATING mode. These values can then be selected and used when programming the ambient chronothermostat.

Instructions for setting the three temperatures follow.

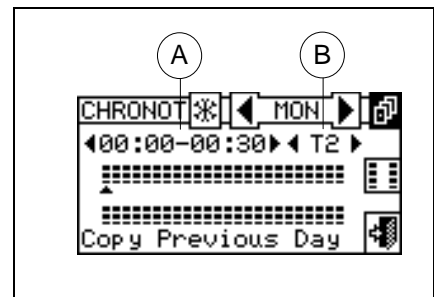
- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the "User settings" menu.
- 3 - If requested, enter the user password on the numerical keypad that appears on the display;

- 4 - Select "Plants" from the drop-down menu.
- 5 - Select for two-line cooling/heating plants (in this case 6 temperature levels may be set, 3 for the cooling plant and 3 for the heating plant), for hot water production plants (in this case there are 3 temperatures to set), for chilled water production plants (in this case there are 3 temperatures to set).
- 6 - Select "Ambient Setup" from the drop-down menu.
- 7 - Select "**Chronot. Set Ptns**" from the drop-down menu.
- 8 - Position the cursor on the first temperature value at the top left of the screen.
- 9 - Press the knob to allow the change of the selected value.
- 10 - Turn the knob to modify the value.
- 11 - Press the knob to confirm the set value.
- 12 - Repeat the last 3 steps to set the other temperatures.
- 13 - To exit, select .





### 3.4.1.2.3 Chronothermostat

This option allows the user to program the chronothermostat. The figure on the right shows an example for a typical day. The chronothermostat allows a temperature value (T1, T2, T3 or "OFF") to be set for each half-hour interval during the day. For the plant to operate in chronothermostat mode, it is necessary to connect an ambient temperature sensor, supplied as an optional extra, to the Direct Digital Controller.



Description of the symbols/icons in the main screen:

	Indicates that the chronothermostat for heating operation is being programmed.
	Indicates that the chronothermostat for cooling operation is being programmed.
	Changes the day for which the chronothermostat is being programmed.
	Shows the day that is being programmed.

	Copies the previous day: allows the program for the current day to be copied from the previous day.
	Enables copying of period. This key allows the user to quickly copy the ambient temperature level set for a specific period to one or more adjacent periods.
Arrows "A" ◀▶	Allow the user to select one of the 48 periods available, one for each half-hour interval.
Arrows "B" ◀▶	Allow the user to set a temperature level for the period selected.

A small arrow (see detail "L" in Figure 10 a page 44) on the two rows at the bottom indicates which half-hour interval is being programmed.

**Chronothermostat programming**

The use of the chronothermostat allows up to 3 temperature levels to be selected: T1, T2 and T3 (e.g. T3 day, T2 night and T1 anti-freezing) as well as the switch-off (OFF) for each period selected. It is possible to program a total of 48 periods with a duration of 30 minutes each, and to assign a specific temperature level to each period (T1, T2, T3 and OFF).

The figure below shows the screen for programming the weekly chronothermostat. This screen shows all the buttons and symbols used to enable programming.

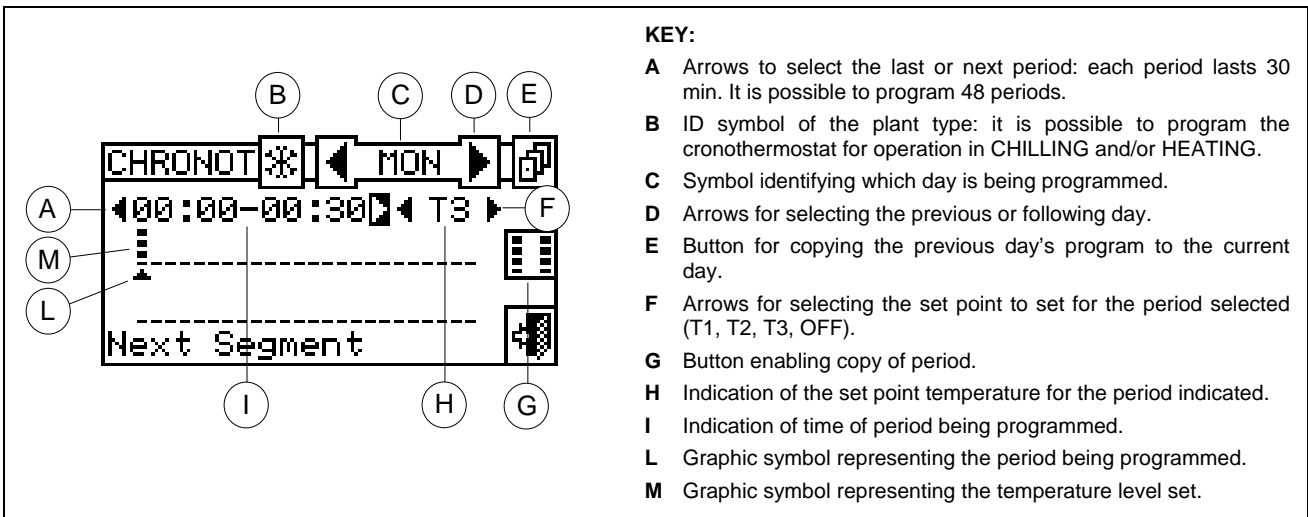







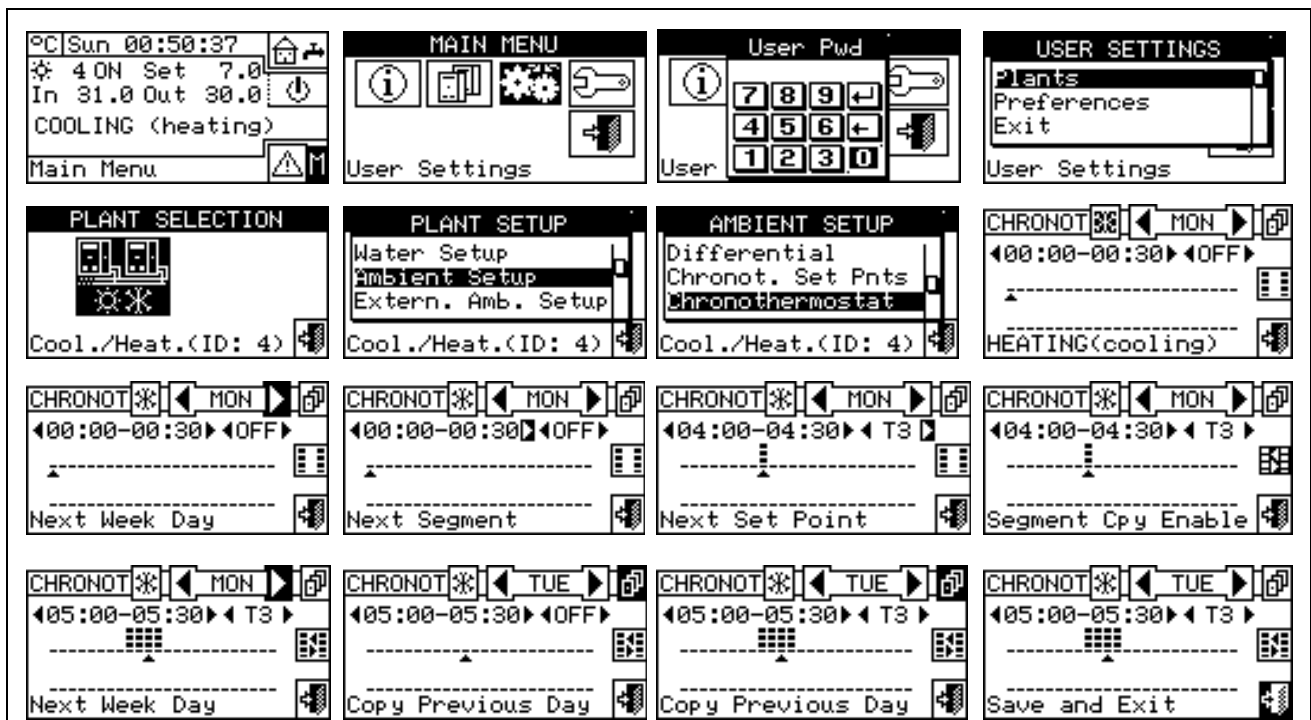


Figure 10 – AMBIENT CHRONOTHERMOSTAT PROGRAMMING SCREEN

To carry out chronothermostat programming, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the "User settings" menu.
- 3 - Enter, if requested, the user password on the numerical keypad that appears on the display;
- 4 - Select "Plants" from the drop-down menu.
- 5 - Select the appropriate icon:  for two-line cooling/heating plant;  for the hot water production plant;  for the chilled water production plant.
- 6 - Select "Ambient Setup" from the drop-down menu.
- 7 - Select "Chronothermostat" from the drop-down menu.
- 8 - (Two-line hot/cold plants only) Select button "B" to choose the operating mode for which the chronothermostat is to be programmed:  for HEATING,  for COOLING.

- 9 - Select one of the arrows "D" as shown in Figure 10 to choose the day of the week; between the two arrows there is a brief description in letters of the day (◀LUN▶).
- 10 - Select the period to be programmed via the arrows marked "A" (◀00:00-00:30▶) in Figure 10. The ▲ symbol (see label L in Figure 10) indicates the period to be programmed.
- 11 - Select the set-point temperature level for the period: you can select three temperature levels and the plant switch-off. Position the cursor on one of the arrows labelled "F" (◀T3▶) and press the knob to change the set point temperature. Next to the ▲ symbol some small black squares will appear according to the level selected:  
 Functioning in heating mode: ▬ level T3; ▬ level T2, ▬ level T1; ▬ OFF.  
 Conditioning operation: ▬ level T3; ▬ level T2, ▬ level T1; ▬ OFF
- 12 - Select another period using the arrows "A" and repeat the operation described in step 11.
- 13 - If the same temperature level for a certain number of adjacent periods is desired, enable the copy period function by means of the copy period button . The symbol indicates that the copy period button has been enabled. The use of this function speeds up the chronothermostat programming operations: to copy the temperature level on adjacent periods use the arrows "A". To disable the function, press the copy period button again.
- 14 - Once programming of the 48 periods is complete, select one of the arrows (◀LUN▶) to change the day. If the 48 periods are to be programmed in the same way as the previous day, use the copy previous day button .
- 15 - When all days of the week have been programmed, exit the menu by selecting .



**3.4.1.3 External ambient setup**

In this menu all parameters for “ExtT” (external temperature) operating mode can be set.

To gain access to the “Environment setting” menu, first configure the consent in “TExt” or “Crvc” mode (climatic curve (for more information refer to paragraph “On/off command configuration” on page 84).

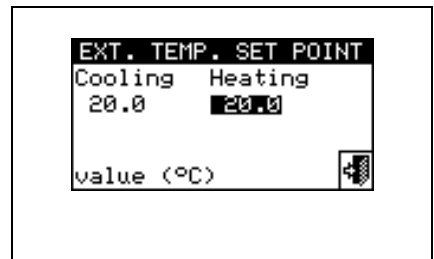
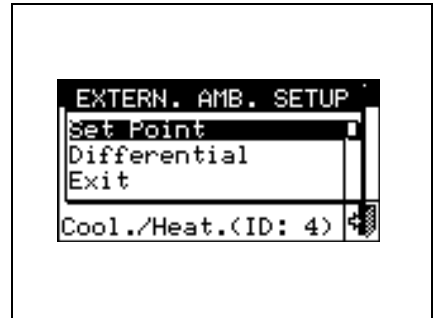
The parameters that may be programmed in this operating condition are:

- 3.4.1.3.1 Set point
- 3.4.1.3.2 Differential

**3.4.1.3.1 Set point**







This option allows the user to define external temperature values for cooling and/or heating operation in “ExtT” (external ambient temperature) mode.

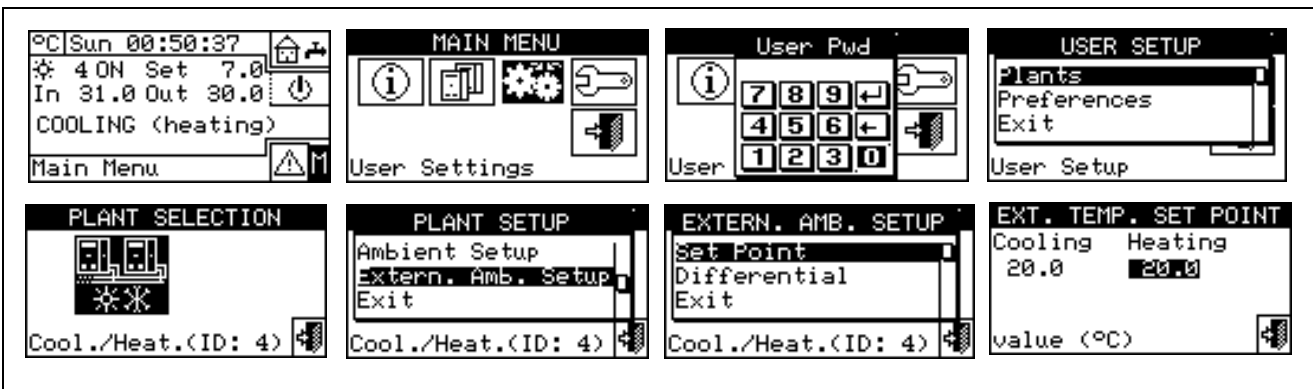
To exit, select .



**Configuring external set point temperature**

Instructions for setting the external temperature follow:

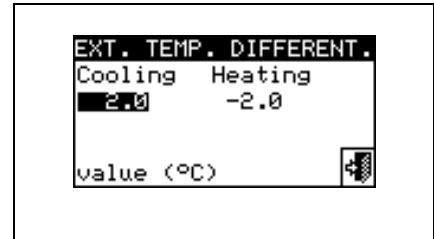
- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the “User settings” menu.
- 3 - Enter, if requested, the user password on the numerical keypad that appears on the display;
- 4 - Select “Plants” from the drop-down menu.
- 5 - Select the appropriate icon:  for two-line cooling/heating plants,  for hot water production plants;  for chilled water production plants.
- 6 - Setup” from the drop-down menu.
- 7 - Select “Set point” from the scrolling menu.
- 8 - Position the cursor on the value to be modified (Cooling and/or Heating).
- 9 - Press the knob to allow the change of the selected value.
- 10 - Turn the knob to modify the value.
- 11 - Press the knob to confirm the set value.
- 12 - To exit, select .





### 3.4.1.3.2 Differential

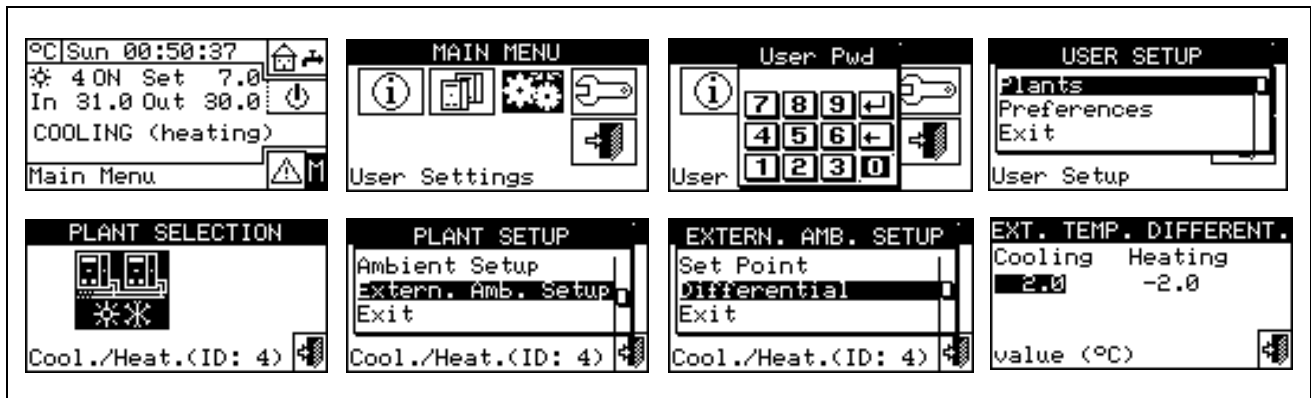
This parameter must be set for the “ExtT” (external temperature).  
 This screen shows the differential value set for heating and/or cooling operation according to the type of plant configured.



#### Setting the differential

To set the external air temperature differential value or values, proceed as follows.

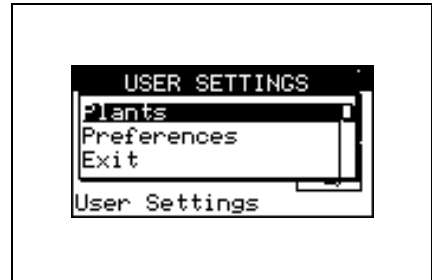
- 1 - Select from the initial screen to access the main menu.
- 2 - Select to access the “User settings” menu.
- 3 - Enter, if requested, the user password on the numerical keypad that appears on the display;
- 4 - Select “Plants” from the drop-down menu.
- 5 - Select the appropriate icon: for two-line cooling/heating plant; for the hot water production plant; for the chilled water production plant.
- 6 - Setup” from the drop-down menu.
- 7 - Select “Differential” from the drop-down menu.
- 8 - Position the cursor on the value to be modified (Cooling and/or Heating).
- 9 - Press the knob to allow the change of the selected value.
- 10 - Turn the knob to modify the differential value.
- 11 - Press the knob to confirm the set value.
- 12 - To exit, select .



**3.4.2 PREFERENCES**

From the user settings menu, select “Preferences” to access the drop-down menu where it is possible to set the following parameters:

- 3.4.2.1 *Language*
- 3.4.2.2 *Date and Time*
- 3.4.2.3 *Temperature Measurement Unit*
- 3.4.2.4 *Alarm Beeper*
- 3.4.2.5 *Display Options*
- 3.4.2.6 *User Password Setup*






**3.4.2.1 Language**

The following languages are available for viewing the indications on the display: Italian, English, French, German, Spanish. Select “Exit” to return to the list of preferences.

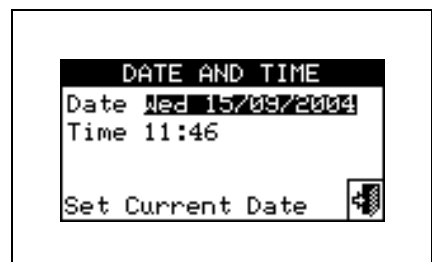


If a language is selected by mistake, wait for 30 minutes until the DDC returns automatically to the main screen, then proceed as follows:



- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the “User settings” menu.
- 3 - Position the cursor by turning the knob on the second line of the drop-down menu, and press the knob.
- 4 - A second drop-down menu appears. Simply select the first line by pressing the knob.
- 5 - Turn the knob to choose the language and press the knob to confirm the choice.
- 6 - Wait for the change to the language selected.
- 7 - To exit, select .

**3.4.2.2 Date and Time**

In this screen, current time and date may be modified.



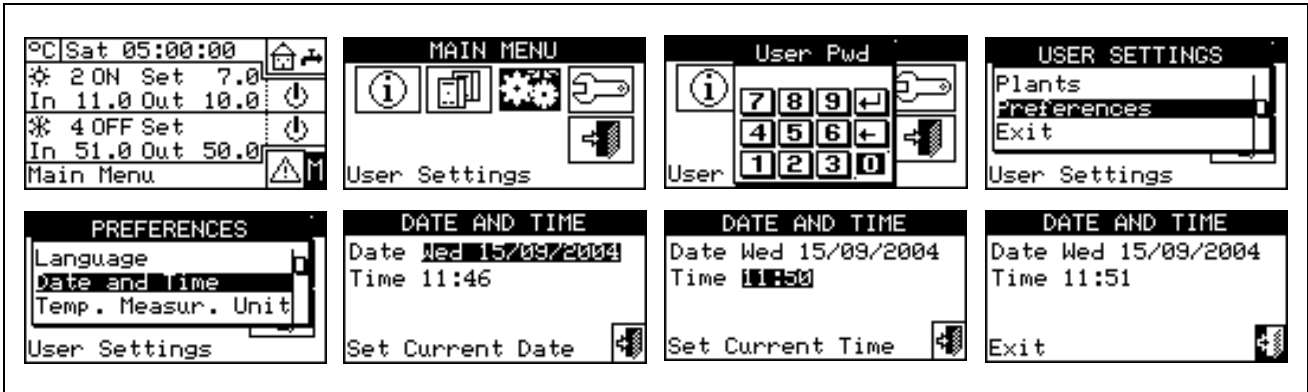
**Setting current date and time**

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the “User settings” menu.
- 3 - If requested, enter the user password on the numerical keypad that appears on the display.
- 4 - Select “**Preferences**” from the drop-down menu.
- 5 - Turn the knob to scroll the cursor downwards until “**Date and time**” is highlighted and press the knob to access the submenu.
- 6 - To modify the date and/or time, turn the knob to position the cursor on the value to be modified.

- 7 - Press the knob. The figure selected will start to flash.
- 8 - Turn the knob to change the value and press the knob to confirm.
- 9 - To exit, select

NOTE

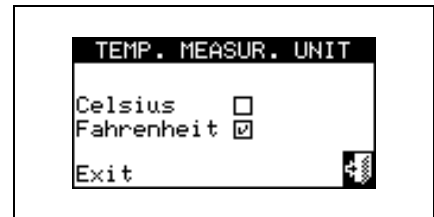
The clock is restarted once the exit button has been pressed and if at least one of the two fields has been selected.



### 3.4.2.3 Temperature Measurement Unit

This screen shows the current temperature units. To modify the unit, position the cursor on and press the knob to confirm.

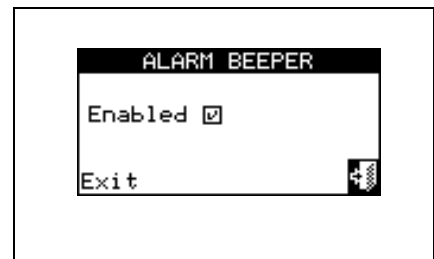
To exit, select .



### 3.4.2.4 Alarm Beeper

The Direct Digital Controller is equipped with a beeper that is activated each time an alarm regarding the operation of the units managed occurs. To disable the beep select  and press the knob to visualise .

To exit, select .




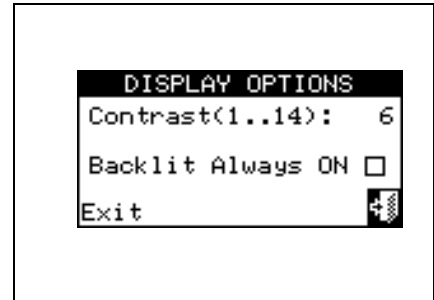
**3.4.2.5 Display Options**

This option allows the user to adjust the contrast of the graphic display.

To adjust the contrast:

1. Position the cursor on the contrast level.
2. Press the knob. The number starts to flash.
3. Turn the knob to modify the value.
4. Press the knob to confirm the contrast level chosen.
5. Select "Lighting always On" and the backlighting stays on, otherwise it will switch off after 15 minutes of Encoder inactivity.





To exit, select .

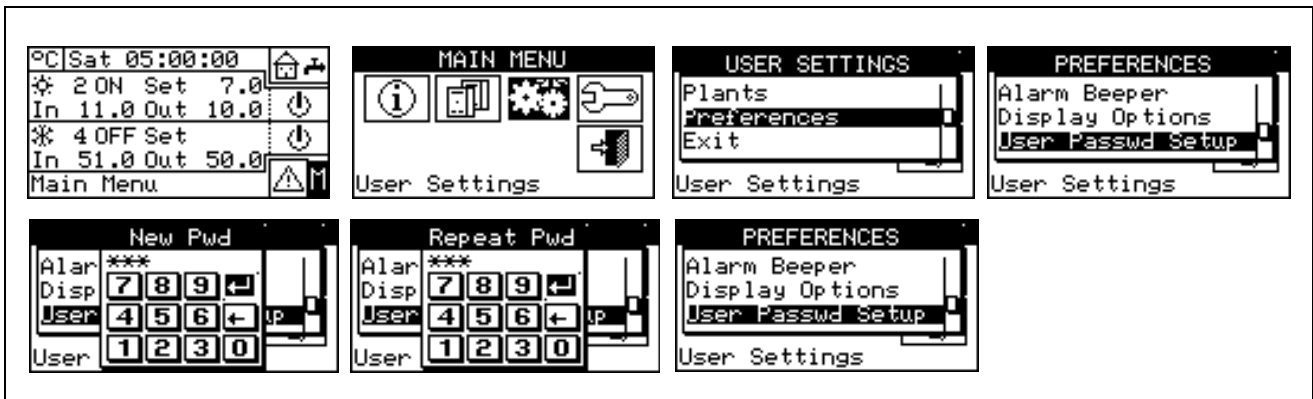



**3.4.2.6 User Password Setup**

This option allows the user to set/disable the user password.

To set the user password, follow the instructions below:





- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the "User settings" menu.
- 3 - Select "Preferences" from the drop-down menu.
- 4 - Select "Set user password" from the drop-down menu.
- 5 - Enter the password requested and select  to confirm.
- 6 - Enter the new password again and select  to confirm.




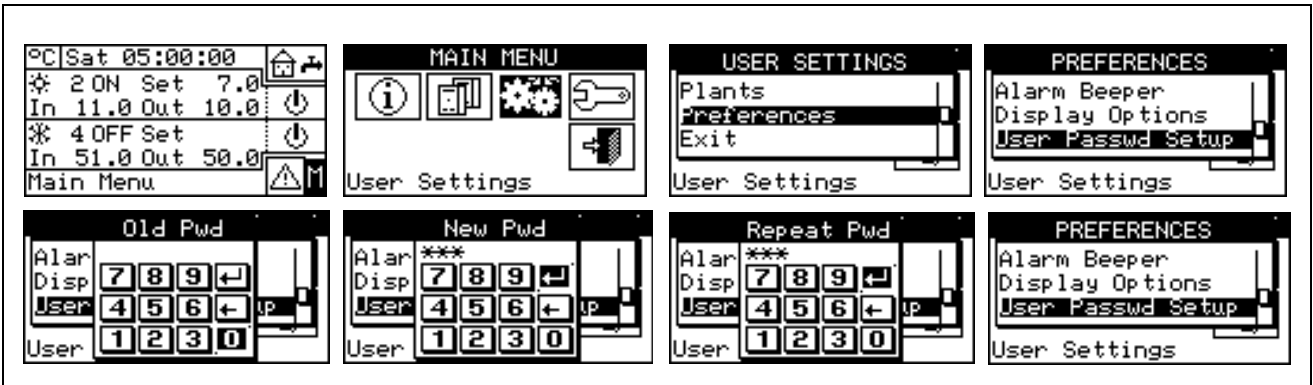
Once the password has been enabled, it must be entered every time it is necessary to access the "User settings" menu (.

Each time the password is entered to access the User settings menu, it remains active for 10 minutes after exiting from the menu.


Instructions for modifying or disabling the user password follow.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to access the "User settings" menu.
- 3 - If requested, enter the user password on the numerical keypad that appears on the display.
- 4 - Select "Preferences" from the drop-down menu.
- 5 - Select "Set user password" from the drop-down menu.
- 6 - If a user password is present, a numerical keypad appears on the screen. Enter the old password via this keypad and then select  to confirm it.
- 7 - The screen asks for the new password to be entered; enter it and select .

8 - To confirm the new password, enter it again and select .



NOTE

To disable the password, do not enter a new password at steps 7 and 8 - simply select .  
 If the user password is disabled, it is not necessary to enter it to access the "User settings menu".

If an incorrect password is entered, press Enter. The DDC returns to the previous menu.

## 4 INSTALLATION

### 4.1 CONNECTING THE DIRECT DIGITAL CONTROLLER

WARNING

Before proceeding with operations for the creation of the electrical system, the professionally qualified personnel concerned is urged to read carefully the “Warnings” contained in Section 1, “GENERAL WARNINGS”, of this manual: they provide important indications regarding installation safety and references to current norms.

**Incorrect installation may cause damage to persons, animals or things, for which the manufacturer may not be deemed responsible.**

#### 4.1.1 GENERAL INFORMATION

The connection of the **Direct Digital Controller (DDC)** requires:

- Power supply to the Direct Digital Controller;
- Connection of the DDC and all units via a CAN-BUS cable.

NOTE

BEFORE CARRYING OUT ANY OPERATION TO CONNECT THE DIRECT DIGITAL CONTROLLER, DISCONNECT THE POWER SUPPLY FROM THE UNITS BY MEANS OF THE MAIN POWER SWITCH PROVIDED BY THE ELECTRICAL INSTALLATION TECHNICIAN.

#### **Power supply of the Direct Digital Controller**

The Direct Digital Controller must be supplied by a 230/24 V.a.c safety transformer - 50/60 Hz power no less than 20 VA (not supplied); in particular, this transformer must comply with standard EN 61558-2-6.

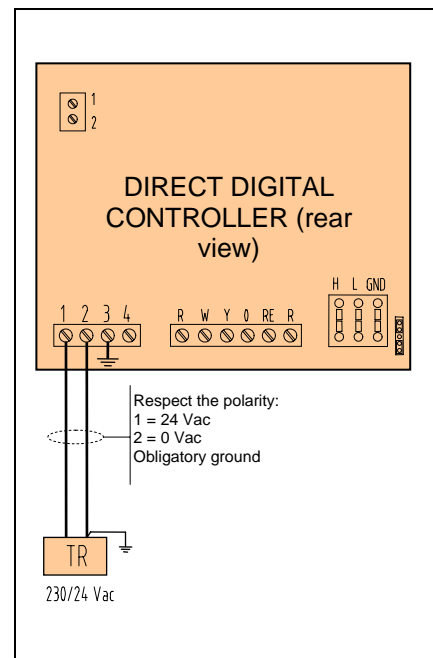
Use a 3 x 0,75 mm<sup>2</sup> electrical connecting cable and make the connections on the terminals of the 4-pole connector located at the bottom left of the rear of the DDC, respecting the polarity as in the diagram on the right

- terminal 1 = 24 V;
- terminal 2 = 0 V;
- terminal 3 = ground.

**The maximum length for this cable is 1 m.**

**Warning:** in any case, terminal 3 of the DDC’s 4-pole connector must be connected to a safety ground (RCO < 1Ω).

The Direct Digital Controller is additionally equipped with a backup battery which, in the absence of electrical power, is able to preserve values set in memory. **The duration of the backup battery is approximately 7 years**, after which it is necessary to replace it (by contacting a **ROBUR Technical Assistance Centre**).



#### **Connecting the Direct Digital Controller to the units**

The Direct Digital Controller must be connected to the units via a CAN-BUS cable, to create a data communication network, characterised by a series of “n” nodes as indicated in the examples in Figure 11 or Figure 12.

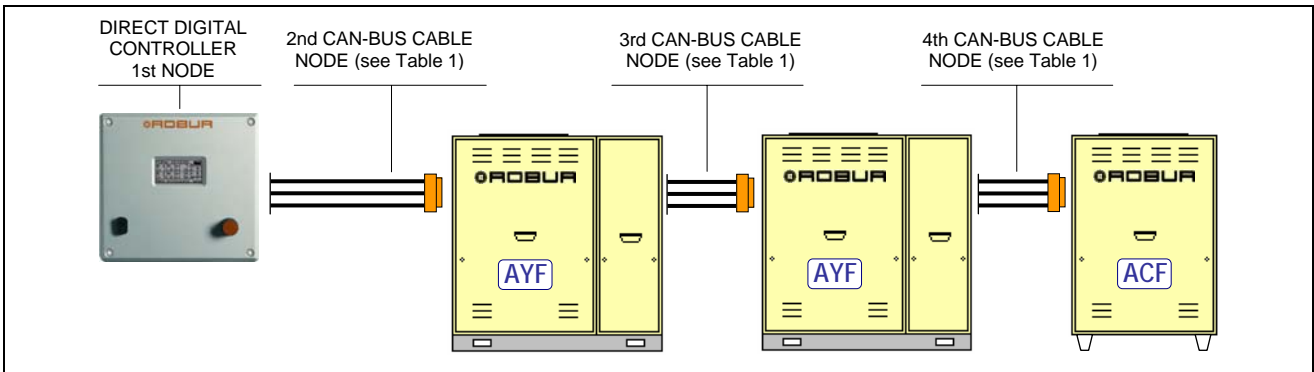


Figure 11 – EXAMPLE OF CONNECTION OF DIRECT DIGITAL CONTROLLER TO SEVERAL GA SERIES UNITS

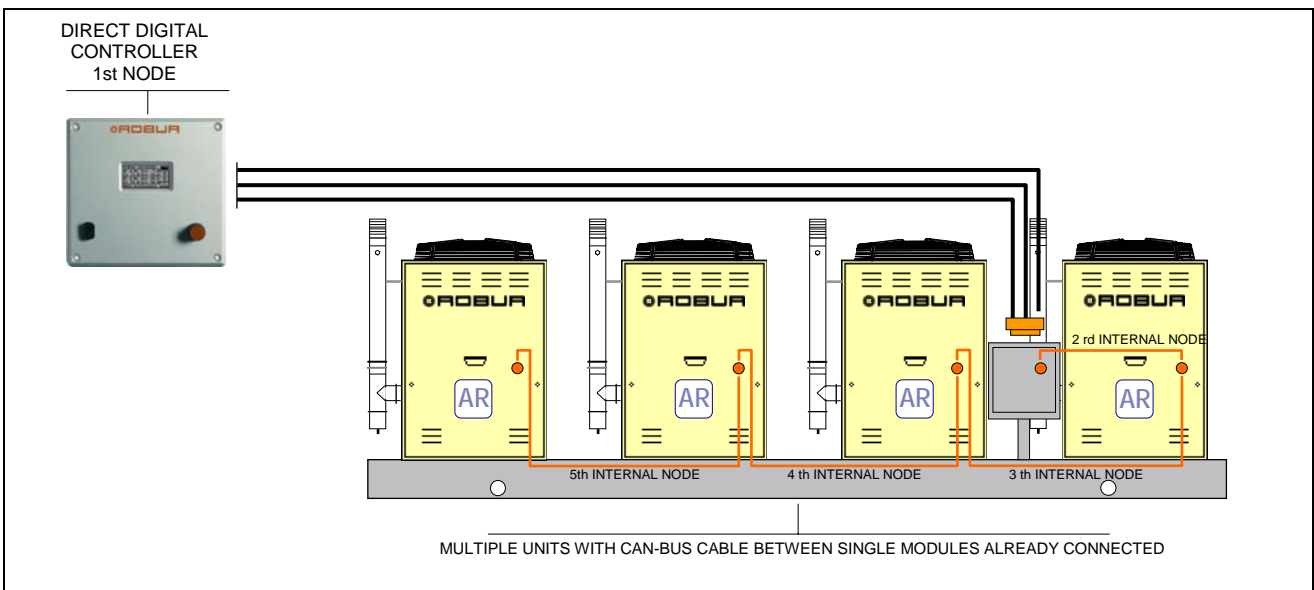


Figure 12 – EXAMPLE OF CONNECTION OF DIRECT DIGITAL CONTROLLER TO SINGLE PREASSEMBLED GAHP SERIES UNIT

For total cable length of up to 200m and communication networks with MAX 6 nodes (example 1 Direct Digital Controller connected to 1 RTCF 300-00) a simple 3 x 0, 75 mm<sup>2</sup> shielded cable may be used. In all other cases, use a CAN-BUS cable, available as a ROBUR accessory, or follow the specifications given below.

NAME OF CABLE	MARKINGS / COLOURS			MAX. LENGTH	note	
<b>Robur</b>						
ROBUR NETBUS	H=BLACK	L= WHITE	GND= BROWN	450 m	-----	
<b>Honeywell SDS 1620</b>						
BELDEN 3086A	H=BLACK	L= WHITE	GND= BROWN	450 m	In all cases, the fourth wire may not be used	
TURCK type 530						
<b>DeviceNet Mid Cable</b>						
TURCK type 5711	H= BLUE	L= WHITE	GND= BLACK	450 m		
<b>Honeywell SDS 2022</b>						
TURCK type 531	H=BLACK	L= WHITE	GND= BROWN	200 m		

Table 1 – EXAMPLES OF CAN-BUS CABLES FOR THE CONNECTION OF THE DIRECT DIGITAL CONTROLLER TO GA and GAHP SERIES UNITS

**WARNING**

Diagrams and procedures for connecting the Direct Digital Controller to ROBUR units or to other Robur devices are contained in the specific Installation, Operation, Activation and Maintenance Manuals supplied with the units themselves.

For the operation of connecting the DDC, please consult this specific documentation.

**4.1.2 CONNECTING THE DIRECT DIGITAL CONTROLLER**

The following connection terminals are located on the rear of the Direct Digital Controller (see Figure 13):

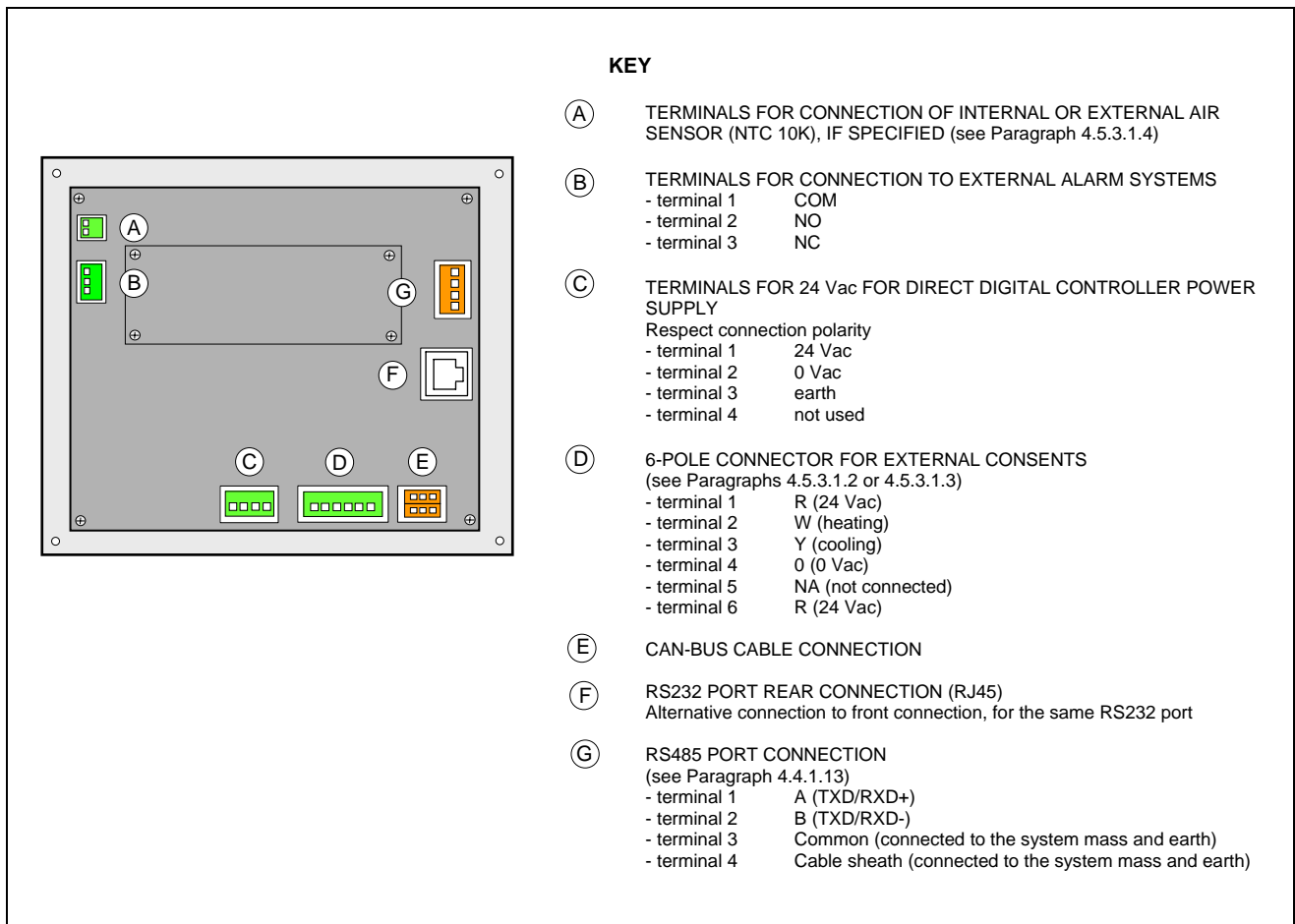
- 2-pole connector for ambient air temperature sensor, supplied as an optional accessory, if specified (see detail A in Figure 13);
- 3-pole connector for alarm signal relay contacts (see detail B in Figure 13);
- 4-pole connector for 24 Vac power supply. Current is supplied to the DDC by a 24 Vac, 50/60Hz single secondary transformer (see detail C in Figure 13);
- 6-pole connector for external operation commands, if specified (see detail D in Figure 13);
- 6-pole CAN-BUS connector for connecting the DDC to the units (see detail E in Figure 13).

A standard male 9-way connector (RS232 serial port) is located on the front of the Direct Digital Controller for connection to a PC (see Figure 1 on page 7).

**NOTE**

In particular applications, an external alarm signal may be required for high chilled water temperature and/or for low hot water temperature, or for a general alarm that allows any anomalies in the units to be signalled. To this end, a specific terminal with 3 contacts (see detail B in Figure 13) is provided on the rear of the Direct Digital Controller for the activation, via a relay, of an alarm signal, such as a light, siren or other device (for further information see Paragraphs 4.4.2.6.7 – **“Temperature Alarm Setup (Master DDC only)”** on page 100 and 4.4.2.4 – **“Alarm output setup”** on page 86.

This connection must only be used to control external equipment at very low safety voltage (SELV) up to a maximum of 24 V and at a maximum current of 1 A. Do not connect external equipment to a 230 V supply.



**Figure 13**– REAR VIEW OF DIRECT DIGITAL CONTROLLER and DETAIL OF ELECTRICAL CONNECTIONS



## NOTE

To carry out the electric connection between DDC and RB100 we suggest to refer to the “Electric installer section” of the booklet provided with the RB200 device (Code D-LBR468).

To carry out the electric connection between DDC and RB200 we suggest to refer to the “Electric installer section” of the booklet provided with the RB200 device (Code D-LBR632).

### APPLYING THE DIRECT DIGITAL CONTROLLER

For internal installation, the Direct Digital Controller must be applied as a panel by carrying out the following operations (see Figure 14):

- Create a 155 by 151 mm rectangular opening;
- Position the Direct Digital Controller over the opening created and mark the 4 points of the holes by which it is to be fixed in place;
- Make 4 holes of 4 mm in diameter;
- proceed with the operation of applying the Direct Digital Controller over the opening in the panel with the screws and nuts (supplied).

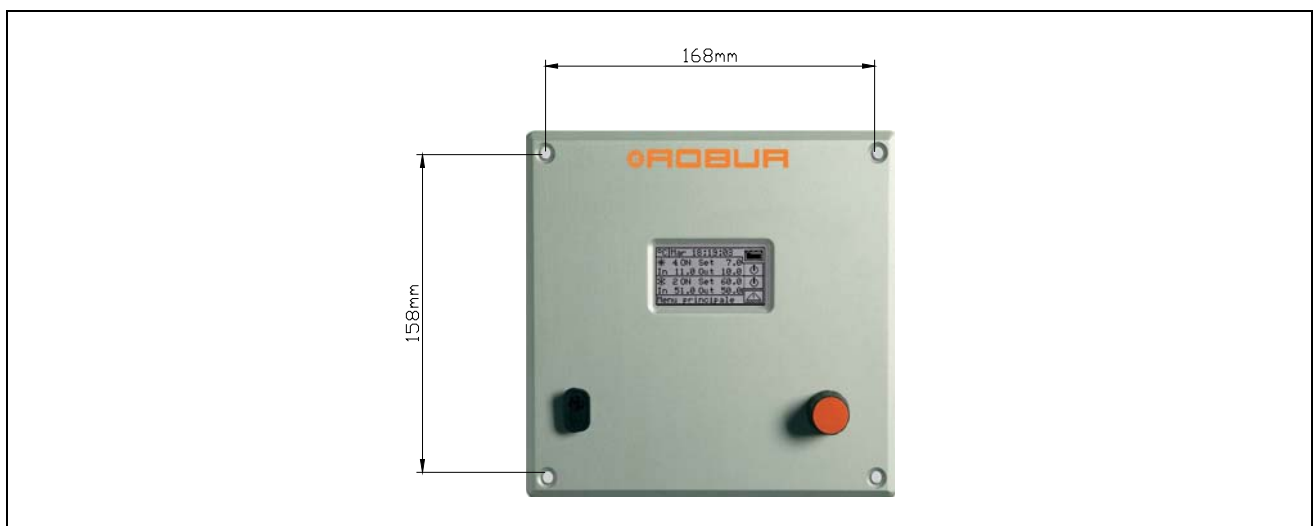


Figure 14 — DISTANCE BETWEEN FIXING HOLES FOR DIRECT DIGITAL CONTROLLER

## NOTE

The operating temperature range of the Direct Digital Controller is 0 ÷ 50 °C (32° ÷ 122°F). If the temperature of the installation environment is below zero freezing, the Direct Digital Controller continues to function correctly to -10 °C (14°F), but its LCD screen may not be able to display data.

## 4.2 DESCRIPTION OF AUXILIARY BOILER OPERATING METHODS FOR HOT SERVICE ON BASE PLANT PART

Limited to the hot service on the base plant part (heating and/or base domestic hot water) obtained with a mixed generation system (heat pump and auxiliary boilers), two different operating modes are available for the auxiliary boilers, selected using specific parameters:

- **Complement mode**  
This mode is used for plants in which the auxiliary boilers complement, but do not substitute, heat pumps in all the plant operating field. This means that the heat pumps can also work at max. thermal load, and therefore that the plant always requests delivery and return water temperatures that are compatible with the maximum permitted temperatures of the heat pump. It follows that the installed power (sum of the power of the heat pumps and the auxiliary boilers) is usually equal to the total power requested of the plant.

- **Complement and substitution mode**

This mode on the other hand is used for plants in which, at a high thermal load, it is foreseen that the temperatures requested for delivery and/or return water are incompatible with the maximum permitted temperatures of the heat pumps. In this type of plant, starting with a given thermal load we must keep the heat pumps off and use only the auxiliary boilers; we must therefore install auxiliary boilers that are able to provide 100% of the maximum power requested of the plant (nominal plant power). Therefore the system assumes that the nominal plant power is equal to the total power of the auxiliary boilers and delivers this power according to one of the following diagrams:

A - As far as is possible (low and medium thermal load) it enables the heat pumps and possibly a fraction of the auxiliary boilers, so that the total enabled power corresponds to the nominal plant power.

B - At high thermal load, and in particular when the requested temperatures are incompatible with those permitted by the heat pump, it disables the heat pumps and enables all the auxiliary boilers, so that the total enabled power is still equal to the nominal plant power.

The system passes from one power delivery layout to the other maximising the use of the heat pumps, as far as is permitted by the temperatures requested of the plant.

NOTE

If necessary it is possible to explicitly declare the nominal plant power value, using a special parameter; this is useful in the event that the total power of the auxiliary boilers is higher than the nominal plant power.

NOTE

It is clear that this boiler operating mode requires the use of variable water set points according to the external temperature (based on the climatic curve), otherwise the system will always work with water temperatures that are not compatible with the heat pumps

For the description of the setting operations for these parameters, refer to the paragraph 4.4.2.6.2 "Auxiliary boiler operation" on page 94 and 4.4.2.6.3 Rated plant power on page 95.

**Warning generation for premature substitution of the heat pumps**

When using the "Complement and substitute" mode it is possible to specify a delivery or return temperature limit value; the delivery value is used if the delivery is regulated and the return value in the opposite case.

If the passage from layout A to layout B (see previous paragraph) takes place when the temperature measured on the manifold on which the regulation takes place is less than the specified limit value, the warning W1027 is generated and memorised in the event history. This is used to underline situations in which the heat pumps are disabled with lower manifold water temperatures than those nominally set and which lead to a lower use of the heat pumps; this warning acts for information only, and does not affect the system functionality. To obtain a correct diagnostic, set an appropriate limit value according to the plant characteristics.

NOTE

These parameters are found in the hot service regulation parameters page of the base plant part (see 4.3.1 HEATING SERVICE).

**Variant of the Complement and substitution: Progressive complement and substitute**

Again in the case of using the "Complement and substitution" mode it is possible to select advanced settings which substitute the heat pumps with auxiliary boilers progressively rather than in a single moment. When the operating limit of the heat pumps is reached, corresponding to the passage from the power delivery layout A to layout B described above, the system attempts to substitute a single heat pump with the auxiliary boilers (rather than substituting them all as takes place in the "standard complement and substitution" mode); subsequently it continues to monitor the temperatures; once the limit operating condition of the heat pumps is reached again, the system substitutes another heat pump with power generated by the auxiliary boilers. This

process is repeated when necessary and can lead to the progressive substitution of all the heat pumps or their progressive re-inclusion.

This use of this advanced variant of the complement and substitution mode is subordinate to the satisfaction of the following requirements:

- Hydraulic configuration of the boilers in series with the heat pumps (see the “Applications manual”)
- Installation of an additional temperature probe on the return manifold of the heat pump

NOTE

These two requirements imply the use of the RB200 device, which is able to manage the temperature probes of the effective delivery and return manifolds in the serial hydraulic configuration, and the additional probe on the return manifold of only the heat pumps.

- Correct setting of some additional parameters, concerning an auxiliary regulator which manages the substitution and progressive re-inclusion of the heat pumps

NOTE

These parameters are found in the hot service regulation parameters page of the base plant part (see 4.3.1 HEATING SERVICE).

### Hydraulic configuration of the auxiliary boilers in parallel or in series with the heat pumps

Whatever the auxiliary boiler operating mode, it is possible to use the hydraulic configuration in parallel or in series.

In the parallel configuration, the return pipes from the auxiliary boilers are connected directly to the plant return manifold, like those in the heat pumps; similarly, all the delivery pipes are connected to the plant delivery manifold. In this case, to carry out the regulation, the DDC may use:

- If the auxiliary boilers are AY modules (Robur), the average temperature read by the machine probes, or dedicated manifold probes, managed by the RB200.
- If the auxiliary boilers are third party, only dedicated manifold probes, managed by the RB200.

In the serial configuration, the return pipes from the auxiliary boilers are connected to the delivery manifold of the heat pumps and the delivery pipes to the plant delivery manifold; only the return pipes from the heat pumps are connected to the plant return manifold. This configuration is advantageous when the plant, at high thermal load, requires a higher delivery temperature than the maximum permitted by the heat pumps [60 or 65 °C (140 or 149° F) according to the models] and develops a higher Delta T than that of the heat pumps [10 °C (18°F)]. In this case, to carry out the regulation, the DDC must always use dedicated manifold probes, managed by the RB200, which may be positioned on the effective plant delivery and return manifolds.

For more information on this subject, refer to the "Applications Manual" (D-LBR630).

## 4.3 DESCRIPTION OF THE REGULATION WATER TEMPERATURE ALGORITHM AND OF THE RELATIVE PARAMETERS

### 4.3.1 HEATING SERVICE

#### Objective of the regulation

The Digital Control Panel regulates the water temperature with the objective of maintaining it within a band centred on the set point. The range of this period is defined by the relevant “Water differential” parameter, as indicated in Figure 15. The default value of the parameter is 2 °C (3,6 °F) [i.e.  $\pm 1$  °C ( $\pm 1,8$ ° F) with respect to the set point value]; for normal applications it is recommended to use this value.

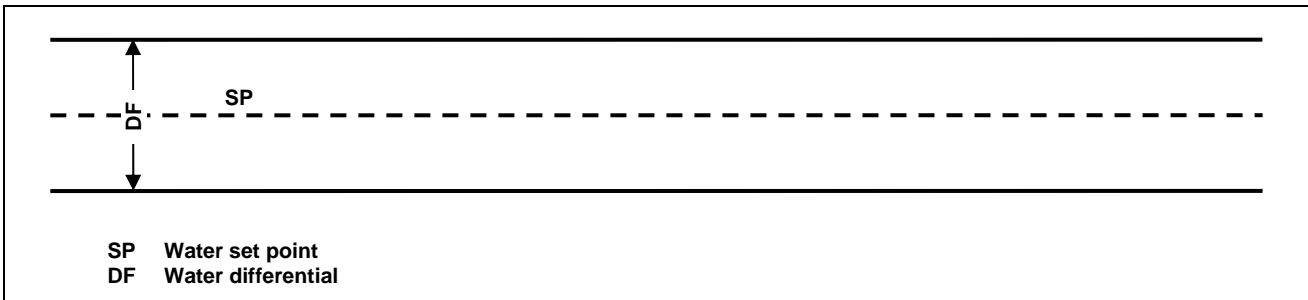


Figure 15

To make the regulation, the DDC manages switch-on and switch-off in cascade mode of the different types of machines available, adapting the power supplied to the system heat load.

**Machine categories**

On the basis of their type, the machines are assigned to “categories” which have different properties to each other, in a way to allow the control panel to manage the various types of machine with differentiated logic and parameters. However, the machines have equivalent features within a category.

In heating mode, the existing categories are:

- *Category 1*  
The hot modules of all current Robur heat pumps are automatically assigned to this category.
- *Category 2*  
This category is reserved for future Robur products.
- *Category 3*  
All current Robur heat pumps in the AY line are automatically assigned to this category.
- *Categories 4 - 7*  
Any third party boilers can be assigned by the installer to these categories. For setting instructions refer to paragraph 4.4.1.9 “Third party product category” on page 76.

**Machine power of a category**

The power of the individual machine belonging to it is defined via a parameter for each category. For categories 1 and 3 (heat pumps and AY boilers) the pre-set value that cannot be modified is 35 kW. For each of the categories 4-5-6-7 (third party boilers) the value that can be set by the installer is from 1 to 1680 kW.

**Switch-on priority of a category**

An ignition priority is associated to each category, expressed via a parameter with value from 0 to 6, which determines the priority of use of the machines belonging to this category. The higher the value the higher the priority.

For category 1 (Robur heat pumps) the value, which is set automatically and cannot be modified, is 6, corresponding to maximum priority. For category 3 (Robur AY boilers) the value set by default is 4, but this can be modified from 0 to 4. For categories 4-5-6-7 (third party boilers) the value set by default is 3, but again this can be modified from 0 to 4. Therefore the system will always switch on the heat pumps first and will use the boilers only when the thermal load is higher than the installed power of the heat pumps; the installer can decide the relative switching on priority of all categories used for boilers, whether Robur or third party. Please note that it is possible to assign the same switching on priority to several categories used for boilers; the DDC will maintain a balanced operating time for boilers belonging to equal priority categories.

**Number of stages of a category**

The number of stages used by the regulation system is defined for every category. This is determined by a parameter, which can be set in the range from 1 to 10.

The parameter must always be set at the value corresponding to the number of the stages desired. If the number of machines is not an exact multiple of the parameter value, the system will use the number of stages corresponding to the value of the parameter, but the stages will not be uniform, i.e. they will be made up from different amounts of machines. The DDC will maintain a balanced operating time of the machines, modifying the assignment of the machines to various stages of the category every 24 hours.

## NOTE

When the values of the number of stages in each category are set initially, or if they are subsequently varied, it is also necessary to modify the setting of the other parameters; refer to paragraph **Default values of the parameters and indications for correct choice of their values (categories 1 and 3)**” on page 103 and in particular Table 2.

### Prevention time, enabling integral and prevention integral of a category, description of the regulation algorithm

These three parameters are also defined for each category, which affect the regulation algorithm used by the system to maintain the temperature of the water inside the differential period.

The regulator operates by switching the machine that constitutes the various stages of the various categories on and off. When the regulator is operating on the stages of a given category, it uses the values of the three parameters corresponding to this category. This allows to optimise the regulation on the basis of the features of the specific category (number and power of the stages, type of heat generator).

Successively, the regulation algorithm is illustrated via an example of evolution of the water temperature through time. It is assumed that the system is made up from two stages belonging to a unique category and that the initial condition is within machines all off and temperature of the water within the differential band. In the following description, refer to Figure 16.

A. **Zone 1 of the graph in Figure 16:** while the temperature of the water remains within the differential band centred around the set point, the regulator keeps all machines off.

B. **Point 2:** when the falling water temperature, exits the differential band, the regulator switches the machines, which constitute the first stage of the category at highest priority, on.

**Note: subsequently, switch-on of the machines that constitute a stage data will be defined for brief switch-on of the stage**

C. **Zone 3:** if the energy supplied by the first stage is such to make the temperature of the water rise quickly inside the differential band and keep it there, the regulator does not perform other interventions and keeps the first stage on.

D. **Point 4 and Zone 5:** if the energy supplied by the first stage causes the water temperature to rise above the differential band, the regulator switches the first stage off and keeps it off in zone 5.

E. **Point 6 and Zone 7:** in this case, the energy supplied by the first stage is not sufficient to cause quick rise of the water temperature. When the first stage has been switched back on in point 6, the regulator, after a delay equal to the value inserted for the “**prevention time**” parameter, starts to calculate the energy deficit, represented by the dotted area in zone 7. If the dotted area should reach the value set for the “**enabling integral**” parameter, the regulator “would release” the second stage and switch it on. In the case represented in zone 7, instead, the temperature of the water rises within the differential band before the dotted area reaches this value, therefore the regulator does not switch the second stage on, but keeps the first stage on, as the temperature of the water remains within the differential band.

F. **Point 8 and Zone 9:** in the same way as the case described in D, the regulator switches the first stage in point 8 off and keeps it off in zone 9.

G. **Points 10 and 11 and zone 12:** the situation is similar to that described in E, but in this case, after the delay equal to “**prevention time**”, the dotted area that represents the energy deficit reaches the value set for the “**enabling integral**” parameter, therefore the regulator “releases” the second stage and switches it on (in point 11); it keeps it on in zone 12, i.e. up to when the temperature of the water is below or within the differential band.

H. **Point 13 and zone 14:** in the same way as the case described in D, for the first stage, if the energy supplied by the second stage causes the water temperature to rise over the differential band, the regulator switches the second stage off in point 13 and starts to calculate the excess energy, represented by the dotted area in zone 14. If the dotted area should reach the value set for the “**prevention integral**” parameter, the regulator “would block” the second stage and would switch the first stage off. In the case represented in zone 14, instead, the temperature of the water returns within the differential band before

the dotted area reaches this value, therefore the regulator does not "block" the second stage and keeps the first stage on. The second stage is maintained off in all of zone 14.

- I. **Point 15 and zone 16:** because the second stage has not been "blocked", it is switched back on immediately when the falling temperature of the water, escapes the differential band and zone 16 is kept on.
- J. **Points 17 and 18 and zone 19:** the situation is similar to that described in H.: the regulator switches off the second stage of point 17, but in this case in the subsequent point 18 the dotted area that represents the excess energy reaches the value set for the parameter "**prevention integral**"; therefore in point 18 the regulator "releases" the second stage and switches off the first; it then maintains this state in zone 19. In zone 19 the system is therefore once again in the situation of zone 1, described in A.; **therefore all possible subsequent evolutions of the system fall within the cases already described**; for example, in point 20 the first stage will be switched on again, as previously occurred in point 2.

It is possible to summarise the functioning of the regulation algorithm with the following rules:

- In a given moment, the regulator works with a certain number of stages released and the rest blocked.
- The first stage of the category with highest priority is never blocked.
- All blocked stages are always off; all released stages, **except the last**, are always on; the last released stage is switched on or off when the temperature of the water, respectively falling or rising, exits the differential band.
- A blocked stage is released (and switch-on) if the area that represents the energy deficit, calculated starting from the expiry of "**prevention time**", reaches the "**enabling integral**" (Figure 16) value.
- A released stage is blocked (and the previous stage is switched off) if the area that represents the excess energy reaches the "**prevention integral**" value.

#### NOTE

- The release and block technique of the stages, based on the "**enable and prevention integrals**", allow to "centre" the power of generation adapting it to the load of the system. In a given load condition, the system maintains some systems **stably** of and all of the others, except one, on. The remaining stage is switched on or off alternately to regulate the temperature of the water, keeping it within the differential band. This regulation adapts the generation power also when faced with fluctuations contained in the load. However, successively, to significant load variations, one or more further stages are blocked or released in succession, until the generation power is taken almost back into equilibrium with the load. At this point the system goes back to regulating the alternate switch-on/off of an individual stage.
- The "**prevention time**" allows to consider the fact that the machines start to produce energy only after a certain time from start-up. Starting from the moment that the regulator has switched a stage on, the prevention time allows to wait that effect is produced on the regulation of this stage, before starting to calculate the energy defect still present and potentially reach switching on another stage. Therefore the values of this parameter are linked to the features of the various types of machines.
- As already mentioned previously, if several machine categories are present, on increase of the heat load, the system first switches on all stages available in the highest priority category and then, if necessary, passes to switching the stages on of the priority category immediately lower, and so on. When the heat load drops the system switches the stages off in the reverse order. Each individual time, the regulator uses the parameter values defined for the category with lowest priority that have at least one stage on; for example, in the case of the system with two machine categories, the regulator uses the values defined for the category for highest priority until only the stages of this category are switched-on. From the time that at least one stage of the second category is switched on, it passes to using the values of the parameters of the same. It goes back to using the values of the first category when all stages of the second are off again.

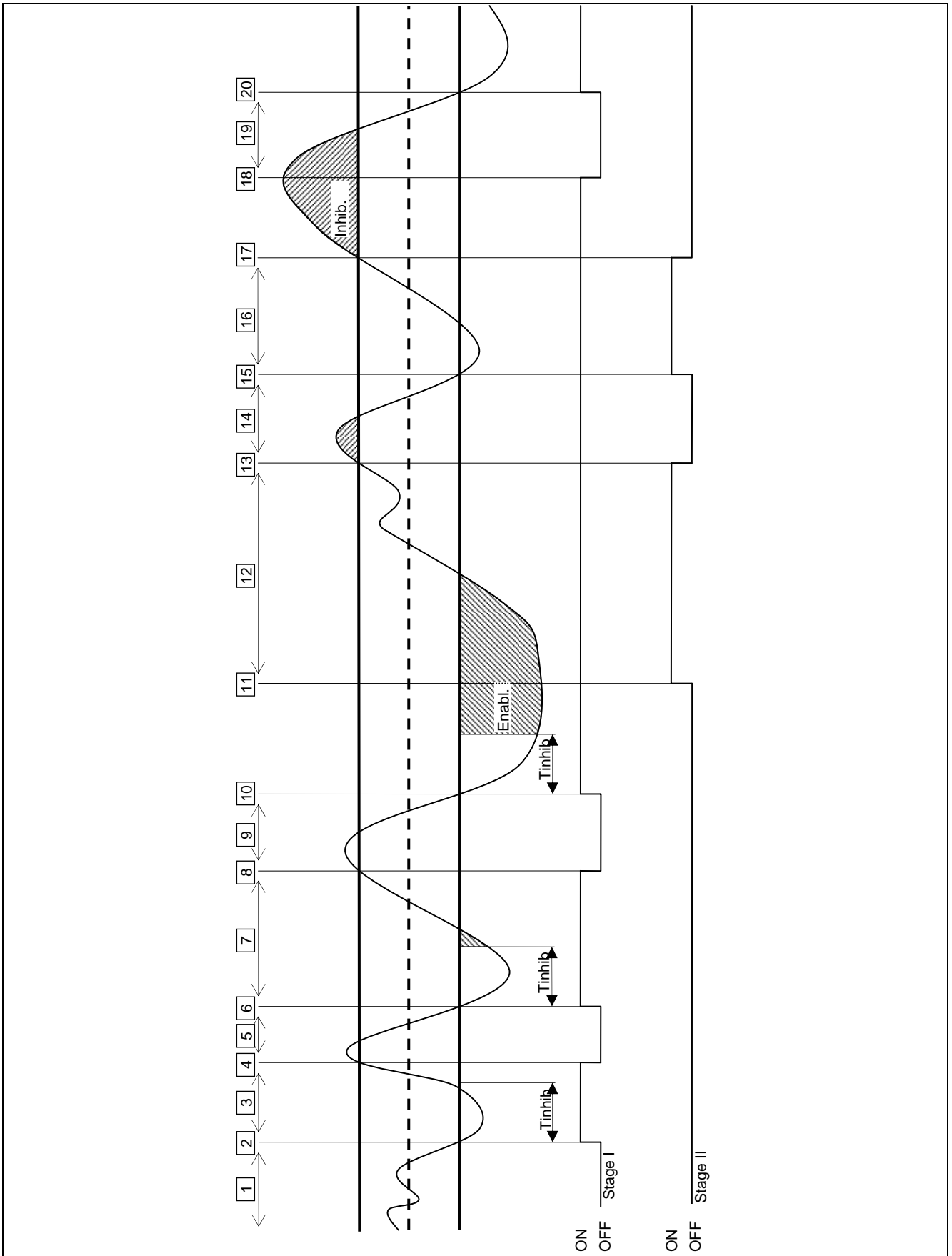


Figure 16

### Minimum switch-on time of a category

This further parameter is present for every category. This allows to define the minimum switch-on time of every stage of the category and has the purpose of preventing that the machines are kept on for a period that is too brief, with negative impact on the yield of the same. In practice, when a stage is switched on, it can be switched off only after the **“minimum switch-on time”** has passed, whatever the rules of the regulation algorithm described in the relative paragraph; for example, referring to Figure 16, if the time passing between points 2 and 4 is less than the **“minimum switch on time”**, the first stage would not be switched off in point 4, but later, after the **“minimum switch on time”** calculated from point 2. It is clear that the use of too high a value of this parameter can lead to poor regulation, as the respect for the minimum switch on time will cause frequent and consistent breaches in the rules of the normal algorithm; on the other hand, too low a value will lead to the machine being switched on for very short periods, which will compromise yield.

### Default values of the parameters and indications for correct choice of their values (categories 1 and 3)

Default values			
Parameter	Value of Categ. 1	Value of Categ. 3	Recommended setting
Machine power	35 kW	35 kW	Not modifiable
Priority	6	4	Not modifiable
Prevention time	5 minutes	2 minutes	Use default values
Mi. switch-on time	7 minutes	3 minutes	Use default values
Number of stages	10	10	Use the maximum value possible for the number of machines present
Enable integral	6 °C * minutes (10,8 °F * minutes)	6 °C * minutes (10,8 °F * minutes)	Use the semi automatic configuration (refer to paragraph 4.4.2.6.4 “Regulation parameters” on page 96), which calculates the value of these parameters according to the other data set for all categories; the calculation is made when exiting the configuration panel
Disable integral	8 °C * minutes (14,4 °F * minutes)	8 °C * minutes (14,4 °F * minutes)	

Table 1 – REGULATION PARAMETER DEFAULT VALUES HEATING OPERATION (categories 1 and 3)



### Default values of the parameters and indications for correct choice of their values (categories 4 - 7)

Default values		
Parameter	Value of Categ. 4 - 7	Recommended setting
Machine power	35 kW	Set the power value in kW of the single machine belonging to the category
Priority	3	Set a value between 0 and 4
Prevention time	2 minutes	Set a value suited to the type of machine used
Minimum activation time	3 minutes	Set a value suited to the type of machine used
Number of stages	10	Use the maximum value possible for the number of machines present
Enable integral	6 °C * minutes (10,8 °F * minutes)	Use the semi automatic configuration (refer to paragraph 4.4.2.5.4 Regulation parameters 89), which calculates the value of these parameters according to the other data set for all categories; the calculation is made when exiting the configuration panel
Disable integral	8 °C * minutes (14,4 °F * minutes)	

Table 2 - REGULATION PARAMETER DEFAULT VALUES HEATING SERVICE (categories 4 - 7)

### Guide lines for the calibration of the parameters on the basis of the observation of the behaviour of the system.

The values for the automatically set integrals using the semi-automatic configuration refer to plants with normal heat inertia.

If systems must be regulated with very low or very high inertia values, it is possible that the regulation parameters are calibrated differently.

Several guide lines are given below:

- The first indicator of a well-regulated system is that in normal conditions (with constant load) there is only one intermittent stage.  
If, however, there are several intermittent stages in normal running conditions, the integrals must be increased, both prevention and enabling.
- If the response to load or set point variations is too slow:
  - reduce the integrals, both prevention and enabling;
  - reduce the number of stages, only after having acted with the previous option.
- If a single stage is too intermittent:
  - maximise the number of stages;
  - increase the differential [default = 2°C (3,6° F)] without exaggerating so as not to shift too far away from the set point.
- If too marked overshoots are observed (the temperature rises too much over the set point):
  - reduce the prevention inhibition;
- If too marked overshoots are observed (the temperature falls too much below the set point):
  - reduce the enabling inhibition;

When a set point is requested that is very near to the operational limits of the machines, if the load is low the system will regulate badly as the machines will tend to go continuously into limit thermostating.

To prevent this phenomenon that largely worsens yield, it is necessary to intervene with the activation of the climatic curves or, alternately, reduction of the set point (in heating mode).

In the case of systems with common pump, where the phenomenon is particularly marked, it is also possible to intervene by reducing the number of stages.

### Third party boiler water pump delay

Only for categories 4, 5, 6 and 7, for third party boilers, this parameter is also present. For a given category, the parameter is present when assigned to boilers with dedicated water pumps controlled by the Robur system; this has the purpose of establishing the switch off delay for this type of water pump. If more than one

boiler of this type is assigned to a category, the switch off delay is the same for all the water pumps of these boilers.

#### **Delivery and return limit temperature**

For category 1 only, destined for heat pumps, these parameters may also be present. In particular, the parameters will be present in the event of using the "complement and substitution" operating mode with the auxiliary boilers. For details on the meaning of these parameters, refer to paragraph 4.2 - DESCRIPTION OF AUXILIARY BOILER OPERATING METHODS FOR HOT SERVICE ON BASE PLANT PART on page 55.

#### **Auxiliary regulator parameters for "Progressive complement and substitution" mode**

For category 1 only, destined for heat pumps, these parameters may also be present. In particular, the parameters will be present in the event of using the "progressive complement and substitution" operating mode with the auxiliary boilers. For details on the meaning of these parameters, refer to paragraph 4.2 - DESCRIPTION OF AUXILIARY BOILER OPERATING METHODS FOR HOT SERVICE ON BASE PLANT PART on page 55.

#### **Setting the parameters**

For the description of the setting operations of the parameters, refer to the paragraph 4.4.2.6.4 "Regulation parameters" on page 96 relative to setting the basic system part.

### **4.3.2 DOMESTIC HOT WATER (DHW) SERVICE**

#### **DHW service on the basic system part**

Regarding the "base" DHW service, i.e. supplied at the same time as the heating service and on the same pipes, the regulation is identical to that described previously for the heating service and uses the same values as the parameters.

#### **DHW service on the separable system part**

For the DHW service supplied on the pipes on the separable part of the plant, the regulation algorithm is identical to that described for the heating system. In this case, however, parameters are used that are dedicated to allow differentiation of the regulation. To set these, refer to the 4.4.2.5.4 "Regulation parameters" paragraph on page 89 relative to the settings of the separable system part. **The default values of the parameters are identical to those of the basic system part.**

#### NOTE

In this case the Delivery and return limit temperature and Auxiliary Regulator parameters are never present for the "Progressive complement and substitution" mode as the "complement and substitution" operating mode of the auxiliary boilers is not foreseen on the separable plant part.

### **4.3.3 CONDITIONING OPERATION**

#### **General description**

The algorithm used to regulate the temperature of the water is identical to that of the heating mode, except for inversion of the logic, thanks to which the stages are switched on when the temperature is higher than the objective and off when lowered. Therefore, for a description of the algorithm, refer to the 4.3.1 "Heating service" paragraph on page 57.

The "**Water differential**" parameter also exists in cooling mode, with default value = 2°C (3,6° F) and with the same meaning described for the heating mode.

#### **Categories of machines and parameters default values**

For the conditioning service, the following categories are defined:

- **Category 1**  
The cold modules of all current Robur heat pumps and chillers are assigned to this category.
- **Categories 2 and 3**  
These categories are reserved for future Robur products.
- **Categories 4 - 7**  
Any third chillers can be assigned by the installer to these categories. For setting instructions refer to Table 4 on page 65.

For category 1 (chillers and heat pumps) the pre-set value that cannot be modified is 17 kW.

For each of the categories 4-5-6-7 (third party chillers) the value that can be set by the installer is from 1 to 1680 kW.

For category 1 the default value is 6, for categories 4-5-6-7 it is 3.

For all categories the switch on priority can be freely set in the complete range between 0 and 6; therefore it is possible to set any switch on order for the Robur and third party units. Please note that it is possible to assign the same switching on priority to several categories; as in the heating mode, the DDC will maintain a balanced operating time for machines belonging to a given category and those belonging to equal priority categories.

#### Default values of the parameters and indications for correct choice of their values (category 1)

Default values		
Parameter	Category 1 value	Recommended setting
Machine power	17 kW	Not modifiable
Priority	6	Set a value from 0 to 6
Prevention time	7 minutes	Use default values
Mi. switch-on time	10 minutes	Use default values
Number of stages	10	Use the maximum value possible for the number of machines present
Enable integral	6 °C * minutes (10,8 °F * minutes)	Use the semi automatic configuration (paragraph 4.4.2.6.4 Regulation parameters on page 96) , which calculates the value of these parameters according to the other data set for all categories; the calculation is made when exiting the configuration panel
Disable integral	8 °C * minutes (14,4 °F * minutes)	

Table 3 - REGULATION PARAMETER DEFAULT VALUES CONDITIONING SERVICE (categories 1)

#### Default values of the parameters and indications for correct choice of their values (categories 4 - 7)

Default values		
Parameter	Value of Categ. 4 - 7	Recommended setting
Machine power	17 kW	Set the power value in kW of the single machine belonging to the category
Priority	3	Set a value between 0 and 6
Prevention time	7 minutes	Set a value suited to the type of machine used
Minimum activation time	10 minutes	Set a value suited to the type of machine used
Number of stages	10	Use the maximum value possible for the number of machines present
Enable integral	6 °C * minutes (10,8 °F * minutes)	Use the semi automatic configuration (paragraph 4.4.2.6.4 Regulation parameters on page 96) , which calculates the value of these parameters according to the other data set for all categories; the calculation is made when exiting the configuration panel
Disable integral	8 °C * minutes (14,4 °F * minutes)	

Table 4 - REGULATION PARAMETER DEFAULT VALUES CONDITIONING SERVICE (categories 4 - 7)

For the qualitative guide lines for integral modifications on the basis of observations of the behaviour of system regulation, refer to that said for the heating mode (see 4.3.1 "Heating service" on page 57).

#### Third party chiller water pump delay

Similarly to heating mode, only for categories 4, 5, 6 and 7, for third party chillers, this parameter is also present. For a given category, the parameter is present when assigned to chillers with dedicated water pumps controlled by the Robur system; this has the purpose of establishing the switch off delay for this type of water

pump. If more than one chiller of this type is assigned to a category, the switch off delay is the same for all the water pumps of these boilers.


NOTE

In this case the Delivery and return limit temperature and Auxiliary Regulator parameters are never present for the "Progressive complement and substitution" mode as the "complement and substitution" operating mode is not foreseen on cold generation plants.

**Setting the parameters**

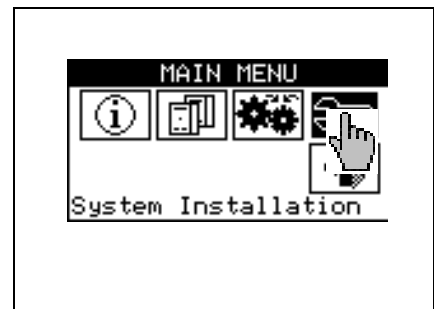
For the description of the setting operations for these parameters, refer to the paragraph 4.4.2.6.4 "Regulation parameters" on page 96 relative to setting the basic system part.

**4.4 SYSTEM INSTALLATION**

Only professionally qualified personnel may access this menu. To access the menu select  from the main menu as shown in the figure on the right, then enter, if requested, the installer password on the numerical keypad that appears on the display.

The options available in this menu are indicated below.

- 4.4.1 DDC
- 4.4.2 PLANTS



**4.4.1 DDC**




To access the menu, select DDC from the drop-down menu.

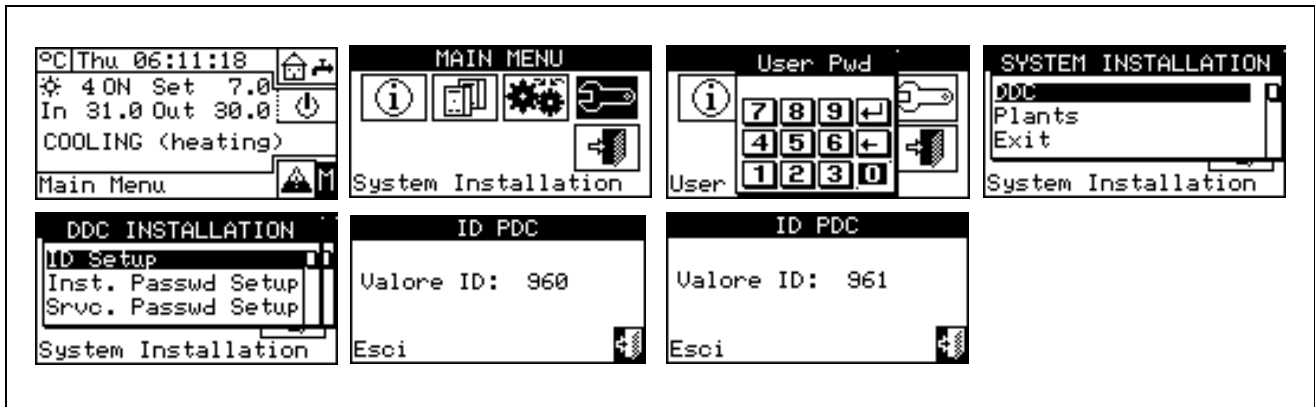


**4.4.1.1 Setting ID**

This option allows the user to assign the ID of each Direct Digital Controller in Multi DDC plants. For single DDC plants it is not necessary to assign an ID to the DDC, as in this case the default value of ID=960 is assigned.

To set the ID, follow the instructions below.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - Select "DDC" from the drop-down menu.
- 5 - Select "Set ID" from the drop-down menu.
- 6 - Position the cursor on the number to the left of the text "ID value". Press the knob: the number starts to flash. Turn the knob to modify the value and press to confirm.
- 7 - To exit, select .
- 8 - Repeat steps 1 to 7 for each DDC linked to the CAN BUS network and assign an ID value that is **different** from that of the other DDCs.



#### 4.4.1.2 Setting the installer password

This option allows the user to set/disable the installer password.






Once the password has been enabled, it is necessary to enter it in order to access:

- **System Installation** ();


#### NOTE

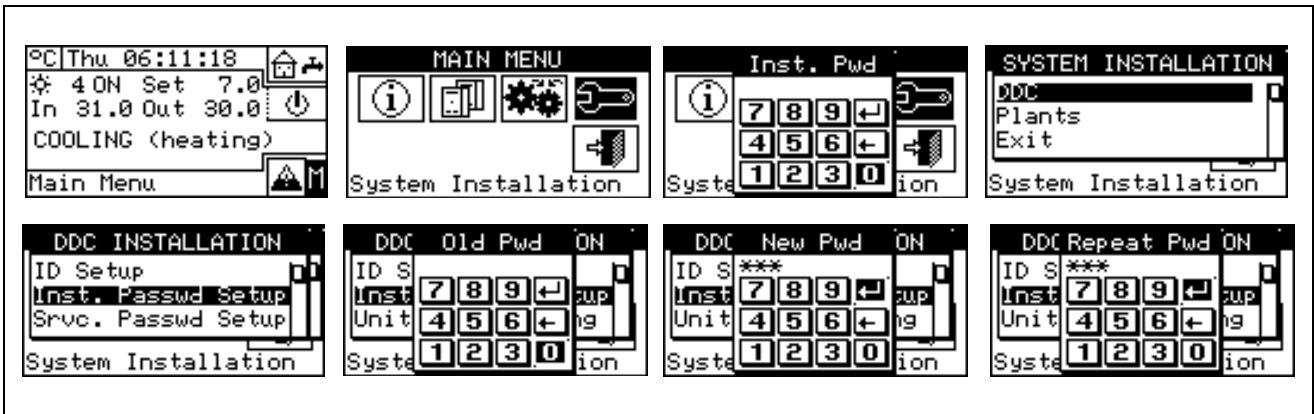
Every time a menu is left with active password, the installer password is kept enabled for a period equal to 10 min. At the end of this period, the entering of the installer password will be required again to gain access to one of the above-said menus.

To set or change the installation password, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - If required, enter the installer password on the numerical keypad shown on the display;
- 4 - Select “**DDC**” from the drop-down menu.
- 5 - Select “**Inst. Passwd Setup**” from the drop-down menu.
- 6 - If an installer password is already present, a numerical keypad will appear on the DDC’s screen. Enter the old installer password and select  to confirm.
- 7 - Enter the new password and select  to confirm.
- 8 - Enter the new password again and select  to confirm.

#### NOTE

To **disable** the installer password, do not enter the new password at points 7 and 8 – instead, simply select .





If the installation password is disabled, it is no longer necessary to enter it in order to gain access to the following menus:

**4.4.1.3 Service password setup**

This option permits to set/disable the assistant’s password .






Once the password has been enabled, it is necessary to enter it in order to access to:

- **Modifying Set of Parameters** (option present in Units management menu );
- **Default Set of Parameters** (option present in Units management menu .


**NOTE**

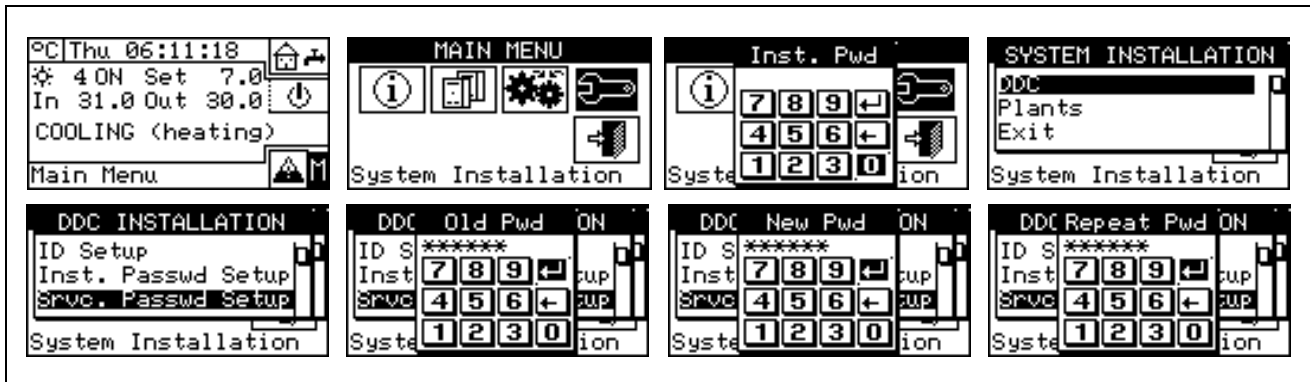
Every time a menu is left with active password, the assistant’s password is kept enabled for a period equal to 10 min. At the end of this period, the entering of the assistant’s password will be required again to gain access to one of the above-said menus.

To set or change the installation password, follow the instructions below:

- 1 - Select  from the initial screen to access the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - If required, enter the installer password on the numerical keypad shown on the display;
- 4 - Select “**DDC**” from the drop-down menu.
- 5 - Select “**Srvc.Passwd Setup**” from the drop-down menu.
- 6 - If an assistant’s password is already present on the DDC screen, a numerical keypad will be shown; enter the assistant’s old password on the numerical keypad and select  to confirm.
- 7 - Enter the new password and select  to confirm.
- 8 - Enter the new password again and select  to confirm.

**NOTE**

**To disable** the Assistant’s password, do not enter the new password at steps 7 and 8, but select only .



#### 4.4.1.4 Machine configuration

Before performing these operations, make sure that all the built-in S61 electronic boards have been configured, i.e. have had an **ID (identifier = network address)** assigned to them and have been assigned to a plant.

Moreover, check that the correct group of belonging has been assigned to every unit: Base plant part or Splitting plant part (see programming manual, sheet S61).

In the presence of one or more RB100 or RB200 devices, also check that they have been configured (see “RB100 Installation and Use Booklet” Code D-LBR468 or “RB200 Installation and Use Booklet” Code D-LBR632) according to the type of device used.

Finally ensure that all units and any RB100 or RB200 devices are switched on when the Direct Digital Controller (DDC) is switched on.

#### Description of the screen.

Figure 17 shows an example screen from the Machine configuration menu.

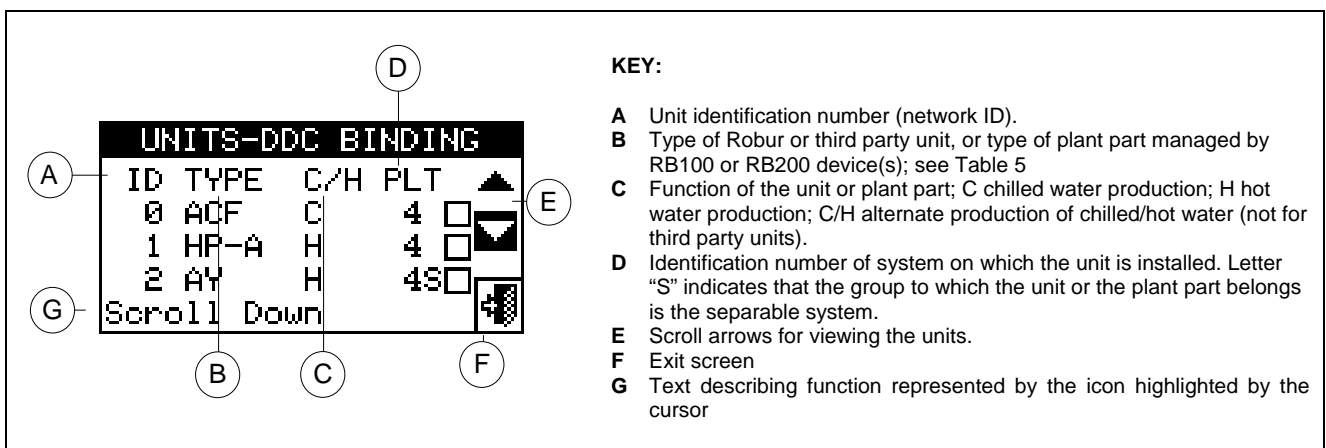


Figure 17— EXAMPLE OF MACHINE CONFIGURATION MENU SCREEN

Table 5 shows all types of units and plant parts with a short description. For more information on the management of third party units (only with RB200) and plant parts also refer to the “Installation and use booklet for RB100 (code D-LBR468) and the “RB100 Applications Manual (code D-LBR467)”, or the “Installation and Use Booklet for RB200” (Code D-LBR632) and “Applications Manual” (Code D-LBR630), according to the device used.

The DDC deduces which plant or plants it must manage from the plants on which the units assigned to the DDC itself are configured.

For example, if machines that are all on the same cold plant are assigned to the DDC, it assumes that it has to manage that cold plant.

If machines are assigned to a cold plant and to a hot plant with different IDs, the DDC assumes that it has to manage two independent plants - one cold and one hot.

If 2-line hot/cold machines are assigned to the same plant (AYF/2 or GAHP-AR) and/or cold and hot machines to the same plant (e.g. 1 ACF to plant with ID=0 and a GAHP-A unit to the same plant), the DDC assumes that it has to manage one two-line hot/cold plant.

NOTE

The management of two-line hot/cold plants is obtained also in the following particular cases:

- AYF/4 if both modules are assigned to the same plant ID
- GAHP-GS/WS if both modules are assigned to the same plant ID.






The screen of Figure 17 shows the existing units, for each one of which what follows is indicated machine ID, machine type or plant part type, function (heating and/or cooling) and the number of the plant to which they are assigned (letter “S” indicates that the group to which the unit belongs is the separable plant. If letter “S” is not present beside the string that identifies the unit type, this means that the group to which the unit belongs is the base plant).

For 4-line units (AYF/4 and GAHP-GS/WS), two consecutive rows are displayed (both with the same unit ID), one relating to the cooling module (C), the other to the heating module (H); each row shows the number of the plant to which that module is assigned.

WARNING

**For AYF/4 units it is possible to assign the modules to two different DDCs (Multi DDC plants only).  
For GAHP-GS/WS units the system forces the assignment of the modules to the same DDC.**

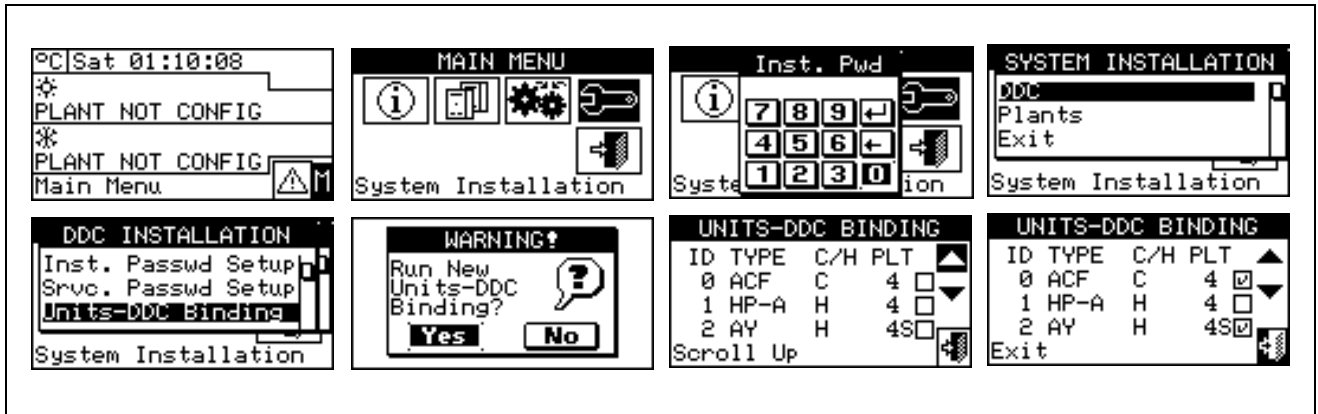
To assign the units and plant parts to the DDC, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “DDC”.
- 5 - Rotate the knob to scroll the cursor downwards until “**Config Machines**” is highlighted then press the knob to access the screen.
- 6 - Select “Yes” to carry out a new configuration. **WARNING: EACH TIME A NEW CONFIGURATION IS PERFORMED, THE PREVIOUS CONFIGURATION IS CANCELLED.**
- 7 - Position the cursor on  then press the knob to assign the machine and/or the deviation valves to the plant. The symbol  points out that the unit has been assigned to the plant.
- 8 - Select  or  to view the other units to assign to the plant or plants.
- 9 - Repeat the operations described in steps 7 and 8 until all the units/valves to be managed by this DDC have been selected.
- 10 - To exit “**Config Machines**” select .

WARNING

**If the plant contains at least one unit belonging to the separable group, the configuration shall be completed following the indications provided in paragraph 4.4.2.5.1 “Heating/DHW Select” on page 87. and to paragraph 4.4.2.6.10 “Heating/DHW select” on page 119 (if at least one hot unit belonging to the base plant is present). Omitting this step, the caption “CONFIG. INCOMPL.” (configuration incomplete) will be shown on the main screen.**





Unit type (code on the display)	Description
ACF	All types of Robur absorption chillers in the ACF60 series
ACF-HR	All types of Robur absorption chillers with heat recuperators in the ACF60-HR series
AY	Robur 35 kW boilers in the AY119 series
AY120	Robur 35 kW condensing boilers in the AY120 series
AYF/2	Robur combined chiller ACF60 and boiler AY119 2 line
AYF/4	Robur combined chiller ACF60 and boiler AY119 4 line
PC/C	ProntoClima Robur for cooling only
PC/CR	ProntoClima Robur for cooling and heating
HP-A	All types of Robur Air-Water absorption heat pumps for non-modulating heating only, GAHP-A series
HP-W	All types of Robur Air-Water non-modulating heat pumps, GAHP-W series
E <sup>3</sup> -A	All types of Robur Air-Water absorption heat pumps for modulating condensing heating GAHP-A and E <sup>3</sup> -A series
E <sup>3</sup> -xS	All types of Robur Ground-Water and Water-Water absorption modulating condensing heat pumps in the GGAHP-GS, GAHP-WS e E <sup>3</sup> -GS, E <sup>3</sup> -WS series
HP-AR	All types of Robur Air-Water absorption heat pumps for heating and cooling (reversible heat pump), GAHP-AR series
PThrd	Boiler or chiller produced by third parties (managed by the RB200 device(s))
Type of plant part (code on display)	Description
VACS	Valve separating the separable plant part without limit switch contacts (managed by RB100/RB200)
VACSF	Valve separating the separable plant part with limit switch contacts (managed by RB100/RB200)
VC/H	Cooling/heating commutation valve without limit switch (managed by RB100/RB200)
C/HVF	Cooling/heating commutation valve with limit switch (managed by RB100/RB200)
ProbC(H)	Delivery and Return T probes for cooling or cooling/heating system. 2 lines (managed by RB200)
ProbesH	Delivery and Return T probes for heating system (managed by RB200)
ProbesSep	Delivery and Return T probes for separable plant part (managed by RB200)
RtnPrbPC	Return T probe for heat pump unit (managed by RB200)
Pump C(H)	Primary water pump of cooling or cooling/heating system. 2 lines (managed by RB200)
PumpH	Primary circuit water pump for heating system (managed by RB200)
PumpSep	Primary circuit water pump on separable plant part (managed by RB200)
PmpC(R)S	Secondary water pump of cooling or cooling/heating system. 2 lines (managed by RB200)
PumpHSec	Secondary circuit water pump for heating system (managed by RB200)



Table 5


#### 4.4.1.5 Checking machine configuration

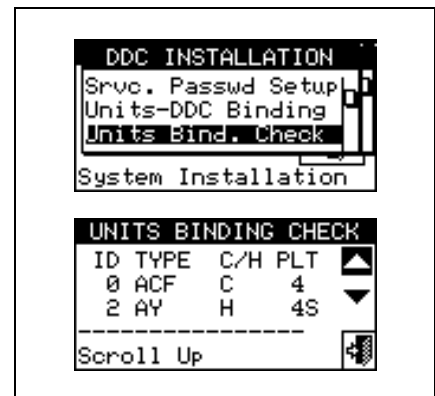
Via this menu, existing machine configurations may be checked.

To carry out a configuration check:

Turn the knob to position the cursor on “Units Bind.Check”, and press the knob to access the screen.

Select  or  to view all the units assigned to this DDC.











To exit, select .



#### 4.4.1.6 Master DDC Setup (Multi DDC plants only)

This option represents the **third phase** of the Multi-DDC configuration (see paragraph 4.5.2.2 – “Multi DDC Binding” on Page 125) and is necessary in order to define the status of each DDC (plant Master or Slave). For a given plant, a single DDC is configured as the Master DDC while the others are configured as Slave DDCs.

To set this option, follow the instructions below:

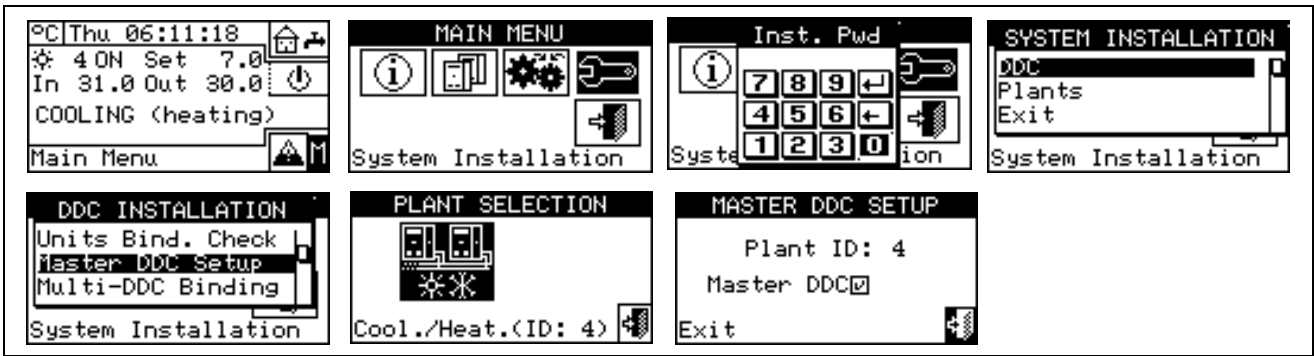
- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “DDC”.
- 5 - Select “Master DDC Setup” from the drop-down menu.
- 6 - Select the  symbol for two-line cooling/heating plants,  for hot water production plants,  or  for chilled water production plants.
- 7 - Position the cursor on  and press the knob to define the DDC as Master or Slave DDC. The  symbol indicates that the DDC has been defined as Master DDC, while the  symbol indicates that it has been defined as a Slave DDC. To exit, select .
- 8 - If the DDC manages two plants, repeat steps 6 and 7 for the other plant.
- 9 - Repeat steps 1 to 7 for each DDC present.

#### NOTE

**On any one plant, only one DDC may be defined as the Master DDC.**

**Units belonging to different groups (Base Group and Separable Group) cannot be configured on a Slave DDC**

**On a Slave DDC it is not possible to configure objects managed by RB100 device(s) (plant parts) or RB200 (third party units and plant parts).**



**4.4.1.7 Multi DDC configuration**

This represents the **fourth stage** of the configuration of Multi DDC plants (for further information consult Paragraph 4.5.2.2– “Multi DDC Binding”) and must be carried out with all the DDCs of the plant receiving electrical current. The DDCs exchange information about the machine assigned to them, to determine whether they must be co-ordinated in order to manage any units. This occurs when units, or modules of units, have been assigned to more than one DDC, linked to the same plant.

All DDCs begin to display information about themselves and about the other DDCs present, as shown in Figure 18. The first row shows information regarding the DDC on which data is being viewed. The following rows regard the other DDCs present in the network. The figure below shows the parameters displayed during configuration of Multi DDC plants.

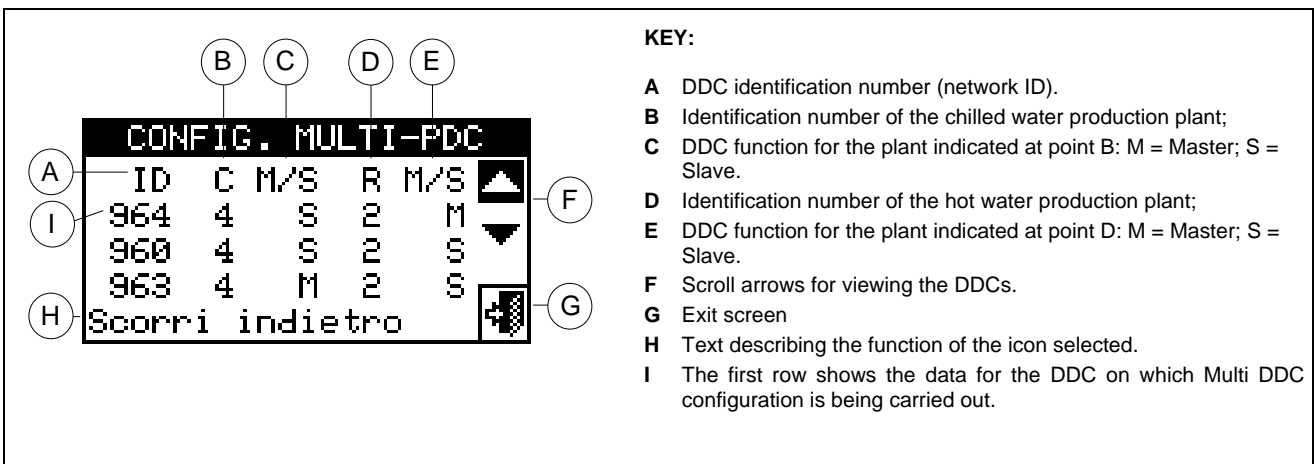




Figure 18 – EXAMPLE OF MACHINE CONFIGURATION MENU SCREEN

For all the DDCs in the plant, carry out the following operations:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password, if requested, on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “DDC”.
- 5 - Select “Multi DDC Binding” from the drop-down menu.
- 6 - Select “Yes” from the screen that appears.
- 7 - A screen appears on which the data described in Figure 18 appears, regarding the DDC on which Multi DDC configuration is being carried out.
- 8 - Repeat steps 1 to 7 on all other DDCs in the plant.

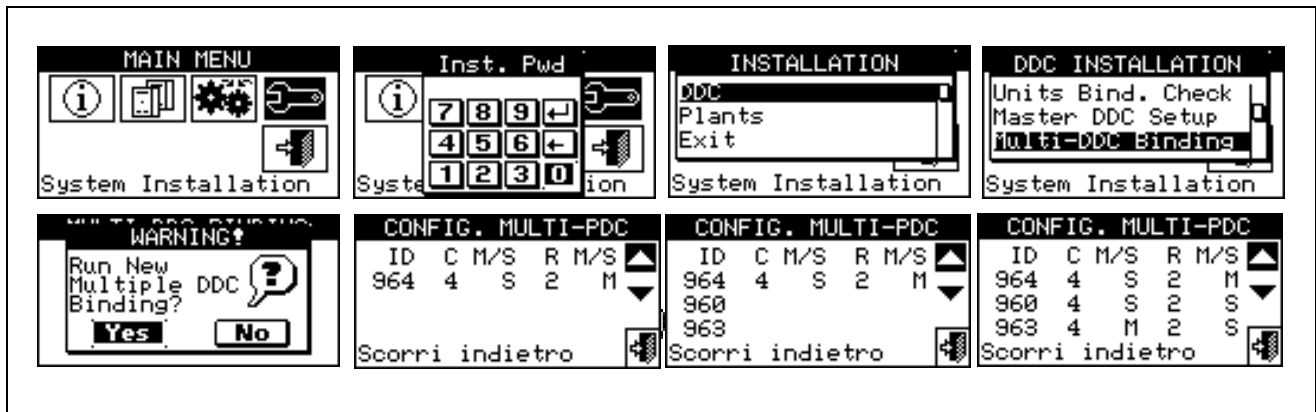
- 9 - Wait for the DDC to receive information from the other DDCs so that all data from them is displayed: DDC ID, number/numbers of plant/plants managed, type of plant, and indication of whether the DDC is a Master or Slave DDC for each plant managed.

NOTE

**All DDC data appears on the screen only when Multi DDC configuration is accessed on all of them.**

- 10 - Check carefully that all information shown is complete and consistent with that desired.

- 11 - Exit by selecting on all the DDCs.



The Master DDC of a plant on which units of the GAHP-GS/WS type are configured MUST be one of those that actually manage a number of GAHP-GS/WS units. (Warning: this rule must be respected by the installation technician, and is not automatically guaranteed).

NOTE 2

If units of the GAHP- GS/WS type are configured as 4-line units (i.e. the cold "branch" is configured on a plant of a different number from the plant on which the hot "branch" is configured), the Master DDC of the two plants MUST be the same. (This rule nevertheless, is "forced", because if a DDC on which units of the GAHP- GS/WS type in 4-line mode are configured is set as Master DDC for one of two plants, it is automatically set ALSO as Master for the other plant).

NOTE 3

Every DDC Slave cannot have units belonging to different Groups; that is, every Slave DDC shall have only units belonging to the Separable Group or only units belonging to the Base Group. The possibility of having units belonging to both Groups occurs only on the Master DDC




NOTE 4

All objects managed by one or more RB100 (plant parts) or RB200 devices (third party units and plant parts) can only be configured on the plant Master DDC.

**4.4.1.8 Checking Multi DDC configuration**

This menu allows the user to check the existing Multi DDC configuration.















To carry out a configuration check:

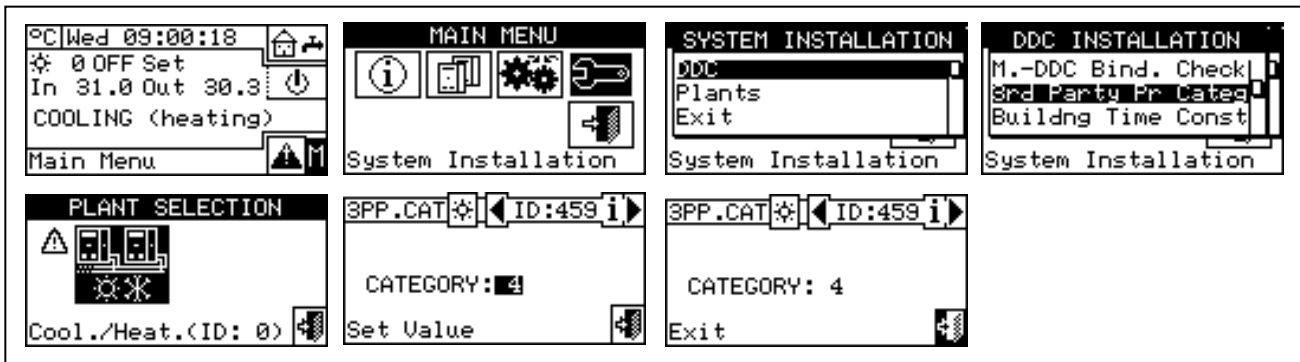
- 1 - Turn the knob to position the cursor on “**M.-PDC Bind. Check**” and press the knob to access the screen.
- 2 - Select  or  to view all the units assigned to this DDC.
- 3 - To exit, select .



**4.4.1.9 Third party product category**

This menu is used to set the category that third party units belong to.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password, if requested, on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “**DDC**”.
- 5 - Select “**Third P prod Categ**” from the drop down menu and press the knob to access the screen.
- 6 - Select the  symbol for two-line cooling/heating plants,  for hot water production plants,  or for chilled water production plants.
- 7 - For plants with 2-line cooling/heating, use the button with the symbol  (HEATING) or  (COOLING) to select the type of third party unit:  for BOILERS,  for CHILLERS.
- 8 - Select the ID of a third party unit using  and .
- 9 - Set the category of the third party unit selected in point 8 to the required value: select the numeric value indicating the category, press the knob and turn clockwise to increase the value, anti-clockwise to decrease the value.
- 10 - Press the knob to confirm.
- 11 - Repeat steps 8, 9 and 10 to set the category of the other third party units of the same type.
- 12 - If necessary, in the case of two-line cooling/heating plants, use the button with the symbol  or  again to select the other type of third party unit and repeat steps 8, 9 and 10 to set the category of all third party units of that type.
- 13 - To exit, select .



#### 4.4.1.10 Building time constant

The option allows to set the time constant of the building. This is used as a parameter of a filter that has the purpose of dampening the external temperature variations for the temperature calculations of the water via climatic curve.

The setting is necessary in the climatic curve and/or external temperature mode is used.




When the external temperature varies, there is a corresponding variation of the heat load and therefore to keep the temperature constant in the rooms, the water temperature must be modified; this is carried out on the basis of the climatic curve.

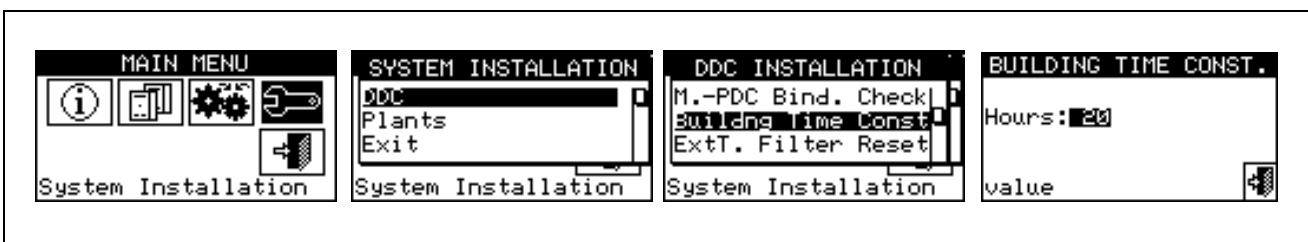
However, due to the heat capacity of the building, the variation of the heat load does not take place instantly on variation of the external temperature, but progressively in a certain interval of time. It is therefore necessary to progressively change the water temperature, ideally during the same interval of time.

The value that can be set for the time constant has a range from 0 to 50h with default value of 20h. This must be set on the basis of the building time constant, e.g. it will assume the low values in the case of pre-fabricated buildings in wood and high values in the case of traditional buildings in stone.

#### NOTE

If the 0 value is set, the filter is disabled. Therefore, for the calculation of the water temperature via climatic curve the instant value of the external temperature is used, instead of the filtered one.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password, if requested, on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select "DDC".
- 5 - Select "Building Time Const." from the drop down menu and press the knob to access the screen.
- 6 - To modify the data previously set, press the knob and turn it clockwise to increase the value, anti-clockwise to decrease it.
- 7 - Press the knob to confirm.
- 8 - To exit, select .






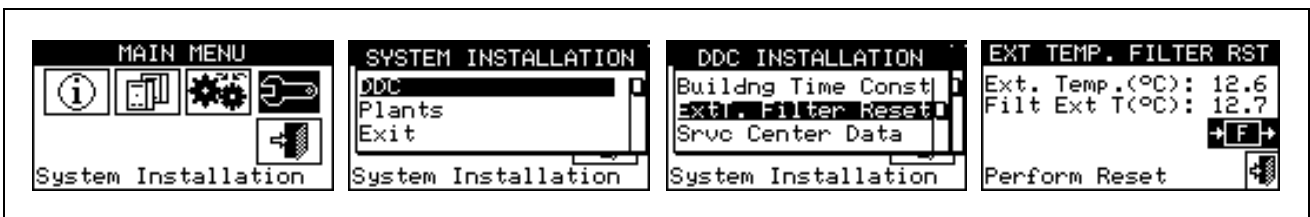
#### 4.4.1.11 Reset external temperature filter

This option allows to re-initialise the external temperature filter. The values of the external filtered temperature are placed equal to that of the instant external temperature and then the filter is re-activated.

NOTE





It is important ALWAYS to follow this operation during the installation phase of the DDC..

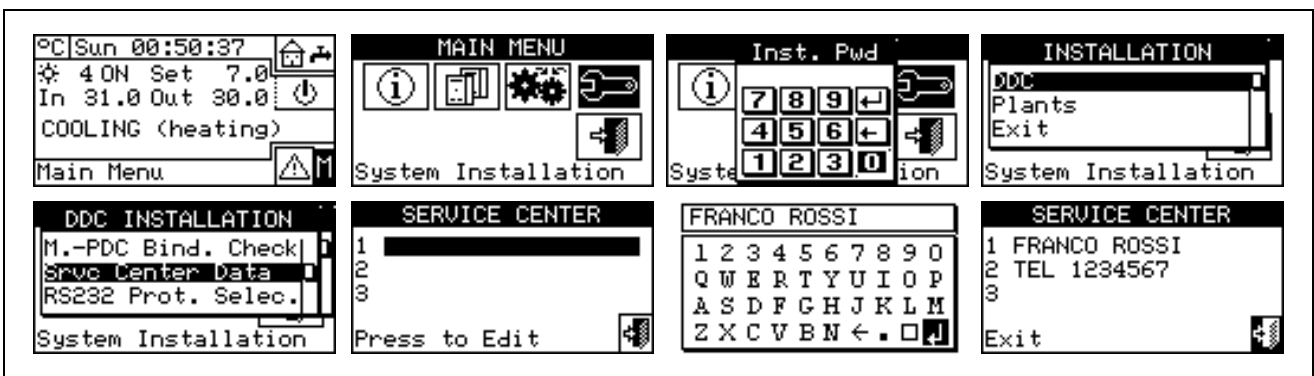
- 1 Select  from the initial screen to gain access to the main menu.
- 2 Select  to gain access to the System installation.
- 3 Enter the installer password, if requested, on the numerical keypad that appears on the display.
- 4 From the drop-down menu select “**DDC**”.
- 5 Select “Ext.temp. filter res. from the drop down menu and press the knob to access the screen.
- 6 Press F to reset the filter.
- 7 To exit, select .



**4.4.1.12 Technical assistance information**

This option allows the user to set the data regarding the Technical Assistance Centre to contact if necessary via the information menu (see Paragraph 3.2.4 - “**TECHNICAL**”).

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “**DDC**”.
- 5 - Turn the knob to scroll the cursor downwards until “Service Centre Data” is selected and press the knob to access the screen.
- 6 - To modify the data that will then be displayed in the information menu (3.2.4 - “**TECHNICAL**”), turn the knob to position the cursor on the row to be modified.
- 7 - Press the knob: a numerical keypad appears that allows up to 18 characters to be entered.
- 8 - When the text has been entered, select  to confirm and exit.
- 9 - Repeat the operations described above to enter the other two rows.
- 10 - To exit, select .





#### 4.4.1.13 Communication protocol selection

This option is used to set up the communication protocol that the DDC uses on the RS-232 and RS-485 serial connection port.

As far as the RS-232 port is concerned, "PC Terminal" can be chosen if a link exists with a Personal Computer provided with terminal emulation software. With this it is possible to give pre-set commands with the keyboard and view the results on the terminal; if you select the Modbus RTU (v1.0 or v2.0) protocol, you will be able to connect any appropriately configured Modbus Master to the DDC for data exchange (the DDC always works as Modbus Slave), using this protocol (the difference between Modbus v1.0 and v2.0 concerns the mapping of the Modbus logs; normally the most recent version is used (v2.0), however v1.0 is maintained for a question of compatibility with older devices).



As far as the RS-485 port is concerned, the "PC Terminal" option is not available, while options Modbus v1.0 and v2.0 are available.

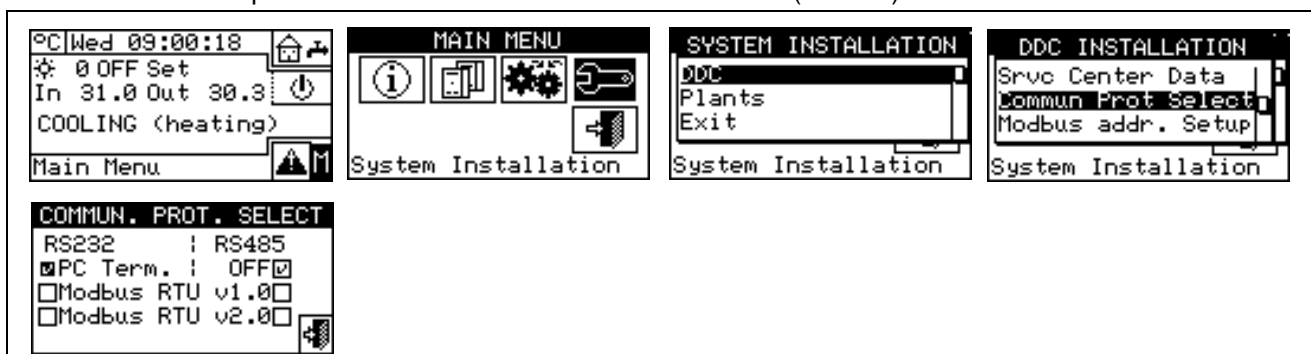
#### NOTE

It is not possible to select a Modbus option for both ports: if a Modbus option is chosen for the RS-232 port, the OFF option (no protocol) is automatically forced on the RS-485 port; on the other hand, selecting a Modbus option for the RS-485 port, the "PC Terminal" option is forced for the RS-232 port.

#### NOTE

The document describing the mapping and meaning of the Modbus logs implemented on the DDC is available on request.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select "DDC".
- 5 - Turn the knob to scroll the cursor downward until "**Select Communic. prot**" is highlighted and press the knob to access the screen.
- 6 - Select the required entry in the left column for RS-232, and in the right column for RS-485; for example:
  - Select "PC Terminal" in the left column (RS-232) if you wish to communicate with a Personal Computer with a terminal emulator, for example to download the events log. Select this also if you must update the DDC software (operation reserved for authorised Technical Assistance Centres)
  - Select a Modbus option (typically, Modbus v2.0) in the left or right column, if using a Master Modbus connected respectively to the RS-232 or RS-485 port of the DDC. Robur WISE and Robur Monitor devices require Modbus V2.0 to be set in the left column (RS-232)





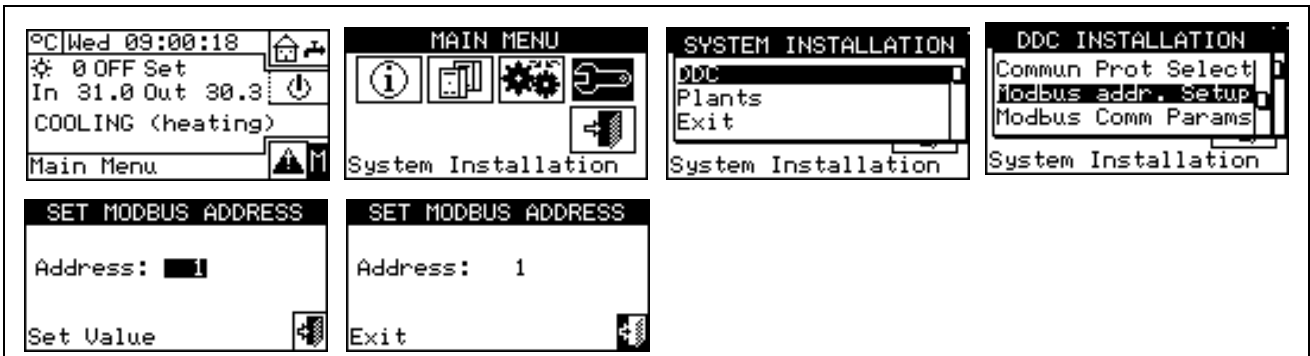
#### 4.4.1.14 Modbus address setting

This option permits to set the Modbus address, that is the address used by the DDC to answer the requests coming from the Master Modbus. Please note that the DDC operates as a slave modbus. This has nothing to do with the concept of Master and Slave between several DDC's located on the same CAN; to all intents and effect, the DDC can be either Master or Slave for the control of its unit on the plant.

The default value is 1 and usually it doesn't need changing, except for links with bus RS-485 instead of RS-232. In case of bus RS-485, in fact, there can be more DDC's linked on the same bus and, to address them, different addresses shall be set. In case of bus RS-232 only one DDC can be linked to the Master modbus, therefore the default value can be left.

The address can be set with values from 1 to 247.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “**DDC**”.
- 5 - Turn the knob to scroll the cursor downward until highlighting “**Modbus addr. Setup**” and press the knob to gain access to the screen.
- 6 - Select the desired address.





**4.4.1.15 Com Modbus parameters**

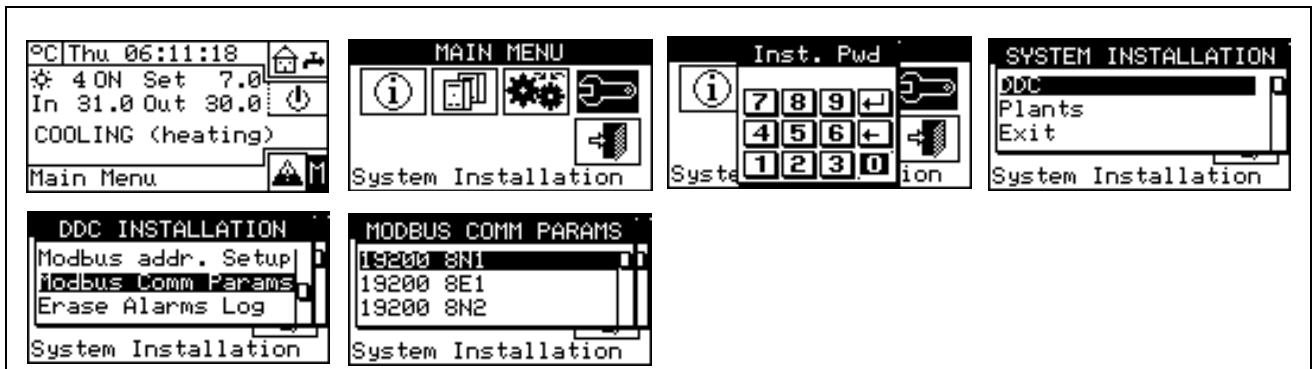
This option permits to set the parameters of the Modbus communication.

In particular, communication speed, number of data bits, stop bits and parity check can be set. The choice is limited to 6 possible combinations:

- a) 19.200 baud, 8 data bits, 1 stop bit, no parity (9600 8N1)
- b) 19.200 baud, 8 data bits, 1 stop bit, pair parity (9600 8E1)
- c) 19.200 baud, 8 data bits, 2 stop bits, no parity (9600 8N2) (not available on RS-485)
- d) 9.600 baud, 8 data bits, 1 stop bit, no parity (9600 8N1)
- e) 9.600 baud, 8 data bits, 1 stop bit, pair parity (9600 8E1)
- f) 9.600 baud, 8 data bits, 2 stop bits, no parity (9600 8N2) (not available on RS-485)

Choose the desired combination, that must correspond to the setting on the Master Modbus device connected to the DDC.

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “**DDC**”.
- 5 - Turn the knob to scroll the cursor downwards until “**Modbus.Com. Param.**” is selected, and press the knob to access the screen.
- 6 - Select the desired communication parameters.





#### 4.4.1.16 Erase alarms Log (for authorised Technical Assistance Centres only)

Allows the event history to be completely deleted without the need to perform a general DDC reset.

#### 4.4.1.17 Factory defaults

This option allows the user to reset the DDC to its default factory settings. All settable parameters are returned to their default values.

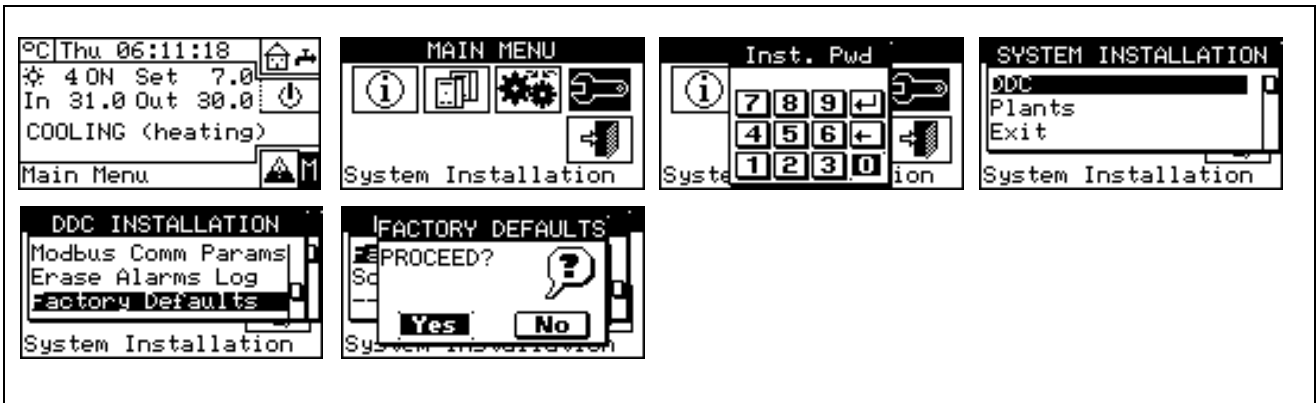
To carry out a DDC reset, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - From the drop-down menu select “**DDC**”.
- 5 - Turn the knob to scroll the cursor downwards until “**Factory defaults**” is selected and press the knob to access the screen.
- 6 - Select “**YES**” to confirm the reset, “**NO**” to return to the drop-down menu.

#### NOTE

**This function causes also the loss of machine configuration, Multi DDC configuration and event history.**

A short message appears on the screen to confirm that the operation has been performed successfully.



**4.4.1.18 Software Update (for authorised Technical Assistance Centres only)**

By connecting to the Personal Computer, this updates the DDC software. The operation may be carried out only by qualified ROBUR personnel or authorised Technical Assistance Centres.

**4.4.2 PLANTS**

Select “**Plants**” from the drop-down menu, then select the plant. The options available in this menu are:

- 4.4.2.1 *BUS access setup*
- 4.4.2.2 *Water pump mode (Master DDC only)*
- 4.4.2.3 *Partial operation mode (Master DDC of Multi DDC plants only)*
- 4.4.2.4 *Alarm output setup*
- 4.4.2.5 *Split plant part*
- 4.4.2.6 *Base plant part*

**4.4.2.1 BUS access setup**

It permits to enable the access by bus to the plant control and to the possibility of modifying the plant operation parameters.

Enabling the plant control allows you to operate the On/Off commands, invert the Cooling/Heating and change the GAHP-GS/WS priorities, in two different ways.

Enabling the modification of functioning parameters allows you to operate on set point, differential, and general water T timer cycle.

The foreseen control options are two:

- BMS control (Building Management System)
- Remote Assistance Control (RM)

These options can be set separately for every plant and they exclude each other.

On the contrary, the parameter access option is unique and it makes no difference between BMS and RM.

**BMS plant control**

By selecting “Control BMS plant” via the bus it is possible to switch the plant on and off, invert the hot and cold (in 2-line hot/cold plants), and with 4-line GAHP-GS/WS units, change the switch on priorities, with the rules laid down for Building Management Systems (BMS).

The procedures are as follows:

- as concerns the switching on/off, a new switch is added in series to the already existing ones. The status of this switch can be varied only by BMS. The switching on of the plant is carried out only if all the switches are ON (closed) (see Figure 20 page 108).

**WARNING**

**Do not enable the BMS control if the switching on/off is not effectively managed via bus; the additional switch status is initially OFF, so if the switch is not managed it is not possible to switch the plant on.**

- as far as cold/hot inversion is concerned, enabling the BMS control allows this to be controlled via bus, rather than by the button on the Plant Control Panel. This button is therefore disabled and appears thus (cooling) or thus (heating) according to the commands given via bus.

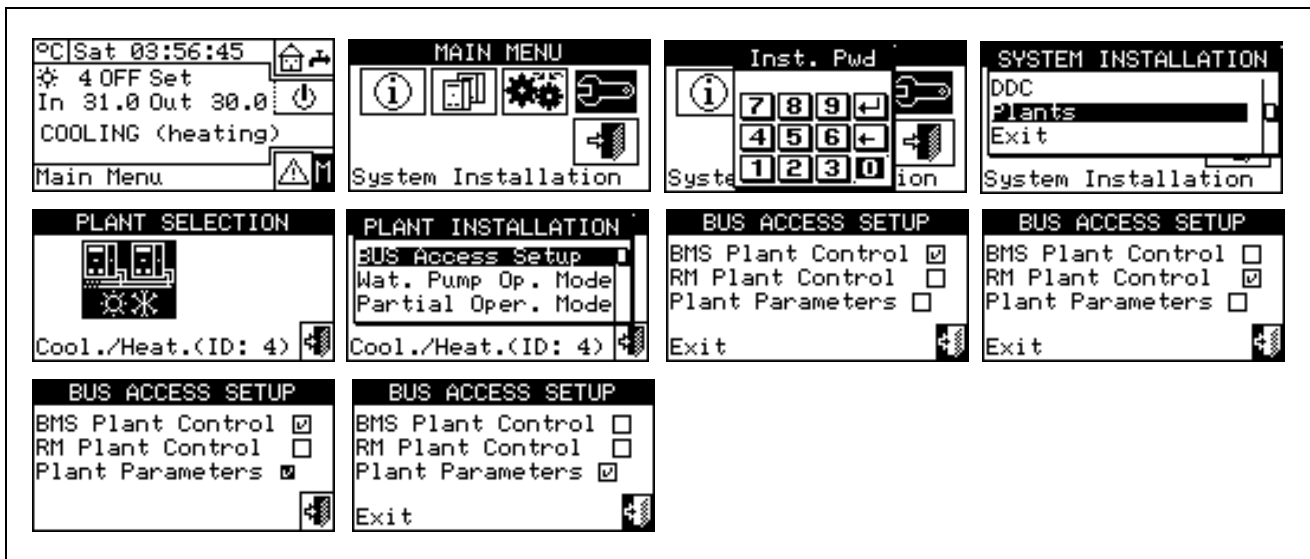
NOTE

The YWAuto consent configuration however has priority over the BMS control, so if both are enabled, the system manages the hot/cold inversion using the RW and RY contacts and ignores the requests from the BMS. Also in this case, the button is disabled and appears thus (cooling) or (heating) according to the commands given by the contacts.

- as concerns the change of heating/cooling operation priority of the GAHP-GS/WS modules, the choice can be carried out with no difference either by DDC (see paragraph 2.4 "COOLING/HEATING SERVICE " on page 11) or by BMS; in this latter case the button will get the appearance corresponding to the choice made by the BMS ( priority to cooling; priority to heating mode).

NOTE




If the cooling operation is set as priority, the GAHP-GS/WS modules can be switched on by the conditioning plant regulator, but not by the heating plant regulator; vice versa if the heating operation is set as priority.



**RM plant control**

By selecting "RM plant control" it is possible to carry out the same operations available for the previous option, but with the procedures foreseen for the Remote Assistance (RM) and that essentially consist in ensuring the possibility of having remote controls that already exists on the DDC, managing them in the equal way. In this case, all the plant control option can be carried out with no difference by DDC or by RM. Plant on/ff, hot/cold inversion and setting of operating priorities for the GAHP-GS/WS units can therefore be done by DDC (see paragraph 2.4 "COOLING/HEATING SERVICE " on page 11) or via bus; when a command is sent via bus, the corresponding button will take on the appearance corresponding to the setting made via bus.

NOTE

The YWAuto consent configuration however has priority over the RM control, so if both are enabled, the system manages the hot/cold inversion using the RW and RY contacts and ignores the requests from the RM system. In this case, the  button is disabled and appears thus  (cooling) or  (heating) according to the commands given by the contacts. After enabling the RM control, if the consent configuration inhibits the global On/Off switch, this control will be shown in reading-only mode on the DDC but it can be modified by remote assistance, therefore operating on the plant consent.

**Plant parameters**

By selecting "Plant parameters" it is possible to set via bus the set point, differential, general T timer cycles via bus, via BMS or RM.







**4.4.2.2 Water pump mode (Master DDC only)**

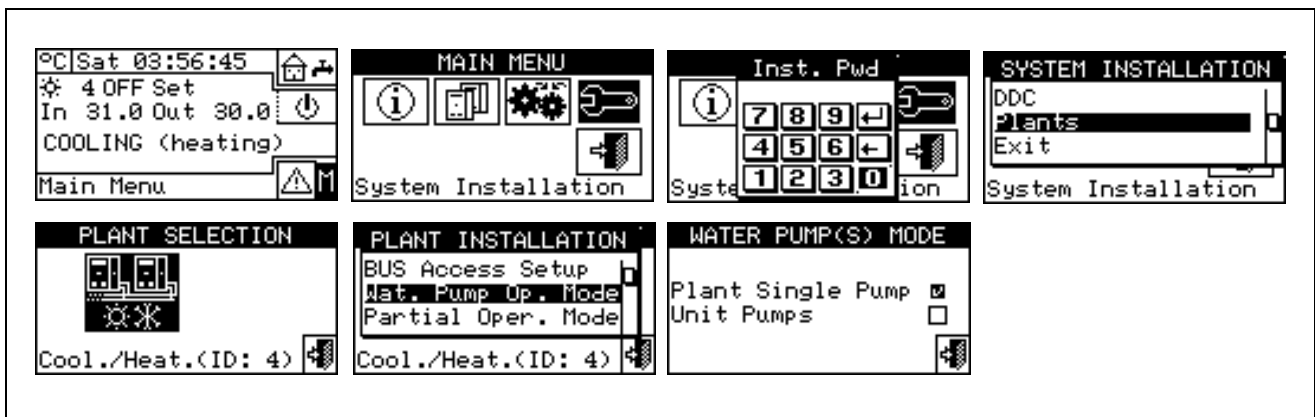
This option, in the "System installation", allows the management mode of the water pump(s) installed on the plant/plants to be defined.

Two operating modes are available:

- **Common water pump:** in this case a single water pump is installed for the plant; the water flow circulating in the plant is always the same.
- **Independent water pump:** in this case a water pump is installed for each unit; the total number of water pumps is the same as the number of units installed. In this case the water flow circulating in the plant is a function of the number of units that are on.(Each water pump is on when the corresponding unit is on).

To set "Water pump mode", follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password, if requested, on the numerical keypad that appears on the display.
- 4 - Select "Plants" from the drop-down menu.
- 5 - Select the  symbol for two-line cooling/heating plants,  for hot water production plants,  or for chilled water production plants.
- 6 - Turn the knob to scroll the cursor downwards until "Wat.Pump Op.Mode" is selected, and press the knob to access the screen.
- 7 - Position the cursor on  next to the option to be set (Plant Single Pump or Unit Pumps) and press the knob to make the selection. The  symbol indicates that the option has been enabled .
- 8 - To exit, select .



NOTE

Repeat steps 5 to 8 for the second plant if the DDC is the Master DDC for two plants. In this case the two plants can have different settings.

**4.4.2.3 Partial operation mode (Master DDC of Multi DDC plants only)**

This option allows the user to select the control mode for switching on the units if one or more Slave DDCs are off.

Two choices are possible:

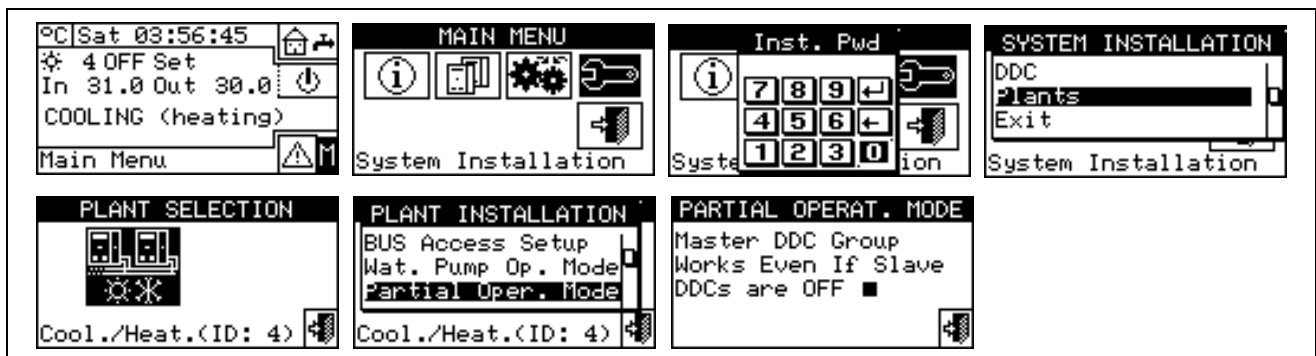
- Disable the operation of the whole plant if one or more Slave DDCs are off (option disabled);
- Allow operation of the part of the plant that is controllable if one or more Slave DDCs are off (option enabled).

NOTE

If the Master DDC is off, the whole plant is deactivated.

To set “**Partial operation Mode**”, follow the instructions below:

- 1 - Select from the initial screen to gain access to the main menu.
- 2 - Select to gain access to the System installation.
- 3 - Enter the installer password, if requested, on the numerical keypad that appears on the display.
- 4 - Select “**Plants**” from the drop-down menu.
- 5 - Select the symbol for two-line cooling/heating plants, for hot water production plants, or for chilled water production plants.
- 6 - Turn the knob to scroll the cursor downwards until “**Partial operation mode**” is selected and press the knob to access the screen.
- 7 - Position the cursor on  and press the knob to make the selection. The  symbol indicates that the option has been enabled (the partial plant operates also when the Slave DDCs are off).
- 8 - To exit, select .



NOTE







Repeat steps 5 to 8 for the second plant if the DDC is the Master DDC for two plants. In this case the two plants can have different settings.

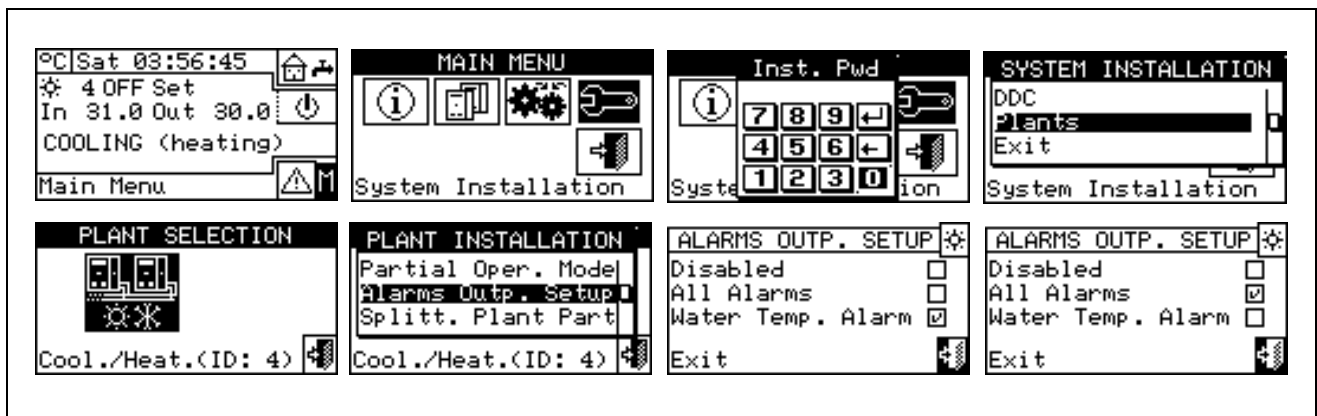
**4.4.2.4 Alarm output setup**

On the rear of the Direct Digital Controller there is a clean contact to send an external signal if errors have occurred in any machines (see detail “B” Figure 13 on page 54). The DDC allows one of the following options to be set:

- Disable the signal output in the event of alarm;
- Enable the sending of a signal for any type of alarm;
- Enable the sending of a signal only in the event of “**Temperature alarms**” (Master DDC only).

To configure one of the options described above, follow the instructions below:

- 1 - Select  from the initial screen to gain access to the main menu.
- 2 - Select  to gain access to the System installation.
- 3 - Enter the installer password on the numerical keypad that appears on the display.
- 4 - Select “**Plants**” from the drop-down menu.
- 5 - Select the plant for which the alarm output is to be set:  for two-line cooling/heating plant;  for the hot water production plant;  for the chilled water production plant.
- 6 - Turn the knob to scroll the cursor downwards until “**Alarms Outp. Setup**” is selected and press the knob to access the screen.
- 7 - Position the cursor on  next to the option to be set (Disabled, Any alarm, Water temp. alarm).
- 8 - Press the knob to activate the option. The  symbol indicates that the option has been enabled .
- 9 - To exit, select .



**NOTE 1**

Repeat steps 5 to 9 for the second plant if the DDC manages two plants.

**NOTE 2**

If the alarm output is enabled for 2 separate plants managed by the DDC, the contact trips if an alarm condition is present in **at least** one of the two plants.