



# Installation, use and programming manual

# **DDC**

for the management and control of Robur absorption units



#### **DISPOSAL**

The appliance and all its accessories must be disposed of separately in accordance with the regulations in force.



Use of the WEEE symbol (Waste Electrical and Electronic Equipment) indicates that this product cannot be disposed of as household waste. Proper disposal of this product helps to prevent potential negative consequences for the environment and human health.

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## INTRODUCTION



## Installation, use and programming manual

This Manual is an integral part of the DDC appliance and must be handed to the end user together

with the appliance.

## I.I RECIPIENTS

This Manual is intended for:

- ► End user, for appropriate and safe use of the appliance.
- ▶ Qualified installer, for correct appliance installation.

## II SYMBOLS AND DEFINITIONS

## **II.1** KEY TO SYMBOLS



**DANGER** 



WARNING



NOTE



**PROCEDURE** 



**REFERENCE** (to other document)

#### **II.2** TERMS AND DEFINITIONS

**DHW** = Domestic Hot Water.

**TAC** = Technical Assistance Centre authorised by Robur.

**Primary circuit** = section of the air conditioning system starting from the generators to the hydraulic separator or heat exchanger (if any).

**Secondary circuit** = section of the air conditioning system downstream of the hydraulic separator or heat exchanger (if any).

**Parallel hydraulic configuration** = hydraulic configuration in which the water inlet to each generator is common. **Series hydraulic configuration** = hydraulic configuration in which all or part of the water flow entering a generator comes from another generator.

**Generator/Appliance/Unit** = general term for machines capable of producing hot and/or chilled water.

**Robur generator** = generator (heat pump, boiler or chiller) produced by Robur, managed by the DDC via the CAN bus communication.

**Third party generator** = generator (usually boiler or chiller) not produced by Robur, which cannot be directly managed by the DDC and therefore requires an additional interface device (RB200).

**Base group** = set of generators located on the base system.

**Separable/separated group** = set of generators on the separable/separated DHW system.

**System ID** = numerical identifier, between 0 and 15, which is set by means of a specific parameter on the Robur generators to indicate that they belong to a specific

system, understood as the hydraulic circuit to which they are connected.



The system ID does not vary between the base system part and the separable/separable system part.

**Network ID/CAN ID** = numerical identifier that uniquely identifies on the CAN bus a Robur generator, a DDC, the valve service of an RB100 device, or each of the services provided by an RB200 device. In the case of Robur generators, the term unit ID or machine ID is also used.

**2-pipe system** = system on which there is only one pair of pipes (delivery/return) in the primary and/or secondary circuit, therefore unable to provide simultaneous hot and cold water services.

**4-pipe system** = system fitted on both primary and secondary circuits with two pairs of pipes, therefore able to supply two distinct services simultaneously.

**Separable DHW system** = part of the primary circuit that can be hydraulically separated from the base system part and operate independently. It can assume two states, depending on the position of the three-way diverter valve:

- hydraulically connected to the base system ("included" status); in the included status this part of the system integrates the heating service;
- separated from the base system ("separate" status); in the separate status, this part of the system is dedicated to DHW production regardless of the service provided by the base system.

**Separate DHW system** = part of the primary circuit for the exclusive production of DHW, hydraulically disconnected permanently from the base system.

**Base system** = part of the primary circuit comprising all generators, excluding those that can be hydraulically separated from it by means of a suitable three-way valve.

**Heat system** = system intended for the production of hot water for heating and/or domestic hot water.

**Cold system** = system intended for production of cold water for cooling.

**Integration** = coordinated control of different types of generators with the aim of maximizing overall system efficiency.

**Power integration** = integration mode in which all generators produce power at the same temperature.

**Temperature integration** = integration mode in which different types of generators can produce power at



different temperatures.

"Integration and progressive replacement" operating mode = possible operating mode for a series hydraulic configuration where the delivery temperature setpoint is not compatible under certain operating conditions with the operating temperatures of some generators (in particular the GAHPs).

"Integration and replacement" operating mode = operating mode in which the temperature setpoint under certain operating conditions may not be compatible with the operating temperatures of some generators (in particular the GAHPs).

"Integration" operating mode = operating mode in which the temperature setpoint in all operating conditions is compatible with the operating temperatures of all generators.

**Heat module** = for a Robur generator, this is the logic control unit that manages hot water production functions.

**Cold module** = for a Robur generator, this is the

logic control unit that manages cold water production functions.

**First start-up** = appliance commissioning operation which may only and exclusively be carried out by a TAC.

**Service request** = signal activating a specific service. Note that some service requests may be relayed to the Robur control system in different ways (directly to the DDC or through RB100/RB200).

**Service** = for Robur control systems, this is the term used to identify a specific functionality of the resources managed by the controllers (heating service, DHW service, cooling service, valve service, pump service, probe service...).

**Base DHW service** = domestic hot water service obtained with the base system.

**Separable/separate DHW service** = domestic hot water service obtained with the separable/separate DHW system

**AHU** = air handling unit.

## III WARNINGS

## **III.1 GENERAL AND SAFETY WARNINGS**



#### Installer's qualifications

Installation must exclusively be performed by a qualified firm and by skilled personnel, with specific knowledge of electrical systems, in compliance with the laws in force in the Country of installation.



#### Misuse

The appliance must only be used for the purposes for which it has been designed. Any other use is deemed hazardous. Incorrect use may affect operation, duration and safety of the appliance. Adhere to the manufacturer's instructions.



#### 1 Use of the appliance by children

The device can be used by children over 8 years old, and by people with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, only if they are under surveillance or after they have received instructions regarding safe use of the appliance and understanding the dangers inherent in it. Children should not play with the appliance.



## **Electrocution hazard**

- Disconnect the electrical power supply before any operation on appliance components.
- For electrical connections exclusively use compliant components and according to the specifications provided by the manufacturer.
- Ensure the appliance cannot be accidentally switched back on.



## Earthing

Electrical safety depends on effective earthing system, correctly connected to the appliance and installed according to the regulations in force.



## In the event of failure

Operations on internal components and repairs may exclusively be carried out by a TAC, using only original spare parts.

In the event of failure of the appliance and/or breakage of any component, do not attempt to repair and/or restore and immediately contact the TAC.



#### **Decommissioning and disposal**

If the appliance is to be disposed of, contact the manufacturer for its disposal.



### **Keep the Manual**

This Installation, use and programming manual must always accompany the appliance and must be handed to the new owner or installer in the event of sale or removal.

# III.2 EXCLUSIONS OF LIABILITY AND WARRANTY



Any contractual or extra-contractual liability of the manufacturer for any damage caused by incorrect installation and/or improper use and/or failure to comply with regulations and with the manufacturer's directions/instructions shall be disclaimed.





In particular, the warranty on the appliance may be rendered void by the following conditions:

- Incorrect installation.
- Misuse.
- Failure to comply with the manufacturer's indications on installation, use and maintenance.
- Alteration or modification of the product or any part thereof.
- Extreme operational conditions or however outside of the operational ranges set forth by the manufacturer.
- Damages caused by external agents such as salts, chlorine, sulphur or other chemical substances contained in the installation water or present in the air of the installation site.
- Abnormal actions transmitted to the appliance by the system or installation (mechanical stresses, pressure, vibrations, thermal expansion, electrical surges...).
- Accidental damages or due to force majeure.



## 1 GENERAL INFORMATION



The DDC and the Robur appliances connected to it cannot be installed correctly without consulting the installation manual included with the appliances and the instructions given below.

The DDC is a panel-mounted device that displays on a backlit LCD graphic display (128x64 pixels) all the status, operating and error conditions of each individual unit to which it is connected. The DDC performs the water thermostating control by switching on and off of the units connected to it.

The DDC can support and manage up to 32 modules (16 for heating and 16 for cooling) where a module is defined as the capacity of an appliance to produce chilled or hot water.

Table 1.1 p. 7 shows the module composition of the appliances managed by the DDC.

**Table 1.1** Module composition of the appliances

Annliance	Module		
Appliance	Heat	Cold	
GAHP A	1	=	
GAHP-AR	1	1	
GAHP GS/WS heating/cooling	1	1	
GAHP GS/WS heating only	1	=	
ACF 60-00 HR	=	1 (1)	
ACF 60-00	=	1	
AY00-120	1	-	

The heat module of the recuperator is not managed by the control system.

The DDC is also capable of managing several systems configurations for the production of hot and/or chilled water, in particular:

- ➤ 1 system for the production of cold water (cold system). For example, a maximum of 16 ACF 60-00 appliances can be connected, which corresponds to a maximum of 16 cooling modules; or:
- ➤ 1 system for the production of hot water (heat system). For example, a maximum of 16 GAHP A or AY00-120 appliances can be connected, which corresponds to a maximum of 16 heating modules; or:
- ▶ 2 independent systems, one for the production of chilled water, the other for the production of hot water (4-pipe configuration) capable of operating simultaneously (a cold system and a heat system independent of each other). It is therefore possible to manage both systems as per points 1 and 2, up to a maximum of 16 heating modules and 16 cooling modules; for example, this is useful in installations with AHUs fitted with a post-heating exchanger that works at the same time as the cooling; or:
- ▶ 1 system for the alternate production (summer/winter) of hot or chilled water (2-pipe hot/cold system). This is a two-pipe system that, for example, serves the heating network in winter and the cooling network in summer. For example, a maximum of 16 GAHP-AR appliances can be connected, which corresponds to a maximum of 16 cooling modules and 16 heating

modules.

For high-power systems, it is also possible to connect two or three DDCs together in order to manage up to 64 or 96 modules (up to 32 modules may be connected to each DDC).

# 1.1 SYSTEM CONTROL WITH DHW PRODUCTION

The DDC can also control a system including DHW production, through the installation of one or more optional RB100 or RB200 (Robur Box) devices or via Modbus protocol.

The RB100 and RB200 devices allow requests for various types of service from one or more external control systems to be interfaced with the DDC.

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

**Cooling service request:** when this input is activated, the device provides a request to the DDC so that the latter can switch on the cold modules on the system, and can manage them in order to meet the request appropriately;

Heating service request: when this input is activated, the device provides a request to the DDC so that the latter can switch on the heat modules on the system, and can manage them in order to meet the request appropriately; DHW0 and DHW1 service request: when one of these inputs is activated, the device provides a request to the DDC so that the latter can switch on the heat modules on the system, and can manage them in order to meet a DHW request appropriately. In particular, each of these inputs can be configured to make separable DHW or base DHW requests; it is also possible to activate both inputs and therefore manage two DHW service requests at the same time.

The base DHW service is normally used to provide a DHW service with a circuit temperature compatible with Robur GAHP high-efficiency heat pumps.

The separable or separate DHW service is normally used to provide a DHW service (complete or supplementary to the base DHW service) that requires higher circuit temperature, not compatible with the GAHP appliances, and therefore provided by conventional heat generators (boilers) installed on the separable or separate part of the system.

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

## 1.2 CONTROL OF ALTERNATE HOT/COLD 2-PIPE PRODUCTION SYSTEM WITH 4-PIPE GENERATION-SIDE OR USER-SIDE MANIFOLDS

Using the RB100 or RB200 device, the DDC is also able to control a three-way valve used to hydraulically switch the system for operation in either heating or cooling. The

valve is useful in the following two cases:

- ► A system with 2-pipe generation (e.g. when using GAHP-AR appliances) and 4-pipe user-side distribution (e.g. underfloor heating and fan coil cooling).
- ➤ A system with 4-pipe generation (use of cooling-only and heating-only appliances installed on separate manifolds) and 2-pipe user-side distribution (e.g. heating and cooling both supplied by the same fan coils).



The installation on separate manifolds of cooling-only and heating-only units is not compulsory, but can be done for specific reasons; for example, to allow during the summer season the production of DHW with heat pumps and at the same time the production of cold water for cooling.



The RB100 device has only one valve control output, whereas the RB200 device has two outputs. Therefore, if it is necessary to control both the separation valve and the cooling/heating switching valve and RB100 devices are used, two RB100 devices will be required; on the other hand, if RB200 devices are used, only one RB200 device will be required.

## 1.3 SYSTEM CONTROL WITH THIRD PARTY BOILERS AND/OR CHILLERS

Using the optional RB200 device, the DDC can also control systems that include, in addition to Robur appliances, third party generators (boilers and/or chillers). The RB200 makes it possible to interface with these generators through specific digital and analogue input and output signals; the DDC will then be able to carry out regulation by switching on and off all the available appliances, including third party ones.

## 1.4 CONTROL OF OTHER SYSTEM COMPONENTS

Again using the optional RB200 device, the DDC can control the operation of various types of water pumps required to implement various system layouts, as well as acquire the temperature of the manifolds of the various system branches using temperature probes connected to the RB200. The use of manifold probes adds flexibility to the system configurations that can be supported by the control system.

# 1.5 EXPANDABILITY OF THE CONTROL SYSTEM WITH RB200 DEVICES

When one or more RB200 devices are to be added to a system consisting of DDCs and Robur heating and cooling modules, the following rules apply:

- 1. On any system, even one with maximum expansion (3 DDCs, 48 heating modules and 48 cooling modules) it is possible to add a fully utilised RB200 device, i.e.:
  - With heating, cooling and DHW requests enabled.

- With all pump, temperature probe and valve services enabled.
- With both the third party generator services enabled; however, it must be considered that every third party generator occupies one heating or cooling module, which must therefore be included in the count of the total number of modules.
- 2. It is also possible to add up to seven more RB200 devices, which are only used to manage additional third party generators, again considering that every generator occupies one heating or cooling module, to be included in the count of the total.

#### 1.6 FUTHER INFORMATION

For further information about:

- ➤ System control with DHW production
- ➤ Control of alternate hot/cold 2-pipe production system with 4-pipe generation-side or user-side manifolds
- ► System control with third party boilers and/or chillers
- ► Control of other system components
- Expandability of the control system with RB100 or RB200 devices
- ► Installation and use of RB100 or RB200 devices



We recommend that you refer to the RB100 or RB200 device manuals, depending on the type of device used.



## 2 QUICK GUIDE FOR THE USER

Figure 2.1 DDC front view



- A Graphic display
  B Selection knob
- C RS232 serial port

# 2.1 GENERAL CHARACTERISTICS OF THE DDC

On the front of the DDC are:

- ► **Graphic display**, on which all the parameters required to control, program and configure the DDC managed systems are shown (detail A, Figure 2.1 *p. 9*).
- ➤ **Selection knob**, this is the tool with which you interact with the DDC, allowing you to select options, set parameters, etc. (detail B, Figure 2.1 *p. 9*).
- ► **RS232 serial port** for connecting the DDC to a PC (detail C, Figure 2.1 *p. 9*).

## 2.2 MAIN SCREEN

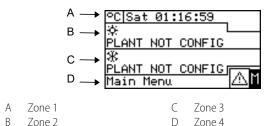
The DDC is able to display the operating conditions of the systems and of each individual appliance to which it is connected.

The DDC display, during normal operation, shows the following parameters:

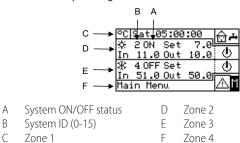
- ➤ Zone 1: this is the top part of the display where, when switched on, the indications of the time, day and the symbol of the temperature measurement unit appear, displaying the inlet and outlet water temperatures of each controlled system (Figure 2.2 p. 9). If DHW production services are configured, the production services are configured, the production in the top right corner, the selection/pressing of which allows the operating parameters of the heating/cooling system ( ) or of the DHW system ( ) to be displayed (Figure 2.3 p. 9).
- ➤ Zone 2: the symbol appears, indicating that the zone displays the operating parameters of the chilled water production system. On the start screen, when the DDC is switched on for the first time, the message "PLANT NOT CONFIG" (system not configured, Figure 2.2 p. 9) appears. During operation, the system water inlet/outlet temperature and the setpoint value (if the system is switched on) are displayed. On the right side appears, which gives access to the "Plant"

- control" menu (Figure 2.3 p. 9).
- ➤ Zone 3: the symbol appears, indicating that the zone displays the operating parameters of the hot water production system relating to the heating service. On the start screen, when the DDC is switched on for the first time, the message, "PLANT NOT CONFIG" (system not configured, Figure 2.2 p. 9) appears. During operation, the system water inlet/outlet temperature and the setpoint value (if the system is switched on) are displayed. On the right side appears, which gives access to the "Plant control" menu (Figure 2.3 p. 9).

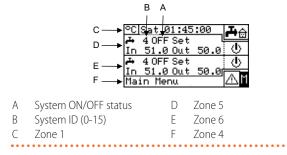
**Figure 2.2** Screen view the first time the DDC is switched on



**Figure 2.3** *Display of 4-pipe heating/cooling and DHW system operating conditions* 



**Figure 2.4** Display of operating conditions for base DHW and separable DHW systems



- ➤ Zone 4: a text appears in the last line, briefly describing the icon on which the cursor is located. The ▲ icon provides access to the "Alarms" menu; the icon provides access to the "Main Menu" (Figure 2.3 p. 9).
- ➤ Zone 5: The → symbol appears, indicating that the zone displays the operating parameters for the hot

water production system relating to the base DHW service (production of DHW using the units of the base system part with the possibility of providing simultaneous heating service). During operation, the system water inlet/outlet temperature and the setpoint value (if the system is switched on) are displayed. On the right side appears, which provides access to the "Plant control" menu for the base DHW system (Figure 2.4 p. 9).



If this type of DHW service is not configured, the message "SERV. NOT CONFIG" (service not configured) will appear.



If this type of DHW service is not configured, the message "SERV. NOT CONFIG" (service not configured) will appear.

The convention used for indicating the heating and/or cooling system is as follows:

- Sun: represents the chilled water production system (cooling).
- Snowflake: represents the hot water production system (heating).

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

Figure 2.5 Systems not configured

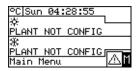


Figure 2.6 Only cooling system configured

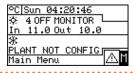


Figure 2.7 Only heating system configured

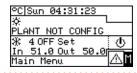
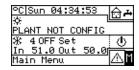


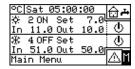
Figure 2.8 Heating and DHW systems configured



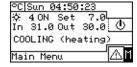
**Figure 2.9** Cooling and heating systems configured for simultaneous operation (4-pipe)

°C	Sun 0	4:48	:06	
-64	4 ON	Set	7.0	
Ĭπ	11.0	Out	10.0	Φ
*	2 0FF			Ф
In			50.0r	A B
Ma:	in Mei	nu		Z:S

**Figure 2.10** Cooling and heating systems configured for simultaneous operation; DHW system configured



**Figure 2.11** Cooling and heating systems configured for alternating operation



**Figure 2.12** Cooling and heating systems configured for alternating operation; DHW system configured

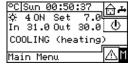


Figure 2.13 DHW system configured





If the setpoint is set to inlet water, the inlet water temperature ("In") appears on the display below the setpoint indication. In the event of an error on the system units, on the main screen you can see:

- ➤ The ▲ symbol flashes.
- ► The display backlight flashes.
- ► The beeper (if activated) emits an intermittent sound (see Paragraph 3.4.2.4 p. 34).



#### Idle:

- **1.** The DDC returns to the main screen after it has been idle for 30 minutes (no knob operation).
- **2.** The display backlight is switched off after it has been idle for 15 minutes (see also Paragraph 3.4.2.5 *p. 34*).
- **3.** If the knob is operated while the display backlight is flashing, it stops flashing; it resumes flashing after

it has been idle for 25 s, if error conditions remain.

## 2.3 SELECTION KNOB

The main user interface for managing, programming and controlling the DDC is the knob on the front of the DDC. The operations that can be carried out using the knob are summarised below:

- Turn the knob clockwise or counterclockwise to move the cursor to the icons to be selected on the display or to change the value of a numeric field.
- **2.** Press the knob to access the selected menu or to confirm the operation being carried out.

Please note that in this manual, whenever you have to select an icon, parameter, etc., you will need to perform the two operations described above.

**Figure 2.14** *Selection knob* 





A Turning the knob

B Pressing the knob

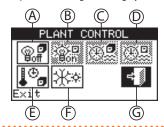
## 2.4 "PLANT CONTROL" MENU

Select the symbol on the main screen, relating to the service to be controlled, to access the "Plant control" menu. Within this screen, depending on the existing

configuration, you can select and manage the buttons that switch on the cooling/heating services.

The Figure 2.15 *p. 11* shows how the "Plant control" menu screen appears for an example of configuration.

**Figure 2.15** *Example of cooling/heating system control screen* 



- A Main on/off switch
- B Group on/off switch (only for multi-DDC systems)
- C General water timer enable switch
- D Group water timer enable switch (only for multi-DDC systems)
- E Chronothermostat enable switch
- F Heating/cooling changeover switch (only for 2-pipe heating/cooling systems)
- G Exit menu
- A. General on/off switch for cooling/heating services

Switches the controlled service(s) on or off (cooling and heating or 2-pipe cooling/heating).

To turn on the service(s) turn the knob and place the cursor to then press the knob. The button will change to to indicate that the switch has been closed (on).

To switch off the service(s) turn the knob and place the cursor to the npress the knob. The button will

change to to indicate that the switch has been opened (off).

The symbol means that the button has been disabled and cannot be selected.

The switch will have no effect on switching on the system.

**B.** Group on/off switch (enabled only for multi-DDC systems) **@**冒

The button allows the user to enable or disable the request to switch on the units directly managed by the

specific DDC. The switching on of the units is however subject to the activation of the main switch present only on the master DDC.

To enable the DDC controlled units turn the knob and place the cursor to then press the knob. The button will change to to indicate that the switch has been closed (on).

To disable the DDC controlled units turn the knob and place the cursor to then press the knob. The button will change to to indicate that the switch has been opened (on).

The symbol means that the button has been disabled and cannot be selected.

The switch will have no effect on switching on the units.

Allows you to use or not the time program for all units. To disable the "General water timer" turn the knob and place the cursor to then press the knob. The button will change to to indicate that the water timer has been deactivated and the switch is closed (on). To enable the "General water timer" turn the knob and place the cursor to then press the knob. The button will change to to indicate that the water timer has been enabled. The corresponding switch will be closed or open depending on whether or not you are within a programmed time slot (Paragraph 3.4.1.1.1.3 p. 24).

The symbol means that the button has been disabled and cannot be selected.

**D.** "Group water timer" enable/disable switch (enabled for multi-DDC systems only)

Allows you to use or not the time program for the units managed by the individual DDC.

To disable the "Group water timer" turn the knob and place the cursor to then press the knob. The button will change to to indicate that the "Group water timer" has been deactivated and the switch is closed (on). The "Group water timer" will still be disabled if the "General water timer" is disabled.

To enable the "Group water timer" turn the knob and place the cursor to then press the knob. The button will change to to indicate that the "Group water timer" has been enabled. The corresponding switch will be closed or open depending on whether or not you are within a programmed time slot (Paragraph 3.4.1.1.1.4 p. 25).

The symbol means that the button has been disabled and cannot be selected.

- E. Chronothermostat enable/disable switch This button is enabled in one of the following two cases and has different functions, described below:
  - The room chronothermostat based on the internal temperature probe is active ("AmbT" mode or, equivalently, "CUST" mode and "CronoT" request active). In this case:

- To disable the chronothermostat, turn the knob and place the cursor to then press the knob. The button will change to to indicate that the chronothermostat has been disabled and that the switch is closed (on), i.e. the system DOES NOT perform the indoor room temperature control.
- To activate the chronothermostat, turn the knob and place the cursor to then press the knob. The button will change to to indicate that the chronothermostat is active. The corresponding switch will be open or closed depending on whether the indoor room temperature meets or does not meet the active room setpoint based on the time program of the chronothermostat, i.e. the system performs the indoor room temperature control, based on the time program of the chronothermostat (for further information see Paragraph 3.4.1.2.3 p. 30).
- 2. The room chronothermostat based on the climatic curve and the outdoor temperature probe is active ("WCmp" mode or, equivalently, "CUST" mode and "WeComp" function active), and the climatic curve function is enabled in the user level menu "Weather comp. enable" (Enable climatic curve, Paragraph 3.4.1.1.1.2 p. 24). In this case, by repeatedly pressing the knob with the cursor positioned on the chronothermostat enable/disable button, the symbol takes on different aspects in sequence to which the following modes correspond:

- the room temperature setpoint is the active one, according to the time program set on the chronothermostat.

- T3 or T3: the room temperature setpoint is always T3 (maximum level of heating or cooling service).

- the room temperature setpoint is always T2 (average level of heating or cooling service).

-  $\blacksquare$  or  $\blacksquare$  the room temperature setpoint is always T1 (minimum level of heating or cooling service).

NOTE: continuing to press the knob will repeat the sequence.

Note that the climatic curve function remains active in all modes stated above; therefore in this case the system ALWAYS performs the internal room temperature control, based on the climatic curve; what changes is only the choice of the room temperature setpoint value.

If neither of the above cases applies, the button will look like to indicate that it is disabled. The system does not perform the internal room temperature control.

F. Heating/cooling operating mode switch (only for 2-pipes heating/cooling systems)

To switch to cooling mode, turn the knob and place the cursor to the press the knob. The button

change to \*\* to indicate that the system is enabled for cooling operation.

To switch to heating mode, turn the knob and place the cursor to cursor cursor t

G. Heating/cooling priority switch for GAHP GS/WS heating/cooling module (only for 4-pipe heating/cooling systems with GAHP GS/WS units) ※※

To give priority to cooling operation, turn the knob and place the cursor on was and press the knob. The button will change to was indicating that priority will be given to the cooling operation of the GAHP GS/WS heating/cooling appliances.

To give priority to heating operation, turn the knob and place the cursor on was and press the knob. The button will change to was indicating that priority will be given to the heating operation of the GAHP GS/WS heating/cooling appliances.



Depending on the existing configuration, some of the buttons may be disabled (status always ON). See Paragraph 4.4.2.7.10.2 *p. 64* for more details.



Each service is independent and the deactivation of a service request does not always result in the appliances being switched off. All configured service requests must be deactivated to ensure that the system is actually switched off.

# 2.5 "PLANT CONTROL" MENU FOR BASE AND SEPARABLE DHW

To access the "Plant control" menu for the DHW system, follow the steps below:

- 1. Select the ☐ → icon from the main screen and press the knob to access the screen displaying the operating parameters of the base and separable DHW services.
- 2. Select the symbol at the top to access the "Plant control" menu for base DHW (Zone 5, Figure 2.4 p. 9).
- 3. Select the symbol at the bottom to access the "Plant control" menu for separable DHW (Zone 6, Figure 2.4 p. 9).
- **4.** In both cases the screen shown in Figure 2.16 *p. 13* will appear on the display.
- **5.** Switching on the units that are used to produce DHW also requires a request from an RB100 or RB200 device

or via Modbus protocol; the button in the ON position alone is not sufficient to switch on the DHW units. The base DHW service and the separable DHW service each require a specific request; for further information, please refer to the manuals of the RB100 or RB200 devices, depending on the type of device used.

**Figure 2.16** Example of base or separable DHW system control screen



A Main on/off switch

A. Base or separable DHW service on/off switch

Switches the corresponding DHW service on/off.

To turn on the service turn the knob and place the cursor to then press the knob. The button will change to to indicate that the switch has been closed (on).

To turn off the service turn the knob and place the cursor to then press the knob. The button will change to to indicate that the switch has been opened (off).

The symbol means that the switch cannot be selected. The switch will have no effect on switching on the units. The symbol only appears on the slave DDC in the case of a multi-DDC configuration, because the corresponding DHW service can only be switched on/off on the master DDC. The symbol on the slave DDC reflects the button status of the master DDC.



Each service is independent and the deactivation of a service request does not always result in the appliances being switched off. All configured service requests must be deactivated to ensure that the system is actually switched off.

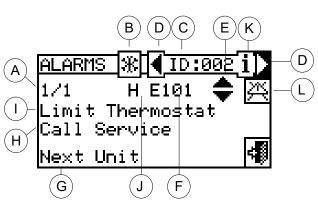
### 2.6 "ALARMS" MENU

The menu allows the user to view the presence of faults in the system's units.

To access the "Alarms" menu, select from the main screen.

Figure 2.17 p. 14 shows the "Alarms" menu screen.

Figure 2.17 Example of "Alarms" menu screen



- A Progressive number of current events for the selected unit
- B System identification symbol; for cooling system; for heating system
- C Unit ID
- Scroll arrows to change the unit whose events are being displayed
- Vertical scroll arrows to view events that have occurred on the unit
- F Event code indication (error: E; warning: W)
- G Description of the cursor position
- H Description of the action to be taken to resolve the event that occurred
- I Description of the event
- J The event belongs to:
  - "C": cooling module
  - "H": heating module
  - "B": electronic board
- K Accesses the "Unit Information" menu of the selected unit
- L Accesses the "Unit Alarms Reset" menu of the selected unit

NOTE: The letters "C" and "H" will not be displayed for GAHP GS/WS

Current events are displayed in the "Alarms" menu: you can view the type of event (warning or error) for each unit type.

Instructions for accessing the "Alarms" menu:

- 1. From the start screen, select **.**
- 2. Select the system for which events have occurred:

  \*\*

  for 2-pipe cooling/heating systems;

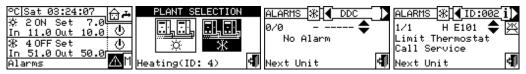
  the hot water production system;

  for the chilled

water production system. The  $\triangle$  symbol that appears next to the system icon indicates the presence of faults on the system.

- 3. To search for the faulty unit select (detail D, Figure 2.17 *p. 14*). If the unit has no errors, "No alarm" will be displayed.
- **4.** Use the vertical scroll arrows (detail E, Figure 2.17 *p. 14*) to view all events on the unit.

Figure 2.18



The  $\stackrel{\square}{\bowtie}$  icon allows access to the "Units Management" menu for error reset or flame control unit reset, if needed. The  $\bf 1$  icon allows access to the "Unit Information" menu for the selected appliance.

## 2.7 ERRORS RESET

This option resets the faults in the selected unit (except for the flame lock-out).

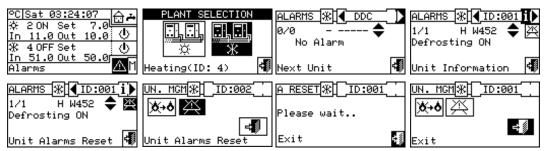
To perform an error reset, follow the instructions below:

- 1. Select from the start screen to access the "Alarms" menu.
- 2. Select the system for which events have occurred:

  \*\*\* for 2-pipe cooling/heating systems; for the hot water production system; for the chilled water production system. The \( \Delta \) symbol that appears next to the system icon indicates the presence of faults on the system.
- 3. Select to display the screen for the faulty unit.
- **4.** Select **1** to access the "Unit Information" menu for the selected appliance.

- **5.** Select to directly access the "Units Management" menu.
- 6. Place the cursor on and press the knob to perform an error reset or, if you wish to reset the flame lock-out, place the cursor on and press the knob to perform a flame lock-out reset.
- 7. Wait for the operation to be carried out. The success of the operation will be indicated by the message "Reset Done" appearing on the display.
- 8. To exit, select .

Figure 2.19





The error reset does not reset the flame lock-out. To reset the flame lock-out it is necessary to move the cursor to and press the knob to reset the flame control unit of the selected unit.



By regulation, a maximum of 5 attempts to unlock the flame lock-out can be made within 15 min. If this number of attempts is exceeded, the function is disabled and it is necessary to make further attempts by acting strictly on the unit concerned, as described in the relevant manual.



Resetting errors for which the message "Call Service" is displayed should only be carried out by qualified personnel.

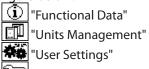


Error reset on third party units is not possible.

## 3 DDC FUNCTIONS

## 3.1 "MAIN MENU"

To access the "Main Menu" from the start screen, select M. The "Main Menu" consists of 5 sections as shown in the figure below:



"System Installation" (see Section 4 *p. 36*)

Figure 3.1



## 3.2 "FUNCTIONAL DATA"

To access "Functional Data" menu, follow the instructions below:

- 1. Select from the start screen to access the "Main Menu".
- **2.** Select to access the "Functional Data" menu. Entering the "Functional Data" menu gives access to a scrolling menu (Figure 3.2 *p. 16*) that provides access to all information on the systems and appliances managed by the DDC.

The items in the menu are:

- ▶ "DDC Information"
- "Units Information"
- ► "Plants Data"
- ➤ "Service Center"
- ► "Alarms Log"
- ► "Exit"

Figure 3.2



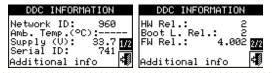
## 3.2.1 "DDC Information"

By accessing two screens it is possible to view some data relating to the DDC: network ID assigned to the DDC, ambient temperature (which is displayed if a ambient temperature probe is connected), supply voltage, serial ID. The second screen shows the HW revision, the FW revision of the boot loader, the FW revision of the application. To access the "DDC Information" menu from the "Functional Data" menu:

**1.** Turn the knob to select the "DDC Information" menu, and press the knob to access the menu.

- 2. Select "1/2" to move to the second screen. To go back to the first screen, select "2/2".
- 3. To exit, select

Figure 3.3



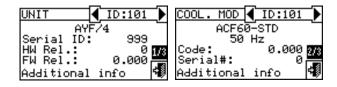
#### 3.2.2 "Units Information"

By accessing two or three screens, it is possible to view some details relating to the units (unit type, unit board ID, HW and FW version of the onboard electronics) and other detailed data relating to the module or the two modules that make up the unit (detailed name of the module, its main and secondary codes separated by a ", and finally the serial number).

To access the "Units Information" menu from the "Functional Data" menu:

- 1. Turn the knob to select the "Units information" menu, then press the knob to access the menu.
- 2. Select the unit using or . The network ID of the selected unit is indicated between the arrows; the first screen ("1/3", or "1/2") containing the unit's data is shown.
- **3.** Select "1/3" or "1/2" to move to the second screen, containing the data of the first module.
- **4.** If the unit consists of two modules, select "2/3" to move to the third screen, containing the data of the second module.
- **5.** Select "3/3" (or "2/2" in case of unit consisting of one module only) to go back to the first screen.
- **6.** To exit, select

Figure 3.4





In the case of a third party boiler or chiller, which is managed via the RB200 device, the first screen shows the generic message "Third Party Unit" and the serial ID, HW and FW version data of the RB200 device that manages the boiler or chiller; the second screen shows a more detailed description of the type of boiler or chiller (with or without

pump control, with or without error detection) and the value of the corresponding configuration parameter set on the RB200 device.

#### 3.2.3 "Plants Data"

Once the unit configuration has been completed (see Section 4 *p. 36*), the functional data of the managed systems can be displayed.

To enter the menu, select "Plants Data" from the "Functional Data" menu.

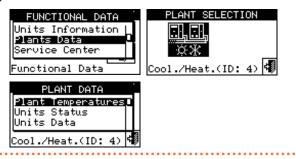
To display the operating data of the systems, select the desired icon. If two systems have been configured, two icons will appear, one for the hot system, characterised by

the icon and one for the cold system, characterised by the icon.

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

- "Plant Temperatures"
- "Units Status"
- ▶ "Units Data"
- ► "Exit"

Figure 3.5



## 3.2.3.1 "Plant Temperatures"

The inlet and outlet water temperatures of the system, the temperature setpoint value and the temperature difference between the inlet and outlet of the air conditioning system or of the base DHW system (if configured) or of the separable/separate DHW system (if configured) are displayed.

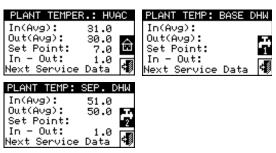
Select to switch to the display of the base DHW system screen ( will appear).

Select to switch to the display of the separable DHW system screen will appear).

Select to switch to the display of the air conditioning system screen ( will appear).

To exit, select

Figure 3.6





For a given temperature, if it is measured by a manifold probe (managed by the RB200 device) instead of by averaging the unit probes, the indication will be "(probe)" instead of "(Avq)".

#### 3.2.3.2 "Units Status"

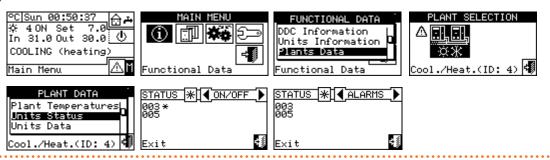
Through the "Units Status" menu it is possible to have a complete overview of the units in operation and those in error, each of which will be identified with its own network ID.

To access the menu, from "Plants Data" menu:

- 1. Select the system whose unit status you wish to view:

  | The control of the chilled water production system; | The chilled water production system. The symbol appearing next to the system icon indicates the presence of a fault.
- **2.** Turn the knob to select the "Units Status" menu, and press the knob to access the menu.
- 3. Select to go to the "ALARMS" screen: next to the unit ID the letter "E" will denote the presence of an error.
- **4.** Regardless of which of the two screens is displayed, turning the knob allows you to select a unit ID and, by pressing it, directly access the "Units Information" menu.
- 5. To exit, select

Figure 3.7



There are two screens: "ON/OFF" and "ALARMS".

The following symbols will appear next to the unit ID for

the "ON/OFF" screen:

- ► if the unit is on.
- ► If the unit is switched off, no symbol will appear next to the unit ID.
- ► if the unit has been excluded from the system via the options in the "Units Management" menu.
- ► "D" if the unit is performing a defrosting cycle. Option valid only for GAHP A and GAHP-AR units.
- ► "T" if the unit is switched off after exceeding operational limit.

Figure 3.8



Select to display units in error or warning. If the unit is in error, "E" will appear next to the unit ID.

In the "ALARMS" screen the following symbols will appear next to the unit ID:

- ► "E" if an error has occurred in the unit.
- ► "W" if a warning has occurred in the unit.
- ► "O" (offline) if there are connection problems between the unit and the DDC.
- ► If the unit has no errors or warnings, no symbol will appear next to the unit ID.

Figure 3.9

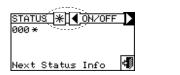


In the case of 2-pipe hot/cold systems, i.e. for alternating hot/cold water production, the symbols active.

Select to switch to the screens relating to the modules dedicated to chilled water production will appear).

Select to switch to the screens relating to the modules dedicated to hot water production will appear).

Figure 3.10





After configuring the units, the DDC searches for all configured units each time it is switched on. Any units not found will be considered offline.

#### 3.2.3.3 "Units Data"

In this menu you can read out the operating data of the units depending on the selected system \* or \* or \* or \*



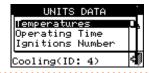
The parameters that may be viewed are:

- ▶ "Temperatures"
- "Operating Time"
- ▶ "Ignitions Number"
- ▶ "Defrostings Number"
- "Switchings Number"
- ➤ "OnTime at low ExtT" (operating time of the solution pump with low ambient temperature)
- ► "OnTime at low In T" (operating time of the solution pump with low return water temperature)
- "OnTime at highExtT" (operating time with high ambient temperature)
- "Limit T. Off Time" (time with temperature exceeding operational limit)
- "Limit T Events Num" (number of exceeded operational limit events)
- "Defrostings Time"
- "Sp.Heat Oper. Time" (operating time in space heating mode)
- ► "DHW Operat. Time" (operating time in DHW mode)
- ► "Additional Data"
- ► "Time since mainten" (time since last maintenance carried out)

To exit each of these menus select 🗐.

### **3.2.3.3.1** "Temperatures"

Figure 3.11



The menu lists all the operating temperatures of the selected unit whose ID is indicated between and . To view the operating temperatures of another unit select. The temperatures that can be displayed depend on the unit type selected (AY00-120, GA ACF, GAHP GS/WS, etc.). Below is the list of temperatures that may be displayed on the screen:

- ► "In", unit inlet water temperature.
- ► "Out", unit outlet water temperature.
- "Ext", outdoor temperature.
- ► "Cnd", condenser temperature.
- ► "Gen", generator temperature.
- ► "Eva", evaporator temperature.
- "TA1"/"TA2", auxiliary probes temperature.
- "Mix", air/gas mix temperature.
- "Flue", flue temperature.
- "GenF", generator fins temperature.



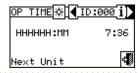
It is not possible to view the operating temperatures of third party units.

### **3.2.3.3.2**"Operating Time"

Operating time in hours and minutes of the unit. To display the operating time of another unit select  $\blacksquare$ .



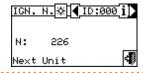
Figure 3.12



### 3.2.3.3 "Ignitions Number"

Number of times the unit has been switched on.

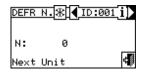
Figure 3.13



#### 3.2.3.4"Defrostings Number"

Number of defrosting cycles of the unit (option valid only for GAHP A and GAHP-AR units).

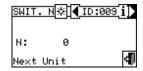
Figure 3.14



## 3.2.3.5 "Switchings Number"

Number of inversions of the unit cycle (option valid only for GAHP-AR units).

Figure 3.15



#### **3.2.3.3.6**"OnTime at low ExtT"

Operating time of the solution pump with low ambient temperature.

The screen is identical to Figure 3.12 *p. 19* and only applies to GA ACF, GAHP A and GAHP-AR.

#### **3.2.3.3.7** "OnTime at low In T"

Operating time of the solution pump with low return water temperature.

The screen is identical to Figure 3.12 *p. 19* and only applies to modules that produce hot water (GAHP A, GAHP-AR, GAHP GS/WS).

## **3.2.3.3.8**"OnTime at highExtT"

Operating time with high ambient temperature.

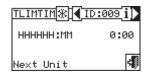
The screen is identical to Figure 3.12 *p. 19*, the operating time with high ambient temperature and solution pump on is shown (only for GA ACF).

## **3.2.3.3.9**"Limit T. Off Time"

Time with the temperature exceeding operational limit. Figure 3.16 *p. 19* shows the time with burner off for

exceeded operational limit.

Figure 3.16



#### **3.2.3.3.10** "Limit T Events Num"

Number of exceeded operational limit events.

Only the cases of exceeded operational limit that cause the burner to switch off are considered.

Figure 3.17

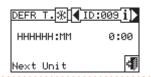


### **3.2.3.3.11** "Defrostings Time"

Defrosting time.

In Figure 3.18 *p. 19* the time with active defrosting cycle is indicated (only for GAHP A and GAHP-AR).

Figure 3.18



## **3.2.3.3.12** "Sp.Heat Oper. Time"

Operating time in space heating mode. The screen is identical to Figure 3.12 *p. 19*.

#### **3.2.3.3.13** "DHW Operat. Time"

Operating time in DHW mode.

The screen is identical to Figure 3.12 p. 19.

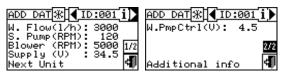
#### **3.2.3.3.14** "Additional Data"

Other data related to the selected unit. To display the data of another unit select : to show the second screen "1/2"; "2/2" to switch from the second to the first screen.



Other third party unit data cannot be displayed.

Figure 3.19



## **3.2.3.3.15** "Time since mainten"

Time since last maintenance carried out.

The screen (Figure 3.20 p. 20) shows:

► Left: operating hours and calendar months since the last maintenance carried out; these are shown regardless of whether the respective maintenance intervals are set; they also continue to be counted after any maintenance intervals that may have been set have expired.

▶ Right: operating hours and calendar months remaining until the expiry of the respective maintenance intervals, if set. If one or both maintenance intervals are not set, the corresponding data is replaced by a series of dashes; if a maintenance interval is set, the corresponding counting stops at 0 when the interval expires.

Figure 3.20





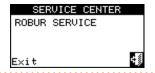
The operations of setting maintenance intervals and resetting the counters of the operating hours and calendar months elapsed since the last maintenance are reserved for TACs. These operations are described in Paragraph 3.3.6 *p. 22*.

#### 3.2.4 "Service Center"

Screen where information of the nearest TAC can be displayed.

To exit, select 🗐

Figure 3.21

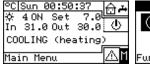


### **3.2.5** "Alarms Log"

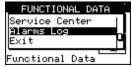
To access the "Alarms Log" menu from the "Functional Data" menu:

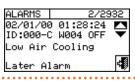
- 1. Turn the knob to select the "Alarms Log" menu, and press the knob to access the menu.
- **2.** Place the cursor on the vertical scroll arrows (see detail "D" in Figure 3.23 *p. 20*) to scroll through the events, from latest to earliest.
- 3. To exit, select

Figure 3.22









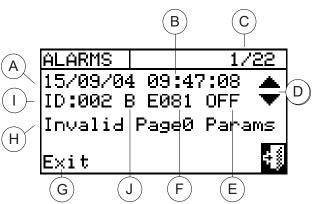
The screen displays all the parameters that characterise a warning or error event. All events are sorted chronologically from the latest to the earliest and the time at which the event occurred and ended is indicated. The following information is provided for each event, as shown in Figure 3.23 *p. 20*: date, time, unit ID, error or warning code, possible indication of the module ("C" cooling, "H" heating) that generated the event; the ON indication relates to

the rise of the warning or error event; the OFF indication relates to its end. In addition, in the central area of the display, a brief description of the type of event that occurred is given.

All the events that occur are stored in the "Alarms Log" menu.

Figure 3.23 p. 20 shows the "Alarms Log" menu screen.

Figure 3.23 Example of "Alarms Log" menu screen



- A Event detection date
- B Event detection time
- C Event number indicator: the first number shows the chronological position of the event being displayed, while the second indicates the total number of events stored by the DDC
- D Vertical scroll arrows: allow you to view the events that occurred on the system in a chronological way
- E Event status: ON indicates when the event occurred; OFF indicates when it ended
- F Numeric code describing the type of event
- G Description of the function highlighted by the cursor
- H Description of the event
- I ID of unit or DDCs on which the displayed event occurred
- J Origin of the fault:
  - "C": cooling module
  - "H": heating module
  - "B": electronic board

NOTE: The letters "C" and "H" will not be displayed for GAHP GS/WS

#### 3.3 "UNITS MANAGEMENT"

The menu allows performing some tasks on the units controlled by the DDC.

Each unit is associated with a screen in the "Units Management" menu, which contains 7 icons that allow the unit to be managed.

- ► "Ignition Box Rearm" allows resetting the flame control unit of the selected unit in the event of a lockout.
- "Unit Alarms Reset" allows resetting the active faults in the selected unit (with the exception of the flame lock-out).
- ► "Unit Exclusion" allows the selected unit to be excluded from the system.
- "Param. Set Modif." allows modifying the parameters set on the unit board. To check the list of parameters, please refer to the unit's installation manual.
- "Default Param. Set" allows resetting the default parameters stored on the unit board.
- "Manual Defrosting" allows running the defrosting cycle for the selected unit (only for GAHP A and GAHP-AR). The unit will only perform a defrosting

cycle if the conditions are met.

► Waint Interval Setup" allows setting the value or disable the maintenance intervals expressed in operating hours and calendar months, and resetting the respective counters for the time elapsed since the last maintenance.

To access the functions described above:

- 1. Select ☐ from the start screen to access the "Main Menu".
- 2. From the "Main Menu", select .

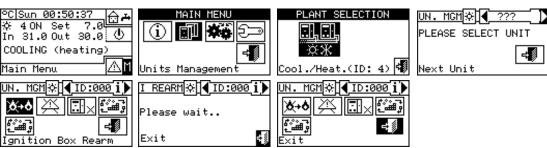
  3. Select the system \* or \* or \*\*
- **4.** Select the unit using **1** or **1**. The unit ID is indicated between the arrows.

## 3.3.1 "Ignition Box Rearm"

To reset the flame control unit in the event of a flame lockout, follow the instructions below:

- 1. Place the cursor on and press the knob to reset the flame control unit.
- Wait for the operation to be carried out. The success of the operation will be indicated by the message "Reset OK".
- 3. To exit, select

Figure 3.24





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

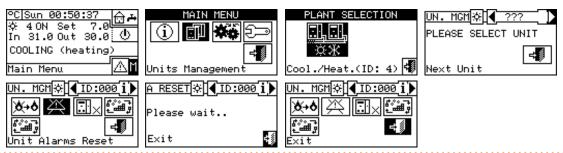
## 3.3.2 "Unit Alarms Reset"

Follow the instructions below to reset unit errors:

- 1. Place the cursor on and press the knob to perform the error reset
- 2. Wait for the operation to be carried out. The success of the operation will be indicated by the message "Reset OK"

To exit, select 📲







The error reset does not reset the flame control

unit.



Error reset on third party units is not possible.

#### 3.3.3 "Unit Exclusion"

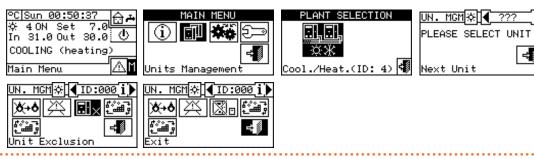
Follow the instructions below to exclude the unit from the system:

1. Place the cursor on wand press the knob to perform

the unit exclusion. Wait for the operation to be carried out. The symbol means that the unit has been excluded from the system. To include the unit in the system again, select and press the knob. The symbol means that the unit is included in the system.

2. To exit, select

Figure 3.26





When a unit is excluded, the DDC considers it to be inoperable and any faults are not reported.

## 3.3.4 "Param. Set Modif." (TAC only)

This option allows changing some parameters on the unit board.



The "Param. Set Modif." operation cannot be performed on third party units.

## 3.3.5 "Default Param. Set"

This option allows the factory parameters stored on the unit board to be restored via the DDC.



The "Default Param. Set" operation cannot be performed on third party units.

## 3.3.6 "Maint Interval Setup" (TAC only)

The option, protected by the service password, allows,

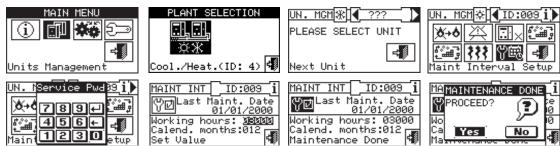
selectively for each unit, to (Figure 3.27 p. 22):

- ▶ Use the appropriate button to reset the counters for the operating hours and calendar months that have elapsed since the last maintenance. This operation is typically carried out immediately after carrying out maintenance work; it also causes the date shown next to the button to be updated.
- ➤ Set the values of the maintenance intervals (operating hours and calendar months) or disable one or both (by setting the value 0; dashes are shown). If a specific maintenance interval is disabled, the warning about the need for maintenance will not be generated when it expires. This operation is normally performed only once during system configuration, and only if the default settings need to be changed.



By default the maintenance intervals are both enabled and set to 3000 operating hours and 12 calendar months respectively; all months are considered to last 30 days.

Figure 3.27



## 3.4 "USER SETTINGS"

From the main menu select . If prompted, enter the user password using the numeric keypad on the screen

and select to confirm. Entering an incorrect password will return you to the main menu screen.

Accessing this menu allows the following parameters to

be viewed/set:

- ▶ "Plants"
- "Preferences"
- "Exit"

Figure 3.28



#### 3.4.1 "Plants"

To access the "Plants" menu:

- 1. Select from the start screen to access the "Main Menu"
- 2. From the "Main Menu", select
- **3.** If requested, enter the user password on the numerical keypad that appears on the display.
- 4. Select "Plants" from the menu.
- 5. Select the system for which you want to set the parameter: \*\* for 2-pipe cooling/heating system; \*\* for hot water production system; \*\* for chilled water production system.

The items in the menu are:

- "Water Setup"
- "Ambient Setup"
- "Extern. Amb. Setup"
- "Quiet Mode Setup"
- ► "Exit"

Figure 3.29



### 3.4.1.1 "Water Setup"

The following paragraphs describe the operating logic of the DDC to allow the operator to set the water parameters correctly, such as the setpoint temperature.

To access this menu, select "Water Setup" from the menu.

#### **3.4.1.1.1** "Cooling/Heating"

To access this menu, select "Cooling" or "Heating" or "Cooling/Heating" from the menu.

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

- "Default Set Point"
- "Weather Comp Enab."
- ► "General Wat. Timer"
- "Group Water Timer"

#### **3.4.1.1.1.1** "Default Set Point"

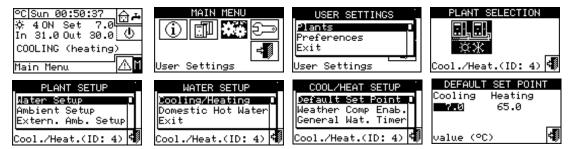
Follow the instructions below to set the setpoint temperature for heating and/or cooling services:

- 1. Select "Default Set Point" from the menu.
- 2. Place the cursor on the temperature value to be changed: for cold-only systems only the cooling setpoint temperature "Cooling" will appear; for hot-only systems only the heating setpoint temperature "Heating" will appear; for 2-pipe hot/cold systems the cooling and heating setpoint temperatures ("Cooling" and "Heating") will appear.
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- **5.** Press the knob to confirm the set value.
- **6.** To exit, select



The default setpoint is used when the general water timer is disabled. Otherwise, the setpoint used at any given time is the one defined in the active water timer (see Paragraph 3.4.1.1.1.3 *p. 24*).

Figure 3.30

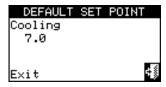


This screen shows the water setpoint temperatures for cooling and/or heating operation according to the type of system configured.

Chilled water production system
The setpoint value represents the desired temperature of the water at the outlet of the unit if the outlet temperature control has been set in the installation menu;

otherwise the setpoint temperature represents the desired temperature of the water returning to the unit.

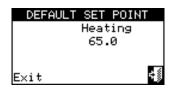
Figure 3.31



► Hot water production system

The setpoint value represents the desired temperature of the water at the outlet of the unit if the outlet temperature control has been set in the installation menu; otherwise the setpoint temperature represents the desired temperature of the water returning to the unit.

Figure 3.32



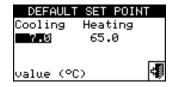
System for alternate production of hot or chilled water

Cooling setpoint: water temperature when the priority is chilled water production.

Heating setpoint: water temperature when the priority is hot water production.

The two setpoints 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.

Figure 3.33



## **3.4.1.1.1.2** "Weather Comp Enab."

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

- **1.** Select "Weather Comp Enab." from the menu.
- 2. Turn the knob and select the desired item. Press the knob to enable/disable the climatic curve. The symbol means that the climatic curve is enabled; the symbol means that the climatic curve has been disabled.
- 3. To exit, select

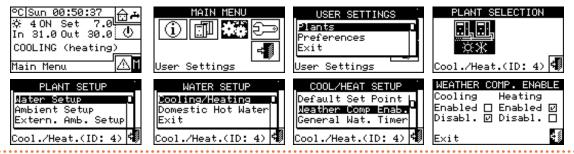


The climatic curve can only be enabled if an operating mode providing for it has been selected in advance (Paragraph 4.4.2.7.10.2 *p. 64*).

If the climatic curve is enabled, the water setpoint is variable and is calculated by the DDC according to the set climatic curve, the outdoor temperature and the required room temperature, also taking into account the maximum and minimum water setpoints.

If the climatic curve is disabled, the corresponding default water setpoint will be used instead (Paragraph 3.4.1.1.1.1 p. 23).

Figure 3.34



## **3.4.1.1.3** "General Wat. Timer"

The function allows managing the "General water timer" operating mode of the system in relation to heating and cooling services. The function allows the user to select up to 4 system activation time slots, within which a water setpoint temperature can be defined. Up to 4 daily time slots can be set to which 4 different temperature levels can be matched. It is possible to enable/disable each time slot without erasing it by operating on the fields as described below. Programming can be diversified for the seven days of the week and for cooling and heating services.

In the case of systems managed by several DDCs,

programming of the general water timer will only be possible from the master DDC.

To program the time slots for a typical day, follow the instructions below:

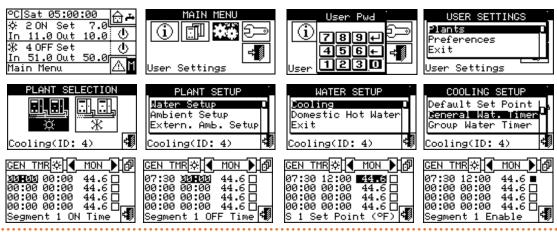
- 1. Select "General Wat. Timer" from the menu.
- 2. Place the cursor on the activation time of the first time slot and press the knob. Turn the knob to select the activation time of the first time slot and press the knob to confirm. The cursor will automatically move to the deactivation time of the first time slot. Proceed as indicated above for programming the deactivation time of the first time slot.
- **3.** Set the water setpoint temperature for the programmed time slot. Press the knob to change the



temperature value once the cursor is positioned on the number. Turn the knob to change the value. Press the knob to confirm.

- 4. The cursor will automatically move to ☐ to enable the programmed time slot. Press the knob to enable the time slot. The ☑ symbol means that the newly programmed time slot has been enabled. NOTE: A time slot can be disabled at any time by pressing ☑. The ☐ symbol means that the programmed time slot
- has been disabled.
- **5.** If needed, proceed in the same way by repeating steps 2-3-4 for programming other time slots.
- **6.** Once the desired time slots have been programmed, you can move on to the next day by selecting the arrow at the top right . If you want to copy the programming of the previous day select or proceed to the programming of the desired time slots.
- 7. To exit, select

Figure 3.35



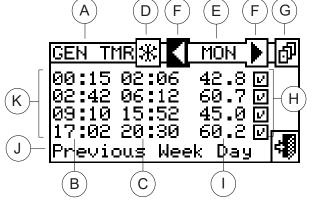
In the event of a programming fault, appropriate error messages are shown on the display:

- ► "Null Time Segment" (or negative)
- ▶ "Overlapped Time Segment" to another enabled time

#### segment

Figure 3.36 *p. 25* shows how the DDC display looks like when programming the general water timer.

**Figure 3.36** *Screen for programming general water timer* 



- A Programming general water timer
- B Time slot switch-on time
- C Time slot switch-off time
- D Identification symbol of the system for which the general water timer is being programmed; for heating system; for cooling system; in the case of 2-pipe heating/cooling systems, it is a button that allows switching between systems
- E Day for which time slots are being programmed
- Scroll arrows to change the day
- G Copy previous day to current day button
- H Checkbox for activating the programmed time slot
- I Setpoint temperature for the programmed time slot
- J Description of the function highlighted by the cursor
- K On/off time slots

## **3.4.1.1.4** "Group Water Timer"

This option can only be programmed for multi-DDC systems. The option allows selecting up to 4 operating time slots for each day of the week. The programming can be diversified for the seven days of the week and for cooling and heating services.

Figure 3.37





The group water timer control only the units directly managed by a specific DDC, therefore, according to the number of DDCs in the system, two situations may arise:

- The system is controlled by a single DDC. The DDC will be defined as master by default and only the general water timer can be used.
- The system is controlled by more than one DDC (master and slave). In this case, only one of the DDCs installed will be defined as the master and, through it, it will be possible to program the general water timer for the whole system and the group water timer for the units directly managed by the master DDC. On the slave DDC(s) it will be possible to program the group water timer in order to control only the units connected to the specific slave DDC. The group of units managed by a specific DDC will operate in the intersection between the general water timer and the group water timer set on it. For example, if a 0-10 general water timer has been set on the master DDC and a 6-12 group water timer has been set on a slave DDC, the units managed by this slave DDC will only have the reguest between 6 and 10.

To program the time slots for a typical day, follow the instructions below:

- 1. Select "Group Water Timer" from the menu.
- 2. Place the cursor on the activation time of the first time slot and press the knob. Turn the knob to select the activation time of the first time slot and press the knob to confirm. The cursor will automatically move to the deactivation time of the first time slot. Proceed

- as indicated above for programming the deactivation time of the first time slot.
- 3. The cursor will automatically move to ☐ to enable the programmed time slot. Press the knob to enable the time slot. The ☐ symbol means that the newly programmed time slot has been enabled. NOTE: A time slot can be disabled at any time by pressing ☐. The ☐ symbol means that the programmed time slot has been disabled.
- **4.** If needed, proceed in the same way by repeating steps 2 and 3 for programming other time slots.
- 5. Once the desired time slots have been programmed, you can move on to the next day by selecting the arrow at the top right . If you want to copy the programming of the previous day select or proceed to the programming of the desired time slots.
- **6.** To exit, select

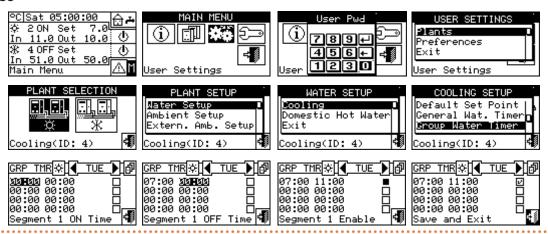


At any given time, the setpoint used is the one set for the general water timer active at that time or the default setpoint if the general water timer is disabled.



Neither general nor group water timer can be used simultaneously with the climate curve mode.

Figure 3.38



## 3.4.1.1.2"Domestic Hot Water"

To access this menu, select "Domestic Hot Water" from the menu

The options that can be set, via this menu, for DHW production services are:

- ► "Base Plt Wat Timer" (base DHW system water timer)
- "Split Plt Wat Timr" (separable DHW system water timer)



The water timer and their setpoints are only taken into account if the parameter "Type of setpoint input for DHW service" is set to "digital with setpoint on DDC" on the RB100 or RB200 device

(essential for DHW management).



For more information, please refer to the RB100 or RB200 device manuals, depending on the type of device used.

Up to 4 daily time slots can be set to which 4 different temperature levels can be matched. It is possible to enable/disable each time slot without erasing it by operating on the fields as described below. Programming can be diversified for the seven days of the week.

In the case of systems managed by several DDCs, programming of the water timer will only be possible from



the master DDC.

#### **3.4.1.1.2.1** "Base Plt Wat Timer"

This function allows managing the "Base DHW system water timer" operating mode of the base DHW service. The function allows the user to select up to 4 system activation time slots, within which a water setpoint temperature can be defined.

To program the time slots for a typical day, follow the instructions below:

- 1. Select "Base Plt Wat Timer" from the menu.
- 2. Place the cursor on the activation time of the first time slot and press the knob. Turn the knob to select the activation time of the first time slot and press the knob to confirm. The cursor will automatically move to the deactivation time of the first time slot. Proceed as indicated above for programming the deactivation time of the first time slot.
- **3.** Set the water setpoint temperature for the programmed time slot. Press the knob to change the

- temperature value once the cursor is positioned on the number. Turn the knob to change the value. Press the knob to confirm.
- 4. The cursor will automatically move to ☐ to enable the programmed time slot. Press the knob to enable the time slot. The ☐ symbol means that the newly programmed time slot has been enabled. NOTE: A time slot can be disabled at any time by pressing ☐. The ☐ symbol means that the programmed time slot has been disabled.
- **5.** If needed, proceed in the same way by repeating steps 2-3-4 for programming other time slots.
- 6. Once the desired time slots have been programmed, you can move on to the next day by selecting the arrow at the top right. If you want to copy the programming of the previous day select or proceed to the programming of the desired time slots.
- 7. To exit, select

Figure 3.39

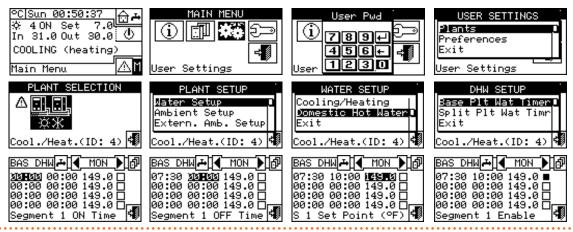
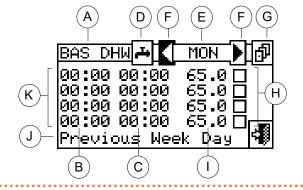


Figure 3.40 *p. 27* shows how the DDC display look like when programming the base DHW system water timer. In the event of a programming fault, appropriate error messages are shown on the display:

- ► "Null Time Segment" (or negative)
- "Overlapped Time Segment" to another enabled time segment

**Figure 3.40** *Screen for programming the base DHW system water timer* 



- A Programming the base DHW system water timer
- B Time slot switch-on time
- C Time slot switch-off time
- D Identification symbol of the system for which the water timer is being programmed is the DHW system
- E Day for which time slots are being programmed
- F Scroll arrows to change the day
- G Copy previous day to current day button
- H Checkbox for activating the programmed time slot
- Setpoint temperature for the programmed time slot
- J Description of the function highlighted by the cursor
- K On/off time slots

## **3.4.1.1.2.2** "Split Plt Wat Timr"

This function allows managing the "Separable DHW system water timer" operating mode of the base DHW service. The function allows the user to select up to 4 system

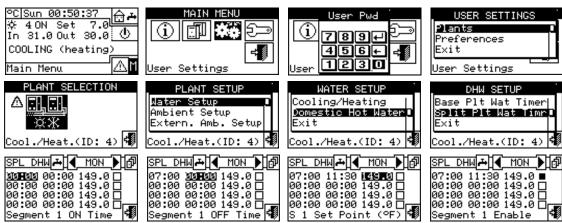
activation time slots, within which a water setpoint temperature can be defined.

To program the time slots for a typical day, follow the instructions below:

- 1. Select "Split Plt Wat Timr" from the menu.
- 2. Place the cursor on the activation time of the first time slot and press the knob. Turn the knob to select the activation time of the first time slot and press the knob to confirm. The cursor will automatically move to the deactivation time of the first time slot. Proceed as indicated above for programming the deactivation time of the first time slot.
- **3.** Set the water setpoint temperature for the programmed time slot. Press the knob to change the temperature value once the cursor is positioned on the number. Turn the knob to change the value. Press the knob to confirm.
- **4.** The cursor will automatically move to  $\square$  to enable the programmed time slot. Press the knob to enable

- **5.** If needed, proceed in the same way by repeating steps 2-3-4 for programming other time slots.
- **6.** Once the desired time slots have been programmed, you can move on to the next day by selecting the arrow at the top right . If you want to copy the programming of the previous day select or proceed to the programming of the desired time slots.
- **7.** To exit, select

Figure 3.41



In the event of a programming fault, appropriate error messages are shown on the display:

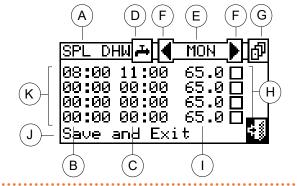
► "Null Time Segment" (or negative)

Figure 3.42 *p. 28* shows how the DDC display look like when programming the separable DHW system water

 "Overlapped Time Segment" to another enabled time segment

timer.

**Figure 3.42** Screen for programming the separable DHW system water timer



- A Programming the separable DHW system water timer
- B Time slot switch-on time
- C Time slot switch-off time
- D Identification symbol of the system for which the water timer is being programmed is the DHW system
- E Day for which time slots are being programmed
- F Scroll arrows to change the day
- G Copy previous day to current day button
- H Checkbox for activating the programmed time slot
- I Setpoint temperature for the programmed time slot
- J Description of the function highlighted by the cursor
- K On/off time slots

## **3.4.1.2** "Ambient Setup"

In this menu all the necessary parameters are set in case the room thermostating is used (internal room temperature of the ambient to be heated/cooled). It is necessary to connect a room temperature probe, available as OSND007 optional, for this operating mode.

To access the "Ambient Setup" menu first you must configure the requests in "AmbT" or "WCmp" mode (Paragraph

#### 4.4.2.7.10.2 p. 64).

The programmable parameters for this operating condition are:

- ▶ "Differential"
- ► "Chronot. Set Pnts"
- ► "Chronothermostat"

To access this menu, select "Ambient Setup" from the menu.



Figure 3.43



Figure 3.44



#### 3.4.1.2.1 "Differential"

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



This setting is only available in "AmbT" mode; it is disabled in "WCmp" mode.

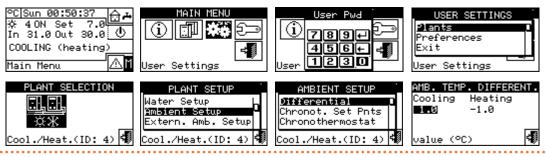
To set the room air temperature differential value(s), proceed as described below.

- 1. Select "Differential" from the menu.
- **2.** Place the cursor on the value to be changed ("Cooling" or "Heating").
- 3. Press the knob to allow changing the selected value.
- 4. Turn the knob to modify the differential value.
- 5. Press the knob to confirm the set value.
- **6.** To exit, select



The recommended values for the room temperature differential are 1 °C for cooling, -1 °C for heating.

Figure 3.45



#### 3.4.1.2.2 "Chronot. Set Pnts"

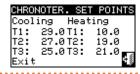
This function allows setting three room temperature values for cooling operation and three temperature values for heating operation, which will then be used and selected when programming the room chronothermostat.

The 3 temperature levels refer to the air temperature in the room to be cooled or heated.



T1 corresponds to the minimum service level (lowest temperature in heating, highest temperature in cooling) so that only values that meet these conditions can be set (heating: T1  $\leq$  T2  $\leq$  T3; cooling: T3  $\leq$  T2  $\leq$  T1).

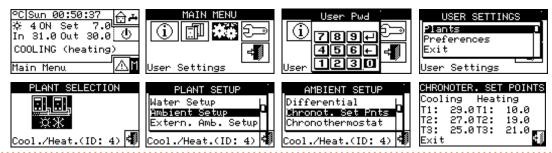
Figure 3.46



Follow the instructions below to set the three temperatures:

- 1. Select "Chronot. Set Pnts" from the menu.
- **2.** Place the cursor on the first temperature value at the top left of the screen.
- **3.** Press the knob to allow changing the selected value.
- 4. Turn the knob to change the temperature value.
- 5. Press the knob to confirm the set value.
- 6. Repeat the last 3 steps to set the other temperatures.
- 7. To exit, select

Figure 3.47



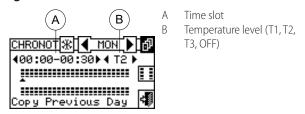
#### 3.4.1.2.3 "Chronothermostat"

The use of the chronothermostat allows you to select up to 3 temperature levels T1, T2 and T3 (e.g. T3 daytime, T2 nighttime and T1 antifreeze) plus switch-off (OFF) for each selected period. A total of 48 periods of 30 minutes each can be programmed, each of which can be assigned a specific temperature level (T1, T2, T3 and OFF).

Figure 3.48 *p. 30* shows an example of programming for a typical day. The chronothermostat allows you to set a temperature value (T1, T2, T3 or OFF) for each half-hour of the day.

In order for the system to operate in "Chronothermostat" mode, the optional OSND007 temperature probe must be connected to the DDC.

Figure 3.48



Description of the icons on the main screen:

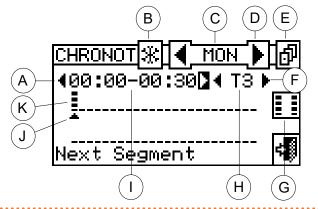
means that the chronothermostat is being programmed for heating operation.

- ▶ ★ means that the chronothermostat is being programmed for cooling operation.
- ▶ Allows you to change the day for which the chronothermostat is being programmed.
- ► MON Indicates the day for which you are programming.
- ► □ "Copy Previous Day", allows the programming made for the previous day to be copied to this day.
- ► "Segment Cpy Enable", allows you to quickly copy the room temperature level set for a period to one or more adjacent periods.
- ► Arrows A . allow you to select one of the 48 available periods, one every half hour.
- ► Arrows B , allow you to set a temperature level for the selected period.

The small arrow (detail J, Figure 3.49 p. 30) placed between the two horizontal lines indicates for which half-hour period the programming is taking place.

Figure 3.49 p. 30 shows the screen for programming the weekly chronothermostat. All the buttons and symbols used to enable programming are shown.

**Figure 3.49** *Ambient chronothermostat programming screen* 



- A Arrows for selecting the previous or next period: each period has a duration of 30 min. Programming of 48 periods is possible
- B Symbol identifying the type of system: the chronothermostat can be programmed for cooling and/or heating operation
- C Day for which programming is taking place
- D Previous or next day selection arrows
- E Copy previous day to current day button
- F Arrows for selecting the setpoint to be set for the selected period (T1, T2, T3, OFF).
- G Period copy enable button
- H Setpoint temperature of the indicated period
- Period for which programming is taking place
- J Indicator of the period for which programming is taking place
- K Set temperature level

To program the chronothermostat, follow the instructions below:

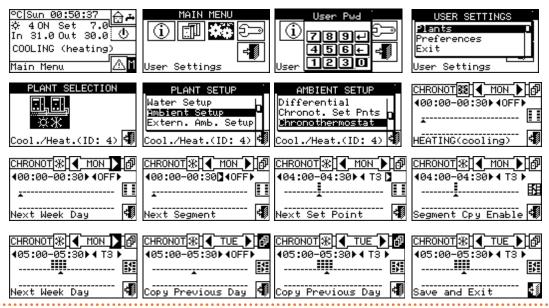
- 1. Select "Chronothermostat" from the menu.
- 2. Only for 2-pipe heating/cooling system: select button B to choose the operating mode for which the chronothermostat is to be programmed: \*\* for heating, \*\*

for cooling.

- 3. Select one of the arrows D as shown in Figure 3.49 p. 30 to choose the day of the week; inside the two arrows there will be an indication of the selected day ( MON ).
- 4. Select the period to be programmed using the

- **6.** Select another period with the A arrows and repeat the operation in the previous step.
- 7. If you want to set the same temperature level for a number of adjacent periods, enable the period copy function using the period copy button. The symbol means that the period copy button has been enabled. The use of this function allows you to speed up the chronothermostat programming operations: in fact, to copy the temperature level on the adjacent periods it is sufficient to use the arrows A. To disable the function, press the button.
- 8. When you have finished programming the 48 periods, select one of the MON arrows to change the day. If you want to program the 48 periods in the same way as the previous day use the copy previous day button
- **9.** When you have completed programming for all days of the week, exit by selecting .

Figure 3.50



#### 3.4.1.3 "Extern. Amb. Setup"

All parameters for the "ExtT" (outdoor temperature) operating mode are set in this menu.

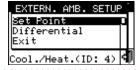
To access the "Extern. Amb. Setup" menu first you must configure the requests in "ExtT" or "WCmp" mode (Paragraph 4.4.2.7.10.2 *p. 64*).

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

- ► "Set Point"
- ► "Differential"

To access this menu, select "Extern. Amb. Setup" from the menu.

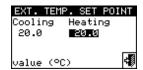
Figure 3.51



#### **3.4.1.3.1** "Set Point"

This function allows the user to define outdoor temperature values for cooling and/or heating operation in "ExtT" (external ambient temperature) mode.

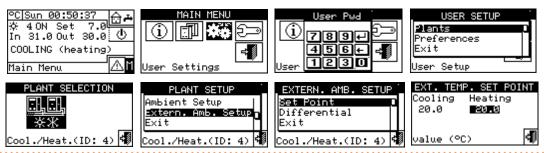
Figure 3.52



Instructions for setting the outdoor temperature follow:

- 1. Select "Set point" from the menu.
- 2. Place the cursor on the value to be changed ("Cooling" and/or "Heating").
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- **5.** Press the knob to confirm the set value.
- **6.** To exit, select

Figure 3.53

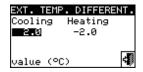


#### **3.4.1.3.2** "Differential"

This parameter must be set for the "ExtT" (outdoor temperature) operating mode.

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

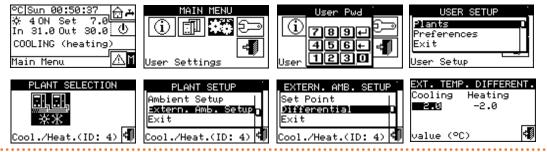
Figure 3.54



To set the outdoor air temperature differential value(s), proceed as described below.

- 1. Select "Differential" from the menu.
- Place the cursor on the value to be changed ("Cooling" and/or "Heating").
- **3.** Press the knob to allow changing the selected value.
- 4. Turn the knob to modify the differential value.
- **5.** Press the knob to confirm the set value.
- **6.** To exit, select .

Figure 3.55



#### 3.4.1.4 "Quiet Mode Setup"

This menu sets all the parameters for managing the quiet mode.

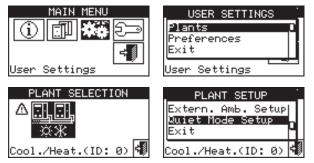
To access the "Quiet Mode Setup" menu, the function must be enabled at the installer level, in the system installation menu (Paragraph 4.4.2.5 *p. 55*).

This mode allows the sound level of the unit fans to be reduced at specific times.

The programmable settings in this operating condition

- "Options"
- "Timer"

**Figure 3.56** *Quiet mode settings* 



With regard to the quiet mode, there are three types of units:

- ► Fanless units (GAHP GS/WS, AY00-120, third party boilers) will always operate normally, as they do not produce ventilation noise.
- ➤ Quiet fan units (GAHP A with brushless fan) can be silenced or disabled (firmware S61 3.027 or higher required). If disabled they will always be switched off during quiet mode, otherwise they will operate in quiet mode.



➤ Standard fan units (GA ACF, third party chillers, GAHP-AR) can be enabled or disabled. If disabled they will always be switched off during quiet mode (typical case), otherwise they will operate normally during quiet mode.

From the "Options" menu of the quiet mode, it is possible to set the behaviour of units with fans during the time slots when the mode is active.

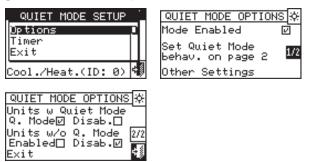
### 3.4.1.4.1 "Options"

In the "Options" menu, user-level quiet mode can be enabled.

If enabled, it is possible to access the second page (Figure 3.57 p. 33) in which it is possible to set the behaviour of the units with quiet mode (silenced fan) and those without quiet mode (standard fan) according to the rules set out in Paragraph 3.4.1.4 p. 32.

To exit, select 🗐.

Figure 3.57 Quiet mode options



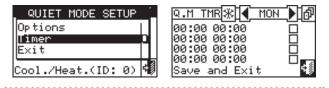
## 3.4.1.4.2 "Timer"

Up to 4 quiet operation time slots can be selected for each day of the week. Programming can be diversified for the seven days of the week and for cooling and heating services.

The setting of the quiet mode time slots follows the same rules as the "Group water timer" (Paragraph 3.4.1.1.1.4 p. 25).

To exit, select

Figure 3.58 Quiet mode time slots

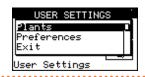


## 3.4.2 "Preferences"

From the "User Settings" menu, select "Preferences" to access the drop-down menu where the following parameters can be set:

- ► "Language"
- ▶ "Date and Time"
- ► "Temp. Measur. Unit" (temperature measurement unit)
- "Alarm Beeper"
- ▶ "Display Options"
- "User Passwd Setup" (user password setup)

Figure 3.59



To access the "Preferences" menu:

- 1. Select ☐ from the start screen to access the "Main Menu".
- 2. From the "Main Menu", select
- **3.** If requested, enter the user password on the numerical keypad that appears on the display.
- 4. Select "Preferences" from the menu.

## 3.4.2.1 "Language"

The following languages are available for the display: Italian, English, French, German and Spanish.
Select "Exit" to return to the list of preferences.

Figure 3.60



If the wrong language is set, wait a few minutes for the DDC to automatically return to the main screen and then proceed as follows:

- **1.** Select ☐ from the start screen to access the "Main Menu".
- 2. From the "Main Menu", select
- **3.** Place the cursor by turning the knob to the second menu item and then press the knob.
- **4.** A second menu will appear from which you can select the second item by pressing the knob.
- 5. Wait for the change to the language selected.
- 6. To exit, select

#### 3.4.2.2 "Date and Time"

Figure 3.61



On the screen you can view and change the current time and date.

To change the current time and date, follow the instructions below:

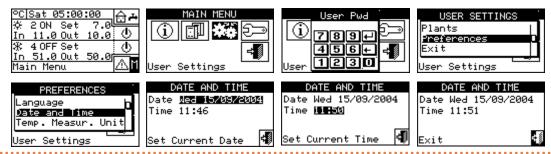
- 1. Select "Date and Time" from the menu.
- **2.** Turn the knob to place the cursor on the value to be changed.
- 3. Press the knob and the selected value will start to flash.
- **4.** Turn the knob to change the value and press the knob to confirm.
- 5. To exit, select



The clock is restarted once the 🗐 button has

been pressed and at least one of the two fields has been selected.

Figure 3.62

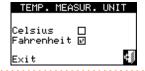


#### **3.4.2.3** "Temp. Measur. Unit"

The current temperature measurement unit is displayed on the screen. To change the measurement unit, place the cursor on and press the knob to confirm.

To exit, select

Figure 3.63



### 3.4.2.4 "Alarm Beeper"

The DDC is equipped with a beeper that is activated whenever an alarm occurs in the managed units. To deactivate the beeper select and press the knob to display .

To exit, select.

Figure 3.64



## 3.4.2.5 "Display Options"

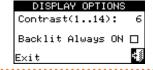
This option allows the contrast of the graphic display to be changed.

To adjust the contrast:

- 1. Place the cursor on the contrast value.
- 2. Press the knob and the number will start to flash.
- 3. Turn the knob to change the value.
- **4.** Press the knob to confirm the chosen contrast value.
- **5.** If "Backlit Always ON" is selected, the backlight will remain on, otherwise it will turn off after 15 minutes of inactivity of the selection knob.

To exit, select 🗐.

Figure 3.65

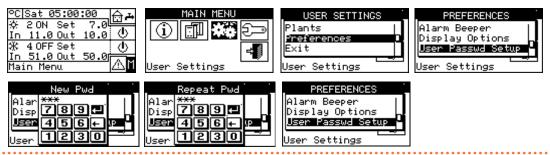


## 3.4.2.6 "User Passwd Setup"

This function allows the user password to be set/disabled. Follow the instructions below to set the user password:

- 1. Select "User Passwd Setup" from the menu.
- **2.** Enter the required password and select to confirm.
- 3. Repeat the new password and select to confirm

Figure 3.66



Once the password has been enabled, you will need to enter it every time you want to access the "User Settings" menu ...

Each time the password is entered, it will remain enabled

for 10 minutes after exiting the menu.

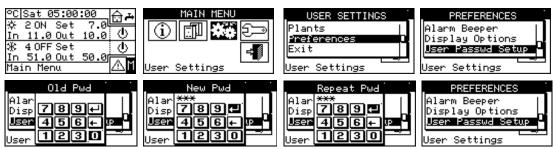
Below are instructions for changing or disabling the user password.

1. Select "User Passwd Setup" from the menu.



- 2. Only if a user password already exists, a numeric keypad will appear on the DDC screen, in which to enter the old password and then select to confirm.
- **3.** Enter the new password and select to confirm.
- **4.** Enter the new password again and select **4.** to confirm.

Figure 3.67





To disable the password, in steps 3 and 4 do not enter a new password but only select . If the user password is disabled, it will no longer be necessary to enter it to access the "User Settings" menu.

If an incorrect password is entered, press and the DDC will return to the previous menu.

## 4 INSTALLATION

## 4.1 CONNECTING THE DDC



Before proceeding with the installation of the electrical system, carefully read Paragraph III *p. 5* which provides important information on regulations and safety. An incorrect installation can cause damages to people, animals and property, for which the manufacturer cannot be held responsible.

#### 4.1.1 General information

The connection of the DDC requires:

- ► Power supply to the DDC.
- Connection of the DDC and all units via a CAN bus cable.
- ➤ Optional connections (Paragraph 4.1.2 *p. 37*): external request, outdoor/indoor probe, general alarm and Modbus protocol.



Before carrying out any operations to connect the DDC, disconnect the power supply from the units using the main switch provided by the electrical installer.

## 4.1.1.1 Power supply of the DDC

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

Use a 3x0,75 mm<sup>2</sup> electrical cable and make the connections on the terminals of the 4-pin connector at the bottom left (rear side) of the DDC, respecting the polarity as in the diagram below:

- ► terminal 1 = 24 V
- ► terminal 2 = 0 V
- ► terminal 3 = earth

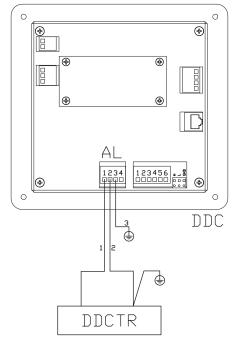
The maximum specified length for this cable is 1m.



In any case, terminal 3 of the DDC's 4-pin connector must be connected to a safety earth (RCO  $< 1 \Omega$ ).

The DDC is also equipped with a buffer battery which, in the event of a power failure, is able to maintain the set values in memory; the duration of the buffer battery is approximately 7 years, after which it must be replaced (contact Robur TAC).

Figure 4.1 Power supply of the DDC



AL = 24 V AC power supply - 4 pin connector

- 1 = 24 V AC
- 2 = 0 V AC
- 3 = earth

DDCTR = Safety transformer (240/24 V AC - 50/60 Hz - min 20 VA)

## 4.1.1.2 Connecting the DDC to the units

The DDC 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 4.2 p. 37 or Figure 4.3 p. 37.

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Figure 4.2 Example of DDC connection to several individual units

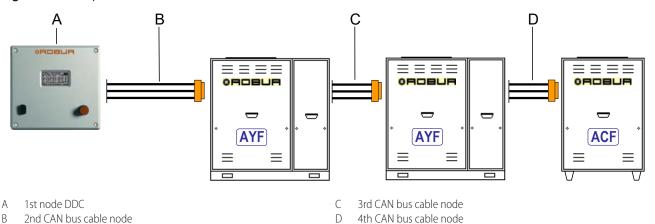
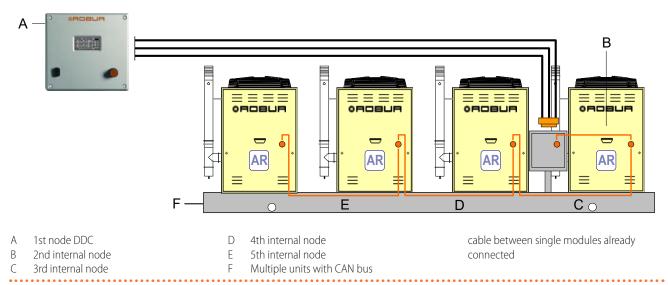


Figure 4.3 Example of DDC connection to a single peassembled unit



For a total cable length of up to 200 m and a communication network with up to 4 nodes (e.g. 1 DDC connected to 1 RTCF 180-00), a simple 3x0,75 mm<sup>2</sup> shielded cable can

be used; for all other cases, use the CAN bus cable available as OCVO008 optional or follow the specifications below.

**Table 4.1** CAN bus cables type

Cable name	Signals / Color			Maximum length	Note	
Robur					Ontional and OCVO000	
ROBUR NETBUS	H = BLACK	L = WHITE	GND = BROWN	450 m	Optional code OCVO008	
Honeywell SDS 1620						
BELDEN 3086A	LL DLACK	L = WHITE GND = BF	CND BDOWN	450		
TURCK type 530	H = BLACK		GND = RKOMN	450 m		
DeviceNet Mid Cable					In all cases the fourth conductor should	
TURCK type 5711	H = BLUE	L = WHITE	GND = BLACK	450 m	not be used	
Honeywell SDS 2022						
TURCK type 531	H = BLACK	L = WHITE	GND = BROWN	200 m		



The diagrams and procedures for connecting the DDC to the units or other Robur devices are provided in the specific manuals, supplied with the units themselves. Please refer to this specific documentation for the DDC connection operation.

#### 4.1.2 DDC connections

The following connection terminals are located on the rear of the DDC (Figure 4.4 p. 38):

- ➤ 2-pin connector for possible connection of an optional room air temperature probe (detail A, Figure 4.4 p. 38).
- ▶ 3-pin connector for alarm relay contacts (detail B,

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Figure 4.4 p. 38).

- ▶ 4-pin connector for 24 V AC power supply. The DDC is supplied by a transformer with a single 24 V AC, 50/60Hz secondary (detail C, Figure 4.4 p. 38).
- ► 6-pin connector for possible connection of external operating requests (detail D, Figure 4.4 *p. 38*).
- ➤ 3-pin CAN bus connector for connecting the DDC with the units (detail E, Figure 4.4 p. 38).

On the front of the DDC is the standard 9-pin male connector (RS232 serial port) for serial connection to a PC (Figure 2.1 *p. 9*).

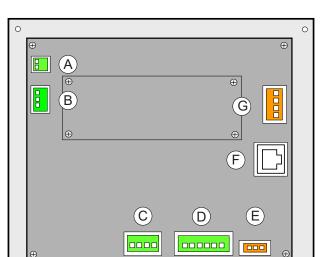


In particular applications, an external alarm signal

may be required for high chilled water temperature and/or low hot water temperature or for a general alarm to signal any unit faults. For this purpose, on the rear of the DDC there is a specific 3-pin terminal (detail B, Figure 4.4 *p. 38*) for activation, via relay, of an alarm signal such as a warning light, horn or other (Paragraphs 4.4.2.7.8 *p. 63* and 4.4.2.4 *p. 54*).

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

Figure 4.4 Back view of the DDC and detail of electrical connections



- Terminals for connection of indoor or outdoor air probe (NTC 10K) (Paragraph 4.5.3.1.4 *p. 80*)
- B Terminals for possible connection of external alarm systems
- terminal 1 COM
- terminal 2 NO
- terminal 3 NC
- Terminals for 24 V AC DDC power supply (respect connection polarity)
- terminal 1 24 V AC
- terminal 2 OV AC
- terminal 3 earth
- terminal 4 not used
- D 6-pin connector for possible external requests (Paragraph 4.5.3.1.2 *p. 77* or 4.5.3.1.3 *p. 78*)
  - terminal 1 R (24 V AC)
- terminal 2 W (heating)
- terminal 3 Y (cooling request)
- terminal 4 0 (0 V AC)
- terminal 5 NA (not connected)
- terminal 6 R (24 V AC)
- E CAN bus cable connection
- F RS232 port rear connection (RJ45 connector). Alternative connection to front connection, for the same RS232 port
- G RS485 port connection (Paragraph 4.4.1.11 p. 50)
- terminal 1 A (TXD/RXD+)
- terminal 2 B (TXD/RXD-)
- terminal 3 Common (connected to system ground and earth)
- terminal 4 Cable shielding (connected to system ground and earth)

#### 4.1.2.1 Mounting the DDC

The DDC, suitable for indoor installation, must be mounted to a panel by performing the following operations (Figure 4.5 *p. 38*):

- ► Make a rectangular opening 155 mm wide and 151 mm high.
- ▶ Place the DDC over the opening made and mark the 4 points of the holes to be drilled for mounting.
- ▶ Drill the four 4 mm holes.
- ➤ Secure the DDC to the panel opening using the screws and nuts (supplied).



The operating temperature of the DDC is 0 to 50 °C. In the case of operation with negative ambient temperatures, down to -10 °C the DDC continues to operate correctly but the LCD display may no longer be able to show data.

**Figure 4.5** Centre distance of holes for DDC mounting



## 4.2 DESCRIPTION OF AUXILIARY BOILER OPERATING MODE FOR HEATING SERVICE ON BASE SYSTEM PART

#### 4.2.1 Complement mode

This mode is used for systems in which the auxiliary boilers complement, but do not replace, the heat pumps in all the system operating range. This means that the heat pumps can also work at maximum thermal load, and therefore that the system always requires outlet and inlet water temperatures that are compatible with the maximum permitted temperatures of the heat pump. This means that the installed heat output (sum of the heat output of the heat pumps and the auxiliary boilers) is usually equal to the total heat output required by the system.

#### 4.2.2 Complement and replacement mode

This mode is instead used for systems in which, at a high thermal load, the temperatures required for the outlet and/or inlet water become incompatible with the maximum temperatures allowed by the heat pumps. In this type of system, therefore, starting from a given thermal load it is necessary to keep the heat pumps switched off and use only the auxiliary boilers; it is therefore necessary to install auxiliary boilers capable of supplying 100% of the maximum power required by the system (plant rated power). The system therefore assumes that the plant rated power is equal to the total power of the auxiliary boilers, and delivers this power according to one of the following scenarios:

- **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 plant rated power.
- **B.** At high thermal load, and in particular when the required temperatures become incompatible with those allowed 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 plant rated power.

The system switches from one scenario to another maximising the use of the heat pumps as far as allowed by the temperatures required by the system.



If needed, it is possible to explicitly declare the plant rated power value, using a special parameter; this is useful if the total power of the auxiliary boilers is higher than the plant rated power.



It is clear that this boiler operation mode requires the use of variable water setpoints based on outdoor temperature (climatic curve), otherwise the system will always work with water temperatures that are not compatible with heat pumps.

Please refer to Paragraphs 4.4.2.7.3 *p. 60* and 4.4.2.7.4 *p. 61* for a description of how to set these parameters.

### **4.2.2.1** Warning generation for premature replacement of the heat pumps

When using the complement and replacement mode, it is possible to specify a limit value for the outlet or inlet temperature; the outlet value is used if the control is carried out on the outlet and the inlet value otherwise.

If the change from scenario A to scenario B (Paragraph 4.2.2 p. 39) occurs when the temperature measured on the manifold on which the control is carried out is lower than the specified limit value, the warning W1027 arise and is stored in the alarms log. This makes it possible to highlight situations in which the deactivation of the heat pumps occurs with a manifold water temperature that is lower than the one defined during the design stage and that therefore leads to a lower use of the heat pumps; this warning only has an informative function, it does not affect the functionality of the system. In order to obtain correct diagnostics, it will be necessary to set a suitable limit value, based on the characteristics of the system.



These parameters can be found in the hot service control parameter screens of the base system part (Paragraph 4.3.1 *p. 40*).

## **4.2.2.2** Variant of the complement and replacement mode: complement and progressive replacement

Again when using the complement and replacement mode, it is possible to choose an advanced setting, which involves replacing heat pumps with auxiliary boilers in a progressive manner, rather than all at once. When the operating limit of the heat pumps is exceeded, corresponding to the change from scenario A to scenario B described above, the system tries to replace only one heat pump with auxiliary boilers (instead of replacing all of them as in the standard complement and replacement mode); it then resumes monitoring the temperatures; when the operating limit condition of the heat pumps is exceeded again, the system replaces another heat pump with auxiliary boilers. This process is repeated when necessary and can lead to the progressive replacement of all the heat pumps or their progressive reactivation.

The use of this advanced variant of the complement and replacement mode is subject to the following requirements:

- ► Hydraulic configuration of boilers in series with heat pumps (refer to the design manual).
- ► Installation of an additional temperature probe on the heat pump return manifold.



These two requirements imply the use of the RB200 device, capable of managing the temperature probes of the actual outlet and inlet manifolds of the series hydraulic configuration, and the additional probe on the return manifold of the heat pumps only.

➤ Correct setting of some additional parameters, related to an auxiliary controller that manages the progressive replacement and reactivation of heat pumps.



These parameters can be found in the hot service control parameter screens of the base system part (Paragraph 4.3.1 *p. 40*).

## **4.2.3** 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 inlet pipes of the auxiliary boilers are connected directly to the system inlet manifold, like those of the heat pumps; similarly, all the outlet pipes are connected to the system outlet manifold. In this case, to perform the regulation, the DDC can use:

- ► If the auxiliary boilers are AY boilers (Robur), the average of the temperatures detected by the unit probes, or dedicated manifold probes, managed via RB200.
- ► If the auxiliary boilers are third party, only dedicated manifold probes, managed via RB200.

In the series configuration, the inlet pipes of the auxiliary boilers are connected to the outlet manifold of the heat pumps and the outlet pipes to the system outlet manifold; only the inlet pipes of the heat pumps are connected to the system inlet manifold. This configuration is advantageous when the system, with a high thermal load, requires a higher outlet temperature than the maximum temperature that can be delivered by the heat pumps (60 or 65 °C depending on the model) and develops a higher thermal leap than that of the heat pumps. In this case, to carry out the adjustment, the DDC must always use dedicated manifold probes, managed via RB200, which can be positioned on the actual outlet and inlet manifolds of the system.



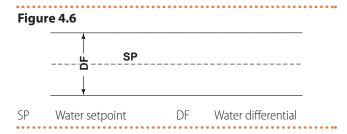
For more information see the design manual.

# 4.3 DESCRIPTION OF THE WATER TEMPERATURE CONTROL ALGORITHM AND RELATED PARAMETERS

#### **4.3.1** Heating service

#### **4.3.1.1** Objective of the regulation

The DDC regulates the water temperature with the objective of maintaining it within a band centred on the setpoint. The width of this band is defined by the "Wat. Differential" parameter (water differential, Figure 4.6 p. 40). The default value of the parameter is 2 °C (i.e.  $\pm 1$  K relative to the setpoint); for normal applications, this value is recommended.



To perform the regulation, the DDC manages the cascade switching on and off of the different available unit types, adapting the heat output to the system thermal load.

#### **4.3.1.2** Unit categories

Depending on their type, units are assigned to categories with different properties, so that the DDC can manage the various unit types with different logic and parameters.

Within a category, however, units have equivalent

characteristics.

In heating mode, the existing categories are:

- Category 1 The heat 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 boilers of the AY product line are automatically assigned to this category.
- ➤ Categories 4 to 7 Any third party boilers can be assigned to these categories by the installer. For setting instructions see Paragraph 4.4.1.8 *p.* 49.

#### 4.3.1.3 Unit power of a category

For each category, the power of the individual unit belonging to it is defined by a parameter.

For categories 1 and 3 (heat pumps and AY boilers) the value is preset and cannot be changed, and 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.

#### **4.3.1.4** Switch-on priority of a category

An ignition priority is associated with each category, expressed by a parameter with a value from 0 to 6, which determines the priority of use of the units belonging to this category; the higher the value the higher the priority. For category 1 (Robur heat pumps) the value, set automatically and not modifiable, is 6, corresponding to the highest priority. For category 3 (Robur AY boilers) the default value is 4 but can be changed in the range from 0 to 4. For categories 4-5-6-7 (third party boilers) the default setting is 3; again, this can be changed in the range from 0 to 4. Therefore, the system will always switch on the heat pumps first and will only use the boilers when the thermal load is higher than the installed power of the heat pumps; the installer can decide the relative switch-on priority of all categories used for boilers, whether Robur or third party. Please note that it is possible to assign the same switch-on priority to several categories used for boilers; the DDC will keep the operating time of boilers belonging to categories with the same priority balanced.



#### 4.3.1.5 Number of stages of a category

For each category, the number of stages used by the control system is defined; it is determined by a parameter, set in the range from 1 to 10.

With independent pumps normally the number of stages is equal to the number of units in each category. With a common pump and high setpoint values, set an appropriate number of stages, less than the number of units. It is always recommended to set the climatic curve.

If the number of units is not an exact multiple of the parameter value, the system will use the number of stages corresponding to the parameter value, but the stages will not be homogeneous, i.e. they will consist of different amounts of units. The DDC will keep the operating time of the units balanced by changing the assignment of the units to the various stages of the category every 24 hours.



When initially setting the values for the number of stages in each category, or if they are changed later, the setting of other parameters must also be changed; see Tables 4.2 p. 43 and 4.3 p. 43.

## **4.3.1.6** Locking time, release integral and reset integral of a category, description of the control algorithm

For each category, these three parameters are also defined, which affect the control algorithm used by the system to maintain the water temperature within the differential band.

The controller operates by switching on or off the units that make up the various stages of the various categories. When the controller is operating on the stages of a given category, it uses the values of the three parameters corresponding to that category; this allows the control to be optimised according to the characteristics of the specific category (number of stages, stage power and integral value, type of heat generator).

In the following, the control algorithm is illustrated by means of an example of time evolution of the water temperature; it is assumed that the system consists of two stages belonging to a single category and that the initial condition is with the units all switched off and the water temperature within the differential band. In the following description refer to Figure 4.7 p. 42.

- **A.** Zone 1 of the graph in Figure 4.7 p. 42: while the water temperature remains within the differential band centred around the setpoint, the controller keeps all units off.
- **B.** Step 2: when the water temperature falls outside the differential band, the controller switches on the units constituting the first stage of the highest priority category. Note: In the following, the switch-on of the units constituting a given stage will be referred to as stage switch-on for the sake of brevity.
- **C.** Zone 3: if the energy supplied by the first stage is such that the water temperature quickly rises and remains within the differential band, the controller does not act further 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 controller switches off the first stage 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 a quick rise in water temperature; after switching the first stage on again in point 6, the controller, after a delay equal to the value of the "Locking Time" parameter, starts to calculate the energy deficit, represented by the dashed area of zone 7; if the dashed area reaches the value of the "Release Integr" parameter, the controller will release the second stage and switch it on. In the case shown in zone 7, on the other hand, the water temperature rises within the differential band before the dashed area achieves this value, so the controller does not switch on the second stage, but keeps the first stage switched on, as the water temperature remains within the differential band.
- **F.** Point 8 and zone 9: similarly to the case described in D, the controller switches off the first stage in point 8 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 "Locking Time", the dashed area representing the energy deficit reaches the value of the "Release Integr" parameter, then the controller releases the second stage and switches it on (in point 11); it then keeps it on in zone 12, i.e. until the water temperature is below or within the differential band.
- H. Point 13 and zone 14: similarly to the case described in D for the first stage, if the energy supplied by the second stage causes the water temperature to rise beyond the differential band, the controller shuts down the second stage in point 13 and starts to calculate the excess energy, represented by the dashed area in zone 14; if the dashed area achieves the value set for the parameter "Reset Integral", the controller will lock the second stage and shut down the first stage. In the case shown in zone 14, however, the water temperature falls within the differential band before the dashed area achieves this value, so the controller does not lock the second stage and keeps the first stage on. The second stage is kept off throughout zone 14.
- **I.** Point 15 and zone 16: as the second stage has not been locked, it is switched on again immediately when the water temperature falls out of the differential band and is kept on in zone 16.
- J. Points 17 and 18 and zone 19: the situation is similar to that described in H: the controller switches off the second stage in point 17, but in this case, in the following point 18, the dashed area representing the excess energy achieves the value of the "Reset Integral" parameter; therefore in point 18 the controller locks the second stage and switches off the first and 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 happened previously in point 2.

The operation of the control algorithm can be summarised

by the following rules:

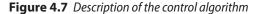
- ► At a given time, the controller works with some stages released and the remaining ones locked.
- ➤ The first stage of the category with highest priority is never locked.
- ► All locked stages are always switched off; all released stages, except the last one, are always switched on; the last released stage is switched on or off when the water temperature, respectively falling or rising, exits the differential band.
- ➤ A locked stage is released (and switched on) if the area representing the energy deficit, calculated since the expiry of the "Locking Time", achieves the "Release Integr" value (Figure 4.7 p. 42).
- A released stage is locked (and the previous stage is switched off) if the area representing the excess energy achieves the value "Reset Integral".

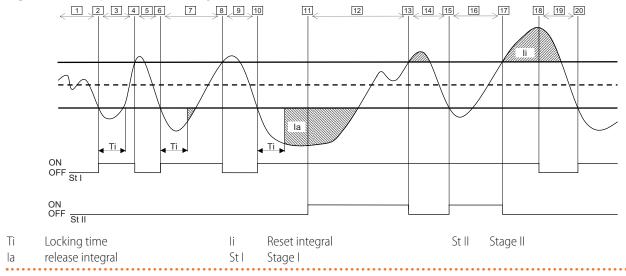


#### **Notes**

▶ The technique of releasing and locking the stages, based on the release and reset integrals, allows the generation power to be matched, adapting it to the system load. Under a given load condition, the system keeps some stages permanently off and all but one on; the remaining stage is switched on and off alternately to control the water temperature, keeping it within the differential band. This regulation adjusts the generation power even with small fluctuations in the load. On the other hand, following significant variations in the load, one or more further stages are locked or released in succession, until the generation power is

- almost matched with the load; at this point, the system returns to adjust by alternately switching a single stage on and off.
- ➤ The "Locking Time" makes it possible to take into account the fact that the units only start producing energy after some time from start-up; from the moment the controller has switched on a stage, the "Locking Time" makes it possible to wait for the effect of that stage to occur on the controller, before starting to calculate the energy deficit still present and potentially switching on a further stage. The values of this parameter are therefore linked to the characteristics of the various unit types.
- As already mentioned above, if several unit categories are present, as the thermal load increases, the system first switches on all available stages of the highest priority category and then, if needed, switches on the stages of the immediately lower priority category, and so on; as the thermal load decreases, the system switches off the stages in the reverse order. The controller uses from time to time the parameter values defined for the lowest priority category that has at least one stage switched on; for example, in the case of a system with two unit categories, the controller uses the values defined for the category with the highest priority until only the stages of this category are switched on; from the moment that at least one stage of the second category is switched on, it switches to use the parameter values of this category; it goes back to use the values of the first category when all stages of the second category are switched off again.





#### 4.3.1.7 Minimum switch-on time of a category

For each category, there is an additional parameter ("Min. Run Time"). This parameter defines the minimum runtime for each stage in the category and is intended to prevent units from being kept on for too short a time, which would have a negative impact on their performance. In practice, when a stage is switched on, it can only be switched off after the minimum runtime time has elapsed,

regardless of the rules of the control algorithm described in Paragraph 4.3.1.6 *p. 41*; for example, with reference to Figure 4.7 *p. 42*, if the time interval between points 2 and 4 were less than the minimum runtime, the first stage would not be switched off in point 4, but later, at the end of the minimum runtime time calculated from point 2. It is clear that the use of a value that is too high for this parameter may lead to a bad adjustment, since the respect of



the minimum runtime will cause frequent and consistent violations of the rules of the normal algorithm; on the

other hand, a value which is too low will allow short runtime of the units, to the detriment of the efficiency.

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

**Table 4.2** Default values for heating service control parameters (categories 1 and 3)

Default values				
Parameter	Value category 1	Value category 3	Recommended setting	
"Unit Power"	35 kW	35 kW	Not editable	
"Turn On Priority"	6	4	Not editable	
"Locking Time"	5 minutes	2 minutes	Use default values	
"Min. Run Time"	7 minutes	3 minutes	Use default values	
"Stages Number"	10	10	Use the maximum value allowed by the number of units	
"Release Integr"	6 °C * minutes	6 °C * minutes	Use the semi-automatic configuration (Paragraph 4.4.2.7.5 p. 61), which calculates	
"Reset Integral"	8 °C * minutes	8 °C * minutes	the value of these parameters based on the other data set for all categories; the calculation is performed when you exit the configuration screen	

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

**Table 4.3** *Default values for heating service control parameters (categories 4 to 7)* 

Default values			
Parameter	Value category 4 to 7	Recommended setting	
"Unit Power"	35 kW	Set the power value in kW of the single unit belonging to the category	
"Turn On Priority"	3	Set a value between 0 and 4	
"Locking Time"	2 minutes	Set a value appropriate to the type of unit used	
"Min. Run Time"	3 minutes	Set a value appropriate to the type of unit used	
"Stages Number"	10	Use the maximum value allowed by the number of units	
"Release Integr"	6 °C * minutes	Use the semi-automatic configuration (Paragraph 4.4.2.6.6 p. 57), which calculates the value of these	
"Reset Integral"	8°C * minutes	parameters based on the other data set for all categories; the calculation is performed when you exit the configuration screen	

## **4.3.1.10** Guidelines for calibrating parameters based on observation of system behaviour

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

If systems with very low or very high inertia values have to be controlled, the control parameters may have to be adjusted differently.

Some guidelines are given below:

- ➤ The first indicator of a well-controlled system is that at steady-state (with constant load) there is only one intermittent stage.
  - If, however, there are several intermittent stages under steady-state conditions, the integrals must be increased, both reset and release.
- ► If too much slowness is observed in response to load or setpoint changes:
  - Reduce integrals, both reset and release.
  - Reduce the number of stages, only after having acted with the previous option.
- ► If too frequent intermittence of a single stage is observed:
  - Maximise the number of stages.
  - Increase the differential (default = 2 °C) without exceeding in order not to deviate too much from the setpoint.
- ► If too much overshoot is observed (the temperature rises too high above the setpoint):
  - Reduce the reset integral.
- ► If too much undershoot is observed (temperature drops too far below setpoint):

#### ■ Reduce the release integral.

When a setpoint is required that is very close to the operating limits of the units, if the load is low the system will adjust poorly as the units will tend to continuously exceed operational limits.

To avoid this effect, which significantly worsens efficiency, the climatic curve must be activated or, alternatively, the setpoint must be reduced (in heating mode).

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

#### 4.3.1.11 Third party boiler water pump delay

For categories 4 to 7 only, which are assigned to third party boilers, this parameter, "Water Pump delay", may also be present. For a given category, the parameter is present when boilers of the type with a dedicated water pump controlled by the Robur system are assigned to it; its purpose is to establish the switch-off delay for this type of water pump. If several boilers of this type are assigned to a category, the switch-off delay will be the same for all the pumps of these boilers.

#### 4.3.1.12 Outlet and inlet limit temperature

For category 1 only, intended for heat pumps, these parameters "Out T Lim(wng)" and "In T Lim.(wng)" may also be present. In particular, the parameters will be present if the complement and replacement operating mode is used. For details on the meaning of these parameters, refer to Paragraph 4.2.2 *p. 39*.

## **4.3.1.13** Auxiliary controller parameters for complement and progressive replacement mode

For category 1 only, intended for heat pumps, these parameters "Limit Reg Setp", "Lim Reg Differ", "LimReg Rel Int" and "LimReg Res Int" may also be present. In particular, the parameters will be present if the complement and progressive replacement operating mode is used. For details on the meaning of these parameters, please refer to Paragraph 4.2.2.2 p. 39.

#### 4.3.1.14 Setting the parameters

For a description of parameter setting operations, please refer to Paragraph 4.4.2.7.5 *p. 61* on base system settings.

#### 4.3.2 DHW service

#### 4.3.2.1 DHW service on the base system part

With regard to the base DHW service, i.e. supplied at the same time as the heating service and on the same pipes, the control is identical to that described above for the heating service and uses the same parameter values but with a different setpoint value.

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

For the DHW service provided on the separable part of the system, the control algorithm is identical to that described for the heating system; however, in this case, dedicated parameter values are used to allow differentiation of the control; for the setting of these, refer to Paragraph 4.4.2.6.6 *p. 57* on the settings for the separable part of the system. The default parameter values are identical to those of the base system part.



In this case, both the parameters "Out T Lim(wng)" and "In T Lim.(wng)" (Paragraph 4.3.1.12 *p. 43*) and the auxiliary controller parameters for complement and progressive replacement mode (Paragraph 4.3.1.13 *p. 44*) are never present, as complement and replacement mode is not provided for the separable part of the system.

#### 4.3.3 Cooling service

#### 4.3.3.1 General description

The algorithm used to control the water temperature is identical to that of the heating mode, except for the reversal of the logic, whereby the stages are switched on when the temperature is higher than the target and switched off when it falls, so for a description of the algorithm please refer to Paragraph 4.3.1.6 *p. 41*.

Also in cooling there is the parameter "Wat. Differential", with default 2 °C and the same meaning as described for heating mode.

#### **4.3.3.2** Unit categories and default parameter values

The following categories are defined for the cooling service:

- ► Category 1
  - The cold modules of all current Robur heat pumps and chillers are automatically assigned to this category.
- ► Categories 2 and 3
  - These categories are reserved for future Robur products.
- ► Categories 4 to 7
  - Any third party chillers can be assigned by the installer to these categories. See Table 4.5 *p. 44* for setting instructions.

For category 1 (chillers and heat pumps) the value is preset and cannot be changed, and is 17 kW.

For each of the categories 4 to 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 to 7 it is 3.

For all categories the switch-on priority is freely settable in the complete range from 0 to 6; therefore any order of switch-on between Robur and third party units is possible. Note that it is possible to assign the same ignition priority to more than one category; as in heating mode, the DDC will keep balanced the operating time of units belonging to the same category as well as those belonging to categories of equal priority.

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

**Table 4.4** *Default values for cooling service control parameters (category 1)* 

Default values			
Parameter	Value category 1	Recommended setting	
"Unit Power"	17 kW	Not editable	
"Turn On Priority"	6	Set a value from 0 to 6	
"Locking Time"	7 minutes	Use default values	
"Min. Run Time"	10 minutes	Use default values	
"Stages Number"	10	Use the maximum value allowed by the number of units	
"Release Integr"	6 °C * minutes	Use the semi-automatic configuration (Paragraph 4.4.2.6.6 p. 57), which calculates the value of these	
"Reset Integral"	8 °C * minutes	parameters based on the other data set for all categories; the calculation is performed when you exit the configuration screen	

#### **4.3.3.4** Default values of the parameters and indications for a correct choice of their values (categories 4 to 7)

**Table 4.5** *Default values for cooling service control parameters (categories 4 to 7)* 

Default values			
Parameter	Value category 4 to 7	Recommended setting	
"Unit Power"	17 kW	Set the power value in kW of the single unit belonging to the category	
"Turn On Priority"	3	Set a value from 0 to 6	



"Locking Time"	7 minutes	Set a value appropriate to the type of unit used	
"Min. Run Time"	10 minutes	Set a value appropriate to the type of unit used	
"Stages Number"	10	Use the maximum value allowed by the number of units	
"Release Integr"	6 °C * minutes	Use the semi-automatic configuration (Paragraph 4.4.2.6.6 p. 57), which calculates the value of these	
"Reset Integral"	8 °C * minutes	parameters based on the other data set for all categories; the calculation is performed when you exit the configuration screen	

For qualitative guidelines for changing parameters based on observation of system control behaviour, refer to what was said for heating mode (Paragraph 4.3.1.10 *p. 43*).

#### 4.3.3.5 Third party chiller water pump delay

Similarly to the heating mode, for categories 4 to 7 only, which are assigned to third party chillers, this parameter, "Water Pump delay", may also be present. For a given category, the parameter is present when chillers of the type with a dedicated water pump controlled by the Robur system are assigned to it; its purpose is to establish the switch-off delay for this type of water pump. If several chillers of this type are assigned to a category, the switch-off delay will be the same for all the pumps of these chillers.



In this case, both the parameters "Out T Lim(wng)" and "In T Lim.(wng)" (Paragraph 4.3.1.12 *p. 43*) and the auxiliary controller parameters for complement and progressive replacement mode (Paragraph 4.3.1.13 *p. 44*) are never present, as complement and replacement mode is not provided for the cooling system.

#### **4.3.3.6** Setting the parameters

For a description of how to set these parameters, please refer to Paragraph 4.4.2.7.5 p. 61 on base system settings.

#### 4.4 "SYSTEM INSTALLATION" MENU

Only qualified personnel may access the menu. To access the menu select from the "Main Menu" as shown in Figure 4.8 *p. 45* then enter, if required, the installer password in the numeric keypad that will appear on the display.

The options available in this menu are shown below.

- ► "DDC"
- ► "Plants"

Figure 4.8



#### 4.4.1 "DDC"

Select "DDC" to access the menu.

Figure 4.9



#### 4.4.1.1 "ID Setup"

This option allows the DDC ID to be assigned in the case of multi-DDC systems. In the case of single-DDC systems, it is not necessary to assign the DDC ID as the default value ID=960 is assigned.

To set the ID, follow the instructions below.

- 1. Select "ID Setup" from the menu.
- 2. Place the cursor on the number to the right of the "ID Value:" text. Press the knob: the number starts flashing. Turn the knob to change the value and press the knob to confirm.
- 3. To exit, select
- **4.** Repeat steps 1 and 2 for each DDC connected to the CAN bus network and assign an ID value different from those assigned to the other DDCs.

Figure 4.10



#### 4.4.1.2 "Inst. Passwd Setup"

This option allows the installer password to be set/disabled.

Once the password has been enabled, you will need to enter it to access the "System Installation" menu ...



Each time the password is entered, it will remain enabled for 10 minutes after exiting the menu.

Follow the instructions below to set or change the installer password:

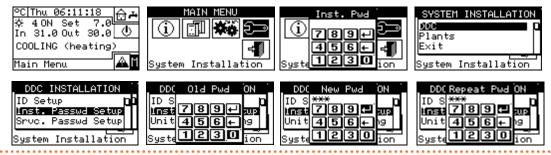
- 1. Select "Inst. Passwd Setup" from the menu.
- 2. If an installer password already exists, a numeric keypad will appear on the DDC screen where you can enter the old installer password and select to confirm
- 3. Enter the new password and select to confirm.

**4.** Enter the new password again and select **4.** to confirm.



To disable the installer password, in steps 3 and 4 do not enter the new password but only select

Figure 4.11



#### 4.4.1.3 "Units-DDC Binding"

Before doing this, make sure that all S61 electronic boards on the units have been configured by assigning a CAN bus network ID and by assigning them to a system.

Also check that each unit has been assigned to the correct group: base system part or separable system part.

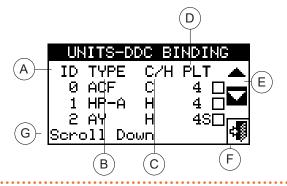
If there are one or more RB100 or RB200 devices, also

check that they have been configured. We advise to you consult the manuals of the RB100 or RB200 devices, depending on the type of device used.

Finally, ensure that all units and RB100 or RB200 devices, if any, are energized when the DDC is switched on.

Figure 4.12 *p. 46* shows an example of the "Units-DDC Binding" menu screen.

Figure 4.12 Example of "Units-DDC Binding" menu screen



- A CAN bus network ID of the unit
- B Type of Robur or third party unit, or type of plant part operated via RB100 or RB200 device(s) (Table 4.6 *p. 47*)
- C Function of the unit or system part; "C" chilled water production; "H" hot water production; "CH" alternating chilled/hot water production (not provided for third party units)
- D ID of the system on which the unit is installed. The letter "S" means that the group to which the unit or plant part belongs is the separable part of the plant.
- E Scroll arrows for displaying units
- F Screen exit button
- G Description of the function highlighted by the cursor

Table 4.6 p. 47 lists all types of units and system parts, with a brief explanation. For more information on the management of third party units (only with RB200) and system parts, we recommend that you consult the RB100 or RB200 device manuals, depending on the type of device used.

The system or systems that will be managed by the DDC are taken from the systems on which the units assigned to the DDC are configured.

For example, if units that are all on the same cooling system are assigned to the DDC, it will assume that it has to manage that cooling system.

If units on a cooling system and units on a heating system of different IDs are assigned to the DDC, the DDC will assume that it has to manage two independent cooling and heating systems.

If 2-pipe hot/cold units (GAHP-AR) and/or cold and hot units belonging to the same system are assigned to the

DDC (e.g. 1 GA ACF on a system with ID=0 and a GAHP A unit on the same system), the DDC will assume it has to manage a 2-pipe heating/cooling system.



A 2-pipe heating/cooling system is also provided in the following special case:

 GAHP GS/WS heating/cooling if both modules are assigned to the same system ID.

In Figure 4.12 *p. 46*, the existing units are shown, showing for each one: the unit ID, the unit type or the type of system part, the function (heating and/or cooling) and the system ID to which they are assigned (the letter "S" means that the group to which the unit belongs is the separable system. If there is no letter "S" next to the unit type, it means that the group to which the unit belongs is the base system).

For 4-pipe units (GAHP GS/WS heating/cooling) two consecutive lines are shown (both with the same unit ID) one



for the cooling module ("C"), the other for the heating module ("H"); each line shows the system ID to which the respective module is assigned.



For GAHP GS/WS units, the system forces the assignment of modules to the same DDC.

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

- 1. Select "Units-DDC Binding" from the menu.
- 2. Select "Yes" to perform a new configuration.



Each time a new configuration is performed, the previous configuration is deleted.

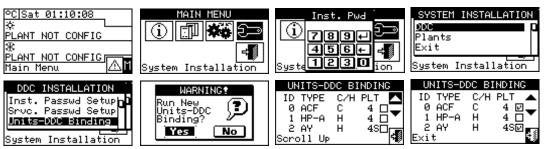
3. Place the cursor on ☐ then press the knob to assign the unit and/or part to the system. The ☑ symbol

- indicates that the unit/part has been assigned to the system.
- **4.** Select or to display other units or parts to be assigned to the system(s).
- **5.** Repeat steps 3 and 4 until all units/parts to be managed by this DDC have been selected.
- 6. To exit "Units-DDC Binding" select



If the system has at least one unit belonging to the separable group, it is necessary to complete the configuration by following the instructions given in Paragraph 4.4.2.6.1 *p. 55* and in Paragraph 4.4.2.7.11 *p. 72* (if there is at least one heating unit belonging to the base group). If this step is omitted, "CONFIG. INCOMPL." (incomplete configuration) will appear on the main display screen.

Figure 4.13



**Table 4.6** Unit and system part types

Unit type (label on the display)	Description				
"ACF"	All types of Robur absorption chillers ACF 60-00 series				
"ACFHR"	All types of Robur absorption chillers with heat recovery ACF 60-00 HR series				
"AY120"	35 kW Robur condensing boilers AY00-120 series				
"E <sup>3</sup> A"	All types of Robur modulating condensing air-water heating only absorption heat pumps GAHP A and E <sup>3</sup> -A series				
"E <sup>3</sup> xS"	All types of Robur modulating condensing ground-water and water-water heating/cooling absorption heat pumps (GAHP GS/WS and E³-GS, E³-WS series)				
"E³xSH"	All types of Robur modulating condensing ground-water and water-water heating only absorption heat pumps (GAHP GS/WS and E³-GS, E³-WS series)				
"HP-AR"	All types of GAHP-AR air-water reversible absorption heat pumps for heating and cooling Robur series				
"3rdPP"	Boiler or chiller manufactured by third party (managed by RB200 device(s))				
Type of system part (label on the display)	Description				
"DHWV"	Separation valve for the separable system part without limit switch contacts (managed by RB100/RB200)				
"DHWVF"	Separation valve for the separable system part with limit switch contacts (managed by RB100/RB200)				
"C/HV"	Cooling/heating commutation valve without limit switch (managed by RB100/RB200)				
"C/HVF"	Cooling/heating commutation valve with limit switch (managed by RB100/RB200)				
"C(H)Prbs"	Outlet and inlet temperature probes for cooling or 2-pipe cooling/heating system (managed by RB200)				
"HProbes"	Outlet and inlet temperature probes for heating system (managed by RB200)				
"SpltPrbs"	Outlet and inlet temperature probes for separable system part (managed by RB200)				
"HPInPrbe"	Return temperature probe for heat pumps (managed by RB200)				
"C(R)Pump"	Primary circuit water pump of cooling or 2-pipe cooling/heating system (managed by RB200)				
"HPump"	Primary circuit water pump for heating system (managed by RB200)				
"SpltPump"	Primary circuit water pump for separable system part (managed by RB200)				
"C(R)SPmp"	Secondary circuit water pump for cooling or 2-pipe cooling/heating system (managed by RB200)				
"HSecPump"	Secondary circuit water pump for heating system (managed by RB200)				

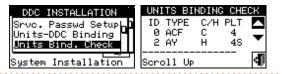
#### 4.4.1.4 "Units Bind. Check"

The menu allows the existing unit configuration to be checked:

To perform a configuration check:

- 1. Select "Units Bind. Check" from the menu.
- 2. Select or to display all units assigned to this DDC.
- 3. To exit, select

Figure 4.14



### **4.4.1.5** "Master DDC Setup" (only for multi-DDC systems)

This option is the third stage of the multi-DDC configuration (Paragraph 4.5.2.2 *p. 75*) and is required to define the role of each DDC (master or slave). For a system, only one DDC is configured as master while the others are configured as slaves.

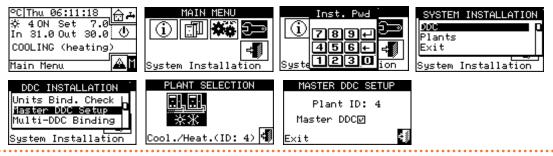
To set this option, follow the instructions below:

- 1. Select "Master DDC Setup" from the menu.
- 2. Select symbol for 2-pipe cooling/heating system; for hot water production system; for chilled water production system.
- 3. Place the cursor on and press the knob to define the DDC as master or as slave. The symbol means that the DDC has been defined as master while the symbol means that it has been defined as slave.
- 4. To exit, select
- **5.** If the DDC manages two systems, repeat steps 2 and 3 for the other system.
- 6. Repeat steps 1 to 3 for each existing DDC.



On a system, only one DDC must be defined as master. Units belonging to different groups (base group and separable group) cannot be configured on a slave DDC. It is not possible to configure third party units or system parts operated via the RB100 or RB200 device(s) on a slave DDC.

Figure 4.15



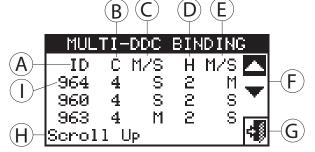
#### 4.4.1.6 "Multi-DDC Binding"

This is the fourth step in the configuration of multi-DDC systems (Paragraph 4.5.2.2 p. 75) and must be performed with all DDCs in the system energized. The DDCs exchange information on the units assigned to them to determine whether they should coordinate for the management of some units. This is the case when more than one DDC has been assigned units, or unit modules,

connected to the same system.

The displays of all DDCs begin to show information about themselves and other existing DDCs as shown in Figure 4.16 *p. 48.* The first line shows information about the DDC on which the data is being displayed. The next lines show information about other DDCs on the network. Figure 4.16 *p. 48* shows the parameters displayed during multi-DDC configuration.

**Figure 4.16** Example of "Multi-DDC Binding" menu screen



- A CAN bus network ID of the DDC
- B Chilled water system ID
- C DDC function for the system indicated in point B: "M" master; "S" slave
- D Hot water system ID
- E DDC function for the system indicated in point D: "M" master; "S" slave
- F Scrolling arrows for viewing the DDCs
- G Screen exit button
- H Description of the function highlighted by the cursor
- The first line indicates the data of the DDC on which the multi-DDC configuration is being performed

The following instructions must be carried out simultaneously on all DDCs in the system:

**1.** Select "Multi-DDC Binding" from the drop-down menu.



4 Installation

2. Select "Yes" to perform a new configuration.



Each time a new configuration is performed, the previous configuration is deleted.

- **3.** A screen will be displayed showing the data described in Figure 4.16 *p. 48* for the DDC on which the multi-DDC configuration is being performed.
- **4.** Repeat steps 1 to 3 on all other DDCs in the system.
- 5. Wait for the DDC to receive information from the other

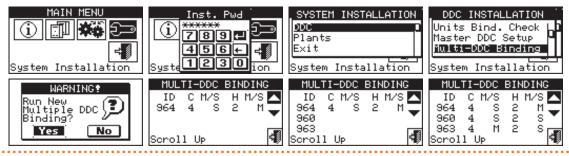
DDCs so that the data of all DDCs are displayed: DDC ID, managed system(s) ID, system type, whether master or slave for each managed system.



All DDC data will only appear on the screen when multi-DDC configuration is accessed on all.

- **6.** Carefully check that the information shown is complete and consistent with what is desired.
- 7. Exit by selecting on all DDCs.

Figure 4.17





The master DDC of a system on which GAHP GS/WS heating/cooling units are configured MUST be one of those which actually manages GAHP GS/WS heating/cooling units. (Warning: this rule must be respected by the person performing the configuration, it is not automatically guaranteed).



If the GAHP GS/WS heating/cooling units are configured as 4-pipe (i.e. the cold branch is configured on a system with a different ID from the system on which the hot branch is configured), the master DDC of the two systems MUST be the same. (This rule is anyway forced because if a DDC, on which GAHP GS/WS heating/cooling units are configured in 4-pipe mode, is set as master of one of the two systems, it is automatically set ALSO as master of the other system).



Each slave DDC cannot have units belonging to different groups; i.e. each slave DDC must only have units belonging to the separable group or only units belonging to the base group. It is only possible to have units belonging to both groups on the master DDC.



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

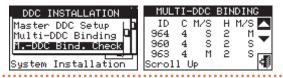
#### 4.4.1.7 "M.-DDC Bind. Check"

The menu allows you to control the existing multi-DDC configuration:

To perform a configuration check:

- 1. Select "M.-DDC Bind. Check" from the menu.
- 2. Select or to display all units assigned to this DDC.
- 3. To exit, select

Figure 4.18



#### 4.4.1.8 "3rd Party Pr Categ"

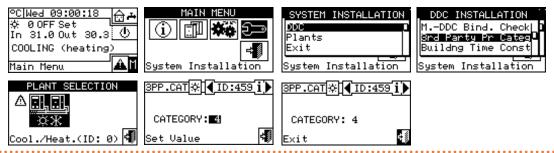
This menu allows setting the category to which third party units belong to.

- 1. Select "3rd Party Pr Categ" from the menu.
- 2. Select symbol \*\* for 2-pipe cooling/heating system; \*\* for hot water production system; \*\* for chilled water production system.
- 3. In the case of a 2-pipe cooling/heating system, choose the type of third party unit: for boilers, for chillers.
- **4.** Select the ID of a third party unit using the **4** and **b** buttons.
- 5. Set the category of the third party unit chosen in step 4 to the desired value: select the numeric value indicating the category, press the knob and turn it clockwise to increase the value, counterclockwise to decrease it.
- **6.** Press the knob to confirm.
- **7.** Repeat steps 4, 5 and 6 to set the category of other third party units of the same type.
- **8.** If needed, in the case of a 2-pipe cooling/heating system, again use the button with the or symbol to choose the other type of third party unit and repeat

steps 4, 5 and 6 to set the category of all third party units of that type.

9. To exit, select 🗐.

Figure 4.19



#### 4.4.1.9 "Buildng Time Const"

This function allows you to set the value of the time constant of the building; it is used as a parameter of a filter which is intended to dampen the variations of the outdoor temperature for the purpose of calculating the water temperature by means of a climatic curve.

The setting is necessary when using the climatic curve and/or outdoor temperature mode.

Due to the thermal capacity of the building, the change in thermal load does not occur instantaneously as the outdoor temperature changes, but progressively over a certain time interval. Therefore, the water temperature must also be changed progressively, ideally during the same time interval.

The value that can be set for the time constant has a range from 0 to 50 h with a default value of 20 h. It must be set according to the time constant of the building. It must be

set according to the time constant of the building; for example, it will assume low values in the case of a prefabricated wooden building and high values in the case of a traditional stone building.



If the value 0 is set, the filter is disabled, so the instantaneous value of the outdoor temperature is used for the calculation of the water temperature via the climatic curve, instead of the filtered one.

- 1. Select "Building Time Const" from the menu.
- To change the previously set data, press the knob and turn it clockwise to increase the value, counterclockwise to decrease it.
- 3. Press the knob to confirm.
- 4. To exit, select

Figure 4.20



#### 4.4.1.10 "ExtT. Filter Reset"

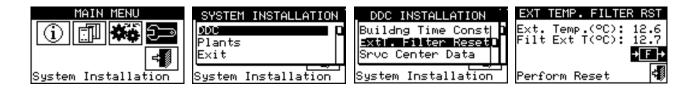
This function allows you to re-initialise the outdoor temperature filter; the value of the filtered outdoor temperature is set equal to that of the instantaneous outdoor temperature, then the filter is reactivated.



It is important to ALWAYS perform this operation during the DDC installation.

- 1. Select "ExtT. Filter Reset" from the menu.
- 2. Press F to reset the filter.
- 3. To exit, select

Figure 4.21



#### 4.4.1.11 "Commun Prot Select"

This function allows setting the communication protocol

that the DDC uses on the RS232 and RS485 serial connection ports.



With regard to the RS232 port, it is possible to choose "PC Term." if connecting with a PC equipped with terminal emulation software. With this it will be possible to give predefined commands with the keyboard and display the results on the terminal; choosing instead the Modbus RTU protocol (v1.0 or v2.0), it will be possible to connect to the DDC any Modbus master device properly configured to exchange data with the DDC (which always operates as Modbus slave), using this protocol (the difference between Modbus v1.0 and v2.0 is related to the mapping of the Modbus registers; normally the most recent version (v2.0) is used, however v1.0 is maintained for backward compatibility with older devices).

For the RS485 port, the option "PC Term." is not available, but the Modbus v1.0 and v2.0 options are available.



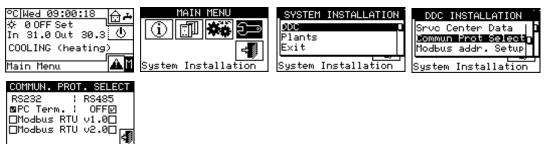
It is not possible to choose a Modbus option for both ports: if a Modbus option is chosen for the RS232 port, the OFF (no protocol) option is automatically forced for the RS485 port; however, if a Modbus option is chosen for the RS485 port, the "PC Term." option is forced for the RS232 port.



The document describing the mapping and meaning of the Modbus registers implemented on the DDC is available on-demand from Robur technical service.

- 1. Select "Commun Prot Select" from the menu.
- **2.** Select the desired item in the left column for the RS232 port, and in the right column for the RS485 port; for example:
  - Select the "PC Term." in the left column (RS232) if you want to communicate with a PC using a terminal emulator, e.g. to download the event logger. Also, select this item if you need to update the DDC software (TAC only).
  - Select a Modbus option (typically Modbus v2.0) in the left or right column if using a Modbus master connected to the RS232 or RS485 port of the DDC respectively.

Figure 4.22



#### 4.4.1.12 "Modbus addr. Setup"

This function allows the Modbus address to be set, i.e. the address used by the DDC to respond to requests from the Modbus master. Note that the DDC behaves as a Modbus slave. This has nothing to do with the concept of master and slave between several DDCs located on the same CAN network; the DDC can be either master or slave to all intents and purposes for controlling its own units on the system.

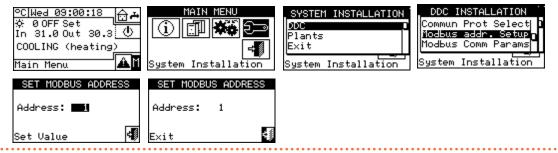
The default value is 1 and normally it is not necessary to

change it, except in the case of connections on RS485 bus instead of RS232. In the case of the RS485 bus, in fact, several DDCs can be connected on the same bus and different addresses must be set to address them. In the case of RS232, only one DDC can be connected to the Modbus master, therefore the default value can be left.

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

- 1. Select "Modbus addr. Setup" from the menu.
- 2. Select the desired address.

Figure 4.23



#### 4.4.1.13 "Modbus Comm Params"

This function allows the Modbus communication parameters to be set.

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

- ► 19.200 baud, 8 data bits, 1 stop bit, no parity (19200 8N1 default value).
- ► 19.200 baud, 8 data bits, 1 stop bit, even parity (19200 8E1).
- ► 19.200 baud, 8 data bits, 2 stop bits, no parity (19200 8N2) (not available on RS485).
- ► 9.600 baud, 8 data bits, 1 stop bit, no parity (9600 8N1).
- ▶ 9.600 baud, 8 data bits, 1 stop bit, even parity (9600

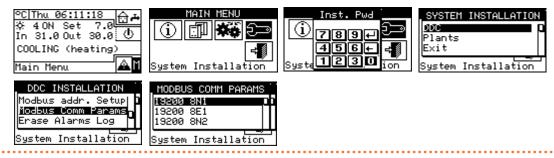
8E1).

▶ 9.600 baud, 8 data bits, 2 stop bits, no parity (9600 8N2) (not available on RS485).

Choose the desired combination, which must match the settings on the Modbus master device connected to the DDC.

- 1. Select "Modbus Comm Params" from the menu.
- 2. Select the desired communication parameters.

Figure 4.24



#### 4.4.1.14 "Factory Defaults"

This function allows the entire DDC to be reset to factory settings. All settable parameters will be reset to default values.

Follow the instructions below to perform the reset:

- 1. Select "Factory Defaults" from the menu.
- 2. Select "Yes" if you want to confirm the reset, "No" if you

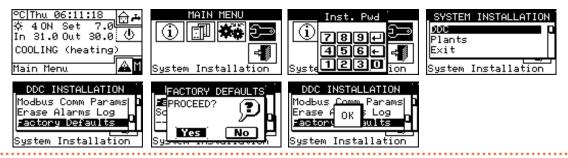
want to return to the menu.



The function also causes the loss of unit configuration, multi-DDC configuration and alarms log.

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

Figure 4.25



#### 4.4.2 "Plants"

The options available in this menu are:

- "BUS Access Setup"
- ► "Wat. Pump Op. Mode" (master DDC only)
- ► "Partial Oper. Mode" (only for master DDC of multi-DDC systems)
- ▶ "Alarms Outp. Setup"
- "Quiet Mode" (master DDC only)
- ► "Splitt. Plant Part"
- "Base Plant Part"

To access the menu:

- 1. Select "Plants" from the menu.
- 2. Select symbol for 2-pipe cooling/heating system; for hot water production system; for chilled water production system.

#### 4.4.2.1 "BUS Access Setup"

Enables access via Modbus to control the system and the possibility of changing the system's operating parameters.

Enabling the system control allows acting on the on/off, cooling/heating inversion and GAHP GS/WS heating/cooling priority change commands, with two different modes. Enabling the modification of operating parameters allows you to act on setpoint, differential and general water timer.

There are two control options:

- ► "BMS Plant Control" (Building Management System)
- ► "RM Plant Control" (remote management)

These options can be set separately for each system and exclude each other.

The parameter access function ("Plant Parameters") is unique and does not distinguish between BMS and RM.

#### 4.4.2.1.1 "BMS Plant Control"

By selecting "BMS Plant Control", it is possible to control via Modbus the on/off switching of the system, the heating/cooling inversion (in the case of a 2-pipe hot/cold system) and, in the case of GAHP GS/WS heating/cooling units in a 4-pipe configuration, the change of priority



for switching on these units, with the rules laid down for Building Management Systems (BMS).

The rules are as follows:

➤ A new on/off switch is added in series with the existing ones. The status of this switch can only be changed via the BMS. The system is only switched on if all switches are on (closed) (Figure 4.51 p. 67).



Do not enable BMS control if the on/off switching is not actually managed via Modbus; the status of the additional switch is initially off, so if the switch is not managed, the system cannot be switched on.

► With regard to the heating/cooling inversion, enabling BMS control allows it to be controlled via Modbus, instead of using the ★★ button on the "Plant control" screen. This button is therefore disabled and looks like (cooling operation) or ★★ (heating operation) depending on the commands given via Modbus.



However, the YWAuto request configuration has priority over BMS control so, if both are enabled,

the system handles heating/cooling inversion using the RW and RY contacts and ignores requests from the BMS. Again, the \*\* button is disabled and looks like \*\* (cooling operation) or \*\* (heating operation) depending on the commands given via the contacts.

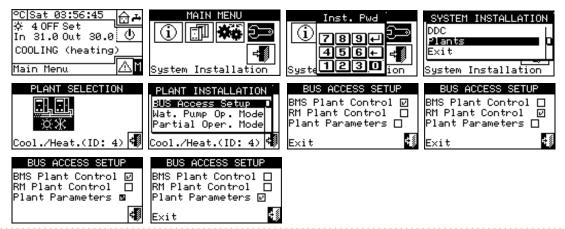
See Paragraph 4.4.2.7.10.2 *p. 64* for more information on configuring requests.

► With regards to changing the heating or cooling operating priority of the GAHP GS/WS heating/cooling units, this can be carried out either via DDC (Paragraph 2.4 p. 11) or via BMS; in the latter case the www button will look like corresponding to the choice made by BMS (www cooling operating priority).



If cooling operation priority is set, the GAHP GS/WS heating/cooling units can be switched on by the cooling system controller, but not by the heating system controller; vice versa if heating operation priority is set.

Figure 4.26



#### 4.4.2.1.2"RM Plant Control"

By selecting "RM Plant Control", it is possible to perform the same operations as those available for the previous option, but with the rules envisaged for remote management (RM) systems, which basically consist of remoting commands that are already present on the DDC, managing them equally.

In this case, all system control operations can be carried out either via DDC or RM.

Switching the system on/off, heating/cooling inversion and setting the operating priority of the GAHP GS/WS heating/cooling units can therefore be carried out via DDC (Paragraph 2.4 *p. 11* ) or via Modbus; when a command is performed via Modbus, the corresponding button will look like corresponding to the setting made via Modbus.



However, the YWAuto request configuration has priority over RM control so, if both are enabled, the system handles heating/cooling inversion using

the RW and RY contacts and ignores requests from the RM system. In this case, therefore, the button is disabled and looks like (cooling operation) or (heating operation) according to the commands given via the contacts. By enabling the RM control, if the request configuration inhibits the global on/off switch, this control will be made read-only on the DDC but will be changeable by remote management, thus acting on the system request.

See Paragraph 4.4.2.7.10.2 *p. 64* for more information on configuring requests.

#### 4.4.2.1.3 "Plant Parameters"

By selecting "Plant Parameters" it is possible to set via Modbus the setpoint, differential, general water timer, via BMS or via RM.

#### 4.4.2.2 "Wat. Pump Op. Mode" (master DDC only)

This function allows you to define the management mode of the water pump(s) installed on the system(s). Two operating modes are available:

- ➤ Common water pump: in this case a single water pump is installed for the system; the water flow circulating in the system 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 installed units. In this case, the water flow circulating in the system is a function of the number of units that are on (each water pump is on when the corresponding unit is on).

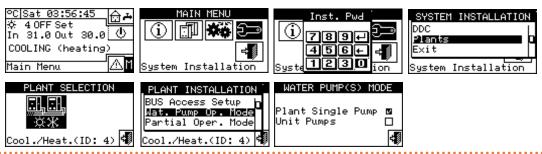
To set the "Wat. Pump Op. Mode":

- 1. Select "Wat. Pump Op. Mode" from the menu.
- 2. Place the cursor on according to the option you want to set ("Plant Single Pump" or "Unit Pumps") and press the knob to make the selection. The symbol means that the option has been enabled.
- 3. To exit, select



Repeat steps 1 to 3 for the second system if the DDC is the master of two systems. In this case, the two systems may have different settings.

Figure 4.27



### **4.4.2.3** "Partial Oper. Mode" (only for master DDC of multi-DDC systems)

This function allows choosing how the units are to be controlled when one or more slave DDCs are switched off. Two choices are possible:

- ► Disable operation of the whole system if one or more slave DDCs are switched off (disabled option).
- ➤ Allow operation of the controllable part of the system if one or more slave DDCs are switched off (option enabled).



If the master DDC is switched off, the whole system is switched off.

To set "Partial Oper. Mode":

- 1. Select "Partial Oper. Mode" from the menu.
- 2. Place the cursor on  $\square$  and press the knob to make the selection. The  $\square$  symbol means that the option has been enabled (the subsystem will operate even if the slave DDCs are switched off).
- 3. To exit, select .



Repeat steps 1 to 3 for the second system if the DDC is the master of two systems. In this case, the two systems may have different settings.

Figure 4.28



#### 4.4.2.4 "Alarms Outp. Setup"

The DDC has a voltage-free contact on the back for sending an output signal in case some units have faults (detail B, Figure 4.4 p. 38). The DDC allows one of the following options to be set:

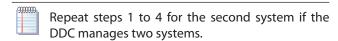
- ► "Disabled": disables signal output in the event of an alarm.
- ► "All Alarms": enables signal output for any type of alarm.
- ► "Water Temp. Alarm": enables the signal output only in the event of a temperature alarm (master DDC only).

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

1. Select "Alarms Outp. Setup" from the menu.

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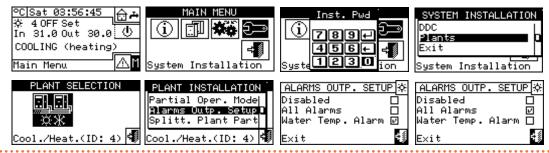
- 2. Place the cursor on  $\square$  next to the option you wish to set ("Disabled", "All Alarms", "Water Temp. Alarm").
- **3.** Press the knob to enable the option. The **!!** symbol means that the option has been enabled.
- 4. To exit, select





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

Figure 4.29



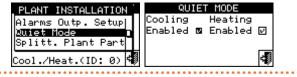
#### 4.4.2.5 "Quiet Mode" (master DDC only)

This menu can be used to enable or disable quiet mode at the installer level, separately for cooling and heating (Figure 4.30 *p. 55*).

Once active at this level, it will be possible to activate it or not at the user level, then defining the time slots in which it must be active.

For further information see Paragraph 3.4.1.4 p. 32.

Figure 4.30 Setting "Quiet Mode" - "Plant Installation" menu



#### 4.4.2.6 "Splitt. Plant Part"

This menu can be used to set the operating parameters of the separable system.

The options available in this menu are:

- ▶ "Heating/DHW Select"
- "Max Water Setpoint"
- ▶ "Wat. Differential"
- ► "Initial power %"
- ► "Plant Rated Power"
- "Regul. Parameters"
- ► "RBox W. Pump delay"
- "Commut Phase Timng""Splitting Vlv Prms"

To access the menu, select "Splitt. Plant Part" from the menu.



Access to the separable system settings is only possible for 2-pipe cooling/heating systems and hot water systems.

#### 4.4.2.6.1 "Heating/DHW Select"

With this setting, it is possible to choose whether the units configured on the separable part of the system are used only for DHW production or whether they are used for the (non-simultaneous) production of hot water for the heating and DHW system. This last function allows the units belonging to this part of the system (separable part) to complement the production of hot water for heating if there is no demand for DHW, or to dedicate themselves to DHW production if there is a demand for this service. DHW production has priority over heating demand.

- 1. Select "Heating/DHW Select" from the menu.
- Place the cursor on next to the option you wish to set: "Heating and DHW (Alternate Service)" or "DHW Only".
- **3.** Press the knob to enable the option. The **!** symbol means that the option has been enabled.
- 4. To exit, select

#### 4.4.2.6.2"Max Water Setpoint"

This function allows you to define the (outlet) setpoint temperature limit of the separable system for DHW production. The setpoint temperature will be subsequently set within the "User Settings" menu if the option "Digital with DDC setpoint" is set on the RB100 or RB200 interface, or acquired from RB100 or RB200. In detail, it is possible to define the maximum water temperature for DHW production within the range 5÷95 °C. For example, if for a DHW production system the setpoint limit setting is 60 °C, the user can choose a setpoint value between 5 °C and 60 °C. To change the setpoint limit:

- 1. Select "Max Water Setpoint" from the menu.
- 2. Place the cursor on the temperature value to be modified
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- **5.** Press the knob to confirm the set value.
- **6.** To exit, select

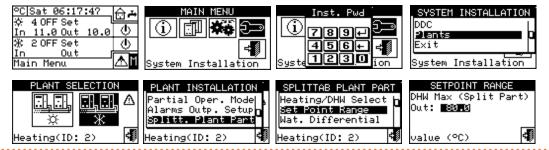
Installation



If the DDC manages a 4-pipe heating/cooling

system, repeat for the second system.

Figure 4.31



#### 4.4.2.6.3 "Wat. Differential"

The screen shows the setpoint temperature differential of the separable system for DHW production.

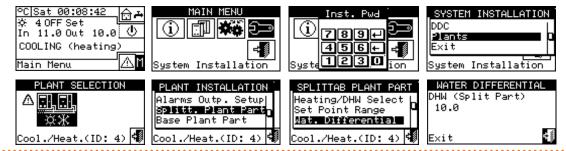
Figure 4.32



To set the differential value:

- 1. Select "Wat. Differential" from the menu.
- Place the cursor on the differential value to be modified.
- 3. Press the knob to allow changing the selected value.
- 4. Turn the knob to change the temperature value.
- **5.** Press the knob to confirm the set value.
- **6.** To exit, select .

Figure 4.33



#### **4.4.2.6.4**"Initial power %"

The initial power is expressed as a percentage of the system's rated power and represents the power that is delivered at the moment the system is switched on.

Based on the set value, the system determines the number of units to be switched on at start-up, approximating the nearest kW value.

This function solves the problems whereby starting the service at 50% power (default value) in low load cases can cause an excessive increase in water temperature, exceeding operational limit on the units.



By setting the value 0, the units will not switch on immediately, even in the presence of the request, but the controller will wait until the system water temperature is lower than the setpoint differential before switching on the first stage.

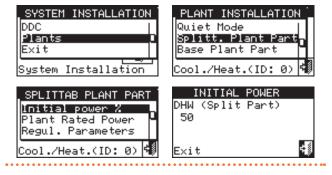


If the system has been switched off for less than 20 minutes, the same number of units will be switched on at start-up as were switched on before switching off, regardless of the 'Initial power %' parameter.

To set the initial power, proceed as follows:

- 1. Select "Initial power %" from the menu.
- **2.** Set the percentage power value from 0 to 100%.
- 3. To exit, select

Figure 4.34 Separable plant initial power



#### **4.4.2.6.5** "Plant Rated Power"

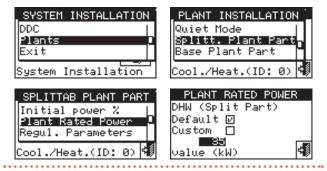
The rated power of the system is the maximum power that can be delivered by the system.

This setting allows managing systems in which the installed power is greater than that actually required (e.g. because heat pumps have been installed in addition to an existing system with boilers, without decommissioning them), without being forced to switch on the entire available power.

To set the rated power of the system:

- 1. Select "Plant Rated Power" from the menu.
- **2.** Place the cursor on  $\square$  next to the option you wish to set: "Default" or "Custom".
- **3.** Press the knob to enable the option. The wissymbol means that the option has been enabled.
- **4.** By choosing the "Default" option, the system will use as rated power all the power installed on the separable system.
- **5.** By choosing the "Custom" option, the power value (expressed in kW) can be adjusted. The set value is always approximated (by excess) to the highest whole number of units.
- **6.** To exit, select

Figure 4.35 Separable plant rated power

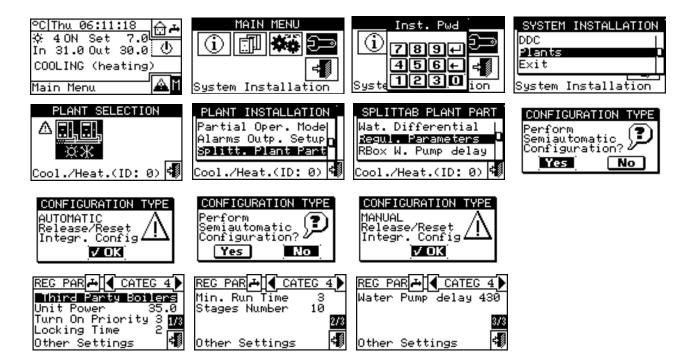


#### 4.4.2.6.6 "Regul. Parameters"

To set the control parameters:

- 1. Select "Regul. Parameters" from the menu.
- **2.** The display shows "Perform Semiautomatic Configuration?".
- **3.** If "Yes" is selected (normally recommended), the display shows "AUTOMATIC Release/Reset Integr. Config" and the DDC will automatically calculate the most suitable values for the two parameters "Release Integr" and "Reset Integral" for all unit categories, based on the number of stages and the power of the units. The calculation and setting of the values take place when you exit the screen.
- 4. If "No" is selected, "MANUAL Release/Reset Integr. Config" appears on the display. Use this option for setting these two parameters manually, or to review the values set automatically by the DDC at the end of previous screen access.
- 5. Choose the unit category for which you wish to set the control parameters using the d and b buttons. Only the categories to which the units actually existing on the installation belong are proposed.
- **6.** Choose the page on which the first value to be edited is located, using the buttons 1/2, 2/2 or 1/3, 2/3, 3/3 (the number on the left on the button indicates the current page, the one on the right the total number of pages available).
- **7.** To change the set values, place the cursor on the value to be changed.
- 8. Press the knob to allow changing the selected value.
- **9.** Turn the knob until the desired value is shown.
- 10. Press the knob to confirm the set value.
- **11.**If required, repeat steps 6 to 10 to complete the parameter settings for the selected category; then, if necessary, move on to set parameters for other categories by performing steps 5 and 6 to 10 again.
- 12.To exit, select ...

Figure 4.36

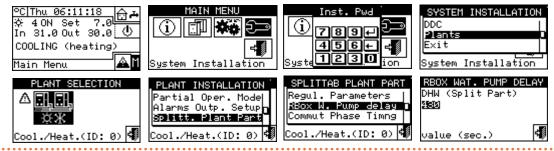


#### 4.4.2.6.7 "RBox W. Pump delay"

This parameter allows setting the switch-off delay on the common primary water pump on the separable system part, if managed by RB200; if this water pump is not configured, access to the parameter settings screen is denied. To set the parameter:

- 1. Select "RBox W. Pump delay" from the menu.
- 2. To change the set values, place the cursor on the value to be changed.
- **3.** Press the knob to allow changing the selected value.
- 4. Turn the knob until the desired value is shown.
- **5.** Press the knob to confirm the set value.

Figure 4.37





Be careful not to confuse this parameter with the "Water Pump delay" parameters that may be present in the setting panels of the various unit categories (Paragraph 4.3.1.11 *p. 43* and Paragraph 4.3.3.5 *p. 45*): in fact, these parameters allow setting the switch-off delays of the dedicated pumps of third party units, if present and controlled by the Robur system.

#### **4.4.2.6.8**"Commut Phase Timng"

This option allows setting the values relating to the times to be respected during the switching phase of the 3-way diverter valves that separate the separable system from the base system. In detail, it is necessary to set:

- ➤ "Units OFF Time:" shows the time during which the units are switched off while the valves are switching (used both during the separation phase and during the inclusion phase in the base system).
- ➤ "Split Plt Added To Avg Addit. Delay: (Joining Phase)" shows how much time must elapse after the inclusion phase of the units of the separable group in the base system, in order to consider the outlet and inlet temperatures of the units just included in the total average of the system.

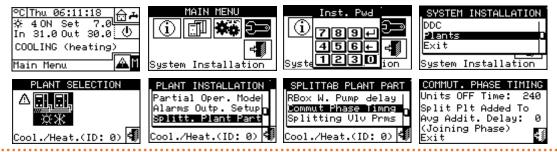
To set these values:

- 1. Select "Commut Phase Timng" from the menu.
- **2.** Place the cursor on the value to be edited; the value is expressed in seconds.



- 3. "Units OFF Time:" can be set from 0 to 600 seconds.
- **4.** "Split Plt Added To Avg Addit. Delay: (Joining Phase)" can be set from 0 to 300 seconds.
- 5. Press the knob to allow changing the selected value.
- **6.** Turn the knob to change the value.
- **7.** Press the knob to confirm the set value.
- 8. To exit, select

Figure 4.38



#### 4.4.2.6.9 "Splitting Vlv Prms"

This parameter only needs to be set if 3-way diverter valves are used for separating the units of the separable group with limit switch contacts.

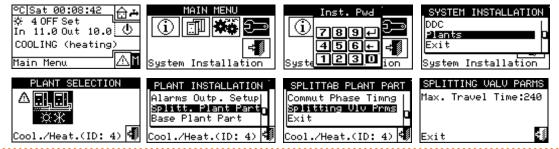
This parameter shows the maximum time it can take for 3-way valves to switch from one position to another. If after this time the valve has not reached the limit switch position, an error is raised. In the case of valves without such contacts, after this time the DDC assumes that the

switching phase has been completed.

To set the value:

- 1. Select "Splitting Vlv Prms" from the menu.
- **2.** Place the cursor on the value to be edited; the value is expressed in seconds (from 0 to 600 s).
- **3.** Press the knob to allow changing the selected value.
- 4. Turn the knob to change the value.
- 5. Press the knob to confirm the set value.
- **6.** To exit, select

Figure 4.39



#### 4.4.2.7 "Base Plant Part"

This menu can be used to set the operating parameters of the base system.

The options available in this menu are:

- "Wat. Differential"
- ▶ "Initial power %"
- "Aux Boilers Funct."
- "Plant Rated Power"
- "Regul. Parameters"
- "RBox W. Pump delay"
- ► "Units Util. Preced" (only for master DDC of systems with GAHP GS/WS heating/cooling)
- ▶ "Temp. Alarm Setup" (master DDC only)
- "Cool/Heat Vlv Prms"
- ▶ "Cool/Heat Srv Conf"
- "Heating/DHW Select"
- "Base DHW Serv Conf"

To access the menu:

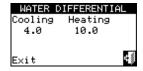
- 1. Select "Base Plant Part" from the menu.
- 2. Select symbol \*\* for 2-pipe cooling/heating

system; for hot water production system; for chilled water production system.

#### 4.4.2.7.1 "Wat. Differential"

The screen shows the setpoint temperature differential. Figure 4.40  $p.\,59$  shows the value for a chilled water production system.

Figure 4.40



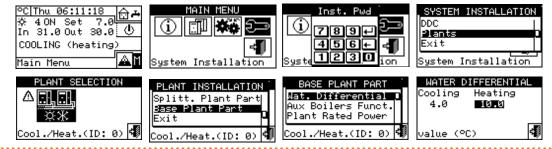
To set the differential value:

- 1. Select "Wat. Differential" from the menu.
- 2. Place the cursor on the value of the differential to be changed: for cooling only systems only the value of the cooling differential ("Cooling") will be shown; for heating only systems only the value of the

heating differential ("Heating") will be shown, for 2-pipe heating/cooling systems both will be shown.

- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- 5. Press the knob to confirm the set value.
- 6. To exit, select

Figure 4.41



#### **4.4.2.7.2**"Initial power %"

The initial power is expressed as a percentage of the system's rated power and represents the power that is delivered at the moment the system is switched on.

Based on the set value, the system determines the number of units to be switched on at start-up, approximating the nearest kW value.

This function solves the problems whereby starting the service at 50% power (default value) in low load cases can cause an excessive increase in water temperature, exceeding operational limit on the units.



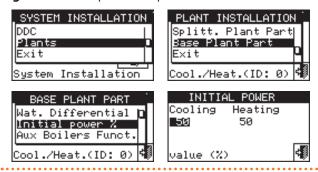
By setting the value 0, the units will not switch on immediately, even in the presence of the request, but the controller will wait until the system water temperature is lower (heating) or higher (cooling) than the setpoint differential before switching on the first stage.



If the system has been switched off for less than 20 minutes, the same number of units will be switched on at start-up as were switched on before switching off, regardless of the 'Initial power %' parameter.

- 1. Select "Initial power %" from the menu.
- 2. Set the percentage power value from 0 to 100%.
- 3. To exit, select

Figure 4.42 Base plant initial power



#### 4.4.2.7.3 "Aux Boilers Funct."

To set the operating mode of the auxiliary boilers (only in heating or 2-pipe cooling/heating systems) proceed as described below; for more information on this topic see Paragraph 4.2 *p. 39* and the design manual.

- 1. Select "Aux Boilers Funct." from the menu.
- 2. Place the cursor on ☐ next to the option you wish to set: "Complement" or "Complem & Substit".
- **3.** Press the knob to enable the option. The results symbol means that the option has been enabled.
- **4.** When the "Complem & Substit" function is activated, the symbol is shown on the display, selecting it and pressing the knob gives the possibility to activate the "Progressive Subst." function.
- **5.** To exit, select



Choosing the "Progressive Subst." option also requires:

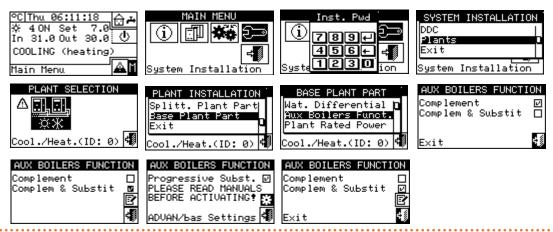
- Hydraulic configuration in series between GAHP and boilers.
- The presence of an additional temperature probe on the inlet manifold of the heat pumps.
- The setting of additional control parameters (Paragraph 4.4.2.7.5 *p. 61*).



Please refer to the design manual and Robur technical service for further clarification on this operating mode.

4

Figure 4.43



#### 4.4.2.7.4"Plant Rated Power"

The rated power of the system is the maximum power that can be delivered by the system.

The rated power of the system can be set for all system types (cooling, heating and separable).

This setting allows managing systems in which the installed power is greater than that actually required (e.g. because heat pumps have been installed in addition to an existing system with boilers, without decommissioning them), without being forced to switch on the entire available power.

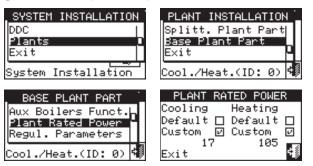
To set the rated power of the system:

- 1. Select "Plant Rated Power" from the menu.
- 2. Place the cursor on  $\square$  next to the option you wish to set: Default or Custom .
- **3.** Press the knob to enable the option. The w symbol means that the option has been enabled.
- **4.** By choosing the "Custom" option, the power value (expressed in kW) can be set. The set value is always approximated (by excess) to the highest whole number of units.
- 5. To exit, select



The default option is "Default", which assigns to the rated power of the system the sum of the powers of all the auxiliary boilers that may be present. This value is normally the correct one when the auxiliary boilers operate in complement and replacement mode, as in this case, the boilers must supply 100% of the power required under high thermal load conditions.

Figure 4.44 Base plant rated power



#### 4.4.2.7.5 "Regul. Parameters"

To set the control parameters:

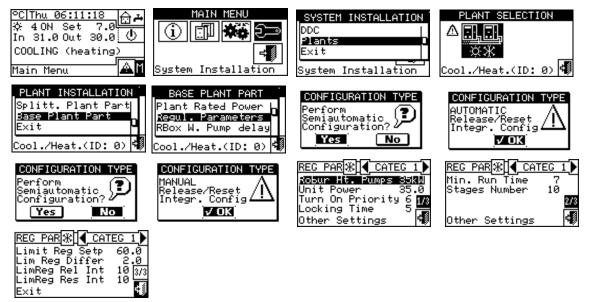
- 1. Select "Regul. Parameters" from the menu.
- **2.** The display shows "Perform Semiautomatic Configuration?".
- **3.** If "Yes" is selected (normally recommended), the display shows "AUTOMATIC Release/Reset Integr. Config" and the DDC will automatically calculate the most suitable values for the two parameters "Release Integr" and "Reset Integral" for all unit categories, based on the number of stages and the power of the units. The calculation and setting of the values take place when you exit the screen.
- 4. If "No" is selected, "MANUAL Release/Reset Integr. Config" appears on the display. Use this option for setting these two parameters manually, or to review the values set automatically by the DDC at the end of previous screen access.
- 5. Choose the unit category for which you wish to set the control parameters using the d and b buttons. Only the categories to which the units actually existing on the installation belong are proposed.
- **6.** Choose the page on which the first value to be edited is located, using the buttons 1/2, 2/2 or 1/3, 2/3, 3/3 (the number on the left on the button indicates the current page, the one on the right the total number of pages available).
- **7.** To change the set values, place the cursor on the value to be changed.
- **8.** Press the knob to allow changing the selected value.

- 9. Turn the knob until the desired value is shown.
- 10. Press the knob to confirm the set value.
- **11.**If required, repeat steps 6 to 10 to complete the parameter settings for the selected category; then, if necessary, move on to set parameters for other categories by performing steps 5 and 6 to 10 again.
- **12.**Only for 2-pipe heating/cooling system: If needed,

select the button with the or symbol again to choose the other operating mode: for heating, for cooling, and repeat steps 5-11 to set the unit category parameters of the newly selected operating mode.

13.To exit, select

Figure 4.45



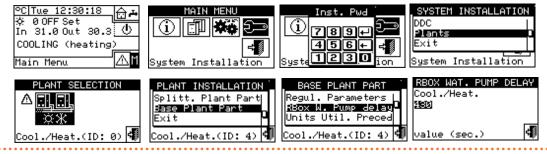
#### 4.4.2.7.6"RBox W. Pump delay"

This parameter allows setting the switch-off delay of the common primary water pump and/or the secondary water pump of the system, if at least one of them is configured and managed by the RB200 device; if neither of these two pumps is configured, access to the parameter setting screen is denied.

To set the parameter:

- 1. Select "RBox W. Pump delay" from the menu.
- 2. To change the set values, place the cursor on the value to be changed.
- **3.** Press the knob to allow changing the selected value.
- 4. Turn the knob until the desired value is shown.
- 5. Press the knob to confirm the set value.

Figure 4.46





Be careful not to confuse this parameter with the "Water Pump delay" parameters that may be present in the setting panels of the various unit categories (Paragraph 4.3.1.11 *p. 43* and Paragraph 4.3.3.5 *p. 45*): in fact, these parameters allow setting the switch-off delays of the dedicated pumps of third party units, if present and controlled by the Robur system.

### **4.4.2.7.7**"Units Util. Preced" (only for master DDC of systems with GAHP GS/WS heating/cooling)

This function allows defining, for each system managed by the DDC, the priority of switching on the GAHP GS/WS heating/cooling units in relation to the units of another type belonging to the same category (category 1). The units with a higher priority are switched on first and off last.

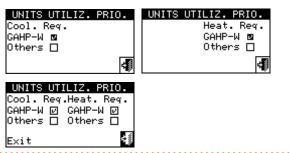
To set parameter "Units Util. Preced":

- 1. Select "Units Util. Preced" from the menu.
- 2. For the chilled water production system, column

"Cool. Req." on the left, place the cursor on next to the units to which you want to give priority for switch-on ("GAHP-W" for GAHP GS/WS heating/cooling or "Others") and press the knob to confirm. The symbol means that the selected units will have priority for switch-on. The same for the hot water system, column "Heat. Req." on the right.

3. To exit, select .

#### Figure 4.47



In Table 4.7 *p. 63*, the order in which the controller decides to switch on the units is indicated according to the choice made for unit priority and operating mode.



The order of priority of operation corresponds to the numerical order in Table 4.7 p. 63 (1 highest priority; 3 lowest priority).

**Table 4.7** Order of priority of operation

Cooling								
Туре	GAHP GS/WS heating/cooling	ACF 60-00 HR	GA ACF	GAHP-AR				
Priority (1)	1	2	3	3				
Priority (2)	3	1	2	2				
	Heating							
Туре	GAHP GS/WS heating/cooling	GAHP A	GAHP-AR	AY				
Priority (1)	1	2	2	3				
Priority (2)	2	1	1	3				

Priority (1): Priority has been given to GAHP-GS/WS hot/cold units. Priority (2): Priority has been given to other units.

#### **4.4.2.7.8** "Temp. Alarm Setup" (master DDC only)

This option allows the user to set the alarm temperatures for hot and/or chilled water production system.

For a chilled water only system, or 2-pipe hot/cold system in cooling mode, an error is raised if the temperature is higher than the set temperature.

For a hot water or 2-pipe hot/cold system in heating mode, an error is raised if the temperature is lower than the set temperature.

It is possible to:

- ▶ Disable the function.
- ➤ Specify whether the limit shown refers to outlet or inlet water temperatures.

Default values are:

- ► Cooling: 110 °C.
- ► Heating: -30 °C.

To set the alarm temperature:

1. Select "Temp. Alarm Setup" from the menu.

- 2. Place the cursor on  $\square$  next to the option you wish to set ("Output Temperat."; "Input Temperat.") and press to select it.
- **3.** Place the cursor on the temperature value to be set. Press the knob. The number starts to flash. Turn the knob to modify the value and press the knob to confirm.



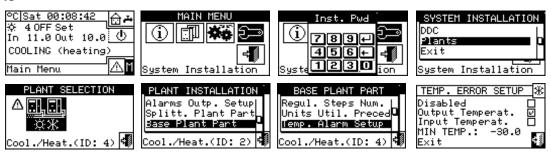
The limit temperature value only appears if the function is enabled ("Disabled"  $\square$ ).

- **4.** Place the cursor on to select the cooling system; select to select the heating system.
- **5.** To exit, select



Repeat steps 1 to 3 for the second system if the DDC is the master of two systems.

Figure 4.48



#### 4.4.2.7.9 "Cool/Heat VIv Prms"

This parameter must be set if centralised 3-way diverter valves are used on the base system for system switching (inverting from cooling to heating and vice versa).

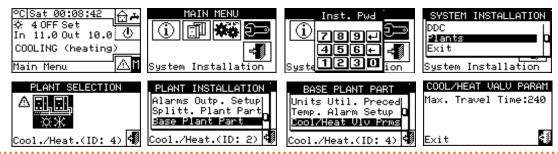
This parameter shows the maximum time it can take for 3-way valves to switch from one position to another. If after this time the valve has not reached the limit switch position, an error is raised. In the case of valves without such contacts, after this time the DDC assumes that the

switching phase has been completed.

To set the parameter:

- 1. Select "Cool/Heat VIv Prms" from the menu.
- 2. Place the cursor on the value to be edited; the value is expressed in seconds (from 0 to 600 s).
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the value.
- **5.** Press the knob to confirm the set value.
- **6.** To exit, select

Figure 4.49



#### **4.4.2.7.10** "Cool/Heat Srv Conf"

The menu allows the configuration of the cooling/heating services.

The options available in this menu are:

- ▶ "DDC/RBox Reqs Enab"
- ▶ "Plant Enab. Setup"
- "Wat. Thermos. Mode" (master DDC only)
- "Weather Comp parms"
- ► "Max Power Limiting"
- "Max Water Setpoint"
- ► "Min Water Setpoint"
- "Chronot. Op. Mode" (only for master DDC of multi-DDC systems)

To access the menu, select "Cool/Heat Srv Conf" from the menu.

#### **4.4.2.7.10.1** "DDC/RBox Regs Enab"

In this menu item, it is possible to determine, for heating and cooling services, whether the switch-on requests of the units are controlled only by the DDC, only by the optional device RB100/RB200, or by both (DDC and RB100/RB200).

To disable the request from one of the Robur control devices, place the cursor on  $\blacksquare$  and press the knob. The  $\square$  symbol means that the request is disabled.

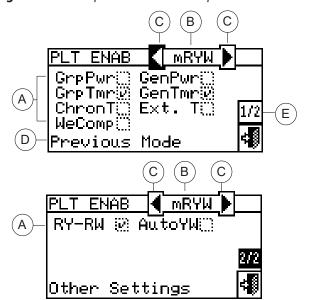


Operating requests for DHW services are ALWAYS controlled by the RB100/RB200 device or via Modbus protocol, so it is not possible to activate DHW services without this device. For more information, we recommend that you consult the manuals of the RB100 or RB200 devices, depending on the type of device used.

#### **4.4.2.7.10.2** "Plant Enab. Setup"

The requests that trigger the switch-on of the system for the cooling and heating services can be considered as series switches inside the DDC. The system is only switched on if all enabled requests are on (closed). If the system is switched on ("ON" shown on the main screen) one or more units will only be switched on when the required setpoint is not met. Figure 4.50 *p. 65* shows what a request configuration screen looks like.

Figure 4.50 Example of "Plant Enab. Setup" menu screen



- A Requests used for selected operating mode; used; not used
- B Operating mode
- C Scroll arrows to change the operating mode
- D Description of the function highlighted by the cursor
- E Other settings



With the exception of the "GenPwr" request, all requests described below ONLY affect the generation of requests from the DDC and not from RB100 or RB200.

The DDC provides different ways of managing the operation of the units as shown in Table 4.8 *p. 75*.

To choose the operating mode of the system:

- 1. Select "Plant Enab. Setup" from the menu.
- 2. Select dor to change the operating mode.
- **3.** If the "CUST" mode is selected, move to the individual  $\square$  item and enable the desired ones ( $\square$ ).
- 4. To exit, select



If the DDC manages a 4-pipe hot/cold system, repeat steps 1 and 2 for the second system.

A description of each request is given below to assist the installer in choosing the most suitable operating mode.



The configurations of the various requests are preset according to the set operating mode (Table 4.8 *p. 75*) and cannot be changed. The requests configuration can only be selected in the "CUST" operating mode.

► "GenPwr" is the request for the main switch of the system for both single-DDC and multi-DDC systems.

The symbol means that the request is checked and implies that the button in the "Plant Control"

menu has been enabled.

The symbol means that the request is uncecked and implies that the button in the "Plant Control" menu is disabled (button symbol disabled and request always on).

■ "GrpPwr" is the request for the partial switch of the system and can only be used for multi-DDC systems. It is the switch of the groups of units managed by a specific DDC.

The symbol means that the request is checked and implies that the sutton in the "Plant Control" menu has been enabled.

The symbol means that the request is uncecked and implies that the button in the "Plant Control" menu is disabled (button symbol disabled and request always on).

■ "GenTmr" is the request for the general water timer. In the "User settings" menu it will be possible to define all the parameters which define the operating mode in which the "GenTmr" request is present, such as setpoint temperature, etc. For programming instructions see Paragraph 3.4.1.1.1.3 p. 24.

The symbol means that the request is checked and implies that the button in the "Plant Control" menu has been enabled.

The symbol means that the request is uncecked and implies that the button in the "Plant Control" menu is disabled (button symbol disabled and request always on).

The request is on (switch closed) in the following cases:

- 1. The request is checked and the button in the "Plant Control" menu is enabled : the request will only be in the on state (switch closed) during the programmed time slots.
- 2. The request is checked and the button in the "Plant Control" menu is disabled : the request will always be on.
- **3.** The request is unchecked **□**: the request will always be on.
- "GrpTmr" is the request relating to the group water timer of the system and is only used for multi-DDC systems. If this request is checked, it makes it possible to perform diversified weekly time programs for the units managed by a specific DDC.

The symbol means that the request is checked and implies that the button in the "Plant Control" menu has been enabled.

The symbol means that the request is uncecked and implies that the button in the "Plant Control" menu is disabled (button symbol disabled and request always on).

The request is on (switch closed) in the following cases:

1. The request is checked ☑ and the button in the "Plant Control" menu is enabled ⊕☐: the request

will only be in the on state (switch closed) during the programmed time slots.

- 2. The request is checked and the button in the "Plant Control" menu is disabled : the request will always be on.
- **3.** The request is unchecked **□**: the request will always be on.
- ► "ChronT" is available on master and slave DDCs and is the request relative to the indoor room chronothermostat of the DDC. It is available by default in the "AmbT" operating mode and can be selected in the "CUST" mode. All the parameters that define the operating mode in which the "CronoT" request is present can be defined in the "Ambient Setup" menu of the "User Settings" menu: room temperature setpoint, differential, etc. For programming instructions see Paragraph 3.4.1.2.3 p. 30.

The symbol means that the request is checked and implies that the button in the "Plant Control" menu has been enabled.

The symbol shows that the request is unchecked. The chronothermostat button in the "Plant Control" menu can be enabled or disabled depending on whether or not the "WeComp" (climatic curve) function is enabled.

The request is on (switch closed) in the following cases:

- 1. The request is checked and the button in the "Plant Control" menu is enabled : the request will be in the on state (switch closed) if you are within the time schedule of the chronothermostat and the indoor ambient setpoint is not met.
- 2. The request is checked and the button in the "Plant Control" menu is disabled the request will always be on.
- **3.** The request is unchecked **□**: the request will always be on.

NOTE: for a multi-DDC system, the request activated on the slave DDC(s) acts only on the individual DDC; for the master DDC it is possible to choose whether the request should act only on that DDC or on the whole system.

NOTE: An indoor room temperature probe must be installed on the DDC(s) of the system on which this request is activated.

■ "Ext.T" is only available on the master DDC in the "ExtT" or "WCmp" operating mode and for the "CUST" mode, if selected. The request allows a switch to be closed depending on the outdoor temperature. In the "User Settings" menu it is possible to define all the parameters that define the "ExtT" operating mode (Paragraph 3.4.1.3 p. 31).

The request is on (switch closed) in the following cases:

- **1.** For heating operation when the outdoor temperature is lower than the set temperature.
- **2.** For cooling operation when the outdoor temperature is higher than the set temperature.
- 3. In all operating modes where the request is

unchecked.

The symbol means that the request is checked.

The symbol means that the request is unchecked.

NOTE: for a multi-DDC system, the request checked on the master DDC also acts on the slave DDCs, i.e. on the whole system.

■ "WeComp" is only available on the master DDC in the "WCmp" operating mode or if selected in the "CUST" mode.

This is not an actual request, but a function that enables the use of the climatic curve to automatically adjust the water temperature according to the outdoor temperature.

The symbol means that the function is active and implies that the button in the "Plant Control" menu has been enabled.

The climatic curve function is actually active if, in addition to "WeComp" being checked ( ), it is enabled in the "Weather Comp Enab." menu of the "User Settings" menu (Paragraph 3.4.1.1.1.2 *p. 24*), otherwise the button will be disabled

The symbol means that the function is not active. The button of the chronothermostat in the "Plant Control" menu can be enabled or disabled depending on whether the "ChronT" request described above is checked or not.

It is not possible to check the "WeComp" function at the same time as the "GenTmr" or "ChronT" request.

When "WeComp" is checked ( ), repeated pressing of the chronothermostat on/off button in the "Plant Control" menu allows the following modes to be set:

- the room temperature setpoint is the active one, according to the time program set on the <a href="mailto:chronothermostat">chronothermostat</a>.
- T3 or T3: the room temperature setpoint is always T3 (maximum level of heating or cooling service).
- the room temperature setpoint is always T2 (average level of heating or cooling service).
- or  $\mathbb{L}^{T_1}$  or  $\mathbb{L}^{T_2}$ : the room temperature setpoint is always T1 (minimum level of heating or cooling service).

NOTE: the climatic curve function is active in all the above modes.

➤ "RY-RW" is available on master and slave DDCs in "mRYW", "aRYW" operating mode or if selected for "CUST" mode. The "RY-RW" requests status is directly related to the status of the external RY-RW contacts on the back of the DDC (Paragraph 4.5.3.1.2 *p. 77*). In all other cases, i.e. when the request is unchecked, it is in the on state.

The symbol means that the request is checked.

The symbol means that the request is unchecked (request always present: switch closed).

The RY request is in the off state (switch open) if, having selected the "mRYW" mode, the RY contact is open. The RW request is in the off state (switch open) if the

RW contact is open after selecting the "mRYW" mode. The request, for the cooling system, is on (switch closed) in the following cases:

- **1.** The request is checked (**L**) and the RY contact is closed.
- **2.** The request is unchecked ( $\square$ ). Consent, for the heating system, is on (switch closed) in the following cases:
- **1.** The request is checked ( ) and the RW contact is closed.
- **2.** The request is unchecked ( $\square$ ).

NOTE: RY and RW requests act on the single DDC (master or slave) on which they are configured; for a multi-DDC system this allows requests to be selectively supplied from outside to one or more DDCs.

► "AutoYW" applies only to 2-pipe hot/cold systems and only to the system's master DDC. The request is available in "aRYW" mode or, if selected, in "CUST" mode. If checked, it means that cooling/heating switching takes place automatically according to the request on the RY-RW contacts (RY closed: switching to cooling; RW closed: switching to heating). If "AutoYW" is unchecked, cooling/heating switching is done manually via the cooling/heating switching button in the "Plant Control" menu ※ or via Modbus.

The  $\square$  symbol means that the request is unchecked, in this case:

■ if the item "BMS Plant Control" is checked in the "BUS Access Setup" menu, the cooling/heating changeover is managed by the BMS (\*\* button in the "Plant Control" menu disabled).

■ otherwise, it is managed manually (※ button in the "Plant Control" menu enabled); furthermore, if the item "RM Plant Control" is checked in the "BUS Access Setup" menu, switching can also be carried out in RM mode.

The symbol means that the request is checked and ALWAYS implies that the button () in the "Plant Control" menu is disabled, as the cooling/heating changeover is automatic according to the RY-RW contacts.

If "AutoYW" is active, simultaneous closing of the RW and RY contacts raises an error and the system is switched off.

NOTE: in "CUST" mode, checking "AutoYW" does not necessarily require checking the "RY-RW" request; it is therefore possible to obtain a configuration in which the RY and RW contacts are used only to perform the cooling/heating changeover, but not as requests for switching on the system.

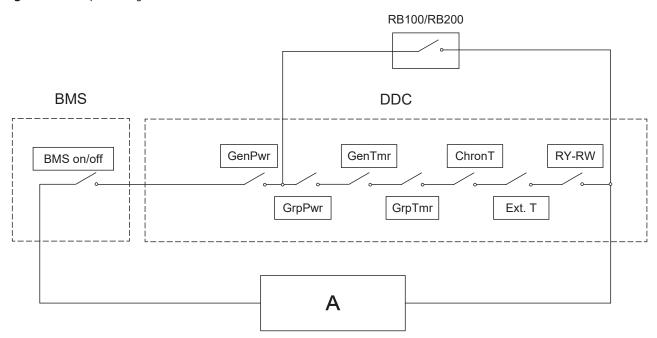
For more information on the "Plant Control" menu, Paragraph 2.4 p. 11.

The requests can be represented as switches in series, as shown in Figure 4.51 *p. 67*; the example shown represents the "CUST" operating mode with the checking of all available requests. The BMS on-off switch is managed ONLY if the "BMS Plant Control" item in the "BUS Access Setup" menu is enabled (Paragraph 4.4.2.1 *p. 52*).



The "WCmp" mode (climatic curve) is not shown in the diagram in Figure 4.51 *p. 67* as it does not act as a request (on-off) but by changing the temperature on the outlet water according to the outdoor temperature.

Figure 4.51 Requests diagram



System (heating and cooling services)

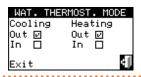
#### **4.4.2.7.10.3** "Wat. Thermos. Mode" (master DDC only)

This function allows you to define the thermostating mode for hot and/or chilled water production systems. Thermostating may be controlled on the outlet or inlet pipes.

To set the thermostating mode:

- 1. Select "Wat. Thermos. Mode" from the menu.
- 2. For the chilled water system, in the "Cooling" column on the left, place the cursor on ☐ and select the pipe on which you wish to carry out thermostating ☐ ("Out" or "In").
- **3.** For the hot water system, in the "Heating" column on the right, place the cursor on □ and select the pipe on which you wish to carry out thermostating □ ("Out" or "In").
- 4. To exit, select

Figure 4.52





If the DDC manages a 4-pipe hot/cold system, repeat the setting for the second system.

#### **4.4.2.7.10.4** "Weather Comp parms"

This function allows defining the parameters of the climatic curves that will influence the outlet temperature of hot and/or chilled water.

The climatic curves allow calculating the system water temperature depending on the measured outdoor temperature and the setpoint temperature of the room.

To set climatic curve parameters:

- 1. Select "Weather Comp parms" from the menu.
- For the chilled water production system, set the parameter "Water Setpoint at ExtT 25°C" and Water Setpoint at ExtT 35°C" and, if needed, the "Offset" parameter.
- **3.** For the hot water production system, set the "Slope" parameter of the heating curve and, if needed, the "Offset" parameter.
- 4. To exit, select

Depending on the type of system, in particular the type of exchangers (radiators, fan coils, floor heating etc.) and the characteristics of the building, a specific curve must be used, selected from the family of climatic curves; furthermore, upon changing the room setpoint temperature, the curve actually used will be automatically modified.

The climatic curves used in the DDC for cooling are different from those used for heating and the way of selecting the specific curve to be used also differs.

As far as cooling is concerned, climatic curves are a family of straight lines and the choice of the curve to be used is made by specifying two points through which it must pass: in detail, the temperature that the chilled water must have at the outdoor temperature of 25 °C and 35 °C must be specified; for example, in the graph shown in Figure

4.53 p. 68 the curve selected implies that the units will produce chilled water at a temperature of 7 °C when the outdoor temperature is 35 °C and 10 °C when the outdoor temperature is 25 °C.

The curve thus defined refers to a room setpoint temperature of 25 °C; if the setpoint temperature is different, the system automatically adjusts the curve used.

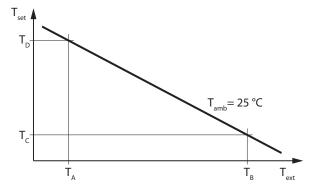
If the slope of the selected curve is not correct, the following cases may occur, to be assessed during early operation of the system:

- ► Higher room temperature when the outdoor temperature is higher: in this case the slope of the curve is insufficient, the value of the parameter "Water Setpoint at ExtT 35°C" should be lowered or "Water Setpoint at ExtT 25°C" should be raised.
- ► Higher room temperature when the outdoor temperature is lower: In this case, the slope of the curve is too steep, the value of the parameter "Water Setpoint at ExtT 35°C" should be raised or "Water Setpoint at ExtT 25°C" should be lowered.

If however the slope is correct (stable room temperature as the outdoor temperature changes), but the room temperature does not match the setpoint, the following cases may occur:

- ► Room temperature always higher than the setpoint: in this case, the "Offset" parameter of the climatic curve must be set to a negative value equal to the deviation of the room temperature from the setpoint; for example, if the setpoint is 24 °C and the actual room temperature is 27 °C, set the "Offset" parameter to -3 °C.
- ► Room temperature always lower than the setpoint: In this case, a positive value must be set for the "Offset" parameter of the climatic curve; for example, if the setpoint is 24 °C and the actual room temperature is 22 °C, set the "Offset" parameter to 2 °C.

**Figure 4.53** *Cooling climatic curve for 25 °C room temperature* 



T<sub>amb</sub> Cooled room temperature

T<sub>ext</sub> Outdoor temperature

T<sub>set</sub> Water setpoint

T<sub>A</sub> Outdoor temperature 25 °C

T<sub>R</sub> Outdoor temperature 35 °C

 $T_C$  Water setpoint with outdoor temperature 35 °C (default 7 °C)

 $T_D$  Water setpoint with outdoor temperature 25 °C (default 10 °C)

As far as heating is concerned, the family of climatic curves



is shown in Figure 4.54 p. 69 and the choice of the curve to be used is made by specifying the value of the "Slope" parameter that indicates the slope of the curve. The curve thus defined is referred to a room setpoint temperature of 20 °C; if the setpoint temperature is different, the system automatically adjusts the curve used.

To set a suitable heating climatic curve:

- ▶ Obtain data on the water temperature required when the outdoor temperature is equal to the design temperature (e.g.: water temperature 60 °C when the outdoor temperature is -10 °C).
- ➤ Using the graph in Figure 4.54 p. 69, choose the curve that meets the requirement of the previous step. Note the slope of the curve and set the relevant "Slope" parameter.

For the example in the previous points, set the value of 1,5, as shown in Figure 4.54 p. 69.



If no curve passes through the point corresponding to the design temperature, choose an intermediate value between those of the curve immediately above and immediately below that point.

- ➤ As a reference, a system using floor heating will use low slope values, a fan coil system medium values and a radiator system high values.
- ► Set the "Offset" parameter to 0.

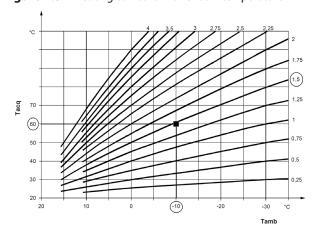
If the slope of the selected curve is not correct, the following cases may occur, to be assessed during early operation of the system:

- ► Lower room temperature when the outdoor temperature is lower: In this case, the slope of the curve is insufficient, a higher value must be set for the "Slope" parameter.
- ► Higher indoor temperature when the outdoor temperature is lower: In this case, the slope of the curve is too steep, a lower value must be set for the "Slope" parameter.

If however the slope is correct (stable room temperature as the outdoor temperature changes), but the room temperature does not match the setpoint, the following cases may occur:

- ▶ Room temperature always higher than the setpoint: in this case, the "Offset" parameter of the climatic curve must be set to a negative value equal to the deviation of the room temperature from the setpoint; for example, if the setpoint is 22 °C and the actual room temperature is 26 °C, set the "Offset" parameter to -4 °C.
- ► Room temperature always lower than the setpoint: In this case, a positive value must be set for the "Offset" parameter of the climatic curve; for example, if the setpoint is 20 °C and the actual room temperature is 19 °C, set the "Offset" parameter to 1 °C.

Figure 4.54 Heating curves for 20 °C room temperature



Tacq Water temperature

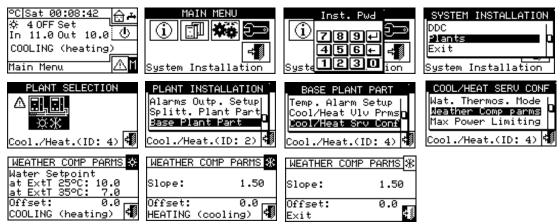
AmbT Outdoor ambient temperature



Limitation of the range of water temperature variation.

It is often advisable to limit the actual permissible water temperature range from the entire outdoor temperature range that would result from the climatic curve calculation alone. This can be done by accessing the menus "Max Water Setpoint" (Paragraph 4.4.2.7.10.6 *p. 70*) and "Min Water Setpoint" (Paragraph 4.4.2.7.10.7 *p. 71*).

Figure 4.55



#### **4.4.2.7.10.5** "Max Power Limiting"

This optional function allows limiting the maximum power available from the system for the heating and cooling services, according to the outdoor temperature.

The maximum power installed in a heating or cooling system is sized for the maximum thermal load condition, which may occur at the minimum (in heating mode) or maximum (in cooling mode) outdoor design temperature. Therefore, in non-extreme climatic conditions, the installed power is excessive; especially in systems with a high number of stages or mixed type (heat pumps plus boilers), more efficient regulation can be achieved by suitably limiting the available power, i.e. preventing the regulator from using, even transiently, an excessive number of units.

In heating mode, the function operates by progressively reducing the number of units that can be used as the outdoor temperature increases. Once activated, three parameters must be appropriately set:

- ► "External Temperat. at 100% Power": the value of the design outdoor temperature must be set.
- "External Temperat. at 0% Power": the outdoor temperature value above which no heating power is required must be set.



In order to avoid excessive power limitation, it may be advisable to set both of these parameters slightly higher than the theoretical values.

■ "Activat. Delay": with this parameter, it is possible to enter a delay for activating the power limitation function, calculated from the moment the system is switched on. In this way, it is possible to allow the system to always use all the available power during the start-up phase of the system. Setting the delay to zero is equivalent to imposing the power limitation immediately after system start-up; this limitation has priority over the application of the initial power.

In cooling mode, the function operates in the same way, clearly with reversed logic with respect to the variations of the outdoor temperature.

The function can be activated or not and configured separately for heating and cooling modes.

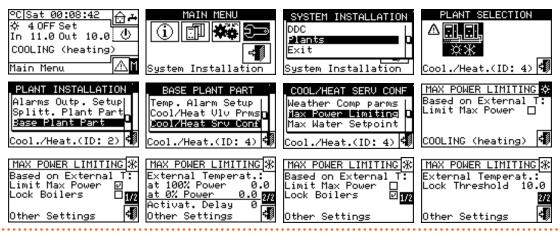
As an alternative to this function, limited to the heating mode, a simplified version can be activated that operates only by preventing the use of the least efficient heat generators (boilers) above a given outdoor temperature. In this case, once the function is activated, just one parameter need to be set:

► "External Temperat.: Lock Threshold": the outdoor temperature value above which the boilers must not be used must be set.

To activate and configure the function:

- 1. Select "Max Power Limiting" from the menu.
- 2. Only for 2-pipe heating/cooling system: select the button with the symbol to choose the operating mode for which to set the parameters: for heating, for cooling.
- 3. To activate the function for the chilled water production system, select the only option available, "Limit Max Power"; at this point, you must access page 2/2 to set/change the three parameters relating to the function: "External Temperat. at 100% Power", "External Temperat. at 0% Power", and "Activat. Delay".
- **4.** To activate the function for the hot water production system, choose and select one of the "Limit Max Power" or "Lock Boilers" options. In both cases, you must access page 2/2 to set/change:
  - If "Limit Max Power" has been selected, the three parameters mentioned in step 3, relating to the hot water production system.
  - If you have selected "Lock Boilers", the parameter "Lock Threshold".
- 5. To exit, select .

Figure 4.56



#### **4.4.2.7.10.6** "Max Water Setpoint"

This function allows defining the upper limit of the setpoint temperatures (outlet and inlet) for cooling and heating on the base system part. The setpoint temperatures are then set by the user in the "User Settings" menu. In detail, it is possible to define the minimum temperatures for the production of chilled water within the range -30  $^{\circ}$ C / +40  $^{\circ}$ C and the maximum temperatures for the production of hot water within the range +5  $^{\circ}$ C / +95  $^{\circ}$ C. For example, if +5  $^{\circ}$ C is set for a chilled water system, the user



will be able to choose a water setpoint higher than +5 °C. In the case of a hot water system, setting a temperature value of +60 °C will give the user the choice of a water setpoint value lower than +60 °C.

Moreover, if the climatic curve function is active, these limits are applied to the setpoint determined by the controller as a function of the outdoor temperature; in the example for the heating system shown above, the maximum water setpoint temperature will be +60 °C even though the climatic curve function would require a higher value.



The outlet and inlet setpoint limits are set separately.

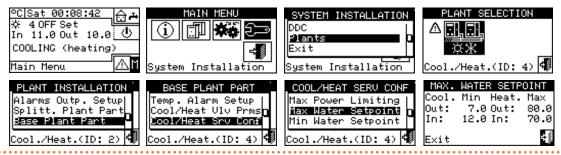
To change setpoint limits:

- 1. Select "Max Water Setpoint" from the menu.
- **2.** Place the cursor on the temperature value to be modified.
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- 5. Press the knob to confirm the set value.
- **6.** To exit, select



If the DDC manages a 4-pipe hot/cold system, repeat the setting for the second system.

Figure 4.57



#### **4.4.2.7.10.7** "Min Water Setpoint"

This function allows defining the lower limit of the setpoint temperatures (outlet and inlet) for cooling and heating on the base system part. The setpoint temperatures are then set by the user in the "User Settings" menu. In detail, it is possible to define the maximum temperatures for the production of chilled water within the range -30 °C / +40 °C and the minimum temperatures for the production of hot water within the range +5 °C / +95 °C. For example, if +30 °C is set for a chilled water system, the user will be able to choose a water setpoint lower than +30 °C. In the case of a hot water system, setting a temperature value of +40 °C will give the user the choice of a water setpoint value higher than +40 °C.

Moreover, if the climatic curve function is active, these limits are applied to the setpoint determined by the controller as a function of the outdoor temperature; in the example for the heating system shown above, the minimum water setpoint temperature will be  $+40\,^{\circ}\text{C}$  even though the climatic curve function would require a lower value.



The settings "Min Water Setpoint" and "Max Water

Setpoint" are linked to each other, so for example, if 50 °C is set as the value for "Max Water Setpoint" (for hot water production), the value for "Min Water Setpoint" that can be set will be less than or equal to 50 °C.



The outlet and inlet setpoint limits are set separately.

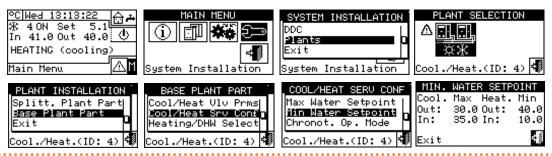
To change setpoint limits:

- 1. Select "Min Water Setpoint" from the menu.
- Place the cursor on the temperature value to be modified.
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- 5. Press the knob to confirm the set value.
- **6.** To exit, select ...



If the DDC manages a 4-pipe hot/cold system, repeat the setting for the second system.

Figure 4.58



### **4.4.2.7.10.8** "Chronot. Op. Mode" (only for master DDC of multi-DDC systems)

This function allows defining, for each system managed by the DDC, the mode of use of the chronothermostat of the master DDC.

Two operating modes are available:

- ► General chronothermostat (master and slaves): In this case, the master's chronothermostat also controls the request on the slaves.
- ➤ Group chronothermostat (master only): The chronothermostat of the master will only give the request to switch on the units directly managed by him.

In practice, two typical configurations are used:

Single chronothermostat: The system is controlled exclusively by the chronothermostat of the master DDC. It is required to select the "General" option described above and disable the chronothermostat request on the slave DDCs (Paragraph 4.4.2.7.10.2 p. 64). Moreover, it is required to connect the room temperature probe, available as OSND007 optional, to the

master DDC.

2. Zone chronothermostat: with this type of configuration it is possible to control the temperature of up to 3 different rooms, one for each DDC. It is required to enable the chronothermostat requests on all the DDCs and it is requested to select the "Group" option described above on the master DDC. Moreover, it is required to connect the room temperature probe, available as OSND007 optional, to each DDC.

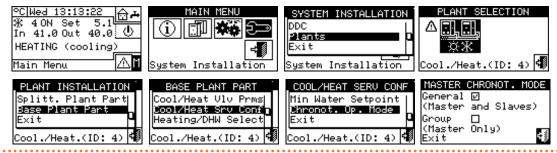
To set the "Chronot. Op. Mode" on the master DDC:

- 1. Select "Chronot. Op. Mode" from the menu.
- 2. Place the cursor on  $\square$  according to the option you wish to set ("General"; "Group") and press the knob to make the selection. The  $\square$  symbol means that the option has been enabled.
- 3. To exit, select



Repeat the operations for the second system if the DDC is the master of two systems.

Figure 4.59

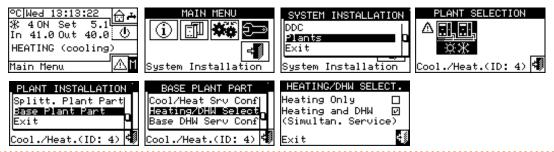


#### **4.4.2.7.11** "Heating/DHW Select"

This menu item allows you to choose whether the units that make up the base system are used only for the production of hot water for the heating system or whether they are used for the production (also simultaneously) of hot water for the heating system and DHW.

- 1. Select "Heating/DHW Select" from the menu.
- 2. Place the cursor on  $\square$  next to the option you want to set: "Heating and DHW (Simultan. Service)" or "Heating Only".
- **3.** Press the knob to enable the option. The wissymbol means that the option has been enabled.
- 4. To exit, select

Figure 4.60



### **4.4.2.7.12** "Base DHW Serv Conf"

To access the menu, select "Base DHW Serv Conf" from the menu.

# **4.4.2.7.12.1** "Max Water Setpoint"

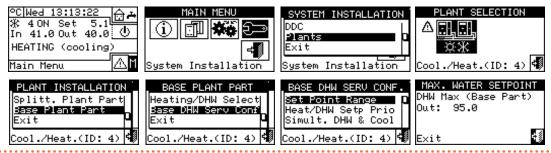
This function allows defining the upper limit of the setpoint temperature (outlet) for DHW production on the base part of the system. The setpoint temperature is then set by the user in the "User Settings" menu. In detail, it is possible to define the maximum temperature for DHW production within the range +5 °C / +95 °C. For example, if the value +60 °C is set, the user can define a water setpoint between +5 °C and +60 °C.

- 1. Select "Max Water Setpoint" from the menu.
- Place the cursor on the temperature value to be modified.
- **3.** Press the knob to allow changing the selected value.
- **4.** Turn the knob to change the temperature value.
- 5. Press the knob to confirm the set value.
- **6.** To exit, select



If the DDC manages a 4-pipe hot/cold system, repeat the setting for the second system.

Figure 4.61



# **4.4.2.7.12.2** "Heat/DHW Setp Prio"

This parameter allows establishing which setpoint value to use for the operation of the units of the base system in case of more than one active switch-on request. In particular, the choice of the setpoint will be evaluated by the controller between the setpoint requests for the base DHW service and the setpoint requests for the heating service. It is important to remember that there can be more than one request of the same type coming from both the DDC and one or more RB100 or RB200.

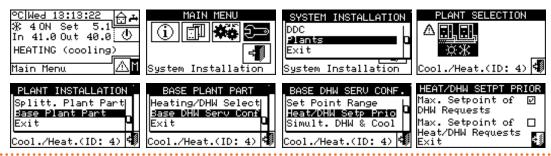
By selecting the item "Max. Setpoint of DHW Requests", the DDC will consider the maximum value of all the base DHW requests as the reference setpoint for the management of the base system. If there are both base DHW requests and heating requests, the setpoint used by the

system will be the one for the DHW request that specifies the highest setpoint value. If there are only heating requests (and not base DHW) the setpoint used will be the highest of all the heating requests.

By selecting the item "Max. Setpoint of Heat/DHW Requests" the DDC will consider as setpoint to be used for the management of the system the maximum value of all requests for both base DHW and heating.

- 1. Select "Heat/DHW Setp Prio" from the menu.
- 2. Place the cursor on  $\square$  next to the option you wish to set.
- **3.** Press the knob to enable the option. The **!** symbol means that the option has been enabled.
- 4. To exit, select

Figure 4.62



# 4.5 INSTRUCTIONS FOR DDC-SYSTEM CONFIGURATION

### 4.5.1 Introduction

The DDC has been designed to flexibly control up to a maximum of 96 modules (maximum 48 cold and 48 hot modules). To achieve this functionality, a modular architecture has been adopted, according to which:

- ► A single DDC can manage up to 32 modules (16 cold modules and 16 hot modules, Paragraph 4.5.2.1 p. 74).
- ➤ Two DDCs can coordinate to manage up to 64 modules (32 cold modules and 32 hot modules, Paragraph 4.5.2.2 p. 75).
- ► Three DDCs can coordinate to manage up to 96 modules (48 cold modules and 48 hot modules, Paragraph 4.5.2.2 p. 75).

Moreover, each DDC can manage units configured on two different systems, as long as they are a hot system and a cold system. This functionality has been designed to allow a single DDC to be used to manage 4-pipe hot/cold systems.

Alternatively, one DDC can manage a single 2-pipe hot/cold system (or, naturally, a single hot or cold system).

The systems are identified by an ID; 16 system IDs (0-15) are available. These IDs are assigned to the units, using the user interface of the board onboard the units, and must be consistent with the water system to which the units are connected. For 4-pipe units, two different system IDs must be assigned, one for the cold module and one for the hot module (GAHP GS/WS hot/cold units in 4-pipe configuration).

The DDC can also support DHW control. In detail, on a system, the DDC can manage DHW production with units belonging to the base system (it uses the same units used for heating to produce DHW at the same time as producing hot water for heating), or with units belonging to the separable system (a part of the system can be separated from the base system to produce DHW independently and not at the same time as the heating system, i.e. even when it is operating in cooling mode).

In order to use this functionality, it is necessary to have an interface device RB100, RB200 or the Modbus protocol on the system, which is used to send on/off requests to the DDC for the configured units.

The DDC can communicate with other DDCs in order to manage systems with a number of units greater than 16.

It is also possible to use several DDCs even if the number of units is less than 16, i.e. if there are several groups of units serving the same system but needing to be managed independently.

Below are instructions for performing both configurations (mono-DDC, multi-DDC).



Before performing the DDC-system configuration, make sure that all connections have been made correctly and that the configuration of the electronic boards on the units has been done correctly.

The DDC-system configuration essentially takes place in two steps:

- ➤ The first step is the configuration of the system's DDC(s). In this phase, the DDC(s) acquire information on the units they have to manage or on any other DDCs.
- ➤ The second step concerns the configuration of the system(s), which must be carried out on each installed DDC. This is the step in which it will be possible to choose the operation mode(s) of the system(s).



Once the DDC-system configuration phases have been completed, before switching on the system, it is still necessary to define the "User Settings" i.e. all the system operating parameters according to the operating mode selected during the system configuration phase. You can thereafter use the "Plant Control" menu to switch on/off the configured system(s).

# **4.5.2** DDC configuration instructions

To carry out the configuration of the DDC or DDCs, proceed as indicated in Paragraph 4.5.2.1 *p. 74* or Paragraph 4.5.2.2 *p. 75*, according to whether the system is managed by a single DDC or by multiple DDCs.

# 4.5.2.1 Mono-DDC configuration

In this step, the DDC acknowledges the units in order to be able to assign them to the DDC.

Before carrying out this step, ensure that:

- ► All the units that the DDC must manage are live and switched on.
- ► The configuration of the electronic board onboard each unit has been carried out according to the



instructions in the installation manual.

► The DDC has been correctly connected according to the instructions in Paragraph 4.1.2 p. 37.

Follow the instructions in the following paragraphs to complete this first configuration step:

- **1.** 4.4.1.3 *p. 46*.
- **2.** 4.4.1.4 *p.* 48 (optional) to check the result of the configuration just performed.

Once this configuration step is complete, move on to Paragraph 4.5.3 *p. 75* to define the system's operating mode.

### 4.5.2.2 Multi-DDC configuration

In order to configure a multi-DDC system, it is necessary to perform 5 steps strictly in the order indicated, and following the instructions in the given Paragraphs:

- **1.** 4.4.1.1 *p.* 45: each DDC is assigned its own ID (DDC IDs must be assigned so that they are all different from each other).
- **2.** 4.4.1.3 *p.* 46: each DDC is assigned the units it is to control.
- **3.** 4.4.1.4 *p.* 48 (optional) to check the result of the configuration just performed.
- **4.** 4.4.1.5 *p.* 48: the role of each DDC (system master or slave) is defined. For a given system, only one DDC must be configured as master and the others as slaves.



If a DDC manages 2 systems (hot and cold) perform step 4 for both.

**5.** 4.4.1.6 *p.* 48: when performing this operation, which must be performed simultaneously on all the DDCs in the system, and after performing the first 4 steps on all of them, the DDCs exchange information on the units assigned to them, to determine whether they should coordinate for the management of some units. This happens in cases where more than one DDC has been assigned units, or unit modules, connected to the same system.



If there is at least one unit belonging to the separable group on the system, it is necessary to complete the configuration by following the instructions given in Paragraph 4.4.2.6.1 *p. 55* and Paragraph 4.4.2.7.11 *p. 72* (if there is at least one hot unit belonging to the base group).

Once this configuration step is complete, move on to Paragraph 4.5.3 *p. 75* to define the system's operating mode.

## 4.5.3 Systems configuration instructions

# 4.5.3.1 Configuring operating mode

The first operation to be carried out is choosing the operating mode, described in Paragraph 4.4.2.7.10.2 *p. 64*. The DDC provides different ways of managing the operation of the units as shown in Table 4.8 *p. 75*.

**Table 4.8** Operating modes (bus access not configured)

Request	"MAN"	"mRYW"	"aRYW" (2)	"ExtT"	"AmbT"	"WCmp"	"MON"	"PLOG"	"CUST"
Global on/off"GenPwr"	Х			Χ	Χ	Χ			Χ*
Group on/off "GrpPwr" (1)	X			Χ	Х	Χ			Χ*
Global timer "GenTmr"	Х	Х	Χ	Χ					Χ*
Group timer "GrpTmr" (1)	X	Χ	Χ	Χ					Χ*
Chronothermostat "ChronT"					Х				Χ*
Outdoor temperature "Ext. T"				Χ		Χ			Χ*
Climatic curve "WeComp"						Χ			Χ*
"RY-RW"		Χ	Χ						X*
"AutoYW" (2)			Χ						Χ*

X" In the "CUST" operating mode it is possible to select the requests that will determine the switching on of the system. However, it is not possible to select the "WeComp" request at the same time as the "GenTmr" or "ChronT" request.

1 Only for multi-DDC systems.

2 Only for 2-pipe hot/cold systems.



Before switching on the system, ensure that all the operating parameters have been correctly configured.

# 4.5.3.1.1 "MAN" mode

In "MAN" mode, the switching on and off of the systems, the inversion from cooling and/or heating operation and vice versa for 2-pipe systems, is performed manually by the user through the DDC, which can also manage the switch-on and off schedule, water temperature control, management of the operating time bands and diagnostics of the connected units.

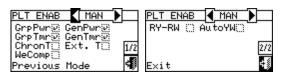
The request for switching the system on or off will be provided manually through the configuration of the "Plant

Control" menu 🕛.

Figure 4.63 *p. 76* shows the active requests for the "MAN" operating mode. The symbol next to the request label means that the request is active. In the "MAN" operating mode, 4 requests are activated:

- ► "GenPwr", general system on/off switch.
- ► "GrpPwr", group system on/off switch (only used for multi-DDC systems).
- ► "GenTmr", general water timer activation request.
- "GrpTmr", activation request for group water timer (only used for multi-DDC systems).

Figure 4.63



The requests in the "MAN" operating mode are predefined and cannot be changed. However, it is possible to exclude some of them by means of the buttons in the "Plant Control" menu.

Once the system configuration is complete, the following parameters must be set:

- ▶ "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ► "Wat. Differential", Paragraph 4.4.2.7.1 p. and, in the case of a separable system, Paragraph 4.4.2.6.3 p. 56.
- ► "Regul. Parameters" Paragraph 4.4.2.7.5 p. 61 and, in the case of a separable system, Paragraph

If there are third party boilers:

► "Aux Boilers Funct.", Paragraph 4.4.2.7.3 p. 60.

- "Plant Rated Power", Paragraph 4.4.2.7.4 p. 61. In the case of common water pumps managed by RB100/ RB200:
- "RBox W. Pump delay", Paragraph 4.4.2.7.6 *p. 62* and, in the case of a separable system, Paragraph 4.4.2.6.7 p. 58.
- "General Wat. Timer", Paragraph 3.4.1.1.1.3 p. 24 (optional).
- "Group Water Timer", Paragraph 3.4.1.1.1.4 p. 25 (optional, only for multi-DDC systems).



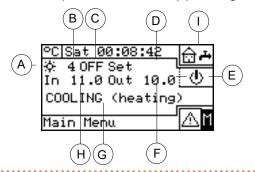
Activation of the general water timer replaces the default water setpoint value set in Paragraph 3.4.1.1.1.1 *p. 23* with the specific value of the time slot active at a given time.

Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu | 🛡 |

4.5.3.1.1.1 System control in "MAN" mode

Figure 4.64 p. 76 shows what the start screen looks like for a 2-pipe cooling/heating system.

**Figure 4.64** Example of start screen for 2-pipe cooling/heating and DHW system control



- Operating mode (heating/cooling)
- Plant ID
- System on/off status
- Water temperature setpoint (if the system is switched on)
- Button for accessing the "Plant Control" menu
- System outlet temperature
- G System type (cooling/heating)
- System inlet temperature
- Displays the operating parameters of the DHW system (  $\blacksquare$



To access the "Plant Control" menu, select the 🕒 button on the start screen.

Figure 4.65 p. 76 shows the "Plant Control" menu screen and the related requests described below.

Figure 4.65



- General on/off switch. Turn the knob to place the cursor on the button and press the knob to activate it (symbol of the on/off button in the on position  $\mathfrak{G}$ ). In the case of a multi-DDC system, it is only active on the master DDC; on the slave DDC(s) it reflects the on/ off status set on the master.
- Group on/off switch. Disabled button (always on) for systems managed by a single DDC. Turn the knob to place the cursor on the button and press it to activate it (symbol of the on/off button in the on position <u>增</u>。). If set to off, it switches off all the units managed

by the specific DDC.

- General water timer on/off button. To turn off the general water timer (its request is always on and the default setpoint is used) place the cursor on the button and press the knob (symbol of request for general water timer off [28]). WARNING: the switch-off of the general water timer automatically implies disabling
- Group water timer on/off button (button disabled for systems managed by a single DDC). If on, the specific DDC also uses the group water timer (Paragraph 3.4.1.1.1.4 *p. 25*).
- ► Chronothermostat button disabled (request disabled in "MAN" operating mode).
- ► ★ Cooling/heating changeove<u>r switch available</u> only for 2-pipe cold/hot systems: | 体制 cooling; | (米米) heating.

If the system is "ON", the cooling/heating changeover or vice versa will take 10 minutes.

If the system is "OFF" (for more than 10 minutes), the cooling/heating changeover is immediate except for GAHP-AR units, which require an additional 7 minutes.

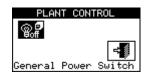


# **4.5.3.1.1.2** DHW system control

To access the "Plant Control" menu for the DHW part, follow the instructions below:

- 1. Select the icon from the start screen and press the knob to access the base and separable DHW system operating parameters display screen.
- 2. Select the symbol at the top to access the "Plant Control" menu for the base DHW system.
- **3.** Select the symbol at the bottom to access the "Plant Control" menu for the separable DHW system.
- **4.** In both cases, the screen shown in Figure 4.66 *p. 77* will be shown on the display.

Figure 4.66



General on/off switch. Turn the knob to place the cursor on the button and press the knob to activate it (symbol of the on/off button in the on position In the case of a multi-DDC system, it is only active on the master DDC; on the slave DDC(s) it reflects the on/off status set on the master.



With the switch in the off position, the DHW service will always be inactive, even in the presence of an external request (RB100, RB200 or Modbus protocol).

# 4.5.3.1.2"mRYW" mode

In the "mRYW" operating mode, the request for on/off operation of the units is managed by external contacts (such as a building automation system); the choice of cooling or heating operation for 2-pipe heating/cooling systems is made manually by the user through the DDC ("Plant Control" menu).

Closing the RY and/or RW contacts of connector D on the back of the DDC (Figure 4.4 *p. 38*) turns on the corresponding system:

- ► RY closed switches on the cooling system or 2-pipe cooling/heating system, if set to cooling mode.
- ► RW closed switches on the heating system or 2-pipe cooling/heating system, if set to heating mode.

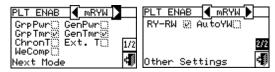
In the case of 2-pipe hot/cold systems, simultaneous closing of the RY and RW contacts is also permitted; in fact, the operation of the units in cooling or heating does not depend on the external inputs but must be selected manually via the icon in the "Plant Control" menu.

Figure 4.67 *p. 77* shows the active requests for the "mRYW" operating mode. The symbol next to the request label means that the request is active. In the "mRYW" operating mode, 3 requests are activated:

- ► "RY-RW", RY-RW external contact activation request.
- ► "GenTmr", general water timer activation request.
- ▶ "GrpTmr", activation request for group water timer

(only used for multi-DDC systems).

Figure 4.67



The requests in the "mRYW" operating mode are predefined and cannot be changed. However, it is possible to exclude some of them by means of the buttons in the "Plant Control" menu.

Once the system configuration is complete, the following parameters must be set:

- ▶ "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ► "Wat. Differential", Paragraph 4.4.2.7.1 p. 59 and, in the case of a separable system, Paragraph 4.4.2.6.3 p. 56.
- ► "Regul. Parameters" Paragraph 4.4.2.7.5 *p. 61* and, in the case of a separable system, Paragraph 4.4.2.6.6 *p. 57*.

If there are third party boilers:

- ► "Aux Boilers Funct.", Paragraph 4.4.2.7.3 p. 60.
- ▶ "Plant Rated Power", Paragraph 4.4.2.7.4 p. 61.

In the case of common water pumps managed by RB100/RB200:

- ► "RBox W. Pump delay", Paragraph 4.4.2.7.6 *p. 62* and, in the case of a separable system, Paragraph 4.4.2.6.7 *p. 58*.
- ► "General Wat. Timer", Paragraph 3.4.1.1.1.3 *p. 24* (optional).
- "Group Water Timer", Paragraph 3.4.1.1.1.4 p. 25 (optional, only for multi-DDC systems).



Activation of the general water timer replaces the default water setpoint value set in Paragraph 3.4.1.1.1.1 *p. 23* with the specific value of the time slot active at a given time.

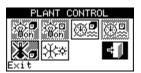
Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu

**4.5.3.1.2.1** System control in "mRYW" mode

To access the "Plant Control" menu, select the button on the start screen.

Figure 4.68 *p. 77* shows the "Plant Control" menu screen and the related requests described below.

### Figure 4.68



- General on/off switch. The switch is disabled in this operating mode.
- ► Group on/off switch. The switch is disabled in this

operating mode.

- General water timer on/off button. To turn off the general water timer (its request is always on and the default setpoint is used) place the cursor on the button and press the knob (symbol of request for general water timer off WARNING: the switch-off of the general water timer automatically implies disabling the group water timer (WE).
- From Group water timer on/off button (button disabled for systems managed by a single DDC). If on, the specific DDC also uses the group water timer (Paragraph 3.4.1.1.1.4 p. 25).
- Chronothermostat button disabled (request disabled in "mRYW" operating mode).

► ★\*\* Cooling/heating changeover switch available only for 2-pipe cold/hot systems: ★\*\* cooling; ★\*\* heating.

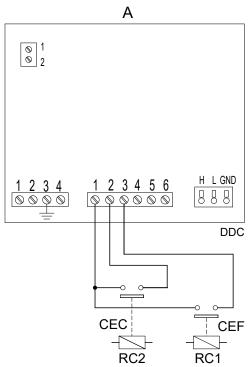
For control of the DHW system, Paragraph 4.5.3.1.1.2 p. 77.

The system is switched on only if:

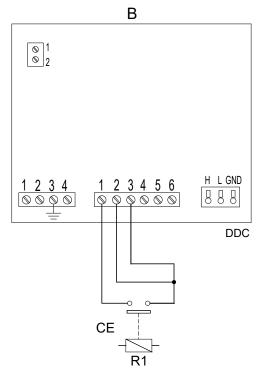
- ► The water timer is disabled and the contact RY (cooling system) or RW (heating system) is closed.
- ▶ If the water timer is enabled, the system will only be switched on if the corresponding external contact is closed and if the water timer is within a switch-on time slot.

Figure 4.69 *p. 78* shows the DDC connection diagram for the "mRYW" operating mode.

**Figure 4.69** Example of external control system connection for "mRYW" mode



- A Diagram for 4-pipe systems and 2-pipe systems with separate requests
- B Diagram for 2-pipe systems only if only one request is available
- CEC Heating external request
- CEF Cooling external request
- CE External request
- R1 Operation request relay (not supplied)
- RC1 Cooling system relay (not supplied)



RC2 Heating system relay (not supplied)

terminal 1 R (24 V AC)
terminal 2 W (heating)
terminal 3 Y (cooling request)
terminal 4 0 (0 V AC)
terminal 5 NA (not connected)

terminal 6 R (24 V AC)

# 4.5.3.1.3"aRYW" mode

In the "aRYW" operating mode, available only for 2-pipe hot/cold systems, the choice of cooling or heating operation is managed by the external contacts RY and RW. The closing of the RY contacts of connector D at the rear of the DDC (Figure 4.4 p. 38) determines:

- ► Switching to cooling if currently in heating mode.
- Switching on the system.
- ➤ Starting up the units.

The closing of the RW contacts of connector D at the back

of the DDC (Figure 4.4 p. 38) determines:

- ► Switching to heating if currently in cooling mode.
- ► Switching on the system.
- ➤ Starting up the units.

The opening of the RY or RW contacts determines:

- ► Maintaining the cooling or heating operating mode in use.
- ► Switching off the system.

In the "aRYW" operating mode, simultaneous closing of the RY and RW contacts is not permitted; if this should

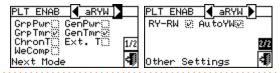


happen by accident, the DDC will show error "E1005". In addition, in the "aRYW" operating mode, the icon in the "Plant Control" menu is disabled.

Figure 4.70 *p. 79* shows the active requests for the "aRYW" operating mode. The symbol next to the request label means that the request is active. In the "aRYW" operating mode, 3 requests and the automatic switching function are activated:

- ► "RY-RW", RY-RW external contact activation request.
- ➤ "AutoYW", activation of automatic changeover to cooling or heating operation, only for 2-pipe heating/cooling systems.
- ► "GenTmr", general water timer activation request.
- ► "GrpTmr", activation request for group water timer (only used for multi-DDC systems).

# Figure 4.70



The requests in the "aRYW" operating mode are predefined and cannot be changed. However, it is possible to exclude some of them by means of the buttons in the "Plant Control" menu.

Once the system configuration is complete, the following parameters must be set:

- ▶ "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ► "Wat. Differential", Paragraph 4.4.2.7.1 *p. 59* and, in the case of a separable system, Paragraph 4.4.2.6.3 *p. 56*.
- ► "Regul. Parameters" Paragraph 4.4.2.7.5 *p. 61* and, in the case of a separable system, Paragraph 4.4.2.6.6 *p. 57*.

If there are third party boilers:

- ► "Aux Boilers Funct.", Paragraph 4.4.2.7.3 p. 60.
- ► "Plant Rated Power", Paragraph 4.4.2.7.4 p. 61.

In the case of common water pumps managed by RB100/RB200:

- ► "RBox W. Pump delay", Paragraph 4.4.2.7.6 *p. 62* and, in the case of a separable system, Paragraph 4.4.2.6.7 *p. 58*.
- "General Wat. Timer", Paragraph 3.4.1.1.1.3 p. 24 (optional).
- "Group Water Timer", Paragraph 3.4.1.1.1.4 p. 25 (optional, only for multi-DDC systems).



Activation of the general water timer replaces the default water setpoint value set in Paragraph 3.4.1.1.1.1 *p. 23* with the specific value of the

time slot active at a given time.

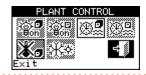
Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu .

**4.5.3.1.3.1** System control in "aRYW" mode

To access the "Plant Control" menu, select the button on the start screen.

Figure 4.71 *p. 79* shows the "Plant Control" menu screen and the related requests described below.

Figure 4.71



- ► General on/off switch. The switch is disabled in this operating mode.
- ► Group on/off switch. The switch is disabled in this operating mode.
- General water timer on/off button. To turn off the general water timer (its request is always on and the default setpoint is used) place the cursor on the button and press the knob (symbol of request for general water timer off WARNING: the switch-off of the general water timer automatically implies disabling the group water timer (WARNING).
- From Group water timer on/off button (button disabled for systems managed by a single DDC). If on, the specific DDC also uses the group water timer (Paragraph 3.4.1.1.1.4 p. 25).
- ► Chronothermostat button disabled (request disabled in "aRYW" operating mode).
- Cooling/heating changeover switch. The switch is disabled in this operating mode, but the symbol provides an indication of the current operating mode: cooling; heating.

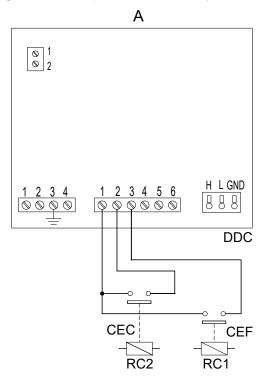
For control of the DHW system, Paragraph 4.5.3.1.1.2 *p. 77*.

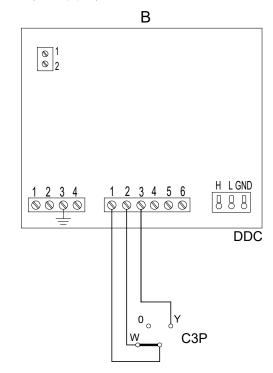
The system is switched on only if:

- ► Water timer disabled and active external request on contacts RY or RW.
- ▶ If the water timer is enabled, the system will only be switched on if there is an external request on the RY (or RW) contacts and if the water timer is within a switch-on time slot.

Figure 4.72 *p. 80* shows the DDC connection diagram for the "RYWa" operating mode.

**Figure 4.72** Example of external control system connection for "aRYW" mode (only for 2-pipe systems)





Α	General diagram
В	Specific diagram for use of general 3-position selector switch
CEC	Heating external request
CEF	Cooling external request
C3P	3-position switch (off/heating/cooling)
RC1	Cooling system relay (not supplied)
RC2	Heating system relay (not supplied)

terminal 1 R (24 V AC)
terminal 2 W (heating)
terminal 3 Y (cooling request)
terminal 4 0 (0 V AC)
terminal 5 NA (not connected)

terminal 6

R (24 V AC)

### **4.5.3.1.4**"AmbT" mode

In the "AmbT" operating mode, the request for on/off operation of the units is managed by a temperature probe, available as OSND007 optional, positioned inside the room to be air-conditioned (Figure 4.73 *p. 80*); for hot/cold 2-pipe systems, the choice of cooling or heating operation is made manually by the user through the "Plant Control" menu of the DDC.

In the "AmbT" operating mode with 2-pipe hot/cold systems, the icon in the "Plant Control" menu allows selection of cooling or heating operation respectively.

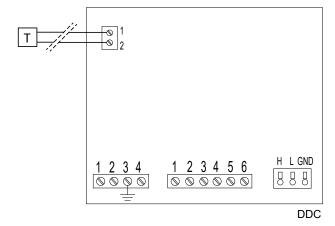
In cooling mode (Figure 4.74 *p. 81*), the system is switched on until the programmed room temperature value (T) is achieved; when the T value is achieved, the system is switched off and is switched on again if the value (T+Diff.) is later achieved, where "Diff." is the set differential.

In heating mode (Figure 4.75 p. 81), the system is switched on until the programmed room temperature value (T) is achieved; when the T value is achieved, the system is switched off and is switched on again if the value (T-Diff.) is later achieved, where "Diff." is the set differential.



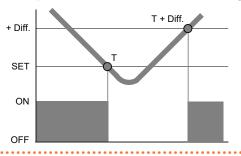
For operation with a room temperature probe, the room chronothermostat must be programmed (Paragraph 3.4.1.2.3 *p. 30*).

**Figure 4.73** Example of ambient temperature probe connection for "TAmb" and "CrvC" modes



T Room probe ("AmbT" mode)
Outdoor probe ("WCmp" mode)

**Figure 4.74** Operation in "AmbT"/"ExtT" mode in cooling mode



**Figure 4.75** Operation in "AmbT"/"ExtT" mode in heating mode

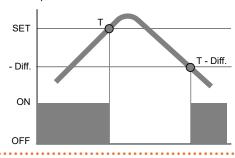
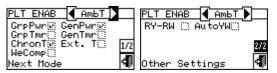


Figure 4.76 *p. 81* shows the active requests for the "AmbT" operating mode. The symbol next to the request label means that the request is active. In the "AmbT" operating mode, 3 requests are activated:

- ► "GenPwr", general system on/off switch.
- ► "GrpPwr", group system on/off switch (only used for multi-DDC systems).
- ► "ChronT", chronothermostat activation request.

Figure 4.76



The requests in the "AmbT" operating mode are predefined and cannot be changed. However, it is possible to exclude some of them by means of the buttons in the "Plant Control" menu.

Once the system configuration is complete, the following parameters must be set:

- ▶ "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ▶ "Wat. Differential", Paragraph 4.4.2.7.1 p. 59 and, in the case of a separable system, Paragraph 4.4.2.6.3 p. 56.
- ► "Regul. Parameters" Paragraph 4.4.2.7.5 *p. 61* and, in the case of a separable system, Paragraph 4.4.2.6.6 *p. 57*.
- ▶ "Differential", Paragraph 3.4.1.2.1 p. 29.
- ► "Chronot. Set Pnts", Paragraph 3.4.1.2.2 p. 29.
- ► "Chronothermostat", Paragraph 3.4.1.2.3 *p. 30*. If there are third party boilers:
- ► "Aux Boilers Funct.", Paragraph 4.4.2.7.3 p. 60.
- ▶ "Plant Rated Power", Paragraph 4.4.2.7.4 p. 61.

In the case of common water pumps managed by RB100/

#### RB200:

► "RBox W. Pump delay", Paragraph 4.4.2.7.6 *p. 62* and, in the case of a separable system, Paragraph 4.4.2.6.7 *p. 58*.

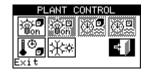
Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu .

# **4.5.3.1.4.1** System control in "AmbT" mode

To access the "Plant Control" menu, select the button on the start screen.

Figure 4.77 *p. 81* shows the "Plant Control" menu screen and the related requests described below.

Figure 4.77



- General on/off switch. Turn the knob to place the cursor on the button and press the knob to activate it (symbol of the on/off button in the on position in the case of a multi-DDC system, it is only active on the master DDC; on the slave DDC(s) it reflects the on/off status set on the master.
- From Group on/off switch. Disabled button (always on) for systems managed by a single DDC. Turn the knob to place the cursor on the button and press it to activate it (symbol of the on/off button in the on position on the specific DDC.
- ► General water timer button disabled (request disabled in "AmbT" operating mode).
- ► ☐ Group water timer button disabled (request disabled in "AmbT" operating mode).
- Chronothermostat on/off button. To switch on the chronothermostat, place the cursor on the button and press the knob (chronothermostat symbol active
- ► ★\* Cooling/heating changeover switch available only for 2-pipe cold/hot systems: ★\* cooling; ★\* heating.

For control of the DHW system, Paragraph 4.5.3.1.1.2 *p. 77*.

The system is switched on only if:

- ➤ The general on/off switch and at least one of the group on/off switches are on, the chronothermostat is on and the room temperature does not correspond to the set temperature.
- ➤ The general on/off switch and at least one of the group on/off switches are on, the chronothermostat is off. In this operating condition, switching on and off is manual, i.e. no room thermostating is carried out.

### 4.5.3.1.5 "ExtT" mode

In the "ExtT" operating mode, the request for the operation of the units is determined by comparing the

temperature detected by the outdoor probe connected to the DDC (if available, otherwise the average of the outdoor temperature probes onboard the units is used) with the programmed outdoor temperature value; for 2-pipe hot/cold systems, the choice of cooling or heating operation is made manually by the user through the "Plant Control" menu of the DDC through the icon in the same menu.

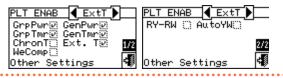
In cooling mode (Figure 4.74 p. 81), the system is switched on if the outdoor air temperature is higher than the programmed outdoor temperature value (T) plus the set differential (Diff.); when the T value is achieved, the system is switched off and is switched on again if the value (T+Diff.) is later achieved.

In heating mode (Figure 4.75 p. 81), the system is switched on if the outdoor air temperature is lower than the programmed outdoor temperature value (T) minus the set differential (Diff.); when the T value is achieved, the system is switched off and is switched on again if the value (T-Diff.) is later achieved.

Figure 4.78 *p. 82* shows the active requests for the "ExtT" operating mode. The symbol next to the request label means that the request is active. In the "ExtT" operating mode, 5 requests are activated:

- ► "GenPwr", general system on/off switch.
- "GrpPwr", group system on/off switch (only used for multi-DDC systems).
- ► "GenTmr", general water timer activation request.
- "GrpTmr", activation request for group water timer (only used for multi-DDC systems).
- ► "Ta Est", request for on/off depending on outdoor temperature.

Figure 4.78



The requests in the "ExtT" operating mode are predefined and cannot be changed. However, it is possible to exclude some of them by means of the buttons in the "Plant Control" menu.

Once the system configuration is complete, the following parameters must be set:

- ► "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ► "Wat. Differential", Paragraph 4.4.2.7.1 *p. 59* and, in the case of a separable system, Paragraph 4.4.2.6.3 *p. 56*.
- ► "Regul. Parameters" Paragraph 4.4.2.7.5 *p. 61* and, in the case of a separable system, Paragraph 4.4.2.6.6 *p. 57*.
- ▶ "Buildng Time Const", Paragraph 4.4.1.9 p. 50.
- ► "ExtT. Filter Reset", Paragraph 4.4.1.10 p. 50.
- ► "Set Point", Paragraph 3.4.1.3.1 *p. 31*.
- "Differential", Paragraph 3.4.1.3.2 p. 32.

If there are third party boilers:

- ► "Aux Boilers Funct.", Paragraph 4.4.2.7.3 *p. 60*.
- ▶ "Plant Rated Power", Paragraph 4.4.2.7.4 p. 61.

In the case of common water pumps managed by RB100/RB200:

► "RBox W. Pump delay", Paragraph 4.4.2.7.6 *p. 62* and, in the case of a separable system, Paragraph 4.4.2.6.7 *p. 58*.

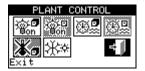
Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu .

# **4.5.3.1.5.1** System control in "ExtT" mode

To access the "Plant Control" menu, select the button on the start screen.

Figure 4.79 *p. 82* shows the "Plant Control" menu screen and the related requests described below.

Figure 4.79



- General on/off switch. Turn the knob to place the cursor on the button and press the knob to activate it (symbol of the on/off button in the on position in the case of a multi-DDC system, it is only active on the master DDC; on the slave DDC(s) it reflects the on/off status set on the master.
- For the cursor on the button in the on position of the specific DDC. Turn the knob to place the cursor on the button and press it to activate it (symbol of the on/off button in the on position of the specific DDC.
- General water timer on/off button. To turn off the general water timer (its request is always on and the default setpoint is used) place the cursor on the button and press the knob (symbol of request for general water timer off ...). WARNING: the switch-off of the general water timer automatically implies disabling the group water timer (...).
- ► Group water timer on/off button (button disabled for systems managed by a single DDC). If on, the specific DDC also uses the group water timer (Paragraph 3.4.1.1.1.4 p. 25).
- Chronothermostat button disabled (request disabled in "ExtT" operating mode).
- ► ★ Cooling/heating changeover switch available only for 2-pipe cold/hot systems: ★ cooling; ★ heating.

For control of the DHW system, Paragraph 4.5.3.1.1.2 p. 77.

The system is switched on only if:

➤ The general on/off switch and at least one of the group on/off switches are on, the water timer is enabled and you are within a switch-on time slot and the outdoor temperature is lower (heating) or higher (cooling) than the set outdoor setpoint (Paragraph 3.4.1.3.1 p. 31).

► The general on/off switch and at least one of the group on/off switches are on, the water timer is disabled and the outdoor temperature is lower (heating) or higher (cooling) than the set outdoor setpoint (Paragraph 3.4.1.3.1 p. 31).

### 4.5.3.1.6"WCmp" mode

In the "WCmp" operating mode, the water temperature is determined according to the outdoor temperature and the climatic curve; for 2-pipe hot/cold systems, the choice of cooling or heating operation is made manually by the user via the "Plant Control" menu of the DDC through the icon in the same menu.

In cooling operation, the water temperature drops as the outdoor temperature rises and rises as the outdoor temperature falls.

In heating operation, the water temperature rises as the outdoor temperature falls and falls as the outdoor temperature rises.

For operation in "WCmp" mode, it is recommended to connect an outdoor temperature probe, available as OSND007 optional.

The outdoor temperature probe must be connected to the appropriate terminals on the back of the DDC (Figure 4.73 *p. 80*).

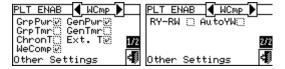


If the outdoor temperature probe is not installed, the operation of the units will be managed according to the average of the temperatures detected by the unit probes, which is significantly less accurate.

Figure 4.80 *p. 83* shows the active requests for the "WCmp" operating mode. The symbol next to the request label means that the request is active. In the "WCmp" operating mode, 4 requests are activated:

- ► "GenPwr", general system on/off switch.
- ► "GrpPwr", group system on/off switch (only used for multi-DDC systems).
- ► "WeComp", climatic curve function.
- "Ta Est", request for on/off depending on outdoor temperature.

### Figure 4.80



The requests in the "WCmp" operating mode are predefined and cannot be changed. However, it is possible to exclude some of them by means of the buttons in the "Plant Control" menu.

Once the system configuration is complete, the following parameters must be set:

- ▶ "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ► "Wat. Differential", Paragraph 4.4.2.7.1 p. 59 and, in the case of a separable system, Paragraph 4.4.2.6.3 p. 56.

- ► "Regul. Parameters" Paragraph 4.4.2.7.5 *p. 61* and, in the case of a separable system, Paragraph 4.4.2.6.6 *p. 57*.
- ► "Set Point", Paragraph 3.4.1.3.1 *p. 31*.
- ▶ "Differential", Paragraph 3.4.1.3.2 p. 32.
- ► "Weather Comp parms", Paragraph 4.4.2.7.10.4 *p. 68*.
- ▶ "Buildng Time Const", Paragraph 4.4.1.9 p. 50.
- ► "ExtT. Filter Reset", Paragraph 4.4.1.10 p. 50.
- ▶ "Weather Comp Enab.", Paragraph 3.4.1.1.1.2 p. 24.
- ► "Chronot. Set Pnts", Paragraph 3.4.1.2.2 p. 29.
- ► "Chronothermostat", Paragraph 3.4.1.2.3 *p. 30*.

If there are third party boilers:

4.4.2.6.7 p. 58.

- ► "Aux Boilers Funct.", Paragraph 4.4.2.7.3 p. 60.
- ► "Plant Rated Power", Paragraph 4.4.2.7.4 *p. 61*. In the case of common water pumps managed by RB100/
- ► "RBox W. Pump delay", Paragraph 4.4.2.7.6 *p. 62* and, in the case of a separable system, Paragraph

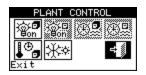
Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu .

**4.5.3.1.6.1** System control in "WCmp" mode

To access the "Plant Control" menu, select the button on the start screen.

Figure 4.81 *p. 83* shows the "Plant Control" menu screen and the related requests described below.

Figure 4.81



- General on/off switch. Turn the knob to place the cursor on the button and press the knob to activate it (symbol of the on/off button in the on position in the case of a multi-DDC system, it is only active on the master DDC; on the slave DDC(s) it reflects the on/off status set on the master.
- For the specific DDC. The switch of the specific DDC. The systems managed by a single DDC. Turn the knob to place the cursor on the button and press it to activate it (symbol of the on/off button in the on position of the specific DDC.
- ► General water timer button disabled (request disabled in "WCmp" operating mode).
- ► Group water timer button disabled (request disabled in "WCmp" operating mode).
- Chronothermostat button. Pressing the button repeatedly causes the symbol on it to change and the following modes to be set:
  - the room temperature setpoint is the active one, according to the time program set on the chronothermostat.

- or T3 comparison or temperature setpoint is always T3 (maximum level of heating or cooling service).
- the room temperature setpoint is always T2 (average level of heating or cooling service).
- or  $\mathbb{L}^{T_1}$  or  $\mathbb{L}^{T_2}$ : the room temperature setpoint is always T1 (minimum level of heating or cooling service).
- NOTE: the climatic curve function is active in all the above modes.
- NOTE: If the button is this means that the climatic curve function has been disabled in the ""Weather Comp Enab." menu (Paragraph 3.4.1.1.1.2 *p. 24*).
- ► ★\* Cooling/heating changeover switch available only for 2-pipe cold/hot systems: ★\* cooling; ★\* heating.

For control of the DHW system, Paragraph 4.5.3.1.1.2 *p. 77*.

The system is switched on only if:

► The general on/off switch and at least one of the group on/off switches are on and the outdoor temperature is lower (heating) or higher (cooling) than the set outdoor setpoint (Paragraph 3.4.1.3.1 p. 31); moreover, the system uses the water setpoint calculated from the climatic curve.

### 4.5.3.1.7"MON" mode

In the monitor operating mode ("MON"), the DDC does not manage any of the setpoint settings, which will be made in the dedicated parameters on the board of each individual unit, nor the switch-on of the units, which will be done using the contacts on the board of each individual unit.

The other functions of the DDC are fully usable and therefore make it possible to display the operating data and information data of the units, as well as any warnings and alarms (also collected in the alarms log). It is also possible to reset any faults and flame lock-outs, as well as display and, if required, change the unit parameters (TAC only). For further information please contact the Robur technical service.

# 4.5.3.1.8"PLOG" mode

The "PLOG" (passive logger) mode is designed to monitor systems managed by other DDCs.

It allows a DDC to acquire on the CAN bus and make all unit data available on Modbus, even though it is not the actual system master.

In contrast to the "MON" mode, it is not possible to reset any faults or display and change unit parameters.

To configure and activate the "PLOG" mode, perform the following sequence of operations:

- 1. Configure the DDC in normal request mode (e.g. "MAN") and as a system master (in the case of a 4-pipe configuration also of both systems, if it is of interest to monitor units located on both).
- **2.** Perform the unit-DDC binding, selecting the units you want to monitor (typically, all of them).
- 3. Set the DDC to "PLOG" mode.

### 4. Configure the actual master DDC(s).



In the case of a 4-pipe configuration, the "PLOG" mode is always applied to both systems; it is not possible to use a DDC as actual controller of one system and passive logger of the other.

If it is needed to deactivate the "PLOG" mode, configure a different request mode on the monitoring DDC and confirm the requested DDC restart in the box shown on the display.

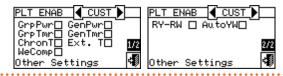
### **4.5.3.1.9**"CUST" mode

In the custom operation mode ("CUST"), the user is free to choose the requests that will determine the switching on and off of the units.

Figure 4.82 p. 84 shows the requests available in the "CUST" operating mode. The  $\square$  symbol next to the request symbol means that request is disabled. To enable the request, place the cursor on  $\square$  and press the knob. The  $\square$  symbol means that the request has been enabled. The requests available in the "CUST" mode are:

- ▶ "GenPwr", general system on/off switch.
- ► "GrpPwr", group system on/off switch (only used for multi-DDC systems).
- ▶ "GenTmr", general water timer activation request.
- "GrpTmr", activation request for group water timer (only used for multi-DDC systems).
- ► "ChronT", chronothermostat activation request.
- ► "WeComp", climatic curve function.
- ► "Ta Est", request for on/off depending on outdoor temperature.
- ► "RY-RW", RY-RW external contact activation request.
- ➤ "AutoYW", activation of automatic changeover to cooling or heating operation, only for 2-pipe heating/cooling systems.

Figure 4.82



It is therefore also possible to combine all available requests (e.g. chronothermostat, water timer and external contacts) or selectively exclude some of them (e.g. general water timer yes, group water timer no, etc.).

It is not however possible to select the "WeComp" function at the same time as the "GenTmr" or "ChronT" consent. Once the system configuration is complete, the following parameters must be set:

- "Default Set Point", Paragraph 3.4.1.1.1.1 p. 23.
- ► "Wat. Differential", Paragraph 4.4.2.7.1 p. 59 and, in the case of a separable system, Paragraph 4.4.2.6.3 p. 56.
- ► "Regul. Parameters" Paragraph 4.4.2.7.5 *p. 61* and, in the case of a separable system, Paragraph 4.4.2.6.6 *p. 57*.
- "General Wat. Timer", Paragraph 3.4.1.1.1.3 p. 24 (if activated).



■ "Group Water Timer" (only for multi-DDC systems), Paragraph 3.4.1.1.1.4 p. 25 (if activated).

If there are third party boilers:

- "Aux Boilers Funct.", Paragraph 4.4.2.7.3 p. 60.
- ► "Plant Rated Power", Paragraph 4.4.2.7.4 p. 61.

In the case of common water pumps managed by RB100/

► "RBox W. Pump delay", Paragraph 4.4.2.7.6 p. 62 and, in the case of a separable system, Paragraph 4.4.2.6.7 p. 58.

If the room chronothermostat is activated, the room settings described in Paragraph 3.4.1.2 p. 28 and listed below must be configured:

- ▶ "Differential", Paragraph 3.4.1.2.1 p. 29.
- ► "Chronot. Set Pnts", Paragraph 3.4.1.2.2 p. 29.
- ► "Chronothermostat", Paragraph 3.4.1.2.3 p. 30.

If "ExtT" request is activated, it must be configured:

- "Building Time Const", Paragraph 4.4.1.9 p. 50.
- ► "ExtT. Filter Reset", Paragraph 4.4.1.10 p. 50.
- "Set Point", Paragraph 3.4.1.3.1 p. 31.
- "Differential", Paragraph 3.4.1.3.2 p. 32.

If the "WCmp" function is activated, it must be configured:

- ▶ "Weather Comp parms", Paragraph 4.4.2.7.10.4 p. 68.
- "Buildng Time Const", Paragraph 4.4.1.9 p. 50.
- "ExtT. Filter Reset", Paragraph 4.4.1.10 p. 50.
- "Weather Comp Enab.", Paragraph 3.4.1.1.1.2 p. 24.
- "Chronot. Set Pnts", Paragraph 3.4.1.2.2 p. 29.
- ► "Chronothermostat", Paragraph 3.4.1.2.3 p. 30.

Once the user settings have been programmed, it is possible to proceed with the switch-on via the "Plant Control" menu 🕒

4.5.3.1.9.1 System control in "CUST" mode

To access the "Plant Control" menu, select the 😃 button on the start screen.

The number of buttons enabled within the "Plant Control"

menu will depend on the choice of requests made.

For more information on the "Plant Control" menu, Paragraph 2.4 p. 11.

To access the "Plant Control" menu for the DHW system, Paragraph 2.5 p. 13.

For further information please contact the Robur technical service.

# 4.5.3.2 Other configurations

Once the operating mode has been selected, set the options listed below:

- "Max Water Setpoint" (Paragraph 4.4.2.7.10.6 p. 70), "Min Water Setpoint" (Paragraph 4.4.2.7.10.7 p. 71), "Max Water Setpoint" for base DHW (Paragraph 4.4.2.7.12.1 *p. 73*) and, in the case of a separable system, Paragraph 4.4.2.6.2 p. 55.
- "Wat. Thermos. Mode", Paragraph 4.4.2.7.10.3 p. 68.
- "Units Util. Preced", Paragraph 4.4.2.7.7 p. 62.
- "Chronot. Op. Mode", Paragraph 4.4.2.7.10.8 p. 72.
- ► "Wat. Pump Op. Mode", Paragraph 4.4.2.2 *p. 54*.
- ► "Partial Oper. Mode", Paragraph 4.4.2.3 p. 54.
- "Temp. Alarm Setup", Paragraph 4.4.2.7.8 p. 63.
- ► "Alarms Outp. Setup", Paragraph 4.4.2.4 p. 54.

#### 4.6 MANAGEMENT AND DISPLAY OF **WARNINGS AND FAULTS**

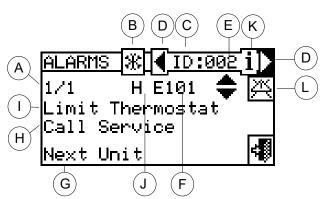
Any malfunctioning of the GA ACF and GAHP series units connected to the DDC is reported and displayed on the DDC itself via:

- ► "Alarms" menu.
- ► "Alarms Log", Paragraph 3.2.5 p. 20.
- ▶ "Units Status", Paragraph 3.2.3.2 p. 17.

To access the "Alarms" menu, select **A** from the main screen.

Figure 4.83 p. 85 shows the "Alarms" menu screen.

Figure 4.83 Example of "Alarms" menu screen



- Progressive number of current events for the selected unit
- System identification symbol; for cooling system; for heating system
- CUnit ID
- D Scroll arrows to change the unit whose events are being displayed
- Vertical scroll arrows to view events that have occurred on the unit
- Event code indication (error: E; warning: W)
- Description of the cursor position
- Description of the action to be taken to resolve the event that occurred
- Description of the event
- The event belongs to:
  - "C": cooling module
  - "H": heating module
  - "B": electronic board
- Accesses the "Unit Information" menu of the selected unit
- Accesses the "Unit Alarms Reset" menu of the selected unit

NOTE: The letters "C" and "H" will not be displayed for GAHP GS/WS

Current events are displayed in the "Alarms" menu: you can view the type of event (warning or error) for each unit

Instructions for accessing the "Alarms" menu:

- 1. From the main screen select
- 2. Select the system for which events have occurred:

the hot water production system; for the chilled water production system. The symbol that appears next to the system icon indicates the presence of faults on the system.

- 3. To search for the faulty unit select . If the unit has no errors, "No alarm" will be displayed.
- **4.** Use the vertical scroll arrows **t** to view all events

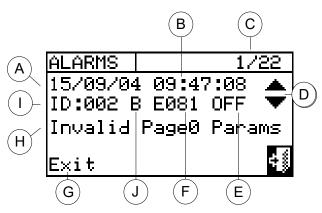
on the unit.

The icon allows access to the "Units Management" menu for error reset or flame control unit reset, if needed.

The  $\dot{\mathbf{1}}$  icon allows access to the "Unit Information" menu for the selected appliance.

Events that occur are stored in the "Alarms Log" menu. Figure 4.84 *p. 86* shows the "Alarms Log" menu screen.

Figure 4.84 Example of "Alarms Log" menu screen



- A Event detection date
- B Event detection time
- C Event number indicator: the first number shows the chronological position of the event being displayed, while the second indicates the total number of events stored by the DDC
- D Vertical scroll arrows: allow you to view the events that occurred on the system in a chronological way
- E Event status: ON indicates when the event occurred; OFF indicates when it ended
- F Numeric code describing the type of event
- G Description of the function highlighted by the cursor
- H Description of the event
- ID of unit or DDCs on which the displayed event occurred
- J Origin of the fault:
  - "C": cooling module
  - "H": heating module
  - "B": electronic board

NOTE: The letters "C" and "H" will not be displayed for GAHP GS/WS

Instructions for accessing the "Alarms Log" menu follow.

- 1. From the main screen select
- 2. Select to access the "Functional Data" menu.
- **3.** Turn the knob to select the "Alarms Log" menu, and press the knob to access the menu.
- **4.** Place the cursor on the vertical scroll arrows (detail D, Figure 3.23 *p. 20*) to scroll through the events, from latest to earliest.
- **5.** To exit, select

Through the "Units Status" menu it is possible to have a complete overview of the running and faulty units.

There are two screens: "ON/OFF" and "ALARMS".

The following symbols will appear next to the unit ID for the "ON/OFF" screen:

- ► If the unit is switched off, no symbol will appear next to the unit ID.
- ► if the unit is on.
- ► if the unit has been excluded from the system via the options in the "Units Management" menu.
- ▶ "D" if the unit is performing a defrosting cycle. Option valid only for GAHP A and GAHP-AR units.
- ► "T" if the unit is switched off after exceeding operational limit.

Select to display units in error or warning. If the unit is in error, "E" will appear next to the unit ID.

In the "ALARMS" screen the following symbols will appear next to the unit ID:

- ► "E" if an error has occurred in the unit.
- ► "W" if a warning has occurred in the unit.
- ▶ "O" (offline) if there are connection problems between

the unit and the DDC.

► If the unit has no errors or warnings, no symbol will appear next to the unit ID.

In the case of 2-pipe hot/cold systems, i.e. for alternating hot/cold water production, the symbols active.

Select to switch to the screens relating to the modules dedicated to chilled water production will appear).

Select to switch to the screens relating to the modules dedicated to hot water production will appear). Follow the instructions below to access the "ALARMS"

1. From the main screen select M.

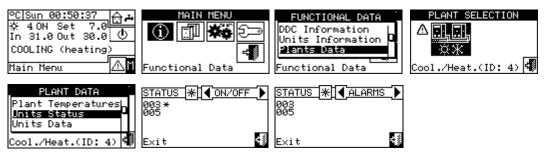
screen:

- 2. Select 1 to access the "Functional Data" menu.
- **3.** Turn the knob to select the "Plants Data" menu, and press the knob to access the menu.
- 4. Select the system whose unit status you wish to view:

  \*\*\* for 2-pipe cooling/heating systems; for the hot water production system; for the chilled water production system. The symbol appearing next to the system icon indicates the presence of a fault.
- **5.** Turn the knob to select the "Units Status" menu, and press the knob to access the menu.
- **6.** Select to go to the "ALARMS" screen: next to the unit ID the letter "E" will denote the presence of an error.
- 7. Regardless of which of the two screens is selected, turning the knob allows selecting a unit ID and, by pressing the knob, accessing the "Unit Information" menu.

8. To exit, select .

# Figure 4.85



Operating faults may be of two types: warnings or errors. If a warning event occurs:

- ➤ Reporting of warning status in the "Alarms" menu (to access the "Alarms" menu select from the main screen).
- ► The warning is reported in the "Alarms Log" menu.
- ► Storage of the warning on event in the alarms log. When the warning event is reset, the following occurs:
- ► Warning signal reset.
- ► Storage of the warning off event in the alarms log. If an error event occurs:
- ➤ Reporting of error status in the "Alarms" menu (to access the "Alarms" menu select ▲ from the main screen).
- ► Flashing of display backlight and ▲ icon.

- ► Activation of the sound beeper, if enabled in the "Alarm Beeper" menu, Paragraph 3.4.2.4 p. 34.
- ➤ Switching of the signal relay, if enabled in the "Alarms Outp. Setup." menu, Paragraph 4.4.2.4 *p. 54*.
- ► Reporting of error status in the "Units Status" menu.
- ► The error is reported in the "Alarms Log" menu.
- ► Storage of the error on event in the alarms log. When the event is reset, the following occurs:
- ► Display and error reporting reset.
- ► Beeper reset.
- ► Display and ▲ icon flashing reset.
- ➤ Signal relay reset.
- ➤ Storage of the error off event in the alarms log. Fault codes are categorised according to the type of unit they originate from, as shown in Table 4.9 *p. 87*.

Table 4.9 Fault codes

Appliance	Error	Warning	Notes
חחר	10	10	The code, for errors generated by the DDC, consists of four digits: the first two indicate the
DDC 10		10	type of unit in error (10 for the DDC) and the other two the error type.
ACF 60-00	0	0	The fault code for the ACF 60-00 module consists of 3 digits: the first defines the unit type (0
ACF 60-00	0	0	for ACF 60-00), the other two identify the error type.
AV(00.120		1	The fault code for the AY00-120 module consists of 3 digits: the first defines the unit type (1
AY00-120	1	1	for AY00-120), the other two identify the error type.
CALIDICCAMC	2	2	The fault code for the GAHP GS/WS module consists of 3 digits: the first defines the unit type
GAHP GS/WS 2		2	(2 for GAHP GS/WS), the other two identify the error type.
CALIDAD		(	The fault code for the GAHP-AR module consists of 3 digits: the first defines the unit type (6 for
GAHP-AR	6	6	GAHP-AR), the other two identify the error type.
CALIDA	4	4	The fault code for the GAHP A module consists of 3 digits: the first defines the unit type (4 for
GAHP A	4		GAHP A), the other two identify the error type.



Refer to the installation manual of the individual units for a detailed list of unit-related faults.

Table 4.10 p. 87 shows the main faults relating to the DDC with an indication of the possible action to be taken.

**Table 4.10** Operative codes

Code	W/E	Description	Notes
1000	W	New appliance configuration	-
1001	Е	Module offline	The event is always associated with the ID of the module involved.
1002	Е	All modules offline	-
1003	Е	High cooling system temperature	Refer to the DDC configuration instructions for the water temperature alarm threshold.
1004	Е	Low heating system temperature	Refer to the DDC configuration instructions for the water temperature alarm threshold.
1005	Е	RY and RW contacts simultaneously activated	"aRYW" mode must be active.
1006	Е	Room temperature probe fault	Room temperature probe faulty or not connected.

Code	W/E	Description	Notes
1007	Е	Configuration conflict on one module	Unit board configuration changed without re-configuring
1007	L	Configuration Confict on one module	the units.
1008	Е	Master DDC offline	Only for slave DDCs that can no longer communicate with
			the master DDC. Only for master DDC that can no longer communicate
1009	E	Slave DDC offline	with slave DDCs and only if the partial operation option is
1005		Slave DDC Offine	disabled.
1010	W	Event history deleted	-
1011	W	Appliance powered on	DDC powered on.
1012	W	Event history restarted	Always combined with DDC power on (W1011).
1013	Е	Separated modules offline	Only on master DDC.
			ID of a module equal to the ID of the heating/cooling valve
1014	Е	Cooling/heating valve configuration mismatch	configured on RB100/RB200 or heating/cooling valve con-
	_	cooming, nearing varies configuration mismatch	figuration on RB100/RB200 modified without re-configuring
			the units.
1015	Е	Cooling/heating valve offline	The DDC is not able to communicate with the RB100/RB200 that controls the heating/cooling valve.
			The time taken for heating/cooling changeover is longer
1016	E	Cooling/heating valve timeout	than that set in the "Max. Travel Time:" parameter of the DDC.
	_		Heating/cooling valve limit switch contacts in a different
1017	E	Cooling/heating valve position error	position than expected.
1010	г	Caaling /lacating value position array	Only possible in case of DDC replacement without having
1018	Е	Cooling/heating valve position error	replicated the previous configuration.
			ID of a module equal to the ID of the DHW valve configured
1019	E	DHW valve configuration mismatch	on RB100/RB200 or DHW valve configuration on RB100/
			RB200 modified without re-configuring the units.
1020	Е	DHW valve offline	The DDC is not able to communicate with the RB100/RB200
			that controls the DHW valve.
1021	E	DHW valve timeout	The time taken for DHW switching is longer than that set in the "Max. Travel Time:" parameter of the DDC.
			DHW valve limit switch contacts in a different position than
1022	E	DHW valve position error	expected.
			Only for FW 4.007.
1023	W	Outdoor temperature probe fault	Outdoor temperature probe faulty or not connected.
1023	VV	Outdoor temperature probe rault	The average of the outdoor temperature probes of the units
			is used as a replacement.
1024	_	DDC/CCLID C d	Only for FW 4.007.
1024	E	DDC/CCI ID configuration conflict	Presence on the same CAN bus network of another DDC/CCI with the same ID.
			From FW 4.008 onwards.
			Outdoor temperature probe faulty or not connected.
1025	W	Outdoor temperature probe fault	The average of the outdoor temperature probes of the units
			is used as a replacement.
			From FW 4.008 onwards.
1026	E	DDC/CCI ID configuration conflict	Presence on the same CAN bus network of another DDC/CCI
			with the same ID.
1027	W	Heat pump temperature operational limits reached before the set	From FW 4.013 onwards.
1028	Е	threshold Third party unit error	From FW 4.013 onwards.
1020	E	Base plant manifold temperature probe fault	From FW 4.013 onwards.
1030	E	Separable plant manifold temperature probe fault	From FW 4.013 onwards.
		Cooling or 2-pipes cooling/heating plant inlet manifold temperature	
1031	E	probe offline	From FW 4.013 onwards.
1032	Е	Cooling or 2-pipes cooling/heating plant delivery manifold temper-	From FW 4.013 onwards.
		ature probe offline	
1033	Е	Heating plant inlet manifold probe offline	From FW 4.013 onwards.
1034	E	Heating plant delivery manifold probe offline	From FW 4.013 onwards.
1035	E	Separable plant inlet manifold probe offline	From FW 4.013 onwards.
1036	E	Separable plant delivery manifold probe offline	From FW 4.013 onwards.
1037	Е	Heat pumps inlet temperature probe offline	From FW 4.013 onwards.
1038	Е	Cooling or 2-pipes cooling/heating plant inlet manifold probe configuration conflict	From FW 4.013 onwards.
		Cooling or 2-pipes cooling/heating plant delivery manifold probe	
1039	Е	( Onling of 7-pines conling/neating plant delivery manifold probe	From FW 4.013 onwards.



Code	W/E	Description	Notes
1040	Е	Heating plant inlet manifold probe configuration conflict	From FW 4.013 onwards.
1041	Е	Heating plant delivery manifold probe configuration conflict	From FW 4.013 onwards.
1042	Е	Separable plant inlet manifold probe configuration conflict	From FW 4.013 onwards.
1043	Е	Separable plant delivery manifold probe configuration conflict	From FW 4.013 onwards.
1044	Е	Heat pumps inlet temperature probe configuration conflict	From FW 4.013 onwards.
1045	Е	Cooling or 2-pipes cooling/heating plant inlet manifold probe fault	From FW 4.013 onwards.
1046	Е	Cooling or 2-pipes cooling/heating plant delivery manifold probe fault	From FW 4.013 onwards.
1047	Е	Heating plant inlet manifold probe fault	From FW 4.013 onwards.
1048	Е	Heating plant delivery manifold probe fault	From FW 4.013 onwards.
1049	Е	Separable plant inlet manifold probe fault	From FW 4.013 onwards.
1050	Е	Separable plant delivery manifold probe fault	From FW 4.013 onwards.
1051	Е	Heat pumps inlet temperature probe fault	From FW 4.013 onwards.
1052	Е	Cooling or 2-pipes cooling/heating plant primary circulating pump offline	From FW 4.013 onwards.
1053	Е	Heating plant primary circulating pump offline	From FW 4.013 onwards.
1054	Е	Separable plant primary circulating pump offline	From FW 4.013 onwards.
1055	Е	Cooling or 2-pipes cooling/heating plant primary circulating pump configuration conflict	From FW 4.013 onwards.
1056	Е	Heating plant primary circulating pump configuration conflict	From FW 4.013 onwards.
1057	Е	Separable plant primary circulating pump configuration conflict	From FW 4.013 onwards.
1058	Е	Base plant manifold probes not configured	From FW 4.013 onwards.
1059	Е	Separable plant manifold probes not configured	From FW 4.013 onwards.
1060	Е	Base plant circulating pump not configured	From FW 4.013 onwards.
1061	Е	Separable plant circulating pump not configured	From FW 4.013 onwards.
1062	Е	Cooling or 2-pipes cooling/heating plant secondary circulating pump offline	From FW 4.013 onwards.
1063	Е	Heating plant secondary circulating pump offline	From FW 4.013 onwards.
1064	Е	Cooling or 2-pipes cooling/heating plant secondary circulating pump configuration conflict	From FW 4.013 onwards.
1065	Е	Heating plant secondary circulating pump configuration conflict	From FW 4.013 onwards.
1066	W	Almost one heat pump has reached operational limit on base plant	From FW 4.015 onwards.
1067	W	Almost one heat pump has reached operational limit on separable plant	From FW 4.015 onwards.
1068	W	DDC restart driven by watchdog	From FW 4.018 onwards.
1069	W	Maintenance required	From FW 4.018 onwards.

To reset errors and/or reset the flame control unit refer to Paragraph 2.7 p. 14.



Error reset or reset of the flame control unit is not possible for third party units.

# **Robur mission**

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