

Cascade management control unit

Instructions for the installation, configuration and use of the **cascade management control unit** (hereafter **Control Unit**) and its expansions, for heating system with up to **3 delivery circuits/collectors** (hereinafter **Collectors**) and production of hot water (with or without addition of solar heating) governed by cascading **boilers / thermal modules** (hereinafter **Generators**).



DANGER! It is recommended to place a **BIPOLAR SWITCH** on the power supply upstream of the kit in accordance with current regulations. The installation must be carried out in compliance with the regulations in force and according to state-of-the-art standards.

ALL installation and electrical connection operations must be done with the circuits **DISCONNECTED** from the power supply.

Kit contents

Q.ty	Item
1	Cascade Control Unit
11	Grommets for wires
1	External Probe ($\beta=3977 - 10k\Omega - \text{at } 25^\circ\text{C}$)
4	Cascade Plant Probe ($\beta=3435 - 10k\Omega - \text{at } 25^\circ\text{C}$)
1	Cascade Control Unit Instructions (this document)

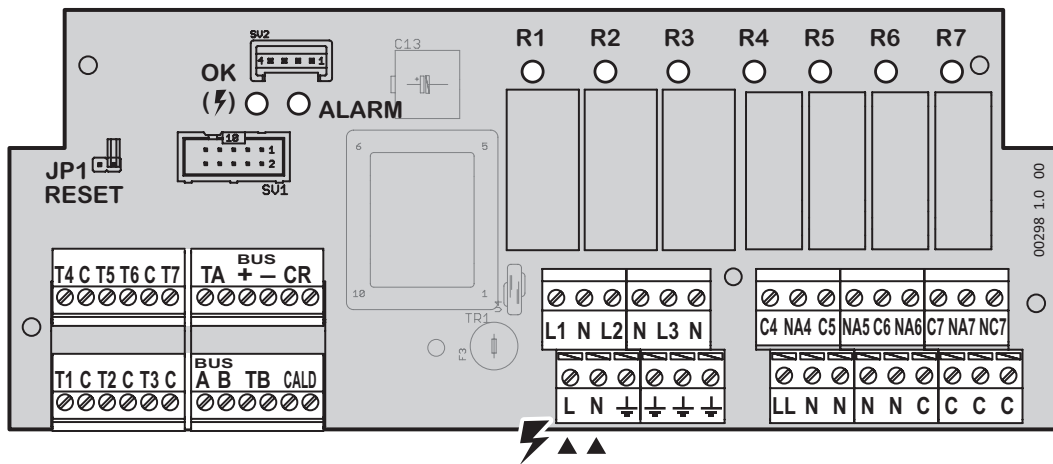
Components - Installation and connection

1.0 - MZ cascade management control unit

Note: the use and programming of the control unit are described in "Using the MZ cascade control unit" on page 3.

The connections of the control unit vary according to the type of system/configuration and are therefore described, case by case, in the following paragraphs relating to system components.

Inside the control unit is present a display card (without parts of any interest to the installer, with the exception of push buttons and display externally accessible) and a main board with all the connection terminals, some diagnostic LEDs and a jumper.



- R1-R7** Activation status LED for corresponding relay
- ALARM** LED for alarm in progress (details on the display)
- OK** LED for Power connected
- JP1 RESET** Jumper - Use to reset the kit's factory settings (see "Complete reset of the control unit" on page 4). Leave open (1 pin engaged) during normal operation.

T1-T7 (+C); TA; TB Inputs for use at very low voltage (SELV) for temperature probes or zone thermostats

+ - A B: Communication BUS for cascade generators no. 1 and subsequent

CALD: communication link with cascade thermal module no. 0 or with the **MS 1.1** solar expansion card, if present

L - N - \perp Phase - Neutral - Ground Inputs for the power supply of the control unit and its loads (230Vac/50Hz)

L1-L3 (+N + \perp) Outputs of driven loads (normally circulating pumps) under relay R1-R3 (230Vac)

LL Phase (L) under the control unit fuse, for 230Vac power supply of the loads driven by the relays R4-R7

N(x4) Neutral (N) for 230Vac power supply of the loads driven by the relays R4-R7

C(x4) Terminals not connected, for auxiliary branches (compatible SELV or loads)

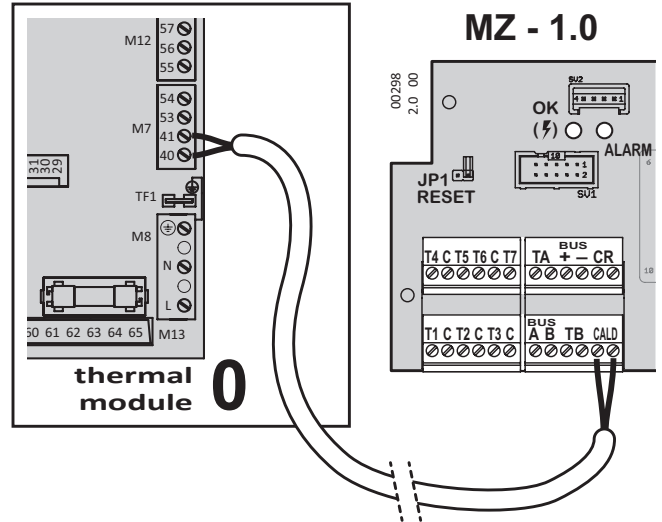
NA4-NA7; NC7 (+C4-7) Dry contacts relay R4-R7 (R4-R6 only Norm. Open, R7 Norm. Open + Norm. Closed) with the possibility of driving loads at 230Vac. See table at page 25 for details.



The only terminal to be connected to energised circuits is the power supply L-N-Ground.

2.0 - Generator 0 - Direct connection to MZ Control Unit

- ▶ Generator **0**, in systems without **MS 1.1** expansion card, must be connected **directly** to the **MZ** control unit.
 - In the configurations that call for the **MS 1.1** expansion card, generator **0** must be connected to it and not to the **MZ** control unit. See component 2.2
- ▶ Open the control panel of generator **0**.
- ▶ Using a cable of an appropriate gauge with 2 conductors, connect the terminals **40** and **41** of terminal **M7*** on the generator to the **CALD** terminals of the **MZ** control unit. *The connection is NOT polarised.*
 - * Normally used for the room thermostat or remote control, when the boiler is in single configuration
- ▶ Pass the cable through a free slot in the control panel, and, outside the boiler, into the provided raceway in the subframe.
- ▶ Close the instrument panel.



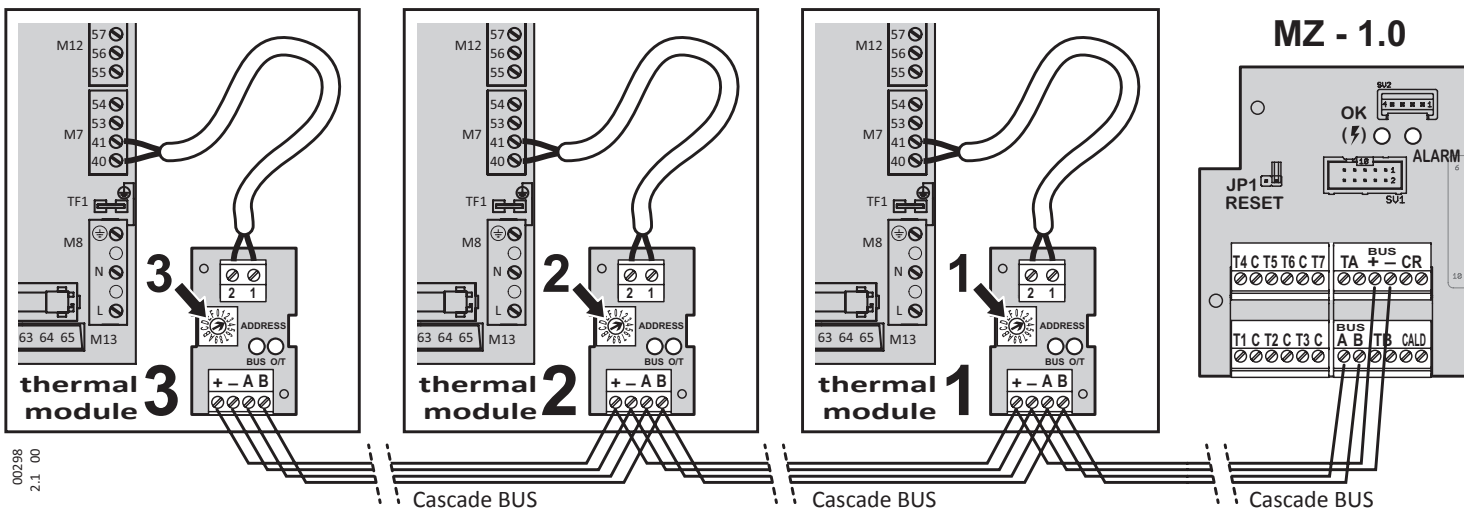
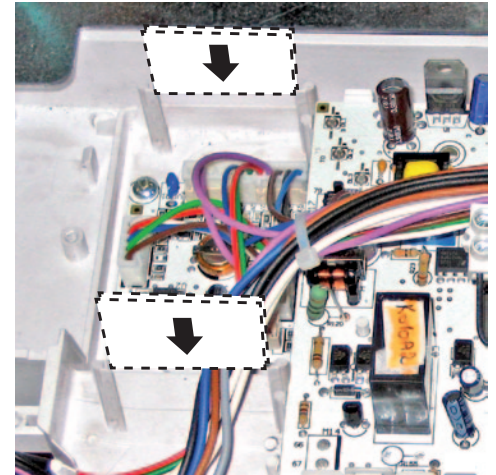
2.1 - Generator - Control Unit interface card

(i) The **2.1** interface card **MUST NOT** be installed in generator **0** because it must be connected **directly** to the **MZ 1.0** control unit or, if present, the **MS 1.1** expansion card.

- ▶ Open the control panel of generator **1**, as well as modules **2** and **3** of the cascade, if present.
- ▶ Connect in parallel the terminals of the cascade BUS (+, -, A, B) using a small-gauge 4-wire cable, *preferably shielded*. Pass the cables through free slots in the control panel, and, outside the boiler, into the provided raceway in the subframe.

(i) Remove 40-50 mm of the cables' outer sheath, and then strip the ends for about 5 mm. Insert the conductors with precision, **avoiding the presence of any free filaments that might cause a short circuit** among the terminals of the cascade BUS.

- ▶ Connect the 2-wire cable (already mounted on the interface card) to terminal **M7** of the boiler, terminals **40** and **41***. *The connection is NOT polarised.*
 - * Normally used for the room thermostat or remote control, when the boiler is in single configuration
- ▶ Turn the "ADDRESS" micro-switch of the interface card to the number (1, 2 or 3) attributed to the Generator.
- ▶ Insert the interface card into a vacant slot of the boiler control panel. Close the control panel.
- ▶ Connect the cascade BUS coming from the parallel **2.1** interface cards to the cascade BUS terminals (+, -, A, B) of the **MZ** unit control unit.



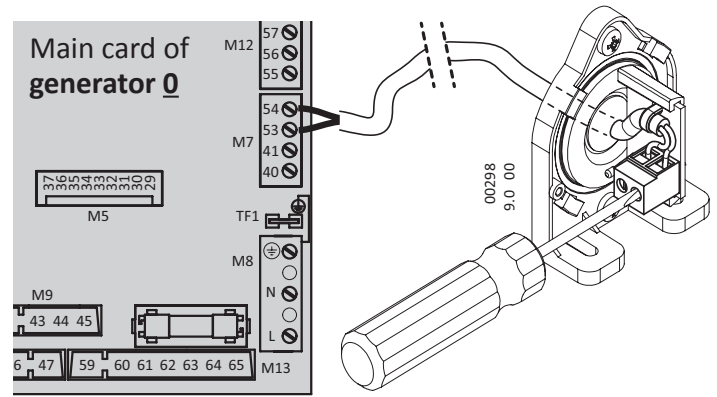
00298
2.1 00

9.0 - Outside temperature probe

- ▶ Component supplied with the **MZ** control unit.
- ▶ Install the component (follow the instructions on the packaging).
- ▶ Prepare the wiring with 2 conductors, from the terminal of the probe to generator **0**, terminal **M7**, terminals **53** and **54**.
- ▶ The connection is **NOT** polarised.

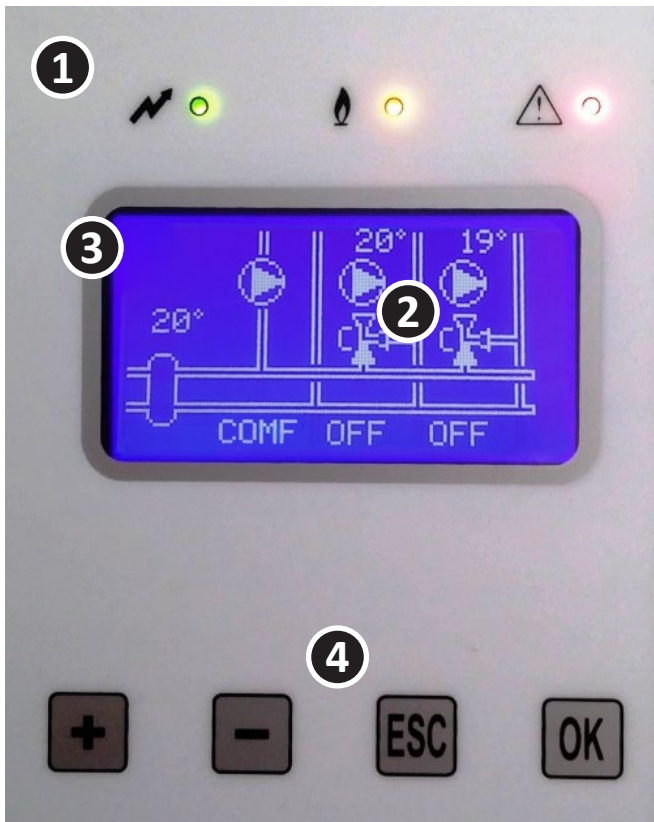
(i) The probe 9.0 must be connected only to the module **0** i.e., to the connected generator **directly** to the **MZ** control unit, without interface card **2.1**.

(i) To make sure that the functionality is enabled, it is necessary to change at least one KD / KDM (dispersion coefficient of one or more zones) - see "Menu 1. - User Settings" on page 16, menus 1.14, 1.15 and 1.16 and the chart "Climate compensation curves" on page 18.



Using the MZ cascade control unit

Controls and indicators



Attention: the diagram on the screen shows a system with 1 direct collector and 2 mixed collectors and it is supplied as just an example. It may differ depending on how the system is configured.

- LED lights
 - ⚡ Power supply on
 - 🔥 Request for heat from the cascade of generators
 - ⚠ Alarm
- Graphic display with screen (variable).
 - View of screens
 - View of menu values and options
- Menu instructions and navigation (on display).
 - While using the menus, it shows the unique number of the current menu, especially useful for navigating through the functions of the kit together with the menu maps included here.
- Control buttons: to browse the menu, consult and modify the available parameters as necessary.
 - OK** Accesses the next/lower level menu. In a menu that involves the modification or choice of a value, activates the change of the value (the asterisk * symbol appears) and confirms/stores the value.
 - ESC** Accesses the previous/higher level menu. In a menu that involves the modification or choice of a value, exits the menu without saving any changes to the value.
 - + -** When navigating the menu, allows you to switch to the next or previous menu of the same level. In a menu that involves the modification or choice of a value, changes the value itself.

Complete reset of the control unit

In case of incorrect initial configuration of the control unit ("Initial configuration of control unit/system" on page 6) the only way to correct it is to perform a complete reset and to repeat the configuration sequence. Proceed as follows:

- ▶ Cut off power to the regulator.
- ▶ Open the cover and close the "JP1 RESET" jumper (remove it and place it over both pins).
- ▶ Close the cover and reconnect the power supply:
 - Initially, the display will show "Invalid signature - Resetting Memory".
 - Then it will change to the **INITIAL CONFIGURATION page "System Configuration"**.
- ▶ Cut off power to the regulator.
- ▶ Open the cover and reposition the "JP1 RESET" jumper to the open position (placed on a single pin, for normal operation).
- ▶ Close the cover and reconnect the regulator power supply.
- ▶ At this point, after the initial phase, access the "System Configuration" menu to set the new configuration, described in "Initial configuration of control unit/system" on page 6.

Display screens

Depending on the initial configuration selected, screens are available regarding the state of operation.

Generator screen

This information is divided into two pages to accommodate all the nine generators (0-3, 4-8) that can be managed by the regulator.

Column header	Symbol	meaning
G	0-8	0-8 number assigned to the generator in the cascade
Rq	R	presence required for current Heating (<i>see note 1</i>)
	-	no current HEAT request
	A	Enable DHW side (always enabled by default with DHW=1 and DHW=2, <i>see note 1</i>)
S	F	Flame present = burner lit
	B	Generator shutdown, followed by the description "Error Ex"; Ex as per generator error code
	-	Generator in stand-by mode with no errors
Trq	Delivery temperature requested	0° Set REQUESTED delivery temperature, from the Control unit to the Generator, with HEAT Request in progress; otherwise 0°
Prq	Power requested	% Set MAXIMUM REQUESTED power percentage, from the Control unit to the Generator, with HEAT Request in progress; otherwise 0%
Tol	Delivery temperature	0° Delivery temperature actually detected at the generator
Pwr	Pwr	% Power percentage actually detected at the generator; with generator in stand-by 0% or 20%

0/T cascade informations
 G RqS Trq Prq Tol Pwr

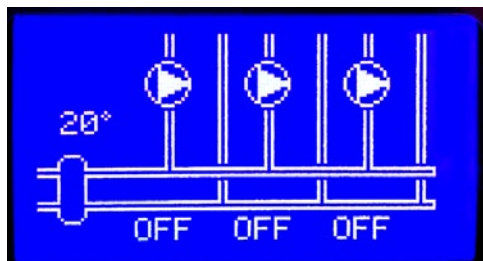
0 -AB Error E1
 1 RA- 85° 108% 23° 20%
 2 -AB Error E1
 3 RA- 85° 108% 22° 20%

Note 1: The enabling of DHW is required ONLY in the configurations DHW=1, but is always provided for by default also with DHW=2, although with DHW=2, the preparation of DHW is managed as a HEAT request, so with active request visible in the field "R".

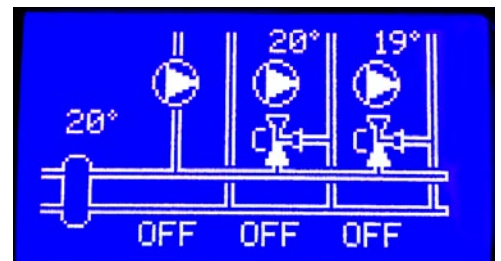
Heating screen

The heating system screen varies depending on the configuration code selected during Initial Configuration (see "Initial configuration of control unit/system" on page 6), where for example: →

Circuits = 3 - configuration with 3 direct collectors



Circuits = 5 - configuration with 1 direct collector and 2 mixed collectors



It indicates:

- ▶ The temperature value detected by the primary collector/balancer probe, if present.
- ▶ For each distribution collector of the heating circuit the following is indicated:
 - The collector request status: OFF, COMF, ECO, A/G
 - The status of the collector circulating pump: fixed symbol = pump off; rotating symbol = pump on

- For the mixed collectors:
 - The temperature value detected by the collector probe after mixing
 - Mixing valve status:
 - A symbol and delivery side "full" = Opening valve side, circulation towards delivery
 - C symbol and return side "full" = Closure valve side, circulation towards return
 - During mixing, the opening or closing of the mixer is activated/deactivated depending on the continuous PID control of the outlet temperature.

DHW screen

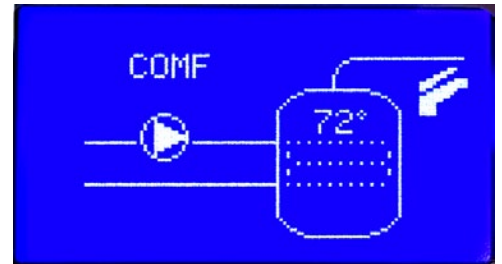
The screen regarding the collector for DHW management is visible only if the subsystem **Prod. DHW = 2 - DHW boiler managed by the collector** is selected during Initial Configuration (see "Initial configuration of control unit/system" on page 6).

This configuration has the DHW boiler operated directly by the regulator and system downstream of the system's primary collector/balancer.

Note: Remember that in this case the regulator sees the request for preparation of the boiler as a request for Heating.

It indicates:

- ▶ the current timeslot setting of ACS collector: **COMF**ort, **ECO**nomy, anti-freeze only (**OFF**), that depends on the timing program of the collector itself (see "Domestic Hot Water management" on page 21)
- ▶ The temperature detected by the DHW boiler probe.
- ▶ The status of the boiler circulating pump:
 - fixed symbol = pump off
 - rotating symbol = pump on



"System alarms" page

The alarms page summarises the alarms present in the system, according to the descriptive codes listed in section "Alarms" on page 28



Settings, configurations (Control unit menu)

All control unit parameters, necessary to optimise the correct operation of the system, are stored in a system menu accessible by means of the commands and the display on the front panel.

The control unit contains a set of standard settings, pre-configured in the factory, which will populate the menu with optimum values at the time of the Initial Configuration, depending on the type of system connected to the unit. The control unit will recognise exactly the type of system, both by analysing the loads connected during the first power up, and on the basis of the data entered by the technician, as described in "Initial configuration of control unit/system" on page 6.

Where deemed necessary to change the default settings, it is possible to access the available settings. The main operation screen includes the instruction "PRESS OK FOR MENU". Press the OK button to access **Menu 1 - USER settings**.

Note: All values are **non-volatile**, i.e., they remain stored even if there is no electricity, **except for the Current Time (menu 1.22) and the Current Date (menu 1.23)**, which remain correct only for a few hours after the interruption of the power supply. Even in this case, there is no need to set the time and date unless you use the clocks on the zones (menus from 1.6 to 1.13), but this function is not normally used and is disabled from the factory.

Menu - general use

The menus are accessible from one of the pages of the main screens by pressing the **OK** button. The menu structure is divided by type of menu, as follows:

- 1 - USER Settings menu
- 2 - SYSTEM Settings menu
- 3 - SYSTEM Information menu
- 4 - SYSTEM Configuration menu
- 5 - Set Password menu

Menus 1, 3 and 5 are always visible, while **menus 2 and 4 are visible for 15 minutes only after entering a special password**.

Changing main menus, or among main menus or submenus of the same level, is done using the **+ and - keys**.

To enter the selected menu press the **OK** button.

Once having entered one of the submenus available it is always possible to scroll between submenus of the same level using the **+ and - buttons**, return to a higher menu using the **ESC** key and enter a specific submenu with **OK**.

For menu subheadings that have values that can be SET or CHANGED, enter the specific page with the OK button. The desired field becomes "editable" by pressing the **OK** button and is marked with the * symbol (in case of multiple editable fields on the same page, scrolling through the various fields is done by pressing **OK** -> or **ESC** <-, the editable field always being marked with the * symbol).

The value is changed with **+ and -** keys, confirmation of the change must be saved with **OK**, cancelled with **ESC**.

The individual submenus may or may not be available depending on the initial configuration.

First start-up of the control unit

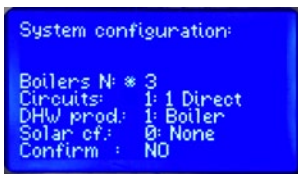
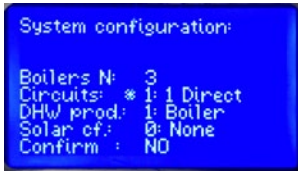
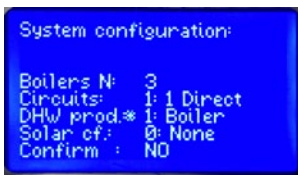
(i) Power the control unit **ONLY** after you have fully completed the installation and system wiring.
BEFORE you power the control unit, power **ALL** generators and set them to **SUMMER** mode.

Initial configuration of control unit/system

When powering the control unit for the first time, **and only in this occasion***, you are prompted to use the control panel to enter information about the system characteristics.

The message "Invalid Signature - Resetting Memory" will briefly appear, followed by "System configuration". Four types of data must be entered, depending on the system (see Table below and "Initial configuration table" on page 7) and confirm. Use the **+ and -** buttons to change the data marked with an asterisk and press the **OK** button to move to the next item or **ESC** to go back to the previous one. At the end of the setting "Solar C.", pressing **OK** activates the line "Confirmation: NO": to memorise all and end the initial setup, press **the + button**.

* **Note:** If, for any reason, you would like to repeat the initial configuration of the control unit and the system, it is possible to reset the controller to the initial state by following the instructions in "Complete reset of the control unit" on page 4.

	Subsystem	Value	Setting - System type	Layout ref.
	No. of Gen:	1...9	Number of generators connected to the control unit (including the first "module 0") <i>Note: the number of the generators in the cascade may be limited by the plumbing kits and the accessories for mechanical installation.</i>	<i>all</i>
Type and number of collectors connected, heating side:				
	Circuits:	1...6	1 1 direct heating collector	↓
			2 2 direct heating collectors	↓
			3 3 direct heating collectors	0.0.3 (page 8)
			4 1 direct heating collector + 1 mixed heating collector	↓
			5 1 direct heating collector + 2 mixed heating collector	0.0.5 (page 10)
			6 2 mixed heating collectors	0.0.6 (page 10)
Combined management of the production of DHW:				
	Prod. DHW:	0...2	0 No DHW management: the cascade system is configured for heating only	all 0.0.x (page 8 - page 10)
			1 The production of DHW is assigned to a single generator	0.1.5 (page 12)
			2 The production of DHW is managed by the control unit as a request for heat from the collector/balancer	0.2.4 (page 14) 0.2.6 (page 14)

Initial configurations NOT allowed

There are some combinations of configurations of the various subsystems that are NOT allowed, not being manageable:

- Circuits: = 5 + Prod. DHW: = 2
- Circuits: = 5 + Solar C.: = 1
- Circuits: = 6 + Solar C.: = 1

and consequently:

- Circuits: = 5 + Prod. DHW: = 2 + Solar C.: = 1
- Circuits: = 6 + Prod. DHW: = 2 + Solar C.: = 1

Selecting one of the above non-allowed combinations, the configuration system will NOT ACCEPT the setting. For example, in the first case, selecting Circuits: 5 → OK → Prod. DHW: 2 → OK, for this last OK the asterisk remains on Prod. DHW and does not move to Solar C. It is necessary to change the setting to one of the allowable combinations, as per the installation diagrams.

Initial configuration table

The following table summarizes all control unit's initial settings according to the components connected to it.

Configuration		Only Heating or Heating + DHW on the boiler						Heating + DHW as CH demand						
Collectors	Code	1	2	3	4	5	6	1	2	3	4	6		
	Option	1 HT	2 HT	3 HT	1 HT + 1 LT	1 HT + 2 LT	2 LT	1 HT	2 HT	3 HT	1 HT + 1 LT	2 LT		
Prod. ACS	Code	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	2	2	2	2	2		
	Option	on Boiler	on Boiler	on Boiler	on Boiler	on Boiler	on Boiler	CH demand	CH demand	CH demand	CH demand	CH demand		
INPUT	Room Thermostat and Temperature inlet contacts	T1												
		C												
		T2				Tmix2	Tmix2	Tmix2				Tmix2	Tmix2	
		C				X	X	X				X	X	
		T3					Tmix3	Tmix3					Tmix3	
		C					X	X					X	
		T4							DHW T.	DHW T.	DHW T.	DHW T.	DHW T.	
		C				X	X	X	X	X	X	X	X	
		T5			TA3		TA3	TA3			TA3		TA3	
		C			X		X	X			X		X	
		T6	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.	Balancer T.
		C		X	X	X	X	X		X	X	X	X	
		T7		TA2	TA2	TA2	TA2	TA2		TA2	TA2	TA2	TA2	
TA	TA1	TA1	TA1	TA1	TA1	TA1		TA1	TA1	TA1	TA1			
OUTPUT	Line 220V	L1	pump 1	pump 1	pump 1	pump 1	pump 1		pump 1	pump 1	pump 1	pump 1	DHW P.	
		L2		pump 2	pump 2	pump 2	pump 2	pump 2		pump 2	pump 2	pump 2	pump 2	
		L3			pump 3		pump 3	pump 3			pump 3		pump 3	
	Free contact for Plant Relays	C4-NA4				vmix2-O	vmix2-O	vmix2-O				vmix2-O	vmix2-O	
		C5-NA5				vmix2-C	vmix2-C	vmix2-C				vmix2-C	vmix2-C	
		C6-NA6					vmix3-O	vmix3-O	DHW P.	DHW P.	DHW P.	DHW P.	vmix3-O	
		C7-NA7					vmix3-C	vmix3-C					vmix3-C	

TABLE KEY		
INPUT	TA1	Thermostat room 1
	TA2	Thermostat room 2
	TA3	Thermostat room 3
	Balan. T.	Balancer Temperature
	Tmix2	Temperature Mix valve room 2
	Tmix3	Temperature Mix valve room 3
	DHW T.	DHW Tank Temperature
OUTPUT	pump 1	Pump room 1
	pump 2	Pump room 2
	pump 3	Pump room 3
	vmix2-O	Line Opening Mix valve room 2
	vmix2-C	Line Closing Mix valve room 2
	vmix3-O	Line Opening Mix Valve room 3
	vmix3-C	Line Closing Mix Valve room 3
DHW P.	DHW Tank Pump	

Mandatory settings of the cascade generators

In order to avoid cascade system malfunctions, all generators that are part of it must necessarily be set to the maximum power value available for each individual generator (**par. 4 = 99**) then each generator should be able to modulate up to the maximum of its nominal power.

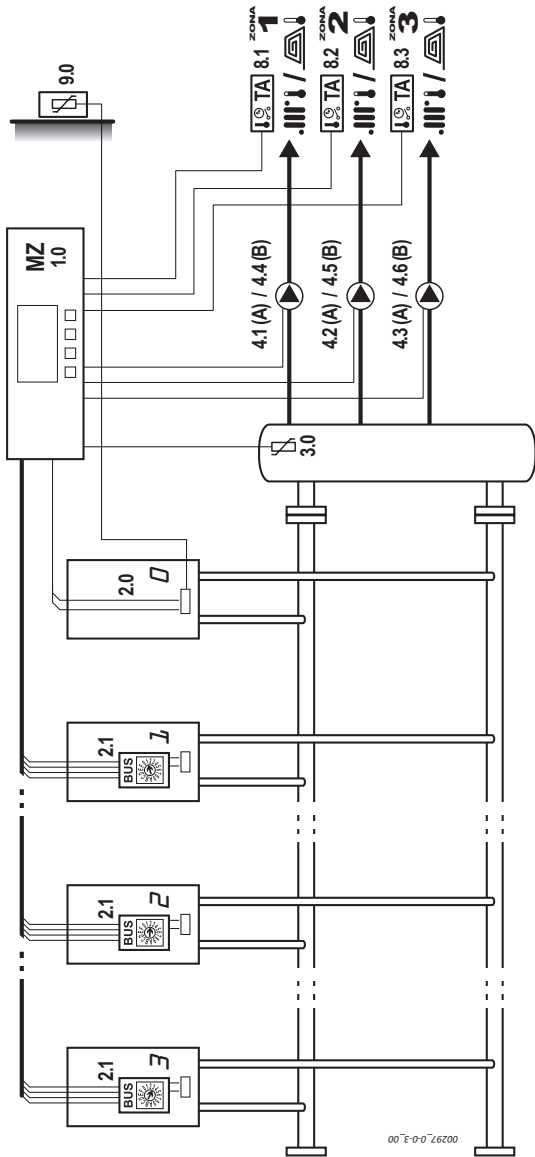
If it is necessary to limit the effective power of a generator (or more), it is necessary to act on the parameter of the single generator concerned, which limits the maximum number of revolutions (**par. 14**) always leaving **par. 4 = 99**.

Use of configurations

This section lists the installation/functional configurations of all types of systems that can be set up and that the control unit can manage, in relation to the "Initial configuration of control unit/system" on page 6 and "Initial configuration table" on page 7, excluding the "Initial configurations NOT allowed" on page 6.

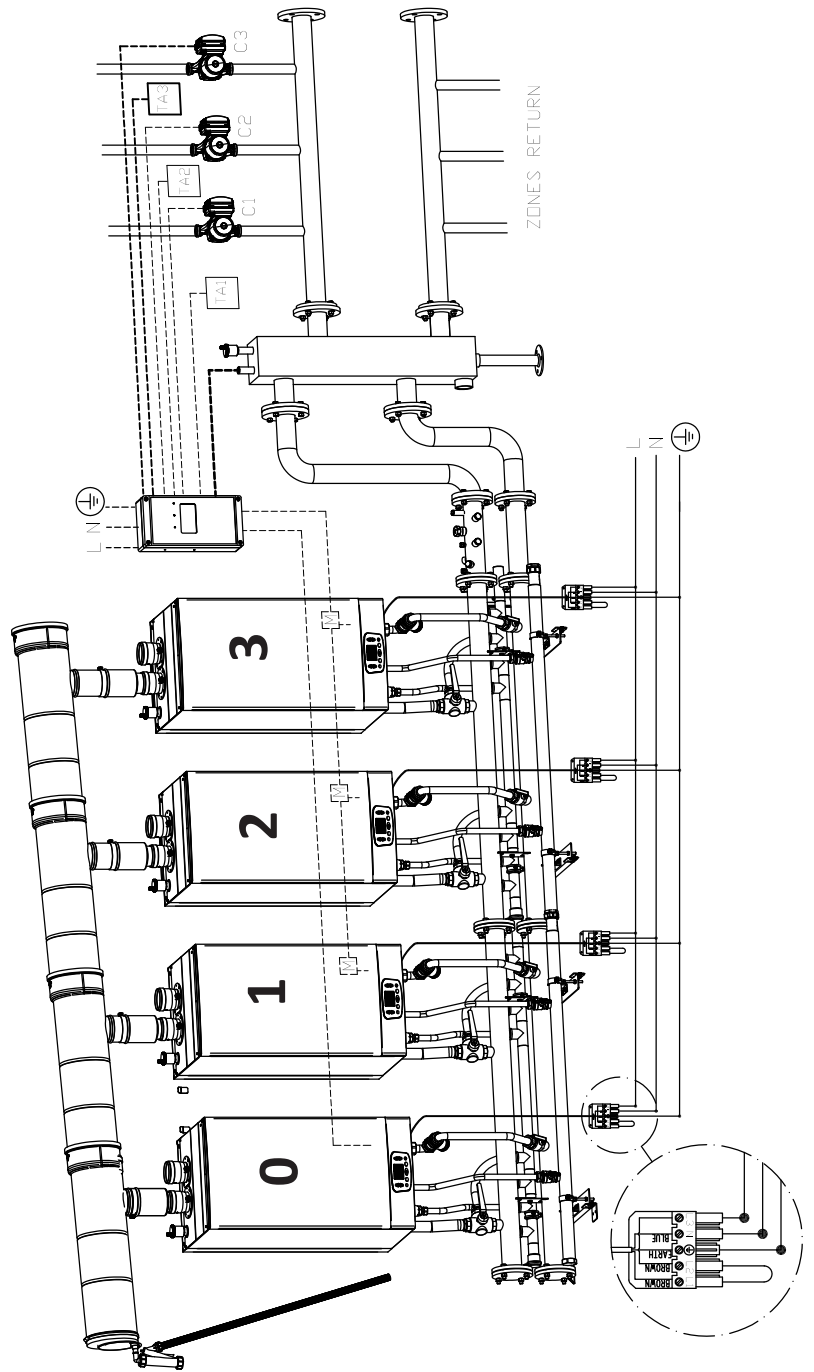
Collectors: The maximum number of collectors is always shown: to use fewer collectors, as a general rule it is sufficient to **first use the lower ones** and then omit unused collectors starting from the highest (3, then 2). **Carefully read the notes for each configuration.**

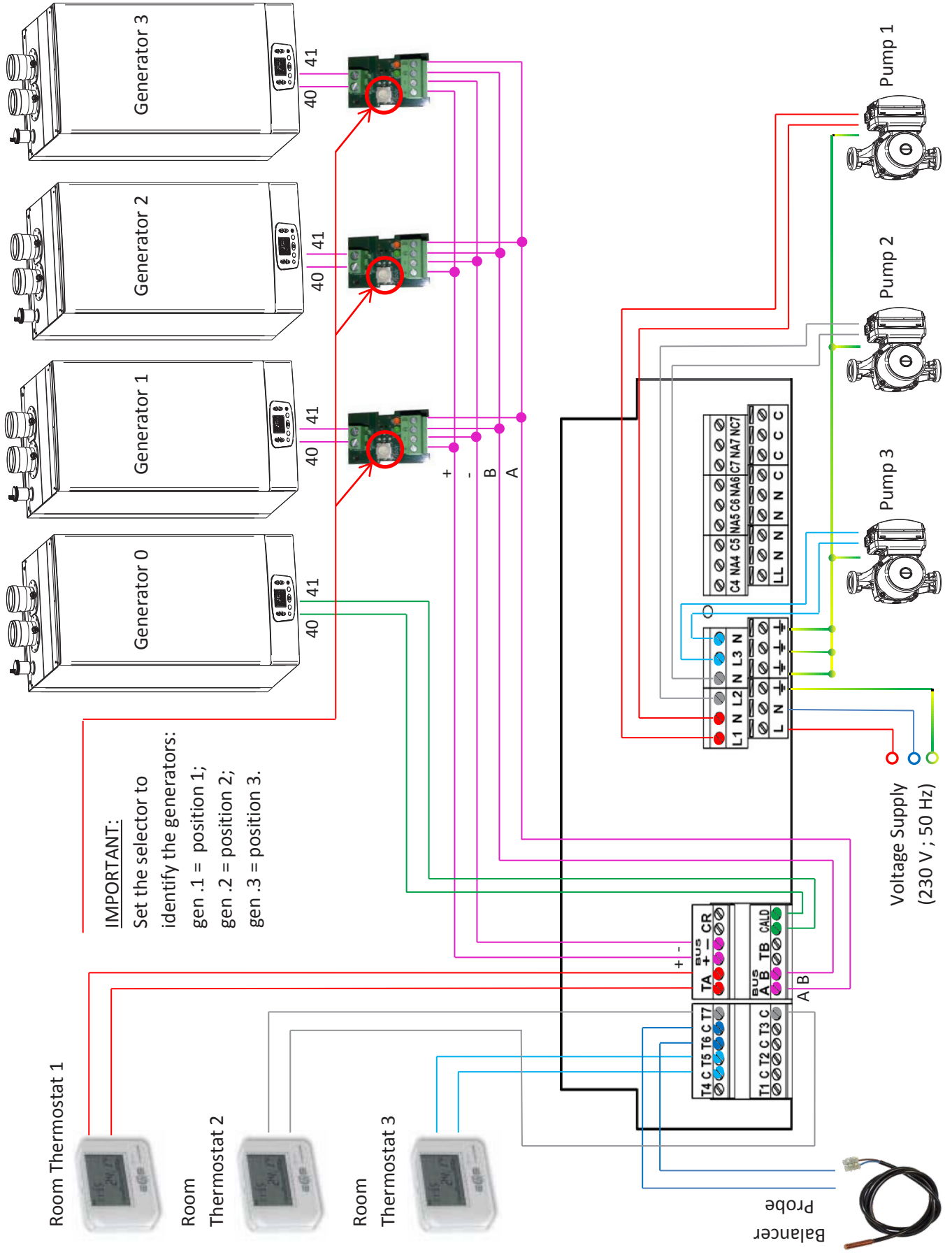
Components: The functional components are identified by a number composed of two parts, separated by a period (.): the first part identifies the type of component; the second identifies the way in which the component is implemented in the system, its connections etc. For example, the pump 4.8 of the configuration 6.2.3 and the 4.10 of the configuration 6.2.6 can physically be the same component, but differ by the type of connection to the MZ control unit.



0.0.3
 No. direct collectors: **1*, 2* or 3**
 No. mixed collectors: **NO**
 Production of DHW: **NO**

* if you configure fewer than 3 collectors, exclude components of the collectors 2 and 3 or just collector 3.
 (A) (B) Note: the heating system with just direct collectors, therefore without mixing valves, can be high temperature (A) or low temperature (B) as long as **all** the collectors are at low temperature and that they are all set up accordingly (see "Menu 1. - User Settings" on page 16, menus 1.14, 1.15 and 1.16). The booster pumps for the low temperature collectors (B) must therefore be equipped with a safety thermostat (see component configurations 4.4, 4.5 and 4.6).





0.0.5

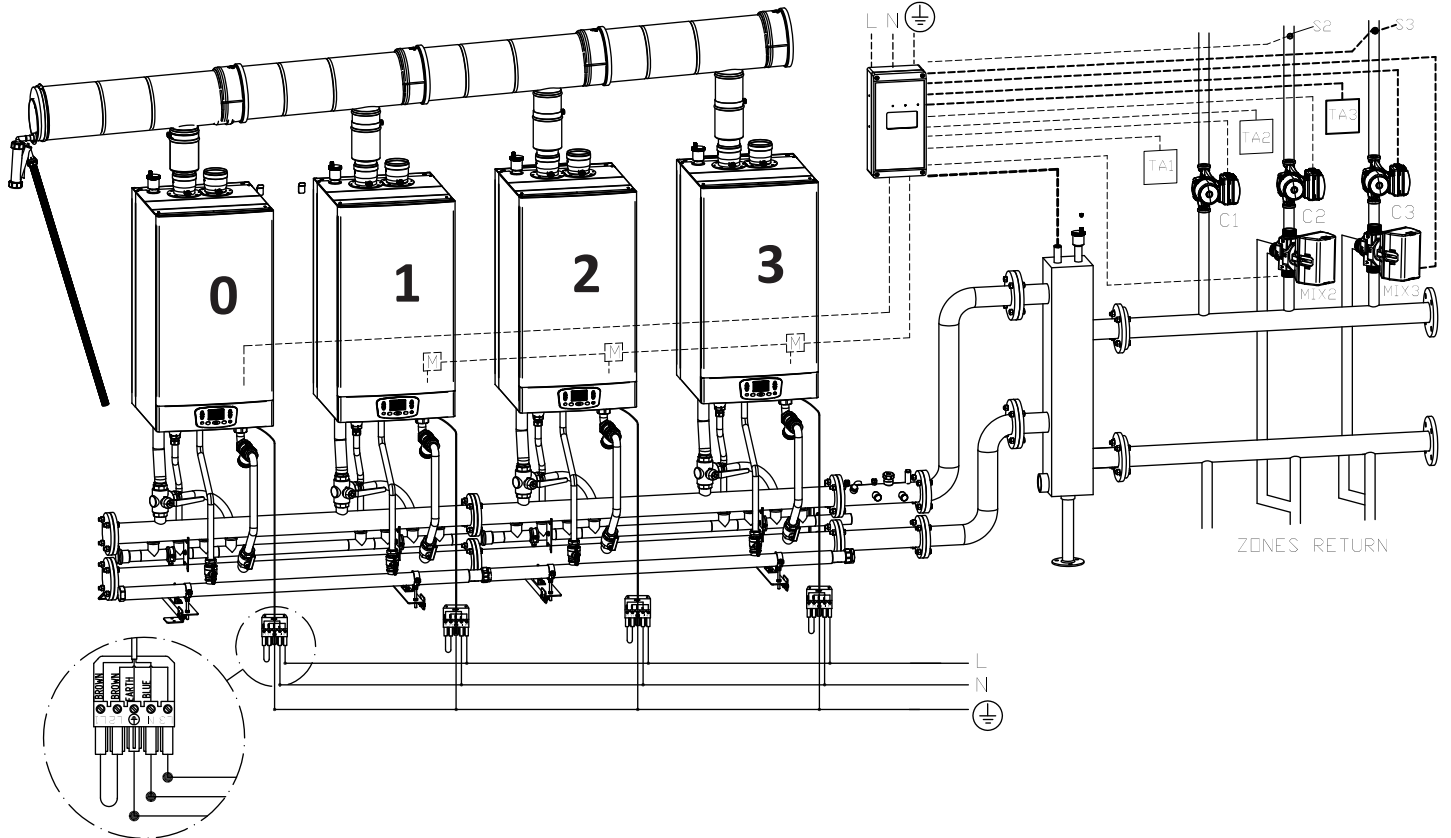
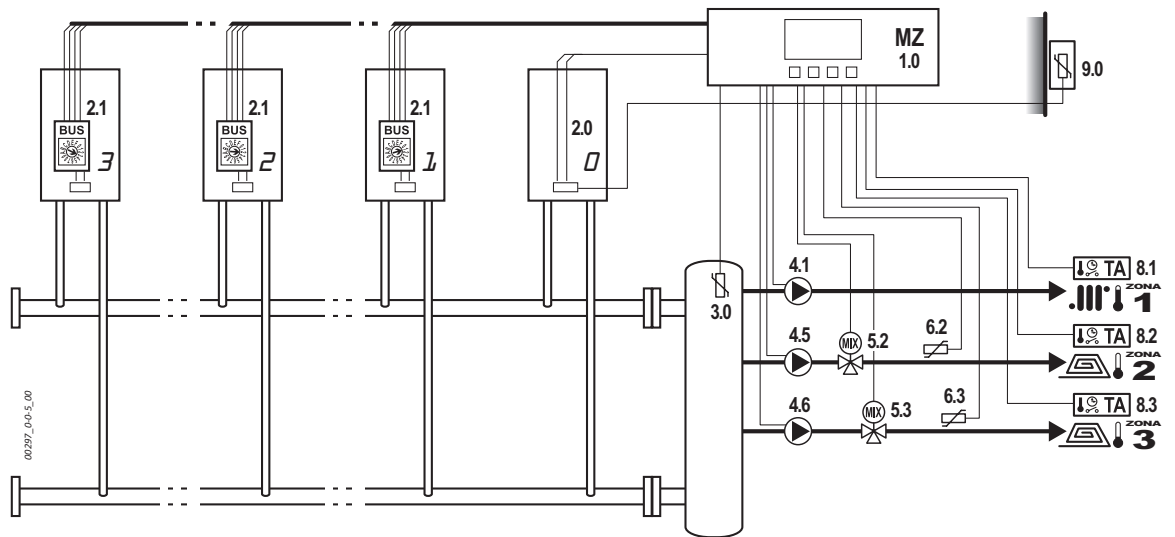
No. direct collectors: **1**

No. mixed collectors: **1* or 2**

Production of DHW: **NO**

* if besides the direct collector you configure only 1 mixed collector, exclude the components of collector 3.

Note: the configuration with 2 direct collectors and 1 mixed is not available.



0.0.6

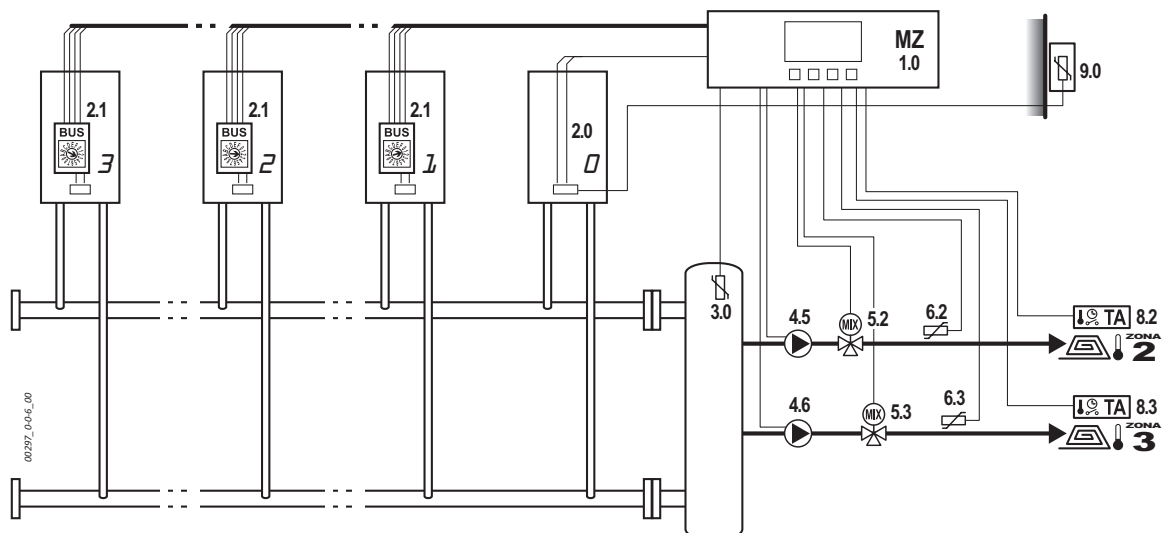
No. direct collectors: **NO**

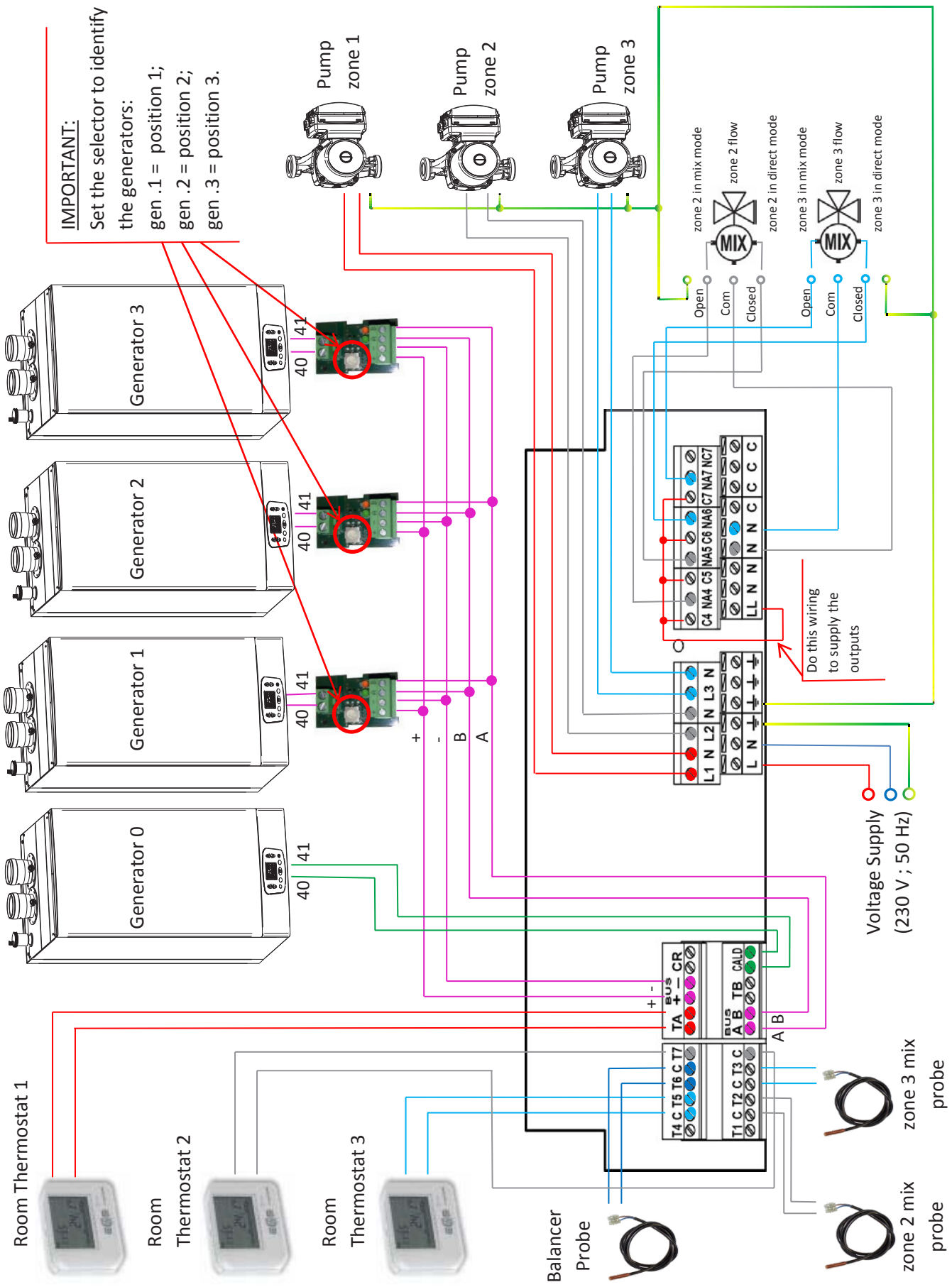
No. mixed collectors: **1* or 2**

Production of DHW: **NO**

Note: It is not possible to configure collector 1 as mixed: the two mixed collectors must necessarily be 2 and 3.

* if you configure only 1 mixed collector, exclude the components of collector 3.





0.1.5

No. direct collectors: **1 or NO****

No. mixed collectors: **1* or 2**

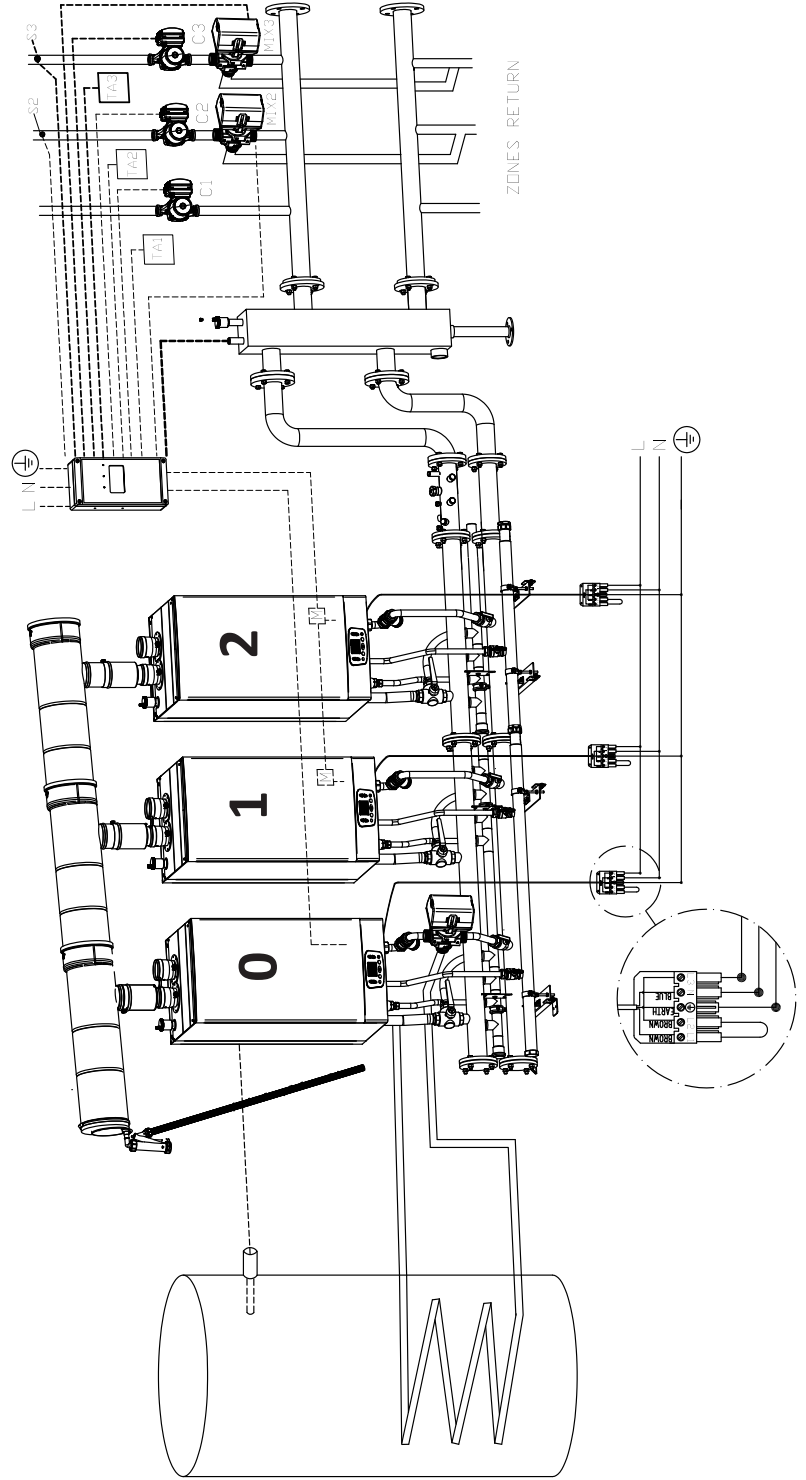
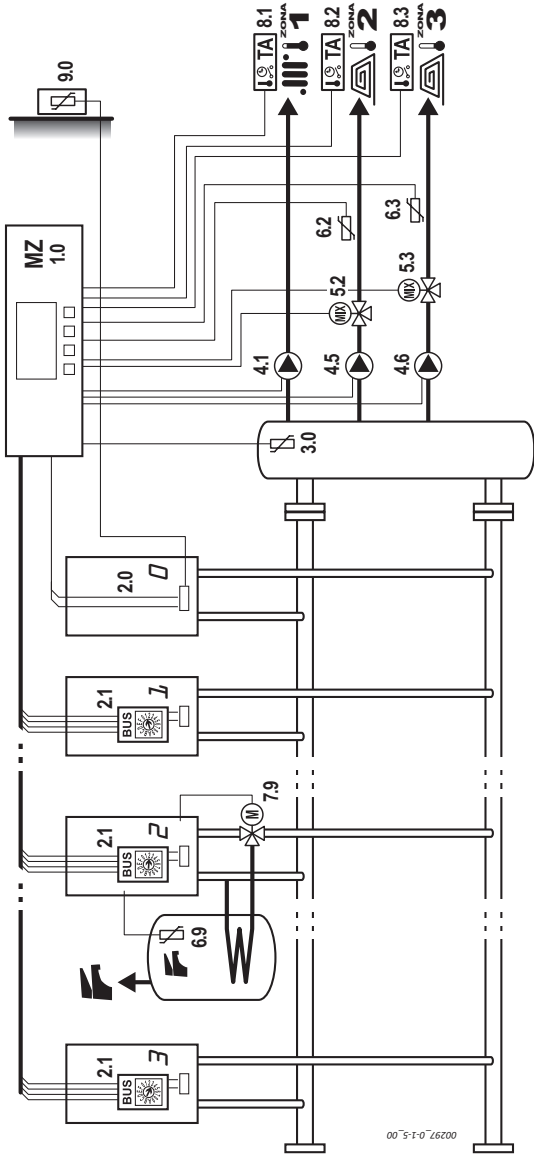
Production of DHW:

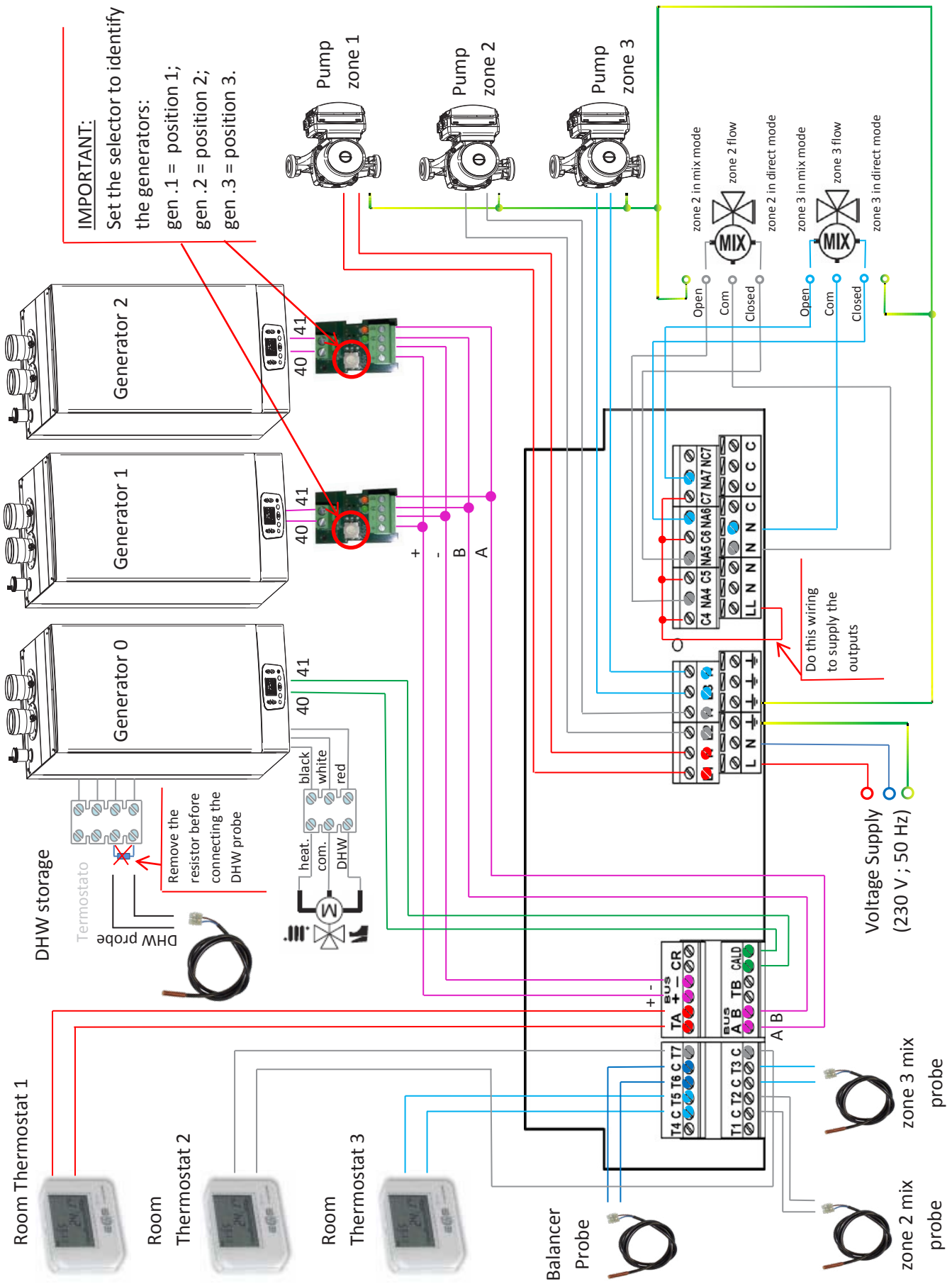
managed by a generator

N.B.: it is the responsibility of the installer to prepare delivery/return connections for the coil and the aforementioned valve.

* If besides the direct collector you configure only 1 mixed collector, exclude the components of collector 3.

** If a direct collector is not used, configure the mixed collectors on lines 2-3 of the control unit all the same (as in configuration 0.0.6).



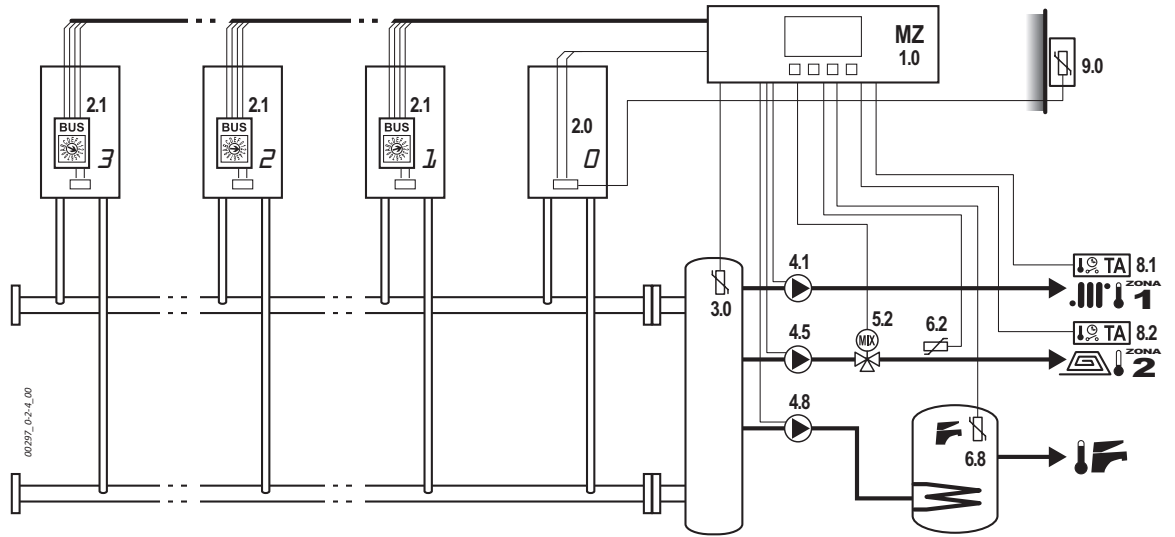


0.2.4

No. direct collectors: **1 or NO**

No. mixed collectors: **1 or NO**

Production of DHW:
from collector



0.2.6

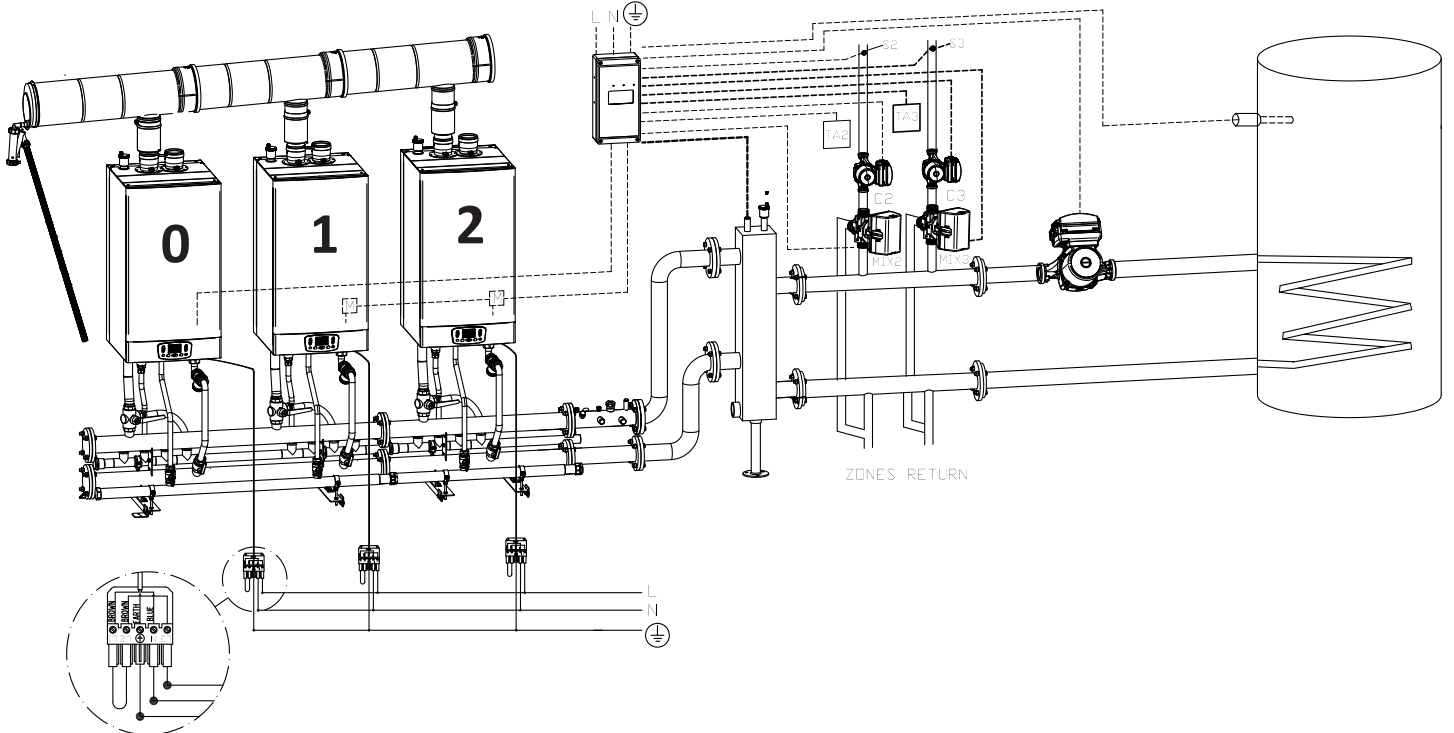
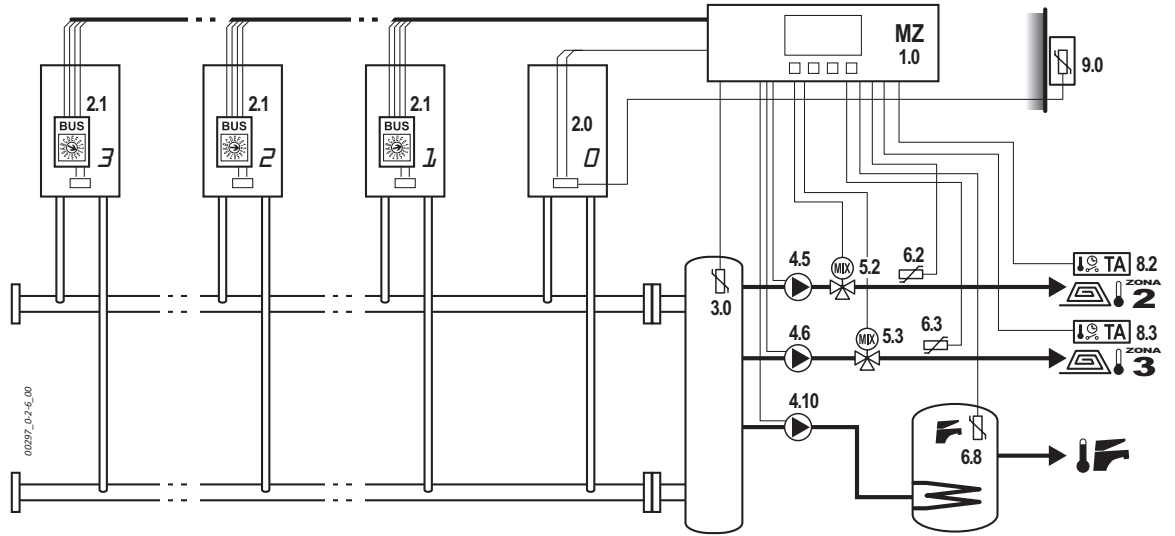
No. direct collectors: **NO**

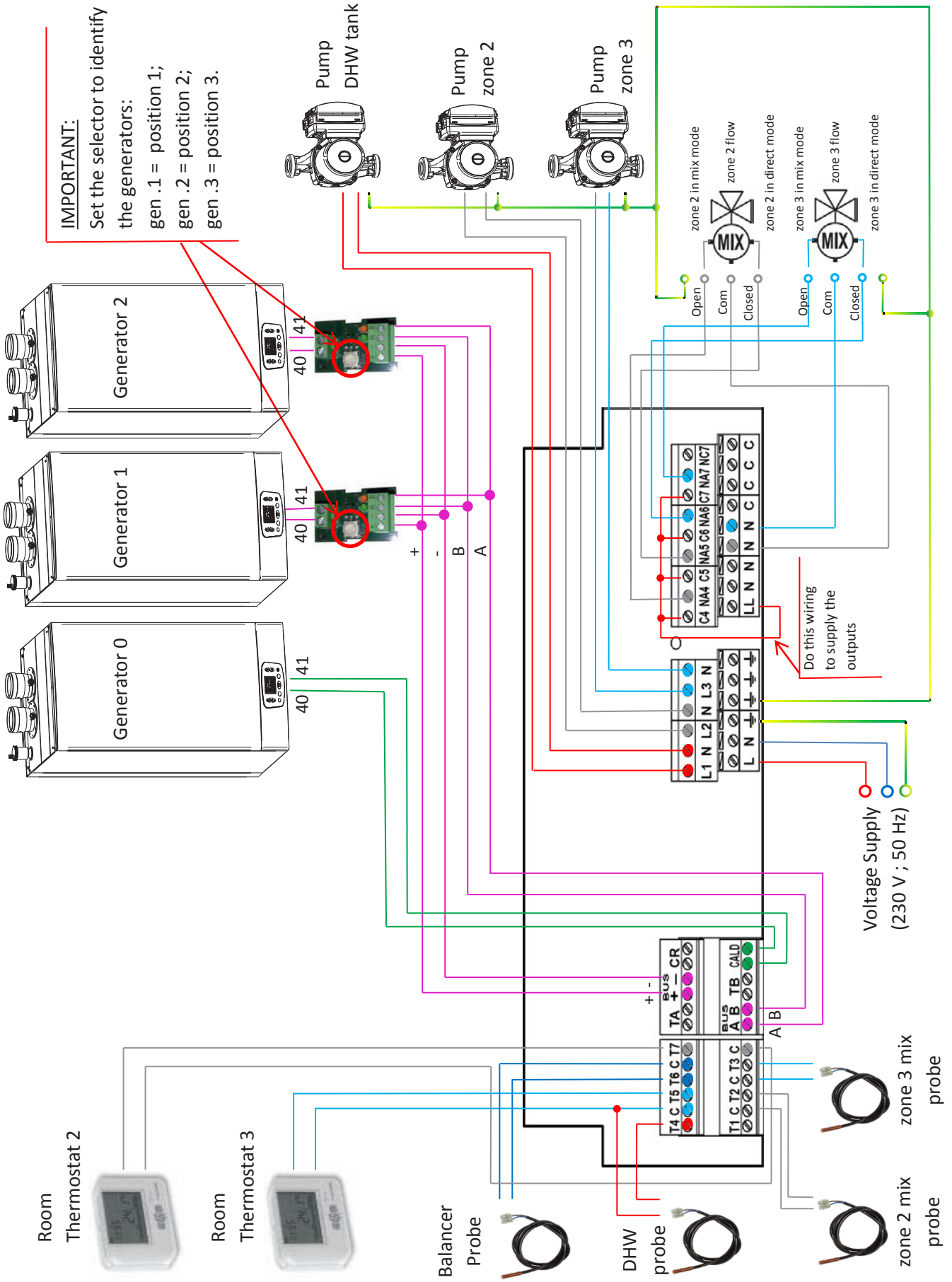
No. mixed collectors: **1* or 2**

Production of DHW:
from collector

Attention: The boiler booster pump is **4.10** (not 4.8): in this case it is **driven by line 1** of the control unit. For this reason, it is not possible to use line 1 to configure a heating collector.

* if you configure only 1 mixed collector, exclude the components of collector 3.





Menu 1. - User Settings

From the main screen, press **OK** to enter Menu 1. - **User Settings**. Press **OK** again to enter the first submenu **1.1 - Enable System**.

It includes main setting needed for managing cascade:

- 1 - Clock/date set
- 2 - Timer for daily programming
- 3 - External probe curve set or collectors fix setpoint - see also:
 - “Configuring the delivery setpoint with thermoregulation - ALWAYS COMFORT clock” on page 18;
 - “Configuring the delivery setpoint in systems without thermoregulation” on page 19
- 4 - External tank set (on collector / on generator) - see also:
 - “Setting DHW FUNCTION managed by COLLECTOR” on page 21;
 - “Setting DHW FUNCTION managed by GENERATOR” on page 22
- 5 - Flow temperatures set (for tank preparation on collector) - see also “Setting DHW FUNCTION managed by COLLECTOR” on page 21

Time and date adjustment (general example for the menu setting)

Below is described, by way of example, the procedure for setting the time and date, which should be performed only if using the zone clocks (menus from 1.6 to 1.13) when commissioning or after extended power outages.

It is suggested to do this to practice programming the menus, even if the clocks are left disabled as per the factory setting, because unlike other settings, this one does not affect the proper operation of the kit.

The method for navigating and changing the menu is the same for all entries in all menus.

- ▶ Once having entered the submenu **1.1 - Enable System**, press the **+ or** - repeatedly until you get to submenu **1.22 - Current Time**.
- ▶ Press **OK**: An asterisk appears next to the value to be changed (hours).
- ▶ Adjust the value by repeatedly pressing or holding down the **+ or** - button until the correct hour is reached.
- ▶ Press **OK**: the value (hour) is stored and an asterisk appears next to the next value to be changed (minutes).
- ▶ Adjust the value by repeatedly pressing or holding down the **+ or** - button until the correct minute is reached.
- ▶ Press **OK**: the value (minutes) is stored and you return to the submenu **1.22 - Current Time**.
- ▶ Press the **+** button to go to submenu **1.23 - Current Date**.
- ▶ Press **OK**: An asterisk appears next to the value to be changed (day).
- ▶ Adjust the value by repeatedly pressing or holding down the **+ or** - button until the correct day is reached.
- ▶ Press **OK**: the value (day) is stored and an asterisk appears next to the next value to be changed (month).
- ▶ Adjust the value by repeatedly pressing or holding down the **+ or** - button until the correct month is reached.
- ▶ Press **OK**: the value (month) is stored and you return to the submenu **1.23 - Current Date**.
- ▶ Proceed in the same way to set the submenus **1.24 - Day of the Week** and **1.25 - Year**.
- ▶ Press **ESC** repeatedly until you return to the main screen.

Using CLOCKS:

For HEATING collectors, the request for heat from the circuit is given by the JOINT consensus of the CLOCK associated with the COMFORT/ECONOMY time slot and by the contact of the respective TA. The request for heat is disabled regardless of the state of the TA contact during the OFF (A/G) time slots.

The selection of the COMFORT and ECONOMY time slots affects the requested collector SETPOINT based on the settings.

For clock 8 associated with DHW, and the eventual clock 7 associated with the anti-Legionella function in cfg. DHW=2, see the pertinent section.

Setting time slots

Six time slots are provided for each day. By default the first time slot of each day is set to COM 00:00, while the others are "n/u" i.e., not used, the day is therefore always in COMFORT.

For each slot, set: MODE (A/g - ECO - COM) and the start time.

The mode set in a time slot will be maintained until the first DIFFERENT programme.

Menu 2. - System Settings

This menu is password protected and thus is invisible, unless an **Installer or Technician** password has been entered in menu 5. **Set Password**.

Note: to prevent unwanted access to the technical menu by inexperienced people, the menu remains available only for 15 minutes after password entry.

It includes every options on **Menu 1**, with some option more:

- 1 - Anti-legionella settings - see also “Setting DHW ANTI-LEGIONELLA FUNCTION” on page 21
- 2 - Boilers priorities - see also “Balance of power” operating mode with generator priorities” on page 24
- 3 - Relays setting when unused - see also “Setting STOP NOTIFICATION FUNCTION” on page 25
- 4 - Timing delay pumps
- 5 - Offset temperature detected

Menu 5. - Set Password

This menu allows you to enter the Installer Password. Once the password is entered, the following will be made available:

- Menu 2. - System Settings.

Note: to prevent unwanted access to the technical menu by inexperienced people, the protected menus remain available only for 15 minutes after password entry.

Menu 3. - System Information

It includes options for status visualization of cascade system; no change is allowed:

- 1 - Generator status
- 2 - Collectors status
- 3 - Timers status
- 4 - Input/Output status

- ▶ If you are in the main screen, press **OK** (you will enter Menu 1. - User Settings).
- ▶ press the + button to display menu 3. - System Information.

Note: If no password was entered in menu 5. Set Password, you will go directly from menu 1. - User Settings to menu 3. - System Information, without displaying menu 2. - System Settings.

Note: This is a view-only menu. No values can be changed from this menu.

- ▶ Press **OK** again to enter the first submenu 3.1 - System Status and consult the value regarding this menu.
- ▶ Press or hold the + or - buttons to scroll through the menus of the same level (3.2 and later) reading the data requested. Some submenus, like 3.15, branch into additional submenus (3.15.1 etc.) that can be navigated with the **OK** and **ESC** buttons.
- ▶ Navigate menu 3. - System Information using the following map as a reference.

Note: the *CLOCK INFO* (3.7-3.14) and *ZONE INFO* (3.15-3.38) sections are not typically used in system management. The operational information is in the sections *COLLECTOR INFO* (3.39-3.46), *BOILER COMMUNIC.* (3.56) and *Generat.(or) Info* (3.59-3.68).

Querying Generator operational status

In submenus 3.59 (Generator 0 Info)-3.68 (Generator 9 Info), only visible depending on the actual number of active generators, more specific submenus are visible where you can view all the current temperatures and the working power of the single Generator. In particular, in submenu 1 (3.59.1; 3.60.1; ... → ... 3.68.1) you can verify the current operational status of the generator itself via a specific functional code, as per the following table.

Part.no	meaning
0	No Request made to the generator
1	Generator in alarm or shutdown
2	Request HEAT no flame
10	Request HEAT with flame
4	Request DHW no flame
12	Request DHW with flame
64	Degraded Generator (see NOTE 1 above)

Part.no	meaning
65	Degraded Generator + Alarm
66	Degraded Generator + HEAT Request no flame
74	Degraded Generator + HEAT Request with flame
68	Degraded Generator + DHW Request no flame
70	Degraded Generator + DHW Request with flame
128	NO COM

Heating circuit management

Configuring the delivery setpoint with thermoregulation based on external temperature

The factory setting is fixed-point management without thermoregulation.

If an external probe is installed, which must be connected to the boiler managed as **GENERATOR 0**, it is necessary to activate thermoregulation on the collectors interested, modifying a set of their operational parameters.

It is possible to simultaneously manage some collectors with thermoregulation and others with fixed point, as it is also possible to set different thermoregulation curves for each collector depending on the system requirements. For each collector it is also possible to set different curves based on the time slots set in COMFORT or ECONOMY mode, according to the settings of the associated clock.

In the case of simultaneous requests from multiple collectors, including any DHW collector, all the active DIRECT collectors will be served at the highest temperature requested at that time. For MIXED collectors, mixing is handled within the collector, so the corresponding areas are served according to the specific setpoint.

Note: It is possible to disable delivery of one or more collectors, in case of simultaneous DHW request. See details in "Setting EXCLUSION of Heating collectors with DHW active" on page 22.

Enabling thermoregulation on individual zone collectors

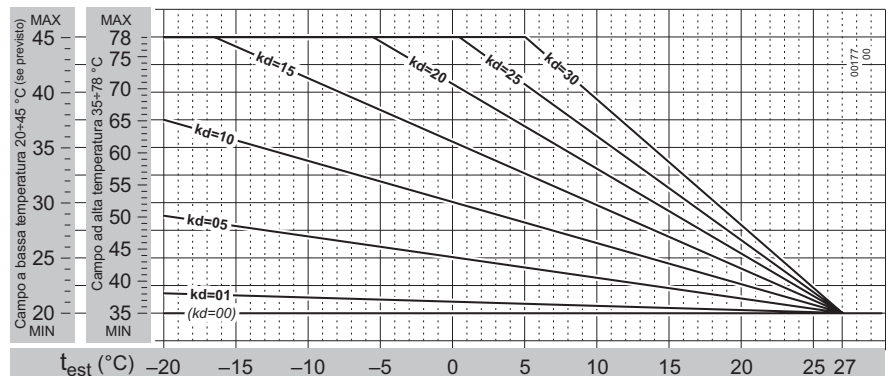
For each zone in which you want to activate thermoregulation you must set the following parameters:

- Set the value of the KD curve within the range 1-30 (with KD=0 thermoregulation is NOT active)
- Set the value of fixed offset to be applied to the thermoregulation calculation. The same parameter acts as a fixed-point delivery setpoint in case of inactive thermoregulation (factory setting), or in the case of active thermoregulation it represents the fixed offset value that is added to the delivery setpoint calculated for the zone by the thermoregulation function and it must therefore be modified with values ranging between 0°C and 5°C.

Climate compensation curves

The installation of the external temperature probe involves setting the climatic compensation curve suited to the system, on the basis of project data including the dispersion coefficient "kd".

Refer to the chart to the side. See also paragraphs "9.0 - Outside temperature probe" on page 3 and "Menu 1. - User Settings" on page 16, menus 1.14, 1.15 and 1.16.



Configuring the delivery setpoint with thermoregulation - ALWAYS COMFORT clock

To activate thermoregulation with associated clock ALWAYS in COMFORT (as default) it is possible to directly access from the USER MENU:

- ▶ MENU: 1 User Settings
- ▶ Access the submenu corresponding to the desired collector:
 - Submenu: 1.14 Set Collector 1
 - 1.15 Set Collector 2
 - 1.16 Set Collector 3
- ▶ Set the KD/KDM to a value between 1-30 as usual. (With value of 0 thermoregulation is not active - see also "Climate compensation curves" on page 18):

• collector 1:	Page: 1.14.3	CC InvCOM -10/Kd	- default: 0
• collector 2:	Page: 1.15.3	CC InvCOM -10/Kd	- default: 0
• collector 3:	Page: 1.16.3	CC InvCOM -10/Kd	- default: 0
- ▶ Set the OFFSET to 0 or to a different value if desired between 0 and 5°C (note that this value is added to the setpoint already calculated by the thermoregulation)

• collector 1:	Page: 1.14.1	Correction Inv.	- default: 78°C (if Direct) / 35°C (if Mixed)
• collector 2:	Page: 1.15.1	Correction Inv.	- default: 78°C (if Direct) / 35°C (if Mixed)
• collector 3:	Page: 1.16.1	Correction Inv.	- default: 78°C (if Direct) / 35°C (if Mixed)

Configuring the delivery setpoint with thermoregulation - clock programmed COMFORT - ECONOMY (with Technician password)

To activate thermoregulation **with associated clock and programmed in COMFORT and ECONOMY mode** it is possible to directly access from Menu **1. - User Settings**.

- ▶ MENU: 1 User Settings
- ▶ Access the submenu corresponding to the desired collector:
 - Submenu: 1.14 Set Collector 1
 - 1.15 Set Collector 2
 - 1.16 Set Collector 3
- ▶ Set the value of KD/KDM for the COMFORT and ECONOMY mode desired, between 1-30 as usual. (With value of 0 thermoregulation is not active - see also "Climate compensation curves" on page 18):
 - collector 1: Page: 1.14.2 C.C. INV ECO -10/ Kd - default: 0
Page: 1.14.3 C.C. INV COMF -10/ Kd - default: 0
 - collector 2: Page: 1.15.2 C.C. INV ECO -10/ Kd - default: 0
Page: 1.15.3 C.C. INV COMF -10/ Kd - default: 0
 - collector 3: Page: 1.16.2 C.C. INV ECO -10/ Kd - default: 0
Page: 1.16.3 C.C. INV COMF -10/ Kd - default: 0
- ▶ Set the OFFSET to 0 or to a different value if desired between 0 and 5°C (note that this value is added to the setpoint already calculated by the thermoregulation)
 - collector 1: Page: 1.14.1 Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)
 - collector 2: Page: 1.15.1 Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)
 - collector 3: Page: 1.16.1 Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)

Thermoregulation range (with Technician password)

Thermoregulation operates as usual within the entire temperature range. Maximum - Minimum Temperature defined for each collector, the working range being defined in the factory as:

- DIRECT collectors: 35°C-78°C
- MIXED collectors: 20°C-45°C

If you want to change the working thermoregulation range of one or more collectors, consequently limiting the scope of the setpoint computed for the collector, you must go to **MENU 2 - SYSTEM Settings**, with Technician password.

Configuring the delivery setpoint in systems without thermoregulation

The factory setting is fixed point management without thermoregulation, so external probe not active.

The heating delivery setpoints in individual collectors are factory-set as follows:

- DIRECT collector → factory SETPOINT = 78°C
- mixed collector → factory SETPOINT = 35°C (value distributed in the zone system circuit, while the boiler operates with a factory offset equal to 5°C to allow the mixing valve to work in the best possible way)

Changing setpoints of individual fixed-point zone collectors

You can configure a specific delivery setpoint for each zone collector.

In the case of simultaneous requests from multiple zones, all active DIRECT zones will be served at the highest temperature requested at that moment, while for the mixed zones the mixing is handled within the collector according to the configured setpoint.

Configuring the delivery setpoint in fixed-point systems - clock ALWAYS COMFORT

With the **clock ALWAYS associated with COMFORT** (default setting) it is possible to directly access the USER MENU:

- ▶ MENU: 1 User Settings
- ▶ Access the submenu corresponding to the desired collector:
 - Submenu: 1.14 Set Collector 1
 - 1.15 Set Collector 2
 - 1.16 Set Collector 3
- ▶ Set the desired SETPOINT depending on the type of collector. (Remember that mixed collectors have a temperature limit control set at 50°C)
 - collector 1: Page: 1.14.1 Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)
 - collector 2: Page: 1.15.1 Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)
 - collector 3: Page: 1.16.1 Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)

Configuring the delivery setpoint in fixed-point systems - clock programmed COMFORT - ECONOMY (with Technician password)

With clock associated and programmed in COMFORT and ECONOMY mode, you must directly access MENU 2 - SYSTEM Settings, with Technician password.

- ▶ MENU: 2 System Settings
- ▶ Access the submenu corresponding to the desired collector:
 - Submenu: 2.25 Set Collector 1
 - 2.26 Set Collector 2
 - 2.27 Set Collector 3
- ▶ Change working mode from KD/KDm to "fixed point":
 - collector 1: Page: 2.25.3 Setting Inv. - default: KD (if Direct) / KDM (if Mixed)
 - collector 2: Page: 2.26.3 Setting Inv. - default: KD (if Direct) / KDM (if Mixed)
 - collector 3: Page: 2.27.3 Setting Inv. - default: KD (if Direct) / KDM (if Mixed)

Note: The following settings are accessible from **Menu 2 - SYSTEM Settings** (with Technician password, already entered in the previous steps to change the working mode from KD/KDM to "fixed point"), but also from **Menu 1. - User Settings** [pages in square brackets].

- ▶ Then set the setpoint for the desired COMFORT and ECONOMY mode, included in the collector's Min-Max range.
 - collector 1: Page: 2.25.4 [1.14.2] C.C. INV ECO -10/ Kd - default: 0
Page: 2.25.8 [1.14.3] C.C. INV COMF -10/ Kd - default: 0
 - collector 2: Page: 2.26.4 [1.15.2] C.C. INV ECO -10/ Kd - default: 0
Page: 2.26.8 [1.15.3] C.C. INV COMF -10/ Kd - default: 0
 - collector 3: Page: 2.27.4 [1.16.2] C.C. INV ECO -10/ Kd - default: 0
Page: 2.27.8 [1.16.3] C.C. INV COMF -10/ Kd - default: 0
- ▶ Set the OFFSET to 0 or to a different value if desired between 0 and 5°C (note that this value is added to the setpoint already calculated through the previous settings)
 - collector 1: Page: 2.25.1 [1.14.1] Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)
 - collector 2: Page: 2.26.1 [1.15.1] Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)
 - collector 3: Page: 2.27.1 [1.16.1] Correction Inv. - default: 78°C (if Direct) / 35°C (if Mixed)

General functions

Overtemperature control in MIXED collectors

Note: the parameters that govern the following operation can be managed only by MENU 2 - SYSTEM Settings, with Technician password.

The temperature in mixed collectors is monitored, and if it exceeds the collector's LIMIT TEMPERATURE, specific for each collector, for a certain period of time equal to "*T. lim. Close V*" the circulation is initially stopped in the collector with forced closing of the mixing valve (for a time of 200 sec, sufficient for the complete closure of a normal motorised mixing valve) and the request for heat from the collector is disabled. After a waiting time equal to "*T. lim. Alarm C*" circulation is restarted in order to verify if the internal temperature returns to an acceptable value.

If the measured temperature remains above the temperature limit for a time equal to "*T. lim. Stop P*" the zone is stopped due to overtemperature, turning off the circulating pump associated with the collector, the generation of the overtemperature alarm code **E78.17 (MIX2)** or **E79.18 (MIX3)**, and the interruption of all requests from the collector itself, displaying "**AL!**" as the status of the collector.

The stoppage is reset ONLY at the end of the request for the zone associated with the collector.

A new request from the collector reactivates the normal cycle, checking the temperature detected.

The triggering of a MIXED ZONE OVERTEMPERATURE alarm inhibits the management of the affected zone and the ignition of the burner for the specific Ignition Request, but does not inhibit the ignition and the management of the other Ignition Requests from other MIXED or DIRECT zones or the management of the DHW boiler managed by the collector.

Source offset between the SETPOINT requested by the collectors and the SETPOINT requested to the generators

For each zone collector is provided the possibility to set a specific temperature offset between the collector distribution setpoint and the heat generation temperature of the boilers when the collector is in demand.

The factory setting for the Source OFFSET value is equal to:

- DIRECT collectors: 0°C
- MIXED collectors: 5°C

And it can be changed in MENU 2 - SYSTEM Settings, with Technician password.

Valve reset at power-on

To ensure the proper working point of mixing valves, at each power-on the mixing valves are forced to close for the reset time of 200 seconds, which is sufficient for the complete closure of a normal motorised mixing valve.

A possible request from the mixed collectors made during the Reset Valve phase interrupts the Reset Valve function and is immediately served with mixing according to the detected temperature inside the collector.

Domestic Hot Water management

Setting DHW FUNCTION managed by COLLECTOR

With DHW managed by collector, initial setting DHW=2 by collector, the preparation of the boiler through the measurement of the internal temperature probe and the activation of its circulating pump is managed directly by the regulator.

By default the DHW circuit is assigned collector 8 and clock number 8, settings that should not be changed for the proper functioning of the system.

There are two different levels of DHW SETPOINTS, COMFORT DHW Setpoint and ECONOMY DHW Setpoint, which are associated with the time slots COMFORT and ECONOMY of clock 8 associated with the DHW collector.

Through clock 8, in addition to setting the different time slots of COMFORT or ECONOMY to associate specific DHW SETPOINTS, it is possible to set time slots to OFF in which the boiler is not prepared, only the antifreeze function is guaranteed.

By default clock 8 is always set to COMFORT mode, and its time slots can be changed like all other clocks in the menu:

- ▶ MENU: 1 User Settings
 - Submenu: 1.13 Clock 8
 - Page: 1.13.2 Prog. Monday - 01 - the first time slot available
 -
 - 1.13.43 Prog. Sunday - 06 - the last time slot available

The associated values of DHW COMFORT and ECONOMY SETPOINT are set by default to 60 and can be changed in menu

- ▶ MENU: 1 User Settings
 - Submenu: 1.4 Set Comfort DHW - default = 60°C
 - 1.5 Set Economy DHW - default = 60°C

During the preparation of the DHW boiler the delivery temperature setpoint requested from the generators is always equal to 78°C, unified for COMFORT and ECONOMY modes, and can be changed in the menu for collector 8 DHW:

- ▶ MENU: 1 User Settings
 - Submenu: 1.21 Collector 8 DHW
 - Page: 1.21.1 Correction Inv - default = 78°C

If you want to differentiate the DHW setpoints for COMFORT and ECONOMY modes you need to set:

- Page: 1.21.1 Correction Inv - = 0°C

and set separately

- Page: 1.21.2 CC InvEco -10/Kd = set Tdelivery ECONOMY
- Page: 1.21.3 CC InvCom -10/Kd = set Tdelivery COMFORT

The value set as Tdelivery affects only the working temperature of the generators but not the preparation temperature of the DHW boiler, which is always constrained by the DHW COMFORT and ECONOMY setpoints (the value of Tdelivery in DHW is always fixed at the value set and independent of Texternal)

The DHW tank's load pump is set to post circulation of 180 sec, which can be changed by accessing MENU 2 - SYSTEM Settings, with Technician password.

Setting DHW ANTI-LEGIONELLA FUNCTION

With DHW managed by collector it is possible to activate the anti-legionella feature by enabling its CLOCK 7 accessing MENU 2 - SYSTEM Settings, with Technician password

- ▶ The anti-legionella function, once enabled, is active in all time slots set to COMFORT on the associated clock 7. By default set to Comfort on Fridays from 1:00 am to 4:00 am.
- ▶ The default time setting can always be changed in MENU 1 - USER Settings on page 1.12 - Set Clock 7.
- ▶ The anti-legionella function is executed as a DHW request with:
 - Set Boiler equal to 70°C
 - Set Delivery equal to 78°C
 - Changeable values accessible in MENU 2 - SYSTEM Settings, with Technician password.
 - In the same MENU 2 it is possible to manually force the anti-legionella function.

Setting **EXCLUSION** of Heating collectors with **DHW active**

With **Prod. DHW=2** (production of hot water managed by collector) the existing Heating requests are served simultaneously with the Boiler preparation request. Consequently the heating collectors and the preparation of the boiler itself will be served by same delivery temperature, equal to the maximum dynamic Setpoint of the active ones. In the case of a MIXED ZONE the water temperature dispensed inside the collector will be controlled as usual via the mixing valve, while the direct zones could be served at a temperature different from the one set.

In some configurations, the problem arises of the **delivery of high temperature fluid into low temperature direct zones** in the moments in which there are contemporaneous requests for heating and boiler preparation.

Also in other systems with mixed collectors, e.g. "0.2.4" on page 14, with the request for boiler preparation collector 1 (direct) will not be served at its setpoint, but rather that of the DHW.

The MZ control unit provides the possibility, via MENU 2 - SYSTEM Settings (with Technician password) to exclude one or more DIRECT collectors when there is a request to prepare the Boiler.

► MENU: 2 System Settings

- Submenu: 2.32 Collector 8 DHW
 - Page: 2.32.17 Collectors Excluded - default = none

selecting the numbers corresponding to the collectors with the **OK and ESC** keys, the collector being changed indicated with *****, exclude (box full) the number corresponding to the collectors that you want to exclude by selecting the exclusion function with the **+ and -** keys. Confirm the setting for each collector with **OK** as usual, where:

- Square "empty" next to the number: collector always served even with DHW active
- Square "full" next to the number: collector EXCLUDED during the phases with DHW active

For collectors defined as EXCLUDED from the collector 8 DHW:

- If the excluded collector was requested before the operation of the DHW request, upon arrival of the DHW request the collector goes OFF and the corresponding pump remains active for the time of Post-circulation.
- If the excluded collector is requested with a DHW request already in progress, the collector remains OFF and the corresponding pump remains off.
- At the end of the DHW request, if the collector is still being requested it switches into COMF and functions as usual.

Example:

- Page: 2.32.17 Collectors Excluded
– 1 2 3 4 5 6 7 8 with this selection collectors 1 and 3 remain OFF with DHW request in progress.

Setting **DHW FUNCTION** managed by **GENERATOR**

With a boiler directly connected to a generator, to autonomously manage the request for DHW from the boiler the generator **MUST** have the setting "PRIORITY DHW=1".

By default all generators connected to the regulator already have "PRIORITY DHW=1".

By default the DHW system is assigned clock number 8, which is configured by default as "always on COMFORT", and for which it is possible to set up differentiated time slots for COMFORT and ECONOMY.

In fact, there are two different levels of DHW SETPOINTS, COMFORT DHW Setpoint and ECONOMY DHW Setpoint, which are associated with the time slots COMFORT and ECONOMY of clock 8 associated with the DHW collector.

Through clock 8, in addition to setting the different time slots of COMFORT or ECONOMY to associate specific DHW SETPOINTS, it is possible to set time slots to OFF in which the boiler is DEACTIVATED.

By default clock 8 is always set to COMFORT mode, and its time slots can be changed like all other clocks in the menu:

► MENU: 1 User Settings

- Submenu: 1.13 Clock 8
 - Page: 1.13.2 Prog. Monday - 01 - the first time slot available
 -
 - 1.13.43 Prog. Sunday - 06 - the last time slot available

The associated values of DHW COMFORT and ECONOMY SETPOINT are set by default to 60 and can be changed in menu

► MENU: 1 User Settings

- Submenu: 1.4 Set Comfort DHW - default = 60°C
- 1.5 Set Economy DHW - default = 60°C

The boiler setpoint can be set in a general manner on all active generators through the submenu described, or on each generator via the **BOILER PARAMETER PAR23**, where

- with PAR23 = 0 the boiler receives the setpoint from the Regulator
- with PAR23 = 10-60 FIXED setpoint of the boiler managed by the generator, it is NOT possible to change it from the regulator.

Setting **DISABLE DHW preparation**

The preparation of the DHW boiler, operated by Collector (DHW=2) or directly by the generator (DHW=1) which can be disabled, by changing the setting to **OFF** mode

► MENU: 1 User Settings

- Submenu: 1.3 Enab. DHW - default = ON

Setting **DHW RECIRCULATION FUNCTION**

With DHW boiler managed by collector (DHW=2) or directly by the generator (DHW=1), it is possible to manage one of the regulator outputs, if free and not used by other loads present in the initial configuration, for the management of a DHW recirculation pump.

Depending on whether the recirculation pump is connected directly to the MZ regulator or to the MS expansion card, to configure the relay output to manage the recirculation pump it is necessary to enter MENU 2 - SYSTEM Settings, with Technician password.

In this case the relay that will control the DHW recirculation pump will be active with:

- **Clock 8 (associated with DHW) in COMFORT mode**, regardless of Ignition Request for DHW boiler active.

The recirculation pump does NOT have a time of post-circulation, and directly follows the associated clock time setting.

In case of DHW DISABLED, DHW recirculation is also disabled regardless of the time programming.

Management processes of thermal generators - cascade operation

There are 2 different management processes for thermal generators controlled by the regulator:

- "Parallel" operating mode
- "Balance of power" operating mode

By default, the regulator is set to work in "balance of power" mode, which allows a dynamic balanced distribution of requested heat to all available generators.

The operating mode can be changed in the section:

► MENU: 2 System Settings

- Submenu: 2.34 Cfg. OpenTherm/R
 - Page: 2.34.1 Cascade Algorithm

"Parallel" operating mode:

With selection "**CASCADE ALGORITHM = PARALLEL**" at the start of each heat request from the system the regulator issues an Ignition Request to all connected and activated generators in HEAT phase INDEPENDENT of the HEAT or DHW priority assigned to each generator.

The request is issued at maximum requested POWER = 100% and at the delivery SETPOINT required by the system, corrected if necessary in PID on the temperature of the primary collector if present.

As long as the demand for heat from the system is present, ALL generators are kept active, modulating ONLY the Delivery temperature requested according to the needs of the system and leaving each generator free to modulate and the burner to turn off if the internal temperatures require it.

"Balance of power" operating mode

The regulator is preset to the "**balance of power**" mode with default setting of all consequent functional parameters.

In this mode, the regulator tends to equalise the powers of the various active generators based on the power required by the system, dynamically rotating their ignition.

At the start of a request for heat a first generator is activated, with power percentage requested equal to "**Idle power**" that represents the initial power supplied to the active generators. This is progressively incremented by a percentage value equal to the "**Gap power**" so as to allow the generator to reach thermal capacity in a progressive manner.

A timed control of the thermal evolution of the active generators is carried out, and at each expiration of "time between changes" the actual power capacity at which the active generators are working is checked, where:

- If the power of all active generators with burner on in heating mode is higher than the input power limit equal to "**Power to Add Gen**" a new generator is asked to start.
- If the power of at least one active generator with burner on in heating mode is lower than the switch-off power limit equal to "**Power to remove Gen**" one of the active generators is requested to shut down.

In the case of ignition of a new generator, even the new generator is in the state of burner on, so all the generators are reset to power requested equal to "**Idle power**" and progressively incremented by asking each for power equal to the lower real power increased by the "**Gap power**" so as to always allow all generators to reach the thermal capacity in a progressive manner.

Available generators are always switched on or off in rotation with equal PRIORITY, so as to distribute the average workload in a uniform manner across all generators.

It is possible to set the minimum number of generators "**Minimum No. Gen.**" and maximum number of generators "**Maximum No. Gen.**" active simultaneously, as well as the number of generators to be started "**No. Gen. Starting**" simultaneously activated on receipt of the request.

If necessary, it is possible to change the functional parameters mentioned by accessing the pertinent menu:

- ▶ MENU: 2 System Settings
 - Submenu: 2.34 Cfg. OpenTherm/R
 - Page: 2.34.17 Time between changes - default 180 sec
 - Page: 2.34.18 No. Gen. Starting - default 1
 - Page: 2.34.18 Minimum No. Gen. - default 1
 - Page: 2.34.18 Maximum No. Gen. - default 9
 - Page: 2.34.21 Power to Add Gen - default 50
 - Page: 2.34.22 Power to Remove Gen - default 30
 - Page: 2.34.23 Idle Power - default 30
 - Page: 2.34.24 Gap Power - default 8

Interaction of generator physical power

Through the "balance of powers" mode the regulator automatically controls the power requested of individual generators independently of the power capacities of the generators themselves.

It is important that the maximum power value set for the individual generators remains set to the maximum expected to allow for the maximum available adjustment (boiler PARAMETER PAR4=99) and not to alter the control algorithm.

(i) If it becomes necessary to limit the effective power of a generator, it is necessary to act on the maximum number of revolutions PAR 14, **always leaving PAR4 = 99.**

"Balance of power" operating mode with generator priorities

In balance of power mode it is possible to define for each generator the degree of priority of use "**pR**".

In the event of a request for heat for the management of existing heating circuits, or for the preparation of the DHW boiler if handled directly by the regulator (initial setting DHW = 2 from collector), the regulator activates alternately initially only those generators with priority setting equal to "**pR:1**".

Only when all the generators with priority **pR:1** are turned on and the heat demand is not yet satisfied will even the lower priority generators (**pR:2**) be turned on, and so on.

Similarly, when the system reaches thermal equilibrium capable of satisfying the demand for heat and the energy produced begins to become redundant, the first generators to be switched off will be those with a lower PRIORITY (**pR:9**).

The priority of use of the generators for the production of heat to be supplied to the primary collector is by default set to 1 (highest priority) for all generators. If you want to set some of the generators to a lower priority, for example because a generator is used as a thermal source also for other elements controlled directly by the regulator, it will be switched on only when all higher priority generators are on with power exceeding **Power to Add Gen.**

The priority of the individual generators can be set from 1 to 9 (1 = highest priority), thus being also able to manually define a fixed ignition sequence of the generators, instead of using the dynamic rotating sequence that is handled automatically among generators of equal priority.

To change the priority pR of generators:

- ▶ MENU: 2 System Settings
 - Submenu: 2.34 Cfg. OpenTherm/R
 - Page: 2.34.4 Priority Gen 0 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.5 Priority Gen 1 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.6 Priority Gen 2 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.7 Priority Gen 3 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.8 Priority Gen 4 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.9 Priority Gen 5 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.10 Priority Gen 5 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.11 Priority Gen 7 - default pR:1 pACS:0/1 (*)
 - Page: 2.34.12 Priority Gen 8 - default pR:1 pACS:0/1 (*)

(*) NOTE: the DHW priority must be at 1 ONLY for those generators in which DHW is handled directly by the generator itself. With DHW managed by the REGULATOR or without DHW, DHW priority setting is not important.

Cascade operation mode with collector temperature control

By default the presence of a temperature probe on the balancer/main collector is expected, which allows additional adjustment PID of the actual collective delivery temperature compared to the value of the temperature setpoint to be distributed in the system, thus recalculating the temperature setpoint requested of the active generators and consequently their power, according to the dynamic needs of the system.

The PID correction made on the actual working setpoint of the generators, with respect to the maximum temperature setpoint dynamically requested by the system, is limited by the following parameters:

- Page: 2.34.15 MAX Negative Corr.
- Page: 2.34.16 MAX Positive Corr.

If the probe on the collector/balancer is not connected, an **E61.3** error will be reported and it is necessary to disable the probe in the menu:

- ▶ MENU: 2 System Settings
 - Submenu: 2.34 Cfg. OpenTherm/R
 - Page: 2.34.13 Can.Second.Probe - default: MZ IA6 D

To disable management of the temperature probe on the collector it must be set to "not configured"

Automatic operation of the system according to the outside temperature.

If the external probe is present (to be connected to generator 0, setting at least one of the Kd/KDM different from 0), automatic switching of the HEATING system is activated depending on the outside temperature.

- Therefore, **if the outside temperature is higher than the limit set** (temperature and hysteresis), **the heating collectors will remain inactive** even if the relative room thermostats request activation. The function acts only on activation of the HEATING SIDE, while the DHW function is always ON, even if operated by collector.

With automatic switching of the system:

- T external detected > "limit T.ext WINTER + hysteresis" → system HEATING side set to OFF
- T external detected < "limit T.ext WINTER" → system HEATING side set to ON

The activation limits are defined and can be changed with the following menu items:

- ▶ MENU: 2 System Settings
 - Submenu: 2.35 Set General Parameters
 - Page: 2.35.10 Limit Text Winter - default: 22 °C
 - Page: 2.35.11 Limit Text Hysteresis - default: 1 °C

General functions

Setting STOP NOTIFICATION FUNCTION

The system may not use all the relays and corresponding outputs of the MZ control unit (and the MS expansion card, if present).




In this case, it is possible to use these resources to drive external devices (like warning lights) to be associated with various types of alarms, for example:

- Stoppage of one of the available generators.
- Stoppage of all generators.
- Presence of a generic error in the entire system.

It is necessary to directly access MENU 2 - SYSTEM Settings, with Technician password.

- ▶ MENU: 2 System Settings
 - Submenu: 2.35 Set General Parameters
 - Page: 2.35.8 Configure MZ RELAY for connection to MZ regulator
 - Page: 2.35.9 Configure MS RELAY for connection to MS expansion
- ▶ Select the appropriate output from those available: MZ: UD1 – UD7 or MS: UD1 – UD3 (see Attention below the table)

Note: for the location of the relays and associated terminals, see "1.0 - MZ cascade management control unit" on page 1.

Menu Page	Exit to menu	Relay	Terminals involved	Contact type	Effect
2.35.8	UD1	R1	L1 - N - 	Power 220V~	With relay active, L1 is powered (Phase)
	UD2	R2	L2 - N - 	Power 220V~	With relay active, L2 is powered (Phase)
	UD3	R3	L3 - N - 	Power 220V~	With relay active, L3 is powered (Phase)
	UD4	R4	C4 - NA4	Clean	With relay active, C4 is connected to NA4
	UD5	R5	C5 - NA5	Clean	With relay active, C5 is connected to NA5
	UD6	R6	C6 - NA6	Clean	With relay active, C6 is connected to NA6
	UD7	R7	C7 - NA7 - NC7	Clean exchange	With relay active, C7 is connected to NA7; With relay inactive, C7 is connected to NC7
2.35.9	UD1	R1	P1 - N - T	Power 220V~	With relay active, P1 is powered (Phase) (T = Ground)
	UD2	R2	P2 - N - T	Power 220V~	With relay active, P2 is powered (Phase) (T = Ground)
	UD3	R3	VC - VO - N - T	Exchange Power 220V~	With relay active, VC is powered (Phase) and VO is isolated With relay inactive, VC is isolated and VO is powered (Phase);



ATTENTION - Relay output connections on MZ Regulator or MS expansion card - For the management of additional external electrical connections, when connecting directly to the MZ regulator or the MS expansion card you need to **pay close attention** to the wiring diagrams and **the absorption limits allowed, both for each input, and for the overall absorption of the connected loads**. See "Technical data" on page 29.

► Set the related functional code to:

- **12 Auto** to report the presence of a general system alarm
 - In this case the relay for reporting the stoppage status will be active when:
 - One of the connected generators reports a stoppage or fault (gas stoppage, probe failure, etc.)
 - External probe faulty
 - One of the probes connected for system management is faulty
 - A system safety function has been triggered (managed by MZ)
- **126 Auto** to report the presence of alarms on the thermal generators
 - In this case the relay for reporting the stoppage status will be active when:
 - One of the connected generators reports a stoppage or fault (loss of communication, gas stoppage, probe failure, etc.)
 - External probe faulty
- **127 Auto** to report the presence of alarms on ALL thermal generators
 - In this case the relay for reporting the stoppage status will be active when:
 - ALL the connected generators report a stoppage or fault (loss of communication, gas stoppage, probe failure, etc.)

Setting REPORTING REQUEST STATUS ON

The system may not use all the relays and corresponding outputs of the MZ control unit (and the MS expansion card, if present).

In this case, it is possible to use these resources to report the active request status, which could be the active request status from a specific zone, from all heating collectors or from the DHW collector (with DHW=2 from collector).

Using one of the relays with a dry contact, relay MZ UD4 - UD7, suitably set according to necessity, it is also possible to control the ignition of an external generator that requires only the closure of a dry contact.

It is necessary to directly access MENU 2 - SYSTEM Settings, with Technician password.

► MENU: 2 System Settings

- Submenu: 2.35 Set General Parameters
 - Page: 2.35.8 Configure MZ RELAY for connection to MZ regulator
 - Page: 2.35.9 Configure MS RELAY for connection to MS expansion

► Select the appropriate output from those available: MZ: UD1 – UD7 or MS: UD1 – UD3 (see table pagepage 25)

► Set the related functional code to:

- **9 Auto** report "req.Source Gen" always ON for every ignition request
 - In this case the relay reporting the status of existing Request when there is at least one request for heat from one of the collectors, both Heating (collectors 1, 2, 3) and collector 8 DHW with DHW=2 (from collector)
- **16 Auto** report "request from ZONA 1": ON with RT zone 1 ON (zone TA closed + clock)
- **17 Auto** report "request from ZONA 2": ON with RT zone 2 ON (zone TA closed + clock)
- **18 Auto** report "request from ZONA 3": ON with RT zone 3 ON (zone TA closed + clock)
- ...
- **53 Auto** report "source 1 active": ON with RT from any HEAT collector (collector 1-2-3)
- **48 Auto** report "DHW activation": ON with RT from DHW (with DHW=2 from collector 8)

Note: Reports regarding the status of the heat Request end with the heat request itself. If the purpose of the report is to intercept the operation of the circulating pump associated with the collector, generating a status of "active" even during the post-circulation cycles, it is necessary to set:

- **64 Auto** report "Collector 1 Pump": ON with Collector 1 pump ON
- **68 Auto** report "Collector 2 Pump": ON with Collector 2 pump ON
- **72 Auto** report "Collector 3 Pump": ON with Collector 3 pump ON
- **92 Auto** report "Collector 8 Pump": ON with Collector 8 DHW pump ON

"Parent collector" management

It is possible to select a specific group of collectors to group together on a physical or logical level into a single collector called Parent collector. In this case the Parent collector will be active whenever one of the collectors associated with it is active.

To associate a parent collector, for example using collector 5 which is not otherwise used in any functional configuration, go to MENU 2 - SYSTEM Settings, with Technician password:

- ▶ MENU: 2 System Settings
- ▶ Access the submenu corresponding to the desired collector:
 - Submenu: 2.25 Set Collector 1
 - Submenu: 2.26 Set Collector 2
 - Submenu: 2.27 Set Collector 3
- ▶ Set "PARENT collector"=5 for each collector to be added to the group:
 - collector 1: Page: 2.25.18 Parent Collector - default: none
 - collector 2: Page: 2.26.18 Parent Collector - default: none
 - collector 3: Page: 2.27.18 Parent Collector - default: none

In this way it is possible to have an indication of when at least one of the associated collectors has been requested, accessing the control of the pump associated with collector 5

- **80 Auto** report "Collector 5 Pump": ON with Collector 5 pump ON

By default, collector 5 post-circulation is equal to 30 sec, so the report of the request from collector 5 is equal to the management of requests from the associated collectors including post-circulation. If you want information just about the request it is necessary to clear the value of post-circulation for collector 5, which once set as Parent collector becomes visible in the menu:

- ▶ MENU: 2 System Settings
 - Submenu: 2.29 Set Collector 5
 - Page: 2.29.12 Pump Postfunc. - default: **30 s** → **0 s** Set collector 5 post-circulation to zero

(i) **ATTENTION - Relay output connections on MZ Regulator or MS expansion card** - For the management of additional external electrical connections, when connecting directly to the MZ regulator or the MS expansion card you need to pay close attention to the wiring diagrams and the absorption limits allowed, both for each input, and for the overall absorption of the connected loads. See table page 25) and "Technical data" on page 29.

Activating forced loads to verify operation

You can forcibly and manually activate each relay to verify its proper connection and the activation of the load by accessing the menu for assigning the functionality to each output:

It is necessary to directly access MENU 2 - SYSTEM Settings, with Technician password.

- ▶ MENU: 2 System Settings
 - Submenu: 2.35 Set General Parameters
 - Page: 2.35.8 Configure MZ RELAY for connection to MZ regulator
 - Page: 2.35.9 Configure MS RELAY for connection to MS expansion
- ▶ Select the appropriate output from those available: MZ: UD8 or MS: UD4

(i) DO NOT change the functional code, to not alter the operation of the regulator, but only access the operation mode. Use the "OK" button to confirm the functional code and move on to change the "Auto" mode:

- function code (do NOT edit) * Auto change the default "AUTO" to:
 - Man. OFF to force relay OFF
 - Man. ON to force relay ON

Note: Forcing the relay ON or OFF cannot be stored and is limited only to the time of the "edit state" of the setting. Upon leaving the setting via the "OK" button the relay configuration returns to AUTO mode.

Alarms

Two different subgroups of alarms are managed, depending on their origin, i.e., concerning conditions or components:


- Of the system, outside the generators
- Inside the generators

Both system and generator alarms trigger the lighting of the red **ALARM** LED on the display of the **MZ** control unit (ref. page 1) and are visible on the page "**system alarms**" (ref. page 5) according to the code and the description given in the "alarms" table below.

Alarms related to generators are also visible on the screens related to the dynamic status of active generators (ref. "Generator screen" on page 4).

The system alarm status is also visible on generator 0, with the coding given in the following table; generator 0 also displays an alarm code that indicates a general alarm on another generator of the system.

Each generator still displays its own alarms and faults, as called for by the relative control electronics, including those relating to the components for the management of the boiler connected directly (subsystem **Prod. DHW = 1** - comp. 6.9; 7.9).

Gen. View 0	View on MZ ⌵Enn.nnn⌴		page description "System alarms"	alarm status description	
71	71	1	----	encounters a KD different from 0 and the external probe is not present (comp. 9.0)	
	60	2	alarm active	faulty probe of DHW boiler (comp. 6.8)	<i>Example of alarm display on MZ</i> 
61	61	3	alarm active	faulty probe of main collector (comp. 3.0)	
80 60	80	7		communication error with MZ control unit (see comp. 2.1)	
58	58	9	Err probe Zone 2	faulty probe of mixed collector 2 (comp. 6.2)	
59	59	10	Err probe Zone 3	faulty probe of mixed collector 3 (comp. 6.3)	
78	78	17	alarm active	overtemperature of mixed collector 2 (detected by comp. 6.2)	
79	79	18	alarm active	overtemperature of mixed collector 3 (detected by comp. 6.3)	
72	72	78	alarm active	generic alarm for a generator	
73	73	79	alarm active	ALL generators in alarm	
51	51	104	alarm active	faulty temperature probe of solar collector (comp. 6.12; 6.14)	
52	52	105	alarm active	faulty temperature probe of lower solar DHW storage (comp. 6.11; 6.16)	
53	53	106	alarm active	faulty temperature probe of upper solar DHW storage (comp. 6.10; 6.15)	
54	54	107	alarm active	faulty solar probe 4 (not provided for in the cases described)	
55	55	108	alarm active	faulty temperature probe of secondary solar DHW storage (comp. 6.13)	

Technical data

Model	MZ Cascade Control Unit
Supply voltage	230Vac -15% + 10% 50Hz
Maximum absorption <i>(related to electronics, excluding user loads)</i>	12 VA 50mA @ 230V
Type and value of fuse protection	TR5 format, 6.3AT (delayed)
Room temperature for operation of the main circuit board	-20°C - +50°C
Room temperature for operation of the LCD display adapter	-10°C - +50°C
Room temperature for storage	-25°C - +80°C
Humidity	max 90% @ 40°C without condensation
Class of protection against electric shocks	cl. II
Work environment	clean
Protection class of the closed and isolated electrical box	IP 54
Protection class of just the board	IP 00
Low voltage contact current (SELV)	1.2mA
Capacity of relay contacts R1 - R3 pump control	230Vac – 5 A (static load)
Capacity of relay contacts R1 - R2 pump control	—
Capacity of relay contacts R4 - R7 pump control or electric by-pass/mixer valve	230Vac – 5 A (static load)
Capacity of relay contacts R3 pump control or electric by-pass/mixer valve	—
MAX total load absorption	6 A
MAX load power output 12V	12V – 100 mA
Minimum guaranteed duration of buffer watch battery (after reaching full charge)	48 h

EC declaration of conformity

The manufacturer Italtherm S.r.l., Via S. d'Acquisto 29010 Pontenure (PC) Italy, hereby declares that this **Kit "Cascade management control unit"** complies with the essential requirements of European Directives:

- Low Voltage Directive **2014/35/EU**
- Electromagnetic Compatibility Directive **2014/30/EU**

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