

Instruction manual



MCX CONTROLLER:

CHILLED WATER CLOSE CONTROL
DIRECT EXPANSION CLOSE CONTROL

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1. Information on this manual

1.1 General characteristics

All example screens and all parameter nomenclatures used in this manual are in English.

NOTE

See the “Language selection” chapter to change the screen language in order to follow the examples described in the manual.

English terms are also used in the “Microprocessor boards I/O (MCX)” chapter, which are the same used to program the boards.

1.1 General characteristics

The microprocessor control manages independently the operation of the unit.

The control essentially consists of:

- microprocessor control board (and possibly an expansion board), contained inside the electrical board;
- graphical user interface.

In the microprocessor control board:

- houses the adjustment program;
- stores all operating parameters;
- allows the parameters to be viewed and set with the user interface.

The control system ensures the following functions:

- temperature and humidity control based on the set-points that can be set with the user interface;
- remote turning on/off of the unit (with CR accessory);
- control of all operating times and start-up rotation of the compressors, to guarantee their efficiency and reliability;
- count of the operating hours of the most significant components;
- passwords on 3 programming levels (User, Manufacturer, Advanced);
- complete alarms detection system;
- log of all alarm events;
- graphic display with icons of the operating status of all components of the units and display of all values read by the probes connected to the control board;
- Inverter fans regulation (optional), with indication of any faults;
- electronic thermostatic valve regulation (optional), with indication of any faults;
- regulation of 1 Inverter compressor (optional), with indication of any faults;
- possibility of communication with a supervision system using an RS485 serial interface;
- clock/calendar management;
- different weekly on/off time bands;
- management of the local network with the possibility of setting rotation of one or more units in stand-by.

2. First start-up

- 2.1 Unit turning on and off
- 2.2 Turning on or off from the menu
- 2.3 Automatic turning on or off

2.1 Unit turning on and off

The unit will be turned on and off with the "ON/OFF" key on the user interface:

	ON/OFF	On/off key
-----------------------------------------------------------------------------------	--------	------------

NOTE








Ensure "C2-17" clamps are connected in the main "X1" terminal board of the electrical board.

Other ways to turn the machine on or off are:

- with the menu
- in automatic mode

2.2 Turning on or off from the menu

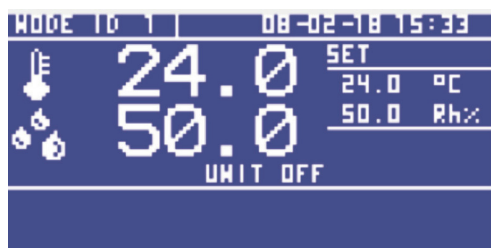
From the menu, the machine is turned on or off as follows:

	ENTER	To open the main menu
 	UP / DOWN	To search for "Start" on the menu
	ENTER	To confirm the selection
 	UP / DOWN	To select between "Turn ON" and "Turn OFF" to turn the unit on or off
	ENTER	To confirm the selection

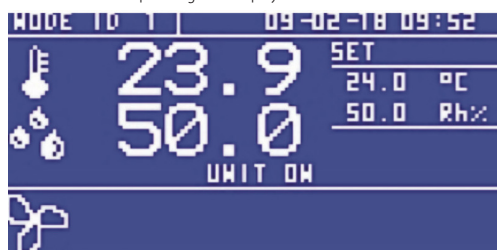
2.3 Automatic turning on or off

In automatic mode, the unit is turned on as follows:

- a remote on/off contact ("C2-17" clamps on the "X1" terminal board of the electrical board);
- a supervision system;
- a time band system.






Display visualisation example with the machine off:
UNIT OFF with no operating icon displayed



Display visualisation example with the machine on in STAND-BY:
UNIT ON and fans on icon



Display visualisation example with the machine on:
UNIT ON with the following icons displayed:

	Unit fans on
	Unit compressors on (2 compressors in this example, one per circuit)
	Machine on in cooling mode (temperature sensor reading 26.5°C and set at 24°C)

3. User interface (display)

3.1 Information on the display

The user interface consists of:

- 128x64 pixel backlit LCD display;
- 66.5x33.2 mm visible active area;
- 6 backlit keys for parameters navigating and editing.

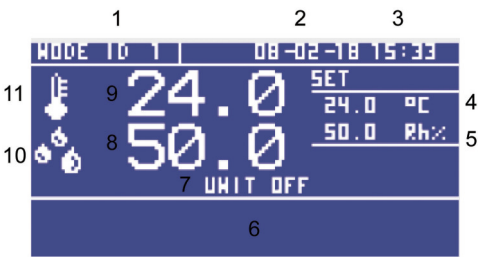
The microprocessor board is connected to the user interface by a special 4-pole cable with an RJ11 jack connector.



Key	Key descriptio	Single pressio (press and release)	Long pressio (press for about 3 seconds)
	ENTER	Opens the Programming menu Selection confirmation	/
	ESC	Exit the rogramming menu Exit a submenu	/
	DOWN	Decreases a value Menu navigation Functions detail menu navigation (ventilation, cooling, etc.)	/
	UP	Increases a value Menu navigation Functions detail menu navigation (ventilation, cooling, etc.)	/
	ALARM	Opens active alarms menu	Resets alarms (manual)
	ON/OFF	/	ON/OFF

3.1 Information on the display











The main user terminal mask (hereinafter called main mask) displays the readings of the probes, of the set-points set and gives essential information on the status of the system.



Legend:

Ref.	Description	Ref.	Description
1	Board node n.	7	Unit status
2	Date	8	Humidity probe reading
3	Time	9	Temperature sensor reading
4	Actual temperature set-point (°C)	10	Humidity symbol
5	Actual humidity set-point (°C)	11	Temperature symbol
6	Operating symbols zone		

The icons on the display, in the operating symbols zone, are the following:

	Cooling function		Heating function
	Humidification function		Dehumidification function
	Fan in operation		Compressor in operation
	Damper in operation		Alarm signal
	Free-Cooling		Second Source

4. Main menu

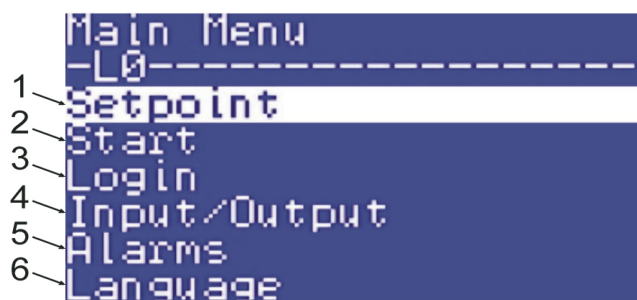
- 4.1 Access to the main menu
- 4.2 Unit status detail

4.1 Access to the main menu

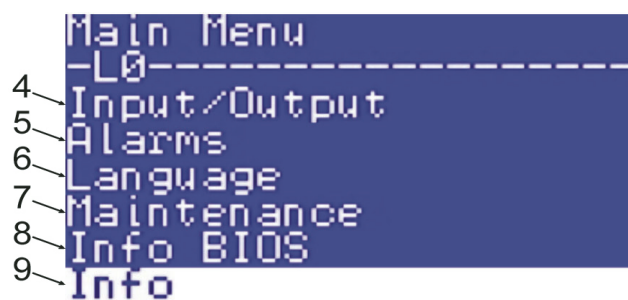
To access to the main menu press:

	ENTER	To access to the main menu
-----------------------------------------------------------------------------------	-------	----------------------------

The following items are displayed in the drop-down menu:






First part of the menu



Second part of the menu



The items in the menu perform the following functions:

Ref.	Item	Description
1	Set-point	access to the submenu to change the temperature and humidity set-points
2	Start	access to the submenu to turn the unit on or off
3	Login	access to the submenu to enter the password to view the various parameters
4	Input/Output	access to the submenu to view the masks that display the values of the unit's analogue and digital inputs and outputs
5	Alarms	access to the submenu to manage the alarms
6	Language	access to the submenu to change the languages recorded on the board
7	Maintenance	access to the submenu to display the unit's working hours, to change the time and date or for the time bands function (Scheduler Setup).
8	BIOS info	access to the submenu to display the board information: board type, BIOS, software version
9	Info	access to the specific mask for the version of the software installed on the unit

	UP / DOWN	To scroll through the main menu
	ENTER	To select an item from the menu
	ESC	To exit the programming menu and submenus

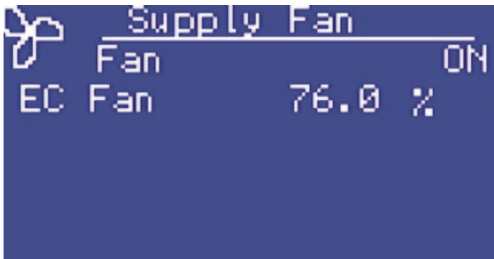
4.2 Unit status detail

To see the detail of the data for the unit's main functions (HEATING - COOLING - HUMIDIFICATION - DEHUMIDIFICATION), press "DOWN":

	DOWN	To access to the menu containing the details of the unit's functions (press several times to switch from one menu to the next)
	UP	To access to the previous menu

Press “Down” to open the following menus (see example below):

1) “Supply Fan” menu for the operating status of the fans:



Supply Fan


Fan ON

EC Fan 76.0 %

Fans on (ON)

76% fans speed (for Inverter fans)

2) “Cooling” menu for operating status in cooling:



Cooling


Request 100.0 %

Compressors ON ON

Cooling status on (ON) at 100%

Both compressors are on

3) “Heating” for operating status in heating (heaters or hot water valve):



Heating

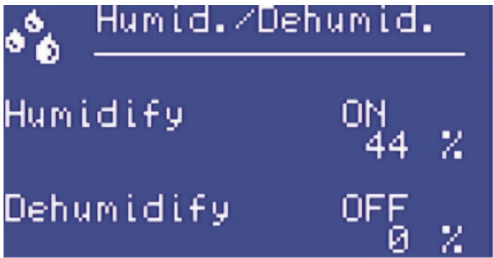
Request 50.0 %

Heaters ON OFF

Heating status on (ON) at 50%

Resistor n. 1 on (ON)
Resistor n. 2 off (OFF)

4) “Humid./Dehumid.” menu for the humidification or dehumidification status:



Humid./Dehumid.

Humidify ON 44 %

Dehumidify OFF 0 %

Humidification status on (ON) at 44%

Dehumidification status off (OFF) at 0%

5. First start-up configuration menu

5.1	Access to the configuration menu
5.2	"Control"
5.3	"Unit Setup"
5.4	"Alarms"
5.5	"Lan Setup"
5.6	"General"
5.7	Language selection
5.8	Date and time setting
5.9	Scheduler setting
5.10	Set-point setting

5.1 Access to the configuration menu




A password is required to open the unit's parameters.

Contact your MONTAIR representative for the password.

There are 3 levels of parameters (with different passwords):







- User
- Manufacturer
- Advanced

To enter to the list of parameters, first enter the password and follow the procedure below:

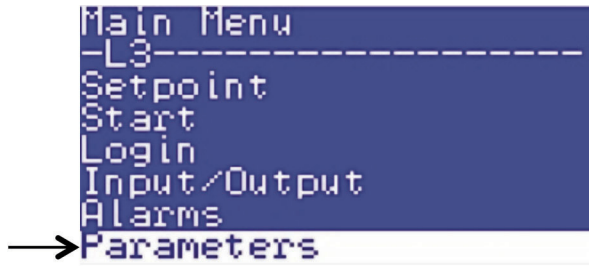
	ENTER	To open the main menu
	UP / DOWN	To search for "Login" on the menu
	ENTER	To confirm the selection

The following screen is displayed where you can enter the password:



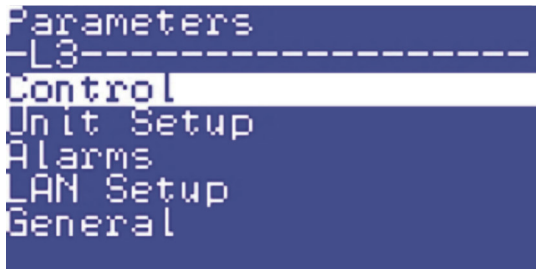
	UP / DOWN	Use the "Up" and "Down" keys to write in the first password field
	ENTER	To confirm the selection of the figure in the first field
	UP / DOWN	Use the "Up" and "Down" keys to write in the second password field
	ENTER	To confirm selection of the figure in the second field
	UP / DOWN	Use the "Up" and "Down" keys to write in the third password field
	ENTER	To confirm selection of the figure in the third field

After entering the password, you will go back to the "main menu" where the new "Parameters" item will be displayed:



	UP / DOWN	To search for "Parameters" on the menu
	ENTER	To confirm the selection

You will have access to the following submenus and their parameters:



	UP / DOWN	To select: "Control", "Unit Setup", "Alarms", "LAN Setup", "General"
	ENTER	To confirm the selection
	ESC	To exit the submenu or the programming menu

The meaning of the various submenus will be explained below:

"Control" - "Unit Setup" - "Alarms" - "LAN Setup" - "General".

5.2 "Control"

"Control"

to change the unit's control parameters.
Open this submenu to change the parameters for:



First part of the menu



Second part of the menu

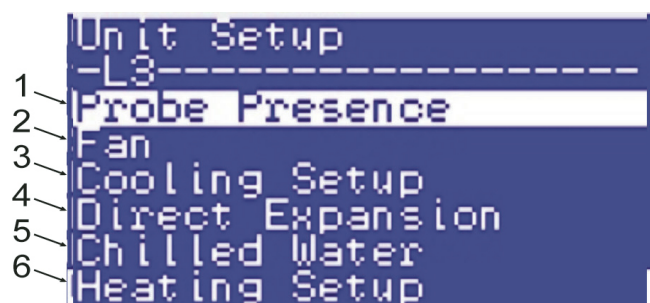
Ref.	Item	Description
1	Ventilation (VEN)	access to the parameters for the type of regulation of the fan used and its options (speed, pressure or constant flow).
2	Room Temperature (TEM)	access to the parameters for the type of temperature regulation: to the dead zone, to the proportional bands in cooling and heating and to the settable limits.
3	Room Humidity (UMI)	opens the humidity regulation parameters: to the dead zone, to the proportional bands in humidification and dehumidification and to the settable limits.
4	Supply Temperature (TMA)	opens the discharge line sensor regulation parameters (optional).
5	Free-Cooling (FRC)	access to the parameters for Free-Cooling operation of the unit (if enabled)
6	Dry-Cooler (DRY)	opens the parameters for the Dry-Cooler fans with the Free-Cooling function (if enabled)
7	Dual Source (DUS)	access to the parameters for operation with a dual water/water or air/water supply source (if enabled).
8	Condensation (CND)	access to the parameters for regulation of the condenser used (air or water): to the regulation mode, to the set-point, to the proportional band.

5.3 "Unit Setup"

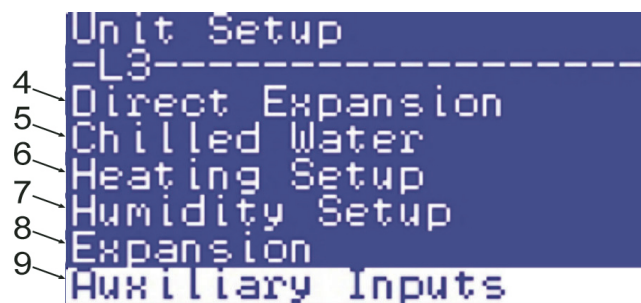
"Unit Setup"

to change the unit's configuration parameters.

Open this submenu to change the parameters for:



First part of the menu



Second part of the menu

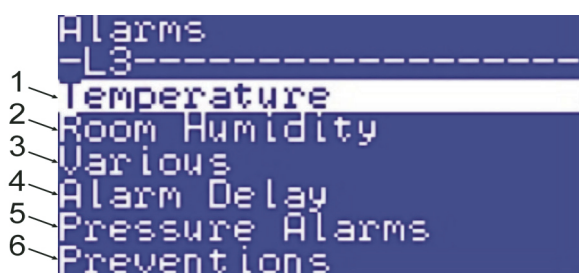
Ref	Item	Description
1	Probe Presence (PRE)	access to the parameters for presence of the probes for: humidity, discharge, pressure and water that can be present on the unit.
2	Fan (VEC)	access to the parameters to configure the EC modulating fans and for the presence of any air dampers.
3	Cooling Setup (FRE)	access to the parameters to configure the type of unit (direct expansion, chilled water, Free-Cooling, dual source).
4	Direct Expansion (CMP-INV-CND-EXV-SUP)	access to the submenus for direct expansion machines. With these submenus you can configure: the number of circuits, the number of compressors, compressor times, rotations, Inverter compressor parameters, the number of condensers that can be set for each unit, condensation fans speed, parameters for electronic thermostats (if enabled) and for under-cooling.
5	Chilled Water (H2O)	access to the parameters to configure chilled water machines.
6	Heating Setup (HEA)	access to the parameters to configure heaters (optional) or water heating valves (optional).
7	Humidity Setup (UMI)	access to the parameters to configure the humidifier (optional) and dehumidification (optional).
8	Expansion (EXC)	access to the parameters for the presence of the expansion board.
9	Auxiliary Inputs (AUX)	access to the parameters to manage a probe linked to an auxiliary relay output.

5.4 "Alarms"

"Alarms"

to change the offset and alarm times parameters.

Open this submenu to change the parameters for:



Ref	Item	Description
1	Temperature (TEM)	access to the parameters to manage the high and low temperature alarms.
2	Room Humidity (UMI)	access to the parameters to manage the high and low humidity alarms.
3	Various (VAR)	access to the parameters to manage floods, fire, smoke and expansion board alarms.
4	Alarm Delay (DEL)	access to the parameters to manage the alarm delays for: temperature, humidity, low pressure, floods, load start delays.
5	Pressure Alarm (HPA)	access to the parameters to manage the pressure alarms relating to high and low pressure transducers.
6	Preventions (PRV)	access to the parameters to manage the alarm prevention activities for: high pressure, low pressure, high supply temperature, percentage increase or decrease of the compressor (for Inverter compressors).

5.5 "Lan Setup"

"LAN Setup"

to change the LAN board parameters.
Open this submenu to change the parameters for:



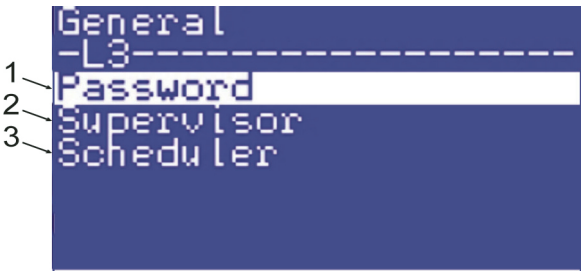
Item	Description
Parameters (NET)	Parameters used to manage the board in a LAN. Example: board address, assignment to a LAN, functions relating to master-slave operation, auto-configuration of nodes (also see the "Procedure for assigning nodes to the boards" chapter).

NOTE: the main parameter in all programs is "n00", which is used to assign the node number to the board.

5.6 "General"

"General"

to change the parameters relating to the passwords and to the serial interface board for supervision.
Open this submenu to change the parameters for:



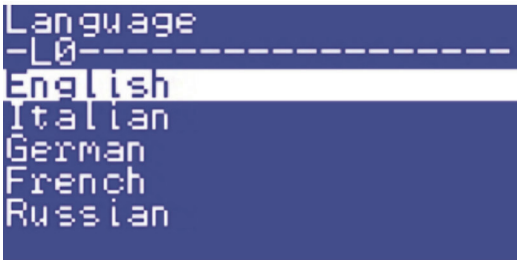
Ref.	Item	Description
1	Password (PAS)	access to the parameters to change the passwords of the three display levels (User, Manufacturer, Advanced).
2	Supervisor (SUP)	access to the parameters to configure the supervision board. For this, you will have to configure: the address, the baudrate and the serial setting.
3	Scheduler (SCH)	access to the parameters to configure the clock board and the programmable operating time bands.

5.7 Language selection

Follow these steps to change the display language:

	ENTER	To open the main menu
	UP / DOWN	To search for "Language" on the menu
	ENTER	To confirm the selection

The following screen is displayed to change the language (from those recorded on the board):



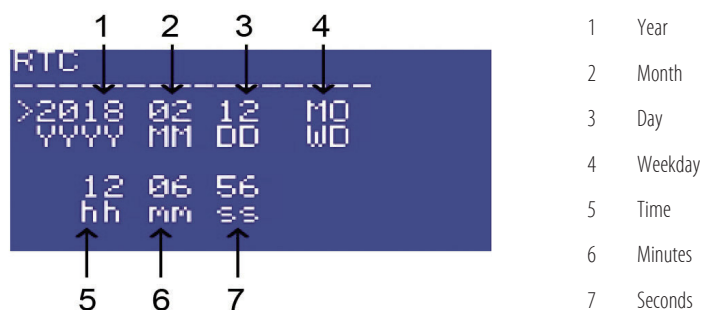
↑ ↓	UP / DOWN	Select the desired language with the "Up" and "Down" keys
↵	ENTER	To confirm the language selection

5.8 Date and time setting

Follow these steps to adjust the calendar clock:

↵	ENTER	To open the main menu
↑ ↓	UP / DOWN	To search for "Maintenance" on the menu
↵	ENTER	To confirm the selection
↑ ↓	UP / DOWN	To search for "Clock" on the menu
↵	ENTER	To confirm the selection

The following screen is displayed to change the year, month, day, time:



↑ ↓	UP / DOWN	Press "Up" and "Down" to go from one field to the next (year, month, day, hour, minutes, seconds)
↵	ENTER	To confirm the selection of the field to be changed
↑ ↓	UP / DOWN	Press "Up" and "Down" to change the value
↵	ENTER	To confirm the selection
✕	ESC	To exit the submenu or the programming menu

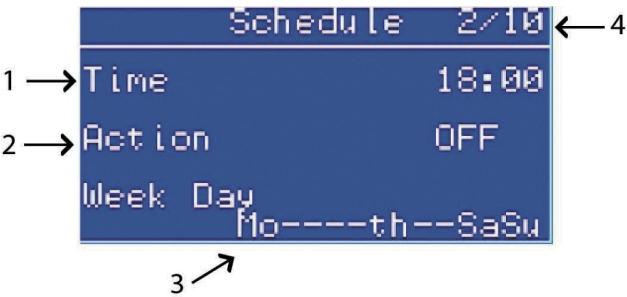
5.9 Scheduler setting

Follow these steps to set the time bands, or better, the start/end time of the event that can also be repeated every day:

↵	ENTER	To open the main menu
↑ ↓	UP / DOWN	To search for "Maintenance" on the menu
↵	ENTER	To confirm the selection
↑ ↓	UP / DOWN	To search for "Scheduler Setup" on the menu
↵	ENTER	To confirm the selection

The following screen is displayed to set up to 10 hours of events that can be repeated every day:

- 1 Event time
- 2 Action (ON/OFF)
ON=turn on
OFF=turn off
- 3 Abbreviations of the weekdays where the event can occur.
- 4 Number of the event to be programmed.
From 1/10 to 10/10.
Up to 10 hours of event can be programmed.



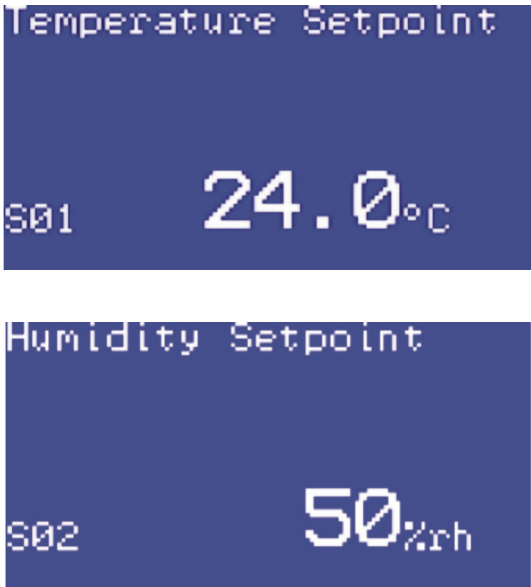
	UP / DOWN	Press "Up" and "Down" to switch from one event to be programmed to another (1/10, 2/10, 3/10..., 10/10)
	ENTER	"Time" to change the highlighted event time.
	UP / DOWN	Press "Up" and "Down" to change the time.
	ENTER	"Action" to change the highlighted event action.
	UP / DOWN	Press "Up" and "Down" to change the action (ON-OFF).
	ENTER	"Week Day" to set the weekday for the highlighted event.
	UP / DOWN	Press "Up" and "Down" to set the weekday.
	ENTER UP / DOWN	Press "Enter" + "Up" and "Down" for each weekday to be programmed.
	ESC	To exit the submenu or the programming menu








5.10 Set-point setting

Follow this path to change the temperature and humidity set-points:

	ENTER	To open the main menu
	UP / DOWN	To search for "Set-point" on the menu
	ENTER	To confirm the selection

Only temperature set-point "S01" and humidity set-point "S02" can be opened (S02, only for machines with humidifier or heaters):



 	UP / DOWN	Search for the set-point to be changed with "Up" and "Down"
	ENTER	To edit the set-point
 	UP / DOWN	Change the selected set-point with "Up" and "Down"
	ENTER	To confirm the selection
	ESC	To exit the planning menu and submenus

NOTE:


These two parameters (S01 and S02) are not locked by any password.

6. Display menu

- 6.1 Information on planning and BIOS
- 6.2 Displaying the working hours of the loads
- 6.3 Displaying the I/O masks

6.1 Information on planning and BIOS

Follow these steps to display the data on programming the board and its version of BIOS:





	ENTER	To open the main menu
 	UP / DOWN	To search for "Info BIOS" on the menu
	ENTER	To confirm the selection

The following information screen is displayed:

```
1 VISUALCLOSECONTROL
2 Ver: 2.34
3 MCX08M 5.04
  AppDate: 18-02-06
  P/C: 9999990
  S/N: 20081301
4 BiosVer: 16-06-13
```

- 1 Type of planning
- 2 Planning version (2.34)
- 3 Type of board installed (MCX08M)
BIOS version (5.04)
- 4 BIOS date

On the other hand, follow these steps if you only want to view the information on the program recorded on the board:

	ENTER	To open the main menu
 	UP / DOWN	To search for "Info" on the menu
	ENTER	To confirm the selection

The following planning information screen is displayed:

```
      CLOSE CONTROL
      REL. 2.34

      DAWFOSS PRODUCT  SYSTEM  S15
```

	ESC	To exit the submenu or the programming menu
-------------------------------------------------------------------------------------	-----	---------------------------------------------

6.1.1 Using the MYKEY (optional)

The MYKEY (myk) is a device (optional) used to load BIOS and programming on a new electronic board (or board to be reprogrammed).

To reprogram the board, you must:

- have a MYKEY device;
- contact your Montair representative who will send you two work folders.
 - The folders will be called: "mykbios" and "mykfiles";
- do not rename or change the structure of the working folders sent to you;
- follow the procedure below.



Photo of the MYKEY device (myk)

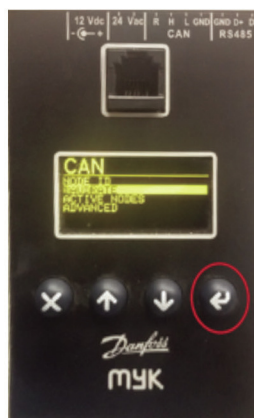
Preliminary procedure for uploading BIOS and the app in MYKEY (myk)

In order to upload BIOS and the app program in the myk device, first check the baudrate communication speed.

Follow this preparation procedure:

- get your MYKEY;
- make sure you have asked your Montair representative for the program to be entered; two work folders called "mykbios" and "mykfiles" will have been sent to you;
- copy the two work folders sent to an external "SD card" folder;
- insert the "SD card" into the MYKEY device (myk);
- ensure the myk reads from (disk1:/) where the folders have been loaded;
- make sure the myk baudrate is set at 500K, following these simple steps:

	DOWN	Scroll to the CAN SETTING menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection
	DOWN	Scroll to the BAUDRATE menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection
	UP / DOWN	To change the number of the Baudrate value to 500K
	ENTER	Press "Enter" to confirm the selection of the value
	ESC	To exit the submenu or the programming menu



Procedure for uploading the app to the main "A1" board

Follow this procedure to upload the app program to the new main board (A1) to be programmed:

- Disconnect the board to be reprogrammed from the CAN;
- Connect the MYKEY to the board (A1) with a special 4-pole cable with RJ11 jack connector;

- Connect the “R” and “H” clamps of the CAN connector on both the board and the MYKEY device (alternatively connect the 120 ohm line start and end heaters between the “H” and “L” clamps of the CAN connector on the two devices);
- Feed the board (A1) at 24V a.c. (clamps 22-24 of the electrical board are also available for this purpose);
- The MYKEY display will turn on:



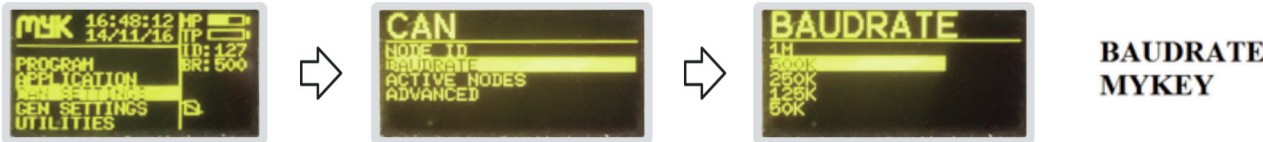
- Check communication between the two devices by displaying the active nodes:

	DOWN	Scroll to the CAN SETTING menu with the “Down” key
	ENTER	Press “Enter” to confirm the selection
	DOWN	Scroll to the ACTIVE NODES menu with the “Down” key
	ENTER	Press “Enter” to confirm the selection. The active nodes screen is displayed



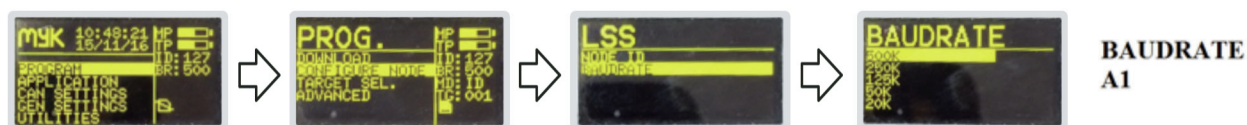
- If the node of board A1 (displayed with symbol “1”) is not present, check that the board and MYKEY baudrate speed is the same;
- To check the myk Baudrate, follow these steps starting from the main MYKEY screen:

	DOWN	Scroll to the CAN SETTING menu with the “Down” key
	ENTER	Press “Enter” to confirm the selection
	DOWN	Scroll to the BAUDRATE menu with the “Down” key
	ENTER	Press “Enter” to confirm the selection
	UP / DOWN	To change the number of the Baudrate value to 500K
	ENTER	Press “Enter” to confirm the selection of the value



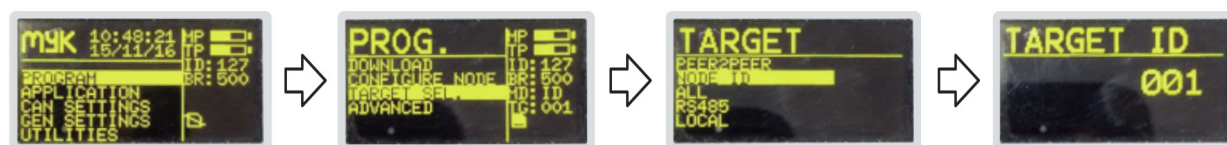
- To check the main board (A1) Baudrate, follow these steps starting from the main MYKEY screen:

↑ ↓	UP / DOWN	Scroll to the PROGRAM menu with the "Up" and "Down" keys
↵	ENTER	Press "Enter" to confirm the selection
↓	DOWN	Scroll to the CONFIGURE NODE menu with the "Down" key
↵	ENTER	Press "Enter" to confirm the selection
↓	DOWN	Scroll to the BAUDRATE menu with the "Down" key
↵	ENTER	Press "Enter" to confirm the selection
↑ ↓	UP / DOWN	To change the number of the Baudrate value to 500K
↵	ENTER	Press "Enter" to confirm the selection of the value



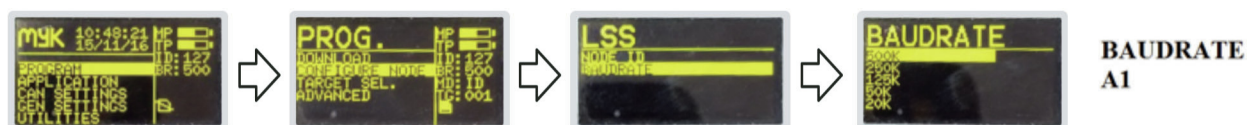
- Address the MYKEY on the node of the board (A1) to upload BIOS and the app:

↑ ↓	UP / DOWN	Scroll to the PROGRAM menu with the "Up" and "Down" keys
↵	ENTER	Press "Enter" to confirm the selection
↓	DOWN	Scroll to the TARGET SEL menu with the "Down" key.
↵	ENTER	Press "Enter" to confirm the selection
↓	DOWN	Scroll to the NODE ID menu with the "Down" key
↵	ENTER	Press "Enter" to confirm the selection
↑ ↓	UP / DOWN	To change the board number to "001"
↵	ENTER	Press "Enter" to confirm the selection of the value



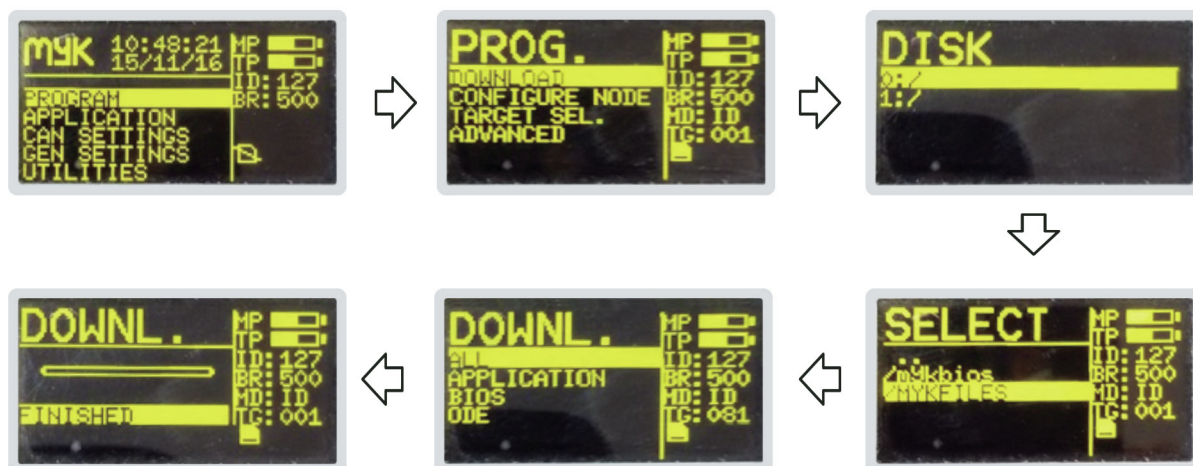
- It is advisable to check the Baudrate of board A1 again:

↑ ↓	UP / DOWN	Scroll to the PROGRAM menu with the "Up" and "Down" keys
↵	ENTER	Press "Enter" to confirm the selection
↓	DOWN	Scroll to the CONFIGURE NODE menu with the "Down" key
↵	ENTER	Press "Enter" to confirm the selection
↓	DOWN	Scroll to the BAUDRATE menu with the "Down" key
↵	ENTER	Press "Enter" to confirm the selection
↑ ↓	UP / DOWN	To change the number of the Baudrate value to 500K
↵	ENTER	Press "Enter" to confirm the selection of the value













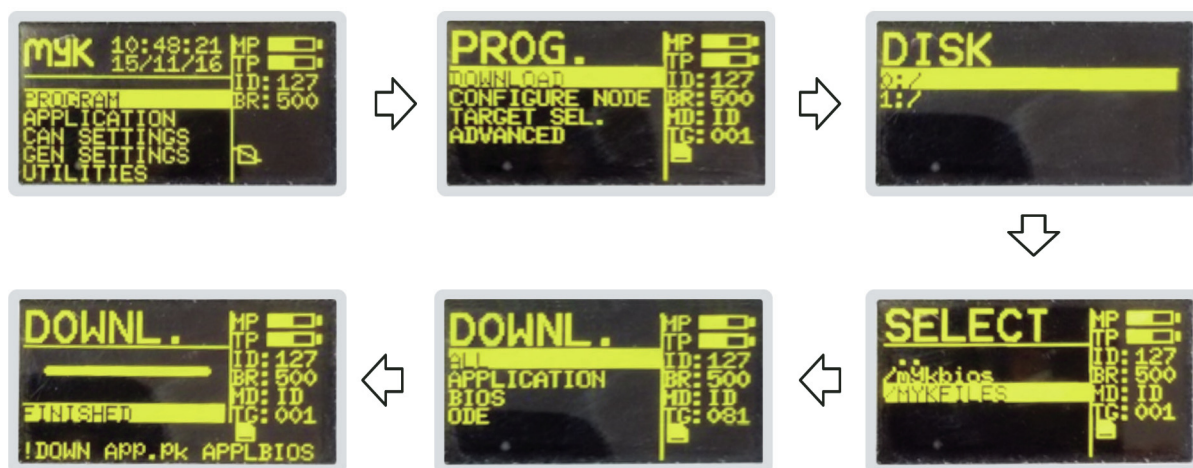
- Now you are ready to upload BIOS to the board, following these steps (starting from the main MYKEY screen):

↑ ↓	UP / DOWN	Scroll to the PROGRAM menu with the "Up" and "Down" keys
↵	ENTER	Press "Enter" to confirm the selection
↑ ↓	UP / DOWN	Scroll to the DOWNLOAD menu with the "Up" and "Down" keys
↵	ENTER	Press "Enter" to confirm the selection. The DISK screen is displayed
↑ ↓	UP / DOWN	Scroll with the "Up" and "Down" keys and select disk 1:/ (disk 1:/ = SD card where the folders have been copied)
↵	ENTER	Press "Enter" to confirm the selection. The SELECT screen is displayed
↑ ↓	UP / DOWN	Scroll with the "Up" and "Down" keys and select the folder to be copied. In this case, the folder with the "mykbios" BIOS
↵	ENTER	Press "Enter" to confirm the selection. The DOWNL screen is displayed
↑ ↓	UP / DOWN	Scroll with the "Up" and "Down" keys and select "ALL"
↵	ENTER	Press "Enter" to confirm the selection. The data will start downloading and the word FINISHED will be displayed at the end of the process.



- In conclusion, we can upload the app program to the board, following these steps (always starting from the main MYKEY screen):

	UP / DOWN	Scroll to the PROGRAM menu with the “Up” and “Down” keys
	ENTER	Press “Enter” to confirm the selection
	UP / DOWN	Scroll to the DOWNLOAD menu with the “Up” and “Down” keys
	ENTER	Press “Enter” to confirm the selection. The DISK screen is displayed
	UP / DOWN	Scroll with the “Up” and “Down” keys and select disk 1:/ (disk 1:/ = SD card where the folders have been copied)
	ENTER	Press “Enter” to confirm the selection. The SELECT screen is displayed
	UP / DOWN	Scroll with the “Up” and “Down” keys and select the folder to be copied. In this case, the folder with the “mykfiles” app
	ENTER	Press “Enter” to confirm the selection. The DOWNL screen is displayed
	UP / DOWN	Scroll with the “Up” and “Down” keys and select “ALL”
	ENTER	Press “Enter” to confirm the selection. The data will start downloading and the word FINISHED will be displayed at the end of the process.



Procedure for changing the node on the external serial interface board “A11” (optional):

If there is an optional external serial interface board (A11) in the CAN, the only way to assign the network node is with the MYKEY device (myk).

The external serial interface board is the only network board to which the node number is assigned manually.

Follow this procedure to assign the node number to the external serial interface board (IS):

- Disconnect the serial interface board (A11) from the CAN;
- Connect the MYKEY to the board (A11) with a cable connected to the “H” and “L” clamps of the CAN connector;
- Connect the “R” and “H” clamps of the CAN connector on both the board (A11) and the MYKEY device (alternatively connect the 120 ohm line start and end heaters between the “H” and “L” clamps of the CAN connector on the two devices);
- Feed the myk and the board (A11) at 24V a.c. (22-24 clamps of the electrical board are also available for this purpose);

- The MYKEY display will turn on:



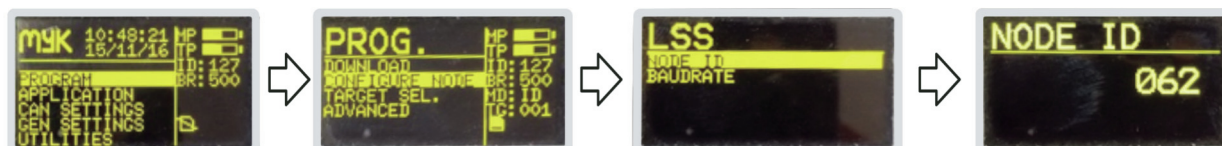
- Display the active nodes as follows:

	DOWN	Scroll to the CAN SETTING menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection.
	DOWN	Scroll to the ACTIVE NODES menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection. The active nodes screen is displayed







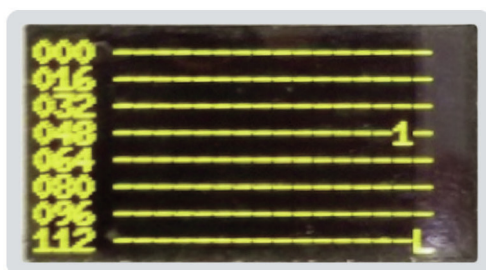
- Change the node number as follows:

	UP / DOWN	Scroll to the PROGRAM menu with the "Up" and "Down" keys
	ENTER	Press "Enter" to confirm the selection
	DOWN	Scroll to the CONFIGURE NODE menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection
	UP / DOWN	Scroll with the "Up" and "Down" keys and select NODE ID.
	ENTER	Press "Enter" to confirm the selection. The NODE ID screen is displayed
	UP / DOWN	To change the node number (in this example n. 062)
	ENTER	Press "Enter" to confirm the selection of the value








- It is advisable to check the node number assigned again at the end:

	DOWN	Scroll to the CAN SETTING menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection
	DOWN	Scroll to the ACTIVE NODES menu with the "Down" key
	ENTER	Press "Enter" to confirm the selection. The active nodes screen is displayed



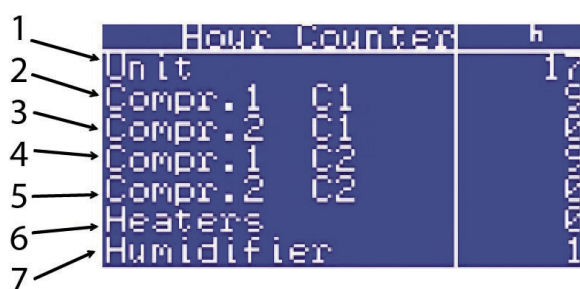
6.2 Displaying the working hours of the loads

Follow these steps to display the total working hours of the unit and its individual loads:

	ENTER	To open the main menu
	UP / DOWN	To search for "Maintenance" on the menu
	ENTER	To confirm the selection
	UP / DOWN	To search for "Working Hours" on the menu
	ENTER	To confirm the selection

The following screen is displayed:








- 1 Total working hours of the unit
- 2 Working hours of compressor 1 circuit 1
- 3 Working hours of compressor 2 circuit 1
- 4 Working hours of compressor 1 circuit 2
- 5 Working hours of compressor 2 circuit 2
- 6 Working hours of the heating elements
- 7 Working hours of the humidifier



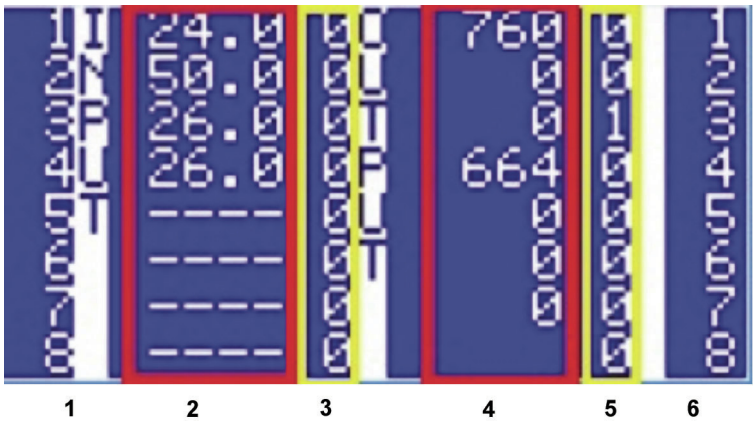
	ESC	To exit the submenu or the programming menu
-------------------------------------------------------------------------------------	-----	---------------------------------------------

6.3 Displaying the I/O masks

Follow this path to open the mask displaying the unit’s analogue and digital input and outputs:

	ENTER	To open the main menu
 	UP / DOWN	To search for “Input/Output” on the menu
	ENTER	To confirm the selection
 	UP / DOWN	“I/O List” to select the I/O mask to be displayed
	ENTER	To confirm the selection

The following I/O mask is displayed:



1	2	3	4	5	6
Progressive number of the INPUTS (analogue and digital)	ANALOG INPUT Analogue inputs (i.e.: reading probes)	DIGITAL INPUT Digital inputs (i.e.: alarms) 1=active 0= inactive	ANALOG OUTPUT Analogue outputs (e.g.:0-10V signals of fans, valves)	DIGITAL OUTPUT Digital outputs (i.e.: coils, contactors and relays) 1=active 0= inactive	Progressive number of the OUTPUTS (analogue and digital)




	ESC	To exit the menu and submenus
-------------------------------------------------------------------------------------	-----	-------------------------------

7. Alarms menu

- 7.1 Access to the alarms menu
- 7.2 List of main alarms

7.1 Access to the alarms menu

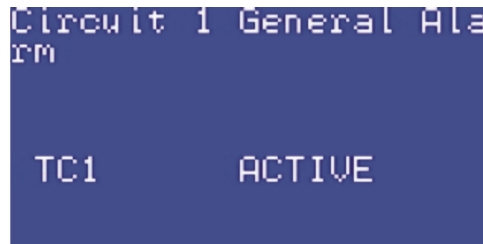
Press the specific "Alarms" key to open the alarms menu and to reset them (in the event of alarms with manual reset):

	ALARM	PRESS the key ONCE to open the "active alarms menu" on the unit
	ALARM	PRESS the key FOR ABOUT 3 SECONDS to reset the alarm displayed
	UP / DOWN	To scroll through the list of alarms that may be present simultaneously on the unit

Example of alarm screens ("TC1" alarm active: compressor circuit n. 1):



Example of unit in alarm (main screen)



Example of specific TC1 alarm on active alarms menu

7.2 List of main alarms

List of main alarms that can be displayed:

Alarm code	Alarm description	Alarm code	Alarm description
E01	Broken room humidity probe	AFS	Unit Fans alarm
E02	Broken room temperature sensor	TC1	Compressors circuit n. 1 general alarm
E05	Condensation pressure transducer n. 1	TC2	Compressors circuit n. 2 general alarm
E06	Condensation n. 2 pressure transducer	ARG	Heaters or heating element
E08	Suction pressure transducer n.1	AFD	Dirty filters
E09	Suction pressure transducer n. 2	AFr	Fire and smoke
E10	Suction circuit n. 1 temperature sensor	ALP	Circuit n. 1 Low pressure switch
E11	Suction circuit n. 2 temperature sensor	AL2	Circuit n. 2 Low pressure switch
E12	Inverter compressor discharge probe	AHP	Circuit n. 1 High pressure switch
AHT	High Room Temperature	AH2	Circuit n. 2 high pressure switch
ALT	Low Room Temperature	AHU	Humidifier
AHH	High Room Humidity	FLO	Flooding
ALH	Low Room Humidity	AFA	Fans Air Flow
HDT	Compressor high discharge temperature	OLA	Inverter compressor oil level
HP1	Circuit n. 1 high pressure sensor	E07	Broken Free-Cooling water temperature sensor
HP2	Circuit n. 2 high pressure sensor	E13	2. coil temperature sensor error
Cn1	Remote condenser n. 1	E15	Broken ambient air temperature sensor
Cn2	Remote condenser n. 2	LP1	Circuit n. 1 low pressure sensor
DEH	Stop Dehumidification due to Low Temperature	LP2	Circuit n. 2 low pressure sensor
EXC	Expansion communication error	AV1	Circuit n. 1 vacuum alarm
AV2	Circuit n. 2 vacuum alarm	CR1	Low compression ratio alarm n. 1
CR2	Low compression ratio alarm n. 2	DS1	High water temperature for CW dual source
DS2	CW dual source water flow alarm	DS3	Second source started warning
DS4	CW dual source external chiller alarm	DS5	Second coil efficiency (CW+CW)

	ESC	To exit the menu and submenus
-------------------------------------------------------------------------------------	-----	-------------------------------

8. Microprocessor boards I/O (MCX)

- 8.1 X-T-H-F Direct expansion Close Control I/O with mechanical thermostat (1/2 circuits)
- 8.2 X-T-H-F Direct expansion Close Control I/O with electronic thermostat (1/2 circuits)
- 8.3 X-T-H-F Direct expansion Close Control I/O with electronic thermostat (1 circuit)
- 8.4 W-D chilled water Close Control I/O
- 8.5 UNDER FLOOR (WOPU) chilled water Close Control (W) I/O

All of the I/O lists (inputs-outputs) for all of MCX boards used in Montair machines are given below.

8.1 X-T-H-F Direct expansion Close Control I/O with mechanical thermostat (1/2 circuits)

I/O list for X-T-H-F direct expansion Close Control units with mechanical thermostat 1 or 2 circuits:

MAIN BOARD MCX08M2 (A1)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Air Flow	1	Room Temperature	1	Circuit 1 Compres. 1	1	Inverter Supply Fan
2	Flood Alarm	2	Room Humidity	2	Liquid Valve Circuit 1	2	Humidifier
3	Dirty Filter	3	Condenser Circuit 1	3	Supply Fan	3 *	Cooling Val./ FC Val.
4	Smoke Fire Alarm	4	Condenser Circuit 2	4	General Alarm	4	Condenser Circuit 1
5	Low Press.Circuit 1	5 *	Temperature FC-TS	5	Heating Out1	/	/
6	High Press.Circuit 1	6	FREE	6	Heating Out2	/	/
7	Remote ON/OFF	7 *	External Temperature	7	Humidifier	/	/
8	General Circuit 1	8	FREE	8	Expansion Alarm	/	/

Key for the parts with an asterisk:

- T Machines = Dual Fluid
- FC machines = Free-Cooling

EXPANSION BOARD MCX06D (A12)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Supply Fan Alarm	1	FREE	1	Damper	1	Condenser Circuit 2
2	General Condenser 1	2	FREE	2	Circuit 1 Compres.2	2 *	Dry Cooler Fan
3	Humidifier Alarm	3 *	External Chiller Alarm	3	Circuit 2 Compres.1	3	FREE
4	Heater Alarm	4 *	Second Source-Supply P.	4 *	C2 Compr.2 / Dry Cooler	/	/
5	Low Press.Circuit 2	/	/	5	Liquid Valve Circuit 2	/	/
6	High Press.Circuit 2	/	/	6	Hot Gas Valve	/	/
7	General Condenser 2	/	/	/	/	/	/
8	General Circuit 2	/	/	/	/	/	/

Key for the parts with an asterisk:

- T Machines = Dual Fluid
- FC machines = Free-Cooling
- AT-AT/P Option = constant pressure and flow rate

8.2 X-T-H-F Direct expansion Close Control I/O with electronic thermostat (1/2 circuits)

I/O list for X-T-H-F direct expansion Close Control units with electronic thermostat 1 or 2 circuits:

MAIN BOARD MCX152V (A1)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Air Flow	1 *	Supply Pressure	1	Supply Fan	1	Inverter Supply Fan
2	Flood Alarm	2	Condenser Circuit 1	2	FREE	2	Humidifier
3	Dirty Filter	3	Condenser Circuit 2	3	Circuit 1 Compres.1	3 *	Inverter C./ Dry C.Fan
4	Smoke Fire Alarm	4	FREE	4	Liquid Valve Cir.1	4 *	Cooling Val./ FC Val.
5 *	External Chiller Alarm	5	Room Humidity	5	Circuit 2 Compres.1	5	Condenser Circuit 1
6	Oil Level	6	Room Temperature	6	Liquid Valve Cir.2	6	Condenser Circuit 2
7	High Press.Circuit 1	7 *	Temperature FC-TS	7	Heating Out1	7	Stepper Motor Valve C1
8	High Press.Circuit 2	8	Suction Temp.Cir.1	8	Heating Out2	8	Stepper Motor Valve C2
9	Remote ON/OFF	9	Suction Press.Cir.1	9	Humidifier	/	/
10	Humidifier Alarm	10	Suction Temp.Cir.2	10	General Alarm	/	/
11	General Condenser 1	11 *	External Temp.	11	Hot Gas Valve	/	/
12	General Condenser 2	12	Suction Press.Cir.2	12	Damper	/	/
13	General Circuit 1	13	FREE	13	Circuit 1 Compres.2	/	/
14	General Circuit 2	14	Discharge Temp.Cir.1	14	Circuit 2 Compres.2	/	/
15	FREE	/	/	15 *	Dry-Cooler	/	/
16 *	Second Source	/	/	/	/	/	/
17	Supply Fan Alarm	/	/	/	/	/	/
18	Heater Alarm	/	/	/	/	/	/

Key for the parts with an asterisk:

- T Machines = Dual Fluid
- FC machines = Free-Cooling
- AT-AT/P Option = constant pressure and flow rate
- INVERTER Compressor

8.3 X-T-H-F Direct expansion Close Control I/O with electronic thermostat (1 circuit)

I/O list for X-T-H-F direct expansion Close Control units with electronic thermostat for 1 circuit only:

MAIN BOARD MCX061V (A1)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Air Flow	1	Suction Temp.Cir.1	1	Circuit 1 Compres.1	1	Inverter Supply Fan
2	Flood Alarm	2	Discharge Temp.Cir.1	2	Liquid Valve Circuit 1	2	Humidifier
3	Dirty Filter	3	Suction Press.Cir.1	3	Expansion Alarm	3 *	Inverter C./ Dry C.Fan
4	Smoke Fire Alarm	4	Condenser Circuit 1	4	Heating Out1	4	Stepper Motor Valve C1
5 *	External Chiller Alarm	5	Room Humidity	5	Heating Out2	/	/
6	High Press.Circuit 1	6	Room Temperature	6	General Alarm	/	/
7	Remote ON/OFF	7 *	Supply Pressure	7	/	/	/
8	General Circuit 1	/	/	/	/	/	/

Key for the parts with an asterisk:

- T Machines = Dual Fluid
- FC machines = Free-Cooling
- AT-AT/P Option = constant pressure and flow rate
- INVERTER Compressor

EXPANSION BOARD MCX06D (A12)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Supply Fan Alarm	1	FREE	1	Humidifier	1	Condenser Circuit 1
2	General Condenser 1	2 *	Temperature FC-TS	2	Supply Fan	2 *	Cooling Val./ FC Val.
3	Humidifier Alarm	3	FREE	3 *	Dry-Cooler	3	FREE
4	Heater Alarm	4 *	External Temp.	4	Circuit 1 Compres.2	/	/
5	Oil Level	/	/	5	Hot Gas Valve	/	/
6	FREE	/	/	6	Damper	/	/
7	FREE	/	/	/	/	/	/
8 *	Second Source	/	/	/	/	/	/

Key for the parts with an asterisk:

- T Machines = Dual Fluid
- FC machines = Free-Cooling
- AT-AT/P Option = constant pressure and flow rate

- INVERTER Compressor

8.4 W-D chilled water Close Control I/O

I/O list for W-D chilled water Close Control units:

MAIN BOARD MCX08M2 (A1)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Air Flow	1	Room Temperature	1	Cooling Out1	1	Inverter Supply Fan
2	Flood Alarm	2	Room Humidity	2	Cooling Out2	2	Humidifier
3	Dirty Filter	3 *	Second Source-Supply P	3	Supply Fan	3 *	Cooling Valve
4	Smoke Fire Alarm	4 *	External Chiller Alarm	4	General Alarm	4 *	Secondary Source Val.
5	Supply Fan Alarm	5 *	Temperature FC-TS	5	Heating Out1	/	/
6	Humidifier Alarm	6	FREE	6	Heating Out2	/	/
7	Remote ON/OFF	7	FREE	7	Humidifier	/	/
8	Heater Alarm	8 *	Secondary Battery Tem.	8	Damper	/	/

Key for the parts with an asterisk:

- D machines = Dual Coil
- AT-AT/P Option = constant pressure and flow rate

8.5 UNDER FLOOR (WOPU) chilled water Close Control (W) I/O

I/O list for UNDER FLOOR (WOPU) chilled water Close Control units (W):

MAIN BOARD MCX08M2 (A1)							
DIGITAL INPUT		ANALOG INPUT		DIGITAL OUTPUT		ANALOG OUTPUT	
1	Air Flow	1	Room Temperature	1	Cooling Out1 (not use)	1	Inverter Supply Fan
2	Flood Alarm	2	Room Humidity	2	Cooling Out2 (not use)	2	Humidifier
3	Dirty Filter	3 *	Supply Pressure	3	Supply Fan	3	Cooling Valv./ PIV Val.
4	Smoke Fire Alarm	4	Flow meter / PIV valve	4	General Alarm	4	
5	Supply Fan Alarm	5	Discharge temp.probe	5	Heating Out1	/	/
6	Humidifier Alarm	6	Water inlet probe	6	Heating Out2	/	/
7	Remote ON/OFF	7	FREE	7	Humidifier	/	/
8	Heater Alarm	8	Water outlet probe	8	Damper	/	/

Key for the parts with an asterisk:

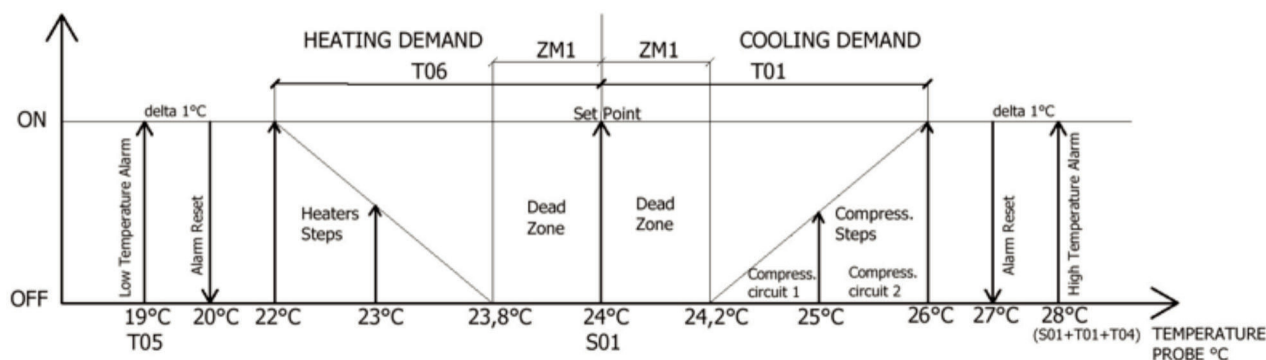
- AT-AT/P Option = constant pressure and flow rate

9. Operating adjustments

- 9.1 Temperature regulation
- 9.2 Humidity regulation
- 9.3 Condensation regulation
- 9.4 Inverter compressor regulation
- 9.5 Free-Cooling unit regulation

9.1 Temperature regulation

The cooling and heating elements are activated by the microprocessor based on algorithms that process the return (or room) temperature values measured with respect to the active set-point, as shown in the figure below:



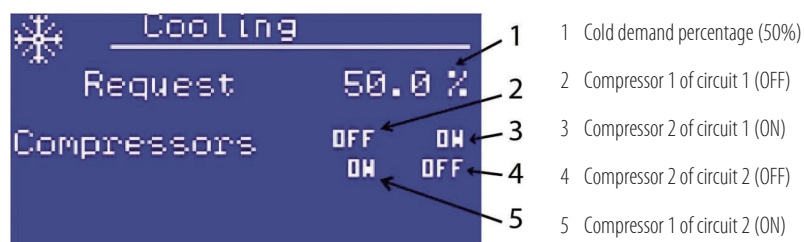
The main parameters for temperature regulation are given in the following table:

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Set-point	SET	S01	Temperature set-point	24.0	°C
Control > Room Temperature	TEM	ZM1	Temperature dead zone (cold/hot)	10	%
Control > Room Temperature	TEM	T01	Proportional band in cooling	2.0	°C
Control > Room Temperature	TEM	T06	Proportional band in heating	2.0	°C
Control > Room Temperature	TEM	r01	Minimum temperature limit	20.0	°C
Control > Room Temperature	TEM	r02	Maximum temperature limit	30.0	°C
Alarms > Temperature	TEM	T04	High temperature alarm offset	2.0	°C
Alarms > Temperature	TEM	T05	Low temperature alarm set-point	19.0	°C

Activation/Deactivation of the compressors (as cooling elements)

The compressors start or stop according to the percentage of cold demand as shown in these examples.

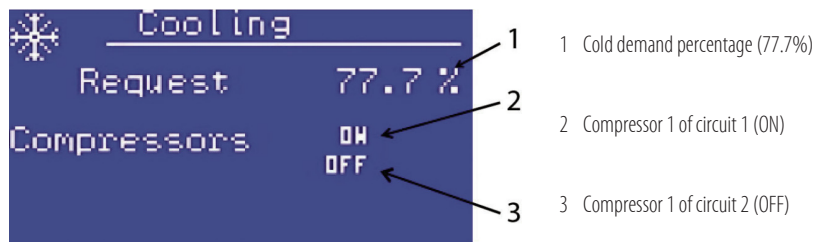
• Example with: 2 circuits and 4 compressors on-off ("Cooling" detail menu)



ACTIVATION OF 4 COMPRESSORS		
Demand %	Compressor	active
> 25%	Compressor 2 Circuit 1	YES
> 50%	Compressor 1 Circuit 2	YES
> 75%	Compressor 1 Circuit 1	YES
1	Compressor 2 Circuit 2	YES

DEACTIVATION OF 4 COMPRESSORS		
Demand %	Compressor	active
< 75%	Compressor 1 Circuit 2	NO
< 50%	Compressor 1 Circuit 1	NO
< 25%	Compressor 2 Circuit 2	NO
0	Compressor 2 Circuit 1	NO

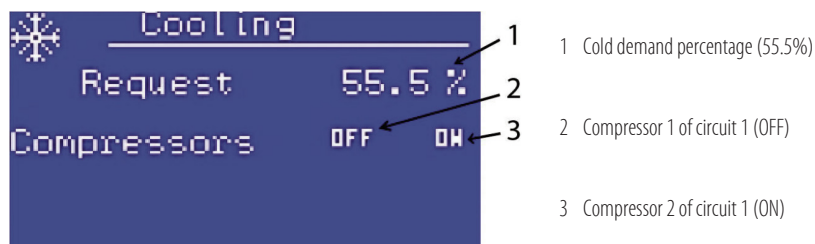
• Example with: 2 circuits and 2 compressors on-off ("Cooling" detail menu)



ACTIVATION OF 2 COMPRESSORS		
Demand %	Compressor	active
> 50%	Compressor 1 Circuit 1	YES
1	Compressor 1 Circuit 2	YES

DEACTIVATION OF 2 COMPRESSORS		
Demand %	Compressor	active
< 50%	Compressor 1 Circuit 2	NO
0	Compressor 1 Circuit 1	NO

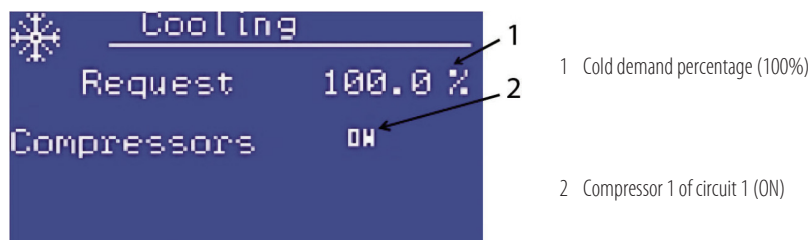
• Example with: 1 circuit and 2 compressors on-off ("Cooling" detail menu)



ACTIVATION OF 2 COMPRESSORS		
Demand %	Compressor	active
> 50%	Compressor 2 Circuit 1	YES
1	Compressor 1 Circuit 1	YES

DEACTIVATION OF 2 COMPRESSORS		
Demand %	Compressor	active
< 50%	Compressor 1 Circuit 1	NO
0	Compressor 2 Circuit 1	NO

• Example with: 1 circuit and 1 compressor on-off ("Cooling" detail menu)



ACTIVATION OF THE COMPRESSOR		
Demand %	Compressor	active
1	Compressor 1 Circuit 1	YES

DEACTIVATION OF THE COMPRESSOR		
Demand %	Compressor	active
0	Compressor 1 Circuit 1	NO

The parameters required for controlling the times of the compressors are as follows:

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Direct Expansion > Compressors	CMP	A16	Minimum time between two different compressors ON (to limit inrush currents)	60	sec
Direct Expansion > Compressors	CMP	A18	Minimum OFF time of same compressor (is the guaranteed OFF interval of each compressor)	240	sec
Direct Expansion > Compressors	CMP	A19	Minimum ON time of same compressor (is the guaranteed ON interval of each compressor)	120	sec
Direct Expansion > Compressors	CMP	A20	Minimum time between two turn-ons of the same compressor (with this parameter, the maximum number of start-ups per hour is defined for each compressor)	360	sec

Opening/Closing of a 3-point water valve (for cooling regulation)

There are no compressors in chilled water machines (W versions) since the water is cooled by an external liquid chiller.

To adjust the cooling of the unit, two digital outputs are used called "Cooling Out1" and "Cooling Out2" that open or close the valve until it is fully opened or closed.

The 3-point water valve opens and closes according to the percentage of cold demand and is linked to parameter A23 (3-point valve stroke time).

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Unit setup > Chilled Water	H ₂ O	A23	3-point valve stroke time	30/72/80*	sec

* dependent on the servo control stroke

Activation/Deactivation of 2 heater steps (as heating elements)

The heaters start or stop according to the percentage of heat demand.

The heater steps can be managed in two ways:

- in stages: the band is divided into two parts (50% + 50%).
 - First heater 1 starts (at 50% of the demand), if the heat demand continues to increase, heater 2 also starts (at 100%).
- in binary mode: the band is divided into three parts (33.3% + 33.3% + 33.3%).
 - First heater 1 starts (33.3%), if the heat demand continues to increase and reaches 66.6%, heater 1 stops and heater 2 starts.
 - If the heat demand reaches 100%, both heaters will be active.

The value of HT1 parameter can be changed to decide whether the heaters are managed in stages or in binary mode:

- HT1=1 (in stages) 50%=heater.1; 100%=(heater.1 + heater.2).
- HT1=4 (binary mode) 33.3%= heater.1; 66.6%=heater.2; 100%=(heater.1 + heater.2).

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Unit Setup > Heating Setup	HEA	HT1	Heaters (management of heaters or water valve for heating)	4319	N°
Unit Setup > Heating Setup	HEA	HT2	Numbers of heaters (steps)	2	N°
Unit Setup > Heating Setup	HEA	HT4	Delayed start-up of the heater with respect to the fan	15/5	sec

• Example: heaters with operation in stages ("Heating" detail menu)

1 Heat Demand (77.7%)

2 Heater n. 2 (OFF) will turn on with demand at 100%

3 Heater n. 1 (ON) with demand at >50%

• Example: heaters with operation in binary mode ("Heating" detail menu)

1 Heat Demand (66.6%)

2 Heater n. 2 (ON) turned on with demand at 66.6%

3 Heater n. 1 (OFF) will turn on with demand at 33.3% or at 100%

NOTE

Binary mode will be used on machines that have an EC Plug-Fan with signal (0-10V).

Heater control in stages will be used on machines with radial fans.

Opening/Closing of a 3-point water valve (for heating regulation)

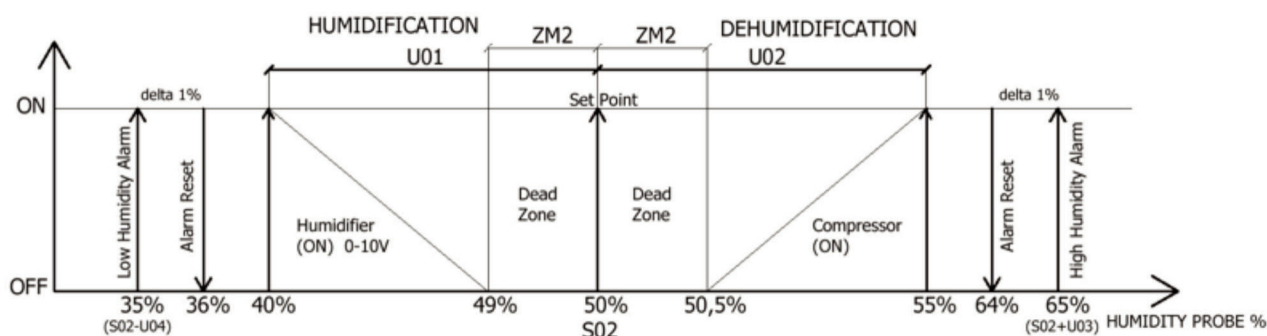
If you wish to use a water coil as a heating element, as an alternative to heaters (options: E+WS or D+WS), the heating can be regulated by a 3-point water valve. To adjust the heating of the unit, two digital outputs are used, called "Heating Out1" and "Heating Out2", which open or close the valve until it is fully opened or closed. The 3-point water valve opens and closes according to the percentage of heat demand and is linked to HT3 parameter (3-point valve stroke time).

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Unit Setup > Heating Setup	HEA	HT1	Heaters (management of heaters or water valve for heating)	3	N°
Unit Setup > Heating Setup	HEA	HT3	3-point valve stroke time	30/72/80*	sec

* dependent on the servo control stroke

9.2 Humidity regulation

The humidification and dehumidification elements are activated by the microprocessor based on algorithms that process the room humidity values measured with respect to the active set-point, as shown in the figure below:



The main parameters for humidity regulation are given in the following table:

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Set-point	SET	S02	Humidity set-point	50	%rh
Control > Room Humidity	UMI	ZM2	Humidity dead zone (humidification/dehumidification)	10	%
Control > Room Humidity	UMI	U01	Proportional band for humidification	10	%rh
Control > Room Humidity	UMI	U02	Proportional band for dehumidification	5	%rh
Control > Room Humidity	UMI	r03	Minimum humidity limit	25	%rh
Control > Room Humidity	UMI	r04	Maximum humidity limit	70	%rh
Alarms > Room Humidity	UMI	UAE	Enabling humidity alarms	1=ye	N°
Alarms > Room Humidity	UMI	U03	Offset for high humidity alarm	15	%rh
Alarms > Room Humidity	UMI	U04	Offset for low humidity alarm	15	%rh

Dehumidification function

The unit will enable the dehumidification function when:

- the temperature set-point is met;
- the humidity rises above the set-point by 5%rh.

The dehumidification function consists in the compressor activation (which will try to bring the humidity value back to the set-point) and activation of a software algorithm for optimisation of the average evaporating temperature by increasing the superheat value to the evaporator (if there is an electronic thermostat).

Activating the compressor to lower the humidity, however, poses a risk of also lowering the temperature set-point.

For this reason, this function also entails activation of the heaters.

The compressor will activate in dehumidification when:

- The temperature set-point is met;
- The humidity reaches the value given by these parameters (S02+U02).

The compressor turns off when the humidity returns to the value of (S02+ZM2)

NOTE

For dehumidification of machines with dual cooling circuit, only the compressors of a single circuit can be activated.

Humidification function

The unit will start humidifying when the humidity level is too low.

With this function, the humidifier will start producing steam (to bring the humidity to the threshold value).

The amount of steam produced will be calculated by the microprocessor based on the humidity value measured in the room and modulated by a 0-10V signal:

- With <(S02-ZM2) humidity measured, the signal will be at the minimum value;
- With <(S02-U01) humidity measured, the signal will be at the maximum value.

NOTE

The operating logic entails that the humidifier will never work together with a compressor.

9.3 Condensation regulation

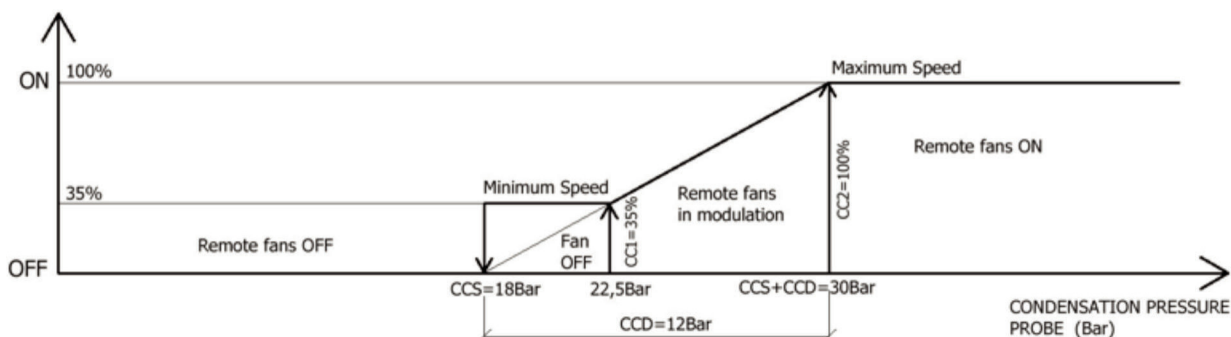
For regulation of the condensation, all units are fitted with a pressure transducer for each circuit; the transducer is on board (standard for all direct expansion units).

With the help of this transducer, the control will provide a 0-10V signal that can be used:

- for regulation of the remote condenser fans (UCM) for aircooled machines (X-T versions);
- for regulation of the pressostatic system (optional) for watercooled machines (H-F versions).

For aircooled machines (X-T versions)

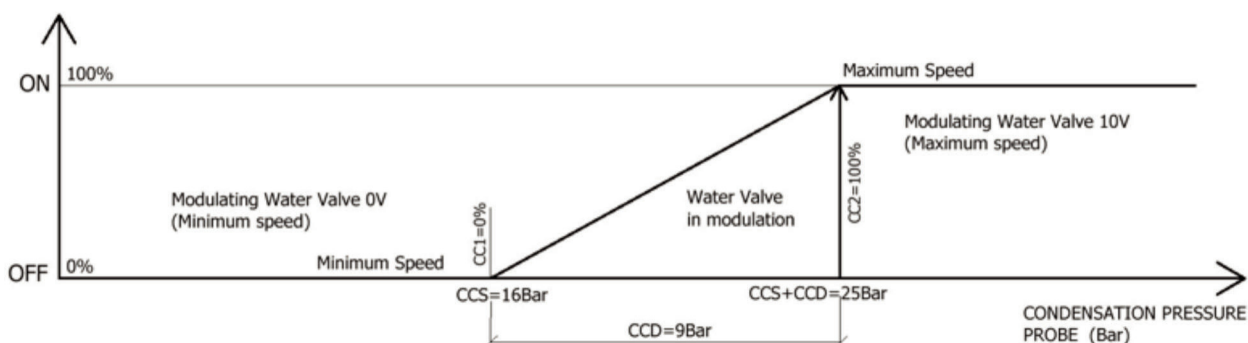
that require a UCM remote condenser, regulation is as shown in the figure:



MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Direct Expansion > Condensation	CND	cCC	Number of condensers	43132	N°
Direct Expansion > Condensation	CND	cc0	Enabling modulating fans (or valve)	1=yes	N°
Direct Expansion > Condensation	CND	cc1	Minuimum fan speed (minimimum valve opening)	35	%
Direct Expansion > Condensation	CND	cc2	Max. fan speed (maximum valve opening)	100	%
Direct Expansion > Condensation	CND	ccY	Minimum valve opening (fan start)	0	%
Direct Expansion > Condensation	CND	ccW	Fan/valve pre-opening time	5	sec
Direct Expansion > Condensation	CND	ccZ	Fan/valve pre-opening time percentage	50	%
Control > Condensation	CND	ccS	Condensation set-point	18.0	bar
Control > Condensation	CND	ccD	Condensation differential	12.0	bar

For watercooled machines (H-F versions)

with a plate exchanger which can have a modulating water valve (optional), regulation is as shown in the figure:



MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Direct Expansion > Condensation	CND	cCC	Number of condensers	43132	N°
Direct Expansion > Condensation	CND	cc0	Enabling modulating fans (or valve)	1=yes	N°
Direct Expansion > Condensation	CND	cc1	Minimum fan speed (minimum valve opening)	0	%
Direct Expansion > Condensation	CND	cc2	Max. fan speed (maximum valve opening)	100	%
Direct Expansion > Condensation	CND	ccY	Minimum valve opening (fan start)	19	%
Direct Expansion > Condensation	CND	ccW	Fan/valve pre-opening time	12	sec
Direct Expansion > Condensation	CND	ccZ	Fan/valve pre-opening time percentage	30	%
Control > Condensation	CND	ccS	Condensation set-point	16.0	bar
Control > Condensation	CND	ccD	Condensation differential	9.0	bar

9.4 Inverter compressor regulation

The microprocessor can also drive an Inverter compressor by Modbus protocol. An "AO" analogue output is also provided that supplies a proportional 0-10V signal (redundant function to be enabled in case of emergency).

These three cases can occur:

- Unit with only one Inverter compressor:

the Inverter modulates from minimum to maximum speed based on the cold demand.

- With cold demand at 100% the compressor is at maximum speed.

- Unit with two compressors:

the first Inverter and the second ON-OFF.

The cold demand band is divided into two parts (50%-100%):

- from 0% to 50% of the band, the Inverter compressor will be regulated;
- from 50% to 100% of the band, the Inverter will be at maximum speed and the ON-OFF compressor can also be activated.

- Unit with three compressors:

the first Inverter and the second and third ON-OFF.

The cold demand band is divided into three parts (33.3%-66.6%-100%):

- from 0% to 33.3% of the band, the Inverter compressor will be regulated;
- from 33.3% to 66.6% of the band, the Inverter will be at maximum speed and the second ON-OFF compressor will also be activated.
- from 66.6% to 100% of the band, the Inverter will be at maximum speed, the second compressor will be at 100% and the third ON-OFF compressor can also be activated.

The main parameters for controlling the Inverter compressor are as follows:

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Direct Expansion > Compr.Inverter	INV	I00	Enabling an Inverter compressor	1=yes	N°
Direct Expansion > Compr.Inverter	INV	I01	Minimum speed of the Inverter compressor	30	%
Direct Expansion > Compr.Inverter	INV	I02	Maximum speed of the Inverter compressor	100	%
Direct Expansion > Compr.Inverter	INV	I03	Starting speed of the Inverter compressor	30	%
Direct Expansion > Compr.Inverter	INV	I04	Forcing period of the Inverter at maximum speed	0	Min
Direct Expansion > Compr.Inverter	INV	I05	Forcing time of the Inverter at maximum speed	0	sec
Direct Expansion > Compr.Inverter	INV	I06	Minimum compressor ON time, with Inverter compressor (replaces parameter A19 for ON-OFF compressors)	60	sec
Direct Expansion > Compr.Inverter	INV	I07	Minimum compressor OFF time, with Inverter compressor (replaces parameter A18 for ON-OFF compressors)	240	sec

NOTE

The Inverter compressor will be the compressor of cooling circuit n. 1.

Any other ON-OFF compressors will belong to cooling circuit n. 2.

9.5 Free-Cooling unit regulation

The Free-Cooling function is used to take advantage of the favourable condition of the water for condensation control, which is related to the room temperature, to modulate a water valve based on the thermal load demand.

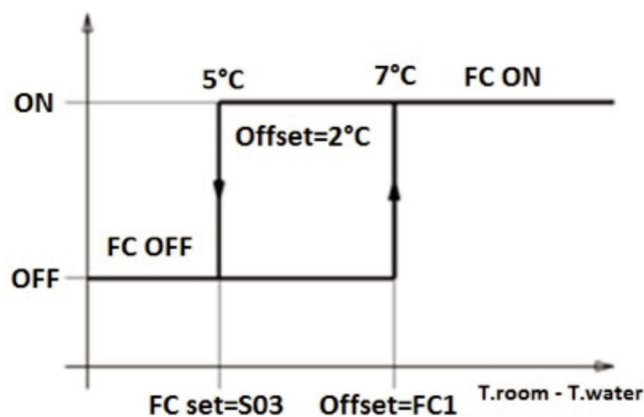
Regulation has these features:

- first the cold demand will try to be met with only modulation of the cooling or Free-Cooling valve;
- if the valve fails to meet the cold demand, then the unit's compressors will also be activated.

Free-Cooling conditions

To enable or disable Free-Cooling, the conditions are defined by the following parameters:

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Control > Free-Cooling	FRC	S03	Free-Cooling Delta (parameter that defines the threshold above which it is efficient to have Free-Cooling)	5.0	°C
Control > Free-Cooling	FRC	FC1	Offset that added to parameter S03 calculates the activation condition of Free-Cooling in the unit	2.0	°C
Control > Free-Cooling	FRC	FC2	Parameter that defines the threshold above which Free-Cooling will always be disabled	15.0	°C
Control > Free-Cooling	FRC	FC3	Parameter that subtracted from FC2 defines the condition for Free-Cooling to occur	3.0	°C



Free-Cooling activation conditions:

$(Temp.room) - (Temp.water) > S03 + FC1$	With this condition, the unit will be in Free-Cooling function
$(Temp.room) - (Temp.water) < S03$	With this condition, Free-Cooling will not be active on the unit

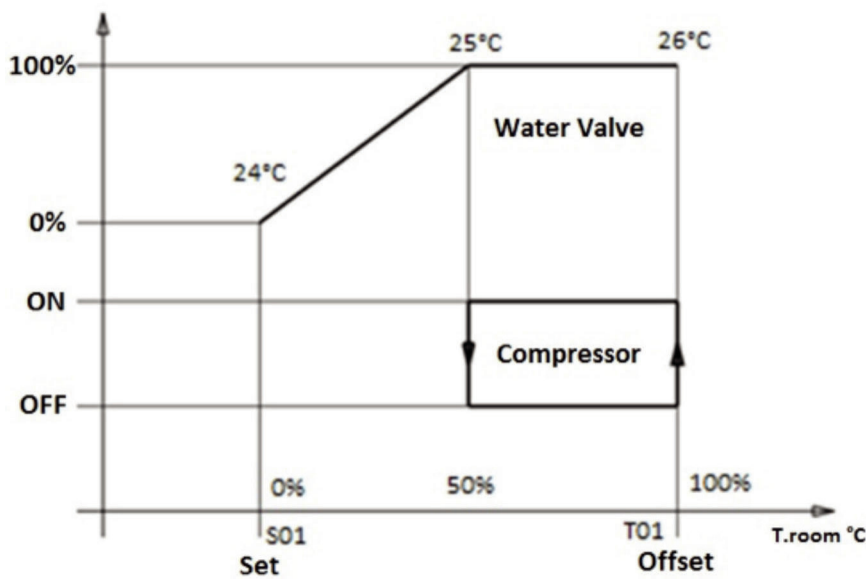
Whereas the Free-Cooling activation threshold is established with the following conditions:

$(Temp.water) > FC2$	With this condition, Free-Cooling will never be active
$(Temp.water) < FC2 - FC3$	With this condition, Free-Cooling can occur

Free-Cooling unit regulation

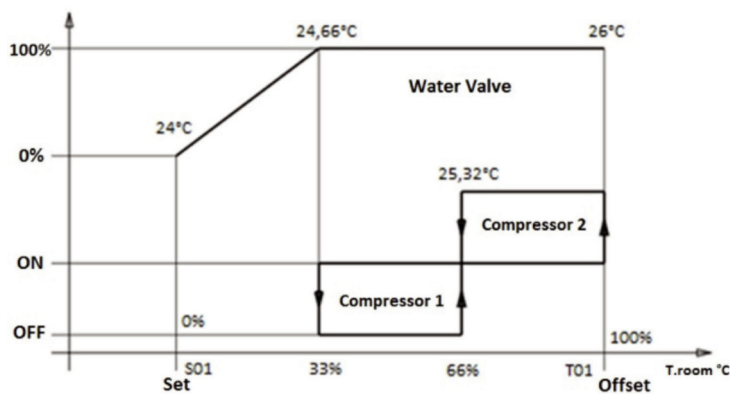
When the machine is in the Free-Cooling activation conditions, the proportional band in cooling (T01) is divided into two or three parts, based on the number of compressors in the unit.

With single-compressor units, regulation is as described in the figure:



Proportional Band:	
from 0% to 50%	Free-Cooling valve in modulation
Higher than 100%	Free-Cooling valve at maximum 100%, Compressor 1 ON

With dual-compressor units, regulation is as described in the figure:



Proportional Band:	
from 0% to 33%	Free-Cooling valve in modulation
Higher than 66%	Free-Cooling valve at maximum 100%, Compressor 1 ON
Higher than 100%	Free-Cooling valve at maximum 100%, Compressor 1 ON, Compressor 2 ON

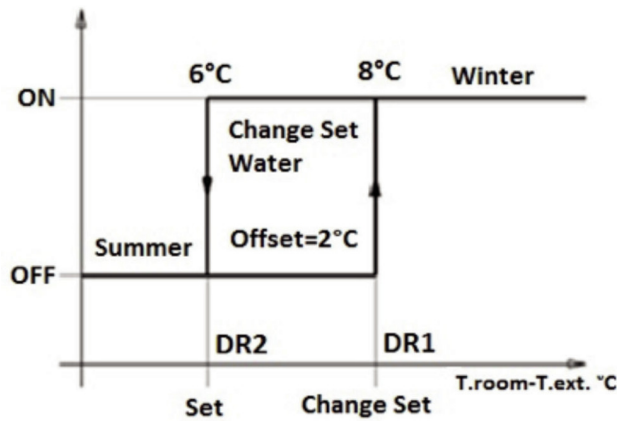
MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Set-point	SET	S01	Temperature set-point	24.0	°C
Control > Room Temperature	TEM	T01	Proportional band in cooling	2.0	°C

Dry-Cooler for Free-Cooling units

Condensation water temperature management is also required by the unit's control, so Free-Cooling units can be combined with other units called Dry-Coolers.

Dry-Coolers consist of a water coil with fans for controlling condensation, with speeds that can be controlled.

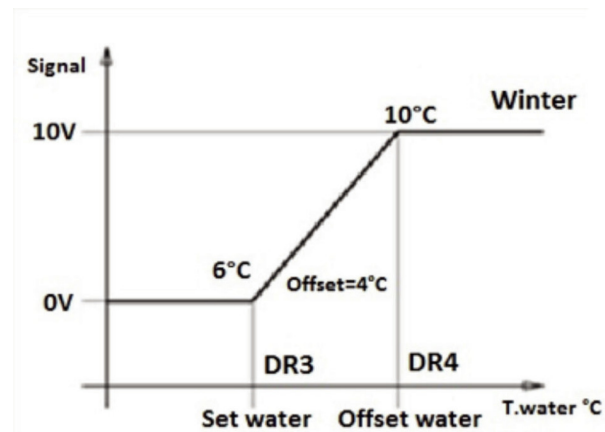
The MCX board can guarantee a 0-10V signal and an ON-OFF signal for modulation of these fans based on the season, as shown in the following charts:



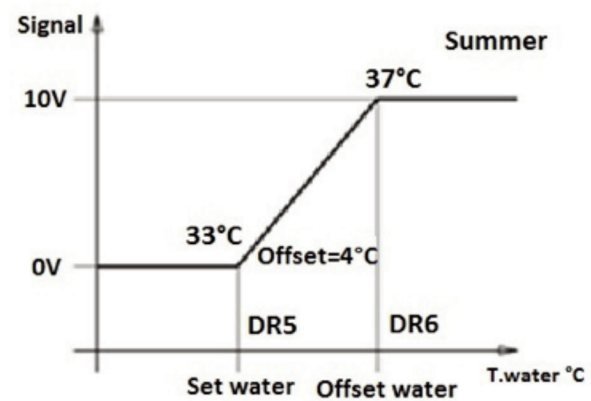
Conditions for changing the water set-point of external Dry Coolers

Changing the Dry-Cooler water set-point:

$(\text{Temp. room}) - (\text{Temp. external}) > \text{DR1}$	With this condition, Dry-Coolers will be in WINTER (linked to parameters DR3-DR4)
$(\text{Temp. room}) - (\text{Temp. external}) < \text{DR1-DR2}$	With this condition, Dry-Coolers will be in SUMMER (linked to parameters DR5-DR6)



WINTER water set-point of external Dry-Coolers



SUMMER water set-point of external Dry-Coolers

MENU PATH	MENU TYPE	PARAMETER NAME	PARAMETER DESCRIPTION	VALUE	UNIT OF MEASURE
Control > Dry-Cooler	DRY	DR1	Parameter that defines the threshold used to change the Dry-Cooler set-point	8.0	°C
Control > Dry-Cooler	DRY	DR2	Differential that subtracted from parameter DR1 calculates the summer-winter season change.	2.0	°C
Control > Dry-Cooler	DRY	DR3	Winter set-point	6.0	°C
Control > Dry-Cooler	DRY	DR4	Winter differential	4.0	°C
Control > Dry-Cooler	DRY	DR5	Summer set-point	33.0	°C
Control > Dry-Cooler	DRY	DR6	Summer differential	4.0	°C

10. Connection to the local network

- 10.1 Wiring the units in a local network
- 10.2 Checking the nodes assigned to the boards
- 10.3 Procedure for assigning nodes to the boards

Connection to the local network means operation of several air conditioners running in a single environment can be controlled, or the air conditioners can be connected in a mixed network where there may also be liquid chillers connected in parallel in the same plant.

The number of units that can be connected depends on the program that manages the network (located in the Eprom Flash memory).

In general, the following can be connected:

- 10 Close Control units without any remote terminal (CR option);
- 9 Close Control units plus 1 remote terminal (CR option);
- Maximum distance from the network: 80 metres (including the cables which are inside the units);
- Baudrate: 500 KBits/sec.

Warnings to be heeded for machines connected to a local network:

- All machines connected to a network must have the same version of the program in the board's Flash Memory;
- In order to communicate in a local network, the different machines must be "configured" so that they can transmit to each other the various information required for correct operation.
 - To this end, first the different units need to be numbered progressively (1,2,3,... 10) and then the various boards and terminals need to be addressed correctly, also see the "Wiring the units in a local network" chapter;
- A terminal can be configured as "private" or "shared":
 - 1. a private terminal: can display the operating status of only the unit to which it is connected by a special 4-pole cable with RJ11 jack connector, at a maximum distance of 3 metres;
 - 2. a shared terminal: can display the operating status of all units connected to the network (it will be connected by Can Bus to the local network) and can have a maximum length of 80 metres (maximum distance of the network, including the cables which are inside the units).

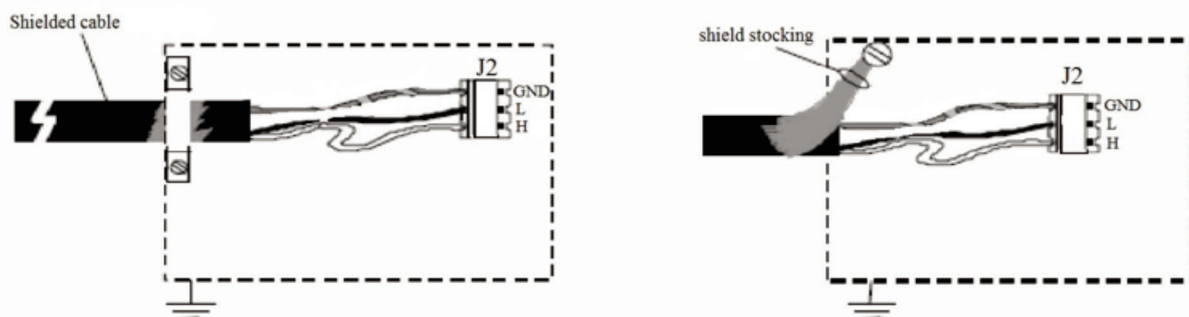
Cable to be used for connection to the local network

The cable used for connections to the local CAN, to be connected to the "J-CAN" clamp of the various boards, must be shielded and of the following type:

- Cat5 24AWG twister pair

The shielded cable sheath for CAN connections must be connected to earth in a single point of the network (as shown in the figure).

Connecting the cable to earth in different points of the network can result in control malfunctions.

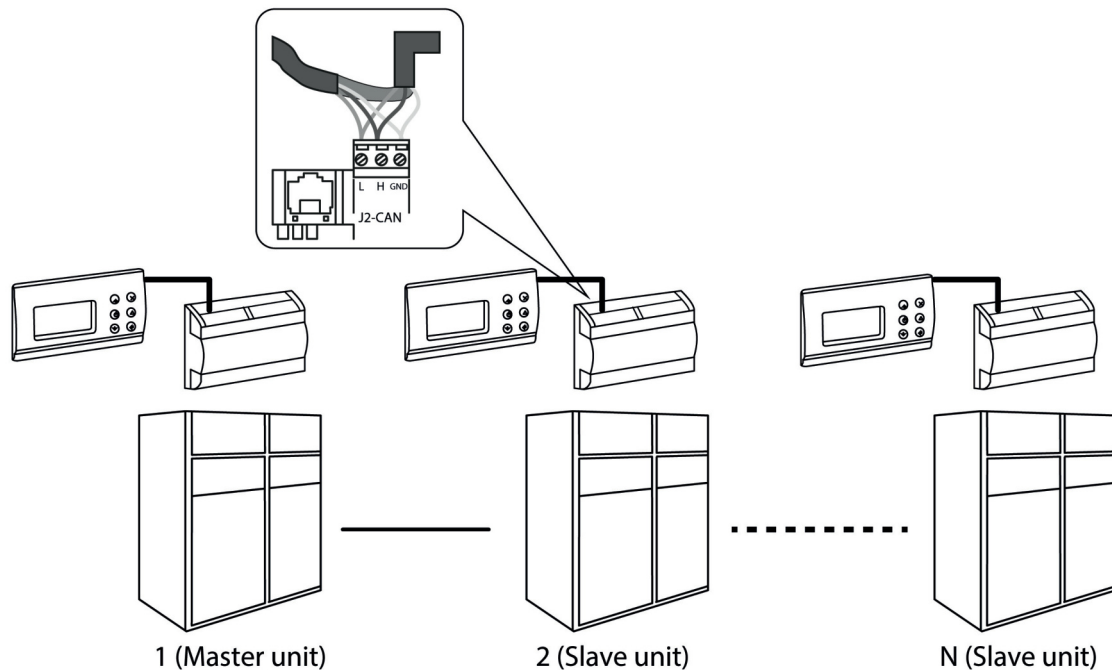


It must be connected, where possible, by fastening the cable with a metal cable tie, as shown in the figure on the left.

Alternatively, the end of the twisted sheath can be used provided the length of the sheath section connected to earth is as small as possible and a wedge-locking washer is used (right figure).

The connection of several boards connected to the local Can Bus network, powered by transformers on the electrical board of each machine, will be done as shown in the figure:

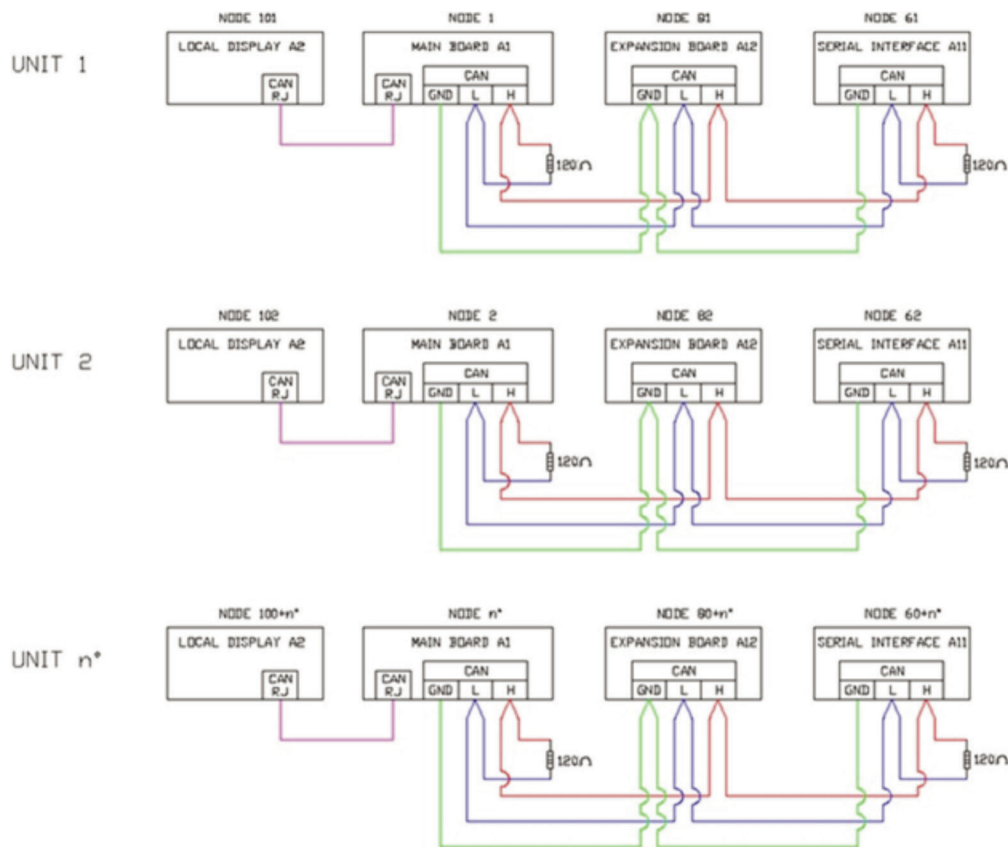
MASTER AND SLAVE (LOCAL NETWORK):



10.1 Wiring the units in a local network

⚠ All electrical connections must be done with the units turned off and disconnected. This precaution is required for safety reasons and to avoid causing unexpected breakdowns on the electronics of the various boards.

Wiring stand-alone units:

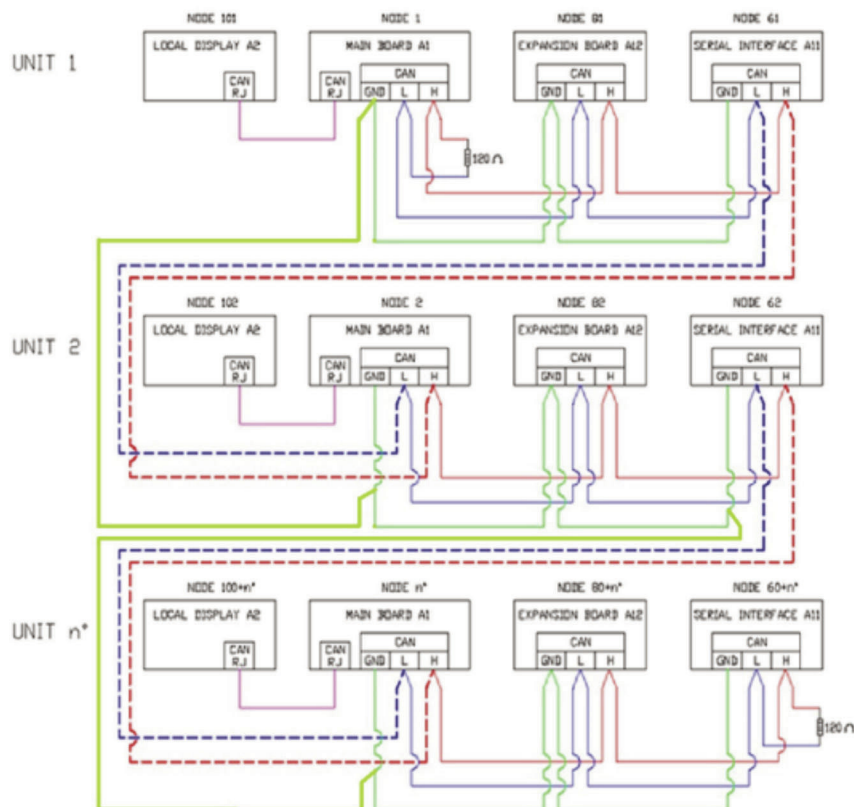


For stand-alone units; with boards of the same electrical board connected in "Can Bus" to each other.

Ensure that a 120 ohm line start and end heater is installed as shown in the figure.

The line start is the first electronic board of the board and the line end is the last electronic board of the same electrical board.

Wiring the units connected in a local network:



In the units connected to the local network: with electronic boards of several electrical boards connected to each other via “Can Bus”.

Ensure that a 120 ohm line start and end heater is installed as shown in the figure.

The line start is the first electronic board of the first machine, whereas the line end is the last electronic board of the last machine connected to the network.

NOTE

To facilitate the installation of the machines in the network and to apply the line start and end heaters (when required), every Montair unit contains clamps for CAN BUS connection called “GND-H-L” (in the main terminal board of the “X1” electrical board).

Assigning nodes to the boards:

Unit number	DISPLAY node n.	MAIN BOARD node n.	EXPANSION BOARD node n.	SERIAL INTERFACE node n.
1	101	1	81	61
2	102	2	82	62
3	103	3	83	63
n	100+n	n	80+n	60+n

NOTE







With the remote terminal option (CR), the node to be assigned to this terminal will be > 120.

10.2 Checking the nodes assigned to the boards

All of the boards and the display must be connected to the CAN, ensuring that:

- the 120 ohm heaters are connected at line start and end
- alternatively, H and R clamps must be connected (on the CAN connector of the board).

Run these checks, power the unit and follow this procedure:

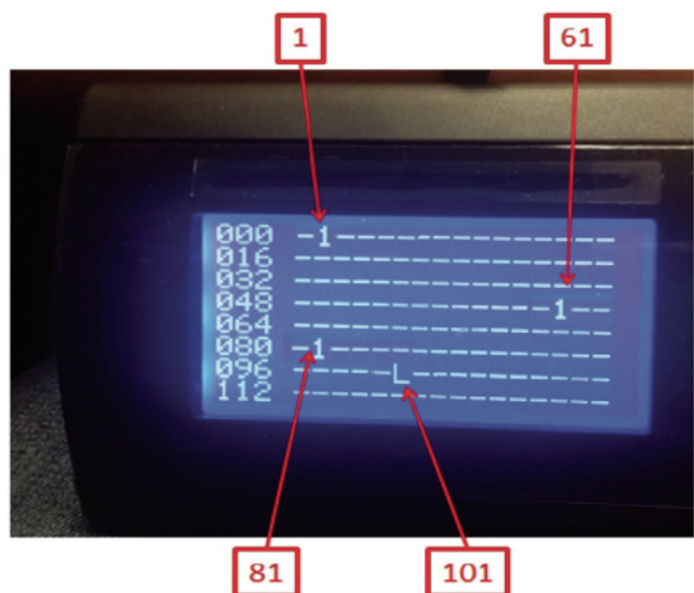
 	ESC ENTER	Simultaneously press “Esc”+“Enter” for about 3 seconds. The BIOS screen of the board will be displayed.
	DOWN	Scroll with the “Down” key to “CAN”
	ENTER	Press “Enter” to confirm the menu item
	DOWN	Scroll with the “Down” key to “ACTIVE NODE”
	ENTER	Press “Enter” to confirm the menu item

A screen will be displayed with all of the node numbers for the boards connected to the CAN (see image below).

NOTE

If this screen is not displayed, check:

- the baudrate speed;
- electrical connections;
- the presence of the line start and end heaters (as indicated in the “Wiring the units in a local network” chapter).



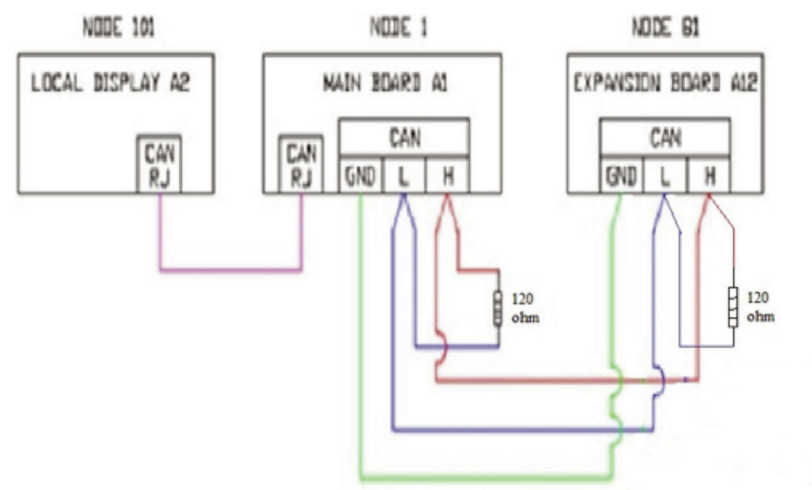
"L" is the ID code of the display on which it is being read.

10.3 Procedure for assigning nodes to the boards

To assign the nodes to the main boards and to the relative expansion boards, there is an automatism called auto-configuration of the nodes. This automatism is linked to parameter “n00” of the NET menu (LAN Setup).

To change the number of the node to the boards, follow this procedure:

- Disconnect all boards from the network;
- Locally wire the main board (A1) to its expansion board (A12) only.
 - Remember to adjust the 120 ohm line start and end heaters as well. Alternatively, H and R clamps will have to be bridged (on the CAN connector of the boards).
- If there is an external serial interface board, remember to disconnect it from the local CAN;
- Also see the following screen:



Now it is time for the auto-configuration phase of the nodes of the boards (A1, A2 and A12) by following these steps:

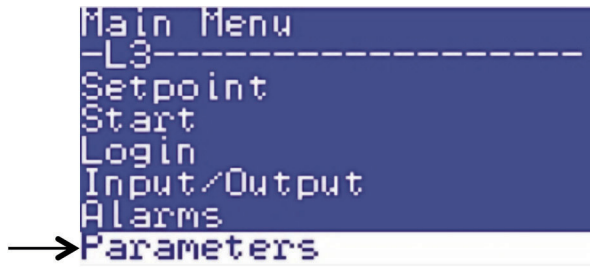
	ENTER	To open the main menu
	UP / DOWN	To search for “Login” on the menu
	ENTER	To confirm the selection

The following screen is displayed where you can enter the password.
Enter with level 2 “Manufacturer”.



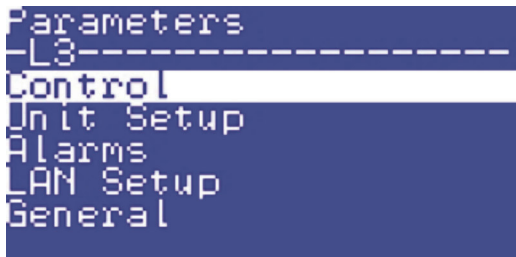
	UP / DOWN	Use the “Up” and “Down” keys to write in the first password field
	ENTER	To confirm the selection of the figure in the first field
	UP / DOWN	Use the “Up” and “Down” keys to write in the second password field
	ENTER	To confirm selection of the figure in the second field
	UP / DOWN	Use the “Up” and “Down” keys to write in the third password field
	ENTER	To confirm selection of the figure in the third field

After entering the password, you will go back to the “main menu” where the new “Parameters” item will be displayed:



	UP / DOWN	To search for “Parameters” on the menu
	ENTER	To confirm the selection

You will have access to the following submenus and their parameters:



	UP / DOWN	To open the “LAN Setup” submenu.
	ENTER	To confirm the selection
	UP / DOWN	To search for parameter “n00”
	ENTER	To confirm the selection
	UP / DOWN	To change the node number of the main board:for example, main board setting (node number 3).
	ENTER	To confirm the board number selection
	ESC	To exit the submenu or the programming menu

Node number 83 will automatically be assigned to the expansion board (A12) and node number 103 will automatically be assigned to the local display (A2) (in the previous example we assigned node number 3 to the main board A1).

The nodes will be assigned according to this simple scheme:

MAIN BOARD “A1” node n.	EXPANSION BOARD “A12” node n.	DISPLAY “A2” node n.
1	81	101
2	82	102
3	83	103
4	84	104
5	85	105
6	86	106
n	80+n	100+n

NOTE

To check if the nodes have been correctly assigned, follow the procedure explained in chapter: “Checking the nodes assigned to the boards”.

11. Remote control

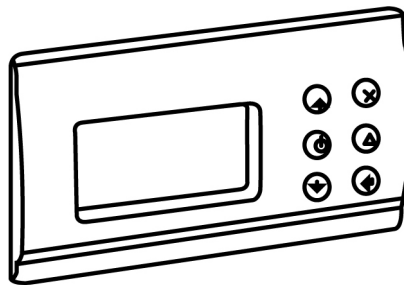
- 11.1 Using the remote control (CR Option)
- 11.2 Assigning the node to the remote display (node higher than or equal to 120)
- 11.3 Programming the remote display as a shared terminal

11.1 Using the remote control (CR Option)

If you want to have a shared terminal for all machines in the network, you will have to buy the remote control (CR Option).

Thanks to this option, you can display the operating status of all of the units connected in the network (connected via Can Bus to the local network).

The maximum distance at which the remote control can be used is 80 metres (intended as the maximum distance of the network, including the cables which are inside the units).



11.2 Assigning the node to the remote display (node higher than or equal to 120)

Assigning the node to the remote display (node higher than or equal to 120):

All of the boards and the remote control (CR option) must be connected to the CAN, ensuring that:

- the 120 ohm heaters are connected at line start and end
- alternatively, H and R clamps must be connected (on the CAN connector of the boards).

After running these checks, the system can be powered (including the CR remote control).

Using the remote control display, follow this procedure:

	ESC ENTER	Simultaneously press "Esc"+"Enter" for about 3 seconds. The BIOS screen of the board will be displayed.
	DOWN	Scroll with the "Down" key to "CAN"
	ENTER	Press "Enter" to confirm the menu item
	DOWN	Scroll with the "Down" key to "NODE ID".
	UP / DOWN	Use the "Up" and "Down" keys to enter the node number to be assigned. In this example, n. 120.
	ENTER	Press "Enter" to confirm the node number
	ESC	To exit the submenu or the programming menu to return to the main BIOS menu











NOTE

The node number to be assigned to the remote control (CR option) must be between 120 and 127.

11.3 Programming the remote display as a shared terminal

Programming the remote display as a shared terminal:

To share the remote control (CR option) with all of the units connected to the local CAN, follow this procedure:

 	ESC ENTER	Return to the main BIOS menu. If you have exited this menu, open it again by simultaneously pressing "Esc"+"Enter" for about 3 seconds.
	DOWN	Scroll with the "Down" key to "MCX SELECTION"
	ENTER	Press "Enter" to confirm the menu item
	DOWN	Scroll with the "Down" key to "MAN SELECTION"
	ENTER	Press "Enter" to confirm the menu item
 	UP / DOWN	Use the "Up" and "Down" keys to enter the number of a node for a main board in the local network. For example, n. 002.
	ENTER	Press "Enter" to confirm the board to be displayed. The previously selected board will be displayed with the remote control. For example, board n. 002.
	ESC	To exit the submenu or the programming menu to return to the main BIOS menu

Now disconnect the remote control in order to restart it!

When it is restarted, the previously selected board will be displayed (board n. 002 as shown in the example).

 	UP DOWN	From now on, if you simultaneously press the "Up" and "Down" keys for about 2 seconds, you will automatically switch to displaying the next CAN board.
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Serie CONTROLLER MCX:	
Emissione 12.18	Sostituisce ---
Catalogo MTM 211B	



n° 1370
according to
97/23/EC (P.E.D.)



The data indicated in this manual is purely indicative. The manufacturer reserves the right to modify the data whenever it is considered necessary.