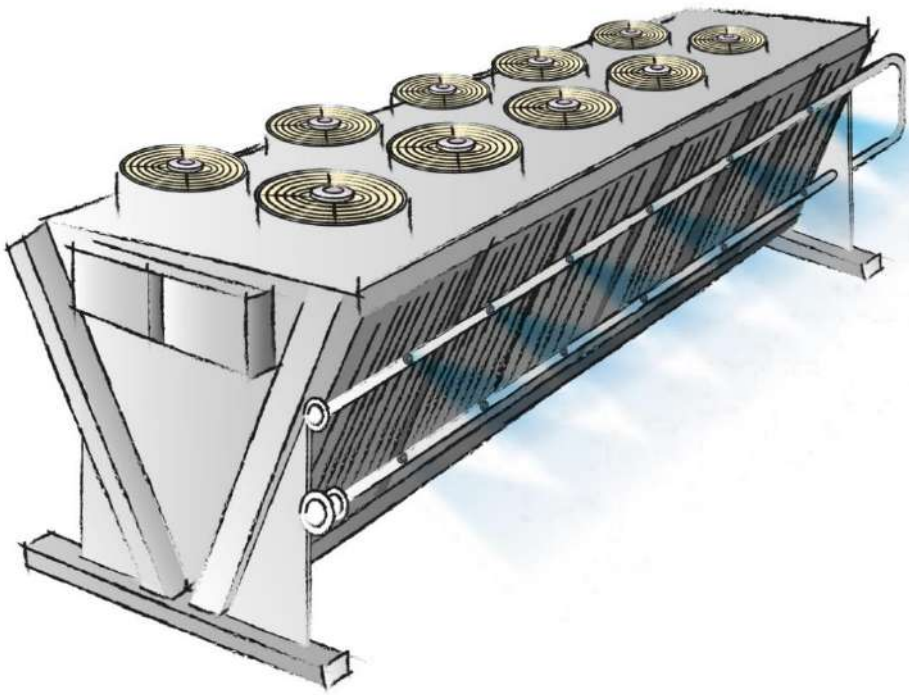


iPRO DRY COOLER
Application for pumping station and dry cooler units

Rev. 1.1

IP SETTINGS:

	Default
IP address	192.168.0.250
Netmask	255.255.255.0
Network	192.168.0.0
Gateway	192.168.0.2
DNS1	192.168.0.254
DNS2	8.8.8.8

This manual refers to the Dry Cooler application for the following versions:

Application version IPRO
Application version V2IPG
Web Site version Embedded
BIOS version
Wizmate version
XWeb version

Contents

1. Recommendations

Symbol  warns the user about the presence of non-insulated "dangerous voltage" inside the product area, which may cause electric shock.

Symbol  warns the user about the presence of important operating and maintenance (assistance) instructions in the documentation attached to the device.

For arranged boards, Dixell Srl cannot accept any liability for damages caused by modems that are not supported.

The documentation can be downloaded from www.dixell.com even prior to purchase.

This manual forms part of the product and must always be kept near the device for easy and quick reference.

1.1 Security

The device cannot be used as a safety device. Verify the limits of application before using the device.

In general, for Dixell products:

- Verify that the power supply voltage is correct before connecting the device.
- Prevent the electronic circuits from getting wet as contact made with water, humidity or any other type of liquid can damage them.
- Comply with the temperature and humidity limits specified in the manual in order to store the product correctly.
- Prevent the device from being dropped, knocked or shaken as either can cause irreparable damage.
- Do not clean the device with corrosive chemical products, solvents or aggressive detergents.
- The device must not be used in applications that differ from that specified in the following material.
- The device must not be opened. Please contact qualified service personnel for any assistance.
- Disconnect all the electric connections before performing any maintenance.
- The device must never be hand-held while being used.
- The device must always be inserted inside an electrical panel that can only be accessed by authorised personnel. For safety purposes, the keyboard must be the only part that can be reached.

1.2 General Notes

In the case of applications in industrial environments, it may be useful to use the main filters (our mod. FT1) in parallel to the inductive loads.

The customer shall bear full responsibility and risk for product configuration in order to achieve the results pertaining to installation and/or final equipment/system. Upon the customer's request and following a specific agreement, Dixell srl may be present during the start-up of the final machine/application, as a consultant, however, under no circumstances can the company be held responsible for the correct operation of the final equipment/system.

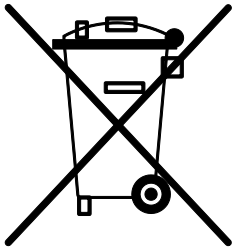
Since Dixell products form part of a very high level of technology, a qualification/configuration/programming/commissioning stage is required to use them as best as possible. Otherwise, these products may malfunction and Dixell cannot be held responsible. The product must not be used in any way that differs from that stipulated in the documentation.

- *Separate the power supply of the device from the rest of the electrical devices connected inside the electrical panel. The secondary circuit of the transformer must never be connected to the earth.*
- *Separate cables of probes and digital inputs from the cables of inductive loads and power cables to prevent any electromagnetic interference. Never run power cables and signal cables in the same ducts.*
- *Consider the maximum current that can be applied to each relay for correct rating.*

Dixell Srl reserves the right to modify this manual without prior notice.

Dixell Srl reserves the right to vary the composition of its products without prior notice to the customer, ensuring the identical and unchanged features of the same.

1.3 Waste Disposal (WEEE)



With reference to Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 and to the relative national legislation, please note that:

- There lies the obligation not to dispose of electrical and electronic waste as municipal waste but to separate the waste.
- Public or private collection points must be used for disposal, in accordance with local laws. Furthermore, at the end of the equipment's life, it is also possible to return it to the dealer when a new purchase is made.
- This equipment may contain hazardous substances. Improper use or incorrect disposal can have adverse effects on human health and the environment.
- The symbol shown on the product or the package indicates that the product was placed on the market after 13th August 2005 and must be disposed of as separated waste.
- Should the product be disposed of incorrectly, sanctions may be applied as stipulated in applicable local regulations regarding waste disposal.

1.4 Installation Precautions

The controller is designed to control Dry Cooler units or remote cooling gas condensers and may be used to manage fan, temperature, according to the specific controls described in the manual.

The following rules must be taken into account for all controller adjustments and/or functions:

1.4.1 Where It Cannot Be Used

The regulator cannot be installed in the following specific cases:

- Units installed in systems with lifesaving functions;
- Units for military use;
- Units operated in nuclear energy systems;
- In all installations where the hardware controller has safety functions.

1.4.2 How It May Be Used

Installation must be on units set up for carrying out the functions reqired/enabled on the controller.

Any inefficiencies due to physical, engineering and/or machine limits cannot be attributed to inadequate controller management.

The operative instructions contained in this manual should be read before using the regulator for each machine function.

1.4.3 Workmanlike Installation

Installation of the controller and the components designated for its operation (power supply, probes, transducers, actuators) must be performed in a workmanlike manner, as set out by this manual and by the operating and maintenance manuals of third party components installed in the machine.

Specifically:

- It is important to install correctly probes, transducers and all control and safety components, according to the indications provided by each manufacturer, taking care to choose the most appropriate position for each.
- The configuration of the iPro controller does not replace nor exclude the configuration of any other regulation elements (inverter, probes etc.) in use. The configuration is the unit installer’s or manufacturer’s responsibility and is essential for the correct operation of the machine.
- All wiring must be made by the installer accurately and in a workmanlike manner. Signals and probes must be separated from the power part, to prevent interference that may affect the system.

2. Overview

This application, which is developed by Dixell, is dedicated to the control of Dry Cooler, remote condensers, pumping groups and installed in iPRO's controllers range (ehiter 4DIN or 10DIN size).

The following main functions are implemented:

- Pumps management;
- Machine management in Free-Cooler or Condenser mode;
- 3-way modulation valve management;
- Fans management;
- Adiabatic cooler management;
- Heat recovery management;
- Auxiliary regulators management.

The unit may be configured in the most traditional ways such as:

- Interface on the machine with Visograph 2.0 keypad and its easy, user-friendly software;
- Wimzate software to configure all settings from the PC;
- Embedded website and configuration wizard.

3. Hardware

3.1 iPRO

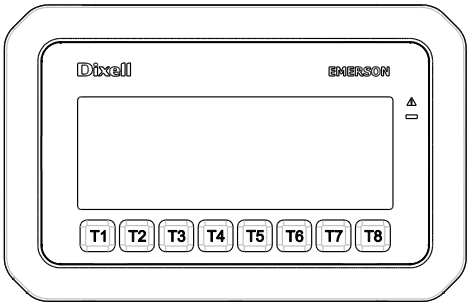
iPRO is the range of programmable controllers manufactured by Dixell.

The range consists of programmable controllers, I/O expansions, drivers for electronic valves and graphical interfaces adapted to cover any type of application in the air-conditioning sector, cooling sector and any relative area. In addition to being one of the most technologically advanced, the system is flexible and can be customised to suit the user's particular requirements.

The Dixell programmable controllers are all powered at 24Vac/dc and use a high performance 32-bit, 200 MHz ARM9 microprocessor. The models differ in size (10DIN or 4DIN) and number of inputs and outputs (analog and digital). One of the features that distinguishes the iPRO controllers is the vast range of connection options with external devices, Dixell as well as other brands. CANBus, RS485 Master and Slave, and an Ethernet and USB port provide maximum flexibility of integration with the outside world. MODBUS RTU protocol, one of the most popular in the world, is used for serial communication. Up to 80 MB of flash memory are entirely available to the user, according to the model.

3.2 Display

The application is able to manage up to 2 Visograf keypads at the same time. It is important for each keypad connected to the iPG board to have a unique address.



Refer to paragraph 3.10 for the electrical connection.

The Display has its own BIOS which can be accessed with a combination of keys.

To enter the display's set up menu, press and hold the two end keys (T1 + T8) of the keyboard until the window requesting the password appears.

- Press the UP key and set 1;
- Press the SET key to confirm;

The first 4 options (from 1 to 4) allow the user to UPLOAD/DOWNLOAD the Application and the Bios to the Dixell VISOKEY.

Before implementing these operations, it is recommended to contact Dixell so as to prevent the device from being damaged.

Option 5, PROGRAM INFO, displays the information of the application resident in the Visograph.

Option 6, SETTINGS, allows the user to set certain configurations:

- ADR VISOGRAPH: to set the address of the display.
- CONTRAST: to adjust the contrast of the display.
- BACKLIGHT: the display backlight time is set (from 1 to 200 seconds, or always on).
- READ EXT: this must always be set to NEVER.
- LANGUAGE: if different languages have been defined in the project, the one to be used is selected via this option.
- BAUD RATE: it must always be set at 38400.
- EXIT: to quit the menu.

To exit the menu permanently, press the EXIT key.

3.3 Overview Of Electrical Connections

To prevent malfunctioning or hazards, the electrical connections must be made by experienced and skilled personnel, taking into account the following recommendations:

- Separate signal cables from power cables.
- Separate analogue input cables from digital input ones.
- Separate serial line cables from power cables (resistive and inductive), to prevent possible malfunction due to electromagnetic interference.
- Separate the power supply of the iPro device from that of the other electrical components.
- The low voltage connections must have reinforced insulation.
- Never use power supply other than indicated to prevent device damage.
- Always use safety transformers.

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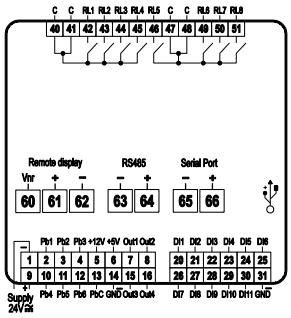
<tr><td>IPG208D</td><td colspan="2"> 
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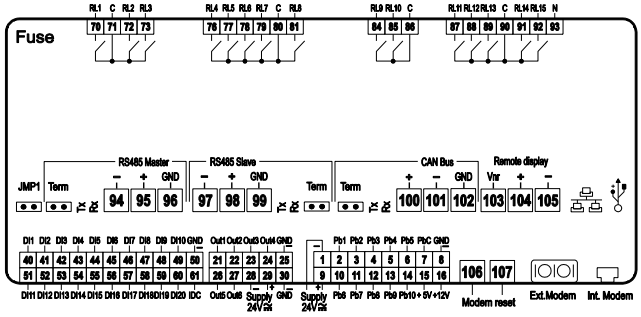
<tr><td>IPG215D</td><td colspan="2"> 
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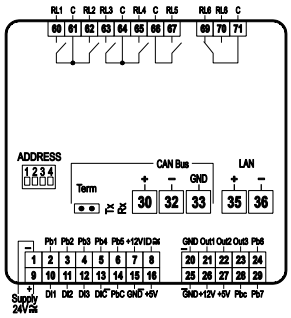
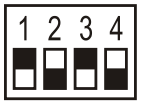
<tr><td>IPX206D</td><td> 
</td><td>ADR: 5 
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</table>

3.4 Power Supply

Power supply of controllers and expansions must be as follows:

IPG208D	24Vac +10/-15%, 50/60Hz (30VA consumption) or 20 - 36Vdc (25W consumption)
IPG215D	24Vac +10/-15%, 50/60Hz (20VA consumption) or 20 - 36Vdc (15W consumption)
IPX206D	24Vac +10/-15%, 50/60Hz (10VA consumption) or 20 - 36Vdc (10W consumption)

Always carefully comply with the following recommendations:

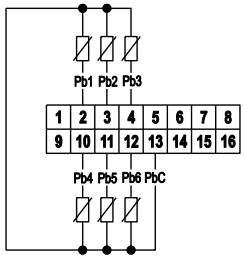
- *Do not use power supply specifications other than indicated;*
- *Always use safety transformers;*
- *Always separate the power supply of the controller from that of all the other electrical devices in the system.*
- *The secondary circuit of the power supply transformer must never be connected to the earth.*
- *Ensure any probes/actuators that require separate 24V power supply are not earthed and/or do not share GND with controller or expansion. If GND is shared, different transformers must be used to power the regulator and the probes/actuators used in the field.*

3.5 Analogue Input Connection

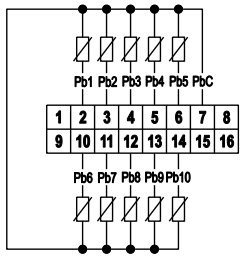
	IPG208D	IPG215D	IPX206D
Analogue conversion:	10-bit A/D converter		
Number of inputs:	6	10	7
Type: **(configurable via software)**	NTC Dixell (-50T110°C; 10KΩ±1% @25°C) PTC Dixell(-55T115°C; 990Ω±1% @25°C) Digital input (potential free contact) Voltage: 0÷1V, 0÷5V, 0÷10V (input impedance 3.7KΩ) Current: 0÷20mA, 4÷20mA (input impedance 100Ω)	NTC Dixell (-50T110°C; 10KΩ±1% @25°C) PTC Dixell(-55T115°C; 990Ω±1% @25°C) Digital input (potential free contact) Voltage: 0÷1V, 0÷5V, 0÷10V (input impedance 3.7KΩ) Current: 0÷20mA, 4÷20mA (input impedance 100Ω)	NTC Dixell (-50T110°C; 10KΩ±1% @25°C) PTC Dixell(-55T115°C; 990Ω±1% @25°C) PT1000 Dixell (-100T150°C; 1KΩ @0°C) Digital input (potential free contact) Voltage: 0÷1V, 0÷5V, 0÷10V (input impedance 3.7KΩ) Current: 0÷20mA, 4÷20mA (input impedance 100Ω)
Digital input status change detection time:	100ms (in any case it depends on the application's cycle time)		
Accuracy:	NTC, PTC: ±1°C 0÷1V: ±20mV 0÷5V: ±100mV 0÷10V:±200mV 2÷20mA, 4÷20mA: ±0.30mA	NTC, PTC: ±1°C 0÷1V: ±20mV 0÷5V: ±100mV 0÷10V:±200mV 2÷20mA, 4÷20mA: ±0.30mA	NTC, PTC, PT1000: ±1°C 0÷1V: ±20mV 0÷5V: ±100mV 0÷10V:±200mV 2÷20mA, 4÷20mA: ±0.30mA
Additional power supplies:	+12V: 200mA in total (between +12V and analogue outputs) +5v: 100mA	+12V: 200mA in total +5v: 100mA	+12V: 40mA max per terminal +5v: 100mA
Notes:	Any inputs that are powered with a voltage that differs from that supplied by the device (+12V or +5V) must be powered separately with a specific transformer (do not use the same controller power secondary circuit) in order to protect the inputs from malfunctioning or damage.		

Connection of NTC or PTC sensors

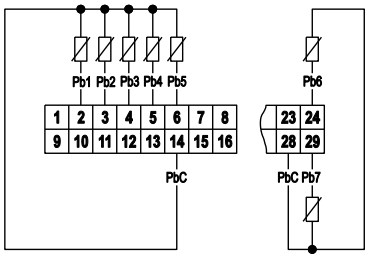
IPG208D



IPG215D



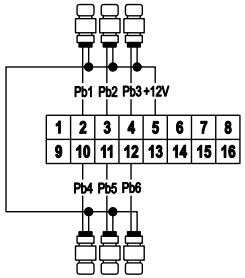
IPX206D



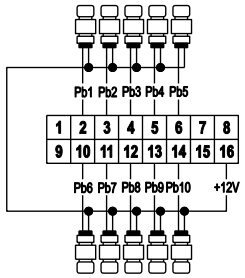
This kind of sensors does not require connecting polarity to be complied with.
As shown in the diagram, each probe must be connected to one of the inputs (from Pb1 to Pb10) and common (PbC).

Connection of pressure transducers and current probes 0÷20mA or 4÷20mA

IPG208D



IPG215D



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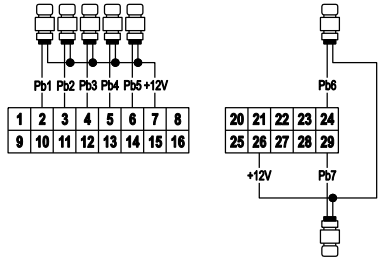
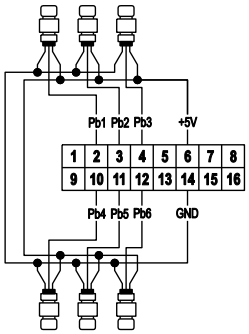


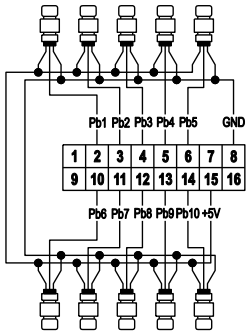
This kind of sensors requires +12Vdc power supply available in the terminal board.
As shown in the diagram, each probe must be connected to one of the inputs (from Pb1 to Pb10) and power supply (+12V).

Connection of ratiometric transducers 0÷5Vdc

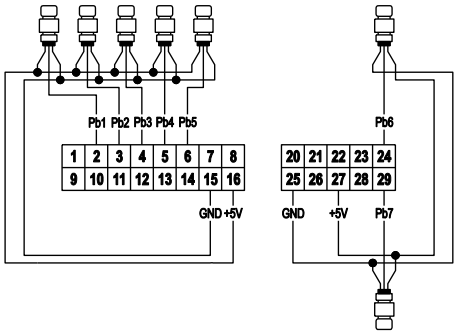
IPG208D



IPG215D



IPX206D

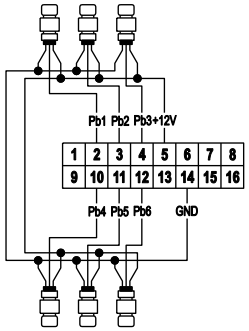


This kind of sensors requires +5Vdc power supply available in the terminal board.

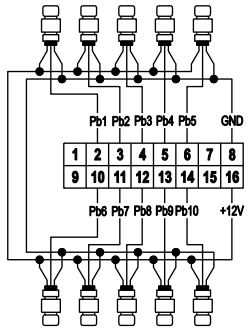
As shown in the diagram, each probe must be connected to one of the inputs (from Pb1 to Pb10) and power supply (+5V and GND).

Connection of active probes 0÷1V, 0÷5V, 0÷10V

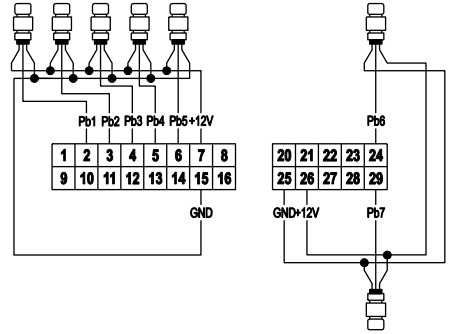
IPG208D



IPG215D



IPX206D

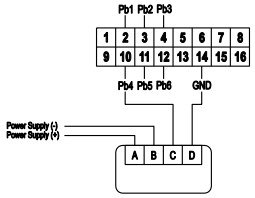


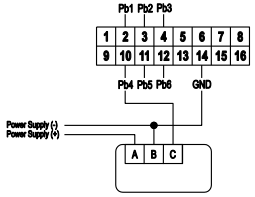
This kind of sensors requires +12Vdc power supply available in the terminal board.

As shown in the diagram, each probe must be connected to one of the inputs (from Pb1 to Pb10) and power supply (+12V and GND).

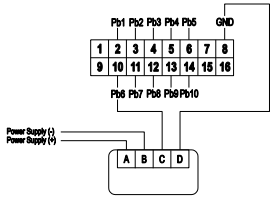
Connection of probes or transducers with separate 24VAC/DC power supply

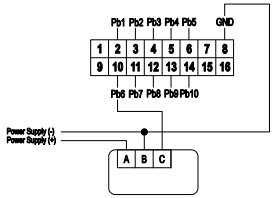
IPG208D



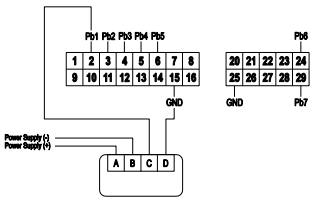


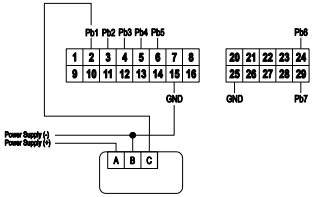
IPG215D





IPX206D





This kind of sensors requires external +24VAC/DC power supply.

As shown in the diagram, each probe must be connected to one of the inputs (from Pb1 to PB10) and GND.

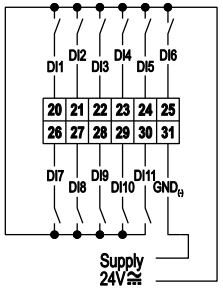
Recommendations:

- comply with the indications of + and - for probe power supply;
- the probe's power supply must be separate from the controller's power supply;

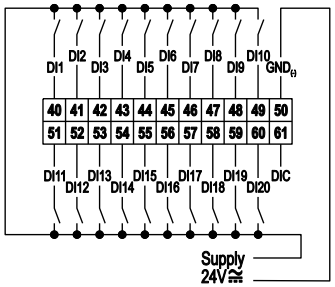
3.6 Digital Input Connection

	IPG208D	IPG215D	IPX206D
Type: **(configurable via software)**	Opto-insulated live contact (24Vac/dc) External power 24Vac/dc ±20%	Opto-insulated potential free or live contact (24Vac/dc) External power 24Vac/dc ±20%	Opto-insulated potential free contact or power supply
Number of inputs:	11	20	3
Digital input status change detection time:	100ms (in any case it depends on the application's cycle time)		
Notes:	Use another transformer (do not use the same secondary of the controller's power) in order to prevent the inputs from malfunctioning or being damaged.	If the digital inputs are used with voltage, use another transformer (do not use the same secondary of the controller's power) in order to prevent the inputs from malfunctioning or being damaged.	Pay attention to use the right common input when the digital inputs are used as dry contacts or power supply contacts.

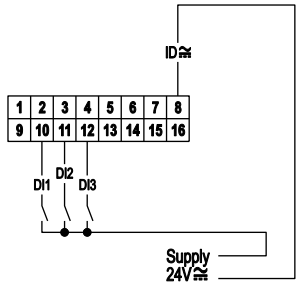
IPG208D



IPG215D



IPX206D

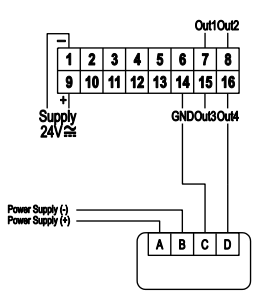


3.7 Connection Of Analogue Outputs

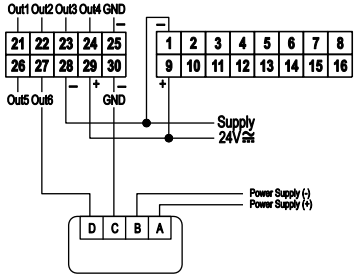
	IPG208D	IPG215D	IPX206D
Type:	Non opto-insulated internal power	Opto-insulated with separate 24Vac/dc power supply	Non opto-insulated internal power
Number of outputs:	4	6	3
Type of analogue output: **(configurable via software parameter)**	4 configurable outputs 0-10Vdc 4-20mA (Out1 - Out4)	4 fixed outputs 0-10Vdc (Out1 - Out4) 2 configurable outputs 0-10Vdc, 4-20mA (Out5 and Out6)	3 fixed outputs 0-10Vdc (Out1 - Out3)
Maximum load:	40mA (Out1 - Out4) max with configured outputs 0-10Vdc 400Ω max with configured outputs 4-20mA 22Ω per live analogue output	40mA (Out1 - Out4) 20mA (Out5 and Out6) max with configured outputs 0-10Vdc 400Ω max with configured outputs 4-20Ma 22Ω per live analogue output	40mA (Out1 - Out3) 22Ω per live analogue output
Accuracy:	Out1 - Out4: ±2% full scale	Out1 - Out4: ±2% full scale Out5 – Out6: ±2% full scale	Out1 - Out3: ±2% full scale
Resolution:	8bit		
Notes:	The electrical devices controlled by these analogue outputs must be powered separately with another transformer (do not use the same secondary of the controller's power) in order to prevent the outputs from malfunctioning or being damaged.		

Connection of actuator 0÷10V, 4÷20mA

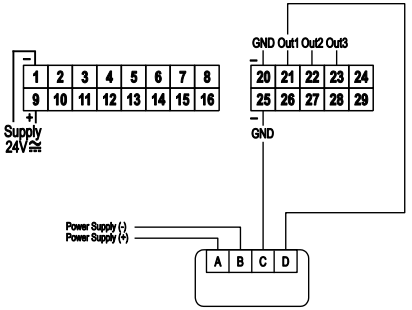
IPG208D

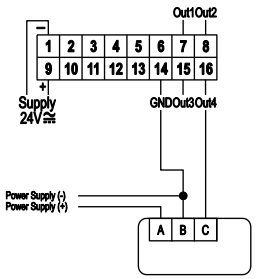


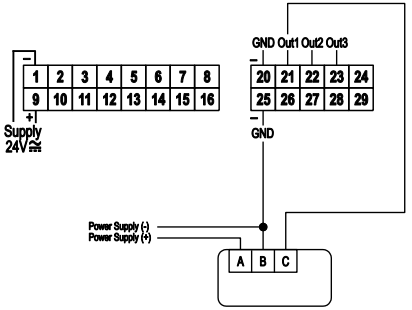
IPG215D

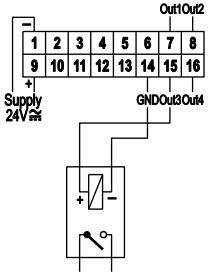


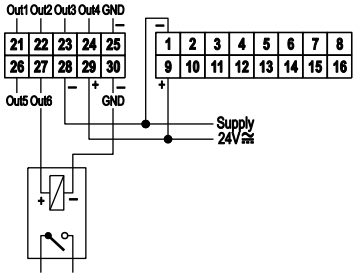
IPX206D

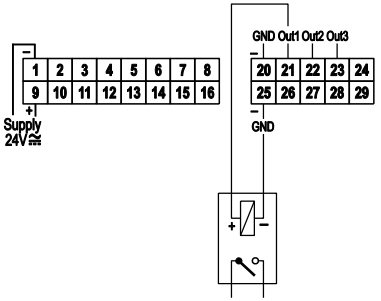



Out1 Out2
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
Supply
24V
GND Out3 Out4
Power Supply (-)
Power Supply (+)
A B C


GND Out1 Out2 Out3
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
20 21 22 23 24
25 26 27 28 29
Supply
24V
GND
Power Supply (-)
Power Supply (+)
A B C


Out1 Out2
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
Supply
24V
GND Out3 Out4


Out1 Out2 Out3 Out4 GND
21 22 23 24 25
26 27 28 29 30
Out5 Out6
GND
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
Supply
24V


GND Out1 Out2 Out3
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
20 21 22 23 24
25 26 27 28 29
Supply
24V
GND

3.8 Connection Of Digital Outputs

	IPG208D	IPG215D	IPX206D
Type:	Relays with NO contacts		
Number of outputs:	8	15	6
Rating	5A(250Vac) SPST 5(2)A	UL: Pilot duty (2A,5A inrush, 24Vac/Vdc, class 2)	
Notes:	Verify the capacity of the output used. There is double insulation between the digital outputs and the low voltage of the rest of the circuit. Do not use different voltages for the various groups of relays nor within each group.		

Some contactors may produce very high electric stresses on the contacts of relays used in the board.

It is recommended to carefully check the technical documentation of contactors and comply with the prescriptions herein contained. Check for the need to use devices to suppress disturbances or over voltage generated by the contactor to protect the contacts of relays used in the board.

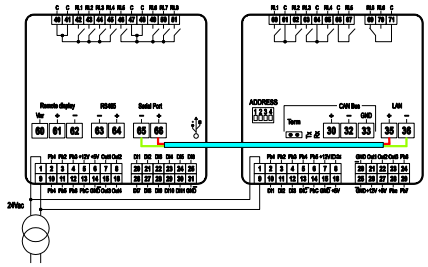
3.9 Connection Of Expansions

The possible type of connection is dictated by the type of hardware.

For units with IPG208D board refer to the indications in the chapter concerning the LAN connection, whereas for machines with IPG215D control unit refer to the CANbus Network.

3.9.1 LAN Network

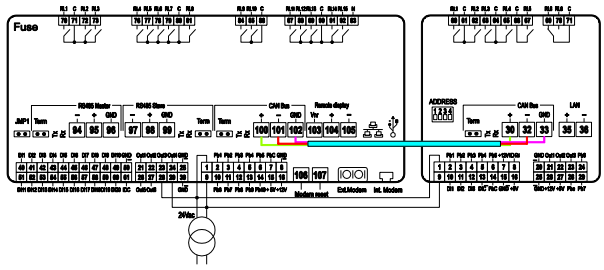
ADR: 5



3.9.2 CANBus Network

The pictures below show the possible hardware configurations.

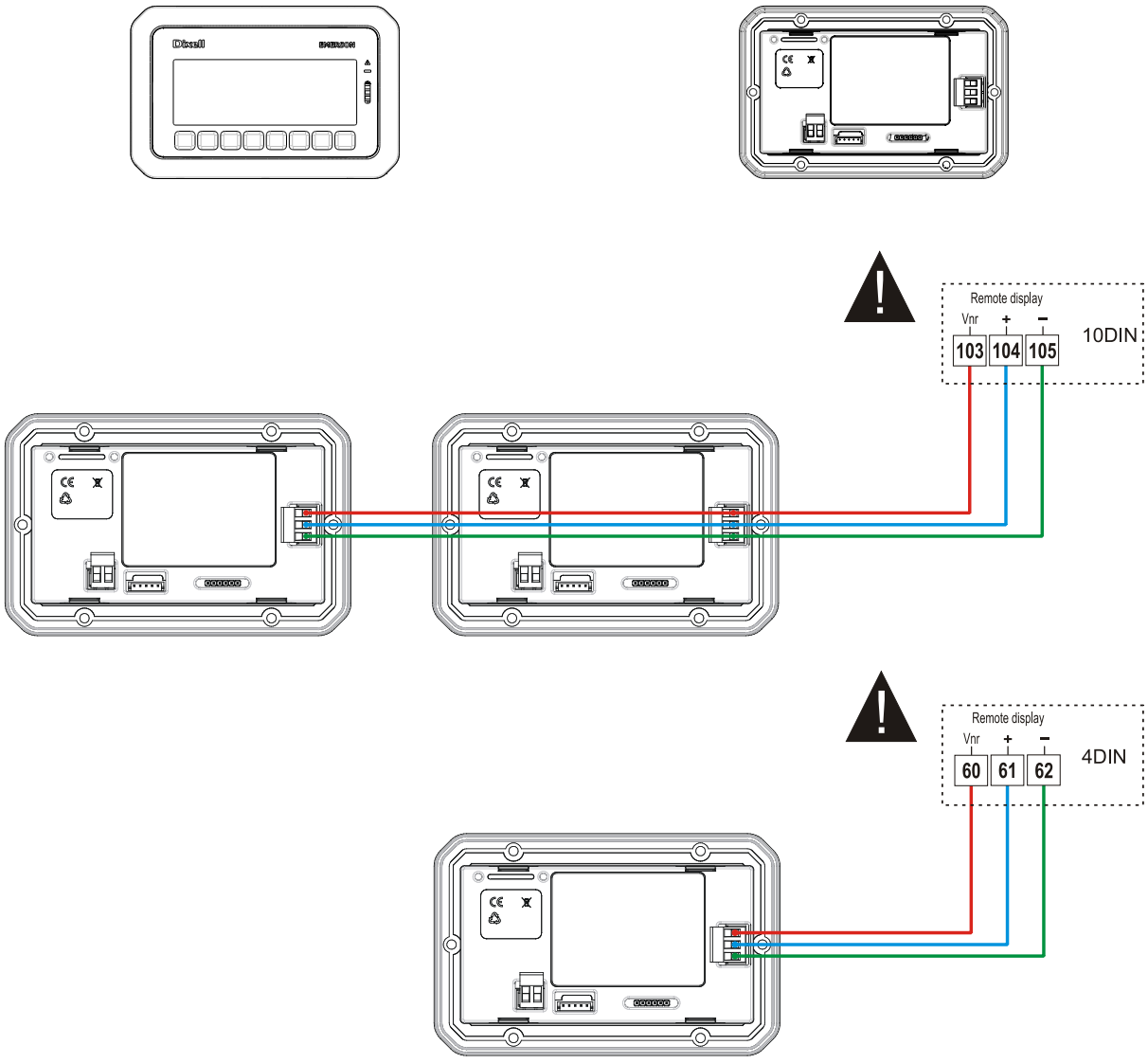
ADR: 5



3.10 Display Connection

The application allows to connect up to two control keyboards (hardware 10DIN); in case of 4DIN hardware the software can manage only one display.

For all models, connection between iPG controller and keyboard uses a BELDEN 8772 type cable (3xAWG20) and the maximum distance between the controller and the keyboard should not exceed 50mt for 4DIN controller and 100mt for 10DIN.



The polarity of the connections should be carefully complied with as any errors might damage the device.

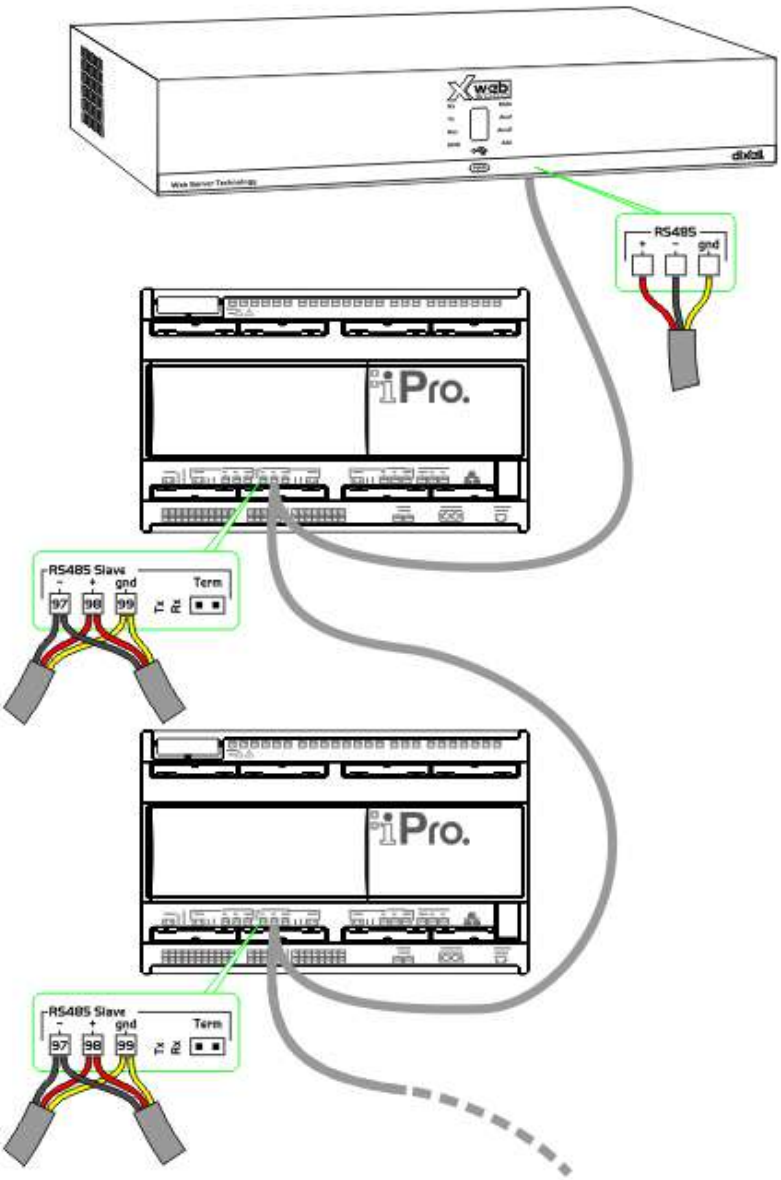
3.11 RS485 Connection

The serial cable may be 2-wire plus shielding, with a minimum section of 0.5mm^2 (e.g. BELDEN 8772).

Important:

- Use a suitable cable, e.g. Belden 8772;
- Connect a 120 ohm 1/4W terminating resistor between + and – of RS485 terminals of the last instrument in the line (if the last device is an iPRO use the terminating jumper on the RS485 slave port);
- GND is not connected to the earth or the instrument power supply;
- Do not set up any branches on the line.
- The serial cable must be kept away from power cables.
- Keep the serial cable away from any source of electromagnetic interference.

3.11.1 SLAVE Port Connection



Follow the diagram of the device used for the numbering.

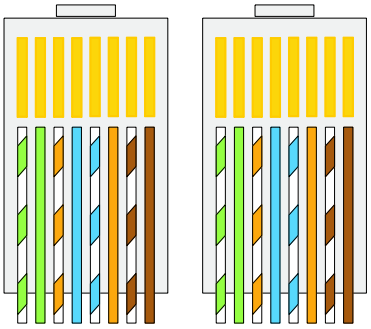
3.12 Ethernet Connection

The connection to the local network should be managed by qualified personnel and the network administrator who must primarily assign an IP address to the unit (an example may be http://192.168.000.111).

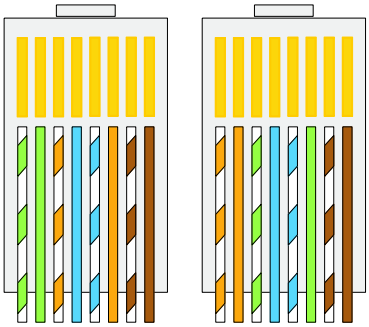
The iPRO uses an RJ45 connector for Ethernet 100BaseT 100Mb/s.

To connect the board to a hub or a switch use a patch cable, while for point-to-point connection between controller and PC use a cross cable.

Ethernet cable connectors



Cross cable connectors



3.12.1 Direct PC Connection

With this type of connection it is possible to connect directly your personal computer to the programmable iPRO controller. In that case, a standard "Crossover Cable" is required. The PC is only able to communicate with the iPRO if the network settings of the two devices are aligned; this means that the PC and iPRO must work in the same network.

The procedure is as follows:

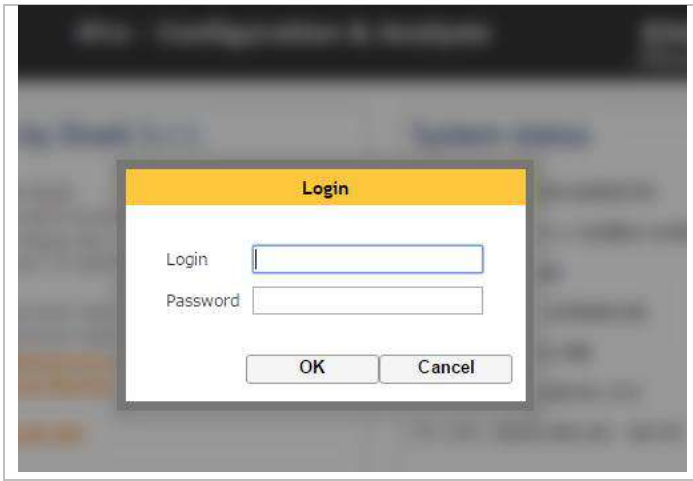
- Disconnect the computer from your company's data network and connect the PC to the iPRO with the crossover cable.
- The personal computer must be set on the same network as the iPRO. Accordingly, change the PC settings as follows:
  - IP: 192.168.000.200(1)
  - Subnet mask: 255.255.255.000
  - pre-set Gateway: leave blank
  - pre-set DNS Server: leave blank
  - Alternative DNS Server: leave blank

(1) Or in any case an address other than 192.168.0.250

Start the browser and enter the IP address of the iPRO in the address bar http://192.168.0.250 (if default IP).

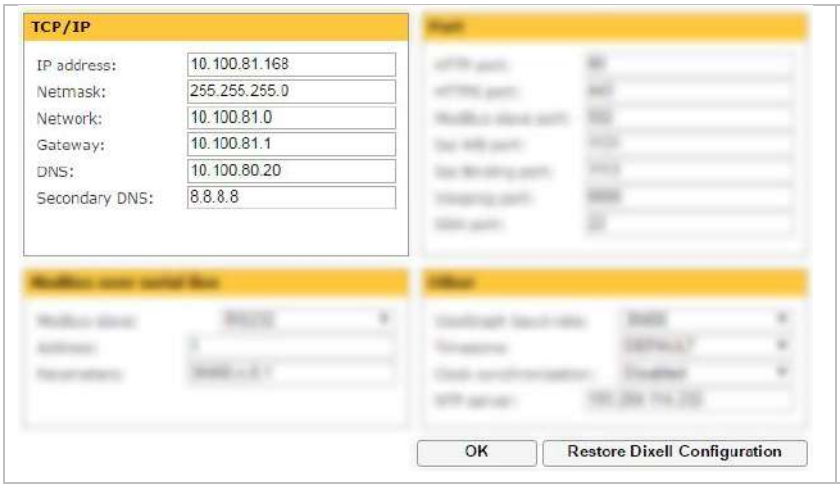
You must log in to be able to change the settings.

Click Login:

	Login: **admin** Password: **Dixell** Click OK to confirm

The instrument's IP address may be changed if necessary.

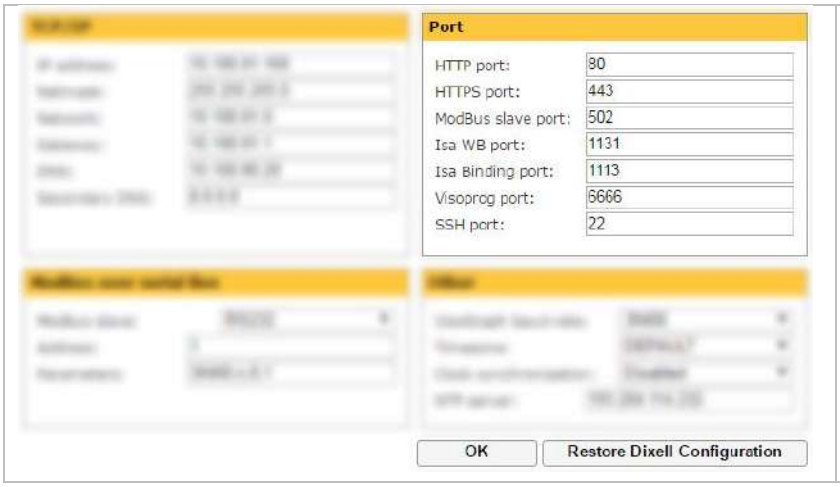
Click on Configure in the web page's side menu, all the network data may be set in the TCP/IP section of the page displayed:



After changing the configuration, press OK to confirm.

The device must be restarted after changing the TCP/IP data.

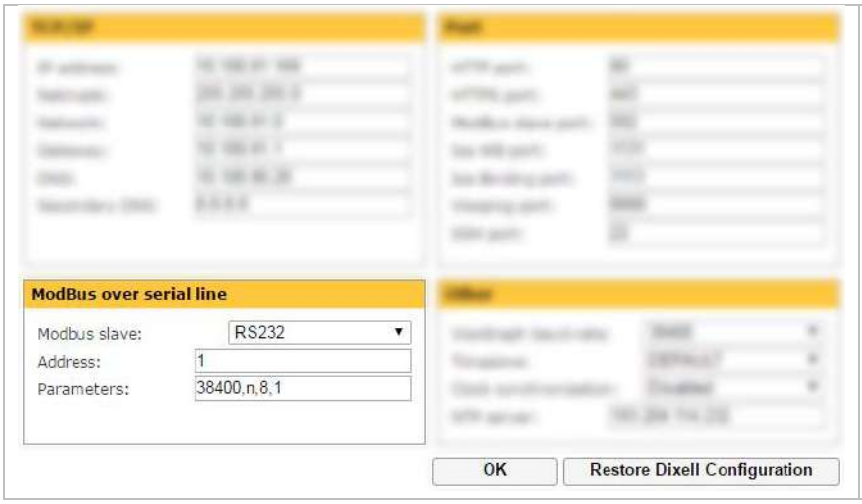
In the same page, it is also possible to change the ports for the various active services in the board;



After changing the configuration, press OK to confirm.

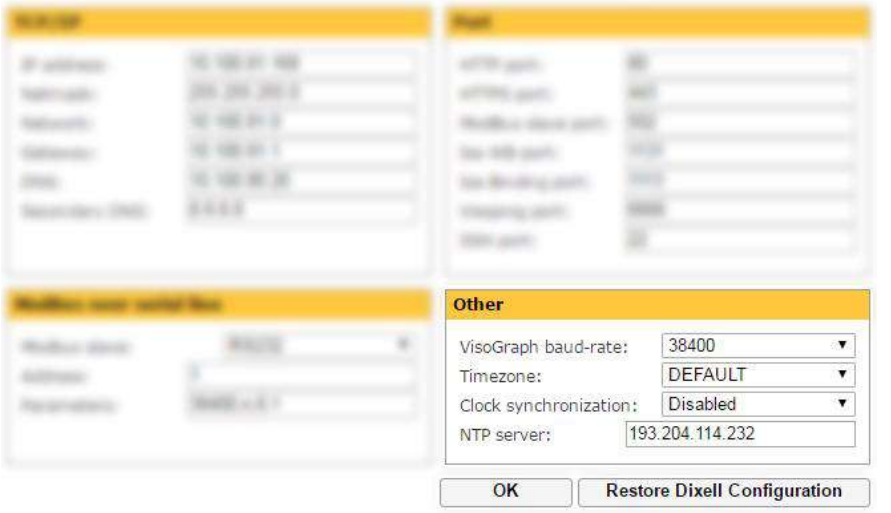
Serial communication ports may also be enabled in configure.

In the Dry Cooler application this option is not required as the ports are already configured by the software:



After changing the configuration, press OK to confirm.

The last option in the “configure” tab is the possibility to synchronise the board’s internal clock with an NTP server deciding the time zone and synchronisation frequency.

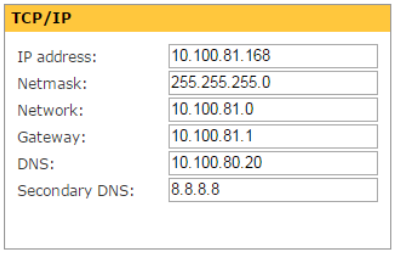


After changing the configuration, press OK to confirm.

Clock synchronisation/setting may entail automatic board reboot. Perform clock synchronisation operations with all regulations disabled and loads off.

3.12.2 Connection To A Network

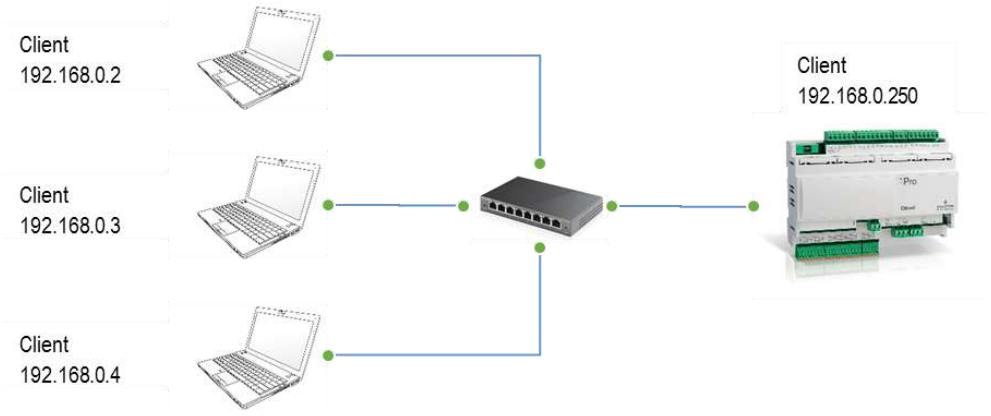
The Intranet or Ethernet connection should be initially managed by the network administrator, who must assign a free IP address to reach the board and provide the other network data required for correct configuration.



After receiving the address from your network administrator, the iPRO must be set with this number (through the procedure described in chapter 3.12.1).

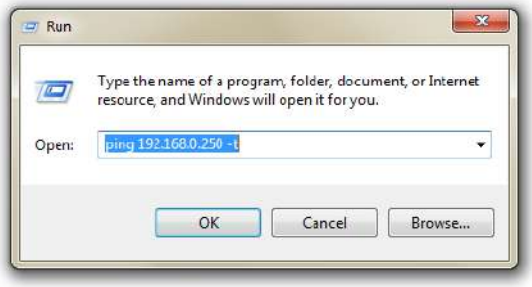
After setting the correct network parameters, connect the board to the network using a standard RJ45 network cable

The Intranet connection makes it possible to interact with iPRO from all client PCs.



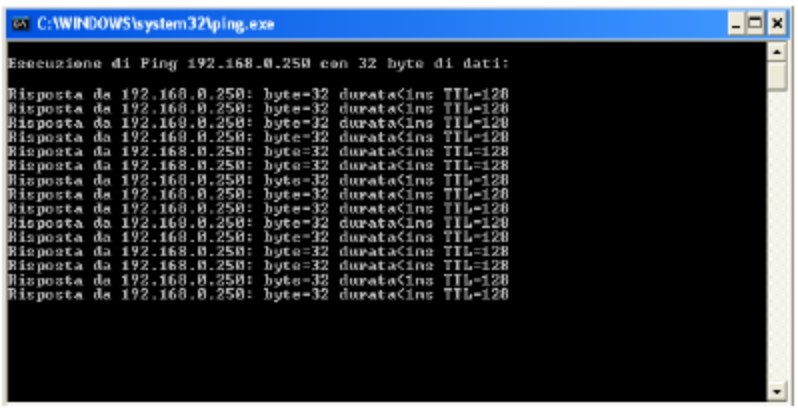
To check whether a board is correctly configured and connected to the network, just ping its address as follows:

- Start the command prompt from a networked PC:
  - Access the “start” menu;
  - Click “run” (or “execute”);
- Enter “ping 192.168.0.250 -t” in the box below.



- Click ok.

If the connection is OK the following will then be displayed:



4. Software Installation Via USB Drive

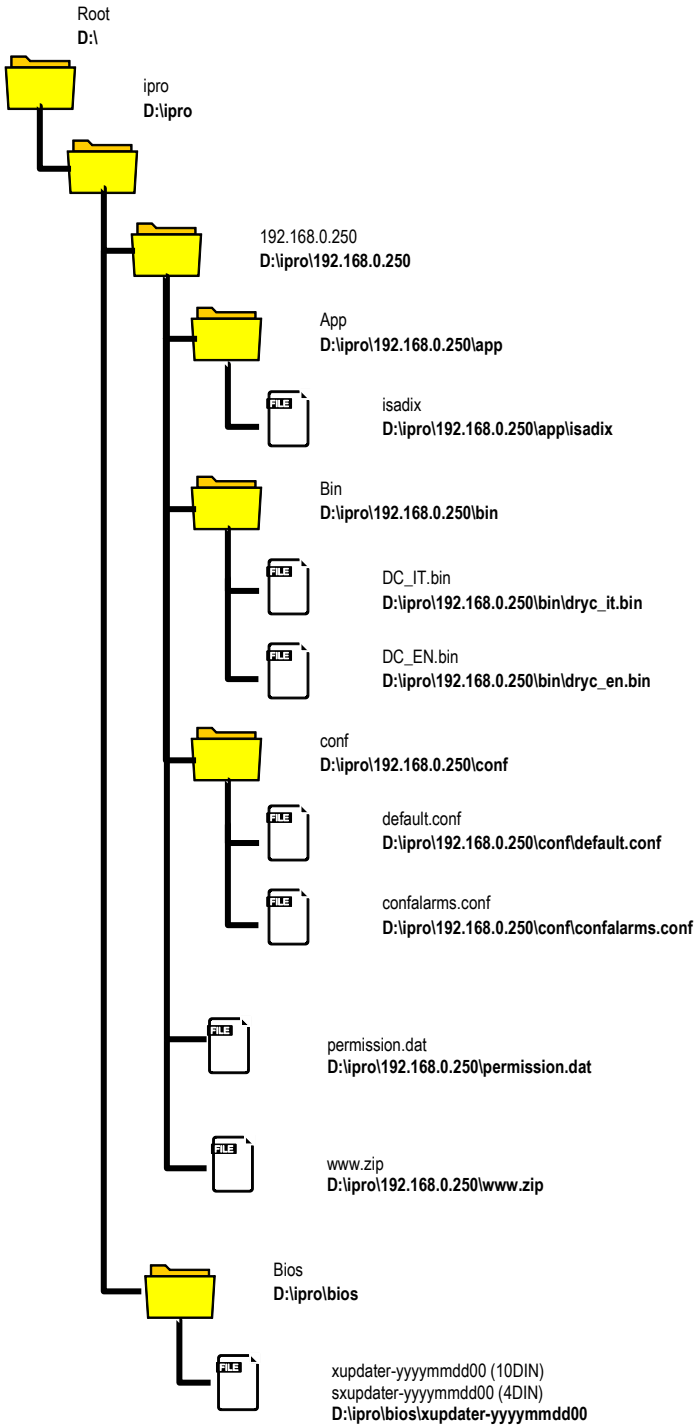
In case of need the application may be updated via a properly prepared USB Drive. In case of updating the bios, the entire procedure may last a few minutes.

During programming all machine functions are disabled.

- *Do not power off the controller during reprogramming;*
- *To prevent accidental start-up, isolate the programmed board from loads*
- *Use the compatible BIOS version according to instructions reported at the beginning of the manual*

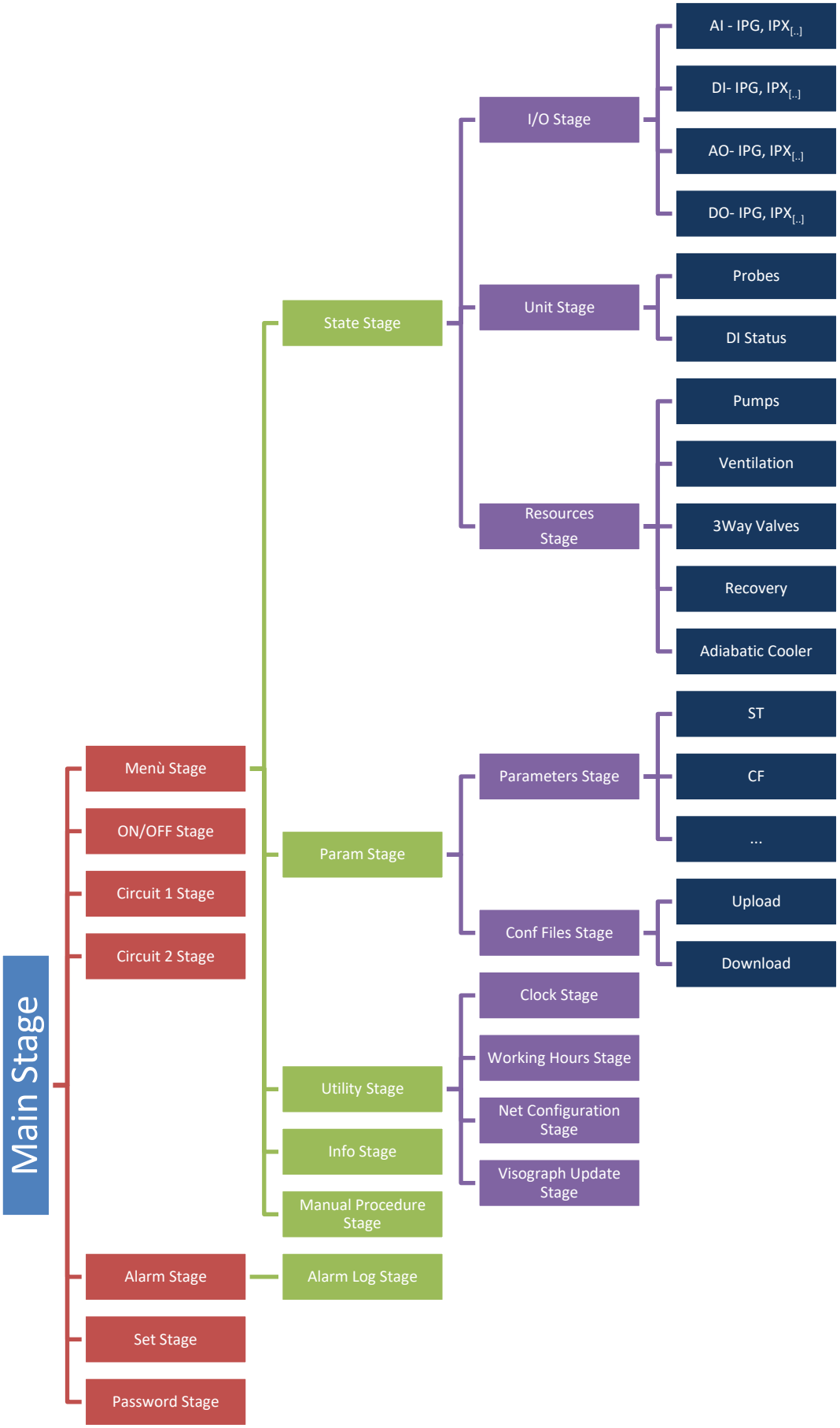
4.1.1 Structure of the USB Drive

The USB Drive for board programming/updating must be structured as follows:



The folders described above require the board to be programmed to have a default IP address.
If the IP is different rename the folder "192.168.0.250" with the address of the board to be programmed.
In this way it is also possible to have in the same USB drive different programs/configurations for different IP addresses.

5. User Interface



5.1 Keys

Listed below are the main keys used in the user interface:

Key	Function
MENU'	Enables access to the stage of menus available for the unit.
	Enables or disables.
C1	Enables access to the operation display menu of circuit 1
C2	Enables access to the operation display menu of circuit 2
SET	Enables access to the setpoint menu from the home screen.
ALARM	Enables access to the alarm menu.
AUX	Enables access to the auxiliary functions menu.
	Enables access to the unit's functions through LOG with password.
ENTER	Confirms the selection
EXIT	Exits from the menu shown to the previous page or to the main screen.
	Increase the value.
	Decrease the value.
HISTORY	Enters the alarm log menu.
	Used for moving to the previous stage.
	Used for moving to the next stage.
	Scrolls up.
	Scrolls down.
RESET	Manually resets the alarm displayed if the reset conditions enable it.
RESET ALL	Resets all active alarms that have been cleared and can be reset manually.
USB	Downloads the alarms LOG onto a USB key connected to iPRO
PUMP	Enables access to the management menu of the modulating pumps.
3WAY	Enables access to the management menu of the 3-way valves.
VENT	Enables access to the management menu of the ventilation set points.
ADB	Enables access to the management menu of the adiabatic cooler activation set point.
REC	Enables access to the management menu of the heat recovery unit set point.

5.2 Icons

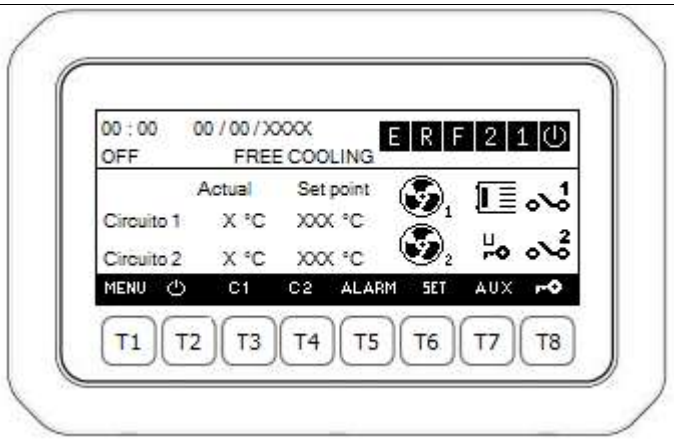
The following describes the meaning of the icons in the user interface:

Icon	Meaning
	BMS abilitato, funzionamento secondo gestione BMS.
	Unit ON
	Unit OFF
	The user has logged and can navigate the HMI with the credentials provided by the password.
	The maintanance operator has logged and can navigate the HMI with the credentials provided by the password.
	The manufacturer has logged and can navigate the HMI with the credentials provided by the password.
	Enables the functioning by the digital contact – ON by digital contact.
	Ventilation Circuit 1 ON – Main stage.
	Ventilation Circuit 2 ON – Main stage.
	Adiabatic Cooler enabled (flashing icon means Adiabatic Cooler is enabled but not active).
	Heat recovery system enabled (flashing icon means Heat Recovery is enabled but not active).
	Free Cooling enabled (flashing icon means conditions aren't good for Free Cooling).
	Circuit 1 enabled.
	Circuit 2 enabled.
	Digital contact enabled to start circuit 1 – Contact OFF
	Digital contact enabled to start circuit 2 – Contact OFF
	Digital contact enabled to start circuit 1 – Contact ON
	Digital contact enabled to start circuit 2 – Contact ON
	ACTIVE Resource / Digital Contact.
	NOT ACTIVE Resource / Digital Contact.
	ACTIVE Regulation step (n= step number).
	NOT ACTIVE Regulation step (n= step number).
	Percentage of the active modulating resource (each bar is equal to 10%).
	STATE menù.
	PARAMETER menù.
	UTILITY menù.
	INFO menù.
	MANMODE menù.
	INPUT – OUTPUT menù.

Icon	Meaning
	Pump 1 – Display of operating data.
	Pump 1 – Display of operating data.
	Ventilation – Display of operating data.
	Recovery unit – Display of operating data.
	Adiabatic cooler – Display of operating data.
	Active alarm.
	NOT RESETTABLE Active allarm (allarm condition still active).
	UNIT menù.
	RESOURCES menù.
	Digital input enabled for Reduced fans speed.
	Ventilation management by External signal.
	3 way valve forced value.

5.3 Main Menu

MAIN



From the main menu you can enter the submenus:

T1 Key (MENU):

You enter the full functions menu from which you can program the unit and control the functioning of each resource.

T2 Key (ON/OFF):

You enter to the unit's on/off screen. From this screen you can also change the functioning/mode of the unit.

T3 Key (C1):

You enter the display menu regarding operation of circuit 1.

T4 Key (C2):

You enter the display menu regarding operation of circuit 2, if configured.

T5 Key (Alarm):

You enter the alarm menu to view active alarms and the alarms occurred.

T6 Key (SET):

You enter the set point menu for the display and setting of the unit.

T7 Key (AUX):

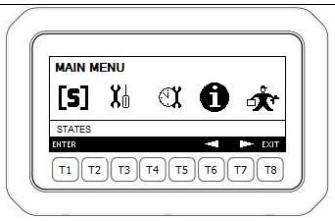
You enter the menu dedicated to the unit's auxiliary functions, if parameterised.

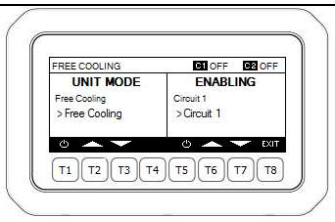
T8 Key (LOG):

You enter the LOG menu from which, by providing a password, you can have the credentials to edit considerable parameters for the unit.

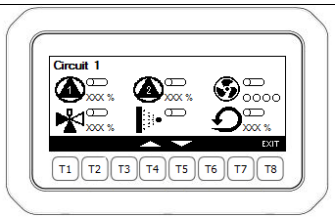
SUBMENUS

MENU

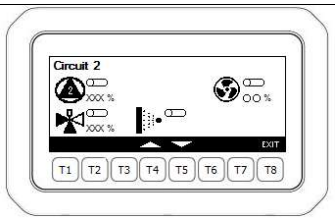




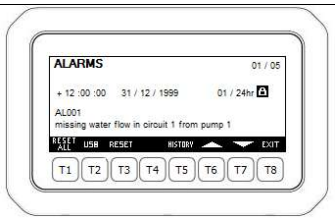
C1



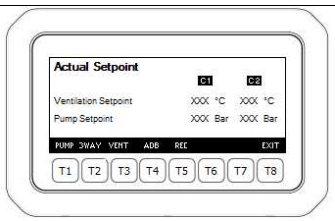
C2



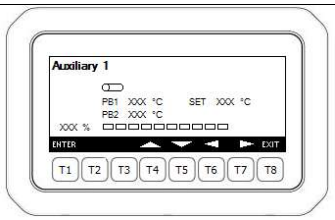
ALARM

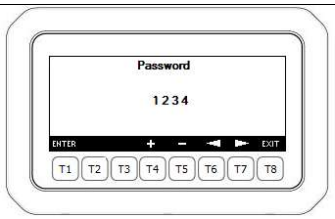


SET



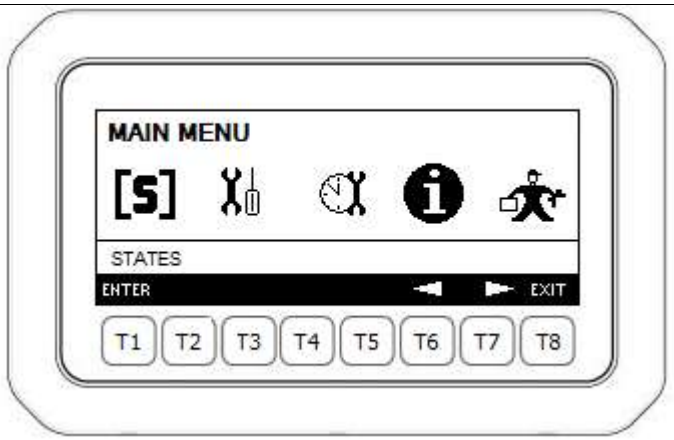
AUX





5.4 1st Level Submenu

5.4.1 Menu Stage



From the MENU you can enter the operating submenus.

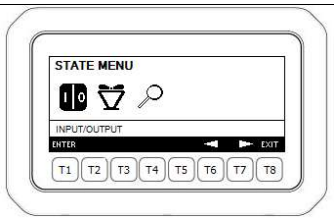
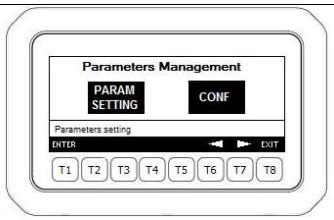
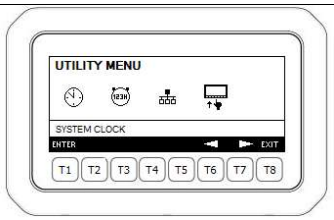
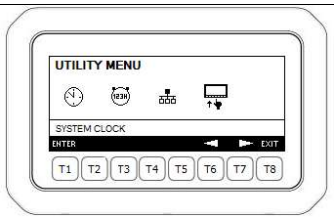
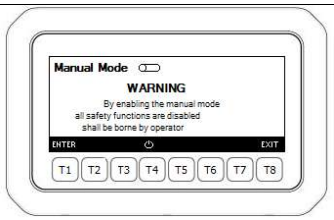
Scrolling left or right you can select 5 different menus, to confirm entry to the selected menu press ENTER.

T1 Key (ENTER):

You confirm entry to the selected menu.

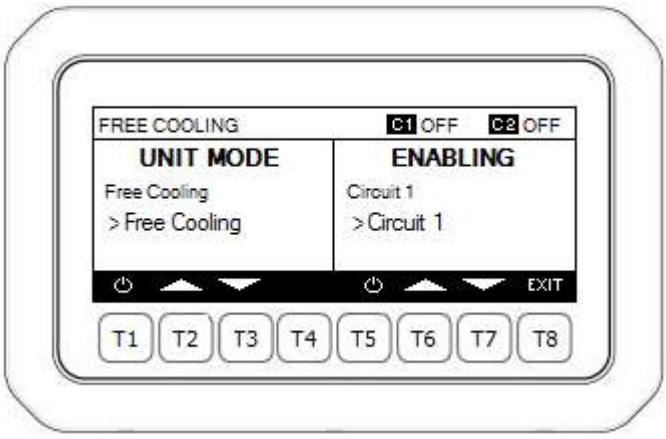
T8 Key (EXIT):

You return to the main screen.

MAIN	SUBMENU
STATE	
PARAMETERS	
UTILITY	
INFO	
MANMODE	

5.4.2 OnOff Stage

MAIN



From the START mask, it is possible to select the operating mode that must be set on the unit, as well as switch each circuit on and off.

T1 Key (ON mode):

You confirm the operating mode selected for the unit.

T5 Key (ON Circuit):

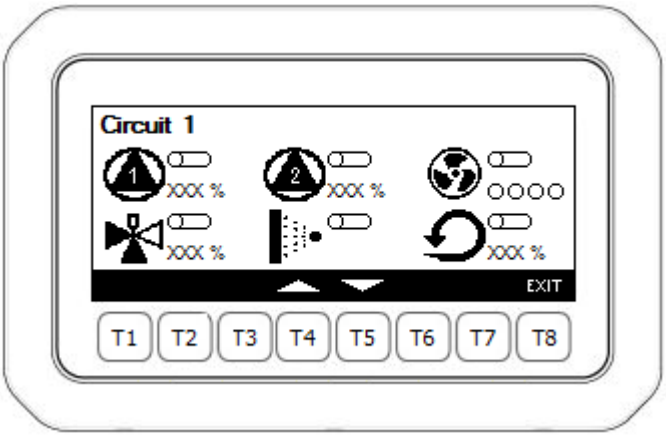
Enables or disables operation of the selected circuit.

T8 Key (EXIT):

You return to the main screen.

5.4.3 Circuit 1 Stage

MAIN



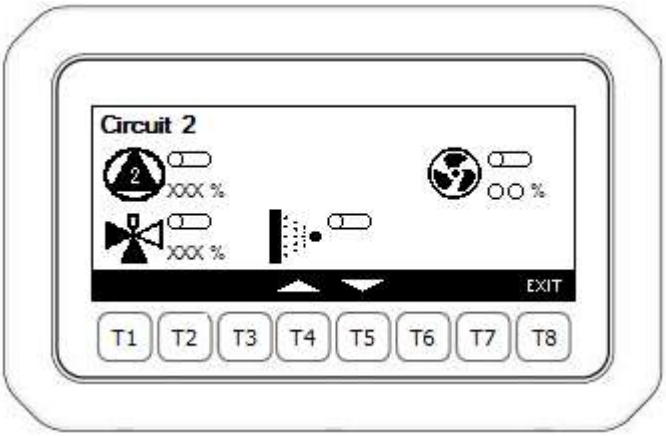
From mask C1 (circuit 1), it is possible to view the main operating parameters of the resources dedicated to circuit 1, with their enabling and any modulating value.

T8 Key (EXIT):

You return to the main screen.

5.4.4 Circuit 2 Stage

MAIN

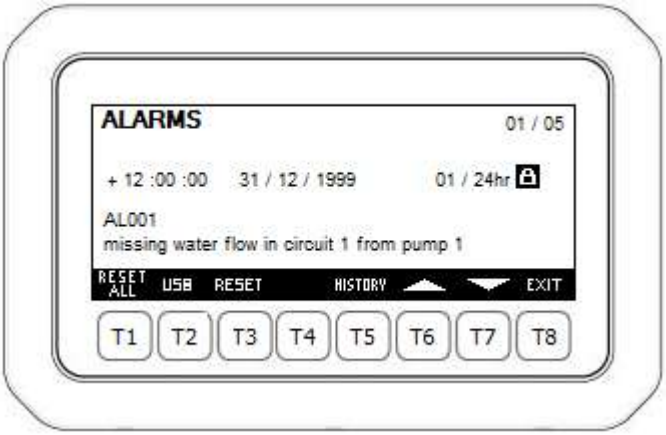


From mask C2 (circuit 2), it is possible to view the main operating parameters of the resources dedicated to circuit 2, with their enabling and any modulating value.

T8 Key (EXIT):

You return to the main screen.

Alarm Stage

MENU	SUBMENU
	HISTORY 

From the ALARM menu you can view the alarms in progress and reset them if the conditions allow it. You can also enter the alarm log and eventually save/download it.

T1 Key (RESET ALL):

You reset all the active alarms with trigger condition cleared and that can be manually reset.

T2 Key (USB):

You download the alarms on a USB pen connected to the iPRO and available for saving.

T3 Key (RESET):

You manually reset the alarm displayed, if the reset conditions allow it (trigger condition cleared).

T5 Key (HISTORY):

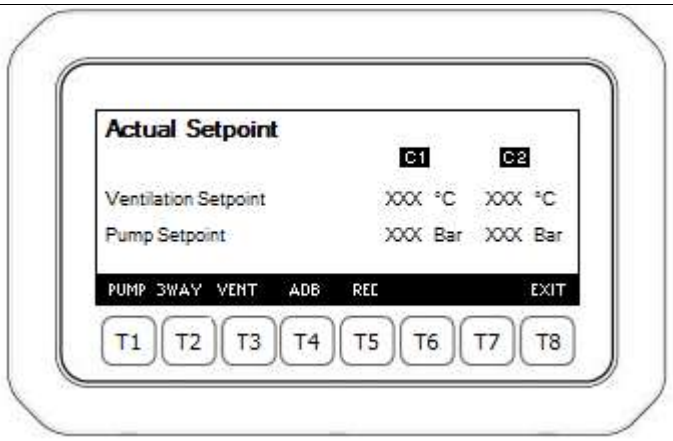
You enter the alarm log.

T8 Key (EXIT):

You return to the main screen.

5.4.5 Active Setpoint Stage

MAIN



From the SETPOINT menu you can view all the unit's operating setpoints. You also enter the specific menus to change their values.

T1 Key (PUMP):

You enter the pumps setpoint control menu.

T2 Key (3WAY):

You enter the 3Way valves setpoint control menu.

T3 Key (VENT):

You enter the ventilation setpoint control menu.

T4 Key (ADB):

You enter the adiabatic cooler activation setpoint control menu.

T5 Key (REC):

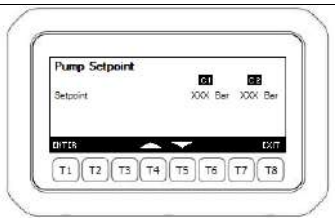
You enter the heat recovery system setpoint control menu.

T8 Key (EXIT):

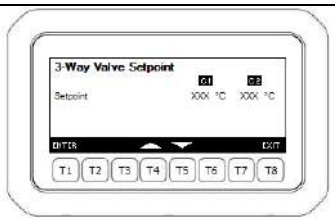
You return to the main screen.

SUBMENU

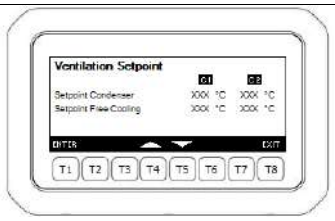
PUMP



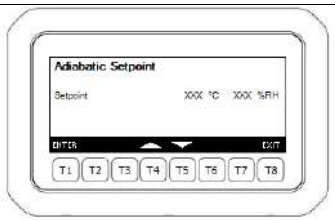
3WAY



VENT



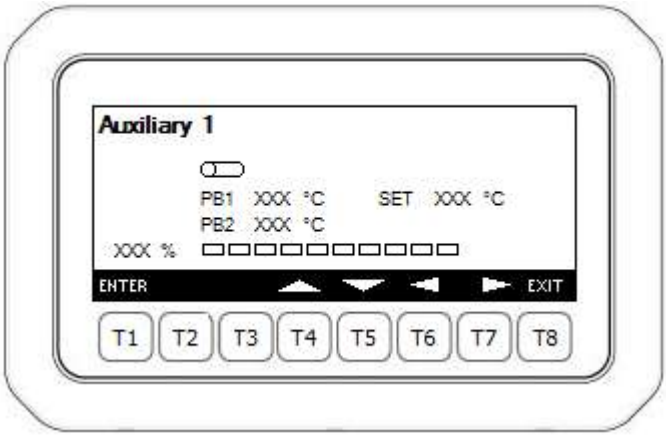
ADB



REC

5.4.6 Auxiliary Functions Stage (AUX)

MAIN



From the AUX mask, it is possible to view operation of the 4 auxiliary functions available in the application. It is also possible to edit their operating set points from this menu.

T3 Key (ENTER):

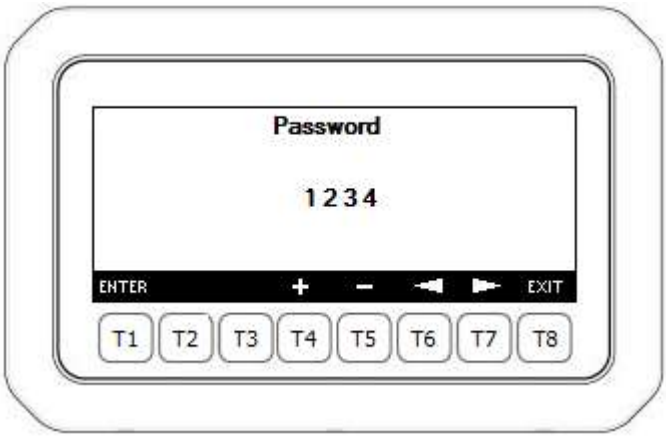
You confirm selection.

T8 Key (EXIT):

You return to the main screen.

5.4.7 Password Stage

MAIN



From the LOG screen you can enter the password required to access the system with the log-in information for the user, service or manufacturer.

T1 Key (ENTER):

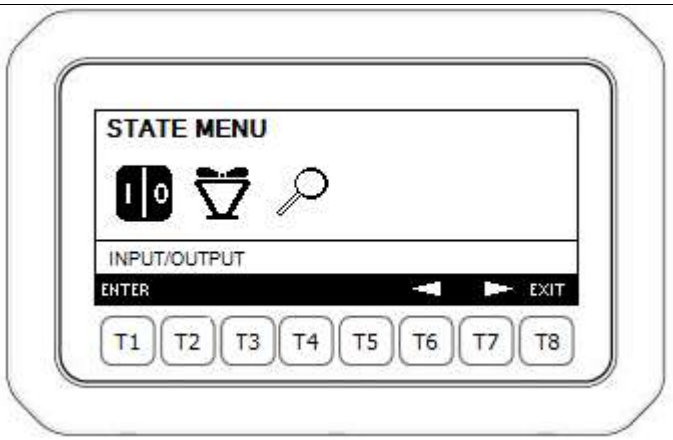
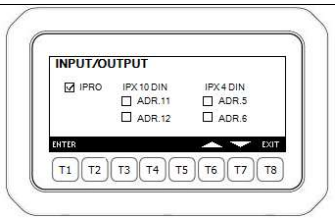
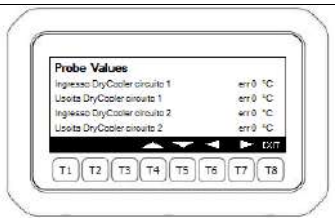
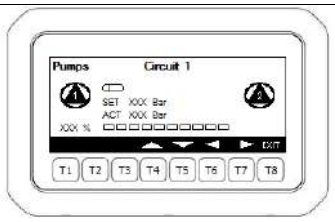
You confirm the password's value set.

T8 Key (EXIT):

You return to the main screen.

5.5 2nd level Main Submenus

5.5.1 State Stage

MAIN	SUBMENUS	
	I/O	
	UNIT	
	RESOURCES	

From the STATE menu you can enter the 3 additional submenus, respectively dedicated to:

I/O – For the display of the status of the unit's inputs/outputs.

UNIT – For the display of the probes and digital inputs according to the function assigned.

RESOURCES – For the status and regulation display of each configured resource.

T1 Key (ENTER):

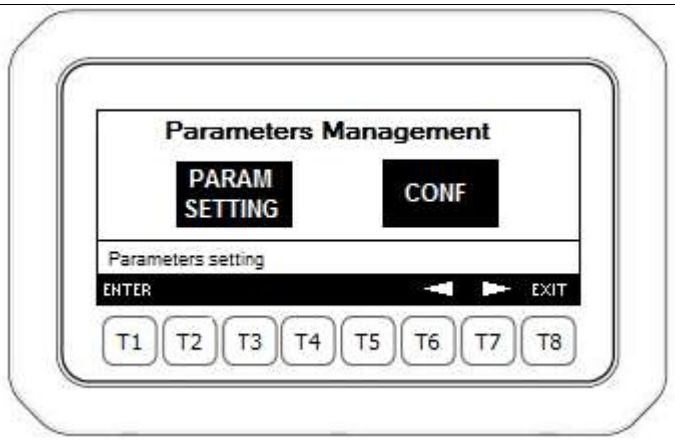
You confirm the entry to the selected menu.

T8 Key (EXIT):

You return to the main screen.

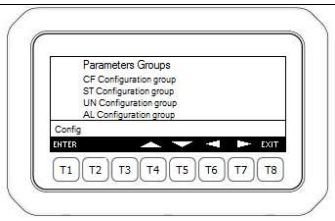
5.5.2 Parameters Stage

MAIN

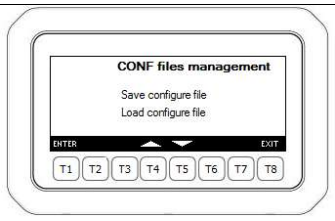


SUBMENU

PARAM SETTING



CONF



From the PARAMETERS menu you can enter the two menus dedicated to the unit's configuration, respectively dedicated to:

PARAM SETTING – For viewing and changing the unit's parameters.

CONF – For the management of the configuration files.

Both menus are accessible only if you entered the LOG with the correct password, respectively for User, Service or Factory.

T3 Key (SET):

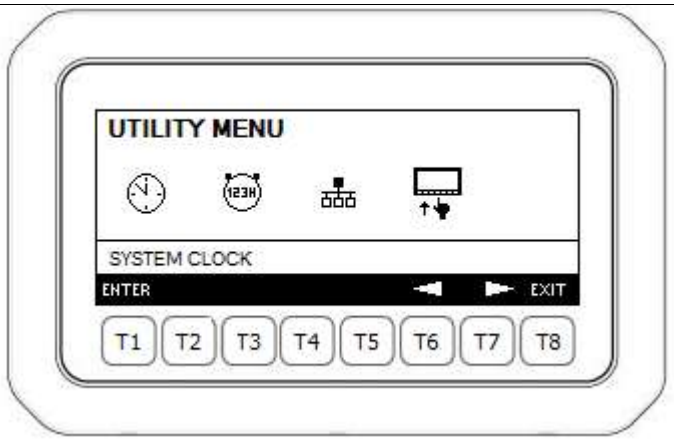
You confirm the entry to the selected menu.

T8 Key (EXIT):

You return to the main screen.

5.5.3 Utility Stage

MAIN



From the UTILITY you can enter a series of submenus specifically dedicated to:

CLOCK – For date and time setup.

HOURS WORKED – To view the activity status of each resource.

COMMUNICATION – To view and/or modify the Ipro communication addresses.

VISOGRAPH UPDATE – To update the keyboard when available/necessary.

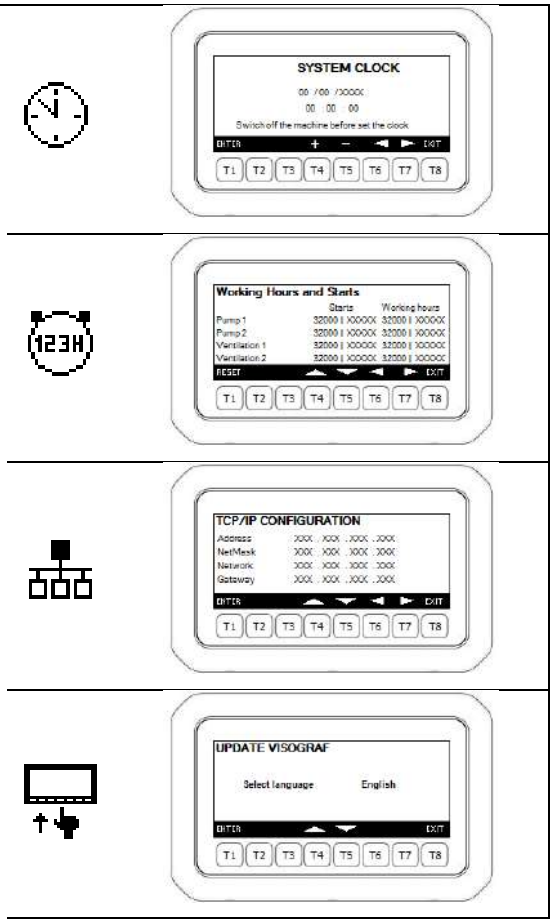
T1 Key (ENTER):

You confirm the entry to the selected menu.

T8 Key (EXIT):

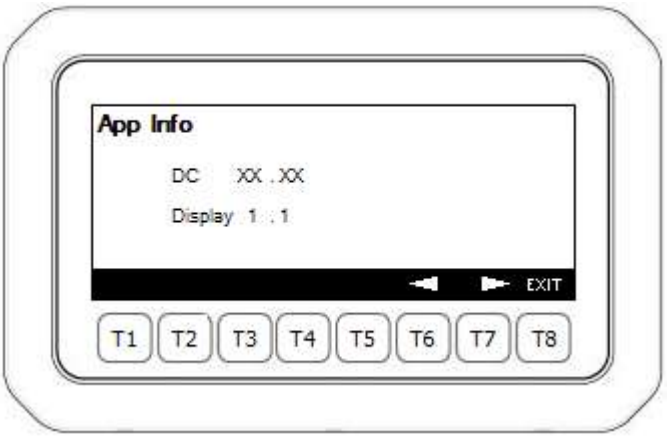
You return to the main screen.

SUBMENUS



5.5.4 Info Stage

MAIN



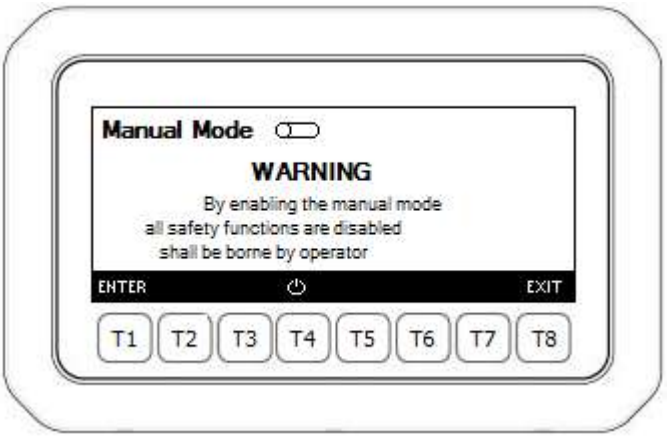
From the INFO menu you can recover information about the application software and the graphic interface in use.

T8 Key (EXIT):

You return to the main screen.

5.5.5 Manual Mode Stage

MAIN



The MANUAL MODE menu is dedicated to the manufacturer and/or service to test the machines single functions forcing the output values to the unit resources.

To enter the MANUAL MODE menu you must LOG with the correct log-in information.

Therefore, activated the manual mode, it's the operator's responsibility to do the activations of the different AHU resources in safe conditions for man and machine.

T1 Key (ENTER):

You enable or disable the function selected.

T4 Key (ON/OFF):

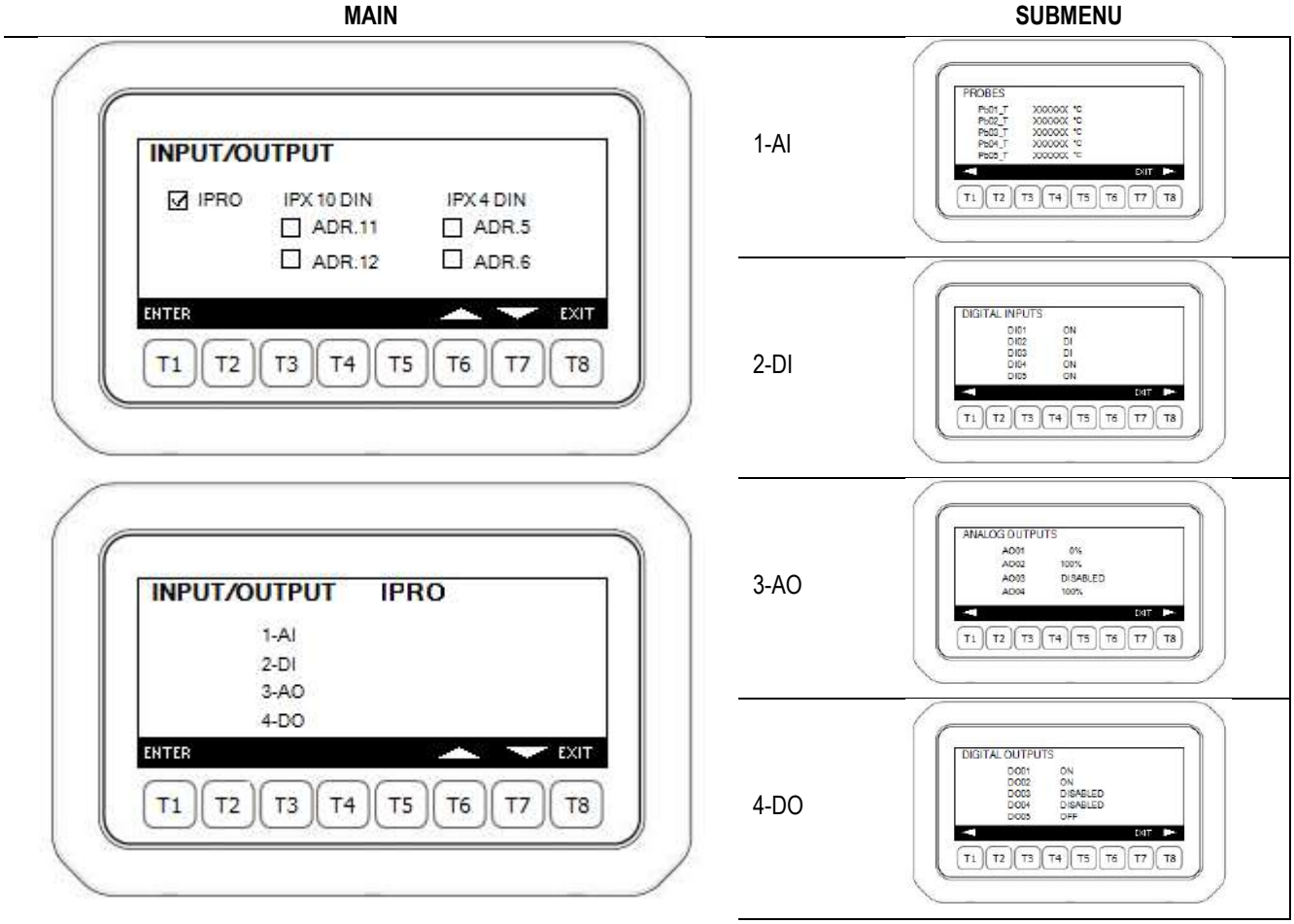
You enable or disable access to manual mode.

T8 Key (EXIT):

You return to the main screen.

5.6 3rd level Main Submenus

5.6.1 I/O Values Stage



Entered the I/O menu, is now proposed the hardware selection for which is requested the view of the inputs/outputs.

After selecting the desired hardware device (among those installed), confirm with the ENTER key and enter the menu to select the type of input/output you want to view.

Even in this case, selected the I/O type required, to confirm press ENTER.

T1 Key (ENTER):

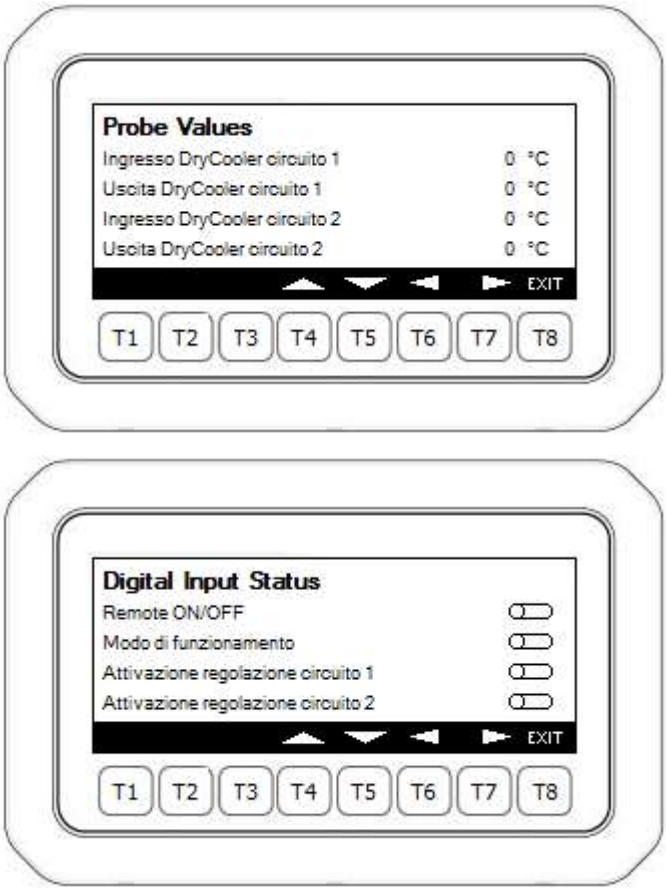
You confirm the selected menu.

T8 Key (EXIT):

You return to the main screen.

5.6.2 Unit Stage

MAIN



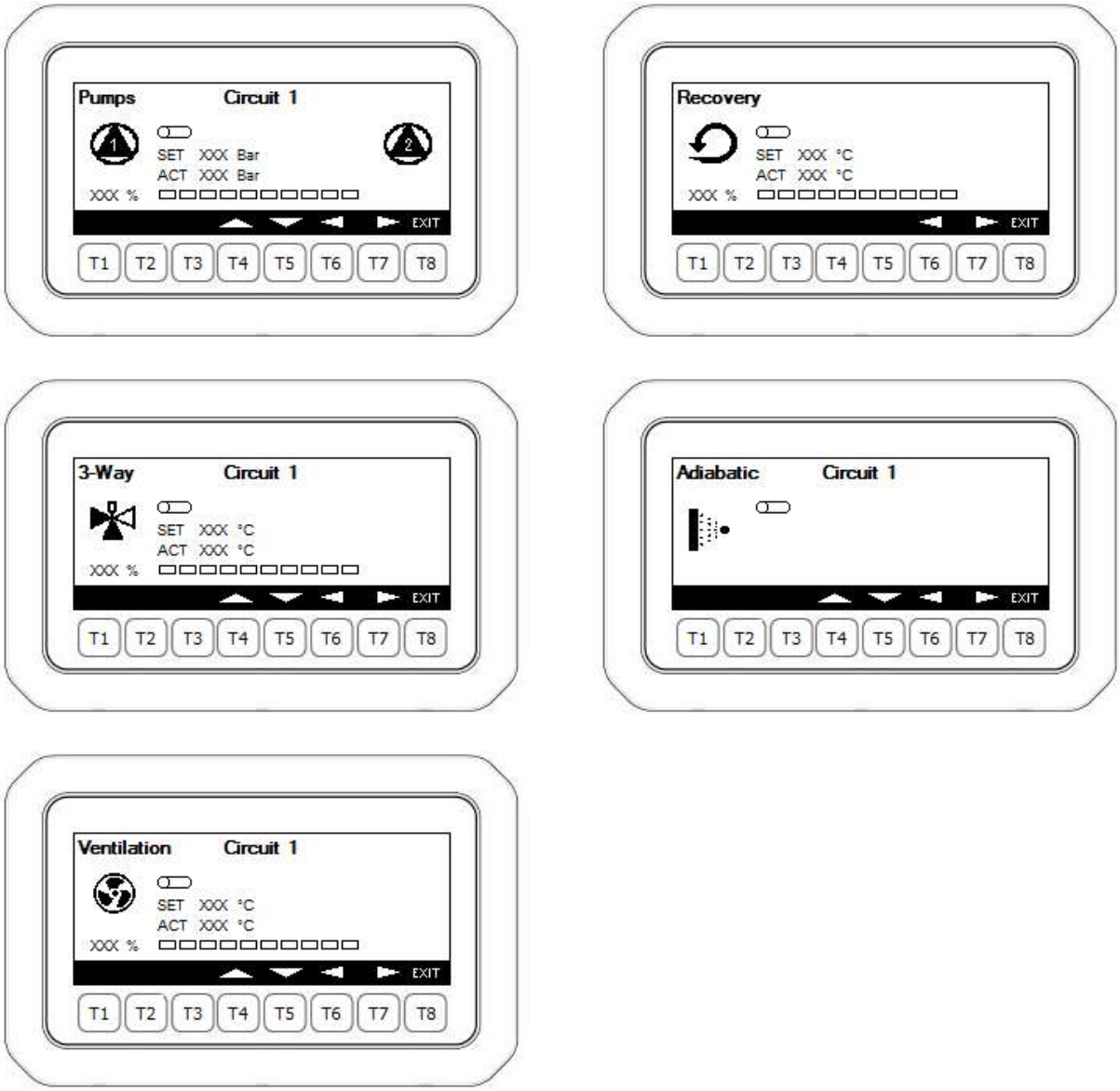
From the UNIT menu you can view the values read by the configured probes and the state of the digital inputs used. The values show the reading of the function and not of the dedicated physical input.

T8 Key (EXIT):

You return to the previous screen.

5.6.3 Resources Stage

MAIN



From the RESOURCE menu you can view the status of all the resources in use, divided into the main categories:

PUMPS – This stage displays all information regarding use of the pumps, divided according to the number of circuits parameterised.

3-WAY VALVE – This stage displays all information regarding operation of the 3-way valves, divided according to the number of circuits parameterised.

VENTILATION – This stage displays all information the fans configured, divided according to the number of circuits parameterised.

RECOVERY – This stage displays all information regarding heat recovery, if parameterised.

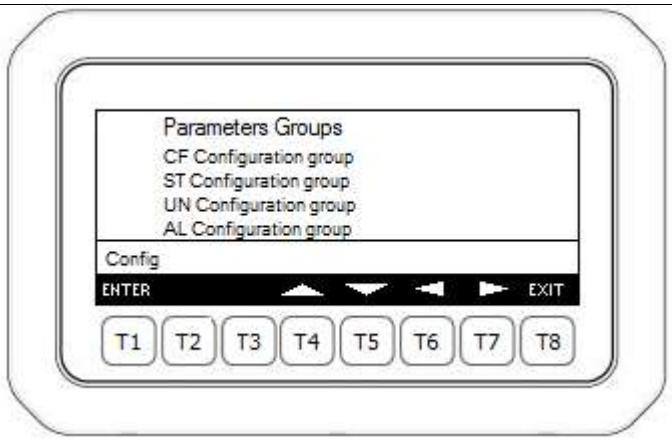
ADIABATIC – This stage displays all information regarding operation of the adiabatic cooler, if applicable, according to the number of circuits parameterised.

T8 Key (EXIT):

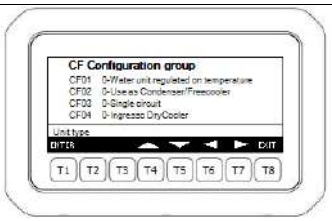
You return to the previous screen.

5.6.4 Parameter Setting Stage

MAIN **SUBMENU**



CF



From the PARAMETERS SETTINGS menu you can enter each parameter group, both to view each parameter and to modify it.

T1 Key (ENTER):

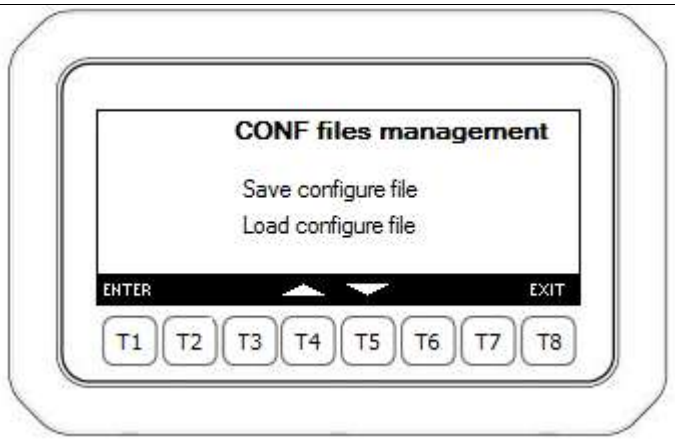
You enter the group of parameters selected.

T8 Key (EXIT):

You return to the previous screen.

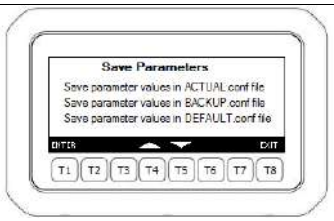
5.6.5 Conf Management Stage

MAIN

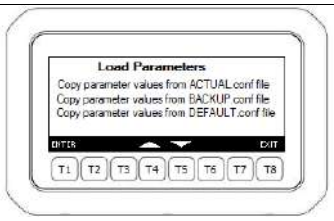


SUBMENUS

SAVE



LOAD



From the CONF FILES MANAGEMENT you can upload or download the configuration files of the machine.

SAVE – Allows you to save the current configuration of the AHU unit in a file available for future use (backup or restore the default settings).

LOAD – Allows to upload a previously saved file on the Ipro device to reset the current configuration.

Attention: Loading a configuration file overwrites the current configuration of the unit with no possibility of recovering the parameters (if not previously saved).

T1 Key (ENTER):

You confirm the selected menu.

T8 Key (EXIT):

You return to the main screen.

5.7 Configuration Files (.conf) Management

The iPro HYDRO application has 3 .con files to fully manage the parameters:

a) actual.conf

b) backup.conf

c) default.conf

While containing all the same parameters, the three files have different functions and are updated at different intervals.

By means of the keyboard, it is possible:

- Save the configuration currently used on each of the 3 files.
- Load one of the 3 files as machine parametrisation.

5.7.1 actual.conf

The actual.conf file is automatically saved when the modification occurs of one or more parameters from the keyboard (upon logout from the parameters menu) or after 20 seconds from the last writing via BMS.

Upon the first start of the application, if an actual file is present, it is deleted and overwritten by the default.conf file.

5.7.2 backup.conf

The backup.conf file is automatically saved at each hour (by updating the previous file) and contains the parameters being used by the unit.

Upon the first start, the backup.conf file is deleted and overwritten as per the rule described above.

5.7.3 default.conf

It is a default file of the unit.

It is not automatically saved, but it needs to be manually saved by the operator.

It is the file that is loaded upon the first start of the application.

5.8 Use of password in the User Interface

The user interface provides for different levels of access, protected by password, through which it is possible to access the different screens to display and/or modify the required values.

3 different levels of password are provided, which are foreseen as follows:

- Level 1 password – USER (defined from parameter **CF30**);
- Level 2 password – SERVICE (defined from parameter **CF31**);
- Level 3 password – MANUFACTURER (defined from parameter **CF32**);

Should an access protection be foreseen to the machine menu, i.e. the parameter **CF28** is on 1, for any access other than the main mask, the level 1 password (user) is requested.

Should the parameter **CF28** be on 2 for any access other than the main mask the level 2 password (service) is requested.

Should an access protection be not foreseen to the machine menu (**CF28** =0), any user can access the menu to start and stop the unit.

In this condition, the level 1 password is not needed to access the function access from the visograph keyboard; however the following access restrictions are enabled:

Parameters Stage – Only accessible if the LOGIN is made with Service or Manufacturer password;

Working Hours Stage - Only accessible if the LOGIN is made with Service or Manufacturer password;

Communication Stage - Only accessible if the LOGIN is made with Service or Manufacturer password;

Update Visograph – Only accessible if the LOGIN is made with Service or Manufacturer password;

Manual Mode Stage – Only accessible if the LOGIN is made with Manufacturer password;

Each machine parameter is subject to the same authentication methods in order to be modified.

The definition of the needed password level to modify each parameter is defined by the manufacturer, according to its set needs and criteria of safety.

It is then possible that the same parameter requires different password levels in order to be modified, based on the type of unit, application domain, and so on.

Parameters with an authentication level equal to 1 can be modified by all users (once the relevant menus have been accessed).

6. Allowed Types Of Machine

The DryCooler application is designed to manage cooling/heating of a fluid by means of step-regulated or in continuous modulation fans.

The treated fluid can be water (it is considered as water the mixtures of water and other antifreeze elements or liquids of any other kind too) or cooling gases.

Besides the fans, the application also manages other components based on the regulated unit and the set options.

- Water units are regulated based on **temperature**.
- Gas units are regulated at the manufacturer's discretion based on **temperature or pressure**.

The parameter **CF01** defines the type of dry cooler machine, according to these possibilities:

0 = water unit regulated on the basis of temperature;

1 = gas unit regulated on the basis of temperature;

2 = gas unit regulated on the basis of pressure.

6.1 Operating Modes

The dry cooler unit can be used for different purposes.

This is the reason why the application allows to be configured on the basis of the desired use.

The parameter **CF02** defines the following possibilities:

0 = Use both for condenser and free-cooler.

1 = Use only as free-cooler.

2 = Use only as condenser.

*The free-cooler operating mode can only be used with units that are parametrised as water units (parameter **CF01** = 0=. Different configurations enable an ACF configuration alarm.*

6.2 Number Of Circuits

The dry cooler application allows to manage units up to 2 independent circuits.

Each circuit can use dedicated resources, which are independently managed, for the regulation of its loop.

When there is the two-circuit configuration, they are independent, e.g. each circuit is regulated on the basis of its own reference set point.

The parameter **CF03** defines the number of circuits of the dry cooler:

0 = 1 circuit.

1 = 2 circuits.

The configuration with two circuits provides that the configuration of the unit type and unit mode are applied to both configured circuits.

In the same way, configurations of actuators (fans, pumps, etc.) will have one configuration only for both circuits.

The active operating mode (condenser / free-cooler) is defined for both circuits.

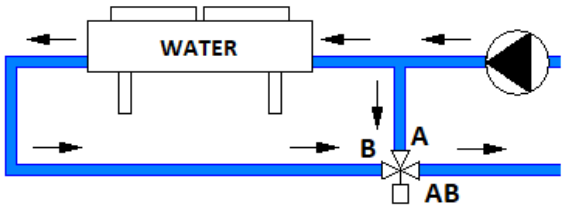
6.3 Examples Of Applications

The following application examples are to be considered as demonstrations and do not constitute e binding rule for the realization of machines.

The manufacturer is required to verify and produce the unit based on the requested regulations and application conditions, which he considers as most appropriate.

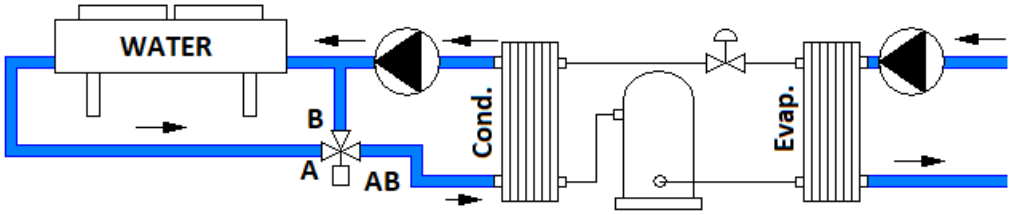
6.3.1 Example 1: “Generic plant” with water Dry Cooler

- Parameter **CF02=2** (only Condenser) or **CF02=1** (only Free Cooler).
- Parameter **CF06=2** (modulating 3 way valve for Condenser and for Free Cooler).



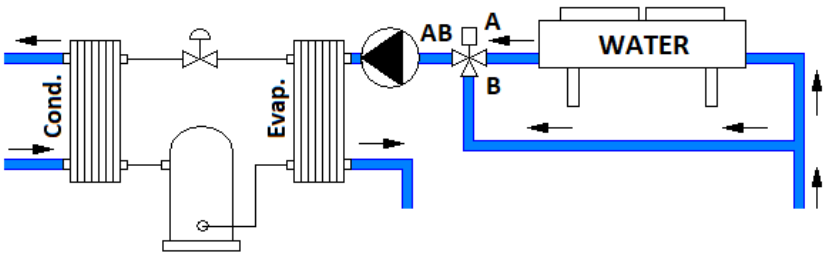
6.3.2 Example 2: Water Dry Cooler used as Condenser

- Parameter **CF02=2** (only Condenser).
- Parameter **CF06=2** (modulating 3 way valve for Condenser and for Free Cooler).



6.3.3 Example 3: Water Dry Cooler used as Free Cooler (Dry Cooler in series with chiller evaporator)

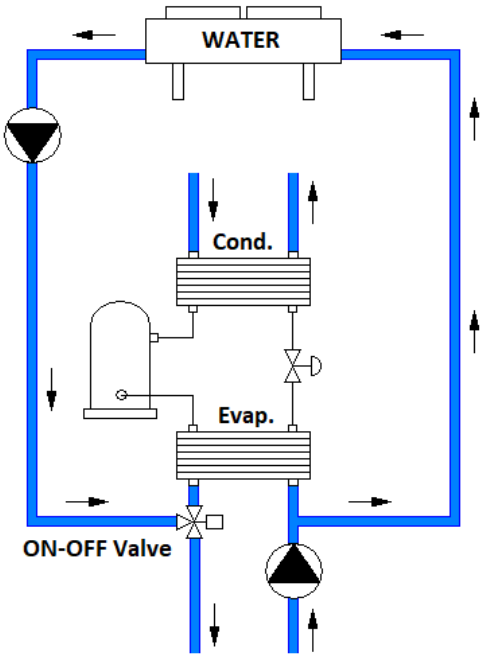
- Parameter **CF02=1** (only Free Cooler).
- Parameter **CF06=0** (valve not managed) or **CF06=1** (modulating 3 way valve for Free Cooler.



If we are using a 3-way modulating valve, the management can be done by Dixel controller (CF06=1). In case of 3-way ON/OFF valve the management can be done by customer (CF06=1); in this second case water temperature control is done modulating fans speed.

6.3.4 Example 4: Water Dry Cooler used as Free Cooler (Dry Cooler in parallel with chiller evaporator)

- Parameter **CF02=1** (only Free Cooler).
- Parameter **CF06=0** (valve not managed)

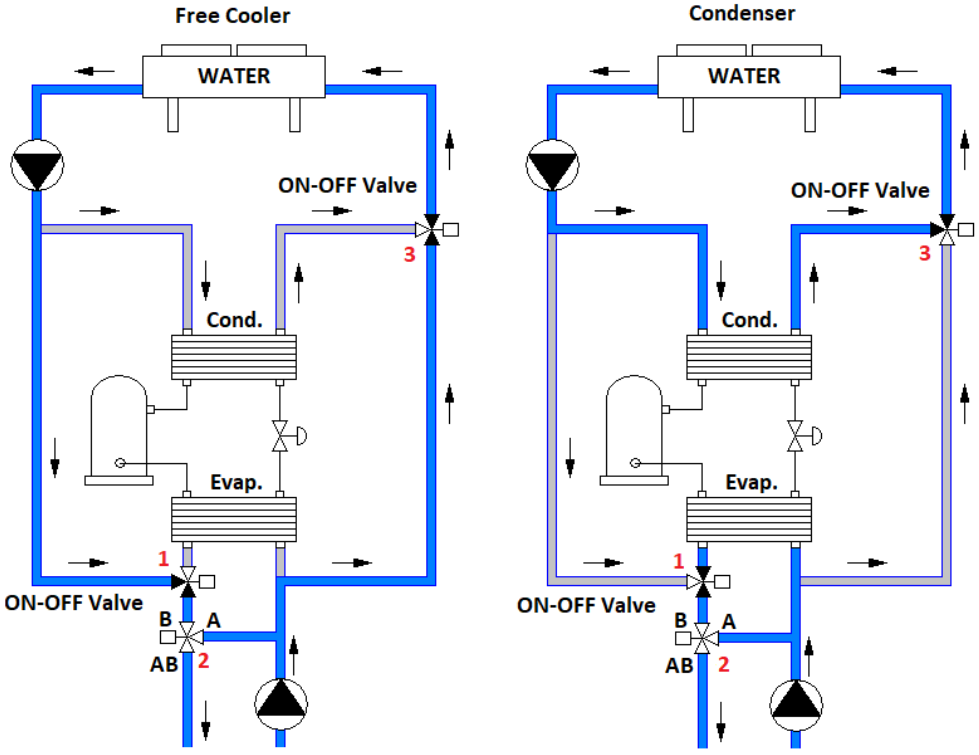


We use a 3-Way ON/OFF valve and the management is done by customer.

Water temperature control is done modulating fans speed.

6.3.5 Example 5: Water Dry Cooler used as Free Cooler or as Condenser in different time.

- Parameter **CF02=0** (free Cooler/Condenser).
- Parameter **CF06=3** (3-Way modulating valve for Free Cooler mode and 100% opening valve for Condenser mode)



Condensing temperature management is done modulating Dry Cooler fans speed; it isn't possible to adopt a 3-Way modulating valve managed by Dixell controller.

- 3 way valved labelled "1" and "3"in the previous picture are ON/OFF type.
- 3 way valved labelled "2" in the previous picture is MODULATING type.

All three valves are managed by Dixell controller.

Chiller has to communicate to Dixell controller when switching between two working mode (Free Cooler and Condenser).

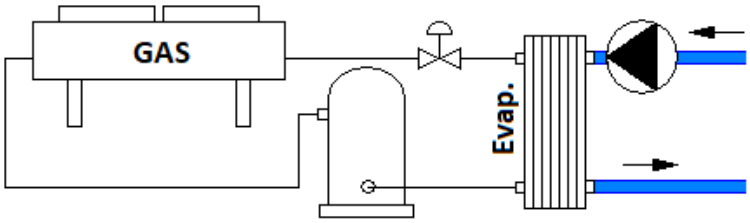
Using dedicated digital output, Dixell controller will manage the two 3-Way ON/OFF valves (labels "1" and "3").

Attention. In Free Cooling mode in some cases (according to water inlet temperature and external air temperature) the chiller evaporator could be bypassed: it is customer responsibility to adop the right solutions in order to avoid evaporator damages.

In Condenser mode the 3-Way modulating valve (label "2") will be 100% opened.

6.3.6 Example 6: Water Dry Cooler used as Free Cooler or as Condenser in different time.

- Parameter **CF02=2** (only Condenser).
- Parameter **CF06=0** (valve not managed)



7. Basic Features

Below are the basic functions of regulation:

- Unit On/Off.
- Switching ON/Switching OFF by HMI.
- Switching ON/Switching OFF by digital input.
- Enabling/Disabling circuits (only in case of two circuits units).
- Dry Cooler regulation probes.
- External air temperature condition for Free Cooling enabling.

7.1 Unit ON/OFF

The ON/OFF command may be subject to user password, if configured from the setting **CF28**. The unit may be turned ON/OFF with the following options:

- HMI (Keyboard).
- Designated digital input if configured.
- BMS (Supervision) if enabled, setting **CF29.**

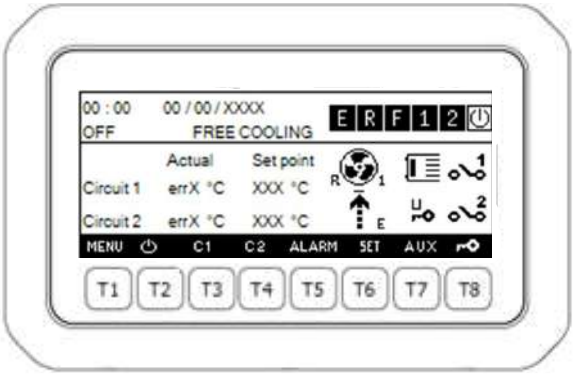
To switch on the unit, it must by enabled by all points listed above (if configured). The first that disables operation switches the unit off.

If the unit is single-circuit, the ON command defines the start of regulation as well, according to the enabled regulation mode.

If the unit is double-circuit, the ON command only sets the unit on “stand-by”. The actual consent to regulation for each circuit must come in this case from the relevant digital input of regulation start.

7.2 Switching ON/Switching OFF by HMI

In order to switch ON and switch OFF the unit, from the main stage do push button T2 for several seconds.

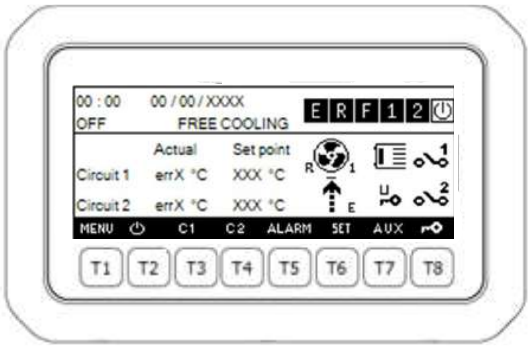


7.3 Switching ON/Switching OFF by digital input

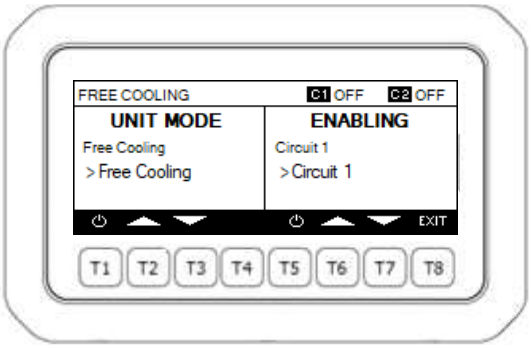
In case function “remote ON/OFF” is enabled, in order to switch ON and switch OFF the unit it is sufficient to act on a dedicated digital input.

7.4 Enabling/Disabling circuits (only in case of two circuits units).

Press T2 button.



Select the circuit we want to operate using buttons T6 and T7; do push button T5 for several seconds in order to enable/disable the selected circuit.



7.5 Dry Cooler Regulation Probes

It is possible to define from parameter **CF04** if the dry cooler regulation probe is the fluid input or output probe.

0 = Dry cooler input probe.

1 = Dry cooler output probe.

The regulation probe is used to manage the following functions:

- 3-way mixing valve regulation.
- Fan regulation.
- Adiabatic cooler regulation.

Regarding Heat Recovery, regulations probes are descripted in detail in paragraph 8.7.

7.6 External air temperature condition for Free Cooling enabling.

The free-cooler operating mode provides that the regulation must be enabled when there are favourable external temperature conditions.

This means that the configuration of the external air temperature prove is mandatory.

Once the free-cooler operating mode is enabled, and the regulation circuit is set to ON, the application enables the free-cooling operation if:

$$T_i > T_e + \Delta_s$$

Where:

Ti = Dry Cooler fluid inlet temperature.

Te = External air temperature.

Δs = Free-cooler enabling safety differential (parameter **ST09**).

Free cooling is disabled with the following conditions:

$$T_i \leq T_e$$

In case of Free Cooling disabling, ventilation is set OFF and 3-Way valve management is set so the fluid bypass the Dry Cooler.

For units with enabled recovery function, for 3-way valve and 3-way modulating recovery valve, see instructions in 8.7

8. Machine Regulations

Below are the main regulations at the disposal of the dry cooler unit:

- Regulation of the dry cooler operating mode.
- Pumps regulation.
- 3-way mixing valve regulation.
- Fans modulation.
- Adiabatic cooler regulation.
- Heat recovery regulation.
- Auxiliary regulations.

8.1 Regulation Of The Dry Cooler Operating Mode

Upon the start of the dry cooler, the operating mode (Condenser or Free-cooler) as well as the ON command must be provided.

For this purpose, it is possible to define the regulation mode from:

- HMI (Keyboard).
- Designated digital input if configured.
- BMS (Supervision).

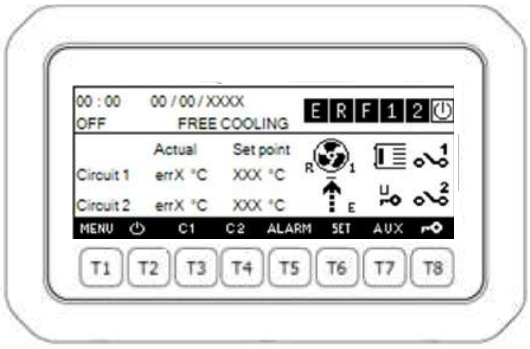
In case of digital input, it has the priority on the definition of mode given by HMI or BMS.

Failing a configured digital input, the unit always starts in the same modes as the ones enabled when it stopped.

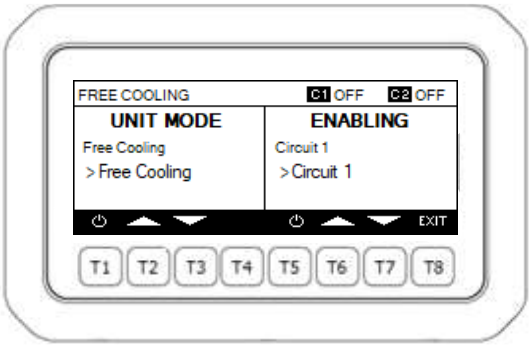
In this case, the operating mode is to be possibly modified from HMI or BMS.

8.1.1 Regulation Of The Operating Mode by HMI

In order to change the unit operating mode (Free Cooler or Condenser), from the main stage do push T2 button.



In this way the user can access to “UNIT MODE”: pushing T6 and T7 buttons to select the working mode, than push for some seconds T1 button.



8.1.2 Regulation Of The Operating Mode by Digital Input

In case dedicated digital input is enabled, the operating mode can be changed only modifying the state of digital input.

In this case it is not allowed anymore to change the operating mode by keypad.

*The regulation mode is to be exclusively provided when the dry cooler unit has the possibility to be used both as condenser and as free-cooler, i.e. with parameter **CF02** = 0.*

8.2 Pump Regulation

The pump unit can be only activated with dry cooler water units, and it is only activated if the following conditions are true:

- Unit ON.
- Circuit enabled to regulation.
- No alarms that provide for the pumps block.

Below is the description of the pump unit operation.

8.2.1 Overview

The dry cooler application manages maximum two outputs for the pump regulation.

Based on the configuration of the machine circuits, it is necessary to define, by means of the parameter **CF05**, which is the management of used pumps.

If the unit is comprised of one single circuit:

0 = Pumps are not managed.

1 = ON/OFF single pump.

2 = Modulating single pump.

3 = ON/OFF double pump (with exchange for scheduled rotation or alarm).

4 = Double modulating pump (with exchange for scheduled rotation or alarm).

If the unit is comprised of two circuits:

0 = Pumps are not managed.

1 = ON/OFF single pump.

2 = Modulating single pump.

*If the unit is double-circuit and the parameter **CF05** is greater than 2 an ACF configuration alarm is displayed.*
*In the same way, a configuration alarm is displayed when the unit is defined as gas unit and the parameter **CF05** is not to 0.*

8.2.2 Pump Activation

Upon the regulation activation, for each circuit, the application waits for a delay time that can be parametrised **PM01** after which the consent is given to the start of the pump regulation.

When shutting down, for each circuit, the application waits for a delay time that can be parametrised **PM02** after which the pump regulation is disabled.

The application manages a water flow alarm defined for each circuit by means of the dedicated flow meter input, see flow alarm (par.10.5).

8.2.2.1 ON/OFF Pump

The activation and deactivation of the On/Off pump follows the above-described rules without any additional regulation.

8.2.2.2 Modulating Pump

If the pump is configured as modulating, the On/Off activation of the pump follows the rules described above, hence during its operating status, the regulator provides to define a modulation output whose value is calculated based on a pressure set point to be kept constant.

For the pressure regulation, a single pressure transducer can be used (located on the hydraulic circuit) or two different pressure transducers can be used (located in different points of the hydraulic circuit).

In the first case, the value read by the pressure transducer is used directly for the regulation of the modulating pump.

$$P\ reg = P\ (trasducer\ A)$$

In the second case, e.g. using two transducers, the application considers the value of the difference between the two transducers as valid, which means:

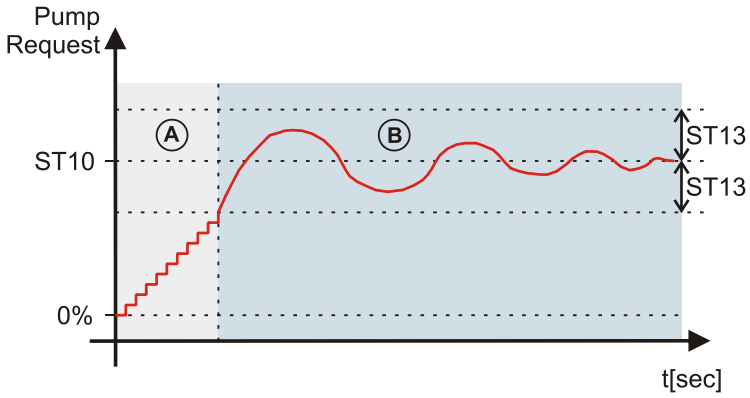
$$P\ reg = P\ (trasducer\ A) - P\ (trasducer\ B)$$

The modulation value is calculated based on two different modes, a **RAMP** regulation and a **PI** regulation.

- When the reference value (P reg) is lower than set-point minus the error defined by the parameter **ST13**, the output signal follows a ramp by increasing the output value by a constant increase of 1% at each second.
- When the reference value (P reg) is greater than set-point plus the error defined by the parameter **ST13**, the output signal follows a ramp by decreasing the output value by a constant decrease of 1% at each second.
- If the reference value (P reg) is included in the set-point range ±**ST13** the regulation of the pump is defined by a PI calculation, according to the values defined by parametrisation. The parameters that can be configured on the PI regulator are respectively the regulation proportional band and the integral time expressed in seconds.

The following graph shows the trend of the regulation when starting the modulating pump:

Modulating pump regulation

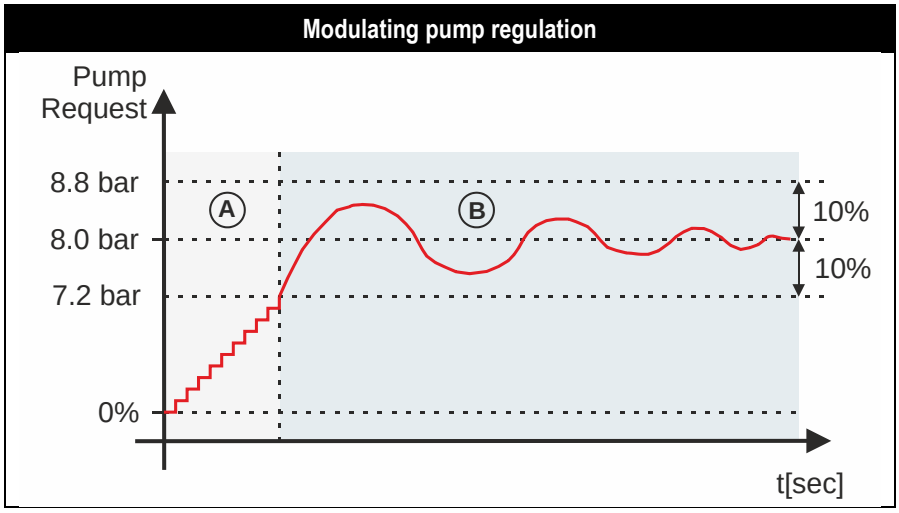


The A zone represents the RAMP phase on the rising edge.
The B zone represents the PI regulation depending on the set-point.

As an example suppose that we have adopted the following parameters:

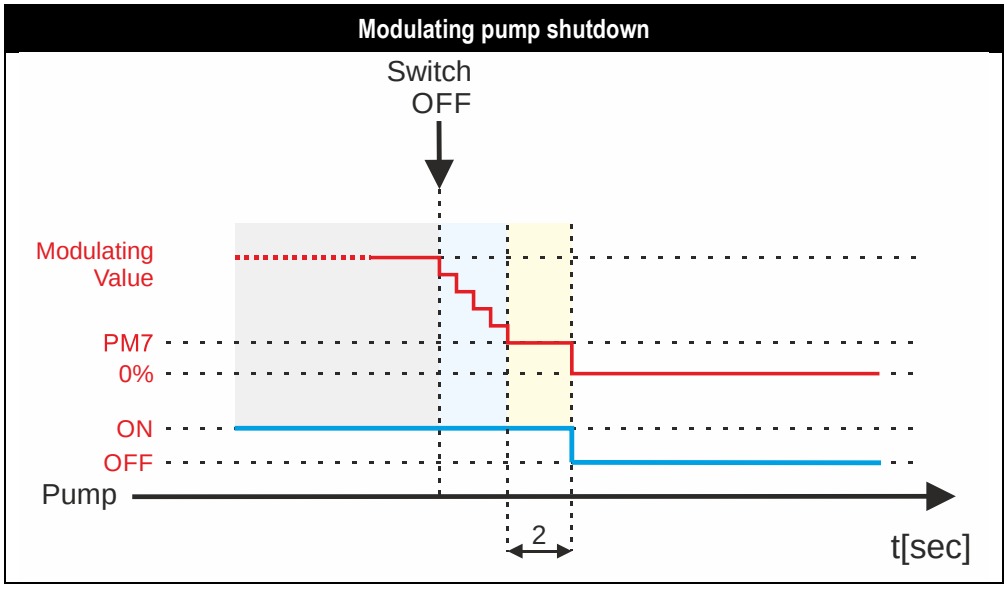
- ST10=8 bar.
- ST13= 10%.

This is the result:



In case of dry cooler with double hydraulic circuit, each circuit shall have parametrised the relevant values that are needed to the regulation.

When shutting down, the modulating pump will reduce its modulation value to the minimum (PM7); at that stage the pump will be disabled after a fixed delay (T) equal to 2 seconds, as shown in the graph below:



8.2.2.3 Pump Rotation

If the dry cooler is with one circuit only, two pumps can be used, one as exchange to the other.

The exchange can occur by scheduled rotation and/or in case of alarm.

Alarms that define the pump rotation are the following:

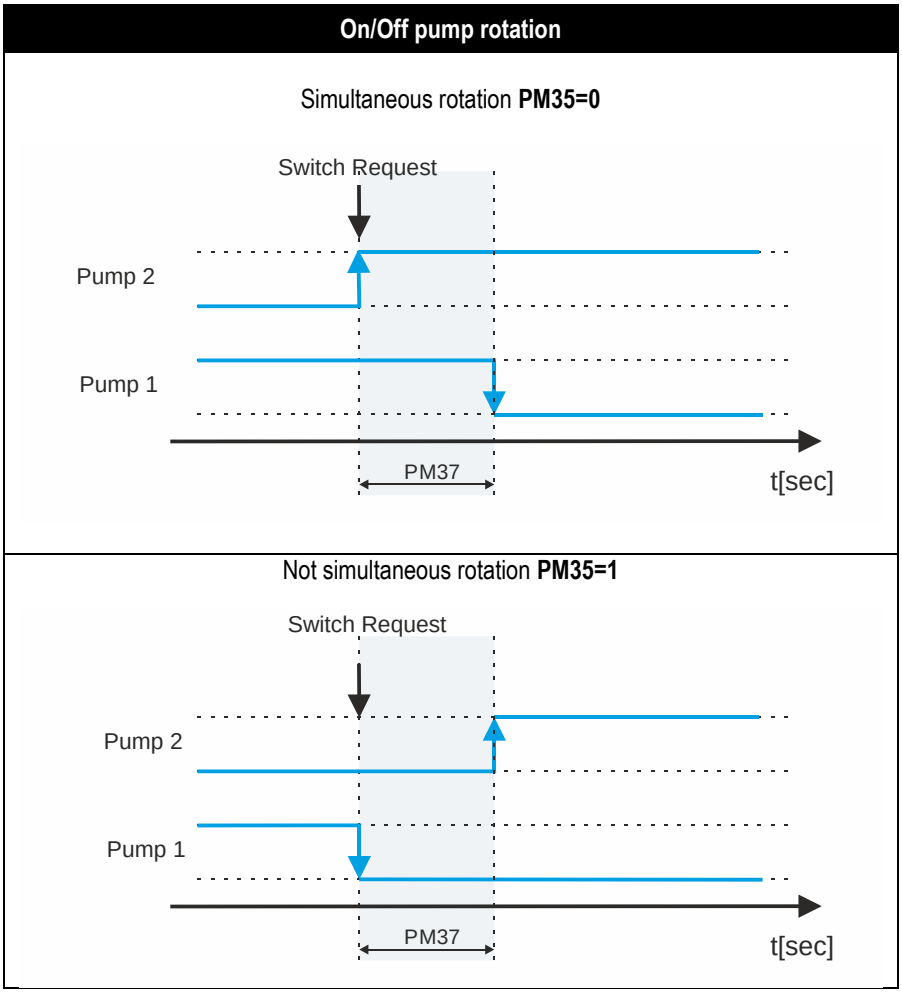
- Water flow alarm.
- Pump thermal overload alarm.

In case of alarm, the pump of relief is enabled and the pump in alarm is immediately disabled.

When resetting the alarm, the pump already in service remains active until reaching its operating hours or until a new alarm occurs.

In case of alarm for missing flow, once the flow alarm is (automatically) reset, the pump in relief is activated until the maximum number of activations allowed by the flow alarm before blocking the unit.

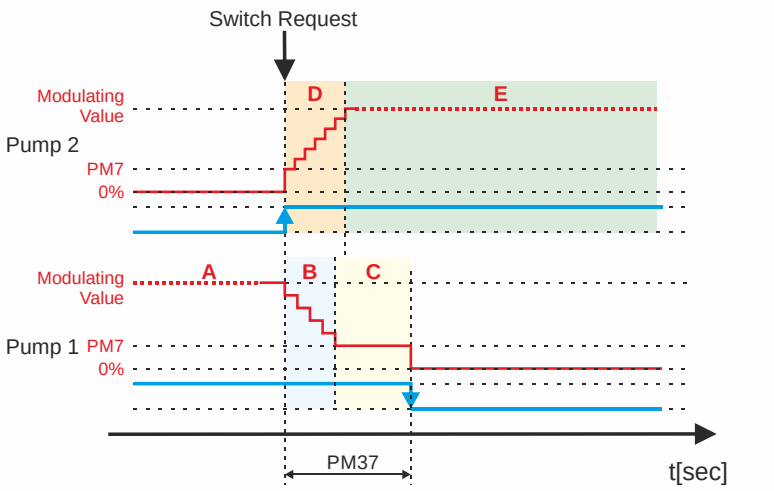
The parameter **PM36** defines the operating hours after which the exchange by rotation occurs, while the parameter **PM35** defines how the exchange occurs, as shown in the graphs below:



The parameter **PM37** defines the delay used for the pump exchange.

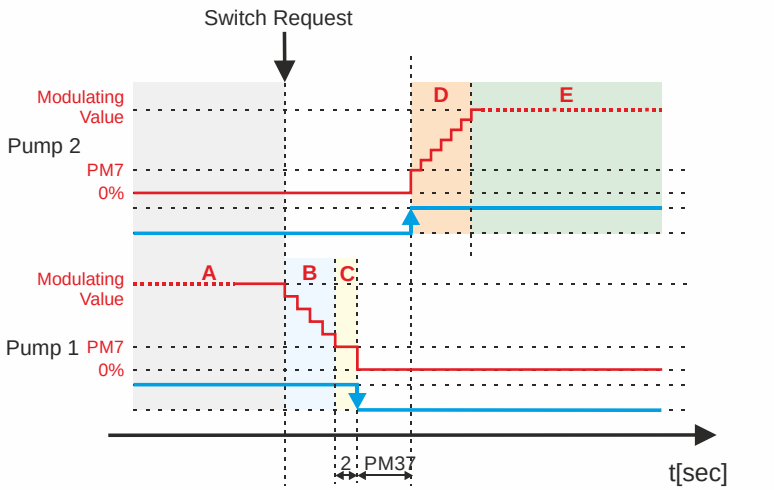
Modulating pump rotation

Simultaneous rotation **PM35=0**



Upon the exchange the stopped pump is activated, after the activation the pump that is already in use will reduce its regulation value by 1% each second until the complete shutdown (after a time equal to **PM37** sec).
At the same time, the pump that has been just activated, will increase its regulation value according to the RAMP regulation logics until the PI regulation insertion.

Not simultaneous rotation **PM35=1**



Upon the exchange the pump that is already in use will reduce its regulation value by 1% each second until reaching its minimum value. It will remain to the minimum value for a fixed time (T) equal to 2 seconds after which the pump will deactivated.
After a tie equal to **PM37** seconds, the pump in stand-by will be activated, which will increase its regulation value according to the RAMP regulation logics until the PI regulation insertion.

8.2.3 Available Actuators For The Pumps

The pump management provides for two possible actuators, one ON/OFF and one modulating for each circuit.

8.2.3.1 ON/OFF Actuator

ON/OFF actuators are the most basic ones, they use the signal from the request to enable or disable the pumps. In order to configure an ON/OFF actuator, it is necessary to define it from parameter **CF05** while the association to the digital output is done by assigning the corresponding DO value.

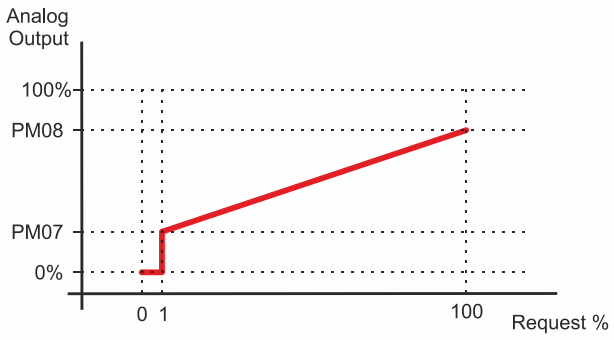
ON/OFF actuator parametrisation	
Pump configuration	It defines the number of pumps and the relevant regulation mode.
DO Digital output	It enables or disables the ON/OFF pump.

8.2.3.2 Modulating Actuator

The actuator of modulating pumps according to the request provides for an output analog signal (0-10V or 4-20mA) for the pump modulation.

Two MIN and MAX parameters (**PM07** and **PM08**) are possible should one wish to limit the regulating range of the modulating output, the MIN and MAX values are set by default to 0% and 100% to have the complete output range.

Modulating pump actuator regulation



In case of alarm, the request to the actuator is overridden to 0.

In order to configure a modulating pump, all fields must be defined, as reported in the table below:

Modulating pump actuator parametrisation	
Pump configuration	It defines the number of pumps and the relevant regulation mode.
Analogue output AO	Provides for the modulating signal for the pump.
DO Digital output	Defines the output for the activation (and deactivation) of the pump
Type of analogue output	Determines the type of output signal (0-10V, 4-20mA).
MIN minimum limitation	MIN - Defines the minimum output value when the request is greater than 0.
MAX maximum limitation	MAX - Defines the maximum output value when the request is equal to 100%.

8.3 Operated Hours And Number Of Start-Ups

The application memorises the working hours and resources activations.

It is also possible to set limits for every resource, in hours and numbers of start-ups, exceeded which the board shows a maintenance request warning. This warning does not affect regulation in any way.

There are two separate counters for hours as well as for start-ups:

- Total counter.
- Partial counter.

The total counter is reset in the same menu with access to level 2 or higher.
The partial counter is reset from the alarms menu (maintenance warning).
For both controls, setting at 0 is equivalent to inactive control.

8.4 3-Way Valve Regulation

The 3-way valve can be only activated with dry cooler water units, and it is only activated if the following conditions are true:

- Unit ON.
- Circuit enabled to regulation.
- Circuit pumps, if configured, active and not in alarm conditions.
- Verified the trigger conditions of the 3-way valve.

Conditions to use the 3-way valve in modulation are:

- The unit is in condenser mode.
- The unit is in free-cooling mode and trigger conditions for the free-cooling are verified (see par.7.6).
- The unit is in free-cooling mode and trigger conditions are not verified, but the recovery function is configured and active.

The 3-way valve, if present, is managed by the application as part of the dry cooler regulation.

Based on the used regulation mode (condenser or free-cooler), the valve is managed differently.

8.4.1 Overview

The dry cooler application manages maximum two outputs for the 3-way valve regulation.

By means of the parameter **CF06**, it must be defined which is the regulating mode to be used for the 3-way valve:

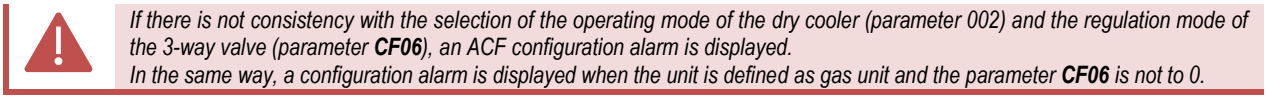
0 = Valve not managed.

1 = Modulating valve for free-cooling only.

2 = Modulating valve for free-cooling and condensation.

3 = Modulating valve for free-cooling and 100% fixed in condensation.

It is possible to parametrise the minimum and maximum regulation value for the 3-way valve. When the valve is not used for the regulation, its output is overriden to 0.



*If there is not consistency with the selection of the operating mode of the dry cooler (parameter 002) and the regulation mode of the 3-way valve (parameter **CF06**), an ACF configuration alarm is displayed.*
*In the same way, a configuration alarm is displayed when the unit is defined as gas unit and the parameter **CF06** is not to 0.*

8.4.2 Regulation Direction

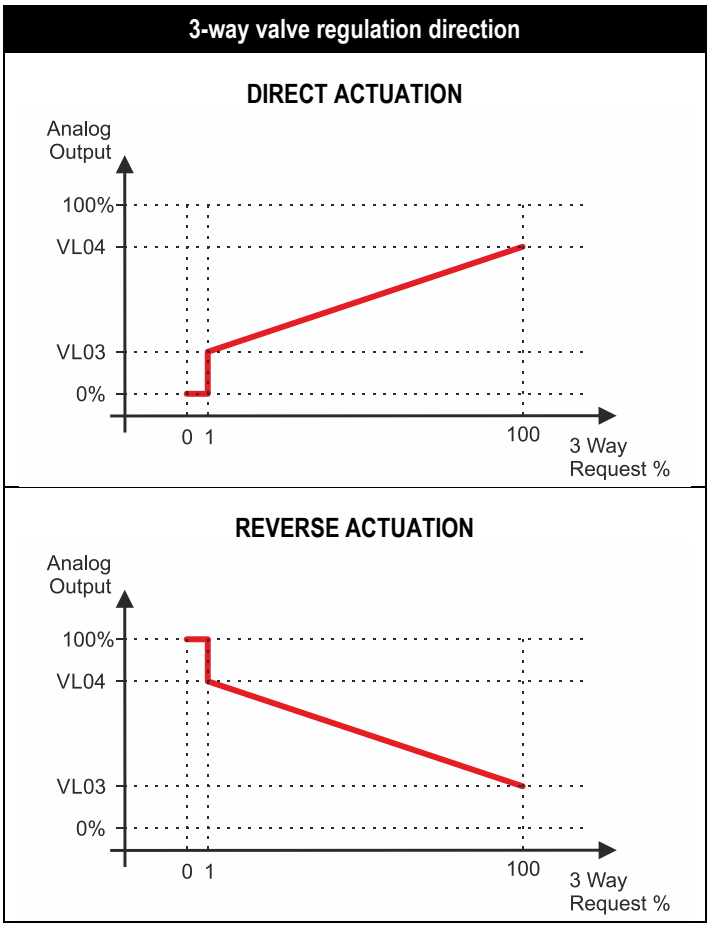
For each valve, the regulation direction is defined for the relevant actuator through the parameter **VL05**.

- If the regulation is direct while the error increases, the output signal increases.
- If the regulation is reverse while the error increases, the output signal decreases.

When the 3-way valve is switched on, the actuator is set at the intended reference value, equal to “MIN” for direct regulation and “MAX” for reverse regulation (parameters **VL03** and **VL04**).

If the MIN and MAX settings are not configured, regulation is performed considering the complete range 0-100%.

The graphs below show the output signal with regards to request according to the parametrised direction.



*In case of alarm, the output to the 3-way valve actuator is defined by the parameters **VL08** or **VL12**. These values represent the actual position that the valve will take.*

8.4.3 Use Of The 3-Way Valve In Free-Cooling Mode

When the unit is working as free-cooler, the 3-way valve, if present, is used as first regulation element to reach the set-point temperature.

When the 3-way valve is fully open, it is considered that the entire water flow is channelled to the dry cooler exchanger, vice-versa, when the valve is fully closed, the entire water flow is recirculated on the loop.

When the trigger conditions for the 3-way valve are verified, for each circuit, the application waits for a fixed delay time of 5 seconds, after which the consent is given to start the 3-way valve regulation.

The 3-way valve is always considered as modulating, its regulation value depends on the following parameters:

- **ST15** = 3-way valve maximum opening regulation band (always with a positive value).
- **ST14** = 3-way valve minimum opening regulation band (a value that can either be positive or negative).

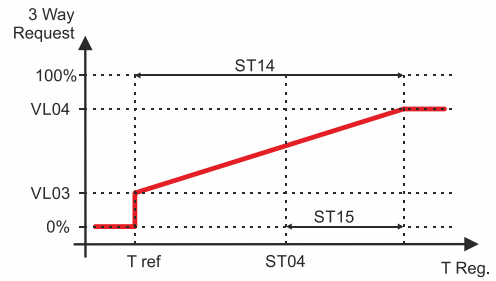
The regulation is of proportional type and is made by using the regulation temperature probe.

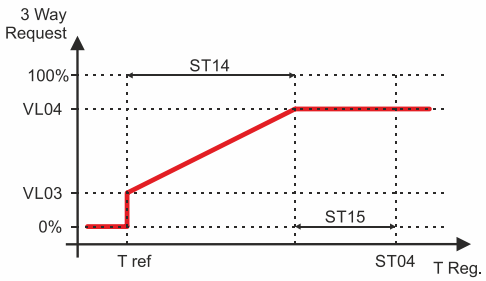
When the free-cooler operating mode is enabled, the set point (T Set) value for the 3-way valve is the same as ventilation, which means **ST04** for circuit 1 and **ST24** for circuit 2.

The graph below highlights the operation of the 3-way valve:

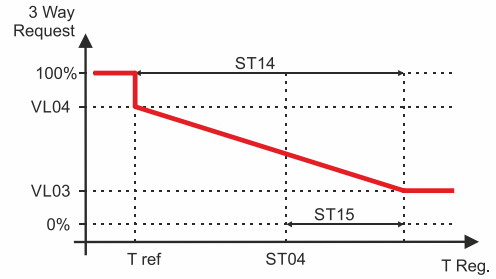
3-Way Valve Actuator Regulation (Free Cooler mode, circuit 1)

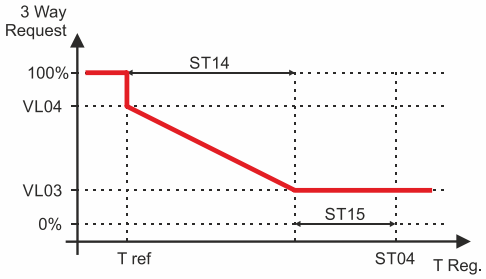
Direct actuation





Reverse actuation

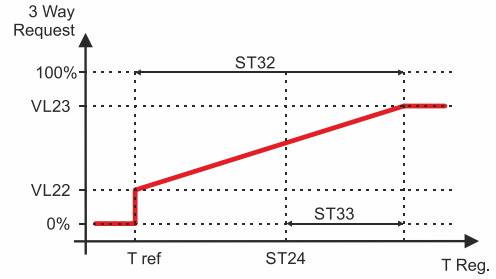




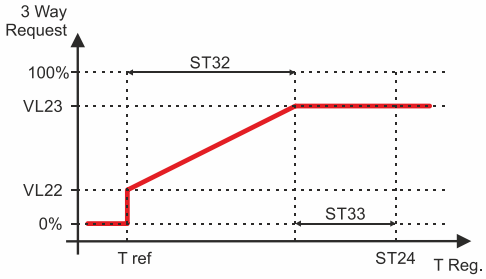
3-Way Valve Actuator Regulation (Free Cooler mode, circuit 2)

Direct actuation

ST33>0

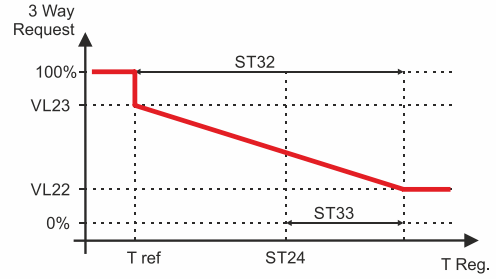


ST33<0

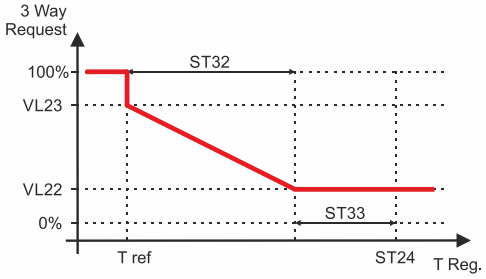


Reverse actuation

ST33>0



ST33<0

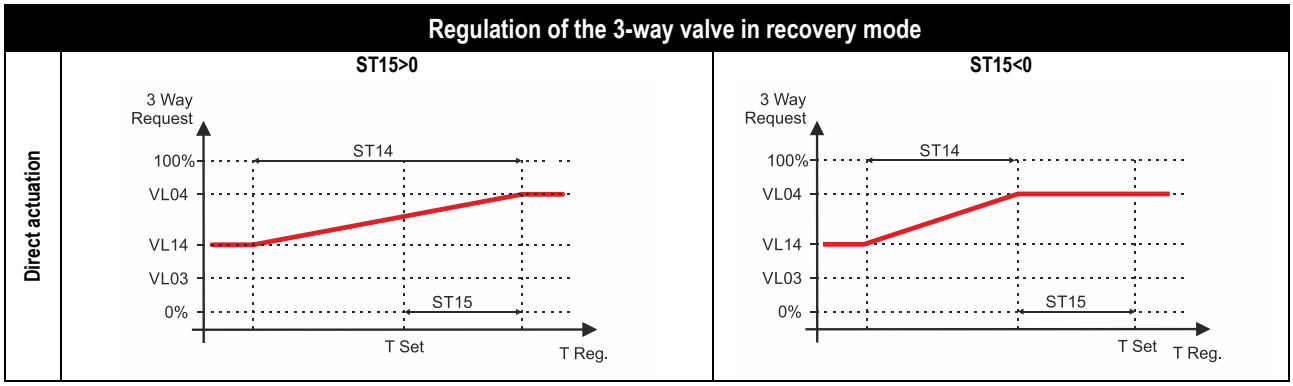


8.4.4 Use Of The 3-Way Valve In Recovery Mode

When the heat recovery function is enabled and active, the 3-way valve will be managed differently compared to the standard regulation.

When heat recovery is active, the set point (T Set) value depends on the mode used by the unit (free-cooler mode Tset=ST04; condenser mode Tset=ST01).

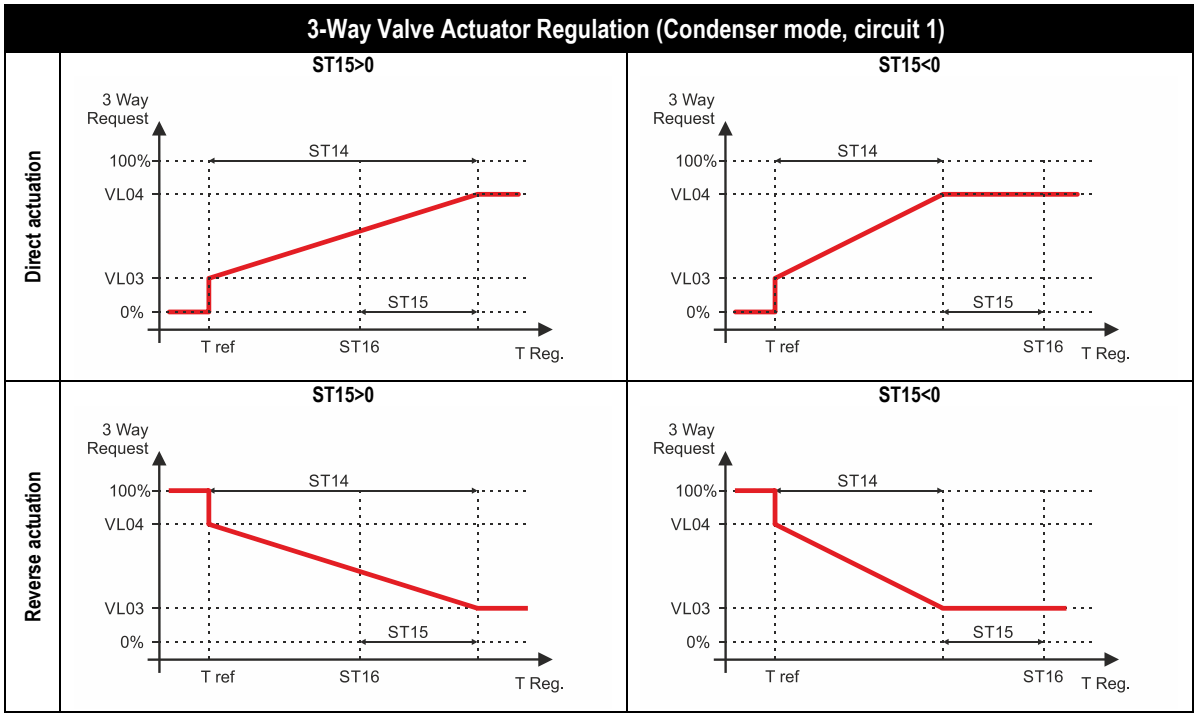
The graph below represents the specific regulation in recovery mode:

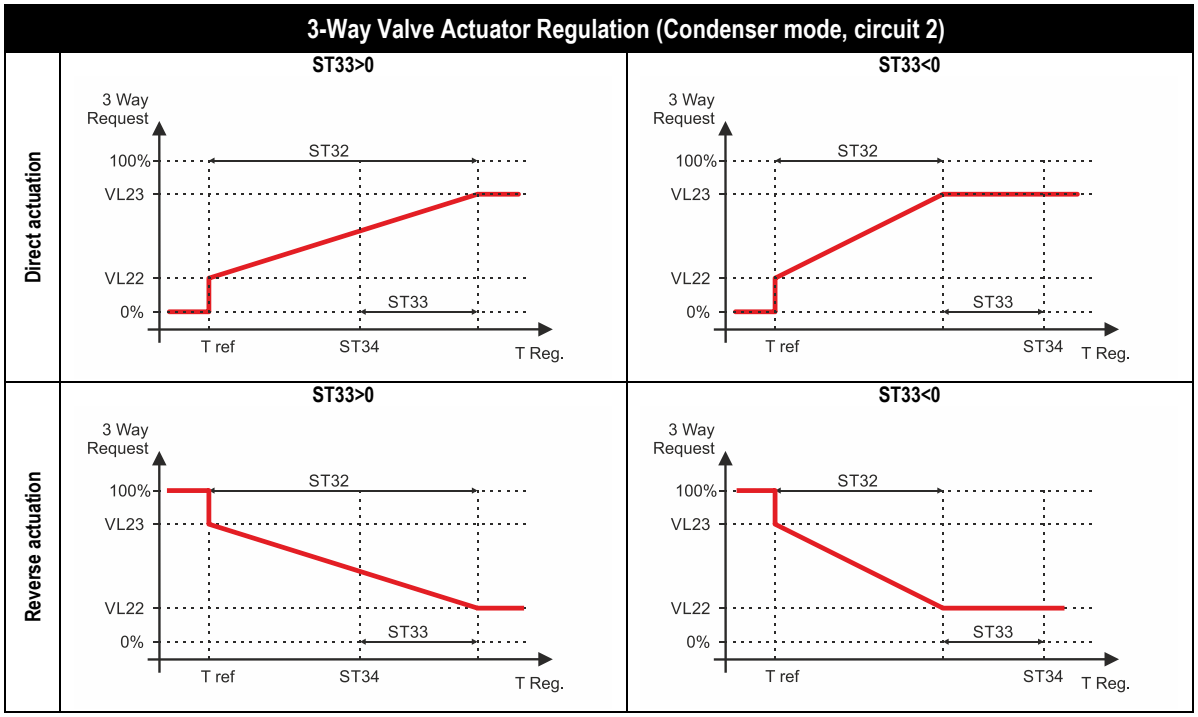


The value of minimum opening of the 3-way valve during the recovery is defined by the parameter **VL14**.

8.4.5 Use Of The 3-Way Valve In Condenser Mode

If the 3-way valve is part of the circuit involved in the regulation in condensation, the valve can be overriden to 100% (fully open) or can be used to prevent return low temperatures of water, according to what is defined by the parameter **CF06**.





If the valve is used in regulation mode (**CF06** = 3) its management is similar to that of the use for free-cooling.

In this case, differentials remain the same as the function previously described, while the reference set-point (T Set) becomes the set **ST16** for circuit1 and **ST34** for circuit 2 (set-point of 3-way in condensation).

8.4.6 Function Of Manual Override

It is possible to override the command output of the 3-way valve in manual mode to a prefixed value in absolute value.

The parameter **VL15** activates or deactivates the manual override command of the 3-way valve:

0 = Deactivated override command.

1 = Activated override command.

If the manual override command of the 3-way command is activated, it is possible to proceed with the valve override to the output value defined by the parameter **VL16** (absolute value of the analog output) through:

- HMI (Keyboard).
- Designated digital input if configured (to be connected to a button).
- BMS (Supervision).

Once the manual override is activated, the application automatically resets the command coming from BMS.

Through the parameter **VL17** it is possible to define if the command must be deactivated by time or manually:

0 = deactivation of the override by manual reset.

1÷120 = minutes during which the valve remains at the set manual value.

In case of **VL17**=0 the manual deactivation must always be made through:

- HMI (Keyboard)
- Designated digital input if configured (to be connected to a button)
- BMS (Supervision)

Any intervention of deactivation of the 3-way regulation (OFF circuit, alarm,...) automatically aborts the manual override of the valve.

8.4.7 Safety Position

It is possible to define for the 3-way valve a safety position, intended as the value to be taken by the analog output dedicated to the valve. The positioning value is defined by the parameter **VL08** or **VL12** and is considered as absolute (which means independent from the regulation direction).

The safety position is made according to the active operating mode for the unit (free-cooler or condenser).

The safety position is performed in the following cases in free-cooler mode:

- In case of alarm involving the 3-way valve
- In case of regulation temperature that is lower than the parameter **VL06**
- In case of regulation temperature that is greater than the parameter **VL07**

The recovery of the 3-way valve normal operation occurs when all the above-mentioned conditions are false for a minimum time of **VL09** seconds.

The safety position is performed in condenser mode in the following cases:

- In case of alarm involving the 3-way valve.
- If the regulation temperature is lower than the parameter **VL10.**
- If the regulation temperature is greater than the parameter **VL11.**

The recovery of the 3-way valve normal operation occurs when all the above-mentioned conditions are false for a minimum time of **VL13** seconds.

*If the parameter **CF06** is equal to 1 or 3, the safety operation is not performed.*

8.4.8 3-Way Valve Actuator Parametrisation

The 3-way actuator is always considered as modulating and uses the signal coming from the request to provide an output analog signal (0-10V or 4-20mA).

Two MIN and MAX parameters are possible should one wish to limit the regulating range of the modulating output, the MIN and MAX values are set by default to 0% and 100% to have the complete output range.

In order to configure the 3-way valve, all fields in the table below must be defined:

3-way actuator parametrisation	
3-way valve manner of use	Defines the presence and operating mode of the valve.
Analogue output AO	Provides for the modulating signal for the valve.
Type of analogue output	Determines the type of output signal (0-10V, 4-20mA).
MIN minimum limitation	MIN - Defines the minimum output value when the request is greater than 0.
MAX maximum limitation	MAX - Defines the maximum output value when the request is equal to 100%.

8.5 Fans regulation

Below the description of the fans operation for the dry cooler unit.

The fans is only enabled if the following conditions are true:

- Unit ON.
- Circuit enabled to regulation.
- Working pumps, if present.
- 3-way valves under regulation, if present.
- The activation condition is verified for the ambient temperature, if provided (see par.7.6).

If the fan activation conditions are verified, for each circuit, the application waits for a delay time that can be parametrised **CF09** after which the consent is given to the start of the fan activation.

When the heat recovery unit is active with the ON/OFF valve, the dry cooler fan function is off.

8.5.1 Overview

The dry cooler application manages different possible configurations for the fan based on the type of desired regulation and the number of configured circuits.

It is possible to regulate the fan both on the basis of the temperature (for water or gas units) and on the basis of pressure (for gas units only) according to the type of unit defined by the parameter **CF01**.

If the unit provides for two separate circuits, it is possible to define if the fan must be common or independent.

In case of common condensation, for the regulation the greatest value will be used between the two regulation probes (apart from the fact that it is a regulation in temperature or pressure).

In case of independent condensation, the request for each ventilating bench will come from the regulation probe defined for the specific circuit.

The parameter **CF07** defines if the condensation is common or independent.

0 = Common ventilation.

1 = Independent ventilation.

In case of single circuit, the value of the parameter **CF07** is not considered.

8.5.2 Ventilation operating mode

Ventilation regulation is a function to adjust the operating mode enabled for the dry cooler (refer to Chap. **Error! Reference source not found.**), or Free-cooler or Condenser.

Each operating mode defines the set point parameters, regulation band and override required for ventilation regulation. The table below summarises the parameters used for each active mode:

Parameter	Active Mode:Freecooler		Active Mode:Condenser	
	Circuit 1	Circuit 2	Circuit 1	Circuit 2
Ventilation Setpoint	**ST04**	**ST24**	**ST01**	**ST21**
Regulation Band	**ST05**	**ST25**	**ST02**	**ST22**
Override	**ST06**	**ST26**	**ST03**	**ST23**

New ventilation regulation values are immediately acquired with every operating mode regulation change.

8.5.3 Definition of the type of ventilation regulation.

It is crucial to define the type of fans regulation, from parameter **CF08**:

0 = Ventilation not present.

1 = Ventilation regulated by steps.

2 = Analog modulating ventilation.

3 = Ventilation regulated by steps using analog external signal.

4 = Analog external signal modulating ventilation.

If the parameter **CF08** is on 0 (ventilation not present), it is considered that the unit is one pumping unit only.

The selection of the fans regulation type is used for both circuits (if configured as independent).

8.5.4 Ventilation Regulated By Steps

The step regulation of the fan provides to use maximum 4 steps of activation, for machines with two circuits max 2 steps of regulation are provided for each circuit.

The step regulation uses the signal coming from the request to activate up to 4 steps of ventilation, which can be parametrised according to what is defined with **FAA01** (for circuit 1) and with **FAB01** (for circuit 2).

Each regulation step activates a designated digital contact.

The ventilation request is regulated based on the set-point defined for each circuit (see table par.8.5.2) which can be temperature set-point or pressure set-point according to the parameter **CF01** of dry cooler construction.

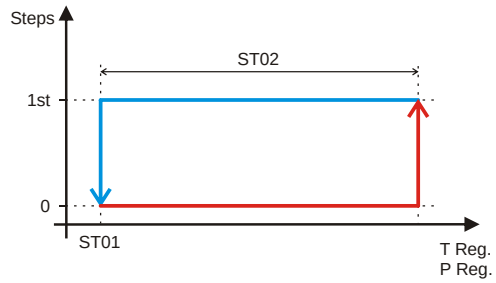
To use the step regulation, the number of regulation steps, the regulation differential of each step (%) and the total regulation band must be set.

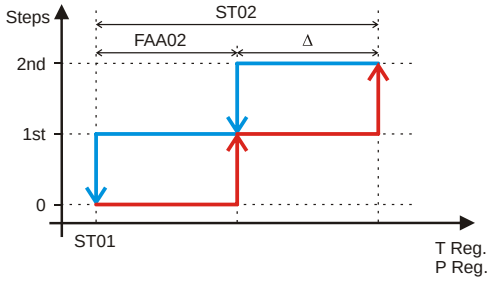
The value of the regulation band defines 100% of the fan request.

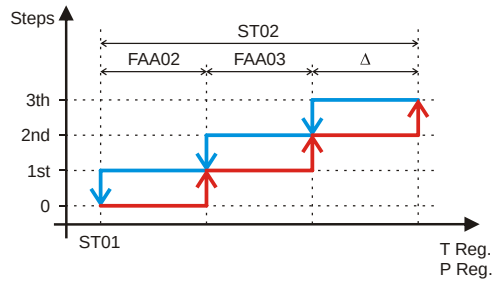
For the first circuit:

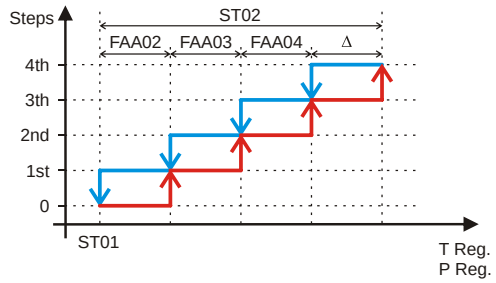
- With one step only the request corresponds to 100% of the regulation band.
- With two regulation steps, the first differential must be set (**FAA02**), the second step will be calculated as equal to 100%-**FAA02**.
- With three regulation steps, differentials 1 and 2 must be set (**FAA02** and **FAA03**), the third step will be calculated as equal to 100%-**FAA02**-**FAA03**.
- With four regulation steps, differentials 1, 2 and 3 must be set (**FAA02**, **FAA03** and **FAA04**), the fourth step will be calculated as equal to 100%-**FAA02**-**FAA03**-**FAA04**.

Step ventilation regulation
Circuit 1 – Condenser Mode

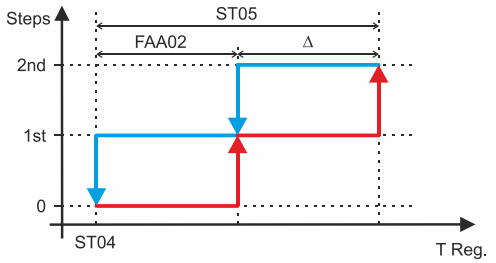


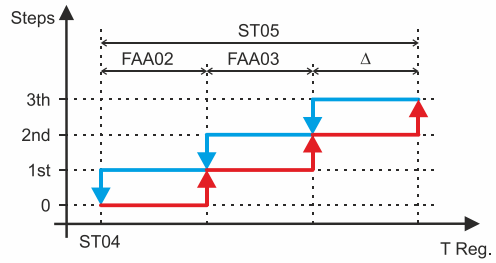


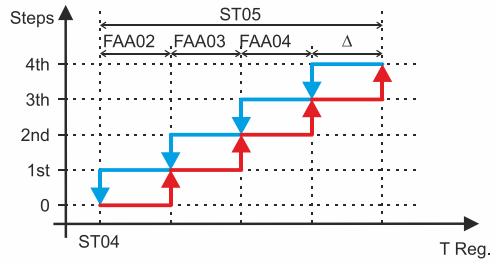




Step ventilation regulation
Circuit 1 – Free Cooler Mode



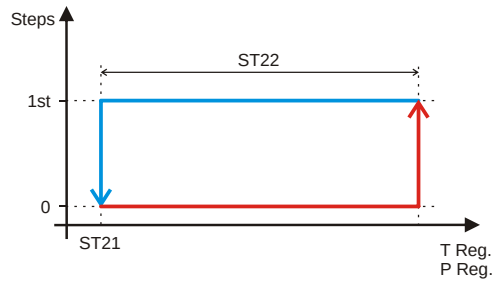


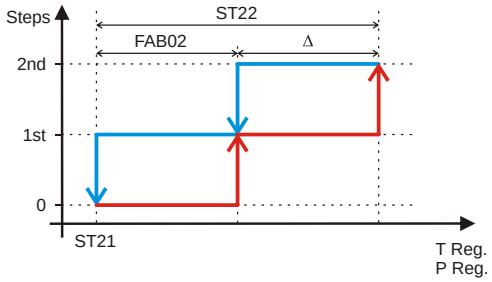


For the second circuit:

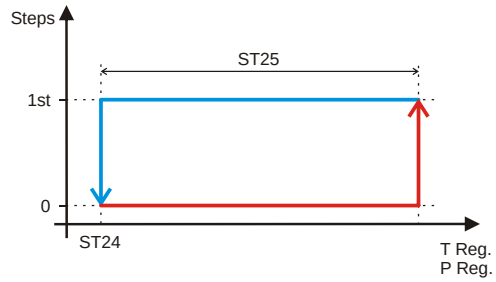
- With one step only the request corresponds to 100% of the regulation band.
- With two regulation steps, the first differential must be set (**FAB02**), the second step will be calculated as equal to “100%-**FAB02**”.

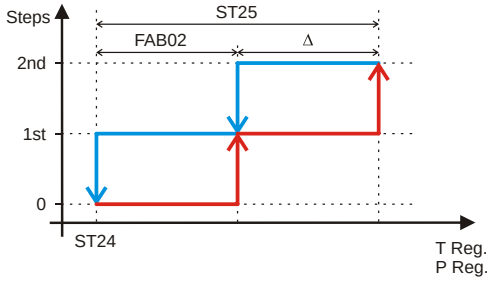
Step ventilation regulation
Circuit 2 – Condenser Mode





Step ventilation regulation
Circuit 2 – Freecooler Mode





If there is inconsistency between the parametrised steps and the differentials set by the user, a configuration ACF alarm will be triggered.

In order to configure a step ventilation it is necessary to define the type of ventilation regulation (parameter **CF08** = 1) while the association to the digital outputs is done by assigning the corresponding DO values.

Step ventilation parametrisation	
Step 1 DO digital output	Obligatory - Enables or disables the first step of ventilation.
Step 2 DO digital output	Enables or disables the second step of ventilation.
Step 3 DO digital output	Enables or disables the third step of ventilation Or enables or disables the first step of the second circuit (for double-circuit units).
Step 4 DO digital output	Enables or disables the fourth step of ventilation Or enables or disables the second step of the second circuit (for double-circuit units).
Number of regulation steps	Defines how many steps are used by the actuator
Differential 1	Defines the first step percentage.
Differential 2	Defines the second step percentage.
Differential 3	Defines the third step percentage.
Differential 4	Defines the first step percentage for double-circuit units.
Regulation band	Defines the regulation band for the request calculation (100%).

Both the values of set-point and the values of differentials are set by using the measurement unit corresponding to the type of regulation used (°C or Bar).

8.5.5 Analog Modulating Ventilation

It is possible to define a modulating regulation for fans, with this type of regulation, the modulation request is calculated based on the set-point defined for each circuit (see table par.8.5.2), which can be temperature set-point or pressure set-point according to the parameter **CF01** of dry cooler construction.

Parameters **ST03**, **ST06**, **ST23**, and **ST26** define the ventilation's override differential respectively for circuit 1 and 2 based on the adjustment mode enabled.

The minimum, rated and maximum ventilation values must be defined for this regulation.

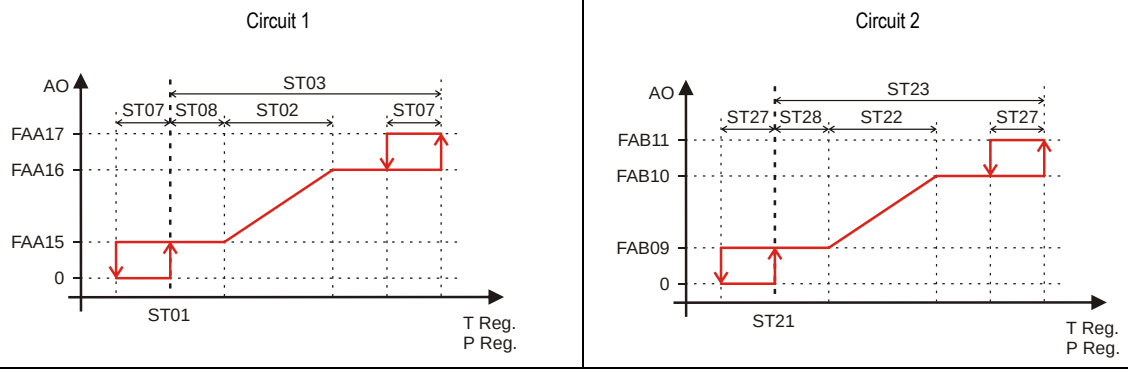
The minimum value represents the lowest value that the analog output of the ventilation can take when it is enabled and used.

The nominal value represents the value reached by the analog output having completed the regulation band.

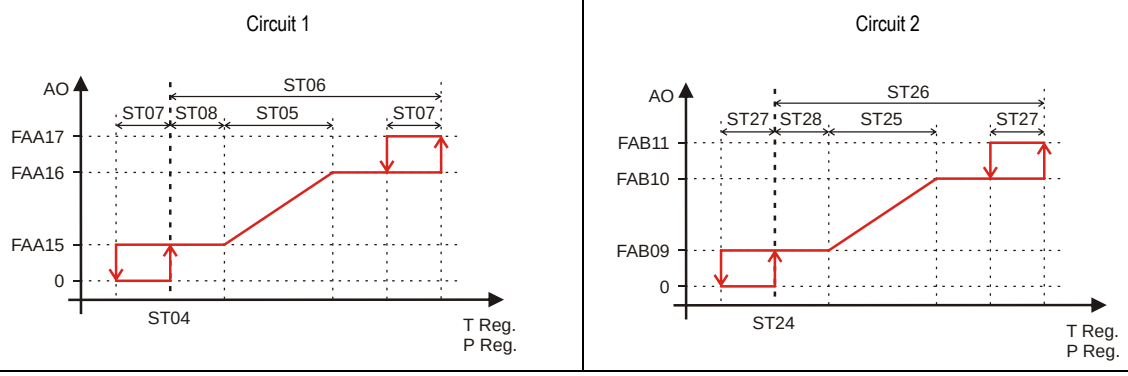
The maximum value represents the highest value that the analog output (in override) can take when the modulating ventilation is enabled and used.

The modulating output has a value calculated as shown in the diagram below:

Modulating ventilation regulation
Condenser Mode



Modulating ventilation regulation
Freecooler Mode



The set-point value represents the ventilation activation value.

The differential defined from parameters **ST07** and **ST27** represents the hysteresis value used both to shutdown the ventilation and to disable the maximum speed.

The differential defined by the parameters **ST08** and **ST28** is used to define the start point of ventilation modulation from the minimum value.

The regulation band enables calculation of the modulating output, from the minimum value to the rated operating value.

The maximum set point (set point + override) value represents the activation point of the maximum service speed for ventilation.

In order to configure a modulating ventilation, it is necessary to define the type of regulation for the ventilation (parameter **CF08** = 2) as well as the operating parameters of the ventilation as per the table below (to be repeated for each of the two circuits):

Proportional modulating ventilation parametrisation	
Ventilation DO digital output	Obligatory - Enables or disables the fan operation.
Ventilation AO analog output	Obligatory - Defines the ventilation modulation value.
Output minimum value %	Defines the minimum value that the ventilation modulating output can take.
Rated output value %	Defines the rated value for the ventilation modulating output.
Output maximum value %	Defines the maximum value that the ventilation modulating output can take.
Differential 1	Defines the ventilation deactivation hysteresis.
Differential 2	Defines the start point of the ventilation modulation.

Both the set-point values and the differential values are set by using the measurement unit corresponding to the type of regulation used (°C or Bar).

8.5.6 Ventilation Regulated By Steps based on external signal

It is possible to manage ventilation by steps using an analog external signal.

In this case tha analog input value (scaled on the base of minimum and maximum value admitted) rapresents the request value for ventilation control.

*This kind of ventilation management can be used in case of one circuit unit (**CF03**=0) or in case of two circuits unit with common ventilation (**CF03**=1 e **CF07**=0)*

A different parametrizazion leads to a configuration alarm.

Using this kind of ventilation management it is mandatory to configure a dedicated analog input; the user has to choose the input type, the unit of measurement, the minimum and maximum values.

If the units of measurement are "°C" or "bar", the set points values are written in the same units.

For the others units of measurements, the user has to adopt a percentage scale.

The parameter **ST01** rapresents the set point, while the parameter **ST02** rapresents the proportional band.

Parameters **FAA02**, **FAA03** and **FAA04** rapresent the activation percentage of every single step as illustrated in par.8.5.4.

Consider as an example a generic analog input 2-10V:

Parameter	Set point [V]	Calculation	**SET POINT** [%]
ST01	**5**	ST01 = (5*100)/8 = 62.5%	**62.5%**
ST02	**8 (10-2)**	ST02 = (8*100)/8 = 100%	**100%**

The activation of every single step is managed as explained in par.8.5.4.

In order to configure correctly this kind of management it is necessary to define the ventilation type (**CF08**=3) and assign to every digital output the right DO value.

In Free Cooler mode the parameters **ST01** and **ST02** are substituted by **ST04** and **ST05**, as descripte in par.8.5.2.

Step ventilation parametrisation	
Step 1 DO digital output	Obligatory - Enables or disables the first step of ventilation.
Step 2 DO digital output	Enables or disables the second step of ventilation.
Step 3 DO digital output	Enables or disables the third step of ventilation
Step 4 DO digital output	Enables or disables the fourth step of ventilation
Number of regulation steps	Defines how many steps are used by the actuator
Differential 1	Defines the first step percentage.
Differential 2	Defines the second step percentage.
Differential 3	Defines the third step percentage.
External analog input	Defines the analog input used for regulation; the user has to configure the input type, the unit of measurement and the work range.

8.5.7 Analog Modulating Ventilation based on external signal

It is possible to manage analog modulating ventilation using an analog external signal.

In this case tha analog input value (scaled on the base of minimum and maximum value admitted) rapresents the request value for ventilation control.

*This kind of ventilation management can be used in case of one circuit unit (**CF03**=0) or in case of two circuits unit with common ventilation (**CF03**=1 e **CF07**=0)*

A different parametrizazion leads to a configuration alarm.

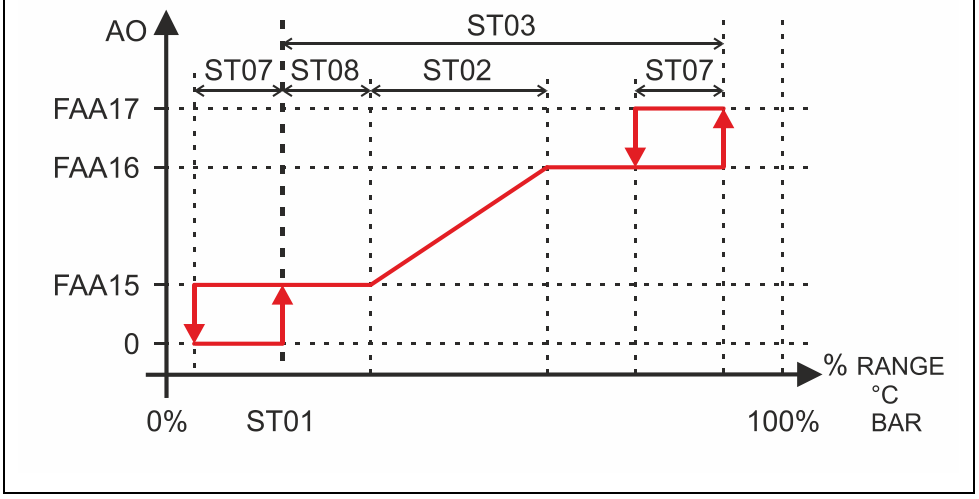
Using this kind of ventilation management it is mandatory to configure a dedicated analog input; the user has to choose the input type, the unit of measurement, the minimum and maximum values.

If the units of measurement are "°C" or "bar", the set points values are written in the same units.

For the others units of measurements, the user has to adopt a percentage scale.

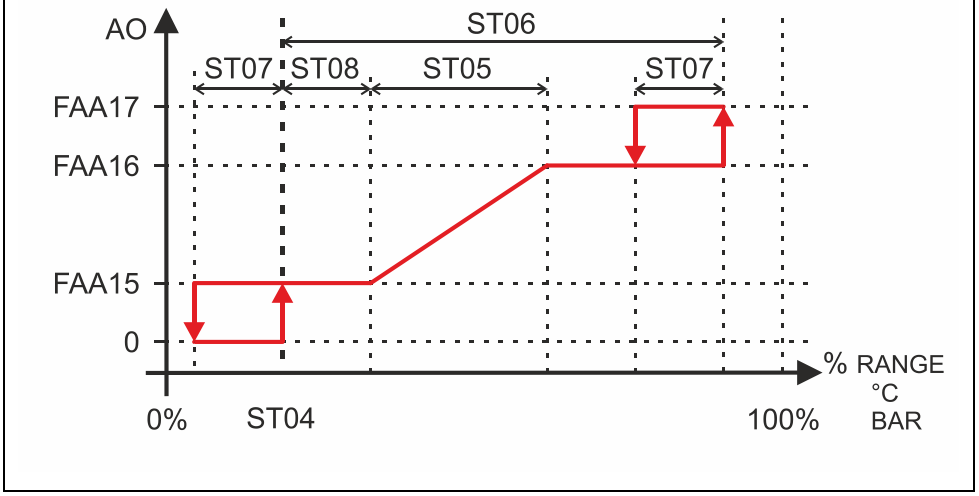
The following graph illustrates how the regulation works in case of unit working in condenser mode.

Modulating Ventilation by External Signal-Condenser Mode
Percentage Scale



In case of unit working in freecoller mode, the parameters **ST01**, **ST02**, **ST03** will be substitued by **ST04**, **ST05**, **ST06** as descripted in par.8.5.2 (“Ventilation operating mode”).

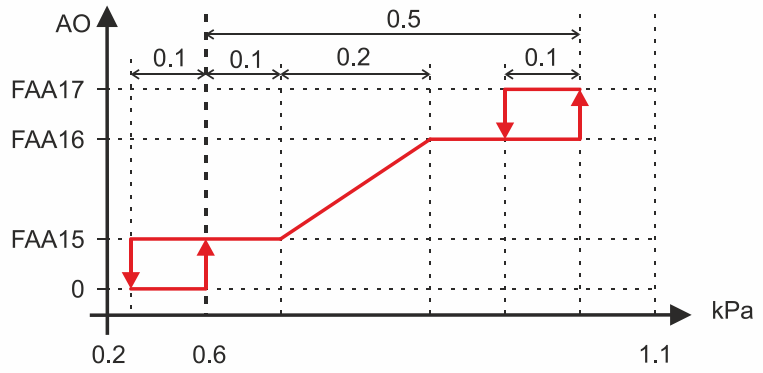
Modulating Ventilation by External Signal-Free Cooler Mode
Percentage Scale



As an example consider using a **4-20 mA** probe with a working range **0.2-1.1 kPa.**

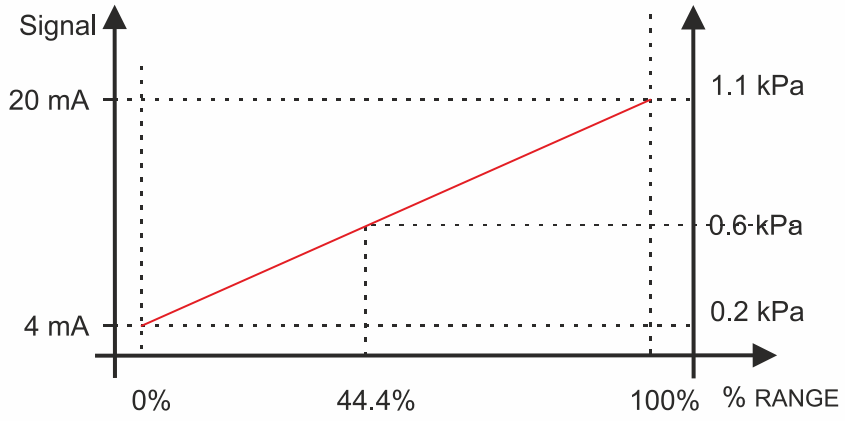
Suppose the end user needs to manage ventilation as illustrated in the following graph; Furthermore suppose the ventilation set point is 0.6 kPa.

Example



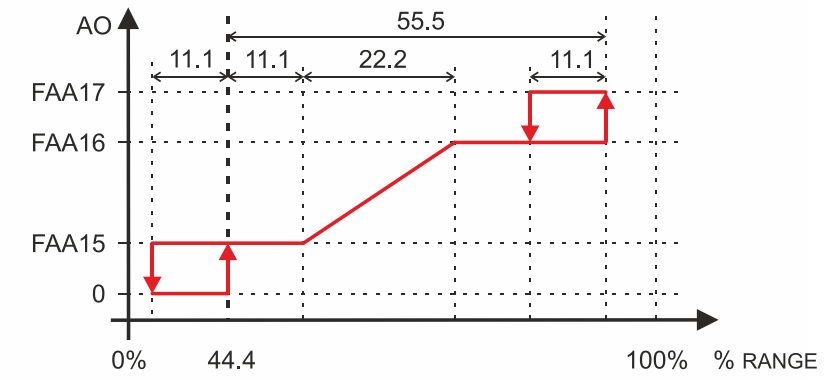
Parametro	Valore Set [kPa]	Calcolo	**Valore SET** [%]
ST01	**0.6**	ST01 = ((0.6-0.2)*100)/0.9 = 66.7%	**44.4%**
ST02	**0.2**	ST02 = (0.2*100)/0.9 = 22.2%	**22.2%**
ST03	**0.5**	ST03 = (0.5*100)/0.9 = 44.4%	**55.5%**
ST07	**0.1**	ST07 = (0.1*100)/0.9 = 11.1%	**11.1%**
ST08	**0.1**	ST08 = (0.1*100)/0.9 = 11.1%	**11.1%**

Example



The result will be as follow:

Example



In order to configure properly this kind of regulation, the user has to set CF08=4 and than follow the same procedure illustrated in par.8.5.5.

Furthermore it is necessary to configure the analog input dedicated to external signal, complete of working range and unit of measurement.

8.5.8 Analog Modulating Ventilation: function "limited speed"

The function “limited speed” is related only for units (water or gas) configurated with modulating ventilation.

When the unit has modulating ventilation , either common ventilation or separate ventilation, it is possible to set a ventilation value in order to limit the fan speed.

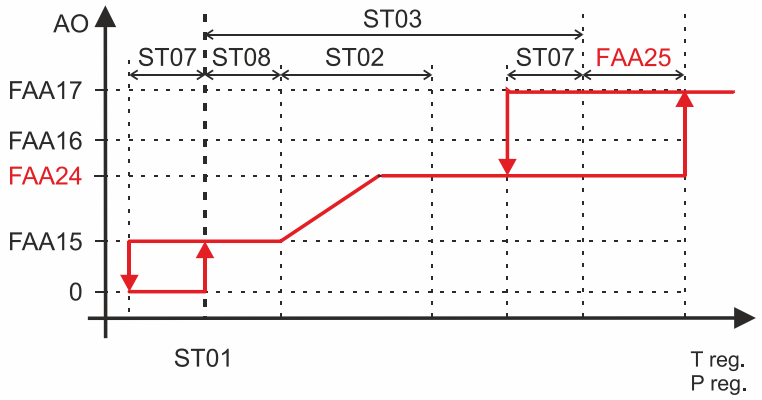
The function “limited speed” is enabled actin on a dedicated digital input.

When the function “limited speed” is enabled, even if the regulation need an higher fan speed the ventilation will be limited.

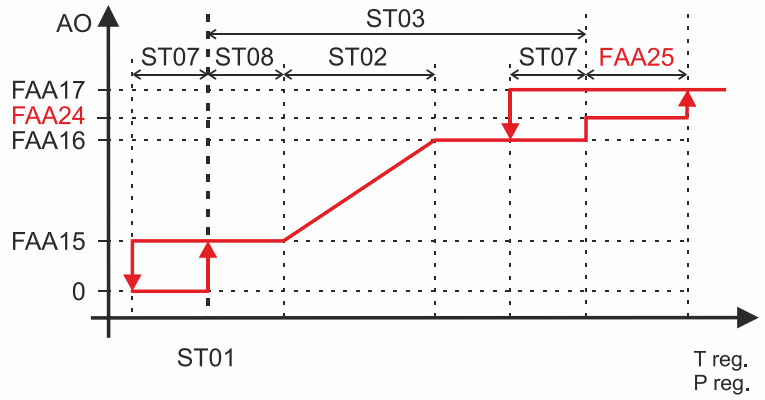
In order to guarantee a good security level, there is a thereshold (FAA25 and FAB13) to force ventilation at maximum speed.

When the regulated variable get over this threshold the ventilation is forced at his maximum value.

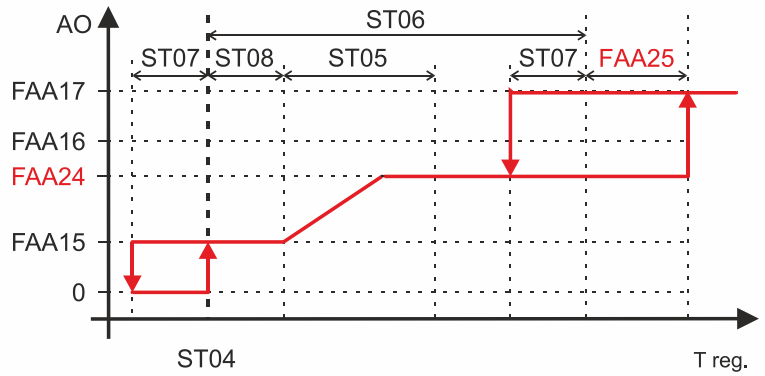
Modulating Ventilation Speed Limited- Condenser mode
Limited speed set point between Minimun set and Nominal set



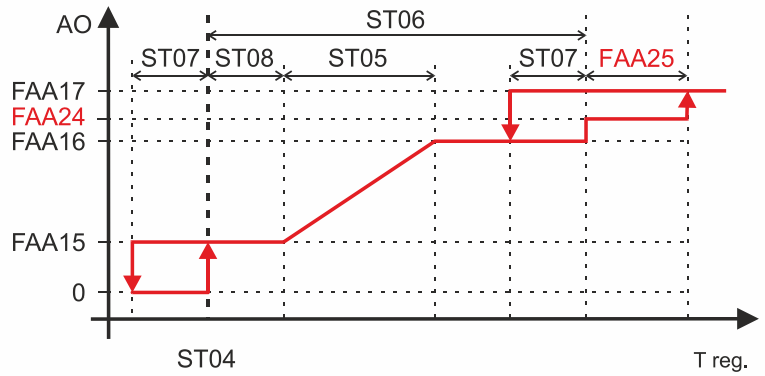
Modulating Ventilation Speed Limited- Condenser mode
Limited speed set point higher than Nominal set



Modulating Ventilation Speed Limited- Free Cooler mode
Limited speed set point between Minimun set and Nominal set



Modulating Ventilation Speed Limited- Free Cooler mode
Limited speed set point higher than Nominal set



8.6 Adiabatic Cooler Regulation

The dry cooler application allows to use an adiabatic cooler if it is embedded in the unit and the service conditions allow for its operation.

The adiabatic cooler can be used both for water and gas units and it is only enabled if the following conditions are true:

- Unit ON.
- Circuit enabled to regulation.
- Working pumps, if present.
- 3-way valves under regulation, if present.
- Ventilation activated at the maximum speed or with all activated steps.
- The activation condition is verified for the ambient temperature, if provided (see par.8.6.2).

Below the description of the adiabatic cooler management.

8.6.1 Overview

The application allows to use an adiabatic cooler for both the circuits that can be configured for the dry cooler.

It is considered that the adiabatic cooler is comprised of a common pumping station for both circuits and two shut-off valves that are used to enable the humidification to each unit circuit.

The adiabatic cooler is enabled through the parameter **CF11**:

0 = Adiabatic cooler not present.

1 = Adiabatic cooler present.

Should a unit with single circuit be configured, it is sufficient to set the digital output for the adiabatic cooler pump activation (the shut-off valve is optional).

Units with two circuits must obligatorily provide for the digital output for the pump activation and the two activation digital outputs related to each circuit.

The adiabatic cooler function provides obligatorily for an external air temperature probe. It is possible to use an external air humidity optional probe.

8.6.2 Adiabatic Cooler Activation

When the adiabatic cooler is configured, its activation is related to the following factors:

- Fluid temperature (or pressure) of the circuit involved.
- Ventilation management in the circuit involved.
- External air temperature.
- External air humidity (optional).

More in detail, the Adiabatic Cooler is activated as follows:

1. The ventilation must be over the **AD03** value (in case of modulating ventilation) or with all steps being configured as active.
2. The fluid temperature measured by the target probe (inlet or outlet temperature based on parameter CF04) is over the set point value defined by **AD01**.
   OR
   The pressure value related to transducer probe exceeds the **AD01** set point value.
3. In case the two previous conditions are trouth, from that moment the controller verifies the external air temperature conditions and compares them with the value defined as adiabatic cooler activation set (parameter **ST19**).
4. If the external air humidity probe is also configured (optional), the controller also verifies the humidity conditions and compares them with the value defined by the adiabatic cooler activation humidity set-point (parameter **ST20**).

5. If both conditions are true for at least **AD06** seconds (calculated from the maximum ventilation request condition) the adiabatic cooler pump is activated.
   Activation conditions are true when:

$$T_{amb} \geq \boldsymbol{ST19}\ °C$$
$$RH_{amb} \leq \boldsymbol{ST20}\ \%$$

6. Upon activating the adiabatic cooler pump, after a delay of **AD05** seconds the consent will be given to the valve opening related to the involved circuit.
7. The possible second circuit performs the same activation procedure; should the pump be already active to support the first circuit, it will not be waiting for the delay AD05 before opening the circuit valve.

8.6.3 Adiabatic Cooler Deactivation

The adiabatic cooler deactivation occurs when at least one of the following confitions are trouth:

1. The fans modulating percentage decrease under the value defined by **AD03-AD04**.
2. In case of steps ventilations even one step is deactivated.
3. The fluid temperature measured by target probe decreases under the value **AD01-AD02**.
4. The gas pressure measured by target ransducer decrease under the value **AD01-AD02**.
5. The conditions of external temperature and/or humidity are no longer appropriate for at least **AD07** seconds;

When deactivating, in case of one circuit unit (or in case of adiabatic cooler actives in one circuit) the pump is immediately shut off while valves are closed after a fixed delay of 1 second.

In case of two circuits unit and both circuits are active, the deactivation occurs closing the valve of the first circuit no need longer adiabatic cooling. For second circuit the procedure is the same illustrated before.

An OFF minimum time exists for the adiabatic cooler before it can be reactivated, which time is defined by parameter **AD08**.

8.6.4 Adiabatic Cooler Actuators

The adiabatic cooler allows to configure three ON/OFF actuators, respectively for:

- Water pump.
- Circuit 1 valve activation.
- Circuit 2 valve activation.

In order to configure the adiabatic cooler, all fields must be defined, as reported in the table below:

Adiabatic cooler parametrisation	
Function activation	Defines if the adiabatic cooler is present.
Pump DO digital output	Defines the output for the activation (and deactivation) of the adiabatic cooler pump
Valve 1 DO digital output	Defines the output for the activation (and deactivation) of the circuit 1 valve
Valve 2 DO digital output	Defines the output for the activation (and deactivation) of the circuit 2 valve

8.7 Regulation Of Heat Recovery

The heat recovery function is only available for water units and for single-circuit units only (parameters **CF01** = 0 and **CF03** = 0).

This function provides for the use of a designated 3-way valve, which can be ON/OFF or modulating.

It is possible to define two different types of use for the hest recovery unit, based on the circuit construction. For this purpose, the parameter **CF10** is used, which provides for:

0 = Recovery not used.

1 = Recovery in serie with Dry Cooler unit.

2 = Recovery in parallel with Dry Cooler unit.

The activation of the heat recovery always depends on the dry-cooler input temperature probe.

When the heat recovery unit is configured, if there is a failure with this probe, it triggers an ACF configuration alarm.

8.7.1 Overview

The heat recovery function is activated when:

- The unit is ON.
- The possible digital contact of activation of the recovery unit is active.
- The dry cooler input probe temperature is favourable (see par.8.7.6 and 8.7.7).

If all above-mentioned conditions are true, the consent is given to the heat recovery unit, which means that the 3-way recovery valve is regulated. During the initial stages of recovery, ventilation can remain active for a time set from parameter **RC03** during which the recovery exchanger reaches its normal operation. During this time, the 3-way valve, if modulating, remains at the minimum modulation value.

The activation of the heat recovery can modify the standard settings of the dry cooler unit.

8.7.2 Heat Recovery Unit Function

The heat recovery function provides that, before distributing fluid to the dry cooler, it is possible to shut-off the fluid and use it as heating vector of an exchanger.

In order to use the heat recovery, a 3-way valve must allow the fluid flow to the exchanger on the recovery side.

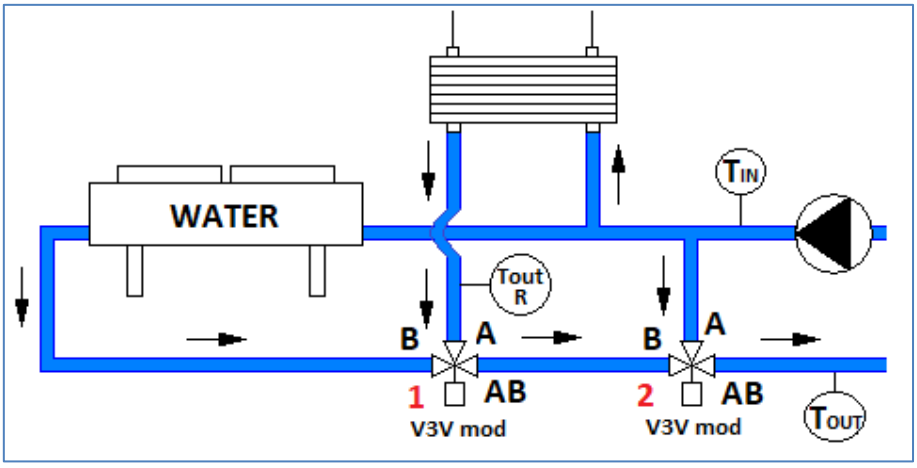
For this purpose, the used valve can be configured by means of parameter **RC01**:

0 = Modulating.

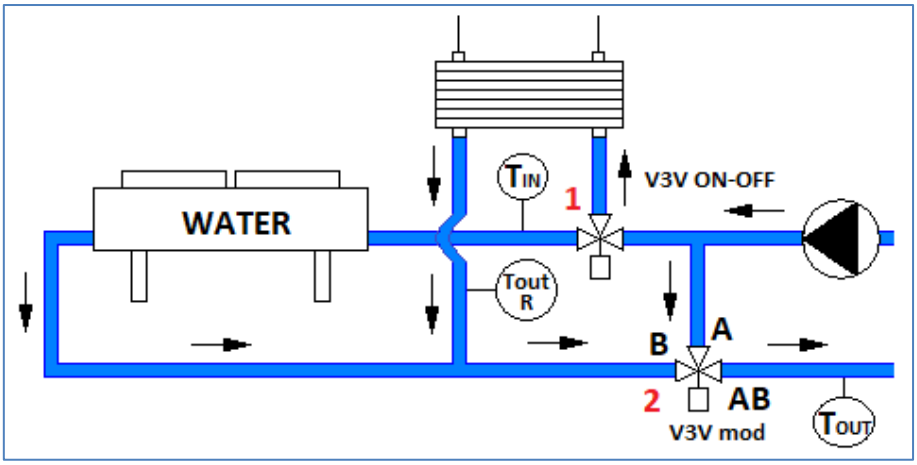
1 = ON/OFF.

8.7.3 Typical plant with Heat Recovery examples

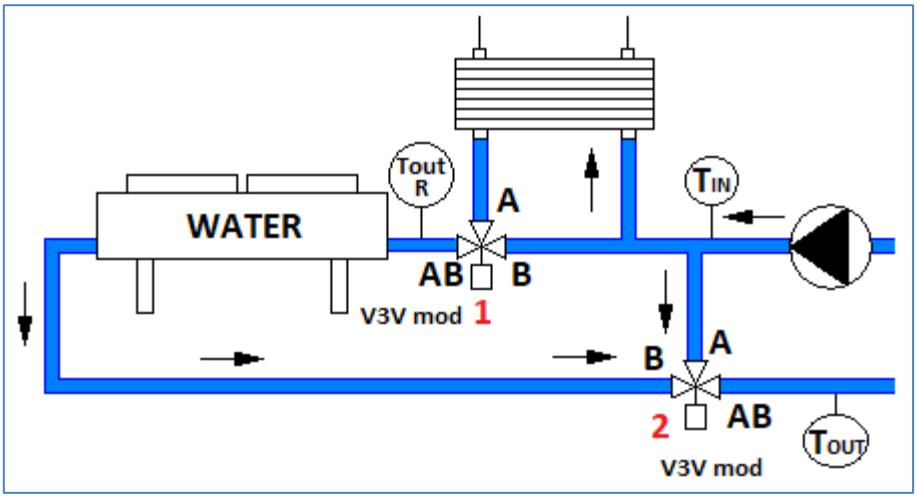
Heat Recovery in **parallel** with dry cooler unit (CF10=2) and 3-way **modulating** valve (RC01=0)



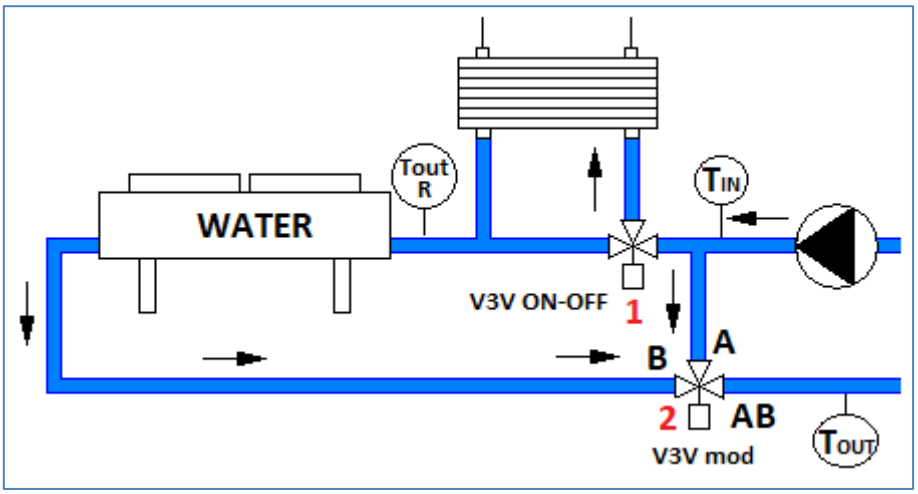
Heat Recovery in **parallel** with dry cooler unit (CF10=2) and 3-way **ON-OFF** valve (RC01=1)



Heat Recovery in **series** with dry cooler unit (CF10=1) and 3-way **modulating** valve (RC01=0)



Heat Recovery in **series** with dry cooler unit (CF10=1) and 3-way **ON-OFF** valve (RC01=1)



8.7.4 Regulation Direction

For each valve it is defined the regulation direction of the relevant actuator by means of parameter **RC12**.

If the regulation is direct while the error increases, the output signal increases.

If the regulation is reverse while the error increases, the output signal decreases.

If the MIN and MAX settings are not configured, regulation is performed considering the complete range 0-100%.

The graphs below show the output signal with regards to request according to the parametrised direction.

In case of alarm, the output to the 3-way valve actuator is overriden to 0 (or 100% in case of reverse regulation).

8.7.5 Input Temperature Calculation

The input temperature value can be mediated by the application in order to avoid oscillations in the operation of the recovery.

The parameter **RC15** defines the number of samplings of the fluid input temperature, which are used to calculate the average value.

The parameter **RC16** defines the sampling time in seconds.

If the value of **RC15** is greater than 1, for the regulation of the recovery valve, the mathematical average of the sampled values is used. Otherwise the instantaneous value of the probe is used, by ignoring the time **RC16** as well.

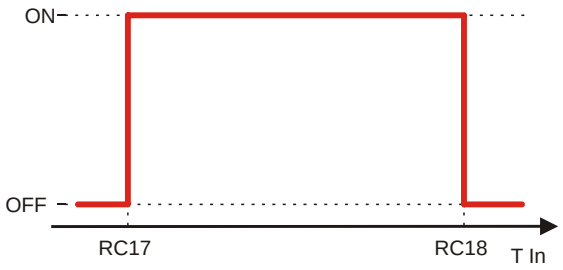
When starting up, if the number of acquired samples is lower than **RC15**, the instantaneous value of the probe is used.

8.7.6 Regulation Of The ON/OFF 3-Way Valve

If an ON/OFF valve is available, its regulation is done according to the parameters of fluid input minimum temperature (parameter **RC17**) and fluid input maximum temperature (parameter **RC18**) only.

The regulation is represented in the chart below:

Regulation of the ON/OFF recovery 3-way valve



When the heat recovery unit is active with the ON/OFF valve, the dry cooler fan function is off.

8.7.7 Regulation Of The Modulating 3-Way Valve

Should the regulation valve be modulating, two different regulations can be used, as defined from parameter **RC02**:

0 = modulation from fluid temperature input probe;

1 = modulation from ΔT fluid temperature;

*When the heat recovery unit is active with modulating valve, if **RC18**≠ 100 the ventilation function of the dry cooler follows its normal regulation, vice-versa when the heat recovery unit 3-way valve is to its maximum (100%), ventilation is deactivated.*

*An inappropriate parametrisation of the maximum value for the recovery valve opening (parameter **RC18**) could involve a too low fluid flow for the dry cooler during the recovery function.*

If:

- *the unit is in free-cooler mode;*
- *the recovery function is enabled **CF10**=1;*
- *external air temperature conditions are not favourable to free-cooling;*
- *the recovery is active or can be activated;*

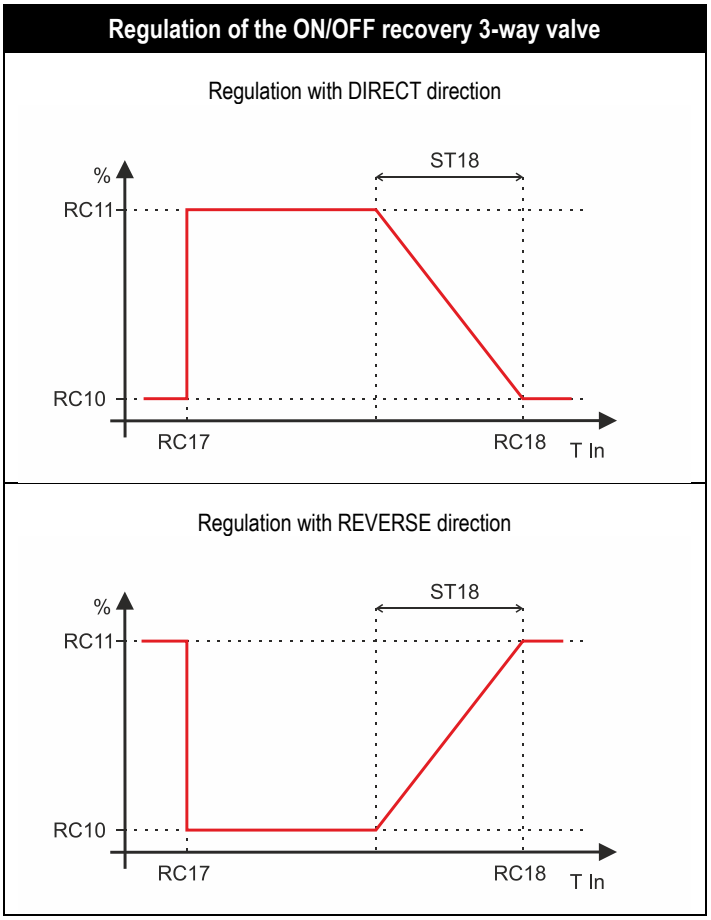
*in this case, as it is not possible to allow the fluid flow in the freecooler, the regulation of the recovery 3-way valve is overriden to 100% by ignoring the parameters **RC17**, **RC18** and **ST18**.*

8.7.7.1 Modulation From Fluid Input Temperature

If the parameter **RC02** is configured to 0 (from temperature input probe), it is necessary to define the parameters related to fluid input minimum temperature (parameter **RC17**) and fluid input maximum temperature (parameter **RC18**).

The regulation will modulate according to a band defined from parameter **ST18**.

The chart below represents the regulation of the modulating valve output:



The parameter of the band **ST18** must always be lower than the difference between parameters **RC18** and **RC17**. Should it be false, an ACF configuration alarm is generated.

8.7.7.2 Modulation From ΔT Recovery Unit

If the parameter **RC02** is configured to 1 (regulation from temperature difference), it is compulsory to use the recovery unit output temperature probe, which is used to define the ΔT of temperature based on the heat recovery effect:

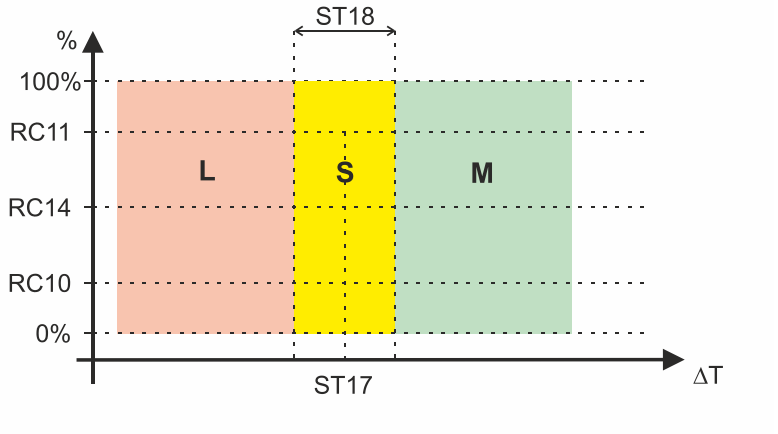
ΔT = TIn – Tout Rec

In this case, the values of minimum and maximum temperature for the fluid input (parameters **RC17** and **RC18**) are only used to enable the recovery function, modulation is performed on the basis of the differential temperature set-point and the regulation band.

Parameters **ST17** and **ST18** respectively define set-point ΔT and regulation band.

The chart below represents the regulation of the modulating valve output:

Regulation of the recovery modulating 3-way valve



The S zone is where the 3-way valve keeps its position
In L zone the valve is regulated according to the parameter **RC13** (% a second) by closing the DIRECT regulation, if present, and opening the REVERSE regulation, if present.
In M zone the valve is regulated according to the parameter **RC13** (% a second) by opening the DIRECT regulation, if present, and closing the REVERSE regulation, if present.
The **RC14** value defines the opening percentage of the recovery function enabling valve.

8.7.8 Function Of Manual Override

It is possible to override the command output of the 3-way valve in manual mode to a prefixed value in absolute value.

The parameter **RC26** enables or disables the manual override command of the recovery unit 3-way valve:

0 = Deactivated override command.

1 = Activated override command.

If the manual override command of the recovery unit 3-way command is activated, it is possible to proceed with the valve override to the output value defined by the parameter **RC27** (absolute value of the analog output) when at least one of the following inputs is active:

- Designated digital input if configured.
- BMS (Supervision).

The manual override deactivation occurs when both inputs are disabled.

Any intervention of deactivation of the 3-way recovery (OFF circuit, alarm,...) automatically aborts the manual override of the valve.

8.7.9 Parametrisation Of The Recovery Unit 3-Way Valve Actuator

The 3-way actuator can be configured as ON/OFF or modulating, in that case it uses the signal coming from the request to provide an output analog signal (0.10V or 4-20mA).

Two MIN and MAX parameters are possible should one wish to limit the regulating range of the modulating output, the MIN and MAX values are set by default to 0% and 100% to have the complete output range.

In order to configure the 3-way valve, the fields reported in the table below must be defined:

Parametrisation of the recovery unit 3-way actuator	
Recovery unit 3-way valve type	Defines the operating mode of the valve.
DO Digital output	Provides for the activation and deactivation of the ON/OFF valve (if configured).
Analogue output AO	Provides for the modulating signal for the valve (if configured).
MIN minimum limitation	MIN - Defines the minimum output value when the request is greater than 0.
MAX maximum limitation	MAX - Defines the maximum output value when the request is equal to 100%.

8.8 Auxiliary Regulations

The application has 4 auxiliary regulators that can be enabled individually. For each device, it is also possible to define:

- The analog values used for regulation (it is possible to use even external signals).
- The regulation type.
- The type of output.

Operation of auxiliary regulation is illustrated below. To simply matters, the parameters indicated refer to operation of auxiliary 1; please refer to the list of parameters for the others.

8.8.1 Definition Of Probe Or Controlled Value

The auxiliary regulator manages a set of more relations between a maximum of 2 probes, which can be selected among all the configured ones.

The parameter **AXA02** defines on which probe, or relation between probes, the regulation is performed. The possibilities offered by the parameter are:

0. 0= No actuation.
1. 1= Actuation on variable V1.
2. 2= Actuation on variable V2.
3. 3= Actuation on differential V1-V2.
4. 4= Actuation on differential V2-V1.
5. 5 = Actuation on MIN minimum value.
6. 6 = Actuation on MAX maximum value.
7. 7 = Actuation on MED average value.

Parameter AXA04 and AXA05 define which variables are used for regulations; below the list of variables available:

8. Circuit 1 inlet temperature probe.
9. Circuit 1 outlet temperature probe.
10. Circuit 1 pressure transducer.
11. Circuit 2 inlet temperature probe.
12. Circuit 2 outlet temperature probe.
13. Circuit 2 pressure transducer.
14. Pump 1 pressure transducer “A”.
15. Pump 1 pressure transducer “B”.
16. Pump 2 pressure transducer “A”.
17. Pump 2 pressure transducer “B”.
18. External air temperature probe.
19. External air humidity probe.
20. Heat Recovery outlet temperature probe.
21. Antifreeze temperature probe.
22. Auxiliaries probe 1.
23. Auxiliaries probe 2.
24. Auxiliaries probe 3.
25. Auxiliaries probe 4.
26. Analog output pump 1.
27. Analog output pump 2.
28. Analog output circuit 1 3 way valve.
29. Analog output circuit 2 3 way valve.
30. Analog output heat recovery 3 way valve.
31. Analog output fans circuit 1.
32. Analog output fans circuit 2.

In case of AXA02>2 the user must evaluate the consistency of the variables used; the software cannot verify this aspect.

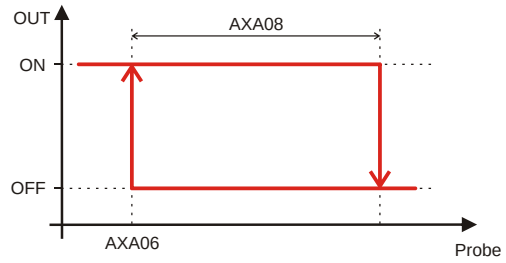
8.8.2 Regulators

For each single regulator, it is possible to select whether the output will be ON/OFF or Modulating.

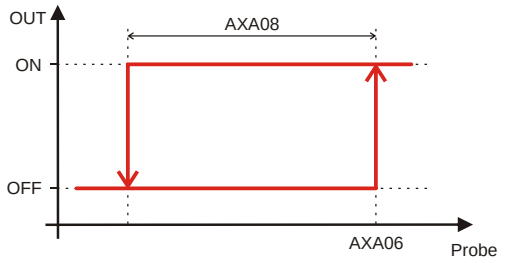
For the ON/OFF actuation, reference is made to the parameters **AXA06**, **AXA08** for set-point and differential, and **AXA03** for the regulation mode.

On/Off auxiliary regulation

Where **AXA03**=0
ON/OFF actuation with DIRECT mode



Where **AXA03**=1
ON/OFF actuation with REVERSE mode

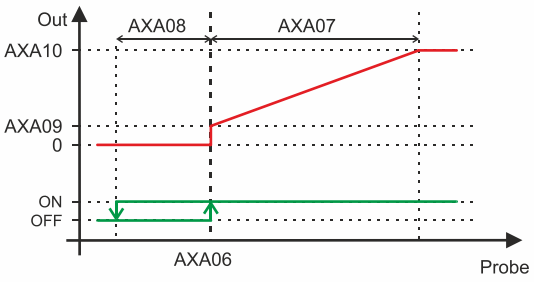


The modulating actuation enables both the analog and digital output (if both configured).

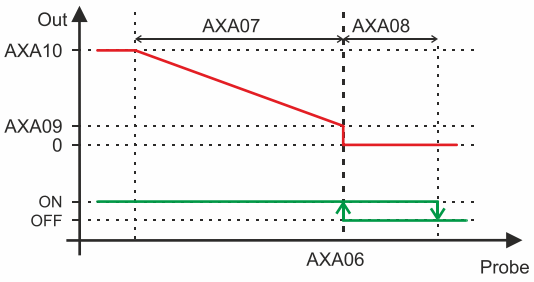
In this case it must be defined the set-point and differential and regulation mode for each regulator, as well as the minimum value of regulation and the maximum value of modulation.

Modulating auxiliary regulation

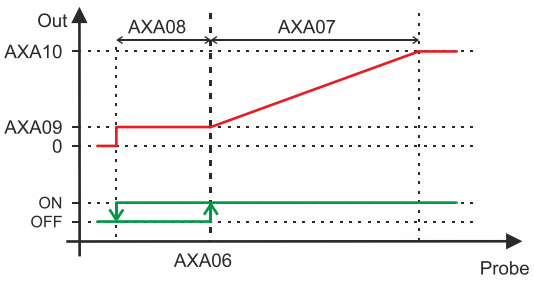
Where **AXA03=2**
Proportional actuation with DIRECT mode and keeping 0



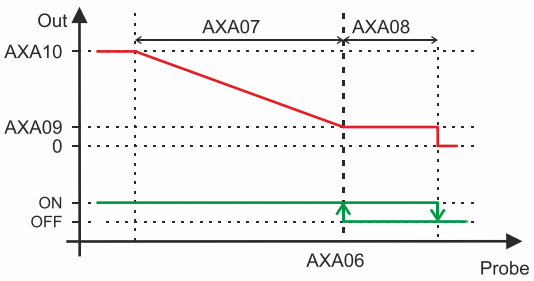
Where **AXA03=3**
Proportional actuation with REVERSE mode and keeping 0



Where **AXA03=4**
Proportional actuation with DIRECT mode and keeping minimum



Where **AXA03=5**
Proportional actuation with REVERSE mode and keeping minimum



In case of alarm on one or both probes used for the auxiliary regulator, it will bring its outputs to 0/off.

9. Machine Statuses

The machine status represents the condition where each configured circuit is operating.

Each machine status is subject to the general ON status of the dry cooler unit (see par.7.1)

In case dry cooler unit is ON, each circuit can have the following status:

- OFF - The circuit is shut-off.
- EMERGENCY – The circuit is in an emergency alarm status but it is not OFF.
- START-UP – The circuit is carrying out the start-up sequence from OFF to ON.
- ON - The circuit is properly working.
- SHUTDOWN – The circuit is under shutdown and is carrying out the sequence from ON to OFF.

The EMERGENCY status may occur from any other status.

From EMERGENCY the circuit switches to OFF status if it is controlled in OFF.

From EMERGENCY the circuit switches to ON (with circuit controlled in ON) always going through the OFF status.

9.1 OFF Status

During the OFF status all regulations are disabled, with the exception of certain alarms that are detected even with unit switched off.

9.2 EMERGENCY Status

The emergency status must have priority over all other statuses as it represents a safety feature for the unit and for operators.

When the Emergency status is triggered, the unit performs emergency shutdown and all resources are immediately disabled with modulation overridden to 0.

The following alarms trigger the EMERGENCY status and may do so even with unit OFF:

- Emergency stop.
- Freeze alarm.
- High condensing pressure alarm.
- Flow switch alarm.
- Pumps unit alarm.

The functions defined by each alarm are set out in the respective chapters.

The Emergency status is maintained for as long as the alarms that triggered it are active.

When the Emergency status is over, the unit goes back into its active status (ON, OFF) always going through the machine's OFF status and circuit start-up sequence.

If the unit is in Emergency from the ON status and the user does not wish the unit to restart after resetting the alarms, it is possible to set the OFF status, which command is executed as soon as the circuit exits the emergency status.

It is not possible to command the ON status from an Emergency status.

9.3 START-UP Status (Start Sequence)

The start-up of each circuit is always performed from the OFF status, only if the following conditions are met:

- There is no machine configuration alarm.
- No emergency alarm is present on the concerned circuit.

When receiving the start-up command, considering the most complete unit that can be parametrised, the following activation is carried out in sequence:

1. Request for circuit start-up.
2. Activation of pumping unit.
3. Activation of 3-way valve regulation.
4. Activation of ventilation and/or recovery regulation.
5. Activation of adiabatic cooler.

Each item above provides for its own activation sequences and delays that can be parametrised as specified in the relevant paragraphs.

The start-up phase is considered as completed when the pumping unit is active and regulated, considering that the following items can remain disabled based on the circuit regulation.

In case of units configured with double circuit, if the two circuits are switched on simultaneously, the second circuit is automatically started up with a fixed delay of 5 secs.

9.4 Restart After Black Out

The software provides that after a shutdown due to a black out, the dry cooler unit restarts in the status as it was before the voltage drop.

9.5 ON Status

During ON status all configured regulations not in alarm condition are active.

9.6 SHUTDOWN Status (Shutdown Sequence)

The machine may shut down from the machine ON status, START-UP status or EMERGENCY status.

The shutdown sequence is the following:

1. Adiabatic cooler deactivation.
2. Recovery deactivation.
3. Ventilation deactivation.
4. 3-way valve regulation deactivation.
5. Pumping unit deactivation.
6. Circuit in OFF.

Each item above provides for its own deactivation sequences and delays that can be parametrised as specified in the relevant paragraphs.

10. Alarms

The regulator alarms are divided into 3 different categories:

- ACF - Configuration alarms.
- AT - Probe reading alarms.
- AL - Unit alarms.

Below is a description of each alarm with the respective trigger and clear conditions and ensuing actuations.

10.1 Alarms Reset

Alarms can be resetted by HMI, by embedded Web site and by BMS. An alarm can be resetted only if the conditions which caused the alarm is expired.

In order to reset an alarm by HMI it is necessary to select the alarm and than push reset button.

10.2 Alarms history

It is possible to see alarm history in a dedicated menu.

Inside alarm history menu the user can see all the alarms in chronological way with activation and deactivation hour and date.

Alarm history can be downloaded in text format inside an USB storage device; please follow instruction on display in order to save the file.

Below each alarm is shown with its activation conditions, deactivation conditions and all the consequences in terms of regulation.

10.3 Configuration Alarms

The application triggers the following configuration alarms to prevent abnormal operation in case of incorrect configuration by the user.

Alarm Code	ACF01
Description	General unit settings configuration alarm
Trigger conditions	One or more of the following conditions exist: • The unit is configured with the gas unit, however, a Free-cooler operating mode is also selected. Parameter **CF01**>0 simultaneously with **CF02**≠2. • The same input is parametrised for different functions. • The same output is parametrised for different functions. • The unit is configured as water unit (CF01=0) controlled on inlet temperature (CF04=0), but te probe isn't configured (UN01=0 and/or UN31=0). • The unit is configured as water unit (CF01=0) controlled on outlet temperature (CF04=1), but te probe isn't configured (UN06=0 and/or UN36=0). • The unit is configured as gas unit (CF01=1) controlled on inlet temperature (CF04=0), but te probe isn't configured (UN01=0 and/or UN31=0). • The unit is configured as gas unit (CF01=1) controlled on inlet temperature (CF04=1), but te probe isn't configured (UN06=0 and/or UN36=0). • The unit is configured as gas unit (CF01=2) controlled on pressure (CF04=1), but te probe isn't configured (UN11=0 and/or UN41=0).
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF02
Description	Pumps configuration alarm
Trigger conditions	One or more of the following conditions exist: • The unit is configured with two hydraulic circuits **CF03**=1 but two pumps are parametrised for circuit **CF05**>2. • The unit is configured as a gas unit **CF01**>0 but at least one pump is parametrised as **CF05**≠0. • The unit has modulating pumps (**CF05**=2 or **CF05**=4) but there isn't any analog input for regulation (**PM09**=0 and/or **PM25**=0). • The unit has one circuit (CF03=0) and one ON/OFF pump (**CF05**=1) but there isn't any digital input for pump start-up (**PM03**=0). • The unit has one circuit (**CF03**=0) and one modulating pump (**CF05**=2) but there isn't any digital input for pump start-up and any analog input for regulation (**PM03**=0 and/or **PM05**=5). • The unit has two circuits (**CF03**=1) and one ON/OFF pump (**CF05**=1) but there isn't any digital input for pump start-up and any analog input for regulation (**PM03**=0 and/or **PM19**=0). • The unit has two circuits (**CF03**=1) and one modulating pump (**CF05**=2) but there isn't any digital input for pump start-up and any analog input for regulation (**PM03**=0 and/or **PM05**=0 and/or **PM19**=0 and/or **PM21**=0). • The unit has one circuit (CF03=0) and two ON/OFF pumps (**CF05**=3) but there aren't any digital inputs for pumps start-up (**PM03**=0 and/or **PM19**=0). • The unit has one circuit (**CF03**=0) and two modulating pumps (**CF05**=4) but there aren't any digital inputs for pumps start-up and any analog inputs for regulation (**PM03**=0 and/or **PM05**=0 and/or **PM19**=0 and/or **PM21**=0). • With water flow alarm detection from probe **AL13**>0, the value parametrised as the set point to enable the water flow alarm **AL19** is higher than the set point values provided for regulation of modulating pumps **ST10** and **ST29**. • A water flow alarm is provided by flow switch **AL13**=0 but the relative digital input is not configured • A water flow alarm is provided by pressure probe **AL13**=0 but the relative analog input is not configured.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF03
Description	3-way valve configuration alarm
Trigger conditions	One or more of the following conditions exist: • Parametrisation of the operating mode of unit **CF02** is not consistent with the regulation mode provided for the **CF06** 3-way valve. • The unit is configured as a gas unit **CF01**>0 and at the same time, a 3-way valve **CF06**≠0 is parametrised. • The unit provides for use of the 3-way valve **CF06**≠0 and the regulation band of minimum valve opening is not greater than the regulation band of maximum opening of **ST15**>**ST14**. • The unit has one circuit (**CF03**=0) and one 3-way modulating valve (**CF06**>0) but there isn't any analog output for valve control (**VL01**=0). • The unit has two circuits (**CF03**=1) and two 3-way modulating valve (**CF06**>0) but there isn't at least one analog output for valve control (**VL01**=0 and/or **VL20**=0).
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF04
Description	Recovery unit configuration alarm
Trigger conditions	One or more of the following conditions exist: • A heat recovery unit **CF10**>0 is provided but the fluid inlet temperature probe is not configured. • A heat recovery unit **CF10**>0 is provided with a modulating valve **RC01**=0 regulated on recovery unit differential temperature **RC02**=1, but the recovery unit output temperature probe is not configured. • A heat recovery unit **CF10**>0 is provided with modulating valve **RC01**=0 regulated on the dry cooler input temperature probe **RC02**=0 and the value defined for recovery regulation band **ST18** is greater than the difference between the maximum **RC18** and minimum **RC17** operating values (**ST18**>**RC18**-**RC17**). • A heat recovery unit **CF10**>0 is provided with a modulating valve **RC01**=0 regulated on recovery unit differential temperature **RC02**=1, and the ΔT **ST17**=0 set point value is not defined. • A heat recovery unit **CF10**>0 is provided with a modulating valve **RC01**=0 regulated on recovery unit differential temperature **RC02**=1 and the value of the band is not consistent with regulation of **ST17**-(**ST18**/2)<0. • A heat recovery regulated on recovery unit differential temperature has a 3-way ON/OFF valve. • A heat recovery regulated on recovery unit differential temperature hasn't the outlet water temperature probe. • The heat recovery is in series with dry cooler unit and the dry cooler is regulated on inlet water temperature.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF05
Description	Ventilation configuration alarm
Trigger conditions	One or more of the following conditions exist: • Step ventilation regulation is parametrised **CF08**=1 but the number of digital outputs configured is not consistent with the regulation steps parametrised in **FAA01** and **FAB01**. • Step ventilation regulation is parametrised CF08=1 but the number of digital outputs configured is different respect steps number. • Modulating ventilation **CF08**=2 is provided but the relative regulation analog digital outputs **FAA07**=0 and/or **FAB07**=0 are not configured. • Step ventilation regulation **CF08**=1 is parametrised but there is an inconsistency between the number of steps parametrised for ventilation regulation of **FAA01** and **FAB01** and the differentials set to enable each step **FAA02**, **FAA03**, **FAA04**, **FAB02**. • Modulating ventilation **CF08**>1 is provided but the band, differential 1 and differential 2 values parametrised for regulation do not differ from 0. I.e. **ST02**=0 and/or **ST05**=0 and/or **ST07**=0 and/or **ST08**=0 for circuit 1 ventilation **ST22**=0 and/or **ST25**=0 and/or **ST27**=0 and/or **ST28**=0 for circuit 2 ventilation • Modulating ventilation **CF08**>1 is provided, but the values parametrised for the fan speed are not consistent, meaning: **FAA15**>**FAA16** and/or **FAA16**>**FAA17** for circuit 1 **FAB09**>**FAB10** and/or **FAB10**>**FAB11** for circuit 2 • Modulating ventilation **CF08**>1 is provided, but the override values are not consistent, meaning: **ST03**<**ST02**+**ST07**+**ST08** for circuit 1 in condenser mode **ST06**<**ST05**+**ST07**+**ST08** for circuit 1 in freecooler mode **ST23**<**ST22**+**ST27**+**ST28** for circuit 2 in condenser mode **ST26**<**ST25**+**ST27**+**ST28** for circuit 2 in freecooler mode
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF06
Description	Adiabatic cooler configuration alarm
Trigger conditions	One or more of the following conditions exist: • An adiabatic cooler **CF11**=1 is parametrised for a single unit, but the digital output is not provided for adiabatic cooler pump activation **AD09**=0. • An adiabatic cooler **CF11**=1 is parametrised for a unit with a double circuit, but the digital outputs envisaged for the pump and/or C1 and C2 activation valves have not been configured, meaning: **AD09**=0 and/or **AD11**=0 and/or **AD13**=0. • An adiabatic cooler **CF11**=1 is parametrised, but no ambient temperature probe has been configured to activate function **UN16**=0.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF07
Description	Auxiliary function 1 configuration alarm
Trigger conditions	One or more of the following conditions exist: • The auxiliary 1 function is used with regulation on probe Pb01, meaning **AXA02**=1 but the probe defined for regulation of **AXA04** is not configured. • The auxiliary 1 function is used with regulation on probe Pb02, meaning **AXA02**=2 but the probe defined for regulation of **AXA05** is not configured. • The auxiliary 1 function is used with regulation on both probes Pb01 and Pb02, meaning **AXA02**>2 but the probes defined for regulation of **AXA04** and **AXA05** are not configured. • The function of auxiliary 1 **AXA02**>0 is used but the regulation differential is **AXA08**=0. • The function of auxiliary 1 **AXA02**>0 with proportional operation **AXA03**>1 is used but the proportional regulation band **AXA07**=0 is not configured.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF08
Description	Auxiliary function 2 configuration alarm
Trigger conditions	One or more of the following conditions exist: • The auxiliary 2 function is used with regulation on probe Pb01, meaning **AXB02**=1 but the probe defined for regulation of **AXB04** is not configured. • The auxiliary 2 function is used with regulation on probe Pb02, meaning **AXB02**=2 but the probe defined for regulation of **AXB05** is not configured. • The auxiliary 2 function is used with regulation on both probes Pb01 and Pb02, meaning **AXB02**>2 but the probes defined for regulation of **AXB04** and **AXB05** are not configured. • The function of auxiliary 2 **AXB02**>0 is used but the regulation differential is **AXB08**=0. • The function of auxiliary 2 **AXB02**>0 with proportional operation **AXB03**>1 is used but the proportional regulation band **AXB07**=0 is not configured.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF09
Description	Auxiliary function 3 configuration alarm
Trigger conditions	One or more of the following conditions exist: • The auxiliary 3 function is used with regulation on probe Pb01, meaning **AXC02**=1 but the probe defined for regulation of **AXC04** is not configured. • The auxiliary 3 function is used with regulation on probe Pb02, meaning **AXC02**=2 but the probe defined for regulation of **AXC05** is not configured. • The auxiliary 3 function is used with regulation on both probes Pb01 and Pb02, meaning **AXC02**>2 but the probes defined for regulation of **AXC04** and **AXC05** are not configured. • The function of auxiliary 3 **AXC02**>0 is used but the regulation differential is **AXC08**=0. • The function of auxiliary 3 **AXC02**>0 with proportional operation **AXC03**>1 is used but the proportional regulation band **AXC07**=0 is not configured.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

Alarm Code	ACF10
Description	Auxiliary function 4 configuration parameters
Trigger conditions	One or more of the following conditions exist: • The auxiliary 4 function is used with regulation on probe Pb01, meaning **AXD02**=1 but the probe defined for regulation of **AXD04** is not configured. • The auxiliary 4 function is used with regulation on probe Pb02, meaning **AXD02**=2 but the probe defined for regulation of **AXD05** is not configured. • The auxiliary 4 function is used with regulation on both probes Pb01 and Pb02, meaning **AXD02**>2 but the probes defined for regulation of **AXD04** and **AXD05** are not configured. • The function of auxiliary 4 **AXD02**>0 is used but the regulation differential is **AXD08**=0. • The function of auxiliary 4 **AXD02**>0 with proportional operation **AXD03**>1 is used but the proportional regulation band **AXD07**=0 is not configured.
Action	Emergency stop
Signal	Buzzer + Flashing red and green LEDs
Reset type	Always automatic (with correct configuration)
Relay activation	General alarm relay + warning relay activation

10.4 Unit Alarms

The application provides for a series of specific alarms, related to the unit operation, in order to prevent hazardous situations.

Below the specific tables of alarms with activation, deactivation and actuation conditions.

10.5 Water Flow Alarm

Alarm Code	AL001
Description	Alarm for missing water flow in circuit 1 from pump 1
Trigger conditions	From digital input, after a time defined by parameter **AL21**. From analog input, if the value of the pressure transducer A is lower than the setting from parameter **AL19** after a time defined by parameter **AL21**.
Clearing conditions	As per logic described below
Action	The circuit disables its regulation and turns off ventilation and pumps, as per the logics described below
Signal	Buzzer + Red LED on
Reset type	Automatic with trigger condition cleared, as per logic described below Defined by parameter **AL22** with trigger condition NOT cleared, as per logic described below
Relay activation	General alarm relay activation

Alarm Code	AL002
Description	Alarm for missing water flow in circuit 1 from pump 2
Trigger conditions	From digital input, after a time defined by parameter **AL21**. From analog input, if the value of the pressure transducer A is lower than the setting from parameter **AL19** after a time defined by parameter **AL21**.
Clearing conditions	As per logic described below
Action	The circuit disables its regulation and turns off ventilation and pumps, as per the logics described below
Signal	Buzzer + Red LED on
Reset type	Automatic with trigger condition cleared, as per logic described below Defined by parameter **AL22** with trigger condition NOT cleared, as per logic described below
Relay activation	General alarm relay activation

Alarm Code	AL003
Description	Alarm for missing water flow in circuit 2
Trigger conditions	From digital input, after a time defined by parameter **AL21**. From analog input, if the value of the pressure transducer A is lower than the setting from parameter **AL19** after a time defined by parameter **AL21**.
Clearing conditions	As per logic described below
Action	The circuit disables its regulation and turns off ventilation and pumps, as per the logics described below
Signal	Buzzer + Red LED on
Reset type	Automatic with trigger condition cleared, as per logic described below Defined by parameter **AL22** with trigger condition NOT cleared, as per logic described below
Relay activation	General alarm relay activation

The alarm for water flow is triggered when the missing water flow is verified in one of the unit circuits and can come from a flowmeter or differential pressure probe, according to setting of parameter **AL13** that enables it.

0 = Alarm for water flow from flowmeter.

1 = Alarm for water flow from probe.

2 = Alarm for water flow from flowmeter + probe.

With parameter **AL13** > 0 it must be defined the set-point and hysteresis values used to verify the conditions of missing water flow in the circuit (parameters **AL19** and **AL20**). The set-point used to trigger the alarm for water flow must always be lower than the set provided for the regulation of pumps (parameters **ST10** and **ST29**) otherwise an ACF configuration alarm is displayed.

With parameter **AL13** = 2 both conditions (from flowmeter and probe) must always be present to trigger the alarm.

If the alarm is triggered from the flowmeter, the relevant input for each configured circuit must be set.
In the same way, if the alarm comes from the pressure probe, the main regulation probe must be set.
The missing configuration of inputs designated to the water flow verification triggers an ACF configuration alarm.

Its activation occurs after a delay from the start of alarm condition, which delay is defined from parameter **AL21**, when the alarm is triggered, it has the following effects on the regulation of the concerned circuit:

- Disables the active pump.
- Disables the function of adiabatic cooler.
- Disables the ventilation.
- Disables the heat recovery.
- Overrides to recirculation the configured 3-way valve.
- After the parametrised time **AL22** a new attempt is made to start up the pump, checking for any new water flow alarms.

The deactivation of the alarm for water flow occurs according to the logic described below:

After a time equal to **AL22** seconds has elapsed, the alarm is automatically reset and the pump restarts, which was previously on (if conditions permit).

A check time elapses, defined by parameter **AL14**, to ensure the alarm has been cleared and the circuit has circulating water flow.

if the alarm is cleared, the circuit reactivates its standard regulations according to times foreseen by the start-up procedure

Vice versa, if the alarm remains on, the unit gives a new signal.

The automatic alarm reset with subsequent restart is permitted for a maximum number of triggers defined from parameter **AL23**, exceeded which the alarm becomes manually reset and must be verified in the field.

Should two pumps be configured in relief, in case of water flow alarm the application automatically restarts the pump that was not previously on.
*If the circuit remains in alarm status, the consent is given to a new rotation up to the maximum number of interventions that is set from parameter **AL23** after which the alarm becomes upon manual reset.*

*The water flow alarm is only signalled when a water dry cooler is configured (parameter **CF01**= 0).*
For water units with a configured pumps unit, it is compulsory to provide for a system to detect water flow for each present circuit.

10.6 High Pressure Alarm (Gas Dry Cooler)

Alarm Code	AL004
Description	High pressure alarm from circuit 1 pressure switch
Trigger conditions	From digital input to signal from circuit 1 pressure switch.
Clearing conditions	From digital input to signal to deactivation of circuit 1 pressure switch.
Action	The circuit disables its regulation by switching off ventilation and adiabatic cooler.
Signal	Buzzer + Red LED on.
Reset type	Always manual.
Relay activation	General alarm relay activation + Circuit 1 HP alarm relay activation.

Alarm Code	AL005
Description	High pressure alarm from circuit 1 pressure transducer.
Trigger conditions	From analog input configured as circuit 1 dry cooler pressure probe, if the value of the pressure transducer is greater than what is defined from parameter **AL03**.
Clearing conditions	From analog input configured as circuit 1 dry cooler pressure probe, if the value of the pressure transducer is lower than what is defined from parameter **AL03** - **AL04**.
Action	The circuit disables its regulation by switching off ventilation and adiabatic cooler.
Signal	Buzzer + Red LED on.
Reset type	Always manual.
Relay activation	General alarm relay activation + Circuit 1 HP alarm relay activation.

Alarm Code	AL006
Description	High pressure alarm from circuit 2 pressure switch.
Trigger conditions	From digital input to signal from circuit 2 pressure switch.
Clearing conditions	From digital input to signal to deactivation of circuit 2 pressure switch.
Action	The circuit disables its regulation by switching off ventilation and adiabatic cooler.
Signal	Buzzer + Red LED on.
Reset type	Always manual.
Relay activation	General alarm relay activation + Circuit 2 HP alarm relay activation.

Alarm Code	AL007
Description	High pressure alarm from circuit 2 pressure transducer.
Trigger conditions	From analog input configured as circuit 2 dry cooler pressure probe, if the value of the pressure transducer is greater than what is defined from parameter **AL09**.
Clearing conditions	From analog input configured as circuit 1 dry cooler pressure probe, if the value of the pressure transducer is lower than what is defined from parameter **AL09** - **AL10**.
Action	The circuit disables its regulation by switching off ventilation and adiabatic cooler.
Signal	Buzzer + Red LED on.
Reset type	Always manual.
Relay activation	General alarm relay activation + Circuit 2 HP alarm relay activation.

10.7 Pump Alarm From External Contact Or MCB

Alarm Code	AL008
Description	Pump 1 alarm from external alarm contact (or MCB)
Trigger conditions	From digital input, after a time defined from parameter **PM40**.
Clearing conditions	From digital input, after a time defined from parameter **PM41**.
Action	The circuit disables its regulation and turns off ventilation and pumps, as per the logics described below.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **PM42** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation.

Alarm Code	AL009
Description	Pump 2 alarm from external alarm contact (or MCB)
Trigger conditions	From digital input, after a time defined from parameter **PM45**
Clearing conditions	From digital input, after a time defined from parameter **PM46**
Action	The circuit disables its regulation and turns off ventilation and pumps, as per the logics described below.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **PM47** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation.

When the alarm is triggered, it has the following effects on the regulation of the concerned circuit:

- Disables the active pump.
- Disables the function of adiabatic cooler.
- Disables the ventilation.
- Disables the heat recovery.
- Overrides to recirculation the configured 3-way valve.

Should two pumps be configured in relief, in case of external contact alarm the application automatically restarts the pump that was not previously on.
*If the circuit remains in alarm status, the consent is given to a new rotation up to the maximum number of interventions that is set from the relative parameters **PM42** and **PM05** after which the alarm becomes upon manual reset.*

10.8 Fans Alarm From External Contact Or MCB

In case unit has fans, it is possible to adopt a dedicated alarm (fans failure) activated by digital input.

The fans alarm can be managed in two different ways using parameter FAA28:

- 0= Only warning.
- 1= Fans stop.

Parameter FAA28 manages alarm for both circuits according to the following table:

	FAA28=0	FAA28=1
Circuit 1 ventilation	**AL010** Warning ventilation circuit 1 from external signal or MCB	**AL011** Alarm ventilation circuit 1 from external signal or MCB
Circuit 2 ventilation	**AL012** Warning ventilation circuit 2 from external signal or MCB	**AL013** Alarm ventilation circuit 2 from externla signal or MCB

Alarm Code	AL010
Description	Ventilating bench 1 warning from external alarm contact (or MCB).
Trigger conditions	From digital input, ventilating bench 1 fans cumulative overload.
Clearing conditions	From digital input, ventilating bench 1 fans cumulative overload.
Action	The circuit works normally but the controller gives a warning.
Signal	Flashing red LED.
Reset type	Defined from parameter **FAA31** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	Warning relay activation + ventilation 1 alarm relay activation.

Alarm Code	AL011
Description	Ventilating bench 1 alarm from external alarm contact (or MCB).
Trigger conditions	From digital input, ventilating bench 1 fans cumulative overload.
Clearing conditions	From digital input, ventilating bench 1 fans cumulative overload.
Action	The circuit disables ventilation and adiabatic cooler, if present.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **FAA31** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation + ventilation 1 alarm relay activation.

Alarm Code	AL012
Description	Ventilating bench 2 warning from external alarm contact (or MCB).
Trigger conditions	From digital input, ventilating bench 2 fans cumulative overload.
Clearing conditions	From digital input, ventilating bench 2 fans cumulative overload.
Action	The circuit works normally but the controller gives a warning.
Signal	Flashing red LED.
Reset type	Defined from parameter **FAA31** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	Warning relay activation + ventilation 2 alarm relay activation.

Alarm Code	AL013
Description	Ventilating bench 2 alarm from external alarm contact (or MCB).
Trigger conditions	From digital input, ventilating bench 2 fans cumulative overload.
Clearing conditions	From digital input, ventilating bench 2 fans cumulative overload.
Action	The circuit disables ventilation and adiabatic cooler, if present.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **FAA31** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation + ventilation 2 alarm relay activation.

10.9 Inverter Fans Alarm

In case of unit with modulation ventilation, it is possible to adopt a dedicated inverter alarm for each ventilation bench.

The inverter fans alarm can be managed in two different ways using parameter FAA32.

Parameter FAA32 manages alarm for both circuits according to the following table:

	FAA32=0	FAA32=1
Circuit 1 ventilation	**AL014** Warning ventilation circuit 1 from inverter digital output	**AL015** Alarm ventilation circuit 1 from inverter digital output
Circuit 2 ventilation	**AL016** Warning ventilation circuit 2 from inverter digital output	**AL017** Alarm ventilation circuit 2 from inverter digital output

Alarm Code	AL014
Description	Circuit 1 ventilation warning from inverter anomaly.
Trigger conditions	From digital input circuit 1 inverter anomaly, after a time defined from parameter **FAA35**.
Clearing conditions	From digital input circuit 1 inverter anomaly, after a time defined from parameter **FAA36**.
Action	The circuit works normally but the controller gives a warning.
Signal	Flashing red LED.
Reset type	Defined from parameter **FAA37** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	Warning relay activation + ventilation 1 alarm relay activation.

Alarm Code	AL015
Description	Circuit 1 ventilation alarm from inverter anomaly.
Trigger conditions	From digital input circuit 1 inverter anomaly, after a time defined from parameter **FAA35**.
Clearing conditions	From digital input circuit 1 inverter anomaly, after a time defined from parameter **FAA36**.
Action	The circuit disables ventilation and adiabatic cooler, if present.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **FAA37** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation + ventilation 1 alarm relay activation.

Alarm Code	AL016
Description	Circuit 2 ventilation warning from inverter anomaly.
Trigger conditions	From digital input circuit 2 inverter anomaly, after a time defined from parameter **FAB20**.
Clearing conditions	From digital input circuit 2 inverter anomaly, after a time defined from parameter **FAB21**.
Action	The circuit works normally but the controller gives a warning.
Signal	Flashing red LED.
Reset type	Defined from parameter **FAB22** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	Warning relay activation + ventilation 2 alarm relay activation.

Alarm Code	AL017
Description	Circuit 2 ventilation alarm from inverter anomaly.
Trigger conditions	From digital input circuit 2 inverter anomaly, after a time defined from parameter **FAB20**.
Clearing conditions	From digital input circuit 2 inverter anomaly, after a time defined from parameter **FAB21**.
Action	The circuit disables ventilation and adiabatic cooler, if present.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **FAB22** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation + ventilation 2 alarm relay activation.

10.10 Antifreeze Alarm

The antifreeze alarm and relevant early warning are required when the dry cooler operating with water must be protected from possible freezing. To do so the unit goes into a specific control status.

Even if the unit is OFF, when the antifreeze function is enabled the machine goes into the stated conditions for this alarm.

The parameter **AL24** identifies the antifreeze alarm management according to the thermostat and/or probes that are used:

0 = Antifreeze alarm not managed.

1 = Alarm from anti-freeze thermostat.

2 = Alarm and early warning from outdoor air temperature probe.

3 = Alarm and early warning from outdoor air temperature probe + thermostat.

4 = Alarm and early warning from outdoor air temperature probe + fluid side antifreeze probe.

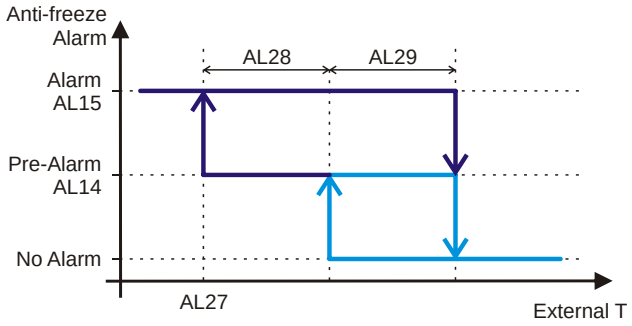
5 = Fluid side anti-freeze probe alarm.

Parameter AL24	AL24=0	AL24=1	AL24=2	AL24=3	AL24=4	AL24=5
Anti-freeze thermostat	Not provided	Used for regulation	Not used	Used for monitoring	Not used	Not used
External air temperature probe	Not provided	Not used	Used for regulation	Used for regulation	Used for regulation	Not used
Water side antifreeze probe	Not provided	Not used	Not used	Not used	Used for regulation	Used for regulation

The antifreeze alarm is detected as follows:

- With anti-freeze thermostat (**AL24**=1) the alarm is triggered only with anti-freeze thermostat on.
- With outdoor air temperature probe used as antifreeze temperature probe (**AL24**=2) the set point temperature must be configured (parameter **AL27**) as well as the differentials, respectively for disabling (parameter **AL29**) and early warning function (parameter **AL28**).
  The antifreeze alarm is triggered as shown in the following graph:

Antifreeze early warning and alarm

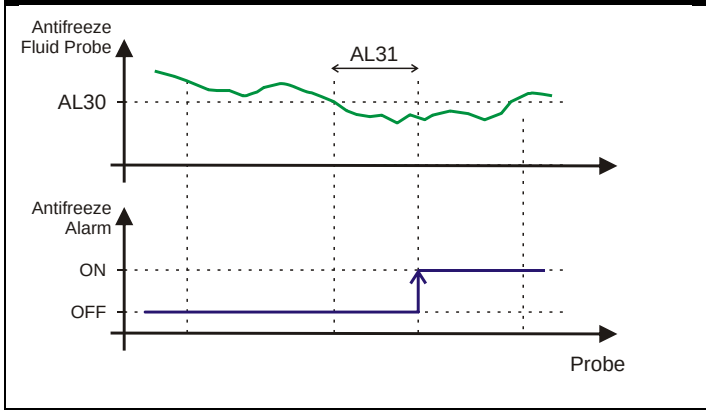


- With anti-freeze temperature probe and monitoring thermostat (**AL24**=3) the set point temperature must be configured, as well as the differentials, respectively for disabling and early warning function.
  When the unit is in early warning condition the status of the anti-freeze thermostat defines entering the alarm status, as follows:
  When the thermostat activates the unit immediately goes into alarm status, regardless of the temperature read by the antifreeze probe.
  Without thermostat activation the unit goes into alarm mode when the antifreeze probe temperature is lower than the antifreeze set point.
  Activations with outdoor air temperature probe follow the same logic set out in the previous graph.
  The antifreeze status is exited when the temperature probe goes back above the threshold defined from parameters **AL27**+**AL28**+**AL29**.
- With parameter **AL24**=4, the use is provided of a possible antifreeze probe on the fluid side for which the monitoring set points **AL30** and respective dwell delay under the monitoring set point **AL31** must also be parametrised.
  It must be also configured the set-point temperature (air side) **AL27** and the relevant differentials for the deactivation and early warning function **AL28** and **AL29**.

When the unit is in early warning condition the monitoring probe on the fluid side defines entering the alarm status, as follows:
If the monitor probe remains under the antifreeze monitor set point (parameter **AL30**) for at least **AL31** seconds, the unit immediately goes into alarm status regardless of the temperature read by the outdoor air temperature probe.
Without activation due to the monitor probe the unit goes into alarm mode when the outdoor air probe temperature is lower than the antifreeze set point (**AL27**).
Activations with outdoor air temperature probe follow the same logic set out in the previous graph.
Exit from the antifreeze status occurs as follows:
When the fluid side antifreeze temperature probe rises above the threshold set by parameters **AL30**+**AL28**, the system falls back within the antifreeze pre-alarm status, unless the outdoor air is below the relative alarm value **AL27**.
If the outdoor air temperature exceeds the pre-alarm disabling value (**AL27**+**AL28**+**AL29**), the antifreeze alarm status is cleared completely.
If the outdoor air temperature is higher than the antifreeze pre-alarm status, but the fluid side temperature is below the alarm activation set point, the unit does NOT issue any signal.

The following graph shows the trigger conditions with anti-freeze probe on the water side:

Antifreeze alarm with probe on the fluid side



- With parameter **AL24**=5, use is only provided of an antifreeze probe on the fluid side for which the monitoring set points and respective dwell delay under the monitoring set point must also be parametrised.
  When the fluid side antifreeze probe has a value below the set point (parameter **AL30**) for at least **AL31** seconds, the unit immediately triggers an alarm.
  When the fluid side antifreeze temperature probe goes back above the threshold defined by parameters **AL30+AL28**, the alarm is cleared.

Alarm Code	**AL018**
Description	Antifreeze early warning.
Trigger conditions	Defined from parameter **AL24**, where **AL24** >1 the activation occurs from the outdoor air temperature probe; The early warning triggering condition is immediate.
Clearing conditions	From outdoor air temperature probe, immediate deactivation.
Action	Signalling the antifreeze early warning status.
Signal	Flashing red LED.
Reset type	Always automatic (with trigger condition cleared).
Relay activation	Warning relay activation.

During the antifreeze early warning, the unit keeps its normal operation; the adiabatic cooler function is disabled and the early warning condition is signalled by means of a warning.

Alarm Code	**AL019**
Description	Antifreeze alarm

Trigger conditions	Defined from parameter **AL24** 0 = Antifreeze alarm not managed; 1 = Alarm from anti-freeze thermostat; 2 = Alarm from external air temperature probe; 3 = Alarm from external air temperature probe + thermostat; 4 = Alarm from outdoor air temperature probe + fluid side antifreeze probe; The alarm triggering condition is immediate for **AL24** <4. The trigger condition occurs after **AL31** seconds from verification of the alarm condition by the monitor probe with **AL24** =4.
Clearing conditions	Defined from parameter **AL24** : With **AL24** =1 clearing is from anti-freeze thermostat; with **AL24** >1 clearing is from outdoor air temperature probe; The alarm clearing condition is immediate.
Action	Unit in anti-freeze alarm
Signal	Buzzer + Red LED on
Reset type	Defined from parameter **AL32** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared)
Relay activation	General alarm relay activation

When the unit is in antifreeze alarm:

- The adiabatic cooler deactivation remains.
- Ventilation is disabled.
- The dry cooler side circulating unit is enabled.
- The 3-way valve is overridden to safety position.
- The heat recovery is disabled.
- Pumps keeps the regulation in use.

10.11 Adiabatic Cooler Pump Alarm From External Contact Or MCB

Alarm Code	AL020
Description	Adiabatic cooler pump alarm from external alarm contact (or MCB).
Trigger conditions	From digital input, after a time defined from parameter **AD17**.
Clearing conditions	From digital input, after a time defined from parameter **AD18**.
Action	The alarm disables the adiabatic cooler.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **AD19** 0 = always automatic 1÷15 = Number of triggers/hour before manual reset 16 = always manual (with trigger condition cleared).
Relay activation	General alarm relay activation.

10.12 Expansion Offline Alarm

When one expansion is configured, the regulator monitors network connection status. If the connection is not available, the expansion offline alarm is triggered.

Alarm Code	AL021
Description	Expansion offline alarm.
Trigger conditions	If the configuration entails expansion, but the same is not found in the network, triggering after a fixed time of connection checking.
Clearing conditions	If the configuration entails expansion, and the same is back online, clearing after a fixed time of connection checking.
Action	Emergency stop.
Signal	Buzzer + Red LED on.
Reset type	Always manual (with trigger condition cleared).
Relay activation	General alarm relay activation.

10.13 Phase Sequence Alarm

Alarm Code	AL022
Description	Phase sequence alarm.
Trigger conditions	From digital input, immediate triggering.
Clearing conditions	From digital input, after a time defined from parameter **AL39**.
Action	Emergency stop.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **AL40** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	General alarm relay activation.

10.14 General Alarms

it is possible to define 3 different general alarms, detected from the relevant digital inputs that provide for an emergency stop respectively of:

General alarm 1 ➔ Circuit 1 emergency stop.

General alarm 2 ➔ Circuit 2 emergency stop.

General alarm 3 ➔ Complete dry cooler unit emergency stop.

These alarms may be used in all cases where the emergency stop should come from a cause outside the dry cooler.

Alarm Code	AL023
Description	General alarm 1.
Trigger conditions	From digital input, after a time defined from parameter **AL43**.
Clearing conditions	From digital input, after a time defined from parameter **AL44**.
Action	Circuit 1 emergency stop.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **AL45** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	General alarm relay activation.

Alarm Code	AL024
Description	General alarm 2.
Trigger conditions	From digital input, after a time defined from parameter **AL48**.
Clearing conditions	From digital input, after a time defined from parameter **AL49**.
Action	Circuit 2 emergency stop.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **AL50** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	General alarm relay activation.

Alarm Code	AL025
Description	General alarm 3.
Trigger conditions	From digital input, after a time defined from parameter **AL53**.
Clearing conditions	From digital input, after a time defined from parameter **AL54**.
Action	Dry cooler unit emergency stop.
Signal	Buzzer + Red LED on.
Reset type	Defined from parameter **AL55** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	General alarm relay activation.

10.15 Auxiliary Function Alarms

Should the auxiliary functions be activated, it is possible to define for each function an alarm contact, which provides for the function stop.

it is also possible to have a cumulative alarm contact, which disables all configured auxiliary functions.

Auxiliary function 1 alarm input ➔ Disables the regulation of the auxiliary function 1.

Auxiliary function 2 alarm input ➔ Disables the regulation of the auxiliary function 2.

Auxiliary function 3 alarm input ➔ Disables the regulation of the auxiliary function 3.

Auxiliary function 4 alarm input ➔ Disables the regulation of the auxiliary function 4.

Auxiliary functions alarm cumulative input ➔ Disables the regulation of all auxiliary functions.

Alarm Code	AL026
Description	Auxiliary function 1 alarm.
Trigger conditions	From digital input, after a time defined from parameter **AXA23**.
Clearing conditions	From digital input, after a time defined by parameter **AXA24**
Action	Deactivation of the regulation of the auxiliary function 4.
Signal	Flashing red LED.
Reset type	Defined from parameter **AXA25** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	Warning relay activation.

Alarm Code	AL027
Description	Auxiliary function 2 alarm.
Trigger conditions	From digital input, after a time defined from parameter **AXB23**.
Clearing conditions	From digital input, after a time defined by parameter **AXB24**
Action	Deactivation of the regulation of the auxiliary function 4.
Signal	Flashing red LED.
Reset type	Defined from parameter **AXB25** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	Warning relay activation.

Alarm Code	AL028
Description	Auxiliary function 3 alarm.
Trigger conditions	From digital input, after a time defined from parameter **AXC23**.
Clearing conditions	From digital input, after a time defined by parameter **AXC24**
Action	Deactivation of the regulation of the auxiliary function 4.
Signal	Flashing red LED.
Reset type	Defined from parameter **AXC25** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	Warning relay activation.

Alarm Code	AL029
Description	Auxiliary function 4 alarm.
Trigger conditions	From digital input, after a time defined from parameter **AXD23**.
Clearing conditions	From digital input, after a time defined by parameter **AXD24**
Action	Deactivation of the regulation of the auxiliary function 4.
Signal	Flashing red LED.
Reset type	Defined from parameter **AXD25** 0= always automatic; 1÷15= Number of triggers/hour before manual reset; 16= always manual; (with trigger condition cleared).
Relay activation	Warning relay activation.

Alarm Code	AL030
Description	Auxiliary functions cumulative alarm.
Trigger conditions	From digital input, after a time defined by parameter **AL58**.
Clearing conditions	Fromital input, after a time defined by parameter **AL59**.
Action	Deactivation of the regulation of all auxiliary functions.
Signal	Buzzer + Red LED on.
Reset type	Always automatic.
Relay activation	General alarm relay activation.

10.16 High water temperature warning

The software can manage an high water temperature dedicated alarm.

This alarm is dedicated only for water unit (CF01=0) and is related to regulation probe (inlet or outlet water probe) ad defined by parameter CF04.

When water temperature is higher the values AL550 (circuit 1) or AL552 (Circuit 2) the software triggers a warning.

When water temperature decreases under “set point-band” the warning disappears instantly.

High water temperature alarms are setting as “automatic reset” and without delays.

Alarm Code	AL031
Description	High water temperature warning circuit 1.
Trigger conditions	From analog input configured as regulation probe circuit 1 if the value read is over **WN01**.
Clearing conditions	From analog input configured as regulation probe circuit 1 if the value read is under **WN01-WN03**.
Action	Warning.
Signal	Flashing red LED.
Reset type	Always automatic.
Relay activation	Warning relay activation. High water temperature circuit 1 warning relay activation.

Alarm Code	AL032
Description	High water temperature warning circuit 2.
Trigger conditions	From analog input configured as regulation probe circuit 2 if the value read is over **WN02**.
Clearing conditions	From analog input configured as regulation probe circuit 2 if the value read is under **WN02-WN03**.
Action	Warning.
Signal	Flashing red LED.
Reset type	Always automatic.
Relay activation	Warning relay activation. High water temperature circuit 2 warning relay activation.

10.17 Low water temperature warning

The software can manage a lowwater temperature dedicated alarm.

This alarm is dedicated only for water unit (CF01=0) and is related to regulation probe (inlet or outlet water probe) ad defined by parameter CF04.

When water temperature is lower the values AL553 (circuit 1) or AL554 (Circuit 2) the software triggers a warning.

When water temperature increases over “set point+band” the warning disappears instantly.

Low water temperature alarms are setting as “automatic reset” and without delays.

Alarm Code	AL033
Description	Low water temperature warning circuit 1.
Trigger conditions	From analog input configured as regulation probe circuit 1 if the value read is under **WN04**.
Clearing conditions	From analog input configured as regulation probe circuit 1 if the value read is over **WN04-WN06**.
Action	Warning.
Signal	Flashing red LED.
Reset type	Always automatic.
Relay activation	Warning relay activation. Low water temperature circuit 1 warning relay activation.

Alarm Code	AL034
Description	Low water temperature warning circuit 2.
Trigger conditions	From analog input configured as regulation probe circuit 2 if the value read is under **WN05**.
Clearing conditions	From analog input configured as regulation probe circuit 2 if the value read is over **WN05-WN06**.
Action	Warning.
Signal	Flashing red LED.
Reset type	Always automatic.
Relay activation	Warning relay activation. Low water temperature circuit 2 warning relay activation.

10.18 Maintenance Request Warning For Work Hours Reached

It is possible to monitor the working hours of pumps, ventilating units, heat recovery units and adiabatic cooler and configure a warning signal for the request of maintenance.

Alarm Code	AL035… AL045
Description	AL027 Working hours reached warning for ventilating unit 1; AL029 Working hours reached warning for ventilating unit 2; AL031 Working hours reached warning for pump 1; AL033 Working hours reached warning for pump 2; AL035 Working hours reached warning for recovery unit; AL037 Working hours reached warning for adiabatic cooler;
Trigger conditions	The resource has reached the stated limit of working hours for the maintenance warning
Clearing conditions	Manual reset
Action	Warning
Signal	Flashing red LED
Reset type	Always manual
Relay activation	Warning relay activation

10.19 Maintenance Request Warning For Number Of Activations Reached

It is possible to monitor the number of activations of pumps, ventilating units, heat recovery units and adiabatic cooler and configure a warning signal for the request of maintenance.

Alarm Code	AL036… AL046
Description	AL028 Number of activations reached warning for ventilating unit 1; AL030 Number of activations reached warning for ventilating unit 2; AL032 Number of activations reached warning for pump 1; AL034 Number of activations reached warning for pump 2; AL036 Number of activations reached warning for recovery unit; AL038 Number of activations reached warning for the adiabatic cooler;
Trigger conditions	The resource has reached the stated limit of number of activations for the maintenance warning
Clearing conditions	Manual reset
Action	Warning
Signal	Flashing red LED
Reset type	Always manual
Relay activation	Warning relay activation

10.20 Alarms Table

10.20.1 Configuration Alarms Table

Alarm Code	Description	Action	LEDs Display	Buzzer	Alarm Relay	Warning Relay
ACF01	Unit general configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			
ACF02	Pumps unit configuration alarm	Emergency stop of the concerned circuit	Green: flashing; Red: flashing;			
ACF03	3-way valve configuration alarm	Emergency stop of the concerned circuit	Green: flashing; Red: flashing;			
ACF04	Heat recovery unit configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			
ACF05	Ventilation configuration alarm	Emergency stop of the concerned circuit	Green: flashing; Red: flashing;			
ACF06	Adiabatic cooler configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			
ACF07	Auxiliary functions1 configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			
ACF08	Auxiliary functions 2 configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			
ACF09	Auxiliary functions 3 configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			
ACF10	Auxiliary functions 4 configuration alarm	Unit emergency stop	Green: flashing; Red: flashing;			

10.20.2 Probe Alarms Table

Alarm Code	Description	Action	LEDs Display	Buzzer	Alarm Relay	Warning Relay
AT001	Circuit 1 input temperature probe alarm	Circuit 1 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT002	Circuit 1 output temperature probe alarm	Circuit 1 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT003	Circuit 2 input temperature probe alarm	Circuit 2 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT004	Circuit 2 output temperature probe alarm	Circuit 2 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT005	Ambient temperature probe	In free cooler mode, unit emergency alarm; In condenser mode, signalling only;	Green: follows its regulation; Red: on;	ON	ON	OFF
AT006	Ambient humidity probe	Signalling only.	Green: follows its regulation; Red: flashing;	OFF	OFF	ON
AT007	Circuit 1 gas pressure probe	Circuit 1 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT008	Circuit 2 gas pressure probe	Circuit 2 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT009	Recovery output probe	Disables recovery regulation	Green: follows its regulation; Red: on;	ON	ON	OFF
AT010	Circuit 1 pump pressure transducer A	Circuit 1 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT011	Circuit 2 pump pressure transducer A	Circuit 2 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT012	Circuit 1 pump pressure transducer B	Circuit 1 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT013	Circuit 2 pump pressure transducer B	Circuit 2 emergency alarm	Green: follows its regulation; Red: on;	ON	ON	OFF
AT014	Auxiliary probe 1	Disables auxiliary regulation 1	Green: follows its regulation; Red: flashing;	OFF	OFF	ON
AT015	Auxiliary probe 2	Disables auxiliary regulation 2	Green: follows its regulation; Red: flashing;	OFF	OFF	ON
AT016	Auxiliary probe 3	Disables auxiliary regulation 3	Green: follows its regulation; Red: flashing;	OFF	OFF	ON

AT017	Auxiliary probe 4	Disables auxiliary regulation 4	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON
AT018	Anti-freeze monitoring probe 1	Circuit 1 emergency alarm	**Green**: follows its regulation; **Red**: on;	ON	ON	OFF
AT019	Anti-freeze monitoring probe 2	Circuit 2 emergency alarm	**Green**: follows its regulation; **Red**: on;	ON	ON	OFF
AT020	Modulating ventilation from external signal	Disables ventilation and adiabatic cooler	**Green**: follows its regulation; **Red**: on;	ON	ON	OFF

10.20.3 Machine Alarms Table

Alarm Code	Description	Action	LEDs Display	Buzzer	Alarm Relay	Warning Relay	Relay HP	Relay ventil.
AL001	Circuit 1 water flow from pump 1 alarm	As per designated logics	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL002	Circuit 1 water flow from pump 2 alarm	As per designated logics	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL003	Circuit 2 water flow alarm	As per designated logics	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL004	Circuit 1 high pressure alarm from pressure switch	Disables circuit 1 regulation	Green: follows its regulation; Red: on;	ON	ON	OFF	ON	--
AL005	Circuit 1 high pressure alarm from pressure transducer	Disables circuit 1 regulation	Green: follows its regulation; Red: on;	ON	ON	OFF	ON	--
AL006	Circuit 2 high pressure alarm from pressure switch	Disables circuit 2 regulation	Green: follows its regulation; Red: on;	ON	ON	OFF	ON	--
AL007	Circuit 2 high pressure alarm from pressure transducer	Disables circuit 2 regulation	Green: follows its regulation; Red: on;	ON	ON	OFF	ON	--
AL008	Pump 1 alarm	As per designated logics	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL009	Pump 2 alarm	As per designated logics	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL010	Ventilating bench 1 warning from external alarm contact (or MCB).	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	ON
AL011	Ventilating bench 1 alarm from external alarm contact (or MCB).	Disables circuit 1 ventilation and adiabatic cooler, if present	Green: follows its regulation; Red: on;	ON	ON	OFF	--	ON
AL012	Ventilating bench 2 warning from external alarm contact (or MCB).	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	ON
AL013	Ventilating bench 2 alarm from external alarm contact (or MCB).	Disables circuit 2 ventilation and adiabatic cooler, if present	Green: follows its regulation; Red: on;	ON	ON	OFF	--	ON
AL014	Circuit 1 ventilation warning from inverter anomaly.	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	ON
AL015	Circuit 1 ventilation alarm from inverter anomaly.	Disables circuit 1 ventilation and adiabatic cooler, if present	Green: follows its regulation; Red: on;	ON	ON	OFF	--	ON
AL016	Circuit 2 ventilation warning from inverter anomaly.	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	ON
AL017	Circuit 2 ventilation alarm from inverter anomaly.	Disables circuit 2 ventilation and adiabatic cooler, if present	Green: follows its regulation; Red: on;	ON	ON	OFF	--	ON

AL018	Antifreeze early warning	As per designated logics	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--
AL019	Antifreeze alarm	As per designated logics	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL020	Adiabatic cooler pump thermal overload alarm	Disables the adiabatic cooler	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL021	Expansion offline alarm	Unit emergency stop	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL022	Phase sequence alarm	Unit emergency stop	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL023	General alarm 1	Circuit 1 emergency stop	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL024	General alarm 2	Circuit 2 emergency stop	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL025	General alarm 3	Unit emergency stop	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL026	Auxiliary function 1 alarm	Disables auxiliary function 1 regulation	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--
AL027	Auxiliary function 2 alarm	Disables auxiliary function 2 regulation	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--
AL028	Auxiliary function 3 alarm	Disables auxiliary function 3 regulation	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--
AL029	Auxiliary function 4 alarm	Disables auxiliary function 4 regulation	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--
AL030	Auxiliary functions cumulative alarm	Disables the regulation of all auxiliary functions	Green: follows its regulation; Red: on;	ON	ON	OFF	--	--
AL031	High water temperature warning circuit 1	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON		
AL032	High water temperature warning circuit 2	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON		
AL033	Low water temperature warning circuit 1	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON		
AL034	Low water temperature warning circuit 2	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON		
AL035	Working hours reached warning for ventilation 1	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--
AL036	Number of activations reached warning for ventilation 1	Only warning to the user	Green: follows its regulation; Red: flashing;	OFF	OFF	ON	--	--

AL037	Working hours reached warning for ventilation 2	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL038	Number of activations reached warning for ventilation 2	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL039	Working hours reached warning for pump 1	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL040	Number of activations reached warning for pump 1	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL041	Working hours reached warning for pump 2	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL042	Number of activations reached warning for pump 2	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL043	Working hours reached warning for heat recovery unit	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL044	Number of activations reached warning for heat recovery unit	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL045	Working hours reached warning for adiabatic cooler pump	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--
AL046	Number of activations reached warning for the adiabatic cooler pump	Only warning to the user	**Green**: follows its regulation; **Red**: flashing;	OFF	OFF	ON	--	--

11. Parameter Table

The application's parameters are grouped in families for easier identification and referencing. Each family of parameters represents a specific function:

Label	Description
CF	Configuration general parameters
ST	Set-point Parameters
UN	Unit probe configuration parameters
AL	General alarms configuration parameters
PM	Pumps configuration parameters
VL	3-way valve set up parameters
FAA	Circuit A fans configuration parameters
FAB	Circuit B fans configuration parameters
AD	Adiabatic cooler configuration parameters
RC	Recovery configuration parameters
AXA	Auxiliary function A configuration parameters
AXB	Auxiliary function B configuration parameters
AXC	Auxiliary function C configuration parameters
AXD	Auxiliary function D configuration parameters

11.1 I/O

Some machine functions require physical inputs and outputs to operate. The selection of these I/O occurs with parameters through which inputs/outputs are to be associated to the specific function.

reference must be made to the following tables.

11.1.1 Analog Inputs (ENUM(AI))

0 = No input associated

Master	Slave ADR5
1 = iPG AI01	31 = iPx.206 [5] AI01
2 = iPG AI02	32 = iPx.206 [5] AI02
3 = iPG AI03	33 = iPx.206 [5] AI03
4 = iPG AI04	34 = iPx.206 [5] AI04
5 = iPG AI05	35 = iPx.206 [5] AI05
6 = iPG AI06	36 = iPx.206 [5] AI06
7 = iPG AI07	37 = iPx.206 [5] AI07
8 = iPG AI08	
9 = iPG AI09	
10 = iPG AI10	

11.1.2 Digital Inputs (ENUM(DI))

0 = No input associated

Master	Slave ADR5
1 = iPG DI01	61 = iPx.206 [5] DI01
2 = iPG DI02	62 = iPx.206 [5] DI02
3 = iPG DI03	63 = iPx.206 [5] DI03
4 = iPG DI04	
5 = iPG DI05	
6 = iPG DI06	
7 = iPG DI07	
8 = iPG DI08	
9 = iPG DI09	
10 = iPG DI10	
11 = iPG DI11	
12 = iPG DI12	
13 = iPG DI13	
14 = iPG DI14	
15 = iPG DI15	
16 = iPG DI16	
17 = iPG DI17	
18 = iPG DI18	
19 = iPG DI19	
20 = iPG DI20	

11.1.3 Analog Outputs (ENUM(AO))

0 = No output associated

Master	Slave ADR5
1 = iPG AO01	19 = iPx.206 [5] AO01
2 = iPG AO02	20 = iPx.206 [5] AO02
3 = iPG AO03	21 = iPx.206 [5] AO03
4 = iPG AO04	
5 = iPG AO05	
6 = iPG AO06	

11.1.4 Digital Outputs (ENUM(DO))

0 = No output associated

Master	Slave ADR5
1 = iPG DO1	46 = iPx.206 [5] DO01
2 = iPG DO2	47 = iPx.206 [5] DO02
3 = iPG DO3	48 = iPx.206 [5] DO03
4 = iPG DO4	49 = iPx.206 [5] DO04
5 = iPG DO5	50 = iPx.206 [5] DO05
6 = iPG DO6	51 = iPx.206 [5] DO06
7 = iPG DO7	
8 = iPG DO8	
9 = iPG DO9	
10 = iPG DO10	
11 = iPG DO11	
12 = iPG DO12	
13 = iPG DO13	
14 = iPG DO14	
15 = iPG DO15	

11.2 CF Parameters

ID	Description	Min	Max	UM	Type
CF01	Unit type: 0: Water unit regulated on the basis of temperature 1: Gas unit regulated on the basis of temperature 2: Gas unit regulated on the basis of pressure	0	2	- -	Integer
CF02	Unit operating mode: 0: Use as Condenser/Freecooler 1: Use as Freecooler 2: Use as Condenser	0	2	- -	Integer
CF03	Number of present circuits: 0: Single circuit 1: Two circuits	0	1	- -	Integer
CF04	Dry Cooler regulation probe: 0: DryCooler input 1: DryCooler output	0	1	- -	Integer
CF05	Pumps configuration: 0: No pumps 1: ON/OFF single pump 2: Modulating single pump 3: ON/OFF double pump 4: Modulating double pump	0	4	- -	Integer
CF06	3-way valve manner of use: 0: Valve not managed 1: Modulating valve for Free-cooling only 2: Modulating valve for Free-cooling and Condensation 3: Modulating valve for Free-cooling and 100% fixed in Condensation	0	3	- -	Integer
CF07	Ventilation management: 0: Common 1: Independent	0	1	- -	Integer
CF08	Ventilating unit type: 0: Fans not present 1: Step ventilation 2: Analog modulating ventilation 3: Step ventilation by external signal 4: Analog modulating ventilation by external signal	0	4	- -	Integer
CF09	Fans activation delay	0	600	sec	Integer
CF10	Heat recovery manner of use: 0: Not present 1: Parallel Recovery 2: Serial Recovery	0	2	- -	Integer
CF11	Adiabatic cooler configuration: 0: Not present 1: Present	0	1	- -	Integer
CF12	Dry cooler unit On/Off input: See ENUM (DI)	0	23	- -	Integer
CF13	Dry cooler unit On/Off input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
CF14	Circuit 1 regulation activation input: See ENUM (DI)	0	23	- -	Integer
CF15	Circuit 1 regulation activation input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
CF16	Circuit 2 regulation activation input: See ENUM (DI)	0	23	- -	Integer
CF17	Circuit 2 regulation activation input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
CF18	Regulation mode input: See ENUM (DI)	0	23	- -	Integer
CF19	Regulation mode input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
CF20	Active free-cooler signal output: See ENUM (DO)	0	21	- -	Integer
CF21	Active free-cooler signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
CF22	Active condenser signal output: See ENUM (DO)	0	21	- -	Integer

CF23	Active condenser signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
CF24	General Alarm Output See ENUM (DO)	0	21	- -	Integer
CF25	General Alarm Output Polarity 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
CF26	Warning Output See ENUM (DO)	0	21	- -	Integer
CF27	Warning Output Polarity 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
CF28	Visibility and Modifiability Level of the Unit Command 0: Always visible/editable 1: Visible/editable with User password (level 1) 2: Visible/editable with Service password (level 2)	0	2	- -	Integer
CF29	Start by BMS Enabling 0: No 1: Yes	0	1	- -	Integer
CF30	Level 1 password	0	9999	--	Integer
CF31	Level 2 password	0	9999	--	Integer
CF32	Level 3 password	0	9999	--	Integer
CF33	Buzzer enabling: 0: Disabled 1: Enabled	0	1	- -	Integer
CF34	Keyboard enabling: 0: Keyboard not used 1: Visograph 2: Visograph 2.0 3: Visotouch	0	3	- -	Integer

11.3 ST Parameters

ID	Description	Min	Max	UM	Type
ST01	Circuit 1 ventilation set-point	-50	110	°C/bar	Decimal
ST02	Circuit 1 ventilation regulation band	0	25	°C/bar	Decimal
ST03	Circuit 1 ventilation override	0	110	°C/bar	Decimal
ST04	Circuit 1 freecooler ventilation set-point	-50	110	°C/bar	Decimal
ST05	Circuit 1 freecooler ventilation regulation band	0	25	°C/bar	Decimal
ST06	Circuit 1 freecooler ventilation override	0	110	°C/bar	Decimal
ST07	Circuit 1 differential 1	0	25	°C/bar	Decimal
ST08	Circuit 1 differential 2	0	25	°C/bar	Decimal
ST09	Free-cooler enabling safety differential	0	20	°C	Decimal
ST10	Circuit 1 pump regulation set-point	0	20	bar	Decimal
ST11	Circuit 1 pump regulation proportional band	0	20	bar	Decimal
ST12	Circuit 1 pump regulation integral constant	0	32767	sec	Integer
ST13	PI regulation insertion percentage band	0	100	%	Integer
ST14	Circuit 1 3-way valve minimum opening regulation band	0	10	°C	Decimal
ST15	Circuit 1 3-way valve maximum opening regulation band	-10	10	°C	Decimal
ST16	Circuit 1 3-way valve regulation set-point in condensation	-30	60	°C	Decimal
ST17	Recovery unit DT set-point	0	20	°C	Decimal
ST18	Recovery unit modulation band	0	20	°C	Decimal
ST19	Adiabatic activation ambient temperature set-point	10	50	°C	Decimal
ST20	Adiabatic activation ambient RH set-point	0	100	%	Integer
ST21	Circuit 2 ventilation set-point	-50	110	°C/bar	Decimal
ST22	Circuit 2 ventilation regulation band	0	25	°C/bar	Decimal
ST23	Circuit 2 ventilation override	0	110	°C/bar	Decimal
ST24	Circuit 2 freecooler ventilation set-point	-50	110	°C/bar	Decimal
ST25	Circuit 2 freecooler ventilation regulation band	0	25	°C/bar	Decimal
ST26	Circuit 2 freecooler ventilation override	0	110	°C/bar	Decimal
ST27	Circuit 2 differential 1	0	25	°C/bar	Decimal
ST28	Circuit 2 differential 2	0	25	°C/bar	Decimal
ST29	Circuit 2 pump regulation set-point	0	20	bar	Decimal
ST30	Circuit 2 pump regulation proportional band	0	20	bar	Decimal
ST31	Circuit 2 pump regulation integral constant	0	32767	sec	Integer
ST32	Circuit 2 3-way valve minimum opening regulation band	0	10	°C	Decimal
ST33	Circuit 2 3-way valve maximum opening regulation band	-10	10	°C	Decimal
ST34	Circuit 2 3-way valve regulation set-point in condensation	-30	60	°C	Decimal

11.4 UN Parameters

ID	Description	Min	Max	UM	Type
UN01	Circuit 1 DryCooler input temperature probe input: See ENUM (AI)	0	17	- -	Integer
UN02	Circuit 1 DryCooler input temperature probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
UN03	C1 DryCooler input temperature probe input min	-50	10	°C	Decimal
UN04	C1 DryCooler input temperature probe input max	0	150	°C	Decimal
UN05	C1 DryCooler input temperature probe input offset	-10	10	°C	Decimal
UN06	Circuit 1 DryCooler output temperature probe input: See ENUM (AI)	0	17	- -	Integer
UN07	Circuit 1 DryCooler output temperature probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
UN08	C1 DryCooler output temperature probe input min	-50	10	°C	Decimal
UN09	C1 DryCooler output temperature probe input max	0	150	°C	Decimal
UN10	C1 DryCooler output temperature probe input offset	-10	10	°C	Decimal
UN11	Circuit 1 DryCooler pressure probe input: See ENUM (AI)	0	17	- -	Integer
UN12	Circuit 1 DryCooler pressure probe input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	2	- -	Integer
UN13	C1 DryCooler pressure probe input min	-1	60	Bar	Decimal
UN14	C1 DryCooler pressure probe input max	0	60	Bar	Decimal
UN15	C1 DryCooler pressure probe input offset	-5	5	Bar	Decimal
UN16	Outdoor air temperature probe input: See ENUM (AI)	0	17	- -	Integer
UN17	Outdoor air temperature probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
UN18	Outdoor air temperature probe input min	-50	10	°C	Decimal
UN19	Outdoor air temperature probe input max	0	150	°C	Decimal
UN20	Outdoor air temperature probe input offset	-10	10	°C	Decimal
UN21	Outdoor air humidity probe input: See ENUM (AI)	0	17	- -	Integer
UN22	Outdoor air humidity input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	5	- -	Integer
UN23	Outdoor air humidity input min	0	50	%	Integer
UN24	Outdoor air humidity input max	50	100	%	Integer
UN25	Outdoor air humidity input offset	-10	10	%	Integer
UN26	Circuit 1 fluid side anti-freeze probe input: See ENUM (AI)	0	17	- -	Integer
UN27	Circuit 1 fluid side anti-freeze probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
UN28	Circuit 1 fluid side anti-freeze probe input min	-50	10	°C	Integer
UN29	Circuit 1 fluid side anti-freeze probe input max	0	150	°C	Integer
UN30	Circuit 1 fluid side anti-freeze probe input offset	-10	10	°C	Integer
UN31	Circuit 2 DryCooler input temperature probe input: See ENUM (AI)	0	17	- -	Integer
UN32	Circuit 2 DryCooler input temperature probe input type: 0: NTC	0	5	- -	Integer

	1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V				
UN33	C2 DryCooler input temperature probe input min	-50	10	°C	Decimal
UN34	C2 DryCooler input temperature probe input max	0	150	°C	Decimal
UN35	C2 DryCooler input temperature probe input offset	-10	10	°C	Decimal
UN36	Circuit 2 DryCooler output temperature probe input: See ENUM (AI)	0	17	- -	Integer
UN37	Circuit 2 DryCooler output temperature probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
UN38	C2 DryCooler output temperature probe input min	-50	10	°C	Decimal
UN39	C2 DryCooler output temperature probe input max	0	150	°C	Decimal
UN40	C2 DryCooler output temperature probe input offset	-10	10	°C	Decimal
UN41	Circuit 2 DryCooler pressure probe input: See ENUM (AI)	0	17	- -	Integer
UN42	Circuit 2 DryCooler pressure probe input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	2	- -	Integer
UN43	C2 DryCooler pressure probe input min	-1	60	Bar	Decimal
UN44	C2 DryCooler pressure probe input max	0	60	Bar	Decimal
UN45	C2 DryCooler pressure probe input offset	-5	5	Bar	Decimal
UN46	Circuit 2 fluid side anti-freeze probe input: See ENUM (AI)	0	17	- -	Integer
UN47	Circuit 2 fluid side anti-freeze probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
UN48	Circuit 2 fluid side anti-freeze probe input min	-50	10	°C	Integer
UN49	Circuit 2 fluid side anti-freeze probe input max	0	150	°C	Integer
UN50	Circuit 2 fluid side anti-freeze probe input offset	-10	10	°C	Integer

11.5 AL Parameters

ID	Description	Min	Max	UM	Type
AL01	Circuit 1 pressure switch input: See ENUM (DI)	0	23	- -	Integer
AL02	Circuit 1 pressure switch input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL03	Circuit 1 high pressure alarm set-point	0	60	bar	Decimal
AL04	Circuit 1 high pressure alarm differential	0	60	bar	Decimal
AL05	Circuit 1 high pressure alarm signal output: See ENUM (DO)	0	21	- -	Integer
AL06	Circuit 1 high pressure alarm signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AL07	Circuit 2 pressure switch input: See ENUM (DI)	0	23	- -	Integer
AL08	Circuit 2 pressure switch input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL09	Circuit 2 high pressure alarm set-point	0	60	bar	Decimal
AL10	Circuit 2 high pressure alarm differential	0	60	bar	Decimal
AL11	Circuit 2 high pressure alarm signal output: See ENUM (DO)	0	21	- -	Integer
AL12	Circuit 2 high pressure alarm signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AL13	Water Flow Rate Alarm Detection 0: Water Flow Alarm by Flow Switch	0	2	- -	Integer

	1: Water Flow Alarm by Probe 2: Water Flow Alarm by Both Flow Switch + Probe				
AL14	Water Flow Alarm Bypass Delay when a Pump Starts	0	300	sec	Integer
AL15	Circuit 1 Flow Switch Input See ENUM (DI)	0	23	- -	Integer
AL16	Circuit 1 Flow Switch Input Polarity 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL17	Circuit 2 Flow Switch Input See ENUM (DI)	0	23	- -	Integer
AL18	Circuit 2 Flow Switch Input Polarity 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL19	Water Flow Setpoint for Alarm Activation	0	10	Bar	Decimal
AL20	Water Flow Hysteresis for Alarm Activation	0,1	2	Bar	Decimal
AL21	Activation Delay of Flow Switch	0	600	sec	Integer
AL22	Time After Which the Flow Switch Alarm Is Automatically Reset	0	600	sec	Integer
AL23	Number of Flow Switch Alarms Before Turning the Alarm from Automatic to Manual 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AL24	Anti-freeze alarm management: 0: Not managed 1: Alarm from anti-freeze thermostat 2: Alarm and early warning from outdoor air temperature probe 3: Alarm and early warning from outdoor air temperature probe + thermostat 4: Alarm and early warning from outdoor air temperature probe + fluid side antifreeze probe 5: Alarm from fluid side antifreeze probe	0	5	- -	Integer
AL25	Anti-freeze input from thermostat: See ENUM (DI)	0	23	- -	Integer
AL26	Anti-freeze polarity from thermostat: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL27	Anti-freeze set-point	-50	110	°C	Decimal
AL28	Anti-freeze early warning activation band	-50	110	°C	Decimal
AL29	Deactivation band of the anti-freeze early warning and alarm	-50	110	°C	Decimal
AL30	Fluid side anti-freeze set-point	-50	110	°C	Decimal
AL31	Fluid side anti-freeze delay time	0	600	sec	Integer
AL32	Number of interventions per hour that make the anti-freeze alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AL33	Circuit 1 anti-freeze circulator activation output: See ENUM (DO)	0	21	- -	Integer
AL34	Circuit 1 anti-freeze circulator activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AL35	Circuit 2 anti-freeze circulator activation output: See ENUM (DO)	0	21	- -	Integer
AL36	Circuit 2 anti-freeze circulator activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AL37	Phase Sequence Alarm Input See ENUM (DI)	0	23	- -	Integer
AL38	Phase Sequence Alarm Input Polarity 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL39	Deactivation Delay of Phase Sequence Alarm	0	120	sec	Integer
AL40	Number of Phase Sequence Alarm Events Before Turning the Alarm from Automatic to Manual 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AL41	General alarm 1 input: See ENUM (DI)	0	23	- -	Integer
AL42	General alarm 1 input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL43	General alarm 1 activation time	0	600	sec	Integer
AL44	General alarm 1 deactivation time	0	600	sec	Integer
AL45	Number of interventions per hour that make the general alarm 1 an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AL46	General alarm 2 input: See ENUM (DI)	0	23	- -	Integer

AL47	General alarm 2 input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL48	General alarm 2 activation time	0	600	sec	Integer
AL49	General alarm 2 deactivation time	0	600	sec	Integer
AL50	Number of interventions per hour that make the general alarm 2 an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AL51	General alarm 3 input: See ENUM (DI)	0	23	- -	Integer
AL52	General alarm 3 input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL53	General alarm 3 activation time:	0	600	sec	Integer
AL54	General alarm 3 deactivation time	0	600	sec	Integer
AL55	Number of interventions per hour that make the general alarm 3 an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AL56	Auxiliary functions cumulative alarm input: See ENUM (DI)	0	23	- -	Integer
AL57	Auxiliary functions cumulative alarm input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AL58	Auxiliary functions cumulative alarm activation time	0	600	sec	Integer
AL59	Auxiliary functions cumulative alarm deactivation time	0	600	sec	Integer

11.6 PM Parameters

ID	Description	Min	Max	UM	Type
PM01	Pump activation delay time	0	300	sec	Integer
PM02	Pump deactivation delay time	0	600	sec	Integer
PM03	Pump 1 activation output: See ENUM (DO)	0	21	- -	Integer
PM04	Pump 1 activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
PM05	Pump 1 regulation analog output: See ENUM (AO)	0	9	- -	Integer
PM06	Pump 1 regulation analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
PM07	Pump 1 minimum output	0	PM8	%	Integer
PM08	Pump 1 maximum output	PM7	100	%	Integer
PM09	Circuit 1 pressure transducer A input: See ENUM (AI)	0	17	- -	Integer
PM10	Circuit 1 pressure transducer A input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	2	- -	Integer
PM11	Circuit 1 pressure transducer A input min	-1	60	Bar	Decimal
PM12	Circuit 1 pressure transducer A input max	0	60	Bar	Decimal
PM13	Circuit 1 pressure transducer A input offset	-5	5	Bar	Decimal
PM14	Circuit 1 pressure transducer B input: See ENUM (AI)	0	17	- -	Integer
PM15	Circuit 1 pressure transducer B input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	2	- -	Integer
PM16	Circuit 1 pressure transducer B input min	-1	60	Bar	Decimal
PM17	Circuit 1 pressure transducer B input max	0	60	Bar	Decimal
PM18	Circuit 1 pressure transducer B input offset	-5	5	Bar	Decimal
PM19	Pump 2 activation output: See ENUM (DO)	0	21	- -	Integer
PM20	Pump 2 activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
PM21	Pump 2 regulation analog output: See ENUM (AO)	0	9	- -	Integer

PM22	Pump 2 regulation analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
PM23	Pump 2 minimum output	0	PM24	%	Integer
PM24	Pump 2 maximum output	PM23	100	%	Integer
PM25	Circuit 2 pressure transducer A input: See ENUM (AI)	0	17	- -	Integer
PM26	Circuit 2 pressure transducer A input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	2	- -	Integer
PM27	Circuit 2 pressure transducer A input min	-1	60	Bar	Decimal
PM28	Circuit 2 pressure transducer A input max	0	60	Bar	Decimal
PM29	Circuit 2 pressure transducer A input offset	-5	5	Bar	Decimal
PM30	Circuit 2 pressure transducer B input: See ENUM (AI)	0	17	- -	Integer
PM31	Circuit 2 pressure transducer B input type: 0: 4..20mA 1: 0..5V 2: 0..10V	0	2	- -	Integer
PM32	Circuit 2 pressure transducer B input min	-1	60	Bar	Decimal
PM33	Circuit 2 pressure transducer B input max	0	60	Bar	Decimal
PM34	Circuit 2 pressure transducer B input offset	-5	5	Bar	Decimal
PM35	Pumps scheduled exchange mode: 0: Simultaneous exchange 1: Not simultaneous exchange	0	1	- -	Integer
PM36	Pumps operation hours for the scheduled exchange	0	32767	hour	Integer
PM37	Pumps simultaneous operation time for the scheduled exchange	0	30	sec	Integer
PM38	Pump 1 alarm input: See ENUM (DI)	0	23	- -	Integer
PM39	Pump 1 alarm input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
PM40	Pump 1 alarm activation time	0	600	sec	Integer
PM41	Pump 1 alarm deactivation time	0	600	sec	Integer
PM42	Number of interventions per hour that make the pump 1 alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
PM43	Pump 2 alarm input: See ENUM (DI)	0	23	- -	Integer
PM44	Pump 2 alarm input polarity: 0: N.C. 1: N.O.	0	1	- -	Integer
PM45	Pump 2 alarm activation time	0	600	sec	Integer
PM46	Pump 2 alarm deactivation time	0	600	sec	Integer
PM47	Number of interventions per hour that make the pump 2 alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
PM48	Pump 1 working hours limit	0	32767	hour	Integer
PM49	Pump 1 starts limit	0	32767	--	Integer
PM50	Pump 2 working hours limit	0	32767	hour	Integer
PM51	Pump 2 starts limit	0	32767	--	Integer

11.7 VL Parameters

ID	Description	Min	Max	UM	Type
VL01	Circuit 1 3-way valve modulation output: See ENUM (AO)	0	9	- -	Integer
VL02	Circuit 1 3-way valve modulation output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
VL03	Circuit 1 3-way valve minimum output	0	VL4	%	Integer
VL04	Circuit 1 3-way valve maximum output	VL3	100	%	Integer
VL05	Circuit 1 3-way valve regulation direction: 0: Direct 1: Reverse	0	1	- -	Integer
VL06	Circuit 1 free-cooler safety position minimum limit	-50	110	°C	Decimal
VL07	Circuit 1 free-cooler safety position maximum limit	-50	110	°C	Decimal

VL08	Circuit 1 free-cooler 3-way valve safety position	0	100	%	Integer
VL09	Minimum time to restore circuit 1 free-cooler safety	0	120	sec	Integer
VL10	Circuit 1 condensation safety position minimum limit	-50	110	°C	Decimal
VL11	Circuit 1 condensation safety position maximum limit	-50	110	°C	Decimal
VL12	Circuit 1 condensation 3-way valve safety position	0	100	%	Integer
VL13	Minimum time to restore circuit 1 condensation safety	0	120	sec	Integer
VL14	Minimum value for 3-way valve opening during recovery phase	0	100	%	Integer
VL15	Circuit 1 3-way valve manual override activation: 0: Disabled 1: Enabled	0	1	- -	Integer
VL16	Circuit 1 3-way valve manual override value	0	100	%	Integer
VL17	Circuit 1 manual opening maintenance time	0	120	min	Integer
VL18	Circuit 1 3-way valve override input: See ENUM (DI)	0	23	- -	Integer
VL19	Circuit 1 3-way valve override input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
VL20	Circuit 2 3-way valve modulation output: See ENUM (AO)	0	9	- -	Integer
VL21	Circuit 2 3-way valve modulation output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
VL22	Circuit 2 3-way valve minimum output	0	VL23	%	Integer
VL23	Circuit 2 3-way valve maximum output	VL22	100	%	Integer
VL24	Circuit 2 3-way valve regulation direction: 0: Direct 1: Reverse	0	1	- -	Integer
VL25	Circuit 2 free-cooler safety position minimum limit	-50	110	°C	Decimal
VL26	Circuit 2 free-cooler safety position maximum limit	-50	110	°C	Decimal
VL27	Circuit 2 free-cooler 3-way valve safety position	0	100	%	Integer
VL28	Minimum time to restore circuit 2 free-cooler safety	0	120	sec	Integer
VL29	Circuit 2 condensation safety position minimum limit	-50	110	°C	Decimal
VL30	Circuit 2 condensation safety position maximum limit	-50	110	°C	Decimal
VL31	Circuit 2 condensation 3-way valve safety position	0	100	%	Integer
VL32	Minimum time to restore circuit 2 condensation safety	0	120	sec	Integer
VL33	Circuit 2 3-way valve manual override control activation: 0: Disabled 1: Enabled	0	1	- -	Integer
VL34	Circuit 2 3-way valve manual override value	0	100	%	Integer
VL35	Circuit 2 manual opening maintenance time	0	120	min	Integer
VL36	Circuit 2 3-way valve override input: See ENUM (DI)	0	23	- -	Integer
VL37	Circuit 2 3-way valve override input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer

11.8 FAA Parameters

ID	Description	Min	Max	UM	Type
FAA01	Number of regulation steps	0	4	nr	Integer
FAA02	Step 1 ventilation weight	0	100	%	Integer
FAA03	Step 2 ventilation weight	0	100	%	Integer
FAA04	Step 3 ventilation weight	0	100	%	Integer
FAA05	Step 1 ventilation activation output: See ENUM (DO)	0	21	- -	Integer
FAA06	Step 1 ventilation activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAA07	Step 2 ventilation activation output: See ENUM (DO)	0	21	- -	Integer
FAA08	Step 2 ventilation activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAA09	Step 3 ventilation activation output: See ENUM (DO)	0	21	- -	Integer
FAA10	Step 3 ventilation activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAA11	Step 4 ventilation activation output: See ENUM (DO)	0	21	- -	Integer

FAA12	Step 4 ventilation activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAA13	Ventilation regulation analog output: See ENUM (AO)	0	9	- -	Integer
FAA14	Ventilation regulation analog output type: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAA15	Ventilation minimum speed	0	100	%	Integer
FAA16	Ventilation rated speed	0	100	%	Integer
FAA17	Ventilation maximum speed	0	100	%	Integer
FAA18	External signal input See ENUM (AI)	0	17	- -	Integer
FAA19	Ventilation management external signal input type 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
FAA20	Ventilation management external signal input UM 0: °C 1: Bar 2: mBar 3: Pa 4: kPa 5: % 6: n.a.	0	5	- -	Integer
FAA21	Ventilation management Min external signal input	-3276	3276	---	Decimal
FAA22	Ventilation management Max external signal input	-3276	3276	---	Decimal
FAA23	Ventilation management external signal input offset	-3276	3276	---	Decimal
FAA24	Circuit 1 reduced speed ventilation set	-3276	3276	%	Integer
FAA25	Circuit 1 reduced speed ventilation deactivation band	-3276	3276	°C/bar	Integer
FAA26	Circuit 1 reduced speed acrivation input See ENUM (DI)	0	23	- -	Integer
FAA27	Circuit 1 reduced speed acrivation input polarity 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
FAA28	Ventilation alarm management by external or magnetothermic switch 0: Warning signal only 1: Ventilation shutdown	0	1	- -	Integer
FAA29	Ventilation MCB input: See ENUM (DI)	0	23	- -	Integer
FAA30	Ventilation MCB input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
FAA31	Number of interventions per hour that make the ventilation MCB alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
FAA32	Ventilation alarm management by inverter fault 0: Warning signal only 1: Ventilation shutdown	0	1	- -	Integer
FAA33	Ventilation inverter failure input: See ENUM (DI)	0	23	- -	Integer
FAA34	Ventilation inverter failure input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
FAA35	Inverter alarm activation time	0	600	sec	Integer
FAA36	Inverter alarm deactivation time	0	600	sec	Integer
FAA37	Number of interventions per hour that make the ventilation inverter alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
FAA38	Circuit 1 high ventilation alarm signal output: See ENUM (DO)	0	21	- -	Integer
FAA39	Circuit 1 high ventilation alarm signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAA40	Ventilation 1 working hours limit	0	32767	hour	Integer
FAA41	Ventilation 1 starts limit	0	32767	--	Integer

11.9 FAB Parameters

ID	Description	Min	Max	UM	Type
FAB01	Number of regulation steps	0	2	nr	Integer
FAB02	Step 1 ventilation weight	0	100	%	Integer
FAB03	Step 1 ventilation activation output: See ENUM (DO)	0	21	- -	Integer
FAB04	Step 1 ventilation activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAB05	Step 2 ventilation activation output: See ENUM (DO)	0	21	- -	Integer
FAB06	Step 2 ventilation activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAB07	Ventilation regulation analog output: See ENUM (AO)	0	9	- -	Integer
FAB08	Ventilation regulation analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
FAB09	Ventilation minimum speed	0	100	%	Integer
FAB10	Ventilation rated speed	0	100	%	Integer
FAB11	Ventilation maximum speed	0	100	%	Integer
FAB12	Circuit 2 reduced speed ventilation set	-3276	3276	%	Integer
FAB13	Circuit 2 reduced speed ventilation deactivation band	-3276	3276	°C/bar	Integer
FAB14	Circuit 2 reduced speed acrivation input See ENUM (DI)	0	23	- -	Integer
FAB15	Circuit 2 reduced speed acrivation input polarity 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
FAB16	Ventilation MCB input: See ENUM (DI)	0	23	- -	Integer
FAB17	Ventilation MCB input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
FAB18	Ventilation inverter failure input: See ENUM (DI)	0	23	- -	Integer
FAB19	Ventilation inverter failure input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
FAB20	Inverter alarm activation time	0	600	sec	Integer
FAB21	Inverter alarm deactivation time	0	600	sec	Integer
FAB22	Number of interventions per hour that make the ventilating bench 2 inverter alarm an alarm with manual reset 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
FAB23	Circuit 2 high ventilation alarm signal output: See ENUM (DO)	0	21	- -	Integer
FAB24	Circuit 2 high ventilation alarm signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
FAB25	Ventilation 2 working hours limit	0	32767	hour	Integer
FAB26	Ventilation 2 starts limit	0	32767	--	Integer

11.10 AD Parameters

ID	Description	Min	Max	UM	Type
AD01	Adiabatic cooler activation set	-50	110	°C/bar	Decimal
AD02	Adiabatic cooler deactivation band	0	25	°C/bar	Decimal
AD03	Ventilation set adiabatic cooler activation	0	100	%	Integer
AD04	Ventilation band for deactivation of adiabatic cooler	0	100	%	Integer
AD05	Adiabatic activation delay after pump activation	0	600	sec	Integer
AD06	Adiabatic cooler activation delay for temperature and/or humidity	0	600	sec	Integer
AD07	Adiabatic cooler deactivation delay for temperature and/or humidity	0	600	sec	Integer
AD08	Minimum time for adiabatic cooler shutdown	1	30	min	Integer
AD09	Adiabatic cooler pump activation output: See ENUM (DO)	0	21	- -	Integer

AD10	Adiabatic cooler pump activation output polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AD11	Circuit 1 adiabatic valve activation output: See ENUM (DO)	0	21	- -	Integer
AD12	Circuit 1 adiabatic valve activation output polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AD13	Circuit 2 adiabatic valve activation output: See ENUM (DO)	0	21	- -	Integer
AD14	Circuit 2 adiabatic valve activation output polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AD15	Adiabatic cooler pump MCB input: See ENUM (DI)	0	23	- -	Integer
AD16	Adiabatic cooler pump MCB input polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AD17	Adiabatic cooler pump alarm activation time	0	600	sec	Integer
AD18	Adiabatic cooler pump alarm deactivation time	0	600	sec	Integer
AD19	Number of interventions per hour that make the adiabatic cooler pump alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer
AD20	Adiabatic cooler working hours limit	0	32767	hour	Integer
AD21	Adiabatic cooler starts limit	0	32767	--	Integer

11.11 RC Parameters

ID	Description	Min	Max	UM	Type
RC01	Recovery unit 3-way valve type: 0: Modulating 1: On/Off	0	1	- -	Integer
RC02	Recovery unit modulating regulation type: 0: Dry cooler input probe 1: Recovery unit temperature DeltaT	0	1	- -	Integer
RC03	Ventilation deactivation delay upon recovery request	0	600	sec	Integer
RC04	Recovery activation request input: See ENUM (DI)	0	23	- -	Integer
RC05	Recovery activation request input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
RC06	On/Off recovery unit 3-way valve activation output: See ENUM (DO)	0	21	- -	Integer
RC07	On/Off recovery unit 3-way valve activation output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
RC08	Recovery unit 3-way valve regulation analog output: See ENUM (AO)	0	9	- -	Integer
RC09	Recovery unit 3-way valve regulation analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
RC10	Recovery unit 3-way valve analog min output	0	RC11	%	Integer
RC11	Recovery unit 3-way valve analog max output	RC10	100	%	Integer
RC12	Recovery unit 3-way valve regulation direction: 0: Direct 1: Reverse	0	1	- -	Integer
RC13	Movement percentage of valve under regulation for DT	1	100	%	Integer
RC14	3-way valve start-up position upon start for DT	0	100	%	Integer
RC15	Number of samples for input average temperature calculation	1	100	nr	Integer
RC16	Input temperature sampling time	1	20	sec	Integer
RC17	Recovery unit input min temperature	-50	RC18	°C	Decimal
RC18	Recovery unit input max temperature	RC17	110	°C	Decimal
RC19	Recovery unit output temperature probe input: See ENUM (AI)	0	17	- -	Integer
RC20	Recovery unit output temperature probe input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC	0	5	- -	Integer

	4: 0..1V 5: 0..5V				
RC21	Recovery unit output temperature probe input min	-50	10	°C	Decimal
RC22	Recovery unit output temperature probe input max	0	150	°C	Decimal
RC23	Recovery unit output temperature probe input offset	-10	10	°C	Decimal
RC24	Active recovery unit signal output: See ENUM (DO)	0	21	- -	Integer
RC25	Active recovery unit signal output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
RC26	Recovery unit 3-way valve manual override control activation: 0: Disabled 1: Enabled	0	1	- -	Integer
RC27	Recovery unit 3-way valve manual override value	0	100	%	Integer
RC28	Recovery unit 3-way valve override input: See ENUM (DI)	0	23	- -	Integer
RC29	Recovery unit 3-way valve override input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
RC30	Heat recovery working hours limit	0	32767	hour	Integer
RC31	Heat recovery starts limit	0	32767	--	Integer

11.12 AXA Parameters

ID	Description	Min	Max	UM	Type
AXA01	Auxiliary function 1 activation conditions: 0: With unit OFF 1: In any status 2: With circuit 1 ON 3: With circuit 2 ON 4: With both circuits ON 5: With unit ON free-cooler mode 6: With unit ON condenser mode 7: With active recovery unit	0	7	- -	Integer
AXA02	Auxiliary function 1 activation: 0: No actuation 1: Actuation on probe PB1 2: Actuation on probe PB2 3: Actuation on differential PB1-PB2 4: Actuation on differential PB2-PB1 5: Actuation on MIN minimum value 6: Actuation on MAX maximum value 7: Actuation on MED average value	0	7	- -	Integer
AXA03	Auxiliary function 1 operating mode: 0: On/Off DIRECT actuation 1: On/Off REVERSE actuation 2: Proportional DIRECT actuation and keeping 0 3: Proportional REVERSE actuation and keeping 0 4: Proportional DIRECT actuation and keeping to the minimum value 5: Proportional REVERSE actuation and keeping to the minimum value	0	5	- -	Integer
AXA04	PB1 probe for auxiliary function 1 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output	0	17	- -	Integer

	21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output				
AXA05	PB2 probe for auxiliary function 1 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output	0	17	- -	Integer
AXA06	Auxiliary function 1 set-point	-50	150	---	Decimal
AXA07	Auxiliary function 1 regulation band	0	50	---	Decimal
AXA08	Auxiliary function 1 differential	0	50	---	Decimal
AXA09	Auxiliary function 1 minimum output	0	AXA10	%	Integer
AXA10	Auxiliary function 1 maximum output	AXA09	100	%	Integer
AXA11	Auxiliary function 1 digital output See ENUM (DO)	0	21	- -	Integer
AXA12	Auxiliary function 1 digital output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AXA13	Auxiliary function 1 analog output: See ENUM (AO)	0	9	- -	Integer
AXA14	Auxiliary function 1 analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
AXA15	Auxiliary probe 1 input: See ENUM (AI)	0	17	- -	Integer
AXA16	Auxiliary probe 1 input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
AXA17	Auxiliary probe 1 input UM: 0: °C 1: Bar 2: mBar 3: Pa 4: kPa 5: % 6: n.a.	0	5	- -	Integer
AXA18	Auxiliary probe 1 input Min	-3276	3276	---	Decimal
AXA19	Auxiliary probe 1 input Max	-3276	3276	---	Decimal
AXA20	Auxiliary probe 1 input offset	-3276	3276	---	Decimal
AXA21	Auxiliary function 1 alarm input: See ENUM (DI)	0	23	- -	Integer
AXA22	Auxiliary function 1 alarm input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AXA23	Auxiliary function 1 alarm activation time	0	600	sec	Integer
AXA24	Auxiliary function 1 alarm deactivation time	0	600	sec	Integer
AXA25	Number of interventions per hour that make the auxiliary function 1 alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer

11.13 AXB Parameters

ID	Description	Min	Max	UM	Type
AXB01	Auxiliary function 2 activation conditions: 0: With unit OFF 1: In any status 2: With circuit 1 ON 3: With circuit 2 ON 4: With both circuits ON 5: With unit ON free-cooler mode 6: With unit ON condenser mode 7: With active recovery unit	0	7	- -	Integer
AXB02	Auxiliary function 2 activation: 0: No actuation 1: Actuation on probe PB1 2: Actuation on probe PB2 3: Actuation on differential PB1-PB2 4: Actuation on differential PB2-PB1 5: Actuation on MIN minimum value 6: Actuation on MAX maximum value 7: Actuation on MED average value	0	7	- -	Integer
AXB03	Auxiliary function 2 operating mode: 0: On/Off DIRECT actuation 1: On/Off REVERSE actuation 2: Proportional DIRECT actuation and keeping 0 3: Proportional REVERSE actuation and keeping 0 4: Proportional DIRECT actuation and keeping to the minimum value 5: Proportional REVERSE actuation and keeping to the minimum value	0	5	- -	Integer
AXB04	PB1 probe for auxiliary function 2 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output	0	17	- -	Integer
AXB05	PB2 probe for auxiliary function 2 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2	0	17	- -	Integer

	16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output				
AXB06	Auxiliary function 2 set-point	-50	150	---	Decimal
AXB07	Auxiliary function 2 regulation band	0	50	---	Decimal
AXB08	Auxiliary function 2 differential	0	50	---	Decimal
AXB09	Auxiliary function 2 minimum output	0	AXB10	%	Integer
AXB10	Auxiliary function 2 maximum output	AXB09	100	%	Integer
AXB11	Auxiliary function 2 digital output See ENUM (DO)	0	21	- -	Integer
AXB12	Auxiliary function 2 digital output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AXB13	Auxiliary function 2 analog output: See ENUM (AO)	0	9	- -	Integer
AXB14	Auxiliary function 2 analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
AXB15	Auxiliary probe 2 input: See ENUM (AI)	0	17	- -	Integer
AXB16	Auxiliary probe 2 input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
AXB17	Auxiliary probe 2 input UM: 0: °C 1: Bar 2: mBar 3: Pa 4: kPa 5: % 6: n.a.	0	5	- -	Integer
AXB18	Auxiliary probe 2 input Min	-3276	3276	---	Decimal
AXB19	Auxiliary probe 2 input Max	-3276	3276	---	Decimal
AXB20	Auxiliary probe 2 input offset	-3276	3276	---	Decimal
AXB21	Auxiliary function 2 alarm input: See ENUM (DI)	0	23	- -	Integer
AXB22	Auxiliary function 2 alarm input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AXB23	Auxiliary function 2 alarm activation time	0	600	sec	Integer
AXB24	Auxiliary function 2 alarm deactivation time	0	600	sec	Integer
AXB25	Number of interventions per hour that make the auxiliary function 2 alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer

11.14 AXC Parameters

ID	Description	Min	Max	UM	Type
AXC01	Auxiliary function 3 activation conditions: 0: With unit OFF 1: In any status 2: With circuit 1 ON 3: With circuit 2 ON 4: With both circuits ON 5: With unit ON free-cooler mode 6: With unit ON condenser mode 7: With active recovery unit	0	7	- -	Integer
AXC02	Auxiliary function 3 activation: 0: No actuation 1: Actuation on probe PB1	0	7	- -	Integer

	2: Actuation on probe PB2 3: Actuation on differential PB1-PB2 4: Actuation on differential PB2-PB1 5: Actuation on MIN minimum value 6: Actuation on MAX maximum value 7: Actuation on MED average value				
AXC03	Auxiliary function 3 operating mode: 0: On/Off DIRECT actuation 1: On/Off REVERSE actuation 2: Proportional DIRECT actuation and keeping 0 3: Proportional REVERSE actuation and keeping 0 4: Proportional DIRECT actuation and keeping to the minimum value 5: Proportional REVERSE actuation and keeping to the minimum value	0	5	- -	Integer
AXC04	PB1 probe for auxiliary function 3 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output	0	17	- -	Integer
AXC05	PB2 probe for auxiliary function 3 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output	0	17	- -	Integer
AXC06	Auxiliary function 3 set-point	-50	150	---	Decimal
AXC07	Auxiliary function 3 regulation band	0	50	---	Decimal
AXC08	Auxiliary function 3 differential	0	50	---	Decimal
AXC09	Auxiliary function 3 minimum output	0	AXC10	%	Integer
AXC10	Auxiliary function 3 maximum output	AXC09	100	%	Integer
AXC11	Auxiliary function 3 digital output See ENUM (DO)	0	21	- -	Integer
AXC12	Auxiliary function 3 digital output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AXC13	Auxiliary function 3 analog output: See ENUM (AO)	0	9	- -	Integer

AXC14	Auxiliary function 3 analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
AXC15	Auxiliary probe 3 input: See ENUM (AI)	0	17	- -	Integer
AXC16	Auxiliary probe 3 input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
AXC17	Auxiliary probe 3 input UM: 0: °C 1: Bar 2: mBar 3: Pa 4: kPa 5: % 6: n.a.	0	5	- -	Integer
AXC18	Auxiliary probe 3 input Min	-3276	3276	---	Decimal
AXC19	Auxiliary probe 3 input Max	-3276	3276	---	Decimal
AXC20	Auxiliary probe 3 input offset	-3276	3276	---	Decimal
AXC21	Auxiliary function 3 alarm input: See ENUM (DI)	0	23	- -	Integer
AXC22	Auxiliary function 3 alarm input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AXC23	Auxiliary function 3 alarm activation time	0	600	sec	Integer
AXC24	Auxiliary function 3 alarm deactivation time	0	600	sec	Integer
AXC25	Number of interventions per hour that make the auxiliary function 3 alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer

11.15 AXD Parameters

ID	Description	Min	Max	UM	Type
AXD01	Auxiliary function 4 activation conditions: 0: With unit OFF 1: In any status 2: With circuit 1 ON 3: With circuit 2 ON 4: With both circuits ON 5: With unit ON free-cooler mode 6: With unit ON condenser mode 7: With active recovery unit	0	7	- -	Integer
AXD02	Auxiliary function 4 activation: 0: No actuation 1: Actuation on probe PB1 2: Actuation on probe PB2 3: Actuation on differential PB1-PB2 4: Actuation on differential PB2-PB1 5: Actuation on MIN minimum value 6: Actuation on MAX maximum value 7: Actuation on MED average value	0	7	- -	Integer
AXD03	Auxiliary function 4 operating mode: 0: On/Off DIRECT actuation 1: On/Off REVERSE actuation 2: Proportional DIRECT actuation and keeping 0 3: Proportional REVERSE actuation and keeping 0 4: Proportional DIRECT actuation and keeping to the minimum value 5: Proportional REVERSE actuation and keeping to the minimum value	0	5	- -	Integer
AXD04	PB1 probe for auxiliary function 4 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B	0	17	- -	Integer

	8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output				
AXD05	PB2 probe for auxiliary function 4 regulation: 0: Circuit 1 DryCooler input temperature probe 1: Circuit 1 DryCooler output temperature probe 2: Circuit 1 DryCooler pressure probe 3: Circuit 2 DryCooler input temperature probe 4: Circuit 2 DryCooler output temperature probe 5: Circuit 2 DryCooler pressure probe 6: Pump 1 regulation pressure transducer A 7: Pump 1 regulation pressure transducer B 8: Pump 2 regulation pressure transducer A 9: Pump 2 regulation pressure transducer B 10: Ambient temperature probe 11: Ambient humidity probe 12: Recovery unit output temperature probe 13: Fluid side anti-freeze probe 14: Auxiliary probe 1 15: Auxiliary probe 2 16: Auxiliary probe 3 17: Auxiliary probe 4 18: Pump 1 modulating output 19: Pump 2 modulating output 20: 3-Way valve C1 modulating output 21: 3-Way valve C2 modulating output 22: Recovery valve modulating output 23: C1 Ventilation modulating output 24: C2 Ventilation modulating output	0	17	- -	Integer
AXD06	Auxiliary function 4 set-point	-50	150	---	Decimal
AXD07	Auxiliary function 4 regulation band	0	50	---	Decimal
AXD08	Auxiliary function 4 differential	0	50	---	Decimal
AXD09	Auxiliary function 4 minimum output	0	AXD10	%	Integer
AXD10	Auxiliary function 4 maximum output	AXD09	100	%	Integer
AXD11	Auxiliary function 4 digital output See ENUM (DO)	0	21	- -	Integer
AXD12	Auxiliary function 4 digital output polarity: 0: Contact closed for activation 1: Contact opened for activation	0	1	- -	Integer
AXD13	Auxiliary function 4 analog output: See ENUM (AO)	0	9	- -	Integer
AXD14	Auxiliary function 4 analog output type: 0: 0..10V 1: 4..20mA	0	1	- -	Integer
AXD15	Auxiliary probe 4 input: See ENUM (AI)	0	17	- -	Integer
AXD16	Auxiliary probe 4 input type: 0: NTC 1: 4..20mA 2: 0..10V 3: PTC 4: 0..1V 5: 0..5V	0	5	- -	Integer
AXD17	Auxiliary probe 4 input UM: 0: °C 1: Bar 2: mBar 3: Pa 4: kPa 5: % 6: n.a.	0	5	- -	Integer
AXD18	Auxiliary probe 4 input Min	-3276	3276	---	Decimal

AXD19	Auxiliary probe 4 input Max	-3276	3276	---	Decimal
AXD20	Auxiliary probe 4 input offset	-3276	3276	---	Decimal
AXD21	Auxiliary function 4 alarm input: See ENUM (DI)	0	23	- -	Integer
AXD22	Auxiliary function 4 alarm input polarity: 0: Contact open if active 1: Contact close if active	0	1	- -	Integer
AXD23	Auxiliary function 4 alarm activation time	0	600	sec	Integer
AXD24	Auxiliary function 4 alarm deactivation time	0	600	sec	Integer
AXD25	Number of interventions per hour that make the auxiliary function 4 alarm an alarm with manual reset: 0: Always manual 1÷15: Number of Events/hour before manual reset 16: Always automatic	0	16	- -	Integer

12. Web Server

The AHU application is equipped with a designated WEB site from where it is possible to configure the unit and/or monitor its operation.

In order to access the site, it is sufficient to use the IP address of the iPRO regulator (see cover back) by using the browser of the PC or mobile device.

Compatible browsers with the site are the following:

- Chrome
- Firefox
- Safari
- Edge

The splash screen of the site, as shown below, requires the login credentials to access all functions of the site.

The first access is carried out with the following credentials:

Login: **admin**

Password: **Dixell**

The main functions on the site are the following:

DASHBOARD: To control the AHU unit operation.

SET POINT: To display and set the operating set-points.

ALARMS: To manage active alarms and alarms log.

SCHEDULER: For the hourly scheduling of AHU operation.

WIZARD: For the graphic and easy configuration of the unit.

I/O: To display the inputs and outputs configured for the unit.

13. Wizmate

The Dixell Wizmate instrument is used for managing the unit's parameters via PC.

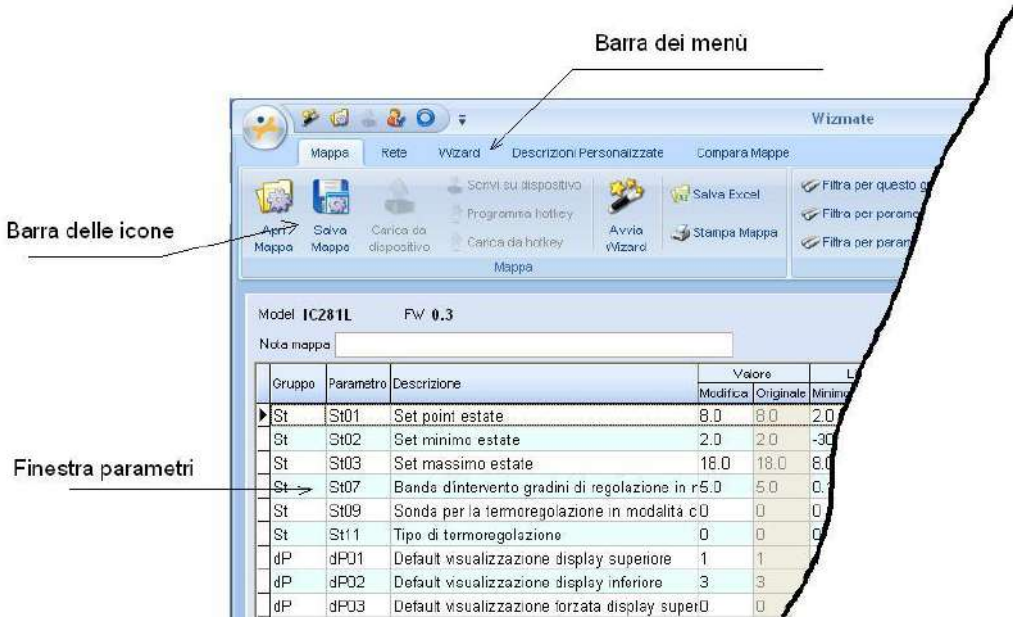
The main functionalities are:

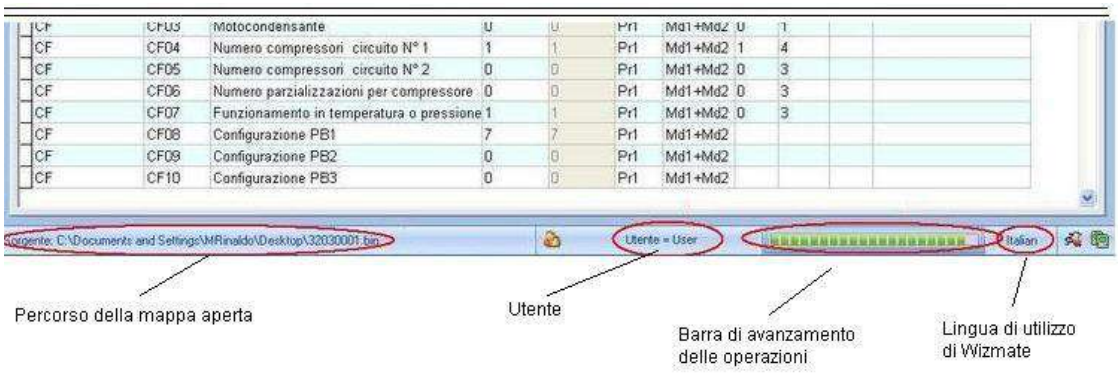
- editing the parameters;
- saving the parameter maps;
- upload/download the parameter maps;

13.1 Use Of Wizmate

The main screen of the WIZMATE is divided into three areas:

1. The **menu bar** which contains the operative menus (Map, Network,..)
2. The **icon bar** which contains the icons of the main commands
3. The **parameter window**, containing the parameters and relevant descriptions





13.1.1 Bar Of The "Map" Menu

Most of the operations to manage the parameter maps can be performed from this window.

The "Open map" command lets you view a previously saved map; after clicking on "Open map" the search files window lets you select the directory where the map to be opened is found.

The standard maps contained in the Wizmate are archived in the "Maps" folder in the program's installation directory.

The "Save map" command lets you save the displayed map; after clicking on "save map" the "Save as" window lets you select the directory where to save the map and assign a name to the map.

The "Read from device" command lets you view the parameter map contained in the device connected to the Prog Tool.

The "Write in device" command lets you transfer the parameter map displayed on the screen into the device connected to the Prog Tool.

The "Program Hotkey" command lets you transfer the parameter map displayed on the screen into the Prog Tool; after performing this operation the Hot Key must be connected into the "Hot Key copy" connector found in the upper part of the Prog Tool and click on "Copy".

The"Read from Hotkey" command lets you view the parameter map contained in a Hot Key; to perform this operation the Hot Key must be connected into the "Programmed Hot Key" connector found on the side of the Prog Tool, click on "Copy", wait for the "Copy" LED to finish blinking then click on the "Read from Hotkey" command.

The "Start Wizard" command lets you previously generated wizards; after clicking on "Start Wizard" the "Wizard Selection" window will ask which wizard to open. Refer to the Wizmate manual for a description of the Wizard function.

The "Save Excel" command lets you save the parameter map displayed on the screen into an excel file. After clicking on "Save Excel" you will be asked for the directory in which to save the file and its name.

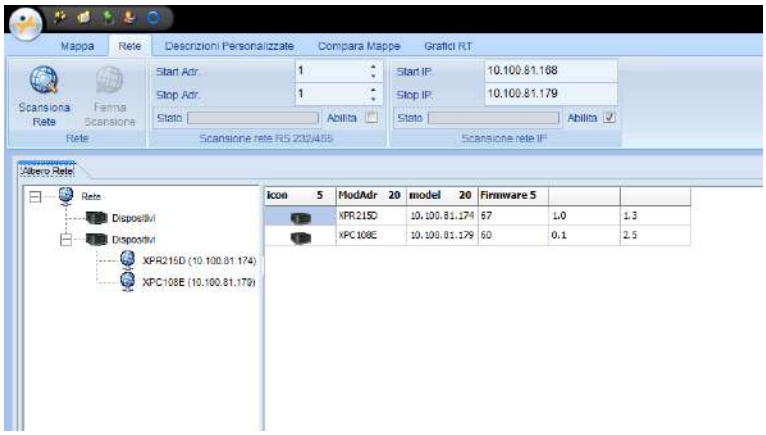
The "Print map" command lets you print the parameter map displayed on the screen.

The group of "Filter" commands let you apply filters to the parameters displayed in the map loaded on the screen.

The group of "Multi-language descriptions" commands lets you:

a. change the parameter description language, selecting it from available languages (typically English or Italian);
b. replace the standard parameter descriptions with customised descriptions previously generated. The procedure for creating, saving and bringing up the customised descriptions is described in chapter 13.1.3.

13.1.2 Bar Of The “Network” Menu



In the “Network” menu bar it is possible to check and look for the devices that may be reached by the Wizmate. After starting up, the Wizmate immediately starts searching for devices connected either via serial port or via IP based on enabling to the two networks. If the Wizmate has been started up before connecting the devices, you need to click on “Scan network” to search and recognise the connected device(s).

13.1.3 Bar Of The “Customised Descriptions” Menu

The “Customised descriptions” menu lets you customise the parameter description; when Wizmate is launched and when a map other than the model in use is opened, the parameter description is always standard.

It lets you save a new customised description.

It lets you print the customised descriptions.

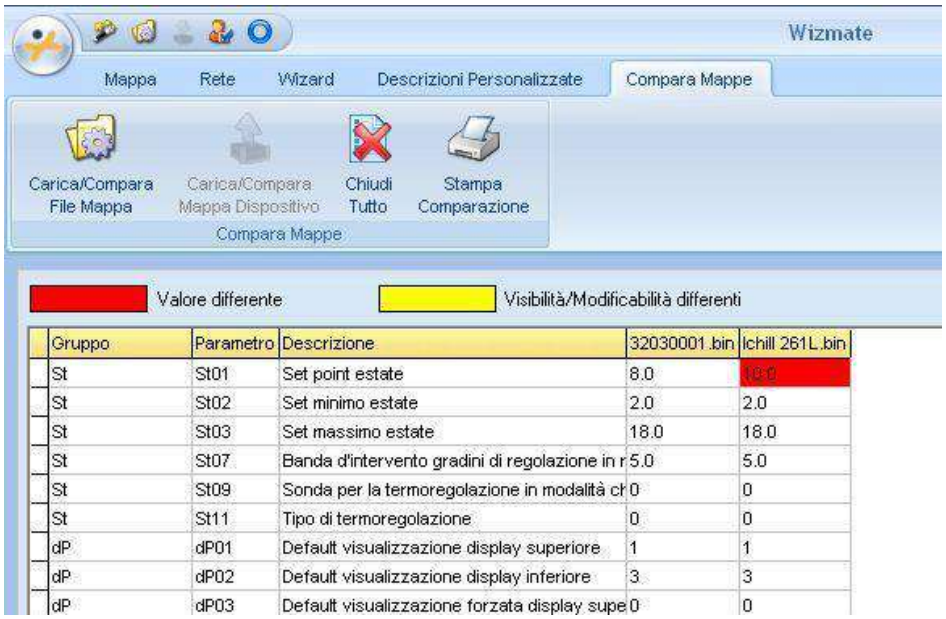
It lets you add a customised description for the map in use; a column is generated, in which you must enter the descriptions of the parameters you wish to change. To maintain the standard description just don’t enter any description in the parameter cell.

To select the customised descriptions they must always be called up via the appropriate menu of the “Icon bar” or right click and select “Customised descriptions”; each time the Wizmate is launched the standard descriptions are shown again.

It lets you remove the customised description column previously selected (to select the description just highlight any cell)

It lets you rename the selected customised description

13.1.4 “Compare Maps” Menu Bar



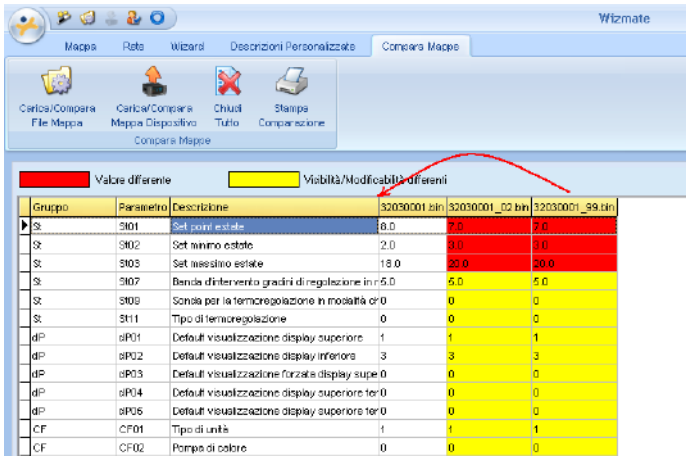
Gruppo	Parametro	Descrizione	32030001.bin	Ichill 261L.bin
St	St01	Set point estate	8.0	10.0
St	St02	Set minimo estate	2.0	2.0
St	St03	Set massimo estate	18.0	18.0
St	St07	Banda d'intervento gradini di regolazione in r	5.0	5.0
St	St09	Sonda per la termoregolazione in modalità ch	0	0
St	St11	Tipo di termoregolazione	0	0
dP	dP01	Default visualizzazione display superiore	1	1
dP	dP02	Default visualizzazione display inferiore	3	3
dP	dP03	Default visualizzazione forzata display supe	0	0

Wizmate lets you compare different maps and highlight the differences (in red parameters with different settings, in yellow parameters with different visibility/modifiability); the comparison is carried out between parameter settings and visibility/modifiability.

Comparison may be:

- between previously generated maps
- between previously generated maps and the map contained in the instrument connected to the Wizmate
- between maps of instruments connected to the Wizmate

The map of reference is the first one to be opened; the comparison is made between the first map and the following ones. If several maps have been opened it is possible to modify their order just by dragging and dropping a map in the desired position (the last map may be dragged and become the map of reference) as shown below.



Gruppo	Parametro	Descrizione	32030001.bin	32030001_02.bin	32030001_99.bin
St	St01	Set point estate	8.0	7.0	7.0
St	St02	Set minimo estate	2.0	3.0	3.0
St	St03	Set massimo estate	18.0	20.0	20.0
St	St07	Banda d'intervento gradini di regolazione in r	5.0	5.0	5.0
St	St09	Sonda per la termoregolazione in modalità ch	0	0	0
St	St11	Tipo di termoregolazione	0	0	0
dP	dP01	Default visualizzazione display superiore	1	1	1
dP	dP02	Default visualizzazione display inferiore	3	3	3
dP	dP03	Default visualizzazione forzata display supe	0	0	0
dP	dP04	Default visualizzazione display superiore ter	0	0	0
dP	dP05	Default visualizzazione display superiore ter	0	0	0
CF	CF01	Tipo di unità	1	1	1
CF	CF02	Pompa di calore	0	0	0

It lets you open maps to be used for comparison

It lets you open the map contained in the device connected to the Wizmate to be used for the comparison

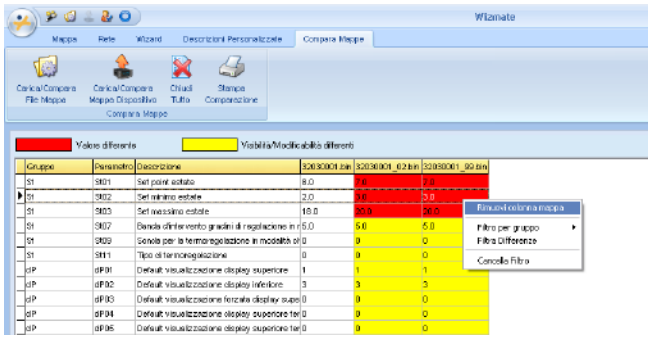
It lets you close the map comparison

It lets you print the map comparison.

WARNING: printing will be in black and white, it is not possible to highlight the parameters that have different settings or visibility.

Commands are available in the map comparison window by right clicking:

- “Remove map column”: lets you remove a map from the comparison
- “Filter by group”: lets you filter parameters by grouping, therefore only view CF, dF parameters, etc.
- “Filter differences”: lets you view only parameters with different setting or visibility
- “Cancel filter”: lets you remove the “Filter differences” command



14. List Of Variables Published In Serial

14.1 Table Of Variables

Address HEX	Address DEC	Tipo	Descrizione	Gain	UM	R/W
B001	45057	Intero	Pressure transducer A Pump 1 management	0,1	bar	R
B002	45058	Intero	Pressure transducer B Pump 1 management	0,1	bar	R
B003	45059	Intero	Pressure transducer A Pump 2 management	0,1	bar	R
B004	45060	Intero	Pressure transducer B Pump 2 management	0,1	bar	R
B005	45061	Intero	Circuit 1 DryCooler input temperature probe	0,1	°C	R
B006	45062	Intero	Circuit 1 DryCooler output temperature probe	0,1	°C	R
B007	45063	Intero	Circuit 2 DryCooler input temperature probe	0,1	°C	R
B008	45064	Intero	Circuit 2 DryCooler output temperature probe	0,1	°C	R
B009	45065	Intero	Circuit 1 DryCooler pressure probe (pressure regulation)	0,1	bar	R
B00A	45066	Intero	Circuit 2 DryCooler pressure probe (pressure regulation)	0,1	bar	R
B00B	45067	Intero	Ambient temperature probe	0,1	°C	R
B00C	45068	Intero	Recovery output temperature probe	0,1	°C	R
B00D	45069	Intero	Ambient humidity probe	1	UR%	R
B00E	45070	Intero	Auxiliary 1 probe	0,1	-	R
B00F	45071	Intero	Auxiliary 2 probe	0,1	-	R
B010	45072	Intero	Auxiliary 3 probe	0,1	-	R
B011	45073	Intero	Auxiliary 4 probe	0,1	-	R
B012	45074	Intero	Circuit 1 anti-freeze probe fluid side	0,1	°C	R
B013	45075	Intero	Circuit 2 anti-freeze probe fluid side	0,1	°C	R
B014	45076	Intero	External signal fan modulation	0,1	°C	R
B201	45569	Bool	ON/OFF unit	--	--	R
B202	45570	Bool	Working mode	--	--	R
B203	45571	Bool	Circuit 1 regulation activation	--	--	R
B204	45572	Bool	Circuit 2 regulation activation	--	--	R
B205	45573	Bool	Pump 1 alarm	--	--	R
B206	45574	Bool	Pump 2 alarm	--	--	R
B207	45575	Bool	Circuit 1 flow switch alarm	--	--	R
B208	45576	Bool	Circuit 2 flow switch alarm	--	--	R
B209	45577	Bool	Recovery request input	--	--	R
B20A	45578	Bool	3-way recovery valve override input	--	--	R
B20B	45579	Bool	3-way Circuit 1 valve override input	--	--	R
B20C	45580	Bool	3-way Circuit 2 valve override input	--	--	R
B20D	45581	Bool	Phase sequence alarm	--	--	R
B20E	45582	Bool	General alarm 1	--	--	R
B20F	45583	Bool	General alarm 2	--	--	R
B210	45584	Bool	General alarm 3	--	--	R
B211	45585	Bool	Anti-freeze thermostat alarm	--	--	R
B212	45586	Bool	Circuit 1 high pressure switch	--	--	R
B213	45587	Bool	Circuit 1 high pressure switch	--	--	R
B214	45588	Bool	Circuit 1 ventilation alarm	--	--	R
B215	45589	Bool	Circuit 2 ventilation alarm	--	--	R
B216	45590	Bool	Circuit 1 ventilation inverter alarm	--	--	R
B217	45591	Bool	Circuit 2 ventilation inverter alarm	--	--	R
B218	45592	Bool	Adiabatic cooler pump alarm	--	--	R
B219	45593	Bool	Auxiliary functions cumulative alarm	--	--	R
B21A	45594	Bool	Auxiliary function 1 alarm	--	--	R
B21B	45595	Bool	Auxiliary function 2 alarm	--	--	R
B21C	45596	Bool	Auxiliary function 3 alarm	--	--	R
B21D	45597	Bool	Auxiliary function 4 alarm	--	--	R
B101	45313	Intero	Fluid pump 1	0,01	%	R
B102	45314	Intero	Fluid pump 2	0,01	%	R
B103	45315	Intero	Circuit 1 - 3-way valve output	0,01	%	R
B104	45316	Intero	Circuit 2 - 3-way valve output	0,01	%	R
B105	45317	Intero	3-way recovery valve output	0,01	%	R
B106	45318	Intero	Auxiliary function 1 output	0,01	%	R
B107	45319	Intero	Auxiliary function 2 output	0,01	%	R
B108	45320	Intero	Auxiliary function 3 output	0,01	%	R
B109	45321	Intero	Auxiliary function 4 output	0,01	%	R
B10A	45322	Intero	Circuit 1 ventilation output	0,01	%	R
B10B	45323	Intero	Circuit 2 ventilation output	0,01	%	R
B301	45825	Bool	General alarm	0	--	R
B302	45826	Bool	Fluid pump 1	0	--	R
B303	45827	Bool	Fluid pump 2	0	--	R
B304	45828	Bool	3-way ON/OFF recovery valve output	0	--	R

B305	45829	Bool	Active free-cooler signal output	0	--	R
B306	45830	Bool	Active condenser signal output	0	--	R
B307	45831	Bool	Active recovery mode signal output	0	--	R
B308	45832	Bool	Fan 1 Circuit 1 digital output	0	--	R
B309	45833	Bool	Fan 2 Circuit 1 digital output	0	--	R
B30A	45834	Bool	Fan 3 Circuit 1 digital output	0	--	R
B30B	45835	Bool	Fan 4 Circuit 1 digital output	0	--	R
B30C	45836	Bool	Fan 1 Circuit 2 digital output	0	--	R
B30D	45837	Bool	Fan 2 Circuit 2 digital output	0	--	R
B30E	45838	Bool	Auxiliary function 1 digital output	0	--	R
B30F	45839	Bool	Auxiliary function 2 digital output	0	--	R
B310	45840	Bool	Auxiliary function 3 digital output	0	--	R
B311	45841	Bool	Auxiliary function 4 digital output	0	--	R
B312	45842	Bool	Circuit 1 high pressure alarm signal output	0	--	R
B313	45843	Bool	Circuit 2 high pressure alarm signal output	0	--	R
B314	45844	Bool	Circuit 1 ventilation alarm signal output	0	--	R
B315	45845	Bool	Circuit 2 ventilation alarm signal output	0	--	R
B316	45846	Bool	Warning output	0	--	R
B317	45847	Bool	Circuit 1 anti-freeze pump output	0	--	R
B318	45848	Bool	Adiabatic cooler pump activation output	0	--	R
B319	45849	Bool	Circuit 1 adiabatic valve activation output	0	--	R
B31A	45850	Bool	Circuit 2 adiabatic valve activation output	0	--	R
B31C	45852	Bool	Circuit 2 anti-freeze pump output	0	--	R
B31D	45853	Bool	Circuit 1 high water temperature warning output	0	--	R
B31E	45854	Bool	Circuit 2 high water temperature warning output	0	--	R
B31F	45855	Bool	Circuit 1 low water temperature warning output	0	--	R
B320	45856	Bool	Circuit 2 low water temperature warning output	0	--	R
B800	47104	Intero	Circuit 1 water flow from pump 1 alarm	1	--	R
B801	47105	Intero	Circuit 1 water flow from pump 2 alarm	1	--	R
B802	47106	Intero	Circuit 2 water flow alarm	1	--	R
B803	47107	Intero	Circuit 1 high pressure alarm from pressure switch	1	--	R
B804	47108	Intero	Circuit 1 high pressure alarm from pressure transducer	1	--	R
B805	47109	Intero	Circuit 2 high pressure alarm from pressure switch	1	--	R
B806	47110	Intero	Circuit 2 high pressure alarm from pressure transducer	1	--	R
B807	47111	Intero	Pump 1 alarm	1	--	R
B808	47112	Intero	Pump 2 alarm	1	--	R
B809	47113	Intero	Ventilating warning 1 alarm from external alarm contact (or MCB).	1	--	R
B80A	47114	Intero	Ventilating bench 1 alarm from external alarm contact (or MCB).	1	--	R
B80B	47115	Intero	Ventilating bench 2 warning from external alarm contact (or MCB).	1	--	R
B80C	47116	Intero	Ventilating bench 2 alarm from external alarm contact (or MCB).	1	--	R
B80D	47117	Intero	Circuit 1 ventilation warning from inverter anomaly.	1	--	R
B80E	47118	Intero	Circuit 1 ventilation alarm from inverter anomaly.	1	--	R
B80F	47119	Intero	Circuit 2 ventilation warning from inverter anomaly.	1	--	R
B810	47120	Intero	Circuit 2 ventilation alarm from inverter anomaly.	1	--	R
B811	47121	Intero	Antifreeze early warning	1	--	R
B812	47122	Intero	Antifreeze alarm	1	--	R
B813	47123	Intero	Adiabatic cooler pump thermal overload alarm	1	--	R
B814	47124	Intero	Expansion offline alarm	1	--	R
B815	47125	Intero	Phase sequence alarm	1	--	R
B816	47126	Intero	General alarm 1	1	--	R
B817	47127	Intero	General alarm 2	1	--	R
B818	47128	Intero	General alarm 3	1	--	R
B819	47129	Intero	Auxiliary function 1 alarm	1	--	R
B81A	47130	Intero	Auxiliary function 2 alarm	1	--	R
B81B	47131	Intero	Auxiliary function 3 alarm	1	--	R
B81C	47132	Intero	Auxiliary function 4 alarm	1	--	R
B81D	47133	Intero	Auxiliary functions cumulative alarm	1	--	R
B81E	47134	Intero	Circuit 1 warning high water temperature	1	--	R
B81F	47135	Intero	Circuit 2 warning high water temperature	1	--	R
B820	47136	Intero	Circuit 1 warning low water temperature	1	--	R
B821	47137	Intero	Circuit 2 warning low water temperature	1	--	R
B822	47138	Intero	Working hours reached warning for ventilation 1	1	--	R
B823	47139	Intero	Number of activations reached warning for ventilation 1	1	--	R
B824	47140	Intero	Working hours reached warning for ventilation 2	1	--	R
B825	47141	Intero	Number of activations reached warning for ventilation 2	1	--	R
B826	47142	Intero	Working hours reached warning for pump 1	1	--	R
B827	47143	Intero	Number of activations reached warning for pump 1	1	--	R
B828	47144	Intero	Working hours reached warning for pump 2	1	--	R
B829	47145	Intero	Number of activations reached warning for pump 2	1	--	R
B82A	47146	Intero	Working hours reached warning for heat recovery unit	1	--	R
B82B	47147	Intero	Number of activations reached warning for heat recovery unit	1	--	R
B82C	47148	Intero	Working hours reached warning for adiabatic cooler pump	1	--	R
B82D	47149	Intero	Number of activations reached warning for the adiabatic cooler pump	1	--	R

B864	47204	Intero	Circuit 1 input temperature probe alarm	1	--	R
B865	47205	Intero	Circuit 1 output temperature probe alarm	1	--	R
B866	47206	Intero	Circuit 2 input temperature probe alarm	1	--	R
B867	47207	Intero	Circuit 2 output temperature probe alarm	1	--	R
B868	47208	Intero	Ambient temperature probe	1	--	R
B869	47209	Intero	Ambient humidity probe	1	--	R
B86A	47210	Intero	Circuit 1 gas pressure probe	1	--	R
B86B	47211	Intero	Circuit 2 gas pressure probe	1	--	R
B86C	47212	Intero	Recovery output probe	1	--	R
B86D	47213	Intero	Circuit 1 pump pressure transducer A	1	--	R
B86E	47214	Intero	Circuit 2 pump pressure transducer A	1	--	R
B86F	47215	Intero	Circuit 1 pump pressure transducer B	1	--	R
B870	47216	Intero	Circuit 2 pump pressure transducer B	1	--	R
B871	47217	Intero	Auxiliary probe 1	1	--	R
B872	47218	Intero	Auxiliary probe 2	1	--	R
B873	47219	Intero	Auxiliary probe 3	1	--	R
B874	47220	Intero	Auxiliary probe 4	1	--	R
B875	47221	Intero	Circuit 1 Anti-freeze fluid probe	1	--	R
B876	47222	Intero	Circuit 2 Anti-freeze fluid probe	1	--	R
B877	47223	Intero	Modulation by external signal	1	--	R
B8A0	47264	Intero	Unit general configuration alarm	1	--	R
B8A1	47265	Intero	Pumps unit configuration alarm	1	--	R
B8A2	47266	Intero	3-way valve configuration alarm	1	--	R
B8A3	47267	Intero	Heat recovery unit configuration alarm	1	--	R
B8A4	47268	Intero	Ventilation configuration alarm	1	--	R
B8A5	47269	Intero	Adiabatic cooler configuration alarm	1	--	R
B8A6	47270	Intero	Aux out 1 configuration alarm	1	--	R
B8A7	47271	Intero	Aux out 2 configuration alarm	1	--	R
B8A8	47272	Intero	Aux out 3 configuration alarm	1	--	R
B8A9	47273	Intero	Aux out 4 configuration alarm	1	--	R
B502	46338	Bool	Unit On	0	--	RW
B502	46338	Bool	Unit Off	0	bar	RW
4515	17685	Bool	Alarm Reset	0	bar	RW
D000	53248	Intero	UnitState - OFF	0	°C	RW
D000	53248	Intero	UnitState - Emergency	0	°C	RW
D000	53248	Intero	UnitState - Start-up	0	--	RW
D000	53248	Intero	UnitState - On	0	--	RW
D000	53248	Intero	UnitState - Shoudown	0	--	RW
D006	53254	Bool	UnitState - Circuit 1	0	--	RW
D007	53255	Bool	UnitState - Circuit 2	0	°C	RW
D002	53250	Intero	Mode - Free Cooling	0	RH%	RW
D002	53250	Intero	Mode - Condenser	0	°C	RW
B501	46337	Intero	Command Free Cooling	0	0	RW
B501	46337	Intero	Command Condenser	0	0	RW
5286	21126	Intero	Pump Setpoint - Circuit 1	0	bar	RW
5296	21142	Intero	Pump Setpoint - Circuit 2	0	bar	RW
528C	21132	Intero	3 Way Setpoint - Circuit 1	0	°C	RW
529B	21147	Intero	3 Way Setpoint - Circuit 2	0	°C	RW
5280	21120	Intero	Ventilation Condenser Setpoint - Circuit 1	0	0	RW
5294	21140	Intero	Ventilation Condenser Setpoint - Circuit 2	0	0	RW
5283	21123	Intero	Ventilation Free Cooling Setpoint - Circuit 1	0	0	RW
5297	21143	Intero	Ventilation Free Cooling Setpoint - Circuit 2	0	0	RW
528F	21135	Intero	Adiatatic External Temperature Setpoint	0	°C	RW
5290	21136	Intero	Adiatatic External Humidity Setpoint	0	RH%	RW
528D	21133	Intero	Recovery Setpoint	0	°C	RW

For each alarms code the following rule applies:

0= no alarm

1= active alarm with automatic reset;

2= active alarm with manual reset, resettable;

3= active alarm with manual reset, not resettable;

For the writing parameters, refer to the limits of previous tables or WizMate.

14.2 General Information Modbus Protocol

The ModBus protocol is a standard protocol of communication between different devices connected to the same communication network.

Each device (except for the Master device) must be compulsorily assigned with an address, which must be unambiguous on the network.

2 versions of the protocol exist, the first is implemented on communication serial ports RS-485 (ModBus-RTU) the second one is on the Ethernet (ModBus.- TCP-IP).

For further information, please refer to the specialised texts and the Web site of the modbus organisation (www.modbus.org).

14.3 Ipro And Particular Features On The Protocol

14.3.1 Overview

The iPro devices support both the ModBus-RTU and the ModBus-TCP-IP protocol.

For both protocols, the implemented functions and alarm codes are mentioned in the following paragraphs:

As far as the communication is concerned, it is suggested a 30 ms interframe, also consider that:

- The response speed can be affected by the ISaGRAF application and other processes enabled on the system;
- Frequent communications with iPro can slow down the ISaGRAF application as well as the other processes;

14.3.2 Supported Function Codes

The table below mentions the supported function codes:

FUNCTION CODE	Description
01	Read Coils
02	Read Discrete Inputs
03	Read Holding Registers
04	Read Input Register
05	Write Single Coil
06	Write Single Register
15	Write Multiple Coils
16	Write Multiple Registers

14.3.3 Supported Alarm Code

Not all alarm codes of the standard protocol are supported by the iPro devices, the table below mentions the supported codes only:

Error CODE	Description
02	ILLEGAL DATA ADDRESS
04	SERVER DEVICE FAILURE

14.3.4 Broadcast Controls

iPro devices **do not** support the reception of Broadcast controls.

14.4 Modbus RTU

All iPro models are equipped with RS-485 Slave port, on which there is the ModBus protocol with the features described in the previous paragraphs.

14.4.1 Communication Parameters

The communication parameters can be set in the iPro devices, these are summarised in the following table

Parameters	Range
Address	1..247
BaudRate	9600, 19200
Parity	N (None), O (Odd), E (Even)
Stop bit	1,2

14.5 Ipro E Mod-Bus Tcp-Ip

iPro devices support the Mod-Bus TCP-IP protocol.

The access door to the ModBus Slave service, which by default has a value equal to **502**, can be modified by the user.

NOTES:

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