

PROGRAMABLE CONTROLLERS FOR AIR HANDLING UNITS



APPLICATION MANUAL

CODE 144AHU0K0E07

Important

Please read the instructions herein before installing and using the device. Follow all instructions and suggestions for installing and connecting the device; keep these instructions in a safe place as you may need them for future reference.

Ensure that this device is properly discarded in accordance with local government regulations as they pertain to the disposal of electrical and electronic devices.



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1 GENERAL

1.1 Description

The air handling units (AHU) contain various programmable application controls providing the user with the widest range of solutions and combinations which can be modified according to construction requirements, including the destination in which the plant subject is installed. The possible configurations vary from the simple use of one coil (utilized for seasonal heating and cooling) to the most complete solution which includes up to three coils (for preheating, cooling and dehumidifying, and post-heating) plus a dehumidifier, recuperator, free-cooling function, shutter controls and the fan pickup and delivery controls.

The AHU are widely configurable with built in sectional components to satisfy any user installation requirement. The primary objective for each solution is to ensure the well being of the environment, including air quality control and thermoigometric well being.

The optimal summer temperature is between $24-26^{\circ}C$ and 40-60%UR; in winter between $18-22^{\circ}C$

40-60%UR.

This application manages AHU with a single coil which is utilized for heating during the winter and cooling during the summer. Environmental conditions are controlled from the central thermal and are reliant on the pre-selection of hot and cold fluids sent by the coil.

The various control functions include:

- Single coil for cooling/heating management
- Manage up to 3 coils (heating, cooling, post-heating)
- Manage up to 3 stages of resistance for the post-heating
- Controlling humidifier On/Off and modulating
- Controlling dehumidifier
- Controlling external air shutters for free-cooling and free-heating in temperature
- Controlling external air shutters for free-cooling and free-heating heat exchanger
- Controlling external air shutters for air quality
- Manage heat recuperation (cross-flow, at single coil, rotating)
- Manage heating and cooling pumps
- Fan Delivery/Pickup Management On/Off and at inverter
- Variation Set Point from digital input and supervisor and nocturnal time zone
- Changing modes of functionalilty from digital input and supervisor
- Seasonal Operation Winter/Summer
- Alarm history
- Navigational User interface divided into four main levels (User, Maintenance Operator, Installation Operator, and Constructor) each level protected by a different password.
- Paramater upload/download using EVKEY.



Mol con	
C-pro C-pro	
C-PRO KILO EXP Expansion	

2 APPLICATIONS

The air handling device can be operated under the following three modes:

- 1) Air handling unit usage during the winter time only.
- 2) Air handling unit usage during the summer time only.
- 3) Air handling unit usage during the summer and winter, with humidity.
- 4) Air handling unit usage during the summer and winter, with humidity and heat recuperation.
- 5) Air handling unit regulated by 2 coils without dehumidification.
- 6) Air handling unit regulated by 3 coils with dehumidification.

utilizing C-PRO KILO + EXP KILO

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-	of which 7 are on EXP KILO
-	of which 5 are on EXP KILO
-	of which 3 are on EXP KILO
	- - -

For viewing purposes it is possible to utilize an alfanumeric display containing 4 x 20 characters which are directly mounted on the controller.

It is also possible to communicate through the Modbus protocol by using the external optional card (an RS-485).



2.1 Air handling device usage during the winter only



2.2 Air handling device usage during the summer only



2.3 Air handling device usage during the summer and winter, with humidity



2.4 Air handling unit usage during the summer and winter, with humidity and heat recuperation

electric system very fan ir filter oickup losing (M)(M) \square CO3 NO4 CO4 OI NOZ NOS COS NOS COS NO7 NC7 CO7 DATA GND VDC max. 8 A max. 8 A max. 8 A max, 8 A max. 8 A max. 8 A max. 8 A E **C-PRO KILO AHU** VDC AO1 DIS DI6 DI7 COM AO2 KOA DI X ⋬ 24 VAC/20 ... 60 VDC fan switch bient air valve electric syst 2nd step 3rd step st step 100 (M) \bigcirc C 010 001 NO12 DATA GND VDC CO12 NO13 CO max. 8 A **C-PRO EXP KILO** V≊ V≊ DI12 DI13 DI14 COM VDC AO4 AO5 GND AO6 \triangle X 24 VAC/20 . I . 60 VDC ig pump alarr CO7/10 ling pump alarr nidifier

2.5 Air handling unit regulated by 2 coils without dehumidification

2.6 Air handling unit regulated by 3 coils with dehumidification



2.7 Layout of connection - C-PRO KILO AHU

The connection layout of the controller is shown below, with related tables explaining the significance of inputs and outputs.



JA Connections for analogue signals				
Conn.	Label	Description		
JA-1	AI1	Analogue inputs n.1 (for NTC probe)		
JA-2	AI2	Analogue inputs n.2 (for NTC probe)		
JA-3	AI3	Analogue inputs n.3 (for NTC probe)		
JA-4	AI4	Analogue inputs n.4 (for transducers 4-20 mA); for ratiometric		
		transducers 0-5 V upon request		
JA-5	AI5	Analogue inputs n.5 (for transducers 4-20 mA); for ratiometric		
		transducers 0-5 V upon request		
JA-6	GND	Common analogue inputs		
JA-7	+5V	Supplying power to ratiometric transducers		
JA-8	+12V	Supplying current to transducers		

JB Connections for digital signals			
Conn.	Label	Description	
JB-1	DI1	Digital input n.1	
JB-2	DI2	Digital input n.2	
JB-3	DI3	Digital input n.3	
JB-4	DI4	Digital input n.4	
JB-5	DI5	Digital input n.5	
JB-6	DI6	Digital input n.6	
JB-7	DI7	Digital input n.7	
JB-8	GND	Common digital inputs	

JC: Connection for EVKEY (key for upload/download parameters) and outputs for TTL-RS-485 module.

JD: Connection for the cut-phase output EVDFAN1 (analogue output 1; not utilized)				
Conn.	Label	Description		
JD-1	VDC	Supplying power to cut-phase module EVDFAN1		
JD-2	A01	Cut-phase output module EVDFAN1		

In order to utilize the cut-phase module EVDFAN1, it is necessary to supply power to the controller in an alternate current; the current that powers the controller must be the same current as that which is used to power the module.

JE: Connections for analogue outputs 2 and 3 (opto-isolator)				
Conn.	Label	Description (Version V+V)		
JE-1	AO2	0-10VDC		
JE-2	GND	Common analogue outputs		
JE-3	AO3	0-10VDC		

JF: Connections for controller power supply				
Conn.	Label	Description		
JF-1	V≅	Controller power supply (24VAC / 20 60 VDC)		
JF-2	V≅	Controller power supply (24VAC / 20 60 VDC)		

JG: Connections for network expansion I/O (not utilized) and for the remote keyboard (not utilized)

Conn.	Label	Description
JG-1	VDC	Remote keyboard power supply (12VDC, max. 50 mA)
JG-2	GND	Common
JG-3	DATA	Serial in tension

JM-JL-JI-JH: Connection for digital outputs				
Conn.	Label	Description		
JM-4	NO1	Contact normally open - output n.1		
JM-3	CO1	Common output n.1		
JM-2	NO2	Contact normally open - output n.2		
JM-1	CO2	Common output n.2		
JL-4	NO3	Contact normally open - output n.3		
JL-3	CO3	Common output n.3		
JL-2	NO4	Contact normally open - output n.4		
JL-1	CO4	Common output n.4		
JI-4	NO5	Contact normally open - output n.5		
JI-3	CO5	Common output n.5		
JI-2	NO6	Contact normally open - output n.6		
JI-1	CO6	Common output n.6		
JH-3	NO7	Contact normally open - output n.7		
JH-2	NC7	Contact normally closed - output n.7		
JH-1	CO7	Common output n.7		

2.8 Layout of connection - EXP KILO

The following presents the connection layout of KILO expansion, with relative tables indicating inputs and outputs.



Conn.	Label	Description
JA-1	AI1	Analogue input n.1 (for NTC probe)
JA-2	AI2	Analogue input n.2 (for NTC probe)
JA-3	AI3	Analogue input n.3 (for NTC probe)
JA-4	AI4	Analogue input n.4 (for NTC probe / transducers 0-20 mA /
		transducers 4-20 mA); ratiometric transducers 0-5 V upon
		request
JA-5	AI5	Analogue input n.5 (for NTC probe / transducers 0-20 mA /
		transducers 4-20 mA); ratiometric transducers 0-5 V upon
		request
JA-6	GND	Common analogue inputs
JA-7	+5V	Supplying power to ratiometric transducers
JA-8	+12V	Supplying current to transducers

JB Connector for the digital signals				
Conn.	Label	Description		
JB-1	ID1	Digital input n.1		
JB-2	ID2	Digital input n.2		
JB-3	ID3	Digital input n.3		
JB-4	ID4	Digital input n.4		
JB-5	ID5	Digital input n.5		
JB-6	ID6	Digital input n.6		
JB-7	ID7	Digital input n.7		
JB-8	GND	Common digital inputs		

JD: Connector for cut-phase output EVDFAN1 (analogue output 1)			
Conn. Label Description			
JD-1	VDC	Supplying power to cut-phase module EVDFAN1	
JD-2	A01	Cut-phase module output EVDFAN1	

In order to utilize the cut-phase module EVDFAN1, it is necessary to supply the expansion with an alternate current; the phase which supplies power to the controller must be the same as that which is supplied to both the expansion and the module.

JE: Connector for the analogue outputs 2 and 3 (for isolation); upon request, not available in daytime models

Conn.	Label	Description (Version V+I)		
JE-1	AO2	0-10VDC		
JE-2	GND	Common analogue outputs		
JE-3	AO3	4-20mA		
		Description (Versione I+I)		
JE-1	AO2	4-20 mA		
JE-2	GND	Common analogue outputs		
JE-3	AO3	4-20 mA		
		Description (Versione V+V)		
JE-1	AO2	0-10VDC		
JE-2	GND	Common analogue outputs		
JE-3	AO3	0-10VDC		

JF: Connector for supplying power to the expansion				
Conn.	Conn. Label Description			
JF-1	V≅	Expansion power supply (24VAC / 20 60 VDC)		
JF-2	V≅	Expansion power supply (24VAC / 20 60 VDC)		

JG: Connector for connecting to controllore			
Conn.	Label	Description	
JG-1	VDC	Power supply (not utilized)	
JG-2	GND	Common	
JG-3	DATA	Serial in tension	

JM-JL-J	JM-JL-JI-JH: Connection for the digital outputs (electromechanical relays)				
Conn.	Label	Description			
JM-4	NO1	Contact normally open relay n.1			
JM-3	CO1	Common relay n.1			
JM-2	NO2	Contact normally open relay n.2			
JM-1	CO2	Common relay n.2			
JL-4	NO3 Contact normally open relay n.3				
JL-3	CO3	Common relay n.3			
JL-2	NO4	Contact normally open relay n.4			
JL-1	CO4	Common relay n.4			
JI-4	NO5	Contact normally open relay n.5			
JI-3	CO5	Common relay n.5			
JI-2	NO6	Contact normally open relay n.6			
JI-1	CO6	Common relay n.6			
JH-3	NO7	Contact normally open relay n.7			
JH-2	NC7	Contact normally closed relay n.7			
JH-1	CO7	Common relay n.7			

3 NETWORK COMPONENTS & ACCESSORIES



4 USER INTERFACE

4.1 Display and keyboard

Application requires an interface incorporated into the controller (later referred to as built-in) with an alfanumeric display containing 4×20 characters and various keys and dedicated led.

4.1.1 Buit-in interface

The built-in interface is directly integrated into the controller.



The keyboard contains four keys which are used to navigate pages, modify parameters and/or values by performing the following functions:

- O and O (UP and DOWN): these keys modify parameters; otherwise, used to move cursor.
- (ENTER): used to confirm a value when editing; otherwise, it enters a command associated to the text where the cursor is currently positioned. If viewing an alarm page press and hold ENTER key down for about 2 seconds allowing for the alarm to reset. When viewing an alarm page, with each key pressure, all active alarms are run.
- (ESC): used to cancel a value when editing; otherwise, it requests the default page associated with the current page in view. If pressed down and held for about 2 seconds, the ESC key enables switching the machine ON and OFF.

Additionally, 2 LED's are presented:

□ ↓ : indicates the presence or absence of alarms.
 Off: no alarms present
 Light on: indicates the presence of new alarms not yet viewed
 Access: all active alarms have been viewed

. □0:

ESC key, identifies current state of machine. *Off:* machine on *On:* machine off (or machine alarms OFF) *Slow flashing light:* machine digital inputs off *Quick flashing light:* machine supervisor off

4.2 Page listing

The following paragraph presents the principle pages and menus presented in the application manual. As previously discussed, the general menu is divided into four sections: User, Maintenance Operator, Installation Operator, and Constructor. In addition, there is a menu (with additional open access pages) which can be referenced to operate the system clock. The structure of the menu is as follows:

- · Clock Menu-RTC
 - General Menu
 - User Menu (Level 1, password for level 1)
 - Maintenance Operator Menu (Level 2, password for level 2)
 - o Maintenance Operator Menu operating branch
 - o Maintenance Operaror Menu manual branch
 - o Maintenance Operator Menu input/output branch
 - · Installation Operator Menu (Level 3, password for level 3)
 - o Installation Operator Menu regulation branch
 - o Installation Operator Menu fans branch
 - o Installation Operator Menu coil branch
 - Installation Operator Menu humidity branch
 - o Installation Operator Menu recuperation branch
 - o Installation Operator Menu external air shutters branch
 - o Installation Operator Menu pumps branch
 - o Installation Operator Menu security branch
 - Installation Operator Menu various branch
 - Installation Operator Menu default branch (level 4, only when machine is off)
 - · Constructor Menu (Level 4, password for level 4, only when machine is off)
 - Constructor Menu implant branch
 - o Constructor Menu hardware IN branch
 - o Constructor Menu hardware OUT branch

4.2.1 RTC Menu

This menu contains the functionality of the systems' RTC:

- \cdot setting the clock
- setting the clock during evening hours
- setting the clock offset at Set Point to regulate during evening hours

In order to enter into this menu click ENTER on the RTC mask, accessed from the general menu.



In the upper right hand corner of the above image appears a ">" indicating that you may navigate to another page. This is done by placing the cursor on the ">" and then pressing ENTER; this will bring you to the following page.



In the upper left hand corner of the above image appears a "<" indicating that you may navigate to the preceding page by placing the cursor on the "<" and then pressing ENTER.

4.2.2 General Menu

The general menu has no level and represents the access point for all the other system menus.



It is possible to view this menu from any point within the user interface by pressing ENTER for approximately 2 seconds. From this menu you can choose the menu you wish to view by pressing the UP and DOWN keys followed by pressing the ENTER key for confirmation.

In the upper right hand corner of the below image appears a "v" which repsents the focus. This indication specifies to the user that additional information is contained therin and can be viewed by pressing the DOWN key (or UP key depending on the direction of the focus) scrolling to view the contents that is not viewable in the current page. In this specific case, once the focus is on the line "COSTRUTTORE" (CONSTRUCTOR), press DOWN to proceed to the subsequent page:



In the same fashion as described in the above two paragraphs, once the focus is placed on the "RTC" line, press the UP key to return to the preceding page.

4.2.3 User Menu

Access to the user menu for level 1 requires a password from a basic user (or superior) in order to view/modify the parameters presented in this branch. The following parameters appear in this branch:

MOdE: Usage during summer/winter by key input
SEtH: Set point for winter operation (or single Set Point)
SEtC: Set point for summer operation
OS01: Offset set point from Digital inputs
OS02: Offset set point from Supervisor
PU01: Set point ambient humidity
PSd1: User password

4.2.4 Maintenance Operator Menu

Access to the Maintenance Operator Menu for level 2 requires a password from a maintenance operator (or superior) in order to view/modify the parameters presented in this branch.

MAINTENANCE	MENU
OPERATION	>>>
MANUAL	\rightarrow
I∕O STATUS	>>>

In this Menu it is possible to view the status of various devices, inputs and outputs utilized by the application. By pressing the ENTER key on the text which reads "MENU' MANUTENTORE" (MAINTENANCE OPERATOR MENU) you will come to a page allowing you the option to change your password (*PSd2*).

In the *FUNZIONAMENTO* (*OPERATION*) Menu you may view/enable characteristics relating to the operation of the devices, including the hours of operation or the maximum threshold of acceptible hours.

Under the *MANUALE (MANUAL)* Menu you can set the fan and humidifier modes to manual/automatic. It is also possible to force the outputs in order to test their functionality.

In the *STATO I/O* (*STATUS I/O*) Menu you can directly view status of the physical inputs and outputs of the card and you can set corrections to the analogue inputs to compensate the required offset for the cables and positioning of the probes.

4.2.5 Menu Installation Operator

The Installation Operator Menu is in level 3 and requires a password from either an installation operator or constructor in order to view/modify the parameters presented in this branch.



The Installation Operator Menu contains all the paramaters related to the configuration of all operations (alarms, regulations, logistics, characteristics) used for this device. By pressing the ENTER key on the text which reads "MENU' INSTALLATORE" (INSTALLATION MENU) you will come to a page allowing you the option to change your password (*PSd3*).

In the *REGOLAZIONI* (REGULATIONS) Menu you can set/view parameters for various specific regulations:

- compensation regulation Set Point
- · cycles for air quality sensors

Within the VENTILATORI (FAN), BATTERIE (COIL), UMIDITA'(HUMIDITY), RECUPERO(RECUPERATION), SERRANDA ARIA (AIR SHUTTER) and POMPE (PUMPS) menus you may set the the related parameters to manage the devices:

- · regulation parameters
- timetable
- · operation

In the *SICUREZZE*(*SECURITY*) Menu you can find all the paramaters which relate to the alarms and the management of device security:

- enabling
- · signal delays
- type of re-arm...

The VARIE(VARIOUS)Menu contains other general parameters:

- · maximum threshold values
- Modbus communication
- enabling On/Off of Digital inputs and supervisor
- enabling secondary Set Point of Digital inputs and supervisor
- enabling summer/winter modes from Digital inputs and supervisor
- enabling probes
- · digital input/output logistics
- enable nocturnal operating mode
- · cancelling history
- \cdot unit of measurment

From the *DEFAULT* Menu it is possible to restore the default values of all the parameters of the application and save or redownload a map which contains all the parameters from the key. This Menu is only accessible when the machine is off.

4.2.6 Constructor Menu

The Constructor Menu appears in level 4 and requires a password from a constructor in order to view/modify the paramaters presented in this branch. In addition, this Menu is only accessible when the device is off.

CONSTRUCTOR MI	ENU
CONFIGURATION	>>>
HARDWARE IN	>>>
HARDWARE OUT	>>>

The Constructor Menu contains all the parameters relating to the configuration of the device. By pressing the ENTER key on the text which reads "MENU' COSTRUTORE" (CONSTRUCTOR MENU) you will come to a page allowing you the option to change your password for all four levels.

The *CONFIGURAZIONE(CONFIGURATION)* Menu allows you to set/view the parameters relating to the characteristics used to configure the device.

- unit type
- · coil number
- · device enablement
- utilization of the expansion

In the HARDWARE IN Menu you can set the positions of the digital inputs.

In the HARDWARE OUT Menu you can set the positions of the analogue and digital inputs.

4.2.7 Password

Within each menu (excluding the clock and history menus) is an associated level that has conditional access. Each level has an associated password which permits access to the functions within a particular menu. Once the password is typed in, the protected functions will become accessible to the user. Typing in the correct password will have the following two effects:

- permits access to the correllated level
- permits access to sub-levels

Each password for each level can be modified from within that level or from a higher level. For example, all passwords within the constructor level can be modified by levels below the contructor level.

The following is an example of the password page appearing in the contructor menu:

PSd1	USER:	0
PSd2	MAINTENAN.:	56
PSd3	INSTALLER:	6
PSd4	CONSTRUCT.:	-5

The range of acceptable values for the password is: -999 / 9999.

If no further action is required in the current page, after a period of 4 minutes, the password insterted will expire thus requiring a new password to be insterted.

4.2.8 Main OFF page

The main OFF page displays the reason for which the unit is turned off.



When the "Unita' *OFF da alarm*" (OFF from alarm) is on, it can be shut down completely by using either the keys, digital inputs or supervisor.

4.2.9 Main ON page

When the unit is turned ON the following main pages will appear:



from which you may access the status page, by pressing ENTER on the ">". By pressing the ESC key you will able to view the alarm and history pages.

The Set Point viewed is that which is presently in use by the regulations and is calculated by the relative parameters based on the modes of operation (SEtC, SEtH) and by the possible variations introduced from the relative functions (compensation, evening time mode, digital inputs, supervisor).

Additionally, the page includes certain information relating to functions which have yet to become active:

- cR: Compensation Set Point summer
- tR: Variation Set Point in nocturnal operating mode
- dR: Variation Set Point from digital inputs
- **sR:** Variation Set Point from supervisor
- sF: Active fans for cycles of air quality control sensors
- **LD:** The dehumidification functional limit is active
- FC: The external air shutters are active for free-cooling
- **FU:** The external air shutters are active for free-heating
- **OA:** The external air shutters are active for air quality control
- MX: The external air shutters are active for free-cooling/free-
- MA: heating and for air quality control (the maximum requested)
- The external air shutters are active for free-cooling/freeheating and for air quality control (the average requested)
- **FX:** The external air shutters are active in a fixed opening

The function is active if the related code is visible in the page.

4.2.10 Status page

From the main page it is possible to scroll through the various pages and have open access to view the status of each device in operation.

These pages are not password protected and are only accessible when the unit is ON. To view, press ENTER on ">" on the main ON page.

To scroll the status pages press ENTER on the label "<" to return to a preceding page or on the label ">" to view a successive page.

The following page summarizes the main values pertaining to the regulation of the delivery temperature:

KOUTLET 2/10 20 ∏emP.∶.2 5.0 <u>SP :</u> 0 5% Heat R . 64 18 <u>Ø</u> i – 5245 Cool R . 32 0

Value of delivery probe and regulation Set Point

Requested heating (and cooling in the case where a single coil is used) and actual Set Point for heating

Requested cooling and actual Set Point for cooling

The following page summarizes the main values pertaining to the regulation of humidity:

<u> </u>	Value of ambient humidity probe and regulation Set Point
Room rH: <u>50 SP: 55</u>	
Hum. R.: 25.0 24 →	Requested humidification and and actual humidification
Dehum, R.: 45.0 32	Set Point
	Requested dehumidification and actual dehumidification Set
	Point

Note. If certain devices are disabled, the information contained in the parameters for that particular devices operating status will be substituted by dots ("....") in order to exclude information pertaining to any disabled devices from being stored in the status pages. The same applies for probes which are disabled.

4.2.11 Alarm pages

In order to view the alarms, choose *ALARMI (ALARMS)* from the general Menu or, alternatively, from the main pages by pressing ESC to view the following page:



You can press ENTER on "Mostra ALARMI >>"(Show Alarms >>).

If no alarms are present you will see written "*NO ALARMI*" (*NO ALARMS*), otherwise, each time you press ENTER you will view the next active alarm, and so forth.

By pressing the ENTER key for approximately 2 seconds, you will restore the alarms in the case where the condition of error was restored. If this were not true, the current mask would remain in view. If from one alarm page you press the ESC key or if you wait for a 60 second timeout period, you will be brought back to the main page of the application. This level is not password protected.

4.2.12 History pages

In order to view the alarm history, choose *STORICO (HISTORY)* from the general Menu. Alternatively, on the main page you can press the ESC key in order to view the following page:



Press ENTER on "Mostra STORICO >>"(Show History>>).

If no elements are present you will see "*NO ALARMI*"(*NO ALARMS*) written on the screen. Otherwise, you will arrive at the following page which provides information from the most recent element memorized in history:



where the information is from the last element reported and memorized in the history. To view the preceding element press ENTER on ">>". By repeating this procedure you will be able to run each element contained in history until you arrive at the first inserted element, from here, at the request of the successive element, you will view the last memorized element. The history is viewed in a circular manner.

In order to exit the historical page press the ESC key or wait for the 60 second timeout period to expire. This level is not password protected.

4.2.13 Project and Firmware Versions

Press down on the UP+DOWN keys simultaneously for approximately two seconds and then press ENTER on the label **InFo.** The following information pertaining to the project and firmware versions of the controller will appear:



To return to the application page press the ESC key.

5 CONFIGURATION PARAMETERS

To follow is a list of all the parameters which are managed by the application. A brief description will be furnished for each parameter explaining the range of acceptable values, units of measurement, the reccomended default values and the menus in which they can be found. The Menus are structured using the following logic:

- OR : Clock Menu
- UT : User Menu

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- MA: Maintenance Operator Menu
 - MA-F: Maintenance Operator Menu operating branch
 - o MA-M: Maintenance Operator Menu manual branch
 - o MA-CA: Maintenance Operator Menu calibration branch
 - o MA-IO: Maintenance Operator Menu input/output branch
- IS : Installation Operator Menu
 - IS-R: Installation operator Menu regulations branch
 - IS-F: Installation operator Menu fans branch
 - IS-B: installation operator menu coil branch
 - o IS-U: installation operator menu humidity branch
 - IS-RH: installation operator menu recuperation branch
 - IS-SE: Installation operator Menu external air shutters branch
 - IS-P: Installation operator Menu pumps branch
 - IS-S: Installation operator Menu security branch
 - IS-V: Installation operator Menu various parameters branch
 - IS-D: Installation operator Menu default branch
- CO : Constructor Menu
 - o CO-W: Constructor Menu implant branch
 - o CO-HI: Constructor Menu hardware IN branch
 - CO-HO: Constructor Menu hardware OUT branch.

5.1 Directory of configuration parameters

Code	Description parameter	Default	Min	Max	UM	Menu	Note
	CLOCK MENU						
D T01	Inis menu is accessible only if PG05=1 Regin pocturnal operating mode	00.00.00	00.00.00	22:50:50		OP	
PT02	End nocturnal operating mode	00:00:00	00.00.00	23.59.59	-	OR	
PT03	Offset of Set Point nocturnal operating mode	0.00.00	-20.0	20.0	°C	OR	
Level		0.0	20.0	20.0		- OR	
1	USER MENU						
MOd E	Operating mode 0: Summer (Cooling) 1: Winter (Heating)	1	0	1	-	UT	
SEtC	Set Point summer	24.0	PH03	PH04	°C		
SEtH	Set Point winter/single	20.0	PH03	PH04	°C	UT	If PH27=1 (single Set Point), the single Set Point utilized for regulation and SEtH.
PU01	Set Point for humidity management	55	0	100	%	UT	
OS01	Offset at regulation Set Point from digital input	0.0	-20.0	20.0	°C	UT	If PH25=1
OS02	Offset at regulation Set Point from Supervisor	0.0	-20.0	20.0	°C	UT	If PH26=1
PSd1	Password for User Level (1)	0	-999	9999	-	UT	
Level 2	MAINTENANCE OPERATOR MENU						
PM00	Limit the maximum hours of fan operation. Related alarms will sound if maximum hours are exceeded.	20000	0	100000	Hrs.	MA-F	
PM01	Hours of fan operation - delivery	0	0	100000	Hrs.	MA-F	
PM02	Hours of fan operation - pickup	0	0	100000	Hrs.	MA-F	
PM10	Limit the maximum hours of pump operation. Related alarms will sound if maximum hours are exceeded.	20000	0	100000	Hrs.	MA-F	
PM11	Hours of cooling pump operation	0	0	100000	Hrs.	MA-F	
PM12	Hours of heating pump operation	0	0	100000	Hrs.	MA-F	
PM90	Last date of machine maintenance				-	MA-F	
PM20	Manual/automatic fan operation - delivery 0: Auto – automatic operation 1: Manu – manual operation	0 (Auto)	0 (Auto)	1 (Manu)	-	MA-M	
PM21	Force the value of the fan in manual operation	0.0	0	100.0	%	MA-M	If fan On/Off set PM21>0 to activate
PM23	Manual/automatic fan operation - pickup 0: Auto –automatic operation 1: Manu –manual operation	0 (Auto)	0 (Auto)	1 (Manu)	-	MA-M	
PM24	Force the value of the fan pickup module in manual operation	0.0	0	100.0	%	MA-M	If fan On/Off set PM24>0 to activate
PM26	Manual/automatic humidifier operation 0: Auto –automatic operation 1: Manu –manual operation	0 (Auto)	0 (Auto)	1 (Manu)	-	MA-M	
PM27	Force the value of the humidifier in manual operation	0	0	100	%	MA-M	If humidifier On/Off set PM27>0 to

							activate
PM80	Calibration of the ambient air temperature probe	0.0	-10.0	10.0	°C	MA-IO	
PM81	Calibration of the delivery air temperature probe	0.0	-10.0	10.0	°C	MA-IO	
PM82	Calibration of the external air temperature probe	0.0	-10.0	10.0	°C	MA-IO	
PM83	Calibration of the ambient humidity probe	0	-10	10	°C	MA-IO	
PM84	Calibration of the air temperature expulsion probe	0.0	-10.0	10.0	°C	MA-IO	
PM85	Calibration of the anti-freeze temperature probe	0.0	-10.0	10.0	°C	MA-IO	
PM87	Calibration of the pre-heating air temperature probe	0.0	-10.0	10.0	°C	MA-IO	
PM88	Calibration of the air quality probe (CO2/VOC)	0	-100	100	ppm	MA-IO	
PM89	Calibration of the external air humity probe	0	-10	10	%	MA-IO	
PSd2	Password Maintenance Operator Level (2)	0	-999	9999	-	MA	
Level 3	INSTALLATION OPERATOR MENU						
	REGULATION						
PC01	Enable compensation Set Point summer	NO (0)	NO (0)	YES (1)	-	IS-R	
PC02	Set Point maximum for summer compensation	28.0	SEtC	PH04	°C	IS-R	
PC03	Set Point (on external t.) from begining compensation	26.0	PH03	PH04	°C	IS-R	
PC04	Differential for the summer compensation of Set Point	4.0	0.0	20.0	°C	IS-R	
PC05	Enable cycles for air quality sensors for ambient temperature (when probe is restarting)	NO (0)	NO (0)	YES (1)	-	IS-R	
PC06	Wait time prior to fan activation for air quality sensors	6	1	99	Min	IS-R	Only with
PC07	Fan activation time for air quality sensors	2	1	30	Min	IS-R	PG05=1
PC08	Activate both fans for air quality sensors 0 : NO – Only activate pickup fan 1 : YES – Activate both fans	NO (0)	NO (0)	YES (1)	-	IS-R	
	FANS						
PF01	Types of regulations for fans: 0: Continuous Regulation 1: On/Off Regulation 2: Module Regulation 3: Module Regulation with steps to enable On/Off	1	Continuo us (0)	Inverter+ OnOff (3)	-	IS-F	
PF02	Differentials for fan regulation	5.0	0.0	30.0	°C	IS-F	
PF03	Minimum speed for the regulation of fan modules	0.0	0.0	PF04	%	IS-F	
PF04	Maximum speed for the regulation of fan modules	100.0	PF03	100.0	%	IS-F	
PF05	Minimum time between the startup of pickup and delivery fans.	20	0	999	Sec	IS-F	
PF08	Differentials of On/Off steps on ramp of regulation of fan modules	8.0	PF03	60.0	%	IS-F	Only if PF01=3
PF09	Wait time (on and off) of On/Off steps on ramp of regulation of fan modules	10	0	999	Sec	IS-F	Only if PF01=3
PF10	Pickup and delivery fan speed in ambient probe alarm	30.0	0.0	100.0	%	IS-F	If fans On/Off set PF10 > 0 to activate in probe error
	COILS						
Pb01	Proportional band for regulation of valves (cooling/heating)	10.0	0.0	20.0	°C	IS-B	
Pb02	Integral time for regulation of valves (cooling/heating)	0	0	999	Sec	IS-B	If Pb02=0 integral action

							not present
Pb03	Neutral zone for the regulation of temperature	4.0	0.0	20.0	°C	IS-B	
Pb05	Maximum shifting for Set Point calculation running of delivery	0.0	0.0	20.0	°C	IS-B	If Pb05=0 function not enabled
Pb06	Proportional band for the Set Point calculation running of delivery	5.0	0.0	20.0	°C	IS-B	
Pb10	Opening of heating valves alarm probe delivery	30.0	0.0	100.0	%	IS-B	
Pb11	Opening of cooling valves alarm probe delivery	30.0	0.0	100.0	%	IS-B	
Pb20	Insertion/release time single stage of resistance for the post-heating	60	0	999	Sec	IS-B	
	HUMIDITY Menu accessible only if PG06>0 or PG12=1						
PU02	Neutral zone for the regulation of humidity	6	0	100	%	IS-U	
PU03	Differential for the regulation of humidity	10	0	100	%	IS-U	
PU04	Integral time for the regulation of dehumidification (with cold coil)	0	0	999	Sec	IS-U	If PU04=0 ntegral action not present
PU05	Enable functional limit for the dehumidification	NO (0)	NO (0)	YES (1)	-	IS-U	
PU10	Enable humidifier control with delivery temperature	YES (1)	NO (0)	YES (1)	-	IS-U	
PU11	Set Point on the delivery temperature to enable the humidifier	22.0	PH03	PH04	°C	IS-U	Only if PU10=1
PU12	Differential on the delivery temperature to enable the humidifier	3.0	0.0	20.0	°C	IS-U	Only if PU10=1
	VALVES						
PV01	Proportional band for regulation of valves (cooling/heating)	10.0	0.0	30.0	°C	IS-Va	
PV02	Integral time for regulation of valves (cooling/heating)	0	0	999	Sec	IS-Va	If PV02=0 integral action not present
PV05	Maximum shifting for Set Point calculation running of delivery	0.0	0.0	10.0	°C	IS-Va	If PV05=0 function not enabled
PV06	Proportional band for the Set Point calculation running of delivery	5.0	0.0	20.0	°C	IS-Va	
PV10	Opening cooling/heating valves alarm probe delivery	30.0	0.0	100.0	%	IS-Va	
	EXTERNAL AIR SHUTTERS Menu accessible only if PG07>0						
PS01	Type of Free-Cooling / Free-Heating 0: Disabled 1: Free-Cooling / Free-Heating in temperature 2: Free-Cooling / Free-Heating heat exchanger	1	0	2	-	IS-SE	
PS02	Enable air quality control	NO (0)	NO (0)	YES (1)	-	IS-SE	
PS03	Shutter command type 0: Only for Free-Cooling/Free-Heating 1: Only for controlling air quality 2: Priority to the greater of the two requests 3: Average of the two requests	0	0	3	-	IS-SE	
PS04	Proportional band for the modulation of the external air shutters	8.0	0.0	30.0	°C	IS-SE	
PS05	Minimum opening for the external air shutters	0.0	0.0	PS06	%	IS-SE	
PS06	Maximum opening for the external air shutters	100.0	PS05	100.0	%	IS-SE	
PS07	Run time for the external air shutters from 0% to 100%	120	0	3600	Sec	IS-SE	
PS08	Maximum time to maintain signal until end run time on relay for external air shutters. Signal will shut off once maximum time is reached	5	0	600	Sec	IS-SE	

PS09	Minimum variation regulation for operating the	0.0	0.0	90.0	%	IS-SE	Enabled if
PS10	Fixed value for opening external air shutters	50.0	0.0	100.0	%	IS-SE	Only with fixed regulation (PG07=2)
PS11	Offset at Set Point during winter (at ambient temp.) until the external air shutters remain closed during winter operating mode	2.0	0.0	30.0	°C	IS-SE	Only with regulation module (PS01=1)
PS12	Differential enabling free-cooling and free- heating in temperature	2.0	0.0	20.0	°C	IS-SE	
PS13	Differential Set Point enabling free-cooling and free-heating in temperature	4.0	0.0	20.0	°C	IS-SE	
PS15	Differential enabling free-cooling and free- heating heat exchanger	8.0	1.0	100.0	KJ/ Kg	IS-SE	
PS16	Differential Set Point enabling free-cooling and free-heating heat exchanger	10.0	1.0	200.0	KJ/ Kg	IS-SE	
PS20	Set Point – Air Quality Control	600	0	10000	ppm	IS-SE	
PS21	Differential – Air Quality Control	100	0	2000	ppm	IS-SE	
	RECUPERATORS Menu accessible only if PG13>0						
Pr01	Differential Set Point for regulation of recuperator	5.0	0.0	20.0	°C	IS-RH	
Pr02	Differential of regulation of recuperator	3.0	0.0	20.0	°C	IS-RH	
Pr03	Minimum Set Point expulsion temperature	1.0	PH03	PH04	°C	IS-RH	
Pr04	Differential minimum expulsion temperature	4.0	0.0	20.0	°C	IS-RH	
Pr05	By pass cycle time of recuperators at cross flow for melting	5	1	99	Min	IS-RH	
Pr07	Minimum velocity of rotating heat recuperator velocity	0.0	0.0	Pr08	%	IS-RH	Only if
Pr08	Maximum velocity of rotating heat recuperator velocity	100.0	Pr07	100.0	%	IS-RH	PG13=4
	PUMPS Menu accessibile only if PG10=1 or PG11=1						
PP01	Types of pump regulation 0: Continuous regulation 1: Regulation On/Off	0	0	1	-	IS-P	
PP02	Set Point on the regulation ramp for pump startup	5.0	PP03	90.0	%	IS-P	Only if
PP03	Set Point on the regulation ramp for pump shutdown	2.0	1.0	PP02	%	IS-P	PP01=1
PP04	Wait time for pump shutdown (only with PP01=1)	10	1	99	Min	IS-P	OFF – Unit immediately shuts down pump
	HUMIDIFIER This menu is accessible only if PG06=1						
PU02	Type of regulation for humidifier 0: ON/OFF Regulation 1: Module Regulation	0	0	1	-	IS-U	
PU03	Differential for the regulation of the humidifier	10	0	100	%	IS-U	
PU10	Enable humidifier control with temperature of delivery	YES (1)	NO (0)	YES (1)	-	IS-U	
PU11	Set Point at temperature of delivery enabling humidifier	22.0	PH03	PH04	°C	IS-U	Only if PU10=1
PU12	Differential on the temperature of delivery to enable humidifier	3.0	0.0	20.0	°C	IS-U	Only if PU10=1
	ALARM PARAMETERS						

PA01	Enable alarms during hours of fan operation	YES (1)	NO (0)	YES (1)	-	IS-S	
PA02	Enable alarms during hours of pump operation	NO (0)	NO (0)	YES (1)	-	IS-S	
PA03	Signal alarms during hours of operation on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA04	Probe alarm delay	10	0	240	Sec	IS-S	
PA05	Signal alarm probe on alarm relay	YES (1)	NO (0)	YES (1)	I	IS-S	
PA06	Expansion alarm delay	5	0	999	Sec	IS-S	
PA08	Signal delivery fan alarm on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA09	Signal pickup fan alarm on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA10	Alarm delay thermal fans	2	0	999	Sec	IS-S	
PA11	Alarm delay inverter fans	2	0	999	Sec	IS-S	
PA15	Alarm delay thermal pumps	2	0	999	Sec	IS-S	
PA16	Signal alarms thermal pumps on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA20	Type of pressure switch alarm re-arm (dirty recuperator) 0: Auto - Automatic 1: Manu - Manual	Manu (1)	Auto (0)	Manu (1)	-	IS-S	
PA21	Pressure switch alarm delay (dirty recuperator)	30	0	999	Sec	IS-S	
PA24	Type of alarm re-arm pressure switch air filter 0: Auto - Automatic 1: Manu - Manual	Manu (1)	Auto (0)	Manu (1)	-	IS-S	
PA25	Pressure switch air filter alarm delay	30	0	999	Sec	IS-S	
PA26	Signal alarms pressure switch air filter alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA28	Reset airflow meter alarm delay	30	0	999	Sec	IS-S	
PA29	Airflow meter alarm delay	5	0	999	Sec	IS-S	
PA30	Signal alarm air flow meter on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA31	Type of humidifier alarm re-arm 0: Auto - Automatic 1: Manu - Manual	Auto (0)	Auto (0)	Manu (1)	-	IS-S	
PA32	Humidifier alarm delay	2	0	999	Sec	IS-S	
PA33	Signal alarms humidifier on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA35	Type of anti-freeze alarm management: 0: Disabled 1: From digital contact 2: From anti-freeze probe	1	0	2	-	IS-S	
PA36	Alarm delay anti-freeze	5	0	999	Sec	IS-S	
PA37	Signal alarm anti-freeze on alarm delay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA38	Activation Set Point for anti-freeze alarm from transducer	2.0	PH03	PH04	°C	IS-S	
PA39	Activation differential for anti-freeze alarm from transducer	3.0	0.0	10.0	°C	IS-S	
PA40	Enable RTC alarm	YES (1)	NO (0)	YES (1)		IS-S	
PA41	Type of RTC alarm restoration 0: Auto - Automatic 1: Manu - Manual	Manu (1)	Auto (0)	Manu (1)	-	IS-S	
PA42	Signal RTC alarms on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
PA45	Signal alarms fire/smoke on alarm relay	YES (1)	NO (0)	YES (1)	-	IS-S	
	VARIOUS PARAMETERS						
PH01	Minimum value threshold for the pressure probe	0	-10.0	PH02	Bar	IS-V	
PH02	Maximum value threshold for the pressure probe	30.0	PH01	45.0	Bar	IS-V	
PH03	Minimum temperature value for the Set Point	-5.0	-15.0	PH04	°C	IS-V	
PH04	Maximum temperature value for the Set Point	40.0	PH03	70.0	°C	IS-V	
PH05	Enable machine start-up/shut-down by pressing the ESC/Stand-By key	YES (1)	NO (0)	YES (1)	-	IS-V	
PH06	Enable the change in summer/winter operating	YES (1)	NO (0)	YES (1)		IS-V	

	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)			1			
	modes utilizing the keyboard (ModE parameter)						
PH07	Enable machine start-up/shut-down using the	YES (1)	NO(0)	YES (1)	-	IS-V	
11107	Digital inputs	125 (1)	110 (0)	125 (1)		10 1	
01100	Enable the change in summer/winter operating	NO(0)	NO(0)	VEC (1)		IC M	
F HU8	modes utilizing the Digital inputs	NO (0)	NO(0)	1ES(1)	-	15- v	
	Enable machine start-up/shut-down as						
PH09	supervisor	NO (0)	NO (0)	YES (1)		IS-V	
	Enable the change in summer/winter operating						
PH10	modes as supervisor	NO (0)	NO (0)	YES (1)		IS-V	
DII11		1	1	0.47			
PHII	Modbus card address	1	1	247	-	1S-V	
PH12	Baud Rate of comunication for the card	3	0	4	-		
11112	(0=1200, 1=2400, 2=4800, 3=9600, 4=19200)	5	Ű	•			
PH13	ModBus parity (0=none, 1=Odd, 2=Even)	2	0	2	-	IS-V	
PH14	Stop Bit ModBus (0=1bit, 1=2bit)	0	0	1	-	IS-V	
							Set SI (1) and
PH18	Cancel alarm history	NO(0)	NO(0)	YES (1)	-	IS-V	wait for value
11110		110 (0)	110 (0)	125 (1)		10 1	NO (0)
DI125	Enchla variation Sat Daint from Digital inputs	NO (0)	NO(0)	VEC (1)		IC V	110 (0)
	Enable variation Set Point noin Digital inputs	NO (0)	NO(0)	$\frac{1ES(1)}{VEC(1)}$	-	15-V	
PH26	Enable variation Set Point as Supervisor	NO (0)	NO (0)	YES (1)	-	15-V	
							If PH27=1
							(single Set
	Enable distinct/single Set Point for						Point), the
DUAT	heating/cooling:	0	0	1			single Set
PH2/	0: Set Point distinct	0	0	1	-	15-V	Point utilized
	1. Set Point single						for the
	1. Set I onte single						regulation is
							SEtH
	Enable necturnal operating mode for the						SLui.
PH28	Enable nocturnal operating mode for the	NO (0)	NO (0)	YES (1)	-	IS-V	
	modification of the Set Point regulation						
	Unit of measurement of temperature:						
PH32	0: °Celsius	0 (°C)	0 (°C)	1 (°F)	-	IS-V	
	1: °Fahrenheit						
	Unit of measurement of pressure:						
PH33	0: Bar	0 (Bar)	0 (Bar)	1 (psi)	-	IS-V	
	1: psi						
PH34	Value of the Atmospheric Pressure	1013	0	10000	hPa	IS-V	
PH37	PPM transducer minimum value CO2/VOC	0	0	10000	nnm	IS-V	
DH38	PPM transducer maximum value CO2/VOC	2000	0	10000	nnm	IS V	
DI140	Enchla automal temperature proha	2000 NO (0)		VES (1)	ppm		
ГП 4 0		NO (0)	NO (0)	1ES(1)	-	15- v	
	Enable ambient air numidity probe						
PH41	0: Disabled	1	0	2	-	IS-V	
	1: Enabled with sensor 420mA		-				
	2: Enabled with sensor 05V						
PH42	Enable air expulsion temperature probe	YES (1)	NO (0)	YES (1)	-	IS-V	
PH43	Enable anti-freeze temperature probe	NO (0)	NO (0)	YES (1)	-	IS-V	
PH45	Enable pre-heating air temperature probe	NO (0)	NO (0)	YES (1)	-	IS-V	
	Enable air quality probe (CO2/VOC)	· · · ·					
	0: Disabled						
PH46	1: Enabled with sensor 4.20 mA	0	0	2	-	IS-V	
	2: Enabled with sensor 0.5V						
	Enable external eir humidity probe						
	0. Dischlad						
PH47		0	0	2	-	IS-V	
	1: Enabled with sensor 420mA						
	2: Enabled with sensor 05V						
	Logistics of Digital inputs for:						
PH50	- change in summer/winter modes	NO(0)	NO(0)	NC(1)	_	IS-V	
11150	- On/Off remote		10(0)		_	10- 4	
	- change in Set Point of regulation						
PH51	Logistics of Digital inputs used for the alarms	NO (0)	NO (0)	NC (1)	-	IS-V	
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PH52	Logistics of Digital inputs used for the alarm flux status	NC (1)	NO (0)	NC (1)	-	IS-V	
PH53	Logistics of Digital inputs for alarm fire-smoke	NC (1)	NO (0)	NC (1)	-	IS-V	
PH60	Logistics of alarm relay	NO (0)	NO (0)	NC (1)	-	IS-V	
PH15	Restoring the manufacturers' defualt parameters	NO (0)	NO (0)	YES (1)	-	IS-D	Wait for the value NO(0) upon completion of restore
PSd3	Password Installation Operator Level (3)	0	-999	9999	-	IS	
Level 4	CONSTRUCTOR MENU						
	CONFIGURATION PARAMETERS Upon modification of these parameters it is advised to remove and delete the card feed						
PG00	Unit type: 1: Winter operating mode only 2: Summer operating mode only 3: Winter and summer operating mode with humidity 4: Winter and summer operating mode with humidity and heat recuperation 5: Two coils without dehumidification 6: Three coils with dehumidification	3	1	6	-	CO-W	
PG01	Number of coils 1: Heating/Cooling (Unit with single coil) 2: Heating, Cooling 3: Heating, Cooling, Post-Heating	1	1	3	-	COW	If PG01=1 the MOdE parameter decides if hot or cold
PG02	Enable the presence of the expansion	NO (0)	NO (0)	YES (1)	-	CO-W	
PG03	Enable RTC system clock	YES (1)	NO (0)	YES (1)	-	CO-W	If PG03=0, history does not memorize elements and the nocturnal operating mode is disabled
PG04	Primary types of regulation: 0: On fan 1: On valves	Valv. (1)	Fan (0)	Valv. (1)	-	CO-W	
PG05	Positioning probe of regulation: 0: Ambient probe 1: Probe in restart channel	Amb. (0)	Amb. (0)	Rest. (1)	-	CO-W	
PG06	Enable humidifier 0: Disabled 1: Regulation ON-OFF 2: Regolation Modulating	1	0	2	-	CO-W	
PG07	Enabled external air shutters 0: Disabled 1: Modulating regulation 2: Fixed opening	1	0	2	-	CO-W	
PG08	Enable delivery fans	YES (1)	NO (0)	YES (1)	-	CO-W	
PG09	Enable pickup fans	YES (1)	NO (0)	YES (1)	-	CO-W	
PG10	Enable heating circulation pump (or single pump for the unit at single coil)	NO (0)	NO (0)	YES (1)	-	CO-W	
PG11	Enable cooling circulation pump	NO (0)	NO (0)	YES (1)	-	CO-W	
PG12	Enable dehumidification	NO (0)	NO (0)	YES (1)	-	CO-W	
PG13	Manage heating recuperator	0	0	4	-	CO-W	

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	0. Disabled						
	1: At cross flow						
	2. Using two coils						
	3: Rotating On/Off (DO)						
	4: Rotating Modulating (AO)						
-	Post-heating with electrical resistance:						
	0: Operation disabled						
PG14	1: One stage of resistance	0	0	3	-	CO-W	
1011	2: Two stages of resistance	Ŭ	Ũ	C		00 11	
	3: Three stages of resistance						
PSd4	Password for Constructor Level (4)	0	_999	9999	_	CO	
1.541	HARDWARF IN PARAMETERS	0	,,,,	,,,,,		00	
	Positioning of Digital inputs while machine is						
Hd01	Ω_{n}/Ω_{ff}	1	0	7	-	CO-HI	
	Positioning of Digital inputs for the changes in						
Hd02	operating mode (summer/winter)	0	0	7	-	CO-HI	
	Positioning of Digital inputs for the variations of						
Hd03	Set Deint embient	0	0	7	-	CO-HI	
	Desitioning of Digital inputs of alarm thermal						
Hd05		3	0	7	-	CO-HI	
	Delivery lan						
Hd06	Positioning of Digital inputs of alarm inverter	0	0	7	-	CO-HI	
	Delivery fan						
Hd07	Positioning of Digital inputs of alarm thermal	0	0	7	-	CO-HI	
	pickup fan						
Hd08	Positioning of Digital inputs of alarm inverter	0	0	7	-	CO-HI	
	pickup fan						
11.110	Position of digital input of thermal heating pump	0	0	14			
HdIO	alarm (or single circulation pump for the unit at	0	0	14	-	СО-НІ	
	single coil)						
Hd11	Position of digital input of thermal cooling	0	0	14	-	CO-HI	
	pump alarm	-	-				
Hd13	Position of digital input of thermal resistance	0	0	14	-	CO-HI	
	pump alarm	, 	Ű			00	
Hd15	Positioning of Digital inputs of alarm humidifier	0	0	7	-	CO-HI	
Hd16	Positioning of Digital inputs of alarm air	6	0	7	-	CO-HI	
maro	flowmeter	0	Ŭ	,		00 111	
Hd17	Positioning of Digital inputs of alarm anti-freeze	5	0	7	_	CO-HI	
11017	thermostat	5	0	,		00 111	
Hd18	Positioning of Digital inputs of alarm air filter	4	0	7	_	CO-HI	
11010	pressure switch		0	/		00 111	
Hd10	Position of digital input of pressure switch	0	0	14	_	CO-HI	
Thur	recuperator alarm	0	0	14	_	CO-III	
Hd20	Positioning of Digital inputs of alarm fire-smoke	0	0	7	-	CO-HI	
	HARDWARE OUT PARAMETERS						
HF01	Positioning of Digital outputs of delivery fans	1	0	7	-	CO-HO	
HF02	Positioning of Digital outputs of pickup fans	2	0	7	-	CO-HO	
HU01	Positioning of Digital outputs of humidifier	0	0	7	-	CO-HO	
U\$01	Positioning of Digital outputs to control the	Δ	0	7			
H201	opening of external air shutters	4	0	/	-	СО-НО	
11000	Positioning of Digital outputs to control the	5	0	7			
H502	closing of external air shutters	5	0	/	-	CO-HO	
	Position of digital ouput of the heating pump (or						
HP01	single circulation pump for the unit at single	0	0	14	-	CO-HO	
	coil)						
HP02	Position of digital output of the cooling pump	0	0	14	-	CO-HO	
II of	Position of the digital output dedicated to the	-					
Hr01	recuperator	0	0	14	-	со-но	
LID01	Position of the digital output of the first stage of	0	0	1.4			
HEUI	electrical resistance	U	0	14	-	CO-HO	

HE02	Position of the digital output of the second stage of electrical resistance	0	0	14	-	СО-НО	
HE03	Position of the digital output of the third stage of electrical resistance	0	0	14	-	СО-НО	
HA01	Position of the digital output of the alarm relay	7	0	14	-	CO-HO	
HA02	Position of the digital output for dirty filter indicator alarm or dirty recuperator	6	0	14	-	СО-НО	
HA04	Position of the analogue output of the heating valves (or single for heating/cooling in case the unit is at single coil)	2	0	6	-	СО-НО	
HA05	Position of the analogue output of the cooling/dehumidifying valve	0	0	6	-	СО-НО	
HA06	Position of the analogue output of the post- heating valves	0	0	6	-	СО-НО	
HA07	Positioning of Analogue outputs for the inverter fans	3	0	6	-	СО-НО	
HA08	Positioning of Analogue outputs for the humidifier module	0	0	6	-	СО-НО	
HA09	Position of the analogue output dedicated for the rotating recuperator	0	0	6	-	СО-НО	

Note. In order to accurately configure the machine parameters, it is advised that the card feed be removed/deleted once the machine parameters have been configured and for each subsequent modification to the "*parametri di configurazione*" (*configuration parameters*).

6 REGULATIONS

6.1 Unit status

There are additional procedures for the start-up/shut-down of the unit:

1) Using the **On/Off** key (parameter, PH05=1)

Startup: press the related key for approximately 2 seconds: if all the other enabled conditions are present, the machine will turn "ON".

Shutdown: press the related key for approximately 2 seconds: the machine will turn "OFF".

 Using the On/Off command from the Digital inputs (parameter, PH07=1) Startup: close the remote On/Off contact: if all the other enabled conditions are present, the machine will turn "ON".

Shutdown: if the remote On/Off contact opens, the machine will turn "OFF from Digital inputs" (as also indicated by the dictation "OFF_D").

3) Using the **supervision protocol** (parameter, PH09=1) *Startup:* activate from protocol the startup status: if all the other enabled conditions are present, the machine will turn "ON".

Shutdown: if the startup status becomes deactivated from the protocol, the machine will turn "OFF da protocollo di supervisione" (OFF from supervision protocol) (as also indicated by the dictation "OFF_S").

The status of the On/Off key has priority with respect to the other two keys. In fact, the status of the On/Off from Digital Inputs and from supervision protocol are accessible only when the machine's keyboard is turned on.

A machine with its **Digital inputs** shut off can:

- Change to OFF status by pressing the ESC key.
- Change to OFF status as supervisor if you re-enter the conditions of OFF from Digital inputs and set the status of OFF from supervisor.
- Change to ON status if you re-enter the conditions of OFF from Digital inputs and do not set the status of OFF from supervisor.

A machine with its **supervision protocol shut off** can:

- Change to OFF status by pressing the ESC key.
- Change to status OFF from Digital inputs if you re-enter the conditions of OFF from supervisor and switch the status of OFF from Digital inputs.
- Change to ON status if you re-enter the conditions of OFF from supervisor and the conditions of OFF from Digital inputs are not present.

The machines On/Off key is the ESC key, which needs to be pressed down for approximately 2 seconds.

The remote On/Off inputs (if present) can be configured through the following parameters:

- *PH07*: Enable the function
- PH50: Set the logic NC, NO for the digital contacts
- *Hd01*: Set the position for the Digital inputs

6.1.1 Alarm OFF status

When the machine is turned on an additional status, **OFF da alarm (Alarm Off)** exists. This shuts down the unit, all devices, and closes the external air shutters completely until the alarm conditions are restored. The central alarm will shut down to OFF status if there is no digital / supervisor consent or shut down is requested via the keyboard. The alarms which provoke this status are as follows:

- Fan thermal alarm
- Fan inverter alarm
- Air Flow Meter alarm
- Fire/smoke alarm

Once alarm conditions have been restored the machine will return to normal operation.

6.2 Unit Type

While the machine is turned off, using the parameter *PG00* in the *COSTRUTTORE* (CONSTRUCTOR) Menu, it is possibile to choose the type of unit that you wish to utilize. Based on the value of the parameters, different defualts become available for the positioning of inputs and outputs. The regulation and other parameters which correspond to diverse functionalities can be modified manually according to user requirements.

To follow is a list of the machines which are managed by the respective configurations of inputs and outputs.

Note. The default configurations can also be modified according to user requirements by entering modifications to the paramaters manually.

ATTENTION. When changing the machine type (through modification of parameter PG00) it is necessary to shutdown and then restart the card to ensure the unit has been correctly configured; in order to allow the card to assign all the parameters contained therein it is advisable to wait a few seconds (3 seconds should be more than sufficient) before removing the tension.

6.2.1 Unit in WINTER operating mode (PG00=1)

The *MOdE* parameter can be setup by default in *INVERNO (WINTER)*. Unit at single coil *PG01*=1.

The fan regulations can be setup by default in On/Off (PF01=1).

The primary regulation can be setup by default on the valve (PG04=1). The regulation of the shutter is fixed (PG07=2).

PIN	ANALOGUE INPUTS
AI1	Ambient air temperature probes (NTC)
AI2	Air delivery temperature probes (NTC)
AI3	Not utilized
AI4	Not utilized
AI5	Not utilized

PIN	DIGITAL INPUTS
DI1	On/Off remote
DI2	Not utilized
DI3	Thermal delivery fan
DI4	Air filter pressure switch
DI5	Anti-freeze thermostat
DI6	Airflow status
DI7	Not utilized

PIN	ANALOGUE OUTPUTS
AO 1	Not utilized
AO 2	Heating valve control (0-10V)
AO 3	Not utilized

PIN	DIGITAL OUTPUTS
DO1	Delivery fan
DO2	Pickup fan
DO3	Not utilized
DO4	Opening external air shutters
DO5	Closing external air shutters
DO6	Dirty filter indicator
DO7	Alarm

6.2.2 Unit in SUMMER operating mode (PG00=2)

The *MOdE* parameter can be setup by default in *ESTATE (SUMMER)*. Unit at single coil *PG01=1*.

The fan regulations can be set up by default in On/Off (*PF01=1*).

The primary regulation can be set up by default on the valve (PG04=1). The regulation of the shutter is fixed (PG07=2).

PIN	ANALOGUE INPUTS
AI1	Ambient air temperature probes (NTC)
AI2	Air delivery temperature probes (NTC)
AI3	Not utilized
AI4	Not utilized
AI5	Not utilized

PIN	DIGITAL INPUTS
DI1	On/Off remote
DI2	Not utilized
DI3	Thermal delivery fan
DI4	Air filter pressure switch
DI5	Anti-freeze alarms
DI6	Air flow status
DI7	Not utilized

PIN	ANALOGUE OUTPUTS
AO 1	Not utilized
AO 2	Cooling valve control (0-10V)
AO 3	Not utilized

PIN	DIGITAL OUTPUTS
DO1	Delivery fan
DO2	Pickup fan
DO3	Not utilized
DO4	Opening external air shutters
DO5	Closing external air shutters
DO6	Dirty filter indicator
DO7	Alarm

6.2.3 Unit operation during WINTER/SUMMER WITH HUMIDITY (PG00=3)

The *MOdE* parameter can be set up by default in *INVERNO (WINTER)*. Unit at single coil *PG01=1*.

The fan regulations can be set up by default in inverter with On/Off (*PF01=3*).

The primary regulation can be set up by default on the valve (PG04=1).

The primary regulation starts with valves set on default (PG04=1).

The regulation of the shutter is enabled for free-cooling/free-heating (*PG07=1*, *PS01=1*).

PIN	ANALOGUE INPUTS
AI1	Ambient air temperature probes (NTC)
AI2	Air delivery temperature probes (NTC)
AI3	External air temperature (NTC)
AI4	Humidity probe (420 mA)
AI5	Air expulsion temperature probe (NTC)

PIN	DIGITAL INPUTS
DI1	On/Off remote
DI2	Remote communication summer/winter
DI3	Thermal delivery fan
DI4	Air filter pressure switch
DI5	Anti-freeze thermostat
DI6	Air-flow meter
DI7	Thermal pickup fan

PIN	ANALOGUE OUTPUTS
AO 1	Not utilized
AO 2	Cooling/heating valve control (0-10V)
AO 3	Inverter fan control (0-10V)

PIN	DIGITAL OUTPUTS
DO1	Delivery fan
DO2	Pickup fan
DO3	Humidifier on/off
DO4	Opening external air shutters
DO5	Closing external air shutters
DO6	Dirty filter indicator
DO7	Configurable alarms (all active alarms)

6.2.4 Unit for operation in WINTER/SUMMER with humidity and recuperation (PG00=4)

The *MOdE* parameter starts while set on default on WINTER Unit at single coil PG01=1.

The regulation of the fans starts while set on default on inverter with On/Off (PF01=3). The primary regulation starts while set on default on the valve (PG04=1).

The regulation of the shutter is enabled for free-cooling/free-heating (PG07=1, PS01=1). The recuperator in use is that at cross flow PG13=1.

PIN	ANALOGUE INPUTS
AI1	Ambient air temperature probe (NTC)
AI2	Air delivery temperature probe (NTC)
AI3	External air temperature (NTC)
AI4	Ambient humidity probe (420 mA)
AI5	Expulsion air temperature probe (NTC)

PIN	DIGITAL INPUTS
DI1	On/Off remote
DI2	Summer/winter remote commutation
DI3	Thermal delivery fan
DI4	Pressure switch recuperator dirty
DI5	Anti-freeze thermostat
DI6	Humidifier alarm
DI7	Thermal pickup fans

PIN	ANALOGUE OUTPUTS
AO 1	Not utilized
AO 2	Valve command heating/cooling (0-10V)
AO 3	Fans inverter command (0-10V)

PIN	DIGITAL OUTPUTS
DO1	Delivery fans
DO2	Pickup fans
DO3	Shutter by-pass recuperator
DO4	Opening of external air shutter
DO5	Closing of external air shutter
DO6	Humidifier on/off
DO7	Alarm

6.2.5 Unit with 2 coils without dehumidification (PG00=5)

The *MOdE* parameter starts while set by default on *WINTER*.

This unit provides the utilization of the expansion (PG02=1).

The regulation of the fans starts while on its default setting on the inverter with On/Off (*PF01=3*).

The number of coils is PG01=2; the post-heating is managed by the resistance PG14=3. The dehumidification is disabled PG12=0.

The regulation of the shutter is enabled for free-cooling/free-heating (PG07=1, PS01=1). The recuperator utilized is that which is at cross flow PG13=1.

PIN	ANALOGUE INPUTS
AI1	Ambient air temperature probe (NTC)
AI2	Delivery air temperature probe (NTC)
AI3	External air temperature (NTC)
AI4	Ambient humidity probe (420 mA)
AI5	Expulsion air temperature probe (NTC)
AI6	Anti-freeze temperature probe (NTC)
AI7	Not utilized
AI8	Preheating air temperature probe (NTC)
AI9	Air quality probe CO2/VOC (420 mA)
AI10	External humidity probe (420 mA)

PIN	DIGITIAL INPUTS
DI1	On/Off remote
DI2	Summer/winter remote commutation
DI3	Thermal delivery fans
DI4	Dirty pressure switch recuperator
DI5	Pressure switch air filter
DI6	Airflow meter
DI7	Thermal pickup fan
DI8	Humidifier alarm
DI9	Inverter delivery fan alarm
DI10	Inverter pickup fan alarm
DI11	Heating pump alarm
DI12	Cooling pump alarm
DI13	Fire/smoke alarm
DI14	Not utilized

PIN	ANALOGUE OUTPUTS
AO 1	Not utilized
AO 2	Heating valve command (0-10V)
AO 3	Cooling valve command (0-10V)
AO 4	Not utilized
AO 5	Fans inverter command (0-10V)
AO 6	Modulating humidifier command (0-10V)

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PIN	USCITE DIGITALI
DO1	Delivery fan
DO2	Pickup fan
DO3	Not utilized
DO4	Opening of external air shutter
DO5	Closing of external air shutter
DO6	Dirty filter indicator
DO7	Alarm
DO8	Shutter by-pass recuperator
DO9	Heating pump
DO10	Cooling pump
DO11	Electrical resistance – first stage
DO12	Electrical resistance – second stage
DO13	Electrical resistance – third stage
DO14	Not utilized

6.2.6 Unit with 3 coils with dehumidification (PG00=6)

The *MOdE* parameter with default setting on *WINTER*.

This unit provides utilization of the expansion (PG02=1).

The regulation of the two fans starts while set on default on the inverter with On/Off (*PF01=3*).

The number of coils configured is PG01=3; the post-heating is guaranteed by the third coil. The dehumidification is enabled PG12=1.

The regulation of the shutter is enabled for free-cooling/free-heating (PG07=1, PS01=1). The recuperator utilized is that which is at cross flow PG13=1.

PIN	ANALOGUE INPUTS	
AI1	Ambient air temperature probe (NTC)	
AI2	Delivery air temperature probe (NTC)	
AI3	External air temperature (NTC)	
AI4	Ambient humidity probe (420 mA)	
AI5	Expulsion air temperature probe (NTC)	
AI6	Anti-freeze temperature probe (NTC)	
AI7	Not utilized	
AI8	Preheating air temperature probe (NTC)	
AI9	Air quality probe CO2/VOC (420 mA)	
AI10	External humidity probe (420 mA)	

PIN	DIGITAL INPUTS	
DI1	On/Off remote	
DI2	Summer/winter remote commutation	
DI3	Thermal delivery fans	
DI4	Dirty pressure switch recuperator	
DI5	Pressure switch air filter	
DI6	Airflow meter	
DI7	Thermal pickup fan	
DI8	Humidifier alarm	
DI9	Inverter delivery fan alarm	
DI10	Inverter pickup fan alarm	
DI11	Heating pump alarm	
DI12	Cooling pump alarm	
DI13	Fire/smoke alarm	
DI14	Not utilized	

ANALOGUE OUTPUTS	
Not utilized	
Heating valve command (0-10V)	
Dehumidification and cooling valve command (0-10V)	
Not utilized	
Fans inverter command (0-10V)	
Post-heating valve command (0-10V)	

	PIN	DIGITAL OUTPUTS
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DO1	Delivery fan
DO2	Pickup fan
DO3	Humidifier on/off
DO4	Opening external air shutter
DO5	Closing external air shutter
DO6	Dirty filter indicator
DO7	Alarm
DO8	Shutter by-pass recuperator
DO9	Heating pump
DO10	Cooling pump
DO11	Not utilized
DO12	Not utilized
DO13	Not utilized
DO14	Not utilized

6.3 Operating mode during summer/winter

The operating modes can assume the following values:

Parameter "MOdE"	Description
0 = COOL - SUMMER	Summer operation
1=HEAT – WINTER	Winter operation

There are additional procedures which allow you to set the operating mode of the unit:

1) Using the *MOdE* parameter in the user Menu (function enabled by using parameter *PH06*)

Set – Positioned on the *ModE* parameter, press the ENTER key, modify the values using the UP and DOWN keys. Confirm by pressing the ENTER key again.

2) Using the command **Summer/Winter from Digital inputs** (function enabled by using parameter *PH08* and parameter *Hd02* to stabilize the position of associated Digital inputs)

Set - With open contact the unit is in "winter" operating mode, with closed contact the unit is in "summer" operating mode.

3) Using the **supervision protocol** (enabled by using parameter *PH10*) Set - Enter from protocol, through relative status, the change command for the operating mode.

Note. It is advisable to carry out the change the summer/winter operating modes while the machine is shut down.

6.4 Setting the RTC

When the card remains without tension for a few days, the RTC (Real Time Clock) system clock discharges requiring it to be reset to the correct date and time while also restoring the eventual alarm (if enabled, PA40=1). In this case, upon macchine startup the following page will appear allowing you to set the RTC:



Once the clock has been configured press **OK** to update the RTC and then enter into the main application page. Pressing **OK** to confirm also re-arms the clock alarm (AL28) at which point the conditions of the alarm have been restored.

In case the alarm doesn't disappear: apply and release tension to the card and then manually re-arm the alarm.

Note. This function is enabled only if the paramater PG03=1, that is, if the system clock is enabled.

6.5 Fans

The central air handling can manage the operation of two fans, one delivery fan and one pickup fan. Both fans are regulated in the same fashion; the type of regulation is set from the parameter *PF01* (Continous Regulation, On/Off Regulation, Module Regulation, Module Regulation with steps to enable). Deciding which fans to enable – delivery fan or pickup fan - can be done from the Constructor Menu using the parameters *PG08* e *PG09*, respectively.

Managing the fans occurs through a Set Point and a differential set by a parameter and the temperature reading on the probe used to regulate the ambient temperature. Startup and shutdown can be achieved from a thermoregulatory block and by using the parameter $PF05 = Tempo \ minimo \ tra \ accensione \ dei \ ventilatori \ (Minimum \ time \ between \ fan \ startup)$ you can delay startup between the two fans in order to avoid simultaneous startup of both fans.

Near the positioning of the regulation probe it is possibile to activiate the cycles for the air quality sensors to "sense" the correct temperature (parameter *PG05* and *PC05*).

6.5.1 Continuous regulation and On/Off

The continous regulation is connected to the status of the central unit; the fans turn on and off every time the machine is turned on and off. In order to set this regulation select PF01=0.

The *On/Off regulation* provides ability for startup/shutdown of fans operating from the regulation Set Point (*SEtC, SEtH*) and from a differential (*PF02*) and are compared with the ambient temperature reading, or from the pickup channel according to where the regulatory probe is positioned. In order to set this regulation select PF01=1.

Each mode of operation (summer/winter) has its own distinct regulation.





WINTER operating mode



Note. It is necessary to set the positions of the two digital outputs for the fan's parameter HF01(delivery) and HF02(pickup). If a parameter is equal to zero the signal from the relative fan will not be enabled on any digital output.

6.5.2 Modulating Regulation

Generally controlled by an inverter, it carries out a refined heating control (funz. invernale) "winter operating mode" or cooling function (funz. estivo) "summer operating mode" from the central unit particularly focused on saving energy. The regulation and operation of the regulation Set Point (*SEtC, SEtH*) is that of a differential (*PF02*) which is compared to the ambient temperature reading, or on the pickup channel according to where the regulation probe is positioned. In order to set this regulation select *PF01=2*.

Each mode of operation (summer/winter) has its own distinct regulation.



SUMMER operating mode

The regulations for both fans are identical, therefore there is only one regulation ramp which is brought to a single analogue output. You will be required to set the position from the Constructor Menu by going to parameter HA07. If HA07=0 the signal will not be enabled on any anlalogue output.

6.5.3 Modulating regulation with steps to enable

The same logic for the modulating regulation applies with the additional possibility of shutting down the fan with a specific step on the regulation ramp. For this regulation select PF01=3.



The shutdown point corresponds to the value of the ambient temperature regulation Set Point. The action of strarting up and and shutting down is delayed in order to avoid short cycles and having the transistors potentially mislead the regulation (parameter *PF09*).

The regulations for both fans are identical, therefore there is only one regulation ramp which is brought to a single analogue output. The position needs to be set from the constructor Menu by going to parameter HA07. If HA07=0 the signal is not enabled on any analogue output. It is also possible to associate at the two steps of enablement two digital outuputs for the fans by setting the positioning parameters HF01 (for delivery) and HF02 (for pickup).

6.5.4 Air quality sensor cycles

When during planning purposes the regulation probe is positioned on the the pickup channel (set PG05=1) at a satisfactory ambient temperature, it is necessary to activate cyclically the pickup fan in order to "sense" the ambient temperature (parameter PC05 to enable).

The cycle is composed of a wait time (*PC06*) during which the fan remains shut off as well as a wait time for activation (*PC07*) during which the fans will turn on. The cycle always begins with a period of pause; as soon as the fan is shut down from the regulation ambient temperature (satisfactory ambient temperature), the cycle will terminate if during the activation phase the regulation ramp of the ambient temperature exceeds the activation point of the fan. With the parameter *PC08* you can decide whether to activate only the pickup fan (*PC08=0*) or both the pickup and outake fans (*PC08=1*) during air quality control sensoring.

Note 1. If the fan regulation is continuous (PF01=0) the air quality sensor cycle can never be activated and is thus unusable. If the pickup fan is not present (PG09=0) this function cannot be used.

Note 2. The fan activation time during the cycle (*PC07*) must be sufficiently long with respect to the protection time during the startup of the two fans (*PF05*) so as to ensure that both fans are able to turn on during the start up of the air quality sensoring phase (if requested, see *PC08*).

6.5.5 Fan status

Below are the different operating modes in which each fan may find itself:

- 1. *Disabled*: the fan has not been configured for the implant. In this state in the user interface you will see the symbol "-".
- 2. Off: the fan is off. In this state in the user interface you will see written "OFF".
- 3. On: the fan is on. In this state in the user interface you will see written "ON".
- 4. *Waiting for startup*: the fan is about to startup, and is in a temporary queue. In this state in the user interface you will see written (and flashing) "WON".
- 5. *Alarm*: the fan is in alarm for thermal reasons or because of the alarm inverter. In this state in the user interface you will see written "*ALL*".
- 6. *Manual*: the fan is operating manually. In this state in the user interface you will see written "*MANU*".

A fan operating manually is nevertheless sensitive to eventual alarms, in this case the status will be that of Alarm.

6.5.6 Security inputs

You must manage the security of the "thermal fan" for both fans that have been configured. In order to enable the alarm you must set from the *constructor* Menu the *positions* in which the digital inputs will be connected for the security evaluations (*Hd05*, *Hd07*).

In cases where the fans are at the inverter, it is possible to also manage the security settings for the "alarm inverter" in the same way as was done for the thermal configuration by configuring the positions in parameters Hd06 and Hd08.

In order to prevent activating the security and related alarm, you will need to set the parameter of the position at the value 0.

6.5.7 Fans in probe error

In cases where an error is verifed by the ambient regulation probe it is possible to decide the behavior to attribute to the two fans utilizing the parameter *PF10*.

In cases where the fans are in modulating regulation, and therefore are at the inverter using the parameter PF10, it is possible to decide the speed they must maintain during the alarm phase.

In cases where the fans are the On/Off type and need to be forced on you must set a value (any value that is higher than 0.0%) at the parameter *PF10*.

In each case where PF10=0.0% in probe error, the two fans are turned off.

6.6 Main regulations

The application wants to maintan comfortable conditions within the internal ambient; in order to achieve this the two main regulations are made on two fundamental units of measurement: temperature and humidity. Both regulations provide a Neutral Zone (parameter Pb03 for the temperature and PU02 for the humidity) in which there is no requested regulation. The logic of the regulation appears below:

The **Regulation of the Temperature** works on the heating and cooling coils in order to maintain the temperature as close as possible to the Set Point which has been set.



The **Regulation of Humidity** works on the humidifier and on the process of dehumidification (utilizing the cooling coil) in order to maintain the humidity as close as possible to the Set Point which has been set. The humidification process can also be performed using the On-Off switch on the humidifier.



Note. For both of the regulations (humidity and temperature) the *Neutral Zone* is positioned at half the requested setPoint; therefore the activation point of the resepective requests is $SP+(ZN/2) \in SP-(ZN/2)$.

6.7 Cooling and Heating Regulations

When the primary regulation is made on the valve (PG04=1) it is possible to manage and to regulate the command for the cooling /heating valve.

The regulation comes on a flowing Set Point calculated as shifting from the regulation ambient temperature Set Point. The valve is commanded using a proportional algorithm (P), or a proportional integral (PI). The reference probe is that of the delivery temperature.

Note. With the unit running on a single coil, enabling the valve will depend on the type of primary regulation that is chosen. If the parameter PG04=0, primary regulation on the fans, the valve remains disabled. In order to utilize you will need to set PG04=1 (primary regulation on the valve).

6.7.1 Set Point flowing from delivery

If the delivery temperature probe is present it is preferable to use an algorithm which, in relation to the shifting between Set Points and ambient temperatures, stabilizes the temperature value required for air delivery and thus effects the action of the regulation module on the valve. The delivery set Point is calculated like the flowing Set Point on the ambient temperature.



The *Minimum Limit* and the *Maximum Limit* are expressed as the difference (Pb05) in temperature with respect to *SEtC* (*SEtH*, if single Set Point), ambient regulation set Point. The neutral zone is the same zone which is set for the regulation of the coils on the delivery temperature.

Note. Setting Pb05=0.0 the function is as if it were disabled; in this case the Delivery Set Point coincides with the Ambient Set Point.

6.7.2 Valve module regulation

In order to utilize it is necessary to set the position (at greater than zero) of the analogue outputs in the constructor menu using the *HA05* parameter (cooling valve) and *HA04* (heating valve). If HA05=0 and HA04=0 the indicator is not enabled on any of the analogue outputs. In order to utilize only a proportional regulation you need to only set the integral time to zero (*Pb02=0*). Setting an integral time greater than zero (Pb02>0) will provide a more precise regulation, the integral part is tasked with bringing the output up to speed reducing the error introduced by the sole proportional component (by default the integral component is disabled).

COOLING: proportional regulation of the cooling valve.



Note. The cooling valve is the same as that which is utilized for the dehumidification, thus the cooling regulation is also influenced by the request for dehumidification; for additional information refer to paragraph "6.9.1 Dehumidify regulation".

HEATING: proportional regulation of the heating valve.



In the case where the delivery probe verifies an error it is possible to decide the value of the opening of the valve during an alarm by setting the parameters Pb10 and Pb11 equal to 0.0%. In probe error the respective valves remain closed.

6.8 Post-Heating

This may be performed using one coil (PG01=3) or, alternatively, utilizing electrical resistances (PG14>0). The post-heating serves two main purposes: integration of heat in heating or compensation in the dehumidification phase in order to realize the amount of heat lost (i.e. drop in temperature) during dehumidification.

The regulation takes place on the running delivery SetPoint and the valve can be commanded using a proportional algorithm (P), or proportional integral (PI). The referenced probe is that of the delivery temperature.

6.8.1 Post-Heating with coil

The third coil is used to regulate the post-heating valve in analogue mode, the regulation utilizes twice the heating differential (Pb01).

The activation graph is as follows.



Note. It is necessary to set the position of the analogue output of the valve operating on parameter HA06. If HA06=0 the indicator will not be enabled on any of the analogue outputs. Using this coil represents an alternative to using the electrical resistances.

6.8.2 Post-Heating with resistance

Based on the number of configured resistances (PG14=1,2,3) double the regulation differential (Pb01) must be divided proportionally in order to guarantee uniform startup of each single stage of resistance. In addition to the number of resistances it is also necessary to configure the positions of the relative configured digital outputs (parameters *HE01*, *HE02*, *HE03*).



Within each insertion/removal of resistances a certain amount of time (parameter Pb20) must elapse in order to avoid simultaneous occurrences. Using the Hd13 parameter it is possible to enable the thermal alarm of the resistance, which provides for the immediate shutdown of the device.

Note. In order to exclusively utilize the resistances for purposes of post-heating it is important to set PG14>0 and PG01=2.

6.8.3 Status of the resistance

Each of the three stages of the resistances can assume one of the following operating states:

- 1. *Disabled*: the stage of the resistances is not managed by the controller. The symbol "…" will appear in the user interface while in this state.
- 2. *Off:* the stage of the resistances is off. The word "*OFF*" will appear in the user interface while in this state.
- 3. *Waiting for startup*: the stage of the resistances is about to startup, and is in queue for a protection timetable. In this state in the user interface you will see written (and flashing) "WON".
- 4. *Waiting for shutdown*: the stage of the resistances is about to shutdown, and is in queue for a protection timetable. In this state in the user interface you will see written (and flashing) "WOF".
- 5. *On*: the stage of the resistances is on. In this state in the user interface you will see written "ON".
- 6. *Alarm*: the resistances are blocked as a result of the relative thermal alarms. In this state in the user interface you will see written "*ALL*".

6.9 Dehumidification

In order to adjust the comfort of the ambient it is necessary to also consider the humidity in the air and regulate it based on a determined desired Set Point percentage (PU01) and at a neutral zone (PU02) in which the humidity conditions are acceptable and do not require any intervention. The regulation of the dehumidification is proportional-integral, to render it only proportional you need to only set the integral time to zero (PU04=0).

If the ambient humidity probe is present it is possible to command a dehumidification process by utilizing the cooling coil in order to eliminate the humidity from the incoming air. Dehumidification management is enabled by activating parameter PG12=1, in the constructor menu.

6.9.1 Dehumidification regulation

The regulation utilizes the same cooling coil, thus implying that there are at least two configured coils (PG01>1). The ambient air humidity probe is also enabled (PH41=1), if the probe is disabled or in error the management of dehumidification is inhibited. It is also necessary to configure the positions of the analogue outputs for the valve of the cooling coil (HA05). Since the same coil is used for the cooling the regulation of dehumidification assumes the following rules:

1) When requesting only cooling the coil is regulated according to the logic previously seen.

2) When requesting only to dehumidify the coil is utilized exclusively to dehumidify the ambient air and is illustrated in the following graph:



3) In case where the requested actions are mixed and require both dehumidification and cooling you will need to consider the average value of the two requests and the coil will be commanded with the arithmetic mean of the two values.

6.9.2 Regulation limit on dehumidification

When there is an active request for dehumidification and there is a pending request for continuous heating, this function (enabled by parameter PU05=1) allows for limiting the

cooling valve opening to dehumidify in order to contrast the continous decrease in temperature (required by the dehumidification) and rapidly returning to the desired conditions in temperature. This action has a more immediate effect on temperature and allows for energy savings, optimizing coil control.



When the dehumidification request is active the action limit's objective will be to limit the dehumidificatin in order to prevent continuously cooling the air (caused by dehumidification) and, as a result, to always request more heat to the heating (and post-heating) coils. This action optimizes the regulation resulting also in energy savings.

Note. If the delivery air temperature probe is in error this regulation cannot be utilized.

Example 1

Dehumidification request = 80%

Dehumidification limitation = 50%

In this condition the request for dehumidification to the coils will either be 40% or 50% of the 80% of the effective request.

Example 2

Dehumidification request = 80%Dehumidification limitation = 25%In this condition the request for dehumidification to the coils will either be 60% or 25% of the 80% of the effective request.

Example 3

Dehumidification request = 80%Dehumidification limitation = 0%In this condition the request for dehumidification will pass entirely to the coil.

6.10 Humidification

To adjust the comfort of the ambient it is necessary to also consider the humidity in the air and to regulate it based on a determined Set Point desired percentage (*PU01*) and at a neutral

zone (*PU02*). If the ambient humidity probe is present it is possible to command the humidifier using On/Off switch or by using the module. Humidity management is enabled by activating the parameter PG06>0, in the constructor menu. The ambient air humidity probe is also activated (PH41=1), if the probe is disabled or in error dehumidification management will be inhibited.

It is possible to activate a digital input for the dehumidifier alarm by setting the position using the parameter Hd15. With Hd15=0 the alarm is disabled.

6.10.1 Enabling humidifier (delivery temperature operation)

In order to function correctly the humidifier requires a minimum value for air temperature, for which it identifies a Set Point (*PU11*) and relative hysteresis (*PU12*) on the delivery temperature to enable/disable the humidifier. This function is enabled by parameter *PU10*. In case PU10=0 (function disabled) the humidifier will startup/shutdown on the normal Set Point percentage (*PU01*).



With the delivery probe in error the function is inhibited and the humidifier will startup/shutdown on the Set Point percentage.

6.10.2 Humidifier On/Off

In order to utilize the On/Off regulation of the humidifier you must set parameter PG06 to 1. It is necessary to also set the position of the digital output in which will be connected to the humidifier (parameter HU01).



Note. In order to utilize this function it is necessary to enable the ambient humidity probe, setting parameter *PH41* to 1. When the probe is in error the humidifier is shut off.

6.10.3 Modulating humidifier

In order to utilize the modulating regulation of the humidifier it is necessary to set the parameter PG06 to 2. The position of the analogue output that is connected to the humidifier also needs to be set (parameter HA08).



Note. To utilize this function it is necessary to enable the ambient humidity probe by setting parameter *PH41* to 1. When the probe is in error the humidifier is shut off.

6.10.4 Humidifier status

The humidifier assumes the following operating states:

- 1. *Disabled*: the humidifier has not been configured for the system. While in this state you will see the symbol "…" in the user interface.
- 2. *Off*: humidifier is off. While in this state you will see written "*OFF*" in the user interface.
- 3. *Off due to delivery temperature*: humidifier is off due to the low delivery air temperature. While in this state you will see written "OFFt" in the user interface.
- 4. *On*: humidifier is on. While in this state you will see written "ON" in the user interface.
- 5. *Alarm*: humidifier is in alarm. While in this state you will see written "*ALL*" in the user interface.

6.11 External Air Shutters

The program provides the managment of a motorized shutter for the intake of external air to support the ambient temperature regulation. The type of management is determined by parameter PG07, in the constructor menu:

- PG07=0: Disabled
- *PG07=1*: Enabled in modulating regulation
- *PG07=2*: Enabled in fixed opening

In modulating regulation, the shutter can be utilized for:

- Free-Cooling / Free-Heating in temperature
- Free-Cooling / Free-Heating heat exchanger

(parameter *PS01=1*) (parameter *PS01=2*) (parameter *PS02=1*)

- Air quality control

The regulation also provides a position of minimal opening of the shutter to guarantee the minimal quantity of projected renewed air (parameter *PS05*) and the corresponding maximum position of the opening (parameter *PS06*).

6.11.1 Regulation in fixed opening

In this mode the external air shutter always assumes the same value of opening as decided by parameter *PS10*. In this regulation the range of values of opening is from 0% to 100%, there is no minium value for the opening. In order to utilize this regulation it is necessary to set PG07=1.

Note. With this modality the free-cooling, free-heating and the air quality control cannot be utilized.

6.11.2 Enable Free-Cooling and Free-Heating in temperature

The free-cooling in temperature, if enabled (PS01=1), can be activated when the difference between the ambient air temperature and the external air temperature reaches the Set Point which has been set (parameter *PS13*) and relative hysteresis (parameter *PS12*).

The free-heating in temperature, if enabled (PS01=1), can be activated when the difference between the external air temperature and the ambient air temperature reaches the Set Point which has been set (parameter PS13) and relative hysteresis (parameter PS12).



Note. It is necessary to enable the utilization of the external air temperature probe (PH40=1). If the probe is in error the regulation is disabled.

6.11.3 Enable Free-Cooling and Free-Heating heat exchanger

The heat content regulation also considers the air humidity to enable the free-cooling and free-heating processes. In order to utilize this function you must set PS01=2 and it is necessary to enable the ambient humidity probes (PH41=1), external temperature (PH40=1) and external air humidity (PH47=1). Additionally, it is necessary to set the value of the atmospheric pressure in hPa (parameter PH34). The regulation provides the calculation of the external heat content (HExt) and ambient heat content (HAmb).

The calculation of the heat content is done using the temperature value and the humidity value utilizing the atmospheric pressure to achieve a more precise calculation. The differential Set Point (PS16) and relative hysteresis (PS15) must be set in order to enable at the regulation.

To enable see graphs below:



Note. If one of the probes in use are in error or if the regulation has not been configured it will be disabled. This regulation can be used only in the presence of a external air humidity probe which has been configured on the expansion; therefore this function can be utilized only if the expansion is enabled (PG02=1).

6.11.4 Free-Cooling and Free-Heating Regulation

The regulation of the free-cooling/free-heating commands the opening of the external air shutter. When free-cooling/free-heating conditions exist; or if the regulation can be enabled (and the request is greater than zero) the ramps which command the heating/cooling are split into two successive ramps, the first (half the differential) regulates the free-cooling/free-heating using the external air shutter, the second regulates the heating/cooling valves.



SUMMER operation/COOLING: Free-Cooling

WINTER operation/HEATING: Free-Heating



Note. If one of the probes included in the regulation is in error the regulation of the free-cooling/free-heating can no longer be utilized and the heating/cooling ramp regulate the total regulation differential.

6.11.5 Air quality control

The external air shutter may be used to replace the air upon request by the appropriate probe (VOC/CO2). It is necessary to enable the parameter PS02=1, and the regulation probe for the air quality (PH46>0). The external air shutter can be commanded based on the regulation probe at set point (PS20) and at the relative differential (PS21).

Note. If the air quality probe is in error the regulation is inhibited. The probe can be one of two types: 4..20mA (*PH46=1*) or 0..5V (*PH46=2*);

6.11.6 Shutter Command

The external air shutter can be utilized for two regulations: free-cooling/free-heating and air quality control. The priority of these requests is decided by parameter *PS03*:

- *PS03=0*: The shutter is commanded by Free-cooling / Free-heating
- *PS03*=1: The shutter is commanded by air quality control
- *PS03*=2: The shutter is commanded by the largest request
- *PS03=3*: The request of the shutter is calculated as the arithmetic mean of the two requests for free-cooling (/free-heating) and air quality control in order to fulfill both active requests.

The shutters are managed through two digital outputs which are configurable by parameters *HS01* and *HS02* which command the opening and closing, respectively. In order to correctly command the external shutter motor it is necessary to set the following parameters:

- *PS05*. Minimum value of shutter opening.
- *PS06*. Maximum value of shutter opening.
- *PS07*. Shutter run time to go from 0% to 100%.
- *PS08*. Maximum time to maintain signal at end of relay.
- *PS09* (optional). If greater than zero the command at relay are given only when the actual variation on the regulation ramp exceeds the set value. If *PS09=0* the command will always pass.

Note. Each time the unit is in ON status (for turning on the card, for restoration of an alarm block, or to restore the feed after a black-out), the external air shutters will re-align; for the entire run time (plus eventual time PSO9), the shutter will close and the regulation will be interrupted. Once the run time has elapsed the regulation will return to its normal operating state. This is necessary because there is no feedback for controlling the position of the shutter.

6.11.7 Shutter status

In the user interface you can identify the operating status of the shutters which will present you with one of the following:

- 1. *Disabled*: the shutter is not managed by the controller. In the user interface you will see the symbol " " when in this state.
- 2. *Closed*: the shutter is closed. In the user interface you will see written"*CHIUSA*"(*CLOSED*) and a value of 0.0%. when in this state
- 3. *Opening*: the shutter is in the process of opening. In the user interface you will see written "*APERTURA*" (*OPENING*) flashing with the corresponding value when in this state.
- 4. *Open*: the shutter is open and still at the determined value. In the user interface you will see written "*APERTA*", *(OPEN)* and the corresponding value of opening when in this state.
- 5. *Closing*: the shutter is in the process of closing. In the user interface you will see written "*CHIUSURA*" (*CLOSING*) flashing with the corresponding value when in this state.
- 6. *Alignment*: the shutter is in the process of moving in order to align in response to the start up of the unit or because the tension is restoring. In the user interface you will see written "*ALLINEAM*." (*ALIGNMENT*) with the value 0.0% flashing.

6.12 Heat Recuperators

When the quantity of renewed air is substantive the air treatment centers provide a system which recovers the expulsion air for a better exercise of energy costs. Using the parameter (PG13>0) it is possibile to utilize the heat recovery by selecting one of the following different recuperators:

- PG13 = 0: Management disabled
- PG13 = 1: Recuperator at cross flow
- PG13 = 2: Recuperator at double coil
- *PG13* = 3: Recuperator rotating On/Off
- *PG13* = 4: Recuperator rotating modulating

Recovery management presupposes that the expulsion air temperature probe is present, therefore in order to utilize the recovery the probe will need to be enabled by setting parameter PH42=1.

6.12.1 Recuperators at cross flow

In order to utilize this recuperator set PG13=1. The recuperator provides a by-pass shutter which is used to prevent the passage of external air through the air exchange channels. The recuperator is normally always active and is by-passed during the free-cooling/free-heating phases or during the defrost cycles with external temperatures that are too low. Set the setPoint (*Pr03*) and the relative differential (*Pr04*) in order to activate the defrost cycle.



When the minimum temperature conditions of the expulsion air are reached, as represented in the diagram, a cyclical sequence of recuperator by-pass are activated in order to permit the expulsion air (hot, ambient air) to defrost the air exchange channels.



After the delay *Pr05* the by-pass shutter will activate in oder to allow for defrosting. When the temperature rises above the allowable value the shutter will deactivate while the recuperator restarts.

Note. It is necessary to set the position of the digital output of the recuperators by-pass shutter using the parameter dedicated to the recuperator, Hr01. When the regulation probes are in error this function is disabled.

6.12.2 Recuperator at double coil

In order to utilize this recuperator set PG13=2. The recuperator at double coil is activated using the circulation pump (of fluid exchange) between the two coils. In order to limit the pumps energy consumption, the activation will be managed by the difference between the expulsion air temperature and external air temperature (parameter Pr01 and relative differential Pr02). The circulation pump will stop during the free-cooling and free-heating phases.



This recuperator does not require its minimum expulsion temperature to be regulated since frost will not accumulate inside the coil.

Note. It is necessary to set the position of the digital output of the recuperator, using the dedicated parameter, Hr01. The external temperature probe must also be enabled (PH40=1). When the regulation probes are in error this function is disabled.

6.12.3 Rotating Recuperator

In this case the recuperator can be regulated in two different ways: On/Off (PG13=3), or with an analogue output (PG13=4) and is only active when the fans are turned on. The recuperator will be deactivated during the free-cooling and free-heating phases.

PG13=3. Regulation On/Off


Note. It is necessary to set the position of the digital output of the recuperator, using the dedicated parameter, Hr01. The external temperature probe must also be enabled (PH40=1). When the regulation probes are in error this function is disabled.

PG13=4. Modulating regulation



Note. It is necessary to set the position of the digital output of the recuperator, using the dedicated parameter, Hr09. The external temperature probe must also be enabled (PH40=1). When the regulation probes are in error the function is disabled.

6.12.4 Recuperator status

The recuperator may assume one of the following modes of operation:

- 1. *Disabled*: the recuperation is not being managed. In this state in the user interface you will see the symbol "…".
- 2. *Off:* the recuperator is off. In this state in the user interface you will see written "*OFF*".
- 3. *Defrosting*: the recuperator is off and defrosting is activated (only when recuperator is at cross flow, PG13=1). In this state in the user interface you will see written (and flashing) "*OFF_D*".
- 4. *Off for free-cooling/heating*: the recuperator is off (because of a request for free-cooling/heating). In this state in the user interface you will see written "*OFF_F*".
- 5. On: the recuperator is on. In this state in the user interface you will see written "ON".

6.13Heating/Cooling Pumps

A simple method for managing the two circulation pumps (for heating/cooling) is provided. In order to enable the cooling pump you need to set parameter PG10 to 1. To enable the heating pump you will need to set parameter PG11 to 1 in the Constructor menu.

Based on the requirement you may choose between two regulations by going to parameter *PP01* (continuous regulation, On/Off regulation).

It is possible to activate the digital input for the thermal alarm for either of the two pumps by setting the positions using parameters Hd10 and Hd11. With Hd10=0 or Hd11=0 the relative alarm is not enabled.

The positions of the dedicated digital outputs also need to be set using the parameters HP01 and HP02. If the respective parameter is equal to zero none of the digital outputs will command the device.

6.13.1 Continuous regulation

The continuous regulation is dependent on the status of the central unit. The pumps will startup and shutdown each time the machine starts up and shuts down. In order to set this regulation select PP01=0.

6.13.2 Regulation On/Off

The circulation pumps will activate when there is an actual heating/cooling request which exceeds a startup set (*PP02*) and they shutdown when the same request falls below a certain shutdown set (*PP03*). In order to set this regulation select PP01=1.



When the regulation ramp exceeds *PP02* the pump will activate; when it falls below *PP03* a timer will activate keeping the pump active for a set period of time (parameter *PP04*). The timer resets if the ramp returns above PP02. The pump will be shut down by using the shutdown command from the unit cancelling the active timer.

Note. In case where the primary regulation is on the fans (PG04=0), this regulation can be used only if the fan regulation is in the modulating type.

6.13.3 Pump status

Both pumps may assume any of the following operating states:

- 7. *Disabled*: the pump is not managed by the controller. In the user interface you will see the symbol " " when in this state.
- 8. *Off*: the pump is off. In the user interface you will see written "*OFF*" when in this state.
- 9. *Waiting for shutdown*: the pump is in the process of shutting down, and is in queue for scheduled protection. In the user interface you will see written (and flashing) *"WOFF"* when in this state.
- 10. On: the pump is on. In the user interface you will see written "ON" when in this state.
- 11. *Alarm*: the pump alarms are on. In the user interface you will see written "*ALL*" when in this state.

6.13.4 Security Inputs

Thermal pump security management is provided for both configured pumps. To enable the alarm you must go into the constructor menu and set the positions which will be connected to the digital inputs in order to survey the security (Hd10, Hd11). In order to not activate the security and related alarm you need to set the parameter of the position to a 0 value.

6.14 Unit at single coil (seasonal)

In this type of unit (PG01=1) there is only one dedicated valve for heating and cooling and, if enabled, there is a single circulation pump; the operating mode (parameter MOdE) determines which behavior to utilize. In the same way all the regulations (fans, free-cooling/free-heating, regulations of set-point, alarms, etc..) are distinguished based on the operating mode. The heating function is guaranteed when the parameter MOdE=1; meanwhile the cooling function is guaranteed when MOdE=0.

The correct software configuration is obtained considering all the resources (parameters and operating states) normally utilized for heating the machine when using more than one coil, which, in these particular centers, are considered mixed resources commanded univocally based on operating mode (summer/winter). The "mixed" hardware parameters to consider for the unit at single coil with circulation pump are the following:

PG01=1 (single coil) *PG10*: enable circulation pump (heating) *HP01*: position of circulation pump digital output (heating) *Hd10*: position of circulation pump alarm (heating) *HA04*: position of heating/cooling valve analogue output (heating)

For units using a single coil it is not possible to manage dehumidification and postheating. The resources normally managed for cooling and post-heating are not piloted; it is therefore recommended to reset all the configuration parameters in order to avoid malfunctions.

16.14.1 Primary regulation

For these types of units it makes sense to also set the primary regulation parameter PG04; using the appropriate constructor parameter, PG04, it is possible to choose the organ on which the primary regulation will be made from the central unit: fans or valves.

- If PG04 = 0, the primary regulation is made on the fans which, at the appropriate time, will be regulated in different ways (parameter *PF01*). This type of configuration excludes utilization of the valve and therefore the controller does not provide any commands on the analogue/digital outputs for controlling the single heating/cooling valve.
- If *PG04=1*, the primary regulation is made on the valve. The intake of hot/cold air is modulated by the heating/cooling coil, meanwhile the fans are working to recirculate the air of the central unit. Fan regulation can be set with the appropriate parameter *PF01*. In this configuration it is necessary to determine the position of the analogue output which will be connected to the single valve of regulation.

In units with more than one coil the parameter PG04 does not condition any regulation.

6.15 Management (various)

6.15.1 Single or distinct Set Point

It is possible to manage a single regulation Set Point for summer/winter, or to set two different ones. If the parameter *PH27 Enables the single/distinct Set Point* is set to 1 the Set Point is singular (only one parameter), otherwise the Set Point is distinct (two distinct parameters: *SEtH* and *SEtC*).

In the case of a single Set Point (PH27=1) the parameter SEtC (summer Set Point), is no longer valid and the **single** regulation **Set Point** becomes the **SEtH** which no longer assumes the value of a single winter set but instead that of a single regulation Set Point for the summer/winter.

6.15.2 Compensation for Set Point

Only during summer operating mode (parameter MOdE=0=CooL), the cooling regulation requests a compensation for the regulation ambient temperature Set Point to function with the external temperature (parameter PC01 to enable the function). The function is important to avoid an accessive jump in thermal temperature between the external and internal ambient temperatures and ensures adequate comfort under mutual conditions. Furthermore, this allows for energy savings on the implant.



The compensation Set Point increases proportionally with the increase in external temperature until it reaches the maximum admissible set configured at parameter PC02.

Note. To utilize this function it is necessary to enable the external temperature probe and set the parameter *PH40* to 1. When the external probe is in error this function is inhibited.

6.15.3 Variation Set Point from Digital inputs

The program provides the possibility to manage a parameter OS01 Offset Set Point from DI which, based on the status of the Digital inputs, provides a sum at the regulation Set Point. It

is possible to set the logic for the Digital inputs by setting the parameter *PH50*: 0=NO (Normally open), 1=NC (Normally closed).

In order to enable this function you will need to enable parameter *PH25 Enable variation Set Point from Digital inputs* and set the *position* on which the related Digital inputs will be connected (parameter *Hd03*). If this parameter is set to 0, the function is disabled.

Note. The offset is summed at its <u>current</u> value of the Set Point and not by the value which is defined by the parameter; this indicates that the Set Point could have already been modified due to other interventions: time zone, variations by supervisor.

6.15.4 Variation Set Point from Supervisor

The program provides the possibility to manage a parameter OS02 Offset Set Point from Supervisor which, based on the status set by the supervisor, sums an offset at the regulation Set Point. To enable this function set the parameter PH26 Enable variation Set Point from supervisor and set to one the related variable from supervisor.

Note. The offset is summed at the <u>current</u> value of the Set Point and not that which is defined by the parameter; this indicates that the Set Point could have already been modified due to other interventions: time zone, variations by Digital inputs.

6.15.5 Variation Set Point in nocturnal time zone

The program provides the possibility to manage the nocturnal time zone in order to modify the value of the regulation Set Point of the temperature. In the daytime zone the Set Point remains that of regulation, meanwhile during the nocturnal time zone it is possible to sum an offset (parameter *PT03*). The nocturnal zone is defined by two paramaters: begin time zone (*PT01*) and end time zone (*PT02*). To enable the function activate the parameter *PH28 Enable nocturnal time zone for modification of regulation Set Point*. If the RTC is in alarm or disabled, the function becomes inhibited.

Note. The offset is summed at the <u>current</u> value of the Set Point and not that which is defined by the parameter; this indicates that the Set Point could have already been modified due to other interventions: variations by Digital inputs, supervisor.

6.15.6 Manual fan operation

In this state the devices do not participate in thermoregulation; they are however sensitive to eventual alarms. Manual operation (or operating less than the two delivery and pickup fans) is guaranteed by parameter PM20.

- · If value set to 0 (Auto) this will define normal device behavior
- If value set to 1 (Manu) this will disable the fans and bring them to manual operation

Fans operating manually do not participate in regulations and can be forced into operation using parameter PM21.

If the fans are the On/Off type they may be forced on by simply setting any value greater than 0.0% at parameter *PM21*.

If the fans are in modulating regulation, and therefore at inverter with parameter PM21, it is possible to set the speed which must be maintained during the test phase. In each case where the value is 0.0% the fans will remain off.

While operating manually the fans will always be sensitive to alarms and related consequences. In order to restore at the regulation you will need to reset parameter PM20 to the value "Auto" (Automatic).

6.15.7 Last date of maintenance

In the Menu Manutentore->Funzionamento (Maintenance Operator->Operation) you will find a page with the ability to memorize the last date of maintenance for the implant. By pressing on "Aggiorna" (Update) the old date which is in the system will automatically be updated with the new correct date; updating the maintenance date can be done at parameter *PM90*.

6.15.8 Restoring default parameters

Using the procedure "*Ripristino parametri*"(*Restore Parameters*) it is possibile to restore all the parameters of the implant to their default values. Enter the *installation operator Menu-*>*Default* (accessible only when the machine is shut off) and set the parameter PH15=SI (1) "YES (1)" and wait until the value "*NO*" (0) appears on the display. The system will automatically restore all of the parameters.

After this operation is complete it is necessary to unfeed and refeed the machine in order to avoid malfunctions.

6.15.9 Programming key

It is possible to save the values of all the parameters for the implant in the program key with the capability of transferring a copy onto one or more compatible instruments. You may only save and restore when the machine is turned *OFF* (*OFF_D* or *OFF_S*) connecting the key to the programming connector.

To save a particular parameter map onto the key:

- Enter the *DEFAULT* Menu
- Press the SET (ENTER) key on *OK* near the voice *EVKEY Store*: the transfer of the parameters onto the key is evidenced by the related flashing led light
- Wait for the flashing to stop: if the led is green, the operation has concluded correctly, otherwise the light will be red

To copy a parameter map from the key onto a compatible device:

- Enter the DEFAULT Menu
- Press the SET (ENTER) key on *OK* near the voice *EVKEY Restore* the transfer of the paramaters from the key onto the compatible device, this is evidenced by the related flashing led light
- Wait for the flashing to stop: if the led is green, the operation has concluded correctly, otherwise the light will be red

Note. The data saved onto the key includes information on the product and related version and methods for transferring parameter maps onto other compatible devices.



7 DIAGNOSTICS

The application is in the process of managing a series of alarms and related fans, pumps, probes and other operations from the central unit. Based on the various types of alarms it is possible to configure a rearmament (if manual or automatic), an eventual delay in signal and of other actions which will follow in a specific case.

When one or more alarms are active the alarm icon flashes.

To see the alarms, choose *ALARMI (ALARMS)* from the general Menu; alternatively, alarms can be seen at the Main page by pressing ESC and then choosing "*Mostra ALARMI* >>"(*Show Alarms*>>).

If from one alarm page you press the ESC key, or if you wait for the 60 second timeout period, you will be brought back to the main application page.

In order to run the various active alarms you need to press the ENTER key further: the alarms are presented in order of priority as they are presented in the alarm table.

All the digital inputs related to the alarms are managed from the parameter *PH51* which assumes the following significance:

- If set to "NO" the inputs are normally open: logic N.O.
- If set to "NC" the inputs are normally closed: logic N.C.

7.1 Manual and automatic alarms

As previously displayed there are two types of alarms, those which are re-armed manually and those which are re-armed automatically. Certain alarms are capable of having their type of rearmament set from the parameter (*Riarmo alarmi*) "*R-arm alarm*" more in accordance with user requirements. Meanwhile other alarms already have their rearmament stabilized by the application.

7.1.1 Manual alarms

In the case where a manually re-armed alarm is present, the led L0 will begin flashing.

Once the conditions for which the alarm are verified they will be restored allowing for manual rearmament of the alarm. To perform this operation:

- position on the alarm restore page
- press the ENTER key for approximately 2 seconds.

At this point if there are no other alarms, the following will appear on the indicated page "*NO ALARMI*"(*NO ALARMS*), the led L0 will shut off and the machine will return to normal operation or you will view the page relating to the next active alarm.

The consequences derived from a manual active alarm remain valid until the user cancels the alarm message.

7.1.2 Automatic alarms

In the case where a automatically re-armed alarm is present, the led L0 will begin flashing.

Once the conditions for which the alarm are verified the rearmament and the cancellation of the alarm message are restored; restoration is automatic without user intervention. The consequences derived from an automatic active alarm remain valid until the causes for which the alarm went off are restored.

7.2 Table of Alarms

The following is a list of all the alarms managed by the application. The order of presentation is the same as the order of presentation for the active alarms. All alarms can be viewed even when the mahcine is off.

Code	Description of alarm	Re-arm	Consequence	Delay
AL01	Thermal delivery fan (*2)	Auto	Shuts down all devices	Fixed 2 sec.
AL02	Thermal pickup fan (*2)	Auto	Shuts down all devices	Fixed 2 sec.
AL03	Alarm inverter delivery fan (*2)	Auto	Shuts down all devices	Fixed 2 sec.
AL04	Alarm inverter pickup fan (*2)	Auto	Shuts down all devices	Fixed 2 sec.
AL05	Thermal circulation pump	Auto	Stops the pump	Fixed 2 sec.
AL08	Air filter pressure switch	A/M	Visualization	May be set
AL09	Humidifier	A/M	Stops the humidifier	May be set
AL10	Airflow meter (*2)	Manu	Shuts down all devices	May be set
AL11	Anti-freeze	Auto	Shuts down fans and closes the shutter Forces heating coil to 100% Forces cooling coil to 0%	May be set
AL13	Fire/smoke Alarm (*2)	Auto	Shuts down all devices	-
AL14	Operating hours – delivery fans	Manu*1	Visualization	-
AL15	Hours of operation – Uptake fan	Manu*1	Visualization	-
AL16	Hours of operation – Heating pump	Manu*1	Visualization	-
AL17	Hours of operation – Cooling pump	Manu*1	Visualization	-
AL18	Ambient air probe broken or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL19	Air delivery probe broken or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL20	External air probe broken or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL21	Ambient humidity probe broken or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL22	Air delivery pressure probe broken or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL23	Anti-freeze temperature probe damaged or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL25	Pre-heating air temperature probe damaged or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL26	VOC probe (or CO2) damaged or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL27	External air humidity probe damaged or disconnected	Auto	Inhibits the regulations upon which the probe is dependent	May be set
AL28	RTC Alarm broken or discharged	A/M	Inibits management of the time zone	-
AL29	Expansion alarm	Auto	Stops devices on expansion	May be set

A/M: Automatic or Manual alarm (set from parameter)

(*1) To re-arm alarms connected to the hours of operation you need only reset the hours on the device to zero.

(*2) These alarms cause the unit to shutdown bringing it to the status OFF from alarm

Note. To activiate the alarms derived from the digital contacts you need to set to a value greater than zero the relative position for which the dedicated digital inputs will be connected. If the position is zero the alarm is not managed. A position may be repeated only once; it is not possible to manage the same position like "OR" for additional alarms.

7.2.1 Air Flow Meter Alarm

The flowmeter can be managed after the initial startup phase of the unit and after the *Ritardo flussostato da reset PA28 (Flowmeter delay from reset PA28)*: once this time elapses, if the contact indicates lack of flow, the alarm will immediately go off.

During normal operation the flow sensor is continuously monitored: if the contact indicates lack of flow for a period greater than that at parameter *PA29* the alarm will immediately go off.



The flowmeter alarm is restored manually, activation requires the shutdown of the unit bringing it to the state of *OFF da alarm (Alarm OFF)*.

7.2.2 Anti-freeze Alarm

The method used to enable the alarm is configurable with parameter *PA35*:

- *PA35=0*: alarm disabled
- *PA35=1*: alarm at digital input
- PA35=2: alarm at anti-freeze temperature probe (implies enabling the probe with PH43=1)

Anti-freeze probe alarm



7.3 Alarm relay

The program provides the possibility to manage a relay for a configurable alarm. For each type of alarm there is a parameter that permits you to choose whether that particular alarm must be signaled on the the alarm relay. Additional alarms can be addressed at relay.

The position of the digital output dedicated to signal the alarm can be set using the parameter *HA01*, if equal to zero the alarm relay will not be utilized.

Using the relative parameter (*PH60*) it is possible to stabilize the polarity (NO, or NC) of the digital output of the alarm.

7.4 Alarm history

The controller memorizes in a suitable (non volotile) memory zone organized like the FIFO queue, the STORICO ALARMI (ALARM HISTORY), or rather it could be a list of the last alarms verified.

In order to view the alarm history, choose *STORICO (HISTORY)* from the general Menu, or from the main page by pressing ESC in order to view the following page:

Show ALARMS >> Show HISTORIAN >>

you may press ENTER on "Mostra STORICO >>" (Show HISTORY>>).

Each element of the history is associated with the following information:

- progressive number for the alarm
- mnemonic code of the alarm (AL01, AL03, ...)
- date and hours in which alarm has been verified

The code for every alarm is that which is presented in the alarm table. The storage capacity of the history is 100 events.

Using the parameter *PH18 Cancella lo Storico alarmi (Cancel Alarm History)* it is possibile to eliminate from history all the elements memorized; set the parameter to SI (YES) (1) and wait a couple of seconds until the re-reading of the default value NO (0).

Note 1. In the case where the memory capacity has reached it's full limit (i.e. 100 events recorded) and you wish to memorize/record another event, the first event initially stored in memory would be overwritten with the new event. The same would follow for other elements.

Note 2. The history is enabled only if the parameter PG03=1, or if the system clock is enabled.

8 MODBUS VARIABLES

It is possible to control the application using a supervisor, utilizing the Modbus protocol. The communication comes across an interface (serial RS485) which is already integrated in the controller. To follow are the various states/parameters exported by the application.

8.1 ModBus Export Table

Addr	Name	Value	Min	Max	Description	Mode
257	Packed_DI	0	0	65535	Bit1=DI1, Bit2=DI2, Bit3=DI3, Bit4=DI4, Bit5=DI5, Bit6=DI6, Bit7=DI7	R/W
385	Packed_DO	0	0	65535	Bit1=D01, Bit2=D02, Bit3=D03, Bit4=D04, Bit5=D05, Bit6=D06, Bit7=D07	R/W
513	AI01_Evironment_Probe	0.0	-3276.8	3276.7		R/O
514	AI02_AirSupply_Probe	0.0	-3276.8	3276.7		R/O
515	AI03_AirExternal_Probe	0.0	-3276.8	3276.7		R/O
516	AI04_HumidityEnvironment_Probe	0	-32768	32767		R/O
517	AI05_AirPressureSupply_Probe	0.0	-3276.8	3276.7		R/O
641	AO_InverterFan	0.00	0.00	100.00		R/W
642	AO_ValveRequest	0.00	0.00	100.00		R/W
643	AO_Humidifier	0.00	0.00	100.00		R/W
769	PackedAlarm_1	0	0	65535	Bit1=AL01, Bit2=AL02, Bit3=AL03, Bit4=AL04, Bit5=AL05, Bit6=AL06, Bit7=AL07, Bit8=AL08, Bit9=AL09, Bit10=AL10, Bit11=AL11, Bit12=AL12, Bit13=AL13, Bit14=AL14, Bit15=AL15, Bit16=AL16	R/W

770	PackedAlarm_2	0	0	65535	Bit1=AL17, Bit2=AL18, Bit3=AL19, Bit4=AL20, Bit5=AL21, Bit6=AL22, Bit7=AL23, Bit8=AL24, Bit9=AL25, Bit10=AL26, Bit11=AL27, Bit12=AL30, Bit13=AL31	R/W
1025	Status_OnOff_bySUP	0	0	1		R/W
1026	Status_MOde_bySUP	0	0	1		R/W
1027	Status_En_OffsetSP_bySUP	0	0	1		R/W
1281	CLOCK_RTC (Low)	0	0	214748364 7		R/W
1282	CLOCK_RTC (High)					
1283	StatusUnit	0	0	5		R/W
1284	v_MOdE	0	0	1		R/W
1285	actual_Winter_Unique_SetPoint	0.0	-15.0	158.0	Winter Set Point or Set Point unique(if selected by PH27)	R/W
1286	actual_SummerSetPoint	0.0	-15.0	158.0		R/W
1287	actual_SupplySetPoint	0.0	-15.0	158.0		R/W
1288	Status_SupplyFan	0	0	6	0=Disabilitato, 1=OFF, 2=Wait ON, 3=ON, 4=Wait OFF, 5=ALL, 6=Manual	R/W
1289	Status_ReturnFan	0	0	6	0=Disabilitato, 1=OFF, 2=Wait ON, 3=ON, 4=Wait OFF, 5=ALL, 6=Manual	R/W
1290	Status_Humidifier	0	0	7	0=Disabilitato, 1=OFF, 2=Wait ON, 3=ON, 4=Wait OFF, 5=ALL, 6=Manual, 7=OFFt	R/W
1291	Status_Pump	0	0	5		R/W
1292	actual_SetPoint_Shutter	0.0	-15.0	158.0		

1293	Status_AirExtShutter	0	0	б	0=Disabilitato, 1=OFF, 2=Opening, 3=ON, 4=Closing, 5=ALL, 6=Allineamento	R/W
1294	Position_AirShutter	0.00	0.00	100.00	0% -100.00%	R/W
1537	PT01_Start_NightTB (Low)	0	0	86399		R/W
1538	PT01_Start_NightTB (High)					
1539	PT02_End_NightTB (Low)	0	0	86399		R/W
1540	PT02_End_NightTB (High)					
1541	PT03_OffsetSetPoint_Night	0.0	-20.0	68.0		R/W
1542	MOdE_SummerWinterMode	1	0	1	0=Estate (Cooling), 1=Inverno (Heating)	R/W
1543	SEtC_SummerSetPoint	24.0	-15.0	158.0		R/W
1544	SEtH_WinterSetPoint	20.0	-15.0	158.0	Winter Set Point or Set Point unique(if selected by PH27)	R/W
1545	PU01_Humidifier_SetPoint	55	0	100		R/W
1546	OS01_OffsetSetPoint_DI	0.0	-20.0	68.0		R/W
1547	OS02_OffsetSetPoint_SUP	0.0	-20.0	68.0		R/W
1548	PM00_Limit_HourFan (Low)	20000	0	100000	ore x 10	R/W
1549	PM00_Limit_HourFan (High)					
1550	PM01_SupplyFan_Hours (Low)	0	0	100000		R/W
1551	PM01_SupplyFan_Hours (High)					
1552	PM02_ReturnFan_Hours (Low)	0	0	100000		R/W
1553	PM02_ReturnFan_Hours (High)					
1554	PM10_Limit_HourPump (Low)	20000	0	100000	ore x 10	R/W
1555	PM10_Limit_HourPump (High)					
1556	PM11_Pump_Hours (Low)	0	0	100000		R/W
1557	PM11_Pump_Hours (High)					
1558	PM20_EnManual_SupplyFan	0	0	1		R/W
1559	PM21_ForceSuppyFan	0.00	0.00	100.00		R/W
1560	PM23_EnManual_ReturnFan	0	0	1		R/W
1561	PM24_ForceReturnFan	0.00	0.00	100.00		R/W

1562	PM26_EnManualHumidifier	0	0	1		R/W
1563	PM27_ForceHumidifier	0	0	100		R/W
1564	PM80_Calibration_EnvironmentProbe	0.0	-9.9	50.0		R/W
1565	PM81_Calibration_AirSupplyProbe	0.0	-9.9	50.0		R/W
1566	PM82_Calibration_AirExternalProbe	0.0	-9.9	50.0		R/W
1567	PM83_Calibration_HumidityEnvironment_Probe	0	-9	9		R/W
1568	PM84_Calibration_AirSupplyPressure_Probe	0.0	-14.5	14.5		R/W
1569	PM90_LastMaintainDATE (Low)	252460801	2524608 01	214748364 7		R/W
1570	PM90_LastMaintainDATE (High)					
1571	PC01_EnableSetPointCompensation	0	0	1		R/W
1572	PC02_MaxSetPoint_Compensation	28.0	-15.0	158.0		R/W
1573	PC03_SetPointExternal_StartCompensation	26.0	-15.0	158.0		R/W
1574	PC04_OffsetSetPointExternal_Compensation	4.0	0.0	68.0		R/W
1575	PC05_Enable_SniffingMode	0	0	1		R/W
1576	PC06_WaitTime_SniffingCycle	6	1	99	Minute	R/W
1577	PC07_ActiveTime_SniffingCycle	2	1	30	Minute	R/W
1578	PC08_EnableBothFans_onSniffing	0	0	1		R/W
1579	PF01_FanRegulationType	1	0	3	0=Continue, 1=On/Off, 2=Inverter, 3=Inverter+On/O ff	R/W
1580	PF02_FanRegulation_Diff	5.0	0.0	86.0		R/W
1581	PF03_MinSpeedFan	0.00	0.00	100.00		R/W
1582	PF04_MaxSpeedFan	100.00	0.00	100.00		R/W
1583	PF05_Fan_TonOther	20	0	999		R/W
1584	PF08_FanRegulation_InverterOnOff_Diff	2.00	0.00	60.00		R/W
1585	PF09_FanRegulation_InverterOnOff_Time	10	0	999		R/W
1586	PF10_ForceOnErrorProbe	30.00	0.00	100.00		R/W
1587	PV01_Valve_BP	10.0	0.0	86.0		R/W
1588	PV02_Valve_Ti	0	0	999		R/W
1589	PV05_Offset_ValveSupplySetPoint	0.0	0.0	50.0		R/W
1590	PV06_Diff_ValveSupplySetPoint	5.0	0.0	68.0		R/W
1591	PV10_ForceValve_OnErrorProbe	30.00	0.00	100.00		R/W
1592	PS01_TypeRegulation_AirExternalShutter	0	0	1	0=Moduling,	R/W

					1=FixedOpen	
1593	PS02_SetWinterMinLimit_AirExternalShutter	14.0	-15.0	158.0		R/W
1594	PS03_SetSummerMaxLimit_AirExternalShutter	28.0	-15.0	158.0		R/W
1595	PS04_Diff_AirExternalShutter	8.0	0.0	86.0		R/W
1596	PS05_MinRegulationValue_AirExternalShutter	0.00	0.00	100.00		R/W
1597	PS06_MaxRegulationValue_AirExternalShutter	100.00	0.00	100.00		R/W
1598	PS07_RunningTime_AirExternalShutter	120	0	3600	Sec	R/W
1599	PS08_EndRunMaximumSignalTime_AirExternalShutte	5	0	600		R/W
1600	PS09_MinVariation_AirExternalShutter	0.00	0.00	90.00	%	R/W
1601	PS10_FixRegulationValue_AirExternalShutter	50.00	0.00	100.00		R/W
1602	PS11_DiffHeating_AirExternalShutter	2.0	0.0	86.0		R/W
1603	PP01_PumpRegulation	0	0	1		R/W
1604	PP02_SetON_Pump	5.00	1.00	90.00		R/W
1605	PP03_SetOFF_Pump	2.00	1.00	90.00		R/W
1606	PP04_TimeOFF_Pump	10	1	99	Minute	R/W
1607	PU02_TypeRegulation_Humidifier	0	0	1	0=DO, 1=AO	R/W
1608	PU03_Humidifier_Diff	10	0	100		R/W
1609	PU10_tSupply_EnableHumidifier_Enable	1	0	1		R/W
1610	PU11_tSupply_EnableHumidifier_Set	22.0	-15.0	158.0		R/W
1611	PU12_tSupply_EnableHumidifier_Diff	3.0	0.0	68.0		R/W
1612	PA01_En_Alarm_HourFan	1	0	1		R/W
1613	PA02_En_Alarm_HourPump	0	0	1		R/W
1614	PA03_AlarmHours_alarmDO	1	0	1		R/W
1615	PA04_AlarmProbe_Delay	10	0	240		R/W
1616	PA05_AlarmProbe_alarmDO	1	0	1		R/W
1617	PA08_AlarmSupplyFan_alarmDO	1	0	1		R/W
1618	PA09_AlarmReturnFan_alarmDO	1	0	1		R/W
1619	PA10_ThermalFan_Delay	2	0	999		R/W
1620	PA11_InverterAlarmFan_Delay	2	0	999		R/W
1621	PA15_ThermalPump_Delay	2	0	999		R/W
1622	PA16_AlarmPump_alarmDO	1	0	1		R/W
1623	PA24_ResetType_AlarmAirFilterSwitch	1	0	1		R/W
1624	PA25_AlarmAirFilterSwitch_Delay	30	0	999		R/W

1625	PA26_AlarmAirFilter_alarmDO	1	0	1		R/W
1626	PA28_AlarmAirFlowSwitchDelay_Reset	30	0	999		R/W
1627	PA29_AlarmAirFlowSwitchDelay	5	0	999		R/W
1628	PA30_AlarmAirFlowSwitch_alarmDO	1	0	1		R/W
1629	PA31_ResetType_AlarmHumidifier	0	0	1		R/W
1630	PA32_HumidifierAlarm_Delay	2	0	999		R/W
1631	PA33_AlarmHumidifier_alarmDO	1	0	1		R/W
1632	PA35_EnableType_AntiFreezeAlarm	1	0	1	0=DI, 1=Probe	R/W
1633	PA36_AlarmAntiFreeze_Delay	5	0	999		R/W
1634	PA37_AlarmAntiFreeze_alarmDO	1	0	1		R/W
1635	PA40_EnableAlarmRTC	1	0	1		R/W
1636	PA41_ResetType_AlarmRTC	1	0	1		R/W
1637	PA42_AlarmRTC_alarmDO	1	0	1		R/W
1638	PA45_AlarmSmokeFire_alarmDO	1	0	1		R/W
1639	PH01_PressureMinValue	0.0	-145.0	625.5		R/W
1640	PH02_PressureMaxValue	30.0	-145.0	625.5		R/W
1641	PH03_MinValueSetPointTemperature	-5.0	-15.0	158.0		R/W
1642	PH04_MaxValueSetPointTemperature	40.0	-15.0	158.0		R/W
1643	PH05_Enable_OnOffByKey	1	0	1		R/W
1644	PH06_EnableChangeMode_KEY	1	0	1		R/W
1645	PH07_Enable_OnOffByDI	1	0	1		R/W
1646	PH08_EnableChangeMode_DI	1	0	1		R/W
1647	PH09_Enable_OnOffBySuperv	0	0	1		R/W
1648	PH10_EnableChangeMode_SUP	0	0	1		R/W
1649	PH11_Modbus_Address	1	1	247		R/W
1650	PH12_Modbus_Baud	3	0	4		R/W
1651	PH13_Modbus_Parity	2	0	2		R/W
1652	PH14_Modbus_StopBit	0	0	1		R/W
1653	PH15_RestoreDefault	0	0	1		R/W
1654	PH18_HistoryReset	0	0	1		R/W
1655	PH25_EnableOffsetSP_DI	0	0	1		R/W
1656	PH26_EnableOffsetSP_SUP	0	0	1		R/W
1657	PH27_EnableUniqueSetPoint	0	0	1		R/W

1658	PH28_EnableNightTimeBand	0	0	1		R/W
1659	PH32_TemperatureUM	0	0	1		R/W
1660	PH33_Press_UM	0	0	1	0=Bar, 1=psi	R/W
1661	PH40_EnableExternalProbe	0	0	1		R/W
1662	PH41_EnableHumidityEnvironmentProbe	0	0	1		R/W
1663	PH42_EnableAirPressureSupplyProbe	0	0	1		R/W
1664	PH50_Logic_DI_OnOff_SP_Mode_Remote	0	0	1		R/W
1665	PH51_Logic_DI_Alarm	0	0	1		R/W
1666	PH52_Logic_DI_AlarmAirflow	1	0	1		R/W
1667	PH53_Logic_DI_AlarmFire	1	0	1		R/W
1668	PH60_Logic_DO_Alarm	0	0	1		R/W
1669	PG00_UnitType	1	1	3	1=Only Heat, 2=Only Cool, 3=Heat/Cool + Humidity	R/W
1670	PG03_EnableRTC	1	0	1		R/W
1671	PG04_PrimaryRegulation	1	0	1	0=Fan, 1=Valve	R/W
1672	PG05_RegProbe_Return	0	0	1		R/W
1673	PG06_EnableHumidifier	0	0	1		R/W
1674	PG07_EnableAirExternalShutter	1	0	1		R/W
1675	PG08_EnableSupplyFan	1	0	1		R/W
1676	PG09_EnableReturnFan	1	0	1		R/W
1677	PG10_EnablePump	0	0	1		R/W
1678	Hd01_PosDI_OnOffRemote	1	0	7		R/W
1679	Hd02_PosDI_ChangeModeRemote	0	0	7		R/W
1680	Hd03_PosDI_SetPointRemote	0	0	7		R/W
1681	Hd05_PosDI_ThermalSupplyFan	3	0	7		R/W
1682	Hd06_PosDI_AlarmInverterSupplyFan	0	0	7		R/W
1683	Hd07_PosDI_ThermalReturnFan	0	0	7		R/W
1684	Hd08_PosDI_AlarmInverterReturnFan	0	0	7		R/W
1685	Hd10_PosDI_ThermalPump	0	0	7		R/W
1686	Hd15_PosDI_AlarmHumidifier	0	0	7		R/W
1687	Hd16_PosDI_AlarmAirflowSwitch	6	0	7		R/W
1688	Hd17_PosDI_AntiFreeze	5	0	7		R/W
1689	Hd18_PosDI_AlarmAirFilterSwitch	4	0	7		R/W

1690	Hd20_PosDI_AlarmFire	0	0	7	R/W
1691	HF01_Pos_DO_SupplyFan	1	0	7	R/W
1692	HF02_Pos_DO_ReturnFan	2	0	7	R/W
1693	HU01_Pos_DO_Humidifier	0	0	7	R/W
1694	HS01_Pos_DO_OpenShutterAirExternal	4	0	7	R/W
1695	HS02_Pos_DO_OpenShutterAirExternal	5	0	7	R/W
1696	HP01_Pos_DO_Pump	0	0	7	R/W
1697	HA01_Pos_DO_GlobalAlarm	7	0	7	R/W
1698	HA02_Pos_DO_AirFilterSwicth	6	0	7	R/W
1699	HA05_Pos_AO_Valve_Heating_Cooling	2	0	3	R/W
1700	HA07_Pos_AO_InverterFan	0	0	3	R/W
1701	HA08_Pos_AO_Humidifier	0	0	3	R/W

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