



PROGRAMMABLE CONTROLLER FOR AIR HANDLING UNITS WITH CROSS FLOW HEAT RECOVERY



APPLICATION MANUAL

CODE 144SAVE00E01

Important

Read these instructions carefully before installation and use and follow all recommendations regarding installation and for the electric connection; keep these instructions for future reference.

The instrument must be disposed of according to local Standards regarding the collection of electric and electronic appliances.



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1 GENERALITIES

1.1 Description

The application is dedicated to the control and regulation of the Air Handling Units with cross flow recovery heat exchanger. There are two solutions available:

- **COMPACT Control:** Responds to minimum requirements and the Standards.
- **COMPLETE Control:** Integrates the heating and high recovery efficiency functions to the *Base* solution.

The solution makes use of the large modularity of the *c-pro micro* programmable controllers: the *compact* control unit uses just one C-PRO MICRO CAN controller, connected to a LCD graphical user terminal VGRAPH, while to obtain the *complete* control solution a C-PRO EXP MICRO (CAN) must be connected to the C-PRO MICRO (CAN).

The C-PRO MICRO (CAN) controller has the following I/O:

- Digital outputs: **6**
- Digital inputs: **5**
- Analogical inputs: **4**
- Analogical outputs: **1+2**

The C-PRO EXP MICRO (CAN) expansion has the following I/O:

- Digital outputs: **6**
- Digital inputs: **5**
- Analogue inputs: **4**
- Analogue outputs: **1 (+2 optional)**

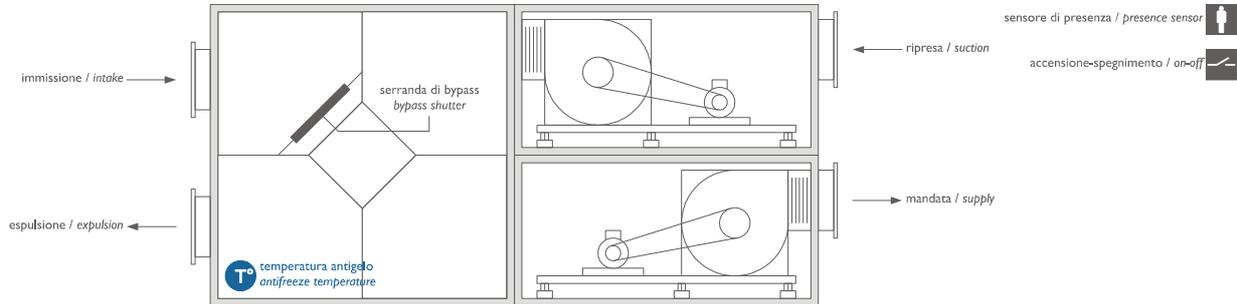
Both instruments are equipped with CAN field port and a second TTL port, which via a TTL / RS485 serial interface (MODbus) allows connection to BMS or EVCO (RICS) supervision systems.

The main control functions managed by the “Complete” solution are:

- Supply fan management
- Return fan management
- Management of the cross flow recovery heat exchanger by-pass damper
- Outside air damper management
- Management of hot water coil for heating (or a group of 3 electric heaters)
- Management of time bands with ECONOMY and COMFORT working mode
- CO₂ probe management for fan control
- Alarms log
- User Menu split in three main levels (User, Installer, Manufacturer), each protected by a different password.

2 Applications

2.1 COMPACT solution



The picture above shows a principle layout. It is intended for indicating the presence of the components, not their position, in the AHU controlled by the EVCO device. It is also NOT intended for indicating the real layout of the AHU.

The unit has the following main features:

- N° 2 Fans with 3 speeds or with 1 speed + speed variator
- N° 1 Heat exchanger/Cross flow recovery heat exchanger
- N° 1 Recovery heat exchanger By-pass damper (optional)
- N° 1 Recovery heat exchanger anti-freeze temperature probe
- N° 1 Presence sensor (installed in the room)
- N° 1 Start – Stop (remote)

Note: The compact solution is by default configured for piloting 3-speed fans (PG10 = DO)

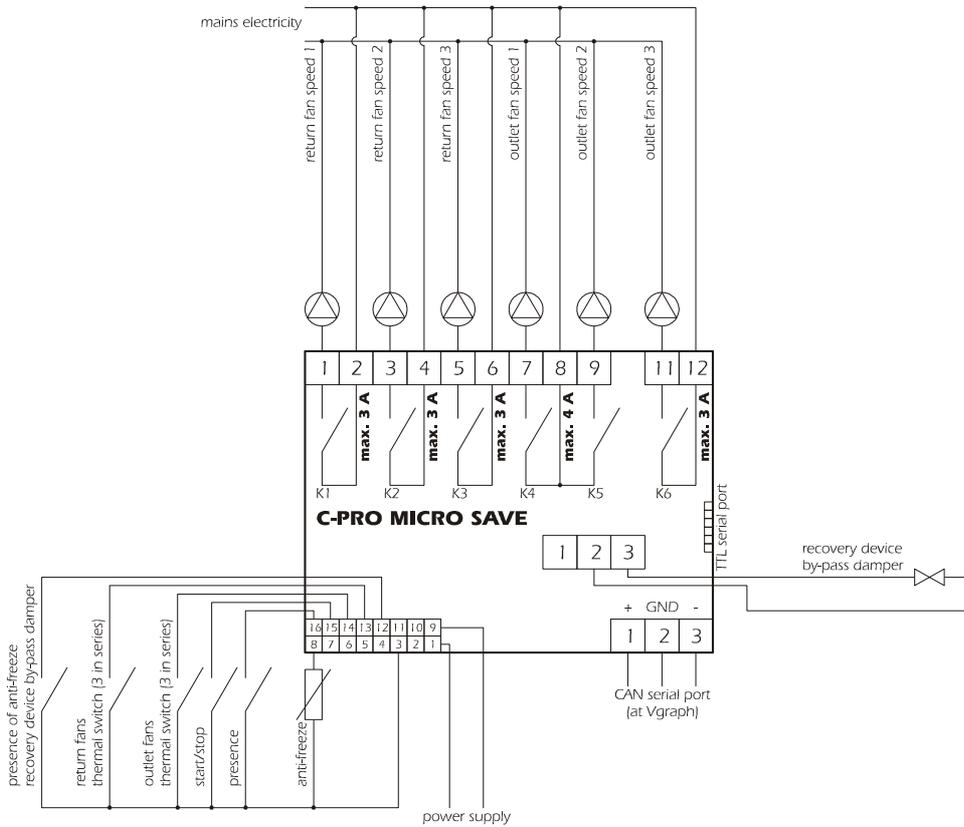
2.1.1 I/O configuration with 3-speed fans

c-Pro MICRO CAN with 2 AO (V+V) (code CPU1S0C2)	
I/O	Description
Analogue inputs	
AI 1	Anti-freeze Temperature Probe (Recovery heat exchanger By-Pass) NTC
AI 2	Not used
AI 3	Not used
AI 4	Not used
Serial ports	
TTL (485)	(TTL with external interface EVIF becomes RS485 Modbus RTU)
CAN bus	To the EXP micro and/or Vgraph
Digital inputs	
DI 1	Presence sensor
DI 2	Start – Stop (remote)
DI 3	Supply fan thermal overload
DI 4	Return fan thermal overload
DI 5	By-pass damper presence (anti-freeze recovery heat exchanger)
Analogue outputs	
AO 1	Not used
AO 2	Not used
AO 3	Recovery heat exchanger BY-PASS damper control (0-10 V)
Digital Outputs (Relay)	
DO 1	Return fan speed 1
DO 2	Return fan speed 2
DO 3	Return fan speed 3
DO 4	Supply fan speed 1
DO 5	Supply fan speed 2
DO 6	Supply fan speed 3

RTC system clock - Real Time Clock: present on user interface VGraph

Electric connections with 3-speed fans

Note: For driving the 3-speed fans (Digital output) set PG10=DO



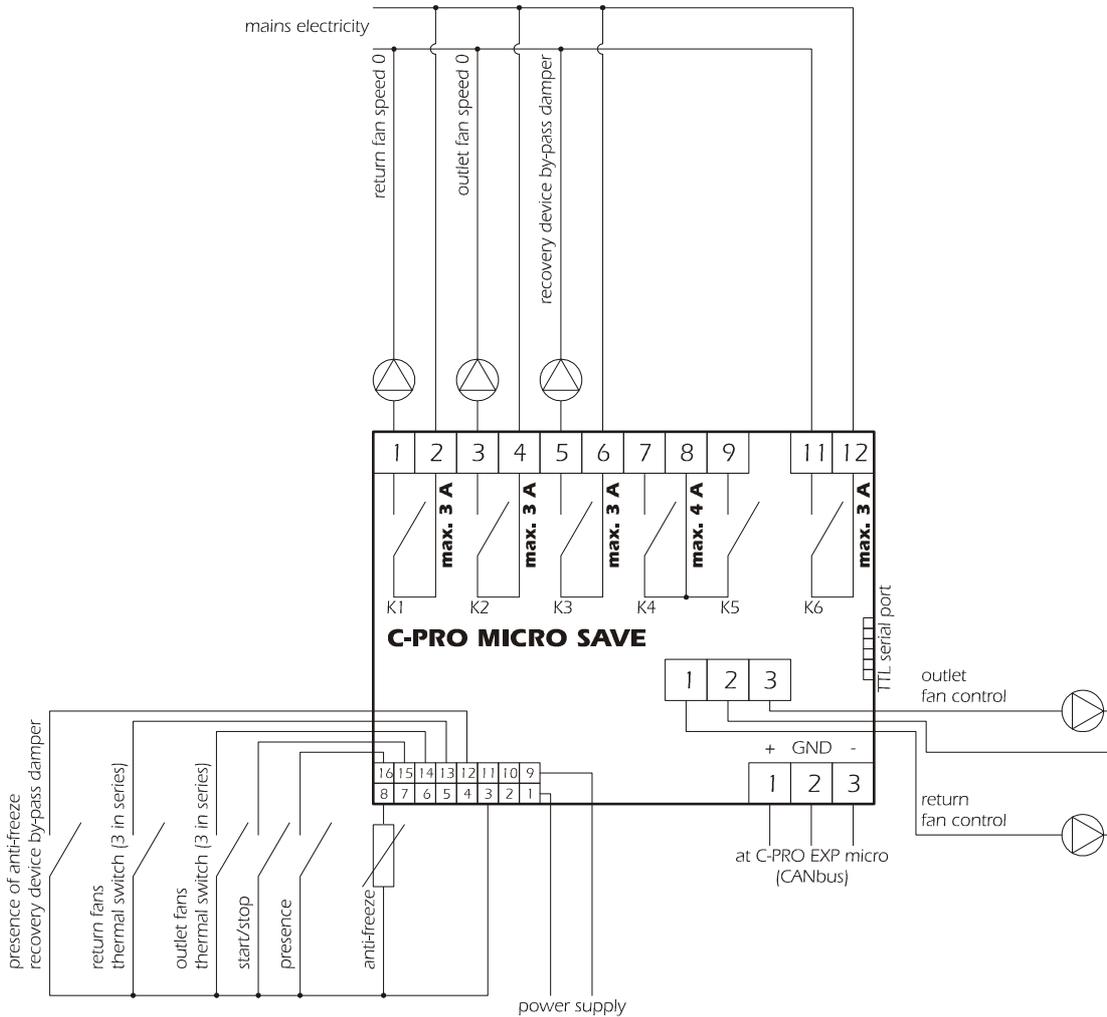
2.1.2 I/O configuration with 1 speed fans + speed variator

c-Pro MICRO CAN with 2 A/O V+V (code CPU1S0C2V)	
I/O	Description
Analogue inputs	
AI 1	Anti-freeze Temperature Probe (Recovery heat exchanger By-Pass) NTC
AI 2	Not used
AI 3	Not used
AI 4	Not used
Serial ports	
TTL (485)	TTL with external interface EVIF becomes RS485 Modbus RTU
CAN bus	To the EXP micro and/or Vgraph
Digital inputs	
DI 1	Presence sensor
DI 2	Start – Stop (remote)
DI 3	Supply fan thermal switches (protection)
DI 4	Return fan thermal switches (protection)
DI 5	BY-Pass damper presence (anti-freeze recovery heat exchanger)
Analogue outputs	
AO 1	Not used
AO 2	Return fan piloting signal (0-10 V)
AO 3	Supply fan piloting signal (0-10 V)
Digital Outputs (Relay)	
DO 1	Return fan (speed 0) enabling
DO 2	Supply fan (speed 0) enabling
DO 3	Recovery heat exchanger BY-PASS damper
DO 4	
DO 5	
DO 6	

RTC system clock - Real Time Clock: present on the user interface **Vgraph**

Electric connections with 1 speed fans + variator

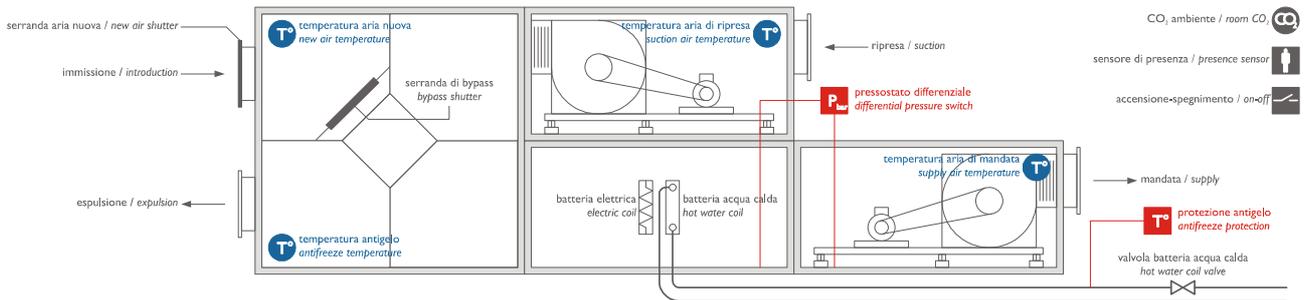
Note: For driving the modulating fans (Analogue output) set PG10=AO



(* The control of the recovery heat exchanger By-Pass damper can be either digital or analogue, by setting the PG03 parameter.

C-PPRO MICRO and Vgraph power supply must be each other galvanically insulated

2.2 COMPLETE solution



The picture above shows a principle layout, it is intended for indicating the presence of the components, not their position, in the AHU controlled by the EVCO device. It is also NOT intended for indicating the real layout of the AHU.

N.B. 1) The coil electric heater is an alternative to the hot water coil.

2) The CO₂ probe is an optional just in the 3-speed fans version. In this version the heating regulation function based on the return air temperature is also available.

The following are added to the functions and parts of the *COMPACT* version:

- High efficiency Recovery heat exchanger/Heat exchanger
- Differential pressure switch
- Electric heaters protection
- Electric heaters option or Hot water coil option (parameter *PG02*)
- Outside air damper option (parameter *PG04*)
- Summer By-Pass damper option (parameter *PG08*)
- Outdoor Air Temperature Probe
- Return Air Temperature Probe
- Supply Air Temperature Probe
- CO₂ and air quality sensor for automatic fan speed modulation option
- Heating control based on return temperature probe

Notes

- The electric heaters can be used instead of (not together with) the how water coil
- The COMPLETE solution is configured by default for driving 3 speed fans (*PG10* = DO)

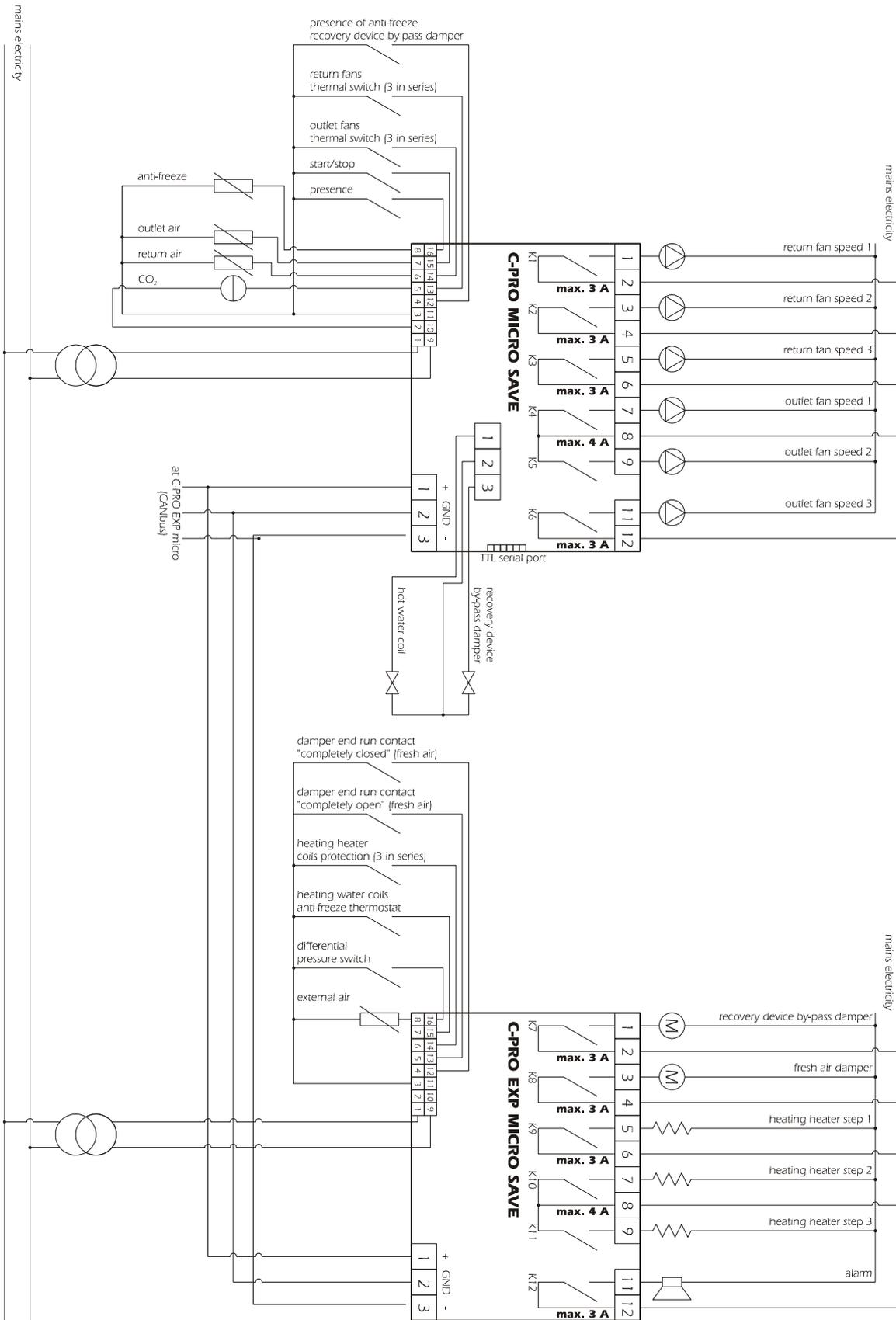
2.2.1 I/O configuration with 3-speed fans

c-Pro MICRO CAN with 2 A/O V+V (code CPU1S0C2V)	
c-Pro EXP MICRO CAN with 2 A/O V+V (code CPUES0C2V)	
I/O	Description
Analogue inputs	
AI 1	Anti-freeze Temperature Probe (Recovery heat exchanger By-Pass) - NTC
AI 2	Supply Air Temperature Probe - NTC
AI 3	Return Air Temperature Probe - NTC
AI 4	CO ₂ probe (0-5 V) (Optional)
AI 5	Outdoor Air Temperature Probe - NTC
AI 6	Not used
AI 7	Not used
AI 8	Not used
Serial ports	
TTL (485)	TTL with external interface EVIF becomes RS485 Modbus RTU
CAN bus	To the EXP micro and/or Vgraph
Digital inputs	
DI 1	Presence sensor
DI 2	Start – Stop (remote)
DI 3	Supply fan thermal overload (protection)
DI 4	Return fan thermal overload (protection)
DI 5	BY-Pass presence (anti-freeze recovery heat exchanger)
DI 6	Differential pressure switch
DI 7	Hot water coil anti-freeze thermostat
DI 8	Electric heaters thermal overload
DI 9	Outside air damper limit switch (full open)
DI 10	Outside air damper limit switch (full closed)
Analogue outputs	
AO 1	Not used
AO 2	Hot water coil modulating valve control (0-10 V)
AO 3*	Recovery heat exchanger BY-PASS damper control (0-10 V)
AO 4	Not used
AO 5	Not used
AO 6	Not used
Digital Outputs (Relay)	
DO 1	Return fan first speed
DO 2	Return fan second speed
DO 3	Return fan third speed
DO 4	Supply fan first speed
DO 5	Supply fan second speed
DO 6	Supply fan third speed
DO 7*	Recovery heat exchanger BY-PASS damper
DO 8	Outside air damper
DO 9	Electric heaters step 1
DO 10	Electric heaters step 2
DO 11	Electric heaters step 3
DO 12	Generic alarm (can be configured)

(*) The control of the *Recovery heat exchanger By-Pass* damper can be digital or analogue, by setting the relevant PG03 parameter.

RTC system clock - Real Time Clock: present on the user interface VGraph

Electric connections with 3-speed fans



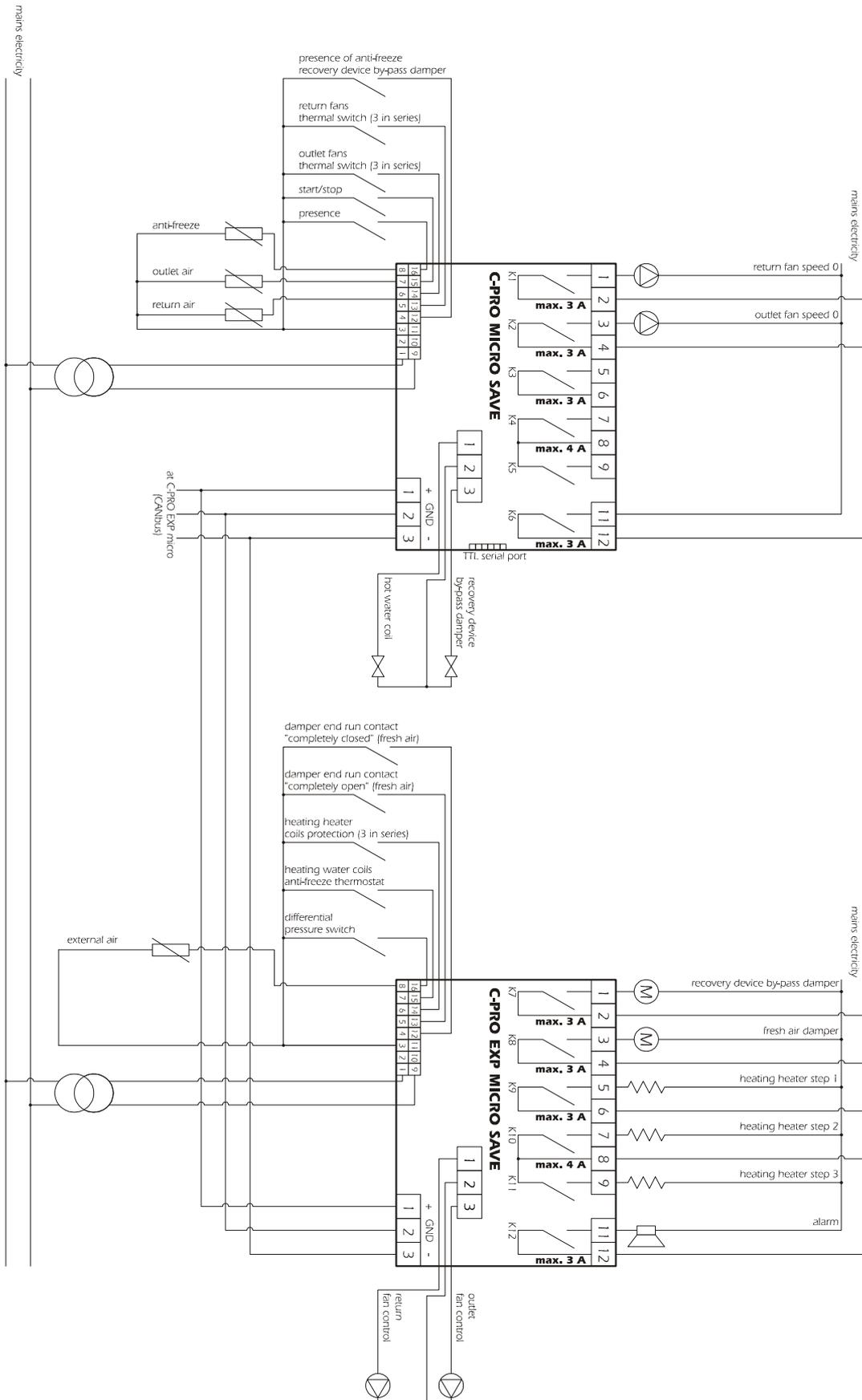
2.2.2 I/O configuration with 1 speed fans + speed variator

c-Pro MICRO CAN with 2 A/O V+V (code CPU1S0C2V)	
c-Pro EXP MICRO CAN with 2 A/O V+V (code CPUES0C2V)	
I/O	Description
Analogue inputs	
AI 1	Anti-freeze Temperature Probe (Recovery heat exchanger By-Pass) - NTC
AI 2	Supply Air Temperature Probe - NTC
AI 3	Return Air Temperature Probe - NTC
AI 4	<i>Not used</i>
AI 5	Outdoor Air Temperature Probe - NTC
AI 6	<i>Not used</i>
AI 7	<i>Not used</i>
AI 8	<i>Not used</i>
Serial ports	
TTL (485)	TTL with external interface EVIF becomes RS485 Modbus RTU
CAN bus	To the EXP micro and/or Vgraph
Digital inputs	
DI 1	Presence sensor
DI 2	Start – Stop (remote)
DI 3	Supply fan thermal overload
DI 4	Return fan thermal overload
DI 5	BY-Pass damper presence (anti-freeze recovery heat exchanger)
DI 6	Differential pressure switch
DI 7	Hot water coil anti-freeze thermostat
DI 8	Electric heaters thermal overload
DI 9	Outdoor air damper limit switch (full open)
DI 10	Outdoor air damper limit switch (full closed)
Analogue outputs	
AO 1	<i>Not used</i>
AO 2	Hot water coil modulating valve control (0-10 V)
AO 3*	Recovery heat exchanger BY-PASS damper control (0-10 V)
AO 4	<i>Not used</i>
AO 5	Return fan driving signal (0-10 V)
AO 6	Supply fan driving signal (0-10 V)
Digital Outputs (Relay)	
DO 1	Return fan speed 0
DO 2	Outlet fan speed 0
DO 3	
DO 4	
DO 5	
DO 6	
DO 7*	Recovery heat exchanger BY-PASS damper
DO 8	Outdoor air damper
DO 9	Electric heaters step 1
DO 10	Electric heaters step 2
DO 11	Electric heaters step 3
DO 12	Generic alarm (can be configured)

(*) The control of the recovery heat exchanger By-Pass damper can be digital or analogue, by setting the PG03 parameter.

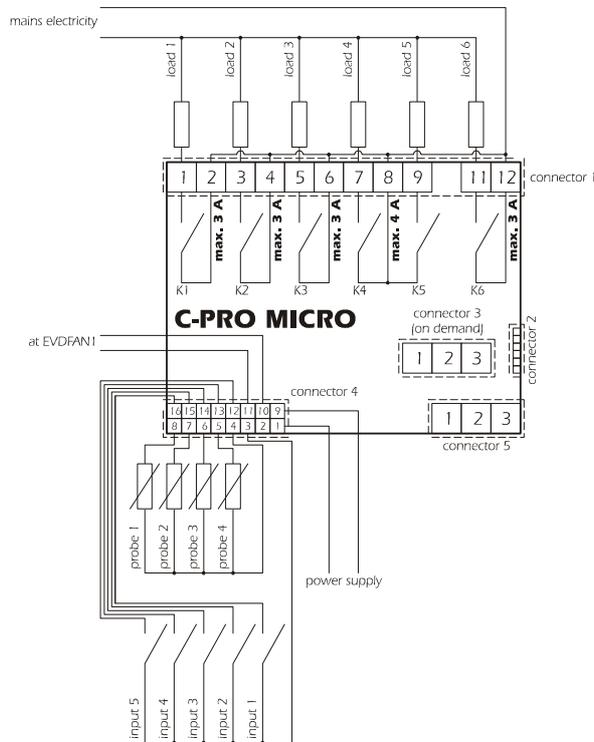
The C-PPRO MICRO and C-PRO EXP MICRO power supplied must be galvanically isolated from each other.

Electric connections with 1 speed fans + variator



2.3 Connection lay out for C-PRO MICRO CAN

Below find the connection lay out of the C-PRO MICRO controller with tables relevant to the meaning of the inputs and outputs.



C-PRO MICRO connections

Connector 1: Connection for the relay outputs		
Conn.	Code	Description
C1-1	DO1	Relay n.1 normally open contact
C1-2	COMMON DO1	Common relay n.1
C1-3	DO2	Relay n.2 normally open contact
C1-4	COMMON DO2	Common relay n.2
C1-5	DO3	Relay n.3 normally open contact
C1-6	COMMON DO3	Common relay n.3
C1-7	DO4	Relay n.4 normally open contact
C1-8	COMMON DO4, DO5	Common relay n.4,5
C1-9	DO5	Relay n.5 normally open contact
C1-11	DO6	Relay n.6 normally open contact
C1-12	COMMON DO6	Common relay n.6

Connector 2: Connection for the upload/download parameters and/or output pen for RS485 module and/or controller flash download module

C-PRO MICRO SAVE APPLICATION MANUAL

Connector 3: Connector for the analogue output (optional, not available in the day versions)		
Conn.	Code	Description (Version V+I)
C3-1	AO2	0-10VDC
C3-2	GND	Common analogue output
C3-3	AO3	4-20mA
Description (Version I+I)		
<i>C3-1</i>	<i>AO2</i>	<i>4-20mA</i>
<i>C3-2</i>	<i>GND</i>	<i>Common analogue output</i>
<i>C3-3</i>	<i>AO3</i>	<i>4-20mA</i>
Description (Version V+V)		
C3-1	AO2	0-10VDC
C3-2	GND	Common analogue output
C3-3	AO3	0-10Vdc

Connector 4: Connector for low voltage signals		
Conn.	Code	Description
C4-1	12VAC	Power supply (12VAC/DC)
C4-2	5V	Ratiometric transducers power supply
C4-3	GND	Common analogue and digital inputs
C4-4	GND	Common analogue and digital inputs
C4-5	AI4	Analogue input n.4 (for NTC probes, 0/4-20 mA or 0-5V transducers)
C4-6	AI3	Analogue input n.3 (for NTC probes, 0/4-20 mA or 0-5V transducers)
C4-7	AI2	Analogue input n.2 (for NTC probes)
C4-8	AI1	Analogue input n.1 (for NTC probes)
C4-9	12VAC	Power supply (12VAC/DC) (max. 50 mA, not protected against short circuit)
C4-10	12VDC	0/4-20 mA transducers and phase cut module power supply
C4-11	AO1	Jog output for phase cut module
C4-12	DI5	Digital input n.5
C4-13	DI4	Digital input n.4
C4-14	DI3	Digital input n.3
C4-15	DI2	Digital input n.2
C4-16	DI1	Digital input n.1

Connector 5: Connector for the remote keyboard and expansion of I/O (CAN)		
Conn.	Code	Description
C5-1	CAN +	Connector for the connection of the CAN + serial port
C5-2	GND	Ground reference connector
C5-3	CAN -	Connector for the connection of the CAN - serial port

2.4 Connection lay out for C-PRO EXP MICRO CAN

Below find the connection lay out of the expansion with tables relevant to the meaning of the inputs and outputs.

Connector 1: Connection for the relay outputs		
Conn.	Code	Description
C1-1	DO1	Relay n.1 normally open contact
C1-2	COMMON DO1	Common relay n.1
C1-3	DO2	Relay n.2 normally open contact
C1-4	COMMON DO2	Common relay n.2
C1-5	DO3	Relay n.3 normally open contact
C1-6	COMMON DO3	Common relay n.3
C1-7	DO4	Relay n.4 normally open contact
C1-8	COMMON DO4, DO5	Common relay n.4, 5
C1-9	DO5	Relay n.5 normally open contact
C1-11	DO6	Relay n.6 normally open contact
C1-12	COMMON DO6	Common relay n.6

Connector 2: Connector for low voltage signals		
Conn.	Code	Description
C2-1	12VAC	Power supply (12VAC/DC)
C2-2	Not connected	Not connected
C2-3	GND	Common analogue and digital inputs
C2-4	GND	Common analogue and digital inputs
C2-5	AI4	Analogue input n.4 (for NTC 0/4-20 mA or 0-5V transducers)
C2-6	AI3	Analogue input n.3 (for NTC 0/4-20 mA or 0-5V transducers)
C2-7	AI2	Analogue input n.2 (for NTC probes)
C2-8	AI1	Analogue input n.1 (for NTC probes)
C2-9	12VAC	Power supply (12VAC/DC)
C2-10	12VDC	0/4-20 mA transducers and phase cut module power supply (max. 50 mA, not protected against short circuit)
C2-11	AO1	Jog output for phase cut module
C2-12	DI5	Digital input n.5
C2-13	DI4	Digital input n.4
C2-14	DI3	Digital input n.3
C2-15	DI2	Digital input n.2
C2-16	DI1	Digital input n.1

Connector 3: Connector for the controller (IntraBus)		
Conn.	Code	Description
C3-1	12VDC	Power supply
C3-2	GND	Common
C3-3	DATA	Serial live

Connector 3: Connector for the controller (CAN)		
Conn.	Code	Description
C3-1	CAN +	Connector for the connection of the CAN + serial port
C3-2	GND	Mass reference connector
C3-3	CAN -	Connector for the connection of the CAN - serial port

4 User interface

4.1 Display and keyboard

Both control solutions (compact and complete) use the **Vgraph** user terminal equipped with LCD graphic display 128x64 pixel and 6 keys. The terminal can be panel mounted (IP 65 with optional gasket) on the unit or remote using EVCO wall box or in wall recess boxes type “506”. Besides the EVCO front plates it is possible to use BTicino “Living” or “Light” series plates.

4.1.1 V-graph interface

The interface is connected via CAN to the controller



The keyboard has 6 keys for page navigation and editing values, with the following meaning:

- UP and DOWN: in editing they modify the parameter values, otherwise they move the cursor. If the DOWN button is pushed for about 2 seconds the buzzer is silenced.
- LEFT and RIGHT: display of the masks in succession.
- ENTER: in editing it confirms the value, otherwise it sends any control associated to the text where the cursor is positioned. If an alarm page is being displayed pushing this key for about 2 seconds causes the alarm reset. If the alarms pages are being displayed a short push moves to the following active alarm.
- ESC: in editing it cancel the modification, otherwise it requests for default page associated to the current page. If the ESC key is pressed for about 2 seconds the unit is switched on/off.

4.2 List of pages

This paragraph presents the main pages and menus present in the application. The general menu is divided into three levels: user, installer and manufacturer, there is also a menu for the management of the system clock and some free access state pages. The menus have the following structure:

- Main Menu
 - User Menu (Level 1, level 1 password)
 - Installer Menu (Level 2, level 2 password)
 - Clock branch installer menu
 - Maintenance branch installer menu
 - Fans branch installer menu
 - Heating elements branch installer menu
 - Free-cooling branch installer menu
 - Safety device branch installer menu
 - Various device branch installer menu
 - Default branch installer menu (level 3, only with unit OFF)
 - Manufacturer Menu (Level 3, level 3 password, only with unit OFF)
 - Configuration branch manufacturer menu
 - Fans branch manufacturer menu
 - Heating elements branch manufacturer menu
 - Outdoor air damper branch manufacturer menu
 - Recovery heat exchanger branch manufacturer menu
 - Safety device branch manufacturer menu
 - Various branch manufacturer menu

4.2.1 Main Menu

The main menu is the access point for all other system menus.



It is possible to display this menu from any point of the user interface pushing the ENTER key for about 2 seconds. From this page it is possible to enter the other menu using the UP and DOWN keys and pushing the ENTER key to confirm. By pushing the ESC key on this page it is possible to go back to the main page of the application.

4.2.2 Password

Each menu has an associated level (except clock and log) with a relevant password for accessing to the various functions present in that menu. Once the correct password has been entered the protected function can be accessed. Two effects are obtained by entering a password correctly:

- release of the correlated level
- release of the sub-levels

Every level password can be modified from the same level or higher levels. For instance any password can be modified from the manufacturer level.

PASSWORD		
PSd1	USER	59
PSd2	INSTALLER	-8
PSd3	MANUFACTURER	32

The range of values accepted for the passwords is: -999 / 9999.

If no action is taken on a menu after 4 minutes the password inserted expires and it must be entered again.

4.2.3 User Menu

The User menu is on level 1, that is the level 1 (or higher) password must be taped in for entering the menu and display/modify the parameters present in this branch.

By pushing the RIGHT key from this mask it is possible to access the page used for changing the password (*PSd1*).

4.2.4 Installer Menu

The Installer menu is on level 2, that is the level 2 (or higher) password must be taped in for entering the menu and display/modify the parameters present in this branch.

INSTALLER MENU	
CLOCK	>>>
MAINTENANCE	>>>
FANS	>>>
SAFETIES	>>>
VARIOUS PARAMETERS	>>>

Compact version

INSTALLER MENU	
CLOCK	>>>
MAINTENANCE	>>>
FANS	>>>
HEATING	>>>
FREE COOLING	>>>
SAFETIES	>>>
VARIOUS PARAMETERS	>>>

Complete version

The installer menu contains all parameters relevant for the configuration of all functionalities (alarms, regulation, logic, features...) of the unit. Pushing the RIGHT or LEFT keys it is possible to access the mask for setting the password (*PSd2*).

In the *MAINTENANCE* menu it is possible to view/enable the features relevant for the working condition of the devices controlled (i.e. the running hours and the maximum threshold of hours acceptable). In this menu it is possible to see the states of the physical inputs and outputs of the board and also to set the offset to be added to the analogue inputs measure in order to compensate the readout error due to wiring, positioning of the probes.

In the *FANS*, *HEATING* and *FREE COOLING* menus it is possible to set the parameters for management of the related devices

In the *SAFETIES* menu stand all parameters concerning the alarms and the management of the safety conditions for the controlled devices

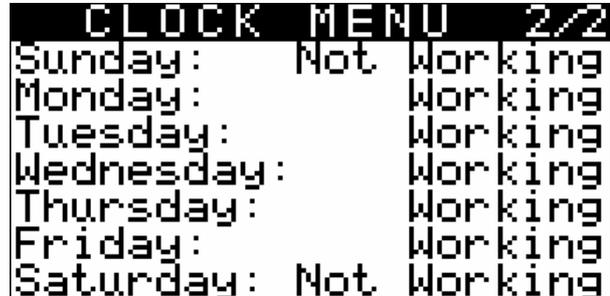
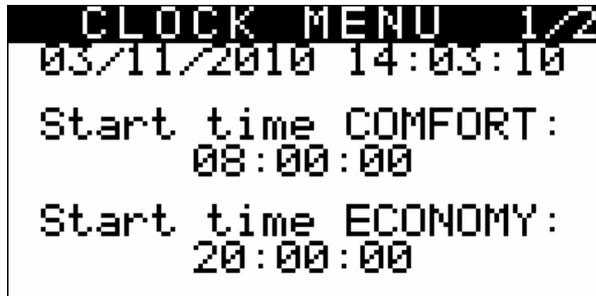
In the *VARIOUS PARAMETERS* menu stand other general parameters, moreover, entering this menu it is possible to access the page for resetting the parameters to factory default values.

4.2.5 RTC Menu

This menu contains the functionalities linked to the system RTC:

- the setting of the clock
- setting the COMFORT/ECONOMY time bands

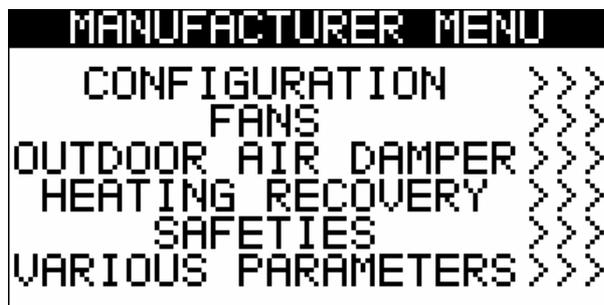
To enter this menu, press ENTER on the RTC mask from the main menu.



In this page it is possible to set the system clock and the two time periods of the fans' automatic working (parameters *PT01* and *PT02*). By pushing the ESC key from this menu it is possible to go back to the general menu.

4.2.6 Manufacturer Menu

The Manufacturer menu is on level 3, that is the level 3 password must be taped in for entering the menu and display/modify the parameters present in this branch. This menu can only be accessed with the unit OFF.



Compact version



Complete version

The manufacturer menu contains all parameters relevant to unit configuration.

In the *CONFIGURATION* menu it is possible to display/modify the parameters relevant for the design features of the unit.

In the *FANS*, *HEATING*, *OUTDOOR AIR DAMPER* and *RECOVERY HEAT EXCHANGER* menus, it is possible to set the parameters relevant to management of the devices.

In the *SAFETIES* menu stand all parameters concerning the alarms and the management of the safety conditions for the controlled devices.

In the *VARIOUS PARAMETERS* menu stand other general parameters, moreover, entering this menu it is possible to access the page for resetting the parameters to factory default values.

4.2.7 Main OFF page

The main OFF page changes depending on the reason why the unit is OFF. There are three possibilities:

1. **Unit OFF:** Unit switched-off pushing the relevant key
2. **Unit OFF by Start-Stop:** Unit ON by key but OFF due to digital contact *DI/2 Start-Stop* in “Stop” position
3. **Unit OFF by Supervisor:** Unit ON by key but OFF due to a Modbus command from the supervision module.
4. **Unit OFF by Alarm:** Unit switched-ON by key but switched-OFF due to unit block alarms.



Note: The MANUFACTURER menu can only be accessed if the unit is in one of these states.

4.2.8 Main ON page

The main page is displayed when the unit is in ON mode:

COMPACT VERSION



Alarm icon: appears when there are active alarms. If all of them have been viewed the icon becomes fixed, otherwise (some active alarms not viewed) the icon keeps flashing.

Fans speed

Recovery Heat Exchanger Bypass damper status

- Information regarding the fans working mode:
- COMFORT: Comfort period automatic control
 - COMFORT+P.: Comfort period automatic control WITH presence sensor active.
 - ECONOMY: Economy period automatic control.
 - ECONOMY+P.: Economy period automatic control WITH presence sensor active.
 - NOT WORKING DAY: Automatic control during not working days
 - RTC ERROR: Automatic control during RTC error
 - MANUAL: Manual control

From the main page it is possible to access the state pages by pressing the RIGHT key. Pressing ESC it's possible to go to the page for displaying the alarms and log.

COMPLETE VERSION



Air temperature set point for main temperature control (supply/return)

- Information regarding the fans working mode:
- COMFORT: Comfort period automatic control
 - COMFORT+P.: Comfort period automatic control WITH presence sensor active.
 - ECONOMY: Economy period automatic control.
 - ECONOMY+P.: Economy period automatic control WITH presence sensor active.
 - NOT WORKING DAY: Automatic control during not working days
 - RTC ERROR: Automatic control during RTC error
 - MANUAL: Manual control
 - CO₂ SENSOR: Control based on CO₂ sensor readout



Alarm icon: appears when there are active alarms. If all of them have been viewed the icon becomes fixed, otherwise (some active alarms not viewed) the icon keeps flashing.

From the main page it is possible to access the state pages by pressing the RIGHT key. Pressing ESC it's possible to go to the page for displaying the alarms and log.

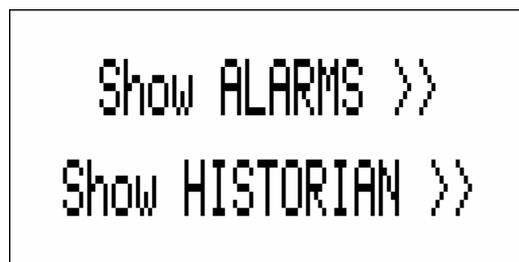
4.2.9 State Pages

From the main page it is possible to scroll the free access pages, which show the states of the controlled devices. These pages are not protected by password and can only be accessed with unit ON. To display them, press the LEFT and RIGHT keys.

Note: If some devices are disabled from parameter, the information regarding their working status is replaced with dots “...” in order to avoid filling the state pages with information not enabled by the control. The same is valid for the disabled probes.

4.2.10 Alarm pages

To display the alarms, select “*Show ALARMS >>>*” from the general menu or press ESC from the main page to display this page:



Position the cursor on “*Show ALARMS >>*” and then press ENTER key.

If no alarms are present the writing “*NO ALARS*” is displayed. Otherwise every time ENTER key is pushed the next active alarm is displayed.

For resetting the alarm, in case the alarm condition is expired, keep pushed the ENTER key for about 2 seconds. If the alarm cause is still active the alarm is not reset and the current mask remains displayed.

If the ESC key is pressed on an alarm page or you wait 60 seconds for timeout, go back to the main page of the application. This level is not protected by a password.

4.2.11 Log pages

To display the alarms log, select *HISTORIAN* from the general menu or press ESC from the main page to display this page:



move the cursor on “*Show HISTORIAN >>*” and push the ENTER key.

If no elements are present, “*NO ALARMS*” is displayed otherwise the following page is proposed:

<pre> ALARM HISTORY Status: OK Element N° 2 Code: AL08 Value: -18.0 Next>> 21/02/2010 08:19:04 </pre>	<p>State of the log</p> <p>→ Running number of the record</p> <p>→ Alarm code</p> <p>→ Alarm value</p> <p>→ Date and time of the</p>	<p>{ Ok: correct reading Empty: empty memory Overflow: memory full Error: failed log reading</p>
---	--	---

In this page stand the information regarding the last element in the log.

To view the previous element move the cursor on “*Next>>*” and push the ENTER key. By repeating this procedure it is possible to scroll all log elements until reaching the first element inserted. Once reached the last element, on the request of the next element, the last element memorised is re-proposed: log display is circular.

To exit the log pages, press the ESC key or wait 60 seconds for timeout. This level is not protected by a password.

4.2.12 Project and Firmware Versions

Press the LEFT+RIGHT keys at the same time for about 3 seconds. The information regarding the versions of the project and the controller firmware are displayed.



To return to the main application page, press the ESC key.

5 Configuration parameters

Below are listed all parameters managed by the application. A brief description, the range of acceptable values, unit of measurement, the default value proposed and the menu in which it is found is supplied for every parameter. The menus are structured following this logic:

- UT: user menu
- IS: installer menu
 - OR: Clock branch installer menu
 - IS-MA: maintenance branch installer menu
 - IS-F: fans branch installer menu
 - IS-B: heating coils branch installer menu
 - IS-SE: outside air damper branch installer menu
 - IS-FC: Free Cooling branch installer menu
 - IS-S: safety device branch installer menu
 - IS-V: various parameters branch installer menu
 - IS-D: default branch installer menu
- CO: manufacturer menu
 - CO-G Configuration branch manufacturer menu
 - CO-F Fans branch manufacturer menu
 - CO-B Heating coils branch manufacturer menu
 - CO-SE Outside air damper branch manufacturer menu (free-cooling)
 - CO-RH Recovery heat exchanger branch manufacturer menu
 - CO-S Safety branch manufacturer menu
 - CO-V Various branch manufacturer menu

5.1 COMPACT solution list of configuration parameters

Code	Parameter description	Default	Min	Max	UM	Menu	Notes
Level 1	USER MENU						
	USER						
PF02	Fans speed in manual regulation mode	V3	V0	V3		UT	Only if PF01=0 (Manual Regulation)
PSd1	User level password (1)	0	-999	9999	-	UT	
Level 2	INSTALLER MENU						
	CLOCK						
PT01	Start of the COMFORT time period	08:00:00	00:00:00	23:59:59	-	OR	
PT02	Start of the ECONOMY time period	20:00:00	00:00:00	23:59:59	-	OR	
PT11	Sunday	0 Working	0 Working	1 Not Working		OR	
PT12	Monday	0 Working	0 Working	1 Not Working		OR	
PT13	Tuesday	0 Working	0 Working	1 Not Working		OR	
PT14	Wednesday	0 Working	0 Working	1 Not Working		OR	
PT15	Thursday	0 Working	0 Working	1 Not Working		OR	
PT16	Friday	0 Working	0 Working	1 Not Working		OR	
PT17	Saturday	0 Working	0 Working	1 Not Working		OR	

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Code	Parameter description	Default	Min	Max	UM	Menu	Notes
MAINTENANCE							
PM01	Max number of fans working hours. The relevant alarm occurs over this limit	20000	0	100000	Hours	IS-MA	
PM02	Supply fan working hours	0	0	100000	Hours	IS-MA	
PM03	Return fan working hours	0	0	100000	Hours	IS-MA	
PM90	Last maintenance date					IS-MA	
PM11	Anti-freeze air temperature probe offset	0.0 0.0	-10.0 -18.0	10.0 18.0	°C °F	IS-MA	
FANS							
PF01	Type of fans regulation: 0: Manual 1: Automatic 2: Automatic with presence sensor	0	0	2		IS-F	
PF03	Fans speed in COMFORT period	V2	V0	V3		IS-F	
PF04	Fans speed in ECONOMY period	V1	V0	V3		IS-F	
PF05	Fans speed in RTC error	V0	V0	V3		IS-F	Only if PF01=1/2 /3
PF12	Fans speed in COMFORT with presence sensor active	V3	V1	V3		IS-F	
PF13	Speed in case of « non Working » day	V0	V0	V3		IS-F	
PF21	Speed variator value corresponding to speed V1	33.50	0.00	100.00	%	IS-F	Only version with variator
PF22	Speed variator value corresponding to speed V2	66.50	0.00	100.00	%	IS-F	
PF23	Speed variator value corresponding to speed V3	100.00	0.00	100.00	%	IS-F	
ALARM PARAMETERS							
PA01	Enabling fans working hours alarm	Active (1)	Not-active (0)	Active (1)	-	IS-S	
PA02	Signals working hours alarms on alarm relay	No (0)	No (0)	Yes (1)	-	IS-S	
PA04	Signals the supply/return fans thermal overload on the alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	
PA25	Signals RTC alarm on alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	
PA27	Signals probe alarms on alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	
VARIOUS PARAMETERS							
PH01	Minimum temperature value	-15.0	-20.0 -4.0	PH02	°C °F	IS-V	
PH02	Maximum temperature value	95.0	PH01	110.0 230.0	°C °F	IS-V	
PH05	Enables unit switch-on/off from "Start/Stop" digital input	Yes (1)	No (0)	Yes (1)	-	IS-V	
PH06	Enables unit switch-on/off from supervisor	No (0)	No (0)	Yes (1)		IS-V	
PH18	Cancel the alarms log	NO (0)	NO (0)	YES (1)	-	IS-V	Set Yes (1) and wait for the NO (0) value to be read again
PH20	Enable buzzer	Yes (1)	No (0)	Yes (1)	-	IS-V	
PH30	Temperature unit of measurement 0: °Celsius 1: °Fahrenheit	0 (°C)	0 (°C)	1 (°F)	-	IS-V	
PH99	Reset the factory parameters default	NO (0)	NO (0)	YES (1)	-	IS-D	Wait for the NO (0) value to be read again on reset completion
PSd2	Installer level password (2)	0	-999	9999	-	IS	

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Code	Parameter description	Default	Min	Max	UM	Menu	Notes
Level 3	MANUFACTURER MENU						
	CONFIGURATION PARAMETERS						
	<i>After modification of these parameters it is recommended to remove and then re-apply the power supply to the board.</i>						
PG01	Enabling of expansion	No (1)	No (0)	Yes (1)	-	CO-G	
PG02	Selection of type of device for heating: 0: Disabled 1: Hot water coil only 2: Electric heater coil only	Disabled (0)	Disabled (0)	Heaters (2)	-	CO-G	
PG03	Type of recovery heat exchanger by-pass damper control: 0: Digital Control (DO7) 1: Analogue Control (AO3)	AO (1)	DO (0)	AO (1)	-	CO-G	
PG04	Outside air damper enabling	No (0)	No (0)	Yes (1)	-	CO-G	
PG05	Enabling of post-ventilation	No (0)	No (0)	Yes (1)	-	CO-G	
PG06	Enabling of recovery heat exchanger anti-freeze protection	Type 1 (1)	Not-active (0)	Type 2 (2)	-	CO-G	
PG08	Enabling of recovery heat exchanger by-pass in summer	No (0)	No (0)	Yes (1)		CO-G	
PG09	Activation of outside air damper limit switch	No (0)	No (0)	Yes (1)		CO-G	
PG10	Type of fan	DO (0)	DO (0)	AO (1)	-	CO-G	
PSd1	User level password (1)	0	-999	9999	-	CO-G	
PSd2	Installer level password (2)	0	-999	9999	-	CO-G	
PSd3	Manufacturer level password (3)	0	-999	9999	-	CO-G	
	FANS						
PF06	Minimum time that must pass for the switch-on/off of each individual step of the fans	3	0	999	Sec	CO-F	
PF07	Temperature setpoint of the fans for anti-freeze protection of the recovery heat exchanger	2.0	PH01	PH02	°C °F	CO-F	
PF08	Differential for anti-freeze protection of the recovery heat exchanger	2.0	0.0	20.0 36.0	°C °F	CO-F	
PF09	Minimum stand-by time before requesting switch-off of a further fan step	5	1	99	Min	CO-F	
PF10	Differential for the by-pass of the recovery unit damper in anti-freeze protection mode	2.0	0.0	20.0 36.0	°C °F	CO-F	
PF11	Fans working time in post-ventilation mode	30	0	999	Sec	CO-F	
	OUTSIDE AIR DAMPER						
	This menu is only accessible if PG04=1						
PS01	Fans switch-on delay from outside air damper activation	45	0	999	Sec	CO-SE	Reading only
PS02	Outside air damper switch-OFF delay from fans switch-off	15	0	999	Sec	CO-SE	
PS05	Delay of outside air damper end run	60	0	999	Sec	CO-SE	
	RECOVERY HEAT EXCHANGER						
Pr01	Anti-freeze temperature minimum setpoint	1.0	PH01	PH02	°C °F	CO-RH	
Pr02	Anti-freeze temperature minimum differential	2.0	0.0	20.0 36.0	°C °F	CO-RH	
Pr03	Recovery heat exchanger by-pass cycle time for cyclical defrosting	5	1	99	Min	CO-RH	

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Code	Parameter description	Default	Min	Max	UM	Menu	Notes
ALARM PARAMETERS							
PA03	Enabling of supply/return fans thermal overload alarm	Active (1)	Not-active (0)	Active (1)	-	CO-S	
PA05	Enabling of differential pressure switch alarm	Not-active (0)	Not-active (0)	Active (1)	Sec	CO-S	
PA06	Delay of differential pressure switch alarm	10	0	999	Sec	CO-S	
PA08	Signals differential pressure switch alarm on alarm relay	No (0)	No (0)	Yes (1)	Sec	CO-S	Only if PG02=0
PA09	Anti-freeze alarm active on hot water coil	Not-active (0)	Not-active (0)	Active (1)	Sec	CO-S	
PA10	Anti-freeze alarm delay on hot water coil	10	0	999	Sec	CO-S	
PA12	Activates the heaters thermal switch alarm	Not-active (0)	Not-active (0)	Active (1)	Sec	CO-S	Only if PG02=1
PA13	Signals heaters thermal overload alarm on alarm relay	No (1)	No (0)	Yes (1)		CO-S	Only if PG02=1
PA16	Enable supply high temperature alarm from temperature probe	Not-active (0)	Not-active (0)	Active (1)		CO-S	
PA17	Supply high temperature alarm setpoint	85.0	PH01	PH02	°C °F	CO-S	
PA19	Supply high/low temperature alarms differential	3.0	0.0 0.0	20.0 36.0	°C °F	CO-S	
PA20	High/low temperature alarms delay	10	0	999	Sec	CO-S	
PA22	Expansion alarm delay	5	0	999	Sec	CO-S	
PA24	RTC alarm enabling	Active (1)	Not-active (0)	Active (1)	-	CO-S	
PA26	Probes alarms signals delay	10	0	240	Sec	CO-S	
VARIOUS PARAMETERS							
PH11	Board Modbus address	1	1	247	-	CO-V	
PH12	Communication Baud Rate for the board (0=1200, 1=2400, 2=4800, 3=9600, 4=19200)	3	0	4	-	CO-V	
PH13	ModBus Parity (0=none, 1=Odd, 2=Even)	2	0	2	-	CO-V	
PH14	Stop Bit ModBus (0=1bit, 1=2bit)	0	0	1	-	CO-V	
PH40	Enable supply temperature probe	No (01)	No (0)	Yes (1)	-	CO-V	
PH41	Enable return temperature probe	No (0)	No (0)	Yes (1)	-	CO-V	
PH42	Enable CO ₂ probe (0-5V)	No (0)	No (0)	Yes (1)	-	CO-V	
PH43	Enable outside air temperature probe	No (0)	No (0)	Yes (1)	-	CO-V	
PH51	Logic of the digital input DI1	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH52	Logic of the digital input DI2	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH53	Logic of the digital input DI3	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH54	Logic of the digital input DI4	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH55	Logic of the digital input DI5	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH56	Logic of the digital input DI6	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH57	Logic of the digital input DI7	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH58	Logic of the digital input DI8	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH59	Logic of the digital input DI9	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH60	Logic of the alarm relay DO10	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH61	Logic of the alarm relay DO12	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH80	CAN communication Baud Rate (20K, 50K, 125K, 500K)	1	1	4	-	CO-V	

Note: Once the unit parameters have been configured and at each modification of the configuration parameters it is recommended to switch OFF / switch ON the power supply to the board to make sure the configuration has been correctly updated.

5.2 COMPLETE solution list of configuration parameters

Code	Parameter description	Default	Min	Max	UM	Menu	Notes
Level 1	USER MENU						
	USER						
SPHM	Supply temperature heating setpoint	22.0	PH01	PH02	°C °F	UT	
SPHR	Return temperature heating setpoint	20.0	PH01	PH02	°C °F	UT	
PF02	Fans speed in manual regulation mode	V3	V0	V3		UT	Only if PF01=0 (Manual Regulation)
PSd1	User level password (1)	0	-999	9999	-	UT	
Level 2	INSTALLER MENU						
	CLOCK						
PT01	Start of the COMFORT time period	10:00:00	00:00:00	23:59:59	-	OR	
PT02	Start of the ECONOMY time period	16:00:00	00:00:00	23:59:59	-	OR	
PT11	Sunday	0 Working	0 Working	1 Not Working		OR	
PT12	Monday	0 Working	0 Working	1 Not Working		OR	
PT13	Tuesday	0 Working	0 Working	1 Not Working		OR	
PT14	Wednesday	0 Working	0 Working	1 Not Working		OR	
PT15	Thursday	0 Working	0 Working	1 Not Working		OR	
PT16	Friday	0 Working	0 Working	1 Not Working		OR	
PT17	Saturday	0 Working	0 Working	1 Not Working		OR	
	MAINTENANCE						
PM01	Functioning hours maximum limit for fans. The relevant alarm will be triggered over this limit	8000	0	100000	Hours	IS-MA	
PM02	Outlet fan functioning hours	0	0	100000	Hours	IS-MA	
PM03	Return fan functioning hours	0	0	100000	Hours	IS-MA	
PM90	Last date on which maintenance was performed on the machine					IS-MA	
PM11	Calibration of the anti-freeze air temperature probe	0.0	-10.0 -18.0	10.0 18.0	°C °F	IS-MA	
PM12	Calibration of the outlet air temperature probe	0.0	-10.0 -18.0	10.0 18.0	°C °F	IS-MA	
PM13	Calibration of the return air temperature probe	0.0	-10.0 -18.0	10.0 18.0	°C °F	IS-MA	
PM15	Calibration of the outside air introduction temperature probe	0.0	-10.0 -18.0	10.0 18.0	°C °F	IS-MA	

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Code	Parameter description	Default	Min	Max	UM	Menu	Notes
FANS							
PF01	Type of fans regulation: 0: Manual 1: Automatic 2: Automatic with presence sensor 3: Automatic with CO ₂ sensor	0	0	3	-	IS-F	
PF03	Fans speed in COMFORT period	V2	V1	V3	-	IS-F	
PF04	Fans speed in ECONOMY period	V1	V0	V2	-	IS-F	
PF05	Fans speed in RTC error	V0	V0	V3	-	IS-F	Only if PF01=1/2 /3
PF12	Fans speed in COMFORT with presence sensor active	V3	V1	V3	-	IS-F	
PF13	Speed in case of « non working » day	V0	V0	V3	-	IS-F	
PF14	Set point CO ₂ for Speed 1 and 2	500	PH03	PF15	ppm	IS-F	Speed 1: CO ₂ < PF14 Speed 2: CO ₂ ≥ PF14 CO ₂ < PF15 Speed 3: CO ₂ > PF15
PF15	Set point CO ₂ for Speed 2 and 3	1100	PF14	PH04	ppm	IS-F	
PF21	Speed variator value corresponding to speed V1	33.50	0.00	100.00	%	IS-F	Only version with variator
PF22	Speed variator value corresponding to speed V2	66.50	0.00	100.00	%	IS-F	
PF23	Speed variator value corresponding to speed V3	100.00	0.00	100.00	%	IS-F	
HEATING COILS <i>This menu is only accessible if PG02>0</i>							
Pb01	Regulation probe for heating 0: Supply Probe 1: Return Probe	0	0	1		IS-B	
FREECOOLING							
Pr04	Outside air/recovery heat exchanger bypass temperature set point in summer	15.0	PH01	PH02	°C °F	IS-FC	
Pr05	Return air/recovery heat exchanger bypass temperature set point in summer	22.0	PH01	PH02	°C °F	IS-FC	
ALARM PARAMETERS							
PA01	Enabling fans working hours alarm	Active (1)	Not-active (0)	Active (1)	-	IS-S	
PA02	Signals working hours alarms on alarm relay	No (0)	No (0)	Yes (1)	-	IS-S	
PA04	Signals the supply/return fans thermal overload alarm on the alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	
PA07	Differential pressure switch alarm delay on unit start-up	60	0	999	sec	IS-S	
PA11	Signals the coil anti-freeze alarm on the alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	Only if PG02=1
PA15	Signalling of the outside air damper limit switch alarm on alarm relay	Yes (1)	No (0)	Yes (1)		IS-S	
PA21	Signalling of high/low temperature alarms on the alarm relay	yes (1)	No (0)	Yes (1)		IS-S	
PA23	Signalling of expansion alarm on alarm relay	Yes (1)	No (0)	Yes (1)		IS-S	
PA25	Signals RTC alarm on alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	
PA27	Signals probe alarms on alarm relay	Yes (1)	No (0)	Yes (1)	-	IS-S	

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Code	Parameter description	Default	Min	Max	UM	Menu	Notes
VARIOUS PARAMETERS							
PH01	Minimum temperature value	-15.0	-20.0 -4.0	PH02	°C °F	IS-V	
PH02	Maximum temperature value	95.0	PH01	110.0 230.0	°C °F	IS-V	
PH03	Minimum CO ₂ probe PPM value	0	0	PH04	ppm	IS-V	
PH04	Maximum CO ₂ probe PPM value	0	PH03	10000	ppm	IS-V	
PH05	Enables unit switch-on/off from "Start/Stop" digital input	Yes (1)	No (0)	Yes (1)	-	IS-V	
PH06	Enables unit switch-on/off from supervisor	No (0)	No (0)	Yes (1)		IS-V	
PH18	Cancels the alarms log	NO (0)	NO (0)	YES (1)	-	IS-V	Set YES (1) ad wait for the NO (0) value to be read again
PH20	Enable buzzer	Yes (1)	No (0)	Yes (1)	-	IS-V	
PH30	Temperature unit of measurement 0: °Celsius 1: °Fahrenheit	0 (°C)	0 (°C)	1 (°F)	-	IS-V	
PH99	Reset the factory parameters default	NO (0)	NO (0)	YES (1)	-	IS-D	Wait for the NO (0) value to be read again on reset completion
PSd2	Installer level password (2)	0	-999	9999	-	IS	
Level 3	MANUFACTURER MENU						
	CONFIGURATION PARAMETERS						
	<i>After modification of these parameters it is recommended to remove and then re-apply the power supply to the board.</i>						
PG01	Enabling of expansion	Yes (1)	No (0)	Yes (1)	-	CO-G	
PG02	Selection of type of device for heating: 0: Disabled 1: Hot water coil only 2: Electric heater coil only	Heaters (2)	Disabled (0)	Heaters (2)	-	CO-G	
PG03	Type of recovery heat exchanger by-pass damper control: 0: Digital Control (DO7) 1: Analogue Control (AO3)	DO (0)	DO (0)	AO (1)	-	CO-G	
PG04	Outside air damper enabling	Yes (1)	No (0)	Yes (1)	-	CO-G	
PG05	Enabling of post-ventilation	Yes (1)	No (0)	Yes (1)	-	CO-G	
PG06	Enabling of recovery heat exchanger anti-freeze protection	Type 1 (1)	Disabled (0)	Type 2 (2)	-	CO-G	
PG08	Enabling of recovery heat exchanger by-pass in summer	Yes (1)	No (0)	Yes (1)		CO-G	
PG09	Activation of outside air damper end run	Yes (1)	No (0)	Yes (1)		CO-G	
PG10	Type of fan	DO (0)	DO (0)	AO (1)	-	CO-G	
PSd1	User level password (1)	0	-999	9999	-	CO-G	
PSd2	Installer level password (2)	0	-999	9999	-	CO-G	
PSd3	Manufacturer level password (3)	0	-999	9999	-	CO-G	

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Code	Parameter description	Default	Min	Max	UM	Menu	Notes
FANS							
PF06	Minimum time that must pass for the switch-on/off of each individual step of the fans	3	0	999	Sec	CO-F	
PF07	Fans temperature setpoint for anti-freeze protection of the recovery heat exchanger	2.0	PH01	PH02	°C °F	CO-F	
PF08	Fans differential for anti-freeze protection of the recovery heat exchanger	2.0	0.0 0.0	20.0 36.0	°C °F	CO-F	
PF09	Minimum stand-by time before requesting switch-off of a further fan step	5	1	99	Min	CO-F	
PF10	Fans differential regulation for the by-pass of the recovery unit damper in anti-freeze protection mode	2.0	0.0 0.0	20.0 36.0	°C °F	CO-F	
PF11	Fans functioning time in post-ventilation mode	30	0	999	Sec	CO-F	
HEATING COILS <i>This menu is only accessible if PG02>0</i>							
Pb02	Proportional band for PI regulation of the heating coil (water/electric)	10.0	0.0 0.0	20.0 36.0	°C °F	CO-B	
Pb03	Integral time for PI regulation of the heating coil (water/electric)	0	0	999	Sec	CO-B	If Pb03=0 integral action not present
Pb04	Hot water coil opening value in regulation probe error mode	0.0	0.0	100.0	%	CO-B	
Pb05	Heaters single stage insertion/release time for post-heating	60	0	999	Sec	CO-B	
Pb06	Number of electric heaters active during probe error mode.	1	0	3		CO-B	
OUTSIDE AIR DAMPER <i>This menu is only accessible if PG04=1</i>							
PS01	Fans switch-on delay from outside air damper activation	45	0	999	Sec	CO-SE	
PS02	Outside air damper switch-on delay from fans switch-off	15	0	999	Sec	CO-SE	
PS05	Delay of outside air damper end run	60	0	999	Sec	CO-SE	
RECOVERY HEAT EXCHANGER							
Pr01	Anti-freeze temperature minimum setpoint	1.0	PH01	PH02	°C °F	CO-RH	Used only if PG06=2
Pr02	Anti-freeze temperature minimum differential	2.0	0.0 0.0	20.0 36.0	°C °F	CO-RH	
Pr03	Recovery heat exchanger by-pass cycle time for cyclical defrosting	5	1	99	Min	CO-RH	

C-PRO MICRO SAVE APPLICATION MANUAL

Code	Parameter description	Default	Min	Max	UM	Menu	Notes
ALARM PARAMETERS							
PA03	Enabling of outlet/return fans thermal switch alarm	Active (1)	Not-active (0)	Active (1)	-	CO-S	
PA05	Enabling of differential pressure switch alarm	Active (1)	Not-active (0)	Active (1)	Sec	CO-S	
PA06	Delay of differential pressure switch alarm	10	0	999	Sec	CO-S	
PA08	Signals differential pressure switch alarm on alarm relay	Yes (1)	No (0)	Yes (1)	Sec	CO-S	Only if PG02=0
PA09	Anti-freeze alarm active on hot water coil	Not-active (0)	Not-active (0)	Active (1)	Sec	CO-S	
PA10	Anti-freeze alarm delay on hot water coil	10	0	999	Sec	CO-S	
PA12	Activates the heaters thermal overload alarm	Active (1)	Not-active (0)	Active (1)	Sec	CO-S	Only if PG02=1
PA13	Signals heaters thermal switch alarm on alarm relay	Yes (1)	No (0)	Yes (1)		CO-S	Only if PG02=1
PA16	Enable supply high temperature alarm from temperature probe	Active (1)	Not-active (0)	Active (1)		CO-S	
PA17	Supply high temperature alarm setpoint	85.0	PH01	PH02	°C °F	CO-S	
PA19	Supply high/low temperature alarms differential	3.0	0.0 0.0	20.0 36.0	°C °F	CO-S	
PA20	High/low temperature alarms delay	10	0	999	Sec	CO-S	
PA22	Expansion alarm delay	5	0	999	Sec	CO-S	
PA24	RTC alarm enabling	Active (1)	Not-active (0)	Active (1)	-	CO-S	
PA26	Probes alarms signals delay	10	0	240	Sec	CO-S	
VARIOUS PARAMETERS							
PH11	Board Modbus address	1	1	247	-	CO-V	
PH12	Communication Baud Rate for the board (0=1200, 1=2400, 2=4800, 3=9600, 4=19200)	3	0	4	-	CO-V	
PH13	ModBus Parity (0=none, 1=Odd, 2=Even)	2	0	2	-	CO-V	
PH14	Stop Bit ModBus (0=1bit, 1=2bit)	0	0	1	-	CO-V	
PH40	Enable outlet temperature probe	Yes (1)	No (0)	Yes (1)	-	CO-V	
PH41	Enable return temperature probe	Yes (1)	No (0)	Yes (1)	-	CO-V	
PH42	Enable CO ₂ probe (0-5V)	No (0)	No (0)	Yes (1)	-	CO-V	
PH43	Enable outside air temperature probe	Yes (1)	No (0)	Yes (1)	-	CO-V	
PH51	Logic of the digital input DI1	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH52	Logic of the digital input DI2	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH53	Logic of the digital input DI3	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH54	Logic of the digital input DI4	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH55	Logic of the digital input DI5	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH56	Logic of the digital input DI6	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH57	Logic of the digital input DI7	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH58	Logic of the digital input DI8	N.C. (1)	N.O. (0)	N.C. (1)	-	CO-V	
PH59	Logic of the digital input DI9	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH60	Logic of the alarm relay DO10	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH61	Logic of the alarm relay DO12	N.O. (0)	N.O. (0)	N.C. (1)	-	CO-V	
PH80	CAN communication Baud Rate (20K, 50K, 125K, 500K)	1	1	4	-	CO-V	

Notes:The outside air return probes activation parameters, respectively *PH41* and *PH43* are conditioned by the state of the digital input that indicates the presence of the By-Pass damper (DI5). If the input confirms the presence of the By-Pass, the two parameters are active, otherwise they are deactivated. Any changes to the parameters are allowed, but any change in state of the digital input DI5 implies changes of the two parameters.

Once the machine parameters have been configured and at every modification of the configuration parameters, it is advised to remove and re-apply the power supply to the board to allow the control to configure itself correctly.

6 REGULATIONS

6.1 State of the unit

There are several unit switch-on/off procedures:

- 1) Via the relevant **ON/OFF key**
Switch-ON: press the relevant key for about 2 seconds, if all the conditions are fulfilled the unit starts working (“ON” mode).
Switch-OFF: press the relevant key for about 2 seconds, the unit stops working (“OFF” mode).
- 2) Using the **Start/Stop from digital input** control (parameter, *PH05=1*)
Switch-ON: close the contact, if all the conditions are fulfilled the unit starts working (“ON” mode).
Switch-OFF: if the contact is open the unit stops working (“OFF from Start/Stop” mode).
- 3) Via **Supervision protocol** (parameter, *PH06=1*)
Switch-ON: activate the switch-on state from protocol, if all the conditions are fulfilled the unit starts working (“ON” mode).
Switch-OFF: if deactivated by switch-on state protocol the unit stops working (“OFF from Supervisor” mode).

The ON/OFF status from key has priority with respect to the other two. In fact the ON/OFF states by digital input and supervision protocol can only be reached with machine in “ON” mode.

A machine **switched-off by Start/Stop digital input** can:

- pass to the OFF state from key (by pressing ESC).
- pass to the OFF state from supervisor if the OFF condition from digital input returns and the OFF state is set by supervisor.
- pass to the ON state if the ON condition from digital input returns and the OFF state is not set by supervisor.

A unit **switched-OFF by supervision protocol** can:

- Move to the OFF state by key (by pressing ESC key).
- Move to the OFF state from digital input if the OFF condition from supervisor ceases and the OFF state from digital input is triggered.
- Move to the ON state if the OFF condition from supervisor ceases and the OFF state is not present from digital input.

The unit ON/OFF key is the ESC key pressed for about 2 seconds.

The remote Start/Stop input (when present) can be configured using the parameters:

- *PH05:* Enables the function
- *PH52:* Sets the NC, NO logic for the digital contact

6.1.1 OFF state for alarm

When the machine is active and an heavy alarm occurs the unit switches into the **OFF due to alarm status**. In this case the unit and all devices are switched OFF and the dampers are completely closed until the alarm condition has been reset. When the unit is OFF for alarm it is possible to switch to the other OFF states by means of the relevant digital input, key or supervisor.

The alarms that cause the “OFF for alarm” are:

- Supply fan thermal overload alarm
- Return fan thermal overload alarm
- Differential pressure switch alarm
- Outdoor air Damper limit switch alarm

The unit recovers the normal working mode when the alarm has been reset.

6.2 RTC setting

When the board is disconnected from the mains for many days the RTC (Real Time Clock) system clock backup battery discharges. At the next connection to the mains the controller will display an RTC alarm. To get rid of it and allow a proper working condition the RTC has to be updated using the below mask:



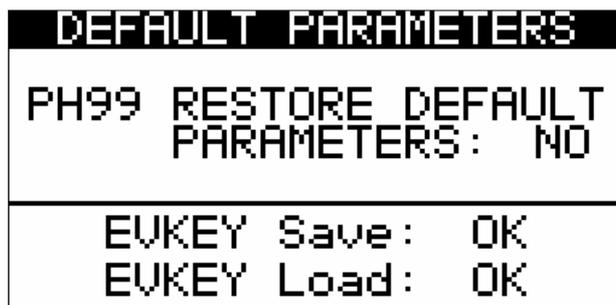
Once the clock is configured, press **OK** to update the RTC and access the main page of the application. Confirmation by pressing **OK** also resets any clock alarm (*AL16*) as long as the alarm conditions are reset.

If the alarm should not disappear switch OFF and back ON power supply to the board and manually reset the alarm.

6.3 Restore the (factory) default parameters

Via the “*Parameters Reset*” procedure it is possible to bring back the system parameters to the default value. The procedure can only be activated with machine in OFF mode

Enter the *Installer -> Various Parameters -> Default* menu and press the ENTER key.



Set the *PH99* parameter to “YES”(1) and wait until it becomes “NO”(0) again on the display. The system automatically restores all parameters’ default values.

Note: After this operation switch OFF and back ON power supply to the board to prevent for malfunctioning.

6.4 Last maintenance operation date

From the *Installer->Maintenance* menu, press RIGHT until reaching the following mask:



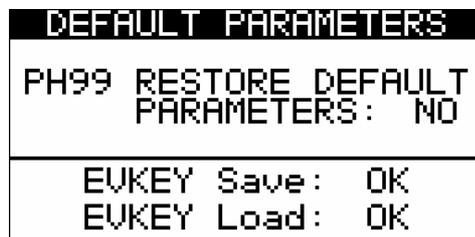
Positioning the cursor on the “Update” writing and pushing the Enter key the old date relevant for the previous maintenance will be overwritten with the present date updating the *PM90* parameter.

6.5 Programming key

It is possible to save the value of all system parameters into the programming key or upload them from the programming key. By means of this key is therefore possible also to copy the parameters from one device into one or more compatible ones. The saving or uploading operation can be carried out only with machine *OFF*, by connecting the key to the programming terminal.

To save a parameter list in the programming key:

- Enter the *DEFAULT* menu
- Move the cursor on *EVKEY Save: OK* and push the ENTER key. The storage of the parameters into the key is shown by means of LED blinking.
- Wait the blinking to finish, if the LED becomes green the operation was successful, otherwise the LED becomes red.



To copy a parameter list from the programming key into the device:

- Enter the *DEFAULT* menu
- Move the cursor on *EVKEY Upload: OK* and push the ENTER key. The storage of the parameters into the device is shown by means of LED blinking.
- Wait the blinking to finish, if the LED becomes green the operation was successful, otherwise the LED becomes red.

Note: The information to the product and relevant software version are saved in the key in order to allow the transfer of parameter maps only between compatible devices

6.6 Functionality of the COMPACT control solution

This control solution offers the base functionality present also in the "complete" solution.

6.6.1 Supply and return fans

The program manages two fans, supply and return, independently with a 3 steps control logic. This can be achieved using 3 digital output or one analogue output to pilot a speed variator with 3 speed levels. The working is the same for both fan except for the case of Recovery heat exchanger antifreeze protection when the 2 fans are driven with different speeds.

The regulation mode depends on the *PF01* parameter which determines the 3 types of regulation:

- *PF01=0* manual regulation
- *PF01=1* automatic regulation without presence sensor
- *PF01=2* automatic regulation with presence sensor

In ON/OFF regulation (parameter *PG10=0*) the 3 speeds (*V1*, *V2*, *V3*) are activated each by a dedicated relay. In regulation with speed variator inverter (parameter *PG10=1*) the three speeds are determined by the value defined by the parameters *PF21*, *PF22* and *PF23*.

6.6.1.1 Manual regulation

The fans work at the *MANUAL* speed set via the *PF02* parameter.

6.6.1.2 Automatic regulation without presence sensor

Two time periods are defined: *ECONOMY time band* and *COMFORT time band*. A working speed is defined for each time period, respectively *ECONOMY* speed (parameter *PF04*) and *COMFORT* speed (parameter *PF03*). The fans are controlled at the speed defined in the relevant time periods.

The following parameters must be used

- *PT01*: start of COMFORT time band.
- *PF03*: fans speed in COMFORT band.
- *PT02*: start of ECONOMY time band.
- *PF04*: fans speed in ECONOMY band.

For each day of the week it is possible to define whether this day is a working or non-working day, parameters *PT11=Sunday*, *PT12*, *PT13*, *PT14*, *PT15*, *PT16*, *PT17*):

- Working days: the regulation is the normal automatic type for *ECONOMY e COMFORT* time period;
- Non-working days: the speeds are determined by parameter *PF13*, due to defect *V0*.

Note: If the RTC system clock is in alarm condition it is possible to set the *PF05* parameter to determine at which speed both fans must function.

6.6.1.3 Automatic regulation with presence sensor

In addition to the previous regulation rules it is possible to modify the working speed on the basis of a presence sensor. If the presence sensor is active (indicating there is someone inside the room), during the COMFORT time band the fans speed is forced to the value set on parameter *PF12*.

6.6.1.4 Fans thermal overload

Via the digital inputs *DI3/DI4 Supply/Return fans thermal overload protection* it is possible to enable the thermal overload alarm of each fan. The alarms are signalled after a fixed delay of 2 seconds and have automatic reset. The alarms are enabled setting *PA03=1*. If this is not the case, the thermal overload alarms of the two fans are disabled.

The activation of the thermal overload alarm switches OFF the unit bringing it to the *OFF due to alarm* status.

6.6.1.5 Fans status

Each of the two fans can be in the following working states:

1. *OFF*: the fan is OFF.
2. *ON V1*: the fan is ON at speed 1.
3. *ON V2*: the fan is ON at speed 2.
4. *ON V3*: the fan is ON at speed 3.
5. *Switch-ON stand-by*: the fan is to be switched-on. Timing is in progress, e.g. stand-by due to pre-start of the outside air damper. The status shows the switch-on stand-by for each of the individual speeds.
6. *Switch-OFF stand-by*: the fan is to be switched-off. Timing is in progress, e.g. in the case of post-ventilation.
7. *Alarm*: the fan is in alarm conditions due to thermal overload.

Reaching of the individual speed in switch-ON can be delayed via the parameter *PF06*. If *PF06=0* switch-ON/OFF is immediate.

6.6.1.6 Fans running hours

Each fan has an associated variable that counts the number of running hours (Supply fan parameter *PM02*, Return fan parameter *PM03*). The running hours can be zeroed by resetting the relevant parameter.

If the running hours set in the *PM01* parameter are exceeded, an alarm is given indicating fan running hours exceeded (alarms *AL09*, *AL10*).

6.6.2 Recovery heat exchanger anti-freeze protection

A probe measures the temperature T of the exhaust air after the recovery heat exchanger on the extraction circuit. The critical defrosting temperature T_g (can be set by parameter *PF07*) is fixed by default at 0 °C. Considering the risk of frost in the recovery heat exchanger when $T \leq T_g$ it is necessary to take some action for protecting the exchanger when this temperature level is reached. To use this function the *PG06* parameter must be enabled (by default it is always enabled).

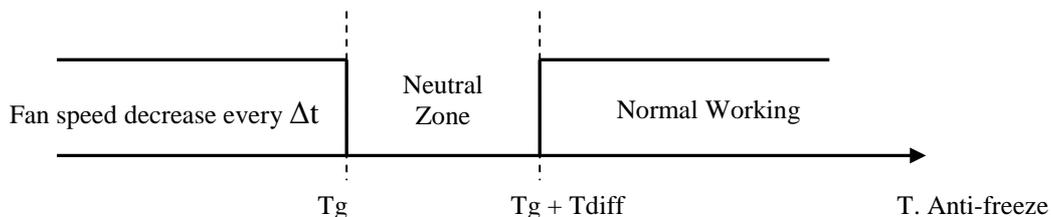
There are two possible strategies depending on the presence of the by-pass damper (stated by the state of the dedicated digital input which polarity is determined by the *PH55* parameter).

The two antifreeze strategies are described in the following paragraphs.

Note: If the anti-freeze temperature probe is in error conditions, this regulation is not enabled and the fans are regulated exclusively on the basis of the *PF01* parameter.

6.6.2.1 Unit without By-pass damper (digital contact not active)

In this case the action taken for anti-freeze purpose is decreasing the fan speeds with a neutral zone control.



When $T \leq T_g$, the outlet fan speed will decrease progressively ($V3-V2-V1$) until stopping ($V0$). If this condition occurs and remains for a time Δt (time set by parameter *PF09*) the speed reduction takes place, every Δt there is a further decrease until the supply fan switches OFF.

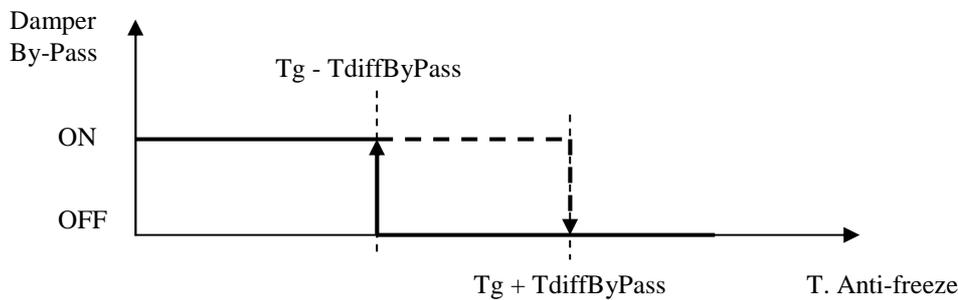
If the temperature T is between T_g and $T_g + T_{diff}$ (default 3°C , can be modified by parameter $PF08$) the current speed is maintained. Only when the temperature T becomes $T \geq T_g + T_{diff}$ the fan speed returns to the normal condition (i.e. at the speed set by the user).

6.6.2.2 Unit with motorised By-pass (digital contact excited)

Same behaviour as in the previous case with speed reduction but never down to zero in order to allow the air flow through the recovery heat exchanger before being eject. As the exhaust air is warmer than the outside air the heat exchanger is “defrosted”.

When the supply fan is at minimum speed and the low temperature situation still remains for Δt minutes, the fan does not switch off but there’s a particular activation strategy of the recovery heat exchanger By-Pass damper:

- When $T \leq T_g - T_{diffByPass}$ (default 2°C , can be modified by $PF10$ parameter): opening of the By-pass damper
- When $T \geq T_g + T_{diffByPass}$: closure of the By-pass damper.



The return to normal working condition (speed selected by the user and By-Pass closed) takes place only when $T \geq T_g + T_{diff}$ (default 2°C , can be modified by $PF08$ parameter).

6.6.2.3 Recovery heat exchanger by-pass damper logic

The by-pass damper can be controlled using a digital signal or an analogue signal, it must be configured setting the $PG03$ parameter from the manufacturer menu.

PG03=0

The damper is managed with a digital control via the DO7 relay. When the relay is not active the damper is closed while when the relay is active the damper is open and the recovery heat exchanger is by-passed.

PG03=1

The damper is managed with an analogue control via the analogue output AO3. When 0% the damper is closed, while when 100% the damper is open and the recovery heat exchanger is by-passed.

6.6.3 Cross flow recovery heat exchanger and by-pass damper

The recovery heat exchanger to be used is the cross flow static type. The anti-freeze by-pass damper can be present in the unit (optional, the presence is determined by the status of digital input 5).

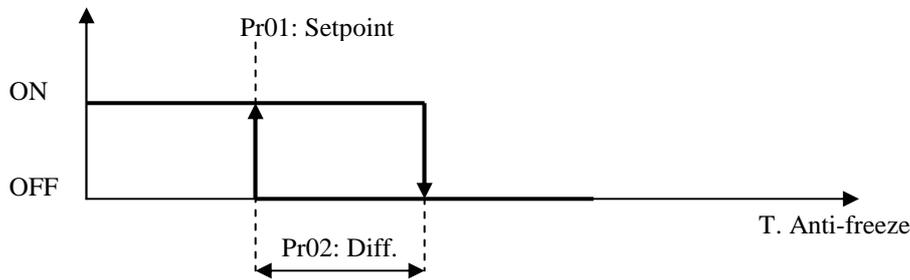
This damper allows the unit to work with very low outside air temperatures (e.g. $-10 / -12^{\circ}\text{C}$) preventing the moisture of the ejected air to condensate and freeze inside the heat exchanger (which would cause the obstruction of air flow up to complete block).

The anti-freeze temperature probe identifies the freezing temperature and drives the fan speed decrease and the activation of the recovery heat exchanger by-pass damper.

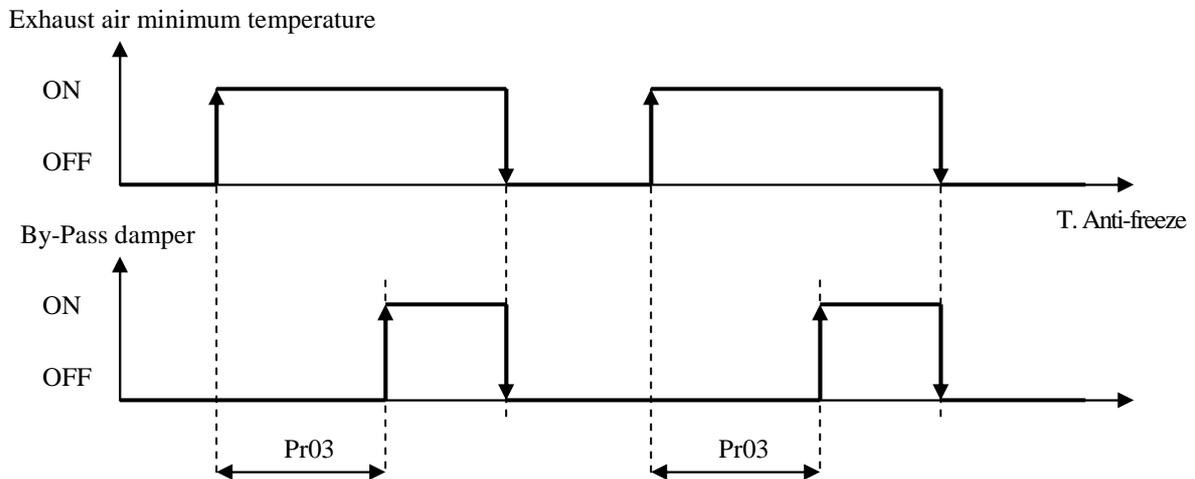
The recovery heat exchanger is normally active and is by-passed (opening the by-pass damper) only during free-cooling (if present and enabled) and during cyclical defrosting when outside temperature is too low. To activate this function set $PG06 = 2$

6.6.3.1 Cyclical defrosting with minimum temperatures

The set point must be determined along with its differential for the activation of the defrosting cycle.



When the anti-freeze minimum temperature condition is reached a cyclical by-pass sequence of the recovery heat exchanger is activated to allow the exhaust air (warmer, from the room) to defrost the recovery heat exchanger air channels as shown in the below diagram.



After the (parameter *Pr03*) delay the by-pass damper is activated to allow defrosting. As soon as the exhaust air temperature is back above the accepted value the damper is deactivated and the recovery heat exchanger starts again.

Note: If the anti-freeze probe is in alarm condition the function is disabled.

6.7 Features of the COMPLETE control solution

All functions of the *COMPACT* version are included in this version.

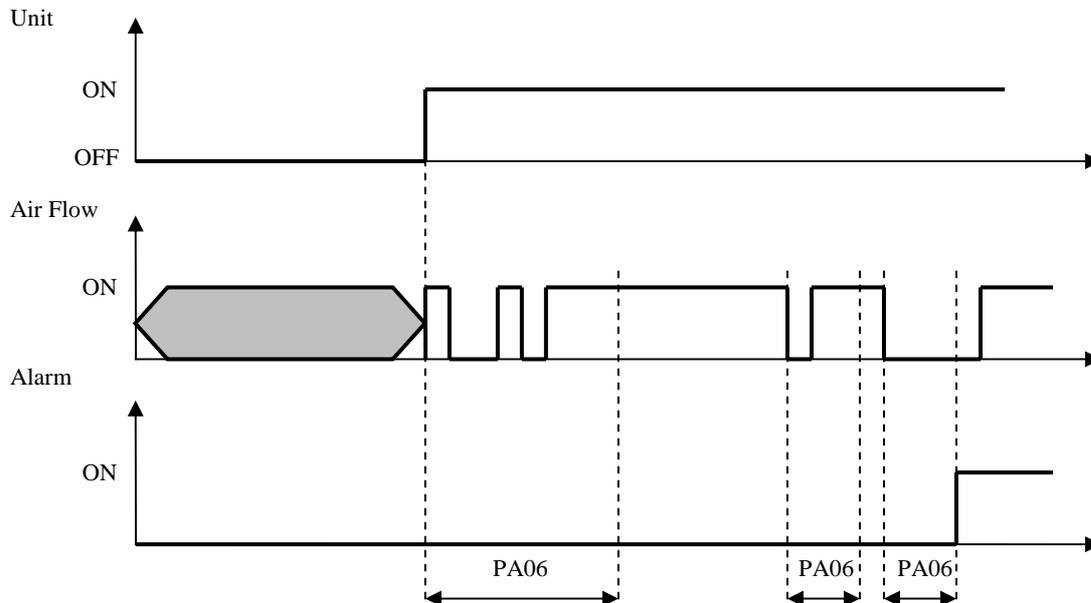
Below are listed only the additional features of the COMPLETE control solution.

6.7.1 Post-Ventilation

By setting the parameter $PG05=1$ it is possible to decide whether to run the fans for a time configured on parameter $PF11$, also after unit switch-OFF. If the function is active when the unit stops the fans keep working for further $PF11$ seconds.

6.7.2 Differential pressure switch

The lack of air flow is signalled via the *DI6 Differential Pressure switch* digital input. The pressure switch status is considered after the initial start-up phase of the unit (the length of this phase is configured by parameter $PA06$). On expiry of this time if the contact signals a lack of air flow the alarm is signalled immediately. During normal working the differential pressure switch is monitored continuously. If the contact signals a lack of flow for a period exceeding the $PA06$ parameter, the alarm is signalled immediately.



To enable the alarm, set $PA05=1$.

The differential pressure switch alarm has manual reset. Activation leads to switch-off of the unit taking it into the *OFF due to alarm* status.

6.7.3 Fresh air intake damper

It is possible to manage an optional motorised damper (can be enabled by parameter $PG04=1$) for fresh air intake purpose. The damper is managed via ON/OFF (digital) activation. The damper can be either fully open or fully closed, modulation is not possible as well as a minimum opening.

When the fans are requested to start first the damper is opened and, after a delay configured on parameter $PS01$, the fans are activated too.

When the fans are switched OFF the damper is kept open for a time configured on parameter $PS02$.

6.7.3.1 Fresh air intake damper limit switches

In order to have a feedback about the real status of the damper (fully open or fully closed) the digital inputs $DI9$ and $DI10$ are connected to the damper's "fully open" and "fully closed" limit switches. Every time the damper is requested to change its status it is verified that both limit switches change their status within the expected time frame (defined on parameter $PS05$). If during this time the states of both digital inputs change this means everything is working fine. If this is not the case the $AL06$ alarm with manual reset is generated and the unit is brought to the "OFF due to alarm" status.

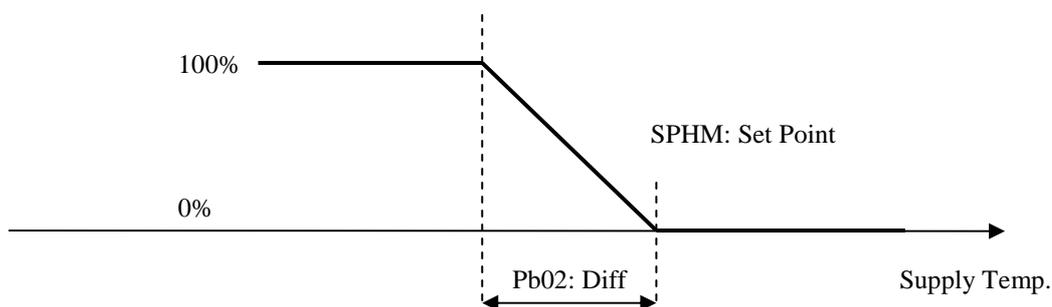
6.7.4 Heating

The *COMPLETE* solution offers the possibility to use a hot water coil or a set of three electric heaters for space heating purpose. By setting the $PG02$ parameter the desired resource is activated along with the relevant alarms connected. For using this function it is necessary to enable the supply temperature probe setting $PH40=1$.

During the anti-freeze protection of the recovery heat exchanger, on units without by-pass, the heating source must be deactivated for protection. The heating source is disabled with a delay defined at the parameter $PF09$ after the fan speed has reduced to $V1$ during the supply fan speed decrease for antifreeze protection. If the antifreeze condition remains active for further $PF09$ the supply fan is stopped.

6.7.4.1 Heating with hot water coil

To use the hot water coil for space heating it is required to set the parameter $PG02=1$. The control is based on the supply temperature via a supply Set Point ($SPHM$ parameter) and a relevant differential ($Pb02$ parameter). The coil is controlled via a proportional-integral algorithm (PI). The control can be only proportional by setting the integral time $Pb03=0$.



In case the control probe has an alarm condition it is possible to decide the opening percentage of the coil valve during alarm setting the $Pb04$ parameter. If $Pb04 = 0.0\%$ in probe error condition the valve remains closed.

Anti-freeze safety on hot water circuit (AL04)

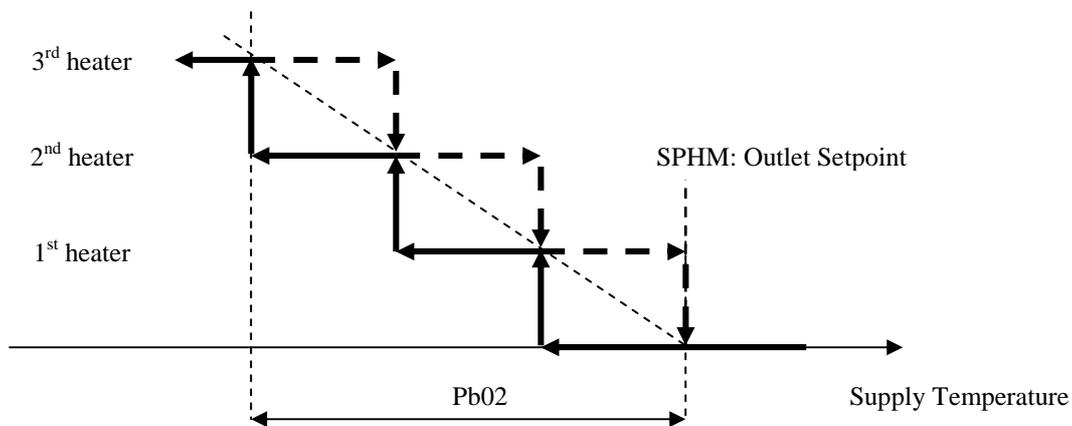
The anti-freeze mechanical thermostat (digital input DI7) is mounted downstream the coil either inside or outside the pipe. On its intervention (voltage free contact closure on controller digital input), the controller carries out the following steps:

- a) Open the 3-way valve completely (hot water)
- b) Close the fresh air damper
- c) Stop the fans

This alarm is enabled by setting $PA08=1$ and is only active if the hot water coil is enabled ($PG02=1$). The alarm is signalled after a set delay (parameter $PA09$) and is reset automatically.

6.7.4.2 Heating with electric heaters (3 stages)

To use the electric heaters for space heating purpose it is necessary to set the parameter $PG02=2$. The control is based on the supply temperature via a supply Set Point ($SPHM$ parameter) and a relevant differential ($Pb02$ parameter).



Between following activation / de activation of the heaters a delay has been implemented (parameter $Pb05$) in order to prevent for simultaneous current peaks.

In case the control probe has an alarm condition it is possible to decide the number of heaters to be activated during the the alarm by setting the $Pb06$ parameter. If $Pb06=0$ in probe error condition no heater is active.

Heaters thermal overload alarm

Via the $DI8$ (*Electric heaters thermal overload protection*) digital input it is possible to activate the heaters thermal overload alarm. On occurrence of this alarm the heaters are immediately switched OFF. The alarm is signalled after a fixed delay of 2 seconds and is reset automatically. The alarm is enabled by setting $PA12=1$. The alarm can be enabled only if the heaters are configured ($PG02=2$).

6.7.4.3 Heaters status

Each of the three heaters can assume one out the following status:

1. *Disabled*: the heater is not managed by control.
2. *Off*: the heater is not active.
3. *In switch-ON stand-by*: the heater is about to switch-ON, it is in stand-by due to protection times.
4. *In switch-OFF stand-by*: the heater is about to switch-off, it is in stand-by due to protection times.
5. *On*: the heater is active.
6. *Alarm*: the heater is blocked due to the relevant thermal overload alarm.

6.7.4.4 Heaters over temperature protection with automatic reset

By setting the parameter PA16=1(high temperature) it is possible to decide whether to use the supply high temperature alarms or not. The following parameters must be configured in order to use these alarms:

- PA17 = Automatic reset over temperature protection Set Point
- PA19 = Temperature alarm differential
- PA20 = Temperature alarm activation delay

The alarms are signalled after the PA20 delay time have automatic reset. The alarms are disabled in case of alarm condition on the supply temperature probe. These alarms can only be activated with the unit running.

6.7.5 Heat exchanger by-pass in summer mode (Free-Cooling)

During summer cycle, when the outside temperature is low enough it is possible to take advantage of the outside air for cooling down the internal ambient by means of the by-pass damper. Set PG08=1 to enable this function. This function uses the outside air temperature probe (TExt) and the return temperature probe (TInt).

When $T_{Ext} \geq T_{ke}$ (default 15 °C, it can be modified by parameter Pr04) and return temperature $T_{Int} \geq T_{ki}$ (default 22 °C, it can be modified by parameter Pr05) and if $T_{Ext} \leq T_{Int}$ the function is active and opens the heat exchanger by-pass damper.

Note: To use this function the outside and return temperature probes must be enabled, respectively PH43=1 and PH41=1. If one of the two probes is in error condition the function is disabled.

6.7.6 Modulation of the air flow with CO₂ probe

This function is enabled by setting PF01=3 and can be enabled only during COMFORT time bands. In this configuration the fan speed control is based on the value sensed by the CO₂ probe. The fans speed depend on the value set on parameters PF14, PF15 which indicate the set for CO₂ concentration for each of the three speeds. In this state the minimum speed is V1.

Example. Parameters default

CO₂ probe

- 0V -> PH03 = 100 ppm
- 5V -> PH04 = 1100 ppm

Fans

- PF14 = 500 and PF15 = 1500 ppm.
- Speed 1 for measured value < 500 ppm
- Speed 2 for measured value between 500 ppm (included) and 1500 ppm
- Speed 3 for measured value \geq 1500 ppm

Note: To use this function the CO₂ probe must be enabled (parameter PH42=1) along with the relevant linearisation values (parameters PH03 and PH04). If the RTC clock is in error condition it is possible to set parameter PF05 which defines the fans speed in this condition.

6.7.7 Heating control depending on Return Air Temperature

It is possible to decide whether to control the space heating (by means of hot water coil or electric heaters) depending on the return air temperature instead of on the supply air temperature (Pb01=0). To use this function set Pb01=1 and also set the SPHR parameter indicating the value of the regulation set point on the return air temperature. To use of this the return air temperature probe must be enabled (PH41=1).

7 DIAGNOSTICS

The application can manage a series of alarms relevant to the fans and the devices configured. Depending on the various types of alarm it is possible to configure a manual or automatic reset, a possible delay and the actions to carry out in the specific case.

When one or more alarms are active the alarm icon  on the main page flashes, if configured ($PH20=1$) and only with the machine ON the buzzer is also activated.

To display the alarms, select *ALARMS* on the general menu or press ESC from the main page and then select “*Show ALARMS >>*”.

If the ESC key is pressed on an alarm page or you wait 60 seconds for timeout, go back to the main page of the application. To scroll through the various active alarms, press ENTER again: the alarms are presented in the order of priority, as they are listed in the alarms table.

To silence the buzzer, press the vGRAPH1 down key for about 2 seconds.

7.1 Manual and automatic reset alarms

As shown previously there are two types of alarm. Those with manual reset and those with automatic reset. For some alarms it is possible to set (*Alarms Reset*) the most suitable type of reset for user needs by means of the relevant parameters. Other alarms have predetermined reset type.

7.1.1 Manual reset alarms

If a manual reset alarm occurs the alarm icon starts to flash and the buzzer is activated (if configured $PH20=1$).

Once the conditions for which the alarm has occurred are reset it is possible to manual reset the alarm. To perform this operation:

- Enter the relevant alarm page
- hold the ENTER key down for about 2 seconds.

At this point, if there are no other active alarms, the page indicating “*NO ALARMS*” will be displayed, the icon disappears, the buzzer switches off and the unit starts working normally. If there are other active alarms the page relevant to the next active alarm will be displayed.

The consequences relevant to an active manual reset alarm remain valid until the user reset the alarm message.

7.1.2 Automatic reset alarms

If an automatic reset alarm occurs the alarm icon starts to flash and the buzzer is activated (if configured $PH20=1$).

Once the conditions for which the alarm occurred are reset the alarm message and the relevant consequences are reset automatically without need of user intervention.

7.2 Alarms table

Below is a list of all alarms managed by the application. The order of presentation is the same as the order of active alarms occurrence. The alarms can be displayed also with the machine in OFF status.

Code	Alarm description	Reset	Consequence	Delay
AL01	Supply fan thermal overload ^(*)	Automatic	Switches all devices off	Fixed 2 s
AL02	Return fan thermal overload ^(*)	Automatic	Switches all devices off	Fixed 2 s
AL03	Differential pressure switch ^(*)	Manual	Switches all devices off	Selectable
AL04	Hot water coil anti-freeze	Automatic	- Open the hot water valve completely - Close the fresh air damper - Switches fans OFF	Selectable
AL05	Electric heaters thermal overload – manual reset	Manual	Switches the heaters OFF	Fixed 2 s
AL06	Outside air damper limit switch “completely open” ^(*)	Manual	Switches all devices off	Selectable
	Outside air damper limit switch “completely closed” ^(*)			
AL07	Electric heaters thermal overload – automatic reset	Automatic	Switches the heaters OFF	Selectable
AL09	Supply fan running hours	Manual ^(*)	Signalling only	-
AL10	Return fan running hours	Manual ^(*)	Signalling only	-
AL11	Anti-freeze temperature probe	Automatic	Inhibits the relevant control	Selectable
AL12	Supply air temperature probe	Automatic	Inhibits the relevant control	Selectable
AL13	Return air temperature probe	Automatic	Inhibits the relevant control	Selectable
AL14	CO ₂ probe	Automatic	Inhibits the relevant control	Selectable
AL15	Outdoor intake air temperature probe	Automatic	Inhibits the relevant control	Selectable
AL16	RTC broken or battery discharged alarm	Manual	Inhibits the control depending on RTC	-
AL17	Expansion communication alarm	Automatic	Switches OFF the devices connected to the expansion	-

^(*) These alarms cause the unit to switch OFF (*OFF due to alarm* status)

^(*) To reset the alarms linked to running hours just reset the device hours.

7.3 General alarm relay

The controller manages a configurable alarm relay. For each alarm there is a parameter which selects whether that alarm must be signalled on the alarm relay. Several alarms can be addressed to the relay.

Via the relevant parameter (*PH61*) it is possible to establish the polarity (NO, or NC) of the alarm relay.

7.4 Alarms log

The controller record the ALARMS LOG in a non-volatile area of the memory organised as FIFO (First In First Out), that is a list of the last 100 alarms occurred.

To display the alarms log, select LOG from the General menu or press ESC from the main page to display this page:

```

Show ALARMS >>
Show HISTORIAN >>

```

Move the cursor on “*Show HISTORIAN>>>*” and push the Enter key. The alarms log screen will be displayed:

```

ALARM HISTORY
Status: OK
Element N° 2
Code: AL08
Value: -18.0 Next>>
21/02/2010 08:19:04

```

Each element of the log has the following information associated:

- Alarm running number
- Alarm mnemonic code (AL01, AL03, ...)
- Alarm occurrence date and time
- A possible value associated to the alarm

The alarm mnemonic code is the one shown in the alarms table. The log can hold 100 events.

Via the *PH18 (Delete alarms log)* parameter it is possible to cancel all the alarms stored in the log. Set the parameter at SI (1) and wait a few seconds for the NO (0) default value to be read again.

Note 1: The storing in the log of an alarm beyond the maximum number allowed (100) means the first alarm of the log is overwritten.

8 MODBUS VARIABLES

The controller can be managed by a supervisor via Modbus protocol. The communication takes place via optional TTL/RS485 serial interface outside the controller. The various states/parameters exported from the controller are shown below.

8.1 ModBus exporting table

Addr Base 0	Addr Base 1	Name	Value	Min	Max	Description	Mode
0x0100	257	Packed_DI	0	0	65535	Bit1=DI1, Bit2=DI2, Bit3=DI3, ..., Bit13=DI13, Bit14=DI14	R/W
0x0180	385	Packed_DO	0	0	65535	Bit1=DO1, Bit2=DO2, ..., Bit13=DO13, Bit14=DO14	R/W
0x0200	513	AI01_Antireeze_Probe	0.0	-3276.8	3276.7		R/O
0x0201	514	AI02_AirSupply_Probe	0.0	-3276.8	3276.7	Only Complete Version	R/O
0x0202	515	AI03_AirReturn_Probe	0.0	-3276.8	3276.7		R/O
0x0203	516	AI04_CO2_Probe	0	-3276.8	3276.7		R/O
0x0204	517	AI05_AirExternal_Probe	0.0	-3276.8	3276.7		R/O
0x0281	642	AO_ByPassRecover	0.00	0.00	100.00		R/W
0x0282	643	inverterFan_Return	0.00	0.00	100.00		R/W
0x0283	644	inverterFan_Supply	0.00	0.00	100.00		R/W
0x0284	645	AO_HeatingCoilRequest	0.00	0.00	100.00	Only Complete Version	R/W
0x0300	769	PackedAlarm_1	0	0	65535	Bit1=AL01, Bit2=AL02, Bit3=AL03, Bit4=AL04, Bit5=AL05, Bit6=AL06, Bit7=AL07, Bit8=free, Bit9=AL09, Bit10=AL10, Bit11=AL11, Bit12=AL12, Bit13=AL13, Bit14=AL14, Bit15=AL15, Bit16=AL16	R/W
0x0301	770	PackedAlarm_2	0	0	65535	Bit1=AL17, Bit2=AL18, Bit3=AL19,	R/W

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						Bit4=AL20, Bit5=AL21, Bit6=AL22, Bit7=AL23, Bit8=Free, Bit9=AL25, Bit10=AL26, Bit11=AL27, Bit12=AL28, Bit13=AL29	
0x0400	1025	Status_OnOff_bySUP	0	0	1		R/W
0x0500	1281	CLOCK_RTC (Low)	0	0	2147483647		R/W
0x0501	1282	CLOCK_RTC (High)					
0x0502	1283	StatusUnit	0	0	5		R/W
0x0503	1284	UI_MainLabelDown	0	0	7		R/W
0x0504	1285	Status_SupplyFan	0	0	9	0=Disabilitato, 1=OFF, 2=Wait ON, 3=ON, 4=Wait OFF, 5=ALL, 6=Manual	R/W
0x0505	1286	Status_ReturnFan	0	0	9	0=Disabilitato, 1=OFF, 2=Wait ON, 3=ON, 4=Wait OFF, 5=ALL, 6=Manual	R/W
0x0506	1287	UI_byPassAntiFreeze	0	0	1		R/W
0x0507	1288	Status_FreshAir	0	0	5	Only Complete Version	R/W
0x0508	1289	byPassRecover_Summer	0	0	1		R/W
0x0509	1290	Status_Heater1	0	0	5	Only Complete Version	R/W
0x050A	1291	Status_Heater2	0	0	5		R/W
0x050B	1292	Status_Heater3	0	0	5		R/W
0x050C	1293	active_ProbeHeating	0.0	-3276.8	3276.7	Only Complete Version	R/O
0x050D	1294	active_SetPointHeating	0.0	-20.0	230.0		R/W
0x050E	1295	active_HeatingCapacity	0.00	0.00	100.00		R/W
0x0606	1543	SPHR_SetPoint_Return	20.0	-20.0	230.0		R/W
0x0607	1544	SPHM_SetPoint_Supply	22.0	-20.0	230.0		R/W
0x0608	1545	PT01_Start_Confort_TB (Low)	28800	0	86399		R/W
0x0609	1546	PT01_Start_Confort_TB (High)					
0x060A	1547	PT02_Start_Economy_TB (Low)	72000	0	86399		R/W
0x060B	1548	PT02_Start_Economy_TB (High)					
0x060C	1549	PT11a17_TypeDay[0]	0	0	1	0=Sunday,.. 6=Saturday	R/W

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0x060D	1550	PT11a17_TypeDay[1]	0	0	1	0=Sunday,... 6=Saturday	R/W
0x060E	1551	PT11a17_TypeDay[2]	0	0	1	0=Sunday,... 6=Saturday	R/W
0x060F	1552	PT11a17_TypeDay[3]	0	0	1	0=Sunday,... 6=Saturday	R/W
0x0610	1553	PT11a17_TypeDay[4]	0	0	1	0=Sunday,... 6=Saturday	R/W
0x0611	1554	PT11a17_TypeDay[5]	0	0	1	0=Sunday,... 6=Saturday	R/W
0x0612	1555	PT11a17_TypeDay[6]	0	0	1	0=Sunday,... 6=Saturday	R/W
0x0613	1556	PM01_Limit_HourFan (Low)	8000	0	100000		R/W
0x0614	1557	PM01_Limit_HourFan (High)					
0x0615	1558	PM11_Calibration_AntiFreezeProbe	0.0	-18.0	18.0		R/W
0x0616	1559	PM12_Calibration_AirSupplyProbe	0.0	-18.0	18.0		R/W
0x0617	1560	PM13_Calibration_AirReturnProbe	0.0	-18.0	18.0		R/W
0x0618	1561	PM14_Calibration_CO2_Probe	0	-200	200		R/W
0x0619	1562	PM15_Calibration_AirExternalProbe	0.0	-18.0	18.0		R/W
0x061A	1563	PM02_SupplyFan_Hours (Low)	0	0	100000		R/W
0x061B	1564	PM02_SupplyFan_Hours (High)					
0x061C	1565	PM03_ReturnFan_Hours (Low)	0	0	100000		R/W
0x061D	1566	PM03_ReturnFan_Hours (High)					
0x061E	1567	PM90_LastMaintainDATE (Low)	252460801	299721601	2147483647		R/W
0x061F	1568	PM90_LastMaintainDATE (High)					
0x0620	1569	PF01_FanRegulationType	0	0	3	0=Continue, 1=Auto, 2=Auto with DI, 3=CO2 Probe (Only Complete Version)	R/W
0x0621	1570	PF02_SpeedFan_ManualReg	3	0	3		R/W
0x0622	1571	PF03_SpeedFan_Confort	2	1	3		R/W
0x0623	1572	PF04_SpeedFan_Economy	1	0	2		R/W
0x0624	1573	PF05_SpeedFan_ErrorRTC	0	0	3		R/W
0x0625	1574	PF06_MinTimeOnStepsFan	3	0	999	sec	R/W
0x0626	1575	PF07_SetPointAntiFreeze	2.0	-20.0	273.0		R/W
0x0627	1576	PF08_DiffAntiFreeze	2.0	0.0	20.0		R/W
0x0628	1577	PF09_DeadZoneOutsideTime	5	1	99	Minute	R/W
0x0629	1578	PF10_DiffByPassAntiFreeze	2.0	0.0	20.0		R/W

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0x062A	1579	PF11_MinTimePostFan	30	0	999	sec	R/W
0x062B	1580	PF12_SpeedFan_Confort_DI	3	1	3		R/W
0x062C	1581	PF13_SpeedFan_WeekEnd	0	0	3		R/W
0x062D	1582	PF14_SetCO2_FanSpeed1_2	500	0	10000		R/W
0x062E	1583	PF15_SetCO2_FanSpeed2_3	1100	0	10000		R/W
0x062F	1584	PF21_AOValue_Speed1	33.50	0.00	100.00		R/W
0x0630	1585	PF22_AOValue_Speed2	66.50	0.00	100.00		R/W
0x0631	1586	PF23_AOValue_Speed3	100.00	0.00	100.00		R/W
0x0632	1587	Pb01_HeatRegulationProbe	0	0	1		R/W
0x0633	1588	Pb02_HeatingDiff	10.0	0.0	36.0		R/W
0x0634	1589	Pb03_HeatingCoil_Ti	0	0	999		R/W
0x0635	1590	Pb04_ForceHeat_OnErrorProbe	0.00	0.00	100.00		R/W
0x0636	1591	Pb05_HeaterOnOffDelayTime	60	0	999		R/W
0x0637	1592	Pb06_HeaterOnErrorProbe	0	0	3		R/W
0x0638	1593	PS01_PreStartTime_Fresh_Fan	45	0	65535		R/W
0x0639	1594	PS02_DelayOFF_Fresh	15	0	65535		R/W
0x063A	1595	PS05_LimitSwitch_WaitTime	60	0	999		R/W
0x063B	1596	Pr01_SetPoint_MinTemp_HeatRecover	1.0	-20.0	230.0		R/W
0x063C	1597	Pr02_Diff_MinTemp_HeatRecover	2.0	0.0	36.0		R/W
0x063D	1598	Pr03_TimeByPass_Recover	5	1	99	Minute	R/W
0x063E	1599	Pr04_SetPointExt_ByPassSummer	15.0	-20.0	230.0		R/W
0x063F	1600	Pr05_SetPointRet_ByPassSummer	22.0	-20.0	230.0		R/W
0x0640	1601	PA01_En_Alarm_HourFan	1	0	1		R/W
0x0641	1602	PA02_HourFanAlarm_Rele	0	0	1		R/W
0x0642	1603	PA03_EnableThermalFanAlarm	1	0	1		R/W
0x0643	1604	PA04_ThermalFanAlarm_Rele	1	0	1		R/W
0x0644	1605	PA05_En_AirFlowPressSwitch	1	0	1		R/W
0x0645	1606	PA06_AlarmAirFlowSwitchDelay	10	0	999		R/W
0x0646	1607	PA07_AlarmAirFlowSwitchDelay_StartUp	60	0	999		R/W
0x0647	1608	PA08_PressSwitchAlarm_Rele	1	0	1		R/W
0x0648	1609	PA09_EnableAntiFreezeCoil	0	0	1		R/W
0x0649	1610	PA10_DelayAlarm_AntiFreezeCoil	10	0	999		R/W
0x064A	1611	PA11_AntiFreezeCoilAlarm_Rele	1	0	1		R/W
0x064B	1612	PA12_EnableThermalResistor	1	0	1		R/W

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0x064C	1613	PA13_ThermalResistorAlarm_Rele	1	0	1		R/W
0x064D	1614	PA15_LimitSitwchAlarm_Rele	1	0	1		R/W
0x064E	1615	PA16_EnHighTempAlarm	1	0	1		R/W
0x064F	1616	PA17_SetPointHT	85.0	-20.0	230.0		R/W
0x0650	1617	PA19_Diff_TempAlarm	3.0	0.0	36.0		R/W
0x0651	1618	PA20_TempAlarmDelay	10	0	999		R/W
0x0652	1619	PA21_LT_HT_Alarm_Rele	1	0	1		R/W
0x0653	1620	PA22_ExpansionDelayAlarm	5	0	999		R/W
0x0654	1621	PA23_ExpAlarm_Rele	1	0	1		R/W
0x0655	1622	PA24_EnableAlarmRTC	1	0	1		R/W
0x0656	1623	PA25_RTCArmAlarm_Rele	1	0	1		R/W
0x0657	1624	PA26_AlarmProbe_Delay	10	0	240		R/W
0x0658	1625	PA27_ProbeAlarm_Rele	1	0	1		R/W
0x0659	1626	PH01_MinTempValue	-15.0	-20.0	230.0		R/W
0x065A	1627	PH02_MaxTempValue	95.0	-20.0	230.0		R/W
0x065B	1628	PH03_MinPPM_CO2	0	0	10000		R/W
0x065C	1629	PH04_MaxPPM_CO2	1100	0	10000		R/W
0x065D	1630	PH05_Enable_OnOffByDI	1	0	1		R/W
0x065E	1631	PH06_Enable_OnOffBySuperv	0	0	1		R/W
0x065F	1632	PH11_Modbus_Address	1	1	247		R/W
0x0660	1633	PH12_Modbus_Baud	3	0	4		R/W
0x0661	1634	PH13_Modbus_Parity	2	0	2		R/W
0x0662	1635	PH14_Modbus_StopBit	0	0	1		R/W
0x0663	1636	PH18_HistoryReset	0	0	1		R/W
0x0664	1637	PH20_EnableBuzzer	1	0	1		R/W
0x0665	1638	PH30_TemperatureHR	0	0	1		R/W
0x0666	1639	PH40_EnableAirSupplyProbe	1	0	1		R/W
0x0667	1640	PH41_EnableAirReturnProbe	1	0	1		R/W
0x0668	1641	PH42_EnableCO2Probe	1	0	1		R/W
0x0669	1642	PH43_EnableAirExternalProbe	1	0	1		R/W
0x066A	1643	PH51_Logic_DI1	0	0	1	0=NO, 1=NC	R/W
0x066B	1644	PH52_Logic_DI2	0	0	1	0=NO, 1=NC	R/W
0x066C	1645	PH53_Logic_DI3	1	0	1	0=NO, 1=NC	R/W
0x066D	1646	PH54_Logic_DI4	1	0	1	0=NO, 1=NC	R/W

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0x066E	1647	PH55_Logic_DI5	0	0	1	0=NO, 1=NC	R/W
0x066F	1648	PH56_Logic_DI6	1	0	1	0=NO, 1=NC	R/W
0x0670	1649	PH57_Logic_DI7	0	0	1	0=NO, 1=NC	R/W
0x0671	1650	PH58_Logic_DI8	1	0	1	0=NO, 1=NC	R/W
0x0672	1651	PH59_Logic_DI9	0	0	1	0=NO, 1=NC	R/W
0x0673	1652	PH60_Logic_DI10	0	0	1	0=NO, 1=NC	R/W
0x0674	1653	PH61_Logic_DO_Alarm	0	0	1		R/W
0x0675	1654	PH80_CAN_BaudRate	1	1	4	1=20k ,2=50k, 3=125k, 4=500k	R/W
0x0676	1655	PH99_RestoreDefault	0	0	1		R/W
0x0677	1656	PG01_EnableExpansion	1	0	1		R/W
0x0678	1657	PG02_HeatingType	2	0	2	0=Disable, 1=Coil, 2=Resistor	R/W
0x0679	1658	PG03_ByPassDamper_Type	0	0	1	0=DO7, 1=AO3	R/W
0x067A	1659	PG04_Enable_FreshAir_Shutter	1	0	1		R/W
0x067B	1660	PG05_EnablePostVentilation	1	0	1		R/W
0x067C	1661	PG06_EnableAntiFreezeType	1	0	2		R/W
0x067D	1662	PG08_Enable_ByPassRecover_Summer	1	0	1		R/W
0x067E	1663	PG09_EnableLimitSwitch_FreshAir	1	0	1		R/W
0x067F	1664	PG10_FanType	0	0	1		R/W
0x0680	1665	PSd1_UserPassword	0	-999	9999		R/W
0x0681	1666	PSd2_InstallerPassword	0	-999	9999		R/W
0x0682	1667	PSd3_ManufacturerPassword	0	-999	9999		R/W

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Application manual C-PRO MICRO SAVE

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