SIMPLIFIED TECHNICAL MANUAL

TECNAIR
A Panasonic Company

USE AND MAINTENANCE SURVEY3 ELECTRONIC REGULATOR CONNECTED WITH PACi

Software version 3.3

SYMBOLS

NOTE!
This symbol is used to indicate helpful hints for the operator.

ATTENTION! DANGER!
This symbol is used to indicate situations or operations that may be potentially dangerous or that require the operator's attention.

The Manufacturer adopts a policy of continuous development and therefore reserves the right to make changes and improvements to any product described in this document without prior notice. Technical data and dimensions are not binding.

CLOSE CONTROL
AIR CONDITIONERS

SIMPLIFIED TECHNICAL MANUAL

USE AND MAINTENANCE SURVEY³
ELECTRONIC REGULATOR
CONNECTED WITH P-SERIERS + PACi

Software version 3.3

List of revisions				
Revision	**Date**	**Author**	**Chapters**	**Descriptions**
A	10/2025	PA	All	First version

CONTENTS

WARRANTY CONDITIONS

All Products of the Manufacturer or bearing the trademark of the Manufacturer are built according to the state of the art techniques, in compliance with the current reference standards, as stipulated in the certificate of conformity provided together with the products.

All Products of the Manufacturer or bearing the trademark of the Manufacturer are designed to be installed inside a system that controls them. The designer or installer of the product assumes all liability and risk relating to its installation in the destination system.

The Manufacturer and its Branches/Affiliates do not guarantee that all aspects of the product and any software included will comply with the requirements of the destination system. In this case, following specific agreements, the Manufacturer can act as a consultant for the successful start-up of the product, but will not be held liable, under any circumstances, for the smooth operation of the destination system.

All Products of the Manufacturer or bearing the trademark of the Manufacturer are subject to the following warranty which is deemed as entirely accepted and signed at the time of placing the order.

The warranty on the Products of the Manufacturer with the model P-Series and bearing the trademark of the Manufacturer is valid for TWENTY-FOUR MONTHS (2 years) from the shipment date of the material. For the subsequent outdoor unit PACi models bearing the trademark of the Manufacturer and with model references commecning with 'U-', please refer to your local Sales Office or Authorised Service Centre for details for the relevant warranty conditions.

The following conditions relate solely to those pertaining to the P-Series units. For the PACi outdoor unit, please refer to the relevant installation and service manuals.

If start-up is not carried out by Manufacturer-authorised technicians, the warranty is validated by submitting a completed copy of the product's technical start-up report.

During the warranty period, the Manufacturer, under its sole discretion and as quickly as possible, undertakes to repair or provide as new any parts with acknowledged defects relating to material, construction or workmanship, which make them unsuitable for their intended use.

The claim must be submitted in writing, indicating the details of the reported fault, the serial number or code of the product, where the fault was identified and indication of the component that caused the fault, if this is easily identifiable. The Manufacturer will accept no claim made over the phone.

For operational purposes, claims can only be accepted during office hours, Monday to Friday. If a request is submitted on a public holiday, the Manufacturer will consider it as received at the beginning of the next business day after it was sent.

Faulty components are replaced ex works (EXW). Transport costs are borne by the Customer, even if the warranty cover is applied, unless specified otherwise by the Manufacturer.

The costs to replace faulty components (labour, materials, refrigerant, etc.) are borne by the Customer, even if the warranty cover is applied, unless specified otherwise by the Manufacturer.

Materials replaced while under warranty are the property of the Customer, who must dispose of them according to current regulations. Any disposal costs are borne by the Customer.

If parts should be returned while under warranty, they must be returned no later than three (3) months from the shipment date of the replacement part, organised and at the expense of the Customer. Otherwise, all the parts will be charged at the applicable list price at the time of their shipment.

The Manufacturer is not liable to pay compensation for direct or indirect damage, of any kind and for any reason. The Manufacturer is also not liable for any delay in the supply of parts under warranty or in the execution of work under warranty.

WARRANTY RESTRICTIONS

The above mentioned warranty conditions are valid as long as the Customer has fulfilled all obligations according to the contract and in particular those relating to payment. A delayed payment or non-payment of the supply, even if partial, suspends any warranty. The warranty does not give the Customer any right to suspend or delay payments, which must be paid in any case according to the stipulations of the order and specified in the written order confirmation.

Without precluding due compliance with other instructions provided in the technical documentation supplied with the product, it must be noted that the following instructions must be complied with accordingly, in order for the warranty to be valid:

Transport and positioning

- Do not remove the product from its original packaging until it has reached the installation site.
- Do not drop, knock or shake the product, as the internal circuits and mechanisms may be irreparably damaged.
- Store the product in an environment that complies with the temperature and humidity limits specified in the technical documentation.

Installation

1) The product must be installed by skilled personnel who fulfil the adequate requisites for the task as defined by the regulations in the country where positioning and installation take place.
2) The system that will control the product must be implemented according to professional standards, according to the instructions provided in the technical documentation and the regulations of the country where positioning and installation take place, with particular attention to the setting up of:

- Water or cooling lines serving the product and the relevant components.
- Electrical power and connection lines of the product and the relevant components.
- Aeraulic lines of the product and the relevant components.

3) Do not install the product outdoors or in areas that are subject to adverse weather.
4) Do not install the product in areas where there is oil, or where there are oil vapours or various kinds of aerosols, and where there are flammable vapours.
5) Do not install the product in environments where there is equipment that generates electromagnetic waves, and where the line voltage is subject to great fluctuations.
6) Do not install the product in environments where the air contains corrosive pollutants, a high dust or salt content.
7) Do not install the product on vehicles or boats.

First start-up

1) The product must be started up by skilled personnel who fulfil the qualification requisites for the task as defined by the regulations in the country where positioning and installation take place.
2) The system controlling the units must be started up according to professional standard, according to the instructions provided in the technical documentation and the regulations of the country where positioning and installation take place.
3) A copy of the technical start-up report of the product must be delivered to the Manufacturer.

Use and maintenance

1) Do not use the product for applications other than those specified in the technical documentation.
2) Do not use the product in an environment that does not comply with the temperature and humidity limits specified in the technical documentation.
3) Perform maintenance cycles according to the schedules specified in the technical documentation.
4) Clean the product with neutral detergents. Do not use corrosive chemicals and solvents or aggressive detergents.

Furthermore, the Manufacturer reserves the right to void the warranty of the products sold if:

A) The labels or plates bearing the trademark of the Manufacturer and the serial number or the registration number of the product have been deleted and/or removed.
B) The product has been subjected to alterations or mechanical processes not specifically authorised by the Manufacturer.
C) The product has been used inconsistently with the instructions provided in the technical documentation and regulations of the country where positioning and installation take place, or for purposes other than what it was designed for.
D) The defects are due to negligence, incompetence, poor maintenance, carelessness and inability of the End-user, damage caused by third parties, unforeseeable circumstances or force majeure or for any other reason not attributable to defects in the construction quality.

The following are henceforth considered excluded from the warranty:

A) All parts with marginal defects that have a negligible effect on the value or function of the product.
B) All parts typically subject to sliding or rolling friction (bearings, brushes, etc.).
C) All parts typically subject to consumption (filters, humidifier cylinders, etc.).
D) All parts typically subject to oxidation or corrosion if not properly used or serviced (headers, wires and copper contacts or metal alloys, internal or external parts of the units, etc.).
E) All parts not supplied by the Manufacturer, even if these are an integral part of the system that controls the product.

1 INTRODUCTION

The following manual provides a condensed and simplified overvew of the configuration and setup of the SURVEY³ controller and Panasonic CZ-RTC6 with respect to the P-Series + PACi connection.

1.1 SURVEY³ ELECTRONIC REGULATION SYSTEM + PACi

SURVEY³ is an electronic regulation system developed for integrated control of Close Control conditioning units in the direct expansion (A) and relevant related accessories.

The system consists of:

- One basic I/O C-PRO3 control board, in plastic container the size of 8 DIN modules, for installation on DIN guide inside the electrical panel:
- An EPJgraph user terminal with LCD graphic display, resolution 320 x 240 pixel, 16 colour, integrated font and 6-key touchscreen (with pre-set functions).
- One or more electronic EC fans with integrated electronic regulation board.

Additional control boards may be installed according to the type of unit and installed accessories:

- CPY humidifier control board (when specified), in plastic container the size of 6 DIN modules, for installation on DIN guide inside the electrical panel.
-
- Panasonic CZ-RTC6 wired controller for managing commissioning, servicing and maintenance of the relevant PACi outdoor unit connected in the system. All standard functions relating to the system control are managed SURVEY³ electronic control system.

Thanks to the high degree of interfacing of the unit's main components, with the SURVEY³ electronic control system it is possible to monitor and control any operational aspect of the system, assuring the user has real time access via the display at the front of the machine or via a supervision system or BMS (Building Management System).

Constant monitoring of the system's general status affords a high degree of reliability. Integrated management of the alarms of the unit's main components allows the user to act promptly for maintenance, reducing system downtime to a minimum.

1.2 DETAILED INFORMATION FOR SURVEY³ ELECTRONIC REGULATION SYSTEM

For full details relating to the SURVEY³ controller please refer to the relevant full Technical Manual, incuding control algorithms. This can be found via the weblink, or dedicated QR code shown below.

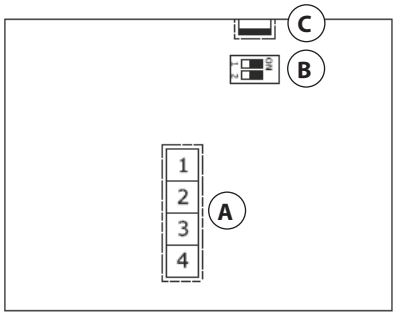
1.3 DETAILED INFORMATION FOR PACi CONTROLS AND RELATED OUTDOOR UNITS

Please refer to the SERVICE MANUAL for the relevant outdoor unit for full details.

2 DESCRIPTION OF SURVEY³ SYSTEM INPUTS-OUTPUTS

2.1 DESCRIPTION OF EPJGRAPH USER INTERFACE INPUTS-OUTPUTS

Below is a description of the meanings of the inputs and outputs of the EPJgraph user interface.



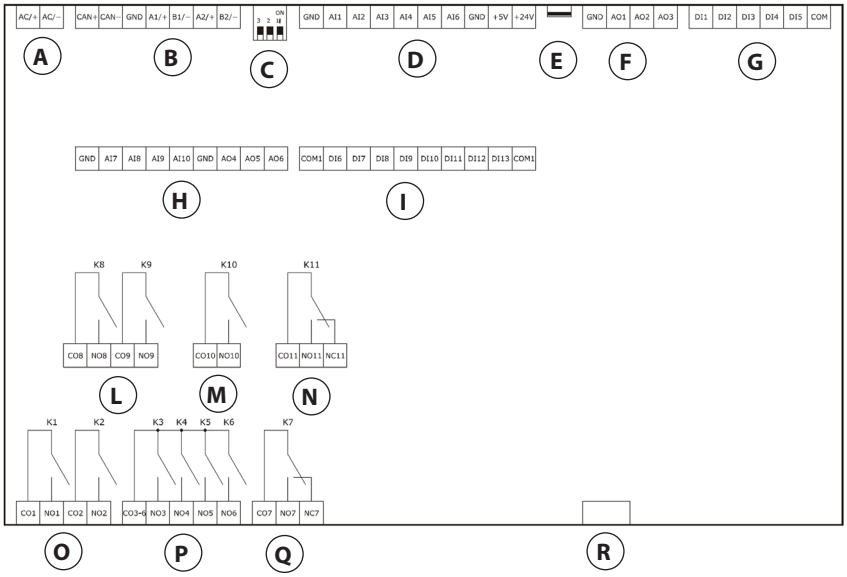
A - Power supply - CANbus Port			
Name		**Type**	**Description**
1	**Vac / +**	24 V AC	Power supply input
2	**Vac / -**	24 V AC	Power supply input - CANbus port ground
3	**CAN +**	-	Signal + CANbus port
4	**CAN -**	-	Signal - CANbus port

B - Termination heater micro-switches			
Name		**Type**	**Description**
1	**N.C.**	-	Reserved
2	**CANLT**	-	CANbus port termination

C - USB port		
Name	**Type**	**Description**
USB 2.0	A	Interfacing and programming port

2.2 DESCRIPTION OF INPUTS-OUTPUTS ON BASIC I/O C-PRO3 CONTROL BOARD

Below is a description of the meanings of the inputs and outputs of the basic I/O C-PRO3 control board.



A - Power supply - Modbus Slave RS485 port - CANbus port		
Name	**Type**	**Description**
AC/+	24 V AC	Power supply input
AC/-	24 V AC	Power supply input

B - Modbus Slave RS485 port - Modbus Master RS485 port - CANbus port		
Name	**Type**	**Description**
CAN +	-	Signal + CANbus port
CAN -	-	Signal - CANbus port
GND	-	CANbus port ground, Modbus Master RS485 and Modubs Slave RS485
A1/+	-	Signal + Modbus Master RS485 port
B1/-	-	Signal - Modbus Master RS485 port
A2/+	-	Signal + Modbus Slave RS485 port
B2/-	-	Signal - Modbus Slave RS485 port

C - Termination heater micro-switches		
Name	**Type**	**Description**
CAN LT	-	CANbus port termination
RS485 LT1	-	Modbus Slave RS485 port termination
RS485 LT2	-	Modbus Master RS485 port termination

D - Analogue inputs 1... 6		
Name	**Type**	**Description**
GND	-	Analogue inputs common
AI 1	0-5 V DC	Air pressure sensor
AI 2	4-20 mA	Air humidity sensor IN (Ambient)
AI 3	4-20 mA	Air humidity sensor OUT (Supply)
AI 4	NTC	Air temperature sensor IN (Ambient)
AI 5	NTC	Air temperature sensor OUT (Supply)
AI 6	NTC	Reserved
GND	-	Analogue inputs common
+5 V	5 V DC	Stabilised ratiometric transducer power supply 0-5 V (5 VDC, 60 mA max.)
VS	12 V DC	Power supply to 0-20 mA / 4-20 mA / 0-10 V transducers (12 VDC, 120 mA max.)

E - USB port		
Name	**Type**	**Description**
USB 2.0	A	Interfacing and programming port

F - Analogue outputs 1... 3		
Name	**Type**	**Description**
GND	-	Analogue input and analogue output common
AO 1	0-10 V	Supply fan modulation
AO 2	0-10 V	PACi 0 - 10 V control signal
AO 3	0-10 V	Modulating electric coil

G - Digital inputs 1... 5		
Name	**Type**	**Description**
DI 2	N.O.	Clogged air filter alarm
DI 3	N.O.	Remote OFF
DI 4	N.C.	General electric coil alarm
DI 5	N.C.	Condensate discharge pump alarm
COM	-	Digital input common

H - Analogue inputs 7... 10 and analogue outputs 4... 6		
Name	**Type**	**Description**
GND	-	Analogue input and analogue output common
AI 7	NTC	Reserved
AI 8	4-20 mA	Reserved
AI 9	4-20 mA	Reserved
AI 10	NTC	Water detection alarm probe
GND	-	Analogue input and analogue output common
AO 4	0-10 V DC	Reserved
AO 5	0-10 V DC	Reserved
AO 6	0-10 V DC	Humidification modulation

I - Digital inputs 6... 13		
Name	**Type**	**Description**
COM1	-	Digital input common
DI 6	N.O.	PACi outdoor unit general alarm input
DI 7	N.C.	Configurable input 2
DI 8	N.C.	Configurable input 3
DI 9	N.C.	Configurable input 4
DI 10	N.C.	Configurable input 5
DI 12	-	Reserved
DI 13	-	Reserved
COM1	-	Digital input common

L - Digital outputs 8 and 9		
Name	**Type**	**Description**
CO 8	-	Reserved
NO 8	N.O.	Reserved
CO 9	-	Reserved
NO 9	N.O.	Reserved

M - Digital output 10		
Name	**Type**	**Description**
CO 10	-	Digital output common 10
NO 10	N.O.	Reserved

N - Digital output 11		
Name	**Type**	**Description**
CO 11	-	Digital output common 11
NO 11	N.O.	Reserved
NC 11	N.C.	Reserved

O - Digital outputs 1 and 2		
Name	**Type**	**Description**
CO 1	-	Digital output common 1
NO 1	N.O.	Ventilation control

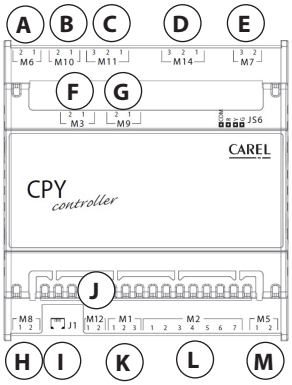
P - Digital outputs 3 ... 6		
Name	**Type**	**Description**
CO 3-6	-	Digital outputs common 3 - 6
NO 3	N.O.	Configurable digital output 1
NO 4	N.O.	Configurable digital output 2
NO 5	N.O.	Configurable digital output 3
NO 6	N.O.	Configurable digital output 4

Q - Digital output 7		
Name	**Type**	**Description**
CO 7	-	Digital output common 7
NO 7	N.O.	Configurable digital output 5
NC 7	N.C.	Configurable digital output 5

R - RJ45 port		
Name	**Type**	**Description**
RJ45	RJ45	Ethernet RJ45 port

2.3 DESCRIPTION OF CPY HUMIDIFIER BOARD INPUTS-OUTPUTS

Below is a description of the meanings of the CPY humidifier board inputs and outputs.



A - M6 - Discharge pump activation		
Name	**Type**	**Description**
1	-	Digital output common
2	N.O.	Discharge pump activation control

B - M10 - Contactor activation contact for submerged electrode voltage		
Name	**Type**	**Description**
1	-	Digital output common
2	N.O.	Contactor activation control for submerged electrode voltage

C - M11 - Water charging and discharging solenoid valve control		
Name	**Type**	**Description**
1	N.O.	Charging solenoid valve activation control
2	-	Digital output common
3	N.O.	Discharging solenoid valve activation control

D - M14 - Relay indicating humidifier in production		
Name	**Type**	**Description**
1	N.O.	Humidifier in production indication activation control
2	-	Digital output common
3	N.O.	Humidifier in production indication activation control

E - M7 - Submerged electrode current measuring amperometric transformer input (TAM)		
Name	**Type**	**Description**
1	-	Common
2	0-2V DC	Amperometric transformer (TAM)

F - M3 - Conductivity meter		
Name	**Type**	**Description**
1	-	Common
2	-	Conductivity measuring device

G - M9 - High water level sensor		
Name	**Type**	**Description**
1	-	Common
2	-	Cylinder level sensor

H - M8 - Electrical power supply connection		
Name	**Type**	**Description**
1	24 V AC	Power supply input
2	24 V AC	Power supply input

I - J1 - Connection for CPY terminal		
Name	**Type**	**Description**
1	RJ12	Connection for CPY terminal

J - M12 - tLAN network connection		
Name	**Type**	**Description**
1	-	tLAN data line
2	-	tLAN data line common

K - M1 - Modbus RS485 network connection		
Name	**Type**	**Description**
A / +	-	Signal + Modbus RS485 port
B / -	-	Signal - Modbus RS485 port
GND	-	Modbus RS485 port ground

L - M2 - Control signals		
Name	**Type**	**Description**
1	+15 V DC	Active probe power supply
2	-	Control signal input
3	-	Active probe power supply and control signal input common
4	N.C.	Enable for operation
5	-	Digital input common
6	N.C.	Manual discharge
7	N.C.	Reset operating hour counter.

M - M5 - Alarm		
Name	**Type**	**Description**
1	-	Digital output common
2	N.O.	General humidifier alarm

2.4 DESCRIPTION OF ELECTRONIC FAN INPUTS-OUTPUTS

2.4.1 EC FANS - TYPE 1 (FOR MODELS 071, 111, 121, 141)

Below is a description of the meanings of the inputs and outputs of electronic fans model 1.

A - Analogue inputs and Modbus Slave RS485 port		
Name	**Type**	**Description**
RSA	-	Signal + Modbus Slave RS485 port
RSB	-	Signal - Modbus Slave RS485 port
RSA	-	Signal + Modbus Slave RS485 port
RSB	-	Signal - Modbus Slave RS485 port
GND	-	Modbus Slave RS485 port ground
0-10 V PWM	0-10 V/PWM	Analogue control input
4-20 mA	4-20 mA	Analogue control input
+20 V	20 V DC	Power supply to transducers (50 mA max.)
+ 10 V	10 V DC	Power supply for potentiometer (10 mA max.)
0-10 V PWM	0-10 V/PWM	Analogue control input
GND	-	Analogue inputs ground
OUT	0-10V DC	Analogue output for slave fan control

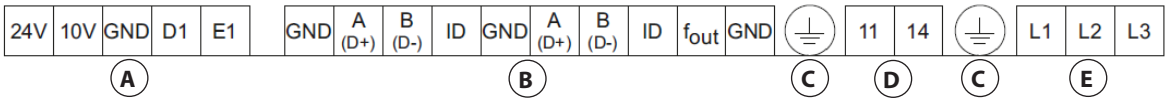
B - Alarm relay		
Name	**Type**	**Description**
NO	N.O.	General fan alarm
COM	-	Digital output common
NC	N.C.	General fan alarm

C - Electrical power supply		
Name	**Type**	**Description**
L1	400 V	Electronic motor power supply
L2	400 V	Electronic motor power supply
L3	400 V	Electronic motor power supply

D - Connecting terminal to earth		
Name	**Type**	**Description**
PE	-	Earthing cable connection

2.4.2 EC FANS - TYPE 2 (FOR MODEL 211)

Below is a description of the meanings of the inputs and outputs of electronic fans model 2.



A - Analogue and digital inputs		
Name	**Type**	**Description**
24 V	24 V DC	Digital input power supply (70 mA max.)
10 V	10 V DC	Power supply for potentiometer (10 mA max.)
GND	-	Analogue inputs ground
D1	-	Operation digital input
E1	0-10 V DC	Analogue control input

B - Modbus Slave RS485 port		
Name	**Type**	**Description**
GND	-	Modbus Slave RS485 port ground
A (D+)	-	Signal + Modbus Slave RS485 port
B (D-)	-	Signal - Modbus Slave RS485 port
ID	-	Reference for auto-addressing
GND	-	Modbus Slave RS485 port ground
A (D+)	-	Signal + Modbus Slave RS485 port
B (D-)	-	Signal - Modbus Slave RS485 port
ID	-	Reference for auto-addressing
FOUT	Hz	Output in frequency
GND	-	Output ground in frequency

C - Connecting terminal to earth		
Name	**Type**	**Description**
PE	-	Earthing cable connection

D - Alarm relay		
Name	**Type**	**Description**
NO	N.O.	General fan alarm
COM	-	Digital output common

E - Electrical power supply		
Name	**Type**	**Description**
L1	400 V	Electronic motor power supply
L2	400 V	Electronic motor power supply
L3	400 V	Electronic motor power supply

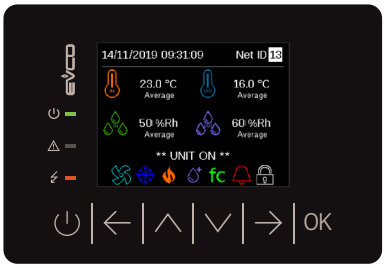
3 SURVEY³ SYSTEM USER INTERFACE

3.1 EPJGRAPH USER TERMINAL

The user terminal features an LCD graphic display with resolution 320 x 240 pixels, 16 colours, integrated font and 6-key touch-screen (with pre-set functions).

3.1.1 EPJGRAPH USER TERMINAL KEYPAD

There are keys on the User terminal with special functions as shown in the table below.



Key	Name	Description
⏻	**ESC**	Press to exit the menus and parameter editing procedures.
	ON-OFF	Hold down to turn the unit on and off.
←	**LEFT**	Press to scroll the unit's status pages to the left.
	ALARM	Hold down to access to the active alarms menu.
∧	**UP**	Press to scroll up through the pages associated with a specific group; if the cursor is in a setting field, the user can increase the value.
∨	**DOWN**	Press to scroll down through the pages associated with a specific group; if the cursor is in a setting field, the user can decrease the value.
→	**RIGHT**	Press to scroll the unit's status pages to the right.
	HOME	Hold down to go back to the Home page.
OK	**OK**	Press to edit a parameter and confirm the setting. In the active alarms menu, press to scroll through the alarms, hold down to delete active alarms.
	MENU	Hold down to access to the Main menu page.
∧ | ∨	**UP + DOWN**	Hold down to unlock the user terminal keyboard.

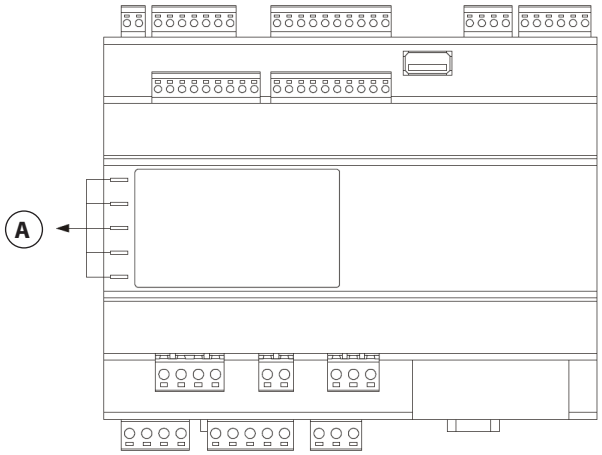
3.1.2 VGRAPH USER TERMINAL SIGNAL LED

There are LEDs on the User terminal with special functions as shown in the table below.

Key	Colour	Description
⏻	Green	Operation LED: • If on, the unit is ON • If it is flashing, the unit is turned off from remote control or due to critical alarm/Unit in standby (Local Network) • If off, the unit is OFF
⚠	Red	Alarm LED: • If it is on, an alarm is in progress that has already been viewed • If it is flashing a new alarm is in progress • If it is off, no alarm is in progress
↯	Orange	Power supply LED: • If on, the device is powered • If off, the device is not powered

3.2 I/O C-PRO3 BASE CONTROL BOARD SIGNAL LEDS

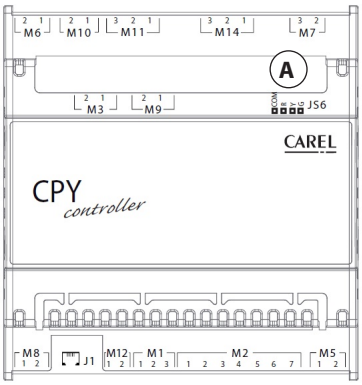
The I/O C-PRO3 base control board features LEDs with special functions as shown in the table below.



A - Signal LED		
Name	**Colour**	**Description**
ON	Green	Power supply LED: • If on, the device is powered • If off, the device is not powered
RUN	Green	Operation LED: • If on, the application software is running • If off, the application software is not running
⚠	Red	System alarm LED: • If on, the clock battery is charging or the clock is not set • If it is flashing very slowly, access in external flash memory (USB) is in progress • If it is flashing slowly, a system alarm is in progress with automatic reset • If it is flashing quickly, a system alarm is in progress with manual reset • If it is off, no system alarm is in progress
CAN	Red	CANbus communication LED: • If on, CANbus communication has not been established • If it is flashing slowly, CANbus communication has communication errors • If it is flashing quickly, CANbus communication is correct • If it is off, there is no CANbus communication
L1	-	Not used

3.3 CPY HUMIDIFIER BOARD SIGNAL LEDS

There are LEDs on the CPY humidifier board with special functions as shown in the table below.



A - Signal LED		
Name	**Colour**	**Description**
	Red	Alarm LED: • If it is flashing an alarm is in progress • If it is off, no alarm is in progress
	Yellow	Steam production LED: • If it is on, production is at 100% • If it is flashing, the number of blinks indicates the production percentage • If it is off, the humidifier is off
	Green	Power supply LED: • If on, the device is powered • If off, the device is not powered

4 USE OF SURVEY³ MICROPROCESSOR

ATTENTION!

The example icons indicated below are shown in black and white for simplification.

The icons and text may assume different colours on the display depending on the position and their function.

Access to information regarding the unit's management and adjustment parameters is organised in the following order:

1) **MAIN PAGE:** This makes it possible to rapidly access the unit's general status.

2) **UNIT AND COMPONENTS STATUS PAGE:** It displays the status of every component installed in the unit, or controlled by it.

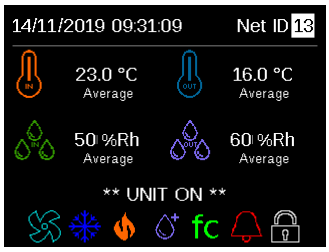
3) **MAIN MENU:** This lets you access the software management **MENUS**. The **MENUS** divide the parameters into categories for easier user interaction.

4) **MENU:** The main menu contains various **MENUS**. Every **MENU** contains **PARAMETER GROUPS** that can be viewed or edited.

- **OPEN MENUS:** these display the alarms, device operating hours, time and date, and enable the entry of temperature and humidity set-points and internal clock setting.
- **PASSWORD**-PROTECTED MENUS: to set the unit's regulation and configuration parameters.

5) **PARAMETER GROUPS:** The **PARAMETERS** are collected in specific **GROUPS**, making it easier to access and edit them.

4.1 MAIN, UNIT AND COMPONENTS STATUS PAGES



This group of pages represents the primary view of the regulation software. Access to the status pages of the unit and components is gained by simply pressing the **LEFT** (←) and **RIGHT** (→) keys. Parameters relative to components that are not installed will not be displayed, accordingly some pages might not be visible.

4.1.1 SYMBOLS AND ICONS OF THE MAIN, UNIT AND COMPONENTS STATUS PAGES

Various types of icons are used in the software pages. The meanings of the icons are provided in the table below.

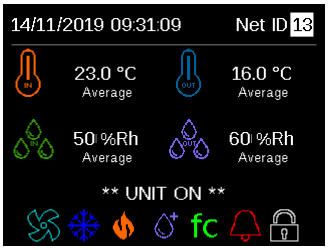
Software icons			
Probes			
Return temperature	Supply temperature	Return humidity	Supply humidity

Statuses				
Motorised damper	Unit fans	Cooling	Modulating compressor	Modulating electric coil
Dehumidification	Humidification	Active alarm	Active key block	

Components regulation and status					
Probes - Real values	Remote probes	Unit fans	Air filters	Direct expansion	DC inverter Compressor
Compressor 1	Modulating electric coil	Humidification / Dehumidification	Configurable digital inputs	Configurable digital outputs	

4.1.2 MAIN SCREEN

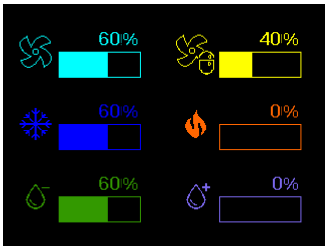
This page represents the view of the primary software. The following can be displayed on this page:



- The set time and date.
- The unit's network address.
- Return temperature (average value, if active).
- Supply temperature (average value, if active).
- Return humidity, if any (average value, if active).
- Supply humidity, if any (average value, if active).
- The status of the unit.
- The presence of any active alarms.
- The icons of the main active components (see previous chapter).

4.1.3 PROGRESS BAR

This page summarises the status of the main regulation components, representing them through progress bars that indicate the percentage of regulation. The following can be displayed on this page:

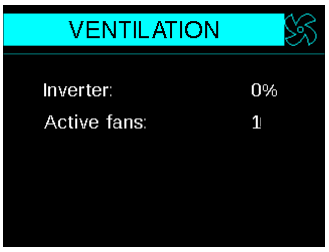


- The status of the supply fans.
- The status of the condenser fans or dry coolers (not applicable to PACi connection).
- The status of the cooling components.
- The status of the heating components (if present).
- Dehumidification status (if present).
- Humidification status (if present).

4.1.4 VENTILATION

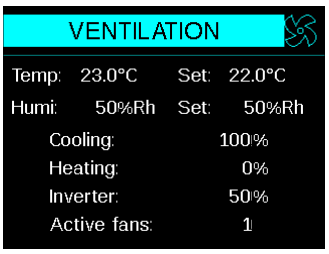
The ventilation status pages show different views depending on the set type of regulation.

If fixed speed regulation is on, the following will be displayed:



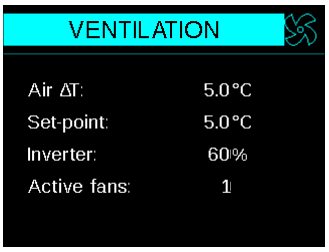
- Fan speed in percentage.
- Number of active fans.

If regulation is running in proportion to the cooling or heating regulation, the following will be displayed:



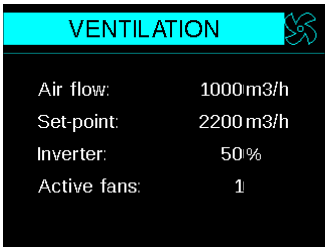
- The controlled temperature and relevant set-point.
- The controlled humidity and relevant set-point (if there is humidity control).
- The cooling and heating demand.
- The fan speed demand in percentage.
- Number of active fans.

If regulation is active for control of the constant temperature ΔT, the following is displayed:



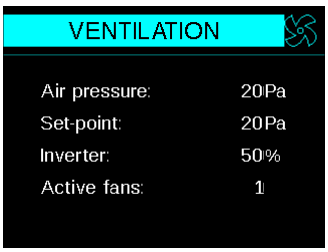
- The current temperature ΔT and relative set-point.
- The fan speed demand in percentage.
- Number of active fans.

If constant air flow regulation is on, the following will be displayed:



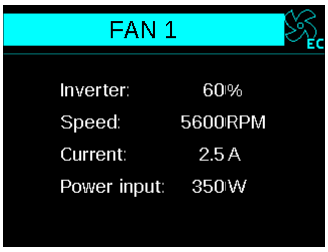
- The current air flow rate in m^3/h.
- The air flow rate set-point in m^3/h.
- The fan speed demand in percentage.
- Number of active fans.

If constant air pressure regulation is on, the following will be displayed:



- The current air pressure in Pa.
- The air pressure set-point in Pa.
- The fan speed demand in percentage.
- Number of active fans.

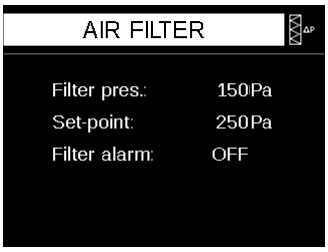
The operating values of each fan (up to 10) in the unit will also be displayed:



- Fan speed in percentage.
- Fan speed in revs per minute (RPM).
- Absorbed current in Ampere.
- Used electrical power in Watt.

4.1.5 DIRTY FILTER MANAGEMENT

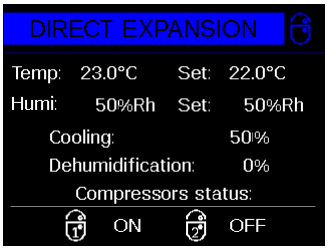
If the unit comes with an analogue air filter differential pressure sensor, the following will be displayed:



- Air filter differential pressure.
- Filter clogging alarm set-point.
- Dirty filter alarm status.

4.1.6 DIRECT EXPANSION

The direct expansion regulation status pages may show different views depending on the type of accessories and number of cooling circuits the unit is fitted with. It will therefore be possible to view:

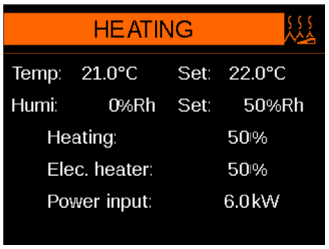


- The controlled temperature and relevant set-point.
- The controlled humidity and relevant set-point (if there is humidity control).
- The cooling demand.
- The dehumidification demand (if there is humidity control).
- Activation status of the compressors.

4.1.7 HEATING

The heating status pages may show different views depending on the type of accessories the unit is fitted with.

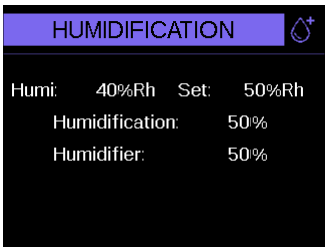
If there is a modulating heating electric coil, it will be possible to view:



- The controlled temperature and relevant set-point.
- The controlled humidity and relevant set-point (if there is humidity control).
- The heating demand.
- The heating electric coil regulation percentage.
- Used electrical power in Kw.

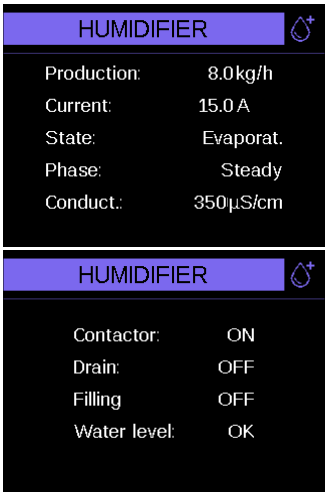
4.1.8 HUMIDIFICATION

In units with humidification system, the following information will be displayed:



- Controlled humidity and relative set-point.
- The humidification demand.
- The humidifier operation percentage.

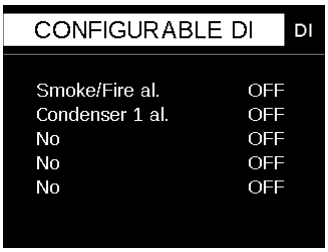
Unit with internal submerged electrode humidifier:



- The requested steam production.
- The current absorbed by the humidifier in Ampere.
- The humidifier operation status.
- The humidification regulation phase.
- The water conductivity of the humidifier in µS/cm.
- The humidifier power contactor status.
- The humidifier discharge valve status.
- The humidifier filling valve status.
- The water level in the humidifier cylinder.

4.1.9 CONFIGURABLE DIGITAL INPUTS

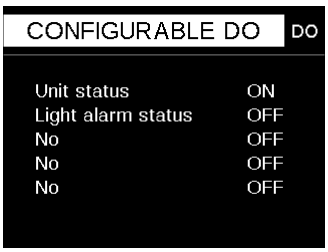
The following information will be displayed depending on configurable digital input settings:



- Description and status of configurable digital input 1.
- Description and status of configurable digital input 2.
- Description and status of configurable digital input 3.
- Description and status of configurable digital input 4.
- Description and status of configurable digital input 5.

4.1.10 CONFIGURABLE DIGITAL OUTPUTS

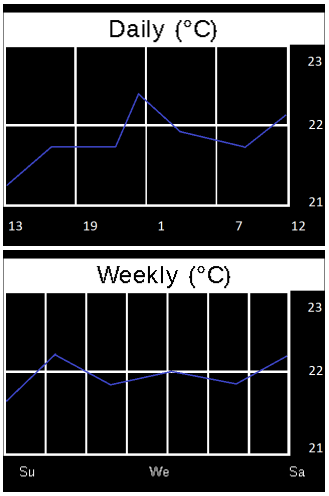
The following information will be displayed depending on the configurable digital output settings:



- Description and status of configurable digital output 1.
- Description and status of configurable digital output 2.
- Description and status of configurable digital output 3.
- Description and status of configurable digital output 4.
- Description and status of configurable digital output 5.

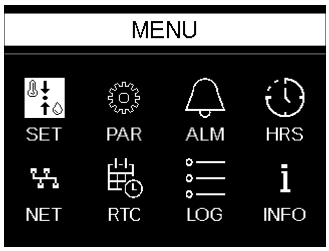
4.1.11 GRAPHS

These pages will display graphs related to:



- **Daily controlled temperature trend:** The trend represents the average temperature of the day.
- **Weekly controlled temperature trend:** The trend represents the average temperature of the 6 previous days.
- **Daily controlled humidity trend:** The trend represents the average humidity of the day.
- **Weekly controlled humidity trend:** The trend represents the average humidity of the 6 previous days.

4.2 MAIN MENU



To access the **MAIN MENU** simply press and hold down the **OK** key (OK). It is possible to select the **MENUS** on the **MAIN MENU** by moving the cursor with the **UP** (^) and **DOWN** (v) keys. Press the **OK** (OK) key to access the selected menu.

4.2.1 SYMBOLS AND ICONS THAT CAN BE DISPLAYED IN THE MAIN MENU

Various types of icons are used in the main menu. The meanings of the icons are provided in the table below.

Main menu							
SET	NETWORK	PAR	RTC	ALM	LOG	HOURS	INFO

Alarms and alarm log menu	
OK	OK
Press OK key	Press and hold OK key

4.2.2 CHANGES TO PARAMETERS

To change the parameters, proceed as follows:

- Select the **PARAMETER** that needs to be changed using the **UP** (^) and **DOWN** (v) keys and press the **OK** (OK) key to enable the changed parameter; the parameter will start to flash.
- Change the parameter using the **UP** (^) and **DOWN** (v) keys. Holding the keys pressed will speed up the increments of the value being changed. If the parameter contains multiple editable fields, switch between fields using the **LEFT** (←) and **RIGHT** (→) keys.
- To memorise the entered value, simply press **OK** (OK). However, should you not wish to save the parameter, just press **ESC** (⏻).

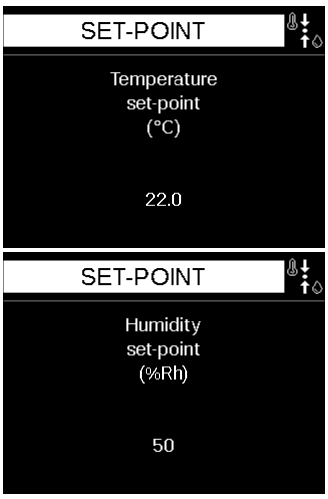
4.2.3 CHECK AND CLEARANCE OF ACTIVE ALARMS

From the **ALM - Active alarms** menu it is possible to view the alarms that are active on the unit. Access this menu by holding down the **LEFT/ALARM** (←) key.

Use the **OK** (OK) key to scroll through all active alarm signals. Hold the **OK** (OK) key pressed to reset the displayed alarm.

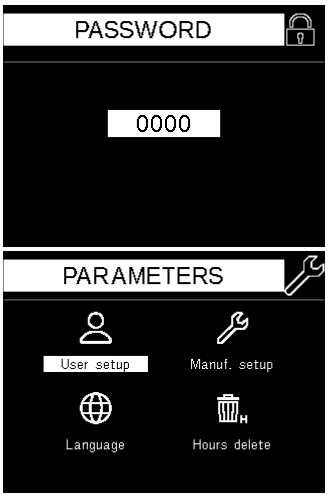
Press **ESC** (⏻) to return to the main program page.

4.2.4 SET - SET-POINT MENU



Within the **SET - Set-point** menu it is possible to modify the ambient temperature and ambient humidity regulation set-points. These parameters can be modified so that the user is able to select his/her preferred ambient conditions.

4.2.5 PAR - REGULATION PARAMETERS MENU



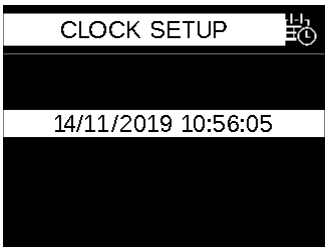
Within the **PAR - Parameters** menu, after gaining access by entering the correct login password, it is possible to edit the unit regulation parameters and the unit configuration parameters. The group is divided into the following sections:

- **USER SETUP:** Modification of the unit regulation and operation parameters.
- **MANUF. SETUP*:** Unit operating parameter configuration.
- **LANGUAGE:** To change the software language.
- **HOURS DELETE:** To clear the hours of operation.

For more information see the following chapters.

* For details relating to the MANUF. SETUP, please refer to your local sales agent or Authorised Service Centre for support.

4.2.6 RTC - CLOCK MENU

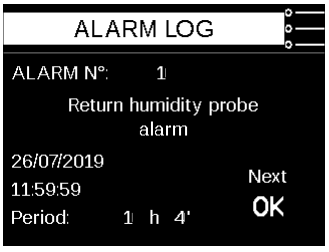


From the **RTC - Clock** menu, it is possible to change the current time and date.

4.2.7 ALM - ACTIVE ALARMS MENU

From the **ALM - Active alarms** menu it is possible to view the alarms that are active on the unit.

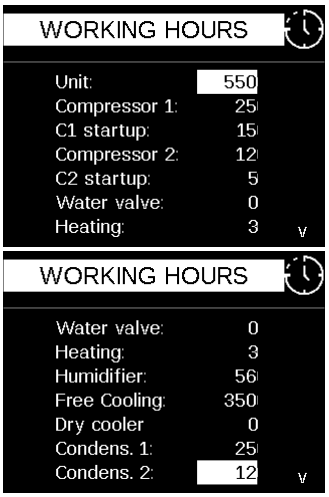
4.2.8 LOG - ALARM LOG MENU



Within the **LOG - Alarms log** menu it is possible to display the unit's alarm log. The alarms are stored in chronological order. The page displays the date, time and duration of the alarm.

Press the **OK** (OK) key to scroll through the stored alarms.

4.2.9 HOURS - WORKING HOURS LOG MENU

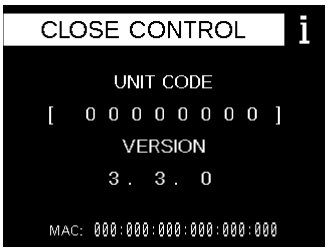


Within the **HOURS - Working hours log** menu it is possible to display the working hours of the following components of the unit:

- **Working hours:** This tells you the total hours of unit operation (Unit ON).
- .
- **Heating:** This tells you the total hours of heating operation.
- **Humidifier:** This tells you the total hours of humidifier operation.
- **Free Cooling:** This tells you the total hours of operation of the free cooling system.
- **Power fault:** Indicates the number of shutdowns due to power failure.

To scroll the working hours, simply press the **DOWN** (⋁) key.

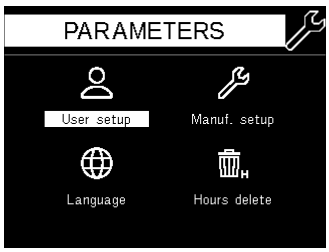
4.2.10 INFO - INFORMATION MENU



Within the **INFO - Information** menu it is possible to display:

- The serial number of the unit.
- The software version installed in the unit.
- The MAC address of the controller.

4.3 PARAMETERS MENU



4.3.1 SYMBOLS AND ICONS THAT CAN BE SHOWN ON THE DISPLAY

Various types of icons are used in the software pages. The meanings of the icons are provided in the table below.

Parameters menu				
				
User setup	Factory setup[1]	Language	Delete log	Delete hours[1]

User menu parameter groups					
Ventilation	Temperature	Limit temperature	Humidity	Humidifier	Free cooling & Two sources[2]
Condensers[2]	Dry cooler[2]	Air filters	Probe calibration	Modbus	Ethernet
BACnet[2]		Datalog		Password	

1. The Factory setup and Delete hours can only be accessed with the Factory Password. If access is required to these areas, please contact your local sales agent or Authorised Service Centre for support

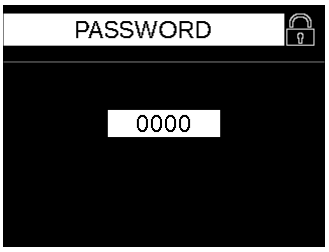
2. These items will can be shown on the display but are not relevant to the PACi connection. If pressed, you will not be able to enter the menus.

4.3.2 ACCESS TO PASSWORD-PROTECTED MENUS

To access the parameters in the **PAR - Parameters** menu, it is necessary to insert the **LOGIN** password.

To enter the password proceed as follows:

- Press **OK** (OK) to enable password changes. The field will start flashing and the first digit of the password will be selected.
- Change the value of the digit using the **UP** (∧) and **DOWN** (∨) keys. To switch between the digits press the **LEFT** (←) and **RIGHT** (→) keys.
- To memorise the entered value, simply press **OK** (OK). To exit the password change without saving, simply press **ESC** (⏻).



Default password (Editable) USER PARAMETERS:

0123

4.3.3 ACCESS TO GROUPS AND REGULATION PARAMETERS

The **PARAMETERS MENU** is divided into various **MENUS**. A different number of **MENUS** will be available depending on the level of the inserted password.

The **MENUS** can be selected by scrolling the cursor using the **UP** (∧) and **DOWN** (∨) keys. Press the **OK** (OK) key to access the **MENU**.

The **MENUS** are in turn divided into different **GROUPS,** the name of which describes the function of the parameters it contains.

To switch between the pages of the various **MENUS** press the **LEFT** (←) and **RIGHT** (→) keys.

The **GROUPS** can be selected by scrolling the cursor using the **UP** (∧) and **DOWN** (∨) keys. Press the **OK** (OK) key to access the **MENU**.

Some of the groups may be inaccessible, this means the components to which they refer are not included in the unit.

4.3.4 CHANGES TO PARAMETERS

To change the parameters, proceed as follows:

- Select the **PARAMETER** that needs to be changed using the **UP** (^) and **DOWN** (v) keys and press the **OK** (OK) key to enable the changed parameter; the parameter will start to flash.
- Change the parameter using the **UP** (^) and **DOWN** (v) keys. Holding the keys pressed will speed up the increments of the value being changed. If the parameter contains multiple editable fields, switch between fields using the **LEFT** (←) and **RIGHT** (→) keys.
- To memorise the entered value, simply press **OK** (OK). However, should you not wish to save the parameter, just press **ESC** (⏻).

4.3.5 USER SETUP

The following parameter groups can be displayed in the **USER SETUP**:

- **Ventilation:** Contains the fan regulation parameters.
- **Temperature:** Contains the temperature regulation parameters.
- **Limit temperature:** Contains the limit temperature regulation parameters.
- **Humidity:** Contains the humidity regulation parameters.
- **Humidifier:** Contains the humidifier regulation parameters.
- **FC & TS*:** Contains the Free Cooling and Two Sources system regulation parameters.
- **Condenser*:** Contains the condenser regulation parameters.
- **Dry cooler*:** Contains the dry cooler regulation parameters.
- **Air filters:** Contains the air filters regulation parameters.
- **Probe calibration:** Contains the parameters for the unit's probe calibration.
- **Modbus:** Contains the parameters of the Modbus protocol.
- **Ethernet:** Contains the parameters of the Ethernet protocol.
- **Bacnet:** Contains the parameters of the BACnet protocol.
- **Datalog:** Contains the parameters relative to the saving of operating parameters.
- **Password:** Allows the access password to be modified.

* PLEASE NOTE: With PACi connection, some parameters will not be available.

4.3.6 LANGUAGE SETUP

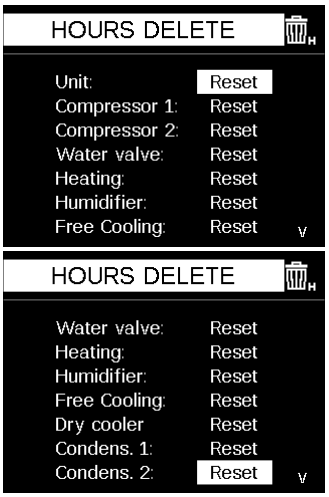
ATTENTION!

Language changes require the controller to be rebooted in order to be confirmed.

The regulation software lets you configure several languages. From the **LANGUAGE SETUP** it is possible to select one of the following languages:

1) Italian
2) English
3) French
4) German
5) Spanish
6) Dutch
7) Russian
8) Polish

4.3.7 CLEAR WORKING HOURS



Within **CLEAR WORKING HOURS** it is possible to clear the log of working hours of the main components.

To scroll the working hours, simply press the **DOWN** ( ) key.

5 REGULATION LOGICS AND UNIT PARAMETERISATION

5.1 REGULATION SOFTWARE VERSION

The regulation software can be supplied in three different versions, each distinguished by a capital letter at the end of the progressive number. The different software versions differ in regards to the type of serial communication available.

Following is a list of the differences between the various software versions:

- **Software version AB:**

This versions makes the following serial protocols available:

1) Modbus RTU Slave on RS485 port
2) Modbus IP Slave on RJ45 port
3) BACnet IP on RJ45 port

5.2 REGULATION SOFTWARE LANGUAGE CHANGE

ATTENTION!

Language changes require the controller to be rebooted in order to be confirmed.

The regulation software lets you configure several languages. With the "**Language**" parameter (Language Menu) it is possible to select one of the following languages:

1) Italian
2) English
3) French
4) German
5) Spanish
6) Dutch
7) Russian
8) Polish

Once the parameter has been changed, reboot the controller in order to confirm the change and allow the selected language to be applied.

5.3 KEY LOCK

The regulation software lets you configure a key lock function, which is automatically activated if the keypad is not touched for 120 s.

With the "**Enable Key Lock**" parameter (Factory Setup - Key lock) it is possible to select one of the following types of key lock:

1) **No:** Key lock is not active.
2) **Yes:** The keys will lock after inactivity.
3) **Password:** The keys will lock after inactivity and the user password will be required to unlock the keypad.

When the keys are locked the display shows the relevant icon (). When the keys are locked it will **NOT** be possible to:

- Turn the unit on and off from the keypad.
- Access the main menu.
- Delete active alarms.

It will nevertheless be possible to:

- Display the component status by pressing the **LEFT** (←) and **RIGHT** (→) keys.
- Display active alarms by pressing and holding down **ALARM** (←).

To remove the key lock just press the **UP + DOWN** (∧ | ∨) keys at the same time for a few seconds. An unlock password might be required; this would be the **USER** password.

5.4 TURNING THE UNIT ON

The unit may be switched on and off by pressing the **ON/OFF** (⏻) button for a few seconds. The unit's status may be viewed on the display's main page.

If the units are installed in local network, depending on the configuration of the "**Dynamic ON-OFF**" parameter (Factory set-up - Local network), it will be possible to simultaneously switch all the units in a local network on or off.

When it is on (**Unit ON**), the unit may be controlled remotely from the digital **OFF input** and from the supervision/BMS Modbus system.

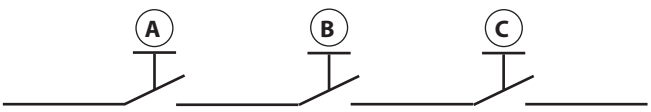
5.4.1 OFF FROM REMOTE AND FROM SUPERVISION/BMS MODBUS SYSTEM

ATTENTION!

If the supervision/BMS system sets the unit to OFF, and it is not possible to restore the ON status (for example due to lack of communication), the OFF condition can be reset by interrupting the power supply of the unit 3 consecutive times in 1 minute.

After being started from the terminal, the unit may be turned off and on remotely from a digital **OFF input** and from the supervision/BMS Modbus system.

For reasons of operator safety, should the unit be set to OFF from the display, the unit may not be started in any way via the digital OFF input remotely and via the supervision/BMS Modbus system. The unit's switch-on priority is therefore as follows:



A On/Off from display
B Off from remote
C Off from supervision/BMS Modbus system

5.4.2 AUTOMATIC RE-START DUE TO POWER FAILURE

ATTENTION! DANGER!

Risk of immediate start-up after resetting the main switch if used as an emergency stop!

The main switch can be used as an emergency stop when the operator is near the machine (during start-up, operation and maintenance). In this case, resetting the main switch will allow the machine to immediately restart, without any additional action by the operator.

The control software features an automatic re-start function in case of power supply failure. Should there be an outage on the power supply line, when it is restored SURVEY³ will resume the operation that was running prior to the problem.

Resuming previous operation will only be possible if, upon restarting, the unit has no shut-down alarms that prevent it from switching back on.

5.4.3 POWER SUPPLY FAILURE ALARM

The control software features an automatic notification function for shut-down in case of power supply failure. If there is a power outage, when the power comes back on SURVEY³ will display an alarm to notify the user of the problem.

From the "**No electrical power supply alarm**" (Factory setup - Alarm management) parameter it is possible to enable the alarm for re-start due to power outage.

The parameter makes it possible to choose the alarm triggering type:

1) **No:** No alarm is generated in the event of restart due to power failure.
2) **Unit ON**: The alarm will be generated at the next SURVEY³ restart only if the unit was running (**Unit ON**). If the unit was off (**Unit OFF**), no alarm will be generated.
3) **Yes:** The alarm will **ALWAYS** be generated the next time SURVEY³ is restarted.

When it is configured, a SURVEY³ restart following a power failure will generate the "**Electrical power supply failure alarm**" to alert the user to the problem.

5.5 AIR SUPPLY FAN REGULATION

SURVEY³ has the possibility of controlling one or more air supply fans with various types of control. The type of control is connected to the fan's features and the environment requiring climate-control.

The "**Type of fans**" parameter (Factory Setup) is pre-configured for the P-Series + PACi conection as follows.

1) **Modbus EBM 3PH:** This controls EBM PAPST fans with three-phase power supply through Modbus Master communication protocol. Utilised on models 121 and 141.
2) **Modbus EBM 1PH:** This controls EBM PAPST fans with single-phase power supply through Modbus Master communication protocol. Utilised on models 071 and 111.
3) **Modbus ZIEHL 3PH:** This controls ZIEHL ABEGG fans with three-phase power supply through Modbus Master communication protocol. Utilised on models 211.

The "**Regulation type**" parameter (Factory Setup) it pre-configured to regulate fan control as follows:

1) **Cold/Hot reg.:** The fans will be adjusted to variable operating speeds proportionally to the cooling or heating demand.

Please note: other fan control regulations are possible. If the pre-configured fan control is not matching with the site requirements, please contact the local sales dealer or Authorised Service Centre for support.

5.5.1 REGULATION OF MODULATING FANS PROPORTIONALLY TO THE COOLING OR HEATING DEMAND

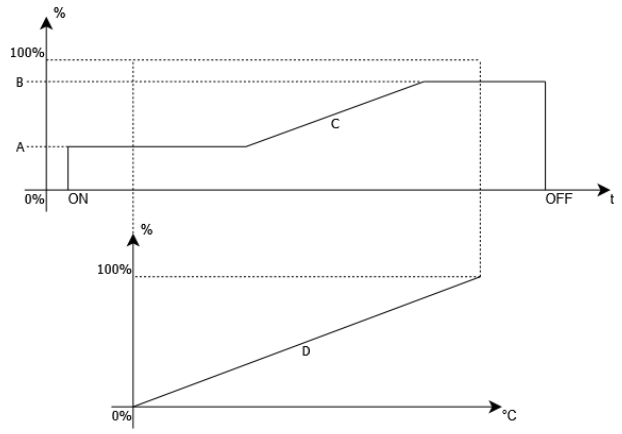
The control software is able to manage fan regulation at a speed value that is proportional to the cooling or heating demand. This can result in significant energy savings and a reduction in noise levels, particularly with partial loads.

With the "**Regulation type**" parameter (Factory Setup - Ventilation) it is possible to configure the fan regulation so as to modulate the speed according to the cooling or heating demand.

With the "**Minimum speed**" parameter (Factory Setup - Ventilation) it is possible to configure the minimum operation speed at which the fan may regulate.

With the "**Maximum speed**" parameter (Factory Setup - Ventilation) it is possible to configure the maximum operation speed that the fan can regulate at.

ATTENTION: Setting the minimum speed at a value below 30% is not recommended because this might prevent correct ambient temperature and humidity reading. With direct expansion units with electric coils the fan speed will be maintained at maximum speed until the component switches off, in order to guarantee optimal operation of the components.



A Minimum speed (Factory setup - Ventilation)
B Maximum speed (Factory setup - Ventilation)
C Fan modulation area
D Cooling or heating demand

5.5.2 FAN ALARM MANAGEMENT

When fans are controlled via the Modbus connection, SURVEY³ is able to detect the following alarm conditions of each fan installed in the unit, triggering the "**Fan inverter alarm (1-2-3-4-5)**" specifying the nature of the problem. The following alarm causes are possible:

- **Communication down:** SURVEY³ constantly monitors correct communication with the fans' control module in order to assure their correct operation.
- **No phase alarm:** The fan control electronics constantly check for motor power supply. The check is carried out on every individual motor phase.
- **High inverter temperature:** The fan control electronics constantly check the control module temperature in order to prevent damage due to excessively high temperatures.
- **High motor temperature:** The fan control electronics constantly check the motor temperature in order to prevent damage due to excessively high temperatures.
- **Inverter error:** The fan control electronics constantly check control module status and report any damage.
- **Motor overload:** The fan control electronics constantly check the motor status and report any overload.
- **Low voltage:** The fan control electronics constantly check the control module's status and report any DC power supply reduction.
- **No master-slave communication:** The fan control electronics constantly check the communication status with the slave fans and report any communication failure.
- **Hall sensor error:** The fan control electronics constantly check the status of the Hall sensor and report any damage.

5.6 TEMPERATURE REGULATION

5.6.1 TEMPERATURE CONTROL TYPE

All units are fitted with two operating temperature reading probes. One probe is located in the ambient air intake section and is defined as "**Return temperature probe"**, while another probe is placed in the ambient air supply compartment and is defined as "**Supply temperature probe".**

With the "**Regulation sensor**" parameter (User setup - Temperature) it is possible to configure which probe is designated for temperature control. The type of control is normally connected to the type of system one wishes to implement. The following controls may be selected:

- **Return temperature regulation:** SURVEY³ will use the return temperature value to regulate the temperature. This setting is ideal for rooms where the thermal loads are uniformly distributed.

- **Supply temperature regulation:** SURVEY³ will use the supply temperature value to regulate the temperature. This setting is ideal for rooms where the thermal loads are not uniform, and the return temperature might not be correct.

5.6.2 SETTING THE TEMPERATURE SET-POINT LIMITS

Should it be required to limit the setting field of the temperature regulation set-point, it is possible to configure its minimum and maximum limit:

With the "**Minimum temperature set-point limit**" parameter (Factory setup - Set-point limits) it is possible to configure the minimum setting limit of the temperature set-point.

With the "**Maximum temperature set-point limit**" parameter (Factory setup - Set-point limits) it is possible to configure the maximum setting limit of the temperature set-point.

This function is ideal for preventing excessively high or low regulation values to be set, which might create problems in the system.

5.6.3 TEMPERATURE REGULATION DEAD ZONE SETTING

In order to prevent continuous fluctuations in the cooling or heating demand near the regulation set-point, it is possible to configure a regulation dead zone which will deviate the regulation start point from the set-point. See the following chapters for further information.

With the "**Temperature dead zone**" parameter (Factory setup - Dead zone) it is possible to configure the temperature regulation dead zone.

This function is ideal for systems where the thermal loads are highly variable and there might be over-regulation near the set-points.

5.7 HUMIDITY REGULATION

5.7.1 SUPPLY AND RETURN HUMIDITY PROBE CONFIGURATION

The units may be fitted with a return humidity probe, "**Return humidity**" parameter (Factory setup - Probes), that lets you view the return air humidity reading.

5.7.2 SETTING THE RETURN HUMIDITY SET-POINT LIMITS

Should it be required to limit the setting field of the humidity regulation set-point, it is possible to configure its minimum and maximum limit:

With the "**Minimum humidity set-point limit**" parameter (Factory setup - Set-point limits) it is possible to configure the minimum setting limit of the humidity set-point.

With the "**Maximum humidity set-point limit**" parameter (Factory setup - Set-point limits) it is possible to configure the maximum setting limit of the humidity set-point.

This function is ideal for preventing excessively high or low regulation values to be set, which might create problems in the system.

5.7.3 RETURN HUMIDITY REGULATION DEAD ZONE SETTING

In order to prevent continuous fluctuations in the dehumidification and humidification demand near the regulation set-point, it is possible to configure a regulation dead zone which will deviate the regulation start point from the set-point. See the following chapters for further information.

With the "**Humidity dead zone**" parameter (Factory setup - Dead zone) it is possible to configure the humidity regulation dead zone.

This function is ideal for systems where the thermal loads are highly variable and there might be over-regulation near the set-points.

5.7.4 MANUAL HUMIDIFIER WATER DISCHARGE

In order to carry out routine humidifier maintenance, it might be necessary to empty water forcibly from the cylinder.

With the "**Manual cylinder discharge**" parameter (User setup - Humidifier) it is possible to manually discharge water from the steam cylinder to remove it for maintenance.

5.7.5 LINES AND HUMIDIFIER CYLINDER PRE-WASHING MANAGEMENT

The pre-washing function allows cleaning the cylinder and water lines, in particular after having set up the hydraulic connections and/or replaced the cylinder. During washing, the cylinder is filled (with closed contactor) and emptied 3 times to remove any impurities contained inside the cylinder and the pipes.

With the "**Cylinder pre-washing**" parameter (User setup - Humidifier) it is possible to enable the pre-washing function.

The humidifier will automatically go back to normal operation at the end of the pre-washing function.

5.7.6

5.7.7 HIGH AND LOW RETURN AND SUPPLY HUMIDITY ALARMS

With the "**High return humidity alarm offset**" (User set-up - Humidity) and "**Low return humidity alarm offset**" (User set-up - Humidity) parameters it is possible to configure two alarm thresholds for humidity control.

Exceeding these thresholds will trigger the "**High return humidity alarm**" or the "**Low return humidity alarm**" to alert the operator to any problems.

In units with supply humidity probe, with the "**High supply humidity alarm limit**" (User setup - Humidity) and "**Low supply humidity alarm limit**" (User setup - Humidity) parameters it is possible to configure two alarm thresholds for supply humidity.

Exceeding these thresholds will trigger the "**High supply humidity alarm**" or the "**Low supply humidity alarm**" to alert the operator to any problems.

High and low humidity alarm triggering does not pose a shutdown problem for the unit that will continue operating regularly. With the "**Temperature and humidity alarms delay**" parameter (Factory setup - Alarms management) it is possible to delay alarm triggering.

Alarm triggering is defined by the following formulas:

$$Al_{Hh} = In > Set + Offset_{Hh}$$

$$Al_{Lh} = In < Set - Offset_{Lh}$$

$$Al_{Hsh} = In > Limit_{Hsh}$$

$$Al_{Lsh} = In < Limit_{Lsh}$$

Where:

- **Al_{Hh}** is the high return humidity alarm
- **Al_{Lh}** is the low return humidity alarm
- **Al_{Hsh}** is the high supply humidity alarm
- **Al_{Lsh}** is the low supply humidity alarm
- **In** is the return humidity value.
- **Set** is the "**Humidity set-point**" parameter (Main menu - Set-point)
- **$Offset_{Hh}$** is the "**High return humidity alarm offset**" parameter (User setup - Humidity)
- **$Offset_{Lh}$** is the "**Low return humidity alarm offset**" parameter (User setup - Humidity)
- **$Limit_{Hsh}$** is the "**High supply humidity alarm limit**" parameter (User setup - Humidity)
- **$Limit_{Lsh}$** is the "**Low supply humidity alarm limit**" parameter (User setup - Humidity)

5.7.8 AIR HUMIDITY PROBES ALARM MANAGEMENT

If the return humidity probe is broken or disconnected SURVEY³ will trigger the "**Broken return humidity probe alarm**". In the same way, if the supply humidity probe is broken or disconnected SURVEY³ will trigger the "**Broken supply humidity probe alarm**".

The return humidity probe alarm stops humidity regulation, whereas the supply probe has no effects on regulation.

5.7.9 HUMIDIFIER ALARM MANAGEMENT

The CPY humidifier board controls the internal humidifier's alarm detection. With the Modbus Master protocol, SURVEY³ receives the humidifier's alarm statuses, triggering the "**Humidifier alarm**" and providing the type of alarm. See the chapter on alarm management for further information.

With the "**Configurable output (1-2-3-4-5)**" parameter (Factory setup - Digital outputs) it is possible to configure one of the five digital outputs in order to provide the "**General external humidifier alarm**".

Both alarms stop humidifier regulation.

5.8 DIRECT EXPANSION UNIT REGULATION

The "**Machine type**" parameter is preset to "**Direct Expansion**", and preconfigured for connection to PACi outdoor units. No additional setting should be necessary. If any issues are experienced during setup, or commissioning, please contact your local sales dealer or Authorised Service Centre.

PACi direct expansion units exploit the properties of R32 refrigerant gas to cool air. The control and modulation of the refrigerant circuit is managed by the PACi outdoor unit. The P-Series units provide an internal 0 - 10 V signal from which the PACi will adapt its operation accordingly.

5.8.1 COMPRESSOR OPERATION

- The compressor operation is managed exclusively by the PACi outdoor unit, please consult the relevant Service Manual for the PACi outdoor unit in question for full details.
- The compressor will modulate according to the demand, internal temperatures, and the ambient conditions under which the unit is currently operating. No intervention is required for the control of the PACi unit.

5.8.2 PACi UNIT ALARM MANAGEMENT

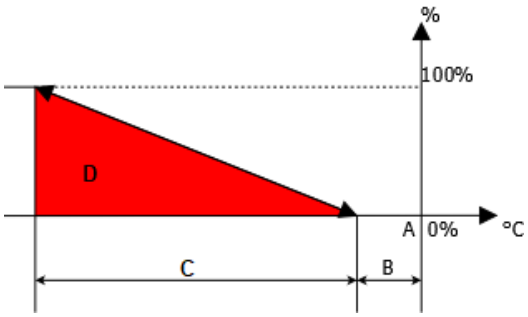
The PACi control interface provides a general alarm to the SURVEY³ controller via Digital Input (DI6). A general alarm will be indicated on the SURVEY³ controller. In such an event, please refer to the Panasonic CZ-RTC6 controller located in the lower left corner of the electrical enclosure for individual alarm details relating to the PACi connection

Further details pertaining to PACi alarms and alarm management can be found in section XXX.

5.8.3 HEATING WITH ELECTRIC MODULATING COILS

The SURVEY³ is able to manage modulating electric coils through a 0-10 V signal. The figures below illustrate the diagram of modulation with proportional temperature regulation:

The "**Electric coil power**" parameter is preset at the factory for the configuration ordered. If adjustment is required, or if any issues are experienced during setup, or commissioning. please contact your local sales dealer or Authorised Service Centre. .



A **Temperature set-point (Main menu - Set-point)**
B **Temperature dead zone (Factory setup - Dead zone)**
C **Proportional band (User setup - Temperature)**
D **Heating**

5.8.4 ELECTRIC COIL ALARMS MANAGEMENT

The electric coils provide active protection against overheating, through the installation of a safety thermostat placed inside the electric coil.

Should the safety thermostat detect a temperature exceeding 135 °C, it will stop coil operation.

Opening the alarm digital input will trigger the "**Electric coil thermostat alarm**" which will stop heating regulation. The thermostat is manually reset, therefore it will need to be reset to clear the alarm.

5.9 CONFIGURABLE DIGITAL INPUTS

SURVEY³ is able to control up to five configurable digital inputs.

The "**Configurable input (1-2-3-4-5)**" parameter (Factory setup) are pre-configured as **N.O. - Normally open** according to the table below.

Other configurations are possible to match with the site requirements. If a modified arrangement is required, please contact your local sales dealer of Authorised Service Centre for support.

TYPES OF CONFIGURABLE DIGITAL INPUTS		
Input Ref:	**Management**	**Software reaction**
DI 6	**PACi alarm input[1]**	Alarm only
DI 7	**Gas leak detector alarm**	Alarm only
DI 8	**Smoke/Fire Alarm**	Unit OFF
DI 9	**Gas leak detector alarm**	Alarm only
DI 10	**- unassigned -**	- unassigned -

1. The PACi alarm input is required for operational alarm feedback from the PACi system and cannot be substituted

5.10 CONFIGURABLE DIGITAL OUTPUTS

SURVEY³ is able to control up to four digital outputs freely configurable by the user.

The "**Configurable output (1-2-3-4-5)**" parameter (Factory setup) are pre-configured as **N.O. - Normally open** according to the table below.

Other configurations are possible to match with the site requirements. If a modified arrangement is required, please contact your local sales dealer of Authorised Service Centre for support.

TYPES OF CONFIGURABLE DIGITAL OUTPUTS		
Output No.	**Management**	**Description**
1	**Cooling status signal**	
2	**Non-critical alarm signal**	
3	**Critical alarm signal**	
4	**Cooling alarm signal**	

5.11 AIR FILTER MANAGEMENT

5.11.1 AIR FILTER ALARM MANAGEMENT WITH DIGITAL DIFFERENTIAL PRESSURE PROBE

SURVEY³ is able to manage an air filter alarm, to signal the presence of dirty filters, with a digital differential pressure probe with manually-calibrated trigger threshold.

If a filter is dirty, the differential pressure value will exceed the trigger threshold, accordingly the digital pressure probe will react by opening a contact located on the digital dirty filter alarm input.

The SURVEY³ regulator will then generate the "**Clogged air filter alarm**". The clogged air filters alarm does not stop normal unit operation.

5.12 INTERNAL COMPONENTS ALARMS MANAGEMENT

5.12.1 REFRIGERANT GAS LEAK DETECTION ALARM MANAGEMENT

SURVEY³ is able to manage a refrigerant gas leak detection device. The gas leak alarm is managed by a detector fitted either within or outside of the the unit.

When connected to the pre-configured DI 7 of the "**Configurable input (1-2-3-4-5**)", should a refrigerant gas leak occur, the relative sensor will act on the digital alarm input. SURVEY³ generates the "**Refrigerant gas leak detector alarm"**.

The alarm does not stop normal unit operation, allowing the fans to continue to operate. This is essential for the safe operation of the system in the event of an R32 leak refrigerant leakage.

5.12.2 SMOKE/FIRE ALARM MANAGEMENT

SURVEY³ is able to control a smoke or fire presence alarm, to switch off the unit.

When connected to the pre-configured DI 8 of the "**Configurable input (1-2-3-4-5**)", the SURVEY³ will trigger the "**Smoke/fire presence alarm**" which stops normal unit operation. According to the "**Smoke/fire alarm reset type**" parameter setting (Factory setup - Alarms management), it is possible to select the type of alarm reset choosing between **Manual** or **Automatic**.

To amend the setting of the "**Smoke/fire alarm reset type**" parameter setting please contact your local sales dealer or Authorised Service Centre for support.

5.13 PROBE CALIBRATION MANAGEMENT

The value of the probes installed inside the unit might need to be changed depending on system requirements. To this end SURVEY³ is able to manage a probe calibration value to be added to the actual reading.

With the "**Return temperature**" parameter (User set-up - Probe calibration) it is possible to calibrate the return temperature probe.

With the "**Supply temperature**" parameter (User set-up - Probe calibration) it is possible to calibrate the supply temperature probe.

With the "**Return humidity**" parameter (User set-up - Probe calibration) it is possible to calibrate the return humidity probe.

With the "**Supply humidity**" parameter (User set-up - Probe calibration) it is possible to calibrate the supply humidity probe.

With the "**Differential air pressure**" parameter (User Set-up - Probe calibration) it is possible to calibrate the air differential pressure sensor.

With the "**Filter differential pressure**" parameter (User Set-up - Probe calibration) it is possible to calibrate the dirty filter differential pressure sensor.

5.14 MODBUS RTU OR TCP SLAVE SERIAL COMMUNICATION MANAGEMENT

ATTENTION!

Communication parameter changes require the controller to be rebooted in order to be confirmed.

The SURVEY³ regulator is equipped with an RS485 and RJ45 serial output for connection to the supervision/BMS systems through the Modbus RTU or TCP slave protocol. See the following chapters for further information.

With the "**Modbus address**" parameter (User set-up - Modbus) it is possible to set the unit's serial address for interfacing with the Modbus network.

With the "**Modbus Baudrate**" parameter (User set-up - Modbus) it is possible to set the unit's communication speed for interfacing with the Modbus network.

With the "**Modbus Parity**" parameter (User set-up - Modbus) it is possible to set the unit's parity for interfacing with the Modbus network.

With the "**Modbus Stop bit**" parameter (User set-up - Modbus) it is possible to set the unit's number of stop bits for interfacing with the Modbus network.

5.15 ETHERNET BOARD MANAGEMENT

ATTENTION!

Communication parameter changes require the controller to be rebooted in order to be confirmed.

The SURVEY³ regulator is equipped with an RJ45 serial output for connection to an Ethernet network. See the following chapters for further information.

With the "**IP address**" parameter (User set-up - Ethernet) it is possible to set the unit's IP address for Ethernet interfacing.

With the "**Subnet mask**" parameter (User set-up - Ethernet) it is possible to set the unit's subnet mask for Ethernet interfacing.

With the "**Gateway**" parameter (User set-up - Ethernet) it is possible to set the unit's gateway for Ethernet interfacing.

With the "**Web server IP port**" parameter (User set-up - Ethernet) it is possible to set the unit's IP port for Web Server Ethernet interfacing.

With the " **Modbus TCP port**" parameter (User set-up - Ethernet) it is possible to set the unit's IP port for Modbus TCP Ethernet interfacing.

With the " **BACnet IP port**" parameter (User set-up - Ethernet) it is possible to set the unit's IP port for BACnet IP Ethernet interfacing.

5.16 CLEARING OPERATING HOURS

5.16.1 CLEARING OPERATING HOURS

During unit maintenance operations it might be required to clear the operating hours of the main components, stored in the SURVEY³.

With parameter "**Unit hours**" (Clearing the hours) it is possible to delete the unit's operating hours.

With parameter "**Heating**" (Clearing the hours) it is possible to delete the electrical heater's operating hours.

With parameter "**Humidifier**" (Clearing the hours) it is possible to delete the humidifier's operating hours. With an internal humidifier, the operating hours on the CPY board will also be cleared.

Access to alarms log clearing is only possible with a **Manufacturer** log in. Please contact your local sales dealer or Authorised Service Centre for support.

5.17 FACTORY SETTINGS RESET MANAGEMENT

5.17.1 FACTORY SETTINGS RESET THROUGH SURVEY³ MEMORY

SURVEY³ saves the factory settings in its internal memory during the unit's commissioning operations.

If these parameters need to be restored, through the "**Factory settings reset**" parameter (Factory Setup - Parameters) it is possible to return to the unit's configuration during the factory commissioning stage.

5.17.2 FACTORY SETTINGS RESET THROUGH USB

SURVEY³ allows a specific configuration file to be uploaded through the USB port on the regulation board.

To perform this operation the relative file **parapp.ucjm** must be uploaded onto a USB. The USB must then be inserted in the USB port on the regulation board.

If the factory settings need to be restored using the USB port, through the "**USB factory settings reset**" parameter (Factory Setup - Parameters) it is possible to activate the upload of the file saved on the USB.

Access to Factory Settings Reset is only possible with a **Manufacturer** log in. Please contact your local sales dealer or Authorised Service Centre for support.

5.18 OPERATING PARAMETER RECORDING MANAGEMENT

SURVEY³ records the unit's operating parameters in its internal memory at regular intervals of 30 seconds for a maximum 10-day period. Once the maximum memory capacity is reached, the old data is cleared in order to save the more recent data.

The parameters recorded in the memory are:

Return temperature.	Unit status.
Supply temperature.	Cooling demand.
Return humidity.	Heating demand.
Supply humidity.	Dehumidification demand.
Air pressure.	Humidification demand.

5.18.1 PARAMETER RECORDING IN THE EVENT OF AN ALARM

In the event of an alarm the SURVEY³ immediately saves the above-listed parameters and a description of the generated alarm. This recording is independent of the regular time-based recordings, which continue to function regularly.

5.18.2 DOWNLOAD OF RECORDING VIA USB PORT

SURVEY³ allows a specific configuration file to be downloaded through the USB port on the regulation board.

In order to perform this operation, a USB needs to be inserted in the USB port on the regulation board. Once the USB has been inserted, the recorded data can be downloaded through the "**Print CSV**" parameter (User Setup - Datalog).

Once the data has been exported, a file will be saved on the USB in the **Comma-Separated Values** format (abbreviated to **CSV**), named "**Close Control_xxxx_xx_xx**" where "x" indicates the date on which the download was made (e.g. Close Control_2019_11_12). The **CSV** files can be viewed in any electronic spreadsheet management programme (E.g. Microsoft Excel).

5.19 CHANGING ACCESS PASSWORDS

The parameter management menus are password-protected. It is possible to change these passwords according to user requirements. If modified, the original passwords will no longer be valid.

With the "**User password**" parameter (User set-up - Password) it is possible to change the password to access the **User** menu.

With the "**Manufacturer password**" parameter (Factory setup - Password) it is possible to change the password to access the **Manufacturer** menu.

6 COMPONENT CONTROL MODBUS MASTER NETWORK

SURVEY³ microprocessors use a Modbus MASTER network to control the devices installed in the unit. The following devices are interfaced with the Modbus MASTER network:

- EC air supply fans.
- CPY submerged electrode humidifier control board.

The Modbus Master control network is implemented during unit assembly in the production line (see wiring diagram for additional details):

6.1 MODBUS MASTER NETWORK DEVICE ADDRESSING

The components connected to the Modbus master network are addressed in the testing stage in the factory.

In case of replacement the components will be sent already configured for connection to the Modbus Master network. Only fans will be sent not pre-configured. Fans addressing configuration will take place through an auto-addressing function.

The following table sets out the addresses of individual components that might be included in the Modbus Master network:

Modbus Master network addressing	
Device	**Address**
CPY	4
Fan 1	6
Filter differential pressure	15

6.1.1 FAN AUTO-ADDRESSING IN CASE OF REPLACEMENT

In the event of fan replacement, the SURVEY³ microprocessor features a check and auto-addressing function of the Modbus master network. In the event of a communication alarm of one or more fans the SURVEY³ microprocessor will start checking whether there are new fans in the network. If the SURVEY³ microprocessor finds a non configured fan (new) in the network, it will change the address to that of the faulty one. If there is an alarm on several fans, this fan will be given the first free address.

During the auto-addressing process the NEW FANS will have to be connected ONE AT A TIME.

7 LIST OF REGULATION SOFTWARE PARAMETERS

7.1 SET-POINT MENU: SET-POINT EDITING

7.1.1 SET-POINT

Description	Limits	Default	Unit of measure
Temperature set-point	20.0 - 40.0	22.0	°C
Humidity set-point	20 - 75	50	%Rh

7.2 USER SETUP: OPERATING PROGRAM SETTINGS

7.2.1 LANGUAGE

Description	Limits	Default	Unit of measure
Language	Italian - Polish	English	-

7.2.2 TEMPERATURE

Description	Limits	Default	Unit of measure
Regulation sensor	Return - Supply	Return	-
Regulation type	P - PI - PID	P	-
Proportional band	0.1 - 60.0	2.0	°C
Integration time	0 - 9,999	120	s
Derivation time	0 - 9,999	30	s
High temperature alarm offset	0.0 - 20.0	10.0	°C
Low temperature alarm offset	0.0 - 20.0	10.0	°C

7.2.3 LIMIT TEMPERATURE

Description	Limits	Default	Unit of measure
High limit temperature alarm limit	-15.0 - 90.0	30.0	°C
High limit temperature management	*	Alarm Only	-
Low limit temperature alarm limit	-15.0 - 90.0	8.0	°C
Low limit temperature management	**	Alarm Only	-
* Alarm only - Stop component - Reduction - Cold activation			
** Alarm only - Stop component - Reduction - Hot activation			

7.2.4 HUMIDITY

Description	Limits	Default	Unit of measure
Dehumidification proportional band	1 - 50	10	%Rh
Humidification proportional band	1 - 50	10	%Rh
High return humidity alarm offset	0 - 100	20	%Rh
Low return humidity alarm offset	0 - 100	20	%Rh
High supply humidity alarm limit	0 - 100	95	%Rh
Low supply humidity alarm limit	0 - 100	20	%Rh

7.2.5 HUMIDIFIER

Description	Limits	Default	Unit of measure
Enable humidification	No - Yes	Yes	-
Manual cylinder discharge	No - Yes	No	-
Cylinder pre-wash	No - Yes	No	-

7.2.6 PROBE CALIBRATION

Description	Limits	Default	Unit of measure
Return temperature	-10.0 - 10.0	0.0	°C
Supply temperature	-10.0 - 10.0	0.0	°C
Return humidity	-10 - 10	0	%Rh
Supply humidity	-10 - 10	0	%Rh
Air differential pressure	-10 - 10	0	Pa
Filter differential pressure	-10 - 10	0	Pa

7.2.7 MODBUS

Description	Limits	Default	Unit of measure
Modbus Address	1 - 247	1	-
Modbus Baudrate	*	19200	Baud
Modbus Parity	Even - None	Even	-
Modbus Stop bit	1 - 2	1	Stop bit
* 1200 - 2400 - 4800 - 9600 - 19200 - 28800 - 38400 - 57600			

7.2.8 ETHERNET

Description	Limits	Default	Unit of measure
IP address	-	192.168.1.24	-
Subnet mask	-	255.255.255.0	-
Gateway	-	192.168.1.1	-
Webserver IP port	0 - 65535	80	-
Modbus TCP port	0 - 65535	502	-
BACnet IP port	0 - 65535	47808	-

7.2.9 PASSWORD

Description	Limits	Default	Unit of measure
User Password	0 - 9999	0123	-

8 UNIT ALARMS MANAGEMENT

8.2.1 SYMBOLS AND ICONS THAT CAN BE SHOWN ON THE DISPLAY

Various types of icons are used in the software pages. The meanings of the icons are provided in the table below.

Alarms	
OK	OK 3SEC
Press OK key	Press and hold OK key

8.1 SIGNALLING, CHECK AND CLEARANCE OF ALARM CONDITIONS

8.1.1 ALARM PRESENCE SIGNALLING

The presence of one or more active alarms is signalled by:

- Activation of the (**Buzzer**) incorporated in the user terminal.
- Illumination of the **RED LED** on the front panel of the user terminal (⚠);
- Alarm presence icon (🔔) appears on the program's main page.
- If the alarm is **CRITICAL**, and therefore blocks unit operation, the **GREEN LED** (⏻) starts flashing.

8.1.2 CHECK AND CLEARANCE OF ACTIVE ALARMS

From the **ALM - Active alarms** menu it is possible to view the alarms that are active on the unit. Access this menu by holding down the **LEFT/ALARM** (←) key.

Use the **OK** (OK) key to scroll through all active alarm signals.

Hold the **OK** (OK) key pressed to reset the displayed alarm.

Press **ESC** (⏻) to return to the main program page.

Example of active alarm display.

8.1.3 ALARM SIGNAL BUZZER MANAGEMENT

In the presence of a new alarm, SURVEY³ emits a signal (Buzzer) to inform the user of the alarm condition.

If the (Buzzer) sound is featured in the "**Alarm buzzer**" parameter (Factory setup - Alarm management) it is possible to remove the alarm (Buzzer).

8.2 DESCRIPTION OF SURVEY³ MICROPROCESSOR ALARMS

8.2.1 CRITICAL ALARMS

Name:	**Smoke/fire detection alarm**
Cause:	The digital smoke/fire alarm input is open
Delay:	At startup: 10 - In operation: 5 s
Effect:	Tripping causes the unit to shut off All devices will stop without complying with the operating times.
Solutions:	Check for the presence of smoke or fire inside the room Check the electrical connection of the digital input
Restore:	Second parameter

Name:	**Critical generic alarm**
Cause:	The digital critical generic alarm input is open
Delay:	At startup: 10 s - In operation: 5 s
Effect:	Tripping causes the unit to shut off All devices will stop without complying with the operating times
Solutions:	Check the electrical connection of the digital input
Restore:	The alarm needs to be reset manually

8.2.2 FAN ALARMS

Name:	**General supply fans alarm**
Cause:	The unit's fans are blocked by the tripped air flow sensor or the fan's electrical protection
Delay:	At startup: 40 s - In operation: 5 s
Effect:	Tripping causes the unit to shut off All devices will stop without complying with the operating times
Solutions:	Check for any problems on the aeraulic circuit that might reduce the unit's air flow. Check the electrical connection of the air flow sensor and of the fan's electrical protection. Check fan speed Check the status of the fan
Restore:	The alarm needs to be reset manually

Name:	**Fan N alarm**
Cause:	The fan has one of the following problems: **Communication down** **No phase alarm** **High inverter temperature** **Inverter error** **Motor overload** **Low DC voltage** **No master-slave communication** **Hall sensor error** **High motor temperature**
Delay:	At startup: 30 s - In operation: 30 s
Effect:	Tripping causes the unit to shut off All devices will stop without complying with the operating times
Solutions:	Check Modbus communication cable wiring Check the fan's electrical connection Check the power supply voltage of the electrical line Check the fan regulation module Check the status of the fan
Restore:	The alarm needs to be reset manually

8.2.3 PROBE ALARMS

Name:	**Broken return temperature probe alarm**
Cause:	Broken or disconnected return temperature probe
Delay:	At startup: 10 s - In operation: 10 s
Effect:	See chapters above
Solutions:	Check the probe's electrical connection Check the probe signal
Restore:	The alarm resets automatically

Name:	**Broken supply temperature probe alarm**
Cause:	The supply temperature probe is broken or disconnected
Delay:	At startup: 10 s - In operation: 10 s
Effect:	See chapters above
Solutions:	Check the probe's electrical connection Check the probe signal
Restore:	The alarm resets automatically

Name:	**Broken return humidity probe alarm**
Cause:	The return humidity probe is broken or disconnected
Delay:	At startup: 10 s - In operation: 10 s
Effect:	Humidity regulation stops
Solutions:	Check the probe's electrical connection Check the probe signal
Restore:	The alarm resets automatically

Name:	**Broken supply humidity probe alarm**
Cause:	The supply humidity probe is broken or disconnected
Delay:	At startup: 10 s - In operation: 10 s
Effect:	Alarm limit regulation is stopped
Solutions:	Check the probe's electrical connection Check the probe signal
Restore:	The alarm resets automatically

Name:	**Differential air pressure probe alarm**
Cause:	The differential air pressure probe is broken or disconnected
Delay:	At startup: 10 s - In operation: 10 s
Effect:	See chapters above
Solutions:	Check the probe's electrical connection Check the probe signal
Restore:	The alarm resets automatically

8.2.4 INTERNAL HUMIDIFIER ALARMS

Name:	**Internal humidifier alarm**
Cause:	The internal humidifier has one of the following problems: **Communication** **Internal memory error** **Parameter error** **High electrode current** **Low steam flow rate** **Failed discharge** **Hours of maintenance** **No water** **Cylinder maintenance** **Cylinder burnt out** **Foam presence** **Life timer expired** **High water level** **High conductivity** **Connection error** See the chapters below for the description of the alarms
Delay:	At startup: 30 s - In operation: 30 s
Effect:	Humidification will stop
Solutions:	See the chapters below
Restore:	The alarm needs to be reset manually

8.2.5 COMPONENT ALARMS

Name:	**Electric coil thermostat alarm**
Cause:	The electric coil over-heated thereby tripping the safety thermostat
Delay:	At startup: 10 s - In operation: 5 s
Effect:	The electric coil stops
Solutions:	Check fan speed Check fan air flow Check the aeraulic circuit
Restore:	The alarm needs to be reset manually

Name:	**Clogged air filter alarm**
Cause:	The dirty filter differential pressure sensor detected excessive pressure
Delay:	At startup: 10 s - In operation: 5 s
Effect:	Signalling only
Solutions:	Check air filter status Check pressure sensor calibration Check the pressure sensor connection Check the aeraulic circuit
Restore:	The alarm needs to be reset manually

Name:	**Refrigerant gas leak detector alarm**
Cause:	There is an alarm on the refrigerant gas leak detector
Delay:	At startup: 10 s - In operation: 5 s
Effect:	See chapters above
Solutions:	Check the status of the refrigerant gas leak detector
Restore:	The alarm needs to be reset manually

Name:	**No electrical power supply alarm**
Cause:	There is an electrical power supply outage on the unit
Delay:	At startup: 10 s - In operation: 5 s
Effect:	See chapters above
Solutions:	Check the status of the unit's electrical power supply line
Restore:	The alarm needs to be reset manually

Name:	**Non-critical generic alarm**
Cause:	The digital generic non-critical alarm input is open
Delay:	At startup: 10 s - In operation: 5 s
Effect:	Signalling only
Solutions:	Check the status of the digital input
Restore:	The alarm needs to be reset manually

8.2.6 TEMPERATURE AND HUMIDITY ALARMS

Name:	**High temperature regulation alarm**
Cause:	The regulated temperature has exceeded the alarm threshold
Delay:	At startup: Second parameter - In operation: Second parameter
Effect:	Signalling only
Solutions:	Check the unit's operating status
Restore:	The alarm resets automatically

Name:	**Low temperature regulation alarm**
Cause:	The regulated temperature has exceeded the alarm threshold
Delay:	At startup: Second parameter - In operation: Second parameter
Effect:	Signalling only
Solutions:	Check the unit's operating status
Restore:	The alarm resets automatically

Name:	**High limit temperature alarm**
Cause:	The limit temperature has exceeded the alarm threshold
Delay:	At startup: Second parameter - In operation: Second parameter
Effect:	Second parameter (See chapters above)
Solutions:	Check the unit's operating status
Restore:	The alarm resets automatically

Name:	**Low limit temperature alarm**
Cause:	The limit temperature has exceeded the alarm threshold
Delay:	At startup: Second parameter - In operation: Second parameter
Effect:	Second parameter (See chapters above)
Solutions:	Check the unit's operating status
Restore:	The alarm resets automatically

Name:	**Return high humidity alarm**
Cause:	The return humidity has exceeded the alarm threshold
Delay:	At startup: Second parameter - In operation: Second parameter
Effect:	Signalling only
Solutions:	Check the unit's operating status
Restore:	The alarm resets automatically

Name:	**Return low humidity alarm**
Cause:	The return humidity has exceeded the alarm threshold
Delay:	At startup: Second parameter - In operation: Second parameter
Effect:	Signalling only
Solutions:	Check the unit's operating status
Restore:	The alarm resets automatically

8.3 DESCRIPTION OF INTERNAL HUMIDIFIER CPY BOARD ALARMS

Name:	**High electrode current**
Cause:	Electrode overcurrent. The current is greater than the maximum limits due to: • Excessively high water conductivity. • Water level high due to leakage in filling valve. • Water level high due to malfunctioning of discharge valve/header. • Electrode malfunction (for example, a bridge of hard water build-up between electrodes or touching electrodes). • TAM electrical circuit not configured properly. • TAM electrical circuit failure.
Solutions:	• The conductivity level of the water must be between 125-1250 µS/cm. • Check for leakage in the filling valve and clean it or have it replaced. • Check that the discharge valve is working properly. • Replace the cylinder. • Refer to the wiring diagram. • Replace the TAM.

Name:	**Internal memory error**
Cause:	The software or configuration parameters are corrupted
Solutions:	Contact the Manufacturer

Name:	**Parameter error**
Cause:	The configuration parameters are corrupted
Solutions:	Contact the Manufacturer

Name:	**High water conductivity**
Cause:	High supply water conductivity. The possible cause could depend on: • Conductivity electrodes in short circuit (for example, a bridge of hard water build-up between electrodes or touching electrodes). • Water conductivity exceeding maximum limit.
Solutions:	• Clean the conductivity reading electrodes. • The conductivity level of the water must be between 125-1250 µS/cm.

Name:	**Maintenance time expired**
Cause:	Maintenance time expired
Solutions:	Replace/clean the cylinder, then reset operating hours to zero

Name:	**Life timer expired**
Cause:	Life timer expired
Solutions:	Replace/clean the cylinder, then reset operating hours to zero

Name:	**No water**
Cause:	No feed water; the humidifier is trying to introduce water but the level inside the cylinder does not increase at the intended speed. The problem could depend on low mains water pressure or no mains water.
Solutions:	The mains water pressure must be between 0.1 and 0.8 MPa (1-8 bar).

Name:	**Low steam flow rate**
Cause:	Low steam flow rate during reduced production. The steam flow rate is estimated by the current reading of the TAM amperometric transformer. The problem could depend on: • Network water conductivity too low. • Too much foam inside the cylinder. • High amount of limescale inside the cylinder. • TAM electrical circuit not configured properly. • TAM electrical circuit failure.
Solutions:	• The conductivity level of the water must be between 125-1250 µS/cm. • Clean the cylinder and restart. • Clean/replace the cylinder. • Refer to the wiring diagram to check the circuit. • Replace the TAM.

Name:	**Failed discharge**
Cause:	The water inside the cylinder is unable to flow away correctly. The problem could depend on: • Clogged/malfunctioning discharge valve. • Clogged header • Clogged cylinder filter
Solutions:	• Check that the discharge valve is working properly. • Remove the cylinder and the discharge valve and clean the header. • Replace the cylinder.

Name:	**Cylinder maintenance**
Cause:	The cylinder requires maintenance due to limescale build-up.
Solutions:	Unscheduled maintenance: make sure the cylinder works properly, and, if needed, replace it.

Name:	**Connection error**
Cause:	Control signal not connected correctly.
Solutions:	Check the wiring of the control signal.

Name:	**High water level**
Cause:	High water level without humidification demand. The alarm occurs if water reaches the high level electrodes when the humidifier is blocked or disabled.
Solutions:	Check for leakage in the filling valve and clean/ replace it.

Name:	**Foam presence**
Cause:	Presence of foam inside the cylinder due to lubricants, solvents, detergents in the feed water (sometimes present in the water pipes after installation because they are dirty).
Solutions:	• Wash the feed water pipes abundantly. • Check the quality of the water.

Name:	**Cylinder burnt out**
Cause:	Cylinder burnt out. The alarm is displayed when production does not meet the demand within 3 hours of the "Cylinder Maintenance" display.
Solutions:	Scheduled maintenance: change the cylinder.

9 SUPERVISION THROUGH SERIAL PROTOCOLS

9.1 SUPERVISION THROUGH MODBUS PROTOCOL

9.1.1 SUPERVISION THROUGH MODBUS RTU SLAVE PROTOCOL

The SURVEY³ microprocessors can be inserted in a supervision and/or BMS (Building Management System) network, which adopts the Modbus® RTU standard through the dedicated RS485 serial board. The serial communication protocol has the following characteristics:

Modbus RTU Slave	
Protocol	Modbus® Slave, RTU mode
Communication Std.	RS485 not isolated with respect to network
Baud Rate (default)	Variable between 1200, 2400, 4800, 9600, 19200, 28800, 38400 and 57600 (19200)
Word Length	8
Parity (default)	Variable between None, Odd and Even (Even)
Stop Bits (default)	Variable between 1 and 2 (1)
Function code	03 (03 hex) - Read analog output holding registers
	06 (06 hex) - Write single analog output holding registers
	16 (10 hex) - Write multiple analog output holding registers

9.1.2 SUPERVISION THROUGH MODBUS TCP SLAVE PROTOCOL

The SURVEY³ microprocessors can be inserted in a supervision and/or BMS (Building Management System) network, which adopts the Modbus® TCP standard through the dedicated Ethernet RJ45 serial board. The serial communication protocol has the following characteristics:

Modbus TCP Slave	
Protocol	Modbus® Slave, TCP mode
Communication standard	RJ45 Ethernet
IP Address (default)	192.168.1.24
Subnet Mask (default)	255.255.255.0
Predefined gateway (default)	192.168.1.1
Port (default)	502
Function code	03 (03 hex) - Read analog output holding registers
	06 (06 hex) - Write single analog output holding registers
	16 (10 hex) - Write multiple analog output holding registers

9.2 CLOSE CONTROL SURVEY[3] MICROPROCESSOR SUPERVISOR VARIABLES (SOFTWARE VERSION 3.2)

Modbus								
Address		Data type	Description	uom	Limits		Dec	R/W
Base 0	Base 1							
HEX	DEC				Min	Max		
DI								
65	102	16 bit unsigned	Dirty filter alarm	-	0	1	0	R
66	103	16 bit unsigned	Remote OFF status	-	0	1	0	R
67	104	16 bit unsigned	Heater thermostat alarm	-	0	1	0	R
781	1922	16 bit unsigned	Configurable DI1 meaning	-	0	26	0	R
69	106	16 bit unsigned	Configurable DI 1	-	0	1	0	R
782	1923	16 bit unsigned	Configurable DI2 meaning	-	0	26	0	R
6A	107	16 bit unsigned	Configurable DI 2	-	0	1	0	R
783	1924	16 bit unsigned	Configurable DI3 meaning	-	0	26	0	R
6B	108	16 bit unsigned	Configurable DI 3	-	0	1	0	R
784	1925	16 bit unsigned	Configurable DI4 meaning	-	0	26	0	R
6C	109	16 bit unsigned	Configurable DI 4	-	0	1	0	R
785	1926	16 bit unsigned	Configurable DI5 meaning	-	0	26	0	R
6D	110	16 bit unsigned	Configurable DI 5	-	0	1	0	R
DO								
96	151	16 bit unsigned	Fan control	-	0	1	0	R
78B	1932	16 bit unsigned	Configurable DO1 meaning	-	0	19	0	R
98	153	16 bit unsigned	Configurable DO 1	-	0	1	0	R
78C	1933	16 bit unsigned	Configurable DO2 meaning	-	0	19	0	R
99	154	16 bit unsigned	Configurable DO 2	-	0	1	0	R
78D	1934	16 bit unsigned	Configurable DO3 meaning	-	0	19	0	R
9A	155	16 bit unsigned	Configurable DO 3	-	0	1	0	R
78E	1935	16 bit unsigned	Configurable DO4 meaning	-	0	19	0	R
9B	156	16 bit unsigned	Configurable DO 4	-	0	1	0	R
78F	1936	16 bit unsigned	Configurable DO5 meaning	-	0	19	0	R
9C	157	16 bit unsigned	Configurable DO 5	-	0	1	0	R
9D	158	16 bit unsigned	Electric heat stage 1	-	0	1	0	R
Temperature								
C7	200	16 bit signed	Return temperature	°C	-3276.8	3276.7	1	R
C9	202	16 bit signed	Supply temperature	°C	-3276.8	3276.7	1	R
CB	204	16 bit signed	Temperature delta	°C	-3276.8	3276.7	1	R
Humidity								
D1	210	16 bit signed	Return humidity	%Rh	-32768	32767	0	R
AO								
12B	300	16 bit unsigned	Supply fan / Dry cooler	%	0	100	2	R
12C	301	16 bit unsigned	Cooling valve / FC / Inverter	%	0	100	2	R
12D	302	16 bit unsigned	Heating valve /Heater	%	0	100	2	R
12E	303	16 bit unsigned	TS cooling valve 2	%	0	100	2	R
12F	304	16 bit unsigned	Condenser 1	%	0	100	2	R
130	305	16 bit unsigned	Condenser 2 / Humidifier	%	0	100	2	R
Unit status								
135	310	16 bit unsigned	Unit status	-	0	6	0	R
FAN								
13F	320	16 bit unsigned	Fan 1 speed	%	0	100	2	R
140	321	16 bit unsigned	Fan 1 speed RPM	RPM	0	65535	0	R

Modbus								
Address		Data type	Description	uom	Limits		Dec	R/W
Base 0	Base 1							
HEX	DEC				Min	Max		
141	322	16 bit unsigned	Fan 1 current	A	0	6553.5	1	R
142	323	16 bit unsigned	Fan 1 power	W	0	65535	0	R
Regulation								
16B	364	16 bit unsigned	Cooling request	%	0	100	2	R
16C	365	16 bit unsigned	Heating request	%	0	100	2	R
16D	366	16 bit unsigned	Dehumidification request	%	0	100	2	R
16E	367	16 bit unsigned	Humidification request	%	0	100	2	R
Humidifier								
1D5	470	16 bit unsigned	Current steam production	kg/h	0	6553.5	1	R
1D6	471	16 bit unsigned	Humidifier conductivity	µS/cm	0	65535	0	R
1D7	472	16 bit unsigned	Humidifier absorbed current	A	0	6553.5	1	R
1D8	473	16 bit unsigned	Humidifier operating mode	-	0	7	0	R
1D9	474	16 bit unsigned	Humidifier operating status	-	0	11	0	R
1DA	475	16 bit unsigned	Humidifier control	-	0	1	0	R
1DB	476	16 bit unsigned	Humidifier discharge	-	0	1	0	R
1DC	477	16 bit unsigned	Humidifier charging	-	0	1	0	R
1DD	478	16 bit unsigned	Humidifier high water	-	0	1	0	R
Electrical heater								
1EA	490	16 bit unsigned	Electric heater request	%	0	100	2	R
1EB	492	16 bit unsigned	Electric heater power	kW	0	6553.5	1	R
Operating hours								
1F3	500	32 bit unsigned (Low)	Unit working hours	h	0	100000	0	R
1F4	501	32 bit unsigned (High)						
1FF	512	32 bit unsigned (Low)	Heating working hours	h	0	100000	0	R
200	513	32 bit unsigned (High)						
201	514	32 bit unsigned (Low)	Humidifier working hours	h	0	100000	0	R
202	515	32 bit unsigned (High)						
Remote ON/OFF								
5FD	1534	16 bit unsigned	ON/OFF from supervisor	-	0	1	0	R/W
Set-point								
600	1537	16 bit signed	Temperature set-point	°C	-40	302	1	R/W
601	1538	16 bit unsigned	Humidity set-point	%Rh	0	100	0	R/W
Limit temperatures								
613	1556	16 bit signed	High limit temp. threshold	°C	-15	194	1	R/W
614	1557	16 bit unsigned	High limit temp. management	-	0	3	0	R/W
615	1558	16 bit signed	Low limit temp.threshold	°C	-15	194	1	R/W
616	1559	16 bit unsigned	Low limit temp. management	-	0	3	0	R/W
Humidity regulation								
611	1554	16 bit unsigned	High humidity offset	%RH	0	100	0	R/W
612	1555	16 bit unsigned	Low humidity offset	%RH	0	100	0	R/W
729	1834	16 bit unsigned	High supp. humidity threshold	%RH	0	100	0	R/W
72A	1835	16 bit unsigned	Low supp. humidity threshold	%RH	0	100	0	R/W
Humidifier regulation								
60E	1551	16 bit unsigned	Humidification enabling	-	0	1	0	R/W
74F	1872	16 bit unsigned	Manual draining	-	0	1	0	R/W
750	1873	16 bit unsigned	Cylinder washing	-	0	1	0	R/W

Modbus								
Address		Data type	Description	uom	Limits		Dec	R/W
Base 0	Base 1							
HEX	DEC				Min	Max		
Cumulative alarms								
275	630	16 bit unsigned	General alarams	-	0	1	0	R
276	631	16 bit unsigned	Not critical alarms	-	0	1	0	R
277	632	16 bit unsigned	Critical alarms	-	0	1	0	R
278	633	16 bit unsigned	Fans alarms	-	0	1	0	R
27A	635	16 bit unsigned	Temperature alarms	-	0	1	0	R
27B	636	16 bit unsigned	Humidity alarms	-	0	1	0	R
Critical alarms								
280	641	16 bit unsigned	Fire / Smoke alarm	-	0	1	0	R
281	642	16 bit unsigned	Critical generic alarm	-	0	1	0	R
Digital Fan Critical alarms								
289	650	16 bit unsigned	General supply fans alarm	-	0	1	0	R
Fan alarms								
293	660	16 bit unsigned	Fan general alarm 1	-	0	1	0	R
294	661	16 bit unsigned	Phase failure / Undervolt.1	-	0	1	0	R
295	662	16 bit unsigned	Communication 1	-	0	1	0	R
296	663	16 bit unsigned	Power mod overheated 1	-	0	1	0	R
297	664	16 bit unsigned	Master / Slave com. 1	-	0	1	0	R
298	665	16 bit unsigned	Regulation module 1	-	0	1	0	R
299	666	16 bit unsigned	Motor overheated 1	-	0	1	0	R
29A	667	16 bit unsigned	Hall sensor error 1	-	0	1	0	R
29B	668	16 bit unsigned	Locked motor 1	-	0	1	0	R
29C	669	16 bit unsigned	Low DC 1	-	0	1	0	R
Probes alarms								
301	770	16 bit unsigned	Return temperature probe	-	0	1	0	R
302	771	16 bit unsigned	Supply temperature probe	-	0	1	0	R
303	772	16 bit unsigned	Return humidity probe	-	0	1	0	R
Humidifier alarms								
351	850	16 bit unsigned	Internal humidifier alarm	-	0	1	0	R
352	851	16 bit unsigned	Communication alarm	-	0	1	0	R
353	852	16 bit unsigned	Memory error alarm	-	0	1	0	R
354	853	16 bit unsigned	Parameters error alarm	-	0	1	0	R
355	854	16 bit unsigned	Electrodes high current	-	0	1	0	R
356	855	16 bit unsigned	Low steam production alarm	-	0	1	0	R
357	856	16 bit unsigned	Drain loss alarm	-	0	1	0	R
358	857	16 bit unsigned	Maintenance hours alarm	-	0	1	0	R
359	858	16 bit unsigned	Water loss alarm	-	0	1	0	R
35A	859	16 bit unsigned	Cylinder maintenance alarm	-	0	1	0	R
35B	860	16 bit unsigned	Exaust cylinder alarm	-	0	1	0	R
35C	861	16 bit unsigned	Foam presence alarm	-	0	1	0	R
35D	862	16 bit unsigned	Life time expired alarm	-	0	1	0	R
35E	863	16 bit unsigned	High water level alarm	-	0	1	0	R
35F	864	16 bit unsigned	High conductivity alarm	-	0	1	0	R
360	865	16 bit unsigned	Connection error alarm	-	0	1	0	R
Other components alarms								
367	872	16 bit unsigned	Electric heater alarm	-	0	1	0	R
368	873	16 bit unsigned	Dirty filter alarm	-	0	1	0	R

Modbus								
Address		Data type	Description	uom	Limits		Dec	R/W
Base 0	Base 1							
HEX	DEC				Min	Max		
36C	877	16 bit unsigned	Motocondenser alarm	-	0	1	0	R
36D	878	16 bit unsigned	Refrigerant leak alarm	-	0	1	0	R
36E	879	16 bit unsigned	Power fault alarm	-	0	1	0	R
36F	880	16 bit unsigned	Not critical generic alarm	-	0	1	0	R
Temperature alarms								
383	900	16 bit unsigned	High regulation temperature alarm	-	0	1	0	R
384	901	16 bit unsigned	Low regulation temperature alarm	-	0	1	0	R
385	902	16 bit unsigned	High limit temperature alarm	-	0	1	0	R
386	903	16 bit unsigned	Low limit temperature alarm	-	0	1	0	R
Humidity alarms								
38D	910	16 bit unsigned	High room humidity alarm	-	0	1	0	R
38E	911	16 bit unsigned	Low room humidity alarm	-	0	1	0	R
Critical alarms Reset								
3E8	1001	16 bit unsigned	Reset Fire / Smoke alarm	-	0	1	0	R/W
3E9	1002	16 bit unsigned	Reset generic serious alarm	-	0	1	0	R/W
Fan alarms Reset								
3EA	1003	16 bit unsigned	Reset supply fan alarm	-	0	1	0	R/W
3EB	1004	16 bit unsigned	Reset fan 1 alarm	-	0	1	0	R/W
Humidity alarms Reset								
404	1029	16 bit unsigned	Reset internal humidifier alarm	-	0	1	0	R/W
Other components alarms Reset								
407	1032	16 bit unsigned	Reset electric heater alarm	-	0	1	0	R/W
408	1033	16 bit unsigned	Reset dirty filter alarm	-	0	1	0	R/W
40C	1037	16 bit unsigned	Reset motocondenser alarm	-	0	1	0	R/W
40D	1038	16 bit unsigned	Reset gas leak alarm	-	0	1	0	R/W
40E	1039	16 bit unsigned	Reset power fault alarm	-	0	1	0	R/W
40F	1040	16 bit unsigned	Reset generic soft alarm	-	0	1	0	R/W

10 SURVEY³ TROUBLESHOOTING

10.1 THE UNIT DOES NOT START

Check:

- That the mains power supply is on.
- That there is 24 Vac downstream of the supply voltage transformer.
- That the 24 Vac supply connector is properly plugged in.
- That the protection fuse is intact.
- That the cable connecting the terminal and the main board has been connected properly.

10.2 INCORRECT READING OF INPUT SIGNALS

Check:

- That the inputs have been calibrated correctly (from program).
- That the probe power supply is correct.
- That the probe connection is set up as per the wiring diagram.
- That the probe output signal is correct.
- That the probe wires are positioned at a suitable distance from potential sources of electromagnetic interference (power cables, contactors, high-voltage cables and cables connected to devices with high voltage consumption at start-up).
- That the thermal resistance level between the probe and any probe pocket is not too high. Place a little paste or conductive oil inside the pockets if necessary, in order to guarantee effective temperature transmission.

10.3 QUESTIONABLE ALARM SIGNALLING FROM DIGITAL INPUT

Check:

- That there is 24 Vac power supply on the alarm contact.
- That the terminal is fitted into its seat.
- That there are no breaks upstream of the terminal.

10.4 FAILED CLOSURE OF A DIGITAL OUTPUT

Check:

- That there is 24 Vac power supply on the digital contact.
- That the terminal is fitted into its seat.
- That there are no breaks downstream of the terminal.

10.5 NO ANALOGUE OUTPUTS

Check:

- That there is a 0-10Vcc analogue output signal.
- That the terminal is fitted into its seat.
- That there are no breaks downstream of the terminal.

10.6 THE SURVEY ACTIVATES THE WATCH-DOG FUNCTION

Check:

- That the power cables do not run near the main board microprocessors.
- That there are no sources of electromagnetic interference near the microprocessor or the data transmission cables.

10.7 THE SERIAL CONNECTION WITH THE SUPERVISOR/BMS IS NOT WORKING

Check:

- That the unit's serial address is set correctly.
- That the unit's baud rate (communication speed) is set correctly.
- What type of serial cables are used.
- That the serial cable connection is correct based on the wiring diagram.
- That the power cables do not run near the main board microprocessors.
- That there are no sources of electromagnetic interference near the microprocessor or the data transmission cables.

10.8 LOCAL NETWORK CONNECTION IS NOT WORKING

Check:

- That the unit's serial address is set correctly.
- That the unit's baud rate (communication speed) is set correctly.
- What type of serial cables are used.
- That the power cables do not run near the main board microprocessors.
- That there are no sources of electromagnetic interference near the microprocessor or the data transmission cables.

10.9 MODBUS MASTER CONNECTION IS NOT WORKING

Check:

- That the serial cable connection is correct based on the wiring diagram.
- That the power cables do not run near the main board microprocessors.
- That there are no sources of electromagnetic interference near the microprocessor or the data transmission cables.

11 PACI COMMISSIONING & SETTINGS

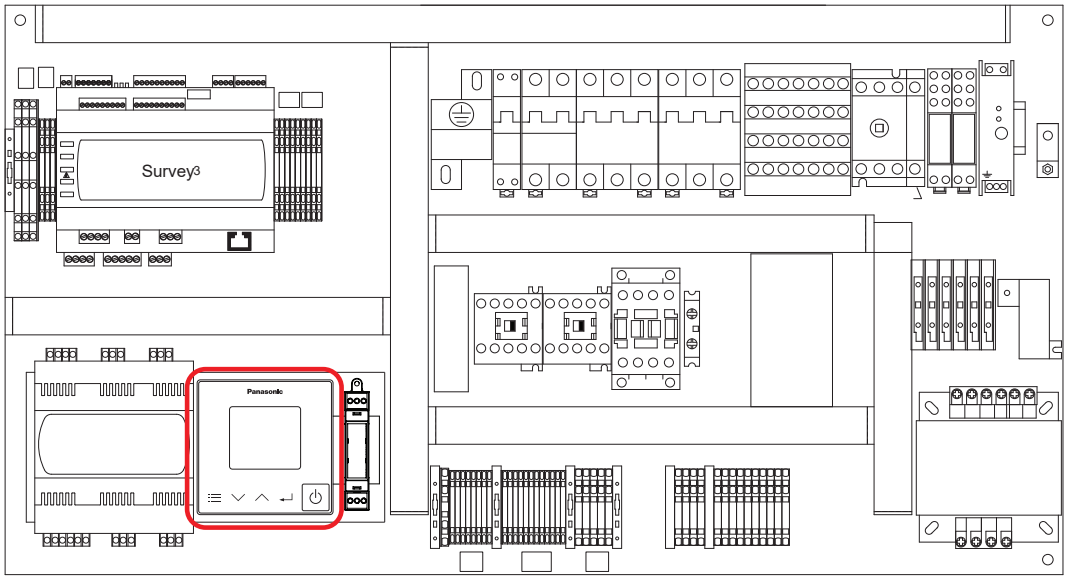
11.1 ADDRESSING THE PACi UNITS

11.1.1 PACi CONNECTION CONTROL ARRANGEMENT

Prior to commencing the controls commissioning, please ensure the wiring requirements have been correctly applied to the installation. Please refer to the dedicated INSTALLATION, ROUTINE, AND SPECIAL MAINTENANCE manual for P-Series + PACi.

There are separate power supplies for both the P-Series and the PACi outdoor units. Though it is necessary to have both units powered for the intial test run, it is not necessary to power on the P-Series indoor unit to complete the addressing of the PACi. The interface PCB and control arrangement for the PACi is powered by the outdoor unit.

Located in the lower left portion of the electrical enclosure, you will find the integrated display (CZ-RTC6), which is used for the commissioning / service and maintenance of the PACi outdoor unit connection. Please refer to the image below.



PLEASE NOTE: The above image represents an arrangement of the electrical enclosure. The final arrangement supplied may differ from what is represented

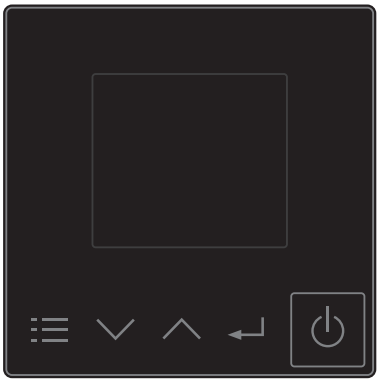
11.1.2 PACi INITIAL START-UP AND AUTO-ADDRESSING

The P-Series units for connection with PACi should be pre-configured to allow connection to the relevant outdoor unit supplied with the relevant P-Series unit. If any issues are experienced, please refer to section "**PACi DETAILED SETTING ITEMS**".

1) Power on the outdoor unit.

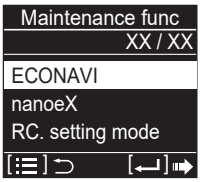
2) At the P-series indoor unit, the CZ-RTC6 display will switch on and under normal operation the Auto-address sequence should start automatically (see step 7)

   Using a combination of the buttons, it is possible to access various menus, which allows the user to change settings and options.

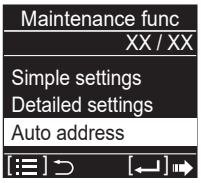


CZ-RTC6 Series Controller

3) Press the , and buttons simultaneously until the display changes. The "**Maintenance Func**" screen will be shown

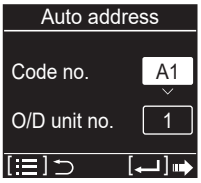


4) Using the and buttons to reach the "**Auto address**" menu, and press .



5) The "Auto address" screen will be displayed. Using the Using the and buttons, change the "**Code no.**" until it shows "**A1**"

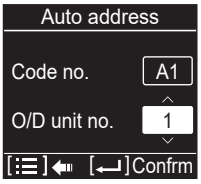
After selecting the "**Code no**." , press the button and proceed to Step 6).



6) Unless multiple outdoor units are connected, the "**O/D unit no.**" should always be "**1**". If it is not

It is possible to adjust the "**O/D iunit no.**" by pressing the and buttons.

After selecting the required "**O/D unit no.**", press the button , and the auto addressing function will start and the below actions will commence in sequence

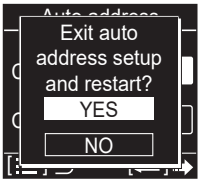


7) The Auto-address sequence is as follows.

It will take approximately 10 minutes for the Auto-address function to complete, after which the units will return to normal stopped state

8) If the button is pressed under Step 5), the Auto-address-end screen is displayed.

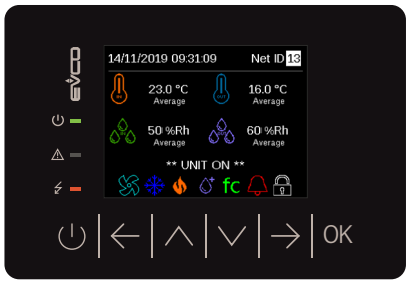
Using the and buttons, select "**YES**", and press the button



11.1.3 P-SERIES SETPOINT SETTING

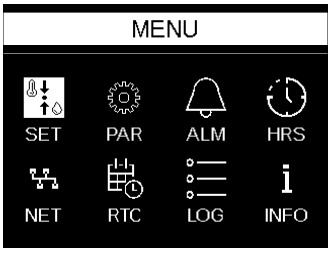
Prior to commecning any setting, please ensure the P-Series unit is correctly wired, and powered ON. Please refer to the dedicated INSTALLATION, ROUTINE, AND SPECIAL MAINTENANCE manual for P-Series + PACi.

The setpoint setting is managed within the EPJGRAPH user terminal keypad. Full details can be found in the section "EPJ-GRAPH USER TERMINAL KEYPAD", earlier in the document

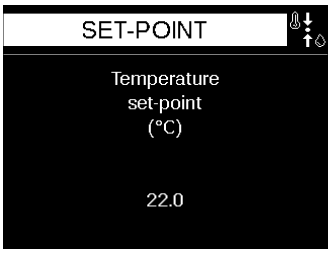


1) Press and hold the power (⏻) button for at least 3 seconds to switch on the unit.

2) Press and hold the OK button for at least 3 seconds to enter the main menu, and press the OK button to enter "SET" - SET-POINT MENU.



3) Press the OK button to allow the value to be adjusted.
Use the ∧ and ∨ buttons to adjust the value, and press the OK button to confirm..



4) Once setting of the temperature has been made, press the power (⏻) button to escape from the SET-POINT menu, and again to exit from the main menu.

PLEASE NOTE: The accuracy of maintaining the temperature setpoint depends on the Upper and Lower T-set limit cooling settings within the PACi control. Please follow the guidance in the next section "SETTING PACi TEMPERATURE LIMITS".

11.1.4 SETTING PACi TEMPERATURE LIMITS

The PACi outdoor unit modulates the performance based on the ambient conditions to which it is operating, but also as a result of the demand from the indoor.

The P-Series unit provides a 0 - 10 V signal to modulate the capacity demand based on temperature. If the temperature exceeds the setpoint, the demand will increase providing additional cooling. inversely, when the temperature setpoint is satisfied, the demand requirement reduces accordingly.

Depending on the accuracy required for the application at hand, it is possible to adjust the way the PACi unit reacts in achieving the temperature setpoint.

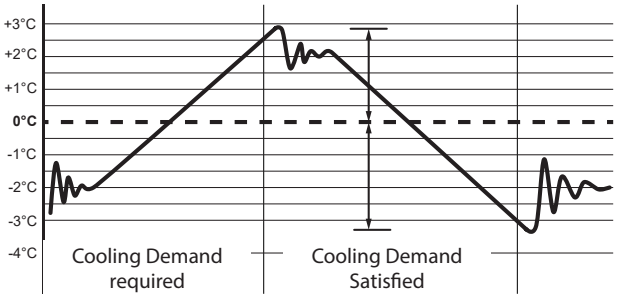
The higher the accuracy for maintaining the setpoint, the greater the energy that will be consumed. Ensure the accuracy is matching with the installation at hand to avoid unncessesary wastage of energy

The following outlines the logic and procedure for adjusting the setpoint limits on the PACi system to allow the system to follow the temperature according to the installation requirements.

GENERAL TEMPERATURE CONTROL LOGIC

If we consider the fluctuation in temperature as a result of the offset, as we can see from the example there can be a potentially big swing in temperature.

PLEASE NOTE: A larger temperature swing will reduce the power consumption.

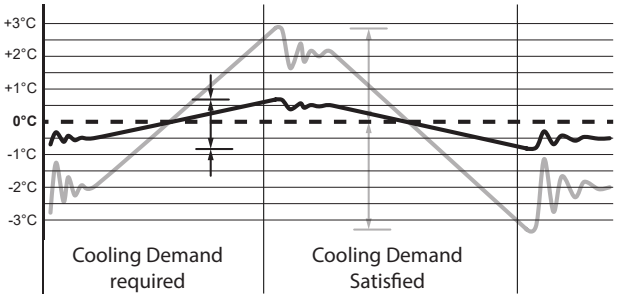


If the Upper and Lower limit tolerance is reduced, the fluctiation in temperature is reduced.

However, under such tigher tolerances, the power consumption will increase accordingly.

The tighter tolerance has been overaid with the more loose tolorance

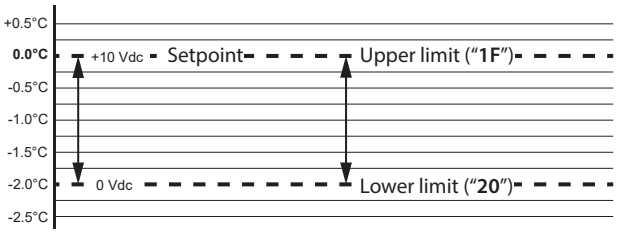
PLEASE NOTE: The tighter the tolerance, the higher the the power consumption, due to increased call for demand



The "**Setpoint**" is the temperature set within the P-Series unit.

The Upper and Lower T-set limit cooling settings, configured using the integrated CZ-RTC6 controller, provide the means of managing the temperature demand via the internal 0 - 10 Vdc signal.

The 0 - 10 Vdc equates to the demand in terms of the temperature limits between "**1F**" and "**20**". The fewer the degrees between "**1F**" and "**20**", the tighter the control.

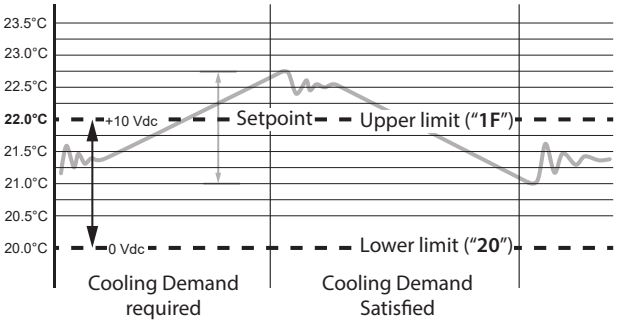


As shown in the example shown right, the Upper limit ("**1F**") is fixed at the setpoint (**22 °C**), and Lower limit ("**20**") is fixed at -2 °C versus the setpoint (**22 °C**).

With this setting, the system can acurately maintain an fluctuation of ±1.0 °C versus the setpoint.

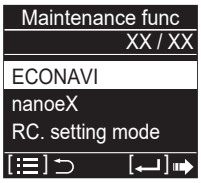
The cooling demand will increase as the ambient temperature exceeds the setpoint. Once satisfied, the demand will drop until completely satisfied.

Should the temperature again rise above the setpoint, the system will again call for more demand

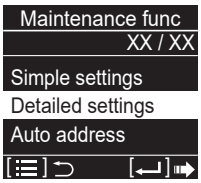


SETTING TEMPRATURE LIMITS

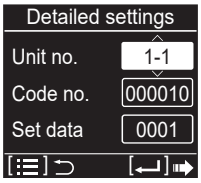
1) Press the , and buttons simultaneously until the display changes. The "**Maintenance Func**" screen will be shown



2) Using the and buttons to reach the "**Detailed settings**" menu, and press .



3) The "**Detailed settings**" screen will be displayed. Using the Using the and buttons, change the "**Unit no.**" if required. All standalone units will be preconfigured with "**1-1**", as standard. Following the selection of the "**Unit no.**", press to continue to step 4.



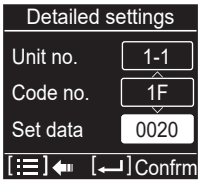
PLEASE NOTE

If the "**Unit no.**" displays "**All**", the Auto-address setting has not been complete correctly. Please refer to section "**PACi INITIAL START-UP AND AUTO-ADDRESSING**" for further details.

4) From the "**Detailed settings**", it is possible to adjust the "**Code no.**" by pressing the and buttons. It may take several presses of the buttons to reach the desired value.

Adjust the value of the "**Code no.**" to "**1F**" to adjust the Upper Limit T-Set Cooling, and "**20**" for the Lower Limit T-Set Cooling, then press the button to jump to "**Set data**"

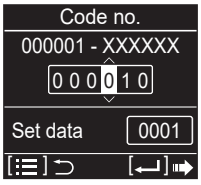
5) With "**Set data**" highlighted, use the and buttons to adjust the value, and press the button to confirm.



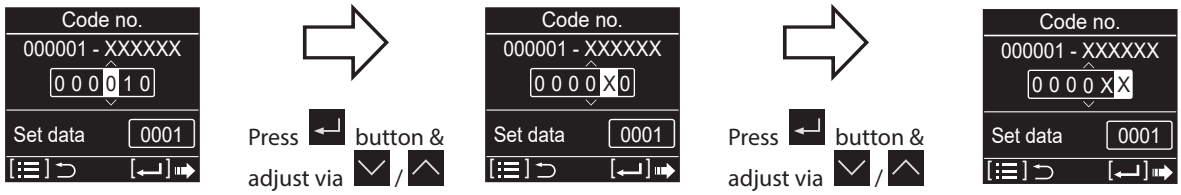
or the default values for "**1F**" and "**20**", please refer to section "**PACi DETAILED SETTING ITEMS**". If the setpoint has been adjusted in the P-Series units, it is necessary to adjust the "**1F**" and "**20**" values accordingly.

Alternatively, it is possible to use the following method for adjusting the "**Code no.**" and related "**Set data**".

From step 4), with "**Code no.**" highlighted, press and hold the button for at least 2 seconds until the display changes to the separate "**Code no.**" screen, as shown right.

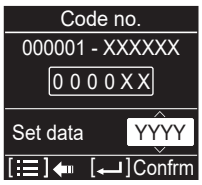


The "**Code no.**" value can be changed using the and buttons, and move to the next value by pressing the button as shown in the example below.



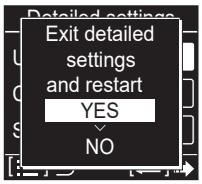
6) After completing the change to the "**Code no.**" , press the button to move to the "**Set data**".

As with the "**Code no.**", adjust the values with the and buttons, pressing to confirm.



7) Once the changes have been completed, press the button and the detailed setting end screen is displayed.

Using the and buttons, select "**YES**", and press the button



NOTE: Setting at shipment is 2 K difference between Upper and Lower limit of set temperature limit, in order to maintain a stable room temperature for the close control units. In case you change the P-series Setpoint as explained under 11.1.3 from default 22°C to any other value, at the same time you need to change parameters "1F" and "20" accordingly.

Example: Setpoint had been changed from 22°C to 25°C. In this case for close control, you need to adjust parameter "1F" to "25" (= 25 °C), whereas parameter "20" need to be adjusted to "23" (= 23 °C).

11.1.5 PACi DETAILED SETTING ITEMS

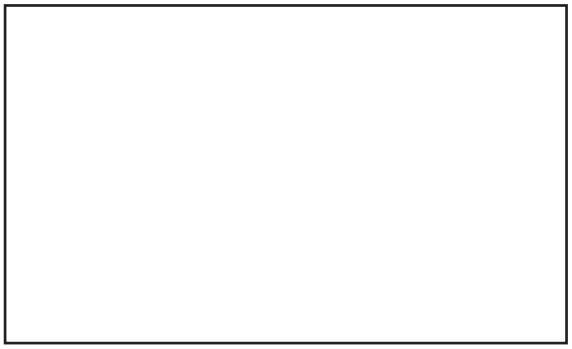
The following detaled setting items represent the items that are preset on the units at the factory. Only the values for Upper and Lower T-set limit cooling (DN 1F / 20) should be adjusted during the commissioning of the systems.

Adjusting values of any other items may result in in correct operation. In the event any issues are experienced, please consult your local sales dealer or Authorised Service Centre for support

DN	Setting values by model					Description
	071	111	121	141	211	
6	0	0	0	0	0	Heating intake sensor shift (0 = no shift)
7	0	0	0	0	0	Electrical heater (0 = no)
0B	0	0	0	0	0	Demand setting (0 = with demand available)
0C	0	0	0	0	0	Display of cold wind protection (0 = display yes)
0D	1	1	1	1	1	Auto mode (1 = prohibited)
0F	1	1	1	1	1	Cooling only (1 = cooling only)
10	6	6	6	6	6	model type (6 = high static pressure type)
11	12	15	17	18	23	Actual capacity (12=7,1kW; 15=10,0kW; 17=12,5kW; 18=14,0kW; 23=25,0kW)
12	1	1	1	1	1	OU address
13	1	1	1	1	1	IU address
14	0	0	0	0	0	Group address (0 = stand alone)
15	22	22	22	22	22	Temp. Sensors (22 = TA, E1, E2)
16	31	31	31	31	31	Fan speeds (31 = 5 speeds + LL)
17	**0**	**0**	**0**	**0**	**0**	Cooling intake temperature shift [1)]
1F	**22**	**22**	**22**	**22**	**22**	Upper T-set limit cooling [1)]
20	**20**	**20**	**20**	**20**	**20**	Lower T-set limit cooling [1)]
28	1	1	1	1	1	After power failure (1 = returns to previous state)
2C	6	6	6	6	6	EEV type (6 = no EEV, R32 model)
2D	7	7	7	7	7	Mode settings (7=Cool,Dry,Fan)
FE	1	1	1	1	1	1 = no fan feedback check
30A	7	7	7	7	7	T-evap shift lower band limit
30B	7	6	6	6	6	T-evap shift upper band limit
30D	4	4	4	4	4	High pressure setting (4=41,5bar)
30E	0	0	0	0	0	Max. C1,C2 shift compressor no Hz increase
30F	0	0	0	0	0	Max. C1,C2 shift compressor Hz decrease
A00	11	15	15	15	21	Functional capacity individual 1
B20	12	18	18	18	23	Functional capacity individual 2
1A9	11	11	11	11	21	min set cap. Limit
1AA	18	18	18	18	23	max set cap. Limit

1) Parameter 1F = Tset; Parameter 20 = Tset - 2K; Parameter 17 allows to set an offset for locally optimising the control in a range of -10 … +10

12 NOTES



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