1-PH HEE BOX

Control manual

CIAT

CONTENTS

Original text: French version

1 - MONITORING AND REGULATION

1.1 Controller

Each air heater is managed by the controller. In addition to its control functions, it also monitors and detects any faults with the air handling unit.

⚠️ IMPORTANT: To avoid any problems, the password must be known only by qualified personnel.

1.2 The pLDPRO terminal

The terminal is supplied equipped with an LCD screen (8 lines x 22 characters) with six control keys. It is installed on the front of the unit's electrical box. It allows all of the program operations to be carried out. The terminal can be used to display the unit's operating conditions and change its parameters.

The pLDPRO terminal displays the following data:
- Values of connected sensors
- Unit on/off cycles
- Calibration of the sensors
- Fault detection
- The password-protected configuration and operating parameters
- Device running times and time delays

The connection with the pLAN network allows the program to use a terminal mounted on the front of the AHU and/or a wall-mounted terminal installed in the room to be air conditioned.

Button	Description
↩	Back button
◉	Provides access to the **"Menu"**
⚠️	The ⚠️ key is used to display the active faults in the alarms menu, to clear any faults and indicate a fault if the red warning light on the key is lit.
↓	The ↓ key has two functions: 1: to manage the screens on the display (next screen) 2: to adjust the values of the monitoring parameters (decrease)
↑	The ↑ key has two functions: 1: to manage the screens on the display (previous screen) 2: to adjust the values of the monitoring parameters (increase)
↵	- Enter key: Used to access the various menus from the drop-down menu to validate the data entered.
↑ + ↓	- Unit on/off: press these keys simultaneously to switch the unit on/off.

1.3 The controller

The descriptions of the terminals on the controller are provided below.

230 V controller supply → L / N — G / G0 — **J1 - power supply**

Passive sensors power supply → +Vdc / GND / +5 Vref — **J2 - probe supply**

Analogue inputs for the sensors NTC - 0/1V - 0/5V → B1, B2, B3, B4, B5, B6, B7, GND, +Vdc — **J3 - analog input**

Communication expansion board port (Modbus, BACnet, LON, KNX) → **J6**

On/Off inputs → DI1, DI2, DI3, DI4, DI5, DI6, DI7, DIC1 — **J4 - digital input**

0/10 V analogue outputs → GND, Y1, Y2, Y3 — **J5 - analog output**

J7 — RJ11 connector for the pLDPRO configuration terminal (pLAN)

J8 — RX-/TX- / RX+/TX+ / GND — 3-point connector to connect up other units (pLAN)

J9

J10 — Vout / RX-/TX- / RX+/TX+ / GND — FIELDBUS port (configured in tLAN)

J11 — Valve output (not used)

J12 - group 1 — C1, NO1, NO2, NO3

J13 - group 1 — C2, NO4, NO5, NO6 — On/Off outputs 24Vac - 1A - 100,000 cycles

J14 - group 2 — NO7, C3, NC7

1.4 Description of the air handling units

The unit can perform the following functions:
- Ventilation.
- Control, monitoring, reporting and regulation of the unit's component parts.
- The air is heated/cooled using the hot/cold water coil.

1.5 Controller inputs and outputs

* Contact state during operation

Terminal	Input	Description	*
J3	B1	Room temperature (NTC 10k)	
	B2	TPL temperature (NTC 10k)	
	B3		
	B4		
	B5		
	B6		
	B7		
J4	DI1	Changeover	C
	DI2	Antifreeze thermostat	C
	DI3	Air heater fan operation feedback	O
	DI4	TPL fan operation feedback	O
	DI5	Remote control	C
	DI6		
	DI7		
J16	DI8		
	DI9		
	DI10		
J18	B8		
	B9		
	B10		
	B11		
	B12		

Terminal	Outputs	Description	*
J5	Y1	Air heater fan speed	
	Y2	TPL or air heater fan speed	
	Y3	Hydraulic coil	
J12	NO1	Fresh air damper control	NO
	NO2		
	NO3		
J13	NO4	Danger fault summary relay	NO
	NO5	Maintenance fault summary relay	NO
	NO6		
J14	NO7		
J5	Y4		
	NO8		
	NO9		
J15	NO10		
	NO11		
	NO12		

2 - CONFIGURING THE CONTROLLER

The controller and display must be configured before the unit is commissioned.

2.1 Configuring with master HEE Mono Boxes only:

The value of the display's factory-set address is '32'. It is pointless to only change it in the master HEE Mono Box.

If the nn field is set to '0', the terminal will use the Point-to-Point Protocol (not the pLAN) to communicate with the controller and the "I/O Board address: xx" field will disappear as it will not be necessary.

It is however essential to assign a controller to the pLDPRO display by giving it an address (I/O Board address):

- Power up the master HEE Mono Box
- To switch to configuration mode, simultaneously press the ⬇, ⬆ and ⏺ keys for approx. 5 seconds; the page shown below will be displayed, with the cursor flashing in the top left corner:

```
Display address
Setting ……………. : 32

I/O Board address   : --
```

- To change the controller address (I/O Board address) press ↵ twice: the cursor will move to the (--) field.
- using the ⬆ key, select the value 01, and confirm by pressing the ↵ key again. If the value selected is different from that stored previously, the page for the following figure is displayed and the new value will be stored in the terminal's permanent memory.

```
Terminal config
Press Enter
To continue
```

- Press ↵ again.

```
P:01 Adr Priv/Shared
Trm1   32 Pr
Trm2   None   --
Trm3   None   -- Ok?No
```

- Set Trm1 to 32 by pressing ⬇, press ↵ .
- Set value 'Pr' (Private) to 'Sh' (Shared) by pressing ⬆, press ↵ .

```
P:01 Adr Priv/Shared
Trm1   32 Sh
Trm2   None   --
Trm3   None   -- Ok?No
```

- Go to 'No' by pressing ↵ several times, select 'Yes' by pressing ⬆ then ↵ .

The controller now has the correct address in Master mode only.

2.2 Configuring with slave HEE Mono Boxes only:

To configure the various slaves, the pLDPRO terminal must be removed from the master unit and connected to the slave units.

a) For the first slave:

- Power up the Slave HEE Mono Box
- To switch to configuration mode, simultaneously press the ↓, ↑ and ⦿ keys for approx. 5 seconds; the page shown below will be displayed, with the cursor flashing in the top left corner:

```
Display address
Setting................. : 32


I/O Board address  :  --
```

- Press ↵ .
- Change the Display address setting from 32 to 00 by pressing ↑, then press ↵ .

```
        Terminal config
         Press Enter
         To continue
```

- Switch off the Slave HEE Mono Box.
- Switch it back on again and then immediately press ⚠ and ↑ for approx. 15 seconds.

```
pLan address : 1
UP:          increase
DOWN:     decrease
ENTER:    save & exit
```

- Change the pLan address to 2 by pressing ↑, then press ↵ .

If there are no other Slave HEE Mono Box(es), go to step c), otherwise go to step b) to configure the other Slave HEE Mono Box(es).

b) For the second Slave HEE Mono Box:

- Connect the pLDPRO to the slave to be configured
- Power up the Slave HEE Mono Box concerned and immediately press on ⚠ and ↑ for approx. 15 seconds

```
pLan address : 1
UP:          increase
DOWN:     decrease
ENTER:    save & exit
```

- Change the pLan address to 3 by pressing ↑, then press ↵ .

If you have other Slave HEE Mono Boxes to connect, simply adjust point b) by increasing the pLan address by 1 each time (e.g. 3rd slave: pLan address 4, 4th slave: pLan address 5, etc.).

c) Assigning pLDPRO/Master HEE Mono Box display links:

- Connect the display to the Master HEE Mono Box
- To switch to configuration mode, simultaneously press the ↓, ↑ and ⊙ keys for approx. 5 seconds; the page shown below will be displayed, with the cursor flashing in the top left corner:

```
Display address
Setting ……………. : 00

I/O Board address  :  --
```

- Press ↵ .
- Change the Display address setting from 00 to 32 by pressing ↓, then press ↵ .

```
Display address
Changed
```

- Press ↓,↑ and ⊙ again for approx. 5 seconds, the page below will display:

```
Display address
Setting ……………… : 32

I/O Board address   :  --
```

- Change the I/O Board address by pressing ↵ twice to position the cursor to – and move to 01 by pressing ↑, then press ↵ .

```
Terminal config
Press Enter
To continue
```

- Press ↵ again.

```
P:01 Adr Priv/Shared
Trm1    --  Pr
Trm2   None    --
Trm3   None    -- Ok?No
```

- Set Trm1 to 32 by pressing ↓, press ↵ .
- Set value 'Pr' (Private) to 'Sh' (Shared) by pressing ↑, press ↵ .

```
P:01 Adr Priv/Shared
Trm1    32 Sh
Trm2   None    --
Trm3   None    -- Ok?No
```

- Go to 'No' by pressing ↵ several times, select 'Yes' by pressing ⬆ then ↵ .

The Master HEE Mono Box/display connection has been made, the same operation must now be repeated on the Slave HEE Mono Box(es):

c) Assigning pLDPRO/Slave HEE Mono Box display links:

- Connect the display to the Slave HEE Mono Box.
- To switch to configuration mode, simultaneously press the ⬇, ⬆ and ⦿ keys for approx. 5 seconds; the page shown below will be displayed, with the cursor flashing in the top left corner:

```
Display address
Setting ............... : 32

I/O Board address :  --
```

- Change the I/O Board address by pressing ↵ twice to position the cursor to – and move to 02 by pressing ⬆, then press ↵ .

```
Terminal config
   Press Enter
   To continue
```

- Press ↵ again.

```
P:01 Adr Priv/Shared
Trm1    -- Pr
Trm2   None    --
Trm3   None    -- Ok?No
```

- Set Trm1 to 32 by pressing ⬇, press ↵ .
- Set value 'Pr' (Private) to 'Sh' (Shared) by pressing ⬆, press ↵ .

```
P:01 Adr Priv/Shared
Trm1    32 Sh
Trm2   None    --
Trm3   None    -- Ok?No
```

- Go to 'No' by pressing ↵ several times, select 'Yes' by pressing ⬆ then ↵ .

The Slave EC Box/display connection no. 1 has been made, if there are other slave boxes to be configured, repeat point d) by increasing the I/O Board address by 1 each time (e.g. for the 2nd slave: I/O Board address 3; for the 3rd slave: I/O Board address 4, etc.).

The address configuration for the boxes and display is now complete; you can now refit the pLDPRO display on the Master HEE Mono Box and connect the master/slave boxes by connecting the terminals.
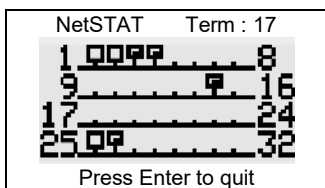
"Networked controller"
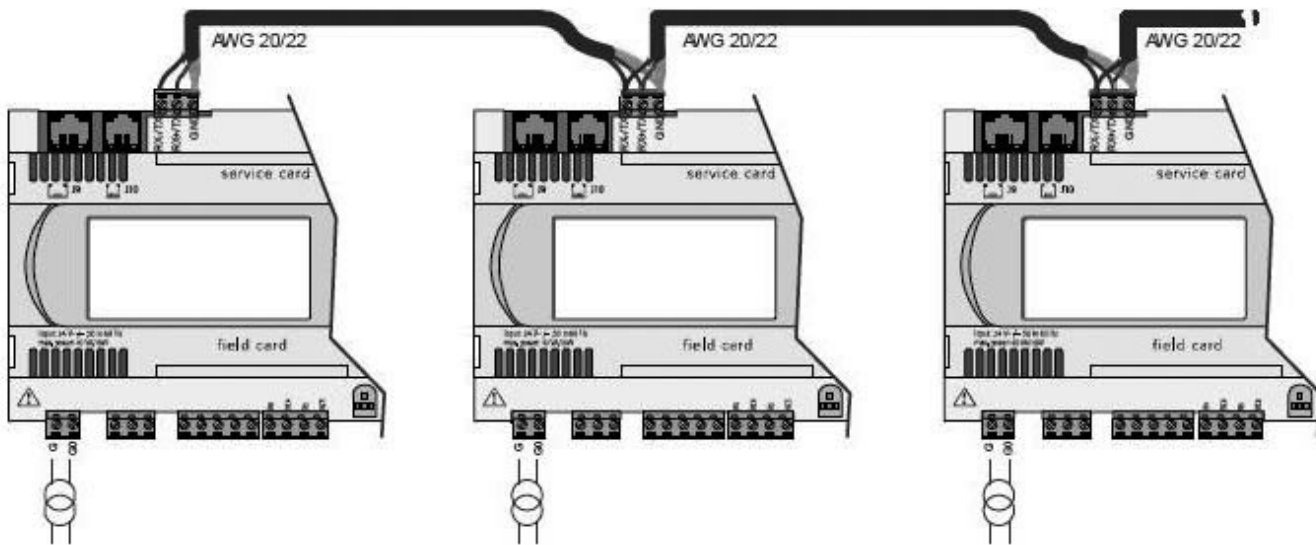
2.3 State of the pLAN

When the system starts up, the pLAN network may encounter a number of problems (card fault and terminal start-up) caused by incorrect connections or a wrong address. The state of the pLAN network can be displayed in real time on a special mask in order to identify which devices (controller or terminal) are correctly connected and addressed.

To display the special page, press ↑ ↓ and ⊙ simultaneously for at least 10 seconds. After the first 5 seconds, a page is displayed; after 5 more seconds, the next page appears:

Once on the screen, network addresses 1 to 32 are displayed. The small rectangles represent the terminals and the large rectangles , the controllers. If symbols appear then disappear, the pLAN may be unstable or, more likely, two components share the same address. The number after **Term** indicates the address of the terminal used. The example shows that the network is made up of 3 controllers with the addresses 1, 2, 25 and 4 terminals with the addresses 3, 4, 15 and 26. Once the page has been verified, turn off the power, check the connections and addresses, then turn the power back on.

3 - MANAGING A NETWORK OF MULTIPLE CONTROLLERS

The pLAN network is the name of the physical network that links controllers to remote HMI terminals

pLAN = **p**ersonal **L**ocal **A**rea **N**etwork

The connection of the controllers via the pLAN network allows the datapoints of one controller to be exchanged for another, following the logic set out by the program, i.e. the direction that these datapoints must follow and that from which they come. As a consequence, they are not programmed by the user, who must only carry out the electrical connection.

3.1 pLAN electrical connections

3.1.1 Connecting controllers to the pLAN

The electrical connection between the controllers under the pLAN network (RS485) is carried out using an AWG20/22 shielded cable composed of a twisted pair and a shield. The cards must be connected in parallel using the J7 or J8 connector.

The first and last controller must be no more than **500 m** apart.

See diagram above "Networked controller"

3.2 Addressing the pLAN

There is a range of 32 possible addresses (binary logic). As a result, a total of 32 controllers and terminals can be connected over the pLAN network.

The pLAN network will not work if the same address is shared by two components!

```
┌─────────────────────────┐
│  ┌───┐           ┌───┐   │
│  └───┘  pLDPRO   └───┘   │
│         display          │
│         Address: 32      │
│  ┌───┐           ┌───┐   │
│  └───┘           └───┘   │
└─────────────────────────┘
            │
    ┌───────┼───────────────┬─────────────┐
┌─────────┐ ┌─────────┐ ┌─────────┐ ┌ ─ ─ ─ ─ ─ ┐
│ Master  │ │ Master  │ │ Master  │   Master
│controller│ │controller│ │controller│  controller
│Address:1│ │Address:2│ │Address:3│   Address:31
└─────────┘ └─────────┘ └─────────┘ └ ─ ─ ─ ─ ─ ┘
```
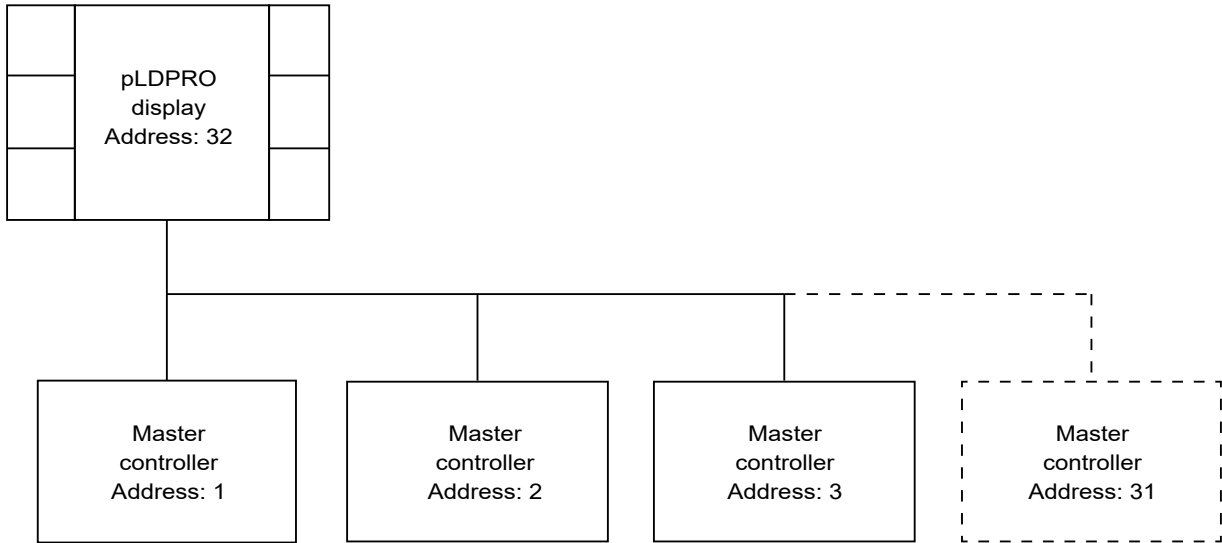
4 - GENERAL DESCRIPTION OF THE SCREENS

4.1 Machine state
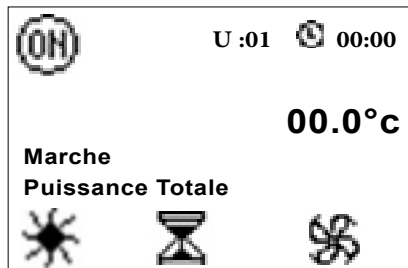
U:01	Indicates the units address
(ON)	Indicates the unit run or shutdown request
00.0°C	Indicates the ambient temperature
⏱ 00:00	Indicates the time
✳	Indicates the "Heating" operating mode. When there is a request, the pictogram is activated.
�	Indicates fan operation. When there is a request, the pictogram is activated.

"Prg" key

```
┌─────────────────────────────────┐
│              Menu               │
│                                 │
│   □ 14.Niveau d'accès           │
│   □ 16.Versions                 │
│   ■ 1.Consignes                 │
│   □ 2.Etat machine              │
│   □ 4.Paramètres machine        │
│                                 │
└─────────────────────────────────┘
```

To switch to another menu, press the ⬆ or ⬇ keys to scroll through the available menus. The selected menu is opposite the arrow and on a black background. To confirm your choice, simply press ↵ .
The available menus are as follows:

1	Setpoints
2	Machine status
4	Mach. parameters
5	Adjust. params
6	Reading parameter
8	Test mode
9	Timer programming
11	Communication
13	Alarms
14	Access level selection
16	Program version

4.2 Setpoint menu

No.	Description	Unit	Min.	Max.	By default	Increment	Visibility	Levels
					Setpoints menu			
P150	Cooling comfort temperature setpoint	°C	15	30	20	0.1	-	1
P151	Eco cooling temperature setpoint	°C	Cooling comfort setpoint	30	22	0.1	-	1
P152	Heating comfort temperature setpoint	°C	8	27	18	0.1	-	1
P153	Eco heating temperature setpoint	°C	8	Comfort heating stp	16	0.1	-	1
P154	Frost protection temperature setpoint	°C	5	Eco heating stp	8	0.1	-	1
P155	Δt TPL setpoint	°C	1	5	3	0.1	If present TPL = YES	2
P156	Δt TPL max.	°C	Δt TPL stp	10	5	0.1	If present TPL = YES	2

4.3 Machine parameters menu

No.	Description	Unit	Min.	Max.	By default	Increment	Possible choices	Visibility	Levels
					Machine parameters menu		- - - - - -		
P01	Unit size (a)	-	0	15	0	1	0 - 1 - H4300 2 - H4351 3 - H4352 4 - H4353 5 - H4401 6 - H4402 7 - H4403 8 - H4451 9 - H4452 10 - H4453 11 - H4501 12 - H4502 13 - H4503 14 - H4631 15 - H4632 16 - H4633	-	2
P02	Supply type	-	0	1	0	1	0 - 1-Ph 1 - 3-Ph	-	2
P03	Coil type	-	0	2	0	1	0 - Cooling 1 - Heating 2 - Mixed	-	2
P04	Controller type	-	0	1	0	1	0 - Master 1 - Slave with sensor 2 - Slave without sensor	-	2
P10	Antifreeze thermostat present	-	0	1	0	1	0 - NO 1 - YES		2
P11	Fresh air damper present	-	0	1	0	1	0 - NO 1 - YES	-	2
P12	TPL present	-	0	1	0	1	0 - NO 1 - YES	-	2
P20	Air heater sensor calibration	°C	-5	5	0	0.1	-	If controller type ≠ slave without sensor	2
P21	TPL sensor calibration	°C	-5	5	0	0.1	-	If present TPL = YES	2

4.4 Settings parameters menu

No.	Description	Unit	Min.	Max.	By default	Increment	Possible choices	Visibility	Levels
P100	Language	-	0	1	0	1	0 - French 1 - English		1
P101	Time	-	00:00	23:59	00:00	1	-	-	1
P102	Date	-	01/01/2010	31/12/2050	01/01/2014	1	-	-	1
P110	Operating mode	-	0	2	2	1	0 - Cooling 1 - Heating 2 - Auto	If coil type = mixed	2
P111	Operation type	-	0	2	0	1	0 - Comfort 1 - Eco 2 - Frost protection	-	1
P112	Eco/comfort selection	-	0	2	0	1	0: Time sched. or CMS 1: On/Off input only 2: On/Off input override		
P115	Return air/fresh air	-	0	1	0	1	0 - Return air 1 - Fresh air	If damper present fresh air = YES	2
P117	Air heater fan override	-	0	1	0	1	0 - Auto 1 - Man.	-	1
P118	Fan override speed	%	0	Air heater fan max. speed	50	1	-	If fan override = Man.	1
P119	Fan override time delay	min.	0	180	30	1	-	If fan override = Man.	1
P120	Air heater fan min. speed	%	0	Air heater max. speed	0	1	-	-	2
P121	Air heater fan max. speed	%	air heater min. speed	Calculated max. speed	100	1	-	-	2
P122	TPL min. speed	%	0	TPL max. speed	0	1	-	If present TPL = YES	1
P123	TPL maximum speed	%	TPL min. speed	100	100	1	-	If present TPL = YES	1
P130	Hot Proportional Band op.	°C	1	10	3	0.5	-	If coil type = heating or mixed	2
P131	Hot integration time op.	min.	0	30	Def.	1		If coil type = heating or mixed	2
P135	Cold Proportional Band op.	°C	1	10	3	0.5	-	If coil type = cooling or mixed	2
P136	Cold integration time op.	min.	0	30	Def.	1	-	If coil type = cooling or mixed	2
P140	High temperature fault threshold	°C	Stp + Band	75	24	1	-	-	2
P141	High temperature fault time delay	s	60	300	120	1	-	-	2
P142	Low temperature fault threshold	°C	10	Stp + Band	12	1	-	-	2
P143	Low temperature fault time delay	s	60	300	120	1	-	-	2

4.5 Read-only parameters menu

No.	Description	Unit	Min.	Max.	By default	Increment	Possible choices	Visibility	Levels
P250	Air heater temperature sensor	°C	-	-	-	-	-	-	1
P251	TPL sensor temperature	°C	-	-	-	-	-	If present TPL = YES	1
P255	Air heater fan speed	%	-	-	-	-	-	-	1
P256	TPL fan speed	%	-	-	-	-	-	If present TPL = YES	1
P257	Valve opening	%	-	-	-	-	-	-	1
P260	Fresh air damper state	C - O	-	-	-	-	Open/Closed	If fresh air damper present = YES	1
P261	Changeover contact state	C - O	-	-	-	-	Open/Closed	If coil type = mixed	1
P262	Fan operation feedback state	C - O	-	-	-	-	Open/Closed	-	1
P263	Antifreeze thermostat state	C - O	-	-	-	-	Open/Closed	If frost protection thermostat present = YES	1
P264	Remote on/off command state	C - O	-	-	-	-	Open/Closed	-	1
P265	TPL operation feedback state	C O	-	-	-	-	-	If present TPL = YES	1
P270	Δt TPL calculated	°C	-	-	-	-	-	If present TPL = YES	1
P272	Eco/comfort contact state	C - O	-	-	-	-	Open/Closed	If P116 = 2 or 3	1
P273	Eco/comfort summary		-	-	-	-	Eco/Comfort	If P116 = 2 or 3	1

4.6 Versions Menu

```
U :01      PROGRAMME      pr1
         HELIO Control

V 03.00                11/07/16

Bios : 06.42
Boot : 04.05
```

Shows the name and version of the program installed on the microprocessor.

4.7 Time schedule

The time must be set for the time schedule to work correctly.
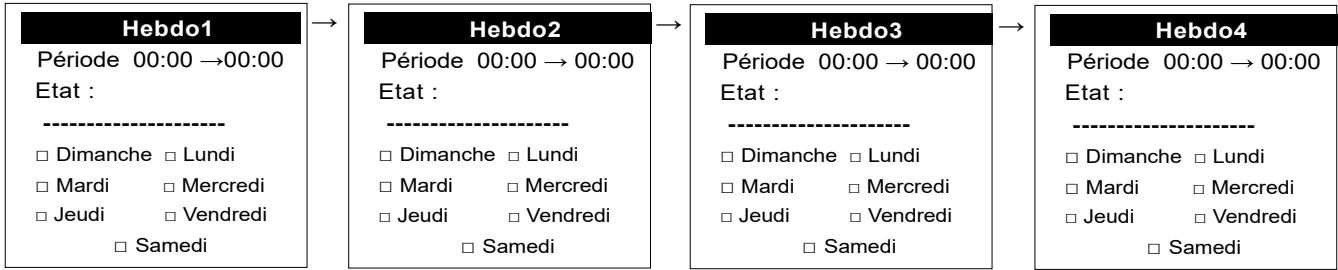
The user will choose an operating mode in the operating mode parameter.

When there is a time schedule active according to the periods below, the regulation will deviate from the current mode and switch into the mode selected by the time schedule.

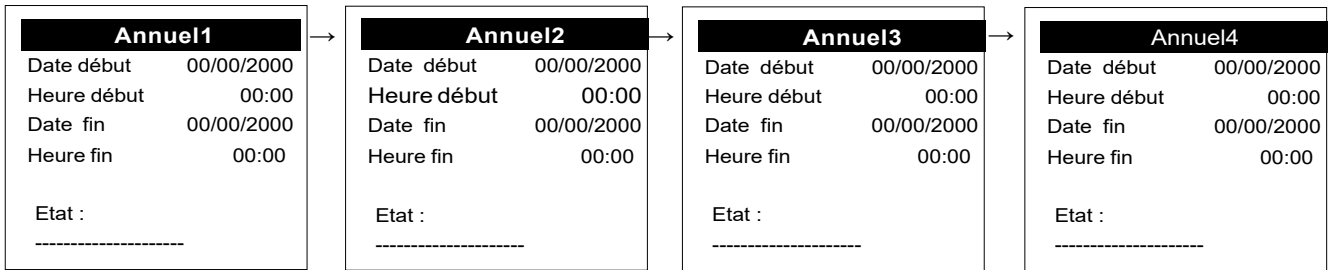Two types of schedule are possible. Weekly/yearly.

The time schedule can be used to switch between states: Off, Comfort, Eco and Frost protection.

If two schedule periods overlap, priority is given to the annual schedule in the following order:
Annual 1 → Annual2 → Annual3 → Annual4 → Weekly1 → Weekly2 → Weekly3 → Weekly4.

Hebdo1	→	**Hebdo2**	→	**Hebdo3**	→	**Hebdo4**
Période 00:00 →00:00 Etat : -------------------- □ Dimanche □ Lundi □ Mardi □ Mercredi □ Jeudi □ Vendredi □ Samedi		Période 00:00 → 00:00 Etat : -------------------- □ Dimanche □ Lundi □ Mardi □ Mercredi □ Jeudi □ Vendredi □ Samedi		Période 00:00 → 00:00 Etat : -------------------- □ Dimanche □ Lundi □ Mardi □ Mercredi □ Jeudi □ Vendredi □ Samedi		Période 00:00 → 00:00 Etat : -------------------- □ Dimanche □ Lundi □ Mardi □ Mercredi □ Jeudi □ Vendredi □ Samedi

Period   00:00 → 00:00   Start and end times (hour and minute) of weekly time program period
State: Selection of the state during this period: ------
                                                                                                                   Off
                                                                                                                   Comfort
                                                                                                                   Eco
                                                                                                                   Frost protection

□**Sunday**
□**Monday**
□**Tuesday**
□**Wednesday**   Day of the week on which the weekly time schedule is applied (■☑= day selected)
□**Thursday**
□**Friday**
□**Saturday**

Annuel1	→	**Annuel2**	→	**Annuel3**	→	**Annuel4**
Date début 00/00/2000 Heure début 00:00 Date fin 00/00/2000 Heure fin 00:00 Etat : --------------------		Date début 00/00/2000 Heure début 00:00 Date fin 00/00/2000 Heure fin 00:00 Etat : --------------------		Date début 00/00/2000 Heure début 00:00 Date fin 00/00/2000 Heure fin 00:00 Etat : --------------------		Date début 00/00/2000 Heure début 00:00 Date fin 00/00/2000 Heure fin 00:00 Etat : --------------------

Start date   00/00/2010   Start day, month and year of yearly time schedule
Start time   00:00   Start time in hours and minutes of yearly time schedule
Start date   00/00/2010   End day, month and year of yearly time schedule
Start time   00:00   End time in hours and minutes of yearly time schedule
State: Selection of the state during this period: ------
                                                                                                                 Off
                                                                                                                 Comfort
                                                                                                                 Eco
                                                                                                                 Frost protection

Note: it is not recommended to use a local time schedule with a CMS, as this could create conflicts in the control system

4.8 Alarms menu

Pressing the ⚠ key confirms and clears all faults that are no longer present.

To view faults that are still present, press the ↑ ↓ keys (see description of faults in paragraph 5.1)

The following screen appears when no faults are present:

Pas de défauts !

4.9 Test mode menu

```
┌─────────────────────────────────┐
│                            f1   │
│        Forçage des sorties      │
│                                 │
│              ⚠                  │
│                                 │
│          Unité sur Off          │
└─────────────────────────────────┘
```

If all the controller's outputs are overridden, the alarms will not be signalled on the display.
Disconnecting the display will maintain the override and may result in damage to the hardware.
This menu can only be accessed in level 3 and with the unit off.

WARNING!

ACTIVATION OF ALL OVERRIDES IS THE PROGRAMMER'S RESPONSIBILITY

NONE OF THE SAFETY DEVICES ARE OPERATIONAL

The unit must be set to " OFF ".
Select the output to be changed by pressing ↑or ↓. Confirm by pressing **ENTER**.
The cursor places itself below the override authorisation (free or overridden). Confirm by pressing **ENTER**.
The cursor places itself under the override value. Display the new value by pressing the ↑ key or the ↓ key. Confirm by pressing **ENTER**.
The unit is now in "test mode".
The overrides are cancelled when the unit is set back to "on"

Output	Parameter	Setting range	Default value	Access level	Mask
Air heater fan	State 0-10 V	0-100%	0%	3	f2
TPL fan	State 0-10 V	0-100%	0%	3	f3
Coil valve	State 0-10 V	0-100%	0%	3	f4
Fresh air damper	Damper state	Open/Closed	Closed	3	f5
Fault relays	Danger	Open/Closed	Closed	3	f6
	Maintenance	Open/Closed	Closed	3	f6

4.10 Access level menu

```
┌─────────────────────────────┐
│  Niveaux accès      .       │
│  Niveau actuel : 1          │
│                             │
│                             │
│  Accès niveau 1 ->          │
│  Accès niveau 2             │
│  Accès niveau 3             │
│                             │
└─────────────────────────────┘
```
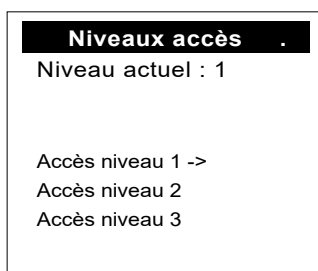
Displays the current level

Visible only if the current level = 2 or 3, used to access or return to level 1
Visible only if the current level = 1 or 3, used to access or return to level 2
Visible only if the current level = 1 or 2, used to access or return to level 3

```
┌─────────────────────────────┐
│  Niveaux accès      .       │
│                             │
│                             │
│     🔑   ACCES NIVEAU 1     │
│                             │
│  Retour au niveau 1 :       │
│                   Non       │
│                             │
└─────────────────────────────┘
```

If level 1 access selected

If yes back to access level 1

Niveaux accès . ACCES NIVEAU 2 Mot de passe : 0000	If access level 2 selected and access level = 1 Re-enter the installer password
Niveaux accès . ACCES NIVEAU 2 Saisir nouveau code niveau 2 ? Non	If password ok If yes, change the installer password. If no, back to current access level page

Niveaux accès .
 	
 ACCES NIVEAU 2
 	
 Nouveau mot de passe :
       0000
            Non
	
	 Re-enter the new installer password

Niveaux accès . ACCES NIVEAU 2 Retour au niveau 2 : Non	If access level 2 selected and access level = 3 If yes back to access level 2
Niveaux accès . ACCES NIVEAU 2 Retour au niveau 2 : Non	If access level 2 selected and access level = 1 Re-enter the manufacturer password

The level 2 password can be reset to the factory value. To do this, go to level 2 access and press the **"Prg"** key for 10 seconds.

4.11 Communication menu

```
  SUPERVISION    g1
Protocole      ---------
Vitesse        ----- bds
Adresse        ----
Parité         -----
Bits de stop   -
```

Level 1 access

Choice of the communication protocol with the CMS (MODBUS RTU, MODBUS TCP, BACNET IP)

Choice of communication protocol with the CMS (19200 mandatory for MODBUS TCP, BACNET IP)

Address of the controller on the communication network to the CMS

Parity: None, odd, even

Number of stop bits: 1 or 2

```
  RESEAU pLAN  pL1

Adresse  pCo3      01

1  ▢................16
17 ▢................32
```

Level 1 access

Address of the controller on the pLAN communication network to the user terminal

pLAN network state

When the system starts up, the pLAN network may encounter a number of problems (card fault and terminal start-up) caused by incorrect connections or a wrong address. The state of the pLAN network can be displayed in real time on this special mask in order to identify which devices (controller or terminal) are correctly connected and addressed.

Network addresses 1 to 32 are displayed. The small rectangles ▢ represent the terminals and the large rectangles ▣, the controllers.

If the symbols flash, the pLAN may be unstable or, more likely, two components share the same address.

The example indicates that the network is formed of 1 controller with the address 1 and 1 terminal with the address 17.

5 - CONTROL

5.1 Starting the machine

Switching from OFF/ON or ON/OFF is done locally by pressing the 2 ⬆ and ⬇ keys on the display or via the CMS. If using both modes, the last requested action is performed.

5.2 HEE air heater control:

5.2.1 Choosing the type of operation:

Parameter P112 is used to choose between the eco/comfort setpoints either by:

- Parameter P111 (local or CMS) or time schedule: the last order received (time schedule or parameter P111) is taken into account.
- the on-off input J4 DI6 only: depending on the input state (open=eco), the operation is eco or comfort
- forcing of on/off input J4 DI6: the eco or comfort state is indicated by the time schedule or the CMS but the

on/off input is used to force the setpoint to comfort: for example a presence detector enables overriding of the CMS or time schedule.

Comfort
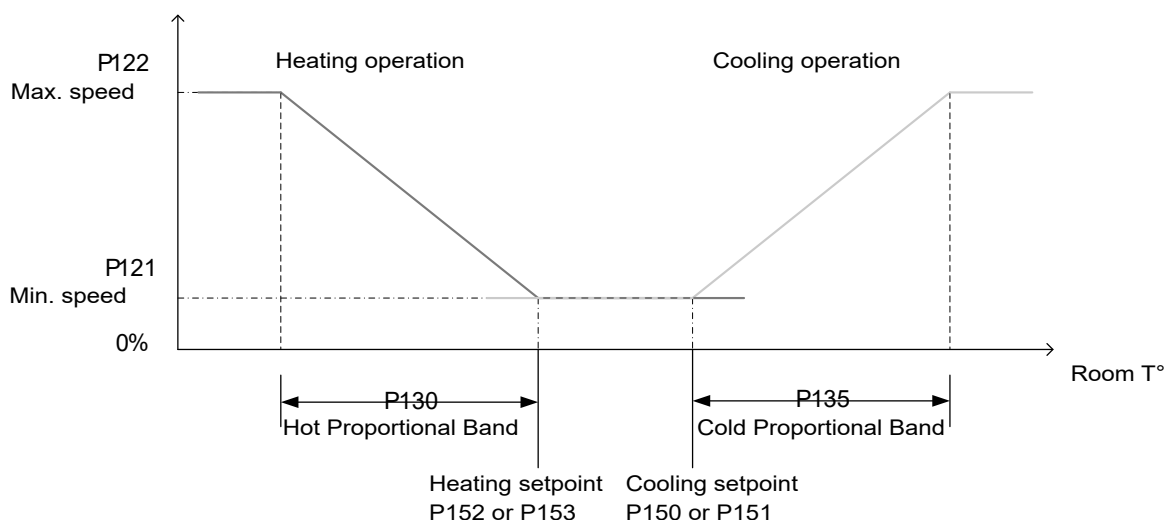
Economy

The temperature is controlled according to the eco setpoint.

In HEATING mode, the shift will be downwards: i.e. comfort setpoint > eco setpoint
E.g.: HEATING setpoint in Comfort mode = 20°C → HEATING setpoint in ECO mode = 17°C.

In COOLING mode, the shift will be upwards: i.e. comfort setpoint < eco setpoint
E.g.: COOLING setpoint in Comfort mode = 24°C → COOLING setpoint in ECO mode = 27°C.

Frost protection

The frost protection function is validated in HEATING mode. In COOLING mode, it is automatically switched to ECONOMY mode.
An integral action must be entered into the parameters.
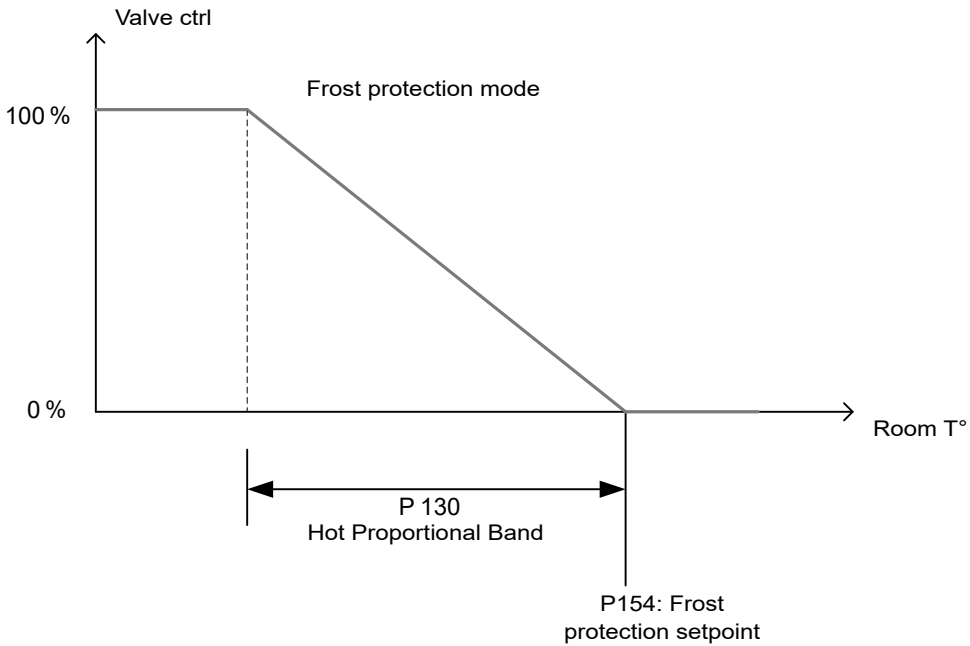
5.2.2 Managing the 0-10 V output for valve control

5.2.2.1 Mixed, heating and cooling coil.

Used to set the control box's operating mode. This parameter only appears for mixed coils.
- WINTER. Heating and fan override.
- SUMMER. Cooling and fan override.
- AUTO. CHANGEOVER thermostat fitted to the coil's main water supply pipe.

It will automatically enable HEATING/COOLING mode, depending on the temperature of the fluid.
The CHANGEOVER thermostat is fitted as standard on mixed coils.
- the CHANGEOVER contact is closed: COOLING mode
- the CHANGEOVER contact is open: HEATING mode

The symbols below will be displayed on the main page to show the current mode.

Cooling override	Heating override	Heating mode via changeover	Cooling mode via changeover

5.2.2.2 Heating Coil, HEATING mode

"Stop" position: the valve is closed

"COMFORT" position: the 0-10 V signal will depend on the difference between the regulated temperature value (room) and the setpoint. Regulation will only start after a 30-second time delay on the fan operation feedback contact. An integral action must be entered into the parameters.

Valve ctrl

100 %

Heating operation

0 %

Room T°

P 130
Hot Proportional Band

P152 or P153
Setpoint
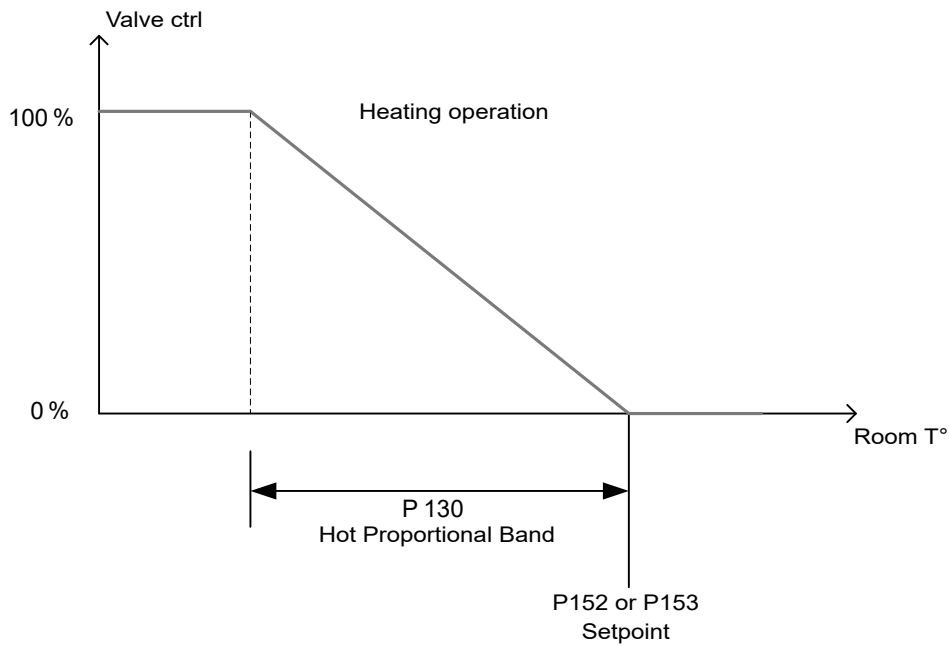
5.2.2.3 Cooling coil, COOLING mode

"Stop" position: the valve is closed

"COMFORT" position: the opening of the valve will depend on the difference between the regulated temperature value (room) and the setpoint. Regulation will only start after a 30-second time delay on the fan operation feedback contact. An integral action must be entered into the parameters.

Valve ctrl

100 %

Cooling operation

0 %

Room T°

P 135
Cold Proportional Band

P150 or P151
Cooling setpoint
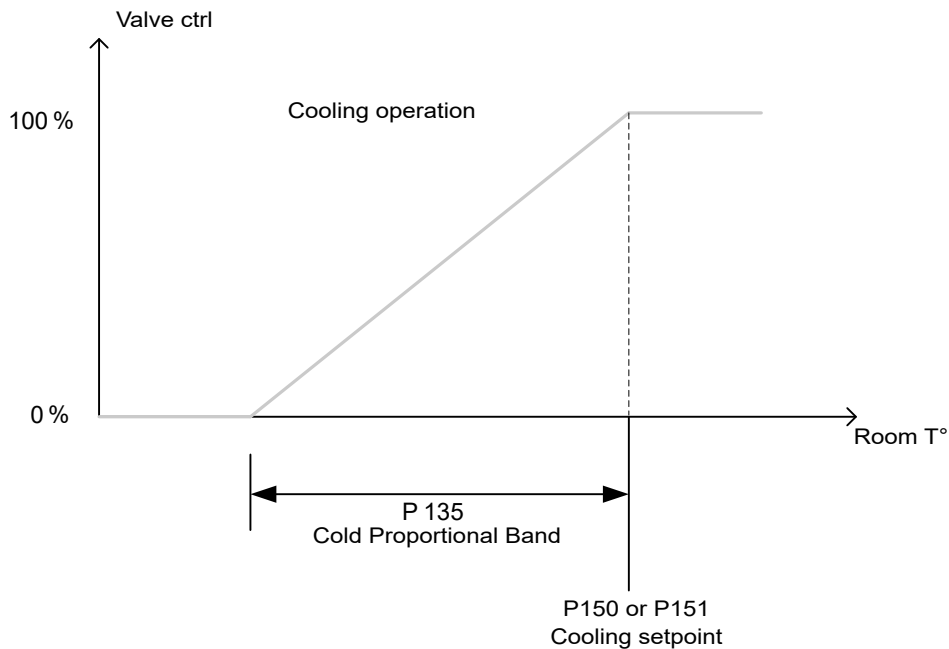
5.3 TPL regulation:

TPLs are destratifiers which can only be regulated according to the fan speed.
This is calculated from the difference between the room temperature measured by the sensor in the Master 1-ph HEE BOX (or remotely if this option has been chosen) and the sensor fitted in the TPLs.

$$\Delta t = T°_{TPL} - T° \text{ Air heater}$$

P155 Δt setpoint   P156 Max. Δt
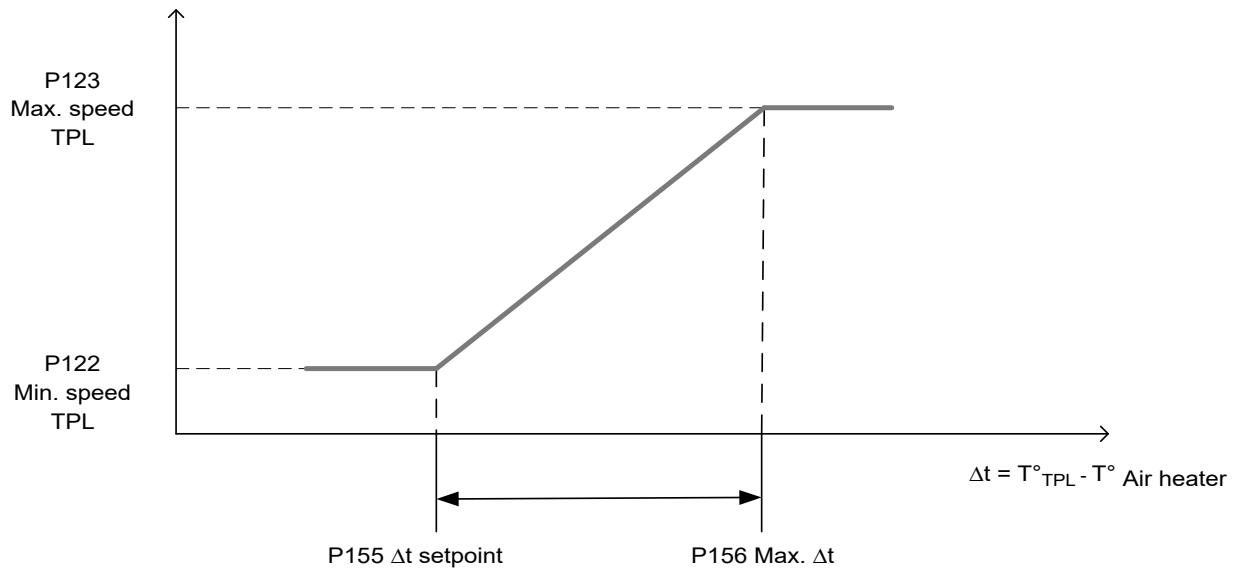
5.4 The fault relays

One relay per fault summary level is provided
- "Maintenance" fault summary
- "Danger" fault summary

"Maintenance" faults are faults which only send information to notify the operator. They can be validated by pressing the ⚠ key for 3 seconds if they have disappeared.

The "Danger" faults, which are of a higher level, are faults which send information to notify the operator, but also start a process to secure the unit. They can be cleared by pressing the ⚠ key if they have disappeared.

6 - ALARMS

6.1 Description of faults displayed in the alarms menu

6.1.1 Fan fault
After the fan command, if the fan operation feedback is not closed (P261) after 10 seconds, the fan fault is activated.
The fan fault is a danger fault.

6.2 Fault table

* All possible options are covered by this table

Faults	Sources	Causes	Solutions
Fan	ID3 fan operation feedback	- Embedded thermistor faulty - Circuit breaker - Current too high - Switch coil	- See causes - Reset or replace - Monitor starting current - Replace coil or contactor
Air flow rate	Supply air flow rate pressure sensor 0-1000 Pa B1	- Belt faulty - Filter not installed - Malfunction - Sensor disconnected - Fan	- Change belt - Install filter - Replace sensor - Reconnect sensor - See fan fault
Filter dirty	Differential pressure sensor filter 0-1000 Pa	- Filter fouled	- Clean or replace filter
Filter blocked	Differential pressure sensor filter 0-1000 Pa	- Filter too dirty	- Replace filter
Isolation damper	Damper limit switch ID5	- Closing problem	- See causes
Pump	Pump operation feedback ID2	- Electrical protection fault - No water flow	- See causes - See causes

7 - MONITORING

The controller may be connected to a local or remote monitoring PC or to most types of CMS (Modbus). For the listed functions to be used, optional cards (Rs485, pCO Web) or gateways (devices able to interpret various communication protocols) must be installed.

NOTE:

If using a communication bus, the routing and processing of the available data are outside CIAT's scope of supply. They must be provided by the installer, and require the involvement of an integrator.

7.1 CMS

Various communication standards can be used to connect with a CMS monitoring system.

Expansion boards are inserted in the "Serial Card" port on the controller.

ModBus® RTU: insert the RS485 expansion board (CIAT code: **7119749**) and connect it as described in the manual. Validating the protocol on the user terminal (screen **g1**):

- **Protocol**   MODBUS RTU
- **Speed**   ---- bds (Set in accordance with the CMS speed)
- **Address**   001 (Different to 0)

ModBus® TCP: insert the pCo Web card (CIAT code: **7119753**) and connect it as described in the manual. Validating the protocol on the user terminal (screen **g1**):

- **Protocol**   MODBUS TCP
- **Speed**   19,200 bds (Mandatory)
- **Address**   001 (Mandatory)

Bacnet® IP: insert the pCo Web card (CIAT code: **7119753**) and connect it as described in the manual. Validating the protocol on the user terminal (screen **g1**):

- **Protocol**   BACNET IP
- **Speed**   19,200 bds (Mandatory)
- **Address**   001 (Mandatory)

7.2 The datapoint database

The unit comes with a communication database that includes the most important datapoints for the program, from the values of the sensors to the parameters displayed in the masks. The database contains three types of datapoint: digital datapoints, integer datapoints and analogue datapoints. The tables below list the names of these datapoints, their addresses and types (read-only (R) or read/write (R/W)).

7.3 Modbus

7.3.1 ModBus RTU connection diagram
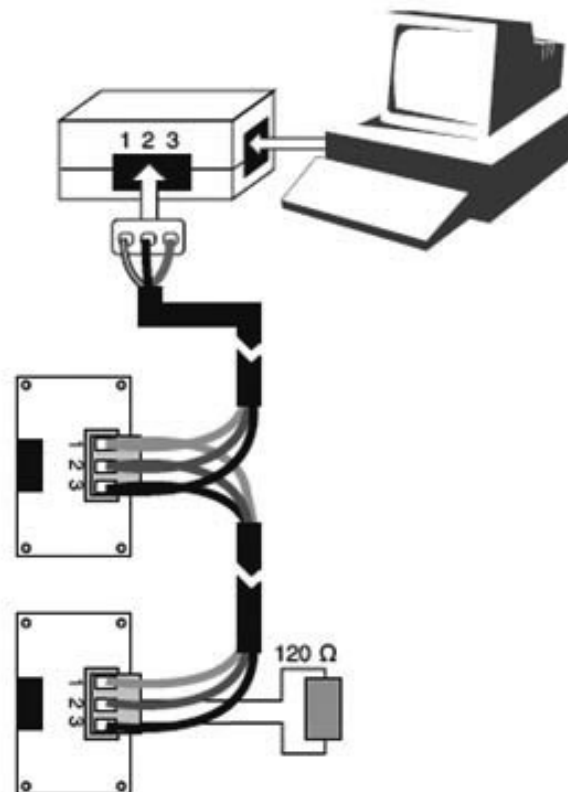
7.3.2   RS485 connection close-up
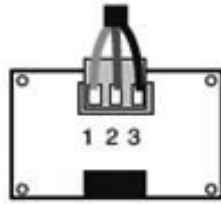
Pin	Description
1	GND
2	RX+/TX+
3	RX-/TX-

The components required for connection to the remote and/or local ModBus supervision system are as follows:
- An asynchronous half duplex RS485 serial card (code: **PCOS004850**) in RTU mode, connected to each pCO_3 controller.
- A standard RS485/USB converter for connection to a PC (not supplied by CIAT). The converter can be connected to any network RS485 card.
- An electrical network using an **AWG20/22** shielded cable (not supplied by CIAT) comprising a twisted pair and shielding with a maximum length of **1000 m.** This network must never run parallel to power cables at a distance of less than **50 cm**. These cables may cross, but perpendicularly. You are requested not to form a loop with the network cable or the earth braid, and to properly separate the various cable families (control, power, earth and communication bus).
- A supervision program installed on a PC (not supplied by CIAT).
An 120 Ω ¼ W electrical resistor must be connected to the RS485 serial card in the last position on the bus, as shown in the connection diagram.
The format of the data frame, which cannot be modified, is as follows: 8 data bits, 2 stop bits and without parity on 2 words (2 bytes), high-order, low-order.
The data format (16 bits, signed) is standard for Modbus except for analogue data which is in the format "Integer divided by 10".
The codes for the ModBus functions used are:
-     1 or 2: Read n bits
-     3 or 4: Read multiple registers (16 bits)
-     5: Write one bit
-     6: Write one register
-     8: Read diagnostics counters
-     11: Read event counter
-     15: Write n bits
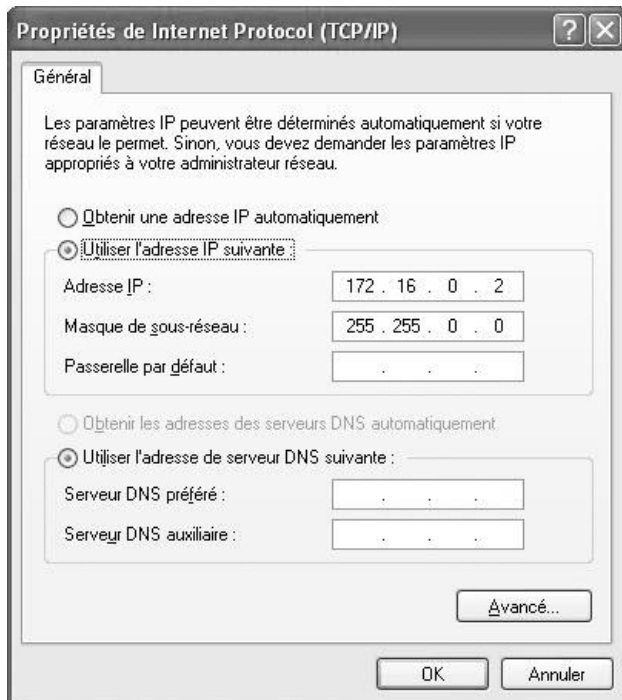-   16: Write multiple registers (16 bits)
NB: The JBus addresses are equal to the "ModBus address" - 1

7.3.3 Modbus TCP connection

The Modbus TCP protocol connection requires a communication card to be connected and configured as shown below.

PC local IP address: 172.16.0.2
Subnet mask: 255.255.0.

pCOWeb card IP address: 172.16.0.1

Setting the card to its factory configuration (shown above):
Disconnect the power supply to the pCO3 card – Press the button on the pCOWeb card – Keep pressing, and switch the power to the pCO3 card back on – The green LED on the left flashes then goes off (after approx 30 secs) – Now release the button.

Configuring communication on the pCO3:
Protocol: CAREL
Speed: 19200

During normal operation, with the cable connected and the IP correctly set, the LED on the left is green and flashing and the LED on the right is green and constant.

Enter the address http://172.16.0.1 in a web browser
Click "Go to Administrator Area"
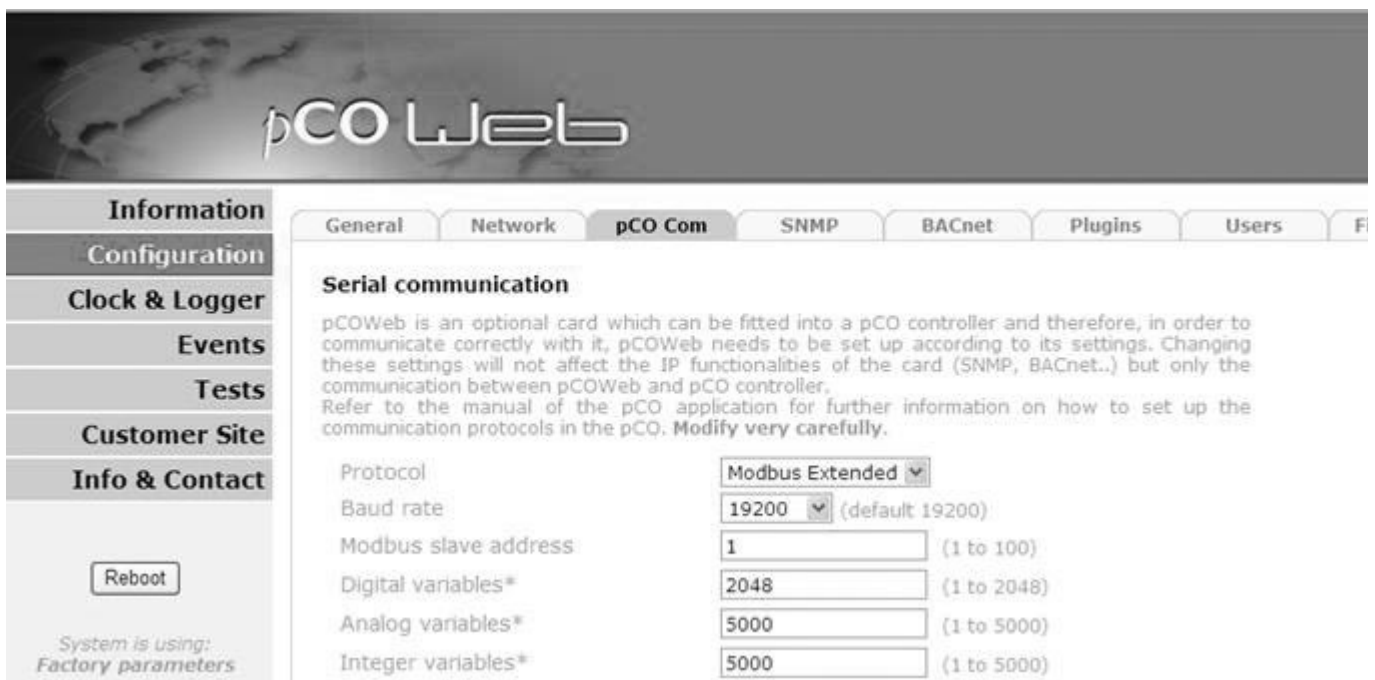User name: admin
Password: fadmin

Click Configuration then pCO Com.
In Protocol: Modbus Extended OR BACNET IP
Baud rate: 19200
Then the button: Submit

The speed (baud rate) must be identical in the communication menu

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