EN7546666-04

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FLOWAY ACCESS

Control manual

CIAT

CONTENTS

1 - FOREWORD

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

The HMI terminal displays the following data which can be edited at any time:

- The function is requested
- The unit comprises a heat recovery unit
- The unit is operating
- There is a supply air cooling requirement
- Values of connected sensors
- Unit on/off cycles
- Calibration of the sensors
- Detection of alarms and log of the last 100 alarms
- Password-protected configuration and operating parameters
- Device running times and time delays
- Managing time programs (6 weekly and 6 annual)
- Language selection

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

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

2 - THE CONTROL PLC

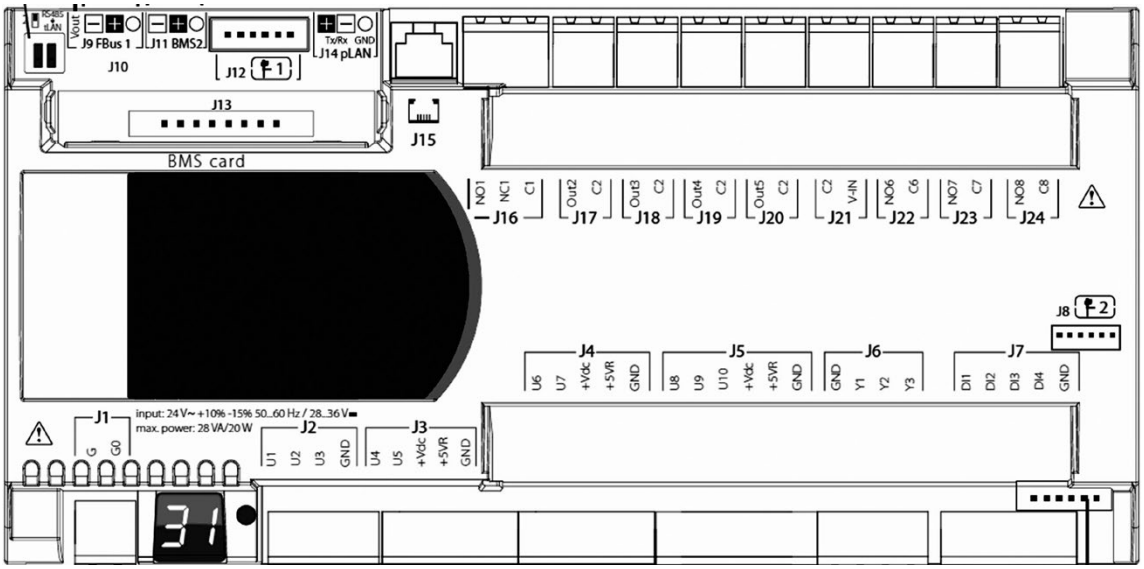
2.1 - Introduction

The control PLC is used to control and monitor the operating status of the various components of the air handling unit. Depending on the options, it provides temperature control and fan management. It can be connected to a CMS so that it can be controlled remotely.

2.2 - Inputs/outputs

The PLC has analogue and on/off inputs/outputs. The list of inputs/outputs is described below (according to the options installed).

The PLC is installed in the main electrics box and the expansion modules (if present) are in the additional boxes installed as close as possible to the elements being controlled.



Input/output designations	Type
U	On/off or analogue input
GND, C	Shared
DI	On/off input
Y	Analogue output
Out	Polarised 24 V on/off output
NO	Normally open potential-free on/off output
NC	Normally closed potential-free on/off output

Connector	Inputs	Type	Description
J1	G		+24 Vac power supply
	G0		Shared
J2	U1	0-10V	CO_2 air quality measurement or supply air duct pressure sensor
	U2	NTC	Return air temperature sensor
	U3	NTC	Supply air temperature sensor
	GND		Shared
J3	U4	NTC	Fresh air temperature sensor
	U5	ON/OFF	Changeover thermostat
	+Vdc		Not used
	+5VR		Not used
	GND		Shared
J4	U6	ON/OFF	Intake filter pressure switch
	U7	ON/OFF	Exhaust filter pressure switch
	+Vdc		Not used
	+5VR		Not used
	GND		Not used
J5	U8	ON/OFF	DX unit defrosting
	U9	0 - 5V	Air intake fan differential pressure sensor (controller software version >= V09) otherwise: not used
	U10	0 - 5V	Extraction fan differential pressure sensor (controller software version >= V09) otherwise: not used
	+Vdc		Not used
	+5VR		Not used
	GND		Shared

Connector	Outputs	Type	Description
J6	GND		Shared
	Y1	0-10V	Hydraulic coil valve control or DX unit valve control
	Y2	0-10V	DX unit no.2 control
	Y3		Not used
Connector	**Inputs**	**Type**	**Description**
J7	DI1		Fire fault
	DI2		Electrical heater or DX group fault
	DI3		Setpoint 1 / Setpoint 2 contact
	DI4		Remote on/off control
	GND		Shared
J8			Not used
Connector	**Other**	**Type**	**Description**
J9	Vout		Not used
	FBus1 -		Connection to fans and Th-Tune - Tx/Rx -
	FBus1 +		Connection to fans and Th-Tune - Tx/Rx +
	GND		Connection to fans and Th-Tune - common
J10			Not used
J11	BMS2 -		ModBus RS485 CMS connection - Tx/Rx -
	BMS2 +		ModBus RS485 CMS connection - Tx/Rx +
	GND		ModBus RS485 CMS connection - shared
J12			Not used
J13			Housing for expansion board
J14	pLAN -		pLAN - Rx/Tx-
	pLAN +		pLAN - Rx/Tx+
	GND		pLAN - shared
Connector	**Outputs**	**Type**	**Description**
J15			pLAN connector for HMI
J16	NO1		Fault summary
	NC1		Not used
	C1		Shared
J17	Out2	ON/OFF	Recovery unit control
	C2		Shared
J18	Out3	ON/OFF	Isolation damper opening control
	C2		Shared
J19	Out4	ON/OFF	Electric heater stage 1 control
	C2		Shared
J20	Out5	ON/OFF	Electric heater stage 2 control
	C2		Shared
J21	C2		Shared
	V-IN		+24 Vac power supply
J22	NO6		AHU operating feedback
	C6		Shared
J23	NO7		DX unit run/shutdown control
	C7		Shared
J24	NO8		DX unit heating/cooling control
	C8		Shared

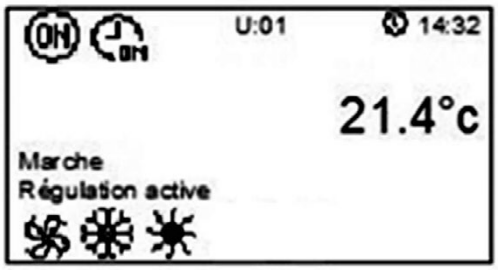
2.3 - Terminal

The terminal is supplied equipped with an LCD screen (8 lines x 22 characters) and 6 keys. It is installed on the front of the electrics box for the unit or remotely. It is connected to connector J15 on the PLC via a telephone cable.

It is used to modify the programme parameters and view the machine state

2.3.1 - Machine status

The terminal is used to view the machine state.



List of symbols and explanations

U:01 Indicates the unit's address on the pLAN bus

ON Indicates the unit run or shutdown request

Icon	On/off request for the unit
OFF	Off from the terminal or the CMS
ON flashing	On from the terminal or the CMS and off via the remote control
ON	On from the terminal or the CMS

21.4°C Indicates the set temperature value (room, extraction or intake)

14:32 Indicates the time

On Indicates the unit state

Unit status	Description
Off	The unit is off
Off due to a fault	The unit is stopped following a fault
On	The unit is operational
On setpoint 1	The unit is operational with the setpoints 1
On setpoint 2	The unit is operational with the setpoints 2
Night cooling	Night cooling mode is active
Frost protection	The unit is stopped but is providing frost protection
Manual mode	Test mode is active
Fire protection	Fire protection is active

Control active Indicates the operating status

Operating status	Description
Damper opening	The isolation damper is in the process of opening
Ventilation start-up	The ventilation is in the process of starting up
Control active	The control functions are active
Limited regulation	Certain control functions are not authorised (e.g. Flow rate insufficient for electrical heater or DX unit operation)
Fan delay	The unit is in the process of stopping but the ventilation remains active to cool the electric heaters or the gas burner
Free cooling	Free cooling is in progress
Outdoor temperature limit	The outdoor temperature is too low for the unit to operate.
DX unit defrosting	The DX unit is defrosting.

Indicates the state of the time schedule

Icon	Time schedule state
	No validated time schedule
	At least one time schedule is validated and active Flashing if override currently requested by the Th-Tune
	At least one time schedule is validated but not active

Indicates a "Cooling" request

Indicates a "Heating" request

Indicates the operation of the fan(s)

Indicates operation in terms of air quality

2.3.2 - Menus

The user interface is organised according to the menus below (certain menus are only accessible when the access level is 2 or 3 (see 4.18) and when the option is present on the machine):

1 / Machine status
2 / Setpoints
3 / Fault
4 / Fault memory
5 / Scheduling
  5.1 / Weekly
  5.2 / Annually
6 / Access levels
7 / Machine parameters (P01 to P99)
8 / Setting parameters (P100 to P299)
9 / Read parameters (P300 to P549)
10 / Versions (P550 to P599)
11 / Fault level (P600 to P699)
12 / Communication
  12.1 / BMS1 (P700 to P709)
  12.2 / BMS2 (P710 to P719)
  12.3 / pLAN (P720 to P729)
13 / Calibration (P800 to P849)
14 / Direction of the inputs/outputs (P850 to P899)
17 / Intake FMA EC motor
  17.0 / FMA settings (P1200 to P1219)
  17.1 / Intake FMA1 (P1220 to P1239)
19 / Exhaust FMA EC motor
  19.0 / FMA settings (P2200 to P2219)
  19.1 / Exhaust GMV1 (P2220 to P2239)
20 / Energy meter
  20.1 / Main box (P3000 to P3049)
21 / Test mode (P3500 to P3599)
22 / Measured values

2.3.3 - Keys

The 6 keys on the interface are used to change the parameters, acknowledge faults, and switch the unit on or off. The operation of these keys is described below.

Key	Description
Esc	Used to go up one level in the menu tree and access the machine status menu from the general menu
	This key is used to view the faults on the display, and indicates the presence of a fault
Prg + 	Acknowledgement of a fault.
🡻	This key has several functions: 1. to manage the masks on the display (next mask) 2. to go to the next line in the menu 3. to adjust the values of the monitoring parameters (decrease)
🡹	This key has several functions: 1. to manage the masks on the display (previous mask) 2. to go to the previous line in the menu 3. to adjust the values of the monitoring parameters (increase)
Prg + 🡹	Switches the unit on.
Prg + 🡻	Switches the unit off.
🡸	Used to validate the data entered and go into a menu. It is continuously backlit to indicate when the power is on

2.4 - Touchscreen terminal

The terminal supplied is equipped with a 4.3" touchscreen display. It is connected to connector J15 on the PLC via a telephone cable.

It is used to modify the programme parameters and view the machine status

2.4.1 - Machine status

The terminal is used to view the machine status.

- **Supply air 23.0 °C:** Indicates the controlled temperature value (supply, return or room air)
- **Intake 2340 m³/h 120 Pa:** indicates the flow rate or pressure value measured
- **Exhaust 2340 m³/h:** indicates the flow rate value measured

 ……. Indicates the operation of the fan(s) (rotates when the fans are working)

- Unit status **On** indicates the unit status

Unit status	Description
Off	The unit is off
Off due to a fault	The unit is stopped following a fault
On	The unit is operational
On setpoint 1	The unit is operational with the setpoints 1
On setpoint 2	The unit is operational with the setpoints 2
Night cooling	Night cooling mode is active
Frost protection	The unit is stopped but is providing frost protection
Manual mode	Test mode is active
Fire protection	Fire protection is active

- **Control active** Indique Indicates the operating status

Operating status	Description
Damper opening	The isolation damper is in the process of opening
Ventilation start-up	The ventilation is in the process of starting up
Ventilation only	The control operates without the control components
Control active	The control functions are active
Control limited	Certain control functions are not authorised (E.g.: flow rate insufficient for the electric heater operation)
Fan delay	The AHU is in the process of shutting down but the ventilation remains active to cool the electric heaters
Free cooling	Free cooling is in progress
Outdoor temperature limit	The outdoor temperature is too low for the unit to operate
DX unit defrosting	The DX unit is in defrosting mode

- **Current mode** : symbol grey if operation requested but inactive, symbol coloured if operation requested and active

: Indicates a "Cooling" request

: Indicates a "Heating" request

: Indicates operation in terms of air quality

2.4.2 - Menu bar

Retour à l'écran d'accueil

Retour au niveau de menu supérieur

Recherche de paramètre

Choix du niveau d'accès

Pas de défaut actif.

Présence d'un défaut (Dans ce cas la barre de LED est éclairée, en rouge si défaut danger, en jaune si défaut maintenance). Lien vers la liste des défauts actifs.

2.4.3 - Menus

Main menu

Level 1	Level 2	Level 3	Access level
Information			1
Login			1
Setpoints	Setpoints 1		1
	Setpoints 2		1
	Setpoint change		2
	Setpoint compensation		2
	Night cooling		2
Time program	Weekly 1		1
	Weekly 2		1
	Weekly 3		1
	Weekly 4		1
	Weekly 5		1
	Weekly 6		1
	Annual 1		1
	Annual 2		1
	Annual 3		1
	Annual 4		1
	Annual 5		1
	Annual 6		1
Faults	Current fault		1
	History		1
	Faults level		2
Value reading	Ventilation		1
	Filters		1
	Coils		1
	Heat recovery units		1
	Dampers		1
	Inputs/Outputs		1
	Temperatures		1
	Meters		1
	Setpoint change		1
	EC intake fan		1
	EC exhaust fan		1
	DX unit		1
	Energy meter		1
Curves	Temperature curves		1
	Ventilation curves		1
Settings	Language		1
	Date and time		1
	Ventilation	Fan management	2
		Fan PID	2
		Pressure thresholds	2
		Air quality	2
		Downgraded fresh air flow rate	2
		Fire management	2
		DX unit	2
		Warning management	2
	Energy optimisation	Night cooling and free cooling	2
		Heat recovery unit	2
	Communication		2
	Temperature	Temperature management	2
		Temperature threshold	2
		Temperature PID	2
		Neutral zone limitation and compensation	2
		Changeover	2
		Frost protection	2
	Input/output management	I/O direction	2
		Calibration	2
	Time del. / selections	Time delays	2
	EC fans		3
	Emulation PGD		3
	Service	Fault memory full	3
		Machine parameters	3
		Parameters back-up	3
		Test mode	3
		Reset time meters	3
		EC fan addressing	3

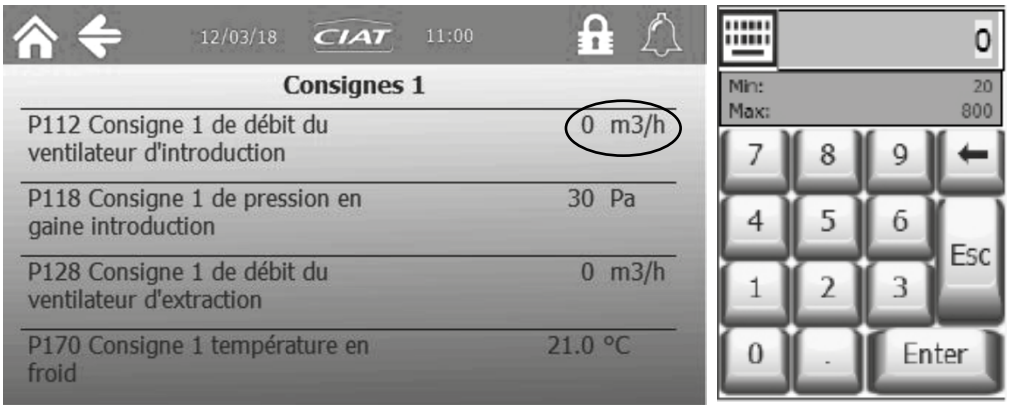
2.4.4 - Use

Action	Description
Start-up/shutdown	From the home screen, press and confirm
Fault acknowledgement	Press the alarm icon in the menu bar and confirm with
Status: machine shut down	red
Status: machine on	green
Status: run request with the unit shut down	red/green flashing

Accessing the parameters

In each parameters table, it is possible to scroll down the table using your finger.

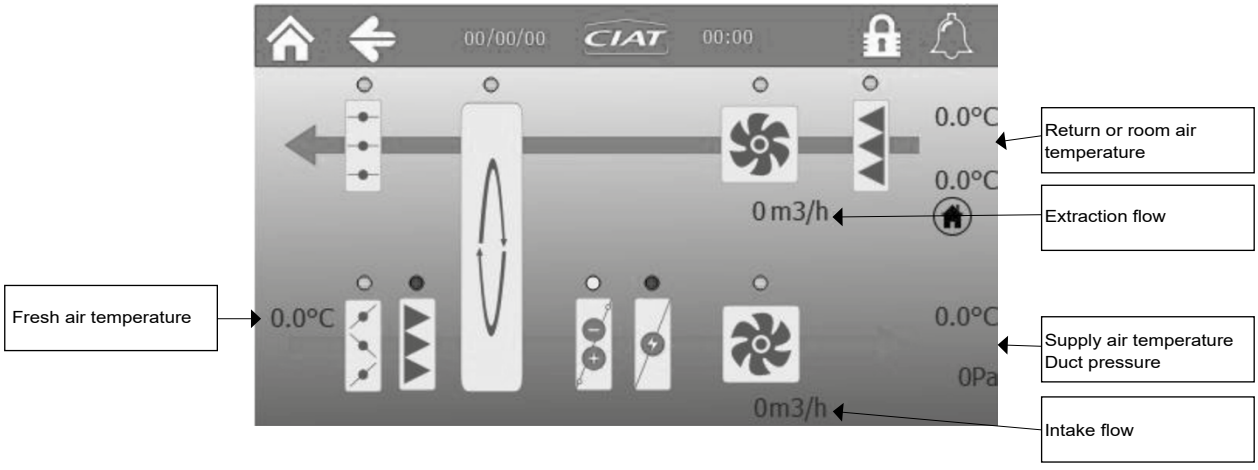
In the setpoint or setting parameters table, it is possible to modify a value by pressing on it. A numeric pad will open, indicating the possible setting range (min. and max.), and this must be confirmed via Enter



It is possible to search for a parameter using its number. To do so, press the icon in the menu bar. Enter the parameter number, and confirm with . If the parameter exists and your access level is sufficient, you will be automatically redirected to the page containing this parameter. Otherwise, an error message will be displayed.

Overview

The home screen shows an overview of the operation of the machine. Only the components present in the machine are visible.



Press on each component to access the corresponding reading parameters.

A ring positioned beside each component indicates its status:

- Grey: : inactive
- Green: in operation
- Orange: maintenance fault
- Red: danger fault

Access level

The access level selection can be accessed by pressing on the padlock in the menu bar or main menu.

The current level is displayed at the bottom of the screen. To go back to level 1, you need to enter the password "1111".
Pressing on the stars will bring up a numeric keypad to enter the password for the desired level:

Once a password has been entered,  is used to view the password, and  is used to confirm.

Curves

The screen records the values of the main parameters (temperatures, flow rate, duct pressure and filter differential pressure). It is possible to choose the record duration (1, 6, or 12 months), the oldest values are erased, which sets the sampling period (1 acquisition every 60 s for example))

1 month (1 every 60 s)

6 months (1 every 400 s)

12 months (1 every 800 s)

Pressing  brings up the curve settings :

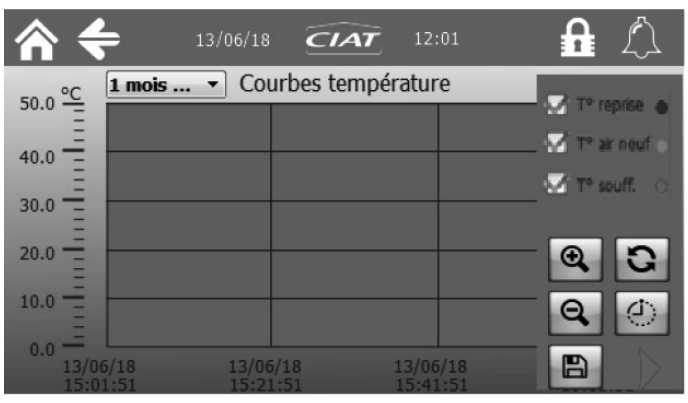
 : zoom in on the vertical axis

 : zoom out on the vertical axis

 : zoom reset

 : change horizontal axis duration

 : save values as CSV on a USB stick



3.1 - Management of on and off modes

The unit can be started by the terminal or by the CMS. Parameter P716 is used to authorise or deny CMS control of the unit.

When the unit is operating, an on/off "remote control" input is used to stop the unit. This may have been previously started up by the HMI in the ON position.

The unit's various operating modes can also be programmed (see time schedule).

The unit has a "frost protection" mode which is only used when the controlled temperature is the room temperature. When this mode is activated, if the unit is off, it will automatically restart if the room temperature drops below the threshold set as P228.

To be able to start up the unit, the machine parameters must be locked (P99 = yes)

If the unit is shut down via the terminal but remote control is authorised (P716=remote) then the air handling unit may potentially start at any time (if the CMS gives the order for example).

The unit will only operate if the fresh air temperature is above the minimum threshold (P265). If the unit has been started but the outdoor temperature is too low, a periodic reminder will be issued every hour, to measure the outdoor temperature and check whether it is above the threshold.

99	Configuration locked
716	Control type
228	Frost protection temperature setpoint
265	Fresh air temperature limit for unit operation

3.2 - Managing the setpoints

The PLC manages setpoints 1 and setpoints 2 for the temperatures and flow rates/pressures. Setpoints 1 are, for example used when the building is occupied and setpoints 2 when the building is unoccupied.

Parameter P160 is used to select between the setpoints 1/2 either via the time schedule or via the on/off input J5 U10 (only if there is no direct expansion coil) and via the CMS control.

Note: if parameter P160 indicates on/off input forcing mode, then the input indicates the setpoint 1 selection and must operate on setpoint 1; otherwise it depends on the scheduling or the CMS.

Parameter P161 is used to select whether the change in setpoint is based on the temperature setpoints, on the ventilation setpoints (flow rate or pressure) or on both.

Setting P161	Operation		
	Setpoint	Selection Setpoint 1	Select Setpoint 2
Temperature	Temperature	Setpoint 1	Setpoint 2
	Flow rate or pressure	Setpoint 1	
Ventilation	Temperature	Setpoint 1	
	Flow rate or pressure	Setpoint 1	Setpoint 2
Temperature + Ventilation	Temperature	Setpoint 1	Setpoint 2
	Flow rate or pressure		

Note: this table takes the input as normally closed; it can be configured NO/NC. If the actuation takes place via the CMS, then the input becomes inactive.

160	Setpoint 1/Setpoint 2 selection
161	Application of setpoint 1/setpoint 2 selection

3.3 - Safety and insulating damper

The unit may have up to 4 isolation dampers. They are all wired in parallel. The presence of at least one damper is given by parameter P26.

The insulating damper is activated by an On/Off servomotor with spring-return. The time required for it to open is P108.

When the unit is shut down, this damper is normally closed.

It will open upon the unit start-up request, then after a certain time lag, the unit will switch to "Run" mode and the damper is kept open until the unit is shut down or a "danger" fault appears

26	Isolation damper
108	Damper opening time delay

3.4 - Managing the filters

Pressure switches measure the filter clogging (intake and exhaust), and a fault appears if the filter is clogged (new filter must be ordered and replacement scheduled) or blocked (machine is shut down).

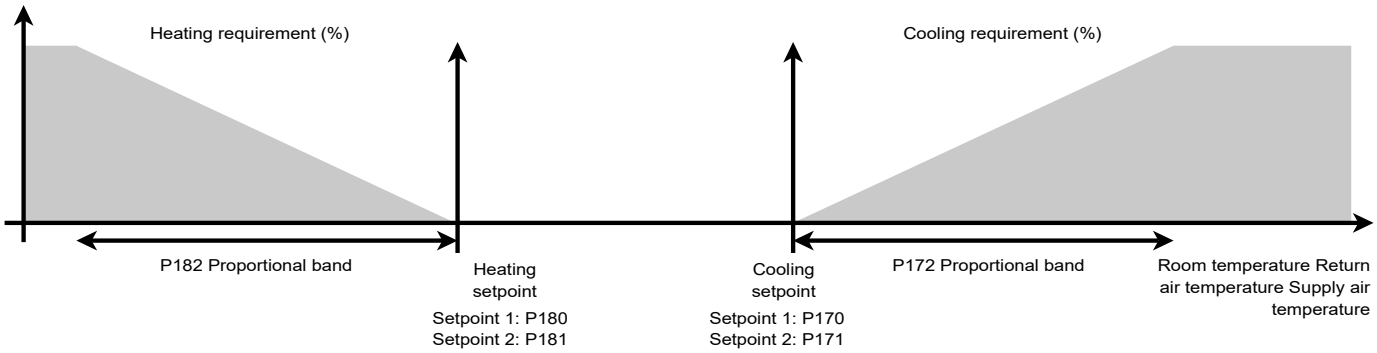
If a pressure switch is triggered, the "filter dirty" fault is triggered. If this fault is present for more than a week, the "filter blocked" fault is triggered. If the "filter blocked" fault is cleared and the pressure switch is triggered less than an hour after the machine restart, then the "filter blocked" fault is triggered again. It is possible to view the pressure switch status of each filter (P338 and P339).

3.5 - Temperature control

The set temperature may be:
- the return air temperature
- the ambient temperature (if the Th-Tune room remote control is present)
- the supply air temperature

This choice is made via parameter P154

The temperature is set via a PID which calculates a heating requirement (P395) or a cooling requirement (P394). There is one heating setpoint (P180) and one cooling setpoint (P170), with the option to have a deadband between these two different setpoints. The calculated requirement is then split between the heating and cooling elements.



- The heating and cooling setpoints must not overlap in automatic mode (P155)
- in heating only or cooling only mode, the setpoints may overlap.

154	Target temperature selection
155	Temperature control mode selection
168	Heating or cooling change authorisation time delay

Cooling PID:

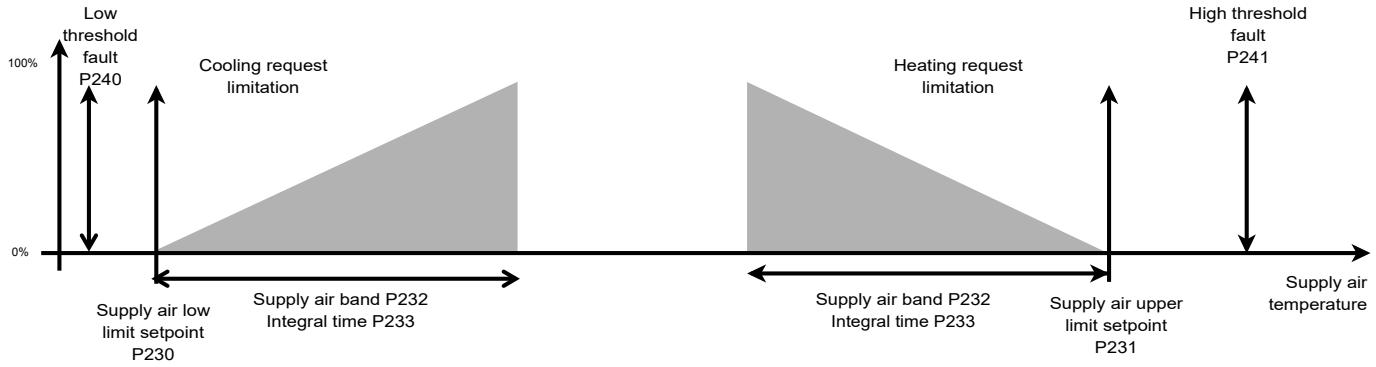
170	Temperature setpoint 1 in cooling mode
171	Temperature setpoint 2 in cooling mode
172	Temperature control PID proportional band (P) in cooling mode
173	Temperature control PID integral time (I) in cooling mode
174	Temperature control PID derivative time (D) in cooling mode

Heating PID:

180	Temperature setpoint 1 in heating mode
181	Temperature setpoint 2 in heating mode
182	Temperature control PID proportional band (P) in heating mode
183	Temperature control PID integral time (I) in heating mode
184	Temperature control PID derivative time (D) in heating mode

Supply air limitation

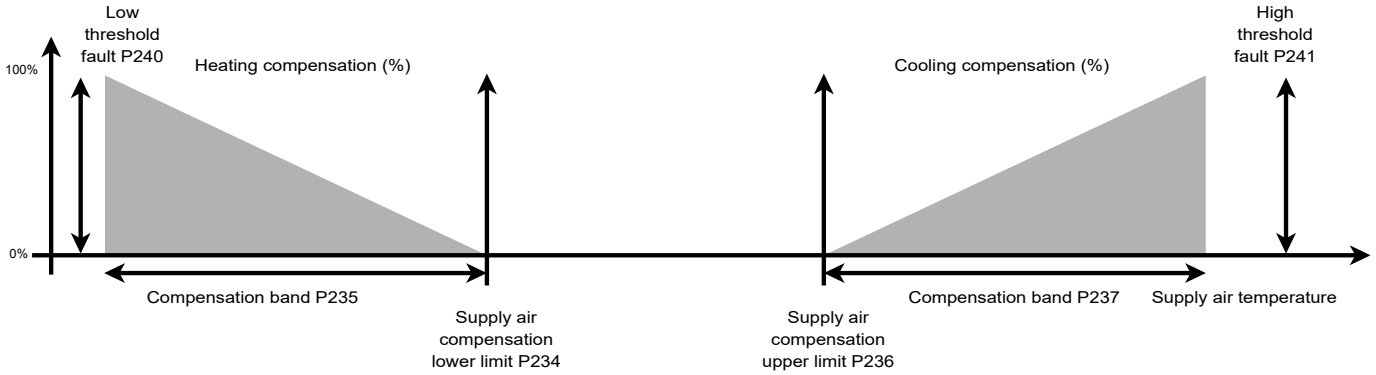
When control is being applied to the return air or room air, the supply air temperature can be limited. This limitation is used to avoid blowing air at too high a temperature in heating mode or too cold a temperature in cooling mode. This limitation is activated by parameter P156.



156	Supply air limitation = With or Without
230	Supply air temperature low limit setpoint
231	Supply air temperature upper limit setpoint
232	Supply air temperature limit proportional band
233	Supply air temperature limit (I) integral time

Supply air compensation

When control is being applied to the return air or room air, the supply air temperature can be compensated. This compensation is used avoid blowing air at too cold or too high a temperature when the control is in deadband mode (no heating or cooling requirement calculated). This compensation is activated by parameter P157.



157	Supply air compensation in deadband = With or Without
234	Low supply air temperature compensation setpoint in deadband
235	Low supply air temperature compensation proportional band in deadband
236	High supply air temperature compensation setpoint in deadband
237	High supply air temperature compensation proportional band in deadband

The temperature upper and lower thresholds (P240 to P245) are used to trigger a fault if the temperature is outside of these limits.

240	Supply air temperature low limit threshold
241	Supply air temperature upper limit threshold
242	Return air temperature low limit threshold
243	Return air temperature upper limit threshold
244	Room temperature low limit threshold
245	Room temperature upper limit threshold

3.6 - Display Fan Control

The controller runs the plug fans with an EC motor. The unit has one intake fan and one exhaust fan. Pressure sensors for measuring the air flow are wired, on the EC motor or on the PLC (depending on the parameter P01 Unit model).

It is possible to control the intake air flow rate by constant flow rate or constant duct pressure.

Constant air flow control (P104)

The flow rate setpoints can be configured: Air intake flow rate setpoints 1 / 2 (P112, P113) and Air extraction flow rate setpoints 1 /2 (P128, P129)

The PID for the intake motor control is managed via P114 to P116, and the exhaust motor control via P130 to P132

Intake flow

112	Air intake fan flow rate setpoint 1
113	Air intake fan flow rate setpoint 2
114	Air intake fan flow control PID proportional band (P)
115	Air intake fan flow rate control PID integral time (I)
116	Air intake fan flow rate control PID derivative time (D)

Extraction flow

128	Air extraction fan flow rate setpoint 1
129	Air extraction fan flow rate setpoint 2
130	Air extraction fan flow rate control PID proportional band (P)
131	Air extraction fan flow rate control PID integral time (I)
132	Air extraction fan flow rate control PID derivative time (D)

Constant duct pressure control (P104)

In this case, a pressure sensor must be added and installed in the supply air duct. This sensor must be connected to the main PLC.

The intake pressure setpoints are settable: setpoints 1/2 (P118, P119) The PID for the Intake motors control is managed via P120 to P122

In this case the exhaust fan operates based on intake flow rate feedback (default setting) with a multiplier factor (P106) to create a positive pressure or vacuum pressure at the exhaust

A limiter function prevents the flow rate from exceeding a maximum value of + 10%. This function limits the maximum intake fans percentage, according to the air flow rate.

Duct pressure

118	Air intake duct pressure setpoint 1
119	Air intake duct pressure setpoint 2
120	Air intake duct pressure control PID proportional band (P)
121	Air intake duct pressure control PID integral time (I)
122	Air intake duct pressure control PID derivative time (D)
124	Duct pressure low limit threshold
125	Duct pressure upper limit threshold

Motor

The motors are run via modbus. They must be addressed, and parameters P51 and P78 indicate whether their Modbus addresses have been configured (see Commissioning chapter).

Configuration

51	Air intake FMA1 configuration
71	Air extraction FMA1 configuration

Motors warning

The motor warnings are fed back via the EC motors ModBus connection. The  button on the user interface is used to show and display their presence. The parameters indicating whether or not a warning is present and displaying the last warning received are shown in the EC motors information menu. The acknowledgement of a motor warning depends directly on the information fed back via the ModBus connection.

These can be defined:
- as "maintenance" or "danger" type warnings via parameters P650 and P651.
- as taken into account (or not) on the fault output via parameter P292.
- as present (or not) on the CMS via parameter P293.

The motor warnings are stored in the fault memory of the PLC. In the "4.Fault memory" menu, the text states if the warning concerns the intake motor or the exhaust motor and a warning code is also shown (see correlation table below). If several warnings are fed back simultaneously, up to 4 fault codes may be shown with the text.

Correlation table with warnings :

#Warning Code	Definition
#Code 1	Current limitation
#Code 2	(reserved)
#Code 3	Power limitation
#Code 4	Power output temperature too high
#Code 5	Motor temperature too high
#Code 6	Internal circuit temperature too high
#Code 7	Voltage too low (DC-link)
#Code 8	Slowdown mode
#Code 9	(reserved)
#Code 10	Current speed too low
#Code 11	Cable rupture
#Code 12	(reserved)
#Code 13	Voltage too high (DC-link)
#Code 14	Speed limit exceeded
#Code 15	Supply voltage high
#Code 16	Load shedding function active

Faults

The pressure sensors used for the FMAs are used to detect the presence of the air flow (threshold P111). The PLC triggers a fault if the flow rate is greater or less than the fixed limits.

Flow rate control

110	AHU max flow rate
111	AHU flow rate low limit threshold

Note:

The air flow rate lower limit fault (intake or exhaust) is triggered if the flow rate measurement is less than 50% of the low threshold (P111) for at least 10 s.

This time lag is extended to 60 s during the DX unit defrosting phase in derated mode (P286 = derated mode)

Minimum flow rates according to the unit model:

P1	P111
Unit model	**minimum flow rate**
1000 Alu	350 m^3/h
1000 Plastic	350 m^3/h
2000 Alu	500 m^3/h
2000 Plastic	500 m^3/h
3000 Alu	800 m^3/h
3000 Plastic	700 m^3/h
5000 Alu	900 m^3/h
7500 Alu	1400 m^3/h

Air intake fan

104	Air intake ventilation control

Air extraction fan

106	Multiplication factor value of the signal sent by the air extraction fan with pressure control in the supply air duct

3.7 - Energy recovery

The unit has a fixed-speed wheel recovery unit. This is used to warm fresh air up in winter or cool fresh air down in summer.

The wheel recovery unit operates as follows:

- If the recovery unit heating requirement is greater than 50% with a 50% hysteresis, and the return air temperature is greater than the fresh air temperature + the difference P225 then it operates
- If the recovery unit cooling requirement is greater than 50% with a 50% hysteresis, and the return air temperature is less than the fresh air temperature - the difference P225 then it operates

During the ventilation start-up phase, it operates.
- If there is a free cooling or night cooling requirement, the recovery unit is shut down.
- There is a 1°C hysteresis between start-up/shutdown

Wheel seizing prevention

The PLC gives the order for the wheel to operate 1 minute every 4 hours.

Load shedding of the wheel

Load shedding of the wheel is possible using parameter P158.

225	Temperature difference for recovery unit run authorisation

		Temperature	
		Return air < fresh air –P225	Return air > fresh air + P225
Heat recovery unit requirement	Cooling > 50% with a 50% hysteresis	On	Off
	None	Off	Off
	Heating > 50% with a 50% hysteresis	Off	On
	Free cooling Night cooling	Off	Off

3.8 - Coil

The unit may contain a hydraulic or direct expansion coil, or an electrical heater.

This coil is configured using parameters P28 and P32.

The hydraulic coil may be a cooling coil, heating coil or mixed coil (heating or cooling according to the network temperature), a direct expansion coil or electrical heater

28	Coil
32	Electric heater

3.8.1 - Mixed coil scenario

In the case of a mixed coil, the changeover may be made either via an on/off input or via the CMS (settable via parameter P162).

The changeover thermostat must be fitted by the installer on the mixed coil inlet, at a point where water is in constant circulation.

The changeover status (heating or cooling made) can be viewed via parameter P345.

162	Changeover selection

3.8.2 - Frost protection

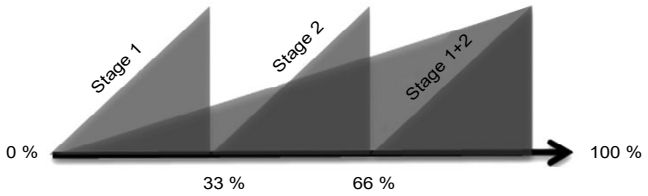
The hydraulic coil frost protected by controlling the unit's supply air temperature. If this is below the threshold P248, the frost protection fault is triggered and the isolation register is closed, the ventilation stops and the coil valves are opened 100%.

A frost prevention function is available once the unit is shut down (via the HMI, the CMS or a danger fault), or during the ventilation start-up phase. It consists in leaving the hydraulic coil valve slightly open (settable value) to maintain water circulation (P260). This opening is maintained constantly (including when the machine is shut down).

248	Hydraulic coil frost protection safety threshold
260	Coil valve opening percentage when shut down

3.8.3 - Electrical heater scenario

The control can operate an electrical heater comprising 2 on/off stages. These are operated in 3 stages (stage 1, followed by stage 2 and then stages 1 and 2).



Electric heating requirement

A minimum air flow rate is required to use the electric heaters (P126). If the flow rate is less than this parameter, the electrical heater will not be able to start up and a "control limited" message will appear.

Electric heater configuration

32	Electric heater
126	Minimum flow rate for electrical heater operation

Minimum flow rates according to the unit model:

P1	P126
Unit model	**minimum flow rate**
1000 Alu	500 m³/h
1000 PP	500 m³/h
2000 Alu	1000 m³/h
2000 PP	1000 m³/h
3000 Alu	1500 m³/h
3000 PP	1500 m³/h
5000 Alu	2000 m³/h
7500 Alu	3000 m³/h

Fan delay

If the electrical heater is in operation and a unit shutdown request appears, a settable post ventilation (P164)

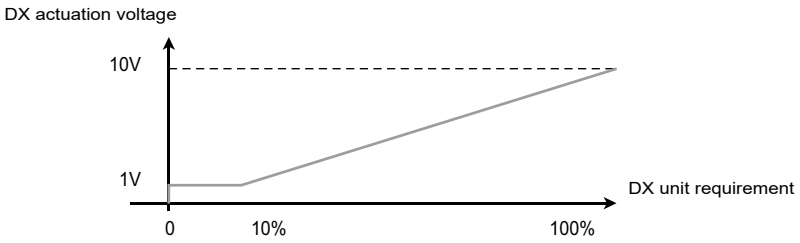
is used for cooling the electrical heaters

164	Fan delay time

3.8.4 - Direct expansion coil scenario

The unit is started up if the DX unit requirement is greater than 10%, and the unit is shut down when this request is at 0%.

The unit then regulates its output between its minimum and maximum levels. If two DX units are present, the two are controlled in parallel (same 0-10 V control).



Defrosting management

If the unit starts a defrosting phase, (P446 = active), the unit adapts its flow rate/pressure according to the mode selected with P286:

- None: the unit continues to operate as per its setpoint
- Derated mode: the unit reduces its flow rate or pressure to the setpoints P287, P288 and P289
- AHU shutdown: the unit is shut down during defrosting

Minimum flow rate

A minimum air flow rate is required to use the DX coil (P126). If the flow rate is less than this parameter, the DX coil will not be able to start up and a "control limited" message will appear.

P1	P126	P287	P288 and P289
Machine size	**Coil minimum flow rate**	**Defrosting pressure (P104 = pressure) (P286 = Reduced mode)**	**Defrosting flow rate (P104 = Flow rate) (P286 = Reduced mode)**
1000 Alu	580 m³/h	100 Pa	450 m3/h
1000 PP	580 m³/h	100 Pa	450 m3/h
2000 Alu	940 m³/h	100 Pa	600 m3/h
2000 PP	940 m³/h	100 Pa	600 m3/h
3000 Alu	1500 m³/h	100 Pa	900 m3/h
3000 PP	1500 m³/h	100 Pa	900 m3/h
5000 Alu	2600 m³/h	100 Pa	1000 m3/h
7500 Alu	3000 m³/h	100 Pa	1500 m3/h

3.9 - Free Cooling

Free cooling is used to cool the building when the outdoor temperature is lower than that inside the building. This operating mode is used when the following conditions are met:

- Function activated in P150 parameters (only if control takes place on the return air or room temperature).
- Cooling requirement: the PID outlet must be greater than 0%
- The difference between the regulated temperature (measured return or room) and the fresh air must be sufficient: fresh air temperature < regulated temperature – P206 (3°C factory value).
- The fresh air temperature is above the "free cooling temperature low limit" (P207)

When operating in free cooling mode, the supply air temperature is not controlled, and the recovery unit and coil are shut down. It is important to configure a fresh air temperature low limit which is sufficiently high to ensure no discomfort is caused.

150	Free cooling control
206	Free cooling and night cooling operating differential compared to the controlled temperature
207	Temperature low limit for free cooling and night cooling

3.10 - Night cooling

The regulated temperature must be the return or room air value. The fans control must be based on flow rate. Night cooling is used to cool the building using the colder night air

In this case, when night cooling is active, the ventilation flow rate setpoint is the "night cooling" flow rate (P212 and P213)

Several conditions must be met to activate night cooling:

- The function must be activated by the parameter P151
- The controller is located in a "night cooling" time slot or it is forced via the CMS.
- Cooling requirement: the regulated temperature must be greater than the night cooling temperature setpoint P210.
- There must be sufficient difference between the regulated temperature and the fresh air: fresh air temperature < regulated temperature – P206 (3°C factory value).
- The fresh air temperature is above the "night cooling temperature low limit" (P207)

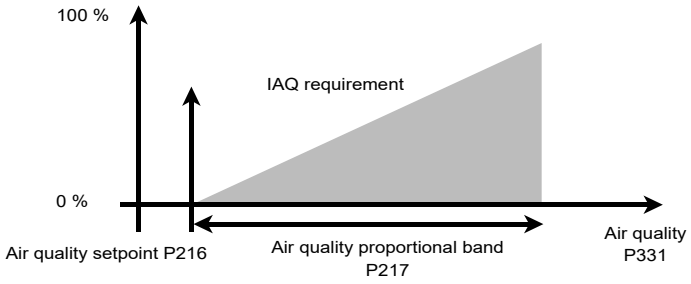
Periodic restarts: if one of the conditions for activation of night cooling is not verified (fresh air temperature, night cooling difference, or cooling requirement), the unit stops.

The fans will be restarted at the night cooling flow rate for 5 minutes each hour, and night cooling will be reactivated if all the conditions are verified. Otherwise, the AHU will stop again. Furthermore, if the fresh air temperature is 3°C below P207 (Temperature low limit for free cooling and night cooling) for more than 5 seconds, the restart must be stopped (to prevent the frost protection fault triggering).

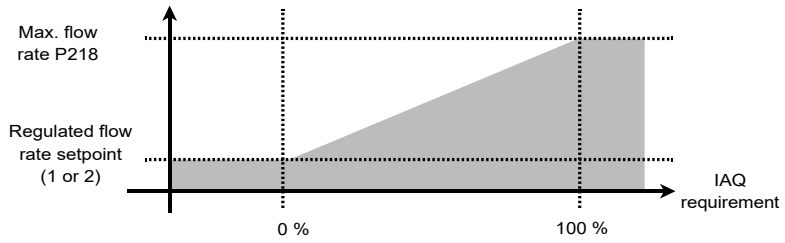
151	Night cooling control
206	Free cooling and night cooling operating differential compared to the controlled temperature
207	Temperature low limit for free cooling and night cooling
210	Control setpoint in night cooling mode
212	Air intake fan flow rate setpoint in night cooling mode
213	Air extraction fan flow rate setpoint in night cooling mode

3.11 - CO_2 air quality

If there is a CO_2 sensor in the exhaust air flow and the FMAs are flow rate set, it is possible to activate the air quality function (P152). This function calculates an IAQ (Indoor Air Quality) (P382) requirement thanks to a proportional controller (P217) so that the CO_2 concentration setpoint (P216) can be monitored.



This function works by increasing the fan flow rate, to a maximum value set by P218.



152	Air quality control
216	Air quality setpoint
217	Air quality proportional band
218	Air flow max setpoint on intake for air quality
382	Calculated air quality requirement

3.12 - Fire protection

If there is a DAD (stand-alone activating detector) in the unit, the control's fire monitoring needs to be activated (P24). There are several operating modes in case of fire detection:

- Unit shut down
- Intake fan forced to P282 flow rate and exhaust fan shut down
- Exhaust fan forced to P283 flow rate and intake fan shut down
- Intake fan forced to P282 flow rate and exhaust fan to P283 flow rate

24	Fire detection
280	Fire safety operating mode
282	Intake flow rate in case of fire
283	Exhaust flow rate in case of fire

The fire fault management strategy must be chosen according to the regulations in force in the AHU's country of installation. The AHU is not a smoke extraction device.

3.13 - Remote control in Th-Tune room

The Th-Tune is a room thermostat and is used as a room temperature sensor. It is used to display the unit status (setpoints, operating status, ventilation status). It is used to modify temperature setpoint 1 and force operation to setpoint 1 or 2.

If the machine is running via the time schedule and this corresponds to a request to switch the unit OFF or ON on setpoint 2 or a request to run in frost protection mode or even to run in night cooling mode, then pressing the timer button will restart the machine on setpoint 1 for 2 hours.

Key	Description
mode	Key has no effect
	Key has no effect
	This key is used to start or shut down the unit
	This knob has 2 functions: - Press: used to alter the setpoint or parameter selected - Rotate: used to select a setpoint or parameter, and modify it
	Button to override machine operation on setpoint 1 for 2 hours when it is running on a time schedule.

Current cooling / heating control status

Key	Description
	Current heating control
	Current cooling control

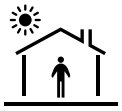
Current air flow rate setpoint

Key	Description
Symbol missing	Ventilation shut down (unit running, but frost protection or night cooling mode in progress, but fresh air temperature condition not met)
	Flow rate setpoint 2 in progress
	Flow rate setpoint 1 in progress

Current unit status

Key	Description
	Ventilation shut down (unit running, but frost protection or night cooling mode in progress, but fresh air temperature condition not met)
	Flow rate setpoint 2 in progress
	Flow rate setpoint 1 in progress

Setpoint monitored

Key	Description
	Setpoint 1 in progress
	Setpoint 2 in progress

Temperature, setpoint, time (central part of screen)

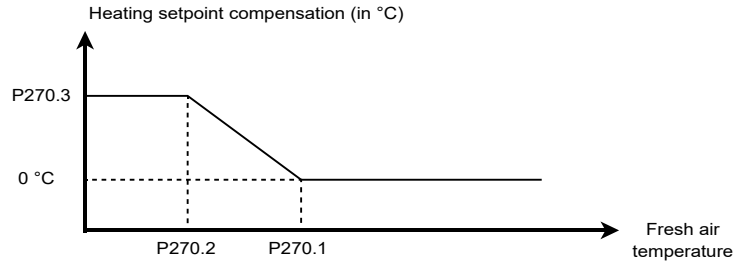
Key	Description
	Indicates the ambient temperature if the unit is running, otherwise OFF indicated if the unit is shut down or with a danger fault. If the knob is used, indicates the value of the setpoint or parameter being set.
	By default indicates current time. If the knob is used, name of setpoint being set: Mode = selecting setpoint 1 or 2 (this choice is visible only if the setpoint 1 / 2 selection is controlled by time slot or CMS (P160=1) CsgC: heating temperature setpoint 1 value CsgF: cooling temperature setpoint 1 value Cali: room temperature sensor calibration (limited to +/-3°C) the key symbol is shown when the override request is activated via the mode button

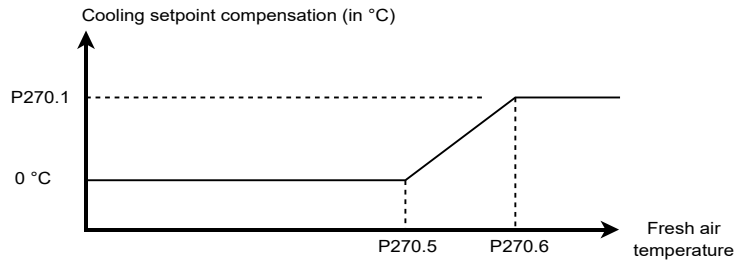
149	Th Tune

3.14 - Temperature setpoint compensation

The temperature setpoint compensation function is used to adjust the temperature setpoint according to the outdoor temperature.

If the temperature setpoint compensation function is selected (P270), a compensation is calculated according to the fresh air temperature, in accordance with the curves below.





The compensations calculated are added to the selected setpoint 1 / 2 to give the setpoint value to be used.

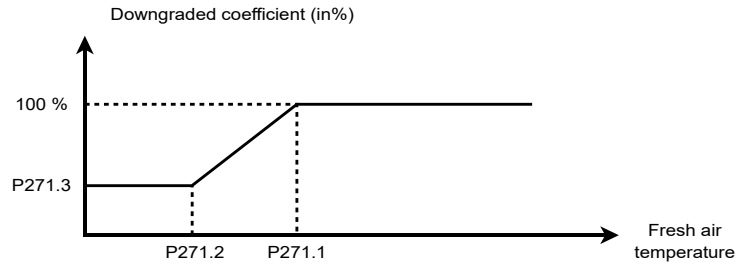
270	Temperature setpoint compensation activation
270,1	Heating compensation start fresh air temp.
270,2	Heating compensation end fresh air temp.
270,3	Heating compensation max. setpoint difference
270,5	Cooling compensation start fresh air temp.
270,6	Cooling compensation end fresh air temp.
270,7	Cooling compensation max. setpoint difference

3.15 - Downgraded fresh air flow rate

A downgraded fresh air flow rate function based on the outdoor temperature is used to limit the flow rate if the outdoor temperature is low.

This function is only selectable only if the fans control is based on flow rate.

If the downgraded fresh air flow rate function is selected (P271), a downgraded flow rate coefficient is calculated based on the fresh air temperature, in accordance with the curve below:



The intake flow rate set point to use for the control is the selected setpoint 1 / 2 multiplied by the downgrading percentage.

The exhaust flow rate set point to use for the control is the selected setpoint 1 / 2 multiplied by the downgrading percentage.

271	Downgraded fresh air flow rate activation
271,1	Downgraded mode start fresh air temperature
271,2	Downgraded mode end fresh air temperature
271,3	% min. flow rate in downgraded mode

3.16 - Time management

The date and time are set using parameters P102 and P103. The date uses weekly/annual programming,

and stores the time at which a fault occurred.

The PLC contains a battery to prevent the time being wiped in the event of a power cut. If the time is not stored after a power cut, the battery needs to be changed (service life of approximately 10 years – varies according to ambient conditions).

102	Date
103	Time

3.17 - Scheduling

The time schedule is used to change the unit's operating mode (off, setpoints 1, setpoints 2, frost protection, etc.) according to the time, day of the week or the season.

The PLC authorises 6 periods of weekly programming and 6 periods of annual programming, which may overlap and be individually validated.

Requested state	Display condition
Off	
Frost protection	P154 Target temperature selection = room
Night cooling (programmed weekly only)	P151 Night cooling = with
On setpoint 1	P160 Setpoint 1/Setpoint 2 selection = terminal or CMS
On setpoint 2	P160 Setpoint 1/Setpoint 2 selection = terminal or CMS, or On/Off input only or On/Off input forcing
On	P160 Setpoint 1/Setpoint 2 selection = without

In weekly programming, when the ranges overlap, the priority, from to least important, is as follows:

1. Off
2. Frost protection
3. Night cooling
4. On setpoint 2

In annual programming, when the ranges overlap, the priority, from most to least important, is as follows:

1. Off
2. Frost protection
3. On setpoint 2
4. Weekly prog.

The annual programming takes priority over the weekly programming. Example of weekly programming:

Programmed shutdown of the unit, every Saturday and Sunday, 09:00 - 16:00.

Example of annual programming:
Annual programming between 15th October and 1st April, the frost protection state will be active.

3.18 - Access level

The PLC comprises 3 access levels, which are used to prevent unauthorised persons from altering certain parameters.
Level 1 is the "customer" level. It is used to alter the setpoints.
Level 2 is the "installer" level. It is used to alter the settings parameters.
Level 3 is the "manufacturer" level. It is used to alter the machine parameters.

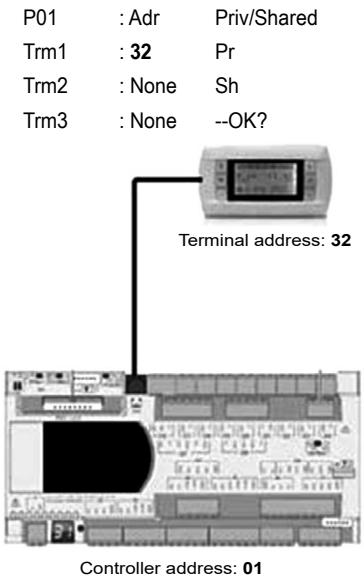
4 - MANAGING A NETWORK OF CONTROLLERS AND HMI TERMINALS

To establish communication between controllers and terminals, it is necessary to give an address to each of the elements.

This addressing is performed at the factory, but if a defective component is replaced (controller or terminal), it may have to be performed on site.

4.1 - One controller and one terminal:

The terminal addressing procedure is described in the following section, paragraph 5.4.3. The procedure for the controller is in paragraph 5.4.3. The controller and terminal must have different addresses. The example opposite shows one addressing option



4.2 - Several controllers and terminals:

Several terminals or controllers may be interconnected, without any additional components, using the pLAN (local area network). This enables several terminals to be used to display the parameters from one controller or, conversely, one terminal can be used to display the parameters from several controllers.

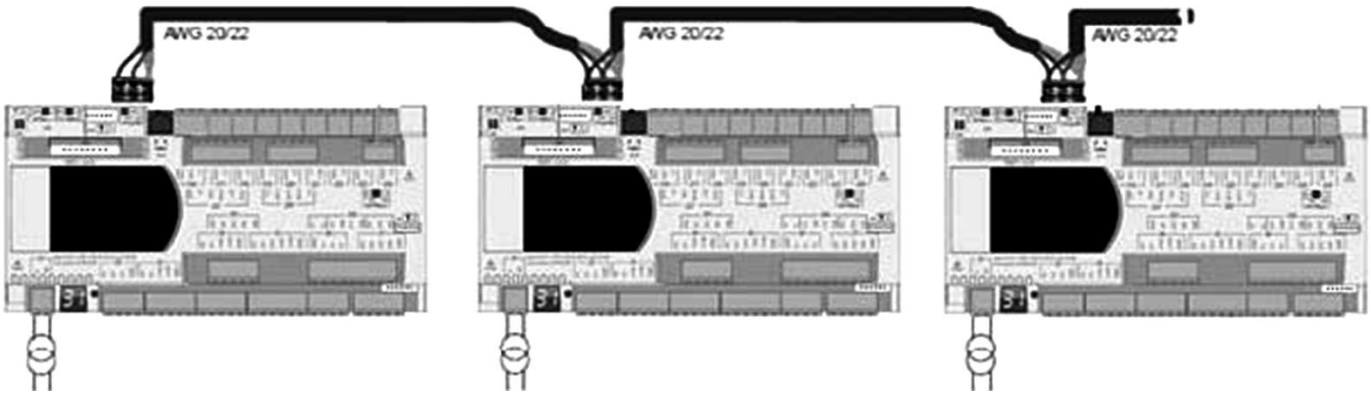
Only the electrical connection and configuration of the addresses need to be performed by the user.

4.3 - Electrical connections for the pLAN (local area network)

4.3.1 - Connecting controllers to the pLAN

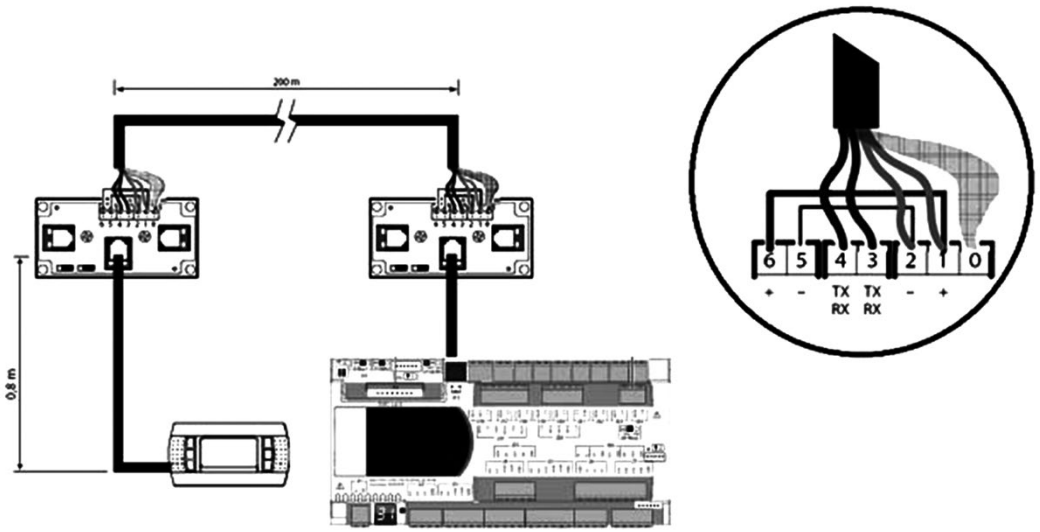
The electrical connection between the controllers in the pLAN (RS485) is installed using an AWG20/22 shielded cable composed of a twisted pair and a shield. The cards must be connected in parallel using the J14 connector.

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



4.3.2 - Connecting a remote screen to the pLAN

The user can connect a user terminal to connector J15 up to a distance of 50m. For a greater distance, 2 TCONN boards and a AWG20/22/24 shielded cable comprising 2 twisted pairs and shielding must be used. The shielded cable must be no longer than 200m.



4.4 - Addressing the pLAN

4.4.1 - Operation

Once the controllers are connected over the pLAN network, the controllers and the terminals must be addressed.

The range of addresses which can be used is from 1 to 32.

This means that a total of 32 controllers and terminals can be connected over the pLAN. The pLAN will not work if the same address is shared by two components

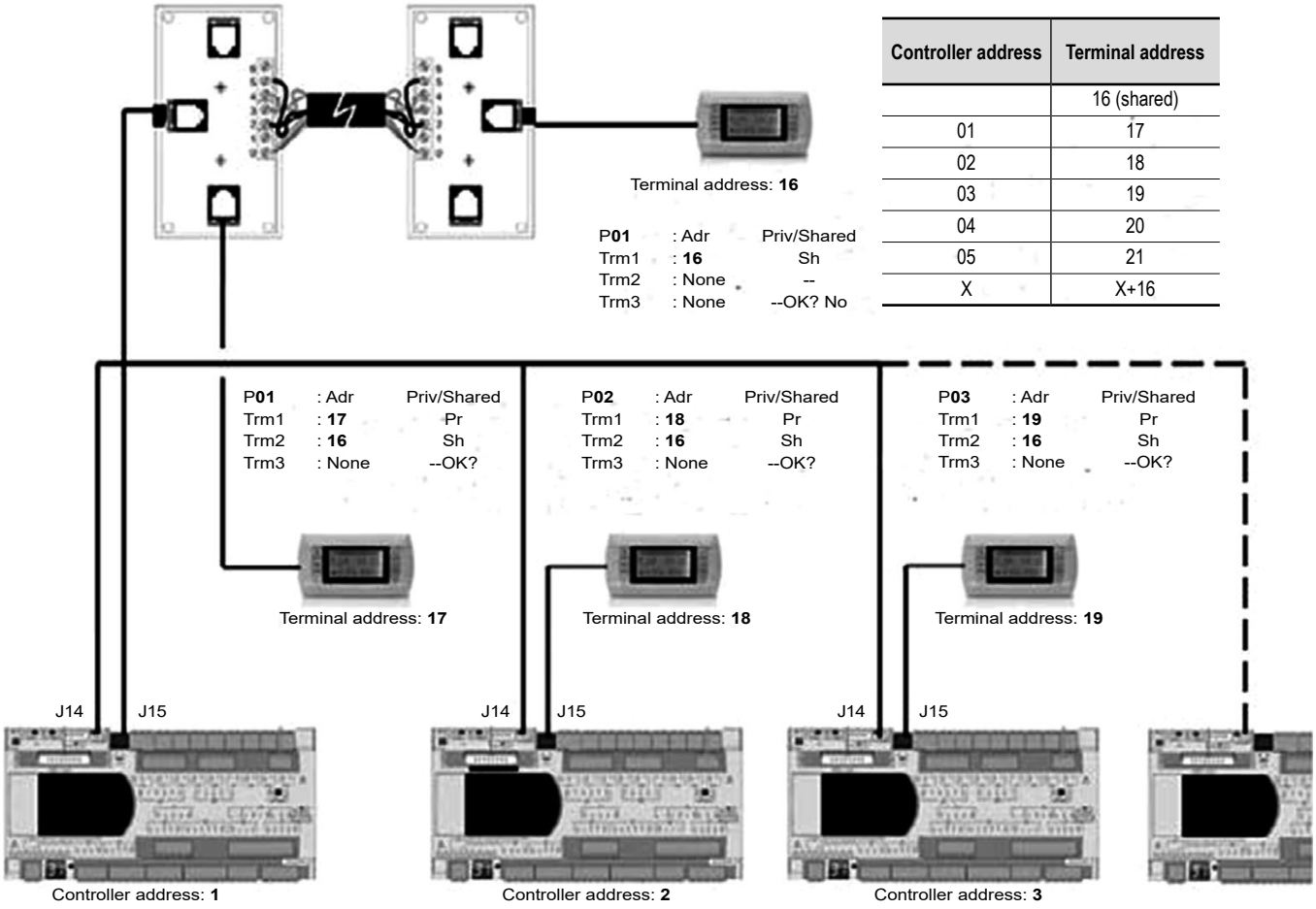
Recommended addressing:

It is generally recommended to use a commonly used system of addressing:

The address for the terminals must be equal to the: **controller address +16**

The shared terminal address must be equal to 16

Please ensure the addressing diagram below is respected:



Controller address	Terminal address
	16 (shared)
01	17
02	18
03	19
04	20
05	21
X	X+16

In the following procedures, it is possible that the message "NO LINK" will appear. If this occurs, please repeat the procedure.

4.4.2 - Modifying the HMI terminal addresses

It is only possible to modify the address of the terminal when it is connected to the controller (telephone connector) and when the controller is powered on.

To switch to configuration mode, simultaneously press the ↑ ↓ and ← keys for at least 5 seconds; the page shown below will be displayed, with the cursor flashing in the top left corner:

- to change the terminal's address (Display address setting) press the ↵ key once: the cursor will move to the address field (nn).
- select the desired value using the ↑ ↓ keys and confirm by pressing the ↵ key again.

If the value selected is different from that previously stored, the page shown in the figure below will be displayed, and the new value will be stored in the terminal's permanent memory.

Please note: if you need to change the address of a controller using a terminal, you may only do so with a terminal with the address 0.

After having changed the controller address, remember to change the terminal address from 0 to a different value to ensure normal operation.

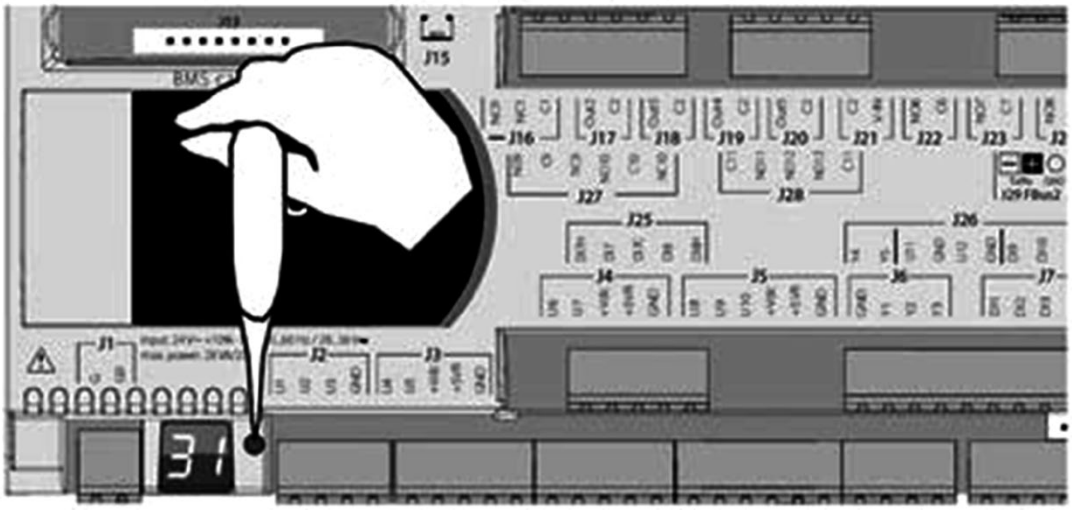
4.4.3 - Modifying the controller addresses

The value of the factory-set address is '1'. The controller pLAN address can be modified, if the controller needs to be networked.

Directly from the controller

To modify the address, it is necessary to use a screwdriver and to follow the procedure below:

- Press the button for 5 seconds: the address should flash
- Press the button several times or press and hold until the desired address is obtained
- Wait for the address to flash rapidly.
- The address is now saved.
- Disconnect then reconnect the controller (powering off confirms)

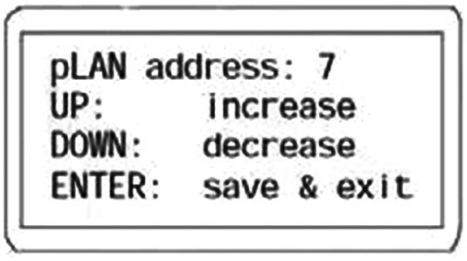


From a terminal

To modify the address for the controllers:

- The terminal must have an address set to 0 (see the procedure in section 5.4.2)
- Switch off the power
- Once the unit is powered back on, press the + ↑ keys simultaneously until the following screen appears, then release.

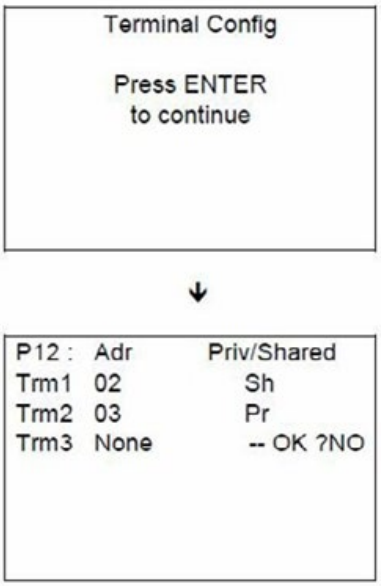
Select the controller address using the ↑ and ↓keys and confirm with the ↵key



4.4.4 - Assigning private and shared HMI terminals

At this point, it is necessary to modify the list of terminals linked to each controller; to do so, follow the procedure below:

- enter configuration mode using the ↑↓ and ← keys as described in the previous paragraph;
- press ← until the cursor moves to the (I/O board address) field;
- using the ↑↓ keys, select the desired address for the controller. The only values selectable will be those of the controllers that are on the network. If the pLAN network is not working correctly or if no controllers are present, the field cannot be changed and will display a "—";
- pressing the ↵ key again will bring up the mask sequences here on the right
- as above, press the ← key to move the cursor from field to field. Press the ↑↓ keys to change the value of the current field. The P:xx field shows the address of the selected controller. In the example above, controller No. **12** is selected;
  In the case of a shared display for a set of units (maximum 31), the terminal must be configured on each unit in "Sh" mode. The fields in the "Adr" column contain the addresses of the terminals associated with the controller whose address is **12**; the "Priv/Shared" column shows the terminal type.
- **Shared = Sh= means that this terminal 02 may also be used with the other controllers present on the loop (shared terminal)**
- **Priv = Pr= means that this terminal 03 can only operate with this controller no.12 (private terminal)**
- to exit the configuration procedure and store the data, select "YES" in response to "OK?" and confirm with the ← key
  If the terminal remains inactive (no buttons pressed) for more than 30 seconds, it will automatically exit configuration mode without saving any changes made.

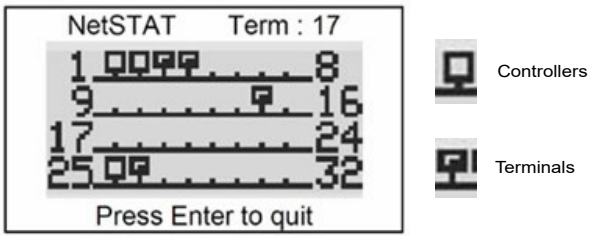


4.4.5 - Checking the pLAN address

The pLAN address is displayed at the top of the main screen, in the centre. It is also possible to access parameter P720 in the configuration parameters so that the controller address on the pLAN can be read.

When the system starts up, the pLAN may encounter a number of problems (board fault and terminal start-up) caused by incorrect connections or if an incorrect address has been assigned. The state of the pLAN 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 on any network terminal for at least 10 s. After the first 5 seconds, a page is displayed; after 5 more seconds, the following page appears:

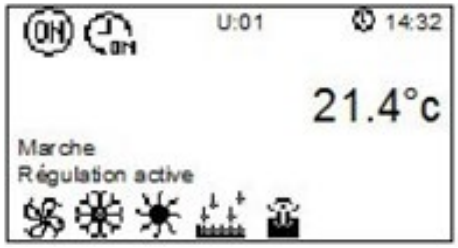


Once on the screen, network addresses 1 to 32 are displayed. The small rectangles represent the terminals and the large rectangles , the controllers. If symbols appear then disappear, the pLAN may be unstable or, more likely, two components share the same address. The number after Term indicates the 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 power the system back on.

4.4.6 - Access to the different controllers on a network from a shared HMI terminal

If a terminal is shared so that it can be used with several controllers, simultaneously pressing the ***Esc*** + 🡻 keys switches between controllers. The pLAN address for the controller is displayed on the "Machine status" screen, providing information on which control the HMI is connected to.

- For example, the screen below is the main screen for the board with the address 1:



5 - ENERGY METER CONNECTION AND ADDRESSING

An energy meter can be installed in the unit's electrics box (optional). The meter type depends on the unit size. Two references are used depending on whether it is a single-phase or three-phase model.

Information is exchanged via an RS-485 ModBus wire link.

Single-phase energy meter reference: ABB B21-112-100

Three-phase energy meter reference: ABB B23-112-100

5.1 - Meter addressing:

The energy meter must be configured with the following values:

Address: 10

Speed: 19200

Parity: none

Number of stop bits: 2

The energy meter (single-phase or three-phase) is addressed using the  keys on the meter, which must be powered on.

Follow the steps below to configure the meter:

Go back to the previous display by pressing **and holding** the  key

Step	Action	Result
0	Main display	Displays the energy consumed value in KWh
1	Press the key 	Displays "RS-485" or "PULSE" or "AL" or "OUTPUT" or "Ir SET" or "WirES" or "LEdPULS" or "UPgrAdE"
2	Press the key	Scrolls through the text, stop on the "rS-485" display
3	Press the key 	Displays "Prot"
4	Press the key 	Displays the protocol, e.g. "ModBus"
5	Press the key 	Protocol display flashes
6	Press the key 	Scrolls through the possible "ModbuS" or "EqbuS" values, stop on the "ModbuS" text
7	Press the key 	Displays "Modbus"
8	Press **and hold** the key 	Displays "Prot"
9	Press the key 	Displays "bAUd"
10	Press the key 	Displays the communication speed, e.g. "1200"
11	Press the key 	Temperature display flashes
12	Press the key 	Scrolls through the speeds, stop on the "19200" display
13	Press the key 	Displays the communication speed "19200"
14	Press **and hold** the key 	Displays "bAUd"

Step	Action	Result
15	Press the key	Displays "AddrES"
16	Press the key	Displays the address, e.g. "1"
17	Press the key	Address hundreds digit flashes
18	Press the key	Scrolls through the values from 0 to 9, stop on the value "0"
19	Press the key	Hundreds = 0 Address tens digit flashes
20	Press the key	Scrolls through the values from 0 to 9, stop on the value "1"
21	Press the key	Hundreds = 0 Tens = 1 Address units digit flashes
22	Press the key	Scrolls through the values from 0 to 9, stop on the value "0"
23	Press the key	Hundreds = 0 Tens = 1 Unit = 0
24	Press **and hold** the key	Displays "AddrES"
25	Press the key	Displays "PArity"
26	Press the key	Displays the parity, e.g. "nonE"
27	Press the key	Parity text flashes
28	Press the key	Scrolls through the possible values "nonE", "Odd", "EuEn", stop on the text "nonE"
29	Press the key	Displays the parity "nonE"
30	Press **and hold** the key	Displays "PArity"
31	Press the key	Back to the "Prot" display
32	Press **and hold** the key	Displays "rS-485"
33	Press **and hold** the key	Displays "InStAnt"
34	Press **and hold** the key	Back to the main display of energy consumed value in KWh

If the energy meter is configured like this then connected via the RS-485 link, information circulation is confirmed on the meter by the following icon: .

5.2 - Associated parameters:

The parameter "P44 main box energy meter" present in the machine parameters is used to bring up the menu "20.Energy meter" containing the meter reading parameters.

No.	Description	Setting		Display conditions	Access level
		Enumeration	By default		
44	Energy meter	0: None 1: With	0		3

No.	Description	Setting		Unit	Display conditions	Access level
		Enumeration	By default			
3000	Energy consumed		0	kWh		1
3001	Instantaneous power		0	W		1
3002	Voltage		0	V	Single-phase meter	1
3004	Voltage L1 - L2		0	V	Three-phase meter	1
3005	Voltage L3 - L2		0	V	Three-phase meter	1
3006	Voltage L1 - L3			V	Three-phase meter	1
3008	Current L1			A	Three-phase meter	1
3009	Current L2			A	Three-phase meter	1
3010	Current L3			A		1
3012	Fault summary	0 : Fault not present 1 : Fault present				1
3013	Communication state	0 : offline 1 : online				1
3014	Serial number					1
3015	Version number					1

6 - CONNECTION TO A CMS

The controller may be connected to a local or remote supervision PC or to most types of CMS (ModBus RTU, ModBus IP, Lonworks, KNX or BACnet IP).

Using KNX, LonWorks, ModBus IP or BACnet IP requires the installation of optional boards. The Modbus/BACnet, KNX and LON communication tables are available separately.

NOTE:

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

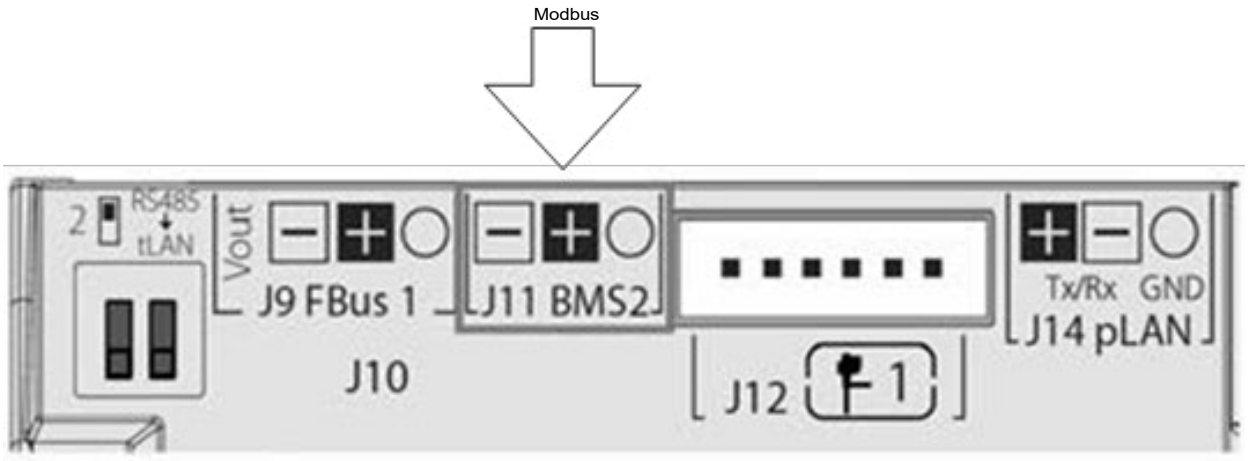
Parameters P706 and P716 indicate whether buses BMS1 and BMS2 are operating in read-only mode (local control) or read/write mode (remote control). These parameters must be identical.

706	Control type	0: local 1: Remote
716	Control type	0: local 1: Remote

6.1 - Modbus RTU

The controller has a built-in RS485 port and can automatically communicate via ModBus RTU. The controller is a ModBus slave on port J11-BMS2. Parameters P710 to P716 are used to configure this port.

710	Selection of the type of communication protocol used on the BMS2 port	1 : ModBus RTU
711	Selection of the transmission speed on the BMS2 port	0 : 1200 1 : 2400 2 : 4800 3 : 9600 4 : 19200
712	Parity on the BMS2 port	0: None 1 : odd 2 : even
713	Number of stop bits on the BMS2 port	
715	Selection of the controller address on the BMS2 bus	
716	Control type	0: Local 1: Remote



The cable must be a type AWG20/22/24 (Filotex FMA-2P, Belden ref. 9842 / 9842NH 24AWG or equivalent) shielded cable, not included in our scope of supply, comprising a twisted pair and shielding, and must be no longer than 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 120 Ω ¼W electrical heater must be connected to the RS485 serial board, in the last position on the bus.

The data format (16 bits, signed or Boolean) is ModBus standard, except for analogue data which is in the format "Integer multiplied by 10".

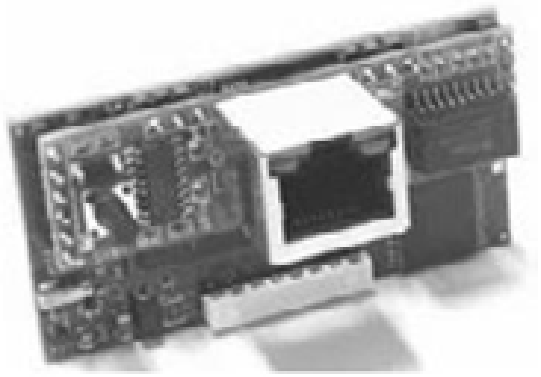
The codes for the Modbus functions used are:
- 1 or 2: Read several bits
- 3 or 4: Read several registers (16 bits)
- 5: Write one bit
- 6: Write one register (16 bits)
- 15: Write several bits
- 16: Write several registers (16 bits)

6.2 - Modbus TCP/IP and BACnet IP

Configuring the board

The board is factory fitted. If this is not the case, switch off the controller and insert the board in J13 (entitled BMS card or BMS1) on the controller.

Press the button found on the board whilst switching the power to the controller back on. The left-hand LED will start to flash rapidly.

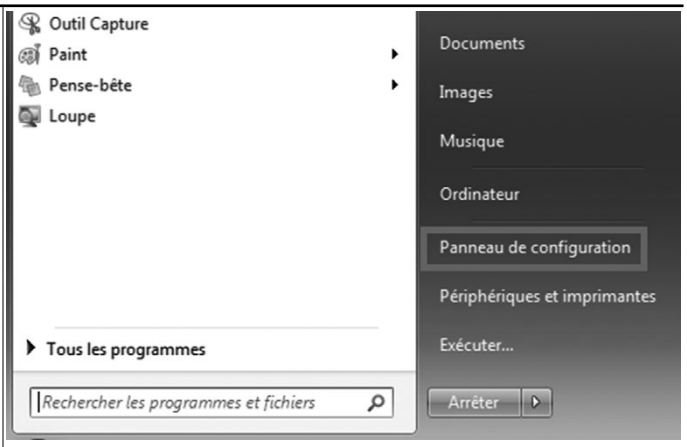
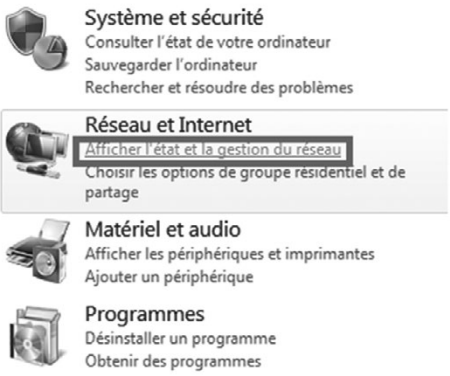


Keep pressing the reset button. After approximately 30 seconds, the left-hand LED (status LED) switches from green to red, and then starts flashing. At this point, release the button.

The board is now initialised to the address 172.16.0.1. You will now need to configure your PC to a fixed IP.

Procedure for Windows 7:

Important: you must have administrator rights to your computer

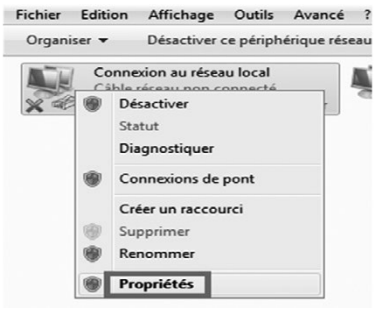
Go to the **Start** menu on your PC then **Control Panel**.	
In the Network and Internet section, click the link **View network status and tasks**.	

A new window will open.

In the left-hand section, select **Change adapter settings**.

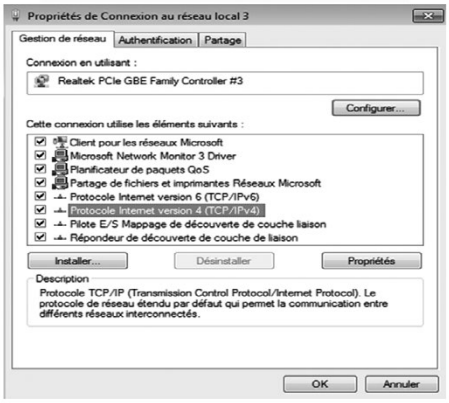
Right-click with the mouse on the name of the network connection you wish to configure.

In the menu which appears, select **Properties**.



Select the row **Internet Protocol Version 4 (TCP/IPv4).**

Click the **Properties** button.

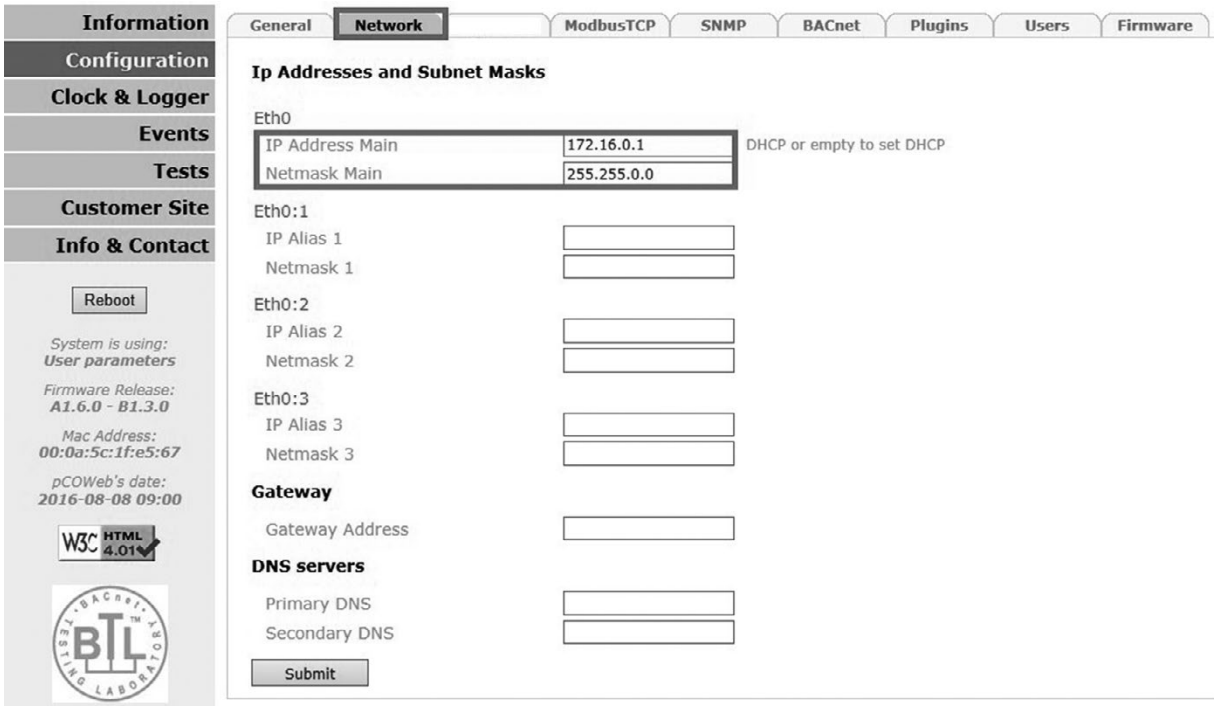


Enter the IP address: **172.16.0.2.**
Subnet mask: **255.255.0.0**

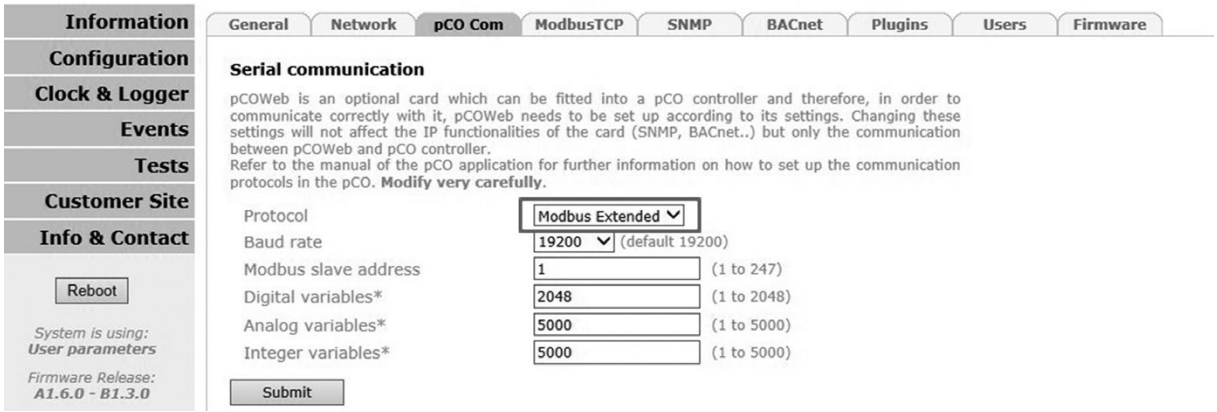
Then, confirm

6 - CONNECTION TO A CMS

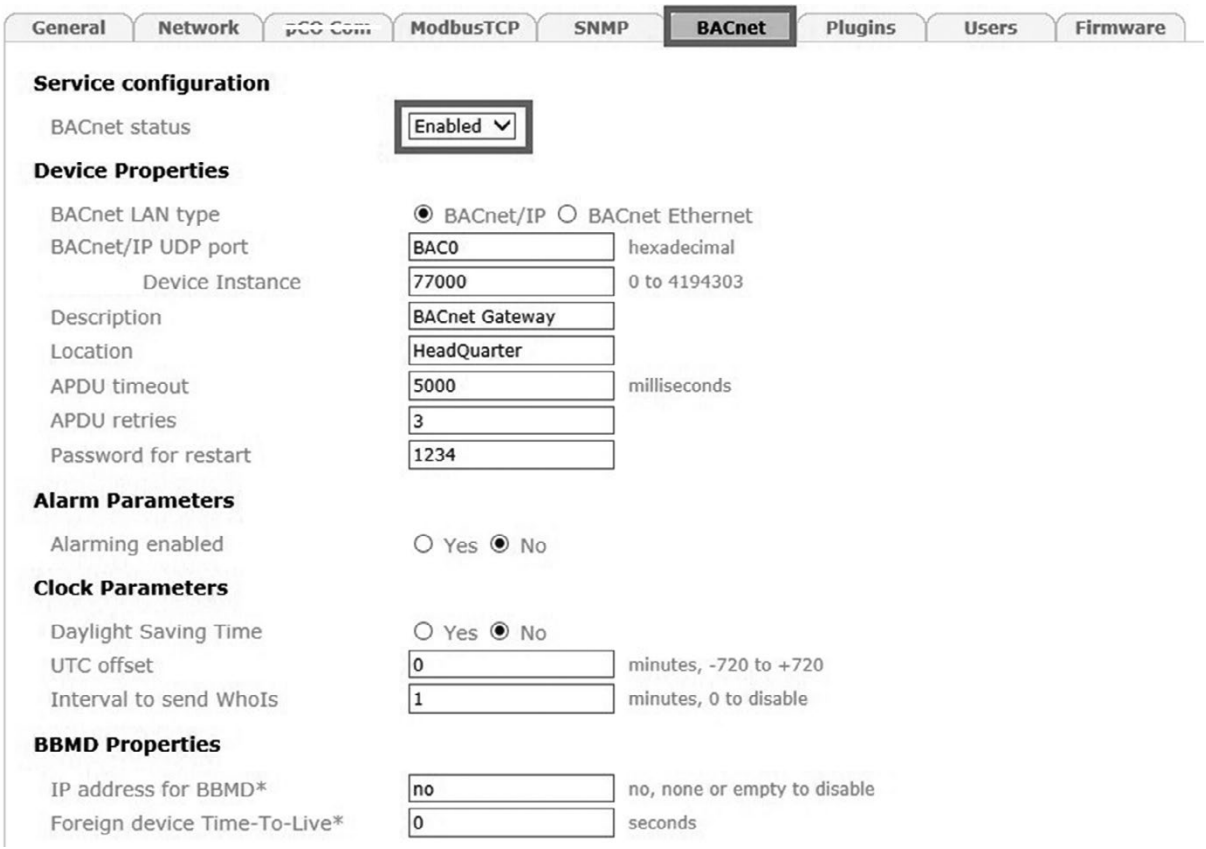
Once these elements have been modified, connect a network cable between your PC and the board.
Open an internet browser (Internet explorer, Chrome, Firefox, etc.) and enter http://172.16.0.1 in the address bar
You will now be connected to the web server.
The login for access is admin
The password is fadmin
Click in the **Configuration** menu, and select the **Network** tab.
Complete this page with the information for your local network (IP address & Netmask).



Then, in the pCO Com tab, change the protocol to Modbus Extended.



Next, in the BACnet tab (if communication is via BACnet), check that this is activated and set the parameters as required.



You also need to activate the mapping for Bacnet on the first 2048 "digital" and "analog" variables (Configuration -> BACnet)

Once complete, confirm the page, disconnect your PC, restart the PLC and connect it to the network.

For use with Modbus TCP/IP, configure P700 = Modbus TCP. For use with BACnet IP, configure P700 = BACNET IP.

The PLC only manages Bacnet variables in Binary format (address type DXXX) and Analogue format (address type AXXX).

6.3 - LON

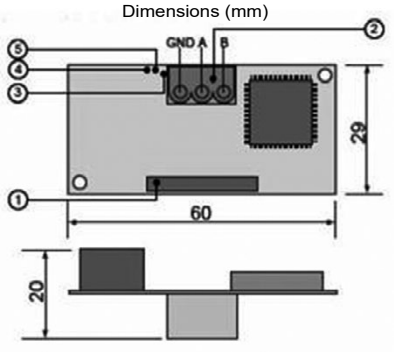
Use of LON requires a board (type FTT-10A), supplied pre-loaded by the manufacturer.

The board is factory fitted. If this is not the case, switch off the controller and insert the board in J13 (entitled BMS card or BMS1) on the controller.

It may be recharged on-site using the "nxe" file available on request.

1. Connector for the controller
2. Disconnectable terminal for connection of the LonWorks® network (GND, A, B)
3. Service pin (create a temporary shunt between the two terminals to create a service PIN, disconnect this shunt after completing the operation)
4. Green service LED: state of the node, lit during the pin service, flashing when the board receives a command from the network, if permanently lit = board faulty
5. Red fault LED: signals an installation issue (incorrect connection to the PLC) or communication configuration issue (check parameter P700)

Dimensions (mm)



6 - CONNECTION TO A CMS

To validate the LON communication protocol on the PLC, adjust the following values in the "Communication" menu on the user terminal:
- P700 = Protocol = LON
- P716 = Control type = Local for LON access to the read-only variables (nvo)

Remote for LON access to the read and write datapoints (nvi/nvo)

The manufacturer does not provide a system start-up, configuration, parameter setting or LonWorks network addressing service. The configuration of this type of network requires the creation of an LNS database. This database may only be used and managed by personnel trained in the use of LON configuration tools and their associated specifications. Refer to the recommendations issued by LonMark (www.lonmark.org) for more information on this matter.

To ensure the LonWorks network is correctly configured, each party must undertake to adhere to the following roles

Task	Brand	Integrator	Installer
Supply of the loaded LON communication board	X		
Supply of the .XIF integration file	X		
Installation of units equipped with LON controller			X
Record of barcodes (NeuronID)		X*	X*
Creation of the LON database		X	
Addressing and configuration of LON network		X	
Definition of the bindings between LON controllers and with the BMS		X	
Definition of BMS setpoints and time schedules		X	

* Method to be defined jointly by the integrator and installer.

Considering the central role of the integrator, it is essential that the latter is included in the project as early as possible so as to be able to anticipate and validate the BMS architectures, integration tools, etc.

Configuration process

The creation of the LNS database requires the use of a LON configuration tool such as NL220, NLFacilities or LonMaker. This step is performed OFFline (i.e. whilst disconnected from the network) and consists of defining the list of controllers present, the configured parameters, the bindings, etc.

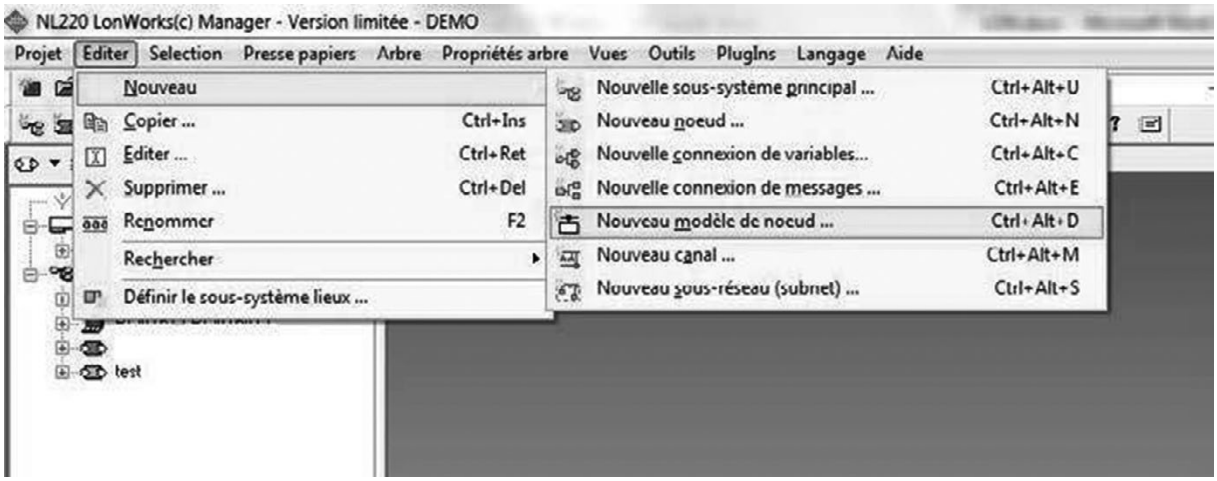
To facilitate this, the manufacturer provides an xif file describing the LON communication table for the supplied controller. This file enables the integrator to create the corresponding model in his/her LNS database. This can then be duplicated as many times as there are controllers present on the bus.

The air handling units do not require Resources Files other than LonMarkResourceFiles1400

included as standard in all LON official tools.

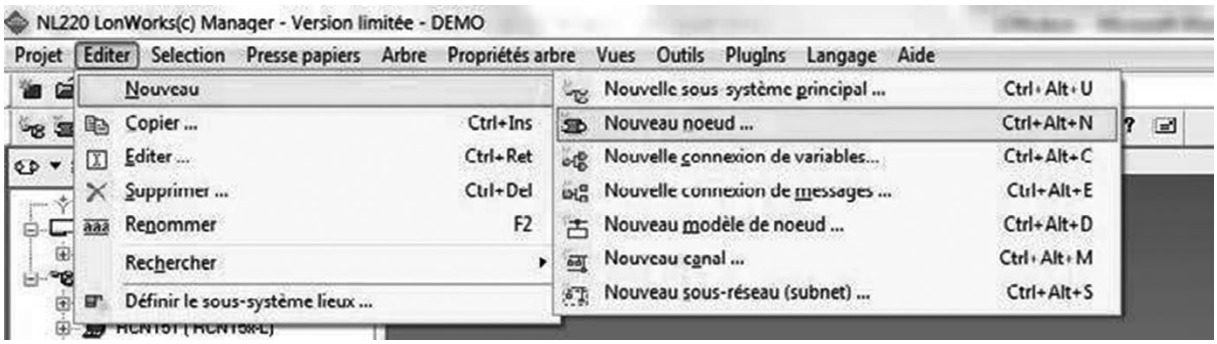
Example of import of the xif file with NL220:

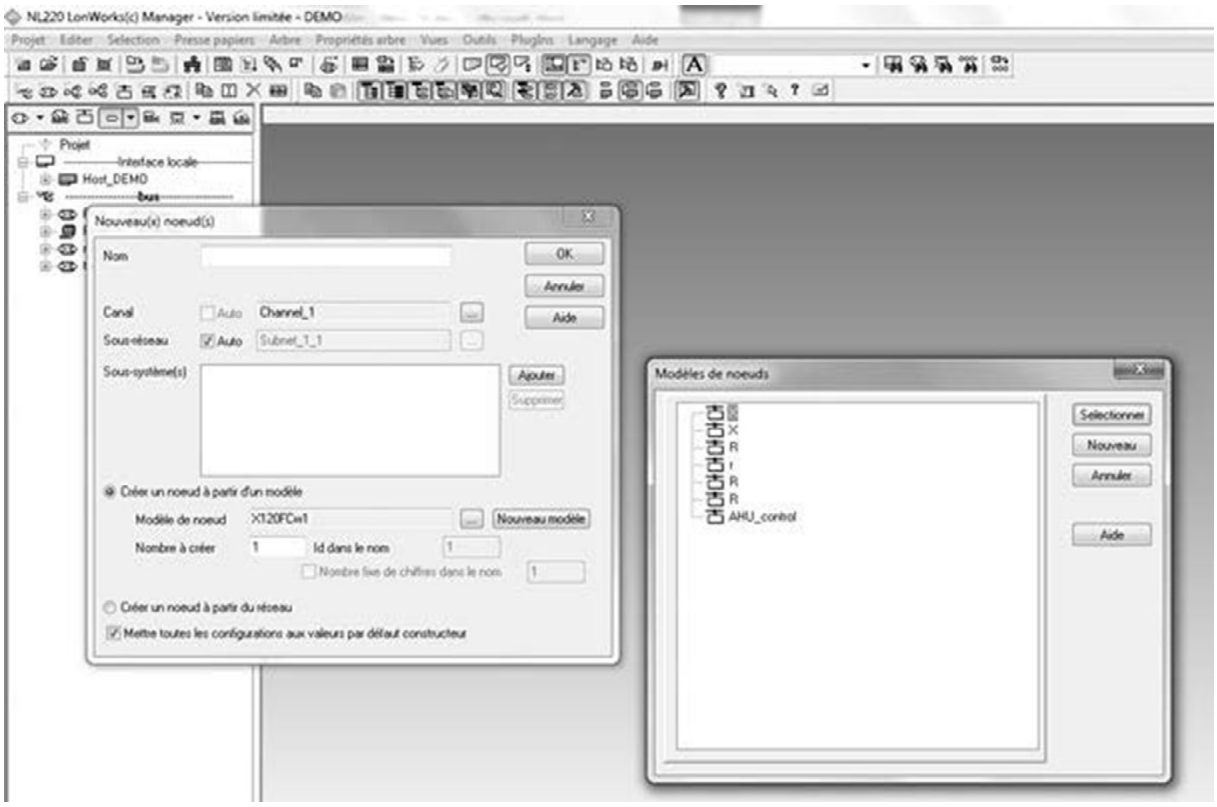
Once the project has been opened, create a new node model:



Give this model a name and, in the description box, select the xif provided using the " ... " key.

The air handling unit controller will now appear in the list of node models, which will enable as many controllers to be created in the database as there are controllers present on the network.



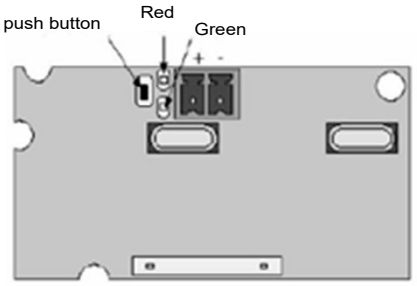


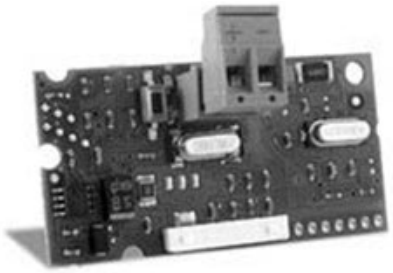
The rest of the configuration (creation of the bindings on the nvi/nvo type datapoints) is carried out normally, as it would be for any other LON product. Our PLC does not have any nci/SCPT/UCPT type datapoints. The configuration parameters are only accessible from the HMI terminal.

6.4 - KNX

The use of KNX requires an optional board. The board is factory fitted. If this is not the case, switch off the controller and insert the board in J13 (entitled BMS card or BMS1) on the controller.

The bus used is a TP1, with a transmission speed of 9600 Bds. This bus requires a specific external power supply.





LED		Meaning	Cause / solution
Red	Constantly lit	No communication between KNX board and the controller.	Check the configuration: - controller address incorrect - transmission speed incorrect - wrong protocol
	Flashing	Communication error between KNX card and the controller	The board has been configured with a version or address not recognised by the controller BIOS.
	Off	Communication with the controller is established	
Green	Constantly lit	The button has been pressed to allocate the address, and the board is awaiting the corresponding procedure from ETS	
	Rapidly flashing	The XML file has not been downloaded A rapid flash indicates receipt of the address after the button has been pressed.	Proceed with configuration.
	Slow shutdown	Configuration in progress: the XML file is being downloaded by ETS	
Green + Red	Both constantly lit	No power supply on KNX bus	Check: KNX bus power supply, electrical connections and polarity of connections on the connector + and - terminals

To validate the KNX communication protocol on the PLC, adjust the following values in the "Communication" menu on the user terminal:
- P700 = Protocol = KNX
- P716 = Control type = Local for KNX access to the read only datapoints
  Remote for KNX access to the read and write datapoints

The manufacturer does not provide a system start-up, configuration, parameter setting or KNX network addressing service. The configuration of this type of network requires the creation of an ETS database. This database may only be used and managed by personnel trained and expert in the use of KNX configuration tools and their associated specifications. Refer to the recommendations issued by the KNX association (www.knx.org) for more information on this matter.

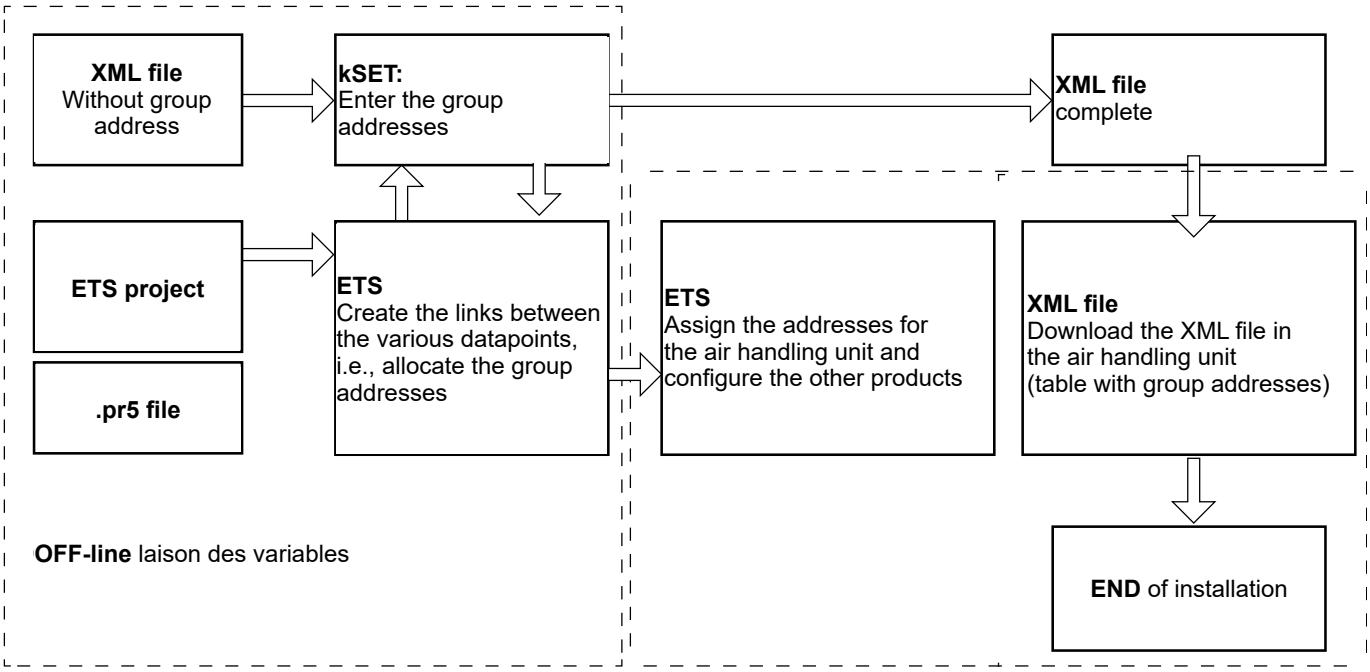
To ensure the KNX network is correctly configured, each party must undertake to adhere to the following roles.

Task	Brand	Integrator	Installer
Supply of the KNX communication board	X		
Supply of the KSet software, the plug-in and the xml integration file	X		
Installation of units equipped with KNX controller			X
Creation of the ETS database		X	
Addressing and configuration of the KNX network		X	
Definition of the links between KNX controllers and with the BMS		X	
Definition of BMS setpoints and time schedules		X	

Considering the central role of the integrator, it is essential that the latter is included in the project as early as possible so as to be able to anticipate and validate the BMS architectures, integration tools, etc.

Configuration process

The diagram below illustrates the phases of the "configuration process" required for configuring the board correctly:



The first step of the configuration is performed OFFline (i.e. disconnected from the network). It consists of defining, within ETS, the list of products used in the project and of defining the group addresses (i.e. the data which will be exchanged between the KNX controllers).

The special feature of the KNX controller for air handling units is that the allocation of the group addresses is not performed from ETS but from the KSet software.

The creation of air handling controllers in the ETS project requires the use of a plug-in, which also enables the xml file generated with KSet to be imported and uploaded to the air handling unit controller.

KSet software

To allocate the group addresses OFFline, install and open the KSet software. In the File menu, open the xml file provided.

The Group column has already been completed with the default group addresses. Delete the group addresses opposite the KNX datapoints which do not apply to the project, and edit the group addresses for the variables relevant to the project if the defaults do not apply.

Do not make any changes to the other columns.

	Group	Name	Datapoint type	IN/OUT	Index	COIL/REG	Conversion Rule	Conversion Value
1	1/1/1	Filter 1	16-bit float	OUT	1112	Register	Multiply	10
2	1/1/2	PressionGaine	16-bit float	OUT	1110	Register	Multiply	10
3	1/1/3	Supply air temperature	16-bit float	OUT	1100	Register	None	
4	1/1/4	TemperatureReprise	16-bit float	OUT	1111	Register	None	
5	1/1/5	Filtre2	16-bit float	OUT	1113	Register	Multiply	10
6	1/1/6	EncrassRecuperateur	16-bit float	OUT	1117	Register	Multiply	10
7	1/1/7	TemperatureNeuf	16-bit float	OUT	1103	Register	None	
8	1/1/8	Temperatureambiante	16-bit float	OUT	1102	Register	None	
9	1/1/9	DebitVentilSoufflage	16-bit float	OUT	1108	Register	Multiply	10
10	1/1/10	DebitVentilReprise	16-bit float	OUT	1109	Register	Multiply	10
11	1/1/11	QualiteAir	16-bit float	OUT	1116	Register	Multiply	10
12	1/1/12	TemperatureReseau	16-bit float	OUT	1104	Register	None	
13	1/1/13	Filtre3	16-bit float	OUT	1114	Register	Multiply	10
14	1/1/14	Humidite	16-bit float	OUT	1106	Register	None	
15	1/1/20	Batterie1	16-bit float	OUT	1142	Register	None	
16	1/1/21	VitesseRecupRotatif	16-bit float	OUT	1144	Register	None	
17	1/1/22	VitesseVentilSoufflage	16-bit float	OUT	1140	Register	None	
18	1/1/23	VitesseVentilReprise	16-bit float	OUT	1141	Register	None	
19	1/1/24	Batterie2	16-bit float	OUT	1143	Register	None	
20	1/1/25	BipasseRecup	16-bit float	OUT	1180	Register	None	
21	1/1/26	Triac	16-bit float	OUT	1159	Register	None	
22	1/1/27	Melange	16-bit float	OUT	1169	Register	None	

	Group	Name	Datapoint type	IN/OUT	Index	COIL/REG	Conversion Rule	Conversion Value
23	1/1/28	Burner	16-bit float	OUT	1178	Register	None	
24	1/1/29	Humidifier	16-bit float	OUT	1145	Register	None	
25	1/1/40	WVentSConfort	16-bit float	IN	400	Register	None	
26	1/1/41	WVentSConfort	16-bit float	OUT	400	Register	None	
27	1/1/42	WVentRConfort	16-bit float	IN	401	Register	None	
28	1/1/43	WVentRConfort	16-bit float	OUT	401	Register	None	
29	1/1/44	WVentSEco	16-bit float	IN	402	Register	None	
30	1/1/45	WVentSEco	16-bit float	OUT	402	Register	None	
31	1/1/46	WVentREco	16-bit float	IN	403	Register	None	

When all the group addresses have been defined, save the xml file (File menu) with another name.
The types of KNX Datapoint available and the respective conversion methods are listed in the table below:

Name type	Standard ID	Format	KNX range	Range available in the controller
Boolean (DPT_Switch)	1,001	1 bit	Off / On	Off / On
Unsigned 8 bit (DPT_Value_1_Ucount)	5,010	Unsigned 8 bits	0 to 255	0 to 255
Signed 8 bit (DPT_Value_1_Count)	6,010	Signed 8 bits	-128 to +127	-128 to +127
Unsigned 16 bits (DPT_Value_2_Ucount)	7,001	Unsigned 16 bits	0 to 65535	0 to 32767
Signed 16 bits (DPT_Value_2_Count)	8,001	Signed 16 bits	-32768 to +32767	-32768 to +32767

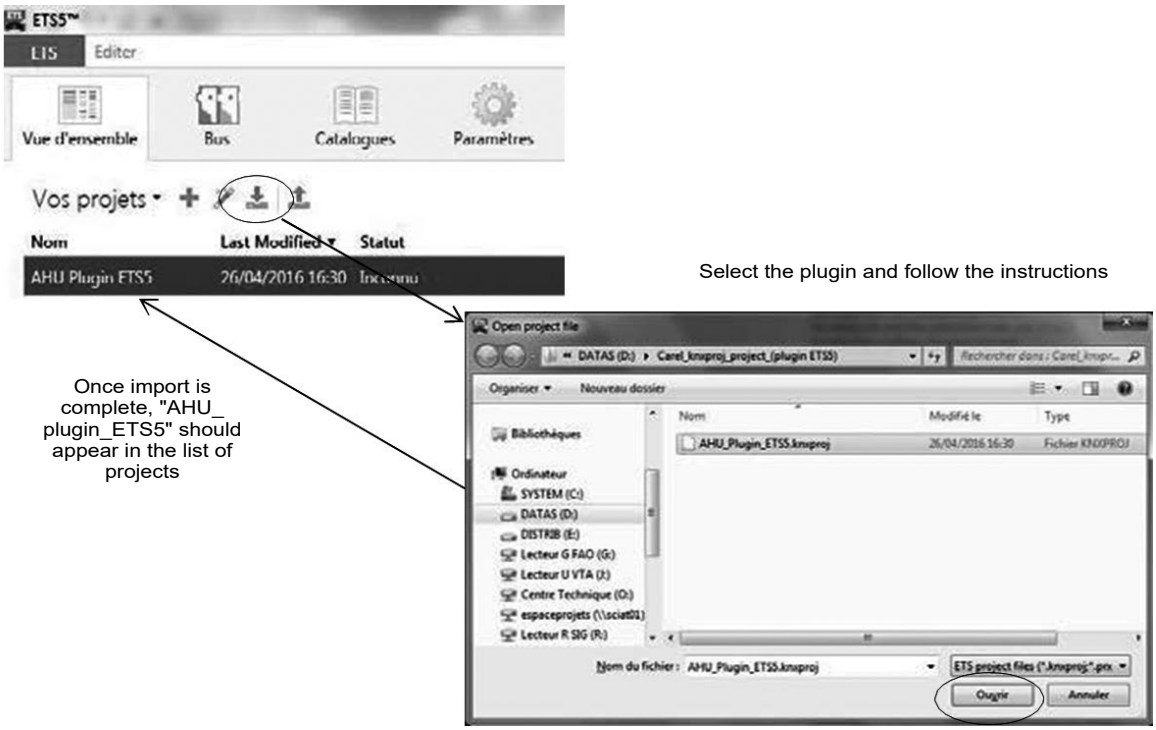
The plugin

Declaring the air handling unit controller in the ETS project requires the use of a plug-in:
- AHU_plugin_21 for ETS3
- AHU_plugin_30 for ETS4
- AHU_Plugin_ETS5 for ETS5

This plugin is used to allocate the individual addresses for the controllers and to download the table created by KSet, i.e. the XML file.

6.4.1 - Installing the plugin with ETS5

Carry out installation of the plugin AHU_Plugin_ETS5.knxproj provided.
Import "AHU_plugin_ETS5.knxproj" as shown below.

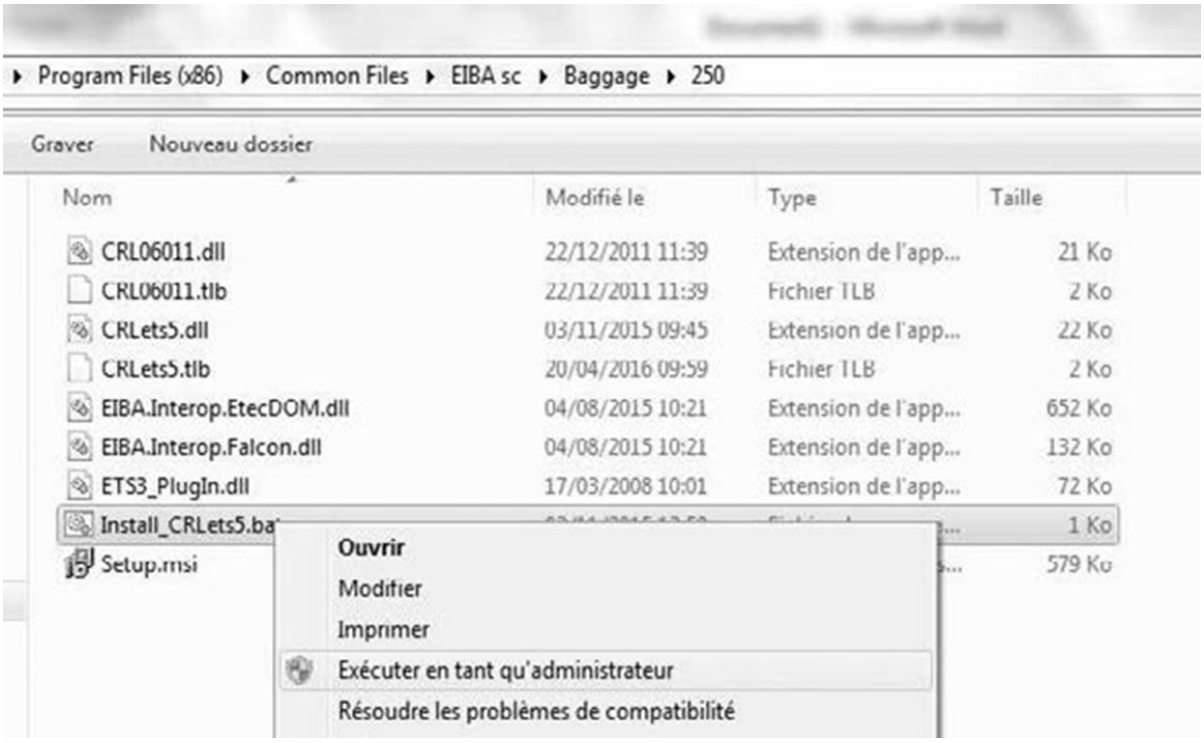


6 - CONNECTION TO A CMS

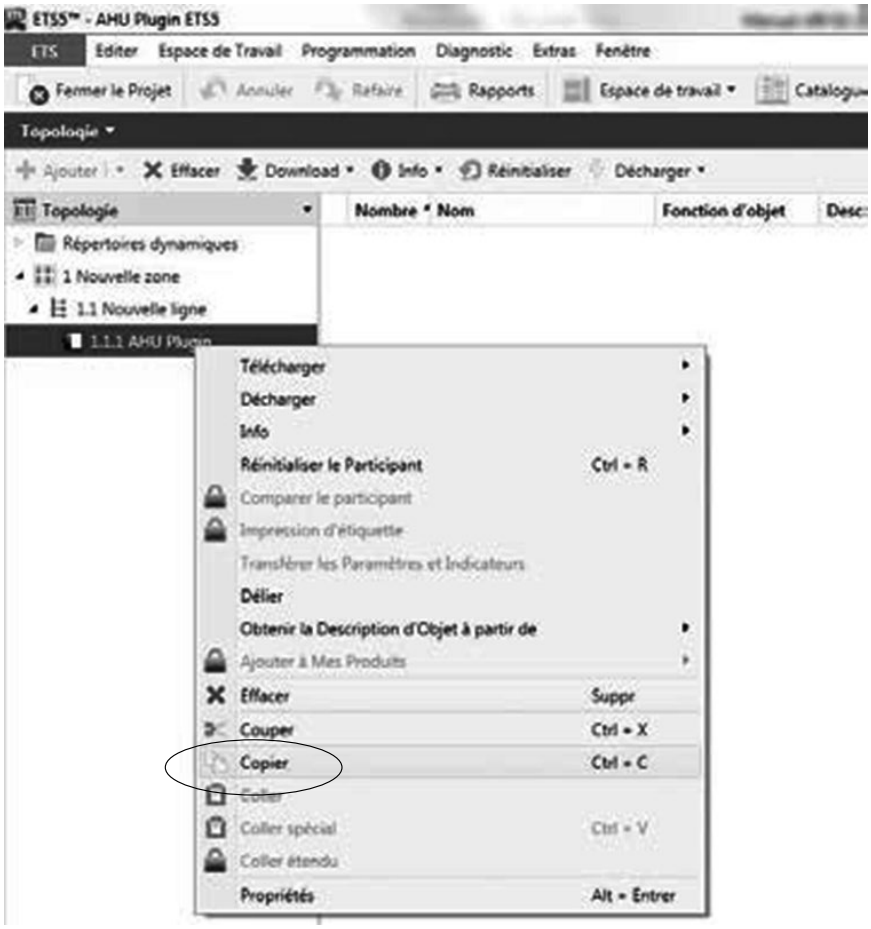
Close ETS.

Execute the batch file in the directory below as an administrator:

- For 64-bit Windows: C:\Program Files (x86)\Common Files\EIBA sc\Baggage\250\Install_CRLets5.bat
- For 32-bit Windows: C:\Program Files\Common Files\EIBA sc\Baggage\250\Install_CRLets5.bat



Reopen ETS5 and open the "AHU_plugin_ETS5" project.



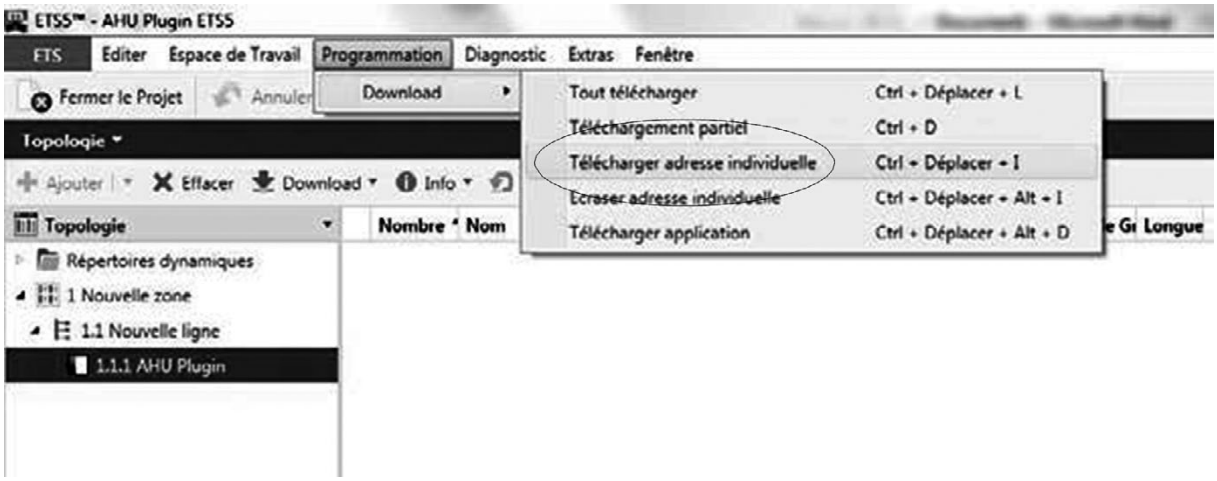
Copy and paste the plugin model for each device to be included in your project. The address of each device is automatically incremented. If necessary, you can manually change the address of a device in Properties.

6.4.2 - Assigning the physical address

The physical address of the KNX board is assigned using the standard ETS procedure. You must ensure that:
- The Bus wire network is drawn out and connected
- The Bus is powered on
- The optional KNX board is connected to the network
- The controller is powered on

Use the mouse to select the controller which must be configured, and right-click to select "Download" (or in the Programming menu, select "Download").

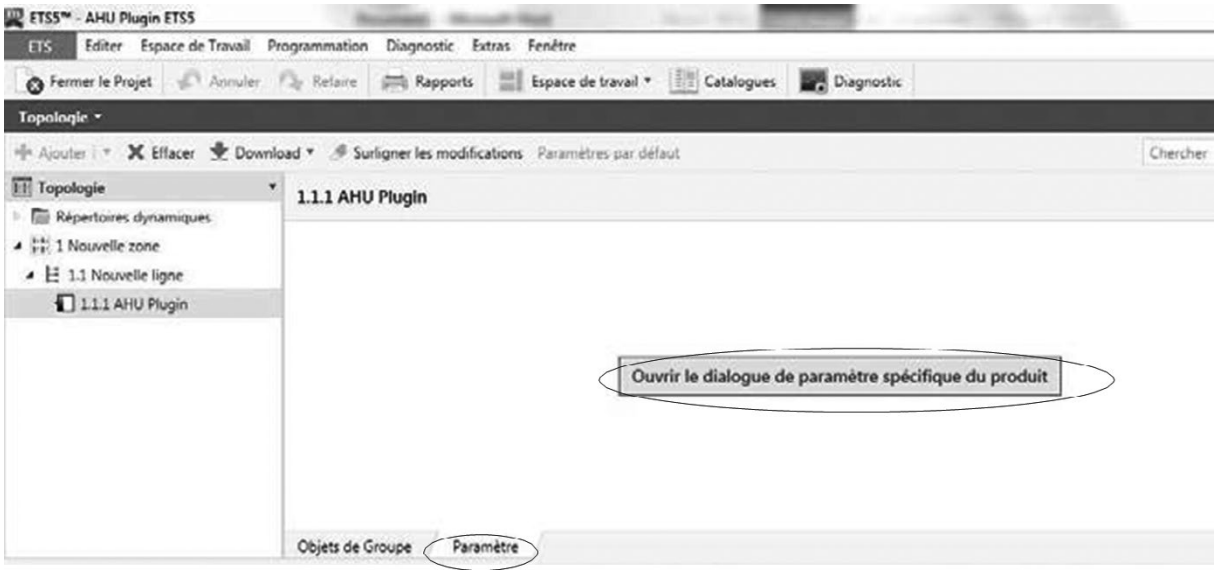
Select "Download individual address" to activate the configuration procedure and press the button on the board. The green LED on the board goes out to indicate when the operation is complete. If the board address has already been configured, the message "The address is already used by another device" is displayed.



6.4.3 - Downloading the XML file

You must ensure that:
- The Bus wire network is drawn out and connected
- The Bus is powered on
- The KNX board is connected to the network
- The controller is powered on

On ETS5, use the mouse to select the controller which needs to be configured, select the "Parameter" tab and click "Open the dialogue box for parameter specific to the product".



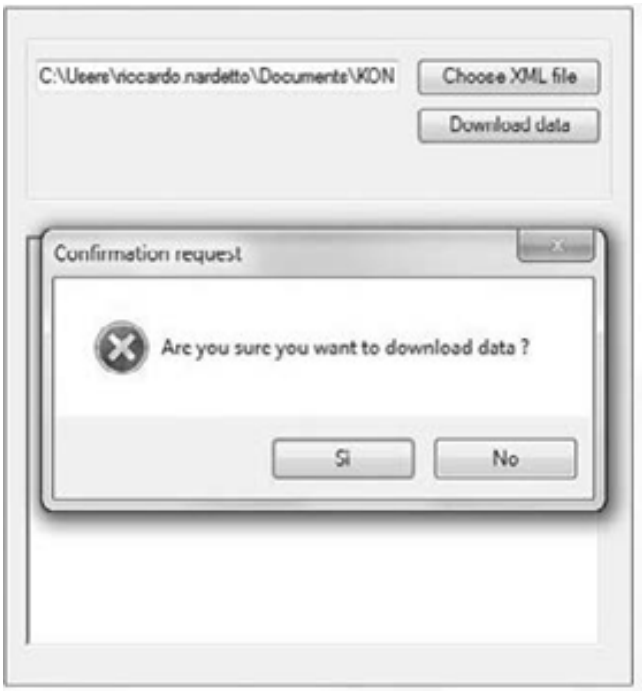
Use "Choose XML file" to open the XML configuration file required.

Click on "Download data" and confirm the confirmation request.

Wait for the message "Memory access closed successfully" to be displayed. During the loading phase indicated by the drop-down control lines under ETS5, and while the green LED on the board is flashing, no other operation

can be performed. The download time may vary according to the size of the XML file and the network traffic; for a maximum size file, this time may be 2 minutes.

In extreme cases, i.e. high traffic and large XML files, the bus may be disconnected and ETS5 will signal an error. In this case, simply repeat the download.



NOTE:

This procedure is specific to the KNX board and is the only configuration operation permitted by the ETS5 program, other than allocation of the address.

The KNX datapoints loaded via this plug-in do not appear in the Group Objects tab. To check and/or modify your group addresses, you need to re-open your xml file from KSet and, once the modifications are complete, upload it via the ETS plugin.

Our PLC does not have any configuration parameters accessible within KNX. They can only be accessed from the HMI terminal.

7 - COMMISSIONING

7.1 - Actions required prior to commissioning

To perform system start-up on the air handling unit, it is necessary to check that the electric cabling complies with the diagram and with best industry practice. The air handling and hydraulic circuits must be compliant and in perfect working order.

Once these actions are complete, it is necessary to complete the "assembly completion notice" document and to return it to your regional office at least 15 days before the intended system start-up date.

No movement can take place until your office has received this document.

If system start-up should prove impossible due to a failure to comply with the instructions in the assembly completion notice, additional costs will be invoiced at the applicable rate.

7.2 - Addressing

EC motor addressing

The EC motors have been allocated addresses in the factory.

If you need to change a motor address (following its replacement, for example), proceed as follows.

If you have several motors requiring addresses, this procedure must be performed on each motor in turn. Disconnect the ModBus connections for all the motors and reconnect just the motor in question.

The Th-Tune must also be disconnected when addressing EC motors.

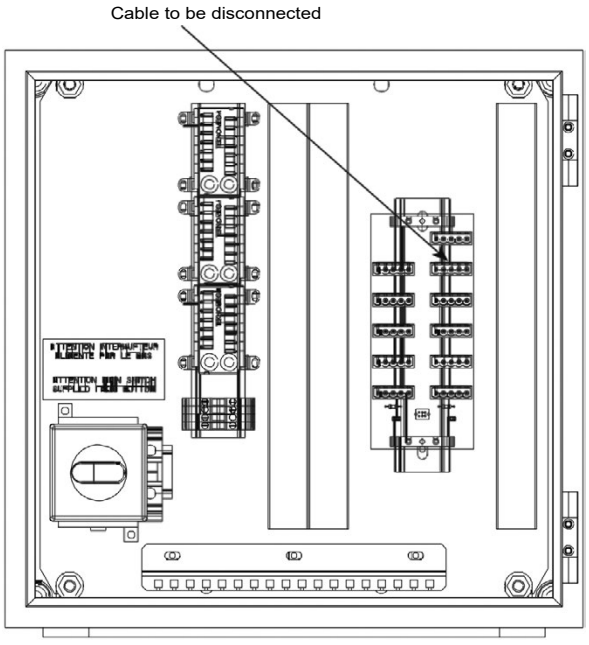
In the machine parameters menu (warning: this operation requires level 3 access), select parameter P51 to P78 "addressing config" corresponding to the motor to be allocated an address.

If the motor does not have an address, or has an incorrect address, this parameter indicates "not performed". Confirm this parameter to launch the addressing wizard: the "Start ad", "Config" and "Status" rows will appear on part of the screen.

In the "Start ad" field, select the current motor address. For a motor which has never been addressed, select "Factory FMA"; otherwise, select FMA 1 to 8 according to the current address of the motor. To find out the current address of the motor, disconnect the ModBus connections from all the other motors, and look for the motor which is still "online" in menus 17 and 19:

parameter P1231 for intake FMA1, P1351 for intake

FMA2, P2231 for exhaust GMV1, etc.



Confirm the field "Start ad" and, in the "Config" field, select and confirm "requested" to start the automatic addressing procedure. The "State" field starts on "Awaiting start proc.", then automatically scrolls to indicate the configuration step in progress (awaiting connection, FMA stop, com. param. sent., reset FMA soft, awaiting restart). When the addressing procedure is complete, the "Status" field switches to "configuration OK" and the selected "addressing config." parameter (for example P51 for intake FMA1) switches to "complete."

If the configuration ends with the message "config failed", check:
- The motor's power supply
- The ModBus connection for the motor to be addressed
- The start address for the FMA
- Check that just one non-addressed motor is connected to the ModBus link
- Check that the final address has not already been allocated to another motor

Then restart the configuration.

Repeat this operation for each motor requiring addressing or re-addressing.

7.3 - Test mode

Test mode is a mode which enables the installer to individually test the PLC's different outputs. In this mode, faults are no longer managed.

If the display is disconnected, the override is maintained and may result in damage to the equipment. This menu can only be accessed in level 3.

WARNING!
ANY FORCING IS THE PROGRAMMER'S RESPONSIBILITY
NONE OF THE SAFETY DEVICES ARE OPERATIONAL

The unit stops automatically if test mode is confirmed (Override validation).

Select the output to be changed using ↓ or ↑ Confirm using ↵

The cursor places itself below the override authorisation (free or overridden). Confirm with↵

The cursor places itself under the override value. Display the new value using the ↑ or ↓ keys. Confirm using ↵ .

The unit is now in "manual mode".

The overrides will be cancelled if the user does not confirm the override.

7.4 - Calibration

Menu 13 "Calibration" is used to correct an offset between a read pressure value or temperature value and a measured pressure or temperature value.

It is possible to add an offset of +- 5°K to the values read by the temperature sensors, and +- 100 ppm to the values read by the CO_2 sensor.

The pressure sensors are calibrated by a wizard: in the calibration menu, when the parameter corresponding to the sensor which requires calibration has switched to "yes" then the measured value is saved and used as the offset. The adjusted value then becomes 0.

To calibrate the pressure sensors, the unit must be stopped and the air flow must be zero. It is also possible to temporarily disconnect the connection tubing from the pressure sensor.

8 - FAULTS

When the PLC detects an issue, it triggers a fault.

8.1 - Fault type

Faults may either be "maintenance" or "danger" type faults.

"Maintenance" faults are information provided to the user and signal that the unit is not operating correctly, but that this does not have any immediate consequences (a fouled filter, for example). These may be cleared once the issue has been resolved.

"Danger" faults are issues which prevent the unit from operating; the unit will shut down immediately (or after the fan delay). The issue must be resolved before the unit can be restarted. The faults may be cleared once the unit has been shut down and the fault has disappeared.

"Maintenance" faults may be configured as "danger" faults using parameters P602 to P651. Conversely, for safety reasons, it is not possible to configure "danger" faults as "maintenance" faults.

8.2 - Fault relays

The PLC contains a faults summary relay. This relay is a 250Vac / 6A type relay. It is triggered when at least one "maintenance" or "danger" fault is present. If it is an EC motor warning from one of the fans, its triggering depends on parameter P292.

Its action direction is configurable (P882).

8.3 - Fault memory

The PLC stores the last 100 faults and the date and time that each of these faults occurred. This is menu

4 "fault memory". This memory cannot be cleared.

8.4 - List of faults

Here is the list of the different faults and warnings

No.	Designation of faults
1	powering down
2	fire protection
4	frost protection
11	Intake FMA1 EC motor
31	Exhaust FMA1 EC motor
21	Intake FMA1 EC motor warning
41	Exhaust FMA1 EC motor warning
48	Intake air flow low limit
49	Extraction air flow low limit
50	intake air flow rate
51	exhaust air flow rate
52	intake filter 1 clogged
53	intake filter 1 blocked
58	exhaust filter 1 clogged
59	exhaust filter 1 blocked
71	electric heater manual safety thermostat
73	DX unit
80	Duct pressure too low
81	Duct pressure too high
82	Supply air temperature too low
83	Supply air temperature too high
84	Return temperature too low
85	Return temperature too high
86	Room temperature too low
87	Room temperature too high
90	fresh air temperature sensor
91	supply air temperature sensor
92	return air temperature sensor
93	room temperature sensor
101	Loss of communication with the intake FMA1
121	Loss of communication with the extraction FMA1
140	Loss of communication with main box energy meter
150	Loss of communication with Th-Tune

9 - PARAMETERS

Below is the list of parameters which can be adjusted by the user (level 1 access - no password required), the installer (level 2 access), or the manufacturer (access level 3). The level 2 password can be requested from your technical support. Some parameters are not always visible and depend on the machine's configuration.

9.1 - Machine parameters

No.	Description	Setting		Display conditions	Access level
		Enumeration	By default		
1	Unit model				3
4	Characteristics of the pressure sensor for the air intake fan	4 : 0-1600Pa 0,3-5V 5 : 0-1000Pa 0,5-4,5V 6 : 0-3000Pa 0,5-4,5V	5	(Depending on P01 Unit model)	3
5	Coefficient value K for the intake fan		4	Visible as read-only	3
12	Characteristics of the pressure sensor for the air extraction fan	4 : 0-1600Pa 0,3-5V 5 : 0-1000Pa 0,5-4,5V 6 : 0-3000Pa 0,5-4,5V	5	(Depending on P01 Unit model)	3
13	Coefficient value K for the exhaust fan		4	Visible as read-only	3
24	Fire detection	0: None 1: With	0		3
26	Isolation damper	0: None 1: With	0		3
28	Hydraulic coil	0: None 1: Cold water 2: Cooling direct expansion 3: Hot water 4: Mixed (water) 5: Heating direct expansion 6: Reversible direct expansion	0	P32 = Without	3
32	Electric heater	0: None 2 : 2 stages	0	P28 = Without	3
44	Energy meter	0: None 1: With	0		3
51	Air intake FMA1 configuration	0: Not completed 1: Completed	0		3
71	Exhaust FMA configuration	0: Not completed 1: Completed	0		3
99	Configuration locked	0: unlocked 1: locked	0		3

9.2 - Settings parameters

No,	Description	Setting		Unit	Display conditions	Access level
		Enumeration	By default			
Adjust, params						
100	Language	0: French 1: English 2: German 3: Spanish 4: Italian 5: Dutch	0			1
102	Date	DD/MM/YYYY				1
103	Time	HH/MM				1
104	Air intake ventilation control	1: Flow rate 2: Duct pressure	0			2
106	Multiplication factor value of the signal sent by the air extraction fan with pressure control in the supply air duct		1		P104 Air intake ventilation control = Duct pressure	2
108	Damper opening time delay		180	s	P26 Isolation damper = With	2
110	AHU max flow rate		P1 function	m^3/h	Visible as read-only	3
111	AHU flow rate low limit threshold		50% P110	m^3/h	Visible as read-only	3
112	Air intake fan flow rate setpoint 1		10000	m^3/h	P104 Air intake ventilation control = Flow rate	1
113	Air intake fan flow rate setpoint 2		10000	m^3/h	P104 Air intake ventilation control = Flow rate and P160 Setpoint 1/setpoint 2 selection = sched./ CMS, or On/Off input only or forcing and P161 Application of the setpoint 1/setpoint 2 selection = ventilation or temperature + ventilation	1
114	Air intake fan flow control PID proportional band (P)		6000	m^3/h	P104 Air intake ventilation control = Flow rate	2
115	Air intake fan flow rate control PID integral time (I)		20	s	P104 Air intake ventilation control = Flow rate	2

No,	Description	Setting		Unit	Display conditions	Access level
		Enumeration	By default			
116	Air intake fan flow rate control PID derivative time (D)		0	s	P104 Air intake ventilation control = Flow rate	2
118	Intake duct pressure setpoint 1		200	Pa	P104 Air intake ventilation control = Duct pressure	1
119	Air intake duct pressure setpoint 2		100	Pa	P104 Air intake ventilation control = Duct pressure and P160 Setpoint 1/setpoint 2 selection = sched./ CMS, or On/Off input only or forcing and P161 Application of the setpoint 1/setpoint 2 selection = ventilation or temperature + ventilation	1
120	Air intake duct pressure control PID proportional band (P)		50	Pa	P104 Air intake ventilation control = Duct pressure	2
121	Air intake duct pressure control PID integral time (I)		20	s	P104 Air intake ventilation control = Duct pressure	2
122	Air intake duct pressure control PID derivative time (D)		0	s	P104 Air intake ventilation control = Duct pressure	2
124	Duct pressure low limit threshold		10	Pa	P104 Air intake ventilation control = Duct pressure	2
125	Duct pressure upper limit threshold		900	Pa	P104 Air intake ventilation control = Duct pressure	2
126	Minimum flow rate for electric heater operation		10000	m^3/h	P32 Electrical heater = 2 stages On/Off or P28 = Cooling direct expansion or heating direct expansion or reversible direct expansion	3
128	Extraction fan flow rate setpoint 1		10000	m^3/h	P104 Air intake ventilation control = Flow rate	1
129	Extraction fan flow rate setpoint 2		10000	m^3/h	P104 Air intake ventilation control = Flow rate and P160 Setpoint 1/setpoint 2 selection = sched./ CMS, or On/Off input only or forcing and P161 Application of the setpoint 1/setpoint 2 selection = ventilation or temperature + ventilation	1
130	Air extraction fan flow rate control PID proportional band (P)		6000	m^3/h		2
131	Air extraction fan flow rate control PID integral time (I)		20	s		2
132	Air extraction fan flow rate control PID derivative time (D)		0	s		2
149	Th Tune	0: None 1: With	0			2
150	Free cooling control	0: None 1: With	1			2
151	Night cooling control	0: None 1: With	0		P104 Air intake ventilation control = Flow rate	2
152	Air quality control	0: None 1: With	0		P104 Air intake ventilation control = Flow rate	2
154	Target temperature selection	0 : Supply air	1		P150 Free cooling control = None and P151 Night cooling control = None	2
		1 : Return				
		2: Ambient			P149 Th-Tune = With	
155	Temperature control mode selection	0: Automatic 1: Cooling only 2: Heating only	0			2
156	Supply air limitation	0: None 1: With	1		P154 Target temperature selection = return or room air	2
157	Supply air compensation in deadband	0: None 1: With	1		P154 Target temperature selection = return or room air	2
158	Rotary heat exchanger load shedding	0 : released 1 : forced shutdown	0			2
160	Setpoint 1/Setpoint 2 selection	0: None 1: Time schedule or CMS 2: On/Off input only 3: On/Off input forcing	0			2
161	Application of setpoint 1/setpoint 2 selection	0: Temperature 1: Ventilation 2 : Temperature and ventilation	0		P160 = Setpoint 1/setpoint 2 selection = Sched./ CMS or On/Off input	2
162	Changeover selection	0: CMS 1 : On/Off input	1		P28 hydraulic coil = mixed	2
164	Fan delay time		240	s	P32 Electric heater = 2 On/Off stages	2
168	Heating or cooling change authorisation time delay		1	mm		2
170	Temperature setpoint 1 in cooling mode		25,0	°C		1

No,	Description	Setting		Unit	Display conditions	Access level
		Enumeration	By default			
171	Temperature setpoint 2 in cooling mode		30,0	°C	P160 Setpoint 1/setpoint 2 selection = sched./ CMS, or On/Off input only or forcing and P161 Application of the setpoint 1/setpoint 2 selection = temperature or temperature + ventilation	1
172	Temperature control PID proportional band (P) in cooling mode		5,0	°C		2
173	Temperature control PID integral time (I) in cooling mode		600	s		2
174	Temperature control PID derivative time (D) in cooling mode		0	s		2
180	Temperature setpoint 1 in heating mode		23,0	°C		1
181	Temperature setpoint 2 in heating mode		18,0	°C	P160 Setpoint 1/setpoint 2 selection = sched./ CMS, or On/Off input only or forcing and P161 Application of the setpoint 1/setpoint 2 selection = temperature or temperature + ventilation	1
182	Temperature control PID proportional band (P) in heating mode		5,0	°C		2
183	Temperature control PID integral time (I) in heating mode		600	s		2
184	Temperature control PID derivative time (D) in heating mode		0	s		2
206	Free cooling and night cooling operating differential compared to the controlled temperature		3,0	°C	P150 Free cooling control = With or P151 Night cooling control = With	2
207	Temperature low limit for free cooling and night cooling		15,0	°C	P150 Free cooling control = With or P151 Night cooling control = With	2
210	Control setpoint in night cooling mode		17,0	°C	P151 Night cooling control = With	1
212	Air intake fan flow rate setpoint in night cooling mode		10000	m^3/h	P151 Night cooling control = With and P104 Air intake ventilation control = Flow rate	2
213	Air extraction fan flow rate setpoint in night cooling mode		10000	m^3/h	P151 Night cooling control = With and P104 Air intake ventilation control = Flow rate	2
216	Air quality setpoint		800	ppm	P152 Air quality control = With	2
217	Air quality proportional band		100	ppm	P152 Air quality control = With	2
218	Air flow max setpoint on intake for air quality		10000	m^3/h	P152 Air quality control = With and P104 Air intake ventilation control = Flow rate	2
225	Temperature difference for recovery unit run authorisation		3	°C		2
228	Frost protection temperature setpoint		17,0	°C	P154 Target temperature selection = room	2
230	Supply air temperature low limit setpoint		16,0	°C	156 Supply air limitation = with	2
231	Supply air temperature upper limit setpoint		26,0	°C	156 Supply air limitation = with	2
232	Supply air temperature limit proportional band		20,0	°C	156 Supply air limitation = with	2
233	Supply air temperature limit (I) integral time		150	s	156 Supply air limitation = with	2
234	Low supply air temperature compensation setpoint in deadband		16,0	°C	P157 Supply air compensation in deadband	2
235	Low supply air temperature compensation proportional band in deadband		5,0	°C	P157 Supply air compensation in deadband	2
236	High supply air temperature compensation setpoint in deadband		35,0	°C	P157 Supply air compensation in deadband	2
237	High supply air temperature compensation proportional band in deadband		5,0	°C	P157 Supply air compensation in deadband	2
240	Supply air temperature low limit threshold		15,0	°C		2
241	Supply air temperature upper limit threshold		45,0	°C		2
242	Return air temperature low limit threshold		15,0	°C	P154 Target temperature selection = return air	2
243	Return air temperature upper limit threshold		35,0	°C	P154 Target temperature selection = return air	2
244	Room temperature low limit threshold		15,0	°C	P154 Target temperature selection = room	2
245	Room temperature upper limit threshold		35,0	°C	P154 Target temperature selection = room	2
248	Hydraulic coil frost protection safety threshold		4,0	°C	P28 Hydraulic coil no.1 = Cooling or Heating or mixed	3
260	Coil valve min. opening percentage		0	%	P28 Hydraulic coil no.1 = Cooling or Heating or mixed	2
265	Fresh air temperature limit for unit operation		-20	°C		3

No,	Description	Setting		Unit	Display conditions	Access level
		Enumeration	By default			
270	Temperature setpoint compensation activation	0: None 1: With	0			2
270,1	Heating compensation start fresh air temp.		10,0	°C	P270 = With	2
270,2	Heating compensation end fresh air temp.		-20.0	°C	P270 = With	2
270,3	Heating compensation max. setpoint difference		3,0	°C	P270 = With	2
270,5	Cooling compensation start fresh air temp.		25,0	°C	P270 = With	2
270,6	Cooling compensation end fresh air temp.		40,0	°C	P270 = With	2
270,7	Cooling compensation max. setpoint difference		2,0	°C	P270 = With	2
271	Downgraded fresh air flow rate activation	0: None 1: With	0			2
271,1	Downgraded mode start fresh air temperature		10,0	°C	P271 = With	2
271,2	Downgraded mode end fresh air temperature		-20.0	°C	P271 = With	2
271,3	% min. flow rate in downgraded mode		30,0	%	P271 = With	2
280	Fire safety operating mode	0: off 1: Intake forced / exhaust shut down 2: Exhaust forced / intake shut down 3: Intake and exhaust forced	0		P24 = with P24 = with and P104 = flow rate control	2
282	Intake flow rate in case of fire		10000	m³/h	P280 = 1 or 3	2
283	Exhaust flow rate in case of fire		10000	m³/h	P280 = 2 or 3	2
286	DX unit defrosting management	0: None 1: Derated mode 2: AHU shut down	0		P28 = Cooling direct expansion or heating direct expansion or reversible direct expansion	2
287	Intake pressure setpoint during DX unit defrosting		100	Pa	P286 = Derated mode and P104 = duct pressure	2
288	Intake flow rate setpoint during DX unit defrosting		As per P1	m³/h	P286 = Derated mode and P104 = flow rate	2
289	Exhaust flow rate setpoint during DX unit defrosting		As per P1	m³/h	P286 = Derated mode and P104 = flow rate	2
292	FMA warning on fault output	0 : No 1 : Yes	1			2
293	FMA warning on CMS	0 : No 1 : Yes	1			2

9.3 - Reading parameters

No.	Description	Setting	Unit	Display conditions	Access level
		Enumeration			
Reading parameters					
300	Calculated intake flow rate setpoint		m^3/h	P104 Air intake ventilation control = Flow rate	1
301	Air intake fan flow rate		m^3/h		1
302	Air intake fan differential pressure		Pa		1
304	Duct pressure calculated setpoint		Pa	P104 Air intake ventilation control = Duct pressure	
305	Duct pressure		Pa	P104 Air intake ventilation control = Duct pressure	1
306	Calculated extraction flow rate setpoint		m^3/h		1
307	Air extraction fan flow rate		m^3/h		1
308	Extraction fan differential pressure		Pa		1
320	Calculated cooling setpoint		°C		1
321	Calculated heating setpoint		°C		1
322	Supply air temperature		°C		1
323	Fresh air temperature		°C		1
324	Return air temperature		°C		1
326	Room temperature		°C	P154 Target temperature selection = Room	1
331	CO_2 air quality		ppm	P152 Air quality control = With	1
338	Intake filter pressure switch				1
339	Exhaust filter pressure switch				1
340	Remote control				1
341	Setpoint 1 / Setpoint 2			P160 Setpoint 1/setpoint 2 = On/Off input	1
342	Fire			P24 Fire detection = With	1
345	Mixed coil changeover thermostat			P28 Hydraulic coil no.1 = Mixed and P162 Changeover selection = On/Off input	1
350	DX unit control			P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	1
353	DX unit defrosting			P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	1
356	Electric heater safety thermostat			P32 Elec. heater = 2 on/off stages	1
370	Isolation damper			P26 Isolation damper = With	1
372	Air intake fan				1
373	Air intake fan operating-hour meter		h		1
374	Air intake fan percentage		%		1
376	Air extraction fan				1
377	Extraction fan operating-hour meter		h		1
378	Extraction fan percentage		%		
380	AHU operating feedback				1
382	Calculated air quality requirement		%	P152 Air quality = With	1
392	Setpoint 1 / setpoint 2 status			P160 = Setpoint 1/setpoint 2 selection = Sched./CMS or On/Off input	1
394	Calculated cooling demand		%		1
395	Calculated heating demand		%		1
398	Cooling block	0: off 1 : on			1
399	Heating block	0: off 1 : on			1
400	Coil 1 Cooling		%	P28 Coil no.1 = cold water or mixed or cooling direct expansion or reversible direct expansion	1
401	Coil 1 Heating		%	P28 Coil no.1 = hot water or mixed or heating direct expansion or reversible direct expansion	1
410	Stage 1 electric heater	0: off 1 : on		P32 Electric heater = 2 On/Off stages	1
411	Hour meter and stage 1 electrical heater		h	P32 Electric heater = 2 On/Off stages	1
414	Stage 2 electric heater	0: off 1 : on		P32 Electric heater = 2 On/Off stages	1
415	Stage 2 electric heater operating-hour meter			P32 Electric heater = 2 On/Off stages	1
420	Bypass state	0 : inactive 1 : active		P32 Electric heater = 2 On/Off stages	1
422	Changeover state	0: heating 1: cooling		P28 Coil no.1 = mixed	1
440	DX unit run/shutdown	0: off 1 : on		P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	1

No.	Description	Setting	Unit	Display conditions	Access level
		Enumeration			
441	Direct expansion coil hour meter		h	P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	1
446	DX unit defrosting status	0 : inactive 1 : active		P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	1
447	DX unit heating/cooling	0 : heating 1 : cooling		P28 Coil = reversible direct expansion	1
450	Recovery unit	0 : off 1 : on			1
451	Heat recovery unit operating-hour meter		h		1
453	Recovery unit efficiency		%		
472	Fault summary	0 : off 1 : on			1
490	Weekly programming request	0 : inactive 1 : active			1
491	State requested by the weekly programming	0 : off 1 : Frost protection 2 : Night cooling 3 : Setpoint 2 on 4: Setpoint 1 run 5: On			1
492	Annual programming request	0 : inactive 1 : active			1
493	State requested by the annual programming	0: off 1: Frost protection 2 : Night cooling 3 : Setpoint 2 on 4: Setpoint 1 run 5: On 11: Weekly prog. 1 12: Weekly prog. 2 13: Weekly prog. 3 14: Weekly prog. 4 15: Weekly prog. 5 16: Weekly prog. 6			1

9.4 - Faults level

No.	Description	Setting		Display conditions	Access level
		Enumeration	By default		
602	intake filter 1 clogged	0 : Maintenance 1 : Danger	0		2
606	Exhaust filter 1 clogged	0 : Maintenance 1 : Danger	0		2
609	Manual electrical heater safety thermostat	0 : Maintenance 1 : Danger	1	P32 Electric heater = 2 On/Off stages	3
620	Supply air temperature too low	0 : Maintenance 1 : Danger	0		2
621	Supply air temperature too high	0 : Maintenance 1 : Danger	0		2
622	Return temperature too low	0 : Maintenance 1 : Danger	0	P146 Target temperature selection = return air	2
623	Return temperature too high	0 : Maintenance 1 : Danger	0	P146 Target temperature selection = return air	2
624	Room temperature too low	0 : Maintenance 1 : Danger	0	P146 Target temperature selection = room	2
625	Room temperature too high	0 : Maintenance 1 : Danger	0	P146 Target temperature selection = room	2
628	Duct pressure too low	0 : Maintenance 1 : Danger	0	P104 Air intake ventilation control = Duct pressure	2
629	Duct pressure too high	0 : Maintenance 1 : Danger	0	P104 Air intake ventilation control = Duct pressure	2
632	Loss of communication with energy meter	0 : Maintenance 1 : Danger	0	P40 Main box energy meter = With	2
635	Loss of communication with Th Tune	0 : Maintenance 1 : Danger	0	P149 = with	2
640	room temperature sensor	0 : Maintenance 1 : Danger	0	P149 = with	2
650	Intake FMA EC motor warning	0 : Maintenance 1 : Danger	0		2
651	Exhaust FMA EC motor warning	0 : Maintenance 1 : Danger	0		2

9.5 - Communication parameters

No.	Description	Setting		Unit	Display conditions	Access level
		Enumeration	By default			
Communication parameters						
BMS1						
700	Selection of the type of communication protocol used on the BMS1 port	0 : None 1 : ModBus RTU 2 : LON 3 : KNX 4 : ModBus TCP 5 : BACNET IP 6 : WEB	0			2
701	Selection of the transmission speed on the BMS1 port	0 : 1200 1 : 2400 2 : 4800 3 : 9600 4 : 19200	3 if P700=1 or 3 2 if P700=2 4 if P700=4, 5 or 6		P700 = 1	2
702	Parity on the BMS1 port	0: None 1 : odd 2 : even	0		P700 = 1	2
703	Number of stop bits on the BMS1 port		1		P700 = 1	2
704						
705	Selection of the controller address on the BMS1 bus		1		P700 = 1	2
716	Control type	0: Local 1: Remote	1			2
BMS2						
710	Selection of the type of communication protocol used on the BMS2 port	1 : ModBus RTU	0			2
711	Selection of the transmission speed on the BMS2 port	0 : 1200 1 : 2400 2 : 4800 3 : 9600 4 : 19200	3			2
712	Parity on the BMS2 port	0: None 1 : odd 2 : even	0			2
713	Number of stop bits on the BMS2 port		1			2
714						
715	Selection of the controller address on the BMS2 bus		1		P710 = 3	2
716	Control type	0: Local 1: Remote	0			2
pLAN						
720	pCO address on the pLAN network		1			2

9.6 - Calibration

No.	Description	Setting				Unit	Display conditions	Access level
		Min.	Max.	Increment	By default			
Adjust. params								
800	Calibration of the air intake fan flow rate sensor							2
801	Calibration of the air extraction fan flow rate sensor							2
802	Calibration of the supply air duct pressure sensor						P104 Air intake ventilation control = Duct pressure	2
809	Calibration of supply air temperature sensor	-5.0	5,0	0,1	0,0	°C		2
810	Calibration of fresh air temperature sensor	-5.0	5,0	0,1	0,0	°C		2
811	Return air temperature sensor calibration	-5.0	5,0	0,1	0,0	°C		2
813	Calibration of the room air temperature sensor	-3.0	3,0	0,1	0,0	°C	P149 = with in read-only, modifiable from Th-Tune	2
816	Calibration of CO_2 Air Quality sensor	-200	200	1	0	ppm	P149 Air quality control = With	2

9.7 - Input/Output directions

No.	Description	Setting		Display conditions	Access level
		Enumeration	By default		
Adjust. params					
850	Remote control input direction	0 : Normally open 1 : Normally closed	1 (NC)		2
851	Setpoint 1/Setpoint 2 input direction	0 : Normally open 1 : Normally closed	0 (NC)	P160 Setpoint 1/setpoint 2 = On/Off input	2
852	Fire detection input direction	0 : Normally open 1 : Normally closed	1 (NC)	P24 Fire detection = With	3
855	Changeover thermostat input direction	0: Open in heating 1: Closed in heating	1 (NC)	P28 = mixed coil and P162 = On/Off input	3
856	Intake filter pressure switch input direction	0 : Normally open 1 : Normally closed	1 (NC)		3
857	Exhaust filter pressure switch input direction	0 : Normally open 1 : Normally closed	1 (NC)		3
866	DX unit defrosting input direction	0 : Normally open 1 : Normally closed	1 (NC)	P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	2
867	DX unit control input direction	0 : Normally open 1 : Normally closed	1 (NC)	P28 Coil = Cooling direct expansion or heating direct expansion or reversible direct expansion	2
872	Electric heater manual safety input direction	0 : Normally open 1 : Normally closed	1 (NC)	P32 Electric heater = 2 On/Off stages	3
882	Fault reporting output direction	0 : Normally open 1 : Normally closed	1 (NC)		2
885	AHU operating feedback output direction	0 : Normally open 1 : Normally closed	1 (NC)		2
886	DX unit control output direction	0: Open in heating 1: Closed in heating	1 (NC)	P28 Coil = reversible direct expansion	2

9.8 - Motors

No.	Description	Setting		Unit	Access level
		Enumeration	By default		
Air intake FMA settings					
1200	Min. speed percentage		0	%	3
1201	Max. speed percentage		100	%	3
1202	Acceleration ramp-up		100	s	3
1203	Deceleration ramp-down		100	s	3
Air intake FMA 1 information					
1220	Calculated min. speed			rpm	1
1221	Calculated max. speed			rpm	1
1222	Speed requested			rpm	1
1223	Current speed			rpm	1
1224	Current consumed			A	1
1225	Power input			W	1
1226	Motor temperature			°C	1
1227	Operating counter			h	1
1230	Fault summary	0 : inactive 1 : active			1
1231	Communication state	0 : inactive 1 : active			1
1234	Warning summary	0 : inactive 1 : active			1
1235	Warning status				1
1238	Motor type				1
1239	Version number				1
Extraction FMA 1 settings					
2200	Min. speed percentage		0	%	1
2201	Max. speed percentage		100	%	1
2202	Acceleration ramp-up		100	s	1
2203	Deceleration ramp-down		100	s	1

No.	Description	Setting		Unit	Access level
		Enumeration	By default		
Extraction FMA 1 information					
2220	Calculated min. speed			rpm	1
2221	Calculated max. speed			rpm	1
2222	Speed requested			rpm	1
2223	Current speed			rpm	1
2224	Current consumed			A	1
2225	Power input			W	1
2226	Motor temperature			°C	1
2227	Operating counter			h	1
2230	Fault summary	0 : inactive 1 : active			1
2231	Communication state	0 : inactive 1 : active			1
2234	Warning summary	0 : inactive 1 : active			1
2235	Warning status				1
2238	Motor type				1
2239	Version number				1

9.9 - Energy meter

No.	Description	Setting		Unit	Access level
		Enumeration	By default		
3000	Energy consumed		0	kWh	1
3001	Instantaneous power		0	W	1
3002	Voltage		0	V	1
3004	Voltage L1 - L2		0	V	1
3005	Voltage L3 - L2		0	V	1
3006	Voltage L1 - L3		0	V	1
3008	Current L1		0	A	1
3009	Current L2		0	A	1
3010	Current L3		0	A	1
3012	Fault summary	0 : Fault not present 1 : Fault present			1
3013	Communication state	0 : offline 1 : online			1
3014	Serial number				1
3015	Version number				1

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