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SAFETY AND ENVIRONMENT INSTRUCTIONS

- Installation and maintenance of the unit must be performed by qualified staff according to local and current standards and regulations.
- Use Personal Protective Equipment to avoid damages related to electrical, mechanical (injuries from contact with metal sheets, sharp edges) and acoustics risks.
- Do not use the unit for any purpose other than that for which it is designed. This appliance may only be used for conveying air free of hazardous or construction dust.
- Move the equipment as indicated in the handling chapter.
- Carry out grounding in accordance with current standards. Never start-up a device that is not grounded (protective earth).
- Before any intervention, ensure that the device is turned off and wait for the complete shutdown of the moving components of the ventilation unit before opening the doors.
- During operation, inspection panels, doors and hatches must always be mounted and closed.
- The device is started or stopped only via the proximity switch.
- Safety and control equipments must not be removed, short-circuited or deactivated.
- During interventions, be vigilant to the temperature that certain components can reach (water battery or electrical resistance ...).
- The installation must comply with fire safety regulations.
- Any waste generation must be treated in accordance with the regulations in force.
- It is the responsibility of the installer of the equipment to ensure compliance with the regulations concerning noise emissions inside the building and to adapt, if necessary, the conditions of installation.
- We accept no liability for damages resulting from misuse of the equipment, unauthorized repair or modification or non-compliance with this notice.

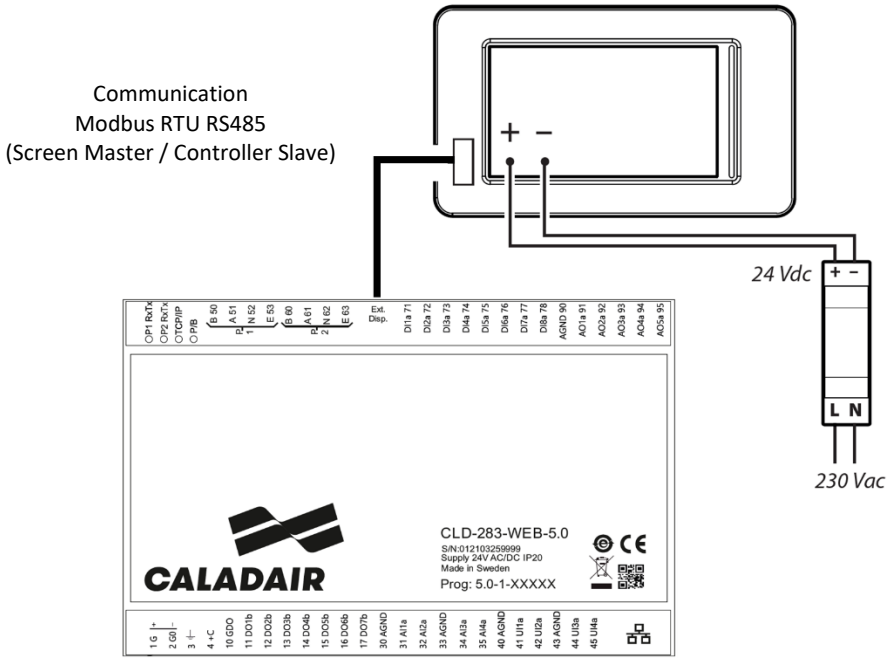
	REMINDER AND DEFINITION OF PICTOGRAMS USED
	Danger and warning: • Operation or situation that may present a danger • Warning about instructions to follow
	Reading the documentation that accompanies the product is mandatory.

I. PHYSICAL PRESENTATION OF THE PG 5.0 TOUCH SCREEN

The PG 5.0 touch screen replaces the ED9200.

The 4.3" touchscreen technology with 65°000 colours display provides high quality images and advanced features that facilitate human-machine interaction and make easier the navigation between the different screens.

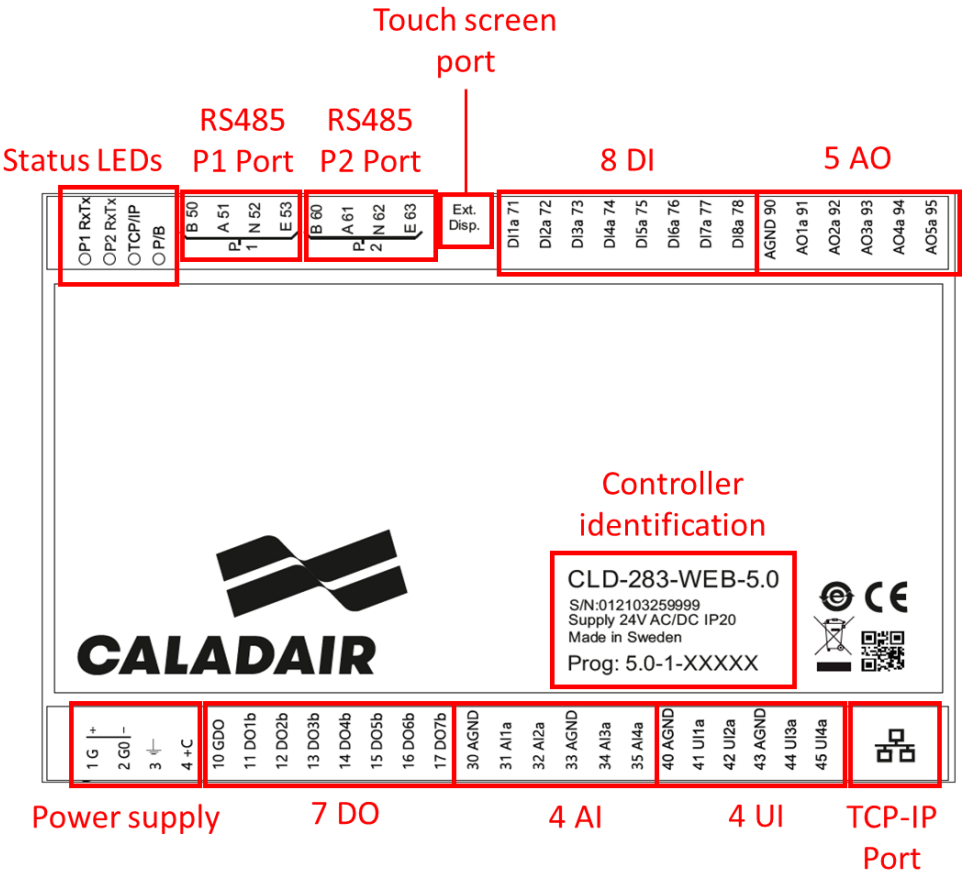
It is protected from bad weather and UV rays thanks to its IP65 protection rating and an orientable cover fixed directly to the front of the machine.



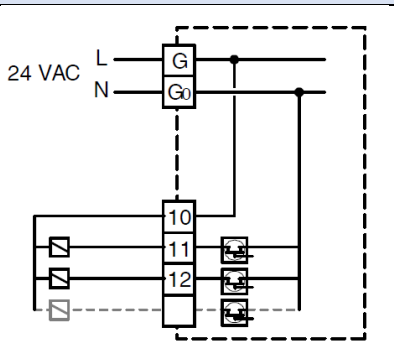
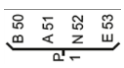
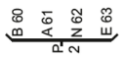
The touch screen is supplied by a dedicated 230Vac / 24 Vdc transformer and communicates with the CLD-283 controller by Modbus RTU RS485 via the « EXT DISP. » port. The screen is master, and the controller is slave.

II. PHYSICAL PRESENTATION OF THE CLD-283 CONTROLLER

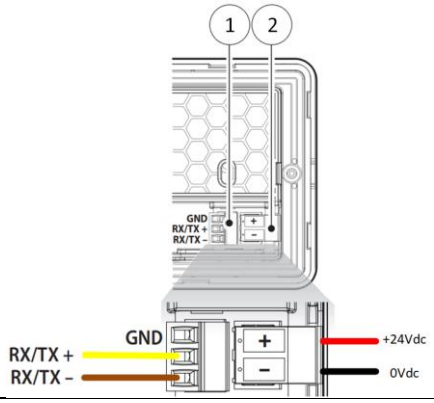
The CLD-283 controller is physically very similar to the previous version. The number of I/Os remains unchanged, as do the dimensional characteristics.



Terminal	Definition	Details
G (+)	24Vac supply	G (+) is also used to supply TRPS, TRPR, and CO2 sensors.
G0 (-)		
⏚	Earth connection	
+C (24Vdc)	24Vdc supply used **only** for DI and UDI	24V**dc** (stabilised direct current) supply voltage
(4) LED for luminous indications		
P1 RxTx	RS485 Port 1 status LED	The LED flashes when communication is active. The LED is off when there is no active communication.
P2 RxTx	RS485 Port 2 status LED (reserved for the communication with other expansion device or EDT2)	
TCP/IP	TCP/IP port status LED	
P/B	Printed Board status LED	The LED is lit when the controller is switched on.

(7) Digital Outputs DO		
GD0	DOs Common and internally connected to G (+)	
DO1…DO7	24Vac polarized outputs (controller supply voltage), internally connected to G0(-)	DO outputs must be relayed or the 3.15A protective fuse located on the 24Vac power supply will blown.
(5) Analog Outputs AO		
AGND	AOs Common	
AO1…AO5	0-10V outputs	
(8) Digital Inputs DI		
AGND	DIs Common	
DI1…DI8	24Vdc polarized inputs (dry contact between +C and corresponding DI)	
(4) Analog Inputs AI		
AGND	AIs Common	
AI1…AI4	PT1000 or 0-10V inputs depending on machine version (see wiring diagram of the unit)	
(4) Universal Inputs UI		
AGND	UIs Common	
UI1…UI4	Inputs can be configured as analog input AI or digital input DI depending on the unit version (see wiring diagram of the unit)	
(1) TCP-IP Port		
	Reserved port for communication between the unit and a BMS via TCP-IP link. RJ45 connector.	Available protocols: Bacnet IP or Modbus TCP
(1) RS485 P1 Port		
	Reserved port for the communication between the machine and the BMS by RS485 serial line. Screw type terminal.	Available protocols: Bacnet MS/TP or Modbus RTU
(1) RS485 P2 Port		
	Reserved port for the communication with expansion device or EDT2 room remote control.	
(1) PG 5.0 touch screen communication port		
Ext. Disp.	Reserved port for the communication with the PG 5.0 touch screen.	

III. CLD-283 CONTROLLER / PG 5.0 TOUCH SCREEN CONNEXION



1	Modbus communication connector
2	24Vdc supply connector

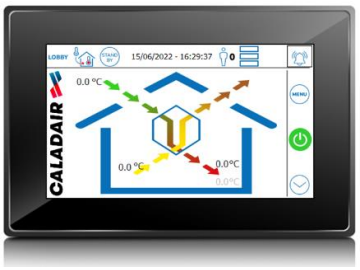
The PG 5.0 touch screen has a 2-pole connector for 24Vdc power supply and a 3-pole connector for Modbus communication with the controller.

IV. EASY 5.0 AND EDT2 REMOTE TOUCH SCREENS (Options)

IV.1. EASY 5.0 Wall Touch Screen Master

The touch screen is available as an option to be remote from the ventilation unit up to 100m away.
The optional kit includes:

- A screen to be remote
- An electrical harness to be extended to the desired length within a limit of 100m
- A screen cover
- A wall support plate (surface mounting).



The electrical connection between the remote display and the ventilation unit is the responsibility of the installer. Observe the electrical connection indicated in chapter III CLD-283 CONTROLLER / PG 5.0 TOUCH SCREEN CONNEXION.
For the extension of the electrical harness, use:

- A 2x0,75mm² cable (or equivalent) for the 24Vdc power supply
- A Belden 3106A cable (or equivalent) for communication.

It is not possible to operate the embedded touch screen and the remote touch screen simultaneously. Only one screen can be functional at a time. The general wiring diagram is available in the installation and operating manual of the ventilation unit.
For quick access during maintenance, remember to reconnect the front screen in place of the remote screen.

IV.2. EDT2 Wall-Mounted Touch Screen User

The EDT2 Wall-mounted Touch screen User is an optional end-user room touch screen. It offers simplified functionality compared to the EASY 5.0 Wall Touch Screen Master.
See manual MS-REL-002 - EDT2 for use and installation of the EDT2 Wall-mounted Touch screen User.

V. THERMAL SEQUENCES DEFINITION

V.1. General information

The control of temperature is defined by 3 different thermal sequences illustrated by a pictogram visible from the Home Page (the size of the coloured area indicates the rate of the need calculated):

- Cooling sequence (cooling coil management: cold water coil, changeover coil, DX coil)
- Recovery sequence (plate or rotary recuperator management depending on version)
- Heating sequence (heating coil management: electric heater, hot water coil, changeover coil, DXR coil).

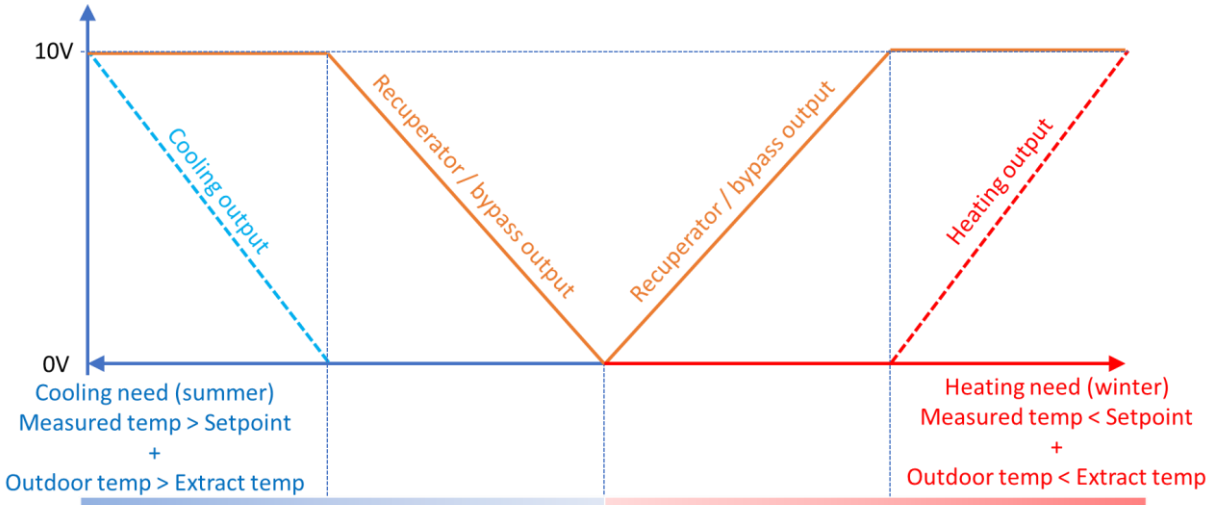
Every sequence is managed by its own PID control parameters and is linked to an Analog Output AO (see wiring diagram of the machine).

In the case of a rotary type recuperator, the recovery sequence acts on the rotation speed of the wheel: the faster the wheel turns, the greater the heat recovery. When the unit is off (standby), there is no heat recovery, this is also the case in free cooling or free heating operation.

In the case of a plates type recuperator, the recovery sequence acts on the opening angle of the bypass flap: the closer the bypass, the greater the fresh air flow through the recuperator, and the greater the heat recovery. The bypass also provides frost prevention (specific PID parameters settings), free cooling and free heating functions.

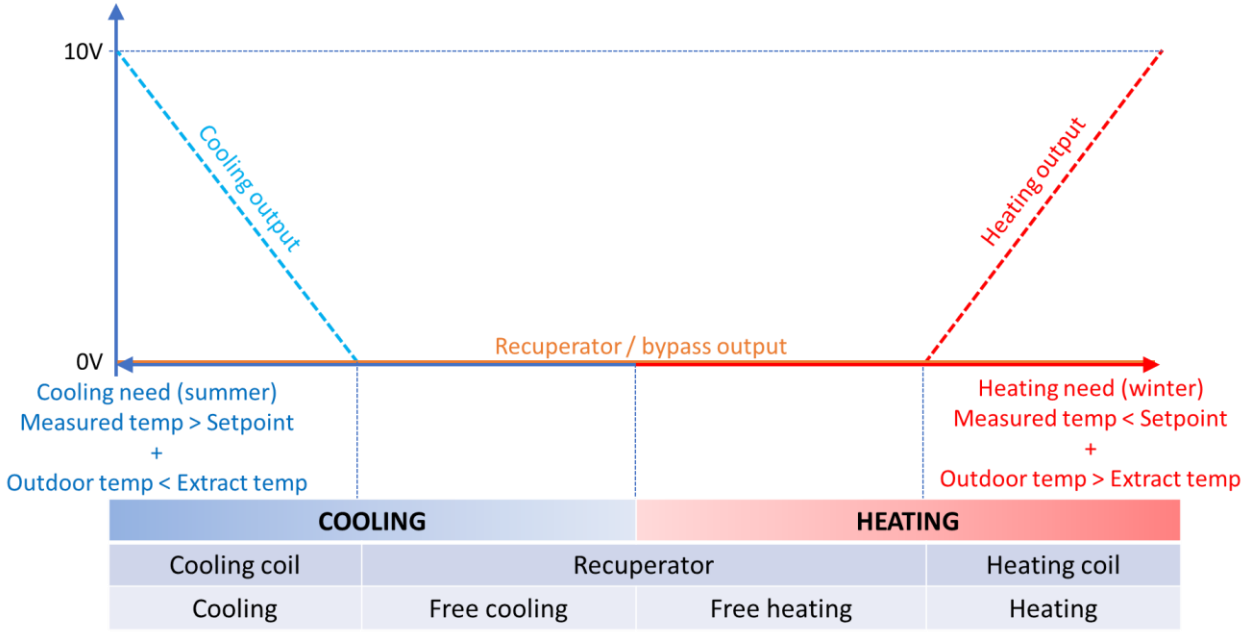
These 3 sequences work in cascade according to the descriptive graphs below.

<u>Thermal sequences with heat recovery:</u>



COOLING		HEATING	
Cooling coil	Recuperator		Heating coil
Cooling + Cold Recovery	Cold recovery	Heat recovery	Heating + Heat recovery

Thermal sequences without heat recovery:



V.2. Heating need and request

The operation of the electric heater or hot water coil occurs when heating is requested:

- Measured supply air temperature is lower the supply air temperature setpoint (supply air temperature control mode)
- Measured extract air temperature is lower the extract air temperature setpoint (extract air temperature control mode).

The operation of the electric heater depends on the operation of the supply air fan (SAF): in the event of the apparition of the alarm Id=1 “SAF Supply Air Fan Alarm” or frost prevention function by supply airflow reduction is active, the electric heater is immediately disabled in order to avoid any overheating of the heating element and its close area.

V.3. Cooling need and request

The operation of the cold-water coil occurs when cooling is needed:

- Measured supply air temperature is higher than the supply air temperature setpoint (supply air temperature control mode)
- Measured extract air temperature is higher the extract air temperature setpoint (extract air temperature control mode).

V.4. Heat recovery need and request

The operation of the recuperator occurs when a request for heat recovery is necessary:

- There is a heating request, and the air extract temperature is higher than the outdoor air temperature
- There is a cooling request, and the air extract temperature is lower than the outdoor air temperature.

Depending on the need for heat recovery, the controller will act either on the opening angle of the bypass flap (plate type recuperator) or on the rotation speed of the rotary exchanger (rotary recuperator).

VI. INITIALIZATION OF THERMAL SEQUENCES AT START UP

Initialization at start-up allows the machine to be started at an operating point as close as possible to the one that will be recalculated during operation in order to avoid any source of discomfort and unnecessary energy consumption.

Initialization of the thermal sequence at start-up only depends on the outdoor temperature measured at the time of starting the machine:

Outdoor temp < +3°C	Outdoor temp ≥ +3°C
The unit starts up in 100% heating need*. As long as the run indicator signal of the supply air fan is off**, the electric heater is not activated.	The unit starts in maximum energy recovery.

*The control output for the 3-way valve or the output of the electric heating coil is 100%.
**ECO/DIVA: the contact of the pressure switch DEP S is open; LOBBY: the pressure signal is below the minimum threshold; MAC2/QUATTRO: the flow signal is below the minimum threshold.

VII. START-UP SEQUENCE

When the start-up sequence is active, it is shown by the pictogram  in the “operating mode” area on the home page.

The start-up sequence is activated when all the following conditions are met:

- The control is ON on the touch screen ()
- There are no Active class A alarms (alarms that stop the unit)
- There is no active remote stop order
- And at least:
    - one time slot (reduced run or normal run) is active
    - or a remote order (reduced or normal run) is active
    - or the fire function (set to start the unit) is active
    - or an operating request coming from the BMS is active.

The start-up sequence extends over a total time of 120s. During this time, the alarms are disabled (excepted for the alarm (63) “Electric heater overheated” which is always monitored) and the unit starts at the operating point defined at the initialization. The minimum fans control signal does not apply yet.

The fresh air and exhaust air isolation dampers opens as soon as the start-up sequence is activated. The extract air fan control signal is enabled 15s after the start-up sequence is activated. 15s later, the supply air fans control signal is enabled and the supply air fan starts. The controller outputs relating to the control of heating, cooling, 3-way valves and pumps are enabled.

Once the 120s have elapsed, the unit switches from start-up sequence to normal mode sequence. The minimum and maximum fans control signal is then taken in account, and alarm monitoring is enabled.

In the event of a power supply failure, the unit will automatically restart the start-up sequence as soon as the power supply is restored.

VIII. STOP SEQUENCE

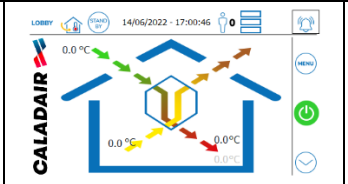
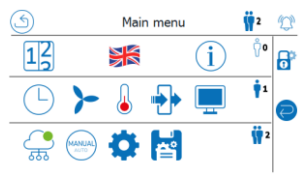
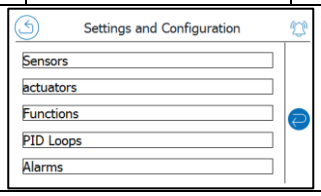
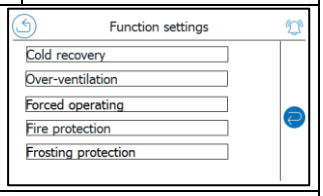
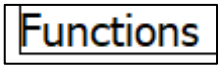
When the stop sequence is active, it is shown by the appearance of the pictogram in the “operating mode” area of the home page.

The stop sequence occurs when at least one of the following conditions is present:

- Appearance of an alarm whose action requires the normal/fast shutoff of the unit
- Switching the unit to OFF on the touch screen ( )
- No active time slots
- Fire function is active and set to stop the unit
- Stop request coming from the BMS
- Remote stop order.

The stop sequence extends over the time related to the setting of the fans stop delay (post-ventilation) and to the closing delays of the fresh air and extract air isolation dampers. When the stop sequence is active, the management of alarms and the controller output of supply air electric heater are immediately deactivated (the recuperator and heating/cooling water coils outputs remain active). The supply air fan is stopped after 180s. The extract air fan is shut down 30s after. Then, fresh air and extract air dampers à closed 5s after and all the actuator command signals are desabled.

IX. NIGHT OVERVENTILATION FUNCTION (Night Cooling)

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

When the night overventilation is active, it is shown by the pictogram in the “operating mode” area of the home page.

The night overventilation makes it possible to drop the temperature of the building and evacuate the stored heat during the day thanks to the outdoor coolness of the night. This function improves the comfort and saves energy from air climatising systems. It is possible to set a dedicated ventilation setpoint (fan offset) in order to adjust (more or less) the airflow of the unit when night overventilation function is active.

The activation of night overventilation requires both thermal conditions during the daytime and during the night time set (factory setting 00:00 – 7:00).

The night overventilation function is managed by the following parameters:

Parameter	Configuration	Factory setting
Activation of the function (user condition)	Activated	Activated
	Deactivated	
Operating time slot	Start hour (settable)	00:00
	Stop hour (settable)	07:00
Fans offset (applied to the normal run setpoint)	Supply air fan (settable)	0
	Extract air fan (settable)	0
Outdoor temperature threshold reached during the day	(Settable)	22°C
Outdoor temperature range during the night overventilation time slot	Max temperature (settable)	35°C
	Min temperature (settable)	14°C
Minimum extract air temperature threshold during the night overventilation time slot	(Settable)	18°C
Gap between extract air temp and outdoor air temp	(Settable)	2°C
Blocking duration of heating outputs after the night overventilation	(Settable)	180 minutes
Duration between 2 tests	(Settable)	60 minutes
Temperature sensors brewing time	(Settable)	180 s

<u>Fans setpoints:</u>
When the night overventilation is active, the fans setpoints automatically switch on the normal run setpoint plus an offset (if this one is set). For version ECO/DIVA/MAC2/QUATTRO, the normal speed/flow setpoint should always be greater than reduced speed/flow setpoint to take full advantage of the function.
For LOBBY (VAV air distribution - constant pressure control) network version, the normal pressure setpoint setting will correspond to the night overventilation setpoint. It is necessary to use the night overventilation report signal to force the opening of the modulating dampers located on the air distribution network. You can also set a fan offset in night overventilation if you want to make sure to reach an airflow close to the maximum of the unit.

<u>Time schedule:</u>
Take care not to overlap normal run slot on the night overventilation time slot as this would have the consequence of inhibiting the night overventilation function for the overlapping time of the two functions. Night overventilation can only be done if the reduced run is in progress or if the unit is in standby (no active time slot in progress).

All of the following conditions must be met in order to activate the function:

- The user has activated the operation of the night overventilation function (accessible setting)
- Less than 4 days have elapsed since the unit has been operating in running mode (reduced or normal run)
- At least one time slot must be active within the next 24h
- The daytime outdoor temperature has exceeded the set threshold (22°C settable)
- The normal run and the remote orders must be off
- The current time is within the allowed time range (00:00 – 07:00, adjustable)
- The gap between the air extract temperature and the outdoor air temperature is sufficient (2°C adjustable)

The unit stops and restarts when the function is released. It then launches a phase of 180s (adjustable) during which the plant operates with the overventilation parameters set (normal run fan setpoint + offset if present) in order to properly irrigate the temperature sensors and ensure that the measured values are stabilized and reflect reality.

After this time has elapsed, stop conditions are checked. If at least one of the following conditions is true, then the unit exits from the night overventilation function:

- The outdoor air temperature is outside the allowed range:
  - 35°C < Outdoor air temperature
  - Outdoor air temperature < 14°C
- The extract air temperature is below the specified value (18°C)
- The normal run, remote orders are ON
- The gap between the air extract temperature and the outdoor air temperature is sufficient (2°C adjustable)
- The stop hour (07:00) is exceeded.

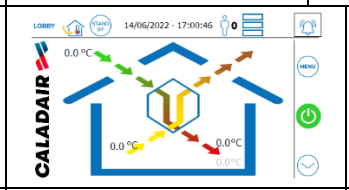
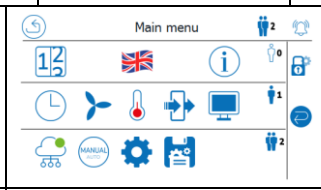
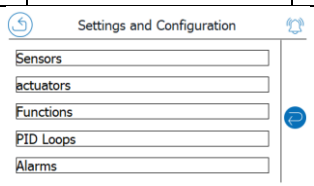
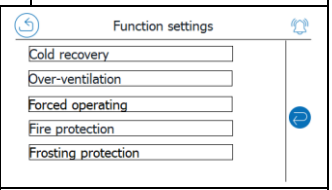
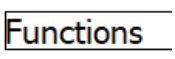
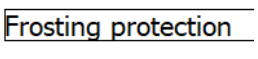
When the night overventilation has been activated, in order not to lose all the comfort benefits and energetics benefits accumulated, the heating outputs signals of the controller are inhibited for 180 minutes (adjustable) after the function is ended.
Example: the heating can only be activated from 08:00 am if the night overventilation has ended at 5:00 am although the stop hour is set to 7:00.

If the activation conditions are met again, the fan speed offset will only be active after a timeout of 60 minutes from the last end of the function.

When the night overventilation is active:

- The night overventilation DO Digital Output (NO normally open) is closed. This signal has to be used to force the opening of the any dampers located on the air distribution network (LOBBY – constant air pressure network)
- The actual fan setpoint used is the normal run setpoint + night overventilation fan offset (adjustable).

X. FROST PREVENTION FUNCTION BY SUPPLY AIRFLOW REDUCTION

	Access path to the function (Level access: Expert)						
	Step 1	→	Step 2	→	Step 3	→	Step 4
From Screen							
Area to Click on							

When outdoor air temperature is low (winter), the reduction of supply airflow prevents the frost of the recuperator.

This function is conceivable when the building is mainly heated by generators whose energy cost is more favourable than the use of electric heater or when there are power supply constraints.
Please note that the decrease of supply airflow will make a misbalance with the extract airflow. So, it is necessary to provide external air intake devices.

To activate the function, it is necessary to adjust the outdoor air temperature threshold close to -10°C. In factory, this threshold is set to -100°C that makes this function inactive.

This function is activated when the 2 following conditions are met:

- The frost prevention function by bypass (see XXVII.3 Frost prevention of the plate heat recuperator) is running
- And the measured outdoor temperature is below the threshold set.

When the function is active, the control signal of the SAF supply air fan switches automatically to the minimum signal value of 25% (2,5Vdc, non-adjustable) regardless of the fan control type (ECO/DIVA/LOBBY/MAC2/QUATTRO).

To allow the SAF supply air fan to return to normal operation, the outdoor air temperature must return above the threshold (+1°C) **AND** the frost prevention function must have returned to standby. This is not always instantaneous depending on the PID settings.

It is not recommended to activate this function on SMART/INFINITE units equipped with fresh air electric preheater. Indeed, the fresh air flow becoming low (supply air fan control signal at minimum), this could result in overheating of the electric preheater.

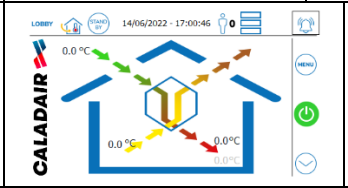
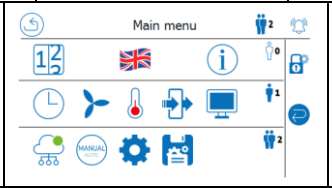
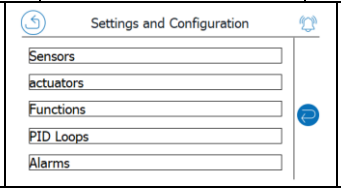
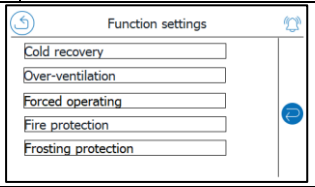
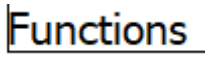
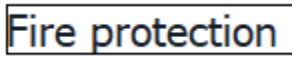
Ventilation					Recuperator		Type of heating coil		Thermal control
ECO	LOBBY	MAC2	DIVA	QUATTRO	PLATE	ROTARY	BE	BC	SMART/INFINITE (Fresh air electric preheater)
✓	✓	✓	✓	✓	✓	---	✓	✓	✗

✓ = Possible
X = Not recommanded
--- = Non functional

If the unit is equipped with an electric heater, it will be deactivated during the entire time function is active in order to avoid excessive overheating of the heating element and its surroundings.This function is not used in units equipped with a rotary recuperator.

XI. FIRE PROTECTION FUNCTION

XI.1. General information and possible configurations

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

When the fire protection function is active, it is shown by the pictogram  in the “operating mode” area of the home page.

The fire protection function is activated when the corresponding digital input DI is active and makes it possible to force the operation of the unit on particular sequences specific to the fire protection function.

The fire protection function is factory deactivated. It needs to be set at the commissioning of the unit.

The fire protection function does not allow to control fire dampers. The management of these devices must be done independently.

When the fire protection function is running, the control signal of the plate recuperator bypass is deactivated, and fresh air is derived from the recuperator.

The fire protection function can only manage the behaviour of the unit, fans, and isolation dampers.

In the case of a rotary recuperator, the recuperator sequence remains on Auto if the selected operating mode allows the operation of the unit.

Parameter	Possible choices	Details
Function activation	Enabled or disabled	Make possible the operation of the fire protection function.
Operating mode	Stop	The unit is stopped when the fire protection function is active. The shutdown of the fans is immediate even with an electric heater. There is no post-ventilation sequence.
	Continu	The unit runs continuously without taking into account the time schedule with the fans setpoints below(1).
	Normal ON/OFF conditions	The unit runs according to the time schedule.
	Supply only	The supply air fan SAF only runs according to the corresponding setpoint below(1).
	Extract only	The extract air fan EAF only runs according to the corresponding setpoint below(2).
(1)SAF supply air fan setpoint	Auto	The fan operates at the speed/pressure/flow requested by the time schedule. It is stopped if the current time slot is inactive.
	100% manual output	The fan operates at maximum speed regardless the type of fan control mode (speed/pressure/flow).
	Reduced run	The fan operates at speed/pressure/flow corresponding to the reduced run setpoint.
	Normal run	The fan operates at speed/pressure/flow corresponding to the normal run setpoint.
(2)EAF extract air fan setpoint	Auto	The fan operates at the speed/pressure/flow requested by the time schedule. It is stopped if the current time slot is inactive.
	100% manual output	The fan operates at maximum speed regardless the type of fan control mode (speed/pressure/flow).
	Reduced run	The fan operates at speed/pressure/flow corresponding to the reduced run setpoint.
	Normal run	The fan operates at speed/pressure/flow corresponding to the normal run setpoint.

Opening setpoint of fresh air isolation damper	Fan function	The fresh air damper is forced to open if the fan is in operation or forced to close if the fan is stopped.
	Open	The fresh air damper is forced to open if the fire protection function is activated.
	Closed	The fresh air damper is forced to close if the fire protection function is activated.
Opening setpoint of extract air isolation damper	Fan function	The extract air damper is forced to open if the fan is in operation or forced to close if the fan is stopped.
	Open	The extract air damper is forced to open if the fire protection function is activated.
	Closed	The extract air damper is forced to close if the fire protection function is activated.
Setpoint of plate recuperator sequence	The bypass remains open (parameter not adjustable)	The plate recuperator is bypassed when the fire protection function is activated.

XI.2. Fire Alarm (N°58)

The fire alarm is factory set in Class C (=warning), with a delay of 1s and without action.

XII. COMMISSIONING PROCEDURE

The commissioning procedure can follow the following sequence of steps:

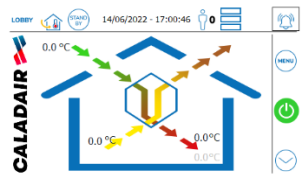
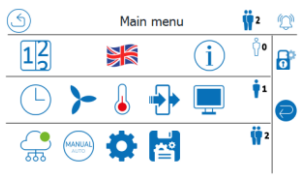
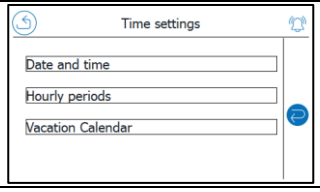
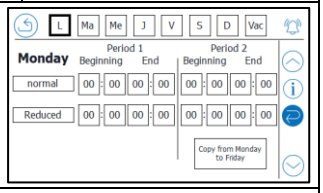
Step	Icon PG 5.0	Description	Additional Information
1		Installation and wiring of options (if present)	
1.1		Hot / cold 3-way valves	See Maintenance and installation manual of the unit
1.2		Hot / cold circulators	See Maintenance and installation manual of the unit
1.3		Changeover thermostat	See Maintenance and installation manual of the unit
1.4		Remote orders (smoke detection devices, fire detection devices, remote reduced run order, remote normal run order, remote stop order, fire protection)	See Maintenance and installation manual of the unit
1.5		Run indicator output signals (night overventilation LOBBY, alarm)	See Maintenance and installation manual of the unit
1.6		Remote touch control EDT2	See Installation and using manual of EDT2 XXXV.6 Navigation and access to menus
2		Date and time settings	XXXV.6 Navigation and access to menus
3		Automatic daylight saving setting	XXXV.6 Navigation and access to menus
4		Time schedule settings	XXXV.6 Navigation and access to menus
5		Fans setpoints setting	XXXV.6 Navigation and access to menus XIX FANS CONTROL MODES
6		Temperature setpoints setting	XXXV.6 Navigation and access to menus XVIII TEMPERATURE CONTROL MODES

7		Communication ports wiring and setting	XXXV.6 Navigation and access to menus XVI BMS COMMUNICATION
8		Specific functions setting	XXXV.6 Navigation and access to menus
8.1		Night overventilation function	IX NIGHT OVERVENTILATION FUNCTION (Night Cooling)
8.2		Fire protection function	XI FIRE PROTECTION FUNCTION
8.3		Frost prevention function by reducing supply airflow rate	X FROST PREVENTION FUNCTION BY SUPPLY AIRFLOW REDUCTION
9	MANUAL AUTO	Checking the correct operation and PIDs adjustment	XXXV.6 Navigation and access to menus 0 HELP FOR SETTING THE P.I.D. PARAMETERS
10		Backup of users settings*	XXXV.6 Navigation and access to menus

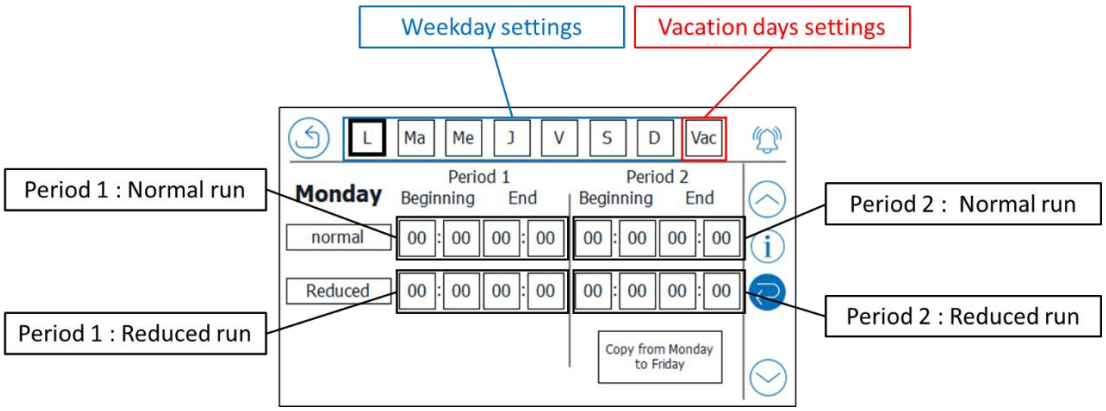
*Using the backup function at the end of the commissioning will save all the adjusted parameters and will allow to restore a useful setup in any time.

XIII. SETTING THE TIME SLOTS

XIII.1. General information

	Access path to the function (Level access: Service)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to clic on	MENU				Hourly periods			

The setting of the time slots is to be adapted according to the type of occupation of the area supplied by the ventilation unit, and whether the ventilation unit must maintain thermal comfort.
The setting of the time slots consists in associating 2 adjustable ventilation levels (reduced run / normal run) with 2 adjustable time slots (period 1 / period 2), this for all days of week, and for the day that is assigned to the “vacation days”.



For each time slot, it is necessary to adjust the starting time and the ending time.

Time slot setting principle:
00:00 – 00:00 means that the time slot is not active
00:00 – 24:00 means that the time slot is permanently active
07:00 – 19:00 means that the time slot is active from 7:00 am to 7:00 pm

XIII.2. Time slots priorities and remote orders

When time slot overlap, the following information shall be considered:

- When a reduced run slot and a normal run slot overlap, the normal run has priority over the reduced run
- When there is no active run (when neither the reduced run nor the normal run is enabled), the ventilation unit is in standby
- If the ventilation unit is in standby by absence of reduced/normal run time slot, it can start in the night overventilation time slot (00:00 - 00:07am) if the night overventilation function is allowed to operate
- The night overventilation function can only work if the ventilation unit is:
  - Running in reduced run
  - In standby (no active time slot).

Remote orders have priority over the time slot setting. If the ventilation unit:

- Is running in normal run (by time slot) and the remote reduced run order is activated, the ventilation unit will operate in reduced run
- Is running in reduced run (by time slot) and the remote normal run order is activated, the ventilation unit will operate in normal run
- Is in standby (no active time slot) and a remote reduced/normal run order is activated, the ventilation unit will operate in reduced/normal run the whole time the remote order in reduced/normal run is active.

The night overventilation function will only be started if:

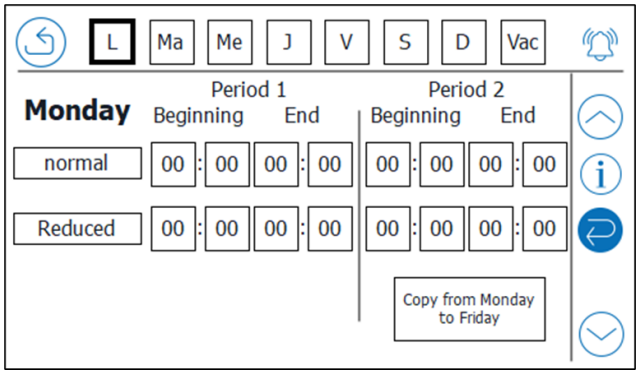
- The time slot that overlaps the night overventilation time slot is the reduced run
- Or the ventilation unit is in standby (no active time slot)
- And there is not remote run order.

To prevent any risks of internal deterioration of the ventilation unit and clogging of the pressure tapping tubes by condensation, it is casually not recommended to have standstill slots, especially if:

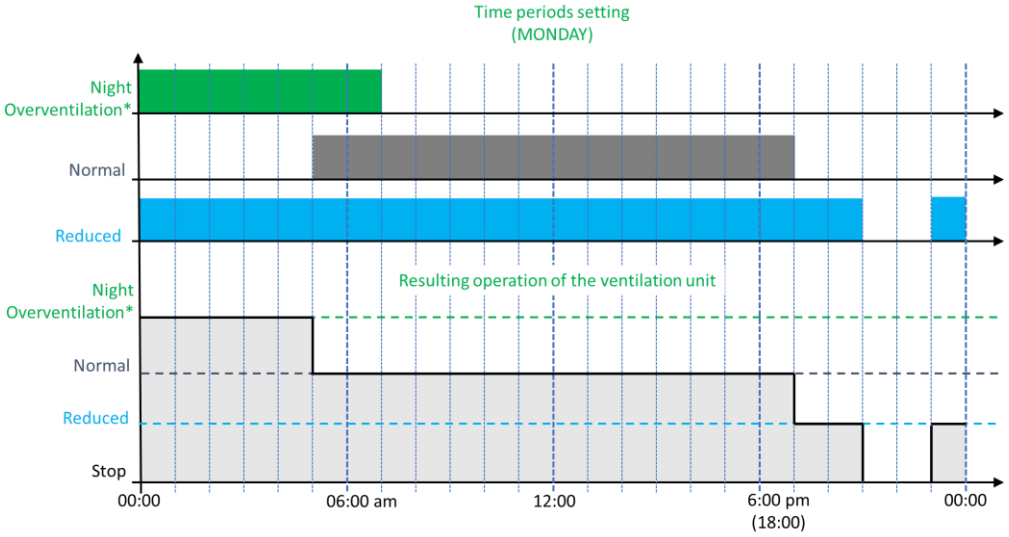
- These shutdown phases are short and repeated
- Extract air is moist
- The ventilation unit is installed outside, in a cold region, and without isolation dampers.

For these reasons, it is recommended to have at least the reduced slot permanently (recommended setting 00:00 – 24:00).

The screen below sums up the operating logic for the following time slots settings:



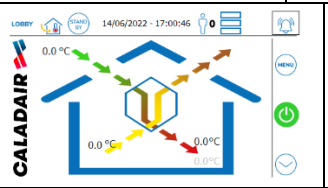
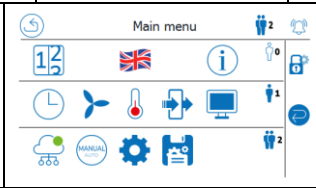
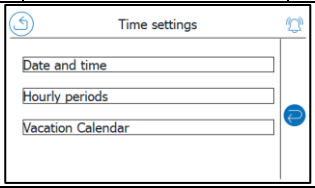
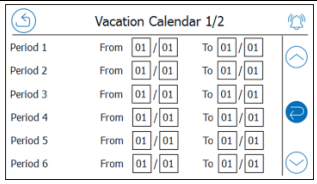
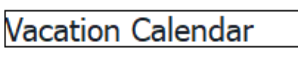
Resulting operation of the ventilation unit:



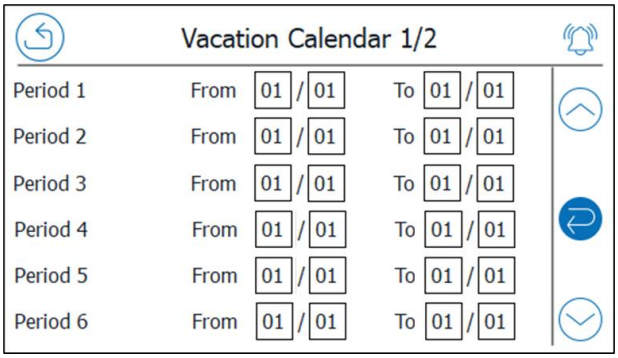
*The night overventilation will only work if the activation conditions are met.
If different settings are required for the other days of the week, set the time slots of the corresponding weekdays accordingly.

XIII.3. Vacation calendar

Access path to the function (Level access: Service)

	Step 1	→	Step 2	→	Step 3	→	Step 4
From Screen							
Area to clic on							

The vacation calendar gives the possibility to declare particular daily operation time slots (other than weekdays), usually corresponding to absence periods (holidays) of the building in order to decrease energy consumption and operating costs of the ventilation unit.



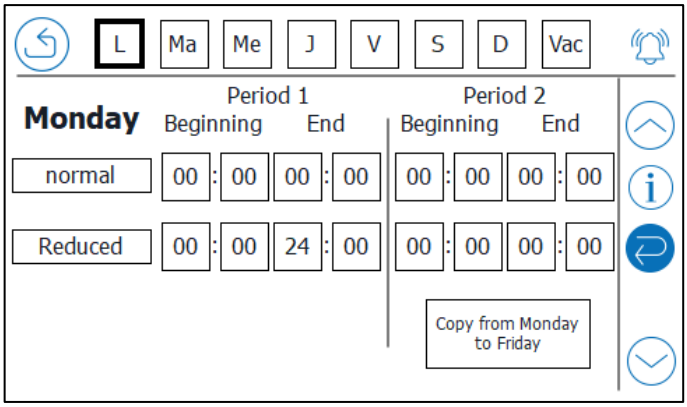
By default, the first day of the year is a day that is part of the vacation calendar.
It is necessary to set the “vacation day” time slots in advance.

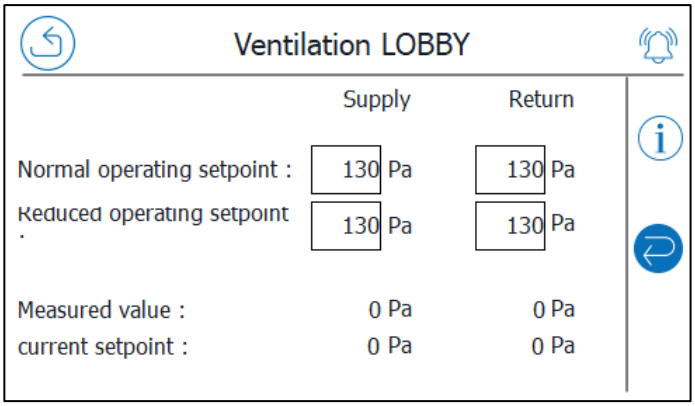
Each vacation slot is defined by a starting day/month and an ending day/month. Up to 12 different slots can be set.
The “Vacation” slot can therefore extend over several days, weeks, even months if needed.

XIII.4. Recommendations for setting the timer of LOBBY versions

When the ventilation unit is running at constant pressure (LOBBY), the air distribution network usually imposes only one single operating pressure. Therefore, a single supply and extract pressure settings is sufficient, and it is not necessary to activate any normal run time slot and only the reduced run can be used. This allows the night overventilation to be functional if it is used.
However, if the normal run time slot is required, it should be not overlapped with the night overventilation time slot (00:00 – 07:00), so that the night overventilation function does not become inoperative.

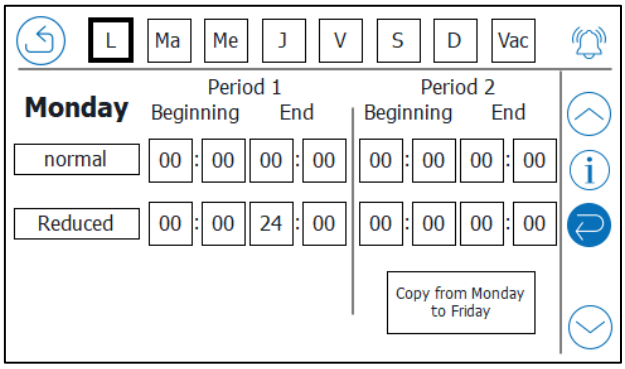
Below is an example of time slots (left) and ventilation (right) settings for optimal operation of a LOBBY control:





XIII.5. Recommendations for setting the timer of DIVA and QUATTRO versions

The time slot associated with normal run does not allow the fan speed (DIVA) or air flow rate (QUATTRO) to be regulated according to the CO2 level.
For the CO2 control to work properly, the desired time slot must be associated with reduced run only. The reduced run must therefore always be programmed during the occupied time slot of the zone, and during the remaining time to ensure a minimum air exchange, which results in the following setting:



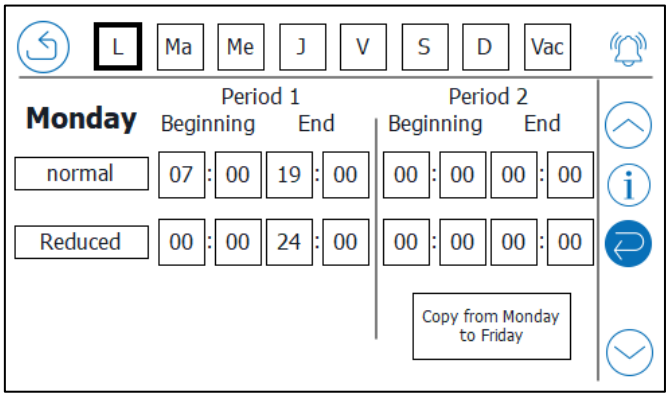
The use of a normal operation time slot allows the fans to be forced to the normal operation setpoint without CO2 management. This can be useful, for example, when you want to purify the room between two occupancy periods.

XIII.6. Recommendations for setting the timer of ECO and MAC2 versions

In ECO or MAC2 version, it is necessary to distinguish:

- The occupancy time slot of the building (or zone) to which the normal run will be associated
- The unoccupied time slot (absence) to which the reduced mode will be associated.

The example below corresponds to an occupation of the zone served by the ventilation unit between 7:00 and 19:00. During this time the ventilation unit operates in normal run to ensure the required comfort and air quality. The remaining time, the ventilation unit operates in reduced mode to limit energy consumption. If the conditions for activating the night overventilation function are met, it will be operational during the set time slot (00:00 - 7:00 ex works).



XIV. MAINTENANCE AND TROUBLESHOOTING

XIV.1. General information

The causes that lead to malfunctions are either:

- Outside the unit:
  - Particular air distribution network, presence of controlled dampers, etc.
  - BMS and remote orders that sends wrong instructions
- Inside the unit:
  - Sensors, probes, actuators, wiring, etc.

In most cases, the trouble will be detected by the controller and alarm(s) will appear. This does not necessarily mean that the cause(s) comes from the machine itself and prior checks must be carried out before carrying out the diagnosis.

XIV.2. Checks prior to any diagnosis

Prior to carry out any diagnosis, the technician must:

- Check out the air distribution network and the compatibility with the unit and its version, especially:
  - Sizing: does the nominal operating point of the system (unit + air distribution network) allow a correct operation? Examples: MAC2/QUATTRO: piping diameter too small; LOBBY: piping network too short, etc.
  - Compatibility of fan control type (speed, pressure, flow): is the type of fan control compatible with the air distribution network type?
  - Do the control devices (zone dampers) installed on the network have a dynamic and minimum/maximum opening positions adapted to the unit?
- Check for presence of active alarms (active alarms menu) which indicate that a problem is currently present and point to possible causes
- Check the alarms history (alarms history menu) which shows the last 100 recorded alarms. Apparition time and date are important because they allow to check if the problems occur regularly (for example every day at the same time) or if they occur at particular time that could correspond to the setting of the time schedule (wrong setting of reduced run, normal run, night overventilation, etc.)
- Check the power supply of the controller (24Vac) or the lighting of the green P/B LED on the front of the controller
- Check that they are no remote order (remote reduced run order, remote normal run order, remote stop order, etc.): check out the status of DI digital inputs and the corresponding wiring.
- Check that they are no remote setpoints from BMS (RS485 P1 port or TCP-IP port):
  - Check the physical presence of the wiring on the corresponding ports and disconnect if necessary
  - The flashing of P1RxTx or TCP/IP green LED on the controller front panel indicates the presence of communication between the unit and the external device (BMS). The communication takes priority over remote orders and internal setpoints (time schedule, etc.).
  - The forcing of the operating mode by the BMS is visible from the “BMS request” on main page 3 (see XXXV.5.c Main page 3)
- Check the absence of functions in manual mode
- Check the settings of the unit:
  - Time schedule (reduced run, normal run, night overventilation, etc.)
  - Fans setpoints
  - Temperature setpoints
- Check the status of filters
- Check the tightness of terminals and connectors

XIV.3. Simplified diagnosis

In the first approach, it is necessary to distinguish between a blocking trouble (the unit is stopped and doesn’t work) than a non-blocking trouble (e.g., the unit works but stops/starts sporadically).

A blocking fault is characterised by the permanent presence of an active Class A alarm with “normal stop” action. For this kind of alarm (e.g. overheating of the safety thermostat of the electric heater), the unit cannot be restarted until the cause has disappeared and the alarm has been acknowledged. It will also be necessary to physically reset the safety thermostat directly on itself.

A non-blocking fault is characterised by the absence of an alarm (external trouble to the unit), or by the presence of a Class C Alarm (warning).

The table of alarms and faults (see XV.10 Table of alarms) summarises all possible alarms and errors, and for each, the causes and remedies that allow to orientate the diagnosis and the checks.

XIV.4. Advanced diagnosis

When the previous points have been checked and the trouble is still present, a more accurate diagnosis is needed. For this, it is necessary to know the control loops and the input required for each of them.

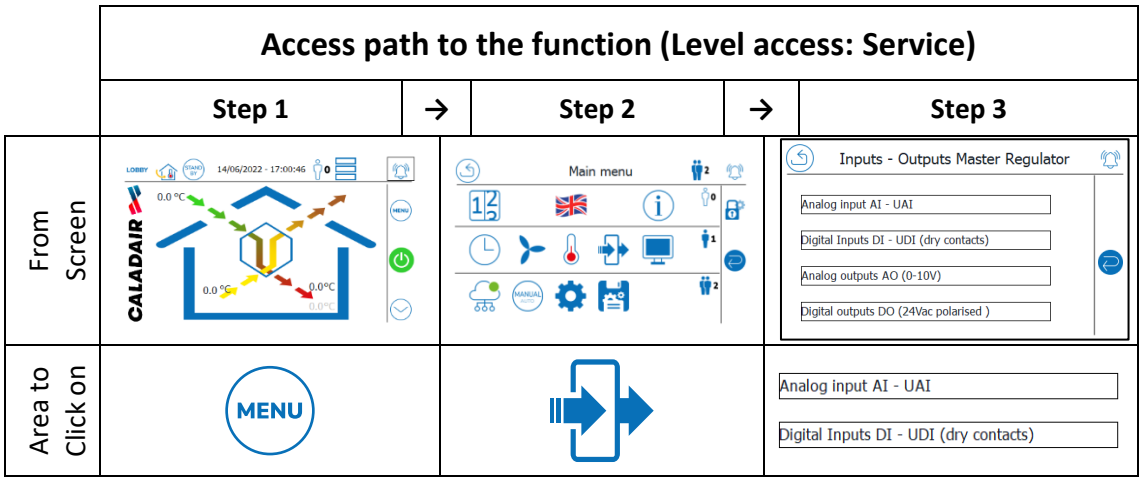
XIV.4.a. *Checking an active BMS*

The setpoints from the BMS have priority over all other internal/external setpoints.

The automatic overwriting of a setpoint that has just been modified via the PG 5.0 touch screen by another value is a sign that a communication port is working, and an external device (BMS) is writing data into the controller.

The flashing of green LEDs (see II PHYSICAL PRESENTATION OF THE CLD-283 CONTROLLER) and the physical electrical connection of communication ports (RS485 P1 port or TCP-IP port) makes it possible to know if a communication is functional and working.

XIV.4.b. *Checking input signals*



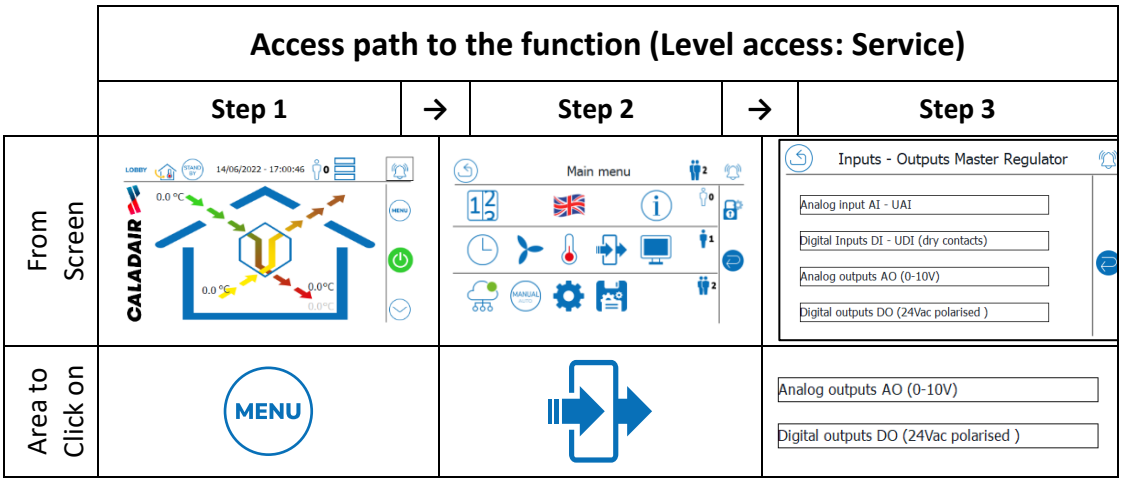
The check of measured values and the status of inputs (AI Analog Inputs, DI Digital Inputs) is a quick check before any diagnosis. The status of signal inputs determines the status of signal outputs and therefore the operation of the unit.

The following table shows the main checks to be carried out on the various controller inputs:

DIGITAL INPUTS	EXPLANATION
Status of remote orders (reduced run, normal run, stop)	The remote orders from DI Digital Inputs have priority over setpoints that have been configured. For example, if the time schedule calls for operation in normal run and the reduced run Digital Input is active, the unit will operate in reduced run.
Inputs settings	If a DI Digital Input that is configured in factory as NO (Normally Open) and it is passed to NC (Normally Closed) and nothing has been linked to the corresponding DI Digital Input, this will lead to a malfunction of the unit.
Wiring	A wrong wiring can lead to an undesired operation. For example, if a dry contact switch is wired to DI5 instead of DI4, the unit will stop instead of operating in normal run.

ANALOG INPUTS	EXPLANATIONS
Signal stability	Signal instability can be caused by a problem in the measuring line, such as poor electrical contact (probe, sensor, connectors, terminal, wiring, etc.) but also by an external problem to the unit (turbulence created by an elbow, etc.).
Signal plausibility	Does the measured value seem correct? (For example, if the outdoor air temperature sensor gives a value of +25°C whereas we know that the temperature is closed to -5°C, we can easily say that there is a problem). In general, it is necessary to have a second measuring device (temperature sensor, pressure sensor, etc.) which is independent of the unit in order to check this type of cause.
Signal coherence	Here we will check if all the measured values are consistent with each other to ensure that there is not reversal between 2 or more sensors (e.g., reversal of 2 temperature sensors).

XIV.4.c. *Checking output signals*



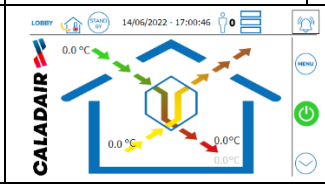
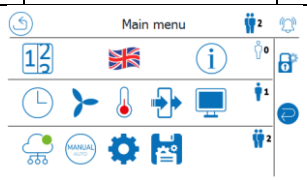
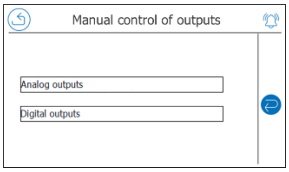
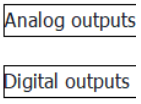
The checking of output signals makes it possible to know the status of each controller output (DO Digital Output or AO Analog Output) which controls the actuators (e.g., Fans, recuperator, 3-way valves, coils, etc.) or the transmission of information (e.g. status of night overventilation, alarm status etc.) which can be used by the user of the unit.

The checking of outputs is a quick and easy way to check that the signals on controller outputs sent to the actuators are consistent. E.g., if the controller sends a speed setpoint of 7V to the supply air fan and the fan doesn't operate, it is easy to imagine that the problem is either with the fan itself, or between the controller and the fan (wiring, wires, fan power supply, etc.).

The checking of outputs must be carried out while the unit is running. Unfortunately, in some cases, it is possible that the trouble will not allow the checking of some outputs because the unit is stopped (faulted), and all outputs will be zero. This is particularly the case when a Class A alarm with "stop" action is active.

In other cases, some outputs are only active or take on certain values only when certain conditions are met (e.g. night overventilation output) or when certain input signals reach certain values. It is therefore difficult to check out these outputs. The manual control function of outputs can therefore be very useful for diagnosis.

XIV.4.d. *Manual control of controller outputs*

Access path to the function (Level access: Expert)				
	Step 1	→	Step 2	→ Step 3
From Screen				
Area to Click on				

The controller has a manual control function that allows to control the actuators and customer devices outputs in an individual way, continuously, independently of control and safety loops. This makes it possible to check in particular:

- The status and the good operation of analog/digital outputs of the controller
- The status and the good operation of actuators (e.g. fans, motorised dampers, 3-way valves, etc.)
- The right operation of an external device wired by the technician (e.g. alarm report signal)
- The right operation of a functioning run indicator device (e.g. air pressure switch).

The other interest of the manual control function of the outputs is to be able to check the operation of certain sensors. By acting directly on fan, it allows the airflow circulation to act on the air pressure switch which makes it possible to check the operation of this device.

The manual control function of the outputs can also be used during the setup phase because it allows to manage with accuracy the operating point of certain actuators (fans, etc.) thus makes it possible to take measures (voltage, current, pressure, temperature, etc.) or to check the operation of external devices (isolation dampers, alarm report signal, night overventilation output signal, etc.).

The manual control of the outputs is a function that can only be accessed when the unit is stopped (OFF) in order to avoid any wrong operation that could endanger the operator and the unit. The unit cannot be restarted if any of the outputs are in manual state. All outputs must be in automatic mode in order to restart the unit.

Notes :

- Manual control of the rotary recuperator: it is necessary to activate the DO Digital Output “rotary recuperator” in order to send the run command (power supply) to the recuperator
- Manual control of the fans: in addition, this function makes it possible to check the correct operation of the airflow control pressure switches (ECO/DIVA), air pressure transmitters (LOBBY), and airflow meters (MAC2/QUATTRO).

XV. ALARMS

XV.1. General information

The operation and the management of the alarms are defined by several parameters:

- The class: A, B or C
- The type of action
- The delay and the time unit
- The threshold (for some parameters).

An alarm can have different states:

- Active
- Cancelled
- Acknowledged

When an alarm is in active state, it is visible in the “active alarms” menu and it is immediately recorded in the alarm memory (“alarm history” menu).

XV.2. Alarm class

The alarm class defines how the alarm must be acknowledged.

CLASS	DESCRIPTION
A	The cause has disappeared, and the alarm must be manually acknowledged. It is not possible to acknowledge the alarm until the cause has disappeared. It is the manual acknowledgment that finally gives the permission to restart.
B	Class A and class B are identical. The interest is to make a distinction of action for the same type of manual acknowledgement.
C	The alarm is automatically acknowledged when the cause disappears. The class C alarm is used as warning. According to the setting, the unit can be stopped when a class C alarm occurs.

XV.3. Alarm action

The alarm action defines the behaviour of the unit when the corresponding alarm occurs. They are several possible actions:

ACTION	DESCRIPTION
Disabled	When the alarm occurs, the unit continues to operate as if nothing had happened. This action is used for malfunction that are not important for the safety of the unit (e.g. pressure deviation, filter fouling). This type of action is similar to a warning.
Quick stop	The post-ventilation sequence is not considered, all controller outputs are immediately deactivated when the alarm occurs.
Normal stop	The post-ventilation sequence is considered. This sequence is defined by the stop delay of the fans and isolation dampers.
Reduced run	The alarm forces the selected run level.
Normal run	

XV.4. Delay and time unit of alarm

The delay specifies how long the cause must be present to activate the alarm. It is a delay in onset.
This condition is available for all alarms.
There is no delay for the disappearance of the cause. When it disappears, the alarm is instantly cancelled.

XV.5. Alarm threshold

For some alarms, in addition of the delay of appearance, a threshold condition can be set.
When the criterion has exceeded the threshold during the delay, the alarm changes to “active” state.

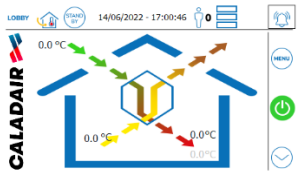
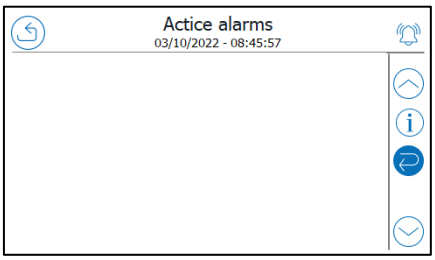
The threshold is available for alarms whose the cause depends on analog value: too high temperature, too low pressure or airflow, etc.

XV.6. Alarm status

When an alarm is present, it can take several states depending on the current state of the cause:

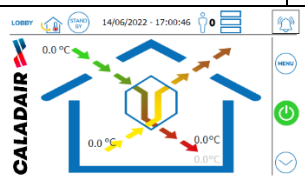
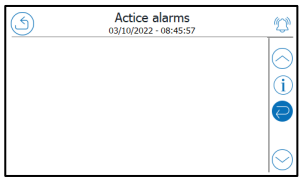
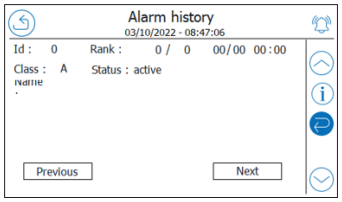
ALARM STATUS	DESCRIPTION
Active	The cause is currently present.
Cancelled	The cause has disappeared, and the alarm can be manually acknowledged (if Class A or B).
Acknowledged	The alarm was manually acknowledged.

XV.7. Active alarms

	Access path to the function (Level access: Guest)		
	Step 1	→	Step 2
From Screen	 Accessible from any screens		
Area to Click on			

« Active Alarms » menu allows to visualize alarms that are currently active.
An active alarm is an alarm whose activation condition is currently present, but the cause has potentially disappeared.

XV.8. Alarm history

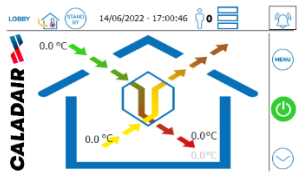
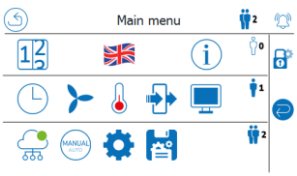
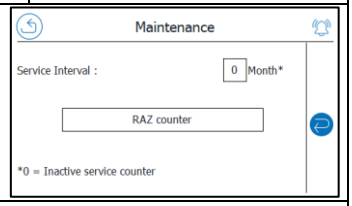
	Chemin d'accès à la fonction (Niveau d'accès : Guest)		
	Step 1 →	Step 2 →	Step 3
From Screen	 Accessible depuis tous les écrans		
Area to Click on			

The "alarm history" menu monitors up to 100 alarm events recorded according to the FIFO (first in first out) principle. The 101st event (the most recent) overrides the oldest event.

The reset of the alarm buffer is not possible: the recorded alarms cannot be erased.
The year of appearance is not memorized, only the months and days are indicated.

For each alarm, the history alarm records the date and time of appearance (active status), disappearance (cancelled status), and manual acknowledgment (if class A) which make easier the diagnosis and troubleshooting.

XV.9. Maintenance alarm (filters)

	Access path to the function (Level access: Guest)		
	Step 1 →	Step 2 →	Step 3
From Screen			
Area to Click on			

The "maintenance alarm" allows to indicate by an alarm that the set service interval has expired and a need for preventive maintenance (filters fouling check) is necessary. This alarm can be used for purposes other than filters check.

One month corresponds to 30 days, the countdown is operational as soon as the unit is powered.
When the unit is not powered, the controller does not work, the countdown is not carried out.

<u>Example:</u>
If the service interval is set to 12 months, the alarm will be activated after 12 months X 30 days/month = 360 days.
Il the power supply has been cut off during a cumulated time of 3 days, the alarm will be activated after 363 days.
It is not possible to know the remaining time or to set an anniversary date.
This function is to be set during commissioning by setting an interval other than 0.

XV.10. Table of alarms

Id	Description	Class	Delay	Action	Value/Threshold	Details/Explanations	Possible causes
1	Supply Air fan (SAF) Alarm	A	30s	Normal stop*	ECO/DIVA: 25Pa (pressure switch setting) LOBBY: 25Pa (control setting) MAC2/QUATTRO: control settings which depends on unit model/size (see table below)	ECO/DIVA: the run indicator signal (pressure switch (DEPS)) of the fan did not arrive within the specified time (30s), the unit is stopped and needs for a manual acknowledgment to restart. The pressure switch is a NO (Normally Open) type, it closes when the differential pressure exceeds 25Pa (factory set). LOBBY: The air pressure signal sent by the air pressure sensor (TRPS) has not exceeded the minimum threshold (25Pa) in the specified time (30s). The threshold is set to 25Pa in the controller. MAC2/QUATTRO: The airflow signal sent by the air pressure (TRPS) sensor has not exceed the minimum threshold in the specified time (30s). The minimum threshold depends on each unit model/size (see table below).	• Door/panel opened • Defective fan • Defective fan power supply • Defective speed control signal (controller output defective, wiring/connexion defective, etc.) • Presence of condensation in the pressure tapping hoses • Pressure tapping hoses inverted, poorly connected or clogged • Fresh air isolation register remains closed • Air distribution network: fire damper closed, air duct obstructed, external body. <u>ECO / DIVA only:</u> • Pressure switch defective • Pressure switch not set • Wiring/connexion defective between pressure switch and controller • Too low speed setpoint for network pressure drop <u>LOBBY only:</u> • Defective pressure sensor • Defective wiring/connexion between pressure sensor and controller • Too small air network pressure drops <u>MAC2 / QUATTRO only:</u> • Defective pressure (airflow) sensor • Defective wiring/connexion between airflow sensor and controller • Too high air distribution network pressure drops • Dirty filters or filters not suitable

Id	Description	Class	Delay	Action	Value/Threshold	Details/Explanations	Possible causes
6	Extract Air Fan (EAF) Alarm	A	120s	Normal stop*	see Id=1 Supply Air Fan (SAF) Alarm	see Id=1 Supply Air Fan (SAF) Alarm	see Id=1 Supply Air Fan (SAF) Alarm
44	Recuperator rotation alarm	C	600s			The run indicator signal from the rotary recuperator control unit was not received in the specified time. The unit continues to operate without energy recovery.	The wheel is blocked or has a mechanical rotation fault. The belt is broken or slipping. The drive motor has a malfunction. The K2 Relay or the power supply of the recuperator control unit is defective.
53	Filters (supply and extract) alarm	C	600s			The filters pressure drop has exceeded the setting value (300Pa for M5+F7 filters, 200Pa for F7 filters, 150Pa for M5 filters) of corresponding filter pressure switch.	Dirty filter. Filter not suitable (third-party supply not corresponding to manufacturer requirements). Inadequate filtration class. The airflow within the unit is obstructed by an external element.
54	Extract filter alarm	C	600s			See Id=53 Filters (supply and extract) alarm	See Id=53 Filters (supply and extract) alarm
56	Frost alarm (THA)	C	120s	Quick stop**		The frost prevention thermostat (THA) detected a temperature of the hot water heating coil below its setting (factory set +5°C). When the alarm is activated, the unit immediately stops without post-ventilation sequence and the output of hot water coil is forced to 100% (10V). See XXIII.2 Frost prevention.	The hot water coil circulating pump does not work (no water flow). The 3-Way valve remains closed. The hot water producer does not work or supplies a water that is too cold. The setting of the frost prevention thermostat THA has been changed (factory setting=+5°C) The frost prevention thermostat is defective. The wiring between the frost prevention thermostat THA and the controller is defective.

Id	Description	Class	Delay	Action	Value/Threshold	Details/Explanations	Possible causes
58	Fire alarm	C	1s			The behaviour of the unit depends on the setting of the fire function made by the operator. The fire function is disabled at the factory and has to be enabled at commissioning. The operation of the unit, fans, isolation dampers, and bypass depend on the configuration of the function.	"Fire protection" digital input is active (dry contact closed)
60	External stop	C	1s			The "External stop" digital input is active (dry contact closed). The unit is stopped as long as the contact is closed. This forcing has priority on time schedule.	
62	Service stop	C	1s			The unit is passed to OFF from the on/off button of the screen touch PG 5.0 home page. This command has priority on the time schedule and BMS request.	
63	Electric heater overheating / electric preheater overheating	A	1s	Normal stop*		The safety thermostats (THS or THSD) have detected a temperature > 100°C. When the alarm is activated, the unit is stopped with a post-ventilation sequence in order to cool down the coil. The safety thermostats (THS r THSD) are NC (Normally Closed) type. It is necessary to manually reset it and acknowledge the alarm in order to restart the unit.	Lack/loss of supply airflow while the electric heater was active (sudden supply air fan failure, power supply failure, etc.). Defective Solid State Relay: a defective SSR can become passing which generates a permanent power supply to the electric (pre)heater.
78	Internal cell error	C	120s	Normal stop*		The state of charge of the cell has reached the minimum threshold to save the controller configuration in the event of a power supply failure.	The cell is defective and/or the controller is too old. The cell (CR2032) must be replaced as soon as possible in order to avoid losing the controller configuration in the event of power supply failure.

Id	Description	Class	Delay	Action	Value/Threshold	Details/Explanations	Possible causes
79	Maintenance alarm	C	1			The set maintenance interval is exceeded, preventive maintenance action is necessary. The unit continues to operate normally.	Setting the maintenance interval = 0 (factory setting) allows to deactivate the maintenance alarm. See the description of this function.
82	SAF Supply Air Fan deviation alarm	C	30 min		LOBBY: 50Pa MAC2/QUATTRO: depends on the unit size (see table below)	The measured air pressure or flow rate exceeded the threshold during the specified time (30 minutes). The threshold is equal to the actual setpoint +/- threshold value. LOBBY: (e.g., actual setpoint = 120Pa) 70Pa < Air pressure < 170Pa MAC2/QUATTRO: (e.g., actual setpoint = 1000 m3/h) 700m3/h < airflow < 1300m3/h	See alarm Id=1 Supply Air fan (SAF) Alarm
83	EAF Extract Air Fan deviation alarm	C	30 min		LOBBY: 50Pa MAC2/QUATTRO: depends on the unit size (see table below)	The measured air pressure or flow rate exceeded the threshold during the specified time (30 minutes). The threshold is equal to the actual setpoint +/- threshold value. LOBBY: (e.g., actual setpoint = 120Pa) 70Pa < Air pressure < 170Pa MAC2/QUATTRO: (e.g., actual setpoint = 1000 m3/h) 700m3/h < airflow < 1300m3/h	See alarm Id=6 Extract Air Fan (EAF) Alarm
86	Supply air temperature too high	A	5s	Normal stop*	55°C	The supply airflow has become too small regarding the instantaneous electric heater power output. The unit stops when the alarm appears. To restart, the air supply temperature must drop below 55°C and the alarm must be manually acknowledged.	SAF Supply Air Fan defective. Isolation damper or network dampers (partially) closed. The Solid State Relay of electric heater control is defective.

Id	Description	Class	Delay	Action	Value/Threshold	Details/Explanations	Possible causes
113	Operation in manual mode	C	1s			This alarm does not stop the unit but it is necessary to stop the unit in order to switch the outputs in manual mode. All the outputs must be in auto mode in order to make the restart of the unit possible.	
115	SAF Supply Air Fan in manual mode	C	1s				The corresponding actuator is in manual control mode.
116	EAF Extract Air Fan in manual mode	C	1s				
117	Heating coil in manual mode	C	1s				
118	Recuperator in manual mode	C	1s				
119	Cooling coil in manual mode	C	1s				
125	Fresh air isolation damper in manual mode	C	1s				
126	Extract air isolation damper in manual mode	C	1s				
138	Output(s) in manual mode	C	1s				At least one output is in manual mode. This alarm comes in conjunction with alarms 113/115/116/117/118/119/125/126/140. Also indicates that heating and cooling outputs have switched to manual mode.
140	Fresh air electric preheater in manual mode	C	1s				The fresh air electric preheater is in manual control mode.

Id	Description	Class	Delay	Action	Value/Threshold	Details/Explanations	Possible causes
145	Outdoor air temperature sensor error	A	5s	Normal stop*			Temperature sensor and/or wiring is defective (open circuit or short-circuit)
146	Supply air temperature sensor error	A	5s	Normal stop*			
147	Exhaust air temperature sensor error (bypass)	A	5s	Normal stop*		Plate recuperator units only	
148	Extract air temperature sensor error	A	5s	Normal stop*			
165	Supply air pressure sensor error	A	5s	Normal stop*		LOBBY only	Defective/absent sensor and/or defective wiring (open circuit or short-circuit)
166	Extract air pressure sensor error	A	5s	Normal stop*		LOBBY only	Defective/absent sensor and/or defective wiring (open circuit or short-circuit)
167	Supply airflow sensor error	A	5s	Normal stop*		MAC2 and QUATTRO only	Defective/absent sensor and/or defective wiring (open circuit or short-circuit)
168	Extract airflow sensor error	A	5s	Normal stop*		MAC2 and QUATTRO only	Defective/absent sensor and/or defective wiring (open circuit or short-circuit)
175	CO2 sensor error	A	5s	Normal stop*		DIVA and QUATTRO only	Defective/absent sensor and/or defective wiring (open circuit or short-circuit)
179	Fresh air electric preheater temperature sensor error	A	5s	Normal stop*		Plate recuperator units only	Temperature sensor and/or wiring defective/absent. (Open circuit or short-circuit) in the event that the unit is equipped with a fresh air electric preheater (INFINITE only). 1000 Ohms resistor defective/absent at the controller terminals in the event that the unit is not equipped with a fresh air electric preheater (all versions except INFINITE).

192	Communication error with slave controller	C	120s				Wrong configuration on master or slave controller, defective wiring between M/S controller, defective M/S controller, EDT2 not connected to P2 port or the wiring is defective.
193	Fresh air electric preheater control loop error	C	5s				Wrong setting of the function
194	Controller internal error	A	5s	Normal stop*			Wrong internal configuration

*Normal stop = stop including post-ventilation

**Quick stop = no post-ventilation, all controller outputs are instantly deactivated when the fault occurs.

XV.11. Fans run indicator signals and fans deviation thresholds

UNIT (MAC2 or QUATTRO)	REDUCED RUN AIRFLOW	NORMAL RUN AIRFLOW	RUN INDICATOR SIGNAL THRESHOLD SUPPLY / EXTRACT AIR FANS	DEVIATION THRESHOLD SUPPLY / EXTRACT AIR FANS
CARMA 9010	400 m3/h	800 m3/h	300 m3/h	240 m3/h
CARMA 9016 / SILVERTOP 15	800 m3/h	1200 m3/h	300 m3/h	360 m3/h
CARMA 9023 / SILVERTOP 23	1000 m3/h	1800 m3/h	350 m3/h	540 m3/h
CARMA 9035 / SILVERTOP 35	1700 m3/h	3000 m3/h	610 m3/h	900 m3/h
CARMA 9048	2000 m3/h	3500 m3/h	770 m3/h	1050 m3/h
SILVERTOP 52	2750 m3/h	3900 m3/h	740 m3/h	1170 m3/h
CARMA 9070	3000 m3/h	5800 m3/h	1200 m3/h	1740 m3/h
NEOTIME 600	250 m3/h	500 m3/h	155 m3/h	150 m3/h
NEOTIME 900	350 m3/h	700 m3/h	225 m3/h	210 m3/h
NEOTIME 1300	550 m3/h	1100 m3/h	500 m3/h	330 m3/h
NEOTIME 1800	750 m3/h	1500 m3/h	550 m3/h	450 m3/h
NEOTIME 2500	1000 m3/h	2000 m3/h	650 m3/h	600 m3/h
FREETIME 1500/ HEXAMOTION 15	700 m3/h	1000 m3/h	300 m3/h	300 m3/h
FREETIME 2000/ HEXAMOTION 20	1000 m3/h	1400 m3/h	350 m3/h	420 m3/h
FREETIME 2500 / HEXAMOTION 27	1750 m3/h	2400 m3/h	580 m3/h	720 m3/h
FREETIME 3500 / HEXAMOTION 35	2000 m3/h	3000 m3/h	580 m3/h	900 m3/h
HEXAMOTION 45	2750 m3/h	3900 m3/h	740 m3/h	1170 m3/h
HEXAMOTION 60	3250 m3/h	4600 m3/h	770 m3/h	1380 m3/h
HEXAMOTION 80	4200 m3/h	6000 m3/h	1200 m3/h	1800 m3/h

XV.12. Details of frost prevention alarm

When the frost prevention alarm is active, this means that the bulb temperature of the frost prevention thermostat located on the hot water coil dropped below +5°C (factory set) and there is a risk of frost of the coil. The ventilation is immediately stopped (quick stop) without post-ventilation, and the hot water coil control output is forced to 100% (10V) in order to open the 3-way valve and rise the temperature as fast as possible.
When the bulb temperature exceeds +5°C, the unit automatically restarts and the position command signal of the 3-way valves get back the current value calculated by the controller (PID).

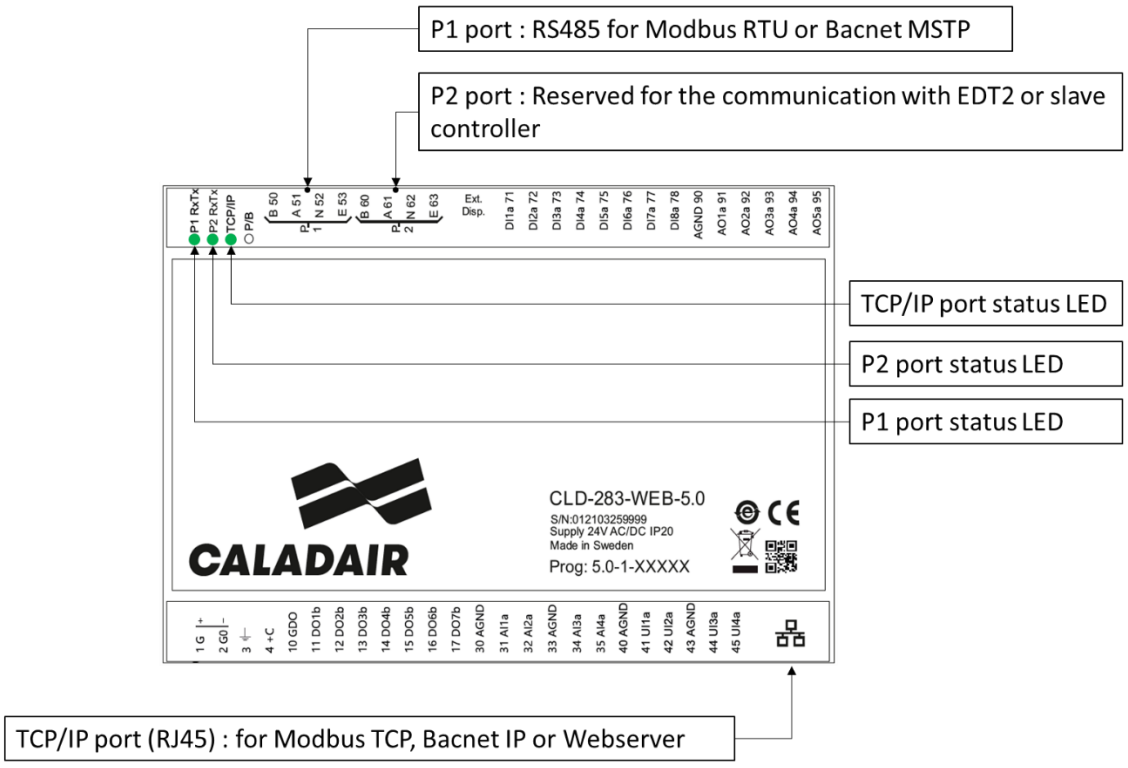
XVI. BMS COMMUNICATION

XVI.1. General information

The controller features 2 external communication ports:

- P1 Port: Modbus RTU RS485 (slave) or Bacnet MS/TP protocols
- TCP-IP Port: Modbus TCP or Bacnet IP protocols, or access to the Webserver.

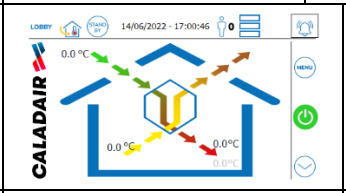
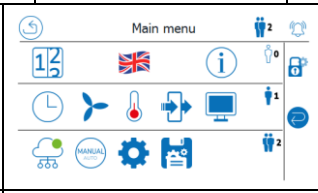
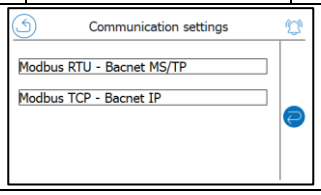
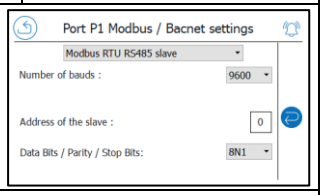
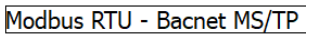
When there is an active communication on a port, the corresponding green LED is flashing:



When a network scan is performed to identify the controller, it appears under “CALADAIR AHU” name and “CLD-283-WEB-5.0” model.

Nom du régulateur	Modèle	Numéro de sér	PLA	ELA	Adresse IP	MAC	Description
CALADAIR AHU	CLD-283-WEB-5.0	012011170601	254	254	192.33.50.112	0030970429F6	

XVI.2. Modbus RTU RS485 communication

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

Supported functions by the Modbus RTU protocol implemented into the controller:

SUPPORTED FUNCTION	Coil Status Register	Input Status Register	Holding Register	Input Register
1 / Read Coils	✓			
2 / Read Discrete Input		✓		
3 / Read Holding Register			✓	
4 / Read Input Register				✓
5 / Write Single Coil	✓			
6 / Write Single Register			✓	
15 / Write Multiple Coils	✓			
16 / Write Multiple Registers			✓	

By default, the slave address of the controller is factory set to 1. The address can be set between 1 and 247. Each controller present on the Modbus network must have a different address from the others.

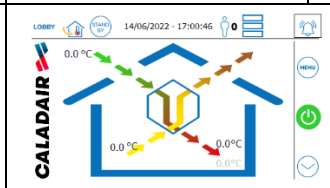
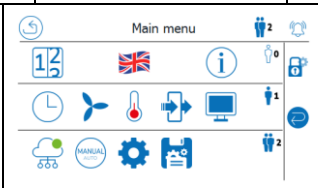
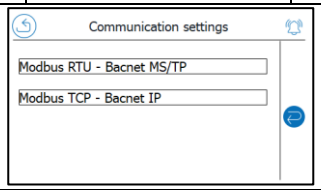
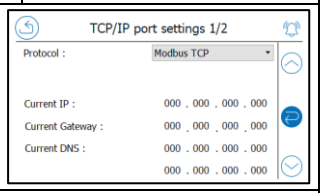
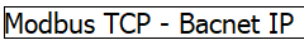
The controller uses the RTU transmission mode, not to be confused with the ASCII mode in the settings.
The settings for the transmission mode must be the same in the master unit and the slave units, since Modbus/RTU cannot understand Modbus/ASCII messages. The configuration parameter Word length is always 8 for Modbus/RTU.

A maximum of 47 registers can be read in one message.

The Modbus master must wait for a minimum of 3.5 character times (4 ms at 9600 bps) between two messages. When the Modbus master communicates with more than one controller on the same communication line (RS485), the Modbus master must wait for a minimum of 14 character times (16 ms at 9600 bps) between the answer and the first question for the next controller.

PARAMETER	POSSIBLE VALUES RANGE
Bauds rate	9600/14400/19200/28800/38400/57600/76800/115200
Address (slave)	1…247
Data bits	8
Parity	None/Even/Odds
Stop bits	1/2

XVI.3. Modbus TCP communication

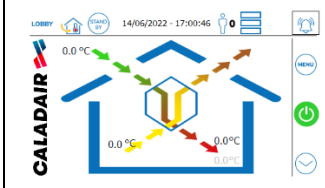
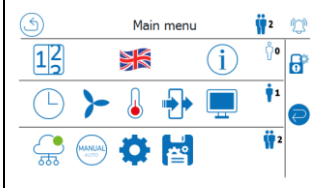
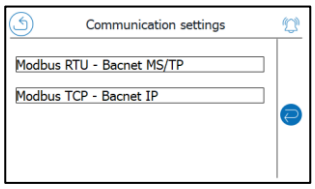
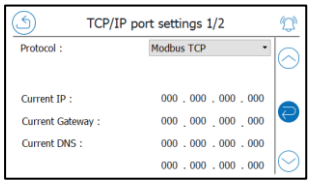
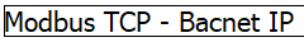
	Access path to the function (Level access: Expert)			
	Step 1 →	Step 2 →	Step 3 →	Step 4
From Screen				
Area to Click on				

Enabling Modbus TCP protocol requires the manual configuration of the following parameters in the event the DHCP is not enabled:

IP Address	192.033.050.112
Gateway	192.033.050.005
DNS	192.033.050.040
Subnet mask	255.255.255.000

In the event that DHCP is enabled (factory setting), the parameters above are automatically assigned by the network at the time of connexion of the TCP-IP port (see II PHYSICAL PRESENTATION OF THE CLD-283 CONTROLLER).

XVI.4. Communication Bacnet MS/TP et Bacnet IP

	Access path to the function (Level access: Expert)			
	Step 1 →	Step 2 →	Step 3 →	Step 4
From Screen				
Area to Click on				

Only one Bacnet communication at once is possible: if the IP bacnet and the MSTP Bacnet are enabled, Bacnet IP only will be functional because it has priority. To make functional Bacnet MSTP, IP Bacnet must be disabled.

In Bacnet, the list of exchange variables depends on unit configuration. For example, if the temperature control is “air supply constant temperature”, variables corresponding to air temperature compensation are not accessible.

The functions supported by the controller are the following:

SUPPORTED FUNCTION	TYPE*
Read and write binary value (BV)	10XXX
Read binary value (BV)	20XXX
Read and write analogue value (AV)	30XXX
Read analogue value (AV)	40XXX
Read and write multistate value (MSV)	30XXX
Read multistate value (MSV)	40XXX

*XXX = address of the variable in Modbus protocol.

	IP Bacnet	MSTP Bacnet (RS485)	DETAILS
Bauds rate		X	9600/14400/19200/28800/38400/57600/76800/115200 bauds
Device ID	X	X	Composed by 2 parts: low Device ID + high Device ID concatenated to make 1 complete Device ID: High Device ID (01234) + low Device ID (56789) = Device ID (0123456789)
Device Name	X	X	‘’Corrigo 5.0’’ Neither viewable nor configurable by the PG 5.0 touch screen. Use the embedded Webserver.
UDP port number	X		It is the dedicated communication port. Composed by 2 parts: low UDP and high UDP concatenated to make 1 complete UDP: high UDP (01234) + low UDP (56789) = UDP (0123456789)
BBMD	X	X	BACnet Broadcast Management Device address. This is used for internet communication between devices running BACnet. Neither viewable nor configurable by the PG 5.0 touch screen. Use the embedded Webserver
Max Master Device		X	The max master address is the MAC address of the highest master device on the BACnet MS/TP network segment. Setting this number above the highest MAC address will decrease network performance.
MAC Address		X	The MAC address of the device. This needs to be unique only to the subnet to which the device is attached.
DHCP	X		The Dynamic Host Configuration Protocol (DHCP) is a network protocol used on Internet Protocol (IP) networks for dynamic distribution of network configuration parameters, such as IP addresses, DNS servers and other services. (see XVI.5 IP configuration (DHCP)).

XVI.5. IP configuration (DHCP)

The Dynamic Host Configuration Protocol (DHCP) is a network protocol used on Internet Protocol (IP) networks for dynamic distribution of network configuration parameters, such as IP addresses, DNS servers and other services.

The controller can be configured to get the IP address in 2 ways:

- Either from a DHCP server (dynamic addressing)
- Or manually by filling the input data from the PG 5.0 screen touch (static addressing). These inputs have to be identified beforehand.

The IP configuration is needed for the 2 communication protocols:

- IP Bacnet
- TCP Modbus

By default, the controller is configured with enabled DHCP. The addressing is automatically done by the network:

IP	192.033.050.112
Gateway	192.033.050.005
DNS	192.033.050.040
Subnet mask	255.255.255.000

If the DHCP is disabled, the configuration has to be done manually.

XVI.6. Modbus and BACnet exchange tables

The Modbus addresses of the tables use the generic Modbus Standard. There is no offset to be expected, the first existing variable is addressed to 0 (and not 1).

Scale factor = 10 means that the value read has to be divided by 10 to be converted to the real value.
Example: the value read in the supply air temperature is 230 means that the real temperature is 230 / 10 = 23.0°C.

Acknowledgment of alarms through the communication is not possible. The acknowledgment must be done in physical presence of a person, on site, directly on the PG 5.0. touch screen after identifying and fixing the cause of the problem.

The instructions sent by the communication have priority over all other instructions (internal and external) except for the on/off control button of the PG 5.0. touh screen which has the absolute priority: if the local PG 5.0. touch screen is OFF, the unit cannot start even if the BMS requires it. Therefore, the PG 5.0. must be ON in order the BMS can work.

XVI.6.a. *Unit status*

	Unit	Read	Write	Modbus Scale factor	Modbus Function	Modbus Address	Modbus Variable type	BACnet Addresse	Details
Unit status		X		1	Input Register	428	short	MSV, 30789	**Modbus :** 0=stop / 1=startup / 2=low speed / 3=high speed / 7=CO2 manag. / 8=Free Cooling / 9=post-ventilation / 10=fire / 13=frost protection **BACnet :** 1=stop / 2=startup / 3=low speed / 4=high speed / 8=CO2 manag. / 9=Free Cooling / 10=post-ventilation / 11=fire / 14=frost protection
Outdoor temperature (fresh air)	°C	X		10	Input Register	291	short	AV, 40291	
Supply air temperature	°C	X		10	Input Register	292	short	AV, 40292	
Extract air temperature	°C	X		10	Input Register	294	short	AV, 40294	
Exhaust air temperature	°C	X		10	Input Register	293	short	AV, 40293	Only for plates recuperator
Preheated air temperature	°C	X		10	Input Register	325	short	AV, 40325	Only for plates recuperator
Supply air fan speed	%	X		1	Input Register	465	short	AV, 40375	Only for ECO and DIVA versions
Extract air fan speed	%	X		1	Input Register	466	short	AV, 40376	Only for ECO and DIVA versions
Supply air fan pressure	Pa	X		10	Input Register	311	short	AV, 40311	Only for LOBBY version
Extract air fan pressure	Pa	X		10	Input Register	312	short	AV, 40312	Only for LOBBY version
Supply air fan flow	m3/h	X		0.1	Input Register	313	short	AV, 40313	Only for MAC2 and QUATTRO versions
Extract air fan flow	m3/h	X		0.1	Input Register	314	short	AV, 40314	Only for MAC2 and QUATTRO versions
CO2 rate	ppm	X		1	Input Register	321	short	AV, 40321	Only for MAC2 and QUATTRO versions
Supply air fan total running time	hours	X		10	Input Register	434	short	AV, 40434	
Extract air fan total running time	hours	X		10	Input Register	435	short	AV, 40435	
Heating analog/digital output	%	X		10	Input Register	1014	short	AV, 40363	0%=0V 100%=10V / 0%=0% PWM 100%=100% PWM
Bypass / Rotat. recuperator analog output	%	X		10	Input Register	1015	short	AV, 40634	Rotating recuperator or plates recuperator bypass 0%=0V 100%=10V
Cooling analog output	%	X		10	Input Register	1016	short	AV, 40365	0%=0V 100%=10V
Supply air fan analog output	%	X		10	Input Register	375	short	AV, 40375	0%=0V 100%=10V
Extract air fan analog output	%	X		10	Input Register	376	short	AV, 40376	0%=0V 100%=10V

XVI.6.b. *Setpoints*

	Unit	Read	Write	Modbus Scale Factor	Modbus Factory Value	Modbus Register type	Modbus Address	Modbus Variable	BACnet Address	Details
Operating mode setpoint	-	X	X	1	0	Holding Register	796	short	MSV, 30796	**Modbus :** 0=not active 1=low speed 2=high speed 4=Unit stop **BACnet :** 1=not active 2=low speed 3=high speed 5=Unit stop
Supply air constant temperature setpoint	°C	X	X	10	180	Holding Register	811	short	AV, 30811	Only used for supply constant air temperature control
Extract air constant temperature setpoint	°C	X	X	10	180	Holding Register	812	short	AV, 30812	Only used for extract constant air temperature control
Outdoor air temperature 1	°C	X	X	10	-200	Holding Register	817	short	AV, 30817	Only used for air law temperature control
Outdoor air temperature 2	°C	X	X	10	-50	Holding Register	818	short	AV, 30818	Only used for air law temperature control
Outdoor air temperature 3	°C	X	X	10	100	Holding Register	819	short	AV, 30819	Only used for air law temperature control
Outdoor air temperature 4	°C	X	X	10	150	Holding Register	820	short	AV, 30820	Only used for air law temperature control
Outdoor air temperature 5	°C	X	X	10	200	Holding Register	821	short	AV, 30821	Only used for air law temperature control
Outdoor air temperature 6	°C	X	X	10	250	Holding Register	822	short	AV, 30822	Only used for air law temperature control
Outdoor air temperature 7	°C	X	X	10	350	Holding Register	823	short	AV, 30823	Only used for air law temperature control
Outdoor air temperature 8	°C	X	X	10	400	Holding Register	824	short	AV, 30824	Only used for air law temperature control
Air temperature setpoint 1	°C	X	X	10	250	Holding Register	825	short	AV, 30825	Only used for air law temperature control
Air temperature setpoint 2	°C	X	X	10	230	Holding Register	826	short	AV, 30826	Only used for air law temperature control
Air temperature setpoint 3	°C	X	X	10	200	Holding Register	827	short	AV, 30827	Only used for air law temperature control
Air temperature setpoint 4	°C	X	X	10	190	Holding Register	828	short	AV, 30828	Only used for air law temperature control
Air temperature setpoint 5	°C	X	X	10	180	Holding Register	829	short	AV, 30829	Only used for air law temperature control
Air temperature setpoint 6	°C	X	X	10	180	Holding Register	830	short	AV, 30830	Only used for air law temperature control
Air temperature setpoint 7	°C	X	X	10	230	Holding Register	831	short	AV, 30831	Only used for air law temperature control
Air temperature setpoint 8	°C	X	X	10	230	Holding Register	832	short	AV, 30832	Only used for air law temperature control
Supply air fan high speed setpoint (normal run)	%	X	X	10	70	Holding Register	848	short	AV, 30848	Only for ECO and DIVA versions
Supply air fan low speed setpoint (reduced run)	%	X	X	10	40	Holding Register	847	short	AV, 30847	Only for ECO and DIVA versions
Extract air fan high speed setpoint (normal run)	%	X	X	10	70	Holding Register	851	short	AV, 30851	Only for ECO and DIVA versions
Extract air fan low speed setpoint (reduced run)	%	X	X	10	40	Holding Register	850	short	AV, 30850	Only for ECO and DIVA versions
Supply air fan high pressure setpoint (normal run)	Pa	X	X	10	130	Holding Register	836	short	AV, 30836	Only for LOBBY version
Supply air fan low pressure setpoint (reduced run)	Pa	X	X	10	130	Holding Register	835	short	AV, 30835	Only for LOBBY version
Extract air fan high pressure setpoint (normal run)	Pa	X	X	10	130	Holding Register	839	short	AV, 30839	Only for LOBBY version
Extract air fan low pressure setpoint (reduced run)	Pa	X	X	10	130	Holding Register	838	short	AV, 30838	Only for LOBBY version
Supply air fan high flow setpoint (normal run)	m3/h	X	X	0.1	See details	Holding Register	842	short	AV, 30842	Only for MAC2 and QUATTRO versions, factory value depends on machine model
Supply air fan low flow setpoint (reduced run)	m3/h	X	X	0.1	See details	Holding Register	841	short	AV, 30841	Only for MAC2 and QUATTRO versions, factory value depends on machine model
Extract air fan high flow setpoint (normal run)	m3/h	X	X	0.1	See details	Holding Register	845	short	AV, 30845	Only for MAC2 and QUATTRO versions, factory value depends on machine model
Extract air fan low flow setpoint (reduced run)	m3/h	X	X	0.1	See details	Holding Register	844	short	AV, 30844	Only for MAC2 and QUATTRO versions, factory value depends on machine model
CO2 Setpoint 1	ppm	X	X	1	800	Holding Register	1036	short	AV, 31036	Only for DIVA and QUATTRO versions
CO2 Setpoint 2	ppm	X	X	1	900	Holding Register	1038	short	AV, 31038	Only for DIVA and QUATTRO versions
CO2 Setpoint 3	ppm	X	X	1	1000	Holding Register	1040	short	AV, 31040	Only for DIVA and QUATTRO versions
CO2 fan compensation 1	%	X	X	1	0%	Holding Register	1037	short	AV, 31037	Only for DIVA version
CO2 fan compensation 2	%	X	X	1	15%	Holding Register	1039	short	AV, 31039	Only for DIVA version
CO2 fan compensation 3	%	X	X	1	30%	Holding Register	1041	short	AV, 31041	Only for DIVA version
CO2 fan compensation 1	m3/h	X	X	0.1	See details	Holding Register	1037	short	AV, 31037	Only for QUATTRO version, factory value depends on machine model
CO2 fan compensation 2	m3/h	X	X	0.1	See details	Holding Register	1039	short	AV, 31039	Only for QUATTRO version, factory value depends on machine model
CO2 fan compensation 3	m3/h	X	X	0.1	See details	Holding Register	1041	short	AV, 31041	Only for QUATTRO version, factory value depends on machine model

XVI.6.c. *Alarms and errors*

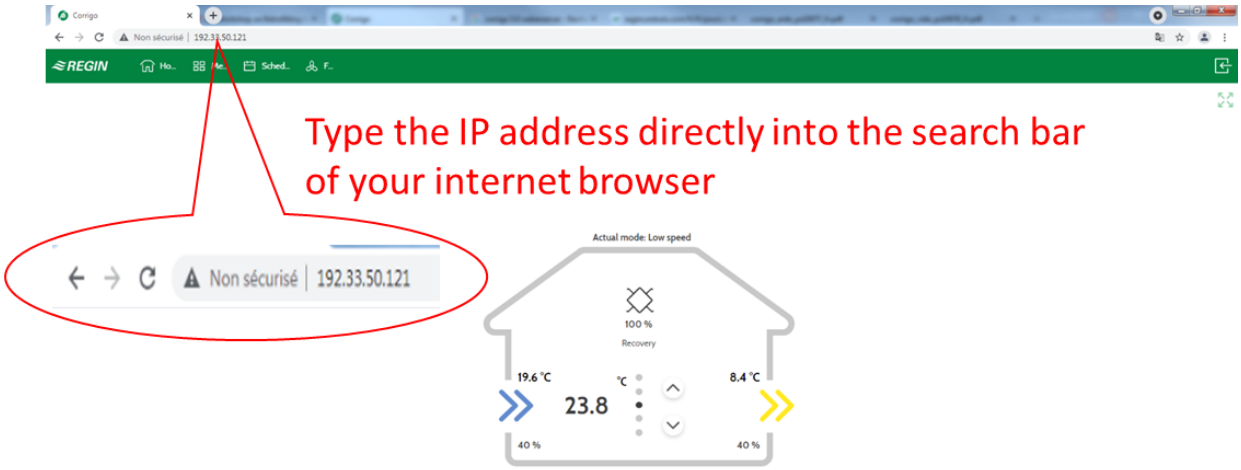
	Read	Write	Modbus Reg. Type	Modbus Address	Modbus Variable	BACnet Address	Details
Presence of A/B/C Alarm	X		Input Status	7	bool	BV, 20007	0=no alarm / 1=at least one alarm is present
Presence of class A Alarm	X		Input Status	8	bool	BV, 20008	0=no alarm / 1=alarm present
Presence of class B Alarm	X		Input Status	9	bool	BV, 20009	0=no alarm / 1=alarm present
Presence of class C Alarm	X		Input Status	10	bool	BV, 20010	0=no alarm / 1=alarm present
Supply air fan error	X		Input Status	11	bool	BV, 20011	0=no alarm / 1=alarm present
Extract air fan error	X		Input Status	16	bool	BV, 20016	0=no alarm / 1=alarm present
Supply / extract filters error	X		Input Status	63	bool	BV, 20063	0=no alarm / 1=alarm present
Internal battery error	X		Input Status	88	bool	BV, 20088	0=no alarm / 1=alarm present
Electrical heater overheating	X		Input Status	73	bool	BV, 20073	0=no alarm / 1=alarm present Only for units equipped with electical coil
Hot water coil frost prevention error	X		Input Status	66	bool	BV, 20066	0=no alarm / 1=alarm present Only for units equipped with hot water coil
Rotary recuperator error	X		Input Status	54	bool	BV, 20054	0=no alarm / 1=alarm present Only for rotating recuperator units
Fresh air temperature sensor error	X		Input Status	154	bool	BV, 20154	0=no alarm / 1=alarm present
Supply air temperature sensor error	X		Input Status	156	bool	BV, 20156	0=no alarm / 1=alarm present
Exhaust air temperature sensor error	X		Input Status	157	bool	BV, 20157	0=no alarm / 1=alarm present Only for plate recuperator units
Extract air temperature sensor error	X		Input Status	158	bool	BV, 20158	0=no alarm / 1=alarm present
Pre-heated air temperature sensor error	X		Input Status	191	bool	BV, 20191	0=no alarm / 1=alarm present Only for plate recuperator units
Supply air fan pressure sensor error	X		Input Status	175	bool	BV, 20175	0=no alarm / 1=alarm present
Extract air fan pressure sensor error	X		Input Status	176	bool	BV, 20176	0=no alarm / 1=alarm present
Supply air fan flow (pressure) sensor error	X		Input Status	177	bool	BV, 20177	0=no alarm / 1=alarm present
Extract air fan flow (pressure) sensor error	X		Input Status	178	bool	BV, 20178	0=no alarm / 1=alarm present
CO2 probe error	X		Input Status	185	bool	BV, 20185	0=no alarm / 1=alarm present Only for DIVA et QUATTRO
Fire mode actived	X		Input Status	68	bool	BV, 20068	0=no alarm / 1=alarm present
Analog/digital output(s) in manual mode	X		Input Status	148	bool	BV, 20148	0=no alarm / 1=alarm present
Supply air fan deviation	X		Input Status	92	bool	BV, 20092	0=no alarm / 1=alarm present
Extract air fan deviation	X		Input Status	93	bool	BV, 20093	0=no alarm / 1=alarm present
Supply air temperature too high	X		Input Status	96	bool	BV, 20096	0=no alarm / 1=alarm present

XVII.EMBED WEBSERVER

The CLD-283 controller includes a WEBSERVER that now operates on HTML5 to replaces JAVA which is no longer supported. It can be accessible by any recent internet browser (download adds-on if necessary or update the internet browser used).

ACCESS RIGHTS	PASSWORD
EXPERT	2222
SERVICE	3333
GUEST	5555

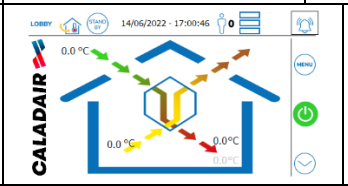
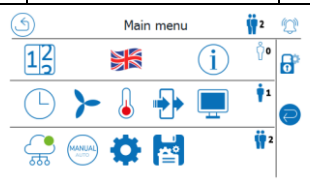
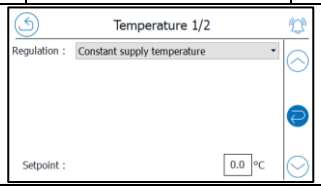
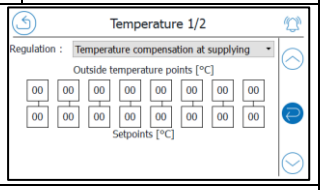
The webserver is accessible by typing the IP address of the controller directly in the search bar of the chosen internet browser:



CALADAIR AHU

The IP address is available from the “communication” menu of the PG 5.0. touch screen, see XVI.5 IP configuration (DHCP).

XVIII. TEMPERATURE CONTROL MODES

	Access path to the function (Level access: Service)						
	Step 1	→	Step 2	→	Step 3	→	Step 4
From Screen							
Area to Click on							

XVIII.1. Choice of temperature control mode

The controller features 4 different control modes of temperature:

- Constant supply air temperature
- Supply air temperature varies according to outdoor temperature
- Constant extract air temperature
- Extract air temperature varies according to outdoor temperature.

The units are factory set with air supply temperature with outdoor compensation.

The choice of temperature control mode depends on several factors:

- Presence of heating/cooling system in the building
- Presence of heating/cooling coils (integrated to the unit or remote controlled) managed by the controller of the unit
- Type of building occupancy
- The level of comfort expected.

The presence of several systems that provides both heating/cooling in a building is often complex to develop because of the different areas to be managed, different dynamics and response time, different possibilities of setting, different operating principles, etc. Often, systems operate independently each other, in an open loop and there is no central control that manages and monitors all the different generators in a comprehensive manner.

The unit will be ensured to:

- Recover maximum energy and does not blow cold air in cold season in order to not overload the main heating system (and inversely in summer)
- Use maximum of free energy (free cooling or free heating) from outdoor during off-season.

An extract air temperature control is to be avoid when a heating/cooling system other than the ventilation unit is present and cover the thermal needs.
A supply air temperature control is to be preferred. It is assumed that in this case, the ventilation unit (with built-in heating and/or cooling coils) only ensures air supply at a temperature close to the setpoint avoiding problems of discomfort of users (feeling of hot or cold air). The supply air temperature setpoint must always be:

- Higher than the master system in cold periods (heating)
- Lower than to the master system in hot periods (cooling).

The outdoor temperature compensation makes it possible to best meet these requirements whatever the time of year. We will also think about adjusting, if necessary, the temperature set (factory setting 18°C) of the night overventilation function.

If there is a BMS or a centralised control management system, the supply temperature in cooling or heating mode can be managed via the Modbus or Bacnet communication by acting on the supply temperature setpoint.

If a BMS or an external centralized control system is used, it will be possible, for example, via Modbus or Bacnet communication, to manage the supply setpoint by adding an offset (or not) of a few degrees in heating mode and vice versa in cooling mode compared to the setpoint of the main system thus allowing to bring only a minimum of energy while maintaining the comfort of the occupants. Another solution is to recover the type of need (hot/cold/neutral zone) of the main heating/cooling system and construct the supply temperature setpoint from the measurement of the recovery temperature on which a constant or variable offset is added.

If the ventilation unit is to provides lonely the heating/cooling requirements of the building (recent buildings), the ventilation unit is to be equipped with corresponding coils or has to control remoted coils. In this case, extract air temperature control with outdoor compensation is to be preferred because extract air temperature reflects the internal conditions of the buildings. The control of remoted coils or generators is done using the 2 AO Analog Outputs and the 2 DO Digital Outputs available on the CLD-283 controller:

- 0-10V heating output used depending on configuration as:
  - Opening setpoint of heating 3-way valve
  - Heating setpoint of the generator
- 0-10V cooling output used depending on configuration as:
  - Opening setpoint of cooling 3-way valve
  - Cooling setpoint of the generator
- On/off type heating output (24Vac to be relayed) used depending on configuration as:
  - Running authorization of the generator
  - Running authorization of the heating pump*
- On/off type cooling output (24Vac to be relayed) used depending on configuration as:
  - Running authorization of the generator
  - Running authorization of the cooling pump*.

*There is no management of pump anti-fouling cycle.

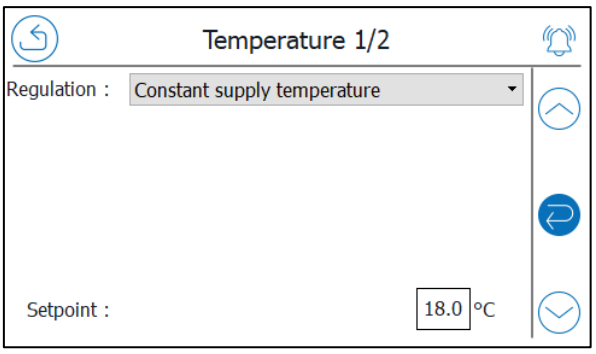
Whatever the air temperature control mode, performances and comfort depend on the air distribution network quality (sealing, thermal insulation, distribution, balancing, etc.).

XVIII.2. Constant supply air temperature

The control of constant supply air temperature is shown by the pictogram  in the “temperature mode” area of the home page.

This control mode of temperature is the easiest to implement and adjust. It ensures the compatibility of the unit with a possible main heating/cooling system that meets alone the thermal needs of the building and the comfort requirements.

There is only one setpoint to adjust. The setpoint is factory set to +18°C and is adjustable from +12°C to +40°C.



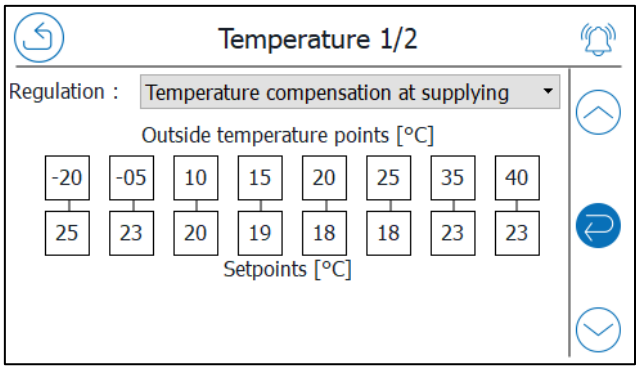
XVIII.3. Supply air temperature with outdoor air temperature compensation

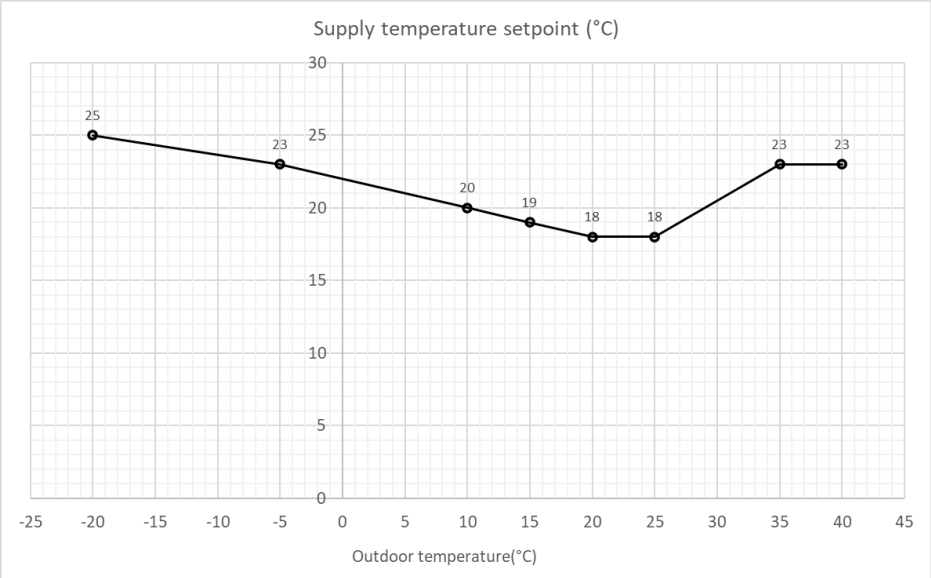
The control of supply air temperature with outdoor temperature compensation is shown by the pictogram  in the “temperature mode” area of the home page.

This temperature control mode allows to take in account the effects of outdoor temperature in the thermal behaviour of the building. Comfort and energy consumption are improved.

The air temperature curve is a couple of 8 points of outdoor temperature / supply temperature setpoint. The pre-defined factory settings are to be adjusted according to the real behaviour of the building.

The controller uses the same temperature setpoint parameters whether you are in supply air or extract air control. When you select extract air, you must adjust the setpoints because factory setpoints are suitable for supply air temperature.





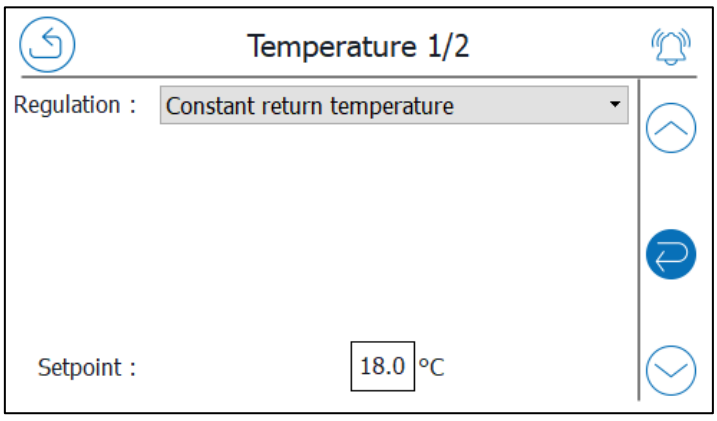
In order to avoid an overconsumption of energy while keeping an acceptable comfort, it may be considered to raise the temperature setpoint at high outdoor temperatures.

XVIII.4. Constant extract air temperature

Constant extract air temperature control is shown by the pictogram  in the “temperature mode” area of the home page.

Extract air temperature control is to be preferred when the ventilation unit alone or widely manages the thermal conditions in the building and when the internal conditions fluctuate due to the internal occupancy rate. It makes it possible to control the internal thermal conditions of the building in closed loop.

The setpoint is factory set to 18°C and is adjustable from +12°C to 40°C.



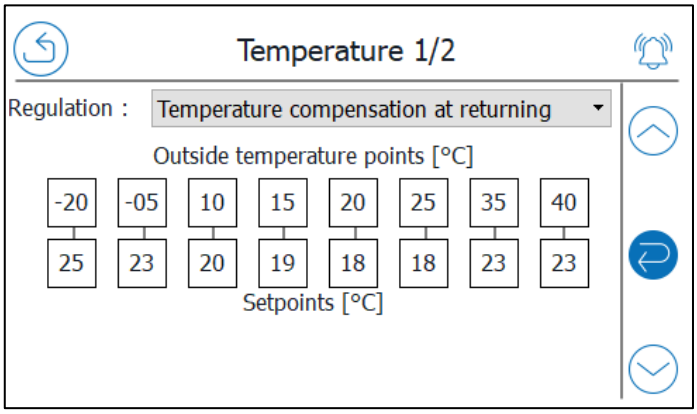
XVIII.5. Extract air temperature with outdoor air temperature compensation

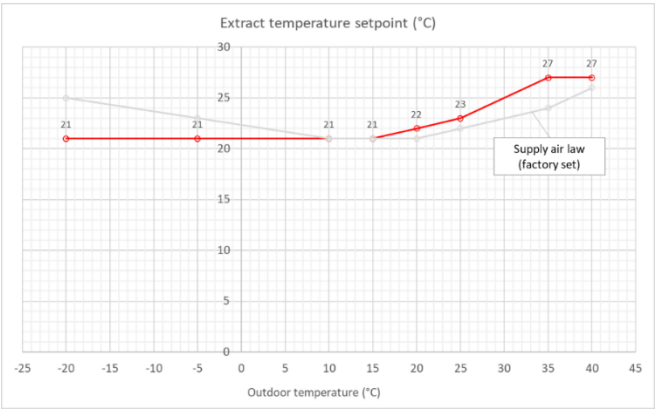
Extract air temperature control as a function of outdoor temperature is shown by the pictogram  in the “operation mode” area of the home page.

This temperature control mode allows to take into account the influence of outdoor temperature on the thermal behaviour of the building which significantly improves the comfort and energy consumption: the effects of cold walls in winter and solar radiation in summer are thus minimized.

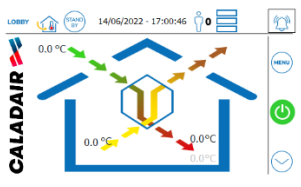
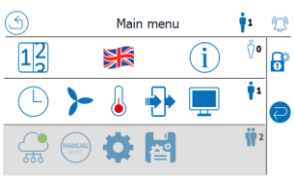
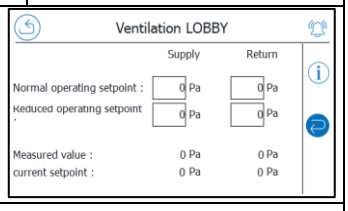
The extract air temperature curve is fully adjustable from a 8 points couple of outdoor temperature / extract air temperature.

The controller uses the same temperature setpoints variables whether it is a supply air or an extract air curve. Switching from supply air temperature with outdoor compensation to extract air temperature with outdoor compensation therefore requires the setpoint to be adjusted for each outdoor temperature point. The setpoints are in standard adapted for a supply air temperature with outdoor compensation. The red curve below shows an example of setting if the extract air temperature with outdoor compensation is selected:





XIX. FANS CONTROL MODES

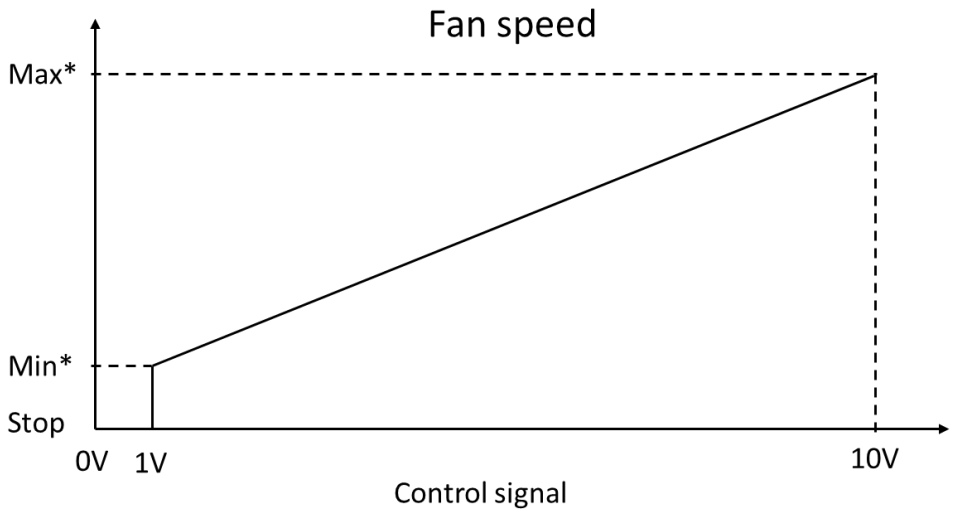
	Access path to the function (Level access: Service)				
	Step 1	→	Step 2	→	Step 3
From Screen					
Area to Click on	MENU				Normal operating setpoint : 0 Pa 0 Pa Reduced operating setpoint 0 Pa 0 Pa

XIX.1. General information

For all versions of unit, the fans are controlled by a 0-10V analog speed signal directly provided by the CLD-283 controller.

The fans start at a command voltage of 1V (minimum speed) and stop at a voltage below 1V. The maximum speed is obtained when command voltage = 10V.

Between 1…10V, the fan speed is proportional to the command signal.



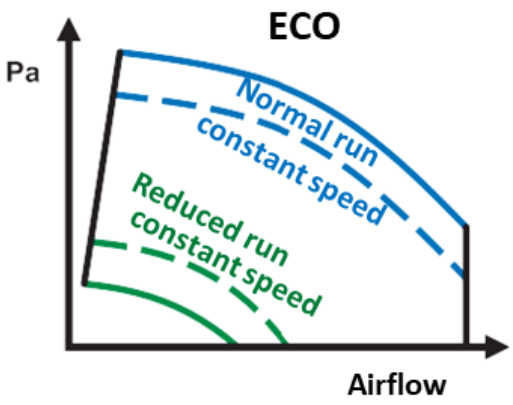
* Min and max fan speed depend on fan model.

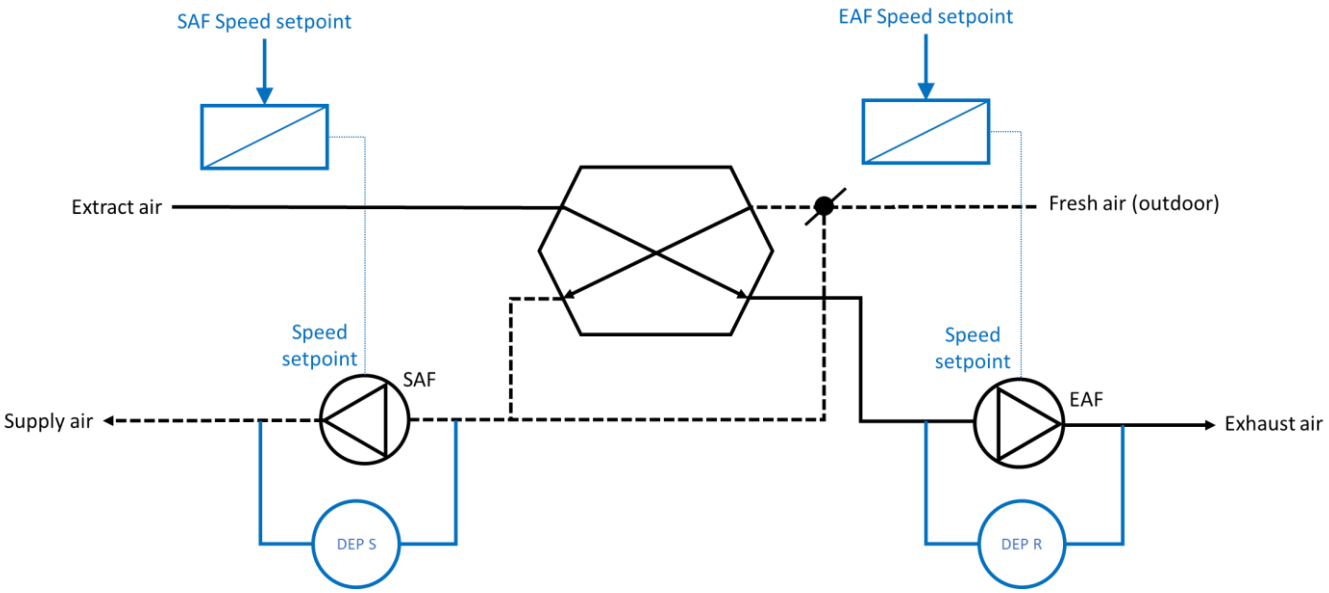
The run indicator is made either by:

- Pressure switches for ECO/DIVA versions (factory set to 25Pa)
- Pressure sensors for LOBBY versions (threshold of 25Pa factory set in the CLD-283 controller)
- Airflow sensor (differential pressure + K coefficient) for MAC2/QUATTRO versions (variable threshold configured in the CLD-283 controller depending on unit version/size, see XV.11 Fans run indicator signals and fans deviation thresholds).

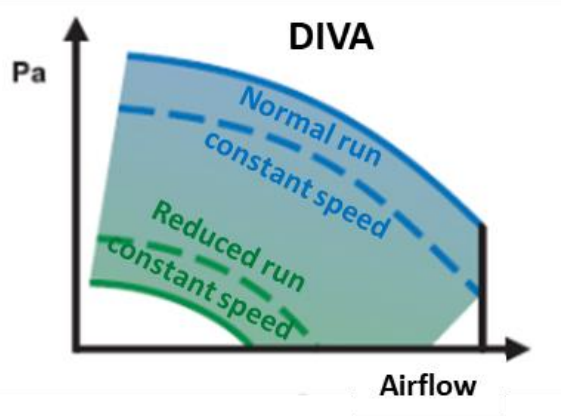
XIX.2. ECO Control

The ECO control is an open loop control of the speed of the extract and supply air fans. A speed setpoint (0-10V signal), which depends on the time schedule, is directly sent from the CLD-283 controller to the fan. The pressure or the airflow are a result between the fan pressure/flow curve and the air distribution network curve.



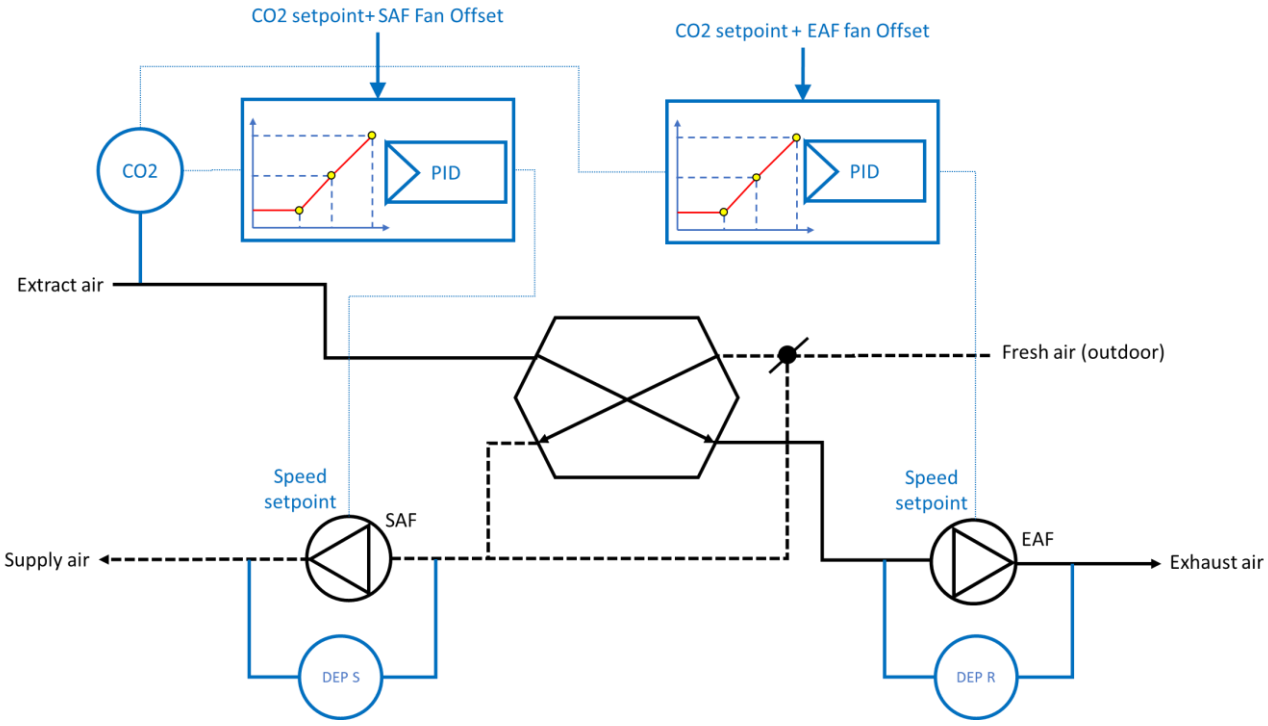


XIX.3. DIVA control

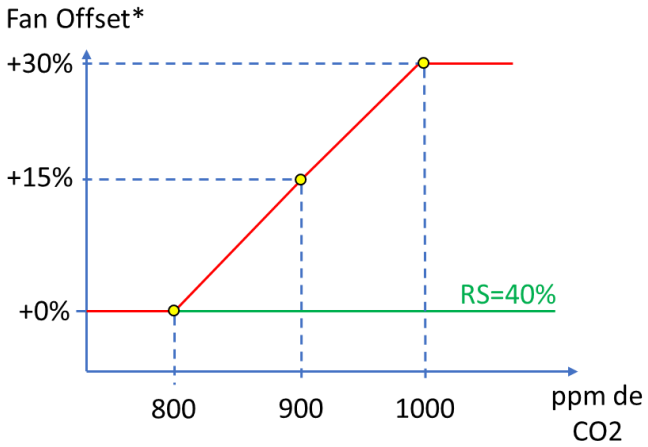


The DIVA control is a closed loop control of the CO2 rate: the higher the CO2 rate, the higher the fans speed, and vice-versa.

The fans speed is controlled individually and continuously according to an adjustable curve of 3 couples of CO2 rate / fans offset. This control allows to keep a good comfort while maintaining a low energy consumption.



3 Offsets on RS and linear interpolation



*Applied to RS (Reduced Speed regime)

Below 800ppm, the fan offset is zero, the fan operates at 40% (factory set) of its maximum speed.

Beyond 1000ppm, the fan offset is kept constant at +30% (factory set) which makes a resulting speed setpoint of 70% of the maximum speed (40% + 30% = 70%).

An intermediate point set at 900ppm and offset +15% makes it possible to adapt the progressivity of the fan behaviour.

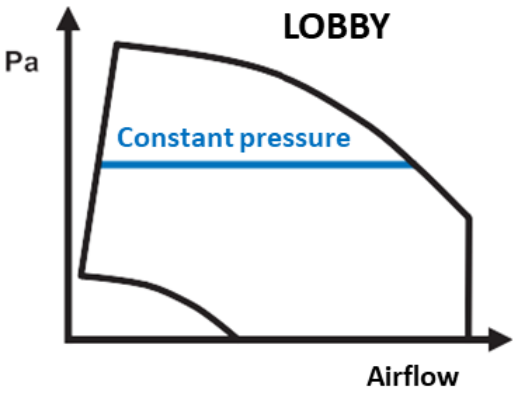
The factory settings are made to have a proportional variation of the fan speed on a 800…1000 ppm range of CO2 rate.

CO2 ppm (adjustable)	**Fan Offset (%) (adjustable)**
800	0 (Corresponding fan % = 40% = ECO reduced run factory setpoint)
900	15 Corresponding fan % = 55%)
1000	30 (Corresponding fan % = 70% = ECO normal run factory setpoint)

The 3 CO2 and offset setpoints are adjustable by the operator.

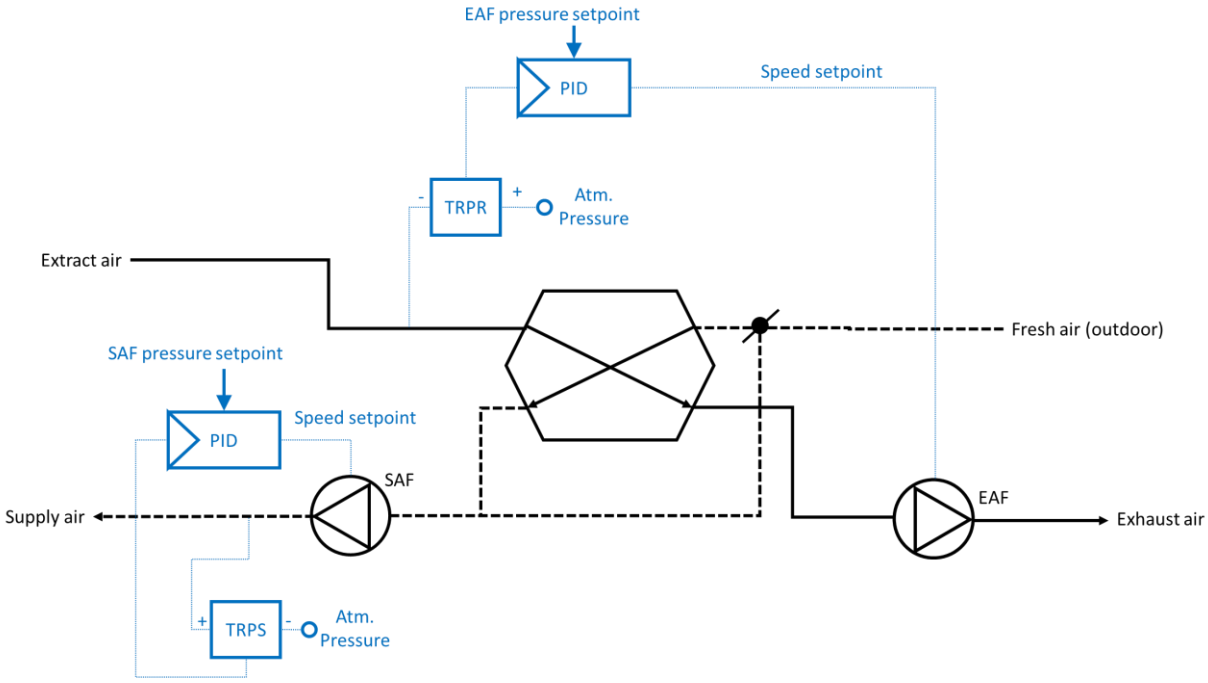
When setting the time schedule, it is important to set only one time slot of reduced run because all the offsets apply on this run level. If a normal run time slot is set, the CO2 management will not be effective, as well as night overventilation during the corresponding time slot.

XIX.4. LOBBY control



The LOBBY control is a closed loop control of the pressure (or VAV = variable air volume).

The extract and supply air fans speed are individually and continuously adjusted thank to a PID algorithm in order to keep the measured pressure equal to the pressure setpoint of the controller, whatever the (variable) conditions of the air distribution network.



When the measured air pressure is below the setpoint, the controller increases the output analog value (0-10V voltage) of the speed fan signal in order to increase the air flow and thus the resulting pressure, and inversely.

Note that the air distribution network being in variable flow, the thermal power provided by the eventual heating/cooling coils will be thus variable.

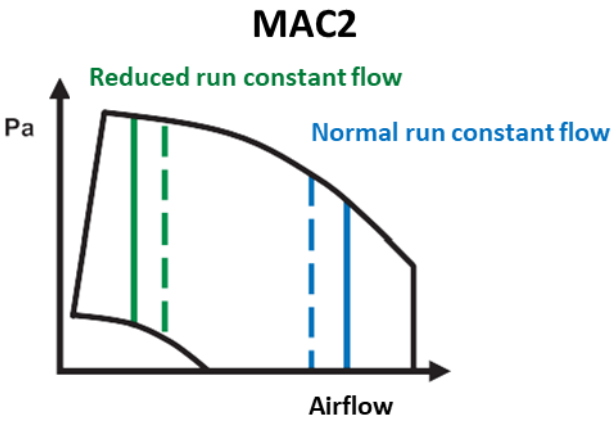
An elbow placed directly at the inlet or the outlet of the unit can cause pressure disturbances and operating instabilities. It is necessary to respect a minimum length of 5 x duct diameter between the elbow and the unit.

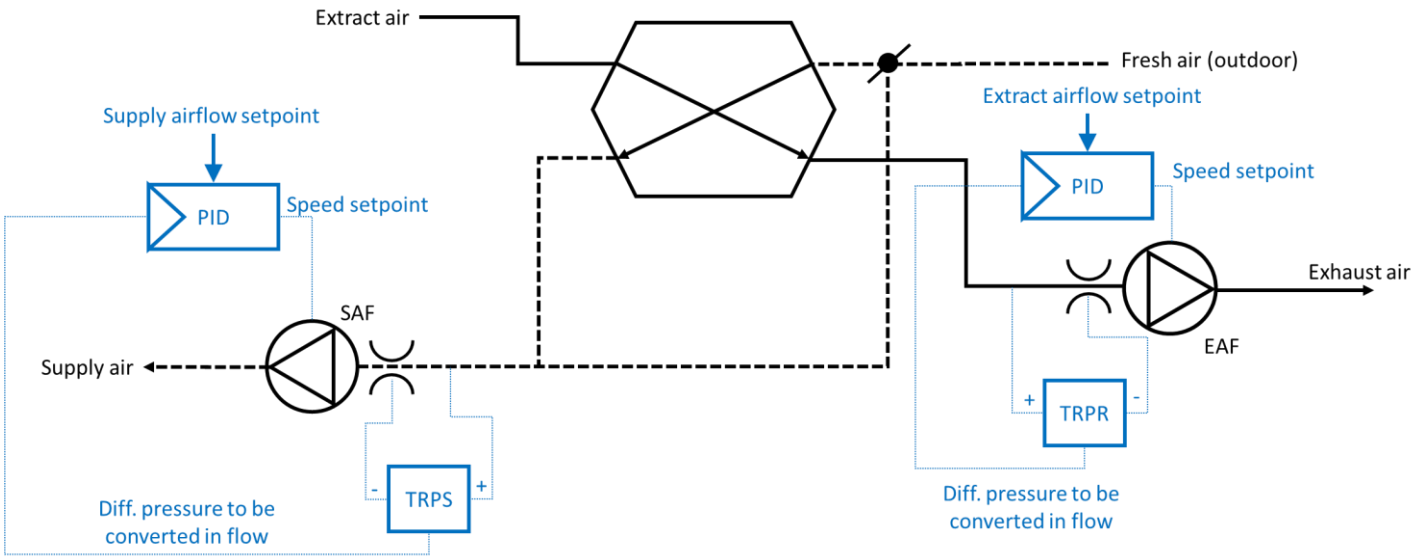
The reduced run pressure and normal run pressure factory setpoints are identical because VAV air distribution networks usually operate on single pressure level only. However, it is possible to set a different (higher) normal run pressure setpoint in order to manage 2 different pressures levels or to increase the resulting flow rate even more during night overventilation activation slot. In the latter case, it is important to leave the reduced run pressure slot active for the entire duration of the night overventilation operating slot (00:00 – 07:00).

XIX.5. MAC2 control

The MAC2 control is a constant flow closed loop control (or CAV = constant air volume).

The extract and supply fans speed are adjusted individually and continuously by a PID algorithm in order to get a measured air flow equivalent to the air flow setpoint, and this independently of the fouling state of the filters.



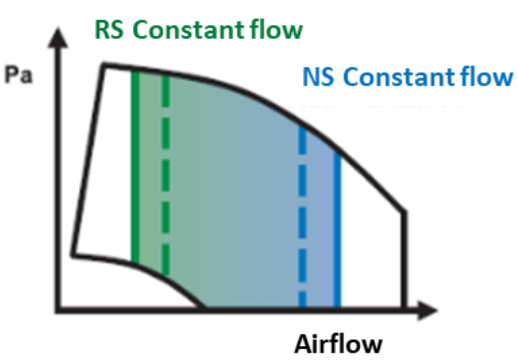


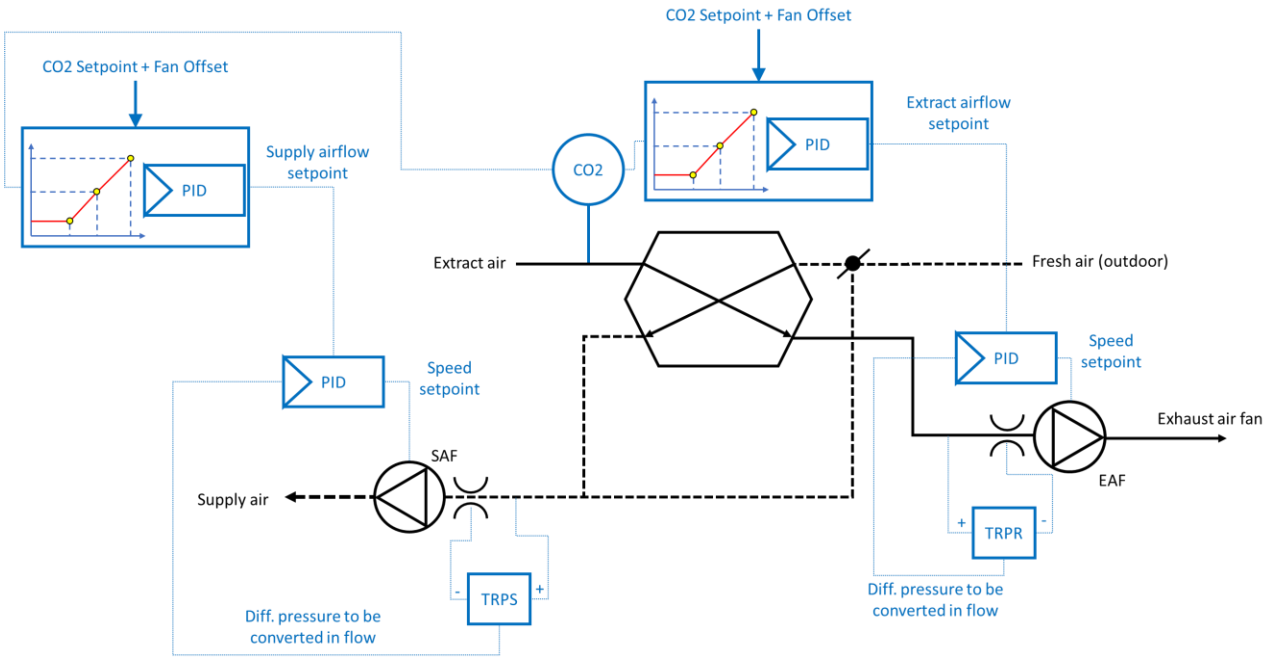
When the measured air flow is below the setpoint, the controller increases the output analog value (0-10V voltage) of the fan speed signal in order to increase the air flow, and inversely.

XIX.6. QUATTRO Control

The QUATTRO control is an air flow closed loop control as a function of CO2 rate.

The extract and supply air fans speed are adjusted individually and continuously according to an adjustable curve in order to keep the CO2 rate in the extract air to an acceptable level for the health of occupants while a low energy consumption.





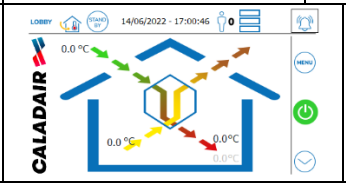
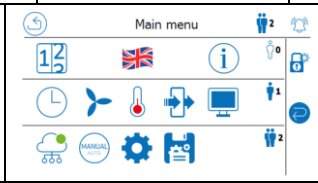
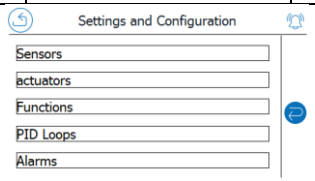
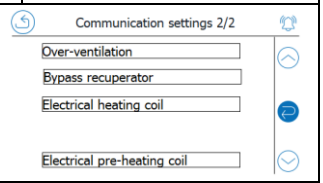
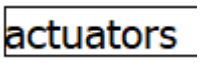
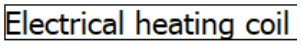
The factory settings depend on the size of each unit model. The settings are made to have a fan modulation airflow proportional on the 800…1000 ppm CO2 range, keeping on identical modulation airflow range of MAC2.

	QUATTRO
CO2 ppm (adjustable)	**Fan Offset (m3/h) (Different for each unit model) (Adjustable value)**
800	0 (No offset = airflow of the reduced run setpoint of the corresponding MAC2 version unit)
900	$\frac{Offset_{1000} + Offset_{800}}{2}$
1000	Value which depends on the corresponding MAC2 unit model/size in order to get the same normal run setpoint See XV.11 Fans run indicator signals and fans deviation thresholds

The 3 CO2 and offsets setpoints are adjustable by the operator.

When setting the time schedule, it is important to set only one reduced run time slot because all the offsets apply on this run level. If a normal run time slot is set, the CO2 management will not be effective, as well as night overventilation.

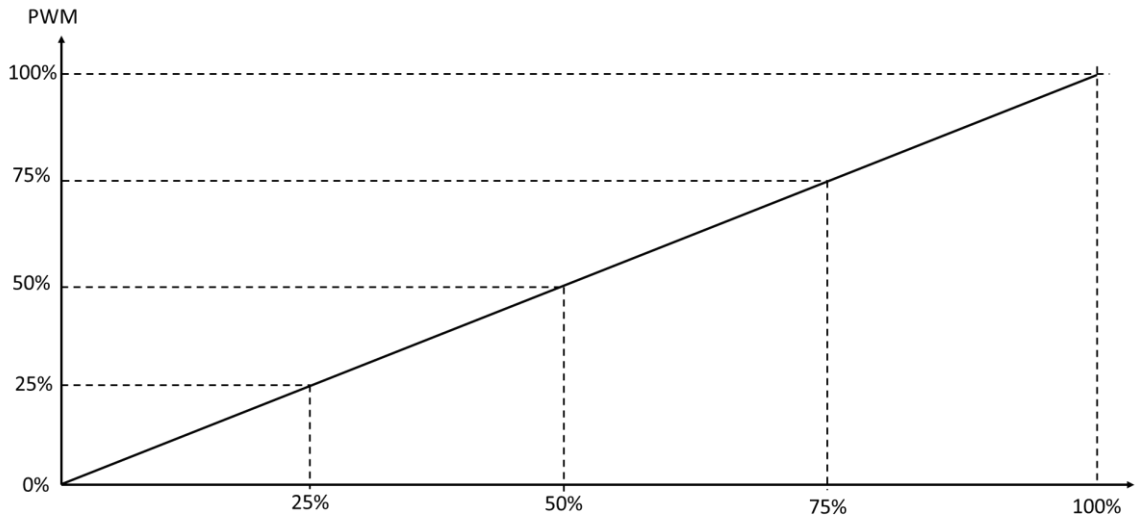
XX. CONTROLLING THE ELECTRIC HEATER (BE)

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

XX.1. Thermal power modulation

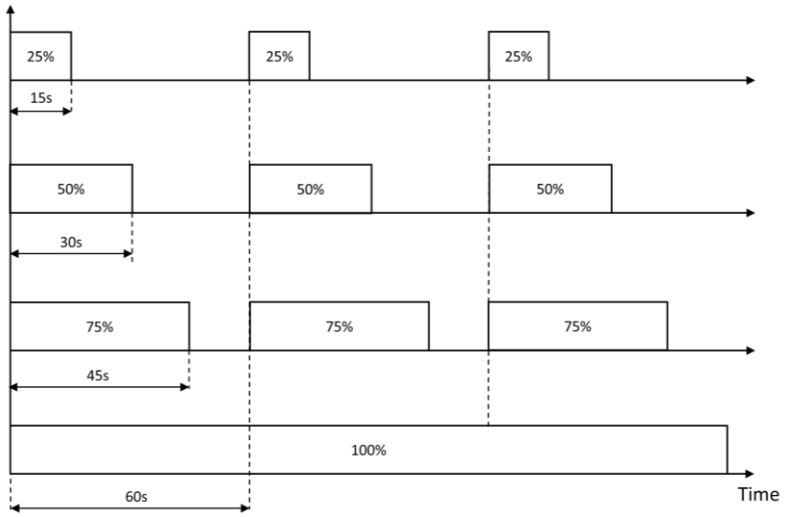
The heating needs calculated by a PID algorithm is converted into a PWM (pulse width modulation) control signal used to control the power SSR Solid State Relay that supplies the heating element of the electric heater. The PWM signal period is 60s (non-adjustable).

The PWM value is directly proportional to the calculated heating need. The PWM control signal is directly sent to the corresponding output of the CLD-283 output as follow:



Heating request calculated by the PID as a function of the gap between the temperature setpoint and the measured temperature at supply or extract (according to the temperature control set)

Electrical heating coil DO output status for various calculated PWM values



XX.2. Overheating protection by THS Overheat Safety Thermostat

The electric heater features an overheat safety thermostat (THS) factory set to 100°C that protects the unit of any overheating. The overheat safety thermostat (THS) turn off the power supply of the electric heater by opening the command line of the K1 contactor which activates the (63) “Overheating heating coil” alarm.

The electric heater is controlled by the supply air fan run indicator signal in order to avoid any overheating in the event of fan failure:

- If the SAF run indicator signal is inactive (or too low) while there is a request to activate the electric heater, this one will not be activated
- If the electric heater is in operation and the supply air fan run indicator signal get down, then the electric heater will be disabled.

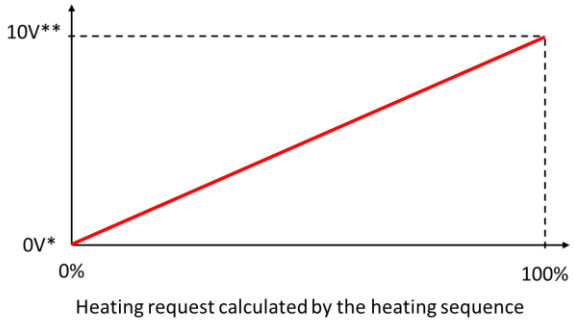
This control does not exist either for electric preheater or for hot water heating coil.

XXI. CONTROLLING THE HOT WATER COIL (BC)

XXI.1. Thermal power modulation

The heating needs calculated by a PID algorithm is converted into a 0-10V analog control signal directly sent as setpoint to the 3-way modulating valve via the corresponding output of the CLD-283 as follow:

Control signal sent to the 3-way valve servomotor



*0V: the 3-way valve is connected such a way that the hot water coil is not supplied with hot water
**10V: the 3-way valve is connected such a way that the hot water coil is fully supplied with hot water

When the heating request is zero, the resulting control signal is zero (0Vdc) and there is no water flow across the hot water coil.
When the heating needs is maximum, the resulting control signal is maximum (10Vdc) and the water flow across the hot water coil is maximum.

XXI.2. Frost prevention thermostat (THA)

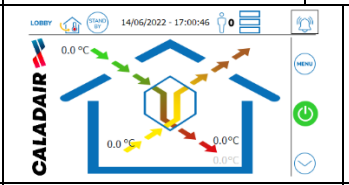
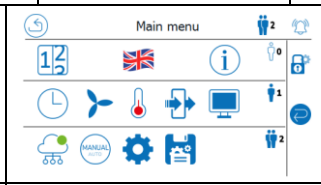
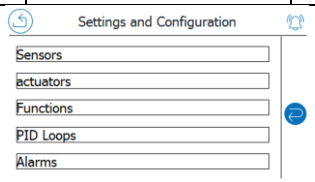
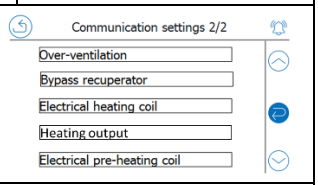
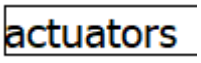
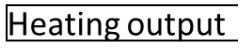
The hot water coil features a NC (Normally Closed) frost prevention thermostat (THA) that switches off the operation of the ventilation when the air temperature that crossing it drops below +5°C (factory set) in order to avoid frosting. When the air temperature rises above +5°C, the contact closes and the fans restart.

The opening of the frost prevention thermostat (THA) lead to the apparition of alarm Id=56 “anti-frost alarm”.

XXI.3. Thermal performances

It is necessary to provide the hot water coil with the flow and the temperature required when selecting the equipment in order to ensure thermal performances.

XXII. CONTROLLING THE HOT WATER PUMP

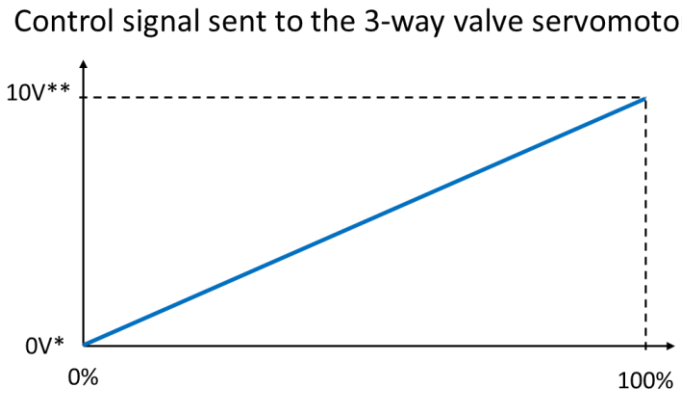
	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

When the heating sequence is active (heating request > 0%), the DO Digital Output that controls the hot water pump is enabled, and inversely.
This function is available only for control that manages hot water coil, and it is not available for control that manage electric heater.

XXIII. CONTROLLING THE COLD-WATER COIL

XXIII.1. Thermal power modulation

The cooling needs calculated by a PID algorithm is converted into a 0-10V analog control signal directly sent as setpoint to the 3-way modulating valve via the corresponding output of the CLD-283 as follow:



*0V: the 3-way valve is connected such a way that the cold water coil is not supplied with cold water
**10V: the 3-way valve is connected such a way that the cold water coil is fully supplied with cold water

When the cooling need is zero, the resulting control signal is zero (0Vdc) and there is no cold-water flow across the cold-water coil.
When the cooling need is maximum, the resulting control signal is maximum (10Vdc) and the cold-water flow across the cold- water coil is maximum.

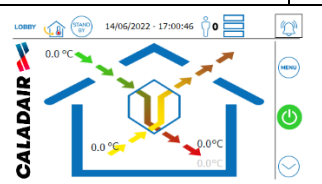
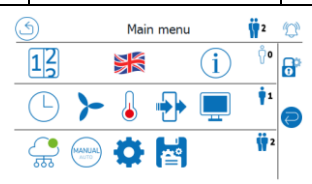
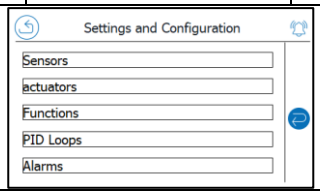
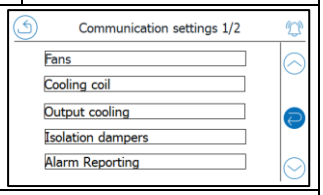
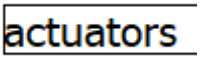
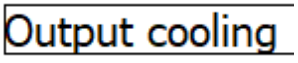
XXIII.2. Frost prevention

The frost prevention of the cold-water coil is made by a sufficient water/glycol concentration (MEG or MPG) in conformity with the chiller and the expected operation temperature range. If a frost prevention thermostat is envisaged, it must have an external action to the unit.

XXIII.3. Thermal performance

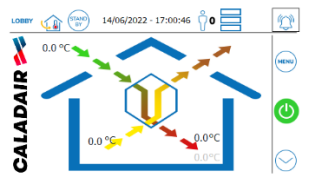
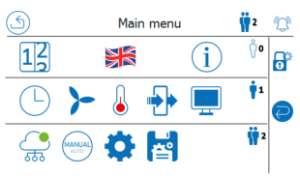
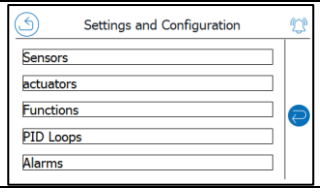
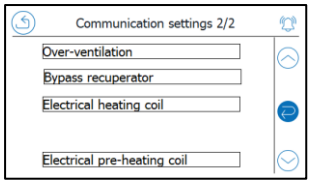
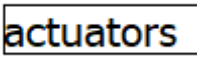
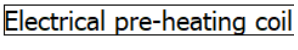
It is necessary to provide the cold-water coil with the flow, the temperature, and glycol (MEG or MPG) rate required when selecting the equipment in order to ensure thermal performances.

XXIV. CONTROLLING THE COLD WATER PUMP

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

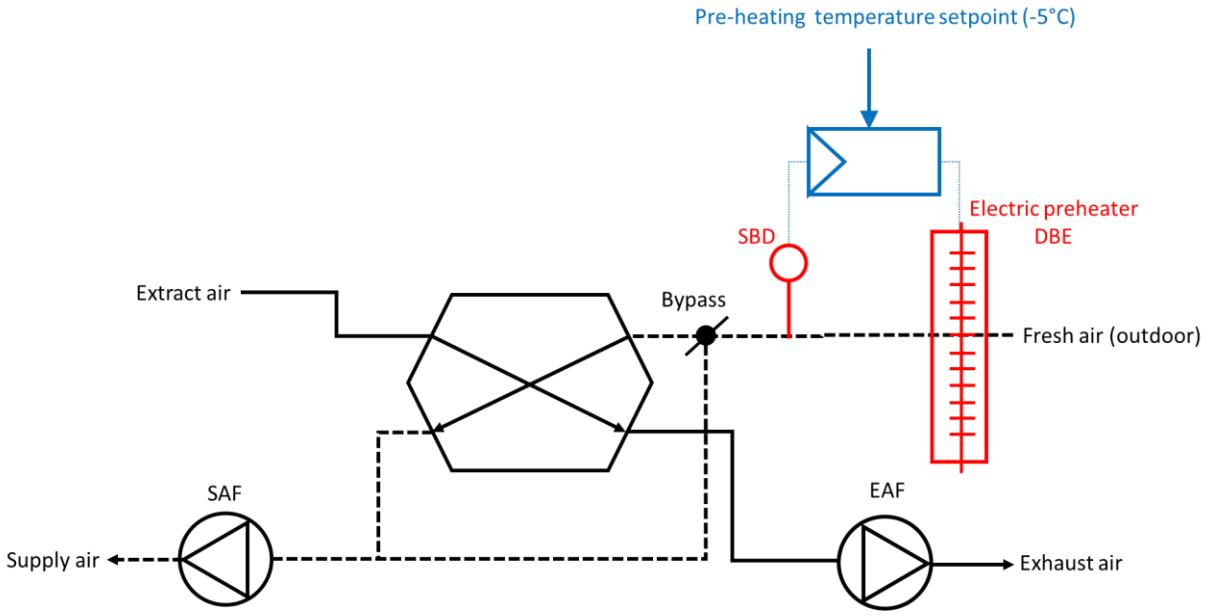
When the cooling sequence is active (cooling request > 0%), the DO Digital Output that controls the cold- water pump is enabled, and inversely. When there is no cooling request, the DO Digital Output is inactive.

XXV.CONTROLLING THE FRESH AIR ELECTRIC PREHEATER (frost prevention of the plates recuperator)

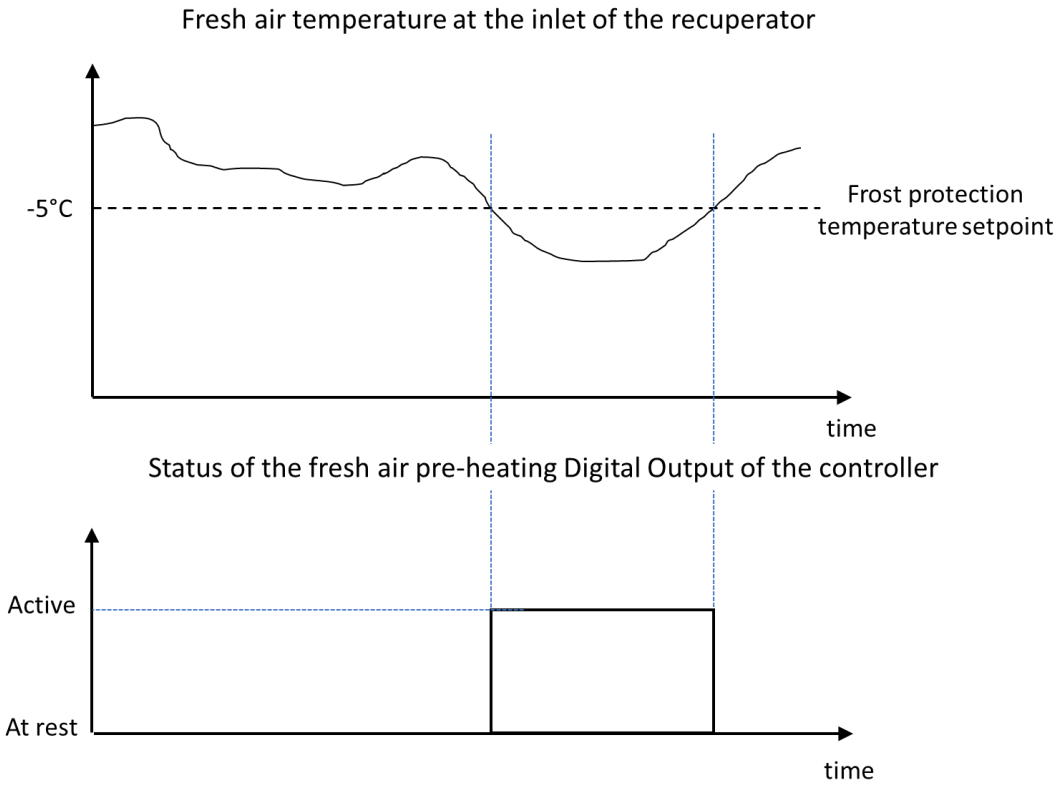
	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

The purpose of the fresh air electric preheater is to keep a sufficient temperature (factory set to -5°C) at the fresh air inlet of the plates recuperator in order to prevent any icing risk of the moisture on the air extract side. This is an optional equipment which comes in addition of the modulating bypass (in serial) in order to enlarge the operation range especially in cold climate installation.

It operates as on/off from an algorithm that compares the actual value of fresh air inlet temperature with the fresh air inlet temperature setpoint. The electric preheater therefore only comes in action when outdoor air temperature is below -5°C.



The sequence is managed by a PID algorithm. The DO Digital Output that allows the power supply of the electric preheater is of on/off type.



This sequence is independent of the heating, recovery, cooling and frost prevention sequences.

The fresh air electric preheater features an overheat safety thermostat (THSD), normally closed (NC), set to +100°C that cuts off the power supply of the KD contactor control circuit in order to protect the unit from any overheating.

XXVI. CONTROLLING THE ROTARY RECUPERATOR

XXVI.1. General information

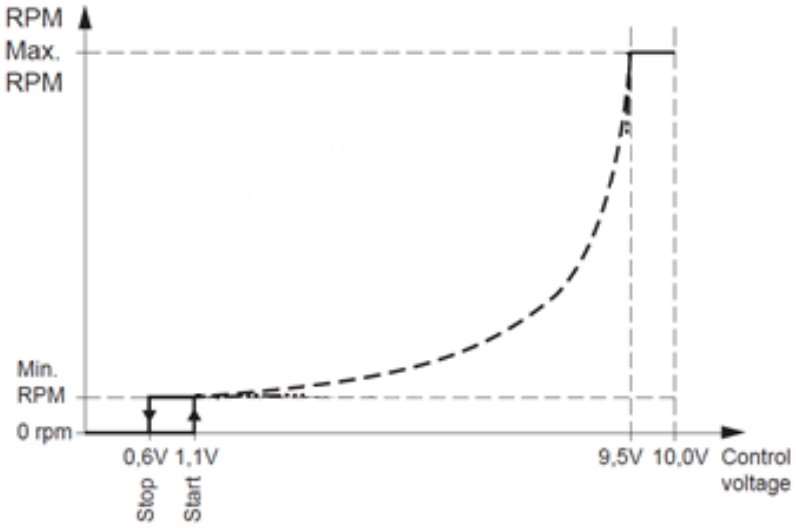
The rotary recuperator consists of a wheel (heat exchanger) driven by a stepper motor via a belt, all managed by an electronic control unit.

Unlike the plates recuperator, the rotary recuperator does not incorporate bypass function, neither to manage recovery rate, nor to manage frost prevention. The heat recovery is continuously adapted thank to the modulating rotation speed of the wheel. The higher the speed, the higher the heat recovery. At zero speed, the recovery is zero. The recovery performance is not quite proportional to rotational speed.

XXVI.2. Modulation of heat recovery rate

The rotary recuperator is controlled by the heat recovery sequence. This sequence has its own PID control loop that calculates a heat recovery requirement from the measured temperatures and the current setpoint. This requirement is converted into an analog 0-10V control signal used as rotational speed setpoint of the wheel.

The wheel drive stepper motor starts when the signal exceeds 1,1V and stops when the signal drops below 0,6V. Beyond 9,5V, the wheel turns at maximum speed. Between 1,1V…9,5V, the wheel rotational speed follows the curve of the graph below.
The speed acceleration ramp is set to 60s (it takes 60s to go from minimum speed to maximum speed).

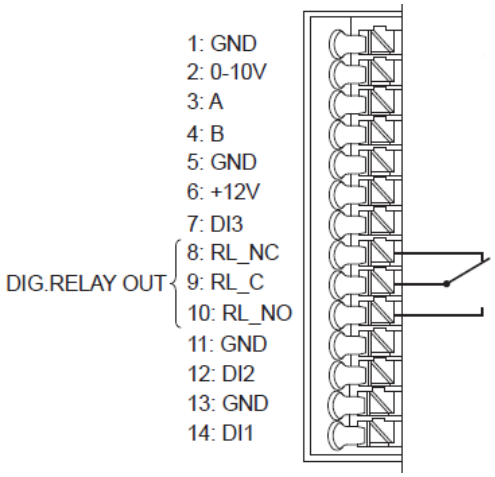


XXVI.3. Run indicator of the rotary recuperator

The electronic control unit of the rotary recuperator features a function that monitors the right operation of the wheel. If a rotation error is detected, the information is sent to the CLD-283 controller which records an alarm and display it to the PG 5.0 Touch screen.

The monitoring of the wheel rotation is based on the concordance between the expected current, voltage, FEM and actual conditions (rotational speed, temperature, etc.) of the stepper motor.

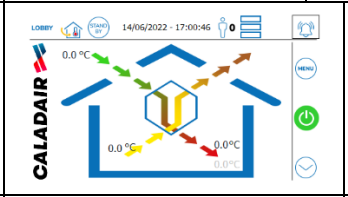
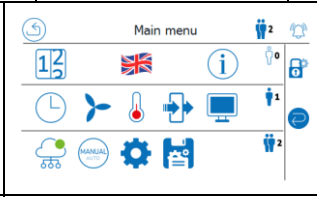
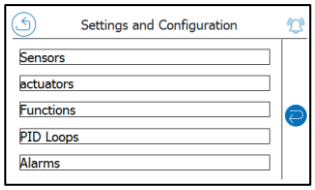
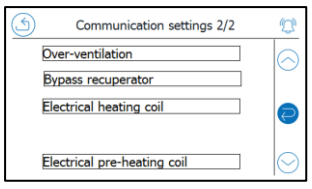
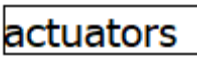
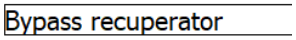
This process makes it possible to know if the belt is broken, if the rotor is blocked, or if the stepper motor is defective, without any inductive or hall effect external sensors.



The run indicator of the recuperator uses the normally open NO DIG RELAY OUT output (electrically connected between (9) and (10)). When there is an operating error, the contact opens. If the wheel is operating properly, the contact is closed.

XXVII. CONTROLLING THE PLATES HEAT RECUPERATOR

XXVII.1. General information

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

The heat recovery is continuously adapted thank to the modulating bypass flap placed on the fresh air stream.

When the heat recovery requirement rate is maximum, the bypass flap is closed, and all the fresh air cross the recuperator. Conversely, when the heat recovery requirement rate is zero (free cooling / free heating), the bypass flap is opened, and the fresh air bypasses the recuperator.

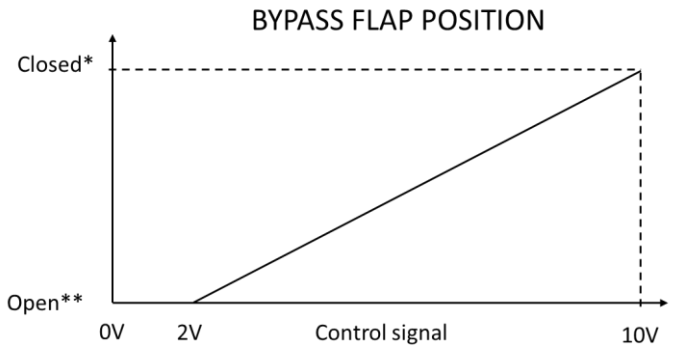
The operation of the bypass occurs when:

- There is a heating request, and the extract air temperature is higher than the outdoor air temperature
- There is a cooling request, and the extract air temperature is lower than the outdoor air temperature
- There is a risk of frost of the recuperator: frost prevention has priority and heat recovery is disabled.

XXVII.2. Modulation of heat recovery rate

The bypass is managed by the heat recovery sequence and has its own PID control loop that calculates the heat recovery demand from the measured temperature and the current temperature setpoint. This demand is converted into a 0-10V control signal by the CLD-283 controller and sent to the bypass servomotor.

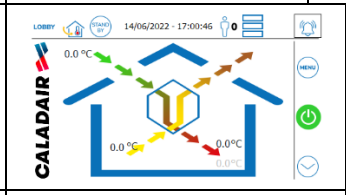
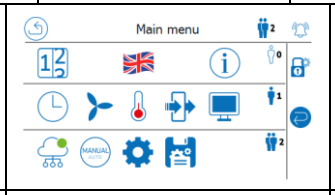
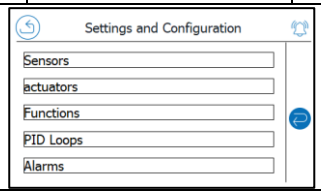
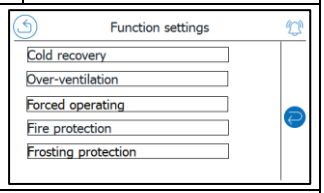
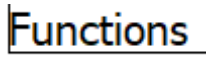
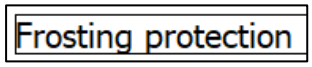
The servomotor starts to open at 2,0V and is fully open at 10,0V. Between 2V…10V the opening is proportional to the voltage. Below 2V, the bypass is open. The opening/closing time depends on the model of the servomotor: from 35s to 150s.



*Closed : all fresh air passes through the plates recuperator (maximum heat recovery)
**Open : all fresh air is diverted from the recuperator (no heat recovery)

≤2V = the bypass is open at 100% (no heat recovery or the frost prevention is in operation)
10V = the bypass is closed (heat recovery at maximum and frost prevention function in standby)

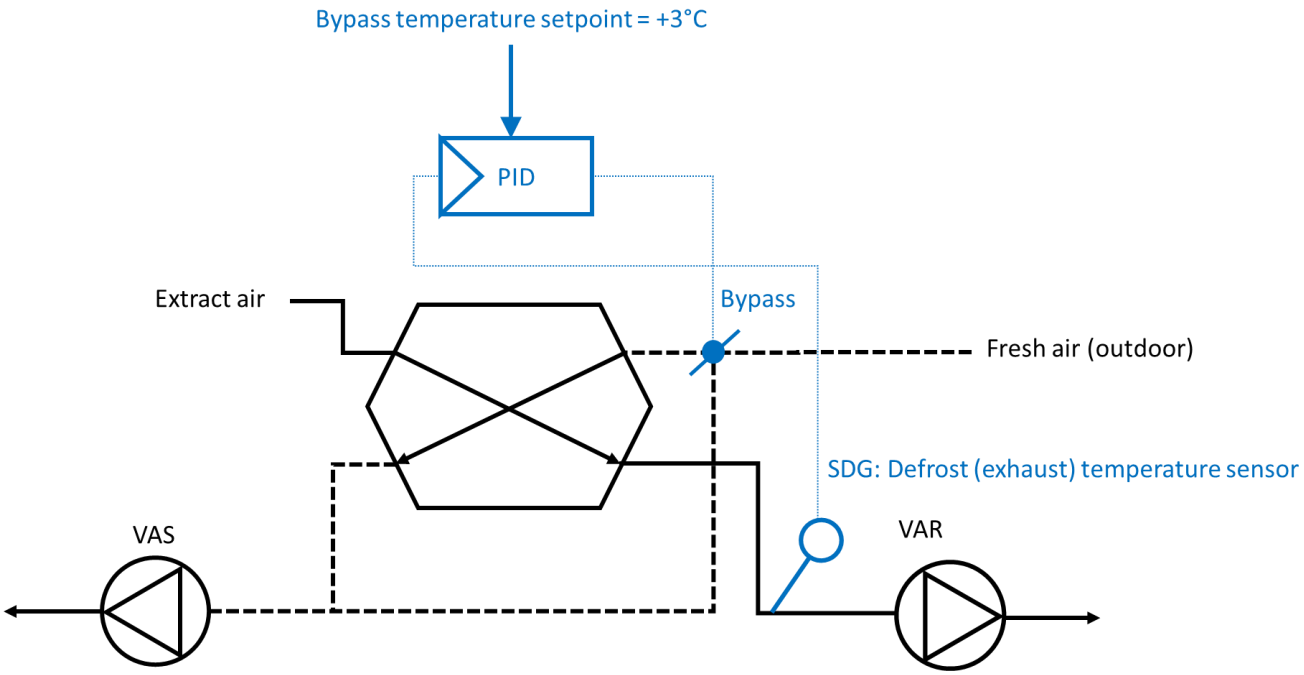
XXVII.3. Frost prevention of the plate heat recuperator

	Access path to the function (Level access: Expert)							
	Step 1	→	Step 2	→	Step 3	→	Step 4	
From Screen								
Area to Click on								

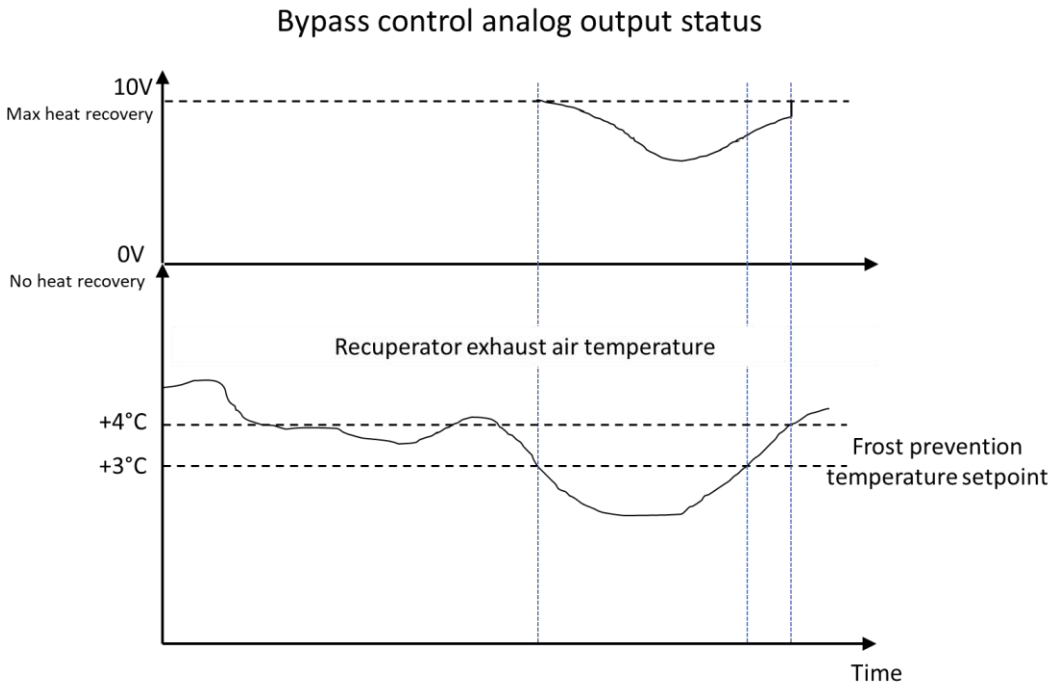
When the frost prevention function is active, it is shown by the pictogram  in the “operating mode” area of the home page.

The purpose of the bypass is to deviate the cold outdoor air from the recuperator in order to avoid frosting of extract air moisture. When the exhaust air temperature drops below +3°C, the frost prevention function is enabled, and the bypass starts to modulate its opening in order to keep the exhaust air temperature ≥ +3°C. The function stops when the exhaust air temperature exceeds +4°C.

The frost prevention function is an independent function that features its own PID control parameters in order to adapt the reactivity.



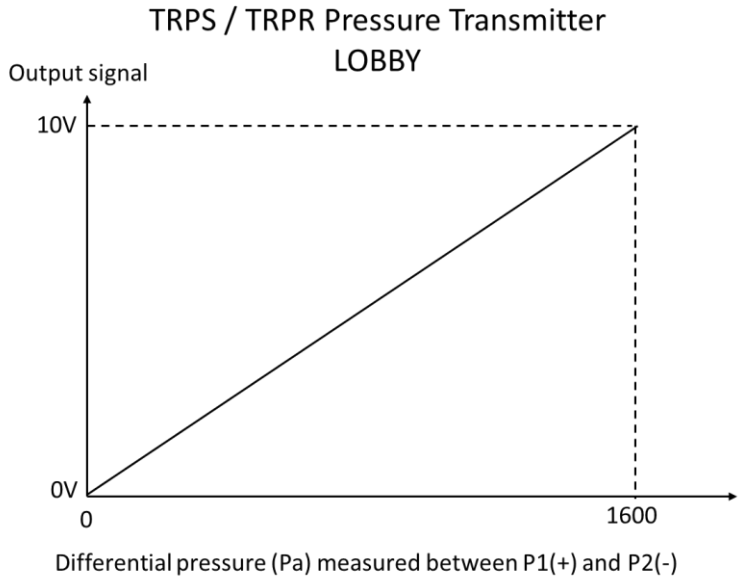
The frost prevention function is also used as a condition for activating the function of supply air flow reduction (see X FROST PREVENTION FUNCTION BY SUPPLY AIRFLOW REDUCTION).



XXVIII. LOBBY PRESSURE SENSORS

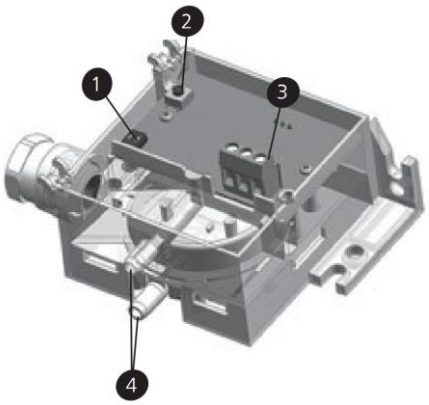
The LOBBY pressure sensor is a differential pressure sensor.

It converts the pressure difference between atmospheric pressure and the corresponding extract or supply air pressure into a 0-10V analog signal that can be used by the CLD-283 controller. The output signal is proportional to the measured pressure difference.



The pressure difference is also used as fans run indicator signal. When the measured pressure is lower than a threshold of 25Pa (factory setting), the controller interprets this as a fan malfunction and can activate some alarms. If the controller manages an electric heater, it is only enabled if the supply pressure is higher than the threshold of the corresponding run indicator signal. It is also a condition of fan activation.

The LOBBY pressure sensor is the same for all units.



Mark	Details
1	Setting dip switches
2	Zero setting The sensor has to be in its position of operation with all disconnected pressure ports
3	Terminal
4	P1(+) and P2(-) Pressure ports

Dip switches setting position:

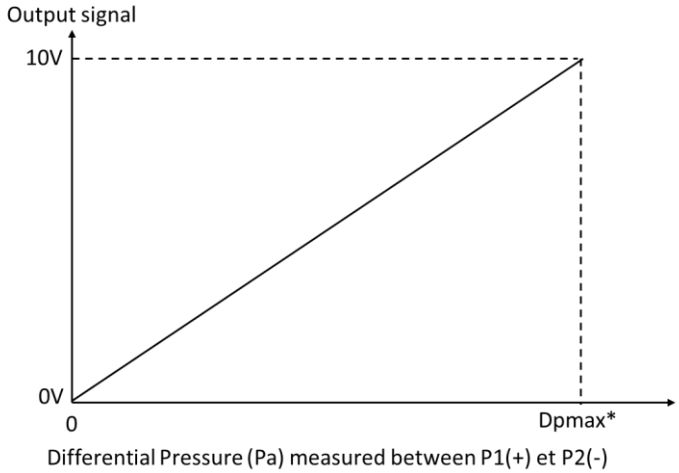
	Maximum differential pressure rating = 1600 Pa The dip switches are in OFF position (0 position)

XXIX. MAC2 / QUATTRO PRESSURE SENSORS

The MAC2/QUATTRO pressure sensor is a differential pressure sensor.

It converts the pressure difference measured onto the inlet ring into a 0-10V analog signal that can be used by the CLD-283 controller which then converts it in flow. The output signal is proportional to the measured pressure difference:

TRPS / TRPR Pressure transmitter
MAC2 - QUATTRO



*DPmax depending on unit ventilation model and size (300Pa / 1600Pa / 5000Pa)

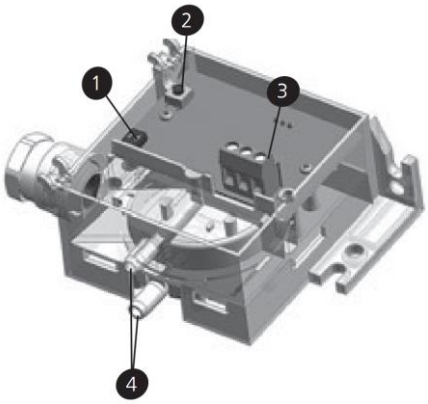
From the characteristics of the fan inlet ring, it is possible to convert the measured differential pressure into a volume flow with the following relationship:

$Q = K \times \sqrt{\Delta P}$	
Q	Volume flow
K	Conversion factor
ΔP	Differential pressure

The K conversion factor is set from the factory in the controller software of each unit model/size.

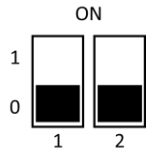
The supply and extract air flows are used as fans run indicator signal. When the corresponding air flow is lower than the specified threshold (different for each unit model/size), the controller interprets this as a fan malfunction and can activate some alarms. If the controller manages an electric heater, it is only enabled if the supply flow is higher than the threshold of the corresponding run indicator signal. It is also a condition of fan activation.

The rating of the MAC2/QUATTRO pressure sensor depends on the unit model/size.



Mark	Details
1	Dip switches
2	Zero setting The sensor has to be in its position of operation with all disconnected pressure ports
3	Terminal
4	P1(+) and P2(-) Pressure ports

Dip switches setting position:

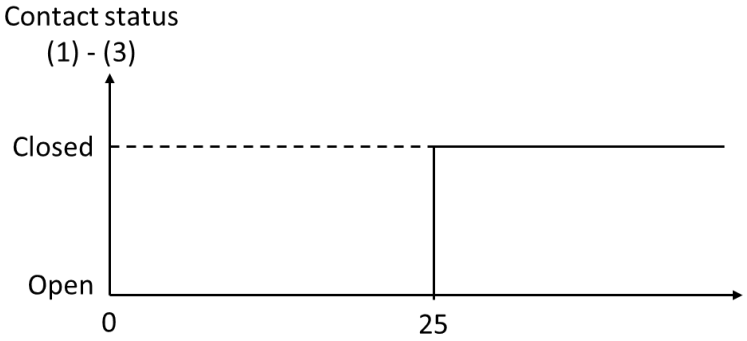
	Maximum differential pressure rating The dip switches are in off position (0 position) (300 Pa, 1600 Pa, 5000 Pa depending on version)

XXX.ECO / DIVA FANS OPERATION CONTROL PRESSURE SWITCHES

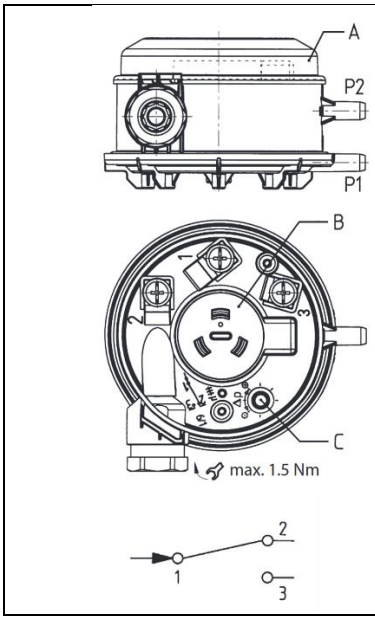
ECO and DIVA versions feature an adjustable pressure switch (factory setting = 25 Pa) for the operation control of supply and extract air fans thank to a measure of differential pressure.

The pressure switches are of NO type (Normally Open, electrical connection between terminals (1) and (3)).
The contact is open when there is no air flow, and closes when the fan flow makes a differential pressure higher than 25 Pa.

DEP S – DEP R Pressure Switches
ECO - DIVA



Differential pressure (Pa) measured between P1(+) and P2(-)



Mark	Details
P1 (+)	Positive pressure port
P2 (-)	Negative pressure port
A	Removable cover
B	Setting
1	Terminal of common
2	NC contact terminal (not used)
3	NO contact terminal

Control method:

First, check the connection of pressure picking pressure hoses and the absence of moisture or foreign bodies (insects, grease, etc.) inside them.

Unit (fan) stopped:

- The contact between terminals (1) and (3) is open (∞ Ohms), pressure switch electrically disconnected
- The voltage between terminals (1) and (3) is 24Vdc, pressure switch electrically connected
- The corresponding DI Digital Input must indicate “inactive” state.

Switch the fan to manual mode and set a manual setpoint of 50%:

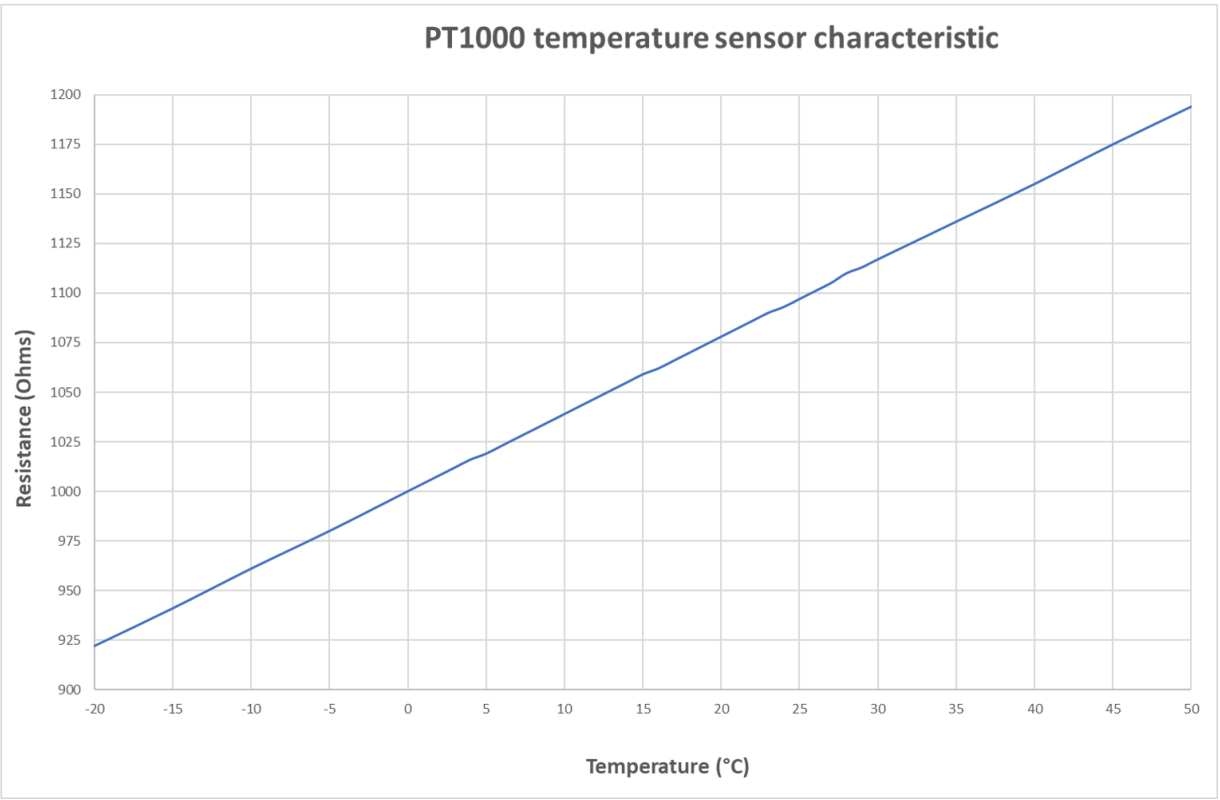
- The contact between the terminals (1) and (3) is closed (< 2 Ohms), pressure swich electrically disconnected
- The voltage between the terminal (1) and (3) is 0Vdc, pressure switch electrically connected
- The corresponding DI Digital Input must indicate an “active” state.

XXXI. PT1000 TEMPERATURE SENSOR

The PT1000 temperature whose sensitive element consists of platinum that makes a very high robustness and accuracy with a signal drift near zero over the entire expectancy life of the unit. It is therefore not necessary to replace it in preventive maintenance.

The resistance of the probe is 1000 Ohms at 0°C. The resistance characteristics as a function of the temperature is presented below:

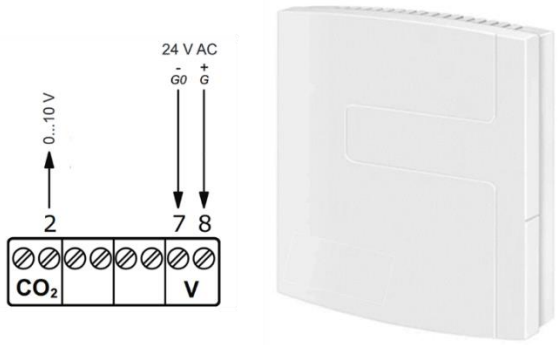
T (°C)	R (Ohms)
50	1194
45	1175
40	1155
35	1136
30	1117
29	1113
28	1110
27	1105
26	1101
25	1097
24	1093
23	1090
22	1086
21	1082
20	1078
19	1074
18	1070
17	1066
16	1062
15	1059
14	1055
13	1051
12	1047
11	1043
10	1039
9	1035
8	1031
7	1027
6	1023
5	1019
4	1016
3	1012
2	1008
1	1004
0	1000
-5	980
-10	961
-15	941
-20	922



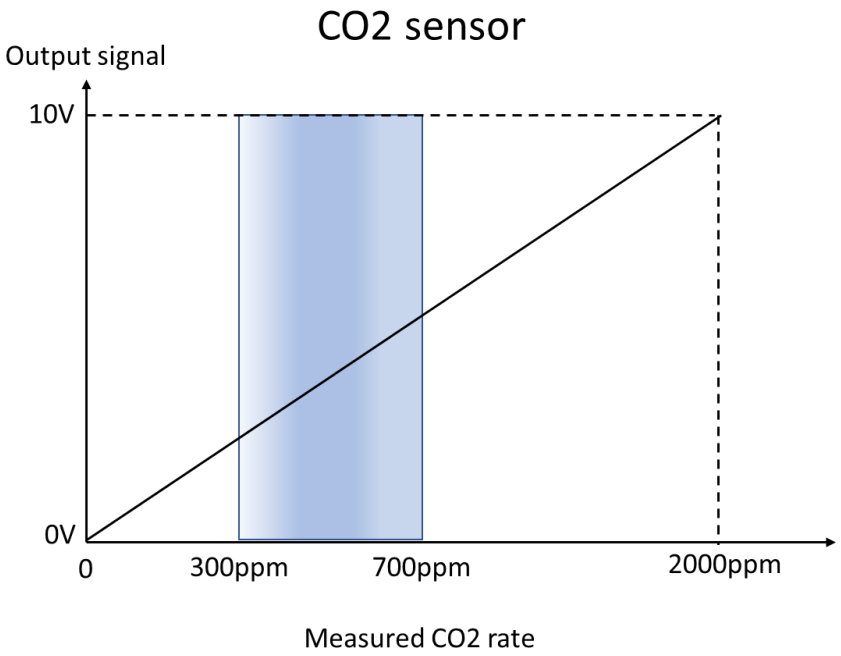
The checking of the probe is done with an ohmmeter and a second temperature probe (reference probe) and must take into account all the measuring loop: probe + wiring + connectors, as close as possible to the corresponding input of the controller.

XXXII. CO2 PROBE

The CO2 probe converts the CO2 concentration rate of the extract air into a 0-10V signal that can be used by the controller.



The output value of the probe proportionally depends on CO2 concentration rate:



The CO2 probe is sensitive to dust and deposits. The preventive maintenance of extract air filter will maintain a correct operation over time.

The ambient air contains about 300 to 600ppm of CO2 depending on the location. In cities and polluted areas, the concentration can even reach 700ppm. In low polluted areas, the concentration is about 400ppm. This information makes it possible to know if the probe shows signs of malfunction: if we measure a CO2 rate of 200ppm (or 0ppm) or 1500ppm in an extra-urban area, it is possible that the probe is malfunctioning and must be replaced.

The CO2 probe is neither adjustable nor calibratable.

XXXIII. HELP FOR SETTING THE P.I.D. PARAMETERS

A PID (Proportional Integral Derivative) control loop is a numerical algorithm integrated into the controller that calculates in continue an analog value setpoint (e.g., 0-10V fan speed) from the gap (error) between the setpoint configurated (e.g. 2500m3/h) and the actual measured value (e.g., 3000m3/h). It is a control in closed loop.

The purpose of this algorithm is to adjust in continue the output signal of the controller in order to cancel the gap between the configured setpoint and the actual measure.

Since the unit being factory set with "general" PID parameters that meets most of the installations, it can be necessary to adjust them during commissioning or after a certain operation time. In general, the problems to be fixed are:

- Fans pumping: the fans are pumping and generates significant flow variations that make noise
- The setpoint is too slow to reach the setpoint.

It is usually necessary to modify P and/or I parameters when the settings of setpoints (fans, temperature, etc.) are very different from the factory-defined values, and/or the real installation (network volume/length, building size, etc.) has an unconventional typology, as well as if the unit is under/oversized with an operating point very far from the nominal operating point. We will:

- Increase the parameter P of supply air fan SAF in LOBBY version if the setpoint is significantly increase
- Increase the parameter I of supply air fan SAF in LOBBY version if the supply network is very short and uneven
- Increase the P and I parameter if the unit is oversized
- Decrease the P and I parameters if the unit is undersized.

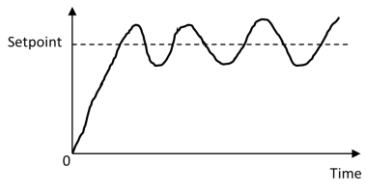
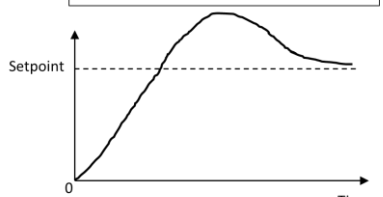
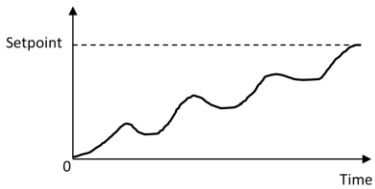
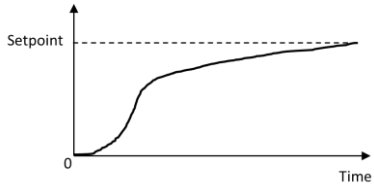
	Factory settings of Fans PID parameters		
	P	**I**	**D**
SAF Supply Air Fan	500 Pa	20 s	There is not derivative factor (derivative term is not used)
EAF Extract Air Fan	500 Pa	20 s	

The 1st prerequisite before changing the settings of a PID is to check if the measurement of the quantity to be regulated (e.g. supply pressure in LOBBY) is stable. If it is unstable, the cause must be determined and corrected. We can mention the causes generally encountered:

- The sensor (temperature, pressure, flow, etc.) is poorly placed and is subject to parasitic influences (turbulence, radiation, leaks, etc.). In this case, therefore, we will try to move the sensor to a quieter place or to calm the conditions by installing specific devices.
- Presence of an external disturbance that generates airflow instabilities in the machine (e.g. 90° elbow immediately at the unit outlet/inlet, leaks, etc.).
- Presence of an external disturbance such as dampers that open/close too much quickly → Change the speeds of opening and closing the registers and leave a minimum of opening.

	Definition	Details	Ex. of general equation	Influence
P	Proportional band	It is the image of the gain. The output control signal is directly proportional to the gap Setpoint – Measure.	$\frac{1}{P} \times (setpoint - measure)$	↑P = the output signal drops for a same gap ↓P = the output signal rises for a same gap If P is too low, the system becomes unstable. If P is to high, the system is slow.
I	Integral	It allows to cancel the static error (error that the term P cannot cancel alone) when operating conditions are steady.	$\frac{1}{I} \times \int_0^t (Setpoint - measure)\, dt$	↑I = the output signal drops for a same gap ↓I = the output signal rises for a same gap
D	Derivative	Anticipatory term, it can cause instabilities on slow systems, that is why it is not used in ventilation.	The derivative is never used.	

The output values of terms P and I are summed and converted into analog signal (e.g., 0-10V fan speed signal).

Real system response*	Corrections to make	
	P	**I**
Oscillations around the setpoint 	↑	
Overshoot 	↑	↑
Instability 	Check for the measurement stability and the absence of external disturbances. Check for the unit sizing in relation to the actual operation conditions and/or the compatibility of the setpoint with the system.	
Too slow response 		↓

*The measure is stable and is not disturbed by conditions external to the unit.

XXXIV. CHECKING THE OUPTUT VOLTAGE OF DO DIGITAL OUTPUTS

All the digital outputs DO1 to DO7 are polarised at the same voltage of the 24Vac power supply (approximately ~27Vac). They are also all equipped with MOSFET (Metal Oxyde Semiconductor Field Effect Transistor) technology transistor.

The particularity of this kind of transistor, unlike a conventional transistor, is that it delivers a voltage close to its supply voltage when it is in standby without load. When a load is connected, the output voltage drops to zero.
Therefore, a voltage at the controller output can be measured when the DO is in the off state, which is misleading but quite normal. This difference in operation is very important when carrying out a diagnosis on the DOs or when an actuator is connected to them.

The table below summarises the values to be obtained for a controller typical supply voltage of about 28Vac:

DO status (NO)	LOAD	MEASURED VOLTAGE BETWEEN GDO AND DO…
Inactive (open)	Absent (open circuit or disconnected connector)	About 20-25Vac (if 0Vac, may reflect a faulty controller)
	Present (>10mA)	0Vac (If ~24Vac, may reflect a faulty controller)
Active (closed)	Absent (open circuit or disconnected connector)	28Vac (supply voltage of the controller) (Si 0Vac, may reflect a faulty controller)
	Present (>10mA)	

XXXV. PRESENTATION OF THE "PG 5.0" TOUCH SCREEN

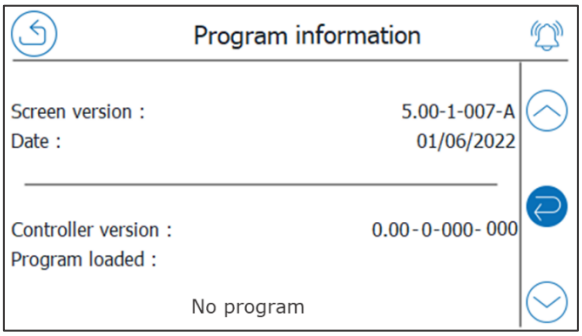
XXXV.1. Technical specifications

Display technology	LCD TFT (Liquid Cristal Display – Thin-Film Transistor)
Touch technology	Resistive
Colours number	65K
Size	4,3''
Display resolution	480 pixels x 272 pixels
Adjustable brightness	yes
Adjustable standby	yes
Display languages	French, English, Spanish, Italian, German
Protection rating	IP65
Electrical insulation class	III
Maximum power input	7W

XXXV.2. Controller compatibility and software version

The PG 5.0 touch screen and the CLD-283 controller communicate together with a RS485 serial bus. The screen reads and writes data into the controller. For a correct operation, it is important to ensure the software compatibility between the controller and the screen.

The software versions of the CLD-283 controller and the PG 5.0 touch screen are viewable at the "Program information" page accessible from the icon ⓘ of the "Main menu" page.



XXXV.3. Basic screen settings

The basic screen settings can be accessed by any user, no password is required. This means that anyone can change the display:

- Language
- Brightness
- Standby timeout.

XXXV.4. Access levels

Access to the various functions of the EASY 5.0 Control is password-protected which makes it possible to manage the level of access and operating security of the machine.
The password is an unchangeable 4-digit word stored in the hard memory of the controller.

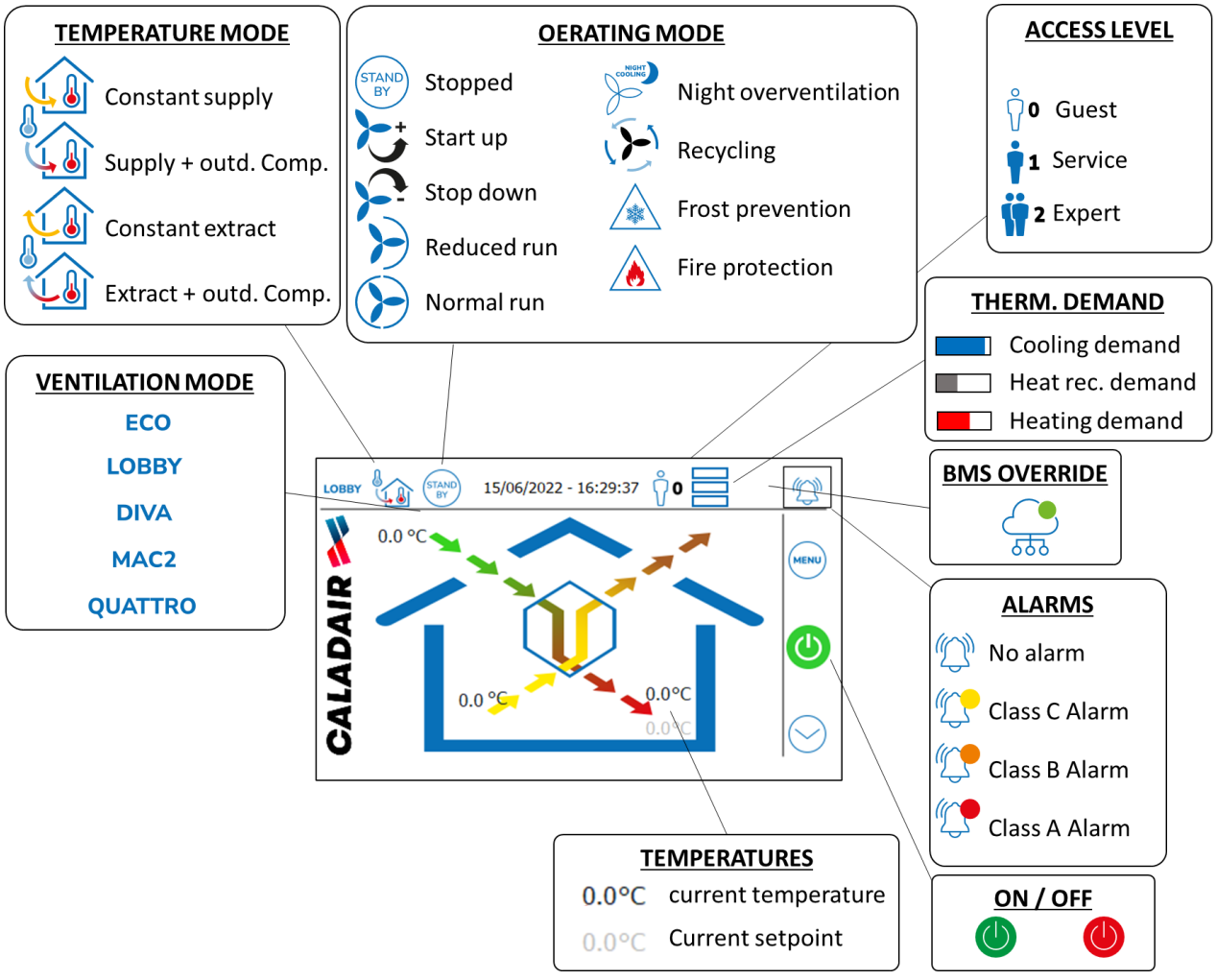
ACCESS LEVEL	PASSWORD	FUNCTION
Guest		The Guest access level gives access to: • Language, brightness, timeout settings • Read only the main status information and values of the unit • Set or reset maintenance counter interval and maintenance alarm • Active alarms and history alarm menus
Service	3333	All Guest functions as well as: • Clock and time schedule settings • Ventilation settings • Temperature settings • Reading of inputs/outputs controller values • Settings the EDT2 touch screen remote control
Expert	1111	All Service functions as well as: • Settings of the BMS communication • Access to the manual control function • Activation and settings of specific functions • Saving and restoring parameters

XXXV.5. Dashboard and main pages

XXXV.5.a. *Home Page*

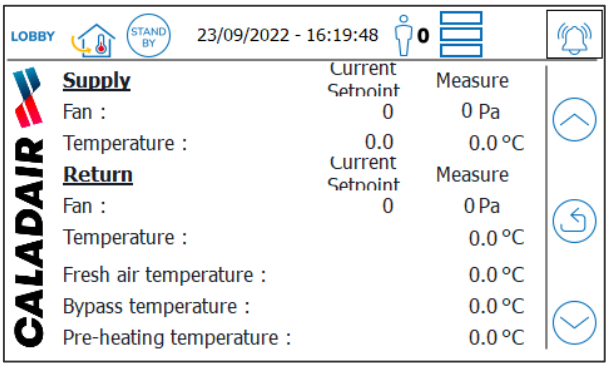
The “Home Page” is displayed permanently when the screensaver is not active.
It is a dashboard that makes it possible to see at a glance the general operating status of the machine:

- Date and time
- Current temperature setpoint, and measured temperatures values
- Fans control mode (ECO, DIVA, LOBBY, MAC2, QUATTRO)
- Temperature control mode (constant supply, variable supply, constant extract, variable extract)
- Current operating mode
- Current access level
- Current thermal demands (cooling, heat recovery, heating)
- Presence and number of alarms



XXXV.5.b. *Main Page 2*

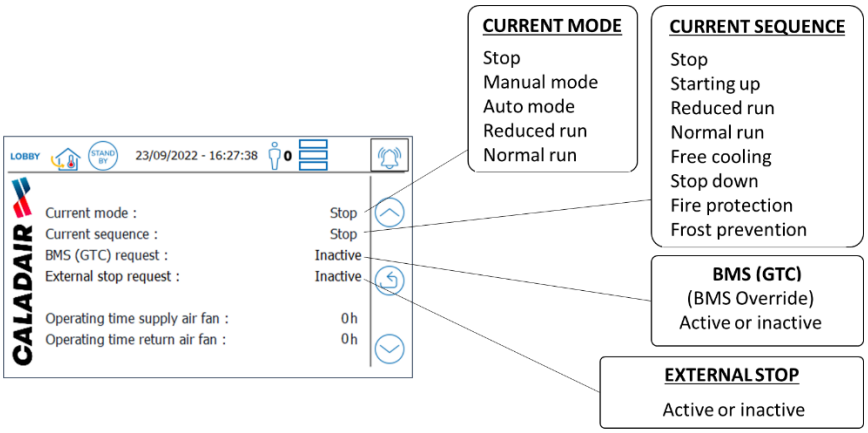
The main page 2 can be accessed from the Home Page (button) by any user and supplements the information given by the Home Page. It shows the actual temperature and fan setpoints as well as the actual corresponding measured values. It is then possible to check the consistency between the different values which make easier and faster any diagnosis by anyone without access rights.



XXXV.5.c. *Main page 3*

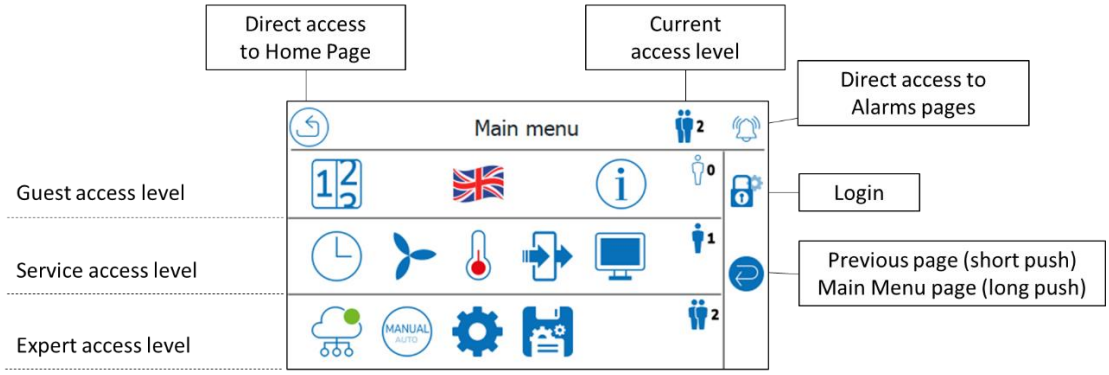
The main page 3 can be accessed from the main page 2 (button) by any user and supplements the information given by the Home Page and the Main Page 2. It shows current sequences, current modes, and the eventual presence of remote orders coming either from the BMS or from the remote stop order Digital Input. An active BMS request may be the cause of an uncontrolled operation of the unit. A permanent stop of the unit can be caused by an active remote stop order.

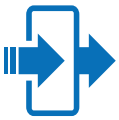
The fan operating time indicates the using rate of the unit and allows the preventive maintenance intervals to be adapted if operating time records are taken. A low using rate allows to space out inspection intervention and to plan a possible next intervention date.



XXXV.6. Navigation and access to menus

The Main Menu page is accessible from the Home Page (button MENU).



Icon	Access to…	Required access level	Details
	System general information	Guest	Firmware version Software version Communication errors between display / controller Display status
	Maintenance counter setting	Guest	Maintenance alarm / Maintenance counter
	Active alarms and alarms history	Guest	Alarms presence and acknowledgment Recorded alarms
	Clock and time schedule settings	Service	System date and time Times schedule Vacation calendar
	Fans setpoints settings	Service	Reduced run setpoint Normal run setpoint CO2 setpoints
	Temperature setpoints settings	Service	Temperature control mode Temperature setpoints Temperature limits
	Input/output values of the controller	Service	Analog Inputs AI – UAI Digital Inputs DI Analog Outputs AO Digital Outputs DO
	EDT2 Touch screen remote control	Service	Enable/disabled Extended run time Minimum + maximum temperature allowable offset
	Bus Communication (BMS) settings	Expert	Modbus RTU – Bacnet MS/TP Modbus TCP – Bacnet IP
	Manual mode control	Expert	Actuators manual control (advanced diagnosis)
	Miscellaneous settings and functions configuration	Expert	Sensors Actuators Functions PID Alarms
	Settings backup and restoration	Expert	Backup and restoration of user settings Backup and restoration of factory settings