CADB/T-HE BASIC

Heat recovery unit with integrated control

EN

ENGLISH

INDEX

1. INTRODUCTION

Thank you for purchasing this appliance. It has been manufactured in full compliance with applicable safety regulations and EU standards.
Please read this instruction book carefully, as it contains important information for your safety during the installation, use and maintenance of this product.
Keep it at hand for future reference.
Please check that the appliance is in perfect condition when you unpack it, as all factory defects are covered by the **S&P** guarantee.

2. SAFETY REGULATIONS AND "CE" MARKING

S&P technicians are firmly committed to research and development of ever more efficient products and in compliance with current safety regulations.
The instructions and recommendations given below reflect current regulations, principally regarding safety, and therefore are based on compliance with general regulations. Therefore, we recommend all people exposed to hazards to strictly follow the safety regulations in force in your country. **S&P** will not be held liable for any possible harm or damage caused by non-compliance with the safety regulations, as well as caused by modifying the product.
The **CE** mark and the corresponding declaration of conformity are proof of the product's conformity with current EU regulations.

3. GENERAL INSTRUCTIONS

A hazard analysis of the product has been carried out as provided in the Machine Directive. This manual contains information for all personnel exposed to these hazards, with the aim of preventing possible harm or damage due to faulty handling or maintenance.
All maintenance operations (ordinary and extraordinary) must be carried out with the machine switched off and the electrical power supply disconnected.
To avoid a possible accidental start up, place a warning notice on the electrical control panel with the following text:

"Attention: control disconnected for maintenance operations"

Before connecting the power supply cable to the terminal strip, make sure the mains voltage corresponds to the voltage indicated on the specifications plate of the unit.
Regularly check the product labels. If, due to the passing of time, they are no longer legible, they must be replaced.

4. UNIT LABELLING

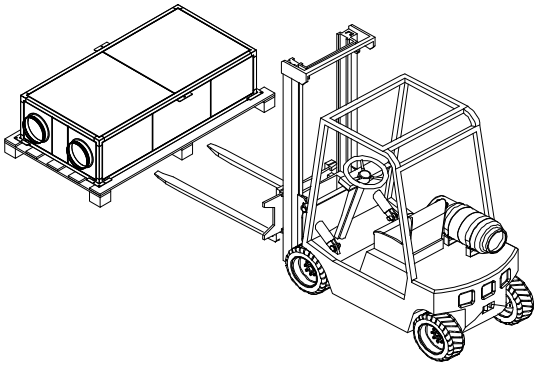
The machine may come with several pictograms that must not be removed. These signs are divided into:
- **Prohibition signs:** Do not repair or adjust when in operation.
- **Danger signs:** Warning of the presence of live elements inside the container bearing the sign.
- **Identification signs:** CE card, indicating product information and manufacturer's address. The CE mark indicates the product's conformity with EEC standards.

Danger signs

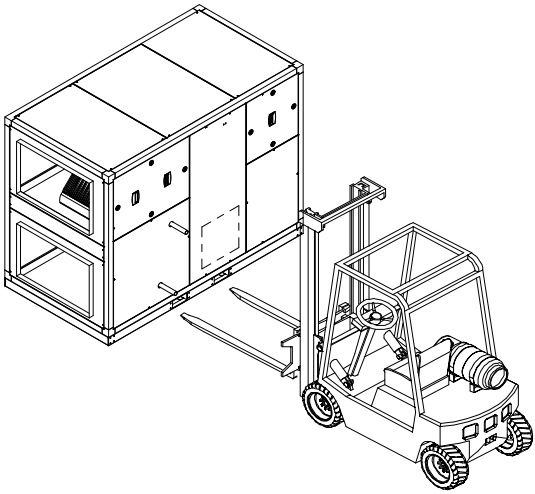
Prohibition signs

5. HANDLING

The CADB/T-HE models 04 to 33 are delivered fixed with screws to the pallets.
The models 45 to 100 are equipped with a bed, due to its weight are supplied without pallets. The unit can be handled by a pallet transporter, a forklift, or a crane.
The handling machines will be adapted to the load and the lifting conditions. In all cases, the lifting will be done at the device's base. The centre of gravity is located at the centre of the unit. The device must be carefully manipulated only in the horizontal position.



Models 04 to 33



Models 45 to 100

6. LIFTING

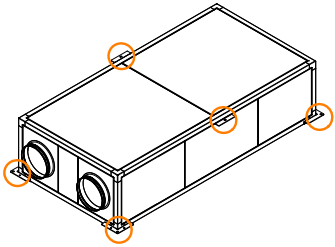
6.1. INTRODUCTION

- If the equipment has to be lifted by crane, the corresponding risk assessment must be carried out and all the necessary safety measures must be taken to avoid accidents.
- The materials and means used during the handling and lifting of the equipment must be appropriate to the shape and dimensions of the equipment.
- Ensure that the means used can support the loads to be lifted. It is recommended to oversize the weight of the equipment with a coefficient of 3 or higher.
- Unit weight: (check unit weights in next section).

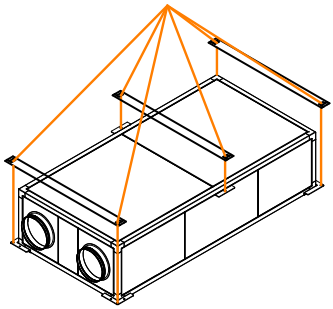
6.2. RECOMMENDED LIFTING METHOD

6.2.1. Horizontal models: 04 to 33 LH/RH

These models include 6 supports, 4 of them located in the bottom corner of the unit and 2 in the mid of the upper longitudinal profile (except size 04):

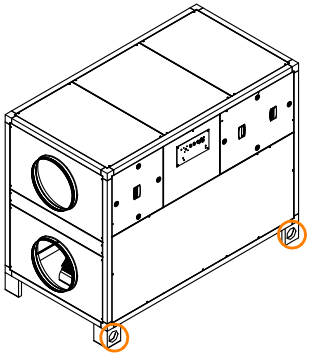


Use the 6 supports (4 in case of size 04) to lift the unit, ensuring that the weight of the unit is well distributed through the 6 cables or slings used.

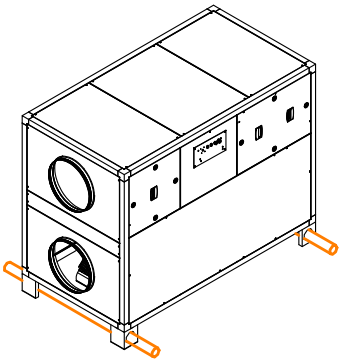


6.2.2. Vertical models: 04 to 33 LV/RV

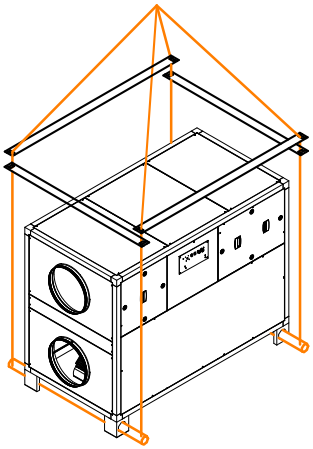
These models include support feet. Each feet has a hole that allows to pass a lifting bar inside them:



Fit 2 metallic bars across the holes of the feet as shown in the picture:

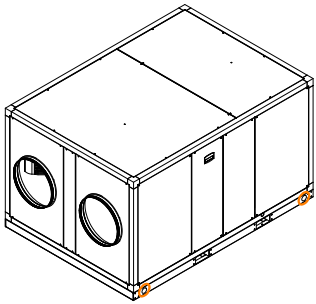


Use exclusively bars specifically designed for lifting purpose, ensuring the bars are suitable for the unit weight.
Use spacers bars to avoid cables or slings from damaging the unit.

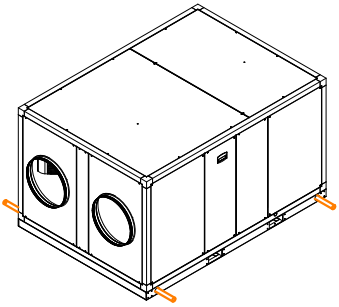


6.2.3. Horizontal and vertical models: 45 to 100

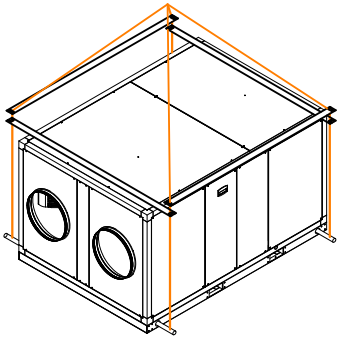
Those models include a perimetral bed support with 2 holes in the ends of the base, shown in the picture:



Fit 2 metallic bars across the holes in the base:



Use exclusively bars specifically designed for lifting purpose, ensuring the bars are suitable for the unit weight.
Use spacers bars to avoid cables or slings from damaging the unit.



7. INSTALLATION

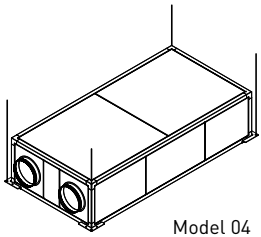
7.1. INTRODUCTION

Horizontal models size 04, 08, 12, 16, 21, 27 and 33

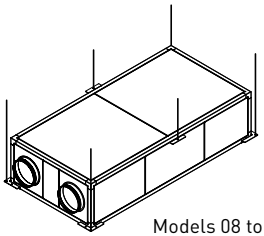
These models are designed to be installed hanging from the ceiling or located behind a false ceiling. When installing the unit, is mandatory to distribute the unit weight between all the supports existing in the units:

- CADB-HE 04: 4 supports (one in each corner)
- CADB/T-HE 08 to 33: 6 supports (one in each corner and 2 centered in each side)

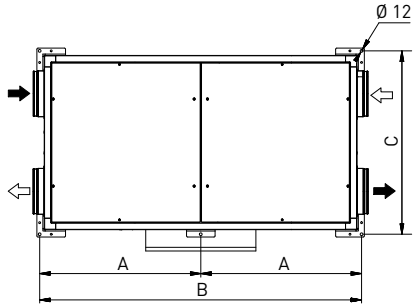
Using studded rods (Ø 8 mm), it can be secured to the ceiling and levelled.



Model 04



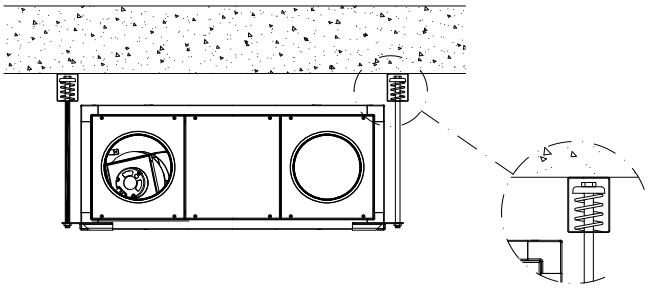
Models 08 to 33



Model	A	B	C
4	-	1558	798
8	894	1788	948
12	869	1738	1088
16	994	1988	1278
21	1169	2338	1678
27	1169	2338	1678
33	1169	2338	1678

The model 04 does not have central support

The installer must ensure that the ceiling structure and the securing elements can bear the weight of the device, taking into account that it is a dynamic load.
To prevent the transmission of vibrations from the unit to the rest of the installation, it is necessary that the installer use specific isolation elements, such as antivibration devices in the supports, flexible sleeves between the unit and the ducts, and flexible couplings between the water connections and the pipelines.

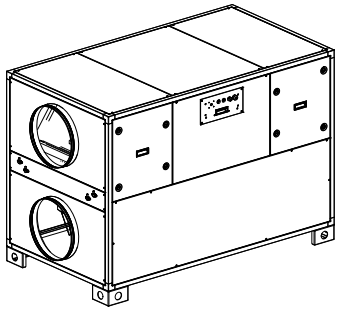


Model	Weight (kg)
4	147
8	183
12	190
16	235
21	333
27	370
33	420

Vertical models

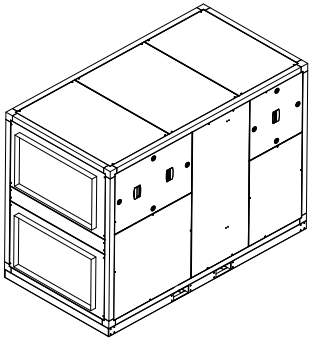
The models size 4 to 27 are supplied with support feets, while the models size 45 and 60 are supplied with a perimetral bed. This bed must be in contact with the ground or with a flat surface. It is essential that the weight of the equipment was distributed between all points of support to prevent unit deformation.
The installer must make sure that the ceiling structure and the securing elements can bear the weight of the unit, taking into account that it is a dynamic load.

Models 04 to 33



Model	Weight (kg)
4	149
8	185
12	192
16	237
21	335
27	372
33	422

Models 45 to 100



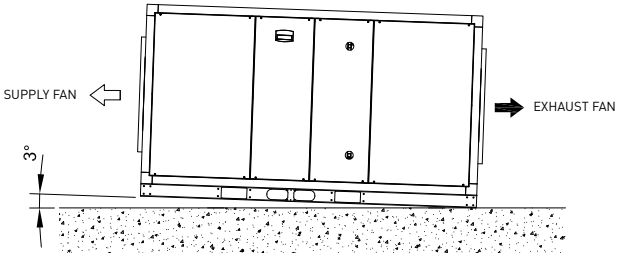
Model	Weight (kg)
45	597
60	730
100	862

Horizontal models of sizes 45 and 60

IMPORTANT!

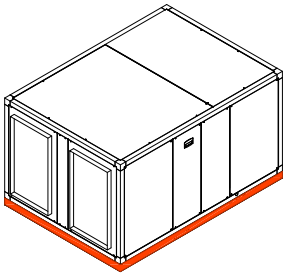
Particularities in the installation of horizontal versions LH and RH

For a correct evacuation of condensation generated into the heat exchanger, it is necessary to install the unit with a minimum slope of **3º** to the side where the extraction fan is placed:



Horizontal models size 45 and 60 are supplied with a perimetral bed. This bed must be in contact with the ground or with a flat surface. It is essential that the weight of the equipment was distributed between all points of support to prevent unit deformation.

The installer must make sure that the ceiling structure and the securing elements can bear the weight of the unit, taking into account that it is a dynamic load.

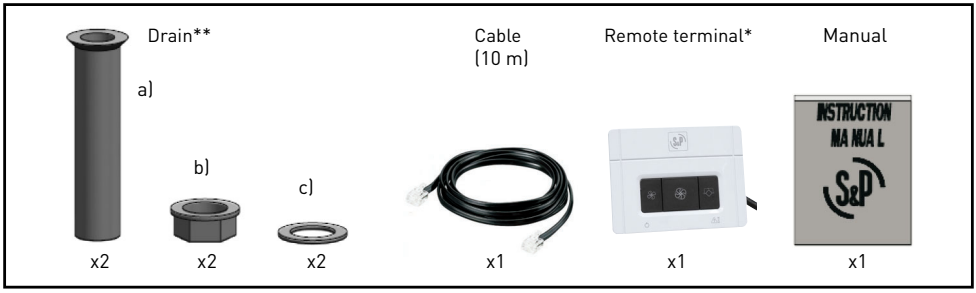


Model	Weight (kg)
45	597
60	730

For all configurations

Once secured the device in correct position, the installer have to perform the connection to the air ducting system, connection to the electric net, and in the case of versions with water coil, the connection with closed circuit of hot water coil.

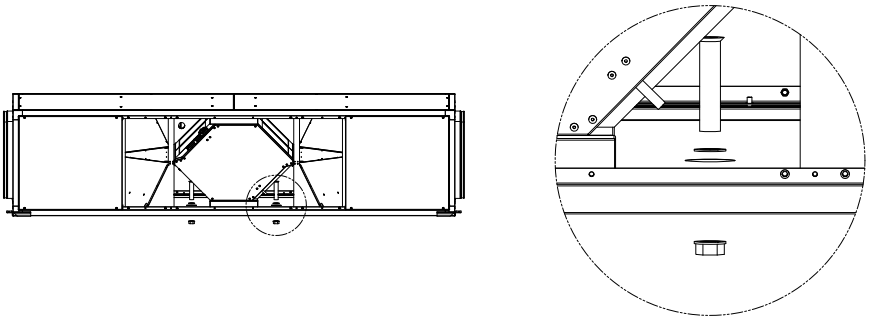
Inside of the unit are supplied the following accessories:



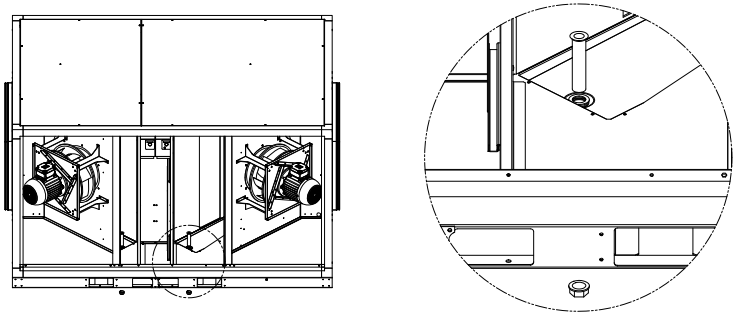
* The remote controller is located inside the electric cabinet.
** In the models 45, 60 and 100 the drain is installed by default in the unit.
The drain is composed by 3 pieces:
a) Drain pipe
b) Female screw
c) Joint ring.

Install the two drains as indicated in the following drawing:

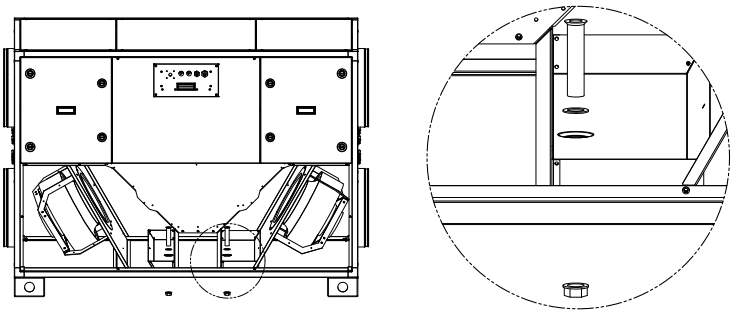
a) Horizontal versions of CADB/T HE 04 to 33



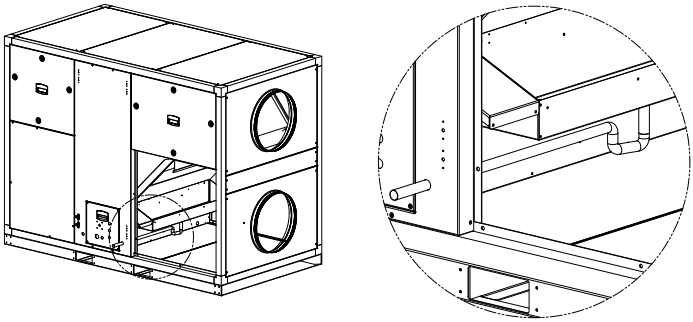
b) Horizontal versions of CADT-HE 45 and 60



c) Vertical versions of CADB/T HE 04 to 33



d) Vertical versions of CADT-HE 45 to 100



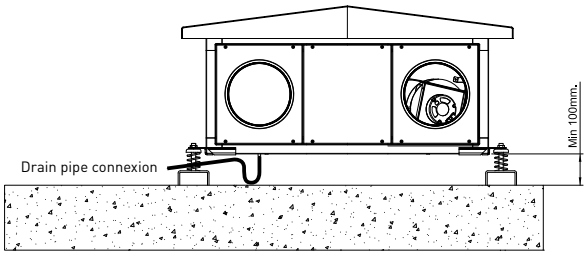
In these versions, the drainpipe and the siphon are supplied mounted in the unit.

7.1.1. Outdoor installation

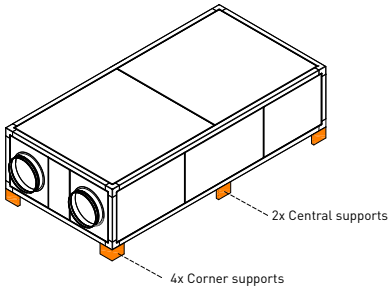
Whenever possible, it is advisable to be mounted indoors. When it is installed outdoors,it is preferable to place the unit under a cover which offers enough protection to prevent rain falling directly to the unit, or install the corresponding rain canopy (TPP accessory). Due to its design and the position of its registers, it is preferable to use vertical versions (LV / RV) for outdoor installation. In addition, these versions have feet that allow direct placement on the ground.

In horizontal version, models 04 to 33, ensure the sufficient space below the unit, to install a siphons in the drain pipe.

If installed on the ground, sufficient space must be guaranteed under the unit so that it is possible to install the corresponding siphons in the condensate outlets of the unit.



There is a Kit composed of 6 feet 5407067200 - KIT PIES CADB-HE, which facilitates the assembly on floor of these versions:



Detail of a CADB-HE 04 to 33 after the assembly of the KIT PIES CADB-HE

Both in the case that the Kit feet is used, or if the unit is based on antivibration pads, it is essential that the unit support was guaranteed on the 6 existing supporting points being all of them at a same plane.
In the case of not supporting the unit on the central supports it is possible that deformation in the structure of the unit could take place, making it impossible to disassemble the panels.

Suitable rain protection canopy, according to the heat recovery unit model:

Heat recovery unit model	Rain protection cowl model	
	Horizontal (LH / RH)	Vertical (LV / RV)
CADB-HE-D 04	TPP-HE-H 04	TPP-HE-V 04
CADB-HE-D 08	TPP-HE-H 08	TPP-HE-V 08
CADB-HE-D 12	TPP-HE-H 12	TPP-HE-V 12
CADB-HE-D 16	TPP-HE-H 16	TPP-HE-V 16
CADB-HE-D 21	TPP-HE-H 21-27-33	TPP-HE-V 21-27
CADB-HE-D 27	TPP-HE-H 21-27-33	TPP-HE-V 21-27
CADB/T-HE-D 33	TPP-HE-H 21-27-33	TPP-HE-V 33
CADT-HE-D 45	TPP-HE-H 45	TPP-HE-V 45
CADT-HE-D 60	TPP-HE-H 60	TPP-HE-V 60
CADT-HE-D 100	–	TPP-HE-V 100

Risk of condensation inside the unit

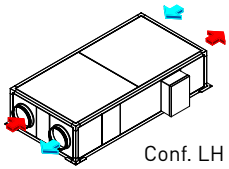
In winter, during the night or during periods of prolonged unit stoppage, it is possible that condensations appear on some internal surfaces of the unit, as well as inside the electrical cabinet.

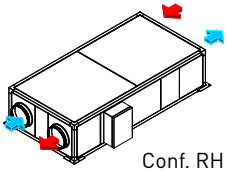
a) Install isolation dampers in air inlet and air outlet.
b) Add anticondensation devices in the electrical cabinet as: cabinet heating elements that prevent condensation formation on cabinet surfaces and electronic components.

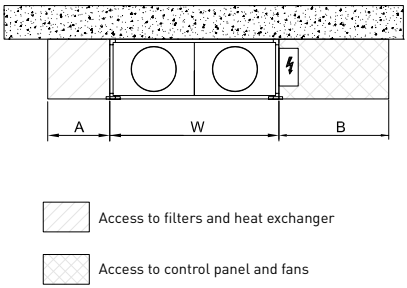
7.2. DIMENSIONS AND FREE SPACE FOR MAINTENANCE

a) Horizontal versions of CADB/T HE 04 to 33 (False ceiling installation)

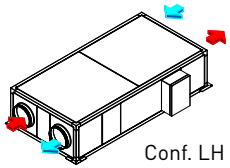
Distances for maintenance in installations with access from the lateral panels

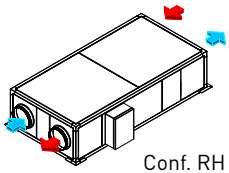


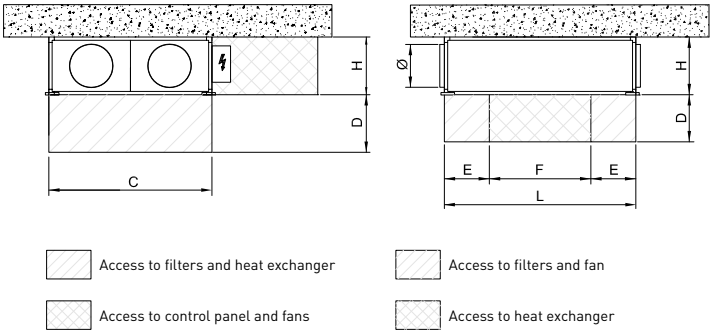




Distances for maintenance in installations with access from the bottom panels



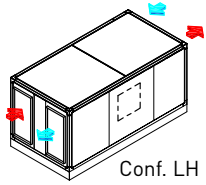


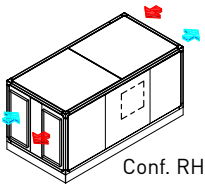


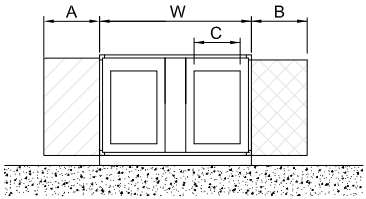
Distances for false ceiling installation

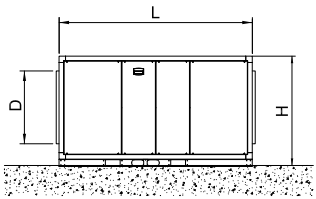
Model	W	H	L	A	B	C	D	Ø	E	F	Weight (kg)
04	760	375	1520	300	400	700	350	200	400	920	147
08	910	425	1750	330	400	860	400	250	400	950	183
12	1050	425	1700	500	400	1000	400	315	500	900	190
16	1240	450	1950	500	500	1190	425	315	500	1150	235
21/27	1640	550	2300	700	700	1590	525	400	700	1300	333
33	1640	650	2300	700	700	1590	625	400	700	1300	420

b) Horizontal versions of CADB/T HE 45 and 60 (Floor installation)









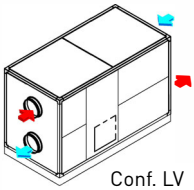
Access to filters and heat exchanger

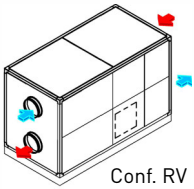
Access to control panel and fans

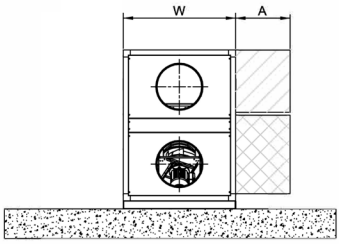
Floor installation

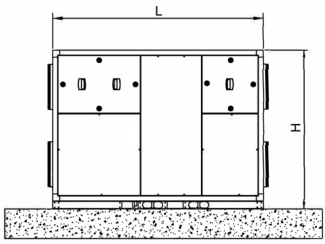
Model	W	H	L	A	B	C	D	Weight (kg)
45	1500	1200	2100	500	600	400	600	597
60	1550	1580	2250	500	750	500	700	730

c) Vertical versions of CADB/T HE 04 to 33







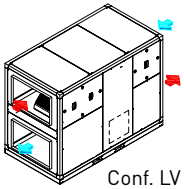


Access to filters and heat exchanger

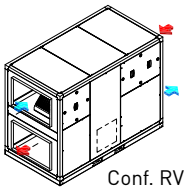
Access to control panel and fans

Model	W	H	L	A	Ø	Weight (kg)
4	540	920	1125	300	200	149
8	610	1020	1275	300	250	185
12	770	1020	1325	400	315	192
16	770	1070	1475	500	315	237
21	970	1270	1750	650	400	335
27	970	1270	1750	650	400	372
33	1170	1270	1750	650	400	412

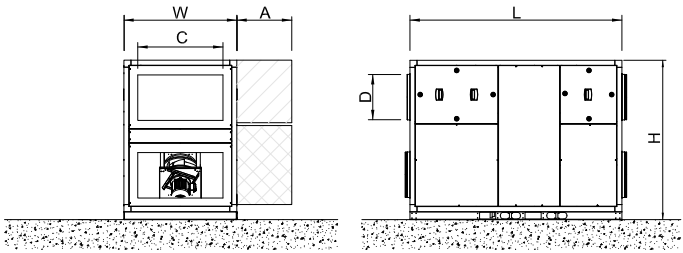
d) Vertical versions of 45, 60 and 100



Conf. LV



Conf. RV



Access to filters and heat exchanger

Access to control panel and fans

Model	W	H	L	A	C	D	Weight (kg)
45	1120	1580	2100	400	600	400	597
60	1500	1630	2250	500	700	500	730
100	2050	1630	2250	650	1100	650	862

7.3. MOUNTING PROCESS OF AN ADDITIONAL SUPPLY FILTER

The heat recovery unit is supplied with the filters already installed. F7 (ePM1 70%) in supply side and M5 (ePM10 50%) in extract side. In addition, it is possible to mount a second filter in the unit (accessory). (For more information see section "Replacement of filters").

7.4. RANGE SPECIFICATIONS

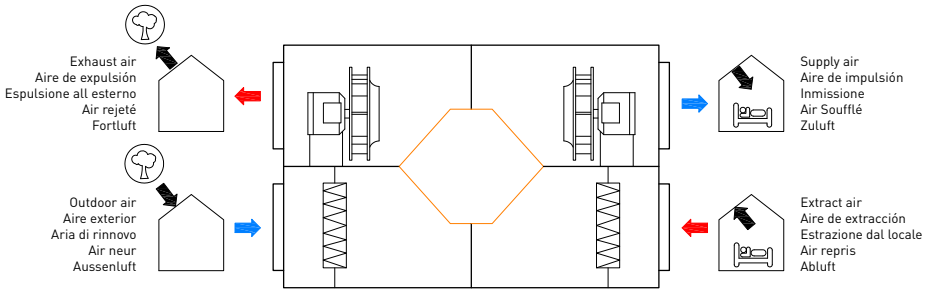
Model	Complete unit						Fan		Weight (kg)
	Air connections diameter (mm)	Nominal airflow (m^3/h)	Efficiency* (%)	Electrical supply	Max. abs. power (kW)	Maximum current (A)	Speed (r.p.m.)	Maximum current (A)	
CADB-HE D 04 BASIC	200	450	87	1/230V, 50Hz	0,2	2,2	3700	0,95	147
CADB-HE D 08 BASIC	250	800	86,4	1/230V, 50Hz	0,4	2,9	2650	1,3	183
CADB-HE D 12 BASIC	315	1.200	85,3	1/230V, 50Hz	0,95	3,5	2550	1,6	190
CADB-HE D 16 BASIC	315	1.600	85,5	1/230V, 50Hz	0,95	4,3	2845	2,0	235
CADB-HE D 21 BASIC	400	2.100	86,7	1/230V, 50Hz	0,9	4,7	1580	2,2	333
CADB-HE D 27 BASIC	400	2.700	83,8	1/230V, 50Hz	1,84	7,5	2450	3,6	367
CADB-HE D 33 BASIC (Mono)	400	3.300	85,9	1/230V, 50Hz	2,2	9,5	2200	4,6	420
CADT-HE D 33 BASIC (Tri)	400	3.300	85,9	3+N/400V, 50Hz	2,2	4,3	2600	2,0	420
CADT-HE D 45 BASIC	600x400	4.500	86,3	3+N/400V, 50Hz	4,43	6,3	2200	3,0	597
CADT-HE D 60 BASIC	700x500	6.100	86,7	3+N/400V, 50Hz	4,43	6,3	2200	3,0	730
CADT-HE D 100 BASIC	1100x610	10.000	88,9	3+N/400V, 50Hz	8,13	11,9	2160	5,8	862

* Wet efficiency referred to nominal airflow. Outdoor conditions (-5ºC / 80% RH) and indoor (20ºC / 50% RH)

7.5. CONNECTIONS

7.5.1. Connection with air duct

The fans are always blowing out with regard to the machine. Before making the connection of air lines, consider the existing identification labels in each inlet/outlet of the heat recovery unit.

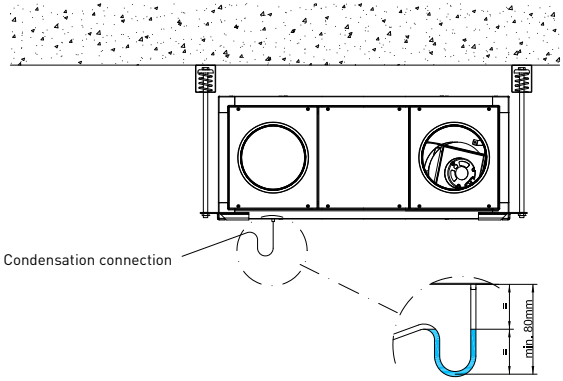


7.5.2. Condensate drainage

The units are supplied with 2 drains (one for each circuit). For added security it has to connect two drains to the condensate discharge pipe. This connection must be made through a pipe of 22 mm of inner diameter and a flange for secure fixation.

Drainage system

- To ensure the removal of draining condensate from the tray a siphon must be installed with pressure head difference in mmWG greater than the pressure provided by the fan.
- The horizontal sections should have a minimum slope of 2%.



The siphon should always be full of water. Check its level periodically, refilling it if necessary. An empty siphon can cause the condensate tray to overflow and water leak through the equipment enclosure.

7.5.3. Electrical connection

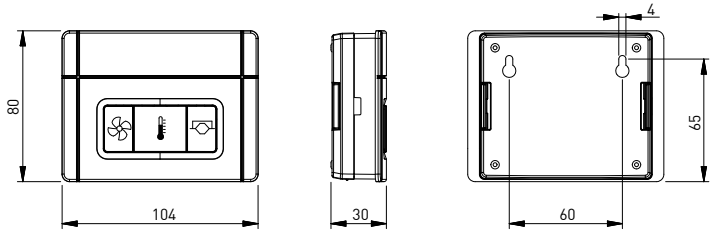
In the recovery unit CADB/T-HE BASIC range, all components integrated into the device, are supplied into the electrical panel (motors, pressure filters, motor pressure switches, temperature sensors and by-pass damper).
The electrical connection is limited to the connection of control terminal (10 m. of supplied cable) and possible electrical accessories as such as CO_2 sensors and finally the connection of the power supply line.

Make electrical connection in accordance to the described in the corresponding wiring diagram, found at the end of this manual.

7.5.3.1. External Touch Display (ETD) control connection

The remote control is supplied with a 10 meter long cable, and it can be replaced by a cable up to 30 meters (minimum control cable type. H05VV-F-4G 0.25). The connection between the control and the control board must be carried out according to the following scheme:
The ETD control has an electrical protection IP-20 degree, so it is valid; it is reserved exclusively for an indoor usage sheltered from moisture.
In case of an outdoor mounting of the CADB/T-HE unit OI, you can also leave it inside the housing of the electrical box. Once the parameter setting is done, the remote control can be disconnected.

Placement of the support and the remote control:



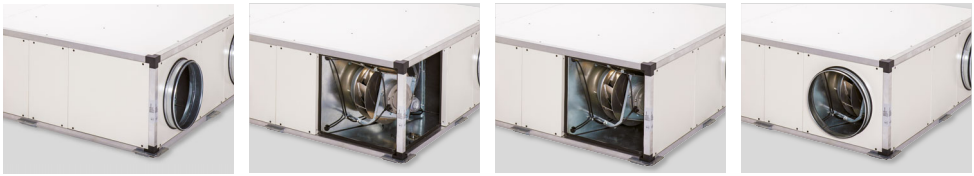
The integration in Modbus networks and the use of the remote controller are not compatible.
The wiring of the RS-485 net is connected at the same terminals used for the remote hand terminal plug.

7.6. CONFIGURATIONS

CADB/T-HE BASIC standard configuration

From these configurations there are multiple variables that can be performed by the professional installer quickly and easily.

Panel replacement process



The CADB-HE heat recovery units are available in two configurations LH and RH in the horizontal models and LV, RV in vertical models.

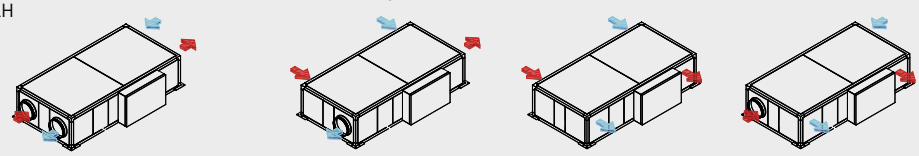
EXHAUST AIR FRESH AIR

Horizontal

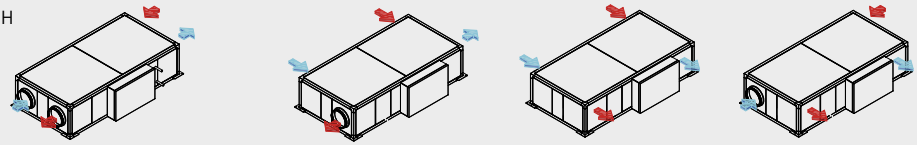
Factory configuration

Examples of some of the configurations that is possible to obtain from factory configuration

LH



RH



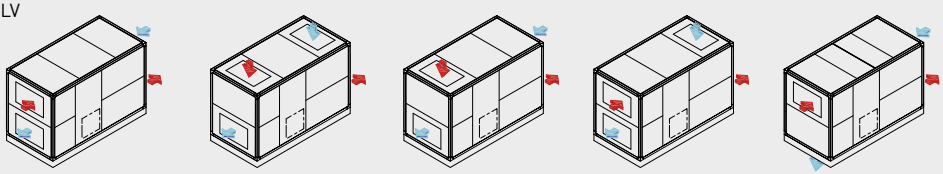
EXHAUST AIR FRESH AIR

Vertical

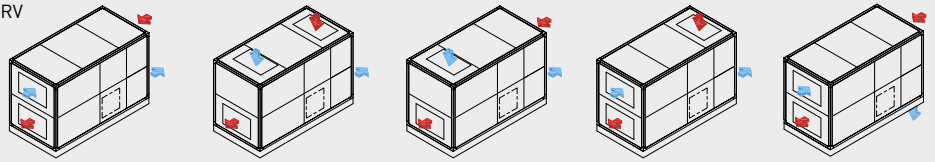
Factory configuration

Examples of some of the configurations that is possible to obtain from factory configuration

LV



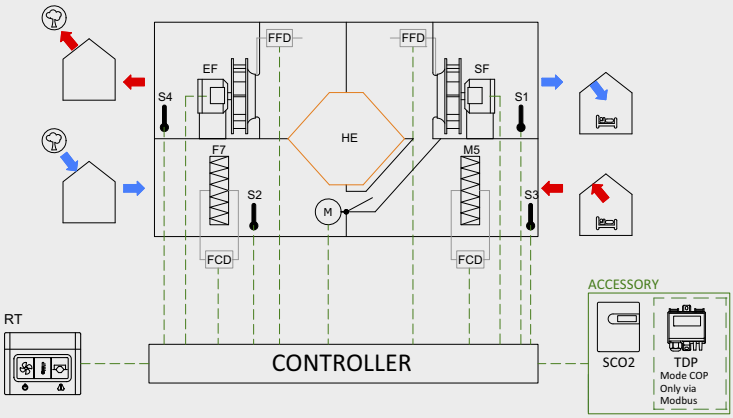
RV



8. CONTROL FUNCTIONS

MAIN ELEMENTS
Control panel includes:
General switch
Electric box including control and wiring components, with access from side panel.
FUNCTIONS
Airflow adjustments
Manual fans speed adjustment
Automatic fans speed adjustment in VAV mode. Fans adjust their speed from the signal measured by an external sensor (CO_2, Relative humidity or Temperature)
Automatic speed adjustment of the fans in COP mode (Constant Pressure). Fans adjust their speed to maintain a constant pressure in the duct net. It is necessary to install an external TDP sensor (accessory)
BOOST function (Forced speed preset via external power free contact) (available just in models 04 to 27)
ON/OFF function (Remote ON/OFF via external power free contact)
Temperature regulation
Temperature probes integrated within the unit (supply, extract, inlet and outlet)
Bypass adjustments
Manual actuation of bypass
Automatic actuation of bypass function free-cooling/ free-heating and heat exchanger anti-freezing protection
SECURITY FUNCTIONS
Control of polluted filters via pressure switches (included)
Alarm display in remote control
Fault detection in temperature probes
Fault detection in fan via pressure switches (included)
Anti-frost protection of heat exchanger via bypass activation.
COMMUNICATION
Remote wiring control
ON/OFF remote digital input via external power free contact.
Alarm digital output via power free contact.
Modbus RTU (RS-485)

9. CONTROL SCHEMES



SF	Supply fan	HE	High-efficiency heat exchanger
EF	Extract fan	RT	Remote control panel
S1	Supply temperature probe	F7	Supply filter
S2	Outdoor temperature probe	M5	Extract filter
S3	Extract temperature probe	M	Bypass actuator
S4	Exhaust temperature probe	SCO2	CO2 sensor (accessory)
FCD	Polluted filters detector (pressure switch)	TDP	Pressure sensor TDP-S (accessory. Exclusively for use in case of Modbus integration)
FFD	Fan Failure Detector (fan relay)		

10. CONTROL BASIC OPERATION

10.1. DESCRIPTION

The control BASIC is a Plug & Play control factory mounted and wired that allows the management and supervision of heat recovery units of the series CADB/T-HE-D without heating/cooling coils.

10.2. MAIN FUNCTIONS

The BASIC controller allows the management of the following functions:

10.2.1. Via the remote terminal supplied with the unit

FUNCTIONALITY
Manual fans speed adjustment
Automatic fans speed adjustment in VAV mode. Fans adjust their speed from the signal measured by an external sensor (CO_2, Relative humidity or Temperature)
Remote stop / start of the unit via external contact (Free of voltage)
BOOST function: Forced preset speed via external contact free of voltage. Only available for models 04 to 27
Bypass damper management
Heat exchanger anti-freezing protection
Alarm display in remote control
Control of polluted filters via pressure switches (included)
Control of fans status / failure
Modbus RTU communication

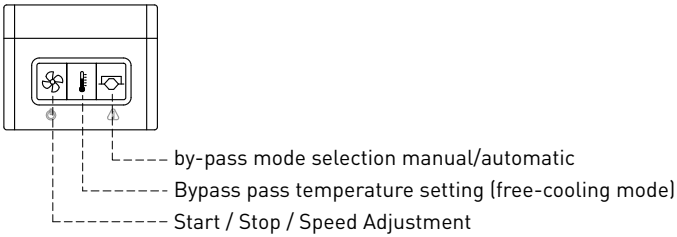
10.2.2. Through integration to Modbus network (external BMS)

Integration into Modbus networks is incompatible with the use of the remote control. In addition to all-functionality available through the remote control, through the map of modbus registers it is possible to obtain the following functionalities and information:

FUNCTIONALITY
Automatic fan speed adjustment in COP (Constant Pressure) mode. Fans vary their speed to maintain a constant pressure in the ductwork. It is necessary to install an external TDP sensor.
Visualization of functional parameters of the unit, including: - Outside air temperature - Supply temperature - Inside air temperature - Outside air expulsion temperature - Current fan speed - Detailed information alarms

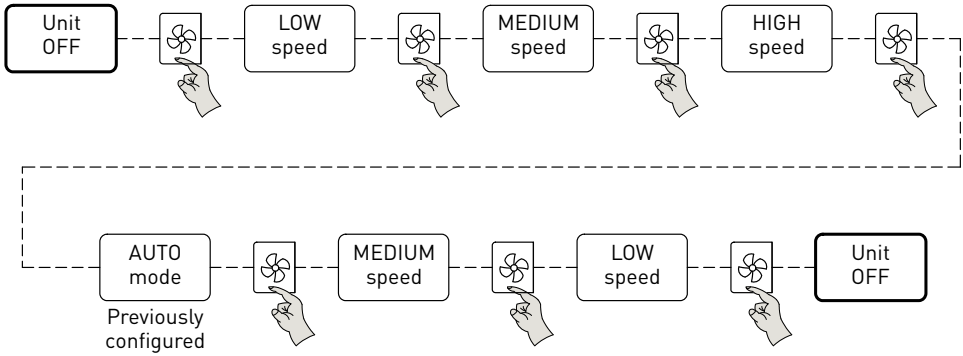
10.3. USE OF REMOTE TERMINAL - USER LEVEL

Using the three buttons on the remote terminal, simple operation settings can be done, as well as obtain information on its operating status.
Function of the buttons:



10.3.1. Fan speed selection (Start / Stop / Speed adjustment)

Pressing the button both fans start running, the fans increase progressively its speed until reaching the LOW setpoint speed. Through successive pulsations it is possible to change the fans speed.
The control of this operation mode will be carried out by means of the button of speed selection, following the sequence:



The colour of the speed button lights up depending on the selected speed:

Speed	Default value* 0-10V signal	Led colour
LOW	3,5 V	Green
MEDIUM	6 V	Orange
HIGH	9,5 V	Red
AUTO	-	Flashing green

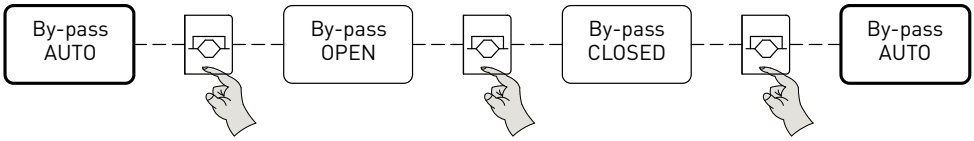
* The set speeds are modifiable (See chapter Control settings).

10.3.2. Free-cooling function setting

The heat recovery units of the CADB / T-HE BASIC range are equipped with a by-pass damper that, when opened, allows outside air to be introduced in the building without being heated / cooled in the heat exchanger. (Being a partial bypass a small percentage of air continues to pass through the heat exchanger).
The BASIC controller manages the by-pass damper based on the temperatures measured by the 4 temperature probes in the unit.
The opening of the bypass occurs under the following conditions:

1. Forced manual opening from the remote controller
2. Free-cooling function, with the bypass being in Automatic mode, if there is cooling demand:
   - Setpoint temperature < Supply air temperature
   - Outdoor temperature < Supply air temperature
   - Outdoor temperature > 12ºC
3. Free-cooling function, with the bypass being in Automatic mode, if there is heating demand:
   - Setpoint temperature < Supply air temperature
   - Outdoor temperature > Supply air temperature
   - Outdoor temperature < 30ºC
4. Frost exchanger protection function. In winter conditions, when there is risk of freezing the condensates inside the heat exchanger, the bypass is opened as the last action of the defrost strategy. Previously, the fan speed is reduced until it reaches the minimum speed.

By pressing on the "bypass" button, the bypass status is modified, being selectable the following positions:



By-pass state	Led colour*
Manually opened	Green
Manually closed	Orange
Automatic mode	Off

* If there are active alarms, the free-cooling led will light up alternately showing both the status of the display and the number of the alarm. The bypass status will be displayed 3 seconds with the corresponding LED color (green or orange) and the corresponding sequence of each alarm.

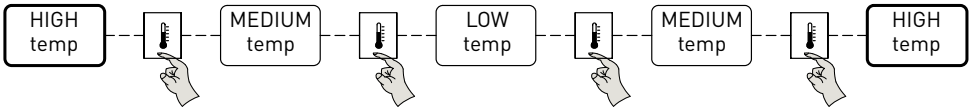
When the bypass is activated manually, it will always have priority over the automatic and will remain in the indicated state for 8 hours.

Operation in automatic mode

The free-cooling / free-heating mode is programmed with the following algorithm: The lower temperature limit of the T_{ODA} probe is a minimum of 12ºC, below this temperature the bypass operation does not happens in order to avoid discomfort due to the entry of air excessively cold.

10.3.3. Setting the by-pass pass temperature in free-cooling mode

Pressing on the button modifies the setpoint temperature value of the by-pass. Below this temperature, whenever there is a demand for cooling in the building, the by-pass damper will be opened:



Temperature	Default value*	Led colour
High	25ºC	Red
Medium	20ºC	Orange
Low	15ºC	Green

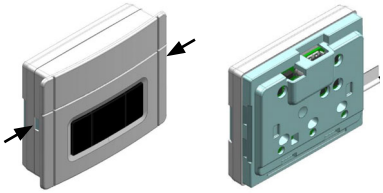
* The setpoint temperatures can be modified (See chapter Control settings).

10.4. ADVANCED PARAMETERS CONFIGURATION

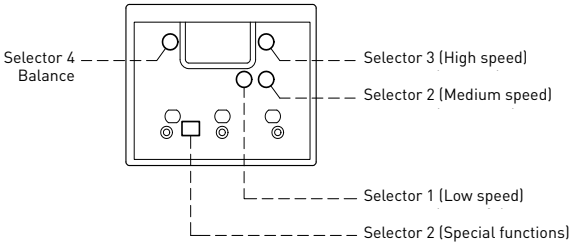
In addition to the functions that can be performed through the three buttons of the hand terminal, it is also possible to modify some of the parameters and functionalities set from factory. Depending on the parameter to be modified, it will be necessary to access the electronic board of the controller (inside the electrical cabinet) or the remote hand terminal.

Access to the selectors inside the remote hand terminal (rotary type)

By disassembling the front of the remote control you have access to a serie of potentiometers that allow to modify some of the factory settings.
Using a screwdriver, perform light lever in the side slots until the front of the control is released.

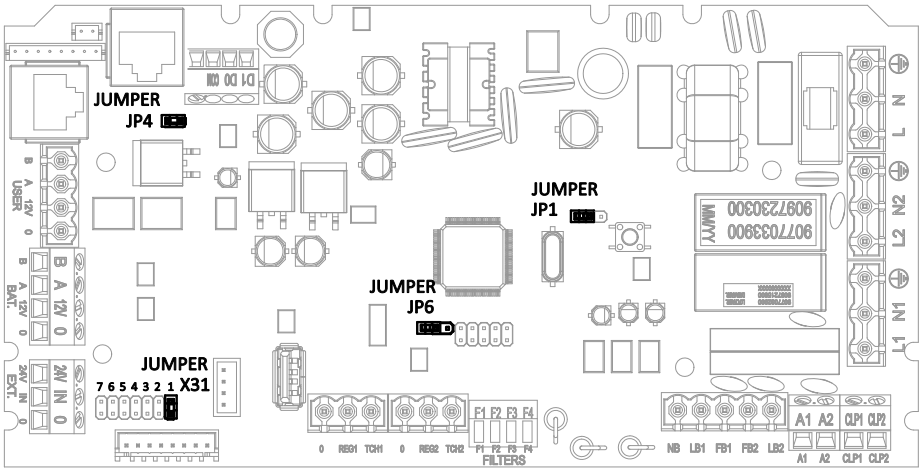


View of the rotary selectors, once the cover is removed:



Access to controller PCB selectors and jumpers

Inside the electrical cabinet is the PCB controller, which has some selectors and jumpers through which it is possible to change the factory settings of the controller:



Jumper	Functionality
JP1	Enable Modbus communication (Control of the unit from the BMS)
JP4	In Modbus networks, define last unit in the network (end of line)
JP6	Type of verification of fans status
X31	Origin fan speed control (Command, external probe, etc.)

Functionality of the selectors and jumpers on the controller board (inside the electrical cabinet).

10.4.1. Modification of predefined speeds

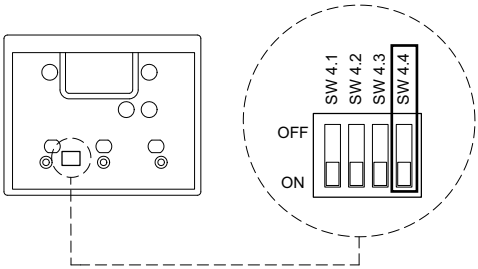
Low Speed (Selector 1): Setting of the supply fan low speed. Between 2,1 and 3,5V with increments of 0,2V for each position of the selector. Default setting 3.5V (Selector position F).
Medium Speed (Selector 2): Setting of supply fan medium speed. Between 3,5V and 6,5V with increments of 0,2V for each position of the selector. Default setting 6V (Selector position D).
High Speed (Selector 3): Setting of supply fan high speed. Between 6,5V and 9,5V with increments of 0,2V for each position of the selector. Default setting 9,5V (Selector position F).
Balance (Selector 4): The predefined setpoints with selectors 1,2 and 3 will be directly those applied to the supply fan, while the extract fan may work with a certain unbalance regarding the supply fan. This unbalance is defined through the selector 4, as a percentage between -30% and 30% with increments of 5%. The unbalance values assigned to each position of the selector are the following ones:

Selector position	Selector 1 (Low speed) (Vdc)	Selector 2 (Medium speed) (Vdc)	Selector 3 (High speed) (Vdc)	Selector 4 (Balance)
0	2,1	3,5	6,5	-30 %
1	2,1	3,7	6,7	-25 %
2	2,1	3,9	6,9	-20 %
3	2,1	4,1	7,1	-15 %
4	2,1	4,3	7,3	-10 %
5	2,1	4,5	7,5	-5 %
6	2,1	4,7	7,7	0 %
7	2,1	4,9	7,9	5 %
8	2,1	5,1	8,1	10 %
9	2,3	5,3	8,3	15 %
A	2,5	5,5	8,5	20 %
B	2,7	5,7	8,7	25 %
C	2,9	5,9	8,9	30 %
D	3,1	6,1	9,1	0 %
E	3,3	6,3	9,3	0 %
F	3,5	6,5	9,5	0 %

Possible regulations depending on the position of the control selectors.

10.4.2. Modification of the bypass opening setpoint (free-cooling mode)

Using the **SW4.4** selector it is possible to select between two ranges of setpoint temperatures:

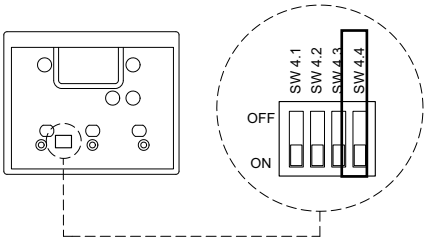


SW4.4	Predefined temperature range
OFF	13/18/23ºC
ON	15/20/25ºC (by default)

Once a certain range has been selected, the setpoint value is selected by pressing on the temperature icon (See section "Remote control setting - User".

10.4.3. Fan selection that acts as a master (only available on units controlled via Modbus in COP mode)

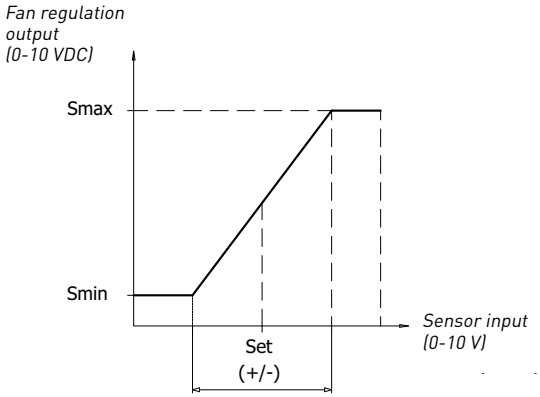
Using the **SW4.3** selector it is possible to define which of the two fans acts as a master. The fan defined as master must be the one that supplies or extracts air from the network of ducts in which the pressure transmitter is installed.
The speed of the fan defined as a slave is regulated as a percentage of the speed of the master fan, being possible to apply a percentage of unbalance.



SW4.3	COP motors configuration
OFF	Supply master- Extract slave
ON	Extract master- Supply slave

10.4.4. Operation at Variable Airflow (VAV) mode, depending on an external sensor (CO_2, temperature or relative humidity)

CADB/T-HE BASIC units can regulate fan control speed proportionally to the signal of an external sensor with 0-10V output. The increase of the sensor measure causes the fan speed to be increased according to a previoulsy configured proportional ramp.



From factory, this functionality is disabled. The automatic operation mode is enabled and configured by means of the jumper in the X31 pin strip (in the controller board). The position of the jumper depends on the type of sensor used according to the following table:

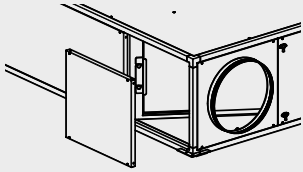
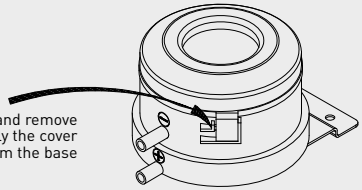
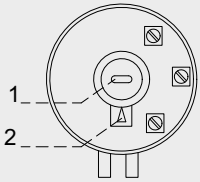
	Without sensor	CO2	Temp.	Hum. Rel.	Control 0-10V desde BMS	Not used	Not used
Jumper position	1	2	3	4	5	6	7
Range	-	2000ppm	50ºC	100%	10V		
Setpoint	-	1100ppm	25ºC	50%	5V		
Offset reg. (+/-)	-	400ppm	2ºC	5%	2.5V		
Alarm	-	1600ppm	28ºC	70%	10V		
Smin	-	2V	2V	2V	2V		
Smax	-	10V	10V	10V	10V		

10.4.5. Filter supervision

CADB/T-HE BASIC heat recovery units are supplied with pressure switches mounted on both filters (supply and extraction). When the differential pressure value measured by the pressure switches exceeds 200Pa an alarm is produced. Depending on the particularities of the installation (operating hours and polution of the outdoor environment) it may be advisable to change the pressure switch setting as indicated in the following table:

Filters state	Airflow	Action
The filters alarm appears offen	When the dirty filter alarm is active, the air flow is correct	Increase pressure switch setting to 300 Pa
No dirty filter alarm appears or it takes too long to appear.	Insufficient air flow due to filter clogging	Reduce the pressure switch setting to less than 200Pa
The filters alarm appears with too much frequency	When the dirty filter alarm is active, the airflow is insufficient	The performance of the heat recovery unit is not enough: - Review the dimensioning of the duct system - Check leakages - Oversize the selected heat recovery unit

To change the pressure switch setting, follow the sequence below:

1. Access the filter zone in which the pressure swich filters are placed	
2. Lift the pressure switch cover	
3. Turn the dial (1) using a flathead screwdriver, until the pointer (2) indicates the pressure value to be defined	

10.4.6. Fan status monitoring

After two minutes from the fans run order, the controller verifies the operation of both fans (supply and extract). In case of detecting an abnormal operation of any of them, the alarm LED will light, and the unit stop sequence will be performed.

The fan status detection is done in two different ways depending on the type of motor used:

- In fans of lower power, it's done by the supervision of the RPM's.
- In fans of higher power, detection is done through the alarm relay integrated in the motors electronic PCB.

The position of jumper **JP6** defines the type of supervision configured. This setting is made at the factory, so the installer should not change these settings.

Heat recovery unit model	Jumper JP6	Function
CADB-HE-D 04 to 33*	Closed-ON	Supervision by control of fan RPM
CADT-HE-D 33* to 100	Open-OFF	Supervision by fans relay

* Model 33 is available in CADB version (with single-phase fans) and CADT (with three-phase fans).

10.4.7. Boost function - Forced High Speed (only available in models single-phase CADB-HE 04 to 33)

By closing an external digital contact, it is possible to force the fan operation at normal speed for a setted time (30 mins. by default).

Operation: When activating and deactivating the boost (push-button operation) on terminals F3-F4, fans start running at Boost speed. The unit will stay at that speed during the preset time (30 minutes by default). After this time the fans go back to its previously selected speed.
By means of the corresponding Modbus registers it is possible to configure:
- Fan control sinal in Boost mode (5 to 10V)
- Boost mode time
- Type of contact (NO, NC): Coil, 6

Deactivation Boost Function: Once the Boost is active, it can be deactivated either by stopping the unit via the remote hand terminal, or by disconnecting it from the power supply.

10.4.8. Remote Stop-Start

It is possible to start-stop the unit by means of an external digital contact (see electric diagrams). The contact closure between CLP1 and CLP2, will produce the unit stop.

When the equipment is stopped remotely the control hand terminal displays an alarm message, warning that it is possible that the unit will be start up from remote at any time.

10.4.9. Protection of heat exchanger unit

This functionality prevents freezing of the condensates existing inside the heat exchanger (On the side of expulsion of air to the outside).

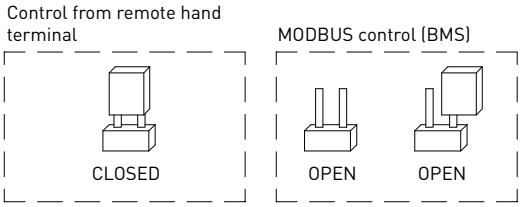
In order to protect the heat exchanger, the BASIC controller implemented 3 different strategies:

Function	Strategy
Fans unbalancing	• It is activated when the exhaust air temperature descends **4ºC**. The unit comes into Defrost mode, setting the supply fan SAF at **50%** of its nominal speed, while the extract fan EAF remains at his nominal speed.
By-pass opening	• It is activated when the exhaust air temperature descends **2ºC**. At that moment the by-pass damper opens, diverting the supply air directly into the building and using the exhaust air to defrost the heat exchanger. • In this situation, the unit enters in Defrost mode, and the alarm "Analog deicing" is activated.
Supply air temperature supervision	• Regardless of the protection strategies activated, if the supply air temperature falls below **11°C**, after a time delay of **5 mins** the unit will stop, restart again after **1 hour.** • These parameters are configurable.

11. BUILDING MANAGEMENT SYSTEM (BMS) CONNECTION

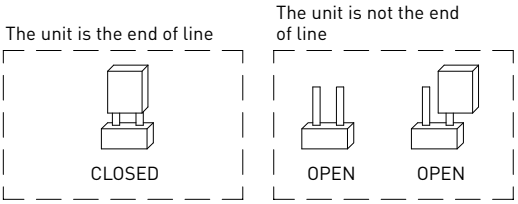
Jumper	Functionality
JP1	Enable Modbus communication (Control of the unit from the BMS)
JP4	In Modbus networks, define the last unit of the network (End of line)

The controller has a Modbus communication module through which it is possible to control the unit from an external BMS, as well as monitor a large part of the functional variables of the unit.
By default, the communication is disabled, to enable it, the position of the JP1 jumper existing on the controller board must be modified.



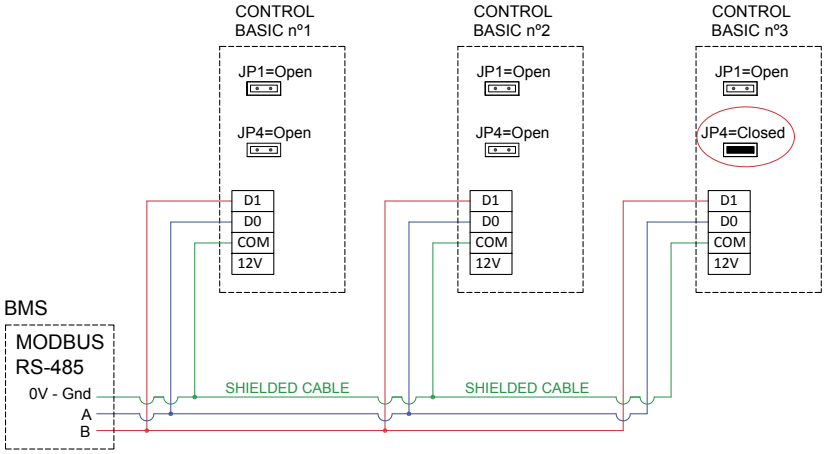
Jumper JP1: MODBUS communication

Once the MODBUS network wiring has been completed, the last unit of the network (end of line) must be specified using the JP4 jumper on the controller board.



Jumper JP4: End of line resistance (in Modbus networks)

Position of the JP1 and JP4 Jumpers depending on the location of the unit in the Modbus network.



Basic characteristics of the Modbus-RTU controller

Addressing	Slave: configurable address from 1 to 247
Diffusion	Yes
Transmission speed	19200
Parity	EVEN
Mode	RTU
Electrical interface	RS-485 2W-wired or RS232
Connector type	RJ 45

MODBUS message

Address	Function	Data	CRC verification
8 bits	8 bits	N x 8 bits	16 bits

The format for each byte in RTU mode is:
Code system: 8–bit binary
Bits per Byte: 1 bit of START (start)
8 data bits, the most significant bit is sent the first
1 bit for the parity (Even parity required)
1 bit of STOP (end)

Modbus memory map

Nº Reg.	Type of register	Description	Range	Data	Default value	R/W	Comments
General configuration							
9	Coil	Unit status	0	Off	1	R/W	
			1	Run			
7	Coil	Contact CLP start/stop	0	Contact NO	0	R/W	
			1	Contact NC			
0	Coil	Fans working mode	0	VAV mode	0	R/W	
			1	COP mode			
0	Input Register	Vin	0 - 10	V		R	Analogic input value (V)
1	Input Register	TODA	-30 - 50	ºC		R	Outdoor Air Temperature (Fresh air)
2	Input Register	TETA	-30 - 50	ºC		R	Extract Air Temperature (Foul air)
3	Input Register	TEHA	-30 - 50	ºC		R	Exhaust Air Temperature (Foul air)
4	Input Register	TSUP	-30 - 50	ºC		R	Supply Air Temperature (Fresh air)

Nº Reg.	Type of register	Description	Range	Data	Default value	R/W	Comments
MODBUS configuration							
0	Holding Register	Communication channel	1 - 247	Channel / Node	1	R/W	
1	Holding Register	Baudrate	0	110	8	R/W	
			1	300			
			2	600			
			3	1200			
			4	2400			
			5	4800			
			6	9600			
			7	14400			
			8	19200			
			9	28800			
			10	38400			
			11	56000			
			12	57600			
			13	115200			
2	Holding Register	Parity	0	Without parity	2	R/W	Involves that will exist 2 stop bits
			1	ODD			
			2	EVEN			
0	Discret input	Communication alarm	0	No alarm	0	R	
			1	Alarm active			
Fans configuration							
1	Coil	Type of motors	0	EC fans	0	R/W	
			1	AC fans with inverter			
4	Holding Register	Pulses per supply fan turn	1 - 5	Pulses/Turn	1	R/W	
3	Holding Register	Pulses per extract fan turn	1 - 5	Pulses/Turn	1	R/W	
5	Holding Register	Minimum RPM	50 - 500	RPM	300	R/W	
1	Discret input	Supply fan alarm	0	No alarm	0	R	
			1	Alarm active			
2	Discret input	Extract fan alarm	0	No alarm	0	R	
			1	Alarm active			
6	Input Register	RPM supply fan	0-5000	RPM supply fan	0	R	
5	Input Register	RPM extract fan	0-5000	RPM extract fan	0	R	
2	Coil	Fan selection master/slave	0	Supply fan master	0	R/W	
			1	Extract fan master			
9	Holding Register	Unbalance slave fan	-30 - 30	%	0	R/W	

Nº Reg.	Type of register	Description	Range	Data	Default value	R/W	Comments
Fans operation mode VAV							
50	Holding Register	Selected speed	1	Low speed	1	R/W	
			2	Medium speed			
			3	High speed			
			4	Automatic			
6	Holding Register	Low speed	0,5 - 5	Volts	3,5	R/W	
7	Holding Register	Medium speed	3 - 8	Volts	6	R/W	
8	Holding Register	High speed	5 - 10	Volts	9,5	R/W	
10	Holding Register	Type of sensor	0	Without sensor	0	R/W	
			1	CO2			
			2	Temperature			
			3	Relative humidity			
			4	0-10V external control			
11	Holding Register	Range PPM	0 - 4000	CO_2 PPM	2000	R/W	If type sensor = 1
12	Holding Register	Temperature Range	0 - 80	ºC	50	R/W	If type sensor = 2
13	Holding Register	Rel.Humidity range	0 - 100	% Humidity	100	R/W	If type sensor = 3
14	Holding Register	Range 0-10V	0 - 10	Volts	10	R/W	If type sensor = 4
15	Holding Register	Setpoint PPM	0 - End of range	PPM	1100	R/W	If type sensor = 1
16	Holding Register	Setpoint ºC	0 - End of range	ºC	25	R/W	If type sensor = 2
17	Holding Register	Setpoint % humidity	0 - End of range	% Humidity	50	R/W	If type sensor = 3
18	Holding Register	Setpoint 0-10V	0 - End of range	Volts	5	R/W	If type sensor = 4
19	Holding Register	Offset regulation (+/-) PPM	0 - End of range	PPM	400	R/W	If type sensor = 1
20	Holding Register	Offset regulation (+/-) ºC	0 - End of range	ºC	2	R/W	If type sensor = 2
21	Holding Register	Offset regulation (+/-) % humidity	0 - End of range	% Humidity	5	R/W	If type sensor = 3
22	Holding Register	Offset regulation (+/-) 0-10V	0 - End of range	Volts	2,5	R/W	If type sensor = 4
51	Holding Register	Alarm limit PPM	0 - End of range	PPM	1600	R/W	If type sensor = 1
52	Holding Register	Alarm limit ºC	0 - End of range	ºC	28	R/W	If type sensor = 2
53	Holding Register	Alarm limit % humidity	0 - End of range	% Humidity	70	R/W	If type sensor = 3
54	Holding Register	Alarm limit 0-10V	0 - End of range	Volts	10	R/W	If type sensor = 4
3	Discret input	Status alarms	0	Alarm not active	0	R	
			1	Alarm active			
23	Holding Register	Minimum output	0 - 5	Volts	2	R/W	
24	Holding Register	Maximum output	5 - 10	Volts	10	R/W	

Nº Reg.	Type of register	Description	Range	Data	Default value	R/W	Comments
Fans operation mode COP							
25	Holding Register	Sensor range	0 - 2500	Pascal	2500	R/W	
26	Holding Register	Setpoint	0 - End of range	Pascal	200	R/W	
29	Holding Register	Kp	1 - 250	Proportional constant	20	R/W	
30	Holding Register	Ki	1 - 250	Integral constant	20	R/W	
27	Holding Register	Minimum output	0 - 5	Volts	2	R/W	
28	Holding Register	Maximum output	5 - 10	Volts	10	R/W	
BOOST (Only available in models 04 to 27)							
8	Coil	BOOST status	0	Not active	0	R/W	
			1	Active			
31	Holding Register	Timmer mode boost	30-600	Minutes	60	R/W	
32	Holding Register	Fan speed setpoint when boost	5 - 10	Volts	10	R/W	
6	Coil	Contact CLP BOOST / Fans control (Selectable through JP6)	0	Contact NO	0 / 1	R/W	
			1	Contact NC			
BY-PASS management							
4	Discret input	By-pass status	0	Open	0	R	
			1	Closed			
33	Holding Register	By-pass operation mode	1	Automatic	0	R/W	
			2	Manual open			
			3	Manual closed			
3	Coil	Definition of Tcontrol	0	TETA	1	R/W	Control in extract air
			1	TSUP			Control in supply air
38	Holding Register	Timmer after by-pass manual operation	0 - 600	Minutes	480	R/W	
49	Holding Register	T_{ODA}	5 - 20	ºC	12	R/W	Outdoor air temperature
39	Holding Register	T_{SUP} minimum	5 - 20	ºC	12	R/W	Supply air minimum temperature
40	Holding Register	T_{SUP} maximum	15 - 30	ºC	30	R/W	Supply air maximum temperature
34	Holding Register	T_{SP} low	5 - 30	ºC	13 / 15	R/W	Low temperature setpoint
35	Holding Register	T_{SP} medium	5 - 30	ºC	18 / 20	R/W	Medium temperature setpoint
36	Holding Register	T_{SP} high	5 - 30	ºC	23 / 25	R/W	High temperature setpoint
37	Holding Register	Active Setpoint Temperature	1	T_{SP} low	2	R/W	
			2	T_{SP} medium			
			3	T_{SP} high			
Defrost management							
6	Discret input	Defrost status	0	Not active	0	R	
			1	Active			
41	Holding Register	T_{RISK}	0 - 10	ºC	5	R/W	
42	Holding Register	T_{SUP} min defrost	5 - 25	ºC	11	R/W	

Nº Reg.	Type of register	Description	Range	Data	Default value	R/W	Comments
44	Holding Register	Not used					
46	Holding Register	Tiempo de espera post Open Bypass	1 - 40	Minutes	2	R/W	
47	Holding Register	Fan speed deceleration ramp	0,1 - 2	V/min	0,5	R/W	
Clogged filter alarm							
5	Discret input	Alarm status	0	Alarm not active	0	R	
			1	Alarm active			
4	Coil	Type of supervision	0	Supervision by time	1	R/W	
			1	Supervision by pressure switch			
48	Holding Register	Time to filter change alarm	500 - 5000	Hours	2500	R/W	
ODA sensor alarm							
8	Discret input	Alarm status	0	Alarm not active	0	R	
			1	Alarm active			
SUP sensor alarm							
9	Discret input	Alarm status	0	Alarm not active	0	R	
			1	Alarm active			
ETA sensor alarm							
10	Discret input	Alarm status	0	Alarm not active	0	R	
			1	Alarm active			
EHA sensor alarm							
11	Discret input	Alarm status	0	Alarm not active	0	R	
			1	Alarm active			

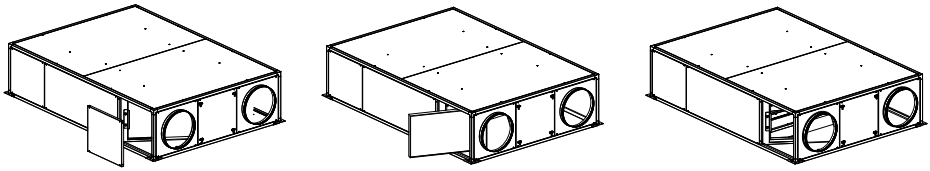
12. INSPECTION, MAINTENANCE AND CLEANING

12.1. REPLACEMENT OF FILTERS

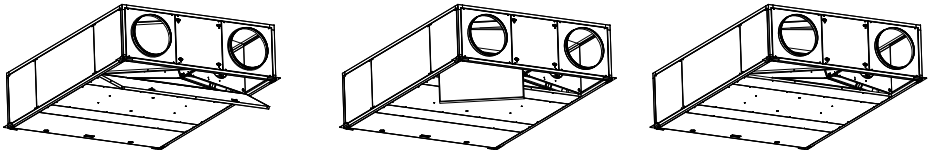
The Pro-Reg control incorporates a function of supervision of the filters clogging.
When the filter replacement is required, the display shows an alarm message.
The registers ubication for filters maintenance depends on the model and version. The exact ubication of the filters is identified by a label in the profile that indicates the type of filter and its characteristics.

FALLING OBJECTS
By loosening the screws that hold the panels, they will be released. In units installed in ceiling, pay special attention to this operation to prevent the fall of a panel. During the maintenance signaling the area below the heat recovery unit and prevent personnel access to it.

- **Horizontal configurations of CADB/T-HE 04 to 33.** The access to filters can be done by the lateral panels and /or by the bottom panels (depending on the model):

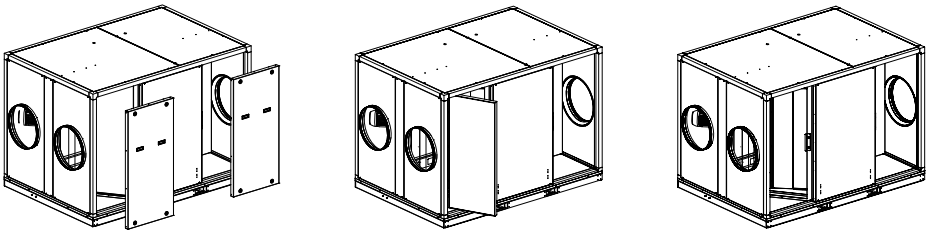


Quick access to filters from the lateral panels.

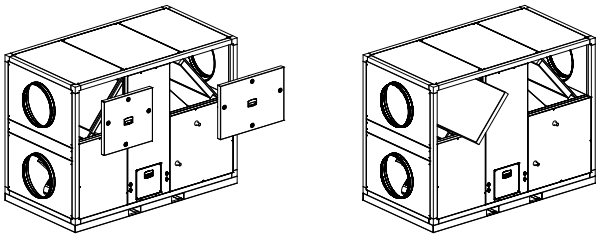


Quick access to filters from the bottom panels.

- **Horizontal configurations of CADB/T-HE 45 and 60.** The access to filters can be done by the side panels:



- **Vertical configurations of CADB/T-HE 04 to 100.** The access to filters can be done by two sides of the unit, removing the specific panels selon in the following image:



Replacement filters are delivered in a plastic bag for extra protection. Remove the bag before installing the filter into the unit.
Before installing the filter make sure that the airflow direction is correct. (indicated by an arrow in the filter).

Filters parts table

Heat recovery model	Ø (mm)	AFR-HE (Accessory filters and spare part for CADB/T-HE)			
		AFR-HE G4	AFR-HE M5	AFR-HE F7	AFR-HE F9
CADB-HE-D 04	200	AFR-HE 200/04 G4	AFR-HE 200/04 M5	AFR-HE 200/04 F7	AFR-HE 200/04 F9
CADB-HE-D 08	250	AFR-HE 250/08 G4	AFR-HE 250/08 M5	AFR-HE 250/08 F7	AFR-HE 250/08 F9
CADB-HE-D 12	315	AFR-HE 315/12 G4	AFR-HE 315/12 M5	AFR-HE 315/12 F7	AFR-HE 315/12 F9
CADB-HE-D 16	315	AFR-HE 315/16 G4	AFR-HE 315/16 M5	AFR-HE 315/16 F7	AFR-HE 315/16 F9
CADB-HE-D 21	400	AFR-HE 400/21-27 G4	AFR-HE 400/21-27 M5	AFR-HE 400/21-27 F7	AFR-HE 400/21-27 F9
CADB-HE-D 27	400	AFR-HE 400/21-27 G4	AFR-HE 400/21-27 M5	AFR-HE 400/21-27 F7	AFR-HE 400/21-27 F9
CADT-HE-D 33	400	AFR-HE 400/33 G4	AFR-HE 400/33 M5	AFR-HE 400/33 F7	AFR-HE 400/33 F9
CADT-HE-D 45	600x400	AFR-HE 450/40-45 G4	AFR-HE 450/40-45 M5	AFR-HE 450/40-45 F7	AFR-HE 450/40-45 F9
CADT-HE-D 60	700x500	AFR-HE 500/54-60 G4	AFR-HE 500/54-60 M5	AFR-HE 500/54-60 F7	AFR-HE 500/54-60 F9
CADT-HE-D 100	1100x610	AFR-HE 710/100 G4	AFR-HE 710/100 M5	AFR-HE 710/100 F7	AFR-HE 710/100 F9

12.2. FILTER INSTALLATION

The heat recovery is supplied with mounted filters.
Low pressure F7 filter for supply air and M5 for extract air.
Possibility of mounting a second filter as accessory.

Installation additional filter:

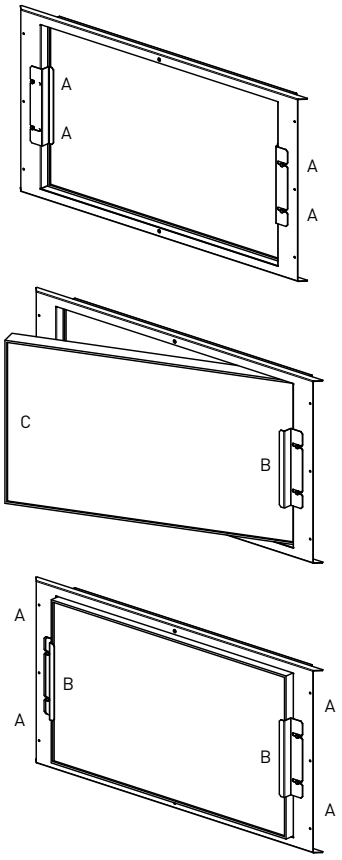
1. Loosen the two sets of filter support brackets (A).

2. Remove the filter holder (B).

3. Fit the second filter (C) ensuring that the direction of air is correct (indicated in the frame of the filter).

4. Ensure that the first filter the air passes is the lower grade of filtration.

5. Once both filters have been through fitted place the filter supports (B) symmetrically and tighten the 4 brackets (A).

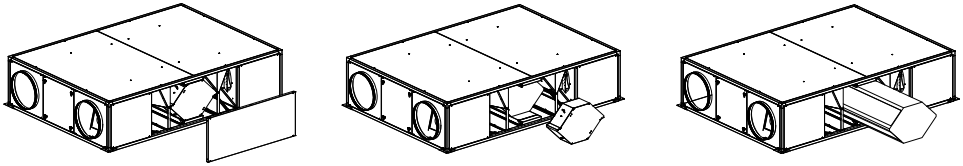


12.3. HEAT EXCHANGER

Horizontal models CADB/T HE 04 to 33

To perform the heat exchanger cleaning it is necessary to remove it from the unit. The disassembly can be easily done from the lateral panel:

Disassembly sequence

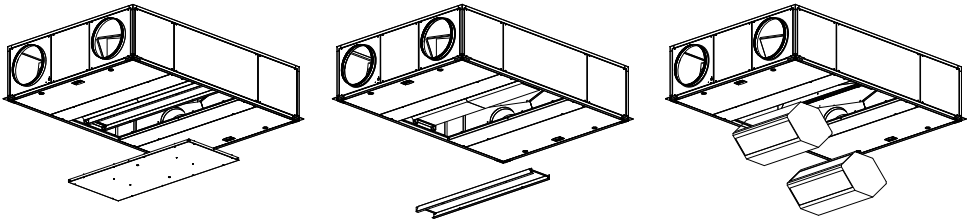


Models 04 to 33: Access to heat exchanger cleaning from lateral panels and from the bottom panels.

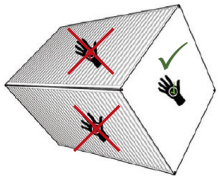
In order to have a good access to heat exchanger it is necessary to remove it form the heat recovey unit.

Alternatively, it is possible to disassemble the heat exchanger from the bottom panels. However, it is necessary to perform a major number of operations to proceed.

Access to the heat exchanger for bottom sequence



FALLING OBJECTS
By loosening the screws that hold the panels, those will be released. In units installed in ceiling, pay special attention to this operation to prevent the fall of a panel. During the maintenance, signaling the area below the heat recovery unit and prevent personnel access to it.



Not manipulate the heat exchanger for the finned area.

Horizontal models CADB/T-HE 45 and 60

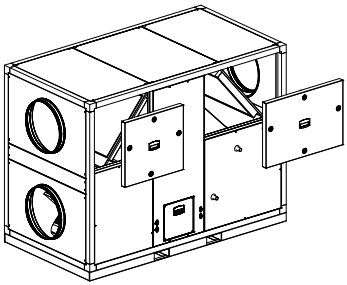
Due to the dimensions and weight of heat exchanger, the cleaning of it has to be perform in situ, without disassembly the heat exchanger.
To access to the heat exchanger, disassembly the side panels of the heat recovery unit and proceed with the cleaning by blowing with compressed air.

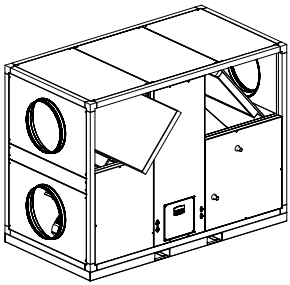
Loose the 4 closures that fix the access panel and remove the panel

Loose the screws that fix the filter and after released, remove it. Clean the heat exchanger with blowing with compressed air

Vertical models CADB/T-HE 04 to 100

Due to the dimensions and weight of heat exchanger, the cleaning of it has to be perform in situ, without disassembly the heat exchanger.
To access to the heat exchanger, disassembly the side panels of the heat recovery unit and proceed with the cleaning by blowing with compressed air.





12.4. CONDENSATION DRAINPIPE

Inspect the drainpipe regularly and make sure it is not blocked, if this is the case, remove the obstruction. Check that the drain pipe has been made in accordance with the "CONNECTIONS" section of this manual.
The siphon should always be full of water. Check its level periodically, refilling it if necessary. An empty siphon can cause the condensate tray to overflow and water leak through the equipment enclosure.

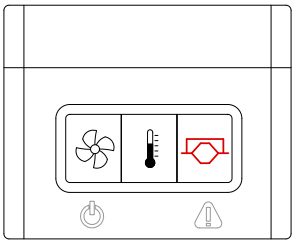
13. OPERATION ANOMALIES

13.1. GENERAL ANOMALIES

Anomaly	Cause	Solution
Difficult to start.	Reduced power supply voltage. Insufficient static torque of motor.	Check motor specification plate. Close the air inlets to reach the maximum speed.Change the motor is necessary. Contact the **S&P** Post-Sales service.
Insufficient airflow. Insufficient pressure.	Blocked pipes and/or inlet points closed. Fan obstructed. Filter overloaded. Insufficient rotation speed. Exchanger package blocked.	Clean inlet tubes. Clean fan. Clean or replace filter. Check power supply voltage. Clean the exchanger.
Reduction in performance after a period of acceptable operation.	Leaks in the circuit before and/or after the fan. Damaged roller.	Check the circuit and restore original conditions.Check the impeller and if necessary, replace with an original spare part. Contact the **S&P** post sales service.
Insufficient performance of the exchanger.	Fins dirty.	Clean the exchanger.
Formation of frost on the exchanger.	Outside air below -5°C.	Insertion of post-heating devices (anti-ice). Contact the **S&P** Customer Advice service.
Air pulsation.	Fan working in flow conditions almost 0. Flow instability, obstruction or bad connection.	Modification of the circuit and/or replacement of the fan. Clean and/or readjust the inlet channels. Operate the electronic regulator, increasing the minimum speed (insufficient voltage). Contact the **S&P** Customer Advice service.
There is water inside the unit.	Drain clogged or wrongly dimentioned.	Check if exists a body/object obstructing the passage of water and remove it. Verify that the drain trap exists and is correctly sized according to the instructins of this manual.

13.2. LIST OF ALARMS

If an alarm is activated or an error occurs, the red LED on the right button will flash.

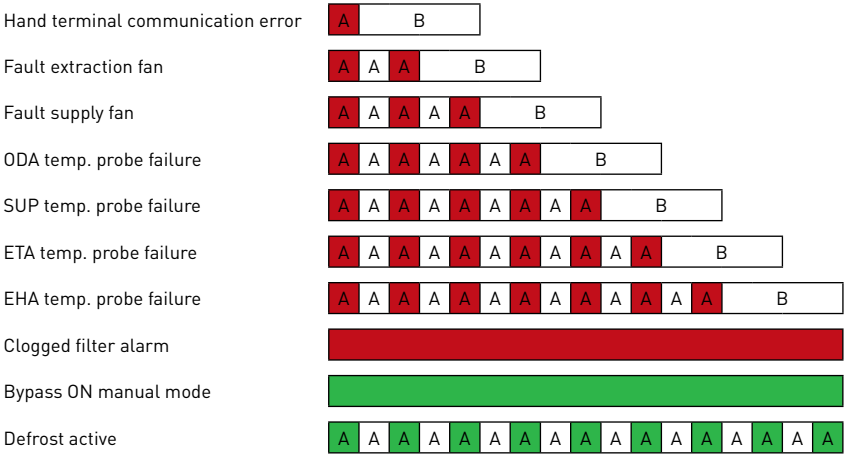


The blinking of the red LED can be combined with green flashes which refer to the by-pass working mode.

The number of LED flashes refers to the type of error detected:

Priority	Alarm/Status	Led	Actuation
1	Communication error between hand terminal and electronic board	Red led, 1 blink	Stop the unit
2	Extraction fan failure	Red led, 2 blinks	Stops unit after 90 s (adjustable) from the "Fan Fault" activation. The "Fan Fault" will be activated only when the alarm situation has been maintained active for 30 s (configurable).
3	Supply fan failure	Red led, 3 blinks	Stop unit after 90 s (adjustable) from the "Fan Fault" activation. The "Fan Fault" will be activated only when the alarm situation has been maintained active for 30 s (configurable).
4	Defrost active	Flashing green led	Defrost management
5	Bypass OPEN in manual mode	Continuous green led	Normal operation
6	Clogged filter alarm	Continuous red led	Normal operation
7	ODA temp. probe failure (fresh air)	Red led, 4 blinks	The unit stops
8	SUP temp. probe failure (supply)	Red led, 5 blinks	Normal operation
9	ETA temp. probe failure (extraction)	Red led, 6 blinks	Normal operation
10	EHA temp. probe failure (exhaustion)	Red led, 7 blinks	The unit stops (freezing risk of the heat exchanger)

The appearance of an alarm generates the activation of the digital output A1-A2, with the exception of alarms for "Defrost active" and "Bypass open in manual mode".

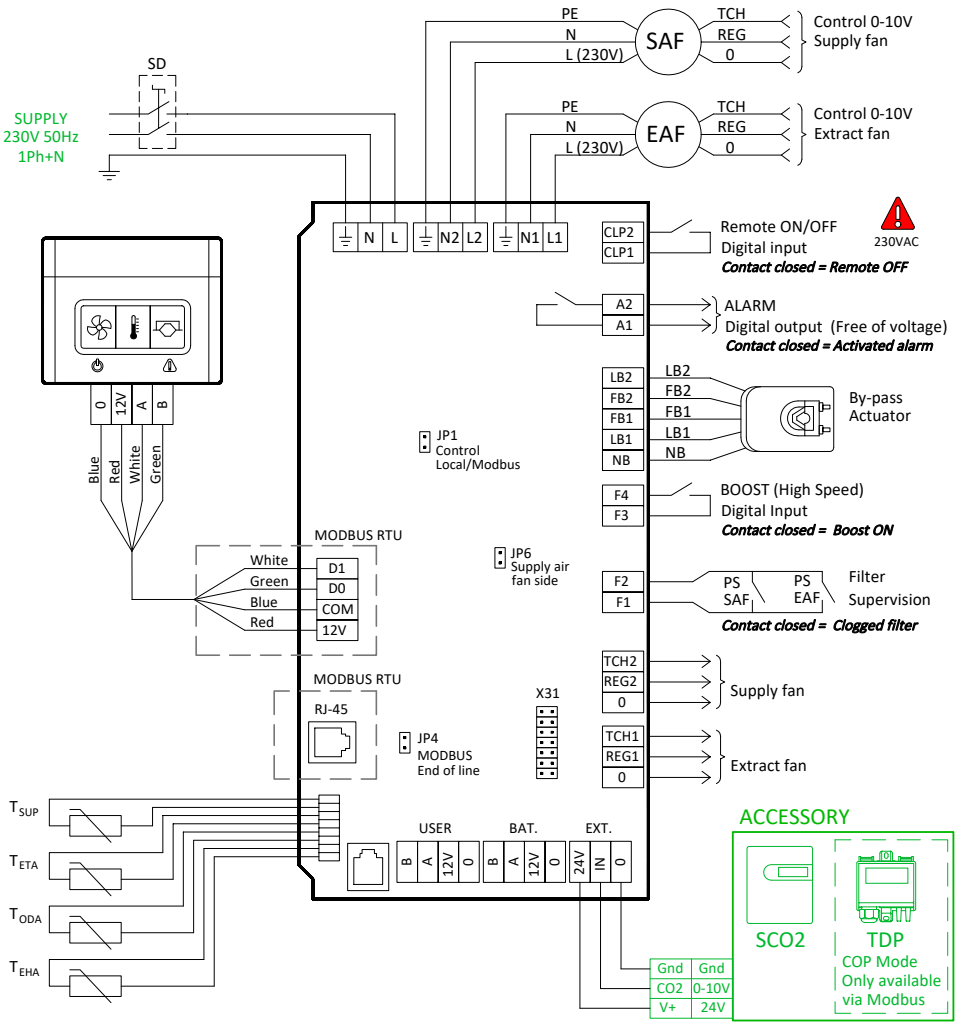


A: 0,75 s

B: 3 s

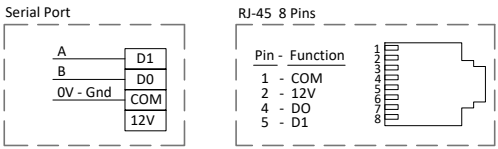
14. WIRING DIAGRAMS

14.1. MODELS EQUIPPED WITH SINGLE PHASE MOTOR CADB-HE-D 04 TO 33 BASIC



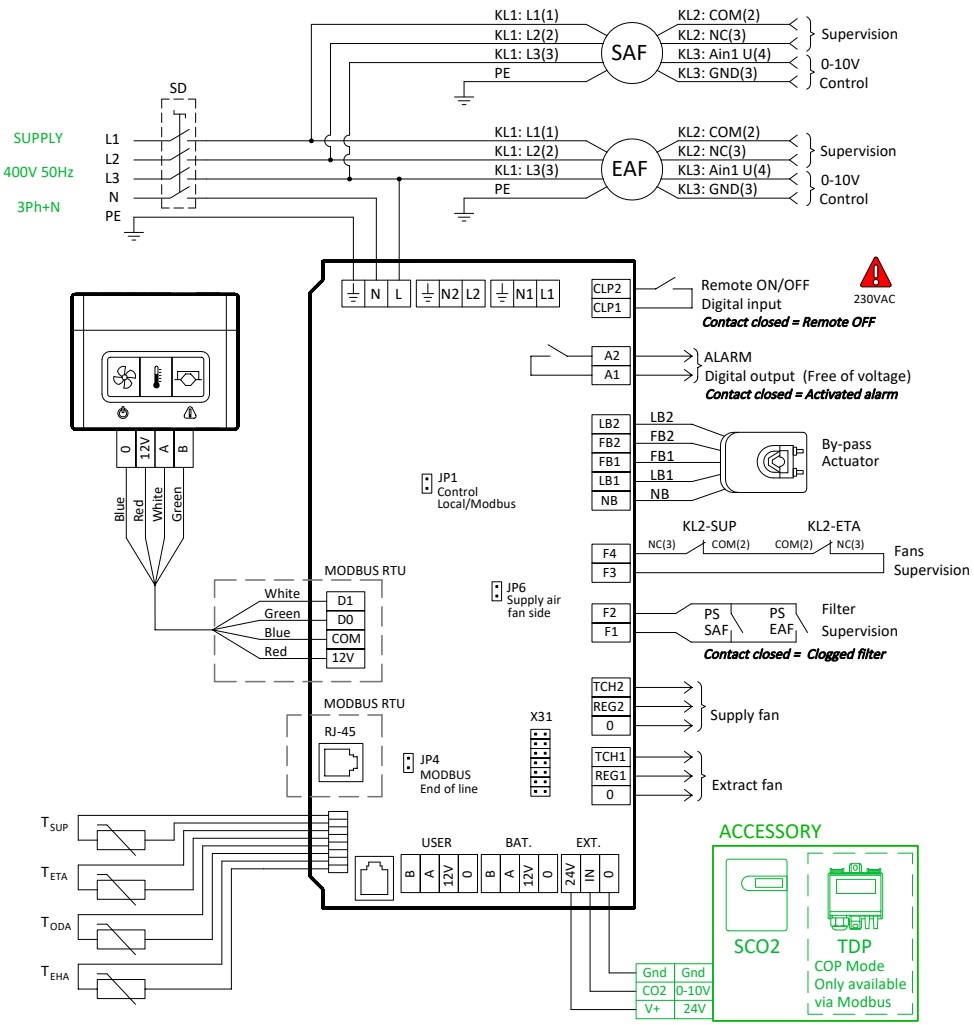
SD:	Switch
SAF:	Supply fan
EAF:	Extract fan
PS:	Pressure Switch
T_{SUP}:	Supply Air Temp. probe (Fresh air)
T_{ETA}:	Extract Air Temp. probe (Foul air)
T_{ODA}:	Outdoor Air Temp. probe (Fresh air)
T_{EHA}:	Exhaust Air Temp. probe (Foul air)

MODBUS INTEGRATION



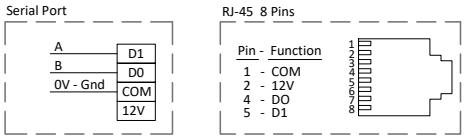
The Modbus RTU network connection can be made through the RJ-45 connector or through the terminals to which the command is connected (in this case the command is disabled)

14.2. MODELS EQUIPPED WITH THREE PHASE MOTOR CADT-HE-D 33 TO 100 BASIC



SD: Switch
SAF: Supply fan
EAF: Extract fan
PS: Pressure Switch
T_{SUP}: Supply Air Temp. probe (Fresh air)
T_{ETA}: Extract Air Temp. probe (Foul air)
T_{ODA}: Outdoor Air Temp. probe (Fresh air)
T_{EHA}: Exhaust Air Temp. probe (Foul air)
KL2-SUP: Supply Fan Relay (Run/Off)
KL2-ETA: Extract Fan Relay (Run /Off)

MODBUS INTEGRATION



The Modbus RTU network connection can be made through the RJ-45 connector or through the terminals to which the command is connected (in this case the command is disabled)

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