Installation, operation and maintenance manual

# CLIMMA AHU AIR HANDLER

Rev. 210506

CLIMMA®
MARINE AIR CONDITIONING

## Table of Contents\

# 1. Introduction

## 1.1. General information

Thank you for purchasing a Climma AHU air handler unit!

## 1.2. System features

Following the main features of the Climma AHU air handlers:

The Climma AHU Air Handler is designed to treat the external air filtering and dehumidifying (in cool mode) and then delivering it inside the boat. An external air treatment is generally composed by one or more AHU Air handlers and one or more extractors to keep the pressure inside the boat slightly higher to prevent any non-treated air intake.

AHU air handlers are equipped with an efficient air filter on intake air, one air/water heat exchanger, an electrical post heating element and a quite and powerful blower. The frame is aluminum, and all the covers are made in stainless steel or anodized aluminum.

## 1.3. Installation

The unit must be installed by an authorized Climma service center and in compliance with the instructions given in this manual.

## 1.1. Transport and handling

When loading or unloading the unit, use a fork lift equipped with forks at least 2/3 the length of the shipping base.

Use an overhead lift if the unit is equipped with lifting eyebolts.

Select lifting equipment suited to the weight and overall dimensions of the packaged unit or components.

Take every precaution to prevent damage, when handling the unit or components keeping in compliance with the information given on the packaging material.

## 1.2. Unpacking

Remove all cardboard, wood or other materials from the wood base. Lift the unit or components by suitable means (e.g. lift truck), remove the wood base, then set the unit or components into position.

Once all packing material has been removed, check that the unit has not been damaged in any way.

*Caution*: Wear protective gloves when handling any packing materials and the wood base. Dispose of all packaging materials appropriately in accordance with local codes.

## 1.3. Directives

Climma AHU Air Handlers respect the following directives.

- CE
- Low voltage: 2006/95/EC
- Electromagnetic Compatibility: 2004/108/EC
- Machinery Directive: 2006/42/CE
- Manufacturing quality Standards UNI EN ISO 9001:2008

## 1.4. General safety

Injuries or accidents caused by failure to comply with the recommendations of this manual are solely the responsibility of the unit operator.

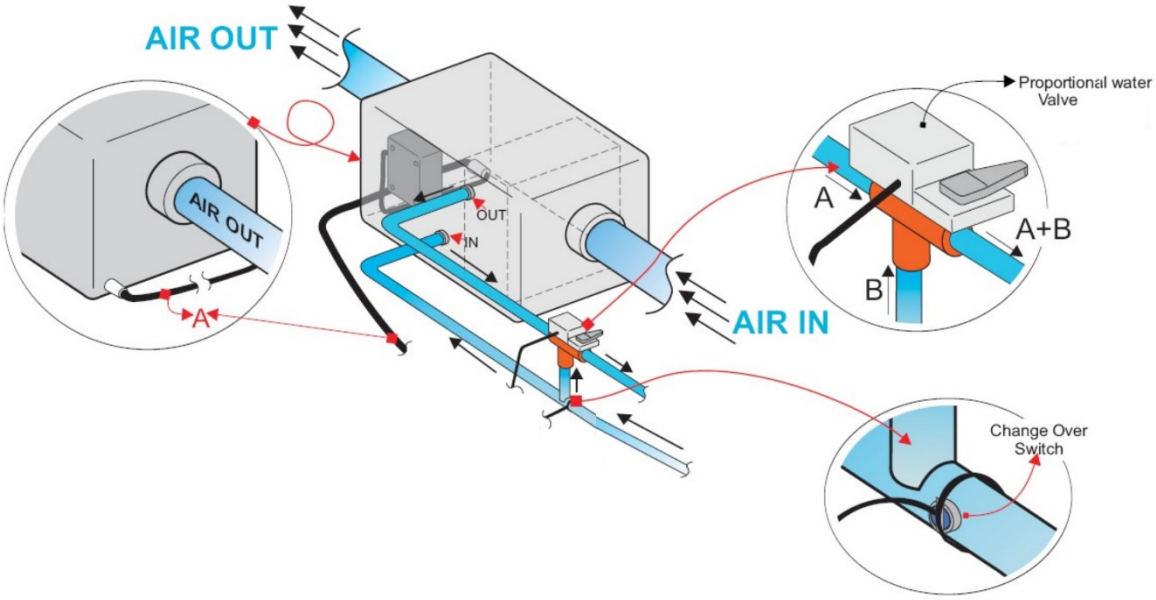
Basic Rules for Safe Operation:

- do not touch the unit with moist or wet hands or feet;
- never operate the unit while barefoot;
- before installation and maintenance operations, disconnect the unit from the power supply. failure to comply may result in injury or death;
- installation and maintenance of this system can be hazardous due to system working pressure and electrical components. Only a Climma certified service center should install and maintain the system;
- to minimize the hazard of electrical shock and personal injury, this component must be effectively grounded;
- during installation and maintenance follow safety codes, wear safety glasses and work gloves;

# 2. INSTALLATION

## 2.1. Climma AHU technical details

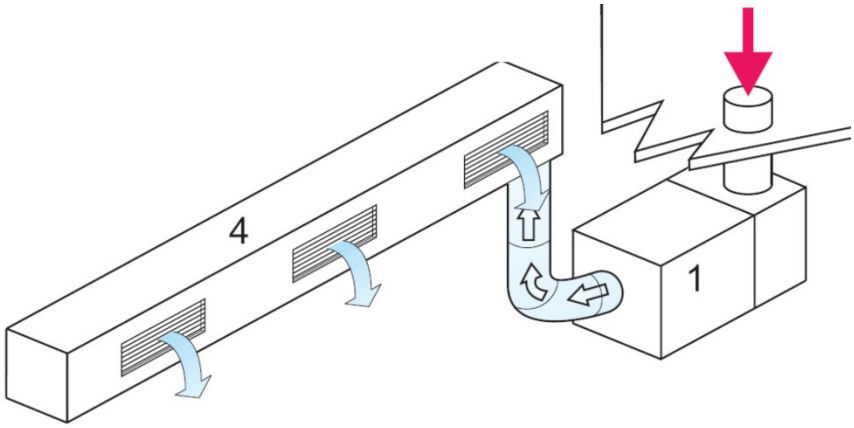
The external air is entering in the unit for the side where the air filter is positioned. It is very important that it is left access for the air filter maintenance. The air is then cooled (in cool mode) with the heat exchanger. The system is designed to cool the air by 10°C. The proportional water valve is controlled by the AHU controller to supply the correct flow to reach this temperature difference. The cold air is then post heated by the electrical resistor which is also controlled by the AHU controller. The air-out set point is set at 22°C by default as the external air is not intended to cool the ambient where there are fan coils to do the cooling job.

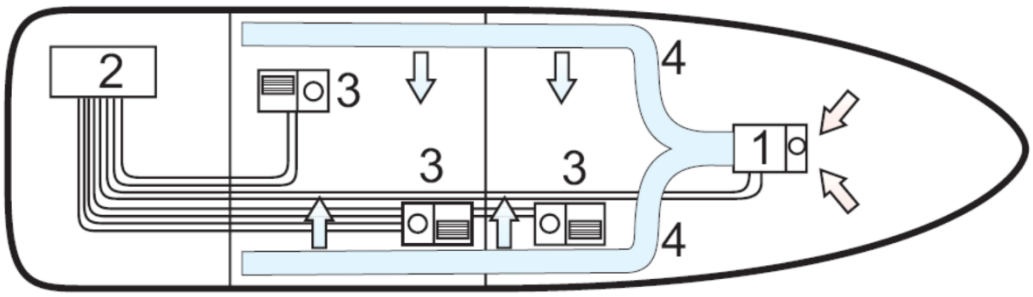



## 2.2. Climma AHU Air Handler positioning

The Climma AHU Air Handler must be installed in technical space or similar area where it can be linked to an external air intake and connected to the ducting of air distribution. In choosing the location it is extremely important to leave access for the regular maintenance (see chapter 4).

1- MISTRAL AHU
2 - CWS central unit
3 – Fan Coils
4 – Air distribution ducting

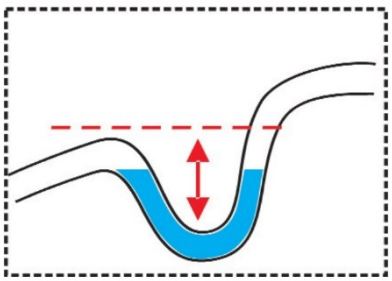



### 2.3. AHU Air Handler condensate water

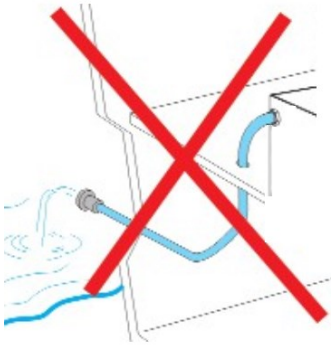
The air treatment means condensate water is extracted from the external air reducing the humidity. Depending on the external air conditions (RH %) and the unit capacity, the quantity of condensate water can easily be several liters per hour. This condensate water must be drained off outboard directly or by means of a pump. The direct discharge to the bilge is not suggested as the condensate water is quite pure and it will smell quickly.
The condensate drain line must be connected to the two ports of the condensate tray. Every Climma AHU Air Handler has two drains for condensate water which have to be properly connected to ensure the correct condensate water drainage.

If the condensate drain pipe needs to run horizontally for a certain length, we strongly suggest making immediately a down bend using an elbow. After a vertical run of 100 mm, the following run can be horizontal. Horizontal runs must be avoided as the condensate water remains inside the hose and can come back to the unit during the navigation at sea.



The air handler and its heat exchanger are in a certain low pressure created by its blower. This low pressure is also in the drain ports.

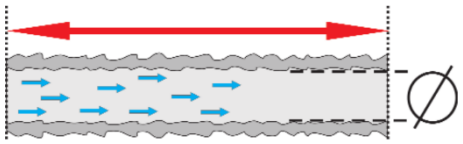
It ais therefore necessary to create a simple syphon in the drain hose to prevent any uncontrolled air intake and odors.



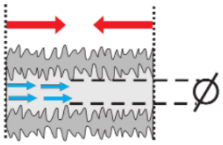
For the same consideration of the low pressure created by the unit, it is strongly suggested to avoid a direct discharge of the condensate overboard. A direct discharge in absence of a correct syphon, could cause the dangerous return of engine smokes. Please refer to the different rules existing in every country.

## 2.4. Air distribution

The capacity and efficiency of the unit is directly related to the air flow. It is therefore very important to make the air distribution avoiding any restriction, elbows and keeping the original diameter of the fan outlet, not exceeding the duct run.
Insulated ducts must be carefully extended in order to reduce to minimum the friction and reach the nominal duct diameter.

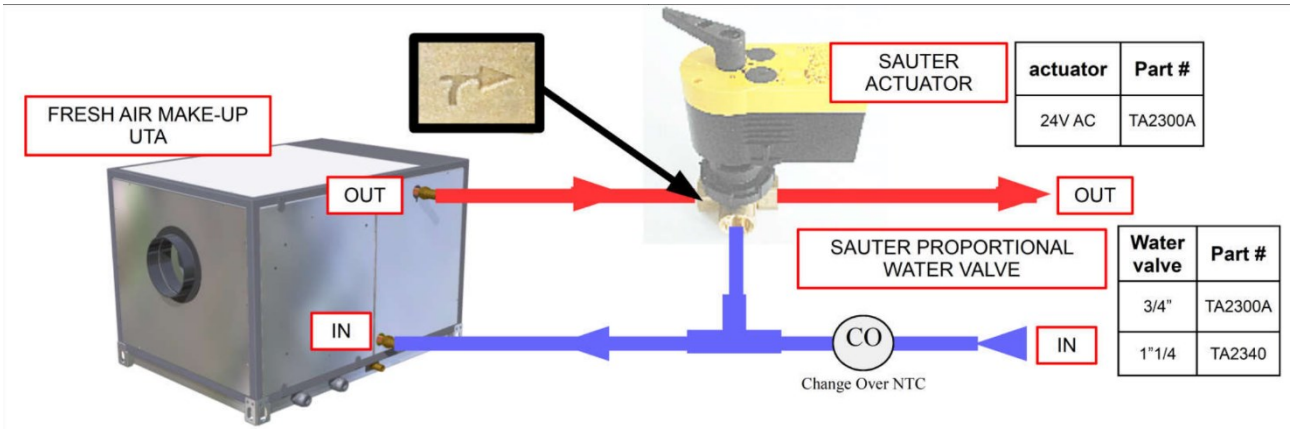


The fan must be connected with a suitable duct to the air distribution circuit. The main duct diameter must respect the original fan duct connection. Insulated flexible ducts must be carefully extended in order to minimize the pressure drop and reach the nominal duct diameter.



## 2.5. Fresh water circuit

Climma  AHU Air Handler ha 2 threaded ports for the connection to the fresh water circuit. The connection includes a proportional water valve which takes care to control the water flow.




## 2.6. ELECTRICAL CONNECTIONS

### 2.6.1. SAFETY FIRST

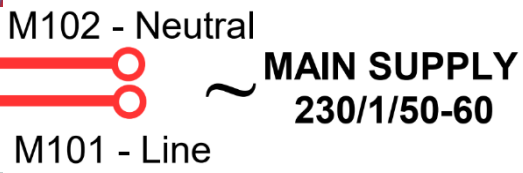
AVOID THE RISK OF THE ELECTROCUTION !!!
Only qualified staff can execute the troubleshooting and the repair. Keep isolated from the ground during the execution of the electrical operations, wearing dry clothes, rubber shoes, rubber carpets, etc.... Don't check wires under voltage if none can bring help.
IMPORTANT NOTE
To avoid possible electrical shocks, that can cause harm or death to people, execute the grounding of the air conditioning system, as indicated:
1- Use a suitable electrical cable with ground wire section and isolation to give the charge from the switch on the control board of the boat to the electrical box of the system. The ground wire must be correctly connected to the ground terminal of the panel.
2- Check that the ground connection between the electrical box and the air-conditioner hasn't suffer any damage during the transport.
3- Check that the connection of the water pump to the suitable terminal of the electrical box includes also the ground connection.
4- Check the ground continuity before switching off the air-conditioner.

### 2.6.2. ELECTRICAL BOX

The electrical box is connected to the unit. For the models AHU 750 and AHU 1500 the electrical box is installed directly on the unit while for the model AHU 400 the box is supplied separately, connected to the unit with the electrical cable of 2 m to be installed vertically on a bulkhead.

### 2.6.3. POWER SUPPLY

Check that the available supply corresponds to the label on the unit, on the box and on the electrical
pump.
The electrical box of the air-conditioner must be connected to mains supply thru a suitable circuit breaker.

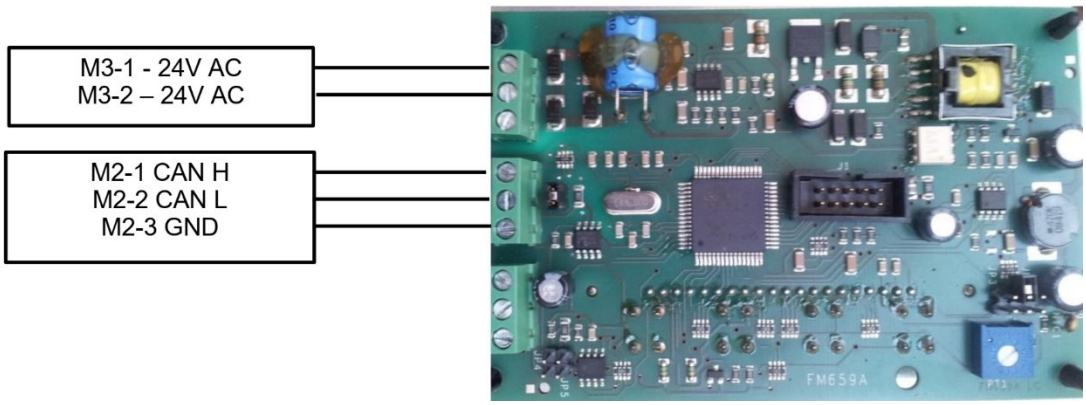



### 2.6.4. Electrical control box

The electrical box is connected to the unit. For the models AHU 750 and AHU 1500 the electrical box is installed directly on the unit while for the model AHU 400 the box is supplied separately, connected to the unit with the electrical cable of 2 m to be installed vertically on a bulkhead.
The electrical box can be installed remotely with the only precaution to be vertically installed for heat dissipation reasons.

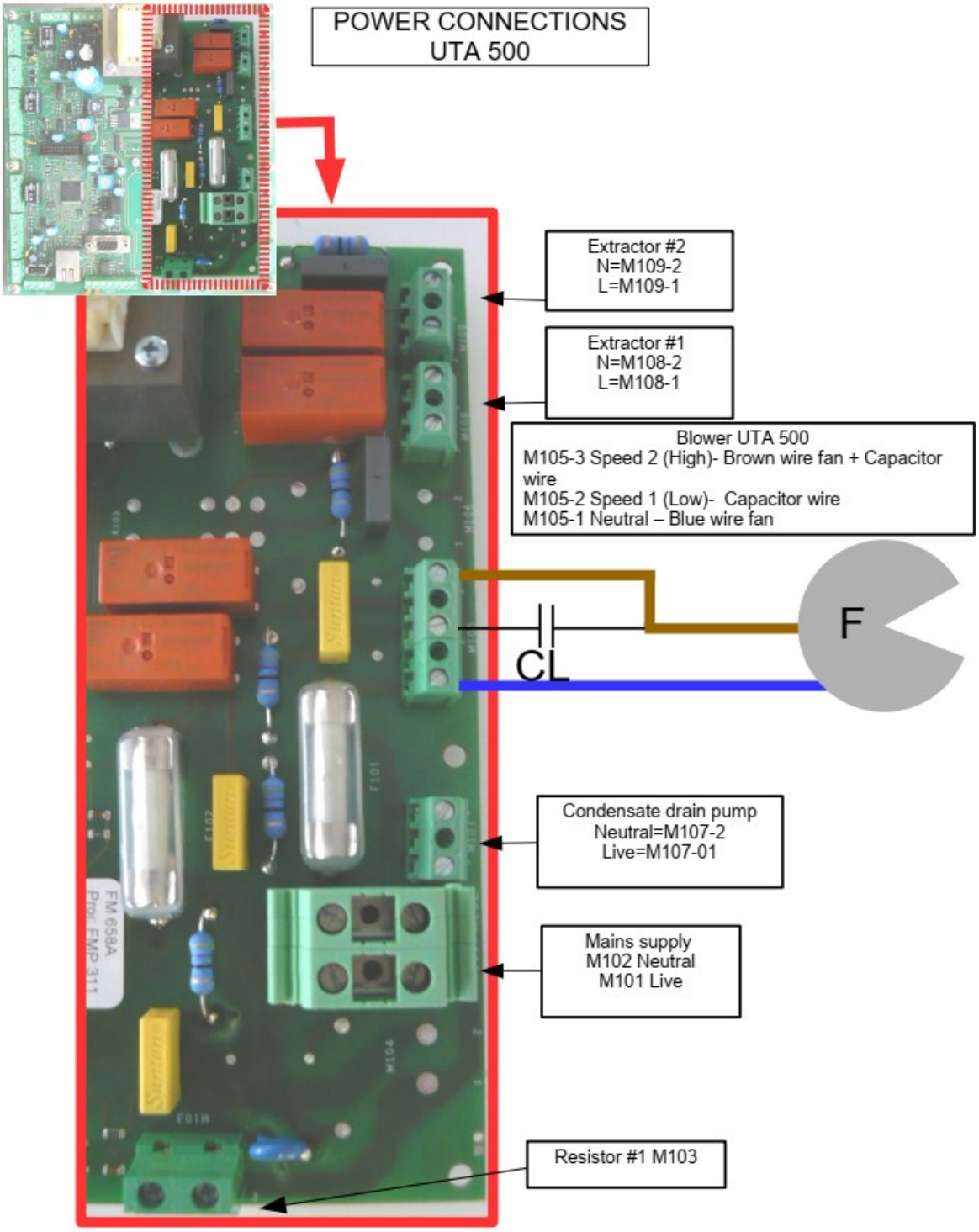
### 2.6.5. CONTROL PANEL

The control panel which is incorporated in the electrical box can be easily removed and installed remotely. A dedicated spare plate is supplied to close the hole on the box cover. The electrical connections can be easily extended following the schematic underneath.

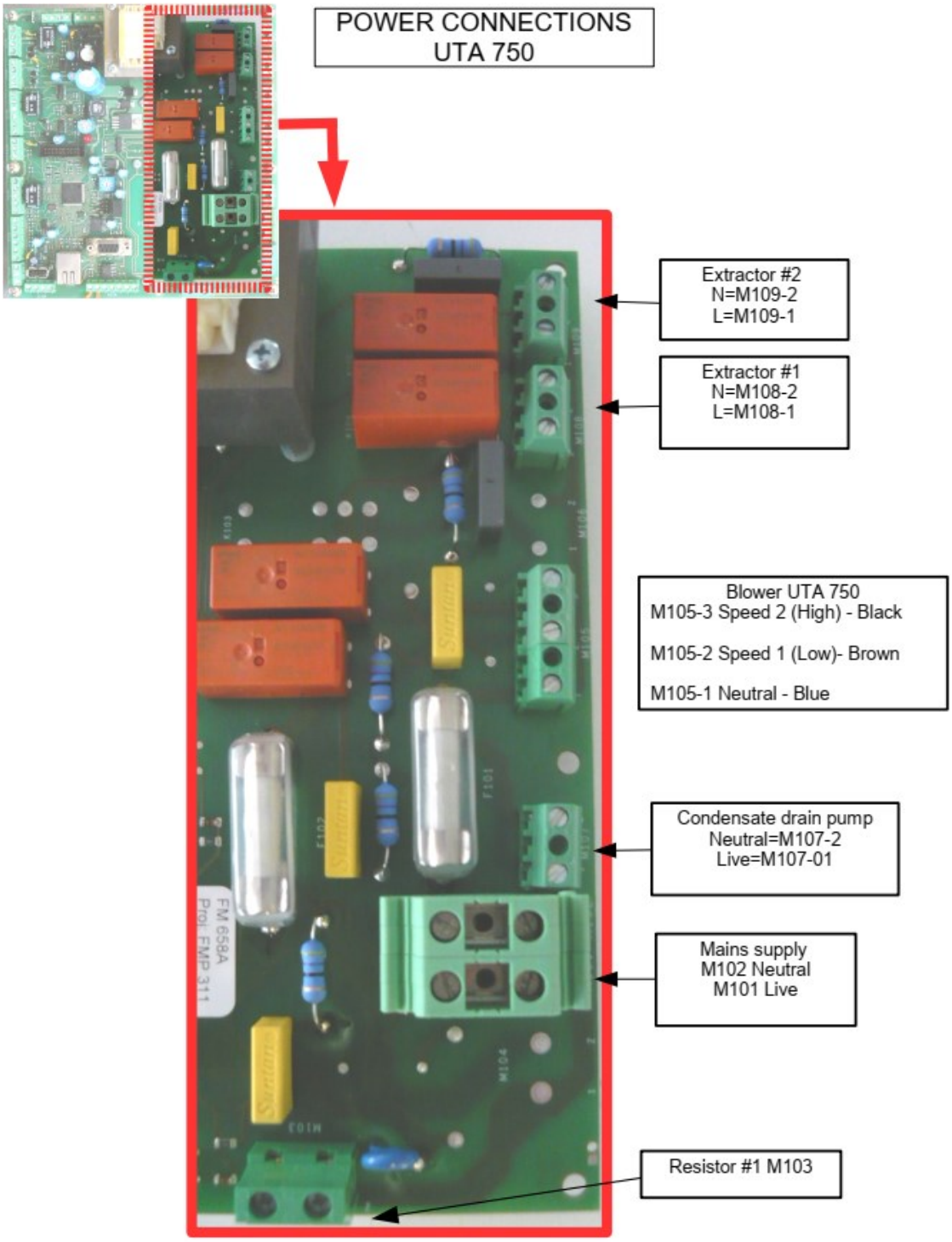



***IMPORTANT NOTE:*** *In the panel connection there is only low voltage (24V AC). It is however suggested that the back of the panel, if remotely installed, is made not accessible*.

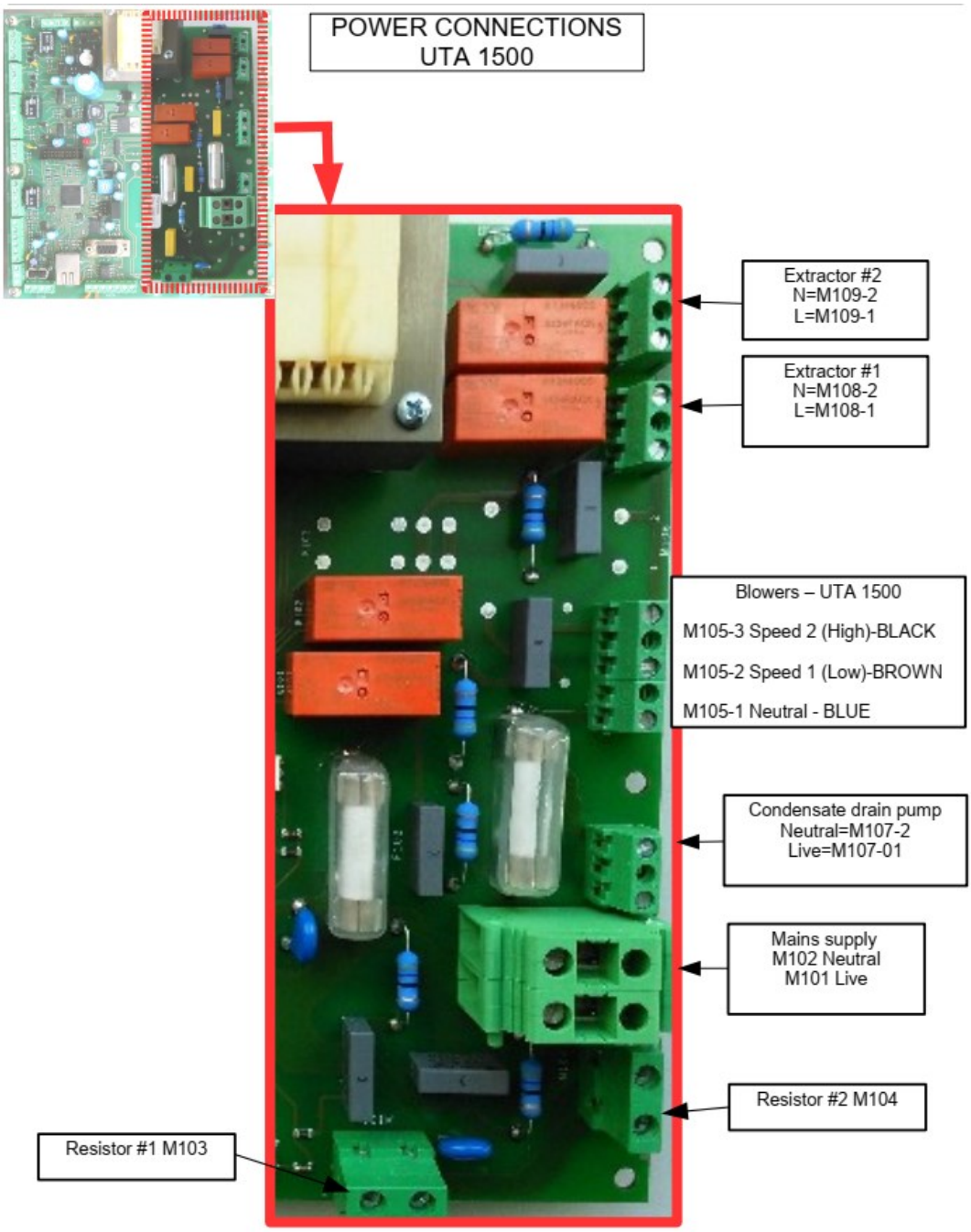
### 2.6.6. Electrical power connections AHU 500



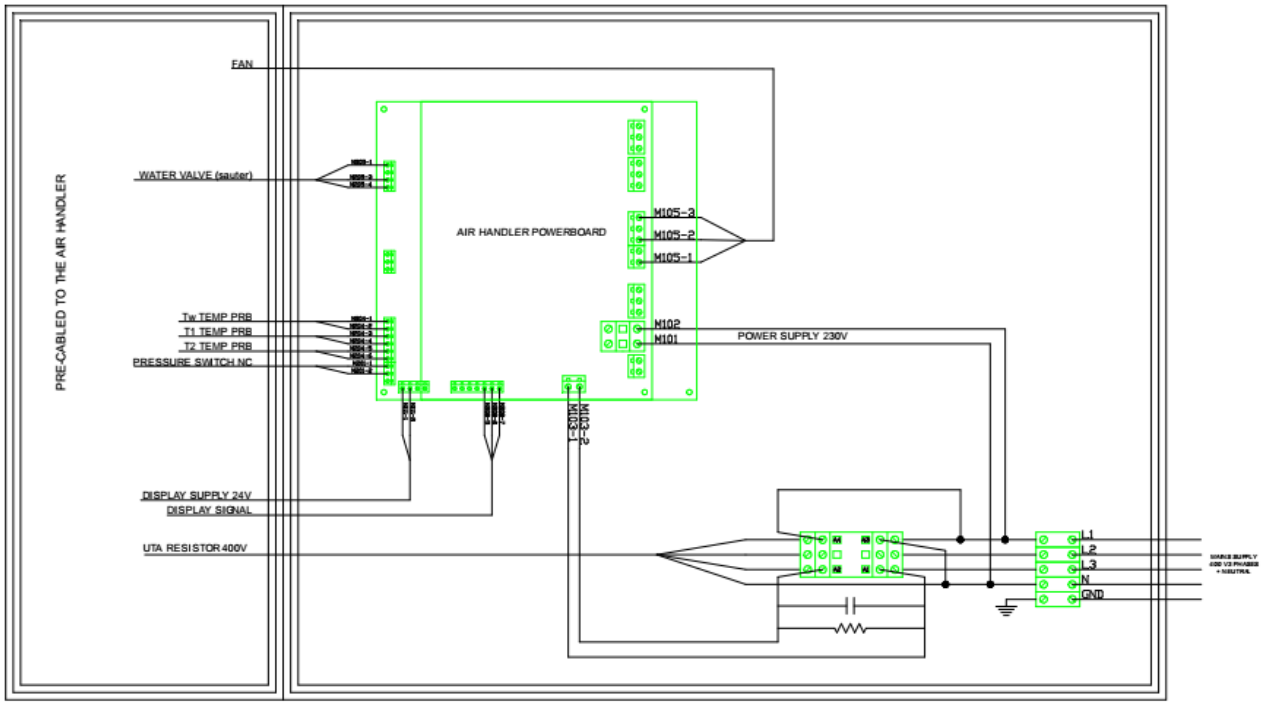
### 2.6.7. Electrical power connections AHU 750



### 2.6.8. Electrical power connections AHU 1500



### 2.6.9. Electrical power connections AHU 400 three phases

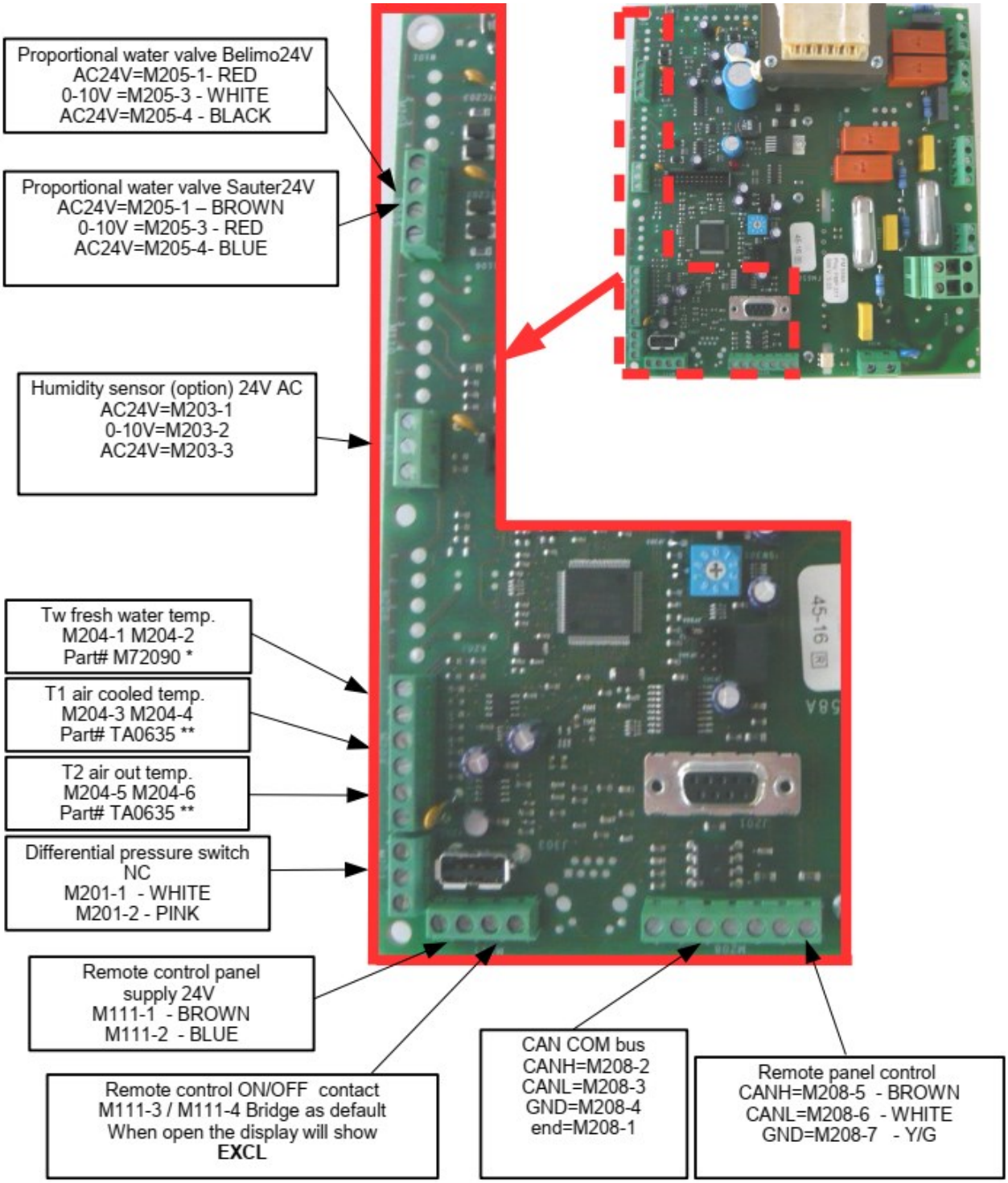



For air handlers made for 400V supply it is necessary to have available a suitable supply 400/3 with neutral which is needed for the supply of the powerboard, the blower and the proportional water valve.

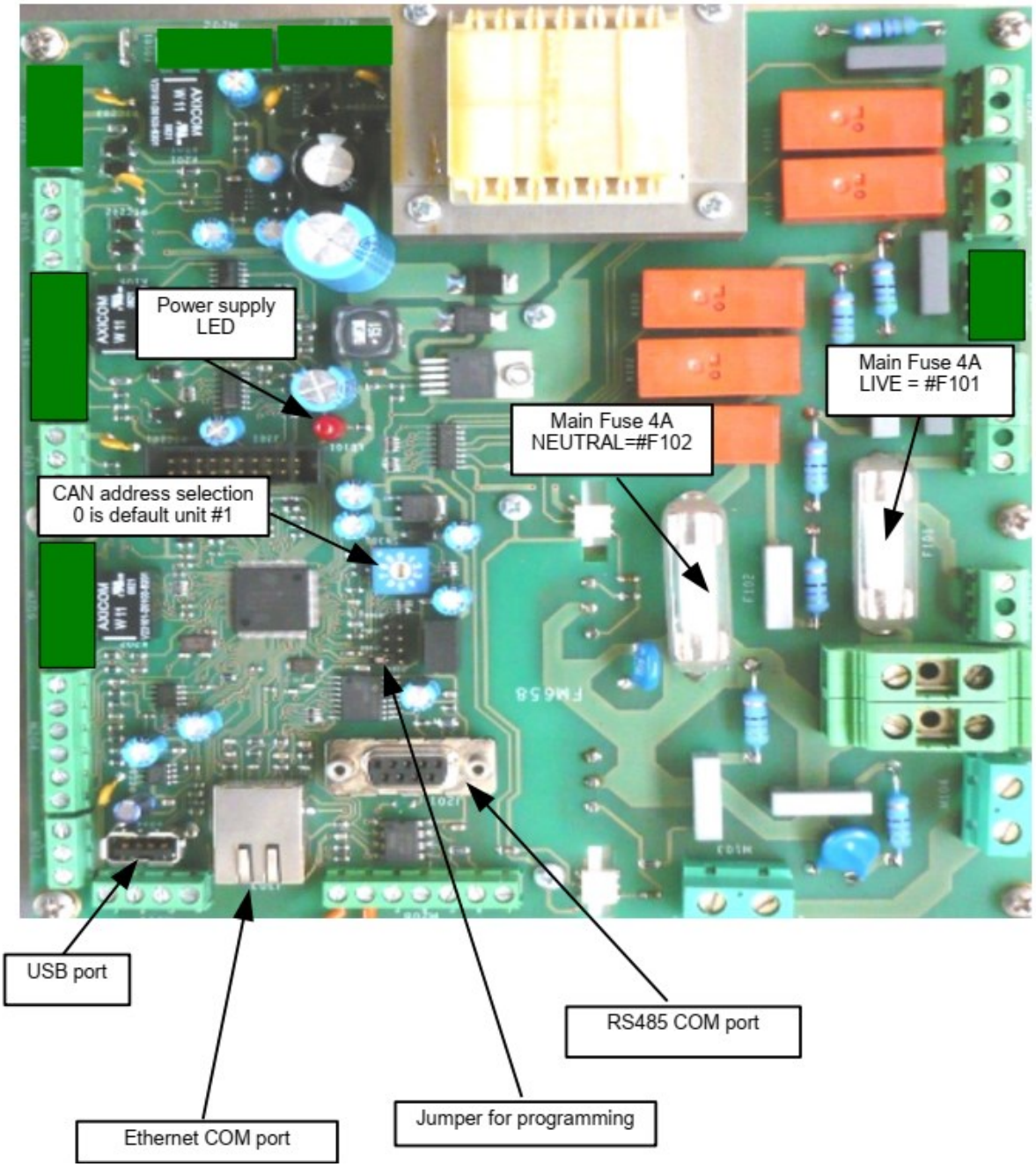
Mains supply must be connected to terminals marked L1-L2-L3-N- GND.

All the other connections are made in the factory with the exception of the proportional water valve (see chapter 2.6.12 ) and the fresh water probe (see chapter 2.6.13).

### 2.6.10. Electrical box control & probes connections



### 2.6.11. Electrical box communication connections

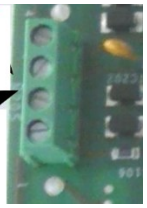


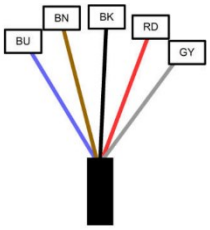
### 2.6.12. Proportional water valve connection

The proportional water valve has to be connected to the electrical box as per schematic at M205 socket. Please note that there is a difference of wire color between valve models.

The water valve supplied from 2017 is Sauter.

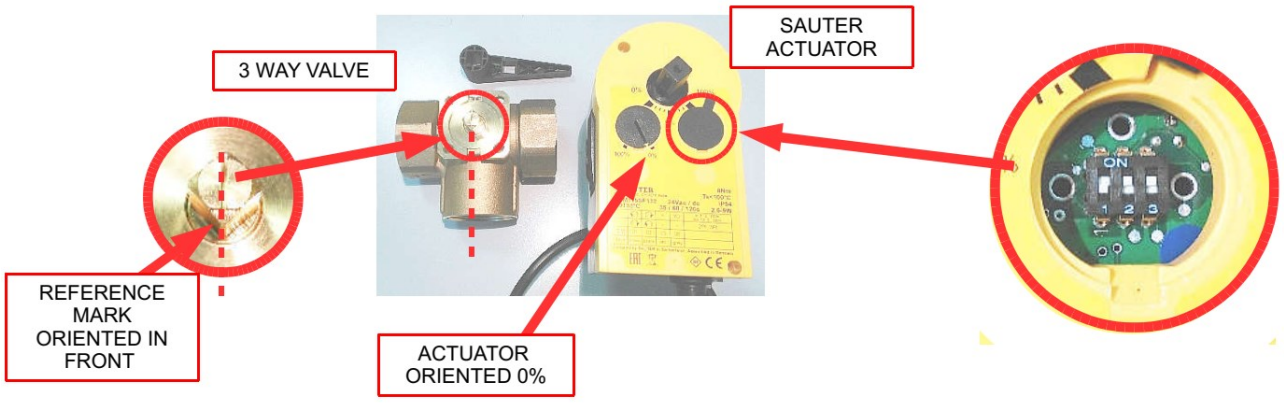
Proportional water valve Sauter24V
AC24V=M205-1 – BROWN
0-10V =M205-3 - RED
AC24V=M205-4- BLUE



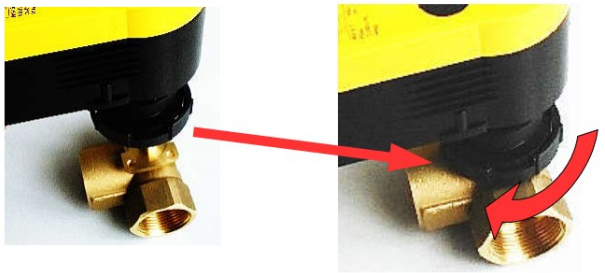



| Wire color | symbol | connection |
|---|---|---|
| BROWN-MARRONE | BN | M-205-1 |
| RED - ROSSO | RD | M-205-3 |
| BLUE -BLU | BU | M-205-4 |
| BLACK - NERO | BK | NOT USED |
| GRAY -GRIGIO | GY | NOT USED |

Make sure that the assembly of the valve motor is made correctly so that the opening / closing of the valve corresponds to the full flow / by-pass.




Keep the references as shown and assemble the two parts locking the nut clockwise

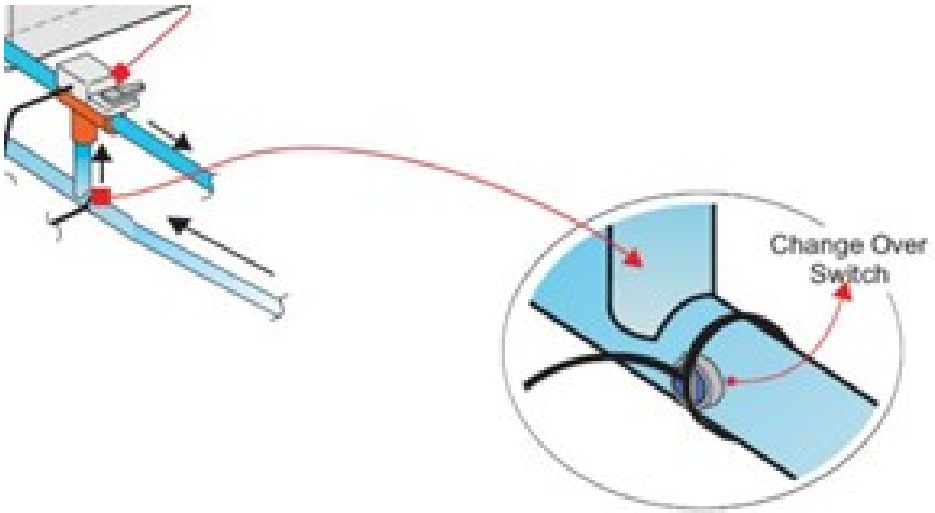


| Dip switch | SET |
|---|---|
| 1 | OFF |
| 2 | ON |
| 3 | ON |
| Time for 90° turn | 60 s |

### 2.6.13. Fresh water temperature probe (change over switch)

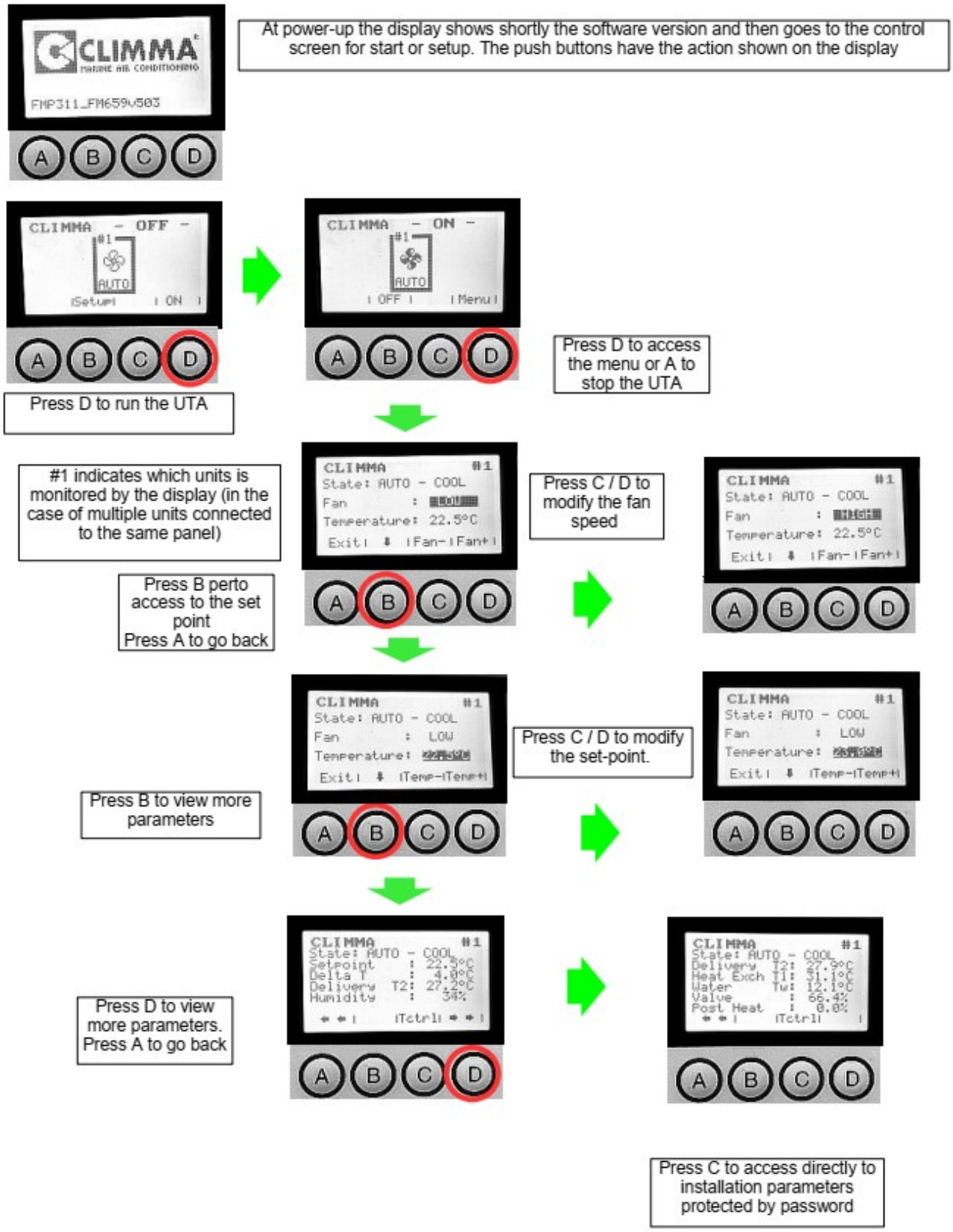
The probe must be installed on the fresh water line arriving to the air handler as shown in the drawing.

The sensing tip (ring) must be fixed to a metal part and properly insulated.

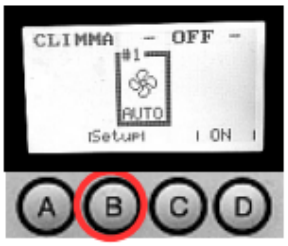


# 3. Operating instructions

## 3.1. Display – operation and user menu



## 3.2. Display setup



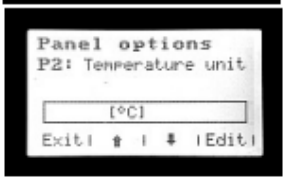

Press B to access setup

In the following sequences the menu choices are selected by the push buttons A B C D corresponding to the options shown on the display . D permits to modify the parameter which is modified pressing B e C. The modification is saved by pressing D



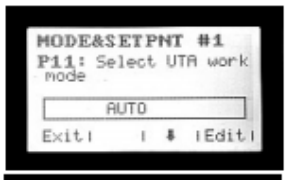
Press D to modify or C to next parameter


Press - / + to modify press D to save the change

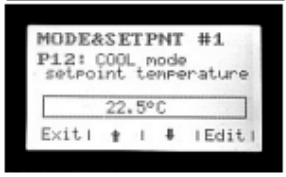



Possible options C° e F°

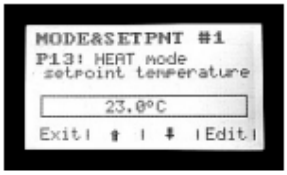

Possible options
NO = AUTOSTART after Black.out
YES = without AUTOSTART

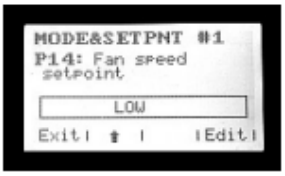

Possible options
OFF
AUTO
COOL
HEAT
FAN



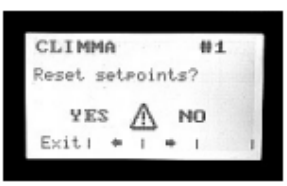

Set point COOL




Set point HEAT




Fan LOW
Or
Fan HIGH
speed choice


WARNING !
YES resets all the parameters to default value.

# 4. Maintenance

To get the best performances from your AHU, it is important to do the suggested maintenance described below. Periods can vary based on the installation area of the boat, based on pollution and based on the system use.

- ✓ Clean the air filter monthly
- ✓ Clean the condensate drain pipe every 2 months
- ✓ Clean the condensate pan every three months

## 4.1. CONDENSATE WATER AND DRAINS

While working, every AHU produces condensate water, especially when humidity is high. It has to be checked periodically that there are no leaks on the condensate water drains and that the condensate water drains regularly. For this check, put some water in the condensate drain and check that it gets drained quickly.
If the condensate water is drained in the bilge, it is advised to drain it in a specific separate area, since it can generate bad smells.

## 4.2. AIR FILTER

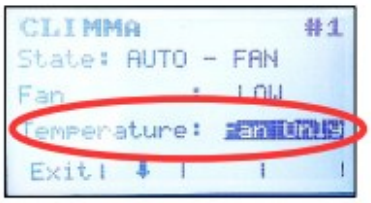
The system requires to clean and periodically change the air filter. This filter is required to clean the air before it goes into the heat exchanger of the AHU.
There is no specific rule for the system maintenance; it depends on the running hours of the system and from the air pollution. We advise to clean the air filter every 30 days maximum.
If the air filter is not completely clean system can stop working or loose efficiency.

## 4.3. ICING

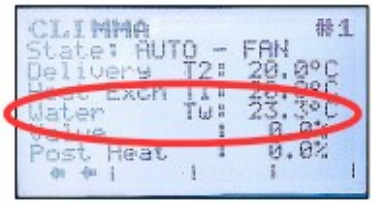
If the boat faces sub-zero temperatures, it is important to check that the fresh water circuit has inside enough percentage of antifreeze liquid to prevent icing.

# 5. TROUBLESHOOTING

## 5.1. Fan Only




Mode is set to AUTO but at power-on the display shows **AUTO – FAN** and as TEMPERATURE there is **Fan Only**



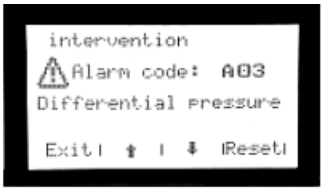

This is due to the fresh water circuit temperature to be within the COOL and the HEAT limit. This causes the control to be unable to choose automatically the functioning mode. As the fresh water circuit temperature reaches the functioning value, the system will automatically start to work properly.


In the MENU screen the set point and Delta T show ------. The control keeps the FAN running while the proportional water valve and the postheating element are off.
The default values for the fresh water circuit temperature are T1<20°C for the COOL mode and T1>30°C for the HEAT mode.

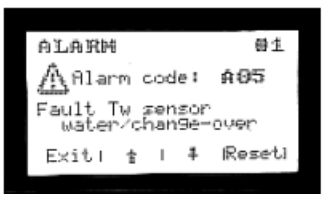
## 5.2. Alarms on display


The FAMU control panels stops as a consequence of 5 possible causes. In case of any alarm, the display shows “ALARM”. Pressing the button corresponding to ALARM the display shows the detail.

A03 is caused by the air safety pressure switch. This alarm is due to insufficient air flow. Check the fan functioning. Once restored, it is possible to reset pressing the corresponding button

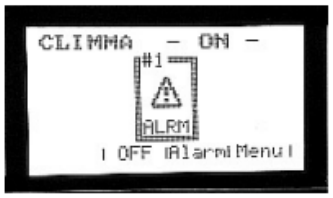



A05 is caused by a faulty or missing air temperature sensor Tw feeling the fresh water. Once repaired, it is possible to reset pressing the corresponding button

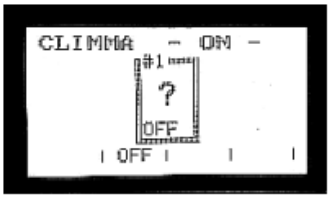



A06 is caused by a faulty or missing air temperature sensor T1 feeling the air out from the heat exchanger. Once repaired, it is possible to reset pressing the corresponding button

A07 is caused by a faulty or missing air temperature sensor T2 feeling the air out from the FAMU.Once repaired, it is possible to reset pressing the corresponding button

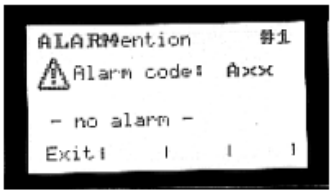




In case of miscommunication between the digital panel and the power board, the display will show this message and the FAMU will stop: check the connecting cable between the panel and the power board.




Only when the communication is restored, the display will show the standard ALARM message

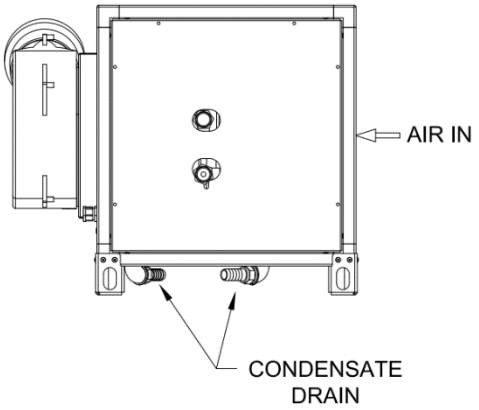

Any alarm, once restored, can be reset pressing the Reset button. The display will show this message



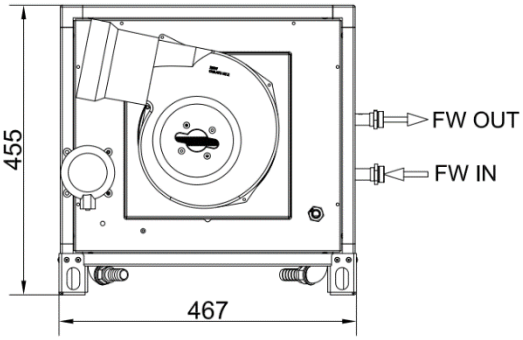
# 6. TECHNICAL CARACTERISTICS

## 6.1. Climma AHU 500

SIDE VIEW

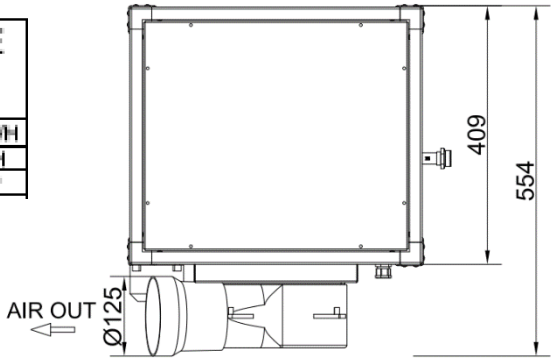


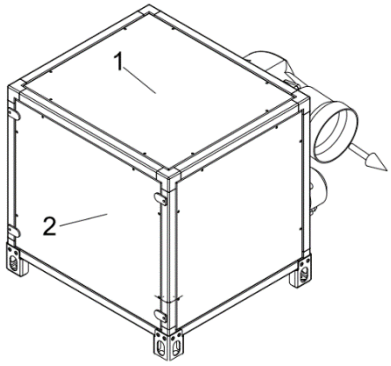

FRONT VIEW



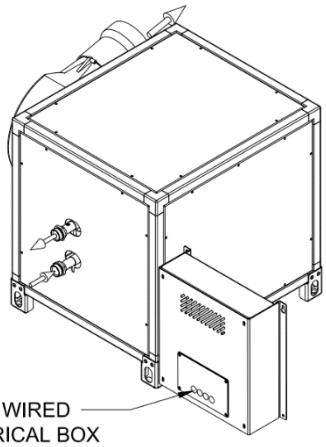

| CARATTERISTICHE TECNICHE<br>TECHNICAL DATA | |
|---|---|
| NOMINAL CAPACITY | 20,000 BTU/H |
| AIR FLOW | 500 M3/H |
| MAX CURRENT COOL MODE | 11 AMP |

TOP VIEW



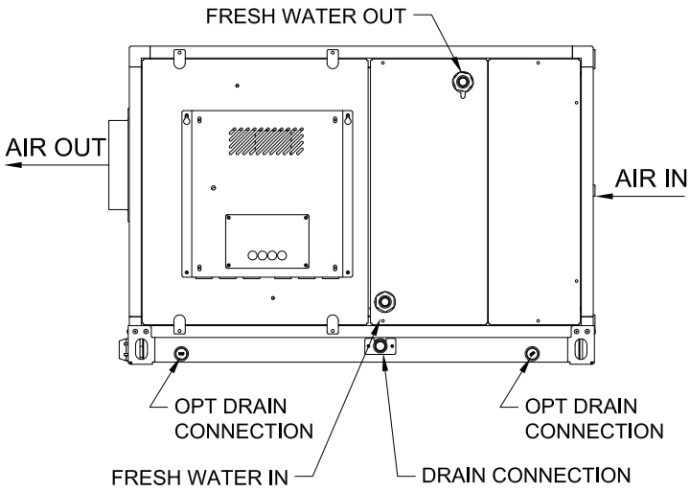




PANEL 1 - 2 - 3 - 4
- Remove one of these panels to clean the air filter.
Provide a technical space in order to extract the filter
(min 850 x 550 x 180).
- These panels must be removed or drilled (duct connection)
for air intake

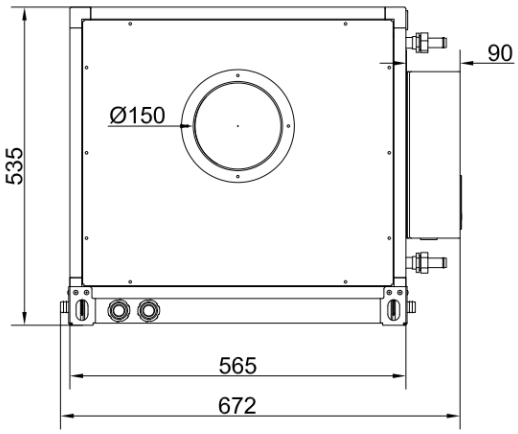


## 6.2. Climma AHU 750

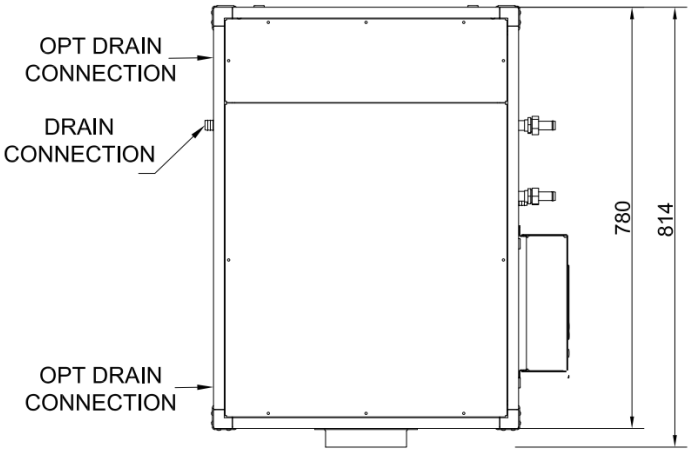
SIDE VIEW



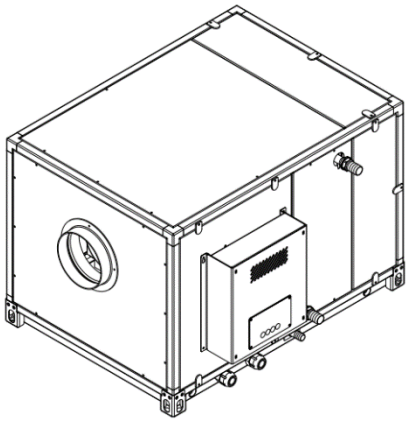

FRONT VIEW

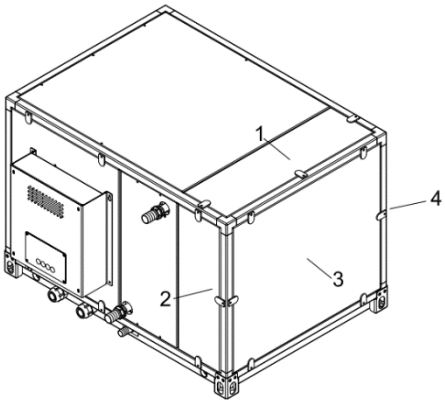



TOP VIEW



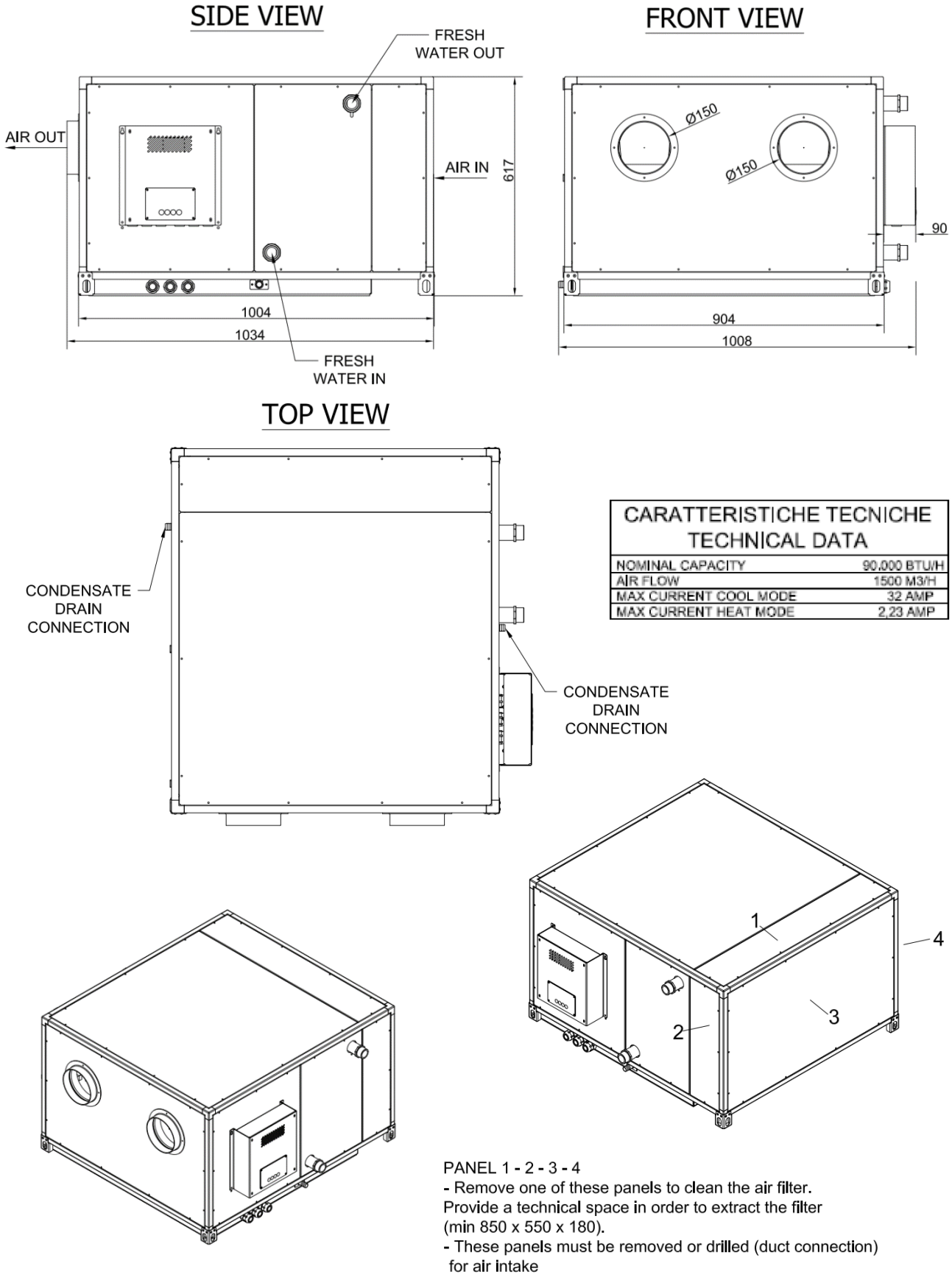

| CARATTERISTICHE TECNICHE TECHNICAL DATA | |
|---|---|
| NOMINAL CAPACITY | 45.000 BTU/H |
| AIR FLOW | 750 M3/H |
| MAX CURRENT COOL MODE | 16 AMP |
| MAX CURRENT HEAT MODE | 1,6 AMP |






Panels 1-2-3-4 give the access to the air filter. These panels give also the air intake to the unit by removing the panel or drilling and installing duct nipples.

## 6.3. Climma AHU 1500




PANEL 1 - 2 - 3 - 4
- Remove one of these panels to clean the air filter.
Provide a technical space in order to extract the filter
(min 850 x 550 x 180).
- These panels must be removed or drilled (duct connection)
for air intake