SKUDO – DC INVERTER HYDRONIC UNITS

CE 14

USER & INSTALLATION MANUAL

READ THIS MANUAL CAREFULLY BEFORE USING THE UNIT

INDEX

1 INTRODUCTION

This user manual includes technical description, operation, installation and mounting guidelines, technical data for the use of SKUDO.

Pay attention to the following symbols. Their function is to emphasize essential information like:

With reference to serious and dangerous situations that may occur with the use of the unit to ensure persons safety.

With reference to dangerous situations that may occur with the use of the unit to prevent damage to property and to the unit itself.

With reference to additional information or suggestions for proper use of the unit.

The manufacturer has the right to update products and manuals, without any obligation to update previous versions, except in particular cases.
This manual reflects the technical knowledge available at the time of commercialization of the unit and cannot be considered inadequate only because later updated according to new technologies.

1.1 LIABILITY

L'unità è garantita secondo gli accordi contrattuali stipulati alla vendita.

The manufacturer is exonerated from any liability and obligation and will cancel the form of guarantee provided in the contract of sale for any accident to persons or property that may occur due to:

- Non-compliance of the instructions present in this manual regarding the management, use, maintenance and incidents extraneous to the routine and proper use of the unit

- Modifications made to the unit and to safety devices without prior written permission of the manufacturer;
- Attempted repair on their own or by not authorized people;
- Missed periodic and constant maintenance or use of non-original spare parts.

In any case, should the user impute the incident to a defect of the unit, it will have to prove that the damage has been a major and direct consequence of this "defect".

1.2 STANDARD OPERATIONAL RULES

Carefully read and strictly observe the following suggestions:

- **the first start-up must be made by qualified staff authorized by the manufacturer;**

- during installation or when you need to work on the unit, you must strictly follow the rules reported on this manual, observe the indications on-board units and take any necessary precautions;

- accidents to persons and property can be avoided by following these technical instructions compiled with reference to Directive 2006/42 / EC and subsequent amendments. In any case always observe national safety regulations;

- do not remove or damage protections, labels or notices, especially those required by law and, if no longer readable, replace them.

All operators must observe both international accident prevention rules and of the country of destination of the unit in order to avoid possible accidents.

Remember that European Union has issued a number of directives concerning the safety and health of workers, among which include directives: 89/391/ EC, 89/686/EC, 89/654/EC, 89/655/EC, 89/656/ EC, 86/188/EC, 92/58/EC and 92/57/EC that each employer has the obligation to respect and enforce.

The units have been designed and built according to the state of the art and applicable rules of the art. Materials used, parts of equipment and the processes of production, quality assurance and control comply with the strictest needs of safety and reliability.

1.3 OPERATIONS AND MAINTENANCE

The user manual can never replace proper and adequate experience; some maintenance jobs are particularly difficult, this manual is a reminder of the main activities to be performed by personnel with proper training, for example by attending training courses from the manufacturer.

Carefully read the following suggestions:

- A constant and careful preventive maintenance will always ensure a high operating safety of the unit. Never postpone necessary repairs and have them performed only by qualified personnel, using only original spare parts;
- The workplace of operators should be kept clean, tidy and free from objects that might hinder movement;
- Operators must avoid awkward operations, in uncomfortable positions that might cause imbalance.
- The workplace must be adequately illuminated for the operations to make there. Insufficient or excessive lighting can generate risks.
- Any work on the unit must be made by qualified personnel;
- before carrying out any work or maintenance on the unit, make sure to remove the power supply;
- Make sure the safety devices are working properly and you have no doubts about how they work; otherwise don't start in any case the unit;
- Only use tools recommended by manufacturer. To avoid bodily injury, do not use worn or damaged tools, poor quality or improvised;
- Once made the cleaning unit, the operator must check that no parts are worn, damaged or not firmly attached, otherwise request the intervention of the maintenance technician;

- It is forbidden to use flammable fluids for cleaning operations

To clean the unit does not use diesel, petrol or solvents as the first leave an oily film that causes dust adhesion while solvents (even if weak) damage the paintwork. If a water jet gets inside the electrical devices in addition to oxidize the contacts, it can cause a malfunction. For this reason never use water or steam jets on sensors, connectors or any electrical part.

1.4 USE

Place the unit in rooms where there is no danger of explosion, corrosion, fire and where there are vibrations and electromagnetic fields. It is also forbidden to operate in a different way from that described or to neglect the illustrated safety tasks.

The unit is studied for heating and cooling of residential and commercial environments, it is expected to be supplied exclusively with water inside plumbing executed in accordance with best practice.

1.5 GENERAL SAFETY RULES

USE APPROPRIATE PROTECTIVE CLOTHING

All operators must use personal protective equipment such as gloves, hard hat, eye goggles, accident prevention shoes and ear defenders against noise.

Generic alarm

Presence of dangerous electrical voltage

Danger burns

Danger operating parts

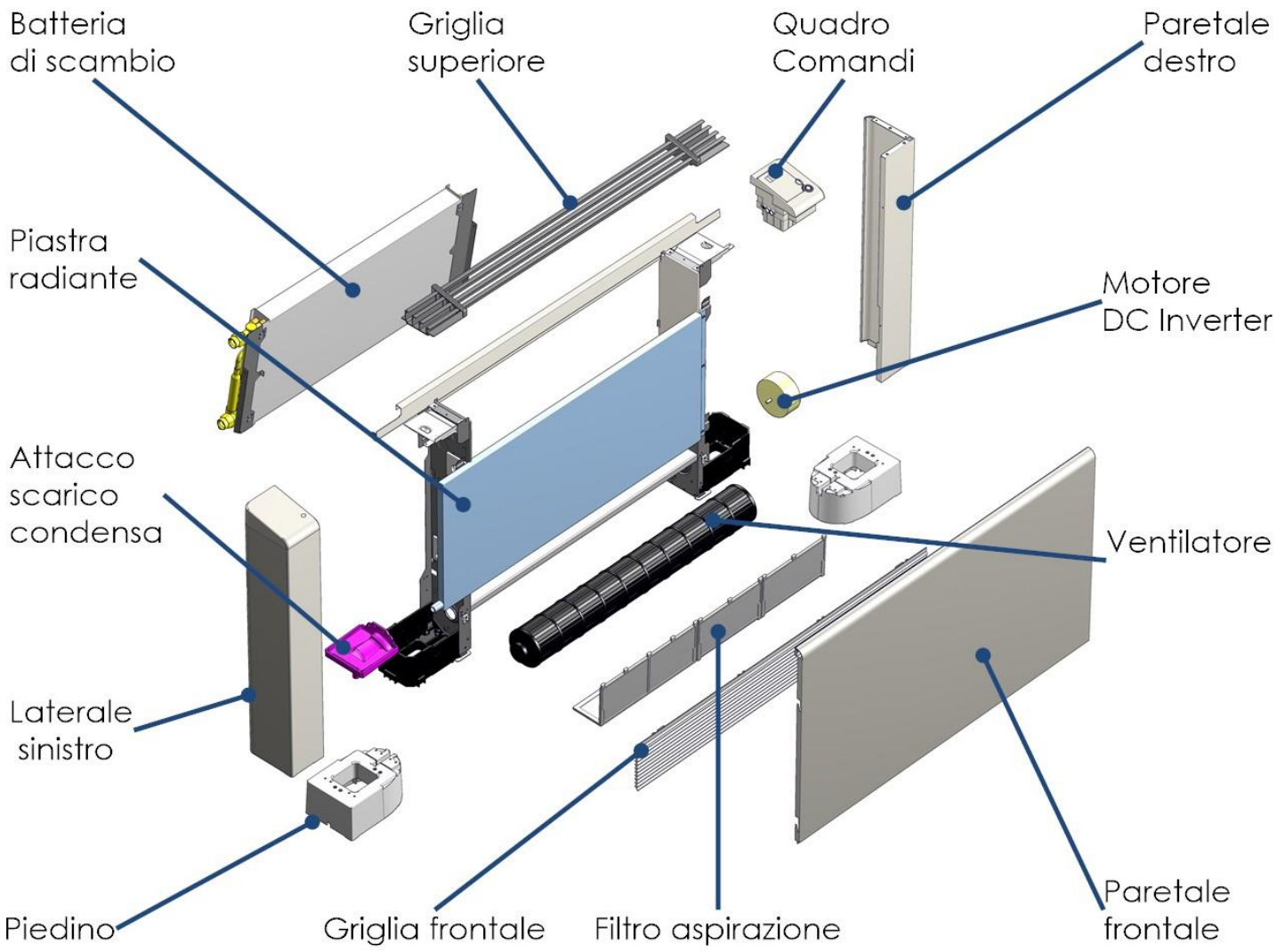
Danger cuts

2 DESCRIPTION

2.1 DESCRIPTION

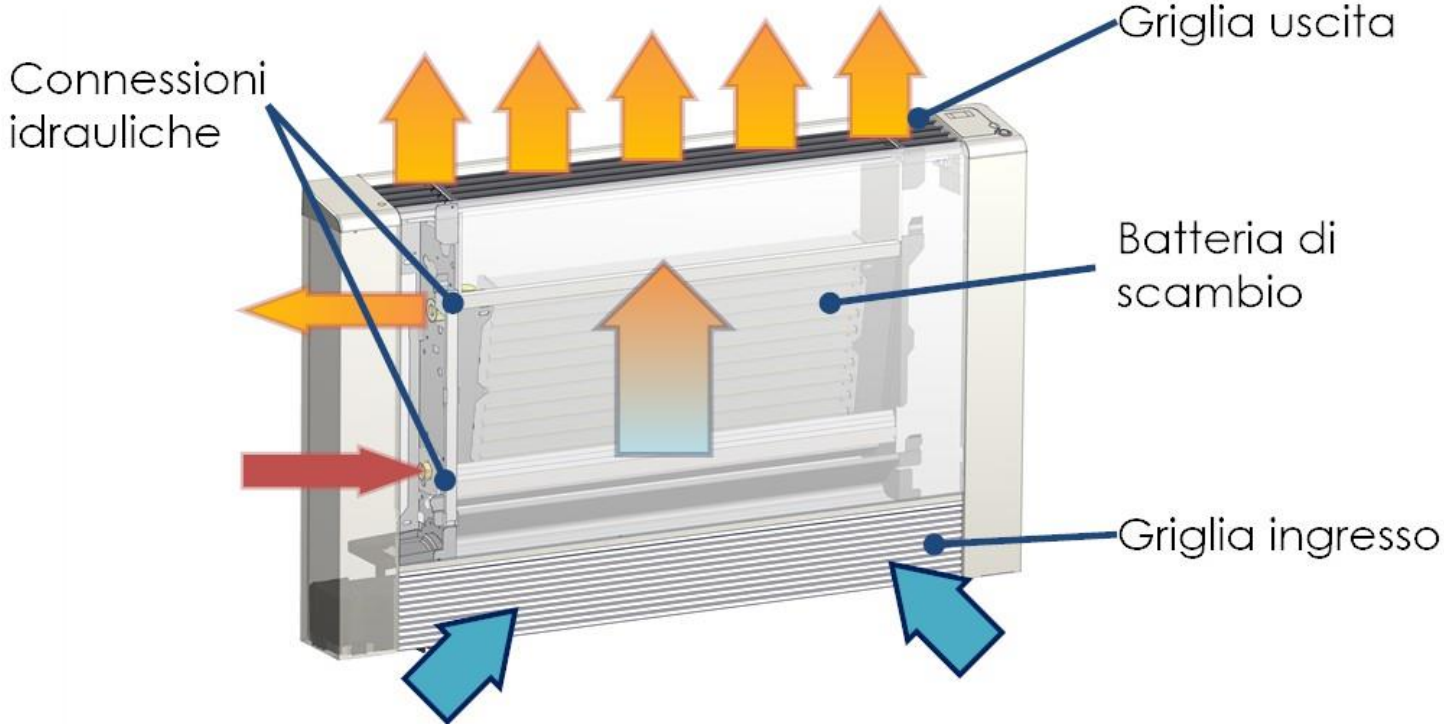
SKUDO is the hydronic terminal for high energy efficiency HVAC systems used in modern residential buildings. The water-fed Skudo heats up the environment in winter and cools it in summer. Skudo is only 13cm thick, and utilizes the best thermal and inverter technology in a compact and elegant shape. Skudo is ideal in heat pumps or renewable energy systems, including solar ones. Quick and effective, it heats, cools and removes humidity while maintaining optimal silence.
It can also be used in installations with a high temperature or in installations of heating only.

2.2 STRUCTURE



2.3 OPERATING LOGIC

Winter operation mode



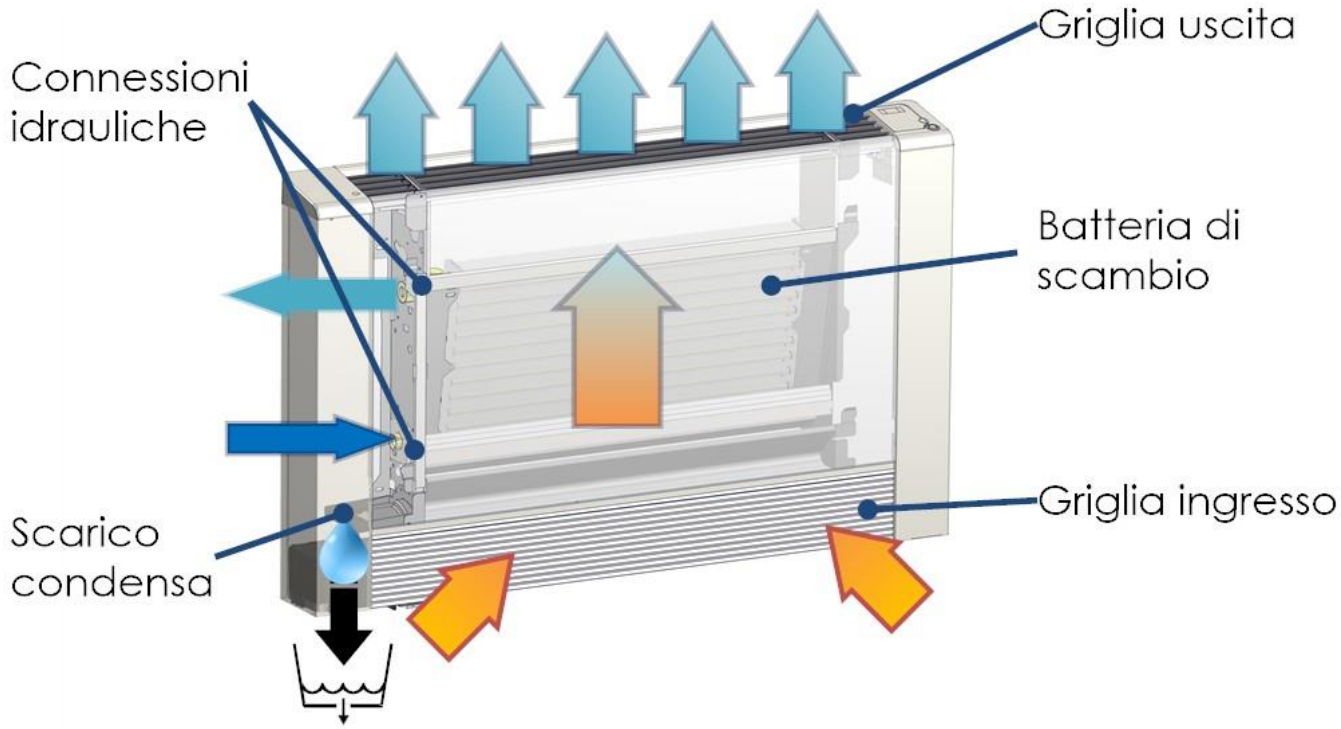
During winter, the unit sucks the cold air from the front grille and conveys it silently, through a tangential asymmetric fan driven by a DC motor inverter, through a heat exchanger. The task of the battery is to transfer the heat from the hydraulic circuit to the air, warming it. Heated air is introduced into the environment through the upper grille. **Note: To avoid the supply of cold air in the rooms in winter, the fan will not start until the water in the heat exchanger is warm enough (by default 26°C).** The required time for water to heat up depends on the length of the supply pipes, among other factors, during this time, the red led (heating) will blink.

Radiantor Technology operating mode

Thanks to the effect of exchange battery and steel plate linked to this, the unit emits heat, when needed, with the fan stopped in the maximum quiet.

The heat exchange is uniform and smooth. In automatic SUPER SIELENCE mode, the "RADIANTors" technology supply heating or cooling power with negligible or absent airflows, in an unparalleled quietness. Skudo optimizes this way both heating and cooling (ideal for reversible heat pumps)

Summer operation mode



During summer the unit draws the hot and humid air from the front grill and conveys it silently through the fan DC Inverter through the heat exchanger. The battery draws heat from the air, cooling and dehumidifying it, and transfers it to the hydraulic circuit supplied with cold water. Through the upper grill the air, cooled and dehumidified, returns to the environment.
The condensate that is formed during the process of dehumidification is collected in a tray and conveyed towards the condensate drain.
N.B. To avoid supply warm air in summer, the fan will not start until the water in the heat exchanger is cold enough (by default 23°C). The required time for water to cool down depends on the length of the supply pipes, among other factors, during this time, the green led (cooling) will blink.
In some cases, the on-board air temperature sensor may be influenced by the heat exchanger temperature, and it could prevent the fan from starting up again. In such cases it is recommended to enable the intermittent operation of the fan when the setpoint is reached (set parameter 20 to 1).

2.4 OPERATING LIMITS

- Room temperature between 5° and 40 °C – humidity between 0 and 90% non-condensing.
- Water temperature between 9° and 90 °C in winter and between 5° and 20° C in summer.

3 ELECTRICAL CIRCUITS

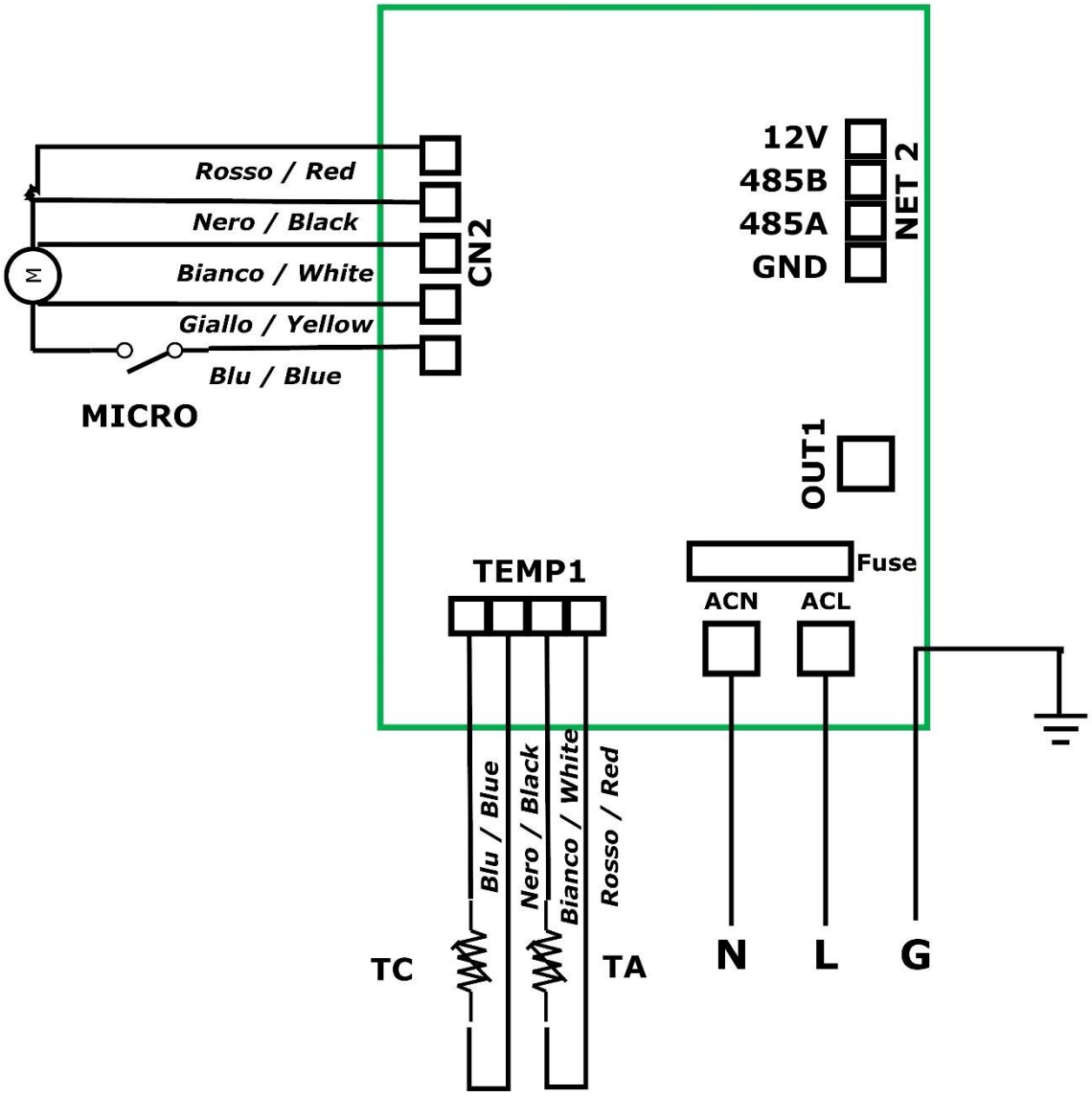
3.1 ELECTRICAL EQUIPMENT

The board is constructed and wired in accordance with standards "Low Voltage" and EMC.

3.2 WIRING DIAGRAM

Make sure that the earth connection is done and efficient.

INTERNAL WIRING



Legend

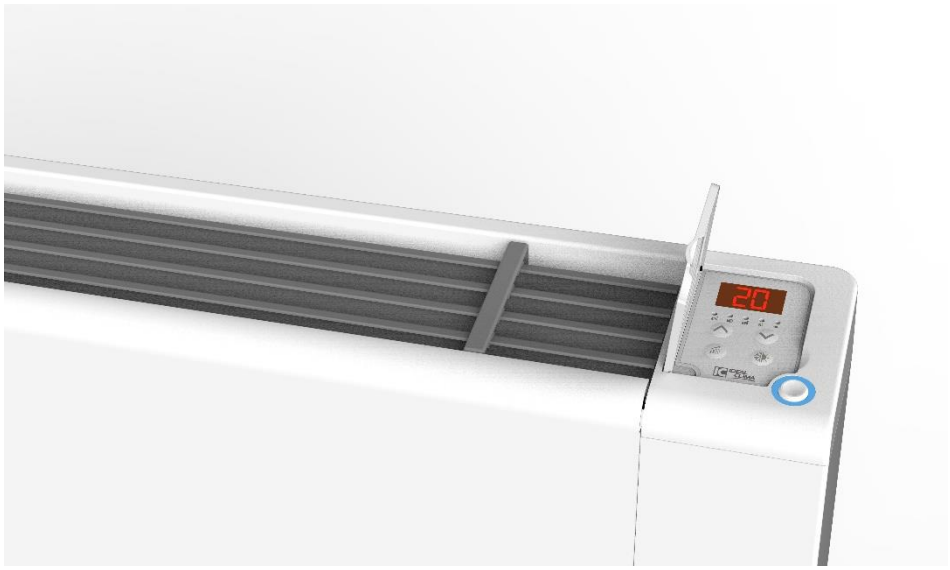
CONTACT	DESCRIPTION
ACL	Power feed 220-240 V ~ 50 Hz LIVE
ACN	Power Feed Neutral
Fuse	Overload Fuse (Type T5A 230V)
OUT1	Live (230 V) command for themic head
CN2	Fan motor terminal block
Micro	Safety Switch. It breaks the circuit if the front grille is not in place.
NET2 - 12V	12 V for low-current load (please do not use)
NET2 - 485B	B- Contact (RX-) for RS485 MODBUS RTU network
NET2 - 485A	A+ Contact (RX+) for RS485 MODBUS RTU network
NET2 - GND	Ground for RS485 MODBUS RTU network
TEMP1- TC	Water temperature NTC sensor (5KOhm Beta 3470)
TEMP1- TA	Room temperature NTC sensor (5KOhm Beta 3470)

4 CONTROLS

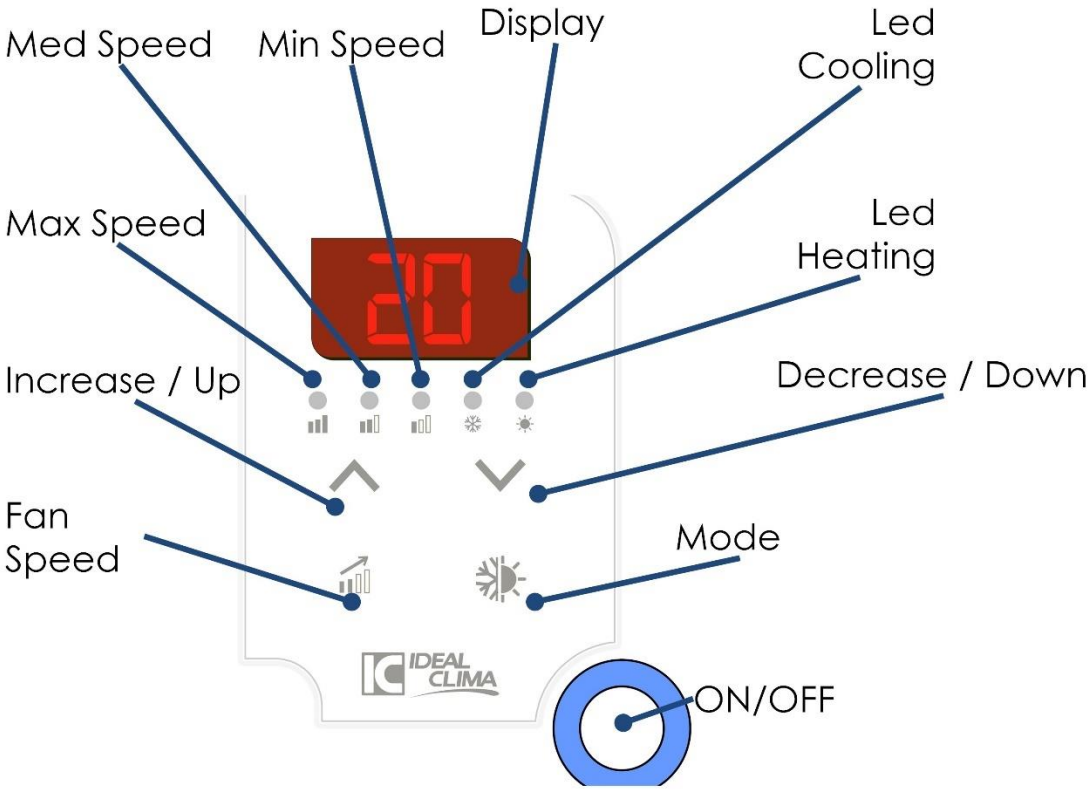
The unit can be controlled in three ways simultaneously:

- With a LCD control panel installed on board machine
- With a remote control (code TQCT03 – optional)
- With LCD control panel + Modbus interface RTU (if installed on board machine the control TQCT02)

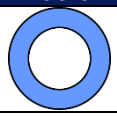
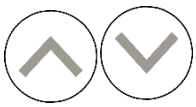
4.1 ON BOARD CONTROL PANEL



The board control is located on the upper right side of the unit - to access to the commands lift the protection lid



Meaning of the buttons :

Tasto	Descrizione	Funzione
	**ON/OFF**	The button turns on and off the unit . When the unit is on, the blue disc around the button lights up.
	**Up / Down**	• A single pressure of one of the two buttons displays the target temperature to join. • Pressing again allows you to increase or decrease the desired temperature.
	**Mode**	The button allows you to manually choose the operating mode of the unit from the following: • cooling (Led " ❄ " on) • heating (Led " ☀ " on) • Auto mode (Led " ❄ " and " ☀ " flash alternately). In auto mode, the temperature can only be changed by changing the parameters 5 and 6 in the adavanced settings.
	**Speed**	This button allows to change the operating speed of the fan from the following: • Maximum speed (Led " ▮▮▮ " on) • Medium speed (Led " ▮▮ " on) • Minimum speed (Led " ▮ " on) • Super silence speed (Led " ▮ " flashes) • Auto speed (Led " ▮ ", " ▮▮ " e " ▮▮▮ flashing in sequence). The unit modulates the speed continuously depending on the room temperature and the desired temperature, reducing consumption and increasing comfort. Note: the auto speed cannot be selected in fan mode only. In the dehumidification mode only the speed is always determined by the unit to maximize the dehumidifying and cannot be varied.

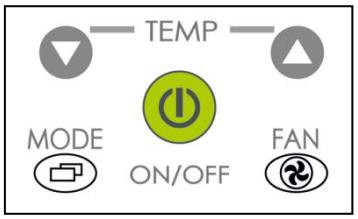
4.2 CHANGING TEMPERATURE SETPOINTS

Dopo 5 secondi di inattività, il dispositivo memorizza il valore impostato e torna alla schermata iniziale.

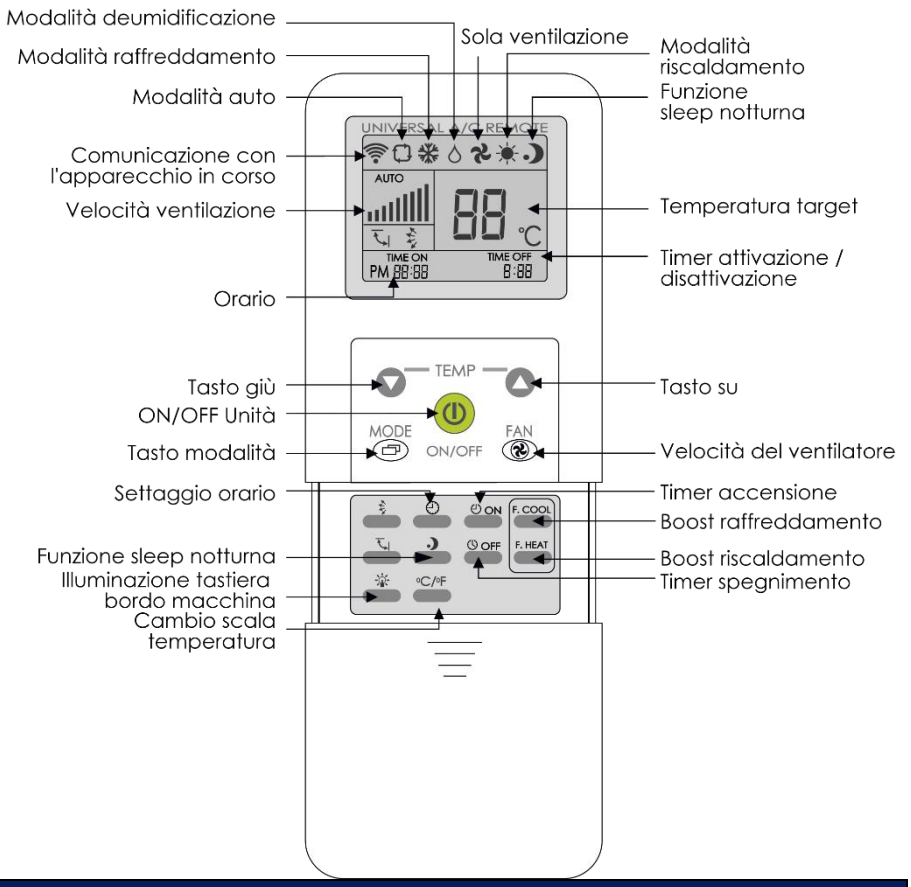
NB: The temperature setpoint cannot be changed in only ventilation mode and dehumidification.

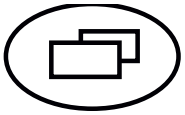
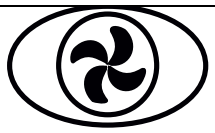
4.3 REMOTE CONTROL

You can operate with the remote control . When sending commands via remote control, the control on board goes off . It can be reactivated by pressing any of the four buttons of the panel on the unit.
The remote control has the following buttons:



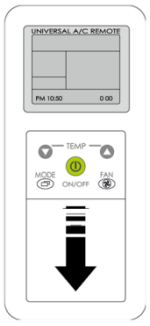
The buttons used most frequently are always available in the visible part of the remote control and have the following meaning :



Button	Description	Function
	**ON/OFF**	The button turns on and off the unit.
	**Up / Down**	• Pressing the up / down button allows you to increase / decrease the temperature target to be reached .
	**Mode**	The button allows you to manually choose the operating mode of the unit from the following: • Cooling (Led on) • Heating (Led " " on) • Auto (Led " ") • Ventilation only (Led " " on): the unit performs only the air ventilation without changing its temperature • Dehumidification only: maximizes dehumidifying capacity of the unit (Led " " on)
	**Speed**	speed Auto (symbol of intensity is off, the message "AUTO").

		The device modulates the speed continuously depending on the room temperature and the desired temperature, reducing consumption and increasing comfort. Note: the auto speed cannot be selected in fan only mode. In the dehumidification only mode the speed is always determined by the device to maximize the dehumidifying and not power can be varied. This button allows to change the operating speed of the fan from the following: • Minimum speed (symbol of intensity at minimum) • Medium speed (symbol of intensity in middle position) • Maximum speed (symbol of intensity at maximum) • Auto speed (symbol of intensity is off, appears message "AUTO"). The unit modulates the speed continuously depending on the room temperature and the desired temperature, reducing consumption and increasing comfort. Note: the auto speed cannot be selected in fan mode only. In the dehumidification mode only the speed is always determined by the device to maximize the dehumidifying capacity and cannot be varied.

Advanced features are made accessible by sliding the lid down :
Advanced features are the following:



Boost cooling function
Pressing " F. Cool " button will engage the boost cooling function, the unit will go into cooling mode at full speed , so to cool the environment quickly. To disable the function, press the button " F. Cool" again.

Boost heating function
Pressing " F. Heat " button will engage the boost heating function, the unit will enter the heating mode at maximum speed in order to heat the room quickly. To disable the function, press the button " F. Heat " again.

Night sleep function
Pressing "sleep" ( ) button will activate the night sleep function, in this mode the unit automatically reduces the target temperature of 2° in heating (the temperature increases by 2° in cooling mode) and limits the modulation range of the fan so that it does not exceed the minimum speed.
The display will show the symbol of the night sleep function ( )
To disable this feature, press again the button "sleep ", the symbol will disappear from the display .

ON Timer
Pressing the " ON" button when the unit is off, you can set the delayed start of the unit. In fact you will see the word " TIME ON " and the number of hours after which the unit will turn on. You can increase the hours of delay up to 11 by pressing the " ON" button. Pressing again the " ON" button , the delayed start will be disabled and the word " TIME ON" will disappear from the display .

NB: to allow the delayed start of the unit, please note that this must be on stand -by but electrically powered .

OFF Timer

By pressing the " off" button when the unit is on, you can set the sleep timer of the unit. In fact you will see the word "TIME OFF " and the number of hours after which the unit will turn off. You can increase the hours of delay up to 11 by repeatedly pressing the " off ". Pressing again the button " off" , the sleep timer will be disabled and the word " OFF TIME " will disappear from the display

Clock set of the remote control

Holding down the " " button for five seconds, the time on display will start to flash. You can now change the displayed time by pressing the " up" and " down " buttons.

Units change of temperature measure

Pressing the "C/F" button you can change the unit of measurement of the temperature displayed by the remote control and the unit from Celsius to Fahrenheit and vice versa .

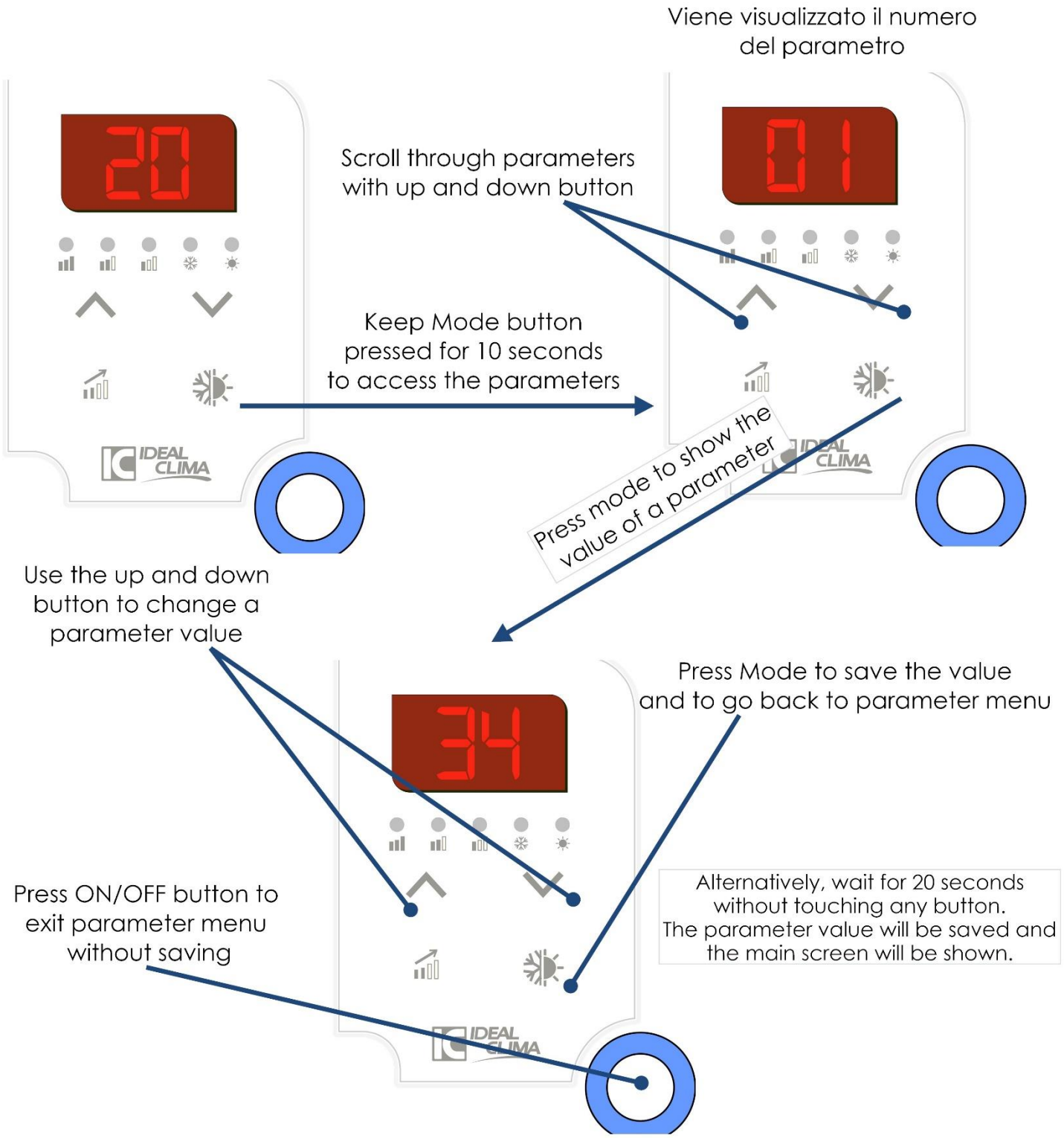
Lighting keyboard on the machine

Pressing the bulb button , you can turn off the display on board of the unit. The unit will remain in operation and will be controllable through the remote control. Pressing again the button bulb , you can reactivate the display.

5 ADVANCED SETTINGS AND PARAMETERS

5.1 ACCESSING ADVANCED SETTINGS FROM CONTROL BOARD

You can access to advanced settings of the unit, that change the operation of the device.
These settings should be changed only by authorized personnel during installation or maintenance of the unit.
To access and edit the advanced parameters of the device proceed as follows:



5.2 PARAMETERS MEANING

Below is the list of parameters and their meaning:

Par.	Description	Function	Default value	Allowed range of values
1	**Temperature setpoint upper limit**	This parameter limits the maximum adjustable temperature target values, both in heating and cooling.	30	0-30
2	**Temperature setpoint lower limit**	This parameter limits the target value of minimum acceptable temperature, both in heating and cooling.	0	0-30
3	**Summer Setpoint**	Goal value of temperature in cooling mode	24	10-30
4	**Winter Setpoint**	Goal value of temperature in heating mode	28	10-30
5	**Summer Setpoint in auto mode**	Goal value of temperature in cooling mode, in auto mode	24	10-30
6	**Winter Setpoint in auto mode**	Goal value of temperature in heating mode, in auto mode	28	10-30
7	**Anti draught**	It indicates, in heating mode, the minimum temperature that the coil exchanger must have before the unit starts the ventilation, so as to avoid annoying cold air currents before the battery is warmed.	24	0-30
8	**Anti hot air**	If this function is active, in cooling mode, the unit monitors the temperature of the coil is fallen below 23° C before to activate the ventilation, so as to avoid hot air currents. 0 = disabled , 1 = enabled	1	0-1
9	**Reserved value**	Reserved value, do not use	0	0-1
10	**Presence of the actuator**	Indicates if the unit has to command the electrical valve actuator. 0 = No, 1 = Yes	0	0-1
11	**Reserved value**	Reserved value, do not use	0	0-1
12	**Temperature scale**	This parameter defines the scale with which the temperature in the display appear. 0 = Celsius 1 = Fahrenheit degrees	0	0-1
13	**Reserved value**	Reserved value, do not use	0	0-1
14	**Modbus address**	This parameter specifies the address to which the unit responds within a Modbus RTU network.	15	1-32
15	**Ability to lock the keyboard on board machine**	This parameter specifies whether you can lock the keypad on the machine. For the steps to lock/unlock the keys see the specific paragraph. 0 = No you cannot lock 1 = yes you can lock the keys	0	0-1
16	**Remote control usable with key lock**	This parameter indicates whether it is possible to use the remote control to command the unit when the onboard control keys are locked. 0 = the remote control cannot be used.	0	0-1

Par.	Description	Function	Default value	Allowed range of values
		1 = remote control can control the unit		
17	**Reserved value**	Reserved value, do not use	0	0-1
18	**Reserved value**	Reserved value, do not use	0	0-99
19	**Reserved value**	Reserved value, do not use	0	0-99
20	**Intermittent ventilation to the target temperature**	This parameter specifies if the unit, once reached the desired target temperature, must activate intermittent ventilation in order to facilitate the maintenance.	0	0-1

All parameters settable by the control on board can also be set via Modbus RTU network if you have installed the control with Modbus connection (code TQCT02).

5.3 MODBUS RTU

The Modbus interface is available only with the control on board code TQCT02 .
Connect RS 485 cables to connector NET2.
NOTE : Size the termination resistor according to the type of chosen network.

The unit can be connected as a slave to a Modbus network with a baud rate of 9600 bps, 8 data bits, no parity, 1 stop bit.

The default Modbus address is 15.
Following functions are available:

- 0x03: read holding register
- 0x04: read input register
- 0x10: write multiple registers

Valori Modbus in lettura (input register)

Indirizzo	Descrizione	Tipo di dati	Formato	Valore di default
46.801	Measured room temperature	Int16 signed	The value is in tenths of a degree (24° C = 240), accuracy 0.5° C	-
46.802	Coil temperature	Int16 signed	The value is in tenths of a degree (24° C = 240), accuracy 0.5° C	-
46.803	Fan speed	Int16 signed	0= stop, 1= Super silence speed, 2= low speed, 3= medium speed, 4= high speed, 5= very high speed, 6= auto speed.	-
46.804	Rotational speed of the fan	Int16 signed	Expressed in rpm	-
46.805	Valve control (open/closed)	Int16 signed	0= nessun comando alla valvola 1= fase inviata alla valvola (uscita Out 1 nello schema elettrico)	-
46.806	Unit status (ON / OFF)	Int16 signed	0 = turned OFF	-

Indirizzo	Descrizione	Tipo di dati	Formato	Valore di default
			1= turned ON	
46.807	Operation mode (heating / cooling)	Int16 signed	0 = cooling mode 1= heating mode	-
46.808	DC Inverter motor alarm	Int16 signed	0 = no alarm 1= sensor failure	-
46.809	Room temperature sensor alarm	Int16 signed	0 = no alarm 1= sensor failure	-
46.810	Coil temperature sensor alarm	Int16 signed	0 = no alarm 1= sensor failure	-

Reading example:
In this example you read the input register from 46801 to 46803 of a unit to the default address

0F	04	B6 D1	00 03	C7 54
SLAVE ID	Read input registers	First register	Number of registers	CRC

The answer is the following:

0F	04	06	00 E6	00 EB	00 03	15 10
SLAVE ID	Read input registers	Number of bytes in the reply (6)	Measured room temperature (230 = 23°C)	Measured water temp (235 = 23,5 °C)	Fan speed (3 = media)	CRC

Modbus value in reading/writing (holding register)

Indirizzo	Descrizione	Tipo di dati	Formato	Valore di default
28.301	Turning the unit ON or OFF	Int16 signed	0 =the unit is turned off 1 = the uniti s turned on	-
28.302	Operating mode of the unit	Int16 signed	0 = automatic, 1= cooling, 2 = dehumidification, 3= fan only, 4= heating	-
28.303	Fan speed	Int16 signed	1 = super silence speed 2 = min speed 3 = medium speed 4 = high speed 6= auto speed	-
28.304	Key lock (public buildings)	Int16 signed	0 = on board control is usable 1= key lock of the on board control (first enable the feature by changing address 28322)	-
28.305	Sleep function (nocturnal alleviation)	Int16 signed	0 = sleep function not active 1 = sleep function activated	-
28.306	Sleep timer function	Int16 signed	0 = inactive 1 – 11 = number of hours after which the unit will automatically shut off	-
28.307	Starting timer fuction	Int16 signed	0 = inactive 1 – 11 = number of hours after which the unit will automatically shut off	-
28.308	End maximum scale target temperature	Int16 signed	Specifies the maximum adjustable target	300

Indirizzo	Descrizione	Tipo di dati	Formato	Valore di default
			temperature (in tenths of a degree 24° = 240)	
28.309	End minimum target temperature scale	Int16 signed	Specifies the minimum target temperature (in tenths of a degree 24° = 240)	180
28.310	Target temperature in cooling mode	Int16 signed	Specifies the desired target temperature (in tenths of a degree 24° = 240)	-
28.311	Target temperature in heating mode	Int16 signed	Specifies the desired target temperature (in tenths of a degree 24° = 240)	
28.312	Target temperature in cooling mode in automatic mode	Int16 signed	Specifies the desired target temperature (in tenths of a degree 24° = 240)	
28.313	Target temperature in heating mode in automatic mode	Int16 signed	Specifies the desired target temperature (in tenths of a degree 24° = 240)	
28.314	Anti activation threshold drafts	Int16 signed	Specifies the threshold temperature of heat exchanger under which do not turn on the fan in heating mode, to avoid cold air currents.	250
28.315	Activation anti draft function	Int16 signed	0 = inactive 1 = active	1
28.316	Activation super silence speed	Int16 signed	0 = inactive 1 = active	0
28.317	Presence valve function activation	Int16 signed	0 = function not active (output OUT1 is not commanded in phase) 1 = function active (output OUT1 is activated in phase)	0
28.318	Reserved function	Int16 signed	Reserved function, do not use	0
28.319	Temperature unit	Int16 signed	0 = Celsius degrees 0 = Fahrenheit degrees	0
28.320	Reserved function	Int16 signed	Reserved function, do not use	0
28.321	Modbus address of the unit	Int16 signed	Acceptable values between 1 and 32	15
28.322	Activate key lock function	Int16 signed	0 = key lock function not active 1 = active	
28.323	Accept commands from the remote control in case of locking keys	Int16 signed	0 = the remote control is disabled 1 = remote control controls unit	
28.324	Password function to change the settings from the terminal on board	Int16 signed	0 = no password required 1 = a password is required before you can change the values by onboard terminal	0
28.325	First two digits password key lock	Int16 signed	This register specifies the first two digits of the password to be inserted to unlock keys.	00
28.326	Last two digits password key lock	Int16 signed	This register specifies the last two digits of the password to be inserted to unlock keys.	00

Indirizzo	Descrizione	Tipo di dati	Formato	Valore di default
28.327	Intermittent fan activation target when temperature is reached	Int16 signed	0 = when desired temperature is reached, the fan stops. 1 = when desired temperature has been reached the fan activates intermittently to keep it.	0

Reading example of holding register

This example reads the holding register from 28301 to 28303 of a unit to default address.

0F	03	6E 8D	00 03	88 26
SLAVE ID	Read holding registers	First register	Number of registers	CRC

The answer is the following :

0F	03	06	00 01	00 04	00 03	51 15
Slave Id	Read holding registers	Number of bytes (6)	Device on/off (1 = ON)	Operating mode (4 = heating)	Fan speed (3 = medium)	CRC

Writing example of holding register

This example writes the holding register from 28301 28303 of a unit to default address

0F	10	6E 8D	00 03	06	00 01	00 01	00 02	41 34
Slave ID	Write holding registers	First register address	Registers to write	Number of bytes	Device on/off (1 = ON)	M Operating mode (1 = cooling)	Fan speed (2 = minima)	CRC

5.4 KEYPAD LOCK (PUBLIC BUILDINGS)

You can lock the keys of the control on board so that operating parameters, including temperatures desired target cannot be varied. This feature is particularly useful in public buildings.

SIMPLE KEY LOCK

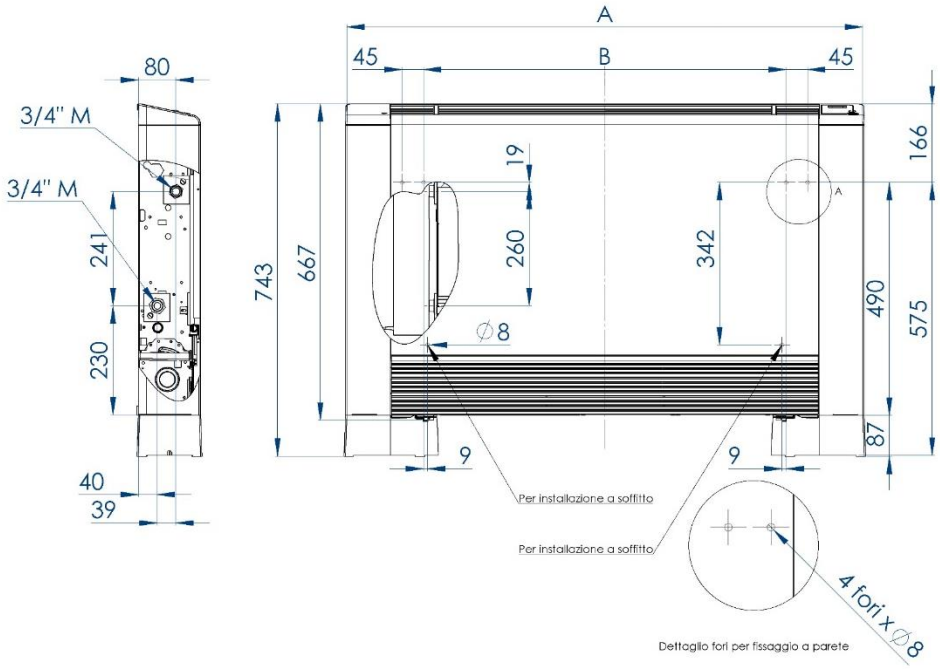
6 TECHNICAL DATA

6.1 TECHNICAL DATA TABLE

Descrizione		SKUDO 250	SKUDO 400	SKUDO 600	SKUDO 800	SKUDO 1000
Codice		**TSM02D**	**TSM04D**	**TSM06D**	**TSM08D**	**TSM10D**
Heating power 70 °C (1)	**W**	**2.000**	**3.800**	**5'450**	**6.950**	**8'600**
Water flow	mc/h	2,8	5,5	7,92	10,1	12,45
Water pressure drop	kPa	6,5	13,0	29,0	23,5	26,2
Heating power 50 °C (2)	**W**	**1'250**	**2'400**	**3'250**	**4'000**	**4.750**
Water flow	mc/h	2,8	5,5	7,92	10,1	12,45
Water pressure drop	kPa	6,5	13,0	29,0	23,5	26,2
Cooling power 7°C (3)	**W**	**800**	**1'650**	**2'500**	**3'250**	**4'050**
Latent heat	**W**	**120**	**280**	**420**	**570**	**740**
Water flow	mc/h	2,35	4,7	7,0	9,15	11,4
Water pressure drop	kPa	6,5	12,5	30,25	24,2	28,2
Air flow rate – max speed	mc/h	160	320	460	580	650
Sound pressure - super silence speed	dB (A)	16,5	14,2	15,4	16,1	16,6
Sound pressure - max speed	dB (A)	37,7	38	39,6	39,9	42,9
Sound pressure - min speed	dB (A)	24,3	22,7	23,9	24,3	27,2
Power supply	V/ph/Hz	230/1+N/50----IP23				
Electric consumption at max speed	W	**11,7**	**15,1**	**16,6**	**23,1**	**30,28**
Piping connections	Inch	0,13	0,15	0,16	0,22	0,28
Condensation drainage pipe	mm	3/4	3/4	3/4	3/4	3/4
Maximum working pressure	bar	0,5				
Net weight	Kg	16	16	16	16	16

(1) entering water temp. 70°, Δ T 10°C, Ambient temp. 20 °C (UNI EN 1397)
(2) entering water temp. 50°, water flow equal to cooling, Ambient temp. 20 °C (UNI EN 1397)
(3) entering water temp. 7°, Δ T 5 °C, Ambient temp. 27 °C – RH 62% (UNI EN 1397)

6.2 DIMENSIONS



CODICE	DESCRIZIONE	A [mm]	B [mm]
TSM02D	SKUDO 250	700	365
TSM04D	SKUDO 400	900	565
TSM06D	SKUDO 600	1'100	765
TSM08D	SKUDO 800	1'300	965
TSM10D	SKUDO 1000	1'500	1'165

All dimensions are in mm

7 AFTER SALES

7.1 TROUBLESHOOTING

On the following pages are the most common reasons that can cause the drive lock or abnormal operation. The division is made according to the symptoms easily identifiable:

NR	TROUBLE	ANALYSYS OF POSSIBLE CAUSES	REMEDY
1	Remote control doesn't respond	Remote control incorrectly set	Remove the batteries from the remote control and wait at least 35 minutes to perform a reset. Reinsert the batteries. If the remote control does not work, contact after sales service.
2	Water overflows from the condensate drain pan	Clogged drain	Verify that the drain passage is free from obstructions
		Little slope drain hose	Check the drain hose slant
3	Onset of bad odors	Failed execution of the siphon on the condensate drain	Verify that the siphon on the condensate drain exists and is properly installed.
4	The device does not activate the ventilation	Hot water does not reach the appliance (in winter) or cold (in summer)	Verify that the hot or cold water generator is working
		The valve, if installed, is closed	Disassemble and check valve, check to see if the device works properly by removing the valve
			Check the valve operation bringing operating voltage to 230V, separately from the unit if you were to turn, check the electrical wiring. If the problem persists, contact after sales service.
5	Presence of droplets of condensation on output grille	High ambient humidity	Under particular conditions of high humidity, condensation can form on the grill. In any case, these drops are collected from the condensate drain pan and then are part of the normal operation of the unit.

NR	TROUBLE	ANALYSYS OF POSSIBLE CAUSES	REMEDY
6	Presence of droplets of condensation on the front panel	Failed insulation	Contact after sales service
7	The remote control does not control the unit	Batteries exhausted	Check whether the remote-control display lights up, otherwise replace batteries.
		Key lock active	Make sure that is inactive the parameter which excludes the possibility for the remote control to operate the unit during the key lock (parameter no. 16 must be set to 1)
8	The air flow is weaker than usual and the unit louder	Dirty filters	Clean, or if necessary, replace filters

Here are the error codes that the display shows with possible causes and corrective actions:

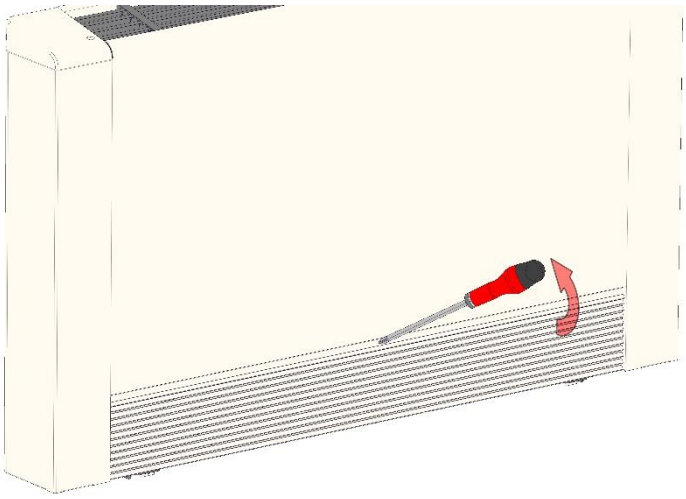
COD	ANOMALIA	ANALISI DELLE POSSIBILI CAUSE	AZIONI CORRETTIVE
P4	Temperature sensor failure	The room temperature sensor could be broken or shorted	Contact after sales service
P5	Coil sensor failure	The temperature sensor of the coil might be broken or shorted	Contact after sales service
E0	DC inverter motor failure	The front grill, in the wrong position, triggered the safety switch	Try placing better the grill and then turn the unit on and off. If the error code reappears, call after sales service

7.2 ORDINARY MAINTENANCE

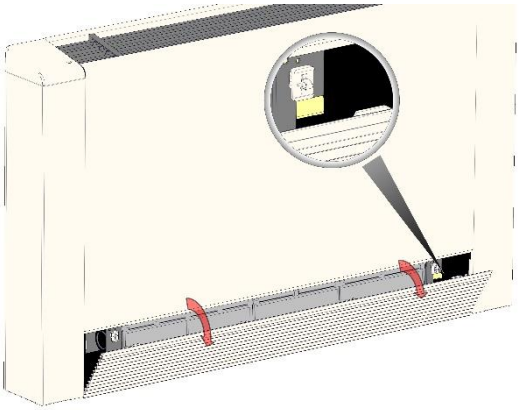
Disconnect the unit from power mains before any maintenance.

FILTERS CLEANING

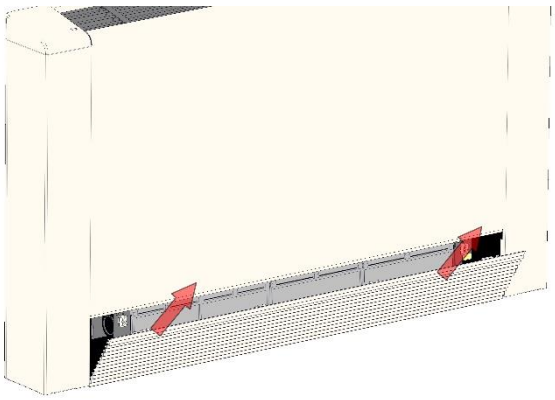
To ensure smooth and quite operation of the unit for long time is recommended to clean the filters at least every six months and replace them every two years.
To remove the filters, proceed as follows:
once removed the power supply, with the help of a screwdriver to pry the upper side of the grid so as to release the magnetic connection.



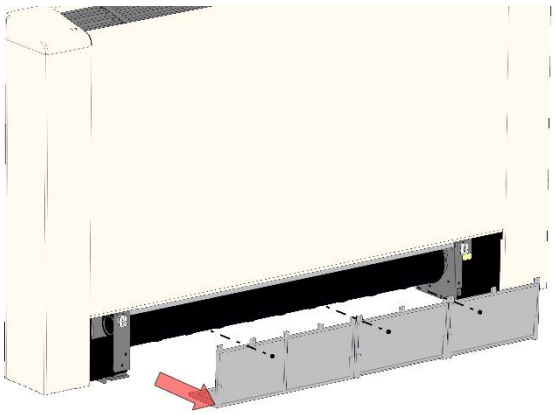
With your hands slightly rotate the grid, the micro safety switch (shown in the round) will ensure the motor stop during this operation:



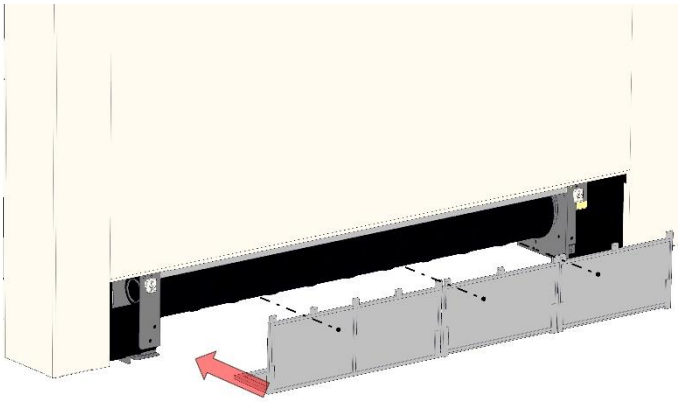
Detach now the front grille from its hinges in which is housed by pulling diagonally as shown in the figure:



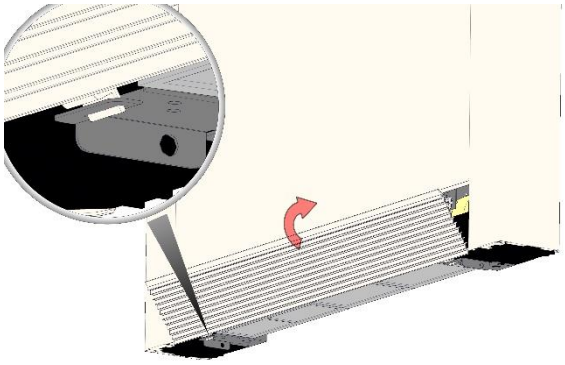
Without using any tools now firmly pull the filter toward you :



Clean the filter with water (or replace it if necessary) and replace it in the same way you have extracted :



Insert the tabs into the hinges, then rotate until the magnetic attacks have not made again taken:



CLEANING UNIT

Clean the unit only with a wet and soft cloth. To avoid to damage the paint of the unit do not use abrasive sponges or aggressive detergents.

8 DISPOSAL OF THE UNIT

When the unit reaches the end of its life and it needs to be removed and replaced, the structure and components, if unusable, must be stripped down and separated according to their basic components.

9 UNIT INSTALLATION

9.1 PRELIMINARY CHECKS

INSPECTION

After receiving the unit, check its integrity: the unit left the factory in perfect condition; any possible damage must be immediately claimed to the transport company and recorded on the Delivery Note before signing.

LIFTING AND TRANSPORT

During unloading and positioning of the unit, it is highly recommended to avoid abrupt or violent handling. The internal transport should be performed carefully and gently, avoiding to use as strengths points the unit components.

In all lifting operations make sure you have firmly anchored the unit, in order to prevent accidental toppling or falling.

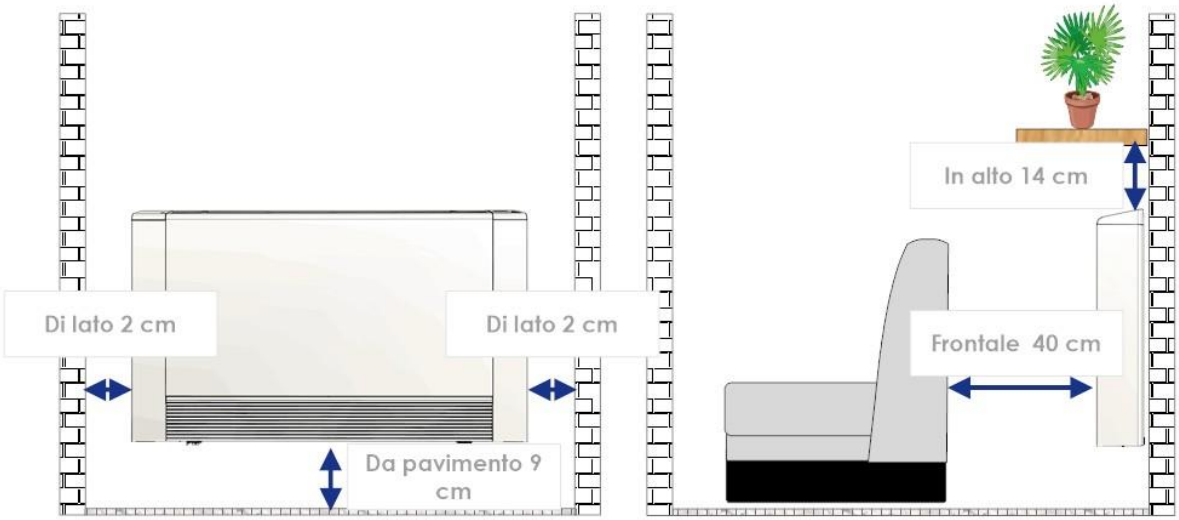
UNPACKING

The packaging unit must be removed carefully without causing damage to the unit; the materials constituting the package are different in nature, wood, cardboard, nylon etc.. It is good practice to keep them separately and deliver them to the disposal or possibly to the recycling companies responsible for this purpose and thus reduce the environmental impact.

9.2 INTENDED USE

SKUDO models are designed and built for indoor installation.
Do not install the fan unit outside and make sure it is not exposed to weather such as rain, hail, frost and humidity.

For correct operation it is necessary to respect the following minimum distances from the unit:



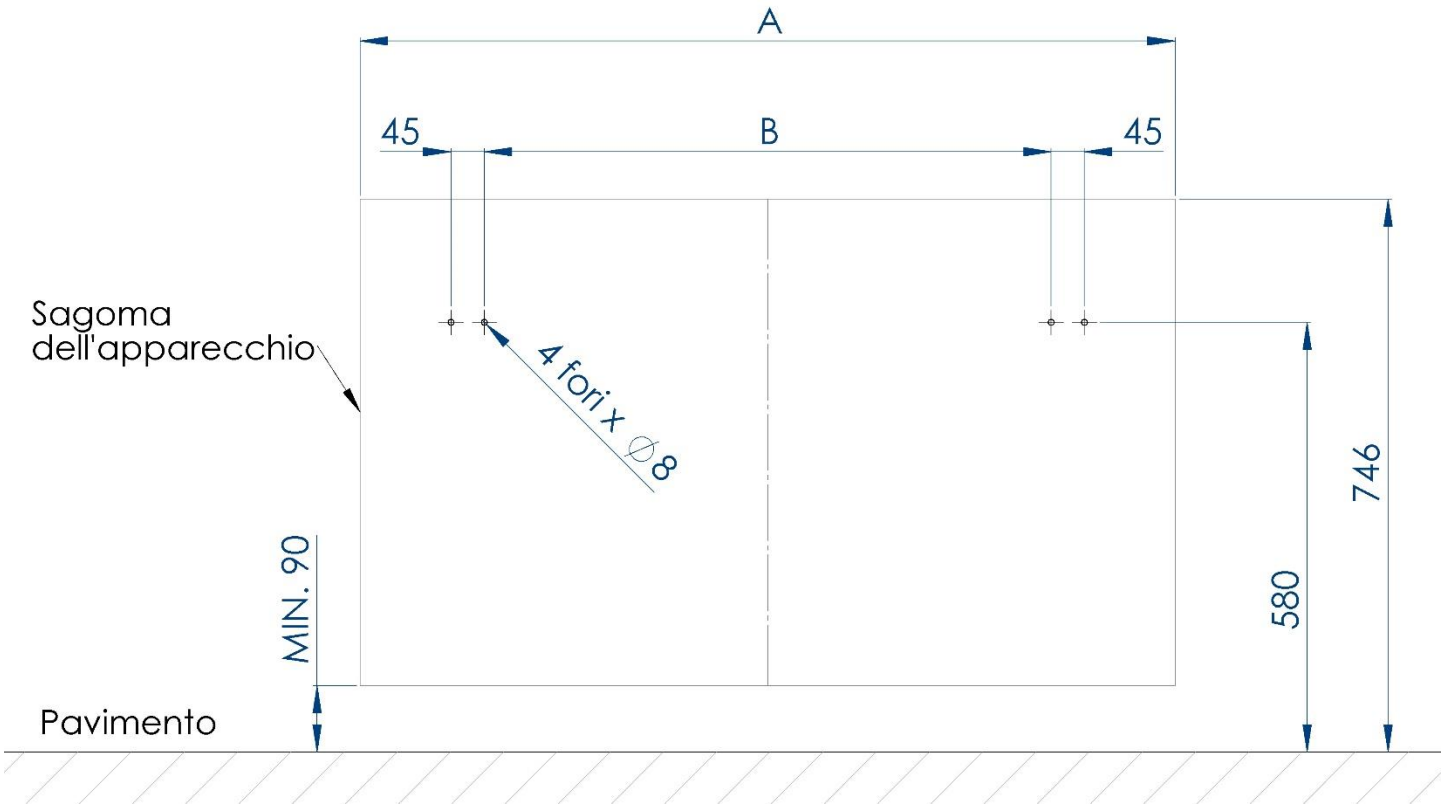
Avoid to place the unit :

- In direct sunlight;
- Near heat sources;
- In damp areas or where there is a risk of contact with water. In the presence of fumes as well combustion residues of oil and other hydrocarbons. (The installation is permitted in environments with biomass heat generator such as pellet stoves and similar).

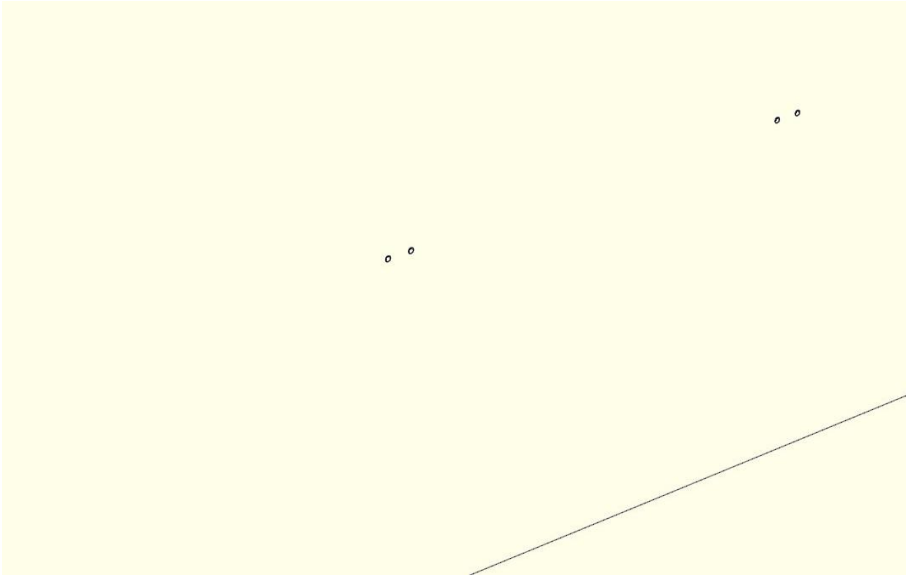
In addition, you must ensure that the built structure that will set the unit is strong enough to withstand its weight, sufficiently flat and that there are no obstacles that can alter the air flow in outlet and expulsion.

9.3 WALL MOUNTING

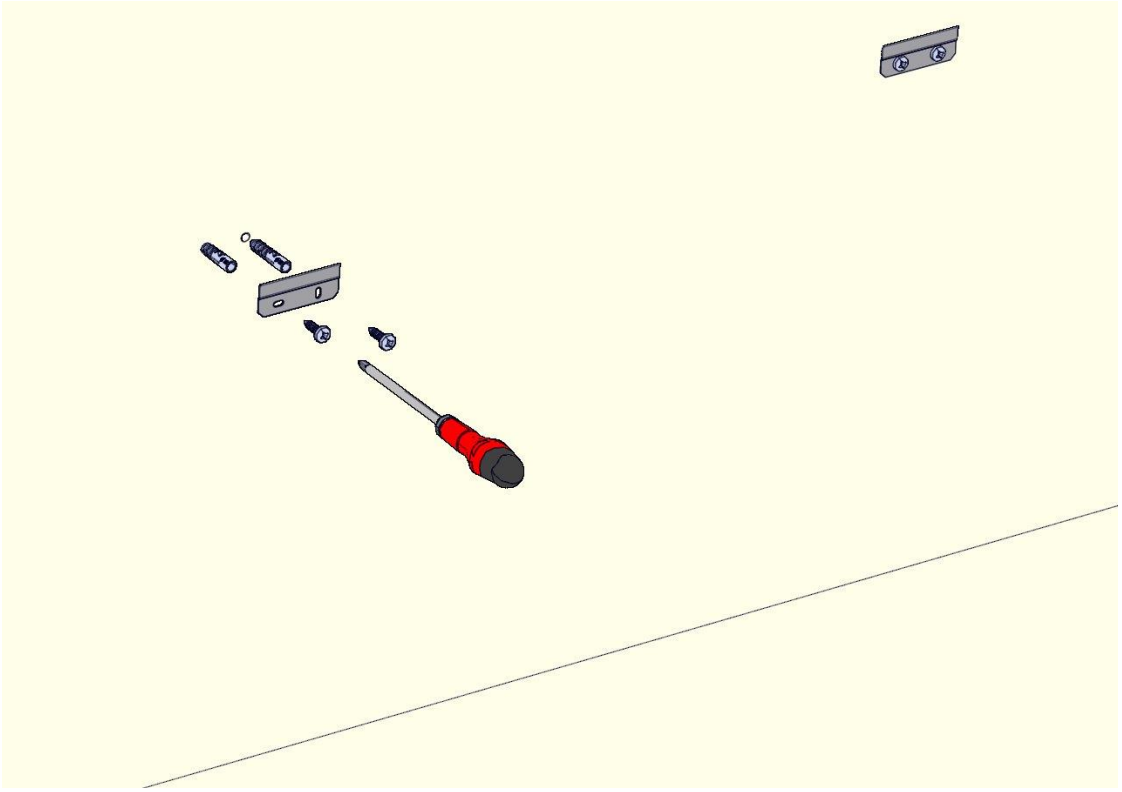
Make four holes in the wall at the location indicated by the following drawing



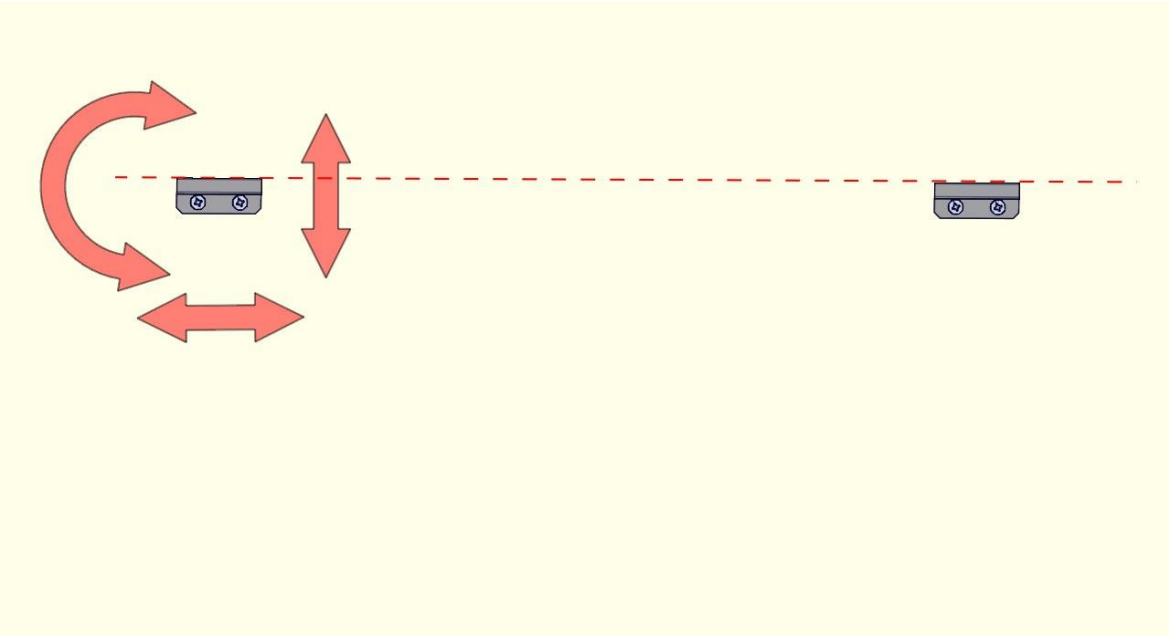
CODICE	DESCRIZIONE	A [mm]	B [mm]
TSM02D	SKUDO 250	700	365
TSM04D	SKUDO 400	900	565
TSM06D	SKUDO 600	1'100	765
TSM08D	SKUDO 800	1'300	965
TSM10D	SKUDO 1000	1'500	1'165



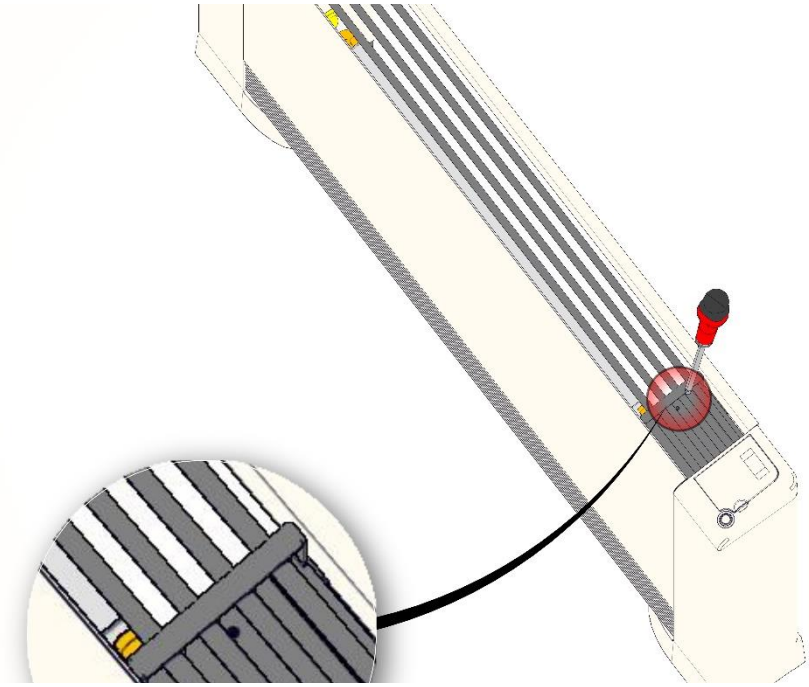
Then put in the holes the four expansion plugs supplied with the unit.
Then attach the two supplied brackets with the four available screws.



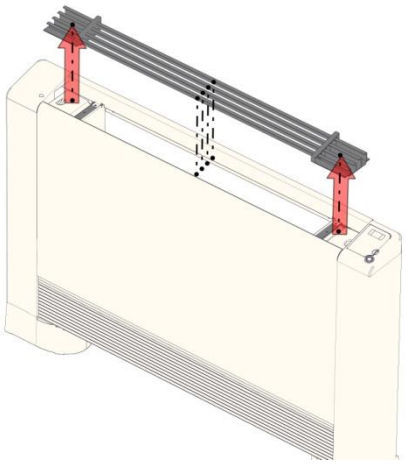
With the help of a spirit level check the alignment of the two shelves and their horizontality. If you need you can take advantage of the slots inside the brackets to adjust its position.



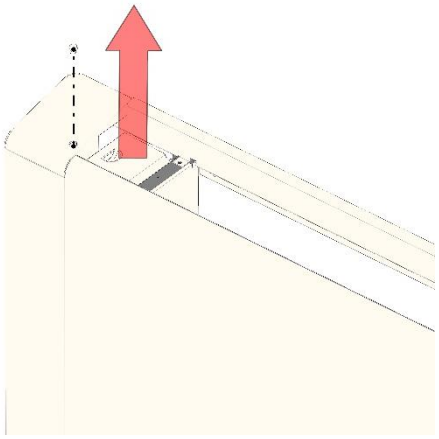
Place the unit on the ground and loosen the two screws that hold the grille on the top:



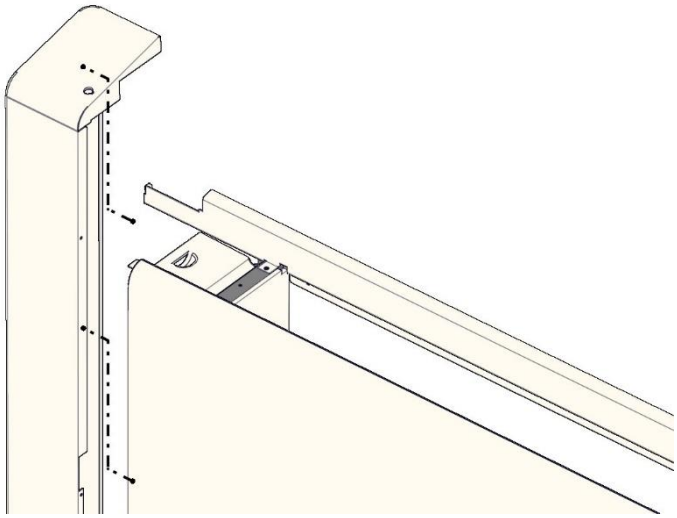
Remove the grille from the top side:



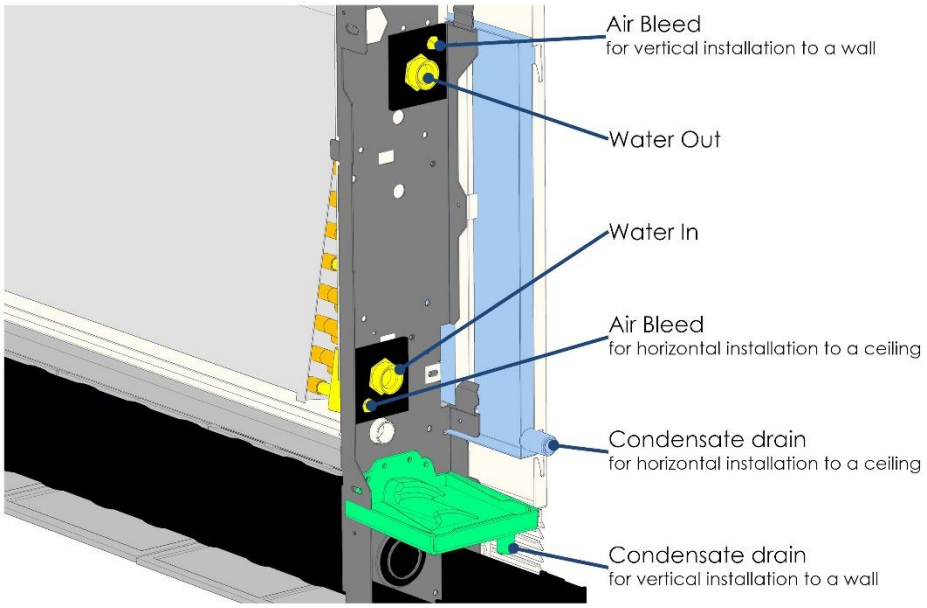
Remove the cap from the left side of the unit:



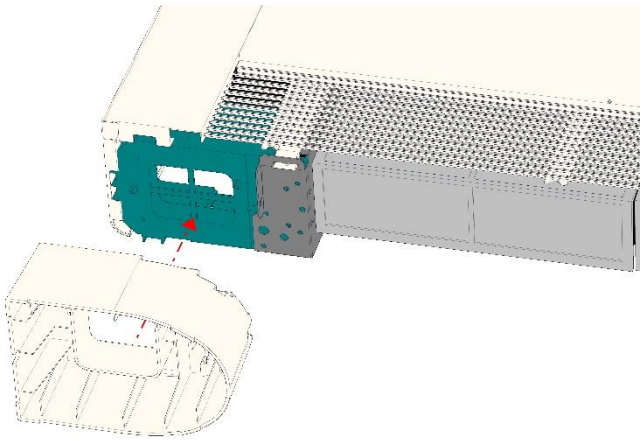
Unscrew the screw that holds in place the left side and remove it gently sliding it upwards:



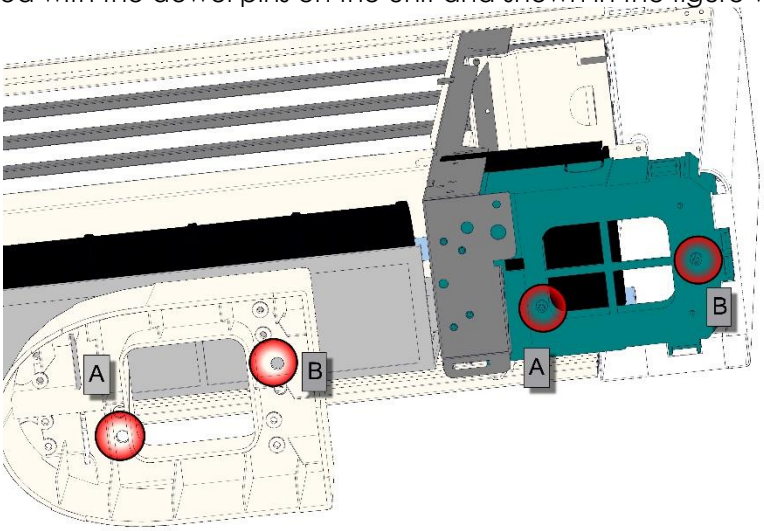
In this way hydraulic connections and the condensate drain will be accessible, as shows the following figure:



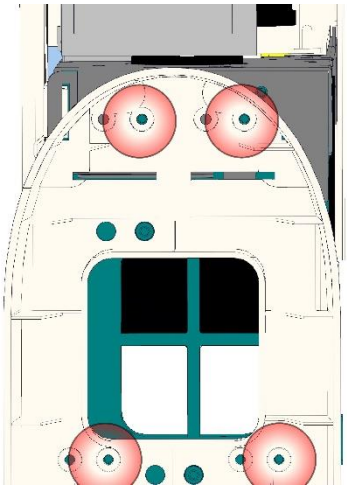
If you have purchased the feet (cod. TPDS01) install them as follows (place them in the direction shown in the figure):



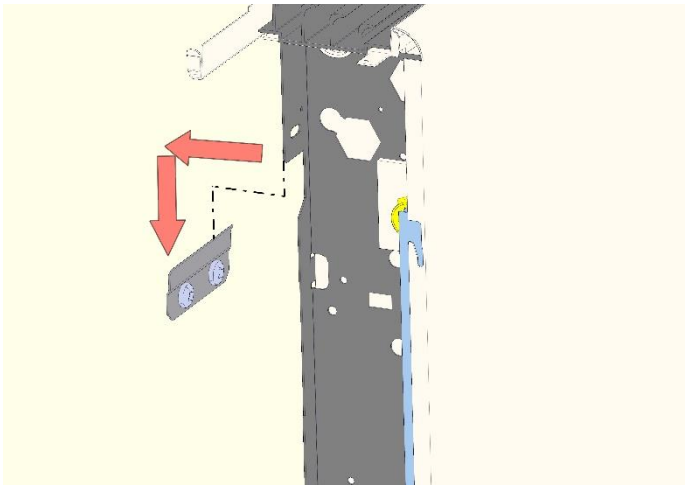
The feet will be centered with the dowel pins on the unit and shown in the figure with the letters A and B:

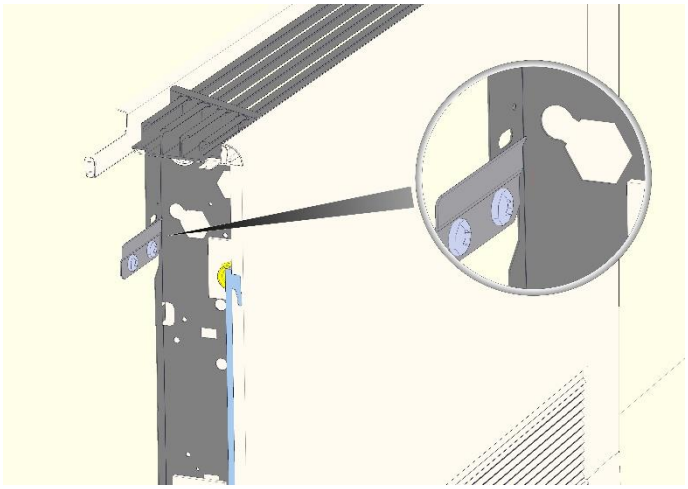


Proceed fixing the feet using the supplied screws into the holes shown in figure:



Lift the unit and fix it to the wall making sure it clips behind the flap of the brackets:



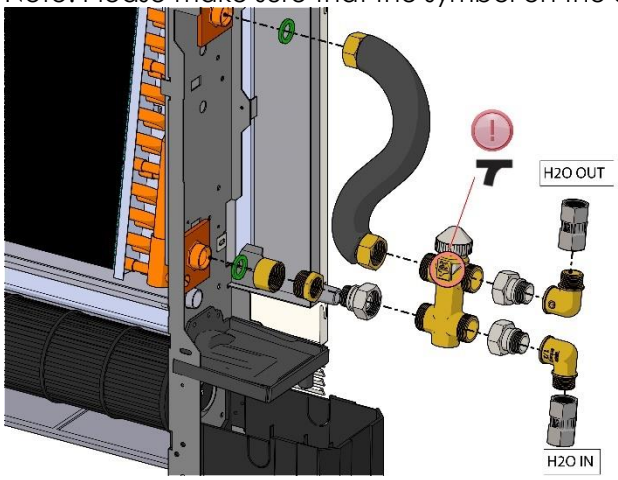


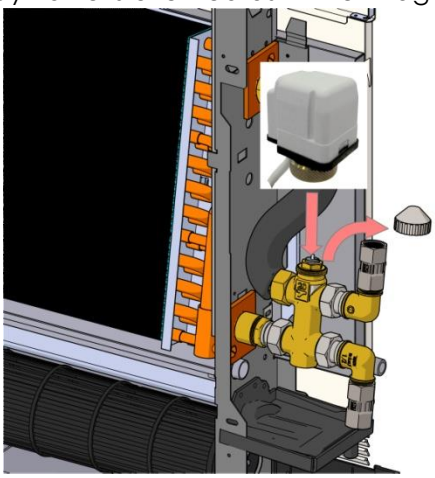
9.4 2-WAY AND 3-WAY VALVE KITS

A 2-way or a 3-way connection kit can be fitted to the unit. An electrothermal actuator can be installed on both kits. A stop-valve is included in both kits. (for the installation sequence please refer to the images below).

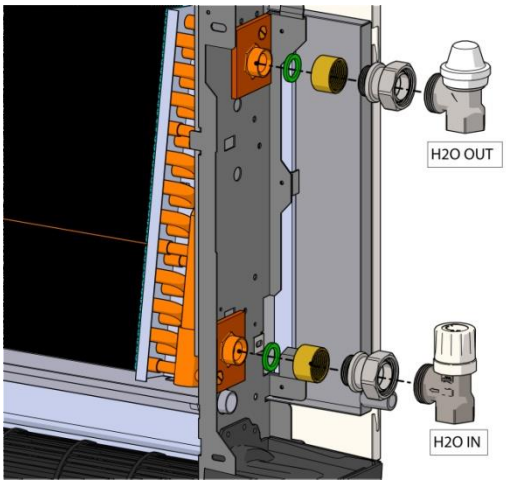
3-way valve:

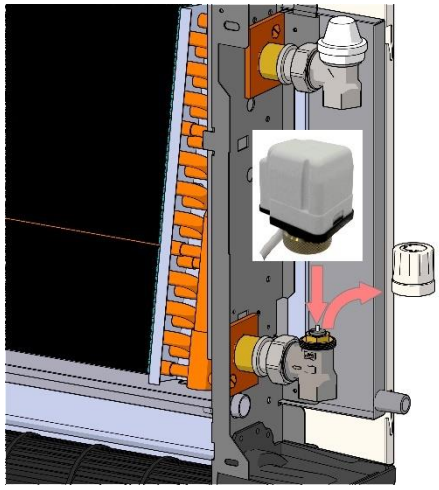
Note: Please make sure that the symbol on the 3-way valve is oriented as in the image.



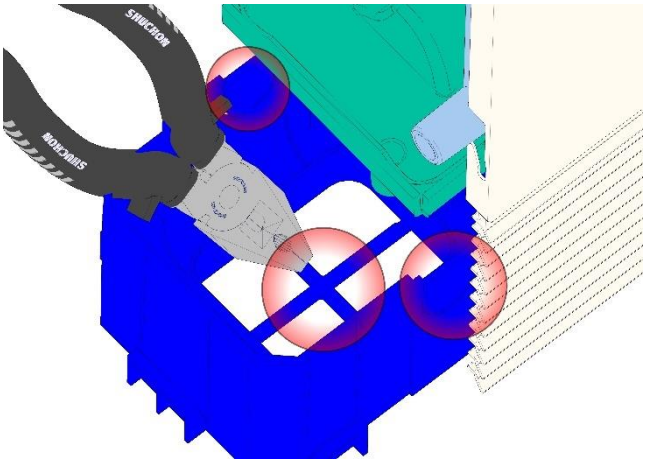


2-way valve:

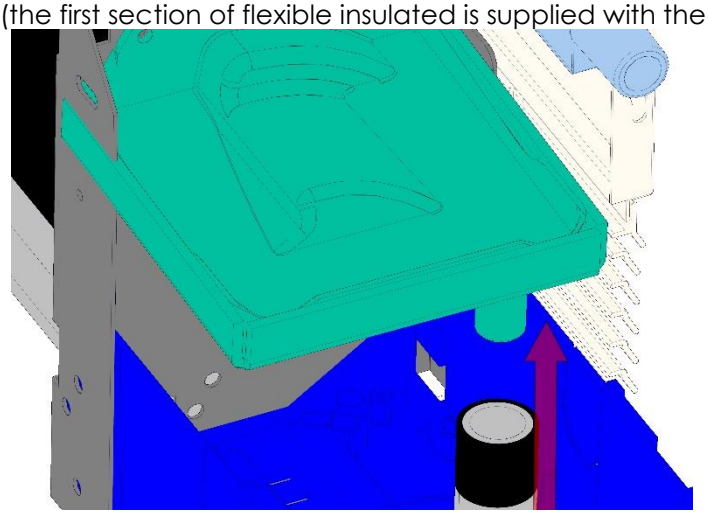




To facilitate the passage of pipes you can remove unnecessary plastic parts of the unit along the appropriate pre-sliced of figure, using tongs or pliers:

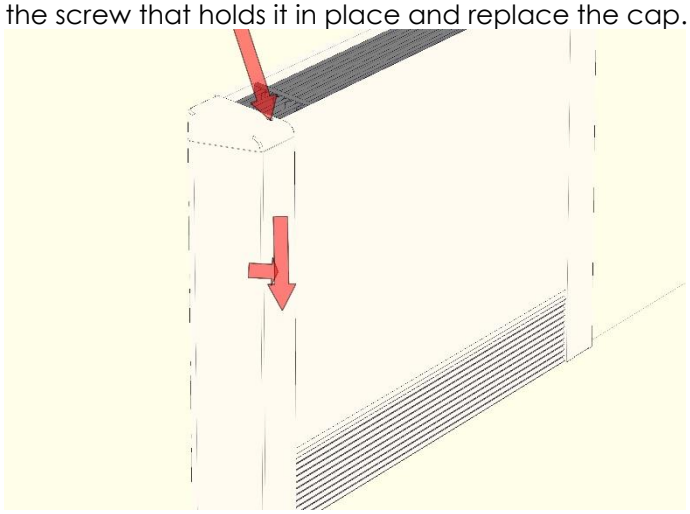


Install the condensate drain (the first section of flexible insulated is supplied with the unit):

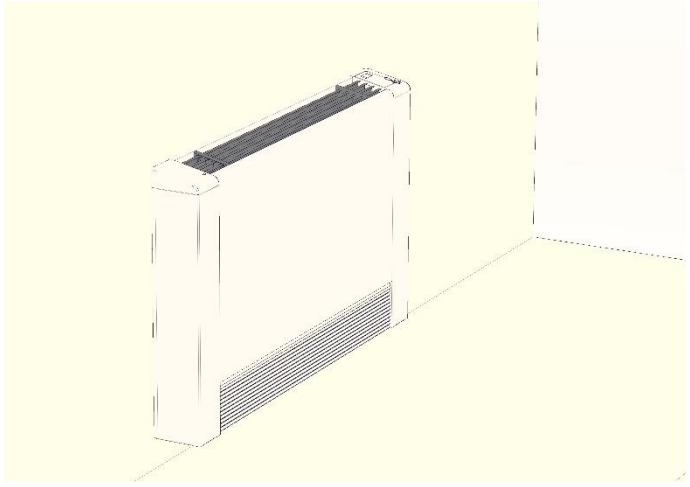


In case of condensate towards wastewater networks, we recommend that you make a small siphon to avoid draining of smells from the drainage system within the environment.
It is possible to use the traps normally used for split air conditioning.
In case of condensation inside containers or trays, make sure that the condensate pipe is not swamped by condensing to avoid overflow tubing and then clogging problems.

Replace the left wall, tighten the screw that holds it in place and replace the cap.



The installation is now complete:

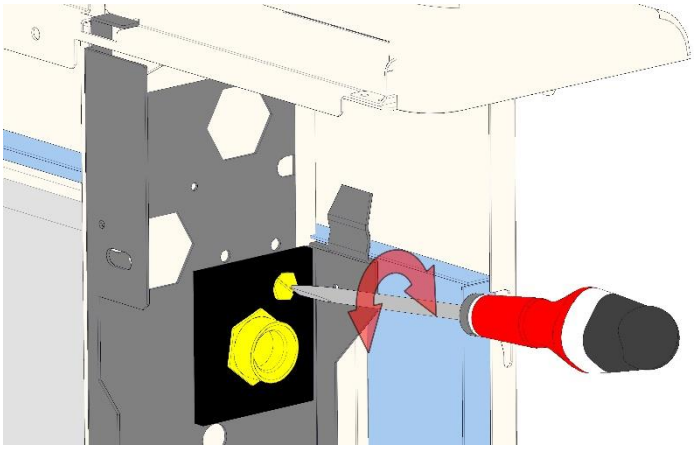


HYDRAULIC TESTING

Shut off the circuit and disconnect the unit in case the system shall be tested at a test pressure greater than the operating pressure of the device

SYSTEM FILLING AND VENTING

Once made hydraulic connections, fill the system by opening any shut-off valves, acting with a screwdriver on vents placed near the water connections of the unit in order to bleed the coil, spilling the air which may be contained in the battery.
Tighten the vent when only fluid comes out.

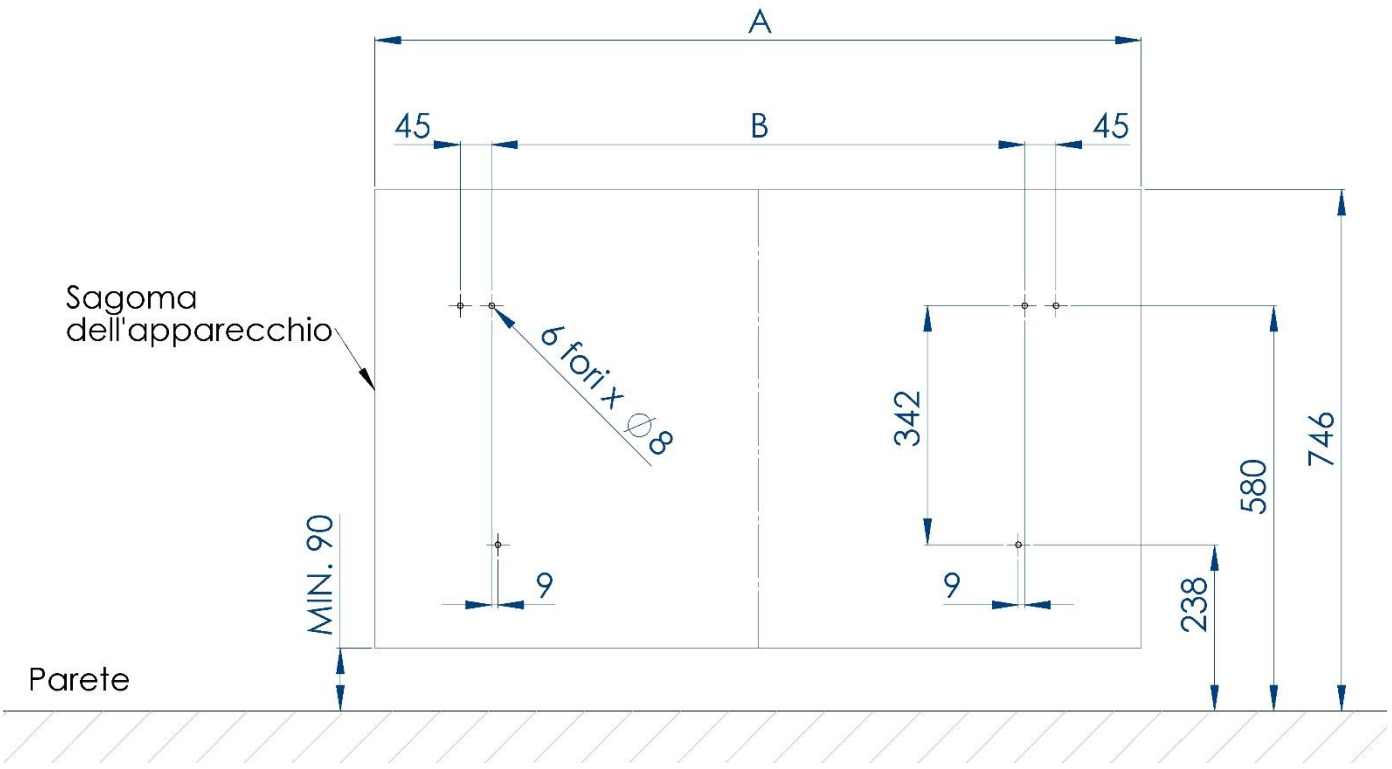


9.5 CEILING INSTALLATION

Ceiling installation is similar to wall installation, with the following differences:

HOLES DRILLING

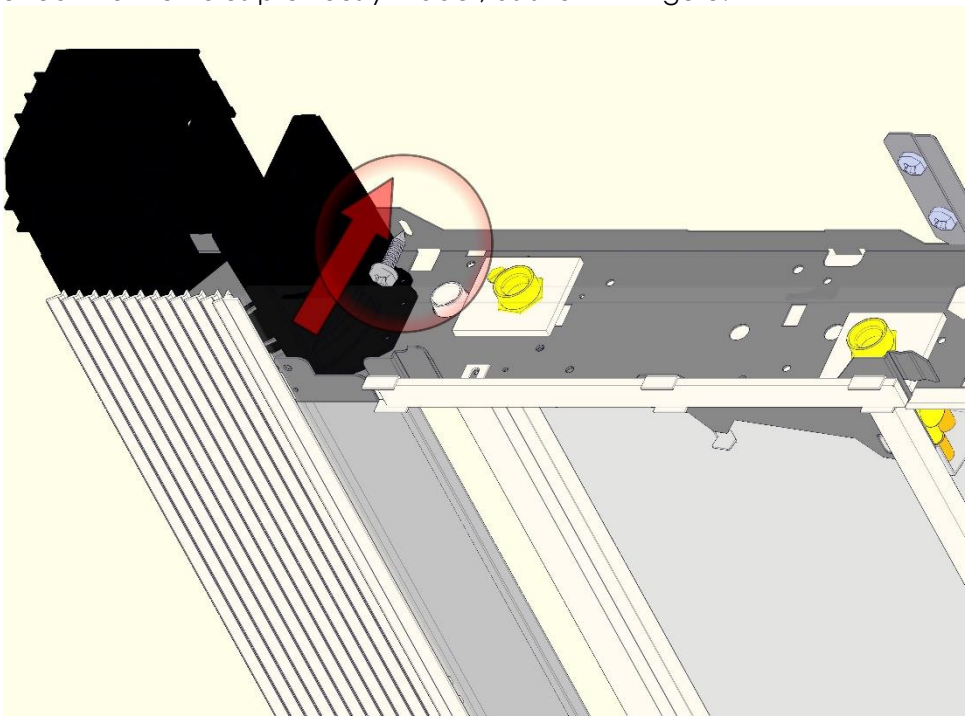
Drill a hole in the ceiling according to the following drawing:



CODICE	DESCRIZIONE	A [mm]	B [mm]
TSM02D	SKUDO 250	700	365
TSM04D	SKUDO 400	900	565
TSM06D	SKUDO 600	1'100	765
TSM08D	SKUDO 800	1'300	965
TSM10D	SKUDO 1000	1'500	1'165

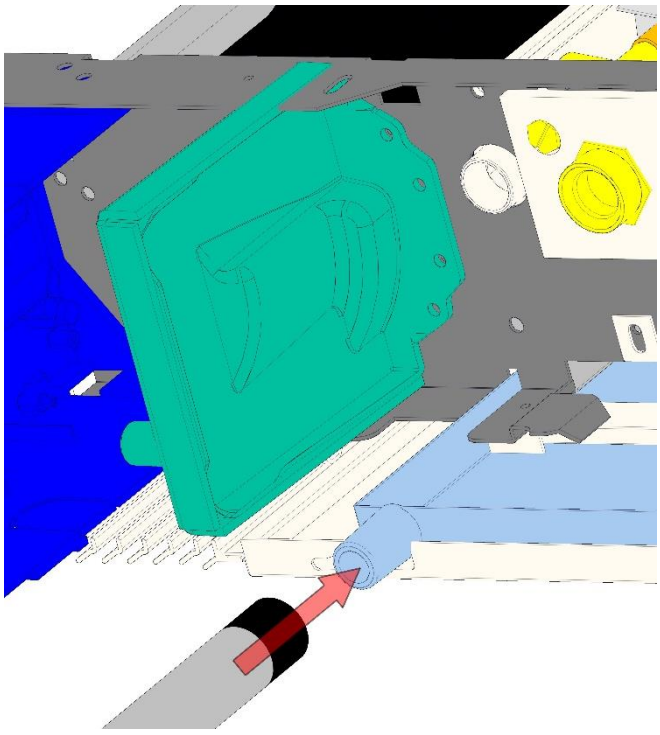
FIXING SCREWS

For greater safety, the ceiling installation requires to fix the frame with two additional expansion plugs (not supplied) to be inserted into the holes previously made , as shown in figure:

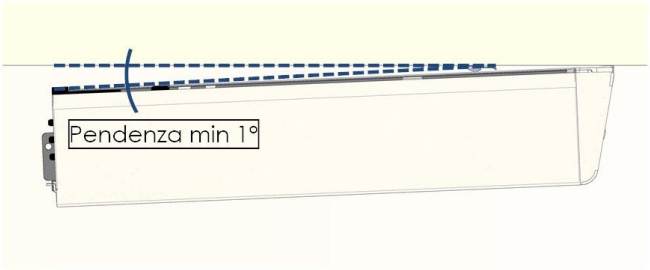


CONDENSATE DRAIN

Install the condensate drain, using the flexible isolated duct supplied with the unit by connecting it as shown in the figure:

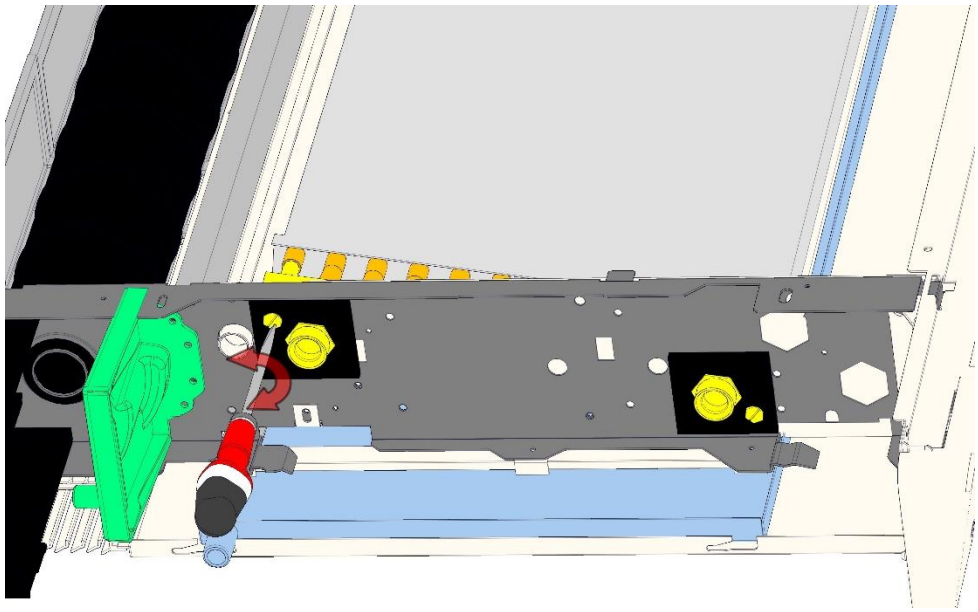


To facilitate the drainage of condensate, it is required to to keep the unit in a gentle slope towards the condensate drain.



AIR RELEASE

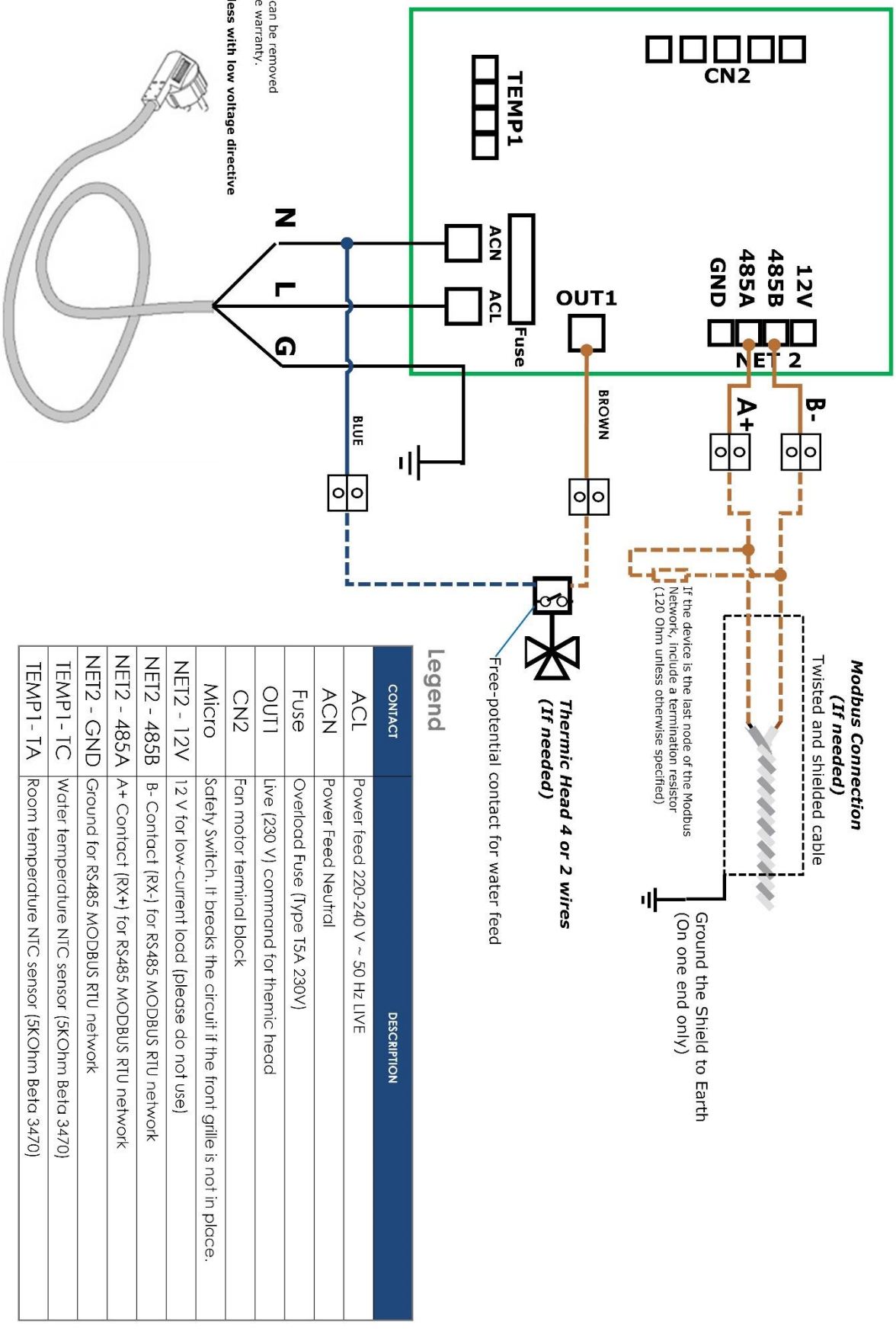
After having made the hydraulic filling of the system, vent the exchange battery through the vent placed higher.



9.6 ELECTRIC WIRE

POWER SUPPLY

Supply the power to the unit as shown in the figure, you can use Schuko plug included in the unit, as well as you can delete it in order to connect the power cord to the electrical system.
Removing the Schuko plug, if carried out in accordance with current regulations for low-voltage installations, will not invalidate the warranty.



Legend

CONTACT	DESCRIPTION
ACL	Power feed 220-240 V ~ 50 Hz LIVE
ACN	Power Feed Neutral
Fuse	Overload Fuse (Type T5A 230V)
OUT1	Live (230 V) command for thermic head
CN2	Fan motor terminal block
Micro	Safety Switch. It breaks the circuit if the front grille is not in place.
NET2 - 12V	12 V for low-current load (please do not use)
NET2 - 485B	B- Contact (RX-) for RS485 MODBUS RTU network
NET2 - 485A	A+ Contact (RX+) for RS485 MODBUS RTU network
NET2 - GND	Ground for RS485 MODBUS RTU network
TEMP1 - TC	Water temperature NTC sensor (5KOhm Beta 3470)
TEMP1 - TA	Room temperature NTC sensor (5KOhm Beta 3470)

9.7 COMMISSIONING AND START UP

Before powering the unit make sure that all the cover panels are in place and well tight with their screws.
Make sure that all the unit parameters as ben set according to the desired application (the procedure to set the parameters is described in paragraph *5.1*ACCESSING ADVANCED SETTINGS FROM CONTROL BOARD*)*, **with particular reference to:**

- Parameter 1: Temperature setpoint upper limit, both for winter and summer operation (30°C).
- Parameter 2: Temperature setpoint lower limit, both for winter and summer operation (0°C).
- Parameter 7: Anti draught. In winter operation, the fan will not start until the water has reached this temperature value (default value 24°C).
- Parameter 8: In summer operation, the fan will not start until the water has reached 23 °C temperature (the temperature value cannot be changed, but the function can be disabled by setting the parameter at 0)
- Parameter 10: Presence of the actuator (set this parameter to 0 if the electrothermal actuator is not present; set to 1 otherwise)
  Note: The actuator takes approximately 2 minutes to close its end-switch that triggers the water pump or the boiler/heat pump.

Ensure that all connections (hydraulic, electric and aeraulic) are properly installed and that are observed all the instructions on labels and on user manual.

10 INTERNATIONAL WARRANTY

The warranty for this product is governed by the sale terms and conditions of Ideal Clima Srl (version 3.0) of which we quote the relevant part related to warranty:
Ideal Clima guarantees its products for defects or manufacturing defects, with the express exclusion of any defect or done regarding the installation, operation and maintenance of the product. - 15.2 Beneficiaries - Ideal Clima provides products only to professional companies. By placing the order, the customer declares that the products are intended for use within their professional, commercial or business activity.
It is excluded the application of the rule 1999/44 / EC and the D. Leg nr. 24 of February 2, 2002. The guarantee is expressed in respect of products supplied by Ideal Clima and exclusively against the Customer.
Ideal Clima reserves the right to apply their own warranty terms, directly or indirectly through individuals identified by this, to the end user only upon explicit request and authorization of the Customer, which is still entitled to the fulfillment of any obligation to the end user under the legislation in force. - 15.3 Performance warranty. The warranty service implies, at the discretion of Ideal Clima, the replacement of the defective product. In any case the manufacturing defects must be recognized by Ideal Clima technical. Parts replaced under warranty remain property of Ideal Clima and must be returned back carriage free. -
15.4 Effect and duration - The warranty starts from the date of purchase and lasts two years. The date of purchase is proven by invoice and proof of delivery. The Customer shall be relieved of warranty unless the defect is brought to the attention of Ideal Clima within 8 days of discovery and before the expiration of the maximum term of duration of warranty. The warranty period is not changed by warranty works -
15.5 Limitations and Exclusions - This warranty does not cover defects due to transport, handling of the product, incorrect storage (eg. not dry rooms, direct sunlight etc.), installation and / or maintenance is not performed by qualified and authorized personnel according to the manufacturer's instructions and regulations, operation outside of the product intended use, use of water, gas and electricity that are not suitable to the product, improper use or maintenance of the product, normal wear.

Ideal Clima srl
Via Magnolini, 8 – 25135 - Brescia Italy
Tel. +39.030.35.45.319 – Fax +39 030.51.09.329
info@idealclima.eu – www.idealclima.eu

Versione 4.0 - DICEMBRE 2016