

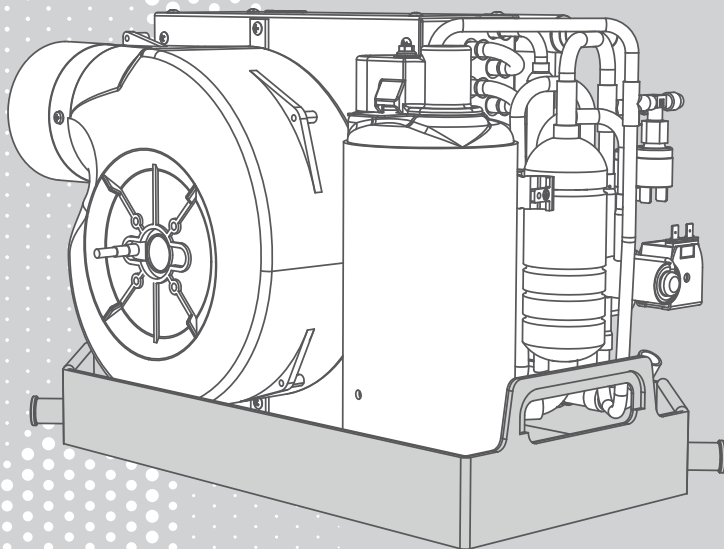
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VITRIFRIGO

COOL AND BEYOND

INSTRUCTION MANUAL

MACS



THANK YOU FOR PURCHASING A VITRIFRIGO PRODUCT

Index

1. INTRODUCTION	36
2. GENERAL WARNING	36
Safety information	36
Disposal	37
3. PURPOSE OF THE MANUAL	37
Identification of the manufacturer	38
4. GENERAL DESCRIPTION	39
Description of the MACS Vitrifrigo kits	39
5. MACHINE DESCRIPTION	40
6. INSTALLATION	41
Air conditioner positioning	41
Fixing the conditioner	42
Installation of the condensate drain piping	42
7. SEA WATER CIRCUIT	42
Sea water tube	44
8. AIR DISTRIBUTION CIRCUIT	45
9. ELECTRICAL BOX	46
Electrical panel assembly	47
Installation of the control panel	47
Electrical connection of the sea water pump	48
Power supply connection	48
10. FIRST START OF THE SYSTEM	49
Cooling mode	49
Heating mode	49
11. TECHNICAL SPECIFICATIONS	50
12. CONTROL PANEL LAYOUT	50
13. MAIN COMMANDS	51
14. VENTILATION CONTROLS	52
15. AUXILIARY COMMANDS	52
16. USER SETTING PARAMETERS	53
17. TECHINICS PARAMETERS SETTING	54
Infrared remote control	58
18. ALLARMS	58
19. ORDINARY MAINTENANCE OF THE SYSTEM	60
Preparation of the water circuit for the winter period	62
20. COMMON PROBLEMS SOLVING GUIDE	63
21. MAINTENANCE LOG (ANNEX)	166
ANNEXES	162

1. INTRODUCTION

Dear client, thank you for choosing one of our products.

Vitrifrigo hopes that you will be completely satisfied with your purchase.

This manual is considered an integral part of the refrigerator and must follow the sales path to the user. The same can be consulted on the Vitrifrigo website www.vitrifrigo.com. Each refrigerator, before being shipped, is thoroughly checked and tested to ensure it operates correctly. For more information or for any clarification, please contact one of our service centres or any of our offices directly.

Vitri Alceste

Models

KIT MACS 7000

KIT MACS 12000

KIT MACS 16000

2. GENERAL WARNING

- The manual refers to the MACS series models.
- Read this manual carefully before using the machine.

Safety information

For correct and safe use of the machine, it is necessary to follow the instructions contained in this manual. The manufacturer is not responsible for any damage resulting from failure to observe the warnings contained in this manual.

The product to which this manual refers is made for the conditioning of interiors inside boats. Uses other than the intended use is not allowed. Any other use is considered improper and therefore dangerous. Carefully read the labels on the machine, do not cover them for any reason and replace them immediately if they are damaged. In the event of a malfunction, disconnect the machine from the power supply.

Non-routine maintenance operations must be carried out exclusively by professionally qualified personnel. Some points of the machine can be hot or with potentially sharp edges.

Before performing any maintenance or cleaning, disconnect the power supply and wait for the time necessary for the machine to cool down.

During maintenance or cleaning operations use suitable personal protective equipment according to current regulations.



The "Danger of electrocution" label on the casing and / or covers warns that their removal exposes the danger of meeting live parts.

ATTENTION Do not expose the machine to water jets, do not use harmful substances for its cleaning. Do not place liquid containers on the machine.

ATTENTION The operation of the system in heating mode (heat pump) is not convenient if the temperature of sea water is less than 10 ° C. Operation at low sea water temperatures (10 ° C) is not guaranteed and no liability is accepted for use of the machine in non-optimal conditions.

ATTENTION Do not allow the machine to be exposed to heat sources.

ATTENTION In case of fire, use a powder fire extinguisher.

ATTENTION The material making up the packaging must be disposed of as required by current regulations.

Disposal

- Do not throw away the packaging of your appliance but select the materials according to the local regulations regarding the disposal of waste.
- This product must not be disposed of in municipal waste but must be disposed of as a separate collection. Contact the Electric and Electronic Equipment (WEEE) Waste Collection Centers in your area or return it to the seller when purchasing new equivalent equipment.
- The symbol above indicates that the refrigerator cannot be disposed of as urban waste.
- Abusive or incorrect disposal of the refrigerator entails administrative and / or criminal legal sanctions as required by applicable laws.



3. PURPOSE OF THE MANUAL

This manual is intended to help the operator to carry out a correct installation, commissioning, maintenance and cleaning of the refrigerator for storing milk, and the user to use it in the most correct way, highlighting the residual risks and those deriving from incorrect use.

This booklet must be considered an integral part of the product to which it refers and must therefore be carefully preserved.

Since this manual refers to different models, the images contained in it are to be considered purely indicative.

Some of them may show details or details slightly different from those of the product in your possession, without however changing the essential information.

The manufacturer reserves the right to update, if deemed necessary, this booklet without notice.

Identification of the manufacturer

Vitrifrigo s.r.l.

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4. GENERAL DESCRIPTION

The range of MACS air conditioners, is composed of standalone systems with direct expansion of refrigerant gas, water-cooled, for the conditioning of indoor environments in boats.



The machine is designed for installation in the internal areas of boats

Description of the MACS Vitrifrigo kits

The following paragraph show a table with quantity and description of each component of the kits sold by Vitrifrigo.

ATTENTION The accessory kits must always be used with the corresponding machine kits. Ex: The MACS 7 MK kit (Machine Kit) must be used with the MACS 7 AK kit (Accessory Kit).

Vitrifrigo declines any responsibility for inadequate operation of the air conditioning system, if accessories of different sizes than those defined by the manufacturer are used.

MACS 7M- MACHINE KIT

Quantity	Description
1	MACS 7 air conditioning units
1	Control panel
1	Electric control box
1	Machine fixing brackets

MACS 7A - ACCESSORIES KIT

Hydraulic Circuit

Quantity	Description
1	Sea water pump PMD371 230V / 50Hz
1	1/2 "sea water intake - brass
1	1/2 "sea discharge - brass
1	1/2 "ball valve - brass / steel

1	1/2 "sea water filter - brass
1	Water pipe L = 10 m - reinforced pvc
12	Screw clamps - stainless steel

Air Circuit

1	Supply grille 254 X 102 mm - plastic
1	Return air grille 254 X 254 mm - plastic
1	Insulated pipe L = 5 m and D = 102 mm - composite

MACS 12M- MACHINE KIT

Quantity	Description
1	MACS 12 air conditioning units
1	Control panel
1	Electric control box
1	Machine fixing brackets

MACS 12A - ACCESSORIES KIT

Hydraulic Circuit

Quantity	Description
1	PMD421 230V / 50Hz sea water pump
1	Sea water connection 3/4 " - brass
1	3/4 "sea discharge - brass
1	3/4 "ball valve - brass / steel
1	Sea water filter 3/4 " - brass
1	Water pipe L = 10 m - reinforced pvc
12	Screw clamps - stainless steel

Air Circuit

1	Supply grille 254 X 127 mm - plastic
1	Return air grille 304 X 304 mm - plastic
1	Insulated pipe L = 5 m and D = 152 mm - composite

MACS 16M- MACHINE KIT

Quantity	Description
1	MACS 16 air conditioning units
1	Control panel
1	Electric control box
1	Machine fixing brackets

MACS 16A - ACCESSORIES KIT

Hydraulic Circuit

Quantity	Description
1	PMD641 230V / 50Hz sea water pump
1	Sea water connection 1" - brass
1	1" sea discharge - brass
1	1" ball valve - brass / steel
1	Sea water filter 1" - brass
1	Water pipe L = 10 m - reinforced pvc
12	Screw clamps - stainless steel

Air Circuit

1	Supply grille 304 X 152 mm - plastic
1	Return air grille 304 X 304 mm - plastic
1	Insulated pipe L = 5 m and D = 152 mm - composite

In addition to the machine kits and accessories for the three sizes 7, 12 and 16, there is an optional kit for air distribution.

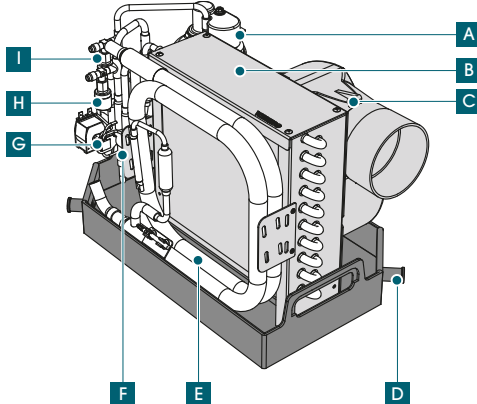
ATTENTION The optional kit "MACS AIR KIT" can be used only with the MACS 12M and MACS 16M machines and only if the main flow grille is present.

MACS AIR KIT - SUPPLY AIR GRILLE KIT

Air Circuit

Quantity	Description
1	Supply grille 254 X 102 mm - plastic
1	Air flow separator - plastic
1	Insulated pipe L = 5 m and D = 102 mm - composite

5. MACHINE DESCRIPTION



A	Rotary compressor
B	Evaporator
C	Coaxial fan
D	Condensate drain
E	Sea water condenser
F	Capillary pipe
G	4-way valve
H	Low pressure switch
I	High pressure switch

The air conditioner works according to a compression cycle of refrigerant, sea water and boat room air. The machine has two mode, cooling mode (for the hot seasons) and heat pump mode (for the cold seasons).

In cooling mode, the air inside the cabin is drawn in by a fan and passed through the evaporator for to be cooled and dehumidified.

At the same time, the refrigerant exchange the heat of the air for to evaporate and enter in the compressor. The compressor pressurizes the refrigerant and the gas passed through the seawater condenser that it is reducing the gas temperature and change state. At the end, the refrigerant enters in the capillary pipe for reducing your pressure and enter in the evaporator.

In heating mode, the refrigeration cycle is reversed by a 4-way valve. In this is situation the condenser and evaporator exchange your roles.

The refrigerant, passed through the sea water exchanger (now evaporator), extracts the heat from the water and evaporates. The gas enters in the compressor and that pressurizes it. The refrigerant passed through the evaporator (now condenser) and exchange the heat with the air cabin.

At the end, the gas passed through the capillary pipe, the coolant returns to the evaporator and the cycle repeats.

6. INSTALLATION

Air conditioner positioning

The air conditioner is designed to supply air directly from the air-conditioned room; therefore, it must be installed in one of the rooms to be conditioned.

ATTENTION **Do not install the air conditioner in environments from which harmful vapours or fumes could be extracted (engine room, bilge, environments containing combustion engines, fuel tanks, gas cylinders, etc.).**

Identify a flat well-levelled surface, suitable to bear the weight of the air conditioner with free space on each side such as to ensure good air circulation and to facilitate installation and maintenance operations.

The air conditioner can be installed in the two configurations shown in annex 1. Figure 1a represents the optimal installation, the machine is installed with the evaporator in front of the air intake grille, or in figure 1b the machine is rotated 90 ° with respect to the supply grille.

ATTENTION **If the installation shown in figure 1b is used, a distance between the front wall and the evaporator of 100 mm must be maintained.**

Fixing the conditioner

The air conditioner must be fixed (Annex 2) using the 4 anti-vibration brackets (they can find in the machine kit) (fig. 2a).

The machine must be fixed on all four lateral sides, the brackets must be embedded in the anticondensation tray (using the “hook” on the rear), with the rubber pad facing out. The position of the brackets along the four sides is free, it can be identified according to the dimensions in the compartment where the machine is housed (fig. 2b).

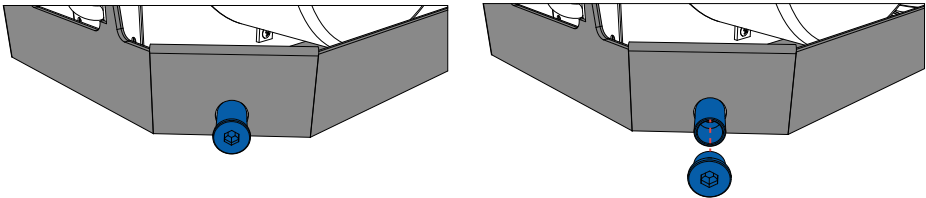
For fixing the machine, use screws suitable for the surface used for fixing.

Installation of the condensate drain piping

With the MACS the ambient air is dehumidified, the water is collected from the anti-condenser tray.

The air conditioner is equipped with two anti-condensation drains, it is possible use only one of two.

The anticondensation drain is equipped with a stainless-steel plug, unscrew the plug, and install the pipe of a suitable section in the drain.

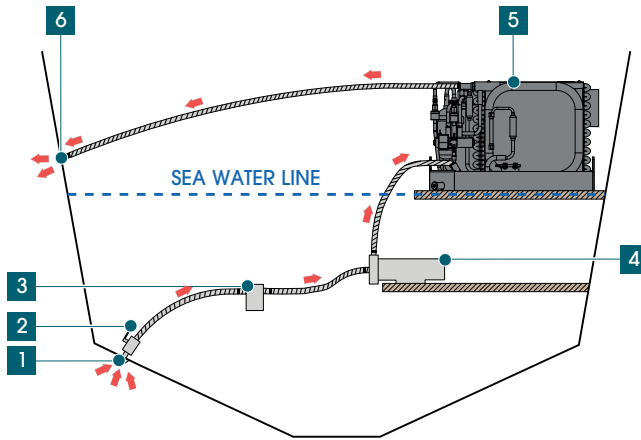


We recommend, to install the machine at a level, that allows the correct flow of the condenser water. It is necessary to fix (by means of stainless-steel clamps) to the condensate drain, a water tube to discharge the condenser water to the sea.

ATTENTION If the exhaust motor tube is overboard, it must be at least 1 m away from the exhaust tube of the motors or generators, the air could be drawn by the fan to the conditioned room. It could cause risks of intoxication or death.

7. SEA WATER CIRCUIT

The sea water circuit is used to supply the sea water for the water condenser. The accessories kit is comprising a water pump that supply the correct quantity of water, necessary for the operation. The following figure shows a correct installation of all the circuit components.



1	Sea water intake	4	Sea water pump
2	Ball valve	5	MACS conditioner
3	Filter	6	Sea water discharge

ATTENTION Follow the instructions below for correct installation of the system

1) Sea water intake: The sea water intake, must be installed oriented towards the bow and as close as possible to the keel and as low as possible with respect to the waterline, in order to avoid the entry of air in the circuit. The sea water intake, of the air conditioner should not be shared with other machines, such as motors or generators.

2) Ball valve: It must be mounted directly on the sea water intake , in an accessible position, so as to allow the circuit to be closed in the event of maintenance operations (e.g. cleaning the filter) or in emergency situations.

3) Filter: It must be positioned before the inlet of the pump, so that it is always below the waterline and the pump itself. Always, install the filter between the ball valve (2) and the seawater pump (4). Install the filter in an accessible position to facilitate periodic cleaning.

4) Sea water pump: The pump is used for the circulation of sea water. The pump it is not self-priming, so it must be positioned 50 cm below the waterline. We also recommend that the delivery pipe starts with a vertical section of 20-25 cm, to keep the pump always primed. The pump must be adequately fixed (and in an accessible position) using the holes in its base. The following table lists the recommended pump capacities according to the capacity of the air conditioner.

Minimum seawater pump capacity	
MACS capacity (btu / h)	Pump capacity (l / min)
7000	12.5
12000	15
16000	30

6) Sea water discharge: The sea discharge must be positioned above the waterline, to have visual confirmation of the flow of water. The height, however, must not be excessive, to minimize the noise produced by the water jet.

ATTENTION **Condenser water connections:** The condenser of the air conditioner is equipped with two connections for connecting the sea water circuit pipes. Tighten the pipes to the connections using stainless-steel clamps. Pay attention to the direction of travel of the water, which must be from the lower coil of the condenser to the upper one. (Annex 3).

Sea water tube

To connect the components of the sea water circuit, use rubber or plastic water pipes with metal reinforcement.

To ensure proper water flow, it is important to choose the tube with the correct diameter. For the dimensions of the correct pipes, following the table below.

Minimum diameter of pipes for sea water circuit		
Water flow rate (l / min)	Inlet circuit pipe diameter (mm)	Outlet circuit pipe diameter (mm)
< 15	16	16
15 ÷ 25	20	16
25 ÷ 40	25	20
40 ÷ 55	25	25
55 ÷ 75	32	25

The water tube that connect the various components of the circuit up to the condenser must always go up. The connecting sections between the various components must be as straight as possible, avoiding tight curves, bends or siphons.

In particular, the section of the supply water tube (from the water intake to the pump) must be as short as possible (it is advisable that it is not longer than 1 m).

If there are two or more air conditioners on the boat, the sea water circuit can be common. In this case, the water intake, the filter and the pump must be sized taking into account the need to power more than one system. After the sea pump, it will be

necessary to provide a manifold, to distribute the water to the condensers of the various air conditioners. It is necessary that the manifold is equipped with water flow regulation valves and the right diameter of water tube, to ensure the correct flow water to each conditioning machine.

8. AIR DISTRIBUTION CIRCUIT

The air distribution system is the all the components that distribute the cooled or heated air in the conditioned environment. The air distribution system must be designed, to ensure correct air flow in the environment.

The machine is supplied with the fan with air outlet (Annex 4.1). The indications relating to the installation of the various air distribution components are provided below.

Adjustable centrifugal fan: The air conditioner fan can be easily rotated, so you can choose the easiest position of the air outlet. To facilitate the rotation of the fan, it is recommended to perform it before positioning the air conditioner in its final location. To rotate the fan, follow the instructions in annex 4.1 and 4.2.

Return air grille: The return air grille is the component of air distribution system that filter and suction the air which must be cooled or heated (Annex 5.1, Fig. 5a).

For correct air distribution, the return air grille must be positioned at the bottom, at the floor level, in front of the finned exchanger. We recommend keeping at least 10 cm. of space between the grill and the exchanger itself.

Generally, the return air grilles are equipped with a filter. If this is not the case, it will be necessary to install a filter in front of the evaporator.

ATTENTION Vitrifrigo return air grilles are equipped with a filter. If grilles other than the Vitrifrigo accessory kit are used in which the air filter is not present, a filter must be installed in front of evaporator or in the grille.

The air filter, whether present on the grille or installed separately, must be periodically cleaned so as not to obstruct the flow of air towards the air conditioner.

Supply grill: The supply grille has the components that supply the conditioner air to the room. The grille must have a surface that guarantees a good flow of air towards the conditioned environment, without the speed of the air being excessive and therefore constituting a source of annoyance for the people who occupy it.

For the correct air distribution, the supply grille must be positioned at the top, and its fins must be oriented in such a way that the air outlet does not face directly towards the return air grille (this would create a short circuit of the treated air) (Annex 5.1, fig. 5b).

ATTENTION The size of the holes, present in the table above, it's refers to the grilles present in the MACS accessory kit. No liability is accepted for errors in the installation of grids do not present in the MACS accessory kit.

Air pipelines: The air pipeline is the insulated tube that connects the machine fan to the supply grille. The forced air (driven by the fan) can also be conveyed to multiple supply grilles, or in the only one grille of system. For MACS 12 and MACS16, Vitrifrigo has an available kit for the second supply grille in case the machine wants to be used for two distinct environments. For all the supply grilles, must be to insulate them to avoid the formation of condensation on boat walls. Before the assembly of the supply grilles in the wall, make sure that all air component connection is right do it.

ATTENTION Since the performance of the air conditioner depends on the air flow, it is important to realize the distribution without bottlenecks, keeping the recommended diameter and not exceeding the length of the pipes.

The air ducts must be fixed well along their path. In straight sections, the ducts must be pulled well. In curved sections, it is necessary to ensure that the curves and deviations are as wide as possible, to avoid bottlenecks. Refer to the following table for the diameters of the main pipes.

Sections of the air delivery pipes recommended	
MACS capacity (btu / h)	Main air duct diameter (mm)
7000	102
12000	152
16000	152

9. ELECTRICAL BOX

Any electrical installation must be carried out by professionally qualified personnel in compliance with current regulations.

ATTENTION Before performing any installation on the electrical component, disconnect the power supply from the air conditioner on the boat's electrical panel, to avoid the risks due to high voltage.

If the wiring diagram supplied with the air conditioner differs from that contained in this manual, refer to the diagram that accompanies the machine. The electrical wiring diagram is on rear part of sheet metal cover of the electrical box.

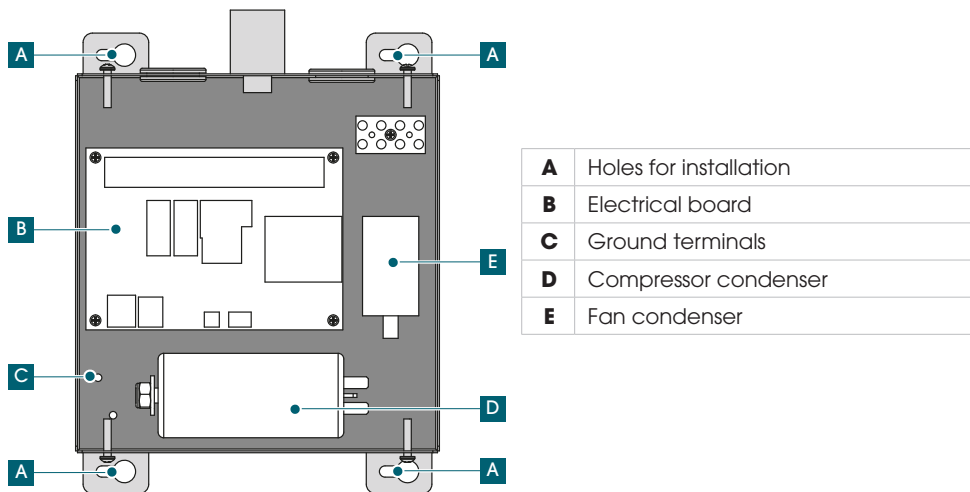
Electrical panel assembly

The MACS electrical panel is supplied connected to the machine. Check it before switch on the machine that all components are plug in according to annex 6 fig 6a. The installer will only have to make the electrical connection of the hydraulic pump, the control panel and the general power supply of the electrical panel. For a correct plug in, follow the diagram of the electrical panel and the indications in the following paragraphs.

The electrical box of the machine is free-standing with a maximum distance of 1 m, follow the installation instructions below.

ATTENTION Mount the controller in a dry location and on a flat surface. Fixing the line ground wire in the specific pin

To instal the electrical box using the four holes using screws suitable for the support material.



To connect the line ground wire to the pinas showed in the figure above. The line ground wire must be fixed with M4 nut (Annex 6, fig. 6b).

Installation of the control panel

The standard control panel of the air conditioner is inserted in a 3-module Vimar Idea series wall mounting support and must therefore be recessed mounted on a wall of the room to be conditioned. A hole is required such as the one shown in the annex 5.2. The panel must be at a maximum distance of 4.5 m from the electrical box of the machine.

The control panel must be connected to the electronic board of the air conditioner (inserted in the electrical box) via the 4-pole RS485 cable supplied. Make sure that the terminals of the connection cable are well hooked both on the electronic board and on the back of the panel. When choosing the position of the panel, consider that the length of the cable supplied is 4 m.

Electrical connection of the sea water pump

The sea water pump must be connected to the electronic board of the air conditioner, using a 3-wire cable (phase, neutral and earth) with a section suitable for the power of the pump itself. As you can see from the wiring diagram in annex 6 fig.6a, the pump phase must be connected to terminal 8 on the board, the neutral to terminal 9. The earth cable must instead be connected to the earth pin inside the electrical box.

The circuits of the electronic board are suitable for supplying power pumps up to 0.7 kW at 220V.

If there are several air conditioners and the sea water circuit is common, terminals 8 and 9 of each electronic board will be connected to a relay box. The pump power supply, independent from that of the air conditioners, will be supplied by the relays connected in parallel between them and each controlled by an air conditioner.

Power supply connection

The power supply must have the characteristics (voltage, number of phases, frequency and amperage) suitable for the model of air conditioner used (see label on the machine).

ATTENTION **The air conditioner must not be connected directly to the electricity network, but to an intermediate distribution panel equipped with all the safety devices provided for by current regulations. Each unit on the boat requires a dedicated differential thermal magnetic circuit breaker and a protection fuse compliant with current regulations. For their sizing refer to the data shown on the machine label.**

When connecting the machine follow the guidelines:

- The conductors used for the power supply must be sized according to current regulations, with a section sufficient to carry the current required by the machine. Always refer to the machine label.
- It is important to consider that the sea water pump is powered directly by the electronic board of the air conditioner. Therefore, when sizing the switch and the conductors, keep in mind that they must also withstand the power of the pump (indicated on the label of the same).

- If there are several air conditioners on the boat, and they have a common water circuit, the pump will be powered directly from the network (and not from the electronic board), therefore it will be necessary to provide a special differential magneto thermic switch and a fuse of protection correctly sized (refer to the pump label).
- For all electrical connections below the waterline, use suitable connectors.

The power cable from the distribution panel must be connected to terminals 4 (neutral) and 5 (phase) of the board control electronics and to the earth terminal block (see wiring diagram in annex 6, fig. 6a).

ATTENTION It is mandatory, by law, to connect the machine to an efficient earthing system. No liability is accepted for any damage resulting from failure to comply with this provision. An incorrect connection of the electrical connection or of the machine grounding will invalidate the product warranty.

10. FIRST START OF THE SYSTEM

Listed below are the operations to be performed for the first start-up of the system, or for its commissioning after a long period of inactivity.

Cooling mode

- Open the ball valve installed on the seacock.
- Turn on the air conditioner switch on the boat's electrical panel.
- Switch on the air conditioner using the control panel.
- Set the cooling mode and adjust the temperature to a value lower (at least 2 ° C) than that of the cabin indicated on the LCD display.
- The plant will start operating. Check that the water from the cooling circuit is drained overboard.
- Close the doors and doors of the air-conditioned room. After a few minutes, there will be as significant difference between the supply and return air temperatures.

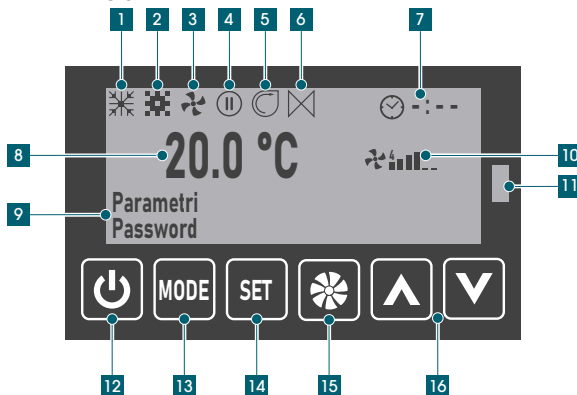
Cooling mode

- Open the ball valve installed on the seacock.
- Turn on the air conditioner switch on the boat's electrical panel.
- Switch on the air conditioner using the control panel.
- Set the heating mode and adjust the temperature up to a value higher (at least 2 ° C) than that of the cabin indicated on the LCD display.
- The plant will start operating. Check that the water from the cooling circuit is drained overboard.
- Close the doors and doors of the air-conditioned room. After a few minutes, there will be as significant difference between the supply and return air temperatures.

11. TECHNICAL SPECIFICATIONS

Features	MACS 7	MACS 12	MACS 16
Cooling capacity	7000 BTU/h 2000 W	12000 3500 W	16000 4600 W
Rated machine voltage	220 V		
Maximum machine voltage	230 V		
Rated machine current	2,9 A	4,2 A	5,4 A
Fan current	0,46 A	0,78 A	1,12 A
Compressor current	2,5 A	4,2 A	5,2 A
Compressor power	555 W	914 W	1060 W
Fan power	105 W	174 W	253 W
Pump power	43 W	75 W	155 W
Power of the 4-way valve	5,5 W	5,5 W	5,5 W
Connection to the control panel	RS485		
Maximum length of connection cable to the control panel	20 m		
Refrigerant	R-410A		
Refrigerant quantity	360 g		500 g
CO2 equivalent	0,730 †		0,995 †
GWP	2088		
Overall dimensions of the machine	273 X 454 X 300 mm	321 X 520 X 333 mm	342 X 557 X 350 mm
Machine weight	23 kg	26 kg	30 kg

12. CONTROL PANEL LAYOUT



1	Cooling mode icon	9	MACS parameters menu
2	Heat pump mode icon	10	Set ventilation
3	Ventilation mode icon	11	Infrared sensor
4	Compressor status icon	12	On/Off switch button
5	Seawater pump icon	13	Mode switch button

6	Switch valve icon	14	Time setting button
7	Time setting icon	15	Ventilation level button
8	Set temperature	16	Plus/Minus room temperature button

13. MAIN COMMANDS





System power on / off

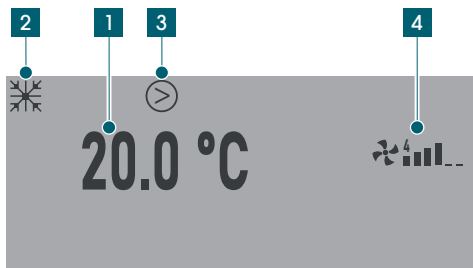
In ON mode, the control panel and the control board are powered. The display shows the desired temperature in the air-conditioned room and the mode (cooling / heating, etc..) machine setting. In OFF mode the control panel and the control board are not powered, and the machine is off.

Hold the power button 12 for about 2 sec. to toggle the AC unit to the "ON" mode. The display will show:

1) The desired temperature on the conditioning room.

2) The operating mode:

-  Cooling mode
-  Heating mode
-  Auto mode
-  Ventilation



3) The fan speed value.

4) Compressor status icon:

To switch of the machine, press the button 12



When the compressor running, the icon showed is (pos. 4 in the image above). If the compressor is off, the icon show in the same position is .

Temperature setting

To set temperature at the desired value, push buttons 16 (decreasing) or (increasing). In the display is showed the setting temperature.

Setting the operating mode

You can choose between 4 different modes of operation, described above by their digital representations.

For changes the mode of MACS press the button 13.

14. VENTILATION CONTROLS

Ventilation mode setting

Is possible define two different ventilation mode:

- **Manual:** The level is defined in manual setting.
- **Automatic:** The setting of the ventilation is automatic. The ventilation increases and decrease in function of difference of environmental temperature and setting temperature.

The setting speed is showed to right and near to the ventilation symbol.



In the default, the speed level is the maximum value in manual mode. It is possible to change the ventilation level using the button 15 . To the default speed value using the button 15 , to pass at the successive speed value, the ventilation pass to the minimum value to the maximum value. At the maximum value if you press another time the ventilation button, the ventilation pass to the automatic mode. If you press another time the ventilation button the level speed return to the minimum value.

For select the automatic mode, from the level six of ventilation press another time the ventilation button for pass to the automatic mode.



15. AUXILIARY COMMANDS

Timer

The timer is the command handle the automatic switch ON or the automatic switch OFF the machine.

- **Timer setting for auto switch OFF:** If the machine is ON (in any mode) and the timer is setting, when the value of time arrived to zero the machine makes an auto switch OFF.
- **Timer setting for auto switch ON:** If the machine is OFF (in any mode) and the timer is setting, when the value of time arrived to zero the machine makes an auto switch ON.

For to setting the timer, push the button 14 . After selecting it, with the button 16 to define the time value desired. The timer symbol and the selected time are shown on the display (with a range from the minimum value of 30 minutes to 8 hours, varying by 30 minutes at a time). The digit to the left of the colon indicates the hours, the one on the right the minutes. If the timer is set, yes shows in the display as in the image here.



For to delete the timer must be push another time the button 14 . If the button 14 is push for errors, wait for two second and the timer selection disappear.

16. USER SETTING PARAMETERS

For to enter in the menu of setting parameters to push the button 13 in the same time of 15. Immediately you can see the word parameter password (see the image below)

In the case of final user, is possible to use the button and you can choice to change the parameter with buttons 16.

For exit to the parameter mode, push another time the button 13 and 15.

The end user in the parameter menu can only change the following parameters:

Languages Selection

After you enter in the parameter mode is possible to change the panel language. There are two options: Italian and English.

Display brightness selection

Is possible to regulate the brightness of o-led panel from the value 5 to the value 25. The brightness of control panel during its use, is ever the maximum brightness level. The value of brightness selecting is the grade of luminosity in the stand-by mode.

Buzzer setting

Is possible to change the option of buzzer setting, the possible options are:

OFF	The acoustic signals are disable
KEY + ALARM	The acoustic signals are switch on during the push of capacitive button and during the alarm signals
ALARM	The acoustic signals are switch on only during the alarm signals
KEYBOARD	The acoustic signals are switch on only during the push of capacitive button



Temperature units setting

Is possible to display the temperature units in two different scales °C and °F.



17. TECHINICS PARAMETERS SETTING

ATTENTION The following parameters must be modified only from qualified user. The change of this is parameters from the user not qualified could the brake of machine.

For to enter in the menu of setting parameters to push the button 13 in the same time of 14. Immediately you can see the word parameter password (see the image below) Use the buttons 16 to select the number corresponding to the password. In the case of final user, is possible to use the button 13 and 14 you can choice to change the parameters. Once the parameter to be changed has been defined, its value is changed (naturally within the parameter range) using buttons 16.

To exit programming mode, repeat the sequence of keys (13 + 15) used to enter it.

After having insert the correct password number, is possibly change the following parameters:

Temperature probe 1

This is option showed the value of temperature measured from the principal probe.



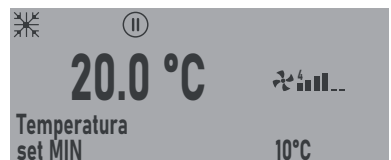
Temperature probe 2

This is option showed the value of second temperature probe. The second probe is an optional of machine. In the standard case the option of temperature probe 2 is showed the word DISAB. (=disable)



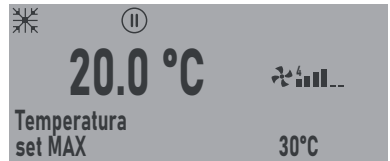
Minimum temperature setting

This is option allow the minimum temperature value selected from the user. The range of temperature value is from 10 to 30 °C.



Maximum temperature setting

This is option allow the maximum temperature value selected from the user. The range of temperature value is from 10 to 30 °C.



External secondary probe

The electronic board have the optional of secondary probe. This is possible to use this is probe for measuredn the environmental temperature. The external probe being an optional is on default disable, after the installation on this is optional is possible to able the probe.



Temperature differential

This is option make the possibility to set a differential value on the temperature control system. The differential induces on the difference between the temperature measured and the setting temperature.

When the difference of two temperature is the same differential value the compressor turn on. he range isa value to 0,5 from 3.



Probe calibration

This is option have the task to correct the probe temperature value respect real ambient temperature. The calibration is a value that have the range from - 5 °C to 5 °C. The value of calibration is added or taken out at the probe temperature.



System operation in case of faulty probe

In the case of the probe is damaged, the air condition system keeps running but with a running times and stop time preinstalled.

The function "faulty probe" use the following parameters: the minutes in the option faulty probe, compressor cycle time OFF - ON and compressor cycle time ON - ON.



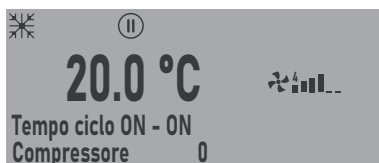
Compressor cycle Time OFF - ON

This is option make to be defined the time (in minutes) of stop compressor time (in other word the time pass between the stop compressor moment and the successive compressor start).



Compressor cycle Time ON - ON

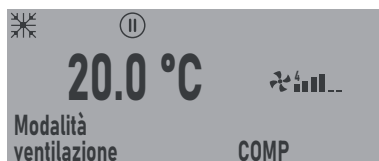
Allows you to set the time (in minutes) that must elapse between two ignitions following of the compressor, independently from the temperature and from the set-point.



Fan operating cycle

Allows you to select the operating mode of the fan in relation to the compressor.

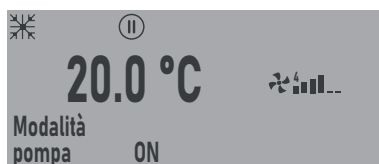
- **ON** The fan runs continuously when the system is on.
- **COMP** The fan runs on the same cycle as the compressor



Sea water pump operating cycle

Allows you to select the type of operation of the pump in relation to the compressor. There are two options:

- **ON** The fan runs continuously when the system is on.
- **COMPR** The pump runs on the same cycle as the compressor.



Minimum speed level

Allows you to adjust the minimum speed of the fan in heating mode, for adapt the speed according to the conditions external. You can select 3 options:

- **MIN** Minimum speed is set to level 2
- **MED** Minimum speed is set to level 3
- **MAX** Minimum speed is set to level 4



Automatic ventilation mode in hot mode

The automatic ventilation mode, as explained above, is the option that allows the variation of the ventilation speed according to the difference between the temperature desired and the temperature present in the room to be conditioned.

In the case of heat pump operation of the machine, the automatic speed it can also work in reverse automatic speed mode.

- **DIRECT** The speed decreases progressively as the difference decreases of temperature
- **REVERSE** The speed increases progressively as the temperature difference decreases



i The electronic control automatically adjusts the intermediate speeds according to the minimum and maximum values set.

Minimum selectable speed in hot mode

It is the minimum speed that can be set in the mode heat. In order not to compromise the functioning of the machine the minimum speed in the mode hot is level 2. You can increase the level minimum up to level 4.



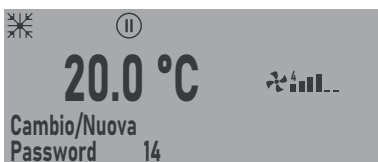
Ambient probe temperature 1

Displays the temperature value detected by the main probe. In this case it is only one display parameter.



Password change

If you want to set a new password, it is You can change it to the following option. After setting the new password exit the menu or change parameter to keep the change made.



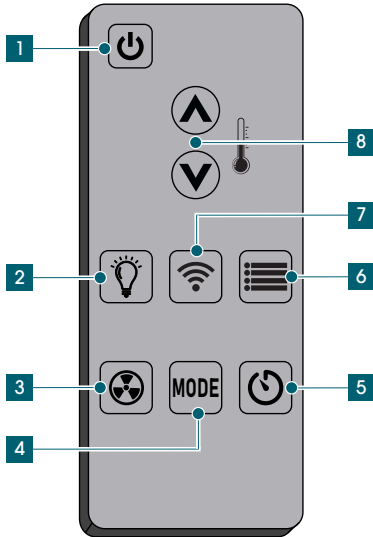
Restore default settings

To restore the default value of each parameter. The instrument parameter values are stored in the memory of the control panel. In case in which, for whatever reason, the latter should be replaced, make sure that in the new panel the correct default values are set. The instrument parameter values were determined by the manufacturer to guarantee the optimum operation of the air conditioner. It is recommended not to modify them.



Infrared remote control

The machine kit has the IR control. With the IR control is possible to select all functions. The icons in the IR control are difference respect the panel control icon.

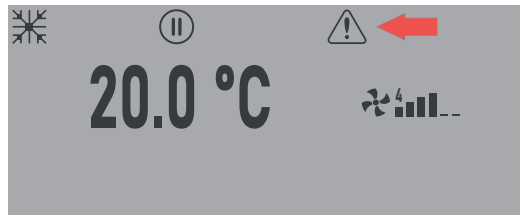


1	Switch ON / Switch OFF
2	No function
3	Ventilation setting
4	Change of operating mode
5	Timer setting
6	Parameters menu
7	No function
8	Temperature Setting

18. ALLARMS

The control and safety systems of the machine have the task of preventing the breakdown of the machine in the event of a malfunction. In the event that the control and safety systems do not work, alarms are generated which in certain cases cause the machine to be switched off and in other cases the machine continues to operate. The two control systems are: the pressure switches and the temperature probe (or probes).

The pressure switches regulate the circuit pressures, in the event of a malfunction of these components, the machine stops since continuing operation without pressure control would lead to a possible breakdown of the machine.



In the event of a probe failure, the machine continues to operate according to the “probe failure” function.

With an alarm present, an alarm message and a danger icon are displayed.



In the event of any alarm, it is advisable to reset the system by disconnecting the power supply to the air conditioner for a few minutes. Restoring the system after a general alarm does not eliminate the problem that led to the occurrence of the failure.

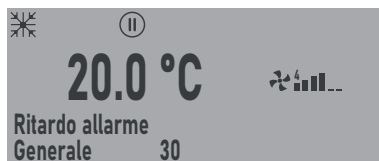


The delay times of the various alarms are valid only for the first start-up of the system. Subsequently the alarms will be immediate.

General alarm delay

The general alarm delay causes that when the machine is switched on, it allows the circuit regulation.

This delay, quantified in minutes, it does not have to be carried to zero unless maintenance or testing of the machine.



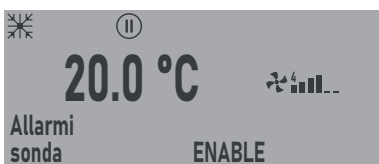
Alarm display delay

With this setting it is possible to delay the display of alarms (any type alarm).

Enabling probe alarm

In the case of a probe alarm, it is on the panel probe error message displayed (as explained in the preface of chapter 17). The “probe error” alarm can be enabled or disable it.

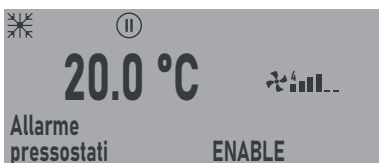
By default it is enabled.



Pressure switch alarm enabling

In the event of a pressure switch alarm (high or low), the message of is displayed in the panel pressure switch error (as explained in the preface of chapter 17).

The “pressure switch error” alarm can be enabled or disable it. By default it is enabled.



Pressure switch alarm delay

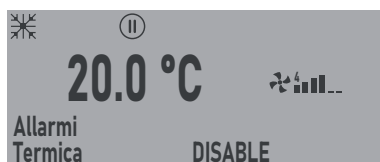
An error reporting delay can be set. The default delay time is 10 mins.



To reset the system it will be necessary to switch it off and on again with button 12.

Thermal alarm enabling

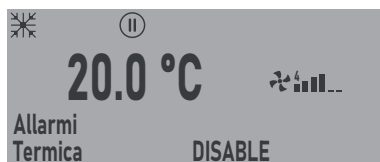
The thermal is an optional component, which can be used for additional protection on the compressor, in order to avoid possible overheating.



Thermal alarm delay

A signaling delay can be set of the error. The default delay time is 10 min.

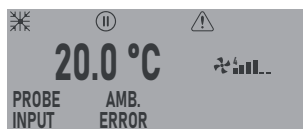
To restore the system you will need to shut it down and turn it on again with button 12.



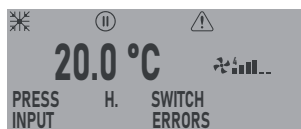
Alarm display

In the event that the system reveals a malfunction, the latter is displayed via the danger symbol and initially for a limited time a message which indicates the problem that generated it.

The three overpressure messages that are displayed are those shown below.



Faulty probe



Error in the high pressure switch



Error in the low pressure switch

19. ORDINARY MAINTENANCE OF THE SYSTEM

Here are the maintenance operations to be carried out on the various components of the air conditioning system.

Return air grille

First, ensure that the return air grille is not obstructed by any kind of object.

The air filter (located on the face of the AC unit's heat exchanger or behind a return air grille) should be periodically checked, cleaned or replaced.

The frequency of its maintenance depends of the AC unit runningtime and the quality of the air.

Cleaning the return air filter is fundamentally for the right operation of the AC unit. In fact, a dirt air filter can cause a decreasing AC unit efficiency in cooling mode, and even the block of the system in heating mode, as a result of a too high cond. pressure due to the lack of air flow through the heat exchanger. In any case, we recommend to clean or replace the filter every time you start your air conditioner after a long period of inactivity. If a return air filter grille is used, please remove the filter on the AC unit (if present).

Air distribution grille(s)

If in the air distribution circuit there is only one supply grille (and it has adjustable fins to guide the flow), verify that it is never closed during AC unit operation.

If there are more air supplies (one primary and the other secondary), please ensure that main supply grille is always open. The other grilles, which could generally be placed outside of the main room, can be closed if you want to have a greater airflow into the main cabin. Sometimes the closure of one or more supply grilles, thus reducing the airflow, can cause ice formation on AC unit heat exchanger in cooling mode, or an high pressure alarm in heating mode.

Condensate collection and drain system

In the stainless-steel basin or in the condensate drain pipes can be algae or other impurities than can block the condensate drain system, preventing the proper condensation-water flow. Therefore, it's necessary to periodically check the status of the basin; if it contains a significant amount of water, this can mean that the drain lines were not placed correctly or that they are obstructed. In this case, clean basin and pipes, eg. using a solution of water and bleach.

Sea water filter

The sea water strainer on the pump suction line is used to prevent that algae, leaves and other objects in thesea water come into the pipes, pump or heat exchanger, causing possible failures.

A low sea-water flow (resulting from strainer clogging) can cause the block of AC unit in cooling mode (due to high cond. pressure) or a lower efficiency in heating mode.

To avoid these potential problems, make sure that water flow in the sea water circuit is always appropriate, and clean strainer frequently. The frequency of its maintenance depends on the running-time of the AC unit and the quality of the sea-water.

Sea water pump

Generally, the sea-water pump is not self-priming, so it must be primed after installation. If correctly installed, you have not to re-prime the pump, unless there is an interruption of

the water-flow. If any object (algae or more) beyond the filter and hang in the pump impeller, it will be necessary a check of the pump. In that case, detach the hose from the pump outlet and check that the water rise up to the water line of the boat. If this does not occur, the pump is obstructed. To clean the pump, follow the instructions on its maintenance booklet.

Hydraulic fittings

Periodically check that all hydraulic connections are sealed and that sea water flows overboard when the AC unit runs.

Electric parts



Before doing any inspection or maintenance operation of electrical parts, disconnect power from AC unit.

Periodically check the status of electrical connections, because vibrations could loosen some contacts, causing functioning problems. Electrical parts should also be kept clean and dry. Periodically check for electrical dispersions. If they occur, they must be eliminated immediately.

Finally, ensure that power supply voltage is correct: main components (compressor, pump, fan, etc..) generally tolerate a difference of $\pm 10\%$ compared with the nominal voltage value.

Refrigerant

The AC unit is factory-charged with the right amount of refrigerant. Normally, refrigerant charge should remain constant all over the life of air conditioner.

Preparation of the water circuit for the winter period

If the boat remains in the water during the winter

In-water storage requires the use of an anti-freeze solution throughout the system's water circuit. Be sure to follow all local ordinances before discharging an anti-freeze solution overboard.

Close ball valve; Open the sea-water strainer, remove and clean its basin. Then close the strainer.

Disconnect water line at ball valve and insert pipe into a bucket of anti-freeze solution.

Run AC unit until a flow of anti-freeze solution is being discharged overboard

Reconnect water line at ball valve.

When you re-starting the AC unit after winter, please follow the start-up instructions in this manual.

If the boat is pulled to the dock during the winter

When the boat is already out of the water, open the seacock to ensure that all the water in the circuit is downloaded;

open the sea water strainer, remove its basket, empty and clean it. Then request the filter;

open the pump head to allow water to drain from inside the pump and from the hose filter-pump; close the seacock.

When putting the boat back in the water:

Partially open the seacock to allow the water to fill the circuit up to the level of the pump; tighten the screws on the pump head until tight.

when the pump is primed, fully open the sea cock;

follow the instructions in this manual to start up the air conditioner.

20. COMMON PROBLEMS SOLVING GUIDE

Problem	Likely cause	Solution
The unit doesn't operate	Power supply	Check voltage at power supply.
		Check that the switches on the boat's electrical panel are not disconnected.
		Check the wiring.
	Temperature	Setpoint could be too high (in cooling mode) or too low (in heating mode). Check and eventually modify the setpoint value.
Fan runs but compressor doesn't start	Power supply	Check voltage at power supply
	Temperature sensors	Check and eventually select the correct temperature sensor . Check that temperature sensor has not fault.
	Pressure switches get blocked	Check for water flow and refrigerant charge. If everything is ok, then check that the pressure switches contacts are not loose or burned, and eventually replace the pressure switches.
	Wiring	Tug on wires to see if they will separate from their connections. Replace terminals if loose or weak. Check for electrical shorts, ground and open circuits.
	Compressor	Replace compressor if defective

Fan	Gas leakage	Locate leak(s) (oil presence on piping indicate cracks or damages causing gas leakage). Replace the correct refrigerant charge
	Compressor run capacitor	Check for electrical shorts. Replace it if defective.
Compressor runs but fan doesn't start	Fan run capacitor	Check for electrical shorts, ground and open circuits. Replace capacitor if defective.
	Fan motor	Check for electrical shorts, ground and open circuits. Verify the fan motor. Replace if defective.
	Power supply	Check voltage at power supply.
The AC unit provides insufficient air cooling	Restriction in water system	Make sure that the sea water intake ball valve is open. Verify that the sea water intake and the filter are not clogged, clean them.
	Water pump	Verify sea water pump. Replace if defective. Check if the pump is undersized, eventually replace it with a bigger one.
	Air filter	Check the air filter, clean or replace it.
	Air heat-exchanger	The air heat-exchanger may require cleaning if the unit operated without a filter.
	Refrigerant leakage	Locate leak(s) (oil presence on piping indicate cracks or damages causing gas leakage). Replace the correct gas charge.
The AC unit provides insufficient air heating	Restriction in water system	Make sure that the sea water intake ball valve is open. Verify that the sea water intake and the filter are not clogged, clean them.
	Water pump	Verify sea water pump. Replace if defective. Check if the pump is undersized, replace it with a bigger one.
	Air filter	Check the air filter, clean or replace it.
	Air heat-exchanger	The air heat-exchanger may require cleaning if the unit operated without a filter.
	Sea water temperature	The sea water temperature should never be below 10°C / 50°F.
	4-ways valve	Check functionality of reversing valve.

The AC unit provides insufficient air heating	Refrigerant leakage	Locate leak(s) (oil presence on piping indicate cracks or damages causing gas leakage). Replace the correct refrigerant charge
The AC unit is noisy	Copper piping is vibrating	Separate any pipe that is making contact with other pipe or components.
	Fan	Verify that the fan is firmly attached to the air heat-exchanger. Replace the fan motor if too noisy (the bearings are defective).
	Loose components	Check and tighten loose screws.
	Improper unit installation	Make sure AC unit is levelled and secured to deck.
Water leakage	Drain pan	Verify the welding between the pan and the drain pipe. Repair as required.
	Drain line	Check the drain line for leaks, and that it's tight to the thru-hull connection and to the drain pan.
	Water circuit fittings	Tighten fittings and connections.
Electrical shock touching the unit	Electrical component is shorted to ground	Check control board, fan motor, compressor and pumps with an ohmmeter or high potential tester. Determine what is grounded and replace or rewire.