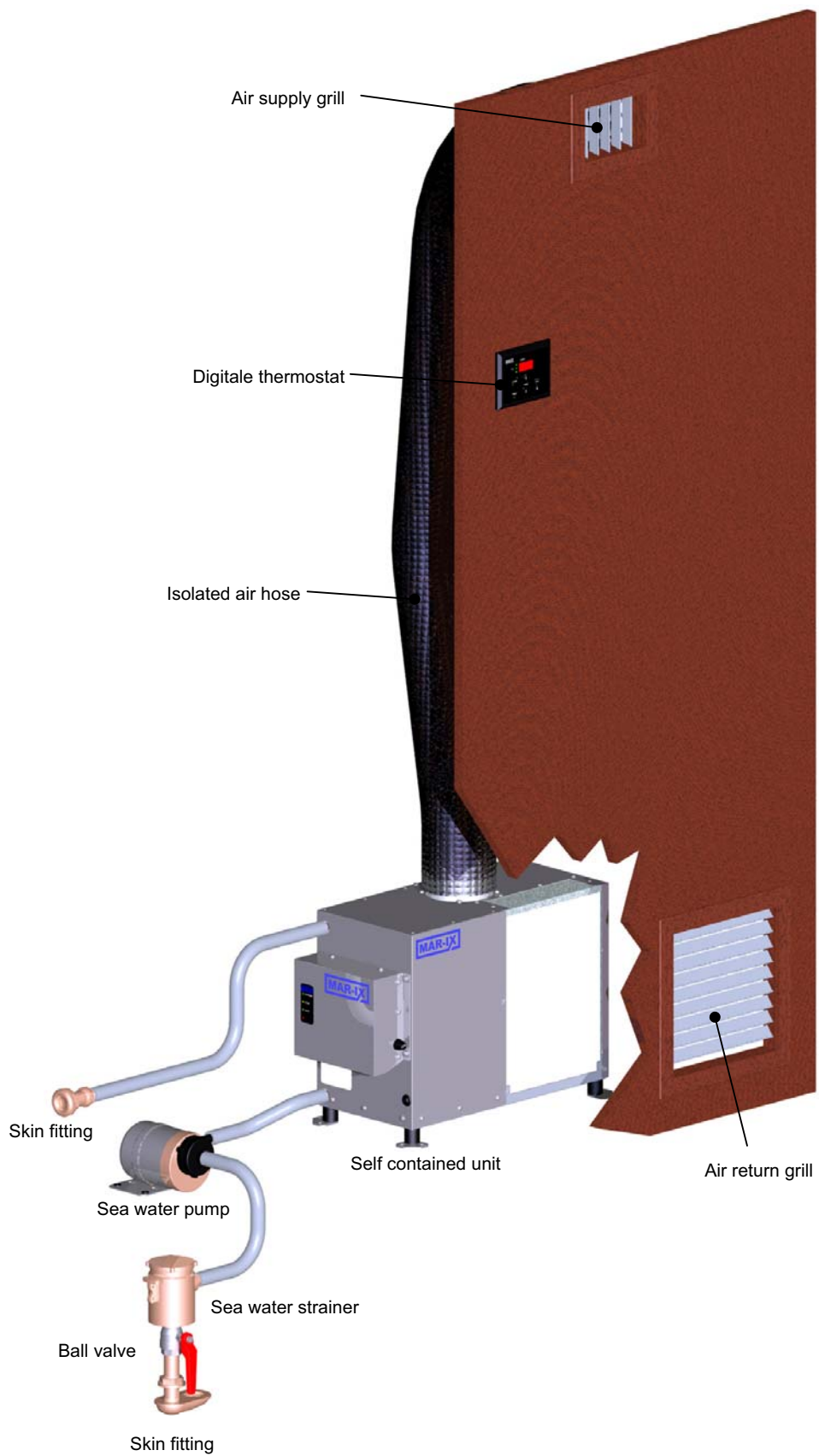




Air conditioning systems for nautical applications

User & Installation
Manual

Self contained unit
SCU-3



Example self contained unit installation.

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1. Introduction

In this manual the installation, use and maintenance is described for the air conditioning systems as mentioned on the title page.

Please read this manual carefully and take note of the usage, installation and maintenance points given. This way malfunctions will be avoided and you will retain your warranty.

No special tools are required and neither is there a need for specific cooling technique knowledge. The technical installation for climate control can be found in the system cabinet.

When repairs or maintenance in this area are needed (system cabinet) this should always be done by certificated companies.

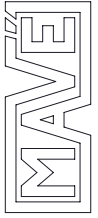
This airco should only be used for nautical purposes. Whenever changes have been made to the airco this will make the warrantee void, in these cases Mavé will not be responsible for possible damages. All risks are then exclusively for the user.

We have tried to make this manual complete with the use of schematics and figures while being as brief as possible. Nonetheless we are available for any queries you might have.

Safety measures

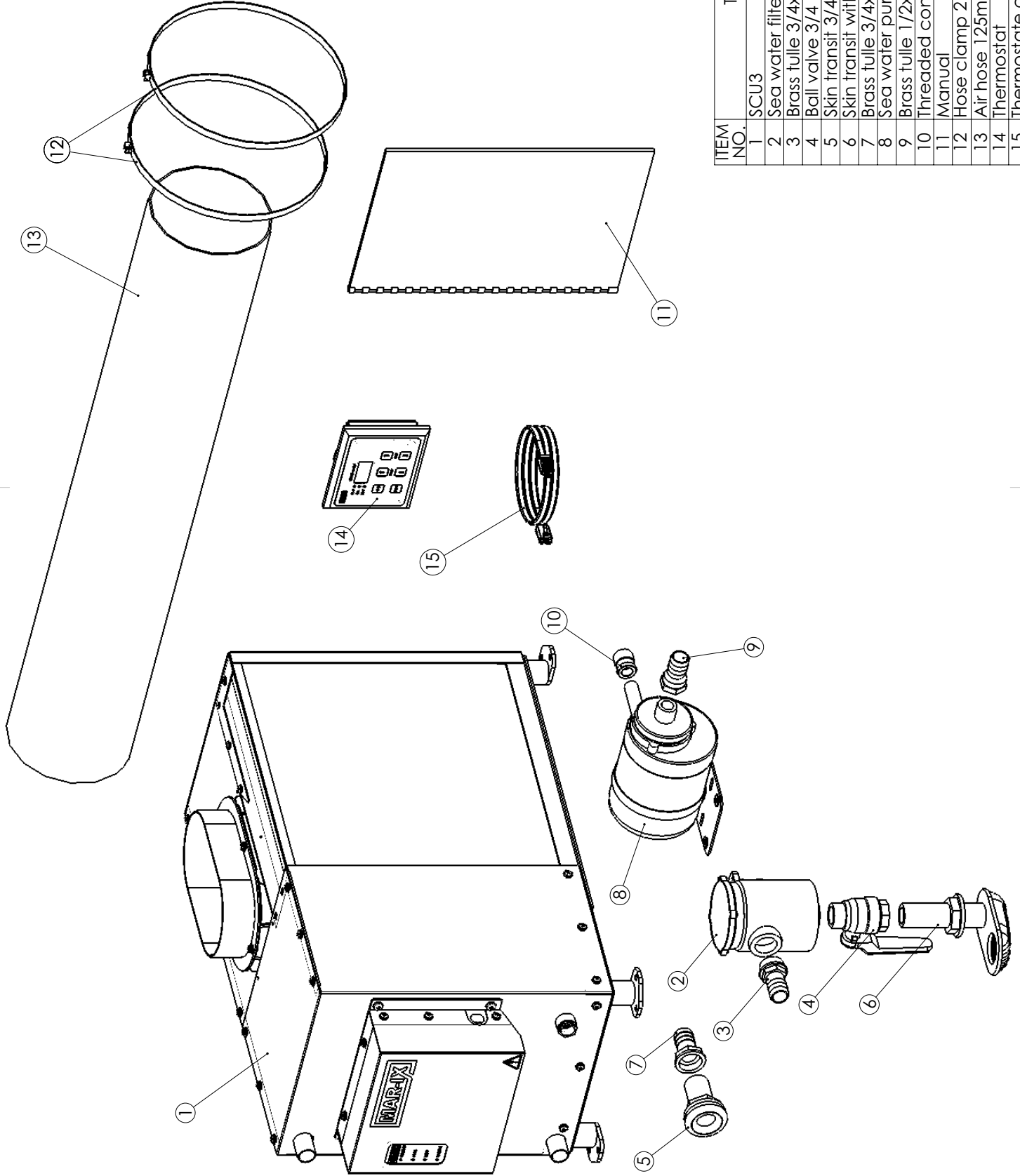
All relevant regulations and laws should be taken into account at all times when working with this product.

- Always use suitable tools for the job.
- Disconnect the power supply when working on the electrical system of this product.
- Never touch hot surfaces in or around the system cabinet.
- Never put combustible materials close to the installation.
- Disconnect the installation when welding close to the installation.
- Never touch moving parts when the installation is in use.



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SCU3 Survey of all parts



ITEM NO.	Title	Part nr	QTY.
1	SCU3	SCU3	1
2	Sea water filter 3/4 I.D.	B10323	1
3	Brass tulle 3/4x20 O.D.	B20565	1
4	Ball valve 3/4 I.D. - O.D.	B10322	1
5	Skin transit 3/4 O.D.	B10321	1
6	Skin transit with sieve 3/4 O.D.	B10320	1
7	Brass tulle 3/4x20 I.D.	B20368	1
8	Sea water pump	N20469	1
9	Brass tulle 1/2x20	B10067	1
10	Threaded connector 1/4	K20424	1
11	Manual	-	1
12	Hose clamp 215mm	B20472	2
13	Air hose 125mm	N20420	1
14	Thermostat	N20549	1
15	Thermostate cable	N20445	1

3. Connections for sea water and/or outside water

The airco SCU3 is an air conditioning system which uses water for cooling. All excess heat in the boat will be transferred to water which is then pumped outside. The external water system consists of an outside water pump, filter and a number of fittings.

Installation:

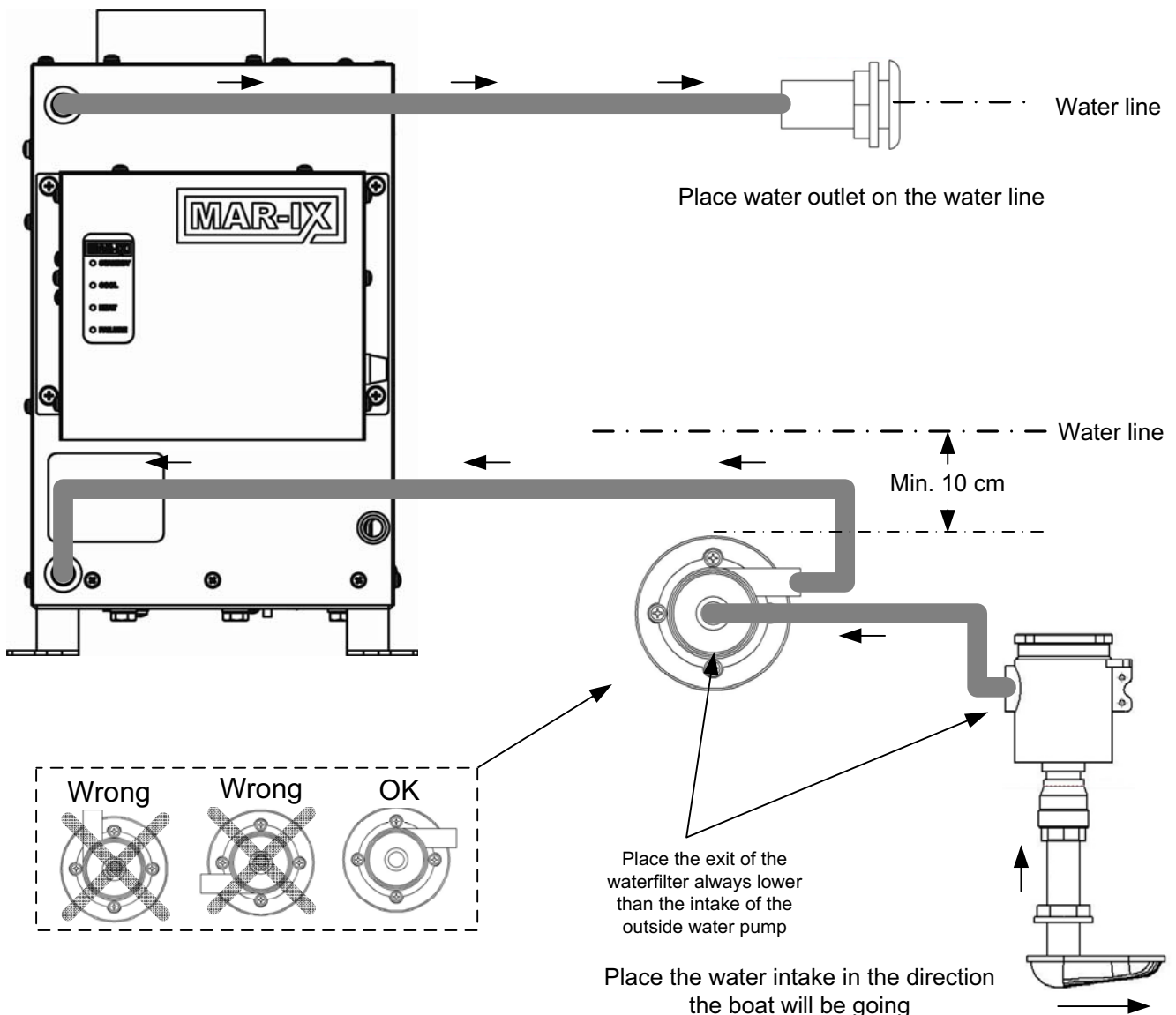
Install the skin through hull fitting with water scoop (N10320) in a low point of the ship where water is always available. Then install the water scoop in the direction the ship is normally going. Take care that the water intake is never placed near a drainage for a toilet, kitchen and/or bathroom. Never combine the outside water system with that of another system (such as the engine).

Install the outside water pump as shown in the figure below. Take care to place the outside water pump at least 10 centimetres below the waterline of the ship. This position is necessary because the pump is **not** self-priming.

A blanking plug (N10322) and water filter (N10323) are part of the scope of supply. These parts should be installed directly on the skin through hull fitting. Use suitable material for making a water tight seal when screwing on these parts.

Install the skin through hull fitting (N10321) on the hull of the ship on the water line.

Connect components of the outside water system with the sea water resistant hose of 20 mm diameter (internal) as shown in the figure below. Always use 2 hose clamps for each connection on hoses placed below the waterline of the boat. Make sure that the hoses do not create tension on the housing of the outside water pump.



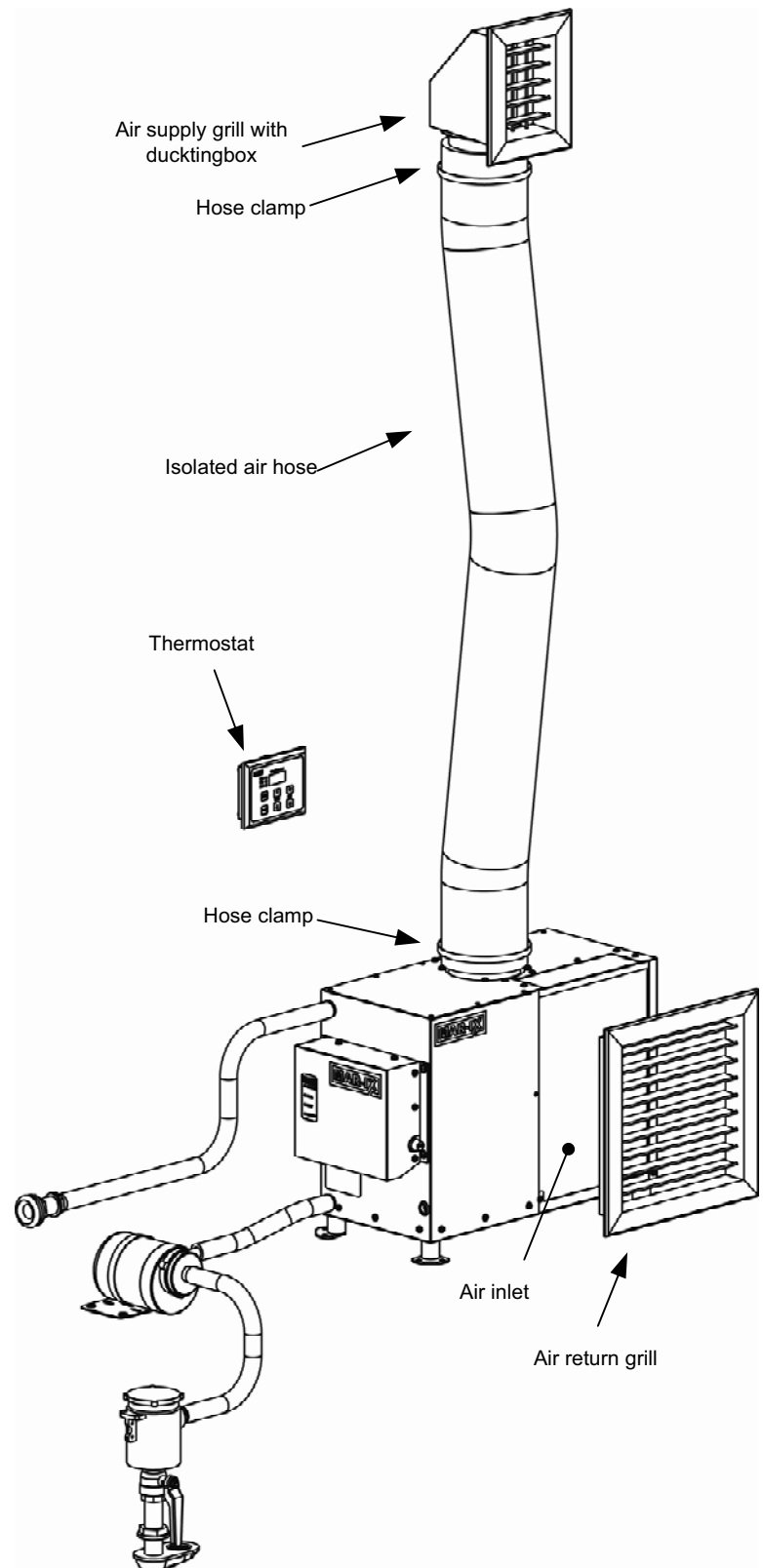
4. Installation

The system cabinet can be placed in every unused area which is connected with the area what has to be cooled. Make sure there is a possibility to supply the system with air and blow it return in the chamber which has to be cooled down. The air from the chamber will pull through the "air return grill" (ARG) to the system cabinet.

It is not necessary to mount the system cabinet directly behind the air return grill if the air has a free passage to the air inlet on the system cabinet. It is recommended that the cooled air is blown out as high as possible. It is also possible to blow out up from a horizontal position. Try to install the isolated air hose with as less as possible corners; every corner reduces the cool capacity, gives air resistant and noise. If corners have to be used, make the radius of the corner as big as possible. Make sure that no dents come in the air hose at the time of installation.

The thermostat has to be placed in a wall under the next circumstances;

- That no direct sunlight can shine on the thermostat.
- That the thermostat is not being placed in the direct airflow from the air supply grill.
- That there is no draught from open doors or windows.



5. Condensation water drain

When the air conditioning system is running it will produce condensed water.

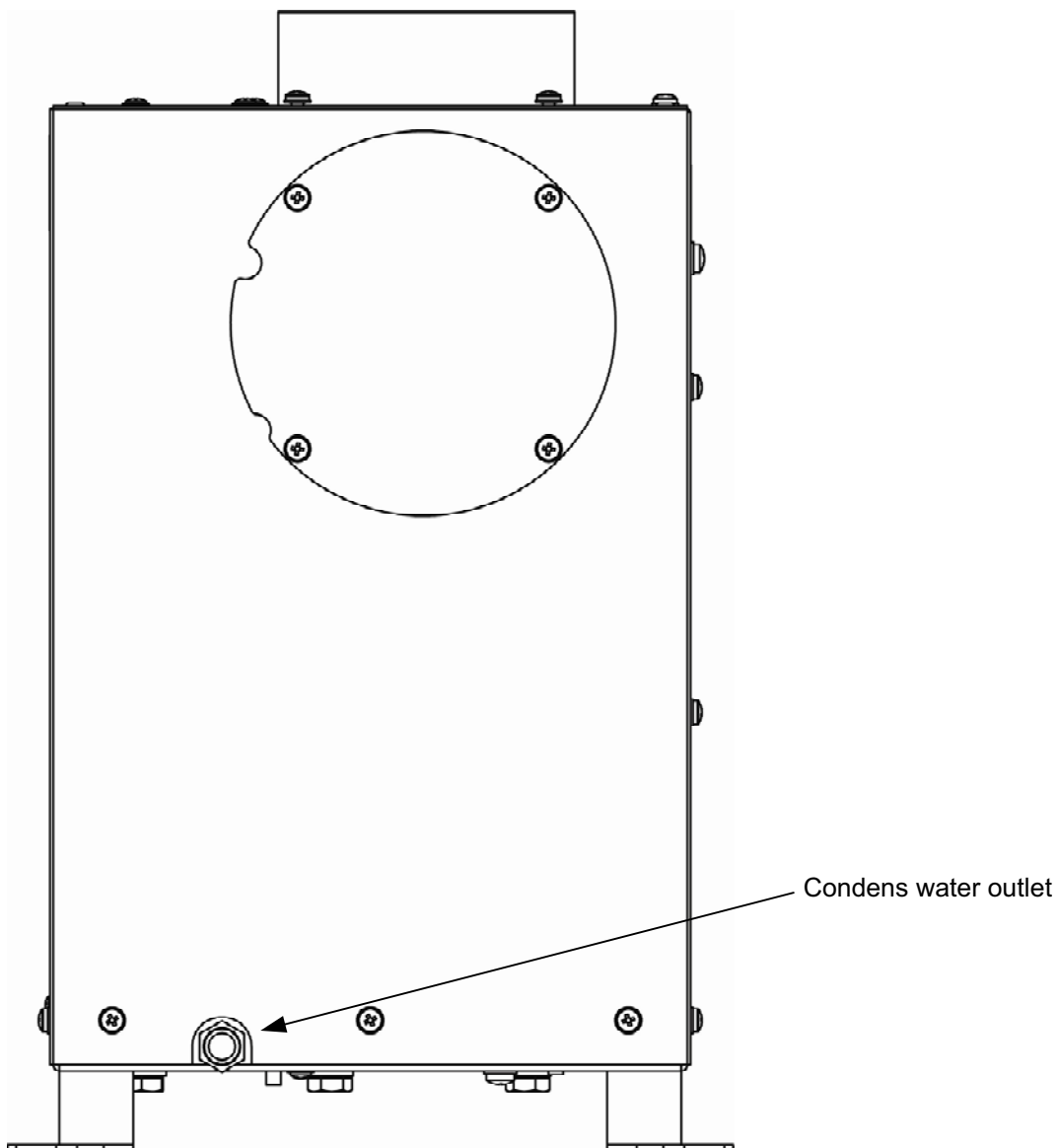
A drainage for condensed water is mounted in the system cabinet which collects this water. How much water will be produced depends on the humidity of the air. The condensed water has to be drained from the system continually which can be done in several ways:

- By a skin through hull fitting direct to the outside water.
- By a connection on the drainage of the sink.
- By a connection on a shower water pump or drainage pump.
- By a connection on the outlet hose of toilet or bilge water tank.
- By a connection to the end of the bilge pump outlet.

Make sure the drainage system is not blocked for draining water from the air conditioning system.

When a connection to a toilet water or bilge water tank is used then always insert a swan's neck or siphon to prevent bad smells. It is advised to fill the swan's neck or siphon partly with salad oil which vaporizes only little and will prevent that the swan's neck or siphon will become dry.

On the lower side of the system cabinet is a drainage for condensed water (see figure).



6. Electrical connections

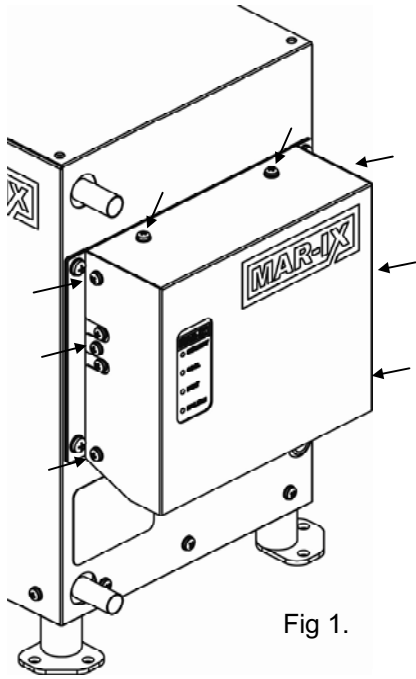


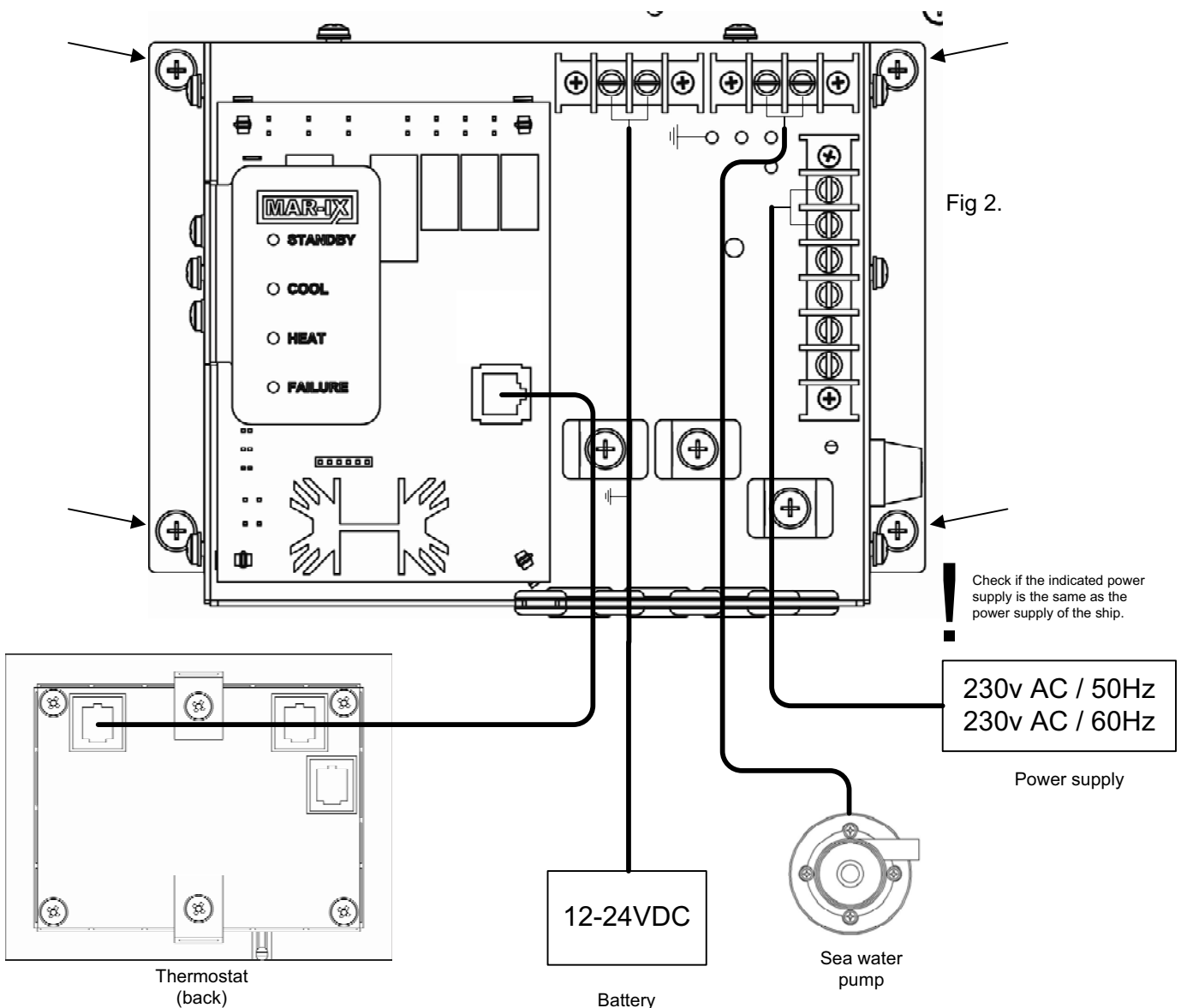
Fig 1.

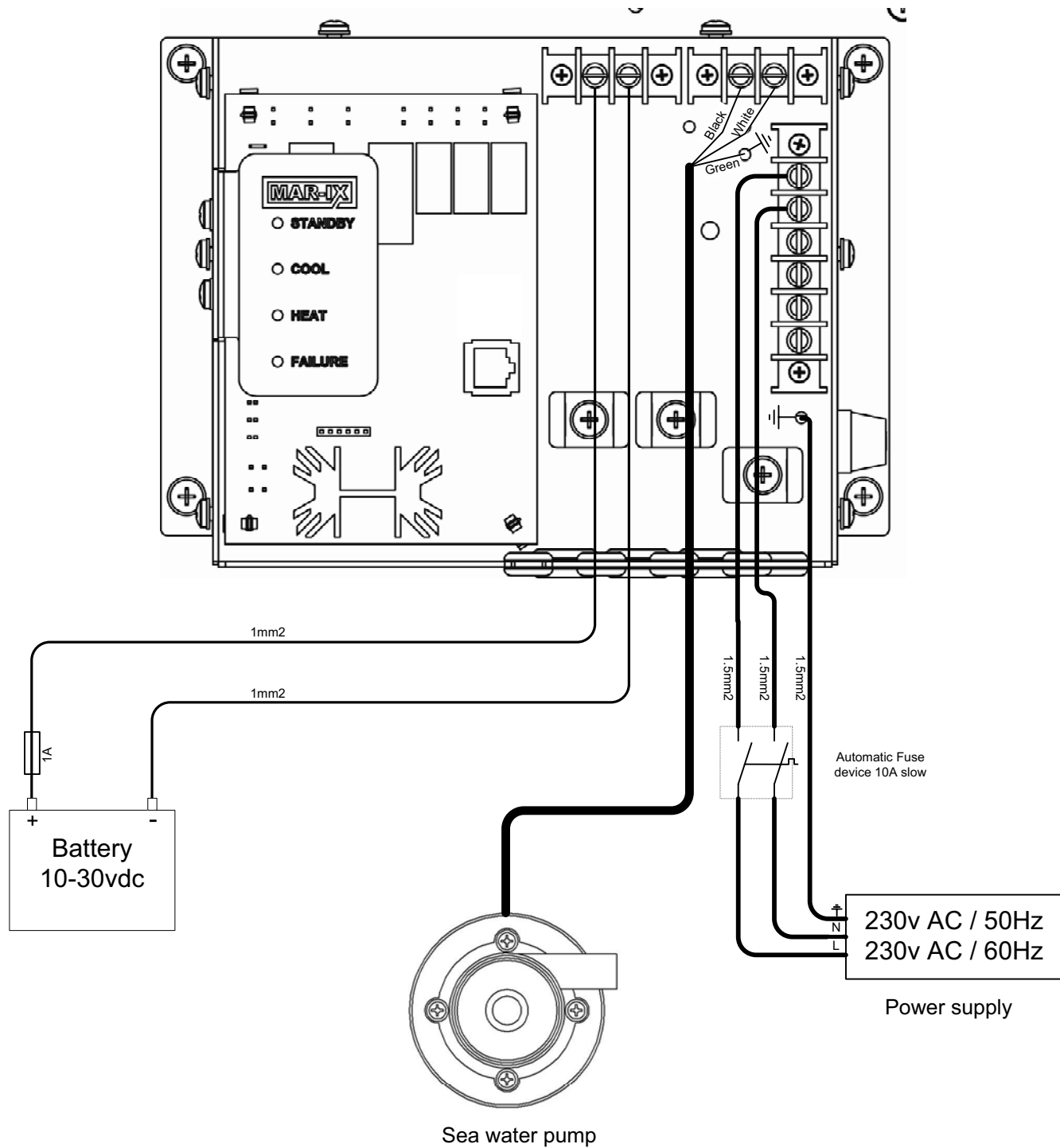
To get access to the electrical connections you need to undo the screws which are indicated by arrows in the figure on the left (Fig 1).

After removing the electrical cover the electrical connections are visible.

In the lower figure (Fig 2) is an overview how the electrical connections are connected.

It is also possible to place the electric box on the other side of the system cabinet. This is possible after removing the screws (4pcs.) that are indicated by an arrow in fig.2. It is also possible to install the electrical box on a separate wall.





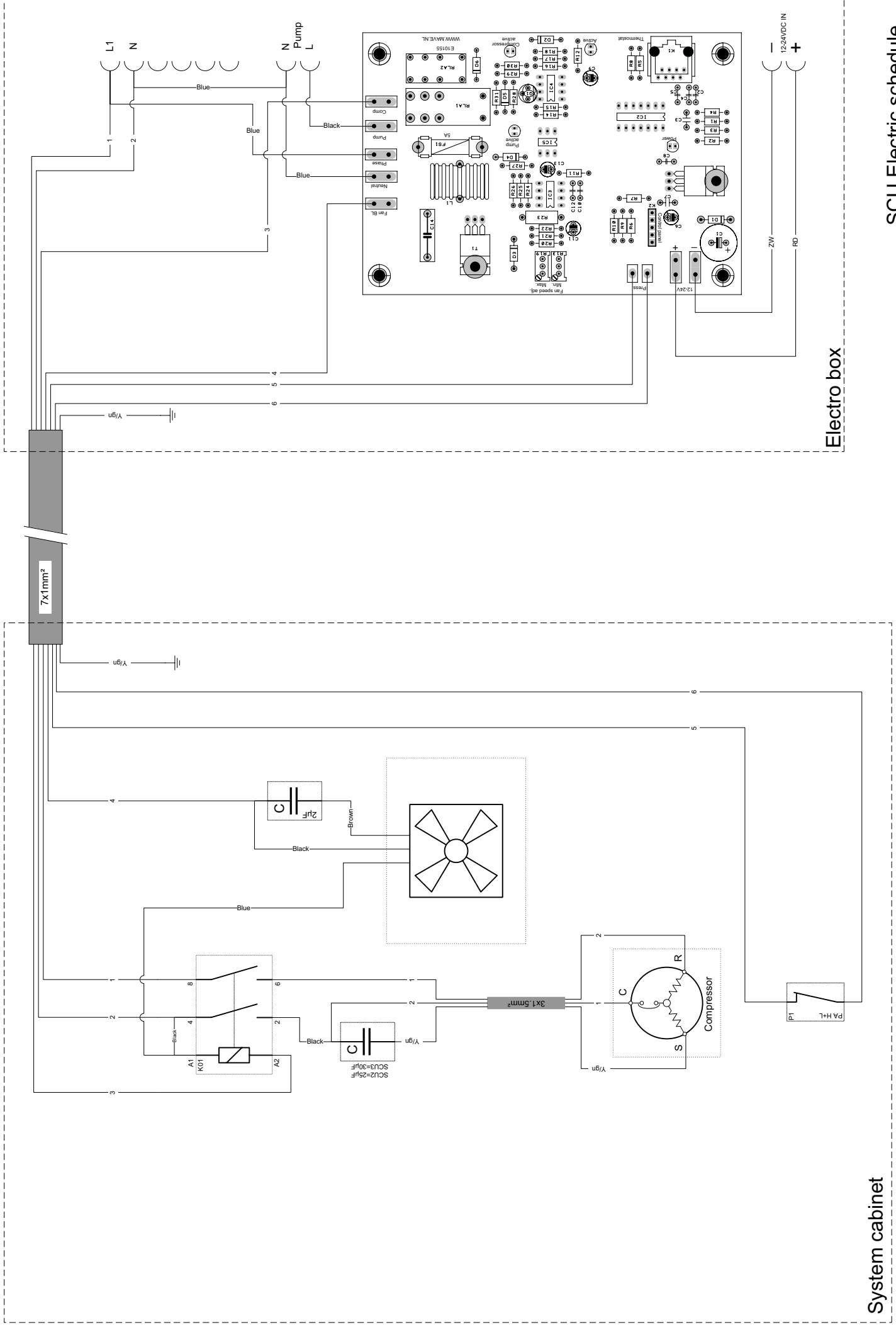
Connections:

The battery is connected using a cable with a minimum of 1 mm². A fuse of 1A must be used.

The power supply must be connected by using a cable with a minimum of 1½ mm² which is suitable for 230 volt alternating current and a slow blow fuse of 10A needs to be used.

Check if the voltage and frequency of the boat are similar to the indicated voltage and frequency on the system label of the system cabinet. The ground cable needs to be connected to a connection on the bottom panel of the electro box.

The sea water pump needs to be connected as indicated in the figure above with the cable which is already mounted on the pump. The ground cable needs to be connected on the bottom panel of the electro box.



SCU Electric schedule

System cabinet

Electro box

8. Technical data

SCU3	
<i>Dimensions (lxwxh)</i>	506x216x354 mm
<i>Weight</i>	31 kg
<i>Cool capacity</i>	3 kW (10.200 Btu)
<i>Refrigerant</i>	350 gram R407C
<i>Number of compressors</i>	1
<i>Voltage</i>	230v 50Hz-ac and 12-24v dc
<i>Power supply AC</i>	230v/50Hz
<i>Power supply DC</i>	10.5-30v
<i>Power intake AC</i>	4.5A
<i>Power intake DC</i>	0.2A max.
<i>Airhose connection</i>	Ø 150 mm
<i>Fluid connection</i>	Ø 20 mm
<i>Max. air flow</i>	650 m ³
<i>Max. environmental temperature</i>	40°C
<i>Max. temperature outside water</i>	35°C

Description of the above mentioned system

The above mentioned system is equipped with a rotary compressor and is filled with an environmentally friendly R407C cooling gas.

The casing is made of corrosion resistant steel 304.

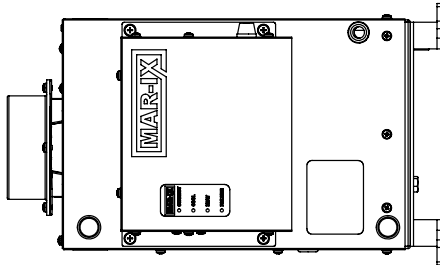
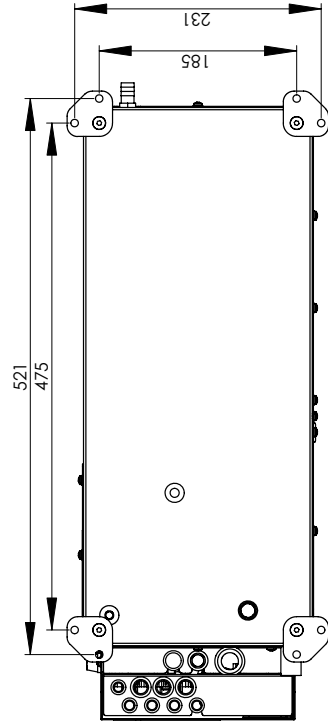
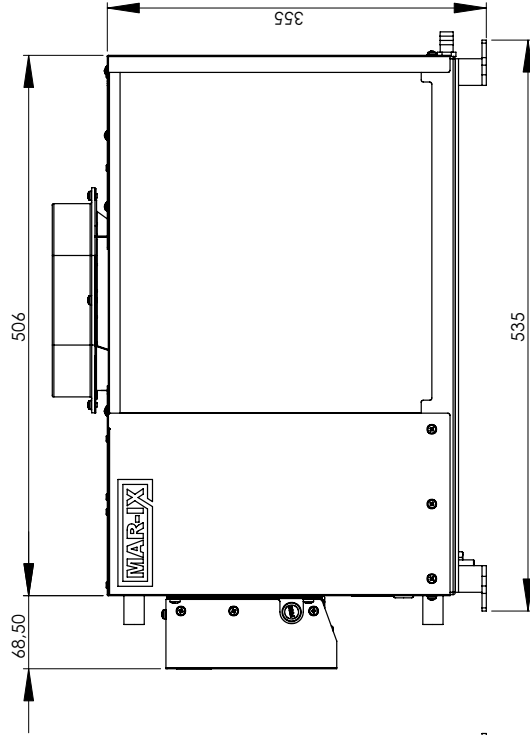
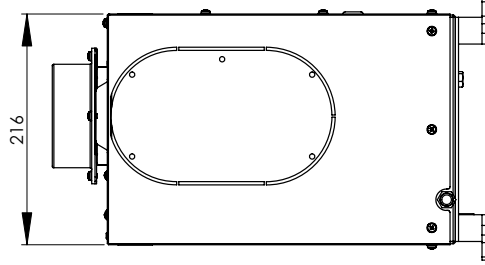
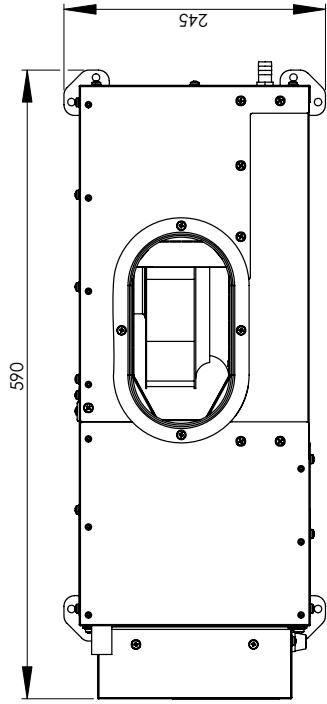
The water cooled condensor is built up using a sea water resistant copper/nickel.

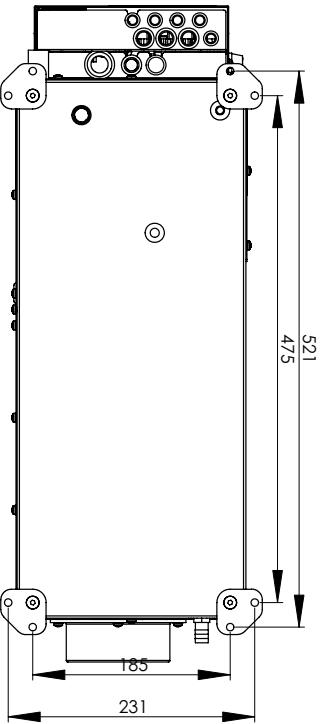
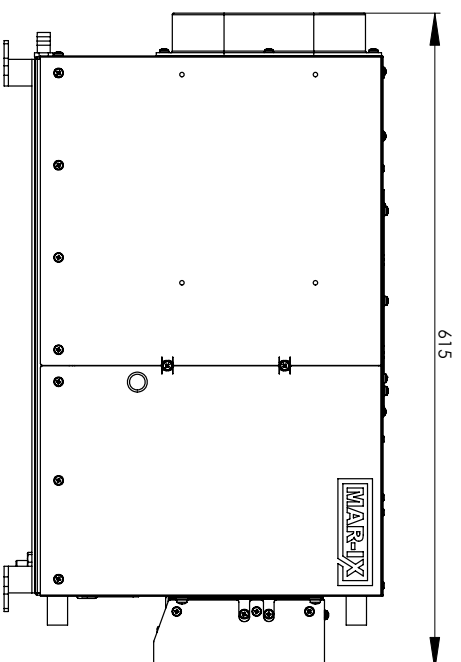
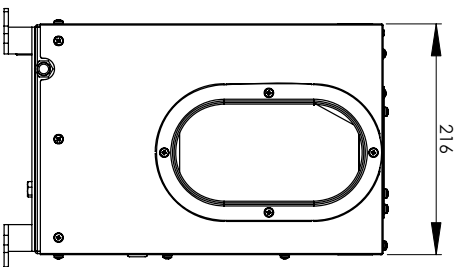
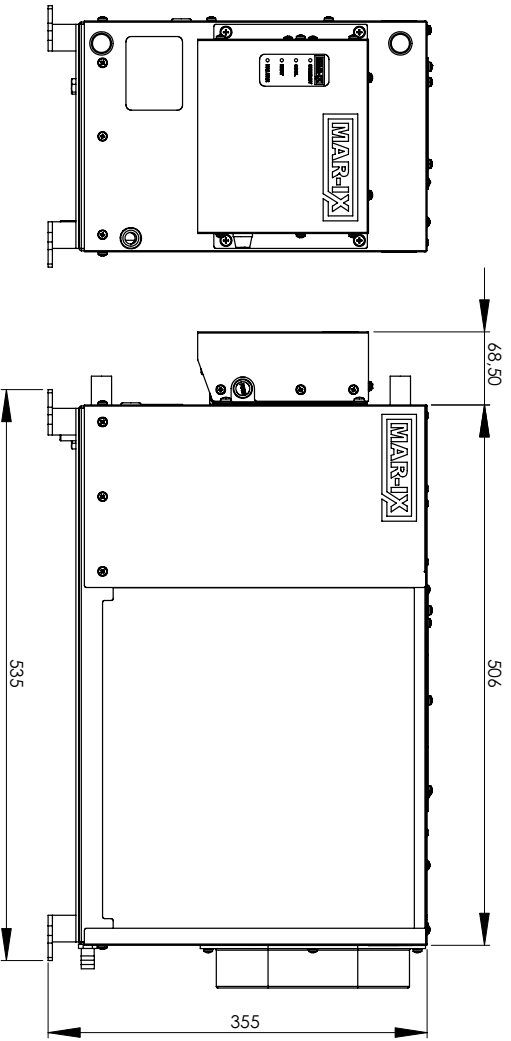
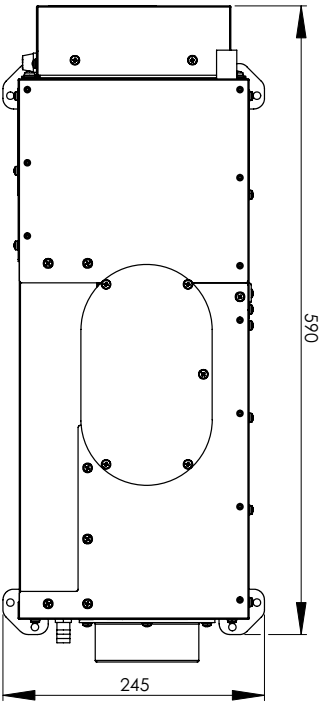


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SCUJ3 Maatvoering bovenuitblaas





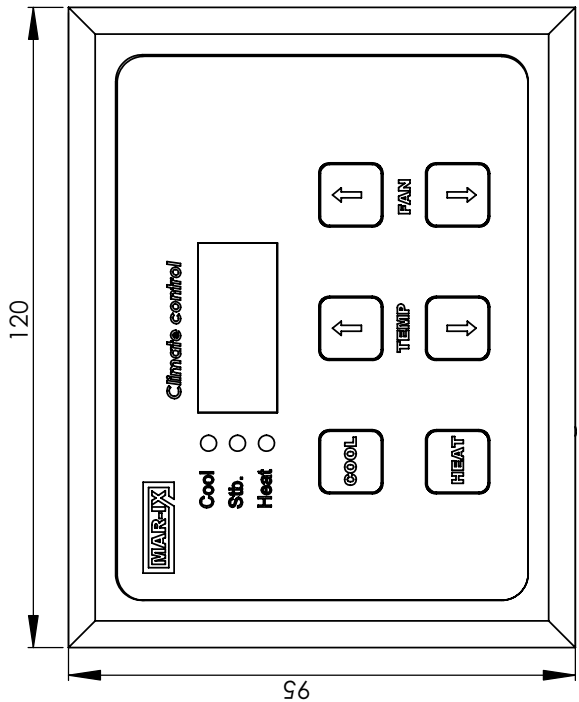
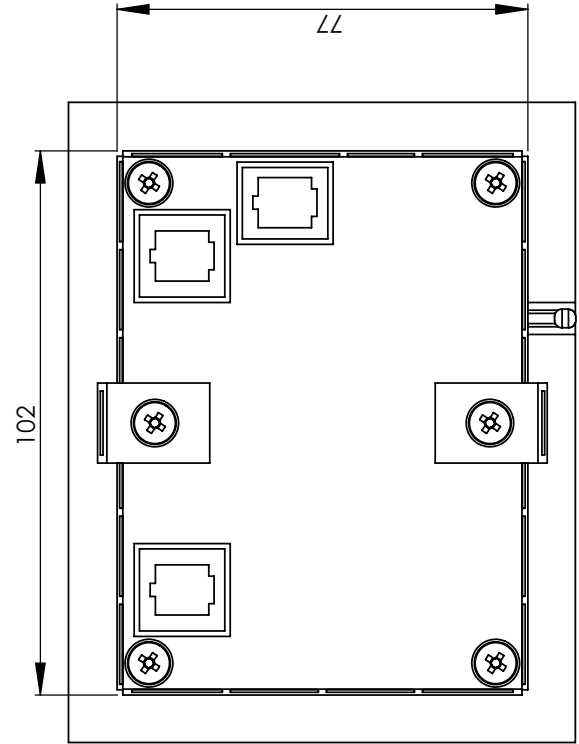
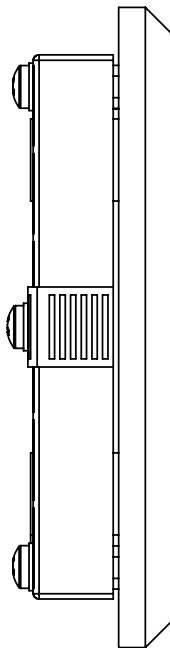
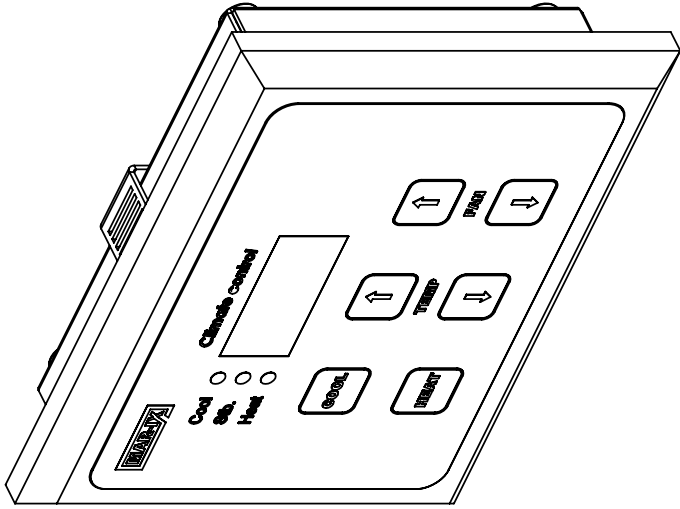
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SCU3 Matvoering zijuitblaas



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Dimensions thermostat digith



10. Preparations for use

If the power supplies are switched on (AC and DC), the thermostat will be lighted and gives the actual temperature in the chamber.

Cool function

At first, make sure that the sea water valve (N10322) is open.

Switch the system on by pressing the 'cool' button on the thermostat.

Look at the outlet in the hull of the boat, if the sea water is flowing well.

The desirable room temperature can be adjusted by pushing the 'temp' button on the thermostat up or down. To let the system functioning, the adjusted temperature has to be lower then the actual temperature.

After \pm 2 minutes the compressor will start to run.

By touching the 'fan' buttons up or down the fan speed can be adjusted.

The fan will only run when the adjusted temperature is lower then the actual temperature.

Adjustment

After installation and testing it is possible that the fan speed needs an adjustment for his minimum speed.

Switch the system on and set the fan speed to it is minimum (5%).

Make sure the temperature on the thermostat is set lower then the actual temperature.

With a small screw driver the minimum speed can be adjusted. At the printed circuit board is a potentiometer with the text 'min. Speed adjust'. By rotating this pot, the minimum fan speed can be set. Do not set the speed to low, because this will have a negative effect on the cool capacity and the evaporator will be freezed.

Dim function

If desired it is possible to dim the light on the thermostat(s). The heating and/or cooling function must not be used when dimming the light on the thermostat. Using the temp buttons the brightness of light can be set between 5% and 100%.

11. Maintenance

Outside water filter: Clean the filter depending on your level of use, but at least once every 3 months.

Close the outside water valve (N10322) beneath the filter.
Remove the cover from the filter.
Take out the filter element and clean the filter by using a brush and water until residue and filth is removed.
Check after reinstalling the filter and opening the outside water valve, if the filter cover does not leak any water.

Condensor: The condensor which is cooled by outside water must be decalcified at least once every year.

Close the outside water valve (N10322) beneath the filter.
Remove the water out of the sea water system by screwing loose both of the hose connections of the condensor.
Connect the lower hose from the condensor.
Use the upper hose to fill the system with cleaning vinegar (8%).
Let the system stand filled with cleaning vinegar for at least 2 days.
Check after reassembly and opening of the outside water valve if the hoses connected to the condensor do not leak any water.

Air filter: The air filter is mounted in the air supply part of the system cabinet. By pollution and dust in the air the air filter will be filthy. How filthy the air filter becomes depends on air quality and use. The air filter can not be cleaned and has to be replaced if necessary. The filter has to be replaced when the colour is dark grey or when the filter has too much air resistance. When the air quality is bad in the used area it will be recommended to use a washable rough air filter behind the air return grill.

12. Preparing for winter

If the boat during winter will be subjected to the temperatures below freezing point then the water must be removed from the outside water system and must be completely flushed through with antifreeze.

Take off the hoses from the condensor and let the system empty as far as possible.

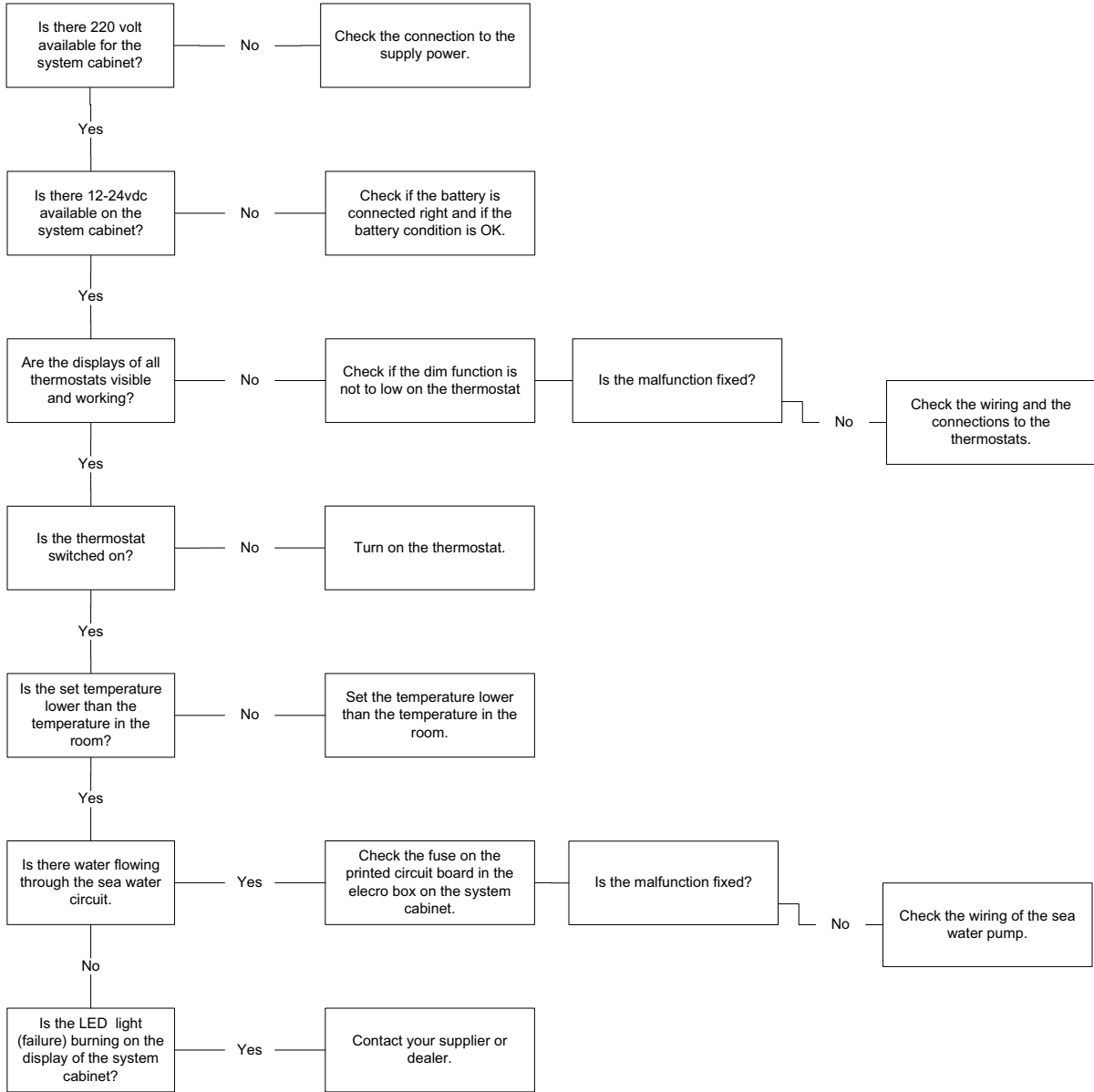
Reconnect the lower tube to the condensor.

Fill the condensor using the upper connection with antifreeze until it runs out of the ship.

Make sure no water can get into the system afterwards.

In areas where there will be no temperatures below freezing point the outside water system must be filled with fresh water or cleaning vinegar.

13. Fault finding



Declaration of Conformity

Mavé B.V. the Netherlands, certifies that all manufactured chillers and AC units have been tested and subjected to the following test procedures:

Pressure test.

The complete installation has been pressure tested with dry N2 according to European and Dutch regulations.

All units have been tested on at least 1.0 times the maximum working pressure with a maximum of 1.3 times the maximum working pressure.

The design pressure of any component is not lower than the maximum working pressure of the refrigeration system or section of the system in which that component is used.

During the testing period the installation has been checked on leakage and deformation.

Testing values.

R410a units.

This testing pressure on the low pressure side was ≥ 2500 KPa(g) $\approx 43^\circ\text{C}$.

This testing pressure on the high pressure side was ≥ 2600 KPa(g) $\approx 43^\circ\text{C}$. (water cooled)

R407c units.

This testing pressure on the low pressure side was ≥ 1750 KPa(g) $\approx 43^\circ\text{C}$.

This testing pressure on the high pressure side was ≥ 1750 KPa(g) $\approx 43^\circ\text{C}$. (water cooled)

R134a units.

This testing pressure on the low pressure side was ≥ 1000 KPa(g) $\approx 43^\circ\text{C}$.

This testing pressure on the high pressure side was ≥ 1000 KPa(g) $\approx 43^\circ\text{C}$. (water cooled)

Vacuum test.

Installations with a refrigerant charge < 10 kg.

A vacuum test has been performed by a vacuum of < 270 Pa and a minimal holding period of 30 minutes.

Refrigerant charge.

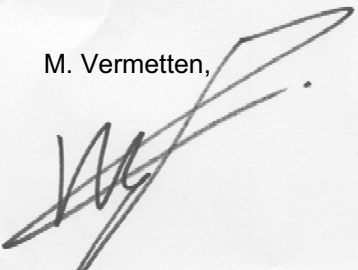
The unit has been charged according the number of kilograms mentioned on the identification plate.

Guidelines and environment.

Mavé B.V. the Netherlands commits herself to deliver the refrigeration installation according to the:

- EN 378 European safety and environment regulations for refrigeration installations and heat pumps
- CE standard
- The Dutch regulations on leak-free refrigeration equipment version 1997 or later.

M. Vermetten,



Managing director Mavé B.V.



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