MBC Marine

Marine air conditioning solutions

INSTALLATION AND USER MANUAL FOR ALL 12-24-48V SDC UNIS

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THANK YOU FOR CHOOSING OUR MBC MARINE PRODUCT!

Professional installation is the key to efficient and safe operation of the equipment so please read the following installation and operating instructions carefully before installing the unit.
Before starting the installation, make sure that the shipping box and the air conditioner are intact. DO NOT use a broken or damaged product.
If the product is damaged, return the product to the place of purchase.

Before the installation please check all parts are in the box and not injured:
- A/C unit
- Display
- 5m LAN cable
- Temperature sensor
- 4 pcs. mounting bracket

EXPLANATION OF SYMBOLS:

ATTENTION!!

Ignoring this information may cause material damage and may have adverse impact to the operation of this product.

WARNING!

Safety information: Ignoring these instructions could result in death or serious injury.

CAUTION!

Safety information: Ignoring this instruction can cause serious injury.

WARNING:

Installation of the system should only be carried out by qualified personnel with appropriate knowledge. The following information is intended for technicians who are familiar with applicable guidelines and relevant safety regulations and precautions. For warranty professional and proper installation specifications are essential. If you do not have the necessary knowledge, entrust the installation to a specialist! It is important to use the appliance only for its intended purpose and in compliance with the relevant regulations.

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PART 1. SAFETY AND FIRE PROTECTION WARNINGS

SAFETY INFORMATION:

The manufacturer assumes no liability for damage to the device in the following cases:

- Installation or connection failure
- Damage to the product due to mechanical impact and over voltage
- Modification of the product without the express written permission of the manufacturer
- Unusual use, differing from standards

FIRE PROTECTION WARNING:

Installation and maintenance of the unit may be dangerous due to pressurized copper pipes and electrical equipment. When working on the unit, always take the safety precautions into account and wear protective goggles during installation, use work gloves and place a fire extinguisher near the work area!

SAFETY WARNING:

It is strictly forbidden to install the air conditioning unit in a place where it is possible for the equipment to deliver carbon monoxide, harmful gas of the engine or any other toxic substance inside the boat.

ELECTRICAL SCHOCK WARNING:

To minimise the risk of electric shock and personal injury, ground the equipment properly! The equipment meets the relevant fire protection requirements. The device must not be installed in premises where petrol engines, tanks, LPG / CPG cylinders, regulators, valves, fuel lines or connectors can be found!

PART 2. INSTALLATION GUIDE, INSTALLATION PLAN

Before starting the installation it is important to plan the location of all the components of the system in advance, including:

- marine a/c units and electric box,
- air ducts and water pipes,
- location of the sea water pump,
- the drainage of drop water and its removal from the boat,
- sea water intakes/outlets,
- electrical connections,
- and the display location.

PLACING OF ELECTRICAL BOX

To avoid overheating and potential failure, the electrical box of MBC Marine SDC units must be installed in a well-ventilated location. This is especially important for 12V models due to high current draw.

Place the box near the evaporator, in the airflow path, without blocking the air intake.
Proper ventilation ensures safe and reliable operation.

WARNING!

Start the installation only if the location of each unit complies with the relevant regulations. At planning, make sure that there is enough space for subsequent installation and maintenance work.

WARNING!

MBC Marine reserves the right to deny warranty claims if the electrical box is installed in an unventilated or enclosed space. Proper ventilation is essential for safe and reliable operation.

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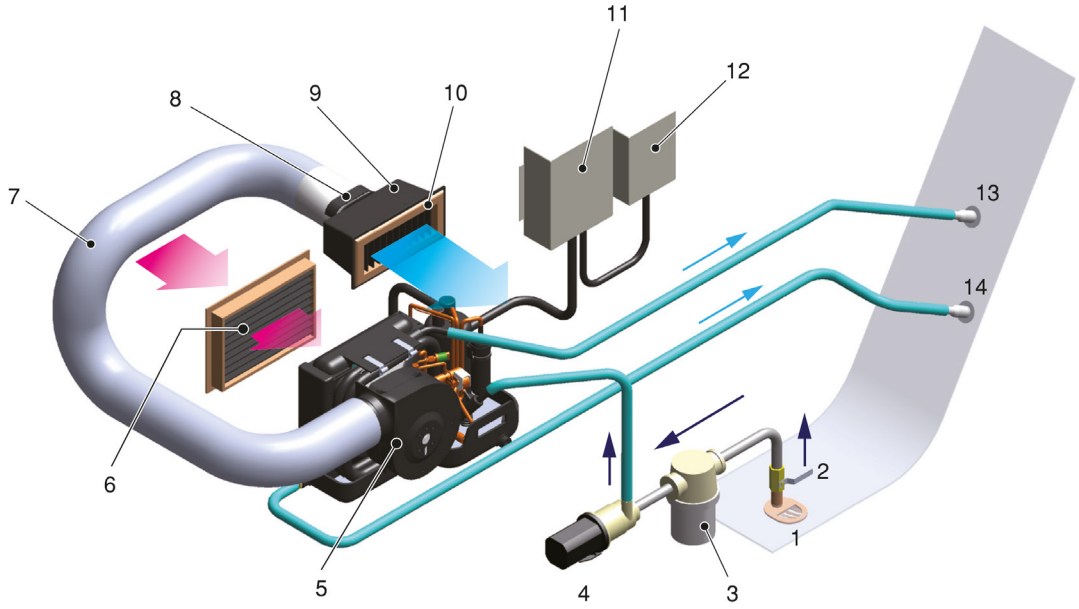
PLACEMENT OF THE AIR-CONDITIONING UNIT

TYPICAL INSTALLATION:

See the picture below for the installation of a self-contained air conditioner unit.



1. Scoop Type Thru-Hull
2. Ball Valve
3. Sea Water Strainer
4. Sea Wtaer pump
5. A/C unit
6. Return Air Grille
7. Flexible Duct
8. Duct Ring
9. Transistion Box
10. Supply Air Grille
11. Control Box
12. Starting Booster Outlet
13. Sea Water Outlet
14. Drain Outlet

INSTALLATION GUIDE

SAFETY WARNING!

IDo not install the air conditioner in the bilge or engine compartment of the boat and make sure that the selected place is properly blocked from gases and vapours coming from these spaces.

The air conditioner unit should be placed on a horizontal surface (e.g. at the bottom of a cabinet or seat) and if possible it should be raised by 1-2 cm on one side to facilitate drainage of condensed water from the drain pan. The device can be installed to the selected place crosswise or lengthwise but it is important to ensure the continuous air supply of the device and within the condenser unit. Place the device so that you can have access for future service and maintenance.

FIXING THE ELECTRICAL BOX

Install the electric box on a dry, flat, solid surface within 1 m of the air conditioning unit. Use the appropriate size of screws to securely fix the electrical box.

WARNING!

Do not direct the drain pipe to such part of the boat that does not have a water intake. The method of condensate discharge differs by ship type therefore removing the drain water from the boat is not part of the standard marine air conditioning unit.

INSTALLING THE DISPLAY

Before installing the display observe the following guidelines: Install the control panel only on a surface that is situated higher than the center of the cabin and is protected from external and internal heat and light sources. Only under these conditions the built-in sensor can measure the cabin temperature accurately.

Do not install the display in a place:

- with direct sunlight,
- near heat producing equipment,
- in a partition wall where there is possible outflow of heat behind the panel,
- under or above the air intake or outlet grids.

INSTALLING THE ROOM TEMPERATURE SENSOR

The Temperature of the room to be cooled must be measured for the appliance to operate. To measure this accurately, the external temperature sensor (black cable with copper sensor) upped in the package must be connected to the AI1 socket on the printed circuit board.

MARINE A/C UNIT DROP WATER DRAIN

The unit produces condensate in COOLING mode which is collected by the drain pan of the unit. The place of the marine a/c unit should be selected so that the condensate drainage resulting from operation should be always ensured. The condensed water collected in the drain pan must be led through the drain discharge (pipeline) to the bilge of the boat possibly directly near to the boat's automatic bilge pump.

If the air conditioner is installed in a place where it is not possible to let the drain water directly into the bilge then it must be collected and pumped out. When installing a drain pump unit do not combine the drain pump's outlet with the outlets of other systems.

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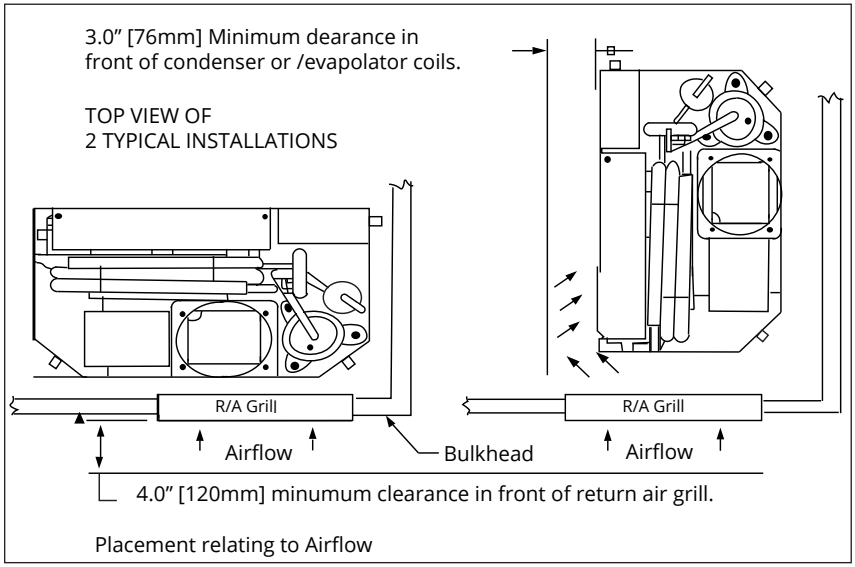
AIR SUPPLY OF THE UNIT

The proper air supply of the unit is essential for the operation of the appliance so when installing the air inlet consider the air volume demand of the certain type and choose the size of the air inlet according to the unit's specifications!

During installation keep a minimum distance of 60mm between the unit and the boat's furniture.

When positioning the unit pay attention to keep the compressor unit as far from the air inlet as possible to minimise noise level. The air conditioning unit may also be placed so that the built-in air inlet is not in the same air chamber with the unit but in this case free air flow must be ensured.

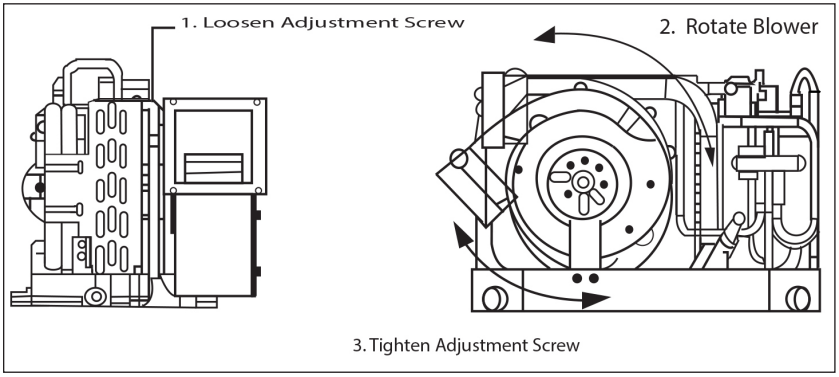


Placement relating to Airflow

WARNING!
Lack of air supply leads to malfunction or even failure of the unit!

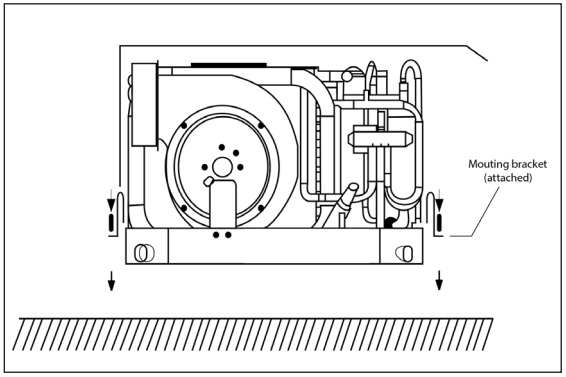
SETTING THE FAN'S AIR OUTLET

Before installation (if necessary) set the fan in the direction which allows the most direct airflow through the air pipes. The air outlet direction of the unit's fan can be adjusted horizontally or vertically. Adjust the air outlet position by loosening the fixing screw and tightly fasten the fixing screw after positioning the outlet to the optimum position. See Figure 3.



MOUNTING THE MARINE A/C UNIT

The basic package of the unit has 4 mounting brackets. During installation - if possible - these should be positioned at equal distance on the edge of the drop pan. If the space available allows you mount the unit so that it is 2 cm higher on one side helping the condensate to drain.



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INSTALLING THE AIR DUCT

Unimpeded air flow is of paramount importance for the system to achieve its proper performance. Always use the right size and quality of air duct with heat and sound insulation designed for air conditioning. During the installation the air duct must be protected from any damage and as far as possible be placed with the smallest branching and bends also built in tensely.

The total length of the air duct must not exceed 4 meters. Systems are sensitive to air reduction, (e.g. from 150/100) which may result reduction of air flow efficiency.

Damaged or clogged air ducts obstruct the airflow, and reducing system of performance. If the airduct is damaged during installation or during subsequent use, it must be repaired or replaced.

WARNING!

Systems are sensitive to air reductions, (e.g. from 150mm to 100mm) which result reduction of air flow efficiency.

During installation, avoid 90°-180° curves on the air duct because the bends are reduce the airflow by 25%)

INSTALLING THE AIR OUTLET

For better efficiency place the unit's air outlets as high as possible in the boat and also set the air vents slats up. By connecting a branched profile it is also possible to connect more air outlets to the unit. When using the branching piece the air distribution must be adjusted beforehand even before the pipes are installed by using the air deflector blade in the section.

WARNING!

The air outlet must not be directed towards the air intake as short circulating cycles can lead to a loss of performance!

THE WATER SYSTEM OF THE UNIT

SAFETY NOTICE!

If you do not have sufficient training to install the water system of the unit consult a qualified boat technician.. In saltwater environment - in case of longer stops - it is recommended to remove seawater from the system. Frost protection should be applied during fresh water use below -5C!

IMPORTANT WARNING!

Sea water pump power consumption cannot exceed nominal 3A Please use less than 3A consumption sea water pump, or install a switch relay.

WARNING! Do not use the system if the sea water below 7 celsius!

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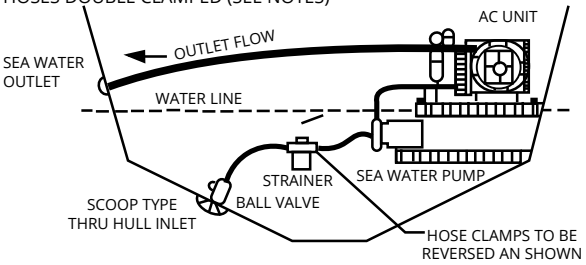
THE WATER SYSTEM OF THE UNIT

Follow the guidelines below to properly install the water system of the marine air conditioner unit.See pictures below:

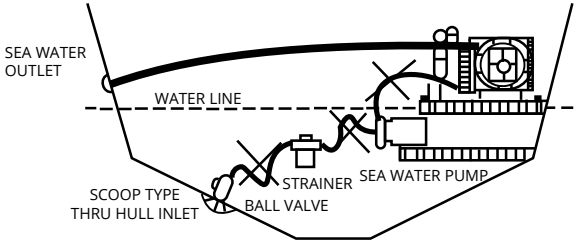
CORRECT

STEADY UPWARD FLOW FROM INLET
TO UNIT THEN DOWNWARD TO OUTLET.
HOSES DOUBLE CLAMPED (SEE NOTES)

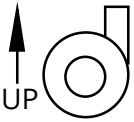


INCORRECT

HOSES MUST NOT HAVE KNIKS,
LOOPS OR HIGH SPOTS WHERE
AIR CAN BE TRAPPED



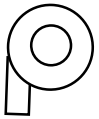
PUMP HEAD ORIENTATION



CORRETCT

CORRECT

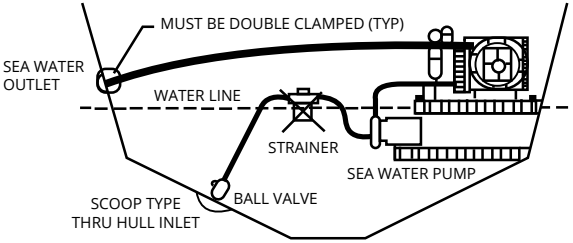
INCORRECT



INCORRECT

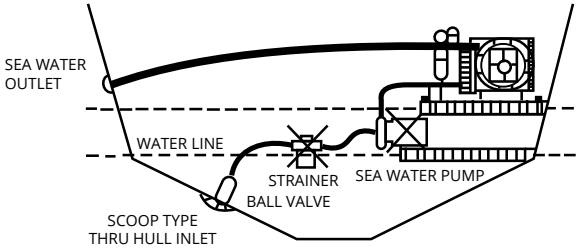
INCORRECT

STRAINER MUST BE BELOW PUMP
HOSES MUST BE DOUBLE CLAMPED



INCORRECT

PUMPS & STRAINER MUST
BE BELOW WATER LINE



SEA WATER PUMP PLACEMENT

The place of the centrifugal pump and the water strainer should be chosen to be at least 30 cm below the waterline. The water pump can be installed horizontally or vertically. The centrifugal pump must be filled with water before first use.!

If a self-priming pump is used, the circulation pump and the water strainer can be placed above the waterline but due to higher noise level preferably in a place where it does not disturb the living space of the boat. (Engine – room, compartments under seating surfaces, etc.)

WATER INLET AND OUTLET PROFILES:

WARNING!

Do not install the water outlet from the water inlet within a distance of 150cm, because short circulating cycles may lead to a decrease in the performance of the device!

SAFETY WARNING!

- The water system must have a direct shut off after the water inlet profile for the event of a malfunction or maintenance. Without a shut-off valve the system is life-threatening!
- Do not share the water supply and water flow of the air conditioning system with other systems (eg toilet, motor)!

The water-inlet must be positioned as deep as possible on the bottom of the boat. For better efficiency it is important to make sure to have the coldest water possible in the condenser. Install the water outlet over the waterline by maximum 150mm. The water drain should not be installed underneath the waterline as then the water circulation cannot be controlled.

WATER PIPES AND WATER STRAINER:

IMPORTANT WARNING:

Do not operate the system without a water strainer! Operation of the system without a water strainer will cause failure of the water pump and later the entire system failure. Replace the plastic case water strainer every 2 years! The water system must be able to be shut down during malfunction or maintenance so without installing a ball valve the system is life-threatening!

For the water piping use a plastic water hose with high-grade steel spiral reinforcement that is resistant to cross-sectional reduction during bending and twisting.

INSTALLATION INSTRUCTIONS FOR THE BUILDING UP OF THE WATER SYSTEM:

- Install the water intake fitting as deeply as possible and as low and close to the keel as possible. It is important to place the water-intake fitting so it can be easily accessible . When drilling the hull, ensure that the drill is of the correct size.
- Seal the inlet with sealant suitable for boats and underwater use. (Follow the instructions of the manufacturer of the sealant!)
- Attach a ball valve to the water inlet fitting and install the bronze hose end on the ball valve. The water system must be able to be shut down therefore without installing a ball valve the system is life-threatening!

- Place the water strainer so that it remains accessible during cleaning following the flow direction on the water strainer.
- Connect the water pipe from the water inlet fitting to the water strainer, from the water strainer to the pump and then to the lower condenser input - marked with an arrow - of the marine a/c unit.
- Connect the water pipe from the condenser outlet to the water outlet fitting.
- Seal the outlet with sealant suitable for boats and underwater use. (Follow the instructions of the manufacturer of the sealant!)
- During the installation of the water piping all kinds of bends, loops and use of 90 ° profiles should be avoided.
- Use thread sealing cord for all metal threaded connections. (Loctite 55)
- Connect a ground wire to the metal parts that come in contact with seawater including the seawater inlet and the air conditioner.
- When putting the boat in water check the sealing of the built-in fittings, connectors and connections.

All metal parts that come into contact with seawater should be connected to the boat's grounding. These include:

- the water inlet access,
- the pump (ground wiring harness)
- the air conditioning.

Before starting the unit, check for possible leaks of the water system!

WARNING!

Each hose connection must be secured with 2 pieces of stainless steel clamps each at 180 degrees!

PART 3. OPERATION - CONTROL

Before starting to operate the device check the entire system as follows:

GENERAL CONTROL:

Check that there are no leaks in the water system.

- Check that the condensate can flow into the bilge; Fill water into the drain pan and check for unhindered water flow to the bilge and water basin. There should not be more than 2-3 cm of water left in the pan.
- Make sure that the air ducts their insulation are properly aligned.
- Make sure that the air duct is clean to avoid damaging of the device.
- Before starting the machine for the first time check that the ball valves on the water system are open.
- Make sure that the unit's compressor does not emit any metallic or vibrating sound when it is switched on. It is important to maintain that the compressor moves free on the rubber beds as these rubber bucks are responsible for absorbing the vibration of the compressor.

ELECTRIC CONTROL:

- Check that the power source meets the rating instructions and the power requirements of the device.
- Check that the current and fuse are properly connected, properly grounded, and that all connections are secure.
- Check the power supply comes to the unit.

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PART 4. OPERATING INSTRUCTIONS

Use the touch buttons on the keypad to set the operating mode, fan speed, and desired temperature. The display also provides information on the operation of the equipment for each operating mode as follows:

 3 way valve is in operation

 ventilator is in operation

 compressor is in operation

 water circulation pump is in operation

You can set the following functions with the touchpad buttons on the keypad:

- with OFF and ON to turn off and on the device
- to acquire the desired temperature
- to select the mode
- to control the fan speed.

OFF and ON
Press and release the button to turn the device on or off.

MODE Selecting
Press MODE to select the desired operating mode:

COOL (cooling) 

HEAT (heating) 

FAN (vent) 

VENTILATOR

Press the button to select automatic or manual fan mode. In manual fan mode by pressing the fan button again will cause the fan speed to be higher first and lower afterwards and then it will return to AUTO mode. In AUTO mode the fan speed is controlled by a microprocessor depending on the difference between the set value and the internal temperature.

UP (∧) Press and release the button to display the set value. Press and hold the UP button to continuously increase the set value. Pressing the button increases the previous value by one step.

DOWN (∨) Press and release the button to display the set value. Press and hold the DOWN button to continuously decrease the set value. Pressing the button reduces the previous value by one step.

WARNING!
Wait at least 10 seconds to switch between each mode because the coolant flowing in the system needs time to return to the normal pressure volume.

PART 5. POWER REQUIREMENTS FOR ALL DC-TYPE AIR CONDITIONERS

POWER REQUIREMENTS FOR ALL DC-TYPE AIR CONDITIONERS

Install a proper fuse (see the pic.)

A separate fuse or circuit breaker must be installed between the AC unit and the power source, so that the unit and cabling will be protected against overload. A “slow blow” ANL type fuse must be used to withstand the starting-up current of the compressor (see the table for fuse sizing). The fuse must be included in the ‘positive cable’, as close to the battery as possible.

Measure the total length of power cable

The total length of the power cable determines the recommended cross section. Please check the correct cable size in the table.

WARNING!

The total cable length is defined as the distance from the positive battery terminal, via fuse, AC unit and all the way back to the negative battery terminal.

Start by measuring the positive cable from the battery terminal to the fuse holder, then from the fuse holder to the ring terminal on the AC unit. Add these two - this is the total length of the positive cable.

Then measure the length of the negative cable, starting from the ring terminal on the AC unit to the negative batter terminal. Add this length to the total length of the positive cable. The result is the total cable length.

If you use a power rail (either negative or both) then the rail length must be included in the total cable length. Also, the rail cross section must be equal or larger than the selected cable cross section.

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Select the correct cable size

Find the recommended power cable cross section by using the measured total cable length and the table shown below, rounding up to the next larger cable size.

Batteries are to be placed as close as possible to the AC unit. It is preferable for the AC unit to have its own battery (bank), independent from the starting and the domestic batteries.

All cables must be properly crimped with a matching terminal. It is acceptable to run multiple parallel cables on both the positive and negative terminal. The cross section is then calculated as the sum of individual cables.

TYPE SDC 24-7000 AND TYPE SDC 48-16000, FUSE 40A

Total cable length		Cable size required	
Meters	feet	mm2	AWG
0-3	0-10	6	10
3-6	10-20	16	6
6-12	20-40	25	4
12-24	40-80	35	2

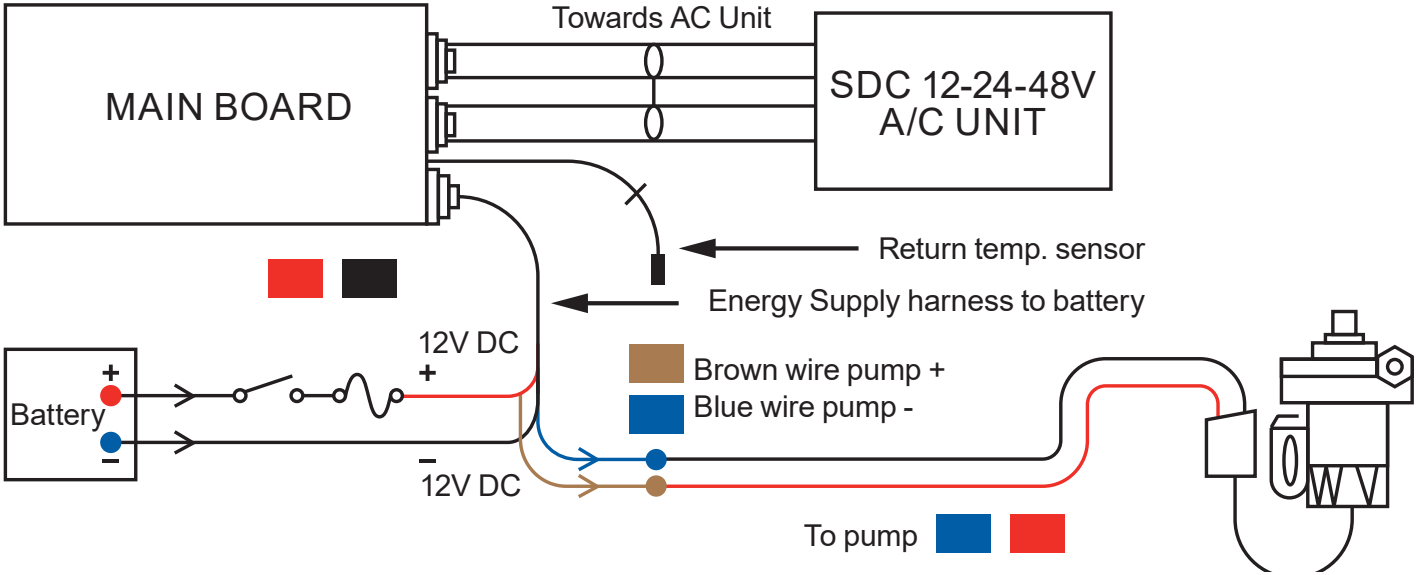
TYPE SDC 12-7000, FUSE 70A

Total cable length		Cable size required	
Meters	feet	mm2	AWG
0-3	0-10	16	6
3-6	10-20	25	4
6-12	20-40	35	2
12-24	40-80	70	2/0

SDC 24-12000, FUSE 60A

Total cable length		Cable size required	
Meters	feet	mm2	AWG
0-3	0-10	10	8
3-6	10-20	16	6
6-12	20-40	35	2
12-24	40-80	50	0

WIRING SHEME (SDC 12-24-48 V AC UNIT)



WARNING!
Check cable size according to AWG diagram
if extended!

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PART 6. TROUBLESHOOTING

The electronic control of the unit detects possible errors and categories them as follows:

- device failure - after trouble-shooting the device will restart automatically.
- system failure - after trouble-shooting the device will restart automatically.
- serious device failure - specialist is needed for troubleshooting.
- serious system failure, - specialist is needed for troubleshooting.

PART 7. ERROR CODES TABLE

ERROR CODE	ERROR DESCRIPTIONS	ISSUE	THREATMENTS	RESUMES
1	Return air temperature sensor error	The temperature sensor is broken	Turn off the system	The device shall restart automatically
2	Evaporator temperature sensor error	The temperature sensor is broken	Turn off the system	The device shall restart automatically
3	Condenser temperature sensor error	The temperature sensor is broken	Turn off the system	After resolving the error, the system restarts automatically
4	Overheated evaporator protection	Compressor stops due to high tempera- ture of radiator, in heating mode	it is normal if the sea water is below 15C	After resolving the system restarts automatically
5	Coolant leak malfunction	Breakage of gas piping	Turn off the system	Do not use the system, contact a technician
6	Error message from main board (based on red light flashing)	All this malfunction are electrical issues		Check the red lights flashes
A	2 short 2 long	Overcurrent protection		Check the correct current on the unit
B	3 short 2 long	Undervoltage protection		Check the correct voltage on the unit
C	4 short 2 long	Overvoltage protection		Check the correct voltage on the unit
D	5 short 2 long	Fail to start compressor		Do not use the system, contact a technician
E	2 short 3 long	Low speed protection		Check the battery supply
F	3 short 3 long	Overload protection		Check the correct voltage on the unit
G	4 short 3 long	Main board overheating protection		After resolving the temp. on main board the unit restarts automatically
8	GAS pressure malfunction	Refrigerant high-pres- sure protection	The compressor turns off	"Check the cooling water flow Check the air flow volume Check the gas in the unit"
9	Evaporator temperature protection	The evaporator is icing	The compressor turns off	After resolving the defrost- ing, the compressor restarts automatically
10	Sea water temperature protection	"- High water temp. in cooling mode - Low water temp. in heating mode"	The compressor turns off	"Increase the cooling water flow Do not use the unit in 7c sea water degree below"
12	Voltage failture	Check the battery voltage	The unit turns off	"check the battery voltage The power cable is too thin Check the connections Check the fuse"
15	Communication failture		Turn off the compressor	"Che ck the LAN cable Replace the main board Replace the display"

PART 8. WARRANTY

NOTE!

Failure to properly ground and connect the unit to the water system or the electrical system and improper installation work will void the warranty.

The product is covered by law for a 2 year warranty period. In the event of a product failure contact our relevant service partner.

PART 9. TECHNICAL DATA

UNIT PARAMETERS		SDC12-7000	SDC24-7000	SDC24-12000	SDC48-16000
Power supply	Ph/V/Hz	DC 12V	DC24V	DC24V	DC48V
COOLING					
Capacity	BTU/hr	7.000	7.000	12.000	16.000
Rated power	kW	0.45	0.56	0.72	0.96
Rated current	A	35	23	30	20
HEATING					
Capacity	BTU/hr	8.000	8.500	13.000	17.000
Rated power	kW	0.54	0.60	0.8	1.2
Rated current	A	45	25	35	25
Seawater flow	m3/h	0.55	0.6	0.9	1.2
Air flow	m3/h	350	350	450	600
Dehumidification	L/h	0.8	1.0	1.2	1.8
Noise level	dB(A)	50	less 50	50	55
Width	mm	400	400	480	500
Height	mm	280	280	300	340
Depth	mm	240	240	285	513
Weight	kg	18	18	23	31
Refrigerant type		R134A	R134A	R134A	R134A
Air duct Diameter	mm	100	100	125	150
Sea water pipe Diameter	mm	16	16	16	16

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CE MANUFACTURER'S DECLARATION OF CONFORMITY

Name and address of manufacturer:
MBC Marine Ltd., Vízesés st. 8/A Budapest, 1028
08 November 2019.

We hereby certify that the designing and manufacturing of

Marine air conditioning units

were performed in accordance with the following specifications of the following standards:

EN 55014-1 2011/65/EC (RoHS), EN 55022, EN 55024,, EN 61000, EN 60950-1, EN 301 489-1, EN 301 489-18.

According to the above, the product :
Marine air conditioner: **SDC12/07 - SDC24/07 - SDC24/12 - SDC48/16**
CONFORMS

to the specifications of standards and directives and to the conditions of healthy and safe use indicated below:

NUMBER, ABBREVIATED NAME OF DIRECTIVE	TITLE
EN 55014-1	Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Part 1: Emission
EN 61000-3-2	Electromagnetic compatibility (EMC). Part 3-2: Limits. Limits for harmonic current emissions (equipment input current ≤16 A per phase).
EN 61000-3-3	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection
IEC 61000-4/2/3/4/5/6/11	Electrostatic discharge, radiated electromagnetic field, electrical fast transients, surge immunity, conducted disturbances, voltage dips immunity.
2011/65/EC (RoHS)	Use of certain hazardous substances in electrical and electronic equipment

Manufactured and marketed fixture conform to the specifications indicated above as the following:

PRODUCT FEATURES	RESULT	TESTING/EVALUATION METHOD
Disturbance power emission	Pass	EN 55014-1
Harmonic current emission	Pass	EN 61000-3-2:2006 + A1: 2009 +A2:2009
Voltage fluctuations and flicker	Pass	EN 61000-3-3:2008
Electrostatic discharge, radiated electromagnetic field, electrical fast transients, surge immunity, conducted disturbances, voltage dips immunity.	Pass	IEC 61000-4-2/3/4/5/6/11
Hazardous substances contents	Pass	Chemical quantitative analysis

These directives apply to full compliance with the installation and operating instructions issued by MBC Marine.

The data here in above are verified by:
MBC Marine Ltd., Vízesés str. 8/A., Budapest, 1028

Last two digits of the year of CE marking: **19**

MBC MARINE KFT.
1028 Budapest
Vízesés u. 8/A
Executive Director

CE