

INSTALLATION AND USER MANUAL

SELF-CONTAINED INVERTER SYSTEMS

Variable-speed (inverter) compressor.
Reverse-cycle cooling and heating · 230 V 50–60 Hz.

VSC 08 · VSC 13 · VSC 16 · VSC 24

VERSION 2.1 · OCTOBER 2026 · EN

VSC



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About this manual

Thank you for choosing MBC Marine

This manual covers the installation, commissioning, operation, maintenance and troubleshooting of MBC Marine **VSC** self-contained marine air conditioning units with inverter (variable-speed) compressor (230 V, single phase). Keep it on board, close to the unit, for the whole life of the system.

WHO SHOULD READ WHAT

Reader	Read these parts
Boat owner / user OWNER	Part 1 Safety · Part 9 Operation · Part 10 Maintenance · 11.2 First checks
Installer INSTALLER	All parts, especially Parts 3–8. Hand this manual to the owner after commissioning.
Service technician TECHNICIAN	Parts 7, 9.5, 10.2 and 11. Refrigerant work requires certification (1.6).

Section headings carry the same coloured tags, so each reader can find the parts relevant to them at a glance.

SAFETY SIGNS USED IN THIS MANUAL



WARNING

A hazardous situation which, if not avoided, **could result in death or serious injury**.



CAUTION

A hazardous situation which, if not avoided, **could result in minor or moderate injury**.



NOTICE

Information about **damage to the unit or the boat**, or loss of performance or warranty. No personal injury risk.



NOTE

Useful information and tips for correct installation and operation.

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PART 1

Safety

Read this part completely before installing, operating or servicing the unit. Ignoring these instructions may result in death, serious injury, fire or damage to the boat.

1.1 Intended use **OWNER** **INSTALLER**

The unit is designed exclusively for cooling, heating and ventilating the interior of boats, using seawater as the heat source and heat sink. Any other use is considered improper. Use the unit only within the operating limits in 2.6 and according to this manual.

1.2 Qualified personnel **INSTALLER**

Installation, electrical connection and commissioning must be carried out only by qualified personnel familiar with marine electrical and plumbing practice and with the applicable regulations. Work on the refrigerant circuit is reserved for technicians certified for flammable (A2L) refrigerants. A professional installation according to this manual is a condition of the warranty.

1.3 Electrical safety **OWNER** **INSTALLER**



WARNING – ELECTRIC SHOCK

Parts of the unit carry 230 V AC. Before opening the electrical box or the unit, switch off the power at the main switchboard or the shore power source and secure it against being switched on again. Contact with live parts can be fatal. Inverter capacitors stay charged for some minutes after switching off.

- Earth (ground) the unit correctly; use the yellow-green conductor only as protective earth.
- Protect the unit with its own circuit breaker and a 30 mA residual current device (RCD).
- Do not operate the unit with the electrical box cover removed.

1.4 Fire, fuel and exhaust gases **OWNER**

INSTALLER



WARNING

Do not install the unit in the engine room, in the bilge, or in any compartment containing petrol engines, fuel tanks, LPG/CNG cylinders, regulators, valves, fuel lines or fittings. The unit must not be able to draw carbon monoxide, exhaust gases or other toxic vapours into the cabin.

During installation and maintenance wear safety glasses and work gloves, and keep a fire extinguisher close to the work area.

1.5 Limitation of liability **OWNER** **INSTALLER**

MBC Marine assumes no liability for damage resulting from:

- incorrect installation or connection;
- mechanical impact or overvoltage;
- modification of the product without written permission from MBC Marine;
- use outside the intended purpose or the specified operating limits.

1.6 Refrigerant R32 (mildly flammable) **OWNER**

TECHNICIAN



WARNING – FLAMMABLE REFRIGERANT

- The unit contains R32 refrigerant (safety class A2L, mildly flammable).
- Do not pierce, cut, drill or burn any part of the refrigerant circuit.
- Keep ignition sources (open flames, operating gas appliances, electric heaters, sparks) away from the unit.
- If you notice a refrigerant leak (oily residue, hissing, ERROR 5): switch the unit off, ventilate the cabin, avoid ignition sources and call a qualified technician.
- Only certified technicians may open the refrigerant circuit. Brazing is allowed only after the refrigerant has been recovered and the circuit has been purged with nitrogen.

PART 2

Product overview

2.1 Models covered OWNER INSTALLER

VSC units are self-contained, reverse-cycle air conditioners: compressor, condenser, evaporator and blower are mounted on one base tray, with a separate electrical box. The inverter-driven compressor adjusts its speed to the actual demand.

Model	Cooling	Heating	Duct
VSC 08	8 000 Btu/h	8 700 Btu/h	125 mm
VSC 13	13 000 Btu/h	13 800 Btu/h	125 mm
VSC 16	16 000 Btu/h	17 600 Btu/h	150 mm
VSC 24	24 000 Btu/h	26 400 Btu/h	200 mm

Full technical data: Part 12.



VSC unit with electrical box



Unit, display and mounting brackets



Blower side with flange



Shipping box

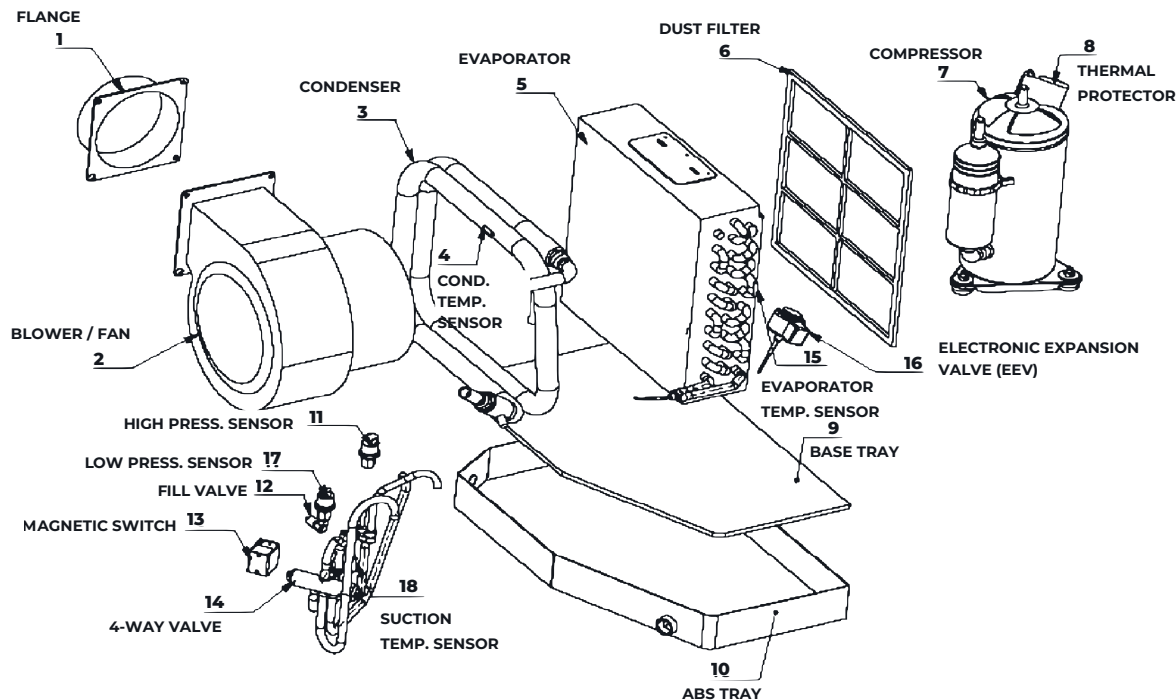
2.2 Package contents INSTALLER

Before starting, check that the shipping box and the unit are undamaged. Do not install a damaged product. The package contains:

Qty	Item	Purpose
1	Air conditioning unit with electrical box	–
1	Display CD-3 (control panel)	User control
1	LAN data cable, 5 m	Display ↔ control board
1	Room temperature sensor, 5 m cable	Connects to the AII (white) socket
4	L-shaped mounting brackets	Securing the unit

If any item is missing or damaged, do not start the installation; contact your distributor or MBC Marine.

2.3 Main components INSTALLER TECHNICIAN



VSC unit – exploded view. 1 Flange · 2 Blower · 3 Condenser · 4 Condenser temperature sensor · 5 Evaporator · 6 Dust (air) filter · 7 Compressor · 8 Compressor thermal protector · 9 Base tray · 10 ABS tray · 11 High-pressure sensor · 12 Service (fill) valve · 13 Magnetic switch (valve coil) · 14 4-way (reversing) valve · 15 Evaporator temperature sensor · 16 Electronic expansion valve (EEV) · 17 Low-pressure sensor · 18 Suction temperature sensor

2.4 How the system works

OWNER

INSTALLER

The unit relies on the balance of three circuits. A fault in any of them reduces performance or triggers a protective shutdown:

- ❶ **Seawater circuit** – carries heat away from (cooling) or to (heating) the condenser. Without proper water flow the compressor overheats.
- ❷ **Air circuit** – circulates cabin air through the evaporator. Insufficient airflow can freeze the evaporator (cooling) or overheat it (heating).
- ❸ **Electrical system** – power supply, inverter, control, communication and safety circuits. Faults can damage the electronics or prevent the unit from starting.

In COOL mode the unit moves heat from the cabin into the seawater. In HEAT mode the reversing valve reverses the cycle and the unit extracts heat from the seawater and releases it into the cabin (reverse-cycle heating).

2.5 Inverter technology

OWNER

INSTALLER

The inverter continuously adjusts the compressor speed (factory setting 25–60 Hz) to the cooling or heating demand, instead of switching the compressor on and off. This gives:

- **Stable cabin temperature** – output is raised or lowered gradually, without sudden swings.
- **Lower energy consumption** – the unit uses only as much power as the demand requires.
- **Quieter operation and longer life** – no full-power starts, less mechanical stress.
- **Better adaptation to seawater temperature** – as the seawater warms up or cools down, the compressor speed follows automatically.

The compressor speed limits can be adjusted by a technician (9.6).

2.6 Operating limits

OWNER

INSTALLER

The limits refer to the seawater temperature at the unit's seawater inlet, assuming correct installation, continuous water flow, free air circulation and a clean filter.

Mode	Seawater temperature at inlet
COOL	below 32 °C
HEAT	7 °C – 18 °C

- **Cooling:** do not operate at seawater temperatures of 32 °C or above. High seawater temperature or low water flow reduces performance even below this limit and can cause a protective shutdown.
- **Heating:** use HEAT mode only between 7 °C and 18 °C seawater temperature. Below 7 °C there is not enough heat in the water; above 18 °C heating is rarely needed.



NOTICE

Operation outside these limits may reduce performance, cause protective shutdowns (e.g. ERROR 8, 9, 10) and is excluded from warranty.

PART 3

Planning the installation

3.1 Before you start INSTALLER

No two boats are the same. Do not copy the installation of another boat: the correct set-up depends on the specific vessel. Most problems reported in the field are not caused by the unit but by installation faults such as wrong tilt, poor ventilation, a clogged filter or undersized ducting. Proper installation according to this manual is a condition of the warranty.



NOTICE

Start the installation only when every component location complies with the applicable regulations. Plan enough free space for installation and later maintenance.

3.2 Choosing the location INSTALLER

REQUIREMENTS

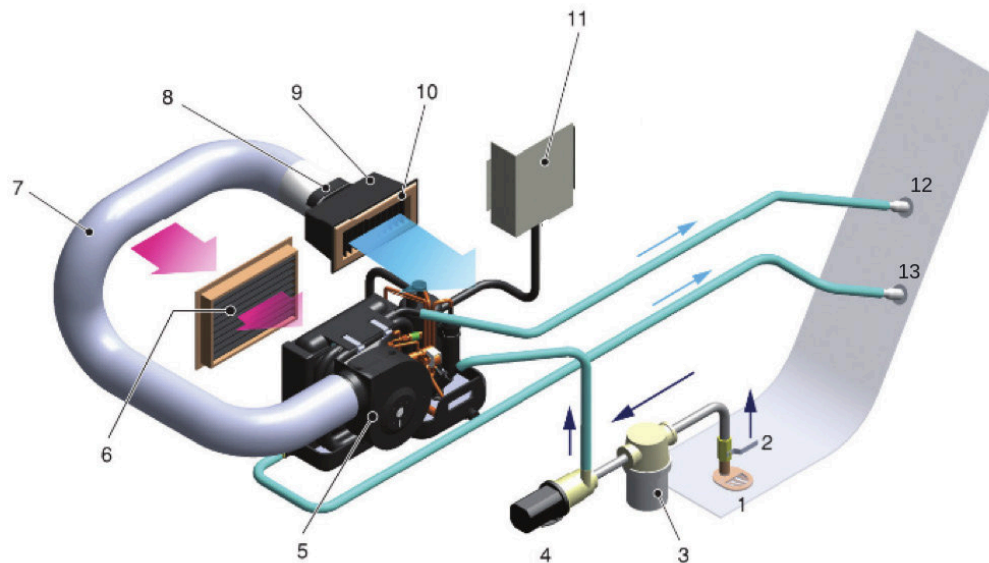
- Dry, well-ventilated enclosed space, protected from heat sources and exhaust gases.
- Stable, level, horizontal base, at least **60 mm** free space on all sides for airflow.

- Return air grille and air filter easily accessible for cleaning; do not install the unit in closed furniture that is difficult to dismantle.
- Compressor side placed as far as possible from the return air opening, to reduce noise.
- Room for the electrical box on a dry, well-ventilated surface within cable reach. The inverter needs cooling air: keep at least 10 cm free around the box.
- Possible condensate drain route to the bilge (see 4.2).

AVOID

- Engine room, machinery spaces, bilge (see 1.4).
- Directly next to ventilation ducts.
- Wet or damp floor areas.
- Paths of exhaust fumes or carbon monoxide.
- Tight, closed or poorly ventilated compartments.

3.3 Typical installation **INSTALLER**



1. Scoop-type thru-hull fitting
2. Ball valve (seacock)
3. Seawater strainer
4. Seawater pump

5. Air conditioning unit
6. Return air grille
7. Flexible duct
8. Duct ring

9. Transition box
10. Supply air grille
11. Electrical box
12. Seawater outlet (overboard)

13. Condensate drain outlet

PART 4

Mounting the unit

4.1 Mounting INSTALLER

- 1 Place the unit on a stable, horizontal surface with at least 60 mm clearance on all sides.
- 2 Tilt the unit **1–2 cm towards the condensate drain** so that the drain pan empties completely.
- 3 Secure the unit along the edge of the tray with the 4 brackets supplied. Tighten firmly but not excessively.
- 4 Mount the electrical box on a dry, well-ventilated surface, ideally in the return air path, with at least 10 cm free space for cooling.

4.2 Condensate drain INSTALLER

In COOL mode the unit produces condensate, collected in the drain pan. Route the drain hose (DN20) with a continuous fall to the bilge, ideally close to the automatic bilge pump. Where direct drainage is not possible, collect the condensate and pump it out with a dedicated drain pump. The drain route depends on the boat and is not part of the standard unit.



NOTICE

- Do not connect the drain pump outlet to the discharge line of any other system.
- Never route the drain to an area where water cannot be collected or pumped out.

Drain test: after installation pour 2–3 litres of water into the drain pan and check that it drains freely, without backflow or leaks.

4.3 Display (control panel) INSTALLER

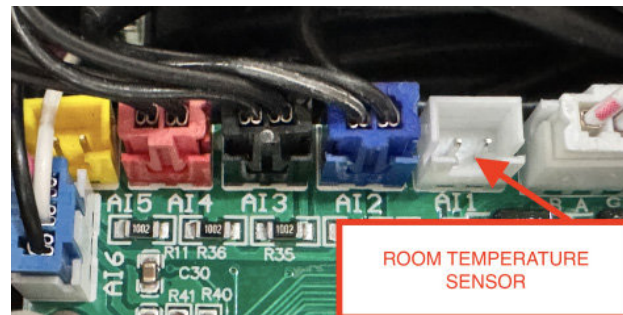
Install the display (type CD-3; a smart display is available as an option) on an easily accessible wall, above the mid-height of the cabin, protected from heat and light. Do not install it:

- in direct sunlight or near heat-producing appliances;
- on partition walls with heat accumulating behind them;
- directly above or below supply or return air grilles.

Connect the display to the control board with the 5 m LAN cable supplied.

4.4 Room temperature sensor INSTALLER

The display has a built-in sensor, but for accurate cabin temperature control **always install the supplied room temperature sensor** (5 m cable). Place it in the return air stream, away from supply air and heat sources. Connect it to the **AI1 (white)** socket on the control board.



Room temperature sensor on the AI1 (white) socket of the control board

PART 5

Air system



NOTICE

Insufficient airflow is the most common cause of malfunction. Even a 30–40 % airflow loss can cause performance problems and error codes (ERROR 4 in heating, ERROR 9 in cooling).

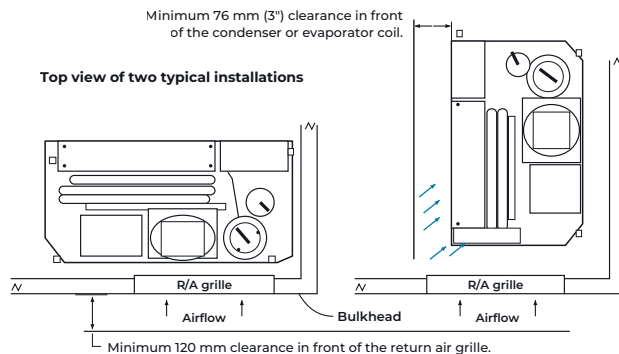
5.1 Return air INSTALLER

The unit draws cabin air in through the return grille, passes it over the evaporator and blows it out through the supply side. Size the return grille at least as large as the value in table 5.4. A grille that is too small restricts airflow and may freeze the evaporator (ERROR 9) or overload the compressor.



NOTICE

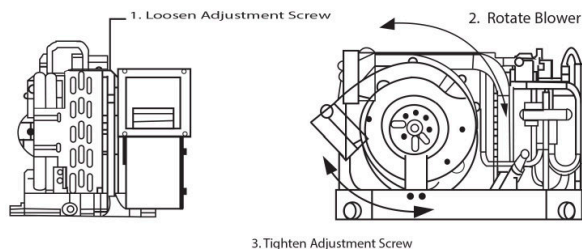
The unit does not need to be installed directly against the return air grille. Maintain a minimum 60 mm (2.4") clearance around the unit to ensure adequate airflow.



Return air: keep the minimum clearance in front of the coil and the return air grille.

5.2 Blower orientation INSTALLER

Before installation, turn the blower outlet to the position that gives the most direct route to the supply duct. Loosen the fixing screw, rotate the blower horizontally or vertically, then tighten the screw firmly.



1 Loosen the adjustment screw · 2 Rotate the blower · 3 Tighten the screw

5.3 Supply air and ducting **INSTALLER**

- Use thermally and acoustically insulated duct of the diameter given in table 5.4. Never reduce the duct diameter (e.g. a 150 mm outlet must not be reduced to 100 mm).
- Keep the total duct length below 4 m. Avoid 90° and sharp bends: each can reduce airflow by up to 25 %.
- Install ducts taut, without kinks or creases, and make sure furniture cannot compress them later. Repair or replace a damaged duct.
- Install supply grilles as high as possible in the cabin, because cold air sinks.
- Do not point the supply louvres towards the return grille: this short-circuits the air and reduces performance.
- Avoid undersized grilles, closed louvres or narrow branches: the fan cannot push enough air, the

evaporator can freeze in cooling (ERROR 9) or overheat in heating (ERROR 4).



Incorrect installation: uninsulated duct, reduced diameter, excessive length and sharp bends, creased and compressed duct.
Consequences: reduced performance, frequent shutdowns and error codes, shorter service life.

5.4 Air system sizing per model INSTALLER

	VSC 08	VSC 13	VSC 16	VSC 24
Supply duct diameter (mm)	125	125	150	200
Min. return air grille, nominal size (mm)	250×250	250×250	300×250	250×350
Min. supply air grilles, nominal size (mm)	200×100	2 × 200×100	2 × 150×250	3 × 250×150
Airflow high / medium / low (m³/h)	420 / 350 / 280	580 / 495 / 410	730 / 610 / 520	1200 / 1080 / 900
Max. total duct length	4 m	4 m	4 m	4 m

Grille sizes are factory-specified minimum nominal sizes. Where several supply grilles are given (e.g. 2 × 200×100), each supply duct ends in its own grille of at least this size. Larger grilles are always acceptable; smaller ones restrict airflow.

PART 6

Seawater system

The seawater circuit removes heat from the condenser (cooling) or supplies heat to it (heating). Insufficient flow leads to compressor overheating, error codes (ERROR 6, 8, 10) and shutdown. The circuit must be unobstructed, continuous and free of air. Required flow per model: Part 12.

6.1 Component order **INSTALLER**

- ❶ Scoop-type thru-hull fitting
- ❷ Ball valve (seacock), directly on the fitting
- ❸ Seawater strainer
- ❹ Seawater pump
- ❺ Condenser inlet of the unit
- ❻ Condenser outlet → overboard fitting



NOTICE

Do not share the seawater circuit with other systems (e.g. toilet or engine cooling). This causes flow problems and error codes.

6.2 Seawater intake **INSTALLER**

Fit the scoop-type intake on the lower part of the hull, preferably near the keel, facing forward. The deeper the

intake, the cooler the water. Mount the ball valve directly on the intake. Where possible, use a combined scoop strainer to keep the distance to the pump short.



WARNING

The seawater circuit must be closable during malfunction or maintenance. Operating without a ball valve (seacock) is a flooding hazard and may endanger life.

6.3 Pump and strainer **INSTALLER**

- Install the pump (magnetic drive, centrifugal) and the strainer **30–50 cm below the waterline**, so that they fill by gravity. A centrifugal pump cannot self-prime.
- Keep the strainer close to the pump. Orient the pump head so that the outlet points upwards (see figure 6.7).
- Install the strainer where it is easy to open and inspect. Its transparent bowl must be intact.
- All suction-side components (thru-hull, valve, strainer, pump) must be airtight.
- Pump size: the pump must deliver at least the required seawater flow of the unit (Part 12: 10–30 l/min) against the

losses of the actual installation (hose length, fittings, strainer, height difference). Use one pump per unit.



NOTICE

Never operate the system without a strainer: debris destroys the pump and can lead to complete system failure. MBC Marine is not responsible for failures caused by an incorrectly installed or operated seawater pump.

6.4 Hoses **INSTALLER**

- Use only spiral-reinforced, pressure-resistant hose that does not collapse when bent.
- Route the hose with a continuous rise from the pump to the condenser inlet: no loops, high points or sharp bends where air can be trapped.
- Hose inner diameter: at least the size of the condenser connection, 5/8" (16 mm), on the whole circuit. Keep the hoses as short as possible.
- Double-clamp all hose connections. Seal threads with marine-grade sealant (e.g. Loctite 55 or Sika 291i).

6.5 Seawater outlet **INSTALLER**

Install the overboard outlet above the waterline, at most 150 mm above it, so the flow can be checked visually. Keep it at least 150 cm from the intake, so the system does not draw in its own warm discharge water.

6.6 Galvanic protection and bonding

INSTALLER

Connect all metal parts in contact with seawater (intake fitting, pump, unit base tray) to the boat's bonding system. Install a zinc or aluminium sacrificial anode upstream of the pump to protect the condenser and pump from electrolytic corrosion.



NOTICE

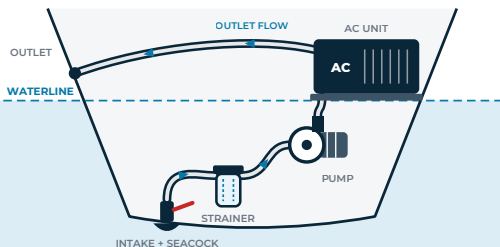
MBC Marine assumes no liability for damage caused by electrolysis or corrosion if no sacrificial anode or bonding is installed. Galvanic corrosion of the condenser is excluded from warranty.

6.7 Correct and incorrect seawater installation INSTALLER



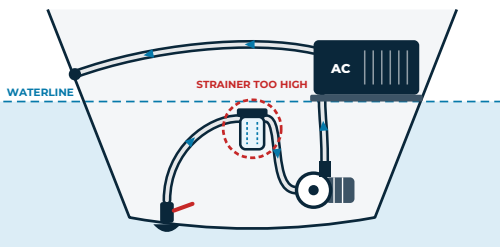
CORRECT

Steady rise from intake to unit, then down to the outlet. Pump and strainer below waterline.



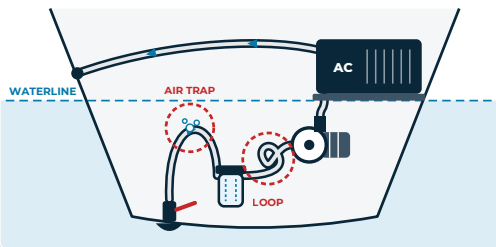
INCORRECT

The strainer must not be higher than the pump. Keep it low and close to it.



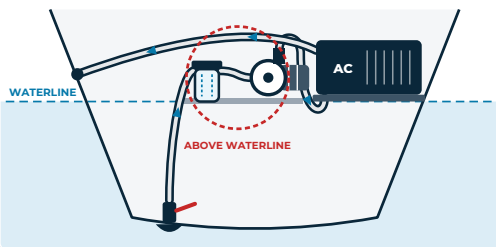
INCORRECT

Loops, kinks or high points in the hose trap air and stop the flow.



INCORRECT

Pump and strainer above the waterline: the pump cannot fill and runs dry.



PUMP HEAD ORIENTATION



Outlet pointing up
Air escapes, pump primes



Outlet sideways
Air stays in the pump



Outlet pointing down
Air stays in the pump

Correct: steady rise from inlet to unit, then down to the outlet; strainer and pump below the waterline; hoses double-clamped. Incorrect: loops or high points that trap air, strainer above the pump, pump or strainer above the waterline.

6.8 Seawater system checklist INSTALLER

- ☐ All connections and threads sealed with marine-grade sealant; hoses double-clamped.
- ☐ Ball valve fully operable and easily accessible.
- ☐ Strainer accessible, clean, bowl intact.
- ☐ Pump and strainer 30–50 cm below the waterline; pump outlet pointing up.
- ☐ Suction side airtight; hose rising continuously to the unit.
- ☐ Outlet above the waterline (max. 150 mm), at least 150 cm from the intake.
- ☐ All wetted metal parts bonded; sacrificial anode installed.
- ☐ Before first start: no leaks, clean strainer, sufficient water flow at the outlet.



NOTE

If you do not have sufficient training to install the seawater system, consult a qualified boat technician.

6.9 Checking the seawater flow INSTALLER TECHNICIAN

Check the flow at commissioning and whenever ERROR 8 or ERROR 10 appears, or the inverter shows blink code 1, 2, 5 or 13 (11.5). Use either method with the unit running in COOL mode:

- **Volume method:** collect the water from the overboard outlet in a measuring container and time it. Flow (l/min) = litres × 60 ÷ seconds. Example: 10 litres in 30 seconds = 20 l/min.
- **Temperature method:** after 10–15 minutes of operation, measure the water temperature at the strainer and at the overboard outlet. At the required flow the outlet is about 4–5 °C warmer. A difference above 8 °C means the flow is roughly half of the required value or less.

Compare the result with the required flow in Part 12. If it is too low, check the strainer, the intake, the pump (air lock) and the hose routing.

PART 7

Electrical installation



WARNING – ELECTRIC SHOCK

Disconnect all power before working on the electrical installation. Only qualified electricians may connect the unit.

7.1 Electrical requirements INSTALLER

- Supply: 230 V, 1 phase, 50/60 Hz, stable. Operating range at the unit terminals under load: 220–240 V. Current draw per model: see Part 12.
- Cable cross-section: min. $3 \times 1.5 \text{ mm}^2$; choose it by model and cable length (table 7.7).
- A dedicated circuit breaker for the unit only (minimum rating per model: see Part 12), plus a 30 mA RCD.
- Protective earth is mandatory. Use the yellow-green conductor only as earth, never as neutral.
- Fit ferrules on all stranded cable ends connected to the terminal block.
- Keep the LAN and sensor cables away from 230 V cables to avoid interference.



NOTICE

Undersized wiring or loose connections cause overheating and contact failures and can damage the control board, the inverter or the compressor.

7.2 Terminal block INSTALLER

Terminal (from left)	Function
HEAT	Not used – leave unconnected
P1	Seawater pump – PHASE output
P0	Seawater pump – NEUTRAL output
L0	Shore power – NEUTRAL input
L1	Shore power – PHASE input
E	EARTH – shore power and pump (mandatory)

The seawater pump is powered and switched by the control board through P1/P0 (230 V). Its behaviour is set by DIP switch SW5 (see 7.5).

7.4 Display, sensors and connectors INSTALLER

TECHNICIAN

Connector on control board	Connects to
LAN socket (RJ45)	Display, via 5 m LAN cable
AI1 – white	Room / return air temperature sensor
Blue	Evaporator temperature sensor (factory fitted)
Black	Condenser temperature sensor (factory fitted)
Red	Suction temperature sensor (item 18, factory fitted)

The control board communicates with the inverter driver board through an internal cable (factory fitted). A red LED on the control board shows the inverter status (11.5).

Switch	OFF	ON
SW3 – after power failure	Unit stays off	Restores last operating state
SW4 – evaporator & condenser sensors	Sensors active	Sensor functions disabled
SW5 – seawater pump	Switches on/off with the compressor	Runs continuously after start
SW6 – ventilation (FAN) mode	Available	Not available

7.5 DIP switch settings INSTALLER TECHNICIAN



NOTICE

Change DIP switches only with the power switched off, and only if you understand the effect. Incorrect settings may cause malfunction or reduced performance.

SW1	SW2	Operating mode
OFF	ON	Cooling and heating (factory setting)
ON	ON	Cooling only

Factory setting	SW1	SW2	SW3	SW4	SW5	SW6
VSC	OFF	ON	ON	OFF	OFF	OFF



DIP switch block SW1–SW6 on the control board

7.6 Electrical checklist INSTALLER

- ☐ Supply voltage 230 V and stable; cable cross-sections correct.
- ☐ Shore power phase on L1, neutral on L0.
- ☐ Pump phase on P1, neutral on P0.
- ☐ Earth of shore power and pump connected to E.
- ☐ All terminals tight, ferrules fitted, no damaged insulation.
- ☐ Dedicated circuit breaker and 30 mA RCD installed.
- ☐ Electrical box in a dry, well-ventilated place with 10 cm free space, cover closed.
- ☐ Display connected with the LAN cable and communicating.
- ☐ Room temperature sensor connected to AI1 (white).
- ☐ DIP switches at the correct setting for the installation.

7.7 Cable sizing INSTALLER

Maximum one-way cable length from the switchboard to the unit for a voltage drop of 3 % (copper, 230 V, maximum heating current from Part 12):

Model	3 × 1.5 mm ²	3 × 2.5 mm ²
VSC 08	> 100 m	> 100 m
VSC 13	100 m	> 100 m
VSC 16	80 m	> 100 m
VSC 24	55 m	90 m

Use the next larger cross-section for longer runs. The cable must also be rated for the circuit breaker current and suitable for marine use (tinned, multi-strand).



NOTICE

A long or thin supply cable lowers the voltage at compressor start and causes inverter faults (blink codes 3, 7, 12). Measure the voltage at the terminals under load: min. 210 V.

PART 8

Commissioning (first start-up)

8.1 Before switching on **INSTALLER**

- ☐ Seawater and electrical checklists (6.8, 7.6) completed; drain test done (4.2).
- ☐ Air filter fitted; all grilles open and unobstructed.
- ☐ Seacock open; strainer clean and filled with water.
- ☐ No tools or packaging left inside the unit or the electrical box; covers closed.

8.2 First start **INSTALLER**

- 1** Open the seacock. Make sure the pump and hoses are filled with water and free of air (gravity filling).
- 2** Switch on the circuit breaker. The display shows the start screen; tap it to open the main screen.
- 3** Select COOL mode (or HEAT, depending on the seawater temperature) and a set temperature well below (or above) the cabin temperature.
- 4** Within a short time check a steady water flow from the overboard outlet. **No flow? Switch off immediately** and vent the pump.
- 5** Check airflow at every supply grille at all fan speeds.
- 6** After 10–15 minutes of operation check that the supply air is clearly cooler (or warmer) than the return air, and

that no error code is shown. The status screens (9.4) show temperatures, compressor speed and supply voltage.

- 7** Measure the supply voltage at the unit terminals with the compressor running: it must stay within 220–240 V.
- 8** Check all water connections and the drain for leaks.

8.3 Handover to the owner **INSTALLER**

- Explain basic operation (Part 9), the operating limits (2.6) and the owner maintenance tasks (10.1).
- Show the seacock, the strainer, the air filter and the circuit breaker.
- Fill in and sign the commissioning and handover record (8.4) together with the owner, and start the maintenance log (10.5).
- Hand over this manual and register the product at www.mbc-marine.com (2-year warranty for registered units installed by an MBC partner, see Part 13).

8.4 Commissioning and handover record INSTALLER OWNER

Fill in at the first start, sign together with the owner and keep a copy with this manual. A copy also serves as proof of professional installation for the warranty registration (Part 13).

Boat name / hull no.

Unit model / serial no.

Display type (CD-3 / smart display)

Installer company

Date of first start

Measured at first start	Value
Supply voltage under load	V
Running current, cooling / heating	A
Seawater flow (6.9)	l/min
Seawater in / overboard outlet	°C
Return air / supply air, cooling	°C
Return air / supply air, heating	°C

- ☐ Unit level and secured, at least 60 mm free space around it (3.2, Part 4)
- ☐ Condensate drain routed and tested (4.2)
- ☐ Ducts and grilles sized per table 5.4; air filter fitted
- ☐ Seacock, strainer and pump below the waterline, no loops (Part 6)
- ☐ Breaker, RCD, cable size (7.7) and earth (PE) checked
- ☐ DIP switches set as required (7.5)
- ☐ Cooling and heating tested; no error code after the test run
- ☐ Owner instructed (8.3); manual and maintenance log handed over

Installer – name and signature

Owner – name and signature

PART 9

Operation

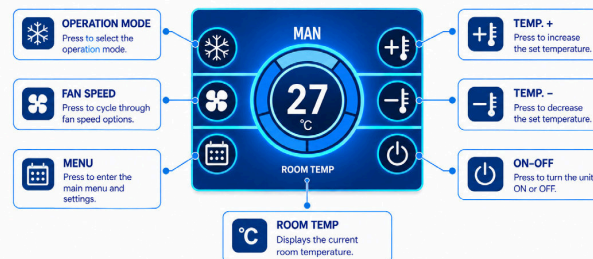
9.1 Control panel OWNER

The display is a touch screen. After power-on it shows the MBC Marine start (sleep) screen with the room temperature: tap the screen to open the main screen, which gives access to all everyday functions.

Button	Function
ON/OFF	Switches the unit on or off
MODE	Selects the operating mode: Cool / Heat / Fan (Fan only if enabled with SW6)
TEMP + / -	Raises / lowers the set temperature; the set value is shown while you press
FAN	Cycles through the fan speeds
MENU	Opens the status screens and settings

DISPLAY OVERVIEW

The main display provides quick access to all primary functions and operating information.



Main screen

14 °C



Start (sleep) screen

9.2 Everyday use **OWNER**

- 1 Make sure the seacock is open and the circuit breaker is on.
- 2 Tap the screen, then press ON/OFF to switch the unit on.
- 3 Press MODE to select COOL, HEAT or FAN (ventilation only).
- 4 Set the desired temperature with TEMP + / -.
- 5 Press FAN to choose the fan speed.



NOTICE

Wait at least 5 seconds before switching between COOL and HEAT, so that the refrigerant pressures can equalise.

- After a power failure the unit restarts in its last state or stays off, depending on DIP switch SW3.

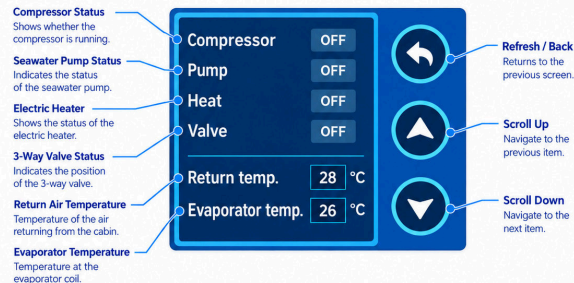
9.3 Tips for comfort and efficiency **OWNER**

- Keep hatches, windows and doors closed while cooling or heating.
- Choose a moderate set temperature; the inverter then runs quietly at low speed.
- Use a higher fan speed in hot, humid conditions; this also prevents evaporator icing.
- Keep the return and supply grilles free; do not cover them with cushions or curtains.
- Clean the air filter regularly (Part 10).

9.4 Status screens OWNER TECHNICIAN

SYSTEM STATUS SCREEN

This screen provides real-time information about the system status and key operating parameters.



Compressor Status
Shows whether the compressor is running.

Seawater Pump Status
Indicates the status of the seawater pump.

Electric Heater
Shows the status of the electric heater.

3-Way Valve Status
Indicates the position of the 3-way valve.

Return Air Temperature
Temperature of the air returning from the cabin.

Evaporator Temperature
Temperature at the evaporator coil.

Compressor OFF

Pump OFF

Heat OFF

Valve OFF

Return temp. 28 °C

Evaporator temp. 26 °C

Refresh / Back
Returns to the previous screen.

Scroll Up
Navigate to the previous item.

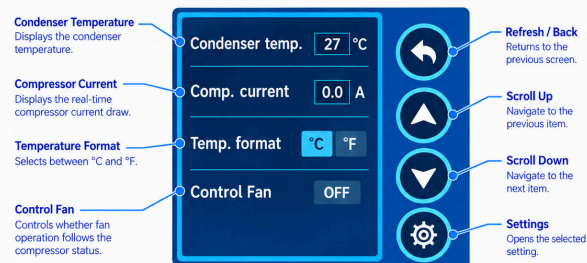
Scroll Down
Navigate to the next item.

PARAMETER	EXPLANATION
 COMPRESSOR	Indicates the current operational status of the compressor. OFF: The compressor is not running; no active cooling or heating is taking place. ON: The compressor is running, and the refrigerant is circulating in the system.
 PUMP	Indicates seawater pump status. OFF: No seawater flow – system cannot cool or heat. ON: Seawater is circulating. Note: Continuous pump operation is required for safe performance.
 HEAT	This function applies only to units equipped with electric heating. Electric heating is not available on VSC models.
 VALVE	Indicates the status of the 3-way valve. OFF: in cooling mode, ON: in heating mode.
 RETURN TEMP.	Temperature of air returning from the cabin.
 EVAPORATOR TEMP.	Temperature at the evaporator coil, approximately equal to the air temperature of the fan air.

NOTE
The values shown are for reference only and may vary depending on operating conditions.

SYSTEM PARAMETERS SCREEN

This screen displays additional operating values and system configuration options.



Condenser Temperature
Displays the condenser temperature.

Compressor Current
Displays the real-time compressor current draw.

Temperature Format
Selects between °C and °F.

Control Fan
Controls whether fan operation follows the compressor status.

Condenser temp. 27 °C

Comp. current 0.0 A

Temp. format °C °F

Control Fan OFF

Refresh / Back
Returns to the previous screen.

Scroll Up
Navigate to the previous item.

Scroll Down
Navigate to the next item.

Settings
Opens the selected setting.

PARAMETER	EXPLANATION
 CONDENSER TEMP.	Temperature measured at the condenser.
 COMP. CURRENT	Real-time compressor current draw.
 TEMP. FORMAT	Select between °C and °F display.
 CONTROL FAN	Determines whether fan operation follows the compressor status automatically. OFF: The fan runs continuously, regardless of whether the compressor is active. ON: The fan only runs when the compressor is operating, allowing quieter and more energy-efficient operation.

NOTE
Displayed values may vary depending on system operation and environmental conditions.

INVERTER OPERATING DATA

This screen displays real-time refrigerant and inverter operating parameters.

Suction Pressure
Displays the pressure on the suction side of the compressor.

EEV Opening
Displays the opening level of the electronic expansion valve.

Compressor Speed
Displays the current compressor speed in hertz.

Bus Voltage
Displays the inverter DC bus voltage.

IPM Temperature
Displays the temperature of the IPM (Intelligent Power Module).

Refresh / Back
Returns to the previous screen.

Scroll Up
Navigate to the previous item.

Scroll Down
Navigate to the next item.

Settings
Opens the selected setting.

PARAMETER	EXPLANATION
SUCTION PRESSURE	Displays the pressure on the suction side of the compressor.
EEV OPEN	Indicates the opening level of the Electronic Expansion Valve in steps or percentage. This valve regulates refrigerant flow into the evaporator.
COMPRESSOR SPEED	Displays the current operating speed of the compressor in hertz.
BUS VOLTAGE	Shows the DC voltage level within the inverter power supply.
IPM TEMP.	Displays the temperature of the IPM (Intelligent Power Module), which is part of the inverter power electronics.

NOTE
Displayed values are for reference and vary according to system load and operating conditions.

DISPLAY BRIGHTNESS SETTINGS

This screen controls display brightness and the screen saver brightness level.

Brightness Time
Sets how long the screen remains at normal brightness after the last user interaction.

Normal Brightness
Adjusts the brightness level while the display is active.

Screen Saver Brightness
Adjusts the reduced brightness level used by the screen saver.

Refresh / Back
Returns to the previous screen.

Scroll Up
Navigate to the previous item.

Scroll Down
Navigate to the next item.

Settings
Opens the selected setting.

PARAMETER	EXPLANATION
BRIGHTNESS TIME	Sets how long the screen stays at full brightness after the last user interaction.
NORMAL	Active brightness level. This upper bar shows the brightness level while the display is being used.
SCREEN SAVER	Activates a reduced-brightness mode after the set time to extend screen life and reduce power consumption.

NOTE
Lower screen saver brightness can reduce power consumption and extend display life.

9.5 Technician settings (PIN protected) TECHNICIAN

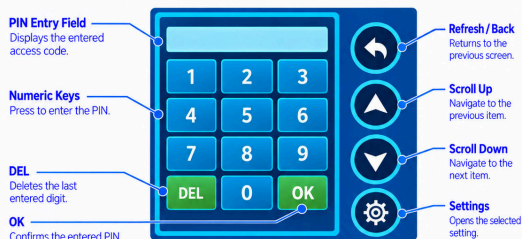


NOTICE

The settings menu is intended for qualified service personnel only. Incorrect settings can impair operation and protective functions. The PIN code is provided by MBC Marine to authorised partners.

PIN-PROTECTED SETTINGS

Enter the access code to open the advanced configuration menu.



CONTROL	FUNCTION
 NUMERIC KEYS	Enter the required PIN code.
 DEL	Delete the last entered digit.
 OK	Confirm the PIN and open the protected menu.



IMPORTANT WARNING

The PIN-protected menu provides access to advanced configuration and factory settings.

Only qualified personnel should change these settings. Incorrect adjustments may affect system performance or cause equipment damage.

FAN SPEED VOLTAGE SETTINGS

This screen sets the output voltage for each of the five fan-speed levels.



PARAMETER	EXPLANATION
 FAN SPEED 1	Factory setting: 30 V.
 FAN SPEED 2	Factory setting: 40 V.
 FAN SPEED 3	Factory setting: 50 V.
 FAN SPEED 4	Factory setting: 60 V.
 FAN SPEED 5	Factory setting: 95 V.
 ADJUSTMENT RANGE	Each fan-speed level can be adjusted independently between 20 V and 99 V.



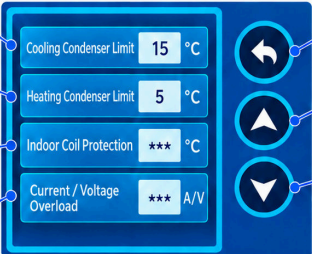
IMPORTANT

These values are factory settings. Adjustments should be made only when necessary and by qualified personnel.

Lower settings may reduce airflow noise in compact or quiet cabins. Always ensure that sufficient airflow is maintained for safe and reliable operation.

PROTECTION SETTINGS

This screen displays temperature and electrical protection thresholds.



Cooling Condenser Limit
Minimum condenser temperature in cooling mode.

Heating Condenser Limit
Minimum condenser temperature in heating mode.

Indoor Coil Protection
Not adjustable on VSC models.

Electrical Overload
Not adjustable on VSC models.

Refresh/Back
Returns to the previous screen.

Scroll Up
Navigate to the previous item.

Scroll Down
Navigate to the next item.

PARAMETER	EXPLANATION
 COOLING CONDENSER LIMIT	Defines the minimum permitted condenser temperature in cooling mode. The value is based on the condenser sensor reading, not the incoming seawater temperature.
 HEATING CONDENSER LIMIT	Defines the minimum permitted condenser temperature in heating mode. The condenser can become colder than the incoming seawater after heat is extracted. If the measured temperature reaches the set limit, the compressor stops to reduce the risk of freezing and heat-exchanger damage.
 INDOOR COIL PROTECTION	This parameter is not adjustable on VSC models.
 ELECTRICAL OVERLOAD	Current and voltage overload protection. This parameter is not adjustable on VSC models.



IMPORTANT

Protection thresholds are factory settings. Changes must be made only by qualified personnel and only when approved by MBC Marine technical support.

FAN AND COMPRESSOR CONFIGURATION

This screen configures the available fan-speed steps and compressor operating limits.



Fan Steps
Selects the number of available fan-speed levels.

Address
Displays the unit communication address.

Minimum Compressor Speed
Sets the lower compressor-frequency limit.

Maximum Compressor Speed
Sets the upper compressor-frequency limit.

Refresh/Back
Returns to the previous screen.

Scroll Up
Navigate to the previous item.

Scroll Down
Navigate to the next item.

PARAMETER	EXPLANATION
 FAN STEPS	Defines the number of fan-speed levels available during operation. Depending on the system configuration, 1, 3 or 5 levels can be selected. Current setting: 5.
 ADDRESS	Unit communication address. This parameter is not adjustable on VSC models. Current value: 01.
 MIN. COMPRESSOR SPEED	Defines the minimum compressor frequency during low-load operation. Adjustable range: 10–35 Hz. Factory setting: 25 Hz.
 MAX. COMPRESSOR SPEED	Defines the maximum compressor frequency under full load. Adjustable range: 40–85 Hz. Factory setting: 60 Hz.



IMPORTANT

Compressor frequency limits are factory settings. Incorrect values may reduce performance, cause unstable operation or damage the system. Changes must be made only by qualified personnel.

9.6 Speed limits and parameter overview

TECHNICIAN

The minimum and maximum compressor speeds are set on the fan and compressor configuration screen (factory setting 25–60 Hz). Change them only for the reasons below.



NOTICE – LOW SPEED IN COLD WATER

If the seawater is very cold, the compressor can freeze the water inside the condenser in HEAT mode and stop the seawater flow. Reducing the minimum speed lowers the compressor output and the risk of freezing.



NOTICE – HIGH SPEED

Do not set the maximum speed above 70 Hz for extended periods. Prolonged high-speed operation may damage the compressor or cause system failure.

TECHNICIAN SETTINGS: FACTORY VALUES

Parameter	Factory	Range
Fan speed 1 / 2 / 3 / 4 / 5	30 / 40 / 50 / 60 / 95 V	20–99 V each
Fan steps	5	1, 3 or 5
Min. compressor speed	25 Hz	10–35 Hz
Max. compressor speed	60 Hz	40–85 Hz
Cooling condenser limit	15 °C	MBC approval only
Heating condenser limit	5 °C	MBC approval only
Indoor coil protection	70 °C	fixed
Current / voltage overload	–	fixed
Address	01	fixed
Brightness time (user menu)	30 s	–

Screens: 9.4 and 9.5. Note the original values before changing any setting, and record every change in the maintenance log (10.5).

Maintenance and lay-up



WARNING

Switch off the unit and the circuit breaker before any maintenance. Close the seacock before opening the strainer.

10.1 Owner maintenance OWNER

When	Task
Before each trip / weekly in season	Check that water flows steadily from the overboard outlet while the unit runs.
Weekly in season	Inspect the strainer; clean the basket if debris is visible.
Monthly in season	Remove and rinse the air (dust) filter with fresh water; let it dry before refitting.
Monthly	Check that grilles are free and the condensate drains (no water around the unit).
Always	Never run the unit without the air filter or with the seacock closed.

10.2 Annual service by a technician TECHNICIAN

- Clean or descale the condenser (seawater side) with a suitable marine descaler; flush thoroughly with fresh water.
- Inspect and, if worn, replace the sacrificial anode; check the bonding connections.
- Check pump, hoses, clamps and seacock for wear and leaks.
- Clean the drain pan and drain line; check the evaporator coil for dirt.
- Tighten electrical terminals; check insulation and the RCD. Clean the electrical box and check that the inverter cooling fan runs.
- Check operating values on the status screens and the refrigerant circuit for leaks (certified technician only).

10.3 Lay-up and winterization OWNER TECHNICIAN

In salt water, remove seawater from the system for longer stops. In winter, protect the system against frost; frost damage is excluded from warranty.

- 1 Switch off the unit and the circuit breaker.
- 2 Close the seacock.

- 3 Drain the seawater circuit (strainer, pump, hoses, condenser), or flush it with fresh water and fill it with a non-toxic, environmentally friendly antifreeze suitable for marine systems, following local regulations.
- 4 Clean the strainer and the air filter.
- 5 Leave the seacock closed and label it.

10.4 Recommissioning OWNER INSTALLER

Refill and vent the seawater circuit, check all hoses and clamps for leaks, open the seacock and follow the first-start steps in 8.2.

10.5 Maintenance log OWNER TECHNICIAN

Record every maintenance task, repair and parameter change. Copy this page when it is full.

Date	Op. hours	Work carried out / parameter changed	Seawater flow (l/min)	Current (A)	Name / signature

PART 11

Troubleshooting

11.1 How faults are shown **OWNER**

The control system protects the unit by shutting it down when it detects a fault, and shows an error code on the display. Some faults are temporary and clear automatically; others need a technician. Code 7 is not used on VSC units.



WARNING

Owners: only carry out the checks marked for owners. Do not open the electrical box or the refrigerant circuit. Work marked **Technician** must be done by qualified personnel.

11.2 First checks for owners **OWNER**

Symptom	Check
Unit does not start, display dark	Circuit breaker and RCD on? Shore power or generator available?
Runs, but no cooling / heating	Correct mode and set temperature? Seacock open? Water flowing from the outlet? Strainer clean? Seawater within limits (2.6)?
Weak airflow	Air filter clean? Grilles open and unobstructed? Fan speed too low?
Water around the unit	Drain hose blocked or kinked? Unit still tilted towards the drain?
Error code on the display	Note the code, see table 11.3. If it persists, call a technician.

11.3 Error code overview

OWNER

TECHNICIAN

Code	Error	Typical cause	Unit reaction	Recovery / action
1	Room temperature sensor	Sensor or cable (All, white) open or faulty	System stops	Restarts automatically when the sensor is OK
2	Evaporator temperature sensor	Sensor or cable (blue) open or faulty	System stops	Restarts automatically when the sensor is OK
3	Condenser temperature sensor	Sensor or cable (black) open or faulty	System stops	Restarts automatically when the sensor is OK
4	Evaporator overheat (heating)	Insufficient airflow in HEAT mode	Compressor stops	Restarts automatically after cooling down; check air system
5	Refrigerant leak	Leak or low charge; abnormal operating conditions	System stops	Do not use the unit – call a technician
6	Inverter fault	Inverter module protection; see LED blink code (11.5)	Compressor stops	Technician counts the LED blinks
8	High refrigerant pressure	Low seawater flow (cooling) or low airflow (heating)	Compressor stops	Check seawater flow and airflow
9	Evaporator icing (defrost)	Low airflow, cold seawater, low refrigerant charge	Compressor stops, defrost	Restarts automatically after defrost
10	Seawater temperature protection	Interrupted seawater flow; seawater ≥ 32 °C (cool) or < 7 °C (heat)	Compressor stops	Check continuous seawater flow; respect limits
11	Low refrigerant pressure	Low charge, blocked airflow, iced evaporator	Compressor stops	Clean filter; technician checks pressures
12	Suction temperature sensor	Sensor or cable (red) open, shorted or loose	System stops	Technician checks the sensor
13	IPM overtemperature	Electrical box poorly ventilated, inverter fan fault	Compressor stops	Let it cool; improve ventilation
14	Communication driver ↔ control board	Internal cable, connector or board fault	Compressor stops	Technician checks the cable and boards
15	Communication display ↔ control board	LAN cable, display or control board	System stops	Restarts when communication returns; check LAN cable

11.4 Error code details **TECHNICIAN**

1 Room temperature sensor

The room temperature sensor on the white A11 socket is disconnected or faulty.

POSSIBLE CAUSES

- Connector loose or not plugged in
- Damaged cable
- Faulty sensor

TECHNICIAN **TECHNICIAN**

- Check that the white connector is firmly seated in the white A11 socket.
- Inspect the cable for damage.
- Replace the sensor with a compatible MBC sensor if faulty.

2 Evaporator temperature sensor

The evaporator sensor on the blue socket reads an open circuit (infinite resistance) or an implausible value.

POSSIBLE CAUSES

- Broken wire
- Connector not properly seated on the control board
- Faulty sensor

TECHNICIAN **TECHNICIAN**

- Inspect the wiring and connector.

- Replace the sensor with a compatible one if damaged.

3 Condenser temperature sensor

The condenser sensor on the black socket (fitted at the bottom of the condenser) is disconnected or faulty.

POSSIBLE CAUSES

- Broken wire
- Connector not properly seated
- Faulty sensor

TECHNICIAN **TECHNICIAN**

- Check the black connector and wiring.
- Replace the sensor if faulty.

4 Evaporator overheat protection (HEAT mode)

In HEAT mode the evaporator (indoor coil) temperature has reached the protection limit (70 °C). The compressor stops and restarts automatically after the coil has cooled down. Occasional occurrence (once every 20–30 minutes) is not critical.

POSSIBLE CAUSES

- Restricted airflow: dirty filter, closed or undersized grilles
- Ducts too long (over 4 m), kinked or reduced in diameter

WHAT THE OWNER CAN DO

- Clean the air filter; open all grilles; select a higher fan speed.

TECHNICIAN TECHNICIAN

- Check grille sizes and ducting against table 5.4 and correct as needed.

5 Refrigerant leak

The control detects a suspected refrigerant leak or low charge. The code alone does not prove that refrigerant is missing: other abnormal operating conditions (e.g. no seawater flow) can also trigger it. Oil traces in the base tray may indicate a leak.

WHAT THE OWNER CAN DO

- Switch the unit off, ventilate the cabin, keep ignition sources away (R32 is flammable) and call a technician. Do not use the unit.

TECHNICIAN TECHNICIAN

- First verify continuous seawater flow, clean intake and strainer, correct pump operation, airflow and supply voltage. Do not open the circuit before these are confirmed.
- Measure the pressures with gauges. If a leak is confirmed: recover the refrigerant, pressure-test with dry nitrogen and locate the leak with an approved detector.
- Repair by brazing or by replacing the component; repeat the nitrogen pressure test.

- Evacuate thoroughly and recharge with the type and amount of R32 on the nameplate.

6 Inverter fault

The inverter module has stopped the compressor to protect itself. The code 6 alone does not tell the cause: the red LED on the control board shows it as a blink code. See 11.5.

WHAT THE OWNER CAN DO

- Switch off at the circuit breaker, wait 10 minutes and restart. Check that water flows from the outlet. If the code returns, call a technician.

8 High refrigerant pressure

The high-pressure sensor reports a condensing pressure that is too high: heat is not being removed. The compressor stops.

POSSIBLE CAUSES

- COOL mode: seawater flow low or stopped (air-locked pump, clogged strainer, blocked intake or hose). Low flow can trigger ERROR 10 and ERROR 8 together.
- HEAT mode: airflow too low (ducts over 4 m, undersized grilles, dirty filter)
- Rarely: faulty high-pressure sensor

WHAT THE OWNER CAN DO

- Check water flow at the outlet and clean the strainer; clean the air filter and open the grilles.

TECHNICIAN TECHNICIAN

- Vent the pump, check intake and hoses; check the air system against table 5.4.
- If the error persists with correct seawater flow and airflow, check the sensor and contact MBC Marine service.

9 Evaporator icing – defrost

Under normal circumstances this is not a fault. The evaporator has started to ice up; the compressor stops and defrosting runs. The unit restarts automatically within a few minutes.

POSSIBLE CAUSES

- Low airflow: low fan speed, dirty filter, restricted return air, undersized supply grilles
- Cold seawater (approx. 13–16 °C) combined with a warm cabin, typically early in the season
- Low refrigerant charge, if the error also occurs in warm weather (seawater 24–26 °C)

WHAT THE OWNER CAN DO

- Clean the filter, open all grilles, choose a higher fan speed.

TECHNICIAN TECHNICIAN

- Check the air system and the evaporator sensor; check the refrigerant charge if the fault persists in warm conditions.

10 Seawater temperature protection

The unit does not measure seawater flow directly; it monitors the condenser temperature. ERROR 10 stops the compressor when the seawater side is outside the operating limits: 32 °C or above in COOL mode, or below 7 °C in HEAT mode (see 2.6).

POSSIBLE CAUSES

- Interrupted seawater flow (most common): the water left in the condenser heats up from the refrigerant, and the system detects this as an incorrect seawater temperature.
- Seawater temperature outside the operating limits

WHAT THE OWNER CAN DO

- Check that the seawater flow is continuous (steady stream from the outlet while running); seacock open, strainer clean. Then restart the unit.

TECHNICIAN TECHNICIAN

- Check the pump for air locks and the intake, hoses and condenser for blockages; check the condenser sensor (black).

11 Low refrigerant pressure

The suction pressure is too low. The compressor stops to prevent damage.

POSSIBLE CAUSES

- Refrigerant leak or insufficient charge

- Clogged air filter or blocked airflow across the evaporator
- Iced evaporator
- Very low cabin load in mild weather
- HEAT mode: low seawater flow or very cold seawater (the seawater coil works as evaporator)

WHAT THE OWNER CAN DO

- Clean the air filter and check that the blower runs; let the unit defrost, then restart. In HEAT mode check the seawater flow and the limits in 2.6.

TECHNICIAN TECHNICIAN

- Measure the pressures; look for leaks (oil traces on joints and copper lines). Never add refrigerant without a leak test (see ERROR 5).

12 Suction temperature sensor

The sensor on the compressor suction line (red socket) is disconnected, shorted or gives invalid readings.

POSSIBLE CAUSES

- Wire damaged by vibration or corrosion
- Poor contact between sensor and suction pipe
- Loose connector; aged sensor

TECHNICIAN TECHNICIAN

- Check that the sensor is tightly clamped to the suction line; check wiring and connector.
- Measure the NTC resistance at ambient temperature; replace the sensor if out of range.

13 IPM overtemperature

The inverter power module (IPM) has exceeded its safe temperature. The compressor stops immediately.

POSSIBLE CAUSES

- Poorly ventilated electrical box; blocked vents or faulty inverter fan
- High ambient temperature
- Overload: long runtime, dirty filter, poor seawater cooling

WHAT THE OWNER CAN DO

- Let the unit cool down; make sure nothing covers the electrical box.

TECHNICIAN TECHNICIAN

- Check the inverter fan and vents; provide at least 10 cm free space around the box.

14 Communication: driver ↔ control board

The inverter driver board and the control board have lost communication. The compressor cannot run.

POSSIBLE CAUSES

- Damaged, corroded or loose communication cable
- Interference from nearby 230 V cables
- Faulty driver or control board

TECHNICIAN TECHNICIAN

- Switch off; inspect and reseat the cable and connectors; replace an oxidised cable.

- Keep signal cables away from mains cables. Restart and monitor; replace the board if the error persists.

15 Communication: display ↔ control board

The display cannot communicate with the control board. The system stops and restarts automatically when communication returns.

POSSIBLE CAUSES

- Loose or damaged LAN cable; corroded RJ45 connectors
- Faulty display or control board

TECHNICIAN TECHNICIAN

- Reseat and clean the connectors; replace the LAN cable.
- Replace the display, then the control board, if the fault persists.

11.5 ERROR 6: inverter LED blink codes

TECHNICIAN



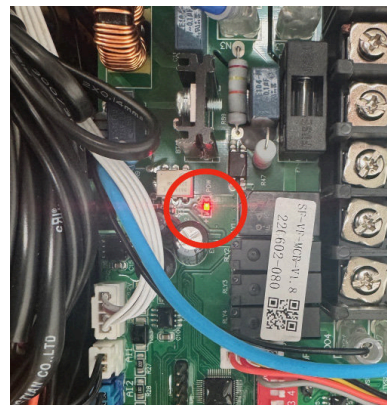
WARNING – ELECTRIC SHOCK

The LED can only be read with the electrical box open and the unit powered. Only qualified personnel may do this.

The control board in the electrical box has a red LED:

- **Standby:** 1 s on / 1 s off.
- **Compressor running:** steady on.
- **Fault:** blinks 0.5 s on / 0.5 s off, as many times as the fault number, then a 3 s pause, repeated until the fault is cleared.

Count the blinks and find the fault in the table below. Most inverter faults are caused by the installation: seawater flow, ventilation of the electrical box and supply voltage. Check these first, before replacing components.



Red status LED on the control board



NOTE

General rules for every blink code: after a shutdown, wait at least 2–3 minutes before restarting so the pressures can equalise. Measure the supply voltage at the unit terminals under load: it must stay within 220–240 V.

Blinks	Fault	Typical causes	What to do
1	IPM protection	Electrical box poorly ventilated or fan blocked; poor seawater cooling; low supply voltage; high current from low charge or a worn compressor	Switch off for 10 min. Check box ventilation and fan, seawater flow and voltage under load. Technician checks charge; if it persists, IPM / board service.
2	Phase current overcurrent	Compressor overload or jam; poor seawater cooling; low charge; low voltage; loose or undersized cables; restarting too soon	Tighten compressor terminals; check seawater flow and voltage; wait 2–3 min between restarts. If it persists, compressor or inverter service.
3	Compressor stall / start failure	Supply below 210 V at start; restart under pressure (short cycling); wiring fault; mechanical compressor fault; inverter output fault	Wait 5–10 min for pressure equalisation. Check voltage at start and compressor wiring. Humming without running or clicking off quickly: suspect compressor damage.
4	Phase current sampling fault	Faulty current sensor on the inverter board; loose or corroded sensor wiring; interference	Switch off for 10 min and restart. Inspect sensor wiring and connectors. If it persists, inverter board service.
5	Overpower protection	Restricted seawater cooling; low charge; long or thin supply cables; low voltage; hot electrical box; heavy load in hot climates	Let it cool 10–15 min. Check seawater system, voltage under load, cable size and box ventilation. Technician checks pressures and current draw.
6	Communication with control board lost	Loose or corroded communication cable; interference; firmware mismatch; control board fault	Inspect, clean and reseal the communication cable; route it away from 230 V cables; update firmware if available; replace the cable or board.
7	DC bus undervoltage	Low supply voltage; long or undersized cables; loose terminals; weak generator or shore power	Measure the voltage at the unit under load. Tighten terminals; correct cable size; use another supply. A voltage monitoring relay is recommended.
8	DC bus overvoltage	Voltage surge from shore power or generator; poorly regulated generator or inverter; switching the supply while the unit runs	Wait 10 min before restarting. Check voltage regulation; do not switch power sources while the unit runs; a surge protector is recommended. If it recurs, inverter service.
9	Input overcurrent	Very low supply voltage; undersized cables; short circuit or earth fault; locked compressor; poor seawater cooling	Let the unit cool. Check voltage, cable size and seawater flow. Measure starting and running current with a clamp meter.
11	Input voltage sampling fault	Fault in the voltage sensing circuit; loose L / N terminals; supply too low to register; grounding or interference problems	Switch off 5–10 min and restart. Tighten and clean L and N terminals; measure the voltage; try another supply. If it persists, board service.

Blinks	Fault	Typical causes	What to do
12	Input undervoltage	Overloaded marina supply; long or thin cable; voltage dips; loose terminals; weak generator	Measure the voltage at the terminals under load (min. 210 V). Use 3 × 2.5 mm ² or larger for long runs; tighten terminals; use another supply or a voltage stabiliser.
13	Heat sink / IPM overheat	Real overheating; poor ventilation, fan fault, poor seawater cooling, high ambient temperature, continuous heavy load	Let it cool 10–15 min. Improve box ventilation; clean the fan; check seawater flow. If it recurs, check thermal paste and sensor.
14	OHB temperature sensor fault	Inverter temperature sensor loose, damaged or corroded; open or short circuit	Switch off 5–10 min and restart. Check sensor wiring and connector; replace the sensor or board if needed.
15	IPM overtemperature shutdown	Box in a confined space; blocked or faulty fan; high ambient temperature; poor seawater cooling; aged thermal paste	Let it cool 10–15 min. Mount the box in a ventilated place (ideally in the return air path); check fan, seawater flow and voltage.
16	EEPROM failure	Inverter memory corrupted by a voltage spike, moisture, salt or board fault	Switch off at the breaker for 1–2 min and restart. If it returns immediately, contact MBC Marine service: board replacement or reprogramming.

11.6 Faults without an error code TECHNICIAN

Symptom	Possible cause	Check / remedy
Weak cooling, no error code	Dirty filter or evaporator; low fan speed; undersized or leaking ducts; supply air mixing with return air; seawater close to 32 °C; max. compressor speed set too low; low refrigerant charge	Clean the filter; check the air system against 5.4; check the speed limits (9.6); measure the air temperature drop across the evaporator (typically 8–12 °C in COOL mode)
Weak heating or no HEAT mode	Seawater too cold (capacity drops below approx. 10 °C, ERROR 10 below 7 °C); low airflow; SW1 set to cooling only	Check seawater temperature and airflow; check SW1/ SW2 (7.5)
Fan runs, compressor does not start	Set temperature already reached; restart delay after a stop; low supply voltage; inverter fault without display code	Check set temperature and mode; wait 3 minutes; measure the voltage under load (min. 210 V); read the inverter LED (11.5)
Compressor runs only at low speed	Set temperature nearly reached (normal inverter behaviour); max. speed limit low; output reduced by high condensing temperature or low voltage	Check the status screens (9.4) and the speed limits (9.6); check seawater flow (6.9) and supply voltage
Short cycling (frequent stops)	Room sensor in the supply air stream or near a heat source; supply air blowing back into the return grille; min. compressor speed set too high for a small cabin	Relocate the room sensor into the return air stream (4.4); separate supply and return grilles; check the min. speed (9.6)
Seawater pump does not run	P1/P0 wiring; SW5 setting; pump fault; air lock	Check wiring (7.2) and SW5 (7.5); vent the pump
No water from the overboard outlet	Seacock closed; strainer clogged; air lock; blocked intake (fouling, plastic bag)	Open the seacock; clean the strainer; vent the pump; clear the intake
Display dark or frozen, unit powered	LAN cable loose or damaged; display or control board fault	Reseat or replace the LAN cable; switch off at the breaker for 1 minute and restart
Electrical box hot, inverter fan noisy	Box in a confined space; blocked or dirty inverter fan	Provide at least 10 cm free space; clean or replace the fan (see blink codes 13, 15)
Noise or vibration	Mounting brackets overtightened; unit or hoses touching the hull; air in the seawater pump; duct resonance	Check mounting (4.1); isolate hoses from the hull; vent the pump; fix loose ducts
Water around the unit or dripping grilles	Drain blocked or not falling; unit not tilted towards the drain; uninsulated supply ducts sweating	Perform the drain test (4.2); check tilt; insulate ducts
Musty smell	Dirty filter, drain pan or evaporator	Clean filter and drain pan; clean the evaporator coil

11.7 Reference values for technicians

TECHNICIAN

All four temperature sensors (room, evaporator, condenser, suction) are NTC sensors. Disconnect the sensor from the control board and measure its resistance: it falls as the temperature rises. An open circuit (infinite) or a short circuit (0 Ω) means a faulty sensor or cable.

Check	Typical value
Supply voltage under load	220–240 V, min. 210 V
Running current	see Part 12 (cooling / heating, per model)
Compressor speed	25–60 Hz (factory limits, 9.6)
Seawater flow	see Part 12 (10–30 l/min); measuring: 6.9
Seawater temperature rise, COOL mode	about 4–5 °C at the required flow
Air temperature drop across the evaporator, COOL mode	typically 8–12 °C
Seawater operating limits	COOL below 32 °C · HEAT 7 °C – 18 °C
Evaporator overheat limit, HEAT mode	70 °C (fixed)
Condenser limits (9.6)	COOL 15 °C · HEAT 5 °C
Inverter LED	standby 1 s on / 1 s off · running: steady

Refrigerant pressures depend on the installation (seawater and cabin temperature, airflow) and are therefore not listed. Compare them with a correctly working installation of the same model.

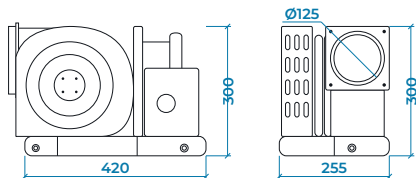
PART 12

Technical data

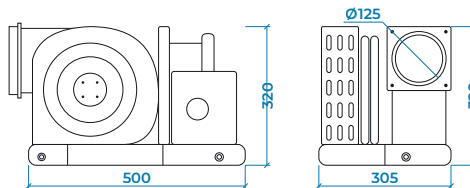
VSC units		VSC 08	VSC 13	VSC 16	VSC 24
Cooling capacity	Btu/h · kW	8 000 · 2.34	13 000 · 3.81	16 000 · 4.69	24 000 · 7.03
Heating capacity	Btu/h · kW	8 700 · 2.55	13 800 · 4.04	17 600 · 5.16	26 400 · 7.74
Power supply		230 V / 1 ph / 50–60 Hz			
Compressor		Inverter (variable speed), factory setting 25–60 Hz			
Power input, cooling	min – max, kW ¹	0.14 – 0.33	0.23 – 0.54	0.29 – 0.66	0.43 – 0.99
Power input, heating	min – max, kW ¹	0.17 – 0.38	0.27 – 0.62	0.33 – 0.76	0.50 – 1.14
Running current, cooling	min – max, A	0.66 – 1.52	1.07 – 2.45	1.32 – 3.03	1.98 – 4.55
Running current, heating	min – max, A	0.76 – 1.75	1.23 – 2.83	1.52 – 3.48	2.28 – 5.23
Airflow	High / Med / Low, m ³ /h	420/350/280	580/495/410	730/610/520	1200/1080/900
Refrigerant R32, charge	g	250	300	400	700
CO ₂ equivalent (GWP 675)	t	0.17	0.20	0.27	0.47
Required seawater flow	l/min	10	16	20	30
Circuit breaker (min.)	A	10	12	12	16
Dimensions H × W × D	mm	300×420×255	320×500×305	340×510×320	410×690×448
Supply duct diameter	mm	125	125	150	200
Min. return air grille (nominal size)	mm	250×250	250×250	300×250	250×350
Min. supply air grilles (nominal size)	mm	200×100	2 × 200×100	2 × 150×250	3 × 250×150
Condensate drain		DN20	DN20	DN20	DN20
Seawater connection		5/8"	5/8"	5/8"	5/8"
Weight	kg	20	26.5	29.5	58

12.1 Dimensional drawings **INSTALLER**

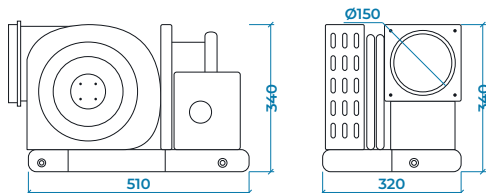
VSC 08



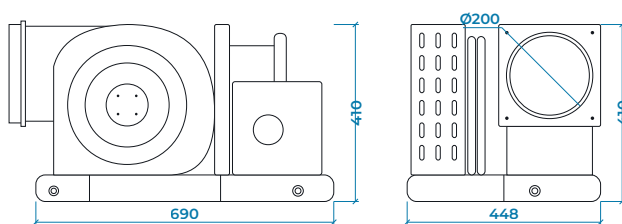
VSC 13



VSC 16



VSC 24



Front view (left) and side view (right) of each unit, in mm, all to the same scale. Height is measured to the top of the evaporator; pipe bends may protrude slightly above it. Dimensions as in the technical data table. Ø = supply air outlet. Electrical box (VSC 08–16): 227 × 156 mm, fixing holes 133.5 mm apart. Allow at least 60 mm free space around the unit (3.2).

Refrigerant: hermetically sealed equipment containing fluorinated greenhouse gases (R32, charge per model in the table on the previous page). All charges are below the m1 limit for R32 in EN 60335-2-40 (1.84 kg), so no minimum room area applies.

¹ Power input in the technical data table is calculated from the running current: $230\text{ V} \times \text{current} \times \text{power factor } 0.95$.

PART 13

Warranty

13.1 Limited warranty OWNER

MBC Marine provides a limited warranty for its marine air conditioning systems against defects in materials and workmanship, for the original end user, within the warranty period. If a verified defect is found during the warranty period, MBC Marine may, at its sole discretion, repair or replace the defective component(s) or refund the purchase price in part or in full. In the case of a refund, the contract is considered terminated and no further claims can be made.



NOTICE

Every warranty claim is based on the **original invoice** showing the **serial number** of the unit. Keep the invoice; without it no warranty claim can be processed.

13.2 Warranty period OWNER

Product status	Warranty
Registered and installed by an official MBC partner	2 years, full warranty
Not registered, or not installed by an MBC partner	1 year: first 6 months parts and labour, last 6 months parts only

The warranty starts on the date of purchase, the date of installation or, for OEM installations, the date the vessel is delivered to the end user, but never later than 3 years after the manufacturing date. The manufacturing date can be verified from the serial number through MBC Marine customer service.

13.3 Product registration OWNER

Register your product at www.abc-marine.com to benefit from the full warranty. For unregistered products as well, the original invoice with the serial number (13.1) is required for any warranty claim.



NOTICE

Improper earthing, incorrect connection to the seawater or electrical system, or installation not according to this manual voids the warranty.

13.4 Exclusions OWNER

- Normal wear and tear (e.g. filters, fuses).
- Labour costs for removal or reinstallation of the system.
- Damage during transport or improper storage.

- Galvanic corrosion of the condenser tubes due to missing or inadequate galvanic protection.
- Installation not following the official MBC Marine guidelines.
- Corrosion, improper maintenance, misuse or external damage.
- Unauthorised modifications, non-genuine parts or repairs by unauthorised personnel.
- Water damage to electrical components such as control boards or displays.
- Frost damage due to insufficient winterization.
- Use of unauthorised refrigerants.
- Damage caused by insufficient or unstable power supply (under- or overvoltage, spikes, surges, incorrect frequency, generator instability).
- Failures caused by restricted airflow (undersized ducts, blocked grilles, dirty filters, improper installation).
- Products with removed, altered or illegible serial number labels.
- Failures from operation outside the specified limits or contrary to this manual.
- Indirect, incidental or consequential damages (including travel costs, lost time, financial loss or personal injury).

national or EU legislation. Statutory rights of consumers remain unaffected.

13.5 Final provisions **OWNER**

MBC Marine reserves the right to amend this warranty policy at any time without prior notice, in particular to comply with

PART 14

Legal disclaimer

MBC Marine has prepared this manual based on the most current information available. It cannot cover every possible situation; please contact our experts for specific questions or unusual requirements. While every precaution has been taken to ensure accuracy, MBC Marine is not liable for errors or omissions, nor for damage arising from the use of the product or of the information in this manual.

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MBC Marine Ltd. · Petőfi Sándor u. 39/A · 2049 Diósd · Hungary · www.mbc-marine.com

EU Declaration of Conformity: see the following page.

EU Declaration of Conformity

Manufacturer	MBC Marine Ltd. Petőfi Sándor u. 39/A, 2049 Diósd, Hungary
Product	VSC self-contained marine air conditioning unit with inverter compressor
Models	230 V 1~: VSC 08, VSC 13, VSC 16, VSC 24
Refrigerant	R32

This declaration of conformity is issued under the sole responsibility of the manufacturer. The products described above are in conformity with the relevant Union harmonisation legislation:

- **2014/35/EU** Low Voltage Directive
- **2014/30/EU** Electromagnetic Compatibility Directive
- **2011/65/EU** and **(EU) 2015/863** RoHS Directive

Harmonised standards and technical specifications applied:

EN 60335-1	Household and similar electrical appliances – Safety – General requirements
EN 60335-2-40	Particular requirements for electrical heat pumps, air conditioners and dehumidifiers
EN 55014-1 / -2	Electromagnetic compatibility – Emission / Immunity
EN 61000-3-2 / -3-3	Harmonic current emissions; voltage fluctuations and flicker (≤ 16 A per phase)
EN IEC 63000	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Conformity applies when the product is installed and operated according to this manual.

PLACE AND DATE OF ISSUE	NAME AND FUNCTION	SIGNATURE
Budapest, 15.10.2025	Roland Várnai, CEO	





MBC Marine Ltd.

Petőfi Sándor u. 39/A · 2049 Diósd · Hungary

www.mbc-marine.com