

Installation, usage and  
maintenance manual

# **CLIMMA CWS DC INVERTER**

Rev. 141104



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## 1. Introduction

### 1.1. General information

Thank you for purchasing a Climma CWS system!

This manual will provide necessary information for the proper installation, operation, and maintenance of your Climma system.

Climma chiller and products are designed and produced to the highest standards and they are all tested in the factory. If your Climma system is used according to the guidelines in this manual, it will guarantee you trouble free operation for many years.

If you require assistance, please contact one of our many authorized service centers. To find the service center please check our website [www.veco.net](http://www.veco.net) or write us at [customerservice@veco.net](mailto:customerservice@veco.net).

#### WARNING

This unit should only be used for the purposes for which it was designed. The manufacturer declines all responsibility for any damage caused by incorrect or unreasonable use, such as:

- improper use by untrained persons;
- technical modifications or operations not suited to specific models;
- use of non-original or non-specific spare parts;

### 1.2. System features

Following the main features of the Climma DC chillers:

- Variable Output from a Single Air-conditioning Unit. Depending on the heat load requirements, the compressor frequency varies controlling the output capacity, to produce faster cooling and heating, significantly improving the comfort on-board.
- Water Cooled Inverter Compressor. Climma's water cooled inverter protects the DC brushless compressor from excessive temperature, current overload and irregular voltage supply, allowing it to be installed in the engine room without additional ventilation. Added to this, the electronic control provides continuous monitoring of the compressor curve to keep the unit within safe operating limits, eliminating also stop-start cycles.
- Eco mode. This function has been specifically developed to optimize the power consumption of the system in three principle ways: it enables the chiller to work more efficiently with a smaller output generator than would ideally be required; in ECO mode the power consumption is further reduced during night operation when only a courtesy/night generator is working running and less power is needed; ECO mode allows the air-conditioning to run while on the dock with a limited shore power supply.
- No Start Load. By using a DC compressor with inverter the Climma compressor starts at a low frequency requiring a fraction of the power.
- Up to 50% energy saving

A Climma centralized air-conditioning system includes different products: the Climma DC chiller, fancoils installed in each cabins, fresh water piping that connects the chiller to the fancoils, sea water piping bringing sea water to the chiller condenser, the fresh and the sea water pumps.

While the Climma system is running in cool mode, the Climma DC chiller is cooling the fresh water that circulates in the fresh water circuit to the fancoils; heat is removed from the cabins through fancoils, blowing fresh air into the cabins.

While in heat mode (reverse cycle mode), the Climma DC chiller is heating the fancoil water circuit that brings heated water to the fancoils, allowing them to blow heated air in the cabins.

DC50: The Climma DC chiller is designed for boats that require a load up to 50.000 Btu/h, which means that in standard conditions, it is suited for motor boat from 50' up to 65' (15-20 meters) and sailing boats between 60' and 70' (18-22 meters).

### 1.3. Installation

The unit must be installed by an authorized Climma service center and in compliance with the instructions given in this manual.

### 1.4. Transport and handling

When loading or unloading the unit, use a fork lift equipped with forks at least 2/3 the length of the shipping base.

Use an overhead lift if the unit is equipped with lifting eye-bolts.

Select lifting equipment suited to the weight and overall dimensions of the packaged unit or components.

Take every precaution to prevent damage, when handling the unit or components keeping in compliance with the information given on the packaging material.

### 1.5. Unpacking

Remove all cardboard, wood or other materials from the wood base. Lift the unit or components by suitable means (e.g. lift truck), remove the wood base, then set the unit or components into position.

Once all packing material has been removed, check that the unit has not been damaged in any way.

Caution: Wear protective gloves when handling any packing materials and the wood base. Dispose of all packaging materials appropriately in accordance to local codes.

### 1.6. Directives

Climma DC chillers respect the following directives.

- CE
- Low voltage: 2006/95/EC
- Electromagnetic Compatibility: 2004/108/EC
- Machinery Directive: 2006/42/CE
- Manufacturing quality Standards UNI EN ISO 9001:2008

### 1.7. General safety

Injuries or accidents caused by failure to comply with the recommendations of this manual are solely the responsibility of the unit operator.

Basic Rules for Safe Operation:

- do not touch the unit with moist or wet hands or feet;
- never operate the unit while barefoot;
- before installation and maintenance operations, disconnect the unit from the power supply. failure to comply may result in injury or death;
- installation and maintenance of this system can be hazardous due to system working pressure and electrical components. Only a Climma certified service center should install and maintain the system;
- to minimize the hazard of electrical shock and personal injury, this component must be effectively grounded;
- during installation and maintenance follow safety codes, wear safety glasses and work gloves;

## 2. Installation

### WARNINGS

- Failure to follow all the instructions in this manual can cause property damage, injury or death.
- Improper installation, adjustment or alteration can cause property damage, injury or death.
- Electrical connections should be performed only by a certified professional.
- Electrical and grounding connections must comply with the National Electric Code and local electric codes. Failure to comply with this procedure can cause property damage, injury or death.
- Before connecting the unit to the electrical supply, verify that the electrical connection agrees with the specifications on the data plate, placed on the main electrical box of the unit. Failure to comply with this procedure can cause property damage, injury or death.
- This appliance must be connected to a grounded, metal, permanent wiring system. Failure to comply with this procedure can cause property damage, injury or death.

### 2.1. Climma DC chiller positioning

The Climma DC chiller must be installed in the engine room, technical space or similar area.

Normal engine room temperatures will not affect the Climma DC chiller, since the condenser and inverter are water cooled. Climma DC chiller does not require additional ventilation during operation.

The unit must be accessible for service.

The unit must be secured on a surface using the mounting brackets below the drain pan.

### WARNINGS

The Climma DC chiller is provided with an inverter mounted on the unit (VDF - Variable Frequency Drive) . The inverter is IP20, therefore the Climma DC chiller must be installed where it would not get wet.

### 2.2. Electronic control box and display

The electronic control box of the Climma DC chiller is already completely connected to the chiller.

The control box has to be installed close enough to the chiller, due to the connection to the unit, and to a flat horizontal or vertical surface.

The control box has to be installed in a location free from water, water spray and moisture and it has to be accessible for operation and maintenance.

The standard version has the display on the control box itself, but the display can be also remote.

If the display is remote, the distance between the control box and the display has to be:

- 50 meters with standard cable
- 500 meters with AWG22 twisted pair cable. Note: please contact Veco if you plan to install the display at a distance exceeding 50mt.

### 2.3. Flow switch installation

Flow switch has to be connected to the electronic control box and it needs to be installed in the fancoil water circulation system.

Please refer to instruction C897 for the correct installation.

WARNING: Failure to properly install the flow switch will void the warranty on the Climma DC chiller.

### 2.4. Grounding

The Climma DC chiller has to be properly grounded to prevent corrosion due to stray current.

**WARNING:** Failure to properly ground the Climma DC chiller will void warranty.

### **2.5. Chiller condensate**

Every Climma DC chiller has two drains for condensate water.

At least one drain has to be properly connected to ensure the correct condensate water drainage.

Plastic condensate drain nipples are provided in a separate plastic bag to help the installation.

### **2.6. Other system components: fancoils**

Climma fancoils have to be installed in a technical space inside or close to the cabin they have to cool/heat.

Fancoils need to be properly secured on a leveled surface in order to operate correctly and remove the condensation. Return air flow from the fancoil has to be ensured as well as the supply air flow from the fancoil.

#### **WARNING**

No fancoil has to be installed close to engine room area and it must be ensured that no vapor or air from the engine room can enter in the return air flow of the fancoil.

The positioning of the fancoil display is important. The temperature sensor is mounted on the display, therefore the display has to be mounted on an inside wall, around the mid-height of the cabin where the air can circulate so that it can sense the correct temperature.

If a correct positioning is not possible, a remote temperature sensor can be mounted; in this case, the sensor must be placed behind the return air grill. In this case, the display temperature sensor will be automatically excluded.

#### **WARNING**

Do not place the temperature sensor on the supply air flow or close to return/supply grills, under the sunlight or close to heating devices.

Ducting of the return and supply air of the fancoil has to be done properly; ducts must be short and as straight as possible, avoiding bends greater than 90° or loops.

Supply air ducting has to be at least 1.5 meter (5') in order to reduce fan motor noise, but it should not exceed 6 meters in order to reduce pressure drops.

Supply and return grills must be located not too close to each other, in order to avoid the supply air to enter directly in the return air flow. Return grill should be placed below while supply grill should be placed over the mid-height, as high as possible in the cabin.

#### **WARNING**

Failure to proper position the supply and return grills will cause no mixing between the cooler temperatures and the warmer temperatures.

All Climma fancoils are provided with condensate drains to remove condensation produced by the fancoil; condensation can reach 2 liters per hour, therefore condensate drains must be properly connected and tested during installation. Drains should be as short and as downhill as possible, with no loops and bends.

To test it, pour some water in the fancoil pan and check that all water flows out of the pan through the drains.

### **2.7. Other system components: sea water circuit**

The Climma DC chillers have a water cooled condenser therefore they need to be connected to sea water to operate correctly.

The sea water circuit includes: a sea water pump sized according to the chiller capacity, a sea water intake and outlet and a sea water strainer.

The sea water in the circuit should not exceed 0.6 m<sup>3</sup>/h every 12.000 Btu/h (2,64 GPM or 10 lt/m per 1 TON) of chiller capacity.

Chiller rated capacity is guaranteed at 20°C (68°F) sea water temperature; the system will work in cool mode up to 40°C (104°F) and in cool mode with a sea water temperature up to 5°C (41°F).

The sea water circuit must always have an uphill incline from the sea water inlet to the chiller condenser to prevent the system to run properly. All hoses should be installed as straight as possible with no loops and bends.

All metal components of the sea water circuit must be properly grounded.

#### SEA WATER PUMP

The sea water pump has to be properly secured on a leveled surface in order to operate correctly; Use the special fixing kit with anti-vibration supports.

The sea water pump has to be installed below the water line in order to operate correctly.

#### SEA WATER INTAKE

Sea water intake has to be installed as far below the water line to ensure always that no air enters the sea water circuit.

#### SEA WATER STRAINER

Sea water strainer has to be installed between the sea water intake and the sea water pump and it must be accessible for cleaning operations. The strainer has to be cleaned periodically.

**WARNING:** Sea water strainer is mandatory in the seawater circuit. Failure to install the sea water strainer will void the warranty.

#### SEA WATER OUTLET

The sea water outlet has to be installed above the sea water line, but as close as possible to it to reduce noises.

### **2.8. Other system components: fresh water circuit**

The fresh water circuit is a closed loop bringing water from the chiller to the fancoils and then back to the chiller again. The circuit has the following components: a fresh water pump, flow switch, manifolds, hoses, an expansion tank and an air-bleeder; everything is sized accordingly to the fancoils number, type and overall capacity.

Water pressure in the circuit must be between 1 and 1.5 Bar (14.5 and 22 psig).

#### FRESH WATER PUMP (CIRCULATION PUMP)

The fresh water pump must be installed near the Climma DC chiller. The pump has to be installed on the return line of the fresh water circuit, pumping water directly in the chiller and then to the fancoils.

#### FLOW SWITCH

Flow meter has to be installed on the fresh water circuit and it has to be accessible for maintenance.

The flow meter switch is mandatory safety equipment that will stop the system whenever the fresh water flow stops or if it is not enough.

The flow meter switch has to be connected to the main electrical box of the unit as specified in the electrical schematic.

Make sure that the flow meter is correctly connected to the control box. To test it, simulate a low flow situation pressing the lever inside the cover of the switch.

#### MANIFOLDS

Manifolds should be installed to be accessible for maintenance. If calibrating valves are installed, they have to be completely opened.

#### HOSES

The water circuit must be as simple and straight as possible, avoiding bends, loops.

#### EXPANSION TANK

The expansion tank allows the water in the system to expand as it gets hot when the chiller is in heat mode and it also acts as a cushion. The expansion tank has to be installed in the fresh water pump inlet.

#### AIR-BLEEDER

The automatic air bleeder must be installed on the pump outlet. This will prevent that any air in the circuit reaches the fan coils and all the legs of the circuit.

#### ANTIFREEZE SOLUTION

The fresh water circuit needs to be filled with water (80%) and antifreeze (20%). Antifreeze will prevent water and pipes from freezing. Antifreeze also reduces the corrosion inside the fresh water circuit.

Always check that the pressure gauge shows 1.5 Bar in the fresh water circuit.

We suggest two methods for filling the fresh water circuit with antifreeze:

- Calculate approximately the circuit capacity; Fill the circuit with water and add to it 20% of antifreeze, using the second charging valve by gravity or using a pressure pump. Then connect the circuit to the sanitary water circuit of the vessel, pressurize up to 1.5 Bar and start purging the air. It is obvious that if purging will be difficult the percentage of antifreeze will decrease, as more water will be needed to fill the circuit, therefore more antifreeze must be added to the circuit.
- Empty the circuit from the water used for leak test. Prepare an antifreeze solution of the quantity needed to fill the circuit, made with 20% of antifreeze liquid; fill the circuit using a pressure pump. Then proceed with purging air and topping up the pressure using the solution.

### **2.9. Electrical connections**

The unit must be installed on a dedicated circuit with a rated thermal-magnetic circuit breaker. The circuit breaker and electric cables (power supply) must be rated for the unit and comply with all local and national codes.

The manufacturer will not be held responsible for damage or injuries due to improper installation.

Incorrect installation will void the Manufacturer's warranty.

The electrical control box is already connected by Veco; to install the electrical box:

- Connect the power supply to the electrical box
- Connect the sea water pump to the electrical box
- Connect the circulation (fresh) water pump to the electrical box

Please refer to instruction C896 or to the Electrical schematic in this manual.

### **2.10. Installation checks**

The following checks MUST be made during the initial field start-up:

- Check all wire connections.
- Check electrical input.
- Check the standard pressure in the refrigerant system.
- Check the expansion valve during operation.

Note: If the unit and/or remote condensing unit were not transported in an upright position, or has been overturned during the installation process, allow them to stand, in an upright position, at least 4 hours before starting the unit.



### 3. Operating instructions

The unit can be controlled by the main electrical control box or remotely via Modbus protocol. In this chapter only the main electrical box control is shown.

#### 3.1. The electrical control box

The electrical control box of the chiller Climma DC is shown below.



The standard Climma DC configuration has the control box with a digital display to control the unit and a local switch. The digital display can also be remote.

The electrical box has to be connected during the installation to the main power supply, to the sea water pump and to the circulation pump.

The electrical box is already connected to: the inverter, the RC valve and water valve on the chiller, to the electronic expansion valve, to the flow meter and to all the pressure and temperature sensors required by the unit.

#### 3.2. The display



The display has 6 buttons:

- **WARNING:** this will allow to access in the Warning/Error screens
- **PROGRAM:** this button allows to enter in the programming mode
- **ESC:** this button allows to exit from the current screen and go back to the previous level
- **ENTER:** when the cursor is on a value, the button allows to confirm the value
- **UP/DOWN:** these buttons allows to move between values or screens

#### 3.3. Modes of operation

The unit has 3 possible modes:

- **SUMMER:** When the unit is in SUMMER mode, the system will run in cool mode as chiller, cooling the water until a specified set-point temperature value is reached.
- **WINTER:** When the unit is in HEAT mode, the system will run as heat pump, heating the water until a specified set-point temperature value is reached.
- **OFF:** when unit is in OFF mode, the compressor will not run but the unit will be powered up.

When the system is powered up it will recall the previous mode of operation.

When the system starts for the first time, it will start in OFF mode.

### 3.4. Climma functions

When the compressor is running, the system can run with two different functions:

- **AUTO function:** when system is in AUTO function, the Climma Control will automatically adjust the system power: when more power is requested, the compressor will run up to its maximum speed, but when less power is requested, compressor will slow down.
- **ECO function:** when system is in ECO function, the Climma Control will automatically adjust the system power, but this time the maximum power is limited to a specific ECO value, which allows you to set a maximum power consumption, lower than the maximum system power consumption.

Example.

Chiller maximum power consumption: 4,2kW

Generator: 10kW

When you are running the generator you can set the AUTO function on. If the system will run at full power, it will still work with no problems, even at maximum speed.

When you are docked, you cannot run the generation and you have only 4kW from the harbor, then you can set the ECO function on. This will allow the system to run up to 50% of its overall power, this means that the power consumption will be limited around 2kW, allowing the system to run anyway.

### 3.5. Starting the unit

To start the unit, turn on the main power supply from the dedicated circuit breaker.

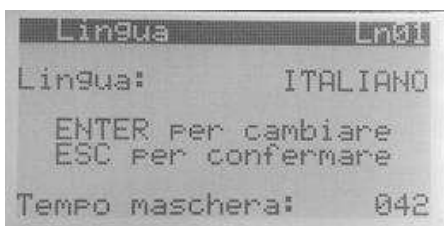
The display will show the following screens.



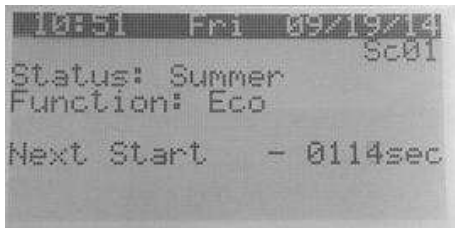
When the display shows the following screen, it's possible to change the language from Italian to English or the other way around.

To change the language from the current one, press ENTER. To confirm the current language press ESC.

If nothing is pressed, the system will start with the current language settings.



After the language settings, the system will go to the main screen.



The main screen will show the current state of the system (Status: Summer, Winter, OFF), the operation mode (Function: Auto, Eco) and information about compressor start-up.

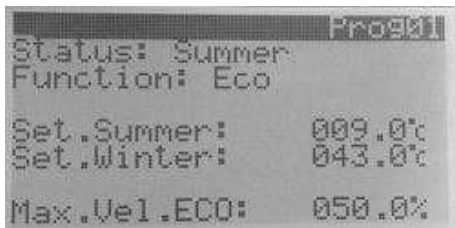
### 3.6. Shut off procedure

To stop the unit from running, first put the unit in OFF mode and then power off the system from the circuit breaker.

### 3.7. Switching between modes

To change the unit state and function, you need to access the programming screen.

Press PROGRAM and the following screen will show (Prog01).



Press ENTER until the selector will be on the value you want to change (the value will blink), then use the arrows UP/DOWN to modify the value.

To confirm the value press ENTER again.

To go back to the main screen, press ESC.

### 3.8. Programming

Following there is the list of parameters that you can change in programming mode.

To change a value, press ENTER until the selector is on the value you want to change (the value will blink), then use the arrows UP/DOWN to modify the value.

To confirm the value press ENTER again.

To go back to the main screen, press ESC.

(to access the following parameters press PROGRAM and move between values with ENTER (Prog01))

STATUS: Summer, Winter, OFF (see the description in 3.2)

Function: Auto, Eco (see the description in 3.3)

Set. Summer: This value is the temperature set point for the unit when running in cool mode. The system will work to bring the temperature of the return water from the fancoils to this value.

Set. Winter: This value is the temperature set point for the unit when running in heat mode. The system will work to bring the temperature of the return water from the fancoils to this value.

Max. Vel. ECO: This value is the maximum power in percentage that the unit can reach when it is in ECO mode. By default this value is set to 50%, but it can be changed from 30% up to 70%.

In the following table, maximum power consumption is shown for the most common ECO settings (DC50 model only).

ECO %	RPS	Consumption (A)	Consumption (kW)
30 %	36 rps	4.9 A	1.0 kW
50 %	60 rps	8.8 A	1.9 kW
70 %	84 rps	14.7 A	3.3 kW

(to access the following parameters press PROGRAM, then move to screen Prog02 with the DOWN arrow, then move between values with ENTER)



Unit of measure: °C, °F

Language: English, Italian

Date: date settings.

Time: time settings.

### 3.9. Warnings and errors

The system logs all alarms, warnings and errors, keeping track of all the information when the issue occurred.

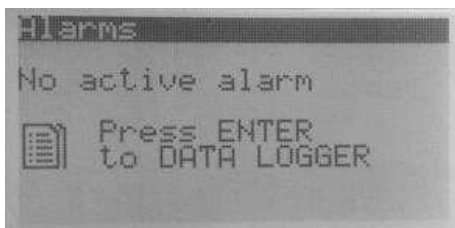
When there is a warning/error, the main display will show a bell symbol; to see the warning/error details, press the WARNING button to see it.

To access the warning/error log, press WARNING from the main screen. Then press ENTER to see the warning/error history.

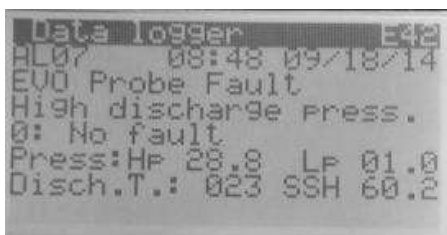
In order to navigate through the warning/errors, use DOWN and UP buttons.

To go back to the main screen press ESC.

Following the main warning/error screen.



Following an example of a warning/error log.



### 3.10. System information

The Climma DC chiller has 4 NTC probes and 2 pressure transducer to control the unit and to ensure the system reliability.

From the digital display, it is possible to navigate through all the system information and monitor the status.

To see other available information, press the DOWN button from the main screen; this will allow you to navigate into other screens. Following a list of all the available system information.

SC02 - Fresh water return temperature: Real time value of the water temperature coming from the fancoils.

SC02 - Set point: This is the ideal temperature value set in the system for the fresh water temperature.

SC02 - Compressor speed: This the real time compressor speed (it varies from 20 up to 100Rps/Hz)

SC03 – Press.Dischg: Discharge pressure.

SC03 – Press.Suct.: Suction pressure.

SC03: EVD valve opening: Percentage of opening of the electronic expansion valve. Electronic expansion valve opens and closes to keep the superheat under control.

SC04 – Envelope zone: System will show if the compressor is working in a safe zone (Inside envelope) or not. If not, it will give you information about the reason.

SC05 – Discharge gas temperature

SC06 – This screen shows some values in a graphic format.

SC07 – Code: Software code.

SC07 – Version: Software version.

SC07 – Data: Software release date.

SC07 – Bios: Bios version and release date.

SC07 – Boot: boot version and release date.

SC08 – From this screen you can enter other control parameters by pressing ENTER.

## 4. Maintenance and cleaning

Climma DC chillers require some basic maintenance that has to be done frequently and some extended maintenance to be done at longer intervals.

### 4.1. Basic maintenance

Following tasks need to be performed frequently.

- Clean the seawater strainer to allow enough sea water to the condenser coil
- The circulation circuit (fresh water circuit) has to be filled with water and no air must be present inside the circuit. Pressure has to be between 1.5 Bar and 2 Bar (21 psi to 28 psi).
- Fancoils return air filters have to be controlled, cleaned or changed regularly.

NOTE. It's recommended that the system is regularly used. If the system is not used at least once a month, then there can be problems with the pump seals or with the reverse cycle valve. Try to run the system at least once a month, both in cool and in heat mode.

When the system is not run for a long period, it's important to manually run the pumps, removing the back cover and manually rotate the cooling fan inside the pump. This will extend the life of the rotating seal which can remain stuck by salt and break at immediate start.

IMPORTANT: Be sure to correctly fix the back cover cap correctly before running the pump at the end of the maintenance.

### 4.2. Extended maintenance

Following tasks need to be performed at a semi-annual.

- Flush and clean the condenser with a scale dissolving solution to prevent scale build-up in the coils and obstructions. To do this, inlet and outlet connections have to be disconnected from the system.
- Check the sea water pump (clean the pump according to the pump model instruction )
- Check every sensor of the system to be properly connected to the control box and to be properly installed on the system.

### 4.3. Winterization

When the boat is subject to a very cold climate, then some anti-freeze solution has to be entered in the fresh water circuit (circulation circuit).

## 5. Warnings, alarms and troubleshooting

### 5.1. Warnings and alarms

Probes naming:

- S1 = B6 = Low pressure meter sensor (suction pressure)
- S2 = B3 = Low temperature sensor (suction temperature)
- S3 = B7 = High pressure meter sensor (discharge pressure)
- S4 = B4 = High temperature sensor (discharge temperature)

Code	Display description	Reset	Delay	Action	notes
AL1	Clock Board Fault compressor 1	Auto	0 sec	Warning	There may be an issue with the battery in the board, please check the battery and if it's not working change it. Check also connections.
AL2	Clock Board Fault compressor 2	Auto	0 sec	Warning	
AL3	Clock Board Fault compressor 3	Auto	0 sec	Warning	
AL4	Clock Board Fault compressor 4	Auto	0 sec	Warning	
AL5	Extended memory fault compressor 1	Auto	0 sec	Warning	Contact the closest Climma service center
AL6	Extended memory fault compressor 2	Auto	0 sec	Warning	
AL7	Extended memory fault compressor 3	Auto	0 sec	Warning	
AL8	Extended memory fault compressor 4	Auto	0 sec	Warning	
AL9	Max discharge pressure compressor 1	Manual	0 sec	OFF compressor	Discharge pressure reading is more then the allowed value therefore the systems shuts off to keep the compressor safe. Check the pressure values registered in the log at the time of the error. Check the sea water pump and flow, as there may be not enough flow through the sea water condenser.
AL10	Max discharge pressure compressor 2	Manual	0 sec	OFF compressor	
AL11	Max discharge pressure compressor 3	Manual	0 sec	OFF compressor	
AL12	Max discharge pressure compressor 4	Manual	0 sec	OFF compressor	
AL13	Min suction pressure compressor 1	Auto	0 sec	OFF compressor	the suction pressure reading is below the safety levels. Please check the value of the pressures and try to reset manually the alarm. If it does not stop, contact the closest Climma service center.
AL14	Min suction pressure compressor 2	Auto	0 sec	OFF compressor	
AL15	Min suction pressure compressor 3	Auto	0 sec	OFF compressor	
AL16	Min suction pressure compressor 4	Auto	0 sec	OFF compressor	
AL17	Probe S1,S2,S3,S4 Alarms compressor 1	Manual	60 sec	OFF compressor	There is a proble with one or more probes. Please check the probes connections. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL18	Probe S1,S2,S3,S4 Alarms compressor 2	Manual	60 sec	OFF compressor	
AL19	Probe S1,S2,S3,S4 Alarms compressor 3	Manual	60 sec	OFF compressor	
AL20	Probe S1,S2,S3,S4 Alarms compressor 4	Manual	60 sec	OFF compressor	Superheat value is below the threshold allowed, check and monitor the system. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL21	Low superheat EVD compressore 1	Auto	0 sec	Warning	
AL22	Low superheat EVD compressore 2	Auto	0 sec	Warning	
AL23	Low superheat EVD compressore 3	Auto	0 sec	Warning	
AL24	Low superheat EVD compressore 4	Auto	0 sec	Warning	The evaporating temperature of the system is low, maybe there is not enough refrigerant or the probe is faulty. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to
AL25	Low evaporation temperature EVD compressor 1 (LOP)	Auto	0 sec	Warning	
AL26	Low evaporation temperature EVD compressor 2	Auto	0 sec	Warning	
AL27	Low evaporation temperature EVD compressor 3	Auto	0 sec	Warning	

AL28	Low evaporation temperature EVD compressor 4	Auto	0 sec	Warning	restart the system. If the error does not go away, contact the closest Climma service center.
AL29	High evaporation temperature EVD compressor 1 (MOP)	Auto	0 sec	Warning	The evaporating temperature of the system is too high, maybe the probe is faulty. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL30	High evaporation temperature EVD compressor 2	Auto	0 sec	Warning	
AL31	High evaporation temperature EVD compressor 3	Auto	0 sec	Warning	
AL32	High evaporation temperature EVD compressor 4	Auto	0 sec	Warning	
AL33	Low suction temperature EVD compressor 1	Auto	0 sec	Warning	
AL34	Low suction temperature EVD compressor 2	Auto	0 sec	Warning	The suction temperature value is too low, maybe there is not enough refrigerant in the system and there's a leak, or maybe a probe is faulty. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL35	Low suction temperature EVD compressor 3	Auto	0 sec	Warning	
AL36	Low suction temperature EVD compressor 4	Auto	0 sec	Warning	
AL37	Start failure compressor 1	Auto5, M	10 sec	OFF compressor	
AL38	Start failure compressor 2	Auto5, M	11 sec	OFF compressor	An error occurred while starting compressor. Check sea water flow in case compressor's envelope reaches zone 5 or zone 9. Then try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL39	Start failure compressor 3	Auto5, M	12 sec	OFF compressor	
AL40	Start failure compressor 4	Auto5, M	13 sec	OFF compressor	
AL41	Envelope alarm compressor 1	Manual	60 sec	OFF compressor	The compressor was working outside of its "safe" zone, therefore the system stopped. Check sea water flow in case compressor's envelope reaches zone 5 or zone 9. Then try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL42	Envelope alarm compressor 2	Manual	60 sec	OFF compressor	
AL43	Envelope alarm compressor 3	Manual	60 sec	OFF compressor	
AL44	Envelope alarm compressor 4	Manual	60 sec	OFF compressor	Delta Pressure < than minimum required for lubrication --> The difference between the suction and discharge pressures is too low and it can create problems to the compressor. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL45	Low pressure differential compressor 1	Manual	60 sec	OFF compressor	
AL46	Low pressure differential compressor 2	Manual	60 sec	OFF compressor	
AL47	Low pressure differential compressor 3	Manual	60 sec	OFF compressor	
AL48	Low pressure differential compressor 4	Manual	60 sec	OFF compressor	Discharge max. Temperature --> The discharge temperature of the system is too much and out of the allowed values. Check that there is enough water going through the condenser. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
AL49	High discharge gas temperature compressor 1	Manual	0 sec	OFF compressor	
AL50	High discharge gas temperature compressor 2	Manual	0 sec	OFF compressor	
AL51	High discharge gas temperature compressor 3	Manual	0 sec	OFF compressor	
AL52	High discharge gas temperature compressor 4	Manual	0 sec	OFF compressor	Temp. Probe B1 (set-point) faulty or
AL53	Temperature sensor B1 error	Auto	60 sec	OFF compressor	



					disconnected
AL54	Temperature sensor B2 error compressor 1	Auto	60 sec	OFF compressor	Temp. Probe B2 (antifreeze) faulty or disconnected
AL55	Temperature sensor B2 error compressor 2	Auto	60 sec	OFF compressor	
AL56	Temperature sensor B2 error compressor 3	Auto	60 sec	OFF compressor	
AL57	Temperature sensor B2 error compressor 4	Auto	60 sec	OFF compressor	
AL58	Temperature sensor B3 error compressor 1	Auto	60 sec	OFF compressor	Temp. Probe B3 (suction temperature) faulty or disconnected
AL59	Temperature sensor B3 error compressor 2	Auto	60 sec	OFF compressor	
AL60	Temperature sensor B3 error compressor 3	Auto	60 sec	OFF compressor	
AL61	Temperature sensor B3 error compressor 4	Auto	60 sec	OFF compressor	
AL62	Temperature sensor B4 error compressor 1	Auto	60 sec	OFF compressor	Temp. Probe B4 (discharge temperature) faulty or disconnected
AL63	Temperature sensor B4 error compressor 2	Auto	60 sec	OFF compressor	
AL64	Temperature sensor B4 error compressor 3	Auto	60 sec	OFF compressor	
AL65	Temperature sensor B4 error compressor 4	Auto	60 sec	OFF compressor	
AL66	Temperature sensor B5 error compressor 1	Auto	60 sec	OFF compressor	NOT USED
AL67	Temperature sensor B6 error compressor 1	Auto	60 sec	OFF compressor	Pressure Probe B6 (suction pressure) faulty or disconnected
AL68	Temperature sensor B6 error compressor 2	Auto	60 sec	OFF compressor	
AL69	Temperature sensor B6 error compressor 3	Auto	60 sec	OFF compressor	
AL70	Temperature sensor B6 error compressor 4	Auto	60 sec	OFF compressor	
AL71	Temperature sensor B7 error compressor 1	Auto	60 sec	OFF compressor	Pressure Probe B7 (discharge pressure) faulty or disconnected
AL72	Temperature sensor B7 error compressor 2	Auto	60 sec	OFF compressor	
AL73	Temperature sensor B7 error compressor 3	Auto	60 sec	OFF compressor	
AL74	Temperature sensor B7 error compressor 4	Auto	60 sec	OFF compressor	
AL75	Defrost end by max time compressor 1	Auto		Lock defrost	Defrost ended by max time duration - NOT USED
AL76	Defrost end by max time compressor 2	Auto		Lock defrost	
AL77	Defrost end by max time compressor 3	Auto		Lock defrost	
AL78	Defrost end by max time compressor 4	Auto		Lock defrost	
AL79	BMS offline heartbeat	Auto			
AL80		Auto			
AL81	Compressor 1 not started by excessive delta P	Auto	300 sec	OFF compressor	Start fail due to high DeltaP
AL82	Compressor 2 not started by excessive delta P	Auto	300 sec	OFF compressor	
AL83	Compressor 3 not started by excessive delta P	Auto	300 sec	OFF compressor	
AL84	Compressor 4 not started by excessive delta P	Auto	300 sec	OFF compressor	
AL85	Antifreeze alarm compressor 1	Manual	0 sec	OFF compressor	Anti freeze temp.probe out of allowed range
AL86	Antifreeze alarm compressor 2	Manual	0 sec	OFF compressor	
AL87	Antifreeze alarm compressor 3	Manual	0 sec	OFF compressor	

AL88	Antifreeze alarm compressor 4	Manual	0 sec	OFF compressor	
AL89	Flowmeter compressor 1	Manual	15sec, 0	OFF compressor	Flow switch error. Low water in the circulation circuit
AL90	Flowmeter compressor 2	Manual	15sec, 0	OFF compressor	
AL91	Flowmeter compressor 3	Manual	15sec, 0	OFF compressor	
AL92	Flowmeter compressor 4	Manual	15sec, 0	OFF compressor	
AL93	Power+ offline compressor 1	Auto	30 sec	OFF compressor	Inverter is offline, shut off the power supply and check the wiring diagram and connections, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.
AL94	Power+ offline compressor 2	Auto	30 sec	OFF compressor	
AL95	Power+ offline compressor 3	Auto	30 sec	OFF compressor	
AL96	Power+ offline compressor 4	Auto	30 sec	OFF compressor	
AL97	Alarms Power+ compressor 1	Manual	0 sec	OFF compressor	See below detailed alarms/errors
AL98	Alarms Power+ compressor 2	Manual	0 sec	OFF compressor	
AL99	Alarms Power+ compressor 3	Manual	0 sec	OFF compressor	
AL100	Alarms Power+ compressor 4	Manual	0 sec	OFF compressor	
AL101	Alarms board slave 1 offline	Auto	60 sec	OFF slave 1 comp.	Slave units offline
AL102	Alarms board slave 2 offline	Auto	60 sec	OFF slave 2 comp.	
AL103	Alarms board slave 3 offline	Auto	60 sec	OFF slave 3 comp.	
AL104	Alarms presence on unit slave 1				Slave units with alarms
AL105	Alarms presence on unit slave 2				
AL106	Alarms presence on unit slave 3				

EXV = Electronic Expansion Valve (errors related to this, AL07 to AL11, are due to other sensors that are required from the valve to work correctly)

### Inverter Alarm codes:

0: No fault	
1: Overcurrent	The current delivered by the inverter drive is too high, check the power supply, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.
2: Motor overload	The current delivered has exceeded the rated motor current beyond the maximum time allowed. Shut off the system, wait 1 minute, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.
3: Overvoltage	The DC voltage between the inverter and the compressor has exceeded the allowed limits. There may be a voltage surges in the power supply, therefore check the power supply. Shut off the system, wait 1 minute, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.
4: Undervoltage	The DC voltage between inverter and compressor is below the allowed limits. This can be due to insufficient power supply or maybe other circuit errors, so check also for other errors, then shut off the system, wait 1 minute, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.
5: Drive overT.	Drive temperature has exceeded the allowed maximum. Inverter is water cooled so check that there is water flow in the cooling plate on the back of the inverter. If there is no flow, check the water valve on the system, which is allowing or not the water to flow in the inverter cooling plate.
6: Drive underT	Drive temperature is lower than the allowed minimum. Heat the environment where the drive is installed.
7: Overcurrent HW	The current delivered by the inverter drive is too high; this can be due to a sudden significant increase in load or short-circuited motor cables. Check the power supply and the cables to the motor, then shut off the system, wait 1 minute, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.

8: Motor overtemp.	The temperature measured by the PTC thermistor on the motor exceed the allowed value. Shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
9: Drive Failure	
10: Cpu error	There has been a data loss in inverter memory, contact the closest Climma service center.
11: Param. default	
12: DC bus ripple	Check the power supply as there are maybe fluctuations. Shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
13: Data comms fault	Data connection from the board to the inverter was interrupted. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
14: Drive thermistor	There has been an internal fault of the inverter, please contact the closest Climma service center.
15: Autotune fault	
16: Drive disabled	Cables are disconnected, an external protector maybe has been activated; check the connections. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
17: Motor phase	Motor cable disconnected, check the cables from the inverter drive to the compressor with power supply off. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
18: Fan fault	Fan failure, try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
19: Speed fault	Incorrect parameters or unsuitable motor load. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
20: PFC Failure	PFC circuit overcurrent; there may be a problem in the power supply or maybe other circuit errors, so check also for other errors, then shut off the system, wait 1 minute, then try to restart the system and reset the alarm. If the error does not go away, contact the closest Climma service center.
21: Error code 21	AC input voltage too high, Check line voltage and the presence of inductive loads on the line that may generate overvoltage.
22: PFC Undervoltage	AC input voltage too low, Check line voltage and the power cables.
23: STO Survey	internal fault. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
24: STO Survey	
25: Ground fault	Drive earth leakage current is too high. Check motor earth insulation and the connection cables.
26: Internal error 1	CPU overload. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
27: Internal error 2	Data loss in memory. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.
28: Drive overload	The current delivered has exceeded the drive's rated current beyond the maximum time allowed, check the load, motor sizing and the cables.
30: Error code 30	
98 : Unexpected inverter restart	
99: Unexpected inverter stop	There is a problem in the data connection between inverter and board. This may be due to a problem in the power supply that allowed for a communication problem between inverter and board. Try to reset manually the alarm, then if it does not go away, shut off the system, wait 1 minute, then try to restart the system. If the error does not go away, contact the closest Climma service center.

## 5.2. Basic troubleshooting

### PROBLEM: SYSTEM IS NOT STARTING

- With power off, check that the power supply is correctly connected to the unit and that the circuit breaker dedicated to the system is on.
- With power off, check the electrical connections to see if there is a bad connection at a terminal block of the electrical control box.
- With power off, check that the circuit breaker on the system is on (the circuit breaker is on-board, between the electrical box and the EMC filter-inverter).
- With power off, check between ground and L and N to see if there is continuity, then continue to all components to find the problem. Correct or replace the component if continuity is found.
- If the problem has always been there, check the circuit breaker, maybe it is not enough.

### PROBLEM: A PUMP IS NOT STARTING

- Check the power supply to the pump (check the connection from the electrical control box to the pump)
- NB. The pumps are working only when the compressor is running.

### PROBLEM: SYSTEM NOT COOLING/HEATING

- If compressor is running, then the system might have lost some refrigerant. Call an authorized Veco service center and check the system pressures (discharge and suction).
- If compressor is not running:
  - check if "Status" is OFF, then switch it to "Winter" or to "Summer". In OFF status the compressor is not supposed to run.
  - check if the unit has already reached the set-point (in Winter mode, the return water temperature has to be higher or equal to the set-point, in Summer mode, the return water temperature has to be lower or equal to the set-point)

### PROBLEM: HIGH PRESSURE ERROR

- (in Summer mode) Check the sea water flow and clean the strainer or the condenser if necessary.
- (in Winter mode) Check the circulation circuit flow and check the circulation pump.
- Check if the sea water pump is running correctly.