



# **CWS AIR-CONDITIONERS**

## **MODUL & MODUL XL**

### **INSTALLATION, OPERATION AND MAINTENANCE MANUAL**

# CWS air-conditioners

## 1 - Installation

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## 1.1 - Electrical connections

### 1.1.1- Electrical box main control panel

The system is controlled by the step regulator (Thermoregulator). When the unit is running the electronic temperature control displays the actual water temperature, which is measured at the fresh water return from fan coils.

The temperature control has 2 set points (ST):

ST1 1 (COOL) for summer cooling at +12° C

ST 2 (HEAT) for winter heating.(only for units with heat option) at +40°C.

The control box is equipped with:

- **"Control"** switch ( 0 - 1 ) is the main switch for the units with cool mode only.

OR

- **"Mode"** change over switch (COOL-OFF-HEAT) in case the system is equipped with "heat" function. This switch selects the running mode for summer or winter operation and in the meantime starts the unit.
- **"FLOW"** light (red) which lits when the fresh water flow is not enough and the safety flow switch has cut the system out. In the same time the step regulator displays a value of -6° C (Cool mode) or +60° C (Heat mode). The system will come back automatically as the fresh water flow returns to the correct value (see also 5.3)



- **"POWER"** light (green) which indicates that the box is connected to mains supply.
- **"RESET"** yellow push button used to reset the compressors safeties. The compressors will restart automatically within 6 minutes after the reset.
- **"LP"**, **"RUN"** and **"HP"** lights for each compressor, indicating respectively an alarm for low pressure, the run situation and the high pressure alarm on each individual compressor.
- **Compressor 1-2...**"On-Off" switch to be used to cut out all or individual compressors for pump test, for limiting the system capacity.

- “Thermoregulator” step regulator which controls the fresh water temperature cutting on and off each compressor. This control has also the function to equalize the compressor running time.
- “Main Power” switch which cuts the entire supply to the electrical box.

### 1.1.2 Remote control panel

The electrical box is equipped with extra connections for an external control panel (supplied as option). This panel is equipped with a “On”-“Off” switch plus the run and alarm lights and also of the mode selection (Cool-Heat) for the systems equipped of this function.



In order to put the remote panel in operation, there is a specific switch inside the control box marked “INT - EXT” . This switch must be turned to "ext".

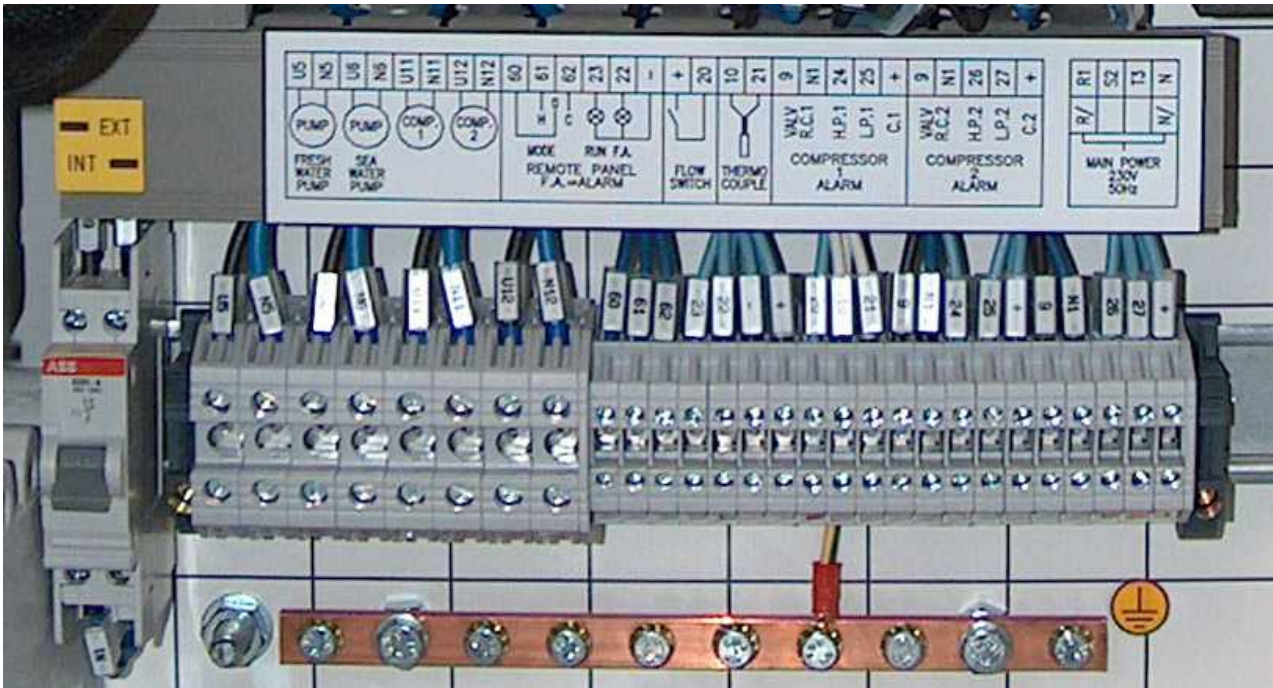
### 1.1.3-Connections between the electrical box and the CWS unit

Connect the unit main box to each module , as shown in the electrical schematic, using an adequate cable, respecting the marking in the main electrical box and in the module box. The numbering must follow the electrical schematic supplied.

### 1.1.4 -The internal connections are:

The internal connections from the main box to the individual module box are:

- Mains supply: check that the mains supply corresponds to the electrical box data.
- Controls: these are the safeties and controls from the electrical box to each single module. Each module is equipped with a connection box with a numbered terminal strip.
- The thermostat probe (mod. NTC) is already installed in the special “pocket” on the unit manifold, and must be connected as indicated in the electrical schematic. The probe cable should run separate from power cables to avoid interferences. In case of need of extending it, use a shielded cable. Do not exceed 10 metres.
- Connect the flow switch (no polarity)as indicated in the electrical schematic. Never run the unit without connecting the safety flow switch (see 3.2 ).



### 1.1.5 - External connections

All the electrical connections must comply with the rules of safety existing in each country, with special care to the ground connection.

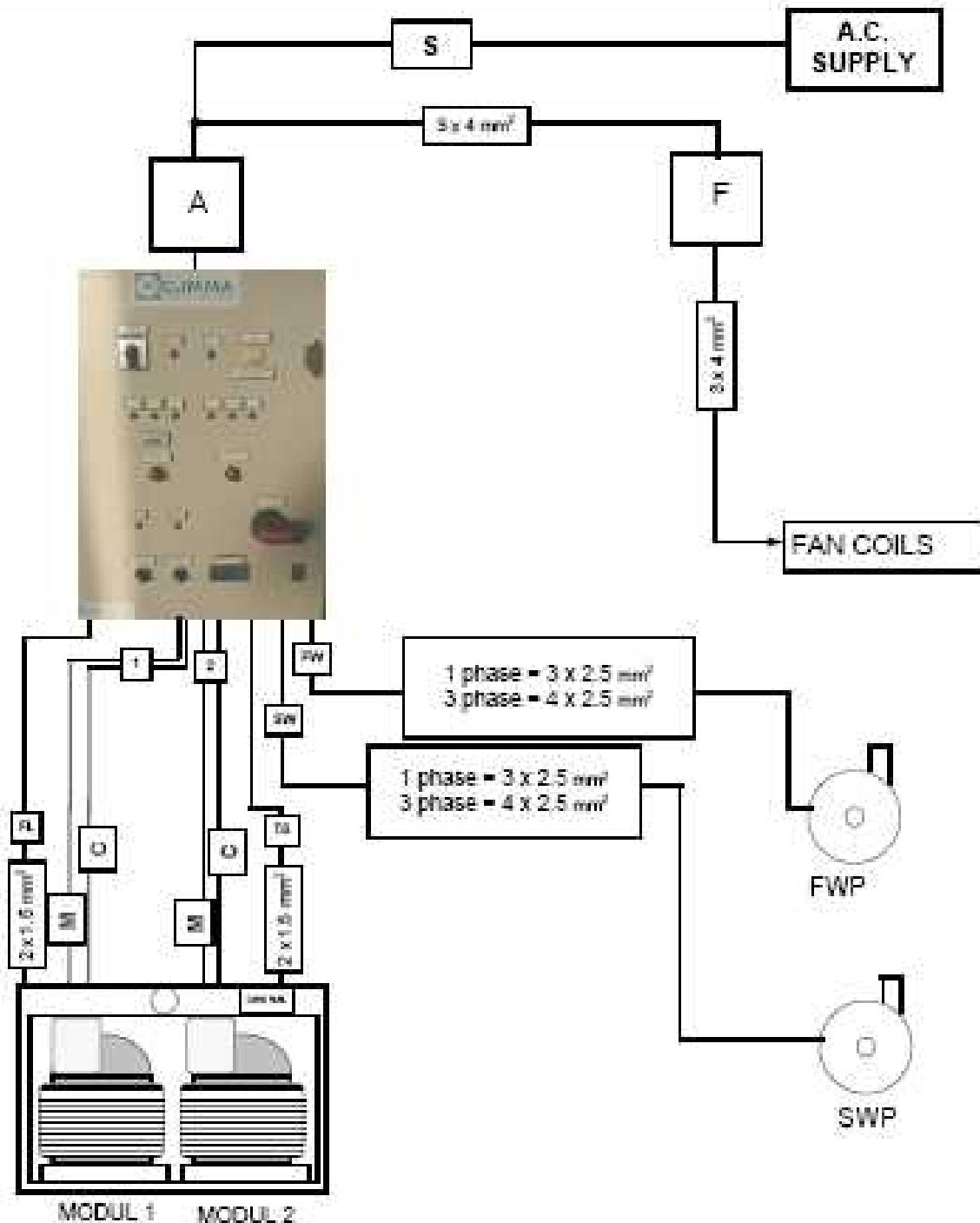
Supply must be connected from a suitable circuit breaker using a cable adequate to the maximum operating load (see table C473). Also the seawater and fresh water pump lines should be done with a cable adequate to the power.

Three phase compressors and pumps must be connected respecting the phase sequence of the three phases (RST). The internal connections are made respecting the phase sequence.

#### Warning:

- If the phase sequence is not respected the **scroll compressor** will not run correctly, will be noisier and inefficient. If the scroll compressor or a pump is let run in the wrong sense for more than 5 minutes it will be damaged.
- Ground connection must be connected to the ground bar.

BLOCK ELECTRICAL SCHEMATIC FOR CWS MODUL  
 SCHEMA ELECTRIQUE A BLOQUES POUR CWS MODUL  
 SCHEMA ELETTRICO A BLOCCHI PER CWS MODUL



- 1, 2, 3,..... = MODUL 1, MODUL 2, MODUL 3, .....
- A, F = CIRCUIT BREAKERS, DISJUNCTEURS, MAGNETOTERMICI
- C = CABLE, see table, voir tableau, vedere tabella
- FL = FLOW SWITCH, FLOWSTAT, FLUSSOSTATO
- FWP = FRESH WATER PUMP; POMPE EAU DOUCE; POMPA FAN COIL
- M = CABLE, see table, voir tableau, vedere tabella
- S = CABLE, see table, voir tableau, vedere tabella
- SWP = SEA WATER PUMP; POMPE EAU DE MER; POMPA MARE
- TS = TEMPERATURE SENSOR (FRESH WATER)



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## 1 - INSTALLATION SEA WATER CIRCUIT

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- **1.2- SEA WATER CIRCUIT**

### 1.2.1 - SEA WATER PUMP

The seawater pump is needed to circulate the given water quantity thru the refrigerant-sea water exchanger. The seawater pump should also be quiet, continuous duty rated, marine grade material construction.

### 1.2.2 - LOCATION

Choose the pump position as per the following rules:

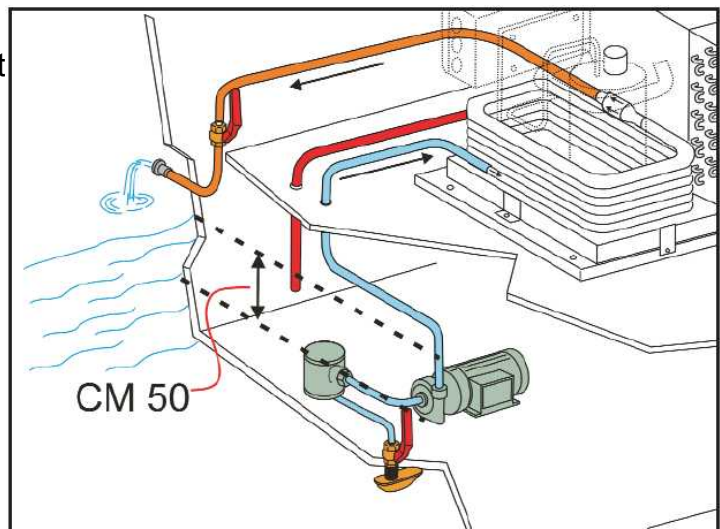
- A.- The pump should be installed with the shaft in horizontal position and the water outlet at top
- B the centrifugal pump must be installed at least 0.50 m below the water line
- C The water intake must be "scoop type" oriented forward.
- D Seacock, strainer and pump intake should be connected without siphoning; the piping should always rise from seacock to the pump
- E - The intake line should be as short as possible (it is very difficult to run a good circuit with an intake piping longer than 1 m).
- F The delivery side of the circuit should have the same characteristics as intake so that the circuit will be self-bleeding.
- G The outlet line of the pump should rise at least for 25 cm. (10 in.) just after the pump outlet in order to keep the pump primed at all times.

### 1.2.3 - INSTALLATION

The pump should be fastened with adequate screws using the holes in its base or the special fixing base (available for small models). For larger pumps, the original quiet and smooth running can be improved by using a silent block mounting.

### 1.2.4 - SEA WATER CIRCUIT

We can resume the following most important rules: the circuit should always rise from water intake to the unit manifold. After that the circuit can rise again or drop to the discharge port. It is absolutely to prevent that the circuit rises and drops making siphons, which will prevent air to be drained, causing an airlock. The discharge side of the circuit should be made so that the water discharge want cause excessive noise both for this yacht and his neighbours. We suggest having the discharge hole just above the water line, so that the water flow can be easily checked at any time.



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## 1 - INSTALLATION FRESH WATER CIRCUIT

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### **3 - Fresh water circuit**

#### **1.3.1-Fresh water circuit connections**

Follow the installation schematic, with particular regard to the sense and position of components.

Keep in mind the accessibility of components for the following steps of installation and also for maintenance. Respect the flow sense marked on the unit. Keep accessible the purging valve installed on the fresh water return.

Respect the nominal diameters of the manifold.

**Manifold:** install it in an accessible position, if possible with a certain heel (purging valve higher).

Check that each calibrating valve (if installed) of the manifold is fully open.

**Expansion tank:** respect the schematic. Connecting port must be upwards to drain out of it.

**Fresh water pump:** respect the layout schematic.

**Fresh water circuit:** keep in mind that the easiest and shortest is the best.

Theoretically any “high” point in the circuit must have a purging valve. Siphoning and “up-and-down” must be avoided as anyway they make the air purging difficult and trap air.

**Fan coil :** respect the flow sense. Each fan coil is equipped with a purging valve that must be accessible both at installation and also for maintenance. The FC type fan coils should be installed with a “ backwards “ heeling.

#### **1.3.2- Automatic air-bleeder**

This device makes much simpler both the bleeding of the new system and the following routine maintenance. It must be installed vertically on the outlet of the fresh water pump. This automatic air-bleeder, once the fresh water pump is primed, bleeds any air which has been trapped inside the circuit automatically. It will be necessary only to bleed the fan coils installed in the highest position as all the remaining air will be bled automatically by this device.

#### **1.3,3 – Safety Flow switch**

This item is installed on the fresh water manifold. **It must be accessible for maintenance and calibration.**

The flow switch is needed as a safety device which cuts out the compressor if the fresh water circulation stops or is not enough.

The flow switch must be electrically connected to the electrical box (two wires cable), as specified in the electrical schematic. The commissioning will test that this safety by simulating a reduction of the fresh water flow.

#### **1.3.4- Pressurizing the fresh water circuit**

The gauge set installed in the fresh water circuit is equipped with two charging ports each ( H –H1) with a manual valve and an automatic check valve, which prevents the internal charge to come back to the pressurized sanitary water circuit in case of mistake. Use one of the two valves to charge and pressurize the circuit with fresh water up to 1.5 Bars checking it with the pressure gauge. This port must be permanently connected to the yacht's sanitary water system, preferably thru an additional manual valve.

Check that the circuit keeps the pressure over a certain period of time indicating that it is leak proof. As you are sure that the circuit is leak proof reduce the pressure to make room and add antifreeze to the circuit (see 3.4).

### 1.3.5- Antifreeze solution

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

- a) Calculate approximately the circuit capacity fill it 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 Bars 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 .
- b) 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.

### 1.3.6- Air bleeding

We strongly recommend that a special “**Automatic Air bleeding vessel**” be installed in the fresh water circuit, just after the pump outlet. This device will dramatically reduce the bleeding procedure and will also keep the system free of air during its life. The “air-bleeding vessel” is available in several sizes.

When the circuit is under pressure with the antifreeze solution, purge the air as follows: Bleed the entire circuit (manifold, fan coils, and all the other purging points) starting from the lowest level and keeping the circuit pressure at 1.5 Bars.

This bleeding must be done **without** running the pump.

Repeat all points, until no more air comes out from the bleeding valves, still keeping the pressure at 1.5 Bars.

Then...

Set to “off “ position each compressor switch.

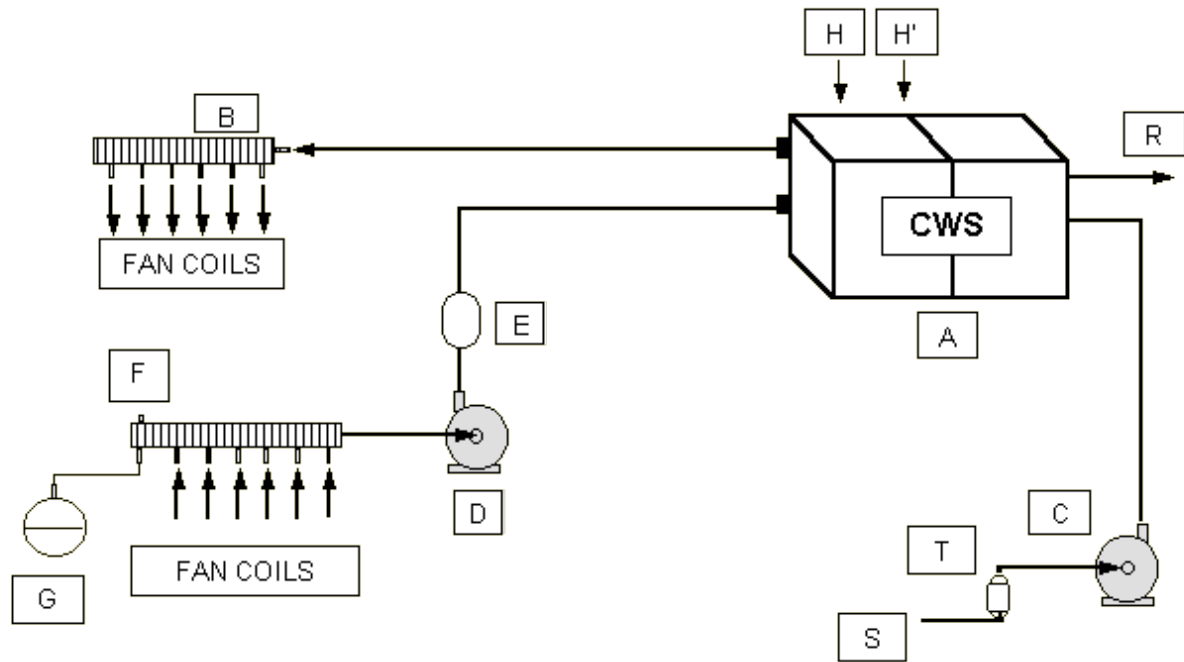
Check that seawater intake is open and start the unit in “Cool “ mode; both pumps will run (see also 5.4).

Let the fresh water pump run for 30 seconds then stop the system and bleed again all points, keeping the pressure at 1.5 Bars.

During this filling procedure it is normal that the red alarm light (flow switch alarm) sometimes comes on, indicating that there is no flow in the circuit.

Bleeding can be considered over when no more air is coming off the purging points and the fresh water circulation pump runs even and quiet.

## CWS SYSTEM CONFIGURATION



- A = Central CWS unit - Unitè centrale CWS – Unità centrale CWS
- B = Fan coil delivery manifold - Collecteur sortie fan coil – Collettore mandata fan coil
- C = Sea water pump – Pompe eau de mer – Pompa acqua mare
- D = Fresh water pump – Pompe eau douce – Pompa acqua dolce
- E = Air bleeding vessel (option) - Deaérateur – Deareatore
- F = Fan coil return manifold – Collecteur retour fan coil – Collettore ritorno fan coil
- FL = Flow swith control – Flussostat – Flussostato
- G = Expansion tank - Ballon d'expansion – Vaso di espansione
- H = Fresh water charge - Remplissage eau douce – Carico acqua dolce
- H' = Antifreeze charge - Remplissage antigel – Carico antigelo
- R = Sea water oulet – Sortie eau de mer – Uscita acqua mare
- S = Sea water inlet - Entree eau de mer – Entrata acqua mare
- T = Sea water strainer – filtre eau de mer - Filtro acqua mare



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## 2 - COMMISSIONING

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## 2 - COMMISSIONING

### 2.1- Fresh water circuit

Important notice: The fresh water circulation must be adequate to the fan coil capacity to achieve the best performance. The flow however must reach the minimum flow specified for the central unit.

The table C413 shows the values of the minimum fresh water flow.

The compressor cannot run without fresh water circulation. Reduced or no water circulation will cause freezing situation and will damage the module in few seconds. If freezing happens, pure water ice will break the special heat exchanger (evaporators) of the unit, causing a complete failure of the module and or of the unit. The following safeties prevent the unit to be damaged by the lack of fresh water circulation.

a) **Safety flow switch**: this device stops the unit if the water flow drops below the preset minimum.

b) **Low pressure switch**: it is installed on each module and stops the unit if the low pressure in the refrigerant circuit falls below 2 bars.

c) **Antifreeze solution**: the fresh water circuit must be filled with water and antifreeze solution (20%).

The addition of antifreeze lowers the freezing point of the water and adds an additional safety to the circuit.

In a freezing condition, the ice made by an antifreeze solution is “softer” and it will unlikely produce a damage. Antifreeze has also the purpose to prevent any corrosion inside the fresh water circuit.

Check that the fresh water circuit pressure gauge shows 1.5 Bars.

### 2.2- Flow switch

As explained at 3.2, a safety flow switch is installed in the fresh water circuit outlet manifold. It is very important to make sure that this safety device is properly wired to the control box. To do this, it is possible to simulate a lack of fresh water flow just pushing the lever inside the switch protecting cup.

**Warning** : the flow switch is connected to the main electrical box and this check must be done by expert engineers only, keeping in mind all the safety precautions.

### 2.3 Start up

⇒ Turn all the compressor switches to “0”

⇒ Give supply to the electrical box and turn the “Main Power switch to “ON”. The green LED light must come on.

⇒ If the unit is equipped with the “Heat” function, turn the “Mode” switch to “Cool” position to test the system in **cool mode**.

OR

⇒ Make sure that the box switch “Control” is in “0” position (Units without heat function).

⇒ For a short time (2-3 seconds) the red warning light “FLOW” will come on, until it is established a regular flow in the fresh water circuit.

⇒ The thermoregulator display will come on. At this stage the display will show the value of - 6°C for the cool mode and a value of + 60°C for the heat mode. This value will appear every time the unit is locked out by a flow switch alarm while the (FLOW) red light is on.

The same testing procedure applies to the unit with electrical heating, taking in mind that the preset thermostat temperature is at + 40° C (104 °F). The electrical heaters have a separate switch and will start instead of the compressors. Normally the number

of heaters or stages is equal to the number of compressors, but it is possible that the heaters or stages are less than compressors.

The design of the Climma fan coil limits the water temperature to 50°C. It is therefore important that the preset value of the thermoregulator (ST2=45°C) is not increased.

#### 2.4- Seawater circuit

Check that the seawater intake is fully open and that the flow is even.

#### 2.5 Fan coil

Check that each fan coil is correctly fed with chilled water, measuring the inlet and outlet temperatures. The difference between these temperatures should be between 5 and 10° C. If the differential is higher, it normally means that there is still air in the circuit and the circulation in that fan coil is poor.

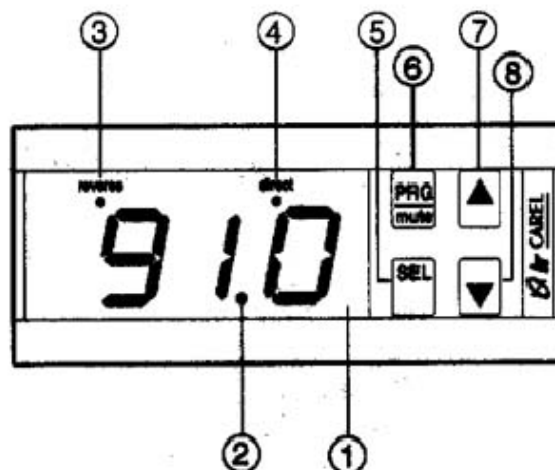
In case of particularly long circuit, it might be necessary to adjust the fan coil flow closing the calibrating valves of the fan coils nearer to the manifold in order to let more water to reach the ones, which are more distant.

**Check that the thermostat sensor is correctly positioned in the air intake of each fan coil.** If the temperature control is "Fan Only" the thermostat stops the fan when the ambient temperature reaches the set point.

If the fan coil control is "Water valve" then the thermostat closes the special water valve connected to the fan coil while the fan keeps running. See special instructions for the fan coil **Vega** electronic infrared control are given separately.

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### CAREL IR 32 Z SETTING – REGOLAZIONE



**MODIFYING THE SET POINT:** press PRG (6) for 5 seconds until ST1 is shown on the display; Press Sel (5): the display shows the actual value of ST1 which is the cut out point (standard +12° C). Press either Arrow –up (7) or Arrow-down (8) to change the set point and then PRG to save. If the display blinks, it means that the maximum preset value (deep program) is reached.

**VARIAZIONE DEL SET POINT:** premere per 5 secondi il pulsante PRG fino a far apparire ST1 sul display. Premere il tasto 5 SEL: il display mostra il valore attuale di ST1 (12°C). Si può usare il pulsante 7-Freccia sù oppure il pulsante 8-Freccia giù per variare il valore secondo le necessità. Se il valore incomincia a lampeggiare e non accetta variazioni significa che quello è il limite impostato nella programmazione avanzata.

# 3 - OPERATION

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### 3 - OPERATION

#### 3.1- Running the unit from the main control panel

- a) Make sure that all the circuit breakers inside the electrical box are put in "ON" position.
- b) Put the switch "(INT - EXT)" in "INT" position.
- c) Turn on "ON" the "Main Power" switch.
- d) The "**POWER**" light (green) which indicates that the box is connected to mains supply.
- e) Turn to "1" all the **compressor** switches.



- f) Turn the "Control" switch on 1 (for units in Cool Only version)

OR

- g) Turn the ".**Mode**" change over switch (COOL -OFF-HEAT) (for units equipped with "heat" function) , to run the system and contemporary to select the running mode (Cool).
- h) The "**FLOW**" light (red) will lit for a short time and then goes off meaning the the fresh water flow is correct.
- i) The step regulator (Thermoregulator) displays initially a value of -6° C the rises till it shows the actual fresh water temperature
- j) Now, one by one, all the compressors will start in sequence
- k) Let the system run checking that the fresh water temperature decreases regularly till it reaches the set point value.



#### 3.2 Running the unit from the remote control panel

Proceed as described in the previous chapter but at point (b) put the switch on "EXT" position, so that the remote panel is in control.

Turn the switch of the remote panel on "1" or "Cool" and then proceed thru the other point till (k).. The system will work normally but it is controlled by the remote panel for

the run and stop operation and also for the “Cool-Heat” selection if the system has this function.

### 3.3 Stop from the main box:

Turn the "Control" or "Mode" switch to "0".

### 3.4 Stop from the remote panel

Turn the remote panel switch to "0".

### 3.5 Pumps

Pumps start as the main switch is turned into Cool or Heat mode or when the “Control” switch is turned to “1”.

### 3.6 Spare pump control

If there is a “duty” pump and a “spare” pump, the electrical box is equipped with a dedicated change over switch for each set of two pumps. This switch controls the use of the duty pump (position 1) or the spare pump (position 2). Before switching from position 1 to position 2, you must make the necessary changes in the sea and/or fresh water circuit, closing and opening valves in order to connect the chosen pump in the circuit.

### 3,7 Alarm reset

In order to reset the compressor alarm it is necessary to:

- a) check the reasons of the alarm and restore the normal functioning conditions
- b) push the yellow “RESET” button for 5 seconds . This operation puts off the alarm lights and will restore the starting procedure, and the compressors will restart automatically within 6 minutes.

### 3.8 Fan coil in summer operation (standard fan coil control panel)

The temperature in each cabin is controlled by a room thermostat, which controls the fan motor. The panel (Fan Coil) change over switch must be set in “Sun” position and the thermostat must be set to medium (horizontal setting). The fan speed control can run the fan on three different speeds. The **minimum speed** is in the centre of the fan control switch.

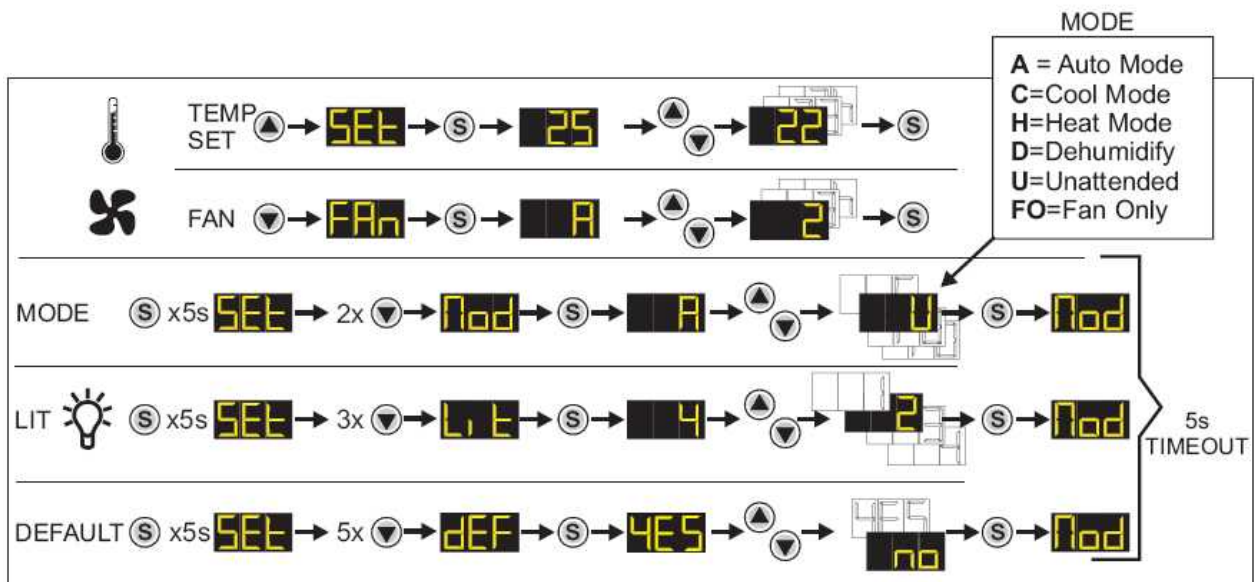
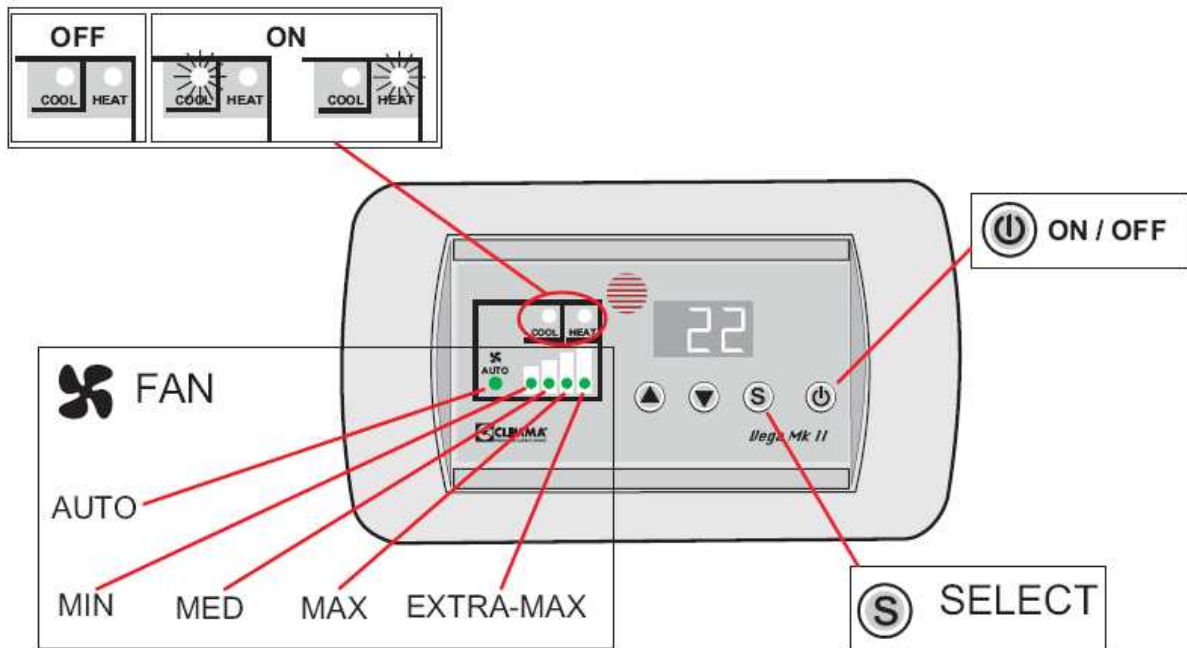


### 3.9 Fan coil in winter operation (standard fan coil control panel)

The temperature in each cabin is controlled by a room thermostat, which controls the fan motor. The panel change over switch must be set in “Ice star” position and the thermostat must be set to medium (horizontal setting). The fan speed control can run the fan on three different speeds. The **minimum speed** is achieved by pressing the centre of the fan control switch.

### 3.10 Vega Mk2 digital control

The complete instructions for this control are supplied together with the product. Here under you find the simplified operation instructions.



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## 4 - MAINTENANCE

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## 4 - MAINTENANCE

4.1- Every time the unit is operated check that:

- 1 - With the "Control" or "Mode" switch on "0" all the check lights must be lit.
- 2 - Before turning the unit on, check that the fresh water pressure in the circuit is between 1 and 2 bars as indicated by the gauge on the unit. If the pressure drops frequently the circuit must be repaired and the leak(s) fixed as continuous topping up the pressure will dilute the antifreeze reducing the unit safety. The antifreeze solution of the Fan Coil circuit must be checked at least every 2 years.  
The solution to refill the circuit must be composed 80% water and 20% glycol or a good antifreeze product.
- 3 - Check frequently the efficiency of the seawater circuit, inspecting the seawater strainer and evaluating or even measuring the seawater flow from the outlet. We suggest keeping available a spare seal for the seawater and also one for the fresh water pump.
- 4 - Clean or better replace the air filters on each fan coil. A dirty air filter is dramatically reducing the fan coil efficiency as it reduces the airflow.
- 5 - At the beginning of the summer season, check that the condensate drain from each fan coil is clean and discharges freely. Consider that in humid and hot days the condensate can reach a flow of 1 litre per hour from each fan coil.
- 6 - If the system is not operated for a while, we suggest turning both pump manually for few turns before running the system.

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## 5 - TROUBLESHOOTING

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## 5 TROUBLESHOOTING

### 5-1 Central unit

a) **Red alarm light (FL)** : this means that the fresh water flow in the circuit is lower than the minimum accepted. This has caused the safety flow switch to cut the unit off. This situation could be very dangerous for the unit and extreme care must be taken in investigating the reason of the cut off.

Check that:

- ⇒ The pressure in the fresh water circuit is between 1 and 2 bars
- ⇒ The fresh water pump circuit breaker is engaged and OK and the fresh water pump is correctly turning.
- ⇒ There is no air in the fresh water circuit. The fresh water pump shouldn't be noisy.
- ⇒ If the system is equipped with a spare pump, make the necessary changes to the fresh water circuit, turn the pump change over switch to number "2", and run the system with the spare pump.

### b) Compressor alarms:

**Yellow lamp**= low pressure: the corresponding module has been working with a pressure too low. Call service and turn this compressor switch to 0.

**Red lamp**=high pressure: the corresponding module has been working with a pressure too high, probably due to lack of cooling water.

In **Summer operation**: check the sea water circuit (intake, strainer and outlet) If the system is equipped with a spare sea water pump, turn the pump switch to "2" and make the necessary changes in the sea water circuit and run the system with the pump N.2. This alarm stops the sea water pump and consequently all the compressors will go off until the Reset procedure is made.

In **winter operation (reverse cycle)**: check the fresh water circuit as this pump is now cooling the condenser.

**Both the yellow and red lamps** contemporary on: it means an intervention of the compressor internal overload safety. Call service and turn this compressor switch to 0.

### c) The system doesn't heat enough:

All the units supplied with reverse cycle can run with seawater temperature above 10° C, which is common in the Mediterranean Sea.

If the sea water temperature falls below 10° C the system should never be run as the sea water heat exchangers could be damaged by freezing. .

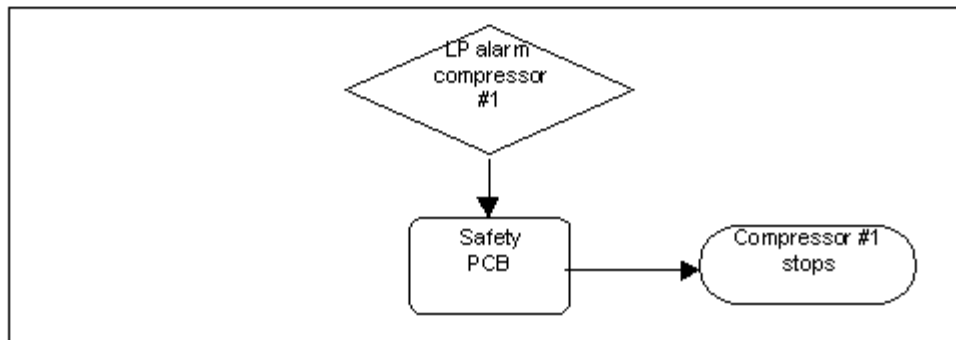
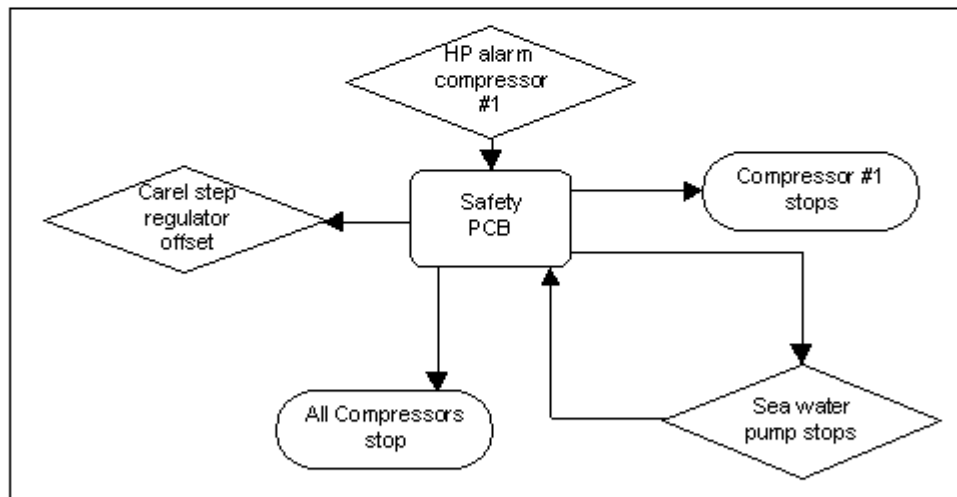
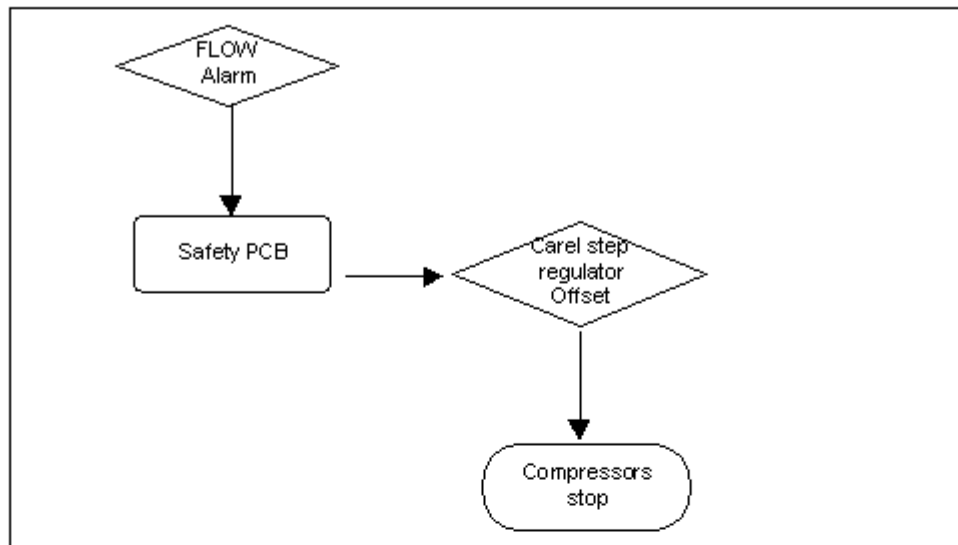
### 5.2 - Fan Coil

The blower doesn't run: make sure first that the control panel is properly set to the desired "Mode" function (cool in summer and heat in winter) and that the thermostat is turned completely to " +15 " for summer operation or " +28 " for winter operation.

Then check the connections. If they are OK, then test the voltage at the blower terminals with the max speed selected. The voltage must be 230V. If the voltage is correct, then the fan motor is defective and must be replaced. Give the fan coil and if possible the motor details to the service in order to get the correct spare. Be aware that the fan coil motor must run with its specified run capacitor, which is installed on its cable.

If there is no voltage then check the change over switch and the thermostat on the control panel.

## SAFETY PCB AND SAFETIES BLOCK DIAGRAM FOR CWS CENTRAL SYSTEMS



# CWS air-conditioners

## 6 - TECHNICAL DATA

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## 6.1- TECHNICAL DATA

### AVERAGE FUNCTIONING VALUES

COOL MODE					
TEMPERATURES		PRESSURES			
Fresh water (°C)	Sea water (°C)	HIGH(bar)	Low (bar)	HIGH(psi)	Low (psi)
26	12	14	4.7	203	68
28	27	15	5.2	217	75

\* Suction temperature + 3° C, Condensing temperature + 38°C

\*\* Condensing temperature+ 45°C

## 6,2 - CWS ELECTRICAL CONNECTION DATA

CWS UNIT	230/1/50		230/3/50		400/3/50	
	MAINS	MODULE	MAINS	MODULE	MAINS	MODULE
<b>542 S</b>	3 x 6	3 x 2.5	5 x 4 - 6*	5 x 2.5	5 x 4 - 6*	5 x 2.5
<b>632 S</b>	3 x 6	3 x 2.5	5 x 6	5 x 2.5	5 x 4 - 6*	5 x 2.5
<b>722 S</b>	3 x 6 - 10*	3 x 2.5 - 4*	5 x 6	5 x 2.5	5 x 4 - 6*	5 x 2.5
<b>813 S</b>	3 x 10	3 x 2.5	5 x 6	5 x 2.5	5 x 6	5 x 2.5
<b>962 S</b>	3 x 10	3 x 4	5 x 6	5 x 2.5	5 x 6	5 x 2.5
<b>1083 S</b>	3 x 16	3 x 2.5 - 4*	5 x 10	5 x 2.5	5 x 6	5 x 2.5
<b>1302 S</b>			5 x 16	5 x 6	5 x 6	5 x 2.5
<b>1443 S</b>	3 x 25	3 x 4	5 x 16	5 x 2.5	5 x 10	5 x 2.5
<b>1444 S</b>	3 x 25	3 x 2.5 - 4*	5 x 16	5 x 2.5	5 x 10	5 x 2.5
<b>1642 S</b>			5 x 16	5 x 6	5 x 10	5 x 4
<b>1953 S</b>			5 x 35	5 x 6	5 x 10	5 x 2.5
<b>2604 S</b>			5 x 50	5 x 6	5 x 10 - 16*	5 x 2.5
<b>3284 S</b>			5 x 50	5 x 6	5 x 16	5 x 4
* = L > 5 m.						

## 6,3 - FAN COIL CAPACITOR TABLE

FAN CAPACITOR TABLE FOR FAN-COIL, COMPACT, SPLIT.

<b>SCATOLA ELETTRICA PER: MODEL:</b>	<b>Cod. Ventilatore Fan Part No.</b>	<b>CM (<math>\mu</math>F)</b>	<b>C1 (<math>\mu</math>F)</b>	<b>C2 (<math>\mu</math>F)</b>	<b>C3 option (<math>\mu</math>F)</b>
FAN-COIL FC 2/W – FCV 2.5 Cod.M61155 – M61230	M4165	1.5	2	1.5	3.15
FAN-COIL FC 4/W – FCV 5 Cod.M61160 – M61235	2 X M4165	3.15	4	2	5
FAN-COIL FC 6/W – FCV 9 Cod.M61180 – M61240	M4166A	2	3.15	2	3.15
FAN-COIL FC 8/12/W Cod.M61165 – M61245	M4168	4	6.3	2	8
FAN-COIL FC 16/20W Cod.M61140 – M61250	2 X M4166A	4	8	2	6.3
FAN-COIL EV 4.5/9/W Cod.M60781- M60836	M64786	2	3.15	2	8
FAN-COIL EV 13/W Cod.M61853 – M61854	M64785	4	5	3.15	-
FAN-COIL EV 17/W Cod.M61041 – M60571	M61560	6.3	8	4	8
FAN-COIL EV 17/Wslim Cod.M65720 – M65735	2 X M64786	4	8	2	-
FAN-COIL EV 24/Wslim Cod.M64320 - M64316	2 X M64785	8	10	6.3	-
COMPACT 5 / 7 / 9 Cod.M61032-M61033-M61037-M61038- M65860-M65890-M66595-M66600	M64786	2	3.15	2	8
COMPACT 9 EH AMEL Cod.M61037AMEL	M64786	2	4	2	-
COMPACT 12 Cod.M61022R-M61023R	M64785	4	5	3.15	-
COMPACT 17 Cod.M60021R - M68765R	M61560	6.3	8	4	8
COMPACT 17slim Cod.M65495	2 X M64786	4	8	2	-
COMPACT 24slim Cod.M63121R-M66845-M68265R	2 X M64785	8	10	6.3	-
SPLIT 4 Evap. EV Cod.M61032-M65860-M61033-M65890	M64786	2	3.15	2	8
SPLIT 6/8 Evap. EV Cod.M61038-M65860-M61037-M65890	M64786	2	3.15	2	8
SPLIT 10 Evap. EV Cod.M61022-M65865-M61023-M66515	M64785	4	5	3.15	-
SPLIT 16 Evap. EV Cod.M60562R-M65870-M60563R-M66505	M61560	6.3	8	4	8
SPLIT 17 Evap. EV SLIM Cod.M65495	2 X M64786	4	8	2	-
SPLIT 22 Evap. EV 22 SLIM Cod.M63121	2 X M64785	8	10	6.3	-
SPLIT 4 FC Cod.M61026-M65860-M61017	2 X M4165	3.15	4	2	5
SPLIT 6 FC Cod.M61017-M65860	M4166	2	3.15	2	3.15
SPLIT 8 FC Cod.M61017-M65860	M4166	2	3.15	2	3.15
SPLIT 7 EVAP EV 115V Cod.M68235	M68165	10	20	8	-

# CWS air-conditioners

## 7 - ELECTRICAL SCHEMATICS

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