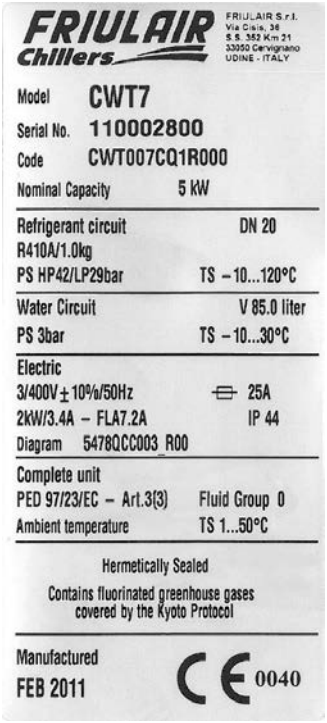
PURESTREAM
CWM CHILLERS
BY FRIULAIR

USER AND MAINTENANCE MANUAL

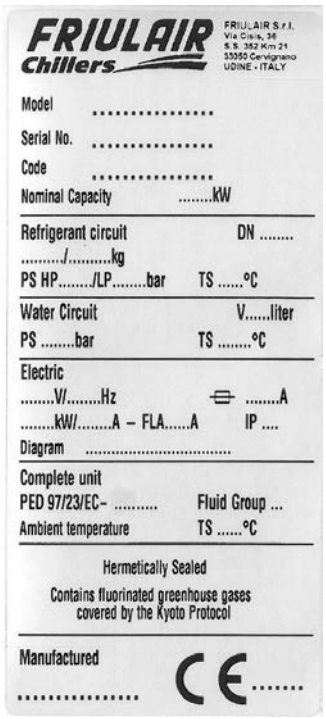
Air cooled liquid chillers
Cooling capacity 0.4 - 3.7 Tons, scroll, rotary and reciprocating compressors
..... 60Hz

Dear Customer,
Thank you for the trust you have placed in us. Please read this manual carefully to obtain the best performance from our product.
In order to avoid incorrect operating conditions and danger for the operators, it is essential that you follow the directions meticulously as well as the current accident-prevention laws in the country of use.
Each **CWM** chiller is rigorously tested before being packed.
This verifies that there are no manufacturing defects and that the machine performs correctly the functions for which it was designed.
This manual must be kept for future reference and is an integral part of the chiller you have purchased.
Due to continuous technical development, we reserve the right to make the necessary modifications without any obligation to give advance notice.
Do not hesitate to contact us if you have any problems or need more information.
The product identification plate, located on the side of the chiller, contains all essential information about the machine.
During installation, fill in the table below, copying the data on the identification plate.
You will have to give this data to the manufacturer, or reseller, whenever you request information, replacement parts, etc., during the warranty period.
Removing or tampering with the identification plate will void the warranty.

Example



Fill in this identification plate



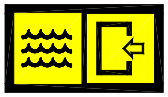
Warranty conditions:

For 12 months from the commissioning date, and no more than 14 months from the shipping date, any parts that were originally defective will be repaired or replaced at no charge. Expenses for transport and travel, room and board for our technicians are excluded.
The warranty excludes any liability for direct or indirect damage to persons, animals and/or property that are caused by incorrect use or inadequate maintenance and is exclusively limited to manufacturing defects.
The right to service under the warranty is secondary to your faultless observance of the installation, use and maintenance instructions in this manual.
The warranty will be voided immediately if the chiller is modified or tampered with, even slightly.
When requesting warranty service, you must provide the data on the product's identification plate.

Summary

1.0 Safety rules

1.1 Definitions of the symbols used

	Read this use and maintenance manual carefully before performing any repairs on the chiller.
	Warnings of a general character; risk of danger or possibility of damaging the machine, pay particular attention to the phrase following this symbol.
	Risk of electrical danger; the phrase highlights conditions that could be fatal. Follow the instructions provided meticulously.
	Risk of danger; component or system under pressure.
	Risk of danger; component or system that can reach high temperatures during operation.
	Risk of danger; it is absolutely forbidden to use water to extinguish fires near or on the chiller.
	Risk of danger; it is absolutely forbidden to operate the machine with the panel open.
	Service that can be performed by the machine's operator, if qualified (1).
	Water input connection point.
	Water output connection point.
	Dispose of each type of material in accordance with the requirements of the country of use.
NOTE:	Phrases to be emphasized that do not contain safety rules.
	This chiller has been carefully designed and constructed to be environmentally friendly: ☐Refrigerants without CFC. ☐Expanded foam insulation without CFC. ☐Energy-saving techniques. ☐Reduced noise. ☐The chiller and its packing materials are recyclable. In order not to hinder our efforts, the user is required to obey the simple ecological warnings indicated by this symbol.

(1) These are persons with the experience, technical preparation and knowledge of standards and regulations who are qualified to perform the necessary actions and able to recognise and avoid possible dangers while handling, installing, using and maintaining the machine.

1.2 Warnings

	Only qualified persons may use and maintain electrically-powered equipment. Before commencing maintenance operations ensure no parts of the machine are live and it cannot be re-connected to the electrical power supply.
	The CWM chillers contain R134a (CWM002) and R407C (CWM003-014) refrigerant. Operations on the cooling circuit must only be performed by specialist personnel with suitable equipment.
	Any modifications to the machine or related operating parameters not previously verified and authorised by the Manufacturer may be hazardous and will invalidate the guarantee.
	Do not use water to extinguish fires near or on the chiller.

1.3 Proper use of the chiller

CWM units are monobloc water chillers with air-condensation.
They are intended for use in industrial process or air-conditioning systems requiring chilled water. Any other use is considered as incorrect.
The manufacturer is not liable for damage resulting from inappropriate use; in all cases, the user is liable for any resulting hazards.

Proper use requires conforming to the installation conditions and limits of operation (see sections 3.5 and 7.0); in particular:

- power voltage and frequency;
- pressure, temperature of incoming water;
- water flow rate;
- surrounding temperature.

The chiller has been tested and completely assembled. The user must only make the connections to other systems, as described in the chapters that follow.

1.4 Instructions for using equipment under pressure conforming to PED Directive 97/23/EC

The proper use of equipment under pressure is an essential prerequisite for ensuring safety.
To this end, the user must proceed as follows:
1. Use the equipment properly within the temperature limits shown in the operating limits stated on the manufacturer's name/data plate.
2. Do not solder on the exchangers or refrigerant fluid pipes.
3. Do not install the equipment in insufficiently ventilated rooms, areas exposed to sources of heat or near inflammable substances.
4. During operation, the equipment must not be subjected to vibrations that could cause fatigue failures.
5. Keep the documentation attached to the equipment (user manual, declaration of conformity, etc.) for future reference.
6. The maximum working pressure stated on the manufacturer's data plate must not be exceeded. Prior to use, the user must fit safety / pressure relief devices.

2.0 OPERATION AND MAIN COMPONENTS

2.1 Chilling circuit

CWM chillers use a vapour-compression cycle in a chilling circuit that essentially consists of the following components: evaporator, compressor, condenser, lamination device (thermostatic expansion valve or capillary tube).

Evaporator: heat exchanger (co-axial or braze-welded) to enable heat exchange between the water and the coolant liquid without them coming into contact with each other. The water is cooled when it passes through the evaporator.

Compressor: compresses the steam from the evaporator to send it to the condenser at a higher pressure.

Condenser: finned pipe exchanger to enable heat exchange between the coolant and the air; it creates coolant gas condensation (which flows inside the pipes) transferring the gas coolant condensation heat to the air (which flows externally); high pressure coolant liquid is thus produced.

Lamination device: reduces the pressure of the liquid coolant coming from the condenser, which is then sent to the evaporator. In particular, the thermostatic valve can modulate coolant flow such as to maintain continuous heating of the gas exiting the evaporator, during various operating conditions and therefore guaranteeing gas flow without liquid parts inside the compressor.

Thanks to these components, the vapour-compression cycle works as follows: the refrigerant liquid evaporates in the evaporator, chilling the water; the refrigerant vapours are then aspirated from the compressor, which compresses them and sends them to the condenser under high pressure; here, thanks to a flow of forced air from the fans, the high-pressure refrigerant gas is cooled, making it condensed and undercooled.
The flow of refrigerant liquid then passes through the lamination valve (thermostatic expansion valve), which drastically reduces its pressure: the refrigerant liquid returns to the evaporator at a reduced pressure where it again evaporates, taking heat from the water.
The chilling circuit also includes a water **pump**, which ensures the flow of water to be chilled by evaporation, and the **fan** which ensures the condenser is cooled.

2.2 Water circuit

The water circuit mainly consists of a pump, evaporator, tank, bypass calibrated between the pump discharge and the system backflow, pressure gauge on the pump discharge, and level sensor (optional). The water flows into the evaporator first where it is cooled, then into the tank, and is then suctioned by the pump which sends it to the system (see water diagrams section 12.0)

CWM002-006 models have an open circuit with a tank at atmospheric pressure.

CWM008-014 models have a closed circuit with a pressurised tank; these models are also equipped with a differential pressure gauge to protect the evaporator, automatic air bleeder valve, safety valve and expansion tank.

Units can be equipped with pumps with an oversized delivery head (P5).

2.3 Fan

The fan forces air through the condenser fins to remove the coolant gas condensation heat, therefore limiting the pressure inside the condenser.
CWM chillers are equipped with axial fans and have internal heat protection for the motor windings (excluding model CWM002).

2.4 Condensation control

When the ambient air temperature decreases, air flow cooling capacity increases slightly, causing a reduction in pressure inside the condenser; to limit this decrease in condensation pressure from falling below acceptable limits for good cooling circuit operation the fan stops temporarily.

2.5 Control of the water temperature

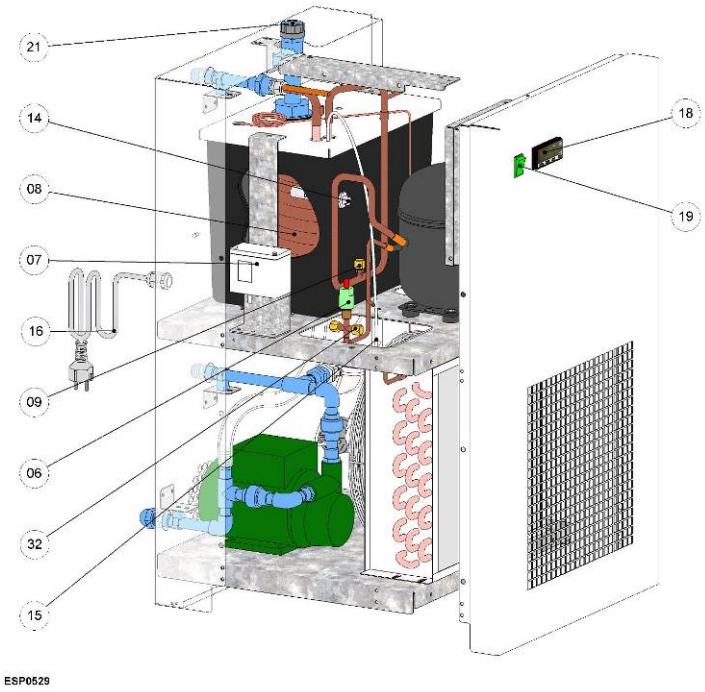
The purpose of the chiller is to maintain the temperature of the water produced within a desired interval as the load on the system varies; this is handled by an electronic controller and a temperature probe that turn the compressors on and off appropriately (see also sections 5.1.3 and 5.2.3)

2.6 Protecting the integrity of the machine

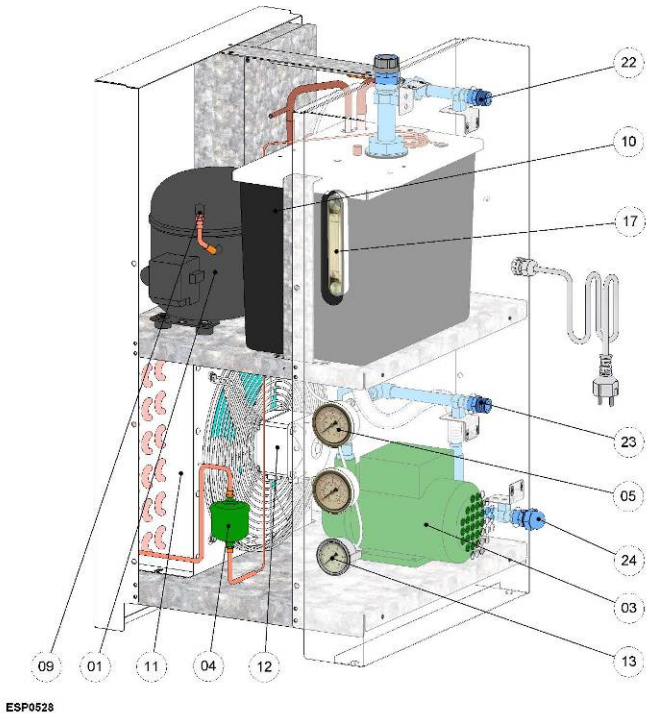
In addition to controlling the temperature, the electronic controller uses pressure gauges, thermostats and timers to prevent and handle situations that could compromise the integrity of the machine (also see Chapter 6.0, Safety Devices).

2.7 CWM units: identification of the main components

2.7.1 CWM002

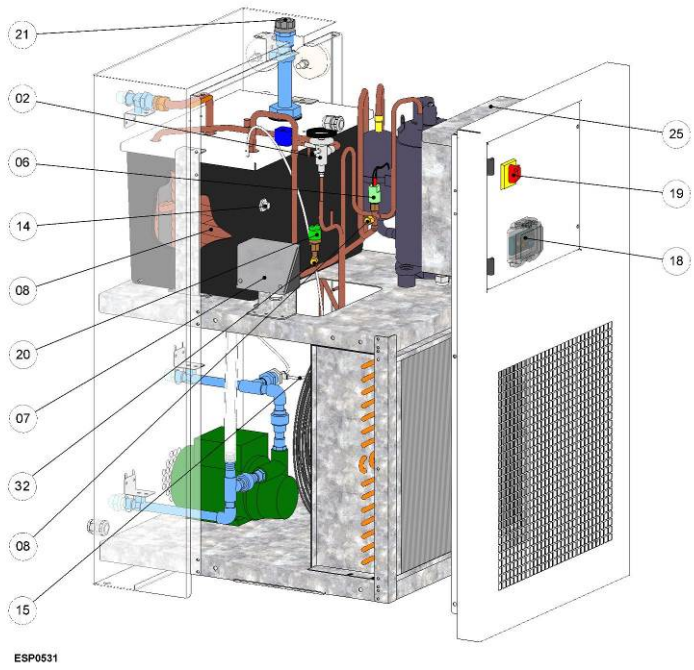


21	Filling inlet
14	Level sensor (optional)
08	Evaporator
07	Fan control pressure gauge
16	Power supply cable
09	Low pressure fitting
06	High pressure fitting
32	High pressure fitting
15	Water bypass
19	Switch
18	Electronic control unit

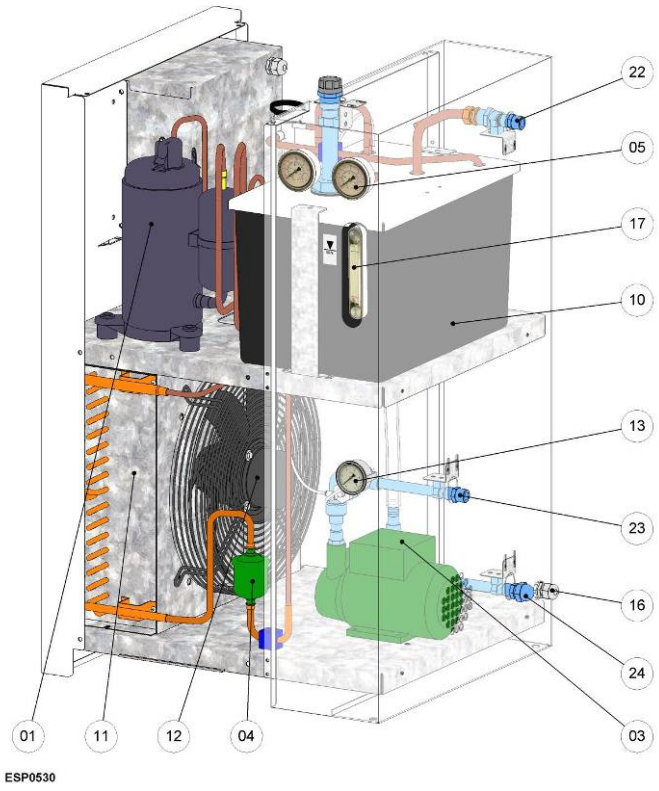


22	Water inlet
10	Tank
17	Water level indicator
23	Water outlet
05	Coolant pressure gauges (optional)
24	Water discharge
03	Pump
13	Water pressure gauge
12	Fan
04	Coolant filter
11	Condenser
01	Compressor
09	Low pressure fitting

2.7.2 CWM003÷006

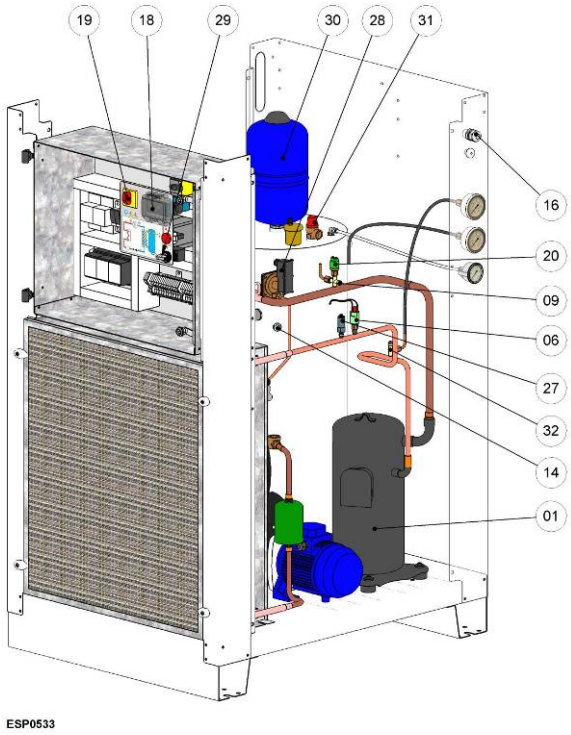


21	Filling inlet
02	Thermostatic expansion valve
06	High pressure gauge
14	Level sensor (optional)
08	Evaporator
20	Low pressure gauge (optional)
07	Fan control pressure gauge
09	Low pressure fitting
32	High pressure fitting
15	Water bypass
18	Electronic control unit
19	Disconnecting switch
25	Switchboard

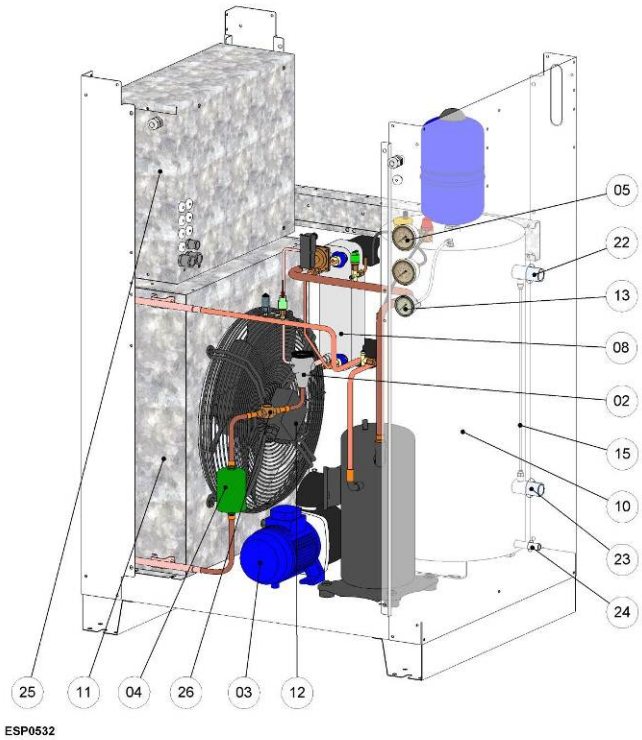


22	Water inlet
05	Coolant pressure gauges (opt)
17	Water level indicator
10	Tank
13	Water pressure gauge
23	Water outlet
16	Electrical power inlet
24	Water discharge
03	Pump
04	Coolant filter
12	Fan
11	Condenser
01	Compressor

2.7.3 CWM008÷014



19	Disconnecting switch
18	Electronic control unit
29	On/Off remote switch
30	Expansion tank
28	Differential water pressure gauge
31	Water safety valve
16	Electrical power inlet
20	Low pressure gauge
09	Low pressure fitting
06	High pressure gauge
27	Pressure transducer
32	High pressure fitting
14	Level sensor (optional)
01	Compressor



05	Coolant pressure gauges
22	Water inlet
13	Water pressure gauge
08	Plate evaporator
02	Thermostatic expansion valve
15	Water bypass
10	Tank
23	Water output
24	Water discharge
12	Fan
03	Pump
26	Coolant glass warning light
04	Coolant filter
11	Condenser
25	Switchboard

3.0 INSTALLATION

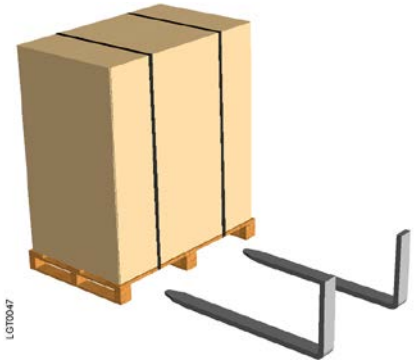
3.1 Transport

The units are supplied packed in a cardboard box on a wooden pallet.
After checking that the packing is undamaged, position the unit near the installation site and unpack it.

Always keep the chiller vertical: turning it upside down can irreparably damage several parts of the unit.

Handle with care. Violent falls can cause irreparable damage.

The centre of the machine is approximately its centre of gravity. In any case, when handling the machine with a forklift truck or pallet jack, always check its stability before lifting.



3.2 Storage

Protect the machine from bad weather, even if packed.
Always keep the chiller vertical, even when in storage. Turning it upside down can irreparably damage several parts of the unit.
If not used, the chiller can be stored packed in an enclosed place, free of dust, with a maximum temperature of 50 °C // 122°F and specific humidity of no higher than 90%.

The packing material is recyclable.
Dispose of each type of material in accordance with the requirements in the country of use.

3.3 Place of installation

Warning! The **CWM002** model is intended for indoor installation only.
All other CWM units can be installed indoors or outdoors.

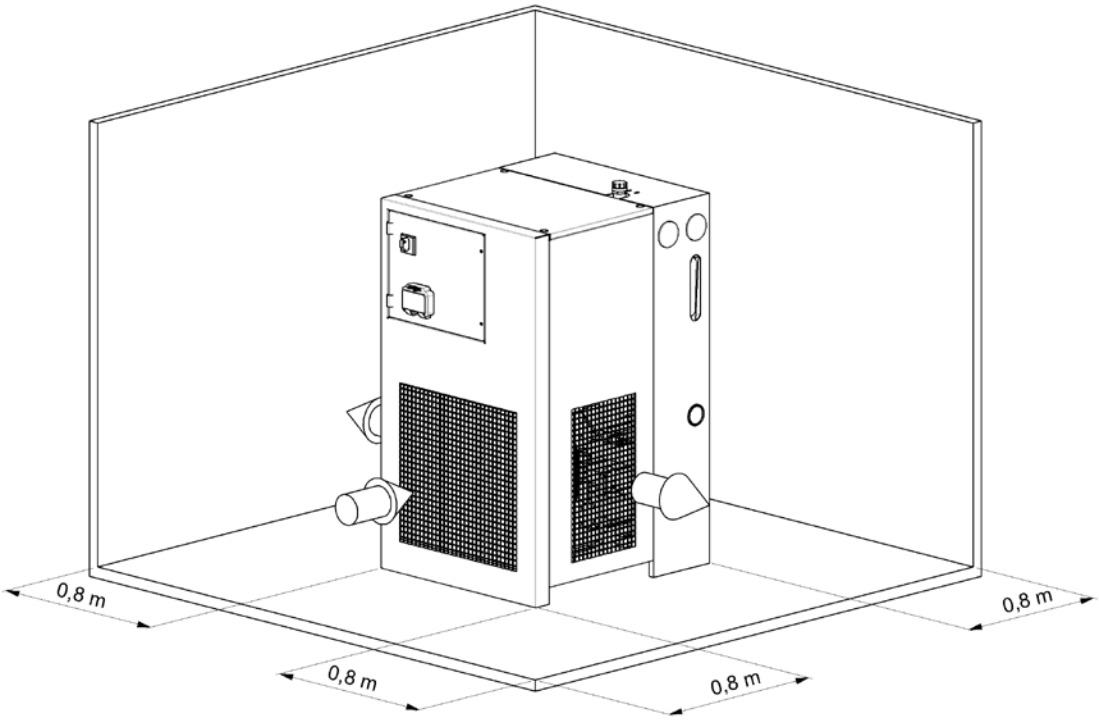
To determine the best place to install the unit, it is important to consider the following aspects:

- the dimensions and source of the water pipes;
- the location of the electricity;
- the solidity of the support surface;
- avoid any obstacles to the flow of the fan which could cause the recirculation of air to the condenser.
- avoid the possible reflection of sound waves: (do not install in narrow or tight spaces).
- provide access for maintenance or repair (see paragraph 3.3.1, “Installation spaces”).
- Average air temperature in the chosen installation area (see Section 7.0 Operating limits)

Attention: if the machine is installed outside, it could find itself at a temperature lower than 0°C//32°F, when stopped; the formation of ice could damage the evaporator. If you do not intend to drain the machine during the winter, you must add anti-freeze to the water circuit (see paragraph 3.4.2, Use of ethylene glycol as a winter anti-freeze)

3.3.1 Installation spaces

To ensure the good functioning of the unit and access for maintenance, you must respect the minimum installation space shown in the figure in this paragraph.
The exit of air from the fans must not be obstructed.
In any case, avoid all situations in which hot air can circulate between the output of the fans and the intake of the machine.
Contact our office to verify feasibility in all cases where one of the preceding conditions cannot be met.



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0,8 m = 31,5 inches

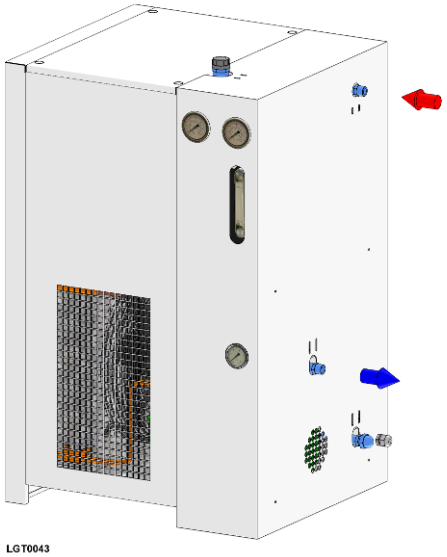
3.4 Water connections

Connect the machine to the water pipes following the instructions located near its water fittings (see figures)

The installation of outlet and inlet taps on the machine is recommended, which will enable machine maintenance without emptying the entire system, and emptying of the machine only during winter downtime.

Important! Install the mechanical water filter, provided with the machine, on its input: scum and impurities can seriously damage the evaporator.

We recommend an extraordinary cleaning of the mechanical water filter after the machine has been running for the first week (also see Chapter 8.0, Maintenance and periodic inspections).



. Water input to the machine

Water exit from the machine

Warning! No naked flames should be used during water connection operations, in the vicinity of or inside the unit.

NOTE It is a good rule that the diameters of the arriving and departing pipes be not less than the water fittings.

Diameters of the water fittings.

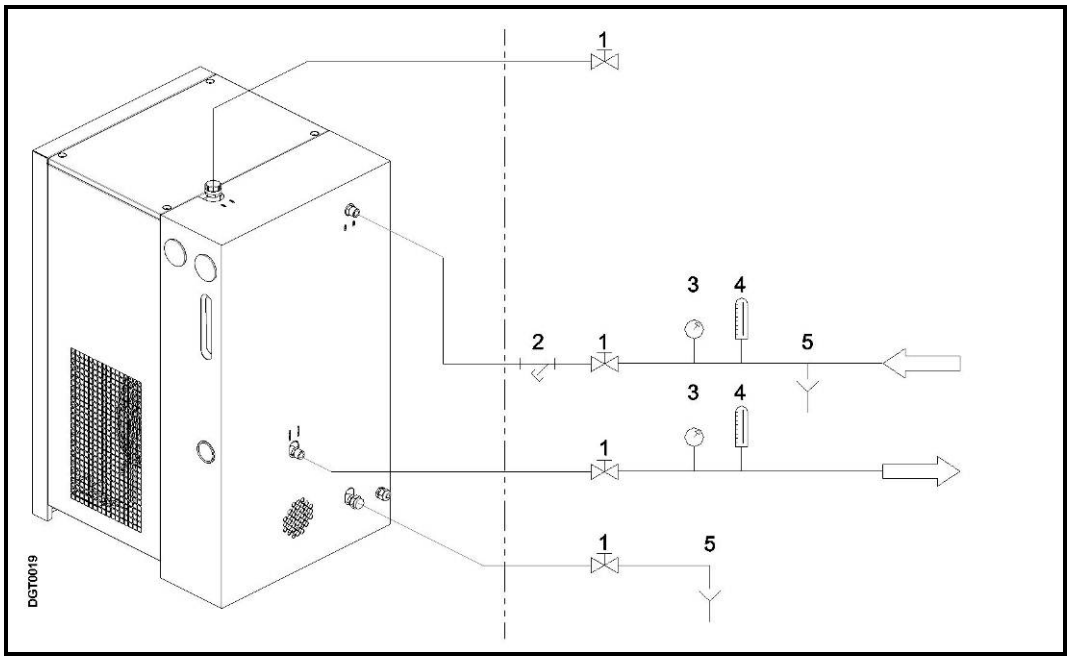
CWM models	002÷006	008÷014
Diameter of the in/out water fittings	1/2” FM	1” FM

3.4.1 Recommended water system for CWM002÷006

CWM002-006 units come as standard with a tank at atmospheric pressure, pump and bypass; it is advisable to also provide the water circuit with:

- A mechanical filter for water in the machine inlet pipes, with mesh no greater than 1mm;
- Machine inlet and outlet taps;
- Discharge tap at the lowest point of the system;
- Inlet and outlet pressure gauges and thermometers for water from the machine, to control its operation.

Diagram of recommended water circuit for CWM002-006 models



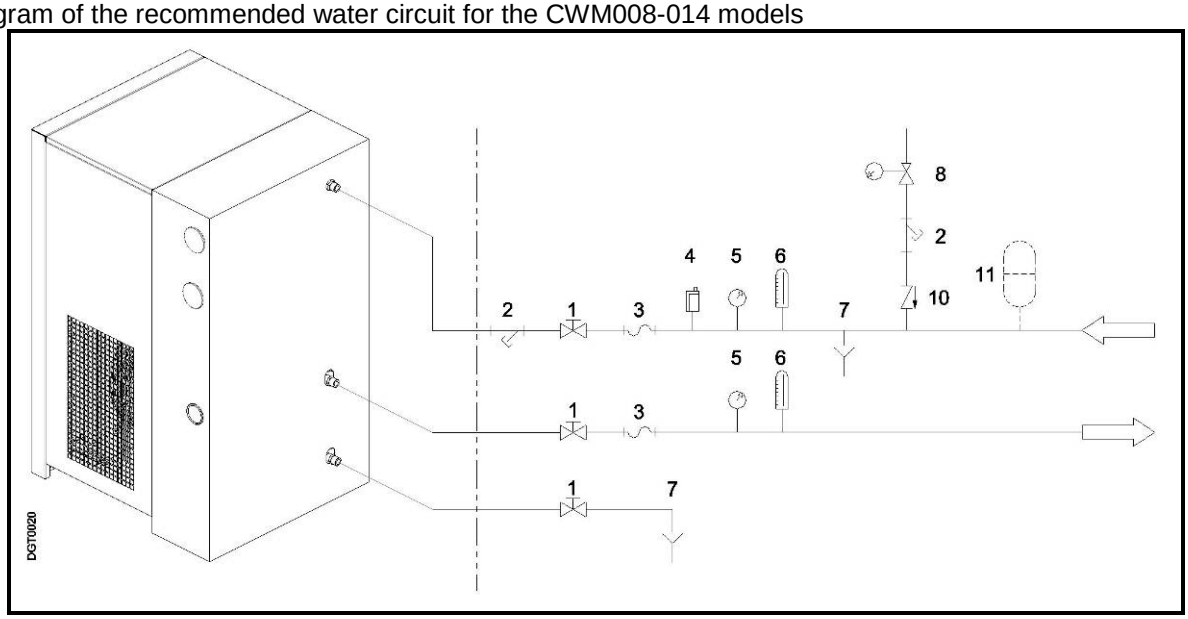
Key			
1	Tap	4	Thermometer
2	Mechanical filter	5	System/unit discharge
3	Pressure gauge		

3.4.2 Recommended water system for CWM008÷014

CWM008-0014 units come as standard with a tank at atmospheric pressure, pump, expansion tank, safety valve, and automatic bleeder valve; it is however advisable to also provide the water circuit with:

- A mechanical filter for water in the machine inlet pipes, with mesh no greater than 1mm;
- Machine inlet and outlet taps;
- a mechanical filter and a backflow valve on the filling line, upstream of the feed tap;
- an air bleeder at the highest point of the system;
- a discharge tap at the lowest point of the system;
- Inlet and outlet pressure gauges and thermometers for water from the machine, to control its operation;
- anti-vibration pipe joints to prevent vibrations from being transmitted to the system.
- In the case of water circuits of considerable capacity it is advisable to check if it is necessary to combine the existing expansion tank on the unit with an additional tank. The capacity of the expansion tank provided with the CWM008-014 models is 5 dm^3 // 1,32 gallons .

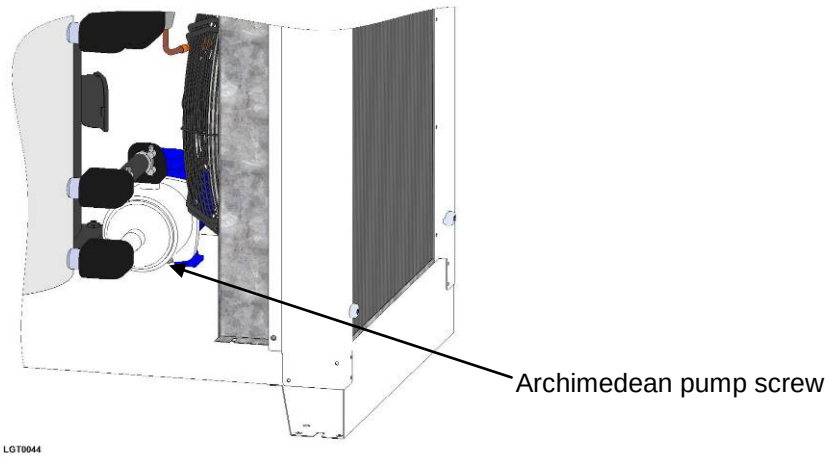
Diagram of the recommended water circuit for the CWM008-014 models



Key			
1	Tap	6	Thermometer
2	Mechanical filter	7	Discharge
3	Anti-vibration joints	8	Filling unit
4	Bleeder valve	10	Backflow valve
5	Pressure gauge	11	Expansion tank (if required)

Important! During winter downtime empty the system (or just the refrigerator) to prevent damage from the cold.

Any residual water inside the pump (CWM008-014) must be discharged using the relevant screws on the upper part of the archimedean pump screw (see diagram).



3.4.3 Use of ethylene glycol as a winter anti-freeze

Instead of emptying the system in the winter, you can charge the system with a mixture of water and a suitable percentage of ethylene glycol, chosen as a function of the lowest expected temperature of the outside air.

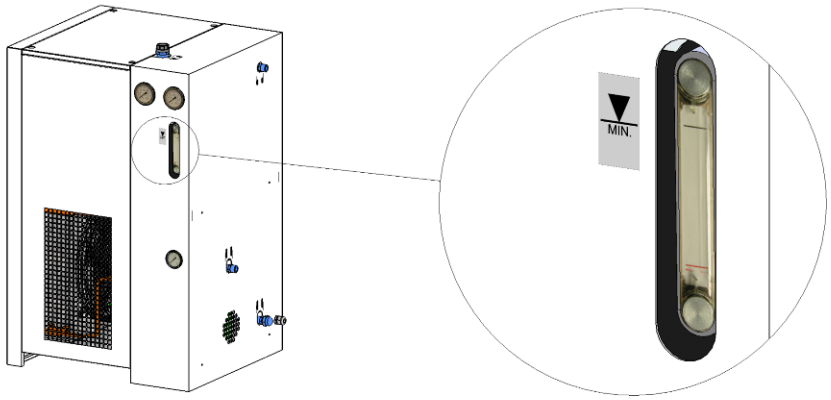
Percentages of ethylene glycol recommended as a function of the expected temperature of the outside air.

Outside air temperature [°C]	0	-5	-10	-12	-15
Outside air temperature [°F]	32	23	14	10,2	5
Percentage of ethylene glycol [%]	10	15	20	25	30

Attention: Maximum concentration of ethylene glycol allowed: **30%**.

3.4.4 Charging the water circuit CWM002-006

- Check that the drain taps are turned off.
- Open the system interception devices.
- Feed the water from the filling inlet above the machine until the water reaches the required level (near the transparent level indicator – see diagram). When the pump starts check the level again and top up if necessary.
- Check for any leaks by examining the circuit.



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3.4.3 Charging the water circuit CWM008-014

Check that the drain taps are turned off.

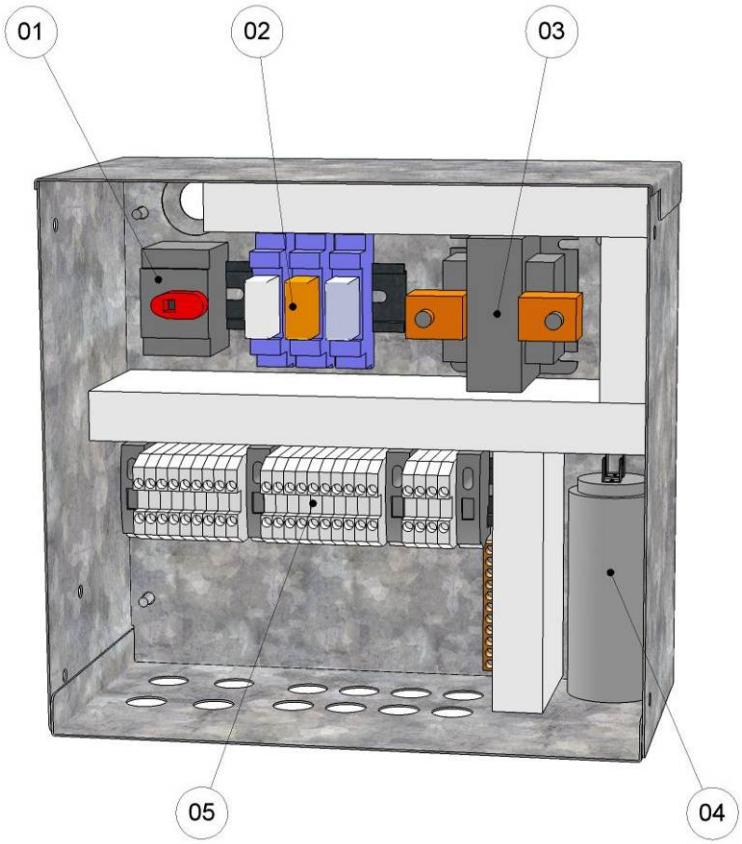
- Open all the system's bleed valves.
- Turn on the system's shut-off devices.
- Start filling by slowly turning on the system's water-charging tap.
- When water starts coming out of the bleed valves, close them and continue charging until the manometer shows at least 1 bar // 15 psi.
- Check for any leaks by looking at the manometer and inspecting the circuit.

3.5 Electrical connections

The machine must be connected to the electricity following the electrical diagram and conforming to the current laws and regulations in the place of installation.

- The voltage, frequency and number of phases must conform to the data shown on the machine's identification plate.
- The power supply voltage must not vary by more than ±10% from its nominal value. ☐ The frequency must not vary by more than ±1% from its nominal value (±2% for brief periods).
- The imbalance between power phases must be <2%.
- Upstream from the electrical panel, install a differential gauge (IDn=0.03A) (main power switch) and slow-blow fuses with the specifications shown on the electrical diagram and in the following table.
- Use wires of the section shown on the electrical diagram and in the following table.

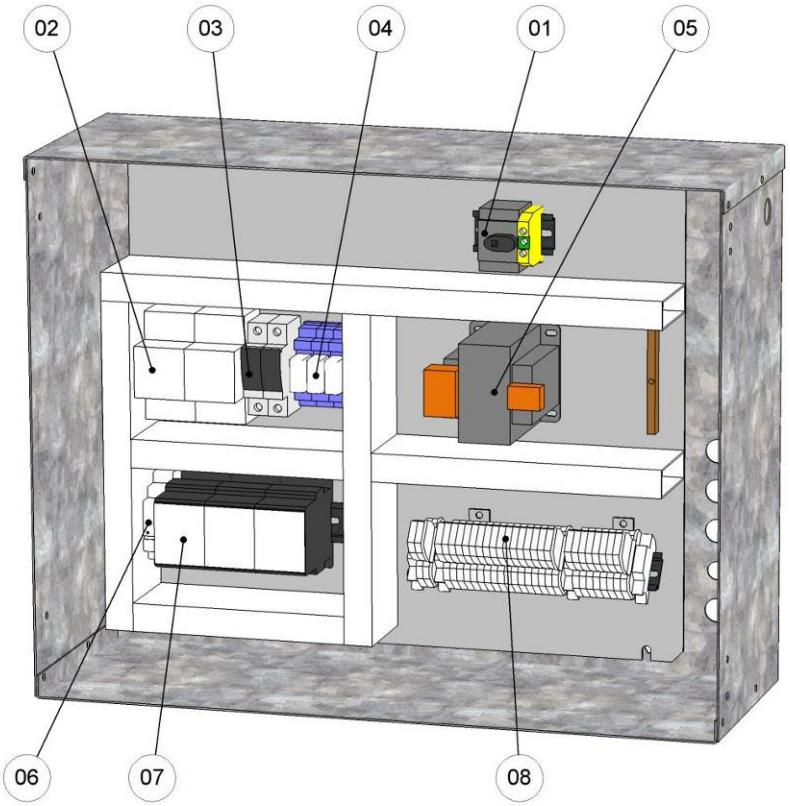
CWM003-CWM006 switchboard:



ESP0536

N°	Description	Component ID
1	Disconnecting switch	QS
2	Relay switch	KHP, KCC, KCP
3	Transformer	TF
4	Condenser of the compressor	CR
5	Terminal boards	A1,A2

Electrical panel CWM008÷CWM014:



ESP0534

N°	Description	Component ID
1	Cut-off switch	QS
2	Compressor and pump protections	QC1 QP1
3	Fuses	FU1,FU2 etc.
4	Relays	KHP, KON, KGA
5	Transformer	TF
6	Phase-sequence control relay	RPP
7	Compressor and pump remote switches	KC1. KP1
8	Terminal strip	A1, A2

Attention! Never change the internal electrical connections, as the warranty will be immediately voided.

Important! Screw the wires solidly to the terminal strip of the cut-off switch and lock the wire with a cable-gland.

Important! Make the cable entering the machine enters the cable-gland from below: this prevents rain from dripping inside the machine.

Important! The earth connection is obligatory: connect the earth wire to the terminal provided in the electrical panel. The ground wire must be longer than the other wires so that it will be the last one to be pulled if the device holding the cable loosens.

3.5.1 Connecting a remote on/off switch

A remote ON/OFF switch can be installed using the terminal clamps on the switchboard terminal board, as shown in the following table:

Models	CWM002	CWM003-006	CWM008-014
Terminals	Not available	X2.7 – X2.8	X2.11 - X2.12
Voltage	Not available	24 V	24 V

Consult the electrical diagram

NB: for CWM008-014 models any remote switch installed will be activated by putting the I/O/REM switch on the switchboard cabinet door in the REM position.

3.5.2 Connection of a remote alert warning indicator

A remote alert warning indicator can be installed using the terminal clamps in the switchboard cabinet, as shown in the following table:

Models	CWM002	CWM003-006	CWM008-014
Terminals	Not available	X2.9 – X2.10	X2.14 – X2.15 – X2.16
Voltage	Not available	24 V	No Voltage

Consult the electrical diagram

4.0 PRELIMINARY CHECKS AND START-UP

4.1 Preliminary checks and preparation for the first start-up

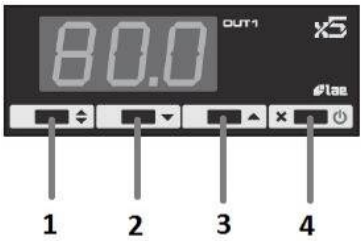
Before starting up the unit, it is a good idea to do the following:

1. Check that the water shut-off valves are open.
2. Verify the regular water level in the tank (for open water systems – CWM002-006)
3. Check the pressure shown on the gauge with the pumps stopped is approximately 1 bar (for closed water systems - CWM008-014).
4. Check that the surrounding temperature is in the range for the machine to function (see Chapter 7.0, Operating Limits).
5. Check the disconnecting switch on the machine switchboard is open.
6. Check that the run/stop switch (I/O/REM) in the electrical panel is in the 0 position (only for CWM008÷014 models)
7. Check that the mains voltage matches the voltage on the machine's identification plate with a tolerance of ±10%.
8. Close the main power supply switch.
9. Close the cut-off switch on the machine's electrical panel.

4.2 Startup

4.2.1 CWM002 Startup

On closing the switch the pump will start up and the electronic control unit will display OFF; to start the refrigerator hold key 4 down for more than 5 seconds.
The controller will display the temperature of the water inside the tank - if it is higher than the set value the compressor will start up.



CWM002 electronic control

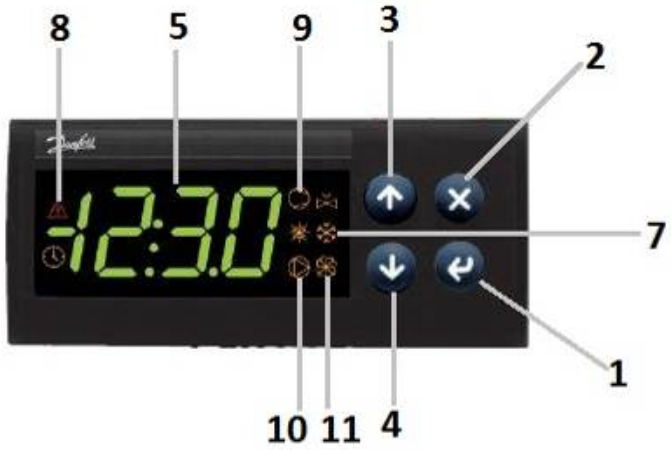
To turn off the compressor hold key 4 down for more than 5 seconds; the pump will continue operating. To stop the pump as well use the switch at the side of the electronic control unit.

4.2.2 CWM003-006 Startup

On closing the disconnecting switch the electronic control unit will display OFF.

To proceed with startup:

1. Turn on the unit by pressing UP ↑ (3) on the electronic control unit for more than 5 seconds. The icon ❄ (7) will light up on the display.



CWM003÷014 electronic control

2. Check pump startup (icon (10) lit up on the display)
3. The display will show the temperature of the water inside the tank; if it is higher than the set value the compressor will start up.

Turn off the unit by holding the UP ↑ (3) key on the electronic control unit for more than 5 seconds; the electronic control unit will first switch off the compressor then shortly after the pump.

WARNING: it is important not to turn off the unit using the main power switch or disconnecting switch on the machine switchboard as this could cause a delayed switch-off of the pump with respect to the compressor, which could damage the evaporator.

4.2.3 CWM008-014 Startup

On closing the disconnecting switch the electronic control unit will display OFF.

To proceed with startup:

1. Put the On/Off/Remote 1/0/Rem switch on the switchboard cabinet door in position 1.
2. Turn on the unit by pressing UP ↑ (3) on the electronic control unit for more than 5 seconds. The icon ❄ (7) will light up on the display.

CWM003-014 electronic control unit

3. Check the alert symbol (8) does not appear on the electronic control unit; if it does appear press the **X ESC**(2) key to see which type of alert has been flagged.

WARNING: on first starting up an alert could occur in relation to an error sequence in the R/S/T phases, shown by the code AC0 on pressing the **X ESC**(2) key.
This safety system safeguards the compressor from the possibility of turning in the wrong direction.

Should this occur open the main power switch upstream of the machine, and invert two phases between them immediately downstream of the main switch itself.

WARNING: do not interfere with cabling downstream of the unit switchboard disconnecting switch at any time, as doing so could compromise the correct sequence of other devices, such as the pump or fans.

Repeat operations from point 1.

4. Check the pump has started (pump icon (10) lit up on display), possibly by checking the pressure of the water upstream and downstream of the machine on the previously installed pressure gauges.
5. Wait for the electronic control unit to verify continuity of water flow via the signal of the differential pressure gauge; if the differential pressure gauge intervenes (alert code A03 on pressing the **X ESC**(2) key), bleed the system, check the interception taps are open and pump operation, then reset the alert flag by pressing the **X ESC**(2) key for 5 seconds.
6. The display will show the temperature of the water inside the tank; if it is higher than the set value the compressor will start up.

Turn off the unit by holding the UP ↑ (3) key on the electronic control unit for more than 5 seconds; the electronic control unit will first switch off the compressor then shortly after the pump.

Alternatively, once the machine has been switched on via the electronic control unit it can be switched on and off using the ON/OFF switch (I/O/REM) on the switchboard cabinet door.

WARNING: the 1/0/REM operating switch has precedence over the UP ↑ (3); by turning off the machine using the 1/0/REM operating switch it will not be possible to start it again using the UP ↑ (3) key on the electronic control unit.

WARNING: it is important not to turn off the unit using the main power switch or disconnecting switch on the machine switchboard as this could cause a delayed switch-off of the pump with respect to the compressor, which could damage the evaporator.

4.3 Start-up under critical conditions

If the air and water temperatures are especially high and outside operating limits, the refrigerator may have been required to operate in unfavourable conditions.

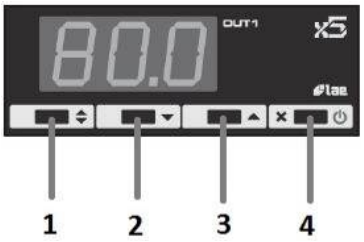
Startup under critical conditions could result in the high pressure gauge intervening (to reset the high pressure gauge see Section 6.2: Resetting the high pressure gauge).

To resolve this issue reduce the heat load of the machine by partially intercepting the users or, if this is not possible, by reducing the rate of water flowing in the evaporator - to this end partially close the outlet tap from the refrigerator and restart the machine.

Let the refrigerator operate under these conditions until the water temperature falls within stipulated operating values, then the tap can be opened fully.

5.0 ELECTRONIC CONTROL UNIT

5.1 CWM002 electronic control unit



The CWM002 electronic control unit

- Displays the temperature of the water exiting the refrigerator.
- Enables the required temperature of the water produced to be set (set point).
- Enables compressor activation and deactivation (standby).
- Controls on/off compressor operation depending on the temperature of the water measured with the set point and upper differential (3°C // 3K //5,4°F).
- Guarantees minimum compressor on/off times to maintain its integrity.
- Signals any faults in the temperature probe with the code OR, simultaneously turning off the compressor.

5.1.1 Main functions of the CWM002 electronic control keys

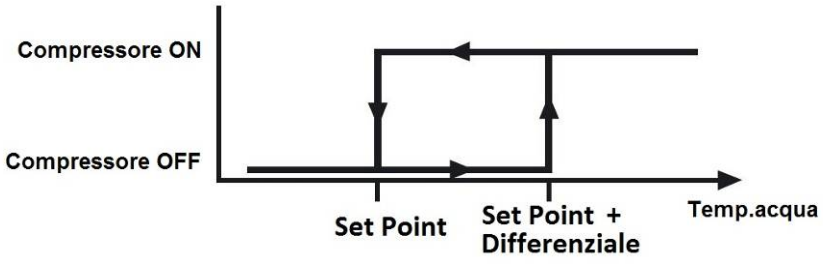
N°	Key	Functions
1.	Setpoint key	Displays the set point value Enables setting of the set point used along with keys 2 and 3
2.	Down key	Enables the decrease of the set point value used along with key 1
3.	Up key	Enables the increase of the set point value used along with key 1
4.	Exit/standby key	Activates/deactivates the compressor when held for more than 3 seconds.

5.1.2 Turning the CWM002 on and off

To enable compressor operation hold the key down for more than 3 seconds; to disable it repeat the same action: the fan and pump operate independently from the electronic control unit and can be stopped via the main switch.

5.1.3 Controlling water temperature – CWM002

The CWM002's electronic control unit regulates the temperature on the basis of a set point value and an upper differential of 3°C // 3K // 5,4°F, according to the following diagram:



5.1.4 Changing the set point – CMW002

Press key 1 for at least half a second to display the setpoint value.
Keeping key 1 pressed, use keys 2 ▼ and 3 ▲ to set the required value.
On releasing key 1 the new setpoint value will be stored.

5.2 CWM003-CWM014 electronic control unit

CWM003-CWM014 electronic control unit

The electronic control unit has a 7-segment display and a series of icons, and manages:

- compressor operation to ensure temperature control of the water produced
- pump operation
- fan speed control (only CWM008-CWM014)

displays:

- unit status (icon ❄)(7)
- compressor status (compressor icon) (9)
- fan status (fan icon) (11)
- pump status (pump icon) (10)
- temperature of water produced (5)
- all digital/analogue inputs/outputs (parameter navigation via the display)

displays the following alerts:

- water differential pressure gauge (only CWM008-CWM014)
- high pressure gauge
- low pressure gauge (optional on CWM003-CWM006)
- antifreeze
- compressor protection – wrong R/S/T phase sequence (only CWM008-CWM014)
- pump and fan protection (only CWM008-CWM014)
- insufficient water level in tank (optional)
- pressure and temperature probe fault

5.2.1 Main functions of the electronic controller buttons and meanings of the icons - CWM003-CWM014

N°	Button/Icon	Functions
1.	**ENTER ↵**	Accesses the menu. Goes to the next menu level. Goes to the mode for editing the selected parameter. Confirms value entered for a parameter.
2.	**X ESC**	Accesses the list of active alarms. When navigating the menus, returns to the previous menu level (pressed once). When navigating the menus, returns to the main page (pressed several times). Exits from parameter edit mode without saving the changes made.
3.	**UP ↑**	When pressed for at least 5 seconds, turns the unit on and off. During menu navigation, scrolls up through the menu items. Increases the value of the parameter being modified. Scrolls up through the alarm list.
4.	**DOWN ↓**	During menu navigation, scrolls down through the menu items. Decreases the value of the parameter being modified. Scrolls down through the alarm list.
5.	DISPLAY	During the machine's operation, shows the temperature of the water exiting the evaporator. During navigation of the menu, indicates the directory above the one where you are. During changing of parameter, indicates the value to be changed, flashing
7.	COOLING icon	Indicates that the machine is ON, even when the compressors are stopped.
8.	ALARM icon	Indicates the presence of one or more active alarms.
9.	COMPRESSOR icon	They indicate the state of the compressor and, more precisely: Off: compressor OFF On: compressor ON Slow flashing: compressor about to turn on. Fast flashing: compressor about to turn off.
10.	PUMP icon	Indicates the state of the pump, more precisely: Off: pump OFF On: pump ON Fast flashing: pump about to turn off.
11.	FAN icon	Indicates the state of the fans: On: fans ON Off: fans OFF.

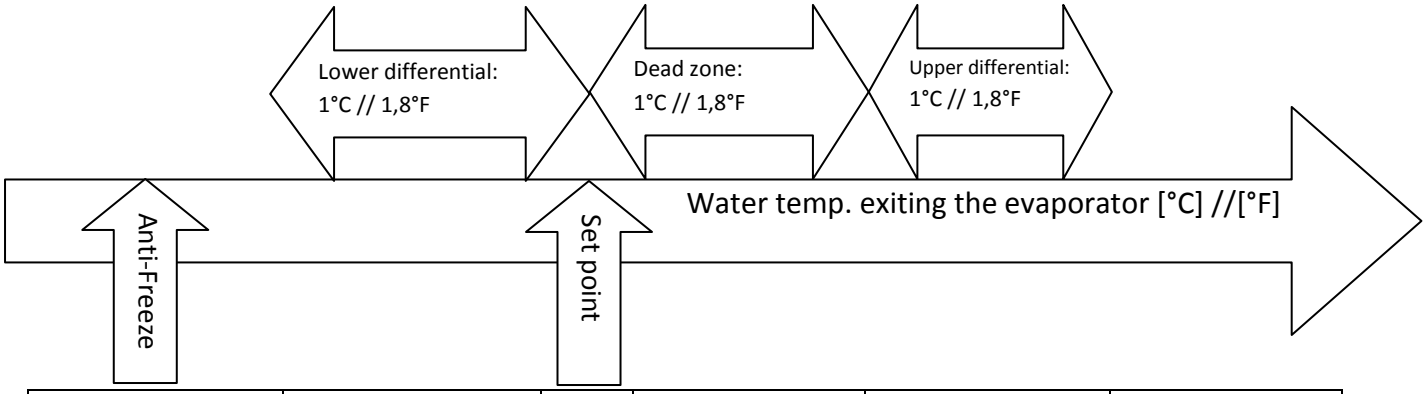
5.2.2 Turning on and off CWM003-CWM014

To turn the unit on, hold down the **UP** ↑ button (3) for more than five seconds
To turn the unit off, hold down the **UP** ↑ button (3) for more than five seconds
Optionally, once the machine has been turned on using the electronic controller, it can be turned on and off from the run/stop switch (I/O/REM) on the door of the electrical panel.

Attention: the run/stop I/O/REM switch has precedence over the ↑ "**UP**" button (3): after turning the machine office from the run/stop I/O/REM switch, it will not be possible to restart it with the ↑ "**UP**" button (3) on the electronic controller.

5.2.3 Controlling water temperature – CWM003-CWM014

The machines have a temperature probe at the exit from the evaporator: based on this temperature, the electronic controller starts and stops the compressors to keep this temperature as close as possible to the temperature set point.
The electronic controller regulates the exit temperature of the evaporator using a dead-zone system: this system is based on three temperature intervals: lower differential - dead zone - upper differential and two temperature values: the set point and anti-freeze.
All these values are distributed on the temperature scale as shown in the figure:



Anti-Freeze	Lower differential	Set point	Dead zone	Upper differential	
Below this value, the compressors are forced off to avoid the formation of ice.	In this interval, the compressors are progressively turned off as the temperature of the water decreases:		In this interval, the compressors that are on are kept on and those that are off are kept off.	In this interval, the compressors are progressively turned on as the temperature of the water increases:	All the compressors are on.
		Numeric examples:			
3°C // 37,4°F	From 6°C//42,8°F to 7°C//44,6°F	**7**°C **44,6**°F	From 7°C//44,6°F to 8°C//46,4°F	From 8°C//46,4°F to 9°C//48,2°F	Above 9°C//48,2°F
3°C // 37,4°F	From 9°C//48,2°F to 10°C//50°F	**10**°C **50**°F	From 10°C//50°F to 11°C//51,8	From 11°C//51,8°F to 12°C//53,6°F	Above 12°C//53,6°F

The set point of the water can be changed: the other parameters (differentials and dead zone) remain constant and follow the set-point value, moving on the temperature scale (see the numeric examples in the table above).

5.2.4 Changing the set point - CWM003÷CWM014

WARNING: if it was not specified during the proposal phase that the unit is required to produce water at temperatures near to 0°C //32°F or below contact the company. (See section 7.3 Low water temperatures).

To change the set point of the exiting water, proceed as follows:
from the main screen, press **ENTER↵** use the **DOWN ↓**button to go to the PAR menu. Press **ENTER↵**, and use the **DOWN ↓**button to go to the REG menu. Press **ENTER↵** In the REG SET menu, press **ENTER ↵** and the set point will be displayed. To change it, press **ENTER↵** and the value will flash. Use the **UP ↑**and **DOWN ↓**,buttons to set the desired value. To confirm it, press **ENTER↵**. To exit without saving it, press **X ESC.**
Press **X ESC** again until you return to the main screen.

5.2.5 Changing the type of restart after a power failure - CWM003-CWM014

In the case of a power failure, the chiller can behave in three different ways when power is restored:

- stay off,
- start,
- return to the same condition it was in when the power failed.

To select one of these options, proceed as follows:

From the main screen, press **ENTER↵** Use the **DOWN ↓** to go to the PAR menu. Press **ENTER↵**. Go to the GEN menu. Press **ENTER↵** Go to dSP menu. Use the **DOWN ↓** to go to the STU menu, press **ENTER ↵**. In the Y02 menu, the type of restart currently set will be displayed, which can be one of the following:

- EQUA: when the power returns, the machine will work in the same way as before the power failed.
- ON: when the power returns, the machine will start.
- OFF: when the power returns, the machine will stay off.

To change the type of restart, press **ENTER↵** and the parameter begins to flash. Use the **UP↑** and **DOWN↓** buttons to select the desired parameter and confirms with **ENTER↵**.
To return to the main screen, press **X ESC** four times.

5.2.6 Changing the serial address (MODBUS and CAN) - CWM003-CWM014

If you are installing a serial network with several devices, it may be necessary to change the serial address of the electronic controller, which is set to 1 at the factory.

From main screen, press **ENTER↵**. Using the **DOWN↓**button, go the PAR menu. Press **ENTER↵**. In the PAR GEN menu, press **ENTER↵**. Use the **DOWN↓** arrow to scroll to the GEN SER menu and press **ENTER↵**: the current serial address is displayed. From the SER menu, press **ENTER↵**: the current value will flash. Use the **UP↑** and **DOWN↓** arrows to set the desired value.
To return to the main screen, press **X ESC** four times.

5.2.7 Display of inputs and outputs - CWM003-CWM014

It is possible to display the analogue and digital outputs to check the operation of the machine and its main components.
From the main screen, press **ENTER↵**. Use the **DOWN↓** button to move to the I/O menu. From here, press **ENTER↵** to access the I/O Od menu. Press **ENTER↵** and, using the **UP↑** and **DOWN↓** buttons, you can display all the values of the analogue and digital inputs and outputs.
Press **X ESC** again until you return to the main screen.
The following values can be displayed:

Input/Output	CWM 003÷006	CWM 008÷014	Description	Unit of measure/Key
AI 1 - analogue input	✓	✓	Temperature at the entrance of the machine	°C
AI 2 - analogue input	✓	✓	Temperature at the exit of the machine	°C
AI 4 - analogue input	n.u.	✓	Pressure of condenser	Bar g
AO 1 - analogue output1	n.u.	Opt.	Fan speed	0÷100%
DI 1 - digital input 1	n.u.	✓	Chiller on/off from run/stop switch (I/O/REM)	0=on 1=off
DI 2 - digital input 2	✓	✓	High-pressure pressure gauge	0=ok; 1=pressure gauge
DI 3 - digital input 3	Opt.	✓	Low-pressure pressure switch circuit	0=ok; 1=pressure gauge
DI 4 - digital input 4	Opt.	✓	Water differential pressure gauge (CWM008÷014) Water level protection (CWM003÷014 – opz.)	0=ok; 1=device intervention
DI 5 digital input 5	n.u.	✓	Compressor and/or phase sequence protection	0=ok; 1=protection intervention
DI 6 - digital input 6	n.u.	✓	Water level and/or pump and/or fan protection	0=ok; 1=protection intervention
DO 1 - digital output 1	✓	✓	Alarm present	0=no alarm 1=alarm
DO 2 - digital output 2	✓	✓	Compressor	0=off; 1=on
DO 5 - digital output 5	✓	✓	Pump	0=off; 1=on
DO 6 - digital output 6	n.u.	✓	Fan	0=off; 1=on

Key: n.u. = not used - Opt = optional

5.2.8 Displaying the software release version of the electronic controller CWM003-CWM014

From the main screen, press **ENTER↵**. Use the **DOWN↓**button to go to the SER menu. Press **ENTER↵**.
From the SER INF menu, press **ENTER↵** and here you can display the version of the software release installed in your controller. Press **X ESC** again until you return to the main screen.

5.2.9 Displaying the parameter set version - CWM003-CWM014

From the main menu press Enter↵, using the Down ↓ key go to menu PAr, press ENTER↵, in the GEN menu press ENTER↵, dSP is displayed, press ENTER↵, PAR is displayed, press ENTER↵, the number indicating the parameter set version is displayed.
To exit press **X ESC** to return to the main menu.

5.2.10 Alarms - CWM003÷CWM014

An alarm condition is signalled by the Alarm icon (8).
Some alarms must be rearmed manually while for others, the rearm is automatic or semi-automatic.

- **Manual rearm:** these alarms must be reset, which can only be done when the alarm condition no longer exists; only then can the machine resume operation.
- **Automatic rearm:** the alarm is automatically deactivated as soon as the alarm condition ceases and the machine restarts by itself. However, the signal (Alarm icon (8)) remains on the display until the alarm code is displayed.
- **Semi-automatic rearm:** semi-automatic alarms behave like automatic alarms; but if the same semiautomatic alarm occurs 5 times in 90 minutes, that alarm becomes a manual alarm; therefore to restart the machine, you will have to remove the cause of the alarm and reset it.
-

5.2.11 Displaying and resetting alarms - CWM003-CWM014

The Alarm icon (8) turns on to indicate an alarm.
To display the code of the alarm that intervened, press the **X ESC** button; use the **UP↑** and **DOWN ↓** buttons to display the codes of any other alarms that intervened at the same time.

To reset an alarm, the condition that caused it must no longer exist

For example, if the low-pressure gauge has intervened, the alarm can only be reset when the pressure has risen beyond the reset value (see paragraph 6.1, Calibrating security devices and type of rearm).
Then, after displaying the alarm, wait for normal conditions to be restored, press **X ESC** again, hold it down for 5 seconds and the alarm will be reset.

5.2.12 Table of alarm codes - CWM003÷CWM014

Alarm code		Alarm description	
CWM 003÷006	**CWM 008÷014**		**Type of reset**
	A03	Evaporator differential pressure switch	Semiautomatic
A03		Water level insufficient	Semiautomatic
	AP1	Pump magnetothermic circuit breaker, water level insufficient and/or ventilator thermal protection	Manual
AH0	AH0	High refrigerant pressure	Manual
AL0	AL0	Low refrigerant pressure	Automatic
	AC0	Magnetothermic compressor circuit breaker and/or wrong phase sequence	Manual
A7A	A7A	Entering water temperature probe failure	Automatic
A7b	A7b	Exiting water temperature probe failure	Automatic
	A7G	Refrigerant pressure transducer failure	Automatic
A09	A09	High exiting water temperature warning	Automatic
AE1	AE1	Anti-freeze alarm	Automatic

6.0 SAFETY DEVICES

CWM chillers have a series of safety devices that limit the machine's temperature and pressure values to ensure that it operates within the anticipated limits and to avoid dangerous situations.
Here is a list of dangerous situations, including the relative safety device and its location.

Dangerous situation	Safety device	Location	CWM 002	CWM 003÷006	CWM 008÷014
High condensation pressure	High-pressure switch	Compressor output pipe	✓	✓	✓
Low evaporation pressure	Low-pressure switch	Compressor intake pipe	**n.a.**	**Opt.**	✓
Low water flow-capacity	Water differential pressure switch	Plate evaporator	**n.a.**	**n.a.**	✓
Low water temperature	Anti-freeze thermostat	Water exit from the evaporator	**n.a.**	✓	✓
High water pressure	Safety valve	Accumulation tank	**n.a.**	**n.a.**	✓
Frequent compressor start-ups	Anti-circulation timer	Electronic controller	✓	✓	✓
Low water level in the tank	Water-level sensor	Tank	**Opt.**	**Opt.**	**Opt.**

Key: n.a. = not available - Opt = optional

When they reach their calibration value, most of the security devices trigger an alarm managed by the electronic controller.

For some safety devices, once the cause of the alarm times out, the machine resumes operation automatically as soon as the reset value is reached. Others must be manually reset to restart the machine (also see paragraph 5.2.10).
The following paragraph lists the characteristics of each safety device.

6.1 Calibration of the safety devices and type of rearm

Safety device	Intervention value	Reset value	Type of reset	CWM 002	CWM 003÷006	CWM 008÷014
High-pressure gauge	30 (20*) barg 435 (290) psi	23 (14*) barg 333 (203) psi	Manual	✓	✓	✓
Low-pressure gauge	1,7 barg // 25 psi	2,7 barg // 39 psi	Automatic	n.a.	Opt	✓
Water differential pressure gauge	18 mbar // 0,25 psi	25 mbar // 0,36 psi	Semiautom	n.a.	n.a.	✓
Anti-freeze thermostat	3°C // 37,4°F	6°C // 42,8°F	Automatic	n.a.	✓	✓
Water safety valve	6 barg // 87 psi	--	--	n.a.	n.a.	✓
Water-level sensor (Opt.)	--	--	Semiautom	Opt	Opt	Opt
Anti-circulation timer**	5 min.	--	--	✓	✓	✓

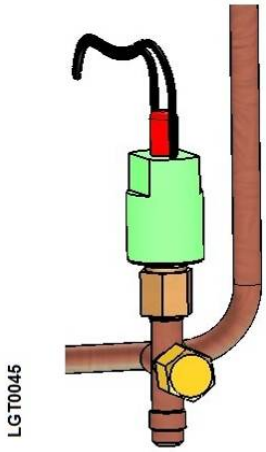
- * CWM002 values
- **This is a function of the electronic controller that prevents the same compressor from stopping and starting too frequently: at least 3 minutes must elapse between one compressor's power up and the next.

6.2 Rearming the high-pressure pressure switch

The intervention of the high-pressure pressure switch is the only case in which, in addition to manually rearming the electronic controller, it is also necessary to reset the pressure switch itself.

The high-pressure pressure switch is located in the compressor compartment on the uninsulated copper pipe that goes from the compressors to the condensation batteries; there is a manual-reset button on top of it. This can only be rearmed when the pressure in the circuit has fallen below the reset value (see table, “Calibration of the safety devices and type of rearm” in paragraph 6.1).

Warning! The upper part of the compressor casing and discharge pipe are at a high temperature.
Be especially careful when working in their vicinity.



High pressure switch

For this reason, when dealing with an intervention of the high-pressure switch, it is necessary to:

A) identify the cause of the rise in pressure (fans not working, condensation batteries dirty or obstructed, obstacles to the flow of exiting air, operating temperature outside operating limits, etc. (also see Chapter 9.0, Trouble shooting) and remove the cause, if possible;
B) wait until the high-pressure manometer falls below the reset value (see the table, “Calibration of the safety devices and type of rearm” in paragraph 6.1);
C) rearm the pressure switch by pressing the red button: if you do not hear a click, it is not rearmed.
D) then, rearm the electronic controller: press **X ESC** once (alarm code AH1 or AH2 is displayed). Then press it again and hold it down for at least 5 seconds.

Attention: the high-pressure gauge stops the compressors while it keeps the condenser fans running to lower the pressure in the condensers.

7.0 OPERATING LIMITS

7.1 Operating temperatures

The various units in the CWM line guarantee several operating limits depending on the model and accessories provided.
The graphs show the limits for continuous operation of the CWM units, in relation to the temperature of the water exiting the machine Tw, and the temperature of the external air Ta.

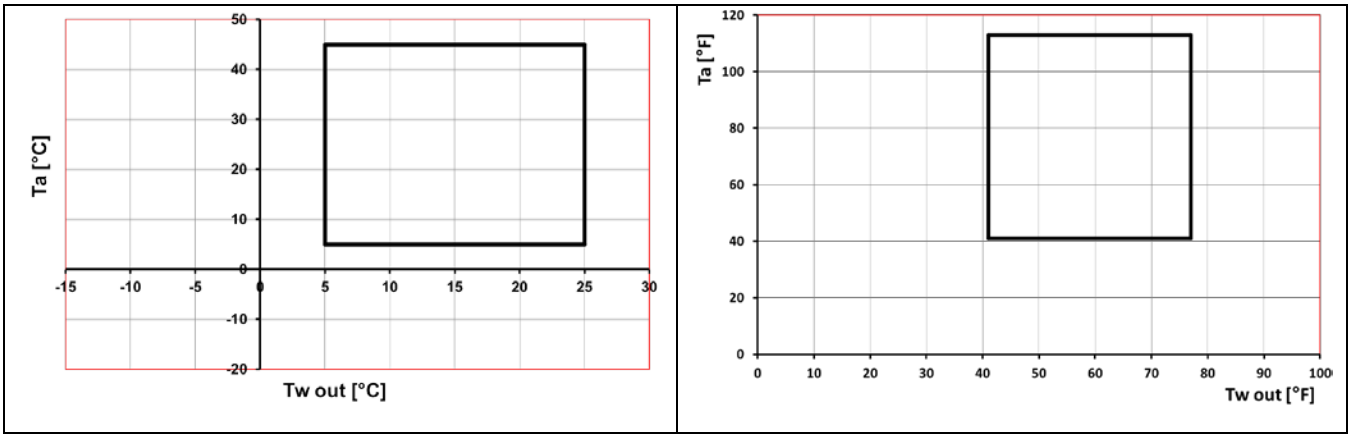
WARNING: produced water temperatures less than 5°C // 41°F require the use of glycolate mixtures and the setting of suitable electronic control unit parameters. Contact the company (see section 7.3)

WARNING: external air temperatures lower than 0°C // 32°F can only be achieved with condensation control and continuous fan speed control (optional only with CWM008-014).

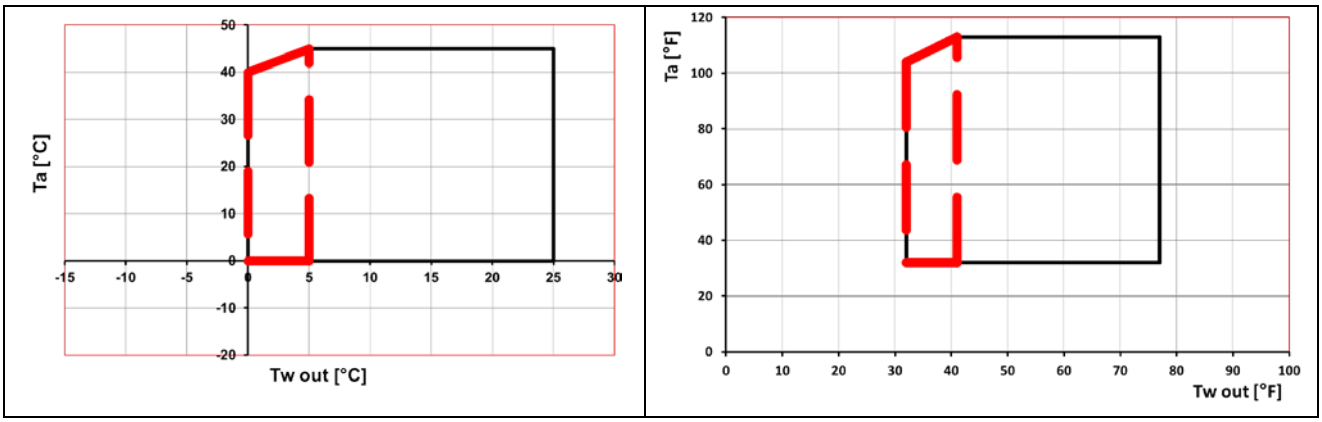
Key

Operation with glycolate water – contact the company.
Operation with condensation control – only CWM008-014.

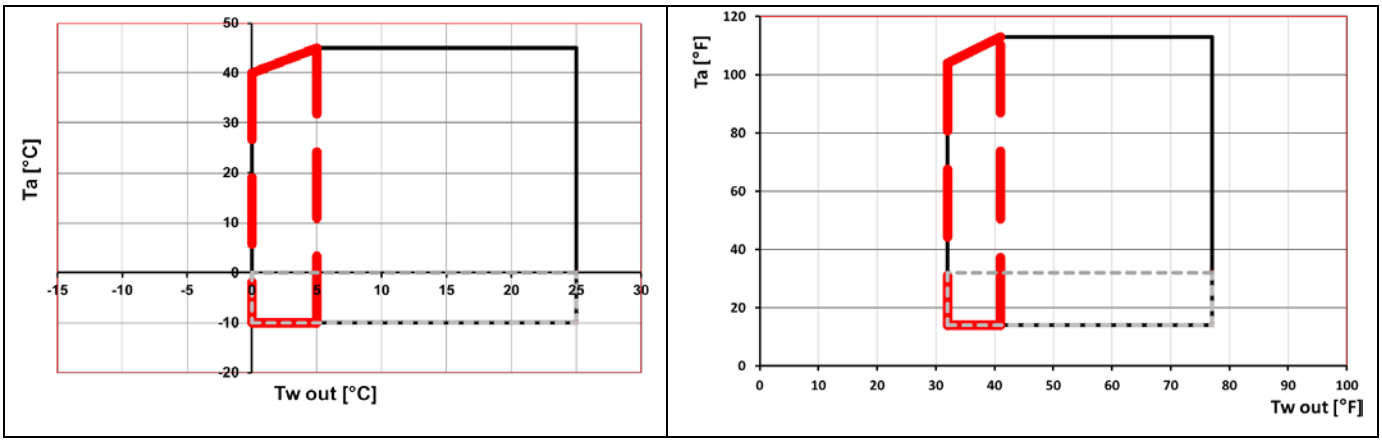
CWM002 50Hz and CWM002 60Hz



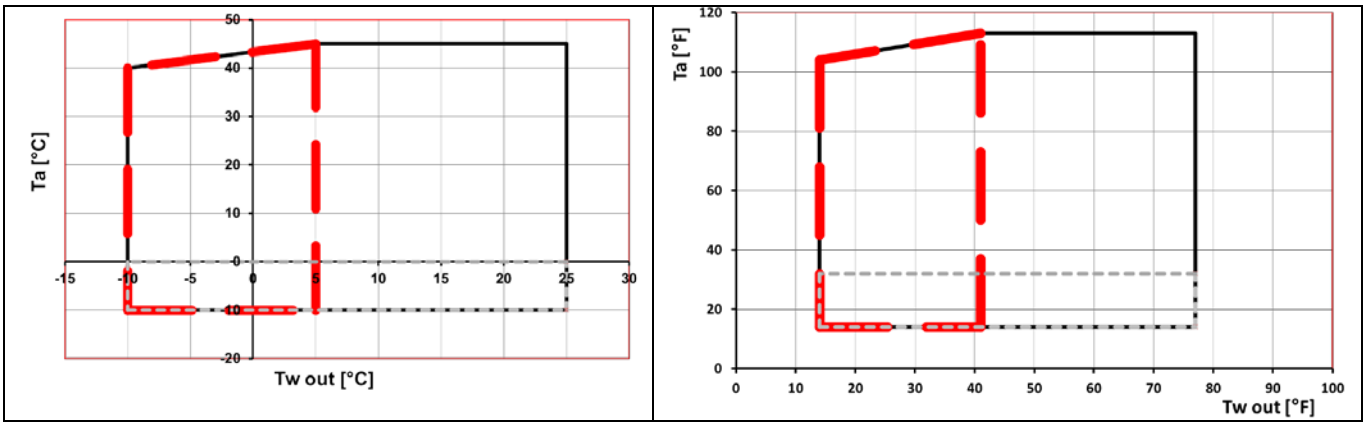
CWM003÷006 50Hz and CWM003÷006 60Hz



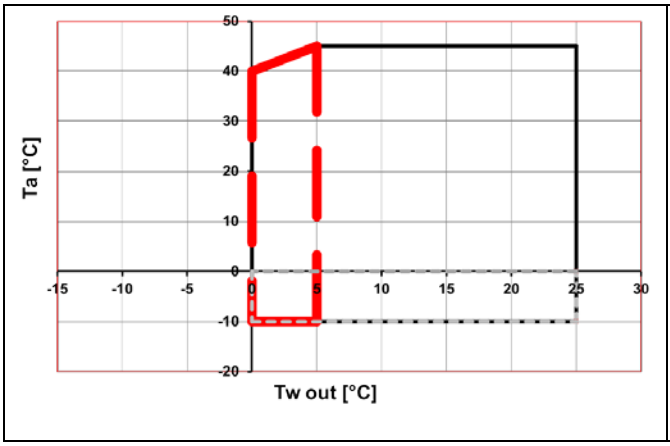
CWM008÷009 50Hz

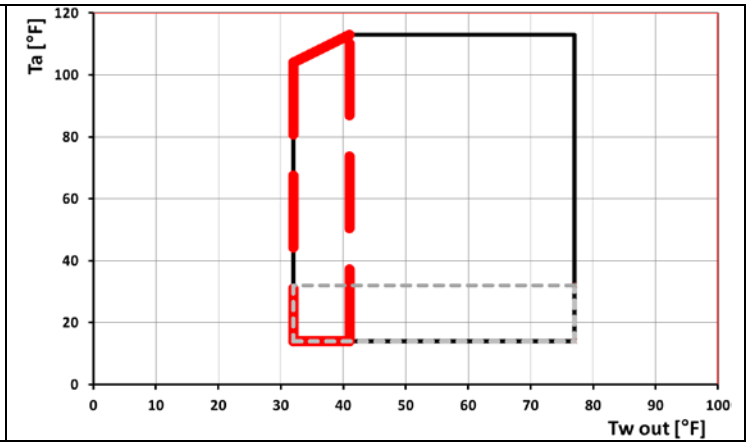


CWM012÷014 50Hz

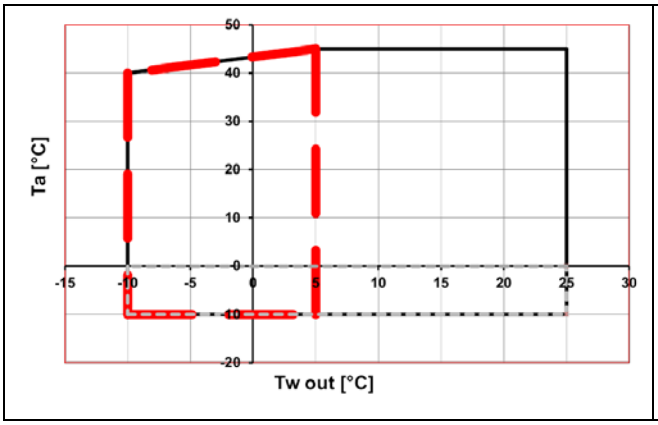


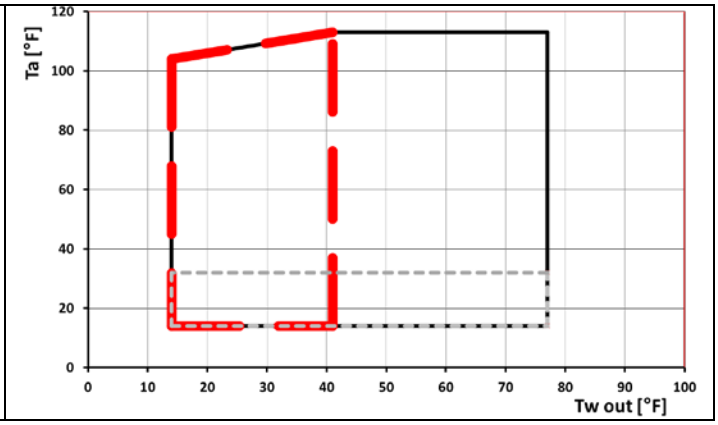
CWM009÷012 60Hz





CWM014 60Hz





7.3 Low water temperatures

If it was not anticipated that the chiller unit offered was to produce water at temperatures close to 0°C // 32°F, or below, you should contact our company.

To achieve temperatures that are negative, or near zero, it is necessary to use anti-freeze (ethylene glycol) in percentages that depend on the desired temperature; it is also necessary to change the calibration of the anti-freeze thermostat.

NOTE The anti-freeze thermostat can only be set at a high programming level for the electronic control unit - contact the company.

7.3.1 Changing the setting of the anti-freeze thermostat – CWM003-CWM014

Please ask our company for the password to change the parameters.
From the main screen, press **ENTER** ↵: the word LOG is displayed press **ENTER** ↵: the text 0 - - is displayed; enter the first of the four digits of the password using the **UP**↑ and **DOWN**↓ buttons; then press **ENTER** ↵: do the same for the other three digits: the word LOG is displayed.
Use the **DOWN**↓ button to scroll the menu until the text PAr is displayed; press **ENTER** ↵: the text GEN is displayed.
Use the **DOWN**↓ button to scroll the menu until the text ALA is displayed; press **ENTER** ↵: the text CFG is displayed.
Use the **DOWN**↓ button to scroll the menu until the text ALA ICE is displayed; press **ENTER** ↵: the text AIS is displayed with the current setting of the anti-freeze thermostat alongside (the factory setting is 3.0).
Press **ENTER** ↵: again and the set value will begin to flash: select the recommended value using the **UP** ↑ and **DOWN**↓ buttons. (see table in paragraph 7.3.2, Recommended glycol percentages for operating with low temperatures).
After selecting the value, confirm it by pressing **ENTER** ↵:
Exit by pressing **X ESC** several times until you return to the main screen.

7.3.2 Recommended glycol percentages for operating with low water temperatures.

The table below shows the percentage of glycol required and the setting of the anti-freeze alarm for each temperature of water produced.

Temperature of the water produced set point [°C]	-10	-7	-5	-3	0	2	5	≥6
Anti-freeze alarm setting [°C]	-14	-9	-9	-5	-2	1	1	3
Temperature of the water produced set point [°F]	14	19,4	23	26,6	32	35,6	41	42,8
Anti-freeze alarm setting [°F]	6,8	15,8	15,8	23	28,4	33,8	33,8	37,4
Percentage of ethylene glycol [%]	30	30	30	25	20	15	15	0

CWM units can operate with water and ethylene glycol mixtures up to a concentration of 30%.

8.0 MAINTENANCE AND INSPECTIONS AND PERIODIC CHECKS

To keep the machine running properly and providing the guaranteed performance required, it is necessary to make some periodic checks:

Operation	Frequency	Execution
Check that the temperature of the water produced is in the required interval.	Daily	User
Check tank water level using level indicator – see section 3.4.2 - (only units with open water circuit)	Daily	
Check for the presence of any alarm signals.	Daily	
Check the functioning of the fans.	Monthly	
Check the pressure of the water circuit with the pump stopped (verify that it is about 1 bar // 15 psi)	Monthly	
Check that the temperature of the air is compatible with the operating limits of the machine.	Monthly	
Clean the air filters (only CWM008÷014)	Monthly(1)	
Clean the condensation batteries with a jet of compressed air.	Annuale (1)	
Clean the water filter.	Monthly(2)	Specialized personnel
Check that the refrigerant liquid peep hole is clear or, at most, with a few bubbles (check with the compressor running – only CWM008÷014).	Every 6 months	
Check that the subcooling and superheating values are, respectively between 3÷5K // 5,4÷9°F and 5÷7K // 9÷12,6°F.	Every 6 months	
Check for traces of oil on the pipes of the chilling circuit (symptom of refrigerant leaks)	Every 6 months	
Check the tightness of the electrical terminals both inside the electrical panel and on the terminal strips of the compressors.	Yearly	
Check the contacts of the remote switches; if they show signs of deterioration, replace them.	Yearly	
Check that the current absorbed by the machine is within the values on the identification plate.	Every 6 monthse	
If the unit will not be used for a long time, drain the water from the pipes and the machine to avoid the formation of ice during the winter (3).	Extraordinary	User

(1) It may be necessary to carry this out more frequently in the case of particularly dirty environments.
(2) We recommend an extraordinary cleaning of the filter after the machine has been operating for the first week.
(3) It is not necessary to do this if the system has been charged with an anti-freeze solution (water and a suitable percentage of glycol) (see paragraph 3.4.2, Use of ethylene glycol as a winter anti-freeze)

Attention! Before carrying out any maintenance on the unit or accessing internal parts, make sure you have cut-off the electricity.

Attention! The upper part of the compressor housing and the output pipe are hot. Be especially careful when working near them.

9.0 TROUBLESHOOTING

Symptom	Possible cause	Possible alarm signal on the electronic controller or other symptom	Solution	Execution
A) The unit does not start	Contacts of the main differential switch are open	Electronic controller off	Close the contacts	User 
	Unit's electrical panel cut-off switch is open	Electronic controller off	Close the contacts	User 
	I/O/REM switch in the O or REM position (only CWM008÷014)	Electronic controller on	Move the switch to I	User
	No consent from the water differential switch (only CWM008÷014)	A03	Check the functioning of the pump, bleed the system.	User
	Compressor timer active	The compressor icon on the display of the electronic controller is flashing	Wait (5 mins at the most)	User
	No consent from the service thermostat	System water at temperature (see display A)	Apply a thermal load to the machine or lower the set point	User
	No consent from the antifreeze thermostat	AE1	Reset a temperature of the water (set point) compatible with the calibration of the antifreeze thermostat (see table in paragraph 7.1.2	User
	Service and anti-freeze probe defective	A7b	Check contacts and replace, if necessary	Specialized personnel 
	Entering water temperature probe defective	A7A	Check contacts and replace, if necessary	Specialized personnel 
	Intervention of the main differential switch	Electronic controller off	Look for current leakage inside the machine	Specialized personnel 

Symptom	Possible cause	Possible alarm signal on the electronic controller or other symptom	Solution	Execution
B) The Compressor doesn't start	Intervention of the thermal protection inside the compressor	The contactor of the compressor is on but the compressor is stopped	Wait for cooling: check that the compressor is working under normal conditions Check for insufficient refrigerant in the circuit (see point H)	Specialized personnel 
	Magnetothermic protection of the compressor open (QC1 - only CWM008-014)	AC0	Look for short circuits in the motor windings of the compressors Check for possible over-absorption of current due to too low voltage; combined with operating conditions near the limits: check the power supply voltage and operating conditions	Specialized personnel 
	Intervention of the phase sequence relay (only CWM008-014)	AC0	Reverse the two phases upstream from the cut-off switch of the unit's electrical panel (see paragraph.4.2.3).	Specialized personnel 
	Contactor of the compressor off (only CWM003-014)	The compressor icon is on but the compressor is stopped	Check the voltage at the coil of the remote switch of the compressor and the continuity of the coil itself	Specialized personnel 
C) Intervention of the high pressure pressure switch	Condenser obstructed or insufficient air flow-capacity	AH0 (only CWM003-014)	Remove dirt from the condenser and any obstacles to the flow of air. Wait for the pressure to drop below the reset value, then rearm the high-pressure pressure switch by pressing the button on top of it (see figure in paragraph 6.2)	User
	The unit has operated outside its operating limits (such as air or water too hot)	AH0 (only CWM003-014)	If possible, restore conditions that are compatible with the operating limits. Reset the high pressure switch (paragraph 6.2)	User

Symptom	Possible cause	Possible alarm signal on the electronic controller or other symptom	Solution	Execution
Continued C) Intervention of the high-pressure pressure gauge	Fan not working	AH0 (only CWM003÷014)	See point F	
	Excessive refrigerant charge	High subcooling (greater than 10K // 18°F)	Drain excess gas	Specialized personnel 
	Presence of air or incondensable gas in the refrigerant circuit	Presence of bubbles on the flow peep hole, also with subcooling values greater than 5 K // 9°F.	Drain the circuit, create vacuum and recharge	Specialized personnel 
	Refrigerant filter clogged or thermostatic valve stuck	Pipe downstream from the component covered with frost.	Check and replace	Specialized personnel 
D) Intervention of the water differential pressure switch	Water circulation pump blocked or defective (only CWM008÷014)	A03 (only CWM008-014)	Unlock or replace the pump	Specialized personnel 
	Circulation pump stopped	A03 (only CWM008-014) Pump icon lit..	Check the voltage at the coil of the contactor of the pump and the continuity of the coil itself	Specialized personnel 

Symptom	Possible cause	Possible alarm signal on the electronic controller or other symptom	Solution	Execution
E) Intervention of the low pressure switch	Coolant filter clogged or thermostatic valve stuck	Pipe downstream from the component covered with frost AL0 (only CWM008-014 – optional with CWM003-006)	Check and replace	Specialized personnel 
	Insufficient refrigerant charge	AL0 (only CWM008-014 – optional with CWM003-006)	See point H	
F) Fan doesn't start	Very low outside air temperatures and consequent intervention of the condensation control	Fan icon off. Condensation pressure normal	The machine can working anyway	
	No voltage output from the fan-speed regulator (only CWM008-014 with optional condensation control)	Fan icon on and fans stopped	Check the voltage output from the regulator and replace, if necessary	Specialized personnel 
	Intervention of the thermal protection inside the fan (only CWM003-014)	AP1 (only CWM008-014)	Check that the working conditions of the machine (outside air temperature) are compatible with the operating limits. Wait for the fan motor to cool.	User
	Electrical connections of the fan loose	Fan icon on and fan stopped (only CWM008-014)	Check and tighten	Specialized personnel 

Symptom	Possible cause	Possible alarm signal on the electronic controller or other symptom	Solution	Execution
G) The unit is working without ever stopping	Excessive thermal load		Reduce the thermal load. Reduce the temperature of the incoming water and/or the flow-capacity of the exit tap of the unit a little	User
	No refrigerant		See point H	
H) Compressor intake pipe covered with frost	No refrigerant	High overheating, low undercooling and high output temperature of the compressor. Traces of oil on the chilling circuit.	Check the chiller circuit with a leak detector. Repair any ruptures and recharge the circuit.	Specialized personnel 
I) The pump doesn't start Magnetothermic protection of the pump open	Excessive water flow capacity; the pump is absorbing too much current.	AP1 (only CWM008-014)	Reduce the flow capacity of the water by closing the output tap of the pump a little bit. Rearm the thermomagnetic protection of pump QP1	User 
	Short circuit or overcurrent	AP1 (only CWM008-014)	Look for a short circuit in the winding of the pump motor. Check for possible over-absorption of current due to too low voltage; check the power supply voltage	Specialized personnel 
J) The unit stops and starts repeatedly; water temperature changes suddenly.	Insufficient water flow rate.		Check water flow rate (see section 7.2). Open the system tap fully. If possible reduce system feed leaks. If possible add a pump in series with suitable head.	Specialized personnel 

10.0 DISMANTLING THE CHILLER

If the chiller is being dismantled, you must separate it into parts of homogeneous material. The following table lists the main materials of the various components of the machine.

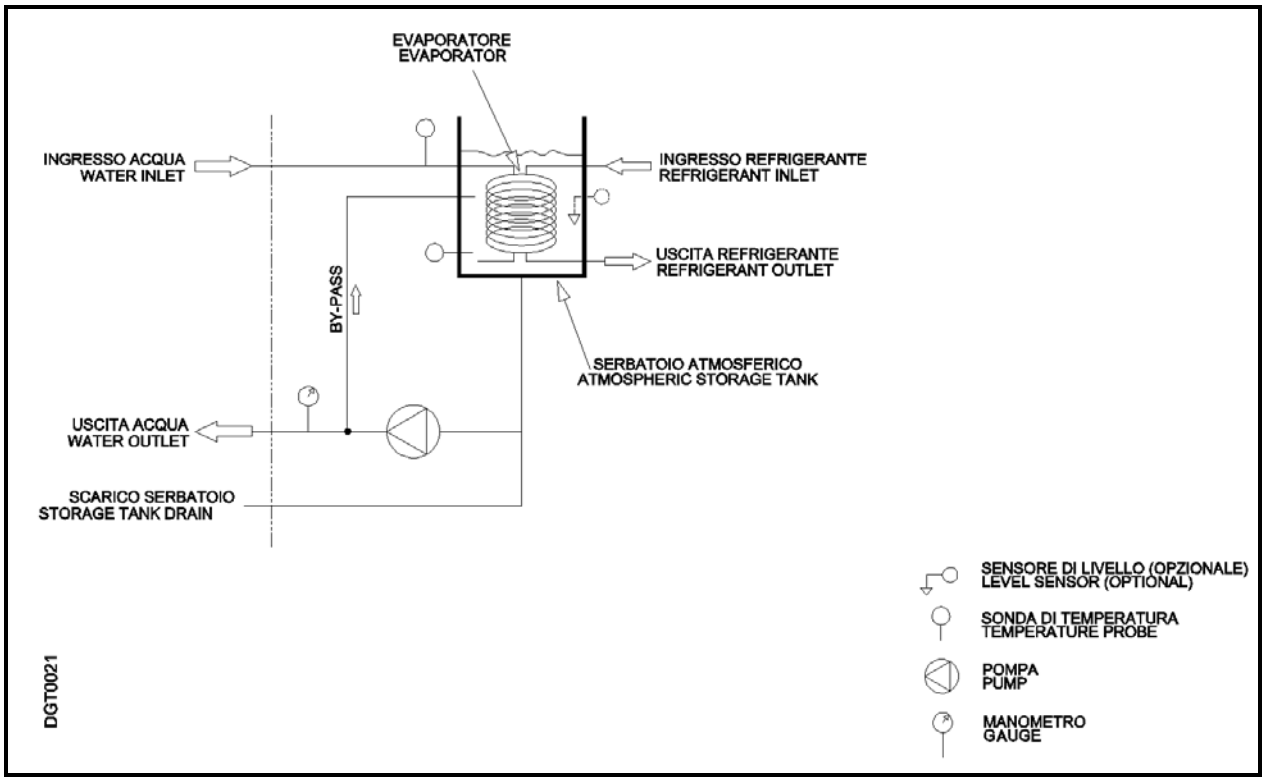
Part	**Material**
Refrigerant fluid	R134a (CWM002),R407C, Oil
Panelling and supports	Carbon steel, epoxy paint
Chiller compressor	Steel, Copper, Aluminium, Oil
Plate exchanger (evaporator CWM008÷014)	Steel, Copper
Coaxial exchanger (evaporator CWM002÷006)	Copper
Condenser	Aluminium, Carbon Steel
Pipes	Rame
Fan	Aluminium, Copper, Steel
Valves	Steel, Bronze
Insulation	Synthetic rubber without CFC, EPS, Polyurethane
Pump	Steel, Copper
Tank	Steel
Electrical wires	Copper, PVC
Electrical parts	PVC, Copper, Bronze

We recommend that you follow current safety norms for the disposal of each single material.
The refrigerant contains particles of lubrication oil from the chiller compressor.

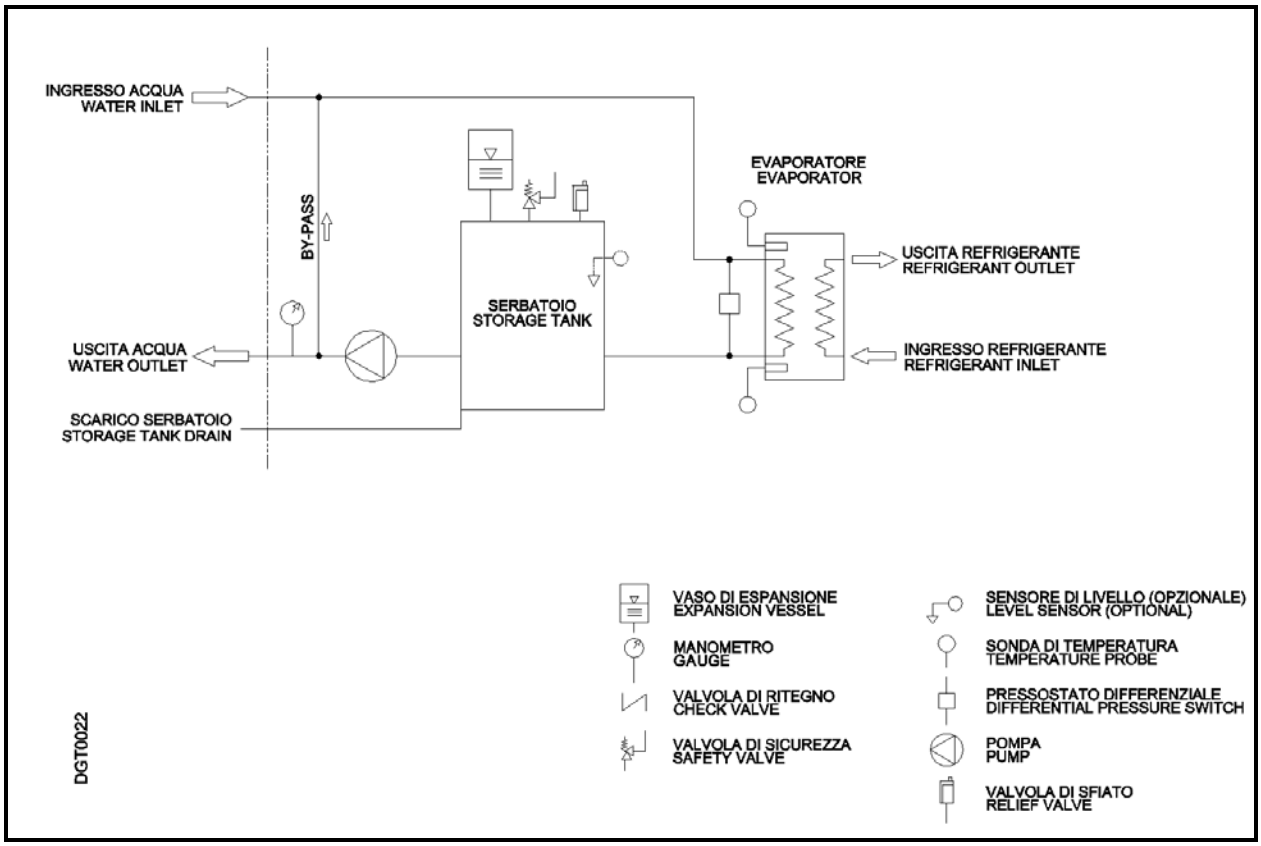
Dispose of refrigerant properly. Remove it from the chiller with suitable tools and deliver it to authorized collection centres that will treat it and make it reusable.

12.0 WATER CIRCUIT DIAGRAMS

CWM002÷CWM006

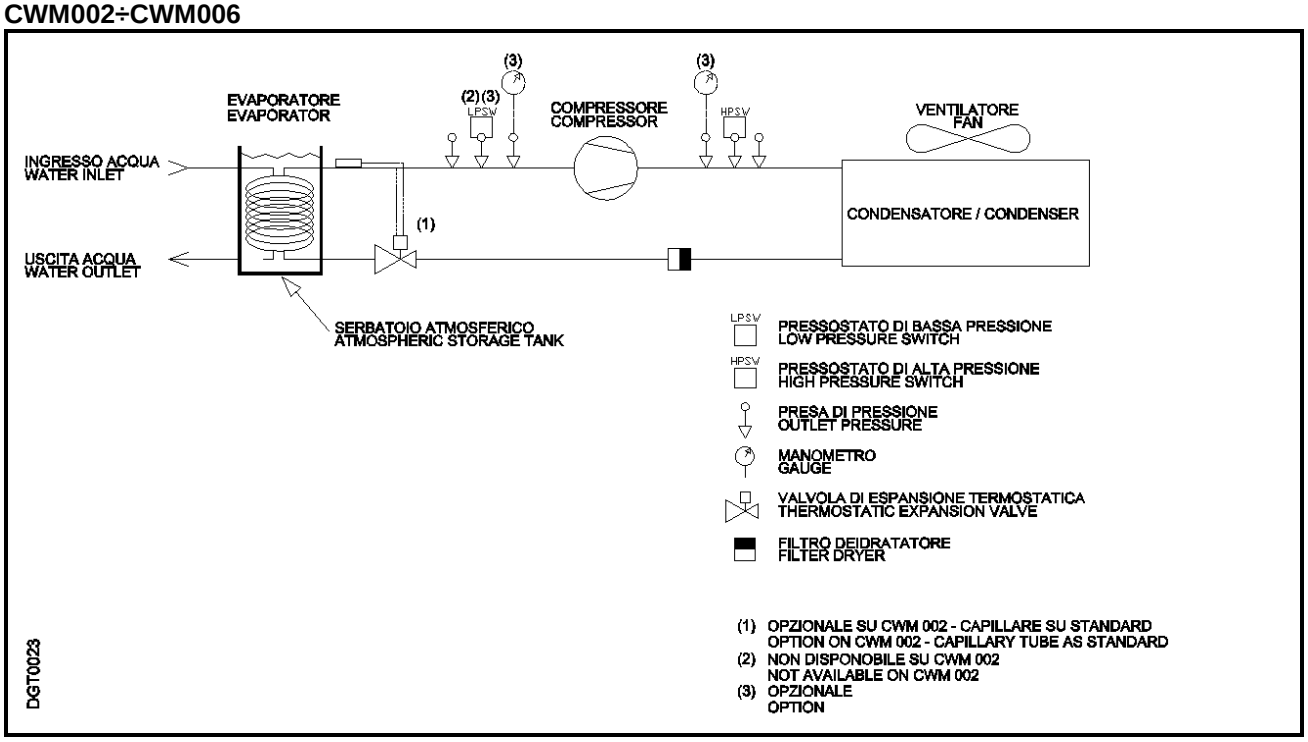


CWM008÷CWM014

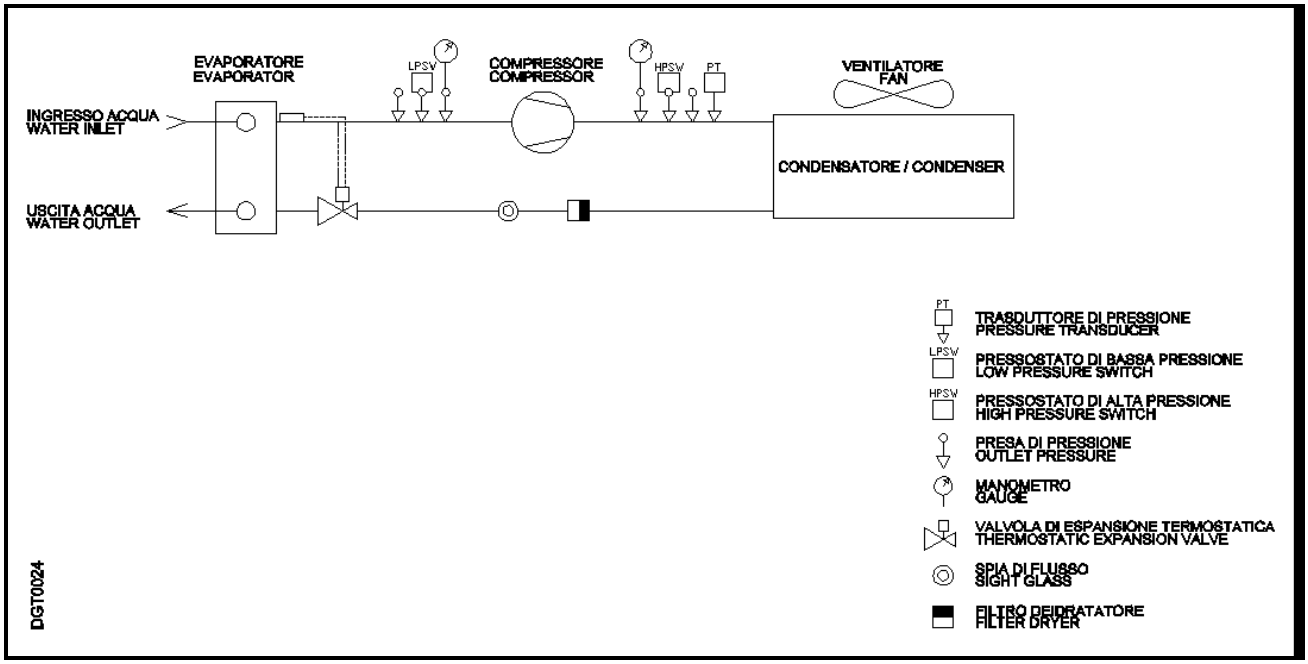


13.0 REFRIGERANT CIRCUIT DIAGRAMS

CWM002÷CWM006

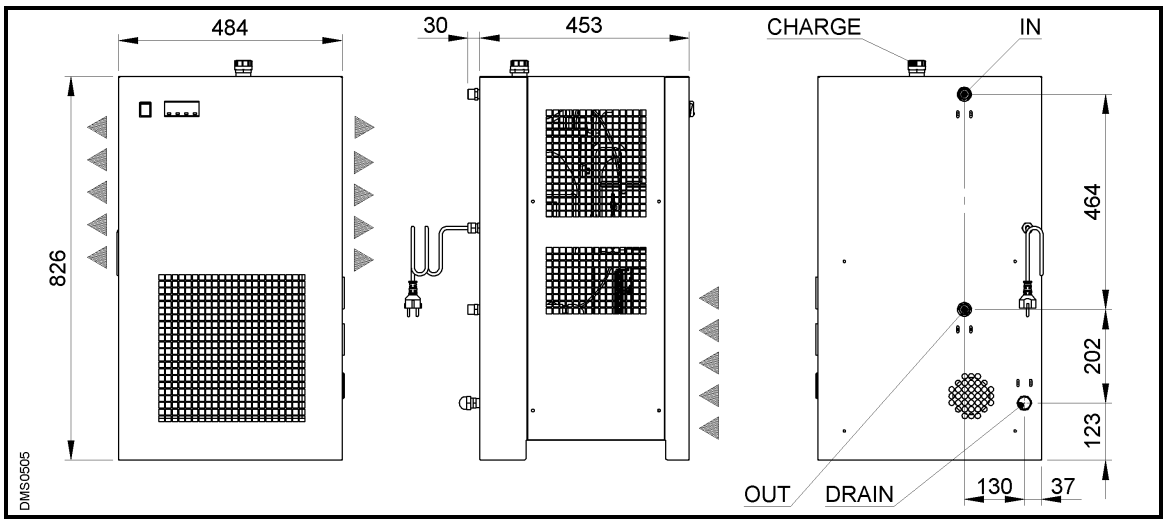


CWM008÷CWM014

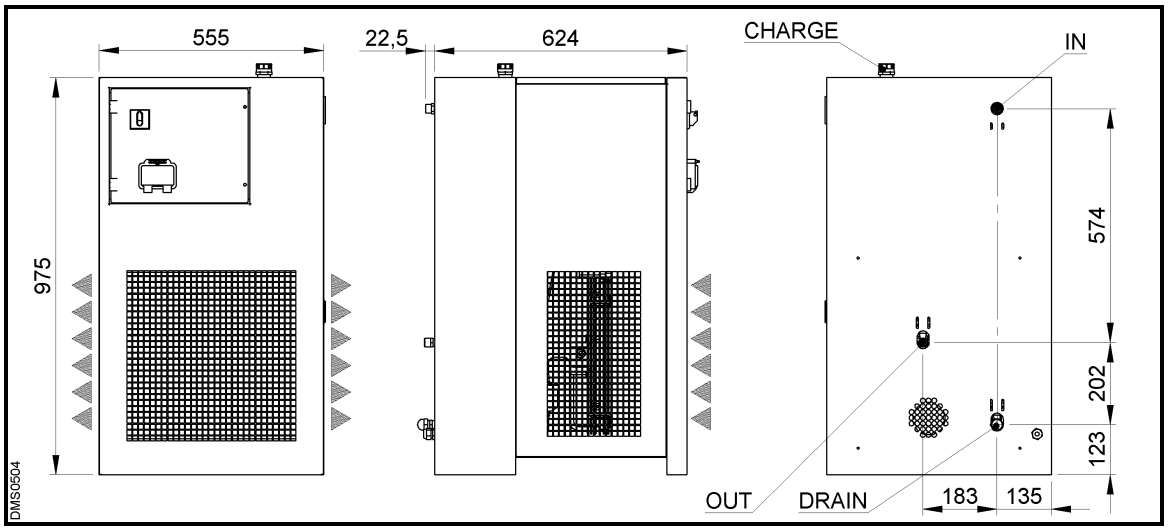


14.0 DIMENSIONAL DRAWINGS [mm]

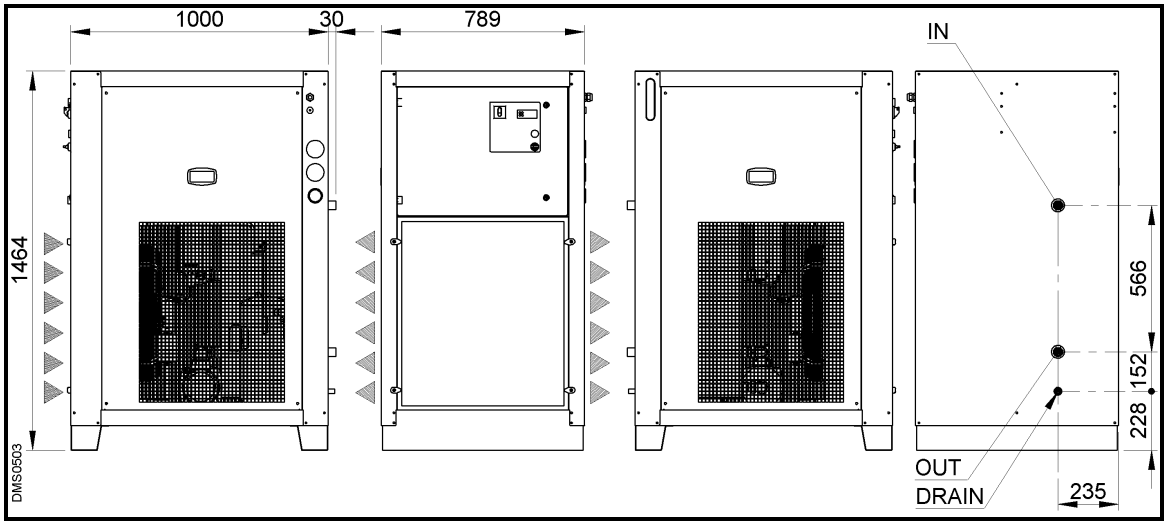
CWM002



CWM003÷CWM006

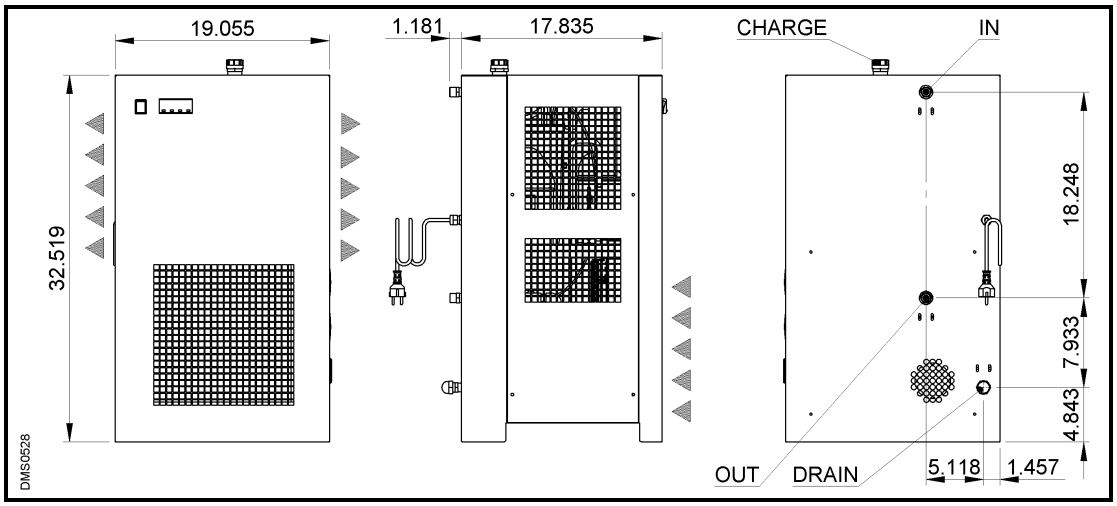


CWM008÷CWM014

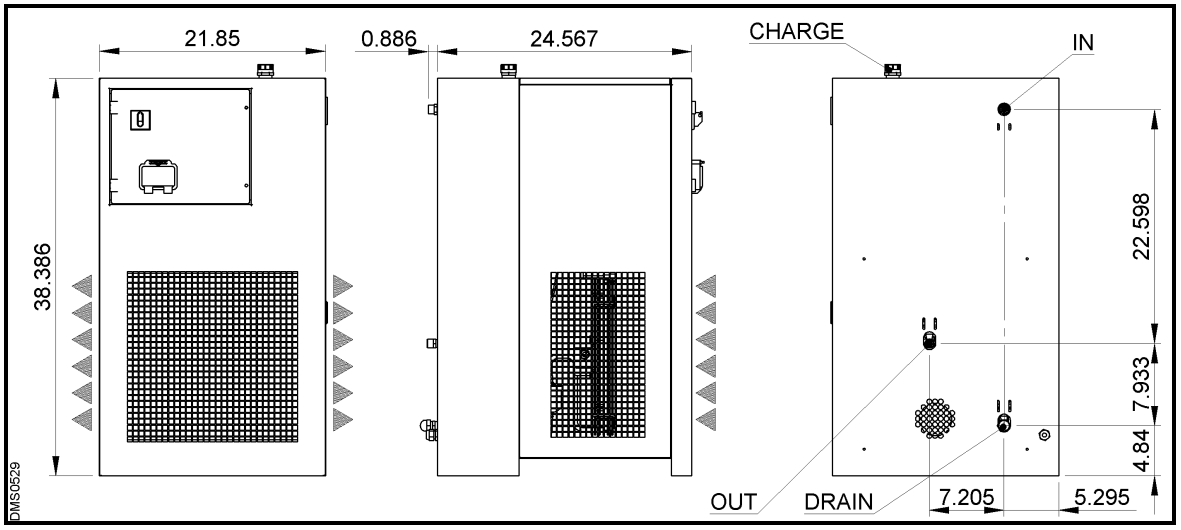


15.0 DIMENSIONAL DRAWINGS [inch]

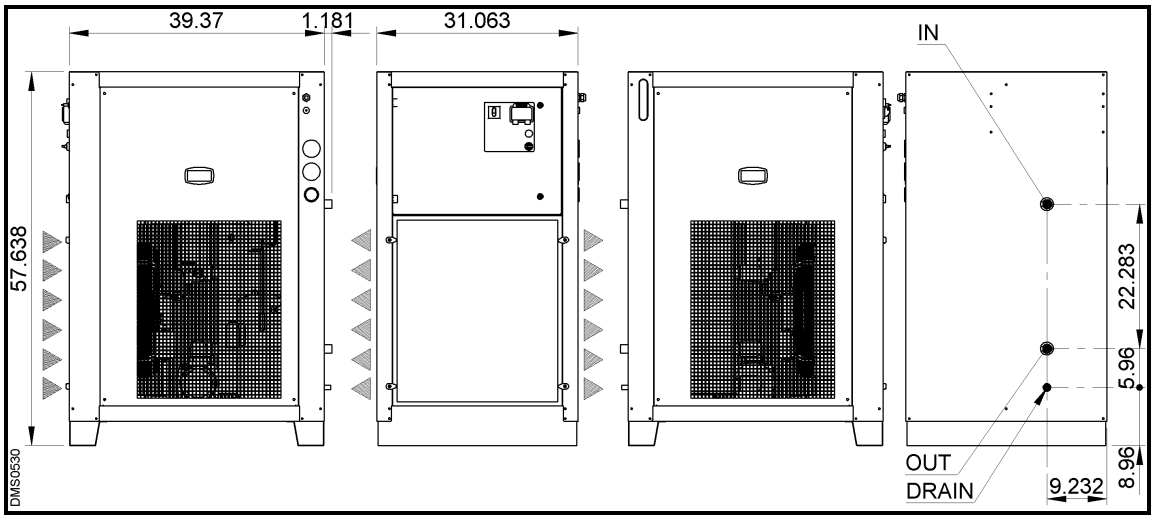
CWM002



CWM003÷CWM006



CWM008÷CWM014



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