PURESTREAM

BY FRIULAIR

CWB CHILLERS

CWB-R
Air-cooled water chillers

User Maintenance Manual
Cooling Capacity from 40 to 160 tons
Scroll compressors-R410 Refrigerant

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 **CWB** 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.

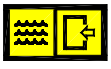
Warranty conditions:
For 12 months from the commissioning date, and no more than 14 months from the shipping date, any parts that were originally defective will be repaired or replaced at no charge. Expenses for transport and travel, room and board for our technicians are excluded.
The warranty excludes 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.

CONTENTS

1

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 recognize 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.

	These chillers contain R410A refrigerant fluids. Service of the refrigerant circuit must be performed by specialized personnel using proper tools.

	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

CWB units are packaged 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 improper.
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, in particular:

- Power voltage and frequency;
- Pressure, temperature and flow-capacity of the incoming water;
- 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 2014/68/EU

The proper use of equipment under pressure is an essential prerequisite for ensuring safety.
To this end, the user must proceed as follows:

- Use the equipment properly within the temperature limits shown in the operating limits stated on the manufacturer's name/data plate;
- Do not solder on the exchangers or refrigerant fluid pipes;
- Do not install the equipment in insufficiently ventilated rooms, areas exposed to sources of heat or near inflammable substances;
- During operation, the equipment must not be subjected to vibrations that could cause fatigue failures.
- Keep the documentation attached to the equipment (user manual, declaration of conformity, etc.) for future reference;
- 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

OPERATION AND MAIN COMPONENTS

2.1 REFRIGERANT CIRCUIT

CWB chillers use a vapour-compression cycle in a Refrigerant circuit that essentially consists of the following components: evaporator, compressor, condenser and thermostatic expansion valve.

Evaporator: this is a braise-welded plate exchanger that exchanges heat between water and a refrigerant fluid without their coming into contact with each other. It consists of corrugated stainless steel plates braise-welded to each other with copper. The evaporator is protected against a lack of water by a differential pressure-switch and against the formation of ice by an anti-freeze system managed by the chiller's electronic controller.

Compressor: this compresses the vapours coming from the evaporator and sends them to the condenser at a higher pressure. CWB chillers uses scroll compressors; they feature a low level of vibration and noise; they are protected by magnetothermic circuit breakers and a temperature sensor in the motor winding.

Condenser: this is a microchannel heat exchanger made entirely of aluminium that exchanges heat between the refrigerant and the air; it condenses the refrigerant gas (which flows inside the exchanger) transferring its condensation heat to the air (which flows outside); this produces refrigerant liquid under high pressure.

Thermostatic expansion valve: this reduces the pressure of the refrigerant liquid coming from the condenser and sends it to the evaporator. This valve modulates the flow of refrigerant in such a way as to maintain the constancy of the superheating of the gas exiting to the evaporator under its various working conditions and, thus ensures that the flow of gas entering the compressor contains no liquid.

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 sub cooled.
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.

2.2 WATER CIRCUIT

A general water circuit could mainly consists of a chillers with its evaporator, pumps, tank, and expansion vessel.
The water flows into the chiller evaporator, where it is chilled, passes in to the tank; afterwards it is drawn by the pump, which sends it to the user.
A differential pressure switch on the evaporator checks that the flow of water is sufficient and stops the chiller compressors if the flow-is too low.
Automatic vent valves fitted on plumbing remove any air bubbles in the circuit.
A fine mesh metal filter ought to be fitted at the entrance to the chiller in order to catch any solid residues that could damage the evaporator.
A water gauge and safety valve should complete the water circuit.

2.3 FANS

The fans force air through the condenser's fins to remove the heat from the condensation of the refrigerant gas, thus limiting the pressure inside the condenser.
CWB chillers use external-rotor axial fans with thermal protection inside the motor winding.

2.4 CONDENSATION CONTROL

When the temperature of the surrounding air drops, the cooling capacity of the air flow is significantly increased, causing the pressure inside the condenser to drop; in order to keep this drop of the condensation pressure from falling below the tolerable limit for the good functioning of the Refrigerant circuit, the fans slow their rotation, reducing the flow of air.
The speed is controlled by an electronic regulator based on the condensation pressure; this allows the machine to operate properly even when the temperature of the outside air is low (see Chapter ***8 Operating Limits***) and also maintains a low level of noise compered to its nominal operating conditions.

2.5 CONTROL OF THE WATER TEMPERATURE

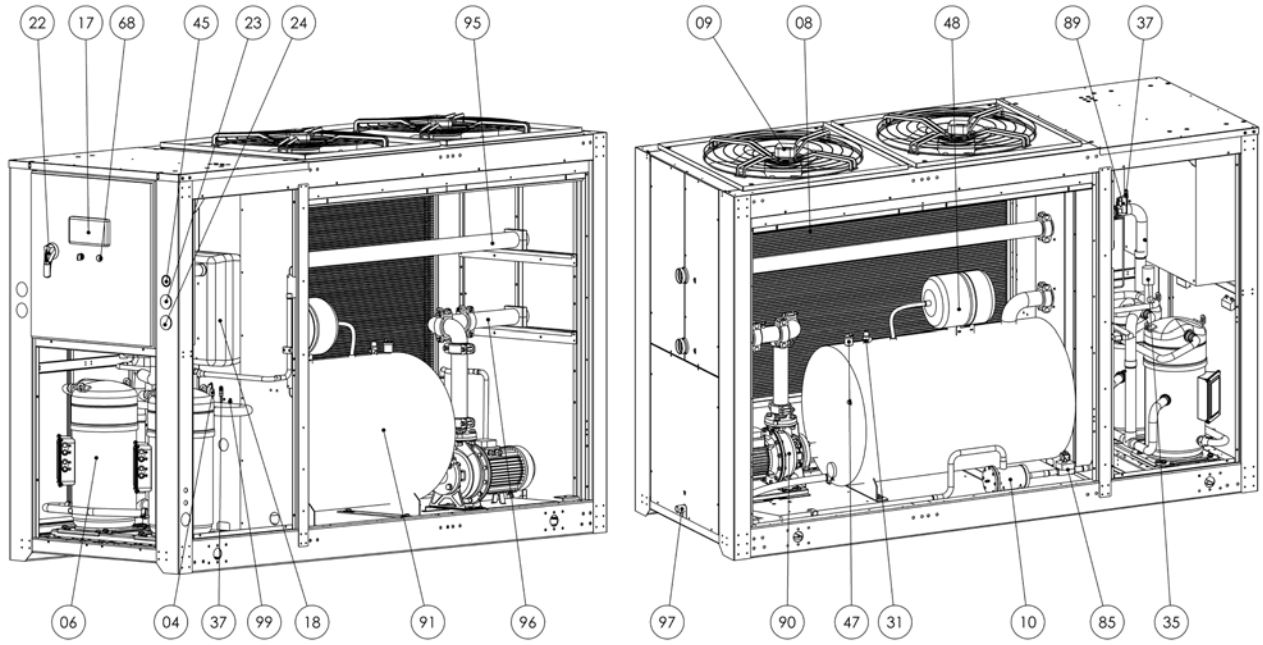
The purpose of the chiller is to maintain the temperature of the water produced within a desired interval as the load on the system varies; this is handled by an electronic controller and a temperature probe that turn the compressors on and off appropriately (see Chapter ***6 Temperature Regulation***).

2.6 PROTECTING THE INTEGRITY OF THE MACHINE

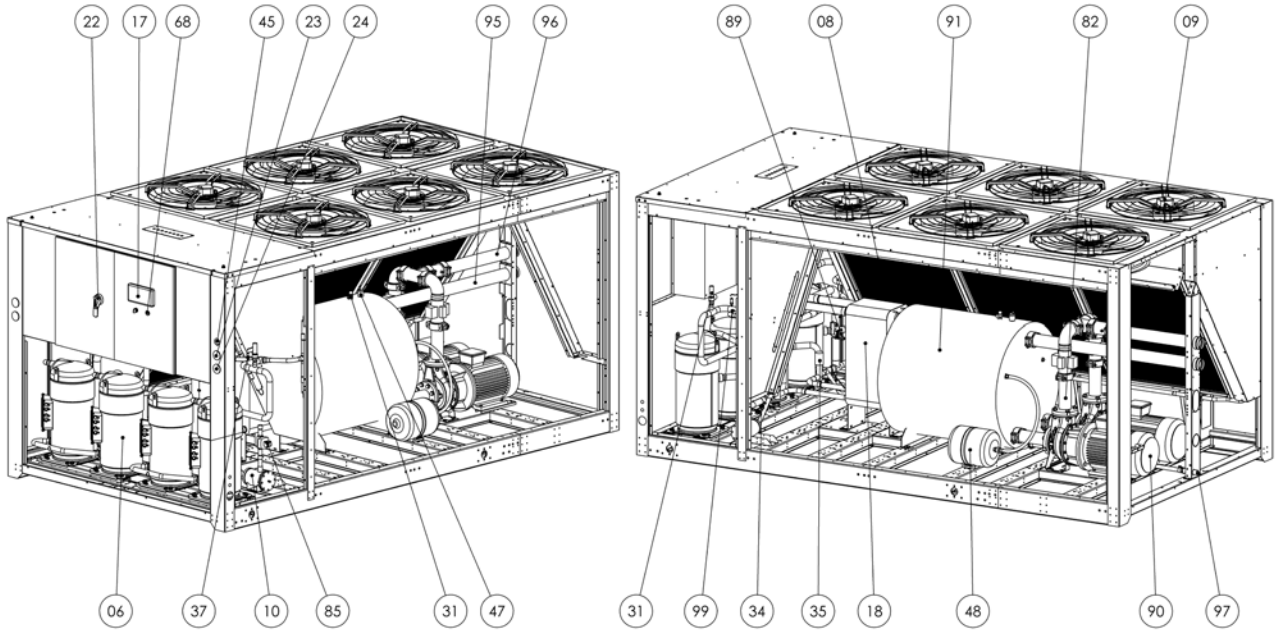
In addition to controlling the temperature, the electronic controller uses pressure switches, thermostats and timers to prevent and handle situations that could compromise the integrity of the machine (also see Chapter ***7 Safety Devices***).

2.7 IDENTIFICATION OF THE MAIN COMPONENTS

2.7.1 TP P3 – Pressurized water tank with single P3 pump



2.7.2 TP D5 – Pressurized water tank with double D5 pump



04 High pressure switch	24 Low pressure gauge	82 Check valve
06 Compressor	31 Safety valve	85 Solenoid valve
08 Condenser	34 Sight glass	90 Pump
09 Fan	35 Thermostatic valve	91 Tank
10 Filter	37 Pressure transducer	95 Water inlet
17 Electronic controller	45 Water gauge	96 Water outlet
18 Evaporator	47 Vent valve	97 Drain
22 Disconnector switch	48 Expansion vessel	99 Pressure plug
23 High pressure gauge	68 On/off light	

2.8 SPARE PARTS

Spare parts list is printed on a dedicated sticker applied inside the chiller. On this sticker each spare part is identified with its ID Number and related Spare Part Number. Here below the cross reference table between ID Number and exploded drawings Ref. With their description and quantity installed inside chillers.

NOTE To order the suggested spare parts or any other part, it is necessary to quote the data reported on the identification plate.

ID N.	DESCRIPTION	NOTE	PART QUANTITY FOR CWB MODEL											
			140	160	190	220	270	300	320	380	420	450	510	570
1	EVAPORATOR GROUP		1	1	1	1	1	1	1	1	1	1	1	1
4	HIGH PRESSURE SWITCH		1	1	1	1	2	2	2	2	2	2	2	2
6	COMPRESSOR	[A]	2	2	2	2	4	4	4	4	4	4	4	4
8	CONDENSER		2	2	2	2	4	4	4	4	4	4	4	4
9	FAN		2	2	3	3	4	4	4	6	6	6	8	8
10	REFRIGERANT FILTER		1	1	1	1	2	2	2	2	2	2	2	2
12	TEMPERATURE PROBE		6	6	6	6	9	9	9	9	9	9	9	9
14	WATER FILTER		1	1	1	1	1	1	1	1	1	1	1	1
17	COMPLETE ELECTRONIC CONTROLLER		1	1	1	1	1	1	1	1	1	1	1	1
18	EVAPORATOR		1	1	1	1	1	1	1	1	1	1	1	1
22	DISCONNECTOR SWITCH		1	1	1	1	1	1	1	1	1	1	1	1
23	HIGH PRESSURE GAUGE		1	1	1	1	2	2	2	2	2	2	2	2
24	LOW PRESSURE GAUGE		1	1	1	1	2	2	2	2	2	2	2	2
25	COMPRESSOR CRANKCASE HEATER		2	2	2	2	4	4	4	4	4	4	4	4
35	THERMOSTATIC EXPANSION VALVE		1	1	1	1	2	2	2	2	2	2	2	2
37	PRESSURE TRANSDUCER		2	2	2	2	4	4	4	4	4	4	4	4
82	CHECK VALVE	[B]	2	2	2	2	2	2	2	2	2	2	2	2
85	LIQUID SOLENOID VALVE		1	1	1	1	2	2	2	2	2	2	2	2
85.1	SOLENOID VALVE COIL		1	1	1	1	2	2	2	2	2	2	2	2
89	DIFFERENTIAL PRESSURE SWITCH		1	1	1	1	1	1	1	1	1	1	1	1
90	WATER PUMP	[C]	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
91	WATER TANK		1	1	1	1	1	1	1	1	1	1	1	1

[A]	The smaller progressive code represents the smallest compressor in tandem configuration.
[B]	Only for double pump version (D2/D3/D5).
[C]	1 or 2 depend from configuration. For P2/P3/P5 version you will find one code, for D2/D3/D5 version you will find two codes.

3

INSTALLATION

3.1 TRANSPORT

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

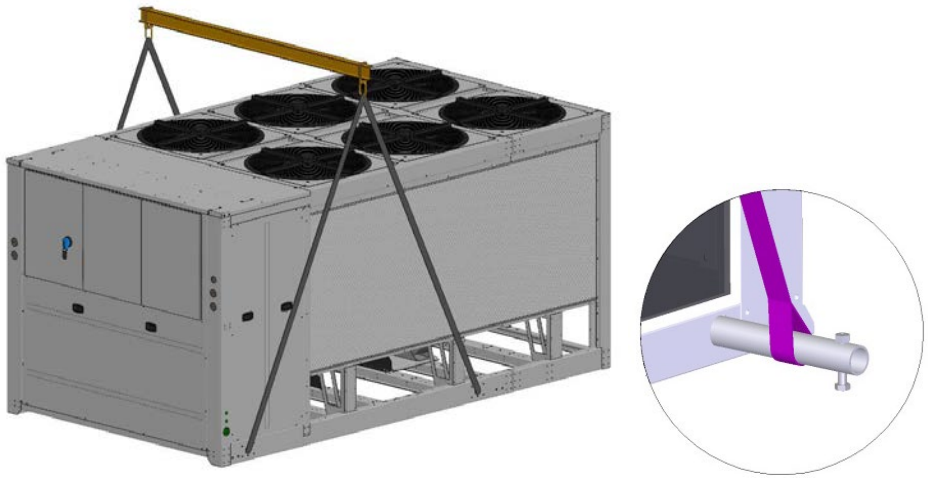
Always keep the chiller vertical: turning it upside down can irreparably damage several parts of the unit.

Handle with care. Violent falls can cause irreparable damage. The units can be handled using belts.

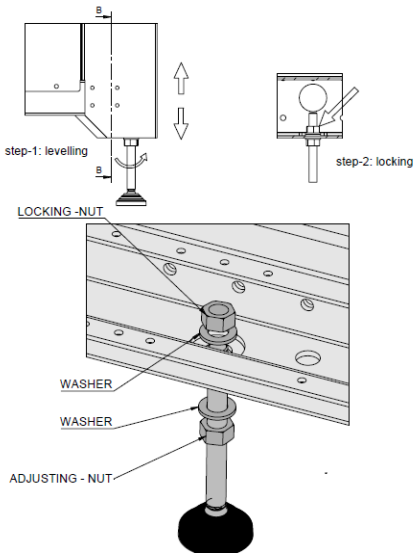
3.1.1 Lifting unit with belts and positioning of leveling feet

All units have lifting holes in the base.

Lock the belts so that they won't slip off during lifting (see figure).



Install the leveling feet that are supplied with the machine and which are inside the electrical panel. Please follow the assembly instructions reported into the User Manual. Without doing so, it will avoid the warranty in case of breakages.



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 60°C//140°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

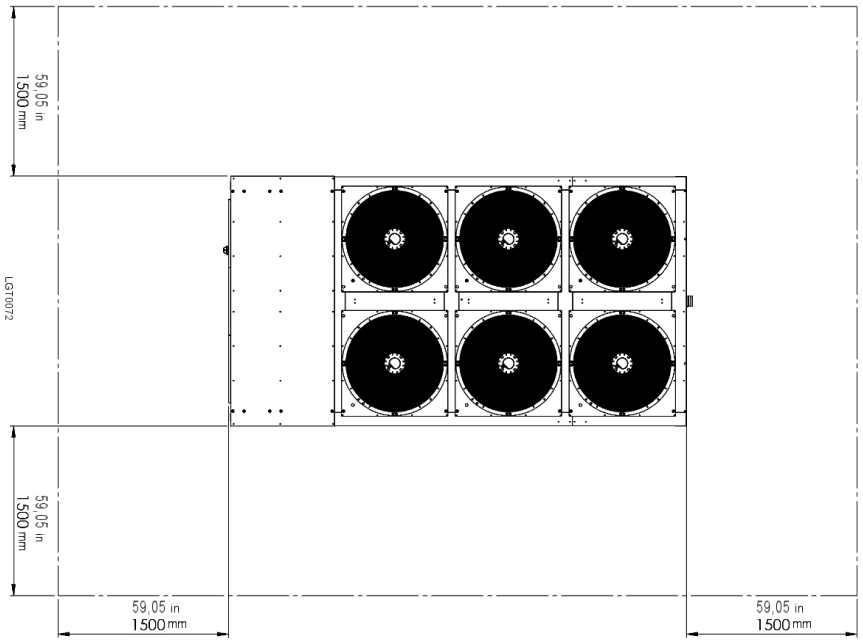
The CWB unit can be installed either inside or outside.
To determine the best place to install the unit, it is important to consider the following aspects:

- The dimensions and source of the water pipes;
- The location of the power supply;
- 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***);
- The air temperatures in the area selected for installation (see Chapter ***8 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 ***6.2 Low water temperatures (<32°F/0°C)***).

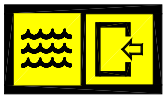
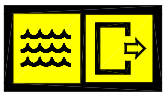
3.3.1 Installation spaces

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 [mm]/[in].
The exit of air from the fans must not be obstructed.
In any case, avoid all situations in which hot air exiting the unit, can be drawn directly to the air intake of the machine.



3.4 WATER CONNECTIONS

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

Water input to the chiller	Water exit from the chiller
	

3.4.1 Recommended water system

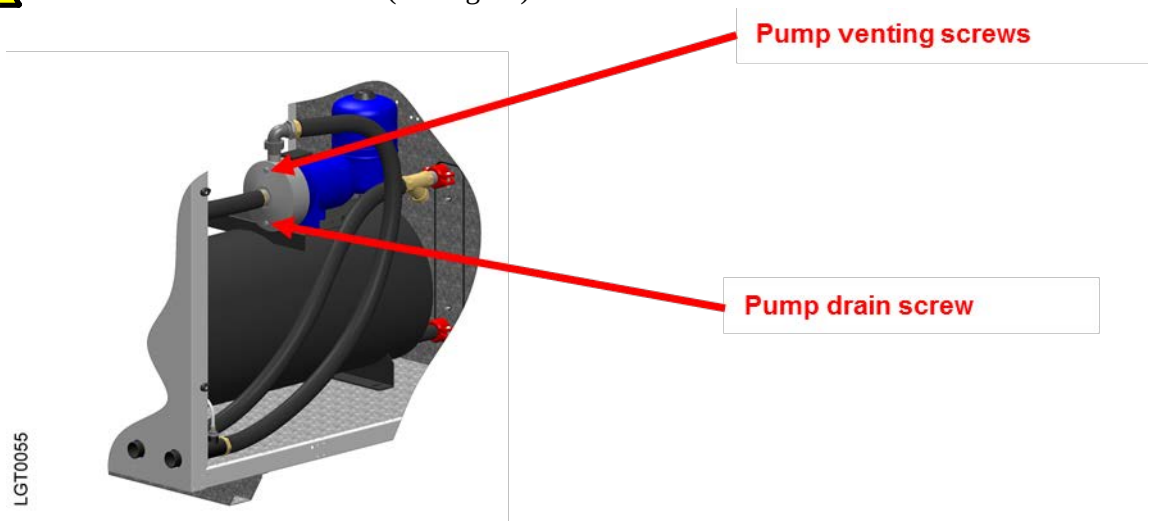
The standard equipment of a water circuit should include tank, pumps, expansion vessel, safety valve, filter, shut-off taps.
In particular, we recommend that the water circuit also be equipped with:

- A mechanical filter and a check valve upstream from the charging tap;
- An air vent at the highest point of the plant;
- A drain tap in the lowest point of the plant;
- Manometers and thermometers at the machine's water input and output to check its functioning;
- Vibration damping joints on the pipes to avoid the transmission of vibration to the plant;
- In the case of water circuits with considerable capacity, we recommend checking whether it is necessary to supplement the expansion vessel already on the unit with another additional one.

Attention! Never work with an open flame near or inside the unit when making connections to the water system.

Important! If the machine charged with pure water, is stopped during the winter, you drain water from the chiller (see paragraph 3.4.2) to avoid damage due to ice.

Important! At start-up, it is necessary to vent all air from inlet water pipe using the air relief valve (see figure).



3.4.2 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	-20
Outside air temperature [°F]	32	23	14	10,2	5	-4
Percentage of ethylene glycol [%]	10	15	20	25	30	40

Attention! Maximum concentration of ethylene glycol allowed: 40%. For glycol concentrations higher than 30%, contact our company's sales offices to make sure that the mechanical seal and the pump motor are suitable for the type and concentration of fluid loaded in the hydraulic system

3.4.3 Charging the water circuit

- Check that the drain taps of the water tank are turned off;
- Open all the system's vent valves;
- Open the system's shut-off devices;
- Ensure that no air is on the pump suction piping and on the pump itself. Use the pump drain tap to grant the complete pump filling (see picture on the previous page);
- Start filling by slowly turning on the system's water-charging tap;
- When water starts coming out of the vent valves, close them and continue charging until the manometer shows at least 1 bar;
- Check for any leaks by looking at the manometer and inspecting the circuit.

3.5 ELECTRICAL CONNECTIONS

The machines 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 switch (IDn=0,03A) (main power switch) and slow-blow fuses with the specifications shown on the electrical diagram.

Use wires of the section shown on the electrical diagram of the unit.

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 and a remote alarm indicator light

A remote on/off switch can be connected to terminals in the electrical panel: there are 24V between these two terminals.
To enable a remote switch, move the I/O/REM switch to REM.
An alarm indicator light can be connected to terminals (clean contact) in the electrical panel.

4

PRELIMINARY CHECKS AND START-UP

4.1 PRELIMINARY CHECKS AND PREPARATION FOR THE FIRST START-UP

Important! At start-up, it is necessary to give off air from inlet water pipe using the air relief valve (see paragraph ***3.4.1 Recommended water system***).

Before starting up the unit, do the following:

- Check that the water shut-off valves are open;
- Check that the pressure shown on water gauge, is at least 1 bar 7/15 PSI;
- Check that the surrounding temperature is in the range for the machine to function (see Chapter ***8 Operating Limits***);
- Check that the CWB chiller's main switch is open (O position);
- Check that the CWB chillers' Local/O/Remote switch on the electrical panel door is in the "O" position;
- Check that the mains voltage matches the voltage on the machine's identification plate with a tolerance of ±10%;
- Close the main power supply switch;
- Turn on one pump of the plant (if needed);
- Close the main switch on the chiller electrical panel (I position).

This puts the machines under voltage without starting it up.

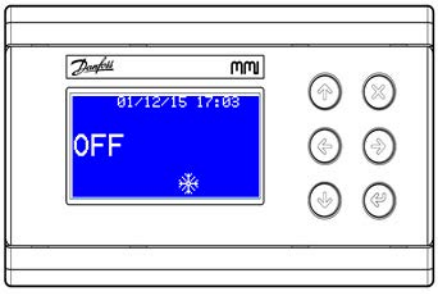
Attention! Apply voltage to the machine at least two hours before start-up to give the heating elements in the compressor housing time to heat the oil inside. Our company reserves the right of not recognizing the warranty in case of premature breaking down of the compressor, if it is established that this operation is not normally executed by the installer / user of the plant.

The heating elements limit the quantity of refrigerant dissolved in the oil and prevent the oil from migrating when the compressors start.
Before start-up, check that the temperature of the lower part of the compressors is at least 10÷15°C//18÷28°F higher than the surrounding temperature.

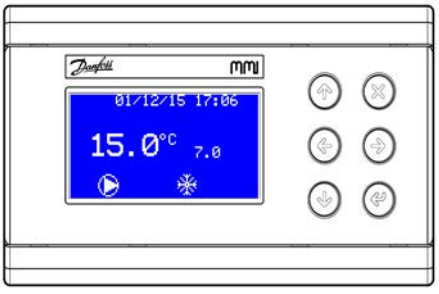
4.2 START-UP

To proceed to start-up:

- Put the "Local/O/Remote" switch on "Local" position;
- Turn the units on by holding down the "**UP**" button on the electronic controller for five seconds;



Will appear:



- Check that the alarm symbol  does not appear on the electronic controller; if this should happen, press the **ESC** button to display the type of alarm triggered.

  Attention! At the first start-up there could be an alarm for an incorrect sequence of the R-S-T phases, indicated by the initials A02, when you press the **ESC** button.
  This safety system prevents the compressors from turning in the wrong direction.
  Note: the phase sequence relay located inside the electrical panel must have both LEDS lit to confirm the correct electromagnetic field.

  
  In this case, turn on the main power supply switch upstream from the machine and reverse the two phases immediately downstream from the main switch.

  
  Attention! Never reverse the wires downstream from the unit main switch on the electrical panel because doing so risks changing the correct sequence of other devices, such as, for example, the pump and fans.

  Repeat the steps from point 1.

- Wait for the electronic controller to verify that the water flow is constant through the signal from the differential pressure-switch; if the differential pressure-switch intervenes (alarm code A03 when you press the **ESC** button), vent the system, check that the shut-off taps and the functioning of the pump are turned on; reset the alarm by holding down the **ESC** button for 5 seconds;
- Wait for the compressors to start.

4.2.1 Start-up under critical conditions

If the temperatures of the water and air are particularly high and outside operating limits, it is possible that the chiller is being asked to work in conditions that are too harsh: in this case, the CWB will partially start, i.e., they will work with only one compressor until the water slowly returns within operating limits; only then will the machine function at full load.
To overcome this problem, you will have to reduce the thermal load on the machine by shutting off some of the uses or, if this is not possible, by reducing the flow of water into the evaporator: partially close the output tap from the chiller and restart the machine.
Operate the chiller under these conditions until the water temperature gradually returns within operating limits; then, you can turn on the tap completely.

4.3 TURNING OFF THE UNIT

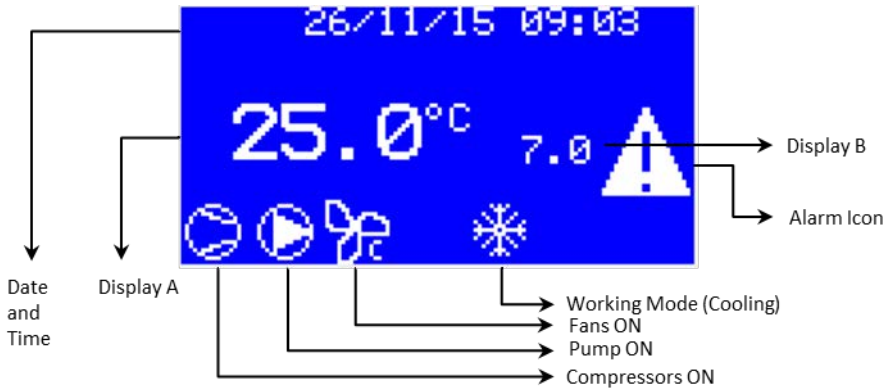
To turn off the chiller, move the Start/Stop switch to the Stop position or hold down the **UP** button on the
electronic controller for at least 5 seconds (see paragraph ***5.2 Turning on and off***).


Attention! It is important to turn the unit off before the pumps, otherwise the risk of damaging the evaporator is existing.

5

ELECTRONIC CONTROLLER

The electronic controller shows a series of icons representing chillers main components:



Electronic controller

It manages:

- The functioning of the compressors to ensure that the water produced has a constant temperature;
- The speed of the fans;
- The functioning of the pump;
- The prevention of the high-pressure alarm.

Displays:

- The state of the unit;
- The state of the compressors;
- The state of the fans;
- The state of the pump;
- The temperature set point (standard factory setting) (display B);
- The temperature of the water produced (standard factory setting) (display A);
- All digital and analogue inputs and outputs (parameters navigation);
- All the alarms that can occur.

5.1 MAIN FUNCTIONS OF THE ELECTRONIC CONTROLLER BUTTONS AND MEANINGS OF THE ICONS

Button/Icon	Functions
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.
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.
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.
DOWN	During menu navigation, scrolls down through the menu items. Decreases the value of the parameter being modified. Scrolls down through the alarm list.
	Indicates the presence of one or more active alarms.
	They indicate the state of the compressors and, more precisely: Slow flashing: compressor about to turn on; Fast flashing: compressor about to turn off.
	Indicates the state of the fans: ON: fans ON; OFF: fans OFF.
	Indicates the state of the pump: ON: pump ON; OFF: pump OFF.

5.2 TURNING ON AND OFF

To turn the unit on, hold down the **UP** button for more than five seconds.

To turn the unit off, hold down the **UP** button 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 Start/Stop switch on the door of the electrical panel.

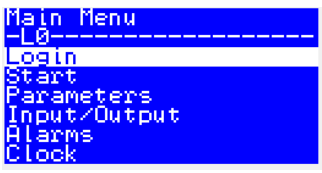
Attention! The Start/Stop switch has precedence over the "**UP**" button: after turning the machine off from the Start/Stop switch, it will not be possible to restart it with the "**UP**" button on the electronic controller.

5.3 CHANGING THE SET POINT

If, during the offer phase, you did not specify that the chiller must produce water at temperatures close to 0°C//32°F, or below, you must contact our company. See paragraph ***6.2 Low water temperatures (<32°F//0°C)***.

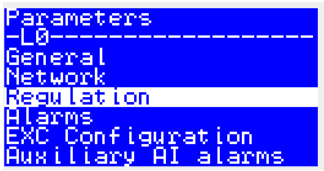
To change the set point of the exiting water, proceed as follows:

- From the main screen press **ENTER**;



- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER**;

- Use the **DOWN** key until the *rEG-Regulation* menu is reached, press **ENTER**;



- Press **ENTER** at *SEt-Setpoint*; the description, the code and the value of the cooling temperature setpoint is displayed;

- Press **ENTER** to change the value using **UP**/**DOWN** key;

- Press **ENTER** to confirm the value;
- Press **ESC** several times to return to main screen.

5.4 CHANGING THE TYPE OF RESTART AFTER A POWER FAILURE

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:

- Starting from the main screen press **ENTER**;
- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER**;
- From the *PAR GEN-General* menu press **ENTER**;
- From the *GEN StU-Setup* menu press **ENTER**, the Y02 menu shows the current restart mode which may 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 will be highlight;
- Use the **UP** and **DOWN** keys to select the desired parameter and confirms with **ENTER**;
- To return to the main screen, press **ESC** four times.

5.5 CHANGING THE SERIAL ADDRESS (MODBUS AND CAN)

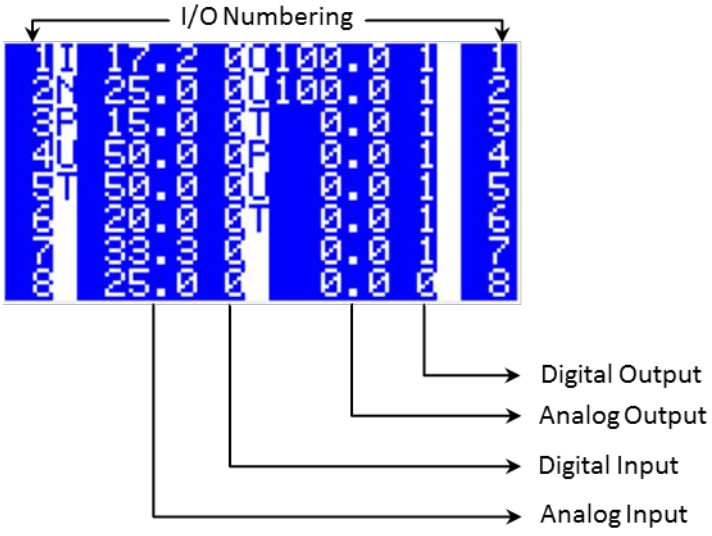
If you are installing a serial network with several devices, it may be necessary to change the serial address of the electronic controller, which is set to 1 at the factory.

- Starting from the main screen press **ENTER**;
- Use the **DOWN** key to reach the *PAR-Parameters* menu, press **ENTER**;
- From the *PAR GEN-General* menu press **ENTER**;
- Use the **DOWN** arrow to reach the *GEN SEr-Serial setting* menu and press **ENTER**;
- Use the **DOWN** key to reach the *SEr-Cid or Ser-Ser* (CAN or MODBUS serial address respectively): the current serial address is displayed;
- Press **ENTER** and use the **UP** and **DOWN** arrows to set the desired value and confirms with **ENTER**;
- To return to the main screen, press **ESC** four times.

5.6 DISPLAY OF INPUTS AND OUTPUTS

It is possible to display the analogue and digital outputs to check the operation of the machine and its main components.

- Starting from the main screen press **ENTER**;
- Use the **DOWN** key to reach the *I-O-Input/Output* menu, press **ENTER**;
- From the I-O menu press **ENTER** at I/O Display;
  Will appear:



- Use **DOWN** key to see the second page;
- To exit press **ESC** until the main screen is displayed.

According to the configuration of the chiller, the electronic controller shows the following signals.

I/O	Numbering	Function
Analog Input	1	----------
	2	Discharge Refrigerant Pressure Circuit 1
	3	Suction Refrigerant Pressure Circuit 1
	4	Discharge Refrigerant Temperature Circuit 1
	5	Liquid Temperature Circuit 1
	6	Suction Refrigerant Temperature Circuit 1
	7	Ambient Temperature
	8	Discharge Refrigerant Pressure Circuit 2
	9	Suction Refrigerant Pressure Circuit 2
	10	Discharge Refrigerant Temperature Circuit 2
	11	Liquid Temperature Circuit 2
	12	Suction Refrigerant Temperature Circuit 2
	13	Evaporator Water Inlet Temperature
	14	Evaporator Water Outlet Temperature
Digital Input	1	On/Off
	2	High Pressure Switch Circuit 1
	3	High Pressure Switch Circuit 2
	4	Water differential Pressure Switch
	5	Reverse Phase Protection
	6	Compressor Overload Circuit 1
	7	Compressor Overload Circuit 2
	8	Compressor 1-2 Internal Protection
	9	Compressor 3-4 Internal Protection
	10	Condenser Circuit 1 Fan Overload
	11	Condenser Circuit 2 Fan Overload
	12	Pump 1
	13	Pump 2
Analog Output	1	Fans Speed Circuit 1
	2	Fans Speed Circuit 2
	3	----------
	4	----------
	5	----------
	6	----------
	7	Opening Expansion Valve 1
	8	Opening Expansion Valve 2
Digital Output	1	Compressor 1
	2	Compressor 2
	3	Compressor 3
	4	Compressor 4
	5	Fan circuit 1
	6	Fan circuit 2
	7	Pump 1
	8	Pump 2

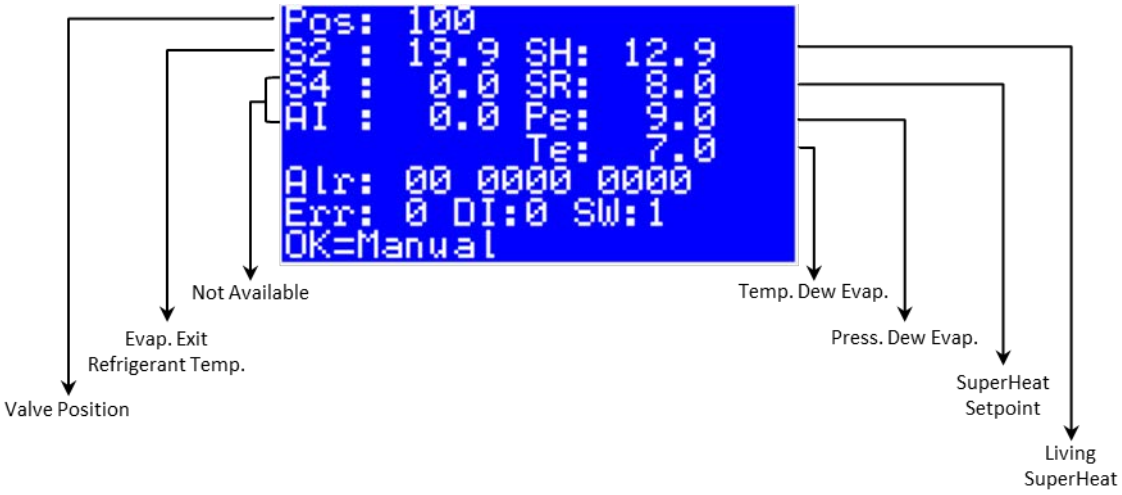
9	Refrigerant Liquid Valve Circuit 1
10	Refrigerant Liquid Valve Circuit 2
11	Heater
12	General Alarm

5.7 DISPLAY EXPANSION VALVE WORKING PARAMETERS

All CWB units are fitted with electronic expansion valves and the electronic control displays living working opening and setting for each valve. This can be done in the following way:

- From the main screen press **ENTER**;
- Use the **DOWN** key to reach the *EEV-Config EEV* menu, press **ENTER**;
- Use the **DOWN** key to choose the valve and press **ENTER**:

- Use the **DOWN** key to reach the Test EEV1 and press **ENTER**.
  Will appear:



5.8 DISPLAY SOFTWARE RELEASE OF THE ELECTRONIC CONTROLLER

- From the main screen press **ENTER**;
- Use the **DOWN** key to reach the *SER-Service* menu, press **ENTER**;
- From the *SER INF-Software info* menu press **ENTER** and the software version installed on the control tool can be viewed;
- To exit press **ESC** until the main screen is displayed.

5.9 DISPLAYING THE COMPRESSOR AND PUMP COUNTERS

- From the main screen press **ENTER**;
- Use the **DOWN** key to reach the *HRS-Hour Counters* menu, press **ENTER**;
- On the *HRS COH-Compressors* menu press **ENTER**, use the arrows to display the hours of operation for the compressor;

- To display the working hours of the pump from *HRS menu*, use the **DOWN** key to scroll down to the *HRS EPH-Evaporator Pumps* menu and press **ENTER**. From here you can display the working hours of the pump (EP1);
- To exit, Press **ESC** again until you return to the main screen.

5.10 ALARMS

An alarm condition is signaled by the Alarm icon.
Some alarms must be rearmed manually while for others, the reset is automatic or semi-automatic.

- **Manual reset:** 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 reset:** the alarm is automatically deactivated as soon as the alarm condition ceases and the machine restarts by itself. However, the signal (Alarm icon) remains on the display until the alarm code is displayed;
- **Semi-automatic reset:** semi-automatic alarms behave like automatic alarms; but if the same semi-automatic 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.

5.10.1 Displaying and resetting alarms

The Alarm icon turns on to indicate an alarm.
To display the description of the alarm that intervened, press the **ESC** button; use the **UP** and **DOWN** buttons to display the description 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 pressure switch has intervened, the alarm can only be reset when the pressure has risen beyond the reset value (see paragraph ***7.1 Calibration of the safety devices and type of rearm***).

Then, after displaying the alarm, wait for normal conditions to be restored, press **ESC** again, hold it down for 5 seconds and the alarm will be reset.

5.10.2 Displaying the alarm history

- From the main screen press **ENTER**;
- Use the **DOWN** key to reach the *ALA-Alarms* menu, press **ENTER**;
- Use the **DOWN** key to reach the *ALA AHS-Alarm history* menu;
- Press **ENTER**. The alarm history will be displayed.

5.10.3 Table of alarm codes

Alarm code	Alarm description	Type of rearm
A01	General alarm	A
A02	Reverse phase protection	A
A03	Evaporator flow switch alarm	SA
AP1	Evap. pump/fan 1 overload alarm	M
AP2	Evap. pump/fan 2 overload alarm	M
AP9	Backup pump running	W
A07	Low air temperature alarm	W
A09	High temperature warning	A
A12	Cond fan/pump run hours exceeded	A
AE1	Evaporator 1 ice alarm	SA
AH1	Circuit 1 high pressure alarm	M
AH2	Circuit 2 high pressure alarm	M
AL1	Circuit 1 low pressure alarm	SA
AL2	Circuit 2 low pressure alarm	SA
AM1	Circuit 1 high suction press alarm	W
AM2	Circuit 2 high suction press alarm	W
AV1	Circuit 1 vacuum alarm	M
AV2	Circuit 2 vacuum alarm	M
AC1	Circuit 1 compressors overload	M
AC2	Circuit 2 compressors overload	M
A32	Compressors 1-2 Internal Protection	M
A33	Compressors 3-4 Internal Protection	M
A51	Circuit 1 cond. fans overload	A
A52	Circuit 2 cond. fans overload	A
AF1	Fan 1-2 Internal Protection	M
AF2	Fan 3-4 Internal Protection	M
A7A	Alarm Probe Tin Evaporator	A
A7B	Alarm Probe Tout Evaporator1	A
A7G	Alarm Probe Discharge Press Circuit 1	A
A7H	Alarm Probe Discharge Press Circuit 2	A
A7K	Alarm Probe Tout	A
A7L	Alarm Probe Remote Set	A
A7V	Alarm Probe Suction Press Circuit 1	A
A7W	Alarm Probe Suction Press Circuit 2	A
A8A	Alarm Probe Discharge Temp Circuit 1	A
A8B	Alarm Probe Discharge Temp Circuit 2	A
A8W	Alarm Probe Suct Temp Circuit 1	A
A8X	Alarm Probe Suct Temp Circuit 2	A
dT1	Circuit 1 high discharge temp	A
dT2	Circuit 2 high discharge temp	A

E10	EEV1 Connection	SA
E11	EEV1 Power fail closure	A
E12	EEV1 S2 Error	M
E14	EEV1 Pe Error	M
E16	EEV1 NO Refrigerant Selected	M
E17	EEV1 Valve Error	M
E19	EEV1 CAN driver diagnostics	M
E20	EEV2 Connection	SA
E21	EEV2 Power fail closure	A
E22	EEV2 S2 Error	M
E24	EEV2 Pe Error	M
E26	EEV2 NO Refrigerant Selected	M
E27	EEV2 Valve Error	M
E29	EEV2 CAN driver diagnostics	M

Legend	A	Automatic	M	Manual
	SA	Semi-automatic	W	Warning

6

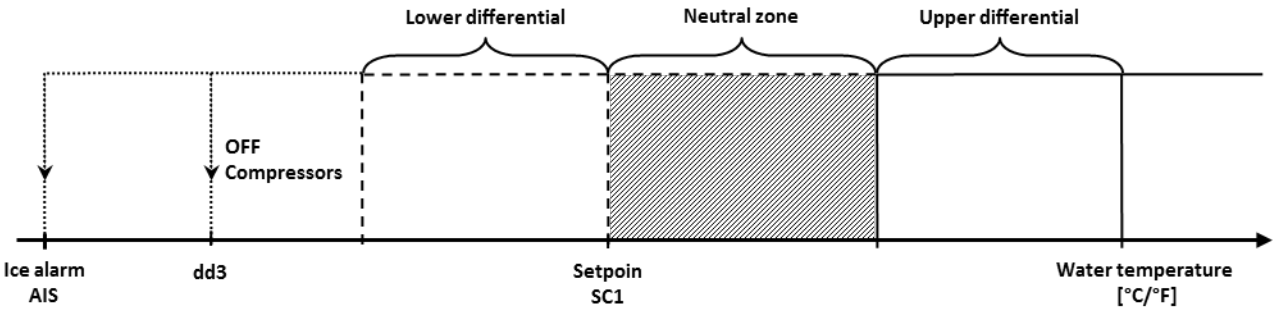
TEMPERATURE REGULATION

6.1 TYPES OF REGULATION

The electronic controller can regulate the water temperature with two different logic: proportional and neutral zone control.
All CWB are set up with a neutral zone regulation based on evaporator outlet water temperature.

6.1.1 Neutral zone control: how it works

The neutral zone regulation is standard on CWB and it is done on evaporator outlet water temperature. This system is based on three temperature intervals: lower differential - neutral zone - upper differential and a temperature.
All these values are distributed on the temperature scale as shown in the figure:

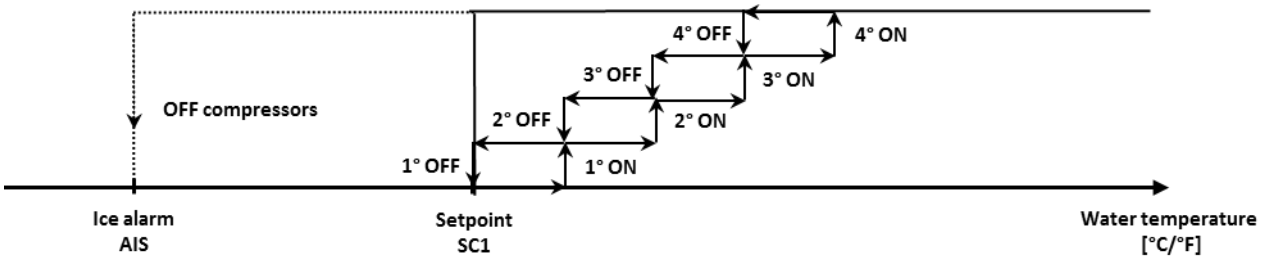


The compressors are forced off.		The compressors are progressively turned off as the temperature of the water decreases.	The compressors that are on are kept on and those that are off are kept off.	The compressors are progressively turned on as the temperature of the water increases.	All the compressors are on.
Numerical example:					
4°C [39,2°F]	4,5°C [40,1°F]	From 6°C [42,8°F] to 7°C [44,6°F]	Set point = 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]
4°C [39,2°F]	4,5°C [40,1°F]	From 9°C [48,2°F] to 10°C [50°F]	Set point = 10°C [50°F] From 10°C [50°F] to 11°C [51,8°F]	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).

6.1.2 Proportional control: how it works

Based on inlet water temperature, the electronic controller starts and stops the compressors to keep this temperature as close as possible to the temperature set point.
This type of control requires the definition of a temperature differential above the set point, in which the compressors are progressively switched on.
At the top of the differential zone, the compressors are all turned on.
The compressors are progressively switched off when water temperature decreases.
The compressors are switched off when water temperature reaches the set point.
Below there is an example for a CWB with 4 compressors:



The compressors are off.	The compressors are progressively turned on as the temperature of the water increases. The compressors are progressively turned off as the temperature of the water decrease.

The set point of the water can be changed: the other parameter (differentials zone) remains constant and follows the set-point value, moving on the temperature scale.

6.2 LOW WATER TEMPERATURES (<32°F/0°C)

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 safety devices.

NOTE The safety devices setting can only be changed at a higher level of programming of the electronic control: please request the password by contacting our company.

CWB units can operate with water and ethylene glycol mixtures up to a concentration of 40%.

For each option of regulation in the paragraphs below, it is indicated the recommended setting for operating with low water temperature.

6.3 NEUTRAL ZONE REGULATION BASED ON OUTLET WATER TEMPERATURE (STANDARD)

All CWB are set up with a neutral zone regulation based on outlet water temperature from evaporator. When neutral zone control on outlet water temperature is chosen, the following parameters must be set as shown:

Parameter	*Description*	*Set*	*Meaning*
dSA	Display A value (ref. figure Chap.5)	5 (=AI2)	Outlet water temperature
dSb	Display B value (ref. figure Chap.5)	2 (=Set)	Setpoint
rEG	Analog Input for temperature regulation	3 (=AI2)	Outlet water temperature
rEt	Regulation type	2	Dead Zone

Follow this path:

- From the main screen press **ENTER** ;
- Press **ENTER** at *LOG-Login*;
- Enter the password[1] using **UP** **/DOWN** key and **ENTER** to confirm the value;
- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER** ;
- At *GEN-General* menu press **ENTER** ;
- At *dSP-Display* menu press **ENTER** ;
- Use the **DOWN** key to reach *dSA - Display A* value and *dSb - Display B* value for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** two times to return to previous menu level;
- Use the **DOWN** key until the *reG-Regulation* menu is reached, press **ENTER** ;
- At *CFR-Configuration* press **ENTER** ;
- Use the **DOWN** key to reach *rEG- Analog Input for temperature regulation* and *rEt-Regulation type* for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** several times to return to main menu.

In this configuration, display A shows outlet water temperature and display B shows setpoint temperature.

6.3.1 Recommended setting for operating with low water temperatures

For operating with low water temperature, it is recommended to set the following parameters:

Parameter	*Description*	*Unit*	*Set*							
	Desired water temperature	°C *[°F]*	-10 *[14]*	-7 *[19,4]*	-5 *[23]*	-3 *[26,6]*	0 *[32]*	2 *[35,6]*	5 *[41]*	7 *[44,6]*
SCL	Setpoint minimum limit	°C [°F]	-11 [12,2]	-8 [17,6]	-6 [21,2]	-4 [24,8]	-1 [30,2]	1 [33,8]	4 [39,2]	6 [42,8]
SC1	Cooling temperature setpoint	°C *[°F]*	-10 *[14]*	-7 *[19,4]*	-5 *[23]*	-3 *[26,6]*	0 *[32]*	2 *[35,6]*	5 *[41]*	7 *[44,6]*
dd3	Min Temp. for OFF compressor	°C *[°F]*	-13 *[8,6]*	-10 *[14]*	-8 *[17,6]*	-6 *[21,2]*	-3 *[26,6]*	-1 [30,2]	2 [35,6]	4.5 *[40,1]*
AIS	Ice alarm setpoint	°C *[°F]*	-14 *[6,8]*	-11 *[12,2]*	-9 *[15,8]*	-7 *[19,4]*	-4 *[24,8]*	-2 *[28,4]*	0 *[32]*	4 *[39,2]*
ALt	Low pressure alarm setpoint	[barg] *[PSI]*	3,0 *[43,5]*	3,5 *[50,8]*	3,8 *[55,1]*	4,2 *[60,9]*	4,6 *[66,7]*	5,0 *[72,5]*	5,6 *[81,2]*	5,8 *[84,1]*
	Percentage of ethylene glycol	%	40	30	30	30	25	20	15	0

[1] Please contact our company.

Follow this path:

- From the main screen press **ENTER**;
- Press **ENTER** at *LOG-Login*;
- Enter the password[2] using **UP** **/DOWN** key and **ENTER** to confirm the value;
- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *reG-Regulation* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *SEt-Setpoint* menu is reached, press **ENTER**;
- Use the **DOWN** key to reach *SC1-Cooling temperature setpoint* and *SCL-Setpoint minimum limit* for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** to return to previous menu level;
- Use the **DOWN** key until the *ddZ-Dead zone* menu is reached, press **ENTER**;
- Use the **DOWN** key to reach *dd3- Min Temp. for OFF compressor* and press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** two times to return to previous menu level;
- Use the **DOWN** key until the *ALA-Alarms* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *ICE-Ice* menu is reached, press **ENTER**;
- At *AIS- Ice alarm setpoint* press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** one times to return to previous menu level;
- Use the **DOWN** key until the *LP-Low pressure* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *ALt-Low pressure alarm setpoint* is reached, press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** several times to return to main menu.

6.4 PROPORTIONAL REGULATION BASED ON OUTLET WATER TEMPERATURE

When proportional control on outlet water temperature is chosen, the following parameters must be set as shown:

Parameter	*Description*	*Set*	*Meaning*
dSA	Display A value (ref. figure Chap.5)	5 (=AI2)	Outlet water temperature
dSb	Display B value (ref. figure Chap.5)	2 (=Set)	Set point
rEG	Analog Input for temperature regulation	3 (=AI2)	Outlet water temperature
rEt	Regulation type	0	Proportional

Follow this path:

- From the main screen press **ENTER**;
- Press **ENTER** at *LOG-Login*;
- Enter the password[3] using **UP** **/DOWN** key and **ENTER** to confirm the value;
- Use the **DOWN** key until the PAR-Parameters menu is reached, press **ENTER**;

[2] Please contact our company.
[3] Please contact our company.

- At *GEN-General* menu press **ENTER**;
- At *dSP-Display* menu press **ENTER**;
- Use the **DOWN** key to reach *dSA - Display A* value and *dSb - Display B* value for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** two times to return to previous menu level;
- Use the **DOWN** key until the *reG-Regulation* menu is reached, press **ENTER**;
- At *CFR-Configuration* press **ENTER**;
- Use the **DOWN** key to reach *rEG- Analog Input for temperature regulation* and *rEt-Regulation type* for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** several times to return to main menu.

In this configuration, display A shows outlet water temperature and display B shows setpoint temperature.

6.4.1 Recommended setting for operating with low water temperatures

For operating with low water temperature, it is recommended to set the following parameters:

Parameter	***Description***	***Unit***	***Set***							
	Desired water temperature	°C *[°F]*	-10 *[14]*	-7 *[19,4]*	-5 *[23]*	-3 *[26,6]*	0 *[32]*	2 *[35,6]*	5 *[41]*	7 *[44,6]*
SCL	Setpoint minimum limit	°C [°F]	-11 [12,2]	-8 [17,6]	-6 [21,2]	-4 [24,8]	-1 [30,2]	1 [33,8]	4 [39,2]	6 [42,8]
SC1	Cooling temperature setpoint	°C *[°F]*	-10 *[14]*	-7 *[19,4]*	-5 *[23]*	-3 *[26,6]*	0 *[32]*	2 *[35,6]*	5 *[41]*	7 *[44,6]*
rC1	Cooling temperature differential	°C *[°F]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*
AIS	Ice alarm setpoint	°C *[°F]*	-14 *[6,8]*	-11 *[12,2]*	-9 *[15,8]*	-7 *[19,4]*	-4 *[24,8]*	-2 *[28,4]*	0 *[32]*	4 *[39,2]*
ALt	Low pressure alarm setpoint	[barg] *[PSI]*	3,0 *[43,5]*	3,5 *[50,8]*	3,8 *[55,1]*	4,2 *[60,9]*	4,6 *[66,7]*	5,0 *[72,5]*	5,6 *[81,2]*	5,8 *[84,1]*
	Percentage of ethylene glycol	%	40	30	30	30	25	20	15	0

Follow this path:

- From the main screen press **ENTER**;
- Press **ENTER** at *LOG-Login*;
- Enter the password[4] using **UP** **/DOWN** key and **ENTER** to confirm the value;
- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *reG-Regulation* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *SEt-Setpoint* menu is reached, press **ENTER**;
- Use the **DOWN** key to reach *SC1-Cooling temperature setpoint* and *SCL-Setpoint minimum limit* for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** to return to previous menu level;
- Use the **DOWN** key until the *PI-PI regulation* menu is reached, press **ENTER**;

[4] Please contact our company.

- At *rC1-Cooling temperature differential* press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** two times to return to previous menu level;
- Use the **DOWN** key until the *ALA-Alarms* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *ICE-Ice* menu is reached, press **ENTER**;
- At *AIS- Ice alarm setpoint* press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** one times to return to previous menu level;
- Use the **DOWN** key until the *LP-Low pressure* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *ALt-Low pressure alarm setpoint* is reached, press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** several times to return to main menu.

6.5 PROPORTIONAL REGULATION BASED ON INLET WATER TEMPERATURE

When proportional control on inlet water temperature is chosen, the following parameters must be set as shown:

Parameter	*Description*	*Set*	*Meaning*
dSA	Display A value (ref. figure Chap.5)	4 (=AI1)	Inlet water temperature
dSb	Display B value (ref. figure Chap.5)	5 (=AI2)	Outlet water temperature
rEG	Analog Input for temperature regulation	2 (=AI1)	Inlet water temperature
rEt	Regulation type	0	Proportional

Follow this path:

- From the main screen press **ENTER**;
- Press **ENTER** at *LOG-Login*;
- Enter the password[5] using **UP** **/DOWN** key and **ENTER** to confirm the value;
- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER**;
- At *GEN-General* menu press **ENTER**;
- At *dSP-Display* menu press **ENTER**;
- Use the **DOWN** key to reach *dSA - Display A* value and *dSb - Display B* value for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** two times to return to previous menu level;
- Use the **DOWN** key until the *reG-Regulation* menu is reached, press **ENTER**;
- At *CFR-Configuration* press **ENTER**;
- Use the **DOWN** key to reach *rEG- Analog Input for temperature regulation* and *rEt-Regulation type* for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** several times to return to main menu.

[5] Please contact our company.

In this configuration, display A shows inlet water temperature and display B shows outlet water temperature.

6.5.1 Recommended setting for operating with low water temperatures

For operating with low water temperature, it is recommended to set the following parameters:

Parameter	*Description*	*Unit*	*Set*							
	Desired water temperature	°C *[°F]*	-10 *[14]*	-7 *[19,4]*	-5 *[23]*	-3 *[26,6]*	0 *[32]*	2 *[35,6]*	5 *[41]*	7 *[44,6]*
SCL	Setpoint minimum limit	°C [°F]	-7 [19,4]	-4 [24,8]	-2 [28,4]	0 [32]	3 [37,4]	5 [41]	8 [46,4]	10 [50]
SC1	Cooling temperature setpoint [6]	°C *[°F]*	-5 *[23]*	-2 *[19,4]*	0 *[32]*	2 *[35,6]*	5 *[41]*	7 *[44,6]*	10 *[50]*	12 *[53,6]*
rC1	Cooling temperature differential	°C *[°F]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*	2 *[3,6]*
AIS	Ice alarm setpoint	°C *[°F]*	-14 *[6,8]*	-11 *[12,2]*	-9 *[15,8]*	-7 *[19,4]*	-4 *[24,8]*	-2 *[28,4]*	0 *[32]*	4 *[39,2]*
ALt	Low pressure alarm setpoint	[barg] *[PSI]*	3,0 *[43,5]*	3,5 *[50,8]*	3,8 *[55,1]*	4,2 *[60,9]*	4,6 *[66,7]*	5,0 *[72,5]*	5,6 *[81,2]*	5,8 *[84,1]*
	Percentage of ethylene glycol	%	40	30	30	30	25	20	15	0

Follow this path:

- From the main screen press **ENTER**;
- Press **ENTER** at *LOG-Login*;
- Enter the password[7] using **UP** **/DOWN** key and **ENTER** to confirm the value;
- Use the **DOWN** key until the *PAR-Parameters* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *reG-Regulation* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *SEt-Setpoint* menu is reached, press **ENTER**;
- Use the **DOWN** key to reach *SC1-Cooling temperature setpoint* and *SCL-Setpoint minimum limit* for set the two parameters. For set the value press **ENTER** to select the parameter, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** to return to previous menu level;
- Use the **DOWN** key until the *PI-PI regulation* menu is reached, press **ENTER**;
- At *rC1-Cooling temperature differential* press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** two times to return to previous menu level;
- Use the **DOWN** key until the *ALA-Alarms* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *ICE-Ice* menu is reached, press **ENTER**;
- At *AIS- Ice alarm setpoint* press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** one times to return to previous menu level;
- Use the **DOWN** key until the *LP-Low pressure* menu is reached, press **ENTER**;
- Use the **DOWN** key until the *ALt-Low pressure alarm setpoint* is reached, press **ENTER** for set the value, **UP** **/DOWN** key to change the value and **ENTER** to confirm the new value;
- Press **ESC** several times to return to main menu.

[6] The actual outlet water temperature depends on the inlet water flow.
[7] Please contact our company.

7

SAFETY DEVICES

CWB 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
High condensing pressure	High pressure switch	Compressor discharge pipe
High condensing pressure	High pressure prevention system	Electronic controller
Low evaporation pressure	Low pressure transducer	Compressor suction pipe
Low evaporation pressure	Low pressure prevention system	Electronic controller
Low water flow-capacity	Water differential pressure switch	Plate heat exchanger
Low water temperature	Anti-freeze thermostat	Water exit from the plate heat exchanger
High water pressure	Safety valve (optional)	Water tank (optional)
Frequent compressor start-ups	Anti-circulation timer	Electronic controller
Low water level in the tank	Water level sensor (optional)	Water tank (optional)

When they reach their set 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 ***5.11 Alarms***).

The following paragraph lists the characteristics of each safety device.

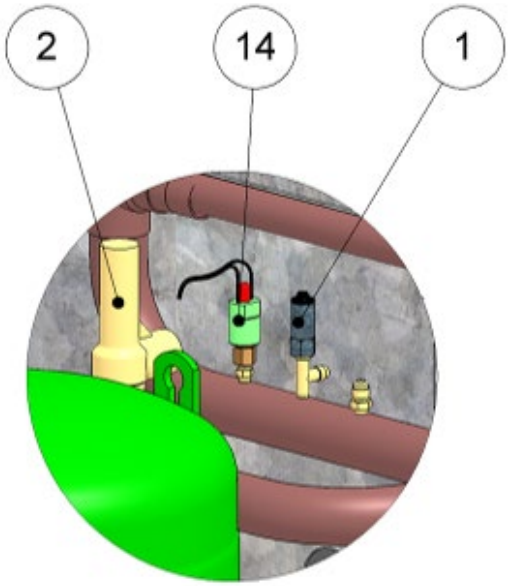
7.1 CALIBRATION OF THE SAFETY DEVICES AND TYPE OF REARM

Safety device	Intervention value	Reset value	Type of rearm
High pressure switch	41,5 barg // 602 psi	33 barg // 478 psi	Manual
Low pressure transducer	5,8 barg // 84 psi	6,8 barg // 99 psi	Semiautomatic
Low pressure transducer (Vacuum alarm)	3,3 barg // 48 psi	3,8 barg // 55 psi	Manual
High pressure prevention*	40 barg // 580 psi	38 barg // 551 psi	Automatic
Low pressure prevention	6,8 barg // 99 psi	7,8 barg // 113 psi	Automatic
Water differential pressure switch	85 mbar // 1,24 psi	105 mbar // 1,53 psi	Manual
Anti-freeze thermostat	4°C // 39,2°F	8°C // 46,4°F	Semiautomatic
Water safety valve	6 barg // 87 psi	---	---
Anti-circulation timer**	5 min.	---	---

* Consists in reducing the number of functioning compressors to 1 until the condensation pressure falls below the reset value again.
** 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.

7.2 RESETTING 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 coils; there is a manual-rearm 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 7.1).



2 – Refrigerant safety valve
14 - High-pressure pressure switch
1 – High pressure transducer

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 coils dirty or obstructed, obstacles to the flow of exiting air, operating temperature outside operating limits, etc. – also see Chapter ***10 Troubleshooting***) 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 7.1);
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 **ESC** once (alarm code AH1 or AH2 is displayed). Then press it again and hold it down for at least 5 seconds.

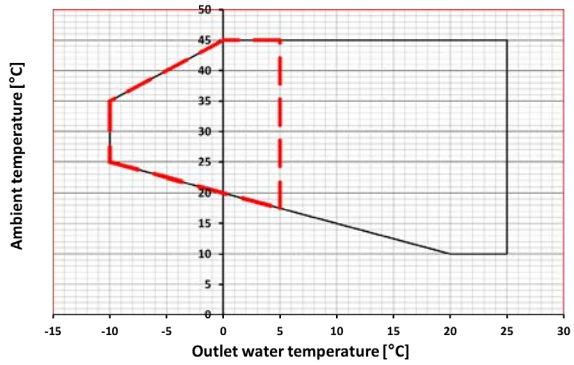
Attention! The high-pressure switch stops the compressors while it keeps the condenser fans running to lower the pressure in the condensers.

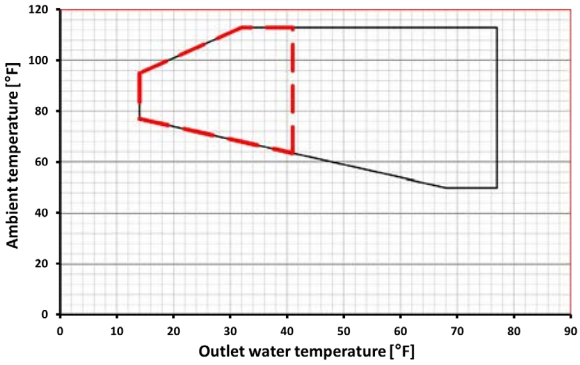
8

OPERATING LIMITS

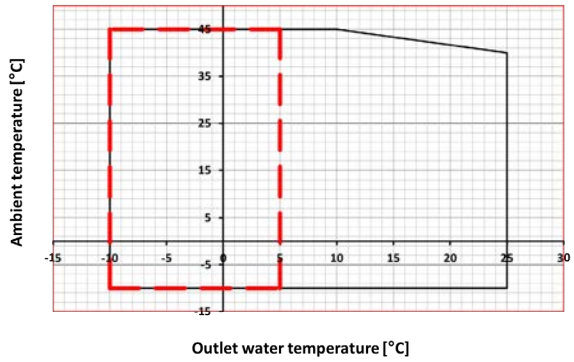
CWB series units feature broad operating limits in relation to the temperature of the outside air, thanks to the condensation control (also see paragraph ***2.4 Fans***); they are also prepared to produce water at low temperature: in this case, it is necessary to contact our company (see paragraph ***6.2 Low water temperatures (<32°F/0°C)***).
The graphs show the continuous operating limits of CWB units in relation to the temperature of the water exiting the machine and the temperature of the outside air.

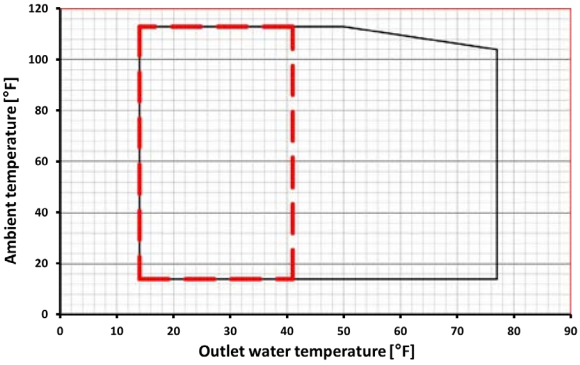
STANDARD LIMITS





CONDENSING CONTROL LIMITS – CE OPTION





Glycol mixture needed – contact our company

Attention! The dotted line indicates the need to use an ethylene glycol mixture and set adequate parameters in the electronic controller (see paragraph ***6.2 Low water temperatures (<32°F/0°C)***).

9

SEPR - SEASONAL ENERGY PERFORMANCE RATIO
ACCORDING TO COMMISSION REGULATION (EU) 2016/2281

Data reported here below are in accordance with European Regulation (EU) 2016/2281 for eco-design requirements of cooling products and high temperature process chillers.
Only for units at 50Hz power supply.

400V/3Ph/50Hz												
Model CWB	140	160	190	220	270	300	320	380	420	450	510	570
SEPR	5,02	5,03	4,96	4,8	4,96	4,85	4,71	4,87	4,89	4,76	4,94	4,93

400V/3Ph/50Hz – CE option												
Model CWB	140	160	190	220	270	300	320	380	420	450	510	570
SEPR	5,04	5,05	5,15	4,98	5,15	5,03	4,89	5,11	5,13	5,04	5,13	5,12

10

MAINTENANCE, 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 range	Daily	User
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	Monthly(1)	
Clean the condensation coils with a jet of compressed air.	Yearly (1)	
Clean the water filter	Monthly(2)	Specialised personnel
Check that the refrigerant liquid sight glass is clear or, at most, with a few bubbles (check with the compressor running)	Every 6 months	
Check that the undercooling 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 refrigerant circuit (symptom of refrigerant leaks)	Every 6 months	
Check the tightness of the electrical terminals both inside the electrical panel and on the compressors terminals.	Yearly	
Check the contacts of the contactors; 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 months	
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	

(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.

11

TROUBLESHOOTING

Cause	Alarm signal or symptom	Solution	Execution
1. The unit does not start			
Contacts of the main differential switch open.	Electronic controller off	Close the contacts	User 
Unit's electrical panel cut-off switch open.	Electronic controller off	Close the contacts	User 
Local/O/REM switch in the O or REM position	Electronic controller on	Move the switch to I	User
No consent from the water differential switch	A03 *Evaporator flow switch alarm*	Check the functioning of the pump, vent the plumbings	User
Compressor timer active	The compressor icon on the display of the electronic controller is flashing	Wait 3 minutes	User
No consent from the service thermostat	Plant water at temperature (see display A)	Apply a thermal load to the machine or lower the set point	User
No consent from the anti-freeze thermostat	AE1 *Evaporator ice alarm*	Reset a temperature of the water (set point) compatible with the calibration of the anti-freeze thermostat (see table in paragraph 6.2)	User
Service and anti-freeze probe defective	A7B *Alarm Probe Tout evaporator*	Check contacts and replace, if necessary	Specialised personnel 
Entering water temperature probe defective	A7A *Alarm Probe Tin evaporator*	Check contacts and replace, if necessary	Specialised personnel 
Intervention of the main differential switch	Electronic controller off	Look for current dispersion inside the machine	Specialised personnel 
2. The compressor doesn't start			
Intervention of the thermal protection inside the compressor 1 or 2	The contactor of the compressor is on but the compressor is stopped A32 *Compressors 1 2 Internal Protection* A33 *Compressors 3 4 Internal Protection*	Wait for cooling: check that the compressor is working under normal conditions. Check for insufficient refrigerant in the circuit (see point 8).	Specialised personnel 
Intervention of the thermal protection inside the compressor 3 or 4			

Cause	Alarm signal or symptom	Solution	Execution
2. (continue) The compressor doesn't start			
Magnetothermic protection of the compressors open (QC1, QC2)	AC1 *Circuit 1 compressors thermal protection* AC2 *Circuit 2 compressors thermal protection*	Look for short circuits in the motor windings of the compressor. 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	Specialised personnel 
Intervention of the phase-sequence relay	A02 *Reverse phase protection*	Reverse the two phases upstream from the cut-off switch of the unit's electrical panel (see paragraph 4.2)	Specialised personnel 
Contactor of the compressor open	The compressor icon is on but the compressor is stopped	Check the voltage at the coil of the contactor of the compressor and the continuity of the coil itself	Specialised personnel 
3. Intervention of the high-pressure pressure switch			
Condenser obstructed or insufficient air flow-capacity	AH1 *Circuit 1 high pressure alarm* AH2 *Circuit 2 high pressure alarm*	Remove dirt from the condenser and any obstacles to the flow of air. Wait for the refrigerant pressure to drop below the reset value (33 bar g), then rearm the high-pressure switch by pressing the button on top of it (see figure in paragraph 7.2)	User
The unit has operated outside its operating limits (such as air or water too hot)	AH1 *Circuit 1 high pressure alarm* AH2 *Circuit 2 high pressure alarm*	If possible, restore conditions that are compatible with the operating limits. Rearm the pressure switch (paragraph 7.2).	User
Fan not working	AH1 *Circuit 1 high pressure alarm* AH2 *Circuit 2 high pressure alarm*	See point 6	
Excessive refrigerant charge	High subcooling (greater than 18°F//10K)	Drain excess refrigerant	Specialised personnel 
Presence of incondensable gas or air in the refrigerant circuit	Presence of bubbles on the refrigerant sight glass, also with subcooling values greater than 9°F//5 K	Drain the refrigerant circuit, create vacuum and recharge	Specialised personnel 
Refrigerant filter clogged or thermostatic valve stuck	Pipe downstream from the component covered with frost.	Check and replace.	Specialised personnel 
Water pump blocked or defective (only for heat pump operation)	AH1 *Circuit 1 high pressure alarm* AH2 *Circuit 2 high pressure alarm*	Unlock or replace the pump	Specialised personnel 

Cause	Alarm signal or symptom	Solution	Execution
4. Intervention of the water differential pressure switch			
Taps of the machine are turned off	A03 *Evap. Flow switch alarm*	Open the taps	User
Water circulation pump blocked or defective	A03 *Evap. Flow switch alarm*	Unlock or replace the pump	Specialised personnel
Water pump stopped	A03 *Evap. Flow switch alarm* Pump icon lit.	Check the voltage at the coil of the contactors of the pump and the continuity of the coil itself	Specialised personnel
5. Intervention of the low-pressure pressure switch			
Refrigerant filter clogged or thermostatic valve stuck	Pipe downstream from the component covered with frost.	Check and replace	Specialised personnel
Insufficient refrigerant charge		See point 8	
6. Fans don't start			
Very low outside air temperatures and consequent intervention of the condensation control	Fan icon off. Condensation pressure normal	The machine is working anyway	
No voltage output from the fan-speed regulator	Fan icon on and fans stopped	Check the voltage output from the regulator and replace, if necessary	Specialised personnel
Intervention of the magnetothermic protection inside the fan	A51 *Circuit 1 fans overload* A52 *Circuit 2 fans overload*	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
Fan fuse blown.	Fan icon on and fans stopped	Look for short circuits in the motor windings of the fans. Check the fan roller bearings.	Specialised personnel
Electrical connections of the fans loose	Fan icon on and fans stopped	Check and tighten	Specialised personnel
Intervention of fans 1,2 or 3 internal thermal protection	AF1 *Circuit 1 fans overload*	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
Intervention of fans 4,5 or 6 internal thermal protection	AF2 *Circuit 2 fans overload*		

Cause	Alarm signal or symptom	Solution	Execution
7. 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 water by closing the exit tap of the unit a little.	User
No refrigerant.		See point 8	
8. Compressor suction pipe covered with frost			
No refrigerant.	High superheating, low subcooling and high discharge temperature of the compressor. Traces of oil on the refrigerant circuit.	Check the refrigerant circuit with a leak detector. Repair any ruptures and recharge the circuit.	Specialised personnel 
9. The pump doesn't start magnetothermic protection of the pump open			
Excessive water flow-capacity; the pump is absorbing too much current.	AP1 *Pump 1 thermal protection alarm* AP2 *Pump 2 thermal protection alarm*	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, QP2.	User 
Short circuit or overcurrent.	AP1 *Pump 1 thermal protection alarm* AP2 *Pump 2 thermal protection alarm*	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.	Specialised personnel 
10. The unit starts and stops alternatively; The outlet water temperature varies greatly			
Low water flow		Verify the water flow. Open the water shut-off valves of the plant. If it is possible, reduce the pressure drop of the water circuit. If it is possible, add a pump with proper availble pressure.	Specialised personnel 

12

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	R410A, Oil
Panelling and supports	Carbon steel, Epoxy paint
Chiller compressor	Steel, Copper, Aluminium, Oil
Plate exchanger (evaporator)	Steel, Copper
Condenser	Aluminium, Carbon Steel
Pipes	Copper
Fan	Aluminium, Copper, Steel
Valves	Steel, Bronze
Insulation	Synthetic rubber without CFC, EPS, Polyurethane
Electrical wires	Copper, PVC
Electrical parts	PVC, Copper, Bronze

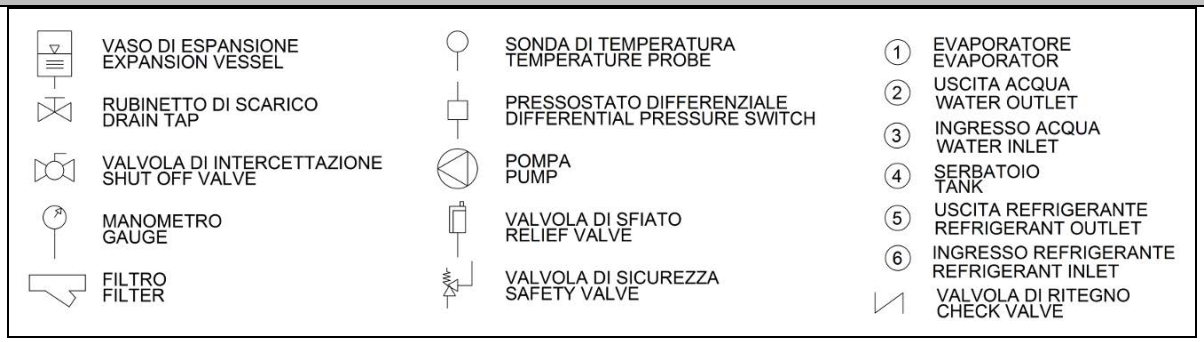
We recommend that you follow current safety norms for the disposal of each single material.
The refrigerant contains particles of lubrication oil from the chiller compressor.

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.

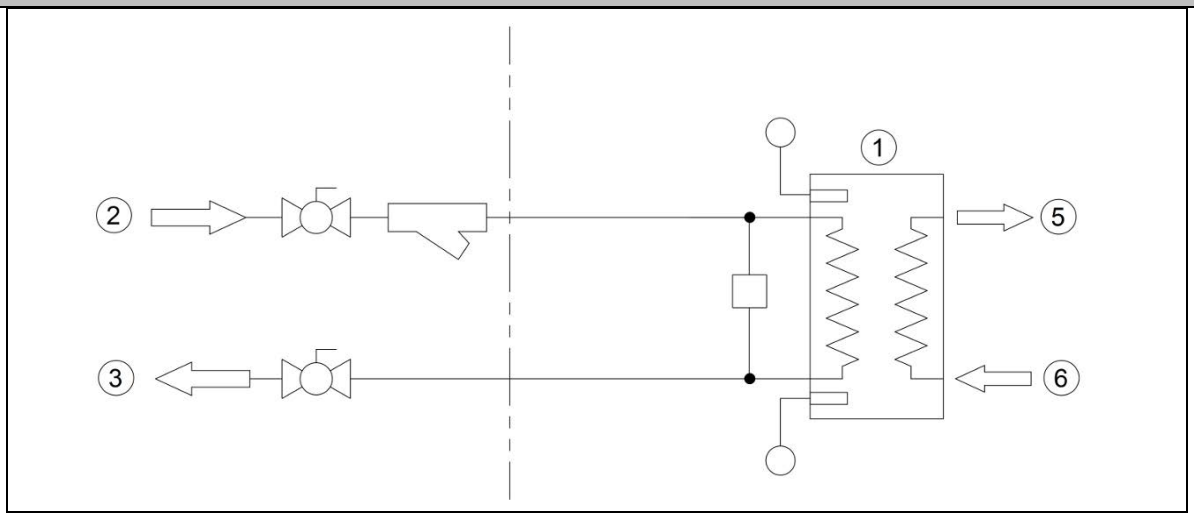
13

WATER DIAGRAMS

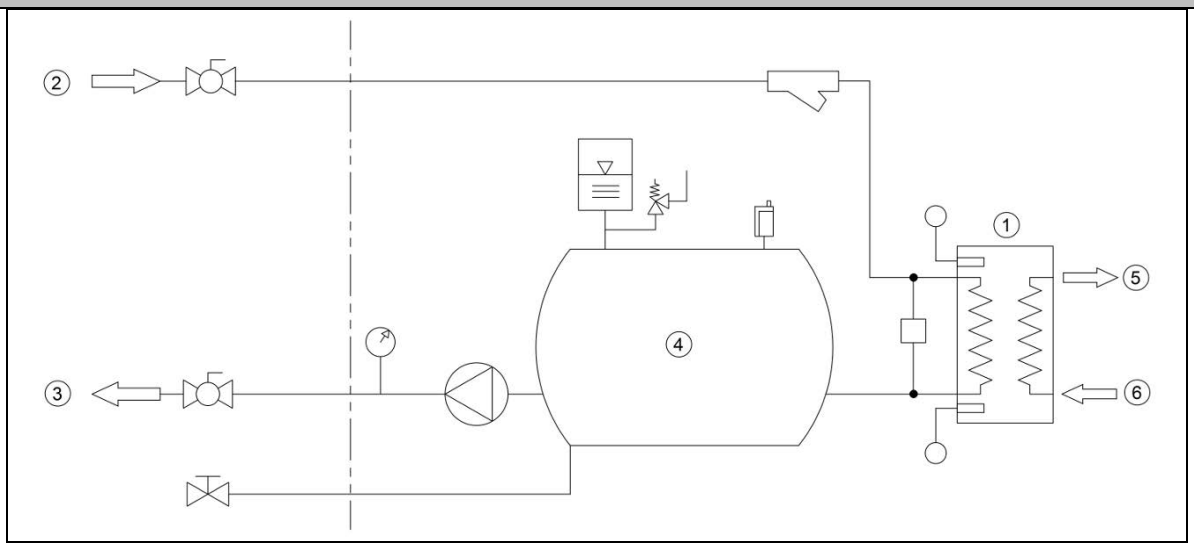
LEGEND



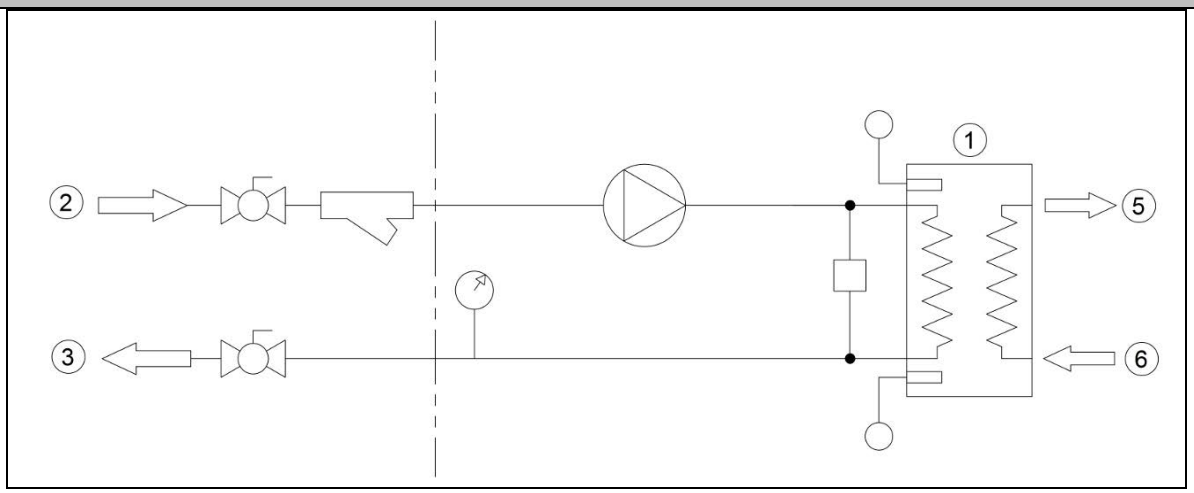
STANDARD



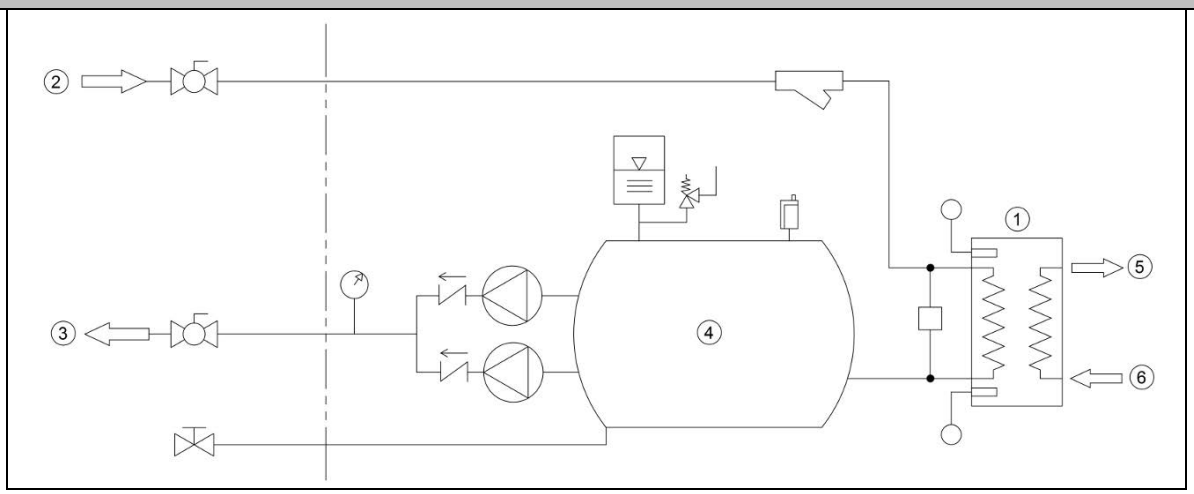
SINGLE PUMP WITH TANK



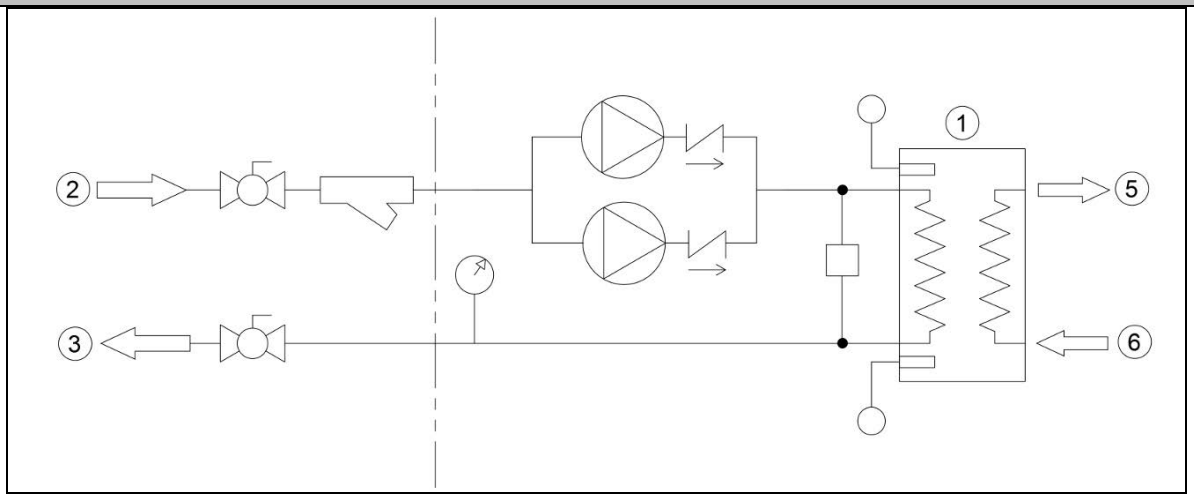
SINGLE PUMP NO TANK



DUBLE PUMP WITH TANK



DOUBLE PUMP NO TANK



14

REFRIGERANT CIRCUIT

LEGEND

PT — TRASDUTTORE DI PRESSIONE / PRESSURE TRANSDUCER

HPSW — PRESSOSTATO DI ALTA PRESSIONE / HIGH PRESSURE SWITCH

PRESA DI PRESSIONE / OUTLET PRESSURE

MANOMETRO / GAUGE

VALVOLA DI ESP. TERMOSTATICA / TERMOSTATIC EXPANSION VALVE

SPIA DI FLUSSO / SIGHT GLASS

FILTRO DEIDRATATORE / FILTER DRYER

VALVOLA UNIDIREZIONALE / CHECK VALVE

VALVOLA DI SICUREZZA / SAFETY VALVE

VALVOLA SOLENOIDE / SOLENOID VALVE

① COMPRESSORI / COMPRESSORS

② USCITA ACQUA / WATER OUTLET

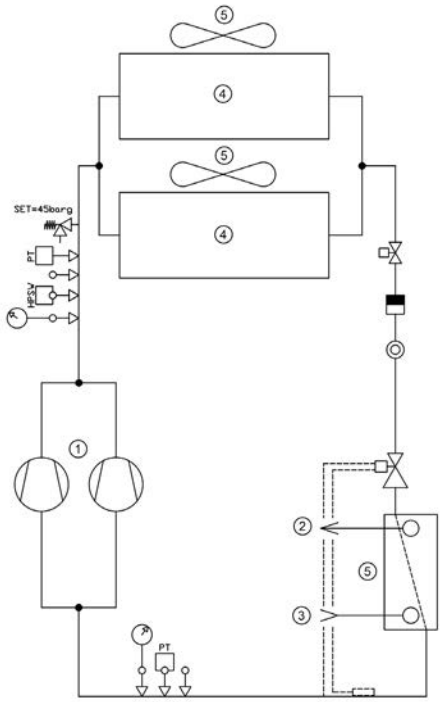
③ INGRESSO ACQUA / WATER INLET

④ CONDENSATORE / CONDENSER

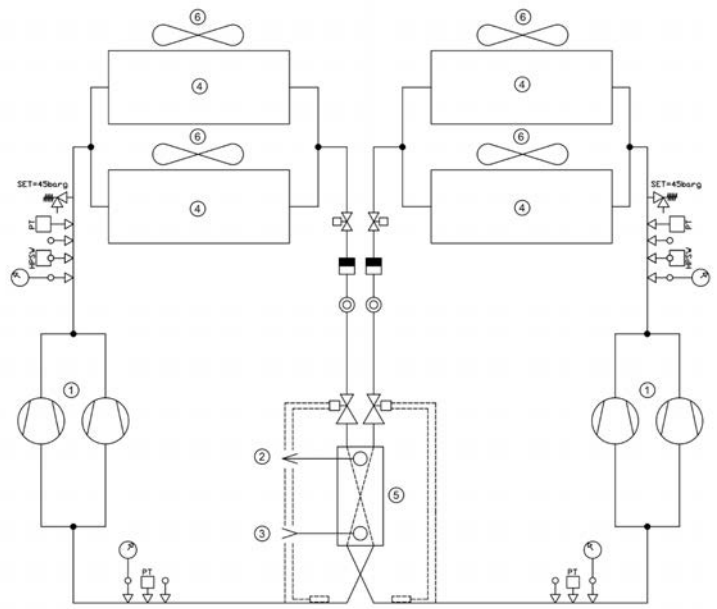
⑤ EVAPORATORE / EVAPORATOR

⑥ VENTILATORE / FAN

SINGLE CIRCUIT



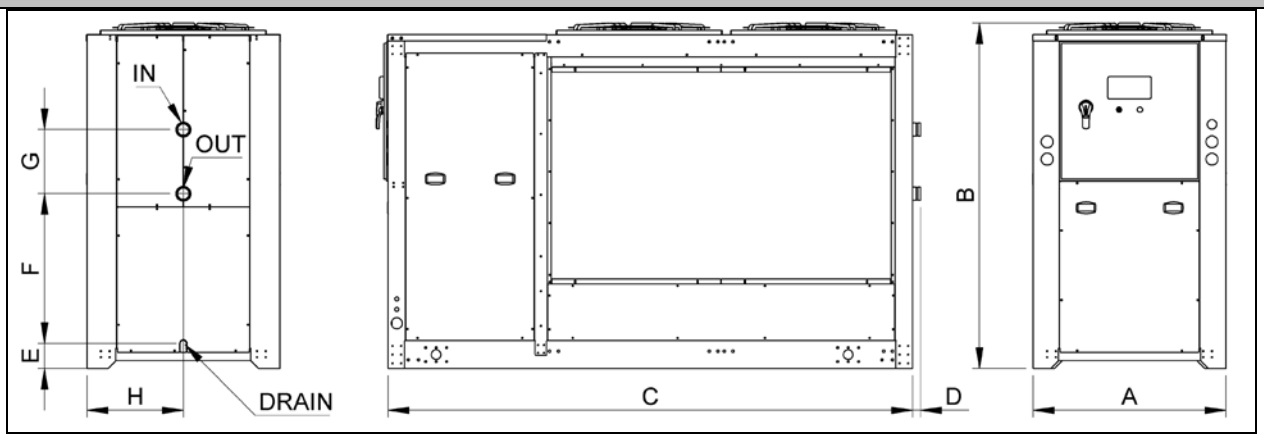
DOUBLE CIRCUIT



15

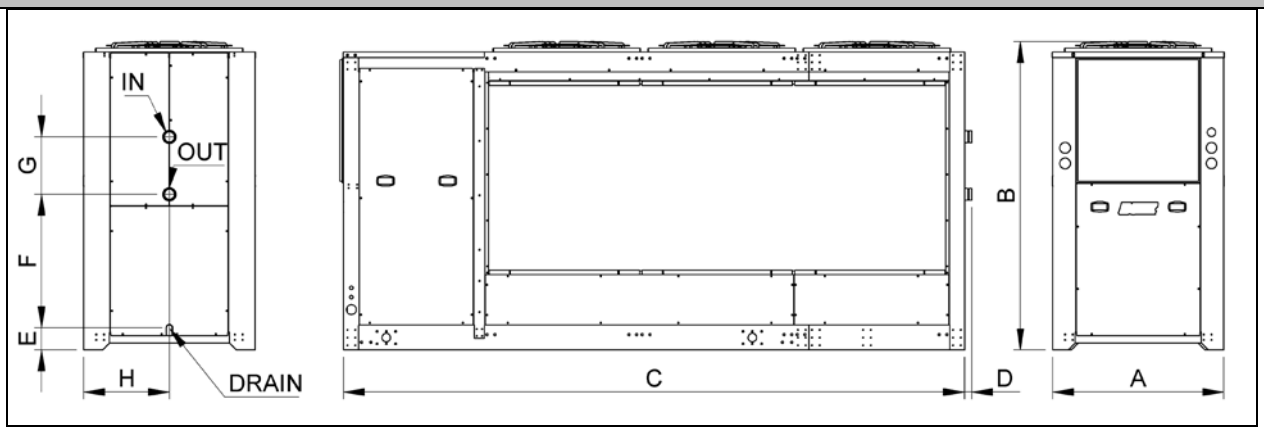
DIMENSIONAL DRAWINGS

CWB 140-160



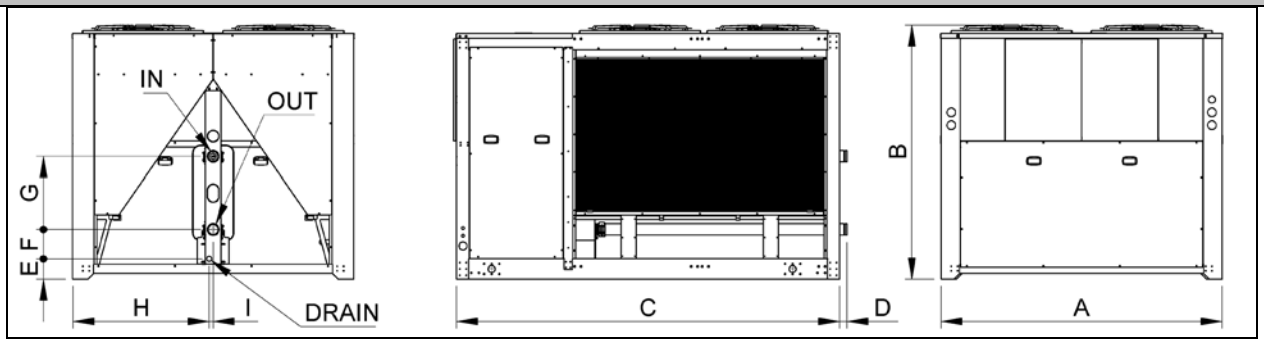
	A [mm]	*B* [mm]	*C* [mm]	*D* [mm]	*E* [mm]	*F* [mm]	*G* [mm]	*H* [mm]	*IN*	*OUT*	*Drain*	*Weight* [kg]
CWB140	1104	1982	3004	46	144	875,5	369	552	2”1/2 VIC	2”1/2 VIC	1” GAS FM	1170
CWB160	1104	1982	3004	46	144	875,5	369	552	2”1/2 VIC	2”1/2 VIC	1” GAS FM	1180

CWB 190-220



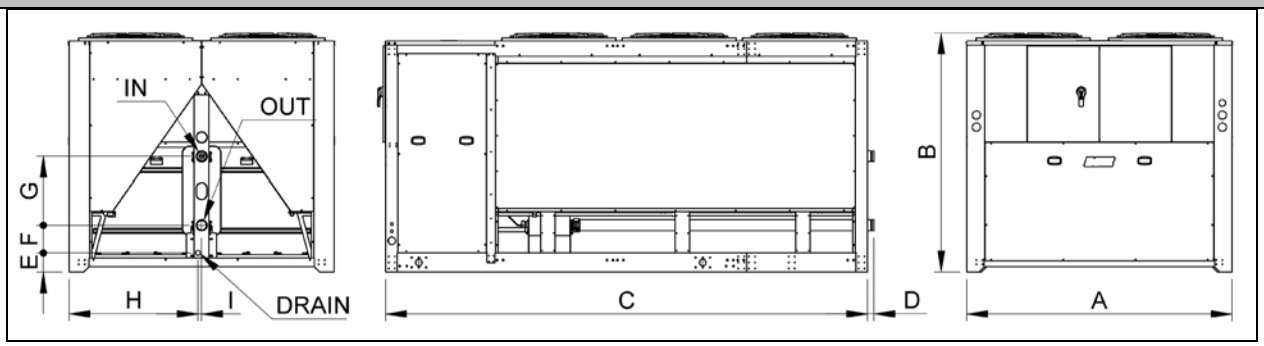
	A [mm]	*B* [mm]	*C* [mm]	*D* [mm]	*E* [mm]	*F* [mm]	*G* [mm]	*H* [mm]	*IN*	*OUT*	*Drain*	*Weight* [kg]
CWB190	1104	1982	4004	46	144	875,5	369	552	2”1/2 VIC	2”1/2 VIC	1” GAS FM	1270
CWB220	1104	1982	4004	46	144	875,5	369	552	2”1/2 VIC	2”1/2 VIC	1” GAS FM	1280

CWB 270-300-320



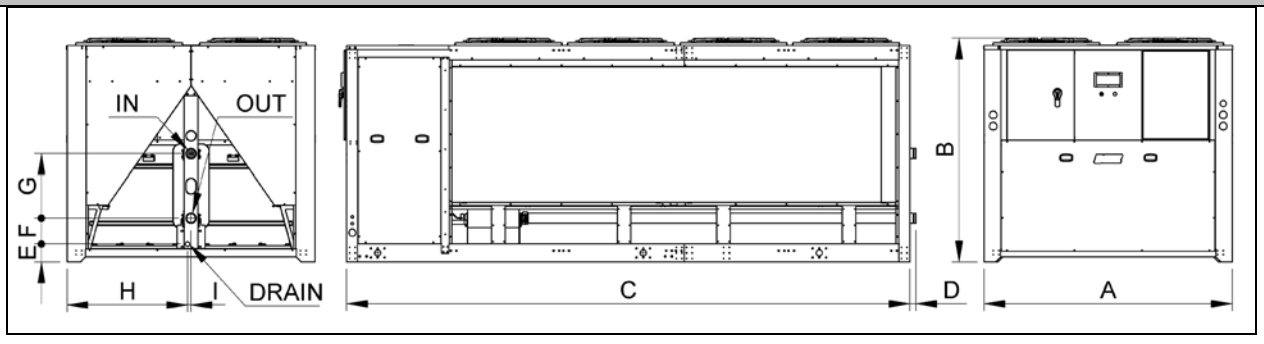
	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	IN	OUT	Drain	Weight [kg]
CWB270	2204	1982	3004	53	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	1830
CWB300	2204	1982	3004	53	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	1860
CWB320	2204	1982	3004	53	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	1890

CWB 380-420-450



	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	IN	OUT	Drain	Weight [kg]
CWB380	2204	1982	4004	51	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	2170
CWB420	2204	1982	4004	51	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	2210
CWB450	2204	1982	4004	51	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	2250

CWB 510-570



	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	IN	OUT	Drain	Weight [kg]
CWB510	2204	1982	5004	54	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	2540
CWB570	2204	1982	5004	54	159	229.5	568	1071	31	3" VIC	3" VIC	1" GAS FM	2570

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