PURESTREAM
CHILLERS
BY FRIULAIR

WATER CHILLER

Model: CWT

Use and Maintenance Manual

Editions Record

Code	Revision	Edition	Changes
7425MUM746	08	09/2020	

Original instructions: **ITALIAN**
EN Translation of the original instructions

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 **CWT** 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.
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.

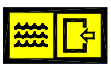
Warranty conditions:
The warranty is valid for 12 months from the machine being powered-up and no longer than 14 months from the delivery date. Any part which is recognised as being faulty at source shall be repaired or replaced free of charge. This does not include transport costs, travel, room and board for technicians. 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.
Repair under warranty is subject to compliance with the installation, use and maintenance instructions contained in the "User manual and maintenance."
The warranty is considered void if the product is modified or tampered with in any way. When making a warranty request, please supply the information available in the product identification label.

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

CWT 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 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

CWT chillers use a vapour-compression cycle in a chilling 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. **CWT** chillers use rotary (models 7 and 10) and 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 micro-channel exchanger made entirely of aluminium that exchanges heat between the refrigerant and the air; it condenses the refrigerant gas (which flows inside the micro-channel) 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 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 **fans** that cool the condenser.

2.2 WATER CIRCUIT

The water circuit mainly consists of: pump, evaporator, tank, and expansion vessel.
The water flows first into the evaporator, where it is chilled, and then to the tank; afterwards it is aspirated by the pump, which sends it to the system.
A differential pressure switch on the evaporator checks that the flow of water is sufficient and stops the compressors if the flow-capacity of the water does not ensure the good functioning of the exchanger.
An automatic vent valve removes any air bubbles in the circuit.
A fine mesh metal filter at the entrance to the machine catches any solid residues that could damage the evaporator.
The unit is equipped with P3 pump, but it can be supplied with different heads (see systems with pump P5).

A manometer and safety valve complete the unit's 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.
CWT 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 chilling 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 very low (see Chapter ***7 Operating Limits***) and also maintains a low level of noise with respect to its nominal operating conditions.

2.5 CONTROL OF THE WATER TEMPERATURE

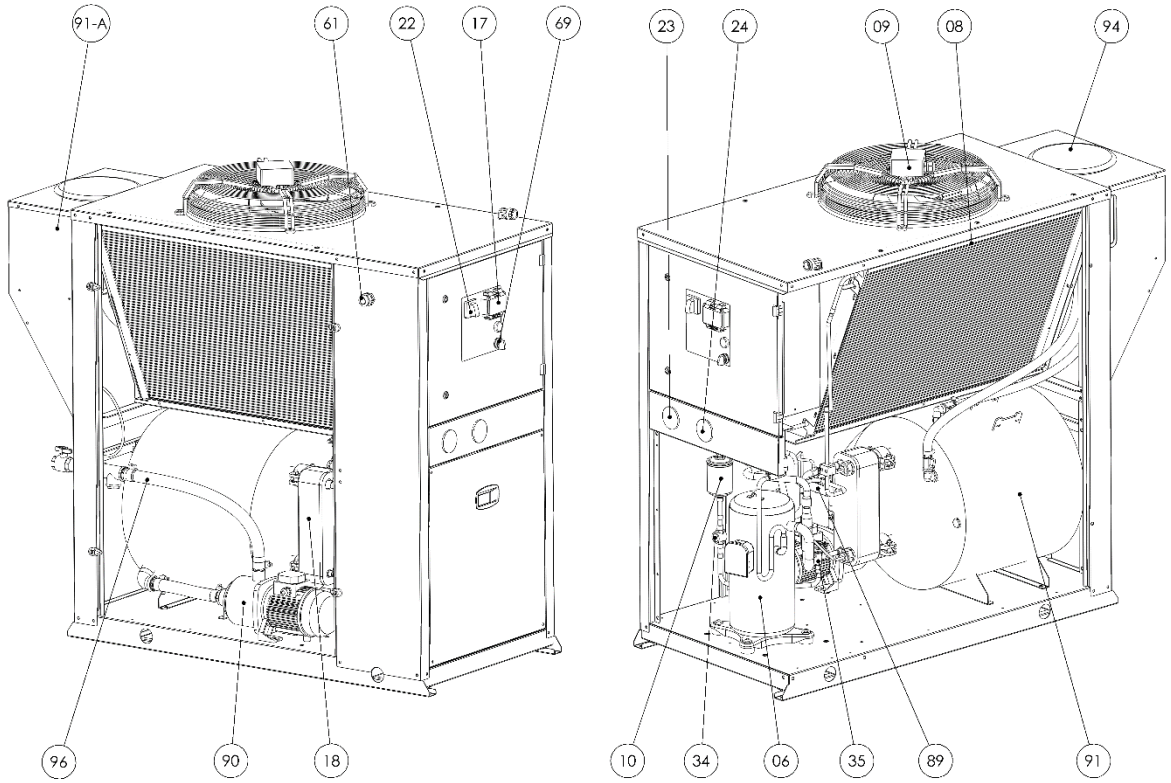
The purpose of the chiller is to maintain the temperature of the water produced within a desired interval as the load on the system varies; this is handled by an electronic controller and a temperature probe that turn the compressors on and off appropriately (also see paragraph ***5.3 Water temperature: dead-zone regulation***).

2.6 PROTECTING THE INTEGRITY OF THE MACHINE

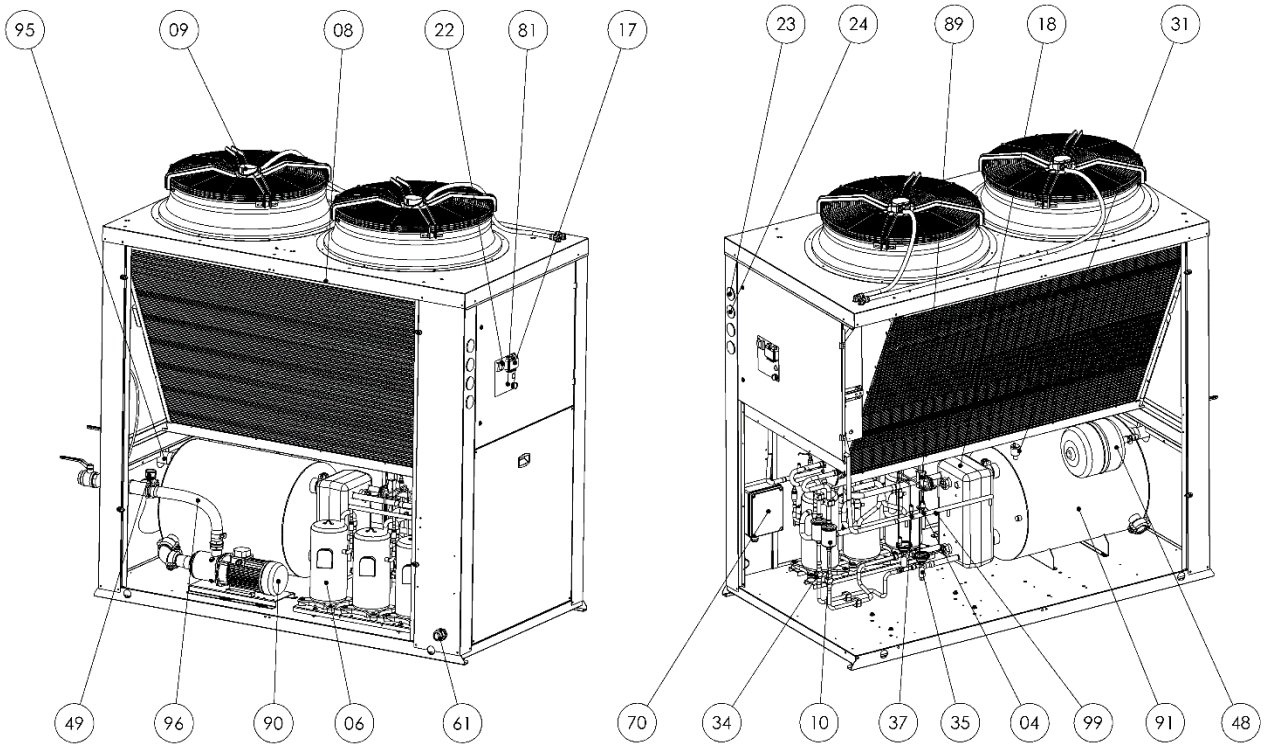
In addition to controlling the temperature, the electronic controller uses pressure switches, thermostats and timers to prevent and handle situations that could compromise the integrity of the machine (also see Chapter ***6 Safety Devices***).

2.7 CWT UNITS: IDENTIFICATION OF THE MAIN COMPONENTS

2.7.1 TA version – Open circuit kit with additional water tank



2.7.2 BA version – Automatic water bypass valve



04 High pressure switch
06 Compressor
08 Condenser
09 Fan
10 Refrigerant filter
17 Electronic control
18 Evaporator
22 Disconnector switch
23 High pressure gauge
24 Low pressure gauge
31 Safety valve
34 Sight glass
35 Thermostatic expansion valve
37 Pressure transducer
48 Expansion vessel
49 Automatic water bypass valve
61 Power input
69 Selector 1/0/Remote
70 Fan speed regulator (Voltage regulator)
81 Refrigerant diagram
89 Differential pressure switch
90 Pump
91 Water tank
91-A Additional tank
94 Water filler
95 Inlet water
96 Outlet water
99 Pressure plug

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	COMPONENT QUANTITY FOR CWT MODEL															
			007	010	015	018	020	025	030	038	040	045	055	065	075	090	110	130
1	EVAPORATOR GROUP		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	HIGH PRESSURE SWITCH		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
6	COMPRESSOR		1	1	1	1	1	2	2	2	2	3	3	3	4	4	6	6
8	CONDENSER		1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
9	FAN		1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
10	REFRIGERANT FILTER		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
12	TEMPERATURE PROBE		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
14	WATER FILTER		1	1	1	1	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	1	1	1	1
18	EVAPORATOR		1	1	1	1	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	1	1	1	1
23	HIGH PRESSURE GAUGE		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
24	LOW PRESSURE GAUGE		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
25	COMPRESSOR CRANKCASE HEATER		1	1	1	1	1	2	2	2	2	3	3	3	4	4	6	6
35	THERMOSTATIC EXPANSION VALVE		1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
37	PRESSURE TRANSDUCER		2	2	2	2	2	2	2	2	2	2	2	2	4	4	4	4
89	DIFFERENTIAL PRESSURE SWITCH	[A]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
90	WATER PUMP		½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½
91	WATER TANK	[B]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
92	WATER LEVEL SENSOR	[B]									1	1	1	1	1	1	1	1

[A]	1 or 2 codes depending on the configuration. For the P3 / P5 version only one code will appear. For the D3 / D5 version two codes will appear.
[B]	Only for Atmospheric Water Tank (TA option)

3

INSTALLATION

3.1 TRANSPORT

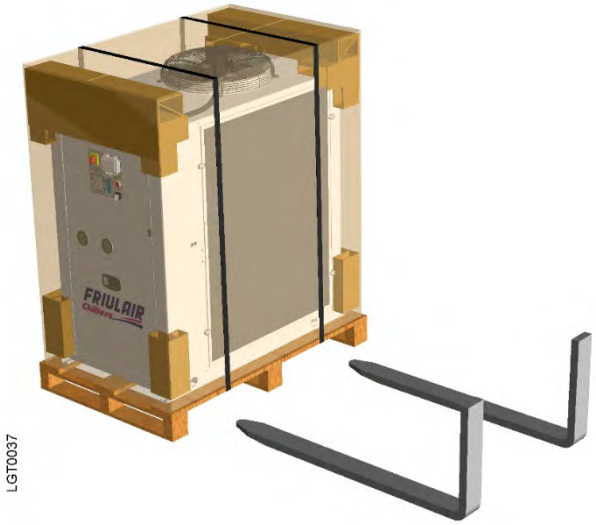
The units are supplied packed in a cardboard box on a wooden pallet.
After checking that the packing is undamaged, position the unit near the installation site and unpack it.

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 units can be handled using tubes and belts or a forklift truck.

3.1.1 Handling the unit with a forklift truck or pallet jack

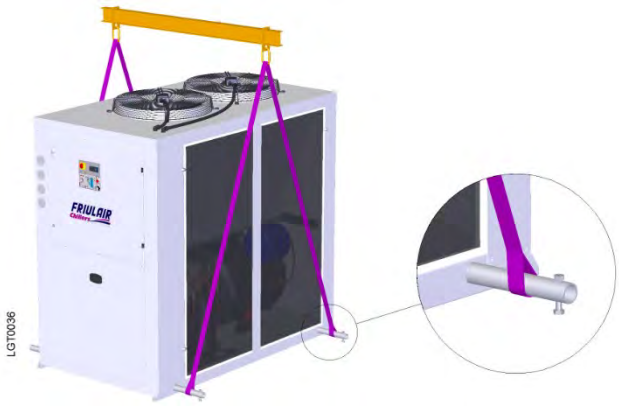
The centre of the machine is approximately its centre of gravity. In any case, when handling the machine with a forklift truck or pallet jack, always check its stability before lifting.



3.1.2 Lifting with belts and tubes

All units have holes in the base to house the lifting tubes
Use steel tubes with a diameter of 1¼" and at least 3 mm//0.11 inch - thick and long enough to project at least 250÷300 mm//10÷12 inch from both sides of the machine's profile.

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



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

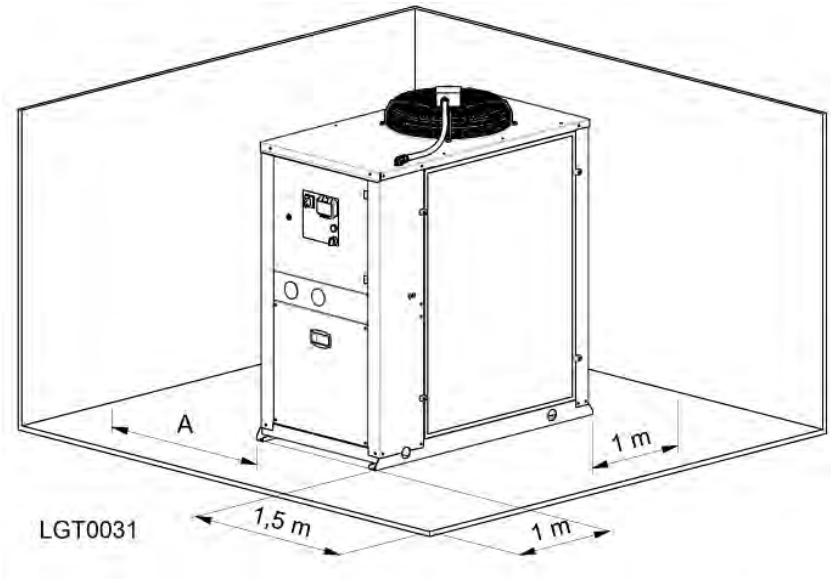
The **CWT** unit can be installed either inside or outside.
To determine the best place to install the unit, it is important to consider the following aspects:

- The dimensions and source of the water pipes;
- The location of the 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***);
- The air temperatures in the area selected for installation (see Chapter ***7 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

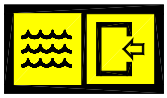
To ensure the good functioning of the unit and access for maintenance, you must respect the minimum installation space shown in the figure in this paragraph.
The exit of air from the fans must not be obstructed.
In any case, avoid all situations in which hot air can circulate between the output of the 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.



Model	A
CWT 010÷015	0.8 m // 32 inches (access for maintenance)
CWT 018÷150	1.5 m // 60 inches

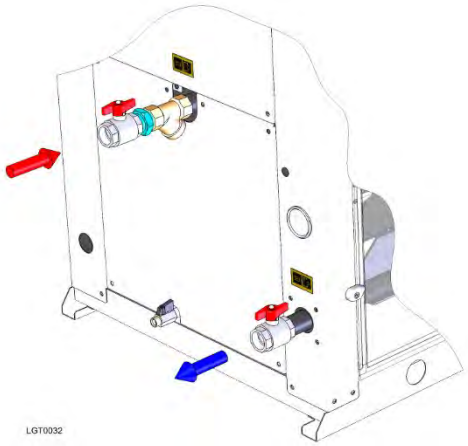
3.4 WATER CONNECTIONS

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

 Water input to the machine  Water exit from the machine

Use the input and output taps provided with the machine: they allow the machine's maintenance without emptying the entire system or emptying the machine during the winter.

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



Diameters of the water fittings			
CWT models	**010÷030**	**038÷065**	**075÷150**
60 Hz	1" NPT FF	1½ " NPT FF	2" NPT FF

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

We recommend an extraordinary cleaning of the mechanical water filter after the machine has been running for the first week (also see Chapter ***8 Maintenance and periodic inspections***).

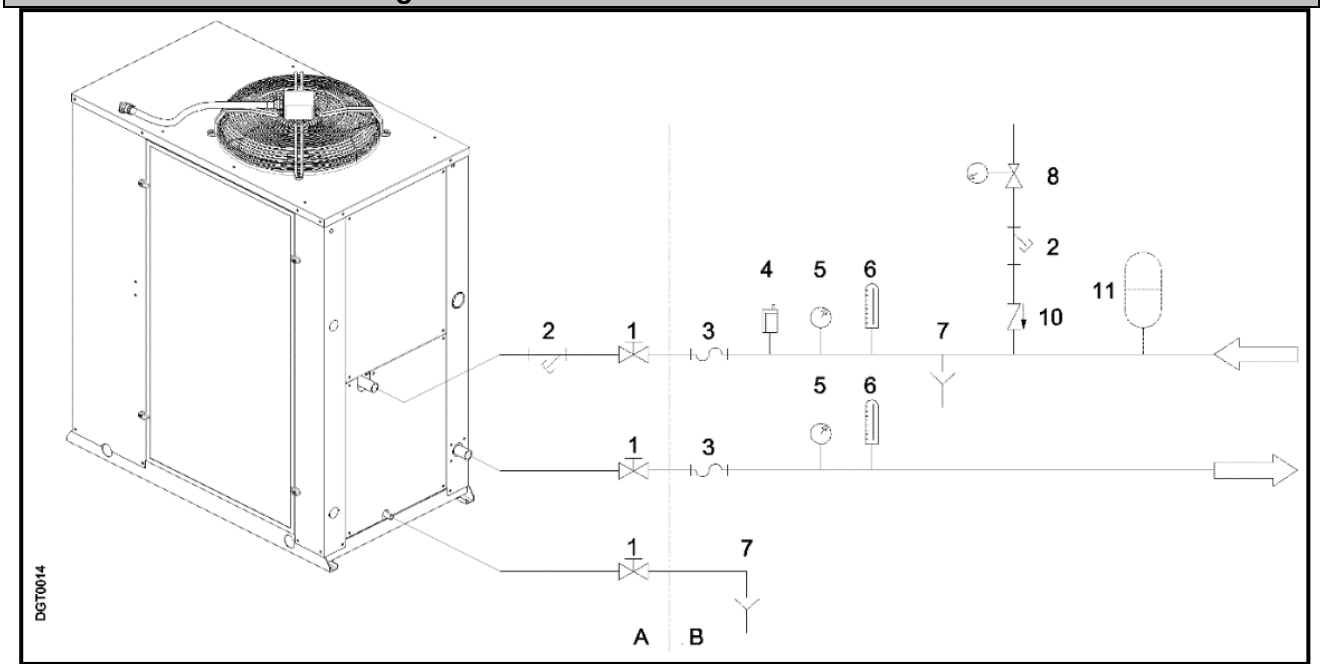
3.4.1 Recommended water system

The standard equipment provided with **CWT** units includes tank, pump, expansion vessel, safety valve, filter, shut-off taps and automatic vent valve; however, 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 system;
- A drain tap in the lowest point of the system;
- 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 system.

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.

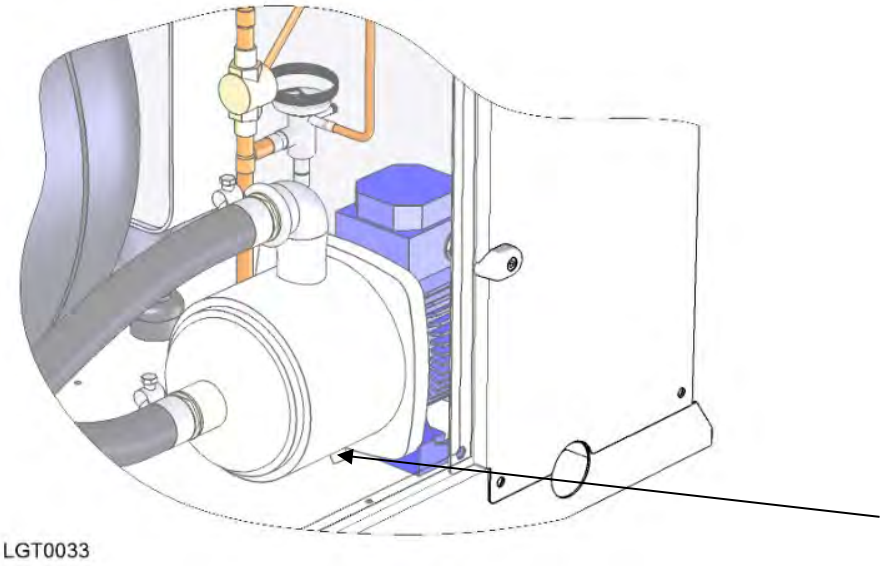
Diagram of the recommended water circuit



Key			
1	Knob	7	Unload
2	Mechanical filter	8	Filling unit
3	Vibration-damping joint	10	Check valve
4	Vent valve	11	Expansion vessel (if any)
5	Manometer	A	Components supplied with the machine
6	Thermometer	B	Components supplied by the installer

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

Important! If the machine is stopped during the winter, you must empty the system (or just the chiller) to avoid frost damage; any water remaining in the pump must be drained using the screw on the lower part of the pump housing (see figure).



PUMP DRAIN SCREW

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
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: **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

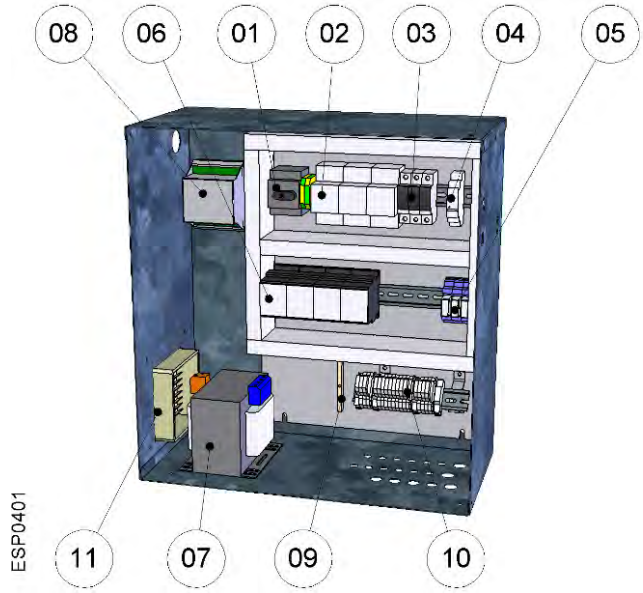
- Check that the drain taps are turned off;
- Open all the system's vent valves;
- Turn on the system's shut-off devices;
- Start filling by slowly turning on the system's water-charging tap;
- When water starts coming out of the vent valves, close them and continue charging until the manometer shows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

3.5 ELECTRICAL CONNECTIONS

The 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 switch (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 of the unit.

Example of an electrical panel



No.	Description	Component ID
1	Cut-off switch	QS
2	Compressor and pump protections	QC1, QC2, etc. QP1
3	Fuses	FU1, FU2, etc.
4	Phase-sequence control relay	RPP
5	Relays	KHP, KRO, KGA
6	Compressor and pump remote switches	KC1, KC2, etc. KP1
7	Transformer	TF
8	Electronic fan-speed regulator	A2, A3
9	Earthing terminal	PE
10	Terminal strip	--
11	Cooling-air intake grill	--

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 (see the figure of the electrical panel in this paragraph).

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

Consult the electrical diagram.

Model	Remote on/off	Remote alarm indicator
CWT 010÷020	X2.11 – X2.12	X2.13 – X2.14 – X2.15
CWT 025÷030	X2.13 – X2.14	X2.15 – X2.16 – X2.17
CWT 038÷040	X2.13 – X2.14	X2.15 – X2.16 – X2.17
CWT 045÷065	X2.11 – X2.12	X2.13 – X2.14 – X2.15
CWT 075÷090	X2.11 – X2.12	X2.13 – X2.14 – X2.15
CWT 110÷150	X2.11 – X2.12	X2.13 – X2.14 – X2.15

4

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:

- Check that the water shut-off valves are open;
- Check that the pressure shown on the manometer with the pumps stopped is at least 1 bar (for closed water systems);
- Check that the surrounding temperature is in the range for the machine to function (see Chapter ***7 Operating Limits***);
- Check that the cut-off on the electrical panel of the machine is open (O position);
- Check that the run/stop switch (I/O/REM) in the electrical panel 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;
- Close the cut-off switch on the machine's electrical panel (I position).

This puts the machine under voltage without starting it up.

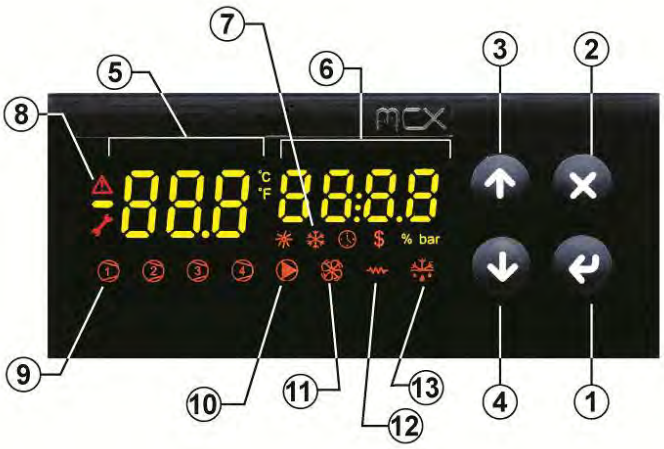
Attention! Apply voltage to the machine at least two hours before start-up to give the heating elements in the compressor housing time to heat the oil inside.

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:

1. Move the remote on/off switch (I/O/REM) on the door of the electrical to position 1;
2. Turn the unit on by holding down the "**UP**" ↑ button (3) on the electronic controller for five seconds. The ❄ icon (7) on the display will light up;
3. Check that the alarm symbol (8) does not light up on the electronic controller; if this should happen, press the **X ESC** button to display the type of alarm triggered;



Electronic controller

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 **AC0** (for **CWT** models 010÷065) or **A02** (for **CWT** models 075÷150), when you press the **X ESC** button.
This safety system prevents the compressors from turning in the wrong direction.

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

Note: the phase sequence relay located inside the electrical panel must have <u>both</u> <u>LEDS</u> lit to confirm the correct electromagnetic field.

Attention! Never reverse the wires downstream from the cut-off 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.

4. Check that the pump has started (the pump icon (10) lights up) and check the water pressures upstream and downstream from the machine on the manometers previously installed;
5. 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 **X 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 **X ESC** button for 5 seconds;
6. 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 **CWT** models with at least two compressors (**CWT** 025÷150) 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.
For **CWT** models with one compressor (**CWT** 010÷020), the consequence of starting up under critical conditions could be the intervention of the high-pressure pressure switch (to rearm the high-pressure pressure switch, see paragraph ***6.2 Rearming the high-pressure pressure switch***).
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, hold down the **UP ↑** (3) button on the electronic controller for at least 5 seconds or, move the run/stop I/O/REM switch to the O position (see paragraph ***5.2 Turning on and off***).

Attention! It is important not to turn the unit off using the main power supply switch or the cut-off on the machine's electrical panel because this would not provide for the delayed power-off of the pump regarding the power-off of the compressors, with the risk of damaging the evaporator; in addition, it would prevent the functioning of the heating elements in the compressor housing.

5

ELECTRONIC CONTROLLER

Electronic controller

The electronic controller has two 7-segment displays and a series of icons.
It manages:

- The functioning of the compressors to ensure that the water produced has a constant temperature;
- The functioning of the pump;
- The speed of the fans;
- The prevention of the high-pressure alarm (**CWT** 025÷150).

Displays:

- The state of the unit (❄ icon) (7);
- The state of the compressors (4 compressor icons) (9);
- The state of the fans (fan icon) (11);
- The state of the pump (pump icon) (10);
- The temperature set point (display B) (5);
- The temperature of the water produced (display A) (6);
- All digital and analogue inputs and outputs (parameters navigation, through displays A and B).

Displays the following alarms:

- Water differential pressure switch;
- High-pressure pressure switch;
- Low-pressure pressure switch;
- Anti-freeze thermostat;
- Compressor protection - wrong R-S-T phase sequence;
- Pump and fan protection - water level in tank insufficient;
- Pressure and temperature probe failure.

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.
⑤	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.
⑥	During the machine's operation shows the temperature set point for the water. During navigation of the menu, indicates the directory where you are. When modifying a parameter, the value to be modified is displayed flashing.
⑦	Indicates that the machine is ON, even when the compressors are stopped.
⑧	Indicates the presence of one or more active alarms.
⑨	They indicate the state of the compressors and, more precisely: Off: compressor OFF On: compressor ON Slow flashing: compressor about to turn on. Fast flashing: compressor about to turn off.
⑩	Indicates the state of the pump, more precisely: Off: pump OFF On: pump ON Fast flashing: pump about to turn off.
⑪	Indicates the state of the fans: On: fans ON Off: fans OFF.

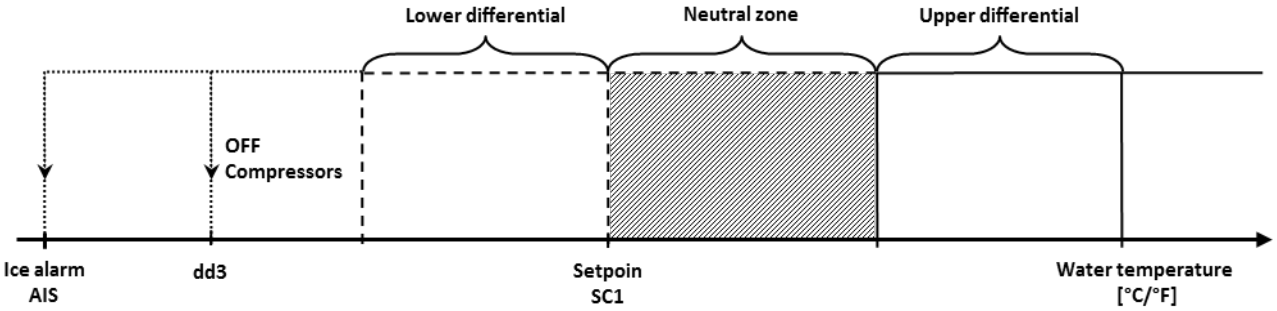
5.2 TURNING ON AND OFF

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.

5.3 WATER TEMPERATURE: DEAD-ZONE REGULATION

This system is set on three temperature ranges: 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 neutral zone) remain constant and follow the set-point value, moving on the temperature scale (see the numeric examples in the table above).

5.4 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 ***7.2 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.

5.5 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:

- From the main screen, press **ENTER** ↵;
- Use the **DOWN** ↓ to go to the *PAR* menu. Press **ENTER**↵;
- Go to the *PAR GEN* menu. Press **ENTER** ↵;
- In the *GEN 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.

5.6 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.

- 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.

5.7 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.

- 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 IOd* 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:

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

** Compressor 4 for **CWT** with four compressors.

5.8 DISPLAYING THE SOFTWARE RELEASE VERSION OF THE ELECTRONIC CONTROLLER

- 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.

5.9 DISPLAYING THE COMPRESSOR AND PUMP COUNTERS

- From the main screen, press **ENTER** ↵;
- Use the **DOWN**↓ button to go to the HRS menu. Press **ENTER** ↵;
- In the *HRS COH* menu, press **ENTER** ↵;
- Use the arrows to display the working hours of the compressors (C01 C02, etc.);
- To display the working hours of the pump, after going to the *HRS COH* menu, use the **DOWN** ↓ button to scroll down to the *HRS EPH* menu and press **ENTER** ↵;
- From here you can display the working hours of the pump (EP1);
- To exit, Press **X ESC** again until you return to the main screen.

5.10 ALARMS

An alarm condition is signalled by the Alarm icon (8).
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 (8)) 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 (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 pressure switch 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.

5.10.2 Displaying of alarm history

- From the main screen, press **ENTER** ↵;
- Use the **DOWN**↓ button to go to the *ALA* menu. Press **ENTER** ↵;
- Use the **DOWN**↓ button to go to the *ALA AHS* menu. Press **ENTER** ↵;
- Press **ENTER** ↵ and the alarm history is displayed.

5.10.3 Table of alarm codes

Alarm code for CWT		Alarm description	Type of rearm
010÷065	075÷150		
A01	**A01**	General alarm	Automatic
	A02	Phase sequence alarm	Automatic
A03	**A03**	Evaporator flow switch alarm	Manual
AP1	**AP1**	Pump 1 overload alarm and/or fans overload and/or level switch alarm	Manual
AP2	**AP2**	Pump 2 overload alarm	Manual
AP9	**AP9**	Backup pump running	Automatic
A07	**A07**	Low air temperature alarm	Automatic
A09	**A09**	High temperature warning	Automatic
AE1	**AE1**	Evaporator ice alarm	Semiautomatic
AH1	**AH1**	Circuit 1 high pressure alarm	Manual
	AH2	Circuit 2 high pressure alarm	Manual
AL1	**AL1**	Circuit 1 low pressure alarm	Semiautomatic
	AL2	Circuit 2 low pressure alarm	Semiautomatic
AM1	**AM1**	Circuit 1 high suction pressure alarm	Semiautomatic
	AM2	Circuit 2 high suction pressure alarm	Semiautomatic
AV1	**AV1**	Circuit 1 vacuum alarm	Manual
	AV2	Circuit 2 vacuum alarm	Manual
AC1		Circuit 1 compressors overload and/or phase sequence alarm	Manual
	AC1	Circuit 1 compressors overload	Manual
	AC2	Circuit 2 compressors overload	Manual
A7A	**A7A**	Alarm probe inlet temperature evaporator	Automatic
A7B	**A7B**	Alarm probe outlet temperature evaporator	Automatic
A7G	**A7G**	Alarm probe discharge pressure circuit 1	Automatic
	A7H	Alarm probe discharge pressure circuit 2	Automatic
A7K	**A7K**	Alarm probe outlet temperature	Automatic
A7L	**A7L**	Alarm probe remote set	Automatic
A7M	**A7M**	Alarm probe outlet temperature condenser 1	Automatic
	A7N	Alarm probe outlet temperature condenser 2	Automatic
A7V	**A7V**	Alarm probe suction pressure circuit 1	Automatic
	A7W	Alarm probe suction pressure circuit 2	Automatic
A8A	**A8A**	Alarm probe discharge temperature circuit 1	Automatic
	A8B	Alarm probe discharge temperature circuit 2	Automatic
A8W	**A8W**	Alarm probe suction temperature circuit 1	Automatic
	A8X	Alarm probe suction temperature circuit 2	Automatic
dT1	**dT1**	Circuit 1 high discharge temperature	Automatic
	dT2	Circuit 2 high discharge temperature	Automatic
Cn	**Cn**	Expansion communication fault	Automatic

6

SAFETY DEVICES

CWT 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. When they reach their calibration value, most of the security devices trigger an alarm managed by the electronic controller.
Here is a list of dangerous situations, including the relative safety device and its location.

Dangerous situation	Safety device	Location
High condensation pressure	High-pressure pressure switch	Compressor output pipe
High condensation pressure	High-pressure prevention system (CWT 025÷150)	Electronic controller
Low evaporation pressure	Low-pressure pressure transducer	Compressor intake pipe
Low evaporation pressure	Low-pressure prevention system (CWT 025÷150)	Electronic controller
Low water flow-capacity	Water differential pressure switch	Plate evaporator
Low water temperature	Anti-freeze thermostat	Water exit from the plate evaporator
High water pressure	Safety valve	Accumulation tank
Frequent compressor start-ups	Anti-circulation timer	Electronic controller
Low water level in the tank	Optical Water-level sensor (opt. CWT 045÷150)	Tank

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 ***5.10 Alarms***).

The following paragraph lists the characteristics of each safety device.

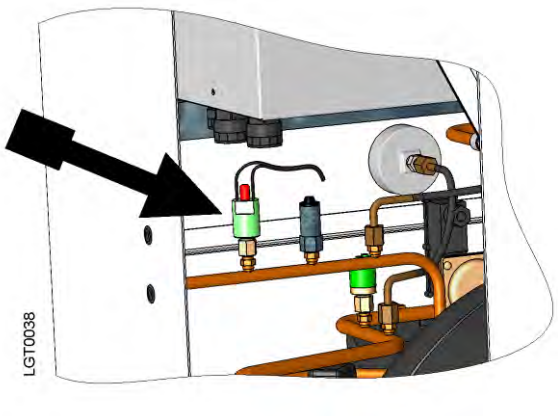
6.1 CALIBRATION OF THE SAFETY DEVICES AND TYPE OF REARM

Safety device	Intervention value	Reset value	Type of rearm
High-pressure pressure switch	41,5 barg // 602 psi	33 barg // 478 psi	Manual
Low-pressure transducer (Low refrigerant pressure)	5,8 barg // 84 psi	6,8 barg // 99 psi	Semi-Automatic
Low-pressure transducer (Vacuum alarm)	3,3 barg // 48 psi	3,8 barg // 55 psi	Manual
High-pressure prevention*	40 barg // 580 psi	35 barg // 508 psi	Automatic
Low-pressure prevention	6,3 barg // 91 psi	7,3 barg // 106 psi	Automatic
Water differential pressure switch	85 mbar // 1,23 psi	105 mbar // 1,52 psi	Manual
Anti-freeze thermostat	4°C // 39,2°F	8°C // 46,4°F	Semi-Automatic
Water safety valve	6 barg // 87 psi	---	---
Anti-circulation timer**	3 min.	---	---

* Only active on units with more than one compressor (**CWT** 025÷150): 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.

6.2 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 batteries; 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 6.1).



High-pressure 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 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 switch stops the compressors while it keeps the condenser fans running to lower the pressure in the condensers.

7

OPERATING LIMITS

CWT 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); they are also prepared to produce water at low temperature: in this case, it is necessary to contact our company (see paragraph ***7.2 Negative water temperatures***).
The graphs show the continuous operating limits of **CWT** units in relation to the temperature of the water exiting the machine and the temperature of the outside air.

Warning! Produced water temperatures less than 5°C//41°F require the use of glycolate mixtures and the setting of suitable electronic controller parameters. Contact the company (see paragraph ***5.10***).

Warning! External air temperatures lower than 0°C//32°F can only be achieved with condensation control and continuous fan speed control.

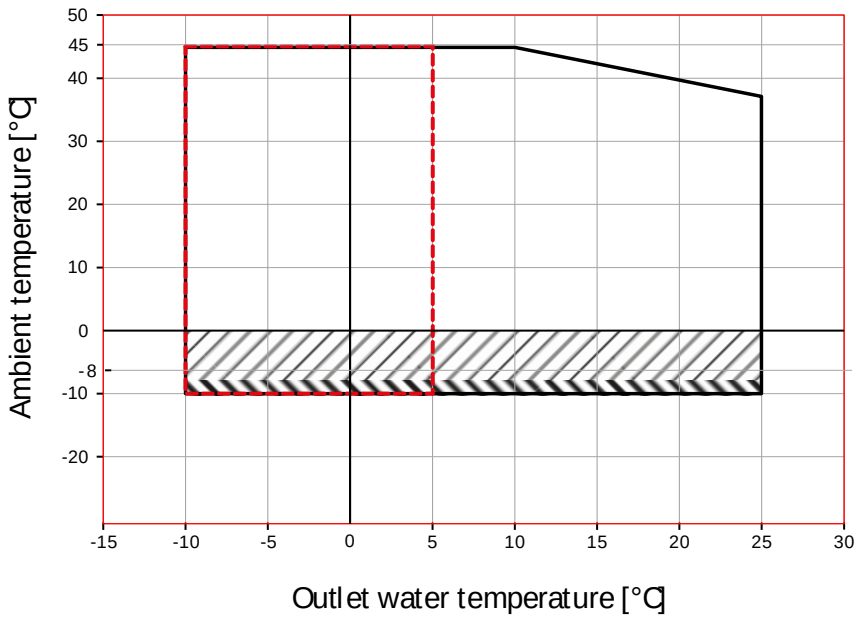
Warning! According to the condensation control chosen and applied on the machinery, verify the real operating limit of the ambient temperature sustainable by the unit.

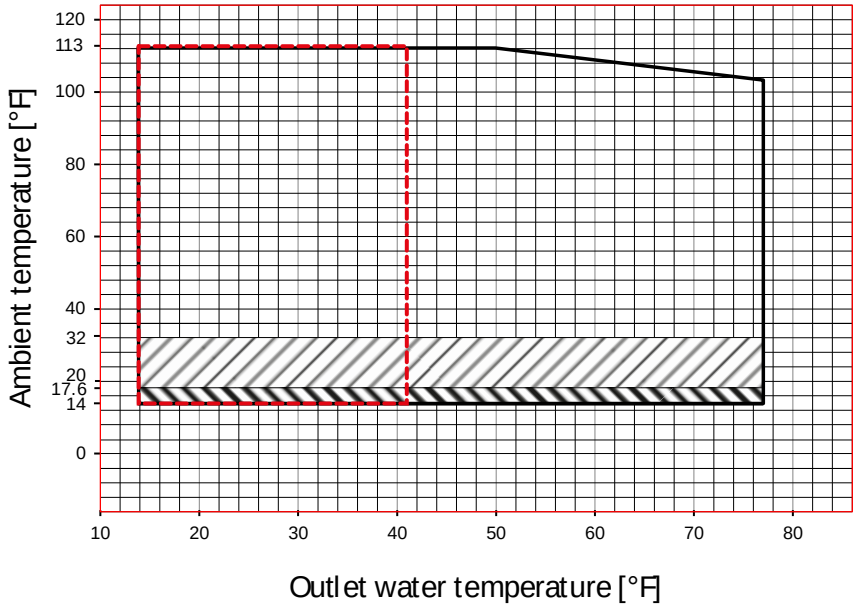
Legend

Mandatory ethylene glycol - please contact our company

Standard continuos fan(s) speed control - phase cut type

Mandatory continuos fan(s) speed control - electronic fan(s) (CE)
Available only for CWT 045-150 3/460/60 and CWT 065-150 3/575/60





7.1 MINIMUM WATER FLOW

It is recommended to grant a minimum water flow to the chiller in order to avoid serious damages to the evaporator and to the whole machine (see following table).

Modél CWT	010	015	018	020	025	030	038	040	045	055	065	075	090	110	130
Minimum water flow [m^3/h]	0.65	0.85	1.00	1.30	1.30	1.65	2.00	2.55	2.55	2.90	3.60	4.40	4.90	6.20	7.60

Check that water temperature difference between inlet and outlet of the chiller is less than 14.4°F/8°C; higher values could be the symptom of an insufficient water flow.

7.2 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 the anti-freeze thermostat and the relative parameters.

CWT units can operate with water and ethylene glycol mixtures up to a concentration of 40%.
In case of RH and/or RA1 / RA2 / RA3 (HEATING or ANTI-FREEZE RESISTORS) option installed on the machine, check that the Chiller setpoint does not conflict with the one chosen for this option. Contact our Service Assistance to request instructions.

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

7.2.1 Changing the setting of the anti-freeze thermostat and relative parameter

Please ask our company for the password for changing the parameters.
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]	3,0	3,5	3,8	4,2	4,6	5,0	5,6	5,8
	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[1] using **UP** ↑ **/DOWN** ↓ key and **ENTER** ↵ to confirm the value;
- Use the **DOWN** ↓ key until the *PAR* menu is reached, press **ENTER** ↵;
- Use the **DOWN** ↓ key until the *PAR reG* menu is reached, press **ENTER** ↵;
- Use the **DOWN** ↓ key until the *reG SEt* menu is reached, press **ENTER** ↵;
- Use the **DOWN** ↓ key to reach *SCL-Setpoint minimum limit* and *SC1-Cooling temperature setpoint* 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 X** to return to previous menu level;
- Use the **DOWN** ↓ key until the *rEG ddZ* 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 X** two times to return to previous menu level;
- Use the **DOWN** ↓ key until the *PAR ALA* menu is reached, press **ENTER** ↵;
- Use the **DOWN** ↓ key until the *ALA 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 X** one times to return to previous menu level;
- Use the **DOWN** ↓ key until the *ALA LP* 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 X** several times to return to main menu.

[1] Please contact our company.

8

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

Only for units at 50Hz power supply.

Model CWT	010	015	018	020	025	030	038
SEPR	4,48	4,42	4,42	4,41	4,91	4,86	4,85

Model CWT	040	045	055	065	075	090	110	130
SEPR	4,84	5,30	5,32	5,31	5,65	6,28	6,81	6,80

9

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 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 batteries with a jet of compressed air.	Yearly (1)	
Clean the water filter.	Monthly(2)	Specialised personnel
Check that the refrigerant liquid peep hole 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 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 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	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.

10

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 
I/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**	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**	Reset a temperature of the water (set point) compatible with the calibration of the anti-freeze thermostat (see table in paragraph 7.2.1)	User
Service and anti-freeze probe defective	**A7K**	Check contacts and replace, if necessary	Specialised personnel 
Entering water temperature probe defective	**A7B**	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	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 8).	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 

Cause	Alarm signal or symptom	Solution	Execution
2. (continue) The compressor doesn't start			
Magnetothermic protection of the compressors open (QC1, QC2, Etc.)	**AC1** *(for CWT 010÷150 circuit 1)* **AC2** *(for CWT 075÷150 circuit 2)*	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	**AC1** *(for CWT 010÷150)* **A02** *(for CWT 075÷150)*	Reverse the two phases upstream from the cut-off switch of the unit's electrical panel (see paragraph 4.2)	Specialised personnel 
3. Intervention of the high-pressure pressure switch			
Condenser obstructed or insufficient air flow-capacity	**AH1** *(for CWT 010÷150 circuit 1)* **AH2** *(for CWT 075÷150 circuit 2)*	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 6.2)	User
The unit has operated outside its operating limits (such as air or water too hot)	**AH1** *(for CWT 010÷150 circuit 1)* **AH2** *(for CWT 075÷150 circuit 2)*	If possible, restore conditions that are compatible with the operating limits. Rearm the pressure switch (paragraph 6.2).	User
Fan not working		See point 6	
Excessive refrigerant charge	High subcooling (greater than 18°F//10 K)	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 
4. Intervention of the water differential pressure switch			
Taps of the machine are turned closed	**A03**	Open the taps	User
Water circulation pump blocked or defective	**A03**	Unlock or replace the pump	Specialised personnel 
Water pump stopped	**A03** Pump icon lit.	Check the voltage at the coil of the contactors of the pump and the continuity of the coil itself	Specialised personnel 

Cause	Alarm signal or symptom	Solution	Execution
5. Intervention of the low pressure transducer			
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 thermal protection inside the fan	**AP1**	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
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** **AP2**	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** **AP2**	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 

11

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.

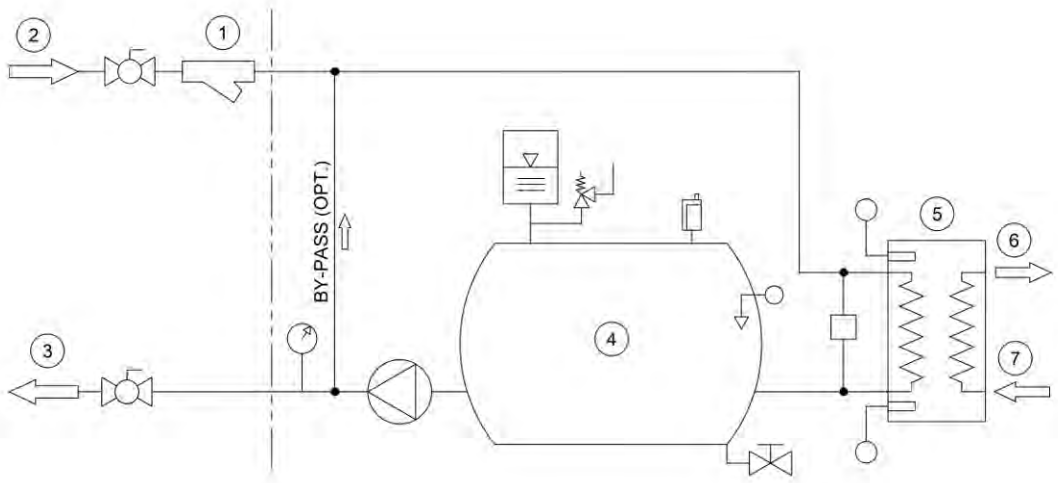
Part	Material
Refrigerant fluid	R410A, Oil
Panelling and supports	Carbon steel, epoxy paint
Chiller compressor	Steel, Copper, Aluminium, Oil
Plate exchanger (evaporator)	Steel, Copper
Condenser	Aluminium, Carbon Steel
Pipes	Copper
Fan	Aluminium, Copper, Steel
Valves	Steel, Bronze
Insulation	Synthetic 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.

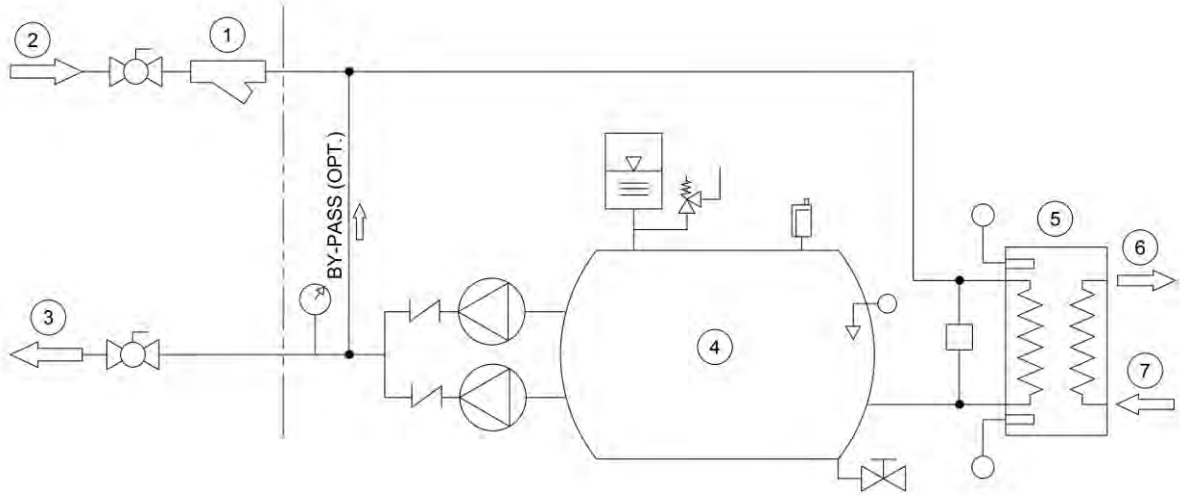
Dispose of refrigerant properly. Remove it from the chiller with suitable tools and deliver it to authorised collection centres that will treat it and make it reusable

WATER DIAGRAMS

VERSION WITH SINGLE PUMP – TP P3/P5



VERSION WITH DOUBLE PUMP – TP D3/D5



KEY

1. INSTALLED ON EVAPORATOR
2. WATER INLET
3. WATER OUTLET
4. STORAGE TANK
5. EVAPORATOR
6. REFRIGERANT OUTLET
7. REFRIGERANT INLET

- EXPANSION VESSEL
- DRAIN TAP
- SHUT OFF VALVE
- GAUGE
- FILTER
- CHECK VALVE
- LEVEL SENSOR (OPTIONAL)
- TEMPERATURE PROBE
- DIFFERENTIAL PRESSURE SWITCH
- PUMP
- RELIEF VALVE
- SAFETY VALVE

REFRIGERANT CIRCUITS DIAGRAMS

KEY

PT — PRESSURE TRANSDUCER

HPSW — HIGH PRESSURE SWITCH

OUTLET PRESSURE

GAUGE

SIGHT GLASS

THERMOSTATIC EXPANSION VALVE

SOLENOID VALVE

FILTER DRYER

CHECK VALVE

SAFETY VALVE

1 COMPRESSOR

2 CONDENSER

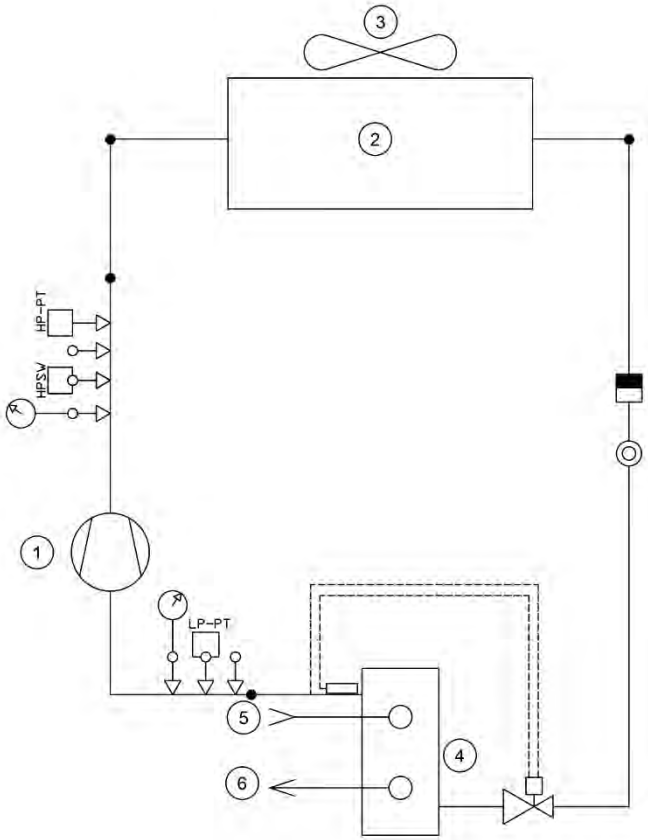
3 FAN

4 EVAPORATOR

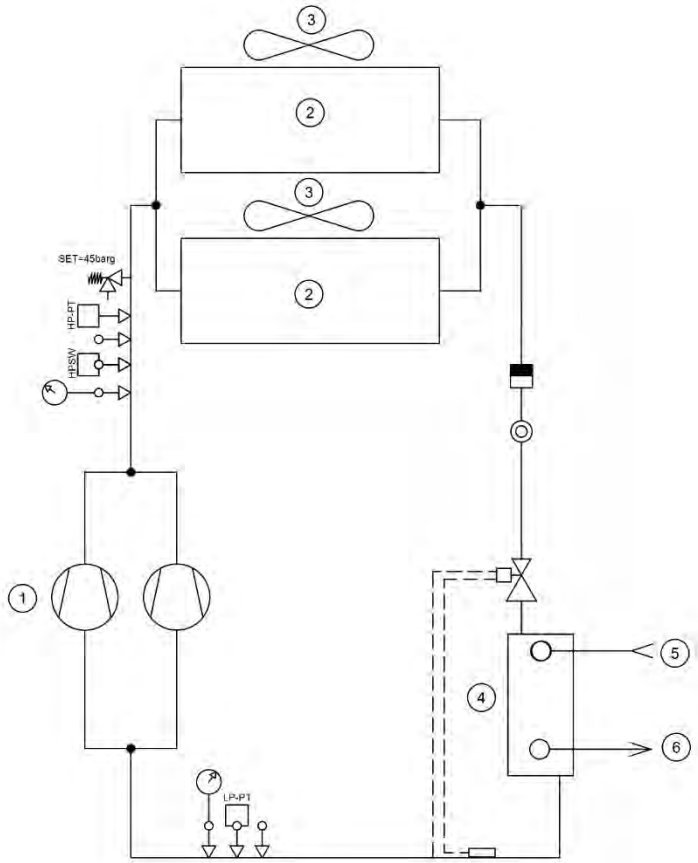
5 WATER INLET

6 WATER OUTLET

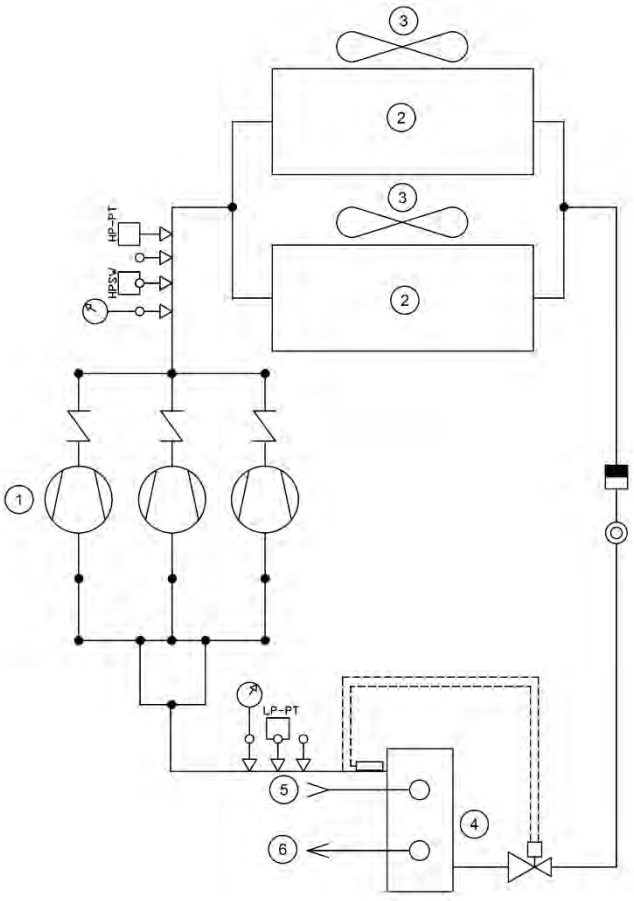
REFRIGERANT CIRCUIT DIAGRAM FOR CWT MODELS 010÷020



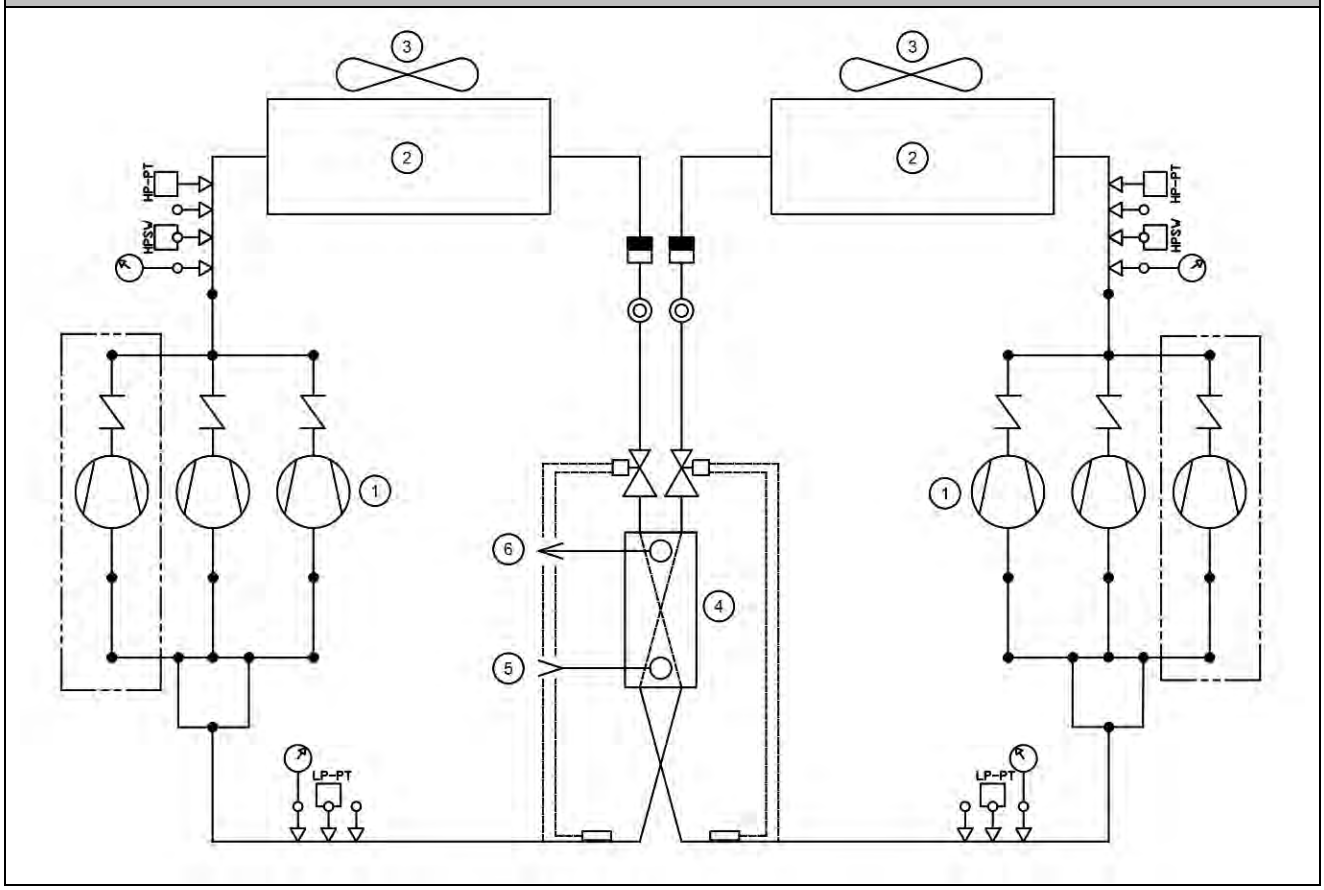
REFRIGERANT CIRCUIT DIAGRAM FOR CWT MODELS 025÷040



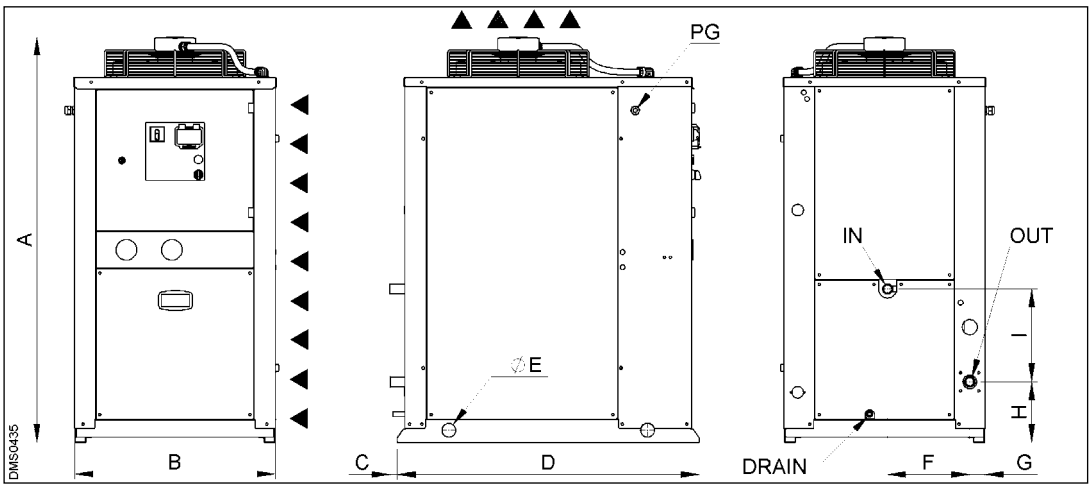
REFRIGERANT CIRCUIT DIAGRAM FOR CWT MODELS 045÷065



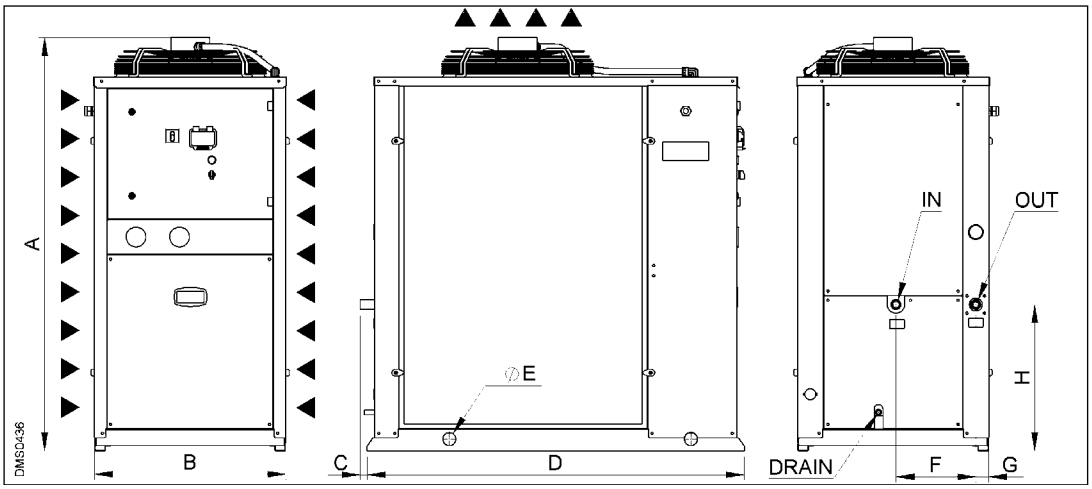
REFRIGERANT CIRCUIT DIAGRAM FOR CWT MODELS 075÷150



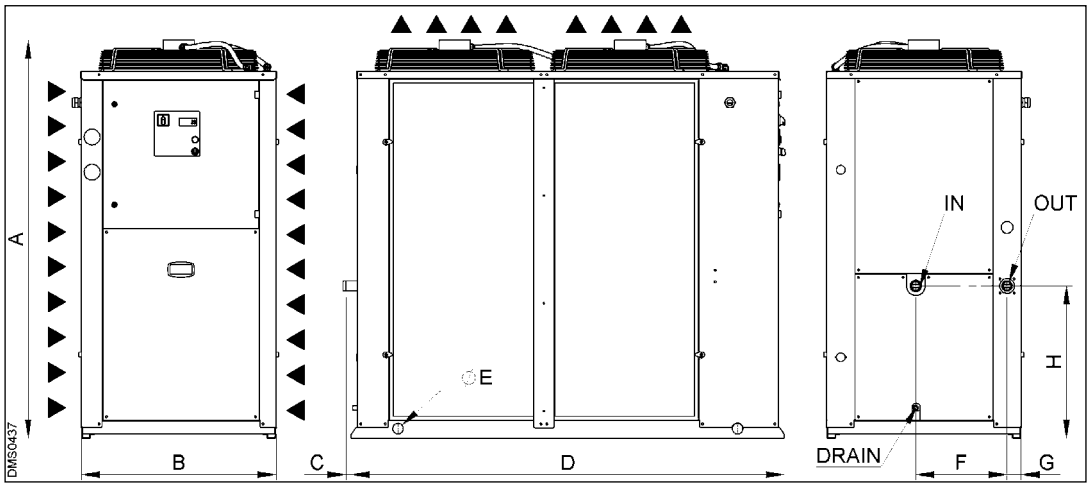
DIMENSIONAL DRAWINGS



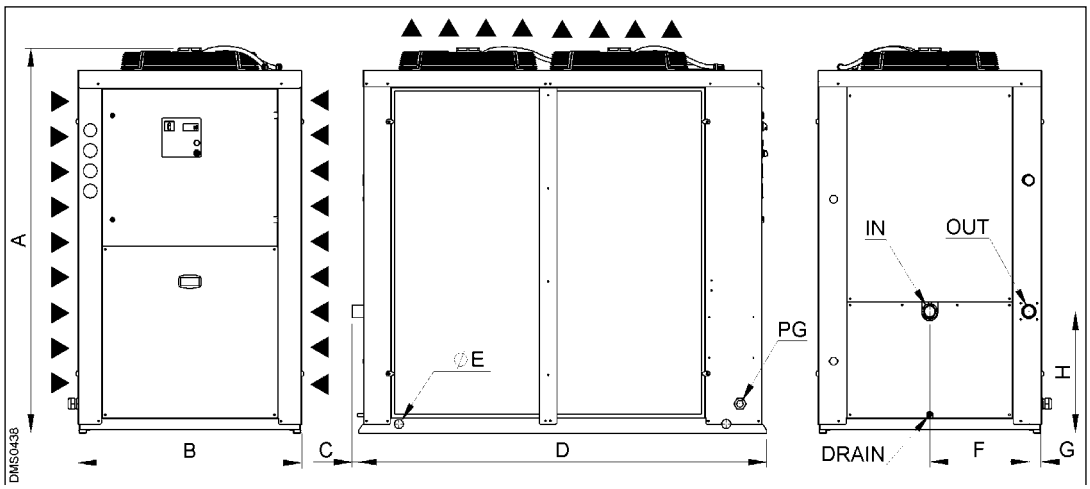
	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	IN	OUT	Drain
CWT010	1335	670	35	995	45	270	50	380	125	1” FF	1” FF	3/8”
CWT015	1335	670	35	995	45	270	50	380	125	1” FF	1” FF	3/8”
	[in]	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**				
CWT010	52,6	26,4	1,4	39,2	1,8	10,6	2,0	15,0	4,9	1” FF	1” FF	3/8”
CWT015	52,6	26,4	1,4	39,2	1,8	10,6	2,0	15,0	4,9	1” FF	1” FF	3/8”



	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	IN	OUT	Drain
CWT018	1425	670	35	1205	45	275	45	505	1” FF	1” FF	3/8”
CWT020	1425	670	35	1205	45	275	45	505	1” FF	1” FF	3/8”
CWT025	1425	670	35	1205	45	275	45	505	1” FF	1” FF	3/8”
CWT030	1425	670	35	1205	45	275	45	505	1” FF	1” FF	3/8”
	[in]	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**			
CWT018	56,1	26,4	1,4	47,4	1,8	10,8	1,8	19,9	1” FF	1” FF	3/8”
CWT020	56,1	26,4	1,4	47,4	1,8	10,8	1,8	19,9	1” FF	1” FF	3/8”
CWT025	56,1	26,4	1,4	47,4	1,8	10,8	1,8	19,9	1” FF	1” FF	3/8”
CWT030	56,1	26,4	1,4	47,4	1,8	10,8	1,8	19,9	1” FF	1” FF	3/8”



	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	IN	OUT	Drain
CWT038	1535	750	35	1632	45	375	60	650	1”½ FF	1”½ FF	3/8”
CWT040	1535	750	35	1632	45	375	60	650	1”½ FF	1”½ FF	3/8”
CWT045	1705	835	35	1852	45	450	60	650	1”½ FF	1”½ FF	3/8”
CWT055	1705	835	35	1852	45	450	60	650	1”½ FF	1”½ FF	3/8”
CWT065	1705	835	35	1852	45	450	60	650	1”½ FF	1”½ FF	3/8”
	[in]	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**			
CWT038	60,4	29,5	1,4	64,3	1,8	14,8	2,4	25,6	1”½ FF	1”½ FF	3/8”
CWT040	60,4	29,5	1,4	64,3	1,8	14,8	2,4	25,6	1”½ FF	1”½ FF	3/8”
CWT045	67,1	32,9	1,4	72,9	1,8	17,7	2,4	25,6	1”½ FF	1”½ FF	3/8”
CWT055	67,1	32,9	1,4	72,9	1,8	17,7	2,4	25,6	1”½ FF	1”½ FF	3/8”
CWT065	67,1	32,9	1,4	72,9	1,8	17,7	2,4	25,6	1”½ FF	1”½ FF	3/8”



	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	IN	OUT	Drain
CWT075	1900	1110	35	2025	45	495	60	600	2” FF	2” FF	3/8”
CWT090	1900	1110	35	2025	45	495	60	600	2” FF	2” FF	3/8”
CWT110	2180	1215	35	2230	45	545	60	600	2” FF	2” FF	3/8”
CWT130	2180	1215	35	2230	45	545	60	600	2” FF	2” FF	3/8”
CWT150	2180	1215	35	2230	45	545	60	600	2” FF	2” FF	3/8”
	[in]	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**	**[in]**			
CWT075	74,8	43,7	1,4	79,7	1,8	19,5	2,4	23,6	2” FF	2” FF	3/8”
CWT090	74,8	43,7	1,4	79,7	1,8	19,5	2,4	23,6	2” FF	2” FF	3/8”
CWT110	85,8	47,8	1,4	87,8	1,8	21,5	2,4	23,6	2” FF	2” FF	3/8”
CWT130	85,8	47,8	1,4	87,8	1,8	21,5	2,4	23,6	2” FF	2” FF	3/8”
CWT150	85,8	47,8	1,4	87,8	1,8	21,5	2,4	23,6	2” FF	2” FF	3/8”

CAG PURIFICATION INC. Unit 2, 3770B Laird Road, Mississauga ON. L5L 0A7

Toll 1-800-951-0777 Fax 905-820-3490 www.cagcooling.com email: chillers@cagcooling.com