

PURESTREAM

CHILL-CUBE MULTIBANK

BY FRIULAIR



TM



Chill-Cube Multibank Water Cooled Water Chiller

User Manual



Editions Record

Code	Revision	Edition	Note
7425MUM691	01	02/2018	

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 instructions meticulously as well as the current accident-prevention laws in the country of use.

Every chiller/heat pump in the **MWC** series is tested thoroughly before being packed.

At this stage, checks are made to verify that there are no manufacturing defects and that the machine performs correctly the functions for which it was designed.

This manual must be kept for future reference and is an integral part of the chiller you have purchased.

Due to continuous technical development, we reserve the right to make the necessary modifications without any obligation to give advance notice.

Do not hesitate to contact us if you have any problems or need more information.

The product identification plate, located on the side of the chiller, contains all essential information about the machine.

During installation, fill in the table below, copying the data on the identification plate.

You will have to give this data to the manufacturer, or reseller, whenever you request information, spare parts, etc., during the warranty period.

Removing or tampering with the identification plate will void the warranty.

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
1.1	Definitions of the symbols used	1
1.2	Warnings	2
1.3	Proper use of the chiller	2
1.4	Instructions for using equipment under pressure conforming to PED Directive 2014/68/EU3	
2	OPERATION AND MAIN COMPONENTS	4
2.1	Refrigerant circuit.....	4
2.2	Water circuit.....	4
2.3	Control of the water temperature.....	4
2.4	Protecting the integrity of the machine	5
2.5	MWC units: identification of the main components.....	5
2.5.1	MWC041 VBM – Mechanical hot gas bypass valve	5
2.5.2	MWC042 CCW – Water condensing control.....	5
2.6	Spare parts	6
3	INSTALLATION.....	7
3.1	Transport	7
3.2	Storage	7
3.3	Place of installation.....	7
3.4	Water connections	8
3.4.1	Recommended water system	8
3.4.2	Use of ethylene glycol as a winter anti-freeze.....	9
3.4.3	Charging the water circuit.....	9
3.5	Electrical connections	10
3.5.1	Connecting a remote on/off switch	10
3.5.2	Connecting a remote alarm indicator light.....	10
4	PRELIMINARY CHECKS AND START-UP	11
4.1	Preliminary checks and preparation for the first start-up	11
4.2	Start-up.....	11
4.2.1	Start-up under critical conditions	12
4.3	Turning off the unit.....	12
5	ELECTRONIC CONTROLLER.....	13
5.1	Main functions of the electronic controller buttons and meanings of the icons	13
5.2	Switching on/off	14
5.3	Controlling water temperature.....	14
5.4	Changing the cooling set point.....	15
5.5	Display of inputs and outputs	15
5.6	Alarms	16
5.6.1	Displaying and resetting alarms	16
5.6.2	Table of alarm codes	17
5.6.3	Displaying alarm history.....	18
5.7	Low water temperatures (<32°F//0°C).....	18
5.8	Parameters changing.....	18
5.9	Setting the date and time	18
6	SAFETY DEVICES	19
6.1	Calibration of the safety devices and type of rearm.....	19
6.2	Rearming the pressure switch.....	20

7	OPERATING LIMITS	21
8	MAINTENANCE, INSPECTIONS AND PERIODIC CHECKS	22
9	SEER - SEASONAL ENERGY EFFICIENCY RATING According to commission regulation (EU) 2016/2281	23
10	TROUBLESHOOTING.....	24
11	DISMANTLING THE CHILLER	27
12	WATER DIAGRAMS	28
13	REFRIGERANT DIAGRAMS.....	29
14	DIMENSIONAL DRAWINGS	31
	ANNEX A – ELECTRONIC CONTROL MENU STRUCTURE	32

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 authorized 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

MWC units are monobloc water chillers with water-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:

1. Use the equipment within the temperature range outlined in the operating limits on the manufacturer's plate;
2. Do not solder on the exchangers or refrigerant fluid pipes;
3. Do not install the equipment in insufficiently ventilated rooms, areas exposed to sources of heat or near inflammable substances;
4. During operation, the equipment must not be subjected to vibrations that could cause fatigue failures;
5. Keep the documentation attached to the equipment (user manual, declaration of conformity, etc.) for future reference;
6. The maximum operating pressure shown on the manufacturer's plate must not be exceeded. The user is responsible for fitting appropriate safety/control devices.

OPERATION AND MAIN COMPONENTS

2.1 REFRIGERANT CIRCUIT

Operation of the MWC chillers/heat pumps is based on a vapour compression cycle implemented within the chiller circuit and made up of the following components: evaporator, compressor, condenser and thermostatic expansion valve.

Evaporator: this is a braze-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 braze-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. The MWC series has scroll compressors which are characterized by low noise and vibration levels. They are protected by thermal magnetic circuit breakers and a temperature sensor inside the motor windings.

Condenser: braze-welded plate exchanger which enables heat exchange between the refrigerant and the water. It condenses the refrigerant gas by transferring condensation heat from the refrigerant gas to the water. As a result high pressure liquid refrigerant is produced.

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 water, the high-pressure refrigerant gas is cooled, making it condensed and undercooled. The flow of refrigerant liquid then passes through the lamination 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

The water flows first into the evaporator, where it is chilled. Finally it returns 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. A fine mesh metal filter at the entrance to the evaporator catches any solid residues that could damage the evaporator. A manometer and safety valve complete the unit's water circuit.

2.3 CONTROL OF THE WATER TEMPERATURE

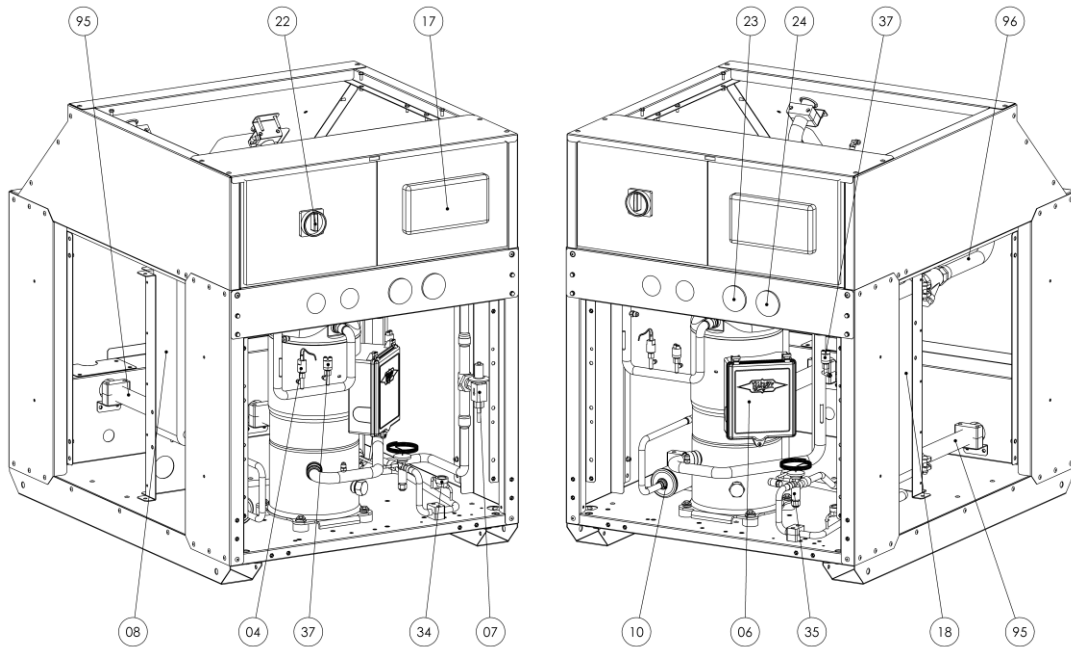
The purpose of the chiller is to maintain the temperature of the water produced within a desired interval as the load on the system varies; this is handled by an electronic controller and a temperature probe that turn the compressor on and off appropriately (also see paragraph **5.3 Controlling water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

2.4 PROTECTING THE INTEGRITY OF THE MACHINE

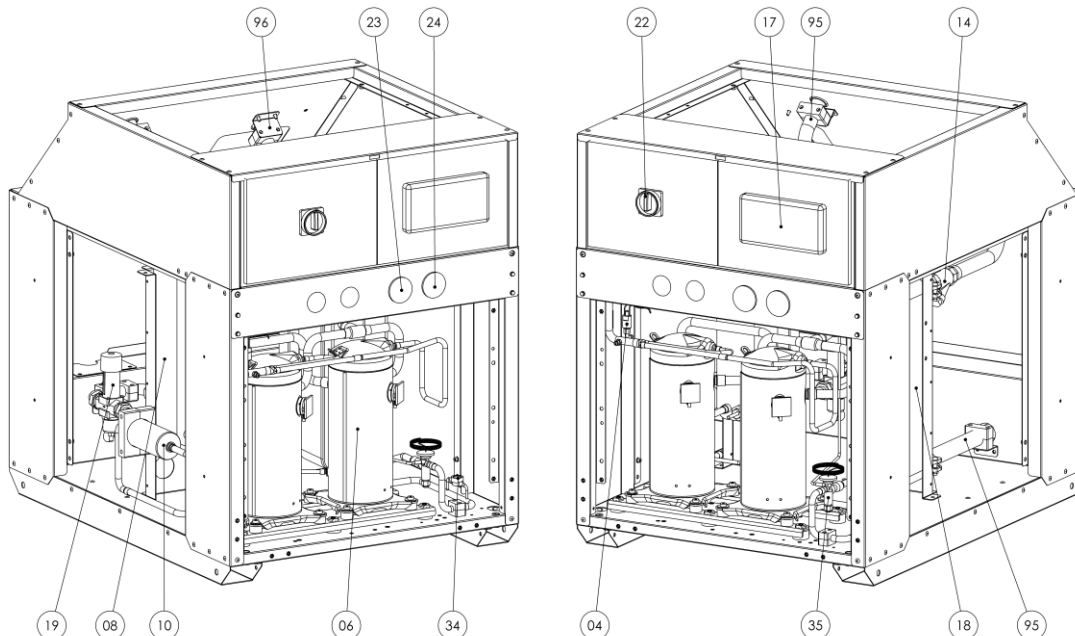
In addition to controlling the temperature, the electronic controller uses pressure switches, thermostats and timers to prevent and handle situations that could compromise the integrity of the machine (also see Chapter 6 *Safety Devices*).

2.5 MWC UNITS: IDENTIFICATION OF THE MAIN COMPONENTS

2.5.1 MWC041 VBM – Mechanical hot gas bypass valve



2.5.2 MWC042 CCW – Water condensing control



04 High pressure switch
 06 Compressor
 08 Condenser
 07 Hot gas bypass valve
 10 Refrigerant filter
 14 Water strainer
 17 Electronic controller

18 Evaporator
 19 Condensing control valve
 22 Disconnecter switch
 23 High pressure manometer
 24 Low pressure manometer
 34 Sight glass
 35 Thermostatic valve

37 Pressure transducer
 90 Pump
 91 Tank
 95 Water inlet
 96 Water outlet

2.6 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		PART QUANTITY FOR MWC MODEL	
			041	042
1	EVAPORATOR GROUP		1	1
4	HIGH PRESSURE SWITCH		1	1
6	COMPRESSOR	[A]	1	2
7	HOT GAS BYPASS VALVE	[B]	1	
8	CONDENSER		1	1
10	REFRIGERANT FILTER		1	1
12	TEMPERATURE PROBE		4	4
17	COMPLETE ELECTRONIC CONTROLLER		1	1
18	EVAPORATOR		1	1
22	DISCONNECTOR SWITCH		1	1
23	HIGH PRESSURE GAUGE		1	1
24	LOW PRESSURE GAUGE		1	1
25	COMPRESSOR CRANKCASE HEATER		1	2
35	THERMOSTATIC EXPANSION VALVE		1	1
37	PRESSURE TRANSDUCER		2	2
89	DIFFERENTIAL PRESSURE SWITCH		1	1
90	WATER PUMP (Evaporator and/or condenser side)	[C]	1/2	1/2

[A]	The smaller progressive code represents the smallest compressor in tandem configuration.
[B]	Optional.
[C]	1 or 2 depend from configuration.

INSTALLATION

3.1 TRANSPORT

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



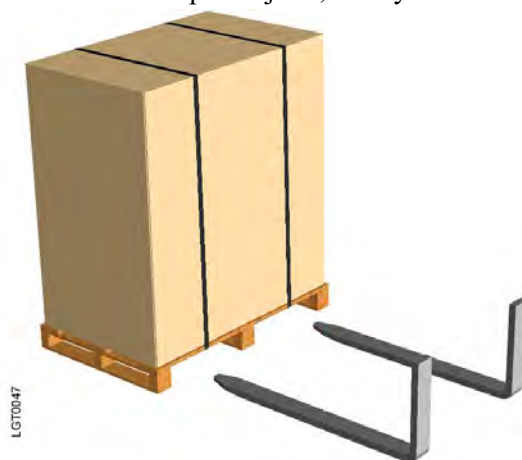
Always keep the chiller vertical: turning it upside down can irreparably damage several parts of the unit.



Handle with care. Violent falls can cause irreparable damage.



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



3.2 STORAGE

Protect the machine from bad weather, even if packed.

Always keep the chiller vertical, even when in storage. Turning it upside down can irreparably damage several parts of the unit.

If not used, the chiller can be stored packed in an enclosed place, free of dust, with a maximum temperature of 50 °C/122 °F and specific humidity of no higher than 90%.



The packing material is recyclable.

Dispose of each type of material in accordance with the requirements in the country of use.

3.3 PLACE OF INSTALLATION

The MWC unit can be installed inside.

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

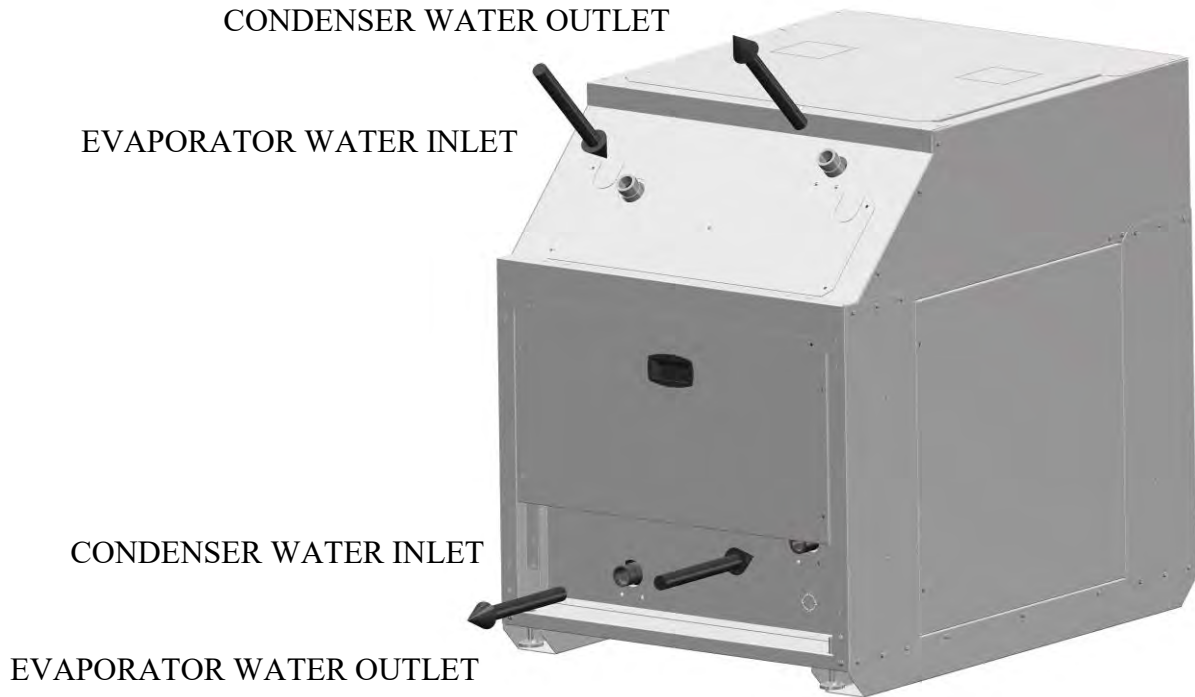
- The dimensions and source of the water pipes;
- The location of the electricity;
- The solidity of the support surface;
- Avoid the possible reflection of sound waves: (do not install in narrow or tight spaces);
- Provide access for maintenance or repair.



Attention! If the machine is installed outside, it could find itself at a temperature lower than 32°F//0°C, 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*).

3.4 WATER CONNECTIONS

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



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 9 *Maintenance, inspections and periodic inspections*).

MWC	Evaporator	Condenser
50 Hz version	1" 1/4	1" 1/4
60 Hz version	1" 1/4	1" 1/4

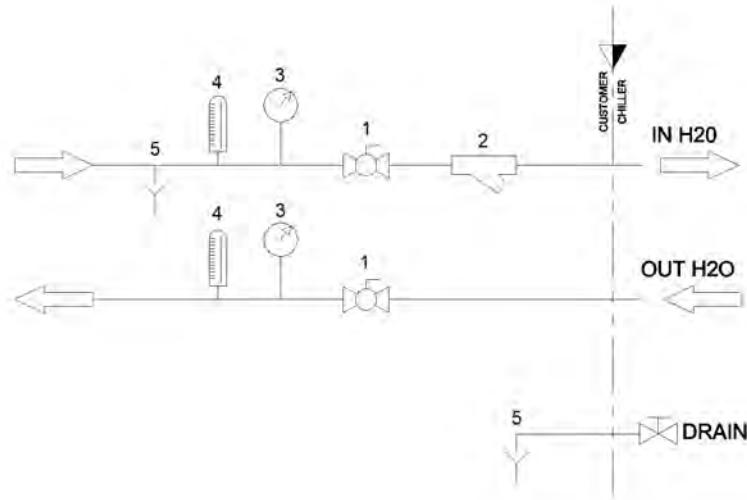
3.4.1 Recommended water system

The MWC units can be provided with a pump, filter and automatic venting valve, however it is advisable to also equip the water circuit 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 possibly on the unit with another additional one.

Diagram of the recommended water circuit



DGT0038

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



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.

3.4.2 Use of ethylene glycol as a winter anti-freeze

Instead of emptying the system in 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
Percentage of ethylene glycol [%]	10	15	20	25	30



Attention! Maximum concentration of ethylene glycol allowed: 40%.

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 the system level again;
- 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 $\pm 10\%$ from its nominal value;
- The frequency must not vary by more than $\pm 1\%$ from its nominal value ($\pm 2\%$ for brief periods);
- The imbalance between power phases must be $< 2\%$;
- Upstream from the electrical panel, install a differential switch ($ID_n=0,03A$) (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.



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 mandatory: 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

A remote on/off switch can be connected to terminals X3.1 and X3.2 of the terminal strip in the electrical panel: there are 24V between these two terminals.



Consult the electrical diagram.

3.5.2 Connecting a remote alarm indicator light

An alarm indicator light can be connected to terminals X3.3, X3.4 and X3.5 (clean contact) of the terminal strip in the electrical panel.



Consult the electrical diagram.

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 surrounding temperature is in the range for the machine to function (see Chapter 7 *Operating Limits*);
- Check that the mains voltage matches the voltage on the machine's identification plate with a tolerance of $\pm 10\%$;
- Close the main power supply switch;
- Close the cut-off switch on the machine's electrical panel.

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 50-59 °F [10-15°C] higher than the surrounding temperature.

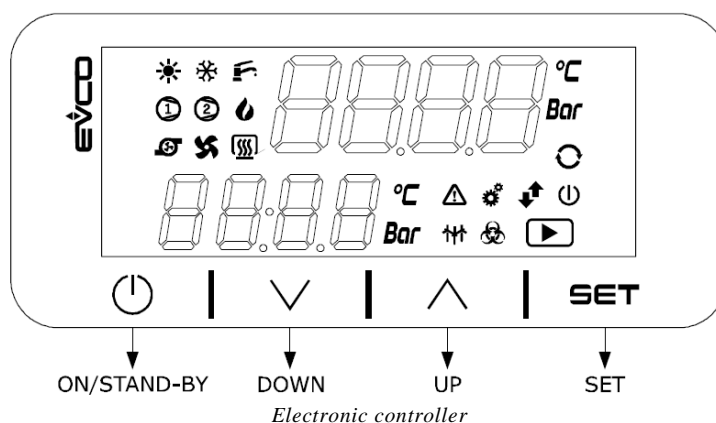
4.2 START-UP





Attention! At start-up after couple of days, you must adjust date and time (see paragraph 5.9 *Setting the date and time*).


To proceed to start-up:

1. Connect the device power supply. Touch the  for 4 seconds. The led  will flash and turn off, the chiller will switch on.



2. Check that the alarm symbol  does not light up on the electronic controller; if this should happen, press the  key 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 **AC21** when you press the  key.

This safety system prevents the compressor from turning in the wrong direction.




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 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.

3. 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 **AL03** when you press the  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 **SET** button for 5 seconds;
4. Wait for the compressors to start.



4.2.1 Start-up under critical conditions

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 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 disable, touch the  for 4 seconds. The led  will flash and turn on, the chiller will switch off.



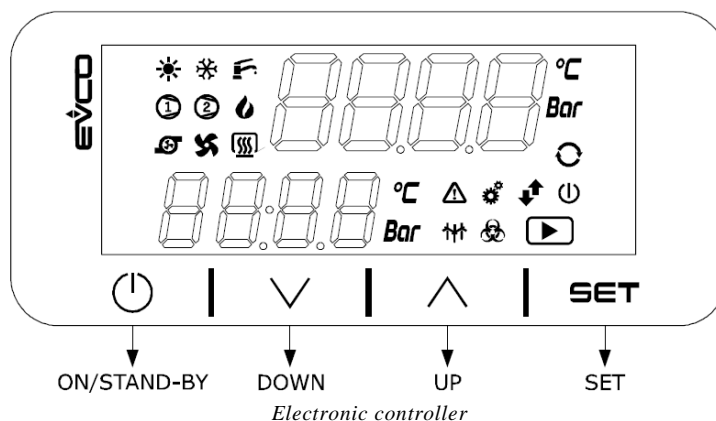
Attention! It is important not to turn the unit off using the main power supply switch or the cut-off on the machine's electrical panel because this would not provide for the delayed power-off of the pump regarding the power-off of the compressors, with the risk of damaging the evaporator; in addition,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

ELECTRONIC CONTROLLER

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

It manages:

- The functioning of the compressor to ensure that the water produced has a constant temperature;
- The prevention of the high-pressure alarm;
- The prevention of the low pressure alarm.






Displays:







- The state of the unit;
- The state of the compressor;
- The outlet water temperature;
- The inlet water temperature;
- All digital and analogue inputs and outputs (navigation between parameters).

Displays the following alarms:

- Water differential pressure switch;
- High-pressure pressure switch;
- Low-pressure pressure transducer;
- Anti-freeze;
- Compressor protection – wrong R-S-T phase sequence;
- Pressure and temperature probe failure.

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





Button	Function
	On/off button Exit procedure
SET	Setting setpoint Access the menu
	Down key
	Up key

Display/Led	Function
	Indicates the state of compressor: On: compressor ON Off: compressor OFF Flashing: setting setpoint mode or compressor protection
	Alarm active
	Energy saving on
	°Celsius unit
	°Fahrenheit unit
	Indicates the state of the chiller: On: chiller OFF Off: chiller ON

5.2 SWITCHING ON/OFF



Attention! At start-up after couple of days, you must adjust date and time (see paragraph *5.9 Setting the date and time*).

Connect the device power supply. Touch the  for 4 seconds. The led  will flash and turn off, the chiller will switch on. To disable, touch the  for 4 seconds. The led  will flash and turn on, the chiller will switch off.

5.3 CONTROLLING WATER TEMPERATURE

This is the factory setting for the temperature regulation based on evaporator outlet water temperature. A parameter set the position of the neutral zone of regulation:

- Before or after the setpoint in function of the active mode;
- At the setpoint.

For better understand the regulation mode, two steps must be described:

- Switch on;
- Switch off.

SWITCH-ON:

- The compressor is switched on when the temperature is out of the neutral zone:
 - ✓ Working temperature > Set Point + Neutral zone
- The compressor is off if the temperature is inside the neutral zone or if:
 - ✓ Working temperature < Set Point

The second compressor is not switched on immediately even if the temperature is still out the neutral zone, but it will be waited the delay sets.

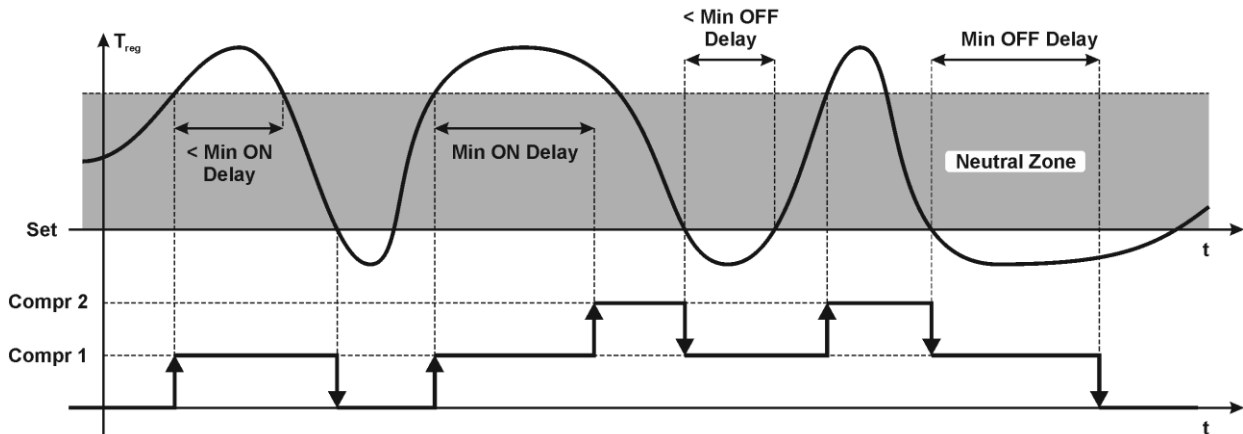
SWITCH-OFF:

- The compressor is switched off when the temperature:
 - ✓ Working temperature < Set Point
- The compressor is on if the temperature is inside the neutral zone or if:
 - ✓ Working temperature > Set Point + Neutral zone

The second compressor is not switched off immediately even if the temperature is still out the neutral zone, but it will be waited the delay sets.

Parameter	Description	Factory Setting
SPC1	Cooling setpoint	7°C//44.6°F
PC00	Working temperature probe	0 – outlet water temperature probe
PC14	Neutral zone regulation	5
PC18	Type of neutral zone	0 – separate

The neutral zone regulation is showed in the following picture.



5.4 CHANGING THE COOLING SET POINT



To assign a value lower than to 41 °F//5 °C, the minimum set point value must be changed. To do this contact the manufacturer.



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.

To change the set point of the outgoing water proceed as follows:

- Starting from the main screen press **SET** for 4 seconds and use the key to reach the **User** menu;
- Press **SET**, and use the key to reach the **SPC1** parameter;
- Press **SET** to change the value and use or keys to set it;
- To confirm press **SET**;
- To exit without saving press .

5.5 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 **SET** for 4 seconds and use the key to reach the **Stat** menu;
- Use or keys to scroll the list of status of main component and I/O;
- Press again until you return to the main screen.

The following values can be displayed:

Analog input	
1	Condensing pressure
2	Evaporating pressure
3	Evaporator inlet water temperature
4	Evaporator outlet water temperature
5	Condenser inlet water temperature
6	Condenser outlet water temperature
7	Compressor discharge temperature
8	Compressor suction temperature
9	Reverse phase sequence and compressor protection
Digital input	
1	ON-OFF unit
2	High pressure switch
3	Differential pressure switch
4	Thermal protection evaporator pump (optional)
5	Thermal protection evaporator pump (optional)
Analog output	
1	-----
2	-----
3	-----
4	-----
Digital output	
1	Compressor 1
2	Compressor 2
3	Evaporator pump (optional)
4	Condenser pump (optional)
5	General alarm
6	-----
7	-----


5.6 ALARMS

An alarm condition is signaled by the Alarm icon .


Some alarms must be rearmed manually while for others, the rearm is automatic or semi-automatic.




- **Manual rearm:** these alarms must be reset, which can only be done when the alarm condition no longer exists; only then can the machine resume operation;
- **Automatic rearm:** the alarm is automatically deactivated as soon as the alarm condition ceases and the machine restarts by itself. However, the signal (Alarm icon) remains on the display until the alarm code is displayed;
- **Semi-automatic rearm:** 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.

5.6.1 Displaying and resetting alarms

The Alarm icon  turns on to indicate an alarm.

To display the code of the alarm that intervened:

- Press the  key;

- Press **SET** at Alarm menu;
- Use  or  keys to scroll the list of active alarms;
- Press  again until you return to the main screen.

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 Calibration of the safety devices and type of rearm**).







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

5.6.2 Table of alarm codes

Code	Alarm description	Type of rearm
AL01	Water low temperature	Semiautomatic
AL02	Water high temperature	Semiautomatic
AL03	Water differential pressure switch	Manual
AL04	High pressure from pressure switch	Manual
AL06	High pressure from pressure transducer	Automatic
AL07	Low pressure from pressure transducer	Semiautomatic
AL08	Low pressure during compressor start	Automatic
AL09	Antifreeze	Semiautomatic
AL19	RTC alarm	Automatic
AC21	Thermal protection compressor circuit 1	Manual
AC26	Thermal protection pump 1 (optional)	Manual
AC27	Thermal protection pump 2 (optional)	Manual
AL11	High temperature refrigerant discharge	Automatic
AL13	Working limit	Automatic
AL15	I/O configuration alarm	Automatic
AL27	Reverse phase sequence	Manual
AC01	Compressor working hours limit	Automatic
AP01	Pump 1 working hours limit (optional)	Automatic
AP02	Pump 2 working hours limit (optional)	Automatic
ES01	Inlet water temperature (evaporator) probe	Automatic
ES02	Inlet water temperature (condenser) probe	Automatic
ES03	Outlet water temperature (evaporator) probe	Automatic
ES04	Outlet water temperature (condenser) probe	Automatic
ES10	Condensing pressure transducer	Automatic
ES11	Discharge temperature probe	Automatic
ES12	Suction temperature probe	Automatic
ES13	Evaporating pressure transducer	Automatic
ES15	Auxiliary probe 1	Automatic
ES16	Auxiliary probe 2	Automatic

5.6.3 Displaying alarm history

To display the alarm history:

- Press the  key;
- Press **SET** at Hi St menu;
- Use  or  keys to scroll the list of alarms;
- Press  again until you return to the main screen.

5.7 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.









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

5.8 PARAMETERS CHANGING




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

After contact our company, follow this procedure:

- Starting from the main screen press **SET** for 4 seconds;
- Use the  key to reach the **User** menu;
- Use  or  keys to scroll the list;
- Press **SET** to reach the label P0d1;
- Then press **SET** and insert using  or  keys the password¹;
- Press **SET** to confirm;
- The complete list of parameter will be available for change;
- Press  to return to the main screen.

5.9 SETTING THE DATE AND TIME

Follow this procedure:

- Starting from the main screen press **SET** for 4 seconds;
- Use the  key to reach the **rtc** menu;
- Press **SET** and using  or  keys insert the date;
- Press **SET** to confirm.

¹ Contact our company.

SAFETY DEVICES

MWC 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 transducer	Electronic controller
Low evaporation pressure	Low-pressure transducer	Compressor suction pipe
Low water flow-capacity	Water differential pressure switch	Plate heat exchanger
Low water temperature	Anti-freeze thermostat	Water exit from the plate heat exchanger
Frequent compressor start-ups	Anti-circulation timer	Electronic controller

When the safety devices reach their setting value, most of them 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 **5.6 Alarms**).

The following paragraph lists the characteristics of each safety device.

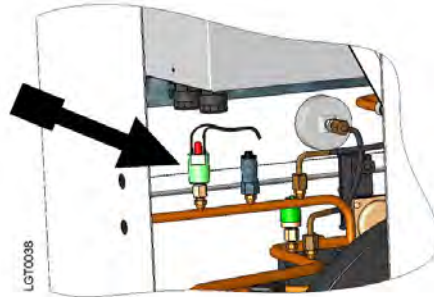
6.1 CALIBRATION OF THE SAFETY DEVICES AND TYPE OF REARM

Safety device	Intervention value	Reset value	Type of rearm
High-pressure pressure switch	41,5 barg// 602 psi	33 barg// 478 psi	Manual
High-pressure transducer	40 barg// 580 psi	35 barg// 508 barg	Automatic
Low-pressure pressure transducer	5,8 barg// 84,2 psi	7,3 barg// 106 psi	Semiautomatic
Water differential pressure switch	85mbar// 1,23 psi	105mbar// 1,52 psi	Manual
Anti-freeze thermostat	39,2°F// 4°C	46,4°F// 8°C	Semiautomatic
Anti-circulation timer*	5 min.	--	--

* This is a function of the electronic controller that prevents the compressor from stopping and starting too frequently: at least 5 minutes must elapse between the compressor's power up and the next.




6.2 REARMING THE 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 condensing 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 6.1).



High-pressure pressure switch

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

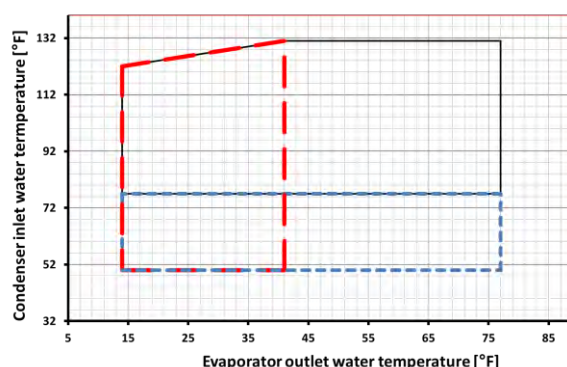
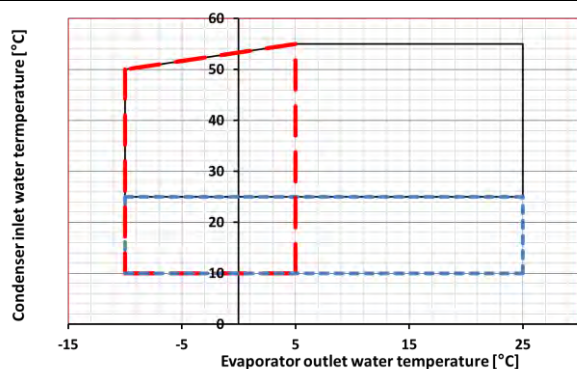
- A) Identify the cause of the rise in pressure (fans not working, condensing coil dirty or obstructed, obstacles to the flow of exiting air, operating temperature outside operating limits, etc. – also see Chapter *10 Troubleshooting*) and remove the cause, if possible;
- B) Wait until the high-pressure gauge 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  once;
- E) Press **SET** at Alarm menu;
- F) Use  or  keys to scroll the list of active alarms;
- G) Then press **SET** again and hold it down for at least 5 seconds.

OPERATING LIMITS

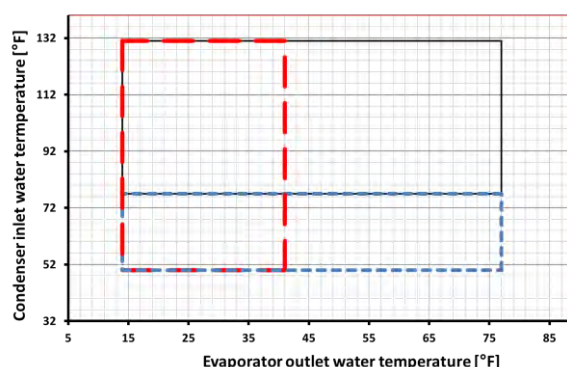
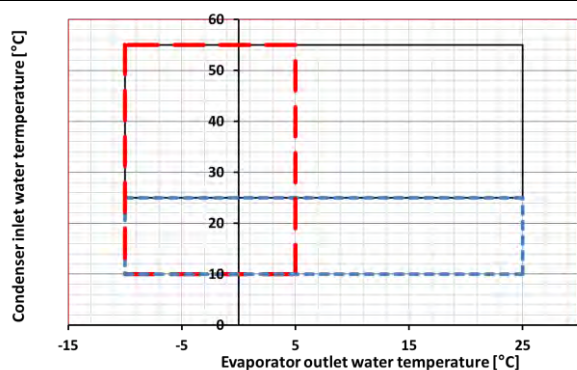
MWC series units feature broad operating limits in relation to the temperature of the outside air, thanks to the condensation control (also see paragraph 2.4); they are also prepared to produce water at low temperature: in this case, it is necessary to contact our company (see paragraph 5.7 *Low water temperatures (<32°F//0°C)*). The graphs show the continuous operating limits of MWC units in relation to the temperature of the water exiting the machine and the temperature of condensation.

- — — — — Operation with glycolate water – contact the company
- - - - - Operation with condensation control (optional)

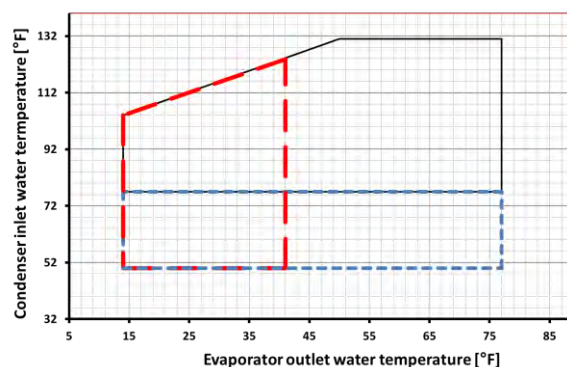
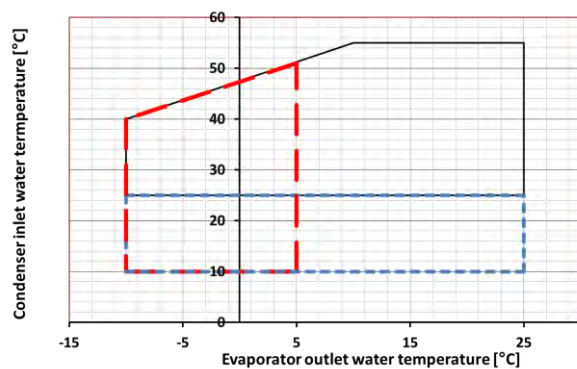
MWC041 50/60 Hz



MWC042 50/60 Hz



MWC042 575V/60Hz




Attention! The red dotted line indicates the need to use an ethylene glycol mixture and set adequate parameters in the electronic controller (see paragraph 5.7 *Low water temperatures (<32°F//0°C)*).

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 interval	Daily	User	
Check for the presence of any alarm signals	Daily		
Check the pressure of the water circuit with the pump stopped (verify that it is about 1 bar)	Monthly		
Check that the temperature of the water is compatible with the operating limits of the machine	Monthly		
Clean the water filter	Monthly ⁽¹⁾	Specialised personnel 	
Check pressure drop of condenser plates heat exchanger	Monthly		
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 overheating values are, respectively between 3 and 5 K and 5 and 7 K	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 plumbings and the machine to avoid the formation of ice during the winter ⁽²⁾	Extraordinary		User

- (1) We recommend an extraordinary cleaning of the filter after the machine has been operating for the first week.
- (2) 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 discharge pipe are hot. Be especially careful when working near them.








SEER - SEASONAL ENERGY EFFICIENCY RATING ACCORDING TO COMMISSION REGULATION (EU) 2016/2281





Only for units at 50Hz power supply.

400V/3Ph/50Hz		
Model MWC	041	042
SEER	6,36	6,76

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 
No consent from the water differential switch	AL03	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	AL09	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	ES03/ES04	Check contacts and replace, if necessary	Specialised personnel 
Entering water temperature probe defective	ES01/ES02	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 
Intervention of the phase-sequence relay	AL27	Reverse the two phases upstream from the cut-off switch of the unit's electrical panel (see paragraph 4.2)	Specialised personnel 

Cause	Alarm signal or symptom	Solution	Execution
2. (continue) The compressor doesn't start			
Magnetothermic protection of the compressors open (QC1)	AC21	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 
3. Intervention of the high-pressure pressure switch			
Condenser obstructed	AL04	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	AL04	If possible, restore conditions that are compatible with the operating limits.	User
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	AL03	Open the taps	User
Water circulation pump blocked or defective	AL03	Unlock or replace the pump	Specialised personnel 
Water pump stopped	AL03	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 transducer			
Refrigerant filter clogged or thermostatic valve stuck	Pipe downstream from the component covered with frost.	Check and replace	Specialised personnel 
Insufficient refrigerant charge	AL07	See point 8	

Cause	Alarm signal or symptom	Solution	Execution
6. 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 
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. The pump doesn't start magnetothermic protection of the pump open			
Excessive water flow-capacity; the pump is absorbing too much current	AC26/AC27	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.	AC26/AC27	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 
9. 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 available pressure.	Specialised personnel 

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	Steel, Copper
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	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.



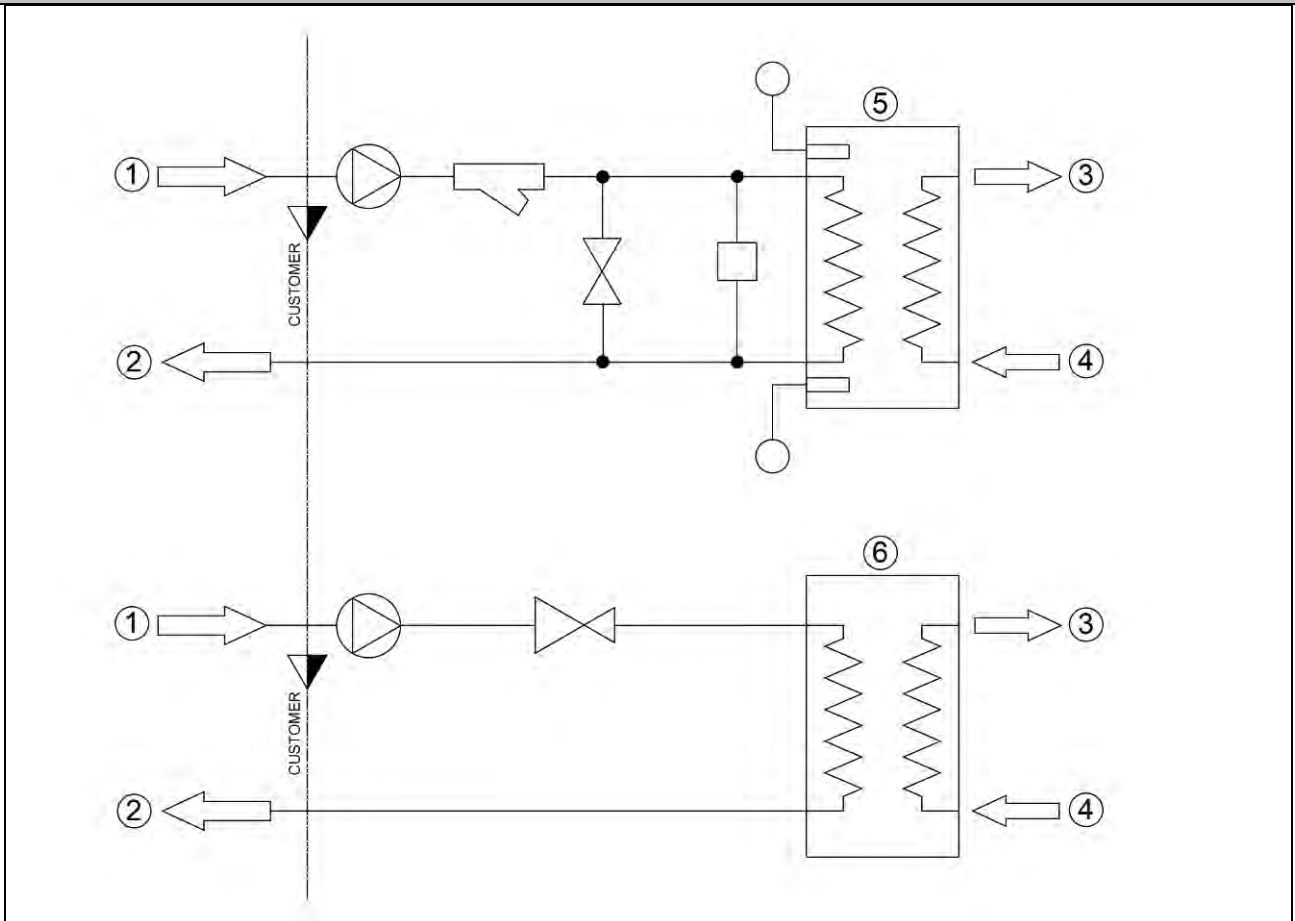
Dispose of refrigerant properly. Remove it from the chiller with suitable tools and deliver it to authorized collection centres that will treat it and make it reusable.

WATER DIAGRAMS

LEGEND

	SONDA DI TEMPERATURA TEMPERATURE PROBE		VALVOLA BYPASS ACQUA (opzionale) WATER BYPASS VALVE (optional)	①	INGRESSO ACQUA WATER INLET
	MANOMETRO GAUGE		PRESSOSTATO DIFFERENZIALE DIFFERENTIAL PRESSURE SWITCH	②	USCITA ACQUA WATER OUTLET
	FILTRO FILTER		POMPA (opzionale) PUMP (optional)	③	USCITA REFRIGERANTE REFRIGERANT OUTLET
	CONTROLLO DI CONDENSAZIONE (opzionale) CONDENSING CONTROL (optional)			④	INGRESSO REFRIGERANTE REFRIGERANT INLET
				⑤	EVAPORATORE EVAPORATOR
				⑥	CONDENSATORE CONDENSER

MWC

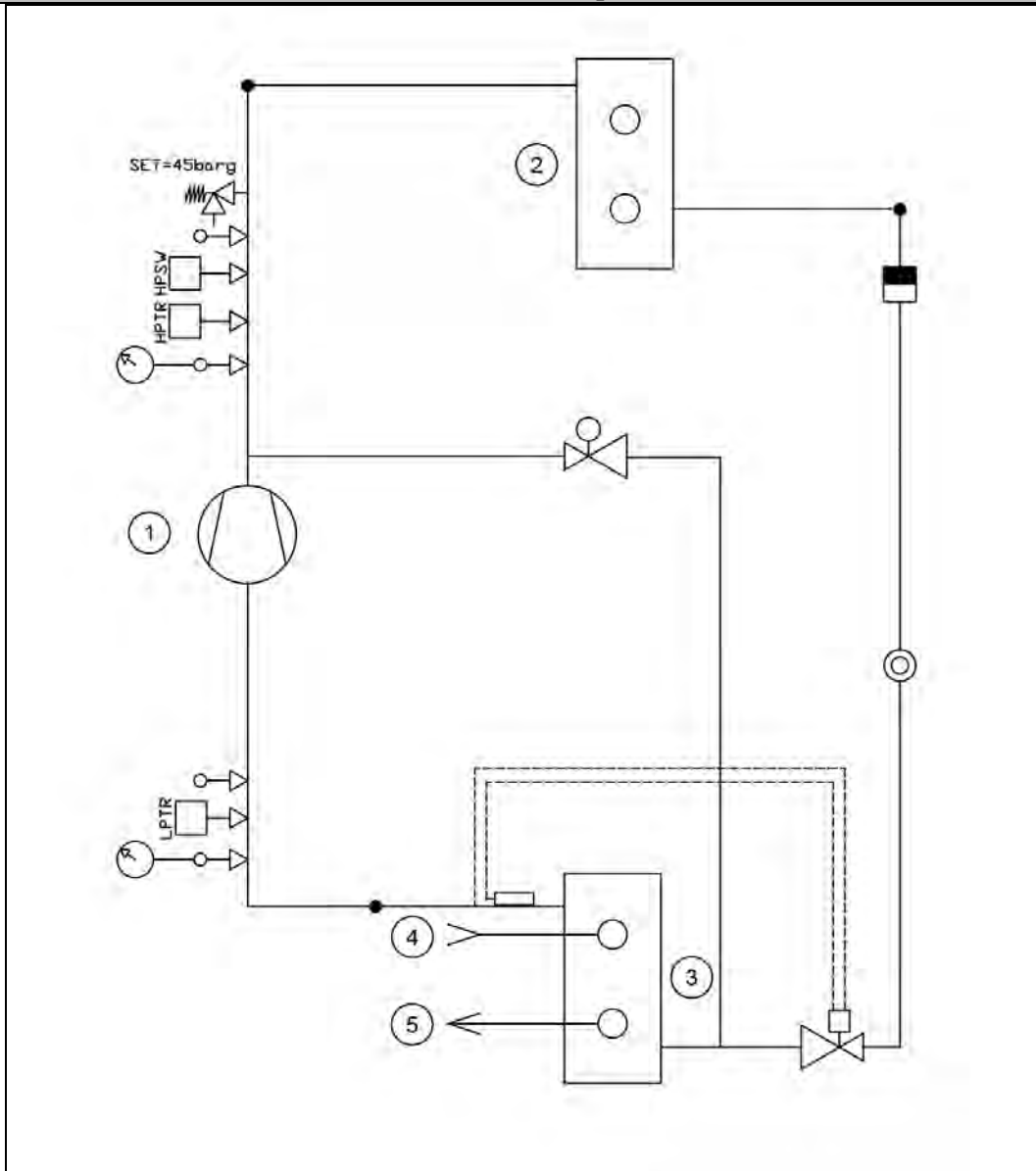


REFRIGERANT DIAGRAMS

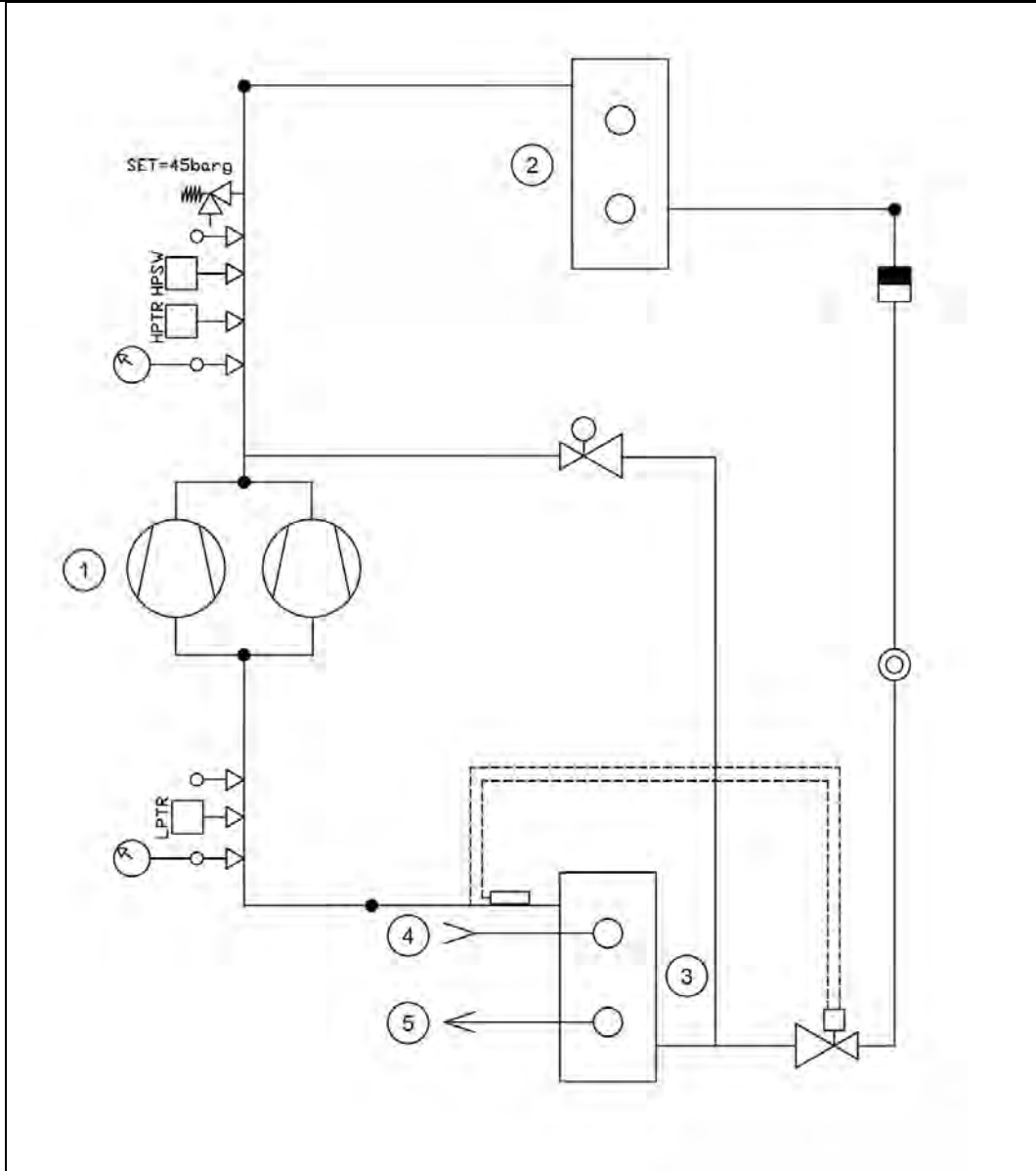
LEGEND

 LPTR	TRASDUTTORE DI BASSA PRESSIONE LOW PRESSURE TRANSDUCER		VALVOLA DI ESPANSIONE TERMOSTATICA THERMOSTATIC EXPANSION VALVE	 1	COMPRESSORE COMPRESSOR
 HPSW	PRESSOSTATO DI ALTA PRESSIONE HIGH PRESSURE SWITCH		VALVOLA SOLENOIDE SOLENOID VALVE	 2	CONDENSATORE CONDENSER
 HPTR	TRASDUTTORE DI ALTA PRESSIONE HIGH PRESSURE TRANSDUCER		FILTRO DEIDRATATORE FILTER DRYER	 3	EVAPORATORE EVAPORATOR
	VALVOLA BYPASS GAS CALDO (OPZ.) HOT GAS BYPASS VALVE (OPTIONAL)		VALVOLA DI SICUREZZA SAFETY VALVE	 4	INGRESSO ACQUA WATER INLET
	SPIA DI FLUSSO SIGHT GLASS		PRESA DI PRESSIONE PRESSURE PLUG	 5	USCITA ACQUA WATER OUTLET
					MANOMETRO GAUGE

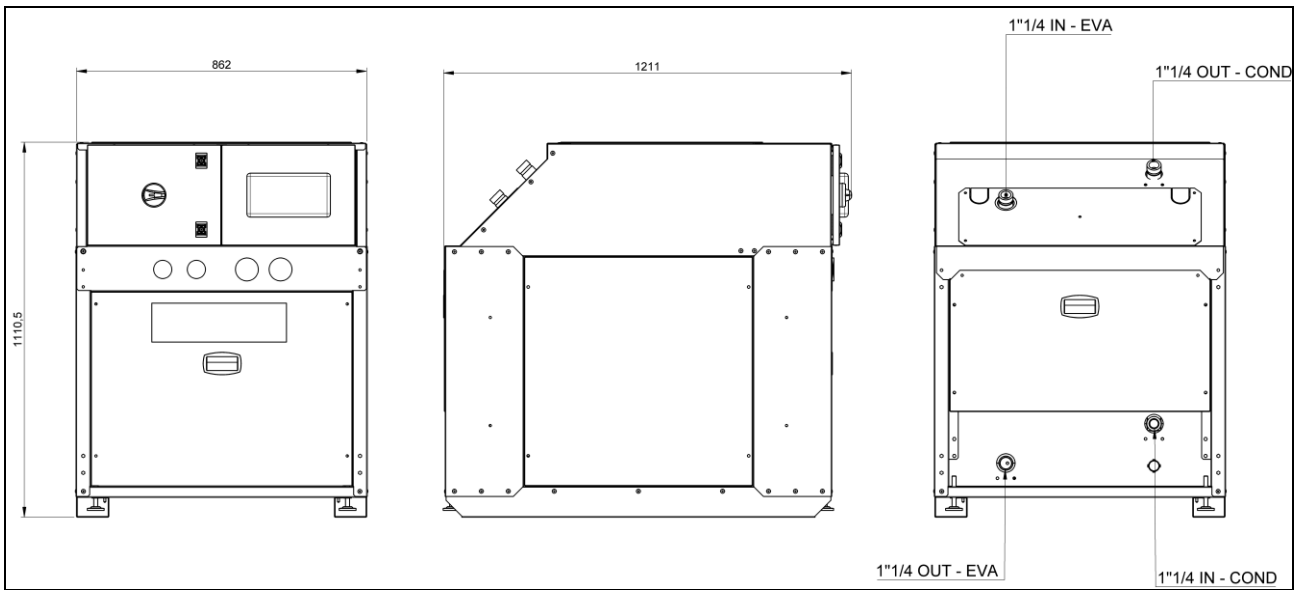
MWC – Monocompressor



MWC – Bicompessors



DIMENSIONAL DRAWINGS



ANNEX A – ELECTRONIC CONTROL MENU STRUCTURE

- LEVEL 0

USEr
Main
InSt
cOnS
StAt
rtc

- LEVEL 1 - USEr

USEr	MOdE
	SPC1
	SPH1
	SPb1
	SSb1
	dFrS
	PSd1

- LEVEL 1 - Main

Main	PU2	
	Func	PM00
		PM01
		PM02
		PM03
		PM04
		PM05
		PM06
		PM30
		PM31
		PM32
		PM33
		PM40
		PM41
	Manu	PM11
		PM12
		PM13
		PM21
		PM22
		PM23
		PMS1

		PM52
		PM53
		PM54
		PM61
		PM62
		PM63
		PM64
		PM99
	CAL	PM81
		PM82
		PM83
		PM84
		PM85
		PM86
		PM87
		PM88
		PM89
		PM90
		PM91
		PM92
		PM93
		PM94
		PM95
	I-O	d1
		A1
		A0
		d0

- LEVEL 1 – InSt

InSt	PU3	
	CoMP	PC28
		PC29
		PC56
	Reg	PC00
		pc02
		pc12
		pc14
		pc17
		pc18
		pc19
		PC20
		PC30
		PC31

		PC62
		PC63
		PC64
		PC65
		PC66
		PC7
		PC68
		PC69
	ScAN	PF01
	dEFr	Pd10
		Pd21
		Pd22
		Pd23
		Pd31
		Pd32
	PuMP	PP07
		PP11
		PP12
		PP13
		PP15
		PP16
		PP21
		PP31
		PP32
		PP33
		PP34
		PP35
		PP36
		PP37
		PP38
		PP39
		PP07
	A-LE	PL01
		PL02
		PL03
		PL04
		PL05
	AuX	Pr06
		Pr07
		Pr08
		Pr09
		Pr10
		Pr11
		Pr12

		Pr13
		Pr14
		Pr22
		Pr23
		Pr24
		Pr25
	AUH	PU01
		PU02
		PU03
		PU04
		PU05
		PU06
		PU07
		PU08
		PU21
		PU22
		PU23
		PU24
		PU25
		PU26
		PU27
		PU28
	Secu	PA01
		PA02
		PA03
		PA04
		PA05
		PA00
		PA01
		PA03
	Par	PH01
		PH02
		PH03
		PH04
		PH05
		PH06
		PH07
		PH11
		PH12
		PH13
		PH14
		MoE
	MAP	PU 4

- LEVEL 1 – cOnS

cOnS	PU 4	
	SE+G	PG00
		PG01
		PG02
		PG03
		PG04
	I O	HA01
		HA02
		HA03
		HA04
		HA05
		HA06
		HA07
		HA08
		HA09
		MarE
	CoMP	PC04
		PC05
		PC06
		PC07
		PC08
		PC09
		PC10
		PC54
		PC55
	rEG	PC15
		PC16
		PC21
		PC22
		PC23
		PC24
		PC34
		PC35
		PC36
		PC49
		MarE
	ScAN	PF02
		PF03
		PF10
		PF11
		PF12
		PF13

		PF14
		PF15
		PF21
		PF22
		PF23
		PF24
		PF25
		PF26
		PF27
		PF31
		PF32
		PF33
		PF34
		PF36
		PF37
		PF38
		PF39
		MoRE
	dEfr	Pd01
		Pd02
		Pd03
		Pd04
		Pd05
		Pd06
		Pd07
		Pd08
		Pd11
		Pd12
		Pd13
		Pd14
		Pd15
		Pd16
		Pd17
		Pd18
		Pd19
		Pd30
	PuMP	PP04
		PP05
		PP06
		PP09
		PP10
	R-LE	PL08
	RuX	Pr04
		Pr05

		Pr15
		Pr16
		Pr17
		Pr18
		Pr19
		Pr20
		Pr28
	SEcu	PA06
		PA07
		PA08
		PA09
		PA10
		PA11
		PA12
		PA19
		PA20
		PA21
		PA22
		PA23
		PA24
		P25
		PA26
		PA27
		PA28
		PA29
		PA30
		PA31
		MoE
	Par	PH31
	UPLU	PU01
		PU02
		PU03
		PU04
		PU05
		PU06
		PU07
		PU08
		PU09
		PU10
		PU11
		PU12
		PU13
		PU14
		PU15

		PU16
		PU17
		PU18
		PU19
		PU20
		PU21
		PU22
		PU23
		PU24
		PU25
		More

- LEVEL 1 – Stat

Stat	Unit
	tDF1
	dFr1
	Tleg
	SE+C
	Setb
	Setd
	CMP1
	CMP2
	CMP3
	InC1
	Fan
	InF1
	PMPU
	PMPS
	PMPP
	AUH1
	AUH2
	tin
	tEHt
	tout
	Pcon
	tCon
	PEVA
	Teva
	Tgas
	tsUC
	tCo1
	tCo2
	tSP1

	tSPo
	tSou
	tUP
	tDn
	AuH1
	AuH2



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