°LAUDA

ULTRACOOL
UC 8, UC 14, UC 24, UC 50, UC 65

DMI-0217-07
27/02/2020

WARNINGS

This Operation Manual is to be followed by all persons working with the unit. It is imperative that this Manual is made freely available at all times to service personnel and is kept at the point where the unit is installed.

The basic maintenance should be carried out by properly trained personnel and, if necessary, under the supervision of a person qualified for this job.

LAUDA Ultracool S.L. personnel, or personnel authorized by LAUDA Ultracool S.L., should carry out any work in the refrigerating or electric circuit during the warranty period. After the warranty period, the work must be carried out by qualified personnel.

Disposal of Waste Equipment by Users in Private Household in the European Union.

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

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Attention. Points of special interest to keep in mind.

1 INTRODUCTION

1.1 GENERAL NOTES

- This water chiller complies fully with CE.
- The Company does not accept responsibility if safety regulations are not met during handling, operation, maintenance and repair, even though these may not be strictly stated in this operation manual.
- We recommend the translation of this operation manual into the native language of foreign workers.
- The usability and life cycle of the water chiller as well as avoiding premature repairs depends on proper operation, maintenance, care and competent repair under consideration of this operation manual.
- We are constantly updating our products and are confident that they respond to the latest scientific and technological demands. However, as manufacturers, we do not always know the end use or the total range of our products' applications. Therefore we cannot accept liability for our products in applications where additional safety measures may be necessary. We highly recommend that users inform us of the intended application in order to undertake additional safety measures, if necessary.

1.2 SAFETY REGULATIONS

The operator has to observe the national working, operating and safety regulations. Also, existing internal factory regulations must be met.
Maintenance and repair work must only be carried out by specially trained personnel and, if necessary, under supervision of a person qualified for this work.

- Protective or safety devices must not be removed, modified or readjusted.
- During operation of the water chiller none of the protective or safety devices must be removed, modified or readjusted, temporarily or permanently.
- Only use correct tools for maintenance and repair work.
- Use original spare parts only.
- All maintenance and repair work must only be carried out to the machine once it has been stopped and disconnected from the power supply. Ensure that the water chiller cannot be switched on by mistake by unplugging it.
- Do not use flammable solvents for cleaning.
- Keep the surrounding area absolutely clean during maintenance and repair work. Keep free of dirt by covering the parts and free openings with clean cloth, paper or adhesive tape.
- Ensure that no tools, loose parts or similar are left inside the system.

2 INSTALLATION

2.1 RECEPTION AND INSPECTION

On receipt of the Ultracool unit, it must be inspected for damage during transport. In the case of any damage, external or internal, this cannot be referred to the manufacturer because all units are checked before dispatch. **If any damage is observed, this should be documented and reported to the forwarding company. The LAUDA Ultracool S.L. warranty does not include any damages incurred during transportation.**

The refrigerant circuit controls are set before shipment of the unit. They should not be re-adjusted under any circumstances (except by an authorized service agent). This would void the warranty of the unit.

2.2 TRANSPORTATION

Keep the unit upright at all times. Do not tilt when shipping or moving.

The Ultracool unit must be transported by pallet jack or forklift truck.

2.3 SITE

The Ultracool unit must be installed in an atmosphere where the range of temperatures is within the indicated margins mentioned in point 3.1. It is necessary to add ethylene glycol to the water of the circuit, as indicated in point 3.1.

The chiller must be installed on a solid level surface that is capable of supporting a minimum of 300kg (660 lb) for UC 8 to 24 models and 650kg (1430 lb) for UC 50 and 65 models. The floor must not have any slope.

If the chiller has wheels, make sure to activate their brakes once the unit is in place to prevent it from moving.
Do not place heavy objects on top of the chiller.

We recommend the installation of the Ultracool unit in a well-ventilated site and in a corrosive-free, dust-free atmosphere.

In the case of outdoor installation, it is recommended to protect the Ultracool unit from rain with a roof.

Leave a space of 1m (40") around the chiller for UC 8 to 24 models and 2m (80") for the UC 50 and 65 models. This space is important to facilitate maintenance work and cleaning, especially in front of the condenser (the heat exchanger on the left side).

If necessary, the unit can be installed without any free space on the right and back sides. In this case, foresee that the unit can be moved forwards to free the access panels when there are maintenance works to be carried out.

The inlet of fresh air onto the condenser should be in the most direct way possible, avoiding any chance of air recycling (the ceiling above should not be at less than 1m (40") for UC 8 to 24 models and 2m (80") for the UC 50 and 65 models.

In case of installation in a small room it is imperative that the room has an appropriate ventilation system to evacuate all the heat generated by the chiller as explained before on this same point. If the heat is not removed the temperature in the room will quickly increase beyond the operating limits of the unit and it will stop by high pressure alarm (see point 3.1).

The Ultracool units must always operate with the panels closed to enable the inlet of fresh air only through the condenser.

2.4 IDENTIFICATION LABELS ON THE ULTRACOOL UNIT

You can find the following labels on the Ultracool unit:

Water inlet from the installation to the UC unit

Water outlet from the UC unit to the installation

Drain

Danger, risk of electric shock

Danger, hot surface

2.5 WATER CONNECTION

Leave at least **1.5 meters (5 feet) of flexible pipe** right after the chiller's inlet and outlet connection. This will allow moving the chiller for a better maintenance access without dismantling the water pipes.

The chiller should be located as close as possible to the application. Pressure drop in the pipe should not exceed 0.7 bar. The water lines must be in pipes of at least 1" for UC 8 to 24 models and 1 ½" for UC 50 and 65 models.

Minimize the number of bends in the water lines. The length of hose, number of fittings, valves, etc. will also cause an increase of the pressure drop.

Always install thermal insulation for all pipes or, at least, make sure that the pipes are opaque to the light.

When possible, install the water lines at the same level as the chiller until reaching the application The height difference between the chiller and the application should never exceed 10m (33 feet). **In the installations in which the water level of the circuit exceeds the maximum level of the tank inside the Ultracool unit, it will be necessary to install a check valve in the water outlet of the Ultracool unit and a solenoid valve in the water inlet.** The power supply of this solenoid valve will be carried out by terminals 25 and 26 designed for that purpose, see point 2.6.

To prevent rusting of the water pipes, we recommend plastic, rubber or stainless steel pipes and brass fittings.

Where flexible tubing is used, it should be of reinforced construction and rated for a minimum working pressure of 6 bar g (90 psig) within -15°C and 40°C (5°F and 104°F).

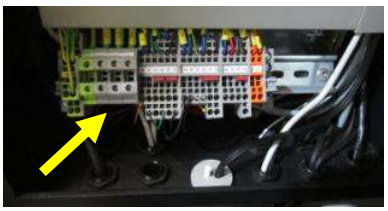
2.6 ELECTRICAL CONNECTION

Operating voltage 400VAC +/-10%, 50Hz, 3 Ph or 460VAC +/-10%, 60Hz, 3 Ph. In terms of Electromagnetic emissions and immunity, this unit is intended for installation in an industrial environment.

Make sure that the supply voltage does not exceed a maximum variation of 10% referring to nominal.

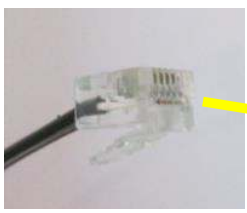
This unit integrates a frequency inverter with a leakage current that exceeds 3,5 mA. On installations where a Residual Current Device (RCD) is used for extra protection, use only an RCD of Type B (time delayed). The use of RCDs must always follow national and local regulations.

Introduce the main power supply cable through the cable gland located on the base of the chiller and connect it to the incoming power terminals which are located on the left side of the X1 terminal block inside the electrical box of the chiller:



For the electrical supply of the Ultracool unit, use an appropriate electrical line according to the data in the characteristics plate.

Take the cable for the external controller display out of the chiller through the brush gland on the base of the chiller and connect it to the back of the display.



Note: The external controller display has no IP protection; make sure it is installed on a location protected from the weather, from dust and from any water splashes.
If the chiller is controlled remotely, it is also possible to remove the display after the initial configuration and store it in a safe location, as the chiller does not need it to operate. In such a case the end connector of the display's cable also needs to remain protected from the elements, for example keeping it inside the electrical box of the chiller.

Ethernet cable connection, if the chiller is connected to a local network via Ethernet or to a Cloud gateway: Introduce the Ethernet cable through the brush gland on the base of the chiller and into the electrical box through the rubber cable holder, then connect it to the Ethernet connector on the right side of the electrical box:





The chiller also has some special terminals prepared for the following functions (introduce the required cables also through the brush gland on the base of the chiller):

Terminals 23 and 24, remote On/Off operation: This chiller can be turned On and Off automatically by an external signal. This remote On/Off signal is transmitted to these terminals by a dry contact in the application (open contact = chiller Off, closed contact= chiller On).
Note: The chiller will not turn On unless these terminals are bridged. Once the commissioning operation is complete, if the remote On/Off function described above is not used, connect the supplied wire bridge between terminals 23 and 24 to be able to turn the chiller On from the display.

Terminals 25 and 26, external solenoid valve connection: They can be used to supply a solenoid valve with 30VDC (the maximum power available for the solenoid valve is 25W). If the pipes of the application are installed above the level of the chiller's tank, this valve prevents backflow when the chiller is stopped. These terminals are only at 30VDC when the water pump is working.

Terminals 57 and 61, external alarm report signal: These terminals provide a dry contact to report a general alarm of the chiller. By default this contact closes when there is an active alarm. If necessary, an authorised technical service can invert this logic so that the contact remains closed during normal operation and opens when there is an alarm.

A system of fuses or circuit breakers must be installed before the power inlet connection to the Ultracool unit. The maximum size of these protections is defined in the Ultracool characteristics plate.

3 STARTUP

3.1 OPERATING CONDITIONS

Water temperature at the inlet:

Nominal:	15°C (59°F)
Maximum:	40°C (104°F) (1)

Cold water temperature at the outlet:

Nominal:	10°C (50°F)
Minimum:	7°C (45°F) (2)
Maximum:	35°C (95°F)

Temperature of the ambient air:

Nominal:	25°C (77°F)
Minimum:	-15°C (5°F) (3)
Maximum:	50°C (122°F)

Observe the permissible storage and operating temperatures. See point 7.1 for storage temperature limits.

(1) If the temperature difference between inlet and outlet is higher than 10°C (18°F) or if the inlet temperature will exceed 40°C (104°F), the external by-pass accessory should be installed. This typically happens with applications that use a water flow significantly lower than the chiller's nominal flow.
The external by-pass option allows the chiller to work with close to its nominal flow even if the application is only using part of that flow.
Please note that a flow lower than the chiller's nominal flow can affect negatively the outlet temperature stability.

(2) The Ultracool units can work with cold water temperatures lower than 7°C (45°F). To do so, add ethylene glycol to the water and contact an authorized technical service to adjust the chiller.

(3) In order to work at temperatures lower than 0°C (32°F), add ethylene glycol to the water and contact an authorized technical service to adjust the chiller.

Only an authorized technical service can adjust the antifreeze set point. The following table shows the ethylene glycol concentration and the antifreeze adjustment required:

Glycol concentration (4) and antifreeze adjustment		Min Ambient Temperature		
		0°C or more	Less than 0°C until -5°C	Less than -5°C until -15°C
Cold Water Set Point	7°C or more	0% 0°C	15% -5°C	30% -15°C
	Less than 7°C until 5°C	15% -5°C	15% -5°C	30% -15°C
	Less than 5°C until 0°C	30% -15°C	30% -15°C	30% -15°C
	Less than 0°C until -5°C	30% -15°C	30% -15°C	30% -15°C
	Less than -5°C until -10°C	40% -20°C	40% -20°C	40% -20°C

Glycol concentration (4) and antifreeze adjustment		Min Ambient Temperature		
		32°F or more	Less than 32°F until 23°F	Less than 23°F until 5°F
Cold Water Set Point	45°F or more	0% 32°F	15% 23°F	30% 5°F
	Less than 45°F until 41°F	15% 23°F	15% 23°F	30% 5°F
	Less than 41°F until 32°F	30% 5°F	30% 5°F	30% 5°F
	Less than 32°F until 23°F	30% 5°F	30% 5°F	30% 5°F
	Less than 23°F until 14°F	40% -4°F	40% -4°F	40% -4°F

(4) The ethylene glycol percentage is given as % measured as weight of the total mixture. In case of any modification in the quantity of water in the installation, the concentration of ethylene glycol should be checked.

If more volume is required it is necessary to keep the ethylene glycol concentration

Do not use automotive antifreeze. Use lab grade ethylene glycol only! Do not use an ethylene glycol concentration above 40%; this would damage the water pump.

3.2 CHILLER STARTUP

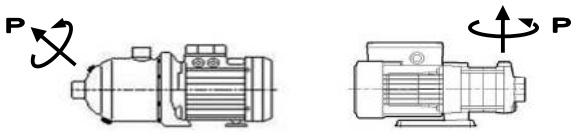
Clean the application water circuit with tap water in order to be sure that there are no free particles. Otherwise the filter element can block up during the startup process.

Turn Off the Main power switch (to avoid any possibility of unexpected startup of the equipment during this operation). Open the lateral panel, open the tank cover and fill the tank **with water of the required quality**

(see annex 9.1), the suitable glycol concentration and the Refrifluid B additive according to **point 3.1** of this manual. Fill it directly to the tank until the maximum level of the tank is reached. On UC 50 and UC 65 models, lift the level switch manually to make sure it resets itself: when it resets you will hear its contact "click".

While filling the tank, make sure no water splashes onto any electrical components. Keep the cover of the electrical box closed during the filling procedure.

Prime the pump in order to release any air inside:
Remove the priming plug (P, see diagram below).
Keep the priming plug open until only liquid runs out the priming plug.
Replace the priming plug and tighten securely.



Do not start the Ultracool unit until the pump has been properly vented.

Open the water inlet valve completely and close the outlet water valve completely as shown on the following pictures:

Make sure that the external fuses are installed, see point 2.6.

Switch OFF the main power switch during any electrical intervention.

Connect the Remote ON/OFF control in terminals 23 and 24. If you do not use a remote control, connect the wire-bridge supplied inside the electrical box to link terminals 23 and 24.

Close both access panels. Switch ON the general switch and, if remote On/Off is used, give a remote On signal. Finally switch the chiller On from the controller display (see point 4.2) and **the unit will start up**.

Check that the working pressure of the pump is higher than the nominal pressure indicated on the characteristics plate. If it is below this value, the pump is turning in the wrong direction. If this happens **switch OFF the main power switch, disconnect the chiller from the power supply** and exchange two phases in the main power supply.

Increase the cold water setpoint up to the maximum allowed value (see point 3.1) to prevent the compressor from starting. Switch the main power switch OFF and then back ON. Open the right panel and adjust the water outlet valve so that the pump works at the nominal pressure indicated in the chiller's data
plate. You can see the pump pressure on the "Info – Process circuit" screen from the Information screens loop on the controller display (see point 4.2).

If the water tank temperature is above the programmed setpoint, the compressor will start roughly 2 minutes after switching the main power switch ON. If this happens switch the main power switch OFF and perform the operation again within 2 minutes. If the compressor works with the lateral panel open the chiller could trip by high pressure alarm, see point 6.

After 5 minutes, or when the unit stops by low water level alarm, turn the main power switch OFF, open the lateral panel and check the level in the tank. If the level is below the maximum refill the water tank until the maximum level.
Repeat this operation until water level in the tank remains constant.

When refilling the tank respect the ethylene glycol concentration as per point 3.1.

Select the desired temperature of the cold water outlet (see point 4.3). The Ultracool units are delivered with a pre-set temperature of 10°C (50°F).

Check the working pressure of the water pump, if it is higher than the nominal value indicated in the characteristics plate and all manual valves in the circuit are fully open, then check that the water pipes meet the requirements on point 2.5.

Please note that, under normal operation, the refrigerant compressor and some copper pipes can reach temperatures above 100°C (212°F).
Be careful not to touch these elements shortly after turning Off the chiller; allow enough time for the components inside to cool down before opening the access panels.

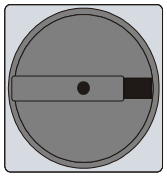
4 CHILLER CONTROLS

4.1 CONTROL AND MONITORING ELEMENTS

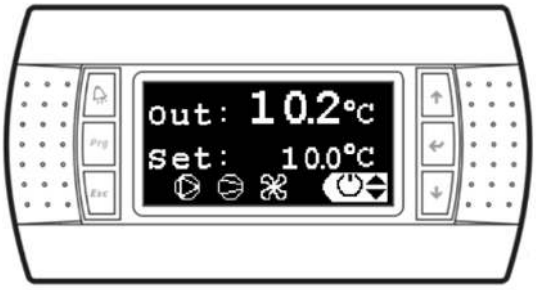
Status LED

Warning/Alarm LED

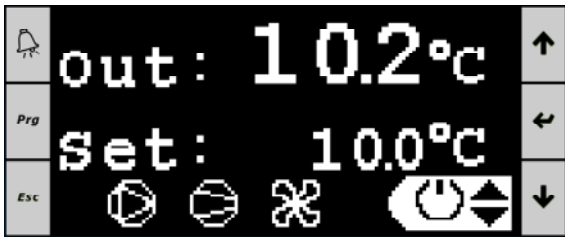
Main Power Switch



External controller display



Webserver controller display



The following elements allow controlling the chiller and monitoring its status:

1. Status LED: It blinks when the unit is turned Off and is waiting for an On signal. It is lit steadily when the unit is turned On.

2. Warning/Alarm LED: It blinks when a Warning is active, the chiller is still running. It is lit steadily when an Alarm is active; either the refrigerant circuit or the complete unit is stopped. See point 6 for troubleshooting.

3. Main power switch: Located on the right side of the chiller. It connects and disconnects the Ultracool unit from the power supply.

4. Controller display: It shows all information on the operation of the chiller and allows controlling it. It can be accessed either from the external display connected to the chiller or from any computer connected to the same Ethernet network as the chiller by accessing its webserver from a web browser.

To access the webserver, the chiller must be connected to the network with an Ethernet cable, see point 2.6.

4.2 UC CONTROLLER

Controller buttons:

Alarm button: Displays the list of active alarms. It's also used to manually reset alarms

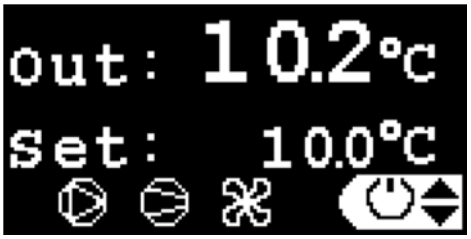
Prg button: Used to access the configuration menu (for authorized service only)

Esc button: Return to the main screen

Up – Down buttons: Navigate between the display screens or increase/decrease the value of a selected parameter

Enter button: Used to enter a subscreen/menu from the main screen or to switch between screen navigation and the different parameters that can be modified on a particular screen

Main screen:



The main screen shows the current outlet temperature, the current setpoint and it shows which motors in the chiller are currently running.
The motor symbols are, from left to right, the water pump, the refrigerant compressor and the motor fan.
If a motor is running, its symbol is lit and if it is stopped, its symbol is not shown. A blinking symbol means that an Off signal has been received, but the motor is still running and it will turn Off shortly, it is being delayed by an internal minimum running time timer in the chiller's software.

From the main screen it's also possible to access the On/Off screen, the setpoint screens and the information screens loop. Use the **Up**/**Down** buttons to select the desired subscreen/menu and press **Enter** to access it:

On/Off screen Set Setpoint Information screens loop

Pressing **Esc** from any screen goes back to this main screen.

4.3 OPERATION

Remote On/Off and On/Off from the display: The unit will only turn On when it receives **both** an On signal from its remote On/Off contacts (circuit closed between terminals 23 and 24, see point 2.6) and it **also** receives an On command from the display. In the same way, the unit will turn Off either when the circuit between terminals 23 and 24 is open or when an Off command is issued from the display.
On/Off memory: Bear in mind that, when the Main Power Switch is turned On, the controller comes back to the last mode/status ("On" or "Off") as it was when the Main Power Switch was last as powered off.
This means that, if the chiller was running when the Main Power Switch was turned Off, it will start suddenly next time it is switched back On.

On/Off from the display: As long as the remote On/Off is connected, the chiller can be turned On and Off from the display (either the remote display connected to the chiller or the webserver on a connected computer).
In order to start/stop the chiller from the display, go to the On/Off screen (see point 4.2), and use the Up/Down buttons to toggle between On and Off.

Setting the temperature: The required outlet temperature can be set between -10°C (14°F) and 35°C (95°F) from the display (either the remote display connected to the chiller or the webserver on a connected computer).
In order to set the temperature, go to the Setpoint screens (see point 4.2), press Enter to highlight the current set value, use the Up/Down buttons to change the value and press Enter again to confirm the new value.

Information screens loop: This is a series of information screens that can be accessed from the controller display (see point 4.2). They contain information on the operation of the chiller. Use the Up/Down buttons to navigate the different screens. Information on the pump pressure and water filter pressure drop can be found within this loop, on the "Info – Plant" screens.
The last screens in this loop give access to change the language, the units of measure and the time and date used by the controller.

Refrigerant compressor control and temperature stability: The chiller relies in its ability to adjust the compressor speed to match the cooling capacity required by the application to maintain a high water outlet temperature stability.
Please note that the compressor has a minimum speed ranging from 15% to 25% depending on the chiller model and specific working conditions.
When the heat load from the application is lower than the minimum capacity of the compressor, the compressor will stop automatically. The compressor restarts once the temperature increases enough, as long as a minimum compressor Off time has elapsed.
In this kind of situation the outlet temperature stability can be worse than +/- 0.5 K.

4.4 PREHEATING FUNCTION

The chiller controller integrates an automated preheating system that can turn on the water pump when the temperature in the water circuit drops below a specified setpoint. The heat introduced by the pump operation maintains the water in the tank and also in the rest of the circuit at the preset temperature. This system will operate as long as the general switch is turned On by turning the water pump On and Off when necessary.

By default this system is disabled, as it has a factory setting of -15°C (5°F).

Setting the preheating temperature: The required preheating temperature can be set between -15°C (5°F) and 35°C (95°F) from the display (either the remote display connected to the chiller or the webserver on a connected computer).
In order to set the temperature, go to the Setpoint screens (see point 4.2), press Down to access the Preheating set screen, press Enter to highlight the current set value, use the Up/Down buttons to change the value and press Enter again to confirm the new value.

Please note that the heat generated by the pump is limited and, depending on the thermal losses in the whole water circuit, it's possible that the temperature cannot reach the preheating setpoint even with the pump running all the time.
It is strongly recommended that all water pipes are properly insulated to minimize the thermal losses.

While the chiller is turned Off but the pump is On because of the preheating system, the pump icon will remain lit, with the letters "PH" blinking besides it:

To disable the preheating system, leave it set at the minimum possible value (-15°C, 5°F).

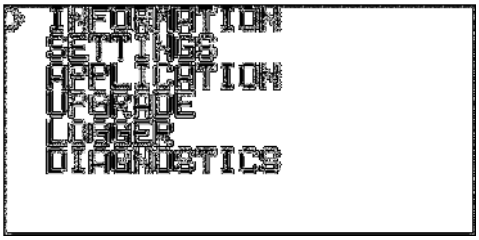
The fastest way to stop the pump in case of emergency (for example if there's a major water leak), is to turn Off the Main Power Switch.

4.5 ETHERNET CONFIGURATION

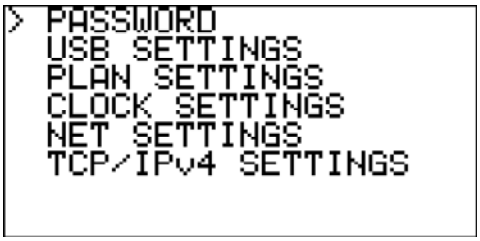
The chiller can be remotely monitored and operated through any PC connected to the same network where the chiller is connected via Ethernet.

To be able to access the chiller remotely it is first necessary to configure its IP address. Follow these steps on the external controller display to do so:

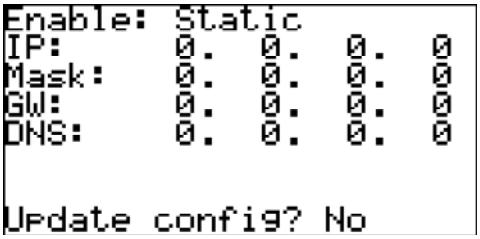
1. Press the **Alarm** and the **Enter** buttons for a few seconds, until the display changes to the following screen:



2. Use the **Down** button to select "SETTINGS" and press **Enter** to access the Settings menu:



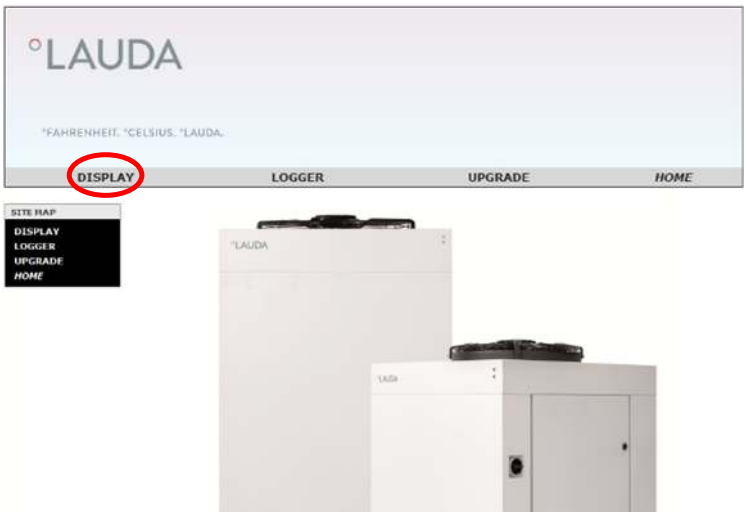
3. Use the **Down** button to select "TCP/IPv4 SETTINGS" and press **Enter** to access the IP Configuration screen:



4. In this screen, use the **Enter** button to move to the next field and **Up** and **Down** to change the values. Check with your IT team which values are correct for your local network.
   Once done, select the "Update config?" field, change it to Yes with the **Up** button and confirm with **Enter**. This will save all the new values.

Note: If no button is pressed during 30 seconds, the controller discards any changes that have not been saved and goes back to the Main screen.

Once done, it will be possible to access the webserver of the chiller from a web browser on any PC connected to the same network as the chiller. To do so, just introduce the IP number of the chiller on the navigation bar of the web browser and select the Display option from the home page.



5 MAINTENANCE

5.1 BASIC MAINTENANCE

Weekly:

Verify that the water temperature indicated on the controller display is approximately at the setpoint.

Verify the water level in the tank.

Verify the pressure drop of the water filter (on the "Info – Process circuit" screen of the Information screens loop, see point 4.3). If the pressure drop exceeds 1.5 bar (22 psi) change the filter element.

Monthly:

With the Unit disconnected (Main power switch Off), clean the condenser removing dust/dirt with a soft brush and/or vacuum clean the surface from the outside.

Do not use any detergents to clean the condenser.

Clean the housing, internally and externally, eliminating the dust present especially on the water pump rack.

Yearly:

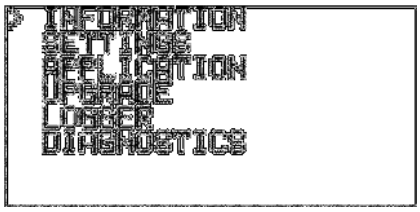
Change the filter element and refill the circuit with water of the required quality (see annex 9.1), the suitable glycol concentration according to point 3.1 and the required volume of Refrifluid B additive (2 liters per each 100 liters of water tank volume).

6 TROUBLESHOOTING

6.1 SAVING A LOG FILE IN CASE OF ALARM

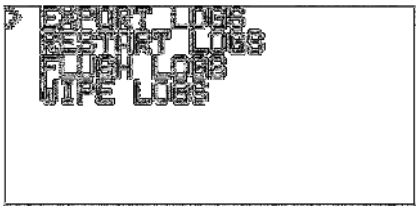
The chiller has a built in a log function that continually records data from the last 36 hours of operation (older data is automatically overwritten).
If an alarm triggers and it's not possible to restore the chiller by following the indications on this chapter, then follow these steps to save a copy of the stored logs shortly after the alarm has triggered. The information contained in the log file with the operation data of the hours preceding the alarm can greatly help the service engineers to diagnose the problem and solve it faster.

1. Press the **Alarm** and the **Enter** buttons for a few seconds, until the display changes to the following screen:

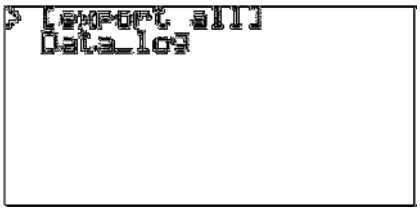


If accessing through the webserver, it's also possible to reach this menu by first clicking on the  icon and then clicking the **Alarm** and **Enter** icons.

2. Use the **Down** button to select "LOGGER" and press **Enter** to access the Logger menu:



3. Press **Enter** to access the Export Logs screen:



4. In this screen, press the **Enter** button to export all data logs. Once the process starts, press the **Esc** button several times to go back to the Main screen.

When the service engineer is on site with the chiller they will be able to retrieve the saved log file for analysis. Please note that if this process is repeated at a later time, the saved log file will be overwritten, which could cause the relevant data to diagnose the alarm to be lost.

6.2 ALARMS AND WARNINGS LIST

See the following table for the main possible causes for an alarm or warning and their solution:

FAULT	CAUSE	SOLUTION	RESTART PROCEDURE
HP alarm by pressure switch **Alarm due to high pressure of the refrigerant:** The pressure of the fridge circuit is higher than the maximum allowed. It stops the compressor	Lateral panels of the housing open	Close the panels	Disconnect the chiller by turning Off the main power switch (see point 4.1). Turn it back On after at least 30 seconds have passed
	Low airflow into the condenser	Check that there is enough free space in front of the condenser and clean the condenser if necessary	
	The ambient temperature is too high	Wait until the ambient temperature is lower	
	Motor fan not working	The motor fan is not working if it is not turning when the chiller is running and then tripping by this alarm. **Contact authorized technical service**	
	High pressure switch failure	**Contact authorized technical service**	
Alarm freeze evaporating temp. **Alarm due to low evaporating temperature:** The evaporation temperature is too low and there is risk of freezing. It stops the compressor if it happens 3 times in a short period	Water circuit blocked	Clean the water circuit. If necessary replace the water filter element. Check for closed valves in the circuit	Disconnect the chiller by turning Off the main power switch (see point 4.1). Turn it back On after at least 30 seconds have passed
	Possible freezing due to low ambient temperature	The ethylene glycol concentration must be according to point 3.1 and the antifreeze setpoint also has to be adjusted accordingly. **Contact authorized technical service**	
	Water tank temperature sensor fault	Measure the water temperature inside the tank and check that it is approximately the same as shown on the controller's display. If it isn't **contact authorized technical service**	

FAULT	CAUSE	SOLUTION	RESTART PROCEDURE
Compressor 1 overload alarm It stops the compressor	Excess current	Check if the electrical connections are correct. Check supply voltage and power surges	Disconnect the chiller by turning Off the main power switch (see point 4.1). Open the electrical box (accessible through the right panel of the chiller) and reset the Q1 circuit breaker. Turn the Main power switch back On
Circuit 1 Power+ offline or **Alarm Offline Drive** It stops the compressor	Q1 circuit breaker tripped	Check if the electrical connections are correct. Check supply voltage and power surges	Disconnect the chiller by turning Off the main power switch (see point 4.1). Open the electrical box (accessible through the right panel of the chiller) and reset the Q1 circuit breaker. Turn the Main power switch back On
	Compressor drive faulty	**Contact authorized technical service**	
Tank level alarm It stops the whole unit	Level switch did not switch to the "full" position	Check that the level switch works properly and that the tank is full enough. After disconnecting the Main Power switch open the right panel, open the water tank to check the water level. UC 50 and 65 only: Lift the level switch manually. If it works correctly you should hear its contact "click". Close the tank and the panel and try to start the unit again	Disconnect the chiller by turning Off the main power switch (see point 4.1). Turn it back On after at least 30 seconds have passed
	Water leak in the internal circuit of the UC	**Contact authorized technical service**	
	Water leak in the external water circuit	Find the leak and get it repaired	
	Water leak in the water pump	**Contact authorized technical service** to replace the water pump. Check that the water quality is inside the limits (see point 9.1)	

FAULT	CAUSE	SOLUTION	RESTART PROCEDURE
or **Pump overload** It stops the whole unit	Circuit breaker Q2 has tripped	Check if the electrical connections are correct. Check voltages, intensities and variations. Check water pressure. Check water quality. Check if the pump is blocked	Disconnect the chiller by turning Off the main power switch (see point 4.1). Open the electrical box (accessible through the right panel of the chiller) and reset the Q2 circuit breaker. Turn the Main power switch back On
or **Phase sequence** It stops the whole unit	Wrong phase sequence at the main power supply	Switch OFF the main power switch, disconnect the chiller from the power supply and exchange two phases in the main power supply	Once the phase sequence is correct the chiller will work normally automatically
Offline EBM 1 It stops the compressor	Q3 circuit breaker tripped	Check if the electrical connections are correct. Check supply voltage and power surges	Disconnect the chiller by turning Off the main power switch (see point 4.1). Open the electrical box (accessible through the right panel of the chiller) and reset the Q3 circuit breaker. Turn the Main power switch back On
	Motor fan faulty	**Contact authorized technical service**	
Chilled water high temperature	The water tank temperature has been more than 5°C (9°F) above the programmed setpoint for some minutes	Check the cold water set point is within the limits indicated on point 3.1, the ethylene glycol proportion is correct and the antifreeze protection is set accordingly. Stop the application so that it does not generate heat and let the chiller without load for some minutes. If the problem persists **contact authorized technical service**	It's a warning only; the chiller is still working normally
High water temperature Safety Alarm It stops the whole unit	The water inlet temperature or water tank temperature has exceeded 45°C (113°F)	Wait until the temperature decreases or change the water in the circuit and restart the unit	Once all water temperatures are below 45°C, disconnect the chiller by turning Off the main power switch (see point 4.1). Turn it back On after at least 30 seconds have passed

FAULT	CAUSE	SOLUTION	RESTART PROCEDURE
Discharge pressure probe error AND **Suction pressure probe error** It stops the compressor	Major refrigerant leak, the unit has lost all of its refrigerant gas Faulty pressure probes	**Contact authorized technical service** **Contact authorized technical service**	The chiller can be restarted after it is repaired
Various temperature/pressure/flow probe errors Depending on the probe, the unit may keep running or it may stop working	A probe is damaged or not reading correctly	Check that the electrical connections are tight. If the problem persists **contact authorized technical service**	The chiller can be restarted when the faulty probe is replaced
The external controller display shows the message „NO LINK“ or „I/O board 01 fault” or it doesn’t lit up at all The chiller keeps running and still responds to commands received through its digital inputs and to remote control through Ethernet	External controller display cable damaged or loose connections External controller display damaged	Check that the cable connections are tight at both ends and examine the total length of the cable for any damages. If the cable is damaged **contact authorized technical service** to replace it **Contact authorized technical service**	The chiller is still running normally and it accepts On/Off commands through the 23/24 digital input. Other settings and information functions are still available through the Ethernet connection
Maintenance request	The chiller has exceeded the working hours defined between preventive maintenances	Contact authorised technical service for a preventive maintenance of the unit	It's a warning only; the chiller is still working normally. The authorised technical service will reset the warning during the preventive maintenance

7 TECHNICAL FEATURES

7.1 TECHNICAL FEATURES

UC			UC 8	UC 14	UC 24	UC 50	UC 65
Cooling capacity		kcal/h	8811	13565	20859	44025	57512
		kW	10,2	15,8	24,3	51,2	66,9
Water flow		l/min	26,6	43,8	84,1	150	196
Water pressure		bar (50 Hz)	4,0	3,7	2,7	3,3	3,3
		bar (60 Hz)	6,4	6,1	5,3	5,5	5,7
Refrigerant circuits		Nº	1	1	1	1	1
Compressor		Nº	1	1	1	1	1
		kW (each)	2,3	3,9	6,5	11,9	16,2
		kW (total)	2,3	3,9	6,5	11,9	16,2
Condenser		Nº	1	1	1	1	1
		kW (each)	12,6	19,6	30,7	63,1	83,1
		kW (total)	12,6	19,6	30,7	63,1	83,1
Evaporator		Nº	1	1	1	1	1
		kW (each)	10,2	15,8	24,3	51,2	66,9
		kW (total)	10,2	15,8	24,3	51,2	66,9
Motor fan		Nº	1	1	1	1	1
		kW (max)	0,50	0,98	0,98	2,56	2,56
		kW (nom)	0,34	0,45	0,79	1,33	1,86
		m3/h (max)	4500	7500	7500	19000	19000
Pump (50 Hz)		kW	0,75	0,75	0,75	1,5	2,3
	max	l/min	130	130	130	230	250
	min		13	13	13	23	25
	max	bar	4,2	4,2	4,2	4,6	5,0
	min		1	1	1	1,5	2,7
Pump (60 Hz)		kW	1,5	1,5	1,5	2,2	4,0
	max	l/min	167	167	167	300	300
	min		17	17	17	30	30
	max	bar	6,6	6,6	6,6	6,8	7,2
	min		2,1	2,1	2,1	2,9	3,8
Volume water tank		l	35	35	35	210	210
Sound Pressure Level (1)		dB(A)	61,0	64,7	64,7	68,7	69,5
Power	50 Hz	kW	3,4	5,1	8,0	14,8	20,4
	60 Hz	kW	4,2	5,8	8,8	15,5	22,1
Max. Fuse		A	25	25	32	50	63
Voltage		V/Ph/Hz	400V/3Ph/50Hz or 460V/3Ph/60Hz				
Storage Temp. limits		ºC (ºF)	-25ºC to 60ºC (-13ºF to 140ºF)				
SEPR			6,44	6,41	5,63	5,37	5,16

(1) Sound Pressure Level at 5 meters from the chiller in free-field conditions. This sound level corresponds to the chillers working at full load in a high ambient temperature. In most situations, at part load and lower ambient temperatures, the sound level is much lower.

All data related to nominal conditions: Water outlet temperature 10ºC and ambient temperature 25ºC.

7.2 ENERGY EFFICIENCY INFORMATION

Model: UC 8			
Type of condensing: Air-cooled			
Refrigerant fluid: R410A			
Item	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance ratio	SEPR	6,44	[-]
Annual electricity consumption	Q	9554	kWh/a
Parameters at full load and reference ambient temperature at rating point A			
Rated refrigeration capacity	P_A	8,30	kW
Rated power input	D_A	3,39	kW
Rated energy efficiency ratio	$EER_{DC,A}$	2,44	[-]
Parameters at rating point B			
Rated refrigeration capacity	P_B	7,75	kW
Rated power input	D_B	2,01	kW
Rated energy efficiency ratio	$EER_{DC,B}$	3,84	[-]
Parameters at rating point C			
Rated refrigeration capacity	P_C	7,19	kW
Rated power input	D_C	1,18	kW
Rated energy efficiency ratio	$EER_{DC,C}$	6,08	[-]
Parameters at rating point D			
Rated refrigeration capacity	P_D	6,64	kW
Rated power input	D_D	0,75	kW
Rated energy efficiency ratio	$EER_{DC,D}$	8,79	[-]
Other items			
Capacity control	Variable		
Degradation co-efficient chillers	C_{dc}	0,90	[-]
GWP of the refrigerant		2088	kg $CO_{2\ eq}$ (100 years)
Contact details	LAUDA Ultracool S.L. - C/ Colom 606, 08228 Terrassa (Barcelona), Spain		

Model: UC 14			
Type of condensing: Air-cooled			
Refrigerant fluid: R410A			
Item	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance ratio	SEPR	6,41	[-]
Annual electricity consumption	Q	15497	kWh/a

Parameters at full load and reference ambient temperature at rating point A			
Rated refrigeration capacity	P_A	13,40	kW
Rated power input	D_A	5,15	kW
Rated energy efficiency ratio	$EER_{DC,A}$	2,59	[-]
Parameters at rating point B			
Rated refrigeration capacity	P_B	12,51	kW
Rated power input	D_B	3,35	kW
Rated energy efficiency ratio	$EER_{DC,B}$	3,72	[-]
Parameters at rating point C			
Rated refrigeration capacity	P_C	11,61	kW
Rated power input	D_C	2,09	kW
Rated energy efficiency ratio	$EER_{DC,C}$	5,53	[-]
Parameters at rating point D			
Rated refrigeration capacity	P_D	10,72	kW
Rated power input	D_D	1,09	kW
Rated energy efficiency ratio	$EER_{DC,D}$	9,78	[-]
Other items			
Capacity control	Variable		
Degradation co-efficient chillers	C_{dc}	0,90	[-]
GWP of the refrigerant		2088	kg $CO_{2\ eq}$ (100 years)
Contact details	LAUDA Ultracool S.L. - C/ Colom 606, 08228 Terrassa (Barcelona), Spain		

Model: UC 24			
Type of condensing: Air-cooled			
Refrigerant fluid: R410A			
Item	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance ratio	SEPR	5,63	[-]
Annual electricity consumption	Q	26720	kWh/a

Parameters at full load and reference ambient temperature at rating point A			
Rated refrigeration capacity	P_A	20,30	kW
Rated power input	D_A	8,50	kW
Rated energy efficiency ratio	$EER_{DC,A}$	2,37	[-]
Parameters at rating point B			
Rated refrigeration capacity	P_B	18,95	kW
Rated power input	D_B	5,46	kW
Rated energy efficiency ratio	$EER_{DC,B}$	3,44	[-]
Parameters at rating point C			
Rated refrigeration capacity	P_C	17,59	kW
Rated power input	D_C	3,49	kW
Rated energy efficiency ratio	$EER_{DC,C}$	5,00	[-]
Parameters at rating point D			
Rated refrigeration capacity	P_D	16,24	kW
Rated power input	D_D	2,00	kW
Rated energy efficiency ratio	$EER_{DC,D}$	8,05	[-]
Other items			
Capacity control	Variable		
Degradation co-efficient chillers	C_{dc}	0,90	[-]
GWP of the refrigerant		2088	kg $CO_{2\ eq}$ (100 years)
Contact details	LAUDA Ultracool S.L. - C/ Colom 606, 08228 Terrassa (Barcelona), Spain		

Model: UC 50			
Type of condensing: Air-cooled			
Refrigerant fluid: R410A			
Item	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance ratio	SEPR	5,37	[-]
Annual electricity consumption	Q	58317	kWh/a

Parameters at full load and reference ambient temperature at rating point A			
Rated refrigeration capacity	P_A	42,30	kW
Rated power input	D_A	15,02	kW
Rated energy efficiency ratio	$EER_{DC,A}$	2,80	[-]
Parameters at rating point B			
Rated refrigeration capacity	P_B	39,48	kW
Rated power input	D_B	10,28	kW
Rated energy efficiency ratio	$EER_{DC,B}$	3,82	[-]
Parameters at rating point C			
Rated refrigeration capacity	P_C	36,66	kW
Rated power input	D_C	7,23	kW
Rated energy efficiency ratio	$EER_{DC,C}$	5,05	[-]
Parameters at rating point D			
Rated refrigeration capacity	P_D	33,84	kW
Rated power input	D_D	5,06	kW
Rated energy efficiency ratio	$EER_{DC,D}$	6,65	[-]
Other items			
Capacity control	Variable		
Degradation co-efficient chillers	C_{dc}	0,90	[-]
GWP of the refrigerant		2088	kg $CO_{2\ eq}$ (100 years)
Contact details	LAUDA Ultracool S.L. - C/ Colom 606, 08228 Terrassa (Barcelona), Spain		

Model: UC 65			
Type of condensing: Air-cooled			
Refrigerant fluid: R410A			
Item	Symbol	Value	Unit
Operating temperature	t	7	°C
Seasonal energy performance ratio	SEPR	5,16	[-]
Annual electricity consumption	Q	79118	kWh/a

Parameters at full load and reference ambient temperature at rating point A			
Rated refrigeration capacity	P_A	55,10	kW
Rated power input	D_A	20,49	kW
Rated energy efficiency ratio	$EER_{DC,A}$	2,67	[-]
Parameters at rating point B			
Rated refrigeration capacity	P_B	51,43	kW
Rated power input	D_B	13,91	kW
Rated energy efficiency ratio	$EER_{DC,B}$	3,67	[-]
Parameters at rating point C			
Rated refrigeration capacity	P_C	47,75	kW
Rated power input	D_C	9,77	kW
Rated energy efficiency ratio	$EER_{DC,C}$	4,85	[-]
Parameters at rating point D			
Rated refrigeration capacity	P_D	44,08	kW
Rated power input	D_D	6,86	kW
Rated energy efficiency ratio	$EER_{DC,D}$	6,38	[-]
Other items			
Capacity control	Variable		
Degradation co-efficient chillers	C_{dc}	0,90	[-]
GWP of the refrigerant		2088	kg $CO_{2\ eq}$ (100 years)
Contact details	LAUDA Ultracool S.L. - C/ Colom 606, 08228 Terrassa (Barcelona), Spain		

8 LOG BOOK

8.1 LOG BOOK

Date	Remarks	Signature

9 ANNEXES

9.1 WATER QUALITY

In order to protect the water circuit of the Ultracool units, the water to be cooled must have specific physical/chemical properties so that it is not aggressive. If this water is outside any of the limits listed in the table below, it can seriously damage some of the materials of the Ultracool unit.

Parameter	Limit values
pH	7 – 8
Total Hardness (TH)	< 150 ppm
Conductivity	50 – 500 µS/cm
NH_3	< 2 ppm
Total iron ions (Fe^{2+} and Fe^{3+})	< 0.2 ppm
Chloride (Cl^-)	< 300 ppm
H_2S	< 0.05 ppm
Solid particles	< 150 µm
Ethylene glycol	Max 40%

The Total Hardness is specified in ppm (mg/L) of Ca_2CO_3.

Please note that ultra-pure waters like deionized water can also be harmful for some of the materials of the Ultracool units as they have a conductivity below 50 µS/cm.

Do not use automotive antifreeze. Use lab grade ethylene glycol only! Do not use an ethylene glycol concentration above 40%; this would damage the water pump.

LAUDA Ultracool S.L. will not accept any warranty for any damage caused by water that is out of one or more of the above limits.

9.2 MSDS REFRIFLUID B

TECHNICAL SHEET

CHARACTERISTICS

Concentrated fluid specially designed for the treatment and conservation of the inside of tanks and piping in cooling equipment or water recirculating chillers (closed circuit).
Its composition has been designed to accomplish two different objectives using a single fluid, resistant to temperature changes:
- It contains an anticorrosive that protects against all types of corrosion to the metal components of the system, such as iron, aluminum, copper and welds of different alloys.
- It includes protectors for refrigeration systems and industrial processes.

INSTRUCTIONS FOR USE

Refrifluid B has to be used diluted into a proportion of 2 litres of Refrifluid B in 100 litres of demineralised water.
If the machine has to work at temperatures below 0ºC (32ºF) it is necessary to use ethylene glycol as antifreeze agent.
With a 20% of ethylene glycol it has a large antifreeze capacity, preventing freezing at temperatures as low as -7ºC (19ºF). To achieve this, dilute 2 litres of Refrifluid B into a proportion of 80 litres of demineralised water and 20 litres of ethylene glycol.

It is recommended to change the cooling water at least once per year.
For other temperatures or more information see the point 3.1.

EC DECLARATION OF CONFORMITY

Manufacturer: LAUDA Ultracool S.L.
C/ Colom II 606, 08226 Terrassa – Spain

Declares that under our sole responsibility for supply/manufacture of the products:

Product Line: Ultracool **Serial number:** from 68948

Type: UC 8, UC 14, UC 24, UC 50, UC 65

and the evaluation process was carried out on its main high-pressure components (compressor, evaporator, liquid vessel and safety devices) in accordance with Module A category I of Directive 2014/68/EU for Types UC 8, UC 14, UC 24 and in accordance with Module A2 category II of Directive 2014/68/EU

Other basic safety and health requirements of European Guidelines are applied:

Directive relating to machinery	2006/42/EC
EMC, Electromagnetic Compatibility	2014/30/EU
Low-voltage Directive	2014/35/EU
Ecodesign Directive	2009/125/EC

The safety objectives of the Machinery Directive in regard to electrical safety were adhered to in accordance with Annex I Paragraph 1.5.1 by its conformity with the Low Voltage Directive 2014/35/EU.

Directive 2011/65/EU (2015/863/EU) – Defined by restriction of the use of certain hazardous substances in electrical and electronic equipment
Regulation (EU) No 517/2014 – Defined by F-GAS regulation
Norm EN 378-2:2018 – Defined by safety and environmental requirements for refrigerating systems and heat pumps

Person responsible for compiling the technical documentation:

Xavi Prats, Technical Director

Terrassa, 26th February 2020

CE 0056

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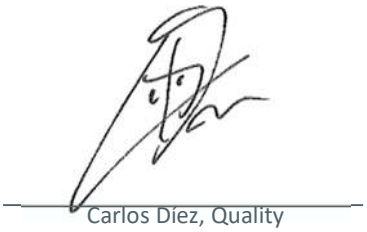

Carlos Díez, Quality Engineer