



Operation manual

Ultracool chillers

UC 2, UC 4

DMI-0226-00
21/10/2021

Read this manual prior to performing any task!

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 EC-machine directives and all its main components are UL and CSA listed.
- 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 tilting of the Ultracool unit may affect the internal suspension of the refrigerant compressor.

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

2.3 SITE

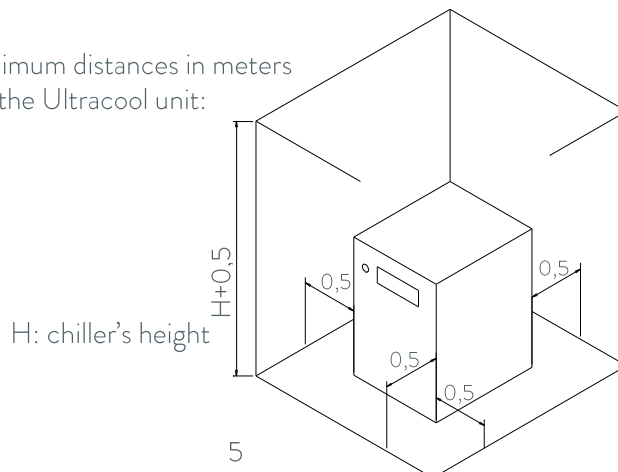
We recommend the installation of the Ultracool unit in a well-ventilated site and in a non-corrosive, dust-free atmosphere. The air renewal of the room should be at least $\frac{3}{4}$ of chiller's motor fan flow (see point 7).

The electrical protection degree of the Ultracool unit is IP44. The chiller must be protected from rain with a roof and it must be installed in such way that the control panel receives as few direct sunlight as possible.

The inlet of fresh air onto the condenser should be in the most direct way possible, avoiding any chance of air recycling.

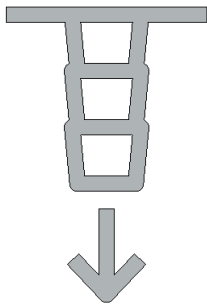
The chiller must be installed on a solid level surface that is capable of supporting a minimum of 150 kg (330 lb).

See in the picture the minimum distances in meters (0,5m = 1,5 feet) around the Ultracool unit:

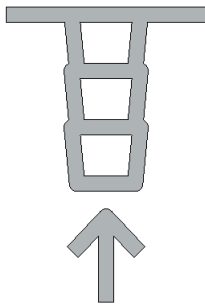


2.4 IDENTIFICATION LABELS ON THE ULTRACOOOL UNIT

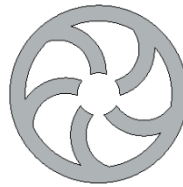
You can find the following labels on the Ultracool unit:



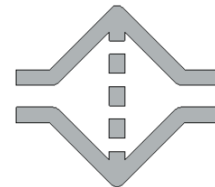
Water outlet from the installation to the Ultracool unit



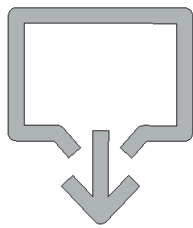
Water inlet from the installation to the Ultracool unit



Water pump pressure



Water filter pressure drop



Drain



Power supply depending on version

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 0,5 bar (7 psi). The water lines must be in pipes of at least ½". Maximum total pipe length depends on the pipe size:

| | Maximum total pipe length |
|------------------|---------------------------|
| pipe diameter ½" | 30 m (100 feet) |
| pipe diameter ¾" | 60 m (200 feet) |

Equivalent Length for Common Fittings and Valves:

| | Type of Fitting or Valve | |
|---------------------------------|--------------------------|------------|
| | Curve 90° | Ball Valve |
| Equivalent pipe length m (feet) | 1,5 (5) | 0,3 (1) |

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



We strongly advise the installation of thermal insulation for all pipes to minimize thermal losses or, at least, making sure that the pipes are opaque to the light.

The water connection of the installation of the Ultracool unit must be carried out according to the indications of the labels (stickers) present on the unit. The tank has to be filled directly by removing the chiller and tank covers.

The chiller can be installed above the application. If the chiller is installed below it, the height difference between the chiller and the application should never exceed 10 m (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 non-return valve in the water outlet of the Ultracool unit and a solenoid valve in the water inlet. Terminals at 230 VAC are designed for that purpose to carry out the supply of this solenoid valve (see point 2.6).

2.6 ELECTRICAL CONNECTION

The electrical design of the Ultracool complies with EN-60204 norms.

Check that the supply voltage does not exceed a maximum variation of +/-10% from the nominal value indicated on the data plate of the chiller.

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

The chiller has some special terminals prepared for the following functions:

- **Terminals 23 and 24, remote On/Off operation:** This chiller can be turned On and Off remotely by using an external dry contact connected to these two terminals: Contact Open = chiller Off, Contact Closed = chiller On.
If this function is not used, **do not remove the wire bridge between 23 and 24.** The chiller will not turn On if these contacts are not bridged.
- **Terminals 25 and 26, external solenoid valve connection:** They can be used to supply a solenoid valve with 230VAC. If the pipes or the application are installed above the level of the chiller's outlet this valve prevents backflow when the chiller is stopped (see point 2.5). These terminals are at 230V only when the water pump is working.
- **Terminals 27 and 28, external alarm report signal:** These terminals provide a dry contact for a general alarm of the chiller. The factory setting of this contact is Normally Open (it closes when there is an active alarm). To change it to Normally Closed it is necessary to contact an authorized service engineer.



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 START-UP

3.1 OPERATING CONDITIONS

Water temperature at the inlet:

Nominal: 15°C (59°F)
 Maximum: 30°C (86°F)

Cold water temperature at the outlet:

Nominal: 10°C (50°F)
 Minimum: 7°C (45°F) (1)
 Maximum: 25°C (77°F)

Temperature of the ambient air:

Nominal: 25°C (77°F)
 Minimum: 0°C (32°F) (2)
 Maximum: 50°C (122°F)

(1) 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 service engineer to adjust the chiller.

(2) When the Speed Regulator (SR) option is included, the Ultracool units can work with ambient temperatures until -15°C (5°F). To do so, add ethylene glycol to the water and contact an authorized service engineer to adjust the chiller.



Only an authorized service engineer can adjust the antifreeze setpoint. The following table shows the ethylene glycol concentration and the antifreeze adjustment required.

| Glycol concentration (3) 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 |

| Glycol concentration (3) 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 |

(3) 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 30%; this would damage the water pump.

3.2 BEFORE START-UP OF THE ULTRACOOL UNIT



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



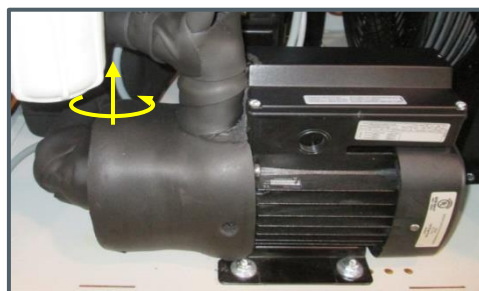
The following points must be checked:

- Water connections have been carried out (see point 2.5).
- External electrical protection is connected (see point 2.6).

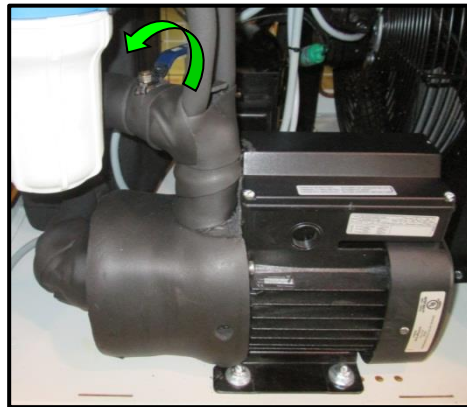
3.3 CHILLER START-UP



Fill the tank with water of the required quality (see annex 9.1), the suitable glycol concentration according to point 3.1 of this manual. Using Refrifluid B consumable is strongly recommended to maintain the water quality. Fill it directly to the tank until the maximum level of the tank is reached. After filling the tank make sure to remove any air left inside the water pump by unscrewing its purge screw until water comes out of it:



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



Start the Ultracool unit with the On/Off switch. After a couple of minutes or when the chiller stops by low level alarm (A10 alarm), stop the Ultracool unit and refill the tank to the maximum water level.

Repeat this procedure until the water level in the tank remains constant.

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

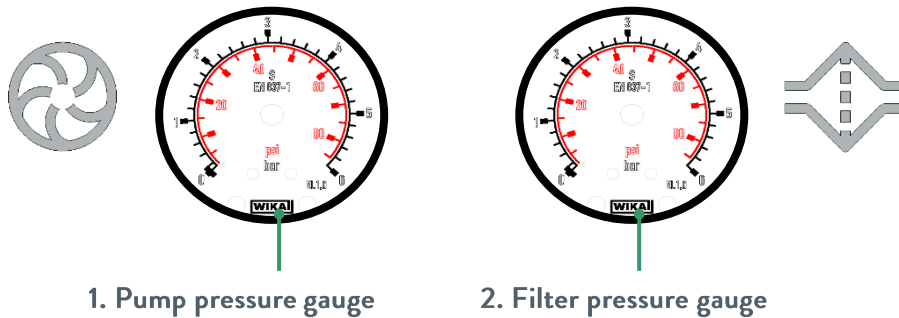


Close gradually the manual valve at the Ultracool outlet to adjust the Pump pressure on the Pump pressure gauge (see point 4.1) to the “Pnom. 1” value (Nominal pressure) indicated on the characteristics plate of the Ultracool:

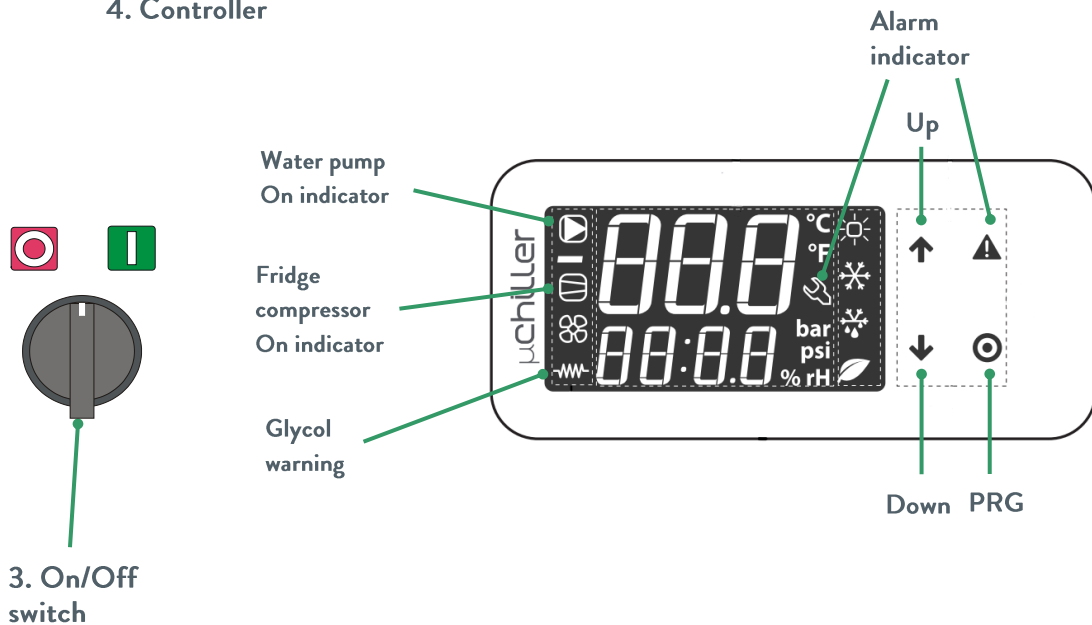


The fridge circuit has an initial delay of 2 minutes after switching the chiller On before it can start. After this time, if the water tank temperature is at least 2°C (3.6F) above the programmed value (see point 4.2), the fridge circuit starts and begins lowering the temperature.

4 CONTROL PANEL



4. Controller



4.1 COMPONENTS OF THE CONTROL PANEL

The control panel consists of the following elements:

1. **Pump pressure gauge:** It indicates the working pressure of the pump. While the chiller is running, its reading must be adjusted to the nominal pressure indicated on the characteristics plate (P_{nom}, 1, see point 3.3).
2. **Filter pressure gauge:** It indicates the pressure drop of the water filter and the evaporator.
3. **On/Off switch:** It turns the Ultracool unit On and Off.
4. **Controller:** It indicates the cold water temperature at the outlet of the Ultracool unit and allows changing its setpoint.

4.2 CONTROLLER OPERATION

As long as the main power switch is on, the display of the control thermostat shows the outlet water temperature on the top row. The bottom row shows “- - -” when the unit is running and “OFF” when it is in Standby.



Remote On/Off: Please note that the chiller cannot be started without an On signal at terminals 23 and 24, either through a closed dry contact from the application or by a wire bridge connected between these two terminals. See point 2.6.

On/Off memory: When the main power switch is turned On, the control thermostat comes back to the last mode/status (“On” or “Standby”) at which it was when it was last powered off. For example, if there is a power loss while the chiller is running, once the power comes back the chiller will start running again automatically. If the unit was in Standby, it will still remain in Standby once the power comes back.

Unit control and basic configuration: From the standard display, pressing DOWN for 3 s gives access to the basic controls of the unit:

- Viewing and adjusting the Setpoint
- Turning the chiller On and Off
- Selecting the Unit of Measure



Please note that if the DOWN button is pressed during less than 3 s, the controller will show the **Unit information screens** (see below in this same point) instead of the basic configuration loop. If this happens, go UP until the ESC screen and press PRG to go back to the standard display to try again.

Procedure

Press:

- DOWN for 3 s to access the basic control screens
- UP and DOWN to cycle through the screens and set the parameters
- PRG to change the parameter value and save the changes
- PRG (3 s) or PRG while on the “ESC” screen to return to the standard display



1. Go to the standard display



2. Press DOWN for 3 s: the current setpoint (SEtA) is shown (read only)



3. Press DOWN: the cooling setpoint (SEtC) is shown
Press PRG: the value flashes; press UP/DOWN to change the value; PRG to confirm



4. Press DOWN: the unit On/Off screen (UnSt) is shown
Press PRG: the value flashes; press UP/DOWN to change to ON or OFF; PRG to confirm



5. Press DOWN: the unit of measure screen (UoM) is shown
Press PRG: the value flashes; press UP/DOWN to change to SI or IMP; PRG to confirm



6. Press DOWN: the ESC screen is shown
Press PRG to exit to the standard display

Unit information screens: From the standard display, pressing DOWN briefly gives access to some basic information screens of the unit:

- If the unit is in Standby, the first information screen shows why the unit is turned OFF: “diSP” means it’s turned OFF from the display. “dI” means it’s turned OFF because the remote On/Off is open (see point 2.6). “AlrM” means it’s not running because of an alarm.
- The “CMP” screen shows which compressors are running (only relevant in units with more than one compressor). Each compressor has one symbol on the bottom row: “o” means that compressor is running and “_” means that compressor is stopped.
- The “EuP1” screen shows the value read by the evaporation sensor.
- The “Hd00” to “Hd02” screens show other information not relevant to the chiller’s operation.
- The ESC screen allows going back to the standard display by pressing PRG.

Other information icons on the display:

1. **Alarm indicator:** this is lit when there is an alarm. Depending on the alarm it can cause fridge circuit or all the Ultracool unit to stop (see point 6). When an alarm is active, pressing the Alarm button shows the active alarm code. If more than one alarm is active, pressing UP or DOWN cycles through all active alarm codes:

- Alarm code A10: Low water level alarm or pump overload.
- Alarm code A28: Antifreeze alarm.
- Alarm code A29: Low refrigerant pressure.
- Alarm code A25: High refrigerant pressure.
- Warning code A15: High water temperature.
- Alarm code A06, A22: Temperature sensor disconnected, short-circuited or faulty.
- Warning code A32, A33, A65, A66: Maintenance warning.

2. **Glycol warning:** this indicator is lit when the working conditions of the chiller require ethylene glycol as antifreeze agent in the water circuit to avoid freezing. Be sure that the water mixture has the suitable ethylene glycol concentration when this is lit.

3. **Pump On indicator:** this remains lit when the pump is working.

4. **Compressor On indicator:** this remains lit when the compressor is working.

5 MAINTENANCE

Units UC Mini are specially equipped with an integrated water filter inside the unit's housing at the water inlet. This filter is accessible through the left panel of the chiller. Please, observe the following maintenance guidelines.

5.1 BASIC MAINTENANCE

Weekly:

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

Verify that the pressure of the pump is the same as the nominal pressure (Pnom) indicated in the characteristics plate.

Verify the water level in the tank.

Verify the state of the water filter, 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 with a blast of compressed air, from the inside towards the outside.

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 of this manual and, if it's being used, the required volume of Refrifluid B additive (2 liters per each 100 liters of water tank volume).

Preventive maintenance warning (A32, A33, A65 and A66)

The controller has a preventive maintenance warning based on working hours of the Ultracool unit. When this warning appears, contact an authorised service engineer to perform the preventive maintenance.

6 TROUBLESHOOTING

6.1 POSSIBLE CAUSES OF ALARMS/WARNINGS

The following chart shows the possible causes for an alarm together with the solution:

| FAULT | CAUSE | SOLUTION | RESTART PROCEDURE |
|--|--|---|---|
| A25 Alarm due to high pressure of the refrigerant: The pressure of the refrigerating circuit is higher than the maximum allowed (20bar, 290psig). It stops the compressor | Low airflow into the condenser The ambient temperature is too high Water temperature too high Motor fan not working | Check that there is enough free space in front of the condenser and clean the condenser if necessary Wait until the ambient temperature is lower Try to cool down the water in the circuit running the chiller with the application stopped. Reduce the water flow by closing the outlet manual valve during this process Check that the motor fan runs at the same time as the compressor. If not, contact authorized service engineer | Disconnect the chiller and connect it again by turning Off/On the power switch (element 3 on point 4.1) |
| A29 Alarm due to low pressure of the refrigerant: The pressure of the refrigerating circuit is below the minimum allowed (0,5 bar, 7 psig) | Too low ambient temperature Water freezing Refrigerant gas leakage | The minimum ambient temperature is -15°C (5°F) Wait until the ambient temperature is higher Verify the ethylene glycol content (see point 3.1). If the problem persists contact authorized service engineer Contact authorized service engineer | The Low-pressure safety switch (SLP) automatically resets itself when the pressure is back to normal |

| FAULT | CAUSE | SOLUTION | RESTART PROCEDURE |
|---|---|---|---|
| A10 Water level alarm | Water leak in the internal circuit of the UC | Contact authorized service engineer | Switch the chiller Off and back On to reset the alarm |
| | Water leak in the external water circuit | Check the external water pipes | |
| | Water leak in the water pump | Contact authorized service engineer | |
| | UC unit installed below the application level | Refill the tank, if when the unit stops water overflows install the solenoid valve option | |
| | Level switch not working | Check that the level switch works properly when the tank is filled up to the maximum level after switching On the chiller. If it does not work contact authorized service engineer | |
| A28 Antifreeze control operates continuously (see point 4) | Cold water temperature required to be below 7°C | Add ethylene glycol to the water (see point 3.1) and contact authorized service engineer to adjust the antifreeze setpoint | The control will go back to normal operation when the problem is solved |
| | Water circuit blocked | Clean the water circuit, check for closed valves in the circuit. If necessary replace the filter element | |
| | Possible freezing due to low ambient temperature | See point 3.1. Contact authorized service engineer | |
| | 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 | |
| | The pump is faulty | Contact authorized service engineer | |
| A15 High water temperature | The water tank temperature has been more than 10°C (18°F) above the setpoint for some minutes | Check the cold water setpoint is within the limits (see point 3.1). Disconnect the application from the chiller for a while and run the chiller without load. If the problem persists contact authorized service engineer | The chiller is still working normally |

| FAULT | CAUSE | SOLUTION | RESTART PROCEDURE |
|---|--|---|---|
| A32, A33, A65, A66 Maintenance warning | The chiller has exceeded the working hours defined between preventive maintenances | Contact authorised service engineer for a preventive maintenance of the unit | The chiller is still working normally. The authorised service engineer will reset the warning during the preventive maintenance |

7 TECHNICAL FEATURES

7.1 TECHNICAL FEATURES 50HZ

| UC | | UC 2 | UC 3 | UC 4 | |
|--------------------------|---------|---------------|------|------|------|
| Cooling capacity | kcal/h | 1803 | 3496 | 4252 | |
| | kW | 2,1 | 4,1 | 4,9 | |
| Water flow | l/h | 337 | 617 | 827 | |
| Water pressure | 3 bar | 3,3 | 3,0 | 2,8 | |
| | 5 bar | 5,3 | 5,1 | 5,0 | |
| Refrigerant circuits | N° | 1 | 1 | 1 | |
| Compressor | kW | 0,7 | 0,9 | 1,2 | |
| | N° | 1 | 1 | 1 | |
| Condenser | kW | 2,8 | 4,9 | 6,1 | |
| | N° | 1 | 1 | 1 | |
| Evaporator | kW | 2,1 | 4,1 | 4,9 | |
| | N° | 1 | 1 | 1 | |
| Motor fan | N° | 1 | 1 | 1 | |
| | kW | 0,18 | 0,18 | 0,18 | |
| | m3/h | 2400 | 2400 | 2400 | |
| 3 bar pump | | kW | 0,50 | 0,50 | 0,50 |
| | max | l/h | 2500 | 2500 | 2500 |
| | min | | 250 | 250 | 250 |
| | max | bar | 3,4 | 3,4 | 3,4 |
| | min | | 1,5 | 1,5 | 1,5 |
| 5 bar pump | | kW | 0,67 | 0,67 | 0,67 |
| | max | l/h | 4100 | 4100 | 4100 |
| | min | | 410 | 410 | 410 |
| | max | bar | 5,5 | 5,5 | 5,5 |
| | min | | 2,5 | 2,5 | 2,5 |
| Volume water tank | l | 19 | 19 | 19 | |
| Sound Pressure Level (1) | dB(A) | 40,0 | 42,5 | 42,5 | |
| Power | ST | kW | 0,9 | 1,0 | 1,3 |
| | SP 3bar | kW | 1,4 | 1,5 | 1,8 |
| | SP 5bar | kW | 1,6 | 1,7 | 2,0 |
| Max. Fuse | A | 16 | 16 | 16 | |
| Voltage | V/Ph/Hz | 230V/1Ph/50Hz | | | |
| Nominal COP | | 2,38 | 3,91 | 3,69 | |

All data related to the following conditions: Water outlet temperature 10°C (50°F) and ambient temperature 25°C (77°F).

(1) Sound Pressure Level at 5 meters from the chiller in free-field conditions.

7.2 TECHNICAL FEATURES 60HZ

| UC | | UC 2 | UC 3 | UC 4 | |
|--------------------------|---------|---------------|------|------|------|
| Cooling capacity | kcal/h | 1829 | 3157 | 3969 | |
| | kW | 2,1 | 3,7 | 4,6 | |
| Water flow | l/h | 337 | 617 | 827 | |
| Water pressure | 3 bar | 3,4 | 3,3 | 3,2 | |
| | 5 bar | 4,9 | 4,8 | 4,6 | |
| Refrigerant circuits | N° | 1 | 1 | 1 | |
| Compressor | kW | 0,6 | 0,7 | 1,0 | |
| | N° | 1 | 1 | 1 | |
| Condenser | kW | 2,7 | 4,3 | 5,6 | |
| | N° | 1 | 1 | 1 | |
| Evaporator | kW | 2,1 | 3,7 | 4,6 | |
| | N° | 1 | 1 | 1 | |
| Motor fan | N° | 1 | 1 | 1 | |
| | kW | 0,25 | 0,25 | 0,25 | |
| | m3/h | 2700 | 2700 | 2700 | |
| 3 bar pump | | kW | 0,60 | 0,60 | 0,60 |
| | max | l/h | 3000 | 3000 | 3000 |
| | min | | 300 | 300 | 300 |
| | max | bar | 3,5 | 3,5 | 3,5 |
| min | 1,5 | | 1,5 | 1,5 | |
| 5 bar pump | | kW | 0,78 | 0,78 | 0,78 |
| | max | l/h | 4800 | 4800 | 4800 |
| | min | | 480 | 480 | 480 |
| | max | bar | 5,0 | 5,0 | 5,0 |
| min | 2,4 | | 2,4 | 2,4 | |
| Volume water tank | l | 19 | 19 | 19 | |
| Sound Pressure Level (1) | dB(A) | 42,5 | 46,8 | 48,2 | |
| Power | ST | kW | 0,8 | 0,9 | 1,3 |
| | SP 3bar | kW | 1,4 | 1,5 | 1,9 |
| | SP 5bar | kW | 1,6 | 1,7 | 2,0 |
| Max. Fuse | A | 16 | 16 | 16 | |
| Voltage | V/Ph/Hz | 230V/1Ph/60Hz | | | |
| Nominal COP | | 2,53 | 3,99 | 3,69 | |

All data related to the following conditions: Water outlet temperature 10°C (50°F) and ambient temperature 25°C (77°F).

(1) Sound Pressure Level at 5 meters from the chiller in free-field conditions.

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 $\mu\text{S}/\text{cm}$ |
| 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 | 0% (the units with the option stainless steel pump accept as maximum 30%) |

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 $\mu\text{S}/\text{cm}$.



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.



Do not use automotive antifreeze. Use lab grade ethylene glycol only! Do not use an ethylene glycol concentration above 30%; this would damage the water pump.