



Operation manual

Ultracool chillers

UC 2, UC 4

DMI-0210-05
12/06/2020

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

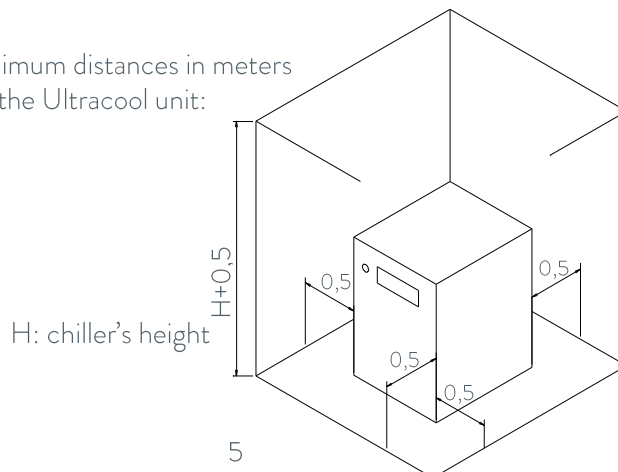
We recommend the installation of the Ultracool unit in a well-ventilated site and in a non-corrosive, dust-free atmosphere. The air renewal of the room should be at least $\frac{3}{4}$ of chiller's motor fan flow (see point 7).

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.

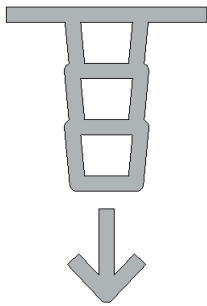
The chiller must be installed on a solid level surface that is capable of supporting a minimum of 150 kg (330 lb).

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

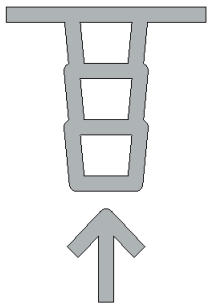


2.4 IDENTIFICATION LABELS ON THE ULTRACOOOL UNIT

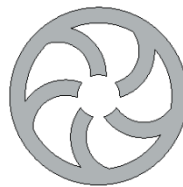
You can find the following labels on the Ultracool unit:



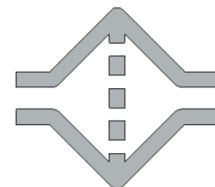
Water outlet from the installation to the Ultracool unit



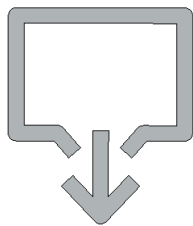
Water inlet from the installation to the Ultracool unit



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 behaviour of this contact can be adjusted in order to open or close when there is an alarm (see point 4.2).



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.



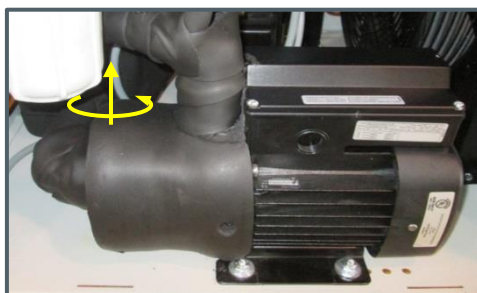
The following points must be checked:

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

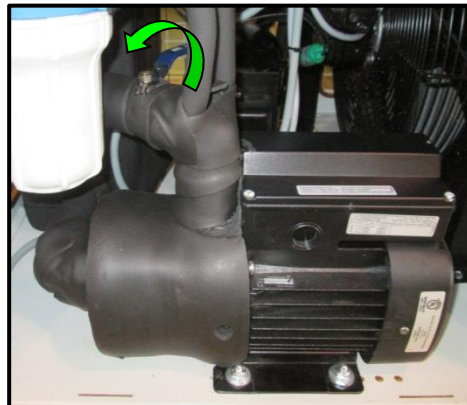
3.3 CHILLER START-UP



Fill the tank with water of the required quality (see annex 9.1), the suitable glycol concentration according to point 3.1 and the Refrfluid B additive supplied with the chiller (2 liters per each 100 liters of water tank volume). 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:



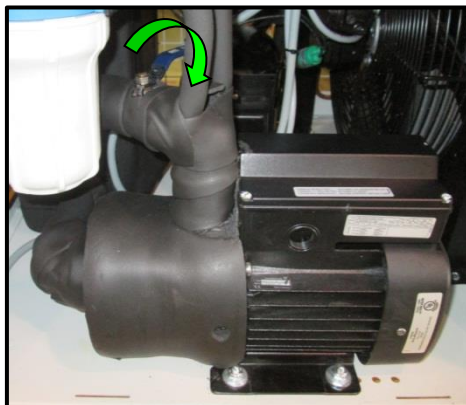
Start the Ultracool unit with the On/Off switch. After a couple of minutes or when the chiller stops by low level alarm (FL alarm), stop the Ultracool unit and refill the tank to the maximum water level.

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.

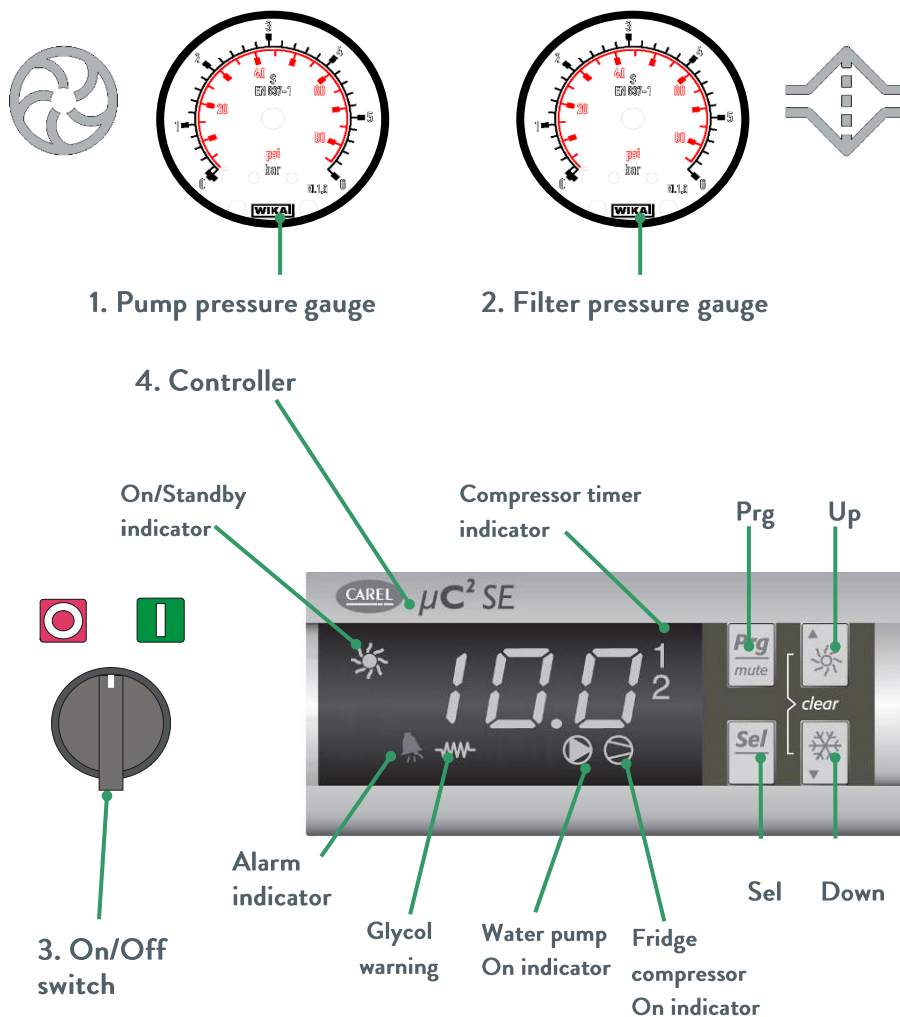


Close gradually the manual valve at the Ultracool outlet to adjust the Pump pressure on the Pump pressure gauge (see point 4.1) to the “Pnom. 1” value (Nominal pressure) indicated on the characteristics plate of the Ultracool:



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



4.1 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

Standby mode: The controller has a Standby mode available. When the controller is in this mode, all motors in the Ultracool unit are stopped, but the display continues to read the water tank temperature.

When the chiller is running, the On/Standby indicator is lit. When the chiller is in Standby, this indicator remains off.

To turn the chiller On while in Standby mode or to go to Standby mode while the chiller is running, keep the Up button pressed during a few seconds, until the On/Standby indicator toggles On or Off.



Make sure to keep the Up button pressed continuously until the On/Standby indicator lights up; if the pressing is interrupted the controller goes into “Temperature probe reading” mode (see below) and does not turn the chiller On. If this happens, press the Prg button to exit this mode and try pressing Up again with no interruptions.

On/Standby memory: When the chiller is turned Off with the On/Off switch and later it is switched back On, the controller stays in the same mode (“On” or “Standby”) it was when the switch was turned Off. This means that, if the chiller was originally in Standby mode when it was last switched off, the chiller will not turn On automatically after the On/Off switch is turned back On, it will remain in Standby mode. To start the chiller again, just use the Up key as indicated above. Alternatively, if a remote On/Off contact is being used, the chiller can also be turned On remotely. To do so, send an On signal by opening and then closing the remote contact connected to terminals 23 and 24.

Temperature probe reading: During normal controller operation, pressing Up for less than 5 seconds allows displaying the current values of the different probes of the chiller. In this mode, pressing Up and Down selects the probe (b01, b02, ...) and pressing Sel displays the temperature currently being read by the selected probe. While in this mode, the controller lights up the On/Standby indicator and a snowflake symbol. To exit this mode, press Prg or do not press any button for at least 60 seconds.

Setting the temperature: Use the following procedure to adjust the required working temperature (between -5°C (23°F) and 25°C (77°F)):

- Press the Sel button for about 5 seconds. The display will show “- / -”.
- Press Down until the display shows “- r -”.
- Press Sel and the display will show “r01”. This parameter is the temperature setpoint.
- Press Sel to display the current setpoint value.
- Use the Up and Down buttons to increase or to decrease the value of the setpoint.
- Press Sel to confirm the new value. The display will show “r01”.
- Press Prg three times to exit the setpoint modification procedure. The display will show again the water tank temperature.

Alarm indicator: When an alarm or a warning is active, the controller lights up the Alarm indicator. If the alarm only affects the refrigerant circuit, the compressor stops. If the alarm affects the water circuit the compressor and the water pump both stop.

The display can show the following alarm and warning codes:

- Alarm code FL: Low water level.
- Alarm code A1: Antifreeze alarm.
- Alarm code LP1: Low refrigerant pressure.
- Alarm code HP1: High refrigerant pressure.
- Alarm code E1 or E2: temperature sensor faulty.
- Alarm code EP_r: EEPROM error during operation.
- Alarm code EP_b: EEPROM error at start-up.
- Alarm code ELS: Low supply voltage.
- Alarm code EHS: High supply voltage.
- Warning code EL1: Electromagnetic noise detected in the power supply.
- Warning code Ht: High water temperature.
- Warning code Hc1, Hc2, Hc3, Hc4: Maintenance warning.

External alarm contact adjustment (see point 2.6):

The UC unit has two terminals that provide a dry contact for a general alarm of the chiller. In order to modify the behaviour of this contact it is necessary to modify the value of the following parameter in the controller:

If P21=0 (default value): The alarm contact closes when there is an active alarm

If P21=1: The alarm contact opens when there is an active alarm.

When the On/Off switch is Off, the alarm contact remains open.

Use the following procedure to modify the P21 parameter:

- Press the **Sel** button for about 5 seconds. The display will show “- / -”.
- Press **Down** until the display shows “- P -”.
- Press **Sel** and the display will show “P21”.
- Press **Sel** to display the current value of P21.
- Use the **Up** and **Down** buttons to set the value to 0 or to 1.
- Press **Sel** to confirm the new value. The display will show “P21”.
- Press **Prg** three times to exit the modification procedure. The display will show again the water tank temperature.

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. Please check **point 3.1** from this manual to adjust the ethylene glycol concentration of the water mixture according to the ambient temperature and antifreeze setpoint.

Pump On indicator: This remains lit while the pump is running.

Compressor On indicator: This remains lit while the compressor is running.

Compressor timer indicator: When “1” blinks it means that the controller is delaying the start of the fridge compressor. When the compressor starts “1” will stop blinking.

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 the Refrfluid B additive supplied with the chiller (2 liters per each 100 liters of water tank volume).

Preventive maintenance warning (Hc1, Hc2, Hc3 or Hc4)

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
HP1 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)
LP1 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
FL 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	
A1 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	
Ht High water temperature	The water tank temperature is above 35°C (95°F) 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
The controller displays the following codes:			
E1, E2	A temperature sensor (NTC sensor) is faulty, disconnected or short-circuited	Contact authorized service engineer	The chiller can be restarted when the faulty part is replaced
EPr, EPb	There is an internal memory error	Contact authorized service engineer	
ELS, EHS	The power supply voltage is out of limits	Check that the power supply is within the specifications: 230VAC +/-10%, 50Hz, 1 Ph or 230VAC +/-10%, 60Hz, 1 Ph	The chiller will go back to normal operation when the problem is solved
EL1	There are electromagnetic disturbances in the power supply	Check the quality of the power being supplied to the chiller. Eliminate the source of the disturbances or connect the chiller to a different power supply	The chiller is still working normally. The message disappears when the disturbances stop
Hc1, Hc2, Hc3, Hc4 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 ₂ S	< 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 Ca₂CO₃.

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.

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 0°C 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 -7°C. 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 Operation Manual.

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: Refrifluid B
This safety data sheet pertains to the following products:
E7011852: 2 L
E7011854: 4 L

1.2 Relevant identified uses of the substance or mixture and uses advised against

General use: Corrosion inhibitor
Industrial use
Professional uses / Public domain

1.3 Details of the supplier of the safety data sheet

Company name: LAUDA Dr. Wobser GmbH & Co. KG
Street/POB-No.: Pfarrstraße 41/43
Postal Code, city: 97922 Lauda-Königshofen
Germany
WWW: www.lauda.de
E-mail: info@lauda.de
Telephone: +49 (0)9343-503-0
Telefax: +49 (0)9343-503-222
Dept. responsible for information:
Department Quality Management,
Telephone: +49 9343 503-331, e-mail info@lauda.de

1.4 Emergency telephone number

**GIZ-Nord, Göttingen, Germany,
Telephone: +49 551-19240**

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to EC regulation 1272/2008 (CLP)

Repr. 2; H361 Suspected of damaging fertility or the unborn child.

2.2 Label elements

Labelling (CLP)



Signal word:

Warning

Hazard statements:

H361

Suspected of damaging fertility or the unborn child.

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Precautionary statements:

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P280 Wear protective gloves/protective clothing/eye protection.
P308+P313 IF exposed or concerned: Get medical advice/attention.
P501 Dispose of contents/container to hazardous or special waste collection point.

Special labelling

Text for labelling: Contains Sodium 2-ethylhexanoate.

2.3 Other hazards

No risks worthy of mention.

Results of PBT and vPvB assessment:

No data available

SECTION 3: Composition / information on ingredients

3.1 Substances: not applicable

3.2 Mixtures

Hazardous ingredients:

Ingredient	Designation	Content	Classification
EC No. 243-283-8 CAS 19766-89-3	Sodium 2-ethylhexanoate	5 - 10 %	Repr. 2; H361.
REACH 01-2119457892-27-xxxx EC No. 215-185-5 CAS 1310-73-2	Sodium hydroxide	< 0.5 %	Skin Corr. 1A; H314.

Full text of H- and EUH-statements: see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General information: First aider: Pay attention to self-protection!

In case of inhalation: Remove person to fresh air and keep comfortable for breathing. Seek medical attention if problems persist.

Following skin contact: After contact with skin, wash immediately with soap and plenty of water. Take off contaminated clothing and wash it before reuse. In the event of discomfort seek medical treatment.

After eye contact: Immediately flush eyes with plenty of flowing water for 10 to 15 minutes holding eyelids apart. Remove contact lenses, if present and easy to do. Continue rinsing. Subsequently consult an ophthalmologist.

After swallowing: Rinse mouth and drink large quantities of water. Never give anything by mouth to an unconscious person. Do not induce vomiting. Immediately get medical attention.

4.2 Most important symptoms and effects, both acute and delayed

After contact with skin: May cause irritations.
After eye contact: May cause irritations.

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4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media:

Alcohol resistant foam, extinguishing powder, carbon dioxide

Extinguishing media which must not be used for safety reasons:

Full water jet

5.2 Special hazards arising from the substance or mixture

May form dangerous gases and vapours in case of fire.

Furthermore, there may develop: sodium compounds, carbon monoxide and carbon dioxide

5.3 Advice for firefighters

Special protective equipment for firefighters:

Wear self-contained positive pressure breathing apparatus and full firefighting protective clothing.

Additional information: Hazchem-Code: -

Cool endangered containers with water jetspray. Do not allow fire water to penetrate into surface or ground water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Avoid exposure. Seal off endangered area. Keep unprotected people away. Provide good ventilation. Avoid contact with the substance. Wear appropriate protective equipment. Take off contaminated clothing and wash it before reuse.

6.2 Environmental precautions

Do not allow to penetrate into soil, waterbodies or drains.

6.3 Methods and material for containment and cleaning up

Collect with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents, or sawdust) and place in closed containers for disposal. Thoroughly clean surrounding area.

6.4 Reference to other sections

Refer additionally to section 8 and 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advices on safe handling: Obtain special instructions before use. Provide adequate ventilation, and local exhaust as needed. Avoid contact with the substance. Take off contaminated clothing and wash it before reuse. Safety shower and eye wash station should be easily accessible to the work area. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storerooms and containers:

Keep containers in a dry, well-ventilated and cool place. Protect from heat and direct sunlight. Store only in original container. Store carefully closed containers upright to prevent any leaks.

Storage temperature: 5 °C up to 35 °C

Shelf life: 24 months

Hints on joint storage: Keep away from food, drink and animal feedingstuffs.

7.3 Specific end use(s)

No information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values:

CAS No.	Designation	Type	Limit value
1310-73-2	Sodium hydroxide	Great Britain: WEL-STEL	2 mg/m ³
		Ireland: 15 minutes	2 mg/m ³

DNEL/DMEL:

Information about Sodium 2-ethylhexanoate:

DNEL workers, long-term, systemic, dermal: 2 mg/kg bw/d

DNEL workers, long-term, systemic, inhalative: 14 mg/m³

DNEL consumers, long-term, systemic, oral: 1 mg/kg bw/d

DNEL consumers, long-term, systemic, dermal: 1 mg/kg bw/d

DNEL consumers, long-term, systemic, inhalative: 3.5 mg/m³

Information about Sodium hydroxide:

DNEL workers, long-term, local, inhalative: 1 mg/m³

DNEL consumers, long-term, local, inhalative: 1 mg/m³

PNEC:

Information about Sodium 2-ethylhexanoate:

PNEC water (freshwater): 0.36 mg/L

PNEC water (marine water): 0.036 mg/L

PNEC sewage treatment plant (STP): 71.7 mg/L

PNEC sediment (freshwater): 0.301 mg/kg dw

PNEC sediment (marine water): 0.03 mg/kg dw

PNEC soil: 0.058 mg/kg dw

8.2 Exposure controls

Provide adequate ventilation, and local exhaust as needed.

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Personal protection equipment

Occupational exposure controls

- Respiratory protection: Respiratory protection must be worn whenever the WEL levels have been exceeded. If vapours form, use respiratory protection.
The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product.
- Hand protection: Protective gloves according to EN 374.
Glove material: Nitrile rubber
Breakthrough time: >480 min.
Observe glove manufacturer's instructions concerning penetrability and breakthrough time.
- Eye protection: Tightly sealed goggles according to EN 166.
- Body protection: Wear suitable protective clothing.
- General protection and hygiene measures:
Obtain special instructions before use. Avoid contact with the substance. Wash hands before breaks and immediately after handling the product. When using do not eat, drink or smoke. Take off contaminated clothing and wash it before reuse. Safety shower and eye wash station should be easily accessible to the work area.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

- Appearance: Physical state at 20 °C and 101.3 kPa: liquid
Colour: rose-coloured, transparent
- Odour: characteristic
- Odour threshold: No data available
- pH value: at 20 °C: 9.5
- Melting point/freezing point: ≤ 0 °C
- Initial boiling point and boiling range: 100 °C
- Flash point/flash point range: No data available
- Evaporation rate: No data available
- Flammability: No data available
- Explosion limits: No data available
- Vapour pressure: at 20 °C: 2350 Pa
at 50 °C: 12381 Pa
- Vapour density: No data available
- Density: at 20 °C: 1 - 1.1 g/mL
- Solubility: Miscible with most organic solvents and alcohols.
- Water solubility: at 20 °C: miscible
- Partition coefficient: n-octanol/water: No data available
- Auto-ignition temperature: 480 °C
- Decomposition temperature: No data available
- Viscosity, dynamic: at 20 °C: 1.27 mPa*s
- Viscosity, kinematic: at 20 °C: 1.23 mm²/s
- Explosive properties: No data available
- Oxidizing characteristics: No data available

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9.2 Other information

Additional information: No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

refer to 10.3

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No dangerous reactions are known.

10.4 Conditions to avoid

Protect from heat and direct sunlight.

10.5 Incompatible materials

No data available

10.6 Hazardous decomposition products

Sodium compounds, hydrocarbons, carbon monoxide and carbon dioxide

Thermal decomposition: No data available

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Toxicological effects: The statements are derived from the properties of the single components. No toxicological data is available for the product as such.
Acute toxicity (oral): Based on available data, the classification criteria are not met.
Acute toxicity (dermal): Based on available data, the classification criteria are not met.
Acute toxicity (inhalative): Based on available data, the classification criteria are not met.
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Eye damage/irritation: Based on available data, the classification criteria are not met.
Sensitisation to the respiratory tract: Based on available data, the classification criteria are not met.
Skin sensitisation: Based on available data, the classification criteria are not met.
Germ cell mutagenicity/Genotoxicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Repr. 2; H361 = Suspected of damaging fertility or the unborn child.
Effects on or via lactation: Lack of data.
Specific target organ toxicity (single exposure): Based on available data, the classification criteria are not met.
Specific target organ toxicity (repeated exposure): Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.

Other information: Avoid contact during pregnancy/while nursing.

Symptoms

After contact with skin: May cause irritations.
After eye contact: May cause irritations.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity: Information about Sodium hydroxide:
Fish toxicity:
LC50 *Leuciscus idus*: 189 mg/L/48h
Daphnia toxicity:
EC50 *Crangon crangon*: 33 mg/L

12.2 Persistence and degradability

Further details: No data available

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water:
No data available

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12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

No data available

12.6 Other adverse effects

General information: Do not allow to penetrate into soil, waterbodies or drains.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste key number: 07 06 04* = other organic solvents, washing liquids and mother liquors

* = Evidence for disposal must be provided.

Recommendation: Dispose of waste according to applicable legislation.

Contaminated packaging

Recommendation: Dispose of waste according to applicable legislation. Non-contaminated packages may be recycled.

SECTION 14: Transport information

14.1 UN number

ADR/RID, IMDG, IATA-DGR:

not applicable

14.2 UN proper shipping name

ADR/RID, IMDG, IATA-DGR:

Not restricted

14.3 Transport hazard class(es)

ADR/RID, IMDG, IATA-DGR:

not applicable

14.4 Packing group

ADR/RID, IMDG, IATA-DGR:

not applicable

14.5 Environmental hazards

Marine pollutant: NO

14.6 Special precautions for user

No dangerous good in sense of these transport regulations.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

No data available

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SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

National regulations - Great Britain

Hazchem-Code:

-

No data available

National regulations - EC member states

Volatile organic compounds (VOC):

0 % by weight = 0 g/L

15.2 Chemical Safety Assessment

For this mixture a chemical safety assessment is not required.

SECTION 16: Other information

Further information

Wording of the H-phrases under paragraph 2 and 3:

H314 = Causes severe skin burns and eye damage.

H361 = Suspected of damaging fertility or the unborn child.

Reason of change:

Changes in section 2: classification, labelling

Changes in section 3: Composition / information on ingredients

Changes in section 13: Waste key number

General revision

Date of first version:

28/11/2012

Department issuing data sheet

Contact person:

see section 1: Dept. responsible for information

For abbreviations and acronyms, see: ECHA Guidance on information requirements and chemical safety assessment, chapter R.20 (Table of terms and abbreviations).

The information in this data sheet has been established to our best knowledge and was up-to-date at time of revision. It does not represent a guarantee for the properties of the product described in terms of the legal warranty regulations.

