OPERATION MANUAL

Ultracool chillers

UC-0060, UC-0080, UC-0100, UC-0140, UC-0180, UC-0240

DMI-0134-00
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 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

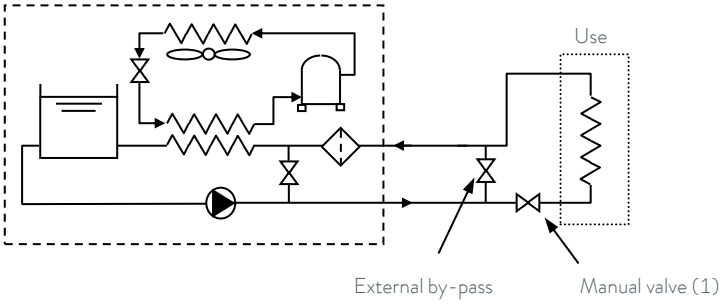
The operator has to observe the national working, operating and safety regulations. Also, existing internal factory regulations must be met.
Maintenance and repair work must only be carried out by specially trained personnel and, if necessary, under supervision of a person qualified for this work.

- 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 POSSIBLE INSTALLATIONS

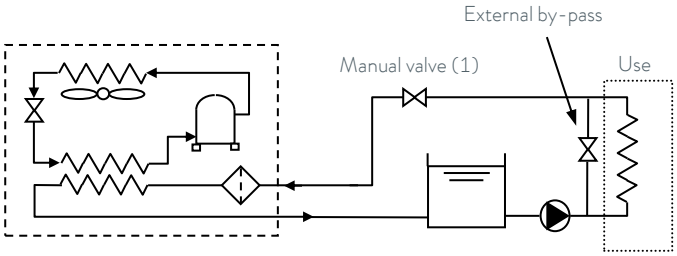
2.1 SUPERPLUS VERSION

Without heat exchanger

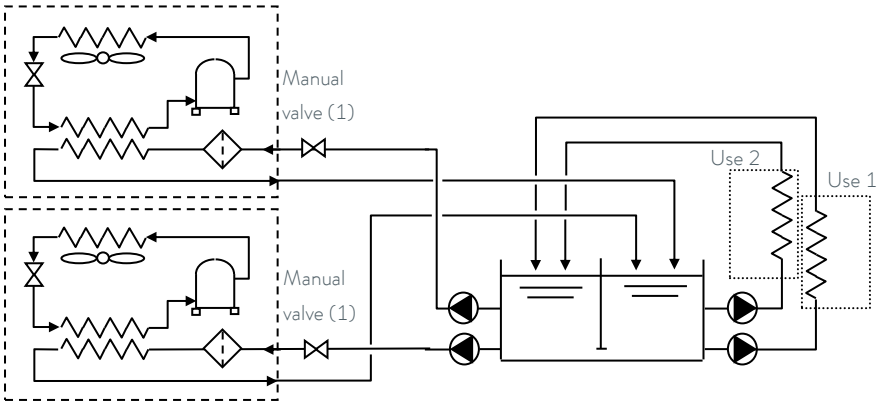


2.2 STANDARD VERSION

With an external water tank



Several Ultracool units with external tank
When there are extensions foreseen



(1) Permits to adjust the pressure drop of the user application according to the nominal pump pressure.

3 INSTALLATION

3.1 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.

3.2 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.

3.3 SITE

The Ultracool unit must be installed in an atmosphere where the range of temperatures is within the indicated margins mentioned in point 4.1. It is necessary to add ethylene glycol to the water of the circuit, as indicated in point 4.1.

The chiller must be installed on a solid level surface that is capable of supporting a minimum of 400kg (880 lb.). The floor must not have any slope.

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 out-door installation, it is recommended to protect the Ultracool unit from rain with a roof and it should be installed in such way that the control panel receives as few direct sunlight as possible.

Leave a space of 1m (40”) in the front, right and left panels of the UC unit (see figure 1). In UC-0180/0240 it is necessary to leave 1m (40”) on the back panel too. This space is important to facilitate maintenance work and cleaning, especially in front of the condenser(s) grid.

If necessary the unit can be installed without any free space on the left and right panels. In this case foresee that the unit can be moved forwards to free the lateral 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”)).

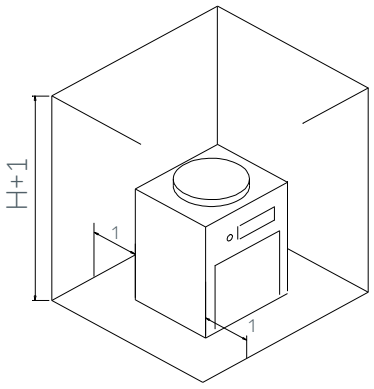


Fig. 1

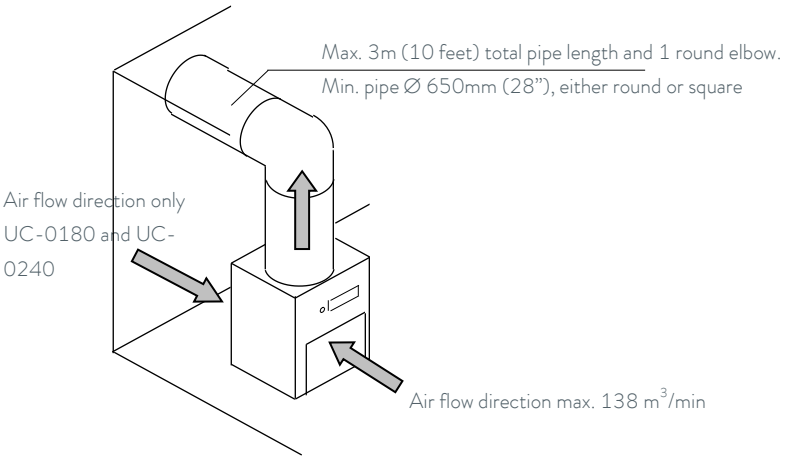


Fig. 2

Figure 1: 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 4.1).

Figure 2 shows the maximum length that the air from the chiller can be conducted if the room has not an appropriate ventilation system. In this case it is still necessary to install a ventilation grid facing the condenser(s) with a minimum surface of 0.75 m2 (8 square feet).

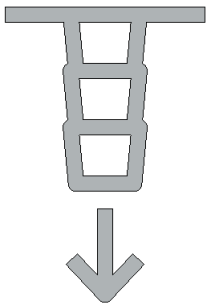
Make sure that if the chiller is vented to the outside there is a way (a louver door or shutoff door on outside wall) to keep the cold outside air from entering the chiller when it is not operating. Take into account the pressure drop created by these elements when sizing the air duct.

In this type of installation consider that the chiller will be drawing into the room the same amount of air that it is exhausting to the outside.

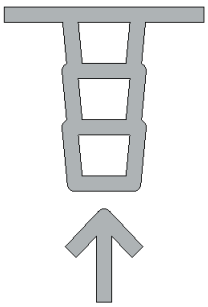
The Ultracool units must always operate with the panels closed to enable the inlet of fresh air only through the condenser.

3.4 IDENTIFICATION LABELS ON THE ULTRACOOL UNIT

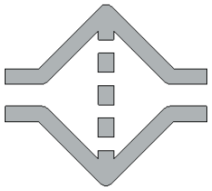
You can find the following labels on the Ultracool unit:



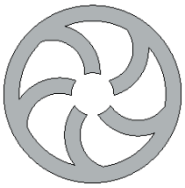
Water outlet from the installation to the Ultracool unit **(inside the housing)**



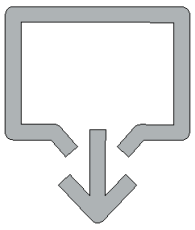
Water inlet from the installation to the Ultracool unit **(inside the housing)**



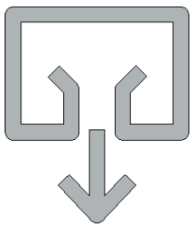
Water filter pressure drop



Water pump pressure



Drain **(inside the housing)**



Connection for the tank overflow **(inside the housing)**

Power supply depending on version

Danger of cuts! Completely disconnect the chiller power supply before opening this cover

3.5 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.

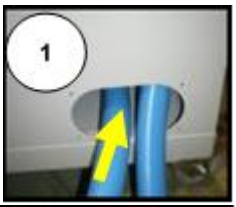
The chiller should be located as close as possible to the application. Pressure drop in the pipe should not exceed 0.7 bar. The water lines must be in pipes of at least 1".

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.

To perform the water connections **make sure the chiller is turned Off and disconnected from any power supply** and open the left panel of the chiller.

Superplus models:

1. Introduce the inlet and outlet water pipes inside the chiller housing through the connections port. There are two connections ports available; one at the back panel and the other at the left panel. You can use the most suitable for you and close the other with the cover supplied.



2. Connect the inlet water pipe to the hose carrier located at the inlet of the water filter.

3. Connect the outlet water pipe to the hose carrier located at the pump outlet. See the identification labels.

4. Connect a pipe at the drain and overflow connection located at the bottom of the water tank. Use a flexible pipe with 10mm internal diameter.

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

Standard models: The user pump must provide the chiller with the flow indicated in the Ultracool characteristics plate (see point 8). Take into account that the maximum pressure at the chiller's inlet cannot exceed 6 bar.

Standard with pump models: If the pump is to draw liquid from a level lower than the pump suction port, a foot/non-return valve must be fitted to the water inlet from the installation to the Ultracool unit.

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 designed for that purpose (see point 3.6).

To prevent rusting of the water pipes, we recommend plastic pipes and fittings.

Where flexible tubing is used, it should be of reinforced construction and rating for a minimum working pressure of 6 bar g (90 psig) within -15°C and 30°C (5°F and 86°F).

3.6 ELECTRICAL CONNECTION

Operating voltage 400VAC +/-10%, 50Hz, 3 Ph or 460VAC +/-10%, 60Hz, 3 Ph depending on the version. It must be checked that the supply voltage does not exceed a maximum variation of 10% referring to nominal.

Introduce the main power supply cable through the cable gland located at the bottom of the right panel (see fig. 7). Avoid as much as possible that the cable gets in contact with the air/refrigerant heat exchanger (which looks like a radiator) as its surface gets hot during operation (see fig. 8). Connect the cable with the incoming power terminal block which is located on the left side of the X1 terminal block inside the electrical box of the chiller (see fig. 9).

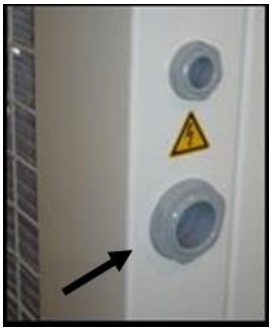


Fig. 7

Fig. 8

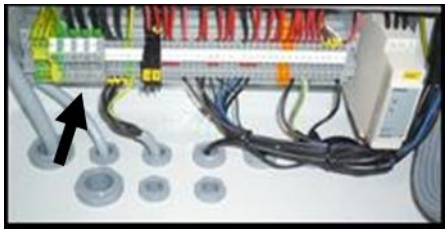


Fig. 9

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 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: During the initial commissioning, the chiller must stay turned Off but connected to the power supply (Main power switch On) for at least 6 hours (see point 4.2). During this time the chiller must not receive any On signal; do not connect the wire bridge supplied between terminals 23 and 24 yet.

- Terminals 25 and 26, external solenoid valve connection: They can be used to supply a solenoid valve with 24VAC. If the pipes of the application are installed above the level of the chiller's outlet this valve prevents backflow when the chiller is stopped (see point 3.5). These terminals are only at 24V 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.

4 START-UP

4.1 OPERATING CONDITIONS

The control thermostat in the chiller will control it in order to maintain the preset cold water temperature.

Water temperature at the inlet:

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

Cold water temperature at the outlet:

Minimum:	13°C (55°F)
Maximum:	25°C (77°F)

Temperature of the ambient air:

Nominal:	25°C (77°F)
Minimum:	-15°C (5°F) (1)
Maximum:	50°C (122°F)

(1) 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 service engineer can adjust the antifreeze setpoint. The following table shows the ethylene glycol concentration and the antifreeze adjustment required.

Glycol concentration (2) 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	13°C or more	0% 0°C	15% -5°C	30% -15°C

Glycol concentration (2) 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	55°F or more	0% 32°F	15% 23°F	30% 5°F

(2) 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.

4.2 CHILLER START-UP

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 start-up process.

Turn Off the Main power switch (to avoid any possibility of unexpected start-up of the equipment during this operation). Open a lateral panel, open the tank cover and fill the tank **with water of the required quality (see annex 10), the suitable glycol concentration** according to **point 4.1** of this manual. Using the 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. Lift the level switch manually to make sure it resets itself: when it resets you will hear its contact "click".

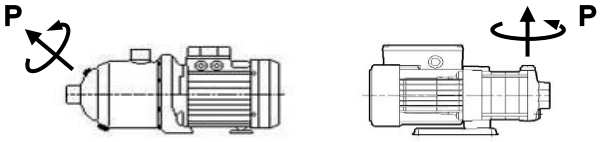
Prime the pump in order to release any air inside, **in superplus models**:

1. Remove the priming plug (P, see diagram below).
2. Keep the priming plug open until only liquid runs out the priming plug.
3. Replace the priming pump and tighten securely.

Standard with pump models:

1. Close the external manual valve at the Ultracool outlet.
2. Remove the priming plug (P, see diagram below).
3. Pump priming:
   a. **If the liquid level in the tank is below the pump inlet:** Pour water through the priming port. Make sure that the suction pipe and pump are completely filled and vented.
   b. **If the liquid level in the tank is above the pump inlet:** Keep the priming plug open until only liquid runs out the priming plug.
4. Replace the priming plug and tighten securely.
5. Open the external manual valve at the Ultracool outlet.

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 3.6.

Make sure that the Remote On/Off control is not connected between terminals 23 and 24 and a wire-bridge is not installed between them either.

When the Ultracool unit is started for the first time, it is necessary to turn On the Main power switch (element 1 in the control panel, see point 5) and wait six hours before continuing with the start-up sequence. This time is necessary for the crankcase of the compressor to heat up. **The compressor can be damaged if this procedure is not followed**.

Close both lateral panels and **switch OFF the main power switch during any electrical intervention.**

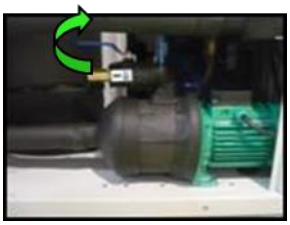
Connect the Remote ON/OFF control in terminals 23 and 24. If you do not use a remote control, connect the wire-bridge supplied inside the electrical box to link terminals 23 and 24.

Switch ON the general switch and, if necessary, give an ON signal through the remote ON/OFF, then **the unit will start up**.

Check that the working pressure of the pump is higher than nominal pressure indicated at 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. In units from UC-180 to UC-0240 with scroll compressors the compressor of the chiller is connected in phase with the water pump: Once the pump is turning in the right direction the compressor will turn correctly too. **If the compressor runs in the wrong direction it will make a loud noise while operating and the chiller will not cool down the water. Do not let the compressor run like this for long or it could get damaged.**

Increase the cold water setpoint up to the maximum allowed value (see point 5.2) to prevent the compressor from starting. Switch the main power switch OFF and then back ON. Open the left panel and adjust the water outlet valve so the pump works at the nominal pressure indicated in the chiller's data plate.

If the water tank temperature is above the programmed setpoint, the compressor will start 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 will trip by high pressure alarm, see point 7.



After 5 minutes stop the unit open the left panel and check the level in the tank. If the level is below the maximum then refill the water tank again.

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

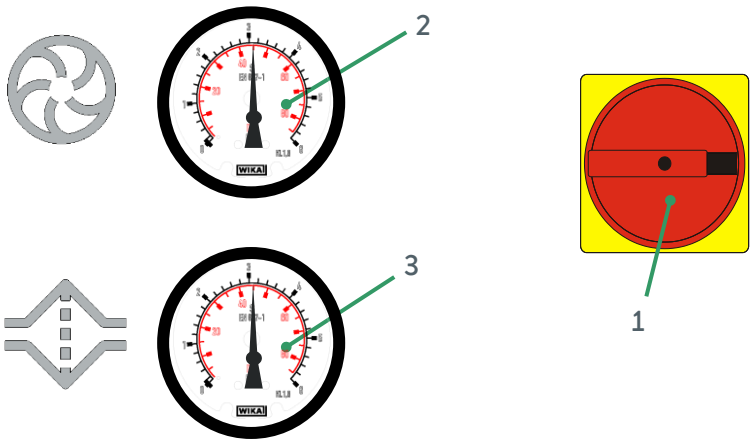
When refilling the tank respect the ethylene glycol concentration as per point 4.1.

In the standard models UC-180 and UC-240, it will be necessary to check the direction of rotation of the compressor. To do so, wait until the compressor starts up. If the direction of rotation is wrong then the compressor produces a loud and disgusting noise. In this case exchange two phases in the main power supply.

On the control thermostat select the desired temperature of the cold water outlet (see point 5.2.1). The Ultracool units are delivered with a pre-set temperature of 13°C (55°F).

Check the working pressure of the water pump, if it is higher than the 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 3.5.

5 CONTROL PANEL

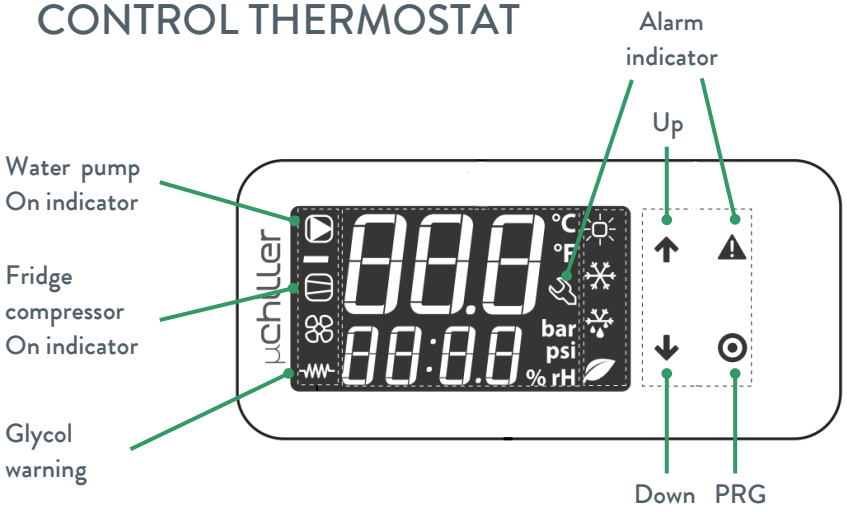


5.1 COMPONENTS OF THE CONTROL PANEL

The control panel consists of the following elements:

1. Main power switch: connects and disconnects the Ultracool unit from the power supply.
2. Water pressure gauge: indicates the pressure supplied by the pump (superplus and standard with pump models) or the pressure at the inlet (standard models).
3. Water filter pressure gauge: indicates the pressure drop of the water filter and the evaporators (superplus units) or the water outlet pressure (standard units).
4. Control thermostat: indicates the cold water temperature at the outlet of the Ultracool unit and enables it to be regulated.

5.2 CONTROL THERMOSTAT



5.2.1 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 3.6.

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:

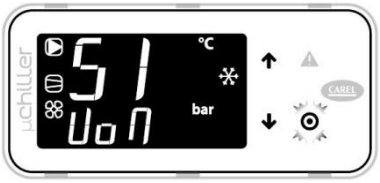
- DOWN for 3 s to access the basic control screens.
- UP and DOWN to cycle through the screens and set the parameters.
- PRG to change the parameter value and save the changes.
- PRG (3 s) or PRG while on the “ESC” screen to return to the standard display.

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 3.6). “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 7). 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 A30: Compressor overload alarm.
- 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.

6 MAINTENANCE

6.1 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 state of the water filter, if the pressure drop exceeds 1 bar (10 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.

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 10), the suitable glycol concentration according to point 4.1 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 authorized service engineer to perform the preventive maintenance.

7 TROUBLESHOOTING

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 (20 bar). It stops the compressor	Lateral panels of the housing open	Close the panels.	Disconnect the chiller and connect it again by turning the Off/On power switch (element 1 on point 5.1).
	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.	
	Water temperature too high	Try to cool down the water in the circuit running the chiller with the application stopped. If the unit still stops, try doing this with the outlet valve completely closed (see point 4.2).	
	Motor fan not working	The motor fan is not working if it is not turning when the chiller is running and tripping by A25, then **contact authorized technical service**	
	High pressure switch failure	**Contact authorized technical service**	
A29 **Alarm due to low pressure of the refrigerant:** The pressure of the refrigerating circuit is below the minimum allowed (0,5 bar)	Ambient temperature too low	The minimum ambient temperature is -15°C	The Low-pressure safety switch (SLP) automatically resets itself when the pressure is back to normal
	Water freezing	Verify the ethylene glycol content (see point 4.1). If the problem persists **contact an authorized technical service.**	
	Gas leakage	**Contact authorized technical service**	
	Low pressure switch failure	Contact **an authorized technical service** to replace it	

FAULT	CAUSE	SOLUTION	RESTART PROCEDURE
A30 Compressor overload alarm	Excess current	Check if the electrical connections are correct. Check supply voltage and power surges.	Disconnect the chiller (turn Off the main power switch, see element 1 on point 5). Open the electrical box and reset the circuit breaker. Turn the Main power switch On and start the unit through the remote On/Off control.
	Compressor running in the wrong direction	All the motors in the chiller are delivered turning in the same direction. Verify that the pump is turning in the right direction. See point 4.2.	
A10 Water level alarm (only SP units)	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 back panel, open the water tank and 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 and connect it again by turning the Off/On power switch (element 1 on point 5)
	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	If there is a leak in the water pump seal **contact authorized technical service** to replace the whole water pump. Check that the water quality is inside the limits (see annex 10).	
or Water pump overload (only SP units)	Circuit breaker Q2 is Off	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 (turn off the main power switch, see element 1 on point 5). Open the electrical box of the chiller and reset the circuit breaker Turn the Main power switch On and start the unit through the remote On/Off control.

FAULT	CAUSE	SOLUTION	RESTART PROCEDURE
or Differential pressure switch trip / flow switch trip (only ST units and units with Flow Switch option)	Water filter blocked Water circuit blocked Possible freezing	Replace the water filter element and check the water quality Clean the water circuit Check the proportion of ethylene glycol	Switch the chiller Off and back On to reset the alarm.
A28 Antifreeze control operates continuously (see point 5)	Water circuit blocked Possible freezing due to low ambient temperature Water tank temperature sensor fault	Clean the water circuits, if necessary replace the water filter element. Check for closed valves in the circuit. The ethylene glycol concentration must be according to point 4.1 and the antifreeze setpoint also has to be adjusted according to it. **Contact authorized technical service.** Measure the water temperature inside the tank and check that it is approximately the same as shown on the control thermostat's display. If it is not **contact authorized technical service.**	The control will go back to normal operation when the problem is solved
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 4.1). Disconnect the application from the chiller for a while and run the chiller without load. If the problem persists **contact authorized technical service.**	The chiller is still working normally
A32, A33, A65, A66 Maintenance warning	The chiller has exceeded the working hours defined between preventive maintenances	**Contact authorized technical service** for a preventive maintenance of the unit.	The chiller is still working normally. The authorized technical service will reset the warning during the preventive maintenance

8 TECHNICAL FEATURES

8.1 TECHNICAL FEATURES 50HZ

UC CE			60	80	100	140	180	240
Cooling capacity		kcal/h	6117	8086	9795	12061	18920	22655
		kW	7,11	9,40	11,39	14,02	22,00	26,34
Water flow		l/h	1204	1598	2016	2628	3753	5043
Water pressure		3 bar	4,0	4,0	3,9	3,7	3,2	2,7
		5 bar	5,3	5,3	5,1	4,8	5,2	4,9
Refrigerant circuits		Nº	1	1	1	1	1	1
Compressor		kW	2,02	2,26	2,81	3,78	4,78	6,25
		Nº	1	1	1	1	1	1
Condenser		kW	9,13	11,66	14,20	17,80	26,78	32,59
		Nº	1	1	1	1	2	2
Evaporator		kW	7,11	9,40	11,39	14,02	22,00	26,34
		Nº	1	1	1	1	1	1
Motor fan		Nº	1	1	1	1	1	1
		kW	1,04	1,04	1,04	1,04	1,04	1,04
		m3/h	7000	7000	7000	7000	9000	9000
3 bar pump		kW	0,75	0,75	0,75	0,75	0,75	0,75
	max	l/h	8000	8000	8000	8000	8000	8000
	min		800	800	800	800	800	800
	max	bar	4,2	4,2	4,2	4,2	4,2	4,2
	min		1	1	1	1	1	1
5 bar pump		kW	1,10	1,10	1,10	1,10	2,20	2,20
	max	l/h	8000	8000	8000	8000	12000	12000
	min		800	800	800	800	1200	1200
	max	bar	5,6	5,6	5,6	5,6	5,8	5,8
	min		1,8	1,8	1,8	1,8	3	3
Volume water tank		l	100	100	100	100	100	100
Sound Pressure Level (1)		dB(A)	56,3	60,1	58,5	58,1	56,0	57,5
Power	ST	kW	3,06	3,30	3,85	4,82	5,82	7,29
	SP 3bar	kW	3,81	4,05	4,60	5,57	6,57	8,04
	SP 5bar	kW	4,16	4,40	4,95	5,92	8,02	9,49
Max. Fuse		A	20	25	25	25	32	32
Voltage		V/Ph/Hz	400/3/50					
Nominal COP			2,32	2,85	2,96	2,91	3,78	3,61

(1) Sound Pressure Level at 5 meters from the chiller in free-field conditions.
All data related to the following conditions: Water outlet temperature 10°C and ambient temperature 25°C.

8.2 TECHNICAL FEATURES 60HZ

UC USA			60	80	100	140	180	240
Cooling capacity		ton	2,64	3,14	3,96	4,74	7,35	8,63
		kW	9,28	11,04	13,94	16,68	25,87	30,38
Water flow		US gal/min	5,30	7,04	8,88	11,57	16,52	22,20
Water pressure		40 psi	57	55	55	54	51	45
		70 psi	78	78	77	75	73	67
Refrigerant circuits		Nº	1	1	1	1	1	1
Compressor		kW	2,87	2,86	3,67	4,91	6,19	8,46
		Nº	1	1	1	1	1	1
Condenser		ton	3,45	3,95	5,00	6,13	9,11	11,03
		Nº	1	1	1	1	2	2
Evaporator		ton	2,64	3,14	3,96	4,74	7,35	8,63
		Nº	1	1	1	1	1	1
Motor fan		Nº	1	1	1	1	1	1
		kW	1,04	1,04	1,04	1,04	1,04	1,04
		scfm	4120	4120	4120	4120	5297	5297
40 psi pump		kW	1,04	1,04	1,04	1,04	1,04	1,04
	max	US gal/min	33,0	33,0	33,0	33,0	33,0	33,0
	min		3,3	3,3	3,3	3,3	3,3	3,3
	max	psi	59	59	59	59	59	59
	min		30	30	30	30	30	30
70 psi pump		kW	1,70	1,70	1,70	1,70	1,70	1,70
	max	US gal/min	33,0	33,0	33,0	33,0	33,0	33,0
	min		3,3	3,3	3,3	3,3	3,3	3,3
	max	psi	81	81	81	81	81	81
	min		49	49	49	49	49	49
Volume water tank		US gal	26,4	26,4	26,4	26,4	26,4	26,4
Sound Pressure Level (1)		dB(A)	56,5	60,8	60,8	60,8	58,0	59,1
Power	ST	kW	3,91	3,90	4,71	5,95	7,23	9,50
	SP 40psi	kW	4,95	4,94	5,75	6,99	8,27	10,54
	SP 70psi	kW	5,61	5,60	6,41	7,65	8,93	11,20
Max. Fuse		A	20	25	25	25	32	32
Voltage		V/Ph/Hz	460/3/60					
Nominal COP			2,37	2,83	2,96	2,80	3,58	3,20

(1) Sound Pressure Level at 5 meters from the chiller in free-field conditions.
All data related to the following conditions: Water outlet temperature 10°C (50°F) and ambient temperature 25°C (77°F).

9 LOG BOOK

9.1 LOG BOOK

Date	Remarks	Signature

10 ANNEXES

10.1 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 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 µS/cm.
A concentration of ethylene glycol higher than the 30% can seriously damage the pump of the Ultracool units.

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.