LCX

Installation, use and maintenance manual

COOLING-ONLY, HEAT PUMP AND FREE-COOLING VERSIONS

Galletti
AIR CONDITIONING

USER MANUAL

- For further information or communication, please contact the company at: info@galletti.it
- To find out the weight of each unit, please refer to the table in the paragraph “Rated specifications”

CONTENTS

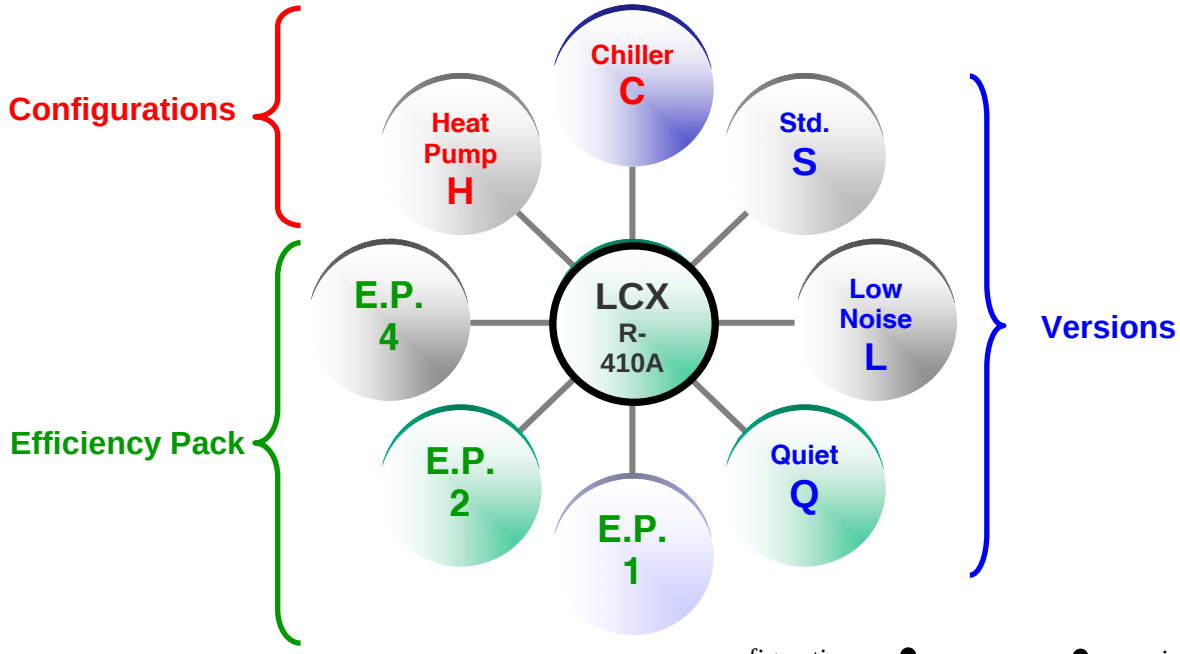
Declaration of conformity

The declaration of conformity is enclosed as a separate document with the papers supplied with the machine, usually placed inside the electric control board.

1 THE SERIES

COOLING-ONLY and HEAT PUMP

Fluid chillers and heat pumps designed to cool water or mixtures of water and an antifreeze agent, intended for civil air-conditioning and industrial cooling systems. LCX chillers, available in versions with different acoustic designs (“S”, “L”, “Q”) and cooling circuit architectures (Efficiency pack 1, 2 , 4), they cover a range of cooling capacities from 44.4 to 355 kW, calculated with reference to standard test conditions of water 12°/7° - air entering the finned block heat exchangers 35°C.



Example of product code composition:

configuration

version

Size + eff. pack

Full name of the machine		L	C	X	104	H	Q
Commercial name		L	C	X			
Model		104					
Operation		H					
chiller	C						
heat pump	H						
Version		Q					
standard	S						
low noise	L						
Quit	Q						

Configurations:

Chiller - cooling only → “**C**”
Heat pump → “**H**”

Versions:

Standard version → “**S**”
Low-noise version – for a low-noise impact → “**L**”
Quiet version - for an extremely low-noise impact → “**Q**”

Efficiency Packs:

Efficiency pack **1** → **1 compressor per circuit**
Efficiency pack **2** → **2 tandem compressors on 1 circuit**
Efficiency pack **4** → **2 tandem compressors on 2 circuits**

Below is a list of all possible models, broken down by efficiency pack :

efficiency pack 1	efficiency pack 2	efficiency pack 4	Indicative cooling capacity of the "cooling-only" version [kW]
-	LCX042CL/CQ	-	48
-	LCX042HL/HQ	-	48
-	LCX052CL/CQ	-	53
-	LCX052HL/HQ	-	53
-	LCX062CS/CL/CQ	-	63
-	LCX062HS/HL/HQ	-	63
-	LCX072CS/CL/CQ	-	70
-	LCX072HS/HL/HQ	-	70
-	LCX082CS/CL/CQ	-	77
-	LCX082HS/HL/HQ	-	77
LCX091CS/CL/CQ	LCX092CS/CL/CQ	LCX094CL/CQ	92
LCX091HS/HL/HQ	LCX092HS/HL/HQ	LCX094HL/HQ	92
LCX101CS/CL/CQ	LCX102CS/CL/CQ	LCX104CL/CQ	103
LCX101HS/HL/HQ	LCX102HS/HL/HQ	LCX104HL/HQ	103
LCX121CS/CL/CQ	LCX122CS/CL/CQ	LCX124CS/CL/CQ	125
LCX121HS/HL/HQ	LCX122HS/HL/HQ	LCX124HS/HL/HQ	125
LCX141CS/CL/CQ	LCX142CS/CL/CQ	LCX144CS/CL/CQ	138
LCX141HS/HL/HQ	LCX142HS/HL/HQ	LCX144HS/HL/HQ	138
LCX161CS/CL/CQ	LCX162CS/CL/CQ	LCX164CS/CL/CQ	155
LCX161HS/HL/HQ	LCX162HS/HL/HQ	LCX164HS/HL/HQ	155
-	-	LCX174CS	162
-	-	LCX174HS	162
-	-	LCX194CS/CL/CQ	187
-	-	LCX194HS/HL/HQ	187
-	-	LCX214CS/CL/CQ	209
-	-	LCX214HS/HL/HQ	209
-	-	LCX244CS/CL/CQ	237
-	-	LCX244HS/HL/HQ	237
-	-	LCX274CS/CL/CQ	271
-	-	LCX274HS/HL/HQ	271
-	-	LCX294CS/CL/CQ	296
-	-	LCX294HS/HL/HQ	296
-	-	LCX324CS/CL/CQ	314
-	-	LCX324HS/HL/HQ	314
-	-	LCX364CS/CL	355
-	-	LCX364HS	355

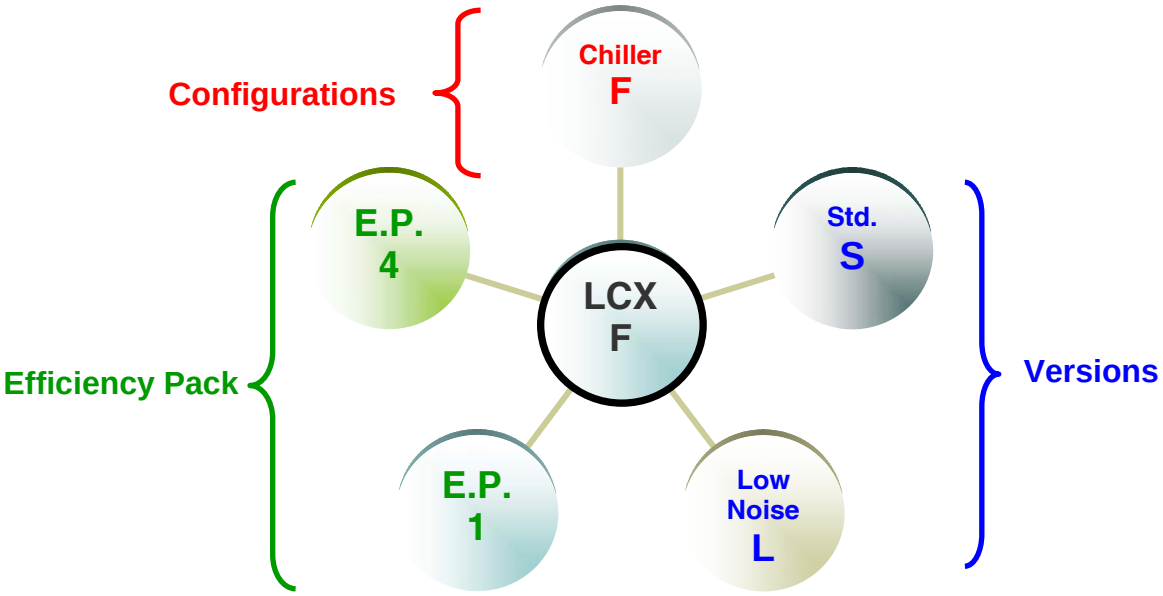
FREE-COOLING

Fluid chillers with Free-Cooling exchange designed to cool water or mixtures of water and an antifreeze agent, intended for civil air-conditioning and industrial cooling systems. LCX chillers, available in versions with different acoustic designs ("S", "L") and cooling circuit architectures (Efficiency pack 1, 4), they cover a range of cooling capacities from 44 to 355 kW, calculated with reference to standard test conditions of water 12°/7° - air entering the finned block heat exchangers 35°C and Free-Cooling operating conditions with an air temperature of +5°C and a temperature differential of the finned block heat exchangers of 15°/12°C.

Configurations: Chiller Free-Cooling → "**F**"

Versions: Standard version → "**S**"
Low-noise version – for a low-noise impact → "**L**"

Efficiency Packs: Efficiency pack **1** → **1 compressor per circuit**
Efficiency pack **4** → **2 tandem compressors on 2 circuits**



Below is a list of all possible models, broken down by efficiency pack:

efficiency pack 1	efficiency pack 4	Indicative cooling capacity of the "cooling-only" version [kW]
LCX041FS/FL	-	49
LCX051FS/FL	-	56
LCX061FS/FL	-	64
LCX071FS/FL	-	72
LCX081FS/FL	-	81
LCX091FS/FL	-	93
LCX101FS/FL	-	105
-	LCX124FS/FL	125
-	LCX144FS/FL	139
-	LCX164FS/FL	160
-	LCX194FS/FL	191
-	LCX214FS/FL	213
-	LCX244FS/FL	240
-	LCX274FS/FL	270
-	LCX294FS/FL	295
-	LCX324FS/FL	314
-	LCX364FS	355

2 FIELD OF APPLICATION

These machines are intended for cooling-heating water and glycol solutions up to a maximum of 35% the weight, in civil, industrial and technological air-conditioning environments.
Their use is recommended within the functioning limits carried in this manual, or else the warranty attached to the sales contract would cease.

3 GENERAL INFORMATION

- When installing or servicing the chiller, you must strictly follow the rules provided in this manual, comply with the directions on the units and take all such precautions as are necessary.

- The fluids under pressure in the cooling circuit and the presence of electrical components may cause hazardous situations during installation and maintenance work.

Therefore only qualified personnel may perform any kind of work on the unit.

- THE UNIT MUST BE STARTED UP FOR THE FIRST TIME EXCLUSIVELY BY QUALIFIED PERSONNEL AUTHORISED BY GALLETTI S.P.A. (SEE ANNEX).

- FAILURE TO COMPLY WITH THE RULES PROVIDED IN THIS MANUAL OR ANY MODIFICATION MADE TO THE UNIT WITHOUT PRIOR AUTHORISATION WILL RESULT IN THE IMMEDIATE INVALIDATION OF THE WARRANTY.

Attention: Before performing any kind of work on the unit, make sure it has been disconnected from the power supply.

4 INSPECTION, CONVEYANCE, SITING

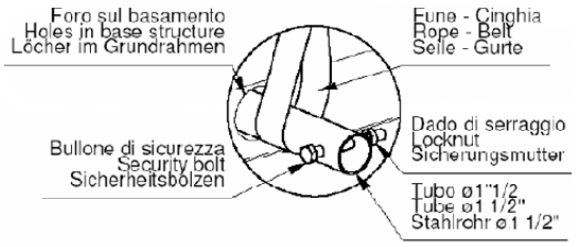
4.1 INSPECTION

Upon receiving the unit, check that it is perfectly intact: the chiller left the factory in perfect conditions; immediately report any signs of damage to the carrier and note them on the Delivery Slip before signing it. Check, in particular, that the fins of the finned block heat exchangers are not bent and have not undergone impacts that may have impaired the system's tightness under pressure.
The manufacturer or its agent must be promptly notified of the entity of the damage.
The Customer must submit a written report describing every significant sign of damage.

- commissioning report,
- wiring diagram,
- warranty certificate and list of authorised service centres,
- check the integrity of the documents accompanying the unit and of this manual.

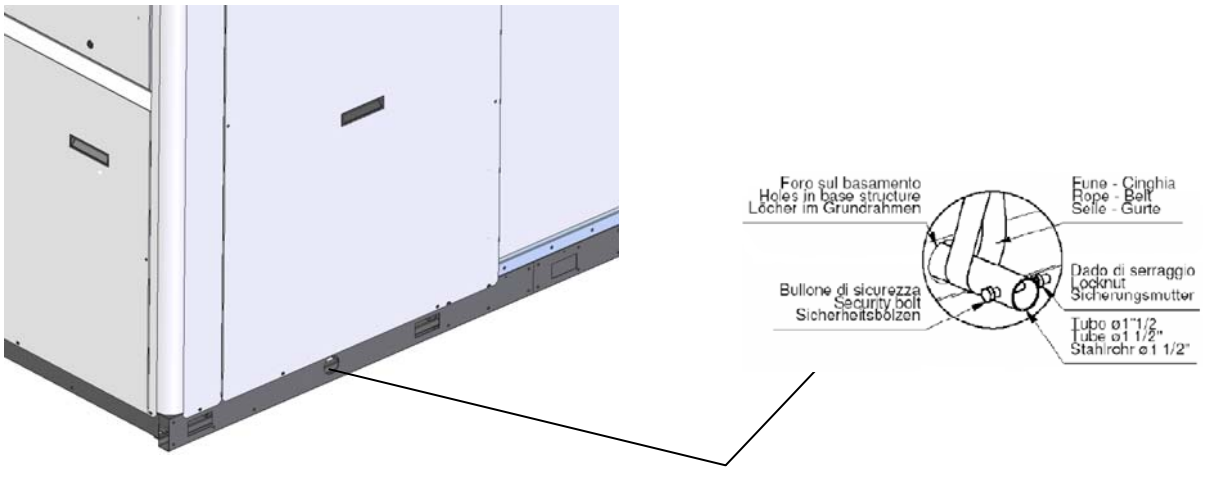
4.2 LIFTING AND CONVEYANCE

While the unit is being unloaded and positioned, utmost care must be taken to avoid abrupt or violent movements. The unit must be handled carefully and gently: avoid using machine components as anchorages when lifting or moving it.
The unit should be lifted using Ø1½" GAS steel pipes at least 3mm thick, to be inserted in the round holes provided on the base side members (see fig. below) and identified by means of stickers. The pipes, which should protrude by at least 250-300mm on every side, must be slung with ropes of equal length secured to the lifting hook (provide stops at the ends of the pipes to prevent the ropes from slipping off due to the weight).



Use ropes or belts long enough to extend beyond the height of the unit and place spacer bars and boards on the top of the unit to avoid damaging the sides and top of the unit itself. The rectangular holes are provided for the attachment of vibration damping supports (optional).

Attention: In all lifting operations make sure that the unit is securely anchored in order to prevent accidental falls or overturning.



4.3 UNPACKING

The packaging must be carefully removed to avoid the risk of damaging the unit. The packaging includes various materials: wood, cardboard, nylon, etc.
It is recommended to keep them separately and deliver them to suitable waste disposal or recycling facilities in order to minimise their environmental impact.
Attention: if the unit is supplied with a pump or pumps and/or tank, you will find the expansion tank packaged in the fan compartment; it must be fixed to the pump intake pipe, where a "TEE" is fixed so as to form a tight seal, or on the tank itself. Remove the cap and screw in the expansion tank (this should be done by qualified personnel), check the pre-fill pressure (0.5 - 1.0 bars-r) before filling the water circuit and starting up the chiller.
Attention: the size of the expansion tank will depend both on the volume of water contained in the system and the water temperature range; always check the tank capacity in relation to the water content of the system.

4.4 SITING

You should bear in mind the following aspects when choosing the best site for installing the unit and the relative connections:
- size and origin of water pipes;
- location of power supply;
- accessibility for maintenance or repairs;
- solidity of the supporting surface;
- ventilation of the air-cooled condenser and necessary clearance;
- direction of prevalent winds: avoid positioning the unit in such a way that the prevalent winds favour the backflow of air to the condenser coils; a speed of 8 m/s (28.8 km/h) already generates a sufficient stagnation pressure to guarantee approx. 60% of the nominal air flow rate.[In situations where the action of air currents is inevitable and there is a simultaneous presence of temperatures below – 5°C, the control of condensation for low outdoor temperatures must be of the flooding type or with a device for choking the condensing exchanger -contact the technical department for further details]
- possible reverberation of sound waves.

All models belonging to the LCX series are designed and built for outdoor installation: avoid covering them with roof structures or positioning them near plants (even if they only partly cover the unit) which may interfere with the regular ventilation of the unit condenser.
It is a good idea to create a base of adequate dimensions to support the unit. This precaution becomes essential when the unit is to be sited on unstable ground (various types of soil, gardens, etc.).

We recommend placing a rigid rubber strip between the base frame and the supporting surface.

Whenever more effective insulation is required, it is recommended to use vibration-damping rubber or spring supports (ref. par. 16).

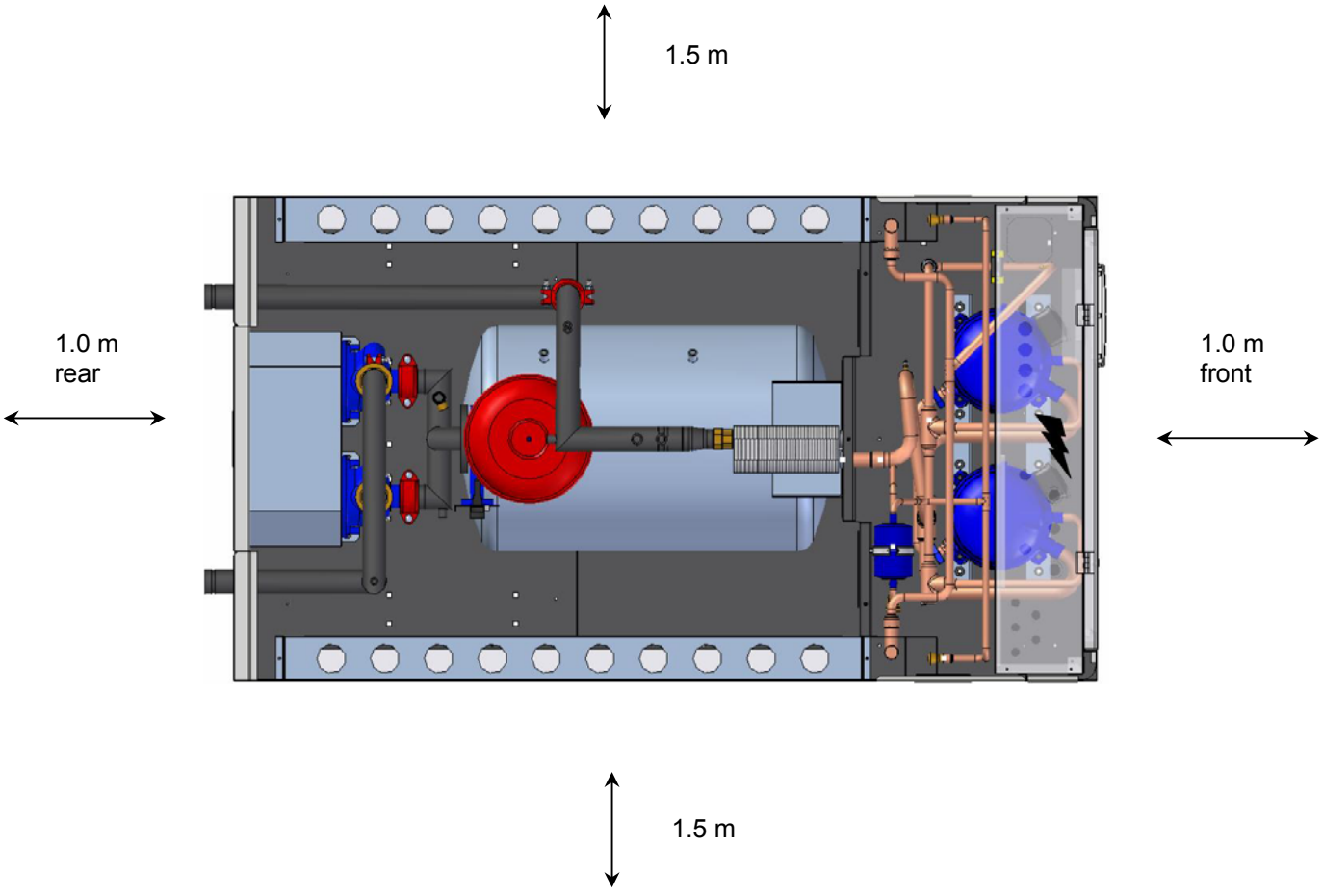
In the case of installation on roofs or intermediate storeys, the unit and pipes must be insulated from walls and ceilings by placing rigid rubber joints in between and using supports that are not rigidly anchored to the walls.
If the unit is to be installed in proximity to private offices, bedrooms or areas where noise levels must be kept down, it is advisable to conduct a thorough analysis of the sound field generated and verify its compatibility with the local laws in force.

5 INSTALLATION

5.1 INSTALLATION CLEARANCE REQUIREMENTS

It is of fundamental importance to ensure an adequate volume of air both on the intake and outlet sides of the finned condenser coils; it is highly important to prevent the air delivered from being re-aspirated as this may impair the performance of the unit or even cause an interruption of normal operation. For this reason it is necessary to guarantee the following clearances (see figure on this page):

- rear side/plumbing connections: min. 1.0 metre to guarantee access to plumbing connections and/or for any necessary maintenance on the pumps, tank, expansion tank, flow switch and 3-way free-cooling valve.
- electric control board side: min. 1.0 metre to guarantee access for inspection and/or maintenance of cooling components.
- finned pack heat exchanger side: min. 1.5 metres to ensure proper air circulation and access to the compressor compartment, also from the side.
- top side: there must be no obstacle to expulsion.



Top view of the unit

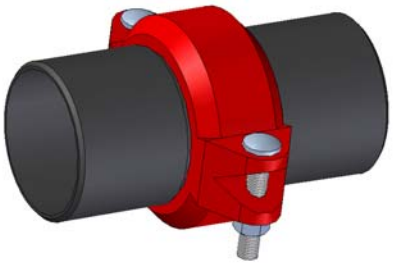
5.2 GENERAL GUIDELINES FOR PLUMBING CONNECTIONS

When you are getting ready to set up the water circuit for the evaporator you should follow the directions below and in any case make sure you comply with national or local regulations (use the diagrams included in this manual as your reference).

- Connect the pipes to the chiller using flexible couplings to prevent the transmission of vibrations and to compensate for thermal expansions. These units are all configured for installation of the water inlet-outlet pipes outside the unit (on the rear) and these pipes are supplied as a standard accessory at no extra cost for the customer.

- Install the following components on the piping:

  - pair of quick-connection couplings with pipe section to be welded (optional item that may be selected from the price list). They facilitate the connecting operations to the plumbing system, greatly speeding up installation.



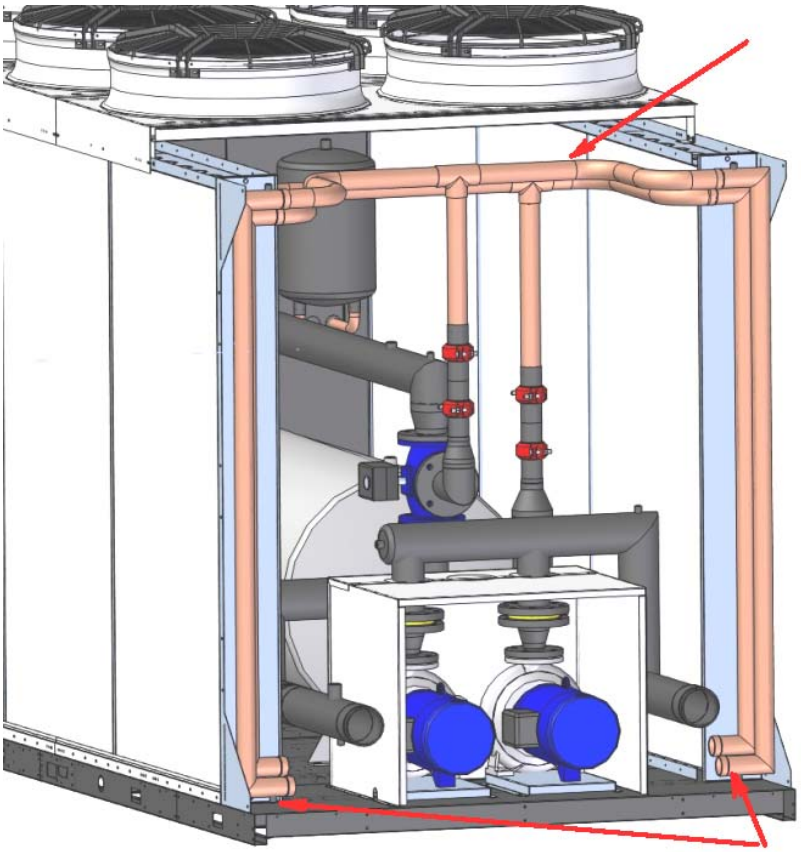
  - temperature and pressure indicators for routine maintenance and monitoring of the unit. Pressure control on the water side allows to assess the correct functioning of the expansion tank and to detect water leakage in advance.

  - sumps on inlet and outlet piping for temperature detection, for a direct view of operating temperatures. They can also be consulted on the microprocessor on board the unit.

  - cut-off valves (gate valves) to isolate the unit from the hydraulic circuit.

  - metal net filter compulsory (inlet piping) with mesh no large than 1 mm, to protect the heat exchanger from slag or impurities inside the piping.
    If the machine is combined with process cycles, it is recommended to install a readily serviceable uncoupling exchanger to prevent possible operation blockages and/or breakage of the plate evaporator.

  - air vent valve placed on the higher parts of the hydraulic circuit to bleed the air. [The internal pipes of the unit are fitted with small air vent valves for bleeding the unit itself: **this operation should be conducted when the unit is disconnected from the power supply -** make sure that the circuit is completely full of water and (FS-FL versions) bleed out the air from the water coils to prevent pump cavitation (see fig.) and check again to make sure there is no air before starting the pump for the first time].



- discharge cock and, where needed, drain tank in order to empty the system for maintenance or seasonal stops. [A 1" drainage valve is provided on the optional water buffer tank: **this operation may only be carried out when the unit is disconnected from the power supply**].

- On the FS-FL versions, it is compulsory to use glycol solutions (max. 35% weight) in order to prevent damage to the finned coil caused by freezing which is very difficult to repair. Carefully assess the minimum air T to which the unit may be exposed and then determine the % of antifreeze to be added.

Failure to use anti-freezing solutions may cause serious damage of the free-cooling coils and to the hydraulic/cooling circuit in general.

5.3 WATER CONNECTION TO THE EVAPORATOR

It is extremely important that the water inlet corresponds with the connection marked with the writing “Water Inlet”.

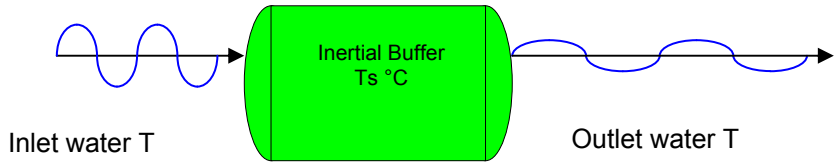
Otherwise the evaporator would be exposed to the risk of freezing since the antifreeze thermostat would not be able to perform its function; moreover the reverse cycle would not be activated in the cooling mode, resulting in additional risks of malfunctioning.
The size and positions of the hydraulic connections are carried on the dimensional tables at the end of the manual.

The water circuit must be set up in such a way as to guarantee that the nominal flow rate of the water supplied to the evaporator remains constant (+/- 15%) in all operating conditions.

The compressors often work intermittently, since the chilling requirements of the user generally do not coincide with the output of LCX unit. In systems containing little water, where the thermal inertia of the water is lower, it is a good idea to check that the water content in the section delivering to users satisfies the condition below:

$$V = \frac{Cc \times \Delta\tau}{\rho \times Sh \times \Delta T \times Ns}$$

V	= water content in user section	[m3]
Sh	= specific heat of the fluid	[J/(kg/°C)]
ρ	= fluid density	kg/m3]
$\Delta\tau$	= minimum time lapse between 2 compressor restarts	[s]
ΔT	= allowed water T differential	[°C]
Cc	= Chilling power	[W]
Ns	= No. of partialization steps	



A **standard** feature of the LCX units is a device for controlling the flow rate (differential pressure switch) in the water circuit in the immediate vicinity of the evaporator.

Any tampering with said device will immediately invalidate the warranty.

It is advisable to install a metal mesh filter with mesh no large than 1mm on the inlet water pipe.

It is strongly recommended to install a safety valve in the water circuit. In the event of serious equipment faults (e.g. fire) it will enable water to be drained from the system, thereby preventing possible bursts. Always connect the drain outlet to a pipe with a diameter at least as large as that of the valve opening and direct it toward an area where the discharge of water cannot harm people. This is a standard feature of units equipped with the optional buffer tank (optional) or pump/s kit.

Attention: During hydraulic connection operations, never work with open flames near or inside the unit.

5.4 PROCEDURE FOR FILLING THE TANK

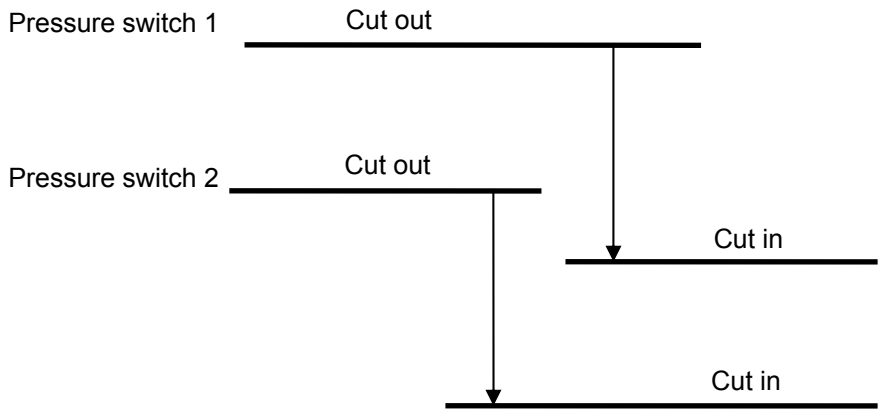
The tank has not been designed to withstand a depression greater than -0.15 Bar. For this reason, attention should be paid to ensure that the pressure on the pump intake side, where the expansion tank is positioned, will always be greater than 0.5 bars **while the pump is running**: this helps to reduce the risk of cavitation.

It is extremely important that the installer follows and verifies the following procedure point by point in order to prevent the risk of the tank exploding or pump cavitation:

a) Discharge the expansion tank until it reaches the pressure of 0.5 bar.
b) Fill the system and pressurise it until approximately + 1 Bar at pump intake (pump stopped).
c) Bleed the system.
d) Check the pump intake pressure (approximately 1 Bar) and start-up the system.
e) Stop the pump after 15-30 minutes and repeat the procedure from step **c)** until you can no longer hear any noises caused by the presence of air in the system.

5.5 SAFETY DEVICES ON THE HIGH-PRESSURE SIDE

Cooling circuit safety devices are provided on each refrigerant circuit according to the volumetric capacity of the compressors installed, as prescribed by Directive 97/23 (PED); in particular, with respect to equipment design, this Directive requires manufacturers to abide by the technical standard nearest to the type of object produced; in the case of chillers designed for air-conditioning or liquid cooling systems, standard UNI EN 378-2 is taken into consideration.
According to this standard, for refrigerant mass flow rates of up to 25dm3 per circuit only one pressure limiting device is required; beyond this limit 2 must be applied. Practically speaking, these are safety pressure switches designed to protect the cooling circuit in a cascade fashion.
What is meant by cascade protection is illustrated in the figure:



…where pressure switch 1 is set at the “PS” (maximum admissible pressure) of the system, while pressure switch 2 will have the setting = PS x 0.9 in accordance with the reference technical standard.

6 ELECTRICAL CONNECTIONS

6.1 GENERAL INFORMATION

Before carrying out any work on electrical parts, make sure the power supply is disconnected.

Check that the mains electricity supply is compatible with the specifications (voltage, number of phases, frequency) shown on the unit rating plate.
The power connection is made by means of a three-core cable plus neutral and earth cable or single-core cables (one per phase) + earth according to the minimum section sizes specified in the wiring diagram, which is an integral part of the documentation accompanying the chiller; the diagram code also appears on the rating plate inside the compressor compartment.

The size of the cable and line protections must conform to the specifications provided in the wiring diagram.

The supply voltage may not undergo fluctuations exceeding ±5% and the unbalance between phases must always be below 2%.

The above operating conditions must always be complied with: failure to ensure said conditions will result in the immediate invalidation of the warranty.

The electrical connections must be made in accordance with the information shown in the wiring diagram provided with the unit and current regulations.

Electrical connections and preliminary checks:

- *Put on the main switch, turn the ½-turn locking screws of the electric enclosure and open it.*
- *Introduce the power cable 400/3/50+N through the hole provided on the left side of the unit (after first removing and making a hole in the aluminium square based on the diameter of the electric cable) and secure it with a cable gland.*
- *Connect the power supply and earthing wire to the terminals of the main switch.*
- *Open the fuse carriers F1 and F2 (or Q1 and Q2 for the motor overload cutouts) of the compressors (F1-F2-F3-F4 for the fuses or Q1-Q2-Q3-Q4 for the overload cutouts in the case of LCX 4 compressor models) to prevent them from starting up in the wrong direction in the event of an incorrect phase sequence.*
- *Switch on the power supply by turning the main switch (QS) to ON.*
- *Verify whether the phase sequence R-S-T is correct by checking, on the phase sequence relay situated in the middle of the electric control board, that the green power on LED and yellow LED indicating the correct sequence both light up; if this does not occur, disconnect the chiller power supply from the external distribution panel and swap over two phases; then repeat the operation. IN NO CASE SHOULD YOU TAMPER WITH THE WIRING DOWNSTREAM FROM THE MAIN SWITCH since this may alter the correct sequence of other devices, e.g. pump(s).*
- *Close the fuse carriers F1 and F2 of the compressors (F1-F2-F3-F4 in the case of LCX 4 compressor models).*
- *Close the electrical control board and lock it by means of the ½ - turn locks.*

An earth connection is required by law. The installer must connect the earthing wire using the earthing terminal situated on the electric control board (yellow and green wire).
The power supply to the control circuit is shunted from the power line through an insulating transformer situated on the electric control board.
The control circuit is protected by suitable fuses.
A **standard** feature of all units is a phase sequence relay that verifies the correct phase sequence; this is necessary to ensure that the chiller is completely functional before enabling a compressor start-up.

6.2 FLOW SWITCH ON THE WATER SIDE

All the LCX units are fitted with a blade-type flow switch to protect the evaporator as a standard. This is installed in series with the water and electrical circuits and wired.

6.3 ELECTRIC CONNECTIONS OF THE CIRCULATION PUMP

If selected when placing the order, the pump kits are supplied pre-wired with all LCX units. For dual pump kits, whether set up according to an “AND” or “OR” logic, rotation is controlled on a time basis and triggered in the event of a fault.

The pump must be started before the chiller and stopped after the latter (minimum recommended delay: 60 seconds). If included as an option, this function is already performed by the microprocessor on the unit.

6.4 REMOTE CONTROLS

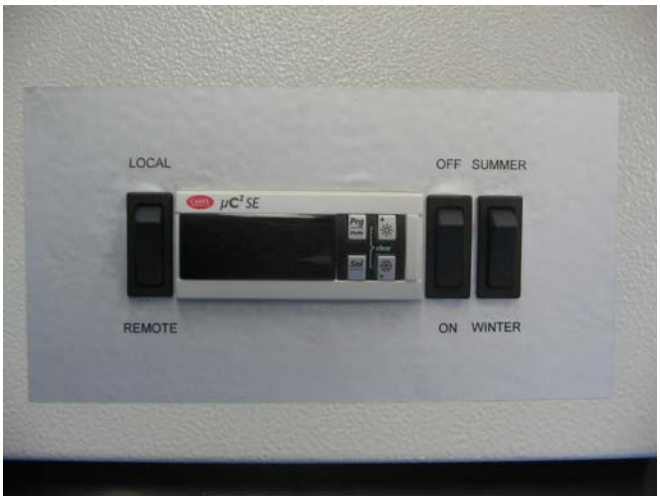
If you wish to include a remote control for switching the unit on and off, you must remove the jumper between the contacts indicated in the wiring diagram and connect the remote ON/OFF control to the terminals themselves [see annexed wiring diagram].

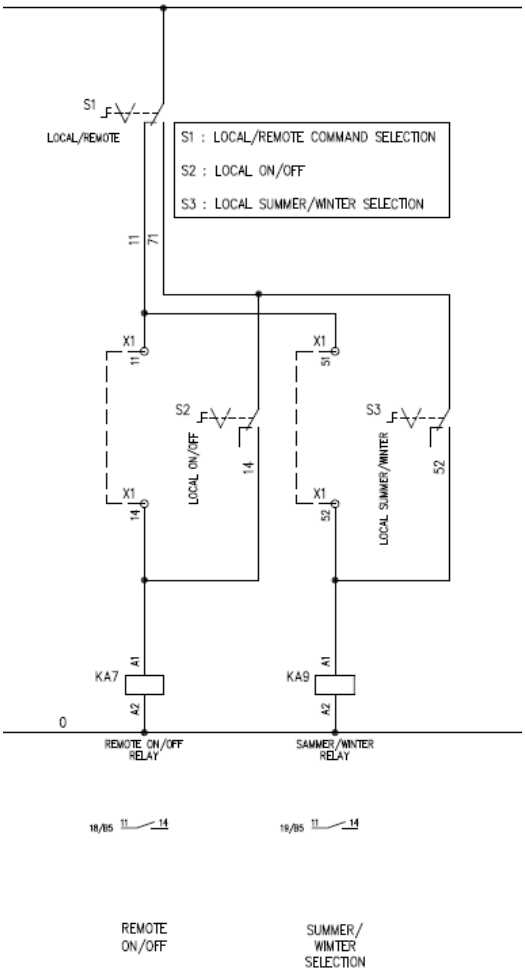
All remote controls work with a very low voltage (24 Vac) supplied by the insulating transformer on the electrical control board.

6.5 REMOTE SUMMER-WINTER SWITCHING

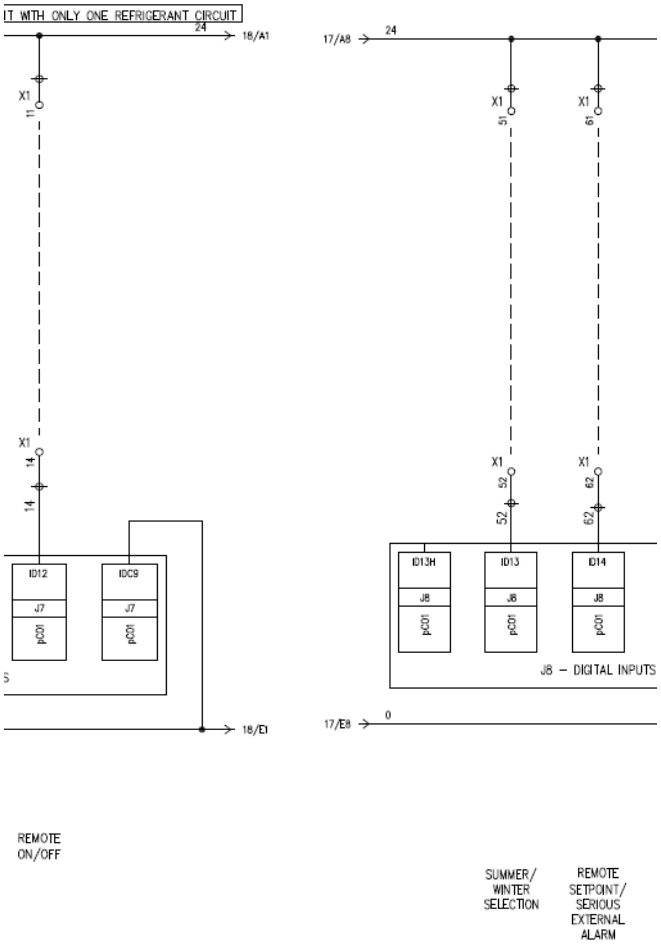
If you wish to include a remote control for switching the unit between the summer and winter operating modes, you must remove the jumper between the contacts indicated in the wiring diagram and connect the remote switching control to the terminals themselves [see annexed wiring diagram]. The switching modes vary according to whether the microprocessor control is of the basic or advanced type: detailed instructions are provided below (see extract of corresponding wiring diagram) and in the microprocessor user manual, an integral part of the documentation provided.

µChiller (available on C and H versions only)





pCO (available on all versions)



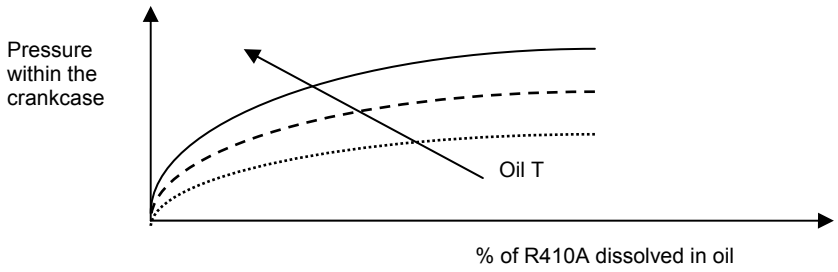
7 START-UP

7.1 PRELIMINARY CHECKS

- Check that all the valves in the cooling circuit are open (liquid line).
- Check that the electrical connections have been made properly and that all the terminals **are securely tightened**. This check should also be included in a periodic six-month inspection.
- Check that the voltage at the RST terminals is 400 V ± 5% and **make sure** the yellow indicator light of the phase sequence relay is on. The phase sequence relay is positioned in the middle right part of the electric control board; if the sequence is not duly observed, it will not enable the machine to start.
- Make sure there are no refrigerant leaks that may have been caused by accidental impacts during transport and/or installation.
- Check the power supply of the crankcase heating elements, where present.

The heating elements must be turned on at least 12-10 minutes before the unit is started. This function is carried out automatically when the main switch is off. Their function is to raise the T of the oil in the sump and limit the quantity of refrigerant dissolved in it.

To verify whether the heating elements are working properly, check the lower part of the compressors: it should be warm or in any case at a temperature of 10 -15°C higher than the ambient temperature.



The diagram above illustrates a specific property [Charles' Law] of gases, which are more soluble in liquids as the pressure increases but less soluble as the temperature increases: if the oil is held at a constant pressure, an increase in temperature will significantly reduce the amount of refrigerant dissolved in it, thus ensuring that the lubricating function desired is maintained. At the same time it should be observed that a slight foaming [1-5 mm] of the oil at start-up (pressure drop => decrease in % of solubility] is normal and will not compromise the system's reliability.

- Check that the plumbing connections have been properly made according to the indications given on the plates located on the unit itself (proper inlet and outlet connections).

- Make sure that the water circuit is duly bled to completely eliminate the presence of air: fill the circuit gradually and open the air vent valves on the top part, which the installer should have set in place.

7.2 STARTING OPERATIONS

Before starting the chiller, turn the main switch off, select the desired operating mode from the control panel [red button = heating, green button = cooling] and press the "ON" button on the control panel.
The unit will start up if enabled:

- by the safety devices of the water circulation pump/s.
- by the flow switch (or differential pressure switch).
- by the T sensor measuring the temperature of the water returning from the system [chiller inlet].
- and no alarms have been triggered.

Start-up:

- *Check that all external cocks of the water circuit are open and water flows properly (the flow alarm should not be triggered).*
- *Put the main switch in the ON position.*
  - *The pump will start immediately.*
  - *After 60 seconds the compressor will start*
- *Check the water temperature differential (12-7°C to be detected by means of a thermometer on the inlet and outlet water pipes of the unit).*
- *Check that there are no leaks on the refrigerant side and water side.*
- *Using all the screws and panels supplied, close the unit.*

If the unit fails to start up, check whether the set point has been set on the desired values.

You should not disconnect the unit from the power supply during periods when it is inoperative but only when it is to be taken out of service for a prolonged period (e.g. at the end of the season). To turn off the unit temporarily follow the directions provided in the section 7.6 "Stopping the Unit".

7.3 CHECKS DURING OPERATION

- Check the phase sequence relay on the control board to verify whether the phases occur in the correct sequence: if they do not, disconnect the unit from power supply and reverse two phases at the unit input. any undue modifications will render the warranty null and void.

All the three-phase devices on the unit, compressor, water pump and fans (some versions) have a set direction of rotation and were harmonized in the factory.

- Check that the temperature of the water entering the evaporator (returning from the system) is close to the setpoint value entered. How long it will take to reach full operating capacity depends on the starting conditions, system size and load conditions.

7.4 CHECKING THE REFRIGERANT LEVEL

- After a few hours of operation, check whether the liquid level indicator has a green crown: a yellow colour indicates the presence of humidity in the circuit. In such a case the circuit must be dehumidified by qualified personnel.

- Large quantities of bubbles should not appear through the liquid level indicator. A constant passage of numerous bubbles may indicate that the refrigerant level is low and needs to be topped up.

- A few minutes after the compressors have started up, check that the end-of-condensation temperature shown on the pressure gauge (refer to the pressure gauge scale for the refrigerant R410A, marked with the initials D.P. - Dew Point) is about 16-22 °C (depending on the type of unit and charging conditions) higher than the temperature of the air entering the condenser with the fans running at top speed.
- Also check that the end-of-evaporation temperature shown on the pressure gauge (refer to the pressure gauge scale for the refrigerant R410A, marked with the initials D.P. - Dew Point) is about 3.5 - 5.0 °C lower than the temperature of the water leaving the evaporator.

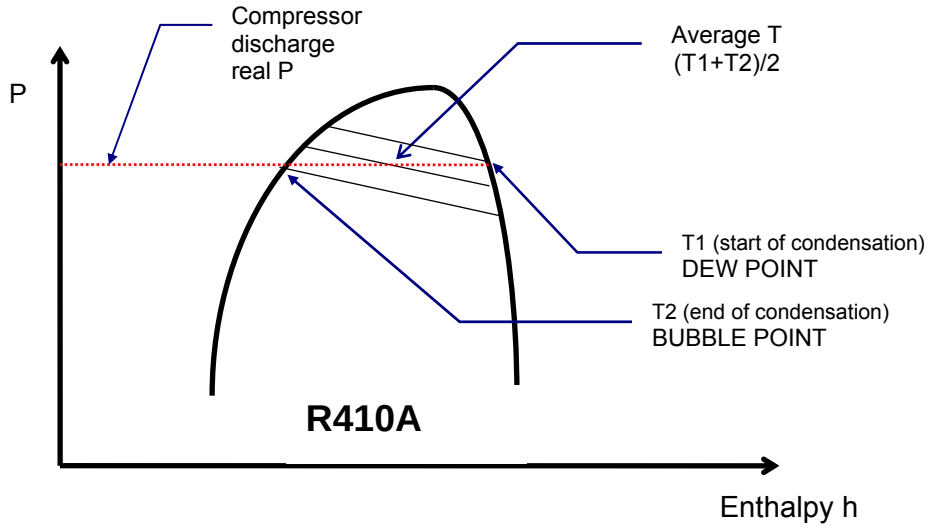
- Make sure the overheating of the refrigerant fluid is limited to between 5 and 8°C. To do this, you should:
  1) read the temperature indicated by a contact thermometer placed on the compressor intake pipe;
  2) read the temperature indicated on the scale of a pressure gauge likewise connected to the intake side; refer to the pressure gauge scale for the refrigerant R410A, marked with the initials D.P. (Dew Point).
     The degree of overheating is given by the difference between the temperatures thus determined.

- Make sure the subcooling of the refrigerant fluid is limited to between 4 and 6°C. To do this, you should:
  1) read the temperature indicated by a contact thermometer placed on the condenser outlet pipe;
  2) read the temperature indicated on the scale of a pressure gauge connected to the liquid inlet at the condenser outlet; refer to the pressure gauge scale for the refrigerant R410A, marked with the initials B.P. (Bubble Point).

The degree of subcooling is given by the difference between the temperatures thus determined.

Attention: all LCX units are loaded with the HFC R410A refrigerant: any top-ups must be made by specialised personnel using the same type of refrigerant, exclusively in the liquid phase.

Attention: the refrigerant R410A requires “POE” polyolester oil of a type approved by the compressor manufacturer.
For no reason should a mineral oil be introduced into the oil circuit.



- The difference between the Dew Point and Bubble Point is known as “GLIDE” and this is a characteristic property of refrigerant mixtures. If pure fluids are used, the phase change occurs at a constant T and thus the glide is equal to zero. If HFC R410A [50%-50% blend of R32 and R125] is used, the glide will be negligible (0.2°C) and the fluid can be considered like a pure fluid.

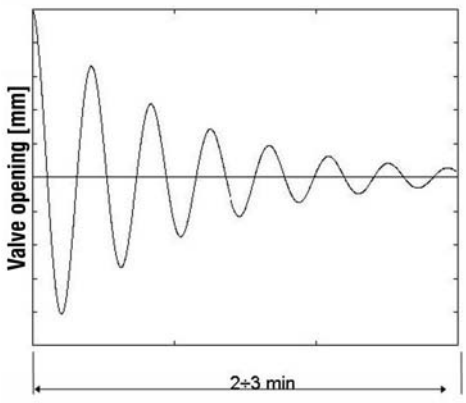
7.5 EXPANSION VALVE

An electronically controlled expansion valve is installed as a standard feature on all LCX units. If correctly parameterised and controlled by the software, this device has the ability to render the operation of the cooling circuit highly efficient and this will have the ultimate effect of decreasing the power intake of the system when a sudden change occurs in the thermal load, with a traditional expansion valve there is a transient time of 2 to 3 minutes before a condition of equilibrium is reached.

Example:

- A compressor switches off
- The evaporation temperature increases
- Overheating decreases
- The valve closes
- The refrigerant flow rate decreases
- The cooling capacity decreases
- The evaporation temperature decreases

...and so on…



Proactive action of an Electronic Expansion Valve:

In the event of a compressor on/off request:

- ✓ The electronic driver pre-positions the valve at a point very near the final equilibrium point.
- ✓ A status of equilibrium is quickly reached with small adjustments.
- ✓ The electronic expansion valve becomes an active, rather than passive, component within the system.
- ✓ The transient time is greatly reduced.
- ✓ Overall the system is more efficient, with higher EERs and therefore greater savings.

7.6 STOPPING THE UNIT

The unit can be stopped by pressing the "OFF" button on the front panel, by turning off the main switch, or via the specific commands on the LCD user interface.

Attention: you should avoid stopping the unit using the main switch: The latter device should be used to disconnect the unit from the electricity supply when there is no passage of current, i.e. when the unit is already turned OFF.
Moreover, if you completely disconnect the unit from the electricity supply, the crankcase heating elements will receive no power, thereby jeopardising the integrity of the compressor the next time the unit is started.

8 OPERATING LIMITS

Operating limits of LCX chillers on COLD-ONLY mode:

Cold-only units:	Min.	Max.
Evaporator outlet water temperature [°C]:	5	15
External air temperature [°C]:	-10	49

To operate with outdoor temperatures below 20 °C it is essential to employ the (optional) device to monitor condensation: Monitoring via fan speed modulation with a cutting phase regulator for -15°C < T outside air < +20 °C.

Operating limits of LCX chillers on HEAT PUMP mode:

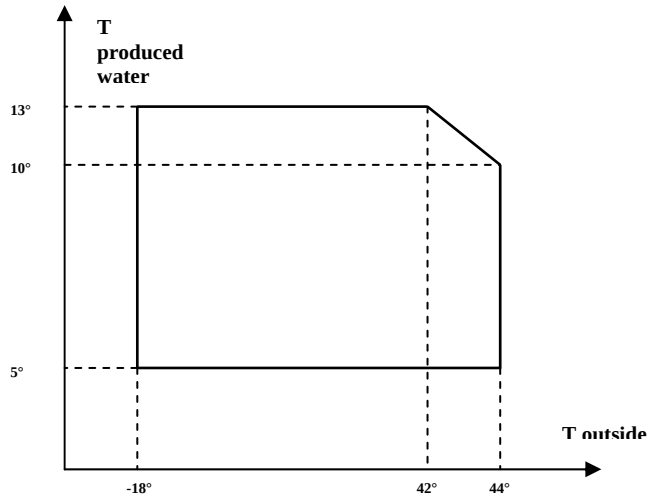
Heat Pump Unit:	Min.	Max.
Condenser outlet water temperature [°C]:	25	55
External air temperature [°C]:	-10	30

To operate with outdoor air temperatures below 0°C the temperature of the water produced will be reduced to 45°C. It is essential to use the (optional) device to monitor evaporation to detect the outlet water temp. from the condenser with an ambient temperature of the air greater than 20°C. For temp. of produced water between 25°C and 30°C is it compulsory to use an electrical expansion valve. ***The unit will automatically block itself below -10°C,*** *thanks to the external low-temperature probe in order to protect the chilling compressors from non application fields they were not designed for.*

Operating limits of LCX chillers on FREE-COOLING mode:

LCX F in relation to the outlet water temperature and outdoor air temperature:

	Min.	Max.
Evaporator outlet water temperature [°C]:	5	13
External air temperature [°C]:	-18	44



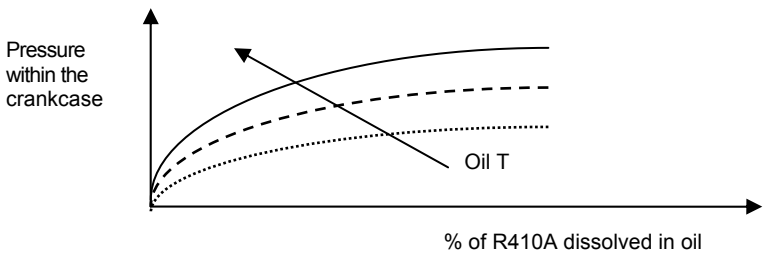
The lower limit is due to the limit of freezing temperature of glycol solutions with 35% of their weight made of glycol, the maximum admitted by the tightness of the pumps used.

Minimum temperature of produced water °C	5	2	-1	-5	-10
Weight percentage of ethylene glycol %	0 %	10 %	15%	25 %	35 %
Freezing point of mixture	0	-4	- 8	-14	-18

The heating elements of the oil sump of the compressor are supplied as a standard for the Free-Cooling units. The "Oil" figure illustrates a specific property [Charles' Law] of gases, which are more soluble in liquids as the pressure increases but less soluble as the temperature increases: if the oil is held at a constant pressure in the sump, an increase in temperature will significantly reduce the amount of refrigerant dissolved in it, thus ensuring that the lubricating function desired is maintained. The problem about poor lubrication, lacking adequate crankcase heating, occurs mostly after breaks where due to the effect of the suction effect of the compressor the pressure in the slump suddenly falls and most of the refrigerant previously dissolved in the oil evaporates. With no heating elements, this would lead to two problems:

- Oil dilution and therefore inadequate lubrication.
- Migration of the oil towards the cooling circuit due to the refrigerant dragging effect.

fig. "oil"



Use of electrical resistances is extremely important especially at the first start-up. It is recommended to leave them inserted for at least 12 hours before starting the compressors.

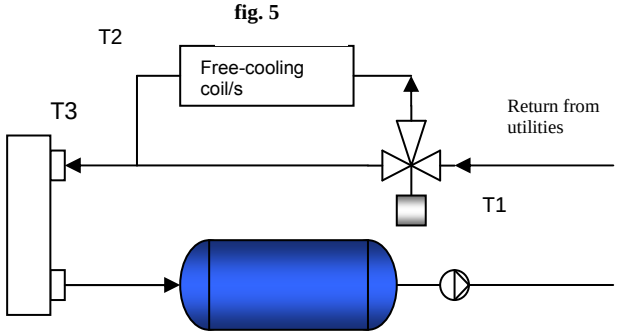
If the outside air T drops considerably, the water T inside the system is controlled by the modulating action of fans and in extreme circumstances (strong prevailing winds) by the closure of the 3-way valve.

The hydraulic circuit - Free-Cooling versions

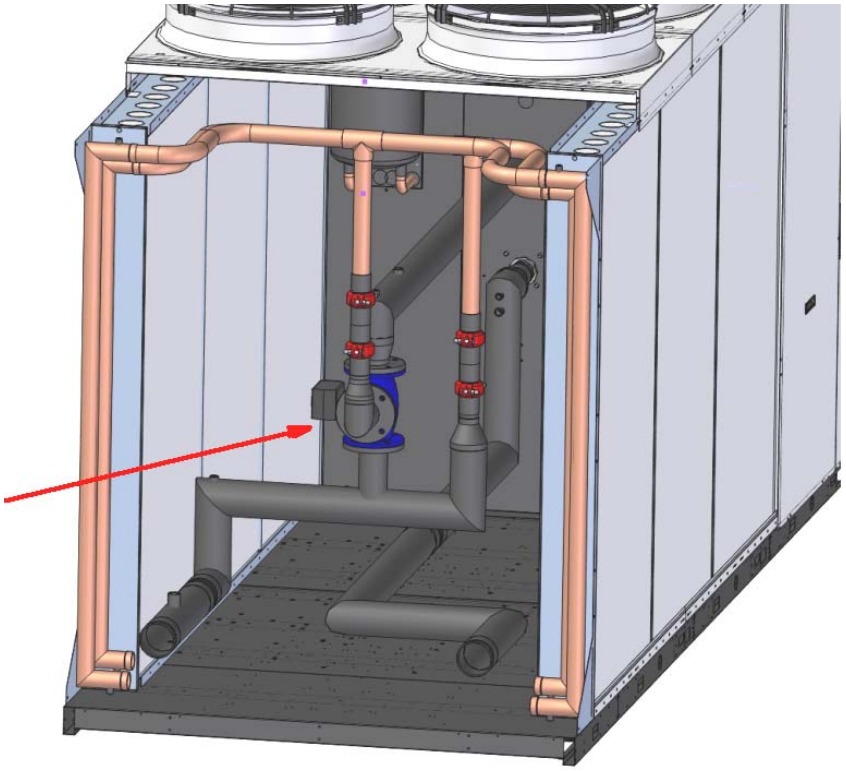
In addition to what has be mentioned above, the Free-Cooling versions foresee a 3-way valve capable of deviating the flow towards the Free-Cooling coils placed upstream the condensing coils, in the air flow direction. Valve activation is controlled by the microprocessor (ADVANCED as per standard) assessing the difference between the system return water (T1) set point T and the outside air (T2). [**fig. 5**]

The probe placed at the evaporator (T3) inlet then triggers the activation of the compressors, integrating them if the Free-Cooling performance is not sufficient to cover the entire thermal requirements. T1 and T3 temperatures are always controlled by the microprocessor on board the unit to assess any faults to the free-cooling 3-way valve: for instance, in free-cooling mode with a switch valve and T1 and T3 are the same, it means that the valve is blocked. In the event of faults occurring in the free-cooling mode, it is possible to decide whether to only generate an alarm or to force the unit to shut down.

fig. 5



The 3-way valve can also be placed manually in the event of faults occurring in the actuating booster: the figure below illustrates the position of the 3-way valve…

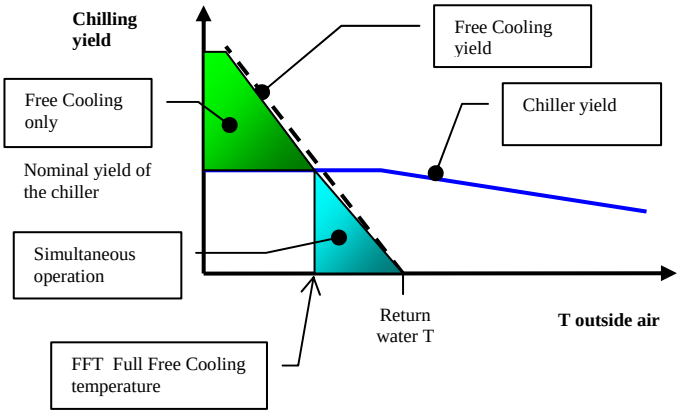


3-way valve - free-cooling version

…which, after switching off the unit, can be accessed manually by removing the rear panel as show in the figure.

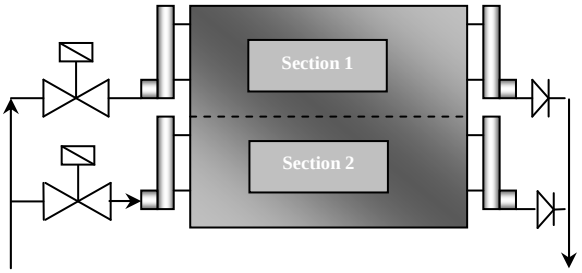
Free-cooling execution provides excellent energy savings in all those situations in which the outside temperature is lower than the fluid in circulation (process industry, close control applications, information technology in general, convention halls, etc.). The performance of the free-cooling circuit depends on the difference between the outside air T and that of the water circulating, as shown in the figure (fig. 6).

Fig. 6



when the T2 of the outside air falls below the T2 of the T1 of the water returning from the system, this will generate a thermal exchange and the free-cooling action begins with integration of one or more mechanical cooling steps. At this stage it is essential to have the maximum air flow rate in order to maximise the performance of the free-cooling coils and, at the same time, effectively control the condensation pressure. Condensing coils are fitted with a special partialization circuit that reduces the surface of thermal exchange and therefore allowing the unit to operated with the full air flow rate (fig.7).

fig. 7



Indeed both sections of the coils are usually operative in the mechanical-only cooling mode, but when the Free-Cooling mode - therefore with T2 of the outside air below (T1-Delta T)°C - in the event of a simultaneous mechanical cooling request (integration), section 1 is excluded and ventilation runs at full speed whilst maintaining excellent control of the condensation pressure.

With total free-cooling, the chilling yield is modulated by adjusting the speed of the fans to keep the outlet T of the water constant.

To prevent any blockages of the 3-way valve, this is automatically switched up to 30% once every 140 h of operation whilst the chiller keeps running.

8.1 WATER FLOW TO EVAPORATOR

The nominal flow rate is based on a temperature differential of 5° C between inlet and outlet water, in relation to the cooling capacity provided at the nominal water (12/7 °C) and air (35°C) temperatures.

The maximum allowed flow rate is associated with a temperature differential of 3 °C: higher flow rates, though admissible, cause pointless, high drops in pressure.

The minimum allowed flow rate is associated with a temperature differential of 8 °C or a minimum pressure drop of 10 kPa: lower flow rates cause a reduction in heat exchange coefficients and excessively low evaporation temperatures, which may trigger the safety devices and cause the unit to stop.

8.2 CHILLED WATER TEMPERATURE

The minimum temperature of the water leaving the evaporator is 5°C: lower temperatures are possible, but for such applications the Manufacturer should be consulted at the time the order is placed.
The maximum temperature of the water entering the evaporator is 20°C. To allow higher temperatures specific equipment solutions must be adapted (split circuits, three-way valves, bypasses, buffer tanks): applications outside the specified limits may be authorised by the manufacturer subject to verification and subsequent authorisation in writing.

8.3 EXTERNAL AIR TEMPERATURE

The units are designed and built to work with outdoor air temperatures ranging from -10 (with condensation control) to 45 °C: applications outside the specified limits may be authorised by Galletti S.p.A. subject to verification and subsequent authorisation in writing. On request, the units may be equipped with an electric heating element to heat up the evaporator in cases where the unit is exposed to severe temperatures during wintertime shutdown periods.
The heating element is activated whenever the temperature of the water leaving the evaporator falls below the temperature set on the antifreeze probe.

8.4 OPERATION WITH WATER AT LOW TEMPERATURES

The standard units are not designed to work with chilled water temperatures below 5°C at the evaporator outlet. In order to work below this limit, the unit requires specific technical adjustments: in such cases contact the Manufacturer.

9 SETTING OPERATING PARAMETERS

9.1 GENERAL INFORMATION

All of the control equipment is calibrated and commissioned in the factory before the unit is shipped. However, after the unit has worked for a reasonable amount of time, a control of the operation and safety devices may be carried out. The settings are shown in Tables I and II.

All servicing of the control equipment must be carried out EXCLUSIVELY BY QUALIFIED PERSONNEL: incorrect calibration values can seriously damage the unit and persons as well.

Many of the functioning parameters and calibrations of the control systems are set by the microprocessor control and are protected by passwords.

TABLE I - SETTING OF CONTROL DEVICES

- LCX C SERIES

CONTROL DEVICE		SET POINT	DIFFERENTIAL
Service thermostat [CS-CL-CQ]	°C	12	4

- LCX H SERIES

CONTROL DEVICE		SET POINT	DIFFERENTIAL
Service thermostat [CS-CL-CQ]	°C	12	4
Service thermostat [HS-HL-HQ]	°C	40	4

- LCX F SERIES

CONTROL DEVICE		SET POINT	DIFFERENTIAL
Service thermostat [FS-FL-CQ]	°C	12	4
Free-Cooling activation temperature =	°C	= System return temp. - 3°C	

TABLE II – SETTING OF SAFETY AND CONTROL DEVICES

- LCX C-H SERIES

CONTROL DEVICE		ACTIVATION	DIFFERENTIAL	RESETTING
Antifreeze thermostat	°C	+4	1	Automatic
Maximum safety pressure switch	bar	45	-13.5	Manual
Maximum safety pressure switch	bar	40.5	-12.2	Manual
Low pressure safety valve	bar	29	-	-
Minimum pressure switch	bar	1.5	+1.0	Automatic
Modulating condensation control	bar	18	10	
Time lapse between two start-ups of the same compressor	s	450	-	-
Flow meter alarm delay	s	20	-	-
Low pressure alarm delay	s	1	-	-
Pump rotation [optional]	h	6	-	-
Defrost end pressure	bar	29	-	-
Maximum defrost time	s	360	-	-
Minimum time between two defrosts	s	1800	-	-

- LCX F SERIES

CONTROL DEVICE		ACTIVATION	DIFFERENTIAL	RESETTING
Antifreeze thermostat	°C	+4	1	Automatic
Maximum safety pressure switch	bar	45	-13.5	Manual
Maximum safety pressure switch	bar	40.5	-12.2	Manual
Low pressure safety valve	bar	29	-	-
Minimum pressure switch	bar	1.5	+1.0	Automatic
Modulating condensation control	bar	18	10	
Time between two start-ups of same compressor	s	450	-	-
Flow meter alarm delay	s	20	-	-
Low pressure alarm delay	s	1	-	-
Pump rotation [optional]	h	6		
Defrost end pressure	bar	n/a	-	-
Temperature differential to activate free-cooling	°C	3	-	Automatic
Water-side safety valve	bar	3		
Max water-side PN with tank	bar	3		
Max PN for standard 3-way valve	bar	6		
Max PN for 3-way poppet valve (optional)	Bar	16		

9.2 MAXIMUM PRESSURE SWITCH

The high pressure switch is of the manually reset type and classifiable as category 4 in accordance with the EEC 97/23 directive. It directly stops the compressor when the discharge pressure exceeds the set value (see section 5.4).

To verify its efficiency, while the compressors are running, close off the passage of air into the condensers and check, by referring to the compressor outlet pressure gauge (previously installed), whether the pressure switch is activated (i.e. the compressors stop) when the set value is reached.

Attention: during this operation, if the safety device fails to activate, the second cascade-connected pressure switch will step in to shut down the unit. However, in any event you should be ready to shut off the unit as directed in the section "Stopping the Unit" – see also section 5.4.

The high pressure switch must be **manually reset**; this is possible only when the pressure falls below the value indicated by set differential (see Table II).

9.3 MINIMUM PRESSURE SWITCH

The low pressure switch stops the compressor when the intake pressure falls below the set value for more than 60 seconds.

The switch is automatically reset when the pressure rises above the value indicated by the set differential (see Table II); however, the unit will not resume operation until the alarm memory on the microprocessor control is cleared.

9.4 SERVICE THERMOSTAT

The function of this device is to start and stop the compressors according to the demand for chilled water, as determined by a sensor placed at the evaporator inlet [water returning from the system].
This device is a function included in the microprocessor control and operates with proportional extension band that can be set.

9.5 ANTIFREEZE THERMOSTAT

The antifreeze sensor situated at the evaporator outlet detects the presence of excessively low temperatures and stops the unit. Together with the flow switch and low pressure switch, this device protects the evaporator from the risk of freezing as a result of faults in the water circuit.
This device is a function included in the microprocessor control.

9.6 ANTI-RECYCLE TIMER

The function of the timer is to prevent excessively frequent compressor starts and stops.
This device is a function included in the microprocessor control.
It sets a minimum time of 300 seconds between two consecutive starts.

Never modify the factory default delay value: wrong settings could cause serious damage to the unit.

9.7 OIL DIFFERENTIAL PRESSURE SWITCH

LCX units are equipped with orbiting scroll compressors; these compressors do not have a lubricant pump and therefore no oil differential pressure switch is provided.

10 ROUTINE MAINTENANCE AND CHECKS

10.1 WARNINGS

For safety reasons concerning installation, the right measures and precautions should be taken to prevent the ambient temperature from rising above 50°C whether the machine is switched on or off.

All the operations described in this chapter MUST ALWAYS BE PERFORMED BY QUALIFIED PERSONNEL.

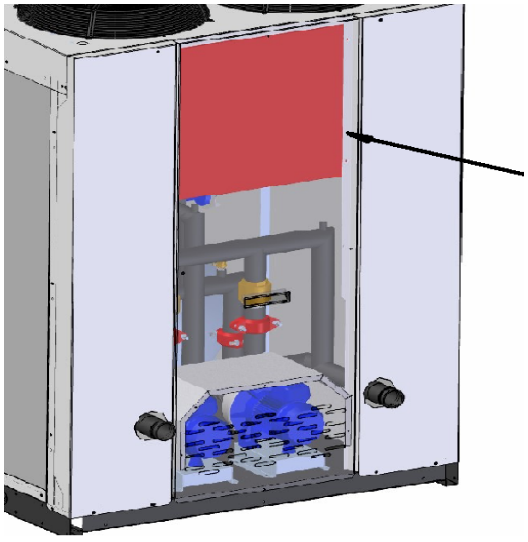
Before carrying out any work on the unit or accessing internal parts, make sure you have disconnected it from the mains electricity supply.

The upper part and outlet pipe of the compressor may reach temperatures as high as 110°C. Be especially careful when working in the surrounding area while the unit is running.

Be especially careful when working in proximity to finned coils since the 0.11 mm-thick aluminium fins can cause superficial injuries due to cuts.

After completing maintenance work, always place the panels enclosing the units back and secure them with the fastening screws provided.

For the safety of the person conducting maintenance work on the LCX units it is compulsory to turn the main switch off before performing said maintenance work. Access to the fan compartment has been fitted with a second safety panel (see fig.) with the sign “warning! moving parts” in order to prevent injuries caused by the fans while they are running with the unit in operation.



Rear of the LCX unit

10.2 GENERAL INFORMATION

It is a good idea to carry out periodic checks to ensure that the unit is working properly:

- Check the efficiency of all the control and safety devices as previously described.
- Check the terminals on the electric control board and compressor terminal boards to ensure that they are securely tightened. The movable and fixed contacts of the circuit breakers must be periodically cleaned and replaced whenever they show signs of deterioration.
- Check the refrigerant level by means of the liquid level indicator (every 6 months).
- Check the oil levels through the windows provided on the compressor crankcases (every 6 months).
- Check the water circuit for leaks (every 6 months).
- If the unit needs to be taken out of service for long periods of time, remove the water from the pipes and the heat exchanger, from the pump/s (optional), the buffer tank (optional) and from the water coil in the case of FREE-COOLING units (if no glycol solutions are used). This operation is essential if during the time the unit is out of service ambient temperatures below the freezing point of the liquid used are expected (typical seasonal operation).
- Check the filling of the water circuit, bleeding air from the circuit through the valves situated in the highest points.
- Check the efficiency of the flow switch or differential pressure switch
- Check the heating elements, where present, of the compressor crankcases.
- Clean the metal mesh filters mounted externally on the water pipes.
- Check the humidity indicator on the liquid level indicator (green = dry, yellow = humid); if the indicator is not green as shown on the indicator sticker, replace the filter (every 6 months).
- Check that the noise emissions of the unit are regular (every 6 months) and more specifically that no vibrations and/or knocking can be detected.

10.3 REPAIRING THE COOLING CIRCUIT

Attention: while performing repairs on the cooling circuit or maintenance work on the compressors, make sure the circuit is left open for as little time as possible. Even if briefly exposed to air, ester oils tend to absorb large amounts of humidity, which results in the formation of weak acids.

If the cooling circuit has undergone any repairs, the following operations must be carried out:

- tightness test;
- emptying and drying of the cooling circuit;
- loading with refrigerant.

If the system has to be drained, always recover the refrigerant present in the circuit using suitable equipment; the refrigerant should be handled exclusively in the liquid phase.

10.4 TIGHTNESS TEST

Fill the circuit with anhydrous nitrogen supplied from a tank with a pressure reducer until the pressure rises to 10 bars.

During the pressurisation phase, do not exceed the pressure setting of the safety valves; otherwise you will cause the latter to open.

The presence of any leaks must be determined using special leak detectors. Should any leaks be detected during the test, empty out the circuit before repairing the leaks with suitable alloys.

Do not use oxygen in the place of nitrogen as a test agent, since this could cause a risk of explosion as well as the certainty of extensive oxidisation in high-temperature areas.

10.5 HARD VACUUM AND DRYING OF THE COOLING CIRCUIT

To achieve a hard vacuum in the cooling circuit it is necessary to use a pump capable of generating a high degree of vacuum, i.e. 15 Pa of absolute pressure.
If there is no suitable vacuum pump available, or whenever the circuit has remained open for long periods of time, you are strongly recommended to adopt the triple evacuation method. This method is also recommended when there is a presence of humidity within the circuit.
The vacuum pump should be connected to the inlets.
The procedure to be carried out is as follows:

- Evacuate the circuit until you reach an absolute pressure of at least 35 Pa. At this point inject nitrogen into the circuit until you reach a relative pressure of about 1 bar.

- Repeat the step described above.

- Carry out the step described above for the third time, but in this case attempting to reach the hardest vacuum possible.

Using this procedure you can easily remove up to 99% of pollutants.

10.6 CHARGING WITH R410A REFRIGERANT

- Connect the tank of refrigerant gas to the male 1/4 SAE inlet situated on the liquid line after discharging a little gas to eliminate air in the connection pipe.

- **Carry out the charging operation with the refrigerant in liquid form** until you reach 75% of the total charge.

- Then connect to the inlet on the intake line and complete the charging process with the refrigerant**in liquid form** until no more bubbles can be seen on the liquid level indicator and the operating parameters specified in the section "Checking the refrigerant level" have been reached.

Since R410A is a binary blend of R32 and R125, it is advisable to charge with refrigerant in the liquid phase to ensure the correct percentage of the 2 components.
Charge through the charging inlet provided between the expansion valve and evaporator inlet.

A unit that was originally charged with R410A in the factory cannot be charged with other refrigerants.

10.7 ENVIRONMENTAL PROTECTION

The law implementing the regulations [reg. EEC 2037/00] which govern the use of stratospheric ozone-depleting substances and greenhouse gases bans the dispersal of refrigerant gases in the environment and requires whoever is in their possession to recover them and, at the end of their useful life, either to return them to the dealer or take them to a suitable waste disposal facility.
The refrigerant HFC R410A is not harmful to the ozone layer but is included among the substances responsible for the greenhouse effect and thus falls within the scope of the aforesaid regulations.

Therefore, special care should be taken when carrying out maintenance work to minimise refrigerant leaks.

11 DECOMMISSIONING THE UNIT

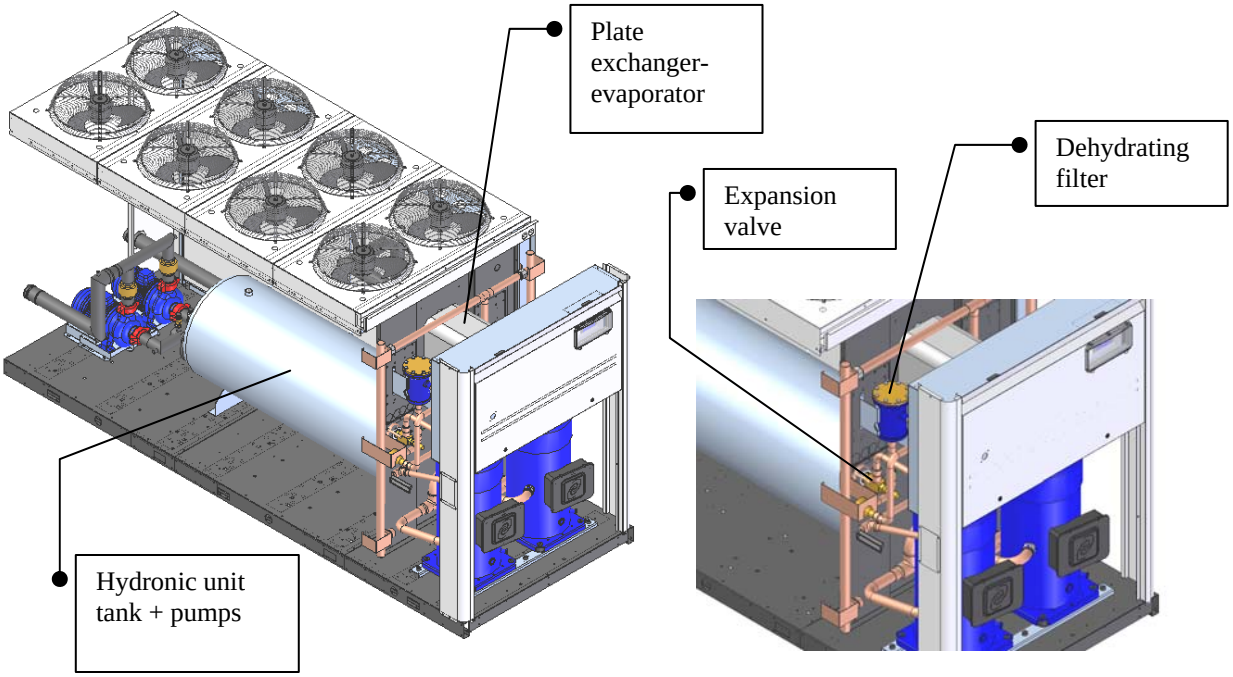
When the unit has reached the end of its working life and needs to removed and replaced, a series of operations should be carried out:
- the refrigerant gas it contains should be recovered by specialised personnel and sent to a waste collection facility;
- the lubricating oil in the compressors should also be recovered and sent to a waste collection facility;
- if they cannot be reused, the framework and components should be scrapped and separated according to the type of material: this applies especially for the considerable quantities of copper and aluminium present in the unit.

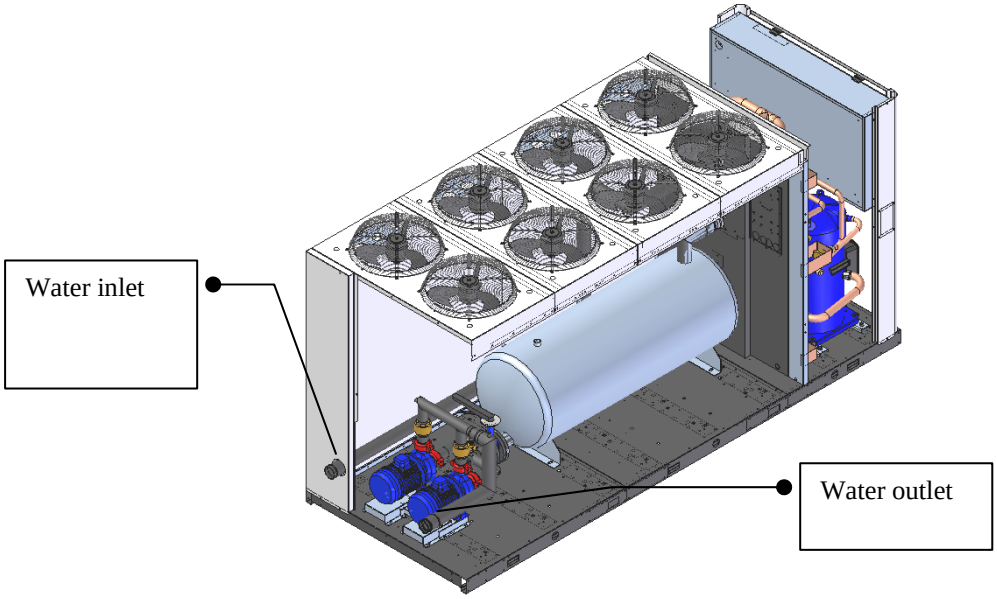
This will make the job of waste collection, disposal and recycling facilities easier and minimise the environmental impact of such processes.

12 TROUBLESHOOTING

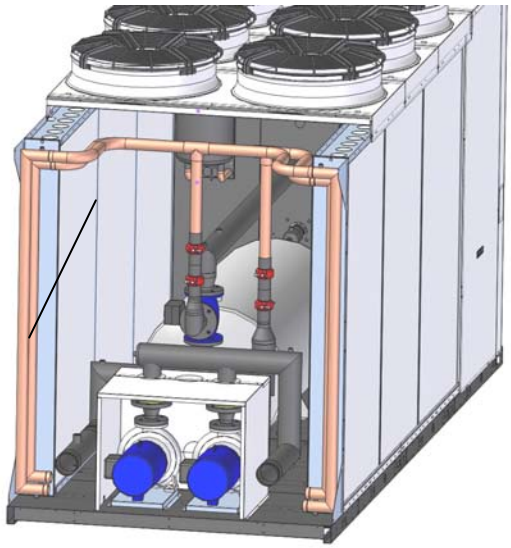
The following pages list the most common causes that can block the chiller unit or cause it to malfunction. The division is made according to the easily detectable symptoms.

You should be extremely careful when attempting to implement any of the possible remedies suggested: overconfidence can result in injuries, even serious ones, to inexpert individuals. Therefore, once the cause has been identified, you are advised to contact the manufacturer or a qualified technician for help.

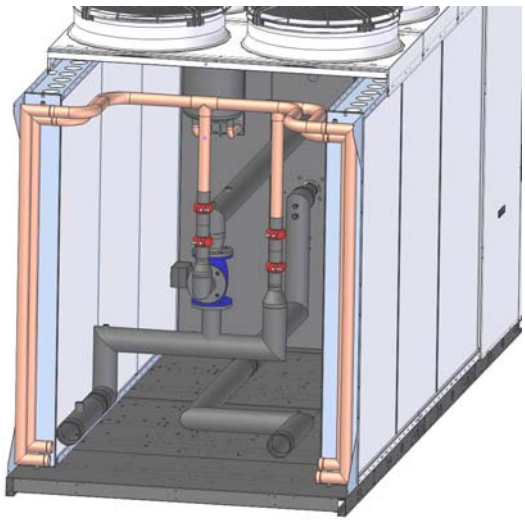




Free-Cooling unit



Free-Cooling version with pumps and tank



Free-Cooling version without hydronic module

FAULT	Analysis of possible causes	Corrective action
The unit does not start.	No electrical power supply.	Check its presence both on the primary and auxiliary circuit.
	The circuit board is not powered.	Check the protections.
	There are alarms present.	Check the microprocessor panel for the presence of alarms, eliminate their cause and restart the unit.
	Incorrect phase sequence.	Invert the two primary power supply phases after having isolated the unit upstream.
The compressor is noisy.	The compressor is not turning in the right direction.	Check the phase sequence relay. Invert the phases on the terminal board after having isolated the unit and contact the manufacturer.
Presence of abnormally high pressure.	Insufficient air flow rate to condenser.	Check that all fans turn correctly.
		Check the condenser air inlet T and prevent recirculation from being formed.
		Check that the effective voltage RMS to the fans is the maximum. Check the pilot pressure transducers of the rev. regulator [optional].
		Make sure the finned coils are clean.
	Presence of air in circuit, detected by the presence of air bubbles on the flow indicator even with sub-cooling values above 5°C.	Drain and pressurise the circuit and check for leaks. Execute a slow emptying [greater than 3 hours] until the value of 15 Pa and then recharge in liquid phase.
	Unit too loaded detectable by sub-cooling greater than 8 °C.	Discharge circuit.
	Thermostat valve and /or filter clogged. These aspects are also present with low pressure faults.	Check the temperatures upstream and downstream from the valve and filter and replace them if necessary.
	Insufficient water flow rate if heat pump is operating.	Check the load loss of the hydraulic circuit and/or the correct functioning [rotation direction] of the pump. Check the outlet water T and make sure it is 45°C or less.

FAULT	Analysis of possible causes	Corrective action
Low condensation pressure.	Faulty transducers.	Check the transducers and the efficiency of the needle pusher on the schrader valves they are connected to.
	Too low outside T and/or presence of strong winds.	Mount the condensation control and /or protect the unit from prevailing winds.
	Low water T if heat pump is operating.	Check whether the thermal load is compatible with the unit's potential.
Low evaporation pressure.	Low water flow rate.	Check the correct rotation of the pumps. Check for load losses on the hydraulic circuit. Make sure the one-way valve of the pump unit is sealed (optional).
	Malfunctioning of thermostat valve.	Heating the bulb by hand, check the opening and adjust it if needed. If there is not response, replace it.
	Clogged filter.	Pressure drops upstream and downstream from the filter should not exceed 2°C. If they do, replace the filter.
	Low condensation T.	Make sure the condensation control works properly [if present].
	Low refrigerant load.	Check the refrigerant level by measuring the degree of subcooling; if it is below 2°C top up the unit.
	Coil frosted if heat pump is operating.	Check the correct defrost parameter settings. Make sure the 4-way valve works properly.
	Low outside T if heat pump is operating.	Check compliance with the operating limits and eliminate any bypasses and back flow of air.
The compressor does not start.	Internal thermal protector tripped.	For models equipped with protection modules, check the status of the thermal contact. Find the causes after restarting.
	Intervention of circuit breakers or fuses in line after short circuit.	Check the cause by measuring the resistance of the individual coils and the isolation towards the chassis before powering.
	Intervention of HP or LP switches.	Check the microprocessor, eliminate the causes.
	The phases in the distribution cabin have been inverted.	Check the phase sequence relay.

FAULT	Analysis of possible causes	Corrective action
High evaporation pressure.	Water T too high.	Check the thermal load and /or thermostat operation.
		Check the operation of the thermostat valve.
Defrosting absent or incomplete (HS-HL-HQ versions).	Error in parameter settings.	Check the setting of the start and end defrost parameters on the microprocessor.
		Check whether defrosting water is properly drained from the coils.
		Check the uniformity of the refrigerant circuit outlet temperatures at the top and bottom of the coils: the maximum temperature differential allowed is 10 °C. Check the refrigerant level.
	The 4-way valve has failed to work.	Check whether it is regularly energized and deenergized.
Free Cooling malfunctioning (FS-FL versions)	No switch of activated 3-way valve.	The opening of the valve can be forced manually, but it is recommended to leave the unit in mechanical operation.
	No switch of deactivated 3-way valve	The valve must be closed manually, replacing the booster as soon as possible.

13 WATER PRESSURE DROPS

13.1 PRESSURE DROPS IN EVAPORATOR

Note: please refer to the product's data sheet (PD) for this kind of information.

13.2 PRESSURE DROPS IN HEAT RECUPERATOR

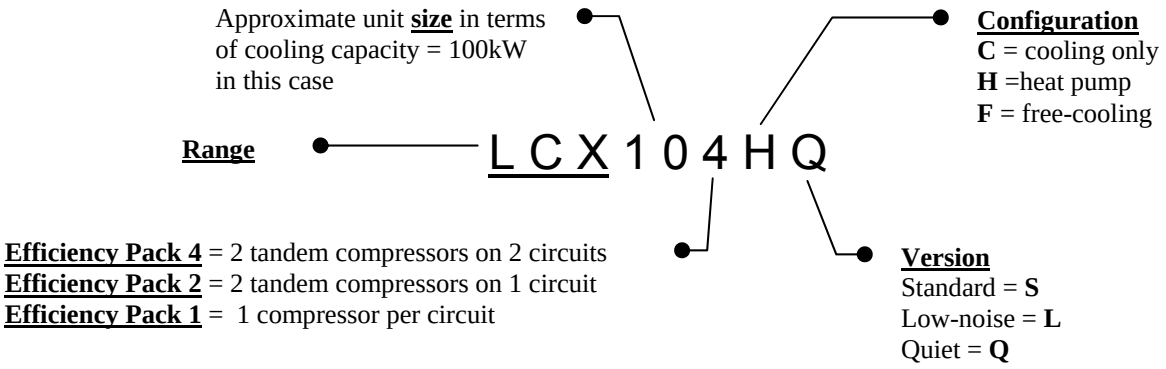
Note: please refer to the product's data sheet (PD) for this kind of information.

13.3 PRESSURE DROPS IN FREE-COOLING FINNED PACK HEAT EXCHANGERS

Note: please refer to the product's data sheet (PD) for this kind of information.

14 TECHNICAL DATA SUMMARY

The technical data table refers to standard versions (*non-silenced)* and is divided according to the ***efficiency pack*** (ref. Table par.1) and the size of the unit:



Rated technical data of LCX water chillers, STANDARD version															
Approx. capacity (kW)		45	50	60	70	80	90			100			120		
Efficiency Pack		2	2	2	2	2	1	2	4	1	2	4	1	2	4
LCX...CS		**042**	**052**	**062**	**072**	**082**	**091**	**092**	**094**	**101**	**102**	**104**	**121**	**122**	**124**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	-	-	58,2	66,5	78,2	88,6	88,6	-	102	113	-	113	113	119
Total cooling power input (UNI14511)	kW	-	-	21,0	23,6	27,2	31,3	32,2	-	36,1	36,1	-	40,5	40,5	42,1
Rated current input	A	-	-	35,7	39,9	45,5	53,4	54,8	-	61,0	61,0	-	69,2	69,2	71,7
EER (UNI14511)		-	-	2,78	2,82	2,88	2,83	2,75	-	2,81	2,81	-	2,79	2,78	2,83
ESEER		-	-	3,67	3,72	3,80	3,29	3,61	-	3,72	3,37	-	3,36	3,68	3,76
Eurovent Efficency Class		-	-	C	C	C	C	C	-	C	C	-	C	C	C
Maximum current input	A	-	-	60	64	75	91	91	-	101	101	-	119	119	120
Starting current	A	-	-	195	192	200	261	261	-	269	269	-	319	319	247
Starting current with Soft-Starter kit	A	-	-	120	133	148	199	199	-	207	207	-	254	254	172
No. of scroll compressors / circuits		-	-	2 / 1	2 / 1	2 / 1	2 / 2	2 / 1	-	2 / 2	2 / 1	-	2 / 2	2 / 1	4 / 2
No. of axial fans		-	-	4	4	4	6	6	-	6	6	-	8	8	8
Air flow rate	m^3/h	-	-	21379	21379	21379	30913	30913	-	30913	30913	-	41340	41340	41340
Water flow rate	l/h	-	-	10046	11477	13492	15284	15284	-	17517	17517	-	19449	19447	20517
Pressure drop, water side	kPa	-	-	28	29	31	32	32	-	32	32	-	34	34	34
Available head, standard pump	kPa	-	-	142	138	135	130	130	-	127	127	-	115	115	116
Buffer tank	dm^3	-	-	200	200	200	220	220	-	220	220	-	340	340	340
Expansion tank	dm^3	-	-	12	12	12	12	12	-	12	12	-	12	12	12
Plumbing connections	"	-	-	2	2	2	2	2	-	2	2	-	$2^1/_2$	$2^1/_2$	$2^1/_2$
Height	mm	-	-	1735	1735	1735	1735	1735	-	1735	1735	-	1735	1735	1679
Length	mm	-	-	2090	2090	2090	2442	2442	-	2442	2442	-	3190	3190	3540
Depth	mm	-	-	1183	1183	1183	1183	1183	-	1183	1183	-	1183	1183	1183
Sound power level	dB(A)	-	-	82	82	82	83	83	-	83	83	-	83	83	82
Sound pressure level	dB(A)	-	-	54	54	54	55	55	-	55	55	-	55	55	54
Base unit operating weight	kg	-	-	540	570	650	730	730	-	730	730	-	1010	1010	1050
Unit with pump and full tank operating weight	kg	-	-	877	907	987	1138	1138	-	1138	1138	-	1581	1581	1641

Rated technical data of LCX water chillers, STANDARD version															
Approx. capacity (kW)		140			160			170	190	210	240	270	290	320	360
Efficiency Pack		1	2	4	1	2	4	4	4	4	4	4	4	4	4
LCX...CS		**141**	**142**	**144**	**161**	**162**	**164**	**174**	**194**	**214**	**244**	**274**	**294**	**324**	**364**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	144	144	143	160	160	152	162	183	201	245	263	293	327	354
Total cooling power input (UNI14511)	kW	50,9	50,9	50,8	58,9	58,9	56,4	58,1	65,6	76,4	95,8	90,5	104	119	138
Rated current input	A	85,8	85,8	85,6	98,5	98,5	94,4	97,1	109	126	157	150	172	195	226
EER (UNI14511)		2,83	2,83	2,82	2,71	2,71	2,70	2,78	2,78	2,63	2,55	2,91	2,81	2,76	2,56
ESEER		3,48	3,63	3,64	3,49	3,75	3,68	3,71	3,59	3,72	3,68	3,71	3,62	3,59	3,54
Eurovent Efficency Class		C	C	C	C	C	C	C	C	D	D	B	C	C	D
Maximum current input	A	131	131	129	137	144	150	136	155	173	196	224	237	251	300
Starting current	A	330	330	245	389	396	266	252	310	330	380	403	468	476	497
Starting current with Soft-Starter kit	A	265	265	186	306	306	214	200	248	268	215	338	385	393	360
No. of scroll compressors / circuits		2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
No. of axial fans		8	8	8	8	8	8	6	6,0	6	6	8,0	8	8	8
Air flow rate	m^3/h	39890	39890	39890	39890	39890	39890	67672	67672	67672	75478	103511	97902	97902	97902
Water flow rate	l/h	24817	24815	24665	27525	27525	26192	27841	31473	34669	42146	45335	50506	56411	60931
Pressure drop, water side	kPa	36	36	36	36	36	36	37	37	38	38	39	40	41	41
Available head, standard pump	kPa	177	176	172	162	162	162	171	151	163	194	179	166	159	137
Buffer tank	dm^3	340	340	340	340	340	340	600	600	600	600	765	765	765	765
Expansion tank	dm^3	12	12	12	12	12	12	24	24	24	24	24	24	24	24
Plumbing connections	"	$2^1/_2$	$2^1/_2$	$2^1/_2$	$2^1/_2$	$2^1/_2$	$2^1/_2$	3	3	3	4	4	4	4	4
Height	mm	1735	1735	1679	1735	1735	1679	1847	1847	1847	2247	2330	2330	2330	2330
Length	mm	3190	3190	3540	3190	3190	3540	3538	3538	3538	3538	4206	4206	4206	4206
Depth	mm	1183	1183	1183	1183	1183	1183	1653	1653	1653	1653	1653	1653	1653	1653
Sound power level	dB(A)	84	84	82	84	84	82	85	85	86	86	86	86	86	87
Sound pressure level	dB(A)	56	56	54	56	56	54	57	57	58	58	58	58	58	59
Base unit operating weight	kg	1055	1055	1070	1085	1085	1220	1440	1460	1470	1620	1880	1912	1947	1947
Unit with pump and full tank operating weight	kg	1626	1626	1661	1656	1656	1811	2208	2276	2286	2469	2894	2926	2961	2961

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX water chillers, LOW NOISE version															
Approx. capacity (kW)		45	50	60	70	80	90			100			120		
Efficiency Pack		2	2	2	2	2	1	2	4	1	2	4	1	2	4
LCX...CL		**042**	**052**	**062**	**072**	**082**	**091**	**092**	**094**	**101**	**102**	**104**	**121**	**122**	**124**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	45,2	52,4	58,2	66,6	78,5	88,6	88,6	90,3	102	102	105	113	113	116
Total cooling power input (UNI14511)	kW	15,7	18,0	20,3	22,9	26,6	30,2	31,1	31,5	35,2	35,2	36,0	40,2	40,2	41,0
Rated current input	A	27,7	34,2	42,2	46,9	53,3	54,7	61,4	55,3	64,9	72,9	70,2	72,7	76,8	72,3
EER (UNI14511)		2,88	2,91	2,86	2,90	2,95	2,93	2,85	2,87	2,89	2,89	2,90	2,81	2,81	2,84
ESEER		3,98	4,23	4,02	4,02	4,06	3,61	4,03	3,86	3,66	4,09	3,95	3,43	3,75	3,64
Eurovent Efficency Class		C	B	C	B	B	B	C	C	C	C	B	C	C	C
Maximum current input	A	41	44	51	55	66	77	77	81	86	86	87	95	95	96
Starting current	A	159	162	185	183	191	246	246	194	254	254	198	295	295	220
Starting current with Soft-Starter kit	A	88	101	111	124	139	184	184	126	192	192	129	221	221	146
No. of scroll compressors / circuits		2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2
No. of axial fans		4	4	6	6	6	8	8	8,0	8	8	8,0	6	6	6
Air flow rate	m^3/h	15398	15398	21955	21955	21955	29393	29393	29393	29393	29393	29393	43434	43434	43434
Water flow rate	l/h	7803	9035	10035	11482	13549	15283	15283	15574	17539	17539	18027	19478	19478	20075
Pressure drop, water side	kPa	26	28	28	29	31	32	32	32	32	32	34	34	34	34
Available head, standard pump	kPa	155	153	142	137	133	129	129	129	127	127	127	115	115	114
Buffer tank	dm^3	200	200	220	220	220	340	340	340	340	340	340	600	600	600
Expansion tank	dm^3	12,0	12,0	12	12	12	12	12	12,0	12	12	12,0	24	24	24
Plumbing connections	"	2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3
Height	mm	1735	1735	1735	1735	1735	1735	1735	1679,0	1735	1735	1679,0	1847	1847	1847
Length	mm	2090	2090	2442	2442	2442	3190	3190	3540,0	3190	3190	3540,0	3538	3538	3538
Depth	mm	1183	1183	1183	1183	1183	1183	1183	1183,0	1183	1183	1183,0	1653	1653	1653
Sound power level	dB(A)	74	74	77	77	77	78	78	77	78	78	77	80	80	77
Sound pressure level	dB(A)	46	46	49	49	49	50	50	49	50	50	49	52	52	49
Base unit operating weight	kg	525	525	630	635	700	905	905	980,0	915	915	980,0	1260	1260	1275
Unit with pump and full tank operating weight	kg	862	862	982	987	1067	1426	1426	1557	1436	1436	1557	2040	2040	2055

Rated technical data of LCX water chillers, LOW NOISE version															
Approx. capacity (kW)		140			160			170	190	210	240	270	290	320	360
Efficiency Pack		1	2	4	1	2	4	4	4	4	4	4	4	4	4
LCX...CL		**141**	**142**	**144**	**161**	**162**	**164**	ND	**194**	**214**	**244**	**274**	**294**	**324**	**364**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	127	127	133	160	160	152	-	177	197	219	255	278	315	337
Total cooling power input (UNI14511)	kW	46,7	46,7	46,5	58,5	58,5	56,1	-	63,6	74,2	83,9	90,0	107	122	150
Rated current input	A	75,3	75,3	74,9	94,0	94,0	90,2	-	102	119	135	143	171	195	239
EER (UNI14511)		2,73	2,73	2,86	2,74	2,74	2,71	-	2,79	2,65	2,61	2,84	2,59	2,58	2,25
ESEER		3,47	3,76	3,91	3,59	3,81	3,71	-	3,54	3,69	3,61	3,50	3,54	3,56	3,49
Eurovent Efficency Class		C	C	C	C	C	C	-	C	D	D	C	D	D	F
Maximum current input	A	106	106	105	120	120	126	-	148	167	190	215	229	242	300
Starting current	A	306	306	222	371	371	241	-	307	318	382	398	494	472	497
Starting current with Soft-Starter kit		231	231	163	276	279	189	-	245	256	217	333	381	389	352
No. of scroll compressors / circuits		2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	-	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
No. of axial fans		6	6	6	6	6	6	-	6,0	6	6	8,0	8	8	8
Air flow rate	m^3/h	43434	43434	43434	40235	40235	40235	-	55808	63261	63261	87186	81687	81687	81687
Water flow rate	l/h	21967	21965	22949	27595	27601	26210	-	30574	33918	37691	44001	47825	54326	58016
Pressure drop, water side	kPa	36	36	36	37	37	37	-	37	37	38	38	39	40	41
Available head, standard pump	kPa	170	170	168	162	162	162	-	155	160	190	181	168	163	142
Buffer tank	dm^3	600	600	600	600	600	600	-	600	600	600	765	765	765	765
Expansion tank	dm^3	24	24	24	24	24	24	-	24	24	24	24	24	24	24
Plumbing connections	"	3	3	3	3	3	3	-	3	4	4	4	4	4	4
Height	mm	1847	1847	1847	1847	1847	1847	-	1847	2247	2247	2330	2330	2330	2330
Length	mm	3538	3538	3538	3538	3538	3538	-	3538	3538	3538	4206	4206	4206	4206
Depth	mm	1653	1653	1653	1653	1653	1653	-	1653	1653	1653	1653	1653	1653	1653
Sound power level	dB(A)	81	81	77	81	81	77	-	82	82	82	84	84	84	85
Sound pressure level	dB(A)	53	53	49	53	53	49	-	54	54	54	56	56	56	57
Base unit operating weight	kg	1310	1310	1290	1330	1330	1440	-	1460	1510	1620	1880	1912	1947	1947
Unit with pump and full tank operating weight	kg	2090	2090	2070	2110	2110	2220	-	2276	2326	2469	2894	2926	2961	2961

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX water chillers, QUIET (super low noise) version															
Approx. capacity (kW)		45	50	60	70	80	90			100			120		
Efficiency Pack		2	2	2	2	2	1	2	4	1	2	4	1	2	4
LCX...CQ		**042**	**052**	**062**	**072**	**082**	**091**	**092**	**094**	**101**	**102**	**104**	**121**	**122**	**124**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	43,2	50,0	55,6	63,5	75,0	84,7	84,7	86,4	97	97	100	107	107	110
Total cooling power input (UNI14511)	kW	15,6	17,9	20,2	22,9	26,5	31,0	31,0	31,3	35,1	35,1	35,8	40,1	40,1	41,1
Rated current input	A	26,5	30,1	34,5	38,7	44,5	52,4	52,5	52,9	59,1	59,1	60,2	64,8	64,8	66,4
EER (UNI14511)		2,76	2,79	2,76	2,78	2,83	2,73	2,73	2,76	2,76	2,76	2,79	2,66	2,66	2,67
ESEER		3,85	4,08	3,90	3,90	3,93	3,49	3,91	3,74	3,53	3,95	3,82	3,26	3,56	3,46
Eurovent Efficency Class		C	C	C	C	C	C	C	C	C	C	C	D	D	D
Maximum current input	A	41	44	51	55	66	77	77	81	86	86	87	95	95	96
Starting current	A	159	162	185	183	191	246	246	194	254	254	198	295	295	220
Starting current with Soft-Starter kit		88	101	111	124	139	184	184	126	192	192	129	221	221	150
No. of scroll compressors / circuits		2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2
No. of axial fans		4	4	6	6	6	8	8	8,0	8	8	8,0	6	6	6
Air flow rate	m^3/h	15398	15398	21955	21955	21955	29393	29393	29393	29393	29393	27041	35930	35930	35930
Water flow rate	l/h	7452	8627	9601	10963	12934	14610	14610	14910	16742	16742	18250	18383	18398	18886
Pressure drop, water side	kPa	26	28	28	29	31	32	32	32	32	32	32	33	33	33
Available head, standard pump	kPa	154	152	140	136	133	128	128	127	125	125	128	114	114	114
Buffer tank	dm^3	200	200	220	220	220	340	340	340	340	340	340	600	600	600
Expansion tank	dm^3	12,0	12,0	12	12	12	12	12	12,0	12	12	12,0	24	24	24
Plumbing connections	"	2,0	2,0	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3
Height	mm	1735	1735	1735	1735	1735	1735	1735	1679,0	1735	1735	1679,0	1847	1847	1847
Length	mm	2090	2090	2442	2442	2442	3190	3190	3540,0	3190	3190	3540,0	3538	3538	3538
Depth	mm	1183	1183	1183	1183	1183	1183	1183	1183,0	1183	1183	1183,0	1653	1653	1653
Sound power level	dB(A)	71	71	73	73	73	75	75	74	75	75	74	76	76	73
Sound pressure level	dB(A)	43	43	45	45	45	47	47	46	47	47	46	48	48	45
Base unit operating weight	kg	525	525	630	635	700	905	905	980,0	915	915	980,0	1260	1260	1275
Unit with pump and full tank operating weight	kg	862	862	982	987	1067	1426	1426	1557	1436	1436	1557	2040	2040	2055

Rated technical data of LCX water chillers, QUIET (super low noise) version														
Approx. capacity (kW)		140			160			170	190	210	240	270	290	320
Efficiency Pack		1	2	4	1	2	4	4	4	4	4	4	4	4
LCX...CQ		**141**	**142**	**144**	**161**	**162**	**164**	**-**	**194**	**214**	**244**	**274**	**294**	**324**
Power supply	V-ph-Hz	400-3N-50												
Cooling capacity (UNI14511)	kW	120	120	124	150	150	138	-	160	178	196	241	261	283
Total cooling power input (UNI14511)	kW	46,6	46,5	46,4	58,4	58,4	55,9	-	69,9	79,4	87,1	89,9	108	122
Rated current input	A	75,1	75,1	74,8	94,0	94,0	90,1	-	112	127	140	144	172	195
EER (UNI14511)		2,58	2,58	2,67	2,57	2,57	2,47	-	2,29	2,24	2,25	2,68	2,43	2,32
ESEER		3,30	3,57	3,71	3,41	3,62	3,53	-	3,36	3,51	3,43	3,32	3,37	3,38
Eurovent Efficency Class		D	D	D	D	D	E	-	F	F	F	D	E	E
Maximum current input	A	106	106	105	120	120	126	-	148	167	190	215	229	242
Starting current	A	306	306	222	317	317	241	-	307	318	382	398	494	472
Starting current with Soft-Starter kit		231	231	168	276	279	195	-	252	266	330	331	382	392
No. of scroll compressors / circuits		2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	-	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
No. of axial fans		6	6	6	6	6	6	-	6,0	6	6	8,0	8	8
Air flow rate	m^3/h	35930	35930	35930	35930	35930	35930	-	35930	40953	40953	69835	69835	69835
Water flow rate	l/h	20730	20730	21337	25875	25876	23812	-	27594	30652	33747	41455	45007	48740
Pressure drop, water side	kPa	35	35	35	35	35	36	-	35	35	36	37	38	38
Available head, standard pump	kPa	170	170	169	166	166	163	-	173	181	200	181	172	168
Buffer tank	dm^3	600	600	600	600	600	600	-	600	600	600	765	765	765
Expansion tank	dm^3	24	24	24	24	24	24	-	24	24	24	24	24	24
Plumbing connections		3	3	3	3	3	3	-	3	4	4	4	4	4
Height	mm	1847	1847	1847	1847	1847	1847	-	1847	2247	2247	2330	2330	2330
Length	mm	3538	3538	3538	3538	3538	3538	-	3538	3538	3538	4206	4206	4206
Depth	mm	1653	1653	1653	1653	1653	1653	-	1653	1653	1653	1653	1653	1653
Sound power level	dB(A)	77	77	73	77	77	73	-	78	78	78	80	80	80
Sound pressure level	dB(A)	49	49	45	49	49	45	-	50	50	50	52	52	52
Base unit operating weight	kg	1310	1310	1290	1330	1330	1440	-	1460	1510	1620	1880	1912	1947
Unit with pump and full tank operating weight	kg	2090	2090	2070	2110	2110	2220	-	2276	2326	2469	2894	2926	2961

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX…H heat pumps, STANDARD version															
Approx. capacity (kW)		45	50	60	70	80	90			100			120		
Efficiency Pack		2	2	2	2	2	1	2	4	1	2	4	1	2	4
LCX…HS		**042**	**052**	**062**	**072**	**082**	**091**	**092**	**094**	**101**	**102**	**104**	**121**	**122**	**124**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	-	-	57,4	65,6	77,1	87,4	87,4	-	100,1	100,1	-	111,2	111,2	117,3
Total power input in cooling mode (UNI14511)	kW	-	-	20,9	23,6	27,1	32,1	32,1	-	36,4	36,4	-	40,4	40,4	42,0
Rated current input	A	-	-	36	40	46	55	55	-	62	62	-	69	69	72
EER (UNI14511)		-	-	2,74	2,78	2,85	2,72	2,72	-	2,75	2,75	-	2,75	2,75	2,80
ESEER		-	-	3,60	3,64	3,72	3,23	3,54	-	3,65	3,30	-	3,29	3,61	3,69
Eurovent Efficency Class		-	-	C	C	C	C	C	-	C	C	-	C	C	C
Heating capacity	kW	-	-	69,5	79,2	93,5	105	107	-	120	120	-	134	134	147
Total power input in heating mode	kW	-	-	19,8	22,1	25,7	30,0	30,0	-	34,2	34,2	-	38,1	38,1	41,7
Rated current input	A	-	-	34	37	43	51	51	-	58	58	-	65	65	71
COP (UNI14511)		-	-	3,51	3,58	3,64	3,51	3,55	-	3,52	3,52	-	3,52	3,50	3,52
Maximum current input	A	-	-	60	64	75	91	91	-	101	101	-	119	119	120
Starting current	A	-	-	195	192	200	261	261	-	269	269	-	319	319	247
Starting current with Soft-Starter kit	A	-	-	120	133	148	199	199	-	207	207	-	254	254	172
No. of scroll compressors / circuits		-	-	2 / 1	2 / 1	2 / 1	2 / 2	2 / 1	-	2 / 2	2 / 1	-	2 / 2	2 / 1	4 / 2
No. of axial fans		-	-	4	4	4	6	6	-	6	6	-	8	8	8
Air flow rate	m^3/h	-	-	21379	21379	21379	30913	30913	-	30913	30913	-	41340	41340	41340
Water flow rate (cooling)	l/h	-	-	9895	11303	13293	15063	15062	-	17262	17263	-	19162	19159	20214
Pressure drop, water side (cooling)	kPa	-	-	23	23	23	24	24	-	26	26	-	27	27	25
Available head, standard pump (cooling)	kPa	-	-	148	145	142	138	138	-	133	133	-	122	122	124
Buffer tank	dm^3	-	-	200	200	200	220	220	-	220	220	-	340	340	340
Expansion tank	dm^3	-	-	12	12	12	12	12	-	12	12	-	12	12	12
Plumbing connections	"	-	-	2	2	2	2	2	-	2	2	-	$2\ ^1/_2$	$2\ ^1/_2$	$2\ ^1/_2$
Height	mm	-	-	1735	1735	1735	1735	1735	-	1735	1735	-	1735	1735	1679
Length	mm	-	-	2090	2090	2090	2442	2442	-	2442	2442	-	3190	3190	3540
Depth	mm	-	-	1183	1183	1183	1183	1183	-	1183	1183	-	1183	1183	1183
Sound power level	dB(A)	-	-	82	82	82	83	83	-	83	83	-	83	83	82
Sound pressure level	dB(A)	-	-	54	54	54	55	55	-	55	55	-	55	55	54
Base unit operating weight	kg	-	-	540	570	650	730	730	-	730	730	-	1010	1010	1050
Unit with pump and full tank operating weight	kg	-	-	877	907	987	1138	1138	-	1138	1138	-	1581	1581	1641

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX heat pumps, STANDARD version															
Approx. capacity (kW)		140			160			170	190	210	240	270	290	320	360
Efficiency Pack		1	2	4	1	2	4	4	4	4	4	4	4	4	4
LCX...HS		**141**	**142**	**144**	**161**	**162**	**164**	**174**	**194**	**214**	**244**	**274**	**294**	**324**	**364**
Power supply	V-ph-Hz	400-3-50													
Cooling capacity (UNI14511)	kW	142	142	141	157	157	150	159	180	198	241	259	289	323	349
Total power input in cooling mode (UNI14511)	kW	50,8	50,9	50,7	58,8	58,8	56,3	58,1	65,6	76,3	95,7	90,4	104,3	118,7	138
Rated current input	A	85,8	85,8	85,6	98,5	98,5	94,4	97,1	109	126	157	150	172	195	226
EER (UNI14511)		2,79	2,79	2,78	2,67	2,67	2,66	2,74	2,74	2,60	2,52	2,87	2,77	2,72	2,53
ESEER		3,41	3,55	3,56	3,42	3,68	3,60	3,64	3,52	3,64	3,61	3,63	3,55	3,52	3,47
Eurovent Efficency Class		C	C	C	D	D	D	C	C	D	D	C	C	C	D
Heating capacity	kW	166	167	168	185	185	179	189	214	233	282	309	343	374	419
Total power input in heating mode	kW	47,6	47,7	47,3	53,1	53,1	50,7	56,9	64,6	71,0	85,6	88,7	99,5	110,3	128
Rated current input	A	80,3	80,3	79,8	89,0	89,0	85,0	94,8	107	117	140	147	164	181	209
COP (UNI14511)		3,49	3,49	3,55	3,48	3,48	3,54	3,32	3,32	3,28	3,29	3,49	3,44	3,39	3,27
Maximum current input	A	131	131	129	137	144	150	136	155	173	196	224	237	251	300
Starting current	A	330	330	245	389	396	266	252	310	330	380	403	468	476	497
Starting current with Soft-Starter kit	A	265	265	186	306	306	214	200	248	268	215	338	385	393	360
No. of scroll compressors / circuits		2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
No. of axial fans		8	8	8	8	8	8	6	6	6	6	8	8	8	8
Air flow rate	m^3/h	39890	39890	39890	39890	39890	39890	67672	67672	67672	75478	103511	97902	97902	97902
Water flow rate (cooling)	l/h	24449	24448	24301	27118	27118	25805	27429	31007	34156	41524	44665	49760	55581	60030
Pressure drop, water side (cooling)	kPa	29	31	31	32	32	32	33	34	35	35	35	35	37	35
Available head, standard pump (cooling)	kPa	181	180	176	165	165	166	173	153	165	196	182	170	161	142
Buffer tank	dm^3	340	340	340	340	340	340	600	600	600	600	765	765	765	765
Expansion tank	dm^3	12	12	12	12	12	12	24	24	24	24	24	24	24	24
Plumbing connections	"	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	4	4	4	4	4
Height	mm	1735	1735	1679	1735	1735	1679	1847	1847	1847	2247	2330	2330	2330	2330
Length	mm	3190	3190	3540	3190	3190	3540	3538	3538	3538	3538	4206	4206	4206	4206
Depth	mm	1183	1183	1183	1183	1183	1183	1653	1653	1653	1653	1653	1653	1653	1653
Sound power level	dB(A)	84	84	82	84	84	82	85	85	86	86	86	86	86	87
Sound pressure level	dB(A)	56	56	54	56	56	54	57	57	58	58	58	58	58	59
Base unit operating weight	kg	1055	1055	1070	1085	1085	1220	1440	1460	1470	1620	1880	1912	1947	1947
Unit with pump and full tank operating weight	kg	1626	1626	1661	1656	1656	1811	2208	2276	2286	2469	2894	2926	2961	2961

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX heat pumps, LOW NOISE version															
Approx. capacity (kW)		45			70			90		100			120		
Efficiency Pack		2	2	2	2	2	1	2	4	1	2	4	1	2	4
LCX...HL		**042**	**052**	**062**	**072**	**082**	**091**	**092**	**094**	**101**	**102**	**104**	**121**	**122**	**124**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	44,6	51,6	57,3	65,6	77,4	87,3	87,3	89,0	100	100	103	112	112	115
Total power input in cooling mode (UNI14511)	kW	15,7	18,0	20,3	22,9	26,5	30,1	31,0	31,4	35,1	35,1	36,0	40,8	40,6	41,1
Rated current input	A	26,5	30,1	34,69	38,84	44,6	51,2	52,59	53,2	59,1	59,1	60,4	66,06	65,67	66,5
EER (UNI14511)		2,84	2,87	2,83	2,86	2,92	2,90	2,82	2,84	2,85	2,85	2,87	2,74	2,75	2,80
ESEER		3,90	4,14	3,94	3,94	3,98	3,54	3,95	3,78	3,59	4,00	3,87	3,36	3,67	3,57
Eurovent Efficency Class		C	C	C	C	B	B	C	C	C	C	C	C	C	C
Heating capacity	kW	52,5	59,9	66,7	76,1	88,0	103	103	105	114	113	118	135	135	139
Total power input in heating mode	kW	14,7	17,0	19,1	21,4	24,9	28,7	28,7	29,5	32,3	32,3	33,8	38,4	38,1	39,4
Rated current input	A	24,9	28,4	32,6	36,3	41,9	48,6	48,6	49,9	54,3	54,3	56,7	61,8	61,4	63,5
COP (UNI14511)		3,56	3,53	3,50	3,56	3,53	3,59	3,59	3,56	3,52	3,50	3,49	3,53	3,55	3,53
Maximum current input	A	41	44	51	55	66	77	77	81	86	86	87	95	95	96
Starting current	A	159	162	185	183	191	246	246	194	254	254	198	295	295	220
Starting current with Soft-Starter kit	A	88	101	111	124	139	184	184	126	192	192	129	221	221	146
No. of scroll compressors / circuits		2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2
No. of axial fans		4	4	6	6	6	8	8	8	8	8	8	6	6	6
Air flow rate	m^3/h	15398	15398	21955	21955	21955	29393	29393	29393	29393	29393	29393	43434	43434	43434
Water flow rate (cooling)	l/h	7688	8901	9887	11311	13349	15057	15057	15344	17280	17280	17761	19234	19227	19829
Pressure drop, water side (cooling)	kPa	22	25	25	25	26	25	25	25	29	29	29	27	27	27
Available head, standard pump (cooling)	kPa	159	156	145	141	138	136	136	135	129	129	132	122	122	121
Buffer tank	dm^3	200	200	220	220	220	340	340	340	340	340	340	600	600	600
Expansion tank	dm^3	12	12	12	12	12	12	12	12	12	12	12	24	24	24
Plumbing connections		2	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3
Height	mm	1735	1735	1735	1735	1735	1735	1735	1679	1735	1735	1679	1847	1847	1847
Length	mm	2090	2090	2442	2442	2442	3190	3190	3540	3190	3190	3540	3538	3538	3538
Depth	mm	1183	1183	1183	1183	1183	1183	1183	1183	1183	1183	1183	1653	1653	1653
Sound power level	dB(A)	74	74	77	77	77	78	78	77	78	78	77	80	80	77
Sound pressure level	dB(A)	46	46	49	49	49	50	50	49	50	50	49	52	52	49
Base unit operating weight	kg	525	525	630	635	700	905	905	980	915	915	980	1260	1260	1275
Unit with pump and full tank operating weight	kg	862	862	982	987	1067	1426	1426	1557	1436	1436	1557	2040	2040	2055

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX heat pumps, LOW NOISE version														
Approx. capacity (kW)		140			160			-	190	210	240	270	290	320
Efficiency Pack		1	2	4	1	2	4	-	4	4	4	4	4	4
LCX...HL		**141**	**142**	**144**	**161**	**162**	**164**	ND	**194**	**214**	**244**	**274**	**294**	**324**
Power supply	V-ph-Hz	400-3N-50												
Cooling capacity (UNI14511)	kW	126	126	132	158	158	150	-	176	194	216	252	274	311
Total power input in cooling mode (UNI14511)	kW	46,7	46,6	46,6	59,2	59,2	56,1	-	63,6	74,9	84,2	90,2	108	123
Rated current input	A	75,5	75,3	75,3	95,3	95,3	90,4	-	102	120	135	144	172	196
EER (UNI14511)		2,70	2,70	2,84	2,67	2,67	2,67	-	2,77	2,59	2,57	2,80	2,54	2,54
ESEER		3,40	3,68	3,83	3,52	3,74	3,64	-	3,47	3,62	3,54	3,43	3,47	3,48
Eurovent Efficency Class		C	C	C	D	D	D	-	C	D	D	C	D	D
Heating capacity	kW	148	148	155	183	183	174	-	206	233	263	295	329	364
Total power input in heating mode	kW	44,7	44,7	43,4	52,7	52,7	50,5	-	59,9	66,8	76,8	85,6	96,8	109
Rated current input	A	72,0	72,0	69,8	84,5	84,5	81,1	-	95,8	107	123	136	154	172
COP (UNI14511)		3,30	3,30	3,56	3,47	3,47	3,45	-	3,44	3,49	3,42	3,45	3,40	3,36
Maximum current input	A	106	106	105	120	120	126	-	148	167	190	215	229	242
Starting current	A	306	306	222	371	371	241	-	307	318	382	398	464	472
Starting current with Soft-Starter kit	A	231	231	163	276	279	189	-	245	256	217	333	381	389
No. of scroll compressors / circuits		2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	-	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
No. of axial fans		6	6	6	6	6	6	-	6	6	6	8	8	8
Air flow rate	m^3/h	43434	43434	43434	40235	40235	40235	-	55808	63261	63261	87186	81687	81687
Water flow rate (cooling)	l/h	21723	21737	22790	27297	27297	25863	-	30320	33492	37260	43482	47226	53617
Pressure drop, water side (cooling)	kPa	29	29	29	34	34	32	-	33	34	33	36	34	37
Available head, standard pump (cooling)	kPa	177	177	174	163	163	165	-	158	163	195	182	172	165
Buffer tank	dm^3	600	600	600	600	600	600	-	600	600	600	600	600	600
Expansion tank	dm^3	24	24	24	24	24	24	-	24	24	24	24	24	24
Plumbing connections		3	3	3	3	3	3	-	3	4	4	4	4	4
Height	mm	1847	1847	1847	1847	1847	1847	-	1847	2247	2247	2330	2330	2330
Length	mm	3538	3538	3538	3538	3538	3538	-	3538	3538	3538	4206	4206	4206
Depth	mm	1653	1653	1653	1653	1653	1653	-	1653	1653	1653	1653	1653	1653
Sound power level	dB(A)	81	81	77	81	81	77	-	82	82	82	84	84	85
Sound pressure level	dB(A)	53	53	49	53	53	49	-	54	54	54	56	56	57
Base unit operating weight	kg	1310	1310	1290	1330	1330	1440	-	1460	1510	1620	1880	1912	1947
Unit with pump and full tank operating weight	kg	2090	2090	2070	2110	2110	2220	-	2276	2326	2469	2894	2926	2961

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX...H heat pumps, QUIET (super low noise) version															
Approx. capacity (kW)		45	50	60	70	80	90			100			120		
Efficiency Pack		2	2	2	2	2	1	2	4	1	2	4	1	2	4
LCX...HQ		**042**	**052**	**062**	**072**	**082**	**091**	**092**	**094**	**101**	**102**	**104**	**121**	**122**	**124**
Power supply	V-ph-Hz	400-3N-50													
Cooling capacity (UNI14511)	kW	42,80	49,50	55,10	62,90	74,20	83,90	83,90	85,60	96,10	96,10	99,00	105,60	105,70	108,50
Total power input in cooling mode (UNI14511)	kW	15,60	17,90	20,20	22,90	26,50	30,00	30,80	31,20	35,10	35,10	35,80	40,00	40,00	41,00
Rated current input	A	26,53	30,13	34,69	38,84	44,60	51,20	52,59	53,18	59,10	59,10	60,40	66,06	65,67	66,50
EER (UNI14511)		2,75	2,77	2,73	2,75	2,81	2,80	2,72	2,74	2,74	2,74	2,76	2,64	2,64	2,65
ESEER		3,90	4,14	3,94	3,94	3,98	3,54	3,95	3,78	3,59	4,00	3,87	3,36	3,67	3,57
Eurovent Efficency Class		C	C	C	C	C	C	C	C	C	C	C	D	D	D
Heating capacity	kW	50,70	57,80	64,30	73,70	85,40	98,80	99,60	101,20	108,70	109,60	113,70	129,60	130,00	134,20
Total power input in heating mode	kW	14,70	16,90	19,00	21,30	24,80	27,70	28,50	29,40	31,20	32,40	33,70	37,70	37,60	38,70
Rated current input	A	24,91	28,39	32,56	36,27	41,90	48,62	48,63	49,93	54,31	54,31	56,68	61,84	61,37	63,46
COP (UNI14511)		3,45	3,43	3,39	3,46	3,44	3,57	3,50	3,45	3,48	3,38	3,37	3,44	3,45	3,47
Maximum current input	A	41	44	51	55	66	77	77	81	86	86	87	95	95	96
Starting current	A	159	162	185	183	191	246	246	194	254	254	198	295	295	220
Starting current with Soft-Starter kit	A	88	101	111	124	139	184	184	126	192	192	129,0	221	221	150
No. of scroll compressors / circuits		2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2
No. of axial fans		4	4	6	6	6	8	8	8	8	8	8	6	6	6
Air flow rate	m^3/h	15398	15398	21955	21955	21955	29393	29393	29393	29393	29393	29393	43434	43434	43434
Water flow rate (cooling)	l/h	7376	8538	9502	10849	12801	14459	14459	14756	16569	16569	17072	18206	18226	18698
Pressure drop, water side (cooling)	kPa	21	24	24	24	25	24	24	24	27	27	28	26	26	26
Available head, standard pump (cooling)	kPa	159	156	145	141	138	136	136	135	129	129	132	122	122	121
Buffer tank	dm^3	200	200	220	220	220	340	340	340	340	340	340	600	600	600
Expansion tank	dm^3	12	12	12	12	12	12	12	12	12	12	12	24	24	24
Plumbing connections		2	2	2	2	2	$2\,^1/_2$	$2\,^1/_2$	$2\,^1/_2$	$2\,^1/_2$	$2\,^1/_2$	$2\,^1/_2$	3	3	3
Height	mm	1735	1735	1735	1735	1735	1735	1735	1679	1735	1735	1679	1847	1847	1847
Length	mm	2090	2090	2442	2442	2442	3190	3190	3540	3190	3190	3540	3538	3538	3538
Depth	mm	1183	1183	1183	1183	1183	1183	1183	1183	1183	1183	1183	1653	1653	1653
Sound power level	dB(A)	71,0	71,0	73,0	73,0	73,0	75,0	75,0	74,0	75,0	75,0	74,0	76,0	76,0	73,0
Sound pressure level	dB(A)	43,0	43,0	45,0	45,0	45,0	47,0	47,0	46,0	47,0	47,0	46,0	48,0	48,0	45,0
Base unit operating weight	kg	525	525	630	635	700	905	905	980	915	915	980	1260	1260	1275
Unit with pump and full tank operating weight	kg	862	862	982	987	1067	1426	1426	1557	1436	1436	1557	2040	2040	2055

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field.

Rated technical data of LCX…H heat pumps, QUIET (super low noise) version														
Approx. capacity (kW)		140			160			170	190	210	240	270	290	320
Efficiency Pack		1	2	4	1	2	4	4	4	4	4	4	4	4
LCX…HQ		**141**	**142**	**144**	**161**	**162**	**164**	ND	**194**	**214**	**244**	**274**	**294**	**324**
Power supply	V-ph-Hz	400-3N-50												
Cooling capacity (UNI14511)	kW	119,00	119,00	123,60	148,60	148,60	137,50	-	159,70	176,80	194,30	238,50	259,10	280,00
Total power input in cooling mode (UNI14511)	kW	46,50	46,50	46,30	58,40	58,40	55,80	-	70,40	79,20	87,00	89,80	107,40	121,80
Rated current input	A	75,11	75,11	74,81	94,00	94,00	90,06	-	113,36	127,45	139,82	143,54	171,73	194,66
EER (UNI14511)		2,56	2,56	2,67	2,55	2,55	2,46	-	2,27	2,23	2,23	2,66	2,41	2,30
ESEER		3,23	3,50	3,64	3,35	3,55	3,46	-	3,30	3,44	3,36	3,26	3,30	3,31
Eurovent Efficency Class		D	D	D	D	D	E	-	F	F	D	E	E	F
Heating capacity	kW	142,60	143,30	149,20	175,30	175,30	169,00	-	198,70	225,40	252,50	285,50	317,50	351,60
Total power input in heating mode	kW	44,50	44,50	43,30	52,70	52,70	50,30	-	59,50	66,60	76,00	84,60	95,90	107,90
Rated current input	A	71,66	71,67	69,73	84,48	84,48	80,77	-	95,33	106,65	121,58	134,63	152,54	171,66
COP (UNI14511)		3,20	3,22	3,44	3,33	3,33	3,36	-	3,34	3,38	3,32	3,38	3,31	3,26
Maximum current input	A	106	106	105	120	120	126	-	148	167	190	215	229	242
Starting current	A	306	306	222	371	371	241	-	307	318	382	398	464	472
Starting current with Soft-Starter kit	A	231	231	168	276	279	195	-	252	266	330	331,0	382	392
No. of scroll compressors / circuits		2 / 2	2 / 1	4 / 2	2 / 2	2 / 1	4 / 2	-	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2	4 / 2
No. of axial fans		6	6	6	6	6	6	-	6	6	6	8	8	8
Air flow rate	m^3/h	35930	35930	35930	35930	35930	35930	-	35930	40953	40953	69835	69835	69835
Water flow rate (cooling)	l/h	20502	20514	21306	25609	25609	23686	-	27519,0	30461	33466	41098	44631	48237
Pressure drop, water side (cooling)	kPa	27	27	27	32	32	26	-	29,0	28	29	34	33	32
Available head, standard pump (cooling)	kPa	153	153	151	151	151	152	-	161	171	193	177	164	153
Buffer tank	dm^3	600	600	600	600	600	600	-	600	600	600	600	600	600
Expansion tank	dm^3	24	24	24	24	24	24	-	24	24	24	24	24	24
Plumbing connections		3	3	3	3	3	3	-	3	4	4	4	4	4
Height	mm	1847	1847	1847	1847	1847	1847	-	1847	2247	2247	2330	2330	2330
Length	mm	3538	3538	3538	3538	3538	3538	-	3538	3538	3538	4206	4206	4206
Depth	mm	1653	1653	1653	1653	1653	1653	-	1653	1653	1653	1653	1653	1653
Sound power level	dB(A)	77,0	77,0	73,0	77,0	77,0	73,0	-	78,0	78,0	78,0	80,0	80,0	80,0
Sound pressure level	dB(A)	49,0	49,0	45,0	49,0	49,0	45,0	-	50,0	50,0	50,0	52,0	52,0	52,0
Base unit operating weight	kg	1310	1310	1290	1330	1330	1440	-	1460	1510	1620	1880	1912	1947
Unit with pump and full tank operating weight	kg	2090	2090	2070	2110	2110	2220	-	2276	2326	2469	2894	2926	2961

Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field

LCX F			41	51	61	71	81	91	101	124	144
Cooling capacity [1]		kW	49,1	52,9	63,3	71,3	80,2	92,5	103,8	123,5	137,1
Total power input [1]		kW	15,9	18,2	21,4	23,1	26,8	30,7	36,2	43,8	48,9
Cooling capacity in Free-Cooling operation [2]		kW	23,8	24,4	30,5	31,5	32,4	42,0	43,3	55,8	57,4
Total free cooling air temperature		°C	-2,3	-3	-2	-3	-4,2	-3,2	-4,1	-3,3	-4,4
EER efficiency pack 1			3,08	2,90	2,96	3,08	2,99	3,01	2,87	*n.d.*	*n.d.*
EER efficiency pack 2			*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
EER efficiency pack 4			*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	2,82	2,80
Expansion vessel		dm3	8	8	8	8	8	12	12	25	25
Buffer tank		dm3	200	200	220	220	220	340	340	600	600
Standard	Height	mm	1735	1735	1735	1735	1735	1735	1735	1823	1823
	Lenght	mm	2090	2090	2440	2440	2440	3190	3190	3540	3540
	Width	mm	1183	1183	1183	1183	1183	1183	1183	1653	1653
	Sound pressure @ 10 m Q=2	dB(A)	52	52	53	53	53	54	54	55	55
Low noise	Height	mm	1735	1735	1735	1735	1735	1735	1735	1823	1823
	Lenght	mm	2090	2090	2440	2440	2440	3190	3190	3540	3540
	Width	mm	1183	1183	1183	1183	1183	1183	1183	1653	1653
	Sound pressure @ 10 m Q=2	dB(A)	42	42	44	44	44	45	45	49	49

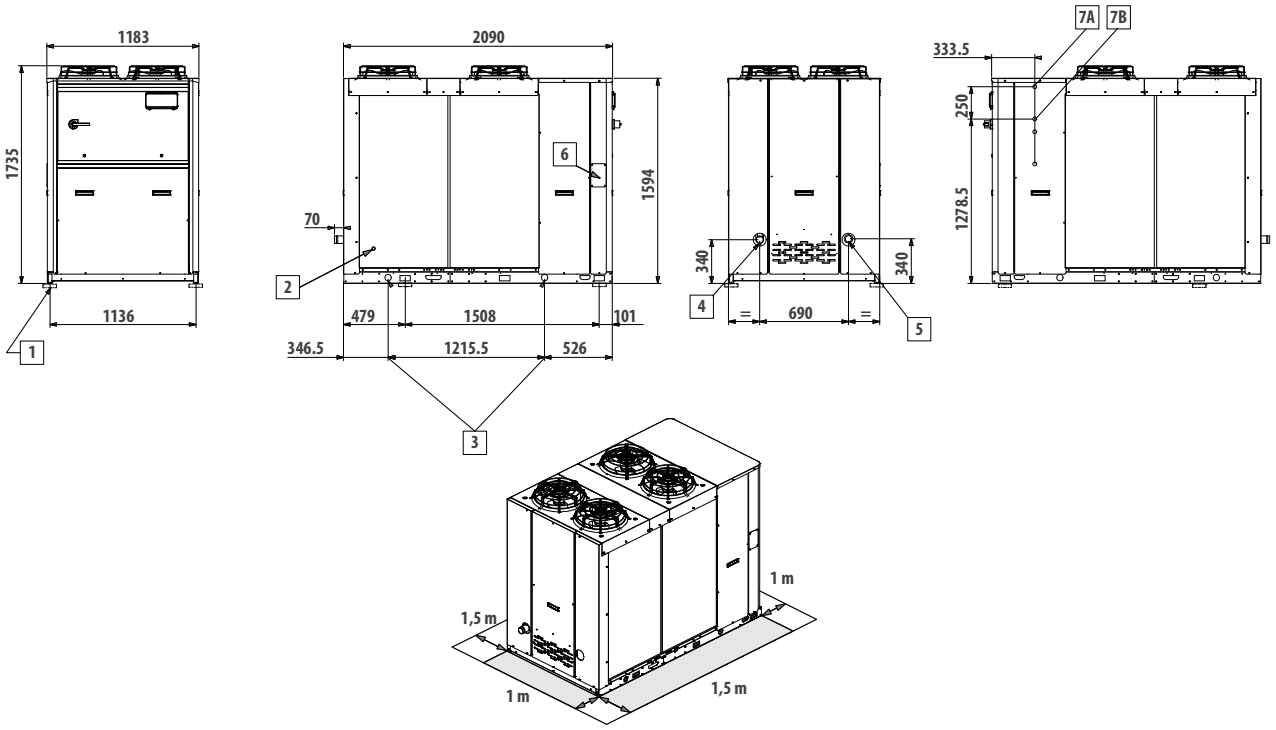
Cooling mode: outdoor air temperature 35°C, water temperature 12°C / 7°C (EN 14511)
Heating mode: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C/45°C (EN 14511)
Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in a clear field

LCX F			164	194	214	244	274	294	324	364
Cooling capacity [1]		kW	159,5	188,6	210,2	236,5	266,2	290,5	308,9	354
Total power input [1]		kW	58,01	62,4	73,7	86,4	97,1	106,6	116,5	124,9
Cooling capacity in Free-Cooling operation [2]		kW	60,3	76,8	78,8	80,9	99,2	101,2	102,5	117,1
Total free cooling air temperature		°C	-6	-5	-6,2	-8	-6,4	-7,6	-8,5	-9,4
EER efficiency pack 1			*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
EER efficiency pack 2			*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*	*n.d.*
EER efficiency pack 4			2,75	3,02	2,85	2,74	2,74	2,73	2,65	2,83
Expansion vessel		dm3	25	25	25	25	25	25	25	25
Buffer tank		dm3	600	600	600	600	765	765	765	765
Standard	Height	mm	1823	2223	2223	2223	2330	2330	2330	2330
	Lenght	mm	3540	3540	3540	3540	4206	4206	4206	4206
	Width	mm	1653	1653	1653	1653	1653	1653	1653	1653
	Sound pressure @ 10 m Q=2	dB(A)	55	55	55	55	56,0	56,0	56,0	56,0
Low noise	Height	mm	1823	2223	2223	2223	2330	2330	2330	*n.d.*
	Lenght	mm	3540	3540	3540	3540	4206	4206	4206	*n.d.*
	Width	mm	1653	1653	1653	1653	1653	1653	1653	*n.d.*
	Sound pressure @ 10 m Q=2	dB(A)	49	49	49	49	51	51	51	*n.d.*

1 = Water temperature 12/7°C, ari temperature 35°C
2 = Water temperature 12/7°C, air temperature 5°C

15 DIMENSIONAL DRAWINGS

LCX FRAME 1

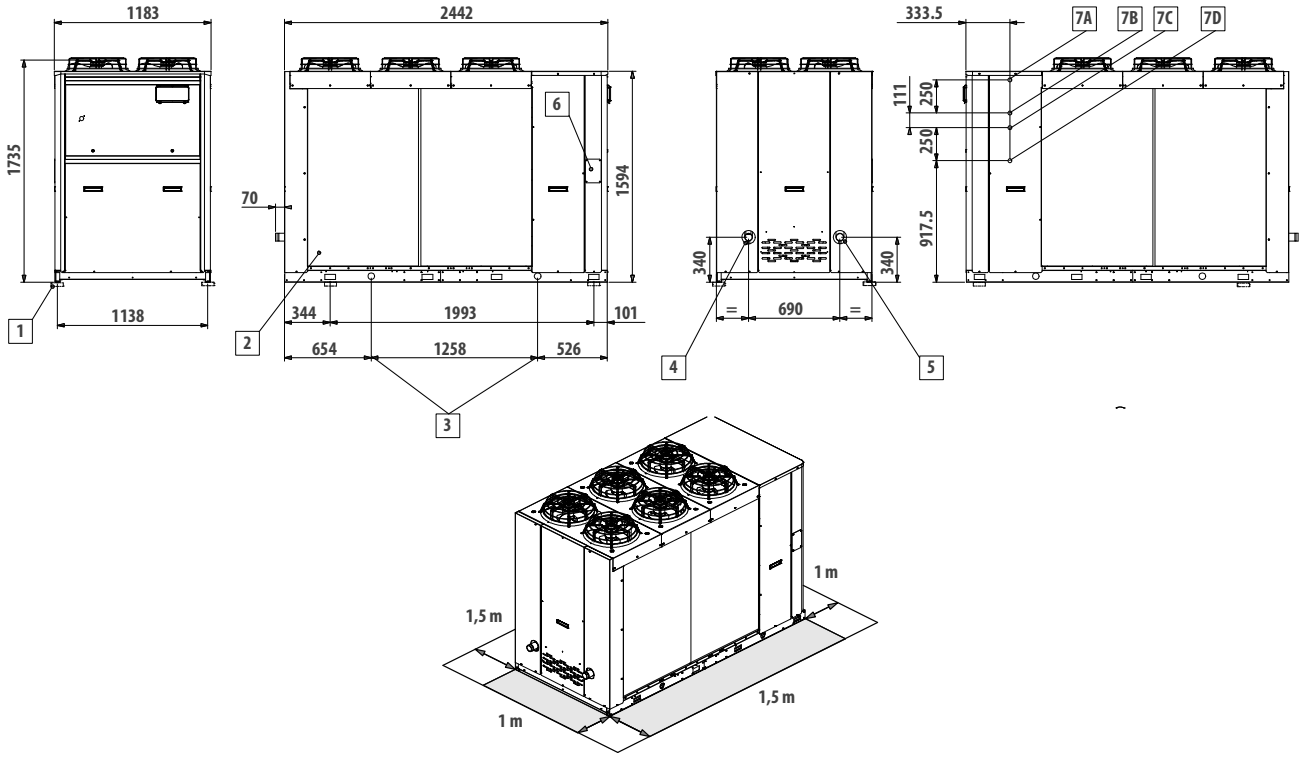


MODEL	VERSION
LCX 42	L - Q
LCX 52	L - Q
LCX 62	S
LCX 72	S
LCX 82	S

KEY

1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points
4	Water inlet (Victaulic 2”)
5	Water outlet (Victaulic 2”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”)
7B	Water inlet heat recovery (1”)

LCX FRAME 2

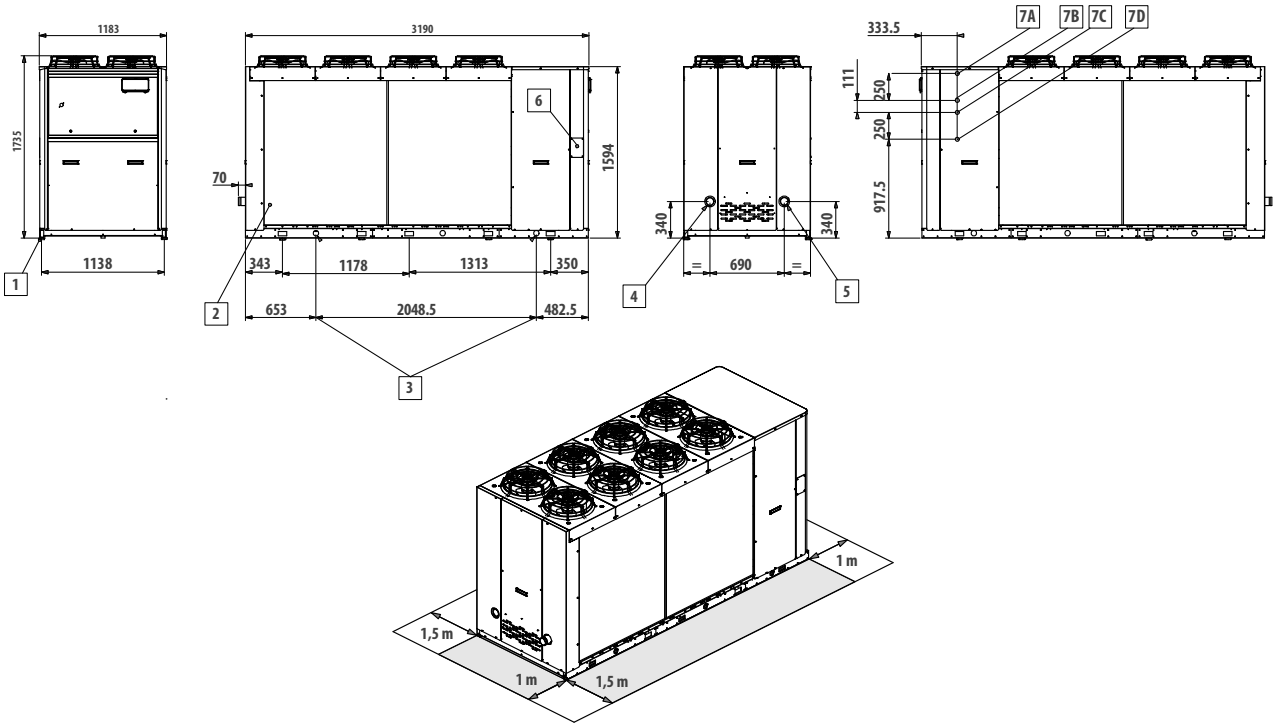


MODEL	VERSION
LCX 62	L - Q
LCX 72	L - Q
LCX 82	L - Q
LCX 91	S
LCX 92	S
LCX 101	S
LCX 102	S

KEY

1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points
4	Water inlet (Victaulic 2”)
5	Water outlet (Victaulic 2”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”) left circuit
7B	Water inlet heat recovery (1”) left circuit
7C	Water outlet heat recovery (1”) right circuit
7D	Water inlet heat recovery (1”) right circuit

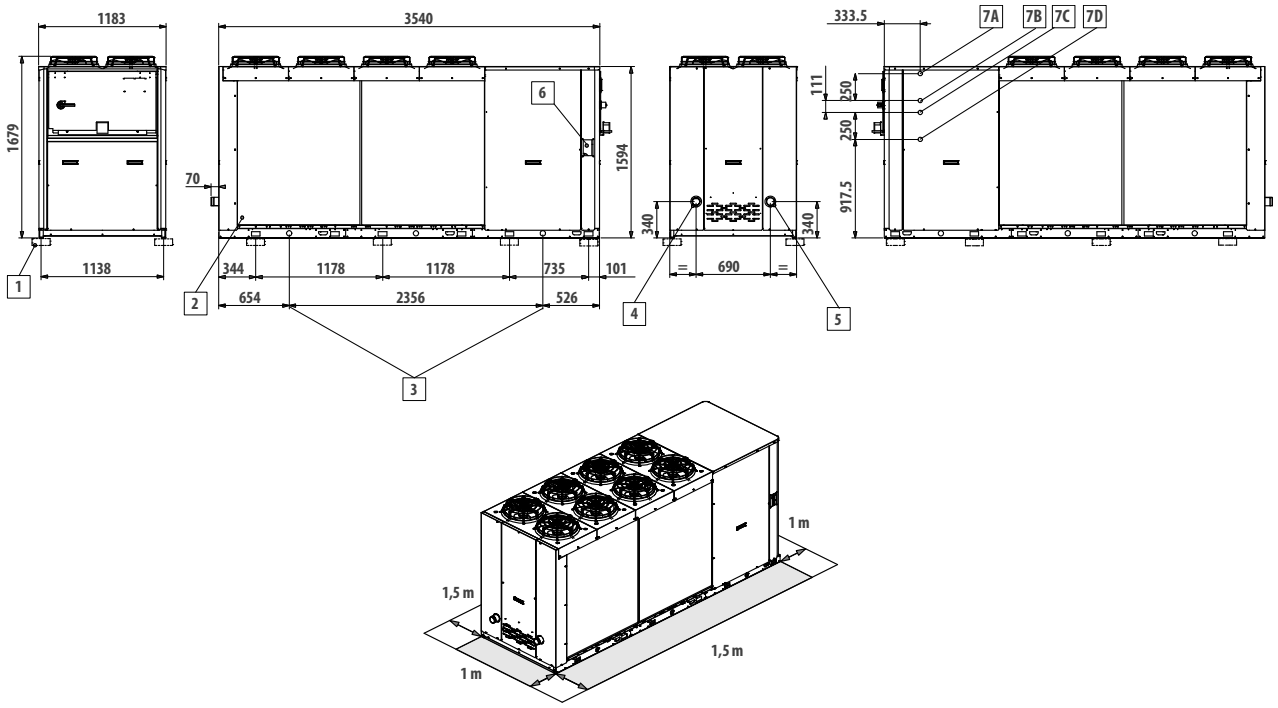
LCX FRAME 3



MODEL	VERSION
LCX 91	L - Q
LCX 92	L - Q
LCX 101	L - Q
LCX 102	L - Q
LCX 121	S
LCX 122	S
LCX 141	S
LCX 142	S
LCX 161	S
LCX 162	S

KEY	
1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points
4	Water inlet (Victaulic 2 1/2”)
5	Water outlet (Victaulic 2 1/2”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”) left circuit
7B	Water inlet heat recovery (1”) left circuit
7C	Water outlet heat recovery (1”) right circuit
7D	Water inlet heat recovery (1”) right circuit

LCX FRAME 3+

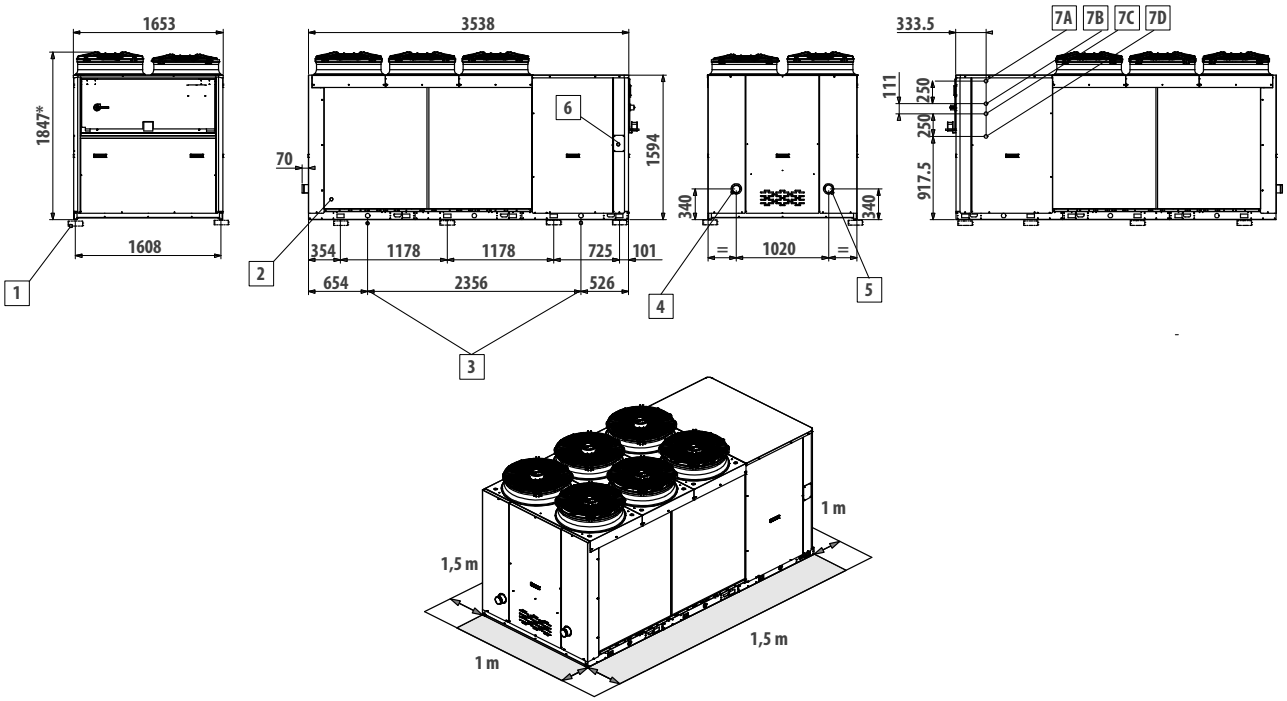


MODEL	VERSION
LCX 94	L - Q
LCX 104	L - Q
LCX 124	S
LCX 144	S
LCX 164	S
LCX 102	S

KEY

1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points
4	Water inlet (Victaulic 2 1/2”)
5	Water outlet (Victaulic 2 1/2”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”) left circuit
7B	Water inlet heat recovery (1”) left circuit
7C	Water outlet heat recovery (1”) right circuit
7D	Water inlet heat recovery (1”) right circuit

LCX FRAME 4

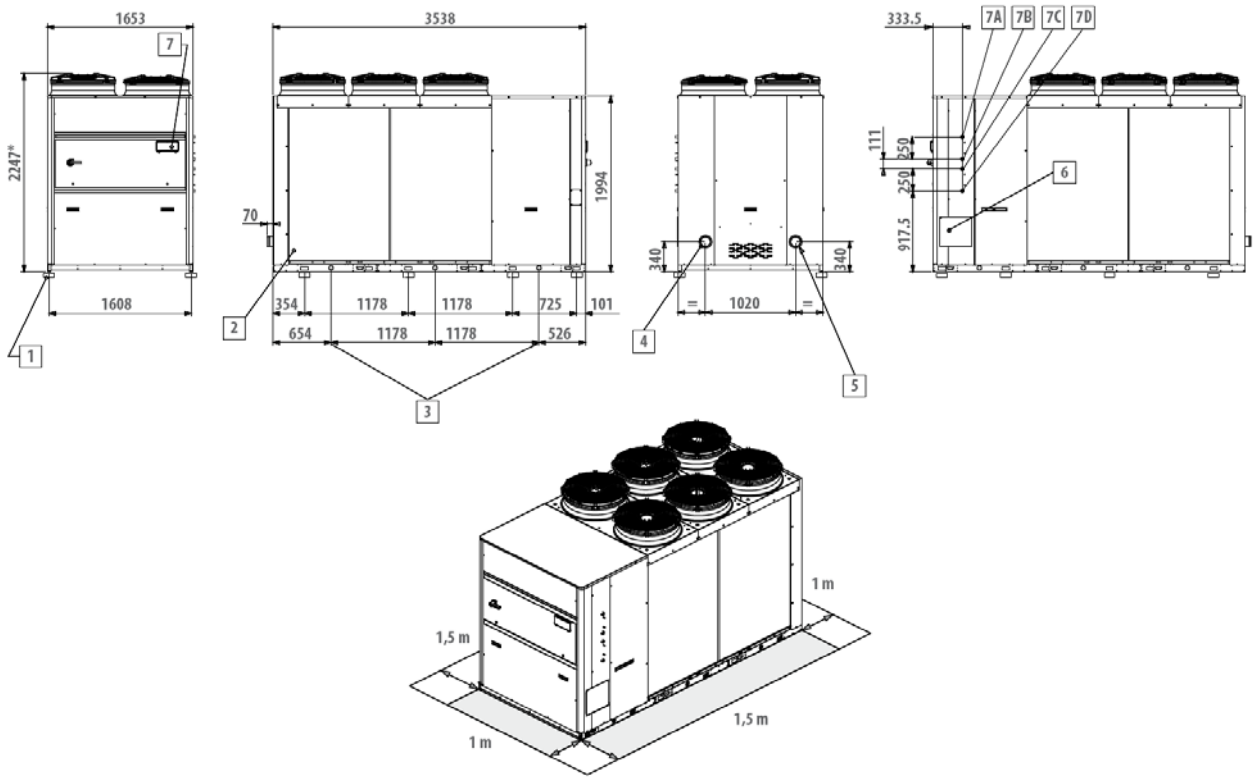


MODEL	VERSION
LCX 121	L - Q
LCX 122	L - Q
LCX 124	L - Q
LCX 141	L - Q
LCX 142	L - Q
LCX 144	L - Q
LCX 161	L - Q
LCX 162	L - Q
LCX 164	L - Q
LCX 174	S
LCX 194	S - L - Q
LCX 214	S

KEY

1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points (optional)
4	Water inlet (Victaulic 3”)
5	Water outlet (Victaulic 3”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”) left circuit
7B	Water inlet heat recovery (1”) left circuit
7C	Water outlet heat recovery (1”) right circuit
7D	Water inlet heat recovery (1”) right circuit
*****	With EC fans = 1884

LCX FRAME 5

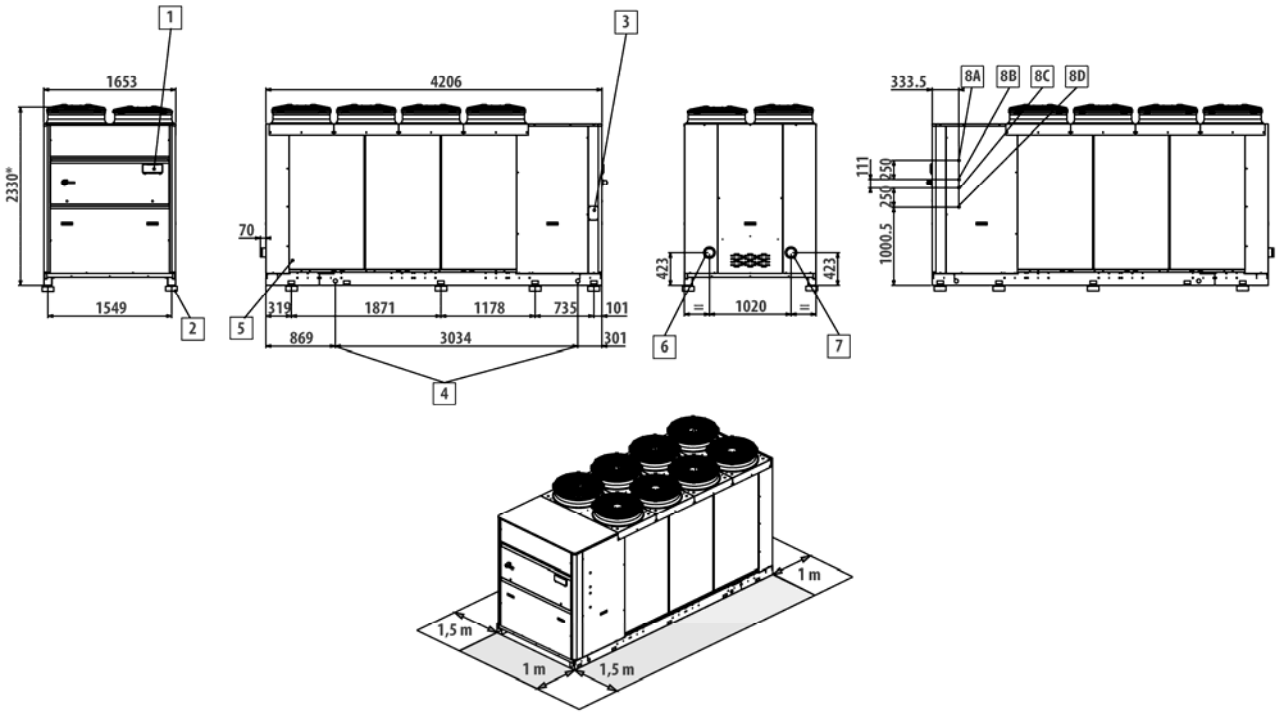


MODEL	VERSION
LCX 214	L - Q
LCX 244	S - L - Q

KEY

1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points (optional)
4	Water inlet (Victaulic 4”)
5	Water outlet (Victaulic 4”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”) left circuit
7B	Water inlet heat recovery (1”) left circuit
7C	Water outlet heat recovery (1”) right circuit
7D	Water inlet heat recovery (1”) right circuit
*****	With EC fans =2284

LCX FRAME 6

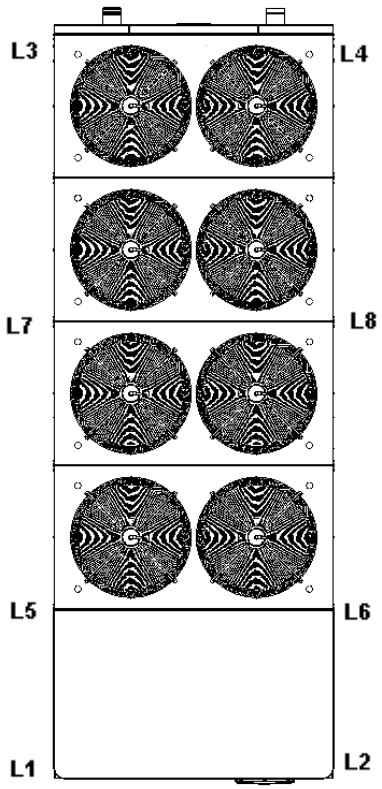


MODEL	VERSION
LCX 274	S - L - Q
LCX 294	S - L - Q
LCX 324	S - L - Q
LCX 364	S - L

KEY

1	Vibration damping supports
2	Protection grill (optional)
3	Lifting points (optional)
4	Water inlet (Victaulic 4”)
5	Water outlet (Victaulic 4”)
6	Power supply cable inlet
7A	Water outlet heat recovery (1”) left circuit
7B	Water inlet heat recovery (1”) left circuit
7C	Water outlet heat recovery (1”) right circuit
7D	Water inlet heat recovery (1”) right circuit
*****	With EC fans =2367

16 SUMMARY TABLE OF WEIGHTS



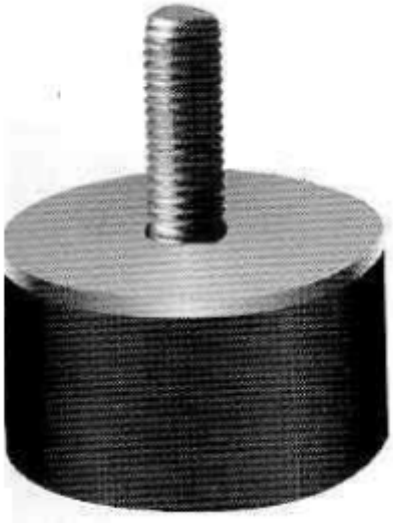
This drawing illustrates the points of the machine for which the **weights for the basic chiller and heat pump models** have been calculated. The values are shown in the following tables.

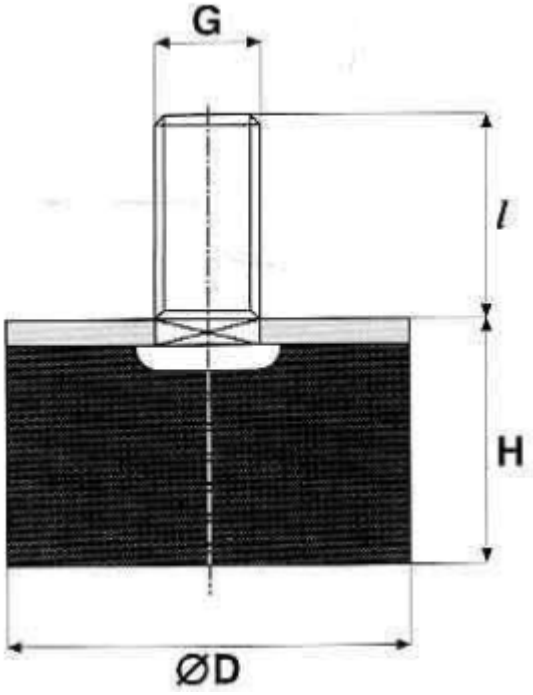
Important note: the weights of hydronic modules (C-H; with 2 pumps + tank, with 1 pump + reservoir, with 2 pumps, with 1 pump) must be added to the standard weights of the basic model (C-H; STD cooling-only, STD heat pump, Free-Cooling STD).
NOTE: all weights indicated above include the refrigerant charge and water contained in the hydraulic system (very important for determining the most suitable support for the unit, especially if equipped with a tank).
To obtain the approximate weight of the unit when empty, subtract the weight in kg of the water contained in the tank – see table below. In other cases the water content is negligible for these purposes.

FRAME	LENGTH	DEPTH	HEIGHT	H2O in the buffer tank [Kg]	Rubber anti-vibration device	Spring anti-vibration device
1	2090	1183	1735	200	DD10040M-M16	ISOTOP SD7-M10
2	2440	1183	1735	220	DD10040M-M16	ISOTOP SD7-M10
3	3190	1183	1735	340	DD10040M-M16	ISOTOP SD7-M10
3+	3540	1183	1735	340	DD10040M-M16	ISOTOP SD7-M10
4	3540	1653	1823	600	DD10040M-M16	ISOTOP SD7-M10
5	3540	1653	2223	600	DD10040M-M16	ISOTOP SD7-M10
6	4206	1653	2330	765	60017033-M20	ISOTOP SD8-M10

- **Rubber anti-vibration devices**

Upon request, LCX Frame 1÷5 units can be fitted with the rubber anti-vibration devices below:



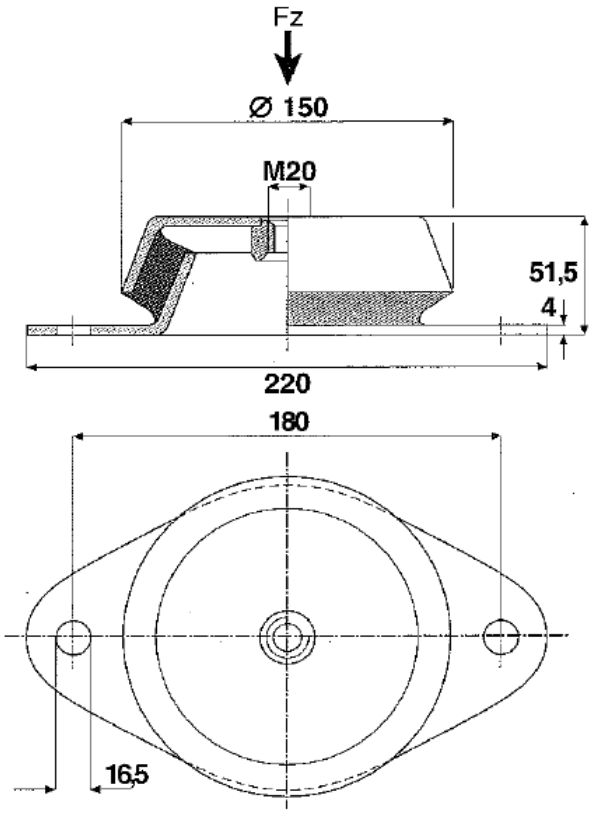


Reference code	øD	H	G x l	Compression stress			
				Load (daN)	f (mm) *		
					43° Sh	57° Sh	68° Sh
DD10040	100	40	M16 x 45	80,0 300,0 500,0	0,91 3,43 5,72	0,50 1,90 3,18	0,35 1,33 2,33

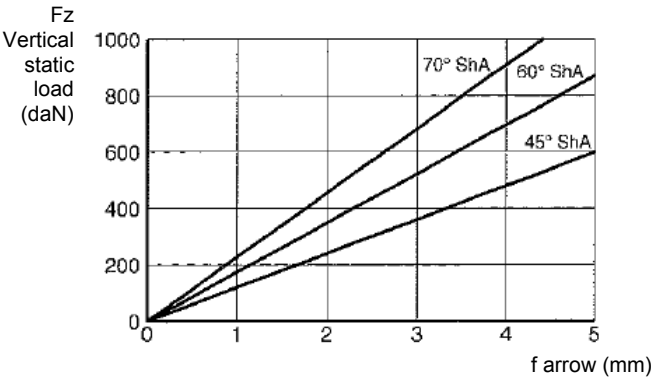
* Indicative values due to the tolerances of the hardnesses of the elastomer and other factors. They may be verified if necessary.

NOTE: For the exact position of every pin please refer to the dimensional drawing enclosed.

Upon request, LCX Frame 6 units can be fitted with the rubber anti-vibration devices with a hardness value of 60°Shore:



°ShA	45	60	70
Fz max adm. – daN	400	500	700



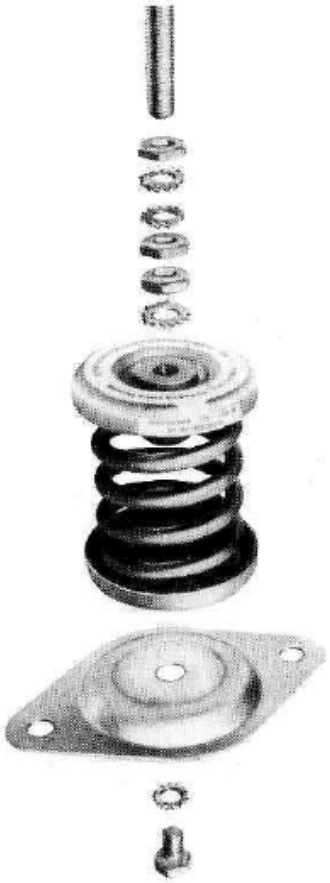
NOTE: For the exact position of every pin please refer to the dimensional drawing enclosed.

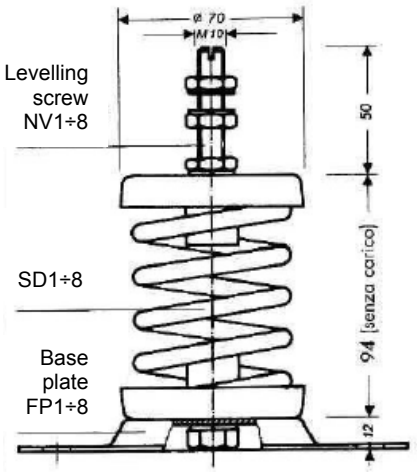
- **Spring anti-vibration devices**

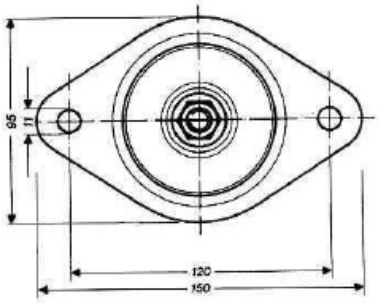
Upon request, LCX units can be fitted with the spring anti-vibration devices below:

Item	Reference	Nominal loads	Elastic property
ISOTOP SD 7	450 000 17	1815 N ÷ 3800 N	121.03 N/mm
ISOTOP SD 8	450 000 28	2800 N ÷ 5200 N	187.10 N/mm

The eigenfrequency (n_e) ranges from 2.6 to 4.1 Hz (154÷245 cycles/min.).



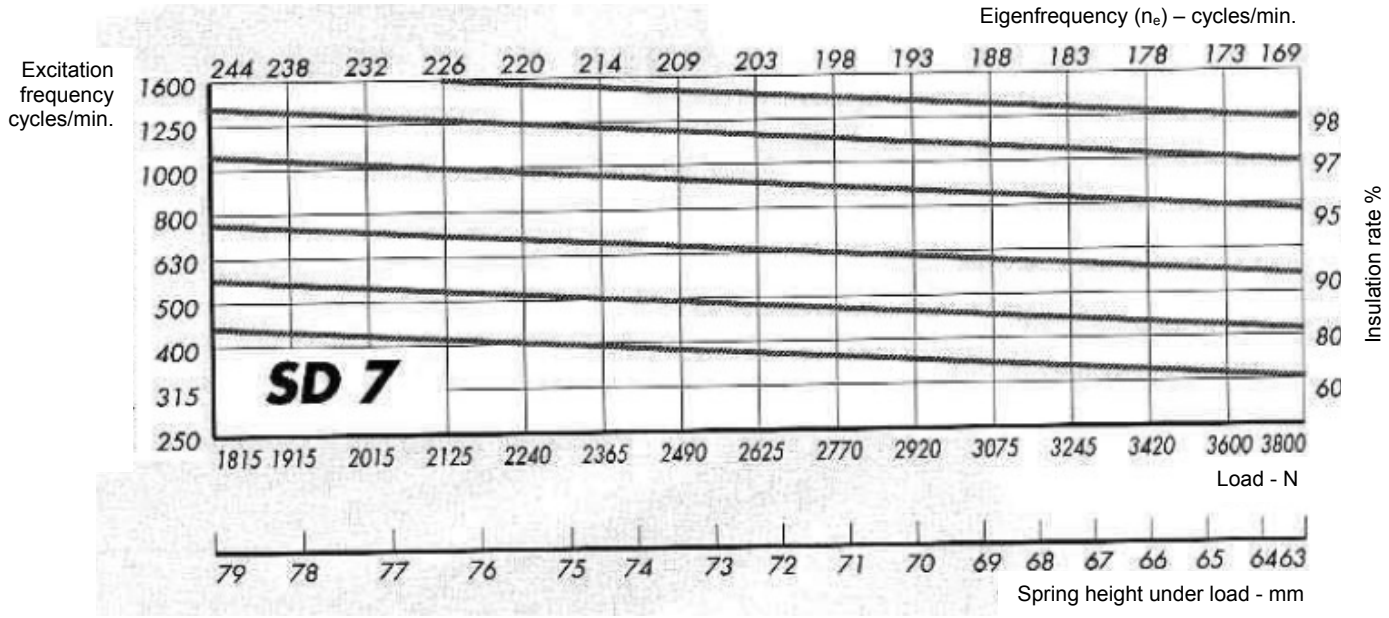




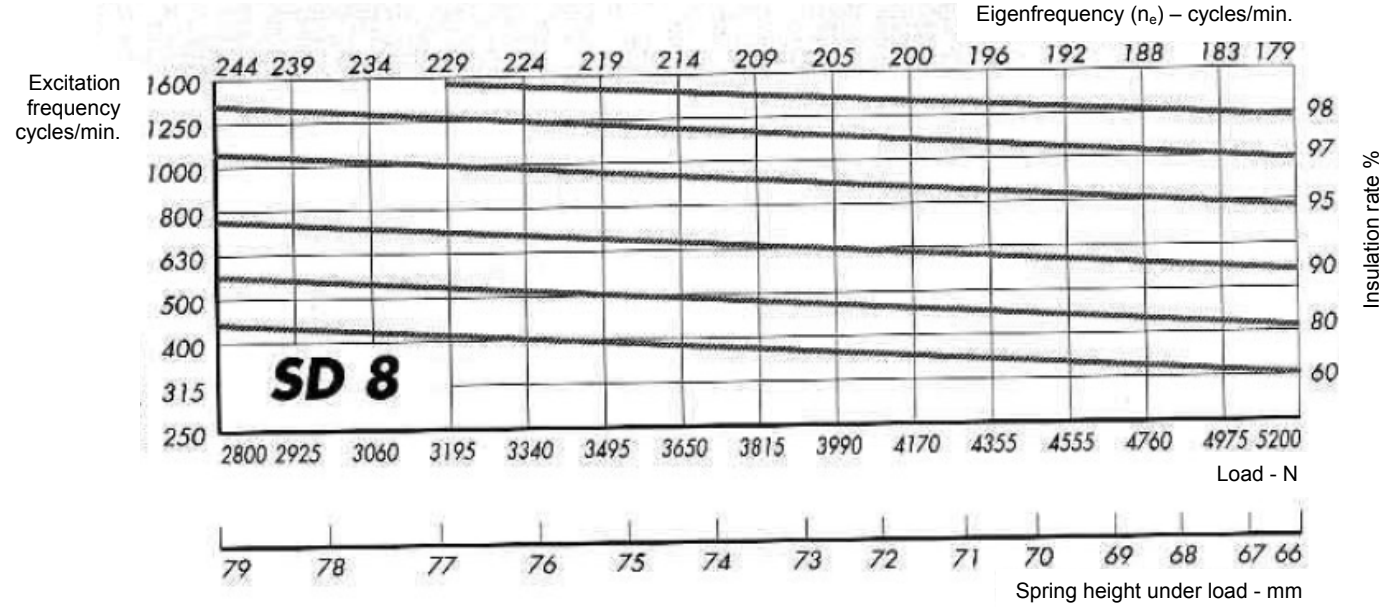
Constant height = interchangeability between the versions of the series

NOTE: For the exact position of every pin please refer to the dimensional drawing enclosed.

The ratings of the spring anti-vibration devices featured on the LCX Frame 1÷5 units are show in the diagram below:



The ratings of the spring anti-vibration devices featured on the LCX Frame 6 units are show in the diagram below:



16.1 TOTAL STD WEIGHTS

- **LCX weights - cooling only**

OPERATING WEIGHT OF LCX-C WATER CHILLER WITHOUT HYDRAULIC OPTIONS

Model		042	052	062	062	072	072	082	082	091-092	091-092	101-102
Version		CS-CL-CQ	CS-CL-CQ	CS	CL-CQ	CS	CL-CQ	CS	CL-CQ	CS	CL-CQ	CS
Frame		1	1	1	2	1	2	1	2	2	3	2
Total (kg)		525	525	540	630	570	635	650	700	730	905	730
Distribution on resting points (kg)	L1	197	197	203	236	214	238	244	263	274	170	274
	L2	197	197	203	236	214	238	244	263	274	170	274
	L3	66	66	68	79	71	79	81	88	91	113	91
	L4	66	66	68	79	71	79	81	88	91	113	91
	L5	-	-	-	-	-	-	-	-	-	170	-
	L6	-	-	-	-	-	-	-	-	-	170	-
	L7	-	-	-	-	-	-	-	-	-	-	-
	L8	-	-	-	-	-	-	-	-	-	-	-

Model		101-102	121-122	141-142	161-162	094-104	124	144	164	121-122	124	141-142
Version		CL-CQ	CS	CS	CS	CL-CQ	CS	CS	CS	CL-CQ	CL-CQ	CL-CQ
Frame		3	3	3	3	3 +	3 +	3 +	3 +	4	4	4
Total (kg)		915	1010	1055	1085	980	1050	1070	1220	1260	1275	1310
Distribution on resting points (kg)	L1	172	189	198	203	147	158	161	183	189	191	197
	L2	172	189	198	203	147	158	161	183	189	191	197
	L3	114	126	132	136	98	105	107	122	126	128	131
	L4	114	126	132	136	98	105	107	122	126	128	131
	L5	172	189	198	203	147	158	161	183	189	191	197
	L6	172	189	198	203	147	158	161	183	189	191	197
	L7	-	-	-	-	98	105	107	122	126	128	131
	L8	-	-	-	-	98	105	107	122	126	128	131

Model		144	161-162	164	174	194	214	214	244	274	294	324
Version		CL-CQ	CL-CQ	CL-CQ	CS	CS-CL-CQ	CS	CL-CQ	CS-CL-CQ	CS-CL-CQ	CS-CL-CQ	CS-CL-CQ
Frame		4	4	4	4	4	4	5	5	6	6	6
Total (kg)		1290	1330	1440	1440	1460	1470	1510	1620	1943	1975	2010
Distribution on resting points (kg)	L1	194	200	216	216	219	221	227	243	303	303	312
	L2	194	200	216	216	219	221	227	243	303	303	312
	L3	129	133	144	144	146	147	151	162	217,5	220	223
	L4	129	133	144	144	146	147	151	162	217,5	220	223
	L5	194	200	216	216	219	221	227	243	268	279	285
	L6	194	200	216	216	219	221	227	243	268	280	285
	L7	129	133	144	144	146	147	151	162	183	185	185
	L8	129	133	144	144	146	147	151	162	183	185	185

NOTE: Identify the model and dimensional frame to use table reported in par. 16.2.

- **LCX weights - heat pump**

OPERATING WEIGHT OF LCX-H HEAT PUMPS WITHOUT HYDRAULIC OPTIONS

Model		042	052	062	062	072	072	082	082	091-092	091-092	101-102
Version		HS-HL-HQ	HS-HL-HQ	HS	HL-HQ	HS	HL-HQ	HS	HL-HQ	HS	HL-HQ	HS
Frame		1	1	1	2	1	2	1	2	2	3	2
Total (kg)		545	545	585	650	585	655	675	735	755	940	760
Distribution on resting points (kg)	L1	204	204	219	244	219	246	253	276	283	176	285
	L2	204	204	219	244	219	246	253	276	283	176	285
	L3	68	68	73	81	73	82	84	92	94	118	95
	L4	68	68	73	81	73	82	84	92	94	118	95
	L5	-	-	-	-	-	-	-	-	-	176	-
	L6	-	-	-	-	-	-	-	-	-	176	-
	L7	-	-	-	-	-	-	-	-	-	-	-
	L8	-	-	-	-	-	-	-	-	-	-	-

Model		101-102	121-122	141-142	161-162	094-104	124	144	164	121-122	124	141-142
Version		HL-HQ	HS	HS	HS	HL-HQ	HS	HS	HS	HL-HQ	HL-HQ	HL-HQ
Frame		3	3	3	3	3 +	3 +	3 +	3 +	4	4	4
Total (kg)		945	1050	1100	1155	1020	1090	1120	1270	1305	1315	1350
Distribution on resting points (kg)	L1	177	197	206	217	153	164	168	191	196	197	203
	L2	177	197	206	217	153	164	168	191	196	197	203
	L3	118	131	138	144	102	109	112	127	131	132	135
	L4	118	131	138	144	102	109	112	127	131	132	135
	L5	177	197	206	217	153	164	168	191	196	197	203
	L6	177	197	206	217	153	164	168	191	196	197	203
	L7	-	-	-	-	102	109	112	127	131	132	135
	L8	-	-	-	-	102	109	112	127	131	132	135

Model		144	161-162	164	174	194	214	214	244	274	294	324
Version		HL-HQ	HL-HQ	HL-HQ	HS	HS-HL-HQ	HS	HL-HQ	HS-HL-HQ	HS-HL-HQ	HS-HL-HQ	HS-HL-HQ
Frame		4	4	4	4	4	4	5	5	6	6	6
Total (kg)		1345	1375	1495	1495	1515	1530	1590	1690	2015	2050	2101
Distribution on resting points (kg)	L1	202	206	224	224	227	230	239	254	323	323	333
	L2	202	206	224	224	227	230	239	254	323	323	333
	L3	135	138	150	150	152	153	159	169	222,5	224	224
	L4	135	138	150	150	152	153	159	169	222,5	224	224
	L5	202	206	224	224	227	230	239	254	278	294	308
	L6	202	206	224	224	227	230	239	254	278	294	308
	L7	135	138	150	150	152	153	159	169	184	184	185
	L8	135	138	150	150	152	153	159	169	184	184	185

NOTE: Identify the model and dimensional frame to use table reported in par. 16.2.

16.2 WEIGHT OF HYDRONIC MODULES C-H-F

- **Weight with 2 pumps + full tank (to be added to the STD weight)**

WEIGHT OF HYDRONIC MODULES: 2 PUMPS + FULL BUFFER TANK (ADD TO WEIGHT OF UNIT)

Model		042	052	062	062	072	072	082	082	91-92	91-92	101-102
Version		S-L-Q	S-L-Q	S	L-Q	S	L-Q	S	L-Q	S	L-Q	S
Frame		1	1	1	2	1	2	1	2	2	3	2
Total (kg)		402	402	402	450	402	450	402	450	500	630	500
Distribution on resting points (kg)	L1	101	101	101	113	101	113	101	113	125	32	125
	L2	101	101	101	113	101	113	101	113	125	32	125
	L3	101	101	101	113	101	113	101	113	125	142	125
	L4	101	101	101	113	101	113	101	113	125	142	125
	L5	-	-	-	-	-	-	-	-	-	142	-
	L6	-	-	-	-	-	-	-	-	-	142	-
	L7	-	-	-	-	-	-	-	-	-	-	-
	L8	-	-	-	-	-	-	-	-	-	-	-

Model		101-102	121-122	141-142	161-162	094-104	124	144	164	121-122	124	141-142
Version		L-Q	S	S	S	L-Q	S	S	S	L-Q	L-Q	L-Q
Frame		3	3	3	3	3+	3+	3+	3+	4	4	4
Total (kg)		630	660	660	660	650	680	680	680	875	875	875
Distribution on resting points (kg)	L1	32	33	33	33	-	-	-	-	-	-	-
	L2	32	33	33	33	-	-	-	-	-	-	-
	L3	142	149	149	149	98	102	102	102	131	131	131
	L4	142	149	149	149	98	102	102	102	131	131	131
	L5	142	149	149	149	98	102	102	102	131	131	131
	L6	142	149	149	149	98	102	102	102	131	131	131
	L7	-	-	-	-	130	136	136	136	175	175	175
	L8	-	-	-	-	130	136	136	136	175	175	175

Model		144	161-162	164	174	194	214	214	244	274	294	324
Version		L-Q	L-Q	L-Q	S	S-L-Q	S	L-Q	S-L-Q	S-L-Q	S-L-Q	S-L-Q
Frame		4	4	4	4	4	4	5	5	6	6	6
Total (kg)		875	875	875	875	908	908	908	950	1115	1115	1115
Distribution on resting points (kg)	L1	-	-	-	-	-	-	-	-	-	-	-
	L2	-	-	-	-	-	-	-	-	-	-	-
	L3	131	131	131	131	136	136	136	143	186	186	186
	L4	131	131	131	131	136	136	136	143	186	186	186
	L5	131	131	131	131	136	136	136	143	186	186	186
	L6	131	131	131	131	136	136	136	143	186	186	186
	L7	175	175	175	175	182	182	182	190	186	186	186
	L8	175	175	175	175	182	182	182	190	186	186	186

NOTE: Combine the weight with the frame identified in par. 16.1.

- **Weight with 1 pump + full tank (to be added to the STD weight)**

WEIGHT OF HYDRONIC MODULES: 1 PUMP + FULL BUFFER TANK (ADD TO WEIGHT OF UNIT)

Model		042	052	062	062	072	072	082	082	091-092	091-092	101-102
Version		S-L-Q	S-L-Q	S	L-Q	S	L-Q	S	L-Q	S	L-Q	S
Frame		1	1	1	2	1	2	1	2	2	3	2
Total (kg)		337	337	337	352	337	352	337	367	408	521	408
Distribution on resting points (kg)	L1	84	84	84	88	84	88	84	92	102	26	102
	L2	84	84	84	88	84	88	84	92	102	26	102
	L3	84	84	84	88	84	88	84	92	102	117	102
	L4	84	84	84	88	84	88	84	92	102	117	102
	L5	-	-	-	-	-	-	-	-	-	117	-
	L6	-	-	-	-	-	-	-	-	-	117	-
	L7	-	-	-	-	-	-	-	-	-	-	-
	L8	-	-	-	-	-	-	-	-	-	-	-

Model		101-102	121-122	141-142	161-162	094-104	124	144	164	121-122	124	141-142
Version		L-Q	S	S	S	L-Q	S	S	S	L-Q	L-Q	L-Q
Frame		3	3	3	3	3 +	3 +	3 +	3 +	4	4	4
Total (kg)		521	571	571	571	577,5	591	591	591	780	780	780
Distribution on resting points (kg)	L1	26	29	29	29	-	-	-	-	-	-	-
	L2	26	29	29	29	-	-	-	-	-	-	-
	L3	117	128	128	128	87	89	89	89	117	117	117
	L4	117	128	128	128	87	89	89	89	117	117	117
	L5	117	128	128	128	87	89	89	89	117	117	117
	L6	117	128	128	128	87	89	89	89	117	117	117
	L7	-	-	-	-	116	118	118	118	156	156	156
	L8	-	-	-	-	116	118	118	118	156	156	156

Model		144	161-162	164	174	194	214	214	244	274	294	324
Version		L-Q	L-Q	L-Q	S	S-L-Q	S	L-Q	S-L-Q	S-L-Q	S-L-Q	S-L-Q
Frame		4	4	4	4	4	4	5	5	6	6	6
Total (kg)		780	780	780	768	816	816	816	849	1014	1014	1014
Distribution on resting points (kg)	L1	-	-	-	-	-	-	-	-	-	-	-
	L2	-	-	-	-	-	-	-	-	-	-	-
	L3	117	117	117	115	122	122	122	127	169	169	169
	L4	117	117	117	115	122	122	122	127	169	169	169
	L5	117	117	117	115	122	122	122	127	169	169	169
	L6	117	117	117	115	122	122	122	127	169	169	169
	L7	156	156	156	154	163	163	163	170	169	169	169
	L8	156	156	156	154	163	163	163	170	169	169	169

NOTE: Combine the weight with the frame identified in par. 16.1.

➢ **Weight with 2 pumps (to be added to the STD weight)**

WEIGHT OF HYDRONIC MODULES: 2 PUMPS (ADD TO WEIGHT OF UNIT)

Model		042	052	062	062	072	072	082	082	091-092	091-092	101-102
Version		S-L-Q	S-L-Q	S	L-Q	S	L-Q	S	L-Q	S	L-Q	S
Frame		1	1	1	2	1	2	1	2	2	3	2
Total (kg)		154	154	154	197	154	197	154	178	190	212	190
Distribution on resting points (kg)	L1	39	39	39	49	39	49	39	45	48	11	48
	L2	39	39	39	49	39	49	39	45	48	11	48
	L3	39	39	39	49	39	49	39	45	48	48	48
	L4	39	39	39	49	39	49	39	45	48	48	48
	L5	-	-	-	-	-	-	-	-	-	48	-
	L6	-	-	-	-	-	-	-	-	-	48	-
	L7	-	-	-	-	-	-	-	-	-	-	-
	L8	-	-	-	-	-	-	-	-	-	-	-

Model		101-102	121-122	141-142	161-162	094-104	124	144	164	121-122	124	141-142
Version		L-Q	S	S	S	L-Q	S	S	S	L-Q	L-Q	L-Q
Frame		3	3	3	3	3 +	3 +	3 +	3 +	4	4	4
Total (kg)		212	212	212	212	190	212	212	212	220	220	220
Distribution on resting points (kg)	L1	11	11	11	11	0	0	0	0	0	0	0
	L2	11	11	11	11	0	0	0	0	0	0	0
	L3	48	48	48	48	29	32	32	32	33	33	33
	L4	48	48	48	48	29	32	32	32	33	33	33
	L5	48	48	48	48	29	32	32	32	33	33	33
	L6	48	48	48	48	29	32	32	32	33	33	33
	L7	-	-	-	-	38	42	42	42	44	44	44
	L8	-	-	-	-	38	42	42	42	44	44	44

Model		144	161-162	164	174	194	214	214	244	274	294	324
Version		L-Q	L-Q	L-Q	S	S-L-Q	S	L-Q	S-L-Q	S-L-Q	S-L-Q	S-L-Q
Frame		4	4	4	4	4	4	5	5	6	6	6
Total (kg)		220	220	220	236	236	236	236	248	248	248	248
Distribution on resting points (kg)	L1	0	0	0	0	0	0	0	0	0	0	0
	L2	0	0	0	0	0	0	0	0	0	0	0
	L3	33	33	33	35	35	35	35	37	41	41	41
	L4	33	33	33	35	35	35	35	37	41	41	41
	L5	33	33	33	35	35	35	35	37	41	41	41
	L6	33	33	33	35	35	35	35	37	41	41	41
	L7	44	44	44	47	47	47	47	50	41	41	41
	L8	44	44	44	47	47	47	47	50	41	41	41

NOTE: Combine the weight with the frame identified in par. 16.1.

- **Weight with 1 pump (to be added to the STD weight)**

WEIGHT OF HYDRONIC MODULES: 1 PUMP (ADD TO WEIGHT OF UNIT)

Model		042	052	062	062	072	072	082	082	091-092	091-092	101-102
Version		S-L-Q	S-L-Q	S	L-Q	S	L-Q	S	L-Q	S	L-Q	S
Frame		1	1	1	2	1	2	1	2	2	3	2
Total (kg)		116	116	116	148	116	148	116	134	143	159	143
Distribution on resting points (kg)	L1	29	29	29	37	29	37	29	33	36	8	36
	L2	29	29	29	37	29	37	29	33	36	8	36
	L3	29	29	29	37	29	37	29	33	36	36	36
	L4	29	29	29	37	29	37	29	33	36	36	36
	L5	-	-	-	-	-	-	-	-	-	36	-
	L6	-	-	-	-	-	-	-	-	-	36	-
	L7	-	-	-	-	-	-	-	-	-	-	-
	L8	-	-	-	-	-	-	-	-	-	-	-

Model		101-102	121-122	141-142	161-162	094-104	124	144	164	121-122	124	141-142
Version		L-Q	S	S	S	L-Q	S	S	S	L-Q	L-Q	L-Q
Frame		3	3	3	3	3 +	3 +	3 +	3 +	4	4	4
Total (kg)		159	159	159	159	142,5	159	159	159	165	165	165
Distribution on resting points (kg)	L1	8	8	8	8	0	0	0	0	0	0	0
	L2	8	8	8	8	0	0	0	0	0	0	0
	L3	36	36	36	36	21	24	24	24	25	25	25
	L4	36	36	36	36	21	24	24	24	25	25	25
	L5	36	36	36	36	21	24	24	24	25	25	25
	L6	36	36	36	36	21	24	24	24	25	25	25
	L7	-	-	-	-	29	32	32	32	33	33	33
	L8	-	-	-	-	29	32	32	32	33	33	33

Model		144	161-162	164	174	194	214	214	244	274	294	324
Version		L-Q	L-Q	L-Q	S	S-L-Q	S	L-Q	S-L-Q	S-L-Q	S-L-Q	S-L-Q
Frame		4	4	4	4	4	4	5	5	6	6	6
Total (kg)		165	165	165	177	177	177	177	186	186	186	186
Distribution on resting points (kg)	L1	0	0	0	0	0	0	0	0	0	0	0
	L2	0	0	0	0	0	0	0	0	0	0	0
	L3	25	25	25	27	27	27	27	28	31	31	31
	L4	25	25	25	27	27	27	27	28	31	31	31
	L5	25	25	25	27	27	27	27	28	31	31	31
	L6	25	25	25	27	27	27	27	28	31	31	31
	L7	33	33	33	35	35	35	35	37	31	31	31
	L8	33	33	33	35	35	35	35	37	31	31	31

NOTE: Combine the weight with the frame identified in par. 16.1.

16.3 PUMPING AND STORAGE SYSTEMS

LCX units may be equipped with 6 types of pumping systems, complete with expansion tank and buffer tanks:
- single pump (low LP head);
- single high-head pump (HP uprated);
- standard pump and back-up pump (OR – low head);
- standard pump and back-up pump (OR – low head);
- low-head pump for combined operation (AND);
- high-head pump for combined operation (AND);

In the case of pump systems including a back-up pump, the microprocessor controls the pumps in such a way as to equally divide the hours of operation, changing over the pumps in the event of a fault.

LCX		042	052	062	072	082	091_2_4
Standard type of pump - OR / AND version							
Available head, LCX with standard pump (nom. flow rate) OR	kPa	118	115	126	133	119	131
Available head, LCX with standard pump (nom. flow rate) AND	kPa	90	89	104	113	102	155
Uprated type of pump - OR / AND version							
Available head, LCX with uprated pump (nom. flow rate) OR	kPa	188	177	183	184	168	181
Available head, LCX with uprated pump (nom. flow rate) AND	kPa	176	166	150	148	131	181
Uprated type of pump - OR / AND (FC) version							
Available head, LCX F with uprated pump (nom. flow rate) OR	kPa	151	131	150	152	129	151
Available head, LCX F with uprated pump (nom. flow rate) AND	kPa	139	120	115	116	91	151
Expansion tank	dm^3	8	8	8	8	8	12
LCX		**101_2_4**	**121_2_4**	**141_2_4**	**161_2_4**	**174**	**194**
Standard type of pump - OR / AND version							
Available head, LCX with standard pump (nom. flow rate) OR	kPa	120	109	152	149	157	136
Available head, LCX with standard pump (nom. flow rate) AND	kPa	144	135	120	119	137	130
Uprated type of pump - OR / AND version							
Available head, LCX with uprated pump (nom. flow rate) OR	kPa	179	189	173	170	189	258
Available head, LCX with uprated pump (nom. flow rate) AND	kPa	179	193	181	185	201	194
Uprated type of pump - OR / AND (FC) version							
Available head, LCX F with uprated pump (nom. flow rate) OR	kPa	113	129	100	78	-	164
Available head, LCX F with uprated pump (nom. flow rate) AND	kPa	115	139	116	104	-	121
Expansion tank	dm^3	12	24	24	24	-	24
LCX		**214**	**244**	**274**	**294**	**324**	**364**
Standard type of pump - OR / AND version							
Available head, LCX with standard pump (nom. flow rate) OR	kPa	150	173	170	152	137	131
Available head, LCX with standard pump (nom. flow rate) AND	kPa	124	177	178	163	150	143
Uprated type of pump - OR / AND version							
Available head, LCX with uprated pump (nom. flow rate) OR	kPa	237	293	289	271	256	233
Available head, LCX with uprated pump (nom. flow rate) AND	kPa	188	210	210	195	182	177
Uprated type of pump - OR / AND (FC) version							
Available head, LCX F with uprated pump (nom. flow rate) OR	kPa	128	189	207	175	148	141
Available head, LCX F with uprated pump (nom. flow rate) AND	kPa	103	110	132	103	79	72
Expansion tank	dm^3	24	24	24	24	24	24

In the case of the dual pump - combined operation option, the advanced type of microprocessor is mandatory, since it controls the switching on of the second pump according to the number of partialization steps required at every moment; this means that the unit will operate in a cost-effective manner for most of its life given that, based on well-known analyses, chillers operate under a regimen of partialization for 97% of their lifetime.

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