Aquaciat Free cooling

NA 08.144 A

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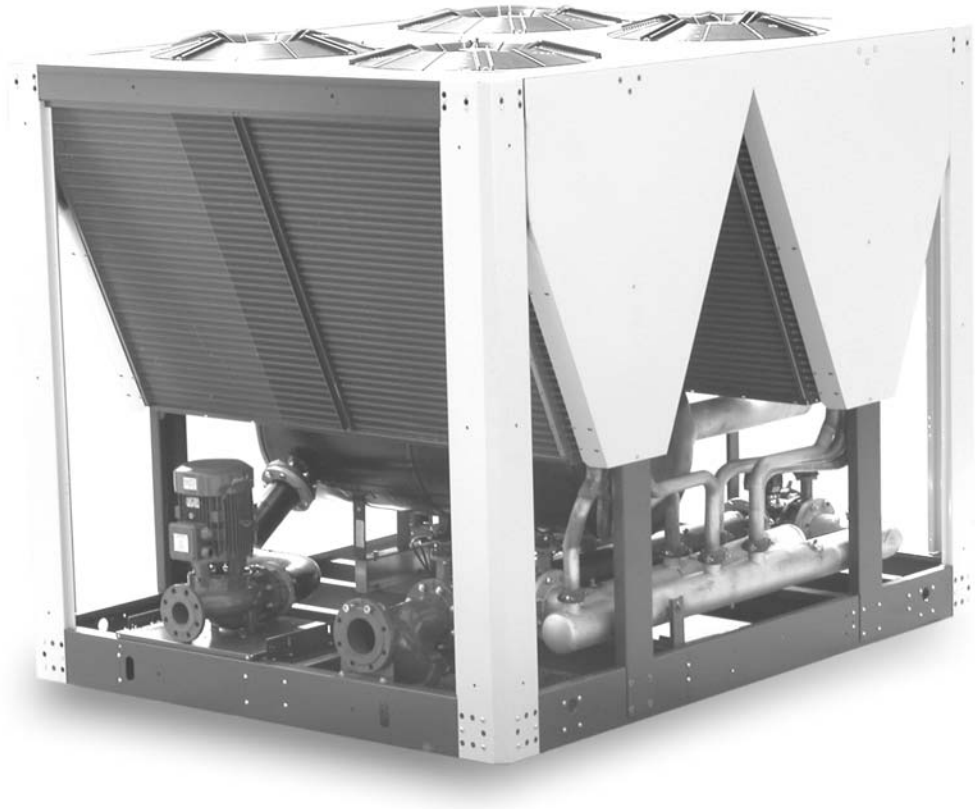
Installation
Operation
Commissioning
Maintenance

CIAT



Receiving the unit

The condition of the equipment must be inspected as soon as it is received. Check that it has not been damaged in transit and that there are no accessories missing. Indicate any damaged or missing items on the delivery slip and notify the carrier of said damaged or missing items by registered letter within three days of delivery.
Each unit has a manufacturer's plate on the front displaying an identification number. Please state this number in all correspondence.
Important: The unit must not be stored in an area exposed to violent winds over 188 km/h and must be secured to the ground.

Unloading

The recipient shall be responsible for unloading the units and providing the necessary handling equipment (see the section on" Handling").

Think safety

... during installation

Read the instructions and keep them for future use

Respect the instructions for using slings (see the labels on the unit)

Check that there is an emergency stop

Fit shut-off valves.

Prohibit public access.

... in an emergency

Switch off the electrical supply.
The process should not be jeopardised if the emergency stop devices are activated.

Warranty

Unless otherwise indicated, our equipment is guaranteed for 12 months after commissioning and no more than 18 months after invoicing. Our guarantee is limited to the replacement of defective parts used in the intended conditions. In particular it does not cover normal wear and tear, nor damage due to corrosion, clogging or the use of fluids incompatible with the materials, nor indirect damage. Synthetic seals with bonding agent (asbestos-free seals) are guaranteed for 6 months.

Storage

● Store the units in a dry room, protected from inclement weather, at a temperature between +5 and +50°C, placing them so that they are not in contact with a wall or with each other, and do not directly touch the floor; protect them against impacts and ensure that they only support their own weight.

● They must rest on blocks which are adjusted correctly to ensure they are completely stable and level.

● Prepare the ground to ensure that there will be no subsidence.

● Leave the blanking trim for the pipes in place before connecting the unit.

● For prolonged storage under humid conditions, it may be necessary to dry the motors in an oven before recommissioning.

● For **long-term storage** (over 3 months), fill the exchanger with an inert gas and seal the pipes hermetically to avoid any condensation and subsequent oxidation (see also the section on "Maintenance of motors").

Irrespective of the storage conditions, we recommend that several rotations of the motors be made every 6 months.

Installation

Warning for the installer

● Before any work is performed, read this guide carefully and ensure it is kept safe for future use. Safety information must be adhered to.

● Refer to the technical documentation or the order documents to find out the electrical specifications and the sound levels.

● The units must not be run under operating conditions which are more restrictive than those it was designed for (pressure, temperature, type and circulation of fluids).

● For units installed in European Union countries, ensure that the entire installation complies with the applicable directives and legal instruments.

Selecting a location

Particular care must be taken when choosing where to place the unit. Take into account the precautions for installation given below:

● Block public access to the facility.

● This unit is designed to operate outdoors, in a tertiary or industrial environment. You must nevertheless ensure that all conditions have been taken into account (negative outdoor temperatures, corrosive atmosphere, altitude).

● It is essential to secure the unit to the ground if there is a risk that it may be exposed to winds over 188 km/h.

Chiller's location

● Since normal use of these units does not require them to be resistant to their seismic activity, its seismic resistance has not been assessed.

● The area where the unit will be sited must be completely accessible so that maintenance and service operations can be carried out with ease. Ensure sufficient space is provided for service operations. Leave free space in front of the safety and control devices.

(see the paragraph on “Location” with diagram)

● Waste from vegetation is a major factor contributing to the clogging of the coil, avoid installing the unit close to deciduous trees.

● Do not install the unit near hot air extraction duct outlets.

● The distances between the unit and anything which may impede the intake and discharge of air must be adhered to.

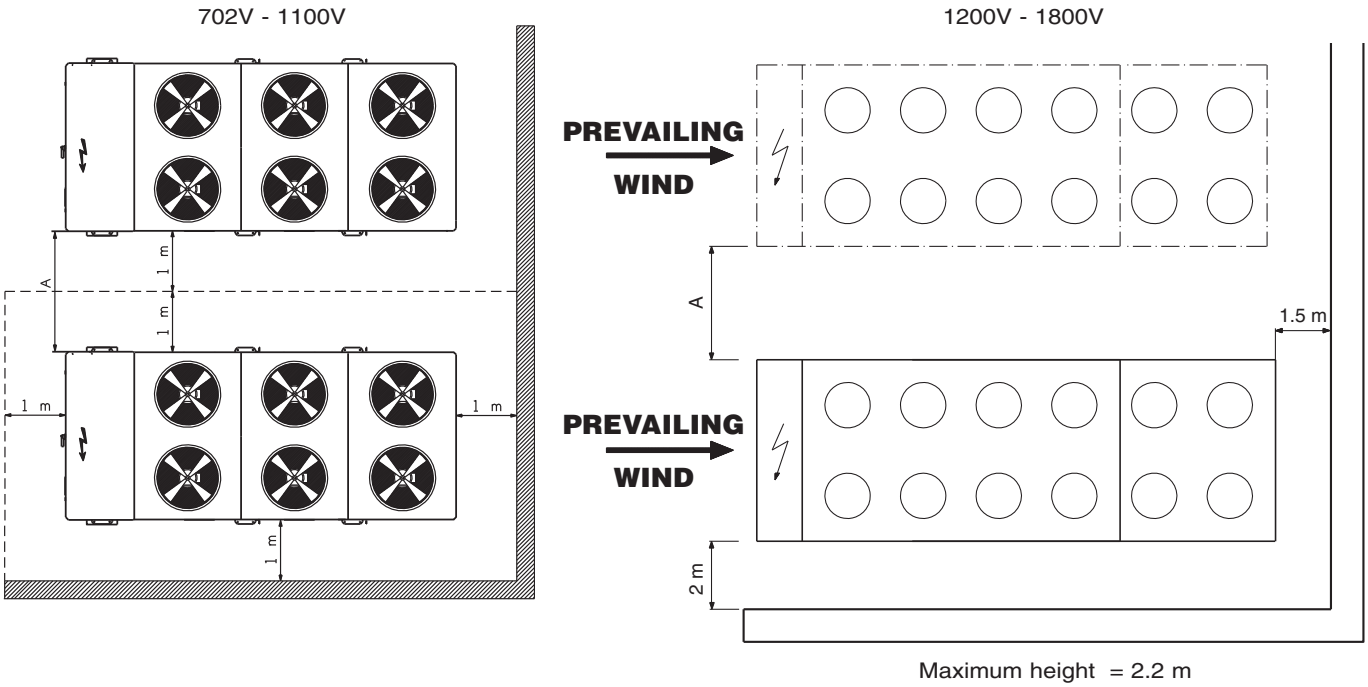
Location

(Clearances to be maintained)

It is important for the chillers to be installed with the necessary clearances:

● So that air discharged by the condenser is not drawn back in.

● So that maintenance can be carried out on the chiller.



2 units: A = 2 m

3 or more units: A = 3 m

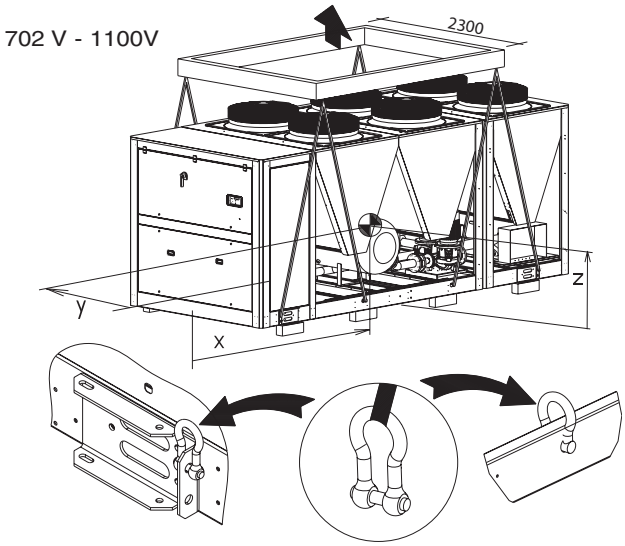
For information on the dimensions, weight, anchorage points and centre of gravity, refer to the drawings provided with the unit.

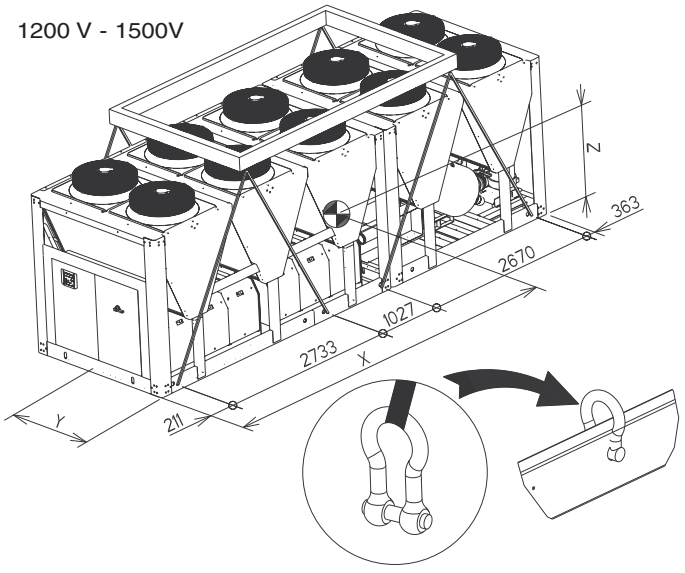
Handling

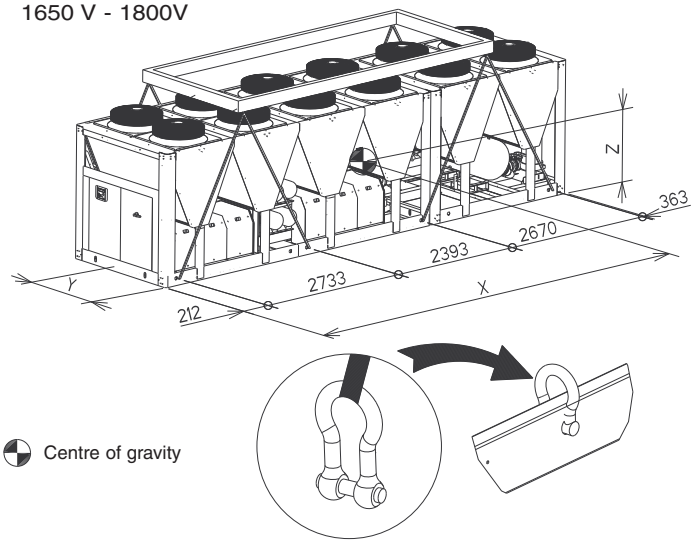
⚠ ● When handling the unit, only use the lifting points marked by the arrow labels. DO NOT USE ANY OTHER POINT OF ATTACHMENT. Respect the instructions for using slings which apply to each type of unit (see the labels affixed to the sides). The weight of the unit is given on the casing.

⚠ LIFTING ACCESSORIES FITTED ON THE UNIT MUST NOT BE REMOVED TO HANDLE ANOTHER LOAD.

● Handle the unit with care. Avoid any impacts or scratches which may affect the unit's ability to operate correctly (perforation of the elbows, damage to the finned surface, twisting of piping, initial corrosion).



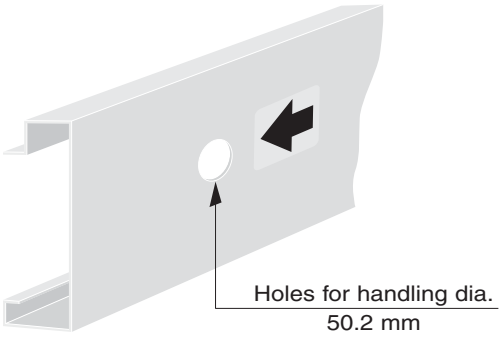




Centre of gravity

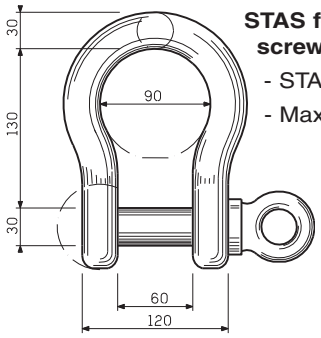
These drawings are provided for information only. Refer to the pictograms on the unit and in the documentation provided with it.

Detailed view of the anchorage point for handling



Type of shackle recommended for handling

- We recommend that shackles be used for handling these units.
- These machines must be unloaded and positioned by a specialist handling company using the appropriate, standardised tools.



STAS forged steel screw loop shackle

- STAS code: 130 M
- Maximum working load: 4000 kg

Sizes	Weight (kg)			
	LDC		LDH	
	Empty	In operation	Empty	In operation
702V	3103	3234	3253	3884
800V	3143	3274	3293	3924
900V	3198	3329	3348	3979
1000V	3238	3369	3388	4019
1100V	3368	3499	3488	4119
1200V	5763	6123	5888	6741
1500V	6266	6657	6391	7275
1650V	6996	7335	7034	7953
1800V	6996	7441	7121	8059

Installation recommendations

- If the human, environmental or financial consequences of failure are significant, take appropriate steps to limit the effects.

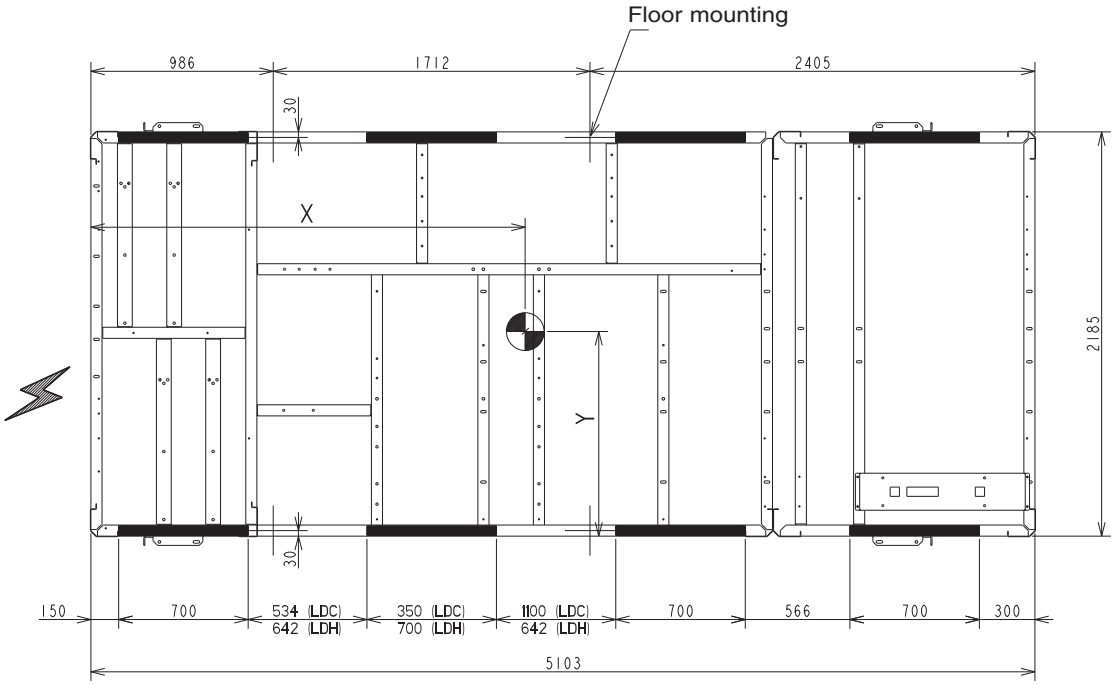
- Check that the unit complies with the safety rules applicable to the site where it is being used (explosive atmosphere, for example).

Vibration isolator

Anti-vibration mounts must be installed beneath the chiller for applications that generate extremely low vibrations. The mounts must be placed at the locations illustrated below.

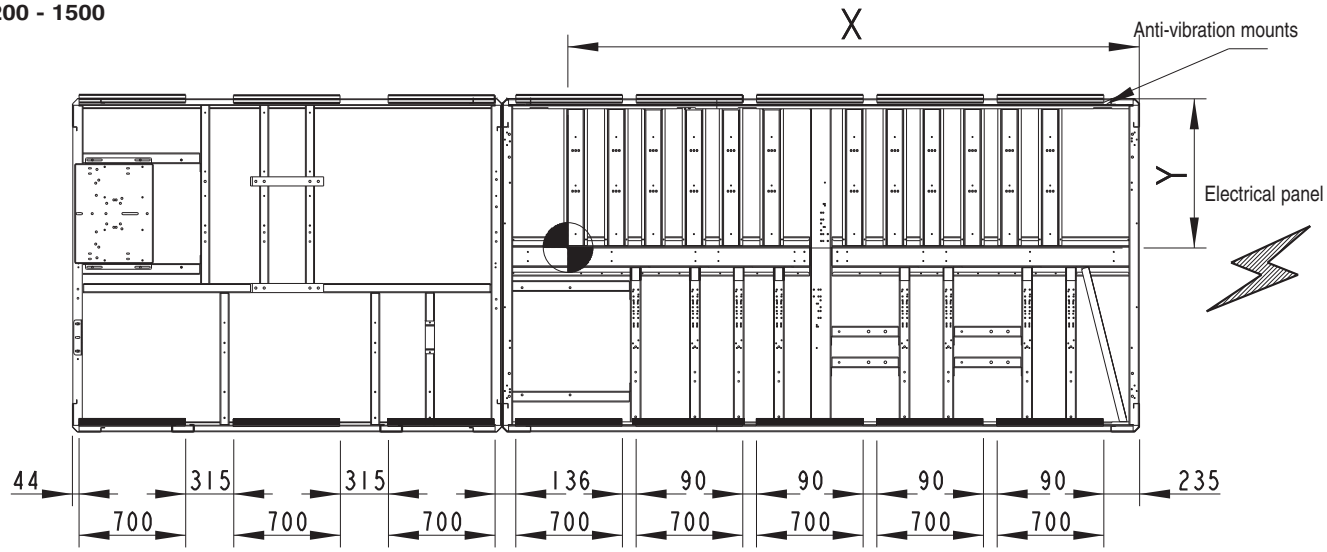
LDC - LDH

702V - 1100V



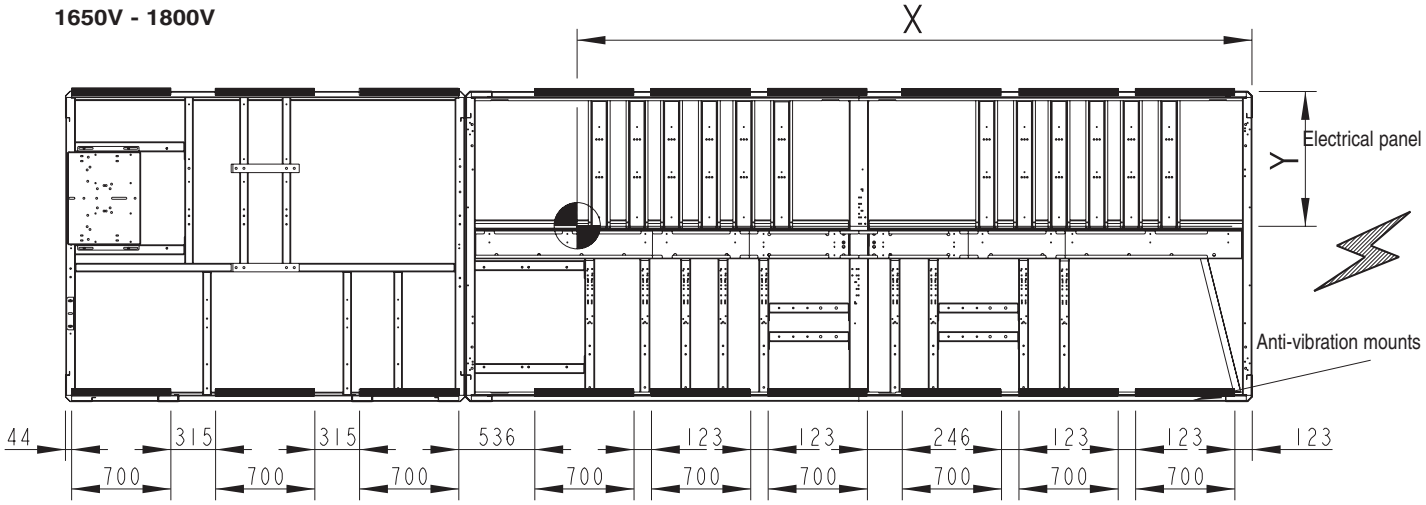
LDC - LDH

1200 - 1500



LDC - LDH

1650V - 1800V



● If objects or hail fall on the unit, there is a risk that the finned components may be damaged. Take appropriate steps to protect it, by adding a protective screen, for example.

● If the unit needs to be installed on a framework, this structure must be calculated based on the weight of the unit during service (full), equipped with all its accessories.

● Check that the sound level given in the technical instructions or in the order acknowledgement receipt is compatible with the permissible value for the site.

●Similarly, it is recommended that personnel working close to sources of high noise emission wear soundproof headphones. Soundproof headphones should in no way impede the wearing of other protective equipment.

● The connection pipes and the regulation or insulation equipment must be set up and supported so as to ensure they do not exert any force on the unit's piping (pressure, torsion or flexion).

● Ensure that the unit is perfectly level so that the pipe bundle can drain correctly. Also ensure that the unit is stable and secured using all of its anchorage points.

● Provide shut-off valves on the inlet and outlet pipes.

● The unit must be fitted with an emergency stop device, located very nearby; this device must be visible and accessible and must allow the electrical supply to the unit and its accessories to be cut off completely.

● Ensure that cutting off the electrical supply, whether intentionally or accidentally, does not jeopardise the process.

● For any accessories, refer to the specific guides.

● Install suitably effective venting and draining devices.

● Connect the pipes to earth in accordance with the overall lightning protection study for the installation as a whole.

● Ensure that the installation complies with the legal texts and codes in force in the country of operation.

Electrical connections

● Electrical connections must be carried out by personnel who are qualified in accordance with current standards and regulations.

● Ensure sufficient devices are provided to guarantee the protection of persons and property, and to enable maintenance operations to be carried out in complete safety.

● Choose power and control cables based on the unit's electrical specifications and the recommendations given in the manuals provided with the accessories.

● The cable routing must be made according to good working practice, using cable glands.

Hydraulic connection

● Blanking plugs are used to guarantee that the inside of pipes remain clean. Only remove them just before connecting the piping.

● Start connecting in accordance with the direction shown by the arrows on the inlet and outlet pipes.

● If welded connections are used, take appropriate precautions to ensure that welding residues do not enter the circuit.

● Never introduce foreign bodies into the circuit.

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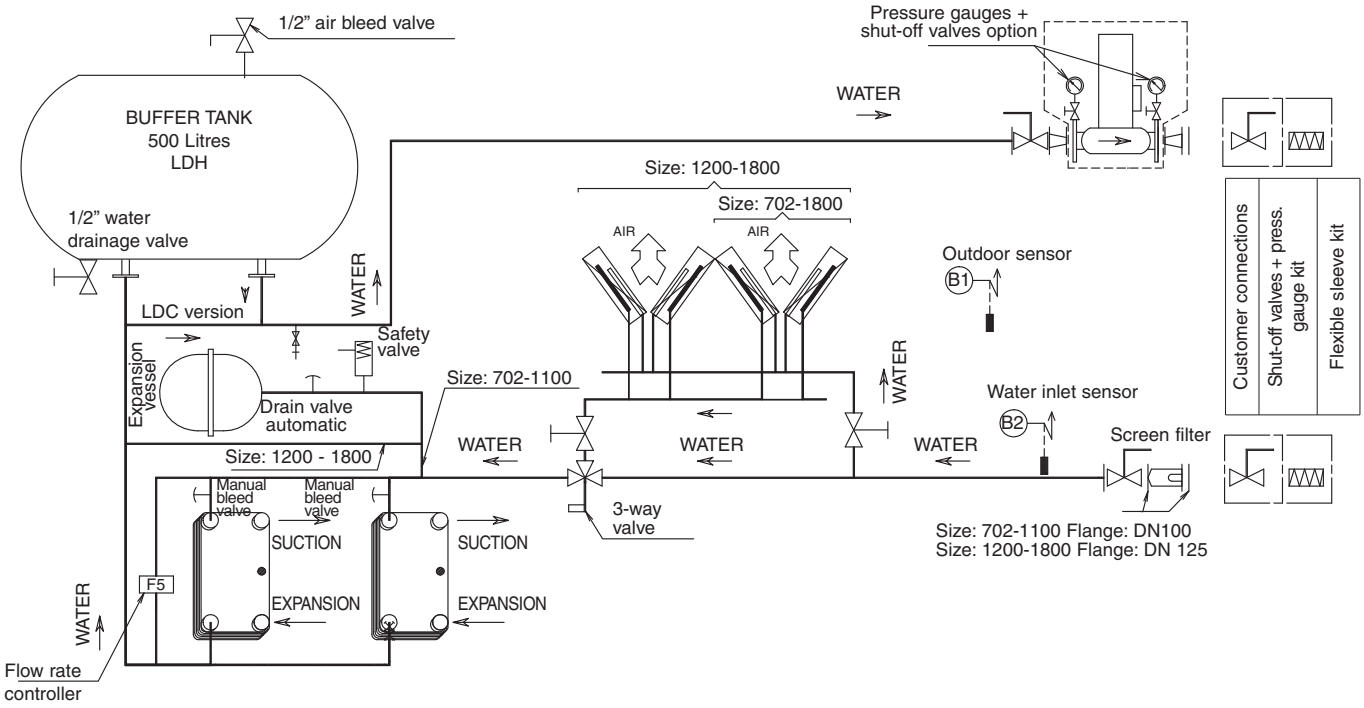
Hydraulic diagram



Hydraulic pumps (C and H versions)

Single pump

Qty.	102	103	104	105	106	107	108	109	110	112	117	118	119
For models from 702V to 1100V	x	x		x		x					x	x	x
For models from 1200V to 1800V			x	x	x	x	x	x	x	x			
Power kW	3	4	4	5,5	5,5	7,5	7,5	11	11	15	2,2	4	7,5
Maximum nominal current A	6,3	8,0	8,0	10,3	10,3	13,8	13,8	20,0	20,0	26,5	4,5	7,8	13,8

Dual pump

Qty.	202	203	204	205	206	207	208	209	210	212	217	218	219
For models from 702V to 1100V	x	x		x		x					x	x	x
For models from 1200V to 1800V			x	x	x	x	x	x	x	x			
Power kW	3	4	4	5,5	5,5	7,5	7,5	11	11	15	2,2	4	7,5
Maximum nominal current A	6,3	8,0	8,0	10,3	10,3	13,8	13,8	20,0	20,0	26,5	4,5	7,8	13,8

Performance of chillers and free cooling modules

	AQUACIAT FREE COOLING		702V	800V	900V	1000V	1100V	1200V	1500V	1650V	1800V
High-performance (HP) version	Chiller's cooling capacity (1)	kW	185	206	246	265	286	327,0	373,0	429,0	483,0
	Chiller's absorbed power	kW	60,3	69,7	81,5	89,6	100,2	110,7	127,6	145,6	163,2
	Chiller's EER efficiency		3,08	2,95	3,02	2,96	2,85	2,96	2,92	2,95	2,96
	Lw/Lp HP version (3)	dB(A)	90/58					93/61	95/63	96/64	98/66
	Free cooling module		1 V - 2 R					2 V - 2 R			
	Cooling capacity (2)	kW	62,9	66,1	70,9	72,8	74,5	117,7	126,2	134,5	140,9
	Absorbed power	kW	4,0	4,0	4,0	4,0	4,0	8,0	8,0	8,0	8,0
	Free cooling EER efficiency		15,73	16,53	17,73	18,20	18,63	14,71	15,78	16,81	17,61
	Lw/Lp HP version (3)	dB(A)	85 / 53					88 / 56			
	Free cooling module		1 V - 4 R					2 V - 4 R			
	Cooling capacity (2)	kW	91,7	95,2	100,5	102,4	104,1	173,7	183,7	193,1	200,0
	Absorbed power	kW	4,0	4,0	4,0	4,0	4,0	8,0	8,0	8,0	8,0
	Free cooling EER efficiency		22,93	23,80	25,13	25,60	26,03	21,71	22,96	24,14	25,00
	Lw/Lp HP version (3)	dB(A)	86 / 54					89 / 57			
Low Noise - LN and Xtra Low Noise - XLN versions	Chiller's cooling capacity (1)	kW	181,0	200,0	241,0	258,0	278,0	321,0	364,0	421,0	471,0
	Chiller's absorbed power	kW	60,4	70,6	81,7	90,9	102,0	110,9	129,6	146,0	164,4
	Chiller's EER efficiency		3,00	2,83	2,95	2,84	2,72	2,89	2,81	2,88	2,87
	Lw/Lp LN version (3)	dB(A)	84/52	85/53	84/52	84/52	85/53	91/59	90/58	91/59	91/59
	Lw/Lp XLN version (3)	dB(A)	81/49	82/50	81/49	81/49	83/51	87/55	87/55	87/55	88/56
	Free cooling module		1 V - 2 R					2 V - 2 R			
	Cooling capacity (2)	kW	57,1	59,6	63,4	64,8	66,1	107,5	114,4	121,0	126,0
	Absorbed power	kW	2,54	2,54	2,54	2,54	2,54	5,08	5,08	5,08	5,08
	Free cooling EER efficiency		22,48	23,46	24,96	25,51	26,02	21,16	22,52	23,82	24,80
	Lw/Lp LN version (3)	dB(A)	78 / 46					81 / 49			
	Lw/Lp XLN version (3)	dB(A)	76 / 44					79 / 47			
	Free cooling module		1 V - 4 R					2 V - 4 R			
	Cooling capacity (2)	kW	78,5	80,9	84,3	85,5	86,6	150,3	157,2	163,5	167,9
	Absorbed power	kW	2,54	2,54	2,54	2,54	2,54	5,08	5,08	5,08	5,08
	Free cooling EER efficiency		30,91	31,85	33,19	33,66	34,09	29,59	30,94	32,19	33,05
	Lw/Lp LN version (3)	dB(A)	79 / 47					82 / 50			
	Lw/Lp XLN version (3)	dB(A)	77 / 45					80 / 48			

(1) Cooling capacity based on: COOLING +12°C/+7°C, MEG 30% and condenser air inlet temperature +35°C.

(2) Cooling capacity of free cooling module based on: Water inlet +12°C, MEG 30% and outdoor air temperature +2°C.

(3) Overall sound power level (Lw) overall sound pressure level (Lp) measured at 10 metres in a free field, as per ISO 3744

Chillers' technical data

AQUACIAT FREE COOLING		702V	800V	900V	1000V	1100V	1200V	1500V	1650V	1800V
Compressors		Hermetic scroll (2900 rpm)								
Start-up mode		Direct in line in series								
Quantity		4	4	4	4	4	4	6	6	6
Power control	No. of stages	8	8	6	8	8	4	6	8	6
	%	100-78-71-57-50-43-28-21-0	100-81-69-62.5-50-37.5-31-19-0	100-83-66-55-33-16-0	100-80-70-60-50-40-30-20-0	100-77-73-54-50-45-27-23-0	100-75-50-25-0	100-83.3-66.6-50-33.3-16.6-0	100-84.8-66.6-48.5-36.4-30.3-18.2-15.1-0	100-83.3-66.6-50-33.3-16.6-0
Refrigerant oil type		Polyolester POE 3MAF (32 cSt)								
Oil capacity	l	17,6	21,8	20,8	22,2	26,2	25,2	40,8	39,3	37,8
No. of refrigerant circuits		2								
Refrigerant (GWP)		R410A (1890)								
Refrigerant load	kg	20,0 +20.0	19,0 +19.0	23,0 +23.0	25,0 +25.0	25,5 +25.5	26,0 +28.0	34,0 +34.0	32,0 +34.0	40,0 +46.0
Electrical supply	ph/Hz/V	3~50 Hz - 400 V (+6%/-10%) + Earth								
Machine protection rating		IP 44								
Control circuit voltage	ph/Hz/V	1~50Hz 230V (+6% / -10%) transformer fitted								
Evaporator		Brazed plate heat exchangers								
Water capacity	l	15,8	15,8	18	20,4	20,4	26	33,5	37	40,5
Chilled water outlet temp. (min./max.)	°C	-12 / +18								
Minimum water flow rate	m^3/h	22,1	24,4	29,3	31,6	34	38	43	50	56
Maximum water flow rate	m^3/h	63,2	69,5	77	77	77	106	110	110	110
Water connection	dia.	DN 100 FLANGE					DN 125 FLANGE			
Max. pressure, water end	bar	4 bar								
Air-cooled condenser		Finned heat exchanger								
Fan dia.	mm	800								
No. x Motor output High Performance (HP) version	kW	4x1.55	4x1.55	4x1.66	4x1.66	4x1.66	6x1.64	6x1.64	8x1.64	8x1.64
Nb x motor output, Low Noise - LN and XTRA Low Noise - XLN versions	kW	4x1.06	4x1.06	4x1.1	4x1.1	4x1.1	6x1.13	6x1.13	8x1.13	8x1.13
Air flow, high-performance (HP) version	m^3/h	81200	81200	78000	78000	78000	121800	117000	159200	156000
Air flow, Low Noise - LN and XTRA Low Noise - XLN versions	m^3/h	60000	60000	58400	58400	58400	90000	87600	118400	116800
Minimum system water volume	l	213	212	213	290	364	1171	871	905	1133
Tank volume, model H	l	500								
Expansion vessel, C & H	l	35					50			
Pump	Qty.	According to table selection (section…)								
Storage temperature	°C	+50								

Free cooling module technical data

AQUACIAT FREE COOLING			702V	800V	900V	1000V	1100V	1200V	1500V	1650V	1800V
High-performance (HP version	Free cooling module		1 V - 2 R					2 V - 2 R			
	Free cooling coil		2-row finned heat exchanger					2-row finned heat exchanger			
	Fan dia.	mm	800					800			
	Number x motor output	kW	2x2					4x2			
	Air flow	m³/h	43900					87800			
	Free cooling module		1 V - 4 R					2 V - 4 R			
	Free cooling coil		4-row finned heat exchanger					4-row finned heat exchanger			
	Fan dia.	mm	800					800			
	Number x motor output	kW	2x2					4x2			
	Air flow	m³/h	42000					84000			
Low Noise - LN and Xtra Low Noise - XLN version	Free cooling module		1 V - 2 R					2 V - 2 R			
	Free cooling coil		2-row finned heat exchanger					2-row finned heat exchanger			
	Fan dia.	mm	800					800			
	Number x motor output	kW	2x1.27					4x1.27			
	Air flow	m³/h	34800					69600			
	Free cooling module		1 V - 4 R					2 V - 4 R			
	Free cooling coil		4-row finned heat exchanger					4-row finned heat exchanger			
	Fan dia.	mm	800					800			
	Number x motor output	kW	2x1.27					4x1.27			
	Air flow	m³/h	33500					67000			
Chilled water outlet min./max.		temp	-12 / +18								
Minimum water flow		m³/h	22,1	24,4	29,3	31,6	34	38	43	50	56
Maximum water flow		m³/h	63,2	69,5	77	77	77	106	110	110	110
Water connection		dia.	DN 100 FLANGE					DN 125 FLANGE			
Max. pressure, water end		bar	4 bar								
Storage temperature		°C	+50								

Electrical characteristics

AQUACIAT FREE COOLING		702V	800V	900V	1000V	1100V	1200V	1500V	1650V	1800V
Electrical supply	ph/Hz/V	3~50 Hz - 400 V (+6%/-10%) + Earth								
		COMPRESSORS								
Maximum nominal current	A	144	161	190	207	224	263	296	348	390
Starting current	A	333	388	440	457	474	514	750	849	892
Starting current with SOFT START option	A	243	279	317	333	350	390	533	601	644
		FAN MOTORS								
		HIGH PERFORMANCE 905 rpm version								
Maximum nominal current	A	13.6 (4x3.4)					20.4 (6x3.4)		27.2 (8x3.4)	
		LOW NOISE - XTRA LOW NOISE 715 rpm versions								
Maximum nominal current	A	8.4 (4x2.1)					12.6 (6x2.1)		16.8 (8x2.1)	
Control circuit voltage	ph/Hz/V	1~50Hz 230V (+6% / -10%) transformer fitted								
Control circuit current	A	2,0			3,0		4,0		5,0	
		FREE COOLING OPTION								
Free cooling module		1 V - 2 R					2 V - 2 R			
		HIGH PERFORMANCE 905 rpm version								
Maximum nominal current	A	8.6 (2x4.3)					17.2 (4x4.3)			
		LOW NOISE - XTRA LOW NOISE 715 rpm versions								
Maximum nominal current	A	5.0 (2x2.5)					10.0 (4x2.5)			
Free cooling module		1 V - 4 R					2 V - 4 R			
		HIGH PERFORMANCE 905 rpm version								
Maximum nominal current	A	8.6 (2x4.3)					17.2 (4x4.3)			
		LOW NOISE - XTRA LOW NOISE 715 rpm versions								
Maximum nominal current	A	5.0 (2x2.5)					10.0 (4x2.5)			

Operation

First commissioning

● Read the guides for commissioning any accessories very carefully and follow all advice.

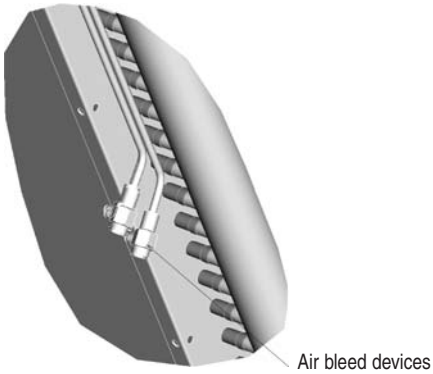
● Check that the supply voltage corresponds to that given on the wiring diagram.

● If necessary, tighten the terminals on the electrics box again.

● Switch the unit on and check that all the fans are turning in the correct direction (direction of rotation shown on the labels).

In the event of abnormal noise coming from the fan motor assemblies, immediately switch off the power supply and contact your CIAT agent.

● Start charging by bleeding the air remaining in the circuit using the vents provided in the top section.



● Start increasing the pressure, then check that the pipe connections are fully sealed.

If anomalies occur...

Your CIAT agent is available to provide you with any help you may require. However, you will save time if you check the following points first:

● Are all fans turning in the correct direction? (check this against the labels).

● Is the supply voltage correct?

● Are the motors running at the correct speed? (check the input current).

● Did you invert the direction of the fluids when connecting the unit?

● Are the fins of the coil clogged?

● Are there any air recycling issues or a bad air supply?

Recommendations for use

● Scaling and corrosion have a very negative effect on the operation and the service life of the units. Therefore, only use treated water (check the compatibility of any additives with the unit's materials).

● In the event of a prolonged period without use, we recommend that the motors be dried in an oven so as to remove any trace of humidity inside.

Maintenance

Recommendations for maintenance

● Make sure power to the unit has been disconnected before servicing.

● All work must be performed by qualified personnel.

● Do not make any modifications without the agreement of CIAT.

● Do not walk directly on the unit.

● For regulated units, don't forget the mandatory inspections.

● In winter, do not allow snow to accumulate around and on top of the unit.

● Periodically check the condition of the anti-corrosion protective coating and touch it up if necessary.

● The category (DESP) as specified by directive 97/23/EC is indicated on the specification attached to the order acknowledgement receipt. The year of manufacture is given on the manufacturer's plate.

Cleaning the bundle

Ensuring a good level of cleanliness is a defining factor for maintaining the performance and service life of the unit. Periodically check to see if the finned bundle is clogged and clean it as often as local conditions require.

● Normal cleaning is carried out using a compressed air jet directed parallel to the fins.

● If there is significant amount of clogging with greasy dust, it is possible to clean using water mixed with a detergent which is compatible with the materials. It is also possible to use a high-pressure steam cleaner. Cleaning must be followed by thorough rinsing with clear water.

● Use of a high-pressure liquid cleaner is forbidden.

● In all cases where it is authorised, cleaning must be carried out carefully to ensure that the finned surface is not damaged. When necessary, straighten the fins using a comb adapted to the line of the fins.

Maintenance of the motors

● If there are any traces of humidity in the motors, it may be necessary to dry them in an oven. They may also be left to run for a few hours, in dry weather, removing the caps from the bleed holes at the lower point (if the motor is equipped with these). Remember to refit the caps so as to maintain the degree of IP protection.

Maintenance frequency

Keep a maintenance log where all operations will be listed.

Retighten the nuts and bolts on the fan motor assemblies (collar, support, etc.)	6 months
Bleed motors equipped with bleed holes	6 months (1)
Clean the coil	1 year (1)
Tighten electrical connections	1 year
Retighten all visible nuts and bolts	1 year
Check for corrosion to the panelling and that the safety-related labels are present	1 year (1)
Check the electric cables	5 years (2)

(1) Frequency adapted to suit local conditions.

(2) If this operation requires removal of the panelling, please contact an approved CIAT agent.

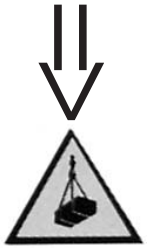
Destruction

- Separate the unit from its power sources.
- Drain the unit, respecting the environmental standards.
- Use the original lifting rings.
- If the signs relating to lifting have been removed (anchoring points, slinging instructions, weight) find out this information from your CIAT agent.

The 4 main risks

Do not overlook them!

lifting, positioning



ACCIDENT

removal of the grilles

INJURY

opening the casing

ELECTROCUTION

contact with the pipes

BURNS

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d'**A**pplications **T**hermiques
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CERTIFIED ISO 9001
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Non contractual document. With the thought of material improvement always in mind, CIAT reserves the right,without notice, to proceed with any technical modification.