

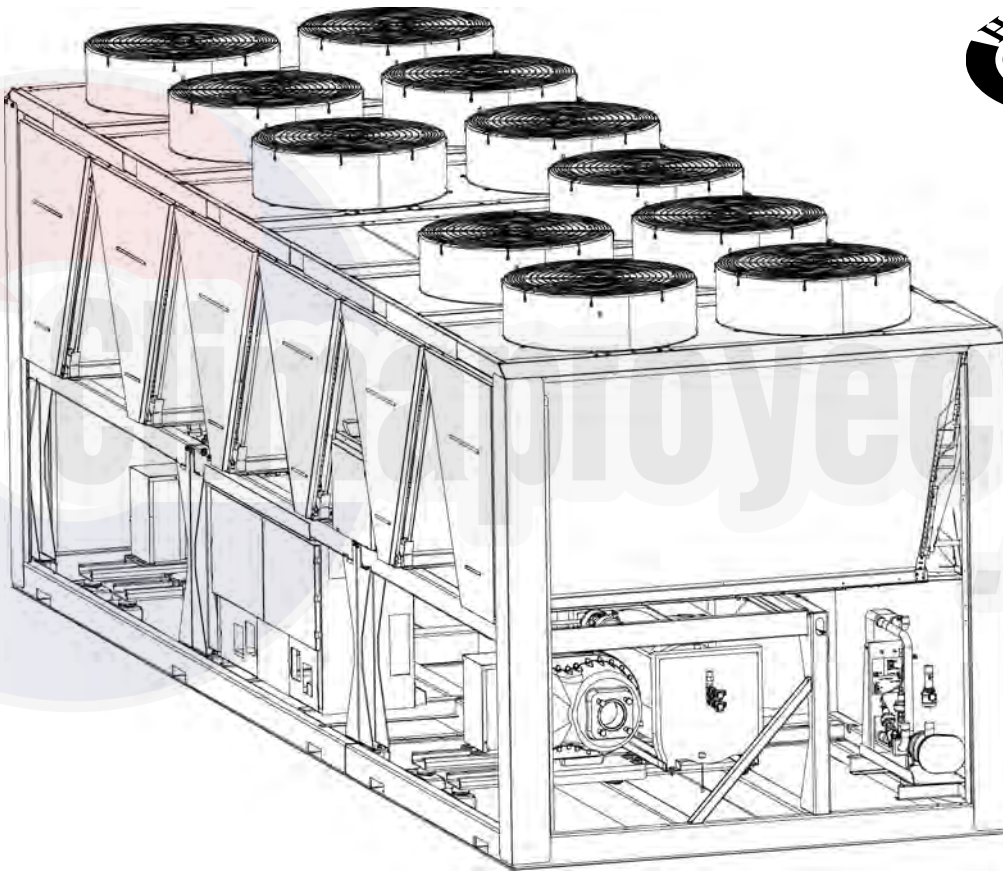


30XA Air-Cooled Liquid Chillers

Nominal cooling capacity: 270-1670 kW

50 Hz

AQUAFORCE™



Installation, operation and maintenance instructions



Quality Management System Approval

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The cover photograph is for illustrative purposes only and is not part of any offer for sale or contract.

1 - INTRODUCTION

The 30XA Aquaforce units are designed to cool water for the air conditioning of buildings and industrial processes.

Prior to the initial start-up of the 30XA units, the people involved in the on-site installation, start-up, operation, and maintenance of this unit should be thoroughly familiar with these instructions and the specific project data for the installation site.

The 30XA liquid chillers are designed to provide a very high level of safety during installation, start-up, operation and maintenance. They will provide safe and reliable service when operated within their application range.

This manual provides the necessary information to familiarize yourself with the control system before performing start-up procedures. The procedures in this manual are arranged in the sequence required for machine installation, start-up, operation and maintenance.

Always ensure that all required safety measures are followed, including those in this document, such as: wearing protective clothing (gloves, shoes) and safety glasses, using appropriate tools, employing qualified and skilled technicians (electricians, refrigeration engineers) and following local regulations. These units comply with the requirements of the European machine safety, electromagnetic compatibility, pressurised equipment and low voltage directives.

1.1 - Installation safety considerations

Access to the unit must be reserved to authorised personnel, qualified and trained in monitoring and maintenance. The access limitation device must be installed by the customer (e.g. cut-off, enclosure).

After the unit has been received, when it is ready to be installed or reinstalled, and before it is started up, it must be inspected for damage. Check that the refrigerant circuit(s) is (are) intact, especially that no components or pipes have shifted (e.g. following a shock). If in doubt, carry out a leak tightness check and verify with the manufacturer that the circuit integrity has not been impaired. If damage is detected upon receipt, immediately file a claim with the shipping company.

Carrier strongly recommends employing a specialised company to unload the machine.

Do not remove the skid or the packaging until the unit is in its final position. These units can be moved with a fork lift truck, as long as the forks are positioned in the right place and direction on the unit.

The units can also be lifted with slings, using only the designated lifting points marked on the unit.

These units are not designed to be lifted from above. Use slings with the correct capacity, and always follow the lifting instructions on the certified drawings supplied with the unit.

Safety is only guaranteed, if these instructions are carefully followed. If this is not the case, there is a risk of material deterioration and injuries to personnel.

Never cover any safety devices.

This applies to the relief valve in the water circuit and the relief valve(s) in the refrigerant circuit(s).

Ensure that the valves are correctly installed, before operating the unit.

In certain cases the relief valves are installed on isolating valves. These valves are factory-supplied lead-sealed in the open position. This system permits isolation and removal of the relief valves for checking and replacing. The relief valves are designed and installed to ensure protection against overpressure caused by fire.

The relief valve must only be removed when the fire risk is fully controlled and this is the responsibility of the operator.

All factory-installed relief valves are lead-sealed to prevent any calibration change. If the relief valves are installed on a change-over manifold, this is equipped with a relief valve on each of the two outlets. Only one of the two relief valves is in operation, the other one is isolated. Never leave the change-over valve in the intermediate position, i.e. with both ways open (locate the control element in the stop position). If a relief valve is removed for checking or replacement please ensure that there is always an active relief valve on each of the change-over valves installed in the unit.

If the unit is installed in a room, the safety valves must be connected to discharge pipes. These pipes must be installed in a way that ensures that people and property are not exposed to refrigerant leaks. These fluids may be diffused in the air, but far away from any building air intake, or they must be discharged in a quantity that is appropriate for a suitably absorbing environment.

Periodic check of the relief valves: See paragraph "Maintenance safety considerations".

Provide a drain in the discharge circuit, close to each relief valve, to avoid an accumulation of condensate or rain water.

Ensure good ventilation, as accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation or explosions.

Inhalation of high concentrations of vapour is harmful and may cause heart irregularities, unconsciousness, or death. Vapour is heavier than air and reduces the amount of oxygen available for breathing. These products cause eye and skin irritation. Decomposition products are hazardous.

1.2 - Equipment and components under pressure

See section "10.2 - Pressure vessels".

1.3 - Maintenance safety considerations

Engineers working on the electric or refrigeration components must be authorized, trained and fully qualified to do so.

All refrigerant circuit repairs must be carried out by a trained person, fully qualified to work on these units. He must have been trained and be familiar with the equipment and the installation. All welding operations must be carried out by qualified specialists.

Any manipulation (opening or closing) of a shut-off valve must be carried out by a qualified and authorised engineer. These procedures must be carried out with the unit shut-down.

NOTE: The unit must never be left shut down with the liquid line valve closed, as liquid refrigerant can be trapped between this valve and the expansion device. (This valve is situated on the liquid line before the filter drier box.)

During any handling, maintenance and service operations the engineers working on the unit must be equipped with safety gloves, glasses, shoes and protective clothing.

Never work on a unit that is still energized.

Never work on any of the electrical components, until the general power supply to the unit has been cut using the disconnect switch(es) in the control box(es).

If any maintenance operations are carried out on the unit, lock the power supply circuit in the open position ahead of the machine.

If the work is interrupted, always ensure that all circuits are still deenergized before resuming the work.

ATTENTION: Even if the unit has been switched off, the power circuit remains energized, unless the unit or circuit disconnect switch is open. Refer to the wiring diagram for further details. Attach appropriate safety labels.

Operating checks: During the life-time of the system, inspection and tests must be carried out in accordance with national regulations.

The information on operating inspections given in annex C of standard EN278-2 can be used if no similar criteria exist in the national regulations.

While working in the fan area, especially when grilles or casings are removed, disconnect the fan power supply to prevent their automatic restart.

Safety device checks (annex C6 – EN378-2): The safety devices must be checked on site once a year for safety devices (high-pressure switches), and every five years for external overpressure devices (pressure relief valves).

Check manual “30XA Pro-Dialog Control” for a detailed explanation of the high-pressure switch test method.

At least once a year thoroughly inspect the protection devices (valves). If the machine operates in a corrosive environment, inspect the protection devices more frequently.

Regularly carry out leak tests and immediately repair any leaks.

Ensure regularly that the vibration levels remain acceptable and close to those at the initial unit start-up.

Before opening a refrigerant circuit, purge and consult the pressure gauges.

Change the refrigerant when there are equipment failures, following a procedure such as the one described in NFE 29-795 or carry out a refrigerant analysis in a specialist laboratory.

Plug all openings whenever the refrigerant circuit is opened for up to one day. For longer openings place a nitrogen charge in the circuit.

1.4 - Repair safety considerations

All installation parts must be maintained by the personnel in charge, in order to avoid material deterioration and injuries to people. Faults and leaks must be repaired immediately. The authorized technician must have the responsibility to repair the fault immediately. Each time repairs have been carried out to the unit, the operation of the safety devices must be re-checked.

Comply with the regulations and recommendations in unit and HVAC installation safety standards, such as: EN 378, ISO 5149, etc.

If a leak occurs or if the refrigerant becomes contaminated (e.g. by a short circuit in a motor) remove the complete charge using a recovery unit and store the refrigerant in mobile containers.

Repair the leak detected and recharge the circuit with the total R134a charge, as indicated on the unit name plate. Certain parts of the circuit can be isolated. Only charge liquid refrigerant R134a at the liquid line.

Ensure that you are using the correct refrigerant type before recharging the unit.

Charging any refrigerant other than the original charge type (R134a) will impair machine operation and can even lead to a destruction of the compressors. The compressors operating with this refrigerant type are lubricated with a synthetic polyolester oil.

Do not use oxygen to purge lines or to pressurize a machine for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.

Never exceed the specified maximum operating pressures. Verify the allowable maximum high- and low-side test pressures by checking the instructions in this manual and the pressures given on the unit name plate.

Do not use air for leak testing. Use only refrigerant or dry nitrogen.

Do not unweld or flamecut the refrigerant lines or any refrigerant circuit component until all refrigerant (liquid and vapour) has been removed from chiller. Traces of vapour should be displaced with dry air nitrogen. Refrigerant in contact with an open flame produces toxic gases.

The necessary protection equipment must be available, and appropriate fire extinguishers for the system and the refrigerant type used must be within easy reach.

Do not siphon refrigerant.

Avoid spilling liquid refrigerant on skin or splashing it into the eyes. Use safety goggles. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

Never apply an open flame or live steam to a refrigerant container. Dangerous overpressure can result. If it is necessary to heat refrigerant, use only warm water.

During refrigerant removal and storage operations follow applicable regulations. These regulations, permitting conditioning and recovery of halogenated hydrocarbons under optimum quality conditions for the products and optimum safety conditions for people, property and the environment are described in standard NFE 29795.

Any refrigerant transfer and recovery operations must be carried out using a transfer unit. A 3/8" SAE connector on the manual liquid line valve is supplied with all units for connection to the transfer station. The units must never be modified to add refrigerant and oil charging, removal and purging devices. All these devices are provided with the units. Please refer to the certified dimensional drawings for the units.

Do not re-use disposable (non-returnable) cylinders or attempt to refill them. It is dangerous and illegal. When cylinders are empty, evacuate the remaining gas pressure, and move the cylinders to a place designated for their recovery. Do not incinerate.

Do not attempt to remove refrigerant circuit components or fittings, while the machine is under pressure or while it is running. Be sure pressure is at 0 kPa before removing components or opening a circuit.

Do not attempt to repair or recondition any safety devices when corrosion or build-up of foreign material (rust, dirt, scale, etc.) is found within the valve body or mechanism. If necessary, replace the device. Do not install safety valves in series or backwards.

ATTENTION: No part of the unit must use feet, racks or supports during operation. Periodically monitor and repair or if necessary replace any component or piping that shows signs of damage.

The refrigerant lines can break under the weight and release refrigerant, causing personal injury.

Do not climb on a machine. Use a platform, or staging to work at higher levels.

Use mechanical lifting equipment (crane, hoist, winch, etc.) to lift or move heavy components. For lighter components, use lifting equipment when there is a risk of slipping or losing your balance.

Use only original replacement parts for any repair or component replacement. Consult the list of replacement parts that corresponds to the specification of the original equipment.

Do not drain water circuits containing industrial brines, without informing the technical service department at the installation site or a competent body first.

Close the entering and leaving water shutoff valves and purge the unit water circuit, before working on the components installed on the circuit (screen filter, pump, water flow switch, etc.).

Do not loosen the water box bolts until the water boxes have been completely drained.

Periodically inspect all valves, fittings and pipes of the refrigerant and hydronic circuits to ensure that they do not show any corrosion or any signs of leaks.

It is recommended to wear ear defenders, when working near the unit and the unit is in operation.

2 - PRELIMINARY CHECKS

2.1 - Check equipment received

- Inspect the unit for damage or missing parts. If damage is detected, or if shipment is incomplete, immediately file a claim with the shipping company.
- Confirm that the unit received is the one ordered. Compare the name plate data with the order.
- The unit name plate must include the following information:
 - Version number
 - Model number
 - CE marking
 - Serial number
 - Year of manufacture and test date
 - Refrigerant used and refrigerant class
 - Refrigerant charge per circuit
 - Containment fluid to be used
 - PS: Min./max. allowable pressure (high and low pressure side)
 - TS: Min./max. allowable temperature (high and low pressure side)
 - Relief valve set pressure
 - Pressure switch cut-out pressure
 - Unit leak test pressure
 - Voltage, frequency, number of phases
 - Maximum current drawn
 - Maximum power input
 - Unit net weight

- Confirm that all accessories ordered for on-site installation have been delivered, and are complete and undamaged.

The unit must be checked periodically during its whole operating life to ensure that no shocks (handling accessories, tools etc.) have damaged it. If necessary, the damaged parts must be repaired or replaced. See also chapter “Maintenance”.

2.2 - Moving and siting the unit

2.2.1 - Moving

See chapter 1.1 “Installation safety considerations”.

2.2.2 - Siting the unit

Always refer to the chapter “Dimensions and clearances” to confirm that there is adequate space for all connections and service operations. For the centre of gravity coordinates, the position of the unit mounting holes, and the weight distribution points, refer to the certified dimensional drawing supplied with the unit.

The support points under the chassis must have at least the size of the chassis opening at the lifting point (minimum 220 x 180 mm) in order to prevent a deformation of the chassis.

Typical applications of these units are in refrigeration systems, and they do not require earthquake resistance. Earthquake resistance has not been verified.

CAUTION: Only use slings at the designated lifting points which are marked on the unit.

Before siting the unit check that:

- the permitted loading at the site is adequate or that appropriate strengthening measures have been taken.
- the unit is installed level on an even surface (maximum tolerance is 5 mm in both axes).
- there is adequate space above the unit for air flow and to ensure access to the components.
- the number of support points is adequate and that they are in the right places.
- the location is not subject to flooding.
- for outdoor installations, where heavy snowfall is likely and long periods of sub-zero temperatures are normal, provision has to be made to prevent snow accumulating by raising the unit above the height of drifts normally experienced. Baffles may be necessary to deflect strong winds. They must not restrict air flow into the unit.

CAUTION: Before lifting the unit, check that all casing panels are securely fixed in place. Lift and set down the unit with great care. Tilting and jarring can damage the unit and impair unit operation.

If 30XA units are hoisted with rigging, it is advisable to protect coils against crushing while a unit is being moved. Use struts or spreader bar to spread the slings above the unit. Do not tilt a unit more than 15°.

WARNING: Never push or lever on any of the enclosure panels of the unit. Only the base of the unit frame is designed to withstand such stresses.

Checks before system start-up

Before the start-up of the refrigeration system, the complete installation, including the refrigeration system must be verified against the installation drawings, dimensional drawings, system piping and instrumentation diagrams and the wiring diagrams.

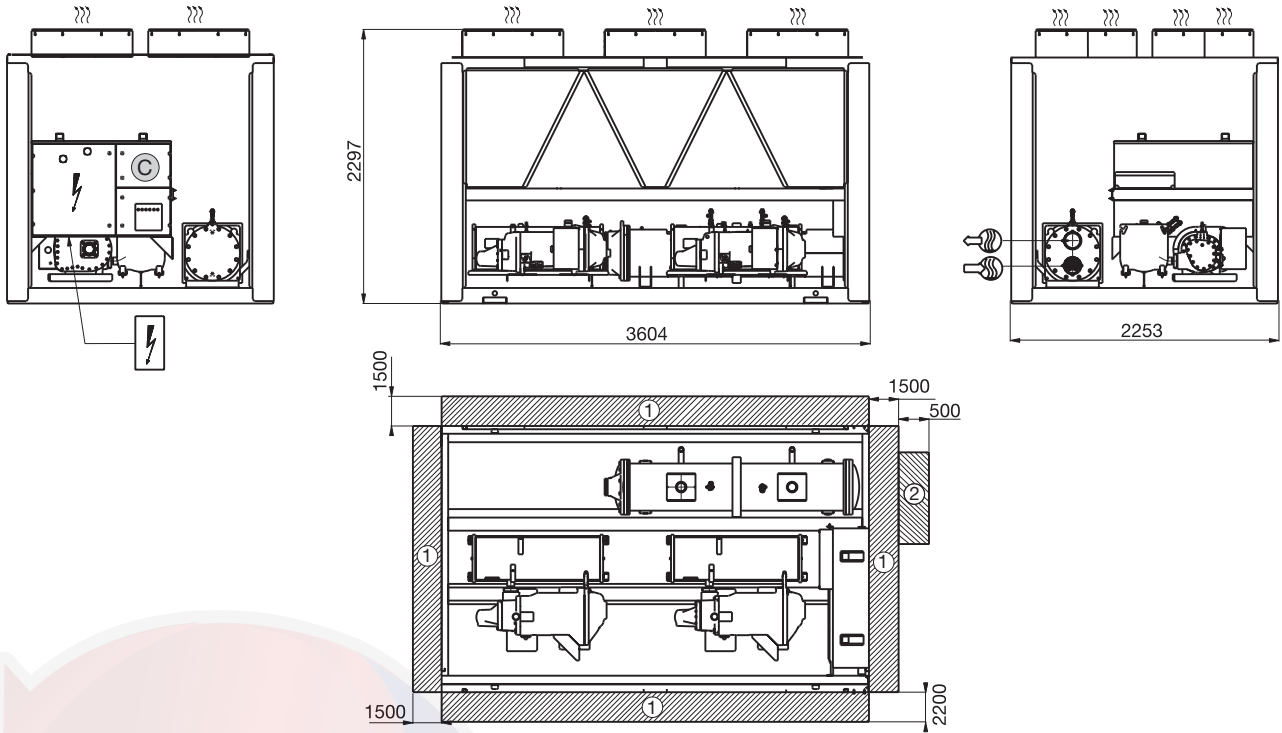
During the installation test national regulations must be followed. If no national regulation exists, paragraph 9-5 of standard EN 378-2 can be used as a guide.

External visual installation checks:

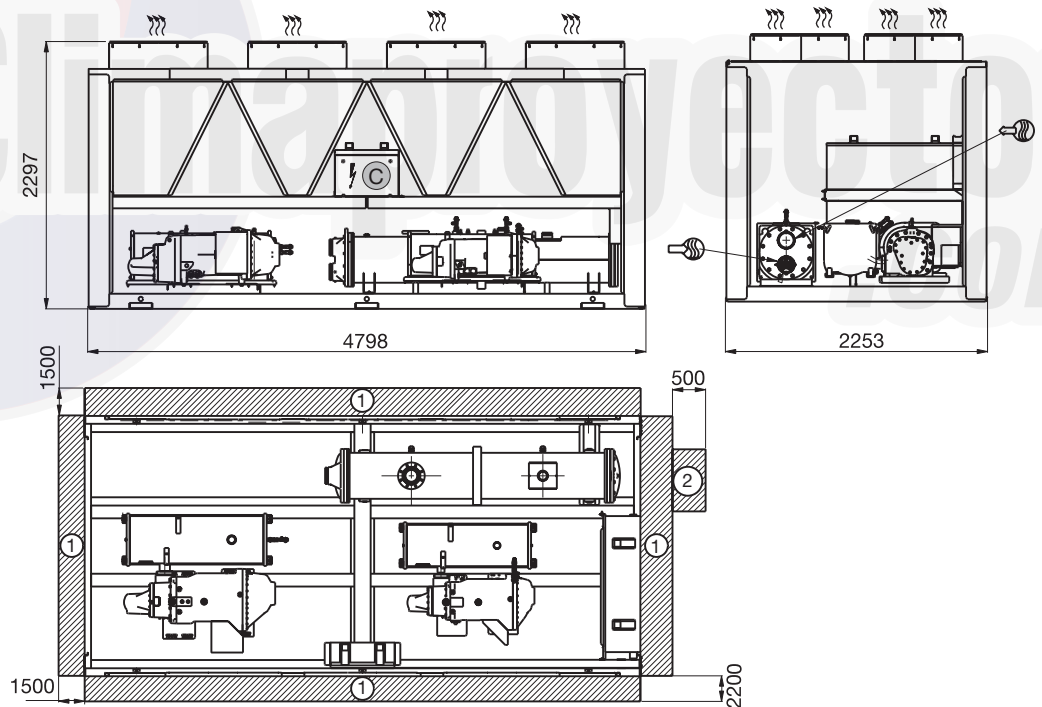
- Compare the complete installation with the refrigeration system and power circuit diagrams.
- Check that all components comply with the design specifications.
- Check that all safety documents and equipments that are required by current European standards are present.
- Verify that all safety and environmental protection devices and arrangements are in place and comply with the current European standard.
- Verify that all relevant documents for pressure vessels (certificates, name plates, files, instruction manuals etc.) required by the current European standards are present.
- Verify the free passage of access and safety routes.
- Check that ventilation in the plant room is adequate.
- Check that refrigerant detectors are present.
- Verify the instructions and directives to prevent the deliberate removal of refrigerant gases that are harmful to the environment.
- Verify the installation of connections.
- Verify the supports and fixing elements (materials, routing and connection).
- Verify the quality of welds and other joints.
- Check the protection against mechanical damage.
- Check the protection against heat.
- Check the protection of moving parts.
- Verify the accessibility for maintenance or repair and to check the piping.
- Verify the status of the valves.
- Verify the quality of the thermal insulation and of the vapour barriers.

3 - DIMENSIONS, CLEARANCES

3.1 - 30XA 252-352 (standard) and 252-302 (option 254/255)



3.2 - 30XA 402-452 (standard) and 352-452 (option 254/255)



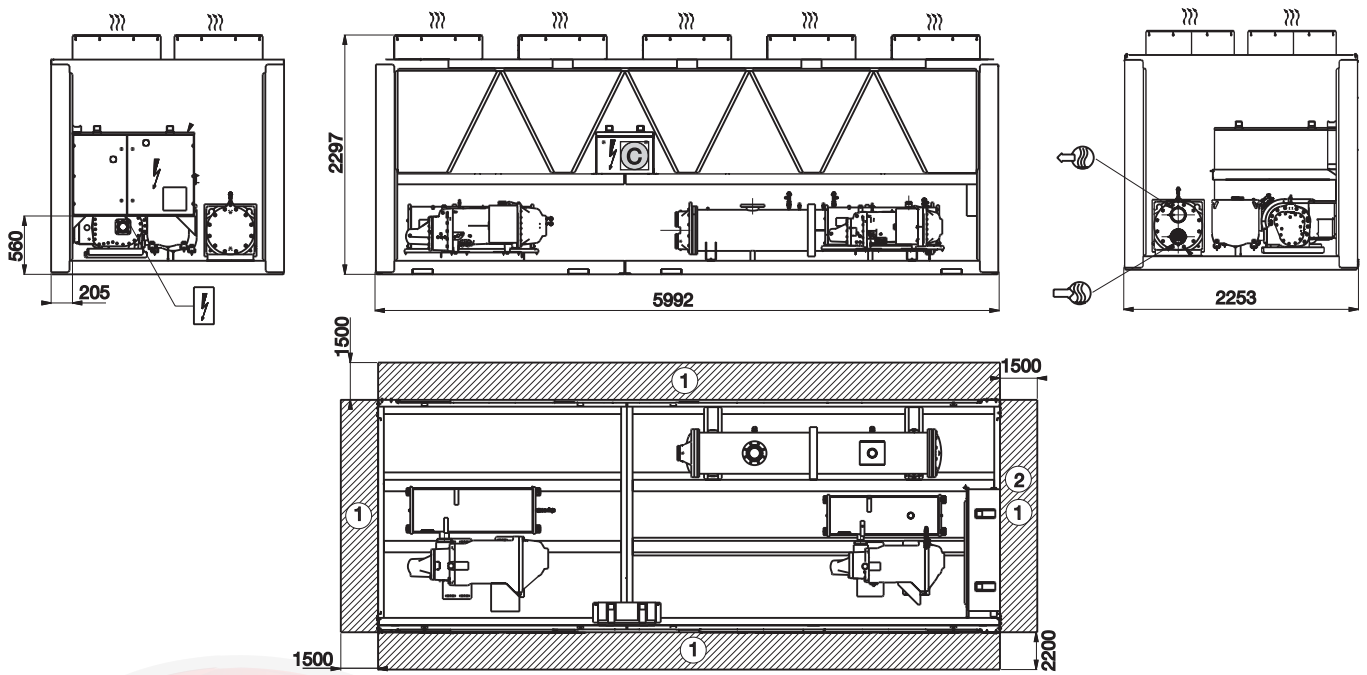
Legend:
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- ☹ Water inlet
- ☹ Water outlet
- ☹ Air outlet - do not obstruct
- ⚡ Power supply connection
- ⓐ Control circuit connection

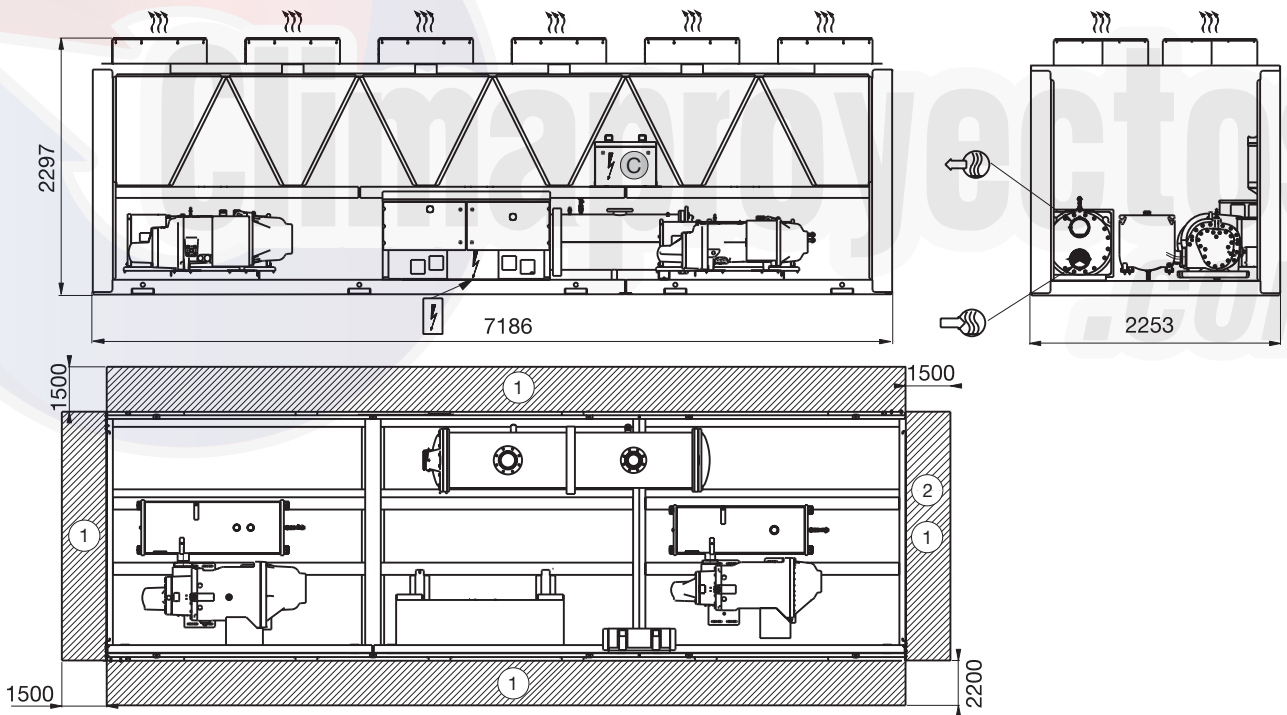
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

3.3 - 30XA 502 (standard and option 254/255)



3.4 - 30XA 602-802 (standard) and 602-702 (option 254/255)



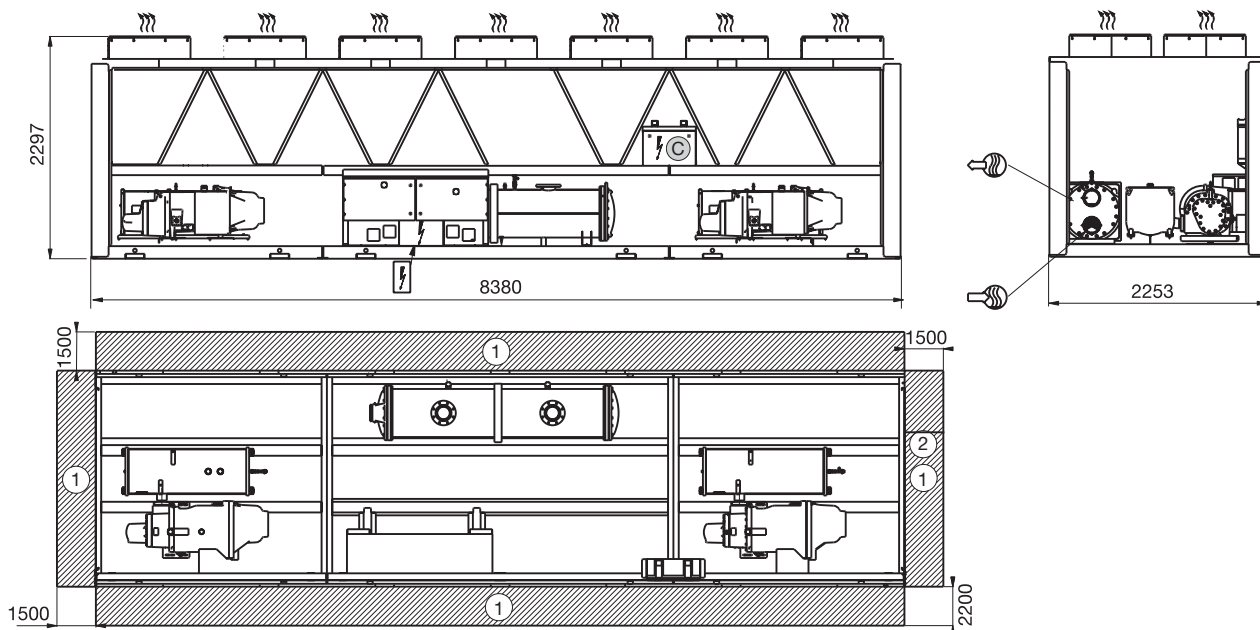
Legend:
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- Water inlet
- Water outlet
- Air outlet - do not obstruct
- Power supply connection
- Control circuit connection

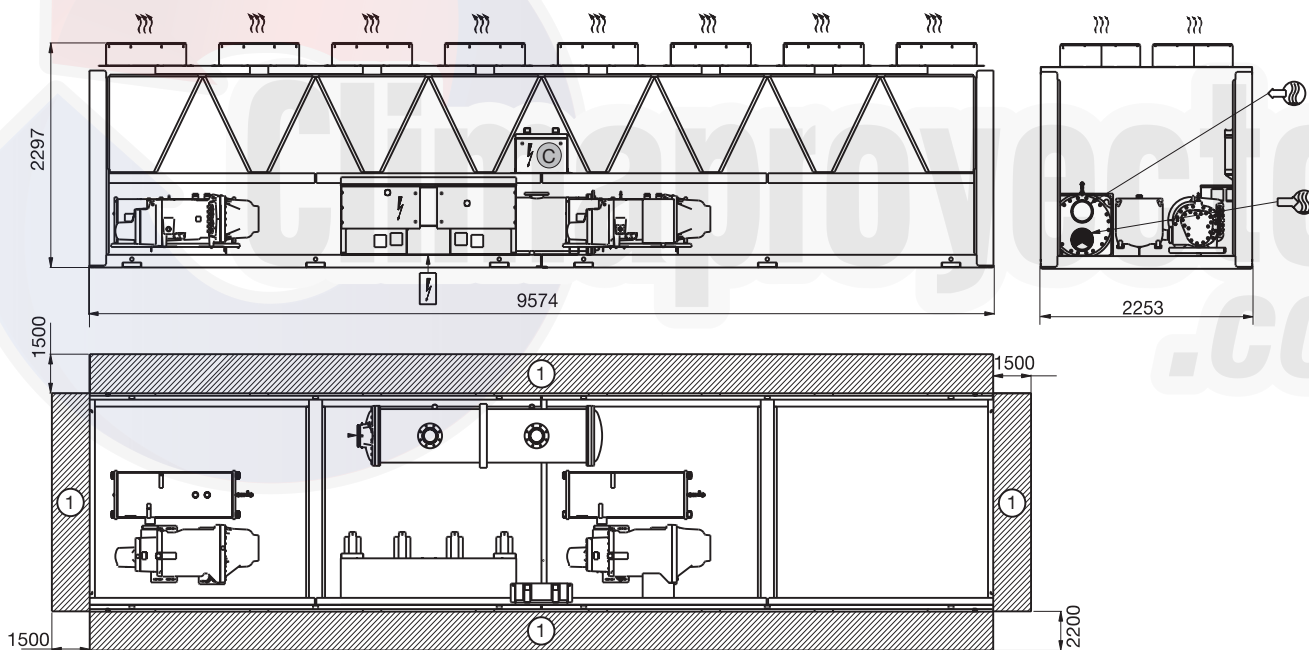
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

3.5 - 30XA 852-902 (standard) and 752-852 (option 254/255)



3.6 - 30XA 1002 (standard) and 902-1002 (option 254/255)



Legend:

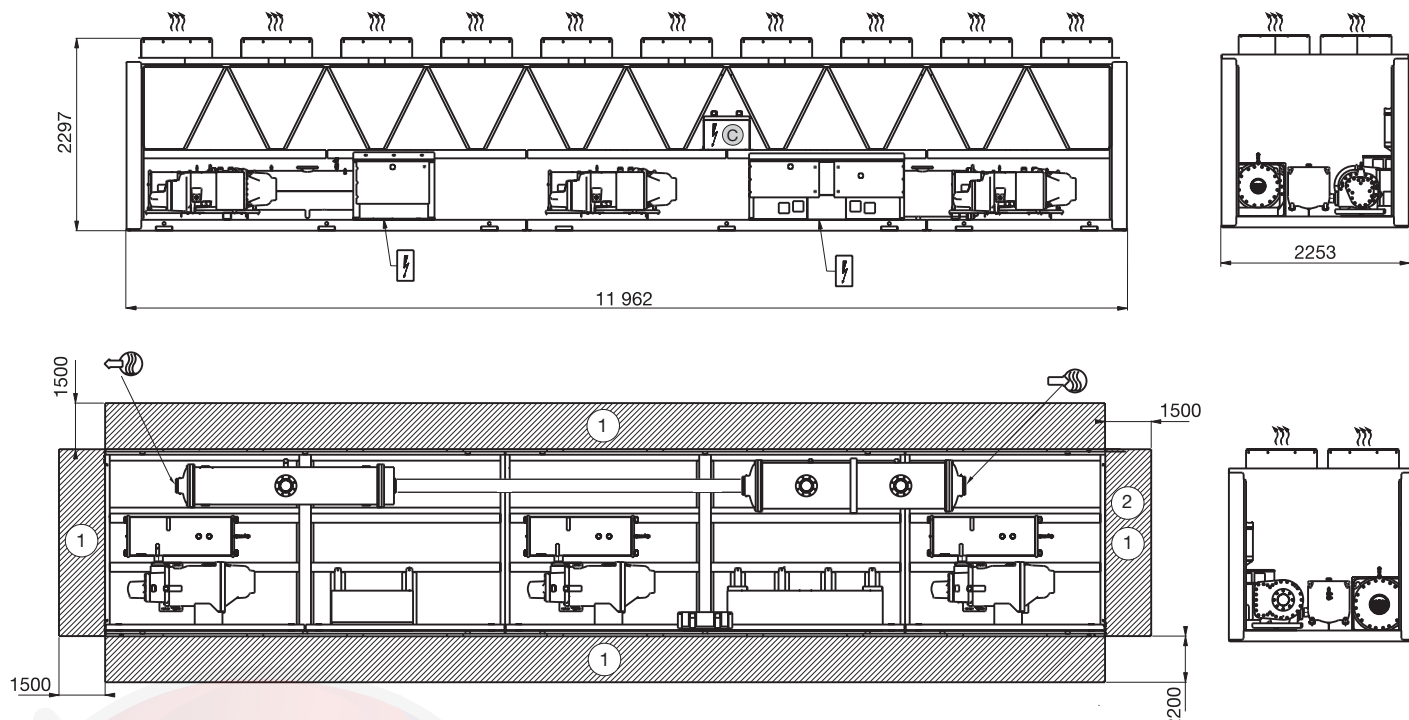
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- ☹ Water inlet
- ☹ Water outlet
- ☹ Air outlet - do not obstruct
- ⚡ Power supply connection
- ⓐ Control circuit connection

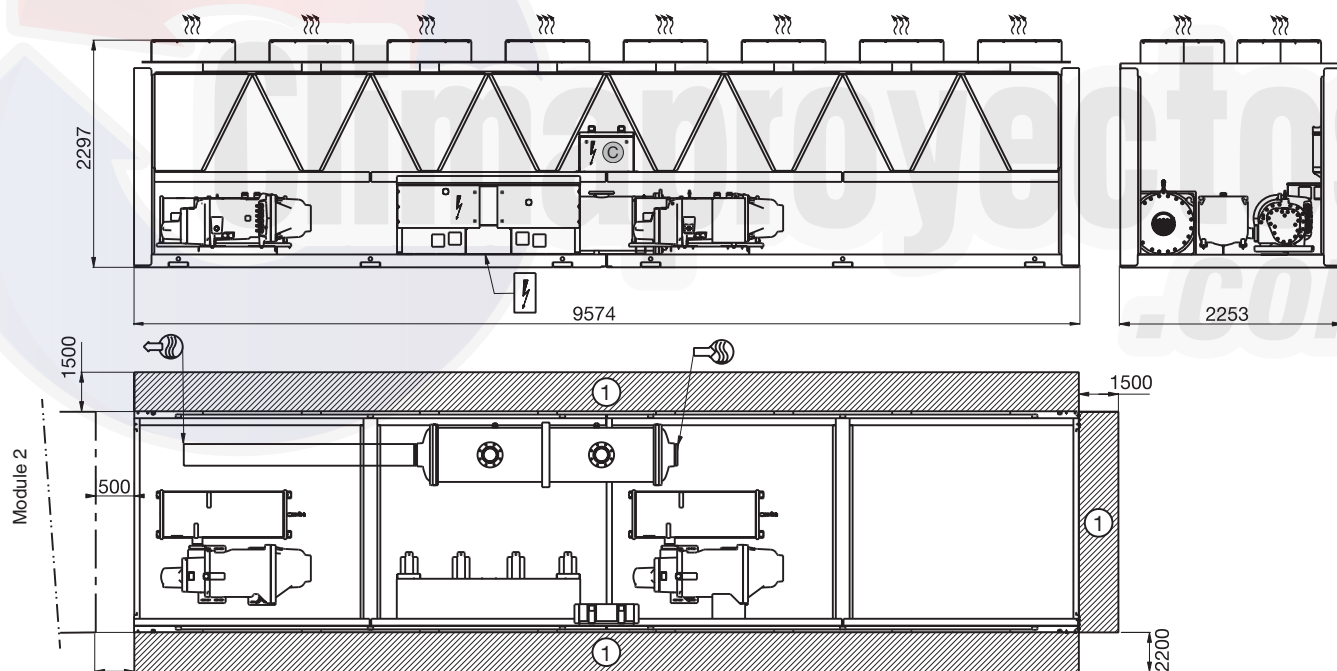
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

3.7 - 30XA 1102-1352 (standard and option 254/255)



3.8 - 30XA 1402-1502 module 1 (standard and option 254/255)



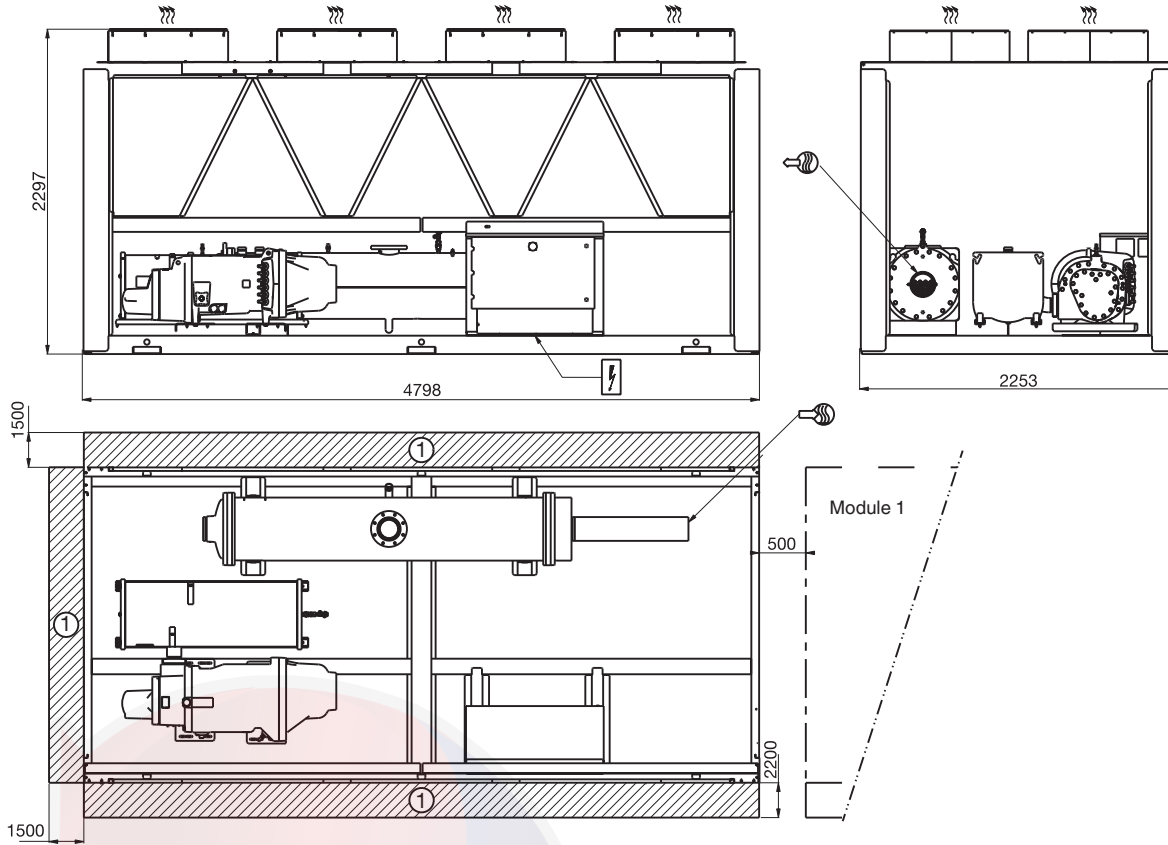
Legend:
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- ☹ Water inlet
- ☹ Water outlet (sizes 1402-1502: to be connected to water inlet of module 2)
- ☹ Air outlet - do not obstruct
- ⚡ Power supply connection
- ⓐ Control circuit connection

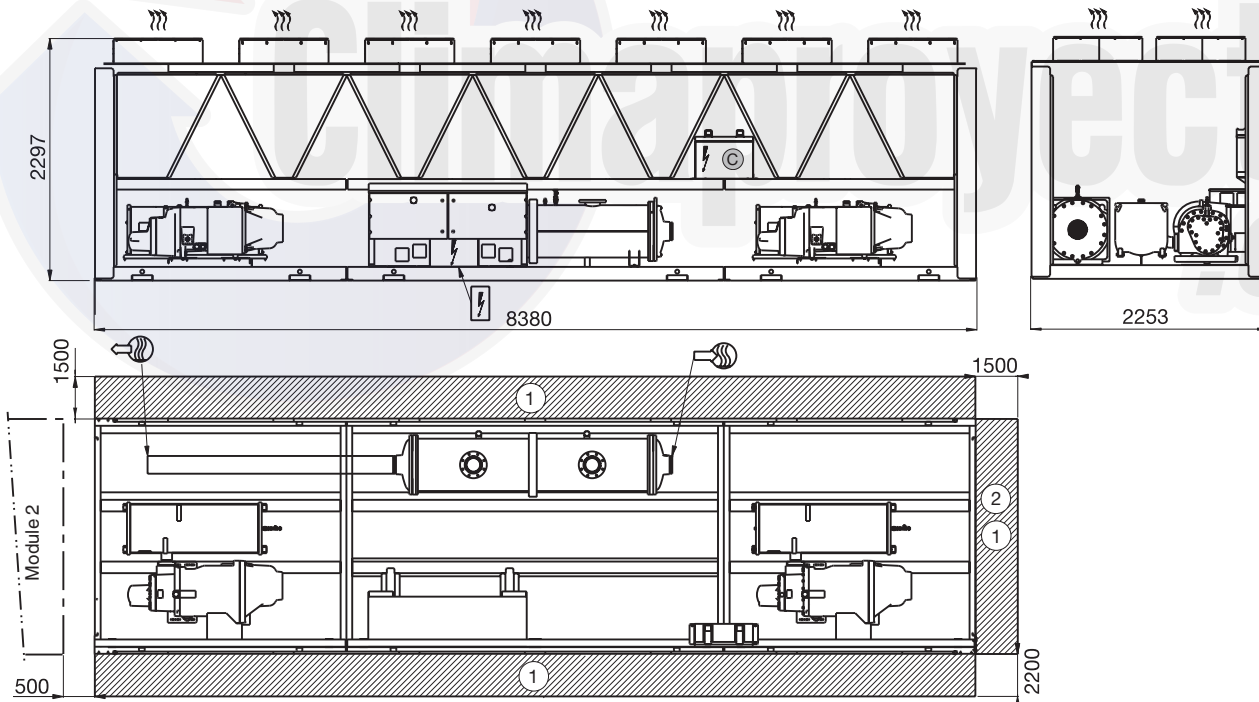
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

3.9 - 30XA 1402-1502 module 2 (standard and option 254/255)



3.10 - 30XA 1702 module 1 (standard and option 254/255)



Legend:

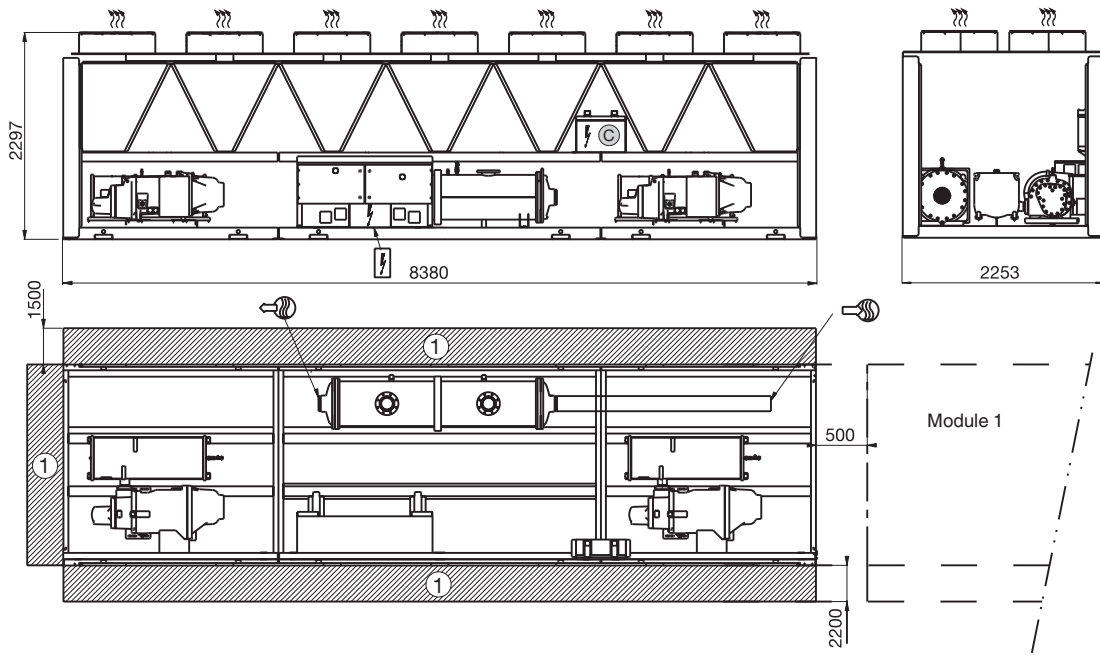
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- ↖ Water inlet (sizes 1402-1502: to be connected to water outlet of module 1)
- ↗ Water outlet (size 1702: to be connected to water inlet of module 2)
- ⋈ Air outlet – do not obstruct
- ⚡ Power supply connection
- ⓐ Control circuit connection

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

3.11 - 30XA 1702 module 2 (standard and option 254/255)



Legend:

All dimensions are given in mm.

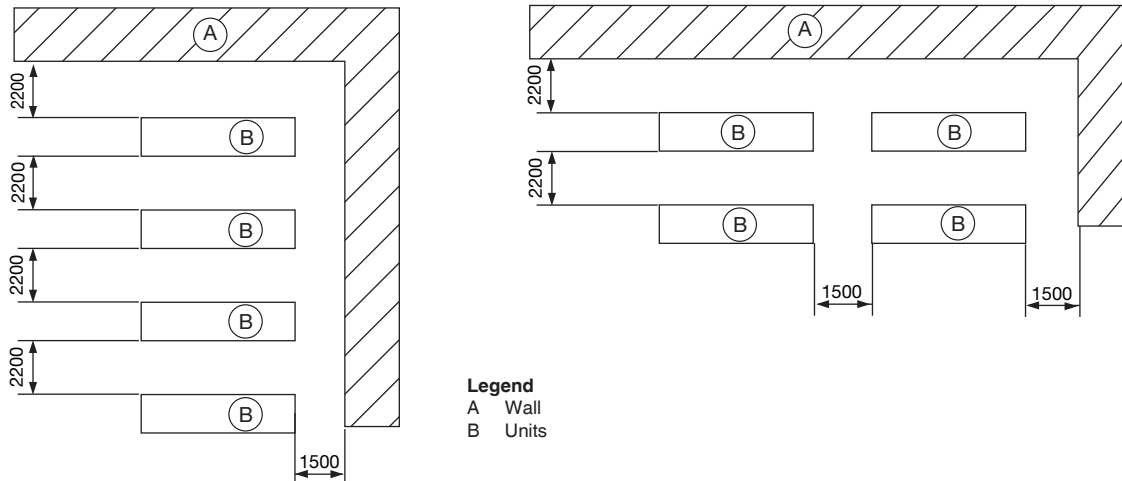
- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- ☹ Water inlet (to be connected to water outlet of module 1)
- ↶ Water outlet
- ☹ Air outlet – do not obstruct
- ⚡ Power supply connection
- Ⓒ Control circuit connection

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

3.12 - Multiple chiller installation

NOTE: If the walls are higher than 2 m, contact the factory.



- Legend**
 A Wall
 B Units

4 - PHYSICAL AND ELECTRICAL DATA FOR 30XA UNITS

4.1 - Physical data 30XA - Standard units and option 119***

30XA		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702	
Nominal cooling capacity*																						
Standard unit‡	kW	268	293	320	382	437	492	605	653	706	764	802	869	952	1116	1216	1297	1382	1426	1478	1605	
Option 119	kW	274	300	326	393	451	508	616	677	726	792	838	899	1000	1147	1247	1354	1442	1468	1523	1675	
Nominal power input*																						
Standard unit‡	kW	87	98	106	122	142	168	198	208	235	259	265	297	321	363	405	445	504	473	488	528	
Option 119‡	kW	88	96	105	120	141	154	192	203	234	249	256	286	310	348	388	425	463	450	465	513	
Operating weight**	kg	3840	3880	3920	4780	4850	5330	6260	6410	6710	7010	7560	7860	8440	10440	10880	11260	11620	8380/4250	8530/4250	7560/7560	
Refrigerant		R-134a																				
Circuit A	kg	36	37	37	53	55	62	62	62	70	74	77	74	80	69	85	78	87	100	92	77	
Circuit B	kg	38	38	39	37	39	39	62	66	62	65	68	77	84	66	66	68	80	85	95	68	
Circuit C	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100	100	96	100	100	77	
Circuit D	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	66	
Compressors		06T semi-hermetic screw compressors, 50 r/s																				
Circuit A		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Circuit B		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Circuit C		-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	
Circuit D		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Minimum capacity	%	15	15	15	15	15	15	15	15	15	15	15	15	15	10	10	10	10	10	10	8	
Control		PRO-DIALOG, electronic expansion valve (EXV)																				
Condensers		All aluminium micro-channel heat exchanger																				
Condenser fans		Axial Flying Bird 4 fans with rotating shroud																				
Standard unit																						
Quantity		6	6	6	8	8	9	11	12	12	12	14	14	16	19	20	20	20	24	24	28	
Total air flow	l/s	20500	20500	20500	27333	27333	30750	37583	41000	41000	41000	47833	47833	54667	64917	68333	68333	68333	82000	82000	95667	
Fan speed	r/s	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	
Option 119																						
Quantity		6	6	6	8	8	9	11	12	12	12	14	14	16	19	20	20	20	24	24	28	
Total air flow at high speed	l/s	27083	27083	27083	36111	36111	40625	49653	54167	54167	54167	63194	63194	72222	85764	90278	90278	90278	108333	108333	126389	
Fan speed	r/s	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	
Evaporator		Flooded multi-pipe type																				
Water content	l	58	61	61	66	70	77	79	94	98	119	119	130	140	168	182	203	224	230	240	240	
Maximum pressure****	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	

* Nominal conditions: evaporator entering/leaving water temperature = 12°C/7°C. Outdoor air temperature = 35°C, evaporator fouling factor = 0.000018 m² K/W.

** Weights are guidelines only. Weight and diameters of connection modules 1 and 2 for sizes 1402 to 1702. The refrigerant charge is also given on the unit nameplate.

*** Options: 119 = high energy efficiency; 254 = traditional coils.

**** Max. water-side operating pressure without hydronic module

‡ Data is not contractually binding and for information only. The values are rounded.

Note:

Unit sizes 30XA 1402 to 1702 are supplied in two field-assembled modules.

4.2 - Physical data 30XA - Units with option 254 and 255***

30XA		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702	
Nominal cooling capacity*																						
Option 254	kW	271	295	322	387	438	493	600	659	708	766	809	870	967	1119	1218	1299	1399	1433	1484	1619	
Option 255	kW	268	293	319	383	434	488	594	652	701	758	801	861	957	1108	1205	1286	1385	1419	1469	1603	
Nominal power input*																						
Option 254‡	kW	88	99	104	124	145	160	198	212	236	258	270	303	327	370	413	453	513	479	497	539	
Option 255‡	kW	90	101	106	127	148	163	202	217	241	263	277	310	335	378	422	464	527	489	509	552	
Operating weight**	kg	4160	4190	4710	5190	5260	5830	6870	7030	7820	8140	8260	9010	9260	11470	11890	12250	12640	9180/4650	9340/4650	8270/8270	
Refrigerant		R-134a																				
Circuit A	kg	60	64	70	85	85	102	102	100	129	112	130	129	140	102	112	112	112	140	140	130	
Circuit B	kg	64	64	56	56	56	56	88	95	88	95	95	103	129	92	92	92	98	103	129	95	
Circuit C	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	135	135	135	122	135	135	130	
Circuit D	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	95	
Compressors		06T semi-hermetic screw compressors, 50 r/s																				
Circuit A		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Circuit B		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Circuit C		-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	
Circuit D		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Minimum capacity	%	15	15	15	15	15	15	15	15	15	15	15	15	15	10	10	10	10	10	10	8	
Control		PRO-DIALOG, electronic expansion valve (EXV)																				
Condensers		All aluminium micro-channel heat exchanger																				
Condenser fans		Axial Flying Bird 4 fans with rotating shroud																				
Quantity		6	6	7	8	8	9	11	12	13	13	14	15	16	19	20	20	20	24	24	28	
Total air flow	l/s	20500	20500	20500	27333	27333	30750	37583	41000	41000	41000	47833	47833	54667	64917	68333	68333	68333	82000	82000	95667	
Fan speed	r/s	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	
Evaporator		Flooded multi-pipe type																				
Water content	l	58	61	61	66	70	77	79	94	98	119	119	130	140	168	182	203	224	230	240	240	
Maximum pressure****	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	

* Nominal conditions: evaporator entering/leaving water temperature = 12°C/7°C. Outdoor air temperature = 35°C, evaporator fouling factor = 0.000018 m² K/W

** Weights are guidelines only. Weight and diameters of connection modules 1 and 2 for sizes 1402 to 1702. The refrigerant charge is also given on the unit nameplate.

*** Option 254 = Units with copper/aluminium coils

Option 255 = Units with copper/aluminium coils without slots

**** Max. water-side operating pressure without hydronic module

‡ Data is not contractually binding and for information only. The values are rounded.

Notes:

Unit sizes 30XA 1402 to 1702 are supplied in two field-assembled modules.

Option 119 (high energy efficiency) can be used together with options 254 and 255. Contact your Carrier representative to obtain the performances.

4.3 - Sound levels

30XA		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702	
Standard unit																						
Sound power level*	dB(A)	89	89	89	92	93	93	94	93	95	95	94	96	95	96	96	96	97	97	97	97	
Sound pressure level at 10 m**	dB(A)	57	57	57	60	61	61	62	61	63	63	62	63	63	63	63	63	64	64	64	64	
Standard unit + option 257																						
Sound power level*	dB(A)	86	86	86	89	90	90	91	90	92	92	91	93	92	93	93	93	94	94	94	94	
Sound pressure level at 10 m**	dB(A)	54	54	54	57	58	58	59	57	60	59	58	60	59	60	60	60	61	61	61	61	
High energy efficiency version (option 119)																						
Sound power level*	dB(A)	94	94	94	95	95	95	96	96	98	98	98	99	98	99	100	99	100	101	100	101	
Sound pressure level at 10 m**	dB(A)	62	62	62	62	62	62	63	64	65	66	65	66	65	66	67	66	67	68	67	67	
Unit with options 119 + 257																						
Sound power level*	dB(A)	92	92	92	94	94	94	95	95	96	96	96	97	97	98	98	98	98	99	99	99	
Sound pressure level at 10 m**	dB(A)	60	60	60	62	62	62	62	62	63	63	63	64	64	65	65	65	62	66	66	65	

* 10⁻¹² W - In accordance with ISO 9614-1 and certified by Eurovent

** Average sound pressure level, unit in a free field on a reflective surface

4.4 - Short-circuit stability current for all units

30XA		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702
Short-circuit stability current (TN system)*																					
Circuits A + B**	kA	38	38	38	38	38	38	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Circuits C + D**	kA	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50	50	50	50	50	50
Units with option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50	50	50	50	50	-

* Type of system earthing

** rms value

4.5 - Electrical data 30XA - Standard unit (including option 81)

30XA		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702
Power circuit																					
Nominal power supply	V-ph-Hz	400-3-50																			
Voltage range	V	360-440																			
Control circuit																					
24 V via internal transformer																					
Maximum start-up current*																					
Circuit A+B	A	269	269	287	402	505	505	574	606	773	803	805	893	941	574	773	803	891	893	941	805
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	805
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	991	1079	1155	1242	1248	1294	-
Nominal start-up current**																					
Circuit A+B	A	245	245	263	378	481	481	539	562	738	759	761	845	869	539	738	759	843	845	869	761
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	761
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	909	993	1036	1156	1125	1143	-
Cosine Phi maximum***		0.88	0.88	0.87	0.88	0.88	0.88	0.88	0.88	0.86	0.86	0.87	0.85	0.86	0.88	0.86	0.87	0.85	0.85	0.86	0.87
Cosine Phi nominal****		0.85	0.85	0.84	0.84	0.86	0.86	0.87	0.87	0.84	0.85	0.85	0.83	0.84	0.85	0.84	0.85	0.83	0.83	0.84	0.85
Maximum power input†																					
Circuit A+B	kW	121	131	141	165	185	204	247	267	293	312	343	359	420	247	293	342	388	390	420	343
Circuit C+D††	kW	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210	210	209	210	210	343
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	457	503	552	597	600	630	-
Nominal unit current draw****																					
Circuit A+B	A	151	167	184	210	240	266	322	349	406	431	452	516	556	322	406	449	569	538	556	452
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	278	278	278	292	278	278	452
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	600	684	727	861	816	834	-
Maximum unit current draw (Un)†																					
Circuit A+B	A	198	215	233	270	303	335	404	436	492	522	572	611	707	404	492	568	655	661	707	572
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	354	354	354	352	354	354	572
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	758	845	922	1007	1015	1061	-
Maximum unit current draw (Un -10%)***																					
Circuit A+B	A	208	232	251	290	326	360	435	469	529	561	615	657	760	435	529	611	705	711	760	615
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	380	380	380	378	380	380	615
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	815	909	991	1083	1091	1141	-

* Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at operation with maximum unit power input.

** Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

*** Values obtained at operation with maximum unit power input.

**** Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

† Values obtained at operation with maximum unit power input. Values given on the unit name plate

†† Circuit D - only for size 1702

Note:

Motor and fan electrical data if the unit operates at Eurovent conditions (motor ambient temperature 50°C): 1.9 A

Start-up current: 8.4 A

Power input: 760 W

4.6 - Electrical data 30XA - Option 119 (including option 81)

30XA - option 119		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702
Power circuit																					
Nominal power supply	V-ph-Hz	400-3-50																			
Voltage range	V	360-440																			
Control circuit																					
		24 V via internal transformer																			
Maximum start-up current*																					
Circuit A+B	A	274	274	292	407	510	510	583	616	782	812	815	905	954	583	782	812	901	905	954	815
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	815
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	1010	1099	1175	1265	1275	1321	-
Nominal start-up current**																					
Circuit A+B	A	246	246	261	379	479	479	535	561	734	757	760	845	860	535	734	757	846	845	860	760
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	760
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	907	991	1026	1124	1122	1133	-
Cosine Phi maximum***																					
		0.88	0.87	0.87	0.88	0.88	0.88	0.88	0.88	0.86	0.86	0.86	0.85	0.86	0.88	0.86	0.87	0.85	0.85	0.86	0.86
Cosine Phi nominal****																					
		0.84	0.84	0.83	0.83	0.85	0.85	0.86	0.86	0.84	0.84	0.84	0.82	0.82	0.84	0.83	0.83	0.83	0.82	0.82	0.84
Maximum power input†																					
Circuit A+B	kW	126	136	147	172	192	212	257	278	304	323	356	372	435	257	304	353	400	405	435	356
Circuit C+D††	kW	-	-	-	-	-	-	-	-	-	-	-	-	-	217	217	217	216	217	217	356
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	475	522	570	615	622	652	712
Nominal unit current draw****																					
Circuit A+B	A	151	167	182	210	237	264	320	346	404	427	446	516	546	320	404	439	537	535	546	446
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	273	273	273	275	273	273	446
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	593	678	712	812	808	820	893
Maximum unit current draw (Un)†																					
Circuit A+B	A	208	226	243	284	316	350	423	457	512	542	596	635	734	423	512	588	678	688	734	596
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	367	367	367	364	367	367	596
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	790	879	956	1041	1056	1102	1191
Maximum unit current draw (Un -10%)***																					
Circuit A+B	A	219	243	262	305	340	376	455	491	551	583	640	683	790	455	551	633	729	740	790	640
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	395	395	395	391	395	395	640
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	850	946	1028	1120	1135	1185	1281

* Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at operation with maximum unit power input.

** Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

*** Values obtained at operation with maximum unit power input.

**** Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

† Values obtained at operation with maximum unit power input. Values given on the unit name plate

†† Circuit D - only for size 1702

Note:

Motor and fan electrical data if the unit operates at Eurovent conditions (motor ambient temperature 50°C): 3.6 A

Start-up current: 20 A

Power input: 1.65 kW

4.7 - Electrical data 30XA - Option 254/255 (including option 81)

Option 254: Units with copper/aluminium coils

Option 255: Units with copper/aluminium coils without slots

30XA - option 254/255		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702
Power circuit																					
Nominal power supply	V-ph-Hz	400-3-50																			
Voltage range	V	360-440																			
Control circuit																					
24 V via internal transformer																					
Maximum start-up current**																					
Circuit A+B	A	269	269	287	402	505	505	574	606	773	805	805	893	941	574	773	803	891	893	941	805
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	761
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	991	1079	1155	1242	1248	1294	1333
Nominal start-up current**																					
Circuit A+B	A	245	245	262	378	480	480	536	562	735	761	761	845	865	536	735	759	859	845	865	761
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	761
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	909	993	1036	1156	1125	1143	1214
Cosine Phi maximum***																					
		0.88	0.88	0.87	0.88	0.88	0.88	0.88	0.88	0.86	0.86	0.87	0.85	0.86	0.88	0.86	0.87	0.85	0.85	0.86	0.87
Cosine Phi nominal****																					
		0.85	0.85	0.84	0.84	0.86	0.86	0.87	0.87	0.84	0.84	0.85	0.83	0.84	0.85	0.84	0.85	0.84	0.83	0.84	0.85
Maximum power input†																					
Circuit A+B	kW	121	131	142	165	185	204	247	267	294	313	343	360	420	247	293	342	388	390	420	343
Circuit C+D††	kW	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210	210	209	210	210	343
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	457	503	552	597	600	630	687
Nominal unit current draw****																					
Circuit A+B	A	151	167	186	210	240	266	322	349	408	433	452	518	556	322	406	449	569	538	556	452
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	278	278	278	292	278	278	452
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	600	684	727	861	816	834	905
Maximum unit current draw (Un)†																					
Circuit A+B	A	198	215	235	270	303	335	404	436	494	524	572	613	707	404	492	568	655	661	707	572
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	354	354	354	352	354	354	572
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	758	845	922	1007	1015	1061	1144
Maximum unit current draw (Un -10%)***																					
Circuit A+B	A	208	232	253	290	326	360	435	469	531	563	615	659	760	435	529	611	705	711	760	615
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	380	380	380	378	380	380	615
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	815	909	991	1083	1091	1141	1230

* Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at operation with maximum unit power input.

** Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

*** Values obtained at operation with maximum unit power input.

**** Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

† Values obtained at operation with maximum unit power input. Values given on the unit name plate

†† Circuit D - only for size 1702

Note:

Motor and fan electrical data if the unit operates at Eurovent conditions (motor ambient temperature 50°C): 1.9 A

Start-up current: 8.4 A

Power input: 760 W

4.8 - Electrical data 30XA - Option 254/255 with option 119 (including option 81)

Option 119: High energy efficiency option

Option 254: Units with copper/aluminium coils

Option 255: Units with copper/aluminium coils without slots

30XA - option 254/255 with 119		252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702
Power circuit																					
Nominal power supply	V-ph-Hz	400-3-50																			
Voltage range	V	360-440																			
Control circuit																					
24 V via internal transformer																					
Maximum start-up current*																					
Circuit A+B	A	274	274	292	407	510	510	583	616	782	815	815	905	954	583	782	812	901	905	954	815
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	815
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	1010	1099	1175	1265	1275	1321	1411
Nominal start-up current**																					
Circuit A+B	A	246	246	261	379	479	479	535	561	734	760	760	845	860	535	734	757	846	845	860	760
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	587	587	587	587	587	587	760
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	907	991	1026	1124	1122	1133	1206
Cosine Phi maximum***																					
		0.88	0.87	0.87	0.88	0.88	0.88	0.88	0.88	0.86	0.86	0.86	0.84	0.86	0.88	0.86	0.87	0.85	0.85	0.86	0.86
Cosine Phi nominal****																					
		0.84	0.84	0.83	0.83	0.85	0.85	0.86	0.86	0.83	0.84	0.84	0.82	0.82	0.84	0.83	0.83	0.83	0.82	0.82	0.84
Maximum power input†																					
Circuit A+B	kW	126	136	148	172	192	212	257	278	306	325	356	373	435	257	304	353	400	405	435	356
Circuit C+D††	kW	-	-	-	-	-	-	-	-	-	-	-	-	-	217	217	217	216	217	217	356
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	475	522	570	615	622	652	712
Nominal unit current draw****																					
Circuit A+B	A	151	167	185	210	237	264	320	346	408	431	446	519	546	320	404	439	537	535	546	446
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	273	273	273	275	273	273	446
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	593	678	712	812	808	820	893
Maximum unit current draw (Un)†																					
Circuit A+B	A	208	226	247	284	316	350	423	457	516	546	596	639	734	423	512	588	678	688	734	596
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	367	367	367	364	367	367	596
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	790	879	956	1041	1056	1102	1191
Maximum unit current draw (Un -10%)***																					
Circuit A+B	A	219	243	266	305	340	376	455	491	555	587	640	687	790	455	551	633	729	740	790	640
Circuit C+D††	A	-	-	-	-	-	-	-	-	-	-	-	-	-	395	395	395	391	395	395	640
Option 81	A	-	-	-	-	-	-	-	-	-	-	-	-	-	850	946	1028	1120	1135	1185	1281

* Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at operation with maximum unit power input.

** Instantaneous start-up current (operating current of the smallest compressor + fan current + locked rotor current in star connection of the largest compressor). Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

*** Values obtained at operation with maximum unit power input.

**** Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C

† Values obtained at operation with maximum unit power input. Values given on the unit name plate

†† Circuit D - only for size 1702

Note:

Motor and fan electrical data if the unit operates at Eurovent conditions (motor ambient temperature 50°C): 3.6 A

Start-up current: 20 A

Power input: 1.65 kW

4.9 - Compressor electrical data

Compressor	I Nom* Std/Option 119	I Max** (Un)	MHA	LRYA (Un)	LRDA (Un)	Cosine Phi (max.)**	Cosine Phi (nom.)*
06TSA155	69/64	86	96	170	530	0.90	0.87
06TSA186	87/80	108	120	170	530	0.89	0.86
06TTA266	128/117	158	176	303	945	0.90	0.86
06TTA301	142/130	173	193	388	1210	0.90	0.89
06TTA356	163/150	198	220	388	1210	0.90	0.89
06TUA483	245/230	280	311	587	1828	0.86	0.84
06TUA554	267/246	329	366	587	1828	0.87	0.85

* Average value for the range (unit at Eurovent conditions)

** Value at maximum capacity and nominal voltage (400 V)

Legend

MHA - Maximum compressor operating current, limited by the unit (current given for maximum capacity at 360 V)

LRYA - Locked rotor current for star connection (connection during compressor start-up)

LRDA - Locked rotor current for delta connection

4.10 - Compressor usage per circuit (A, B, C, D)

Compressor	30XA																			
	252	302	352	402	452	502	602	702	752	802	852	902	1002	1102	1202	1302	1352	1402	1502	1702
06TSA155	AB	B	-	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06TSA186	-	A	AB	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06TTA266	-	-	-	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06TTA301	-	-	-	-	A	-	B	-	B	-	-	-	-	B	B	-	-	-	-	-
06TTA356	-	-	-	-	-	A	A	AB	-	B	B	-	-	A	-	B	-	-	-	BD
06TUA483	-	-	-	-	-	-	-	-	A	A	-	AB	-	-	A	-	B	B	-	-
06TUA554	-	-	-	-	-	-	-	-	-	-	A	-	AB	C	C	AC	AC	AC	ABC	AC

4.11 - Electrical data, optional hydronic module

30XA		252	302	352	402	452	502
Single and dual low-pressure pump							
Motor power	kW	2.2	2.2	3	4	4	5.5
Power input	kW	2.8	2.8	3.9	5.1	5.1	7.2
Maximum current draw	A	4.7	4.7	6.4	8.2	8.2	11.7
Single and dual high-pressure pump							
Motor power	kW	4	5.5	5.5	7.5	11	11
Power input	kW	5.1	7.2	7.2	9.2	13.2	13.2
Maximum current draw	A	8.2	11.7	11.7	15	21.2	21.2

Notes:

- To obtain the maximum power input for a unit with hydronic module add the maximum unit power input to the pump power input.
- To obtain the maximum unit operating current draw for a unit with hydronic module add the maximum unit current draw to the pump current draw.

5 - ELECTRICAL CONNECTION

Please refer to the certified dimensional drawings, supplied with the unit.

5.1 - Power supply

The power supply must conform to the specification on the chiller nameplate. The supply voltage must be within the range specified in the electrical data table. For connections refer to the wiring diagrams and the certified dimensional drawings.

WARNING: Operation of the chiller with an improper supply voltage or excessive phase imbalance constitutes abuse which will invalidate the Carrier warranty. If the phase imbalance exceeds 2% for voltage, or 10% for current, contact your local electricity supply at once and ensure that the chiller is not switched on until corrective measures have been taken.

5.2 - Voltage phase imbalance (%)

$$\frac{100 \times \text{max. deviation from average voltage}}{\text{Average voltage}}$$

Example:

On a 400 V - 3 ph - 50 Hz supply, the individual phase voltages were measured to be:

$$AB = 406 \text{ V}; BC = 399; AC = 394 \text{ V}$$

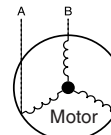
$$\begin{aligned} \text{Average voltage} &= (406 + 399 + 394)/3 = 1199/3 \\ &= 399.7 \text{ say } 400 \text{ V} \end{aligned}$$

Calculate the maximum deviation from the 400 V average:

$$(AB) = 406 - 400 = 6$$

$$(BC) = 400 - 399 = 1$$

$$(CA) = 400 - 394 = 6$$



The maximum deviation from the average is 6 V. The greatest percentage deviation is:

$$100 \times 6/400 = 1.5 \%$$

This is less than the permissible 2% and is therefore acceptable.

5.3 - Power connection/disconnect switch

Units

30XA 0252-1002

30XA 1102-1702

Connection points

1 per unit

1 for circuits A and B

1 for circuit(s) C (and D)

Electrical data notes for 30XA units:

- 30XA 252-1002 units have a single power connection point; 30XA 1102-1702 units have two connection points.
- The control box includes the following standard features:
 - One general disconnect switch per circuit
 - Starter and motor protection devices for each compressor, the fan(s) and the pump
 - Control devices
- **Field connections:**
- All connections to the system and the electrical installations must be in full accordance with all applicable local codes.
- The Carrier 30XA units are designed and built to ensure conformance with these codes. The recommendations of European standard EN 60 204-1 (corresponds to IEC 60204-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment.
- **IMPORTANT:**
- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60 204 is the best means of ensuring compliance with the Machines Directive § 1.5.1.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.
- The operating environment for the 30XA units is specified below:
 1. Environment* - Environment as classified in EN 60 721 (corresponds to IEC 60721) :
 - outdoor installation*
 - ambient temperature range: -20°C to +55°C, class 4K4H*
 - altitude: ≤ 2000 m
 - presence of hard solids, class 4S2* (no significant dust present)
 - presence of corrosive and polluting substances, class 4C2 (negligible)
 2. Power supply frequency variation: ± 2 Hz.
 3. The neutral (N) line must not be connected directly to the unit (if necessary use a transformer).
 4. Overcurrent protection of the power supply conductors is not provided with the unit.
 5. The factory-installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947-3 (corresponds to IEC 60947-3).
 6. The units are designed for connection to TN networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.
- **NOTE: If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.**

* The required protection level for this class is IP43BW (according to reference document IEC 60529). All 30XA units are protected to IP44CW and fulfil this protection condition.

5.4 - Recommended wire sections

Wire sizing is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guideline, and does not make in any way liable. After wire sizing has been completed, using the certified dimensional drawing, the installer must ensure easy connection and define any modifications necessary on site.

The connections provided as standard for the field-supplied power entry cables to the general disconnect/isolator switch are designed for the number and type of wires, listed in the table below.

The calculations are based on the maximum machine current (see electrical data tables).

For the design the following standardised installation methods are used, in accordance with IEC 60364, table 52C:

- For 30XA units installed outside the building:
 - No.17: suspended aerial lines
 - No. 61: buried conduit with a derating coefficient of 20.

The calculation is based on PVC or XLPE insulated cables with copper core. The maximum temperature is 46°C for 30XA units.

The given wire length limits the voltage drop to < 5%.

IMPORTANT: Before connection of the main power cables (L1 - L2 - L3) on the terminal block, it is imperative to check the correct order of the 3 phases before proceeding to the connection on then terminal block or the main disconnect/isolator switch.

5.5 - Power cable entry

The power cables can enter the 30XA control box from below or from the unit side.

For 30XA unit sizes 602 to 1702 the control box that includes the power supply cable connection terminal is located in the lower part of the unit. In this case the control box is raised by 120 mm compared to the lowest point of the chassis. The cable entry point depends on the unit configuration:

1. Unit raised from the ground (e.g. installation on support rails): It is recommended to enter the power cables from below the control box. A removable aluminium plate below the control box allows introduction of the cables.
2. Unit placed on the ground: For power cable entry from below the control box ensure that the cable bend radius is compatible with the connection space available in the control box. If not, an aluminium plate on the control box face allows introduction of the cables.

For units with three circuits with option 81 (single power connection point) the connection must be made from below the unit.

IMPORTANT: Check the cable bend radius for cable entry into a control box, located in the lower part of the unit.

Refer to the certified dimensional drawing for the unit.

5.6 - Field control wiring

Refer to the 30XA Pro-Dialog Controls IOM and the certified wiring diagram supplied with the unit for the field control wiring of the following features:

- Evaporator pump interlock (mandatory)
- Remote on/off switch
- Demand limit external switch
- Remote dual set point
- Alarm, alert and operation report
- Evaporator pump control
- Heat reclaim condenser pump control (option)
- Hot water valve control (option)
- Set point reset via outside air temperature sensor reset
- Various interlocks on the Energy Management Module (EMM) board (accessory or option)

Selection table of minimum and maximum wire sections for connection to 30XA units

30XA	Maximum wire section	Minimum calculated section			Maximum calculated section		
	Section (mm ²)	Section (mm ²)*	Max. length (m)	Wire type	Section (mm ²)*	Max. length (m)	Wire type
252	2 x 240	1 x 95	190	XLPE Cu	2 x 95	410	PVC Cu
302	2 x 240	1 x 95	190	XLPE Cu	2 x 120	435	PVC Cu
352	2 x 240	1 x 120	197	XLPE Cu	2 x 150	455	PVC Cu
402	2 x 240	1 x 150	200	XLPE Cu	2 x 185	470	PVC Cu
452	2 x 240	1 x 185	205	XLPE Cu	2 x 120	435	XLPE Cu
502	2 x 240	1 x 240	205	XLPE Cu	2 x 150	455	XLPE Cu
602	4 x 240	2 x 95	190	XLPE Cu	2 x 240	480	XLPE Cu
702	4 x 240	2 x 120	198	XLPE Cu	2 x 240	480	XLPE Cu
752	4 x 240	2 x 120	198	XLPE Cu	3 x 240	600	XLPE Cu
802	4 x 240	2 x 150	200	XLPE Cu	3 x 240	600	XLPE Cu
852	4 x 240	2 x 150	200	XLPE Cu	4 x 240	685	XLPE Cu
902	6 x 240	2 x 185	205	XLPE Cu	4 x 240	685	XLPE Cu
1002	6 x 240	2 x 240	205	XLPE Cu	5 x 240	750	XLPE Cu
Circuits A and B/C							
1102	4 x 240/2 x 240	2 x 95/1 x 240	190/280	XLPE Cu	4 x 240/2 x 240	685/480	PVC Cu/XLPE Cu
1202	4 x 240/2 x 240	2 x 150/1 x 240	280/280	XLPE Cu	4 x 240/2 x 240	685/480	XLPE Cu/XLPE Cu
1302	4 x 240/2 x 240	2 x 150/1 x 240	280/280	XLPE Cu	4 x 240/2 x 240	685/480	XLPE Cu/XLPE Cu
1352	6 x 240/2 x 240	2 x 185/1 x 240	280/280	XLPE Cu	5 x 240/2 x 240	750/480	XLPE Cu/XLPE Cu
1402	6 x 240/2 x 240	3 x 150/1 x 240	280/280	XLPE Cu	5 x 240/2 x 240	750/480	XLPE Cu/XLPE Cu
1502	6 x 240/2 x 240	3 x 150/1 x 240	280/280	XLPE Cu	6 x 240/2 x 240	750/480	XLPE Cu/XLPE Cu
1702	4 x 240/4 x 240	2 x 150/2 x 150	200/200	XLPE Cu	4 x 240/4 x 240	685/685	XLPE Cu
Option 81							
1102-1502	8 x 240						

* Power supply wire section (see diagram in chapter 5 'Electrical connection').

Note: The current values used are given for a unit equipped with a hydronic kit operating at maximum current.

6 - APPLICATION DATA

6.1 - Operating limits

Evaporator fluid temperature

	°C	Minimum	Maximum
Water entering temperature at start-up	-	-	45
Water entering temperature during operation	6.8	-	21
Water leaving temperature during operation	3.3	-	15

Note: If the leaving water temperature is below 4°C, a glycol/water solution or the frost protection option must be used.

Condenser air temperature

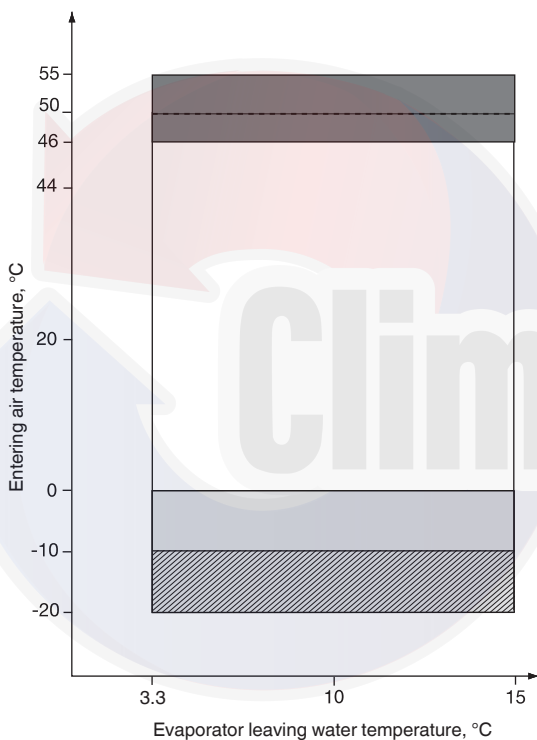
	°C	Minimum	Maximum
Storage	-20	-	68
Operation, standard unit	-10	-	55*
With winter operation option (option 28)	-20	-	55*
With high energy efficiency option (option 119)	-10	-	55*

Note: If the air temperature is below 0°C, a glycol/water solution or the frost protection option must be used.

* Full or part-load operation, depending on the model

** Recommended for operation above 46°C

Operating range 30XA



Legend:

- Part load average: from 46°C for standard unit from 50°C with option 119.
- Operating range, standard unit.
- Below 0°C air temperature the unit must either be equipped with the evaporator frost protection option (41A or 41B), or the water loop must be protected against frost by using a frost protection solution (by the installer).
- Operating range, unit equipped with option 28 (winter operation).

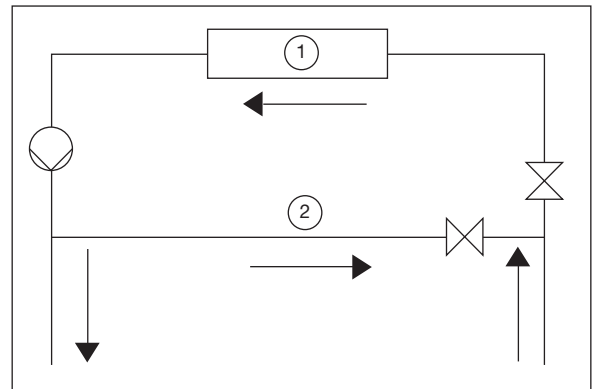
ATTENTION: Option 28 (Winter operation)

If the outside temperature is below -10°C and the unit has been switched off for more than 4 hours, it is necessary to wait 2 hours after the unit has been switched on again to allow the frequency converter to warm up.

6.2 - Minimum chilled water flow (units without hydronic module)

The minimum chilled water flow is shown in the table on the next page. If the system flow is less than this, the evaporator flow can be recirculated, as shown in the diagram.

For minimum chilled water flow rate



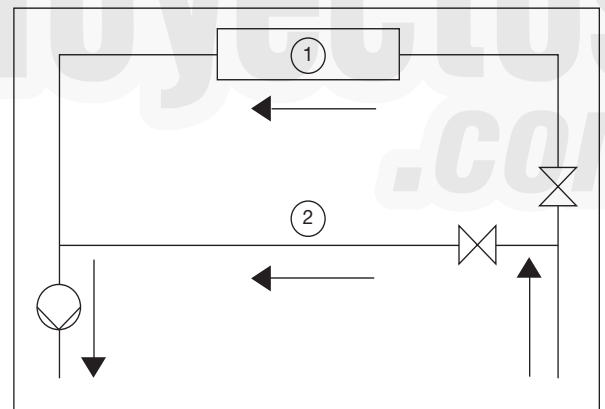
Legend

- 1 Evaporator
- 2 Recirculation

6.3 - Maximum chilled water flow (units without hydronic module)

The maximum chilled water flow is shown in the table on the next page. If the system flow exceeds the maximum value, it can be bypassed as shown in the diagram.

For maximum chilled water flow rate



Legend

- 1 Evaporator
- 2 Bypass

6.4 - Variable flow evaporator

Variable evaporator flow can be used in standard 30XA chillers. The chillers maintain a constant leaving water temperature under all flow conditions. For this to happen, the minimum flow rate must be higher than the minimum flow given in the table of permissible flow rates and must not vary by more than 10% per minute.

If the flow rate changes more rapidly, the system should contain a minimum of 6.5 litres of water per kW instead of 3.25 l/kW.

6.5 - System minimum water volume

Whichever the system, the water loop minimum capacity is given by the formula:

$$\text{Capacity} = \text{Cap (kW)} \times \text{N litres}$$

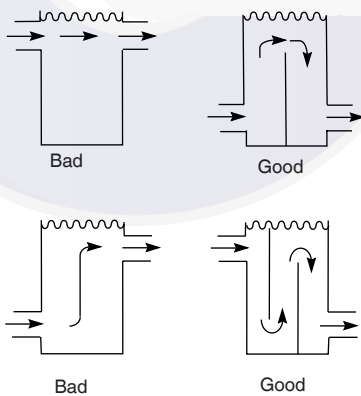
Application	N
Normal air conditioning	3.25
Process type cooling	6.5

Where Cap is the nominal system cooling capacity (kW) at the nominal operating conditions of the installation.

This volume is necessary for stable operation and accurate temperature control.

It is often necessary to add a buffer water tank to the circuit in order to achieve the required volume. The tank must itself be internally baffled in order to ensure proper mixing of the liquid (water or brine). Refer to the examples below.

Connection to a buffer tank



6.6 - Maximum system water volume

Units with hydronic module incorporate an expansion tank that limits the water volume. The table below gives the maximum loop volume for pure water or ethylene glycol with various system concentrations, as well as the static pressures. If the maximum volume is insufficient, compared to the minimum system water loop volume, an additional expansion tank must be added to the system.

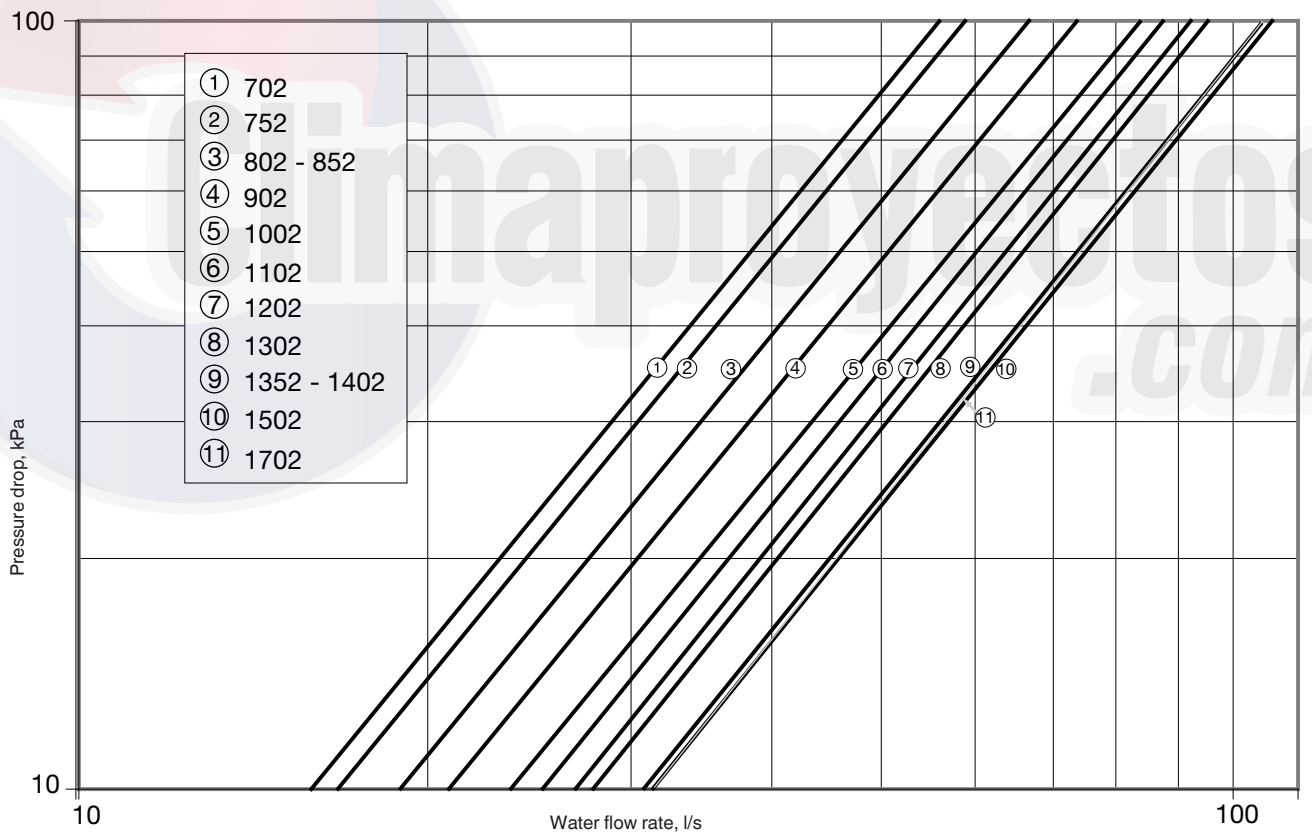
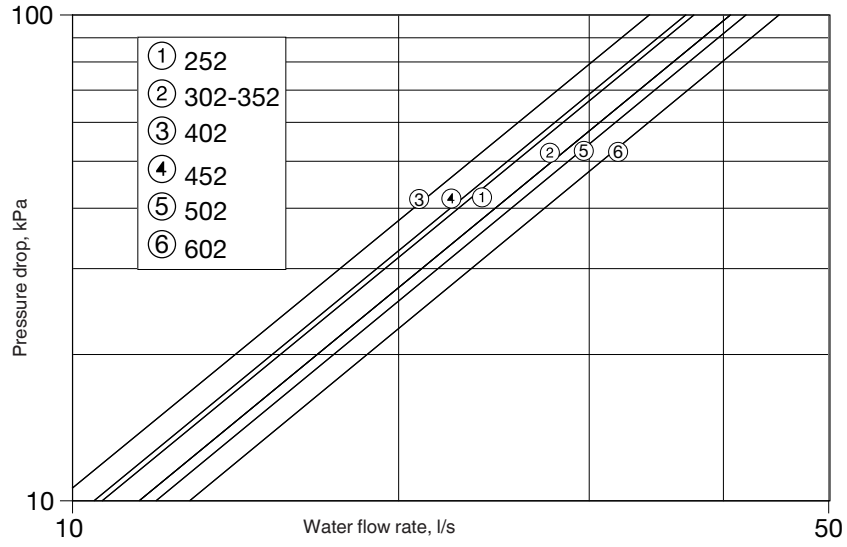
30XA	252-452			502		
	Static pressure bar					
	1	2	2.5	1	2	2.5
Maximum water loop volume l						
Pure water	2400	1600	1200	3960	2640	1980
Ethylene glycol 10%	1800	1200	900	2940	1960	1470
Ethylene glycol 20%	1320	880	660	2100	1400	1050
Ethylene glycol 30%	1080	720	540	1740	1160	870
Ethylene glycol 40%	900	600	450	1500	1000	750

6.7 - Evaporator water flow rate

30XA	Evaporator water flow rate, l/s	
	Min. flow rate	Max. flow rate*
252	3.6	37.5
302	4.0	40.5
352	4.3	40.5
402	5.3	34.1
452	6.0	36.9
502	6.7	42.0
602	8.1	45.0
702	8.9	56.1
752	9.6	59.1
802	10.4	67.1
852	11.0	67.1
902	11.8	73.9
1002	13.1	83.9
1102	15.1	87.8
1202	16.4	92.9
1302	17.5	96.1
1352	18.8	107.4
1402	19.3	107.4
1502	19.9	109.4
1702	22.0	107.4

* The maximum water flow rate corresponds to a pressure drop of 100 kPa.

6.8 - Evaporator pressure drop curve



7 - WATER CONNECTIONS

ATTENTION: Before carrying out any water connections install the water box purge plugs (one plug per water box in the lower section - supplied in the control box).

For size and position of the heat exchanger water inlet and outlet connections refer to the certified dimensional drawings supplied with the unit.

The water pipes must not transmit any radial or axial force to the heat exchangers nor any vibration.

The water supply must be analysed and appropriate filtering, treatment, control devices, isolation and bleed valves and circuits built in, to prevent corrosion, fouling and deterioration of the pump fittings. Consult either a water treatment specialist or appropriate literature on the subject.

7.1 - Operating precautions

The water circuit should be designed to have the least number of elbows and horizontal pipe runs at different levels. Below the main points to be checked for the connection:

- Comply with the water inlet and outlet connections shown on the unit.
- Install manual or automatic air purge valves at all high points in the circuit(s).
- Use an expansion device to maintain pressure in the circuit(s) and install a safety valve as well as an expansion tank.
- Install thermometers in both the entering and leaving water connections.
- Install drain connections at all low points to allow the whole circuit to be drained.
- Install stop valves, close to the entering and leaving water connections.
- Use flexible connections to reduce the transmission of vibrations.
- Insulate all pipework, after testing for leaks, both to reduce heat gains and to prevent condensation.
- Cover the insulation with a vapour barrier.
- Where there are particles in the fluid that could foul the heat exchanger, a screen filter should be installed ahead of the pump. The mesh size of the filter must be 1.2 mm (see 'Typical water circuit' diagram on the right).
- Before the system start-up verify that the water circuits are connected to the appropriate heat exchangers (e.g. no reversal between evaporator and condenser).
- Do not introduce any significant static or dynamic pressure into the heat exchange circuit (with regard to the design operating pressures).
- Before any start-up verify that the heat exchange fluid is compatible with the materials and the water circuit coating.

In case additives or other fluids than those recommended by Carrier are used, ensure that the fluids are not considered as a gas, and that they belong to class 2, as defined in directive 97/23/EC.

Carrier recommendations on heat exchange fluids:

1. No NH_4^+ ammonium ions in the water, they are very detrimental for copper. This is one of the most important factors for the operating life of copper piping. A content of several tenths of mg/l will badly corrode the copper over time.
2. Cl Chloride ions are detrimental for copper with a risk of perforations by corrosion by puncture. If possible keep below 10 mg/l.
3. SO_4^{2-} sulphate ions can cause perforating corrosion, if their content is above 30 mg/l.
4. No fluoride ions (<0.1 mg/l).
5. No Fe^{2+} and Fe^{3+} ions with non negligible levels of dissolved oxygen must be present. Dissolved iron < 5 mg/l with dissolved oxygen < 5 mg/l.
6. Dissolved silicon: silicon is an acid element of water and can also lead to corrosion risks. Content < 1 mg/l.
7. Water hardness: TH >5°F. Values between 10 and 25 can be recommended. This will facilitate scale deposit that can limit corrosion of copper. TH values that are too high can cause piping blockage over time. A total alkalimetric titre (TAC) below 100 is desirable.
8. Dissolved oxygen: Any sudden change in water oxygenation conditions must be avoided. It is as detrimental to deoxygenate the water by mixing it with inert gas as it is to over-oxygenate it by mixing it with pure oxygen. The disturbance of the oxygenation conditions encourages destabilisation of copper hydroxides and enlargement of particles.
9. Specific resistance – electric conductivity: the higher the specific resistance, the slower the corrosion tendency. Values above 3000 Ohm/cm are desirable. A neutral environment favours maximum specific resistance values. For electric conductivity values in the order of 200-6000 S/cm can be recommended.
10. pH: Ideal case pH neutral at 20-25°C
7 < pH < 8

If the water circuit must be emptied for longer than one month, the complete circuit must be placed under nitrogen charge to avoid any risk of corrosion by differential aeration.

Charging and removing heat exchange fluids should be done with devices that must be included on the water circuit by the installer. Never use the unit heat exchangers to add heat exchange fluid.

7.2 - Victaulic water connections

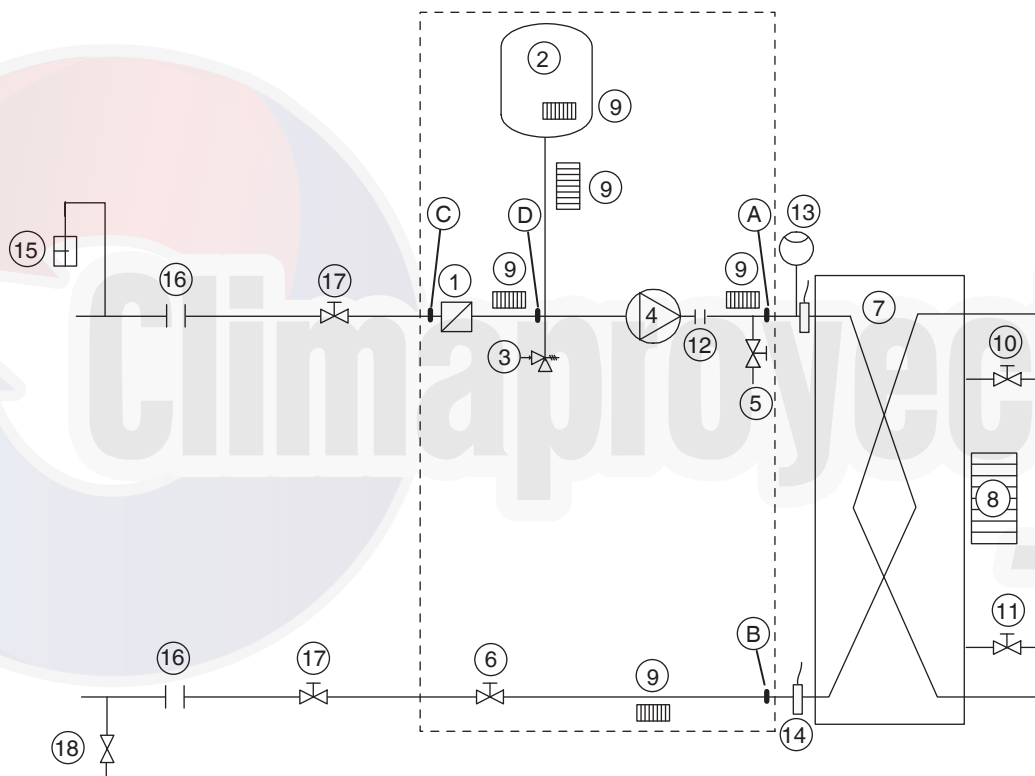
Inlet/outlet diameters without hydronic module

30XA		252-502	602	702-902	1002	1102	1202-1302	1352-1502	1702
Standard									
Diameter	in	5	5	6	8	6/6	6/6	8/6	6/6
Outside diameter	mm	141.3	141.3	168.3	219.1	168.3/168.3	168.3/168.3	219.3/168.3	168.3/168.3
Options 5, 6 and 100A									
Diameter	in	4	5	5	6	5/5	6/5	8/5	6/6
Outside diameter	mm	114.3	141.3	141.3	168.3	141.3/141.3	168.3/141.3	219.1/141.3	168.3/168.3
Option 100C									
Diameter	in	5	6	6	8	-	-	-	-
Outside diameter	mm	141.3	168.3	168.3	219.1	-	-	-	-

Inlet/outlet diameters with hydronic module (option)

30XA (option 116)		252	302	352	402	452	502
Diameter	in	4	4	4	5	5	5
Outside diameter	mm	114.3	114.3	114.3	139.7	139.7	139.7
Expansion tank volume	l	50	50	50	50	50	80
Max. operating pressure	kPa	400	400	400	400	400	400

Typical water circuit diagram



Legend

Components of the unit and hydronic module

- A Pressure sensor (A-B = ΔP evaporator)
- B Pressure sensor
- C Pressure sensor (C-D = ΔP water filter)
- D Pressure sensor
- 1 Victaulic screen filter
- 2 Expansion tank
- 3 Safety valve
- 4 Available pressure pump
- 5 Drain valve
- 6 Flow control valve
- 7 Evaporator
- 8 Evaporator defrost heater (option)
- 9 Hydronic module defrost heater (option)
- 10 Air vent (evaporator)
- 11 Water drain (evaporator)
- 12 Expansion compensator (flexible connections)
- 13 Flow switch
- 14 Water temperature sensor
- 15 Air vent

Installation components

- 16 Flexible connection
- 17 Check valve
- 18 Charge valve
- Hydronic module (supplied as an option)

7.3 - Flow control

Evaporator flow switch and chilled water pump interlock

IMPORTANT: On 30XA units, the unit water flow switch must be energised, and the chilled water pump interlock must be connected. Failure to follow this instruction will void the Carrier guarantee.

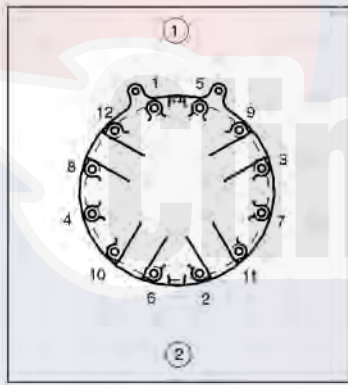
The water flow switch is installed on the evaporator water inlet and adjusted by the control, based on unit size and application. If adjustment is necessary, it must be carried out by qualified personnel trained by Carrier Service.

Terminals 34 and 35 are provided for field installation of the chilled water pump interlock (auxiliary contact for pump operation to be wired on site).

7.4 - Evaporator water box bolt tightening

The evaporator (and condenser) are of the shell and tube type with removable water boxes to facilitate cleaning. Re-tightening or tightening must be done in accordance with the illustration below.

Water box tightening sequence



Legend

- 1 Sequence 1: 1 2 3 4
Sequence 2: 5 6 7 8
Sequence 3: 9 10 11 12

- 2 Tightening torque
Bolt size M16 - 171 - 210 Nm

NOTE: Before this operation we recommend draining the circuit and disconnecting the pipes to be sure that the bolts are correctly and uniformly tightened.

7.5 - Frost protection

7.5.1 - Standard machine

If the chiller or the water piping is in an area where the ambient temperature can fall below 0°C it is recommended to add an antifreeze solution to protect the unit and the water piping to a temperature of 10 K below the lowest temperature likely to be reached at the installation site. Use only antifreeze solutions, approved for heat exchanger duty. If the system is not protected by an antifreeze solution and will not be used during the freezing weather conditions, draining of the cooler and outdoor piping is mandatory. Damage due to freezing is not covered by the warranty.

IMPORTANT: Depending on the climatic conditions in your area you must:

- Add ethylene glycol with an adequate concentration to protect the installation up to a temperature of 10 K below the lowest temperature likely to occur at the installation site.
- If the unit is not used for an extended period, it is recommended to drain it, and as a safety precaution add ethylene glycol to the heat exchanger, using the water entering purge valve connection (a purge connection is available somewhere on the heat exchanger water box in case the machine is not perfectly level).
- At the start of the next season, refill the unit with water and add an inhibitor.
- For the installation of auxiliary equipment, the installer must comply with basic regulations, especially for minimum and maximum flow rates, which must be between the values listed in the operating limit table (application data).

7.5.2 - Optional evaporator frost protection (30XA)

In cases where it is not possible to apply the recommendations in paragraph 7.5.1, the units can be equipped with heaters to protect the evaporator against frost (option 41A or 41B).

7.6 - Operation of two units in master/slave mode

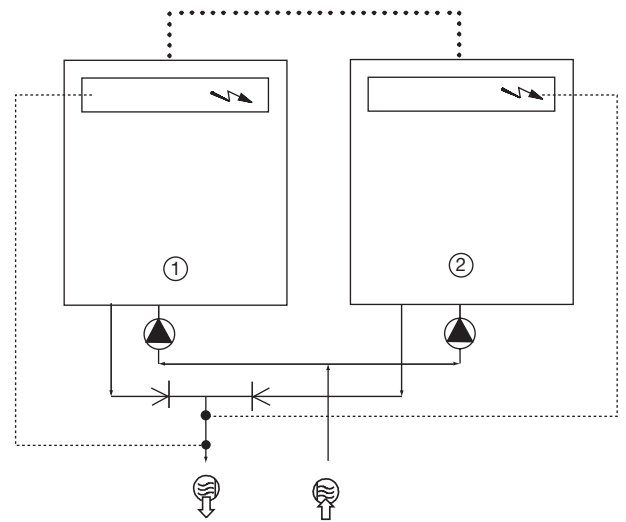
NOTE: This operating mode is not available for 30XA 1702 units.

The control of a master/slave assembly is in the entering water and does not require any additional sensors (standard configuration). It can also be located in the leaving water. In this case two additional sensors must be added on the common piping.

All parameters, required for the master/slave function must be configured using the Service Configuration menu. All remote controls of the master/slave assembly (start/stop, set point, load shedding etc.) are controlled by the unit configured as master and must only be applied to the master unit.

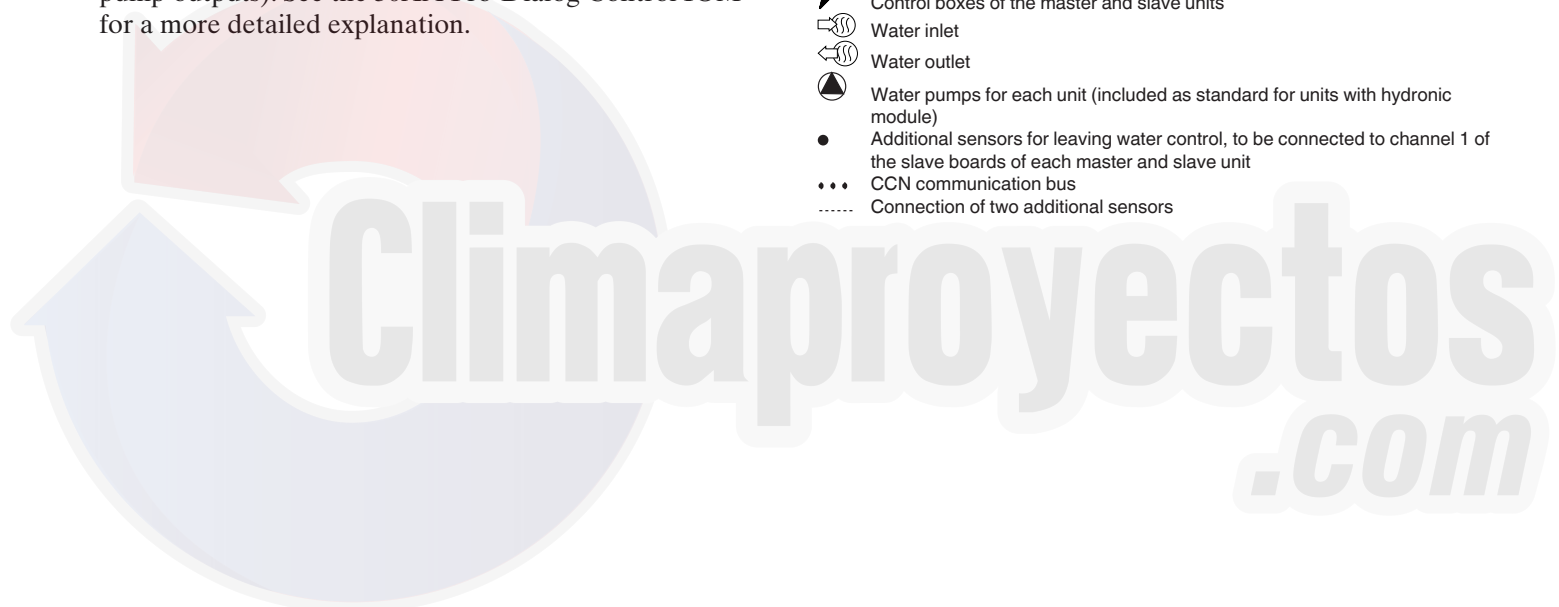
Each unit controls its own water pump. If there is only one common pump, in cases with variable flow, isolation valves must be installed on each unit. They will be activated at the opening and closing by the control of each heat pump (in this case the valves are controlled using the dedicated water pump outputs). See the 30XA Pro-Dialog Control IOM for a more detailed explanation.

30XA with configuration: leaving water control



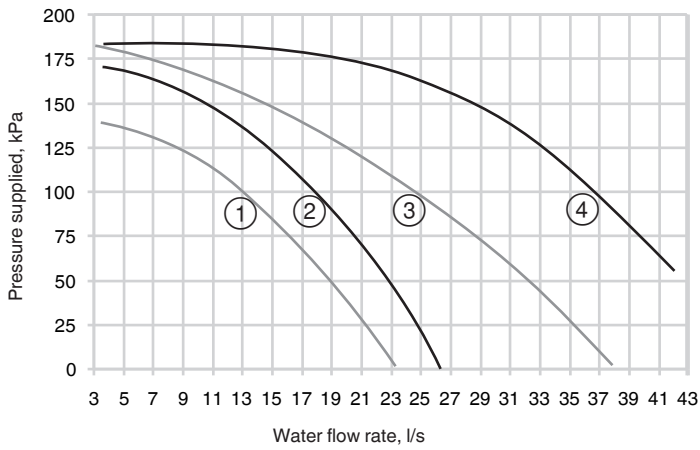
Legend

- 1 Master unit
- 2 Slave unit
- ⚡ Control boxes of the master and slave units
- ⊕ Water inlet
- ⊖ Water outlet
- ⚙ Water pumps for each unit (included as standard for units with hydronic module)
- Additional sensors for leaving water control, to be connected to channel 1 of the slave boards of each master and slave unit
- ... CCN communication bus
- Connection of two additional sensors



7.7 - Pump pressure/flow rate curves

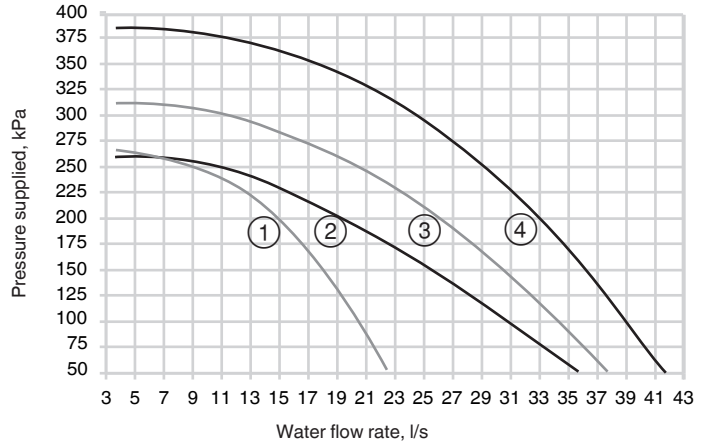
Low-pressure pumps



Legend

- 1 30XA 252-302
- 2 30XA 352
- 3 30XA 402
- 4 30XA 452-502

High-pressure pumps

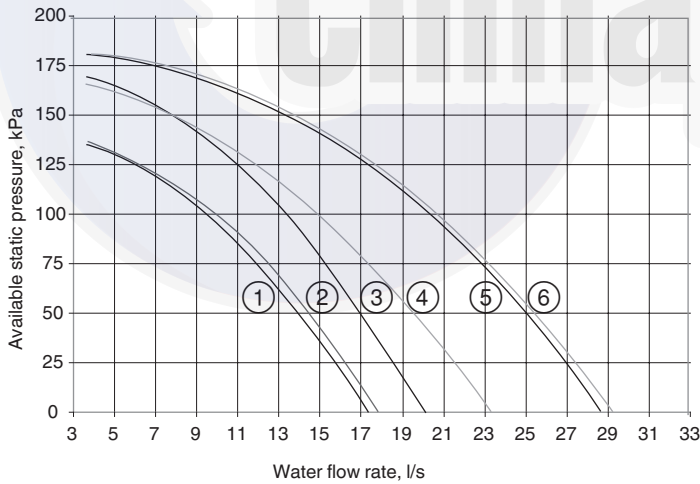


Legend

- 1 30XA 252
- 2 30XA 302-352
- 3 30XA 402-452
- 4 30XA 502

7.8 - Available static system pressure (optional hydronic module)

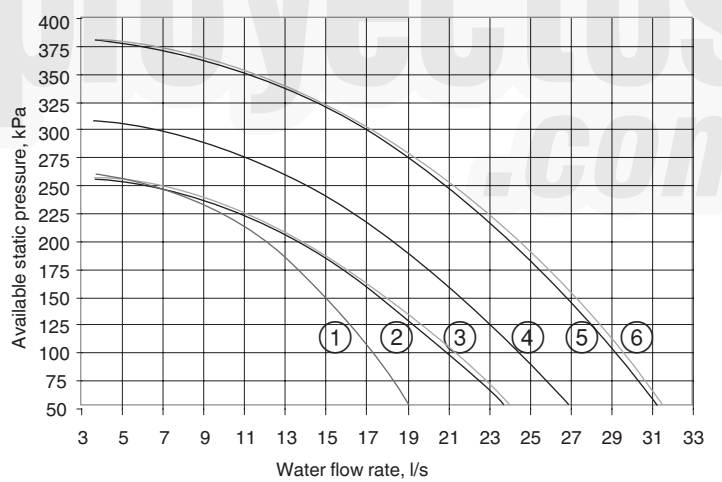
Low-pressure pumps



Legend

- 1 30XA 252
- 2 30XA 302
- 3 30XA 352
- 4 30XA 402
- 5 30XA 452
- 6 30XA 502

High-pressure pumps



Legend

- 1 30XA 252
- 2 30XA 352
- 3 30XA 302
- 4 30XA 402
- 5 30XA 452
- 6 30XA 502

8 - FREE-COOLING OPTION

8.1 - Characteristics

30XA with Option 118A		252	302	352	402	452	502	602	702	752	802	852	902	1002
Operating weight*	kg	3840	3880	3920	4780	4850	5330	6260	6410	6710	7010	7560	7860	8440
Refrigerant charge	kg													
Circuit A		36	37	37	54	56	64	64	64	72	76	79	76	83
Circuit B		38	38	39	37	39	39	64	68	64	67	70	79	87
Refrigerant charge, option 254	kg													
Circuit A		60	64	**	87	87	104	104	102	**	**	133	**	143
Circuit B		64	64	**	56	56	56	90	97	**	**	97	**	132

* Standard unit and option 119

** Option 118A (free cooling) is not compatible with these units.

8.2 - Operating limits

Cooling mode

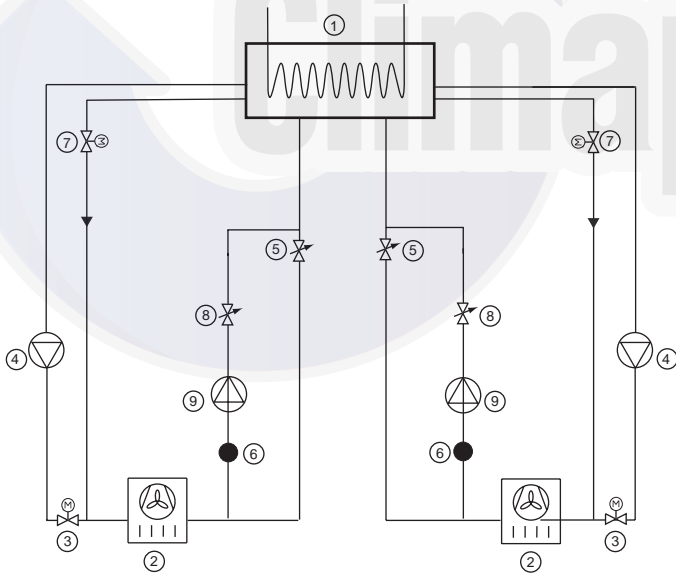
Evaporator		Minimum	Maximum
Entering water temperature at start-up	°C	-	45
Entering water temperature during operation	°C	6.8	21
Leaving water temperature during operation	°C	3.3	26
Condenser (air)		Minimum	Maximum
Outdoor ambient operating temperature	°C	-10	55*
With winter operation option (option 28)	°C	-20	55*

Free-cooling mode

Evaporator		Minimum	Maximum
Entering water temperature at start-up	°C	-	45
Leaving water temperature during operation	°C	3.3	26*
Condenser (air)		Minimum	Maximum
Outdoor ambient operating temperature	°C	-10	20
With winter operation option (option 28)	°C	-20	20

* Maximum configurable set-point

8.3 - Operation



Legend

- 1 Evaporator
- 2 Air condenser (coils)
- 3 Motorised two-way valve, discharge side
- 4 Compressor and oil separator
- 5 Principal electronic expansion valve (EXV)
- 6 Pressure and temperature measurement to calculate the sub-cooling upstream of the pump
- 7 Motorised two-way bypass valve
- 8 Free-cooling expansion device (EXV)
- 9 Refrigerant pump

The change-over between the cooling and free-cooling modes is automatically controlled (it is possible to block the change-over to free-cooling by reconfiguring the machine - see Controls IOM). The configurable parameters permitting change-over are the outside air temperature and the leaving water temperature set-point. As soon as the temperature difference $LWT_{stp} - OAT$ is above 8 K the current capacity in cooling mode is calculated and compared with the theoretical free-cooling capacity. This comparison authorizes/stops the change-over to free-cooling.

After change-over to free-cooling all compressors are stopped, the two (or four) two-way valves change to the free-cooling position (the compressor functions are bypassed). As soon as the valves open, the free-cooling pump is started. This change-over logic takes around 4 minutes. Taking this timing into consideration two cooling - free-cooling change-overs are authorized per hour.

If the capacity supplied in the free-cooling mode is insufficient (set-point not reached), the unit automatically changes over to cooling mode.

To optimize operation in free-cooling mode we strongly recommend to use the set-point offset function. This favours the change-over to free-cooling and increases the capacity in free-cooling mode.

9 - HEAT RECLAIM CONDENSER OPTION

9.1 - Technical data, 30XA units with heat reclaim condenser option

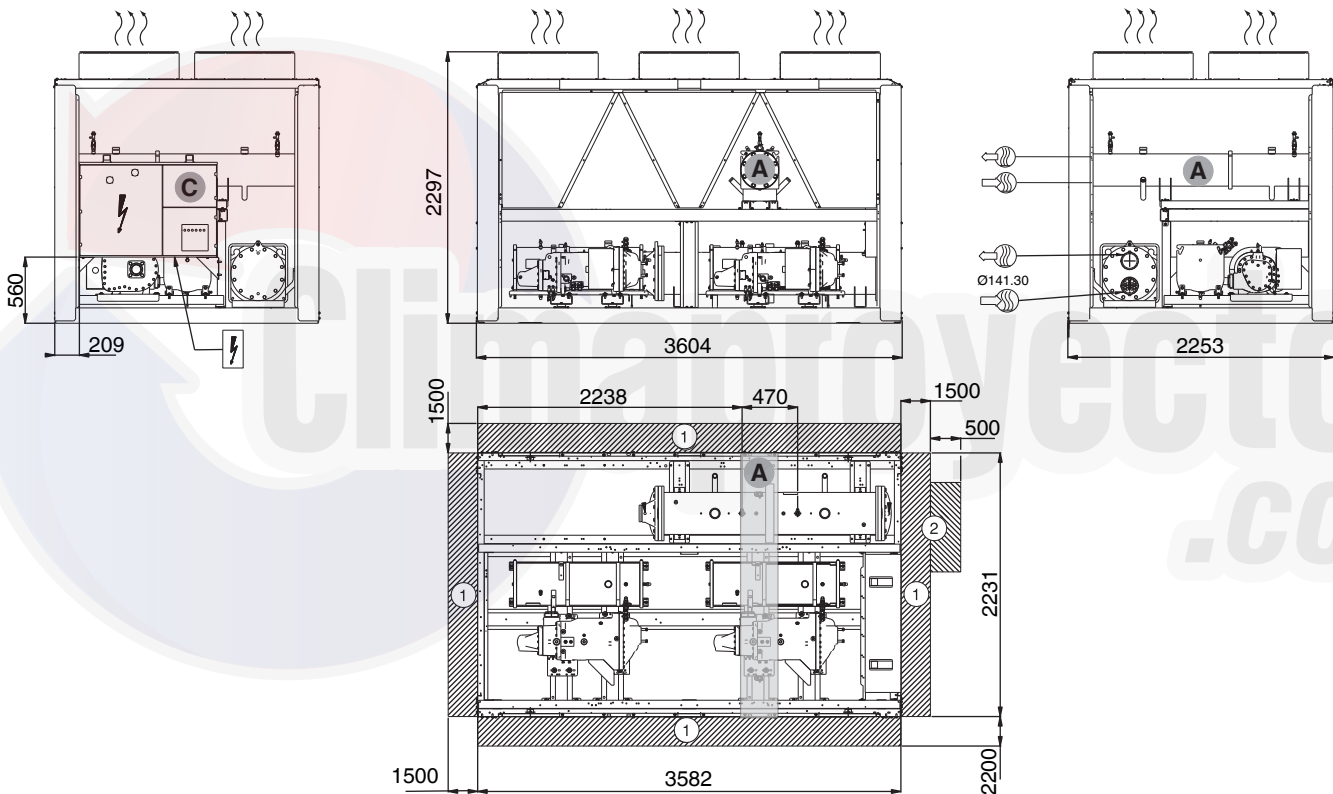
30XA heat reclaim mode		252	302	352	402	452	502	602	702	752	802	852	902	1002	
Cooling capacity*	kW	261	291	311	379	438	493	603	665	707	775	814	875	971	
Heating capacity in heat reclaim mode*	kW	336	373	401	481	554	620	760	832	894	974	1027	1105	1229	
Total power input (unit)*	kW	82	90	99	113	128	140	172	183	206	219	234	253	283	
Total energy efficiency ratio (EER/COP)	kW/kW	3.16/ 4.07	3.22/ 4.13	3.15/ 4.06	3.36/ 4.27	3.40/ 4.31	3.53/ 4.46	3.52/ 4.44	3.63/ 4.55	3.43/ 4.35	3.53/ 4.45	3.48/ 4.40	3.45/ 4.38	3.42/ 4.35	
Operating weight**	kg	4230	4270	4280	5260	5380	5880	7000	7100	7470	7680	8320	8670	9280	
Refrigerant charge															
Circuit A	kg	36	37	37	53	54,5	62	62	62	70	74	77	74	96	
Circuit B	kg	38	38	39	37	39	39	62	66	62	69	68	77	94	
Heat reclaim condenser		Flooded multi-pipe condenser													
Water volume	l	38	38	38	55	68	68	55 + 55	55 + 55	55 + 68	55 + 68	55 + 68	68 + 68	68 + 68	
Water connections		Victaulic													
Diameter	in	3-1/2	3-1/2	3-1/2	4	4	4	4	4	4	4	4	4	4	
Outside diameter	mm	93	93	93	106	106	106	106	106	106	106	106	106	106	

* Entering and leaving water temperature: evaporator 12°C/7°C; heat reclaim condenser: 40°C/45°C

** Weights are for guidance only

9.2 - Dimensions, clearances

9.2.1 - 30XA 252-352 - heat reclaim option



Legend:

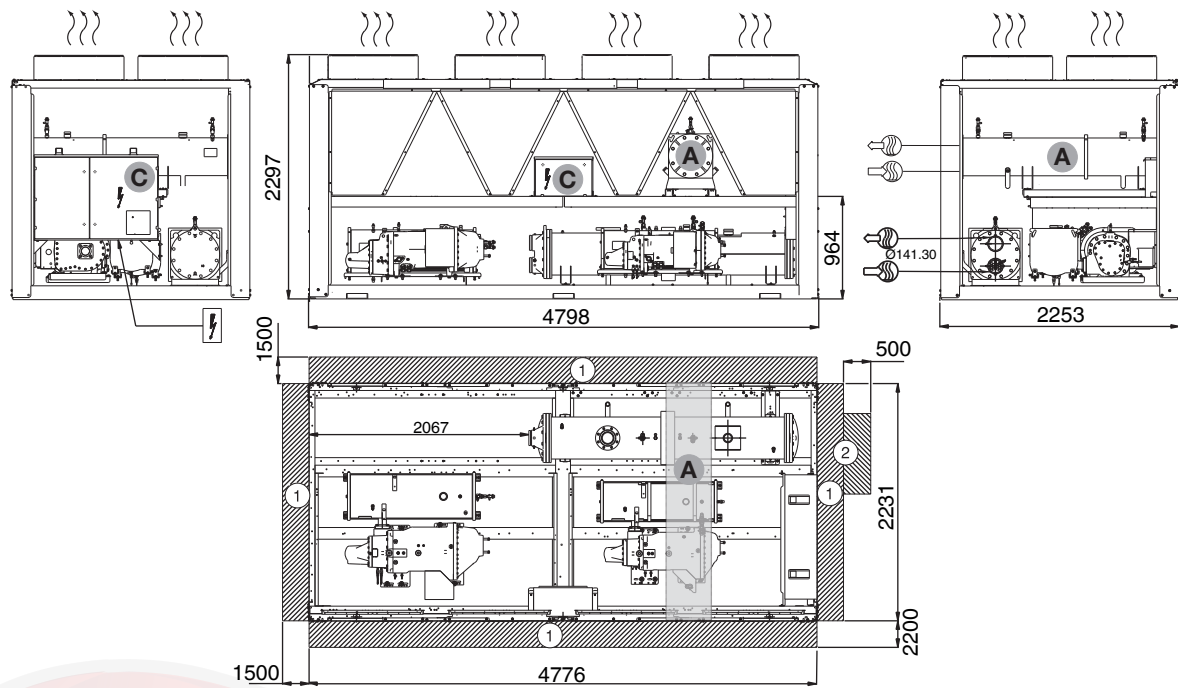
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- ↙ Water inlet
- ↘ Water outlet
- ☼ Air outlet – do not obstruct
- ⚡ Power supply connection
- ⓐ Control circuit connection
- Ⓐ Heat reclaim condenser

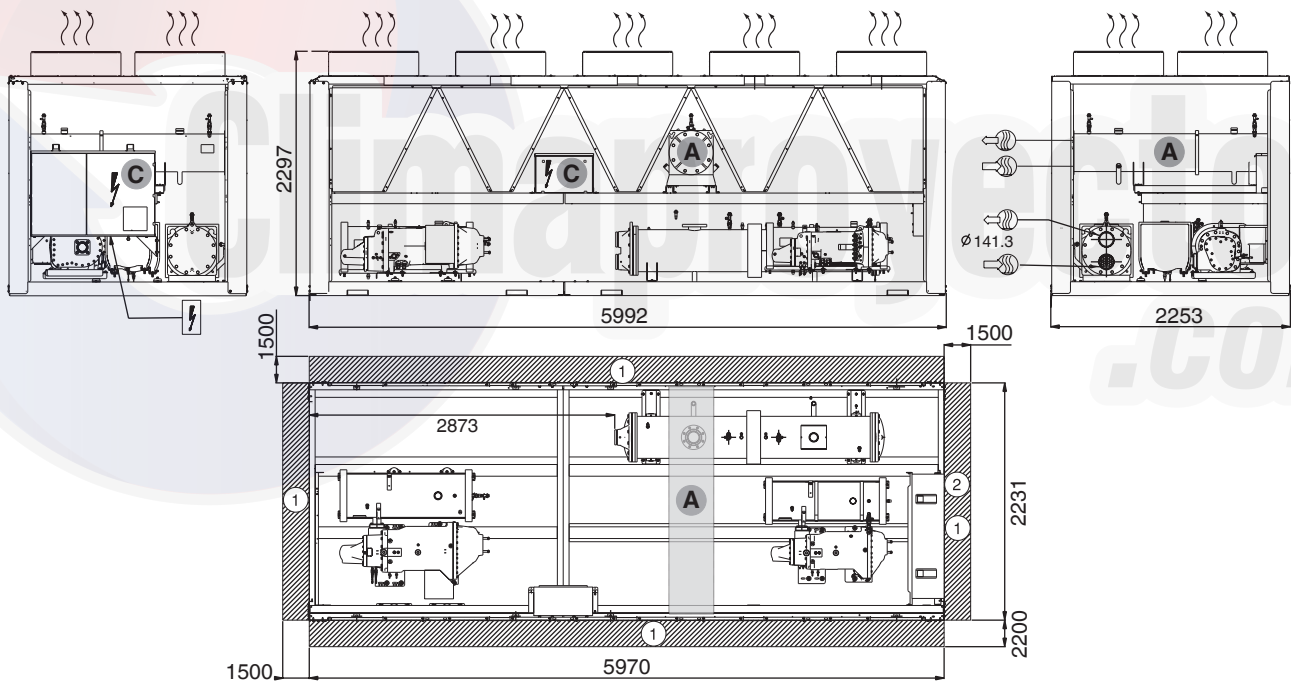
ATTENTION: The Victaulic flange sleeves of the condenser are not installed, but supplied with the unit. The sealing joints are in the control box. The temperature sensors and the condenser flow switch are wired and fixed in the machine. They must be installed as described in the chapter “Condenser water connections”.

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request. For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

9.2.2 - 30XA 402-452 - heat reclaim option



9.2.3 - 30XA 502 - heat reclaim option



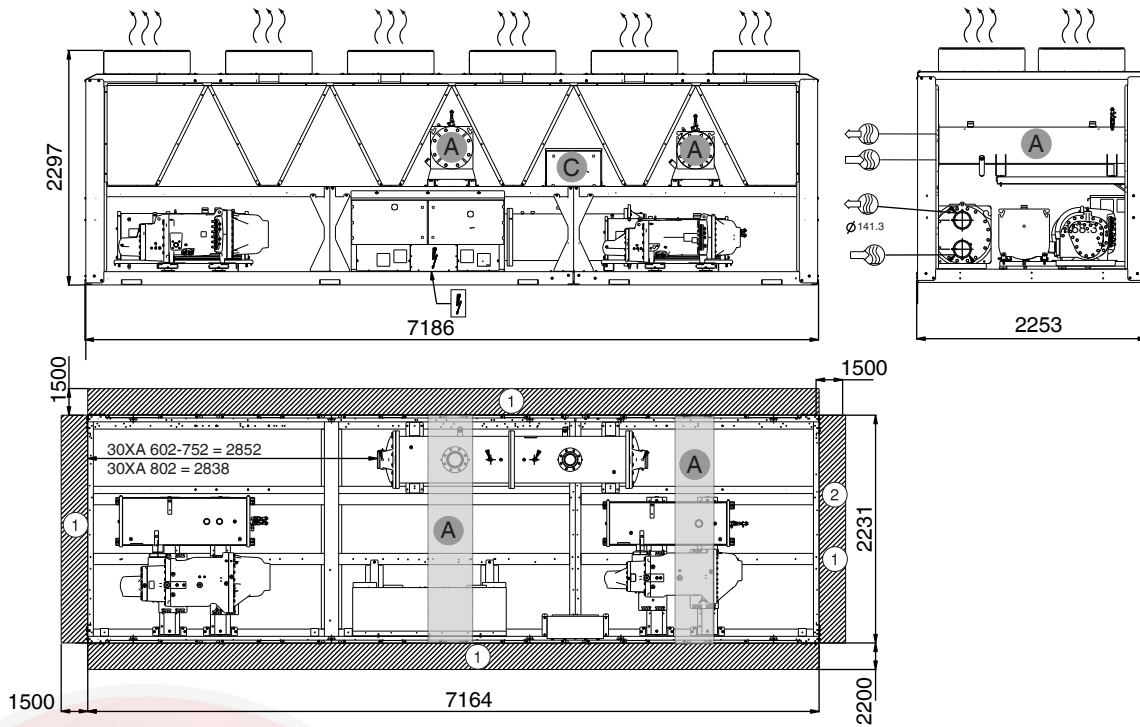
Legend:
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- Water inlet
- Water outlet
- Air outlet – do not obstruct
- Power supply connection
- Control circuit connection
- Heat reclaim condenser

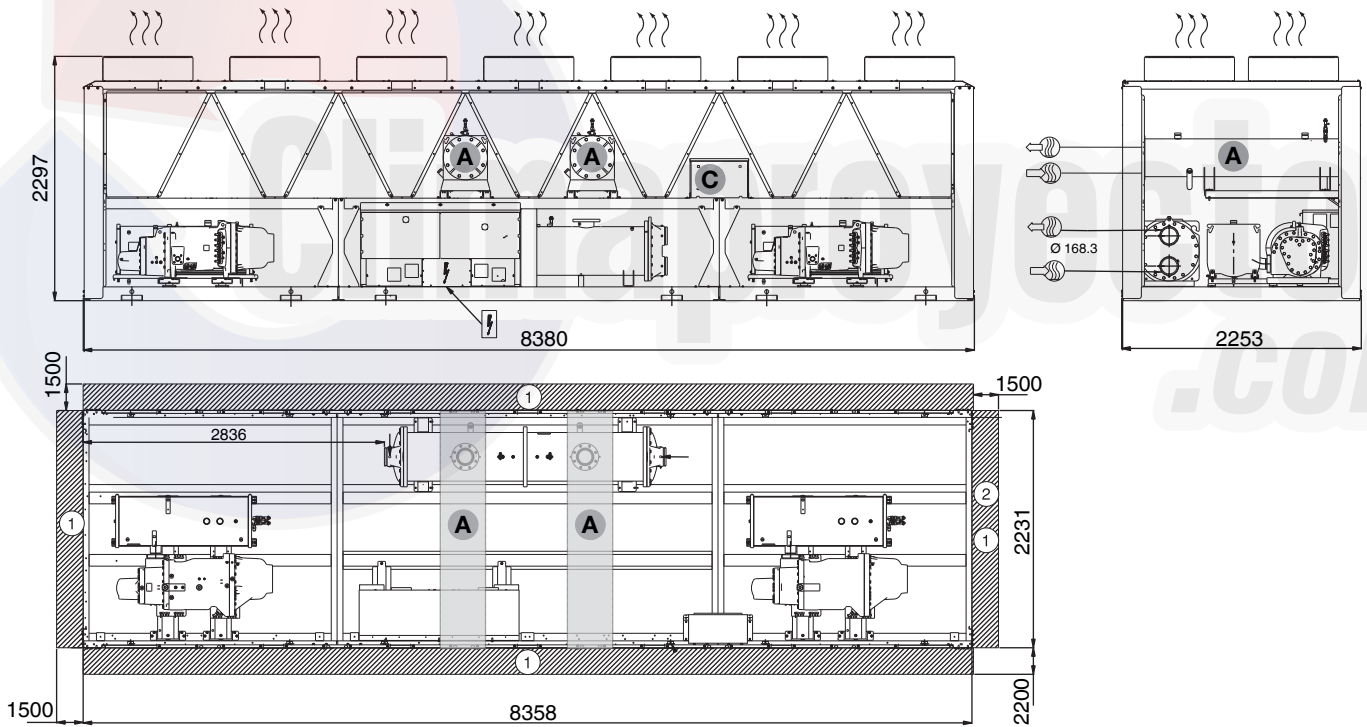
ATTENTION: The Victaulic flange sleeves of the condenser are not installed, but supplied with the unit. The sealing joints are in the control box. The temperature sensors and the condenser flow switch are wired and fixed in the machine. They must be installed as described in the chapter “Condenser water connections”.

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request. For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

9.2.4 - 30XA 602-802 - heat reclaim option



9.2.5 - 30XA 852-902 - heat reclaim option



Legend:

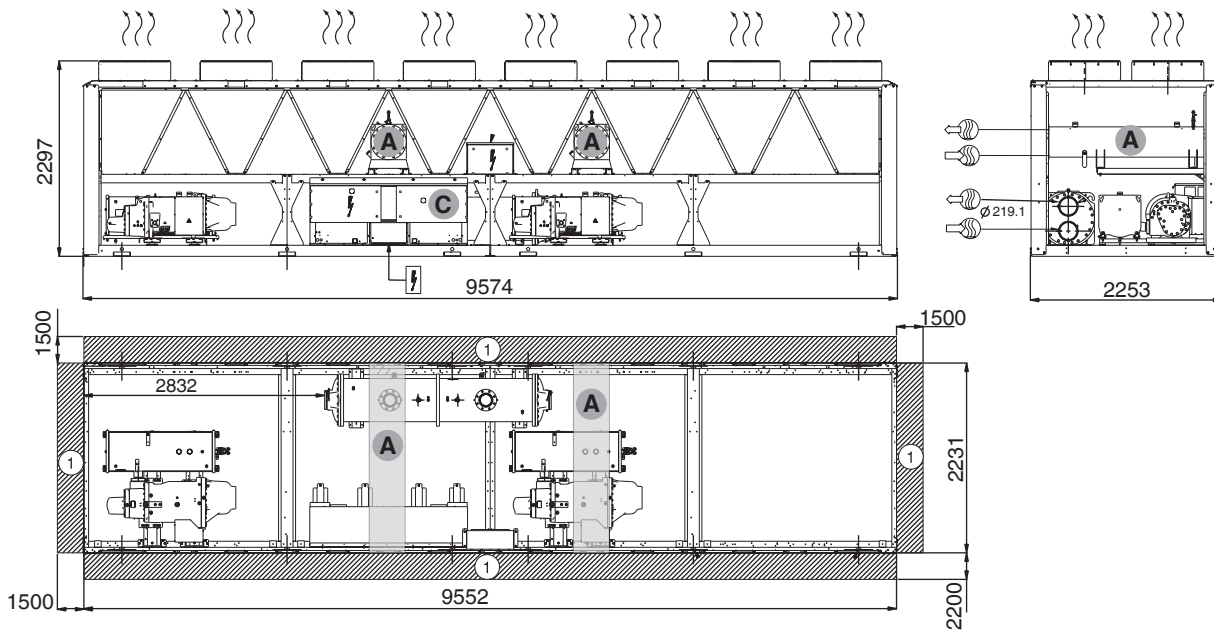
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- Water inlet
- Water outlet
- Air outlet – do not obstruct
- Power supply connection
- Control circuit connection
- Heat reclaim condenser

ATTENTION: The Victaulic flange sleeves of the condenser are not installed, but supplied with the unit. The sealing joints are in the control box. The temperature sensors and the condenser flow switch are wired and fixed in the machine. They must be installed as described in the chapter “Condenser water connections”.

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request. For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

9.2.6 - 30XA 1002 - heat reclaim option



Legend:

All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- Water inlet
- Water outlet
- Air outlet – do not obstruct
- Power supply connection
- Control circuit connection
- Heat reclaim condenser

ATTENTION: The Victaulic flange sleeves of the condenser are not installed, but supplied with the unit. The sealing joints are in the control box. The temperature sensors and the condenser flow switch are wired and fixed in the machine. They must be installed as described in the chapter “Condenser water connections”.

NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request. For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

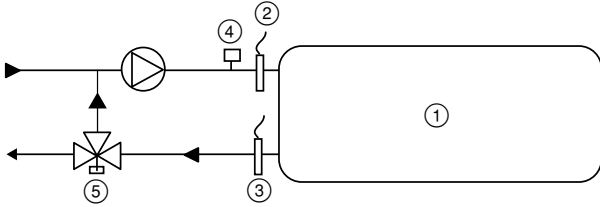
9.3 - Condenser location

All heat reclaim condensers are located between the air-cooled condensers on the upper part of the chassis, supported by two cross rails. The water inlet and outlet are on the same side.

9.4 - Condenser water connections

9.4.1 - Unit with one heat reclaim condenser (30XA 252-502)

The water flow switch must be installed at the water inlet of the installation that arrives at the heat reclaim condenser.



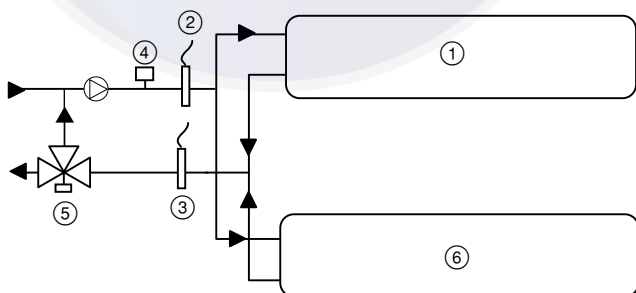
Legend

- 1 Heat reclaim condenser
- 2 Entering water temperature sensor (supplied)
- 3 Leaving water temperature sensor (supplied)
- 4 Condenser water flow switch (supplied)
- 5 Three-way valve (not supplied)

9.4.2 - Unit with two heat reclaim condensers (30XA 602-1002)

The two condensers must be installed in parallel in the water system of the installation. The water flow switch and the entering/leaving water temperature sensors must be installed in the line that is common to both heat reclaim circuits and as close as possible to the condensers. A T-piece must be provided by the installer at the water inlet and outlet of the condensers.

For units with two condensers the maximum cable length of the temperature sensors and the flow switch (7.5 m) is designed to allow connection to the common inlet or outlet in a radius of 4.5 m after routing along the width of the unit.



Legend

Please refer to the legend in chapter 9.4.1 opposite, noting that items 2, 3 and 4 - flow switch and sensors - are placed on the common sections.

9.4.3 - Three-way valves

It is strongly recommended to install a three-way valve in the system (not supplied with the unit). A 0-10 V output is available on the unit electronic board to control this valve. The valve allows bypassing of the heat reclaim condenser entering/leaving circuit to ensure unit operation with heat reclaim at low entering water temperature (< 12.5°C). It also ensures an optimal and controlled leaving water temperature.

9.5 - Operating limits for stable operation (no mode changeover)

9.5.1 - Cooling only mode

Please refer to the earlier chapters in this manual:

6.1 - Unit operating range

6.7 - Evaporator water flow rate

9.5.2 - Heat reclaim mode

Condenser water temperature			
	°C	Minimum	Maximum
Water entering temperature at start-up		12.5*	55
Water entering temperature during operation		20	55
Water leaving temperature during operation		25	60

Evaporator water temperature			
	°C	Minimum	Maximum
Water entering temperature at start-up		-	45
Water entering temperature during operation		6.8	21
Water leaving temperature during operation		3.3	15

* The water entering temperature at start-up must not be lower than 12.5°C. For installations with a lower temperature a three-way valve must be used.

NOTE: If the temperature at the evaporator is below 4°C, a glycol/water solution or the frost protection option must be used.

9.6 - Operating limits for changeover between modes

From cooling only to heat reclaim and vice versa.

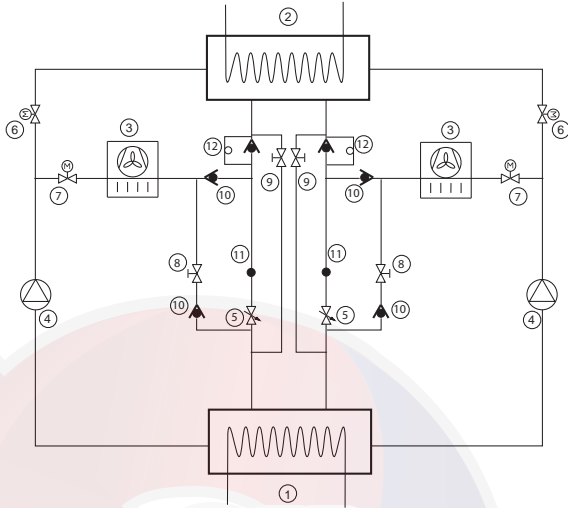
Heat reclaim condenser water temperature			
	°C	Minimum	Maximum
Water entering temperature		12.5	57.5
Ambient operating temperature		-10*	45

* -20°C with winter operation option (option 28)

9.7 - Flow control

The water flow switch supplied needs to be installed at the heat reclaim condenser water inlet and protects the condenser loop against low water flow conditions. When the heat reclaim mode is required, a signal from the additional board output activates the system pump. Once the pump is started, flow detection takes place for one minute. If no flow is detected by the end of this time:

1. changeover to the heat reclaim mode is not permitted
2. mode is changed to cooling only mode when the water flow rate is low, accompanied by a water flow detection alarm.



Legend

- 1 Evaporator
- 2 Heat reclaim condenser
- 3 Air condenser (coils)
- 4 Compressor
- 5 Expansion device (EXV)
- 6 Motorised valve - heat reclaim mode
- 7 Motorised valve - cooling only mode
- 8 Solenoid valve - charge recovery in heat reclaim mode
- 9 Solenoid valve - charge recovery in cooling only mode
- 10 Check valve
- 11 Pressure and temperature measurement to calculate the liquid sub-cooling to optimise the charge recovery
- 12 Check valve with capillary

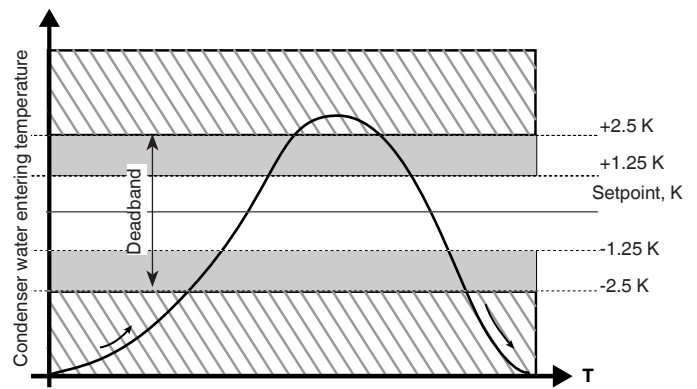
9.8 - Heat reclaim operation

The heat reclaim condenser option is only available on units with two circuits. It has been designed with one or two single or two-circuit shell-and-tube heat exchangers, depending on the unit size.

The two circuits are independently controlled. One circuit can be in cooling only and the other in heat reclaim mode.

Changeover from one mode to the other (changeover from heat exchange at the air condenser to heat exchange at the water condenser and vice versa) is ensured by motorised two-way valves located upstream of the air and water condensers.

Depending on the mode selected (heat reclaim or cooling), the logic compares the water entering temperature required with the setpoint of the condenser entering water temperature, chosen by the user. Depending on this difference the unit circuits are either activated or deactivated in heat reclaim mode (one or two together), as shown in the following diagram and table.



The deadband of 5 K is controlled by default.

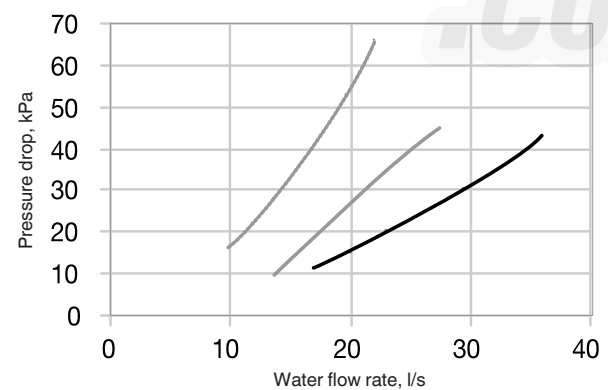
Case	Selection of the heat reclaim mode	Number of circuits in heat reclaim mode	Action
-	NO	0	+ 2 circuits in cooling mode
A	YES	Whatever the number	+ 2 circuits in heat reclaim mode
B	YES	0	+ 1 circuit in heat reclaim mode
		1	No change
		2	No change
C	YES	Whatever the number	No change
D	YES	1	No change
		2	- 1 circuit in heat reclaim mode
E	YES	Whatever the number	- 2 circuits in heat reclaim mode

For more details on the heat reclaim operation logic please refer to the 30XA control manual in chapter "Heat reclaim module option".

9.9 - Condenser pump selection

Heat reclaim condenser water flow rate/pressure drop

Heat reclaim condenser pressure drop in water flow rate function



- Condenser 10" (water volume = 38 litres)
- Condenser 12" (water volume = 55 litres)
- Condenser 14" (water volume = 68 litres)

For units with a water condenser please refer to chapter 9.1.

9.10 - Frost protection

The heat reclaim condenser is equipped with electric heaters to protect the condenser against frost. These are activated if the condenser entering and leaving water temperatures are below 3°C and deactivated, if they are higher than 4.4°C.

10 - MAJOR SYSTEM COMPONENTS AND OPERATION DATA

10.1 - Direct-drive twin-screw compressor with variable capacity slide valve

- 30XA units use 06T geared twin-screw compressors equipped with a variable capacity slide valve for continuous control between 30% and 100% of full load.
- Nominal capacities range from 120 to 530 kW. The seven models used in the 30XA range are economised.

10.1.1 - Oil filter

The 06T screw compressor has an independent oil filter attached to the oil separator. This filter is field replaceable.

10.1.2 - Refrigerant

The 30XA a water chiller operating only with refrigerant R134a.

10.1.3 - Lubricant

The 06T screw compressor is approved for use with the following lubricant: CARRIER MATERIAL SPEC PP 47-32.

10.1.4 - Oil supply solenoid valve

An oil supply solenoid valve is installed on the oil return line as standard to isolate the compressor from oil flow when the compressor is not operating. The oil solenoid valve is field replaceable.

10.1.5 - Suction and economizer screens

To increase the reliability of the compressor, a screen has been incorporated as a standard feature into suction and economizer inlets of the compressor.

10.1.6 - Capacity control system

The 06T screw compressor has an unloading system that is standard on all compressors. This unloading system consists of slide valve that permits changing the length of the screw used for the refrigerant compression. This valve is controlled by the action of a piston controlled by two solenoid valves on the oil return line.

10.2 - Pressure vessels

General

Monitoring during operation, re-qualification, re-testing and re-testing dispensation:

- Follow the regulations on monitoring pressurised equipment.
- It is normally required that the user or operator sets up and maintains a monitoring and maintenance file.
- Follow the control programmes of EN 378-2, annexes A, B, C and D.
- If they exist follow local professional recommendations.
- Regularly inspect the condition of the coating (paint) to detect blistering resulting from corrosion. To do this, check a non-insulated section of the container or the rust formation at the insulation joints.

- Regularly check for possible presence of impurities (e.g. silicon grains) in the heat exchange fluids. These impurities maybe the cause of the wear or corrosion by puncture.
- Filter the heat exchange fluid check and carry out internal inspections as described in EN 378-2, annex C.
- In case of re-testing please refer to the maximum operating pressure given on the unit nameplate.
- The reports of periodical checks by the user or operator must be included in the supervision and maintenance file.

Repair

Any repair or modification, including the replacement of moving parts:

- must follow local regulations and be made by qualified operators and in accordance with qualified procedures, including changing the heat exchanger tubes.
- must be made in accordance with the instructions of the original manufacturer. Repair and modification that necessitate permanent assembly (soldering, welding, expanding etc.) must be made using the correct procedures and by qualified operators.
- An indication of any modification or repair must be shown in the monitoring and maintenance file.

Recycling

The unit is wholly or partly recyclable. After use it contains refrigerant vapours and oil residue. It is coated by paint.

Operating life

This unit is designed for:

- prolonged storage of 15 years under nitrogen charge with a temperature difference of 20 K per day.
- 452000 cycles (start-ups) with a maximum difference of 6 K between two neighbouring points in the vessel, based on 6 start-ups per hour over 15 years at a usage rate of 57%.

Corrosion allowances:

Gas side: 0 mm

Heat exchange fluid side: 1 mm for tubular plates in lightly alloyed steels, 0 mm for stainless steel plates or plates with copper-nickel or stainless steel protection.

10.2.1 - Evaporator

30XA chillers use a flooded multi-tube evaporator. The water circulates in the tubes and the refrigerant is on the outside in the shell. One vessel is used to serve both refrigerant circuits. There is a centre tube sheet which separates the two refrigerant circuits. The tubes are 3/4" diameter copper with an enhanced surface inside and out. There is just one water circuit, and depending on the size of the chiller, there may be one, two or three water passes.

The units have three refrigerant circuits with two evaporators connected in series on the heat transfer fluid.

The evaporator shell has a thermal insulation of 19 mm thick polyurethane foam, an aluminium sheet and a water drain and purge.

It has been tested and stamped in accordance with applicable pressure codes for a maximum operating pressure of 2100 kPa refrigerant-side and 1000 kPa water-side.

The water connection of the heat exchanger is a Victaulic connection. As an option the evaporator is available with frost protection (evaporator frost protection option).

The products that may be added for thermal insulation of the containers during the water piping connection procedure must be chemically neutral in relation to the materials and coatings to which they are applied. This is also the case for the products originally supplied by Carrier.

10.2.2 - Oil separator

In these units, the oil separator is a pressure vessel that is mounted under the outside vertical condenser coils. Discharge gas at the compressor outlet is directed towards the bottom of the oil separator ring and most of the oil separates from the gas by strong deceleration and by gravity. The gas then flows through a wire mesh screen where the remaining oil is separated by coalescence and flows to the bottom of the ring. The gas is now free from oil and leaves the ring at the top towards the condenser.

The oil separator is equipped with a trace heater regulated by the control. This heater is equipped with an internal thermostat that disconnects the power supply when the temperature reaches 85°C and automatically resets when the temperature again falls to a normal value.

The products that may be added for thermal insulation of the vessels during the water piping connection procedure must be chemically neutral in relation to the materials and coatings to which they are applied. This is also the case for the products originally supplied by Carrier.

10.2.3 - Economiser function

The economiser function includes a liquid line valve, a filter drier, two EXVs, a plate heat exchanger as well as protection devices (fuse or valve).

At the condenser outlet a part of the liquid is expanded via the secondary EXV in one of the heat exchanger circuits and then returns as gas at the compressor economiser. This expansion permits increase of the liquid sub-cooling of the rest of the flow that penetrates the evaporator via the principal EXV. This permits increasing the cooling capacity of the system as well as its efficiency.

10.3 - High-pressure safety switch

30XA units are equipped with high-pressure safety switches, calibrated to 2200 kPa.

These pressure switches are located at the discharge of each compressor.

10.4 - Condensers

The 30XA coils are micro-channel condensers made entirely of aluminium. Optional coils with internally grooved copper tubes with aluminium fins are also available (options 254 and 255).

10.5 - Fans

The fans are axial Flying Bird fans equipped with rotating shroud and made of composite recyclable material. Each motor is fixed with transverse supports. The motors are three-phase, with permanently lubricated bearings and insulation class F.

10.6 - Electronic expansion valve (EXV)

The EXV is equipped with a stepper motor (2785 to 3690 steps, depending on the model) that is controlled via the EXV board.

The EXV is also equipped with a sightglass that permits verification of the mechanism movement and the presence of the liquid gasket.

10.7 - Moisture indicator

Located on the EXV, permits control of the unit charge and indicates moisture in the circuit. The presence of bubbles in the sight-glass indicates an insufficient charge or non-condensables in the system. The presence of moisture changes the colour of the indicator paper in the sight-glass.

10.8 - Filter drier

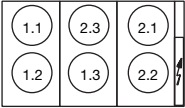
The role of the filter drier is to keep the circuit clean and moisture-free. The moisture indicator shows, when it is necessary to change the element. A difference in temperature between the filter inlet and outlet shows that the element is dirty.

10.9 - Sensors

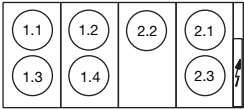
The units use thermistors to measure the temperature, and pressure transducers to control and regulate system operation (see 30XA - Pro-Dialog Control IOM for a more detailed explanation).

30XA fan arrangement

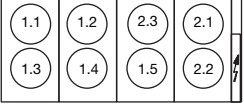
30XA 252-352



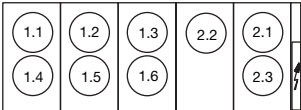
30XA 352 (options 254/255)



30XA 402-452



30XA 502



30XA 602



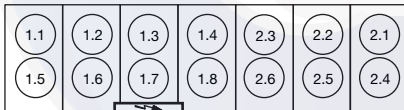
30XA 702



30XA 752 - 802



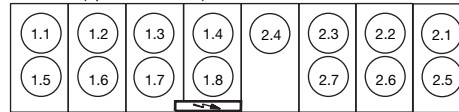
30XA 752-802 (options 254/255)



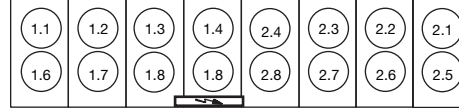
30XA 902



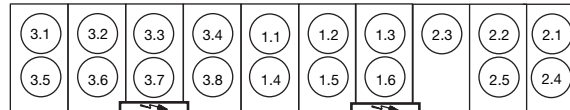
30XA 902 (options 254/255)



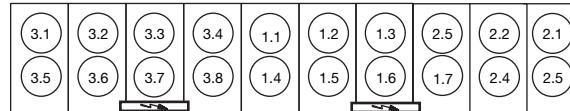
30XA 1002



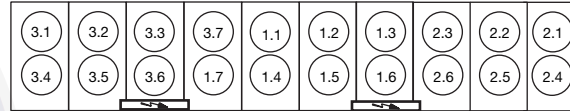
30XA 1102



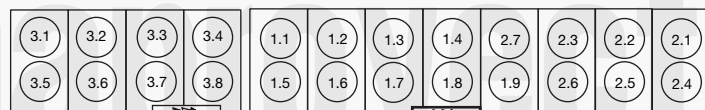
30XA 1202-1302



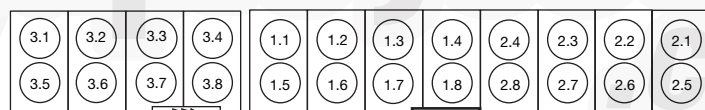
30XA 1352



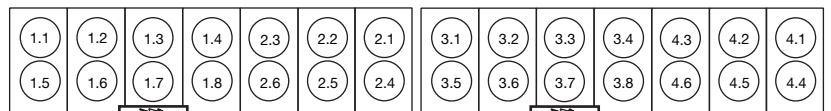
30XA 1402



30XA 1502



30XA 1702



$\textcircled{x.y}$ x,y x = Circuit number
y = Start-up order

NOTE: The values above do not correspond to the fan designation. The fan designation and position are given on the unit drawings and wiring diagrams supplied with the unit.

11 - OPTIONS AND ACCESSORIES

Options	No.	Description	Advantages	Use
Corrosion protection, traditional coils	2B	Factory application of Blygold Polual treatment on the copper/aluminium coils	Improved corrosion resistance, recommended for industrial, rural and marine environments	30XA 252-1702
Corrosion protection, traditional coils	3A	Fins made of pre-treated aluminium (polyurethane and epoxy)	Improved corrosion resistance, recommended for moderate marine and urban environments	30XA 252-1702
Low temperature glycol solution	5	Low temperature chilled water production down to -6°C with ethylene glycol and -3°C with propylene glycol	Covers specific applications such as ice storage and industrial processes	30XA 252-1702
Very low temperature glycol solution	6	Low temperature chilled water production down to -12°C with ethylene glycol (limited to -10°C for certain sizes) and -8°C with propylene glycol (limited to -6°C for certain sizes)	Covers specific applications such as ice storage and industrial processes	30XA 252-1702
IP 54 control box	20A	Increased leak tightness of control boxes	Increased control box protection	30XA 252-1702
Tropical applications	22	Unit control box suitable for tropical applications	Reduced relative humidity in the control box for operation in tropical environments (hot and humid)	30XA 252-1702
Grilles	23	Metallic grilles on the unit front, rear and sides	Enhanced aesthetics, protection against intrusion to the unit interior	30XA 252-1702
Winter operation	28	Fan speed control via frequency converter	Stable unit operation when the air temperature is between -10°C and -20°C	30XA 252-1702
Evaporator frost protection	41A	Resistance heater on the evaporator	Evaporator frost protection down to -20°C outside temperature	30XA 252-1702
Evaporator and hydronic module frost protection	41B	Resistance heater on the evaporator and the hydronic module	Evaporator and hydronic module frost protection down to -20°C outside temperature	30XA 252-1502
Heat reclaim	50	Complete recovery of the heat rejected by the condenser	Free hot-water production as well as cold-water production	30XA 252-1002
Single power connection point	81	Power connection of the machine via one main supply connection	Quick and easy installation	30XA 252-1502
Suction valve	92	Shut-off valves on the compressor suction piping, the economiser line and the compressor discharge piping	Simplified maintenance	30XA 252-1702
Three-pass evaporator	100A	Evaporator with three passes water-side	Increased water inlet and outlet pressure losses on opposite sides	30XA 252-602
One-pass evaporator	100C	Evaporator with one pass water-side	Reduced water inlet and outlet pressure losses on opposite sides	30XA 252-1002
21 bar evaporator	104	Reinforced evaporator for extension of the maximum water-side pressure range to 21 bar	Covers applications with a high water column (high buildings)	30XA 252-1702
Reversed water connections	107	Evaporator with reversed water inlet/outlet	Simplification of the water piping	30XA 252-1702
High-pressure single-pump hydronic module	116B	See hydronic module chapter	Easy and fast installation	30XA 252-502
High-pressure dual-pump hydronic module	116C	See hydronic module chapter	Easy and fast installation, operating safety	30XA 252-502
Low-pressure single-pump hydronic module	116F	See hydronic module chapter	Easy and fast installation	30XA 252-502
Low-pressure dual-pump hydronic module	116G	See hydronic module chapter	Easy and fast installation, operating safety	30XA 252-502
Direct-expansion free-cooling system	118A	Chilled water production without the use of the compressors, using direct-expansion heat exchange on the condensers	Very economical chilled water production at low outdoor temperatures	30XA 252-1002
High energy efficiency	119	Improved condenser performance	Energy cost reduction, full load operation at higher air temperatures	30XA 252-1702
JBus gateway	148B	Two-directional communications board, complies with JBus protocol	Easy connection by communication bus to a building management system	30XA 252-1702
BacNet gateway	148C	Two-directional communications board, complies with BacNet protocol	Easy connection by communication bus to a building management system	30XA 252-1702
LON gateway	148D	Two-directional communications board, complies with LON protocol	Easy connection by communication bus to a building management system	30XA 252-1702
Energy Management Module EMM	156	See chapter "Energy Management Module"	Easy connection by wired connection to a building management system	30XA 252-1702
Unit without enclosure	253	Compressors not equipped with acoustic enclosure	More economical	30XA 252-1702
Traditional coils (Cu/Al)	254	Coils made of copper tubes with aluminium fins	Possibility to add specialised condenser treatment	30XA 252-1702
Traditional coils (Cu/Al) without slots	255	Coils made of copper tubes with aluminium fins without slots	Recommended for the Middle East, sand storms. Possibility to add specialised condenser treatment.	30XA 252-1702
Suction piping insulation	256	Thermal insulation of the suction piping with flexible, anti-UV insulant	Prevents condensation on the suction piping	30XA 252-1702
Low sound level	257	Acoustical insulation of certain unit refrigerant circuit components (suction, evaporator and economiser piping)	Unit sound power level reduction of -3 dB(A)	30XA 252-1702
Accessories		Description	Advantages	Use
CCN JBus gateway		See option 148B	See option 148B	See option 148B
CCN BacNet gateway		See option 148C	See option 148C	See option 148C
CCN LON Talk gateway		See option 148D	See option 148D	See option 148D
Connection sleeve		Piping to be welded with Victaulic connection	Ease-of-installation	30XA 252-1702
Energy Management Module EMM		See controls manual	Easy connection by wired connection to a building management system	30XA 252-1702
Lead-lag kit		Supplementary water outlet temperature sensor kit, field-installed, allows master/slave operation of two chillers connected in parallel.	Optimised operation of two chillers connected in parallel with operating time balancing.	30XA 252-1502
Anti-vibration mountings		Elastomeric anti-vibration mountings for each unit weight distribution point	Absorption of vibrations, linked to the unit operation (essentially compressor)	30XA 252-1702

12 - STANDARD MAINTENANCE

Air conditioning equipment must be maintained by professional technicians, whilst routine checks can be carried out locally by specialised technicians.

Simple preventive maintenance will allow you to get the best performance from your HVAC unit:

- improved cooling performance
- reduced power consumption
- prevention of accidental component failure
- prevention of major time-consuming and costly interventions
- protection of the environment

There are five maintenance levels for HVAC units, as defined by the AFNOR X60-010 standard.

12.1 - Level 1 maintenance (see note)

Simple procedure can be carried out by the user:

- Visual inspection for oil traces (sign of a refrigerant leak)
- Air heat exchanger (condenser) cleaning - see chapter "Condenser coil - level 1"
- Check for removed protection devices, and badly closed doors/covers
- Check the unit alarm report when the unit does not work (see report in the 30XA Pro-Dialog Plus control manual).

General visual inspection for any signs of deterioration.

12.2 - Level 2 maintenance (see note)

This level requires specific know-how in the electrical, hydronic and mechanical fields. It is possible that these skills are available locally: existence of a maintenance service, industrial site, specialised subcontractor.

In these cases, the following maintenance operations are recommended.

Carry out all level 1 operations, then:

- At least once a year tighten the power circuit electrical connections (see tightening torques table).
- Check and re-tighten all control/command connections, if required (see tightening torques table).
- Check the differential switches for correct operation every 6 months (free-cooling option 118A).
- Remove the dust and clean the interior of the control boxes, if required.
- Check the presence and the condition of the electrical protection devices.
- Check the correct operation of all heaters.
- Replace the fuses every 3 years or every 15000 hours (age-hardening).
- Replace the control box cooling fans used with option 22 (with designation EF22_) every five years.
- Check the height of the anti-vibration mountings (located between the compressor rails and the unit chassis) after 5 years of operation, and then each year. When the total minimum height of the mountings is less than 28 mm replace the mountings.

- Check the water connections
- Purge the water circuit (see chapter "Water flow control procedure")
- Clean the water filter (see chapter "Water flow control procedure")
- Fully clean the condensers with a low-pressure jet and a bio-degradable cleaner (counter-current cleaning - see chapter "Condenser coil - level 2")
- Replace the stuffing box packing of the pump after 10000 hours of operation
- Check the unit operating parameters and compare them with previous values
- Keep and maintain a maintenance sheet, attached to each HVAC unit

All these operations require strict observation of adequate safety measures: individual protection garments, compliance with all industry regulations, compliance with applicable local regulations and using common sense.

12.3 - Level 3 (or higher) maintenance (see note)

The maintenance at this level requires specific skills/ approval/tools and know-how and only the manufacturer, his representative or authorised agent are permitted to carry out these operations. These maintenance operations concern for example:

- A major component replacement (compressor, evaporator)
- Any intervention on the refrigerant circuit (handling refrigerant)
- Changing of parameters set at the factory (application change)
- Removal or dismantling of the HVAC unit
- Any intervention due to a missed established maintenance operation
- Any intervention covered by the warranty

NOTE: Any deviation or non-observation of these maintenance criteria will render the guarantee conditions for the HVAC unit null and void, and the manufacturer, France, will no longer be held responsible.

12.4 - Tightening torques for the main electrical connections

Component	Designation in the unit	Value (Nm)
Screw on bus bar, customer connection		
M8		18
M10	L1/L2/L3	30
Soldered screw PE, customer connection (M12)	PE	70
Tunnel terminal screw, compressor contactor		
Contacteur 3RT103*		
Contacteur 3RT104*		5
Contacteur 3RT105*		11
Contacteur 3RT106*	KM*	21
Tunnel terminal screw, current transformer		
Size 2 (3RB2956*)		11
Size 3 (3RB2966*)	TI*	21
Compressor earth terminal in the power wiring control box, terminal M8	Gnd	30
Compressor phase connection terminals M12	1/2/3/4/5/6 on EC	25
Compressor earth connection	Gnd on EC*	25
Tunnel terminal screw, disconnects 3RV1011*	QF*/QM*	1
Tunnel terminal screw, hydronic pump contactor		
Contacteur 3RT101*	KM90*	1
Contacteur 3RT102*		2.2
Screw on bus bar for power connection between the control boxes for option 81	L1/L2/L3	30

12.5 - Tightening torques for the main bolts and screws

Screw type	Used for	Value (Nm)
Metal screw D=4.8	Condensing module, housing supports	4.2
Screw H M8	Condensing module, compressor fixing	18
Taptite screw M10	Condensing module, chassis - structure fixing, control box fixings, compressor fixings, oil separator fixing	30
Taptite screw M6	Piping support, cowling	7
Screw H M8	Piping clip	12
Screw H M6	Piping clip	10
Nut H M10	Compressor chassis	30
Nut H M10	Hydronic pump chassis	30
Screw H M8	Filter drier cover	40
Screw H M12	Economiser port flange	40
Screw H M16	Oil separator flanges, suction flanges	110
Screw H M16	Heat exchanger water boxes	190
Screw H M20	Suction flanges	190
Nut 5/8 ORFS	Oil line	65
Nut 3/8 ORFS	Oil line	26

12.6 - Condenser coil

We recommend, that finned coils are inspected regularly to check the degree of fouling. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that shed their leaves.

For coil cleaning, two maintenance levels are used, based on the AFNOR X60-010 standard:

Level 1

- If the condensers are fouled, clean them gently in a vertical direction, using a brush.
- Only work on condensers with the fans switched off.
- For this type of operation switch off the HVAC unit if service considerations allow this.
- Clean condensers guarantee optimal operation of your HVAC unit. This cleaning is necessary when the condensers begin to become fouled. The frequency of cleaning depends on the season and location of the HVAC unit (ventilated, wooded, dusty area, etc.).
- With MCHX condensers it is preferable to clean them with a vacuum cleaner or a high-pressure cleaner (maximum 68 bar and with 300 mm distance between the diffuser and the coil).

Level 2

The two cleaning products can be used for any of the following coil finishes: Cu/Cu, Cu/Al, Cu/Al with Polual, Blygold and/or Heresite protection.

Clean the coil, using appropriate products.

We recommend TOTALINE products for coil cleaning:

Part No. P902 DT 05EE: traditional cleaning method

Part No. P902 CL 05EE: cleaning and degreasing.

These products have a neutral pH value, do not contain phosphates, are not harmful to the human body, and can be disposed of through the public drainage system.

Depending on the degree of fouling both products can be used diluted or undiluted.

For normal maintenance routines we recommend using 1 kg of the concentrated product, diluted to 10%, to treat a coil surface of 2 m². This process can either be carried out using a high-pressure spray gun in the low-pressure position. With pressurised cleaning methods care should be taken not to damage the coil fins. The spraying of the coil must be done:

- in the direction of the fins
- in the opposite direction of the air flow direction
- with a large diffuser (25-30°)
- at a minimum distance of 300 mm from the coil.

It is not necessary to rinse the coil, as the products used are pH neutral. To ensure that the coil is perfectly clean, we recommend rinsing with a low water flow rate. The pH value of the water used should be between 7 and 8.

WARNING: Never use pressurised water without a large diffuser. Do not use high-pressure cleaners for Cu/Cu and Cu/Al coils! High pressure cleaners are only permitted for MCHX coils (maximum permitted pressure 68 bar)

Concentrated and/or rotating water jets are strictly forbidden.

Never use a fluid with a temperature above 45°C to clean the air heat exchangers.

Correct and frequent cleaning (approximately every three months) will prevent 2/3 of the corrosion problems.

Protect the control box during cleaning operations.

12.7 - Evaporator maintenance

Check that:

- the insulating foam is intact and securely in place.
- the cooler heaters are operating, secure and correctly positioned.
- the water-side connections are clean and show no sign of leakage.

12.8 - Compressor maintenance

12.8.1 - Oil separator

Check the correct operation of the heaters and check that they are well attached to the oil separator ring.

12.8.2 - Integral oil filter change

As system cleanliness is critical to reliable system operation, there is a filter in the oil line at the oil separator outlet. The oil filter is specified to provide a high level of filtration (5 µm) required for long bearing life.

The filter should be checked after the first 500 hours of operation, and every subsequent 2000 hours. The filter should be replaced at any time when the pressure differential across the filter exceeds 2 bar.

The pressure drop across the filter can be determined by measuring the pressure at the filter service port and the oil pressure port. The difference in these two pressures will be the pressure drop across the filter, check valve, and solenoid valve. The pressure drop across the check valve and solenoid valve is approximately 0.4 bar, which should be subtracted from the two oil pressure measurements to give the oil filter pressure drop.

12.8.3 - Compressor rotation control

Correct compressor rotation is one of the most critical application considerations. Reverse rotation, even for a very short duration, damages the compressor.

The reverse rotation protection scheme must be capable of determining the direction of rotation and stopping the compressor within 300 milliseconds. Reverse rotation is most likely to occur whenever the wiring to the compressor terminals is disturbed.

To minimize the opportunity for reverse rotation, the following procedure must be applied. Rewire the power cables to the compressor terminal pin as originally wired.

For replacement of the compressor, a low pressure switch is included with the compressor. This low pressure switch should be temporarily installed as a hard safety on the high pressure part of the compressor. The purpose of this switch is to protect the compressor against any wiring errors at the compressor terminal pin. The electrical contact of the switch would be wired in series with the high pressure switch. The switch will remain in place until the compressor has been started and direction of rotation has been verified; at this point, the switch will be removed.

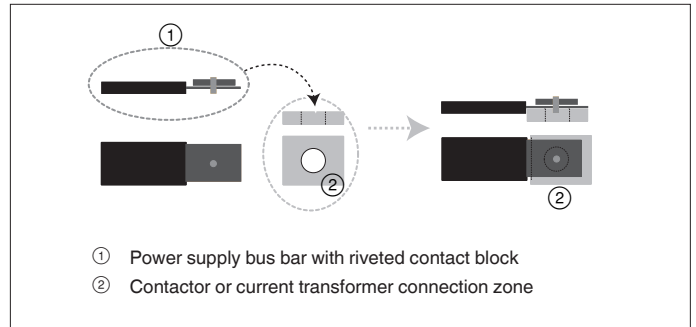
The switch that has been selected for detecting reverse rotation is Carrier part number HK01CB001. This switch opens the contacts when the pressure falls below 7 kPa. The switch is a manual reset type that can be reset after the pressure has once again risen above 70 kPa. It is critical that the switch be a manual reset type to preclude the compressor from short cycling in the reverse direction.

12.9 - Precaution for compressor power supply bus bar connection

This note applies to units using power supply bus bars with riveted contact block at the level of the connection cages in the control box. During re-connection it is imperative to:

- engage each bus bar in the cage up to the stop
- ensure visually that the bus bars have good contact at the connection areas: there must not be any free movement between the bus bar and the connection area created by the fixing rivet of the contact block.

Connection of the contactor or current transformer



13 - START-UP CHECKLIST FOR 30XA LIQUID CHILLERS (USE FOR JOB FILE)

Preliminary information

Job name:
Location:
Installing contractor:.....
Distributor:

Unit

Model:

Compressors

Circuit A

Model number.....
Serial number.....
Motor number.....

Circuit B

Model number.....
Serial number.....
Motor number.....

Circuit C

Model number.....
Serial number.....
Motor number.....

Circuit D

Model number.....
Serial number.....
Motor number.....

Evaporator

Model number.....
Serial number.....

Condenser

Model number.....

Additional optional units and accessories

Preliminary equipment check

Is there any shipping damage?..... If so, where?

Will this damage prevent unit start-up?

- Unit is level in its installation
- Power supply agrees with the unit nameplate
- Electrical circuit wiring has been sized and installed properly
- Unit ground wire has been connected
- Electrical circuit protection has been sized and installed properly
- All terminals are tight
- All chilled water valves are open
- All chilled water piping is connected properly
- All air has been vented from the chilled water circuit
- Chilled water pump (CWP) is operating with the correct rotation. Check the phase sequence of the electrical connection.
If the unit is equipped with a hydronic module, use the pump test function (refer to the 30XA Pro-Dialog control manual).
After the pump test has been completed, switch the unit off again
- Circulate chilled water in the water circuit for at least two hours, then remove, clean and replace the screen filter. After the pump test has been completed, switch the unit off again.
- Inlet piping to cooler includes a 20 mesh strainer with a mesh size of 1.2 mm.
- The compressor flange has been removed.

Unit start-up

- a. Oil heaters have been energized for at least 24 hours (30XA)
- b. Oil level is correct
- c. All discharge and liquid valves are open
- d. All suction valves are open, if equipped
- e. All oil line valves and economizer discharge bubbler valves (if equipped) are open
- f. The contactor
- g. Checks have been carried out for any possible leaks. Unit has been leak checked (including fittings)
 - g1 - on the whole unit
 - g2 - at all connectionsLocate, repair, and report any refrigerant leaks.....
.....
.....
- h. Check voltage imbalance: AB..... AC..... BC.....
Average voltage = V
Maximum deviation = V
Voltage imbalance = %
- i. Voltage imbalance is less than 2%

WARNING: Operation of the chiller with an improper supply voltage or excessive phase imbalance constitutes abuse which will invalidate the Carrier warranty. If the phase imbalance exceeds 2% for voltage, or 10% for current, contact your local electricity supply at once and ensure that the chiller is not switched on until corrective measures have been taken.

Check cooler water loop

- Water loop volume = litres
- Calculated volume = litres
- 3.25 litres/nominal kW capacity for air conditioning
- 6.5 litres/nominal kW capacity for process cooling
- Proper loop volume established
- Proper loop corrosion inhibitor included.....litres of.....
- Proper loop freeze protection included (if required) litres of.....
- Piping includes electric heater tape, if exposed to the outside
- Inlet piping to cooler includes a 20 mesh strainer with a mesh size of 1.2 mm

Check pressure drop across the cooler

- Entering cooler = kPa
- Leaving cooler = kPa
- Leaving - entering = kPa

WARNING: Plot cooler pressure drop on performance data chart (in product data literature) to determine total litres per second (l/s) and find unit's minimum flow rate.

- Total = l/s
- Nominal kW = l/s
- Total l/s is greater than unit's minimum flow rate
- Total l/s meets job specified requirement of..... l/s

WARNING: Once power is supplied to the unit, check for any alarms (refer to the 30XA controls IOM for the alarm menu).

Note all alarms:.....
.....
Notes:.....
.....



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Manufacturer reserves the right to change any product specifications without notice.



Environmental Management System Approval

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