Carrier

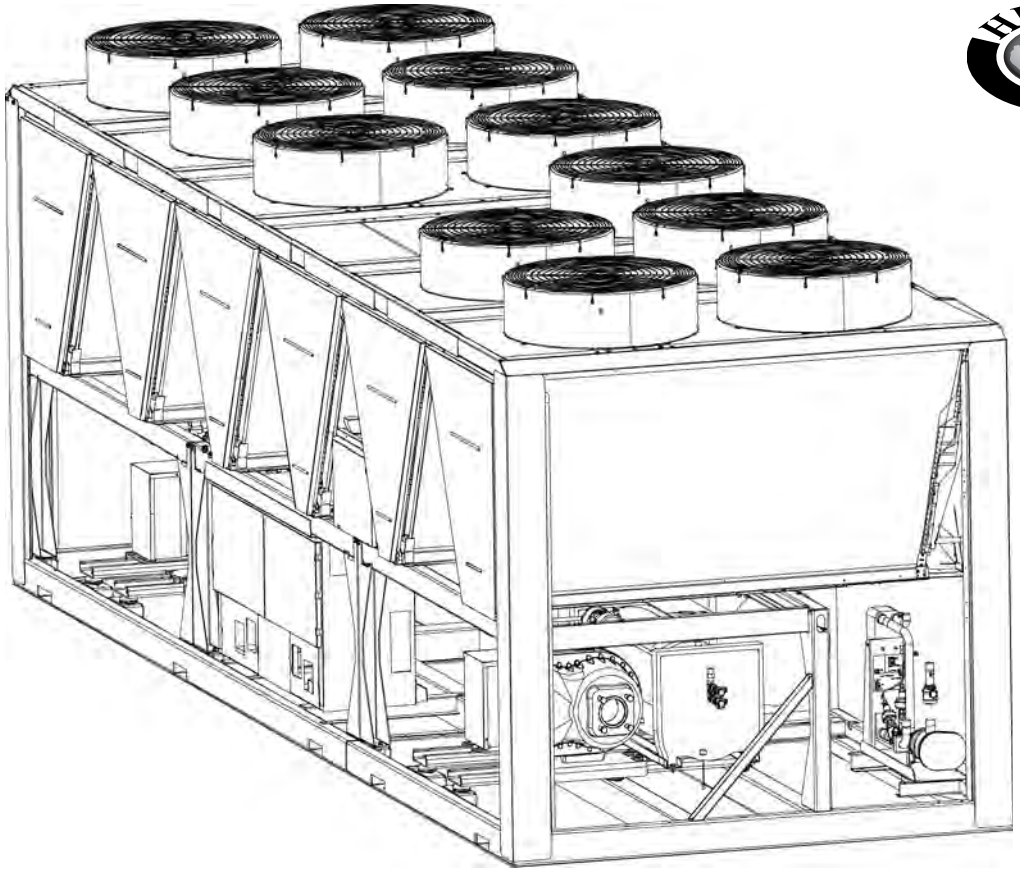
30XA
Air-Cooled Liquid Chillers

Nominal cooling capacity: 270-1670 kW

50 Hz

AQUAFORCE™

HFC-134a



Installation, operation and maintenance instructions

LLOYD'S REGISTER QUALITY ASSURANCE · ISO9001 · UKAS QUALITY MANAGEMENT 001

Quality Management System Approval

Contents

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 procsses.

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. follow-ing 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 strenghtening 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.

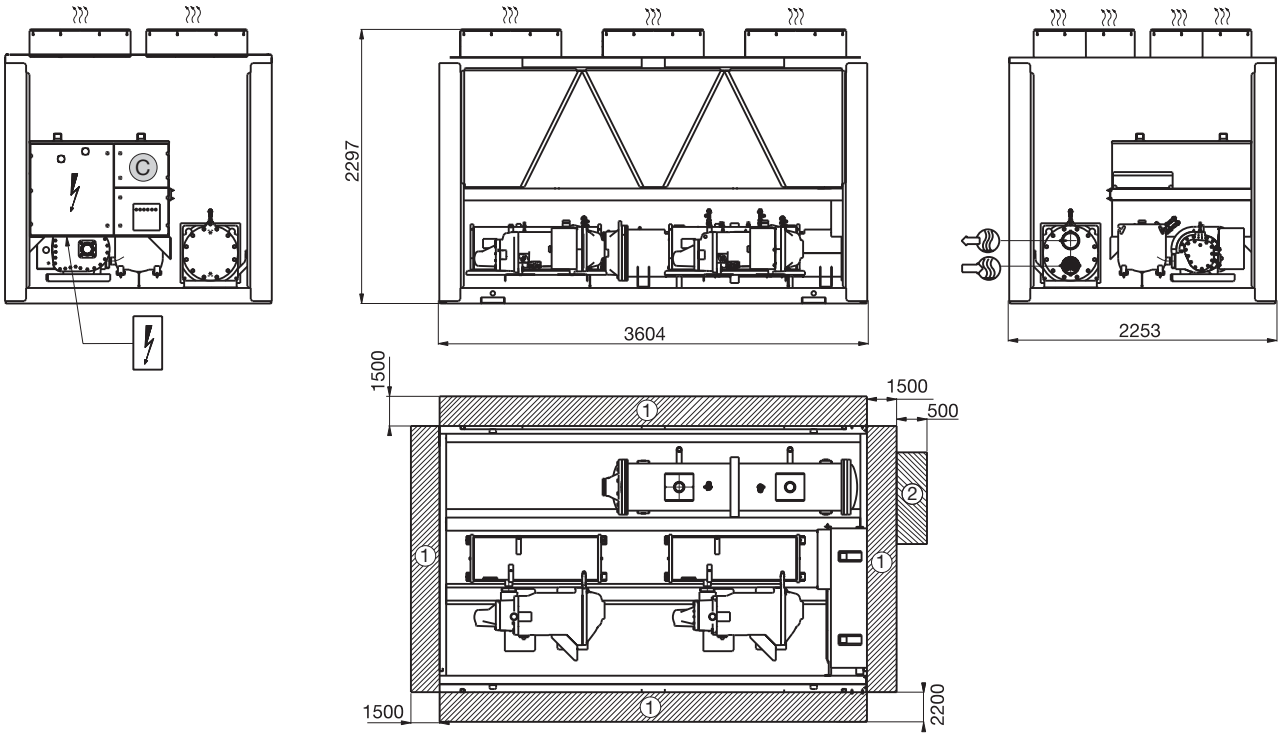
Checks before system start-up
Before the start-up of the refrigeration system, the complete installation, including the refrigeration system must be verified against the installation drawings, dimensional drawings, system piping and instrumentation diagrams and the wiring diagrams.

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.

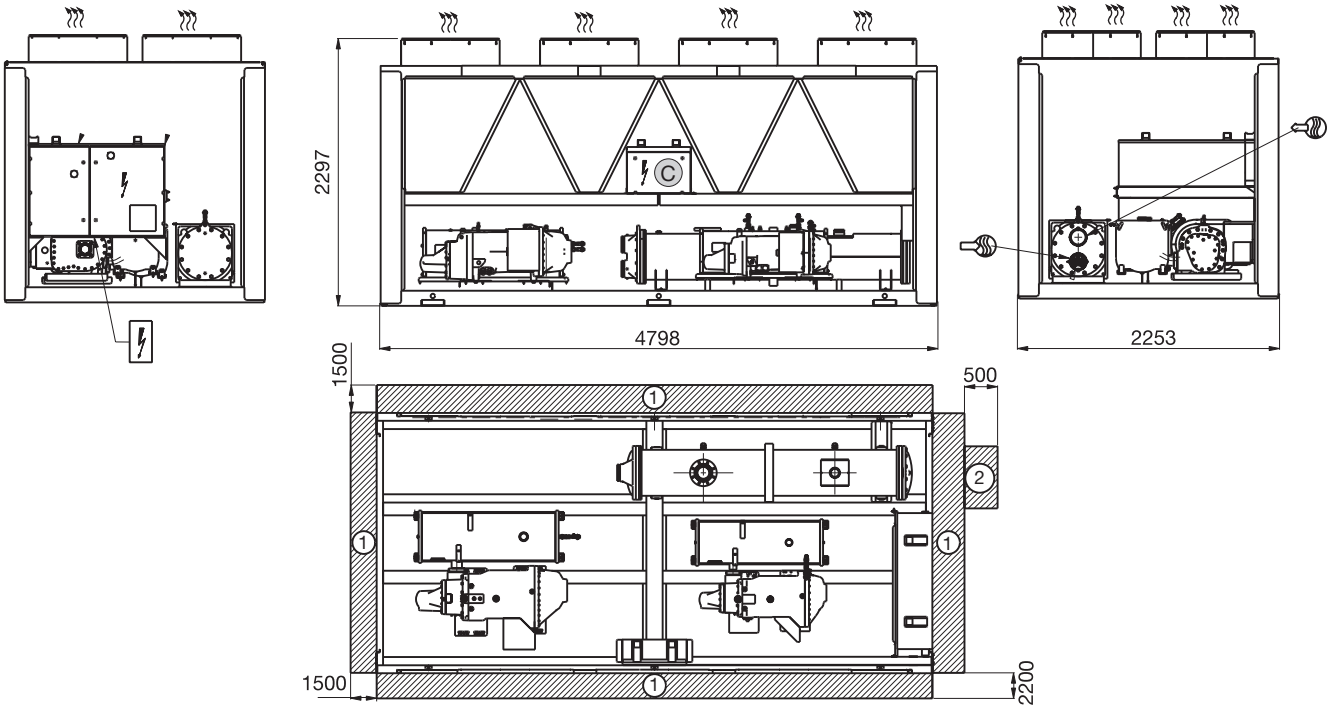
External visual installation checks:
- Compare the complete installation with the refrigeration system and power circuit diagrams.
- Check that all components comply with the design specifications.
- Check that all safety documents and equipments that are required by current European standards are present.
- 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

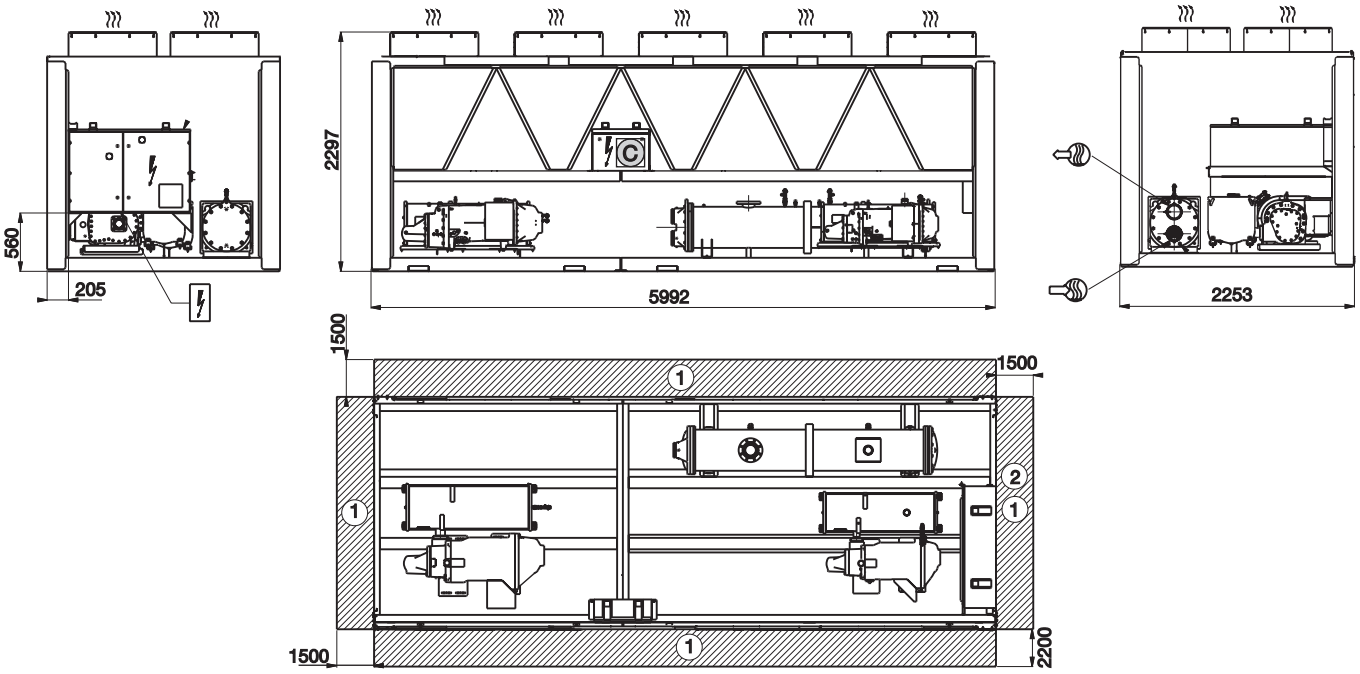
Power supply connection

C Control circuit connection

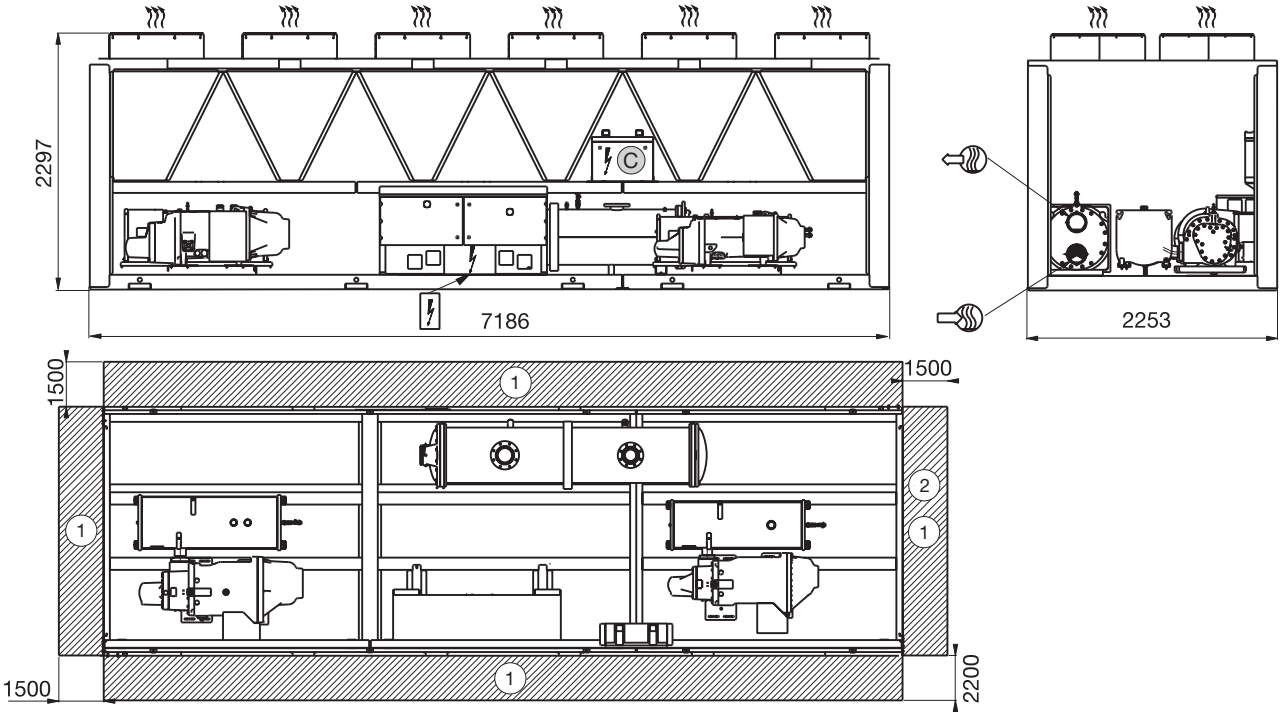
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

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

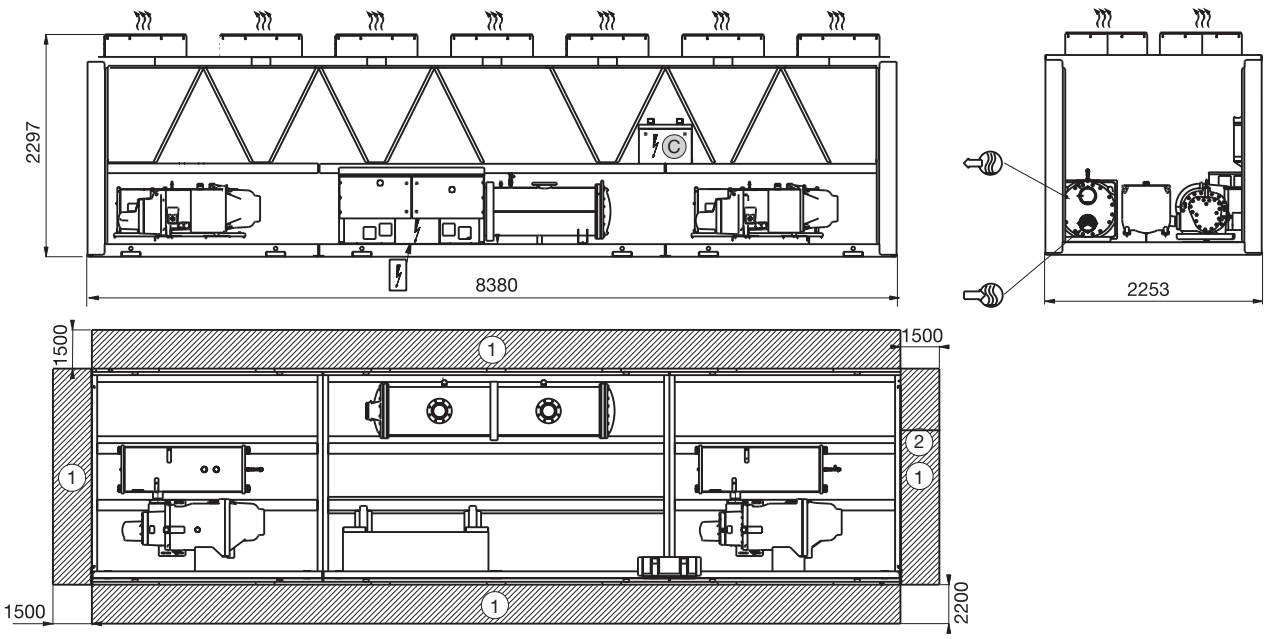
Power supply connection

(C) Control circuit connection

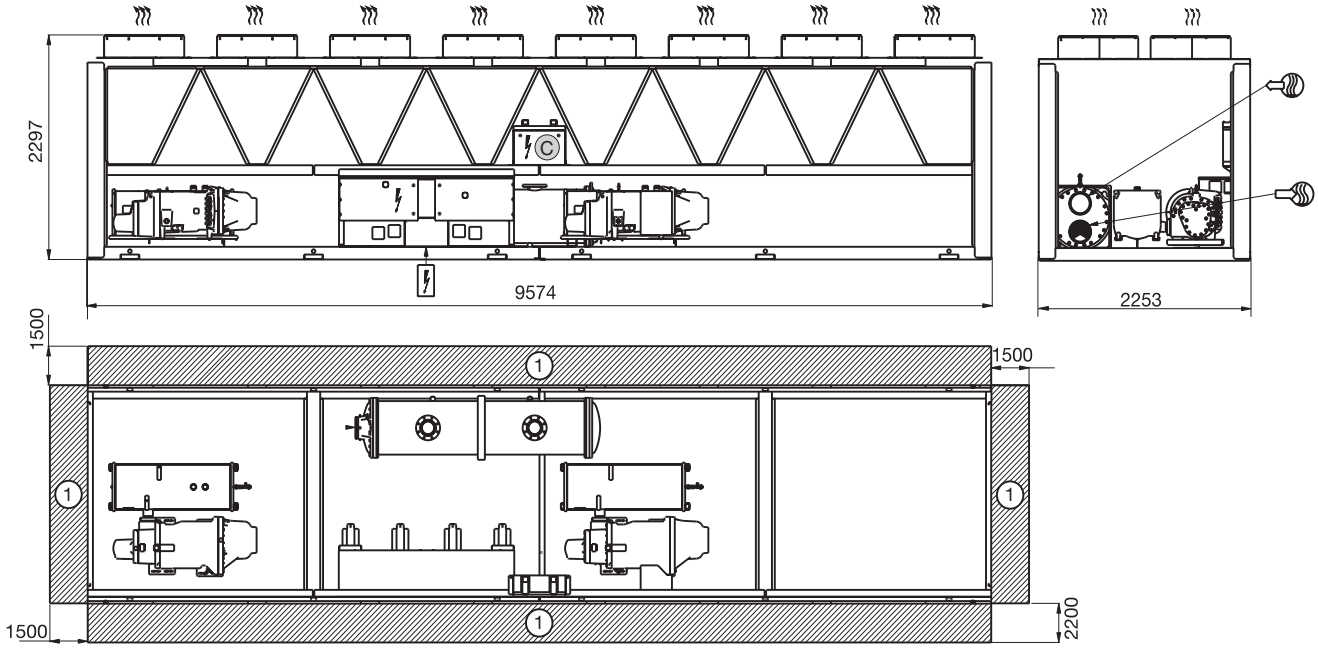
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

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

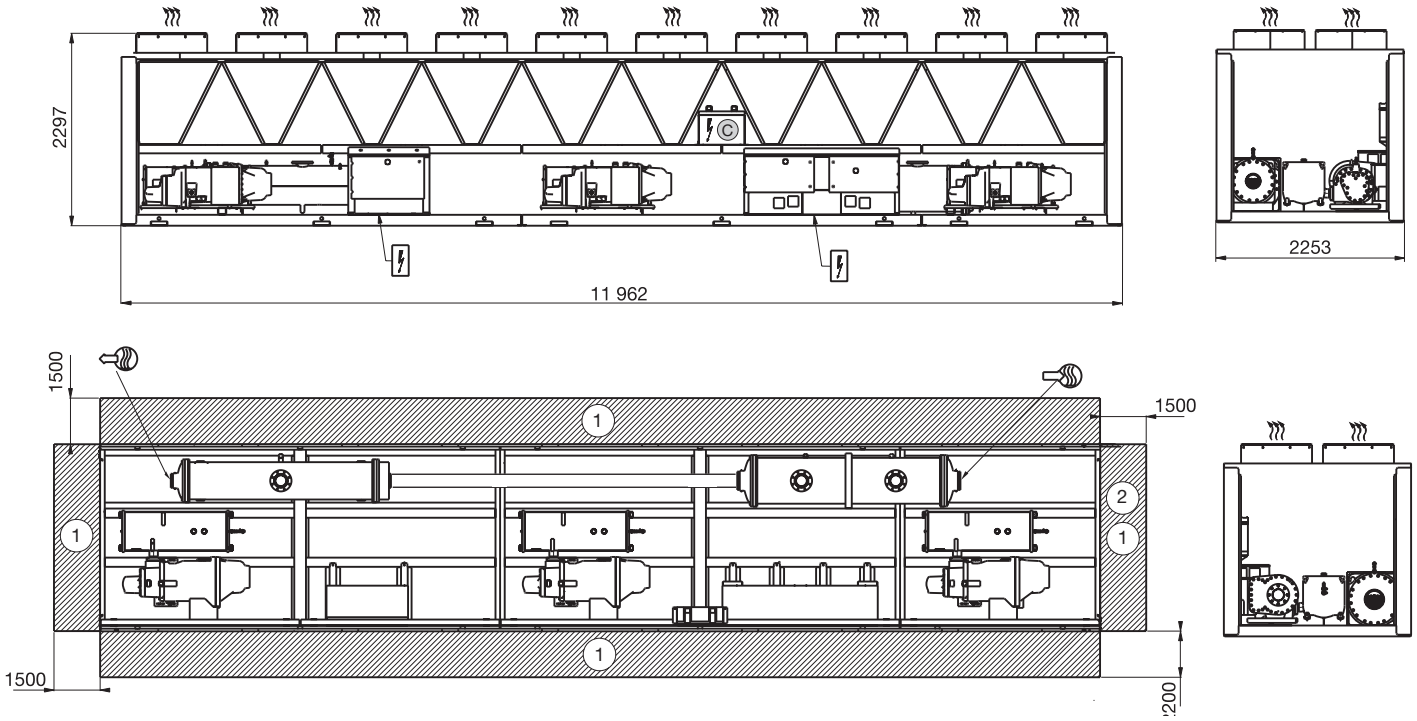
Power supply connection

(C) Control circuit connection

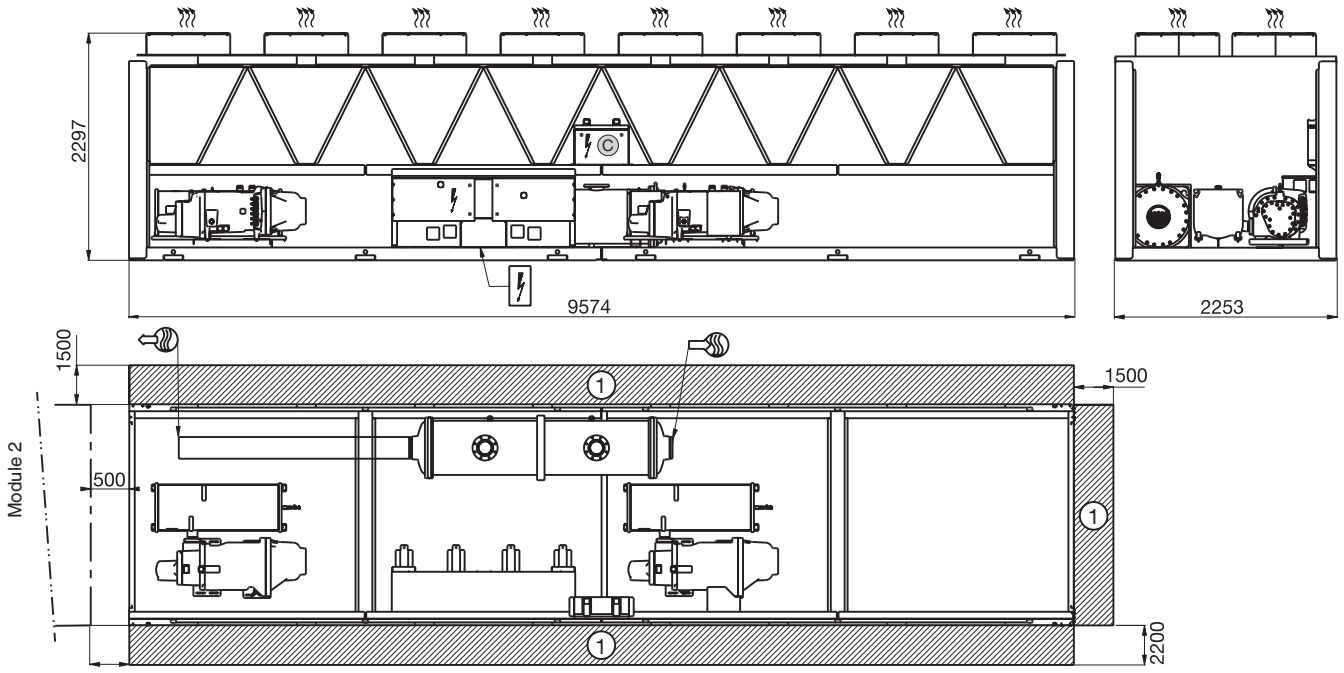
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

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

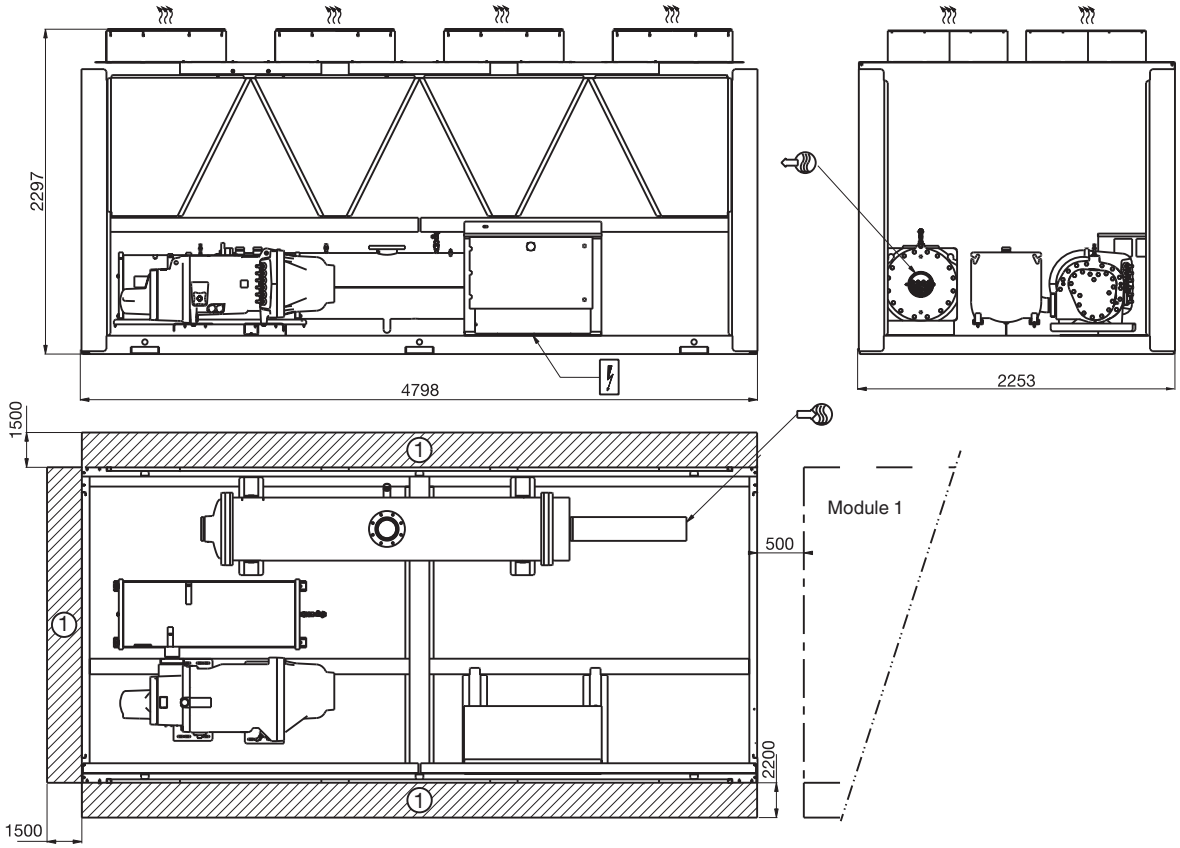
Power supply connection

(C) Control circuit connection

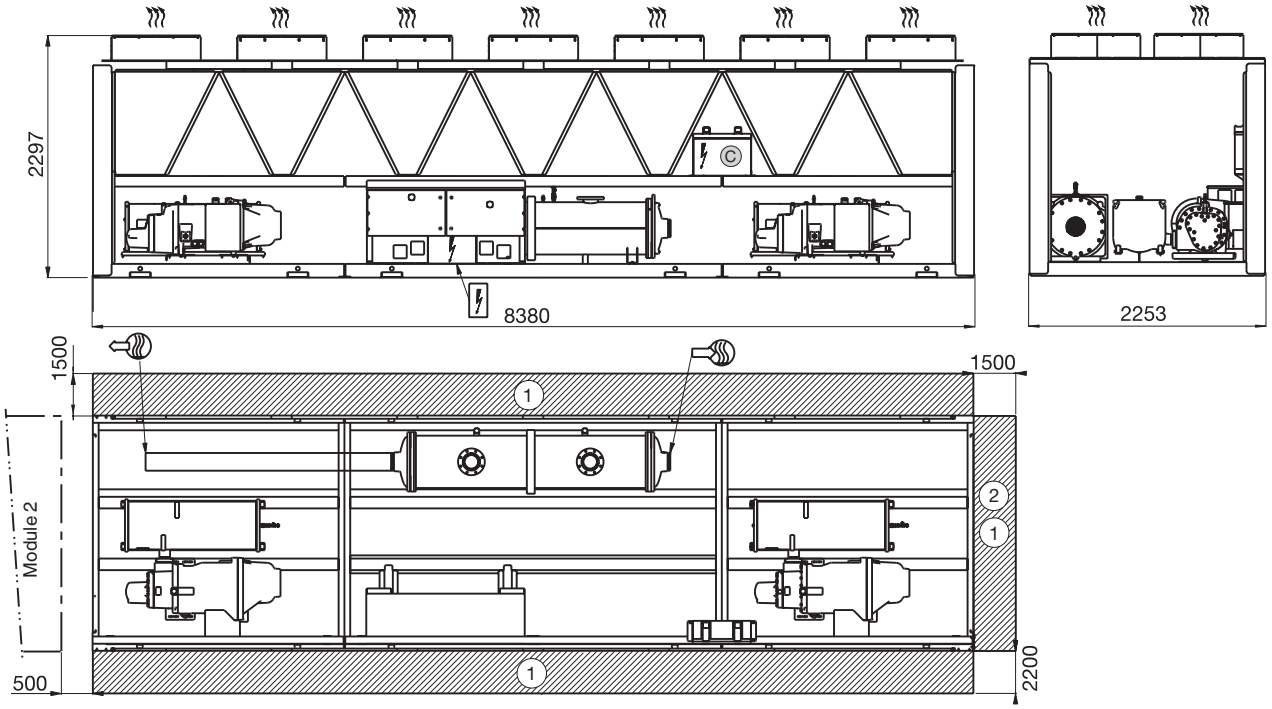
NOTE: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings supplied with the unit or available on request.

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

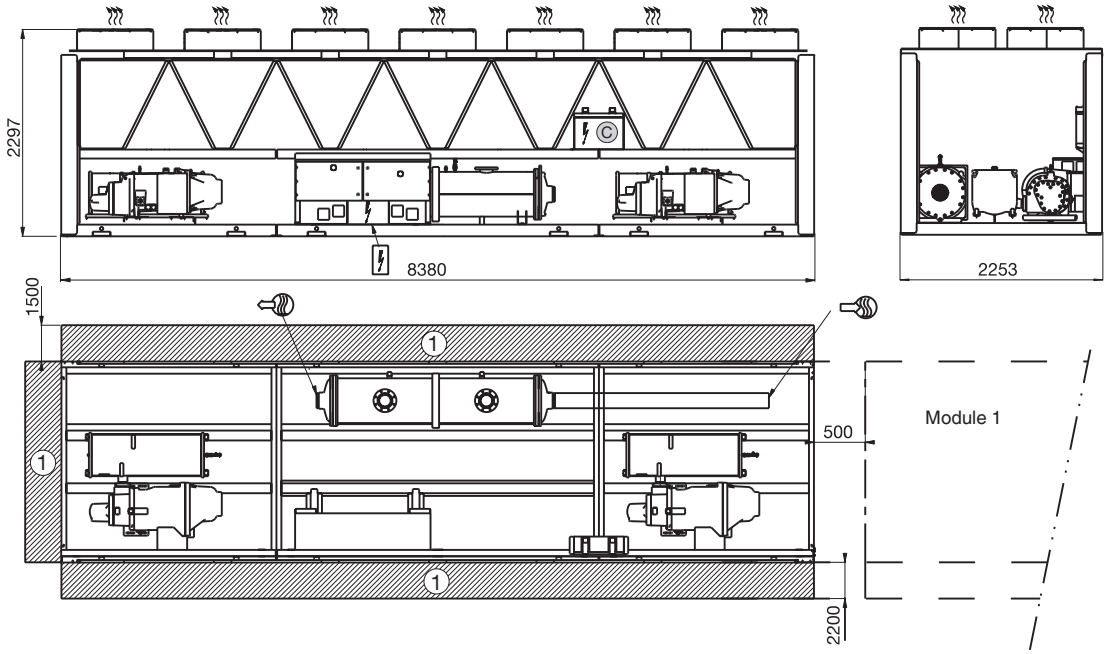
Power supply connection

(C) 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

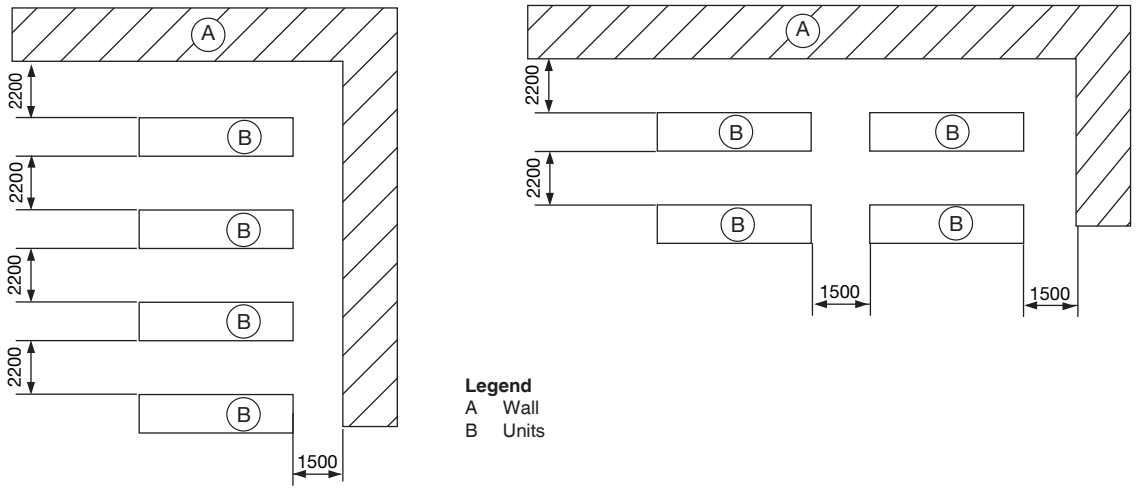
(C) Control circuit connection

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 m^2 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 m^2 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)

	30XA																			
Compressor	**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:
1. To obtain the maximum power input for a unit with hydronic module add the maximum unit power input to the pump power input.
2. 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 (%)

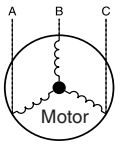
$$\frac{100 \times \text{max. deviation from average voltage}}{\text{Average voltage}}$$

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

AB = 406 V; BC = 399; AC = 394 V

Average voltage = (406 + 399 + 394)/3 = 1199/3
= 399.7 say 400 V

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 x 6/400 = 1.5 %

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

5.3 - Power connection/disconnect switch

Units	Connection points
30XA 0252-1002	1 per unit
30XA 1102-1702	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 guide-line, 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

	Maximum wire section	Minimum calculated section			Maximum calculated section		
30XA	**Section (mm²)**	**Section (mm²)***	**Max. length (m)**	**Wire type**	**Section (mm²)***	**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

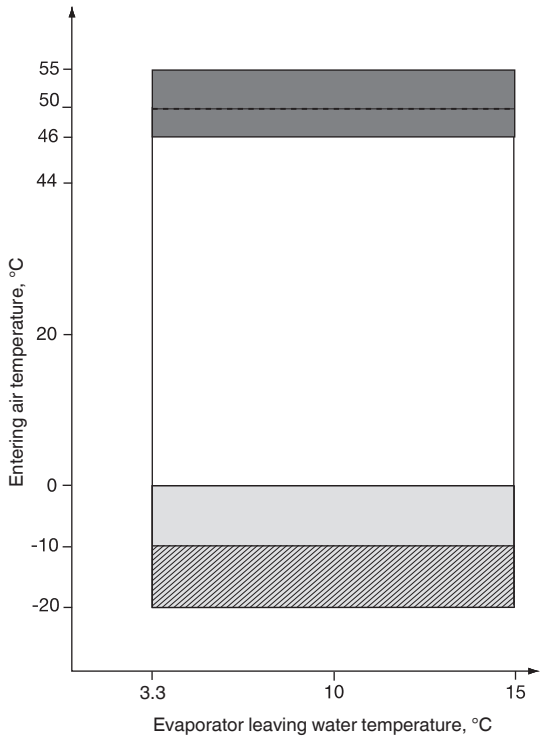
Note: If the leaving water temperature is below 4°C, a glycol/water solution or the frost protection option must be used.

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).

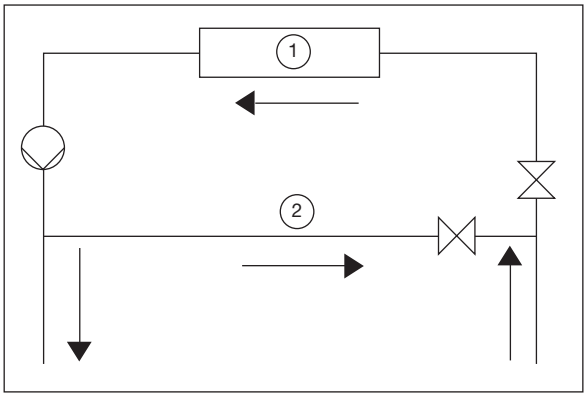
Operating range, unit equipped with option 28 (winter operation).

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

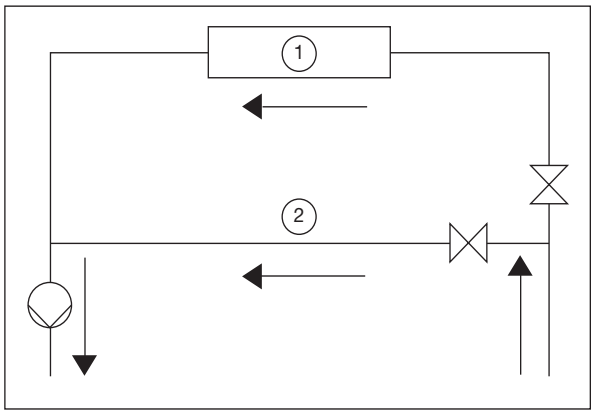


Legend
1 Evaporator
2 Recirculation

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:

Capacity = Cap (kW) x N litres

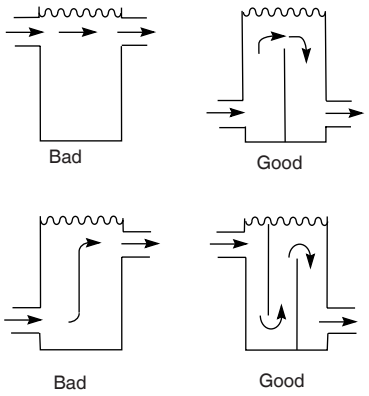
Application	N
Normal air conditioning	3.25
Process type cooling	6.5

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.

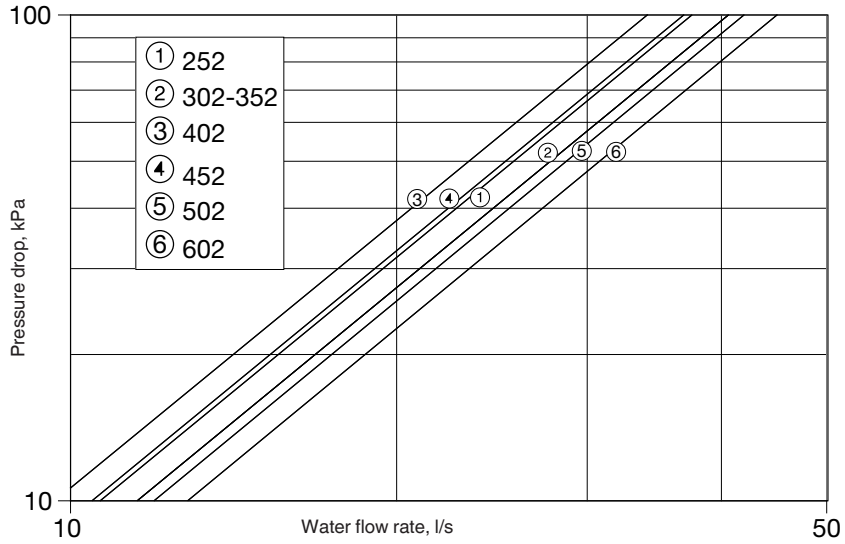
30XA	252-452			502		
Static pressure bar	**1**	**2**	**2.5**	**1**	**2**	**2.5**
Maximum water loop volume l						
Pure water	2400	1600	1200	3960	2640	1980
Ethylene glycol 10%	1800	1200	900	2940	1960	1470
Ethylene glycol 20%	1320	880	660	2100	1400	1050
Ethylene glycol 30%	1080	720	540	1740	1160	870
Ethylene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

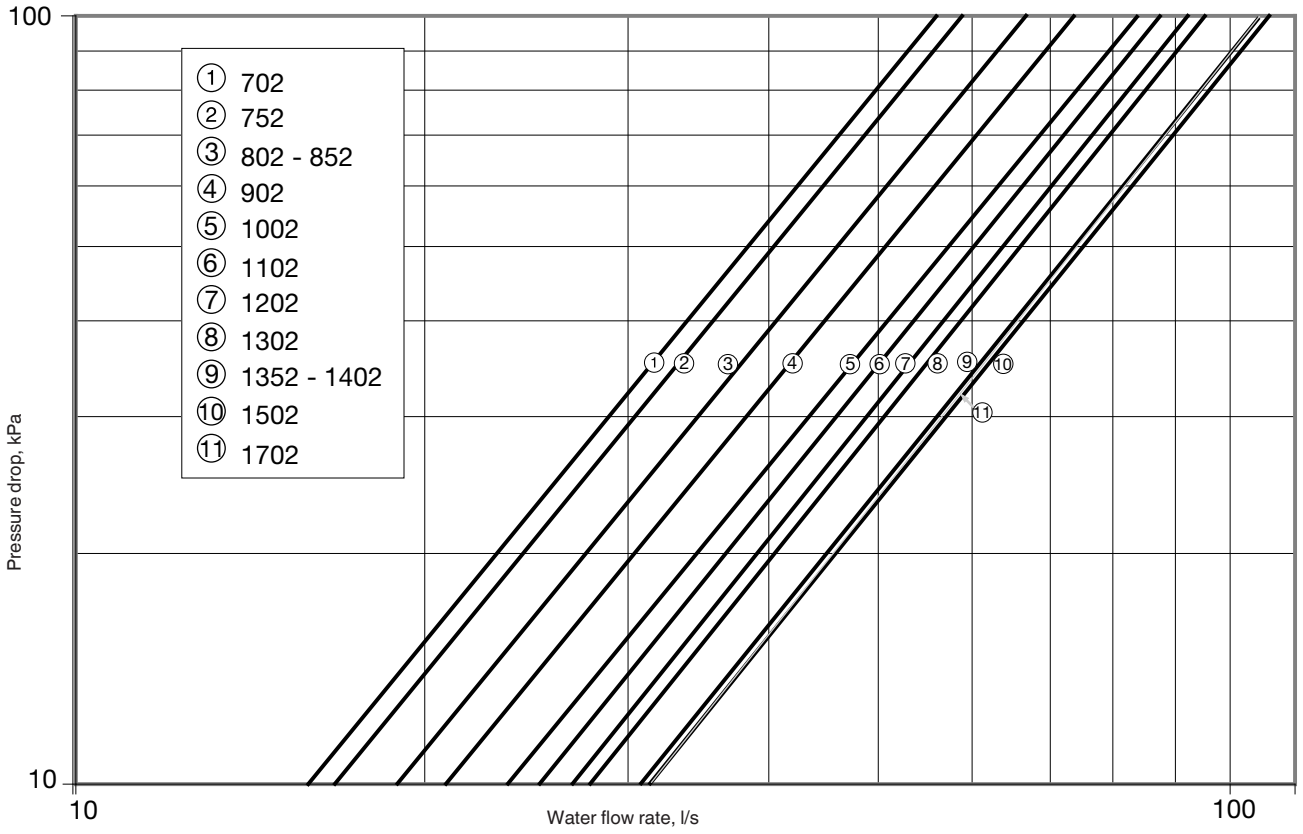
6.7 - Evaporator water flow rate

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

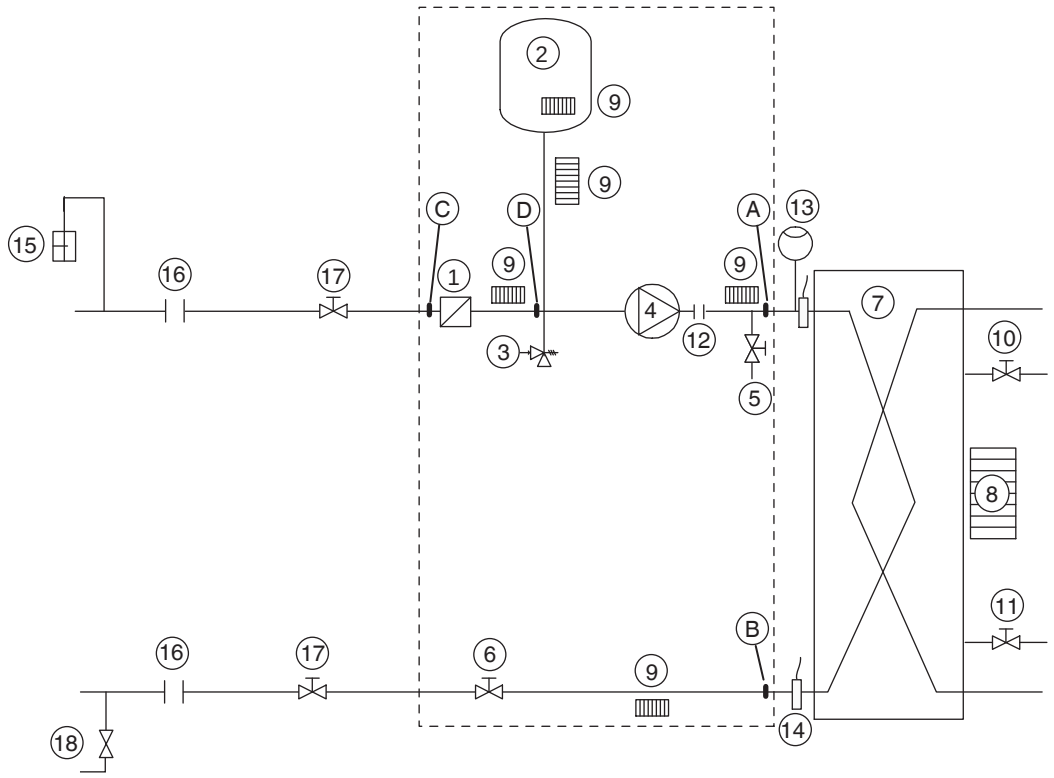
Inlet/outlet diameters without hydronic module

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.

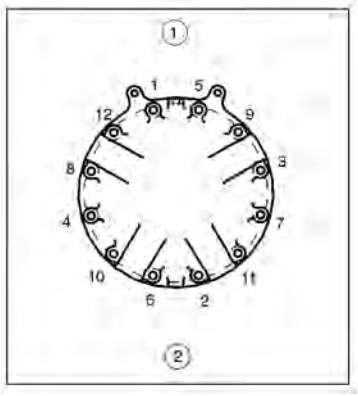
The water flow switch is installed on the evaporator water inlet and adjusted by the control, based on unit size and application. If adjustment is necessary, it must be carried out by qualified personnel trained by Carrier Service.

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

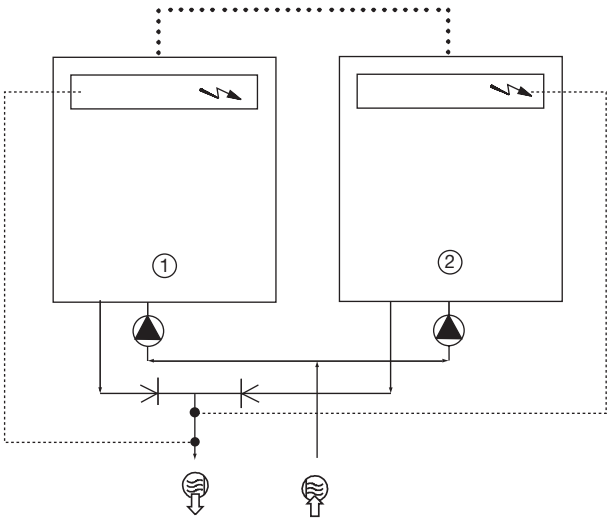
NOTE: This operating mode is not available for 30XA 1702 units.

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

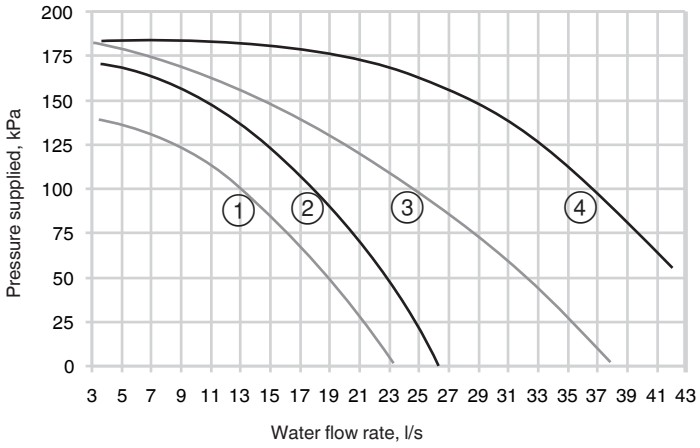


Legend

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

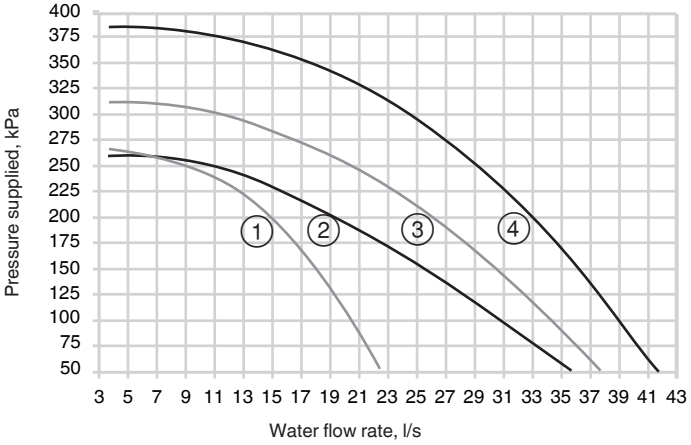
7.7 - Pump pressure/flow rate curves

Low-pressure pumps



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

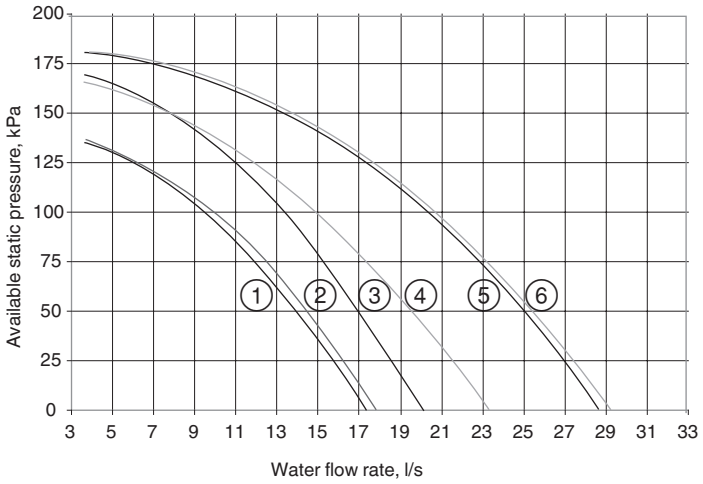
High-pressure pumps



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

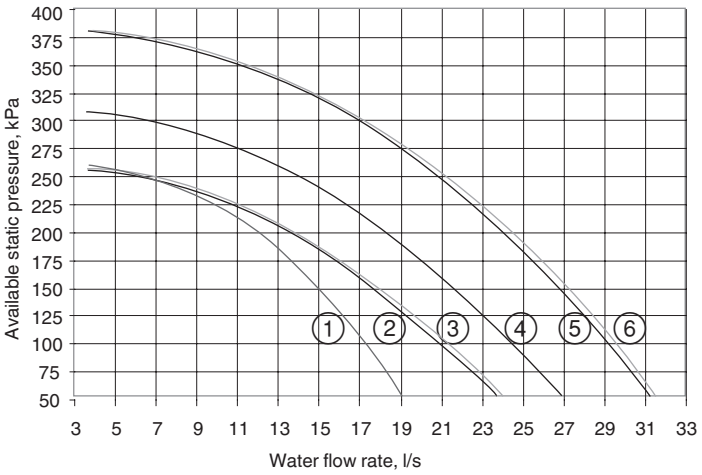
7.8 - Available static system pressure (optional hydronic module)

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

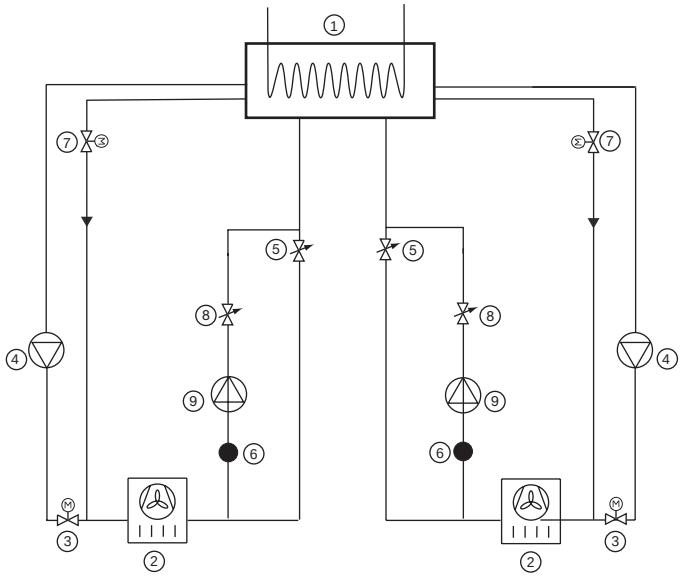
* Standard unit and option 119
** Option 118A (free cooling) is not compatible with these units.

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 LWTstp - 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

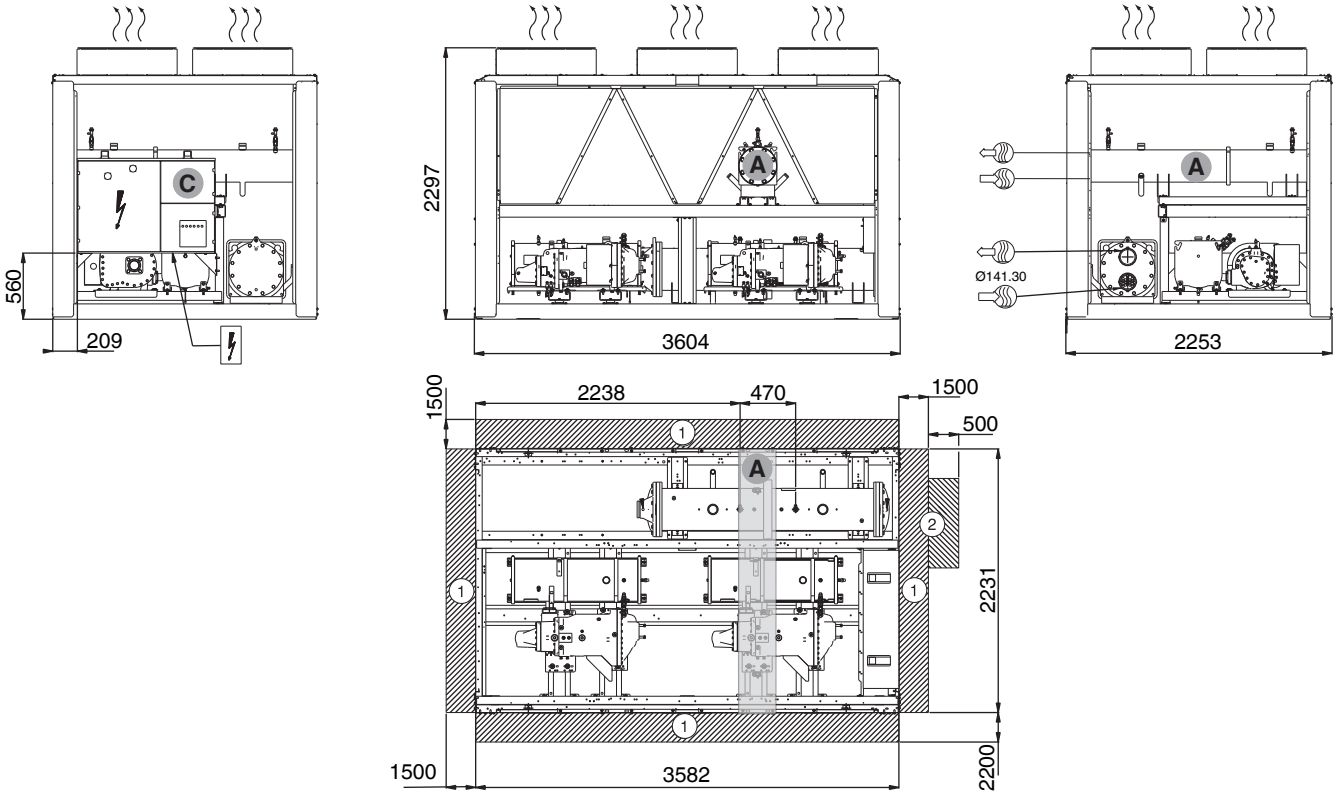
30XA heat reclaim mode		252	302	352	402	452	502	602	702	752	802	852	902	1002
Cooling capacity*	kW	261	291	311	379	438	493	603	665	707	775	814	875	971
Heating capacity in heat reclaim mode*	kW	336	373	401	481	554	620	760	832	894	974	1027	1105	1229
Total power input (unit)*	kW	82	90	99	113	128	140	172	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

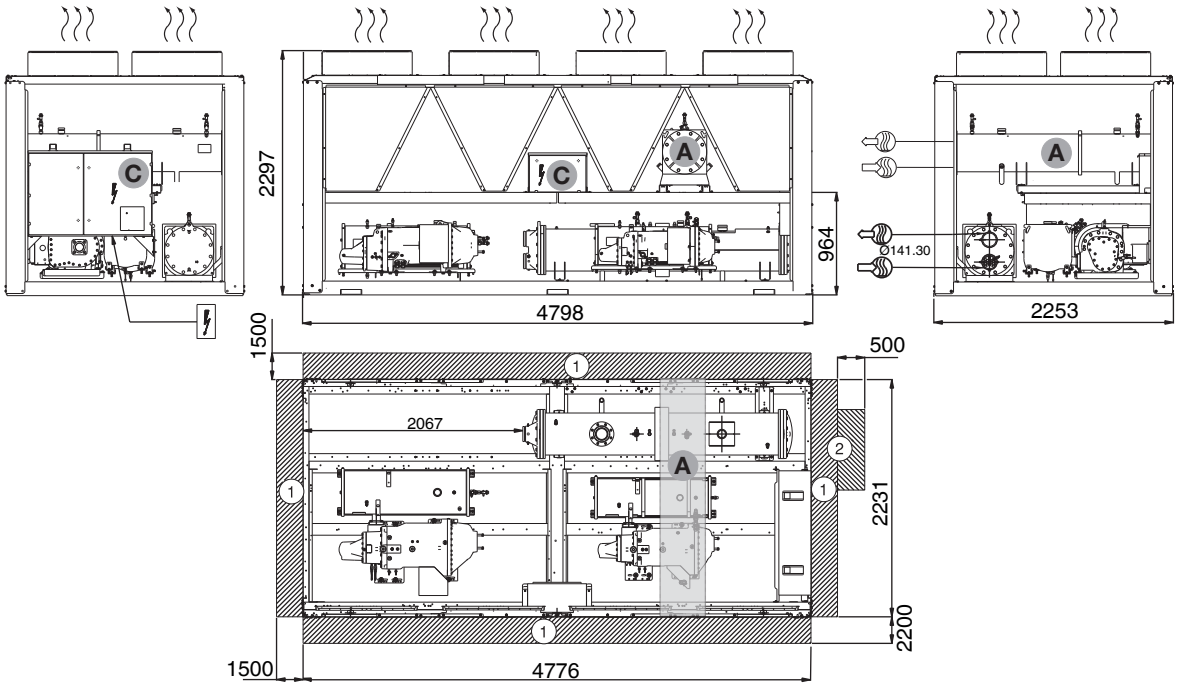
(C) Control circuit connection

(A) Heat reclaim condenser

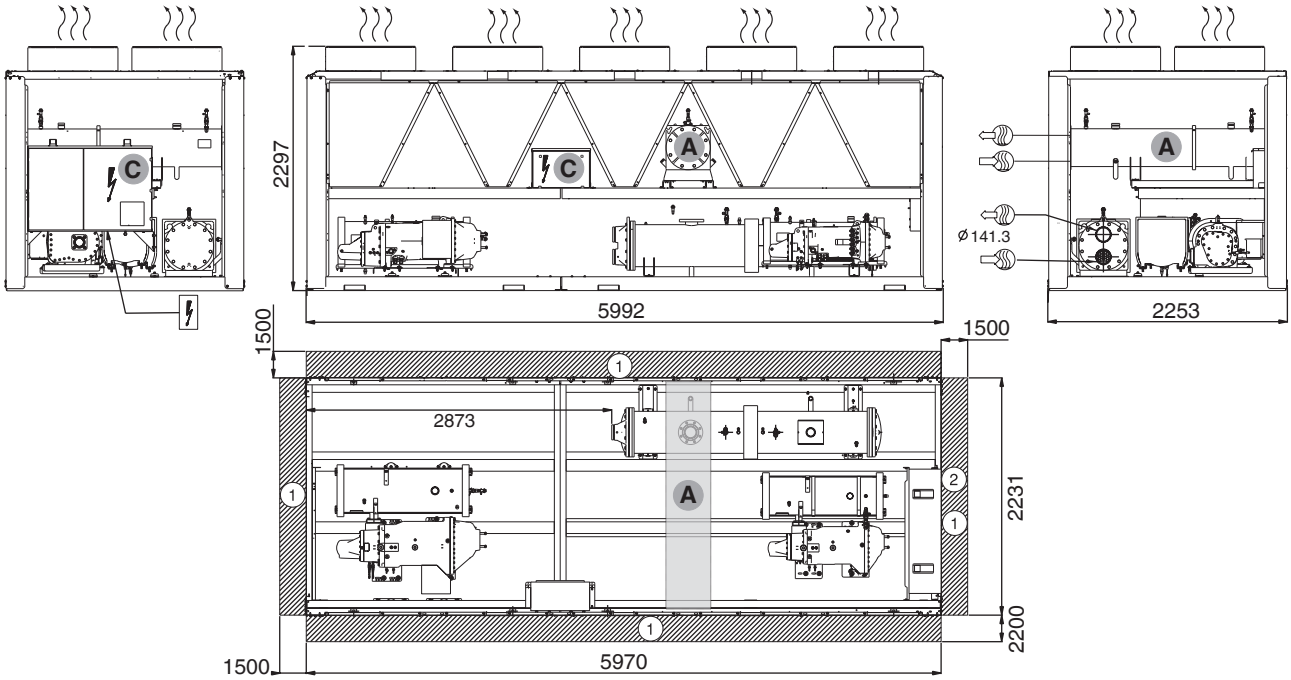
ATTENTION: The Victaulic flange sleeves of the condenser are not installed, but supplied with the unit. The sealing joints are in the control box. The temperature sensors and the condenser flow switch are wired and fixed in the machine. They must be installed as described in the chapter "Condenser water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

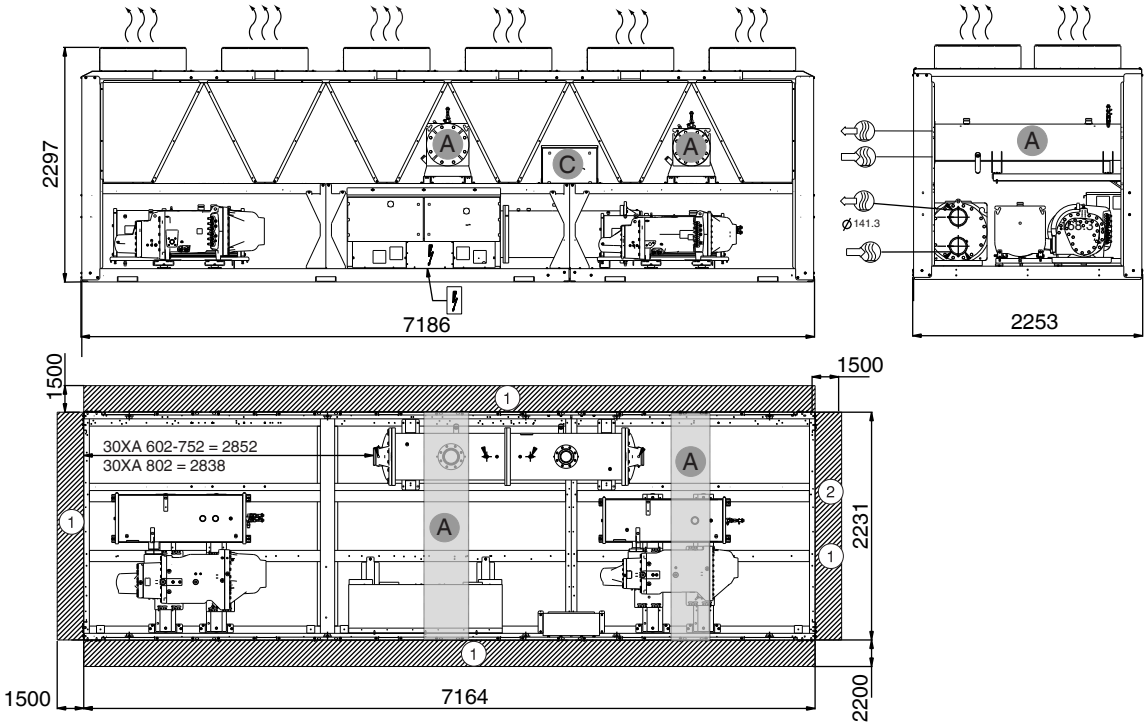
(C) Control circuit connection

(A) Heat reclaim condenser

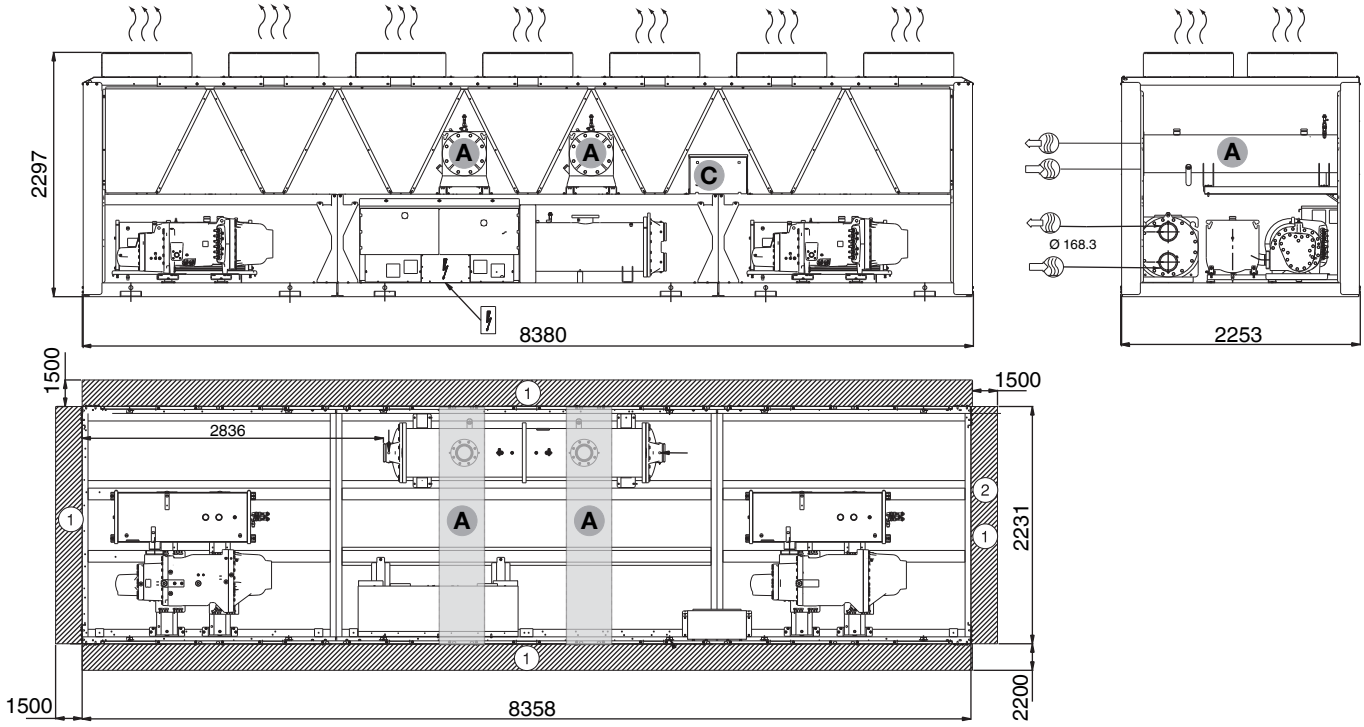
ATTENTION: The Victaulic flange sleeves of the condenser are not installed, but supplied with the unit. The sealing joints are in the control box. The temperature sensors and the condenser flow switch are wired and fixed in the machine. They must be installed as described in the chapter "Condenser water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

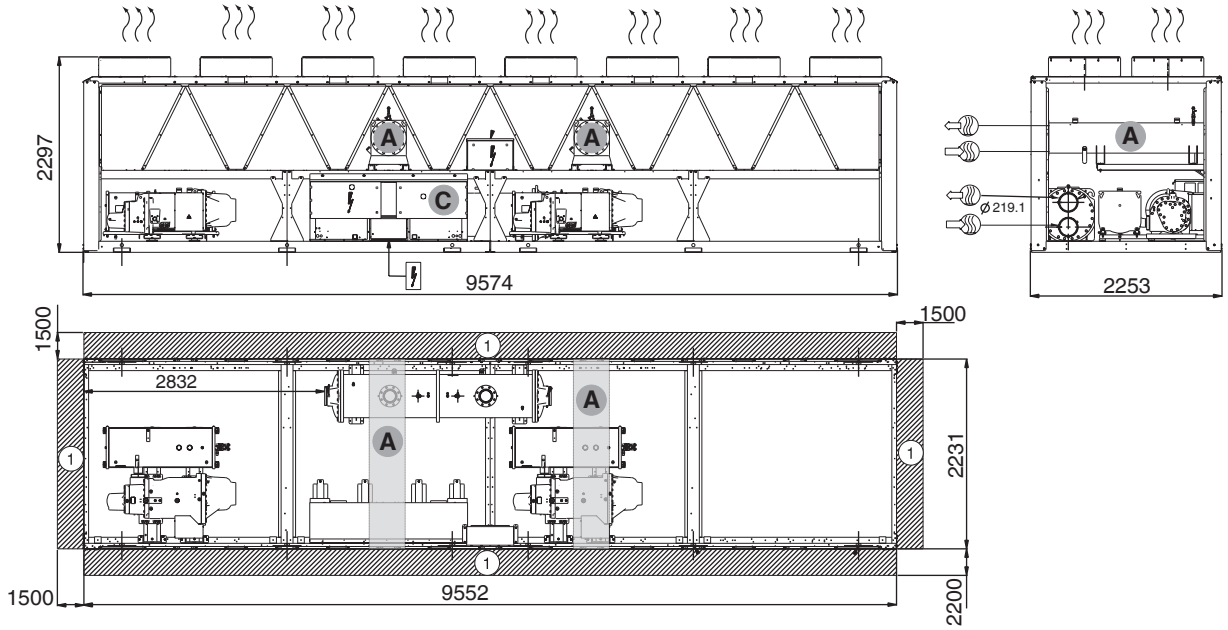
(C) Control circuit connection

(A) 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

(C) Control circuit connection

A 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.

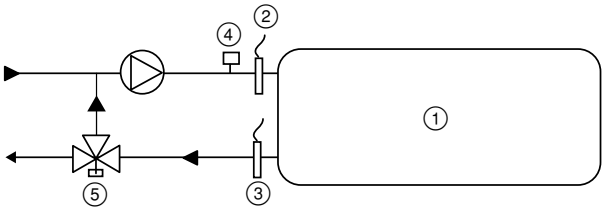
9.3 - Condenser location

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.

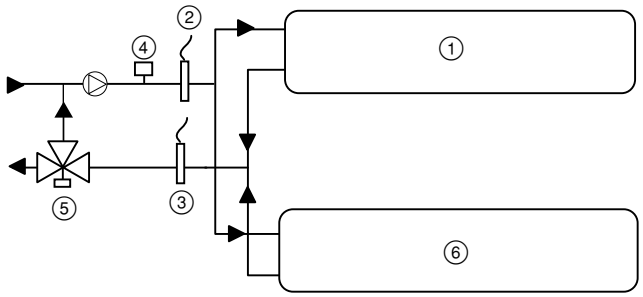


Legend
1 Heat reclaim condenser
2 Entering water temperature sensor (supplied)
3 Leaving water temperature sensor (supplied)
4 Condenser water flow switch (supplied)
5 Three-way valve (not supplied)

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.

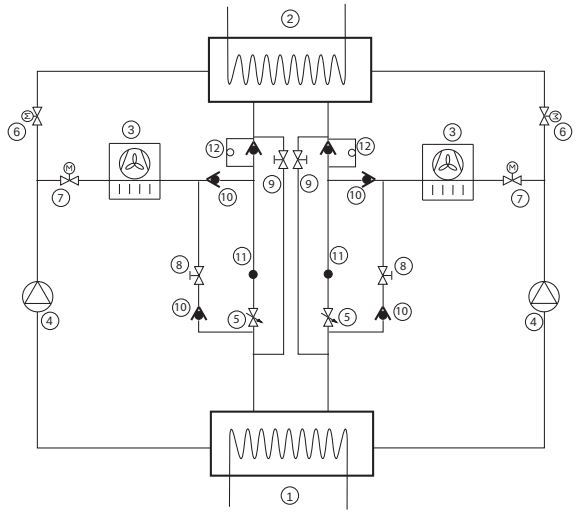
Heat reclaim condenser water temperature			
	°C	Minimum	Maximum
Water entering temperature		12.5	57.5
Ambient operating temperature		-10*	45

* -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

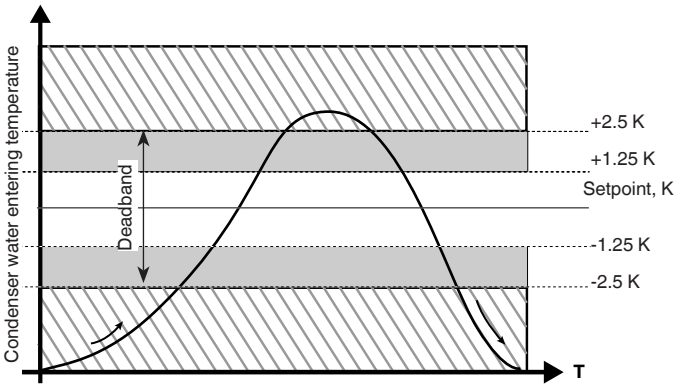
9.8 - Heat reclaim operation

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.

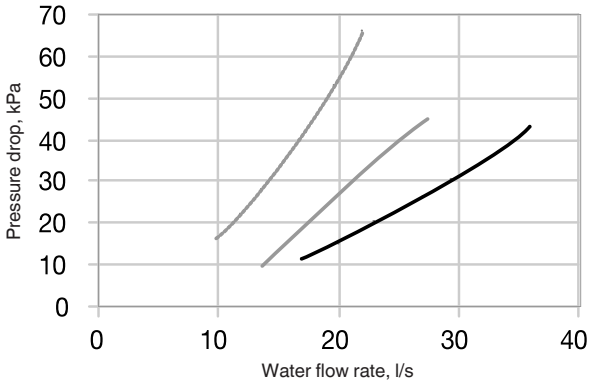
Case	Selection of the heat reclaim mode	Number of circuits in heat reclaim mode	Action
-	NO	0	+ 2 circuits in cooling mode
A	YES	Whatever the number	+ 2 circuits in heat reclaim mode
B	YES	0	+ 1 circuit in heat reclaim mode
		1	No change
		2	No change
C	YES	Whatever the number	No change
D	YES	1	No change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

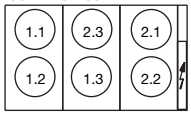
The role of the filter drier is to keep the circuit clean and moisture-free. The moisture indicator shows, when it is necessary to change the element. A difference in temperature between the filter inlet and outlet shows that the element is dirty.

10.9 - Sensors

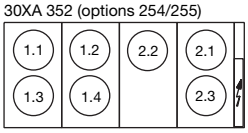
The units use thermistors to measure the temperature, and pressure transducers to control and regulate system operation (see 30XA - Pro-Dialog Control IOM for a more detailed explanation).

30XA fan arrangement

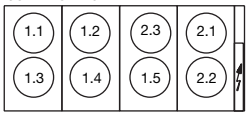
30XA 252-352



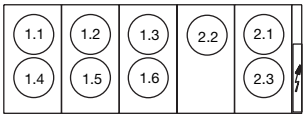
30XA 352 (options 254/255)



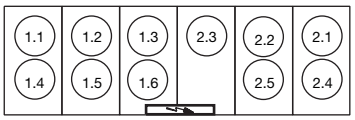
30XA 402-452



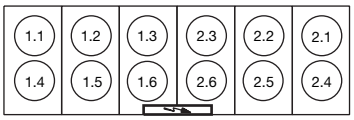
30XA 502



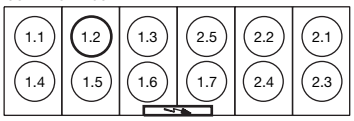
30XA 602



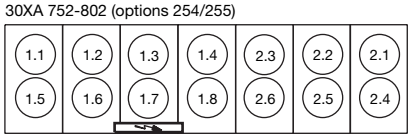
30XA 702



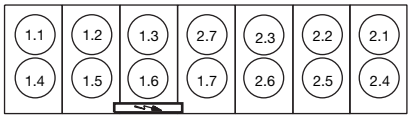
30XA 752 - 802



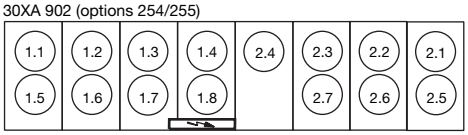
30XA 752-802 (options 254/255)



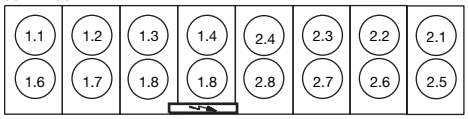
30XA 902



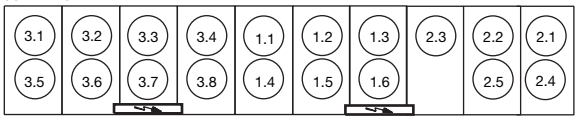
30XA 902 (options 254/255)



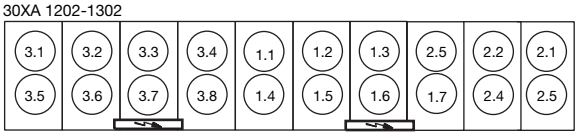
30XA 1002



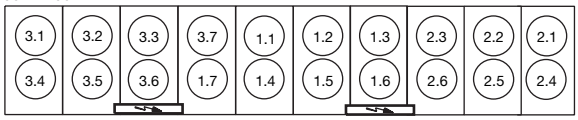
30XA 1102



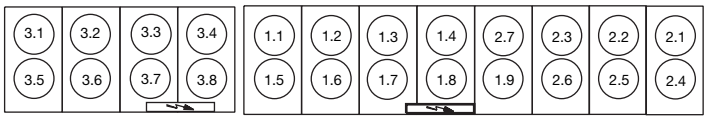
30XA 1202-1302



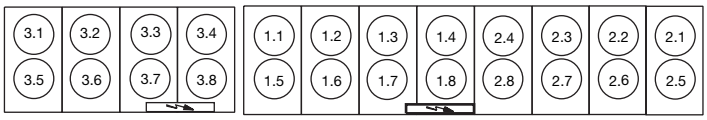
30XA 1352



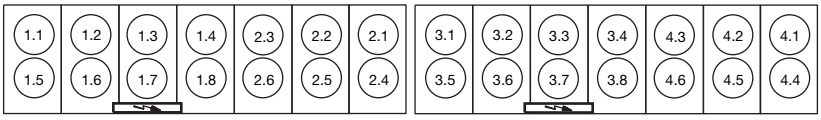
30XA 1402



30XA 1502



30XA 1702



(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 service 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 avail-able 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 nul 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		
Contactor 3RT103*		
Contactor 3RT104*		5
Contactor 3RT105*		11
Contactor 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
Compresor 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		
Contactor 3RT101*	KM90*	1
Contactor 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 m^2. 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.

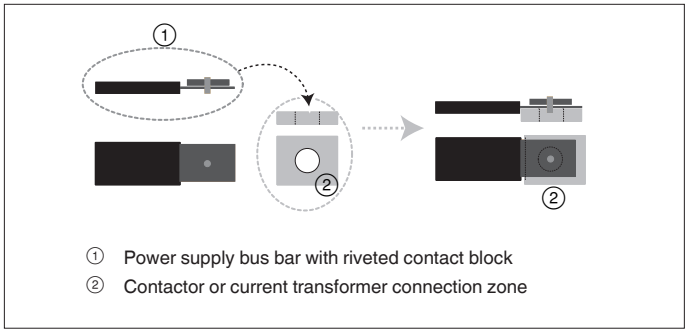
The switch that has been selected for detecting reverse rotation is Carrier part number HK01CB001. This switch opens the contacts when the pressure falls below 7 kPa. The switch is a manual reset type that can be reset after the pressure has once again risen above 70 kPa. It is critical that the switch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

12.9 - Precaution for compresssor 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



① Power supply bus bar with riveted contact block
② Contactor or current transformer connection zone

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

Preliminary information

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

Unit
Model: .....

Compresseurs

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 last 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 connections
  Locate, 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:**.....**
.....

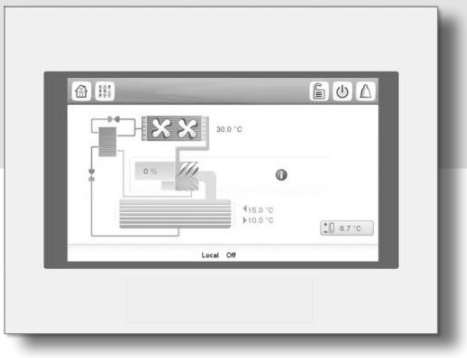
Environmental Management System Approval

Carrier

Order No: 13452-76, 03.2008 - Supersedes order No: 13452-76, 07.2007
Manufacturer reserves the right to change any product specifications without notice.

Manufacturer: Carrier SCS, Montluel, France.
Printed in the Netherlands.

CONTROLS MANUAL



Touch Pilot Control

30XA/XAS/XB/XBP/XW
30XA-ZE/XW-ZE

AquaForce ® PUREtec with R-1234ze(E)

Original document

CONTENTS

CONTENTS

PREFACE

The goal of this document is to give a broad overview of the main functions of the Touch Pilot system used to control:

- 30XAS single-circuit air-cooled chillers,
- 30XA dual-circuit and triple-circuit air-cooled chillers,
- 30XB dual-circuit air-cooled chillers with fixed-speed fan control and 30XBP dual-circuit air-cooled chillers with variable-speed fan control,
- 30XW single-circuit and dual-circuit water-cooled chillers,
- units that come with R-1234ze refrigerant (30XA-ZE air-cooled and 30XW-ZE water-cooled chillers).

Instructions in this manual are given as a guide to good practice in the installation, start-up and operation of the control system. This document does not contain full service procedures for the correct operation of the equipment. The support of a qualified Carrier Service Engineer is strongly recommended to ensure optimal operation of the equipment as well as the optimization of all available functionalities.

Note that this document may refer to optional components and certain functions, options or accessories may not be available for the specific unit. The cover images are solely for illustration and form no part of any offer for sale or any sale contract.

IMPORTANT: All screenshots of the interface provided in this manual include text in English. After changing the language of the system, all labels will be displayed in the language selected by the user.

Please read all instructions prior to proceeding with any work. Pay attention to all safety warnings.

1 - SAFETY CONSIDERATIONS

1.1 - General description

Installation, start-up and servicing of equipment can be hazardous if certain factors particular to the installation are not considered: operating pressures, electrical components, voltages and the installation site (elevated plinths and built-up structures).

Only qualified installation engineers and fully trained technicians are authorised to install and start the equipment. All instructions and recommendations provided in the service guide, installation and operation manuals, as well as on tags and labels fixed to the equipment, components and other accompanying parts supplied separately, must be read, understood and followed. Failure to comply with the instructions provided by the manufacturer may result in injury or product damage.

- ***Apply all safety standards and practices.***
- ***Wear safety glasses and gloves.***
- ***Use the proper tools to move heavy objects.***
- ***Move units carefully and set them down gently.***

1.2 - Safety precautions

Only personnel qualified in accordance with IEC (International Electrotechnical Commission) recommendations may be permitted access to electrical components. It is particularly recommended that all sources of electricity to the unit should be shut off before any work is begun. Shut off the main power supply at the main circuit breaker or isolator.

CAUTION: The equipment uses and emits electromagnetic signals. Tests have shown that the equipment conforms to all applicable codes with respect to electromagnetic compatibility.

RISK OF ELECTROCUTION: Even when the main circuit breaker or isolator is switched off, specific circuits may still be energised as they may be connected to a separate power source.

RISK OF BURNS: Electrical currents may cause components to get hot. Handle power cable, electrical cables and conduits, terminal box covers and motor frames with great care.

IMPORTANT: Some specific safety precautions should be taken in case of HFO units.

For more information about handling the equipment safely, please refer to the IOM Unit documentation (Installation, Operation and Maintenance instructions).

2 - CONTROLLER OVERVIEW

2.1 - General description

The Touch Pilot system controls the start-up of the compressors needed to maintain the desired heat exchanger entering and leaving water temperature. The controller manages the operation of the fans in order to maintain the correct condensing pressure in each circuit. Touch Pilot constantly monitors safety devices that protect the unit against failure and guarantee its optimal functioning.

The control system can operate in three independent modes:

- Local mode: The unit is controlled by commands from the user interface.
- Remote mode: The unit is controlled by dry contacts.
- Network mode: The unit is controlled by network commands (CCN or BACnet). Data communication cable is used to connect the unit to the CCN communication bus.

The operating mode can be selected with the Start/Stop button (see also section 4.5). When the Touch Pilot system operates autonomously (Local or Remote), it retains all of its control capabilities but does not offer any of the features of the Network. The Network emergency stop command stops the unit regardless of its active operating type.

2.2 - Abbreviations

In this manual, the refrigeration circuits are called circuit A, circuit B and circuit C.

CCN	Carrier Comfort Network
DCFC	Dry Cooler Free Cooling
EMM	Energy Management Module
EXV	Electronic Expansion Valve
LED	Light Emitting Diode
LEN	Sensor Bus (internal communication bus linking the basic board to slave boards)
OAT	Outdoor Air Temperature
Network mode	Operating type: Network
Local-Off	Operating type: Local Off
Local-On	Operating type: Local On mode
Local-Schedule	Operating type: Local On following a time schedule
Master mode	Operating type: master unit (master/slave assembly)
Remote mode	Operating type: by remote contacts
VFD	Variable Frequency Drive

3 - HARDWARE DESCRIPTION

3.1 - General description

Each circuit is by default fitted with one SIOB board used to manage all inputs and outputs of the controller.

TCPM board is used to control the operation of screw compressors and AUX1 board is used for fans control (one AUX1 per each circuit). Please note that the first AUX1 board may also include the output used to control the customer variable speed pump for single-circuit units (see also section 7.4.3).

Options such as energy management, heat reclaim, free cooling require additional SIOB boards to be installed. Additionally, chillers fitted with a dry cooler have one extra AUX1 board used to control the optional dry cooler (the board included in the dry cooler).

NOTE: There are two types of dry coolers available, i.e. dry cooler (condenser) used for 30XW water-cooled units and free cooling dry cooler for 30XB air-cooled units.

All boards communicate via an internal LEN bus. The main board continuously monitors the information received from various pressure and temperature probes and accordingly starts the program that controls the unit.

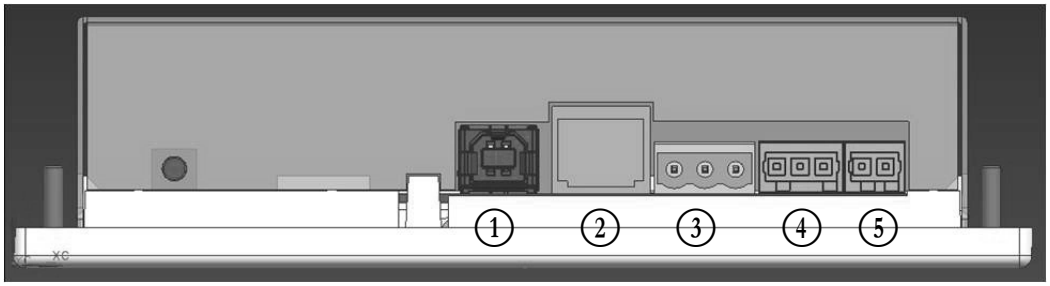
The unit is equipped with the Touch Pilot user interface (5-inch colour LCD touch screen).

3.2 - Electrical box

The electrical box includes all boards controlling the unit and the user interface.

3.3 - Connections of the main controller

Connections are located on the bottom side of the main controller.



Legend
1. USB connector
2. Ethernet connector
3. CCN connector
4. LEN connector
5. Power supply connector (24 VAC)

3.4 - Power supply to boards

All boards are supplied from a common 24 VAC supply referred to earth.

CAUTION: Maintain correct polarity when connecting the power supply to the boards, otherwise the boards may be damaged.

In the event of a power supply interrupt, the unit restarts automatically without the need for an external command. However, any faults active when the supply is interrupted are saved and may in certain cases prevent a given circuit or the unit from restarting.

3.5 - Light emitting diodes on boards

All boards continuously check and indicate the proper operation of their electronic circuits. A light emitting diode (LED) lights on each board when it is operating properly.

- The red LED flashing for a two-second period on the SIOB board indicates correct operation. A different rate indicates a board or a software failure.
- The green LED flashes continuously on all boards to show that the board is communicating correctly over its internal bus. If the green LED is not flashing, this indicates a LEN bus wiring problem.

3.6 - Pressure sensors

Two types of electronic sensors (high and low pressure) are used to measure various pressures in each circuit.

These electronic sensors deliver 0 to 5 VDC. The sensors are connected to the SIOB board.

- **Discharge pressure sensors (high pressure type)**
  These sensors measure the discharge pressure in each circuit. They are used to control head pressure or high pressure load shedding. Discharge pressure sensors are mounted on the discharge line piping of each circuit.
- **Suction pressure sensors (low pressure type)**
  These sensors measure the suction pressure in each circuit. They are used for EXV control. Suction pressure sensors are located on the suction piping of each circuit.
- **Oil pressure sensors (high pressure type)**
  These sensors measure the oil pressure of each compressor. Oil pressure sensors are located at the oil port of the compressor. The economizer pressure is subtracted from this value to arrive at the differential oil pressure.
- **Economizer pressure sensors (high pressure type)**
  These sensors measure the intermediate pressure between high and low pressure. They are used to control the economizer performance.
- **Heat reclaim condenser outlet pressure sensors (optional)**
  These sensors (for air-cooled units with heat reclaim option) permit control of the load in the heat reclaim mode (see also section 7.17).

3.7 - Temperature sensors

Temperature sensors constantly measure the temperature of various components of the unit, ensuring the correct operation of the system.

- **Evaporator entering and leaving water temperature sensors**
  The evaporator entering and leaving water temperature sensors are installed in the entering and leaving side water box. They are used for capacity control and safety purposes.
- **Condenser entering and leaving water temperature sensors**
  These sensors measure the entering and leaving water temperatures in water-cooled units or air-cooled units with the heat reclaim option.
- **Suction gas temperature sensor**
  This sensor is used to control the suction gas temperature. It is located at the suction line of each compressor.
- **Discharge gas temperature sensor**
  This sensor is used to control the discharge gas temperature, and permits control of the discharge superheat temperature. It is located at the discharge line of the compressor.
- **Motor temperature sensor**
  This sensor is used to control the motor temperature of each compressor.
- **Oil temperature sensor**
  This sensor is used to control the oil temperature of each compressor.
- **Temperature setpoint reset sensor**
  This 4-20 mA sensor can be installed remotely from the unit. It is used to reset the setpoint on the unit.
- **Outdoor temperature sensor**
  This sensor is mounted on the control box of air-cooled units. Outdoor temperature sensor is used for start-up, setpoint temperature reset and frost protection control.
- **Master/slave water sensor (optional)**
  The water temperature sensor is used for master/slave assembly control.

3.8 - Actuators

- **Evaporator pumps**
  The controller can regulate one or two evaporator pumps and takes care of the automatic changeover between these pumps (see also section 7.4).
- **Condenser pump**
  In water-cooled units the controller can regulate one condenser pump.
- **Electronic expansion valve**
  The electronic expansion valve (EXV) is used to adjust the refrigerant flow to changes in the operating conditions of the machine. To adjust the refrigerant flow, a piston moves constantly up or down to vary the cross-section of the refrigerant path. This piston is driven by an electronically controlled linear stepper motor. The high degree of accuracy with which the piston is positioned provides precise control of the refrigerant flow.
- **Water flow switch**
  The water flow switch configuration allows for the automatic control of the minimum water flow setpoint of the water flow switch. The configuration depends on the unit size and is made automatically at the start-up. If the measured water flow rate in the water loop is lower than the configured flow rate, the alarm condition shuts off the unit.

3.9 - Connections at the user terminal block

Connections available at the user terminal block may vary depending on the selected options.

3.9.1 - General description

Some contacts can be accessed only when the unit operates in Remote mode.

The following table summarises the connections at the user terminal block.

Terminal block connections				
Description	**Board**	**Input/Output**	**Connector**	**Remarks**
On/Off switch	SIOB, circuit A	DI-01	J1	Used for the unit on/off control if the unit is in Remote mode
Second setpoint switch	SIOB, circuit A	DI-02	J1	The contact is taken into consideration if the unit is in Remote mode
Demand limit switch 1	SIOB, circuit A	DI-03	J1	Used to control demand limit. See section 7.7
Heat cool select status	SIOB, circuit A	DI-04	J1	Used to select heat cool mode
Condenser flow status (30XW only)	SIOB, circuit A	DI-08	J1	Used to control the condenser status
Setpoint reset control	SIOB, circuit A	AI-10	J9	Allows the customer to reset the currently selected setpoint
Alarm relay	SIOB, circuit A	DO-05	J23	Indicates alarms
Running relay	SIOB, circuit A	DO-06	J22	Indicates if the unit is ready to start or operating
Variable speed pump command (dual-circuit 30XW units and 30XB units with option 17)	SIOB, circuit B	AO-01	J10	Used to command the customer variable speed cooler pump (0-10V). See section 7.4.3
Variable speed pump command (single-circuit 30XW units)	AUX1 #1	AO	J5	Used to command the customer variable speed cooler pump (0-10V). See section 7.4.3
Optional				
Occupancy override	SIOB, EMM	DI-01	J1	Enables to switch between occupied (closed contact) and unoccupied mode (open contact)
Demand limit switch 2	SIOB, EMM	DI-02	J1	Used to control demand limit. See section 7.7
Customer interlock	SIOB, EMM	DI-03	J1	Used for the customer safety loops
Ice done contact	SIOB, EMM	DI-04	J1	Used to control the setpoint according to the occupancy schedule
Capacity limit control	SIOB, EMM	AI-10	J9	Used for capacity limitation
Chiller partially shutdown	SIOB, EMM	DO-05	J23	Indicates the shutdown of one of the circuits
Chiller shutdown	SIOB, EMM	DO-06	J22	Indicates the unit shutdown
Chiller capacity running output (0 to 10 V)	SIOB, EMM	AO-01	J10	Reports the capacity percentage of the unit
Heat reclaim condenser flow status (air-cooled units)	SIOB, Heat reclaim	DI-01	J1	Used to verify the water flow on the condenser side
Heat reclaim enable switch (air-cooled units)	SIOB, Heat reclaim	DI-02	J1	Used to switch between air-condenser (open contact) and water condenser (closed contact) in Remote mode
Free cooling disable switch (air-cooled units)	SIOB, Free cooling	DI-01	J1	Used to control free cooling when the unit is in Remote mode

3.9.2 - Volt-free contact on/off/cooling/heating

If the unit operates in Remote mode, on/off contacts and heating/cooling contacts operate as follows:

Without multiplexing

	Off	**Cooling**	**Heating**
On/Off contact	open	closed	closed
Cooling/heating contact	-	open	closed

With multiplexing

	Off	**Cooling**	**Heating**	**Auto**
On/Off contact	open	closed	closed	open
Cooling/heating contact	open	open	closed	closed

Legend

1. Off: Unit is stopped
2. Cooling: Unit is allowed to start in Cooling
3. Heating: Unit is allowed to start in Heating
4. Auto: Unit can run in Cooling or Heating in accordance with the changeover values.

3.9.3 - Volt-free setpoint selection contact

This dry contact input is used to switch between setpoints. It is active only when the control is in Remote mode.

	Cooling		**Heating**	
	Setpoint 1	**Setpoint 2**	**Setpoint 1**	**Setpoint 2**
Setpoint selection contact	open	closed	open	closed

3.9.4 - Volt-free demand limit selection contact

Up to two dry contacts can be used to limit unit capacity. Note that the second contact is available for units with the energy management module.

Capacity limitation with two contacts is as follows:

	100%	**Limit 1**	**Limit 2**	**Limit 3**
Demand limit 1 contact	open	closed	open	closed
Demand limit 2 contact	open	open	closed	closed

The limits are defined in the SETPOINT menu.

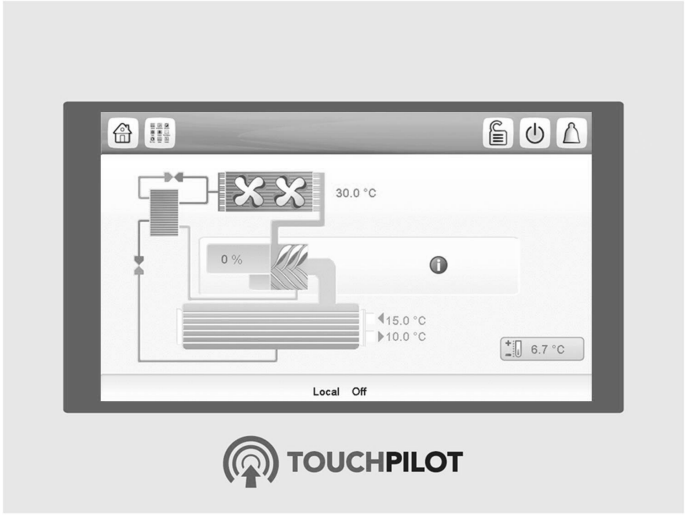
4 - TOUCH PILOT CONTROL INTERFACE

4.1 - General description

Touch Pilot includes the 5 in. touch screen allowing for easy system control. Navigation through the Touch Pilot control is either using the touch screen interface or by connecting to the web interface. It is recommended to use a pen for the navigation via the touch screen.

The navigation menus are the same for both connection methods (Touch Pilot user interface and web browser). Only two web connections are authorised at the same time.

NOTE: Some functionalities are unavailable when using the web browser interface.



4.2 - Screens overview

The Touch Pilot control interface includes the following screens:

- Welcome screen
- Synoptic screen
- Operating mode selection screen
- Data/configuration screens
- Password entry and language selection screen
- Alarms screen
- Parameter modification screen
- Time schedule screen
- Trending visualisation screen

4.3 - Welcome Screen

The Welcome screen is the first screen shown after starting the Touch Pilot user interface. It displays the application name as well as the current software version number.

In order to exit the Welcome screen, press the **Home** button 

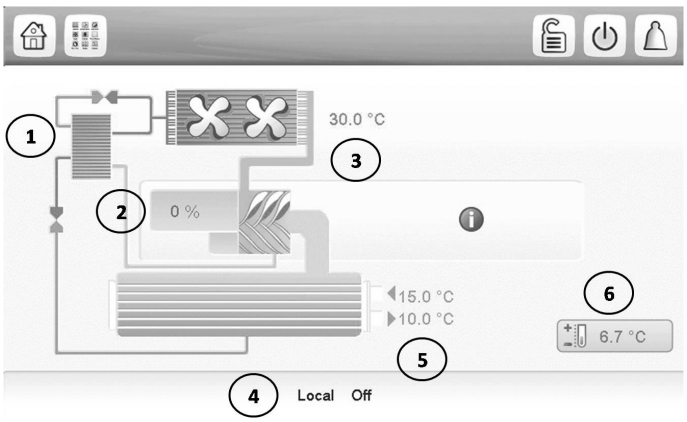
4.4 - Touch Pilot synoptic screen

The Synoptic screen provides an overview of the system control, allowing the user to monitor the vapour-refrigeration cycle. The diagram indicates the current status of the unit, giving information on the unit capacity, the status of condenser and evaporator pump, and the pre-defined setpoint parameter.

All unit functions can be accessed by pressing the **Main menu** button 

The bell located in the upper-right part of the screen lights when any fault is detected (see also section 8.2).

By default, the parameters are presented in metric units. For more information on how to change the system of measurement, see section 4.6.



Legend

1. Economizer
2. Unit capacity percentage
3. Outdoor air temperature
4. Status screen message
5. Evaporator inlet and outlet water temperature
6. Setpoint

NOTE: The synoptic screen display may vary depending on pumps configuration.

Information message box

The information displayed in the status bar at the bottom of the screen includes relevant messages regarding the current user action.

All screens presented further in this manual may display the following messages:

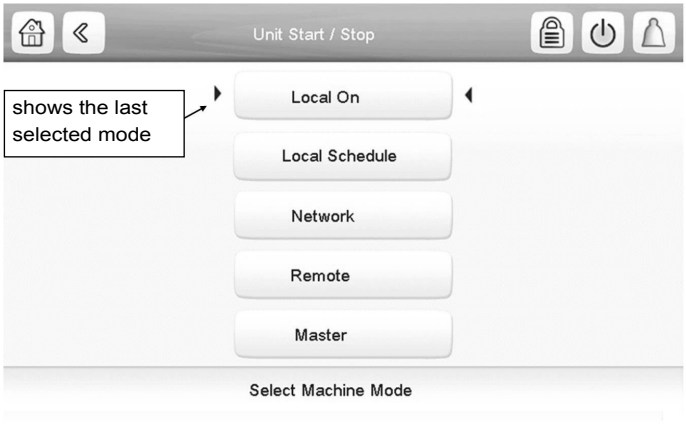
MESSAGE	STATUS
COMMUNICATION FAILURE!	Equipment controller did not respond while reading the table content.
ACCESS DENIED!	Equipment controller denies access to one of the table data blocks.
LIMIT EXCEEDED!	The value entered exceeds the table limits.
Save changes?	Modifications have been made. The exit must be confirmed by pressing Save or Cancel.
HIGHER FORCE IN EFFECT!	Equipment controller rejects Force or Auto command.

4.5 - Start/Stop screen

The Start/Stop screen allows users to select the operating mode of the unit.

4.5.1 - Unit start-up

With the unit in the Local off mode, press the **Start/Stop** button to display the list of operating modes and select the required mode.



NOTE: When entering the menu, please note that the currently selected item corresponds to the last running operating type.

Local On	Local On: The unit is in the local control mode and allowed to start.
Local Schedule	Local Schedule: The unit is in the local control mode and allowed to start if the period is occupied.
Network	Network: The unit is controlled by network commands and allowed to start if the period is occupied.
Remote	Remote: The unit is controlled by external commands and allowed to start if the period is occupied.
Master	Master: The unit operates as the master in the master/slave assembly and allowed to start if the period is occupied.

4.5.2 - Unit stop

In order to stop the unit, press the **Start/Stop** button

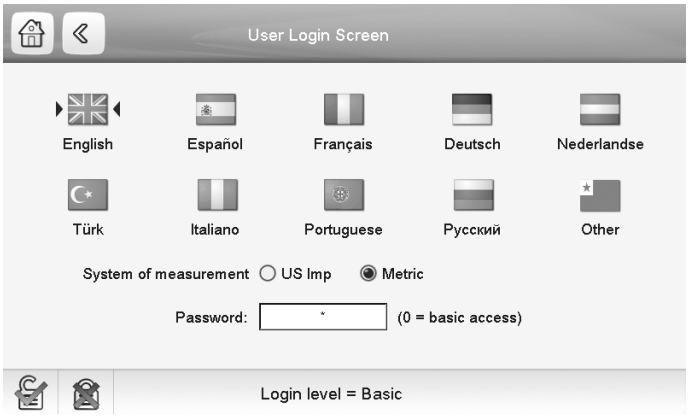
Confirm the unit shutdown by pressing **Confirm Stop** or return to the previous screen by pressing the **Back** button

Once the unit has been stopped, the Synoptic screen will be displayed (see also section 4.4).

4.6 - User Login screen

The User Login screen allows the user to select the language of the controller, change the system of measurement (imperial or metric) and enter a password to gain access to more control options (default password = 11).

The User Login screen can be accessed by pressing the **Log** button in the upper-right corner of the screen (see also section 4.4).



Legend
1. Cursor indicating the selected language
2. Logged-in button
3. Logged-off button
4. System of measurement selection: Metric/Imperial
5. Password dialog box

Once all the changes have been made, press to save or to cancel changes.

NOTE: Password validation is effective only after pressing the Logged-in button.

Security access settings

- User-level security ensures that only authorised users are allowed to modify critical unit parameters.
- Only logged-in users are allowed to access the Configuration menu.
- It is strongly recommended to change the default password of the user interface to exclude the possibility of changing any parameters by an unqualified person.
- Only people qualified to manage the unit should be familiarized with the password.

User password can be modified in the User Configuration menu.

To change your password

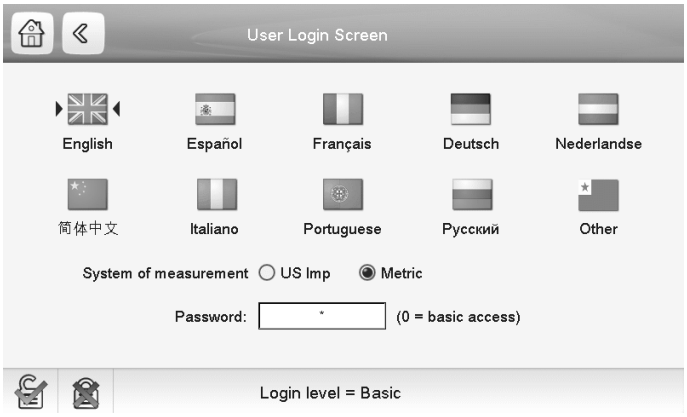
1. Go to the Main Menu.
2. Navigate to the Configuration menu (logged-in users only) and select User Configuration (USERCONF).
3. Select the User Password box and provide your new password.
4. Press OK. The User Configuration screen appears.
5. Press the Save button to save your changes or the Cancel button to exit the screen without making modifications.

4.7 - Language list selection

The control provides two different language lists which means that languages displayed in the User Login screen may vary depending on user preferences ("Language list" parameter in USERCONF - User Configuration).

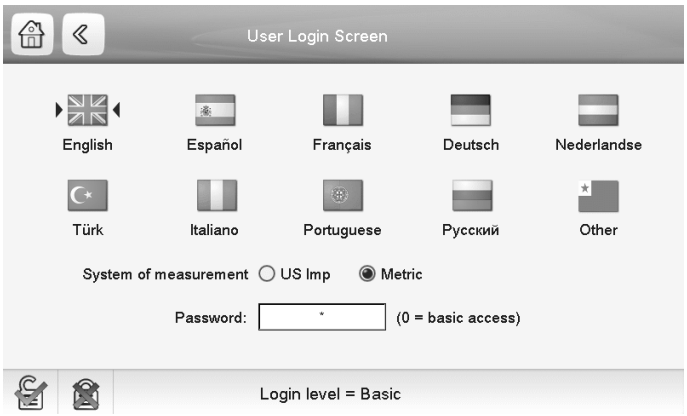
Language list (in USERCONF menu) set to "0":

English, Spanish, French, German, Dutch, Chinese, Italian, Portuguese, Russian, and "other" (custom language).



Language list (in USERCONF menu) set to "1":

English, Spanish, French, German, Dutch, Turkish, Italian, Portuguese, Russian, and "other" (custom language).



Custom language

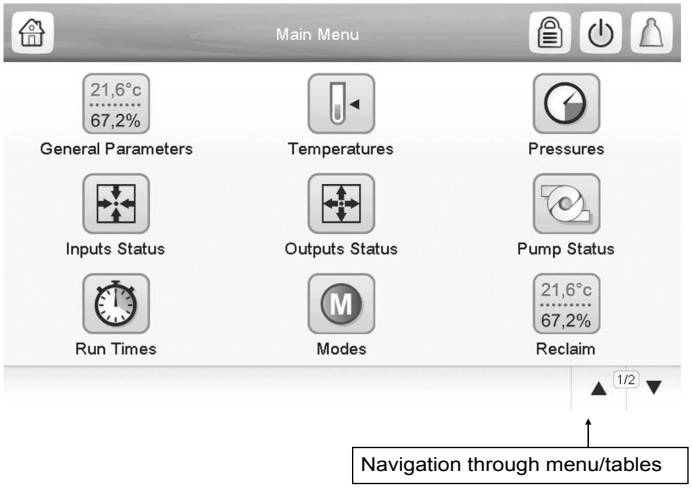
The control system allows users to add new languages to the control. To learn more about language customization, please contact your local Carrier service representative.

NOTE: Custom languages can be uploaded only by Carrier service technicians.

4.8 - Main menu

The Main menu provides access to the main control parameters, including general parameters, inputs and outputs status, etc.

In order to access the menu, press the **Main menu** button located in the upper-left part of the Synoptic screen (see also section 4.4).

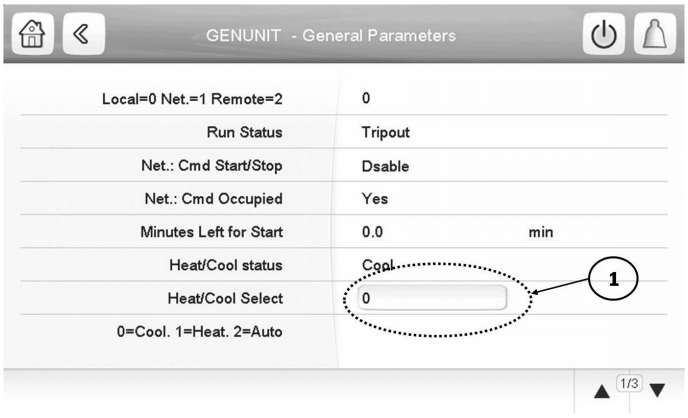


Specific unit parameters table/menu can be accessed by pressing the icon corresponding to the desired category. In order to go back to the Synoptic screen, press

4.8.1 - General parameters screen

The General parameters screen provides access to a set of general unit parameters.

To access the General parameters screen, go to the Main menu and select **General Parameters** 21,6°c 67,2%

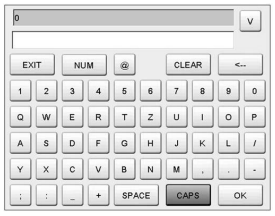


Legend
1. Forceable point

Press the **Up/Down** buttons ▲ ▼ to navigate between the screens.

4.8.2 - Parameter modification

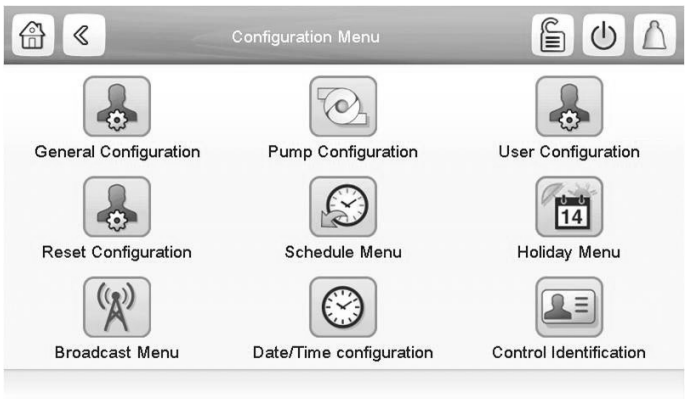
When the user selects the parameter to be modified, the following screen is displayed.



Press **OK** to save or **EXIT** to cancel the modification.

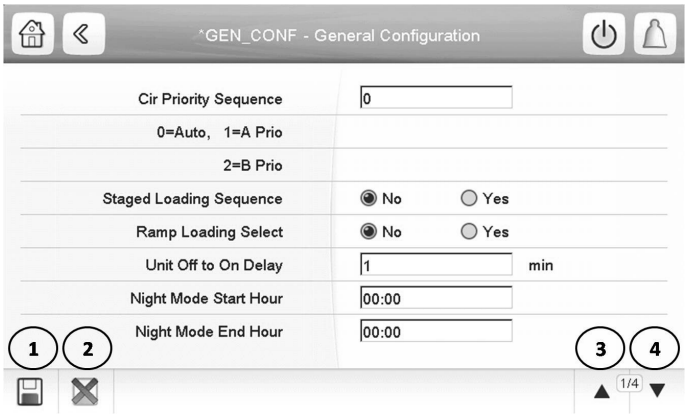
4.9 - Configuration menu

The Configuration menu gives access to a number of user-modifiable parameters such as pump configuration, schedule menu, etc.



General configuration screen

To access the General configuration screen, go to the Configuration menu and select General Configuration



Legend
1. Save
2. Cancel
3. Previous page
4. Next page

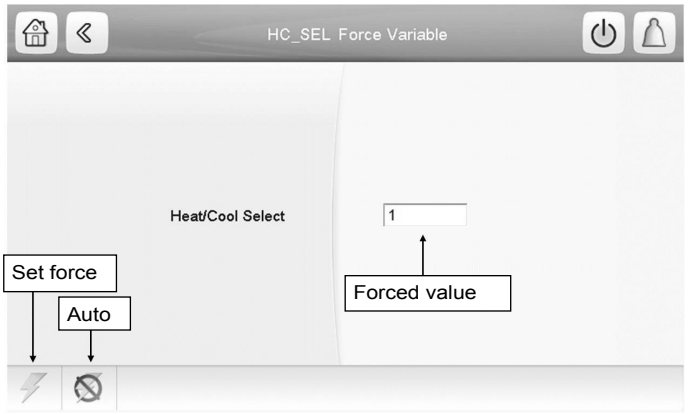
Press the field corresponding to the parameter to be modified and introduce all the necessary changes.

Press the **Up/Down** buttons ▲ ▼ to navigate between the screens.

Once all the necessary modifications have been made, press to confirm or to cancel changes.

4.10 - Override screen

The override screen provides the option to issue the command overriding the current operation of the unit. To access the override screen, press the forceable point of the data screen.



Press to set or to remove the forced point.

4.11 - Schedule screen

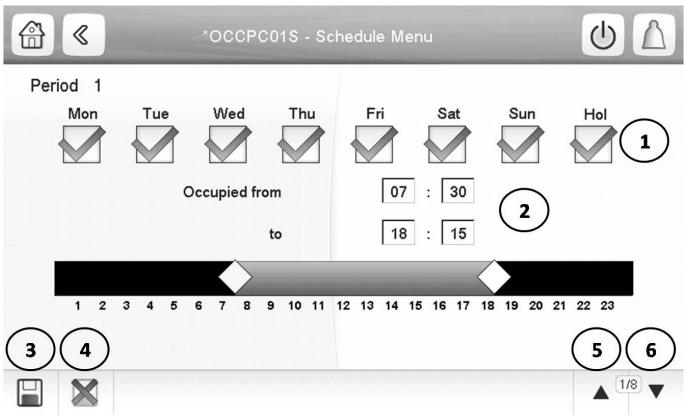
The control incorporates two time schedules, where the first one (OCCPC01S) is used for controlling the unit start/stop, whereas the second one (OCCPC02S) is used for controlling the dual setpoint.

To access the Schedule screen, go to the Configuration menu and select **Schedule** Menu

Set the time schedule and the selected period will be presented in the form of the green band on the timeline.

Press to confirm or to cancel changes.

Each program is in unoccupied mode unless a schedule time period is active. If two periods overlap and are both active on the same day, the occupied mode takes priority over the unoccupied period.



Legend
1. Selection of the applicable days for the time schedule
2. Modification of the period: start time and end time
3. Save
4. Cancel
5. Previous time period
6. Next time period

5 - WEB CONNECTION

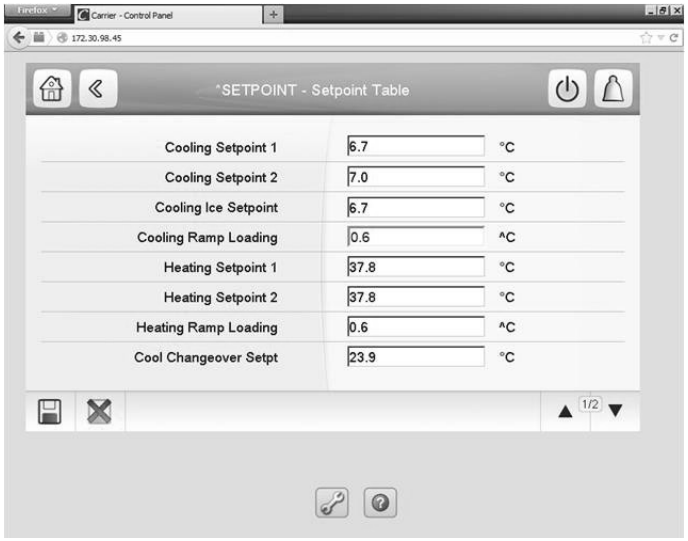
The Touch Pilot system control can be accessed via a web browser (Internet Explorer, Mozilla Firefox, etc.). Connection is from a PC using a web browser with Java.

CAUTION: PCD controllers accessible via the Internet must be protected by firewall and VPN connection.

5.1 - Web interface access

In order to access Touch Pilot, enter the IP address of the unit in the address bar of the web browser.

Unit default address: 169.254.0.1.



NOTE: Only two web connections may be authorised at the same time.

5.2 - Web browser configuration

Minimum web browser configuration:

- Internet Explorer (version 8 or higher) or Mozilla Firefox (version 26 or higher). In the advanced connection options add the unit IP address to the exceptions list. Do not use a proxy server.
- Java platform (version 6 or higher). In the control panel, clear the Keep temporary files on my computer checkbox and use a direct connection.

NOTE: Two users can be connected simultaneously with no priority between them. The last modification is taken into account.

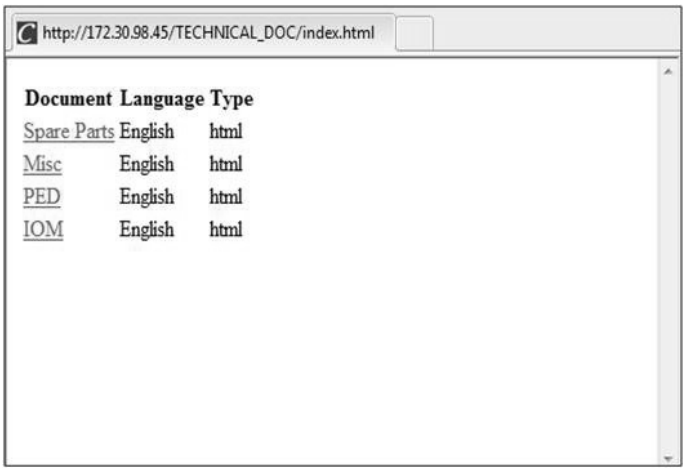
5.3 - Technical documentation access

When the Touch Pilot control is used via a PC web browser, the controller allows the user to access the technical documentation for the product.

Press the **Technical document** button  to access a list of documents related to the unit and its components.

Technical documentation includes the following documents:

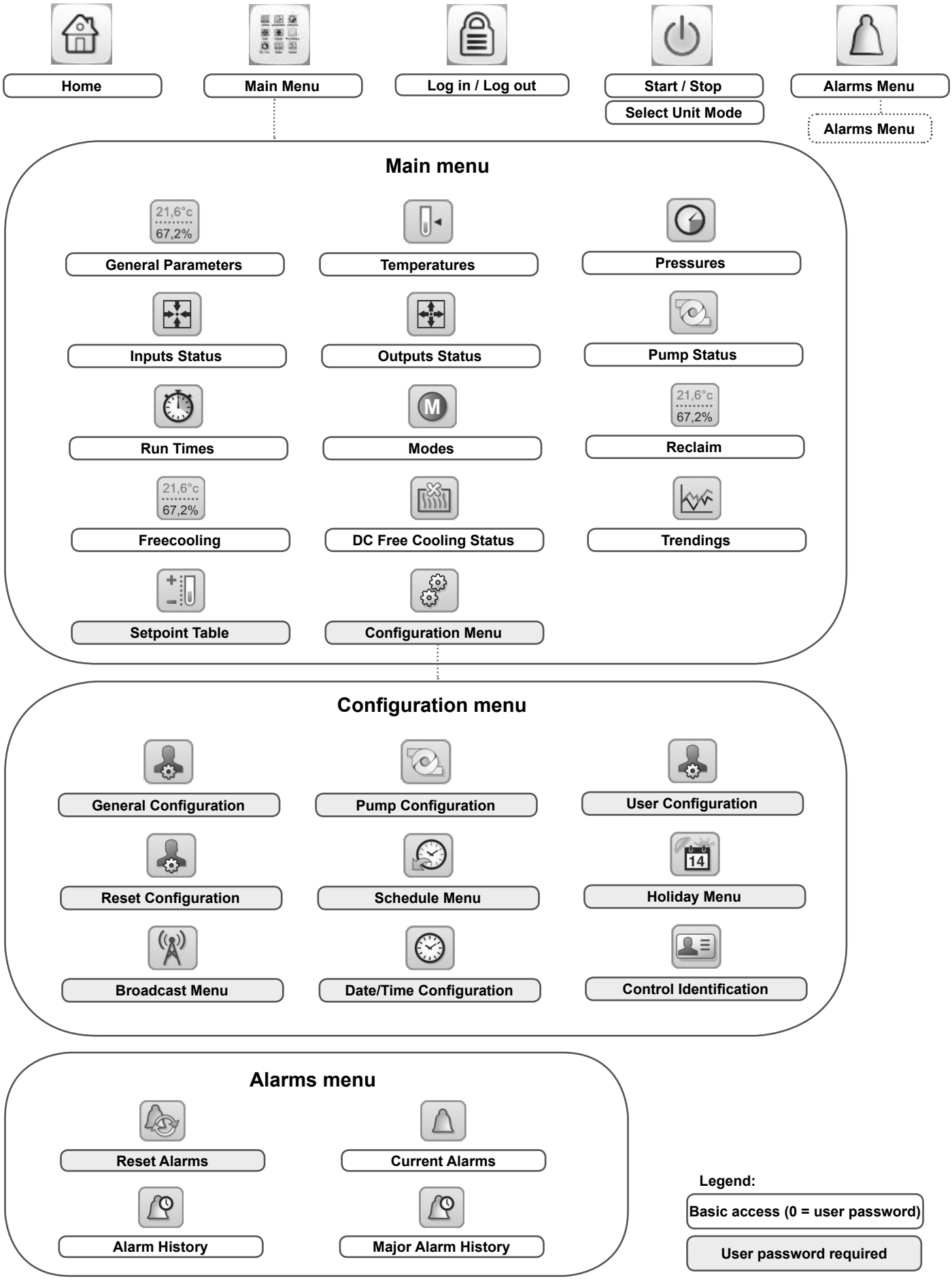
- Spare parts documentation: The list of spare parts included in the unit with reference, description and drafting.
- Misc: Documents such as regulation algorithm, electrical plans, dimension plans, unit certificates.
- PED: Pressure Equipment Directive.
- IOM: Installation operation and maintenance manual, controls installation/maintenance manual.



IMPORTANT: Please save all data (documents, drawings, diagrams, etc.), for example, on your computer. If display memory is erased or the display is replaced, all documents will be lost. Make sure that all documents are stored and may be accessed at any time.

6 - TOUCH PILOT INTERFACE DETAILS

6.1 - Menu structure



6.2 - Detailed menu description

Icon	Displayed text*	Description	Associated table
	General Parameters	General parameters	GENUNIT
	Temperatures	Temperatures	TEMP
	Pressures	Pressures	PRESSURE
	Inputs Status	Inputs status	INPUTS
	Outputs Status	Outputs status	OUTPUTS
	Pump Status	Pump status	PUMPSTAT
	Run Times	Run times	RUNTIME
	Modes	Modes	MODES
	Reclaim	Reclaim	RECLAIM
	DC Free Cooling Status	Dry Cooler Free Cooling status	DCFC_STA
	Freecooling	Free cooling	FREECOOL
	Setpoint Table	Setpoint table	SETPOINT
	Trendings	Trendings	TRENDING
	Configuration Menu	Configuration menu	CONFIG

* Depends on the selected language (English by default).

GENUNIT – General parameters

No.	Status	Unit	Displayed text*	Description
1	0 to 3	-	Local=0 Net.=1 Remote=2	Operating mode: 0 = Local 1 = Network 2 = Remote
2	-	-	Run Status	Unit running status: Off, Stopping, Delay, Running, Ready, Override, Tripout, Test, Runtest
3	0 to 1	-	Net.: Cmd Start/Stop	Unit start/stop via Network
4	0 to 1	-	Net.: Cmd Occupied	Unit time schedule via Network
5	-	min	Minutes Left for Start	Minutes before the unit start-up
6	-	-	Heat/Cool status	Heating/cooling status
7	0 to 2	-	Heat/Cool Select	Heating/cooling selection
8	-	-	0=Cool. 1=Heat. 2=Auto	0 = Cooling 1 = Heating 2 = Automatic heating/cooling control
9	0 to 2	-	Setpoint Select	Setpoint selection
10	-	-	0=Auto. 1=Spt1. 2=Spt2	0 = Automatic setpoint selection 1 = Setpoint 1 2 = Setpoint 2
11	0 to 1	-	Setpoint Occupied?	Setpoint status
12	0 to 100	%	Percent Total Capacity	Total unit capacity

GENUNIT – General parameters (continued)

No.	Status	Unit	Displayed text*	Description
13	-	A	Actual Chiller Current	Actual chiller current
14	0 to 200	A	Chiller Current Limit	Chiller current limit
15	-	°C	Current Setpoint	Current setpoint value
16	-	-	Control Point	Control point
17	0 to 1	-	Emergency Stop	Emergency stop
18	0 to 100	%	Active Demand Limit Val	Active demand limit value
19	0 to 100	%	Actual Capacity cir A	Circuit A running capacity in %
20	0 to 100	%	Actual Capacity cir B	Circuit B running capacity in %
21	0 to 100	%	Actual Capacity cir C	Circuit C running capacity in %

* Depends on the selected language (English by default)

TEMP – Temperatures

No.	Status	Unit	Displayed text*	Description
1	-	°C	Cooler Entering Fluid	Evaporator entering water temperature
2	-	°C	Cooler Leaving Fluid	Evaporator leaving water temperature
3	-	°C	Condenser Entering Fluid	Condenser entering water temperature
4	-	°C	Condenser Leaving Fluid	Condenser leaving water temperature
5	-	°C	Saturated Cond Tmp cir A	Saturated condensing temperature, circuit A
6	-	°C	Saturated Suction Temp A	Saturated suction temperature, circuit A
7	-	°C	Compressor Suction Tmp A	Compressor suction temperature, circuit A
8	-	°C	Discharge Gas Temp cir A	Discharge gas temperature, circuit A
9	-	°C	Motor Temperature cir A	Motor temperature, circuit A
10	-	°C	Saturated Cond Tmp cir B	Saturated condensing temperature, circuit B
11	-	°C	Saturated Suction Temp B	Saturated suction temperature, circuit B
12	-	°C	Compressor Suction Tmp B	Compressor suction temperature, circuit B
13	-	°C	Discharge Gas Temp cir B	Discharge gas temperature, circuit B
14	-	°C	Motor Temperature cir B	Motor temperature, circuit B
15	-	°C	Saturated Cond Tmp cir C	Saturated condensing temperature, circuit C
16	-	°C	Saturated Suction Temp C	Saturated suction temperature, circuit C
17	-	°C	Compressor Suction Tmp C	Compressor suction temperature, circuit C
18	-	°C	Discharge Gas Temp cir C	Discharge gas temperature, circuit C
19	-	°C	Motor Temperature cir C	Motor temperature, circuit C
20	-	°C	Optional Space Temp	Optional space temperature
21	-	°C	CHWS Temperature	Master/slave common water temperature
22	-	°C	CHWS Heat Temp	Master/Slave common heat fluid temperature (available depending on unit configuration)
23	-	°C	External Temperature	External temperature
24	-	°C	Cooler Heater Temp	Evaporator heater temperature
25	-	°C	Circuit C Heater Temp	Heater temperature, circuit C
26	-	°C	Economizer Gas Temp A	Economizer gas temperature, circuit A
27	-	°C	Economizer Gas Temp B	Economizer gas temperature, circuit B
28	-	°C	Economizer Gas Temp C	Economizer gas temperature, circuit C
29	-	°C	Dry Cool Leav Water Tmp	Dry Cooler Leaving Water Temperature (units fitted with a dry cooler)

* Depends on the selected language (English by default).

PRESSURE – Pressures

No.	Status	Unit	Displayed text*	Description
1	-	kPa	Discharge Pressure A	Discharge pressure, circuit A
2	-	kPa	Main Suction Pressure A	Suction pressure, circuit A
3	-	kPa	Oil Pressure A	Oil pressure, circuit A
4	-	kPa	Oil Pressure DifferenceA	Oil pressure difference, circuit A
5	-	kPa	Economizer Pressure A	Economizer pressure, circuit A
6	-	kPa	Discharge Pressure B	Discharge pressure, circuit B
7	-	kPa	Main Suction Pressure B	Suction pressure, circuit B

PRESSURE – Pressures (continued)

No.	Status	Unit	Displayed text*	Description
8	-	kPa	Oil Pressure B	Oil pressure, circuit B
9	-	kPa	Oil Pressure DifferenceB	Oil pressure difference, circuit B
10	-	kPa	Economizer Pressure B	Economizer pressure, circuit B
11	-	kPa	Discharge Pressure C	Discharge pressure, circuit C
12	-	kPa	Main Suction Pressure C	Suction pressure, circuit C
13	-	kPa	Oil Pressure C	Oil pressure, circuit C
14	-	kPa	Oil Pressure DifferenceC	Oil pressure difference, circuit C
15	-	kPa	Economizer Pressure C	Economizer pressure, circuit C

* Depends on the selected language (English by default)

INPUTS – Inputs status

No.	Status	Unit	Displayed text*	Description
1	open/close	-	Remote On/Off Switch	Remote On/Off switch
2	open/close	-	Remote HeatCool Switch	Remote heating/cooling selection switch
3	open/close	-	Remote Reclaim Switch	Remote reclaim switch
4	open/close	-	Free Cooling Disable Sw	Free cooling disable switch
5	open/close	-	Remote Setpoint Switch	Setpoint selection switch
6	open/close	-	Limit Switch 1	Demand limit switch 1
7	open/close	-	Limit Switch 2	Demand limit switch 2
8	open/close	-	Oil Level Input A	Oil level input, circuit A
9	open/close	-	Oil Level Input B	Oil level input, circuit B
10	open/close	-	Oil Level Input C	Oil level input, circuit C
11	-	A	Motor Current A	Motor current, circuit A
12	-	A	Motor Current B	Motor current, circuit B
13	-	A	Motor Current C	Motor current, circuit C
14	-	mA	Reset/Setpnt4-20mA Sgnl	4-20 mA signal, setpoint reset
15	open/close	-	Customer Interlock	Customer interlock
16	open/close	-	Ice Done Storage Switch	Ice storage end switch
17	open/close	-	Occupied Override Switch	Occupied override switch
18	-	mA	Limit 4-20mA Signal	4-20 mA signal, capacity limit
19	open/close	-	Electrical Box Interlock	Electrical box interlock
20	open/close	-	Cooler Heater command	Evaporator heater command
21	no/yes	-	BACnet Dongle	BACnet dongle
22	-	V	Leakage detector 1 val	Leakage detection (Refrigerant leak detection option)
23	-	V	Leakage detector 2 val	Leakage detection (Refrigerant leak detection option)
24	off/on	-	ElecBoxFan1 input state	Electrical Box Fan status 1 (units with HFO)
25	off/on	-	ElecBoxFan2 input state	Electrical Box Fan status 2 (units with HFO)
26	off/on	-	ElecBoxFan3 input state	Electrical Box Fan status 3 (units with HFO)

* Depends on the selected language (English by default).

OUTPUTS – Output status

No.	Status	Unit	Displayed text*	Description
1	off/on	-	Compressor A	Compressor A status
2	off/on	-	Oil Solenoid Output A	Oil solenoid output, circuit A
3	off/on	-	Slide Valve 1 Output A	Slide valve 1 output, circuit A
4	off/on	-	Slide Valve 2 Output A	Slide valve 2 output, circuit A
5	-	V	Capacity Signal Cir A	0-10 V capacity signal, circuit A
6	off/on	-	Compressor B	Compressor B status
7	off/on	-	Oil Solenoid Output B	Oil solenoid output, circuit B
8	off/on	-	Slide Valve 1 Output B	Slide valve 1 output, circuit B
9	off/on	-	Slide Valve 2 Output B	Slide valve 2 output, circuit B
10	-	V	Capacity Signal Cir B	0-10 V capacity signal, circuit B
11	off/on	-	Compressor C	Compressor C status
12	off/on	-	Oil Solenoid Output C	Oil solenoid output, circuit C
13	off/on	-	Slide Valve 1 Output C	Slide valve 1 output, circuit C
14	off/on	-	Slide Valve 2 Output C	Slide valve 2 output, circuit C
15	-	V	Capacity Signal Cir C	0-10 V capacity signal, circuit C

OUTPUTS – Output status (continued)

No.	Status	Unit	Displayed text*	Description
16	-	V	Chiller Capacity signal	Chiller capacity signal
17	off/on	-	Alarm Relay Status	Alarm relay status
18	off/on	-	Running Relay Status	Running relay status
19	off/on	-	Alert Relay State	Alert relay state
20	off/on	-	Shutdown Indicator State	Shutdown indicator status
21	0 to 100	%	Cond 3 Way Valve Pos	Condenser 3-way valve position
22	off/on	-	Cooler Heater Command	Evaporator heater command status
23	off/on	-	Ready or Running Status	Unit ready/running status
24	off/on	-	Reclaim Condenser Heater	Reclaim condenser heater status
25	off/on	-	Ball Valve Close Out A	Ball valve close output, circuit A
26	off/on	-	Ball Valve Open OutA	Ball valve open output, circuit A
27	off/on	-	Ball Valve Close Out B	Ball valve close output, circuit B
28	off/on	-	Ball Valve Open OutB	Ball valve open output, circuit B
29	off/on	-	Ball Valve Close Out C	Ball valve close output, circuit C
30	off/on	-	Ball Valve Open Out C	Ball valve open output, circuit C
31	-	-	Fan Staging Number A	Fan stage, circuit A
32	-	-	Fan Staging Number B	Fan stage, circuit B
33	-	-	Fan Staging Number C	Fan stage, circuit C
34	0 to 100	%	Head Press Act Pos A	Head pressure control – actuator position, circuit A
35	0 to 100	%	Head Press Act Pos B	Head pressure control – actuator position, circuit B
36	0 to 100	%	Head Press Act Pos C	Head pressure control – actuator position, circuit C
37	off/on	-	Oil Heater Output A	Oil heater output, circuit A
38	off/on	-	Oil Heater Output B	Oil heater output, circuit B
39	off/on	-	Oil Heater Output C	Oil heater output, circuit C
40	off/on	-	4 Way Refrig Valve A	4-way refrigerant valve position, circuit A
41	off/on	-	4 Way Refrig Valve B	4-way refrigerant valve position, circuit B
42	close/open	-	Ball Valve Position A	Ball valve position, circuit A
43	close/open	-	Ball Valve Position B	Ball valve position, circuit B
44	close/open	-	Ball Valve Position C	Ball valve position, circuit C
45	off/on	-	Alarm Relay Status	Alarm relay output status
46	off/on	-	Electrical Box Fan sw	Electrical box fan status (units with HFO)
47	0 to 10	-	Dry Cool Vfan1 Output	Dry cooler – variable speed fan 1
48	0 to 10	-	Dry Cool Vfan2 Output	Dry cooler – variable speed fan 2
49	off/on	-	Dry Cool fan stage 1	Dry cooler fan stage 1
50	off/on	-	Dry Cool fan stage 2	Dry cooler fan stage 2
51	off/on	-	Dry Cool fan stage 3	Dry cooler fan stage 3
52	off/on	-	Dry Cool fan stage 4	Dry cooler fan stage 4
53	off/on	-	Dry Cool fan stage 5	Dry cooler fan stage 5
54	off/on	-	Dry Cool fan stage 6	Dry cooler fan stage 6
55	off/on	-	Dry Cool fan stage 7	Dry cooler fan stage 7
56	off/on	-	Dry Cool fan stage 8	Dry cooler fan stage 8

* Depends on the selected language (English by default).

PUMPSTAT – Pump status

No.	Status	Unit	Displayed text*	Description
1	no/yes	-	Cooler Flow Setpoint Out	Evaporator flow setpoint output
2	0 to 1	-	Cooler Pump #1 Command	Evaporator pump 1 control
3	0 to 1	-	Cooler Pump #2 Command	Evaporator pump 2 control
4	0 to 1	-	Rotate Cooler Pumps ?	Evaporator pumps rotation
5	open/close	-	Cooler Flow Switch	Evaporator flow switch
6	0 to 1	-	Condenser Pump Command1	Condenser pump 1 control
7	0 to 1	-	Condenser Pump Command2	Condenser pump 2 control (not available!)
8	0 to 1	-	Rotate Condenser Pumps ?	Condenser pumps rotation (not available!)
9	-	kPa	Water pres before cooler	Evaporator entering water pressure
10	-	kPa	Water pres after cooler	Evaporator leaving water pressure
11	-	kPa	Water pres before filter	Filter entering water pressure
12	-	kPa	Water pres after filter	Filter leaving water pressure
13	-	l/s	Water flow	Water flow rate
14	-	kW	Cooling power	Cooling power
15	open/close	-	Condenser Flow Status	Condenser flow status
16	0 to 100	%	Variable speed pump cmd	Variable speed pump command

* Depends on the selected language (English by default).

6 - TOUCH PILOT INTERFACE DETAILS

RUNTIME – Run times

No.	Status	Unit	Displayed text*	Description
1	-	hour	Machine Operating Hours	Unit operating hours
2	-	-	Machine Starts Number	Number of unit starts
3	-	hour	Compressor A Hours	Operating hours, compressor A
4	-	-	Compressor A Starts	Number of starts, compressor A
5	-	hour	Compressor B Hours	Operating hours, compressor B
6	-	-	Compressor B Starts	Number of starts, compressor B
7	-	hour	Compressor C Hours	Operating hours, compressor C
8	-	-	Compressor C Starts	Number of starts, compressor C
9	-	hour	Cooler Pump #1 Hours	Operating hours, evaporator pump 1
10	-	hour	Cooler Pump #2 Hours	Operating hours, evaporator pump 2
11	-	hour	Condenser Pump #1 Hours	Operating hours, condenser pump 1
12	-	hour	Condenser Pump #2 Hours	Operating hours, condenser pump 2 (not available!)
13	-	hour	Free Cool A Pump Hours	Pump operating hours in Free Cooling, circuit A
14	-	hour	Free Cool B Pump Hours	Pump operating hours in Free Cooling, circuit B

* Depends on the selected language (English by default).

NOTE: The displayed run times are updated every hour.

MODES – Modes

No.	Status	Unit	Displayed text*	Description
1	no/yes	-	Start Up Delay In Effect	Start-up delay in effect
2	no/yes	-	Second Setpoint In Use	Second setpoint in use
3	no/yes	-	Reset In Effect	Setpoint reset active
4	no/yes	-	Demand limit Active	Demand limit active
5	no/yes	-	Ramp Loading Active	Ramp loading active
6	no/yes	-	Cooler Heater Active	Evaporator heater active
7	no/yes	-	Cooler Pump Rotation	Evaporator pump rotation
8	no/yes	-	Pump Periodic Start	Pump periodic start active
9	no/yes	-	Night Low Noise Active	Night low noise active
10	no/yes	-	Master Slave Active	Master/slave mode active
11	no/yes	-	Auto Changeover Active	Automatic changeover active
12	no/yes	-	Heating Low EWT Lockout	Heating low EWT lockout
13	no/yes	-	Condenser Pump Rotation	Condenser pump rotation (not available!)
14	no/yes	-	Cond Pump Periodic Start	Condenser pump periodic start
15	no/yes	-	Ice Mode In Effect	Ice storage mode active
16	no/yes	-	Defrost Active On Cir A	Defrost mode active, circuit A
17	no/yes	-	Defrost Active On Cir B	Defrost mode active, circuit B
18	no/yes	-	Free Cooling Active	Free cooling mode active
19	no/yes	-	Reclaim Active	Reclaim mode active
20	no/yes	-	Low Suction Circuit A	Low suction, circuit A
21	no/yes	-	Low Suction Circuit B	Low suction, circuit B
22	no/yes	-	Low Suction Circuit C	Low suction, circuit C
23	no/yes	-	Map compressor Circuit A	Compressor mapping, circuit A
24	no/yes	-	Map compressor Circuit B	Compressor mapping, circuit B
25	no/yes	-	Map compressor Circuit C	Compressor mapping, circuit C
26	no/yes	-	High Pres Override Cir A	High pressure override, circuit A
27	no/yes	-	High Pres Override Cir B	High pressure override, circuit B
28	no/yes	-	High Pres Override Cir C	High pressure override, circuit C

* Depends on the selected language (English by default).

RECLAIM – Reclaim

No.	Status	Unit	Displayed text*	Description
1	0 to 1	-	Heat Reclaim Select	Heat reclaim selection
2	-	°C	Reclaim Entering Fluid	Reclaim entering water temperature
3	-	°C	Reclaim Leaving Fluid	Reclaim leaving water temperature
4	0 to 100	%	Reclaim Valve Position	Reclaim valve position
5	-	-	Reclaim Status Circuit A	Reclaim status, circuit A
6	-	kPa	Pumpdown Pressure Cir A	Pump-down pressure, circuit A
7	-	°C	Sub Condenser Temp Cir A	Subcooling condenser temperature, circuit A
8	-	°C	Pumpdown Saturated Tmp A	Pump-down saturated temperature, circuit A
9	-	^C	Subcooling Temperature A	Subcooling temperature, circuit A
10	off/on	-	Air Cond Entering Valv A	Air condenser entering valve status, circuit A
11	off/on	-	Water Cond Enter Valve A	Water condenser entering valve status, circuit A
12	off/on	-	Air Cond Leaving Valve A	Air condenser leaving valve status, circuit A
13	off/on	-	Water Cond Leaving Val A	Water condenser leaving valve status, circuit A
14	-	-	Reclaim Status Circuit B	Reclaim status, circuit B
15	-	kPa	Pumpdown Pressure Cir B	Pump-down pressure, circuit B
16	-	°C	Sub Condenser Temp Cir B	Subcooling condenser temperature, circuit B
17	-	°C	Pumpdown Saturated Tmp B	Pump-down saturated temperature, circuit B
18	-	^C	Subcooling Temperature B	Subcooling temperature, circuit B
19	off/on	-	Air Cond Entering Valv B	Air condenser entering valve status, circuit B
20	off/on	-	Water Cond Enter Valve B	Water condenser entering valve status, circuit B
21	off/on	-	Air Cond Leaving Valve B	Air condenser leaving valve status, circuit B
22	off/on	-	Water Cond Leaving Val B	Water condenser leaving valve status, circuit B

* Depends on the selected language (English by default).

DCFC_STA – DC Free Cooling Status Menu

No.	Status	Unit	Displayed text*	Description
1	-	°C	OAT Free Cooling	Free Cooling / Dry Cooler: OAT
2	-	°C	FC Leaving Water Temp	Free Cooling / Dry Cooler: Leaving water temperature
3	-	°C	FC Water Loop Temp	Free Cooling / Dry Cooler: Water loop temperature
4	no/yes	-	Free Cooling Mode Active	Dry Cooler Free Cooling mode active
5	0 to 100	%	FC Capacity	Free Cooling / Dry Cooler capacity
6	0 to 20	-	Fix Speed Fans Stage	Free Cooling / Dry Cooler fan stage (fixed speed fans)
7	0 to 100	%	Varifan Speed	Free Cooling / Dry Cooler: Fan speed
8	0 to 100	%	PID Output Value	Status of PID output
9	0 to 999999	hour	DCFC Operating Hours	Free Cooling / Dry Cooler: Operating hours
10	0 to 999999	-	DCFC Fan Stage 1 Start	DCFC / Fan stage 1: Number of starts
11	0 to 999999	hour	DCFC Fan Stage 1 Hours	DCFC / Fan stage 1: Operating hours
12	0 to 999999	-	DCFC Fan Stage 2 Start	DCFC / Fan stage 2: Number of starts
13	0 to 999999	hour	DCFC Fan Stage 2 Hours	DCFC / Fan stage 2: Operating hours
14	0 to 999999	-	DCFC Fan Stage 3 Start	DCFC / Fan stage 3: Number of starts
15	0 to 999999	hour	DCFC Fan Stage 3 Hours	DCFC / Fan stage 3: Operating hours
16	0 to 999999	-	DCFC Fan Stage 4 Start	DCFC / Fan stage 4: Number of starts
17	0 to 999999	hour	DCFC Fan Stage 4 Hours	DCFC / Fan stage 4: Operating hours
18	0 to 999999	-	DCFC Fan Stage 5 Start	DCFC / Fan stage 5: Number of starts
19	0 to 999999	hour	DCFC Fan Stage 5 Hours	DCFC / Fan stage 5: Operating hours
20	0 to 999999	-	DCFC Fan Stage 6 Start	DCFC / Fan stage 6: Number of starts
21	0 to 999999	hour	DCFC Fan Stage 6 Hours	DCFC / Fan stage 6: Operating hours
22	0 to 999999	-	DCFC Fan Stage 7 Start	DCFC / Fan stage 7: Number of starts
23	0 to 999999	hour	DCFC Fan Stage 7 Hours	DCFC / Fan stage 7: Operating hours
24	0 to 999999	-	DCFC Variable Fan Start	DCFC / Variable speed fan: Number of starts
25	0 to 999999	hour	DCFC Variable Fan Hours	DCFC / Variable speed fan: Operating hours

* Depends on the selected language (English by default).

FREECOOL – Free cooling

No.	Status	Unit	Displayed text*	Description
1	-	-	GENERAL PARAMETERS	GENERAL PARAMETERS
2	0 to 1	-	Free Cooling Disable?	Free cooling mode status
3	-	^C	LWT-OAT Delta	LWT – OAT Delta
4	-	-	CIRCUIT A	Circuit A
5	-	kW	Mechanical Cooling Power	Mechanical cooling power
6	-	kW	Free Cooling Maxi Power	Free cooling maximum power
7	-	min	Next session allowed in	Next session allowed after the specified time
8	-	min	Cooling/FreeCool Timeout	Cooling/free cooling timeout
9	no/yes	-	Free Cool Conditions OK?	Optimal free cooling conditions
10	no/yes	-	Free Cool Request ?	Free cooling request
11	off/on	-	Free Cooling Heaters ?	Free cooling heaters status
12	no/yes	-	Free Cooling Active	Free cooling status
13	-	-	Fan Staging Number	Fan stage
14	off/on	-	Discharge valve Open out	Discharge valve open output
15	off/on	-	Dischrge valve Close out	Discharge valve close output
16	-	-	Discharge valve status	Discharge valve status
17	off/on	-	Bypass valve Open out	Bypass valve open output
18	off/on	-	Bypass valve Close out	Bypass valve close output
19	-	-	Bypass valve status	Bypass valve status
20	off/on	-	Refrigerant Pump Out	Refrigerant pump output
21	-	kPa	Pump Inlet Pressure	Pump inlet pressure
22	-	kPa	Pump Outlet Pressure	Pump outlet pressure
23	-	kPa	Pump Differential Press.	Pump differential pressure
24	0 to 100	%	EXV position	EXV position
25	-	°C	Free cooling Liquid Tmp	Free cooling liquid temperature
26	-	^C	Free cooling Subcool Tmp	Free cooling subcooling temperature
27	-	^C	Free cooling Subcool Spt	Free cooling subcooling setpoint
28	-	-	CIRCUIT B	Circuit B
29	-	kW	Mechanical Cooling Power	Mechanical cooling power
30	-	kW	Free Cooling Maxi Power	Free cooling maximum power
31	-	min	Next session allowed in	Next session allowed after the specified time
32	-	min	Cooling/FreeCool Timeout	Cooling/free cooling timeout
33	no/yes	-	Free Cool Conditions OK?	Optimal free cooling conditions
34	no/yes	-	Free Cool Request ?	Free cooling request
35	off/on	-	Free Cooling Heaters ?	Free cooling heaters status
36	no/yes	-	Free Cooling Active	Free cooling status
37	-	-	Fan Staging Number	Fan stage
38	off/on	-	Discharge valve Open out	Discharge valve open output
39	off/on	-	Dischrge valve Close out	Discharge valve close output
40	-	-	Discharge valve status	Discharge valve status
41	off/on	-	Bypass valve Open out	Bypass valve open output
42	off/on	-	Bypass valve Close out	Bypass valve close output
43	-	-	Bypass valve status	Bypass valve status
44	off/on	-	Refrigerant Pump Out	Refrigerant pump output
45	-	kPa	Pump Inlet Pressure	Pump inlet pressure
46	-	kPa	Pump Outlet Pressure	Pump outlet pressure
47	-	kPa	Pump Differential Press.	Pump differential pressure
48	0 to 100	%	EXV position	EXV position
49	-	°C	Free cooling Liquid Tmp	Free cooling liquid temperature
50	-	^C	Free cooling Subcool Tmp	Free cooling subcooling temperature
51	-	^C	Free cooling Subcool Spt	Free cooling subcooling setpoint

* Depends on the selected language (English by default).

SETPOINT – Setpoint table

No.	Status	Default	Unit	Displayed text*	Description
1	-28.9 to 26	6.7	°C	Cooling Setpoint 1	Cooling setpoint 1
2	-28.9 to 26	6.7	°C	Cooling Setpoint 2	Cooling setpoint 2
3	-28.9 to 26	6.7	°C	Cooling Ice Setpoint	Ice storage setpoint
4	0.1 to 11.1	0.6	^C	Cooling Ramp Loading	Cooling ramp loading setpoint
5	26.7 to 63**	37.8	°C	Heating Setpoint 1**	Heating setpoint 1
6	26.7 to 63**	37.8	°C	Heating Setpoint 2**	Heating setpoint 2
7	0.1 to 11.1	0.6	^C	Heating Ramp Loading	Heating ramp loading setpoint
8	3.9 to 50	23.9	°C	Cool Changeover Setpt	Cooling changeover setpoint
9	0 to 46.1	17.8	°C	Heat Changeover Setpt	Heating changeover setpoint
10	26.7 to 60	35	°C	Water Val Condensing Stp	Water valve condensing setpoint
11	0 to 100	100	%	Switch Limit Setpoint 1	Limit setpoint switch 1
12	0 to 100	100	%	Switch Limit Setpoint 2	Limit setpoint switch 2
13	0 to 100	100	%	Switch Limit Setpoint 3	Limit setpoint switch 3
14	35 to 50	50	°C	Reclaim Setpoint	Heat reclaim setpoint
15	2.8 to 15	5	^C	Reclaim Deadband	Heat reclaim deadband
16	1 to 20	5	^C	Varipump Delta Temp Stp	Variable speed pump delta temperature setpoint

* Depends on the selected language (English by default).
** 26.7 to 70.0°C range for units with HFO.

NOTE: Since specific units may not include certain options, some tables provided in the document contain parameters that cannot be configured for a given unit.

6.3 - Alarms menu

Icon	Displayed text*	Description
	Reset Alarms	Alarm reset
	Current Alarms	Current alarms
	Alarm History	Alarm History
	Major Alarm History	Major alarm history

* Depends on the selected language (English by default).

6.4 - Configuration menu

Icon	Displayed text*	Description	Associated table
	General Configuration	General configuration	GEN_CONF
	Pump Configuration	Pump configuration	PUMPCONF
	User Configuration	User configuration	USERCONF
	Reset Configuration	Reset configuration	RESETCFG
	Schedule Menu	Schedule menu	SCHEDULE
	Holiday Menu	Holiday menu	HOLIDAY
	Broadcast Menu	Broadcast menu	BROCASTS
	Date/Time Configuration	Date/time configuration	DATETIME
	Control Identification	Control identification	CTRL_ID

* Depends on the selected language (English by default).

GEN_CONF – General configuration

No.	Status	Default	Unit	Displayed text*	Description
1	0 to 2	0	-	Cir Priority Sequence	Circuit priority
2				0=Auto, 1=A Prio	0 = Automatic circuit selection 1 = Circuit A priority
3				2=B Prio	2 = Circuit B priority
4	no/yes	no	-	Staged Loading Sequence	Staged loading sequence
5	no/yes	no	-	Ramp Loading Select	Ramp loading selection
6	1 to 15	1	min	Unit Off to On Delay	Unit Off to On delay
7	00:00	0	-	Night Mode Start Hour	Night mode start time
8	00:00	0	-	Night Mode End Hour	Night mode end time
9	0 to 100	100	%	Night Capacity Limit	Night capacity limit
10				Basic Menu Configuration	Basic menu configuration
11				0 = All Access	0 = All access
12				1 = no alarm menu	1 = No alarm menu
13				2 = no setpoint menu	2 = No setpoint menu
14				3 = 1 + 2	3 = No alarm and no setpoint menu
15	0 to 2	0	-	Demand Limit Type Select	Demand limit selection
16				0 = None	0 = None
17				1 = Switch Control	1 = Switch control
18				2 = 4-20mA Control	2 = 4-20 mA control
19	0 to 20	0	mA	mA For 100% Demand Limit	100% demand Limit (mA)
20	0 to 20	10	mA	mA For 0% Demand Limit	0% demand Limit (mA)
21	no/yes	no	-	Current Limit Select	Current limit selection
22	0 to 4000	2000	A	CurrentLimit at 100%	Current limit at 100%
23	14.4 to 15	10	^C	Free Cooling Delta T Th	Free cooling delta temperature
24	20 to 300	30	min	Full Load Timeout	Full load timeout
25	no/yes	no	-	Ice Mode Enable	Ice mode enabled
26	no/yes	no	-	Reverse Alarms Relay	Reverse alarms relay

* Depends on the selected language (English by default).

PUMPCONF – Pump configuration

No.	Status	Default	Unit	Displayed text*	Description
1	0 to 4	0	-	Condenser Pumps Sequence	Condenser pumps sequence **
2	0 to 4	0	-	Cooler Pumps Sequence	Evaporator pumps sequence
3				0 = No Pump	0 = No pump
4				1 = One Pump Only	1 = One pump
5				2 = Two Pumps Auto	2 = Two pumps automatic control
6				3 = Pump#1 Manual	3 = Pump 1 manual
7				4 = Pump#2 Manual	4 = Pump 2 manual
8	24 to 3000	48	hour	Pump Auto Rotation Delay	Pump rotation delay
9	no/yes	no	-	Pump Sticking Protection	Pump sticking protection
10	no/yes	no	-	Stop Pump During Standby	Pump stop when the unit is in standby
11	no/yes	yes	-	Flow Checked If Pump Off	Flow check when the pump is off
12	no/yes	no	-	Cooler Pump Off In Heat	Evaporator pump off in Heating
13	no/yes	no	-	Cond Pump Off In Cool	Condenser pump off in Cooling

* Depends on the selected language (English by default).
** Please note that the unit can control only one condenser pump. This value can be set to “0” or “1”.

USERCONF – User configuration

No.	Status	Default	Unit	Displayed text*	Description
1	1 to 9999	11	-	User Password	User password
2	0 to 1	0	-	Language List	Selected language list
3				0 = eng/spa/fre/ger/dut	Languages available when “language list” is set to “0”
4				chi/ita/por/rus/und	
5				1 = eng/spa/fre/ger/dut	Languages available when “language list” is set to “1”
6				tur/ita/por/rus/und	

* Depends on the selected language (English by default).

RESETCFG – Reset configuration

No.	Status	Default	Unit	Displayed text*	Description
1	0 to 4	0	-	Cooling Reset Select	Cooling reset selection
2	0 to 4	0	-	Heating Reset Select	Heating reset selection
3				0=None, 1=OAT	0 = None 1 = OAT
4				2=Delta T, 4=Space Temp	2 = Delta T 4 = Space temperature
5				3=4-20mA control	3 = 4-20 mA control
6				Cooling	Cooling
7	-10 to 51.7	-10	°C	OAT No Reset Value	OAT, no reset value
8	-10 to 51.7	-10	°C	OAT Full Reset Value	OAT, max. reset value
9	0 to 13.9	0	^C	Delta T No Reset Value	Delta T, no reset value
10	0 to 13.9	0	^C	Delta T Full Reset Value	Delta T, max. reset value
11	0 to 20	0	mA	Current No Reset Value	Current, no reset value
12	0 to 20	0	mA	Current Full Reset Value	Current, max. reset value
13	-10 to 51.7	-10	°C	Space T No Reset Value	Space temperature, no reset value
14	-10 to 51.7	-10	°C	Space T Full Reset Value	Space temperature, max. reset value
15	-16.7 to 16.7	0	^C	Cooling Reset Deg. Value	Maximum cooling reset value
16				Heating	Heating
17	-10 to 51.7	-10	°C	OAT No Reset Value	OAT, no reset value
18	-10 to 51.7	-10	°C	OAT Full Reset Value	OAT, max. reset value
19	0 to 13.9	0	^C	Delta T No Reset Value	Delta T, no reset value
20	0 to 13.9	0	^C	Delta T Full Reset Value	Delta T, max. reset value
21	0 to 20	0	mA	Current No Reset Value	Current, no reset value
22	0 to 20	0	mA	Current Full Reset Value	Current, max. reset value
23	-10 to 51.7	-10	°C	Space T No Reset Value	Space temperature, no reset value
24	-10 to 51.7	-10	°C	Space T Full Reset Value	Space temperature, max. reset value
25	-16.7 to 16.7	0	^C	Heating Reset Deg. Value	Maximum heating reset value
26	-4 to 32	-17.8	°C	Heating OAT threshold	Heating OAT threshold
27	no/yes	no	-	HSM Both Command Select	HSM both command selection
28	no/yes	no	-	Auto Changeover Select	Automatic changeover selection

* Depends on the selected language (English by default).

6 - TOUCH PILOT INTERFACE DETAILS

SCHEDULE – Schedule configuration

No.	Name	Displayed text*	Description
1	OCCPC01S	OCCPC01S - Schedule Menu	Unit on/off time schedule
2	OCCPC02S	OCCPC02S - Schedule Menu	Unit setpoint selection time schedule

* Depends on the selected language (English by default).

HOLIDAY – Holiday configuration

No.	Status	Default	Displayed text*	Description
1	0-12	0	Holiday Start Month	Holiday start month
2	0-31	0	Start Day	Holiday start day
3	0-99	0	Duration (days)	Holiday duration (days)

* Depends on the selected language (English by default).

BROCASTS – Broadcast configuration

No.	Status	Default	Displayed text*	Description
1	0 to 2	2	Activate	Not applicable
OAT Broadcast				
2	0 to 239	0	Bus	Bus number of the unit with outdoor temperature sensor
3	0 to 239	0	Element	Element number of the unit with outdoor temperature sensor
4	disable/enable	disable	Daylight Savings Select	Summer/winter time activation (daylight saving selection)
Daylight Savings Select – Summer time (entering)				
5	1 to 12	3	Month	Month
6	1 to 7	7	Day of Week (1=Monday)	Day of the week (1 = Monday)
7	1 to 5	5	Week Number of Month	Week of the month
Daylight Savings Select – Winter time (leaving)				
8	1 to 12	10	Month	Month
9	1 to 7	7	Day of Week (1=Monday)	Day of the week (1 = Monday)
10	1 to 5	5	Week Number of Month	Week of the month

* Depends on the selected language (English by default).

DATETIME – Date/Time configuration

No.	Status	Default	Displayed text*	Description
Date (DD/MM/YY)				
1	1 to 31	-	Day of month	Day of the month
2	1 to 12	-	Month of year	Month
3	0 to 99	-	Year	Year
4	Monday-Sunday	-	Day of Week	Day of the week
Time (HH:MM)				
5	0 to 24	hour	Hour	Hour
6	0 to 59	min	Minute	Minutes
Daylight Saving Time				
7	no/yes	-	Daylight sav. time on	Daylight saving time active
8	no/yes	-	Daylight sav. time off	Daylight saving time inactive
9	no/yes	-	Tomorrow is a holiday	The following day is a holiday
10	no/yes	-	Today is a holiday	The present day is a holiday

* Depends on the selected language (English by default).

6 - TOUCH PILOT INTERFACE DETAILS

CTRL_ID – Control ID configuration

No.	Status	Default	Displayed text*	Description
1	0 to 239	0	CCN Element Number	Element number
2	0 to 239	1	CCN Bus Number	Bus number
3	9600/19200/38400	9600	CCN Baud Rate	Communication speed
4	-	30XAXW Touch Pilot	Device Description	Unit description
5	-		Location Description	Location description: The number corresponds to the country
6	-	ECG-SR-20M47010	Software Part Number	Software version
7	-		Serial Number	Serial number (MAC address)

* Depends on the selected language (English by default).

7 - TOUCH PILOT CONTROL OPERATION

This section points out the most significant control functionalities, e.g. unit start/stop operation, heat/cool control. It also gives instructions on how to perform critical operations of the main control system.

7.1 - Start/Stop control

The unit state is determined based on a number of factors, including its operating type, active overrides, open contacts, master/slave configuration, or alarms triggered due to operating conditions.

The table given below summarises the unit control type and its running status with regard to the following parameters:

- **Operating type:** Operating type is selected using the Start/Stop button on the user interface.

LOFF	Local off
L-C	Local on
L-SC	Local schedule
rEM	Remote
Net.	Network
MASt	Master unit

- **Start/stop force command:** Chiller start/stop force command can be used to control the chiller state in the Network operating type.
  - Command set to stop: The unit is halted.
  - Command set to start: The unit runs in accordance with schedule 1.
- **Remote start/stop contact status:** Start/stop contact can be used to control the chiller state in the Remote operating type.
- **Master control type:** When the unit is the master unit in a two-chiller lead/lag arrangement, the master unit may be set to be controlled locally, remotely or via network (see also 7.15).
- **Start/stop time schedule:** Occupied or unoccupied status of the unit.
- **Network emergency stop command:** If activated, the unit shuts down regardless of the active operating type.
- **General alarm:** The unit shuts down due to failure.

7.2 - Unit stop function

This function controls the unit compressor capacity reduction. If there is an alarm or a demand to stop, it forces the compressors to the minimum capacity before stopping them.

7.3 - Heating/Cooling selection

For units configured in the heat pump mode, heating/cooling selection can be controlled in various ways, depending on the active operating type. By default, the cooling mode is selected. Heating/cooling control can be automatic or manual.

Heating/Cooling selection can be determined as follows:

- locally at the unit in the GENUNIT menu,
- remotely via the heating/cooling selection contact if the unit is in the Remote operating type,
- via a network command if the unit is in the Network operating type.

In the automatic mode, the outdoor air temperature determines the heating/cooling/standby changeover (see the SETPOINT menu for cooling and heating mode changeover thresholds). The automatic changeover is optional and requires user configuration (GENUNIT – General Parameters).

Parameter status					
On/off status	**Control type**	**Heating/Cooling selection in local mode**	**Heating/Cooling contact in local mode**	**Heat/Cool select**	**Operating mode**
off	-	-	-		cooling
on	local	cooling	-		cooling
on	local	heating	-		heating
on	remote	-	on cooling		cooling
on	remote	-	on heating		heating
on	network	-	-	cooling	cooling
on	network	-	-	heating	heating

NOTE: Please remember that the automatic changeover mode cannot be selected on water-cooled units.

Active operating type						Parameters status						Control type	Unit state
LOFF	**L-C**	**L-SC**	**rEM**	**Net.**	**MASt**	**Start/stop force command**	**Remote start/ stop contact**	**Master control type**	**Start/stop time schedule**	**Network emergency shutdown**	**General alarm**		
-	-	-	-	-	-	-	-	-	-	enabled	-	-	off
-	-	-	-	-	-	-	-	-	-	-	yes	-	off
active	-	-	-	-	-	-	-	-	-	-	-	local	off
-	-	active	-	-	-	-	-	-	unoccupied	-	-	local	off
-	-	-	active	-	-	-	open	-	-	-	-	remote	off
-	-	-	active	-	-	-	-	-	unoccupied	-	-	remote	off
-	-	-	-	active	-	disabled	-	-	-	-	-	network	off
-	-	-	-	active	-	-	-	-	unoccupied	-	-	network	off
-	-	-	-	-	active	-	-	local	unoccupied	-	-	local	off
-	-	-	-	-	active	-	open	remote	-	-	-	remote	off
-	-	-	-	-	active	-	-	remote	unoccupied	-	-	remote	off
-	-	-	-	-	active	disabled	-	network	-	-	-	network	off
-	-	-	-	-	active	-	-	network	unoccupied	-	-	network	off
-	active	-	-	-	-	-	-	-	-	disabled	no	local	on
-	-	active	-	-	-	-	-	-	occupied	disabled	no	local	on
-	-	-	active	-	-	-	closed	-	occupied	disabled	no	remote	on
-	-	-	-	active	-	enabled	-	-	occupied	disabled	no	network	on
-	-	-	-	-	active	-	-	local	occupied	disabled	no	local	on
-	-	-	-	-	active	-	closed	remote	occupied	disabled	no	remote	on
-	-	-	-	-	active	enabled	-	network	occupied	disabled	no	network	on

7.4 - Pumps control

The main control can manage one or two water exchanger pumps, determining each pump on/off state. Both pumps cannot run together. The pump is turned on when this option is configured and when the unit is running.

The pump is turned off when the unit is shut down due to an alarm unless the fault is a frost protection error. The pump can be started in particular operating conditions when the water exchanger heater is active.

If the pump has failed and another pump is available, the unit is stopped and started again with the second pump. If there is no pump available, the unit shuts down.

Units are fitted with the flow switch, allowing for the water flow control. For more information about actuators, see *Water flow switch* in section 3.8.

7.4.1 - Pumps configuration

Basic pump configuration can be performed via the Configuration menu (PUMPCONF – Pump Configuration). Only logged-in users can access the menu (see also section 4.6). The unit must be stopped.

For units with two pumps, these pumps can be controlled automatically or each pump can be started manually.

Pump(s) available	Pumps sequence (PUMPCONF)
No pump	0 (no pump)
One fixed-speed pump	1 (one pump only)
Two fixed-speed pumps	2 (two pumps auto)
	3 (pump#1 manual)
	4 (pump#2 manual)

7.4.2 - Automatic pump selection

If two pumps are controlled and the reversing function has been selected (PUMPCONF – Pump Configuration), the control tries to limit the pump run time to the configured pump changeover delay. If this delay has elapsed, the pump reversing function is activated.

7.4.3 - Customer pump

30XW chillers as well as 30XB chillers with option 17 may be fitted with one external variable speed cooler pump (often also referred to as “customer cooler pump”).

Customer cooler pump can be configured as follows:

Pump available	Cooler Pumps Sequence (PUMPCONF)
No pump	0 (no pump)
One pump (fixed or variable speed)	1 (one pump only)

Depending on the unit (30XW/30XB), the pump is commanded by one of the following outputs:

- 0-10V output on AUX1 board for single-circuit 30XW chillers,
- 0-10V output on the second SIOB board for dual-circuit 30XW chillers and 30XB chillers with option 17.

The “Varipump Delta Temp Stp” parameter in the SETPOINT menu is used to define the delta T that has to be maintained between cooler entering and leaving water temperatures.

7.4.4 - Pumps protection

The control provides the option to automatically start the pump each day at 14:00 for 2 seconds when the unit is off. The heater for the heat exchanger and the water pump (for units with a pump) can be energised so that it protects the heat exchanger or the water pump against any damage when the unit is shut down for a long time at low outdoor temperature.

If the unit is fitted with two pumps, the first pump is started on even days and the second pump is started on odd days. Starting the pump periodically for a few seconds extends the lifetime of the pump bearings and the tightness of the pump seal. Periodical pump quick start can be selected via the Configuration menu (Pump Sticking Protection, PUMPCONF – Pump Configuration).

7.5 - Condenser water pump control

The water condenser pump control applies to air-cooled units fitted with the optional heat reclaim module as well as water-cooled units. This function ensures constant water pumps control, providing the optimum condenser water flow rate and operating cost savings.

7.6 - Control point

The control point represents the water temperature that the unit must produce. It enables to decrease the required capacity depending on the unit load operating conditions.

Control point = Active setpoint + Reset

The control point is calculated based on the active setpoint and the reset calculation.

The forced value can be used instead of any other setpoint calculation only when the unit is in the Network operating type.

7.6.1 - Active setpoint

Two setpoints can be selected. Depending on the current operation type, the active setpoint can be selected manually in the Main menu (GENUNIT – General Parameters), with the volt-free user contacts, with network commands (CCN or BACnet) or automatically with the setpoint time schedule (schedule 2).

The following tables summarise possible selections depending on the control type (Local, Remote or Network) and the following parameters:

- **Heating or Cooling operating mode:** Heat/Cool select (GENUNIT menu)
- **Setpoint selected via the Touch Pilot user interface:** Setpoint select permits selection of the active setpoint if the unit is in the Local operating type (GENUNIT menu)
- **Setpoint switch status:** Remote setpoint switch (INPUTS menu)
- **Schedule 2 status:** Schedule for setpoint selection

LOCAL OPERATING TYPE

Parameter status						Active setpoint
Heating/cooling operating mode	Setpoint selection	Heating/Cooling selection in local mode	Ice storage configuration	Setpoint switch	Schedule 2 status	
cooling	csp1	-	*	*	-	cooling setpoint 1
cooling	csp2	no	*	*	-	cooling setpoint 2
cooling	csp2	yes	closed	*		cooling setpoint 2
cooling	csp2	yes	open	*		ice storage setpoint
cooling	auto	-	*	*	occupied	cooling setpoint 1
cooling	auto	no	*	*	unoccupied	cooling setpoint 2
cooling	auto	yes	closed	*	unoccupied	cooling setpoint 2
cooling	auto	yes	open	*	unoccupied	ice storage setpoint
heating	hsp1	-	*	*	-	heating setpoint 1
heating	hsp2	-	*	*	-	heating setpoint 2
heating	auto	-	*	*	occupied	heating setpoint 1
heating	auto	-	*	*	unoccupied	heating setpoint 2

*Any configuration, (-) default configuration.

REMOTE OPERATING TYPE

Parameter status						Active setpoint
Heating/cooling operating mode	Setpoint selection	Ice storage configuration	Ice done contact	Setpoint switch	Schedule 2 status	
cooling	-	-	*	open	-	cooling setpoint 1
cooling	-	no	*	closed	-	cooling setpoint 2
cooling	-	yes	closed	closed	-	cooling setpoint 2
cooling	-	yes	open	closed	-	ice storage setpoint
heating	-	-	*	open	-	heating setpoint 1
heating	-	-	*	closed	-	heating setpoint 2

*Any configuration, (-) default configuration.

NETWORK OPERATING TYPE

Parameter status						Active setpoint
Heating/cooling operating mode	Setpoint selection	Ice storage configuration	Ice done contact	Setpoint switch	Schedule 2 status	
cooling	-	-	*	*	occupied	cooling setpoint 1
cooling	-	-	*	*	unoccupied	cooling setpoint 2
heating	-	-	*	*	occupied	heating setpoint 1
heating	-	-	*	*	unoccupied	heating setpoint 2

*Any configuration, (-) default configuration.

NOTE: Ice storage configuration and ice done contact apply only to units with the optional energy management module.

7.6.2 - Reset

Reset means the active setpoint is modified so that less machine capacity is required. In the cooling mode the setpoint is increased, whereas in the heating mode it is decreased. This modification is in general a reaction to a drop in the load.

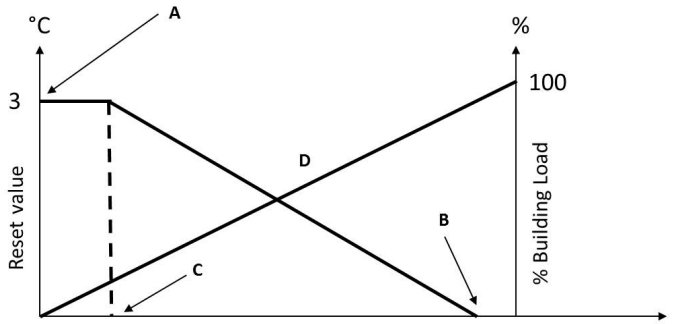
The reset can be based on the following parameters:

- OAT that gives the measure of the load trends for the building
- Return water temperature (ΔT provides the average building load)
- Space temperature (EMM option)
- Dedicated 4-20 mA input

The reset source and the reset parameters can be configured in the Main menu (RESETCFG – Reset Configuration). In response to a drop in the reset source, the cooling setpoint is normally reset upwards to optimise unit performance.

The amount of reset is determined by linear interpolation based on the following parameters:

- A reference at which reset is zero (no reset value)
- A reference at which reset is maximum (full reset value)
- The maximum reset value



20	Reset based on OAT	25
0	Reset based on delta T	3
4	Reset based on analog input	20
no_reset	**selection**	**full_reset**

Legend
A: Maximum reset value
B: Reference for zero reset
C: Reference for maximum reset
D: Building load

7.7 - Capacity limitation

The Touch Pilot control system allows for the constant control of the unit capacity by setting its maximum allowable capacity.

The main control system enables to limit the unit capacity using one of the external orders:

- By means of user-controlled volt-free contacts. Units without the energy management module have one contact. Units with the energy management module permit three capacity limitation levels (see also section 3.9.4). The unit capacity can never exceed the limit setpoint activated by these contacts. The limit setpoints can be modified in the SETPOINT menu.
- By lag limit set by the master unit (master/slave assembly).
- By night mode limitation control. The demand limit value in the night mode is selectable if the value is below the selected limit. A limit value of 100% means that the unit can use all capacity stages.

In certain conditions, the unit power consumption can exceed the capacity limitation threshold to protect the compressors.

7.8 - Current limitation

Current limitation is used via the demand limit function. If the current limitation is active (Current Limit Select in the GEN_CONF menu), the control calculates the sum of compressors current to obtain the total compressor current. If this value exceeds the pre-defined limit, the control commands a reduction of the compressor load, until it is below the limit again. Before loading a capacity stage, the control estimates the future total compressor current and ensures that it does not exceed the limit.

The current limit is based on two parameters:

- The current limit that corresponds to 100% capacity (CurrentLimit at 100%, GEN_CONF – General Configuration)
- The active demand limit determined either by the demand limit contact (see also section 3.9.4) or by the network (Active Demand Limit Val, GENUNIT – General Parameters)

Chiller current limit is displayed in the GENUNIT menu.

Current limitation is disabled if the unit operates in the master/slave mode, the unit is controlled by a System Manager or the night mode is active.

7.9 - Capacity control

This function adjusts the capacity using the compressor slide valve to keep the water exchanger temperature at its setpoint. The control system continuously takes account of the temperature error with respect to the setpoint, the rate of change in this error and the difference between entering and leaving water temperatures in order to determine the optimal moment at which to add or withdraw capacity.

Compressors are started and stopped in a sequence designed to equalise the number of start-ups (value weighted by their operating time). For more information about compressors sequence, see *Balanced loading sequence* and *Staged loading sequence* in section 7.13.

7.10 - Night mode

Night mode allows users to configure the unit to operate with specific parameters in a specific time period. During the night period, the unit capacity is limited and the number of operating fans is reduced.

The night period is defined by a start time and an end time that are the same for each day of the week. The Night mode settings or the maximum capacity value can be configured via the Configuration menu (GEN_CONF – General Configuration).

Only logged-in users can modify Night Mode settings (see also section 4.6).

7.11 - Head pressure control

For air-cooled units, the condensing pressure of each circuit is generated by 10 fans maximum. As an option, a speed variator can be used to control up to four fans so that the speed of the fans is adjusted to maintain the head pressure setpoint. The condensing pressure is independently controlled in each circuit based on the saturated condensing temperature. The control permanently adjusts its setpoint to guarantee optimal performance and ensure anti-short-cycle protection of the fans.

For water-cooled units, condensing pressure control is assured if the three-way valve option is selected. The saturated condensing temperature is controlled based on a user-configurable fixed setpoint (SETPOINT menu). The three-way valve control can be configured only by Carrier service.

7.12 - Circuit lead/lag selection (multi-circuit units)

This function determines the lead and lag circuit on dual-circuit or triple-circuit units. It controls the start/stop sequence of the refrigeration circuits called circuit A, circuit B or circuit C. The circuit authorised to start first is the lead circuit. Lead circuit is used first for capacity increases and at the same time should be decreased last when decreasing capacity. The lead/lag circuits can be selected manually or automatically according to the unit configuration (GEN_CONF – General Configuration).

- **Automatic lead/lag circuit determination:** The control system determines the lead circuit to equalise the operating time of each circuit (value weighted by the number of start-ups of each circuit). As a result, the circuit with the lowest number of operating hours always starts first.
- **Manual lead/lag circuit determination:** Circuit A, B or C selected as the lead circuit. The selected circuit is always the leader. It is the first to start and the last to stop.

7.13 - Compressor loading sequence (multi-circuit units)

This function determines in which order the circuit capacity is changed. Compressor loading is managed by starting/stopping the compressors and controlling the position of the slide valve. Two types of sequencing are available and can be configured by the user via the Touch Pilot user interface (GEN_CONF – General Configuration).

- **Balanced loading sequence:** The control maintains equal capacity between all circuits as the machine loads and unloads.
- **Staged loading sequence:** The control loads the lead circuit completely before the lag circuits are started. When the load is decreasing, the lag circuits are unloaded first.

Staged loading sequence is incorporated under the following conditions:

- One of the circuits is shut down due to its failure
- One of the circuits is in capacity override mode
- Remaining circuits are shut down or fully charged

7.14 - Circuit capacity loading sequence

7.14.1 - Dual circuit – balanced capacity loading

Loading sequence (%)		Unloading sequence (%)	
Lead circuit	Lag circuit	Lead circuit	Lag circuit
0	0	100	100
30 (15)	0	100	95
35	0	95	95
40	0	95	90
45	0	90	90
50	0	90	85
55	0	85	85
60	0	85	80
65	0	80	80
70	0	80	75
70	30 (15)	75	75
70	35	75	70
70	40	70	70
70	45	70	65
70	50	65	65
70	55	65	60
70	65	60	60
70	70	60	55
75	70	55	55
75	75	55	50
80	75	50	50
80	80	50	45
85	80	45	45
85	85	45	40
90	85	40	40
90	90	40	35
95	90	40	30 (15)
95	95	40	0
100	95	35	0
100	100	30 (15)	0
100	100	0	0

7.14.2 - Dual circuit – priority given to one circuit

Loading sequence (%)		Unloading sequence (%)	
Lead circuit	Lag circuit	Lead circuit	Lag circuit
0	0	100	100
30 (15)	0	100	95
35	0	100	90
40	0	100	85
45	0	100	80
50	0	100	75
55	0	100	70
60	0	100	65
65	0	100	60
70	0	100	55
75	0	100	50
80	0	100	45
85	0	100	40
90	0	100	35
95	0	100	30 (15)
100	0	95	30 (15)
100	30 (15)	90	30 (15)
100	35	85	30 (15)
100	40	80	30 (15)
100	45	75	30 (15)
100	50	70	30 (15)
100	55	70	0

Loading sequence (%)		Unloading sequence (%)	
Lead circuit	Lag circuit	Lead circuit	Lag circuit
100	60	65	0
100	65	60	0
100	70	55	0
100	75	50	0
100	80	45	0
100	85	40	0
100	90	35	0
100	95	30 (15)	0
100	100	0	0

NOTE: (15) minimum capacity for standard water-cooled units (without the option for high condensing temperature).

7.14.3 - Triple circuit – balanced capacity loading

Loading sequence (%)			Unloading sequence (%)		
Lead circ.	Lag circ. 1	Lag circ. 2	Lead circ.	Lag circ. 1	Lag circ. 2
0	0	0	100	100	100
30	0	0	100	100	95
35	0	0	100	95	95
40	0	0	95	95	95
45	0	0	95	95	90
50	0	0	95	90	90
55	0	0	90	90	90
60	0	0	90	90	85
65	0	0	90	85	85
70	30	0	85	85	85
70	35	0	85	85	80
70	40	0	85	80	80
70	45	0	80	80	80
70	50	0	80	80	75
70	55	0	80	75	75
70	60	0	75	75	75
70	65	0	75	75	70
70	70	0	75	70	70
70	70	30	70	70	70
70	70	35	70	70	65
70	70	40	70	65	65
70	70	45	65	65	65
70	70	50	65	65	60
70	70	55	65	60	60
70	70	60	60	60	60
70	70	65	60	60	55
70	70	70	60	55	55
75	70	70	55	55	55
75	75	70	55	55	50
75	75	75	55	50	50
80	75	75	50	50	50
80	80	75	50	50	45
80	80	80	50	45	45
85	80	80	45	45	45
85	85	80	45	45	40
85	85	85	45	40	40
90	85	85	40	40	40
90	90	85	40	40	35
90	90	90	40	40	30
95	90	90	40	40	0
95	95	90	40	35	0
95	95	95	40	30	0
100	95	95	35	0	0
100	100	95	30	0	0
100	100	100	0	0	0

7.14.4 - Triple circuit – priority given to one circuit

Loading sequence (%)			Unloading sequence (%)		
Lead circ.	Lag circ. 1	Lag circ. 2	Lead circ.	Lag circ. 1	Lag circ. 2
0	0	0	100	100	100
30	0	0	100	100	95
35	0	0	100	100	90
40	0	0	100	100	85
45	0	0	100	100	80
50	0	0	100	100	75
55	0	0	100	100	70
60	0	0	100	100	65
65	0	0	100	100	60
70	0	0	100	100	55
75	0	0	100	100	50
80	0	0	100	100	45
85	0	0	100	100	40
90	0	0	100	100	35
100	0	0	100	100	30
100	30	0	100	95	30
100	35	0	100	90	30
100	40	0	100	85	30
100	45	0	100	80	30
100	50	0	100	75	30
100	55	0	100	70	30
100	60	0	100	65	0
100	65	0	100	60	0
100	70	0	100	55	0
100	75	0	100	50	0
100	80	0	100	45	0
100	85	0	100	40	0
100	90	0	100	35	0
100	100	0	100	30	0
100	100	30	95	30	0
100	100	35	90	30	0
100	100	40	85	30	0
100	100	45	80	30	0
100	100	50	75	30	0
100	100	55	70	30	0
100	100	60	65	0	0
100	100	65	60	0	0
100	100	70	55	0	0
100	100	75	50	0	0
100	100	80	45	0	0
100	100	85	40	0	0
100	100	90	35	0	0
100	100	100	30	0	0
			0	0	0

7.15 - Energy management module

The energy management module enables to control the level of energy consumption, providing users with information such as current unit status, compressors operating status, etc.

This option requires the installation of an additional SIOB board.

Energy management option – board connections

Description	Input/ Output	Connector	Type	Remarks
Occupancy override control	DI-01	J1	Digital input	If the contact is closed in Remote mode, the unit goes into the occupied mode
Demand limit switch 2	DI-02	J1	Digital input	If the contact is closed, the second capacity limit switch is active
Customer interlock	DI-03	J1	Digital input	Permits immediate unit shutdown (Remote mode only)
Ice storage	DI-04	J1	Digital input	If the contact is closed, the unit enters the ice storage mode
Space temperature	AI-01	J25	Analogue input	Active setpoint reset via space temperature control
Capacity limit control	AI-10	J9	Analogue input	Active setpoint reset via unit capacity control (4-20 mA)
Compressor A	DO-01	J2	Digital output	Output active if compressor A is operating
Compressor B	DO-02	J2	Digital output	Output active if compressor B is operating
Compressor C	DO-03	J6	Digital output	Output active if compressor C is operating
Chiller shutdown	DO-05	J23	Digital output	Output active (relay output) when the unit has completely stopped due to an alarm
Chiller in alert	DO-06	J22	Digital output	Output active (relay output) when the alert has been tripped
Unit capacity	A0-01	J10	Analogue output	0 to10 VDC output

7.16 - Master/slave assembly

Two units can be linked to create the master/slave assembly. The master unit can be controlled locally, remotely or by network commands. Master/slave assembly must be validated in order to start the master/slave chiller operation.

All control commands to the master/slave assembly (start/stop, setpoint selection, heating/cooling operation, load shedding, etc.) are handled by the unit which is configured as the master. The commands are transmitted automatically to the slave unit. If the master chiller is turned off while the master/slave function is active, then the slave chiller will be stopped. Under certain circumstances, the slave unit may be started first to balance the run times of the two units.

In the event of a communication failure between the two units, each unit will return to an autonomous operating mode until the fault is cleared. If the master unit is stopped due to an alarm, the slave unit is authorised to start.

NOTE: Master/slave assembly can be configured only by Carrier service.

7.17 - Heat reclaim option (30XA/30XB)

Air-conditioning system consumes a significant amount of energy that leaves the system in the form of wasted heat. Heat reclaim condenser water pump control enables to capture the energy and convert it into a useful heat source without decreasing the chiller plant capacity.

For air-cooled units fitted with water heat reclaim condenser, the option requires the installation of Reclaim SIOB board. The heat reclaim mode can be controlled locally with the Touch Pilot interface (RECLAIM – Reclaim mode), remotely with the user contact or by Network command.

The heat reclaim function is active when the heat reclaim entering water temperature is lower than the heat reclaim setpoint. The difference between the heat reclaim entering water temperature (RECLAIM menu) and the heat reclaim setpoint (SETPOINT menu) determines the number of circuits required to provide heat reclaim capacity.

Depending on the control mode, the Heat Reclaim option can be enabled as follows:

Mode	Description
Local	Use the Touch Pilot user interface to set “Heat Reclaim Select” parameter to “yes” in the Reclaim menu (Main menu).
Remote	Close the RECL_SW input (DI-02, Reclaim SIOB board).
Network	Force the RECL_SW parameter to “yes” through the CCN bus (RECLAIM table).

Units in Master/Slave assembly

When the unit is a Slave and operating in the Master/Slave assembly, the option is active depending on conditions given in the table below:

Reclaim mode	Local mode (Heat Reclaim Select = yes)	Remote mode (RECL_SW)	Network mode (RECL_SEL CCN bus)
no	no	open	no
yes	yes/no	closed	yes/no
yes	yes	open	yes/no
yes	yes/no	open	yes

The heat reclaim function can be deactivated manually or automatically when the heat reclaim entering water temperature is higher than the heat reclaim setpoint, plus half of the heat reclaim deadband. In the deadband the heat reclaim function is still active.

Changeover procedure from cooling to heat reclaim mode:

- Start-up of the condenser pump.
- Verification of the condenser flow switch control contact. If this remains open after one minute of the condenser pump operation, the circuit remains in cooling mode and an alarm will be activated.
- As soon as delta between saturated condensing temperature and saturated suction temperature reaches 10°C, the pump-down sequence is activated.
- Pump down. Opening of the water condenser water inlet valve and closing of the air condenser air valve.
- The heat reclaim function starts after about three minutes

7.18 - Variable speed fans (option 17)

Air-cooled units fitted with the variable speed fans option allow for reducing the total unit consumption by adjusting the fan speed to the current operating conditions.

The control determines the optimum fan speed based on the current compressor capacity, outdoor air temperature, and leaving water temperature.

7.19 - Evaporator heater option (30XA/30XB)

The evaporator heater protects the evaporator against frost when the unit is stopped at low ambient air temperature. The heater is activated in the case of low outdoor air temperature conditions.

7.20 - Free cooling option (30XA/30XB)

In air-cooled units only, this option allows for the direct use of low outdoor air temperature to cool the water circuit without activating the compressors.

The direct-expansion free cooling system uses the principle of the natural migration of the refrigerant from the evaporator to the condenser. The fans and a refrigerant pump ensure the transfer of the liquid refrigerant from the condenser to the evaporator, which accounts for low power consumption.

The free cooling option enables automatic operation as well as combined operation of mechanical cooling (compressor operation) and free cooling (FREECOOL – Free cooling). The control determines which circuit is allowed to run free cooling. Each refrigerant circuit can operate independently.

Cooling operation may be performed in the following combinations:

- two circuits in mechanical cooling
- two circuits in free cooling
- one circuit in mechanical cooling and one circuit in free cooling

The free cooling option is available for dual-circuit units. It requires the installation of SIOB board that controls the operation of the motorised mechanical changeover valves and the operation of the refrigerant pump.

Free cooling option is enabled based on the following criteria:

- The temperature difference between the outdoor air temperature and the controlled water temperature. The threshold can be configured by the user (GEN_CONF – General Configuration)
- The maximum operating time in free cooling (Full Load Timeout) when the water temperature setpoint is not reached (Full Load Timeout, GEN_CONF – General Configuration)

7.21 - Dry Cooler Free Cooling (30XB)

30XB units can be fitted with a dry cooler which thanks to the use of low outside air temperature facilitates the process of chilling water that is later used in the air-conditioning system (“dry cooler free cooling”). The dry cooler is used not only to assist in cooling water to meet the current cooling demand but it also allows for reducing energy consumption.

This “dry cooler free cooling” mode is enabled when the outside air temperature is below the water loop temperature and the service-configured start threshold parameter.

NOTE: Dry cooler water loop temperature and free cooling OAT measured by the control are read-only values that can be verified in the DC Free Cooling Status menu (DCFC_STA).

The control distinguishes between two types of fan control for a dry cooler free cooling option, where the first one embraces the use of fan staging and the second one that includes the use of variable speed fan. Mixed configuration can also be used (fixed and variable-speed fan control at the same time).

Free Cooling is normally stopped when the free cooling OAT is above the water loop temperature and the service-configured start/stop threshold. However, if it turns out that the cooling power of the dry cooler is not enough in order to reach the cooling setpoint, then the mechanical cooling will be started (when FC capacity is at 100%, then mechanical cooling can be started).

7.22 - Dry cooler option (30XW)

30XW units may come with the dry cooler option that enables the control of a Carrier dry cooler.

The chiller and the dry cooler have to be connected through a LEN RS-485.

7.23 - Hydronic kit option (30XA/30XB)

The hydronic kit option allows for continuous monitoring of the water flow rate.

Hydronic kit option provides the following parameters:

- Inlet and outlet water pressure (PUMPSTAT in the Main menu)
- Evaporator flow rate
- Evaporator capacity

The water flow rate is based on the pressure difference between the evaporator inlet and outlet pressures and the evaporator pressure drop curves.

The evaporator capacity is calculated according to the flow rate, the water constant, and the difference between the entering and leaving evaporator water temperature.

7.24 - 30XA-ZE and 30XW-ZE units (HFO)

The Touch Pilot system may also control air-cooled and water-cooled units with R-1234ze refrigerant (HFO).

Please note that this option comes with advanced electrical box fan protection. In the case of the electrical box fan failure, the unit is shut down and alarm 10100 is triggered.

7.25 - High condensing temperature option (30XW)

7.25.1 - R134a configuration

For water-cooled units only, the economizer enables the increase of the maximum condensing threshold. This means that the saturated condensing temperature can reach a maximum of 63°C (145°F) compared with a maximum of 50°C (122°F) for units that are not fitted with this option.

7.25.2 - HFO configuration

For HFO units (30XW units with R-1234ze refrigerant), the high condensing option authorizes the saturated condensing temperature to reach a maximum of 70°C (158°F) compared with a maximum of 55°C (131°F) for units that are not fitted with this option.

7.26 - Maximum condenser leaving water temperature option (30XW)

For water-cooled units only, this option allows the user to limit the condenser leaving water temperature to 45°C (113°F) and enables to limit the current absorbed by the compressor. When the condensing temperature reaches 44°C (111°F), the increase in the compressor loading is stopped. When the temperature exceeds 45°C (113°F), the compressor is unloaded.

7.27 - Time schedule function

The Touch Pilot system control includes two time schedules.

The first schedule (schedule 1 OCCPC01S) allows for the automatic changeover of the unit from occupied to unoccupied mode: the unit is started during occupied periods.

The second schedule (schedule 2 OCCPC02S) allows for the automatic change of the active setpoint from occupied to unoccupied setpoint, provided that the Auto mode has been selected (RESETCFG – Reset Configuration).

7.27.1 - Occupied/unoccupied periods

- Cooling/heating setpoint 1 is active during occupied periods.
- Cooling/heating setpoint 2 is active during unoccupied periods.

Each schedule consists of eight user-configurable periods. Each period can be validated as active or inactive for each day of the week as well as for a given holiday period. The day begins at 00:00 and ends at 23:59.

The schedule is in unoccupied mode unless a time period is active. If two periods coincide or they are active on the same day, priority is given to the occupied period. Time schedule can be modified by the user in the Configuration menu (see also section 4.11).

7.27.2 - Holidays

This function is used to define 16 holiday periods. Each period is defined by three parameters: the month, the start day and the duration of the holiday period.

During the holiday periods the controller will be in occupied or unoccupied mode, depending on the periods validated as holidays. Each holiday period can be modified by the user (see also section 6.4).

NOTE: The broadcast function (BROCASTS) must be activated in order to use the holiday schedule.

7.28 - Black box function

Touch Pilot registers the values of about 20 predefined variables every 5 seconds. If an operation alarm is raised, the control saves a data set of 180 registrations (including 168 records preceding the alarm and 12 following the alarm) for a duration of 15 minutes of the unit operation.

Each registration is associated with a time schedule defined in hours, minutes and seconds. The control can store the maximum of 20 data sets in the memory. If the threshold of 20 data sets is reached, a rotary registration mechanism is triggered (the old data set is replaced with the new data set).

NOTE: Former data sets can be recovered only by Carrier service.

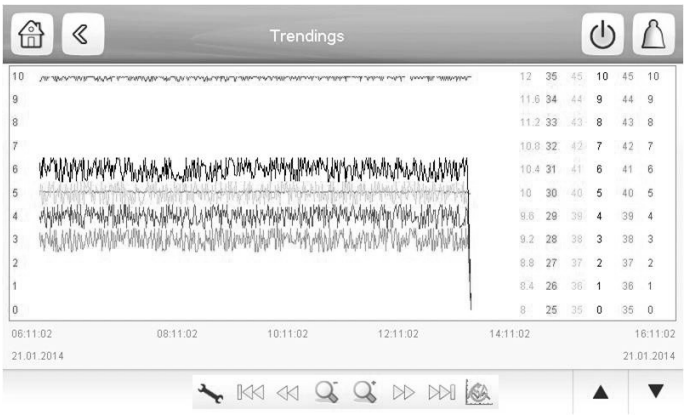
7.29 - Trending

This function enables to visualise the operations of the unit.

To access the Trending menu, navigate to the Main menu and select **Trendings**

Select the parameters to be visualised and press .

Go to the visualization screen by pressing the **Up/Down** buttons.



8 - DIAGNOSTICS – TROUBLESHOOTING

The control system has many fault tracing aid functions, protecting the unit against risks that could result in the failure of the unit. The local interface gives quick access to monitor all unit operating conditions. If an operating fault is detected, the alarm is triggered.

8.1 - E-mail notifications

The control provides the option to define one or two recipients who receive e-mail notifications each time the new alarm occurs or all existing alarms have been reset.

NOTE: E-mail notifications can be configured only by Carrier service.

8.2 - Displaying alarms

The control allows the quick display of the unit status. When the alarm is activated, the bell on the touch screen lights up.

- The blinking bell icon indicates that there is an alarm, but the unit is still running.
- The highlighted bell icon indicates that the unit is shut down due to a detected fault.

8.3 - Current alarms

The Current alarms view provides a list of currently active alarms, including the date and time the alarm occurred. The control displays up to 10 current alarms.

To access the Current alarms view, press the **Alarm** button  in the upper-right part of the screen, and then select **Current Alarms** 

8.4 - Resetting alarms

Touch Pilot control distinguishes between two types of alarms:

- General alarms are used to indicate pumps failure, transducers faults, network connection problems, etc.
- Major alarms are used to indicate process failure.

The alarm can be reset either automatically or manually via the Reset alarms menu. The Reset alarms menu displays up to five alarm codes which are currently active on the unit. Only logged-in users can access the menu (see also section 4.6).

To access the Reset alarms menu, press the **Alarm** button  and select **Reset Alarms** 

The alarm can be reset without stopping the machine. In the event of a power supply interrupt, the unit restarts automatically without the need for an external command. However, any faults active when the supply is interrupted are saved and may in certain cases prevent a circuit or a unit from restarting. Once the cause of the alarm has been identified and corrected, it will be displayed in the alarm history.

8.5 - Alarm history

Information regarding resolved alarms is stored in the Alarm history menu which is divided into 50 recent alarms and 50 recent major alarms. Alarm history can be accessed through the Touch Pilot user interface or the Network Service Tool.

To access the Alarm history menu, press the **Alarm** button  and select **Alarm History** 

8.6 - Alarm codes

The alarm codes are displayed in the Reset Alarms menu, while in the Current Alarm menu and alarm histories textual information regarding the event is provided.

8.6.1 - General alarm codes

No.	Code	Alarm description	Reset type	Action taken	Possible cause
THERMISTOR FAILURE					
1	15001	Evaporator entering water thermistor fault	Automatic, if thermistor reading returns to normal	Unit shuts down	Defective thermistor
2	15002	Evaporator leaving water thermistor fault	As above	Unit shuts down	As above
3	15050	Cooler Leaving Fluid #2 Thermistor	As above	Unit shuts down	As above
4	15003	Defrost thermistor fault, circuit A	As above	Cooling mode: Alert is displayed Heating mode: Circuit A shuts down	As above
5	15004	Defrost thermistor fault, circuit B	As above	Cooling mode: Alert is displayed Heating mode: Circuit B shuts down	As above
6	15006	Condenser entering water thermistor fault	As above	Heating mode: Unit shuts down	As above
7	15007	Condenser leaving water thermistor fault	As above	As above	As above
8	15008	Reclaim condenser entering thermistor fault, circuit A	As above	Unit returns to the air-cooled mode	As above
9	15009	Reclaim condenser leaving thermistor fault, circuit B	As above	As above	As above
10	15010	OAT thermistor fault	As above	Unit shuts down	As above
11	15011	Master/slave common water thermistor fault	As above	Master/slave operation is disabled and the unit returns to the stand-alone mode	As above
12	15032	MASTER/Slave Common Heat Fluid Thermistor	As above	As above	As above
13	15012	Suction gas thermistor fault, circuit A	As above	Circuit A shuts down	As above
14	15013	Suction gas thermistor fault, circuit B	As above	Circuit B shuts down	As above
15	15014	Suction gas thermistor fault, circuit C	As above	Circuit C shuts down	As above
16	15015	Discharge gas thermistor fault, circuit A	As above	Circuit A shuts down	As above
17	15016	Discharge gas thermistor fault, circuit B	As above	Circuit B shuts down	As above
18	15017	Discharge gas thermistor fault, circuit C	As above	Circuit C shuts down	As above
19	15036	Dry Cooler Leaving thermistor failure	As above	None	As above
20	15046	Free Cooling Water Loop Thermistor Failure	As above	Dry cooler free cooling disabled	As above
21	15047	Free Cooling Leaving Water Thermistor Failure	As above	Dry cooler free cooling disabled	As above
22	15048	Free Cooling OAT Thermistor Failure	As above	Dry cooler free cooling disabled	As above
23	15018	Condenser subcooling liquid thermistor fault, circuit A	As above	Unit returns to the air-cooled mode	As above
24	15019	Condenser subcooling liquid thermistor fault, circuit B	As above	As above	As above
25	15021	Space temperature thermistor fault	As above	None	As above
26	15023	Evaporator heater feedback thermistor fault	As above	None	As above
27	15024	Economizer gas thermistor fault, circuit A	As above	Economizer function disabled	As above
28	15025	Economizer gas thermistor fault, circuit B	As above	As above	As above
29	15026	Economizer gas thermistor fault, circuit C	As above	As above	As above
30	15030	Free cooling liquid thermistor fault, circuit A	As above	Free cooling disabled	As above
31	15031	Free cooling liquid thermistor fault, circuit B	As above	As above	As above
TRANSDUCER FAILURE					
32	12001	Discharge transducer fault, circuit A	Automatic, if sensor voltage reading returns to normal	Circuit A shuts down	Defective transducer or installation fault
33	12002	Discharge transducer fault, circuit B	As above	Circuit B shuts down	As above
34	12003	Discharge transducer fault, circuit C	As above	Circuit C shuts down	As above
35	12004	Suction transducer fault, circuit A	As above	Circuit A shuts down	As above
36	12005	Suction transducer fault, circuit B	As above	Circuit B shuts down	As above
37	12006	Suction transducer fault, circuit C	As above	Circuit C shuts down	As above
38	12007	Heat reclaim pump-down pressure transducer fault, circuit A	As above	Reclaim session stopped and the unit returns to the air-cooled mode	As above
39	12008	Heat reclaim pump-down pressure transducer fault, circuit B	As above	As above	As above
40	12010	Oil pressure transducer fault, circuit A	As above	Circuit A shuts down	As above
41	12011	Oil pressure transducer fault, circuit B	As above	Circuit B shuts down	As above
42	12012	Oil pressure transducer fault, circuit C	As above	Circuit C shuts down	As above
43	12013	Economizer pressure transducer fault, circuit A	As above	Circuit A shuts down	As above
44	12014	Economizer pressure transducer fault, circuit B	As above	Circuit B shuts down	As above
45	12015	Economizer pressure transducer fault, circuit C	As above	Circuit C shuts down	As above

No.	Code	Alarm description	Reset type	Action taken	Possible cause
46	12016	Free cooling pump inlet pressure transducer fault, circuit A	As above	Free cooling stopped and the unit returns to mechanical cooling	As above
47	12017	Free cooling pump outlet pressure transducer fault, circuit A	As above	As above	As above
48	12018	Free cooling pump inlet pressure transducer fault, circuit B	As above	As above	As above
49	12019	Free cooling pump outlet pressure transducer fault, circuit B	As above	As above	As above
50	12022	Circuit A Heatpump Approach Pressure Transducer	As above	Cooler pinch control disabled in Cooling mode; discharge superheat control is required	As above
51	12023	Circuit B Heatpump Approach Pressure Transducer	As above	As above	As above
52	12024	Water pressure 1 transducer failure (before the evaporator)	As above	Alert - the values read by the hydronic kit function are not reliable	As above
53	12025	Water pressure 2 transducer failure (after the evaporator)	As above	As above	As above
54	12026	Water pressure 3 transducer failure (before the filter)	As above	As above	As above
55	12027	Water pressure 4 transducer failure (after the filter)	As above	As above	As above
57	12029	Low water pressure	As above	Alert – the unit continues to operate	Water loop pressure too low, risk of pump cavitation
COMMUNICATION FAILURE					
59	4101	Communication loss with Compressor Board A	Automatic, if communication is re-established	Unit shuts down	Bus installation fault or defective board
60	4201	Communication loss with Compressor Board B	As above	Unit shuts down	As above
61	4301	Communication loss with Compressor Board C	As above	Unit shuts down	As above
62	4901	Communication loss with SIOB Board Number 1	As above	Unit shuts down	As above
63	4902	Communication loss with SIOB Board Number 2	As above	Unit shuts down	As above
64	4903	Communication loss with SIOB Board Number 3	As above	Unit shuts down	As above
65	4904	Communication loss with SIOB Board Number 4	As above	Unit shuts down	As above
66	4905	Communication loss with SIOB Board Number 5	As above	Unit shuts down	As above
67	4906	Communication loss with SIOB Board Number 6	As above	Unit shuts down	As above
68	4501	Communication loss with Fan Board Number 1	As above	Circuit A shuts down	As above
69	4502	Communication loss with Fan Board Number 2	As above	Circuit B shuts down	As above
70	4503	Communication loss with Fan Board Number 3	As above	Circuit C shuts down	As above
71	4504	Loss of Communication with Auxiliary # 4 (Dry Cooler Free Cooling Option)	As above	Dry cooler free cooling disabled and the unit returns to mechanical cooling	As above
72	4505	Loss of Communication with Auxiliary # 3 Dry cooler Option	As above	Dry cooler mode is stopped	As above
73	4801	Communication loss with VLT Board Number 1, (units w/o option 17)	As above	Circuit A shuts down	As above
74	4802	Communication loss with VLT Board Number 2, (units w/o option 17)	As above	Circuit B shuts down	As above
75	4803	Communication loss with VLT Board Number 3, (units w/o option 17)	As above	Circuit C shuts down	As above
76	4704	Loss of communication with Fan VLT Drive Board A1 (option 17)	As above	Circuit A shuts down	As above
77	4705	Loss of communication with Fan VLT Drive Board A2 (option 17)	As above	Circuit A shuts down	As above
78	4706	Loss of communication with Fan VLT Drive Board A3 (option 17)	As above	Circuit A shuts down	As above
79	4707	Loss of communication with Fan VLT Drive Board B1 (option 17)	As above	Circuit B shuts down	As above
80	4708	Loss of communication with Fan VLT Drive Board B2 (option 17)	As above	Circuit B shuts down	As above
81	4709	Loss of communication with Fan VLT Drive Board B3 (option 17)	As above	Circuit B shuts down	As above
PROCESS FAILURE					
85	10001	Evaporator frost protection	Manual	Unit shuts down, but the pump continues to run	No water flow, defective thermistor
86	10002	Condenser frost protection, circuit A	Automatic (if saturated discharge temperature is more than 4.4°C) or Manual	Circuit A shuts down, but the pump is running	Discharge pressure transducer defective, refrigerant leak or low condenser water temperature
87	10003	Condenser frost protection, circuit B	As above	Circuit B shuts down, but the pump is running	As above
88	10004	Condenser frost protection, circuit C	As above	Circuit C shuts down, but the pump is running	As above

No.	Code	Alarm description	Reset type	Action taken	Possible cause
89	10005	Low suction temperature, circuit A	Automatic (the first alarm in the last 24 hours) or Manual	Circuit A shuts down	Pressure sensor defective, EXV blocked or lack of refrigerant
90	10006	Low suction temperature, circuit B	As above	Circuit B shuts down	As above
91	10007	Low suction temperature, circuit C	As above	Circuit C shuts down	As above
92	10008	High superheat, circuit A	Manual	Circuit A shuts down	As above
93	10009	High superheat, circuit B	Manual	Circuit B shuts down	As above
94	10010	High superheat, circuit C	Manual	Circuit C shuts down	As above
95	10011	Low superheat, circuit A	Manual	Circuit A shuts down	As above
96	10012	Low superheat, circuit B	Manual	Circuit B shuts down	As above
97	10013	Low superheat, circuit C	Manual	Circuit C shuts down	As above
98	10014	Customer safety loop failure	Automatic (the first alarm in the last 24 hours) or Manual	Unit shuts down	Customer interlock closed
99	10028	Electrical box thermostat	Automatic	Unit shuts down	Electrical box fault: Control box poorly ventilated or poor electrical connection
100	10029	System manager communication fault	Automatic, if communication is re-established	Unit returns to the stand-alone mode	CCN bus installation defective
101	10030	Master/slave communication failure	Automatic	Master/slave control disabled	As above
102	10067	Low oil pressure, circuit A	Manual	Circuit A shuts down	Pressure sensor fault, defective wiring or oil filter installation fault
103	10068	Low oil pressure, circuit B	Manual	Circuit B shuts down	As above
104	10069	Low oil pressure, circuit C	Manual	Circuit C shuts down	As above
105	10070	Maximum oil filter differential pressure, circuit A	Manual	The affected compressor is stopped, other compressors continue to run	As above
106	10071	Maximum oil filter differential pressure, circuit B	Manual	As above	As above
107	10072	Maximum oil filter differential pressure, circuit C	Manual	As above	As above
108	10084	High oil filter drop pressure, circuit A	Manual	None	Pressure sensor fault, wiring defective, oil filter installation fault
109	10085	High oil filter drop pressure, circuit B	Manual	None	As above
110	10086	High oil filter drop pressure, circuit C	Manual	None	As above
111	10075	Low oil level, circuit A	Automatic (three alarms in the last 24 hours) or Manual	Circuit A shuts down	Oil level too low or oil level detector defective
112	10076	Low oil level, circuit B	As above	Circuit B shuts down	As above
113	10077	Low oil level, circuit C	As above	Circuit C shuts down	As above
117	10031	Emergency stop	Automatic	Unit shuts down	Network emergency stop command
118	10032	Evaporator pump 1 fault	Manual	Unit is restarted with another pump running. If no pumps are available, the unit shuts down	Pump overheats or poor pump connection
119	10033	Evaporator pump 2 fault	Manual	As above	As above
120	10015	Flow controller fault - condenser flow switch failure	Automatic (the first alarm in the last 24 hours) or Manual	Condenser pump is stopped	Condenser flow switch open
121	10034	Reclaim operation failure, circuit A	Manual	Circuit A returns to the air-cooled mode	Low condenser flow
122	10035	Reclaim operation failure, circuit B	Manual	Circuit B returns to the air-cooled mode	As above
123	10037	High condensing temperature, circuit A	Automatic	Circuit A shuts down	Defective transducer
124	10038	High condensing temperature, circuit B	Automatic	Circuit B shuts down	As above
125	10039	High condensing temperature, circuit C	Automatic	Circuit C shuts down	As above
129	10043	Low entering water temperature in heating	Automatic, if EWT returns to normal or Heating mode is disabled	None	Entering water temperature is below 3.3°C
130	10073	Condenser pump 1 fault	Manual	Unit is restarted with another pump running. If no pumps are available, the unit shuts down	Pump overheats or poor pump connection
131	10074	Condenser pump 2 fault (not available!)	Manual	As above	As above

No.	Code	Alarm description	Reset type	Action taken	Possible cause
132	10078	High discharge gas temperature, circuit A	Manual	Circuit A shuts down	Defective transducer, max. condensing temperature setpoint too low or refrigerant charge too high
133	10079	High discharge gas temperature, circuit B	Manual	Circuit B shuts down	As above
134	10080	High discharge gas temperature, circuit C	Manual	Circuit C shuts down	As above
135	10081	Suction valve closed, circuit A	Manual	Circuit A shuts down	Economizer pressure transducer defective, suction valve fault
136	10082	Suction valve closed, circuit B	Manual	Circuit B shuts down	As above
137	10083	Suction valve closed, circuit C	Manual	Circuit C shuts down	As above
138	10087	Slide valve control unverifiable, circuit A	Manual	None	Defective or incorrectly wired solenoid valves, defective current transformer
139	10088	Slide valve control unverifiable, circuit B	Manual	None	As above
140	10089	Slide valve control unverifiable, circuit C	Manual	None	As above
141	10090	Flow controller configuration fault	Manual	Unit is not allowed to restart	Defective flow controller or wiring error
142	10091	Flow controller fault – evaporator flow switch failure	Automatic (the first alarm in the last 24 hours) or Manual	Compressors and the evaporator pump are stopped	As above
143	10100	Electrical box fan failure (units with HFO only)	Manual	Unit shuts down	Electrical box fan malfunction or fan current probe malfunction
144	10094	Free cooling operation failure, circuit A	Automatic (three alarms in the last 24 hours) or Manual	Circuit A shuts down, Free cooling can be started 30 minutes later	Refrigerant pump fault
145	10095	Free cooling operation failure, circuit B	As above	Circuit B shuts down, Free cooling can be started 30 minutes later	As above
146	10097	Water exchanger temperature sensors swapped	Manual	Unit shuts down	Leaving water temperature is higher than entering water temperature
180	10050	Refrigerant Leakage Detection	Manual	None	Refrigerant leak or leak detector defective
181	10101	Free Cooling Process Failure	Automatic, if free cooling conditions return to normal	Dry cooler free cooling stopped and the unit returns to mechanical cooling	Conditions not suitable for dry cooler free cooling
MAINTENANCE ALARMS					
147	13-nnn	Service maintenance alert	Manual	None	Preventive maintenance date has passed
182	13005	Fgas check needed, call your maintenance company	Manual	None	As above
VLT DRIVE FAILURE					
148	20-nnn	Variable speed controller error, circuit A (units w/o option 17)	Manual	Circuit A shuts down	Speed controller fault (see section 8.6.2)
149	23-nnn	Variable speed controller error, circuit B (units w/o option 17)	Manual	Circuit B shuts down	As above
150	26-nnn	Variable speed controller error, circuit C (units w/o option 17)	Manual	Circuit C shuts down	As above
151	20-nnn	VLT Fan Drive A1 Failure (option 17)	Manual	Circuit A shuts down	As above
152	21-nnn	VLT Fan Drive A2 Failure (option 17)	Manual	Circuit A shuts down	As above
153	22-nnn	VLT Fan Drive A3 Failure (option 17)	Manual	Circuit A shuts down	As above
154	23-nnn	VLT Fan Drive B1 Failure (option 17)	Manual	Circuit B shuts down	As above
155	24-nnn	VLT Fan Drive B2 Failure (option 17)	Manual	Circuit B shuts down	As above
156	25-nnn	VLT Fan Drive B3 Failure (option 17)	Manual	Circuit B shuts down	As above
160	38-nnn	Variable speed controller alert, circuit A (units w/o option 17)	Manual	None	Speed controller alert (see section 8.6.2)
161	41-nnn	Variable speed controller alert, circuit B (units w/o option 17)	Manual	None	As above
162	44-nnn	Variable speed controller alert, circuit C (units w/o option 17)	Manual	None	As above
163	38-nnn	Variable speed controller A1 alert (option 17)	Automatic	None	As above
164	39-nnn	Variable speed controller A2 alert (option 17)	Automatic	None	As above
165	40-nnn	Variable speed controller A3 alert (option 17)	Automatic	None	As above

No.	Code	Alarm description	Reset type	Action taken	Possible cause
166	41-nnn	Variable speed controller B1 alert (option 17)	Automatic	None	As above
167	42-nnn	Variable speed controller B2 alert (option 17)	Automatic	None	As above
168	43-nnn	Variable speed controller B3 alert (option 17)	Automatic	None	As above
EXV FAILURE					
174	57020	Main EXV stepper motor Failure - cir A	Manual	Circuit A shuts down	Stepper motor failure
175	57021	Main EXV stepper motor Failure - cir B	Manual	Circuit B shuts down	As above
176	57022	Main EXV stepper motor Failure - cir C	Manual	Circuit C shuts down	As above
177	57023	EXV eco stepper motor Failure - cir A	Manual	Circuit A shuts down	As above
178	57024	EXV eco stepper motor Failure - cir B	Manual	Circuit B shuts down	As above
179	57025	EXV eco stepper motor Failure - cir C	Manual	Circuit C shuts down	As above
COMPRESSOR FAILURE					
183-201	11nn	Compressor A fault	Manual	Unit shuts down	See section 8.6.3
202-220	21nn	Compressor B fault	Manual	Unit shuts down	As above
221-239	31nn	Compressor C fault	Manual	Unit shuts down	As above
SOFTWARE FAILURE					
172	55001	Database module fault	Automatic	Unit shuts down	Software problem. Contact Carrier Service
173	56001	Lenscan module fault	Automatic	Unit shuts down	Software problem. Contact Carrier Service
CONFIGURATION FAILURE					
114	9001	Master chiller configuration error Number #1 to nn	Automatic, if master/ slave configuration returns to normal	Master/Slave control disabled	Incorrect unit configuration
115	8000	Initial factory configuration required	Automatic, if configuration is made	Unit not allowed to start	Factory configuration required
116	7001	Illegal factory configuration	Automatic, if configuration is corrected	Unit not allowed to start	Incorrect unit configuration

8.6.2 - Drive alarms

The tables below present the most common alarms associated with the variator malfunction. Please refer to the applicable Danfoss documentation for more information on other alarms.

Code	Alarm /Alert	Description	Action to be taken
Variator alarms (-nnn)			
2	Alarm	Live zero fault	Contact Carrier Service
4	Alarm	Mains phase loss	Check the VFD supply voltage and the phase balance (±3%)
7	Alarm	Overvoltage	Contact Carrier Service
8	Alarm	Undervoltage	Contact Carrier Service
9	Alarm	Inverter overloaded	Check the VFD output current
10	Alarm	Motor overtemperature	Check the motor temperature
11	Alarm	Motor thermistor	Contact Carrier Service
12	Alarm	Torque limit exceeded	Check the VFD output current
13	Alarm	Overcurrent	Check the VFD output current
14	Alarm	Earth fault	Check if an earth fault exists
16	Alarm	Motor short-circuit	Check if there is a short-circuit at the VFD terminals
17	Alarm	Serial communication timeout	Check the connections and the shielding of the serial communication cable
23*	Alarm	Internal fan fault	Check the internal fan rotation
25	Alarm	Brake resistor short-circuited	Contact Carrier Service
26	Alarm	Brake resistor power limit	Contact Carrier Service
28	Alarm	Brake verification	Contact Carrier Service
29	Alarm	VFD temperature too high	Space temperature too high or VFD ventilation obstructed or damaged
30	Alarm	Motor phase U missing	Check wiring of phase U
31	Alarm	Motor phase V missing	Check wiring of phase V
32	Alarm	Motor phase W missing	Check wiring of phase W
33	Alarm	Inrush fault	Current demand too high: Let the VFD cool down for 20 minutes before starting it again
34	Alarm	Fieldbus communication fault	Check the connections and the shielding of the serial communication cable
36	Alarm	Mains failure	Check the VFD supply voltage and the phase balance (±3%)
38	Alarm	Internal fault	Contact Carrier Service

Code	Alarm /Alert	Description	Action to be taken
47	Alarm	24 V supply low	Contact Carrier Service
48	Alarm	1.8 V supply low	Contact Carrier Service
57**	Alarm	AMA timeout	Contact Carrier Service
65	Alarm	Control board overtemperature	Check the space temperature and the VFD fan
67	Alarm	Option configuration has changed	Contact Carrier Service
68	Alarm	Emergency stop	Contact Carrier Service
71	Alarm	PTC 1 emergency stop	Contact Carrier Service
72	Alarm	Emergency stop	Contact Carrier Service
80	Alarm	Drive initialized to default value	Contact Carrier Service
94	Alarm	End of curve	Contact Carrier Service
95	Alarm	Torque loss	Contact Carrier Service
243	Alarm	IGBT defective	Contact Carrier Service
251***	Alarm	New parts detached	Contact Carrier Service
Variator alerts (-nnn)			
1	Alert	10 V low	Contact Carrier Service
2	Alert	Live zero error	Contact Carrier Service
3	Alert	No motor	Check the motor connections
4	Alert	Mains phase loss	Check the VFD supply voltage and the phase balance (±3%)
5	Alert	DC link voltage high	Check the VFD supply voltage and the phase balance (±3%)
6	Alert	DC link voltage low	Check the VFD supply voltage and the phase balance (±3%)
7	Alert	DC overvoltage	Contact Carrier Service
8	Alert	DC undervoltage	Contact Carrier Service
9	Alert	Inverter overloaded	Check the VFD output current
10	Alert	Motor overtemperature	Check the motor temperature
11	Alert	Motor thermistor	Contact Carrier Service
12	Alert	Torque limit exceeded	Check the VFD output current
13	Alert	Overcurrent	Check the VFD output current
14	Alert	Earth fault	Check if an earth fault exists
17	Alert	Control word timeout	Check the connections and the shielding of the serial communication cable
23***	Alert	Internal fan fault	Check the internal fan rotation
25	Alert	Brake resistor short-circuited	Contact Carrier Service
26	Alert	Brake resistor power limit	Contact Carrier Service
28	Alert	Brake verification	Contact Carrier Service
34	Alert	Fieldbus communication fault	Check the connections and the shielding of the serial communication cable
36	Alert	Mains failure	Check the VFD supply voltage and the phase balance (±3%)
47	Alert	24 V supply low	Contact Carrier Service
49	Alert	Motor speed limit exceeded	Contact Carrier Service
59	Alert	Current limit exceeded	Check the VFD output current
62	Alert	Output frequency at maximum limit	Check the VFD output current
64	Alert	Voltage limit	Supply voltage too low
65	Alert	Control board overtemperature	Check the space temperature and the VFD fan
66	Alert	Heat sink temperature low	Space temperature too low
71	Alert	PTC1 emergency stop	Contact Carrier Service
72	Alert	Emergency stop	Contact Carrier Service
90†	Alert	Encoder loss	Contact Carrier Service
94	Alert	End of curve	Contact Carrier Service
95	Alert	Torque loss	Contact Carrier Service
96	Alert	Start delayed	Contact Carrier Service
97	Alert	Stop delayed	Contact Carrier Service
98	Alert	Clock fault	Contact Carrier Service
243	Alert	IGBT defective	Contact Carrier Service
247	Alert	Capacity board temperature	Contact Carrier Service

* Error 24 and 104 possible
** Error 50 to 58 possible
***Error 70 or 250 possible
† Not applicable to variator size 102

8.6.3 - Compressor alarms

Alarm code*	Description	Reset type	Possible cause
XX-01	Motor temperature too high	Manual	Motor/wiring fault
XX-02	Motor temperature outside the range	Manual	Probe defective or incorrect wiring
XX-03	Motor temperature outside the range	Manual	Coil fouled, lack of condenser flow, condenser valve blocked, fan circuit fault, high entering air or condenser water temperature
XX-04	Current consumption too high	Manual	-
XX-05	Locked rotor	Manual	Mechanical compressor fault, motor fault or defective compressor slide valve
XX-06	Phase L1 lost	Manual	Power supply wiring fault
XX-07	Phase L2 lost	Manual	As above
XX-08	Phase L3 lost	Manual	As above
XX-09	Low current alarm	Manual	Defective contactor or capacity fault
XX-10	Current increase fault during the star-delta passage	Manual	Incorrect wiring or no power for the delta contactor
XX-11	Contactor fault	Manual	Incorrect wiring or defective contactor or TCPM board
XX-12	Motor stop impossible	Manual	Incorrect wiring or defective contactor
XX-13	Phase reversal	Manual	-
XX-14	MTA configuration fault	Manual	MTA configuration incorrect or defective TCPM board
XX-15	Incorrect configuration switch	Manual	Configuration switch S1 incorrect wiring or defective TCPM board
XX-16	Switch modification detected	Manual	As above
XX-17	Power supply cut during operation	Automatic	Verify that power supply cuts have occurred
XX-18	Critical software error (UL 1998)	Manual	Power network noise or defective TCPM board
XX-19	Critical error on two current parameters (UL 1998)	Manual	Power network noise or defective TCPM board

*XX stands for compressor (11 – compressor A, 21 – compressor B, 31 - compressor C)

Quality and Environment
Management Systems
Approval

Carrier

United Technologies

Order No.: 13453, 03.2018. Supersedes order No.: 13453, 10.2017.
Manufacturer reserves the right to change any product specifications without notice.

Manufactured by: Carrier SCS, Montluel, France.
Printed in the European Union.