Carrier

United Technologies

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

HFC-134a

Screw Compressor Water-Cooled Liquid Chillers

30HXC 080-375

Nominal cooling capacity 30HXC: 286-1300 kW 50 Hz / 60Hz

Original instructions

CONTENTS

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

1 - INTRODUCTION

Prior to the initial start-up of the 30HXC 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 30HXC liquid chillers are designed to provide a very high level of safety during installation, start-up, opera tion 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.

Be sure you understand and follow the procedures and safety precautions contained in the instructions supplied with the machine, as well as those listed in this guide.

To find out, if these products comply with European directives (machine safety, low voltage, electromagnetic compatibility, equipment under pressure etc.) check the declarations of conformity for these products.

1.1 - Installation safety considerations

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

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

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

It is compulsory to wear personal protection equipment.

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.

Use slings or lifting beams with the correct capacity, and always follow the lifting instructions on the certified drawings supplied with the unit. Do not tilt the unit more than 15°.

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 protection devices.

This applies to the relief valves (if used) in the refrigerant or heat transfer medium circuits, the fuse plugs and the pressure switches.

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

Classification and control
In accordance with the Pressure Equipment Directive and national usage monitoring regulations in the European Union the protection devices for these machines are classified as follows:

	Safety accessory*	Damage limitation accessory** in case of an external fire
Refrigerant side		
High-pressure switch	x	
External relief valve***		x
Rupture disk		x
Fuse plug		x
Heat transfer fluid side		
External relief valve	****	****

* Classified for protection in normal service situations.
** Classified for protection in abnormal service situations.
*** The instantaneous over-pressure limited to 10% of the operating pressure does not apply to this abnormal service situation. The control pressure can be higher than the service pressure. In this case either the design temperature or the high-pressure switch ensures that the service pressure is not exceeded in normal service situations.
**** The classification of these relief valves must be made by the personnel that completes the whole hydronic installation.

If the relief valves are installed on a change-over valve, 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 (bring the actuator in abutment, front or back according to the outlet to isolate). 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.

All factory-installed relief valves are lead-sealed to prevent any calibration change.

The external relief valves and the fuses are designed and installed to ensure damage limitation in case of a fire.

In accordance with the regulations applied for the design, the European directive on equipment under pressure and in accordance with the national usage regulations:

- ***These relief valves and fuses are not safety accessories but damage limitation accessories in case of a fire,***
- ***The high pressure switches are the safety accessories.***

The relief valve must only be removed if the fire risk is fully controlled and after checking that this is allowed by local regulations and authorities. This is the responsibility of the operator.

When the unit is subjected to fire, safety devices prevent rupture due to over-pressure by releasing refrigerant. The fluid may then be decomposed into toxic residues when subjected to the flame:

- ***Stay away from the unit***
- ***Set up warnings and recommendations for personnel in charge to stop the fire.***
- ***Fire extinguishers appropriate to the system and the refrigerant type must be easily accessible.***

The external relief valves must in principle be connected to discharge pipes for units installed in a room. Refer to the installation regulations, for example those of European standards EN 378 and EN 13136.

They include a sizing method and examples for configuration and calculation. Under certain conditions these standards permit connection of several valves to the same discharge pipe. Note: Like all other standards these EN standards are available from national standards organisations.

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.

It is recommended to install an indicating device to show if part of the refrigerant has leaked from the valve. The presence of oil at the outlet orifice is a useful indicator that refrigerant has leaked. Keep this orifice clean to ensure that any leaks are obvious.

The calibration of a valve that has leaked is generally lower than its original calibration. The new calibration may affect the operating range. To avoid a nuisance tripping or leaks, replace or re-calibrate the valve.

Periodic check of the relief valves: See paragraph 1.3 "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

The units are intended to be stored and operate in an environment where the ambient temperature must not be less than the lowest allowable temperature indicated on the nameplate. See section "10.2 - Pressure vessels".

1.3 - Maintenance safety considerations

Carrier recommends the following drafting for a logbook (the table below should not be considered as reference and does not involve Carrier responsibility):

Intervention		Name of the commissioning engineer	Applicable national regulations	Verification Organism
Date	Nature (1)			

(1) Maintenance, repairs, regular verifications (EN 378), leakage, etc.

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.

The insulation must be removed and heat generation must be limited by using a wet cloth.

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:

IMPORTANT INFORMATION REGARDING THE REFRIGERANT USED:

- ***This product contains fluorinated greenhouse gas covered by the Kyoto protocol.***

Fluid type: R134a
Global Warming Potential (GWP): 1430

CAUTION:

1. ***Any handling of refrigerant contained in this product must comply with the F-Gas Directive N° 517/2014 and any other applicable local legislation.***
2. ***Ensure that the refrigerant is never released to the atmosphere during installation, maintenance or equipment disposal.***
3. ***The deliberate gas release into the atmosphere is strictly not allowed.***
4. ***If a refrigerant leak is detected, ensure that it is stopped and repaired as quickly as possible.***
5. ***Only a qualified and certified personnel can perform installation operations, maintenance, refrigerant circuit leak test as well as the equipment disposal and the refrigerant recovering.***
6. ***The gas recovery for recycling, regeneration or destruction is at customer charge.***
7. ***The customer has to carry out periodic leak tests***

System WITHOUT leakage detection		No check	12 months	6 months	3 months
System WITH leakage detection		No check	24 months	12 months	6 months
Refrigerant charge/circuit (CO_2 equivalent)		< 5 tons	5 ≤ charge < 50 tons	50 ≤ charge < 500 tons	Charge > 500 tons*
Refrigerant charge/ Circuit (kg)	R134A (GWP 1430)	Charge < 3.5 kg	3.5 ≤ charge < 34.9 kg	34.9 ≤ charge < 349.7 kg	Charge > 349.7 kg
	R407C (GWP 1774)	Charge < 2.8 kg	2.8 ≤ charge < 28.2 kg	28.2 ≤ charge < 281.9 kg	Charge > 281.9 kg
	R410A (GWP 2088)	Charge < 2.4 kg	2.4 ≤ charge < 23.9 kg	23.9 ≤ charge < 239.5 kg	Charge > 239.5 kg
	HFO's: R1234ze	No requirement			

* From 01/01/2017, units must be equipped with a leakage detection system

8. ***A logbook must be established for the systems that require a tightness check. It should contain the quantity and the type of fluid present within the installation (added and recovered), the quantity of recycled fluid/regenerated/ destroyed, the date and output of the leak test, the designation of the operator and its belonging company, etc.***
9. ***Contact your local dealer or installer if you have any questions.***

Protection device checks (EN 378):
The safety devices must be checked on site once a year for safety devices (see chapter 11.3 - Highpressure safety switch), and every five years for external overpressure devices (external relief valves).

The company or organisation that conducts a pressure switch test shall establish and implement a detailed procedure to fix:

- Safety measures
- Measuring equipment calibration
- Validating operation of protective devices
- Test protocols
- Recommissioning of the equipment.

Consult Carrier Service for this type of test. Carrier mentions here only the principle of a test without removing the pressure switch:

- Verify and and record the setpoints of pressure switches and relief devices (valves and possible rupture discs)
- Be ready to switch-off the main disconnect switch of the power supply if the pressure switch does not trigger (avoid over-pressure or excess gas in case of valves on the high-pressure side with the recovery condensers)
- Connect a calibrated pressure gauge (the values displayed on the user interface may be inaccurate in an instant reading because of the scanning delay applied in the control)
- Neutralise the HP soft value
- Cut the condenser water flow
- Check the cut-off value
- Reactivate HP soft value
- Reactivate manually HP switch.

CAUTION: If the test leads to replacing the pressure switch, it is necessary to recover the refrigerant charge, these pressure switches are not installed on automatic valves (Schraeder type).

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 NF E29-795 or carry out a refrigerant analysis in a specialist laboratory.

If the refrigerant circuit remains open for longer than a day after an intervention (such as a component replacement), the openings must be plugged and the circuit must be charged with nitrogen (inertia principle). The objective is to prevent penetration of atmospheric humidity and the resulting corrosion on the internal walls and on non-protected steel surfaces.

1.4 - Repair safety considerations

It is compulsory to wear personal protection equipment.

The insulation must be removed and warming up must be limited by using a wet cloth.

Before opening the unit always ensure that the circuit has been purged.

If work on the evaporator is required, ensure that the piping from the compressor is no longer pressurised (as the valve is not leaktight in the compressor direction.)

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 protection 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 R-134a charge, as indicated on the unit name plate. Certain parts of the circuit can be isolated. Only charge liquid refrigerant R-134a 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 (R-134a) 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.

RISK OF EXPLOSION: 

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 contact with liquid refrigerant on the 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.

The accidental releases of the refrigerant, due to small leaks or significant discharges following the rupture of a pipe or an unexpected release from a relief valve, can cause frostbites and burns to personnel exposed. Do not ignore such injuries. Installers, owners and especially service engineers for these units must:

- ***Seek medical attention before treating such injuries.***
- ***Have access to a first-aid kit, especially for treating eye injuries.***

We recommend to apply standard EN 378-3 Annex 3.

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 NF E29-795.

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.

ATTENTION: Only use refrigerant R134a, in accordance with 700 AHRI (Air conditioning, Heating and Refrigeration Institute). The use of any other refrigerant may expose users and operators to unexpected risks.

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 relief valves in series or backwards.

ATTENTION: No part of the unit must be used as a walk-way, rack or support. Periodically check 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
  - Fluid being transported
  - 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)
  - Pressure switch cut-out pressures
  - 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 12 "Standard maintenance".

2.2 - Moving and siting the unit

2.2.1 - Moving

See chapter 1.1 “Installation safety considerations”.

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

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.

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

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.

CAUTION: Lift and set down the unit with great care. Tilting and jarring can damage the unit and impair unit operation.

2.2.3 - Checks before system start-up

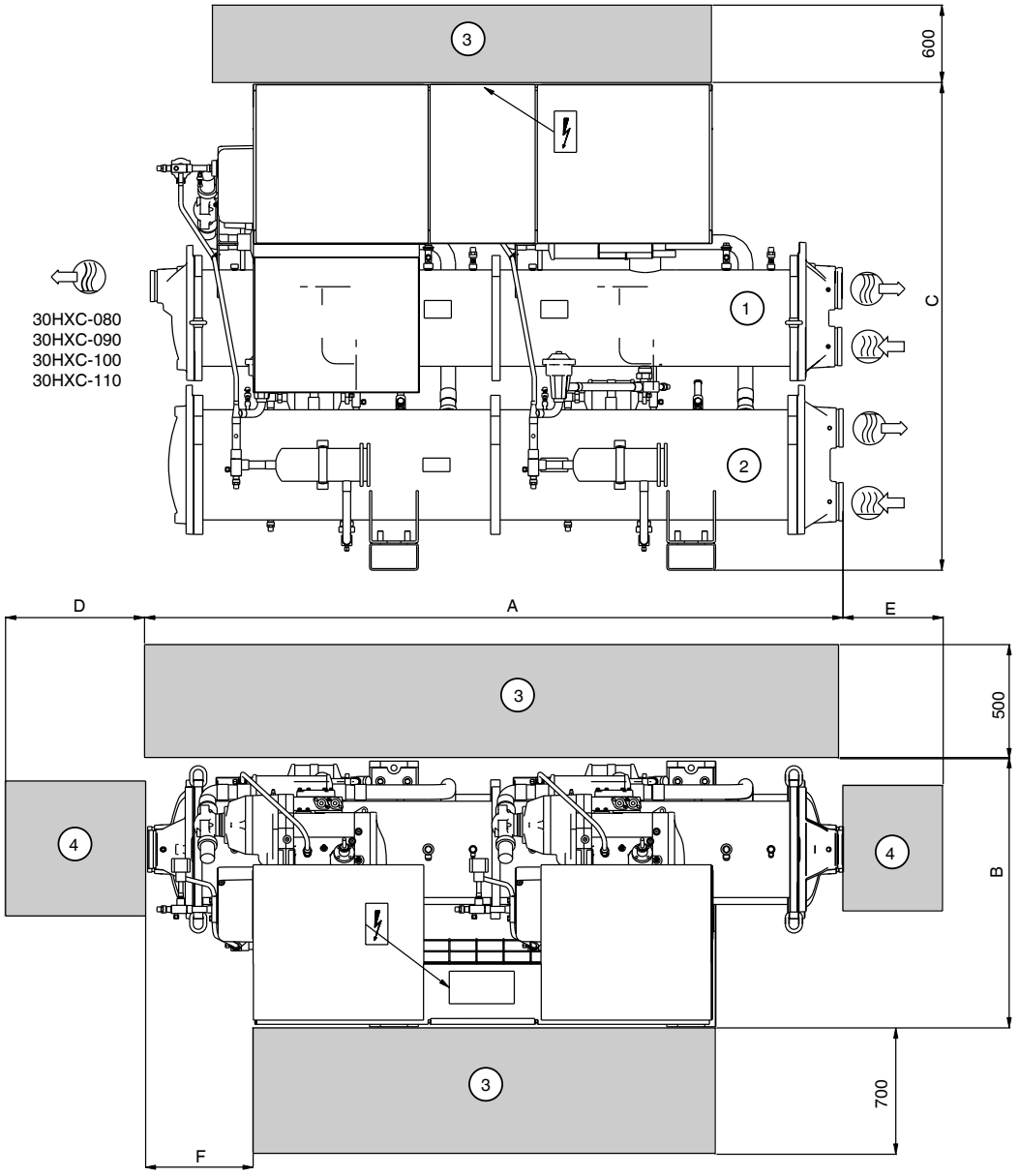
Before the start-up of the refrigeration system, the complete installation, including the refrigeration system must be verified against the installation drawings, dimensional drawings, system piping and instrumentation diagrams and the wiring diagrams.

During the installation test national regulations must be followed. If no national regulation exists, standard EN 378 can be used as a guide.

- External visual installation checks:
- Ensure that the machine is charged with refrigerant. Verify on the unit nameplate that the ‘fluid being transported’ is R-134a and is not nitrogen.
- Compare the complete installation with the refrigeration system and power circuit diagrams.
- Check that all components comply with the design specifications.
- Check that all protection documents and equipment provided by the manufacturer (dimensional drawings, P&ID, declarations etc.) to comply with the regulations are present.
- Verify that the environmental safety and protection and devices and arrangements provided by the manufacturer to comply with the regulations are in place.
- Verify that all document for pressure containers, certificates, name plates, files, instruction manuals provided by the manufacturer to comply with the regulations 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, WEIGHT DISTRIBUTION

3.1 - 30HXC 080-190



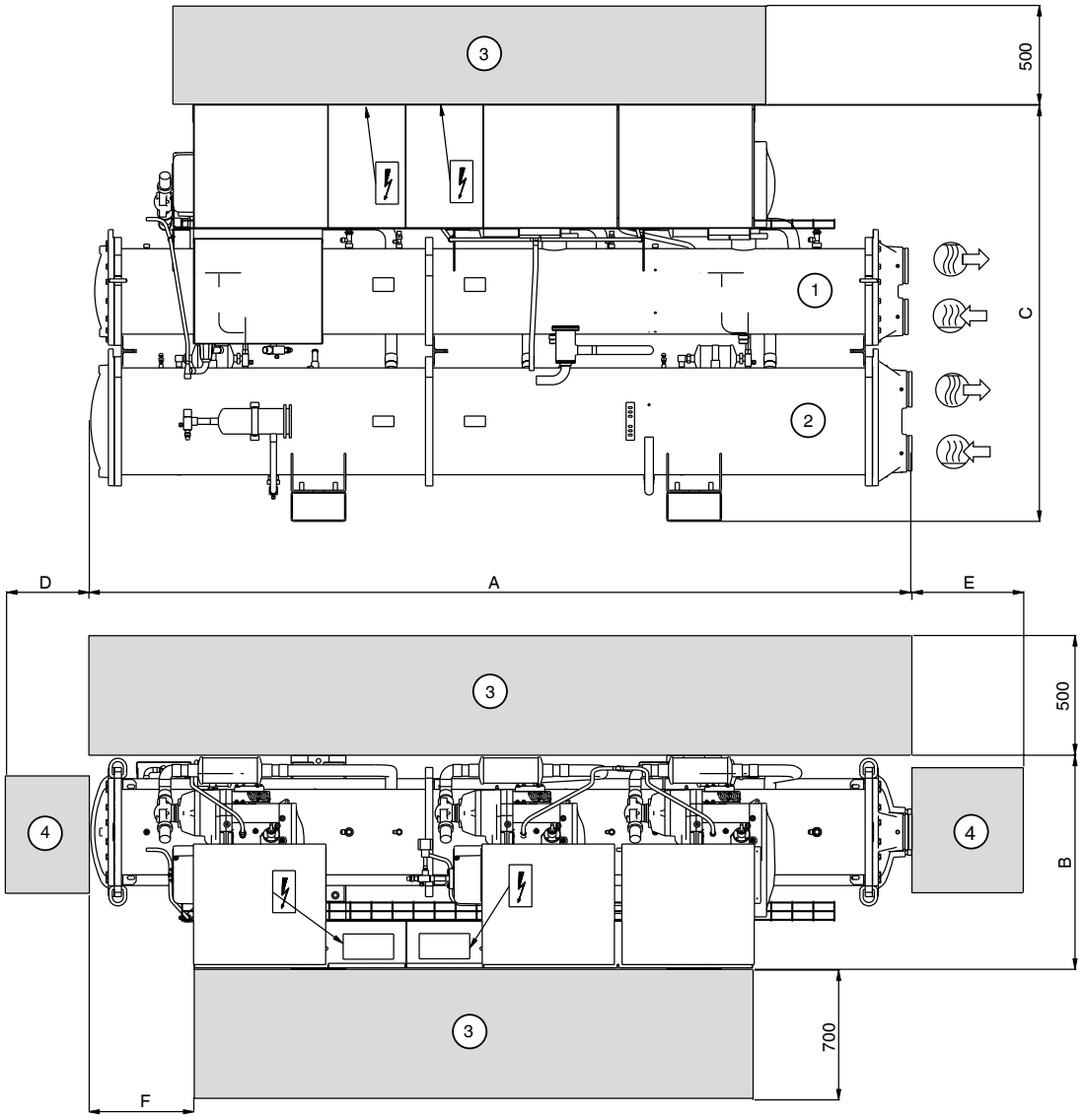
Legend
All dimensions are in mm.

①	Evaporator
②	Condenser
③	Clearances required for operation and maintenance
④	Clearances required for heat exchanger tube removal. Clearances D and E can be either on the left or on the right hand side.
	Water inlet
	Water outlet
	Power supply

30HXC	A	B	C	D	E	F
080-090-100	2558	980	1800	2200	1000	385
110	2565	980	1850	2200	1000	385
120-130-140-155	3275	980	1816	2990	1000	689
175-190	3275	980	1940	2990	1000	689

NOTE: Refer to the certified dimensional drawings supplied with the unit, when designing an installation.

3.2 - 30HXC 200-375



Legend
All dimensions are in mm.

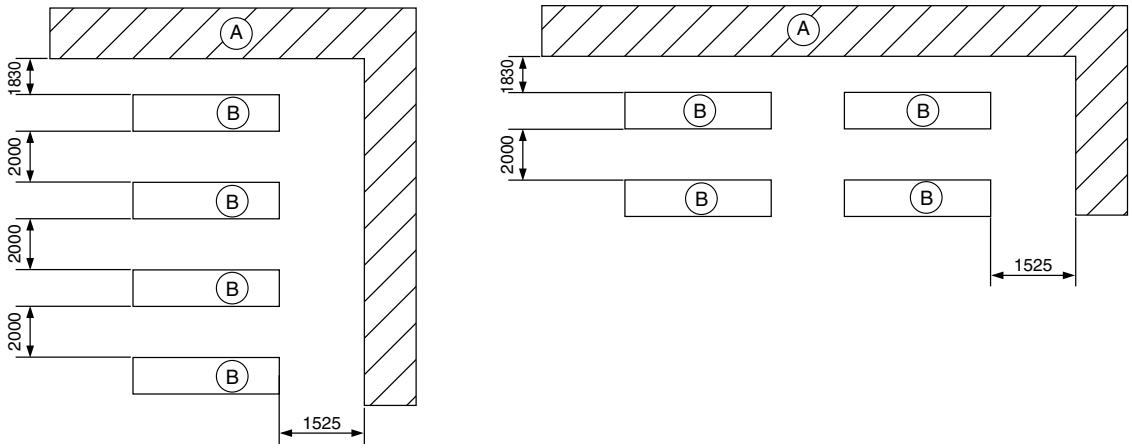
① Evaporator
② Condenser
③ Clearances required for operation and maintenance
④ Clearances required for heat exchanger tube removal. Clearances D and E can be either on the left or on the right hand side.
Water inlet
Water outlet
Power supply

30HXC	A	B	C	D	E	F
200	3903	1015	1980	3600	1000	489
230-260-285	3924	1015	2060	3600	1000	489
310-345-375	4533	1015	2112	4200	1000	503

NOTE: Refer to the certified dimensional drawings supplied with the unit, when designing an installation.

3.3 - Multiple chiller installation

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



Legend
A Wall
B Units

Notes
Unit must have clearances for air flow as follows:
Top: do not restrict in any way

In case of multiple chillers (up to four units), the respective clearance between them should be increased from 1830 to 2000 mm for the side space requirement.

If necessary, add the required clearances for evaporator tube removal.

4 - PHYSICAL AND ELECTRICAL DATA - STANDARD 50HZ APPLICATION

4.1 - Physical data 30HXC

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Sound levels - standard unit																		
Sound power level [1]	dB(A)	94	94	94	94	94	97	98	100	101	101	99	101	102	102	103	104	104
Sound pressure level at 1 m [2]	dB(A)	77	77	77	77	76	79	80	82	83	83	80	82	83	83	84	85	85
Operating weight	kg	2274	2279	2302	2343	2615	2617	2702	2712	3083	3179	3873	4602	4656	4776	5477	5553	5721
Compressor size		Semi-hermetic, twin-screw				The compressor size is identified by its nominal cooling capacity in tons of refrigeration (1 ton = 3.517 kW)												
Circuit A		39	46	46	56	56	66	80	80	80	80+	66/56	80/56	80/80	80+/80+	80/66	80/80	80+/80+
Circuit B		39	39	46	46	56	56	56	66	80	80+	66	80	80	80+	80/66	80/80	80+/80+
Refrigerant - standard unit [3]		R-134a																
Circuit A	kg	33	33	32	31	49	51	48	51	54	56	92	115	117	117	109	104	119
	teqCO_2	47	47	46	44	70	73	69	73	77	80	132	164	167	167	156	149	170
Circuit B	kg	34	34	30	35	52	47	48	50	50	59	54	63	75	75	106	102	137
	teqCO_2	49	49	43	50	74	67	69	72	72	84	77	90	107	107	152	146	196
Oil - standard unit [4]		Polyolester oil CARRIER SPEC. PP 47-32																
Circuit A/B	l	17/17	17/17	17/17	17/17	17/17	17/17	17/17	17/17	17/17	17/17	30/17	30/17	30/17	30/17	34/34	34/34	34/34
Capacity control		PRO-DIALOG Plus control																
No. of control steps		6	6	6	6	6	6	6	6	6	6	8	8	8	8	10	10	10
Minimum step capacity	%	19	19	21	19	21	19	17	19	21	21	14	14	14	14	10	10	10
Evaporator		Shell and tube with internally finned copper tubes																
Net water volume	l	50	50	58	69	65	65	75	75	88	88	126	155	170	170	191	208	208
Water connections		Victaulic connections																
Inlet/outlet	in	4	4	4	5	5	5	5	5	5	5	6	6	6	6	8	8	8
Drain and vent (NPT)	in	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Max. water-side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Condenser		Shell and tube with internally finned copper tubes																
Net water volume	l	48	48	48	48	78	78	90	90	108	108	141	190	190	190	255	255	255
Water connections		Victaulic connections																
Inlet/outlet	in	5	5	5	5	5	5	5	5	6	6	6	8	8	8	8	8	8
Drain and vent (NPT)	in	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Max. water-side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

[1] In dB ref=10-12 W, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1 and certified by Eurovent.

[2] In dB ref 20µPa, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). For information, calculated from the sound power level Lw(A).

[3] Values shown are guidelines only. Please refer to the unit nameplate.

[4] For options 150 and 150A the units are supplied with an additional charge of 3 litres per compressor.

4.2 - Electrical data 30HXC

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Power circuit																		
Nominal power supply (Un)*	V-ph-Hz	400-3-50																
Voltage range	V	360-440																
Control circuit supply		The control circuit is supplied via the factory-installed transformer																
Nominal power input*	kW	53	62	67	76	80	89	102	112	121	129	140	164	192	195	221	250	263
Nominal current drawn*	A	101	115	127	143	149	168	190	207	226	234	255	294	337	354	399	448	477
Max. power input**	kW	87	97	108	119	131	144	161	175	192	212	223	257	288	318	350	384	424
Circuit A	kW	-	-	-	-	-	-	-	-	-	-	144	161	192	212	175	192	212
Circuit B	kW	-	-	-	-	-	-	-	-	-	-	79	96	96	106	175	192	212
Cosine phi, unit at full load		0.88	0.88	0.88	0.88	0.89	0.88	0.88	0.89	0.89	0.89	0.88	0.89	0.89	0.89	0.89	0.89	0.89
Total harmonic distortion***	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max. current drawn (Un - 10%)***	A	158	176	195	215	235	259	289	314	344	379	401	461	517	568	628	688	758
Circuit A	A	-	-	-	-	-	-	-	-	-	-	259	289	344	379	314	344	379
Circuit B	A	-	-	-	-	-	-	-	-	-	-	142	172	172	189	314	344	379
Max. current drawn (Un)***	A	143	160	177	195	213	236	263	285	312	344	365	419	468	516	570	624	688
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	236	263	312	344	285	312	344
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	129	156	156	172	285	312	344
Max. starting current, std. unit (Un)****	A	181	206	223	249	267	298	333	355	382	442	841	978	1027	1200	1129	1184	1373
Circuit A****	A	-	-	-	-	-	-	-	-	-	-	712	822	871	1028	844	871	1028
Circuit B****	A	-	-	-	-	-	-	-	-	-	-	605	715	715	856	844	871	1028
Max. starting current/max. current draw ratio, unit		1.26	1.28	1.26	1.27	1.25	1.26	1.27	1.24	1.22	1.28	2.31	2.33	2.19	2.32	1.98	1.89	1.99
Max. starting current/max. current draw ratio, circuit A		-	-	-	-	-	-	-	-	-	-	3.02	3.13	2.79	2.99	2.96	2.79	2.99
Max. starting current/max. current draw ratio, circuit B		-	-	-	-	-	-	-	-	-		4.70	4.58	4.58	4.97	2.96	2.79	2.99
Max. starting current - reduced current start (Un)****	A	std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	636	683	732	824	834	889	997
Circuit A	A	std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	507	527	576	652	549	576	652
Circuit B	A	std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	330	370	370	385	549	576	652
Max. starting current - red. current start/max. current draw ratio, unit		std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	1.74	1.63	1.56	1.60	1.46	1.42	1.45
Circuit A		std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	2.15	2.00	1.84	1.89	1.93	1.84	1.98
Circuit B		std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	2.56	2.37	2.37	2.24	1.93	1.84	1.89
Three-phase short circuit holding current	kA	25	25	25	25	25	25	25	25	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circuit A	kA	-	-	-	-	-	-	-	-	-	-	25	25	25	25	25	25	25
Circuit B	kA	-	-	-	-	-	-	-	-	-	-	15	15	15	15	25	25	25
Customer standby capacity, unit or circuit B, for evaporator water pump connections†	kW	8	8	8	11	11	11	15	15	15	15	15	18	18	30	30	30	30

* Standard Eurovent conditions: Evaporator entering/leaving water temperature 12°C and 7°C. Condenser entering/leaving water temperature 30°C/35°C.

** Power input, compressor, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, condenser entering/leaving water temperature = 45°C/50°C) and a nominal voltage of 400 V (data given on the unit name plate).

*** Maximum unit operating current at maximum unit power input.

**** Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor)

† Current and power inputs not included in the values above.

N/A Not applicable.

4.3 - Compressor electrical data 30HXC

Reference	Size	I nom.	MHA	LRA	LRA (Y)	LRA (S) 1 cp	LRA (S) 2 cp
06NW2146S7N	39	50	79	344	109	NA	NA
06NW2174S7N	46	60	97	423	134	NA	NA
06NW2209S7N	56	71	117	506	160	260	350
06NW2250S7N	66	86	142	605	191	330	400
06NW2300S5N	80	105	172	715	226	370	420
06NW2300S5E	80+	114	189	856	270	385	480

Legend

06NW	- Compressor for water-cooled units
N	- Non-economized compressor
E	- Economized compressor
I nom.	- Average current draw of the compressor at Eurovent conditions (A)
MHA	- Must hold amperes (maximum operating current) at 360 V (A)
LRA	- Locked rotor current with across-the-line start (A)
LRA (Y)	- Locked rotor current at reduced current (star/delta start-up mode) (A)
LRA (S) 1 cp.	- Start-up with reduced current (A) with electronic starter (start-up duration 3 seconds max.) for one compressor per circuit
LRA (S) 2 cp.	- Start-up with reduced current (A) with electronic starter (start-up duration 3 seconds max.) for two compressors per circuit

4.4 - Electrical data for 30HXC units with high condensing temperatures (option 150/150A)

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Power circuit																		
Nominal power supply (Un)*	V-ph-Hz	400-3-50																
Voltage range	V	360-440																
Control circuit supply		The control circuit is supplied via the factory-installed transformer																
Max. power input*	kW	108	122	136	149	163	180	196	213	229	287	278	310	343	431	426	458	574
Circuit A	kW	-	-	-	-	-	-	-	-	-	-	180	196	229	287	213	229	287
Circuit B	kW	-	-	-	-	-	-	-	-	-	-	98	114	114	144	213	229	287
Max. current drawn (Un - 10%)**	A	198	223	247	271	295	325	355	385	415	516	502	562	622	774	770	830	1032
Circuit A	A	-	-	-	-	-	-	-	-	-	-	325	355	415	516	385	415	516
Circuit B	A	-	-	-	-	-	-	-	-	-	-	177	207	207	258	385	415	516
Maximum current drawn (Un)**	A	180	203	225	246	268	295	323	350	377	469	456	512	566	704	700	754	938
Circuit A	A	-	-	-	-	-	-	-	-	-	-	295	323	377	469	350	377	469
Circuit B	A	-	-	-	-	-	-	-	-	-	-	161	189	189	235	350	377	469
Maximum starting current, standard unit (Un)***	A	281	316	338	382	404	437	521	548	576	635	1255	1549	1603	1734	1737	1792	1969
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	1094	1360	1415	1500	1387	1415	1500
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	960	1226	1226	1265	1387	1415	1500
Max. starting current/max. current draw ratio, unit		1.56	1.56	1.51	1.55	1.51	1.48	1.62	1.57	1.53	1.35	2.75	3.03	2.83	2.46	2.48	2.38	2.10
Max. starting current/max. current draw ratio, circuit A		-	-	-	-	-	-	-	-	-	-	3.71	4.22	3.75	3.19	3.97	3.75	3.19
Max. starting current/max. current draw ratio, circuit B		-	-	-	-	-	-	-	-	-		5.96	6.50	6.50	5.39	3.97	3.75	3.19
Max. starting current - reduced current start (Un)***	A	std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	870	933	987	1129	1121	1176	1364
Circuit A	A	std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	709	744	799	895	771	799	895
Circuit B	A	std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	435	490	490	510	771	799	895
Max.starting current - red. current start/max. current draw ratio, unit		std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	1.91	1.82	1.75	1.60	1.60	1.56	1.45
Circuit A		std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	2.40	2.31	2.12	1.91	2.21	2.12	1.91
Circuit B		std.	std.	std.	std.	std.	std.	std.	std.	std.	std.	2.70	2.60	2.60	2.17	2.21	2.12	1.91
Three-phase short circuit holding current	kA	25	25	25	25	25	25	25	25	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circuit A	kA	-	-	-	-	-	-	-	-	-.	-	25	25	25	25	25	25	25
Circuit B	kA	-	-	-	-	-	-	-	-	-	-	15	15	15	15	25	25	25
Customer standby capacity, unit or circuit B, for evaporator water pump connections†	kW	8	8	8	11	11	11	15	15	15	15	15	18	18	30	30	30	30

* Power input, compressor, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, condensing temperature = 68°C) and a nominal voltage of 400 V (data given on the unit name plate).

** Maximum unit operating current at maximum unit power input.

*** Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor)

† Current and power inputs not included in the values above

N/A Not applicable

The 30HXC 080-375 units for high condensing temperatures are directly derived from the standard models. Their application range is the same as that of the standard units, but permits operation at condenser leaving water temperatures up to 63°C. The PRO-DIALOG control offers all the advantages of the standard units, plus control of the condenser leaving water temperature.

The main modifications are:

- Use of high lift compressors (example: 06NA2300S5N instead of 06NW 2300S5N).
- Modification of electrical components to operate with compressors for high condensing temperatures.
- Modification of heat exchangers to meet pressure code requirements (if necessary).

Option 150

These units are designed for traditional applications for water-cooled units, but for higher condender leaving water temperatures than 50°C.

Like the standard units they are equipped with condenser entering and leaving water sensors.

It is possible to control the machine at the condenser water outlet, requiring a factory configuration change and the use of a heating/cooling inlet reversing device.

Option 150A

These units are designed for water-to-water heat pumps.

They are factory configured as heat pumps (heating/cooling control as a function of the remote reversing device). The condenser incorporates thermal insulation that is identical to that of the evaporator.

Technical information

All information is identical to that of the standard 30HXC units, except for the following paragraphs.

Selection

There are no nominal conditions for this unit type. The selection is made using the current electronic catalogue.

Dimensions

These are identical to those of the standard 30HXC units. The only difference is in the diameter of the incoming field wiring connection, described in the chapter “Recommended selection”. Refer to the dimensional drawings for these units, before proceeding with the wiring.

Compressor

See table in chapter 4.5.

Options and accessories

All options available for the standard 30HXC units are compatible, except low-temperature option 5 for the evaporator available in the special unit.

ATTENTION: If units have two different operating modes - one with high condensing temperature and the other with low condensing temperature - and the transition is made with the unit in operation, the temperature must not vary by more than 3K per minute. In cases where this is not possible, it is recommended to go through a unit start/stop switch (remote start/stop available for standard units).

4.5 - Compressor electrical data 30HXC + option 150/150A

Reference	Size	I nom.	MHA	LRA	LRA (Y)	LRA (S) 1 cp.	LRA (S) 2 cp.
06NA2146S7N	39	72	99	605	191	NA	NA
06NA2174S7N	46	87	124	715	226	NA	NA
06NA2209S7N	56	103	148	856	270	330	480
06NA2250S7N	66	124	177	960	303	435	575
06NA2300S5N	80	149	207	1226	387	490	610
06NA2300S5E	80+	174	258	1265	400	510	660

Legend

06NA	- Compressor for air-cooled units
N	- Non-economized compressor
E	- Economized compressor
I nom.	- Average current draw of the compressor at Eurovent conditions (A)
MHA	- Must hold amperes (maximum operating current) at 360 V (A)
LRA	- Locked rotor current with across-the-line start (A)
LRA (Y)	- Locked rotor current at reduced current (star/delta start-up mode) (A)
LRA (S) 1 cp.	- Start-up with reduced current (A) with electronic starter (start-up duration 3 seconds max.) for one compressor per circuit
LRA (S) 2 cp.	- Start-up with reduced current (A) with electronic starter (start-up duration 3 seconds max.) for two compressors per circuit

5 - PHYSICAL AND ELECTRICAL DATA - OPTIONAL 60HZ APPLICATION (OPTION 60/61)

5.1 - Physical data - 30HXC + option 60 (460V-3ph-60Hz)

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Operating weight*	kg	2274	2279	2302	2343	2615	2617	2702	2712	3083	3179	3873	4602	4656	4776	5477	5553	5721
Refrigerant charge*	kg	HFC-134a																
Circuit A		33	33	32	31	49	51	48	54	54	70	92	115	117	132	109	96	119
Circuit B		34	34	30	35	52	47	48	57	50	70	68	63	75	80	106	109	137
Oil		Polyolester oil CARRIER SPEC. PP 47-32																
Circuit A	l	15	15	15	15	15	15	15	15	15	15	30	30	30	30	30	30	30
Circuit B	l	15	15	15	15	15	15	15	15	15	15	15	15	15	15	30	30	30
Compressors**		Semi-hermetic, twin-screw POWER3																
Size - Circuit A		39	46	46	56	56	66	80	80	80	80+	66/56	80/56	80/80	80+/80+	80/66	80/80	80+/80+
Size - Circuit B		39	39	46	46	56	56	56	66	80	80+	66	80	80	80+	80/66	80/80	80+/80+
Capacity control		PRO-DIALOG Plus control																
No. of control steps		6	6	6	6	6	6	6	6	6	6	8	8	8	8	10	10	10
Minimum step capacity	%	19	19	21	19	21	19	17	19	21	21	14	14	14	14	10	10	10
Evaporator		Shell and tube with internally finned copper tubes																
Net water volume	l	50	50	58	69	65	65	75	75	88	88	126	155	170	170	191	208	208
Water connections		Victaulic connections																
Inlet/outlet	in	4	4	4	5	5	5	5	5	5	5	6	6	6	6	8	8	8
Drain and vent (NPT)	in	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Max. water-side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Condenser		Shell and tube with internally finned copper tubes																
Net water volume	l	48	48	48	48	78	78	90	90	108	108	141	190	190	190	255	255	255
Water connections		Victaulic connections																
Inlet/outlet	in	5	5	5	5	5	5	5	5	6	6	6	8	8	8	8	8	8
Drain and vent (NPT)	in	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Max. water-side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

* The weights shown are guidelines only. For the unit refrigerant charge please refer to the unit nameplate.

** Nominal size per compressor. The compressor size is the same as its nominal cooling capacity in tons of refrigeration (1 ton = 3.517 kW).

5.2 - Electrical data - 30HXC + option 60

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Power circuit																		
Nominal power supply (Un)*	V-ph-Hz	460-3-60																
Voltage range	V	414-506																
Control circuit supply		The control circuit is supplied via the factory-installed transformer																
Nominal operating power input*	kW	56	63	69	78	82	91	103	111	123	129	142	166	189	198	223	249	261
Nominal operating current drawn*	A	94	101	109	121	133	147	164	178	194	213	228	260	291	319	355	388	425
Total harmonic distortion***	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max. operating power input**	kW	87	96	105	118	130	144	159	172	187	212	223	253	281	318	344	374	424
Circuit A**	kW	-	-	-	-	-	-	-	-	-	-	144	159	187	212	172	187	212
Circuit B**	kW	-	-	-	-	-	-	-	-	-	-	79	94	94	106	172	187	212
Max. operating current drawn (Un - 10%)***	A	134	147	161	180	200	220	243	263	286	324	340	386	429	486	526	572	648
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	220	243	286	324	263	286	324
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	120	143	143	162	263	286	324
Maximum operating current drawn (Un)***	A	122	134	146	164	182	200	221	239	260	294	309	351	390	441	478	520	588
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	200	221	260	294	239	260	294
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	109	130	130	147	239	260	294
Maximum starting current, standard unit (Un)†	A	165	165	177	201	195	244	274	292	313	363	685	801	840	979	928	970	1126
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	576	671	710	832	689	710	832
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	485	580	580	685	689	710	832
Max. starting current/max. current draw ratio, unit		1,35	1,23	1,21	1,23	1,19	1,22	1,24	1,22	1,20	1,23	2,22	2,28	2,15	2,22	1,94	1,87	1,91
Max. starting current/max. current draw ratio, circuit A		-	-	-	-	-	-	-	-	-	-	2,88	3,04	2,73	2,83	2,88	2,73	2,83
Max. starting current/max. current draw ratio, circuit B		-	-	-	-	-	-	-	-	-		4,45	4,46	4,46	4,66	2,88	2,73	2,83
Max. starting current - reduced current start (Un)†	A	std	std	std	std	std	std	std	std	std	std	550	621	660	714	748	790	861
Circuit A	A	-	-	-	-	-	-	-	-	-	-	441	491	530	567	509	530	567
Circuit B	A	-	-	-	-	-	-	-	-	-	-	260	330	330	370	509	530	567
Max. starting current - red. current start/max. current draw ratio, unit		std	std	std	std	std	std	std	std	std	std	1,78	1,77	1,69	1,62	1,56	1,52	1,46
Circuit A		-	-	-	-	-	-	-	-	-	-	2,21	2,22	2,04	1,93	2,13	2,04	1,93
Circuit B		-	-	-	-	-	-	-	-	-	-	2,39	2,54	2,54	2,52	2,13	2,04	1,93
Three-phase short circuit holding current	kA	25	25	25	25	25	25	25	25	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circuit A	kA	-	-	-	-	-	-	-	-	-	-	25	25	25	25	25	25	25
Circuit B	kA	-	-	-	-	-	-	-	-	-	-	15	15	15	15	25	25	25
Customer standby capacity, unit or circuit B, for evaporator water pump connections‡	kW	8	8	8	11	11	11	15	15	15	15	15	18	18	30	30	30	30

* Based on standardised ARI conditions: Evaporator entering/leaving water temperature 12.2°C and 6.7°C. Condenser entering/leaving water temperature 29.6°C/35°C.

** Power input, compressor, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, condenser entering/leaving water temperature = 45°C/50°C) and a nominal voltage of 460 V (data given on the unit name plate).

*** Maximum unit operating current at maximum unit power input.

† Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor)

‡ Current and power inputs not included in the values above.

N/A Not applicable

5.3 - Electrical data - 30HXC + option 60 with high condensing temperature (options 150/150A)

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Power circuit																		
Nominal power supply (Un)*	V-ph-Hz	460-3-60																
Voltage range	V	414-506																
Control circuit supply		The control circuit is supplied via the factory-installed transformer																
Max. operationg power input*	kW	107	119	131	146	162	180	196	214	231	277	279	312	347	415	429	462	553
Circuit A	kW	-	-	-	-	-	-	-	-	-	-	180	196	231	277	214	231	277
Circuit B	kW	-	-	-	-	-	-	-	-	-	-	99	116	116	138	214	231	277
Max. operating current drawn (Un - 10%)**	A	167	185	204	227	251	278	303	331	356	427	431	481	534	641	662	712	854
Circuit A	A	-	-	-	-	-	-	-	-	-	-	278	303	356	427	331	356	427
Circuit B	A	-	-	-	-	-	-	-	-	-	-	153	178	178	214	331	356	427
Maximum operating current drawn (Un)**	A	152	169	185	207	228	253	276	301	324	388	392	438	486	582	602	648	776
Circuit A	A	-	-	-	-	-	-	-	-	-	-	253	276	324	388	301	324	388
Circuit B	A	-	-	-	-	-	-	-	-	-	-	139	162	162	194	301	324	388
Maximum starting current, standard unit (Un)†	A	234	264	280	313	302	378	410	436	467	568	1084	1215	1272	1569	1386	1448	1766
Circuit A†	A	-	-	-	-	-	-	-	-	-	-	939	1039	1096	1372	1065	1096	1372
Circuit B†	A	-	-	-	-	-	-	-	-	-	-	820	920	920	1175	1065	1096	1372
Max. starting current/max. current draw ratio, unit		1,44	1,48	1,44	1,45	1,40	1,43	1,39	1,36	1,33	1,44	2,65	2,58	2,41	2,65	2,16	2,06	2,24
Max. starting current/max. current draw ratio, circuit A		-	-	-	-	-	-	-	-	-	-	3,56	3,52	3,11	3,48	3,32	3,11	3,48
Max. starting current/max. current draw ratio, circuit B		-	-	-	-	-	-	-	-	-		5,66	5,23	5,23	5,96	3,32	3,11	3,48
Max. starting current - reduced current start (Un)†	A	std	std	std	std	std	std	std	std	std	std	744	870	927	1054	1041	1103	1251
Circuit A	A	-	-	-	-	-	-	-	-	-	-	599	694	751	857	720	751	857
Circuit B	A	-	-	-	-	-	-	-	-	-	-	400	435	435	550	720	751	857
Max.starting current - red. current start/max. current draw ratio, unit		std	std	std	std	std	std	std	std	std	std	1,82	1,85	1,76	1,78	1,62	1,57	1,59
Circuit A		-	-	-	-	-	-	-	-	-	-	2,27	2,35	2,13	2,18	2,24	2,13	2,18
Circuit B		-	-	-	-	-	-	-	-	-	-	2,76	2,47	2,47	2,79	2,24	2,13	2,18
Three-phase short circuit holding current	kA	25	25	25	25	25	25	25	25	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circuit A	kA	-	-	-	-	-	-	-	-	-.	-	25	25	25	25	25	25	25
Circuit B	kA	-	-	-	-	-	-	-	-	-	-	15	15	15	15	25	25	25
Customer standby capacity, unit or circuit B, for evaporator water pump connections‡	kW	8	8	8	11	11	11	15	15	15	15	15	18	18	30	30	30	30

* Power input, compressor, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, condensing temperature = 68°C) and a nominal voltage of 460 V (data given on the unit name plate).

** Maximum unit operating current at maximum unit power input.

† Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor)

‡ Current and power inputs not included in the values above

N/A Not applicable

5.4 - Physical data - 30HXC + option 61 (380V-3ph-60Hz)

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Operating weight*	kg	2274	2279	2302	2343	2615	2617	2702	2712	3083	3179	3873	4602	4656	4776	5477	5553	5721
Refrigerant charge*	kg	HFC-134a																
Circuit A		33	33	32	31	49	51	48	54	54	70	92	115	117	132	109	96	119
Circuit B		34	34	30	35	52	47	48	57	50	70	58	63	75	80	106	109	137
Oil		Polyolester oil CARRIER SPEC. PP 47-32																
Circuit A	l	15	15	15	15	15	15	15	15	15	15	30	30	30	30	30	30	30
Circuit B	l	15	15	15	15	15	15	15	15	15	15	15	15	15	15	30	30	30
Compressors**		Semi-hermetic, twin-screw POWER3																
Size - Circuit A		39	46	46	56	56	66	80	80	80	80+	66/56	80/56	80/80	80+/80+	80/66	80/80	80+/80+
Size - Circuit B		39	39	46	46	56	56	56	66	80	80+	66	80	80	80+	80/66	80/80	80+/80+
Capacity control		PRO-DIALOG Plus control																
No. of control steps		6	6	6	6	6	6	6	6	6	6	8	8	8	8	10	10	10
Minimum step capacity	%	19	19	21	19	21	19	17	19	21	21	14	14	14	14	10	10	10
Evaporator		Shell and tube with internally finned copper tubes																
Net water volume	l	50	50	58	69	65	65	75	75	88	88	126	155	170	170	191	208	208
Water connections		Victaulic connections																
Inlet/outlet	in	4	4	4	5	5	5	5	5	5	5	6	6	6	6	8	8	8
Drain and vent (NPT)	in	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Max. water-side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Condenser		Shell and tube with internally finned copper tubes																
Net water volume	l	48	48	48	48	78	78	90	90	108	108	141	190	190	190	255	255	255
Water connections		Victaulic connections																
Inlet/outlet	in	5	5	5	5	5	5	5	5	6	6	6	8	8	8	8	8	8
Drain and vent (NPT)	in	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Max. water-side operating pressure	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

* The weights shown are guidelines only. For the unit refrigerant charge please refer to the unit nameplate.

** Nominal size per compressor. The compressor size is the same as its nominal cooling capacity in tons of refrigeration (1 ton = 3.517 kW).

5.5 - Electrical data - 30HXC + option 61

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Power circuit																		
Nominal power supply (Un)*	V-ph-Hz	380-3-60																
Voltage range	V	342-418																
Control circuit supply		The control circuit is supplied via the factory-installed transformer																
Nominal operating power input*	kW	56	63	69	78	82	91	103	111	123	129	142	166	189	198	223	249	261
Nominal operating current drawn*	A	114	123	132	146	161	178	198	215	235	257	276	315	352	386	430	469	515
Total harmonic distortion***	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Max. operating power input**	kW	87	96	105	118	130	144	159	172	187	212	223	253	281	318	344	374	424
Circuit A**	kW	-	-	-	-	-	-	-	-	-	-	144	159	187	212	172	187	212
Circuit B**	kW	-	-	-	-	-	-	-	-	-	-	79	94	94	106	172	187	212
Max. operating current drawn (Un - 10%)***	A	162	178	194	218	242	266	294	319	246	392	412	467	519	588	637	692	784
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	266	294	346	392	319	346	392
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	145	173	173	196	319	346	392
Maximum operating current drawn (Un)***	A	148	162	177	198	220	242	267	290	315	356	374	424	472	534	580	630	712
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	242	267	315	356	290	315	356
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	132	157	157	178	290	315	356
Maximum starting current, standard unit (Un)†	A	189	189	203	229	225	279	313	335	360	417	778	908	955	1113	1062	1112	1291
Circuit A***	A	-	-	-	-	-	-	-	-	-	-	646	751	798	935	773	798	935
Circuit B***	A	-	-	-	-	-	-	-	-	-	-	536	641	641	757	773	798	935
Max. starting current/max. current draw ratio, unit		1,28	1,17	1,15	1,16	1,14	1,15	1,17	1,16	1,15	1,17	2,08	2,14	2,03	2,08	1,84	1,77	1,81
Max. starting current/max. current draw ratio, circuit A		-	-	-	-	-	-	-	-	-	-	2.67	2.81	2.54	2.63	2.67	2.54	2.63
Max. starting current/max. current draw ratio, circuit B		-	-	-	-	-	-	-	-	-		4,06	4,08	4,08	4,25	2,67	2,54	2,63
Max. starting current - reduced current start (Un)†	A	std	std	std	std	std	std	std	std	std	std	592	667	714	836	821	871	1014
Circuit A	A	-	-	-	-	-	-	-	-	-	-	460	510	557	658	532	557	658
Circuit B	A	-	-	-	-	-	-	-	-	-	-	260	330	330	400	532	557	658
Max. starting current - red. current start/max. current draw ratio, unit		std	std	std	std	std	std	std	std	std	std	1,58	1,57	1,52	1,57	1,42	1,39	1,42
Circuit A		-	-	-	-	-	-	-	-	-	-	1,90	1,91	1,77	1,85	1,84	1,77	1,85
Circuit B		-	-	-	-	-	-	-	-	-	-	1,97	2,10	2,10	2,25	1,84	1,77	1,85
Three-phase short circuit holding current	kA	25	25	25	25	25	25	25	25	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circuit A	kA	-	-	-	-	-	-	-	-	-	-	25	25	25	25	25	25	25
Circuit B	kA	-	-	-	-	-	-	-	-	-	-	15	15	15	15	25	25	25
Customer standby capacity, unit or circuit B, for evaporator water pump connections‡	kW	8	8	8	11	11	11	15	15	15	15	15	18	18	30	30	30	30

* Based on standardised ARI conditions: Evaporator entering/leaving water temperature 12.2°C and 6.7°C. Condenser entering/leaving water temperature 29.6°C/35°C.

** Power input, compressor, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, condenser entering/leaving water temperature = 45°C/50°C) and a nominal voltage of 460 V (data given on the unit name plate).

*** Maximum unit operating current at maximum unit power input.

† Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor)

‡ Current and power inputs not included in the values above.

N/A Not applicable

5.6 - Electrical data - 30HXC + option 61 with high condensing temperature (options 150/150A)

30HXC		080	090	100	110	120	130	140	155	175	190	200	230	260	285	310	345	375
Power circuit																		
Nominal power supply (Un)*	V-ph-Hz	380-3-60																
Voltage range	V	342-418																
Control circuit supply		The control circuit is supplied via the factory-installed transformer																
Max. operationg power input*	kW	107	119	131	146	162	180	196	214	231	277	279	312	347	415	429	462	553
Circuit A	kW	-	-	-	-	-	-	-	-	-	-	180	196	231	277	214	231	277
Circuit B	kW	-	-	-	-	-	-	-	-	-	-	99	116	116	138	214	231	277
Max. operating current drawn (Un - 10%)**	A	203	225	246	275	304	337	367	400	431	517	522	582	646	776	800	862	1034
Circuit A	A	-	-	-	-	-	-	-	-	-	-	337	367	431	517	400	431	517
Circuit B	A	-	-	-	-	-	-	-	-	-	-	185	215	215	259	400	431	517
Maximum operating current drawn (Un)**	A	184	204	224	250	276	306	334	364	392	470	474	530	588	705	728	784	940
Circuit A	A	-	-	-	-	-	-	-	-	-	-	306	334	392	470	364	392	470
Circuit B	A	-	-	-	-	-	-	-	-	-	-	168	196	196	235	364	392	470
Maximum starting current, standard unit (Un)†	A	301	301	320	356	347	430	465	496	534	648	1225	1374	1443	1775	1580	1656	2013
Circuit A†	A	-	-	-	-	-	-	-	-	-	-	1050	1161	1230	1537	1192	1230	1537
Circuit B†	A	-	-	-	-	-	-	-	-	-	-	906	1017	1017	1299	1192	1230	1537
Max. starting current/max. current draw ratio, unit		1,54	1,40	1,37	1,36	1,33	1,35	1,30	1,28	1,25	1,36	2,48	2,41	2,26	2,49	2,04	1,94	2,11
Max. starting current/max. current draw ratio, circuit A		-	-	-	-	-	-	-	-	-	-	3,29	3,25	2,89	3,23	3,07	2,89	3,23
Max. starting current/max. current draw ratio, circuit B		-	-	-	-	-	-	-	-	-		5,18	4,77	4,77	5,46	3,07	2,89	3,23
Max. starting current - reduced current start (Un)†	A	std	std	std	std	std	std	std	std	std	std	799	932	1001	1196	1138	1214	1434
Circuit A	A	-	-	-	-	-	-	-	-	-	-	624	719	788	958	750	788	958
Circuit B	A	-	-	-	-	-	-	-	-	-	-	400	435	435	600	750	788	958
Max.starting current - red. current start/max. current draw ratio, unit		std	std	std	std	std	std	std	std	std	std	1,62	1,64	1,57	1,68	1,47	1,42	1,51
Circuit A		-	-	-	-	-	-	-	-	-	-	1,96	2,01	1,85	2,01	1,93	1,85	2,01
Circuit B		-	-	-	-	-	-	-	-	-	-	2,29	2,04	2,04	2,52	1,93	1,85	2,01
Three-phase short circuit holding current	kA	25	25	25	25	25	25	25	25	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Circuit A	kA	-	-	-	-	-	-	-	-	-	-	25	25	25	25	25	25	25
Circuit B	kA	-	-	-	-	-	-	-	-	-	-	15	15	15	15	25	25	25
Customer standby capacity, unit or circuit B, for evaporator water pump connections‡	kW	8	8	8	11	11	11	15	15	15	15	15	18	18	30	30	30	30

* Power input, compressor, at unit operating limits (evaporator water entering/leaving temperature = 15°C/10°C, condensing temperature = 68°C) and a nominal voltage of 460 V (data given on the unit name plate).

** Maximum unit operating current at maximum unit power input.

† Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor)

‡ Current and power inputs not included in the values above

N/A Not applicable

5.7 - Compressor electrical data - 30HXC + option 60/61

Reference	Size	I nom.	MHA	LRA	LRA (Y)	LRA (S) 1 cp.	LRA (S) 2 cp.
06NW2123S6N	39	43	67	330	104	NA	NA
06NW2146S7N	46	49	80	330	104	NA	NA
06NW2174S7N	56	61	100	405	128	175	210
06NW2209S7N	66	73	120	485	153	205	250
06NW2250S7N	80	88	143	580	183	245	300
06NW2250S7E	80+	97	162	685	216	285	345

Legend

06NA - Compressor for air-cooled units
N - Non-economized compressor
E - Economized compressor
I nom. - Average current draw of the compressor at ARI conditions
MHA - Must hold amperes (maximum operating current) at 342 V (A)
LRA - Locked rotor current with across-the-line start
LRA (Y) - Locked rotor current at reduced current (star/delta start-up mode)
LRA (S) 1 cp. - Start-up with reduced current with electronic starter (start-up duration 3 seconds max.) for one compressor per circuit
LRA (S) 2 cp. - Start-up with reduced current with electronic starter (start-up duration 3 seconds max.) for two compressors per circuit

5.8 - Compressor electrical data - 30HXC + option 60/61 + option 150/150A

Reference	Size	I nom.	MHA	LRA	LRA (Y)	LRA (S) 1 cp.	LRA (S) 2 cp.
06NA2123W6N	39	62	84	485	153	NA	NA
06NA2146W7N	46	73	102	580	183	NA	NA
06NA2174W7N	56	89	125	685	216	245	345
06NA2209W7N	66	107	153	820	259	290	410
06NA2250W7N	80	127	178	920	291	320	460
06NA2250W7E	80+	148	214	1175	371	405	535

Legend

06NA	- Compressor for air-cooled units
N	- Non-economized compressor
E	- Economized compressor
I nom.	- Average current draw of the compressor at ARI conditions
MHA	- Must hold amperes (maximum operating current) at 342 V (A)
LRA	- Locked rotor current with across-the-line start
LRA (Y)	- Locked rotor current at reduced current (star/delta start-up mode)
LRA (S) 1 cp.	- Start-up with reduced current with electronic starter (start-up duration 3 seconds max.) for one compressor per circuit
LRA (S) 2 cp.	- Start-up with reduced current with electronic starter (start-up duration 3 seconds max.) for two compressors per circuit

6 - UNIT CHARACTERISTICS FOR 30HXC UNITS WITH VERY LOW TEMPERATURE OPTION (OPTION 6)

The 30HXC units with the very low temperature option are directly derived from the 30HXC models equipped with the high condensing temperature option (option 150). Unit sizes available with the very low temperature option are the following: 30HXC 090, 110, 130, 155, 175, 200, 230, 260, 310, 345.

Their application range allows the production of glycol/water solution down to -10°C with ethylene glycol at 35% (by weight) or down to -7°C with propylene glycol at 30% (by weight). The precision of these amounts is critical for correct unit operation.

In addition to the ones already listed for the high condensing temperature option (see chapter 4.4) the main modifications are:

- the evaporator is equipped with reinforced thermal 38 mm insulation,
- the electronic expansion valves are changed,
- the use of a wide-band oil differential sensor.

All technical data is the same as for the 30HXC units with option 150 except for the following chapters:

6.1 - Options and accessories

The options available for the 30HXC units equipped with the very low temperature option are as follows: 20, 22, 60, 61, 84, 84D, 84R, 92, 104A, 107, 107A, 152, 193, 194, 197, 199.

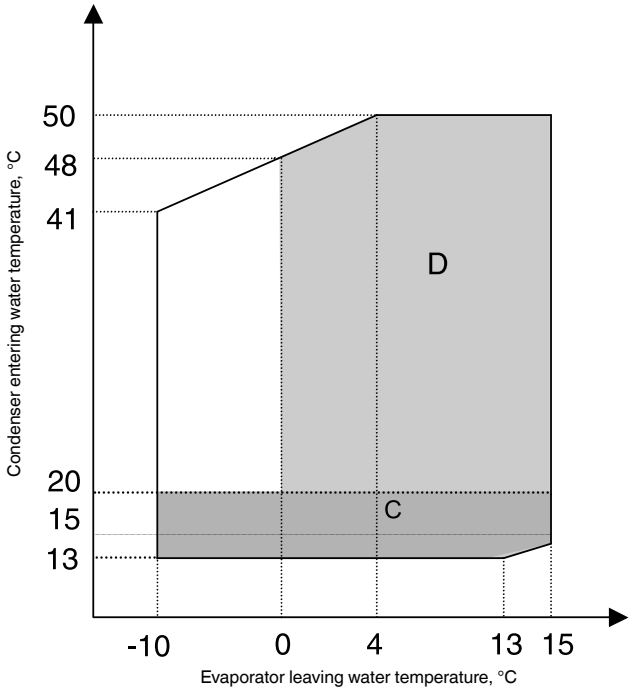
6.2 - Operating range, 30HXC units with very low temperature option

30HXC evaporator with 35% ethylene glycol	°C	Minimum	Maximum
Evaporator entering water temperature		-7.2	21
Evaporator leaving water temperature		-10	15
30HXC evaporator with 30% polypropylene glycol			
Evaporator entering water temperature		-4.2	21
Evaporator leaving water temperature		-7	15
30HXC condenser			
Condenser entering water temperature		20	50
Condenser leaving water temperature		25	55
Outdoor air temperature		6	40

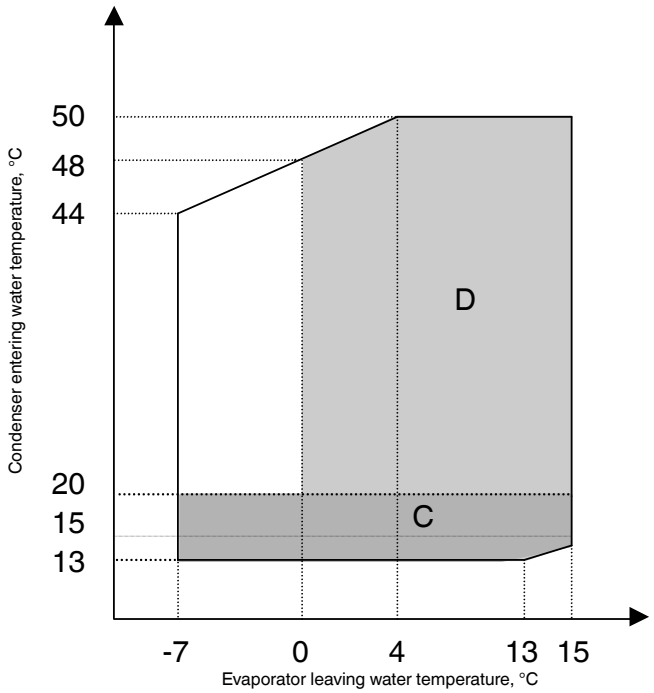
For very low temperature applications the anti-freeze solution is critical for correct unit operation. The following amounts (by weight) are required:

Evaporator leaving water, °C	Ethylene glycol, %	Propylene glycol, %
-6	25	27
-7	28	30
-8	30	NA
-9	33	NA
-10	35	NA

Operating range 35% ethylene glycol



Operating range 30% propylene glycol



Notes

1. Evaporator ΔT = 4 K max. - condenser ΔT = 5 K
2. Operating range applicable for full and reduced load
3. At full load with a condenser entering water temperature below 20°C, a three-way valve must be used to maintain the correct condensing temperature.

Legend

C Unit operating with a condensing pressure control with an analogue water control valve.
For transient operating modes (start-up and part load), the unit can operate down to a condenser water temperature of 13°C.

D Operation permitted, but performances is not optimized

6.3 - Evaporator water flow (l/s) for 35% ethylene glycol

30HXC	Min.* (closed loop)	Max.**
090	8.0	15.7
110	10.6	21.3
130	12.4	25.1
155	14.5	28.1
175	15.6	33.0
200	20.5	38.0
230	21.0	39.7
260	24.1	48.3
310	29.6	62.0
345	30.2	63.0

* Based on a Reynolds number of 4000

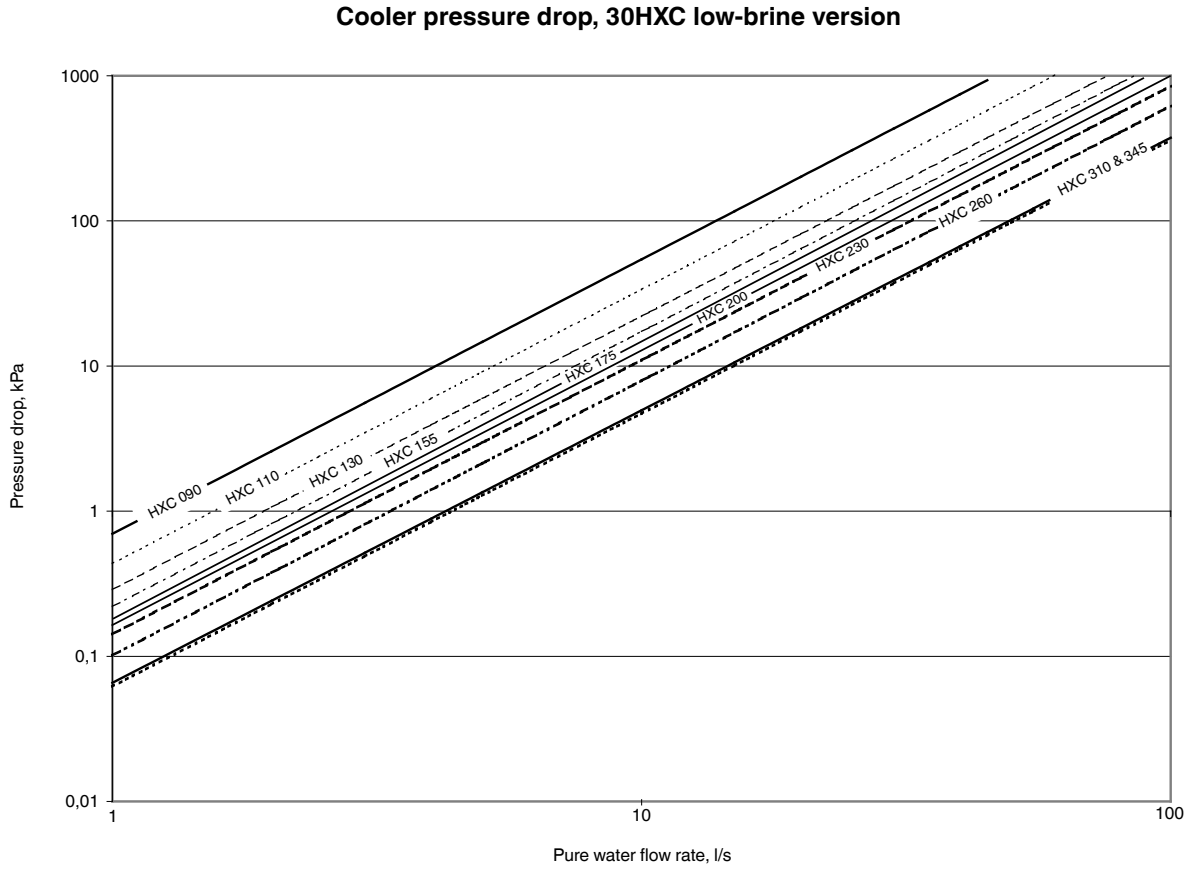
** Based on a water velocity of 3.6 m/s

Evaporator water flow (l/s) for 30% propylene glycol

30HXC	Min.* (closed loop)	Max.**
090	11.1	15.7
110	14.2	21.3
130	16.7	25.1
155	19.1	28.1
175	21.1	33.0
200	25.1	38.0
230	27.4	39.7
260	32.3	48.3
310	40.0	62.0
345	40.6	63.0

6.4 - Evaporator pressure drop curve, units for very low temperature

The evaporator is equipped with heat insulation of 38 mm thick polyurethane foam.



7 - APPLICATION DATA

7.1 - Unit operating range

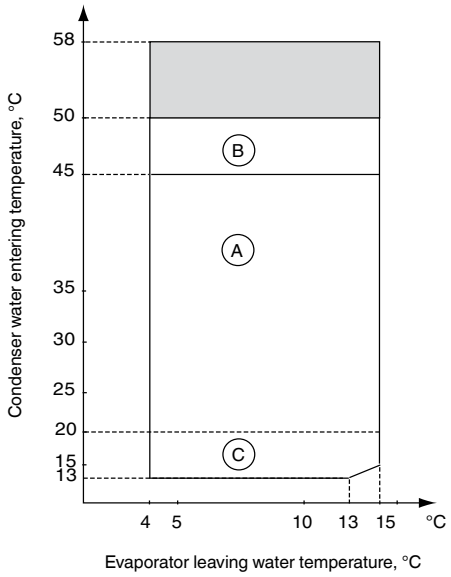
Evaporator 30HXC		Minimum	Maximum
Evaporator entering water temperature	°C	6.8*	21
Evaporator leaving water temperature	°C	4**	15
Condenser (water-cooled) 30HXC		**Minimum**	**Maximum**
Condenser entering water temperature	°C	20***	45
Condenser leaving water temperature	°C	25	50
Outside ambient operating temperature 30HXC	°C	6	40

* For application requiring operation at less than 6.8°C, contact Carrier for unit selection using the Carrier electronic catalog.

** For application requiring operation at less than 4°C, the units require the use of antifreeze.

*** Units operating at full load and below 20°C condenser entering water temperature require the use of a head pressure control with analogue water control valves (see paragraph on head pressure control).
Maximum ambient temperature: for transport and storage of the units the minimum and maximum allowable temperatures are -20°C and +70°C. It is recommended that these temperatures are also applied for transport by container.

† For operation in ambient temperatures down to -18°C the unit must be equipped with option 28.



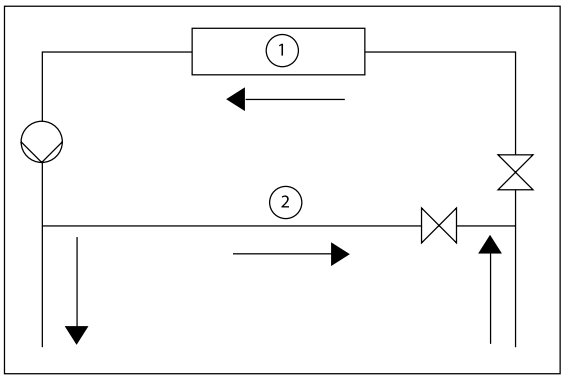
Notes
1. Evaporator and condenser ΔT = 5 K
2. For start-up at full load with a condenser water entering temperature below 20°C, a three-way valve must be used to maintain the correct condensing temperature
3. Maximum condenser water leaving temperature 50°C (at full load)
4. For low evaporator leaving temperatures <+4°C and >-6°C order option 5

Legend
A Standard unit operating at full load.
B Standard unit operating at reduced load.
C Units operating with head pressure control with **analogue water control valve**.
For transient operating modes (start-up and part load) the unit can operate down to a condenser water temperature of 13°C.

Additional operating range for high condensing temperature units and non-reversible heat pumps.

7.2 - Minimum chilled water flow

The minimum chilled water flow is shown in the table on the next page. If the flow is less than this, the evaporator flow can be recirculated, as shown in the diagram. The temperature of the mixture leaving the evaporator must never be less than 2.8 K lower than the chilled water entering temperature.



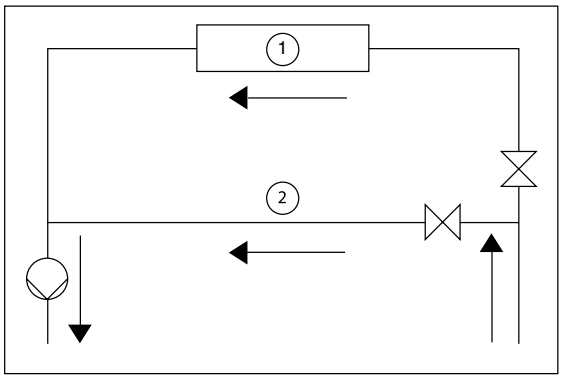
Legend
1 Evaporator
2 Recirculation

7.3 - Maximum chilled water flow

The maximum chilled water flow is limited by the maximum permitted pressure drop in the evaporator. It is provided in the table on the next page. If the flow exceeds the maximum value, two solutions are possible:

- Select a non-standard evaporator with one water pass less which will allow a higher maximum water flow rate.
- Bypass the evaporator as shown in the diagram to obtain a highter temperature difference with a lower evaporator flow rate.

For maximum chilled water flow rate



Legend
1 Evaporator
2 Bypass

7.4 - Variable flow evaporator

Variable evaporator flow can be used in standard 30HXC 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.

7.5 - System minimum water volume

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

Capacity = Cap (kW) x N litres

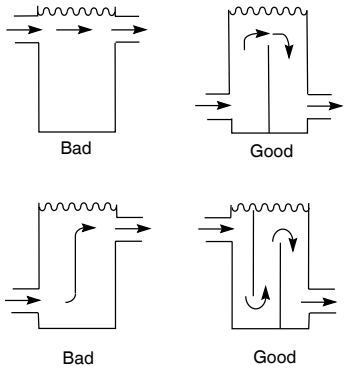
Application	N
Normal air conditioning	3.25
Process type cooling	6.5

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.

NOTE: The compressor must not restart more than 6 times in an hour.



7.6 - Cooler flow rate (l/s)

30HXC	Min.* (closed loop)	Max.**
080-090	5.2	20.8
100	6.5	25.9
110	7.4	29.6
120-130	8.3	33.4
140-155	9.4	37.8
175-190	11.5	45.9
200	14.1	56.3
230	16.3	65.2
260-285	18.3	73.4
310	20.9	83.7
345-375	23.0	91.9

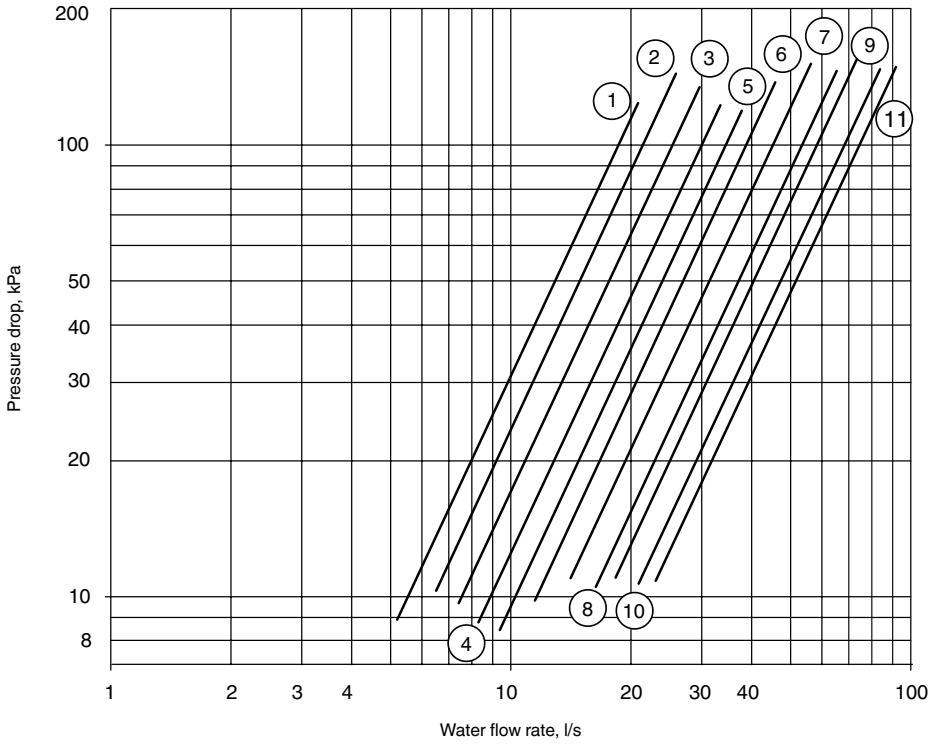
* Based on a water velocity of 0.9 m/s.
** Based on a water velocity of 3.6 m/s.

7.7 - Condenser flow rate (l/s)

30HXC	Min.*		Max.**
	Closed loop	Open loop	
080-110	2.3	7.0	28.2
120-130	3.1	9.3	37.1
140-155	3.7	11.1	44.5
175-190	4.3	13.0	51.9
200	4.9	14.8	59.2
230-285	6.7	20.1	80.4
310-375	8.0	24.0	95.9

* Based on a water velocity of 0.3 m/s in a closed loop and 0.9 m/s in an open loop.
** Based on a water velocity of 3.6 m/s.

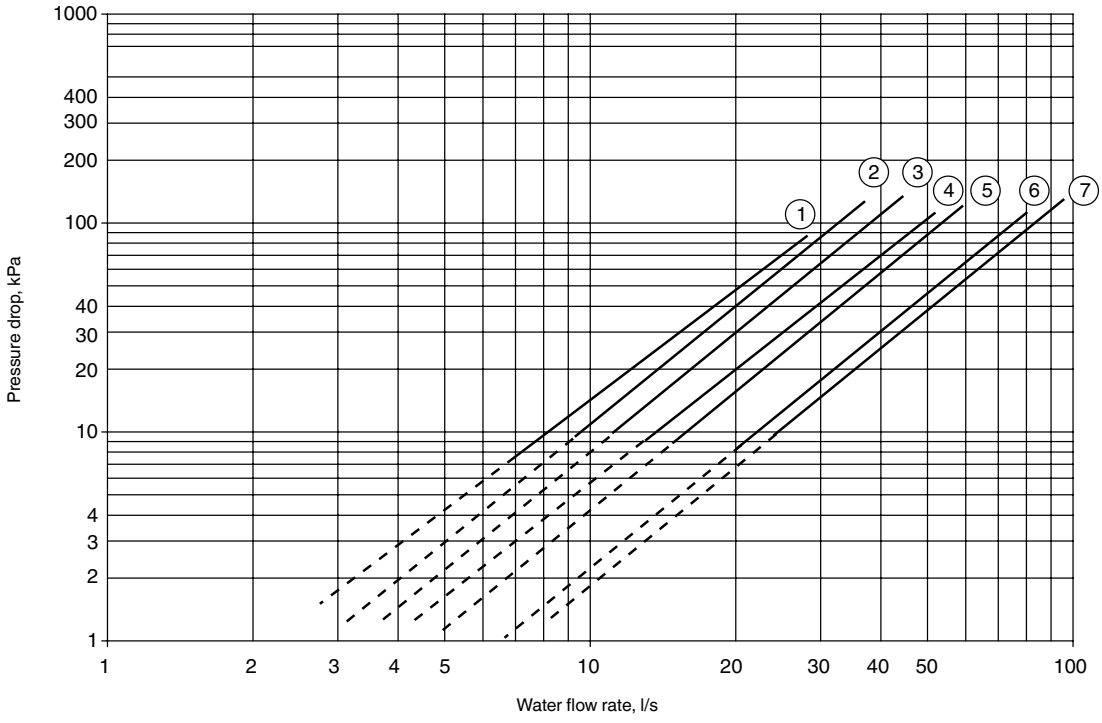
7.8 - Evaporator pressure drop curve



Legend

1	30HXC 080-090
2	30HXC 100
3	30HXC 110
4	30HXC 120-130
5	30HXC 140-155
6	30HXC 175-190
7	30HXC 200
8	30HXC 230
9	30HXC 260-285
10	30HXC 310
11	30HXC 345-375

7.9 - Condenser pressure drop curve



Legend

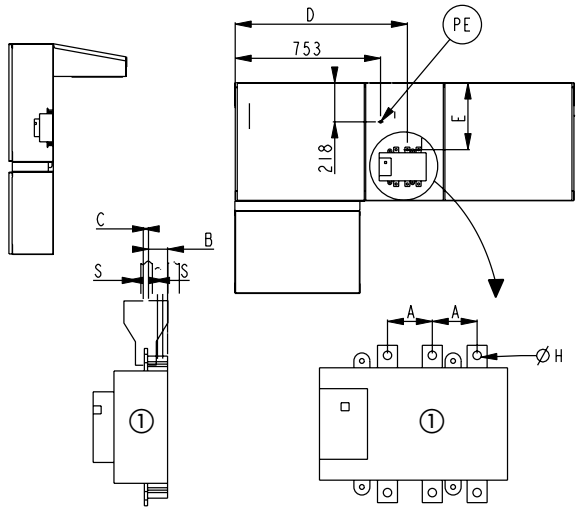
1	30HXC 080-090-100-110
2	30HXC 120-130
3	30HXC 140-155
4	30HXC 175-190
5	30HXC 200
6	30HXC 230-260-285
7	30HXC 310-345-375

Note:
The dotted part of the curves corresponds to the flow values only permitted for closed circuits.

8 - ELECTRICAL CONNECTION

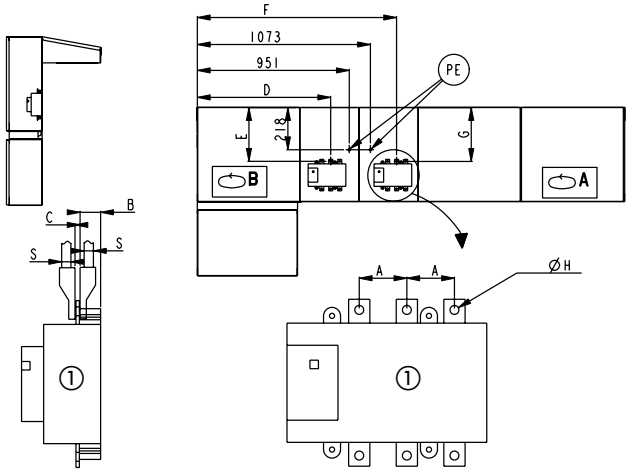
8.1 - Electrical connections 30HXC units

8.1.1 - 30HXC 080-190 control box



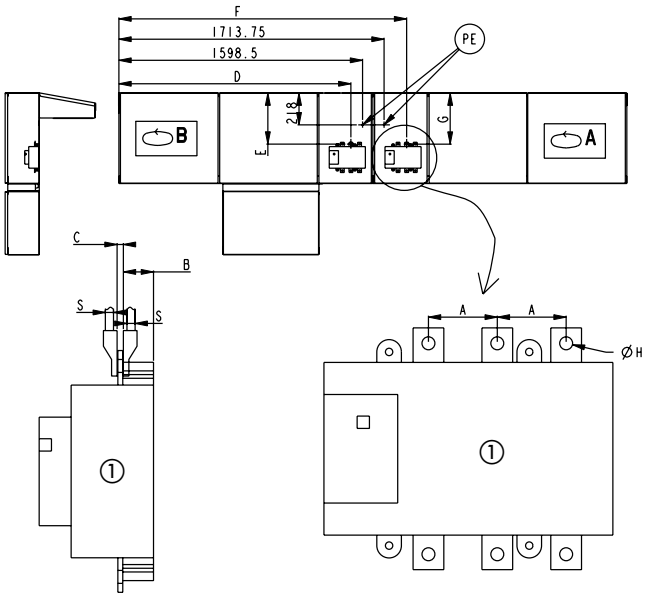
30HXC	A	B	C	D	E	ø H
Standard						
080-190 (315/400A)	56	25	4	863	314	10.5
Option 150/150A						
080-140 (315/400A)	56	25	4	863	314	10.5
155-190 (630A)	68	32	6	880	307.5	12.5

8.1.2 - 30HXC 200-285 control box



30HXC	A	B	C	D	E	F	G	ø H
Standard								
Circuit A								
200-285 (400A)	56	25	4	841	314	1183	314	10.5
Circuit B								
200-285 (250A)	39	23.5	4	811.5	324	-	-	8.5
Option 150/150A								
Circuit A								
200-230 (400A)	56	25	4	841	314	1183	314	10.5
260-285 (630A)	68	32	6	-	-	1200	307.5	12.5
Circuit B								
200-260 (250A)	39	23.5	4	811.5	324	-	-	8.5
285 (400A)	56	25	4	841	314	1183	314	10.5

8.1.3 - 30HXC 310-375 control box



Legend

(1) Main disconnect switch
PE Earth connection
S Power supply cable section (see table “Recommended wire sections”).

30HXC	A	B	C	D	E	F	G	ø H
Standard								
Circuit A								
310-375 (400A)	56	25	4	1492.6	314	1824	314	10.5
Circuit B								
310-345 (400A)	56	25	4	1492.6	314	1824	314	10.5
375 (630A)	68	32	6	1510	307.5	1841	307.5	12.5
Option 150/150A								
Circuit A								
310 (400A)	56	25	4	1492.6	314	1824	314	10.5
345-375 (630A)	68	32	6	1510	307.5	1841	307.5	12.5
Circuit B								
310-375 (630A)	68	32	6	1510	307.5	1841	307.5	12.5

NOTES:

The 30HXC 080-190 units have only one power connection point located at the main disconnect switch.

Before connecting electric power cables, it is imperative to check the correct order of the 3 phases (L1 - L2 - L3).

Non-certified drawings.

Refer to the certified drawings supplied with the unit or available on request.

8.2 - 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.

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.

8.3 - Voltage phase imbalance (%)

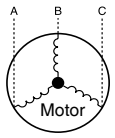
$$\frac{100 \times \text{max. deviation from average voltage}}{\text{Average voltage}}$$

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

AB = 406 V; BC = 399 V; 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.

Electrical data notes for 30HXC units:

- 30HXC 080-190 units have a single power connection point; 30HXC 200-375 units have two connection points.
- The control box includes the following standard features:
  - Starter and motor protection devices for each compressor
  - Control devices
- **Field connections:**
  All connections to the system and the electrical installations must be in full accordance with all applicable codes.
- The Carrier 30HXC units are designed and built to ensure conformance with local codes. The recommendations of European standard EN 60204-1 (corresponds to IEC 60204-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment.
- **Electrical reserves:**
  Circuit B has disconnect switches and branch sections, designed to supply the evaporator and condenser pump power input.

IMPORTANT:

- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204-1 is the best means of ensuring compliance with the Machines Directive and § 1.5.1.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.

1. The operating environment for the 30HXC units is specified below:
   a. Environment* - Environment as classified in IEC 60364 § 3:
      - ambient temperature range: +5°C to +40°C, class AA4
      - humidity range (non-condensing)*:
        50% relative humidity at 40°C
        90% relative humidity at 20°C
      - altitude: ≤ 2000 m
      - indoor installation*
      - presence of water: class AD2* (possibility of water droplets)
      - presence of hard solids, class AE2* (no significant dust present)
      - presence of corrosive and polluting substances, class AF1 (negligible)
      - vibration and shock, class AG2, AH2
   b. Competence of personnel, class BA4* (trained personnel - IEC 60364)
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 (corresponds to IEC 60947) .
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 protection level required to conform to this class is IP21B (according to reference document IEC 60529). All 30HXC units are protected to IP23C and fulfil this protection condition.

8.4 - Recommended wire sections

Wire sizing is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guideline, and does not make Carrier 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 of 30HXC units installed inside the building, the following standardized installation methods are used, in accordance with IEC 60364, table 52C:

- No.13: perforated horizontal cable conduit,
- No. 41: closed conduit.

The calculation is based on PVC or XLPE insulated cables with copper or aluminium core. The maximum temperature is 40°C.

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.

8.4.1 - Field control wiring

IMPORTANT: Field connection of interface circuits may lead to safety risks: any control box modification must maintain equipment conformity with local regulations. Precautions must be taken to prevent accidental electrical contact between circuits supplied by different sources:

- ***The routing selection and/or conductor insulation characteristics must ensure dual electric insulation.***
- ***In case of accidental disconnection, conductor fixing between different conductors and/or in the control box prevents any contact between the conductor ends and an active energised part.***

Refer to the 30GX/HXC Pro-Dialog Plus Controls IOM and the certified wiring diagram supplied with the unit for the field control wirting of the following features:

- Evaporator pump interlock (mandatory)
- Remote on/off switch
- Condenser flow switch (field-supplied)
- Remote heat/cool switch
- Demand limit external switch 1
- Remote dual setpoint
- Alarm report by circuit
- Evaporator pump control
- Condenser pump control
- Remote setpoint reset or outside air temperature sensor reset (0-10 V)

8.4.2 - Selection table of minimum and maximum wire sections - 400 V-3 ph-50 Hz

30HXC	Minimum wire section (mm2)*	Wire type	L (m)	Maximum wire section (mm2)*	Wire type	L (m)
080	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
090	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
100	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
110	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
120	1 x 95	XLPE Cu	180	1 x 185	XLPE Al	220
130	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
140	1 x 120	XLPE Cu	185	2 x 95	XLPE Al	195
155	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	205
175	1 x 150	XLPE Cu	190	2 x 120	XLPE Al	205
190	1 x 185	XLPE Cu	190	2 x 150	XLPE Al	210
200 Circuit A	1 x 95	XLPE Cu	180	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
230 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
260 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235
285 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
310 Circuit A	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	255
				2 x 95	XLPE Cu	270
345 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				2 x 95	XLPE Cu	270
375 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
200 Circuit B	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
				1 x 70	XLPE Cu	205
230 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
260 Circuit B	1 x 95	XLPE Cu	180	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
285 Circuit B	1 x 95	XLPE Cu	180	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
310 Circuit B	1 x 185	XLPE Cu	190	2 x 185	XLPE Al	270
				1 x 240	XLPE Cu	235
345 Circuit B	1 x 185	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
375 Circuit B	1 x 240	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290

* Power supply wire section (see diagrams/legend S in chapter 'Electrical connection'). The disconnect switches are indicated by a 1.

8.4.3 - Selection table of minimum and maximum wire sections 400V-3ph-50Hz + option 150

30HXC	Minimum wire section (mm2)*	Wire type	L (m)	Maximum wire section (mm2)*	Wire type	L (m)
080 Opt. 150	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
090 Opt. 150	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
100 Opt. 150	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
110 Opt. 150	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
120 Opt. 150	1 x 120	XLPE Cu	185	2 x 95	XLPE Al	195
130 Opt. 150	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	205
140 Opt. 150	1 x 150	XLPE Cu	190	2 x 120	XLPE Al	205
155 Opt. 150	1 x 185	XLPE Cu	190	2 x 150	XLPE Al	210
175 Opt. 150	1 x 185	XLPE Cu	190	2 x 150	XLPE Al	210
190 Opt. 150	2 x 95	XLPE Cu	170	2 x 240	XLPE Al	225
200 Opt. 150 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
230 Opt. 150 Circuit A	1 x 150	XLPE Cu	190	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235
260 Opt. 150 Circuit A	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
285 Opt. 150 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295
310 Opt. 150 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
345 Opt. 150 Circuit A	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
375 Opt. 150 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295
200 Opt. 150 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
230 Opt. 150 Circuit B	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
260 Opt. 150 Circuit B	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
285 Opt. 150 Circuit B	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
310 Opt. 150 Circuit B	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
345 Opt. 150 Circuit B	1 x 240	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
375 Opt. 150 Circuit B	2 x 95	XLPE Cu	170	2 x 240	XLPE Cu	295

* Power supply wire section (see diagrams/legend S in chapter 'Electrical connection'). The disconnect switches are indicated by a 1.

8.4.4 - Selection table of minimum and maximum wire sections 460V-3ph-60Hz (option 60)

30HXC	Minimum wire section (mm2)*	Wire type	L (m)	Maximum wire section (mm2)*	Wire type	L (m)
080	1 x 35	XLPE Cu	140	1 x 120	PVC Al	260
090	1 x 35	XLPE Cu	140	1 x 120	PVC Al	260
100	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
110	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
120	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
130	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
140	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
155	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
175	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
190	1 x 120	XLPE Cu	185	2 x 95	XLPE Al	195
200 Circuit A	1 x 50	XLPE Cu	160	2 x 95	PVC Al	310
				1 x 150	XLPE Al	210
230 Circuit A	1 x 70	XLPE Cu	170	2 x 120	PVC Al	325
				1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
260 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235
285 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
310 Circuit A	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	255
				2 x 95	XLPE Cu	270
345 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				2 x 95	XLPE Cu	270
375 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
200 Circuit B	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
				1 x 70	XLPE Cu	205
230 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
260 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 120	XLPE Cu	225
285 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
310 Circuit A	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
345 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 120	XLPE Cu	225
375 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
200 Circuit B	1 x 35	XLPE Cu	140	1 x 120	PVC Al	260
				1 x 95	XLPE Al	195
				1 x 70	PVC Cu	195
230 Circuit B	1 x 50	XLPE Cu	160	2 x 70	PVC Al	285
				1 x 120	XLPE Al	205
				1 x 70	XLPE Cu	205
260 Circuit B	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
				1 x 70	XLPE Cu	205
285 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
310 Circuit B	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
345 Circuit B	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
375 Circuit B	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235

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

8.4.5 - Selection table of minimum and maximum wire sections 460V-3ph-60Hz + option 150/150A

30HXC	Minimum wire section (mm2)*	Wire type	L (m)	Maximum wire section (mm2)*	Wire type	L (m)
080	1 x 50	XLPE Cu	160	1 x 150	XLPE Al	210
090	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
100	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
110	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
120	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
130	1 x 120	XLPE Cu	185	2 x 95	XLPE Al	195
140	1 x 150	XLPE Cu	190	2 x 120	XLPE Al	205
155	1 x 150	XLPE Cu	190	2 x 120	XLPE Al	205
175	1 x 185	XLPE Cu	190	2 x 150	XLPE Al	210
190	1 x 240	XLPE Cu	190	2 x 185	XLPE Al	210
200 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
230 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
260 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				1 x 240	XLPE Cu	235
285 Circuit A	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
310 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235
345 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				1 x 240	XLPE Cu	235
375 Circuit A	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
200 Circuit B	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
				1 x 95	XLPE Cu	215
230 Circuit B	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
260 Circuit B	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
285 Circuit B	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
310 Circuit B	1 x 185	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
345 Circuit B	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
375 Circuit B	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295

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

8.4.6 - Selection table of minimum and maximum wire sections 380V-3ph-60Hz (option 61)

30HXC	Minimum wire section (mm2)*	Wire type	L (m)	Maximum wire section (mm2)*	Wire type	L (m)
080	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
090	2 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
100	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
110	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
120	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
130	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
140	1 x 120	XLPE Cu	185	1 x 240	XLPE Al	225
155	1 x 120	XLPE Cu	185	2 x 95	XLPE Al	195
175	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	205
190	1 x 150	XLPE Cu	190	2 x 120	XLPE Al	205
200 Circuit A	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 120	XLPE Cu	225
230 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
260 Circuit A	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	255
				1 x 185	XLPE Cu	235
285 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
310 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
345 Circuit A	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	255
				1 x 185	XLPE Cu	235
375 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
200 Circuit B	1 x 50	XLPE Cu	160	1 x 120	XLPE Al	205
				1 x 70	XLPE Cu	205
230 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
260 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 95	XLPE Cu	215
285 Circuit B	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
				1 x 150	XLPE Cu	225
310 Circuit B	1 x 150	XLPE Cu	190	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235
345 Circuit B	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280
375 Circuit B	1 x 185	XLPE Cu	190	2 x 185	XLPE Al	270
				2 x 120	XLPE Cu	280

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

8.4.7 - Selection table of minimum and maximum wire sections 380V-3ph-60Hz + option 150/150A

30HXC	Minimum wire section (mm2)*	Wire type	L (m)	Maximum wire section (mm2)*	Wire type	L (m)
080	1 x 70	XLPE Cu	170	1 x 185	XLPE Al	220
090	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
100	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
110	1 x 120	XLPE Cu	185	2 x 95	XLPE Al	195
120	1 x 120	XLPE Cu	185	2 x 120	XLPE Al	205
130	1 x 150	XLPE Cu	190	2 x 120	XLPE Al	205
140	1 x 185	XLPE Cu	190	2 x 150	XLPE Al	210
155	1 x 240	XLPE Cu	190	2 x 185	XLPE Al	220
175	1 x 240	XLPE Cu	190	2 x 185	XLPE Al	220
190	2 x 95	XLPE Cu	170	2 x 240	XLPE Al	225
200 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 240	XLPE Cu	235
230 Circuit A	1 x 150	XLPE Cu	190	2 x 185	XLPE Al	270
				1 x 240	XLPE Cu	235
260 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
285 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295
310 Circuit A	1 x 185	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
345 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Al	280
				2 x 150	XLPE Cu	290
375 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295
200 Circuit B	1 x 70	XLPE Cu	170	1 x 150	XLPE Al	210
				1 x 120	XLPE Cu	225
230 Circuit B	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
260 Circuit A	1 x 95	XLPE Cu	180	1 x 240	XLPE Al	225
				1 x 150	XLPE Cu	230
285 Circuit A	1 x 120	XLPE Cu	185	2 x 150	XLPE Al	265
				1 x 185	XLPE Cu	235
310 Circuit A 1	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295
345 Circuit A 1	2 x 95	XLPE Cu	170	2 x 240	XLPE Cu	295
375 Circuit A	1 x 240	XLPE Cu	190	2 x 240	XLPE Cu	295

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

9 - 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.

9.1 - 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).
- The use of different metals on hydraulic piping could generate eletrolytic pairs and consequently corrosion. It could be needed to add sacrificial anodes.

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 125 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: > 0.5 mmol/l. Values between 1 and 2.5 can be recommended. This will facilitate scale deposit that can limit corrosion of copper. 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. Electric conductivity: 10-600µS/cm
10. pH: Ideal case pH neutral at 20-25°C
    $7 < pH < 8$

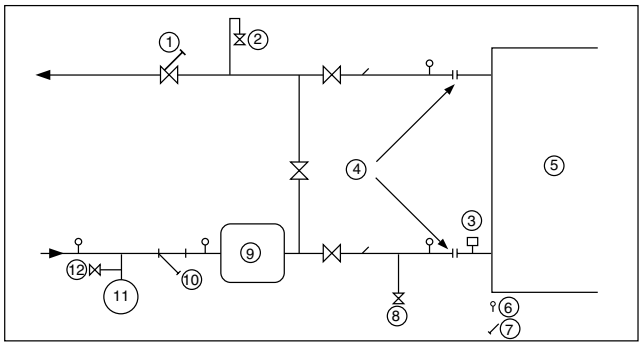
If the water circuit must be emptied for longer than one month, the complete circuit must be placed under nitrogen charge to avoid any risk of corrosion by differential aeration.

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.

9.2 - Water connections

This diagram shows a typical water installation.

Typical water circuit diagram



Legend

1	Control valve	7	Thermostat sleeve
2	Air vent	8	Drain
3	Flow switch for the evaporator	9	Buffer tank
4	Flexible connection	10	Filter (mesh size: 1.2 mm = 20 mesh)
5	Heat exchanger	11	Expansion tank
6	Pressure tap	12	Fill valve

9.3.1 - Evaporator flow switch and chilled water pump interlock

NOTE: This is obligatory and 30HXC units:

- ***The unit water flow switch must be energised.***
- ***The chilled water pump start-up interlock must be connected.***

Failure to follow this instruction will void the Carrier guarantee. The flow switch is supplied, installed on the evaporator entering water pipe and preset at the factory to cut out when there is insufficient water flow.

If any adjustment is required, please refer to chapters:

- ***9.3.1.1 for the more recent flow switches,***
- ***9.3.1.2 for older flow switches (orange colour).***

9.3.1.1 - Flow switch - reference number 00PPG000472900A

IMPORTANT: To adjust the setpoint the unit must be energised, but without water flow.

The default control point is 60 cm/s (0.6 m/s) for all applications. For option 6 the factory setting is 10 cm/s (0.1 m/s).

Changing the setpoint is only necessary if glycol is used in the water system (positive brine), and the correct value is 10 cm/s (0.1 m/s).

If adjustment is required, **the push button below must always be used for safe adjustment. This is available from the Carrier spare parts department**.

Push button
ref. No. 00PPG00473000A

Flow switch
ref. No. 00PPG000472900A

- Switch on the unit without water flow.
- Disconnect the flow switch connector and insert the push button in series with the flow switch.
- Follow sequence A to F below.

NOTE: The new setpoint (in cm/s) corresponds to the duration (in seconds) the push button is pressed.

Control sequence

Timing	Operation
A	**Initialisation:** Press the push button for longer than 1 second
B	**Initialisation validation:** Release the button for between 1 and 5 seconds
C	**Threshold control:** Press for the number of seconds that corresponds to the required setpoint (pressing for 10 seconds sets the setpoint to 10 cm/s or 0.1 m/s)
D	Release for 5 seconds
E	**Stored information feedback:** The light is on for the number of seconds that corresponds to the setpoint.
F	**Internal control:** The flow switch goes out for 5 seconds and can then be disconnected from the push button.

Timing	A	B	C	D	E	F
Duration, s	> 1	1 to 5	3 to 67	5	5 to 65	5

Do not forget to remove the push button at the end of the operation and replace the connector on the flow switch.

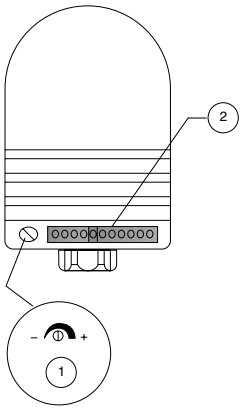
9.3.1.2 - Flow switch - ref. No. HR12AA009EE (orange colour)

If adjustment is necessary:

1. Switch on the unit. Set it to constant flow (preset value).The yellow LED is illuminated, and the output is switched for approximately 20 seconds (power-on delay time).
2. Turn the potentiometer until only one green LED is illuminated. The further the green LED is from the yellow LED, the safer the adjustment (standby capacity in case of flow or temperature fluctuations).
3. After the adjustment attach the label supplied to the potentiometer, in order to protect it against unauthorised tampering.

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).

Potentiometer adjustment (ref.: HR12AA009EE)



Legend
1 Setting potentiometer sensitivity
2 Chain of LEDs
- red LED lights: the unit is not adjusted
- yellow LED lights: the output is switched
- green LED lights: the unit is adjusted

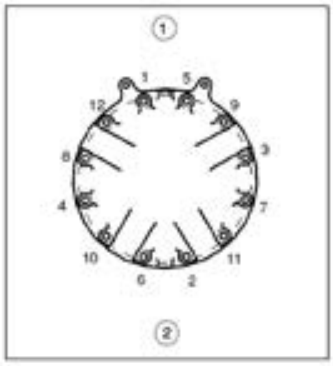
9.3.2 - Condenser water flow switch (30HXC)

The use of a condenser water flow switch is recommended. The flow switch is not supplied, and must be installed on site and connected in accordance with the wiring diagrams.
The condenser water flow rate must be set to 10 l/s.

9.4 - Evaporator and condenser for the 30HXC 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.

9.5 - Frost protection

9.5.1 - 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).***

9.5.2 - Brine machine

30HXC brine applications below 0°C leaving brine temperature are not compatible with stopped situations where water flow is maintained in the evaporator and stopped in the condenser.
The water flow in the evaporator should preferably be stopped after unit shut down. If this is not possible, then the flow must be maintained in the condenser too.
In all cases, it is recommended to maintain the water flow in the condenser few moments after the evaporator flow stopped to allow safe pressure equilibrium.
Special attention has to be given to the hydraulic design when option 152 is selected, in order to maintain the condenser flow even when the 0-10V signal asks for no-flow.

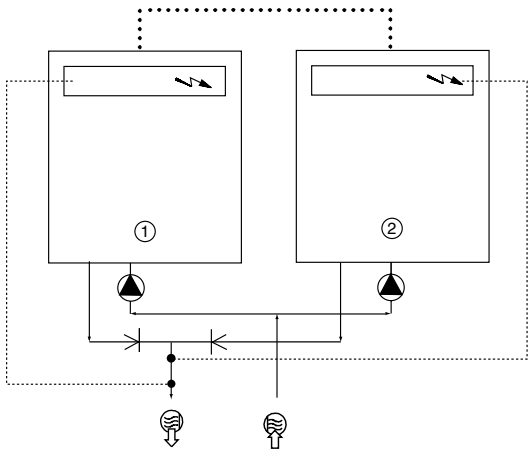
9.6 - Operation of two units in master/slave mode

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, setpoint, 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 30GX/HXC Pro-Dialog Plus Control IOM for a more detailed explanation.

30HXC 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

10 - MAJOR SYSTEM COMPONENTS AND OPERATION DATA

10.1 - Geared twin screw compressor

- 30HXC units use 06N geared twin screw compressors.
- Nominal capacities range from 137 to 281 kW (39 to 80 tons). Economized or non economized models are used depending on the 30HXC unit size.

10.1.1 - Oil filter

The 06N screw compressor has an oil filter integral in the compressor housing. This filter is field replaceable.

10.1.2. - Refrigerant

The 06N screw compressor is specially designed to be used in R-134 a system only.

10.1.3 - Lubricant

The 06N 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 standard on the compressor to isolate the compressor from oil flow when the compressor is not operating.

The oil solenoid 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 - Unloading system

The 06NW screw compressor has an unloading system that is standard on all compressors. This unloading system consists of two steps of unloading that decrease the compressor capacity by rerouting partially compressed gas back to suction.

10.2 - Pressure vessels

10.2.1 - Evaporator

30HXC chillers use a flooded 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 center 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 two or three water passes.

At the top of the cooler are the two suction pipes, one in each circuit. Each has a flange welded to it, and the compressor mounts on the flange.

The evaporator shell has a thermal insulation of 19 mm thick polyurethane foam and a water drain and purge. With the very low temperature option this insulation is 38 mm thick.

10.2.2 - Condenser and oil separator

30HXC chiller use a vessel that is a combination condenser and oil separator. It is mounted below the cooler. Discharge gas leaves the compressor and flows through an external muffler to the oil separator, which is the upper portion of the vessel. It enters the top of the separator where oil is removed, and then flows to the bottom portion of the vessel, where gas is condensed and subcooled. One vessel is used to serve both refrigerant circuits. There is a center tube sheet which separates the two refrigerant circuits. The tubes are 3/4” or 1” diameter copper with enhanced surface inside and out. There is just one water circuit with two water passes.

The condenser shell can have a thermal insulation of 19 mm thick polyurethane foam and a water drain and purge.

10.3 - Electronic expansion device (EXV)

The microprocessor controls the EXV through the EXV control module. Inside this EXV is a linear actuator stepper motor. High-pressure liquid refrigerant enters the valve through the bottom. A series of calibrated slots are located inside the orifice assembly. As refrigerant passes through the orifice, the pressure drops and the refrigerant changes to a 2-phase condition (liquid and vapour). To control refrigerant flow for different operating conditions, the sleeve moves up and down over the orifice, thereby changing effective flow area of expansion device. The sleeve is moved by a linear stepper motor. The stepper motor moves in increments and is controlled directly by the processor module. As the stepper motor rotates, motion is transferred into linear movement by the lead screw. Through the stepper motor and lead screws, 1500 discrete steps of motion are obtained. The large number of steps and long stroke result in very accurate control of refrigerant flow.

At initial start-up, the EXV position is at zero. After that, the microprocessor keeps accurate track of the valve position in order to use this information as input for the other control functions. It does this by initializing the EXV's at startup. The processor sends out enough closing pulses to the valve to move it from fully open to fully closed, then resets the position counter to zero. From this point on, until the initialization, the processor counts the total number of open and closed steps it has sent to each valve.

10.4 - Economizer

Economizers are installed on 30HXC 190, 285 and 375.

The economizer improves both the chiller capacity and efficiency as well as providing motor cooling. The economizers used are direct-expansion plate heat exchangers.

The flow of the direct-expansion plate heat exchanger circuit is adjusted by the thermostatic cooling valves.

10.5 - Oil pumps

The 30HXC screw chillers use one externally mounted pre-lubricating oil pump per circuit. This pump is operated as part ot the start-up sequence.

ATTENTION: The operating temperature of the coil may reach 80°C. In certain temporary conditions (especially during start-up at low outside temperature or low condenser loop temperature) the oil pump can be reactivated.

10.6 - Motor cooling valves

Compressor motor winding temperatures are controlled to the optimum setpoint. The control accomplishes this by cycling the motor cooling solenoid valve to allow liquid refrigerant to flow across the motor windings as needed.

On units equipped with economizers with plate heat exchangers, a thermostatic valve controls the necessary refrigerant flow entering this heat exchanger and continuously flowing over the motor windings. All refrigerant used for motor cooling returns to the rotors and is compressed to the discharge pressure.

10.7 - Sensors

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

11 - MAIN OPTIONS AND ACCESSORIES

Options	N°	Description	Advantages	30HXC
Low-temperature brine solution	6	Low temperature glycol solution production down to -10 °C with ethylene glycol	Covers specific applications such as ice storage and industrial processes	090, 110, 130, 155, 175, 200, 230, 260, 310, 345
IP44C electrical protection level	20	Control box thightness reinforced	Permits unit installation in more severe envrionments	080-375
Tropicalisation	22	Unit control box suitable for tropical climates	Reduced relative humidity in the control boxes for operation in tropical climates (warm and humid)	080-375
Soft Starter	25	Electronic starter on each compressor	Reduced start-up current	200-375
Cu/Ni condensers	33	Condenser tubes and tubes sheets in 90-10 Copper/Nickel alloy	Allows applications with sea water	080-375
Cu/Ni condensers + Sakaphen coated water boxes	34A	Condenser tubes and tubes sheets in 90-10 Copper/Nickel alloy and Sakaphen treatment inside water boxes	Allows applications with sea water, improved durability of water boxes	080-375
Unit supplied in two assembled parts	51	The unit is equipped with flanges that allow disassembly of the unit on site	Facilitates installation in plant rooms with limited access	080-375
460-3-60 power supply	60	Power supply of 460 V-3 ph-60 Hz	Permits unit connection to a power network with specific characteristics	080-375
380-3-60 power supply	61	Power supply of 380 V-3 ph-60 Hz	Permits unit connection to a power network with specific characteristics	080-375
Evap. pump power/control circuit	84	Unit equipped with an electrical power and control circuit for one pump evaporator side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	080-375
Evap. dual pumps power/control circuit	84D	Unit equipped with an electrical power and control circuit for two pumps evaporator side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	080-375
Cond. pump power/control circuit	84R	Unit equipped with an electrical power and control circuit for one pump condenser side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	080-375
Compressor suction valve	92	Valve set for the compressor suction side to isolate it in the refrigerant circuit	Simplified service and maintenance	080-375
Evaporator with one pass less	100C	Evaporator with one pass on the water side. Evaporator inlet and outlet on opposite sides.	Easy to install, depending on site. Reduced pressure drops	080-375
Condenser with one pass less	102C	Condenser with one pass on the water side. Condenser inlet and outlet on opposite sides.	Easy to install, depending on site. Reduced pressure drops	080-375
21 bar evaporator	104	Reinforced evaporator for extension of the maximum water-side service pressure to 21 bar (standard 10 bar)	Covers applications with a high water column evaporator side (typically high buildings)	080-375
21 bar condenser	104A	Reinforced condenser for extension of the maximum water-side service pressure to 21 bar (standard 10 bar)	Covers applications with a high water column condenser side (typically high buildings)	080-375
Reversed evaporator water connections	107	Evaporator with reversed water inlet/outlet	Easy installation on sites with specific requirements	080-375
Reversed condenser water connections	107A	Condenser with reversed water inlet/outlet	Easy installation on sites with specific requirements	080-375
J-Bus gateway	148B	Two-directional communication board complying with JBus protocol	Connects the unit by communication bus to a building management system	080-375
BacNet gateway	148C	Two-directional communication board complying with BacNet protocol	Easy connection by communication bus to a building management system	080-375
Lon gateway	148D	Two-directional communication board complying with Lon Talk protocol	Connects the unit by communication bus to a building management system	080-375
High condensing temperature	150	Increased condenser leaving water temperature up to 63°C. Control of the leaving water temperature.	Allows applications with high condensing temperature (for heat reclaim or dry cooler applications)	080-375
High condensing temperature in non-reversible applications	150A	Operation in heat pump mode only with condenser leaving water temperature up to 63°C.	Allows applications with high condensing temperature (for heat reclaim or dry cooler applications)	080-375
Control for low cond. temperature systems	152	Output signal (0-10 V) to control the condenser water inlet valve	Simple installation: for applications with cold water at condenser inlet (ex. ground-source, groundwater-source, superficial water-source applications) the signal permits to control a 2 or 3-way valve to maintain condenser water temperature (and so condensing pressure) at acceptable values	080-375
RS 485 communication interface with open protocol	155	Additional RS 485 communication board	Communication via CCN protocol	080-375
Dual relief valves installed w/ 3-way valve	194	Three-way valve upstream of the relief valves on the evaporator and the oil separator	Valve replacement and inspection facilitated without refrigerant loss. Comforms to European standard EN378/BGVD4	080-190
Compliance with Swiss regulations	197	Additional tests on the water heat exchangers: supply (additional of PED documents) supplementary certificates and test certifications	Conformance with Swiss regulations	080-375
Compliance with Russian regulations	199	EAC certification	Conformance with Russian regulations	080-375
Welded water exchanger connection kit	266	"Victaulic piping connections with welded joints "	Easy installation	080-375
Welded condenser water connection kit	267	Victaulic piping connections with welded joints	Easy installation	080-375
Flanged evaporator water connection kit	268	Victaulic piping connections with flanged joints	Easy installation	080-375
Flanged condenser water connection kit	269	Victaulic piping connections with flanged joints	Easy installation	080-375
230V electrical plug	284	230V AC power supply source provided with plug socket and transformer (180 VA, 0,8 Amps)	Permits connection of a laptop or an electrical device during unit commissioning or servicing	080-375

11.1 - Compressor suction valves (option 92)

These valves are designed to isolate the compressor from the rest of the circuit. Discharge valves, oil valves and cooling valves are installed in the standard unit. A label attached to the evaporator near each valve shows the open or closed position of the valve. It is important to remove the cap in order to manoeuvre the valve shaft and to replace it after this operation to ensure leak-tightness.

11.2 - Electric protection level of the 30HXC control boxes to IP44C (option 20)

The control boxes are leak-tight and equipped with a ventilation system to ensure cooling of the electrical components. The control box fan is controlled by a thermostat (setpoint 55°C, differential 20°C). A safety thermostat switches the unit off, if the control box temperature exceeds 60°C.

These elements can be shown on the unit and on the wiring diagram.

11.3 - Tropicalised control box for 30HXC units (option 22)

The control boxes are leak-tight and equipped with heaters. The standard components are already treated for "all-weather" operation. Heating the air will reduce the moisture level in the control box and prevent condensation.

11.4 - Disassembled 30HXC units (option 51)

These units are equipped with flange connections on the refrigerant piping to permit disassembly of the units without unwelding. The dimensional drawing for this option gives the weight of the different parts. The units are fully factory-assembled, charged with oil and refrigerant and run-tested at the end of the assembly line. The refrigerant charge is then removed and replaced by a nitrogen holding charge.

IMPORTANT: The oil charge remains in the unit and must not be exposed to moisture during disassembly and reassembly. The refrigerant charge is not supplied and must be provided on site. Please refer to the unit nameplate.

12 - MAINTENANCE

12.1 - Maintenance instructions

Air conditioning equipment must be maintained by professional technicians, whilst routine checks can be carried out locally by specialised technicians. See the standard EN 378-4.
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.

External visual checks. These controls must be carried out:

- After an intervention that is likely to affect the resistance or a change in use or change of high-pressure refrigerant, or after a shut down of more than two years. Components that do not comply, must be changed. Test pressures above the respective component design pressure must not be applied.
- After repair or significant modifications or significant system or component extension.
- After re-installation at another site.
- After repair following a refrigerant leak.
  The frequency of refrigerant leak detection can vary from once per year for systems with less than 1% leak rate per year to once a day for systems with a leak rate of 35% per year or more. The frequency is in proportion with the leak rate.

NOTE: High leak rates are not acceptable. The necessary steps must be taken to eliminate any leak detected.

NOTE 2: Fixed refrigerant detectors are not leak detectors, as they cannot locate the leak.

12.2 - Soldering and welding

Component, piping and connection soldering and welding operations must be carried out using the correct procedures and by qualified operators. Pressurised containers must not be subjected to shocks, nor to large temperature variations during maintenance and repair operations.

12.3 - Refrigerant charging - adding charge

IMPORTANT: These units are designed for use with R-134a only. DO NOT USE ANY OTHER refrigerant in these units.

CAUTION: When adding or removing charge, circulate water through the condenser (HX) and cooler at all times to prevent freezing. Freezing damage is considered abuse and may void the Carrier warranty.

All refrigerant removal and draining operations must be carried out by a qualified technician and with the correct material for the unit. Any inappropriate handling can lead to uncontrolled fluid or pressure leaks.

CAUTION: DO NOT OVERCHARGE system. Over-charging results in higher discharge pressure with higher cooling fluid consumption, possible compressor damage and higher power consumption.

12.4 - Indication of low charge on a 30HXC system

NOTE : To check for low refrigerant charge on a 30HXC, several factors must be considered. A flashing liquid-line sightglass is not necessarily an indication of inadequate charge. There are many system conditions where a flashing sightglass occurs under normal operation. The 30HXC metering device is designed to work properly under these conditions.

1. Make sure that the circuit is running at a full-load condition. To check whether circuit A is fully loaded, follow the procedure described in the Controls manual.
2. It may be necessary to use the Manual Control feature to force the circuit into a full-load condition. If this is the case, see the instructions for using the Manual Control feature in the Controls manual.
3. With the circuit running at full-load, verify that the cooler leaving fluid temperature is in the range of 6°C ± 1.5 K.
4. At this condition, observe the refrigerant in the liquid line sightglass. If there is a clear sightglass, and no signs of flashing, then the circuit is adequately charged. Skip the remaining steps.
5. If the refrigerant appears to be flashing, the circuit is probably low on charge. Verify this by checking the EXV position (see 30GX/HXC Pro-Dialog Plus Controls IOM).
6. If the opening position of the EXV is greater than 60%, and if the liquid-line sightglass is flashing, then the circuit is low on charge. Follow the procedure for adding charge.

12.4.1 - To add charge to the 30HXC systems

1. Make sure that the unit is running at full-load, and that the cooler leaving fluid temperature is in the range of 5.6 to 7.8°C.
2. At these operating conditions, check the liquid-line sightglass. If there is a clear sightglass, then the unit has sufficient charge. If the sightglass is flashing, then check the EXV Percent Open. If this is greater than 60%, then begin adding charge.

NOTE: A flashing liquid-line sightglass at operating conditions other than those mentioned above is not necessarily an indication of low refrigerant charge.

3. Add 2.5 kg of liquid charge into the evaporator using the charging valve located on the top of the evaporator.
4. Observe the EXV Percent Open value. The EXV should begin closing as charge is being added. Allow the unit to stabilize. If the EXV Percent Open remains above 60%, and there are still bubbles in the sightglass, add an additional 2.5 kg of liquid charge.
5. Allow the unit to stabilize, and again check the EXV Percent Open. Continue adding 2.5 kg of liquid refrigerant charge at a time, and allow the unit to stabilize before checking the EXV position.
6. When the EXV Percent Open is in the range of 40-60%, check the liquid line sightglass. Slowly add enough additional liquid charge to ensure a clear sightglass. This should be done slowly to avoid overcharging the unit.
7. Verify adequate charge by continuing to run at full-load with 6°C ± 1.5 K evaporator leaving fluid temperature. Check that the refrigerant is not flashing in the liquid-line sightglass. The EXV Percent Open should be between 40 and 60%. The cooler level indicator should be in the range of 1.5 - 2.5.

12.5 - Electrical maintenance

When working on the unit comply with all safety precautions decribed in section “Maintenance safety considerations”.

- It is strongly recommended to change the fuses in the units every 15000 operating hours or every 3 years.
- It is recommended to verify that all electrical connections are tight:
  - after the unit has been received at the moment of installation and before the first start-up,
  - one month after the first start-up,when the electrical components have reached their nominal operating temperatures,
  - then regularly once a year.

12.6 - Pressure transducers

12.6.1 - Discharge pressure (circuits A and B)

This input is used to measure the high side pressure of each circuit of the unit. It is used to provide the pressure to replace the discharge pressure gauge and to control the head pressure.

12.6.2 - Suction pressure (circuits A and B)

This input is used to measure the pressure of the low side of the unit. It is used to provide the pressure to replace the suction pressure gauge.

12.6.3 - Oil pressure (each compressor)

This input is used to measure the oil pressure of each unit compressor. It is located on the oil pressure port of each compressor.

12.6.4 - Economizer pressure (circuits A and B)

This input is used to monitor the oil pressure differential supplied to the compressor.

12.7 - Oil charging - low oil recharging

12.7.1 - Addition of oil charge to 30HXC systems

1. If the 30HXC unit shuts-off repeatedly on Low oil Level, this may be an indication of inadequate oil charge. It could also mean simply that oil is in the process of being reclaimed from the low-side of the system.
2. Begin by running the unit at full-load for an hour and a half.
3. After running for 1-1/2 hours allow the unit to re-start and run normally. If the Low Oil Level alarms persist, the unit has a low oil charge. Add oil to the oil separator, using the oil charging valve at the bottom of the condenser.

CAUTION: Do NOT add oil at any other location as improper unit operation may result.

4. Make sure that the unit is not running when adding oil, as this will make the oil charging process easier. Because the system is under pressure even when the unit is not running, it will be necessary to use a suitable pump (hand or electric pump) to add oil to the system.

5. Using a suitable pump, add 2 litres of Polyolester oil to the system (CARRIER SPEC: PP47-32). Make sure that the oil level safety switch is NOT jumpered, and allow the unit to re-start and run normally.
6. If low oil level problems persist, add another 1 or 2 litres of oil. If it is necessary to add more than 4 litres of oil to the system, then contact your Carrier distributor service department.

CAUTION: When transferring the refrigerant charge to a storage unit, oil may be carried along when the unit is not operating. Reuse first of all the amount of refrigerant transferred. After draining the oil, only recharge the amount drained (an excess oil charge may impair correct unit operation).

If an oil draining or recovery operation becomes necessary, the fluid transfer must be made using mobile containers.

12.8 - Integral oil filter change

An integral oil filter in the 06N screw compressor is specified to provide a high level of filtration (3 μ) required for long bearing life. As system cleanliness is critical to reliable system operation, there is also a prefilter (7 μ) in the oil line at the oil separator outlet.

The replacement integral oil filter element part number is:

Carrier part number (including filter and O-ring): 06NA 660016S.

12.9 - Filter change-out schedule

The filter should be checked after the first 1000 hours of operation, and every subsequent 4000 hours. The filter should be replaced at any time when the pressure differential across the filter exceeds 2.1 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. The oil filter pressure drop should be checked after any occasion that the compressor is shut down on a low oil pressure safety.

12.10 - Filter change-out procedure

The following steps outline the proper method of changing the integral oil filter.

1. Shutdown and lockout the compressor.
2. Manually force the operation of the oil solenoid valve, in order to press the internal valve shutter onto its seat.
3. Close the oil filter service valve. Bleed pressure from the filter cavity through the filter service port.
4. Remove the oil filter plug. Remove the old oil filter.
5. Prior to installing the new oil filter, “grease” the o-ring with oil. Install the filter and replace the plug.
   Before closing up the lube oil system, take the opportunity to replace the prefilter, as well.
6. When complete, evacuate the filter cavity through the filter service port. Open the filter service valve. Remove any compressor lockout devices, the compressor is ready to return to operation.

12.11 - Compressor replacement

12.11.1 - 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. It is available as part of the “Compressor installation package” (part No. 06NA 660 013). This switch opens the contacts when the pressure falls below 6.8 kPa absolute. The switch is a manual reset type that can be reset after the pressure has once again risen above 69 kPa relative. It is critical that the switch be a manual reset type to preclude the compressor from short cycling in the reverse direction.

12.11.2 - EXV troubleshooting procedure

Follow steps below to diagnose and correct EXV problems.

Check EXV motor operation first (see procedure in the 30GX/HXC Pro-Dialog Plus Controls IOM). You should be able to feel the actuator moving by placing your hand on the EXV. You should feel a hard knocking come from the actuator when it reaches the top of its stroke (can be heard if surroundings are relatively quiet). The actuator should knock when it reaches the bottom of its stroke. If it is believed that the valve is not working properly, contact your Carrier service department for further checks on:

- output signals on EXV module
- wire connections (continuity and tight connection at all pin terminals)
- resistance of the EXV motor windings.

12.12 - Corrosion control

All metallic parts of the unit (chassis, casing panels, control boxes, heat exchangers etc.) are protected against corrosion by a coating of powder or liquid paint. To prevent the risk of blistering corrosion that can appear when moisture penetrates under the protective coatings, it is necessary to carry out periodic checks of the coating (paint) condition.

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

Preliminary information
Job name: .....
Location: .....
Installing contractor: .....
Distributor: .....
Start-up performed by: .....

Equipment
Model: ..... Serial number .....

Compressors

Circuit A	**Circuit B**
1. Model number	1. Model number .....
Serial number	Serial number .....
Motor number	Motor number .....
2. Model number	2. Model number .....
Serial number	Serial number .....
Motor number	Motor number .....

Cooler
Model number ..... Manufactured by .....
Serial number ..... Date .....

Condenser (30HXC)
Model number ..... Manufactured by .....
Serial number ..... Date .....

Air handling equipment
Manufacturer .....
Model number ..... Serial number .....

Additional air handling 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 cables and thermistors have been inspected for crossed wires
☐ All plug assemblies are tight

Check air handling systems
☐ All air handlers are operating
☐ All chilled water valves are open
☐ All fluid piping is connected properly
☐ All air has been vented from the system
☐ Chilled water pump (CWP) is operating with the correct rotation. CWP amperage: Rated: ..... Actual: .....

Check condenser system

☐ All condenser water valves are open
☐ All condenser piping is connected properly
☐ All air has been vented from the system
☐ Condenser water pump (CWP) is operating with the correct rotation.
Condenser water pump amperage: Rated: …….. Actual: ……

Unit start-up

☐ CWP starter has been properly interlocked with the chiller
☐ Oil level is correct
☐ All discharge and liquid valves are open
☐ All suction valves are open, if equipped
☐ All oil line valves and economizer discharge bubbler valves (if equipped) are open
☐ Unit has been leak checked (including fittings)
Locate, repair, and report any refrigerant leaks
.....
.....
.....

Check voltage imbalance: AB ..... AC..... BC.....
Average voltage = ... (see installation instructions)
Maximum deviation = ... (see installation instructions)
Voltage imbalance = ... (see installation instructions)

☐ Voltage imbalance is less than 2%
WARNING: Do not start chiller if voltage imbalance is greater than 2%. Contact local power company for assistance.

☐ All incoming power voltage is within rated voltage range

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 = ...
l/s / nominal kW = ...
☐ Total l/s is greater than unit's minimum flow rate
☐ Total l/s meets job specified requirement of..... (l/s)

Check condenser water loop

☐ Proper loop corrosion inhibitor included.....litres of.....
☐ Inlet piping to condenser includes a 20 mesh strainer with a mesh size of 1.2 mm

Check pressure drop across the condenser
Entering condenser = ... (kPa)
Leaving condenser = ... (kPa)
(Leaving - entering) = ... (kPa)
WARNING: Plot condenser 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 = ...
l/s / nominal kW = ...
☐ Total l/s is greater than unit's minimum flow rate
☐ Total l/s meets job specified requirement of..... (l/s)

Perform TEST function (indicate positive result):
WARNING: Once power is supplied to the unit, check the display for any alarms, such as phase reversal. Follow the TEST function instructions in the Controls and Troubleshooting literature (follow the procedure in the Controls IOM).

Cooler fluid select.....	External reset sensor .....
Minimum load select.....	Cooler pump interlock .....
Loading sequence select	Cooler pump control .....
Lead/lag sequence select.....	Condenser pump control*.....
Head pressure control	Condenser flow switch*.....
Motormaster select*.....	Condenser water sensors* .....
Water valve type*	*If installed

To start the chiller
WARNING: Be sure that all service valves are open, and all pumps are on before attempting to start this machine. Once all checks have been made, move the switch to "LOCAL" or "REMOTE" from "OFF".

☐ Unit starts and operates properly

Temperatures and pressures
WARNING: Once the machine has been operating for a while and the temperatures and pressures have stabilized, record the following:

Cooler EWT.....	Condenser EWT .....
Cooler LWT.....	Condenser LWT.....
Circuit A oil pressure	Circuit B oil pressure.....
Circuit A suction pressure	Circuit B suction pressure.....
Circuit A discharge temperature.....	Circuit B suction temperature .....
Circuit A suction temperature.....	Circuit B discharge pressure .....
Circuit A discharge pressure.....	Circuit B discharge temperature .....
Circuit A liquid line temperature.....	Circuit B liquid line temperature .....

NOTE FOR OPTION 51:
The pouch supplied with the unit contains the label indicating the refrigerant used and describing the procedure required under the Kyoto Protocol F-Gas Regulation:
- ***Attach this label to the machine.***
- ***Follow and observe the procedure described.***

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Quality and Environment
Management Systems
Approval

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