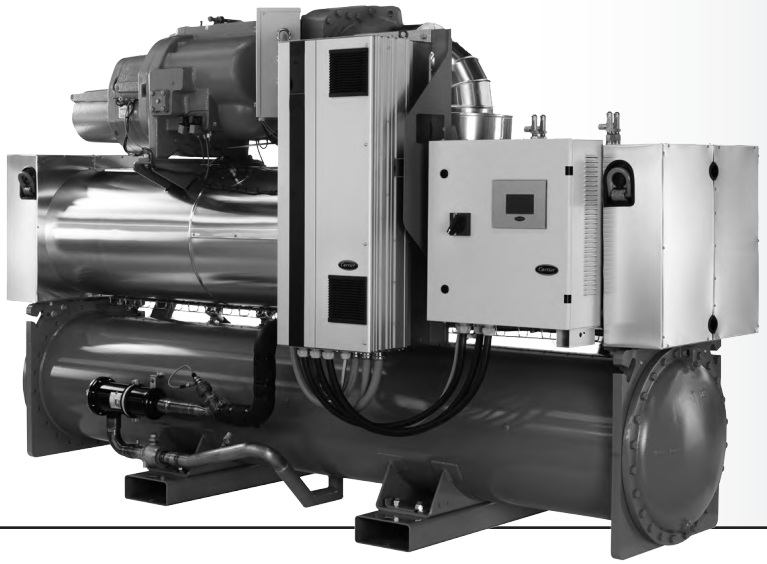
Carrier

United Technologies

TOUCHPILOT

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



Variable-Speed Water-Cooled Liquid Chillers/ Variable-Speed Water-to-Water Heat Pumps

30XW-V/30XWHV

Nominal cooling capacity: 587-1741 kW

Nominal heating capacity: 648-1932 kW

50 Hz

AQUAFORCE™

Original instructions

CONTENTS

This manual applies to the following two variable-speed 30XW unit types:

- 30XW-V Liquid chillers
- 30XWHV Heat pumps

For the operation of the control please refer to the Touch Pilot control manual.

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

1 - INTRODUCTION

30XW-V/30XWHV units are designed to cool or heat water for the air conditioning and heating of buildings and industrial procsses.

Prior to the initial start-up of the 30XW-V/30XWHV 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.

30XW-V/30XWHV units are designed for a very high level of safety during installation, start-up, operation and maintenance.

They are designed for an operating life of 15 years by assuming a 75% utilisation factor; that is approximately 100,000 operating hours.

They will provide safe and long-lasting service when operated within their application range.

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

Always ensure that all required safety measures are followed, including those in this document, such as: wearing protective clothing (gloves, ear defenders, safety glasses and shoes) using appropriate tools, employing qualified and skilled technicians (electricians, refrigeration engineers) and following local regulations.

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 and 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****	x	

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

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 the 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.

All refrigerant handling precautions must comply with local regulations.

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

These products incorporate equipment or components under pressure, manufactured by Carrier or other manufacturers. We recommend that you consult your appropriate national trade association or the owner of the equipment or components under pressure (declaration, re-qualification, retesting, etc.). The characteristics of this equipment/these components are given on the nameplate or in the required documentation, supplied with the products.

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 "9.6 - 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.

ATTENTION: The frequency variators used in the 30XW-V/30XWHV units are equipped with capacitor batteries with a discharge time of twenty (20) minutes after disconnecting the power.

After disconnecting the power to the control box, wait twenty minutes before openeing the control box.

Before any intervention, verify that there is no voltage present at any accessible conducting parts of the power circuit.

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.***
  Refrigerant type: R-134A.
  Global Warming Potential (GWP): 1430.

CAUTION:

1. ***Prevent the release of fluorinated gas from the unit. Ensure that fluorinated gas is never released to the atmosphere during installation, maintenance or disposal. If a leak of fluorinated gas is detected, ensure the leak is stopped and repaired as quickly as possible.***
2. ***Only a qualified service technician is allowed to access this product and to correct the fault.***
3. ***Any handling of fluorinated gas contained in this product (e.g. removing the charge or topping up the gas) must comply with the F-Gas Directive (EC) No. 842/2006 concerning certain fluorinated greenhouse gases and any other applicable local legislation.***
4. ***The gas recovery for recycling, regeneration or destruction is at customer charge.***
5. ***The deliberate gas release is strictly not allowed.***
6. ***Contact your local dealer or installer if you have any questions.***

- ***Carry out periodic leak tests. In the European Union, article 2 of regulation (EU) No.517/2014 makes these mandatory and sets their frequency. The table below shows this frequency, as originally published in the regulation. Check whether an inspection frequency is also set by other regulations or standards applicable to your system (e.g. EN 378, ISO 5149, etc.).***

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, the date and output of the leak test, the designation of the operator and its belonging company, etc.

Leak test periodicity:

System WITHOUT leakage detection		No check	12 months	6 months	3 months
System WITH leakage detection		No check	24 months	12 months	6 months
CO_2 equivalent/ circuit	tonnes	< 5	5 ≤ charge < 50	50 ≤ charge < 500	charge > 500
Refrigerant charge/circuit	kg of R134A	charge < 3.5	3.5 ≤ charge < 34.9	34.9 ≤ charge < 349.7	charge > 349.7

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

Protection device checks:

- ***If no national regulations exist, check the protection devices on site in accordance with standard EN378: once a year for the high-pressure switches, every five years for external relief valves.***
- ***The detailed description of the high-pressure switch test method is given in the service manual for the unit.***

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 set-points 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, pressure switches). 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 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 

Never use air or a gas containing oxygen during leak tests to purge lines or to pressurise a machine. Pressurised air mixtures or gases containing oxygen can be the cause of an explosion. Oxygen reacts violently with oil and grease.

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.

Only use dry nitrogen for leak tests, possibly with an appropriate tracer gas.

Do not unweld or flamecut the refrigerant lines or any refrigerant circuit component until all refrigerant (liquid and vapour) has been removed from unit. 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 and gloves. 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 condi-tioning 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: Use only refrigerant R-134a in accordance with standard 700 AHRI (Air Conditioning, Heating and Refrigeration Institute). Use of any other refrigerant can expose users and technicians working on the unit to unexpected risks.

Do not attempt to remove refrigerant circuit components or fittings, while the unit is under pressure or while it is running.

Be sure pressure is at 0 kPa and that the unit has been shut down and de-energised before removing components or opening a circuit. If the refrigerant circuit is open to carry out a repair, all circuit openings must be plugged, if the repair takes longer than 30 minutes. This prevents humidity from contaminating the circuit, especially the oil. If the work is expected to take longer, charge the circuit with nitrogen.

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. The name plate is attached to the outside right-hand side of the control box.
- 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 - if necessary by removing any thermal or sound insulation - 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 11 "Standard maintenance".

The machine must be installed in a place that is not accessible to the public or protected against access by non-authorised persons.

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.

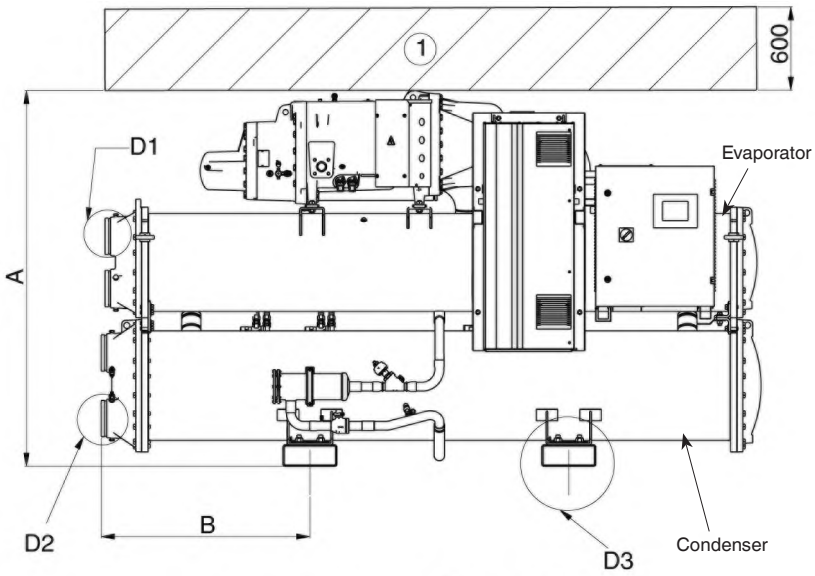
During the installation test national regulations must be followed. If the national regulation does not specify any details, refer to standard EN 378 as follows:

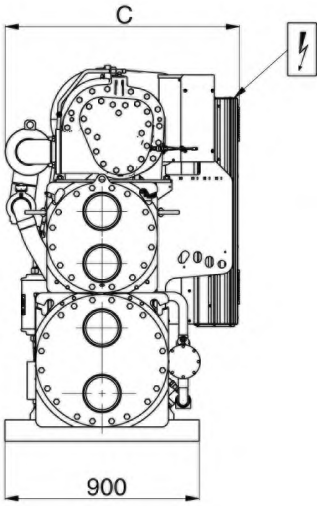
External visual installation checks:

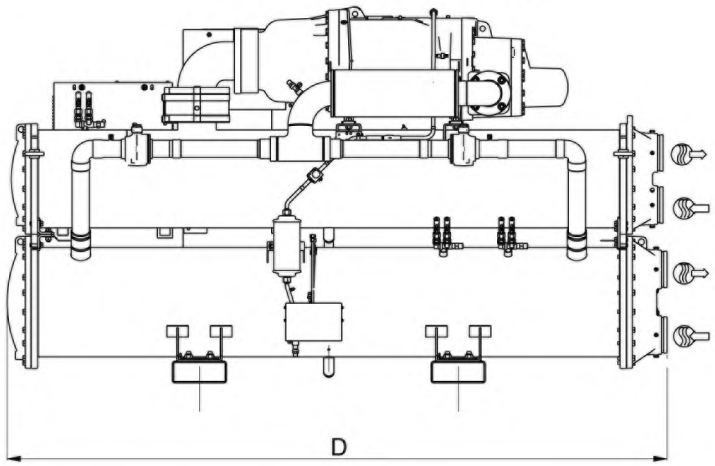
- Ensure that the machine is charged with refrigerant. Verify on the unit nameplate that the 'fluid being transported' is R-134a and is not nitrogen.
- Compare the complete installation with the refrigeration system and power circuit diagrams.
- Check that all components comply with the design specifications.
- 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.
- Check the condition of the insulation of the 400 V cables.

3 - DIMENSIONS, CLEARANCES

30XW-V/30XWHV 580-880







Dimensions in mm							
	A	B	C	D	E	F	G
30XW-V/30XWHV							
580	1743	968	1087	3059	168.3	168.3	2900
630	1743	968	1087	3059	168.3	168.3	2900
810	1950	1083	1237	3290	219.1	219.1	3100
880	1950	1083	1237	3290	219.1	219.1	3100

Legend:
All dimensions are given in mm.

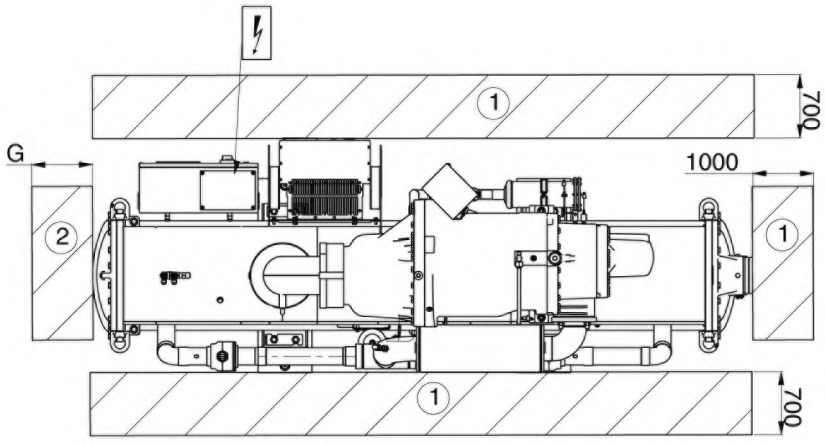
① Required clearances for maintenance

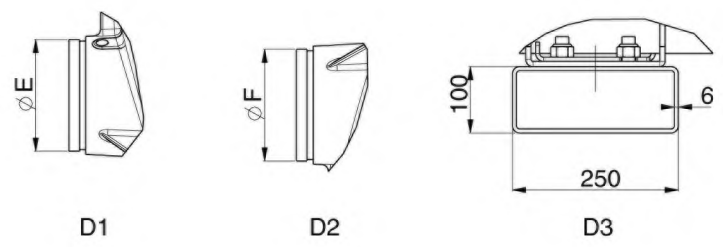
② Recommended space for tube removal

Water inlet

Water outlet

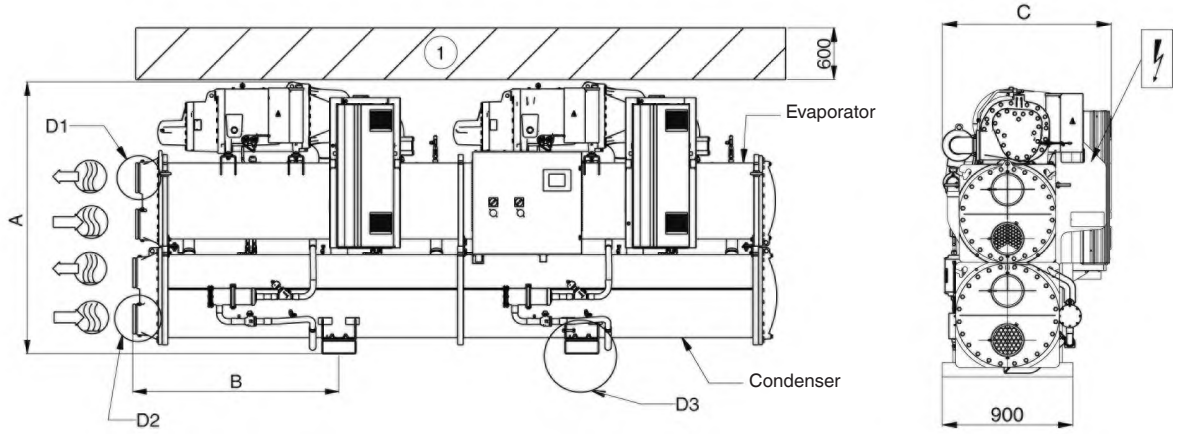
Power supply connection

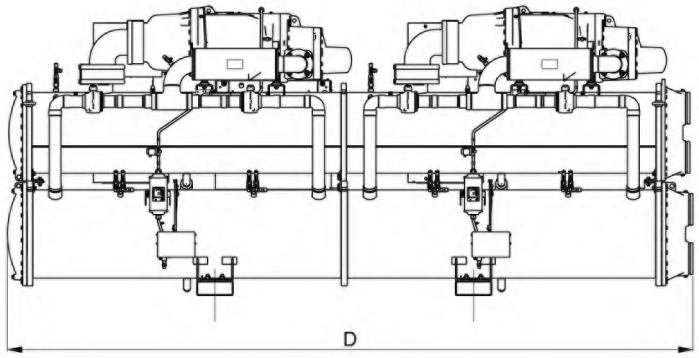


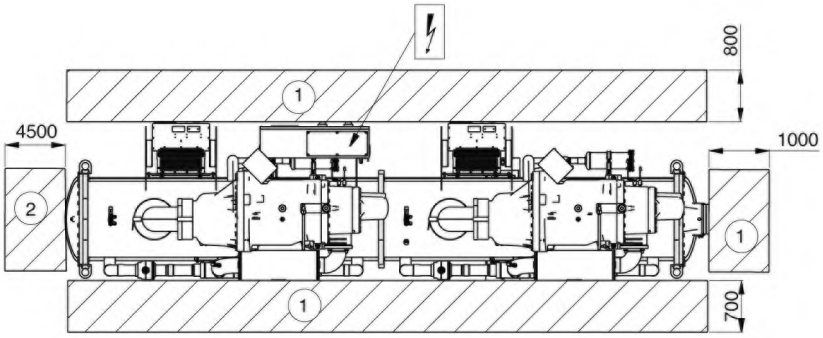


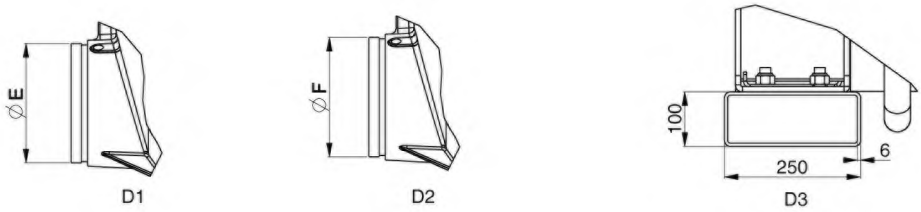
NOTES:

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









Legend:
All dimensions are given in mm.

(1) Required clearances for maintenance

(2) Recommended space for tube removal

Water inlet

Water outlet

Power supply connection

NOTES:

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

	Dimensions in mm					
	A	B	C	D	E	F
30XW-V/30XWHV						
1150	1997	1514	1164	4730	219.1	219.1
1280	1997	1514	1164	4730	219.1	219.1
1470	2051	1514	1255	4730	219.1	219.1
1570	2051	1514	1255	4730	219.1	219.1
1710	2051	1514	1255	4730	219.1	219.1

4 - PHYSICAL AND ELECTRICAL DATA

4.1 - Physical data

30XW-V/30XWHV		580	630	810	880	1150	1280	1470	1570	1710
Sound levels - standard units										
Sound power level*	dB(A)	105	105	105	105	106	106	106	106	106
Sound pressure level at 1 m**	dB(A)	87	87	87	87	87	87	87	87	87
Sound levels - standard unit + option 257* **										
Sound power level*	dB(A)	102	102	102	102	103	103	103	103	103
Sound pressure level at 1 m**	dB(A)	84	84	84	84	84	84	84	84	84
Dimensions - standard unit										
Length	mm	3059	3059	3290	3290	4730	4730	4730	4730	4730
Width	mm	1087	1087	1237	1237	1164	1164	1255	1255	1255
Height	mm	1743	1743	1950	1950	1997	1997	2051	2051	2051
Operating weight** **	kg	3152	3190	4157	4161	7322	7398	7574	7770	7808
Compressors		Semi-hermetic 06T screw compressor, 60 r/s								
Circuit A	-	1	1	1	1	1	1	1	1	1
Circuit B	-	-	-	-	-	1	1	1	1	1
Oil - standard unit		SW220 or RL220H								
Circuit A	l	32	32	36	36	32	32	36	36	36
Circuit B	l	-	-	-	-	32	32	32	36	36
Refrigerant - standard unit** **		R-134a								
Circuit A	kg	130	125	180	175	120	120	115	115	110
Circuit B		-	-	-	-	120	120	120	115	110
Global Warming Potential (GWP)										
Tonnes of CO_2 equivalent of greatest circuit	tonnes	186	186	257	250	172	172	172	164	157
Capacity control		Touch Pilot, inverter-driven compressor, electronic expansion valve (EXV)								
Minimum capacity	%	20	20	20	20	10	10	10	10	10
Evaporator		Multi-pipe flooded type								
Net water volume	l	106	106	154	154	297	297	297	297	297
Water connections (Victaulic)	in	6	6	8	8	8	8	8	8	8
Drain and vent connections (NPT)	in	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
Condenser		Multi-pipe flooded type								
Net water volume	l	112	112	165	165	340	340	340	340	340
Water connections (Victaulic)	in	6	6	8	8	8	8	8	8	8
Drain and vent connections (NPT)	in	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

* In dB ref=10^{-12} W, (A) weighting. Declared dual number 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.

** 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).

*** Option 257 = Low noise level.

**** Weight shown is guideline only. Please refer to the unit nameplate.

4.2 - Electrical data

30XW-V/30XWHV		580	630	810	880	1150	1280	1470	1570	1710
Power circuit										
Nominal power supply	V-ph-Hz	400-3-50								
Voltage range	V	360-440								
Control circuit		24 V via the built-in transformer								
Start-up current*	A	Negligible (lower than maximum current drawn)								
Maximum power factor**		0.91-0.93	0.91-0.93	0.91-0.93	0.91-0.93	0.91-0.93	0.91-0.93	0.91-0.93	0.91-0.93	0.91-0.93
Cosine phi		> 0.98	> 0.98	> 0.98	> 0.98	> 0.98	> 0.98	> 0.98	> 0.98	> 0.98
Harmonic distortion rate***	%	35-45	35-45	35-45	35-45	35-45	35-45	35-45	35-45	35-45
Maximum power input******										
Circuit A	kW	155	193	222	246	155	193	222	222	246
Circuit B	kW	-	-	-	-	155	193	193	222	246
With option 81	kW	-	-	-	-	310	386	415	444	492
Eurovent current draw†										
Circuit A	A	175	200	240	265	175	200	240	240	265
Circuit B	A	-	-	-	-	175	200	200	240	265
With option 81	A	-	-	-	-	350	400	440	480	530
Maximum current draw (Un)******										
Circuit A	A	245	300	346	383	245	300	346	346	383
Circuit B	A	-	-	-	-	245	300	300	346	383
With option 81	A	-	-	-	-	490	600	646	692	766
Maximum current draw (Un -10%)***										
Circuit A	A	270	330	380	421	270	330	380	380	421
Circuit B	A	-	-	-	-	270	330	330	380	421
With option 81	A	-	-	-	-	540	660	710	760	842
Maximum power input with option 150B******										
Circuit A	kW	141	173	199	221	141	173	199	199	221
Circuit B	kW	-	-	-	-	141	173	173	199	221
With option 81	kW	-	-	-	-	282	346	372	398	442
Maximum current draw (Un) with option 150B******										
Circuit A	A	222	272	314	348	222	272	314	314	348
Circuit B	A	-	-	-	-	222	272	272	314	348
With option 81	A	-	-	-	-	444	544	586	628	696
Dissipated power***	W	3000	4200	4700	5300	6000	8400	8900	9400	10600

* Instantaneous start-up current.

** May vary, based on the short-circuit current/max. current draw ratio of the system transformer. Values obtained at operation with maximum unit power input.

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

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

† Eurovent unit operating conditions: evaporator entering/leaving water temperature = 12°C/7°C, condenser entering/leaving water temperature = 30°C/35°C. Gross performances, not in accordance with EN14511-3:2013. These performances do not take into account the correction for the proportional heating capacity and power input generated by the water pump to overcome the internal pressure drop in the heat exchanger.

4.3 - Short-circuit stability current for all units

Short-circuit stability current for all units using the TN system (earthing system type): 50 kA (conditional system short-circuit current Icc/Icf at the unit connection point as rms value).

All units are equipped with a main disconnect switch located in the control box immediately downstream of the unit power connection point.

4.4 - Compressor electrical data

Compressor nominal voltage/frequency: 380V/60Hz

Compressor	I Nom (A)*	I Max (A)**	MHA (A)	LRDA (A)	Cosine phi nom.*	Cosine phi max.**
06TUX483	178	250	279	1537	0.88	0.92
06TUX554	205	315	340	1537	0.89	0.92
06TVX680	245	362	390	2179	0.89	0.92
06TVX753	260	400	430	2179	0.89	0.92

* Value at standard Eurovent conditions: evaporator entering/leaving water temperature 12°C/7°C, condenser entering/leaving water temperature 30°C/35°C.
** Value at maximum capacity and nominal voltage.

Legend
MHA - Maximum compressor operating current, limited by the unit (current given for maximum capacity at 342 V)
LRDA - Locked rotor current for delta connection

4.5 - Compressor usage

30XW-V/30XWHV	580	630	810	880	1150	1280	1470	1570	1710
06TUX483	A	-	-	-	AB	-	-	-	-
06TUX554	-	A	-	-	-	AB	B	-	-
06TVX680	-	-	A	-	-	-	A	AB	-
06TVX753	-	-	-	A	-	-	-	-	AB

Notes, electrical data and operating conditions - 30XW-V/30XWHV units

- The control box includes the following standard features:
  - One main disconnect switch per circuit
  - Anti-short cycle protection devices
  - Control devices
- **Field connections:**
  All connections to the system and the electrical installations must be in full accordance with all applicable codes.
- The Carrier 30XW-V/30XWHV 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*.
- Annex B of EN 60204 1 describes the electrical characteristics used for the operation of the machines. The ones described below apply to 30XW-V/30XWHV units and complement other information in this document:

1. Physical environment**: Environment as classified in EN 60721 (corresponds to IEC 60721):
   - indoor installation
   - ambient temperature range: minimum temperature +5°C to +42°C, class AA4
   - altitude: lower than or equal to 2000 m
   - presence of water: class AD2 (possibility of water droplets)
   - presence of hard solids, class 4S2 (no significant dust present)
   - presence of corrosive and polluting substances, class 4C2 (negligible)
2. Power supply frequency variation: ± 2 Hz.
3. The neutral (N) line must not be connected directly to the unit (if necessary use a transformer).
4. Overcurrent protection of the power supply conductors is not provided with the unit.
5. The factory installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947-3 (corresponds to IEC 60947-3).
6. The units are designed for connection to TN networks (IEC 60364). In IT networks the use of noise filters integrated into the frequency variator(s) make machine use unsuitable. In addition, the short-circuit holding current characteristics have been modified. Provide a local earth, consult competent local organisations to complete the electrical installation.
7. Electromagnetic environment: classification of the electromagnetic environment is described in standard EN 61800-3 (corresponds to IEC 61800-3):
   - Immunity to external interference defined by the second environment***
   - Interference emission as defined in category C3†

- Due to the harmonic currents the integrated frequency variator in the 30XW-V/30XWHV units is a source of interference. An analysis may be required to verify if these interferences exceed the compatibility limits of the other devices connected to the same power supply network. The compatibility levels inside an electrical installation, that must be met at the in-plant coupling point (IPC) to which other loads are connected are described in standard 61000-2-4.
  Two characteristics are required for this analysis:
- The short-circuit ratio (Rsce) of the installation calculated at the in-plant coupling point (IPC).
- The total harmonic current distortion rate (THDI), calculated for the machine at maximum capacity.
- Derived currents: If protection by monitoring the leakage currents is necessary to ensure the safety of the installation, the presence of derived currents introduced by the use of frequency variators in the unit must be considered. In particular the reinforced immunity protection types and a control value not lower than 150 mA are recommended to control differential protection devices.

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.

* 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 Machinery Directive.
** The required protection level for this class is IP21B or IPX1B (according to reference document IEC 60529). All 30XW-V/30XWHV have IP23 units fulfil this protection condition.
*** Example of installations of the second environment: industrial zones, technical locations supplied from a dedicated transformer.
† Category C3 is suitable for use in an industrial environment and is not designed for use in a public low-voltage system that supplies residential locations. As an option, conformity with category C2 permits this type of installation.

5 - ELECTRICAL CONNECTION

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

5.1 - Power supply

The power supply must conform to the specification on the unit nameplate. The supply voltage must be within the range specified in the electrical data table. For connection details refer to the wiring diagrams.

WARNING: Operation of the unit 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 supplier at once and ensure that the unit is not switched on until corrective measures have been taken.

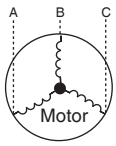
5.2 - Voltage phase imbalance (%)

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

Example:
On a 400 V - 3 ph - 50 Hz supply, the individual phase voltages were measured to be:
AB = 406 V; BC = 399 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.

5.3 - Power connection/disconnect switch

30XW-V/30XWHV 580-880 units have one connection point
30XW-V/30XWHV 1150-1710:
- Standard unit: two connection points
- Unit with option 81: one connection point.

5.4 - Recommended wire sections

Wire sizing is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guide-line, and does not make in any way liable. After wire sizing has been completed, using the certified dimensional drawing, the installer must ensure easy connection and define any modifications necessary on site. The connections provided as standard for the field-supplied power entry cables to the general disconnect/isolator switch are designed for the number and type of wires, listed in the second column of the table below.

The calculations for favourable and unfavourable cases are based on the maximum current for each unit (see electrical data tables). For the design the standardised installation methods in accordance with IEC 60364 are used: multiconductor PVC (70°C) or XLPE (90°C) insulated cables with copper core; arrangement to comply with table 52c of the above standard. The maximum temperature is 42°C. The given maximum length is calculated to limit the voltage drop to 5%.

5.5 - Power cable entry

The power cables can enter the control box from above the unit. A removable aluminium plate on the upper part of the control box face allows introduction of the cables. Refer to the certified dimensional drawing for the unit.

Minimum and maximum connectable wire sections

	Max. connectable wire section*	Calculation favourable case: Perforated horizontal conduit (standardised routing No. 13) - XLPE insulated cable			Calculation unfavourable case: Closed conduit (standardised routing No. 41) - PVC insulated cable, if possible		
30XW-V/30XWHV Circuit(s) A/B	**Section, mm² (per phase)**	**Section**, mm² (per phase)**	**Max. length, m**	**Cable type**	**Section**, mm² (per phase)**	**Max. length, m**	**Cable type*** **
Units without option							
580	2 x 240	1 x 120	250	XLPE	1 x 240	420	PVC
630	2 x 240	1 x 150	250	XLPE	2 x 150	450	PVC
810	2 x 240	1 x 185	250	XLPE	2 x 185	450	PVC
880	2 x 240	1 x 240	280	XLPE	2 x 240	480	PVC
1150	2 x 240/2 x 240	1 x 120/1 x 120	250/250	XLPE	2 x 150/2 x 150	520	PVC
1280	2 x 240/2 x 240	1 x 150/1 x 150	250/250	XLPE	2 x 185/2 x 185	510	PVC
1470	2 x 240/2 x 240	1 x 240/1 x 150	310/250	XLPE	2 x 240/2 x 185	520/510	PVC
1570	2 x 240/2 x 240	1 x 240/1 x 240	310/310	XLPE	2 x 240/2 x 240	530/530	PVC
1710	2 x 240/2 x 240	1 x 240/1 x 240	280/280	XLPE	2 x 185/2 x 185	400/400	XLPE
Units with option 81							
1150 to 1710	4 x 240	2 x 240	280	XLPE	4 x 185	320	XLPE

* Connection capacities actually available for each machine, defined according to the connection terminal size, the control box access opening size and the available space inside the control box.
** Selection simultation result considering the hypothesis indicated.
*** If the maximum calculated section is for an XLPE cable type, this means that a selection based on a PVC cable type can exceed the connection capacity actually available. Special attention must be given to the selection.
Note: The currents considered are given for a machine equipped with a hydronic kit operating at maximum current.

5.6 - 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 Touch Pilot control manual and the certified wiring diagram supplied with the unit for the field control wiring of the following features.

Available as standard:

- Remote on/off switch
- Demand limit external switch
- Remote dual set point
- Alarm and operation report
- Evaporator pump control signal
- Condenser pump control signal. **This does not control condenser pump operation (for this function add option 156 and flow switch).**
- Heating/cooling change-over

Available as an option:

- Water valve control
- Various interlocks and reports on the Energy Management Module board (option 156)
- Refrigerant leak detection

CCN bus connection

- The permanent connection to the system CCN bus is made at the terminal provided for this purpose inside the control box.
- The connection of the CCN service tool is possible at a socket under the control box, accessible from outside.

5.7 - 24 and 230 V power reserve for the user

Control circuit reserve:
After all required options have been connected, the TC transformer includes a power reserve of 1 A at 24 V a.c. that can be used for the field control wiring.

A second TCA transformer supplies the 230 V, 50 Hz circuit to charge a battery for a portable computer at 0.63 A maximum at 230 V. The connection is via an EEC 7/16 type socket (2 poles without earth) located on the inside front of the control box and accessible from outside.

Only devices with class II double insulation can be connected at this socket.

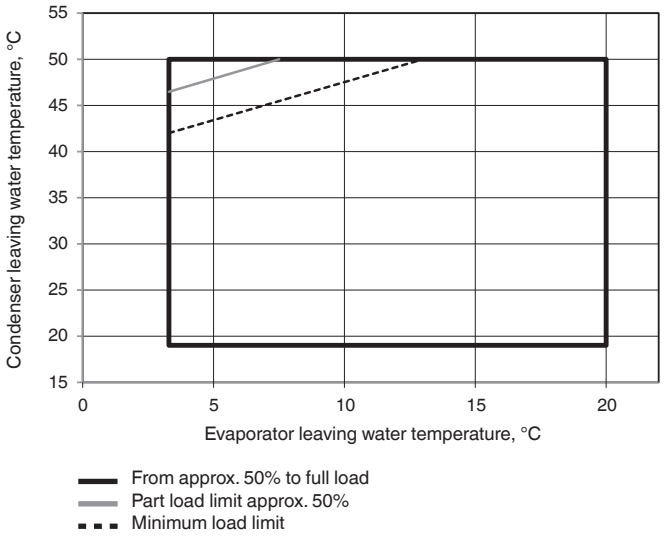
6 - APPLICATION DATA

6.1 - Operating limits

30XW-V/30XWHV	Minimum	Maximum
Evaporator		
Entering temperature at start-up	-	35.0°C
Leaving temperature during operation	3.3°C	20.0°C
Entering/leaving temperature difference at full load	2.8 K	11.1 K
Condenser		
Entering temperature at start-up	13.0°C*	-
Leaving temperature during operation	19.0°C*	50.0°C
Entering/leaving temperature difference at full load	2.8 K	11.1 K

* For lower condenser temperatures a water flow control valve must be used at the condenser (two or three-way valve). Please refer to option 152 to ensure the correct condensing temperature.

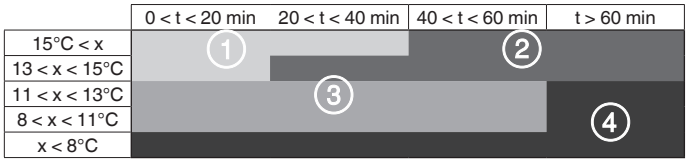
Note: Ambient temperatures: These units are dedicated for indoor environment. The external temperature at chiller start up should be at least 5°C. For such low ambient, option 152 is recommended. During storage and transport of the 30XW-V/30XWHV units (including by container) the minimum and maximum permissible temperatures are -20°C and 72°C (and 65°C for option 200).



For more precise details please refer to the unit selection program.

6.2 - Condenser-side installation recommendation

To ensure unit start-up at low condenser water temperature conditions, a specific installation may be necessary. Please refer to the table below:



x Condenser water temperature before start-up
t Time required to reach a temperature of 19°C at the condenser outlet

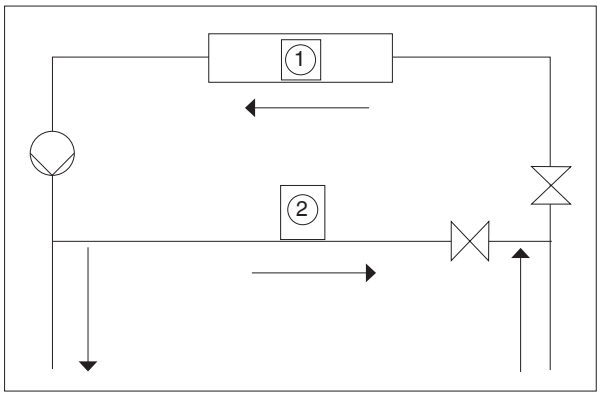
1 The unit can start without the use of a two- or three-way valve, but operation will be more reliable with the control valve.
2 The use of a two- or three-way valve is strongly recommended.
3 The use of a two- or three-way valve is compulsory.
4 The use of a two- or three-way valve is compulsory and the use of variable-speed pumps is strongly recommended.

6.3 - Minimum chilled water flow

The minimum chilled water flow is shown in the table in chapter 6.7 “Evaporator and condenser water flow rates”.

If the system flow is less than the minimum unit flow rate, the evaporator flow can be recirculated, as shown in the diagram.

For minimum chilled water flow rate



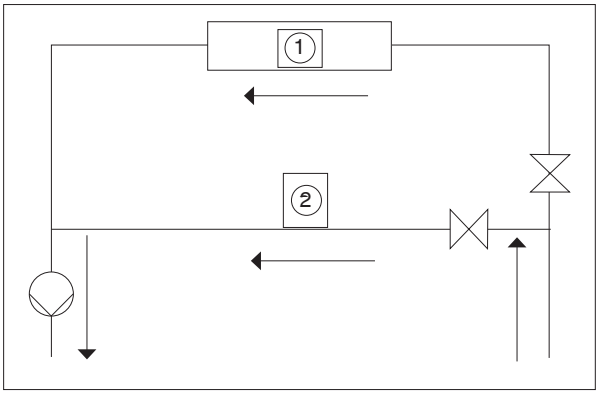
Legend
1. Evaporator
2. Recirculation

6.4 - Maximum chilled water flow

The maximum chilled water flow is limited by the permitted pressure drop in the evaporator. It is provided in the table in chapter 6.7 “Evaporator and condenser water flow rates”.

- Select the option with one water pass less that will allow a higher maximum water flow rate (see option 100C in the table in chapter 6.6 “Number of passes”.
- Bypass the evaporator as shown in the diagram to obtain a lower evaporator flow rate.

For maximum chilled water flow rate



Legend
1. Evaporator
2. Bypass

6.5 - Condenser water flow rate

The minimum and maximum condenser water flow rates are shown in the table in chapter 6.7 “Evaporator and condenser water flow rates”.

If the system flow is higher than the maximum unit flow rate, select the option with one pass less that will allow a higher maximum water flow rate. Please refer to option 102C in the table in chapter 6.6 “Number of passes”.

6.6 - Number of passes

30XW-V/30XWHV	580	630	810	880	1150	1280	1470	1570	1710
Evaporator									
Standard	2	2	2	2	2	2	2	2	2
Option 100C	1	1	1	1	1	1	1	1	1
Condenser									
Standard	2	2	2	2	2	2	2	2	2
Option 102C	1	1	1	1	1	1	1	1	1

6.7 - Evaporator and condenser water flow rates

These below values are given for standard units. For options 100C and 102C, please refer to the unit selection program.

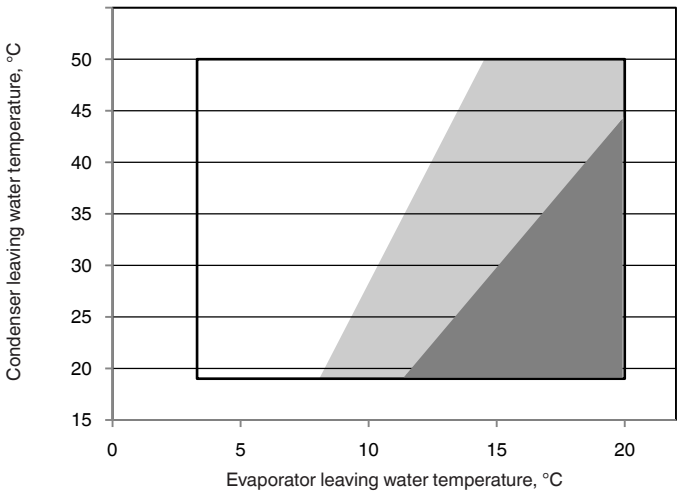
30XW-V/30XWHV	580	630	810	880	1150	1280	1470	1570	1710
Evaporator water flow rate, l/s									
Minimum	10	10	13	13	25	25	25	25	25
Maximum	54	54	76	76	170	170	170	170	170
Condenser water flow rate, l/s									
Minimum	6	6	8	8	15	15	15	15	15
Maximum	52	52	74	74	170	170	170	170	170

Notes
- Minimum evaporator flow rate based on a water velocity of 0,5 m/s.
- Minimum condenser flow rate based on a water velocity of 0,3 m/s.

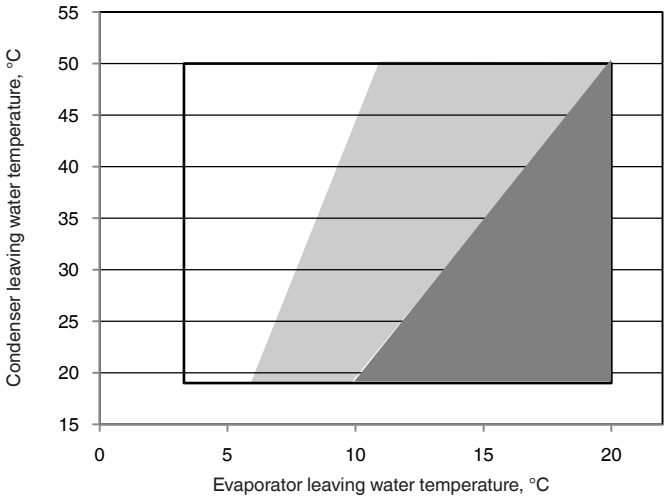
6.8 - Minimum temperature difference

The maximum flow rates recommended by Carrier limit unit operation with a ΔT (entering - leaving) of 3 K in the sections shown below:

30XW-V 1570



30XW-V 1710



Delta_T > 3 K at the condenser

Delta_T > 3 K at the evaporator and the condenser

To achieve a temperature difference of 3 K at the condenser, Carrier recommends the installation of option 102C.

To achieve a temperature difference of 3 K at the evaporator, Carrier recommends the installation of option 100C.

6.9 - Variable flow evaporator

Variable evaporator flow can be used. The controlled flow rate must be higher than the minimum flow given in the table of permissible flow rates and must not vary by more than 10% per minute.

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

6.10 - System minimum water volume

Whichever the system, the water loop minimum volume is given by the formula: Volume = Cap (kW) x N litres

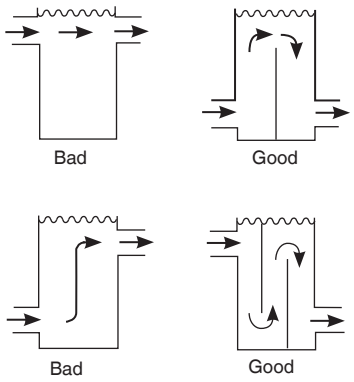
Application	N
Normal air conditioning	3.25
Process type cooling	6.5

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

This volume is necessary for stable operation.

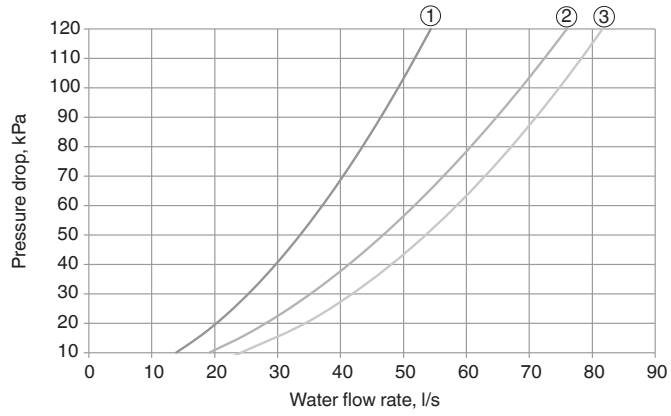
It is often necessary to add a buffer water tank to the circuit in order to achieve the required volume. The tank must itself be internally baffled in order to ensure proper mixing of the liquid (water or brine). Refer to the examples below.

Connection to a buffer tank

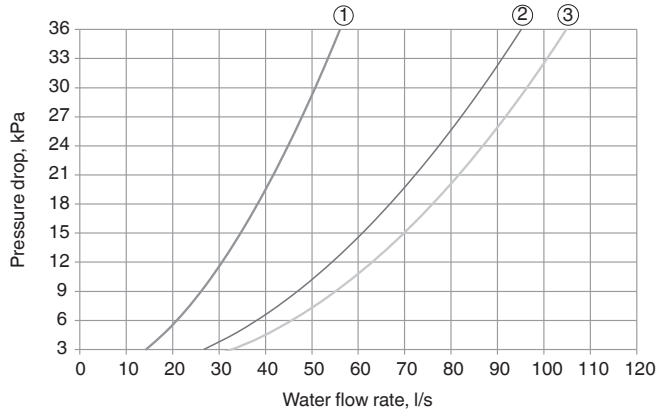


6.11 - Pressure drop curves

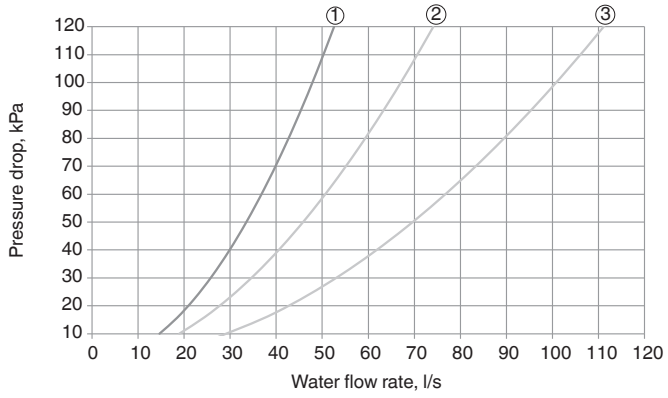
Units with two evaporator passes (standard)



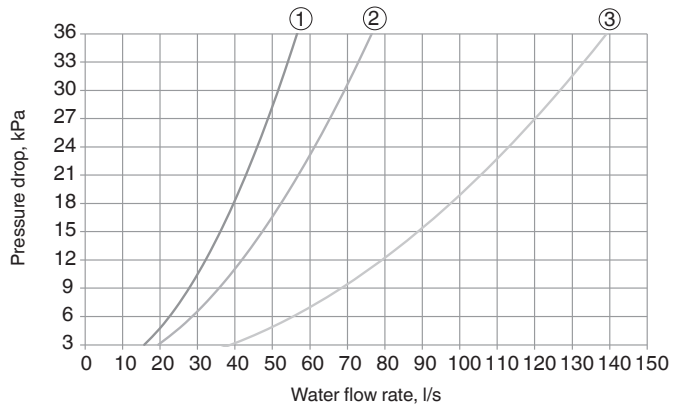
Units with one evaporator pass (option 100C)



Units with two condenser passes (standard)



Units with one condenser pass (option 102C)



1 Sizes 580, 630
2 Sizes 810, 880
3 Sizes 1150, 1280, 1470, 1570, 1710

7 - WATER CONNECTIONS

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

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

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

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

7.1 - Operating precautions

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

- Follow the water inlet and outlet connection direction shown on the unit.
- Install manual or automatic air purge valves at all high points in the circuit(s).
- Use a pressure reducer to maintain pressure in the circuit(s) and install a safety valve and 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.
- If 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.
- Before 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 start-up verify that the heat exchange fluid is compatible with the materials and water circuit coating.
- The use of different metals on hydraulic piping could generate eletrolytic pairs and consequently corrosion. It could be needed to add sacrificial anodes.

  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:

- 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.
- Cl^- Chloride ions are detrimental for copper with a risk of perforations by corrosion by puncture. If possible keep below 125 mg/l.
- SO_4^{2-} sulphate ions can cause perforating corrosion, if their content is above 30 mg/l.
- No fluoride ions (<0.1 mg/l).
- No Fe^{2+} and Fe^{3+} ions with non negligible levels of dis-solved oxygen must be present. Dissolved iron < 5 mg/l with dissolved oxygen < 5 mg/l.
- Dissolved silicon: silicon is an acid element of water and can also lead to corrosion risks. Content < 1 mg/l.
- 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 mg/l is desirable.
- Dissolved oxygen: Any sudden change in water oxy-genation conditions must be avoided. It is as detrimen-tal 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.
- Electric conductivity 10-600µS/cm.
- 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.

ATTENTION: Filling, completing and draining the water circuit charge must be done by qualified personnel, using the air purges and materials that are suitable for the products.

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

7.2 - Water connections

The water connections are Victaulic type connections. The inlet and outlet connection diameters are identical.

Inlet/outlet diameters

Evaporator 30XW-V/30XWHV		**580**	**630**	**810**	**880**	**1150**	**1280**	**1470**	**1570**	**1710**
Units without option 100C										
Connection	in	6	6	8	8	8	8	8	8	8
Outside diameter	mm	168.3	168.3	219.1	219.1	219.1	219.1	219.1	219.1	219.1
Units with option 100C										
Connection	in	6	6	8	8	8	8	8	8	8
Outside diameter	mm	168.3	168.3	219.1	219.1	219.1	219.1	219.1	219.1	219.1
Condenser 30XW-V/30XWHV		**580**	**630**	**810**	**880**	**1150**	**1280**	**1470**	**1570**	**1710**
Units without option 102C										
Connection	in	6	6	8	8	8	8	8	8	8
Outside diameter	mm	168.3	168.3	219.1	219.1	219.1	219.1	219.1	219.1	219.1
Units with option 102C										
Connection	in	8	8	8	8	8	8	8	8	8
Outside diameter	mm	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1

7.3 - Flow control

Evaporator flow switch and chilled water pump interlock

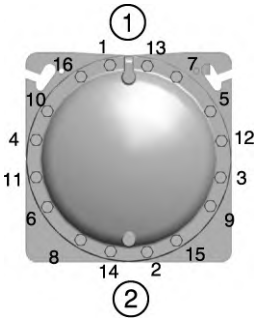
IMPORTANT: On 30XW-V/30XWHV units, the unit water flow switch must be energised. Failure to follow this instruction will void the Carrier guarantee.

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

7.4 - Evaporator and condenser 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 in the example 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
Sequence 4: 13 14 15 16

2 Tightening torque
Bolt size M16 - 171 - 210 Nm

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

7.5 - Operation of two units in master/slave mode

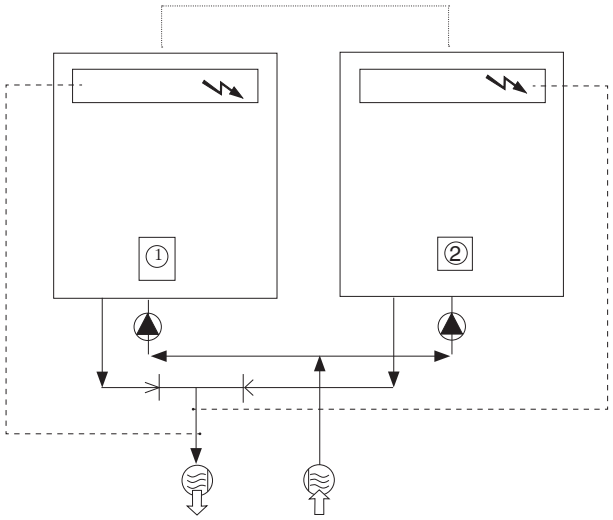
The control of a master/slave assembly is in the entering water and does not require any additional sensors (standard configuration). It can also be located in the leaving water. In this case two additional sensors must be added on the common piping.

All parameters, required for the master/slave function must be configured using the MST_SLV menu.

All remote controls of the master/slave assembly (start/stop, set point, load shedding etc.) are controlled by the unit con-figured 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 unit (in this case the valves are controlled using the dedicated water pump outputs). See the Touch Pilot Control IOM for a more detailed explanation.

30XW-V/30XWHV 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

8 - HEAT PUMPS 30XWHV

8.1 - Physical data for heat pumps

The physical data for 30XWHV for heat pumps are the same as for the 30XW-V units. Please refer to chapter 4.1.

8.2 - Electrical data for heat pumps

The electrical data for 30XWHV for heat pumps are the same as for the 30XW-V units. Please refer to chapter 4.2.

8.3 - Dimensions and clearances for heat pumps

The dimensions and clearances are the same as for the 30XW-V units. Please refer to chapter 3.

8.4 - Operating range for heat pumps

The operating limits are the same as for the 30XW-V units. Please refer to chapter 6.1.

8.5 - Operating modes for heat pumps

8.5.1 - Cooling mode

This operating mode is the same as that for 30XW-V units. The unit controls on the cooling setpoint.

8.5.2 - Heating mode

Unlike in the cooling mode, the unit uses the heating setpoint in this configuration. The evaporator leaving water control (lowest setpoint taken into consideration) is still maintained to prevent operation at very low temperatures.

9 - MAJOR SYSTEM COMPONENTS AND OPERATION DATA

9.1 - Compressors

- 30XW-V/30XWHV units use 06T geared twin-screw compressors equipped with a variable capacity slide valve and controlled by a speed variator.
- Compressor capacity control is ensured by successive use of speed variation (using a frequency variator) and swept volume variation at the screws (using the slide valve).
- The combination of these two control modes permits fine control of the unit capacity between 20% and 100%.
- The 06T compressor models used are: 06TUX483, 06TUX554, 06TVX680, 06TVX753

9.2 - Oil filter

The 06T screw compressor has an independent oil filter.

9.3 - Refrigerant

30XW-V/30XWHV units only use refrigerant R-134a.

9.4 - Lubricant

The 06T screw compressor is approved for use with lubricants:
- Castrol Icematic SW220 (Carrier specification PP47-32)
- Lubrizol Emkarate RL220H (Carrier specification PP47-13)

9.5 - Oil supply solenoid valve

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

9.6 - Pressure vessels

9.6.1 - General

Monitoring during operation, re-qualification, re-testing and re-testing dispensation:
- Follow the regulations on monitoring pressurised equipment.
- It is normally required that the user or operator sets up and maintains a monitoring and maintenance file.
- If no regulations exist or to complement regulations, follow the control programmes of EN 378.
- If they exist follow local professional recommendations.
- Regularly inspect the condition of the coating (paint) to detect blistering resulting from corrosion. To do this, check a non-insulated section of the container or the rust formation at the insulation joints.
- Regularly check for possible presence of impurities (e.g. silicon grains) in the heat exchange fluids. These maybe the cause of the wear or corrosion by puncture.
- Filter the heat exchange fluid check and carry out internal inspections as described in EN 378, annexe C.
- In case of re-testing please refer to the maximum operating pressure given on the unit nameplate.
- The reports of periodical checks by the user or operator must be included in the supervision and maintenance file.

9.6.2 - Repair

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

9.6.3 - Recycling

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

9.6.4 - Operating life

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

9.6.5 - Corrosion allowances:

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

9.6.6 - Evaporator
30XW-V/30XWHV units use a flooded multi-tube evaporator. The water circulates in the tubes and the refrigerant is on the outside in the shell. The tubes are 3/4" diameter copper with an enhanced surface inside and out. There is just one water circuit with two water passes (one pass with option 100C, please refer to chapter 6.6 "Number of passes").

The evaporator shell has a polyurethane foam thermal insulation and a water drain and purge.

It has been tested and stamped in accordance with the applicable pressure codes. The maximum standard relative operating pressure is 2100 kPa for the refrigerant-side and 1000 kPa for the water-side. These pressures can be different depending on the code applied. The water connection of the heat exchanger is a Victaulic connection.

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

9.6.7 - Condenser and oil separator
30XW-V/30XWHV units use a heat exchanger that is a combination condenser and oil separator. It is mounted below the evaporator. Discharge gas leaves the compressor and flows through an external muffler to the oil separator, which is the upper portion of the heat exchanger. 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. The tubes are 3/4" or 1" diameter internally and externally finned copper tubes.

There is just one water circuit with two water passes (one pass with option 102C, please refer to chapter 6.6 "Number of passes"). For the heat pumps the condenser shell can have a polyurethane foam thermal insulation (option 86) and a water drain and purge.

It has been tested and stamped in accordance with applicable pressure codes. The maximum standard relative operating pressure is 2100 kPa for the refrigerant-side and 1000 kPa for the water-side. These pressures can be different depending on the code applied. The water connection of the heat exchanger is a Victaulic connection.

9.7 - High-pressure safety switch

30XW-V/30XWHV units are equipped with high-pressure safety switches.

In accordance with the applicable code the high-pressure switches with manual reset, called PZH (former DBK), are backed up by high-pressure switches that require resetting with a tool. The high-pressure switches that require resetting with a tool are called PZHH (former SDBK).

If a PZHH cuts out, the corresponding PZH in the same compressor is faulty and must be replaced. The PZHH must be reset with a blunt tool with a diameter of less than 6 mm. Insert this tool into the opening on the pressure switch and push the reset button in this location.

These pressure switches are located at the discharge of each compressor. The pressure switch tap does not include a Schrader valve.

9.8 - Electronic expansion valve (EXV)

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

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

9.9 - Moisture indicator

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

9.10 - Filter drier

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

9.11 - Sensors

The units use thermistors to measure the temperature, and pressure transducers to control and regulate system operation (see Touch Pilot control manual for more details).

9.12 - Frequency variator

30XW-V/30XWHV units are equipped with a frequency variator that permits compressor capacity adjustment by varying the motor speed in the 30-60 Hz frequency range.

The compressor drive uses power supply waveform generation with variable frequency and voltage, generated by pulse width modulation (PWM).

Compressor start-up and stopping and the frequency setting for the operating range is only by RS485 communication in the LEN protocol via the Carrier controller.

One of the other frequency variator functions is to ensure the unit safety stop function using wired pressure switches at the digital drive inputs.

The safety stop function of the pressure switches acts on the IGBT bridge module and stops the variator output in accordance with standard EN ISO 13849-1, complying with the requirements of the pressure equipment directive (PED).

10 - OPTIONS

Options	No.	Description	Advantages	Use for 30XW-V range
Light-brine solution, down to -3°C	8	Implementation of new algorithms of control to allow chilled brine solution production down to -3°C when ethylene glycol is used (0°C with propylene glycol)	Matches with most application requirements for ground-sourced heat pumps and fits with many industrial processes requirements	580-1710 (see dedicated paragraph)
Master/slave operation	58	Unit equipped with supplementary water outlet temperature sensor kit to be field-installed allowing master/slave operation of two units connected in parallel	Optimised operation of two chillers connected in parallel with operating time equalisation	580-1710
Single power connection point	81	Unit power connection via one main supply connection	Quick and easy installation	1150-1710
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	580-1710
Evaporator dual pumps electrical 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	580-1710
Condenser pump electrical 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	580-1710
Condenser dual pumps electrical power / control circuit	84T	Unit equipped with an electrical power and control circuit for two pumps condenser side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	580-1710
Condenser insulation	86	Thermal condenser insulation	Minimizes thermal dispersions condenser side (key option for heat pump or heat recovery applications) and allows compliancy with special installation criteria (hot parts insulated)	580-1710
Service valve set	92	Liquid line valve (evaporator inlet) and compressor suction line valve	Allow isolation of various refrigerant circuit components for simplified service and maintenance	580-1710
Evaporator with one pass	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	580-1710
Condenser with one pass	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	580-1710
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)	580-1710
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)	580-1710
Reversed evaporator water connections	107	Evaporator with reversed water inlet/outlet	Easy installation on sites with specific requirements	580-1710
Reversed condenser water connections	107A	Condenser with reversed water inlet/outlet	Easy installation on sites with specific requirements	580-1710
JBus gateway	148B	Two-directional communications board, complies with JBus protocol	Connects the unit by communication bus to a building management system	580-1710
LON gateway	148D	Two-directional communication board complying with Lon Talk protocol	Connects the unit by communication bus to a building management system	580-1710
Bacnet over IP gateway	149	Two-directional high-speed communication using BACnet protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	580-1710
Condensing temperature limitation	150B	Limitation of the maximum condenser leaving water temperature to 45°C	Reduced maximum power input and current absorption: power cables and protection elements can therefore be downsized	580-1710
Control for low condensing 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	580-1710
Energy Management Module EMM	156	Control board with additional inputs/outputs. See Energy Management Module option chapter	Extended remote control capabilities (Set-point reset, ice storage end, demand limits, boiler on/off command...)	580-1710
Leak detection	159	0-10 V signal to report any refrigerant leakage in the unit directly on the controlller (the leak detector itself must be supplied by the customer)	Immediate customer notification of refrigerant losses to the atmosphere, allowing timely corrective actions	580-1710
Compliance with Swiss regulations	197	Additional tests on the water heat exchangers. Additional supply of PED documents, supplementary certificates and test certificates.	Conformance with Swiss regulations	580-1710
Low noise level	257	Evaporator piping sound insulation	3 dB(A) quiter than standard unit	580-1710
Welded evaporator water connection kit	266	Victaulic piping connections with welded joints.	Easy installation	580-1710
Welded condenser water connection kit	267	Victaulic piping connections with welded joints.	Easy installation	580-1710
Flanged evaporator water connection kit	268	Victaulic piping connections with flanged joints.	Easy installation	580-1710
Flanged condenser water connection kit	269	Victaulic piping connections with flanged joints.	Easy installation	580-1710
Thermal compressor insulation	271	The compressor is covered with a thermal insulation layer	Prevents air humidity to condensate on the compressor surface	580-1710
EMC classification C2, as per EN 61800-3	282	Additional RFI filters on the unit power line	Reduces electromagnetic interferences. Increase the variable frequency drive (VFD) immunity level according to first environment (so called, residential environment) requirements and allow its compliancy with emissions level required in category C2	580-1710
Fast Capacity Recovery	QM295	New software algorithms to allow quick restart and fast loading while preserving unit-reliability	Full capacity recovery in less than 5 minutes after power failure. Matches requirements of typical critical missions applications	580-1710
Carrier Connect link (BSS regions only)	298	3G router board NOTE 1: require option 149 NOTE 2: when more than one machine is installed on site, only one of them shall be equipped with option 298 while all of them must be equipped with option 149 NOTE 3: if a CARRIER-PSM is on site, option 298 shall be integrated in the PSM while option 149 is still mandatory for each single unit.	Enabler for Carrier Connect service offer	580-1710

11 - STANDARD MAINTENANCE

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 inter-ventions
- protection of the environment

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

11.1 - Level 1 maintenance

See note below.
Simple procedure can be carried out by the user:
- Visual inspection for oil traces (sign of a refrigerant leak)
- Air heat exchanger (condenser) cleaning - see chapter "Condenser coil - level 1"
- Check for removed protection devices, and badly closed doors/covers
- Check the unit alarm report when the unit does not work (see report in the Touch Pilot control manual).

General visual inspection for any signs of deterioration.

11.2 - Level 2 maintenance

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

In these cases, the following maintenance operations are recommended.

Carry out all level 1 operations, then:
- At least once a year tighten the power circuit electrical connections (see tightening torques table).
- Check and re-tighten all control/command connections, if required (see tightening torques table).
- Check the differential switches for correct operation every 6 months.
- Remove the dust and clean the interior of the control boxes, if required. Check the filter condition (if used).
- Check the presence and the condition of the electrical protection devices.
- Replace the fuses every 3 years or every 15000 hours (age-hardening).
- Replace the control box cooling fans (if used) every five years.
- Check the water connections.
- Purge the water circuit (see chapter 7 "Water connections").
- Clean the water filter (see chapter 7 "Water connections").
- Check the unit operating parameters and compare them with previous values.
- Keep and maintain a maintenance sheet, attached to each HVAC unit.

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

11.3 - Level 3 (or higher) maintenance

See note below.
The maintenance at this level requires specific skills/ approval/tools and know-how and only the manufacturer, his representative or authorised agent are permitted to carry out these operations. These maintenance operations concern for example:
- A major component replacement (compressor, evapo-rator)
- Any intervention on the refrigerant circuit (handling refrigerant)
- Changing of parameters set at the factory (application change)
- Removal or dismantling of the HVAC unit
- Any intervention due to a missed established maintenance operation
- Any intervention covered by the warranty.

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

11.4 - Tightening of the electrical connections

11.4.1 - Tightening torques for the main electrical connections

Screw type	Designation in the unit	Torque value, N·m
Customer connection		
Screw-nut M12 at phase decks	L1/L2/L3	50
Nut on earth terminal	PE	81
Downstream power connections in the control box		
Screw M10 at downstream main disconnect deck (QS10)*	L1/L2/L3	50
Earth terminal M10		50
Power connections in the variator	**GS-**	
M10 nut on the phase pin		19-40
M10 nut on the earth pin		19-40
Compressor phase connection terminals		
M12	1/2/3/4/5/6 on EC-	23
M16	1/2/3/4/5/6 on EC-	30
Compressor earth connection	Gnd on EC-	25
Control disconnect connections		
Upstream and downstream screws at terminals	QF	2

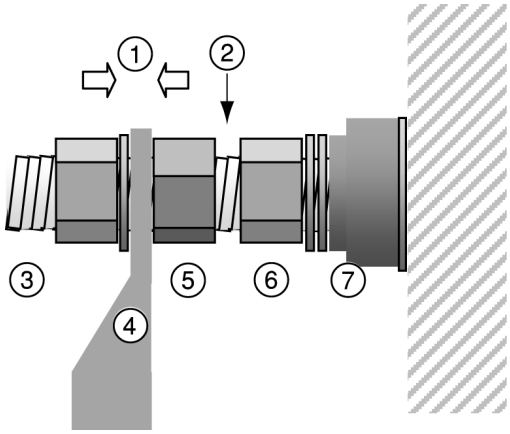
ATTENTION: The tightening of the connections at the compressor terminals requires special precautions. Please refer to the chapter below.

11.4.2 - Connection precautions for the compressor power terminals

These precautions must be applied during an intervention that requires the removal of the power conductors connected to the compressor supply terminals.

The tightening nut of terminal (6) supporting the isolator (7) must never be loosened, as ist ensures terminal tightness and compressor leak tightness.

The tightening of phase lug (4) must apply the torque between counter nut (5) and tightening nut (3): during this operation a counter-torque must be applied at counter nut (5). Counter-nut (5) must not be in contact with the tightening nut of terminal (6).



1. Torque application to tighten the lug
2. Avoid contact between the two nuts
3. Lug tightening nut
4. Flat lug
5. Counter-nut
6. Terminal tightening nut
7. Isolator

11.5 - Tightening torques for the main bolts and screws

Screw type	Used for	Torque value, N·m
M20 nut	Chassis	190
M20 nut	Heat exchanger side-side connection	240
M16 nut	Compressor fixing	190
H M16 screw	Heat exchanger water boxes, structure	190
H M16 screw	Compressor suction flanges	190
H M20 screw	Compressor suction flanges TU & TV	240
M16 nut	Compressor discharge line TU	190
M20 nut	Compressor discharge line TV	240
H M8 screw	Drier cover	35
1/8 NPT connection	Oil line	12
TE nut	Compressor oil line	24,5
7/8 ORFS nut	Oil line	130
5/8 ORFS nut	Oil line	65
3/8 ORFS nut	Oil line	26
H M6 screw	Stauff collar	10
Taptite screw M6	Oil line collar	7
Metric screw M6	Plate fixing, control box, terminal box	7
Taptite screw M10	Oil filter, control box fixing	30

ATTENTION: The tightening of the connections at the compressor terminals requires special precautions. Please refer to the chapter above.

11.6 - Evaporator and condenser maintenance

Check that:

- the insulating foam is intact and securely in place,
- the sensors and flow switch are correctly operating and correctly positioned in their support,
- the water-side connections are clean and show no sign of leakage.

11.7 - Compressor maintenance

11.7.1 - Oil filter change schedule

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

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

The pressure drop across the filter can be determined by measuring the pressure at the discharge port (at the oil separator) and the oil pressure port (at the compressor). 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.

11.7.2 - 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 and can even destroy it.

The reverse rotation protection scheme must be capable of determining the direction of rotation and stopping the compressor within one second. Reverse rotation is most likely to occur whenever the wiring at the compressor terminals has been modified.

To minimise the opportunity for reverse rotation, the following procedure must be applied. Rewire the power cables to the compressor terminals and/or the downstream variator connection decks as originally wired.

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

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

11.8 - Frequency variator maintenance

ATTENTION: Before any intervention at the frequency variator, ensure that the disconnect/isolator switch is open and that no voltage is present (reminder: the capacitor discharge time is approximately 20 minutes).

Only a well qualified person is allowed to replace or modify the components inside the frequency variator.

During periodic inspections, check the ventilation grilles at the frequency variator door; ensure that they are not pierced, damaged or obstructed.

Replace the fan, if a "replace fan" alert/warning is displayed in the alarm list.

For any other alarm or problem at the frequency variator, contact the Carrier service department.

The frequency variators in the 30XW-V/30XWHV units do not require a dielectric test, even if they are replaced parts: they are systematically checked before delivery. Otherwise the filtering components installed in the frequency variator can falsify the measurement and may even be damaged.

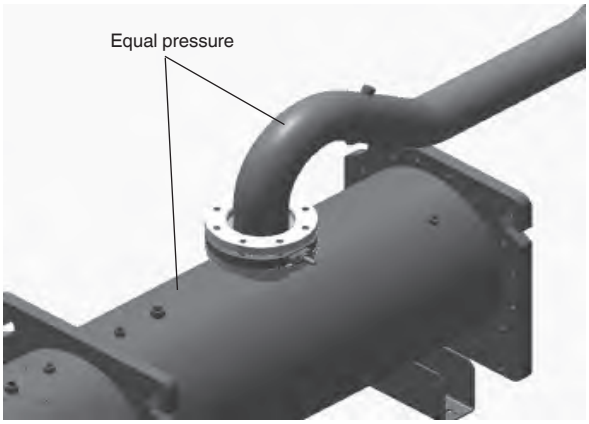
If it is necessary to test the insulation of a component (e.g. compressor, cables) the frequency variator must be disconnected at the power circuit.

11.9 - Service valve (option 92)

The unit can be equipped with optional service valves to facilitate maintenance and repair operations.

If option 92 is ordered, each refrigerant circuit will be supplied with shut-off valves on the compressor economiser, discharge and suction lines.

ATTENTION: The compressor suction valve must be used without pressure difference at the terminals. If there is a pressure difference, leak-tightness at the valve may be lost and the valve can even fail altogether.



12 - START-UP CHECKLIST FOR 30XW-V/30XWHV UNITS (USE FOR JOB FILE)

Preliminary information

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

Unit
Model: .....

Compressors
Circuit A
Model number .....
Serial number .....
Motor number .....

Circuit B
Model number .....
Serial number .....
Motor number .....

Frequency variator
Model number (circuit A/B) .....
Serial number (circuit A/B) .....

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

Condenser section
Model number .....
Serial number .....

Additional optional units and accessories .....
.....

Preliminary equipment check

Is there any shipping damage? ..... If so, where? .....
.....
Will this damage prevent unit start-up? .....

☐ Unit is level in its installation
☐ Power supply agrees with the unit nameplate
☐ Electrical circuit wiring has been sized and installed properly
☐ Unit ground wire has been connected
☐ Electrical circuit protection has been sized and installed properly
☐ All terminals are tight
☐ All chilled water valves are open
☐ All chilled water piping is connected properly
☐ All air has been vented from the chilled water circuit
☐ The unit is switched off again, after the pump test has been completed
☐ Chilled water pump (CWP) is operating with the correct rotation. Check the phase sequence of the electrical connection.
☐ Circulate chilled water in the water circuit for at least two hours, then remove, clean and replace the screen filter. The unit is switched off again, after the pump test has been completed.
☐ Inlet piping to cooler includes a 20 mesh strainer with a mesh size of 1.2 mm.
☐ Carry out a general visual inspection with particular attention to the ventilation grilles (that must not be pierced or obstructed) and ensure that the wiring is not damaged/cut.

Unit start-up

☐ Oil level is correct
☐ All discharge and liquid line valves are open
☐ Locate, repair and mark all refrigerant leaks
☐ All suction valves are open, if used
☐ All oil line valves and economizer valves (if used) are open
☐ Checks have been carried out for any possible leaks. Unit has been leak checked (including fittings)
  ☐ - on the whole unit
  ☐ - at all connections
    Locate, repair, and report any refrigerant leaks.....
    .....
    .....
☐ Check voltage imbalance: AB..... AC..... BC.....
  Average voltage = ... V
  Maximum deviation = ... V
  Voltage imbalance = ... %
☐ Voltage imbalance is less than 2%

WARNING: Operation of the unit 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 supplier at once and ensure that the unit is not switched on until corrective measures have been taken.

Check cooler water loop

☐ Water loop volume = ... litres
☐ Calculated volume = ... litres
☐ 3.25 litres/nominal kW capacity for air conditioning
☐ 6.5 litres/nominal kW capacity for process cooling
☐ Proper loop volume established
☐ Proper loop corrosion inhibitor included.....litres of.....
☐ Proper loop freeze protection included (if required) .....litres of.....
☐ Piping includes electric heater tape, if exposed to temperatures below 0°C
☐ 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 table (in product data literature) to determine total litres per second (l/s) and find unit's minimum flow rate.

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

WARNING: Once power is supplied to the unit, check for any alarms (refer to the Touch Pilot control manual for the alarm menu).

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

NOTE:
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.***

Notes:
.....

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Quality and Environment
Management Systems
Approval

Order No: 13474-76, 05.2015. - Supersedes order No: 13474-76, 05.2013.
Manufacturer reserves the right to change any product specifications without notice.

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