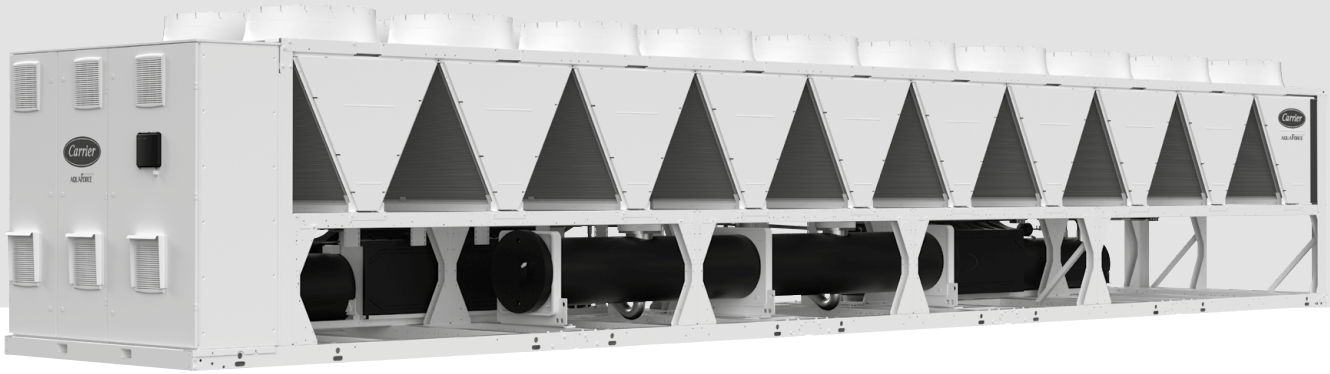
Carrier

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



Liquid chiller with variable speed screw compressor and Greenspeed® intelligence R-134a

30XBV-A 0500 - 1800

Nominal cooling capacity: 494 kW - 1800 kW

Original document

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1 - SYSTEM SAFETY CONSIDERATIONS

The units are designed to provide a very high level of safety and reliability.

The procedures in this manual are arranged in the sequence required for installation, start-up, operation, maintenance and disabling of the units.

Ensure that you follow them and that you take the required safety precautions, including those listed in this guide, which include:

- Wearing personal protective equipment (gloves, safety glasses, safety shoes).
- Having the appropriate tools.
- Employing qualified, skilled technicians (electricians, refrigeration system specialists).

Prior to the initial start-up of the units, everyone involved in the works should be thoroughly familiar with these instructions and with the characteristics of the installation site and ensure these are respected.

1.1 - Electrical safety considerations

ELECTRICAL RISK: 

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 have been isolated and locked out using the disconnect switch(es) on the power box.

WARNING: Even if the unit is stopped, the power circuit remains energized, unless the unit or circuit disconnect switch is open. Refer to the wiring diagram for further details. Follow the appropriate safety guidelines.

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 de-energized before resuming the work.

Variable Frequency Drives (VFD)

WARNING: The variable frequency drives (VFD) fitted to the units have circuit capacitors which take around 20 minutes to discharge after the power supply is disconnected. If the discharge circuit inside the capacitor fails, it is not possible to define the discharge time.

After disconnecting the power supply to the electrical box, wait around 20 minutes before accessing the electrical box or VFD. This value is a guide and may differ from one VFD to another: Refer to the information given on the VFD to find out the precise value.

An internal fault with a VFD can cause serious injury if the VFD has not been closed correctly: It is essential to ensure that all VFD covers are in place and correctly secured before switching on the power supply to the unit.

1.2 - Refrigerant safety considerations

We recommend that standard EN 378-3 Annex 3 is applied.

The refrigerant used in the units in this range is R134a.

1.2.1 - Refrigerant toxicity

Use safety goggles and safety gloves. Do not use your hands to check possible refrigerant leaks.

Vapor is heavier than air and reduces the amount of oxygen available for breathing. Ensure enough ventilation, as accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation or explosions.

These products cause eye and skin irritation. Decomposition products are hazardous. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death.

Avoid any contact with liquid refrigerant. 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.

Any accidental release of refrigerant, whether it is due to small leaks or significant discharges following the rupture of a pipe or an unexpected release from a relief valve, may cause any personnel exposed to experience heart palpitations, faintness, frostbite and burns. Do not ignore such injuries. Installers, owners and especially service engineers for these units must:

- Create a procedure to ensure medical attention is sought beforetreating any symptoms.
- Have access to a first-aid kit, especially for treating eye and skin injuries.

Refrigerant combustion

Refrigerant may be put in contact with flames (non exhaustive):

- During welding without respect to safety instructions to purge the circuit before any intervention.
- When the unit is subjected to fire due to a safety device preventing rupture due to over-pressure by releasing the refrigerant.

After the unit has been submitted to flames, the refrigerant may break down into toxic residues.

Do not clean refrigerant combustion by-products with water, the mixture is highly corrosive.

1.2.2 - Refrigerant & Oil charges transfer & storage

During refrigerant transfer and storage operations follow applicable regulation. The standard NF E29-795 describes the regulations permitting conditioning and recovery of halogenated hydrocarbons under optimum quality conditions for the products and optimum safety conditions for people, property, and the environment.

If any damage is caused to the equipment, the refrigerant must be changed in accordance with this standard, or an analysis of the fluid must be performed by a specialized laboratory.

All precautions concerning handling of refrigerant must be observed in accordance with local regulations.

Transfer service valves

Service valves are positioned on the liquid, suction and discharge lines and are available on all units for connection to the transfer unit.

The units must never be modified to add refrigerant and oil charging, removal and purging devices. These units have the required openings. Refer to the certified dimensional drawings.

Storage containers

Any refrigerant transfer and storage operations must be carried out using mobile containers.

It is dangerous and illegal to re-use disposable (nonreturnable) containers or attempt to refill them. When the cylinders are empty, evacuate the remaining gas pressure, fill out the relevant paperwork and hand them over to an approved recovery agency. **Do not incinerate.**

Refrigerant charge removal

Do not siphon refrigerant.

Traces of vapor should be displaced with dry nitrogen.

The compressors cannot transfer the whole refrigerant charge and can be damaged if used to pump-down.

The refrigerant charge should not be transferred to the high pressure side.

Refrigerant charge filling

Before filling the unit with refrigerant, check the type and quantity required on the unit nameplate.

Charging any refrigerant other than the original type will impair machine operation and can even cause irreparable damage to the compressors.

Do not top up the refrigerant charge.

Only charge the liquid refrigerant at the liquid line.

Oil charge filling

Before filling the unit with oil, check the type and quantity of oil required for a given size of the unit range in this document.

The compressors operating with this refrigerant type are lubricated with a synthetic polyol ester oil, which are completely incompatible with mineral oils.

OPERATING CHECKS:

- ***Important: This product contains R134a which is an HFC gas. HFC gases are part of fluorinated greenhouse gases covered by the Kyoto protocol (1997).***
- Type of fluid: Refer to the unit's nameplate.
- Global Warming Potential (GWP) following AR5: Refer to the table below.

WARNING:

1. ***Any interventions on this product's refrigerant circuit must be performed in accordance with applicable legislation. Within the European Union, this legislation notably includes regulation N° 517/2014, known as F-Gas.***
2. ***Ensure that the refrigerant is never released to the atmosphere during installation, maintenance, or equipment disposal.***
3. ***Deliberate refrigerant release into the atmosphere is not allowed.***
4. ***If a refrigerant leak is detected, ensure that the leak is stopped and repaired as soon as possible.***
5. ***Only certified, qualified personnel are permitted to install, service and perform leak tightness tests on the refrigerant, decommission the equipment and recover the refrigerant.***
6. ***The customer must ensure that any refrigerant recovered is recycled, regenerated, or destroyed.***
7. ***The customer is bound by the obligation to perform leak tightness tests, or have these performed, at regular intervals. Regulations within the European Union have set the following intervals:***

Refrigerant charge/ circuit (kg)	R134a (GWP = 1430)	Charge < 3,5 kg	3,5 ≤ charge < 34,9 kg	34,9 ≤ charge < 349,7 kg	Charge > 349,7 kg
CO_2 equivalent charge of the refrigerant charge / circuit		< 5 tons	5 ≤ charge < 50 tons	50 ≤ charge < 500 tons	Charge > 500 tons(1)
System WITHOUT leakage detection		No check	12 months	6 months	3 months
System WITH leakage detection		No check	24 months	12 months	6 months

(1) From 01/01/2017, units must be equipped with a leakage detection system.

8. ***For all equipment subject to regular leak tightness tests, the operator must keep a log used to record the following:***

- ***The quantities and types of fluids contained in the system (added and recovered).***
- ***The quantity of fluid recycled, regenerated, or destroyed.***
- ***The date and results of the leak tightness tests.***
- ***The details of the technician and of the company performing the work, etc.***

9. ***Contact your local dealer or installer if you have any questions.***

Information on operating inspections given in EN 378 standard can be used when similar criteria do not exist in the national regulation.

1.3 - Pressure equipment safety considerations

1.3.1 - Pressure Equipment regulations

These products include pressure equipment or components manufactured by the unit manufacturer or by other manufacturers. They comply with the European Pressure Equipment Directive.

The characteristics of this equipment/these components are given on the nameplate or in the required documentation, supplied with the products.

We recommend that you contact your professional body to find out which regulations affect you as the operator or owner of pressure equipment or components (declaration, re-qualification, re-testing).

Pressure Vessels

NOTE: Monitoring during operation, re-qualification, re-testing, exemption from retesting:

- Follow the regulations on monitoring pressure equipment.
- The user or operator is usually required to create and maintain a monitoring and maintenance log.
- In the absence of any regulations, or in addition to the regulations, follow the guidance in EN 378.
- Follow the local professional recommendations, whenever they exist.
- Regularly inspect the condition of the coating (paint) on the surface of the components to detect blistering resulting from corrosion. To do this check an uninsulated part of the pressure vessel or for rust drips at a joint in the insulation.
- Regularly check for the presence of any impurities (e.g. sand, grit) in the heat transfer fluids. These impurities can cause wear and/or pitting corrosion.
- Filter the heat-transfer fluid and carry out internal inspections as described in EN 378-2 Appendix C.
- In case of re-testing please refer to the maximum operating pressure given on the unit nameplate
- The reports of the periodical checks by the user or the operator must be included in the monitoring and maintenance log.

Corrosion build-up

Below thickness values are applicable on evaporator shell-and tube heat exchanger and on oil separator:

Refrigerant side: 0 mm

Heat-transfer medium side:

- 1 mm for tube sheets in lightly alloyed steels,
- 0 mm for stainless steel plates or plates with copper-nickel or stainless-steel protection.

Water-box: 1 mm

Parts painted: 0 mm

If any part of the piece (with 0mm of acceptable corrosion) shows corrosion, change the piece.

Overpressure protective devices classification and control

In accordance with the European Pressure Equipment Directive (PED) and national usage monitoring regulations in the European Union relating to design, the protective devices fitted to these machines are classified as follows:

	Safety device(1)	Over pressure protection in case of an external fire(2)
Refrigerant side		
High pressure switch	X	
External relief valve(3)		X
Rupture disk		X
Fuse plug		X
Heat transfert fluid side		
External relief valve	(4)	(4)

(1) Classified for protection in normal service situations.
(2) Classified for protection in abnormal service situations. These accessories are sized for fires with a thermal flow of 10kW/m². No combustible matter should be placed within 6.5m of the unit.
(3) The instantaneous overpressure limitation of 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.
(4) The selection of these relief valves must be made by the personnel responsible for completing the hydraulic installation.

WARNING:

- ***The refrigerant side external relief valves are not safety devices but accessories which limit damage in the event of a fire.***
- ***The safety device on the refrigerant side is the high-pressure safety loop.***

1.3.2 - Overpressure - Protective devices

NEVER COVER OR OBSTRUCT ANY PROTECTIVE DEVICE.

This applies to any fusible plugs, pressure switches, rupture disks and relief valves fitted on the refrigerant or heat transfer medium circuits.

Check that the protective devices are well installed and not covered or obstructed before operating the unit.

Check if the original protection plugs are still present at the relief valves outlets. These plugs are generally made of plastic and should not be there. If they are still present, please remove them.

Relief valves - Installation guidelines

Refer to the installation regulations, for example those of standard EN 378-3 and EN 13136.

Never remove relief valves, even if the fire risk is under control for a particular installation site. There is no guarantee that the relief valves will be re-installed if the unit installation site changes or if it is transported with its refrigerant charge.

If the units are installed in a closed space, each external relief valve must always be vented to outside via a discharge piping.

As the refrigerant can be diffused in the air, ensure that refrigerant is discharged away from building air intakes or that it is discharged into enough suitable absorbent material.

Relief valves – Drainpipes Installation guidelines

Fit devices at the relief valve or at its discharge piping outlet to prevent the penetration of:

- **Foreign bodies (dust, sand, building debris, etc.);**
- **Atmospheric agents (rainwater, air…).**

Indeed, water can form rust or ice and air can generate condensate within the frigorific circuit and lead to a degradation of the unit performances.

These devices, as well as the discharge piping, must :

- Not impair the operation of the relief valve
- Not lead to a pressure drop that is higher than 10% of the set pressure.
- Be installed in a way that ensures that people and property are not exposed to vented refrigerant.

Relief valves - Maintenance

Relief valves must be checked periodically.

Do not attempt to repair or recondition a valve if there has been any corrosion or build-up of foreign material (rust, dirt, scale, etc.) on the valve body or mechanism. In this case, it must be replaced.

Do not install relief valves in series or backwards.

Relief valves - Leaks

It is recommended to install an indicating device to check whether any refrigerant has leaked from the relief 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.

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

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 nuisance tripping or leaks, replace or re-calibrate the valve.

Option 194: Dual relief valves on a change-over valve

If the relief valves are installed on a change-over valve, this is equipped with a relief valve on each of the two outlets. Only one of the two relief valves is in operation, the other one is isolated.

Never leave the change-over valve in the intermediate position, i.e. with both ways open. Bring the actuator in abutment, front or back according to the outlet to isolate.

If a relief valve is removed for checking or replacement, ensure that there is still an active relief valve on each of the change-over valves installed in the unit.

Periodical checks of protective devices

- **External overpressure devices (external relief valves) must be replaced or checked to ensure that their settings and operation are correct at least every five years or in accordance with national regulations, at the earliest opportunity.**
- **The high pressure (SRMCR) safety loop must be tested at least once a year to check it is operating correctly; this must include the compressor shutdown and its activation and deactivation values.**

If the machine operates in a corrosive environment, inspect the protection devices more frequently.

High Pressure Switches - Maintenance

The company or organization that conducts a high pressure switch test must establish and implement detailed procedures for:

- Safety measures.
- Measuring equipment.
- Values and tolerances for cut-off and discharge devices.
- Test stages.
- Recommissioning of the equipment.

The manufacturer recommends contacting Carrier Service for this type of test. An example of the test procedure without removing the pressure switch is given in section “SYSTEM MAINTENANCE” of this manual.

WARNING: If the test results in the replacement of the pressure switch, it is necessary to recover the refrigerant charge. These pressure switches are not installed on Schrader type automatic valves.

1.3.3 - RISK OF EXPLOSION:

Oxygen reaction

Never use air or gases containing oxygen during leak tests, to purge pipework or to pressurize a unit. Only use dry inert gas (nitrogen for example) for leak tests, with an appropriate tracer gas if necessary.

Pressurized air mixtures or gases containing oxygen can cause an explosion. Oxygen reacts violently with oils and greases.

Failure to observe the above recommendations can have serious or even fatal consequences and damage installations.

Maximum pressure levels

Do not introduce significant static or dynamic pressure regarding the operating pressures either during operation or tests in the refrigerant circuits or in the heat exchange circuits.

Never exceed the specified maximum operating pressures.

Verify the maximum allowable high and low side test pressures by checking the pressures given on the unit nameplate.

Heating the refrigerant

Never apply an open flame or pressurized steam to a refrigerant container. Dangerous overpressure can result.

If it is necessary to heat the refrigerant, remove the insulation and only use a wet cloth.

If it is necessary to clean the unit, only use liquid water with a temperature < 70°C.

Never leave refrigerant in liquid form between two closed valves. Any change in temperature may cause the liquid to expand, rupturing the pipes of that part of the refrigerant circuit.

Standard units have a shut-off valve (ball valve) on the liquid line, located before the filter drier.

A refrigerant trap could be created at the unit shutdown between that closed valve and the expansion valve.

Units with option 92 have additionnal isolation valves on the refrigerant circuit. Refer to the unit PID for more information.

1.4 - Human interventions safety guidelines

Human interventions are made of (non exhaustive):

- Installation.
- Maintenance (regular).
- Repairs (when required).
- Dismantling...

1.4.1 - Intervention personnel & equipment requirements

Healthy requirements

To prevent any accident due to electromagnetic interference, it is recommended that personnel holding a pace maker do not service the equipment while it is in operation.

Qualifications requirements

Any person authorized to access the unit must be aware of the general and special safety precautions for the establishment and must also be qualified and trained in surveillance and maintenance.

Any person carrying out work concerning:

- Handling
- Electrical circuits & components
- Refrigerant circuits & components
- Welding / Brazing operations
- Manipulation of a shut-off valve (opening or closing)
- Fire extinguishing

Must:

- Have the relevant qualifications and certifications ;
- Have been specifically trained and warned on this equipment and system ;
- Be authorized to operate.

Personal Protective Equipment

It is compulsory to wear ear protection when working near the unit and the unit is in operation. Technicians or engineers working on the units must be equipped as follows:

Personal protective equipment (PPE)(1)	Operations		
	Handling	Maintenance, service	Welding or brazing(2)
Protective gloves, eye protection, safety shoe, protective clothing.	X	X	X
Ear protection.		X	X
Filtering respirator.			X

(1) We recommend compliance with the instructions in the EN 378-3 standard.
(2) Performed in the presence of A1 refrigerant according to EN 378-1.

The necessary protective equipment must be available.

Fire protection requirements

Appropriate fire extinguishers for the system and the refrigerant type used must be accessible and visible close to the unit installation area.

The personnel in charge of extinguishing a fire must be duly warned and issued with recommendations.

1.4.2 - Access to the unit and its components

Units Access

Access to the unit must be reserved to authorized personnel, qualified and trained in monitoring and maintenance.

The units are designed to be installed in a special location which must not be accessible to the public or must be protected against access by unauthorized persons.

The customer is responsible for installing the access restriction device (e.g. cut-off, enclosure).

Movements within or on the unit

WARNING: No part of the unit must be used as a walkway, rack, or support.

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 and a harness to work at higher level.

Hot / Cold surfaces

Some pipes (discharge and liquid lines) as well as the compressors discharge side can reach temperatures higher than 65°C. Do not touch those pipes without gloves. Risk of human injury by hot burn.

Some pipes (liquid and diphasic lines) as well as the compressors suction side can reach temperatures under 0°C. Do not touch those pipes without gloves. Risk of human injury by cold burn.

Propellers

When working close to the fans, particularly when removing the grilles, ensure that the power supply to the fans is switched off to ensure they cannot run.

Components Handling

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

1.4.3 - Interventions guidelines

Installation

Refer to section "SYSTEM INITIAL START-UP" for safety checks at unit receipt and before system start-up.

Refer to section "SYSTEM STRUCTURAL & ACOUSTICAL DATA" for safety instructions about handling and positionning of the unit.

Repair:

Repairs include (non exhaustive):

- Replacement of removable parts (including changing a wiring harness conductor).
- Modifications of permanent assemblies (welding, soldering, expansion of tubes, etc).

Any repair or modification:

- Must comply with local regulations and recommendations given in the current country safety standards for refrigerant systems and machines, such as: EN 378, ISO 5149, etc.
- Must be approved by the original manufacturer.
- Must be performed by qualified operators in accordance with qualified processes.
- Must be listed in the monitoring and maintenance log.
- Must use only original replacement parts for any component replacement. Consult the list of replacement parts that corresponds to the original equipment.
- Must never attempt to repair or modify a plate heat exchanger.

Maintenance

All installation parts must be maintained by the personnel in charge, in order to avoid material deterioration and injuries to people.

The manufacturer recommends the following template for the maintenance log (the table below is only given as a guide and does not engage the manufacturer's liability):

Intervention		Name of the commissionning engineer	Applicable national regulations	Verification organism
Date	Nature(1)			

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

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

To prevent any damage or accidents, the authorized technician must have the responsibility to repair any malfunctions or leaks immediately.

Each time repairs have been carried out to the unit, the operation of the protection devices must be re- checked.

Periodically check and repair or, if necessary, replace any component or piping that shows signs of damage.

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

Safety requirements during interventions

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

All welding operations and manipulation (opening or closing) of a shut-off valve must be carried out with the unit shutdown.

Do not forget to refit protective caps on service valves and air / water bleeds to prevent leaks.

Before removing components or opening a circuit (refrigerant or heat transfer medium), make sure that :

- The unit has been shut down ;
- The unit is fully de-energized ;
- The circuit pressure is 0 barg (gauge) ;
- The circuit was purged.

Fire intervention guidelines

In case the unit is submitted to a fire, stay away from the unit.

After the unit has been submitted to flames, material may have been seriously damaged by the heat.

Do not restart the unit immediatly. Restart may only be possible after detailed verification by a competent personnel in order to ensure that the unit has not suffered any damage.

Unit's end of life guidelines

Refer to section "SYSTEM FINAL SHUTDOWN" for safety checks at unit end of life.

Hydraulic circuit interventions

Do not drain the heat transfer medium circuits without informing the installation technical department or other competent body first.

Close the shut-off valves on the water inlet and outlet and drain the unit's hydraulic circuit before working on the components installed on the hydraulic circuit (screen filter, pump, water flow sensor, etc.).

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

The pressure sensors on hydraulic circuits are assembled on connections without Schrader ports. Depressurize and drain the system before any work.

Refrigerant circuit interventions

If a leak occurs or if the refrigerant becomes contaminated (e.g. by a short-circuit in a motor), and before any intervention, remove the complete unit charge. Then, detect and repair the leak or the cause for contamination.

Before any operation on the refrigeration circuit, it is necessary to remove the complete refrigerant charge from the unit.

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

Refrigerant circuit opening

If a refrigerant circuit is opened, it must be evacuated, recharged, and tested for leaks.

Before opening a refrigerant circuit, drain and consult the pressure indicators.

If the refrigerant circuit remains open during an intervention:

- If the duration is less than 1 day: seal the openings
- If the duration is more than 1 day: charge the circuit with a dry, inert gas (nitrogen).

The objective is to prevent penetration of atmospheric humidity and the resulting contamination of the circuit (especially the oil) as well as the corrosion of the unprotected internal steel walls.

Refrigerant circuit brazing

Refrigerant in contact with an open flame produces toxic gases. Do not unweld the refrigerant pipework or any refrigerant circuit component or cut these with a torch until all refrigerant (liquid and vapor) as well as the oil have been removed from the unit.

2 - INTRODUCTION

2.1 - 30XBV-A family range

30XBV-A family consists of 12 units sizes.

10 units consist of one single piece (single units):

- 30XBV-A 0500
- 30XBV-A 0600
- 30XBV-A 0700
- 30XBV-A 0800
- 30XBV-A 0900
- 30XBV-A 1000
- 30XBV-A 1100
- 30XBV-A 1200
- 30XBV-A 1300
- 30XBV-A 1450

2 units consist of two pieces (duplex units):

- 30XBV-A 1600
- 30XBV-A 1800

For each unit consisting of two pieces, one piece is called “module 1” and the other piece is called “module 2". Modules 1 and 2 are composed of two refrigeration circuits called "circuit A" and "circuit B".

Please refer to section "Dimensions & Clearances Drawings" to identify the module 1 and 2 for each duplex unit.

2.2 - Units Utilization

Application Range

The units are intended to cool water for building air conditioning or for industrial processes.

They will provide safe and reliable service if used within their application ranges.

The units are intended to be stored and operated in an environment where the ambient temperature must:

- Not be lower than the minimum allowable temperature indicated on the nameplate.
- Not be higher than the maximum allowable temperature indicated on the nameplate.

Units Compliance to applicable directives

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

Lifetime

The units are designed for a theoretical operating life of 15 years, based on load profiles defined within the applicable EcoDesign regulations.

Beyond this period, the manufacturer recommends proceeding to a periodical qualification of the refrigerating circuit following national applicable regulations. It must be conducted by an operator qualified for the control of pressure equipment.

It is recommended to repeat this check every 5 years. This control does not replace the requirements of applicable national regulations.

2.3 - Units Storage

It is mandatory to observe some precautions for storage of the units:

- Do not remove the protection.
- Protect the unit from dust and bad weather.
- Regularly check that no snow has accumulated on the coil.

3 - STRUCTURAL & ACOUSTICAL DESCRIPTION

3.1 - Handling & Positioning

3.1.1 - Handling

Safety can only be guaranteed if the following instructions are carefully followed. Failure to do so may result in damage to the equipment and physical injury.

It is strongly recommended that a specialized company is employed to unload the machine.

Do not remove the skid or the packaging until the unit is in its final position.

Forklift truck

The units can be safely moved with a forklift truck with the correct capacity for the dimensions and weight of the unit.

The forks must be positioned only in the location and direction shown on the units (forks labels on the chassis).

Unit Slinging

The units can be slinged with slings or lifting beams with the correct capacity for the dimensions and weight of the unit.

WARNING : Only attach slings to the dedicated slinging points.

Slinging points are designated via labels on the chassis and mentioned on the certified dimensionnal drawings supplied for the unit.

Unit Lifting

WARNING: Never apply pressure or leverage to any of the unit's panels or uprights. Only the base of the unit frame is designed to withstand such stresses.

No force or effort must be applied to pressurized parts, especially via pipes connected to the water heat exchanger.

Any inappropriate handling can lead to uncontrolled fluid leaks.

CAUTION: Before lifting the unit, check that all casing panels and grilles are securely fixed in place.

It is advisable to protect coils against crushing while a unit is being moved. Use struts or a lifting beam to spread the slings above the unit.

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

Do not tilt a unit more than 15°.

Stuffing / Unstuffing from container

Unstuffing from container must be done slowly, with appropriate truck, and by using a ramp. Manufacturer will not be responsible of bad manipulation while unstuffing.

Duplex Unit Handling

If the unit consists of two modules, they will be handled separately but will operate together. Before any handling of each module, hydraulic connections between module 1 and 2 have to be disconnected.

Refer to the unit PID for more information about the hydraulic piping to dismantle.

Option 331 : Delivery with plastic tarp cover

Do not throw away lifting instructions present on the tarpaulin.

3.1.2 - Positioning

Regulations about frigorific units positionning

Refer to ISO-5149 and EN-378.

The units are classified as "indirect heat exchange systems" (class C occupancy level) in accordance with these standards. This level must be confirmed by the customer.

No charge limitation applies to class C occupancy level for R-134a.

The units are not intended to operate in an ATEX area.

Units Access

Ensure the free space shown in the dimensional drawings is respected to enable easy access for :

- Installation operations (electric and hydraulic connections...).
- Maintenance operations (access to components...).
- Air circulation.

The units must be located at least 6 m from the nearest entrance to the building.

Units Structural Support

Refer to the certified dimensional drawings for :

- The center of gravity coordinates.
- The position of the unit mounting holes.
- The weight distribution points.

Before refitting the unit, check that:

- The chosen location can support the weight of the unit, or that appropriate reinforcement measures have been taken.
- The unit is installed level on an even surface (maximum tolerance is 5 mm along both axes).
- The number of support points is adequate and that they are in the right places.
- If the support structure is sensitive to vibration and/or noise transmission, it is advisable to insert anti-vibration mounts (elastomer mounts or metal springs) between the unit and the structure.

Their number and position must comply with the indications given on the certified dimensional drawing.

Selection of these devices is based on the system characteristics and the comfort level required and should be made by technical specialists.

Protection against climatic events

- Snow :

  Avoid installing the unit in a location where snow is likely to accumulate.

  In areas subject to long periods of sub-zero temperatures, the unit should be raised.

- Wind :

  Baffles may be necessary to deflect strong winds. However, they must not restrict air flow into the unit.

Protection against abnormal events

- Fire :

  Appropriate fire extinguishers for the system and the refrigerant type used must be accessible and visible close to the unit installation area.

- Flood :

  Check that the location is not subject to flooding.

- Earthquakes :

  The typical applications of these units are cooling and heating, which do not require earthquake resistance.

  Earthquake resistance has not been verified.

3.1.2.1 - Underneath a roof

The unit must be preferably installed outdoors (open space). If the unit is installed indoor, it must be in a room where air is able to circulate freely.

The volume of air supplied to the condenser coils must not be restricted to ensure the operation of the unit is not adversely affected.

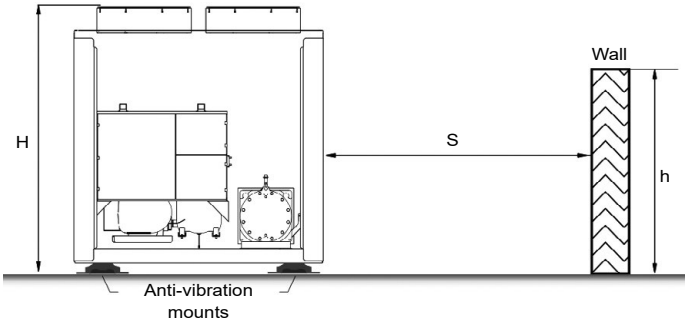
The upper part of the machine (on top of the fans) must not be covered.

If the floor space requires the machine to be partially covered, please contact Carrier Service to assess the various installation options.

3.1.2.2 - Proximity to walls

To guarantee correct operation in most cases:

- If h < H (2.3 m), minimum S = 3 m.
- If h > H or S < 3 m, contact your Carrier distributor to assess the various installation options. An accessory (available for sale as a spare part) can be added to the unit in certain situations.



3.1.2.3 - Installation of multiple chillers

It is recommended that multiple chillers are installed in a single row, arranged as shown in the example below, to avoid warm air being recycled from one unit to another.

If the floor space does not allow this arrangement, contact your Carrier distributor to assess the various installation options.

3.2 - Structural & Acoustical System

3.2.1 - Units Physical Data

30XBV-A Single Units		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Dimensions											
Length	mm | in	5591 | 220	5591 | 220	6785 | 267	7979 | 314	7979 | 314	9175 | 361	10369 | 408	10363 | 408	11561 | 455	12755 | 502
Width	mm | in	2258 | 89	2258 | 89	2258 | 89	2258 | 89	2258 | 89	2258 | 89	2258 | 89	2258 | 89	2258 | 89	2258 | 89
Height	mm | in	2325 | 92	2325 | 92	2325 | 92	2325 | 92	2325 | 92	2325 | 92	2325 | 92	2325 | 92	2325 | 92	2325 | 92
Weights											
Operating weight(1)	kg | lb	4890 | 10781	4929 | 10867	5268 | 11614	6108 | 13466	6204 | 13677	7000 | 15432	7385 | 16281	7826 | 17253	8141 | 17948	9039 | 19928
Sound levels											
Sound Power(2)	dB(A)	95,0	98,5	100,0	102,5	100,5	104,0	102,0	104,0	103,0	104,0
Sound Pressure at 10 m(3)	dB(A)	62,5	66,0	67,5	69,5	68,0	71,0	69,0	71,0	70,0	71,0
Chassis Paint Color		Color code RAL 7035									

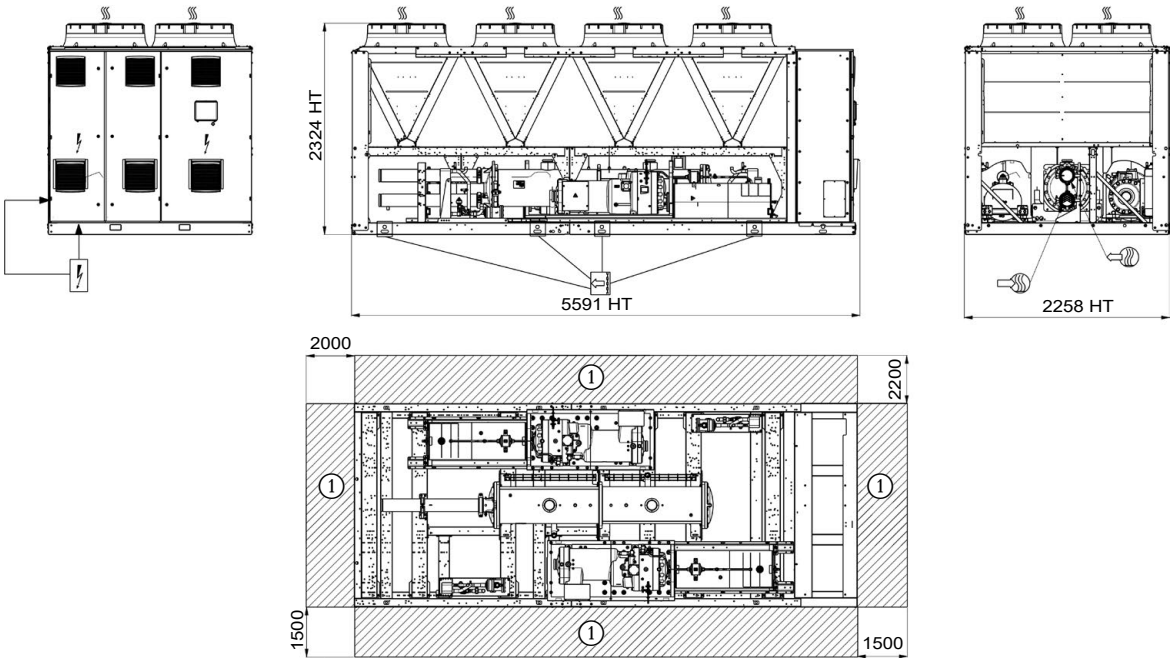
30XBV-A Duplex Units		1600_1	1600_2	1800_1	1800_2
Dimensions					
Length	mm | in	7979 | 314	7979 | 314	7979 | 314	7979 | 314
Length - Module 1 + Module 2	mm | in	15958 | 628		15958 | 628	
Width	mm | in	2258 | 89	2258 | 89	2258 | 89	2258 | 89
Height	mm | in	2325 | 92	2325 | 92	2325 | 92	2325 | 92
Weights					
Operating weight(1)	kg | lb	6110 | 13470	6113 | 13477	6119 | 13490	6119 | 13490
Sound levels					
Sound Power(2)	dB(A)	102,0	102,0	103,5	103,5
Sound Pressure at 10 m(3)	dB(A)	68,5	68,5	70,5	70,5
Chassis Paint Color		Color code RAL 7035			

(1) Values are guidelines only. Refer to the unit name plate.
(2) In dB ref =10^{-12} W, 'A' weighted. Declared noise emission value dissociated in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). Measurement following ISO 9614-1 and certified by Eurovent.
(3) In dB ref =20 µPa, 'A' weighted. Declared noise emission value in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). For information, calculated from the sound power Lw(A).

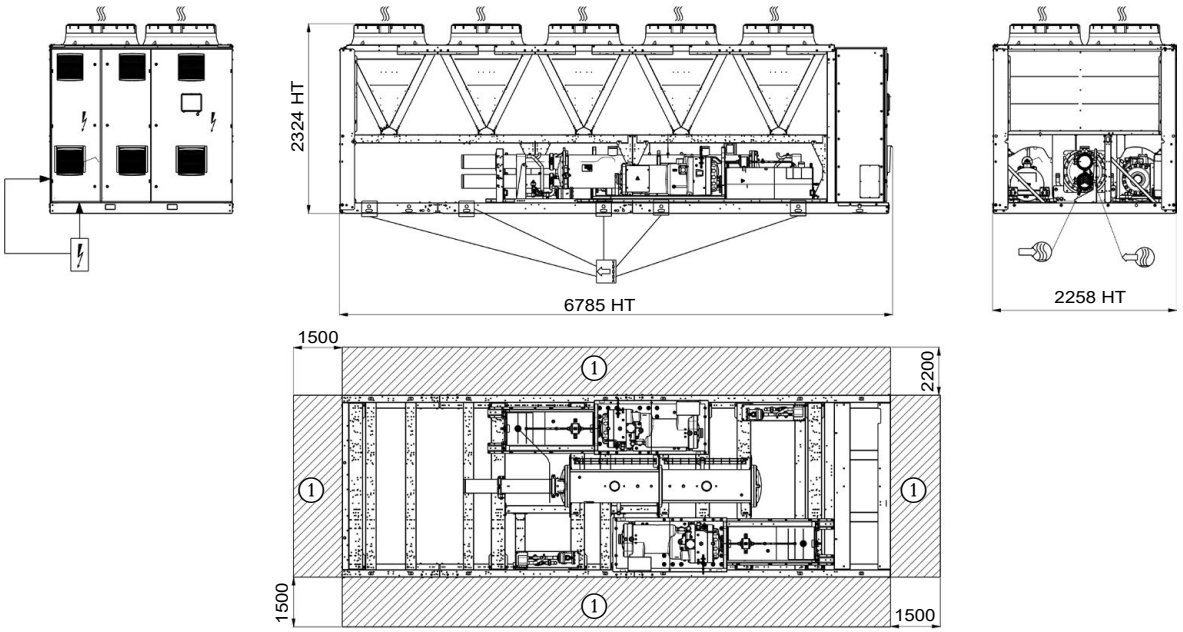
3.3 - Dimensions & Clearances Drawings

3.3.1 - Single Module Units

3.3.1.1 - 30XBV-A 0500/0600



3.3.1.2 - 30XBV-A 0700



Legend

All dimensions are given in mm,

① Cooler water inlet and outlet

Inlet water

Outlet water

Air outlet, do not obstruct

Electrical supply entry

NOTES:

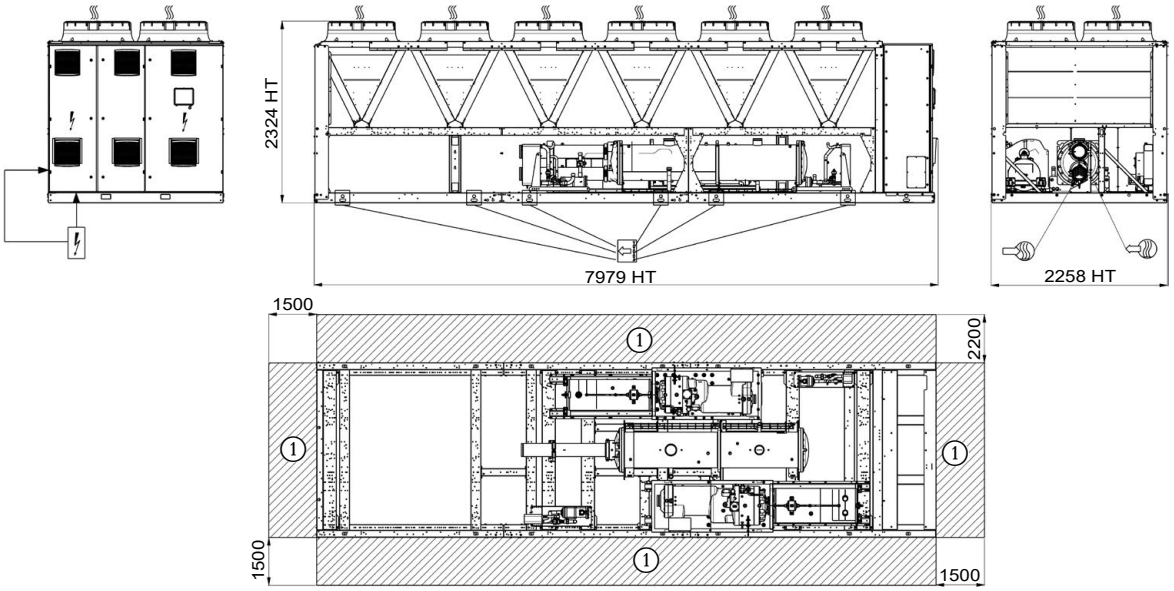
Drawings are not contractually binding.

Before designing an installation, consult the certified dimensional drawings, available on request.

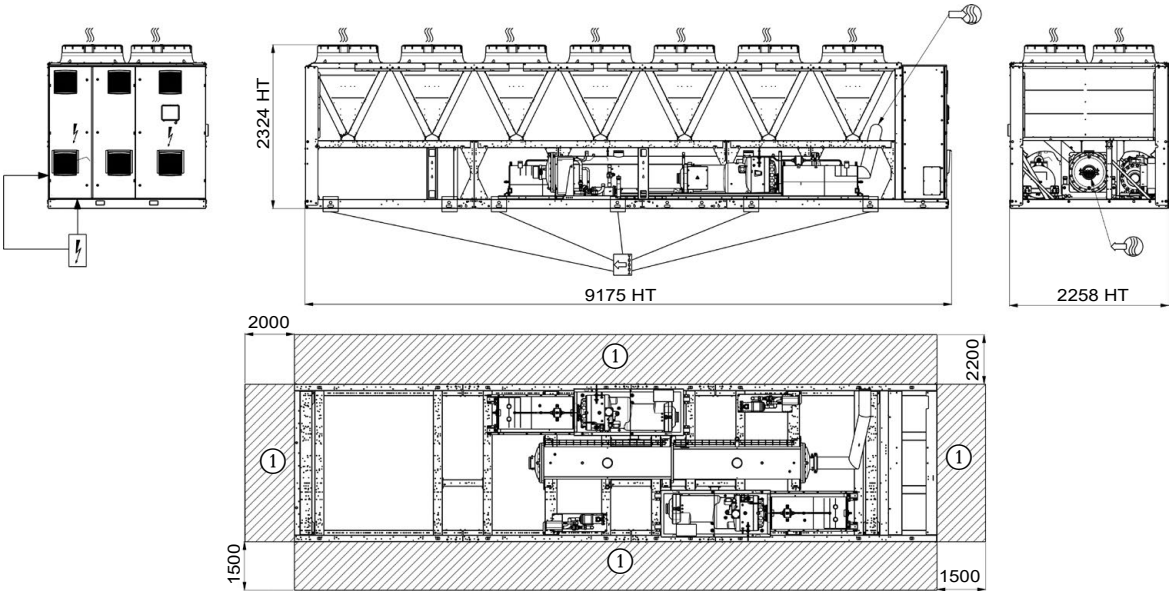
For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

If any unit(s) are close to walls, please refer to chapter "Distance to the wall" of this document to determine the space required.

3.3.1.3 - 30XBV-A 0800/0900



3.3.1.4 - 30XBV-A 1000



Legend

All dimensions are given in mm,

① Cooler water inlet and outlet

Inlet water

Outlet water

Air outlet, do not obstruct

Electrical supply entry

NOTES:

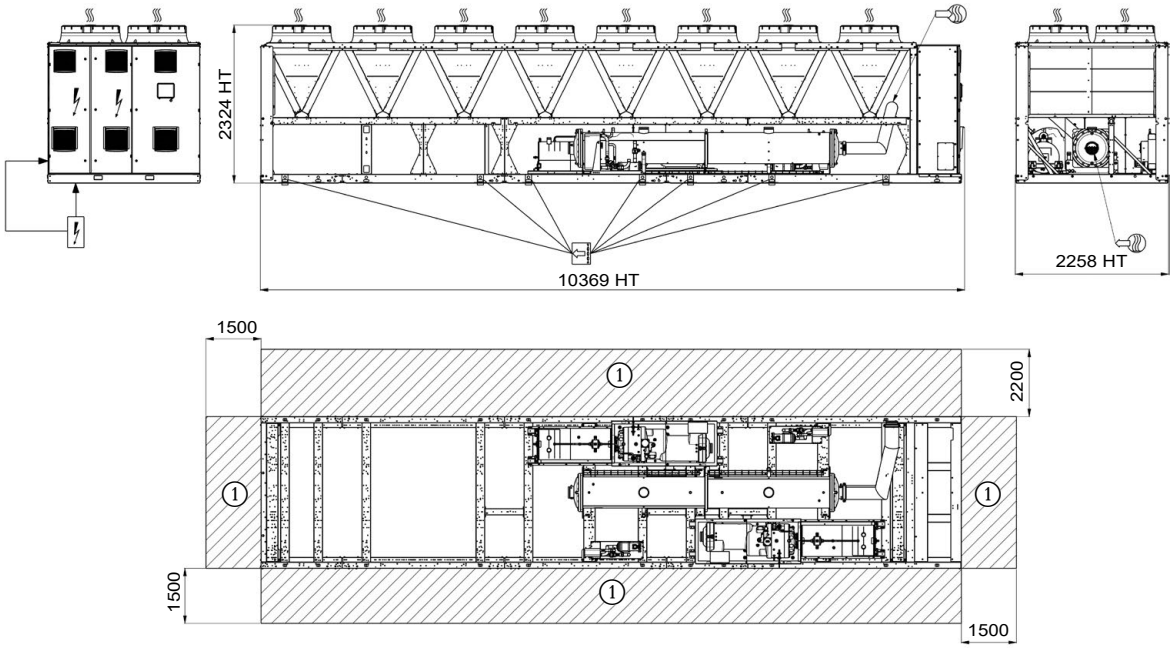
Drawings are not contractually binding.

Before designing an installation, consult the certified dimensional drawings, available on request.

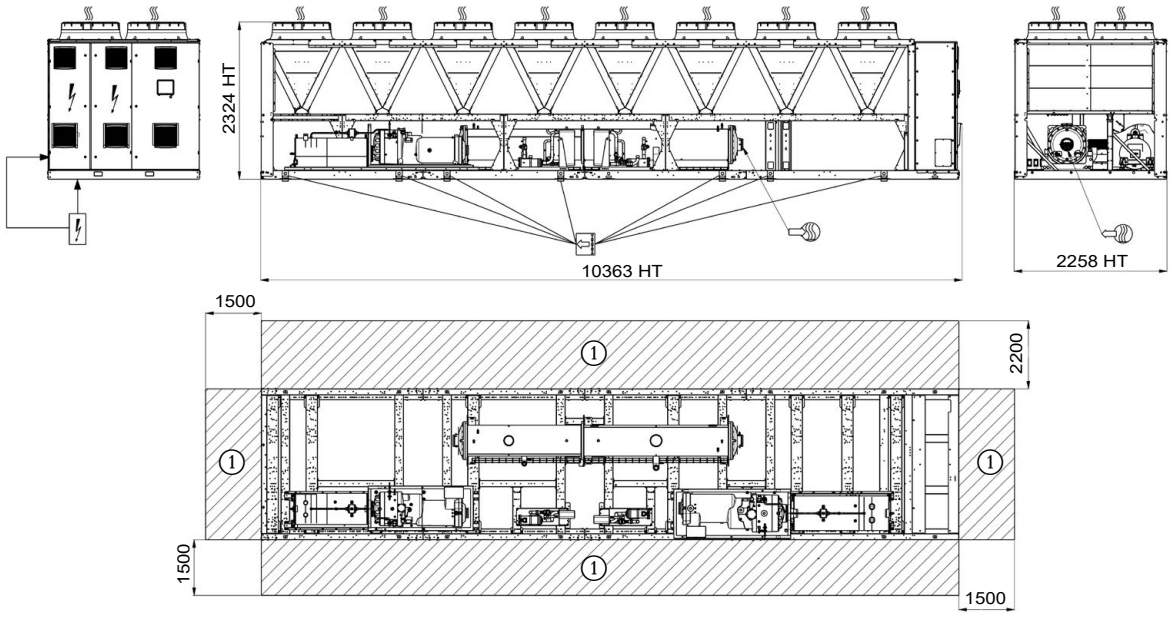
For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

If any unit(s) are close to walls, please refer to chapter "Distance to the wall" of this document to determine the space required.

3.3.1.5 - 30XBV-A 1100



3.3.1.6 - 30XBV-A 1200



Legend

All dimensions are given in mm,

① Cooler water inlet and outlet

Inlet water

Outlet water

Air outlet, do not obstruct

Electrical supply entry

NOTES:

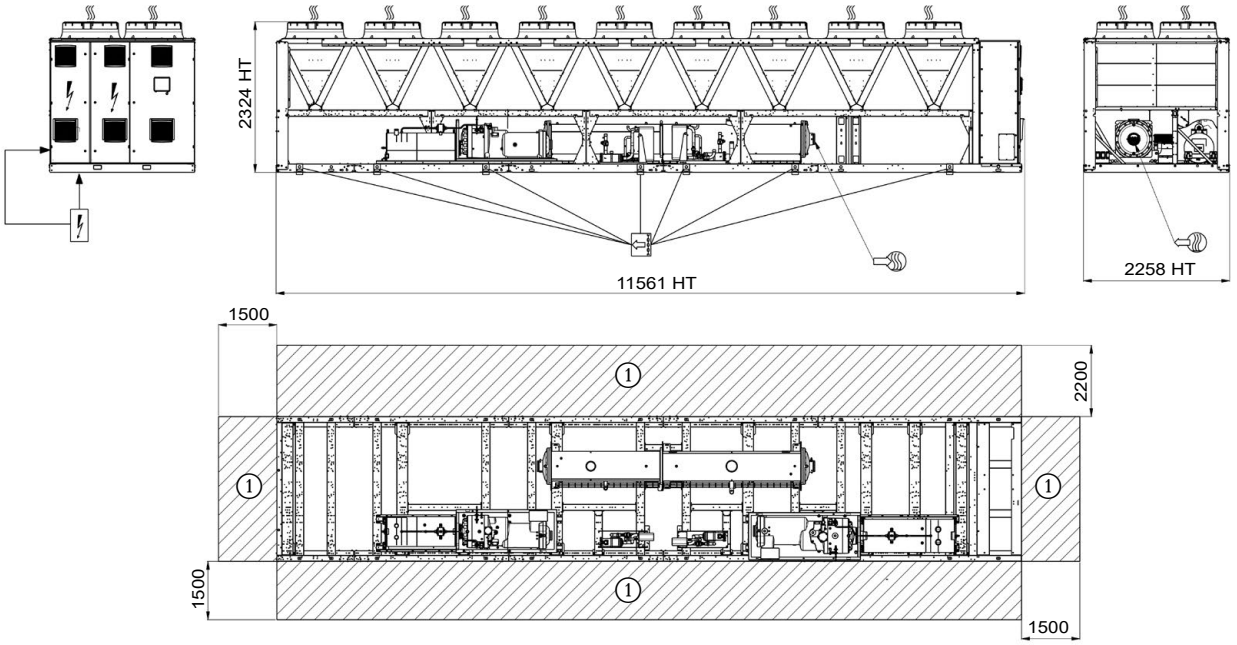
Drawings are not contractually binding.

Before designing an installation, consult the certified dimensional drawings, available on request.

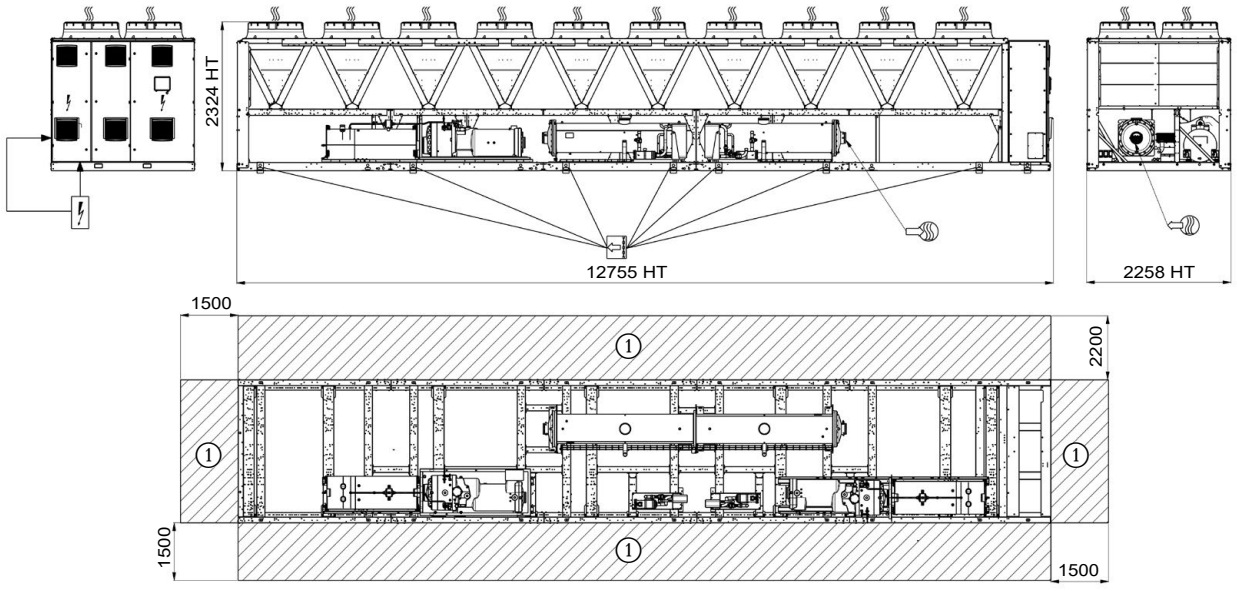
For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

If any unit(s) are close to walls, please refer to chapter "Distance to the wall" of this document to determine the space required.

3.3.1.7 - 30XBV-A 1300



3.3.1.8 - 30XBV-A 1450



Legend

All dimensions are given in mm,

① Cooler water inlet and outlet

Inlet water

Outlet water

Air outlet, do not obstruct

Electrical supply entry

NOTES:

Drawings are not contractually binding.

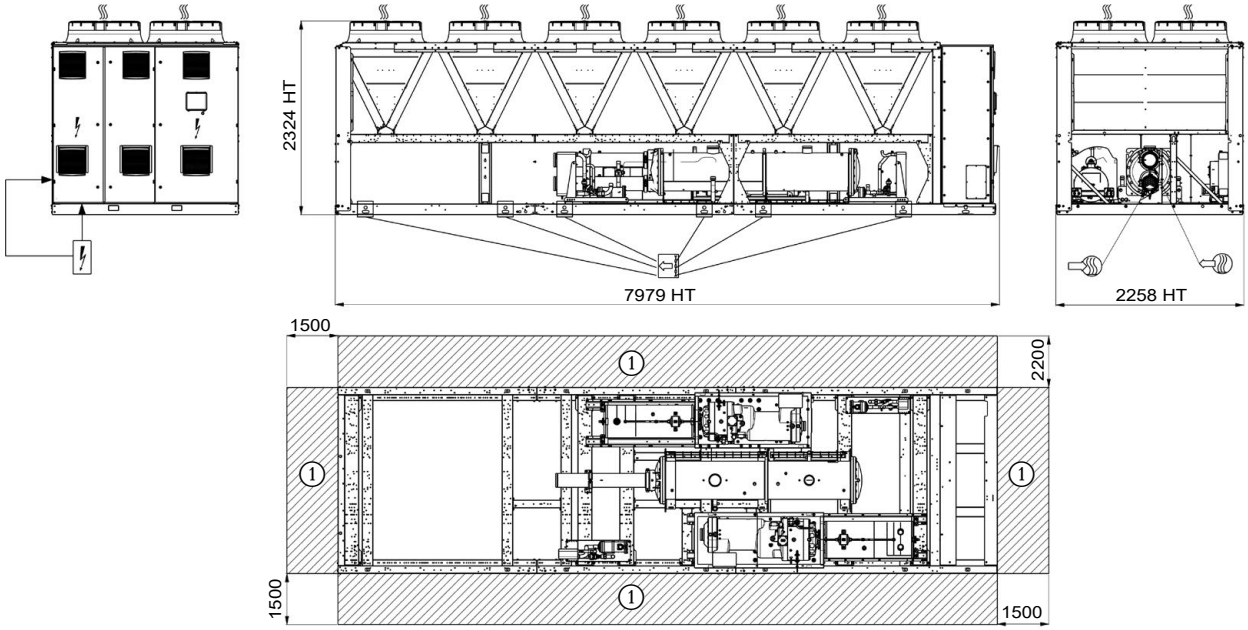
Before designing an installation, consult the certified dimensional drawings, available on request.

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

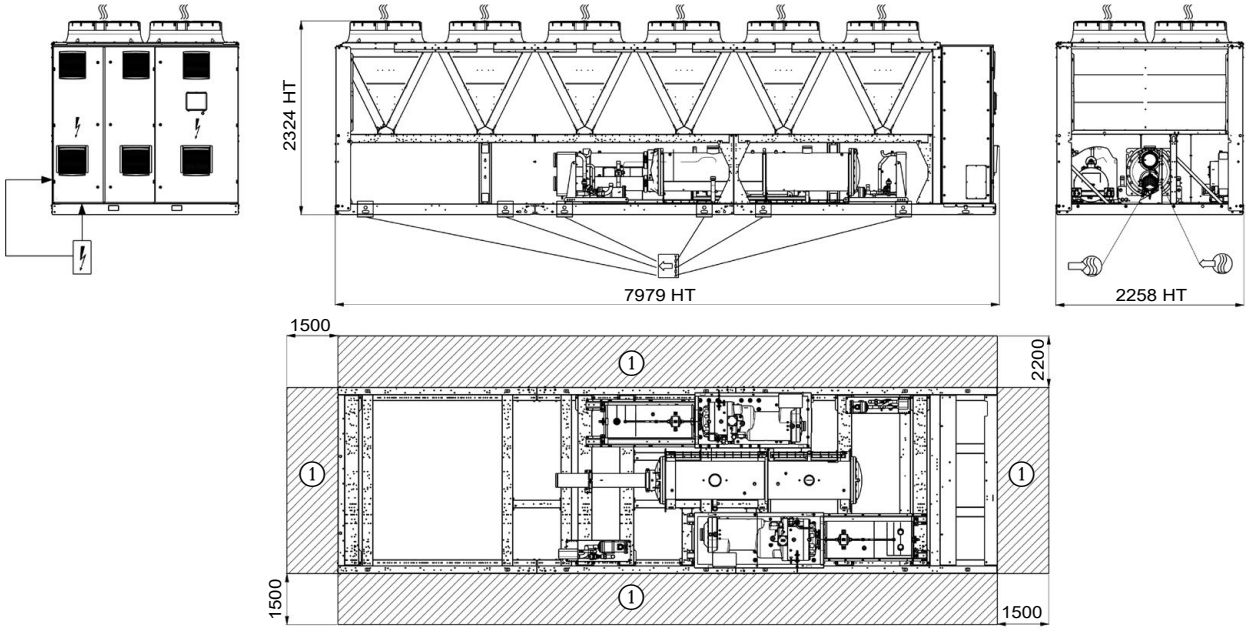
If any unit(s) are close to walls, please refer to chapter "Distance to the wall" of this document to determine the space required.

3.3.2 - Duplex Units - 30XBV-A 1600

3.3.2.1 - 30XBV-A 1600 – Module 1



3.3.2.2 - 30XBV-A 1600 – Module 2



Legend

All dimensions are given in mm,

① Cooler water inlet and outlet

Inlet water

Outlet water

Air outlet, do not obstruct

Electrical supply entry

NOTES:

Drawings are not contractually binding.

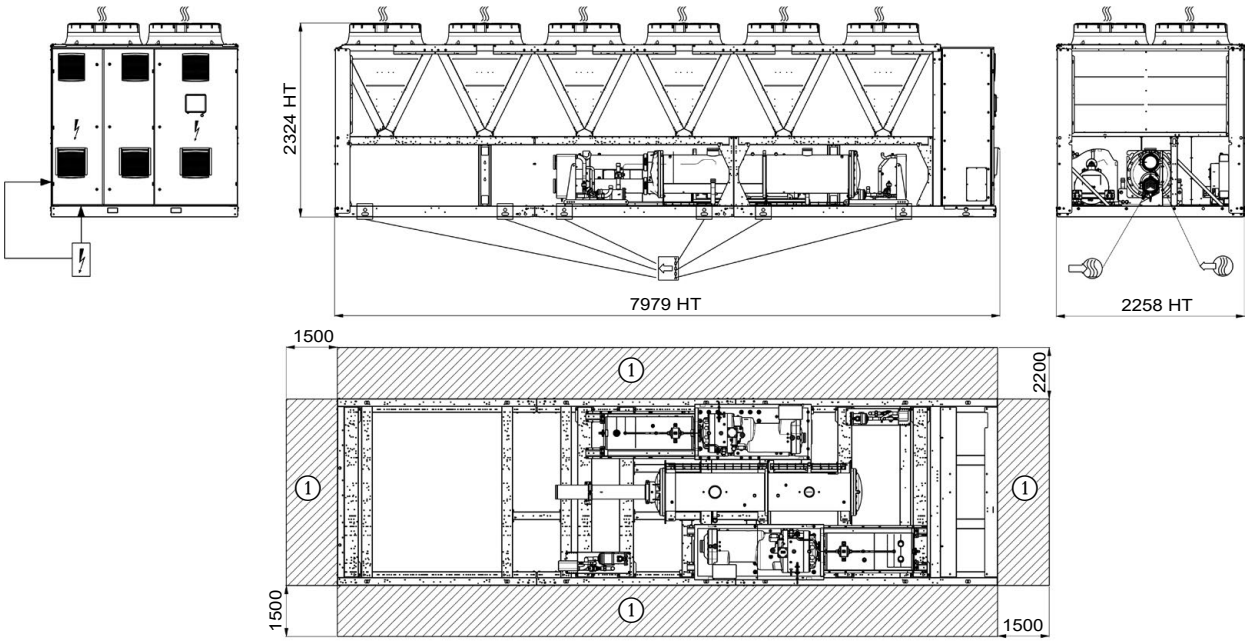
Before designing an installation, consult the certified dimensional drawings, available on request.

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

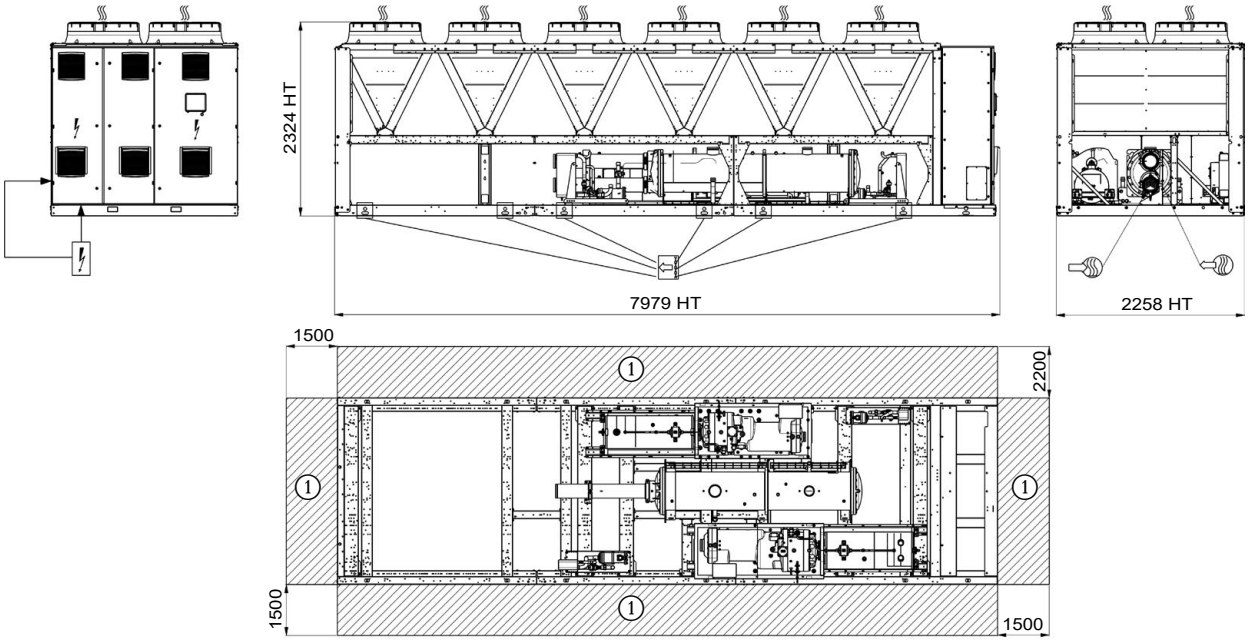
If any unit(s) are close to walls, please refer to chapter "Distance to the wall" of this document to determine the space required.

3.3.3 - Duplex Units - 30XBV-A 1800

3.3.3.1 - 30XBV-A 1800 – Module 1



3.3.3.2 - 30XBV-A 1800 – Module 2



Legend

All dimensions are given in mm,

① Cooler water inlet and outlet

Inlet water

Outlet water

Air outlet, do not obstruct

Electrical supply entry

NOTES:

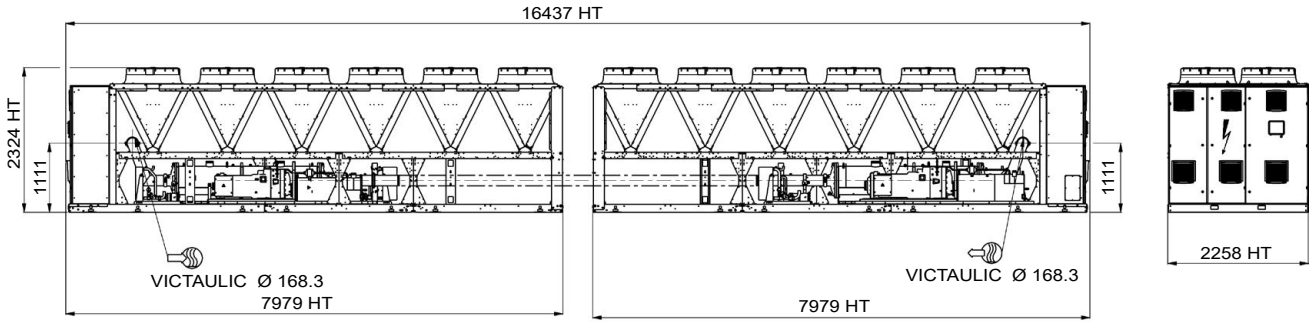
Drawings are not contractually binding.

Before designing an installation, consult the certified dimensional drawings, available on request.

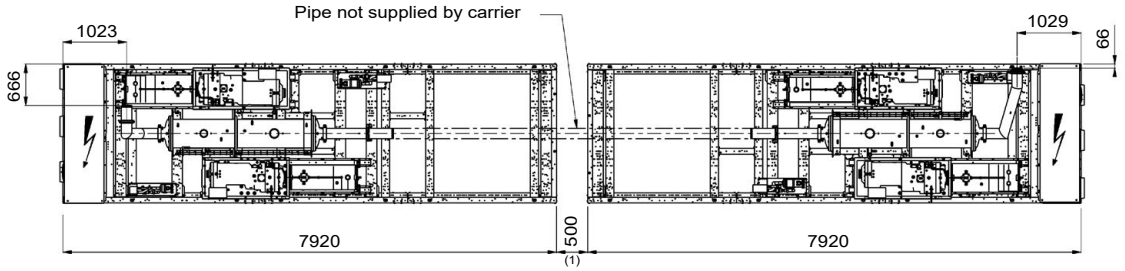
For the positioning of the fixing points, weight distribution and centre of gravity coordinates please refer to the dimensional drawings.

If any unit(s) are close to walls, please refer to chapter "Distance to the wall" of this document to determine the space required.

3.3.4 - 30XBV 1600 & 1800 recommended installation



MODULE 1 **MODULE 2**



Space required between Module
1 and Module 2 for coil service

(1) For maintenance, if the distance is below 500 mm, the extraction of the final coils between modules is carried out by dismounting the roof of cover of the module corresponding “V“ coils.

4.1 - Electrical Connections

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

The power supply must conform to the specification on the chiller nameplate.

The supply voltage must be within the range specified in the electrical data table.

WARNING: Operating the chiller with an incorrect supply voltage or excessive phase imbalance constitutes misuse which will invalidate the Carrier warranty.

4.1.1 - Power cables access routing

The power cable access routing into the electrical cabinet is from the side or from the underneath of the unit: Refer to the plans for the unit.

The choice depends on the installation configuration of the machine and the specifications of the cables to be connected:

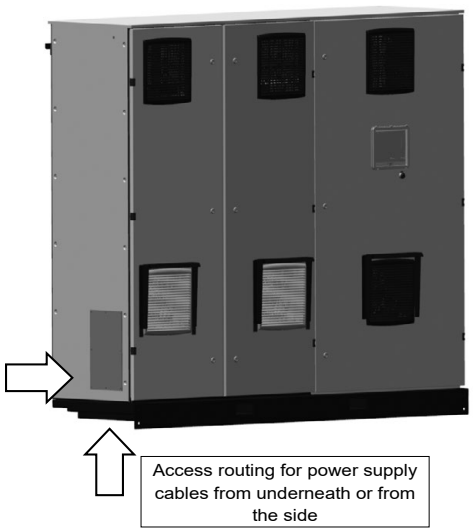
Cable access routing from the side of the unit: This configuration allows a larger number of cables to be connected and/or for larger curve radii.

Cable access routing from the underneath of the unit: This configuration requires the unit to be raised in relation to the cable routing level (for example: Fitting on rails and supports). The quantity of conductors which can be connected and the bending radius needed are also restricted.

The installer is responsible for ensuring the electrical cabinet is sealed around the power cable access routing. Holes must be drilled in the plate provided, and the latter must be assembled.

Important: Check the bending radius for the cable access routing underneath the unit. Refer to the certified dimensional drawing for the unit.

Location of the openings for inserting external connections



4.1.2 - Field-installed control wiring

IMPORTANT: Connecting the interface circuits on-site creates certain safety risks. Any modification to the electrical box must ensure the equipment remains compliant with local regulations.

In particular, precautions must be taken to prevent accidental electrical contact between the circuits supplied by different sources:

- ***The choice of routing and/or insulation characteristics of the conductors ensures double electrical insulation.***
- ***The conductors should be fixed together inside the electrical box to prevent contact between the end of the conductor and a live part in case of accidental disconnection.***

Refer to the SmartVu™ control manual and the certified wiring diagram supplied with the unit for the field control wiring for

the following features:

- Remote on/off switch.
- Capacity limit external switch.
- Remote dual setpoint.
- Operating and alarm feedback.
- Evaporator pump control.
- Setpoint offset.
- Various interlocks on the Energy Management Module (EMM) board option.
- Control of the variable speed evaporator pump.
- Refrigerant leakage detection signal (option).

Connections to the customer communication bus

The CCN bus is connected using the connectors specifically provided inside the electrical box. Two connectors are provided to allow both permanent and service connections.

The permanent Ethernet bus and USB service socket are connected using the connector integrated into the touchscreen

interface.

A shielding clamp for the cable from the system is provided near the permanent bus connectors.

Customer and Service power reserves

After all possible options have been connected, the CT transformer ensures the availability of a 1A power reserve at 24 Vac for the on-site control cabling.

4.1.3 - Recommended cables sections

Wire sizing is the responsibility of the installer and depends on the characteristics and regulations applicable to each installation site.

The cable selections given in this document are therefore only given as a guide, and do not in any way incur Carrier's liability. After wire sizing has been completed, using the certified dimensional drawing, the installer must verify the appropriate means of connection and define any modifications necessary on site.

The connections provided as standard for the customer-supplied power supply cables, are designed for the number and type of cross sections given in the second column of the table below.

The calculations of favorable and unfavorable cases have been performed using the maximum possible current for each unit.

The study includes the standardized installation cases according to IEC 60364:

- Cable with PVC (70°C) or XLPE (90°C) insulation.
- Cable with copper core.
- Cable fitted in accordance with table 52c of the standard.

Cables with aluminum core require higher cables sections. Please contact Carrier Service in case of such requirement.

The maximum ambient temperature taken into consideration for this study is 46°C.

The given maximum length is calculated to limit the voltage drop to 5%.

IMPORTANT: Before connecting the main power cables (L1 - L2 - L3), always check the correct order (clockwise) of the 3 phases before connecting to the terminal.

Minimum and maximum cable section selection table for connection to 30XBV-A units:

30XBV-A	Max. connectable section(1)		Calculation of favourable case: - Suspended overhead line (standardized routing n°. 17) - Cable insulated to 90°C - Copper conductor (Cu)			Calculation of unfavourable case: - Conductors in ducts or multi-conductor cables in closed conduits (standardized routing n°. 41) - Cable insulated to 70°C when possible - Copper conductor (Cu)		
	Side connection	Bottom connection	Section(2)	Max. length for a voltage drop <5%	Cable type(3)	Section(2)	Max length for a voltage drop <5%	Cable type(3)
	qty x mm² (per phase)	qty x mm² (per phase)	qty x mm² (per phase)	m	-	qty x mm² (per phase)	m	-
0500	4 x 240	2 x 240	1 x 150	223	90°C	2 x 185	459	70°C
0600	4 x 240	2 x 240	1 x 185	216	90°C	3 x 240	561	70°C
0700	4 x 240	2 x 240	1 x 240	237	90°C	2 x 185	329	70°C
0800	4 x 240	3 x 240	2 x 120	207	90°C	2 x 240	345	70°C
0900	4 x 240	3 x 240	2 x 150	224	90°C	2 x 240	314	90°C or 70°C
1000	4 x 240	4 x 240	2 x 150	195	90°C	3 x 240	352	90°C or 70°C
1100	4 x 240	4 x300	2 x 185	209	90°C	3 x 240	323	90°C or 70°C
1200	3 x 300	4 x300	2 x 240	235	90°C	3 x 240	302	90°C
1300	3 x 300	4 x300	2 x 240	219	90°C	4 x 185	286	90°C
1450	3 x 300	4 x300	3 x 150	185	90°C	4 x 240	290	90°C
1600_1	4 x 240	3 x 240	2 x 120	207	90°C	2 x 240	345	70°C
1600_2	4 x 240	3 x 240	2 x 120	207	90°C	2 x 240	345	70°C
1800_1	4 x 240	3 x 240	2 x 150	224	90°C	2 x 240	314	90°C or 70°C
1800_2	4 x 240	3 x 240	2 x 150	224	90°C	2 x 240	314	90°C or 70°C

(1) Connection capacities actually available for each unit. These are defined according to the connection terminal size, the electrical box access opening dimensions, and the available space inside the electrical box.
(2) Selection simulation result considering the hypotheses indicated.
(3) If the maximum calculated selection is for a 90°C cable type, this means that a selection based on a 70°C 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 without options.

4.2 - Electrical Components

4.2.1 - Main Electrical Cabinet

The main electrical cabinet(s) contains:

- Only when option 70/70D is selected: a power supply disconnecting component for each power supply (disconnect switch).
- Part of the equipment protecting the circuits inside the machine from short circuits.
- Variable frequency drives to manage and protect against overload the compressors.
- The control devices.

4.2.2 - Variable Frequency Drives

The units are equipped with variable frequency drives for the compressors motors.

The variable frequency drives enable the speed of the motors to be selected by adjusting the voltage and frequency by modulating the pulse width (PWM).

The frequency setpoint on the operating range and the status feedback for the variable frequency drives is transmitted by communication via the internal RS485 Bus using the LEN Protocol by the "Carrier controller".

For the compressors, the variable frequency drives provide the unit shutdown function via the pressure switches cabled to the regulator's digital inputs.

4.2.3 - Fans Motors

The fan motors are equipped with a rotating shroud and made of composite recyclable material. Each motor is fixed with transverse supports.

All the fans in the same refrigerating circuit run together at the same rotation speed.

Standard units are equipped with AC asynchronous induction motors, fixed speed.

Refer to wiring diagram for more detailed information about distribution of ventilation.

The motors are three-phase, with lifetime lubricated bearings and class F insulation (IP55 level).

According to regulation No. 640/2009 and amendment 4/2014 implementing directive 2009/125/EC regarding eco-design requirements for electric motors:

30XBV-A Standard Units		
Motor Type		Asynchronous
Number of poles	p	6
Nominal Voltage	V	400
Number of phases	Ph	3
Nominal Input Frequency	Hz	50
Maximum Input Power (400V)	kW	1,96
Nominal Shaft Power Output	kW	1,4
Motor manufacturer		Leroy Somer
Motor P/N		00PPG000558400A
Speed regulator		NO
Motor included in the application domain of the regulation 640/2009 & amendement 4/2014		NO
Sales leaflet for exemption		Article 2.1
Ambient air temperature for which the motor is specifically designed	°C	70

4.3 - Electrical System

4.3.1 - Units short circuit current withstand capability

30XBV-A Single Units		**0500**	**0600**	**0700**	**0800**	**0900**	**1000**	**1100**	**1200**	**1300**	**1450**
Rated short-circuit currents											
Rated short time (1s) current - Icw	kA rms	20	20	20	20	20	40	40	40	40	40
Rated peak current - Ipk	kA pk	80	80	80	80	80	110	110	110	110	110
Value with upstream electrical protection(1)											
Rated conditional short circuit current Icc	kA rms	50	50	50	50	50	50	50	50	50	50
Associated protection - Type		Fuses (gG/gL)									
Associated protection - Maximum rating	A	630	630	630	800	800	1000	1000	1250	1250	1250

30XBV-A Duplex Units		**1600_1**	**1600_2**	**1800_1**	**1800_2**
Rated short-circuit currents					
Rated short time (1s) current - Icw	kA rms	20	20	20	20
Rated peak current - Ipk	kA pk	80	80	80	80
Value with upstream electrical protection(1)					
Rated conditional short circuit current Icc	kA rms	50	50	50	50
Associated protection - Type		Fuses (gG/gL)			
Associated protection - Maximum rating	A	800	800	800	800

(1) If another current limitation protection device is used, its time-current and thermal constraint (I^2t) trip characteristics must be at least equivalent to those of the recommended protection.

NOTE: The short-circuit stability current values above are suitable with the TN system.

4.3.2 - Units Electrical Data

30XBV-A Single Units		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Power circuit supply											
Nominal voltage	V-ph-Hz	400-3-50									
Voltage range	V	360-440									
Input power(1)											
Maximum operating input power(2)	kW	225	277	314	359	395	453	494	528	568	642
Operating current draw(1)											
Maximum Current (Un)(2)	A	350	431	488	558	614	704	768	820	882	998
Maximum Current (Un-10%)	A	374	471	513	599	646	768	807	888	916	1027
Power factor at maximum input power(1)		0,91-0,93									
Displacement Power Factor (Cos. Phi)(3)		>0,98									
Total current harmonic distortion rate (THDi)(4)	%	35-45%									
Start-up current(1)											
Maximum Current (Un)(5)	A	193	252	280	275	290	396	427	436	457	570

30XBV-A Duplex Units		1600_1	1600_2	1800_1	1800_2
Power circuit supply					
Nominal voltage	V-ph-Hz	400-3-50			
Voltage range	V	360-440			
Input power(1)					
Maximum operating input power(2)	kW	359	359	395	395
Operating current draw(1)					
Maximum Current (Un)(2)	A	558	558	614	614
Maximum Current (Un-10%)	A	599	599	646	646
Power factor at maximum input power(1)		0,91-0,93			
Displacement Power Factor (Cos. Phi)(3)		>0,98			
Total current harmonic distortion rate (THDi)(4)	%	35-45%			
Start-up current(1)					
Maximum Current (Un)(5)	A	275	275	290	290

(1) Values obtained at operation with maximum operating input power.
(2) Values given on the unit nameplate.
(3) Values decrease when load lowers.
(4) May vary according to the installation's short circuit ratio. The exact values depend on the short-circuit ratio (Rsce).
THDi increases when load lowers. It's necessary to consider a degradation of the values when the input power drops.
The highest impact on the installation occurs when the current is maximum.
Therefore compliance of the installation regarding voltage harmonic distortion at PCC (per IEC61000-2-4 or other standard) shall be usually checked at max load in order to cover all load conditions.
(5) Starting current of the smallest compressor + Operating current of the biggest compressor + Fan current.

4.4 - Electrical Notes

Compliance of electrical installation
Electrical installation and all the connections to the network must be carried out in compliance with all standards applicable to the installation location.
Generally, the recommendations of the International Electrotechnical Commission document (IEC60364) are accepted as compliance with the requirements of the installation guidelines.
The units are designed and built to ensure compliance with these guidelines.
The European standard EN 60204-1 corresponds to IEC 60204-1 - Machine safety - Electrical equipment of machines - part 1: General requirements.
It was specifically taken into account when the electrical equipment was designed.
Note : The standard EN60204-1 also enables to meet the requirements of the Machinery Directive.
Annex B of EN 60204-1 is intended to define the electrical characteristics used for the operation of the units.
Those described below apply alongside the other information provided in this document.
Note: if aspects of an installation require different specifications from those listed below (or which are not listed), always contact your Carrier representative.
Overcurrent Protections
Overcurrent protection of the power supply conductors is not provided with the unit.

WARNING: A part of the short circuit protection must be carried out on the customer installation, in compliance with the instructions given in this document.

Leakage Currents Protections
If protection by monitoring the leakage currents is necessary to ensure the safety of the installation, the presence of DC voltage component as well as additional derived currents introduced using variable frequency drives in the unit must be considered.
It is especially recommended that the differential protection devices are:

- Suitable for protection of DC and AC circuitry
- Of reinforced immunity protection types and/or set at a threshold value not lower than 150 mA.

Unit's Power Connection Point
The units are equipped with one electrical power connection point as standard.
For duplex units, each module has its own power connection point.
When the option 70/70D is selected, the power connection point is located immediatly upstream of the main disconnect switch.
Neutral Regime
The units are designed for connection to TN networks (IEC 60364).
The neutral wire (N) must not be connected directly to the unit.
Note :
In IT networks, the use of filters integrated into the variable frequency drives is not suitable.
In addition, the equipment 's short circuit holding current characteristics are modified.
Unit's Disconnect Switch
The absence of the main disconnect switch is an exception that shall be considered at the building installation level.
The unit has no CE marking. To install the unit into EU, it is mandatory to select the option 70 or 70D.
With the option 70 or 70D, the main disconnect switch is of a type suitable for power interruption, in compliance with EN 60947-3 (equivalent to IEC 60947-3).
Environment Classification following IEC 60364

Environment Criteria	Environment Class
Ambient atmosphere	Outdoor(1)
Altitude	up to 1000 m (2000 m)(2)
Ambient temperature range	from -20 °C to +48 °C (55 °C)(3)
Presence of solid foreign bodies	Class AE3 (no significant dust present)(1)
Presence of water	Class AD4 (projection in all directions without pressure)(1)
Presence of corrosive and polluting substances:	Class AF1 (negligible)
Competence of personnel:	BA4 (trained personnel).

(1) The required protection level for this class is IP43-W minimum (according to the reference standard IEC 60529). All units are classified as IP54-W and fulfil this protection condition.
(2) Above 1000m, the maximum temperature must be reduced by 0.5K for every additional 100m up to 2000m.
(3) The value in brackets corresponds to operation with degraded thermal performances.

Electromagnetic (High frequency) conducted disturbances
Compatibility levels for electromagnetic (high frequency) conducted disturbances following EN 61800-3:

Disturbance Criteria	Disturbance Level
Immunity to external interference	Defined by the second environment(1)
Interference emissions	Defined in category C3(2)

(1) Examples of installations included in the first / second electromagnetic environments:

First Environment	Second Environment
§ commercial buildings	§ Industrial zones
§ residential buildings	§ Technical premises powered from a dedicated transformer.

(2) 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 or commercial locations.

Warning: In a residential or commercial environment, this product may cause radio interference in which case additional mitigation measures could be required.

Note : EN 61800-3 is equivalent to IEC 61800-3.
Low frequency conducted disturbances
Compatibility levels for low frequency conducted disturbances as per the class 2 levels from IEC 61000-2-4:

Disturbance Criteria	Disturbance Level
Power supply frequency variation	±1Hz
Voltage Phase imbalance	2%
Voltage Total Harmonic Distortion (THDu)	8%
Rated impulse voltage Uw (IEC60664-1)	2,5 kV

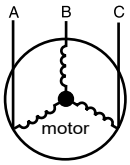
The units integrate variable frequency drives which have harmonic currents which are a source of interference.
An analysis may be required to verify if this interference exceeds the compatibility limits of the other devices connected to the same power supply network.
Note : The compatibility levels inside an electrical installation, that must be met at the in-plant coupling point (IPC) to which other loads are connected, are described in standard IEC 61000-2-4.

WARNING: If the phase imbalance exceeds the limit specified above, contact your local electricity supplier and ensure that the chiller is not switched on until corrective measures have been taken.

Voltage Phase Imbalance Calculation [%]

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

Example:
On a 400 V - 3 ph - 50 Hz supply, the individual phase voltages were measured with the following values:
AB = 406 V;
BC = 399 V;
AC = 394 V.
Average voltage = (406 + 399 + 394)/3 = 1199/3 = 399.7 (rounded up to 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 therefore acceptable.



5 - HYDRAULIC DESCRIPTION

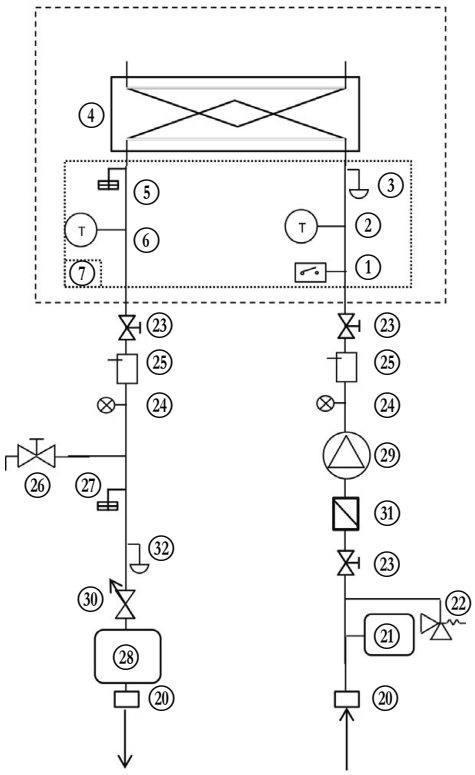
5.1 - Hydraulic Connections

When connecting units to the water distribution pipe work, refer to the certified dimensional drawings supplied with the unit for the dimensions and position of the water inlet and outlet connections.

For connection to the hydraulic network, the Victaulic® connection or the counter-flange must be removed before all welding operations.

5.1.1 - Units Hydraulic Circuit Diagram

1 Module



Legend

Unit Hydraulic Circuit - Components

1. Flow rate sensor
2. Temperature sensor
   NOTE: Provides temperature measurement at the heat transfer medium heat exchanger(s) inlet (see Control Manual)
3. Water purge on water box
4. Water heat exchanger
5. Air bleed on water box
6. Temperature sensor
   NOTE: Provides temperature measurement at the heat transfer medium heat exchanger(s) outlet (see Control Manual)
7. Water box

Customer Hydraulic Circuit - Minimum Additional Components

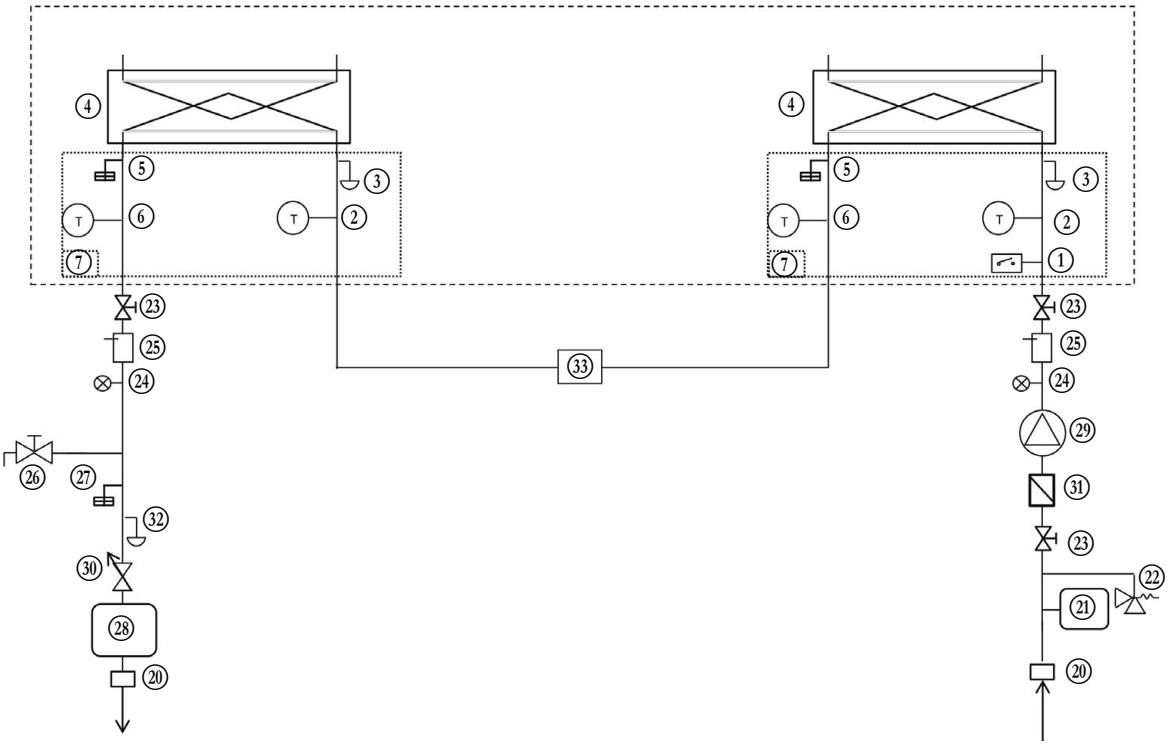
20. Flexible Connection
21. Expansion Vessel
22. Relief Valve
23. Shut-off valve
24. Pressure gauge
25. Well
26. Charge valve
27. Air bleed
28. Buffer tank (if whole hydraulic loop volume under minimum required water volume enabling reaching full unit refrigerating capacity)
29. Pump
30. Water flow control valve (if fixed speed pump)
31. Screen filter (particle size of 1.2mm)
32. Water drain tap

- - - - - Unit Hydraulic Components

NOTES:
- The installation must be protected against frost.

5 - HYDRAULIC DESCRIPTION

2 Modules



Legend

Unit Hydraulic Circuit - Components

1. Flow rate sensor
2. Temperature sensor
   NOTE: Provides temperature measurement at the heat transfer medium heat exchanger(s) inlet (see Control Manual)
3. Water purge on water box
4. Water heat exchanger
5. Air bleed on water box
6. Temperature sensor
   NOTE: Provides temperature measurement at the heat transfer medium heat exchanger(s) outlet (see Control Manual)
7. Water box

Customer Hydraulic Circuit - Minimum Additional Components

20. Flexible Connection
21. Expansion Vessel
22. Relief Valve
23. Shut-off valve
24. Pressure gauge
25. Well
26. Charge valve
27. Air bleed
28. Buffer tank (if whole hydraulic loop volume under minimum required water volume enabling reaching full unit refrigerating capacity)
29. Pump
30. Water flow control valve (if fixed speed pump)
31. Screen filter (particle size of 1.2mm)
32. Water drain tap
33. Piping between modules

- - - - - Unit Hydraulic Components

NOTES:
- The installation must be protected against frost.

5.1.2 - Piping Diameters & Connections Type

Hydraulic Connections are all Victaulic clamping clips type.

30XBV-A Single Units		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Inlet Connection Diameter	mm | in	127 | 5	127 | 5	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6
Outlet Connection Diameter	mm | in	127 | 5	127 | 5	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6

30XBV-A Duplex Units		1600_1	1600_2	1800_1	1800_2
Inlet Connection Diameter	mm | in	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6
Outlet Connection Diameter	mm | in	152,4 | 6	152,4 | 6	152,4 | 6	152,4 | 6

5.1.3 - Installation Nominal Flow Rate Adjustment

Once the heat transfer medium is present within the installation and before the unit start-up, purge the air from the loop.

Then, follow the hydraulic circuit cleaning procedure in 10.5.1– Hydraulic Circuit Cleaning.

If the customer heat transfer medium pump is fixed speed, the flow rate can be adjusted following the next procedure, using a variable flow control valve.

If the customer heat transfer medium pump is variable speed, the flow rate adjustment depends on the pump regulation strategy chosen by the customer.

Nominal Flow Rate:

The temperature difference required between the unit inlet and outlet determines the nominal flow rate of the installation.

Use the specification provided when selecting the unit to know the heat transfer medium flow rate and pressure drop between unit inlet and outlet at your operating conditions.

If this information is not available when commissioning the unit, contact the design office responsible for the installation.

Control Valve:

As the exact total installation pressure drop is not known prior to commissioning, it is necessary to adjust the heat transfer medium flow rate with the control valve to set the required flow rate.

Indeed, due to the pressure drop it generates on the hydraulic network, this flow control valve is used to set the network pressure drop curve to the heat transfer medium pump pressure curve, to obtain the flow rate at the desired operation point.

This will be checked reading the pressures on the pressure gauges at the unit terminals to calculate the unit pressure drop.

Adjustment Procedure:

Before proceeding, it is advisable to remove any possible contamination from the hydraulic circuit. Please follow the procedure described in 10.5.1– Hydraulic Circuit Cleaning.

The pressure drop read using the pressure gauge placed on the unit inlet and outlet is the reference to be used to check and adjust the nominal flow rate of the system.

Compare the pressure drop value measured with the design value on the unit specification.

If the pressure drop reading is below the specified value, this indicates that the flow rate is too high. In this case, close the control valve and read the new pressure difference.

If the pressure drop reading is above the specified value, this indicates that the flow rate is too low. In this case, open the control valve and read the new pressure difference.

Repeat as necessary, closing or opening the control valve until the specific pressure drop corresponding to the operating conditions flow rate is achieved.

NOTE:

Opening the valve is possible only if the valve was too much closed precedingly. If the initial pressure drop is above the specified value, the network has an excessive pressure drop in relation to the available static pressure delivered by the pump.

The nominal water flow cannot be obtained (lower resulting flow) and the difference in temperature between the water inlet and outlet of the evaporator will be increased.

5.2 - Hydraulic Components

5.2.1 - Customer Hydraulic Loop Components

Following components are required to be within the customer hydraulic loop (some of them can be added within the unit as options):

Component	Location in the circuit(s)	Use
Piping	Between other components.	Heat transfer medium channelling.
Filter(s)	Before a pump and after an isolation valve.	See "Fouling"
Expansion vessel	Before the pump.	Allow water extra volume absorption because of high temperatures.
Relief valve	At the pump outlet.	Allow water evacuation to avoid loop components explosion in case of high pressure.
Pressure reducing valves	Along the circuit.	Maintain the pressure of the circuit(s) when the unit is in operation.
Shut-off valves	Close to the water inlet and outlet connections.	Isolate the unit hydraulic loop from the customer hydraulic loop.
Manual or Automatic Vents	All high points in the circuit(s). Automatic vents installed only outside of buildings (ATEX zone 2 possible at the air vent discharge).	Allowing the circuit(s) to be purged from air which: - Decreases thermal performances and - Damages heat transfer fluid Pump body.
Drain connections	All low points in the circuit(s).	Allowing the whole circuit(s) to be drained in case of maintenance
Pressure gauges	Both the water inlet and outlet pipes.	Unit pressure drop measurement.
Thermometers	Both the water inlet and outlet pipes.	Water temperature measurement.
Flow control valve	Along the circuit.	Nominal flow rate adjustment.
Charging valve	Along the circuit.	Heat Transfer Medium charge within the loop.
Insulation	On the cold-water pipework, after testing	Prevent heat transmission and condensation.
Vapor barrier	Covering the above mentionned insulation	Prevent heat transmission and condensation.
Buffer tank(s)	At the unit outlet.	See "Total Water Loop Minimum Volume" and "Buffer Tank".

Heat Transfer Medium Pump

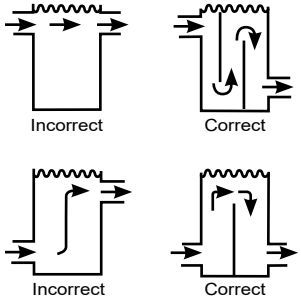
The heat-transfer medium pump must be controlled by the chiller.

Dedicated terminals are provided for connection to the pump control (wiring from chiller to pump control panel by others).

Buffer Tank

It may be necessary to add a buffer tank to the circuit in order to achieve the required volume (see “Total Water Loop Minimum Volume”). The tank must itself be internally baffled to ensure proper mixing of the liquid (water or brine). Please refer to the examples below.

Connection to a buffer tank



5.2.2 - Heat Exchanger for heat transfer fluid chilling, hydraulic side

See section "Evaporation Components" for a global description of the component.

Number of passes on hydraulic side of the heat exchanger:

- Units 500, 600, 700, 800, 900: 2 passes.
- Units 1000, 1100, 1200, 1300, 1450: 1 pass.
- Duplex units 1600, 1800: 1 pass in the evaporator of each module.

A shell and tube heat exchanger has always two water boxes that help distributing the flow entering the tubes or mixing the flow leaving the tubes.

The heat exchanger is equipped with a drain plug located on each water box and an air vent.

WARNING: Before carrying out any hydraulic connections, install the water box bleed plugs (one plug on each water box, supplied in the electrical cabinet).

The evaporator has been tested and stamped in accordance with the applicable pressure code. The maximum standard operating pressure is 1000 kPa relative for the waterside. That pressure may differ according to the regulation and the code applied.

5.2.3 - Flow switch for low flow rate detection

All the units are equipped as standard with a flow switch set in the factory (according to the size of the unit and the application). If adjustment is necessary, it must be performed by qualified personnel, approved by Carrier Service.

IMPORTANT: The water flow switch for the machine must be operational. The Carrier warranty will be voided if this instruction is not adhered to.

5.3 - Hydraulic System

5.3.1 - Customer Hydraulic Loop Requirements

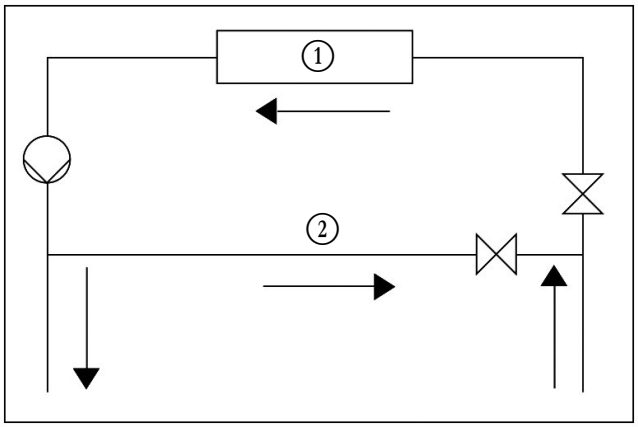
Customer Hydraulic Loop Design

Below the main points to be checked:

- The hydraulic circuit should be designed to have the least number of elbows and horizontal pipe runs at different levels.
- Use flexible connections to reduce the transmission of vibrations. The piping must not transmit any axial or radial force to the exchangers, or any vibrations.
- If the installation flow rate is not between the unit allowed flow range, following instructions are required to be considered:

Hydraulic Flow Rate Recirculation

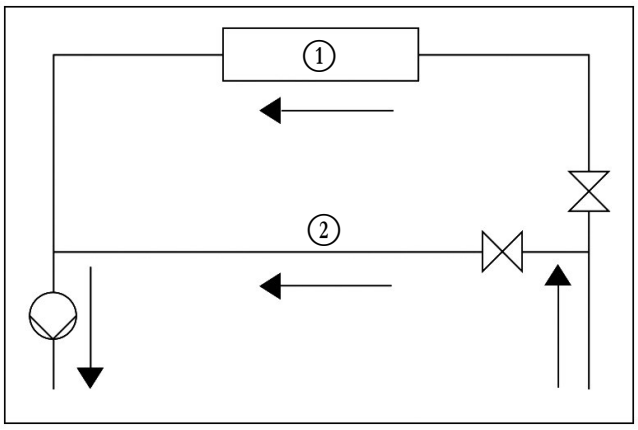
If the installation flow rate is less than the minimum allowed unit flow rate, the flow can be recirculated, as shown in the diagram below:



Legend:
1. Evaporator
2. Recirculation

Hydraulic Bypass

If the installation flow rate exceeds the maximum allowed unit flow rate, it can be bypassed as shown in the diagram below:



Legend:
1. Evaporator
2. Bypass

Installation Pressure Drop minimization:

- Reduce the pressure drops of individual components (elbows, level changes, options, etc.) as much as possible.
- Use the correct pipe diameter.
- Do not extend the hydraulic systems.

Total Water Loop Minimum Volume

Regardless of the system, the water minimum volume in the loop is given by the formula:

Capacity = Cap [kW] x N

Application	N[L/kW]
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.

Material Compatibility:

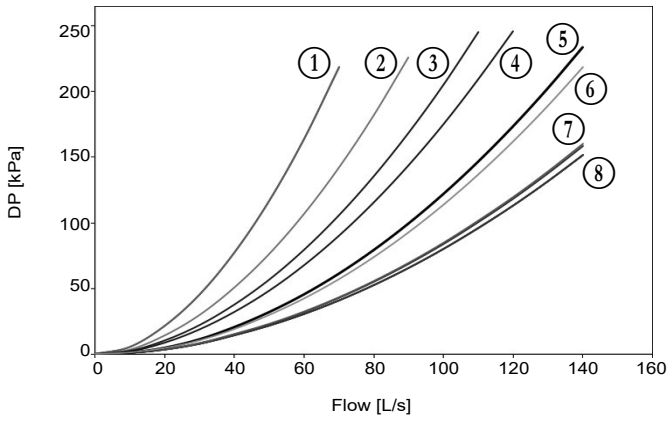
- The use of different metals in the hydraulic system may create galvanic couples and lead to corrosion. Verify the need to install sacrificial anodes.
- Products used for the thermal insulation of components during hydraulic connection must have a chemically neutral effect on the surfaces to which they are applied. All original materials supplied by Carrier comply with this requirement.

WARNING:

- ***If additional equipment is added to the system, the installer must comply with the basic recommendations, especially the minimum and maximum flow rates.***

5.3.2 - Units Pressure Drop Curves

Standard Units Pressure Drop



1. 0500/0600
2. 0700
3. 0800
4. 0900
5. 1600
6. 1800
7. 1450
8. 1200/1300

5.3.3 - Units Hydraulic Circuit Data

You can find here under maximum operating pressures on hydraulic side, minimum and maximum hydraulic flow rates and volume of the hydraulic loop in the unit(1):

30XBV-A Single Units		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Volume in the unit	L | gal	85 | 22	85 | 22	99 | 26	121 | 32	131 | 35	157 | 41	157 | 41	172 | 45	172 | 45	188 | 50
Max. operating pressure - hydraulic side	kPa | psi	1000 | 145	1000 | 145	1000 | 145	1000 | 145	1000 | 145	1000 | 145	1000 | 145	1000 | 145	1000 | 145	1000 | 145
Min. hydraulic flow rate	L/s | gpm	7 | 111	7 | 111	8 | 127	10 | 159	11 | 174	17 | 269	17 | 269	18 | 285	18 | 285	18 | 285
Max. hydraulic flow rate	L/s | gpm	48 | 761	48 | 761	59 | 935	68 | 1078	76 | 1205	125 | 1981	125 | 1981	133 | 2108	133 | 2108	133 | 2108

30XBV-A Duplex Units		1600	1800
Volume in the unit	L | gal	242 | 64	262 | 70
Max. operating pressure - hydraulic side	kPa | psi	1000 | 145	1000 | 145
Min. hydraulic flow rate	L/s | gpm	20 | 317	20 | 317
Max. hydraulic flow rate	L/s | gpm	144 | 2282	161 | 2552

(1) The indicated volume of the hydraulic loop in the unit includes:
- Heat exchanger(s)
- Water boxes
- Valves
- Piping factory fitted inside each single unit and each module of a duplex unit.

5.4 - Heat Transfer Medium

5.4.1 - Material Compatibility

- If additives or fluids other than those recommended by Carrier are used, ensure that these are not considered gases, and that they are class 2, as defined in directive 2014/68/EU.
- Before any start-up, verify that the heat-transfer medium is compatible with the materials and the hydraulic circuit coatings.
- The water must be analyzed. Depending on its composition, the circuit created must include the elements needed for water treatment: Filters, additives, intermediate exchangers, bleed devices, vents, isolation valves, etc., to prevent corrosion, fouling, and deterioration of the pump fittings.

Carrier recommendations:

1. **No NH^{4+} ammonium ions in the water, as these cause significant damage to copper. This is one of the most important factors governing the service life of copper piping. A content of several tenths of mg/l will badly corrode the copper over time.**
2. **Cl^- chloride ions also cause damage to copper with a risk of perforating corrosion. If possible, keep below 125 mg/l.**
3. **SO_4^{2-} sulphate ions can cause perforating corrosion if their content is above 30 mg/l.**
4. **No fluoride ions (<0.1 mg/l).**
5. **No Fe^{2+} and Fe^{3+} ions if non negligible levels of dissolved oxygen are present. Dissolved iron < 5 mg/l with dissolved oxygen < 5 mg/l.**
6. **Dissolved silicon: Silicon is an acid element of water and can also lead to a risk of corrosion. Content < 1 mg/l.**
7. **Water hardness: >0.5 mmol/l. Values between 1 and 2.5 mmol/l 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.**
8. **Dissolved oxygen: Any sudden change in water oxygenation conditions must be avoided. It is as detrimental to deoxygenate the water by mixing it with inert gas as it is to over-oxygenate it by mixing it with pure oxygen. The disturbance of the oxygenation conditions encourages destabilisation of copper hydroxides and shedding of particles.**
9. **Electric conductivity 10-600µS/cm.**
10. **pH: Ideal case pH neutral at 20-25°C (7.5 < pH < 9).**

Corrosion

- To prevent any risk of corrosion by differential aeration, if the hydraulic circuit is drained for a period of more than one month, blanket the entire circuit with dry and inert gas (nitrogen for example) at 0.5bar maximum.
- After a period during which the unit was not operating and drained, at the beginning of the next period of unit operation, fill the system with water treated with appropriate corrosion inhibitors.

5.4.2 - Frost Protection

WARNING: Any damage caused by frost is not covered by the warranty.

The hydraulic components (heat exchanger, piping, pumps…) can be damaged by frost. They will be protected by following the recommendations below. Protection against frost of the installation is the responsibility of the customer.

If the installation is in an area where the ambient temperature is liable to fall below 0°C, it is recommended that antifreeze solution is added to protect it to a temperature of 10K below the lowest temperature likely to be reached at the installation site.

WARNING:

- ***Anti-freeze solutions concentration must be maximum of 45%.***
- ***Only use antifreeze solutions approved for use with heat exchangers.***

If antifreeze solution is not added to the circuit, and the unit is not intended to be operated during freezing conditions, the installation must be drained.

WARNING:

- ***Check that there are no retention points.***

  IMPORTANT: Depending on the atmospheric conditions in your region, you need to:
- ***Add ethylene glycol in a suitable concentration to protect the installation.***
- ***Where applicable, if a long period without use is expected, drain and, as a safety measure, add ethylene glycol to the exchanger via the drain valve located on the water inlet (a drain is available on the water boxes on both sides of the exchanger if the machine is not perfectly levelled).***
- ***In case of prolonged non-usage, the hydraulic circuits must be protected by circulating a passivating solution. (Consult a specialist).***
- ***If it is not to be used in freezing conditions, or during a prolonged period without power (whether this is scheduled or not), the hydraulic components (evaporator, outside pipes, optional hydraulic module…) must be drained without delay.***

5.4.3 - Fouling

- If there are particles in the fluid which are liable to foul the exchanger, a screen filter must be installed upstream of the pump. The mesh size of this filter must be 1.2 mm.
- The brine loop must be clean. To ensure the exchangers are able to operate correctly, it is recommended that a sludge container, settling container, or another filtration system is also installed upstream of the unit, if necessary.
- Before starting the unit, it is recommended to circulate the heat-transfer medium for 10 minutes and then clean the screen filter.

6 - AERAULIC DESCRIPTION

6.1 - Aeraulic Components

6.1.1 - Fan

Fans are axial Flying Bird™ 6 VI impeller. They are trained with motors. Each fan is associated to one motor. Refer to section "Fans Motors" for more information about fan motors.

According to the Regulation No. 327/2011 implementing Directive 2009/125/EC regarding eco-design requirements for fans driven by motors with an electric input power between 125 W and 500 kW.

30XBV-A Standard Units		
Measurement category		A
Efficiency category		Static
Target efficiency level ERP2015		N(2015) 40
Overall Efficiency	%	40,1
Efficiency level at the optimum efficiency point		44,6
Air Flow Rate	m³/s | gpm	4,22 | 66889
Pressure at optimum energy efficiency	Pa | psi	174,2 | 0,0253
Nominal Speed	rpm	948
Specific ratio		1,002
Fan Manufacturer		Simonin
Fan P/N		00PSG002630700A
Year of manufacture		See label on the unit
Relevant information to facilitate the disassembly, recycling or removal of the product at the end of life		See the Maintenance Manual
Relevant information to minimize the impact on the environment		See the Maintenance Manual

6.1.2 - Heat Exchanger for heat rejection, air side

See section "Condensation Components" for a global description of the component.

6.2 - Aeraulic System

6.2.1 - Units Aeraulic Data

30XBV-A Units		**0500**	**0600**	**0700**	**0800**	**0900**	**1000**	**1100**	**1200**	**1300**	**1450**	**1600**	**1800**
Fans Quantity		7	8	10	12	12	14	16	16	18	20	24	24
Maximum Total Air Flow Rate	m³/s | gpm	36 | 572845	41 | 654680	52 | 818350	62 | 982020	62 | 982020	72 | 1145690	83 | 1309360	83 | 1309360	93 | 1473030	103 | 1636700	124 | 1964040	124 | 1964040
Maximum Rotation Speed	rpm	950	950	950	950	950	950	950	950	950	950	950	950

7.1 - Frigorific Components

Components	Features on 30XBV-A
Compressor	Twin Screw Variable Speed with induction motor (06Z)
Expansion Valve	Electronic Expansion Valve (EXV)
Air Heat Exchanger	Novation™ Micro Channel Heat Exchanger (MCHE)
Heat Transfer Medium Heat Exchanger	Flooded Shell & Tube Heat Exchanger (FLHE)
Economizer	Electronic Expansion Valve (EXV Eco) ; Brazed Plates Heat Exchanger (BPHE Eco)

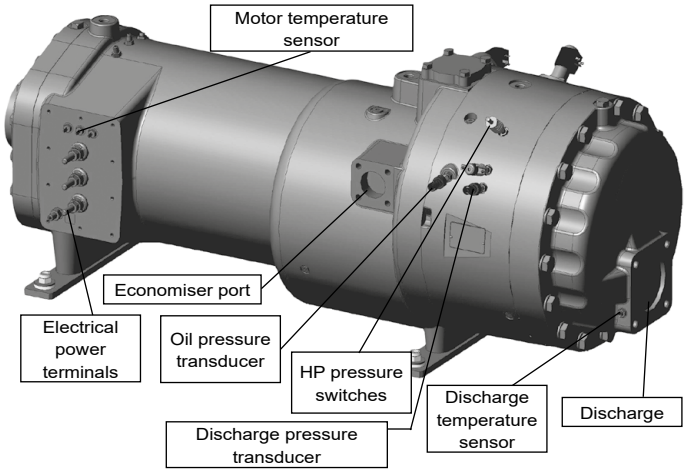
7.1.1 - Refrigerant

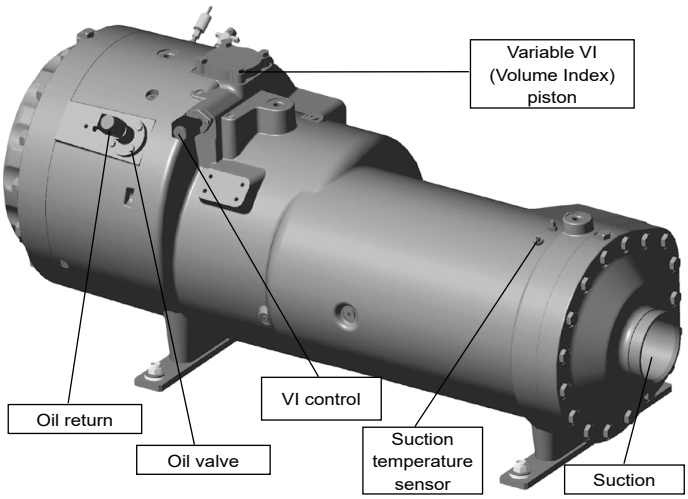
This document concerns units which operate using R134a only.

7.1.2 - Compression Components

7.1.2.1 - Compressors

The units use twin-screw compressors fitted with an asynchronous induction motor fitted on a variable frequency drive to enable screw rotation speed variability.





7.1.2.2 - Economizer and suction port filters

To improve the reliability of the compressor, filters are fitted on the compressor suction connection and economizer port, as standard.

7.1.2.3 - Lubricant oil

The 06Z screw compressor is approved for use with the following lubricants with R134a:

Lubrizol Emkarate RL 220H (specification PP 47-13).

Contact Carrier ERCD to purchase oil top-up.

CAUTION: Too much oil in the circuit can cause the unit to malfunction.

NOTE: Never use oils that have been exposed to air.

7.1.2.4 - Oil supply solenoid valve

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

7.1.2.5 - Oil filter

The 06Z screw compressor has an independent oil filter mounted on to the oil separator. This filter is field replaceable.

7.1.2.6 - Oil separator

On these units, the oil separator is a pressure vessel which is mounted underneath the condenser coils, at the compressor discharge. The gas discharged at the compressor outlet is directed to the oil separator and most of the oil is separated from the gas by a process of rapid deceleration and gravity. The gas is then directed to a mesh filter where the remaining oil is separated by coalescence, and flows to the bottom of the vessel. The oil-free gas exits via the top of the vessel towards the condenser.

The oil separator is equipped with a heater cable managed by the control system. The oil separator also has a built-in silencer.

7.1.2.7 - High Pressure SRMCR safety loop

General description

The unit is equipped with a high-pressure safety loop, known as the SRMCR (Safety-Related Measurement Control and Regulation) loop, comprising:

- 2 high pressure switches (HPS) that require resetting with a tool at the outlet of each compressor called PZHH.
- The speed regulator which supplies the compressor and is equipped with the Safe Torque Off (STO) function.

Refer to the wiring diagram and the nomenclature for the machine (references).

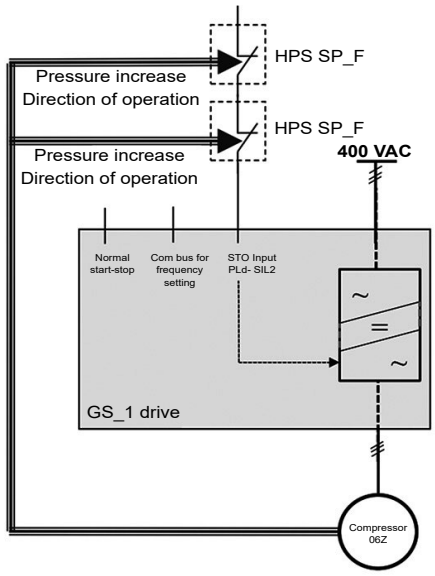
This SRMCR device is designed in accordance with standard EN 61508 for SIL (safety integrity level): 2.

Demand mode: Low and high. The mission time is 20 years.

Periodic testing: The test must be performed at least once a year during the normal periodic pressure test. Refer to the description in section 10.8.4– Periodic test of the high-pressure safety loop.

Description of operation and resetting

The image below is intended to illustrate the operating description: Refer to the detailed machine drawing for the precise wiring diagram.



HPS: High pressure switch SP1F (A) / SP2F (A)
GS_1: Power drive for compressor GSA1 / GSB1

During normal operation, the speed regulator supplies and controls the compressor once the control signal is received via the digital on-off input (normal on-off) and the communication bus (setting the frequency).

When one of the HPS sensors opens, the STO (Safe Torque Off) digital input opens, which instantly suppresses the control command for the thyristors which manage the supply for the compressor, independently of the on-off commands and frequencies: The compressor is no longer supplied and stops immediately.

Restarting after high pressure detection

After overpressure is detected, it is necessary to manually reset the switched HPS. A blunt tool with a diameter of less than 6 mm must be used for this.

Verification in case of a safety device failure

If the unit operating pressure appears to have been exceeded at some point (for example, after the relief valves have been opened), the unit must be stopped immediately.

The safety loop unit must pass all the periodic verifications before any restart is possible.

If the test reveals malfunctions likely to have caused overpressure within the machine, a complete check of all the pressure equipment must be performed to check their mechanical integrity.

7.1.3 - Expansion Components

The expansion module includes a liquid valve, a filter drier, an electronic expansion valve (EXV) and protection devices (fusible plug or valve).

7.1.3.1 - Electronic expansion valve (EXV)

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

The EXV is also equipped with a sight glass used to check the mechanism movement and the presence of the liquid gasket.

7.1.3.2 - Moisture indicator

Located on the EXV, this enables the unit charge to be controlled and indicates moisture in the circuit.

The presence of bubbles in the sight-glass indicates an insufficient charge or non-condensable gases in the system.

The presence of moisture changes the color of the indicator paper in the sight-glass.

7.1.3.3 - 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.

7.1.4 - Condensation Components

The condensers in the units are micro-channel coils made entirely of aluminum.

Depending on applications, silicone cover caps are required to be put on condenser coils block fittings. Please contact Carrier Service for more information.

7.1.5 - Evaporation Components

The heat exchanger enabling chilling of the heat transfer fluid is called the evaporator. The units use a flooded shell-and-tube heat exchanger as evaporator: The heat-transfer medium (water or glycoled water) circulates in the tubes and the refrigerant is inside the shell.

The tubes are copper, and 3/4” in diameter, with a finned surface inside and out.

The evaporator has been tested and stamped in accordance with the applicable pressure code. The maximum standard operating pressure is 2100 kPa relative for the refrigerant side. That pressure may differ according to the regulation and the code applied.

The evaporator has thermal insulation formed of 19 mm thick polyurethane foam. An aluminum cladding is available as an option.

7.1.6 - Economizer Module Components

The economizer module includes an additional electronic expansion valve (EXV Eco) and a brazed plate heat exchanger (BPHE Eco).

At the condenser outlet, a small fraction of the liquid is expanded via the secondary EXV in one of the BPHE circuits and then is returned as a gas to the compressor via the economizer port.

This expansion provides an increase in the liquid subcooling of the other fraction of the refrigerant entering the evaporator via the main EXV. This enables the system's cooling capacity and efficiency to be improved.

7.2 - Frigorific System

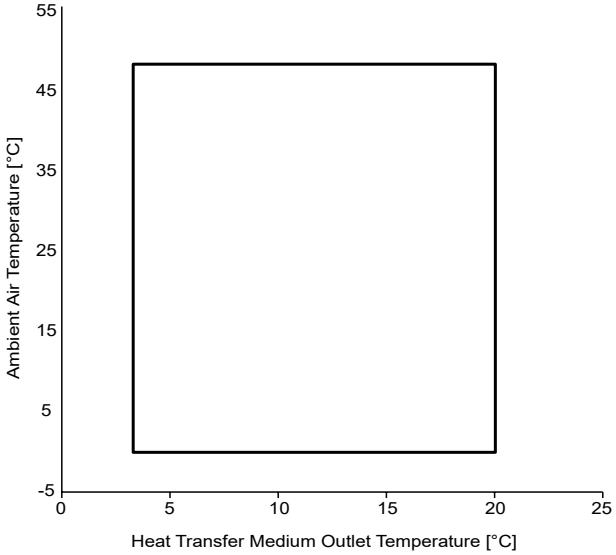
7.2.1 - Units Operating Range

Heat Transfer Medium Heat Exchanger		Minimum	Maximun
Heat Transfer Medium Inlet Temperature at start-up	°C | °F	-	45(1) | 113
Heat Transfer Medium Inlet Temperature during operation	°C | °F	6,8 | 44,2	36 | 96,8
Heat Transfer Medium Outlet Temperature during operation	°C | °F	3,3(2) | 37,9	20 | 68
Air Heat Exchanger		**Minimum**	**Maximun**
Ambient Air Temperature during storage	°C | °F	5 | 41	68 | 154,4
Ambient Air Temperature during operation	°C | °F	0 | 32	48 | 118,4

(1) Operating at partial load.
(2) According to the type of installation and air temperature.

NOTE:
- **The use of brine or antifreeze protection option is required if pure water is to be used and to be cooled below 4 °C.**
- **If the air temperature is to fall below 0 °C, a glycol/water solution or the freeze protection option must be used.**

Units Operating Range



NOTE:
- **These ranges are given for indicative purpose. Check the operating range from Carrier electronic catalogue.**

Legend:
Operating range, standard units

7.2.2 - Units Frigorific Data

30XBV-A Single Units		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Refrigerant Charge(1)		R134a (GWP = 1300 following AR 5 ; ODP=0)									
Circuit A	kg | lb	45 | 99	45 | 99	54 | 119	73 | 161	73 | 161	84 | 185	83 | 183	110 | 243	116 | 256	113 | 249
	teqCO_2	64	64	77	104	104	120	119	157	166	162
Circuit B	kg | lb	42 | 93	45 | 99	54 | 119	59 | 130	62 | 137	84 | 185	83 | 183	86 | 190	86 | 190	113 | 249
	teqCO_2	60	64	77	84	89	120	119	123	123	162
Oil Charge(1)		Oil for R134a. Contact Carrier ERCD for supplying.									
Circuit A	L | gal	27 | 7,1	24 | 6,3	20 | 5,3	23 | 6,1	20 | 5,3	23 | 6,1	20 | 5,3	30 | 7,9	30 | 7,9	30 | 7,9
Circuit B	L | gal	27 | 7,1	24 | 6,3	20 | 5,3	23 | 6,1	20 | 5,3	23 | 6,1	20 | 5,3	20 | 5,3	20 | 5,3	30 | 7,9
Unit Minimum Part Load(2)	%	13	13	13	13	14	12	12	14	13	12
PED Category		IV	IV	IV	IV	IV	IV	IV	IV	IV	IV

30XBV-A Duplex Units		1600	1800
Refrigerant Charge(1)		R134a (GWP = 1300 following AR 5 ; ODP=0)	
Module 1 - Circuit A	kg | lb	73 | 161	74 | 163
	teqCO_2	104	106
Module 1 - Circuit B	kg | lb	59 | 130	60 | 132
	teqCO_2	84	86
Module 2 - Circuit A	kg | lb	73 | 161	74 | 163
	teqCO_2	104	106
Module 2 - Circuit B	kg | lb	59 | 130	60 | 132
	teqCO_2	84	86
Oil Charge(1)		Oil for R134a. Contact Carrier ERCD for supplying.	
Module 1 - Circuit A	L | gal	23 | 6,1	20 | 5,3
Module 1 - Circuit B	L | gal	23 | 6,1	20 | 5,3
Module 2 - Circuit A	L | gal	23 | 6,1	20 | 5,3
Module 2 - Circuit B	L | gal	23 | 6,1	20 | 5,3
Unit Minimum Part Load(2)	%	7	7
PED Category		IV	IV

(1) Values are guidelines only. Refer to the unit name plate.
(2) For standard conditions. Depending on operating conditions, units might have a different minimum part load or cycle.

8 - CONTROL DESCRIPTION

8.1 - Control Components

8.1.1 - Pressure & Temperature Sensors

The unit uses thermistors to measure temperature, and pressure transducers to monitor and control the operation of the system. Refer to the SmartVu™ control manual for more detailed explanations.

8.2 - System Controller

Controller Features	
Human Machine Interface	SmartVu™ with 7" coloured touch screen interface
Languages	10 languages (DE, EN, ES, FR, IT, NL, PT, TR, TU + one on customer choice)

Refer to the SmartVu™ control manual for more detailed explanations.

9.1 - Checks before & after system initial start-up

After the unit has been received, and before it is started up, it must be inspected for damage.

Check that the unit and the accessories have not been damaged during transport and that no parts are missing.

If the unit and the accessories have been damaged upon receipt or the shipment is incomplete, immediately send a claim to the shipping/leveraging company.

National regulations must be followed during these checks. If the national regulation does not specify any details, refer to standard EN 378 as follows:

9.1.1 - Documentation

- Check that all documents provided by the manufacturer to comply with the regulations are present (unit nameplate, declarations of compliance, etc.).

IMPORTANT: If any documentation is missing, order a replacement.

- Check that the declaration of conformity for the pressurized ensemble mentions all the circuit equipment.
- Compare the complete system against:
  - Dimensional drawing.
  - Piping and instrumentation diagram (PID).
  - Wiring diagram.

9.1.2 - Unit Nameplate

The name plate is attached in two places to the unit:

- On the outside of one of the unit frames
- Inside the main electrical cabinet.

Compare the name plate data with the order.

The unit name plate must include the following information:

- Model number - size, address of manufacturer.
- CE marking (only when option 70/70D is selected).
- Serial number.
- Year of manufacture.
- Pressure and leak tightness test date.
- Fluid used for transport.
- Refrigerant used with its GWP.
- Refrigerant charge per circuit.
- PS: Min./max. allowable pressure (high and low pressure side).
- TS: Min./max. allowable temperature (high and low pressure side).
- Pressure switch cut-out pressure.
- Unit leak test pressure.
- Voltage, frequency, number of phases.
- Maximum current.
- Maximum power input.
- Unit net weight.

9.1.3 - Installation Checks

- Verify the installation of electrical and hydraulic connections.
- Verify the supports and fixing elements (materials, routing, and connection).
- Verify that access and safety routes are unobstructed.
- Verify the accessibility for maintenance or repair and to check the piping.
- Verify the status of all valves on refrigerant and hydraulic loops.
- Verify that the environmental protection and safety devices and arrangements provided by the manufacturer to comply with the regulations are in place and compliant.
- Check the protection against heat.

9.1.4 - Refrigerant & Oil Checks

All measures must be taken to ensure that the pressure and temperature limits, specifically those listed on the unit nameplates, are not exceeded during operation, maintenance, and recycling.

Heat exchange fluid temperatures above the maximum recommended can lead to an increase in the refrigerant pressure and can cause a loss of refrigerant due to the relief valve discharge.

- Verify on the unit nameplate that the 'fluid transported' is that recommended for operation and is not nitrogen.
- Verify the instructions and directives to prevent the deliberate removal of refrigerant gases.
- Ensure that the machine is charged with refrigerant.

Each unit is shipped with an exact charge of refrigerant and oil. Check that there are no visible refrigerant or oil leaks:

- No apparent damage on the refrigerant circuit pipes (no trauma, cracks, deformation) ;
- No traces of grease on the connections and refrigerant circuit sensors.

Check that the refrigerant circuit(s) is (are) intact, especially that no components or pipes have shifted (e.g. following a shock).

In case of doubt :

- Carry out a leak tightness using a refrigerant leak detection device suited to the fluid in the unit.
- Check and verify with the manufacturer that the circuit integrity has not been impaired.

9.1.5 - Mechanical Checks

- Verify the quality of welds and other joints.
- Check the protection against mechanical damage.
- Check the protection of moving parts.
- Check that all clamps securing the pipes are correctly tightened.
- ***IMPORTANT:***

If the compressors are equipped with anti-vibration mounts, check whether these mounts have clamping mechanisms.

If they do, the clamping mechanisms must be removed before system start-up.

Clamping mechanisms are identified by red collars and by a label affixed to the compressor sub-assembly.

9.1.6 - Electrical Checks

- Check the power supply at the main connection point and the order of phases.
- Check the operation of the oil heaters (present on the oil separator) 24 hours before starting up the system.
- Check the condition of 400 V cable insulation.
- Check cable gland at main electrical cabinet outlet.

9.1.7 - Hydraulic Checks

- Verify the quality of the thermal insulation.
- Ensure the inlet and outlet water pipes are connected in the direction shown on the unit.

9.2 - Commissioning Operation Checks

Always ensure you have read and fully understood the operating instructions for the units before starting up the unit, and ensure the following precautions have been taken:

- Refer to these instructions.
- All setpoint adjustments and control tests must be carried out before the unit is started up.
- The system must have a heat load and water flowing in the exchangers when it is started up and tested.
- Check the heat transfer fluid circulation pumps, the air handling equipment, and any other equipment connected to the system.

IMPORTANT: Commissioning and start-up must be supervised by a qualified engineer.

NOTE: If the manufacturer's recommendations (system, hydraulic and electrical connections) are not observed, no claims made under the warranty will be accepted.

9.2.1 - Compressors Checks

Ensure that each compressor is rotating in the correct direction, by checking that the discharge temperature rises quickly, the HP increases, and the LP drops.

If it is rotating in the wrong direction, the electric power supply is incorrectly wired (reversed phases). To ensure rotation in the correct direction, swap two power supply phases.

- Check the compressor discharge temperature with a contact sensor.
- Ensure that all safety devices are operational, checking specifically that the high-pressure switches are activated and that any alarms have been cleared.

9.2.2 - Electrical Checks

- Check the input current.
- Check that the air flow from the electrical cabinet cooling fans are directed from the outside of the cabinets to the inside (ensuring fresh air is drawn towards the inside of the cabinets).

9.2.3 - Hydraulic Checks

As the exact total system pressure drop is not known at commissioning, adjust the flow of water with the control valve until the desired nominal rate is obtained.

Follow the procedure described in 5.1.3– Installation Nominal Flow Rate Adjustment.

9.3 - Unit initial start-up checklist

Preliminary information

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

Equipment

Model #: .....

Compressors

Module 1
Model no. .....
Serial number .....
Motor # .....

Module 2
Model no. .....
Serial number .....
Motor # .....

Compressors variable frequency drives

Module 1
Model no. .....
Serial number .....

Module 2
Model no. .....
Serial number .....

Evaporators

Module 1
Model no.: .....
Serial number: .....

Module 2
Model no.: .....
Serial number: .....

Condensers

Model #: .....

Unit options and additional accessories

....
....

9 - SYSTEM INITIAL START-UP

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

☐ The unit is installed level
☐ The power supply corresponds to the unit nameplate
☐ The electrical circuit wiring has been sized and installed correctly
☐ The electrical circuit protection has been sized and installed correctly
☐ The unit earth cable has been connected
☐ All the customer connection terminals (power) are tightened
☐ All the chilled water valves are open
☐ The chilled water pipes are correctly connected
☐ The air present in the chilled water circuit has been purged

Hydraulic Loop

Water loop volume =..... L
Calculated volume =..... L
→3.25 L/nominal kW capacity for air conditioning
→6.5 L/nominal kW capacity for cooling in industrial processes
☐ Correct loop volume established
☐ Proper loop corrosion inhibitor included ..... L of .....
☐ Correct loop frost protection included (if required) ..... L of .....
☐ The installation pipework is equipped with heater cables, if exposed to temperatures below 0°C.

9 - SYSTEM INITIAL START-UP

Before unit start-up

☐ a. The oil heaters have been energized for at least 24 hours
☐ b. All the discharge and liquid valves are open
☐ c. All suction valves are open, if fitted
☐ d. All the oil line valves and economizer valves (if fitted) are open
☐ e. Any leaks have been located. The unit has been checked for leaks (including couplings):
  ☐ f1. on the whole unit
  ☐ f2. on the couplings
  Locate and report any refrigerant leaks
  .....
  .....
☐ g. Check voltage imbalance: AB ..... AC ..... BC .....
  Average voltage = ...V
  Maximum deviation = ...V
  Voltage imbalance = ...%

☐ h. Voltage imbalance less than 2%

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

During unit start-up

WARNING: Be sure that all service valves are open, and that the pump is on before attempting to start this machine. Once all checks are complete, start up the unit.

☐ The unit starts and operates correctly .....

WARNING: Once the unit is energized, check for alarms (refer to the control manual to check the alarm menu).

☐ Report all alarms: .....
☐ Special notes: .....

Temperatures and pressures

WARNING: Once the unit has been operating for a while and the pressures are stabilized, record the following:

Evaporator water inlet .....
Evaporator water outlet .....
Room temperature .....

Module 1 suction pressure .....
Module 2 suction pressure .....
Module 1 discharge pressure .....
Module 2 discharge pressure .....

Module 1 suction temperature .....
Module 2 suction temperature .....
Module 1 discharge temperature .....
Module 2 discharge temperature .....

Refrigerant liquid pressure and temperature, Module 1 .....
Refrigerant liquid pressure and temperature, Module 2 .....
Subcooling value, Module 1 .....
Subcooling value, Module 2 .....

10 - SYSTEM MAINTENANCE & REPAIR

To ensure optimal efficiency and reliability of the units, we recommend establishing a maintenance contract with the local Carrier Service organization. This contract will include regular inspections by the manufacturer's Carrier Service specialists so that any malfunction is detected and corrected quickly, ensuring that no serious damage can occur.

A Carrier Service maintenance contract is the best way to ensure the maximum operating life for your equipment and, through the expertise of Carrier technicians, provides the ideal way to manage your system cost effectively.

Refrigeration equipment must be maintained by professional technicians, whilst routine checks can be carried out locally by specialist technicians (refer to the standard EN378-4).

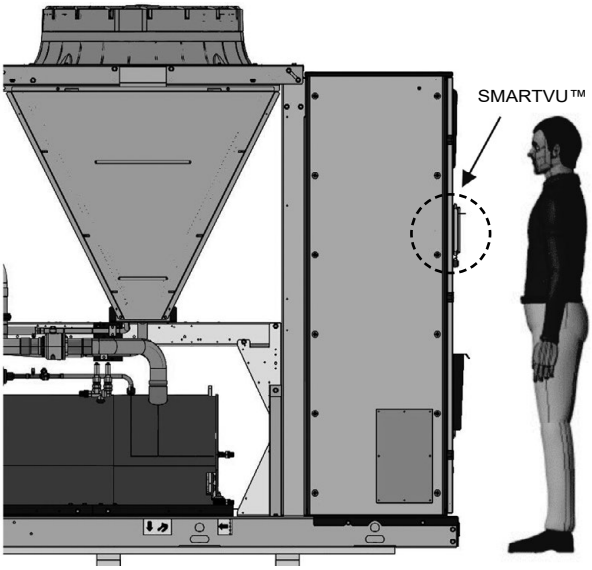
Simple preventive maintenance will allow you to get the best performance from your HVAC unit:

- Improved refrigerating performance.
- Reduced electricity consumption.
- Prevention of accidental component failure.
- Prevention of major time-consuming and costly work.
- Protection of the environment.

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

NOTE: Any deviation from or failure to observe these maintenance criteria will render the guarantee conditions for the refrigeration unit null and void, and will release the manufacturer, Carrier, from its liability.

Position of the operator workstation:



10.1 - Level 1 maintenance

See Note above.

These simple procedures can be carried out by the user:

Standard unit:

- Check for any general visible signs of deterioration.
- If the unit does not operate, check its alarm report (see the report in the SmartVu™ control manual).
- Check for improperly closed doors / covers.
- Check if there is water on the surface of the evaporator, which would be a sign of a defect in its isolation.
- Clean the air-cooled exchangers (see the dedicated chapter).

Refrigerant circuit:

- Verify the refrigerant charge in the liquid line sight glass.
- Verify that the temperature difference at the heat exchanger inlet and outlet is correct.
- Check for leaks (visual inspection for oil traces is a sign of a refrigerant leak).
- Check for detached protective devices.

Electrical:

- Check the filter fouling level at the air vents in the electrical box.
- Check the correct operation on electrical box fans.
- Check the fouling level at the exhaust air openings on the top of the power cabinet (fouling, snow, sand, etc.).

Unit + Option 262/263:

- Perform procedures as per the Standard unit
- Visual inspection of the anti-corrosion coatings.

10.2 - Level 2 maintenance

See Note above.

This level requires specific expertise in electrical, hydraulic and mechanical systems. it is possible that this expertise may be available locally; there may be a maintenance service, industrial site or specialist subcontractor in the area.

In these cases, the following maintenance operations are recommended:

Carry out all level 1 operations, then:

Hydraulic circuit:

- When working on the hydraulic circuit, take care not to damage the adjacent air heat exchanger.
- Check the hydraulic connections.
- Analyze the heat-transfer medium composition.
- Check the concentration of the anti-freeze protection solution (ethylene glycol or propylene glycol).
- Check the heat transfer medium flow rate via the heat exchanger pressure difference.
- Check the operation of the flow switch.
- Check the condition of pipe thermal insulation.
- Check for corrosion of the steel pipe work.
- Check the condition of the expansion tank (customer side) and replace it if required:
  - Presence of corrosion.
  - Loss of gas pressure.
- Clean the hydraulic filter (customer side or already present following options selected).

Electrical:

- At least once a year, tighten the electrical connections for the power supply circuits (see tightening torques table below).
- Check and tighten all control connections, as required.
- Check that the differential circuit breakers are operating correctly every 6 months (if present).
- Remove the dust and clean the inside of the electrical boxes, as necessary.
- Check that the protective devices against access to live parts are present and in good condition.
- Replace the fuses every 3 years or every 15000 hours (ageing).
- Replace the electrical box cooling fans every 5 years.
- Check that the electrical boxes air inlet and outlet are not obstructed. If yes, clean them (sand, dust, leaves…).
- Check good operation of heaters that are present in the units, Measure the current on the terminals inside the electrical box (activate quick test mode to control the heaters if necessary).

Refrigerant circuit:

- Keep an up-to-date service booklet specific to the refrigeration unit in question.
- The unit is subject to F-gas tight regulatory checks. Please refer to the table in the introduction.
- Check the unit operating parameters and compare them with the previous values and note any changes.
- Check the operation of the high-pressure switches. Replace them if there is a fault.
- Check the fouling of the filter drier. Replace it if necessary.

Mechanical:

- Check that the mounting bolts for the ventilation sub-assemblies, fans, compressors, and electrical boxes are securely tightened.
- Check the height of the anti-vibration mounts (located between the feet of the oil separator and the support rails) after 5 years of use, and each year thereafter. Once the total minimum height of the mount is less than 25 mm, the mounts will need replacing.

IMPORTANT: Ensure all adequate safety measures are taken for all these operations: Use appropriate PPE (personal protective equipment), comply with all applicable industry and local regulations, and use common sense.

10.3 - Level 3 (or higher) maintenance

Maintenance at this level requires specific skills/qualifications/ tools and expertise that only the manufacturer, or one of its approved representatives is able to ensure. This maintenance work relates to the following:

- Replacement of a major component (compressor, evaporator).
- Operations on the refrigerating circuit (handling refrigerant).
- Modification of factory-set parameters (change of application).
- Movement or disassembly of the refrigeration unit.
- Any operation due to proven lack of maintenance.
- Any operation covered by the warranty.

To reduce waste, the refrigerant and the oil must be transferred in accordance with applicable regulations, using methods that limit refrigerant leaks and with materials that are suitable for the products.

Any leak detected must be repaired immediately.

The compressor oil that is recovered during maintenance contains refrigerant and must be treated accordingly.

Pressurized refrigerant must not be vented to the open air.

If the refrigerant circuit is opened for a period of up to one day, cap all openings. If open for longer, blanket the circuit with nitrogen.

10.4 - Tightening Torques

10.4.1 - Tightening Torques for the Main Fastenings

Screw type	Use	Value [N.m]
Structural Fixing & Coverings		
Tapping screws D = 4,8mm	Panels (Opt 23) Fan impeller protection housing Condenser modules fixing	4,2
Tapping screws D = 6,3mm	Fan impeller fixing	4,2
M6 Taptite screw	Pipes supports Condenser modules fixing	7
M10 Taptite screw	Chassis / Frame / Structure Electrical panels Compressor and Oil separator fixing Condenser modules (Vés) fixing Economizer modules fixing	30
M6 H screw	Pipe support clip (stauff collar)	10
M8 H screw	Condenser modules fixing Fan plastic impeller fixing	18
M8 H screw	Filter drier housing	35
M8 H nut	Oil separator fixing on frame	14
M10 H screw	Oil separator fixing on frame	30
M16 H Nylstop nut	Compressor fixing on frame	23
M16 H stud	Compressor fixing on frame	30
M16 H screw	Shell & Tube heat exchanger fixing on frame	130
Flanges - Hydraulic Circuit		
M16 H screw	Heat exchanger water boxes flanges	190
Flanges - Frigorific Circuit		
M8 H screw	MCHE coil flanges on discharge & liquid lines	14
M8 H screw	Compressor oil inlet port flange	25
M12 H screw	Compressor economiser port flange	40
M16 H stud and nut	Compressor to Oil separator flange	130
Victaulic collar clamps - Hydraulic Circuit		
M10 H nut	3"	45
M12 H nut	4"	45
M16 H nut	5" & 6"	45
M20 H nut	8"	45
Victaulic collar clamps - Frigorific Circuit		
M10 H nut	3" (Diphasic Line to Evaporator Inlet)	65
M12 H nut	4" (Suction Line)	65
M16 H nut	5" & 6" (Suction line)	65
Threads connections - Oil Line		
5/8 ORFS nut	Oil separator oil outlet port Oil filter	65
Threads connections - Frigorific Circuit Piping		
1"3/4-12-UN Rotalock	Diphasic Line to Evaporator Inlet	100
2"1/4-12-UN Rotalock	Diphasic Line to Evaporator Inlet	145

10.4.2 - Tightening Torques for the Main Electrical Connections

Tightening Torques for the Main Electrical Connections of Standard Units

Component	Designation in the unit	Value [N.m]
Customer connections		
M10 screw-nut on phases	L1/L2/L3	49
M10 screw-nut on earth bar	PE	49
Earthing bar connections		
M8		24
M10		49
Compressor variable frequency drive	GS*	
M8 nuts on internal connections (fuses and busbars)		14,5
M10 nuts on phases	R/S/T U/V/W	29,5
M12 nuts on phases	R/S/T U/V/W	29,5
M8 nuts on earth	GND	29,5
M10 nuts on earth	GND	29,5
Compressor connections	EC*	
M12 nuts on phases	1/2/3	23
M16 nuts on phases	1/2/3	30
M12 screws on ground	GND	25
Switch cage terminal screws		
ABB 243920	KM /KEH*	Spring Terminals
ABB 311581	KEH*	1,2-2,5
FIN391100240060	K118*/K119*	0,5
ABB 273079433	K400	0,6 - 0,8
Circuit breaker and differential block cage terminal screws		
ABB 450040	QF284	2,8
ABB type S803S	QF*	3,5
ABB type MS116 =< 16A	QM100 / QMGS-* / QM* / QFEH1	0,8-1,2
ABB type MS116 >= 20A	QMGS-*	2
ABB type MS132	QMGS-* / QF100-2 / QM*	2
ABB type MS165	QF 100-*	4
Potential transformer	TC*	0,5 - 2,5
Control cabinet distributor		13

Tightening Torques for the Main Electrical Connections of Units + Option 70D

Component	Designation in the unit	Value [N.m]
Main disconnect switch with option 70D		
Circuit breaker - caliber 630/800A	QF100	9
Circuit breaker - caliber 1000A	QF100	18

WARNING: The tightening of the connections at the compressor terminals requires special precautions. Refer to the section below.

10.5 - Hydraulic Maintenance & Repair

WARNING: Filling, topping up, or emptying of the water circuit must be carried out by qualified personnel using the air bleed devices and tools and equipment suitable for the products.

- The heat-transfer medium should be filled and drained using devices fitted to the water circuit by the installer. Never use the unit heat exchangers to add heat exchange fluid.

Check that:

- The insulating foam is neither detached nor torn during works.
- The heaters and probes are operating and correctly positioned in their supports.
- The water-side connections are clean and show no sign of leakage.

10.5.1 - Hydraulic Circuit Cleaning

- Open all control valves completely.
- Start up the heat transfer medium pump.
- Read the unit pressure drop as the difference between the pressure gauges connected to the unit inlet and outlet.
- Let the pump run for 2 hours continuously to flush the system's hydraulic circuit (presence of contaminating solids).
- Perform another reading.
- Compare this value to the initial value.

An increasing pressure difference value indicates that fouling is present inside the hydraulic circuit and must be removed. The hydraulic filters on the installation must be removed and cleaned.

In this case:

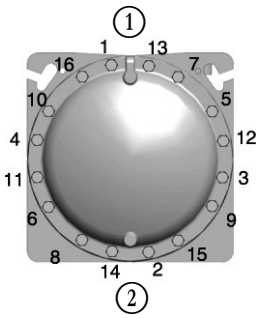
- Drain the installation.
- Remove the filters and clean them.
- Refill and purge the air from the circuit.

Repeat until all fouling is removed.

10.5.2 - Water boxes screws tightening

The evaporator is of the shell and tube type with removable water boxes to facilitate cleaning. Before the unit is first filled with water, or after cleaning, tighten or re-tighten the boxes as per the diagram below.

Water box tightening sequence



Key

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 rating
M16 - 171 - 210 Nm

NOTE: During this procedure, we recommend that the circuit is drained, and the pipes are disconnected to ensure that the bolts are tightened correctly and uniformly.

10.6 - Aeraulic Maintenance & Repair

10.6.1 - Coils (Air heat exchanger) Cleaning

We recommend that coils are inspected regularly to check the degree of cleanliness. This depends on the environment where the unit is installed, in particular urban and industrial sites, and for units installed near trees that shed their leaves.

Recommendations for maintenance and cleaning of MCHE coils:

- Regularly cleaning the coil surface is essential for correct unit operation.
- Eliminating contamination and removal of harmful residue will increase the operating life of the coils and the unit.
- The maintenance and cleaning procedures below are part of the regular maintenance to increase the operating life of coils.
- Clean the surface of the coil by spraying the coil regularly and uniformly from bottom to top, orienting the water jet at right angles to the surface. Do not exceed a water pressure of 6200 kPa (62 bar) or an angle of 45° to the coil. The nozzle must be at least 300 mm away from the coil surface.
- Cleaning could be made on the coil visible part, but also from the top, by removing the fan volute.
- Clean and scrub the entire coil connections with a soft Nylon, PolyPro® or Tynex® brush and low pressure tap water.

Level 1 cleaning:

- Remove all foreign objects or fragments/debris attached to the coil surface or wedged between the chassis and the supports.
- Use a low-pressure dry air jet to remove all traces of dust from the coil.

Level 2 cleaning:

- Carry out the level 1 cleaning operations.
- Clean the coil using suitable products.

Use appropriate PPE including safety glasses and/or mask, waterproof clothes and safety gloves. It is recommended to wear clothing that covers the whole body.

Specific products approved by the manufacturer for cleaning coils are available from the manufacturer's spare parts network. The use of any other product is strictly prohibited. After the cleaning product is applied, rinsing with water is mandatory (see manufacturer's standard RW01-25).

IMPORTANT: Never use a pressure water spray without a large diffuser.

Concentrated and/or rotating water jets are strictly forbidden.

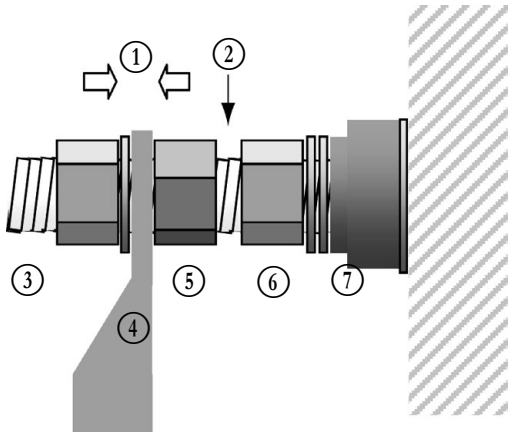
Never use a fluid with a temperature above 45°C to clean the air heat exchangers.

Correct and frequent cleaning (approximately every three months) will prevent 2/3 of the corrosion problems. Protect the electrical cabinets, the VFDs during cleaning operations. Don't forget to remove protections after cleaning operations.

10.7 - Electrical Maintenance & Repair

10.7.1 - Compressor Motor power terminals connection

These precautions need to be applied whenever an operation requires removal of the power conductors connected to the compressor power supply terminals.



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

The tightening nut on the terminal (6) supporting the isolator (7) must never be loosened, as it keeps the terminal secure and stops the compressor leaking.

The phase lug (4) must be tightened applying the torque between the counter nut (5) and the tightening nut (3): During this operation a counter-torque must be applied at counter nut (5).

The lock nut (5) must not be in contact with the terminal securing nut (6).

10.7.2 - Variable frequency drive Maintenance

WARNING: Before any work on the variable frequency drive, ensure that the circuit breaker/disconnect switch is open and there is no voltage present

The capacitors take approximately 20 minutes to discharge. This value is a guide and may differ from one VFD to another: Refer to the information given on the VFD to find out the precise value.

Only appropriately qualified personnel are authorized to replace or make modifications to components inside the variable frequency drive.

During periodic inspections, check the condition of the ventilation grilles on the variable frequency drive door; ensure that they are not pierced, damaged or obstructed.

For any other alarm or problem relating to the variable frequency drive, contact Carrier Service.

In general, a fault with the variable frequency drive can be corrected by repairing or replacing an internal component. If the complete variable frequency drive needs to be replaced, its removal will require prior removal of the ventilation ducts and the top of the cabinet: Please contact Carrier Service. Similarly, precautions must be taken for handling, as the variable frequency drives are very heavy (between 65kg and 120kg, depending on their size).

The variable frequency drives fitted on the units do not require a dielectric test, even if being replaced: They are systematically checked before delivery. Moreover, the filtering components installed in the variable frequency drive can falsify the measurement and may even be damaged.

If the insulation of a component (compressor, cables, etc.) requires testing, the variable frequency drive must be disconnected from the power circuit.

10.8 - Frigorific Circuit Maintenance & Repair

10.8.1 - Checking the compressor rotation

Ensuring the compressor screw rotation is correct is one of the most critical considerations.

Reverse screw rotation, even for a short period, will have a considerable adverse effect on the compressor's reliability, and may even cause irreparable damage. The reverse rotation protection process 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 have been modified.

To minimize any risk of reverse rotation, the following procedure must be applied.

Rewire the electrical wires to the compressor terminals as originally wired. Keep a counter torque on the lower nut on the power supply cable terminal lug when the latter is installed.

When a compressor is replaced, a low-pressure switch must be installed temporarily as a safety measure on the high-pressure part of the compressor. The purpose of this pressure switch is to protect the compressor against any wiring errors at the compressor terminals.

The electrical contact of the switch would be wired in series with the high-pressure switch.

The pressure switch must remain in place until the compressor has been started and direction of rotation has been verified; at this point, the pressure switch can be removed.

The switch that has been selected for detecting reverse rotation is Carrier part number HK01CB001. This pressure switch opens the contacts when the pressure falls below 7 kPa. The pressure switch has a manual reset, which can be reset when the pressure exceeds 70 kPa once more. The pressure switch must be a manual reset type to prevent any risk of the compressor short cycling in the reverse direction.

10.8.2 - Oil separator

Check that the heaters are operating correctly and that they are firmly attached to the oil separator.

10.8.3 - Oil filter change schedule

As keeping the system clean is critical to ensure its reliable operation, there is a filter in the oil pipe at the oil separator outlet.

The oil filter is specified to provide a high level of filtration (5 µ), necessary for ensuring the compressor has a long service life.

The filter should be checked after the first 500 hours of operation, and every subsequent 2000 hours. The filter must be replaced as soon as the pressure differential on the filter exceeds 200 kPa (2 bar).

The pressure drop on the filter is determined by measuring the pressure at the discharge (dp) and the oil pressure (op).

The difference in these two pressures will be the pressure drop on the filter, check valve, and solenoid valve.

The pressure drop on the check valve and solenoid valve is approximately 40 kPa (0.4 bar), which should be subtracted from the two oil pressure measurements to give the oil filter pressure drop.

10.8.4 - Periodic test of the high-pressure safety loop

The aim of this periodic test is to check the settings of the high-pressure safety loop on one of the unit's refrigerant circuits and check it is operating correctly. This procedure must be repeated for each circuit.

1. Fit a calibrated pressure gauge on the high-pressure part of the circuit (compressor discharge).
2. Reset all the active alarms.
3. Activate the HP test mode for the corresponding circuit via the control interface.

   The high-pressure test maybe defined in the fan addressing menu (FAN DRV2).

   To activate the high-pressure test for a specific circuit, access the Maintenance menu.

   Select Fan addressing (section 5.5.10).

   Set the high-pressure test A or high-pressure test B to "yes".
4. Save the fault trip value.
5. Check that the two HPS have tripped.

   If the two HPS have tripped, move on to step 9. If just one of the HPS has tripped.
6. Replace the tripped HPS with another system which has a greater value.

   Alternatively, an emergency stop button can be installed.
7. Repeat steps 2 to 5.
8. Check whether the trip values are correct.

   The trip values must be between +0/-1.4 bars of the rated value indicated on the unit.
9. Reset all the alarms.
10. Reset both the HPS.
11. Deactivate the HP test mode for the circuit.

NOTE: For step 6, electrical disconnection of the tripped HPS and its substitution must be performed within the compressor terminal box. All the procedures for accessing an environment containing hazardous live parts must be respected.

The connector type must be WAGO 231-302 or equivalent.

11 - SYSTEM FINAL SHUTDOWN

The unit is fully or partially recyclable. After use, it may contain refrigerant vapors and oil residues. Some parts are painted.

11.1 - Shutting down

Separate the units from their energy sources, allow them to cool then drain them completely.

11.2 - Recommendations for disassembly

Use the original lifting equipment.

Sort the components according to their material for recycling or disposal, in accordance with regulations in force.

Check whether any part of the unit can be recycled for another purpose.

IMPORTANT: Follow the disassembly procedure indicated in the disassembly instructions.

11.3 - Fluids to be recovered for treatment

- Refrigerant.
- Heat-transfer fluid: Depending on the installation, water, brine solution, etc.
- Compressor oil.

11.4 - Materials to be recovered for recycling

- Steel.
- Copper.
- Aluminum.
- Plastics.
- Polyurethane foam (insulation).

11.5 - Waste Electrical and Electronic Equipment (WEEE)

At the end of its life, this equipment must be disassembled, and contaminated fluids removed by professionals and processed via approved channels for Waste Electrical and Electronic Equipment (WEEE).

12 - OPTIONS

Option	N°	Description	Advantage	Use 30XBV-A
Low noise level	15	Aesthetic and sound absorbing compressor enclosure	Noise level reduction	0500-1800
High ambient temperature	16	Electrical components sized for part load operation up to 55°C air ambient	Extended unit part-load operation up to 55 °C ambient temperature	0500-1800
Grilles and enclosure panels	23	Metallic protection grilles and side enclosure panels	Improves aesthetics, protection against intrusion to the unit interior, coil and piping protection against impacts.	0500-1800
Enclosure panels	23A	Side enclosure panels	Improves aesthetics and piping protection against impacts.	0500-1800
Lead/Lag operation (sensor kit)	58	Unit equipped with supplementary water outlet temperature sensor kit (to be field installed) allowing Lead/Lag operation of two units connected in parallel	Optimised operation of two units connected in parrallel operation with operating time equalisation	0500-1450
Main disconnect switch without fuse	70	Factory-installed main electric disconnect switch in the control box	Ease-of-installation and compliance with local electrical	0500-1800
Main disconnect switch with short-circuit protection	70D	Disconnector circuit breaker equipped with an external disconnect switch handle	Ensure protection of main disconnect switch and associated cables against short-circuits when building devices are not compliant	0500-1800
Service valve set	92	Liquid line valve, evaporator suction line valve and compressor discharge line valve	Allow isolation of various refrigerant circuit components for simplified service and maintenance	0500-1800
Compressor discharge valve	93A	Shut-off valve on the compressor discharge piping	Simplified maintenance	0500-1800
Bacnet over IP	149	Bi-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	0500-1800
Modbus over IP and RS485	149B	Bi-directional high-speed communication using Modbus protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	0500-1800
Energy management module, & input contact for refrigerant leak detection	156+	EMM 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...)	0500-1800
Under voltage relay	159A	Under voltage relay is required in some key markets like UAE to protect the unit against low voltage supply	Electrical protection	0500-1800
Dual relief valves on 3-way valve	194	Three-way valve upstream of dual relief valves on the shell and tubes evaporator	Valve replacement and inspection facilitated without refrigerant loss. Comforms to European standard EN378/BGVD4	0500-1800
Insulation of the evap. In/out ref. lines	256	Thermal insulation of the evaporator entering/ leaving refrigerant lines with flexible, UV resistant insulation	Prevents condensation on the evaporator entering/leaving refrigerant	0500-1800
Enviro-Shield anti-corrosion protection	262	Coating by conversion process which modifies the surface of the aluminum producing a coating that is integral to the coil. Complete immersion in a bath to ensure 100% coverage. Minimal heat transfer variation, tested 4000 hours salt spray per ASTM B117	Improved corrosion resistance, recommended for use in moderately corrosive environments	0500-1800
Super Enviro-Shield anti-corrosion protection	263	Extremely durable and flexible epoxy polymer coating applied on micro channel heat exchangers by electro coating process, final UV protective topcoat. Minimal heat transfer variation, tested 6000 hours constant neutral salt spray per ASTM B117, superior impact resistance per ASTM D2794	Improved corrosion resistance, recommended for use in extremely corrosive environments	0500-1800
Welded evaporator connection (kit)	266	Victaulic piping connections with welded joints	Easy installation	0500-1800
Evaporator with aluminum jacket	281	Evaporator covered with an aluminum sheet for thermal insulation protection	Improved resistance to aggressive climate conditions	0500-1800
Mexico screw compressor	297	Screw compressor made in Mexico	Mexico screw compressor	0500-1800
Compliance with UAE regulation	318	Additional label on the unit with rated power input, rated current and EER following AHRI 550/590	Compliance with ESMA standard UAE.S 5010-5:2019.	0500-1800
Compliance with Qatar regulation	319	Specific nameplate on the unit with power supply 415 V+/-6%	Compliance with KAHRAMAA regulation in Qatar.	0500-1800
Compliance with Morocco regulation	327	Specifics documents according Morroco regulation	Conformance with Morocco regulations	0500-1800
Delivery with plastic tarp cover	331	Plastic sheeting covering the units, with strapping securing it on the wooden pallet	Allow unit to avoid dust and dirt from the outside environment during stocking and shipping	0500-1800
Power supply 400-3-60Hz (compliance with SASO regulation)	335	400-3-60Hz power supply	Permits unit connection to 400-3-60Hz power supply	0500-1800

12 - OPTIONS

12.1 - Option 15: Low Noise

12.1.1 - Structural & Acoustical Description

12.1.1.1 - Structural & Acoustical System

Structural & Acoustical Data

30XBV-A Single Units + Option 15		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Weights											
Operating weight(1)	kg | lb	4930 | 10869	4969 | 10955	5308 | 11702	6148 | 13554	6244 | 13765	7040 | 15520	7425 | 16369	7866 | 17341	8181 | 18036	9079 | 20016
Sound levels											
Sound Power(2)	dB(A)	94,5	96,0	98,0	98,0	97,5	98,5	98,5	99,5	99,5	100,0
Sound Pressure at 10 m(3)	dB(A)	62,0	64,0	65,5	65,0	64,5	66,0	65,5	66,5	66,5	67,0

30XBV-A Duplex Units + Option 15		1600_1	1600_2	1800_1	1800_2
Weights					
Operating weight(1)	kg | lb	6150 | 13558	6153 | 13565	6159 | 13578	6159 | 13578
Sound levels					
Sound Power(2)	dB(A)	100,0	100,0	101,0	101,0
Sound Pressure at 10 m(3)	dB(A)	66,5	66,5	67,5	67,5

(1) Values are guidelines only. Refer to the unit name plate.
(2) In dB ref =10^{-12} W, 'A' weighted. Declared noise emission value dissociated in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). Measurement following ISO 9614-1 and certified by Eurovent.
(3) In dB ref =20 µPa, 'A' weighted. Declared noise emission value in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). For information, calculated from the sound power Lw(A).

12.2 - Option 16: High ambient temperature

12.2.1 - Electrical Description

12.2.1.1 - Electrical Connections

Recommended cables sections

Minimum and maximum cable section selection table for connection to 30XBV-A units:

30XBV-A + Option 16	Max. connectable section(1)		Calculation of favourable case: - Suspended overhead line (standardized routing n°. 17) - Cable insulated to 90°C - Copper conductor (Cu)			Calculation of unfavourable case: - Conductors in ducts or multi-conductor cables in closed conduits (standardized routing n°. 41) - Cable insulated to 70°C when possible - Copper conductor (Cu)		
	Side connection	Bottom connection	Section(2)	Max. length for a voltage drop <5%	Cable type(3)	Section(2)	Max length for a voltage drop <5%	Cable type(3)
	qty x mm² (per phase)	qty x mm² (per phase)	qty x mm² (per phase)	m	-	qty x mm² (per phase)	m	-
0500	4 x 240	2 x 240	1 x 150	211	90°C	2 x 140	521	70°C
0600	4 x 240	2 x 240	1 x 185	204	90°C	2 x 185	352	90°C or 70°C
0700	4 x 240	3 x 240	1 x 240	224	90°C	2 x 240	373	90°C or 70°C
0800	4 x 240	3 x 240	2 x 120	195	90°C	2 x 300	375	90°C or 70°C
0900	4 x 240	4 x 240	2 x 150	211	90°C	3 x 185	325	90°C or 70°C
1000	4 x 240	4 x 240	2 x 185	215	90°C	3 x 240	332	90°C or 70°C
1100	4 x 240	4 x 300	2 x 185	197	90°C	3 x 300	344	90°C
1200	3 x 300	4 x 300	2 x 240	222	90°C	4 x240	334	90°C
1300	3 x 300	4 x 300	2 x 240	206	90°C	4 x240	310	90°C
1450	3 x 300	4 x 300	3 x 150	175	90°C	4 X 300	305	90°C
1600_1	4 x 240	3 x 240	2 x 120	195	90°C	2 x 300	375	90°C or 70°C
1600_2	4 x 240	3 x 240	2 x 120	195	90°C	2 x 300	375	90°C or 70°C
1800_1	4 x 240	4 x 240	2 x 150	211	90°C	3 x 185	325	90°C or 70°C
1800_2	4 x 240	4 x 240	2 x 150	211	90°C	3 x 185	325	90°C or 70°C

(1) Connection capacities actually available for each unit. These are defined according to the connection terminal size, the electrical box access opening dimensions, and the available space inside the electrical box.
(2) Selection simulation result considering the hypotheses indicated.
(3) If the maximum calculated selection is for a 90°C cable type, this means that a selection based on a 70°C cable type can exceed the connection capacity actually available. Special attention must be given to the selection.

12.2.1.2 - Electrical System

Units Electrical Data

30XBV-A Single Units + Option 16		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Power circuit supply											
Nominal voltage	V-ph-Hz	400-3-50									
Voltage range	V	360-440									
Input power(1)											
Maximum operating input power(2)	kW	238	294	332	382	419	481	525	559	601	678
Operating current draw(1)											
Maximum Current (Un)(2)	A	370	457	516	593	651	747	815	868	934	1054
Maximum Current (Un-10%)	A	396	499	543	637	685	816	857	940	977	1098
Power factor at maximum input power(1)		0,91-0,93									
Displacement Power Factor (Cos. Phi)(3)		>0,98									
Total current harmonic distortion rate (THDi)(4)	%	35-45%									
Start-up current(1)											
Maximum Current (Un)(5)	A	203	265	294	292	308	417	451	460	483	598

30XBV-A Duplex Units + Option 16		1600_1	1600_2	1800_1	1800_2
Power circuit supply					
Nominal voltage	V-ph-Hz	400-3-50			
Voltage range	V	360-440			
Input power(1)					
Maximum operating input power(2)	kW	382	382	419	419
Operating current draw(1)					
Maximum Current (Un)(2)	A	593	593	651	651
Maximum Current (Un-10%)	A	637	637	685	685
Power factor at maximum input power(1)		0,91-0,93			
Displacement Power Factor (Cos. Phi)(3)		>0,98			
Total current harmonic distortion rate (THDi)(4)	%	35-45%			
Start-up current(1)					
Maximum Current (Un)(5)	A	292	292	308	308

(1) Values obtained at operation with maximum operating input power.
(2) Values given on the unit nameplate.
(3) Values decrease when load lowers.
(4) May vary according to the installation's short circuit ratio. The exact values depend on the short-circuit ratio (Rsce).
THDi increases when load lowers. It's necessary to consider a degradation of the values when the input power drops.
The highest impact on the installation occurs when the current is maximum.
Therefore compliance of the installation regarding voltage harmonic distortion at PCC (per IEC61000-2-4 or other standard) shall be usually checked at max load in order to cover all load conditions.
(5) Starting current of the smallest compressor + Operating current of the biggest compressor + Fan current.

12.2.2 - System Frigorific Description

12.2.2.1 - Frigorific System

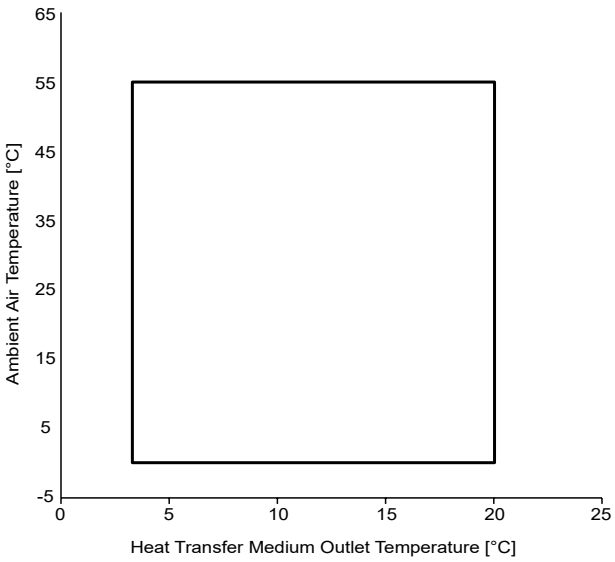
Units Operating Range

Heat Transfer Medium Heat Exchanger		Minimum	Maximun
Heat Transfer Medium Inlet Temperature at start-up	°C | °F	-	45(1) | 113
Heat Transfer Medium Inlet Temperature during operation	°C | °F	6,8 | 44,2	36 | 96,8
Heat Transfer Medium Outlet Temperature during operation	°C | °F	3,3(2) | 37,9	20 | 68
Air Heat Exchanger		**Minimum**	**Maximun**
Ambient Air Temperature during storage	°C | °F	5 | 41	68 | 154,4
Ambient Air Temperature during operation	°C | °F	0 | 32	55 | 131

(1) Operating at partial load.
(2) According to the type of installation and air temperature.

NOTE:
- **The use of brine or antifreeze protection option is required if pure water is to be used and to be cooled below 4 °C.**
- **If the air temperature is to fall below 0 °C, a glycol/water solution or the freeze protection option must be used.**

Units Operating Range



NOTE:
- **These ranges are given for indicative purpose. Check the operating range from Carrier electronic catalogue.**

Legend:
Operating range, standard units

12.3 - Option 58: Operation of two units as a Lead/Lag pair

12.3.1 - System Controls Description

12.3.1.1 - System Controller

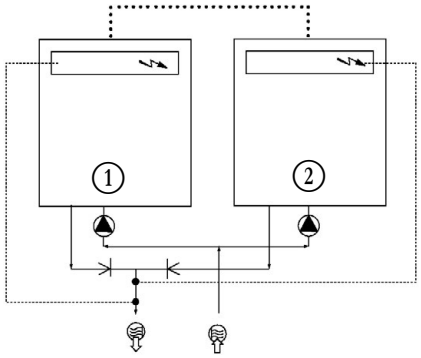
The Lead-Lag pair is controlled on the water inlet without any additional sensors being added (standard configuration). It is also possible to control on the water outlet by adding two additional sensors in the common supply pipe work.

All the parameters required for the Lead/Lag function must be configured using the configuration menu. All remote controls of the Lead/Lag pair (start/stop, setpoint, load shedding, etc.) are managed by the unit configured as the Lead and must only be applied to the Lead unit.

Each unit controls its own water pump. If there is only one common pump, in cases with a variable flow, isolation valves must be installed on each unit. These should be controlled (opened and closed) using the controls for the relevant unit (in this case, valves will be controlled using the dedicated water pump outputs). Refer to the SmartVu™ control manual for a more detailed explanation.

WARNING: To permit Lead/Lag operation both units must be equipped with option 58.

Configuration: Control on the water outlet



Key
1 Lead unit
2 Lag unit
Control panels for Lead and Lag units
Water inlet
Water outlet
Water pumps for each unit
Additional sensors for the control of the leaving water temperature to be connected on channel 1 of the Lag boards of both Lead and Lag unit
Communication bus CCN
Connection of two additional sensors

12.4 - Option 70 - Main disconnect switch without fuse

30XBV-A Single Units + Option 70		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Value with upstream electrical protection(1)											
Rated conditional short circuit current Icc	kA rms	50	50	50	50	50	50	50	50	50	50

30XBV-A Duplex Units + Option 70		1600_1	1600_2	1800_1	1800_2
Value with upstream electrical protection(1)					
Rated conditional short circuit current Icc	kA rms	50	50	50	50

Note: The short-circuit stability current values above are suitable with the TN system.

12.5 - Option 70D: Main disconnect switch with short-circuit protection

12.5.1 - Electrical Description

12.5.1.1 - Additional Electrical Components

Main Electrical Cabinet

The electrical cabinet(s) contains a power supply disconnecting component for each power supply: Circuit breaker if option 70D was chosen.

12.5.1.2 - Electrical System

Compliance of Electrical Installation

Customer Building Electrical Connections

For machines equipped with option 70D, the short circuit protection is already provided.

Short-Circuit Current

30XBV-A Single Units + Option 70D		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Value with upstream electrical protection(1)											
Rated conditional short circuit current Icc	kA rms	50	50	50	50	50	50	50	50	50	50

30XBV-A Duplex Units + Option 70D		1600_1	1600_2	1800_1	1800_2
Value with upstream electrical protection(1)					
Rated conditional short circuit current Icc	kA rms	50	50	50	50

NOTE: The short-circuit stability current values above are suitable with a TN system.

12.6 - Options 92 - Service valves set

Liquid line valve and economizer line valve are present as standard (without option).

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

If option 92 is ordered, each refrigerating circuit will be equipped with isolation valves on discharge line and on evaporator (inlet) suction line.

12.7 - Options 262 / 263: Coils Coating

12.7.1 - System Aeraulic Description

12.7.1.1 - Aeraulic Components

Coils air side

Corrosion

E-coat and TCP treatments (options 262 and 263) protect against aluminum corrosion in aggressive environment.

NOTE: The ageing of the coils depends on external conditions.

13 - OPTIONS CUMULATION

13.1 - Options 335 + 16 : 400-3-60Hz power supply + High ambient temperature

13.1.1 - Structural & Acoustical Description

13.1.1.1 - Structural & Acoustical System

Structural & Acoustical Data

30XBV-A Single Units + Options 335 + 16		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Sound levels											
Sound Power(1)	dB(A)	98,5	100,5	102,0	104,0	102,5	105,5	103,5	105,0	104,5	105,5
Sound Pressure at 10 m(2)	dB(A)	66,0	68,0	69,5	71,5	70,0	72,5	71,0	72,0	71,5	72,5

30XBV-A Duplex Units 335 + 16		1600_1	1600_2	1800_1	1800_2
Sound levels					
Sound Power(1)	dB(A)	104,5	104,5	105,5	105,5
Sound Pressure at 10 m(2)	dB(A)	71,0	71,0	72,0	72,0

(1) In dB ref =10^{-12} W, 'A' weighted. Declared noise emission value dissociated in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). Measurement following ISO 9614-1 and certified by Eurovent.
(2) In dB ref =20 µPa, 'A' weighted. Declared noise emission value in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). For information, calculated from the sound power Lw(A).

13.1.2 - Electrical Description

13.1.2.1 - Electrical Components

Fan Motors

According to regulation N°640/2009 and amendment 4/2014 implementing directive 2009/125/CE with regard to ecodesign requirements for electric motors.

30XBV-A Units + Options 335 + 16		
Motor Type		Asynchronous
Number of poles	p	6
Nominal Voltage	V	400
Number of phases	Ph	3
Nominal Input Frequency	Hz	60
Maximum Input Power (400V)	kW	2,97
Nominal Shaft Power Output	kW	2,4
Motor manufacturer		Leroy Somer
Motor P/N		00PPG000558600A
Speed regulator		NO
Motor included in the application domain of the regulation 640/2009 & amendement 4/2014		NO
Sales leaflet for exemption		Article 2.1
Ambient air temperature for which the motor is specifically designed	°C	70

13.1.2.2 - Electrical Data

30XBV-A Single Units + Options 335 + 16		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Power circuit supply											
Nominal voltage	V-ph-Hz	400-3-60									
Voltage range	V	360-440									
Input power(1)											
Maximum operating input power(2)	kW	251	309	351	403	441	507	554	588	635	716
Operating current draw(1)											
Maximum Current (Un)(2)	A	390	480	545	626	685	788	861	914	987	1112
Maximum Current (Un-10%)	A	415	522	571	671	718	856	902	986	1029	1156
Power factor at maximum input power(1)		0,91-0,93									
Displacement Power Factor (Cos. Phi)(3)		>0,98									
Total current harmonic distortion rate (THDi)(4)	%	35-45%									
Start-up current(1)											
Maximum Current (Un)(5)	A	213	276	308	309	325	438	473	483	509	627

30XBV-A Duplex Units + Options 335 + 16		1600_1	1600_2	1800_1	1800_2
Power circuit supply					
Nominal voltage	V-ph-Hz	400-3-60			
Voltage range	V	360-440			
Input power(1)					
Maximum operating input power(2)	kW	403	403	441	441
Operating current draw(1)					
Maximum Current (Un)(2)	A	626	626	685	685
Maximum Current (Un-10%)	A	671	671	718	718
Power factor at maximum input power(1)		0,91-0,93			
Displacement Power Factor (Cos. Phi)(3)		>0,98			
Total current harmonic distortion rate (THDi)(4)	%	35-45%			
Start-up current(1)					
Maximum Current (Un)(5)	A	309	309	325	325

(1) Values obtained at operation with maximum operating input power.
(2) Values given on the unit nameplate.
(3) Values decrease when load lowers.
(4) May vary according to the installation's short circuit ratio. The exact values depend on the short-circuit ratio (Rsce).
THDi increases when load lowers. It's necessary to consider a degradation of the values when the input power drops.
The highest impact on the installation occurs when the current is maximum.
Therefore compliance of the installation regarding voltage harmonic distortion at PCC (per IEC61000-2-4 or other standard) shall be usually checked at max load in order to cover all load conditions.
(5) Starting current of the smallest compressor + Operating current of the biggest compressor + Fan current.

13.1.3 - Aeraulic Data

30XBV-A Units + Options 335 + 16	0500	0600	0700	0800	0900	1000	1100	1200	1300	1450	1600	1800
Fans Quantity	7	8	10	12	12	14	16	16	18	20	24	24
Maximum Total Air Flow Rate m³/s | gpm	43 | 687421	50 | 785624	62 | 982030	74 | 1178436	74 | 1178436	87 | 1374842	99 | 1571248	99 | 1571248	112 | 1767654	124 | 1964060	149 | 2356872	149 | 2356872
Maximum Rotation Speed rpm	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140

13.2 - Options 15 + 335 + 16 : Low Noise + 400-3-60Hz power supply + High ambient temperature

13.2.1 - Structural & Acoustical Description

13.2.1.1 - Structural & Acoustical System

Structural & Acoustical Data

30XBV-A Single Units + Options 15 + 335 + 16		0500	0600	0700	0800	0900	1000	1100	1200	1300	1450
Weights											
Operating weight(1)	kg | lb	4930 | 10869	4969 | 10955	5308 | 11702	6148 | 13554	6244 | 13765	7040 | 15520	7425 | 16369	7866 | 17341	8181 | 18036	9079 | 20016
Sound levels											
Sound Power(2)	dB(A)	98,0	99,0	100,5	101,0	100,5	101,5	102,0	102,5	102,5	103,0
Sound Pressure at 10 m(3)	dB(A)	65,5	66,5	68,0	68,0	68,0	69,0	69,0	69,5	69,5	70,0

30XBV-A Duplex Units + Options 15 + 335 + 16		1600_1	1600_2	1800_1	1800_2
Weights					
Operating weight(1)	kg | lb	6150 | 13558	6153 | 13565	6159 | 13578	6159 | 13578
Sound levels					
Sound Power(2)	dB(A)	103,0	103,0	104,0	104,0
Sound Pressure at 10 m(3)	dB(A)	69,5	69,5	70,5	70,5

(1) Values are guidelines only. Refer to the unit name plate.
(2) In dB ref =10^{-12} W, 'A' weighted. Declared noise emission value dissociated in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). Measurement following ISO 9614-1 and certified by Eurovent.
(3) In dB ref =20 µPa, 'A' weighted. Declared noise emission value in accordance with ISO 4871 with an uncertainty of +/-3 dB(A). For information, calculated from the sound power Lw(A).

14 - APPENDICES

Appendices are provided in the document wallet with the instruction manual.

14.1 - Appendix 1: Declaration of conformity

14.2 - Appendix 2: Wiring diagram

14.3 - Appendix 3: Machine PID

14.4 - Appendix 4: Dimensional drawings

The quality management system of this product's assembly site has been certified in accordance with the requirements of the ISO 9001 standard (latest current version) after an assessment conducted by an authorized independent third party.
The environmental management system of this product's assembly site has been certified in accordance with the requirements of the ISO 14001 standard (latest current version) after an assessment conducted by an authorized independent third party.
The occupational health and safety management system of this product's assembly site has been certified in accordance with the requirements of the ISO 45001 standard (latest current version) after an assessment conducted by an authorized independent third party.
Please contact your sales representative for more information.

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