Kappa SKY FC

General
High efficiency, single and double circuit free-cooling chillers featuring screw compressors with variable compression ratio and an inverter for capacity modulation

Configurations
Xi: high efficiency , versione with full inverter compressors

Si: compact dimensions , versione with full inverter compressors

Sh: compact dimensions, , versione with hybrid compressors

LGW Xi: refrigerant with low GWP , versione with full inverter compressors

LGW Sh: refrigerant with low GWP compact dimensions, versione with hybrid compressors

/LN: silenced unit

NG: no-glycol execution

/DS: execution featuring a desuperheater

/DC: execution with recovery condenser

Strengths
- Free-cooling BASIC, Free-cooling EXTRA
- Versatile application: water temperature up to 23°C. Operation in a wide range of environmental conditions.
- High efficiency and compact dimensions
- Extended operating limits: down to ambient temperatures of -40°C with special options
- BlueThink advanced control with integrated web server. Multilogic function and Blueye® supervision system. (options)
- Flowzer: energy optimization on water side (options)
- Conforming with **Ecodesign Reg. 2281 tier 2**

WESTERN™ AIRCONDITIONING WARMTEPOMPEN

BlueBox by Swegon

Kappa SKY FC

Kappa SKY FC

APPLICATION AND OPERATING PRINCIPLE

Free cooling units meet growing demands for energy savings, since they have been designed to reduce the operating costs of refrigerating machines that work to serve process applications or in the IT field.

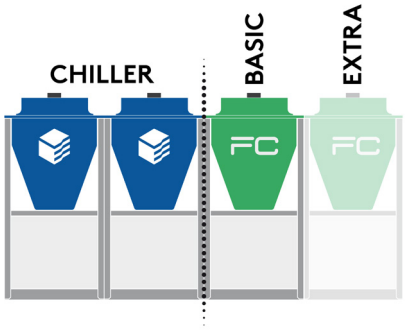
A strong point of our free cooling units is certainly the control system that allows maximum use to be made of the free resource, consisting of outside air, so minimizing the energy used by the compressors. The controller of the unit activates the chiller section and the free cooling section, also in combined mode, based on the actual external air temperatures, the set point and the required load level.

The free cooling section is hydraulically in series with the evaporator and this allows a benefit to be obtained from its activation even when the outside air temperature is sufficient to carry out only a pre-cooling of the water. The missing amount of capacity, in any case lower than the total required, will be provided by the compressors.

As the outside air temperature goes down, the amount of capacity that the free cooling section will be able to transfer to the water will gradually increase. Consequently, the amount of capacity that will have to be covered by the compressors will always be lower.

When the TFT (Total Free-cooling Temperature) is reached, the free cooling section will be able to fully meet the cooling capacity requirement and therefore the compressors can be switched off. In this condition, the unit will be able to provide the system with a cooling capacity equal to that required at design conditions, but with current drawn by the fans alone.

Modular free-cooling



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The main advantage is due to the fact that the condensing coils and the free-cooling coils can have different dimensions (since they are not facing each other) and this makes different combinations possible.

For each model, you can choose from two different free-cooling versions - BASIC and EXTRA -, ranging from the lowest to the highest number of water coils:

- BASIC: this is the most compact free cooling module. This set-up allows you to obtain, with the smallest investment, a free-cooling contribution that can help the chiller section or be used in applications where the cooling load during the winter is very much lower than the nominal load. Average TFT: -4°C.
- EXTRA: this is the free cooling module with the best TFT. This module is used to obtain the maximum capacity from the water coils, and therefore makes maximum use of cooling capacity production through free cooling. This is the ideal set-up for applications where the cooling capacity demand is almost constant throughout the year, such as for example in IT applications or the cooling of industrial processes in general. Average TFT: +2°C.

Also, since there are two separate fan sections, the unit controller will be able to manage them independently and therefore:

- the free-cooling section fans will operate at 100% to extract the maximum capacity from the air
- the chiller section fans will be modulated depending on the instant condensing pressure.

Compared to other free cooling systems, such as for example the system with facing coils, the one used by Kappa SKY FC allows:

- much more precise condensation control, which helps the stability of operation of the machine
- the use of a very simple refrigerant circuit (no capacity reduction of the coils), thereby favouring the reliability of the machine
- limitation of the refrigerant charge because it does not use the "flooding" condensation control, but allows the use of microchannel condensing coils.

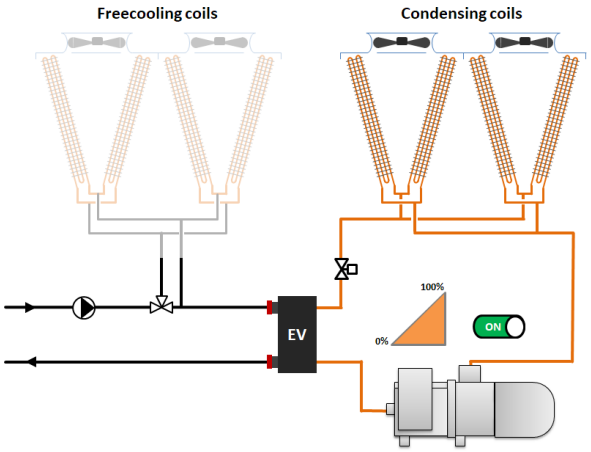
Finally, it should be remembered that the modularity of Kappa SKY FC does not regard only the size of the free cooling section; it also regards the possibility of choosing from various combinations of efficiency and noiselessness of the chiller section.

PRINCIPLE OF OPERATION

How the unit behaves in the various scenarios is explained briefly below.

Chiller only mode

When the ambient temperature is higher than the temperature of the water returning from the system, all the required cooling capacity must be produced by the compressors.

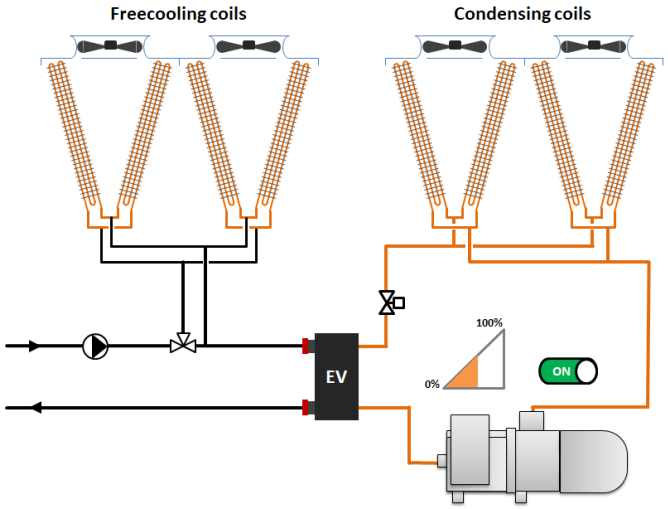


The total cooling capacity is generated by the compressors of the chiller section, and the free cooling coil and relevant fans remain inactive. The operation of the unit is that of a classic chiller.

The 3-way valve bypasses the free cooling coil (so preventing unnecessary head losses) and condensation control is done, when necessary, through fan speed modulation.

Mixed mode

When the ambient temperature is lower than the temperature of the water returning from the system, the controller activates the free cooling section.

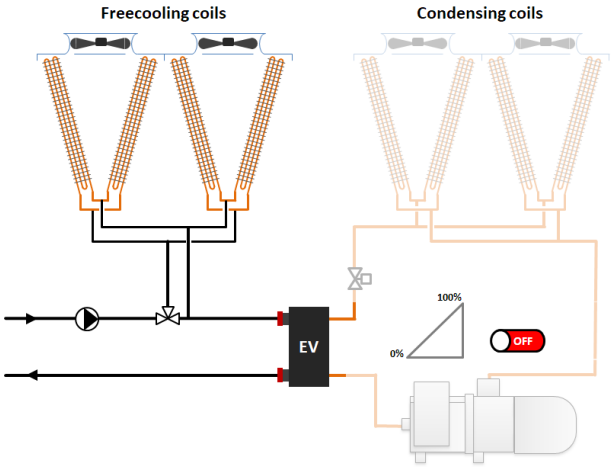


The control switches over the 3-way valve to put the free cooling coil in series with the evaporator and with the free cooling section fans.

The water leaving the free cooling coil will be "pre-cooled" by the outside air (partial free cooling) and is sent to the evaporator inlet. Now the chiller section can operate in reduced capacity mode because it will have to produce only the amount needed to reach total cooling capacity.

Free cooling only mode

For outside air temperatures lower than or equal to the TFT, the unit operates exclusively in free cooling mode.



The output capacity from the water coil fully meets the demand of the system, and therefore the condensing section fans are completely switched off and so are the compressors.

As the outside air temperature falls, the output capacity from the free-cooling section will gradually increase and the controller of the unit will consequently modulate the output capacity through fan speed modulation.

PRODUCT DESCRIPTION

Kappa SKY FC is a range of inverter-controlled screw compressor chillers for the generation of refrigerated water from -8°C up to 23°C with external temperatures ranging between -20°C and 50°C.

The Kappa SKY range is available with 5 efficiency levels (Xi, Si,Sh, LGW Xi and LWG Sh) and 2 noise emission levels (base version and LN). Units from the Xi and LWG Xi series are designed for max. seasonal efficiency. The Si models provide for excellent efficiency and very high compactness. They are specifically designed for retrofit solutions where significant restrictions exist regarding unit housing. All the refrigerant circuits are fitted with an AC inverter-controlled screw compressor that is designed to modulate the demand for cold.

REFRIGERANTS

Refrigerant R513A (GWP=573*) standard.

The refrigerant consists in a blend of R134a (44%) and R1234yf (56%), with temperature glide equal to 0.

R513A is classified as a non hazardous fluid (Group 2 fluid under PED).

It is also included in Class A1 under the ASHRAE Standard 34:

- non-toxic;
- non-flammable.

The excellent GWP value may be an advantage in projects where:

- min. targets are adopted for the containment of the environmental footprint;
- it is possible to receive incentives or other benefits that are applicable in some countries or are connected to specific plant design criteria.

This also goes to the benefit of unit installation, commissioning and maintenance as it reduces the overall management costs.

Refrigerant R1234ze (GWP<1*)

(*) GWP (AR5), pursuant to IPCC V, evaluated over a span of 100 years.

BODY

The body is modular with a load-bearing frame, made of galvanized sheet-iron coated with polyester powder RAL 5017/7035 which makes it highly resistant to weather conditions. All screws and bolts are stainless steel.

There are yellow lifting brackets at the base of the unit to allow lifting with lifting beam.

All the units are monobloc type.

COMPRESSORS

Units fit innovative screw compressors with a variable compression ratio, which ensure optimised operation under all operating conditions.

The new position of the slide valve contributes to changing the compressor internal geometry, thus optimising the purge pressure in function of the ambient conditions. The BlueThink controller constantly monitors the evaporating and condensing temperatures of the unit and changes the compression ratio of the compressors to obtain the maximum achievable efficiency.

The compressors in use are designed according to an exclusive BlueBox specification in order to achieve maximum efficiency both under partial and full load conditions.

Units in Xi and LWG Xi versions are available in single and double circuit configuration. Units in Si version are available in double circuit configuration. Each circuit fits a semi-hermetic screw compressor with variable compression ratio. Each circuit also features an AC inverter for continuous capacity reduction of the refrigeration demand from each compressor from 25 up to 100%, thus achieving a min. control step of 12.5% in double circuit units. The capacity reduction of the entire unit is always continuous, from the minimum capacity reduction step, based on the number of compressors, up to 100%. The variation of the compression ratio caused by the sliding of the internal slide valve, in combination with capacity reduction of the refrigeration demand by the inverter, allows for the maximisation of the energy efficiency of the unit in all operating conditions.

In addition to managing capacity modulation, BlueThink also controls all safety devices so that the compressor can operate within its operating limits at all times and simultaneously safeguard its operation and reliability. Compressor lubrication is ensured by the pressure difference between the delivery and the suction lines, thanks to the regulation action performed by BlueThink.

Units in Sh version are available in double, hybrid circuit configuration. The first circuit fits a semi-hermetic screw compressor with variable compression ratio. The first circuit also features an AC inverter for continuous capacity reduction of the compressor refrigeration demand from 25 up to 100%, thus achieving a min. control step of 12.5% in double circuit units.

The second circuit fits a semi-hermetic screw compressor with stepped capacity reduction. The capacity reduction of the entire unit is always continuous, from the min. capacity reduction step up to 100%. The variation of the compression ratio caused by the sliding of the internal slide valve, in combination with capacity reduction of the refrigeration demand by the inverter, allows for the maximisation of the energy efficiency of the unit in all operating conditions.

All the compressors are fitted with check valve on delivery side, metal mesh filter on suction side and electronic protection with temperature sensors directly inserted in the windings and on the delivery pipe.

Startup in compressors featuring an inverter is of the "Direct On Line" type with an inverter-controlled acceleration ramp that minimises inrush currents.

All the compressors are fitted with check valve on delivery side, metal mesh filter on suction side and electronic protection with temperature sensors directly inserted in the windings and on the delivery pipe.

- The maximum inrush current of the unit is always lower than its maximum absorbed current (calculated in the worst operating condition), therefore making the power cables and line protection devices less onerous.

All the compressors are fitted as standard with crankcase heater and discharge valve.

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In addition to the obvious energy savings arising from greater efficiency, the use of a full inverter unit also brings advantages in terms of installation:

- The maximum inrush current of the unit is always lower than its maximum absorbed current (calculated in the worst operating condition), therefore making the power cables and line protection devices less onerous.

All the compressors are fitted as standard with crankcase heater and discharge valve.

- For these units, the cosφ (power factor) is always greater than 0.95, therefore making external power factor correction systems unnecessary.
- The maximum inrush current of the unit is always lower than its maximum absorbed current (calculated in the worst operating condition), therefore making the power cables and line protection devices less onerous.

All the compressors are fitted as standard with crankcase heater and discharge valve.

SOURCE-SIDE HEAT EXCHANGER

The exchangers are made with microchannel aluminium coils.

Thanks to continuous research in the alloys field, and sophisticated production methods, microchannel coils are made using specific aluminium alloys for the tubes and for the fins. This allows the effects of galvanic corrosion to be drastically reduced to always ensure protection of the tubes that confine the refrigerant. Tubes and fins are also subjected to SilFLUX coating processes (or equivalent) or have zinc added to further increase their corrosion resistance.

The use of microchannel coils, as opposed to conventional copper/aluminium coils, reduces the total weight of the unit and reduces the refrigerant charge.

The V-shaped arrangement of the coils enables them to be protected from hail and makes the unit compact. It also guarantees an increase in the air intake surface, and leaves ample space for distribution of the components of the refrigerant circuit and the hydraulic circuit.

Options are available for installation in environments with a particularly aggressive atmosphere or in coastal or highly industrialized areas. See section: "Description of accessories".

FANS

The fans are axial fans, directly coupled to a three-phase 6-pole electric motor, with integrated thermal overload protection (Klixon®) and IP 54 protection rating.

The fan includes the shroud, designed to optimize its efficiency and reduce noise emission to a minimum, and the safety guard.

The controller manages the speed of the fans in the chiller section through a phase cutting speed adjuster in order to optimize the operating conditions and the efficiency of the unit.

The fan speed regulator is supplied standardly.

This control also has the effect of reducing the noise level of the unit: in fact, the typical conditions under which the control will be modulating the speed of the fans are those of the night, spring and autumn.

The fans in the free-cooling section are managed with a phase cutting speed adjuster depending on the temperature of the output water.

EC, standard or oversized fans are available as options for both sections.

USER-SIDE HEAT EXCHANGER

The exchanger is a dry-expansion shell-and-tube exchanger.

It is sized to maximize the efficiency of the unit by keeping the overall dimensions and the refrigerant charge down to a minimum.

The exchanger consists of a steel shell insulated with a shell made of closed-cell foam material, while the tube bundle is made with copper tubes.

On the hydraulic connections of the heat exchanger, there are pipe taps for the differential pressure switch, and wells for the temperature probes.

REFRIGERANT CIRCUIT

Each refrigerant circuit of the basic unit comprises:

- discharge valve for each compressor
- shut-off valve in the liquid line
- charging sockets
- liquid sight glass
- replaceable solid cartridge dehydrator filter
- electronic expansion valve
- pressure transducers for reading the high and low pressure values and relevant evaporating and condensing temperatures
- high pressure switches and safety valves.

The pipes of the circuit and the exchanger are insulated with extruded closed-cell expanded elastomer that is resistant to UV rays.

Compared to the mechanical expansion valve, the electronic expansion valve allows machine stability to be reached more quickly and better superheating control to maximize the use of the evaporator in all load conditions. This also acts as shut-off valve on the liquid line, as it closes during compressor stops, so preventing dangerous refrigerant migration.

FREE COOLING CIRCUIT

The free cooling circuit consists of:

- the free cooling heat exchanger: this is made with finned pack coils with copper tubes and aluminium fins
- a servo controlled 3-way valve managed by the control
- water drain valve
- air valves (on each individual coil)
- expansion vessel
- safety valve

ELECTRICAL CONTROL PANEL

The electrical control panel is made in a painted galvanized sheet-iron box with forced ventilation and IP54 protection rating. The electrical control panel of the basic unit comprises:

- main disconnect switch
- fuses to protect the compressors, fans and auxiliary circuits
- compressor contactors
- fan contactors
- phase monitor
- potential-free general alarm contacts
- single potential free operating contacts
- external air temperature probe
- a regulation controller with a display;
- Capacitive backup battery for electronic expansion valve
- An AC inverter for each refrigerant circuit

All the electrical cables inside the panel are numbered and the terminal board dedicated to the customer's connections is coloured orange so that it can be quickly identified in the panel.

CONTROL BLUETHINK

Main controller functions

The regulation controller is designed for the following functions:

- water temperature control, with control of the water leaving the user-side exchanger
- activation and modulation of the free-cooling section
- freeze protection
- compressor timings
- automatic rotation of compressor starting sequence
- recording of the log of all machine inputs, outputs and states
- automatic rotation of compressor starting sequence
- recording of the alarm log
- digital input for general ON/OFF
- RS485 serial port with Modbus protocol
- Ethernet serial port with Modbus protocol and integrated web server preloaded web page

For further details on available functions and on displayed information, you can refer to the specific documentation of the control.

By default, the serial connections present as standard are enabled only for reading from BMS. Enabling of writing from BMS is to be requested when ordering.

Main functions of the webserver

The BlueThink controller is standardly supplied with a web server, access to which is gained with an authentication password.

The web page is designed to carry out the following functions (some of these are available only for users with an advanced access level):

- display of the main functions of the unit such as unit serial n°, size, refrigerant
- display of the general status of the machine: water inlet and outlet temperatures, outside air temperature, evaporating and condensing pressures, suction and discharge temperatures
- display of the status of compressors, fans, pumps, electronic expansion valves
- display in real time of the graphs of the main quantities
- display of the graphs of logged quantities
- display of alarm log
- management of users on several levels
- remote ON/OFF
- remote set point change
- remote time band change
- to view instant data relating to current absorption, power and out-of-sync events as well as electricity consumption (where the Energy Meter accessory is fitted).

Human Machine Interface (Display)

The control has a graphic display that allows the following information to be displayed:

- water inlet and outlet temperature
- set temperature and differential set points
- description of alarms
- hour meter of operation and number of start-ups of the unit, the compressors and the pumps (if present)
- high and low pressure values, and relevant condensing and evaporating temperatures
- external air temperature
- superheating at compressor suction.
- to view instant data relating to current absorption, power and out-of-sync events as well as electricity consumption (where the Energy Meter accessory is fitted).

TESTING

All the units are factory-tested and supplied complete with oil and refrigerant.

CONTROLS AND SAFETY DEVICES

All the units are fitted with the following control and safety components:

- high pressure switch with manual reset
- high pressure safety device with automatic reset, for a limited number of occurrences, managed by the controller
- low pressure safety device with automatic reset and limited tripping managed by the controller
- high pressure safety valve
- antifreeze probe at outlet of each evaporator
- water differential pressure switch installed at the factory
- overtemperature protection for compressors and fans

CERTIFICATIONS AND REFERENCE STANDARDS

The manufacturer has implemented and keeps the Management Systems listed below and it is certified against them:

- Quality Management System according to standard UNI EN ISO 9000;
- Environmental Management System according to standard UNI EN ISO 14000;
- Health and Safety Management System according to standard BS OHSAS 18000 (as converted into UNI EN ISO 45000).

These management systems ensure that the company puts in place any and all actions and initiatives to define and monitor the standards defined by its Management, which are stated in its Quality, Environmental and Safety policies.

To meet the safety requirements, the unit was designed and manufactured in compliance with the directives and product regulations below:

- PED Directive: safety criteria to be followed when designing pressure equipment;
- Machinery Directive: safety criteria to be followed when designing machinery;
- Low Voltage Directive: safety criteria to be followed when designing electrical machine parts;
- Electromagnetic Compatibility Directive: electromagnetic compatibility criteria to be followed when designing electrical machine parts;
- WEEE Directive: criteria for product management at the end of its life cycle as waste with a view to environmental protection.

The units are manufactured, tested and checked with reference to the European standards specified in the Declaration of CE Conformity, in accordance with the requirements and procedures of our Quality System.

The installation, use and storage of units featuring mildly flammable refrigerants (A2L pursuant to standard ASHRAE 34), such as R1234ze, must meet the European standards and regulations and the local laws, where applicable.

For further details, please refer to the "Instruction manual for operation and maintenance".

Responsibilities and obligations exclusive to the installer:

- to carry out a specific risk assessment according to the European regulations/standards above and/or the local laws in order to define the necessary measures for conformity;
- to comply with the requirements and to take the measures resulting from the outcomes of the risk assessment, pursuant to the relevant regulations and standards.

VERSIONS

The Kappa SKY FC family is characterised by different versions which differ from one another by the levels of efficiency, compactness and noise. Each model is designed for optional coupling of the EC fans, thus further improving the efficiency levels of the unit.

Xi, LGW Xi

Units in Xi and LGW Xi version require the use of a larger number of condensing coils in order to increase the ratio between the exchange surfaces and the compressor potential capacity, which enables achieving max. efficiency under all load conditions.

The Xi models (full inverter) achieve maximum efficiency at partial loads (SEER) thanks to the use of AC inverters on both circuits and the use of compressors with a variable compression ratio (Vi).

Si / Sh

Units in Si version (full inverter) and Sh version (hybrid circuits) are compact machines and provide for high refrigerant performances, and they maintain excellent performance coefficients both at full and partial load.

The Si models (full inverter) grant high efficiency, including at partial loads (SEER), thanks to the use of AC inverters on all circuits and the use of compressors with variable compression ratio (Vi).

The Sh models (hybrid circuits) contain 2 refrigerant circuits, where one circuit is provided with an AC inverter with a variable Vi screw compressor and the other circuit has a stepless compressor. The Sh models (hybrid circuits) perform at max. efficiency at full load (EER) and, at the same time, maintain excellent seasonal efficiency (SEER).

OPTIONS

/DC: unit with total recovery condenser

In addition to the set-up of a chiller only unit, /DC units comprise:

- a heat recovery condenser for recovering 100% of the condensation heat on each refrigerant circuit. The exchanger is a brazed plate heat exchanger; for multi-circuit units, the heat exchangers are to be manifolded outside the unit (by the customer)
- temperature probe at the inlet of each recovery exchanger
- liquid receiver for each refrigerant circuit with system for emptying the refrigerant from the condensing coil
- potential free contact in the electrical control panel for activation of recovery.

When required by the system, through the closing of a contact, the control automatically manages activation of recovery. Recovery management is carried out through a control on the temperature of the return water. The control also automatically manages safety deactivation of recovery if the condensing pressure becomes too high, and changes to using the condensing coils.

The /DC option is not available for the LGW Xi version.

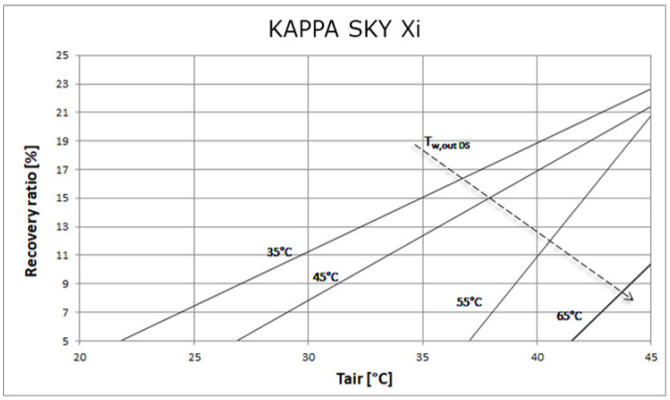
/DS: unit with desuperheater

In addition to the set-up of a chiller only unit, /DS units comprise (for each refrigerant circuit) an exchanger for condensation heat recovery of up to 20% (depending on size, version and operating conditions), placed in series with the condensing coils. The exchanger is a braze-welded plate heat exchanger. For multi-circuit units, the exchangers are to be manifolded outside the unit (by the customer).

Two illustrative graphs are shown below in which, as the ambient temperature changes, (Tair) and as the temperature of the water leaving the heat recovery heat exchanger changes, (Tw,out DS), the percentage of recovered heat is shown as an indication (Recovery ratio).

The percentage of recovered heat is calculated as the ratio between recovered thermal power to the desuperheater and the thermal power released by the condenser under nominal conditions, that is, evaporator inlet/outlet water temperature 12/7°C.

In the following graph, a constant temperature delta of 5°C between water inlet and outlet at the heat recovery heat exchanger has been considered.



The /DS option is not available for the LGW Xi version.

/LN: silenced unit

In the unit with the /LN option, all the compressors are enclosed in fully soundproofed compartments with sound absorbing panels and soundproofing material placed in-between them.

/NG: no glycol option

In addition to the components of the basic version, the /NG set-up unit has:

- a water/water decoupling plate heat exchanger in place of the 3-way valve
- a circulation pump dedicated to the free cooling circuit (closed circuit inside the unit) with shut-off valves upstream and downstream of it
- a paddle flow switch to protect the free cooling circuit
- water safety valve to protect the free cooling circuit
- expansion vessel with water pressure gauge to protect the free cooling circuit

For this version, the intermediate heat exchanger is always in series with the user-side heat exchanger and therefore the head losses inside the machine do not change with the operating mode.

The use of a decoupling exchanger allows only the water contained in the circuit inside the unit to be glycolated and to use pure water in the system, thereby obtaining an immediate economic saving and improving the heat exchange on individual user points.

HYDRAULIC MODULES

The units may be equipped with a pre-installed hydraulic module featuring single propeller centrifugal pumps with intake and delivery flanges on the line.

The pumps fit a high efficiency motor type IE3.

An inverter may be connected to the pumps in order to achieve accurate thermodynamic regulation and to minimise energy consumption (refer to the Flowzer accessories).

All units can be fitted with hydraulic module in various configurations:

- /1P: hydraulic module with one pump
- /2P: hydraulic module with two pumps

All the above-mentioned modules are fitted with pumps that have a head value between 100 and 150 kPa.

Hydraulic modules with one pump have:

- one pump
- a gate valve on the delivery side of the pump
- an expansion vessel

Hydraulic modules with two pumps have:

- two pumps
- a check valve on the delivery side of each pump
- a gate valve on the outlet of the delivery manifold
- an expansion vessel

In the version with 2 pumps, these are always with one on standby while the other is working. Switching over between the pumps is automatic and is done by time (to balance the hours of operation of each one) or in the event of failure.

Hydraulic modules with tank also have:

- a gate valve at the inlet of the pump or the suction manifold
- a tank with drain valve and air valve

Refer to the table showing the configuration compatibility to check whether specific set-ups are available.

DESCRIPTION OF ACCESSORIES

Some accessories may be incompatible with each other even if not expressly indicated.

Refrigerant

R134 R134a
Unit supplied with refrigerant R134a instead of R513A.

Refrigerant circuit accessories

BK Brine Kit LGW
This accessory is compulsory if a water temperature set point lower than +3°C is used or +5°C for LGW Xi unit (if the unit is provided with double set point or variable set point, the lower set point is considered).
The accessory consists of increased insulation and suitable sizing and calibration of some components.
The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.
The cooling set point can then be changed by the customer in an interval that, compared to the set point given on ordering, ranges from -1K up to the maximum temperature allowed by the above-stated operating limits.
The unit will be optimized to work at the set point temperature given on ordering. For different set points, the cooling capacity provided and the level of efficiency of the machine could decrease and move away from these conditions.
For models LGW:
This accessory obligatory requires the condensation control with EC fans.

DVS Double safety valve
With this accessory, instead of each individual safety valve per circuit, there is a "candelabrum" with two safety valves and a diverter valve for choosing the valve in operation. This allows the safety valves to be replaced without having to drain the machine and without having to stop it.

MAFR Pressure gauges
The operating pressures of each circuit of the unit can be displayed on the control by accessing the relevant screens. Also, the machine can be fitted with pressure gauges (two for each circuit) installed in a clearly visible position. These allow reading in real time of the working pressures of the refrigerant gas on the low pressure side and on the high pressure side of each refrigerant circuit.

RIC Liquid receiver
The adoption of this accessory always guarantees correct feeding of the expansion valve even when the unit is subjected to wide external air temperature ranges.

The option is not available for the LGW Xi version.

RUBA Compressor suction valves
The valves situated on the suction side of the compressors allow the compressor to be isolated from the rest of the refrigerant circuit, so making the maintenance operations quicker and less invasive.
The compressor discharge valve is standard on all compressors

VS Liquid line solenoid valve
This accessory prevents refrigerant migration that could damage the compressor on starting.

RPR **Refrigerant leak detector**

With this accessory, a refrigerant leak detector is placed inside each compressor compartment. Detection of a refrigerant leak is managed by the controller through a specific alarm and display of a specific icon on the display of the controller. This alarm stops the unit.

The option can only be applied to units in LN set-up.

The option is not available for the LGW Xi version.

RPP **Refrigerant leak detector with automatic pump down**

Detection of a refrigerant leak with this device is managed by the controller through a specific alarm and a specific icon appearing on the display of the controller. For all the circuits of the unit, the alarm also starts the machine stopping procedure with pump down, confining all the refrigerant in the coils.

The option can only be applied to units in LN set-up.

Fan accessories

VCH **EC fans for the chiller section**

With this accessory, EC fans, with electronically commutated brushless motor, are used for the ventilating section. These guarantee very high efficiency levels for all working conditions and allow a 15% saving on the power absorbed by each fan working at full capacity.

Through a 0-10V analogue signal sent to each fan, the microprocessor also carries out condensation control by continuous adjustment of the air flow rate as the external air temperature changes, with a further reduction in electrical absorption and noise emission.

For further details, see the dedicated chapter: "Aeraulic head losses and options available for the fan section".

VFC **EC fans for the free cooling section**

With this accessory, EC fans, with electronically commutated brushless motor, are used for the ventilating section. These guarantee very high efficiency levels for all working conditions and allow a 15% saving on the power absorbed by each fan working at full capacity.

VCM **Oversize EC fans for the chiller section**

The increased EC fans allow to obtain the same benefits as EC fans and in addition allow to have a residual useful head of about 100Pa.

For further details, see the dedicated chapter: "Aeraulic head losses and options available for the fan section".

VFM **Oversize EC fans for the free cooling section**

The increased EC fans allow to obtain the same benefits as EC fans and in addition allow to have a residual useful head of about 100Pa.

For further details, see the dedicated chapter: "Aeraulic head losses and options available for the fan section".

RECP **Pressure recuperator**

Normally, the air ejected by the fan has a high speed and this manifests itself as kinetic energy that is dissipated into the environment.

The pressure recuperator is a passive element situated on the ejection duct of each individual fan designed to allow better conversion of kinetic energy into static pressure, which manifests itself as a higher pressure generated by the fan.

This higher pressure can have at least two possible applications:

- For the same fan speed, the pressure recuperator allows an increase of about 50Pa in the available pressure of the ventilating section to be obtained. This can be useful for overcoming the head losses that may be present in specific installations. The increase in available pressure is to be considered in addition to the increase that can already be obtained with the application of oversize EC fans
- for the same pressure differential on the air, the pressure recuperator allows the same air flow rate to be obtained with a lower number of revolutions of the fan. This automatically produces a reduction of up to 3 dB(A) in the noise emission of the unit and a reduction in the absorption of the fan, with an immediate increase in the overall efficiency of the unit.

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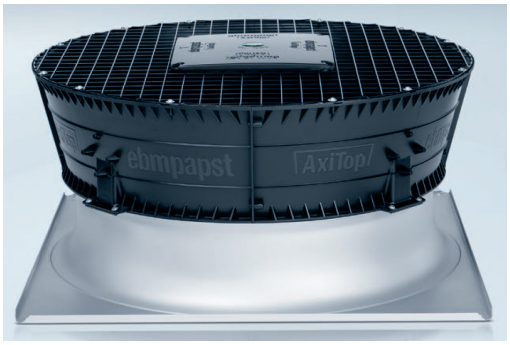
- for the same pressure differential on the air, the pressure recuperator allows the same air flow rate to be obtained with a lower number of revolutions of the fan. This automatically produces a reduction of up to 3 dB(A) in the noise emission of the unit and a reduction in the absorption of the fan, with an immediate increase in the overall efficiency of the unit.

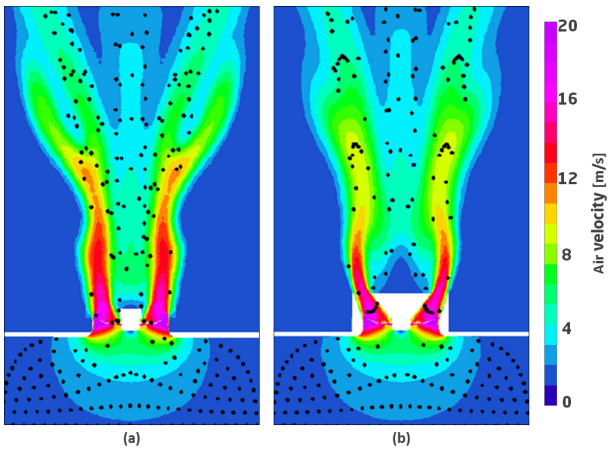
The reduction in total sound power varies depending on the model and version of the unit as it is related to the incidence of noise generated only by the fan section on the total noise emitted by the unit.

For SLN units, which already work with a reduced air flow rate, application of the pressure recuperator has a limited or negligible noise reduction effect.

To allow optimization of the performance of the accessory, combination with the speed adjuster or EC fans is necessary. In this last case, the higher efficiency of the EC fans (especially when operating at low speed) is added to the performance improvement generated by the pressure recuperator.

The accessory is supplied separately from the unit on one or more pallets and it must compulsorily be installed (by the customer) before the first start-up of the machine.





(a) fan only;

(b) fan with pressure recuperator

Hydraulic circuit accessories

FVP FLOWZER VP - Inverter for manual pump adjustment

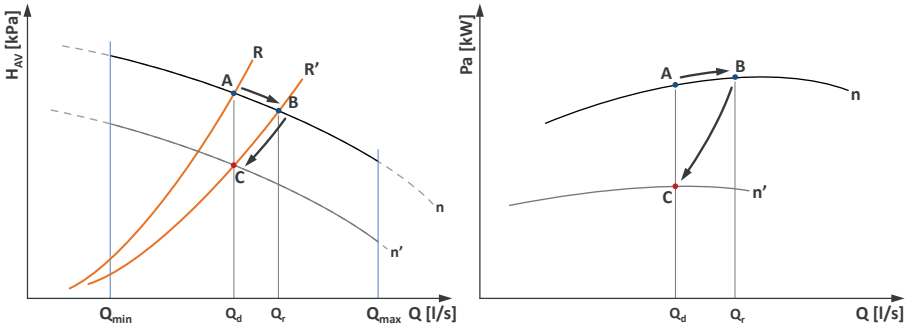
The accessory consists of inserting an inverter in the machine to manually adjust the speed of the pump (or pumps) in order to calibrate the pump flow rate on the head losses of the system.

This accessory is to be combined with one of the integrated hydraulic modules that can be selected for the unit.

Units equipped with integrated hydraulic module allow a certain level of available discharge head (point A) to be obtained under nominal flow rate conditions Qd.

But the actual head loss level of the system (e.g. characteristic curve R') normally causes the pump to find a different equilibrium point (point B), with a flow rate Qr higher than Qd.

In this condition, in addition to having a different flow from the nominal one (therefore also a different temperature jump), there is also a greater absorption of electric power from the pump itself.



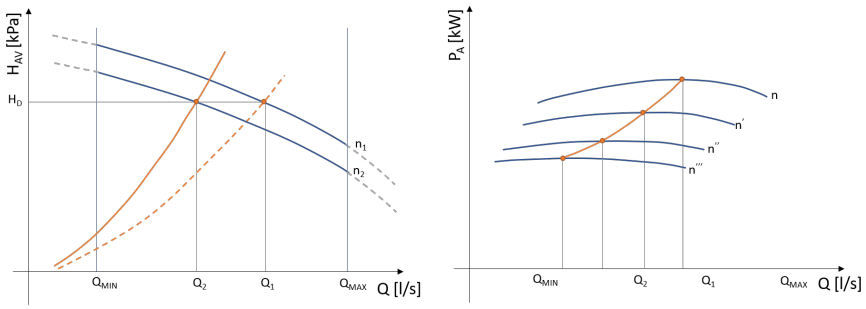
The use of the Flowzer allows the pump speed to be set manually (e.g. at speed n' instead of n) to obtain the design water flow rate and thermal gradient (point C). Once the adjustment procedure has been carried out, the pump will always work at a fixed flow rate.

The adoption of the VP Flowzer allows to considerably reduce the electrical power consumption of the pump with a consequent energy saving. By way of example, a reduction in the flow rate of 10% leads to a reduction in power consumption of around 27%.

For the freecooling units the Flowzer VP is able to manage two different speeds of the pump automatically compensating the pressure drops of the water coil.

FVD FLOWZER VD - control of available pump discharge head for variable flow systems without monitoring the flow rate limits;

Flowzer VD requires two pressure transducers to be installed in the machine. Through these transducers, the inverter can gauge the actual pressure at the ends of the system and it can automatically adapt the pump speed to obtain a set available discharge head value. Flowzer VD must be combined with Flowzer VP. This accessory therefore allows a constant pressure system to be achieved.



With the Flowzer VD, the customer can set, directly on the display, the available discharge head value (Hd) that the unit must maintain. As can be seen from the graph as the user request decreases, the resistant curve of the plant moves to the left, consequently the inverter reduces the speed of the pump in order to maintain the useful head necessary for the unit. With this system a significant reduction in electrical power is achieved. The customer will have to check that, in minimum flow rate conditions (that is, with the maximum number of user points closed), this is always higher than or equal to the minimum flow rate allowed by the unit.

This accessory is useful when the total head losses of the circuit are slightly variable or when they change depending on the seasons (for example, some user points are active only during summer operation and not during winter operation).

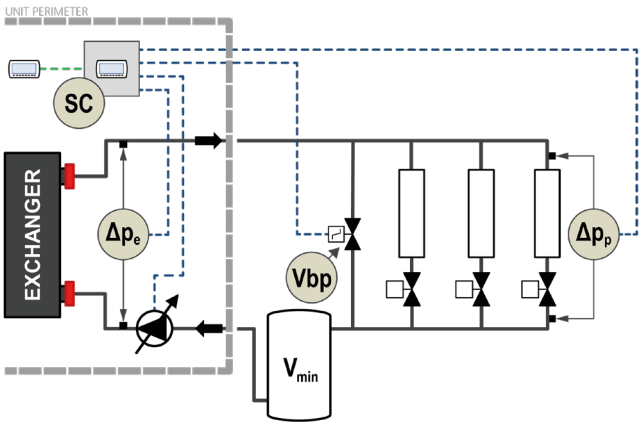
The use of this accessory also allows the pump speed to be adapted to possible fouling of the filter on the hydraulic circuit.

FVF **FLOWZER VFPP - automatic management of variable flow rate in systems with one single primary circuit and a bypass valve;**

Bluethink solution for a variable flow rate system, consisting solely of a user-side primary circuit.

Flowzer VFPP includes:

- a pressure transducer installed at the ends of the user-side exchanger (Δpe)
- a dedicated control system, installed at the factory in the electrical control panel of the unit (Sc)
- a modulating bypass valve with servo-motor supplied separately with it (Vbp), supplied loose (installation by the customer)
- two system pressure transducers (Δpp) supplied separately (installation by the customer)



It is obligatory for the option to be combined with the Flowzer VP (inverter) and with one of the hydraulic modules that can be selected for the unit. The accessory is not compatible with Multilogic. Please contact our sales department for further details.

The unit must include the advanced BlueThink controller and just one heat exchanger on the user side.

The option offers a complete default package to guarantee simple selection, purchasing and commissioning.

Flowzer VFPP has the advantage of:

- implementing an innovative design, which is alternative to the classic system based on fixed flow-rate primary circuit plus secondary circuit
- being ideal for new or entirely redesigned systems, especially for comfort applications
- having a variable flow system, with maximum energy saving
- simplifying the layout of the user circuit
- limiting the capex of the system
- performing a reliable check

The Flowzer VFPP system controller uses an advanced algorithm that enables prevention of unnecessary waste of energy and hunting by the inverter and the bypass valve.

The capex of the system is also reduced thanks to:

- single inverter + pumping module, integrated in the unit
- small internal footprint, due to the simplified layout

The operating principle can be summarized as follows:

- Flowzer VFPP carries out constant control of the discharge head
- the controller modulates the pump speed according to the signal detected by the system transducers Δpp
- as the demand from the system goes down, the pump speed will be reduced.
- the pump speed can be reduced until it reaches the minimum allowed flow rate on the heat exchanger of the unit
- this flow rate is indirectly monitored through the losses detected by the differential pressure transducer Δpe
- When the minimum allowed flow rate threshold is exceeded, the control system will open the bypass valve Vbp to recirculate the flow rate that is not required by the system, but is necessary to guarantee the minimum flow rate to the heat exchanger.

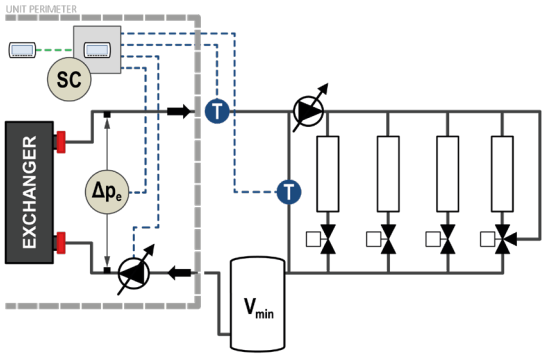
In the required minimum load condition (that is, with all system terminals switched off) the necessary minimum volume (Vmin) must be ensured by the relevant tank to be installed between the unit and the separator or the bypass pipe.

FVPS **FLOWZER VPS - automatic management of variable flow rate, including balancing of flow rates between primary and secondary circuits;**

Bluethink solution for a variable flow rate system, consisting of a primary circuit plus secondary circuit.

Flowzer VPS includes:

- a differential pressure transducer, installed at the factory at the ends of the user-side heat exchanger of the unit (Δpe)
- a dedicated control system, installed at the factory in the electrical control panel of the unit (Sc)
- two system temperature sensors (T) - supplied separately; installation by the customer



It is obligatory for the option to be combined with the Flowzer VP (inverter) and with one of the hydraulic modules that can be selected for the unit. The accessory is not compatible with Multilogic. Please contact our sales department for further details.

The unit must include the advanced BlueThink controller and just one heat exchanger on the user side.

The option offers a complete default package to guarantee simple selection, purchasing and commissioning.

Flowzer VPS has the advantage of:

- being ideal for renovations of existing systems, especially for comfort applications
- achieving a complete variable flow system, with maximum energy saving
- implementing a flexible design, e.g. for scalable or multi-zone systems

The maximum energy saving is achieved thanks to the advanced algorithm, which prevents hunting by the inverter and balances the pump speed and the recirculation flow rate to a minimum.

With refurbishments, the system's capex is limited to the unit and its commissioning.

The dimensions of the inverter of the unit and of the pump module can be favoured by the low design discharge head of the primary circuit.

The operating principle can be summarized as follows:

- Flowzer VPS performs a smart check of the flow rate in the primary circuit and balances it with the flow rate in the secondary circuit.
- the system controller modulates the pump speed according to the condition detected by the system sensors T
- if the system terminals are switched off, the flow rate of the secondary circuit will decrease; therefore the direction of flow is detected indirectly as temperature difference by the system sensors through the separator or the bypass pipe
- The check thus contributes to reducing the speed of the primary pump until the min. flow threshold in the heat exchanger of the unit is exceeded.
- this flow rate is indirectly monitored through the losses detected by the differential pressure transducer Δpe

In the required minimum load condition (that is, with all system terminals switched off) the necessary minimum volume (Vmin) must be ensured by the relevant tank to be installed between the unit and the separator or the bypass pipe.

The temperature sensors of the system T provide a 4-20 mA signal and require 1/2" female fittings.

Further details can be found in the relevant manual.

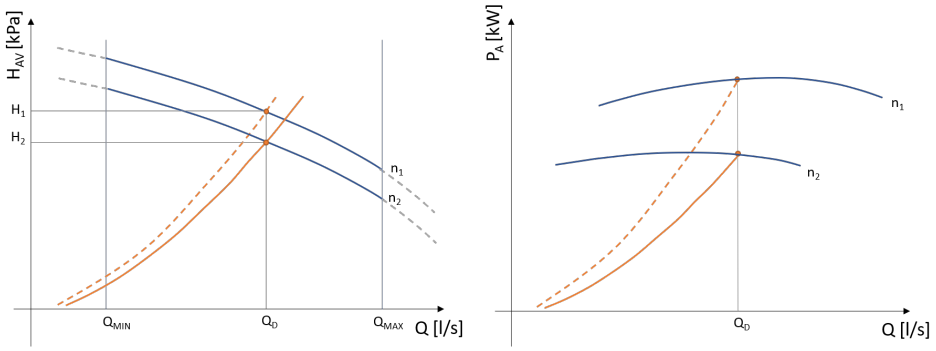
The bypass valve Vbp is controlled through a 0-10 V signal and must therefore be installed within 30 m of the unit.

The pressure transducers of the system Δpp provide a 4-20 mA signal and require two 1/4" female fittings. These transducers must be installed within 200 m of the unit, near the system terminal that is affected by the highest line head losses or in any case in a position where it is possible to measure an adequate pressure value.

Further details can be found in the relevant manual.

FVDE **FLOWZER VDE - flow rate control to keep the flow rate constant as the external working conditions of the system change;**

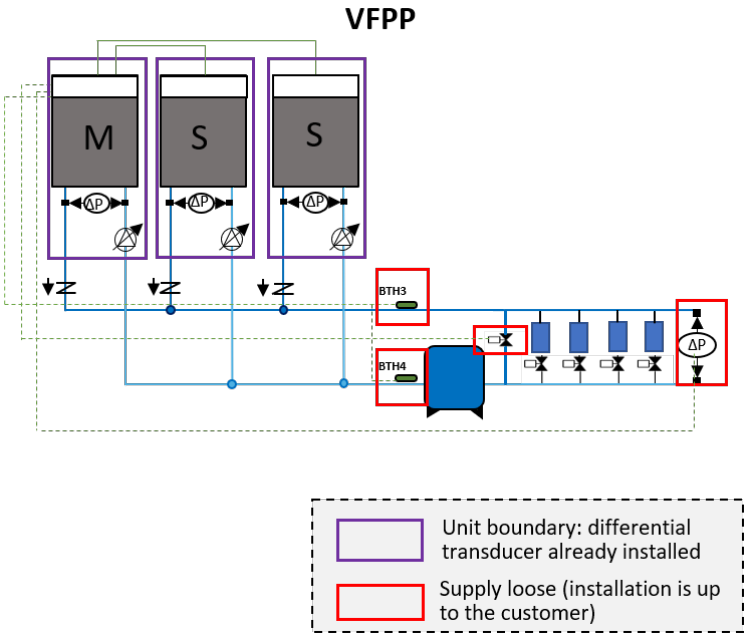
Flowzer VDE requires a differential pressure transducer to be installed in the machine. Through this transducer, the inverter can gauge the actual pressure at the ends of the heat exchanger installed in the machine and it can automatically adapt the pump speed for a constant flow value under all conditions. Flowzer VDE must be combined with Flowzer VP.



Flowzer VDE is used to automatically adjust the pump speed. As the graph shows, the inverter trips and increases the pump speed if a different condition occurs which would cause an undesired drop in the flow rate (e.g. operation of an external dry cooler). This is a more accurate solution than the VP option alone as it always provides for the water flow (Qd) required by the design conditions.

HFx **HYZER E VFPP function**

The HYZER E VFPP function combines the Multilogic function, which is designed to manage multi-machine systems, with the FLOWZER VFPP control for variable flow systems.



It is obligatory for the option to be combined with the Flowzer VP (inverter) and with one of the hydraulic modules that can be selected for the unit.

The unit must include the advanced Bluethink controller, just one heat exchanger on the user side and a minimum capacity step of 25% or less.

Units operate according to the Master/Slave logic that is typical of a Multilogic system. For additional details, please refer to the FMx option.

VFPP control requires the installation on the machine of a differential transducer at the ends of the user-side heat exchanger in order to keep the flow rate in the system within a specific min. value allowed.

For additional details on the FLOWZER VFPP logic, please refer to the dedicated FVF option.

The networked units may be of different types, and the same observations as for the Multilogic option apply:

- if there are both chiller units and heat pumps in the network, the Master unit must obligatorily be one of the HP units;
- if there are both free-cooling and non free-cooling units in the network, the Master unit must obligatorily be one of the free-cooling units.

The HYZER E function requested with the unit can be:

- **HF0:** HYZER E VFPP function for Slave units;
- **HF2:** HYZER E VFPP function for the Master unit in order to manage up to 2 Slave units;
- **HF6:** HYZER E VFPP function for the Master unit in order to manage up to 6 Slave units.

If you need to connect more than 6 slaves (up to 31), you can ask for a quotation from our sales department.

For the slave units, the accessory requires:

- programming of the unit as slave of a system of machines in Multilogic network

For the master units, the accessory requires:

- programming of the unit as master of a system of machines in Multilogic network
- entering of the parameters necessary for connection with the individual slave units
- installation in the electrical control panel of a network switch to allow the units to be connected in a LAN network.
- the supply of 2 temperature probes to be positioned on the delivery and return manifold for system thermoregulation (supplied with the system - installation and wiring by the customer);
- the supply of two pressure transducers (supplied with the system - installation and wiring by the customer) to be installed near the system terminal that is affected by the highest head losses in the line or in any case in a position where it is possible to measure an adequate pressure value.
- The option also includes the supply of a bypass valve controlled by a 0-10 V signal, which must be selected in function of the system capacity. Please refer to the VBx options for correct selection.

The connection between the master unit and the slave units made with a CAT cable. 5E/UTP (prepared by the customer) with RJ45 connectors. Maximum cable length 100m.

For further details, please refer to the controller manual.

The connection between the master unit and the slave units made with a CAT cable. 5E/UTP (prepared by the customer) with RJ45 connectors. Maximum cable length 100m.

For further details, please refer to the controller manual.

VBx VFPP bypass valve for HYZER E

The option is supplied with the bypass valve, which is selected according to the system capacity.

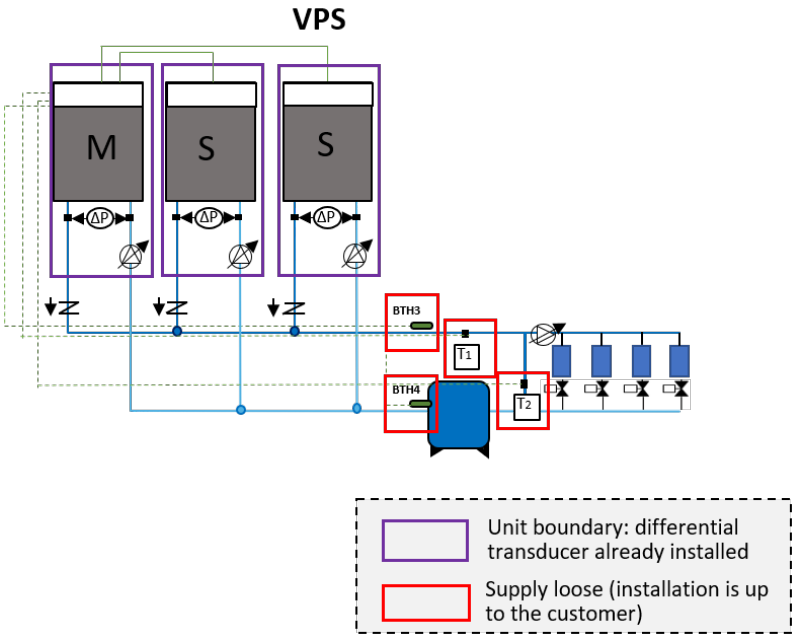
This option must be selected with either the "HYZER E VFPP function for Master unit to manage up to 2 Slave units" or "HYZER E VFPP function for Master unit to manage up to 6 Slave units".

	System capacity range**	Quantity	Diameter	Qmax**
	kW	-	in	m³/h
S_A	<240	1	2 1/2"	41.3
S_B	240÷335	1	3"	57.6
S_C	335÷570	1	4"	98
S_D	570÷850	1	5"	146.2
S_E	850÷1250	1	6"	215
S_F	1250÷1700	2	2 x 5''	2 x 146.2
S_G	1700÷2500	2	2 x 6''	2 x 215

** values based on a 5 °C temperature difference between the delivery and the return temperature

HSx HYZER E VPS function

The HYZER E VPS function combines the Multilogic function, which is used to manage multi-machine systems, with the FLOWZER VPS control for variable flow systems.



It is obligatory for the option to be combined with the Flowzer VP (inverter) and with one of the hydraulic modules that can be selected for the unit.

The unit must include the advanced Bluethink controller, just one heat exchanger on the user side and a minimum capacity step of 25% or less.

Units operate according to the Master/Slave logic that is typical of a Multilogic system. For additional details, please refer to the FMx option.

VPS control requires the installation on the machine of a differential transducer at the ends of the user-side heat exchanger in order to keep the flow rate in the system within a specific min. value allowed.

For additional details on the FLOWZER VPS logic, please refer to the dedicated FVPS option.

The networked units may be of different types, and the same observations as for the Multilogic option apply:

- if there are both chiller units and heat pumps in the network, the Master unit must obligatorily be one of the HP units;
- if there are both free-cooling and non free-cooling units in the network, the Master unit must obligatorily be one of the free-cooling units.

The HYZER E function requested with the unit can be:

- **HS0:** HYZER E VPS function for Slave units;
- **HS2:** HYZER E VPS function for the Master unit in order to manage up to 2 Slave units;
- **HS6:** HYZER E VPS function for the Master unit in order to manage up to 6 Slave units.

If you need to connect more than 6 slaves (up to 31), you can ask for a quotation from our sales department.

For the slave units, the accessory requires:

- programming of the unit as slave of a system of machines in Multilogic network

For the master units, the accessory requires:

- programming of the unit as master of a system of machines in Multilogic network
- entering of the parameters necessary for connection with the individual slave units
- installation in the electrical control panel of a network switch to allow the units to be connected in a LAN network.
- the supply of 2 temperature probes to be installed on the delivery manifold and on the bypass branch, which are typical of VPS control (supplied with the system - installation and wiring by the customer).

The connection between the master unit and the slave units made with a CAT cable. 5E/UTP (prepared by the customer) with RJ45 connectors. Maximum cable length 100m.

For further details, please refer to the controller manual.

PVX Variable flow setup for HYZER X

The dedicated HYZER X controller is designed to manage the different units, devices and components that make up a hydronic system.

Systems featuring this controller require that the PVX option be installed at the ends of the user-side heat exchanger of a differential pressure transducer so that the machine is set up for variable flow rate control.

This option is mandatory in all units making up the system.

For additional information on the product HYZER X, please refer to the specific technical catalogue.

VIX Shut-off valves for systems with external pumps for HYZER X

Systems featuring the HYZER X controller enable the selection of the shut-off valve used in systems that have an external pumping unit.

The option is always supplied separately from the unit and is for installation by the customer.

FLMX User-side flow meter for HYZER X

Systems featuring the HYZER X controller enable the selection of the flow meter option to calculate the flow rate and the performances of the units.

Two flow meters are supplied together with multifunctional machines that need to be installed on the cold and the hot circuit of the unit (installation by customer).

RA Antifreeze heater

These electric heaters are fitted on the pumps and in the tank (depending on the configuration of the machine) to prevent damage to the hydraulic components due to ice formation during periods when the machine is inactive.

Based on normal operating conditions and the percentage of glycol in the system, an appropriate "antifreeze alarm" temperature is set in the control. When a temperature that is 1K higher than the antifreeze alarm threshold is detected at the outlet from the exchanger, the pump (if present) and the antifreeze heaters are switched on. If the temperature of the outgoing water reaches the antifreeze alarm threshold, the compressors are stopped, keeping the heaters and the pumps active, and the general alarm contact of the machine is activated.

VSIW Water-side safety valve

With this accessory, a safety valve is inserted in the hydraulic circuit of the unit: when the calibration pressure is reached, the valve opens and, by discharging (to be routed by the customer), prevents the system pressure from reaching limits that are dangerous for the components present in the system. The valves have positive action, that is, performance is guaranteed even if the diaphragm deteriorates or breaks.

FLUS Flow switch (instead of the water differential pressure switch)

As an alternative to the differential pressure switch (standard flow sensor), it is possible to request the paddle flow switch as accessory. This detects when there is no water flow to the user-side exchanger and sends a signal to the control of the unit that will stop the compressors to prevent damage to the exchangers.

Application of this accessory is compulsory for units that use non-glycol water and work with a yearly cycle where external air temperatures are zero or below.

The flow switch is supplied loose (installation by the customer) and replaces the water differential pressure switch (standard).

IVPO Soundproofed pump compartment

With this accessory, the motor and the impeller of the pumps are enclosed in a compartment that is fully soundproofed with sound absorbing material and soundproofing material.

V3M 3-way modulating valve

With this accessory, a 3-way modulating valve is used in place of the three-point 3-way valve normally used.

This accessory is useful in applications where fan management alone is not sufficient to regulate the capacity given by the free cooling coil. This can happen in applications where the load is very variable or when the outside air temperature can fall many degrees below zero.

The controller modulates the free cooling capacity by acting on the speed adjuster of the fans, but if, even with fans off, the capacity given by the water coil is excessive, the water flow rate will be reduced by modulating the opening of the 3-way valve.

Electrical accessories

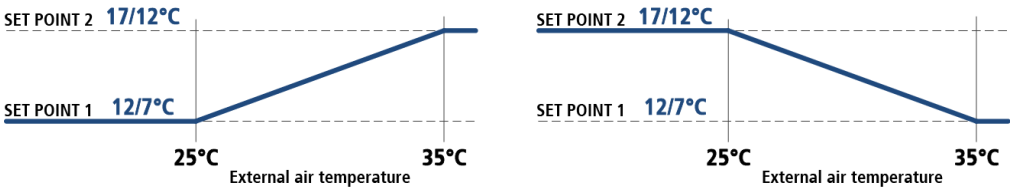
CSP **Set point compensation depending on external air temperature**

For units fitted with this accessory, the set point of the unit is set so that it can vary between two values, a maximum and a minimum, depending on the external air temperature. The compensation ramp and the maximum and minimum values of the set point can be changed by the user.

Unless otherwise specified in the order, the controller will be set to implement a positive compensation logic according to the temperatures shown in the following diagrams:

Positive compensation **Negative compensation**

Chiller



DAA **Double power supply with automatic switching**

A motor-driven automatic switch to which to connect two separate power supply lines (for example, one from the mains power line and one from the uninterruptible power supply unit) is installed in the electrical control panel of the unit.

The switching from one line to another is automatic and obligatorily requires passing through the OFF position.

When this accessory is requested, the power supply of the unit must compulsorily include neutral.

DAM **Double power supply with manual switching**

A manual switch to which to connect two separate power supply lines (for example, one from the mains power line and one from the uninterruptible power supply unit) is installed in the electrical control panel of the unit.

The switching from one line to another is manual and obligatorily requires passing through the OFF position.

ENM **Energy meter**

The accessory allows the main electrical quantities (including voltage, current, power) to be read on the three phases, via current transformer.

This accessory communicates with the BlueThink controller to supervise the monitored data. The values measured are then made available through the unit display and the web server.

ENML **Energy meter with current limiter**

The accessory allows the main electrical quantities (including voltage, current, power) to be read on the three phases, via current transformer.

This accessory communicates with the BlueThink controller to supervise the monitored data. The values measured are then made available through the unit display and the web server.

This accessory is designed to limit the maximum current the unit can absorb. The controller instantly checks the absorption levels and, where necessary, it applies a forced capacity reduction that keeps the absorbed current value below the stored threshold.

FARE Fast Restart

The Fast Restart accessory enables the controller to carry out a fast restart of the unit following a blackout, in order to reduce machine down times to a minimum.

This accessory requires the provision of a power supply line dedicated to the controller (uninterruptible power supply unit installed by the customer) and a maximum and minimum voltage relay in the electrical control panel. In this way, the controller of the unit will always remain powered even during a blackout.

Once the main power supply returns after a blackout, the starting of the first compressor takes place within 60 seconds and the full capacity of the unit is reached in about 180 seconds (a time that depends on the number of compressors and the instant load level).

In order to protect component service life, the controller may carry out the Fast Restart procedure no more than 3 times in an hour and 5 times in one day.

Also, to make it easier to carry out any maintenance on the power supply line dedicated to the controller, there is a selector switch inside the electrical control panel to allow the controller to be powered directly from the main power supply of the machine.

IACV Automatic circuit breakers

With this accessory, automatic circuit breakers are installed instead of fuses for the protection of auxiliary loads. Also, the same accessory uses automatic circuit breakers with adjustable thermal overload protection to protect the compressors.

LIID Limitation of the current absorbed by digital input

When this accessory is requested, a digital input is prepared in the terminal board to activate the forced capacity reduction of the unit to a set fixed level.

This accessory is useful when there is a need to necessarily limit the power absorbed by the unit as regards particular conditions.

We point out that, in some conditions the controller could force the unit to operate at full capacity for limited periods of time.

RE1P Relay for management of 1 external pump

This accessory can be requested for units without pumps and allows a pump outside the machine to be controlled.

RE2P Relay for management of 2 external pumps

This accessory can be requested for units without pumps and allows two pumps outside the machine to be controlled with a running/stand-by logic by implementing a rotation on the hours of operation.

The two pumps are controlled by two separate relays.

RMMT Maximum and minimum voltage relay

This accessory constantly monitors the voltage value and the unit's power supply phase sequence. If the supply voltage does not fall within the set parameters or there is a phase reversal, an alarm is generated that stops the machine to prevent damage to its main parts

SETD Double set point from digital input

The accessory allows you to preset two different operating set points and manage the change from one to the other through a digital signal.

The set point temperatures must be specified when ordering. For optimization of the unit, reference will be made to the lower set point in chiller mode and the higher set point in heat pump mode.

Unless otherwise specified in the order, the controller will be set at the factory with the following temperatures:

- in chiller mode, set point 1 to 7°C and set point 2 to 12°C

SETV Variable set point with remote signal

The accessory allows the set point to be varied continuously between two preset values, a maximum and a minimum, depending on an external signal that can be of the 0-1V, 0-10V or 4-20mA type.

The set point temperatures and the type of signal to use for the adjustment must be specified when ordering. For optimization of the unit, reference will be made to the lower set point in chiller mode and the higher set point in heat pump mode.

Unless otherwise specified in the order, the controller will be set at the factory with 0-10V analogue input and with the following temperatures: 0V corresponds to a set point of 7°C and 10V corresponds to a set point of 12°C.

SQE Heater for electrical control panel

Electric heaters are positioned inside the electrical control panel and these prevent the formation of ice or condensation inside it.

SUN Heaters for operation with air below -25°C

Electric heaters are positioned inside the electrical control panel and these prevent the formation of ice or condensation inside it.

If the operating temperatures of the unit can extend below -25°C, specific measures must be adopted to guarantee correct operation of the unit and the reliability of critical components.

Depending on the limit temperature it is necessary to reach, use will be made of suitably positioned heaters and additional thermal protection up to adoption of special electrical conductors.

TERM Remote-controlled user terminal panel

This accessory allows the terminal normally situated on the machine to be replicated on a support situated at a distance. It is particularly suitable when the unit is placed in an area that is not easily accessible.

The accessory is supplied loose and is to be installed by the customer at a maximum distance of 120m from the unit. We advise using a cable of the following type: "TECO O.R. FE 2x2xAWG24 SN/ST/PUR".

For this accessory, there is a dedicated serial port.

Network accessories

BEET **Blueye® via Ethernet**

Blueye® is a supervision platform that enables remote monitoring of one or more units in the same system interconnected through a network with Modbus protocol.

This accessory features the Blueye device, as already installed and wired in the unit.

The critical variables to be monitored over time are identified for each connected device. These variables are sampled and saved to the cloud so that they are accessible at all times through a web portal or a mobile APP (available for Android and iOS).

The following options can be selected for connection to the internet:

- a LAN (Ethernet) connection - available in the system;
- a connection to a mobile network - at least 3G. The data SIM card is not included.

Three different types of contracts can be signed.

Blueye® Cloud Basic:

- to monitor a max. of 20 variables in total over max. 5 units/peripherals;
- to set a min. sampling frequency of 60 seconds.

Blueye® Cloud Advanced:

- to monitor a max. of 200 variables in total over max. 10 units/peripherals;
- to set a min. sampling frequency of 5 seconds.

Blueye® Connect:

- To monitor up to 10 units/peripherals.

Subscribing to any of the **Blueye® Cloud** enables:

- viewing the history of the monitored variables, in the form of both numerical values and graphs;
- downloading the history of variables in CSV format;
- the creation of automatic reports;
- setting notifications (via APP or mail) with settable thresholds for each variable;
- switching the unit ON/OFF remotely;;
- changing the set point remotely;
- selection of SUMMER/WINTER mode remotely (for reversible units only).

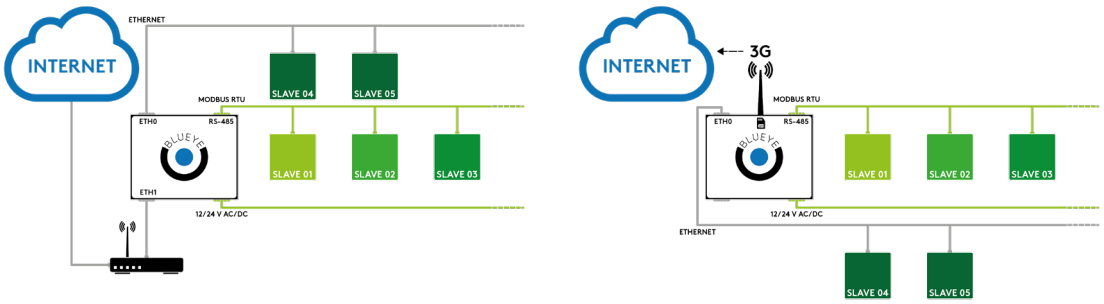
The subscription to the **Blueye® Connect** service offers the advantages below:

- a safe connection (tunnelling) between the user and the remote unit through the Blueye® portal;
- full access to the remote controller;
- real time monitoring;
- software upgrading.

Blueye® via Ethernet is only available for units supplied with an advanced controller and does not include any type of service. This service must be purchased separately based on the number of units/devices to be connected and the number of variables to be monitored. In order to connect multiple units to **Blueye® device, the network switch is required (this accessory is sold separately).**

Units can also be connected to the Blueye device through the RS485 network featuring a Modbus RTU protocol (for this option, refer to BERS accessory).

For further details, refer to the specific Blueye® documentation.



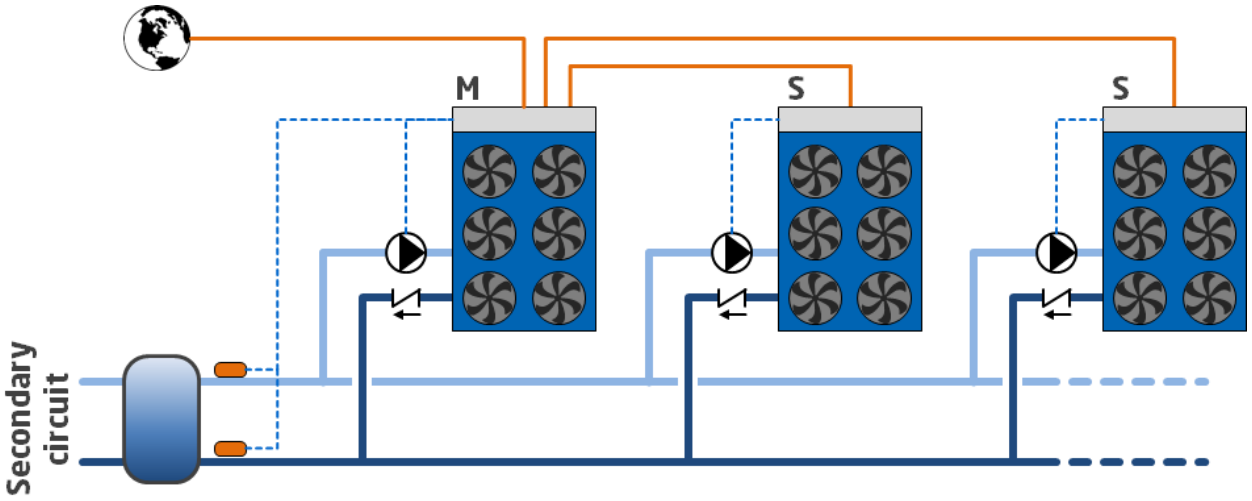
GLO **Modbus Lonworks Gateway**

With this accessory, a RS485/Lon gateway is installed inside the electrical control panel.

By default, the programming gives read-only access to the control of the unit. Enabling of read/write access should be requested when ordering.

FMx **Multilogic Function**

The Multilogic function allows management of up to 32 units equipped with advanced Bluethink controller and connected in hydraulic parallel with each other.



On the basis of the information recorded by the temperature probes installed on the delivery and return manifolds of the system, with the master unit, a capacity request is generated that is distributed among the units connected in the Multilogic network according to settable priority and optimization logics.

If communication between the units fails or if the master is off-line, the slave units can continue to work according to the set thermoregulation parameters.

The connected units can be different from each other, in terms of capacity and set-up, provided the following rules are complied with:

- if there are both chiller units and heat pumps in the Multilogic network, the Master unit must obligatorily be one of the HP units
- if there are both free cooling and non free-cooling units in the Multilogic network, the Master unit must obligatorily be one of the free-cooling units.

The Multilogic function that can be requested with the unit can be:

- **FM0:** Multilogic function for Slave unit
- **FM2:** Multilogic function for Master unit for managing up to 2 Slaves
- **FM6:** Multilogic function for Master unit for managing up to 6 Slaves

If you need to connect more than 6 slaves (up to 31), you can ask for a quotation from our sales department.

For the slave units, the accessory requires:

- programming of the unit as slave of a system of machines in Multilogic network

For the master units, the accessory requires:

- programming of the unit as master of a system of machines in Multilogic network
- entering of the parameters necessary for connection with the individual slave units
- installation in the electrical control panel of a network switch to allow the units to be connected in a LAN network.
- the supply of 2 temperature probes to be positioned on the delivery and return manifold of the system (supplied separately with it, installation and wiring by the customer)

The connection between the master unit and the slave units made with a CAT cable. 5E/UTP (prepared by the customer) with RJ45 connectors. Maximum cable length 100m.

For further details, please refer to the controller manual.

PBA BACnet protocol over IP (Ethernet)

The controller is set for use, in read and write mode, of the BACnet port on IP protocol.

By default, the programming gives read-only access to the control of the unit. Enabling of read/write access should be requested when ordering.

PSN SNMP protocol

The accessory consists of a gateway that allows Ethernet connection to a SNMP manager supervision system.

SERI RS485 serial connection with Modbus protocol

RS485 serial connection with Modbus protocol

SMAR Smartlink function predisposition

This accessory makes it possible to connect the controller of the unit with the controller of a Swegon GOLD™ air handling unit via a simple serial cable, so allowing their operating logi-cs to be merged into a single consciousness that pursues the maximum energy efficiency of the system. The RS485 serial interface is already included and dedicated to connection with Swegon units.

The option is incompatible with:

- double set point
- variable set point with remote signa
- summer/winter selection by digital input
- set point compensation depending on external air temperature
- multilogic
- all communication protocols.

SW4P Network switch with 4 ports

The accessory includes installation in DIN rail of a professional 4-port network switch.Requires Blueye via Ethernet.

SW8P Network switch with 8 ports

The accessory includes installation in DIN rail of a professional 8-port network switch.

Requires Blueye via Ethernet.

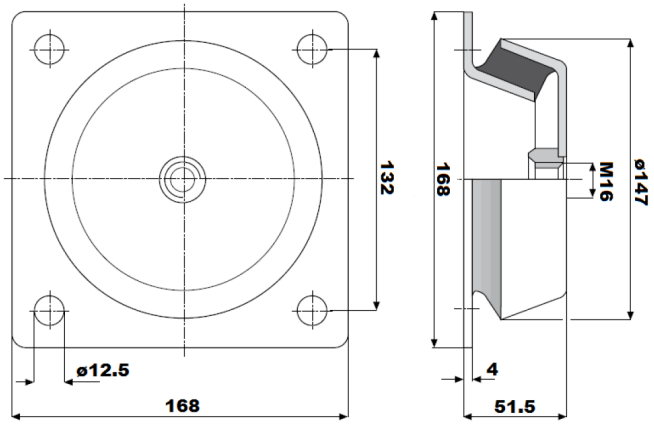
WIFI Wi-Fi

The accessory includes the supply of a Hot Spot WiFi already installed, wired and configured, complete with antenna.This accessory requires the Ethernet port of the controller to be available or, alternatively, a network switch with at least one available port to be present in the machine.

Other accessories

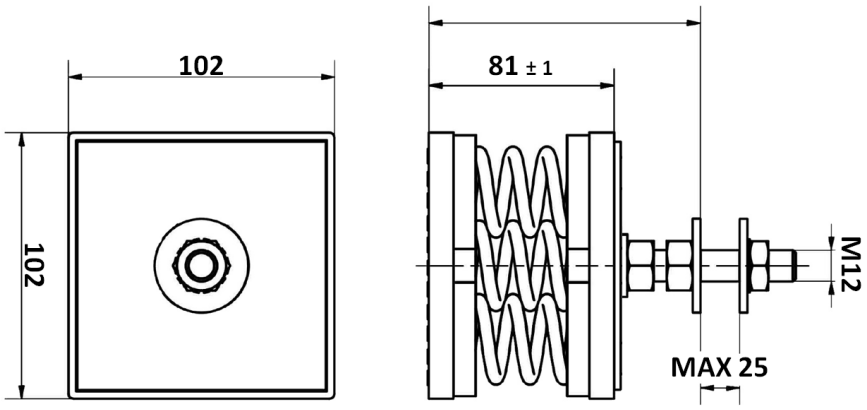
AG Rubber anti-vibration mounts

These allow you to reduce the vibrations transmitted from the unit to the surface it is standing on.
Accessory supplied loose.



AM Spring anti-vibration mounts

These allow you to reduce the vibrations transmitted from the unit to the surface it is standing on.
Accessory supplied loose.



ANTC Coil treated with anti-corrosion paints

The treatment is applied exclusively to finned pack coils with copper tubes and aluminium fins and consists of aluminium passivation and coating with a polyurethane base; a double layer of paint, of which the first passivates the aluminium and acts as primer and the second is a polyurethane based surface coating. The product has high resistance to corrosion and all environmental conditions.

The choice of whether or not to treat the exchanger should be made in relation to the environment in which the unit is to be installed and through observation of other structures and machinery with exposed metal surfaces present in the destination environment.

The cross observation criterion is the most valid method of selection currently available without having to carry out preliminary tests or measurements with instruments. The identified reference environments are:

- marine coastal
- industrial
- urban with a high housing density
- rural

Protective treatment of the exchanger is strongly recommended if at least one of the points below is verified:
- there are obvious signs of corrosion of the exposed metal surfaces in the installation area
- the distance from the coast is less than 20 km
- the prevailing winds come from the sea towards the unit
- the environment is industrial with a significant concentration of pollutants
- the environment is urban with a high population density
- the environment is rural with the presence of organic discharges and effluents.

For chiller units, this accessory also includes the "Cu/Al coil" accessory.

ALPR Pre-painted aluminium coil

This option uses finned pack coils with copper tubes and pre-painted aluminium fins.

BFAN Free cooling coil treated with anti-corrosion paints

Specific option for free-cooling batteries.

The treatment is applied exclusively to finned pack coils with copper tubes and aluminium fins and consists of aluminium passivation and coating with a polyurethane base; a double layer of paint, of which the first passivates the aluminium and acts as primer and the second is a polyurethane based surface coating.

Protective treatment of the exchanger is strongly recommended if at least one of the points below is verified:
- the presence of corrosive phenomena on the metal surfaces exposed in the installation area is evident
- the installation is located close to the sea coast
- the prevailing winds come from the sea towards the unit
- the installation is located close to the sea coast
- the environment is industrial with a significant concentration of pollutants
- the environment is urban with a high population density
- the environment is rural with the presence of organic discharges and effluents

For chiller units, this accessory also includes the "Cu/Al coil" accessory.

With reference to the protection criteria to follow, especially for installations close to the coast, refer to the section titled "Installations that require the use of treated coils".

BFAP Pre-painted aluminium free-cooling coil

The treatment is applied exclusively to finned pack coils and aluminium fins for the free-cooling part.

FW Water filter

To protect the elements of the hydraulic circuit (in particular, the exchangers), there are Y filters that can stop and settle the particles that are normally present in the water flow and would otherwise settle in the more delicate parts of the hydraulic circuit and damage its heat exchange capacity.

Installation of the water filter is mandatory even when it is not supplied as an accessory.

Accessory supplied loose.

MCHE E-coated microchannel coil

The e-coated microchannel coils are treated by immersion of the whole exchanger in an emulsion of organic resins, solvents, ionic stabilisers and deionised water. This is all subjected to a suitable electric field that causes the formation of a solid, uniform deposit on the exchanger. The function of this deposit will be to protect the aluminium from corrosion without penalising its thermophysical properties.

Protective treatment of the exchanger is strongly recommended if at least one of the points below is verified:

- there are obvious signs of corrosion of the exposed metal surfaces in the installation area
- the installation is located close to the sea coast
- the prevailing winds come from the sea towards the unit
- the environment is industrial with a significant concentration of pollutants
- the environment is urban with a high population density
- the environment is rural with the presence of organic discharges and effluents.

With reference to the protection criteria to follow, especially for installations close to the coast, refer to the section titled "Installations that require the use of treated coils".

PRAC **Steel profiles frames for container shipment**

This accessory foresees the mounting of steel profiles frames on the unit for its loading into container.

When this accessory is required it's for the shipping of the unit into container and its loading is mandatory to be done at the factory

RAAL **Cu/Al coils**

This accessory uses finned pack coils with copper tubes and aluminium fins instead of microchannel coils.

RAT **Anti-intrusion nets**

An arc-welded, painted net (RAL colour 7035) is installed to close off the external openings so as to prevent access to the technical compartment by unauthorized personnel.

SLIT **Special pallet/skid for container shipment**

The unit is placed on a skid that makes the container loading and unloading operations easier.

The accessory is mandatory if shipping by container is required

STL **Brackets for transport over long distances**

The accessory consists of adding reinforcing bars to the structural metalwork. This allows the strength of the structure to be increased for long distance road transport.

TECHNICAL SPECIFICATIONS

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1	51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R513A)										
Cooling (A30°C; W10°C; e.g.30%)										
Refrigeration capacity	(1)	kW	288	338	386	492	569	660	753	830
Total absorbed power	(1)	kW	83	100	117	148	168	202	223	272
EER	(1)		3,46	3,38	3,29	3,32	3,38	3,26	3,37	3,05
EER energy class (Eurovent)	(1)		A	A	A	A	A	A	A	B
Compressors										
Compressors/Circuits		n°/n°	1/1	1/1	1/1	1/1	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	25	25	25	25	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	37,5	45	45	60	75	75	90	90
Refrigerant charge (CuAl)		kg	49	59	61	79	99	101	120	123
FC BASIC (A5°C; W10°C; e.g.30%)										
Free-cooling mudules		n°	1 ½	1 ½	2	2 ½	3	3	4	4
Cooling capacity FC only	(3)	kW	161	162	214	266	318	321	425	431
Absorbed power FC only	(3)	kW	6	6	7	9	11	11	15	15
TFT	(4)	°C	-3,3	-6	-3,3	-3,7	-3,2	-5,4	-2,9	-4,5
Total head losses	(5)	kPa	135	174	139	144	142	159	122	151
Total internal volume	(6)	l	140	170	165	370	450	440	505	495
FC EXTRA (A5°C; W10°C; e.g.30%)										
Free-cooling mudules		n°	2 ½	3	3	4	5	5	5	-
Cooling capacity FC only	(3)	kW	254	302	304	400	508	506	508	-
Absorbed power FC only	(3)	kW	9	11	11	15	19	19	19	-
TFT	(4)	°C	2,3	2,4	1,4	1,7	2,4	1,1	-0,2	-
Total head losses	(5)	kPa	88	97	99	97	95	99	96	-
Total internal volume	(6)	l	282	228	223	368	527	519	502	-
Fans										
Chiller fans		n°	5	6	6	8	10	10	12	12
Total air flow rate		m³/h	97000	116000	116000	155000	194000	194000	233000	233000
Fans FC BASIC		n°	3	3	4	5	6	6	8	8
Total air flow rate FC BASIC		m³/h	62000	62000	82000	103000	124000	124000	165000	165000
Fans FC EXTRA		n°	5	6	6	8	10	10	10	-
Total air flow rate FC EXTRA		m³/h	103000	124000	124000	165000	206000	206000	206000	-
User-side heat exchanger										
Quantity		n°	1	1	1	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	55	65	74	94	109	126	144	159
Head loss (A30; W10; e.g. 30%)	(1)	kPa	73	87	85	81	78	72	71	88
Noise levels										
Chiller: Sound power level	(7)	dB(A)	96	97	98	98	99	100	100	101
Chiller: Sound pressure level	(8)	dB(A)	64	65	66	66	67	68	68	69
Chiller: Sound power level in LN version	(7)	dB(A)	92	93	94	94	95	96	96	97
Chiller: Sound pressure level in LN version	(8)	dB(A)	60	61	62	62	63	64	64	65
FC BASIC: Sound power level	(7)	dB(A)	76	76	77	78	79	79	80	80
FC BASIC: Sound pressure level	(8)	dB(A)	44	44	45	46	47	47	48	48
FC EXTRA: Sound power level	(7)	dB(A)	78	79	79	80	81	81	81	-
FC EXTRA: Sound pressure level	(8)	dB(A)	46	47	47	48	49	49	49	-
Dimensions and weight										
Length FC BASIC	(9)	mm	6252	6252	7401	8549	9698	9698	11995	11995
Length FC EXTRA	(9)	mm	7401	7401	9698	9698	11995	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	3942	4145	4305	5551	6789	6891	7906	7991
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	4484	4830	5463	6164	7866	7968	8533	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1	51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R134a)										
Cooling (A30°C; W10°C; e.g.30%)										
Refrigeration capacity	(1)	kW	284	340	381	488	568	654	740	825
Total absorbed power	(1)	kW	80	97	112	141	161	194	213	246
EER	(1)		3,55	3,5	3,4	3,46	3,52	3,37	3,47	3,35
EER energy class (Eurovent)	(1)		A	A	A	A	A	A	A	A
Compressors										
Compressors/Circuits		n°/n°	1/1	1/1	1/1	1/1	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	25	25	25	25	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	37,5	45	45	60	75	75	90	90
Refrigerant charge (CuAl)		kg	49	59	61	79	99	101	120	123
FC BASIC (A5°C; W10°C; e.g.30%)										
Free-cooling mudules		n°	1 ½	1 ½	2	2 ½	3	3	4	4
Cooling capacity FC only	(3)	kW	159	159	214	268	321	322	426	430
Absorbed power FC only	(3)	kW	6	6	7	9	11	11	15	15
TFT	(4)	°C	-3,3	-6	-3,3	-3,7	-3,2	-5,4	-2,9	-4,5
Total head losses	(5)	kPa	135	174	139	144	142	159	122	151
Total internal volume	(6)	l	140	170	165	370	450	440	505	495
FC EXTRA (A5°C; W10°C; e.g.30%)										
Free-cooling mudules		n°	2 ½	3	3	4	5	5	5	-
Cooling capacity FC only	(3)	kW	251	302	301	401	503	503	509	-
Absorbed power FC only	(3)	kW	9	11	11	15	19	19	19	-
TFT	(4)	°C	2,3	2,4	1,4	1,7	2,4	1,1	-0,2	-
Total head losses	(5)	kPa	88	97	99	97	95	99	96	-
Total internal volume	(6)	l	282	228	223	368	527	519	502	-
Fans										
Chiller fans		n°	5	6	6	8	10	10	12	12
Total air flow rate		m³/h	97000	116000	116000	155000	194000	194000	233000	233000
Fans FC BASIC		n°	3	3	4	5	6	6	8	8
Total air flow rate FC BASIC		m³/h	62000	62000	82000	103000	124000	124000	165000	165000
Fans FC EXTRA		n°	5	6	6	8	10	10	10	-
Total air flow rate FC EXTRA		m³/h	103000	124000	124000	165000	206000	206000	206000	-
User-side heat exchanger										
Quantity		n°	1	1	1	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	54,3	64,9	72,8	93,3	108,6	125	141,4	157,5
Head loss (A30; W10; e.g. 30%)	(1)	kPa	73	87	85	81	78	72	71	88
Noise levels										
Chiller: Sound power level	(7)	dB(A)	96	97	98	98	99	100	100	101
Chiller: Sound pressure level	(8)	dB(A)	64	65	66	66	67	68	68	69
Chiller: Sound power level in LN version	(7)	dB(A)	92	93	94	94	95	96	96	97
Chiller: Sound pressure level in LN version	(8)	dB(A)	60	61	62	62	63	64	64	65
FC BASIC: Sound power level	(7)	dB(A)	76	76	77	78	79	79	80	80
FC BASIC: Sound pressure level	(8)	dB(A)	44	44	45	46	47	47	48	48
FC EXTRA: Sound power level	(7)	dB(A)	78	79	79	80	81	81	81	-
FC EXTRA: Sound pressure level	(8)	dB(A)	46	47	47	48	49	49	49	-
Dimensions and weight										
Length FC BASIC	(9)	mm	6252	6252	7401	8549	9698	9698	11995	11995
Length FC EXTRA	(9)	mm	7401	7401	9698	9698	11995	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	3942	4145	4305	5551	6789	6891	7906	7991
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	4484	4830	5463	6164	7866	7968	8533	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY Si FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R513A)							
Cooling (A30°C; W10°C; e.g.30%)							
Refrigeration capacity	(1)	kW	548,2	630,1	729,4	796,0	886,4
Total absorbed power	(1)	kW	170,1	207,8	225,4	262,9	275,4
EER	(1)		3,22	3,03	3,23	3,02	3,21
Compressors							
Compressors/Circuits		n°/n°	2/2	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	12,5	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	60	60	75	75	90
Refrigerant charge (CuAl)		kg	79	70	100	100	120
FC BASIC (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	3	3	4	4	5
Cooling capacity FC only	(3)	kW	318	319	430	431	535
Absorbed power FC only	(3)	kW	8,10	8,10	10,80	10,80	13,50
TFT	(4)	°C	-2,8	-4,8	-2,6	-4,1	-2,2
Total head losses	(5)	kPa	128	143	113	137	109
Total internal volume	(6)	l	450	440	505	495	465
FC EXTRA (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	5	5	5	6	-
Cooling capacity FC only	(3)	kW	501	507	505	602	-
Absorbed power FC only	(3)	kW	13,50	13,50	13,50	16,20	-
TFT	(4)	°C	2,6	1,4	0,1	0,9	-
Total head losses	(5)	kPa	83	85	88	107	-
Total internal volume	(6)	l	527	519	502	494	-
Fans							
Chiller fans		n°	8	8	10	10	12
Total air flow rate		m³/h	155000	155000	194000	194000	233000
Fans FC BASIC		n°	6	6	8	8	10
Total air flow rate FC BASIC		m³/h	124000	124000	165000	165000	206000
Fans FC EXTRA		n°	10	10	10	12	-
Total air flow rate FC EXTRA		m³/h	206000	206000	206000	247000	-
User-side heat exchanger							
Quantity		n°	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	105	120	139	152	169
Head loss (A30; W10; e.g. 30%)	(1)	kPa	73	68	68	83	82
Noise levels							
Chiller: Sound power level	(7)	dB(A)	99	100	100	101	102
Chiller: Sound pressure level	(8)	dB(A)	67	68	68	69	70
Chiller: Sound power level in LN version	(7)	dB(A)	95	96	96	97	98
Chiller: Sound pressure level in LN version	(8)	dB(A)	63	64	64	65	66
FC BASIC: Sound power level	(7)	dB(A)	79	79	80	80	81
FC BASIC: Sound pressure level	(8)	dB(A)	47	47	48	48	49
FC EXTRA: Sound power level	(7)	dB(A)	81	81	81	82	-
FC EXTRA: Sound pressure level	(8)	dB(A)	49	49	49	50	-
Dimensions and weight							
Length FC BASIC	(9)	mm	8549	8549	10846	10846	13144
Length FC EXTRA	(9)	mm	10846	10846	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	6789	6891	7906	7991	8756
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	7866	7968	8533	9603	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY Si FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R134a)							
Cooling (A30°C; W10°C; e.g.30%)							
Refrigeration capacity	(1)	kW	551	632	722	801	877
Total absorbed power	(1)	kW	551,5	632,0	721,6	801,4	877,3
EER	(1)		163,3	199,2	216,1	251,8	263,5
Compressors							
Compressors/Circuits		n°/n°	2/2	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	12,5	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	60	60	75	75	90
Refrigerant charge (CuAl)		kg	79	70	100	100	120
FC BASIC (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	3	3	4	4	5
Cooling capacity FC only	(3)	kW	320	323	427	431	539
Absorbed power FC only	(3)	kW	8,10	8,10	10,80	10,80	13,50
TFT	(4)	°C	-2,8	-4,8	-2,6	-4,1	-2,2
Total head losses	(5)	kPa	128	143	113	137	109
Total internal volume	(6)	l	450	440	505	495	465
FC EXTRA (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	5	5	5	6	-
Cooling capacity FC only	(3)	kW	503	510	506	610	-
Absorbed power FC only	(3)	kW	13,50	13,50	13,50	16,20	-
TFT	(4)	°C	2,6	1,4	0,1	0,9	-
Total head losses	(5)	kPa	83	85	88	107	-
Total internal volume	(6)	l	527	519	502	494	-
Fans							
Chiller fans		n°	8	8	10	10	12
Total air flow rate		m³/h	155000	155000	194000	194000	233000
Fans FC BASIC		n°	6	6	8	8	10
Total air flow rate FC BASIC		m³/h	124000	124000	165000	165000	206000
Fans FC EXTRA		n°	10	10	10	12	-
Total air flow rate FC EXTRA		m³/h	206000	206000	206000	247000	-
User-side heat exchanger							
Quantity		n°	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	105	121	138	153	168
Head loss (A30; W10; e.g. 30%)	(1)	kPa	73	68	68	83	82
Noise levels							
Chiller: Sound power level	(7)	dB(A)	99	100	100	101	102
Chiller: Sound pressure level	(8)	dB(A)	67	68	68	69	70
Chiller: Sound power level in LN version	(7)	dB(A)	95	96	96	97	98
Chiller: Sound pressure level in LN version	(8)	dB(A)	63	64	64	65	66
FC BASIC: Sound power level	(7)	dB(A)	79	79	80	80	81
FC BASIC: Sound pressure level	(8)	dB(A)	47	47	48	48	49
FC EXTRA: Sound power level	(7)	dB(A)	81	81	81	82	-
FC EXTRA: Sound pressure level	(8)	dB(A)	49	49	49	50	-
Dimensions and weight							
Length FC BASIC	(9)	mm	8549	8549	10846	10846	13144
Length FC EXTRA	(9)	mm	10846	10846	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	6789	6891	7906	7991	8756
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	7866	7968	8533	9603	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Sh FC (R513A)							
Cooling (A30°C; W10°C; e.g.30%)							
Refrigeration capacity	(1)	kW	545,47	637,49	706,39	793,55	886,41
Total absorbed power	(1)	kW	161,77	206,33	206,88	248,51	269,77
EER	(1)		3,37	3,08	3,41	3,19	3,28
Compressors							
Compressors/Circuits		n°/n°	2/2	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	12,5	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	60	60	75	75	90
Refrigerant charge (CuAl)		kg	79	70	100	100	120
FC BASIC (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	3	3	4	4	5
Cooling capacity FC only	(3)	kW	318	319	430	431	535
Absorbed power FC only	(3)	kW	11	11	15	15	19
TFT	(4)	°C	-2,8	-4,8	-2,6	-4,1	-2,2
Total head losses	(5)	kPa	128	143	113	137	109
Total internal volume	(6)	l	450	440	505	495	465
FC EXTRA (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	5	5	5	6	-
Cooling capacity FC only	(3)	kW	501	507	505	602	-
Absorbed power FC only	(3)	kW	19	19	19	22	-
TFT	(4)	°C	2,6	1,4	0,1	0,9	-
Total head losses	(5)	kPa	83	85	88	107	-
Total internal volume	(6)	l	527	519	502	494	-
Fans							
Chiller fans		n°	8	8	10	10	12
Total air flow rate		m³/h	155000	155000	194000	194000	233000
Fans FC BASIC		n°	6	6	8	8	10
Total air flow rate FC BASIC		m³/h	124000	124000	165000	165000	206000
Fans FC EXTRA		n°	10	10	10	12	-
Total air flow rate FC EXTRA		m³/h	206000	206000	206000	247000	-
User-side heat exchanger							
Quantity		n°	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	104,2	121,8	134,9	151,6	169,3
Head loss (A30; W10; e.g. 30%)	(1)	kPa	73	68	68	83	82
Noise levels							
Chiller: Sound power level	(7)	dB(A)	99	100	100	101	102
Chiller: Sound pressure level	(8)	dB(A)	67	68	68	69	70
Chiller: Sound power level in LN version	(7)	dB(A)	95	96	96	97	98
Chiller: Sound pressure level in LN version	(8)	dB(A)	63	64	64	65	66
FC BASIC: Sound power level	(7)	dB(A)	79	79	80	80	81
FC BASIC: Sound pressure level	(8)	dB(A)	47	47	48	48	49
FC EXTRA: Sound power level	(7)	dB(A)	81	81	81	82	-
FC EXTRA: Sound pressure level	(8)	dB(A)	49	49	49	50	-
Dimensions and weight							
Length FC BASIC	(9)	mm	8549	8549	10846	10846	13144
Length FC EXTRA	(9)	mm	10846	10846	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	6789	6891	7906	7991	8756
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	7866	7968	8533	9603	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Sh FC (R134a)							
Cooling (A30°C; W10°C; e.g.30%)							
Refrigeration capacity	(1)	kW	548,77	639,41	698,84	798,93	877,31
Total absorbed power	(1)	kW	155,24	197,85	198,3	238,03	258,07
EER	(1)		3,53	3,23	3,52	3,35	3,39
Compressors							
Compressors/Circuits		n°/n°	2/2	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	12,5	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	60	60	75	75	90
Refrigerant charge (CuAl)		kg	79	70	100	100	120
FC BASIC (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	3	3	4	4	5
Cooling capacity FC only	(3)	kW	320	323	427	431	539
Absorbed power FC only	(3)	kW	11	11	15	15	19
TFT	(4)	°C	-2,8	-4,8	-2,6	-4,1	-2,2
Total head losses	(5)	kPa	128	143	113	137	109
Total internal volume	(6)	l	450	440	505	495	465
FC EXTRA (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	5	5	5	6	-
Cooling capacity FC only	(3)	kW	503	510	506	610	-
Absorbed power FC only	(3)	kW	19	19	19	22	-
TFT	(4)	°C	2,6	1,4	0,1	0,9	-
Total head losses	(5)	kPa	83	85	88	107	-
Total internal volume	(6)	l	527	519	502	494	-
Fans							
Chiller fans		n°	8	8	10	10	12
Total air flow rate		m³/h	155000	155000	194000	194000	233000
Fans FC BASIC		n°	6	6	8	8	10
Total air flow rate FC BASIC		m³/h	124000	124000	165000	165000	206000
Fans FC EXTRA		n°	10	10	10	12	-
Total air flow rate FC EXTRA		m³/h	206000	206000	206000	247000	-
User-side heat exchanger							
Quantity		n°	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	104,2	121,8	134,9	151,6	169,3
Head loss (A30; W10; e.g. 30%)	(1)	kPa	73	68	68	83	82
Noise levels							
Chiller: Sound power level	(7)	dB(A)	99	100	100	101	102
Chiller: Sound pressure level	(8)	dB(A)	67	68	68	69	70
Chiller: Sound power level in LN version	(7)	dB(A)	95	96	96	97	98
Chiller: Sound pressure level in LN version	(8)	dB(A)	63	64	64	65	66
FC BASIC: Sound power level	(7)	dB(A)	79	79	80	80	81
FC BASIC: Sound pressure level	(8)	dB(A)	47	47	48	48	49
FC EXTRA: Sound power level	(7)	dB(A)	81	81	81	82	-
FC EXTRA: Sound pressure level	(8)	dB(A)	49	49	49	50	-
Dimensions and weight							
Length FC BASIC	(9)	mm	8549	8549	10846	10846	13144
Length FC EXTRA	(9)	mm	10846	10846	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	6789	6891	7906	7991	8756
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	7866	7968	8533	9603	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY LGW Xi FC

			24.1	31.1	40.1	45.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Xi FC (R1234ze)										
Cooling (A30°C; W10°C; e.g.30%)										
Refrigeration capacity	(1)	kW	263	343	438	501	579	660	729	785
Total absorbed power	(1)	kW	76	99	125	146	167	199	215	238
EER	(1)		3,46	3,46	3,5	3,43	3,46	3,31	3,39	3,29
EER energy class (Eurovent)	(1)		A	A	A	A	A	A	A	A
Compressors										
Compressors/Circuits		n°/n°	1/1	1/1	1/1	1/1	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	25	25	25	12,5	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	29	36	46	52	79	79	91	91
Refrigerant charge (CuAl)		kg	38	48	62	69	107	107	123	123
FC BASIC (A5°C; W10°C; e.g.30%)										
Free-cooling mudules		n°	1 ½	1 ½	2	2 ½	3	3	4	4
Cooling capacity FC only	(3)	kW	162	162	213	269	324	318	429	428
Absorbed power FC only	(3)	kW	6	6	7	9	11	11	15	15
TFT	(4)	°C	-2,2	-6,2	-5,4	-4,1	-3,5	-5,4	-2,7	-3,8
Total head losses	(5)	kPa	112	152	146	117	108	136	114	132
Total internal volume	(6)	l	140	165	225	520	425	425	495	495
FC EXTRA (A5°C; W10°C; e.g.30%)										
Free-cooling mudules		n°	2 ½	3	4	4	5	5	5	-
Cooling capacity FC only	(3)	kW	253	303	404	405	502	504	509	-
Absorbed power FC only	(3)	kW	9	11	15	15	19	19	19	-
TFT	(4)	°C	3	2,3	2,7	1,5	2,2	1	0	-
Total head losses	(5)	kPa	70	72	72	67	58	74	90	-
Total internal volume	(6)	l	282	223	368	519	502	502	494	-
Fans										
Chiller fans		n°	5	6	8	8	10	10	12	12
Total air flow rate		m³/h	97000	116000	155000	155000	194000	194000	233000	233000
Fans FC BASIC		n°	3	3	4	5	6	6	8	8
Total air flow rate FC BASIC		m³/h	62000	62000	82000	103000	124000	124000	165000	165000
Fans FC EXTRA		n°	5	6	8	8	10	10	10	-
Total air flow rate FC EXTRA		m³/h	103000	124000	165000	165000	206000	206000	206000	-
User-side heat exchanger										
Quantity		n°	1	1	1	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	50	66	84	96	111	126	139	150
Head loss (A30; W10; e.g. 30%)	(1)	kPa	63	73	89	58	48	56	69	80
Noise levels										
Chiller: Sound power level	(7)	dB(A)	96	99	100	100	101	102	102	103
Chiller: Sound pressure level	(8)	dB(A)	64	67	68	68	69	70	70	71
Chiller: Sound power level in LN version	(7)	dB(A)	92	95	96	96	97	98	98	99
Chiller: Sound pressure level in LN version	(8)	dB(A)	60	63	64	64	65	66	66	67
FC BASIC: Sound power level	(7)	dB(A)	76	76	77	78	79	79	80	80
FC BASIC: Sound pressure level	(8)	dB(A)	44	44	45	46	47	47	48	48
FC EXTRA: Sound power level	(7)	dB(A)	78	79	80	80	81	81	81	-
FC EXTRA: Sound pressure level	(8)	dB(A)	46	47	48	48	49	49	49	-
Dimensions and weight										
Length FC BASIC	(9)	mm	6252	6252	7401	8549	9698	9698	11995	11995
Length FC EXTRA	(9)	mm	7401	7401	9698	9698	11995	11995	13144	-
Depth	(9)	mm	2260	2260	2260	2260	2260	2260	2260	2260
Height	(9)	mm	2440	2440	2440	2440	2440	2440	2440	2440
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	3942	4145	4305	5551	6789	6891	7906	7991
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	4484	4830	5463	6164	7866	7968	8533	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

KAPPA SKY LGW Sh FC

			47.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Sh FC (R1234ze)							
Cooling (A30°C; W10°C; e.g.30%)							
Refrigeration capacity	(1)	kW	489,83	540,15	626,95	699,37	793,76
Total absorbed power	(1)	kW	131,25	148,24	185,4	196	245,26
EER	(1)		3,73	3,64	3,38	3,56	3,23
Compressors							
Compressors/Circuits		n°/n°	1/1	2/2	2/2	2/2	2/2
Minimum capacity reduction step	(2)	%	12,5	12,5	12,5	12,5	12,5
Refrigerant charge (MCHX)		kg	65	69	69	81	81
Refrigerant charge (CuAl)		kg	85	89	89	105	105
FC BASIC (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	3	3	3	4	4
Cooling capacity FC only	(3)	kW	313,8	316,9	322,1	421,5	427,1
Absorbed power FC only	(3)	kW	8,1	8,1	8,1	10,8	10,8
TFT	(4)	°C	-1,1	-2,3	-4,3	-1,9	-3,1
Total head losses	(5)	kPa	88	94	125	106	135
Total internal volume	(6)	l	440	425	425	495	495
FC EXTRA (A5°C; W10°C; e.g.30%)							
Free-cooling mudules		n°	5	5	5	5	6
Cooling capacity FC only	(3)	kW	478,6	484,51	494,2	500,6	596,8
Absorbed power FC only	(3)	kW	13,5	13,5	13,5	13,5	16,2
TFT	(4)	°C	3,7	2,9	1,7	0,6	1,5
Total head losses	(5)	kPa	52	51	68	83	90
Total internal volume	(6)	l	519	502	502	494	494
Fans							
Chiller fans		n°	8	8	8	10	10
Total air flow rate		m³/h	155000	155000	155000	194000	194000
Fans FC BASIC		n°	6	6	6	8	8
Total air flow rate FC BASIC		m³/h	123600	123600	123600	164800	164800
Fans FC EXTRA		n°	10	10	10	10	12
Total air flow rate FC EXTRA		m³/h	206000	206000	206000	206000	247200
User-side heat exchanger							
Quantity		n°	1	1	1	1	1
Water flow rate (A30; W10; e.g. 30%)	(1)	m³/h	94	103	120	134	152
Head loss (A30; W10; e.g. 30%)	(1)	kPa	44	38	51	63	82
Noise levels							
Chiller: Sound power level	(7)	dB(A)	100	100	101	102	102
Chiller: Sound pressure level	(8)	dB(A)	68	68	69	70	70
Chiller: Sound power level in LN version	(7)	dB(A)	96	96	97	98	98
Chiller: Sound pressure level in LN version	(8)	dB(A)	64	64	65	66	66
FC BASIC: Sound power level	(7)	dB(A)	79	79	79	80	80
FC BASIC: Sound pressure level	(8)	dB(A)	47	47	47	48	48
FC EXTRA: Sound power level	(7)	dB(A)	81	81	81	81	82
FC EXTRA: Sound pressure level	(8)	dB(A)	49	49	49	49	50
Dimensions and weight							
Length FC BASIC	(9)	mm	8549	8549	8549	10846	10846
Length FC EXTRA	(9)	mm	11995	11995	11995	11995	13144
Depth	(9)	mm	2260	2260	2260	2260	2260
Height	(9)	mm	2466	2466	2466	2466	2466
Operating weight FC BASIC (CH MCHX, FC CuAl)	(9)	kg	-	-	-	-	-
Operating weight FC EXTRA (CH MCHX, FC CuAl)	(9)	kg	-	-	-	-	-

(MCHX: unit with microchannel coils; CuAl: unit with copper/aluminium tube/fin coils)

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(2) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

(3) Outside air temperature 5°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.

(4) The TFT (Total Free-cooling Temperature) is the outside air temperature at which the cooling performance of the water coils is the same as the performance of the chiller section under the condition of A30°C; E.G.30% 15/10°C

(5) Data refers to the unit with free-cooling ON

(6) Volume of water contained in the unit when it is working in free cooling mode.

(7) Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable. Binding values. See NOISE LEVELS section.

(8) Values obtained from the sound power level (conditions: note 7), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

(9) The data refers to standard unit with no accessories In particular, the introduction of some accessories such as copper / aluminum coils, hydraulic modules or recovery exchangers may result in an increase in weight that may exceed 10%. For more details, refer to the specific drawing of the selected configuration and to the "Dimensional Diagrams" section.

ECODESIGN

INTRODUCTION

The Ecodesign/ErP Directive (2009/125/EC) lays down new standards for more efficient energy use.

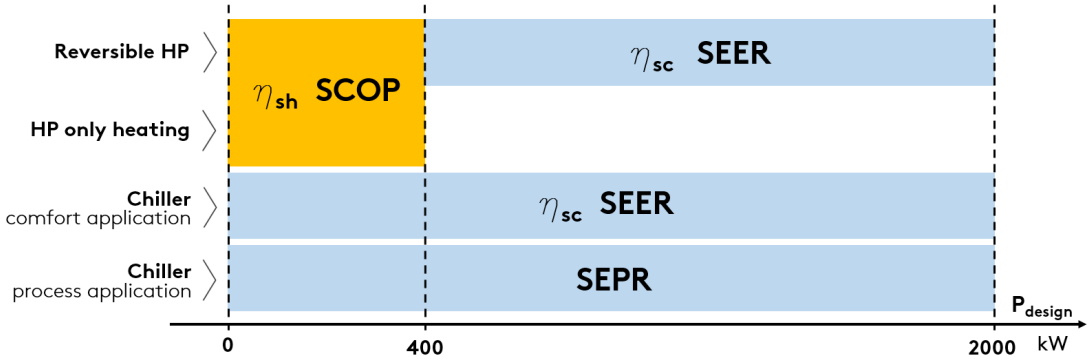
The Directive contains various regulations; as regards chiller products and heat pumps, the regulations of interest are the following:

- Regulation 2013/813, for small heat pumps (Pdesign ≤ 400 kW)
- Regulation 2016/2281, for chillers and heat pumps with Pdesign > 400 kW
- Regulation 2013/811, for heat pumps with Pdesign ≤ 70 kW.

The figure below schematically illustrates the correspondence between product and reference energy ratio.
The last-mentioned regulation (2013/811) regards the labelling (Ecolabel certification) of small heat pumps.
The other two regulations (2013/813 and 2016/2281) set seasonal efficiency targets that the products must comply with to be sold and installed in the European Union (essential requirement for CE marking).
These efficiency limits are defined through ratios, which are respectively:

- ηsh (SCOP), with reference to regulation 2013/813
- ηsc (SEER) for comfort applications and SEPR for process applications, with reference to regulation 2016/2281.

As regards regulation 2016/2281, with effect from 1st January 2021, the required minimum efficiency limit will be raised (Tier 2) from the current threshold (Tier 1).



Some notes and clarifications:

For comfort applications, regulation 2016/2281 sets the ηsc (SEER) ratio in two different operating conditions:

- SEER calculated with machine inlet/outlet water temperature of 12/7°C (low temperature application),
- SEER calculated with machine inlet/outlet water temperature of 23/18°C (medium temperature application).

The minimum efficiency requirement is the same, but can be met at condition 12/7°C or at condition 23/18°C, depending on the application envisaged for the machine.
The minimum efficiency requirements set by the regulations are indicated below.

REGULATION 2016/2281, comfort application

TYPE OF UNIT		MINIMUM REQUIREMENT			
		Tier 1		Tier 2 (2021)	
SOURCE	**Pdesign**	**ηsc [%]**	**SEER**	**ηsc [%]**	**SEER**
air	< 400kW	149	3,8	161	4,1
air	≥ 400kW	161	4,1	179	4,55
water	< 400kW	196	5,1	200	5,2
water	≥ 400kW and < 1500kW	227	5,875	252	6,5
water	≥ 1500kW	245	6,325	272	7

REGULATION 2016/2281, process application

TYPE OF UNIT		MINIMUM REQUIREMENT	
		Tier 1	Tier 2 (2021)
SOURCE	**Pdesign**	**SEPR**	**SEPR**
air	< 400kW	4,5	5
air	≥ 400kW	5	5,5
water	< 400kW	6,5	7
water	≥ 400kW and < 1500kW	7,5	8
water	≥ 1500kW	8	8,5

The conformity of the product must be checked according to the type of application, whether comfort or process, and at the required outlet water temperature.
The two schematic tables below, respectively for comfort application and for process application, indicate the reference of the required conformity according to the type of product and the set point temperature.
Important note: for mixed comfort and process applications, the reference application for conformity is the comfort application.

COMFORT APPLICATION

PRODUCT	OUTLET WATER TEMPERATURE	COMPLIANCE INDEX	REGULATION
Chiller	< 18°C	SEER/ηsc low temperature application	2016/2281
	≥ 18°C	SEER/ηsc medium temperature application	2016/2281
Heat pumps (reversible and only heating) Pdesign≤400kW		SCOP/ηsh	2013/813
Reversible heat pumps Pdesign>400kW	< 18°C	SEER/ηsc low temperature application	2016/2281
	≥ 18°C	SEER/ηsc medium temperature application	2016/2281
Heat pumps only heating Pdesign>400kW		-	-

PROCESS APPLICATION

PRODUCT	OUTLET WATER TEMPERATURE	COMPLIANCE INDEX	REGULATION
Chiller	≥ +2°C , ≤ 12°C	SEPR	2016/2281
	> 12°C	-	-
	> -8°C , < +2°C	-	-

- = exemption from Ecodesign

Some specifications and notes follow.

EC fans:

The only option that positively affects the performance of the unit, by increasing its seasonal energy efficiency ratio, is the VEC accessory.

A unit equipped with EC fans has a higher SEER (ηsc) than the configuration with standard fans.

GAMMA KAPPA SKY FC

The Ecodesign/ErP Directive (2009/125/EC) lays down new standards for more efficient energy use.

Several regulations are part of the directive, and set mandatory seasonal efficiency targets for sale in the European Union.

The unit therefore, to be CE marked and sold in the EU market, must comply with the minimum requirements imposed by the regulations in question.

For Kappa SKY family, in the different configurations, the reference regulation is as follows:

Regulation 2016/2281

ηsc (SEER) for comfort applications and SEPR for process applications, with reference to regulation 2016/2281.

As regards the 2016/2281 regulation starting from 1 January 2021, the minimum required efficiency limit will be raised (Tier 2) compared to the current standard (Tier 1).

With reference to the Kappa SKY range, below is a list of concerned regulations relating to the different units in their various configurations.

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1	51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R513A)										
REGULATION 2016/2281										
COMFORT										
Standard units										
ηsc	(1)	%	179,7	180,5	181,3	188,0	188,0	187,2	188,9	188,4
SEER	(1)		4,57	4,59	4,61	4,78	4,78	4,75	4,80	4,79
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y	Y	Y	Y
Units with EC fans (VEC)										
ηsc	(1)	%	203,8	205,0	203,0	210,6	205,4	198,6	205,8	200,6
SEER	(1)		5,17	5,20	5,15	5,34	5,21	5,04	5,22	5,09
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y	Y	Y	Y
PROCESS										
SEPR	(2)		-	-	-	-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1	51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R134a)										
REGULATION 2016/2281										
COMFORT										
Standard units										
ηsc	(1)	%	189,0	190,2	191,0	197,4	190,6	191,0	195,0	193,4
SEER	(1)		4,80	4,83	4,85	5,01	4,84	4,85	4,95	4,91
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y	Y	Y	Y
Units with EC fans (VEC)										
ηsc	(1)	%	211,8	213,8	211,0	219,4	213,8	206,6	214,2	208,2
SEER	(1)		5,37	5,42	5,35	5,56	5,42	5,24	5,43	5,28
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y	Y	Y	Y
PROCESS										
SEPR	(2)		-	-	-	-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY LGW Xi FC

			24.1	31.1	40.1	45.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Xi FC (R1234ze)										
REGULATION 2016/2281										
COMFORT										
Standard units										
ηsc	(1)	%	184,2	186,2	190,6	190,2	189,8	189,8	190,2	191,0
SEER	(1)		4,68	4,73	4,84	4,83	4,82	4,82	4,83	4,85
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y	Y	Y	Y
Units with EC fans (VEC)										
ηsc	(1)	%	206,6	209,8	218,6	207,0	208,6	205,0	208,6	205,4
SEER	(1)		5,24	5,32	5,54	5,25	5,29	5,20	5,29	5,21
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y	Y	Y	Y
PROCESS										
SEPR	(2)		5,7	5,79	5,73	5,79	5,73	5,56	5,56	5,52
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY Si FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R513A)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	181,8	181,4	183,0	181,0	187,4
SEER	(1)		4,62	4,61	4,65	4,60	4,76
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	194,2	189,4	196,2	190,2	201,4
SEER	(1)		4,93	4,81	4,98	4,83	5,11
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY Si FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R134a)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	189,0	188,2	192,2	189,4	197,4
SEER	(1)		4,80	4,78	4,88	4,81	5,01
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	202,6	196,6	204,6	198,2	209,4
SEER	(1)		5,14	4,99	5,19	5,03	5,31
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Sh FC (R513A)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	179,2	179	180,6	179	180,5
SEER	(1)		4,56	4,55	4,59	4,55	4,59
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	187	183	191,8	186,2	190,2
SEER	(1)		4,75	4,65	4,87	4,73	4,83
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Sh FC (R134a)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	187	182,2	189,8	187,8	189,4
SEER	(1)		4,75	4,63	4,82	4,77	4,81
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	194,6	185,8	199,4	193	198,6
SEER	(1)		4,94	4,72	5,06	4,9	5,04
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY LGW Sh FC

			47.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Sh FC (R1234ze)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	181,1	180,8	185,8	182,3	182,3
SEER	(1)		4,6	4,6	4,72	4,63	4,63
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	188,9	185	193,7	188,1	192,1
SEER	(1)		4,8	4,7	4,92	4,78	4,88
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

ELECTRICAL SPECIFICATIONS

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1
KAPPA SKY Xi FC (R513A)						
General electrical specifications						
Max. absorbed power (FLI)	(1)	kW	83	119	119	172
Max. absorbed current (FLA)	(1)	A	162	227	227	321
Nominal current (Inom)	(2)	A	122,0	147,0	172,0	217,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95
General electrical specifications FC BASIC						
Max. absorbed power (FLI)	(1)	kW	87,4	123,4	124,8	179,3
Max. absorbed current (FLA)	(1)	A	172,2	237,2	240,6	338,0
Max. inrush current (MIC)	(3)	A	20,0	20,0	24,0	27,0
General electrical specifications FC EXTRA						
Max. absorbed power (FLI)	(1)	kW	90,3	127,7	127,7	183,6
Max. absorbed current (FLA)	(1)	A	179,0	247,4	247,4	348,2
Max. inrush current (MIC)	(3)	A	27,0	30,0	30,0	37,0
Power supply			400V / 3ph / 50Hz			
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz			
Suggested line section	(4)	mm²	3x120+1G72	3x150+1G97	3x150+1G97	2x(3x95+1G50)
Suggested line protection	(5)		NH1gG 250A	NH2gG 315A	NH2gG 315A	NH2gG 400A
Electrical specifications for fans						
Rated power of standard fan		n° x kW	5 x 1,45	6 x 1,45	6 x 1,45	8 x 1,45
Rated current of standard fan		n° x A	5 x 3,40	6 x 3,40	6 x 3,40	8 x 3,40
Rated power of EC fan		n° x kW	5 x 1,25	6 x 1,25	6 x 1,25	8 x 1,25
Rated current of EC fan		n° x A	5 x 1,90	6 x 1,90	6 x 1,90	8 x 1,90
Rated power of oversize EC fans		n° x kW	5 x 2,90	6 x 2,90	6 x 2,90	8 x 2,90
Rated current of oversize EC fans		n° x A	5 x 4,40	6 x 4,40	6 x 4,40	8 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY Xi FC

			51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R513A)						
General electrical specifications						
Max. absorbed power (FLI)	(1)	kW	165	235	238	282
Max. absorbed current (FLA)	(1)	A	324	446	453	533
Nominal current (Inom)	(2)	A	246,0	299,0	328,0	403,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95
General electrical specifications FC BASIC						
Max. absorbed power (FLI)	(1)	kW	173,7	243,7	249,6	293,6
Max. absorbed current (FLA)	(1)	A	344,4	466,4	480,2	560,2
Max. inrush current (MIC)	(3)	A	119,0	149,0	159,0	179,0
General electrical specifications FC EXTRA						
Max. absorbed power (FLI)	(1)	kW	179,5	249,5	252,5	-
Max. absorbed current (FLA)	(1)	A	358,0	480,0	487,0	-
Max. inrush current (MIC)	(3)	A	133,0	163,0	166,0	-
Power supply			400V / 3ph / 50Hz			
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz			
Suggested line section	(4)	mm²	2x(3x120+1G70)	2x(3x150+1G95)	2x(3x150+1G95)	2x(3x150+1G95)
Suggested line protection	(5)		NH3gG 500A	NH3gG 630A	NH3gG 630A	NH3gG 630A
Electrical specifications for fans						
Rated power of standard fan		n° x kW	10 x 1,45	10 x 1,45	12 x 1,45	12 x 1,45
Rated current of standard fan		n° x A	10 x 3,40	10 x 3,40	12 x 3,40	12 x 3,40
Rated power of EC fan		n° x kW	10 x 1,25	10 x 1,25	12 x 1,25	12 x 1,25
Rated current of EC fan		n° x A	10 x 1,90	10 x 1,90	12 x 1,90	12 x 1,90
Rated power of oversize EC fans		n° x kW	10 x 2,90	10 x 2,90	12 x 2,90	12 x 2,90
Rated current of oversize EC fans		n° x A	10 x 4,40	10 x 4,40	12 x 4,40	12 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1
KAPPA SKY Xi FC (R134a)						
General electrical specifications						
Max. absorbed power (FLI)	(1)	kW	83	119	119	172
Max. absorbed current (FLA)	(1)	A	162	227	227	321
Nominal current (Inom)	(2)	A	117,0	142,0	164,0	207,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95
General electrical specifications FC BASIC						
Max. absorbed power (FLI)	(1)	kW	87,4	123,4	124,8	179,3
Max. absorbed current (FLA)	(1)	A	172,2	237,2	240,6	338,0
Max. inrush current (MIC)	(3)	A	20,0	20,0	24,0	27,0
General electrical specifications FC EXTRA						
Max. absorbed power (FLI)	(1)	kW	90,3	127,7	127,7	183,6
Max. absorbed current (FLA)	(1)	A	179,0	247,4	247,4	348,2
Max. inrush current (MIC)	(3)	A	27,0	30,0	30,0	37,0
Power supply			400V / 3ph / 50Hz			
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz			
Suggested line section	(4)	mm²	3x120+1G72	3x150+1G97	3x150+1G97	2x(3x95+1G50)
Suggested line protection	(5)		NH1gG 250A	NH2gG 315A	NH2gG 315A	NH2gG 400A
Electrical specifications for fans						
Rated power of standard fan		n° x kW	5 x 1,45	6 x 1,45	6 x 1,45	8 x 1,45
Rated current of standard fan		n° x A	5 x 3,40	6 x 3,40	6 x 3,40	8 x 3,40
Rated power of EC fan		n° x kW	5 x 1,25	6 x 1,25	6 x 1,25	8 x 1,25
Rated current of EC fan		n° x A	5 x 1,90	6 x 1,90	6 x 1,90	8 x 1,90
Rated power of oversize EC fans		n° x kW	5 x 2,90	6 x 2,90	6 x 2,90	8 x 2,90
Rated current of oversize EC fans		n° x A	5 x 4,40	6 x 4,40	6 x 4,40	8 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY Xi FC

			51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R134a)						
General electrical specifications						
Max. absorbed power (FLI)	(1)	kW	165	235	238	282
Max. absorbed current (FLA)	(1)	A	324	446	453	533
Nominal current (Inom)	(2)	A	235,0	285,0	313,0	363,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95
General electrical specifications FC BASIC						
Max. absorbed power (FLI)	(1)	kW	173,7	243,7	249,6	293,6
Max. absorbed current (FLA)	(1)	A	344,4	466,4	480,2	560,2
Max. inrush current (MIC)	(3)	A	119,0	149,0	159,0	179,0
General electrical specifications FC EXTRA						
Max. absorbed power (FLI)	(1)	kW	179,5	249,5	252,5	-
Max. absorbed current (FLA)	(1)	A	358,0	480,0	487,0	-
Max. inrush current (MIC)	(3)	A	133,0	163,0	166,0	-
Power supply			400V / 3ph / 50Hz			
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz			
Suggested line section	(4)	mm²	2x(3x120+1G70)	2x(3x150+1G95)	2x(3x150+1G95)	2x(3x150+1G95)
Suggested line protection	(5)		NH3gG 500A	NH3gG 630A	NH3gG 630A	NH3gG 630A
Electrical specifications for fans						
Rated power of standard fan		n° x kW	10 x 1,45	10 x 1,45	12 x 1,45	12 x 1,45
Rated current of standard fan		n° x A	10 x 3,40	10 x 3,40	12 x 3,40	12 x 3,40
Rated power of EC fan		n° x kW	10 x 1,25	10 x 1,25	12 x 1,25	12 x 1,25
Rated current of EC fan		n° x A	10 x 1,90	10 x 1,90	12 x 1,90	12 x 1,90
Rated power of oversize EC fans		n° x kW	10 x 2,90	10 x 2,90	12 x 2,90	12 x 2,90
Rated current of oversize EC fans		n° x A	10 x 4,40	10 x 4,40	12 x 4,40	12 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY LGW Xi FC

			24.1	31.1	40.1	45.2
KAPPA SKY LGW Xi FC						
General electrical specifications						
Max. absorbed power (FLI)	(1)	kW	83	119	144	162
Max. absorbed current (FLA)	(1)	A	162	227	274	318
Nominal current (Inom)	(2)	A	111,0	144,0	183,0	216,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95
General electrical specifications FC BASIC						
Max. absorbed power (FLI)	(1)	kW	87,4	123,4	149,8	169,3
Max. absorbed current (FLA)	(1)	A	172,2	237,2	287,6	335,0
Max. inrush current (MIC)	(3)	A	20,0	20,0	24,0	112,0
General electrical specifications FC EXTRA						
Max. absorbed power (FLI)	(1)	kW	90,3	127,7	155,6	173,6
Max. absorbed current (FLA)	(1)	A	179,0	247,4	301,2	345,2
Max. inrush current (MIC)	(3)	A	27,0	30,0	37,0	123,0
Power supply			400V / 3ph / 50Hz			
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz			
Suggested line section	(4)	mm²	3x120+1G72	3x150+1G97	2x(3x95+1G50)	2x(3x95+1G50)
Suggested line protection	(5)		NH1gG 250A	NH2gG 315A	NH2gG 400A	NH2gG 400A
Electrical specifications for fans						
Rated power of standard fan		n° x kW	5 x 1,45	6 x 1,45	8 x 1,45	8 x 1,45
Rated current of standard fan		n° x A	5 x 3,40	6 x 3,40	8 x 3,40	8 x 3,40
Rated power of EC fan		n° x kW	5 x 1,25	6 x 1,25	8 x 1,25	8 x 1,25
Rated current of EC fan		n° x A	5 x 1,90	6 x 1,90	8 x 1,90	8 x 1,90
Rated power of oversize EC fans		n° x kW	5 x 2,90	6 x 2,90	8 x 2,90	8 x 2,90
Rated current of oversize EC fans		n° x A	5 x 4,40	6 x 4,40	8 x 4,40	8 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY LGW Xi FC

			52.2	60.2	66.2	71.2
KAPPA SKY LGW Xi FC						
General electrical specifications						
Max. absorbed power (FLI)	(1)	kW	195	235	238	238
Max. absorbed current (FLA)	(1)	A	372	446	453	533
Nominal current (Inom)	(2)	A	245,0	294,0	316,0	352,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95
General electrical specifications FC BASIC						
Max. absorbed power (FLI)	(1)	kW	203,7	243,7	249,6	249,6
Max. absorbed current (FLA)	(1)	A	392,4	466,4	480,2	560,2
Max. inrush current (MIC)	(3)	A	131,0	149,0	159,0	179,0
General electrical specifications FC EXTRA						
Max. absorbed power (FLI)	(1)	kW	209,5	249,5	252,5	-
Max. absorbed current (FLA)	(1)	A	406,0	480,0	487,0	-
Max. inrush current (MIC)	(3)	A	145,0	163,0	166,0	-
Power supply			400V / 3ph / 50Hz			
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz			
Suggested line section	(4)	mm²	2x(3x120+1G70)	2x(3x150+1G95)	2x(3x150+1G95)	2x(3x150+1G95)
Suggested line protection	(5)		NH3gG 500A	NH3gG 630A	NH3gG 630A	NH3gG 630A
Electrical specifications for fans						
Rated power of standard fan		n° x kW	10 x 1,45	10 x 1,45	12 x 1,45	12 x 1,45
Rated current of standard fan		n° x A	10 x 3,40	10 x 3,40	12 x 3,40	12 x 3,40
Rated power of EC fan		n° x kW	10 x 1,25	10 x 1,25	12 x 1,25	12 x 1,25
Rated current of EC fan		n° x A	10 x 1,90	10 x 1,90	12 x 1,90	12 x 1,90
Rated power of oversize EC fans		n° x kW	10 x 2,90	10 x 2,90	12 x 2,90	12 x 2,90
Rated current of oversize EC fans		n° x A	10 x 4,40	10 x 4,40	12 x 4,40	12 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY Si FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R513A)							
General electrical specifications							
Max. absorbed power (FLI)	(1)	kW	232	276	279	335	338
Max. absorbed current (FLA)	(1)	A	440	520	526	620	627
Nominal current (Inom)	(2)	A	254,0	311,0	337,0	392,0	411,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95	0,95
General electrical specifications FC BASIC							
Max. absorbed power (FLI)	(1)	kW	240,7	284,7	290,6	346,6	352,5
Max. absorbed current (FLA)	(1)	A	460,4	540,4	553,2	647,2	661,0
Max. inrush current (MIC)	(3)	A	146,0	166,0	176,0	200,0	210,0
General electrical specifications FC EXTRA							
Max. absorbed power (FLI)	(1)	kW	246,5	290,5	293,5	352,4	-
Max. absorbed current (FLA)	(1)	A	474,0	554,0	560,0	660,8	-
Max. inrush current (MIC)	(3)	A	160,0	180,0	183,0	213,0	-
Power supply			400V / 3ph / 50Hz				
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz				
Suggested line section	(4)	mm²	2x(3x150+1G95)	2x(3x150+1G95)	2x(3x150+1G95)	3x(3x120+1G70)	3x(3x120+1G70)
Suggested line protection	(5)		NH3gG 630A	NH3gG 630A	NH3gG 630A	NH4gG 800A	NH4gG 800A
Electrical specifications for fans							
Rated power of standard fan		n° x kW	8 x 1,45	8 x 1,45	10 x 1,45	10 x 1,45	12 x 1,45
Rated current of standard fan		n° x A	8 x 3,40	8 x 3,40	10 x 3,40	10 x 3,40	12 x 3,40
Rated power of EC fan		n° x kW	8 x 1,25	8 x 1,25	10 x 1,25	10 x 1,25	12 x 1,25
Rated current of EC fan		n° x A	8 x 1,90	8 x 1,90	10 x 1,90	10 x 1,90	12 x 1,90
Rated power of oversize EC fans		n° x kW	8 x 2,90	8 x 2,90	10 x 2,90	10 x 2,90	12 x 2,90
Rated current of oversize EC fans		n° x A	8 x 4,40	8 x 4,40	10 x 4,40	10 x 4,40	12 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY Si FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R134a)							
General electrical specifications							
Max. absorbed power (FLI)	(1)	kW	232	276	279	335	338
Max. absorbed current (FLA)	(1)	A	440	520	526	620	627
Nominal current (Inom)	(2)	A	244,0	298,0	323,0	376,0	393,0
cosφ standard unit	(2)		0,95	0,95	0,95	0,95	0,95
General electrical specifications FC BASIC							
Max. absorbed power (FLI)	(1)	kW	240,7	284,7	290,6	346,6	352,5
Max. absorbed current (FLA)	(1)	A	460,4	540,4	553,2	647,2	661,0
Max. inrush current (MIC)	(3)	A	146,0	166,0	176,0	200,0	210,0
General electrical specifications FC EXTRA							
Max. absorbed power (FLI)	(1)	kW	246,5	290,5	293,5	352,4	-
Max. absorbed current (FLA)	(1)	A	474,0	554,0	560,0	660,8	-
Max. inrush current (MIC)	(3)	A	160,0	180,0	183,0	213,0	-
Power supply			400V / 3ph / 50Hz				
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz				
Suggested line section	(4)	mm²	2x(3x150+1G95)	2x(3x150+1G95)	2x(3x150+1G95)	3x(3x120+1G70)	3x(3x120+1G70)
Suggested line protection	(5)		NH3gG 630A	NH3gG 630A	NH3gG 630A	NH4gG 800A	NH4gG 800A
Electrical specifications for fans							
Rated power of standard fan		n° x kW	8 x 1,45	8 x 1,45	10 x 1,45	10 x 1,45	12 x 1,45
Rated current of standard fan		n° x A	8 x 3,40	8 x 3,40	10 x 3,40	10 x 3,40	12 x 3,40
Rated power of EC fan		n° x kW	8 x 1,25	8 x 1,25	10 x 1,25	10 x 1,25	12 x 1,25
Rated current of EC fan		n° x A	8 x 1,90	8 x 1,90	10 x 1,90	10 x 1,90	12 x 1,90
Rated power of oversize EC fans		n° x kW	8 x 2,90	8 x 2,90	10 x 2,90	10 x 2,90	12 x 2,90
Rated current of oversize EC fans		n° x A	8 x 4,40	8 x 4,40	10 x 4,40	10 x 4,40	12 x 4,40

(1) Data regarding the unit without accessories working in maximum power absorption conditions

(2) Datum related to the unit without accessories working in standard conditions (A35°C; W12/7°C)

(3) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + LRA of the largest compressor)

(4) These values are determined for cables with operating temperature of 40°C, EPR insulation and a line with a maximum length of 50m. The line section must be determined by a qualified technician based on the protection devices, the length of the line, the type of cable used and the type of installation.

(5) The correct line protection part must be determined by a qualified technician based on the length of the line, the type of cable used and the type of installation.

KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Sh FC (R513A)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	179,2	179	180,6	179	180,5
SEER	(1)		4,56	4,55	4,59	4,55	4,59
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	187	183	191,8	186,2	190,2
SEER	(1)		4,75	4,65	4,87	4,73	4,83
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Sh FC (R134a)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	187	182,2	189,8	187,8	189,4
SEER	(1)		4,75	4,63	4,82	4,77	4,81
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	194,6	185,8	199,4	193	198,6
SEER	(1)		4,94	4,72	5,06	4,9	5,04
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

KAPPA SKY LGW Sh FC

			47.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Sh FC (R1234ze)							
REGULATION 2016/2281							
COMFORT							
Standard units							
ηsc	(1)	%	181,1	180,8	185,8	182,3	182,3
SEER	(1)		4,6	4,6	4,72	4,63	4,63
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
Units with EC fans (VEC)							
ηsc	(1)	%	188,9	185	193,7	188,1	192,1
SEER	(1)		4,8	4,7	4,92	4,78	4,88
Compliance Tier 2 (2021)	(1)		Y	Y	Y	Y	Y
PROCESS							
SEPR	(2)		-	-	-	-	-
Compliance Tier 2 (2021)	(2)		Y	Y	Y	Y	Y

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the given condition: it can be installed only in non-EU countries.

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

HYDRAULIC MODULES

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1	51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R513A)										
Volume of the expansion vessel		l	24	24	24	24	24	24	24	24
FC BASIC standard pumps										
Pump model 1P			P9	P23	P10	P10	P6	P6	P6	P7
Pump model 2P			P21	P25	P22	P22	P26	P26	P26	P24
Available head 1P	(1) (2)	kPa	185	225	196	167	189	191	172	184
Available head 1P	(1) (3)	kPa	107	117	117	84	111	90	97	93
Available head 2P	(1) (2)	kPa	205	225	223	187	182	182	161	176
Available head 2P	(1) (3)	kPa	127	117	144	104	104	81	86	84
FC EXTRA standard pumps										
Pump model 1P			P9	P23	P10	P10	P6	P6	P6	-
Pump model 2P			P21	P25	P22	P22	P26	P26	P26	-
Available head 1P	(1) (2)	kPa	185	224	189	177	192	190	172	-
Available head 1P	(1) (3)	kPa	154	194	152	142	162	150	122	-
Available head 2P	(1) (2)	kPa	205	224	222	186	180	181	160	-
Available head 2P	(1) (3)	kPa	174	194	185	151	149	141	110	-

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.
(2) The data refers to a unit with inactive free-cooling.
(3) The data refers to a unit with active free-cooling.

KAPPA SKY Xi FC

			25.1	31.1	34.1	43.1	51.2	59.2	66.2	74.2
KAPPA SKY Xi FC (R134a)										
Volume of the expansion vessel		l	24	24	24	24	24	24	24	24
FC BASIC standard pumps										
Pump model 1P			P9	P23	P10	P10	P6	P6	P6	P7
Pump model 2P			P21	P25	P22	P22	P26	P26	P26	P24
Available head 1P	(1) (2)	kPa	185	225	196	167	189	191	172	184
Available head 1P	(1) (3)	kPa	107	117	117	84	111	90	97	93
Available head 2P	(1) (2)	kPa	205	225	223	187	182	182	161	176
Available head 2P	(1) (3)	kPa	127	117	144	104	104	81	86	84
FC EXTRA standard pumps										
Pump model 1P			P9	P23	P10	P10	P6	P6	P6	-
Pump model 2P			P21	P25	P22	P22	P26	P26	P26	-
Available head 1P	(1) (2)	kPa	185	224	189	177	192	190	172	-
Available head 1P	(1) (3)	kPa	154	194	152	142	162	150	122	-
Available head 2P	(1) (2)	kPa	205	224	222	186	180	181	160	-
Available head 2P	(1) (3)	kPa	174	194	185	151	149	141	110	-

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.
(2) The data refers to a unit with inactive free-cooling.
(3) The data refers to a unit with active free-cooling.

KAPPA SKY LGW Xi FC

			24.1	31.1	40.1	45.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Xi FC (R1234ze)										
Volume of the expansion vessel		l	24	24	24	24	24	24	24	24
FC BASIC standard pumps										
Pump model 1P			P9	P23	P10	P10	P11	P6	P6	P7
Pump model 2P			P20	P25	P10	P10	P22	P26	P26	P24
Available head 1P	(1) (2)	kPa	204	238	176	185	170	207	178	203
Available head 2P	(1) (3)	kPa	136	127	73	98	89	105	105	119
Available head 1P	(1) (2)	kPa	159	238	176	185	177	198	167	196
Available head 2P	(1) (3)	kPa	91	127	73	98	95	96	94	112
FC EXTRA standard pumps										
Pump model 1P			P9	P23	P10	P10	P11	P6	P6	P7
Pump model 2P			P20	P25	P10	P10	P22	P26	P26	P24
Available head 1P	(1) (2)	kPa	204	237	198	184	167	206	177	-
Available head 2P	(1) (3)	kPa	177	206	170	147	136	166	128	-
Available head 1P	(1) (2)	kPa	225	237	222	203	167	251	166	-
Available head 2P	(1) (3)	kPa	204	237	198	184	167	206	177	-

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.
(2) The data refers to a unit with inactive free-cooling.
(3) The data refers to a unit with active free-cooling.

KAPPA SKY Si FC - KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R513A) - KAPPA SKY Sh FC (R513A)							
Volume of the expansion vessel		l	24	24	24	24	24
FC BASIC standard pumps							
Pump model 1P			P6	P6	P6	P7	P7
Pump model 2P			P26	P26	P26	P24	P24
Available head 1P	(1) (2)	kPa	197	200	180	196	176
Available head 2P	(1) (3)	kPa	123	105	109	109	108
Available head 1P	(1) (2)	kPa	190	192	170	188	165
Available head 2P	(1) (3)	kPa	116	97	98	101	97
FC EXTRA standard pumps							
Pump model 1P			P6	P6	P6	P7	-
Pump model 2P			P26	P26	P26	P24	-
Available head 1P	(1) (2)	kPa	195	199	180	195	-
Available head 2P	(1) (3)	kPa	166	162	132	137	-
Available head 1P	(1) (2)	kPa	188	191	169	187	-
Available head 2P	(1) (3)	kPa	159	154	121	129	-

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.
(2) The data refers to a unit with inactive free-cooling.
(3) The data refers to a unit with active free-cooling.

KAPPA SKY Si FC - KAPPA SKY Sh FC

			51.2	59.2	66.2	74.2	81.2
KAPPA SKY Si FC (R134a) - KAPPA SKY Sh FC (R134a)							
Volume of the expansion vessel		l	24	24	24	24	24
FC BASIC standard pumps							
Pump model 1P			P6	P6	P6	P7	P7
Pump model 2P			P26	P26	P26	P24	P24
Available head 1P	(1) (2)	kPa	197	200	180	196	176
Available head 2P	(1) (3)	kPa	123	105	109	109	108
Available head 1P	(1) (2)	kPa	190	192	170	188	165
Available head 2P	(1) (3)	kPa	116	97	98	101	97
FC EXTRA standard pumps							
Pump model 1P			P6	P6	P6	P7	-
Pump model 2P			P26	P26	P26	P24	-
Available head 1P	(1) (2)	kPa	195	199	180	195	-
Available head 2P	(1) (3)	kPa	166	162	132	137	-
Available head 1P	(1) (2)	kPa	188	191	169	187	-
Available head 2P	(1) (3)	kPa	159	154	121	129	-

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.
(2) The data refers to a unit with inactive free-cooling.
(3) The data refers to a unit with active free-cooling.

KAPPA SKY LGW Sh FC

			47.2	52.2	60.2	66.2	71.2
KAPPA SKY LGW Sh FC (R1234ze)							
Volume of the expansion vessel		l	24	24	24	24	24
FC BASIC standard pumps							
Pump model 1P			P10	P11	P6	P6	P7
Pump model 2P			P10	P22	P26	P26	P24
Available head 1P	(1) (2)	kPa	203	210	218	190	199
Available head 2P	(1) (3)	kPa	144	139	124	122	113
Available head 1P	(1) (2)	kPa	203	219	210	180	191
Available head 2P	(1) (3)	kPa	144	147	116	112	106
FC EXTRA standard pumps							
Pump model 1P			P10	P11	P6	P6	P7
Pump model 2P			P10	P22	P26	P26	P24
Available head 1P	(1) (2)	kPa	202	210	217	189	197
Available head 2P	(1) (3)	kPa	178	182	180	144	156
Available head 1P	(1) (2)	kPa	202	218	209	179	189
Available head 2P	(1) (3)	kPa	178	190	172	134	149

(1) Outside air temperature 30°C; evaporator inlet/outlet fluid temperature 15/10°C; glycol at 30%.
(2) The data refers to a unit with inactive free-cooling.
(3) The data refers to a unit with active free-cooling.

PUMP DATA

Model	Rated power	Rated current	Min. flow rate	Max. flow rate
	kW	A	m³/h	m³/h
P1	3	6,3	15	53
P2	4	7,6	27	64
P3	5,5	10,5	36	109
P4	7,5	14,1	36	139
P5	11	20,2	68	213
P6	15	26,6	68	247
P7	18,5	33	68	271
P8	5,5	10,5	27	82
P9	7,5	14,1	27	101
P10	11	20,2	36	135
P11	11	20,2	36	157
P12	15	26,6	36	180
P13	18,5	33	68	271
P14	22	40,4	68	303
P15	3	6,3	26	64
P16	4	7,7	26	75
P17	5,5	10,5	36	109
P18	7,5	14,1	36	129
P19	11	20,2	35	166
P20	5,5	10,5	26	90
P21	7,5	14,1	26	101
P22	11	20,2	36	154
P23	9,2	20,2	24	108
P24	18,5	33	35	219
P26	15	26,6	35	189

USER-SIDE EXCHANGER FLOW RATE FIELDS

The units are sized and optimized for the following nominal conditions: external air 30°C, inlet-outlet from user-side exchanger 15/10°C, glycol at 30%

The units can work at design conditions different from nominal conditions, provided that:

- the design condition falls within the operating limits specified below
- the unit is equipped with all the options required for operation (e.g. brine kit, etc.)
- the flow rate at design conditions (that is, of the specific application) must always come within the allowed flow rate ranges specified below. If the design conditions require a water flow rate that does not come within the allowed operating range, you must contact our sales department that will identify the most suitable solution for the specific application.

KAPPA SKY Xi FC (R513A, R134a)

	Qmin	Qmax
	m³/h	m³/h
25.1	20	85
31.1	22	85
34.1	27	107
43.1	30	120
51.2	32	122
59.2	38	153
66.2	49	203
74.2	50	203

KAPPA SKY Si FC (R513A, R134a) - KAPPA SKY Sh FC (R513A, R134a)

	Qmin	Qmax
	m³/h	m³/h
51.2	32	122
59.2	38	153
66.2	49	203
74.2	50	203
81.2	68	290

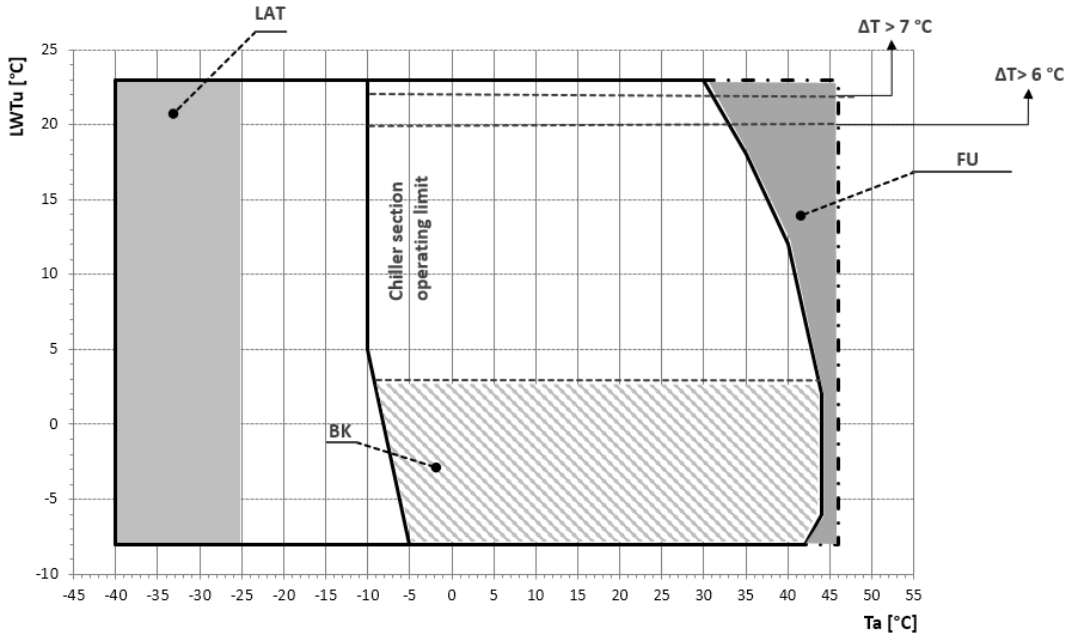
KAPPA SKY LGW Xi FC (R1234ze)

	Qmin	Qmax
	m³/h	m³/h
24.1	20	85
31.1	27	107
40.1	30	120
45.2	38	153
52.2	49	203
60.2	49	203
66.2	50	203
71.2	50	203

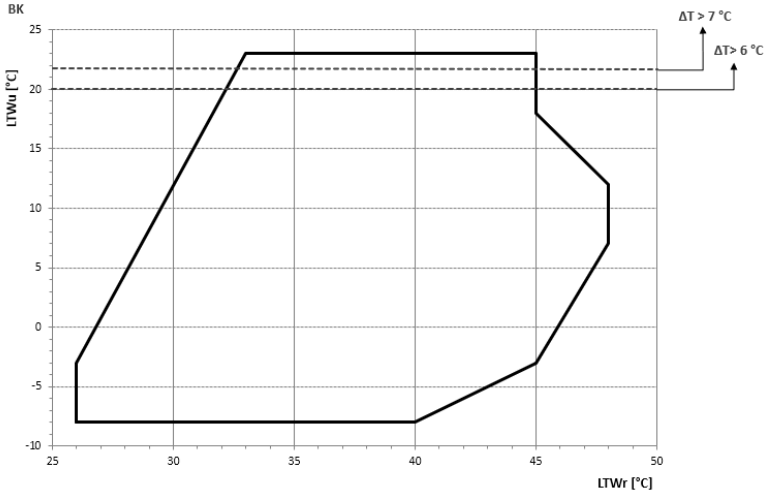
OPERATING LIMITS

KAPPA SKY XI FC

Cooling



Total recovery



Ta: external air temperature

LWTu: water outlet temperature from the user-side heat exchanger

BK: For LWTu below +3°C, it is mandatory to fit the "Brine Kit" accessory

FU: in the indicated area, the control could actuate a forced capacity reduction of the compressors so as to prevent tripping of the safety devices

LAT: in the specified area the unit can only operate if it is supplied with the SUN option "Heaters for unit operation at air temperature below -25°C" and without wind.

For LWTu below +5°C, it is compulsory to use suitable percentages of antifreeze additives (glycols) to prevent ice formation in the exchanger.

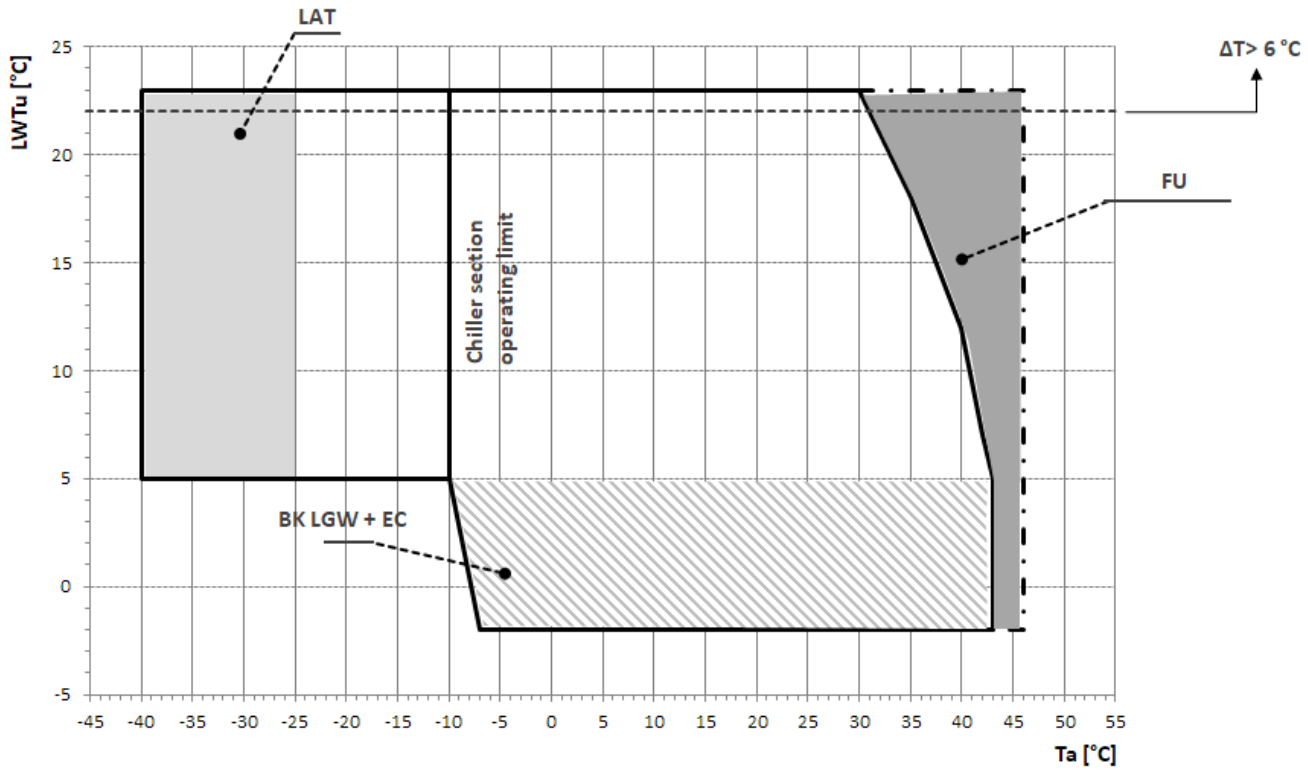
The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.

The cooling set point can then be changed by the customer in an interval that, compared to the set point given on ordering, ranges from -1K up to the maximum temperature allowed by the above-stated operating limits.

The unit will be optimized to work at the set point temperatures given on ordering. For different set points, the cooling capacity provided and the level of efficiency of the machine could decrease and move away from these conditions.

KAPPA SKY LGW XI FC

Cooling



Ta: external air temperature

LWTu: water outlet temperature from the user-side heat exchanger

BK: For LWTu below +5°C, it is mandatory to fit the "Brine Kit LGW" accessory

FU: in the indicated area, the control could actuate a forced capacity reduction of the compressors so as to prevent tripping of the safety devices

LAT: in the specified area the unit can only operate if it is supplied with the SUN option "Heaters for unit operation at air temperature below -25°C" and without wind.

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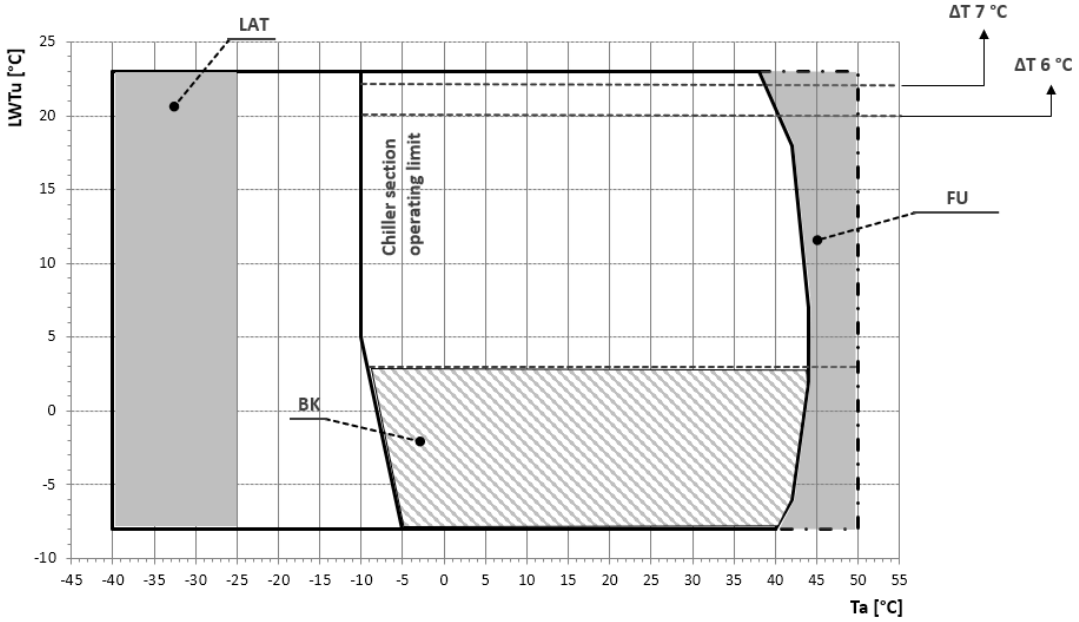
The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.

The cooling set point can then be changed by the customer in an interval that, compared to the set point given on ordering, ranges from -1K up to the maximum temperature allowed by the above-stated operating limits.

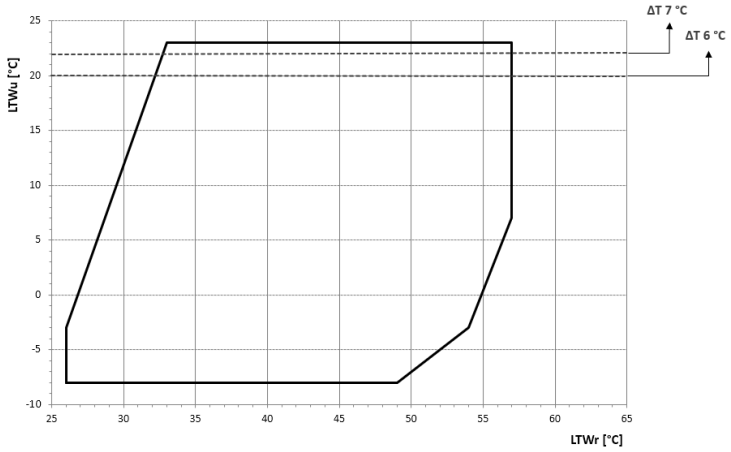
The unit will be optimized to work at the set point temperatures given on ordering. For different set points, the cooling capacity provided and the level of efficiency of the machine could decrease and move away from these conditions.

KAPPA SKY SI FC - KAPPA SKY SH FC

Cooling



Total recovery



Ta: external air temperature

LWTu: water outlet temperature from the user-side heat exchanger

BK: For LWTu below +3°C, it is mandatory to fit the "Brine Kit" accessory

FU: in the indicated area, the control could actuate a forced capacity reduction of the compressors so as to prevent tripping of the safety devices

LAT: in the specified area the unit can only operate if it is supplied with the SUN option "Heaters for unit operation at air temperature below -25°C" and without wind.

For LWTu below +5°C, it is compulsory to use suitable percentages of antifreeze additives (glycols) to prevent ice formation in the exchanger.

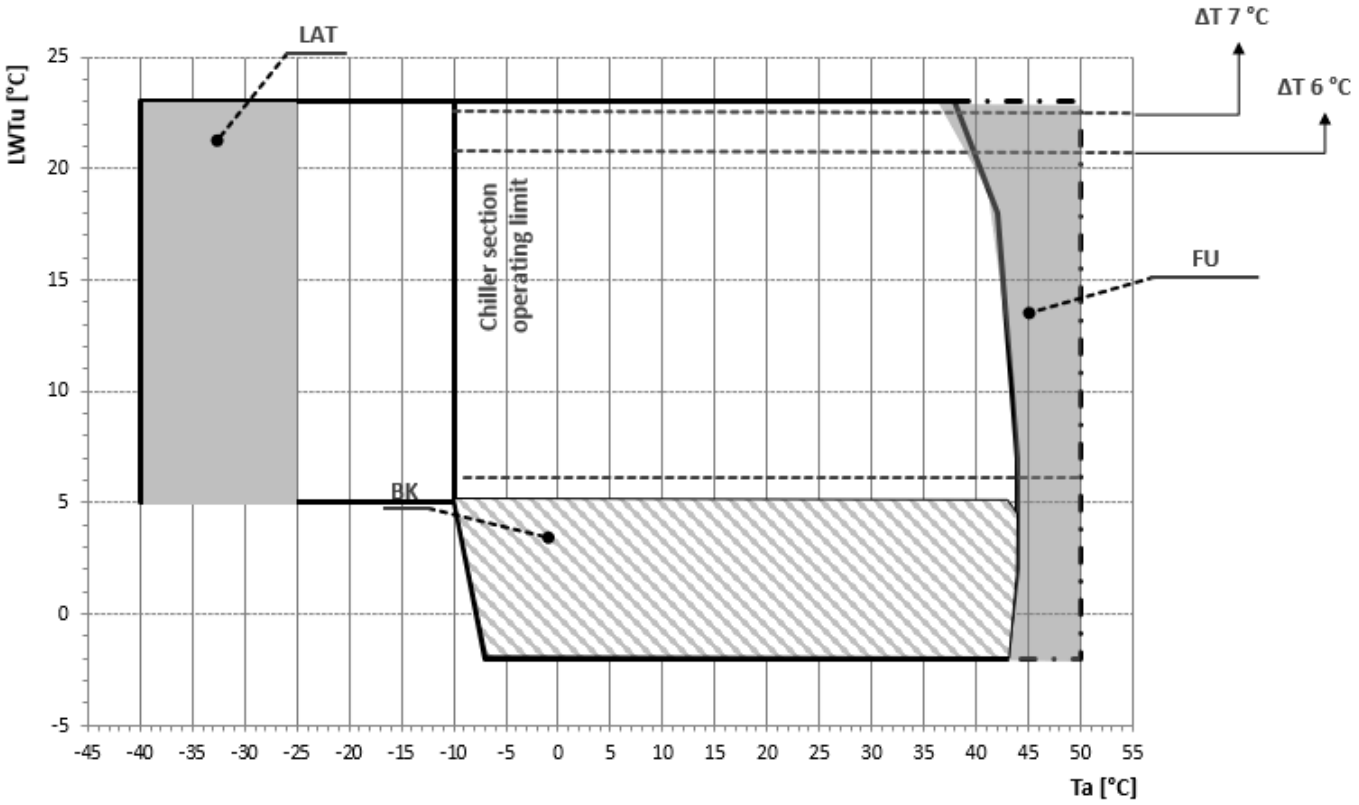
The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.

The cooling set point can then be changed by the customer in an interval that, compared to the set point given on ordering, ranges from -1K up to the maximum temperature allowed by the above-stated operating limits.

The unit will be optimized to work at the set point temperatures given on ordering. For different set points, the cooling capacity provided and the level of efficiency of the machine could decrease and move away from these conditions.

KAPPA SKY LGW SH FC

Cooling



Ta: external air temperature

LWTu: water outlet temperature from the user-side heat exchanger

BK: For LWTu below +5°C, it is mandatory to fit the "Brine Kit LGW" accessory

FU: in the indicated area, the control could actuate a forced capacity reduction of the compressors so as to prevent tripping of the safety devices

LAT: in the specified area the unit can only operate if it is supplied with the SUN option "Heaters for unit operation at air temperature below -25°C" and without wind.

For LWTu below +5°C, it is compulsory to use suitable percentages of antifreeze additives (glycols) to prevent ice formation in the exchanger.

The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.

The cooling set point can then be changed by the customer in an interval that, compared to the set point given on ordering, ranges from -1K up to the maximum temperature allowed by the above-stated operating limits.

The unit will be optimized to work at the set point temperatures given on ordering. For different set points, the cooling capacity provided and the level of efficiency of the machine could decrease and move away from these conditions.

NOISE LEVELS

KAPPA SKY Xi FC (R513A, R134a) - Chiller section

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
25.1	70	38	75	43	78	46	87	55	95	63	85	53	75	43	67	35	**96**	**64**
31.1	71	39	76	44	79	47	88	56	96	64	86	54	76	44	68	36	**97**	**65**
34.1	72	40	77	45	80	48	89	57	97	65	87	55	77	45	69	37	**98**	**66**
43.1	72	40	77	45	80	48	89	57	97	65	87	55	77	45	69	37	**98**	**66**
51.2	73	41	78	46	81	49	90	58	98	66	88	56	78	46	70	38	**99**	**67**
59.2	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
66.2	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
74.2	75	43	80	48	83	51	92	60	100	68	90	58	80	48	72	40	**101**	**69**

KAPPA SKY Si FC (R513A, R134a) - Chiller section

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
51.2	73	41	78	46	81	49	90	58	98	66	88	56	78	46	70	38	**99**	**67**
59.2	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
66.2	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
74.2	75	43	80	48	83	51	92	60	100	68	90	58	80	48	72	40	**101**	**69**
81.2	76	43	81	48	84	51	93	60	101	68	91	58	81	48	73	40	**102**	**69**

KAPPA SKY Sh FC (R513A, R134a) - Chiller section

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
51.2	72	40	77	45	80	48	89	57	97	65	87	55	77	45	69	37	**98**	**66**
59.2	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
66.2	73	41	78	46	81	49	90	58	98	66	88	56	78	46	70	38	**99**	**67**
74.2	75	43	80	48	83	51	92	60	100	68	90	58	80	48	72	40	**101**	**69**
81.2	76	43	81	48	84	51	93	60	101	68	91	58	81	48	73	40	**102**	**69**

Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C.

Lw: sound power levels.

Lw_tot is the only binding value.

Values obtained from measures taken according to standard ISO 3744.

Lp: sound pressure levels calculated from sound power levels, related to distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values.

The acoustic data are related to standard conditions in referable and reproducible operating conditions. All data with the exception of Lw_tot are provided for illustrative purposes only and can not be used for forecasting purposes or for the verification of binding limits.

With special reference to noise emissions, the Manufacturer takes liability for their conformity, limited to the declared Lw_tot value. Any and all other Manufacturer's liability for the impact of such emissions in relation to the location of the machine and other conditions related to machine installation is excluded. The environment and the installation conditions, as well as the operating modes, can alter the sound emissions. Any assessment concerning these conditions falls within the area of competence of the plant designer and/or the fitter.

KAPPA SKY LGW Xi FC (R1234ze) - Chiller section

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
24.1	70	38	75	43	78	46	87	55	95	63	85	53	75	43	67	35	**96**	**64**
31.1	73	41	78	46	81	49	90	58	98	66	88	56	78	46	70	38	**99**	**67**
40.1	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
45.2	74	42	79	47	82	50	91	59	99	67	89	57	79	47	71	39	**100**	**68**
52.2	75	43	80	48	83	51	92	60	100	68	90	58	80	48	72	40	**101**	**69**
60.2	76	44	81	49	84	52	93	61	101	69	91	59	81	49	73	41	**102**	**70**
66.2	76	44	81	49	84	52	93	61	101	69	91	59	81	49	73	41	**102**	**70**
71.2	77	45	82	50	85	53	94	62	102	70	92	60	82	50	74	42	**103**	**71**

KAPPA SKY LGW Sh FC (R1234ze) - Chiller section

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
51.2	73,7	41,1	79,0	46,5	82,1	49,6	91,2	58,7	99,1	66,7	89,1	56,6	79,3	46,7	70,8	38,4	**100**	**68**
59.2	73,6	41,1	79,0	46,5	82,2	49,6	91,1	58,7	99,1	66,7	89,0	56,6	79,3	46,7	70,8	38,4	**100**	**68**
66.2	74,6	42,1	80,1	47,6	83,0	50,6	92,2	59,7	100,1	67,6	90,2	57,6	80,2	47,8	71,8	39,4	**101**	**69**
74.2	75,6	43,0	81,1	48,6	84,1	51,6	93,2	60,7	101,1	68,6	91,1	58,6	81,3	48,8	72,9	40,3	**102**	**70**
81.2	75,5	43,0	81,1	48,6	84,1	51,6	93,2	60,8	101,1	68,6	91,1	58,6	81,2	48,8	72,8	40,3	**102**	**70**

Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C.

Lw: sound power levels.

Lw_tot is the only binding value.

Values obtained from measures taken according to standard ISO 3744.

Lp: sound pressure levels calculated from sound power levels, related to distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values.

The acoustic data are related to standard conditions in referable and reproducible operating conditions. All data with the exception of Lw_tot are provided for illustrative purposes only and can not be used for forecasting purposes or for the verification of binding limits.

With special reference to noise emissions, the Manufacturer takes liability for their conformity, limited to the declared Lw_tot value. Any and all other Manufacturer's liability for the impact of such emissions in relation to the location of the machine and other conditions related to machine installation is excluded. The environment and the installation conditions, as well as the operating modes, can alter the sound emissions. Any assessment concerning these conditions falls within the area of competence of the plant designer and/or the fitter.

Delta wired free cooling module

FC modules	FC fans	Octave bands [dB]																Total [dB(A)]	
		63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
		Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
1 ½	3	71	39	70	38	69	37	71	39	70	38	71	39	67	35	66	34	**76**	**44**
2	4	72	40	71	39	70	38	72	40	71	39	72	40	68	36	67	35	**77**	**45**
2 ½	5	73	41	72	40	71	39	73	41	72	40	73	41	69	37	68	36	**78**	**46**
3	6	74	42	73	41	72	40	74	42	73	41	74	42	70	38	69	37	**79**	**47**
4	8	75	43	74	42	73	41	75	43	74	42	75	43	71	39	70	38	**80**	**48**
5	10	76	44	75	43	74	42	76	44	75	43	76	44	72	40	71	39	**81**	**49**
6	12	77	45	76	44	75	43	77	45	76	44	77	45	73	41	72	40	**82**	**50**

Unit operating at nominal operating capacity, with no options of any kind, with external air temperature of 30°C and user-side heat exchanger water inlet/outlet temperature of 15/10°C.

Lw: sound power levels.

Lw_tot is the only binding value.

Values obtained from measures taken according to standard ISO 3744.

Lp: sound pressure levels calculated from sound power levels, related to distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values.

The acoustic data are related to standard conditions in referable and reproducible operating conditions. All data with the exception of Lw_tot are provided for illustrative purposes only and can not be used for forecasting purposes or for the verification of binding limits.

With special reference to noise emissions, the Manufacturer takes liability for their conformity, limited to the declared Lw_tot value. Any and all other Manufacturer's liability for the impact of such emissions in relation to the location of the machine and other conditions related to machine installation is excluded. The environment and the installation conditions, as well as the operating modes, can alter the sound emissions. Any assessment concerning these conditions falls within the area of competence of the plant designer and/or the fitter.

CONFIGURATIONS THAT ARE NOT POSSIBLE

Kappa SKY Xi FC (R513A/R134a)

	/1P /2P	/DS	/DS /1P /DS /2P	/DC	/DC /1P /DC /2P
25.1				(RFQ)	n.a.
31.1				(RFQ)	n.a.
34.1				(RFQ)	n.a.
43.1				(RFQ)	n.a.
51.2				(RFQ)	n.a.
59.2				(RFQ)	n.a.
66.2				(RFQ)	n.a.
74.2				(RFQ)	n.a.

Kappa SKY Xi FC (R513A/R134a)

	/1P /2P	/DS	/DS /1P /DS /2P	/DC	/DC /1P /DC /2P
25.1				(RFQ)	n.a.
31.1				(RFQ)	n.a.
34.1				(RFQ)	n.a.
43.1				(RFQ)	n.a.
51.2				(RFQ)	n.a.
59.2				(RFQ)	n.a.
66.2				(RFQ)	n.a.
74.2				(RFQ)	n.a.

Kappa SKY Si FC (R513A/R134a) - Kappa SKY Sh FC (R513A/R134a)

	/1P /2P	/DS	/DS /1P /DS /2P	/DC
51.2			n.a.	n.a.
59.2			n.a.	n.a.
66.2			n.a.	n.a.
74.2			n.a.	n.a.
81.2				n.a.

INSTALLATION ADVICE

The units described in this document are, by nature, strongly affected by the characteristics of the system, the working conditions and the installation site.

Remember that the unit must be installed by a qualified and skilled technician, and in compliance with the national legislation in force in the destination country.

The installation must be done in such a way that it will be possible to carry out all routine and non-routine maintenance operations.

Before starting any work, you must carefully read the "Installation, operation and maintenance manual" of the machine and do the necessary safety checks to prevent any malfunctioning or hazards.

We give some advice below that will allow you to increase the efficiency and reliability of the unit and therefore of the system into which it is inserted.

Water characteristics

To preserve the life of the exchangers, the water is required to comply with some quality parameters and it is therefore necessary to make sure its values fall within the ranges indicated in the following table:

Total hardness	2,0 ÷ 6,0 °f
Langelier index	- 0,4 ÷ 0,4
pH	7,5 ÷ 8,5
Electrical conductivity	10÷500 µS/cm
Organic elements	-
Hydrogen carbonate (HCO3-)	70 ÷ 300 ppm
Sulphates (SO42-)	< 50 ppm
Hydrogen carbonate / Sulphates (HCO3-/SO42-)	> 1
Chlorides (Cl-)	< 50 ppm
Nitrates (NO3-)	< 50 ppm
Hydrogen sulphide (H2S)	< 0,05 ppm
Ammonia (NH3)	< 0,05 ppm
Sulphites (SO3), free chlorine (Cl2)	< 1 ppm
Carbon dioxide (CO2)	< 5 ppm
Metal cations	< 0,2 ppm
Manganese ions (Mn++)	< 0,2 ppm
Iron ions (Fe2+ , Fe3+)	< 0,2 ppm
Iron + Manganese	< 0,4 ppm
Phosphates (PO43-)	< 2 ppm
Oxygen	< 0,1 ppm

Installation of water filters on all the hydraulic circuits is obligatory.

The supply of the most suitable filters for the unit can be requested as accessory. In this case, the filters are supplied loose and must be installed by the customer following the instructions given in the installation, operation and maintenance manual.

Glycol mixtures

With temperatures below 5°C, it is mandatory to work with water and anti-freeze mixtures, and also change the safety devices (anti-freeze, etc.), which must be carried out by qualified authorised personnel or by the manufacturer.

Liquid outlet temperature or minimum ambient temperature	°C	0	-5	-10	-15	-20	-25	-30	-35	-40
Freezing point	°C	-5	-10	-15	-20	-25	-30	-35	-40	-45
Ethylene glycol	%	6	22	30	36	41	46	50	53	56
Propylene glycol	%	15	25	33	39	44	48	51	54	57

The quantity of antifreeze should be considered as % on weight

Minimum water content in the system

For correct operation of the unit, it is necessary to ensure a buffering on the system such as to comply with the minimum operating time considering the greater between the minimum OFF time and the minimum ON time. In short, these contribute to limiting the number of times the compressors are switched on per hour and to preventing undesired deviations from the set point of the delivered water temperature.

Larger amounts of water are in any case always preferable, because they allow a smaller number of starts and switch-offs of the compressors, less wear of them and an increase in the efficiency of the system as a consequence of a reduction in the number of transients.

It should also be pointed out that, for air-water units working in heat pump mode, the minimum amount of water must consider the need of the unit to carry out defrosting. Having an adequate buffering volume will allow prevention of too high drifts of the delivered water temperature at the end of the defrost cycle.

The following experimental formula allows to calculate the minimum water volume of the plant.The formula refers only to the operation of the unit in cooling mode.

$$V_{min} = \frac{P_{tot} \cdot 1.000}{N} \cdot \frac{300}{\Delta T \cdot \rho \cdot c_p} + P_{tot} \cdot 0{,}8$$

where

Vmin is the minimum water content of the system [l]

Ptot is the total cooling capacity of the machine [kW]

N: number of capacity reduction steps

ΔT: differential allowed on the water temperature. Unless otherwise specified, this value is considered to be 2.5K

ρ: density of the heat-carrying fluid. Unless otherwise specified, the density of water is considered

cp: specific heat of the heat-carrying fluid. Unless otherwise specified, the specific heat of water is considered

Considering the use of water and grouping together some terms, the formula can be re-written as follows:

$$V_{min} = \frac{P_{tot}}{N} \cdot 28{,}66 + P_{tot} \cdot 0{,}8$$

For the N values, consider the following convention:

- for units with 1 compressor N = 4
- for units with 2 compressors N = 8

Installation site

To determine the best installation site for the unit and its orientation, you should pay attention to the following points:

- compliance with the clearance spaces indicated in the official dimensional drawing of the unit must be guaranteed so as to ensure accessibility for routine and non-routine maintenance operations
- you should consider the origin of the hydraulic pipes and their diameters because these affect the radiuses of curvature and therefore the spaces needed for installing them
- you should consider the position of the cable inlet on the electrical control panel of the unit as regards the origin of the power supply
- if the installation includes several units side by side, you should consider the position and dimensions of the manifolds of the user-side exchangers and of any recovery exchangers
- if the installation includes several units side by side, you should consider that the minimum distance between units is 3 metres
- you should avoid all obstructions that can limit air circulation to the source-side exchanger or that can cause recirculation between air supply and intake
- you should consider the orientation of the unit to limit, as far as possible, exposure of the source-side exchanger to solar radiation
- if the installation area is particularly windy, the orientation and positioning of the unit must be such as to avoid air recirculation on the coils. If necessary, we advise making windbreak barriers in order to prevent malfunctioning.

Once the best position for the unit has been identified, you must check that the support slab has the following characteristics:

- its dimensions must be proportionate to those of the unit: if possible, longer and wider than the unit by at least 30 cm and 15/20cm higher than the surrounding surface
- it must be able to bear at least 4 times the operating weight of the unit
- it must allow level installation of the unit: although the unit is installed on a horizontal base, make slopes in the support surface to convey rain water or defrost water to drains, wells or in any case to places where it cannot generate an accident hazard due to ice formation. All heat pump version units are equipped with discharge manifolds for the condensed water; these can be manifolded to facilitate condensate discharge.

The units are designed and built to reduce to a minimum the level of vibration transmitted to the ground, but it is in any case advisable to use rubber or spring anti-vibration mounts, which are available as accessory and should be requested when ordering.

The anti-vibration mounts must be fixed on before positioning the unit on the ground.

In the event of installation on roofs or intermediate floors, the pipes must be isolated from the walls and ceilings.

It is advisable to avoid installation in cramped places, to prevent reverberations, reflections, resonances and acoustic interactions with elements outside the unit.

It is essential that any work done to soundproof the unit does not affect its correct installation or correct operation and, in particular, does not reduce the air flow rate to the source-side exchanger.

Installations that require the use of treated coils

If the unit has to be installed in an environment with a particularly aggressive atmosphere, coils with special treatments are available as options.

- e-coated microchannel coils for condensing section
- coils with anti-corrosion treatment for condensing section (option available only for Cu/Al coil)
- Coil treated with anti-corrosion paints for freecooling section

A description of the individual accessories is available in the "Description of accessories" section.

The type of coil treatment should be chosen with regard to the environment in which the unit is to be installed, through observation of other structures and machinery with exposed metal surfaces present in the destination environment.

The cross observation criterion is the most valid method of selection currently available without having to carry out preliminary tests or measurements with instruments. The identified reference environments are:

- coastal/marine
- industrial
- urban with a high housing density
- rural

Please note that in cases where different conditions co-exist, even for short periods, the choice must be suitable for preserving the exchanger in the harsher environmental conditions and not in conditions between the worst and best situation.

Particular attention must be given in cases where an environment that is not particularly aggressive becomes aggressive as a consequence of a concomitant cause, for example, the presence of a flue outlet or an extraction fan.

We strongly suggest choosing one of the treatment options if at least one of the points listed below is verified:

- there are obvious signs of corrosion of the exposed metal surfaces in the installation area
- the prevailing winds come from the sea towards the unit
- the environment is industrial with a significant concentration of pollutants
- the environment is urban with a high population density
- the environment is rural with the presence of organic discharges and effluents

In particular, for installations near the coast, the following instructions apply:

- For units with a microchannel coil for the condensing section to be installed between 1 and 20 km from the coast, the use of the option "E-coated microchannel coils" and the option "Coil treated with anti-corrosion paints" for freecooling section is strongly recommended.
- For units with Cu/Al coils to be installed between 1 and 20 km from the coast, the use of the option "Coil treated with anti-corrosion paints" for both the condensing and the freecooling sections is strongly recommended.
- for distances within one kilometer from the coast it is strongly recommended to use the "Battery treated with anti-corrosion paints" accessory both for the condensing section and for the freecooling section

To protect the exchangers from corrosion and ensure optimal operation of the unit, we advise following the recommendations given in the user, installation and maintenance manual for cleaning the coils.

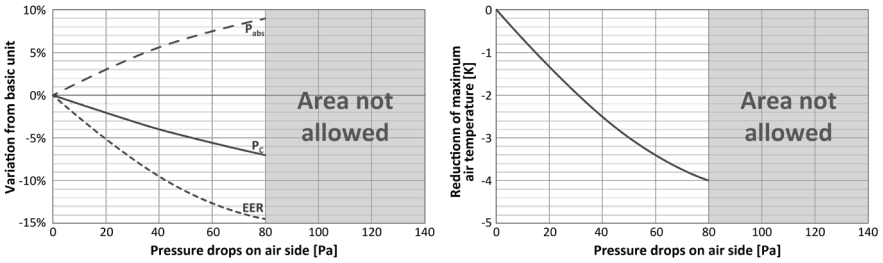
Aeraulic head losses and options available for the ventilating section

With the exception of units for which oversize fans are required, as standard, the units are designed considering that, at the nominal air flow rate, the fans work with null available pressure.

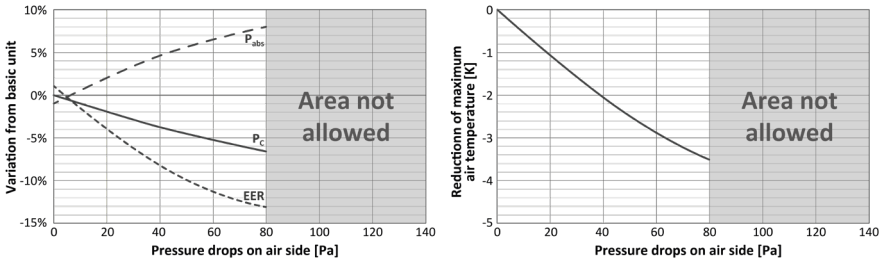
If there are obstacles to free air flow, you should consider the additional aeraulic head losses that will cause a reduction of the air flow rate and a consequent deterioration of performance.

The following diagrams show the trend of cooling capacity (PC), EER, total absorbed power (Pabs) and reduction of the maximum external air temperature in chiller operating mode, depending on the aeraulic head losses that the fans will have to overcome.

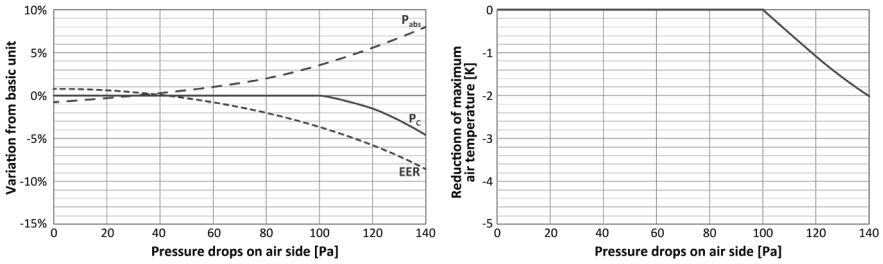
AC fans (Ø 800)



EC fans (Ø 800)



Oversize EC fans (Ø 800)



The indicated values are for the standard machine, without accessories, with AC fans and in any case in the absence of air recirculation.

Example: supposing you expect there to be obstacles that will generate an estimated aeraulic head loss of 60Pa. In this case, there are 3 possibilities:

- use the unit with standard AC fans: compared to ideal conditions, the output power will be reduced by about 5.5%, the total absorbed power will increase by about 7.5%, the EER will be reduced by about 12.5% and the maximum allowed external air temperature for operation at 100% will be reduced by about 3.4K compared to the nominal limit
- use the unit with EC fans: compared to the unit with AC fans working in ideal conditions, the output power will be reduced by about 5%, the total absorbed power will increase by about 6.5%, the EER will be reduced by about 11.5% and the maximum allowed external air temperature for operation at 100% will be reduced by about 2.8K compared to the nominal limit
- use the unit with oversize EC fans: compared to the unit with AC fans working in ideal conditions, the output power of the unit will be unchanged, the total absorbed power will increase by about 1%, the EER will be reduced by about 2% and the maximum external air temperature will remain the one shown in the diagram of the operating limits.

DIMENSIONAL DIAGRAMS

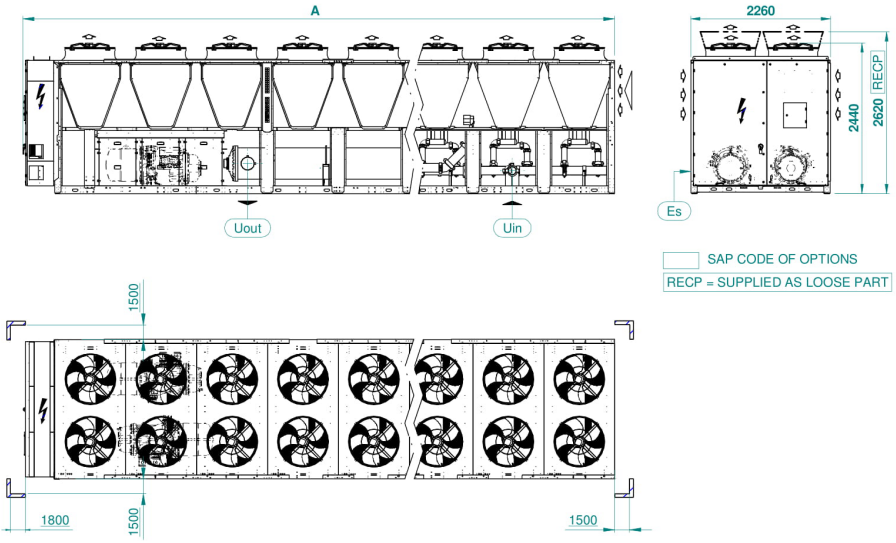
All weights and overall dimensions, as specified in this document, refer to the base unit without any option. The selection of some options, such as copper/aluminium coils, hydraulic modules or recovery heat exchangers, can sensitively increase the dimensions and/or the total net weight of the unit, depending on the unit type.

By way of example:

- /DS: unit with desuperheater --> Weight increase up to +270kg
- /DC: unit with total recovery --> Weight increase up to +766kg
- /RAAL: Cu/Al coils --> Weight increase up to +510kg
- /1P /2P: hydraulic module without tank --> Weight increase up to +400kg

KAPPA SKY XI FC / XI LN FC

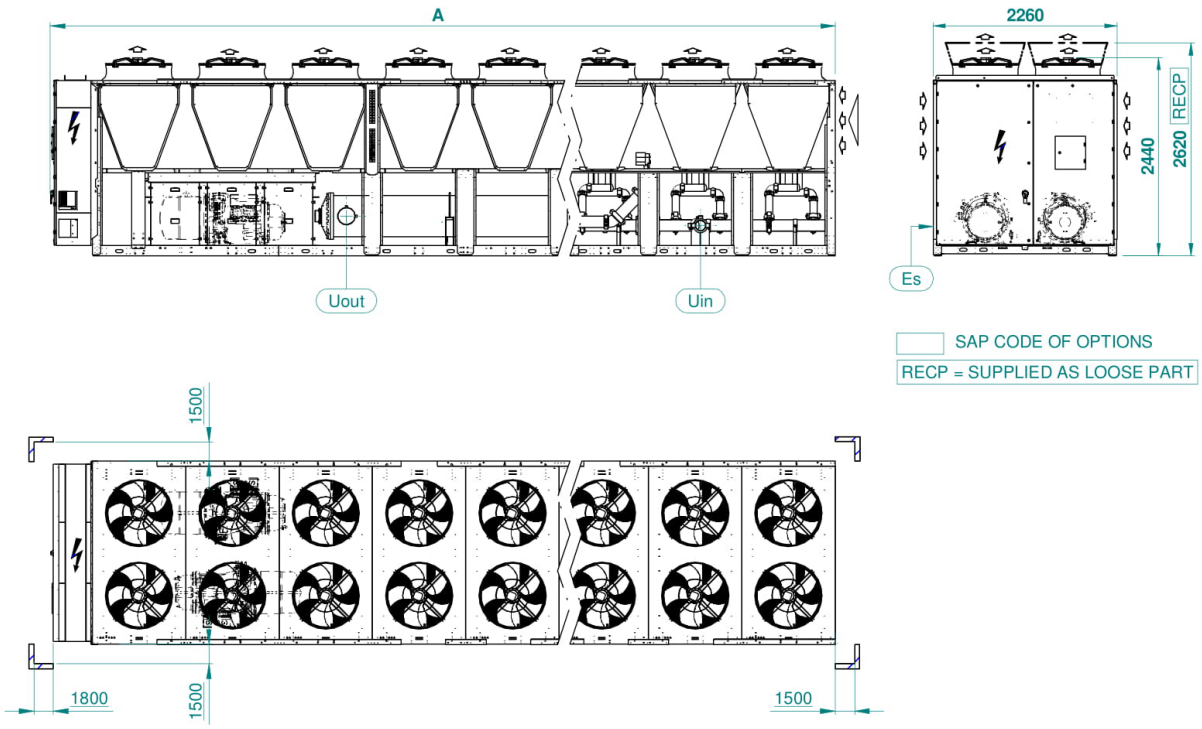
DDIM000505



N.B: This drawing is referred to standard execution. The number od fans is purely representative.
The weights could change in case of options. For details please refer to "TECHNICAL DATA" section within the technical catalogue.

					Xi		Xi LN	
SIZE	VERSION	A LENGTH	Uin	Uout	NET WEIGHT (kg)	OPERATION WEIGHT (kg)	NET WEIGHT (kg)	OPERATION WEIGHT (kg)
25.1	BASIC	6276	OD114.3	OD114.3	3719	3942	3889	4112
	EXTRA	7424	OD114.3	OD114.3	4204	4484	4374	4654
31.1	BASIC	6276	OD114.3	OD114.3	3895	4145	4065	4315
	EXTRA	7424	OD114.3	OD114.3	4510	4830	4680	5000
34.1	BASIC	6276	OD139.7	OD139.7	4039	4305	4209	4475
	EXTRA	7424	OD139.7	OD139.7	4548	4863	4718	5033
43.1	BASIC	8573	OD139.7	OD139.7	5155	5551	5355	5751
	EXTRA	9721	OD139.7	OD139.7	5717	6164	5917	6364
51.2	BASIC	9721	OD139.7	OD139.7	6209	6789	6549	7129
	EXTRA	12017	OD139.7	OD139.7	7196	7866	7536	8206
59.2	BASIC	9721	OD168.3	OD168.3	6320	6891	6660	7231
	EXTRA	12017	OD168.3	OD168.3	7307	7968	7647	8308
66.2	BASIC	12017	OD168.3	OD168.3	7319	7906	7659	8246
	EXTRA	13165	OD168.3	OD168.3	7889	8533	8229	8873
74.2	BASIC	12017	OD168.3	OD168.3	7411	7991	7751	8331
	EXTRA	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: These drawings are not contractually binding. For the installation design, refer to the specific dimensional drawing available on request.



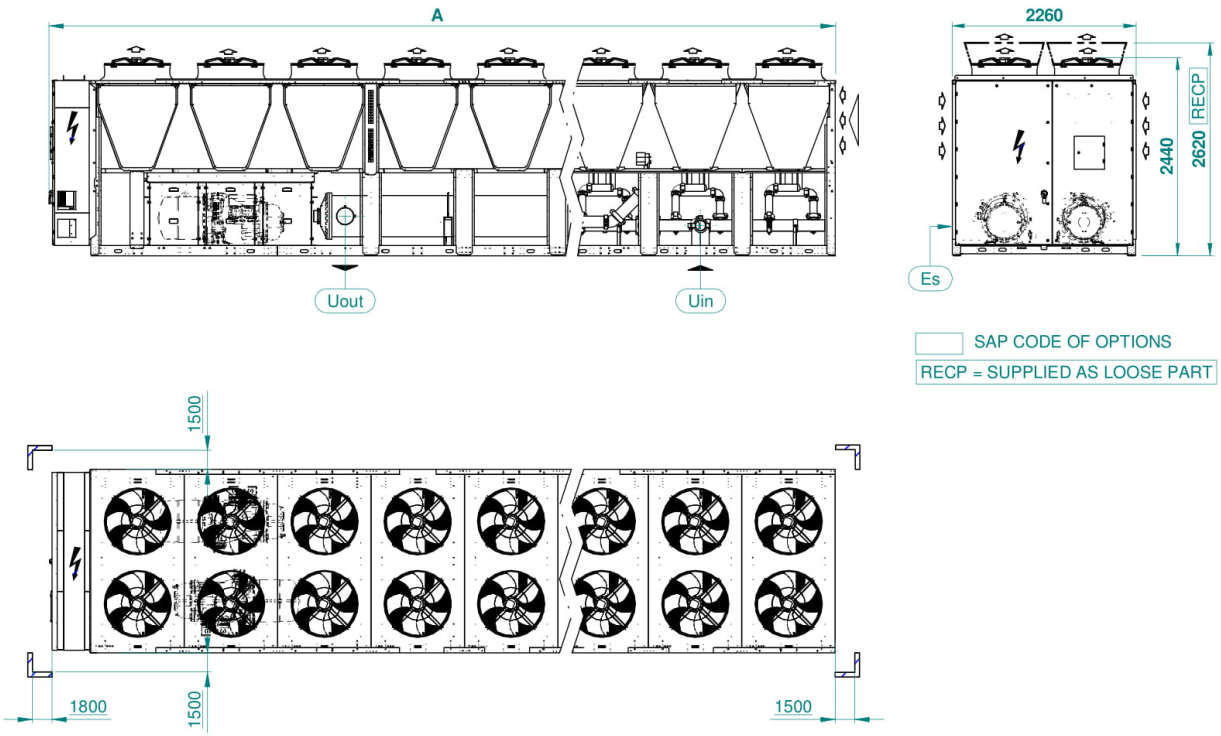
N.B: This drawing is referred to standard execution. The number od fans is purely representative.
The weights could change in case of options. For details please refer to "TECHNICAL DATA" section within the technical catalogue.

					Si		Si LN	
SIZE	VERSION	A LENGTH	Uin	Uout	NET WEIGHT (kg)	OPERATION WEIGHT (kg)	NET WEIGHT (kg)	OPERATION WEIGHT (kg)
51.2	BASIC	8573	OD139.7	OD139.7	6209	6789	6549	7129
	EXTRA	10869	OD139.7	OD139.7	7196	7866	7536	8206
59.2	BASIC	8573	OD168.3	OD168.3	6320	6891	6660	7231
	EXTRA	10869	OD168.3	OD168.3	7307	7968	7647	8308
66.2	BASIC	10869	OD168.3	OD168.3	7319	7906	7659	8246
	EXTRA	12017	OD168.3	OD168.3	7889	8533	8229	8873
74.2	BASIC	10869	OD168.3	OD168.3	7411	7991	7751	8331
	EXTRA	13165	OD168.3	OD168.3	8819	9603	9159	9943
81.2	BASIC	13165	OD168.3	OD168.3	8150	8756	8570	9176
	EXTRA	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: These drawings are not contractually binding. For the installation design, refer to the specific dimensional drawing available on request.

KAPPA SKY LGW XI FC / LGW XI LN FC

DDIM000507



N.B: This drawing is referred to standard execution. The number od fans is purely representative.
The weights could change in case of options. For details please refer to "TECHNICAL DATA" section within the technical catalogue.

					Xi LGW		Xi LGW LN	
SIZE	VERSION	A LENGTH	Uin	Uout	NET WEIGHT (kg)	OPERATION WEIGHT (kg)	NET WEIGHT (kg)	OPERATION WEIGHT (kg)
24.1	BASIC	6276	OD114.3	OD114.3	3719	3942	3889	4112
	EXTRA	7424	OD114.3	OD114.3	4204	4484	4374	4654
31.1	BASIC	6276	OD114.3	OD114.3	3895	4145	4065	4315
	EXTRA	7424	OD114.3	OD114.3	4510	4830	4680	5000
40.1	BASIC	7424	OD139.7	OD139.7	4039	4305	4209	4475
	EXTRA	9721	OD139.7	OD139.7	5080	5463	5250	5633
45.2	BASIC	8573	OD139.7	OD139.7	5155	5551	5355	5751
	EXTRA	9721	OD139.7	OD139.7	5717	6164	5917	6364
52.2	BASIC	9721	OD139.7	OD139.7	6209	6789	6549	7129
	EXTRA	12017	OD139.7	OD139.7	7196	7866	7536	8206
60.2	BASIC	9721	OD168.3	OD168.3	6320	6891	6660	7231
	EXTRA	12017	OD168.3	OD168.3	7307	7968	7647	8308
66.2	BASIC	12017	OD168.3	OD168.3	7319	7906	7659	8246
	EXTRA	13165	OD168.3	OD168.3	7889	8533	8229	8873
71.2	BASIC	12017	OD168.3	OD168.3	7411	7991	7751	8331
	EXTRA	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: These drawings are not contractually binding. For the installation design, refer to the specific dimensional drawing available on request.

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