



FLEXIHEAT UK LTD
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ZIRAN PRO KWR

**HEAT PUMPS WITH LOW-GWP NATURAL
REFRIGERANT**

air-water



33-194 kW

41-253 kW





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GENERAL DESCRIPTION

KEYTER ZIRAN PRO KWR units are compact water-condensed heat pumps designed to control the water temperature in industrial and air-conditioning applications.

In line with our firm commitment to the environment, this range has been specially designed with

- **R290 Natural refrigerant** with a very low **GWP (global-warming potential) = 3**



- **Cutting-edge piston compressor with inverter VFD** designed to work with this type of refrigerant,

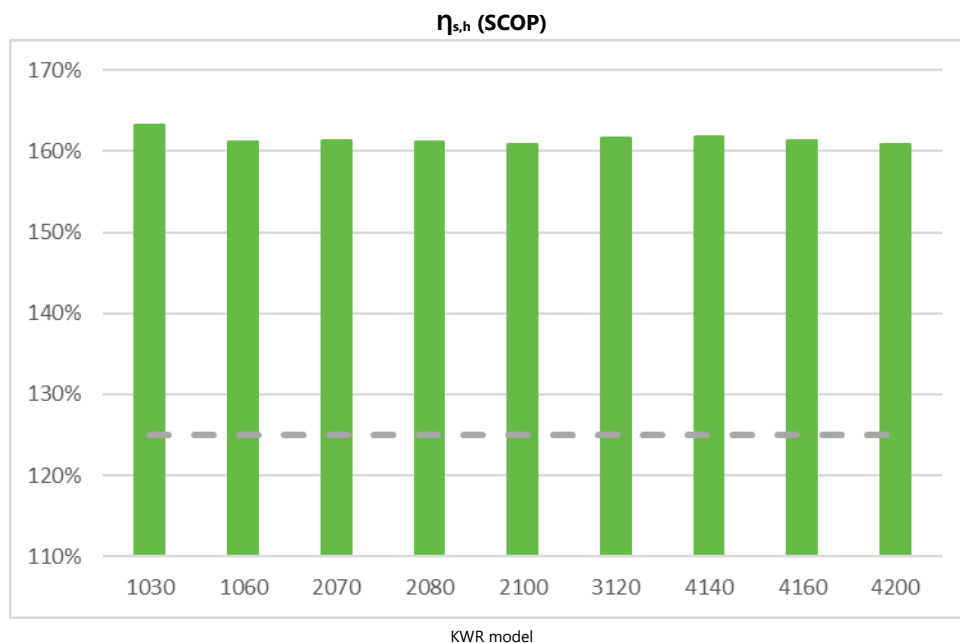


which allows the carbon footprint to be reduced, guaranteeing high energy efficiency.

Therefore, KEYTER ZIRAN PRO units comply with the 2021 Ecodesign requirements for heatpumps (EU 813/2013), with seasonal energy efficiency values well above the minimum required by this directive:



Seasonal energy efficiency for heating



■ η_{s,h} values of the KWR range

All of the unit's components have been designed and optimised for a **reduced R290 refrigerant charge**.

Manufactured with a self-supporting galvanised steel chassis with thermo-hardening polyester finish, designed for outdoor installation and with maximum access for maintenance via removable panels.

**Heat pump range**

Cooling capacity (water I/O 12/7°C; outdoor air 35°C):	[33 kW – 194 kW]
Heating capacity (water I/O 30/35°C; outdoor air 7°C DB, 90% RH):	[41 kW – 253 kW]

The units are made up of one or two refrigerant circuits, with a compressors in each circuit:

- Series 1 and 2-> Units with a single circuit and a single compressor.
- Series 3 and 4-> Units with two circuits and a single compressor per circuit.

Variable power adjustment, thanks to the built-in VFD.

All models include a large number of options in terms of their design, allowing optimal adaptation to your installation.

Available with or without a hydraulic unit and partial hot gas recovery options for **DHW**, with a heat recovery exchanger, depending on the configuration.

All units are supplied having been tested and charged at the factory, or they can optionally be shipped without gas charge for easier transport.

All of KEYTER's product ranges offer the integration of the latest technologies at the service of the highest requirements in air conditioning, cooling and ventilation installations.

The units have also been designed to ensure maximum access for maintenance and service, thus saving on time and costs throughout the service life of the unit.



CODING

K W R 2 100 I V S 4 D

K: Air-conditioning range

W: Compact air-to-water heat pump

R: Heat pump with R290 refrigerant (piston)

2: Build dimensions

100: Nominal power under ARI conditions (cooling if there are several values)

I: Type of application (I: Heat pump)

V: Type of compressor (N: Inverter piston compressor)

S: Hydraulic version:

S: Standard

P: Version with hydraulic unit

H: Version with hydraulic unit and buffer tank

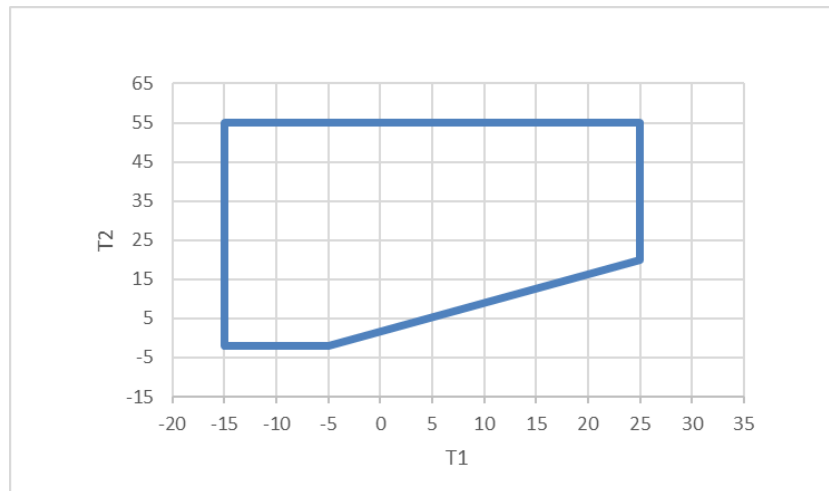
4: Electrical voltage: (4: 400/III/50 Hz + neutral, 3: 400/III/50 Hz without neutral)

D: Coolant: (D: R290)

OPERATING LIMITS

The operating limits of the ZIRAN PRO units are shown below:

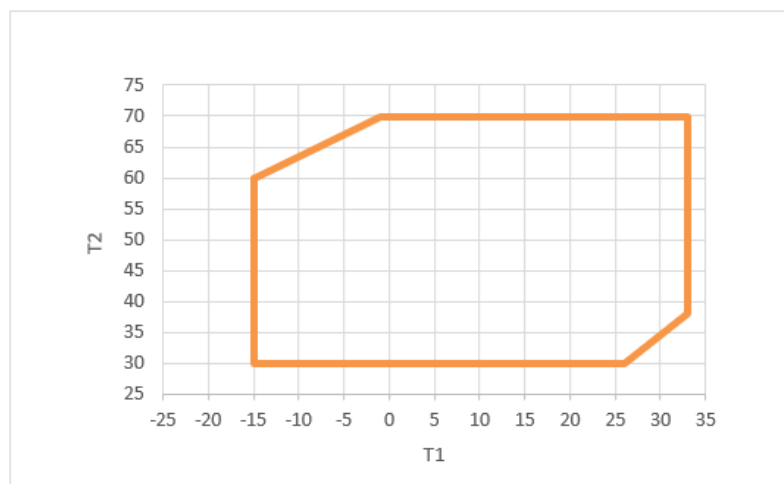
Cooling mode:



- Blue area: map of the unit's operation at full charge.
- T1: Output water temperature (°C).
- T2: Outdoor air temperature DB (°C).

For temperatures below +5°C, temperatures below the water freezing point may occasionally be reached, therefore a glycol and water solution (mono-ethylene glycol or mono-propylene glycol) is required, both for low-temperature cooling temperature ranges and for ice production or energy storage with ice applications.

Heating mode:



- Orange area: map of the unit's operation at full charge.
- T1: Outdoor air temperature WB (°C).
- T2: Output water temperature (°C).
- For outdoor wet bulb air temperatures above 25°C, the fans may be reduced in speed.

For more details, please contact your sales representative.



REGULATIONS

KEYTER complies with all European quality, environmental and eco-efficient design regulations and standards.

The units meet the requirements of the following European standards:

- ISO 9001:2015 Quality Management System, certified by TÜV Rheinland.
- ISO 14001:2015 Environmental Management System, certified by TÜV Rheinland.
- Machinery Directive 2006/42/EC, certified by TÜV Rheinland.
- Pressure Equipment Directive 2014/68/EU. Certified by TÜV Rheinland.
- Low Voltage Directive 2014/35/EU.
- Ecodesign Directive 2009/125/EC, EU/2016/2281.
- Directive on substances that deplete the ozone layer 1005/2009/EC.
- Directive on fluorinated greenhouse gases 517/2014/EU.
- Electromagnetic Compatibility Directive 2014/30/EU and regulations on Radiated electromagnetic emissions, channelled emissions and electromagnetic immunity: IEC 61000-3-3, IEC 61000-6-4, IEC 61000-6-2.
- Directive RoHS 2011/65/EC, on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- European Standard EN 60204-1. Safety of machinery. Electrical equipment of machines.
- Directive on fan motor efficiency 2012/27/EU.
- European Standard EN 378-2.

* All of the above references apply in their latest version.



In addition, the technical team at *KEYTER* is constantly researching and incorporating the latest trends and new developments to improve the energy efficiency of its units and meet the requirements of future regulations.

KEYTER has established a waste management system and uses a dedicated authorised waste manager, certified by ISO 14001, with the purpose of reducing the environmental impact of its products, as well as contemplating the design of the equipment with ecodesign parameters, with the aim of minimising the use of HFC refrigerant gases, plastic packaging, oil, etc.



COMPONENTS

Casing

The heat pumps of the KEYTER ZIRAN PRO KWR E range are built as standard with a self-supporting galvanised steel chassis with a high zinc content. Some of the unit's non-structural elements are made of aluminium to reduce the weight. All machine parts are coated with an oven-cured polyester paint treatment.

All units feature compressors and cooling components in a specific enclosed space.

The units are supplied without hydraulic panelling as standard. The standard casing for the different series in the range is shown below:

➤ **Series 1**

Chassis S-P-H:



➤ **Series 2**

Chassis S-P-H:





➤ **Series 3**

Chassis S-P:



Chassis H:



➤ **Series 4**

Chassis S-P-H:





Refrigerant

KEYTER KWR units use R290 refrigerant as standard, which has a very low Global Warming Potential.

R290: ODP 0, GWP 3

Safety classification: A3 (low toxicity and highly flammable).

In any case, the unit must always run with the refrigerant indicated in the nameplate. Full charge of refrigerant ex-works. If the unit was requested with no gas charge, the gas must be charged by qualified staff, taking into account the instructions in the specific safety datasheet.

Coils

The outdoor equipment features condenser coils made up of copper tubes and aluminium flaps. CU-AL

Compressor

KEYTER ZIRAN PRO units use state-of-the-art inverter piston compressors, specially developed to work with R290 refrigerant.

The inverter piston technology uses a VFD to achieve greater capacity control of the power, and, therefore, increase the seasonal energy efficiency.



Inverter piston compressors with VFD.

Compressors mounted on anti-vibration mounts.

Includes a check valve in the discharge of all compressors and a discharge temperature sensor. Excessive discharge temperature will cause the compressor to be protected via an alarm. They also include phase equalisation and rotation.

Compressor frequency inverter

Frequency inverter equipped with the Safe Torque Off (STO) safety system. This system makes it possible to safely bring a converter to a torque-free state. The STO is typically used for the prevention of an unexpected start of the equipment or for an emergency stop.

Principle of operation of the STO:

Safe Torque Off (STO)	Standard drive functions linked to the STO
1. The inverter detects the STO selection via a safety-related input or via the PROFIsafe safety communication.	-
2. The inverter interrupts the power supply to the motor.	If a motor holding brake is used, the inverter closes the brake.
3. The inverter indicates that the STO is active via a safety-related output or via the PROFIsafe safety communication.	-

Cooling core

The rest of the compact construction or cooling core circuit has the following components:

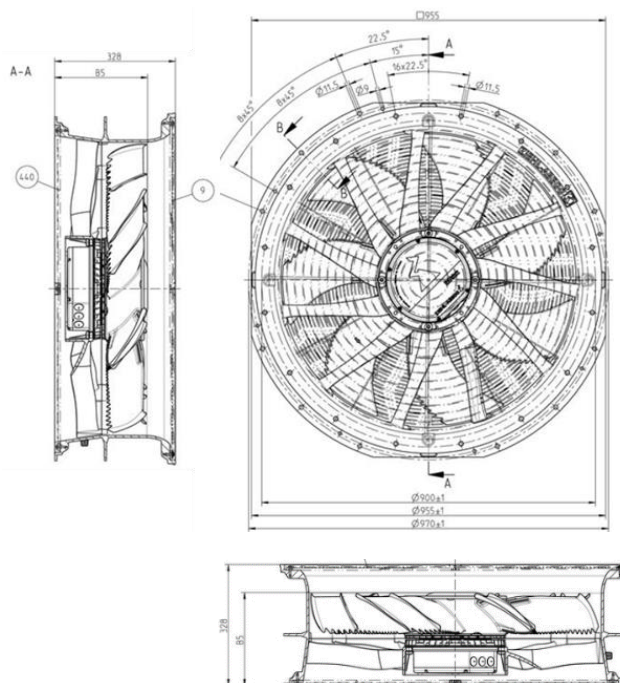
- Antacid dehydrator filter.
- Refrigerant liquid line sight glass.

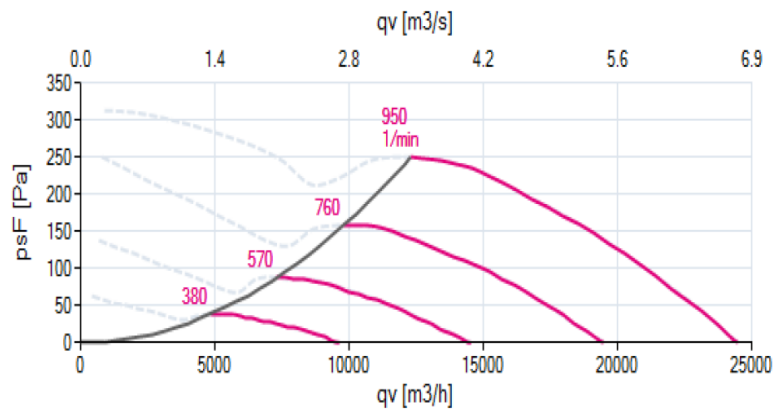
Expansion valve

Electronic expansion valve as standard, to improve the unit's energy efficiency.

Outdoor fans

Units of the ZIRAN PRO range feature axial fans with curved integrated nozzle and EC technology for minimum energy consumption and electronic condensation control.





Characteristic curves: airflow 50 Hz

ATEX axial flow fan for refrigerant gas extraction

ATEX axial fan designed to extract refrigerant gas from inside the equipment enclosure in the event of a leak.

This fan operates when a leak is detected. In addition, for safety reasons, it will be activated periodically to ensure correct operation.

Leak detector

Early detection of R290 gas leaks is essential to prevent hazardous situations. ZIRAN units include as standard a leak detector with two alarm levels, located at the lowest part of the unit, to detect R290 leaks should they occur.

When the sensor detects a leak it activates the first alarm level where the equipment continues to operate and in addition:

- The ATEX refrigerant extraction fan is activated.
- The fan in the electrical panel is activated
- An alarm will appear on the control panel.

If the detector activates the second alarm level:

- The ATEX fan continues to operate
- The main switch trips, cutting off the power supply to all components.
- A LED lights up
- A digital alarm signal is triggered



Heat exchangers

The heat exchangers installed in units of the KEYTER KWR series are AISI 316L stainless steel plate heat exchangers brazed with copper and heat insulated.



photo on the left).

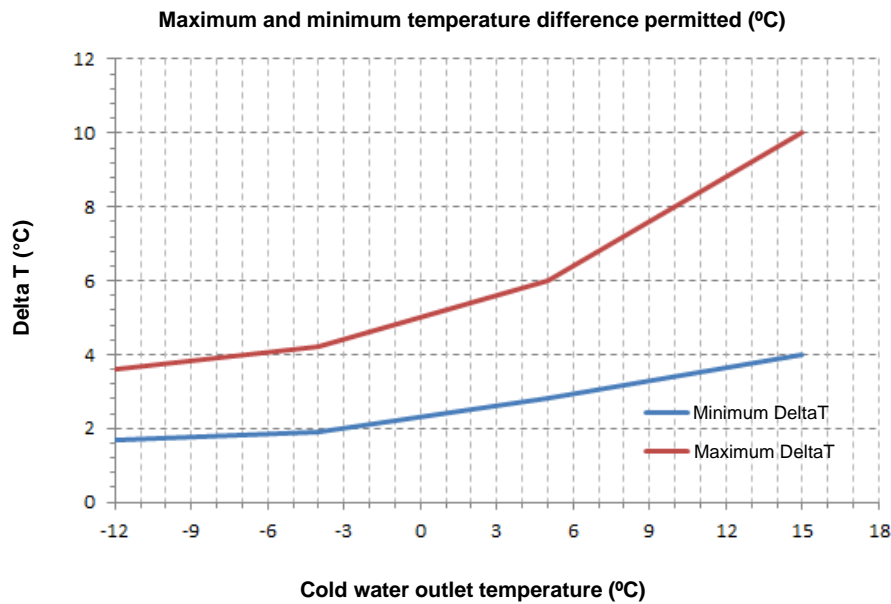
The evaporator-type brazed plate heat exchangers installed as standard include a distributor in the refrigerant inlet channel. It is very important to select and install this correctly to ensure the proper operation of the heat exchanger as an evaporator, to make sure that the biphasic mixture is distributed correctly at the evaporator inlet.

The heat exchanger plates are ultramodern, with a "microplates" plate profile specially designed to achieve the best possible heat transmission coefficient and therefore maximum efficiency (see

The advantages of brazed plates heat exchangers are greater energy and cost savings, better heat transfer and less pressure loss, enabling a more flexible design and a longer service life in clean water and closed circuit conditions.

Plate heat exchangers can have problems with corrosion if the properties and composition of the water are not suitable. When using stainless steel plate heat exchangers, the hydraulic circuits should be filled with water that is filtered and treated when necessary (if you have any questions, please contact our sales department).

The graph below shows the operating limits depending on the temperature jump of the plate heat exchangers. For other conditions, please contact our sales department.



These limits are for equipment operating at full load.

As a general rule, the filling water should also be previously filtered and treated.

Sensors

The units feature thermistors to measure the temperature, and pressure transducers to control the unit (see the control manual for more information).

Protection elements

The following protection elements are included as standard:

- Low and high pressure switches, and a high temperature thermostat for the compressor discharge.
- Water flow switch.
- Anti-freeze protection of the heat exchangers included in the electronic control by means of a sensor.
- Thermal protection of the compressor, circuit breakers and phase protection relay. Differential switches as option.
- Earth leakage circuit breaker for the fan supply line.
- Main switch in the electrical panel.
- Enhanced evaporator design in cooling-only units.

Electrical panel and electronic regulation

Power and distribution electrical panel, with a main switch, general earthing connection and circuit breakers for compressors, fans and pumps.

Standard phase control relay, with control of the phase rotation direction and control of phase asymmetry.

In the electrical panel design for the range, the design of the electrical switchgear for high temperatures and forced ventilation in the electrical panel is considered standard, preventing electrical component failures due to operation of the unit in high outdoor temperatures.



The electrical panel is designed and installed in a separate compartment from the refrigeration circuit.

KEYTER ZIRAN PRO KWR units feature a state-of-the-art AQUAMATIX electronic control system. A Climatix HMI user terminal is also included for AQUAMATIX control, as well as an RS485 communication interface for ModBus communication.



Programmable AQUAMATIX control

CLIMATIX controllers are of the programmable modular type. They have the following general characteristics:

- - 29 physical inputs/outputs per controller
- - Integrated stepper motor outputs with fail-safe behaviour (UPS)
- - Integrated remote or local Human Machine Interface (HMI)
- - Standard USB service connection for tool access
- - Ethernet port for Modbus IP, BACnet IP, OPC, service and Climatix IC
- - SD card interface for applications, firmware update and file
- - Physical input/output extension using extension modules
- - RS-485 interface (galvanically isolated) for Modbus RTU and BACnet MS/TP
- - RS-485 interface for Modbus RTU
- - Process bus for networking Siemens devices
- - Additional connectivity with BACnet IP, BACnet MS/TP, Modbus, M-bus and LO via communication modules



Climatix HMI user terminal



OPTIONAL COMPONENTS

Power supply options

The standard version operates with a voltage of 400/III/50 Hz + neutral (power supply code 4). For other power supplies, please contact the sales department.

Outdoor coil protection

Copper/aluminium coils.

The KEYTER ZIRAN PRO series has the following options available for Cu/Al outdoor coil protection:

- Condensing coil with copper tube and aluminium fins, with polyurethane pre-lacquer.
- **BLYGOLD®**: Condensing coil with copper tube and aluminium fins, coated with Blygold Polual post-lacquer (coastal protection).
- **COPPERFIN™**: Condensing coil with copper tube and copper fins (coastal protection) and high-strength aluminium alloy frames (check availability)

Enclosure

Unit enclosure (series 1)



No enclosure



Closed hydraulic enclosure and coil protection grille



Closed hydraulic enclosure



Coil protection grille



Unit enclosure (series 2)



No enclosure



Closed hydraulic enclosure and coil protection grille



Closed hydraulic enclosure



Coil protection grille

Unit enclosure (series 3, chassis S/P)



No enclosure



Closed hydraulic enclosure and coil protection grille



Closed hydraulic enclosure



Coil protection grille

Unit enclosure (Series 3, chassis H)



No enclosure



Closed hydraulic enclosure and coil protection grille



Closed hydraulic enclosure



Coil protection grille

Unit enclosure (series 4)



No enclosure



Closed hydraulic enclosure and coil protection grille



Closed hydraulic enclosure



Coil protection grille

All panels can be removed in order to access the inside of the unit for maintenance tasks.

Both the cooling and hydraulic enclosure panels are available with 10 or 20 mm thick polyurethane insulation or 20 mm thick rock wool sandwich panel.

Options for reducing the sound level

In installations where the sound level must be below the unit's standard value, the KEYTER ZIRAN PRO series provides the following options:

Compressor insulation

- Sandwich pannels of 20 mm thickness for compressors and cooling components enclosure.

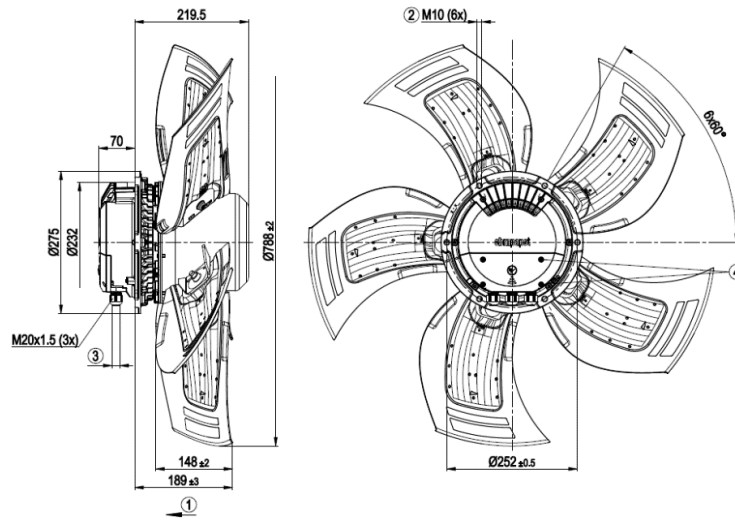
Reduction of fan velocity

- Flow rate of equipment can be adjusted in order to reduce noise level. Please ask for working limits.

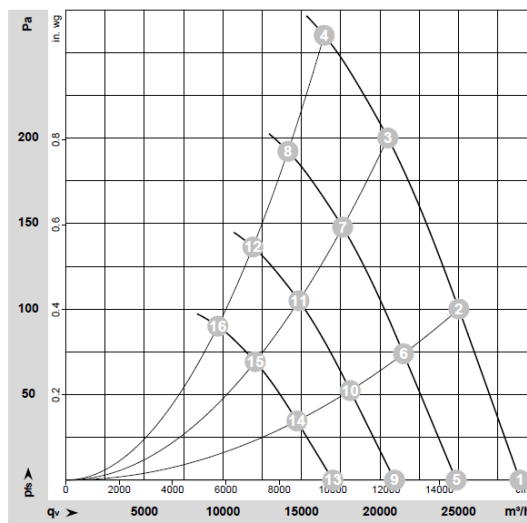
Outdoor ventilation

Optional fans:

- Enhanced axial EC fans:



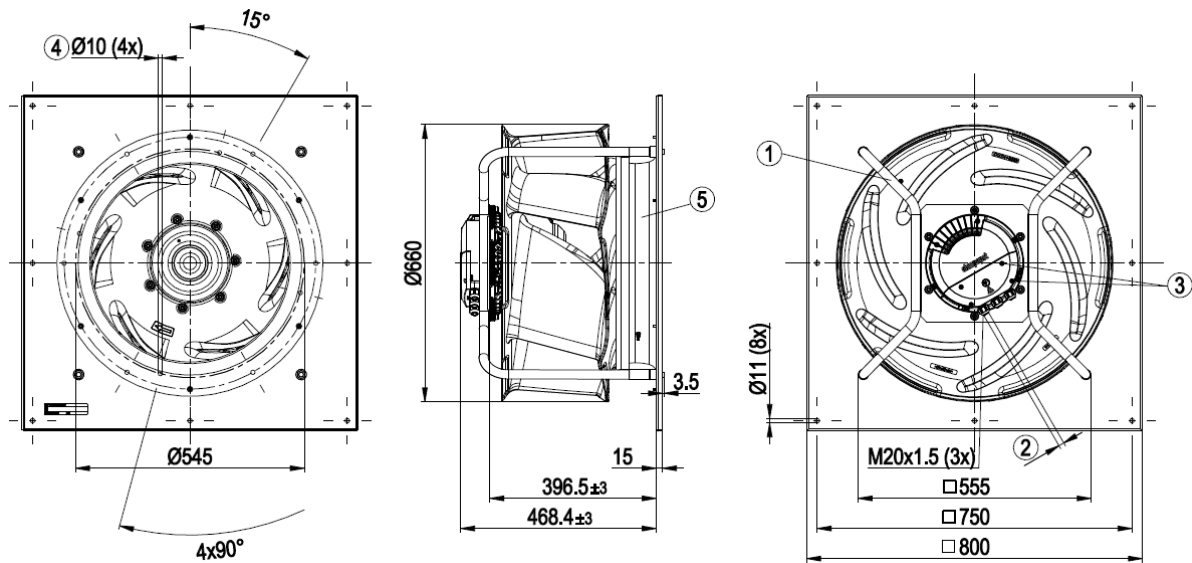
1	"V" airflow direction.
2	Screwing depth max. 20 mm.
3	Cable diameter: min. 4 mm, max. 10 mm, Tightening torque: 4 ± 0.6 Nm.
4	Tightening torque 1.5 ± 0.2 Nm.



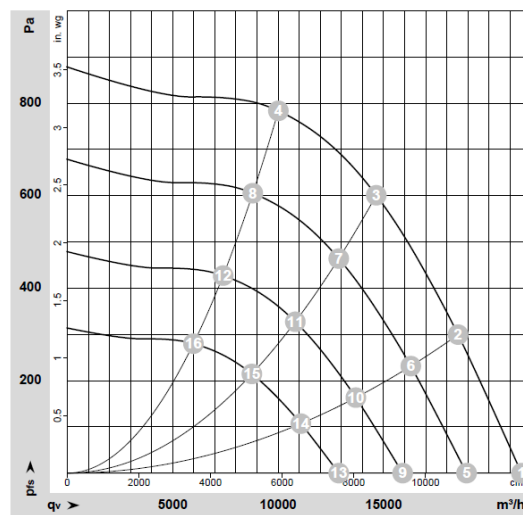
Characteristic curves: airflow 50 Hz

Silent Ring nozzle is mounted as standard with this option.

- Radial EC plug fans:



1	Assembly position: Shaft horizontal (only install support struts vertically, as shown) or rotor on bottom.
2	Cable diameter: min. 4 mm, max. 10 mm, Tightening torque: 2 ± 0.3 Nm.
3	Tightening torque 1.5 ± 0.2 Nm.
4	Fixing holes for FlowGrid.
5	Inlet nozzle with pressure intake tube (factor k:535)



Characteristic curves: airflow 50 Hz



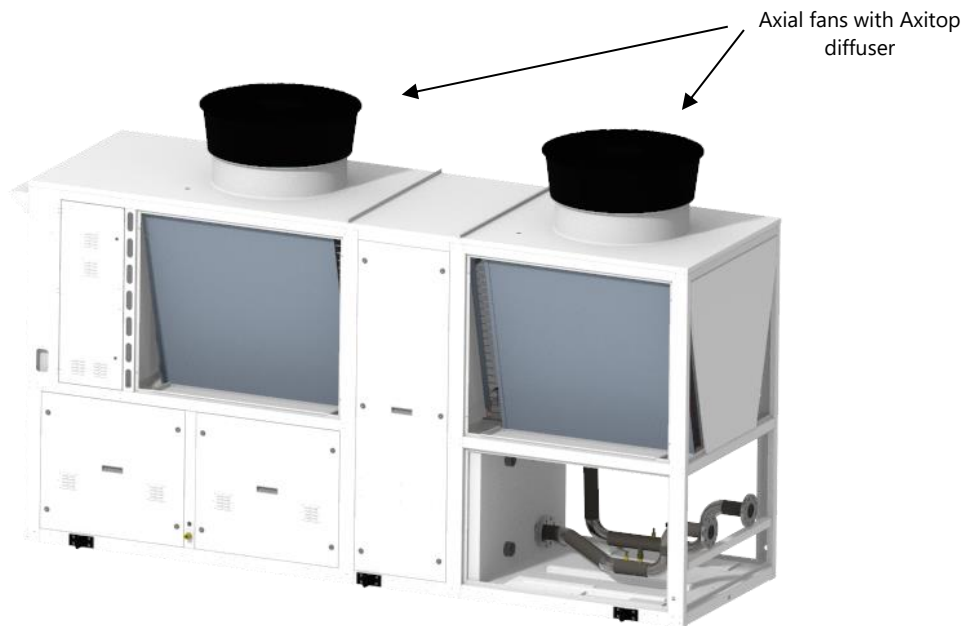
AxiTop® acoustic diffuser



The AxiTop® acoustic diffusion system is available as an accessory mounted at the factory or supplied as a kit, for installations that require efficiency, but ultraquiet operation. The AXITOP provides an acoustic diffusion effect that reduces the noise level by between 1 and 3 dB(A) and increases the axial fan efficiency, making it an ideal, efficient

and economic solution for installations where noise is a key design parameter, but where efficiency and capacity cannot be compromised.

Note: bear in mind that this element increases the height of the unit (+280 mm).



Optional, only compatible with enhanced EC fans

Low water temperature kit

Electrical heater kit in the hydraulic elements to operate with water temperatures up to -10°C . Required for working with glycol water with water outlet temperatures below 0°C . Includes heaters and insulation in the heat exchanger, water piping and expansion vessel.

In the case of units with a hydraulic unit installed, the pump will be replaced to work with an output water temperature of as low as -10°C (if applicable).

Outdoor low temp. kit

Electrical heater kit in the hydraulic elements to work in low outdoor temperatures. Recommended for operating with outdoor temperatures below 0°C if the unit is installed outdoors. Includes heaters and insulation in the heat exchanger, water piping and expansion vessel.



ATEX centrifugal fan for refrigerant gas extraction

ATEX centrifugal fan designed to extract refrigerant gas from inside the equipment enclosure in the event of a leak. This fan allows the leak to be directed to a safe location.

This fan operates when a leak is detected. In addition, for safety reasons, it will be activated periodically to ensure that it is working properly.

ATEX leak detector

Early detection of R290 gas leaks is essential to avoid dangerous situations. ZIRAN units are fitted as standard with a two-stage alarm leak detector, located in the lowest part of the unit, to detect R290 leaks if they occur.

When the sensor detects a leak, it activates the first alarm level, where the equipment continues to operate and, in addition, the ATEX refrigerant extraction fan is activated:

- Its own ATEX sensor is still working
- The ATEX refrigerant extraction fan is activated.
- The electric panel fan is activated
- An alarm appears on the control panel.

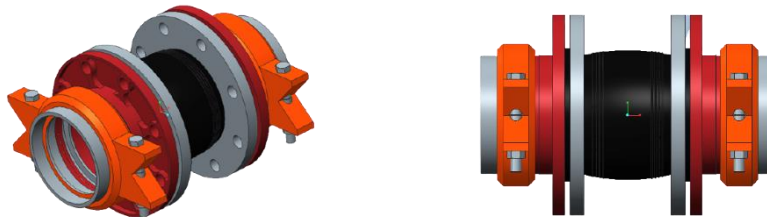
If the detector activates the second alarm level:

- the ATEX fan continues to operate
- The main switch is triggered, cutting power to all components.
- An LED lights up
- A digital alarm signal is triggered*.

*This detector has BMS communication for connection to the installation's alarm control centre.

Hydraulic interconnection

Victaulic joint adapter with rubber anti-vibration sleeve



Anti-vibration supplements

Anti-vibration elements optionally adaptable to the unit's bench. They are supplied packaged inside the outdoor unit.

Reinforced maritime packaging

Special protection of the unit for transportation in containers.



Partial heat recovery

Partial heat recovery system for domestic hot water.

In versions with this option, the units use AISI 316 stainless steel brazed plate heat exchangers for energy recovery, always covered with thermal insulation. This heat exchanger is placed in the compressor's discharge as a "desuperheater". Using this option when the water temperature is below 30°C is not recommended.

Condensation heat recovery allows approximately 20% of the unit's condensation power to be recovered, depending on the model and the operating conditions, which is very useful for reducing the energy consumption in installations that require domestic hot water.

Water recovery outlets available between 30 and 60°C.

With this option, it is also possible to include a recovered water flow supply pump. Check availability.

Please contact our sales department to check the availability of this option depending on the model.

Flexible connections

Flexible connection for the unit's hydraulic intake and outlet.

Energy meter

Electricity meter optionally available.

Pressure gauges

Pressure gauges installed at inlet and outlet of the unit for the S version.

Low pressure switch

Low pressure switch to protect the pump.

Improved phase controller (EXCELLENT) detecting overvoltage and undervoltage

Relay with 3 phases correctly connected, with a voltage control to protect the electronic board.

Electrical panel options

- Protective lacquer for the electrical panel for tropical climates.
- Electrical socket in the electrical panel for common applications.
- Electrical heater kit in the electrical panel to operate in low outdoor temperatures. Recommended for outdoor temperatures of -5°C or below, and required for outdoor temperatures of -10°C or below.

Hydraulic versions

KEYTER ZIRAN PRO KWR units are available in three versions according to their hydraulic elements:

S version: standard equipment, without a hydraulic unit.

P version: unit with a hydraulic unit, hydraulic pump included and without a buffer tank.

H version: unit with a hydraulic unit, hydraulic pump and buffer tank included.



S version: standard unit, without a hydraulic unit

KEYTER KWR units feature a triple protection of the heat exchanger or multi-plate exchanger, respectively, because they come with a flow switch, water anti-freeze protection and freon anti-freeze protection as standard.

The **water filter** is not included as standard, but it can be supplied as an option. A water filter must always be fitted at the inlet of the unit or of the heat exchangers.

Pressure gauges and water filters can be ordered as options.

P version: unit with a hydraulic unit with pump, without a buffer tank, with standard pumping pressure

Integrated hydraulic unit composed, as standard, of a centrifugal pump with mechanical seal, suitable for water or glycol water to 0°C, flow switch, purge and closing valves, and pressure gauges.

The standard hydraulic circuit is designed to comply with the usual requirements for hydraulic installations, with a motor power selected for optimal adjustment to your installation and to avoid wasting energy in transporting water. Insulated pumps with ball valve to facilitate removal as required.

For temperatures lower than 0°C, the low temperature kit is required, which requires replacement of the pump and installation of electrical heaters in hydraulic elements to operate with water temperatures up to -10°C.

The **water filter** is not included as standard, but is supplied as an option. A filter must always be fitted at the inlet of the unit or of the heat exchangers.

H version: unit with a hydraulic unit with a pump and buffer tank, with standard pumping pressure

Integrated hydraulic unit made up of a centrifugal pump with mechanical seal suitable for pure water or glycol water to 0°C, integrated buffer tank with a capacity of 200 litres for series 1 and 2 (except for model 2100) and 375 for series 2 (model 2100), 3 and 4, with an electrical heater to reduce the frequency of compressor starts and stops, flow switch, expansion vessel, bleed and stop valves and pressure gauges.

The standard hydraulic circuit is designed to comply with the usual requirements for hydraulic installations, with a motor power selected for optimal adjustment to your installation and to avoid wasting energy in transporting water.

For temperatures lower than 0°C, the low temperature kit is required, which requires replacement of the pump and installation of electrical heaters in hydraulic elements to operate with water temperatures up to -10°C.

Expansion vessel included in the unit with a 15-litre capacity; the size of expansion vessel required for each installation must be checked in case a larger one is needed.

The **water filter** is not included as standard, but is supplied as an option. A filter must always be fitted at the inlet of the unit or of the heat exchangers.

Characteristics of the centrifugal pumps in versions P and H

Vertical centrifugal pump with a single impeller, with volute casing, not self-priming, in-line execution, with mechanical seal.

The technical features of the standard pumps included in this option are as follows:

Liquid characteristics: Clean fresh water

Temperature limits: (check for extreme conditions)

Version with cast-iron impeller, mechanical seal according to DIN 24960 (carbon/ceramic/NBR)

The motors incorporated in the pumps have the following characteristics:

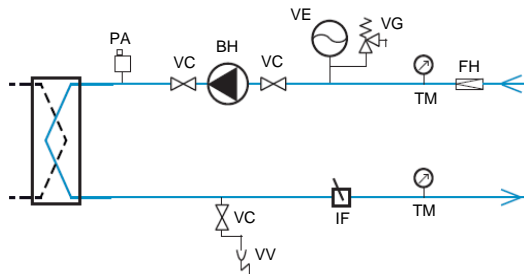
Three-phase motor with nominal powers below 7.5 kW efficiency IE2, and three-phase motors with nominal powers from 7.5 kW efficiency IE3.

IP55 protection

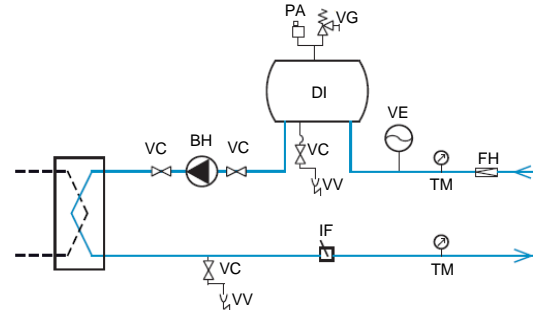
Insulation: Class F. Ambient temperature: 40°C maximum.

Schematic diagrams of the hydraulic units

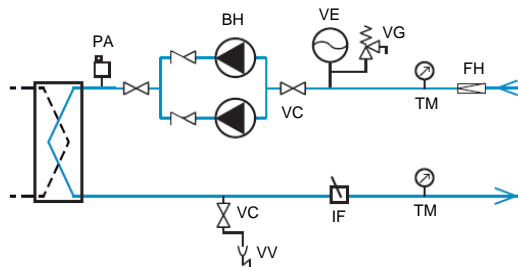
Version P with single pump



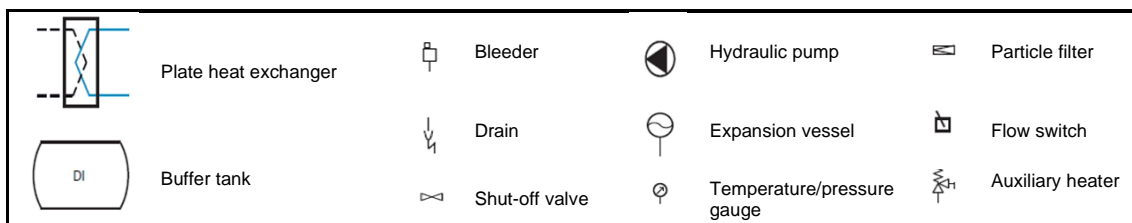
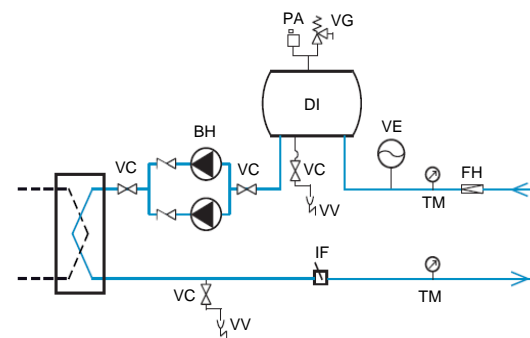
Version H with single pump



Version P with back-up pump



Version H with back-up pump



Note: The FH particle filter is not included as standard with the unit, it is optional.

The recommended position for the filter is recommended, as a filter must always be installed at the inlet of the unit.



The tables below show the operating limits for water temperature and the glycol percentage of KWR units with the standard, high and very high-pressure pump:

Pump with standard pressure available:

KWR model	Pump mechanical seal	Minimum temperature (°C)	Maximum temperature (°C)	Maximum glycol (%)
1030 - 1060	Standard version	0	90	15
	"HS" version	-10	110	35
2070 - 4140	Standard version	-10	110	35
	"HS" version	*	*	*
4160 - 4200	Standard version	0	90	15
	"HS" version	-10	110	35
	Version "E"	-10(*)	120	35

(*) Check the motor power required to compensate the viscosity.

Optional pumps with high pressure and very high pressure available:

Models	Pump mechanical seal	Optional pump with high pressure available			Optional pump with very high pressure available		
		Min. temp. (°C)	Max temp. (°C)	Max. glycol (%)	Min. temp. (°C)	Max temp. (°C)	Max. glycol (%)
1030 - 1040	Standard version	0	90	15	0	90	15
	"HS" version	-10	110	35	-10	110	35
2070 - 4140	Standard version	-10	110	35	0	90	15
	"HS" version	*	*	*	-10	110	35
4160 - 4200	Standard version	0	90	15	0	90	15
	"HS" version	-10	110	35	-10	110	35
	Version "E"	-10(*)	120	35	-10(*)	120	35

(*) Check the motor power required to compensate the viscosity.

For temperatures below -5°C, the changes in viscosity are notable, so you must check if the motor power is sufficient or if it is necessary to select a larger motor size.

The operating limits in the table above are the result of the supplier's experience with the pumps for these types of water-glycol application.

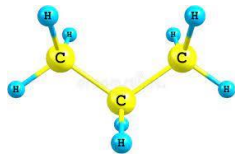
The glycol considered may be ethylene- or propylene-based, always free of impurities.

If the glycol includes anti-corrosion additives or pH regulators, or the operating conditions are outside of the limits, please contact your sales representative to study the correct option in each case.



CHARACTERISTICS OF NATURAL REFRIGERANT R290

Propane, or R-290, is a hydrocarbon used in some cooling units, such as heat pumps, commercial cooling units, etc.



When working with hydrocarbons as refrigerants, these must be high-purity hydrocarbons, since any proportion with other impurities, such as sulphur, water, etc., may degrade the installation's lubricating oils, cause compressors to malfunction and break, etc. In some cases, hydrocarbons that are not of a high purity may be mixed with other hydrocarbons, which drastically reduces the physical and thermodynamic properties of the original hydrocarbon.

Propane used for cooling or air-conditioning applications is not scented like that used for domestic applications (domestic hydrocarbons are scented so they can be easily detected in the event of a leak), so it cannot be easily detected in the event of a leak.

Commercial name: Propane (R-290)

Chemical formula: Propane C₃H₈

Other identification methods: Refrigerant, R-290

Safety classification: A3 (low toxicity and highly flammable)

Chemical family: Hydrocarbons

Characteristics of R290	
Molecular formula	C ₃ H ₈
Appearance	Colourless
Ozone depletion potential (ODP-R11=1)	0
Global warming potential (GWP) 5 IPCC	3
ASHRAE Std. 34 safety classification	A3
Flammability limits – ASTM E681-04 @ 21°C	0.083 kg/m ³
Flammability limits – ASHRAE 34 @ 100°C	2.1% - 9.5% vol.
Units	YES
Molecular weight	44.1 g/mol
Boiling point 101.3 kPa	-42.1°C
Freezing point at 101.3 kPa	-188°C
Critical temperature	96.7°C
Critical pressure	42.48 bar
Critical density	220 kg/m ³
Relative density of steam at flash point (air = 1)	1.5
Relative density of liquid (water = 1)	0.58
Density of steam at boiling point	2.416 kg/m ³
Liquid heating capacity at 25°C	2.719 kJ/(kg·K)
Steam heating capacity at 25°C	1.685 kJ/(kg·K)
Latent heat of vaporisation at boiling point	425.6 kJ/kg
Steam pressure at 20°C	8.3 bar
Liquid thermal conductivity 25°C	0.094 W/m·K
Steam thermal conductivity 25°C	0.018 W/m·K
Liquid viscosity at 25°C	0.097*10 ⁻³ Pa·s
Steam viscosity at 25°C	0.008*10 ⁻³ Pa·s
Ignition temperature	470°C
Solubility of R290 in water	75 mg/L



GENERAL SAFETY RECOMMENDATIONS

This manual is supplied as part of the unit and, therefore, must be kept with the unit at all times.

If the unit is transferred to a new owner, make sure that the manual is supplied with the unit for reference by the new owner and/or installer.

According to the UNE EN-378:2017 standard, there are three categories of access to the equipment (a: general; b: supervised; c: authorised) which, together with its location category, determine the maximum admissible load per circuit in equipment with R290. The following summary table shows these limits:

Access category (1)		Location class (2)	Maximum permissible load per circuit (kg)
a	General	III	5
b	Supervised		10
c	Authorised		Unrestricted

(1) Access categories according to UNE EN-378:2017 chapter 5.1.1

(2) Site class according to UNE EN-378:2017 chapter 5.3. Ziran Pro KWR units are classified as category III for outdoor installation.

The load of the Ziran Pro KWR units is:

Model KWR	1030	1060	2070	2080	2100	3120	4140	4160	4200
N° circuits	1	1	1	1	1	2	2	2	2
Refrigerant load (kg)	6.5	7.3	9.2	9.8	10	7.3+7.3	9.2+9.2	9.8+9.8	10+10

Ziran Pro KWR units can therefore be installed in areas with supervised access (b) for not exceeding 10 kg load per circuit or in areas with authorised access.

The units are designed and built in compliance with the latest European safety regulations, such as the Spanish and European standard UNE-EN 378:2017, Refrigerating systems and heat pumps. Safety and environmental requirements. Part 2: Design, construction, testing, marking and documentation, as well as the latest refrigeration installation safety regulations.

It is mandatory to follow the recommendations and instructions contained in the maintenance manuals, labels and specific instructions. Likewise, it is necessary to comply with the rules and regulations in force.

To prevent all risks of accident during installation, start-up or maintenance, the following specifications must be taken into consideration. The manufacturer shall not be held liable for any criminal or civil responsibilities arising due to injuries to persons and/or animals and/or damage to property caused by errors during installation, maintenance or use, due to failing to follow the instructions in this manual and when unauthorised or unqualified persons perform the tasks described in this manual.



Safety can only be guaranteed if these instructions and the regulation are followed carefully. Otherwise, there is a risk of damage to property and injuries to persons. The unit must only be used according to its design purpose. Any other improper or unintended use will be considered hazardous.

Installation, commissioning, servicing and maintenance of the equipment must be carried out by qualified personnel trained in R290 refrigerant, safety standards and proper procedures for working with this refrigerant according UNE EN 378-4:2017.

This guide does not replace the need for regular maintenance, which must be carried out in compliance with the current local regulations of the place where the unit is installed. Moreover, all maintenance tasks must be carried out by companies and staff qualified to perform the corresponding maintenance and service tasks.

Any task not included in these instructions must be previously authorised in writing by KEYTER.

The manufacturer shall not be held liable for faults or malfunction of the unit resulting from incorrect installation, improper use or lack of maintenance.

Before working with systems containing flammable refrigerants, safety checks must be carried out to minimise the risk of ignition. The absence of refrigerant in the area must be checked with a suitable leak detector before and during work on the equipment.

Also check that there are no ignition sources around the equipment which could cause a risk of fire or explosion. All possible sources of ignition, including smoking, must be kept sufficiently far away from the place of installation, repair, removal and disposal, operations during which refrigerant may be released into the surrounding space.

Ensure that the area is in the open air or sufficiently ventilated before carrying out any work on the system. A certain degree of ventilation must be maintained during the work.

Do not handle the electrical components until the unit has been disconnected from the mains and de-energised.



Live unit, powered with 400V / 3~



Before starting any tasks on the unit, check that its power supply is disconnected to prevent electric shocks.

If the tasks are interrupted, make sure that all circuits have been de-energised before resuming them.



Even when the unit is off, the power supply circuit remains energised. Please make sure that the unit is disconnected from the mains and/or that the ON/OFF switch is set to OFF.



If any tasks need to be performed in the fan area, in particular, if the grille or casing need to be removed, disconnect the fans to prevent them from being switched on.


The mains or isolator switch can be locked out.



Safety labels on the unit

Do not open the electronic pump control module or remove its control elements.

Never remove the rotor from the electronic pump.

 Dismounting the permanent magnet rotor from the electronic pump may be fatal to persons with medical implants.

It is essential to read the instructions for use and follow the safety instructions.
It is forbidden to smoke or use naked flames or other possible sources of ignition.



Please note that the equipment contains flammable gases.



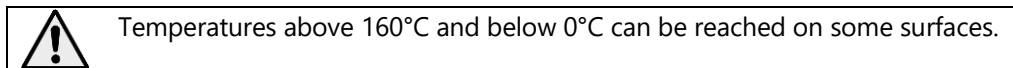
Use PPE when working on the unit. Goggles, gloves, safety boots, safety ear muffs, suitable clothing and helmet, if necessary.

Signs warning about operations with refrigerant:

- Eye protection: safety goggles or protective goggles against splashed chemicals. In compliance with the EN 166 or ANSI Z87.1 standards. In addition, wear a face shield if there is a risk of contact with splashed and/or sprayed liquids or when in contact with liquids suspended in air.
- Hand protection: Leather gloves. Gloves that protect against low temperatures. The gloves must comply with the EN 374 standard or US-OSHA guidelines. Choosing the right glove does not only depend on the type of material, but also on other quality characteristics, which might differ in each manufacturer. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also keep in mind the specific local conditions under which the product is used, such as the risk of cuts, abrasion and contact time.
- Skin and body protection: Wear the suitable protection equipment. When required: waterproof clothing.
- Protective measures: A self-contained breathing apparatus (SCBA) might be required if a leak is detected. The type of protective equipment must be chosen according to the concentration and amount of substance present at the specific place of work.



Exercise due caution with surfaces at high temperatures (compressors, fans, pumps, pipes, etc.) and low temperatures (pipes, coils, etc.).



Temperatures above 160°C and below 0°C can be reached on some surfaces.

The output water temperature of the full heat recovery circuit can reach temperatures of up to 80°C. Also exercise due caution with the hydraulic pipe in this circuit.

Risk of injuries on the parts of the body in contact with the rotor or the fan propeller.

- Make sure that the device against accidental contact is enabled.
- Wait for all parts to stop before working on the system/unit.
- Do not use loose clothing or accessories while working with rotary parts. Take care and tie your hair back.

Exercise due caution when handling refrigerant, in compliance with local regulations. All tasks requiring refrigerant to be handled must be carried out by qualified staff, who must take into account the risks associated with using this substance at all times.

Always use the refrigerant connections supplied to measure the pressure, vacuum or charge with refrigerant.

Discharging refrigerant into the atmosphere is forbidden, so it is essential to prevent leaks and recover any leaked refrigerant. For gas recovery use only A3 certified material.

Before working with the refrigerant circuit, make sure that it is empty and filled with dry nitrogen to remove any components or weld remains inside it. Flushing with nitrogen must be carried out to avoid refrigerant remaining inside the circuit.


Welds must be made by qualified technicians, in compliance with the applicable regulations in the country in which the unit is installed. Use welding rods with a minimum silver content of 30% for all welds on the unit.




Do not have parts of the unit containing refrigerant near sources of ignition. No smoking is allowed.

Refrigerant leaks can cause:

- Suffocation caused by the displacement of oxygen in confined work spaces and narcotic effects or arrhythmia caused by the inhalation of refrigerant.
- Eye irritation and burns due to splashes or contact with skin.

	<p>Wear safety goggles and gloves during work. Prevent contact of the refrigerant with the skin and exercise due caution with the unit's sharp parts or elements.</p>
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	<p>Always ensure there is good ventilation in the work area. If there is poor ventilation, used suitable respiratory equipment.</p>
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In the case of an accident due to the inhalation of refrigerant, proceed as follows:

- Carry the person outside and help them sit or lie down position that allows them to breathe comfortably.
- If this person cannot breathe properly or suffers from a respiratory arrest, duly qualified staff must provide artificial respiration or oxygen.
- It may be dangerous for the person providing assistance to apply mouth-to-mouth resuscitation.
- Seek medical attention immediately.
- If the person is unconscious, have this person sit or lie down in a recovery position and seek medical attention immediately.
- Make sure that the place is properly ventilated.
- Loosen any tight-fitting clothes or accessories, such as the shirt collar, a tie or a belt.

In the event of contact with the eyes:

- If the substance has been in contact with the eyes, immediately rinse your eyes with plenty of water (for at least 15 minutes), lifting the upper and lower eyelids.
- If the person is wearing contact lenses, remove them.
- Seek medical attention if eye irritation occurs.
- Contact with gas expanding quickly may cause burns or freezing.
- The liquid may cause burns similar to those caused by freezing.

In case of a burn due to the refrigerant coming into contact with the skin:

- Wash contaminated skin with plenty of water.
- Remove contaminated clothes and footwear.
- Wash clothes before using it again.
- Clean footwear thoroughly before using again.
- Contact with gas expanding quickly may cause burns or freezing.
- The liquid may cause burns similar to those caused by freezing.
- Seek medical attention if any symptoms appear.

Pressurised units and components

These products feature pressurised units and components. The features of these units/components are indicated on the nameplate or documents supplied with the products.

Some of these pressurised components feature a safety valve. If the valve is tripped, it should be replaced with the same model and features, since its tightness cannot be guaranteed after it has




been tripped because, when the circuit waste is released, such as metal shavings or weld remains, these could fall on the valve seal and then prevent the safety valve from returning to the original position. Components must always be repaired and/or replaced by qualified staff.

Please contact KEYTER's Technical Service when the safety valve is tripped to find the root cause for this.

These parts, like the rest of the unit, will be inspected in compliance with the applicable laws and regulations of the country in which the unit is installed. In Spain, compliance with the Refrigeration Installation Regulation RD 552/2019 and Pressured Equipment Regulation RD 809/2021 is required.

Only the refrigerant indicated on the unit's nameplate should be used.

All tasks requiring compressor oil to be handled must be carried out by qualified staff. Exercise due caution as follows:




Ensure proper ventilation at the place of work. If this is not possible, use a self-contained breathing device.


Wear safety goggles.

Wear neoprene gloves and prevent the oil from touching the skin.

Do not eat, drink or smoke when handling oil.




If units are installed, pay special attention to the safety warnings for work at a height and use a suitable harness.



If it is installed in the units in outdoor installations, pay attention to the dominating wind direction in the area. Extracting panels at excessively high wind speeds could cause workers to fall down and injure themselves; please bear in mind that the force of wind could push the workers holding the panels outside the work area.

Precautions for long periods of downtime.

In the event of long periods of downtime, please take the following precautions to prevent freezing: drain the entire system or add anti-freeze to the hydraulic system.



Never leave water inside the unit's circuit during the winter or when the unit is set to standby, unless the water is mixed with glycol.

Use of anti-freeze additives in water circuits.

Using anti-freeze additives, such as ethylene glycol or propylene glycol, is recommended when operating at water temperatures below +5°C or when the outdoor temperature is below +5°C under determined conditions.

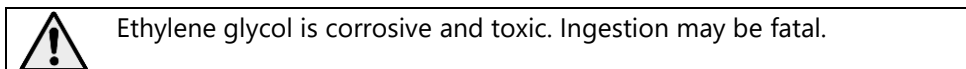


Monoethylene glycol

Monoethylene glycol (also known as ethylene glycol) is an organic compound with the formula: $\text{CH}_2\text{OHCH}_2\text{OH}$. Ethylene glycol is widely used as an anti-freeze and heat transfer fluid in the automotive industry. It is a transparent, colourless and almost odourless liquid that is completely soluble in water.

Monoethylene glycol is toxic and must be handled taking the necessary precautions. Wear the suitable PPE, such as protective goggles against splashed liquids, lab coats, air-purifying respirators, gloves and boots when handling and using this product and when handling and using other chemical products.

Immediately rinse liquids or particles splashed onto the skin with water. In case of liquids splashed into the eyes, rinse with fresh water and seek medical attention.



Standard monoethylene glycol data. Please check the safety datasheet of the specific fluid used at the installation.

Propylene glycol

Propylene glycol can be used instead of monoethylene glycol in applications that require greater safety, such as food applications. In these cases, the propylene glycol used must have a chemical formula approved for processing and for direct contact with food products. This can be checked with the supplier of the anti-freeze solution.

Propylene glycol is a chemical substance classified as safe for health and to the environment if it meets the standards set forth with regards to the content percentages; however, improper handling of quantities in concentration and accidental contact with mucous membranes due to ingestion or inhalation may cause irritation, allergies and discomfort in the respiratory or digestive system.

Its toxic action to the respiratory system if inhaled in the form of industrial propylene glycol powder, gas or vapour due to high temperatures may cause irritation of the nasal sinuses, throat, gills and lungs.

Accidental ingestion of large amounts of undiluted propylene glycol will have a negative impact on health, causing temporary discomfort, such as nausea, vomit and diarrhoea, as well as irreversible damage to the digestive system, such as ulcers, lacerations and poisoning.

In addition, if injected intravenously in extreme cases, it will be fatal.

The main recommendation involves handling propylene glycol in ample and well-ventilated areas; wear a mask and gloves; wash the affected part of the body immediately; take allergen medication or apply anti-bacteria cream if there is a rash; and seek medical attention from the closest hospital or medical centre. Please check the safety datasheet of the specific fluid used at the installation.



RESIDUAL RISKS

All of the risks derived from the unit's operation cannot be fully eliminated, so it is vital to follow the instructions included in this manual.

The unit's residual risks are listed below:

- There is a risk of thermal contact with parts of the unit subject to high and low temperatures. In general, these parts are located inside the unit and are difficult to access, but removing the panels may result in such contact.
- Electric hazard. Live parts in which there is an electric hazard are found inside the unit (electrical panel and refrigerant circuit). These hazardous parts are difficult to access because the electrical panel door must be opened and/or panels must be removed.
- Risks associated with working with refrigerant. Follow the instructions in this manual and in the refrigerant safety datasheet.

REASONABLY FORESEEABLE MISUSE

The situations associated with reasonably foreseeable misuse are listed below:

- Do not use the unit for purposes other than for what it was designed.
- Do not use the unit with refrigerant other to that indicated in the nameplate.
- The unit must not operate outside the limits established and shown in the technical datasheet.
- Do not power the unit with a power supply voltage and frequency different to that shown on the nameplate.
- Do not perform maintenance tasks and/or repairs if you are not qualified to do so.
- Do not perform maintenance tasks and/or repairs without the necessary PPE.
- Do not use the unit indoors and outdoors as a place to store items that are not part of the unit.
- If the unit needs to run with water, do not use water with a high conductivity (maximum limit of 500 $\mu\text{S}/\text{cm}$).
- Do not replace elements with others of different characteristics.
- Wait for at least 2 minutes after disconnecting the power supply from the fans before removing the fan cover. This applies to the electrical panel fan and leak extraction fan(s) mounted on the unit (if mounted).
- Do not use the unit's pipes as a support element.
- Do not change the electrical safeguard settings.
- Do not replace the pressure limiting devices with others with a different set pressure.
- Do not install the unit on uneven surfaces and/or which are not prepared to withstand the weight of the unit, as shown on its dimensional drawing.
- Do not use the unit in atmospheres in which there is a risk of explosion.
- Do not smoke near components containing refrigerant.
- Do not use the unit without the fixed grille guards. If the unit is not used with conduits, installed the fixed grille guards manufactured by KEYTER.
- Do not use water or water with additives at a temperature higher than **50°C** when the unit is not operating.
- Do not use water or pressurised fluids to clean the unit.
- Do not stand or sit on the unit's cover.
- Do not access the refrigeration section without first checking for the absence of refrigerant.



RECEIVING THE UNIT

Keep in mind the following considerations upon reception of the unit and before start-up:

The unit received corresponds to the specifications included in the order. Compare the data on the nameplate with that in the order.

The packaging must be in perfect condition.

The outside surfaces of the unit must not be damaged.

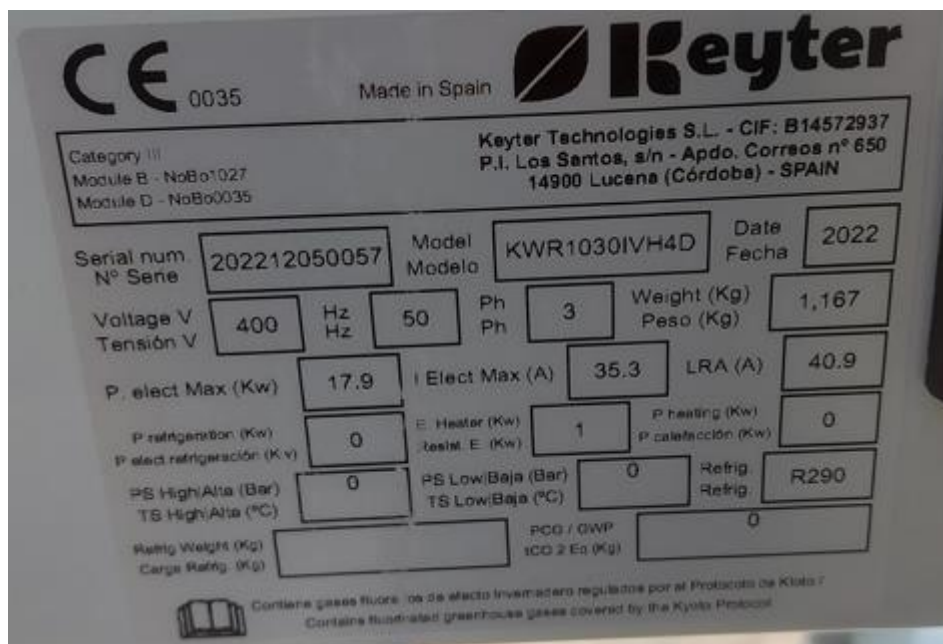
The unit and its components are not damaged.

The refrigerant and drainage connections are not damaged (check the base of the unit).

The accessories are stored inside the unit. Check that these have been supplied as shown in the order, that there are no missing accessories and that there are no signs of damage.

Check that the refrigerant circuits are in perfect working order, in particular, that no components or pipes have been damaged (e.g. after discharge). If in doubt, perform a sealing test. If any damage is detected upon receiving the unit, send a claim to the carrier immediately.

The unit's nameplate includes the following information:




The first two digits of the serial number indicate the year of manufacture of the unit.

IMPORTANT: For all communications with the manufacturer, it is necessary to indicate the unit's serial number.

The voltage on the nameplate should be respected, within the limits -10% / +10%.

It is the customer's responsibility to ensure the proper mains voltage within the established limits.

 Check that the voltage of the nameplate matches the mains voltage.

The nameplate indicates the correct type of refrigerant.



Always use the refrigerant indicated on the nameplate in its pure state.
Avoid using refrigerant blends or other substances.

- It is the customer's responsibility to ensure that the goods have arrived in perfect condition.



Upon receiving your unit, check that there is no damage either on the unit or its components.

- If the product is damaged, note this down on the signed delivery note. A copy of this delivery note will be sent to the factory within the shortest possible time. Failing to indicate damage or not reporting it will invalidate any claim.
- If the product is in perfect working order, the customer is responsible for its transportation and maintenance from that moment onwards.



STORAGE CONDITIONS

The unit should be stored at its final location.

If the unit needs to be stored, make sure that it is stored in a suitable place.

The unit contains R290 refrigerant. Keep in mind that this type of refrigerant is denser than air.

In the event of leaks, the refrigerant may accumulate close to the ground.

The refrigerant must not accumulate in such a way that it can create hazardous, explosive, suffocating or toxic atmospheres.

There must be no sources of ignition, such as sockets, power switches, lamps, electrical switches or other sources of ignition in the surrounding area.

Do not leave the units packaged in the protective film in the sun for a long time. If the protective film is exposed to direct sunlight for a prolonged period of time, the finish on the units may deteriorate.

The units must be stored under the following environmental conditions:

Minimum ambient temperature: -20°C

Maximum ambient temperature: 50°C

Maximum relative humidity: 95% (prevent the condensation of water inside the unit)

Storing the unit at a temperature below the minimum temperature may damage the unit, mainly the electronic controls and unit displays or components.

Storing at temperatures above the maximum temperature may cause the safety valves of the cooling elements to open, causing a loss of cooling fluid.

Check that all panels and the electrical cabinet remain closed. Check that the inside of the circuits remains protected.

The storage of units with flammable refrigerant must be in accordance with the European and local regulations that apply to it.

Units with anti-freeze additives in the water circuits.

Ethylene glycol (MEG) is lightly hygroscopic and must be stored in suitable conditions to prevent its contamination with water and the absorption of humidity.

The storage temperature of MEG is not critical, since storing it at any ambient temperature will not create hazardous conditions. However, keep in mind that the storage temperature must not exceed 40°C to guarantee that its quality remains unchanged. At temperatures below zero, the product's viscosity may be excessively high to transfer it between storage containers with the available pumps.

MEG is a stable chemical element and it is not expected to deteriorate greatly over time, provided that it is stored according to the corresponding instructions. However, best industrial practices recommend storing it over periods of no more than 6 months.



RECOMMENDATIONS FOR TRANSPORT AND LIFTING

The unit must be handled with care to prevent damage during transport and when installing it in its final location. Follow these instructions and the indications in the dimensional drawings supplied with the unit:

- Units must be moved carefully by qualified staff and with the suitable tools.
- Always transport and handle the unit in its horizontal position.
- Prevent any form of movement during transport, as well as sudden impacts or excessive vibration. To achieve this, the unit must be secured onto the transport platform or truck and be transported smoothly.
- Covering the unit during transport to prevent exposure to the rain or wind that could damage the packaging is recommended. Packages damaged during transport and on which water may have seeped through will increase the level of humidity inside the packaging.
- Never stack the unit during transport or storage.
- If the unit needs to be dispatched inside a container, select the most suitable type of container to load and unload the unit. We recommend using Open Top containers for large units.

Units dispatched inside a container must allow the contents to be packaged with wood packaging covered in protective plastic film. The option to use film with a protective vacuum must be offered, according to the transport or storage conditions. The units must be loaded and unloaded properly, using the necessary means to observe the safety regulations and ensuring that the units are not damaged.

- Use slides or rollers to remove the units from the inside of containers. These will be removed after the unit has been unloaded.
- The units must be loaded and unloaded properly, using the necessary means to observe the safety regulations and ensuring that the units are not damaged.
- Use a forklift or pallet jack to move the unit, ensuring that these units can hold and move the weight indicated in the dimensional drawings. Exercise due caution to make sure that the lower parts of the unit are not damaged when they are moved with a forklift or pallet jack. Check that nails cannot damage the lower parts.
- The unit must be lifted with slings. Use slings with the suitable capacity. Use a crane to hoist the unit.

Slings must be inspected and in perfect condition before the unit is lifted.

Slings must be attached to separate units. Check that they are not excessively tight or that they do not damage parts of the unit when lifting it. Refer to the unit's dimensional drawing on page 73.

- When transporting and handling the unit, use the fastening points shown and marked on the structure for such purposes.
- Transport of units with flammable refrigerant must be carried out in accordance with the applicable European and local regulations



Before lifting the unit, check and make sure that all panels of the enclosure are fastened properly. Lift and lower the unit carefully. Incorrect tilting and handling may damage the unit and affect its operation.



INSTALLATION

The final location of the unit will largely determine the proper functioning of the unit.

The customer is responsible for the unit's assembly.

The unit must be installed in a place that cannot be easily accessed and must be protected against access of unauthorised staff.

The IP degree of protection of the original panel, without optional accessories or components installed, is IP54. The degree of protection will be IPX2 or higher after the installation company has handled the panel, depending on the degree of intervention of the installation company on the unit.

The unit cannot be installed in a place with the presence of explosive atmospheres.



The unit stores flammable R290 refrigerant. In the event of a leak, the refrigerant may mix with air and create a flammable atmosphere. There is a risk of fire and explosion.

The unit contains R290 refrigerant. Keep in mind that this type of refrigerant is denser than air. In the event of leaks, the refrigerant may accumulate close to the ground.

The refrigerant must not accumulate in such a way that it can create hazardous, explosive, suffocating or toxic atmospheres.

Refrigerant must not penetrate the building through its openings. Likewise, refrigerant should not accumulate in grooves and holes.

There must be no windows, doors, light wells, doors to basements or ventilation shafts in the surrounding area.

There must be no sources of ignition, such as sockets, power switches, lamps, electrical switches or other sources of ignition in the surrounding area.

No special equipment or accessories are needed. Only the standard equipment and accessories used by a qualified technician are required to install the unit according to UNE EN 378-4:2017.

Observe the following guidelines to maximise the unit's performance:

To install the unit, check that the selected surface is resistant enough to withstand its weight and the vibrations and effort it may transmit, guaranteeing the installation's integrity and safety. The weights of the units are described in the dimensional drawings shown in page 73.

Before installing the unit, make sure that the surface is clean, free of obstacles and level.

The unit has not been designed to withstand loads or tensions that could be transmitted by other adjoining units, structures or pipes. Each external load or tension transmitted to the unit may cause damage to its structure and be hazardous to other people. In these cases, the warranty will be void.



Install the unit in a place with good ventilation and away from heat sources.

Respect the minimum distances shown on page 139 to guarantee proper access to the components during maintenance and the necessary degree of safety.



To guarantee proper operation of the unit and proper access to the components during maintenance, observe the minimum recommended distances on the minimum maintenance distance (page 139) supplied with the unit.

Failure to respect the minimum distances may cause the unit to malfunction.

The unit must be secured onto the floor.

The discharge pipe from the safety valve, which is located at the point indicated on the dimensional drawing, must be extended to a safe place in the installation. This must comply with UNE EN 378-2:2017 and 2014/68/EU (Pressure Equipment Directive).

External hydraulic circuit



All installation pipe design and sizing tasks must be carried out by qualified technicians.

The external hydraulic circuit shall not be supplied by Keyter.

Use pipes with the suitable insulation to prevent condensation and prevent the heat from being fed back to the unit.

The external water circuit will guarantee a constant flow rate through the heat exchanger under all operating conditions. The flow rate information is included in the unit's technical datasheet.

The water circuit must be made up of the following elements:

- Circulation pump, which guarantees the necessary flow rate and the available pressure of the circuit.
- A buffer tank if the total content of the primary water circuit does not reach a value of approximately 2.5 l/kW in terms of its cooling capacity. This element will be designed to reduce the short cycles of compressors.
- An expansion vessel, with a safety valve and drain, installed in a clearly visible place. This element will be sized to absorb a 2% expansion of the total volume of water in the plant (heat exchanger, pipes, buffer tank, etc.).
- Install on/off valves in the pipes at the unit inlets and outlets.
- Design a full bypass with an on/off valve between the collectors of the heat exchangers.
- Install air ventilation valves on the highest points of the water pipe.
- Install full drainage points with plugs, meters, etc. close to the lowest points on the water pipes.
- A water filter at the heat exchanger inlet. This element can be supplied optionally.

The output water temperature of the full heat recovery circuit can reach temperatures of up to 80°C. Please take into account the hydraulic pipe design.

Hydraulic connections

The hydraulic connections are shown on the dimensional drawings supplied with the unit.

Pay special attention to the input and output water connections (as shown on the drawings) to maintain the correct water flow rate direction. This direction is also shown on the corresponding labels attached to the unit:



Draining condensates

Check the position and details of the drainage connections of each unit on the dimensional drawings (page 73).

Do not use common garden hose materials for the condensate drainage pipes. Use galvanised steel, plastic or copper pipes.

If rigid materials are used for the drainage pipes, the drainage pipe must include a plastic coupling piece to absorb any vibrations.

The drainage pipe must be installed under the connection and must be tilted (at an angle of at least 2%) to allow the unit to be drained properly.

Remember to install a trap with the correct dimensions in the drainage line.



Electrical installation



To prevent electric shock or damage to the unit, make sure that the disconnection points are open before making the electrical connections. Failure to implement these measures may cause injury to workers.



The electrical control panel and power supply connections must be made by qualified staff.

The safety devices, labels, colour and cable size, on-site wiring and electrical control panel must be installed in compliance with the current local rules and regulations.

If the installation needs an earth leakage circuit breaker, keep in mind that only earth leakage circuit breakers that are sensitive to all types of currents are allowed (type B or B+). Personal protection cannot be guaranteed while the unit is operating with the earth leakage circuit breakers or with the frequency converters.

When the unit's power supply voltage is connected, there is a risk of generating charge currents in the capacitors in the form of impulses in the CEM filter, which will be integrated in the response of the earth leakage circuit breakers during activation, with no delays.

We recommend installing exponential earth leakage circuit breakers with a 300 mA activation threshold and activation with no delays (super-resistant, K-factor).

Electrical panel

Make sure that the electrical panel is in good condition before connecting the electrical connections. Refer to the wiring diagram supplied by the manufacturer (inside the unit).

Check the wiring diagram of all components to make sure that they have been fitted and connected properly, in particular, the safety elements, such as the automatic circuit breakers and main switch.

Power supply

The power supply must meet the specifications shown on the nameplate and be earthed in compliance with the applicable regulations and laws of the country in which the unit is installed. Refer to the wiring diagrams to check the connections.



Operating the unit with the incorrect power supply voltage or a phase offset will void KEYTER's warranty. If the phase offset exceeds 2% (voltage) or 10% (current), contact your local utility immediately and make sure that the unit is not switched on until the corrective measures have been taken.

Do not connect the unit to provisional installations. The units must be connected to the final electrical installation.



Check the cross-section of the cables to make sure that it complies with the current regulations, according to the operating conditions. Keep in mind the current intensity shown in the technical datasheet.

If the unit is three-phase with neutral and ground, check that the installation is equipped with a three-phase network with neutral and ground.

Keep in mind that units with 400V / III / 50 Hz have a connection with 5 cables, in which ground is always the yellow-green cable.

The unit must be connected to the mains properly. Otherwise, the unit cannot be started.

Install a suitable protection device in the connection line, taking into account the characteristics indicated in the technical datasheet and on the unit's nameplate, of the one of the thermal-magnetic type and another one of the earth leakage type, in compliance with the applicable regulations of the country in which the unit is installed. If more than one unit is installed, each line must have its own protection system.

The installation company will be responsible for selecting the cable size, in compliance with the characteristics and regulations that apply to country in which the unit is installed. To calculate the cross-section of the power supply connection cables, check the electrical data shown on the unit's nameplate and other factors, such as the supply connection length, type of cabling used, etc.; in compliance with the current regulations for electrical installations.

Make sure all of the unit's connections are correct before starting up.



Checking the phase rotation: check the correct order of the 3 phases before connecting the main power supply cables.

After commissioning the unit, the power supply source can only be disconnected during quick maintenance operations (no more than one day).

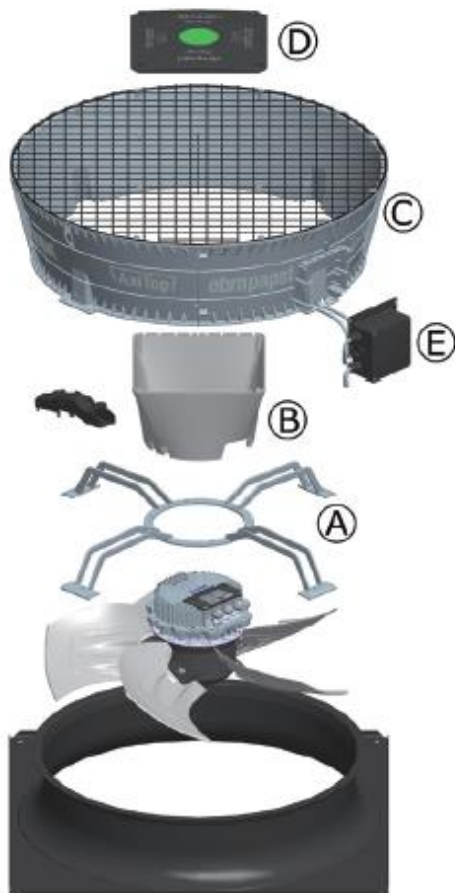
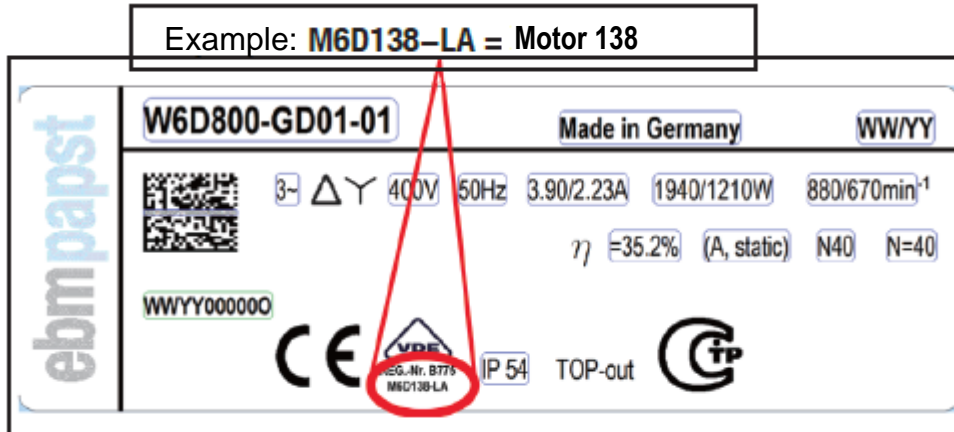
During longer maintenance operations or when the unit is de-commissioned, the power supply source must be serviced to guarantee that the compressor sump heaters receive the power supply and to guarantee that the unit's anti-ice protection elements are working properly.



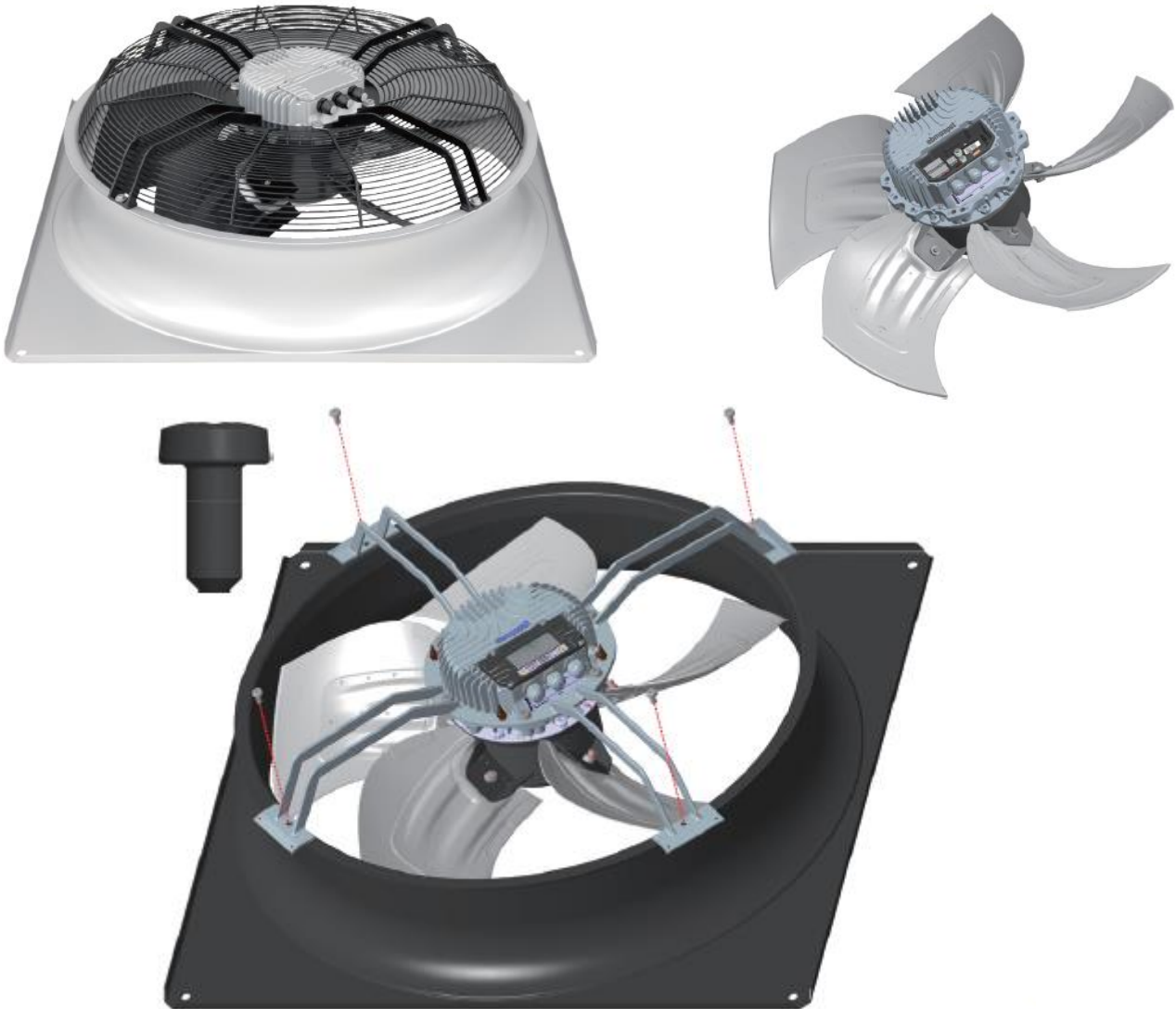


Installing the AxiTop® diffuser (optional)

Axitop is a diffuser installed directly on the axial fan grille, with a 800 and 910(A) diameter and which reduces the noise levels by 1 to 3 dB(A). It can also be used to improve the fan performance (by up to 9%).

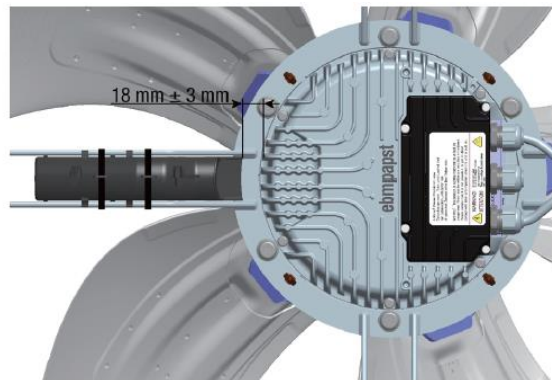


Before starting the assembly procedure, make sure that the motor model corresponds to the AXITOP supplied. There are many different types of AXITOP, according to the type of motor and nozzle diameter. This can be checked on the label (see the above diagram). Check that the support grille (A) and terminal box (E) are installed.

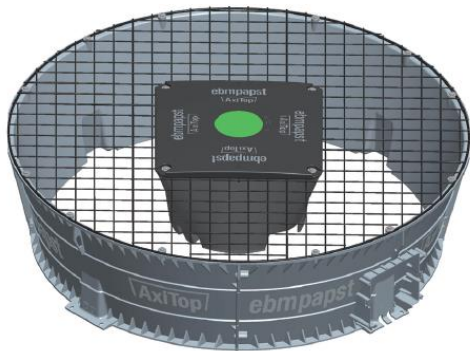


Position of the fan with the support ring, making sure that the press is bolted in the final mounting position and facing downwards (this also applies to the vertical mounting process). Fit and tighten the screws. Next, connect the terminal box, making sure that the wiring order is respected. In the case of 150 motors (910 mm diameter), install the cooling pipe (see image below).

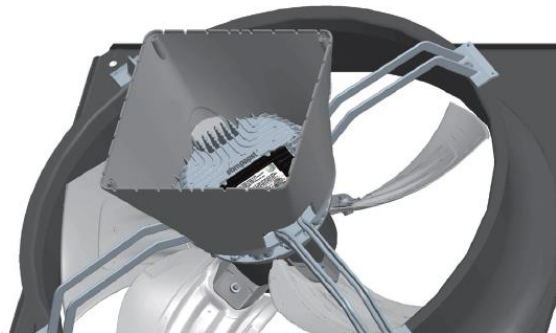
Motor size 112	Motor size 138	Motor size 150
5 Pcs. M6 x 14	4 Pcs. M10 x 25	6 Pcs. M10 x 25
6 Nm ± 0.9 Nm (4.4 lbf-ft ± 0.6 lbf-ft)	30 Nm ± 4.5 Nm (22.1 lbf-ft ± 3.3 lbf-ft)	30 Nm ± 4.5 Nm (22.1 lbf-ft ± 3.3 lbf-ft)



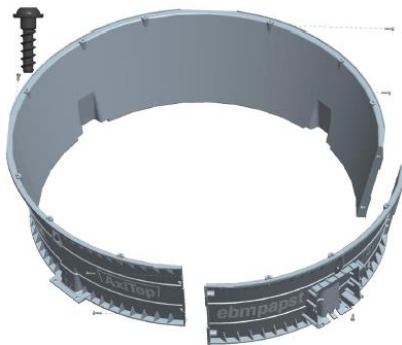
Finally, mount the diffuser, as shown in the image below. If the diffuser is removed, mount it so it can be fitted on the fan.



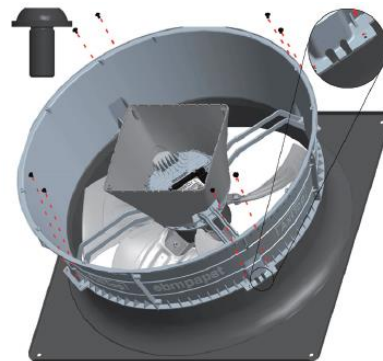
Left: diffuser mounted.



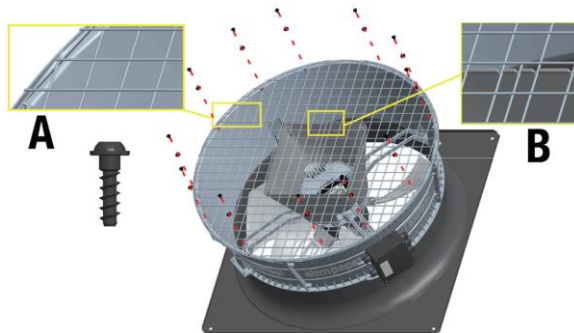
Right: internal diffuser dismounted and placed on the motor



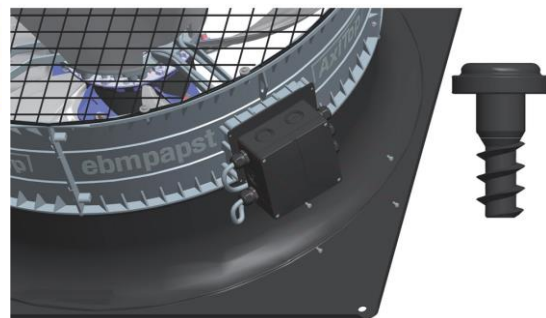
Left: exterior diffuser assembly.



Right: mounting the outer diffuser on the motor



Left: mounting the protective grille.



Right: fitting the external connection box.



START-UP

The start-up procedure must be carried out by qualified technicians, with the corresponding qualification certificates in compliance with the local regulations. No special equipment or accessories are needed. Only the standard equipment and accessories used by a qualified technician are required to start the unit according to UNE EN 378-4:2017.

Preliminary checks

Before starting the unit, please read and fully understand the operating instructions. The following checks must also be performed:

- Check that the installation features all of the necessary elements, including the refrigerant system, as shown in the installation drawings, dimensional drawings, pipe/instrumentation drawings of the system and wiring diagrams. Refer to the national regulations to perform these checks.
- Check the operation of the refrigerant detector.
- Check the operation of the exhaust fan.
- Make sure that all electrical connections are sealed.
- Check that all safety devices have been fitted, in particular, the high-pressure switches.
- Check that all panels have been installed correctly, with the correct bolts.
- Check that there are no refrigerant leaks. Perform these tasks after stopping the unit.
- Check the drainage connections.
- Make sure that the power supply voltage is the same as that shown on the nameplate.
- Check that the power supply of the electronic control systems is connected, following the unit's wiring diagram.
- Check that the pipes are in good condition.
- Check that the water filter is clean and fitted properly.
- If work has been carried out inside the unit, make sure that no objects or tools have been left inside.
- Make sure that the unit is installed in a place that complies with the minimum safety distances for service and maintenance (refer to the minimum maintenance distance (page 139)).
- Make sure that the compressors rest freely on the rubber supports.
- Do not loosen or remove the support mounting bolts.
- The compressor has a sump heater to guarantee the separation between the compressor's refrigerant and sump oil. Activate the sump heater four hours before initial start-up or after a prolonged interruption of operation of the unit. If the heater cannot be enabled in advance, the compressor must be heated in another way to separate the refrigerant from the oil. This task is important, in particular, at low ambient temperatures during commissioning.
- The unit features a sight glass. Check the level of oil in the compressor.
- Make sure that the water pump is started for several minutes before starting the compressor. Before starting the unit, check all of its hydraulic connections, the evaporator connection and the condenser, or the connections between the water inlets and outlets. The water pump should be installed upstream of the unit, so the heat exchanger will have a positive pressure. Version P units feature pumps (supplied from the factory by default) upstream of the heat



exchanger. Take this into account in the case of version S units installed with the pump at the installation.

- Install a filter in the water circuit, upstream of the heat exchanger. This filter must stop all particles larger than 1 mm in diameter and must be installed at least 1 m away from the heat exchanger inlet.
- Check the phase sequence of the unit's components to make sure that it is the correct one: check the direction of rotation of the elements (fans, compressor, etc.). The compressors are equipped with a three-phase control relay at the header. The basic model (standard) can only detect phase and rotational direction errors. The upgraded model (optional) also detects phase offsets, undervoltages and overvoltages.

If the parameters are correct, the compressors will rotate correctly (the compressor's correct direction of rotation can be checked when the pressure on the suction side decreases and the pressure on the discharge side increases after activation of the compressor). If the compressor has not been connected properly, the direction of rotation will be reversed, making a lot of noise and reducing the current consumption.



A compressor that rotates in reverse direction makes an abnormal noise. The compressor will rotate in reverse until it fails. Prevent rotation in reverse of the compressors over long periods of time.



If any of the elements rotate in the wrong direction, disconnect the main voltage supply by cutting off the main switch and reverse the phases until all elements rotate in the right direction.

In some cases, when the compressor stops and starts, a metallic noise might be heard, caused by the compressor's blades. This is an abnormal noise associated with a problem.

If axial electronic fans are installed, also check that they adapt their speed of rotation to the evaporation or condensation pressure.

- The unit must operate with the correct flow rate. This is very important. Do not start the air-conditioning system until the water reaches the desired temperature.

Check that the selected water pump is valid, according to the pressure drop in the hydraulic circuit.

To calculate the operational flow rate, measure the difference between the input and output water temperature.

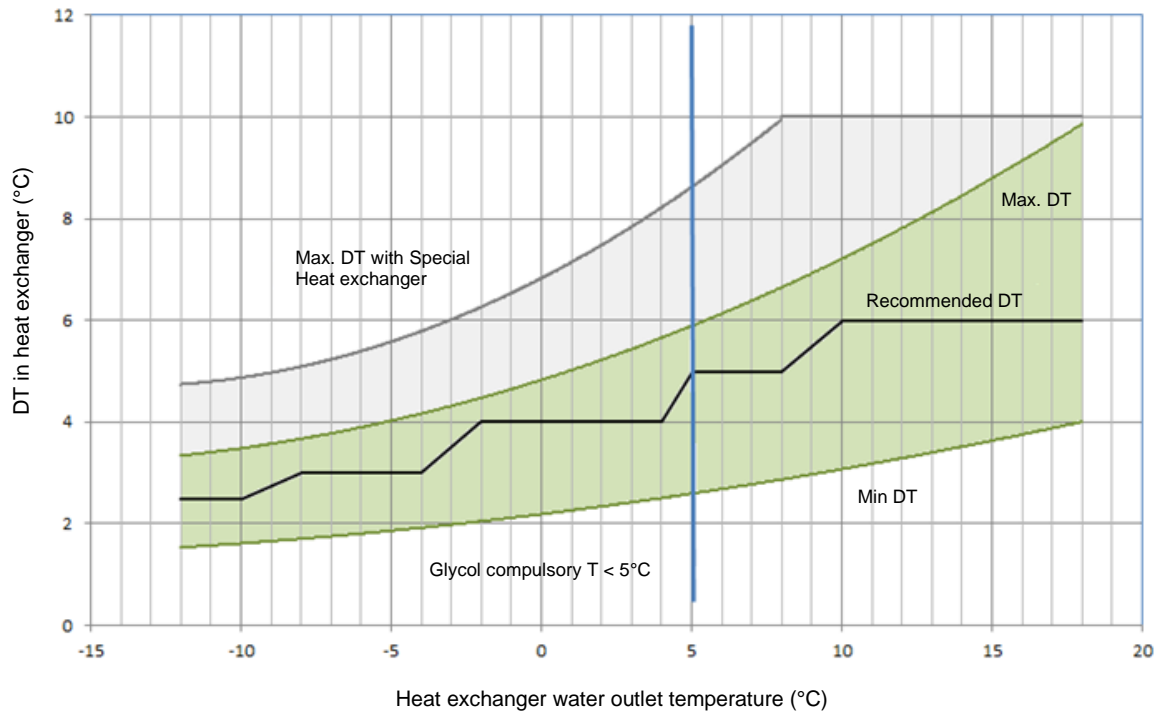
If the unit runs at a low flow rate speed, it will damage the components, including the heat exchanger. The unit's performance will be affected if it runs at a high flow rate speed.

The evaporation process is also sensitive and can be potentially unstable. Minor changes in the heat exchange process operation will have a big impact on system performance. For example, a change in one degree of the evaporation temperature will change the COP by approximately 3%.



An unstable process can also cause the evaporation temperature to fluctuate, with the potential risk of freezing the evaporator.

Therefore, it is necessary to check that the selected values when sizing the installation are within those included in the chart, which shows the work points required to run plate exchangers, in relation to the output temperature of the exchanger and its difference in temperature (DT). These values are also associated with the flow of water through the exchanger, i.e. the higher the flow rate, the lower the difference in temperature.



Output water temperatures below 5°C require the use of glycol water. The green area indicates the operating area allowed, without changes in the heat exchanger. The grey area requires our Commercial Department to be contacted, since it will require the heat exchanger to be replaced.

Examples:

Unit with an output water temperature of 7°C: the recommended DT is 5°C. The unit can operate with a DT between 2.6°C and 6.3°C when a standard heat exchanger is used. It can operate with a higher DT, but Keyter's Commercial Department must be contacted first to check the unit's operation. Therefore, this will generally require the heat exchanger to be replaced with a special model.

Unit with an output water temperature of -2°C: use of glycol is mandatory, with the percentage recommended in the tables in the section on the use of water with glycol. The recommended DT is 4°C, and the DT allowed is between 2°C and 4.4°C. To achieve a DT of up to 6°C, it will be necessary to assess the need for a special heat exchanger.

The chart above does not include the effect of dirt. Water with a high capacity for dirtying will drop the maximum values for difference in temperature.



Start-up

The start-up and performance tests must be carried out after applying the thermal load. Check that the flow rate of water circulating through the heat exchanger is as required.

- Connect the power supply source and turn on the system.
- Check the readings of the pressure gauges. The value of the reading will depend on the weather conditions.
- Check the subcooling and overheating to verify that the refrigerant charge is suitable for the operating conditions. Compare the evaporation and condensation temperatures with the design conditions.
- Also check the operating conditions (flow rate and consumption) and check that the flow rates and pressures of the hydraulic circuit in the installation are as required.
- Check the water temperature.
- 15 minutes after starting the unit, check and make sure that there are no bubbles through the sight glass.
- The presence of bubbles may indicate that some refrigerant has been released from one or more points. These leaks must be repaired before resuming the tasks. Repeat the start-up procedure after eliminating the leaks.
- When the unit is started, complete the service commissioning report (refer to page 51 in this manual) to make sure that the unit is installed correctly and ready for operation.
- After running for several hours, check the main system parameter to make sure that the system is functioning properly or whether any adjustments are required:
 - Check the evaporator input and output water temperature.
 - If possible, check the evaporator water's flow rate.
 - The current absorbed when starting the compressor and stabilised current during operation.
 - Check the readings on the pressure gauges.

For more information, refer to the unit's control manual.

Note: All of the checks described above must be carried out after switching off the unit and taking the necessary precautions. With regards to the inspection parameters, for example, flow rates, pressures, etc., these can be checked on the technical datasheet.

The documents supplied with the unit must be taken out of the electrical panel, except for the wiring diagrams, provided that it is stored in a fireproof folder.



START-UP AND VERIFICATION REPORT

CUSTOMER AND SITE DATA

Customer:

Contact person:

Contact number:

Site management:

Models:

Serial no.:

Date:

Date requested for the start-up:

GENERAL CONDITIONS

Keep in mind the indications on page 51, in addition to the following:

- The following preliminary tasks must be carried out prior to start-up:
 - Connect the power supply.
 - Check the phase sequence.
 - Differential protection of the unit power supply line.
 - Unit power supply from 12 hours prior to start-up.
- Check the existence of demand for thermal load to start the unit.
- The unit must be in the final position. If access to the unit needs to be performed by auxiliary means, these will be at the customer's expense.
- The refrigerant charge of the units is adjusted ex-works. Therefore, if refrigerant needs to be added, it must be supplied by the customer.
- The unit power supply must be the final one. The units are exempt of guarantee if the start-up is not carried out with the final voltage.
- The safety documents and PPE required to access the installation must be provided with the start-up documents.
- The document to request the start-up should be sent at least 2 weeks before the required start-up date.
- From the sending of the document for the start-up, the availability of the requested date will be confirmed within 24 hours.

Delays or subsequent assistance due to non-compliance with the points established in the document for start-up will be invoiced.

The inspection checklist is shown below.

	INSPECTION CHECKLIST	On-site Ref: _____
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MODEL		N° CIRCUITS	
SERIAL NO.		N° COMPRESSORS	
REFRIGERANT		REGULATION/REV.	
PREPARED BY		DATE	

OP. MODE/SETPOINT		PHASE RELAY	
DIRTY PRESSURE SWITCH FILTER		FREECOOLING TYPE	
FLOW RATE CONTROL		OPTIONS	

ELECTRICAL CHECK	GROUP NO. 1	GROUP NO. 2	GROUP NO. 3	GROUP NO. 4
RATED VOLTAGE				
VOLTAGE ON THE POWER/SWITCHING TERMINALS				
POWER INPUT/CURRENT				
COS ρ				
RATED CURRENT OF THE COMPRESSOR				
ABSORBED CURRENT OF THE COMPRESSOR				
COMPRESSOR SERIAL NO.				
COMPRESSOR SERIAL NO.				
OUTDOORS/FAN RELAY CURRENT				
OUTDOORS/ABSORBED FAN CURRENT				
INDOORS/FAN RELAY CURRENT				
INDOORS/ABSORBED FAN CURRENT				
RETURN FAN RELAY CURRENT				
RETURN FAN ABSORBED CURRENT				
POWER OF THE ELECTRICAL HEATERS Kw				
ABSORBED CURRENT OF THE ELECTRICAL HEATERS				
EARTHING RESISTANCE TESTS				

INSPECTION OF SAFETY ELEMENTS	GROUP NO. 1	GROUP NO. 2	GROUP NO. 3	GROUP NO. 4
HIGH-PRESSURE PRESSURE SWITCH				
HIGH-PRESSURE PRESSURE SWITCH RESET				
MAXIMUM SAFETY, PRESSURE 46.2 BAR				
LOW-PRESSURE PRESSURE SWITCH				
LOW-PRESSURE PRESSURE SWITCH RESET				
TEMPERATURE AT DEFROSTING START				
TEMPERATURE AT DEFROSTING END				
CONDENSATION CONNECTION CONTROL				
CONDENSATION DISCONNECTION CONTROL				
EVAPORATION CONNECTION CONTROL				
EVAPORATION DISCONNECTION CONTROL				
ANTI-FREEZE				

CHECKING THE COOLING CIRCUIT	GROUP NO. 1	GROUP NO. 2	GROUP NO. 3	GROUP NO. 4
COMPRESSOR OIL LEVEL SIGHT GLASS				
HIGH PRESSURE (BAR)				
HIGH PRESSURE GAUGE TEMP. (1)				
LIQUID TEMP.				
SUBCOOLING				
COMPRESSOR DISCHARGE TEMP.				
CONDENSATION AIR/WATER TEMP. (2)				
OUTPUT AIR/WATER TEMP.CONDENSATION				
Δ TEMP. CONDENSER				
Δ TEMP. CONDENSER(1)-(2)				
LOW PRESSURE				
LOW-PRESSURE GAUGE TEMP. (3)				
COMPRESSOR SUCTION TEMP.				
OVERHEATING				
EVAPORATOR INPUT AIR/WATER TEMP. (4)				
EVAPORATOR OUTPUT AIR/WATER TEMP.				
Δ TEMP. EVAPORATOR				
Δ TEMP. EVAPORATOR (4)-(3)				

NOTE: Reset the meters to 0 after checking the system operation.

On-site checks

1. Reset all meters to 0
2. Check that the maintenance records have no errors
3. Check that the unit has been accessed properly
4. Check that there are no surface defects on the unit
5. Unit documents (manuals, wiring diagram, layout, technical datasheet, CE marking)

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Remarks regarding the performance tests:



MAINTENANCE

The warranty will only be valid after a maintenance contract is signed with a qualified specialist company. The maintenance contract must be signed so it is effective as of the date of commissioning. The maintenance tasks must be carried out on the unit.

The maintenance tasks must be carried out by qualified staff, even after the end of the warranty period. No special equipment or accessories are needed. Only the standard equipment and accessories used by a qualified technician are required to start the unit. Perform maintenance in accordance with UNE EN 378-4:2017.

The PPE described in the section on GENERAL SAFETY RECOMMENDATIONS is required to perform the maintenance tasks.

KEYTER KWR units require regular maintenance to guarantee their proper operation and, therefore, extend their service life and reduce the operational costs.

All maintenance tasks must be carried out by qualified technical staff, who must use the correct materials.



Before performing tasks in the refrigerant circuit, it is mandatory to fully drain all refrigerant. Following the recommendations for working with A3 refrigerants. Once the refrigerant has been discharged, flush with nitrogen to ensure the absence of refrigerant in the circuit.

Always use original spare parts to make sure that the unit functions properly.

The maintenance periods are shown below for information purposes only, since these may vary according to the type of installation.

During maintenance, the maintenance staff must use portable lighting systems, since some parts inside the unit that require maintenance may require this. (Reference standards: EN 1837:2021 and EN 60204-1:2019).

Sensors

Check the temperature of the output water every day to guarantee its correct operation. Every three months, check the position and that all sensors are fastened properly (temperature and pressure).

Refrigerant circuit

Check all of the adjustment points, overheating and subcooling values every three months and take pressure and temperature readings from the system elements.

Note down these values on the maintenance checklist.

Perform the leak test (after stopping the machine) and check the operating pressures, comparing them with the corresponding values indicated in the start-up checklist.

Never exceed the maximum operational pressure specified.



Cooling components

Early detection of R290 refrigerant leaks is essential to prevent risk situations. It is important to perform periodic inspections and preventive maintenance to ensure the correct condition of piping and connections.

Every three months, check the degree of sealing of the connections in the refrigerant circuit, using a suitable leak detector for the refrigerant gas in the unit. If a leak has been repaired, it is necessary to perform a leak test with nitrogen to check its effectiveness. These operations must be carried out after the unit has been stopped. To test for leaks, use dry nitrogen after draining the refrigerant. **It is advisable to repeat the coolant removal and nitrogen purging process several times.**

Never use gas or air with oxygen to bleed the lines or pressurise the unit, because oxygen reacts violently to grease and oil and may cause an explosion with major or even fatal consequences at the installation.

In the event of leaks: close the unit's cover, warn the end user and contact the Customer Service.


Keep all sources of ignition far from the unit. In particular, naked flames, hot surfaces at a temperature of more than 370°C, electrical devices connected to power supply sources and static discharges.

Make sure that the room is ventilated properly around the product.

Use signs and fences to prevent unauthorised personnel from entering the surrounding area.

To repair a leak, pressurise the circuit with dry nitrogen and make sure that the repair was done correctly. If there are no leaks, suck in the nitrogen and then fill the unit with refrigerant.

Safety recommendations when handling dry nitrogen:

	<p>Follow the recommendations on the dry nitrogen safety datasheet.</p> <p>Do not smoke when working with dry nitrogen.</p> <p>Wear safety gloves (EN 388).</p> <p>Wear safety goggles (EN 166).</p> <p>Wear safety boots (EN ISO 20345).</p> <p>In atmospheres with insufficient oxygen, use a self-contained breathing apparatus or a mask with pressurised air (EN 137).</p>
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Electrical components

Check all electrical components once a month to ensure that there is no rust and that there are no signs of overloading, in addition to tripping the earth leakage protection elements.

Switch off the unit and make sure that all bolts and electrical connections are tight. Turn on and off all contactors and thermal-magnetic circuit breakers by hand after they have been de-energised.

Check the unit's earthing connection at least once a year and that the values recorded meet the requirements of the applicable regulations of the country in which the unit is installed.



Replacement coils

Clean the tube and fin exchangers or coils to guarantee the proper functioning of this heat exchanger and, therefore, the optimal performance of the unit. Coils must be cleaned once every three months. However, in the case of installations with a high dust content, they must be cleaned at least once a month.

Remove the cover to access the inside of the unit.

Clean the coils with water and a neutral pH cleaning product. Dry them with pressurised air after cleaning.

The aluminium or copper fins on the coils are very fragile. Do not use brushes or elements that could deform the fans and damage the coil. Never use pressurised water.

Fans

Every three months, check that the outer fans are turning in the correct direction and that the vibration and noise levels are within the limits. Check the intensity of the fan's three phases and compare them with the rated value on the electrical wiring diagram.

Visually inspect the following elements at least once every three months:

- Protective cover on the electrical contacts. Repair or replace it if damaged.
- Devices, check for damage on the blades and cover. Replace them.
- Cable fastening elements
- Cable insulation elements, check for damage. Replace the cables if they are damaged.
- Tappet due to wear / formation of deposits / corrosion and damage. In this case, clean or replace the tappet.
- Tightness of the cable seal. Fit it again or replace it if it is damaged.

Draining condensates

Check that the condensates are being drained from the units and ensure that they are not clogged, so the unit can drain them properly.

Anti-vibration mounts

Check the anti-vibration mounts on the components (compressors, etc.) and on the unit (if installed) twice a year. Replace them if there are any signs of damage.

Openings

Check the condition of the sealing gaskets every 6 months, in particular, on the electrical panel.

Compressors

The compressors have the necessary lubricating oil. During normal operation of the compressor and provided that the compressor is running with the necessary efficiency, the charge must be enough to cover the compressor's entire service life. However, check the oil level while the unit is running to make sure it is correct.

Make sure that the regular service inspections are carried out to guarantee that the unit performs as expected in terms of reliability and in compliance with the current local regulations.



Make sure that the regular service inspections are carried out to guarantee that the unit performs as expected in terms of reliability and in compliance with the current local regulations.

The following maintenance tasks must be carried out on a regular basis to prevent problems in the compressor associated with the system:

- Check that the safety devices are working properly and adjusted as required.
- Make sure that there are no leaks in the system.
- Check the compressor's current consumption.
- Confirm that the system is running properly, according to the previous maintenance records and environmental conditions.
- Check that all electrical connections are fastened properly.
- Keep the compressor clean and check for the absence of rust on the cover, pipes and electrical connections.

If the compressor needs to be replaced (due to malfunction or if it is burnt), please contact the Technical Service.

Perform the regular maintenance tasks on the compressor once every 6 months.

Oil level

Visually inspect the oil level through the sight glass once a week. Check the acidity of oil in the refrigerant circuit once every three years and after working on the refrigerant circuit. The image below will be used to assess the condition of the oil:



From left to right: as new/OK/OK, plan change in due course/NOK, change oil.

Use oils recommended by the manufacturer and respect the specifications of the oils.

Always use premium refrigerants. Never use unapproved products (refrigerant mixes, hydrocarbons, etc.).

R290 is very soluble in conventional oils. Therefore, the compressors of the ZIRAN KWR unit will be filled with special oils with a high viscosity and particularly good tribology properties.

Keeping in mind this high degree of solubility, there are a series of special requirements to execute, select the operating mode and use the installation and compressor control. Insufficient overheating during operation and of the oil sump when the unit is stopped may reduce the viscosity of the compressor's oils. This may lead to a reduction in the power, a high wear of the parts in the drive mechanism, increased oil dragging effects and the formation of foam. Protect the compressor against "wet operation" and make sure that the suction gas temperature is high enough. Overheating of the suction gas must be of at least 20 K in the piston compressors.

- Avoid excessively low oil temperatures and a high suction pressure when the unit is stopped. The oil heater must be used, with a pump drainage system.



- Avoid rapid changes in the suction pressure. There is a risk of causing friction due to a high gas discharge of the refrigerant and overheating of unstable suction gas.
- Avoid rapid changes in the condensation pressure. There is a risk of forming heavy foam inside the oil separator.

Polyalphaolefin oil (PAO) is one type of oil that meets these requirements.

Fluid line sight glass

The fluid line sight glass is used to inspect the refrigerant flow rate and refrigerant humidity (%) level.

The presence of bubbles indicates that the dehydrating filter is clogged or that the refrigerant level in the unit is too low.

The oil sight glass has a colour indicator. The colour indicator can be compared with the sight glass ring scale to calculate the humidity level in the refrigerant. If the level is too high, replace the filter cartridge, use the unit during one day and then check the percentage humidity level again. No additional tasks are required if the humidity value is within the pre-determined range. If the percentage humidity level continues to be too high, fit the dehydrating filter again, start the unit and run it for another day.

Dehydrator filter

The cooling circuits feature dehydration filters.

The presence of air bubbles inside the sight glass indicates that the filter is clogged. This can also be detected by a difference in temperatures measured downstream and upstream of the drying filter. When the cartridge has been cleaned and there are still a few air bubbles, this indicates that some of the unit's refrigerant has leaked from one or more points; in this case, check and identify these points and repair the leaks. If the filter needs to be replaced, have a qualified technician perform this task when the unit is out of service.

Perform the regular maintenance tasks on the filters once every 6 months.

Sump heater

Every three months, check the sump heater to make sure that it is working properly and that it is secured properly onto the compressor.

HP and LP safety switches

Install a HP and LP pressure gauge and check that the unit's pressure switches are functioning properly. Check them every three months.

Hydraulic components

The following maintenance tasks must be carried out on these components:

- Check the condition of the hydraulic pipe once a year. If there are water leaks, please contact a qualified technician.
- Clean the heat exchanger every 6 months with a specific cleaning agent. Please contact a qualified technician.
- Always install a water filter at the water heat exchanger inlet. This hydraulic filter is not supplied as standard, but can be supplied optionally.



In any case, clean the water filter every three months and heed the corresponding warnings for the LP water circuits.

Heat exchanger

Check that the heat exchanger's water side is clean. To do so, measure the pressure drop on the water side once a week or measure the input and output refrigerant temperatures of the heat exchanger and compare them with the condensation or evaporation pressures.

A big difference between these temperatures would indicate a low efficiency of the heat exchanger. In this case, the exchanger must be cleaned with chemical cleaning processes, since the exchanger might be dirty. These maintenance tasks must be carried out by qualified technical staff.

ATEX leak sensor

Performing regular maintenance of the gas detector guarantees that the device will be ready for use. Failing to do so may lead to the risk of exposure to hazardous gases that could cause serious injuries or even death. Make sure that the gas detector is serviced regularly to ensure that all workers can perform their tasks safely. The calibration of the sensor shall be checked at least once a year. If it has an error of more than 10%, it shall be recalibrated every 6 months.

The sensor shall be replaced after 5 years at the latest.

ATEX fan

Special attention should be paid at least once a year to the wear and tear of bearings, belts, drive pulleys and flexible joints.

In the case of transmission fans, check and make sure that the transmission belt has the correct tension to prevent slipping or excessive force on the moving parts.

The turbine blades or propeller must be inspected at regular intervals to locate damage that may cause offsets of the moving parts.

Regular cleaning is required during the corresponding intervals for all applications in which dust may accumulate on the surfaces of the fan and its components.

Checks every six months:

- electrical earthing connections;
- bolts and screws, making sure they are secured; - belt alignment (if installed);
- shaft alignment.

Check the following at least once a month:

- the fan and motor bearings must be lubricated properly; all bolts must be firmly tightened, in particular, the motor shaft impeller locking bolts, bolts on brackets, traction guides, bearings and motor seal;
- guards against accidental contact, making sure they are mounted properly;
- all parts must rotate freely and with no friction;
- no strange bodies inside the fan;
- the structure must be intact and must not have suffered damage during transport;
- the inside is clean; - the belt tension and alignment.



Resistance of the heat exchanger to corrosion

In general, the filling water inlet should be filtered and treated beforehand.

These units are designed for closed water circuits. The main component of the hydraulic circuit is the heat exchanger. There might be problems caused by corrosion in this exchanger, which could damage it if the water does not have the suitable characteristics.

The table below shows the resistance to corrosion caused by water with different compositions on the components of the exchanger plates in KEYTER KWR units:

Content		Concentration mg/l or ppm	Material	
			AISI 316L	Copper
pH		<6		
		6-7,5		
		7,5-9		
		>9		
Alcalinity	HCO ₃ ⁻	<70		
		70-300		
		>300		
Sulphate	SO ₄ ²⁻	<70		
		70-300		
		>300		
Alcalinity/Sulphate	HCO ₃ ⁻ /SO ₄ ²⁻	>1		
Electrical conductivity	µS/cm	<10		
		10-500		
		>500		
Ammonium	NH ₄	<2		
		2-20		
		>20		
Free chlorine	Cl ₂	<1		
		1-5		
		>5		
Hydrogen sulfide	H ₂ S	<0,05		
		>0,05		
Free carbon dioxide (aggressive)	CO ₂	<5		
		5-20		
		>20		
Nitrate	NO ₃ ⁻	<100		
		>100		
Iron	Fe	<0,2		
		>0,2		
Aluminium	Al	<0,2		
		>0,2		
Manganese	Mn	<0,1		
		>0,1		

The values shown in this table are valid for water at a temperature of 20°C.

Chloride content (Cl ⁻)	Maximum temperature			
	60°C	80°C	120°C	130°C
≤ 10 ppm	AISI 304L	AISI 304L	AISI 304L	AISI 316L
≤ 25 ppm	AISI 304L	AISI 304L	AISI 316L	AISI 316L
≤ 50 ppm	AISI 304L	AISI 316L	AISI 316L	Ti/SMO 254
≤ 80 ppm	AISI 316L	AISI 316L	AISI 316L	Ti/SMO 254
≤ 150 ppm	AISI 316L	AISI 316L	Ti/SMO 254	Ti/SMO 254
≤ 300 ppm	AISI 316L	Ti/SMO 254	Ti/SMO 254	Ti/SMO 254
> 300 ppm	Ti/SMO 254	Ti/SMO 254	Ti/SMO 254	Ti/SMO 254

	Buen comportamiento
	Puede haber corrosión si otro factor está en amarillo
	Uso no recomendado



This type of shell and tube heat exchanger is recommended in industrial applications where the water may contain some dirt or there is an open circuit, although it is very important to monitor the water conditions to prevent corrosion issues in the hydraulic circuit if the water is not suitable. It is important to follow the general guidelines to make sure that the filling water is previously filtered and treated.

The table below shows the resistance to corrosion caused by water with different compositions on the components of the shell and tube heat exchanger of KEYTER KWR units:

	Approximate concentration (mg/l)	Standard version
pH value	7 ÷ 9 (value)	OK
Chloride Cl ⁻	< 3 3 ÷ 50	OK *
Free chlorine Cl ₂	< 0.5	OK
Sulphate SO ₄ ⁻	< 50 50 ÷ 100	OK *
Free carbon dioxide CO ₂	< 5 5 ÷ 50	OK *
HCO ₃ ⁻ / SO ₄ ⁻	> 1 (value)	OK
Nitrate	< 100	OK
Hydrogen sulphide H ₂ S	< 0.05	OK
Oxygen O ₂	< 0.1 0.1 ÷ 2	OK *
Ammonia NH ₄ ⁺	< 2 2 ÷ 20	OK *
Phosphate PO ₄ ³⁻	< 2	OK
Iron and manganese Fe ³⁺ / Mn ⁺⁺	< 0.5	OK
Organic deposits	0 (value)	**

The following recommendations must be taken into account for open hydraulic circuits:

- Keep the water within the values shown above for each exchanger.
- If this is not possible, install another exchanger, making the primary circuit independent.
- Use materials that are compatible with the characteristics of the exchanger's components.



Preventing corrosion on copper

Low oxygen concentration. If it is less than 0.1 ppm, no corrosion will be formed due to pitting.

The high content in HCO_3^- & Cl^- ions reduces the risk of corrosion.

A high SO_4^{2-} and NO_3^- ion content increases the risk of corrosion.

The recommended pH is $6.5 < \text{pH} < 9.5$.

Recommended content of $\text{CO}_2 \leq 44$ ppm (1 mol / m³).

Surface water instead of well water. The organic compounds in surface water act as natural inhibitors.

Organic matter containing ammonia and sulphur compounds increases the risk of corrosion.

Magnetite particles (Fe_3O_4) increase these risks.

No cracks or uneven surfaces, without stagnant water.

A film of carbon (for example, oil decomposing after welding) on the surface increases the risk of corrosion.

Preventing corrosion when using chlorinated water

Make sure that no chlorinated water is in direct contact with the heat exchangers, unless the specific analysis of water is taken into account and the values of the chemical compounds of water are under the thresholds shown in the table with the chemical value limits of water heat exchangers. Otherwise, **chlorinated water must not be fed directly to the heat exchangers.**

Swimming pools are one of the most common installations for these types of applications, in which chlorinated water is fed directly through the heat exchanger to heat the chlorinated water inside the heat pump condenser, which is quite a problem when using stainless steel parts, since copper is less sensitive to corrosion caused by chlorine.

As chlorine is added and it transforms into chloride ions, the concentration of chloride ions increases gradually. In these cases, the concentration of chloride ions could be high enough for the chloride ions and the free chlorine ions to cause corrosion due to pitting, which could seriously damage or even destroy the heat exchangers. However, it is easier to supervise the chlorine levels in large public swimming pools than in small private swimming pools, because public swimming pools usually have qualified maintenance engineers.

These cases should be studied carefully and we recommend not feeding the swimming pool water directly to the heat exchanger.

Swimming pools treated directly with ozone are even more aggressive to heat exchangers, so supplying this type of water directly is also forbidden.

As an option, in the case of high chloride content applications, stainless steel with a high chromium-molybdenum content or a tubular exchanger and coaxial copper-nickel or titanium housing should be used. Using an effective filter at the exchanger inlet and ensuring proper maintenance are essential to guarantee the reliability of the unit in these applications.



Exercise due caution in reverse osmosis water applications, since these have extremely aggressive pH levels for metallic minerals. All of these assumptions are not contemplated in the standard applications of the unit. Please contact the factory for more information.



Failing to observe any of the recommendations indicated in this document to maintain the exchanger water within the values indicated in the above table will void the warranty of the unit.

Glycol concentration

Check the glycol concentration in the water circuits twice a year.

Anti-freeze solutions, such as monoethylene glycol or propylene glycol, are needed when working with water temperatures below 5°C, or when the unit needs to operate in environments at temperatures below 5°C.

After diluting in water, the fluid provides excellent protection against freezing: demineralised water should be added to prevent the formation of deposits. The liquid concentration should be analysed at least once a year to prevent the risk of clogging.

Monoethylene glycol:

Monoethylene glycol (also known as ethylene glycol) is an organic compound with the formula: $\text{CH}_2\text{OHCH}_2\text{OH}$. Ethylene glycol is widely used as an anti-freeze and heat transfer fluid in the automotive industry. It is a transparent, colourless and almost odourless liquid that is completely soluble in water.

Ethylene glycol is corrosive and toxic. Ingestion may be fatal.

Standard MEG data. Refer to the manufacturer's actual commercial data of the glycol used in the installation.

Ethylene glycol is highly hygroscopic and must be stored under special conditions to prevent contamination with water and the absorption of humidity.

The storage temperature of MEG is not critical, since storing it at any ambient temperature will not create hazardous conditions. However, keep in mind that the storage temperature must not exceed 40°C to guarantee that its quality remains unchanged. At temperatures below zero, the product's viscosity may be excessively high to transfer it between storage containers with the available pumps.

MEG is a stable chemical element and it is not expected to deteriorate greatly over time, provided that it is stored according to the corresponding instructions. However, best industrial practices recommend storing it over periods of no more than 6 months.

Storage tanks must be made out of high-density polyethylene or HDPE, stainless steel or mild steel. Hoses must be made out of polypropylene or stainless steel.

Monoethylene glycol is toxic and must be handled taking the necessary precautions. Wear the suitable PPE, such as protective goggles against splashed liquids, lab coats, air-purifying



respirators, gloves and boots when handling and using chemical products. Immediately rinse liquids or particles splashed onto the skin with water. In case of liquids splashed into the eyes, rinse with fresh water and seek medical attention. Never inject these types of liquids.

Propylene glycol:

Propylene glycol (MPG) can be used instead of monoethylene glycol (MED) in applications that require greater safety, such as food applications.

Propylene glycol must have a chemical formula approved for processing and to be in direct contact with food products. This can be checked with the supplier of the anti-freeze solution.

Freezing temperature (± 2°C)		
Concentration (%)	MEG	MPG
0	0	0
10	-4	-3
20	-9	-7
30	-16	-13
40	-23	-22
50	-37	-33
60	-53	-51

Percentage MPG	Solution density kg/l	Percentage MEG	Solution density kg/l
10%	110	-	-
15%	114	-	-
20%	119	-	-
25%	124	25%	137
30%	129	30%	143
35%	134	35%	151
40%	138	40%	159
45%	141	45%	164
50%	-	50%	172

TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
The unit does not start	Not connected to the mains.	Check the connection of the power supply source.
	Main switch open.	Close the main switch.
	Contactors jammed in the open position.	Check and, if needed, replace.
	The PCB is not connected to the power supply source.	Check the thermal-magnetic switches and the connections.
	Active alarm.	Check for the alarms shown on the control screen, eliminate the cause for the alarm and access the unit again.
	Leak detection	Technical Service intervention required
	Incorrect phase sequence.	Reverse the two phases in the primary power supply after disconnecting the unit from the mains.
The unit is too noisy during operation	Noise in the compressor, which is rotating in the opposite direction.	Check the condition of the phase control relay. After de-energising the unit, reverse the phases on the terminal strip and contact the manufacturer.
	Noise in the compressor.	Excessive vibration due to loose brackets, excessively tight bolts or not enough oil. Check the brackets and bolts. Check the oil level. The compressor might need to be replaced.
	The compressor starts and stops.	High or low pressure trips. Check the refrigerant level. Anti-short cycle time is too short. Check the control setup. The evaporator may be dirty or clogged, or the air flow level may be too low. Keep the coils clean. Inspect the fans. Clogged/blocked expansion valve or filter. Check the components and replace them if needed.
	Noise and vibrations in the unit.	Check the brackets and floor surface on which the unit is installed. If the floor is sloping or wavy, the unit may vibrate abnormally. Check the anti-vibration mounts.
Abnormally high pressure value	The flow of air passing through the condenser is too low.	Check that the condenser coil and its conduits are not clogged.
		Check the condenser surface. Check that the coil is clean and not clogged.
		Check the condensing pressure regulation system, if installed.
	Presence of bubbles through the liquid sight glass.	Check the level of subcooling in the circuit. Please contact the Technical Service if it is below 5°C.
	Presence of air in the circuit, detected by the presence of bubbles through the sight glass, even with subcooling values above 5°C.	The circuit must be drained and pressurised, checking for the presence of leaks. Vacuum and then fill in liquid state.
	Subcooling value above 8K, probably due to the fact that the unit has been charged with excess refrigerant.	Reduce the refrigerant charge in the circuit.
	HP pressure switch activated.	Outdoor temperature is excessively high. The outer fan is blocked or not working; check the outer fan. The outdoor coil is dirty. Keep the coils clean.
	Abnormal pressure drop.	The expansion valve or dehydrator filter are dirty or clogged. Check the temperature drop in each component. The component must be replaced if the temperature drop is excessively high.

Excessively low condensation pressure	The pressure transducers are not working properly.	Calibrate the pressure transducers and the condensing pressure regulation system, if installed.
	The expansion valve is not working properly.	In the case of thermostatic pressure valves, check that the valve opens by heating the bulb manually and adjust it if needed. If it does not open, replace it. If it is electronic type, contact the Technical Service.
	The dehydrator filter is clogged.	Check the temperature or pressure drop in the filter. The recommended value is 2K. If the drop is greater, replace it.
	Low subcooling level.	Low refrigerant charge. If it is greater than 2K, charge the unit with refrigerant.
	Internal thermal compressor, Klixon activated.	Stop the unit and restart it. Check the temperature at the unit's suction and discharge taps. Check the condition of the thermal Klixon.
	Overheating level too low: adjust the overheating settings.	Check the thermostatic bulb of the expansion valve. Check whether it is necessary to insulate the bulb or expansion valve and check the position of the bulb, according to the recommendations of the expansion valve.
The compressor does not start	Check the contactor and thermal-magnetic circuit breakers.	Check whether the circuit breakers are off. The cause might be thermal overload or short circuits. If the problem persists, measure the resistance in each winding and the insulation around the motor before energising the unit again. Possible deterioration of the insulation elements may be causing the short circuit and faulty operation of the compressor.
	The motor is making intermittent running noises	Low power supply voltage or the main power supply cable is not connected properly. Check the line supply voltage and the voltage drop across the line. Check the electrical connections.
	Low or high pressure alarm in the compressor.	Check the HP (high-pressure) or LP (low-pressure) alarm on the control screen. Check the causes for showing the default HP or LP values.
	Phase reversal of the power supply.	A phase reversal of the power supply will trip the phase control relay, which will prevent the compressor from starting. Check the condition of the phase control relay
Low oil level in the compressor	Oil or refrigerant leaks in the circuit.	Check for leaks and repair them
	Mechanical fault of the compressor.	Please contact the Technical Service
	Compressor sump heater anomaly.	Check the electrical circuit and the sump oil heater, and if faulty, replace it.
Excessively hot fluid line	Insufficient charge.	Identify and eliminate the cause for the pressure drop and charge with refrigerant.
Frozen fluid line	The fluid line valve is partially closed.	Check that the service valves are open
	The dehydrator filter is clogged.	Replace the filter or filtering cartridge
Frozen suction lines	Incorrectly calibrated re-heating system.	Increase the re-heating system values.
		Check the refrigerant charge in the unit
Tripped safety valve	Malfunctioning previous safety devices	In any case, contact Keyter's Technical Service to find the root cause of the problem
	Calibration and/or incorrect valve operation	



RECOMMENDATIONS WHEN DISASSEMBLING THE UNIT

When the unit has reached the end of its service life and needs to be removed from service, please keep in mind that the unit contains flammable R290 refrigerant. When units are transported without the original packaging, the refrigerant circuit may be damaged and refrigerant may be released. A flammable atmosphere may form when mixed with air. There is a risk of fire and explosion.

Make sure that the refrigerant is drained before transporting the unit.

Procedure:

- Disconnect all circuit breakers of the unit connected inside the building.
- Disconnect the unit from the mains and make sure that it remains connected to the earthing connection.
- Drain any hot water found inside the unit.
- Drain the refrigerant from the unit.
- Keep in mind that the refrigerant will continue to be leak after the refrigerant circuit has been fully drained, due to degassing of the compressor oil.
- Flush with nitrogen to prevent any refrigerant residue from remaining in the circuit.
- Signpost the unit with a visible label on the outside. Note down on the label that the unit has been dismantled and that the refrigerant has been fully drained. Sign the label and note down the date.
- Recycle the refrigerant in compliance with the current regulations. Keep in mind that the refrigerant must be flushed and inspected before it is used again.
- Dispose of or recycle the unit and its components in compliance with the regulations.

Reviewing the regulations associated with recycling units in the country in which the unit is installed is recommended. Components that must be recycled or removed by a waste manager must be identified and classified as such. As many materials as possible should be recycled.



END OF THE UNIT'S SERVICE LIFE

At the end of the unit's service life, all electronic and electrical waste must be managed in compliance with the WEEE regulation (Waste Electrical and Electronic Equipment), European Directive 2012/19/EU. Such waste must be removed and recycled by authorised waste managers, according to the type of waste.

Please make sure that hazardous and non-hazardous waste is disposed of correctly at the end of the unit's service life, with the purpose of preventing any form of negative impact to the environment due to the presence of contaminating substances.



Non-hazardous waste: Finished metal parts, copper piping, coils, exchangers, fans, water pumps, etc.

- Steel plates. Found on the unit's casing, panels, pillars, covers, fans, etc.
- Copper: Found on the tube and fin heat exchangers, refrigerant circuit pipes, control components, electrical components and fan motors, compressors and doors on actuators.
- Aluminium: Found on the fins of the tube and fin exchangers, or on the body of the micro-channel exchangers, on the casing panels and on the mixing, ventilation, return air and other gates.

Hazardous waste: Compressors, filters, refrigerant gas, valves, Waste Electrical & Electronic Equipment (WEEE), etc. The latter must be managed by an authorised manager.

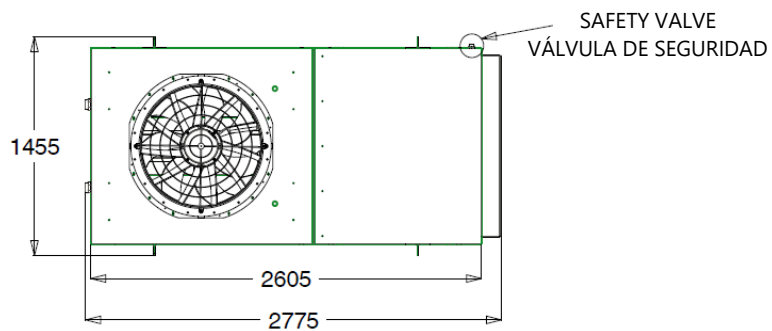
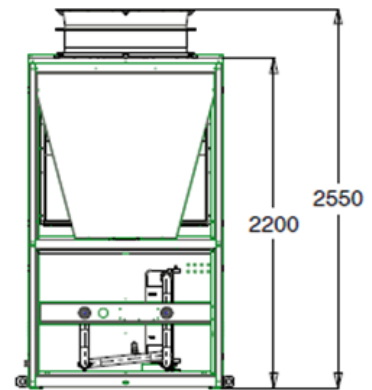
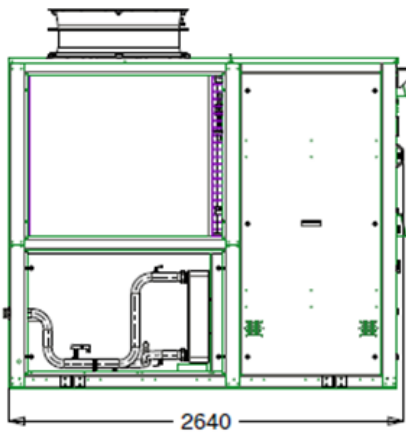
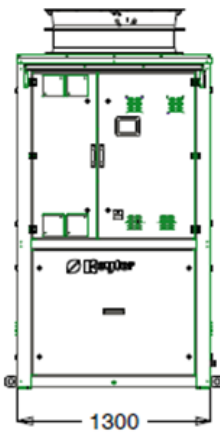
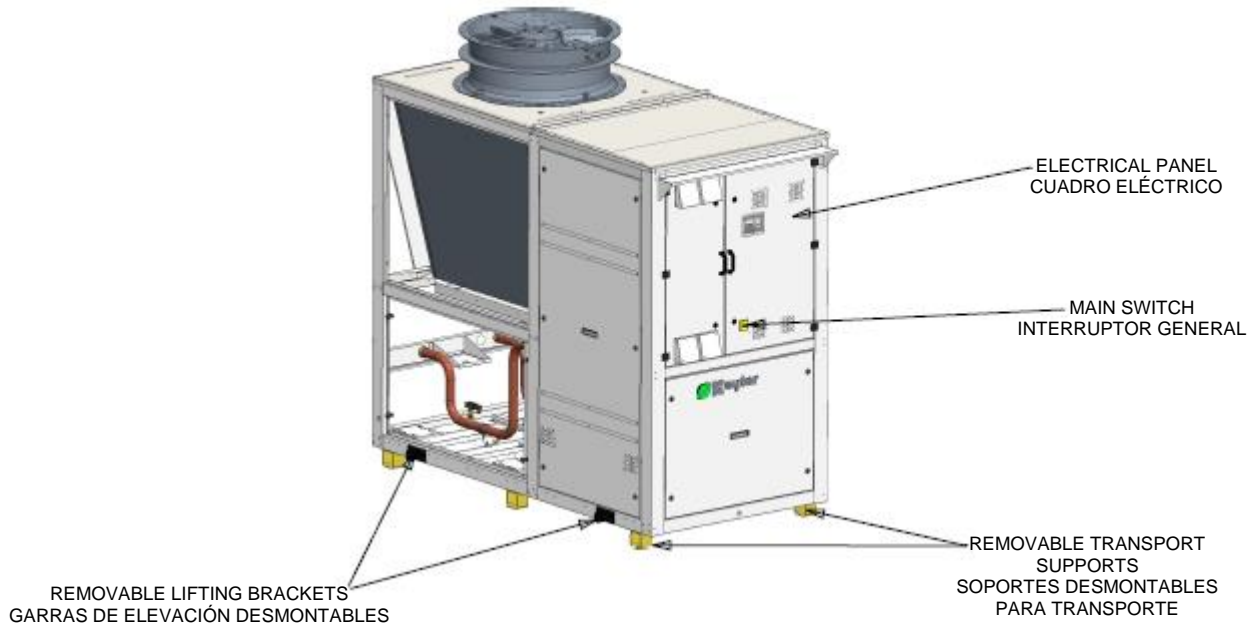
- Refrigerants. It must be recovered from the unit and the local regulations must be reviewed to check the type of treatment required, according to the type of product. Most refrigerants can be recycled.
- Thermal fluids, such as glycol water, whether monoethylene glycol or propylene glycol, must be disposed of and recycled by an authorised waste manager. Discharging them into the environment is strictly forbidden.
- Plastic and polymers: Found in ventilation elements, electrical components, support blocks, filters, etc. In addition, special attention must be paid to the insulation elements, since some may contain polymer foam, which must be treated separately from plastic.
- Lubricating oil. Compressors contain lubricating oils of an organic nature, which are also found in the pipes of the refrigerant circuits. They must be fully recovered and it is strictly forbidden to discharge them into the environment. They must be disposed of by an authorised waste manager.



DIMENSIONAL DRAWINGS

SERIES 1

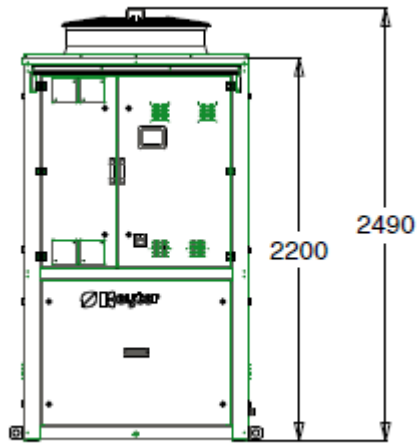
CHASSIS S/P/H



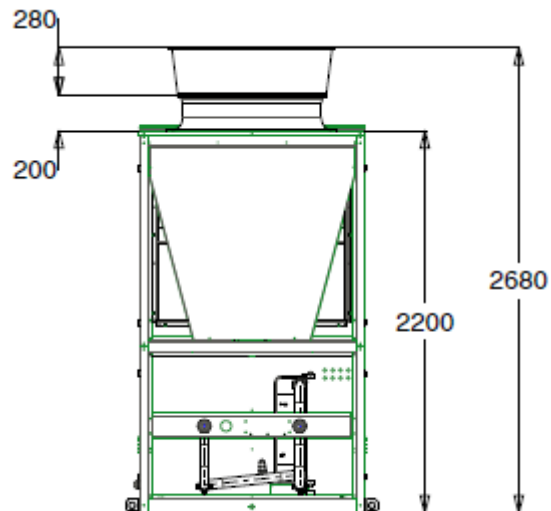


OPTIONS

SILENT RING
TOBERA EXTERIOR CURVA

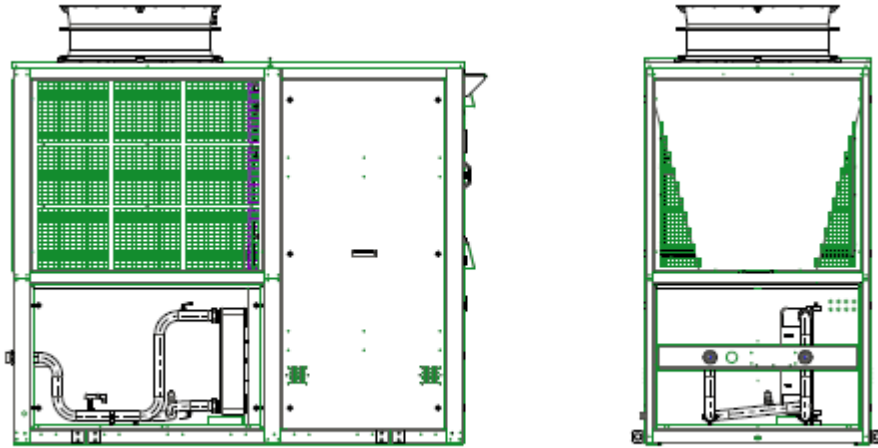


SILENT RING + AXITOP
TOBERA EXTERIOR CURVA + AXITOP

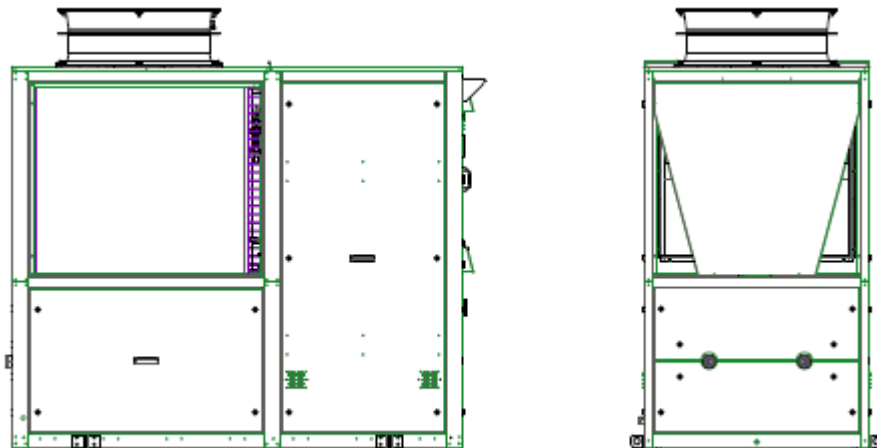




COIL PROTECTION GRID
REJILLAS DE PROTECCIÓN DE BATERÍA



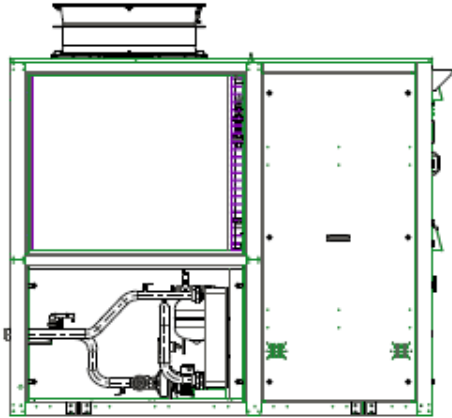
FULLY CLOSED SHEET COMPARTMENT
COMPARTIMENTO DE CHAPA COMPLETAMENTE CERRADO



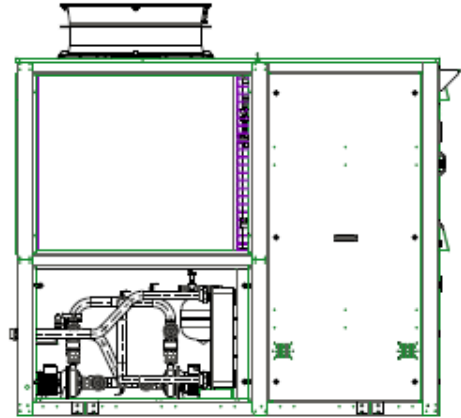


P HYDRAULIC VERSION
VERSIÓN HIDRÁULICA P

SINGLE PUMP
BOMBA SIMPLE

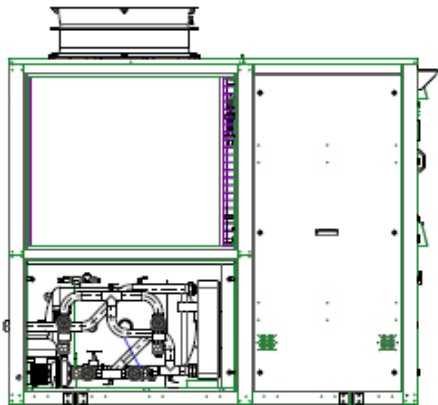


RESERVE PUMP
BOMBA DE RESERVA

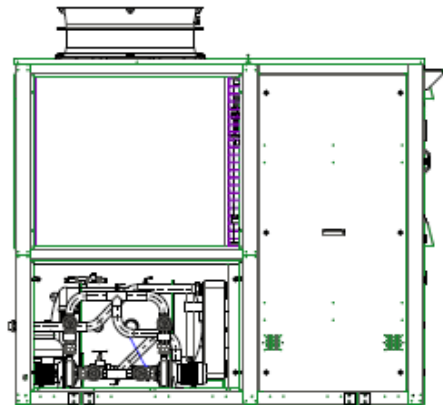


H HYDRAULIC VERSION
VERSIÓN HIDRÁULICA H

SINGLE PUMP
BOMBA SIMPLE

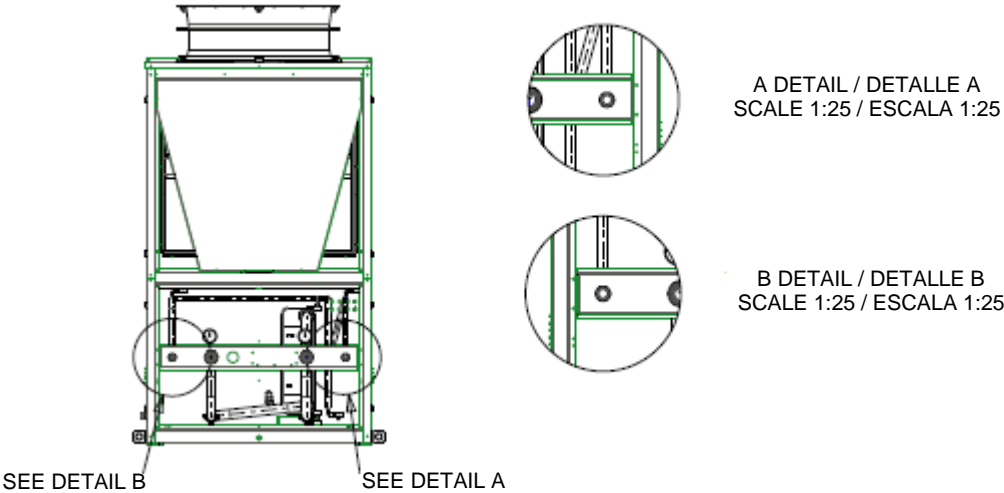


RESERVE PUMP
BOMBA DE RESERVA

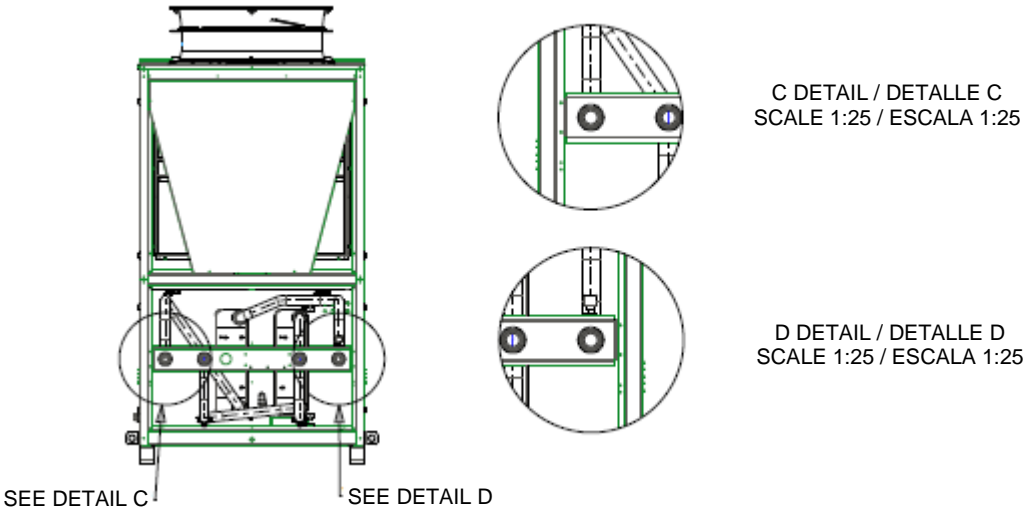




PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL

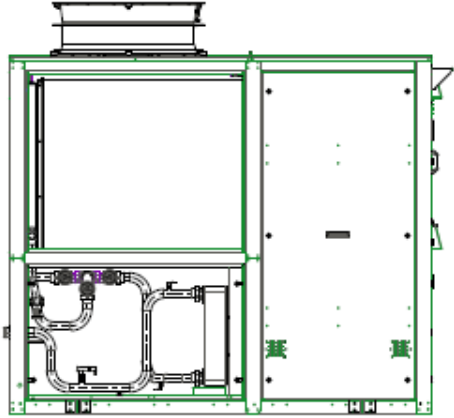


TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL

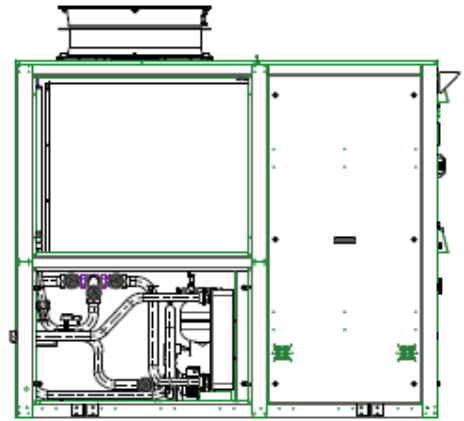




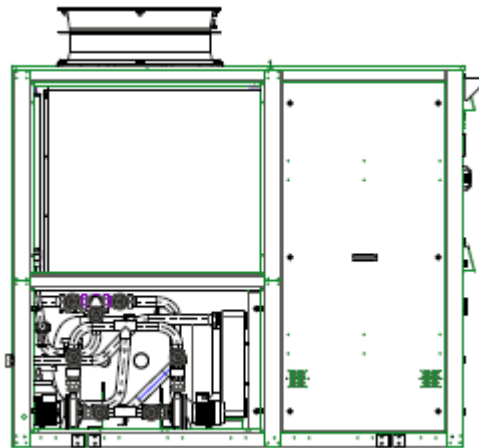
FREE-COOLING
S VERSION / VERSIÓN S



FREE-COOLING
P VERSION / VERSIÓN P



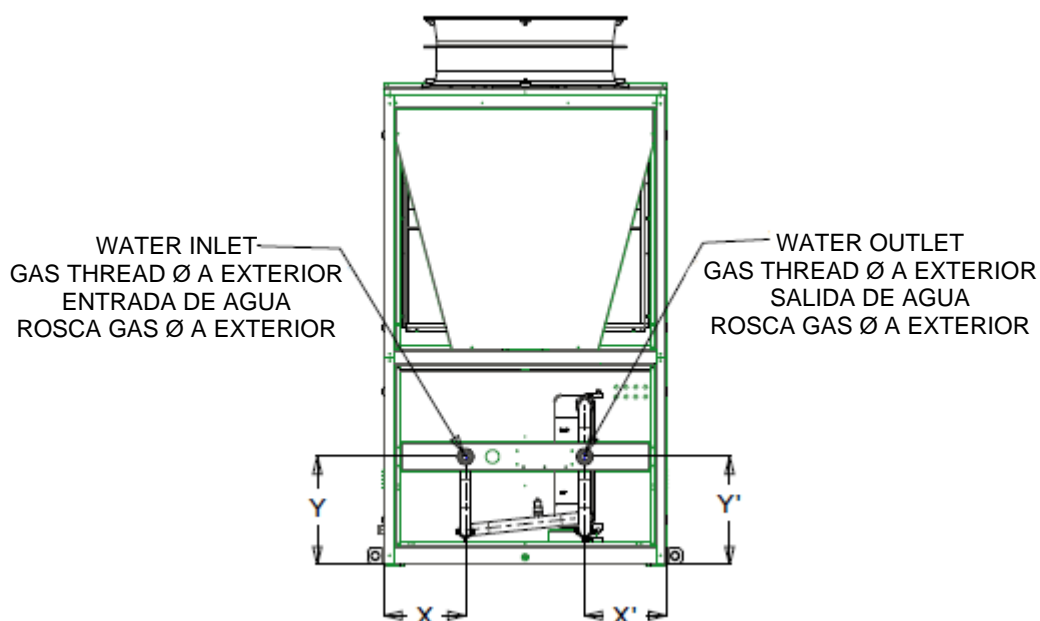
FREE-COOLING
H VERSION / VERSIÓN H





HYDRAULIC CONNECTION DETAILS

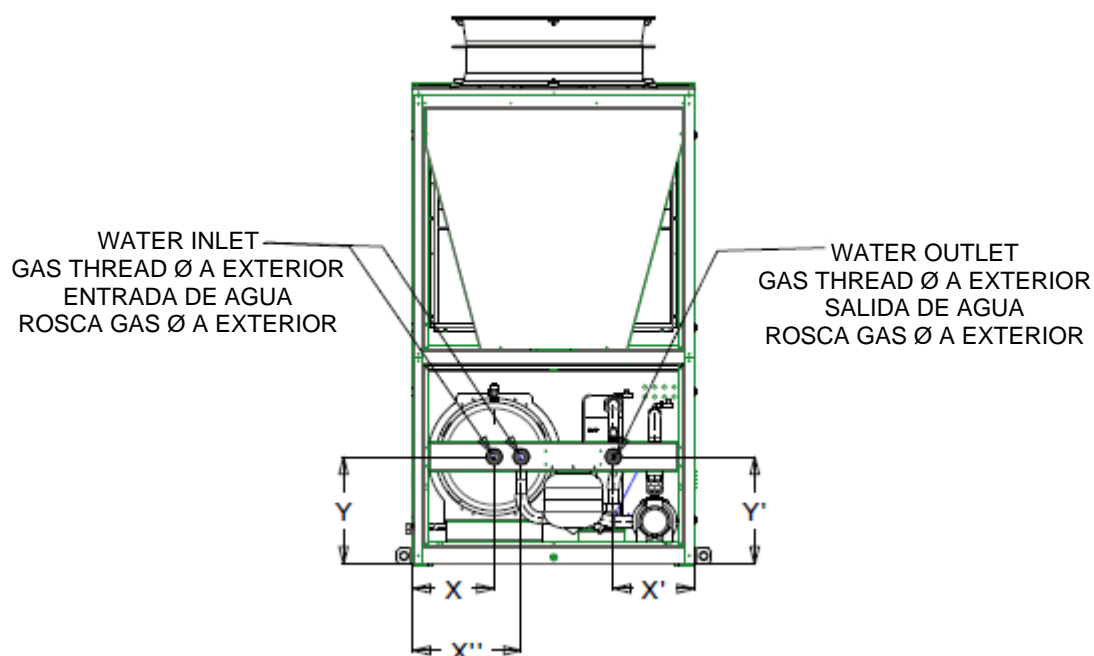
S/P VERSIONS / VERSIONES S/P



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	A
1030	375	375	495	495	1 1/2 "
1060					2"



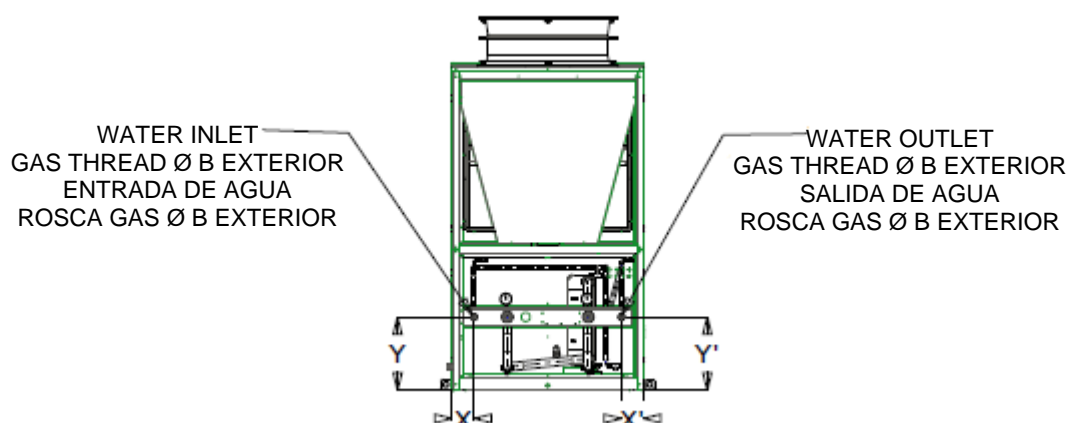
H VERSION / VERSIÓN H



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL						
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES					CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	X'' (mm)	Y (mm)	Y' (mm)	
1030	375	375	500	495	495	1 1/2 "
1060						2"

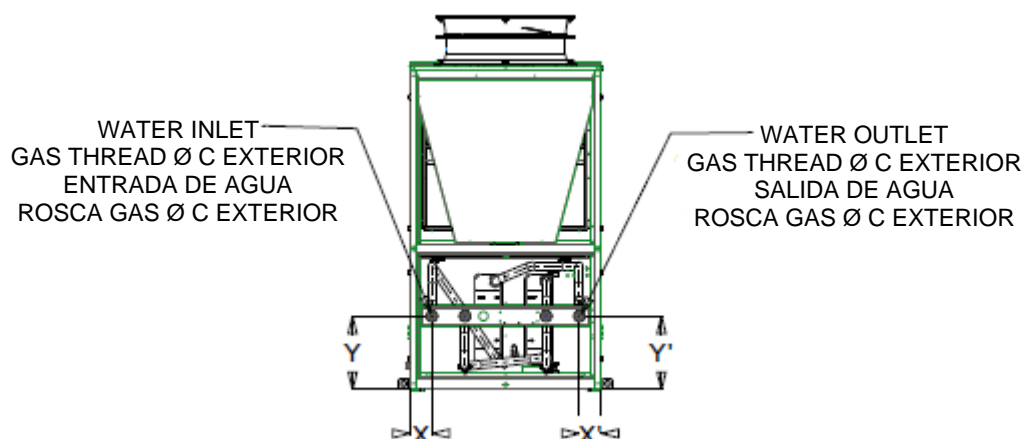


PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL



HYDRAULIC CONNECTIONS PARTIAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN PARCIAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	B
1030/1060	150	150	495	495	1"

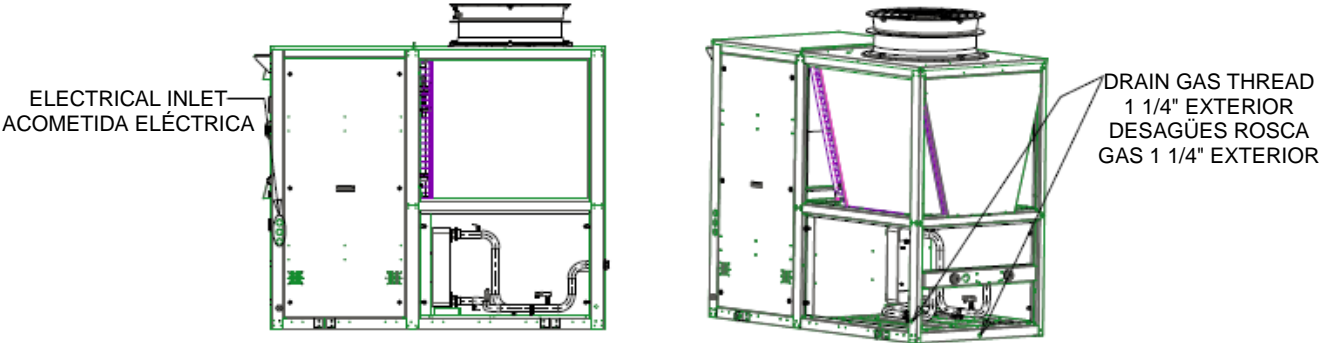
TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL



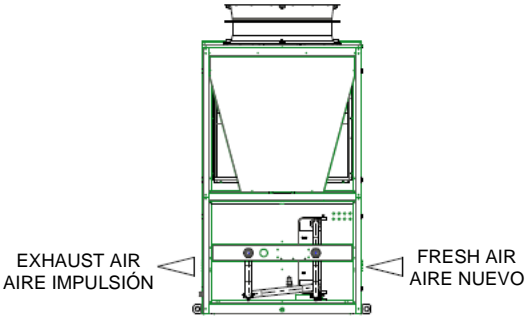
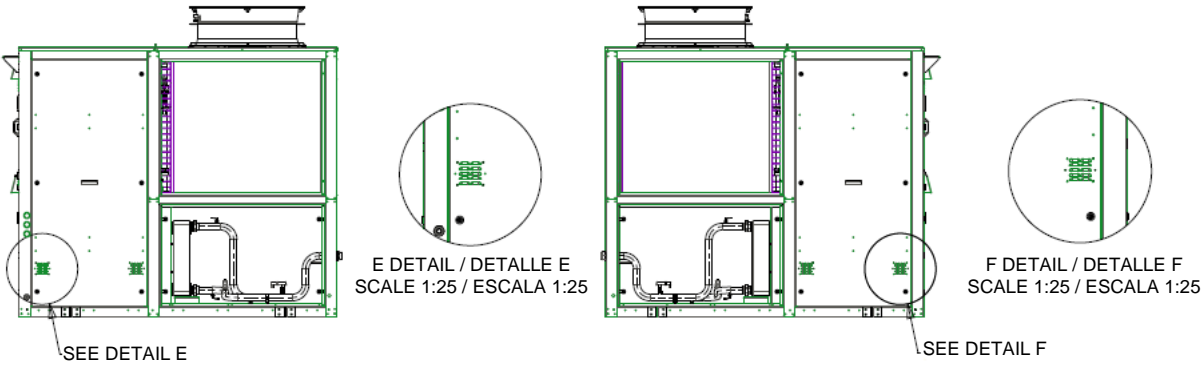
HYDRAULIC CONNECTIONS TOTAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN TOTAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	C
1030	150	150	495	495	1 1/2"
1060					2"



ELECTRICAL SYSTEM DETAILS AND DRAINS

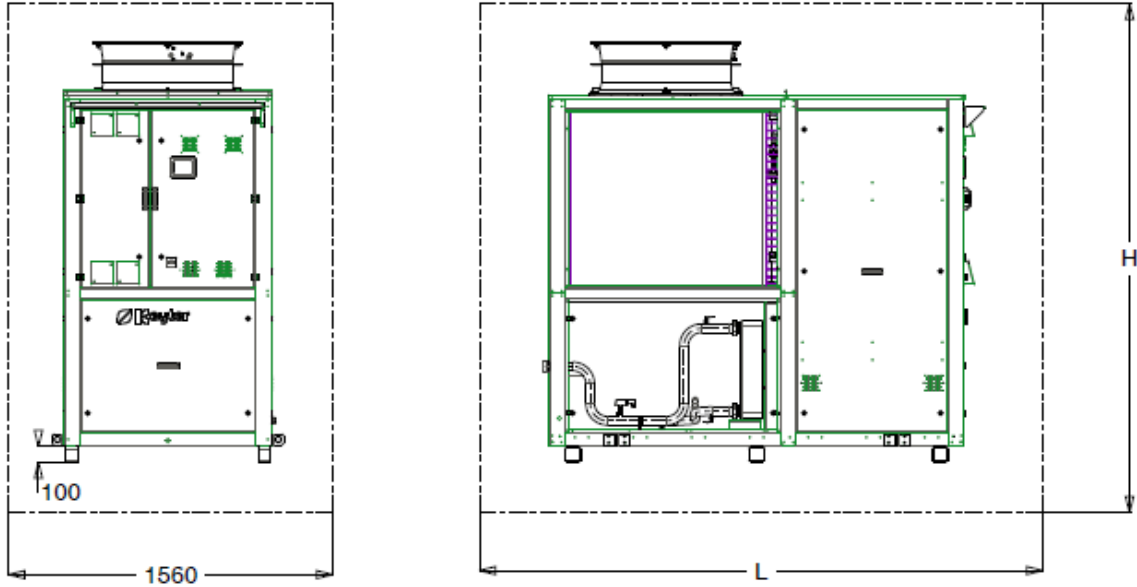


ATEX VENTILATION GRILLES





DIMENSIONS FOR TRANSPORT



OPTIONAL OPCIONAL	TRANSPORT HEIGHT ALTURA DE TRANSPORTE
	H (mm)
STANDARD/ESTÁNDAR*	2750
AXITOP**	2880

VERSION VERSIÓN	TRANSPORT LENGHT LONGITUD DE TRANSPORTE
	L (mm)
S/P/H VERSIONS / VERSIONES S/P/H	2740

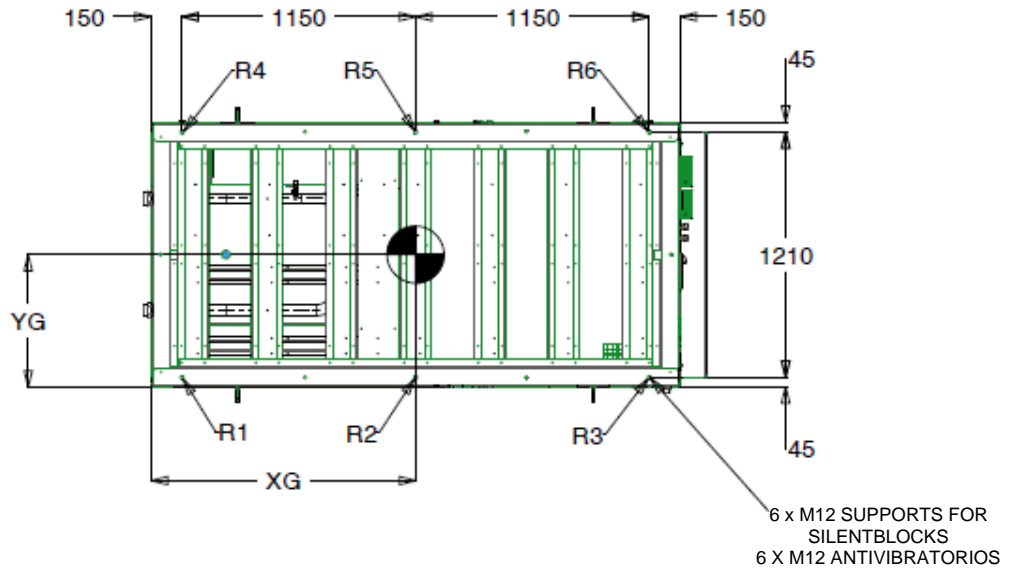
(*) Silent ring has the same height. / Tobera exterior curva tiene la misma altura.

(**) AxiTop is a removable part. / AxiTop es una pieza desmontable.



WEIGHT DISTRIBUTION

VERSION S

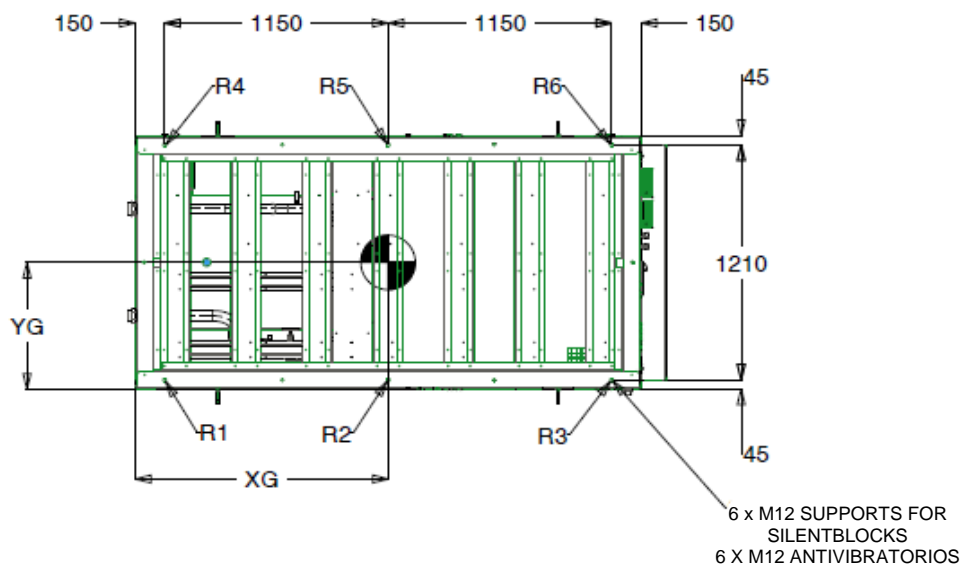


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
1030	1662.4	704.6	38.4	237.1	204.8	70.2	268.9	236.6	1056.0
1060	1660.2	712.1	38.9	248.5	213.8	77.1	286.7	252.0	1117.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
1030	1661.8	704.8	38.7	238.2	205.6	70.7	270.2	237.6	1061.0
1060	1659.3	712.2	39.3	250.0	214.9	77.8	288.6	253.4	1124.0



VERSION P

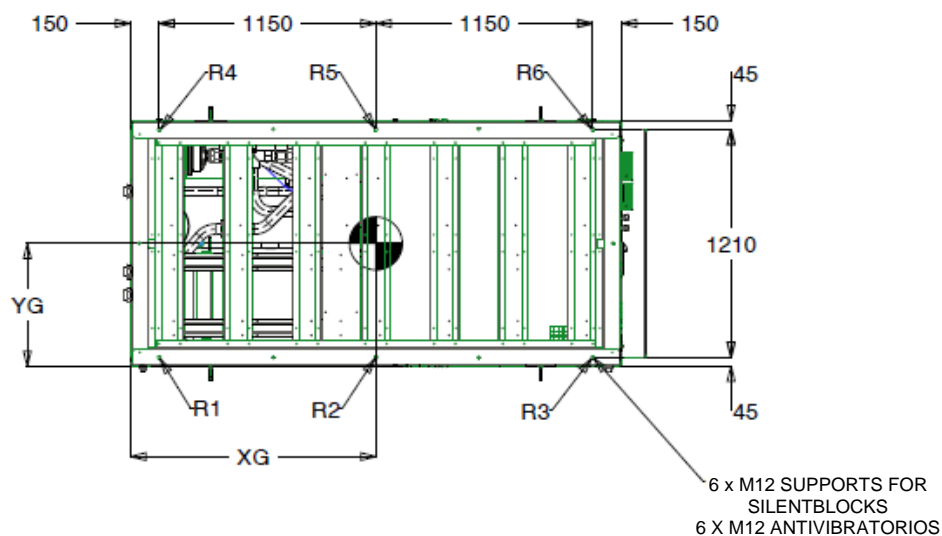


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
1030	1640.8	687.2	50.2	251.1	212.5	72.7	273.6	234.9	1095.0
1060	1639.3	694.9	51.0	262.9	221.7	79.6	291.5	250.3	1157.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
1030	1640.4	687.5	50.5	252.2	213.3	73.2	274.8	236.0	1100.0
1060	1638.5	695.1	51.4	264.4	222.8	80.4	293.3	251.7	1164.0



VERSION H

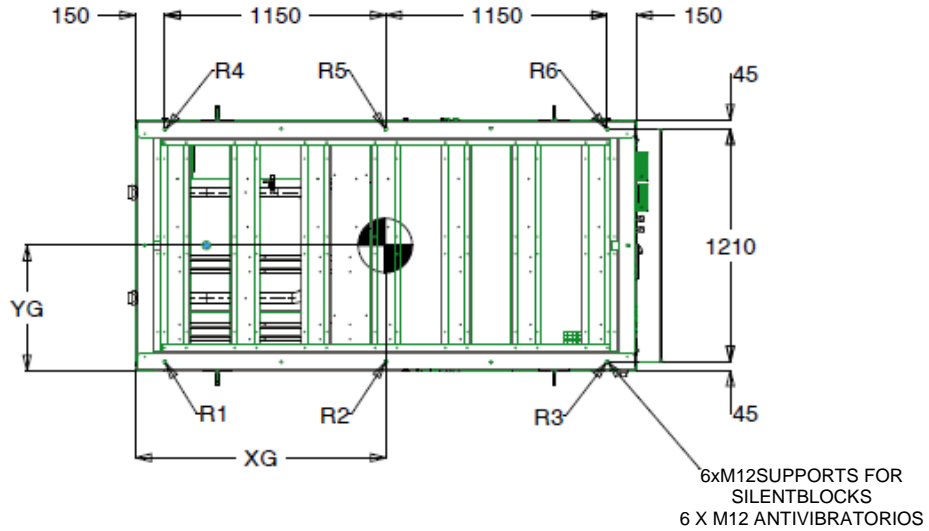


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
1030	1570.0	701.8	66.2	260.5	201.9	99.2	293.3	234.9	1156.0
1060	1572.6	708.8	66.8	272.3	211.2	106.2	311.8	250.7	1219.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
1030	1446.3	683.4	121.4	313.6	208.0	146.5	338.5	233.0	1361.0
1060	1453.8	661.4	133.4	336.9	228.7	142.4	345.9	237.7	1425.0



INCREASED WEIGHT DUE TO OPTIONAL ACCESSORIES INSTALLED

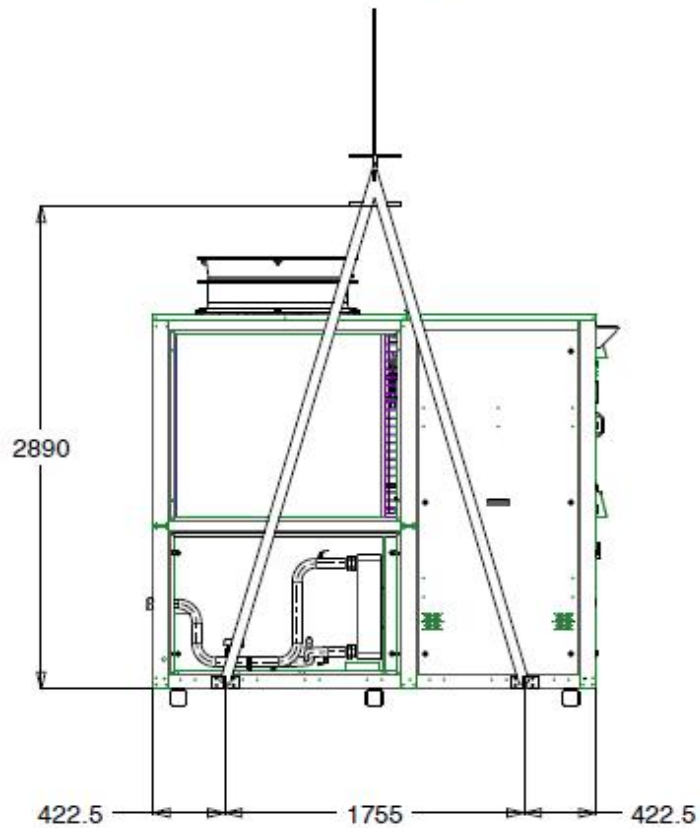


WEIGHT INCREASE BY OPTIONALS / INCREMENTO DE PESOS POR OPCIONALES							
OPTIONALS OPCIONALES	SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	R1	R2	R3	R4	R5	R6	TOTAL
AXITOP	+ 4.0	+3.7	+0.1	+3.8	+3.5	-0.1	+15.0
HIGH PRESSURE PUMP - 1030 MODEL BOMBA DE ALTA PRESIÓN - MODELO 1030	+ 0.6	+0.7	+0.4	+0.1	+0.3	-0.1	+2.0
VERY HIGH PRESSURE PUMP - 1030 MODEL BOMBA DE MUY ALTA PRESIÓN - MODELO 1030	+ 1.8	+2.2	+1.1	+0.3	+0.8	-0.2	+6.0
HIGH PRESSURE PUMP - 1060 MODEL BOMBA DE ALTA PRESIÓN - MODELO 1060	+ 0.9	+1.0	+0.6	+0.3	+0.3	-0.1	+3.0
VERY HIGH PRESSURE PUMP - 1060 MODEL BOMBA DE MUY ALTA PRESIÓN - MODELO 1060	+1.8	+2.1	+1.2	+0.4	+0.7	-0.2	+6.0
RESERVE PUMP - P VERSION - 1030 MODEL BOMBA DE RESERVA - VERSIÓN P - MODELO 1030	+ 14.7	+ 13.0	+ 3.4	+ 5.9	+4.3	-5.3	+ 36.0
RESERVE PUMP - H VERSION - 1030 MODEL BOMBA DE RESERVA - VERSIÓN H - MODELO 1030	+ 3.1	+2.5	-0.7	+3.5	+2.8	-0.2	+11.0
RESERVE PUMP - P VERSION - 1060 MODEL BOMBA DE RESERVA - VERSIÓN P - MODELO 1060	+ 15.0	+13.4	+3.7	+6.0	+4.3	-5.4	+37.0
RESERVE PUMP - H VERSION - 1060 MODEL BOMBA DE RESERVA - VERSIÓN H - MODELO 1060	+3.3	+2.5	-1.0	+4.1	+3.3	-0.2	+12.0
PARTIAL HEAT RECOVERY RECUPERACIÓN PARCIAL	+1.2	+1.3	+0.0	+1.6	+1.6	+0.3	+6.0
TOTAL HEAT RECOVERY RECUPERACIÓN TOTAL	+9.3	+11.3	+3.9	+7.2	+9.3	+2.0	+43.0
FREE-COOLING	+ 37.3	+45.6	+12.0	+38.0	+46.3	+12.8	+192.0



LIFTING STRUCTURE

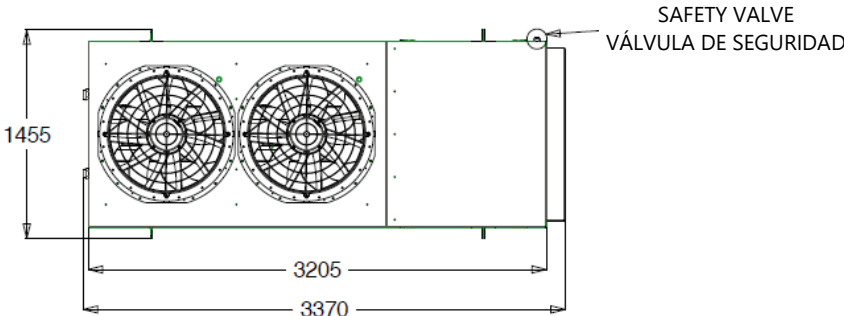
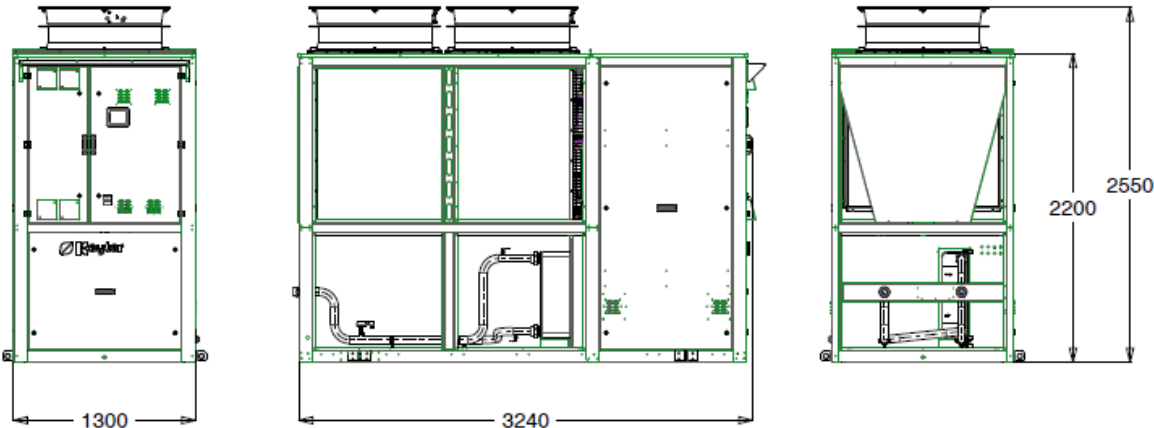
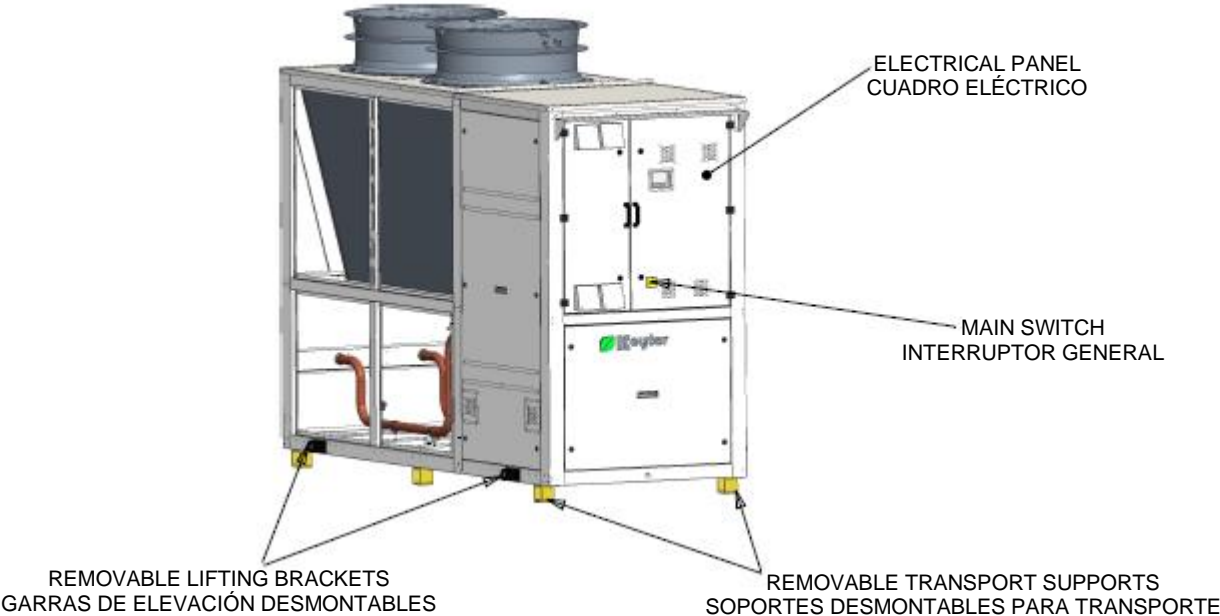
VERSIONS S/P/H





SERIES 2

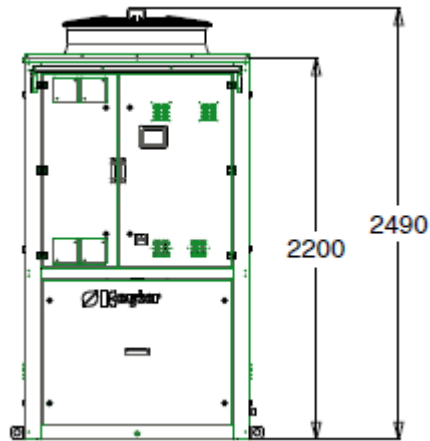
VERSIONS S/P/H



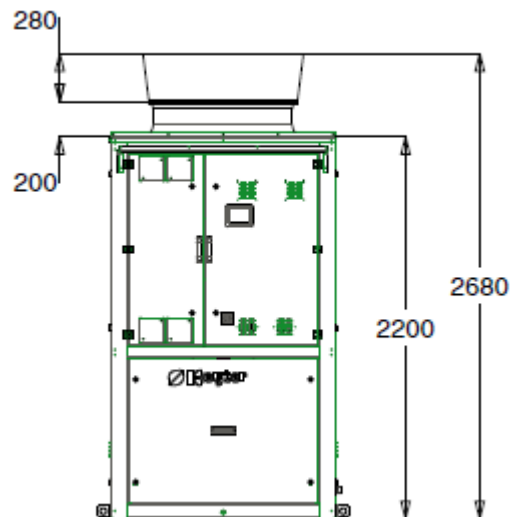


OPTIONS

SILENT RING
TOBERA EXTERIOR CURVA

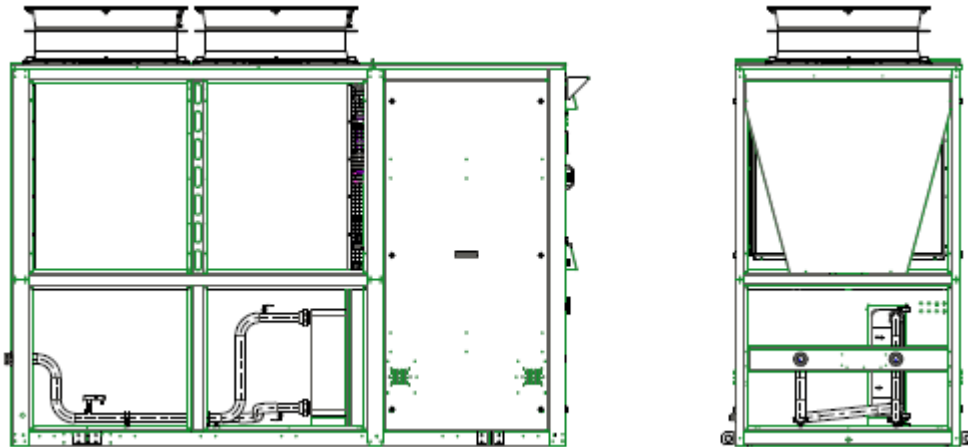


SILENT RING + AXITOP
TOBERA EXTERIOR CURVA + AXITOP

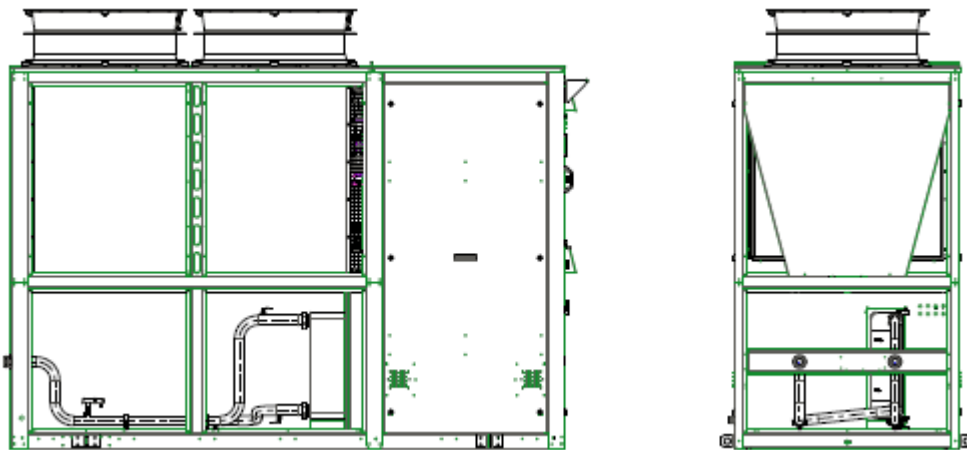




COIL PROTECTION GRID
REJILLAS DE PROTECCIÓN DE BATERÍA



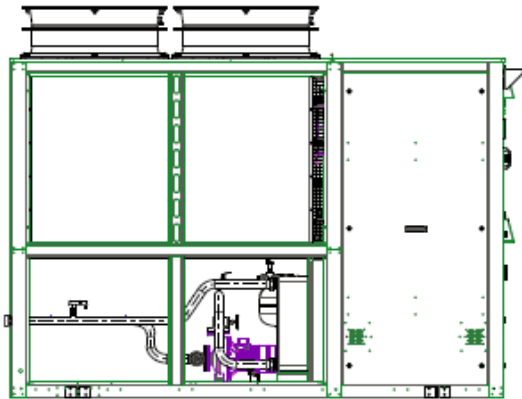
FULLY CLOSED SHEET COMPARTMENT
COMPARTIMENTO DE CHAPA COMPLETAMENTE CERRADO



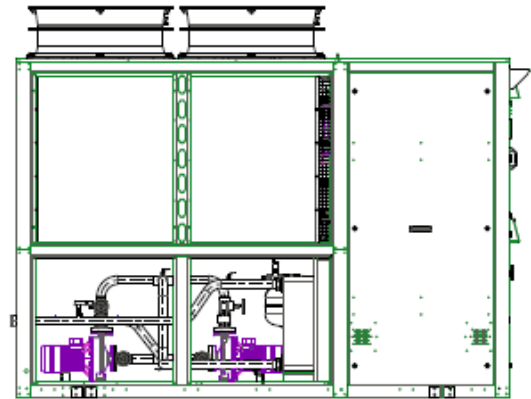


P HYDRAULIC VERSION
VERSIÓN HIDRÁULICA P

SINGLE PUMP
BOMBA SIMPLE

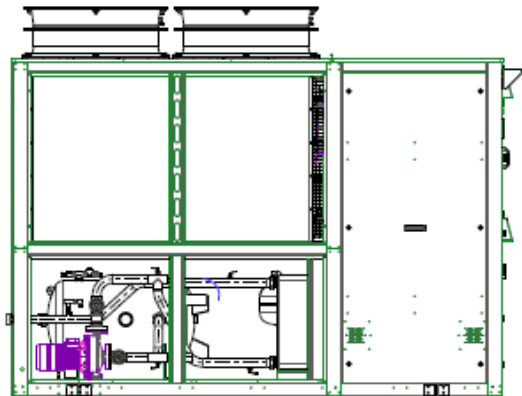


RESERVE PUMP
BOMBA DE RESERVA

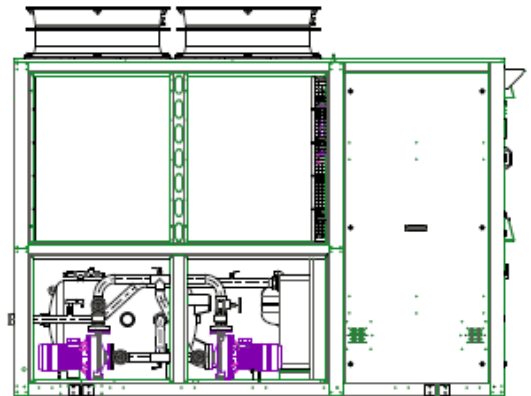


H HYDRAULIC VERSION
VERSIÓN HIDRÁULICA H

SINGLE PUMP
BOMBA SIMPLE

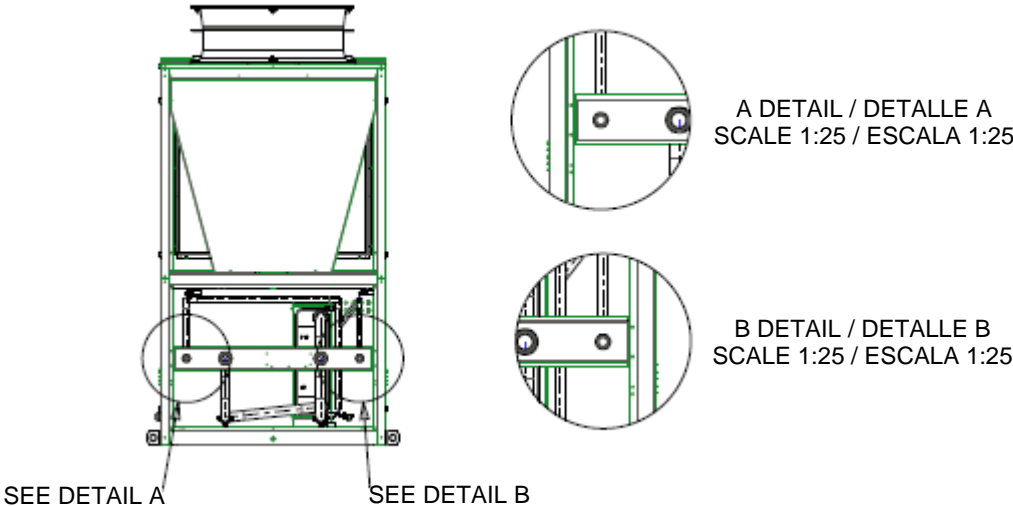


RESERVE PUMP
BOMBA DE RESERVA

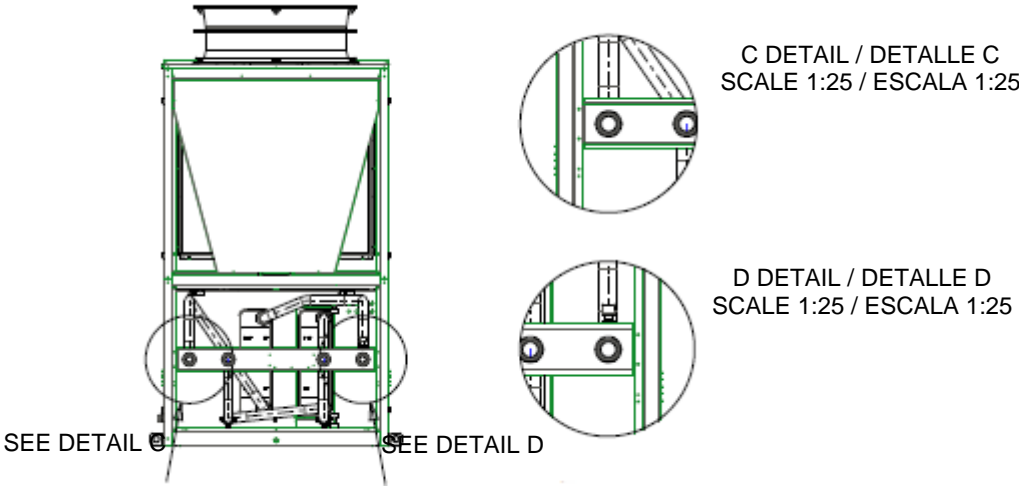




PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL

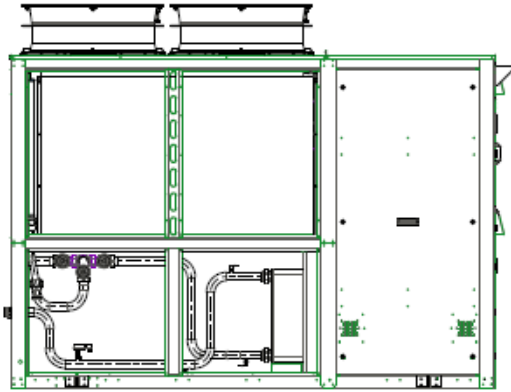


TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL

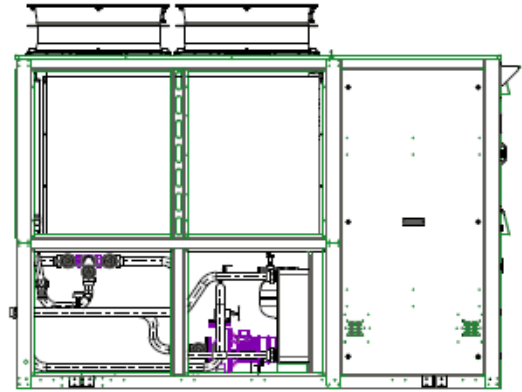




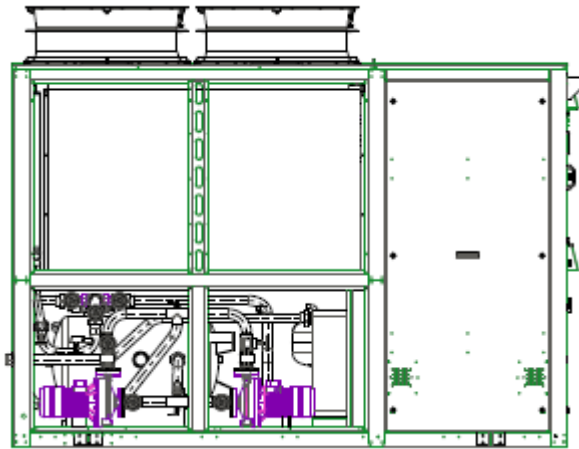
FREE-COOLING
S VERSION / VERSIÓN S



FREE-COOLING
P VERSION / VERSIÓN P



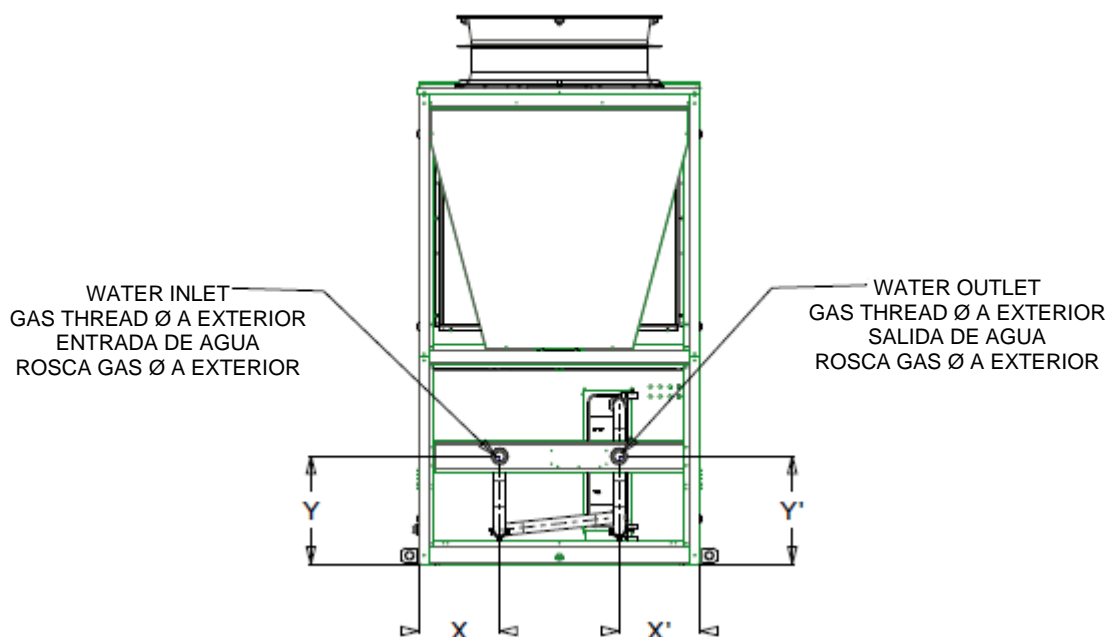
FREE-COOLING
H VERSION / VERSIÓN H





HYDRAULIC CONNECTION DETAILS

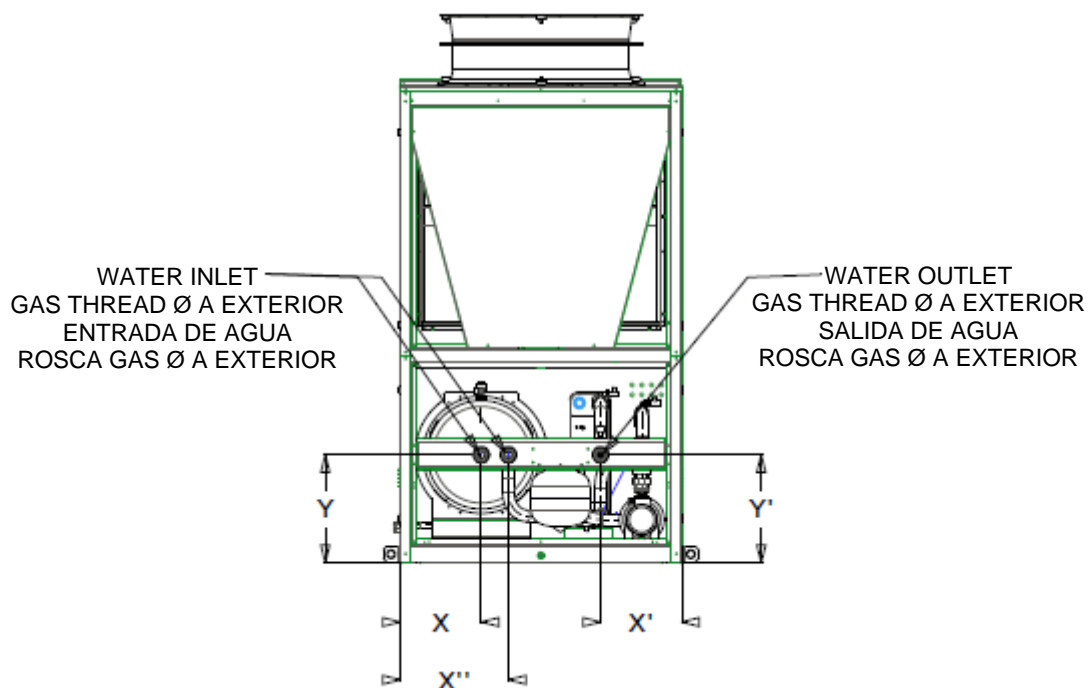
S/P VERSIONS / VERSIONES S/P



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	A
2070/2080/2100	375	375	495	495	2"



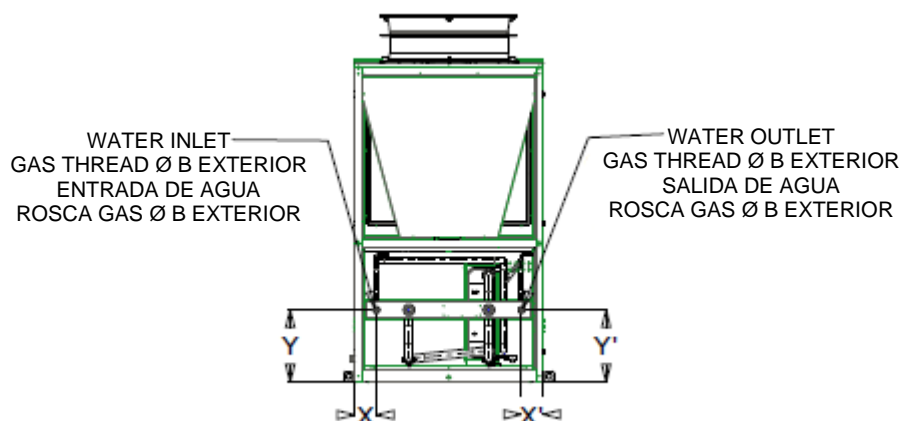
H VERSION / VERSIÓN H



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL						
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES					CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	X'' (mm)	Y (mm)	Y' (mm)	A
2070/2080/2100	375	375	500	495	495	2"

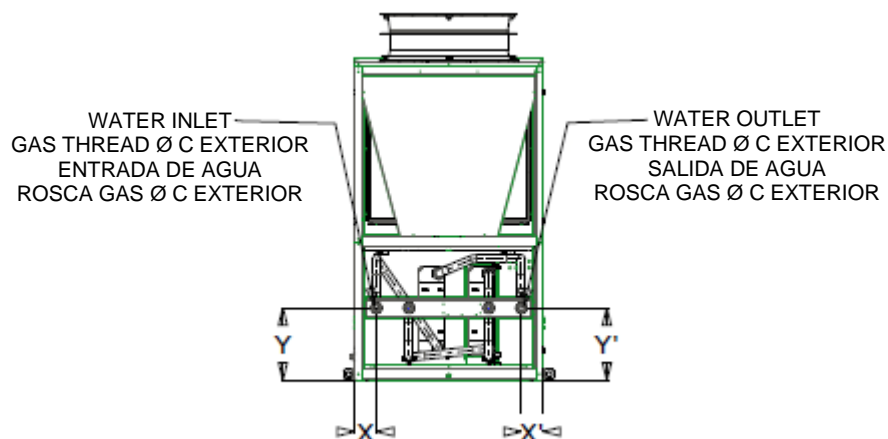


PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL



HYDRAULIC CONNECTIONS PARTIAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN PARCIAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	B
2070/2080/2100	150	150	495	495	1"

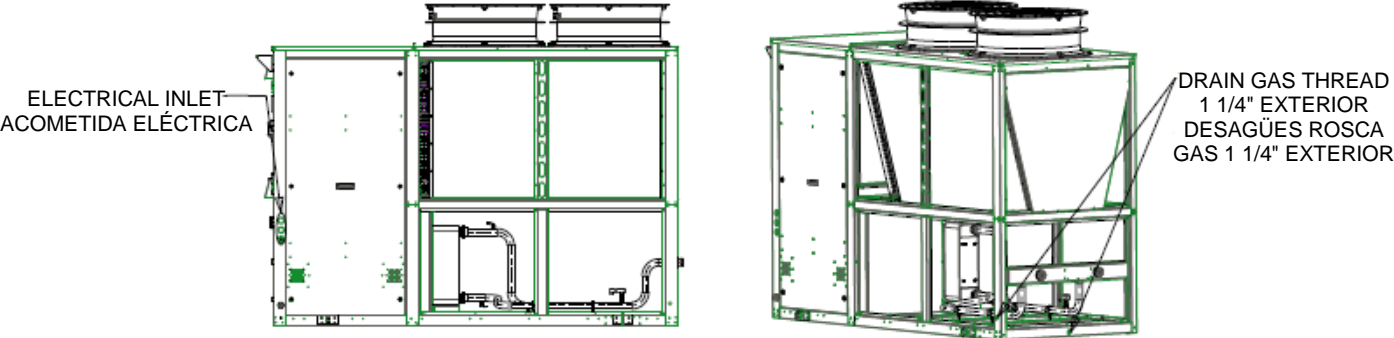
TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL



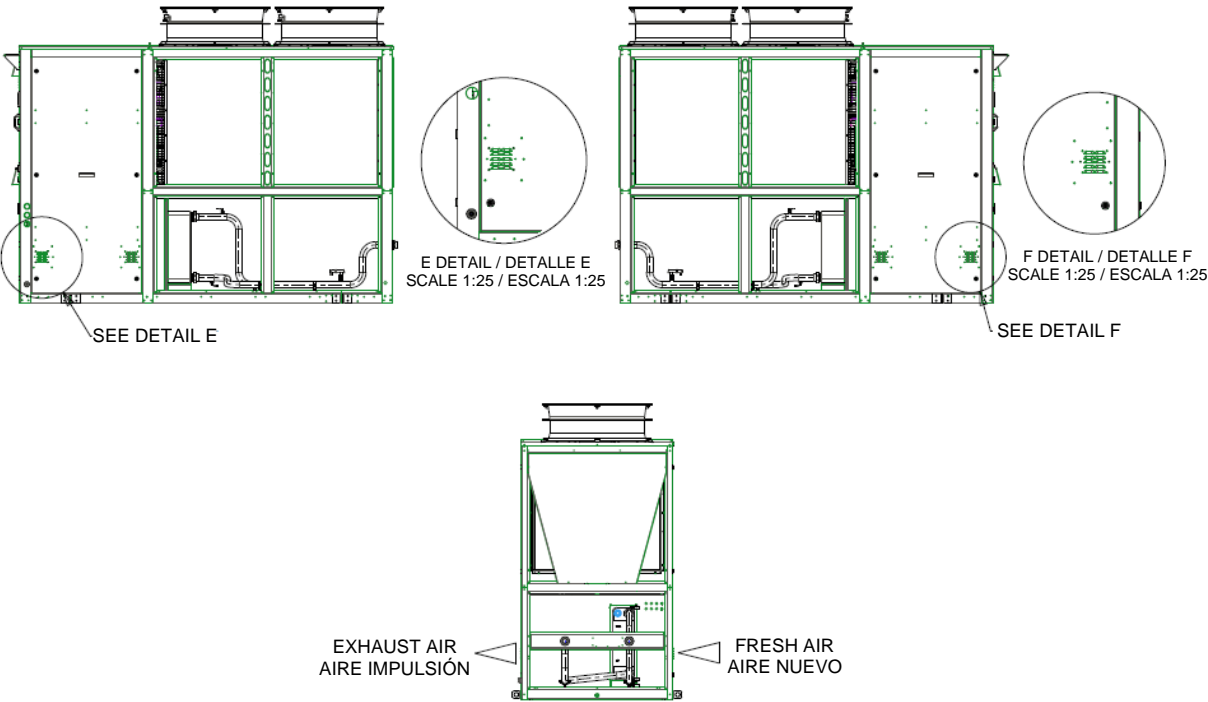
HYDRAULIC CONNECTIONS TOTAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN TOTAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	C
2070/2080/2100	150	150	495	495	2"



ELECTRICAL SYSTEM DETAILS AND DRAINS

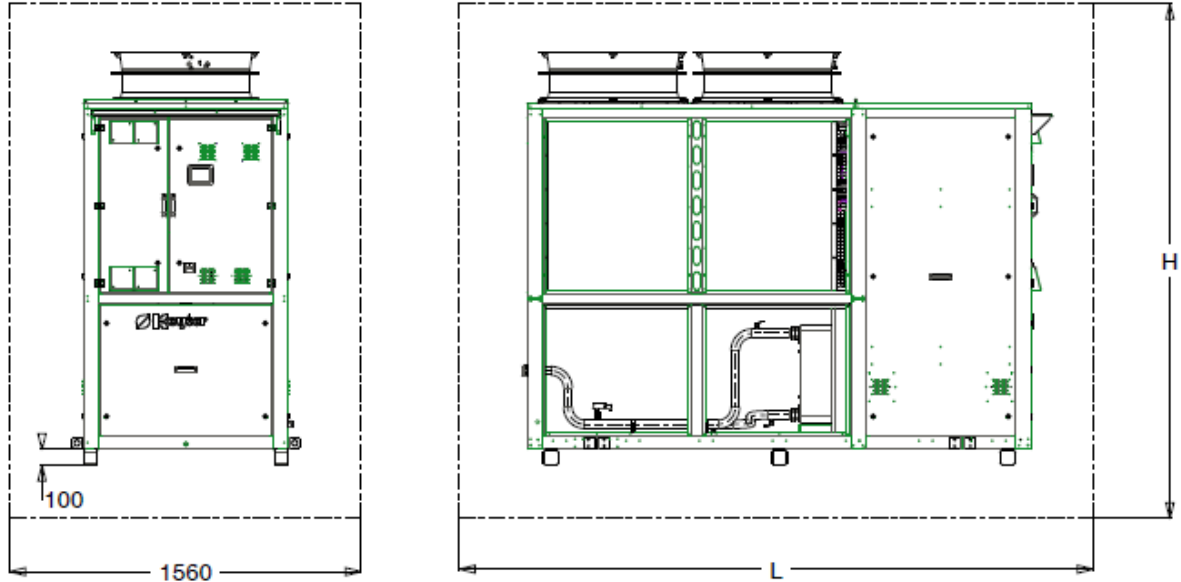


ATEX VENTILATION GRILLES





DIMENSIONS FOR TRANSPORT



OPTIONAL OPCIONAL	TRANSPORT HEIGHT ALTURA DE TRANSPORTE
	H (mm)
STANDARD/ESTÁNDAR	2750
AXITOP*	2880

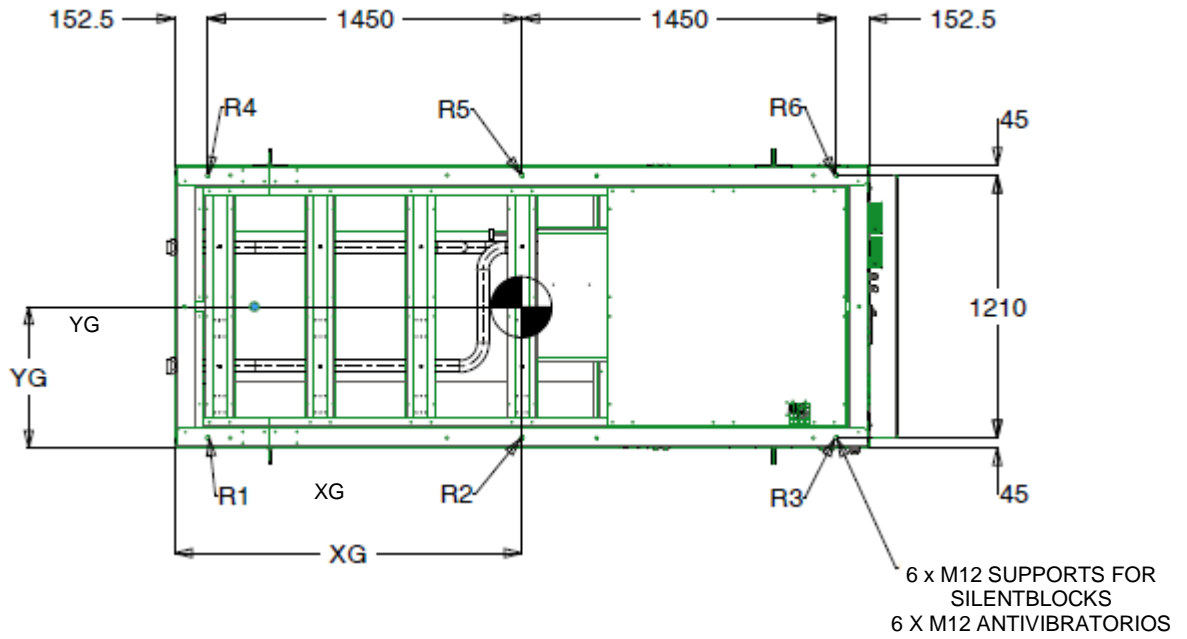
VERSION VERSIÓN	TRANSPORT LENGHT LONGITUD DE TRANSPORTE
	L (mm)
S/P/H VERSIONS / VERSIONES S/P/H	3340

(*) AxiTop is a removable part. / AxiTop es una pieza desmontable.



WEIGHT DISTRIBUTION

VERSION S

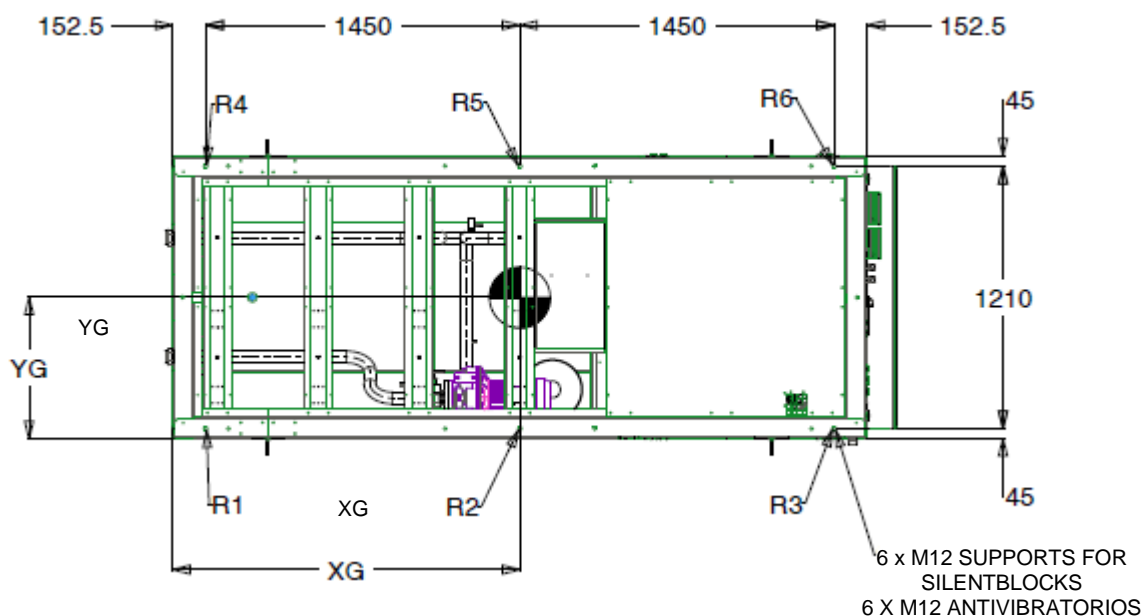


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
2070	1992.3	711.2	60.2	290.7	235.6	104.2	334.7	279.6	1305.0
2080	2006.3	700.4	62.8	303.6	250.1	100.2	340.9	287.4	1345.0
2100	2056.0	700.9	51.3	304.5	262.4	89.2	342.3	300.3	1350.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
2070	1988.6	711.3	61.4	292.6	236.4	105.8	337.0	280.8	1314.0
2080	2002.5	700.7	64.0	305.5	250.8	101.8	343.3	288.6	1354.0
2100	2051.6	701.0	52.7	306.7	263.3	90.9	344.9	301.5	1360.0



VERSION P

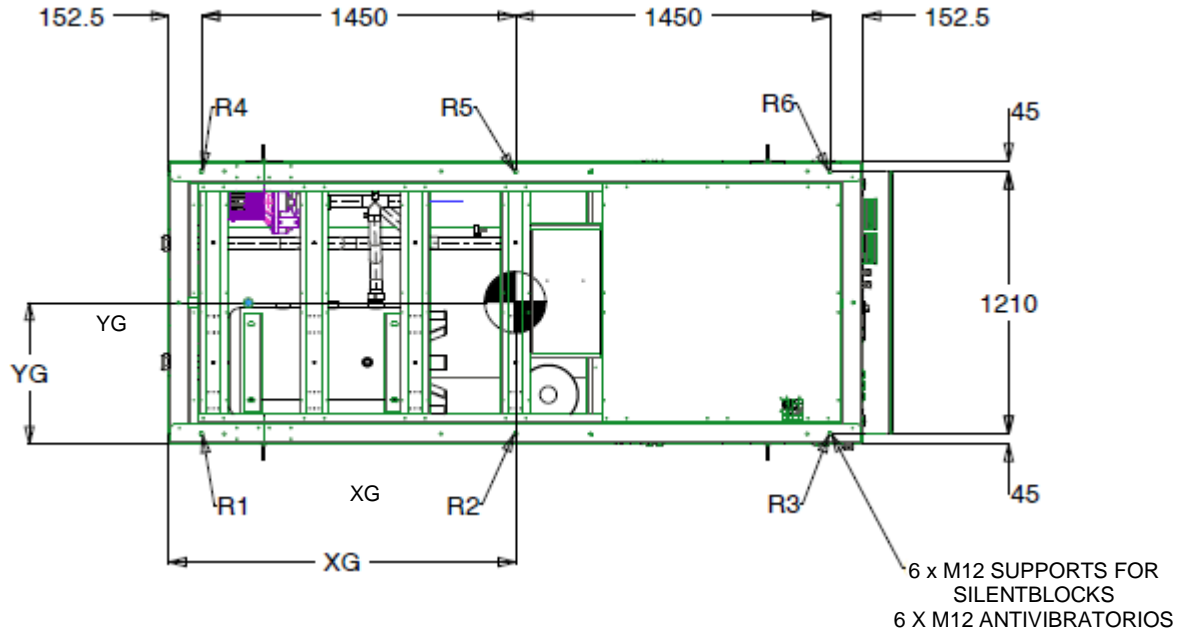


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
2070	1977.0	694.8	71.7	305.9	245.6	105.0	339.0	278.8	1346.0
2080	1991.0	684.7	74.3	318.6	259.9	100.8	345.1	286.3	1385.0
2100	2039.3	685.3	62.9	319.7	272.3	89.9	346.8	299.4	1391.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
2070	1973.4	695.0	73.0	307.8	246.3	106.6	341.4	279.9	1355.0
2080	1987.4	685.1	75.6	320.7	260.7	102.6	347.7	287.7	1395.0
2100	2035.1	685.5	64.2	322.0	273.2	91.6	349.4	300.6	1401.0



VERSION H

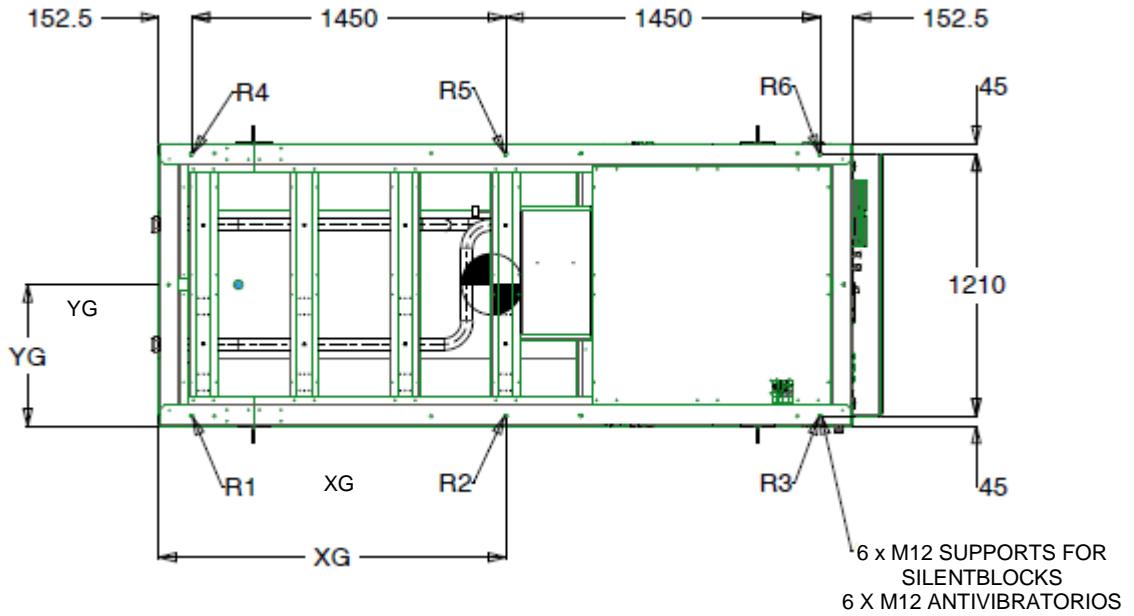


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
2070	1912.8	709.7	83.9	310.6	232.8	129.7	356.4	278.6	1392.0
2080	1928.2	699.6	86.5	323.5	247.3	125.6	362.7	286.4	1432.0
2100	1953.8	694.4	84.0	332.6	261.2	119.8	368.4	297.0	1463.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO									
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	TOTAL
2070	1755.5	667.3	158.6	375.9	243.1	173.9	391.2	258.3	1601.0
2080	1777.7	659.7	159.7	388.8	258.9	168.5	397.5	267.6	1641.0
2100	1701.1	629.2	219.7	453.1	282.5	198.5	431.9	261.3	1847.0



INCREASED WEIGHT DUE TO OPTIONAL ACCESSORIES INSTALLED

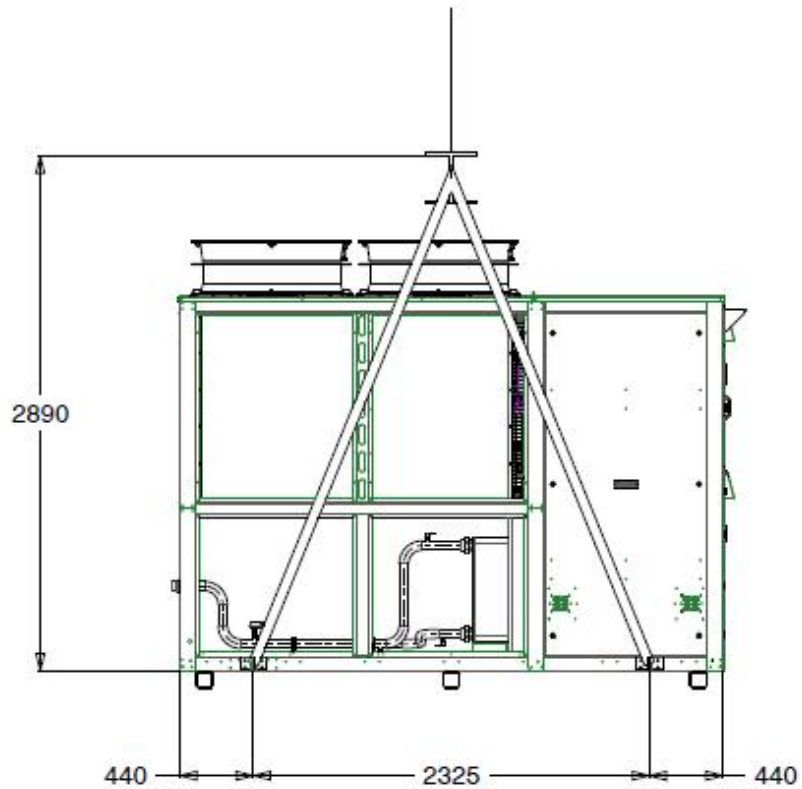


WEIGHT INCREASE BY OPTIONALS / INCREMENTO DE PESOS POR OPCIONALES							
OPTIONALS OPCIONALES	SUPPORTS (kg) REACCIONES (kg)						WEIGHT (kg) PESO (kg)
	R1	R2	R3	R4	R5	R6	
AXITOP	+ 7.9	+7.2	-0.1	+ 7.8	+ 7.3	-0.1	+30.0
HIGH PRESSURE PUMP BOMBA DE ALTA PRESIÓN	+ 0.8	+1.1	+0.8	+ 0.0	+ 0.3	+0.0	+3.0
VERY HIGH PRESSURE PUMP BOMBA DE MUY ALTA PRESIÓN	+ 8.4	+11.7	+8.1	+ 0.3	+ 3.6	-0.1	+ 32.0
RESERVE PUMP - P VERSION BOMBA DE RESERVA - VERSIÓN P	+ 17.2	+ 12.7	+ 0.5	+ 8.6	+ 4.1	-8.1	+ 35.0
RESERVE PUMP - H VERSION BOMBA DE RESERVA - VERSIÓN H	+ 1.0	+ 3.4	-1.0	+ 9.0	+ 11.6	+7.0	+31.0
PARTIAL HEAT RECOVERY RECUPERACIÓN PARCIAL	+0.2	+2.3	+0.9	+ 3.2	+ 5.5	+3.9	+16.0
TOTAL HEAT RECOVERY RECUPERACIÓN TOTAL	+9.7	+ 15.2	+7.9	+ 7.1	+ 12.8	+5.3	+58.0
FREE-COOLING	+ 49.4	+45.2	-0.9	+ 50.5	+46.5	+0.3	+191.0



LIFTING STRUCTURE

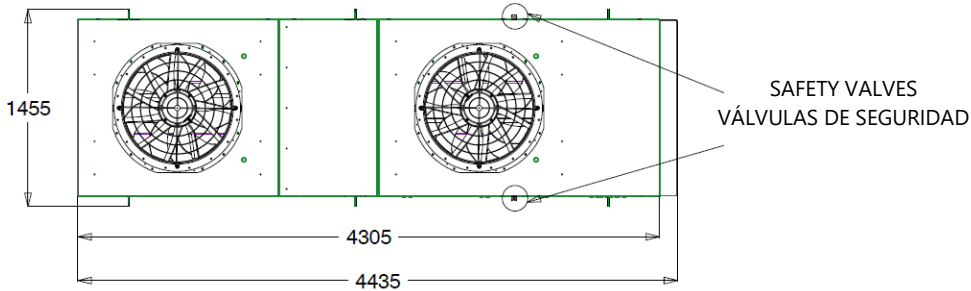
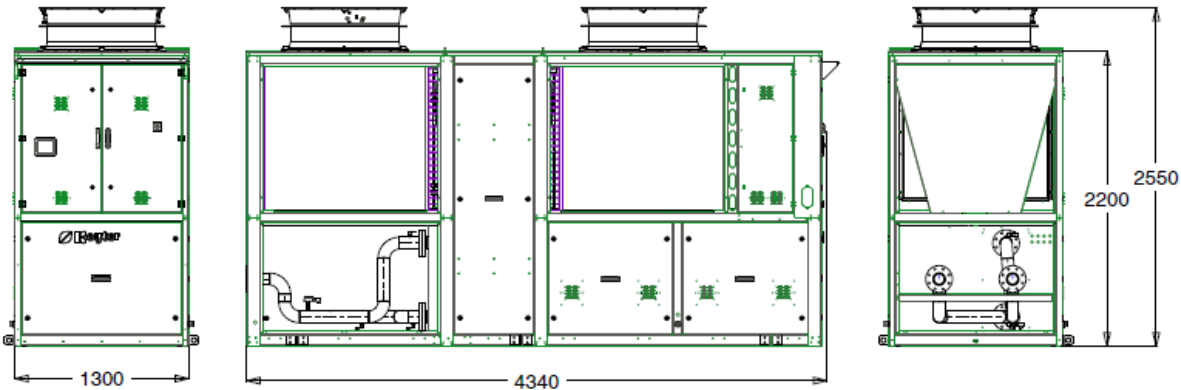
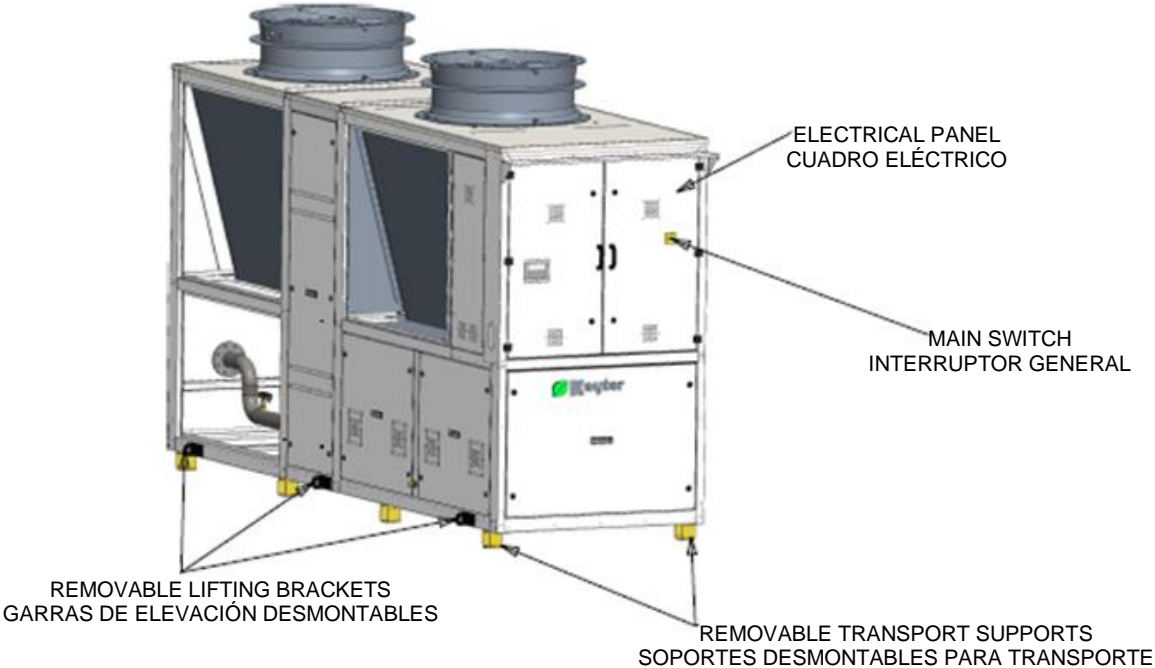
VERSIONS S/P/H





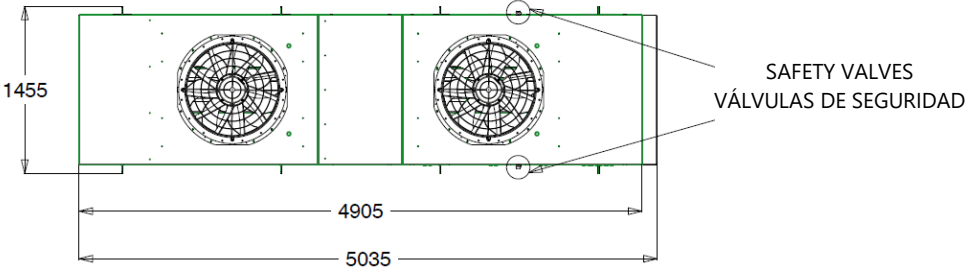
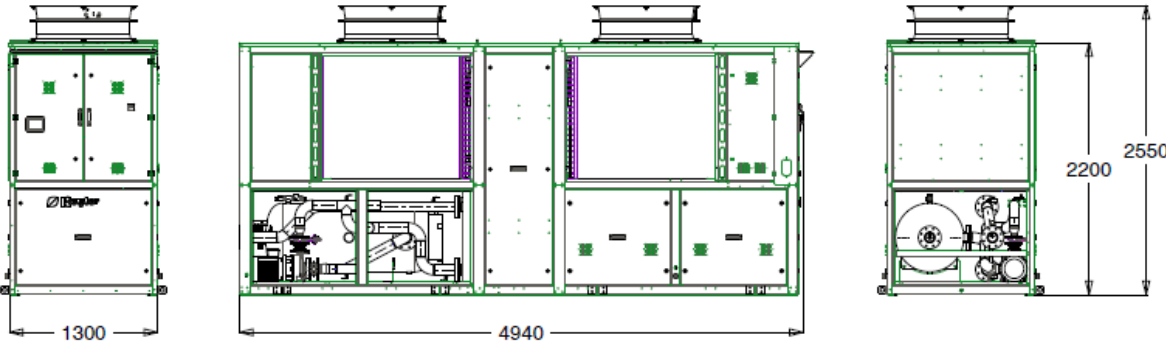
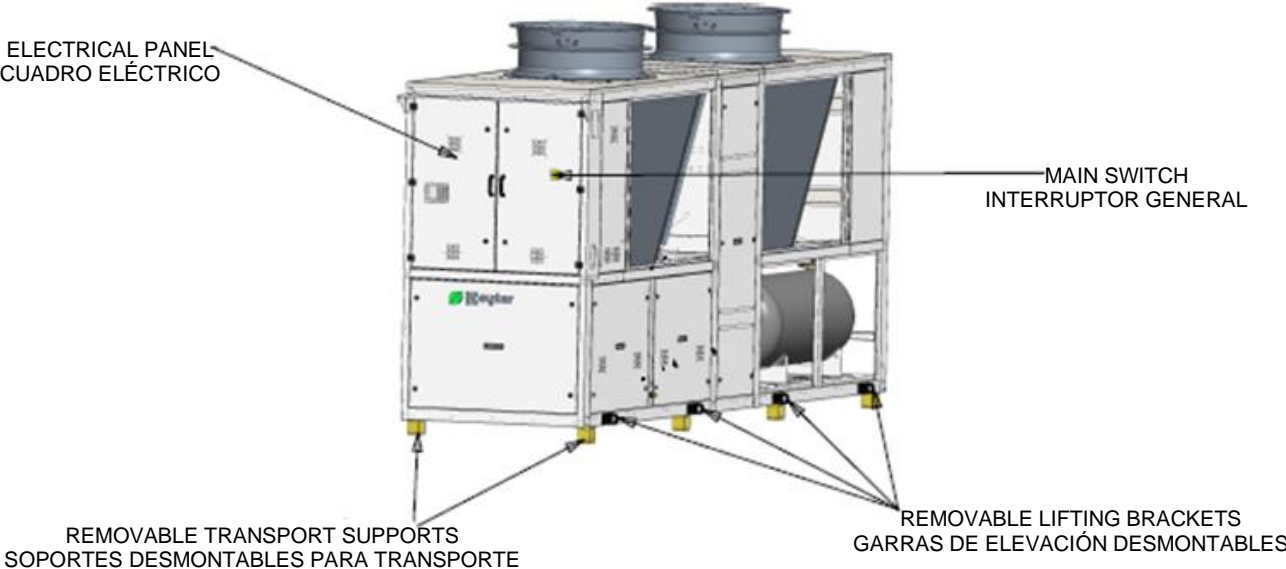
SERIES 3

VERSIONS S/P





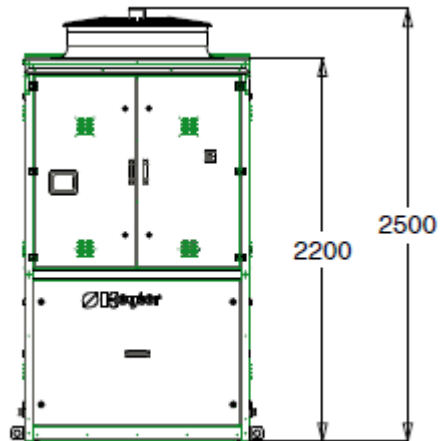
VERSION H



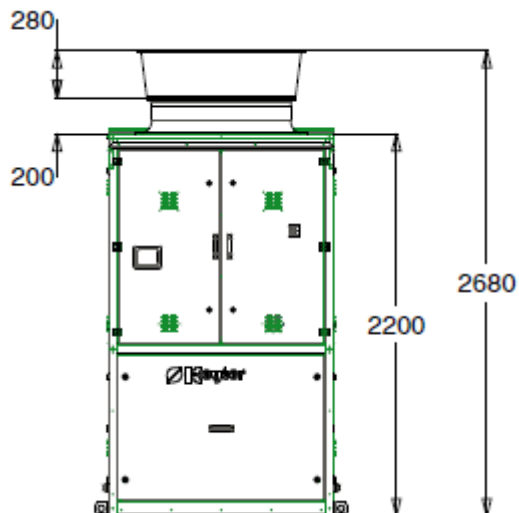


OPTIONS

SILENT RING
TOBERA EXTERIOR CURVA

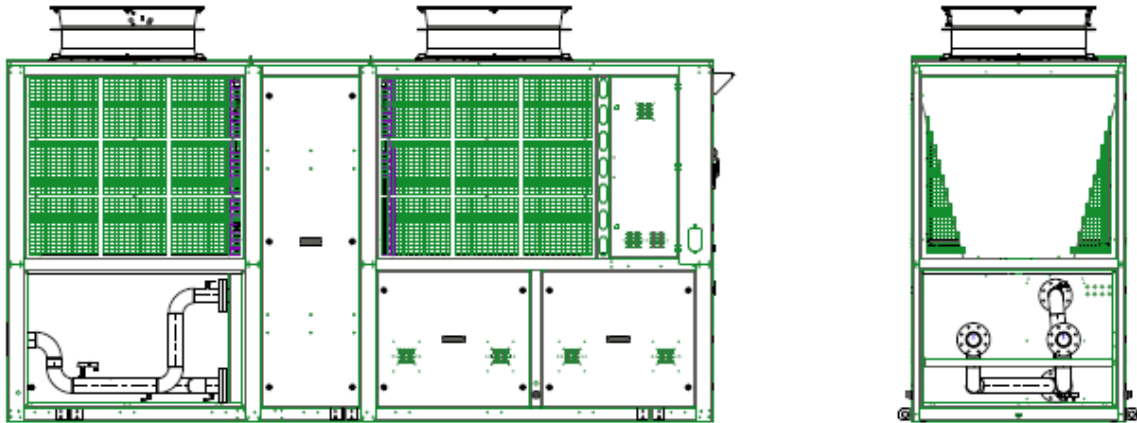


SILENT RING + AXITOP
TOBERA EXTERIOR CURVA + AXITOP

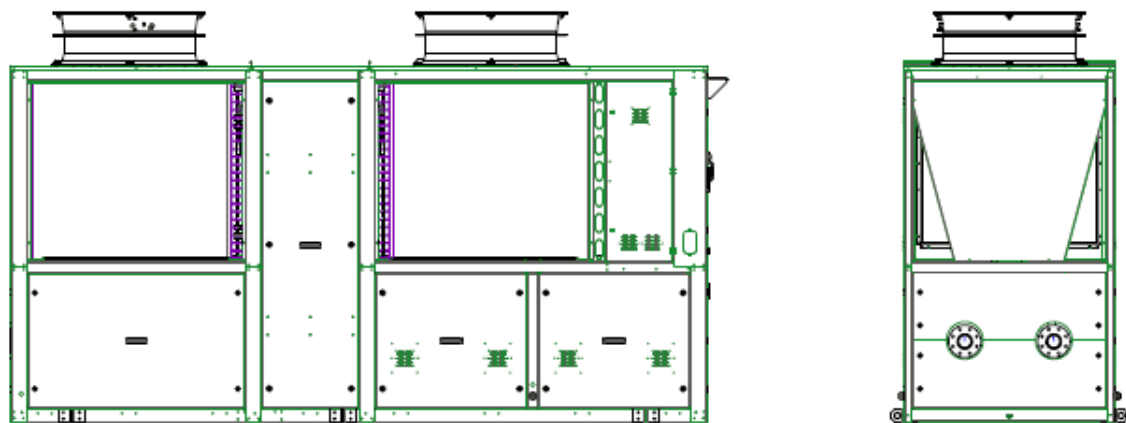




COIL PROTECTION GRID
REJILLAS DE PROTECCIÓN DE BATERÍA



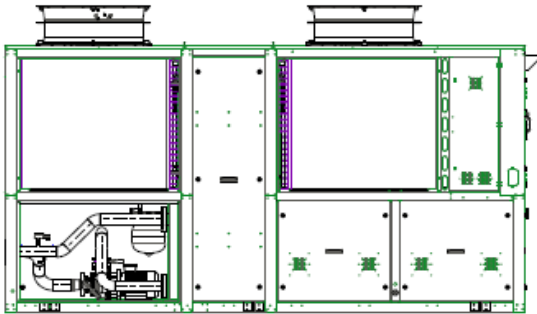
FULLY CLOSED SHEET COMPARTMENT
COMPARTIMENTO DE CHAPA COMPLETAMENTE CERRADO



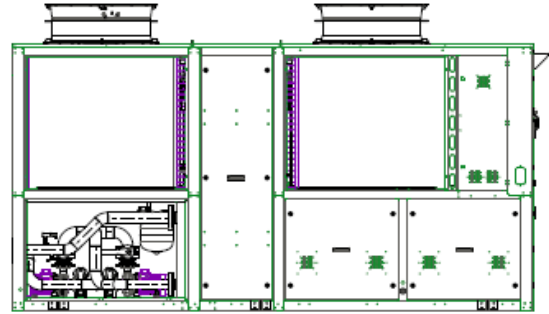


P HYDRAULIC VERSION
VERSIÓN HIDRÁULICA P

SINGLE PUMP
BOMBA SIMPLE

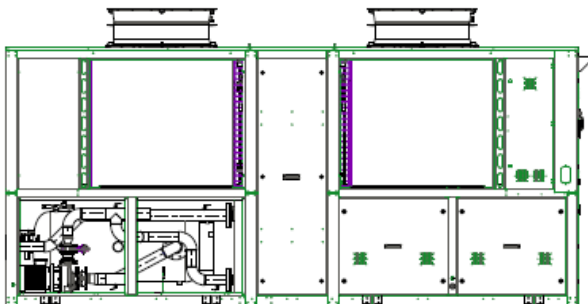


RESERVE PUMP
BOMBA DE RESERVA



H HYDRAULIC VERSION
VERSIÓN HIDRÁULICA H

SINGLE PUMP
BOMBA SIMPLE

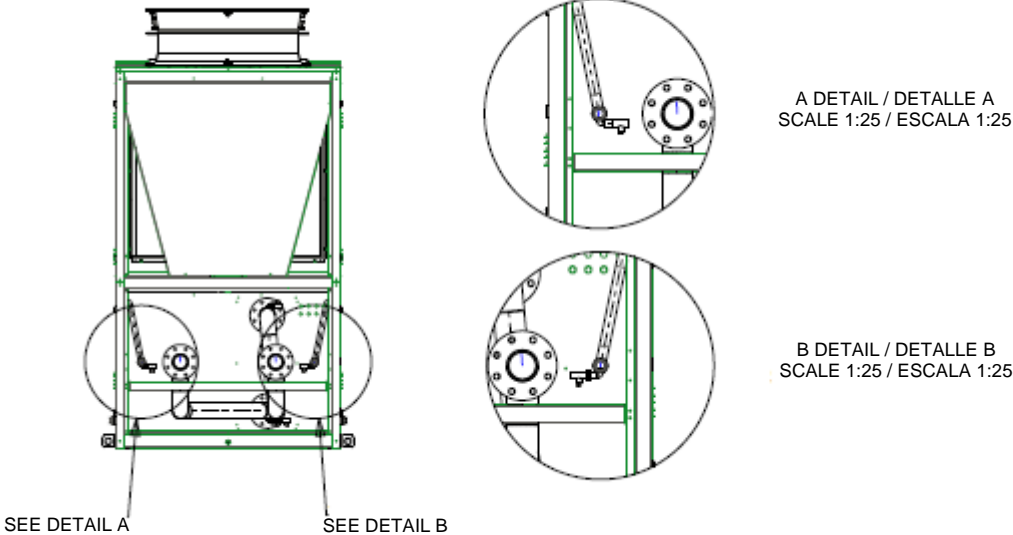


RESERVE PUMP
BOMBA DE RESERVA

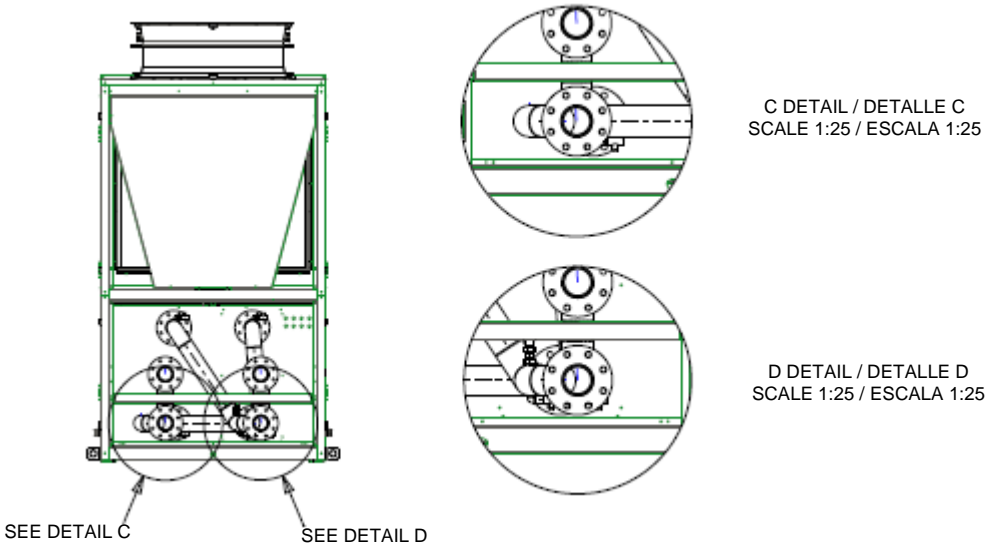




PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL

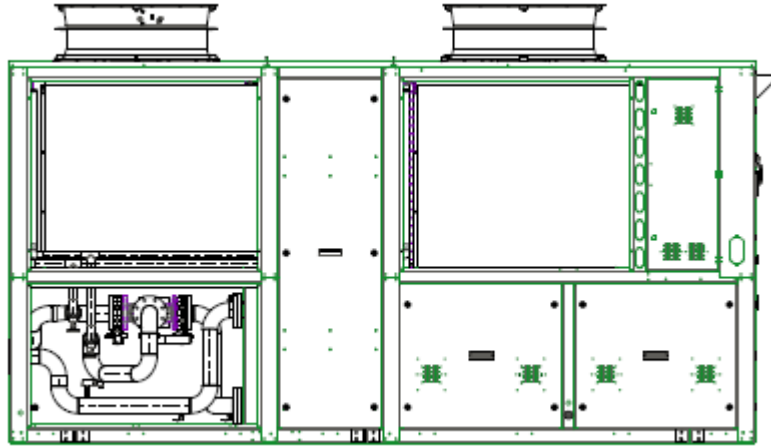


TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL

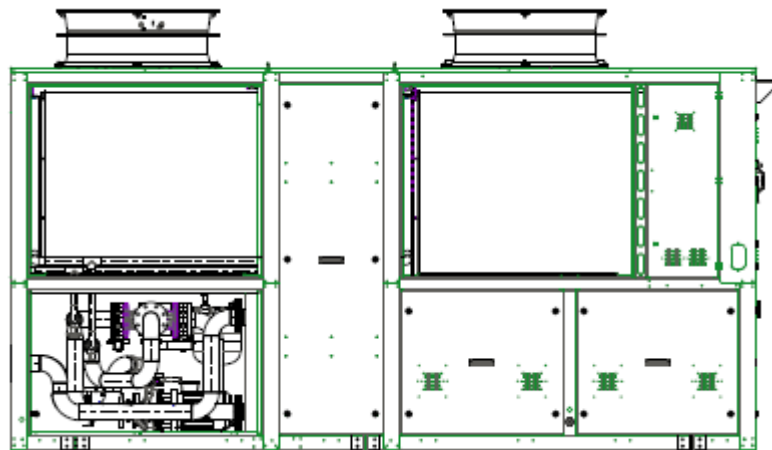




FREE-COOLING
S VERSION / VERSIÓN S



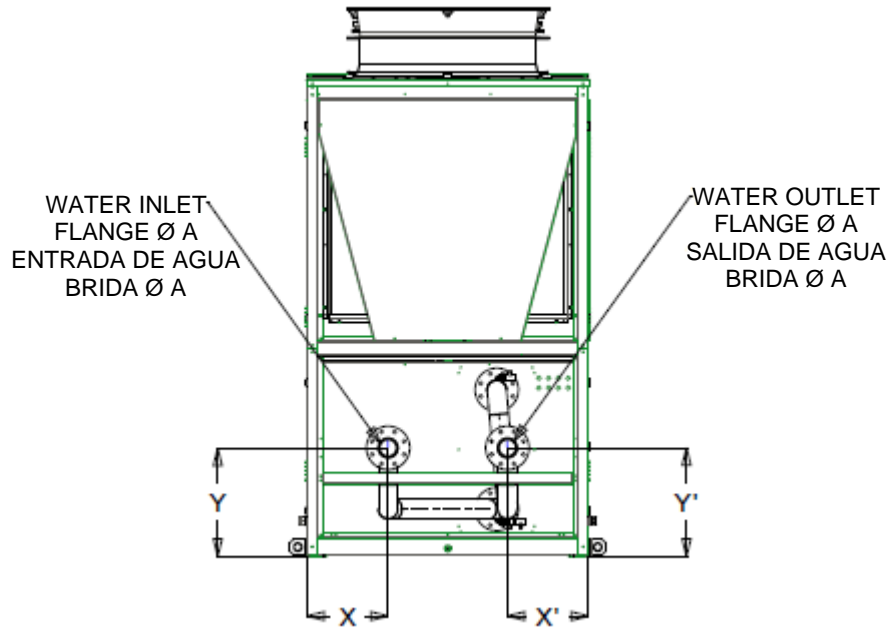
FREE-COOLING
P VERSION / VERSIÓN P





HYDRAULIC CONNECTION DETAILS

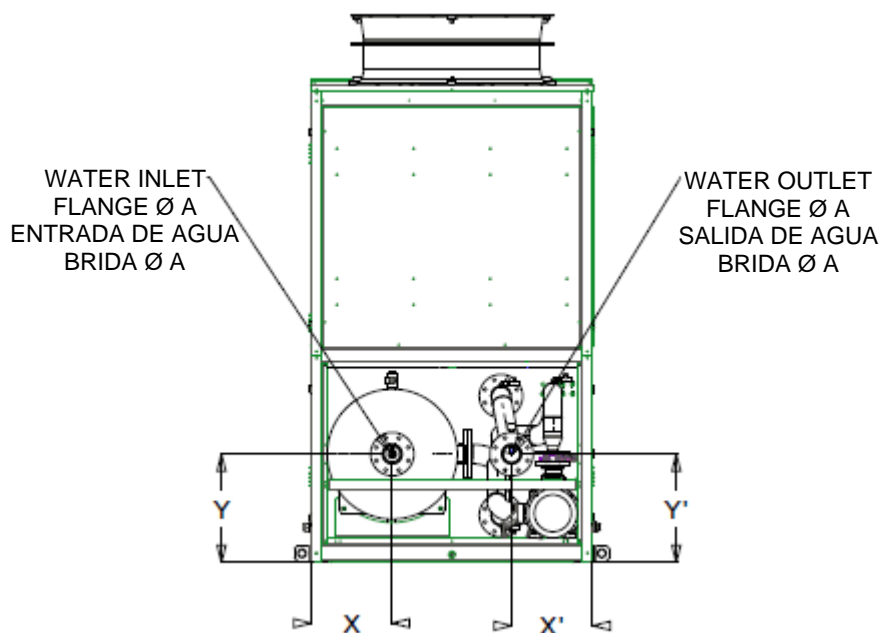
S/P VERSIONS / VERSIONES S/P



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	A
3120	375	375	500	500	DN80



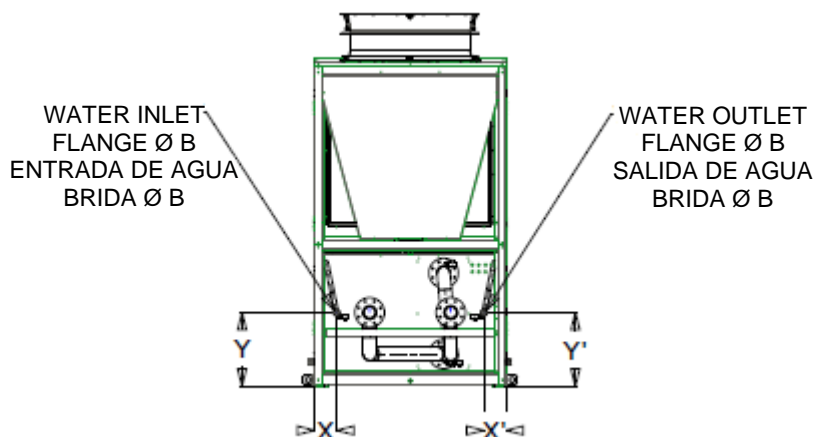
H VERSION / VERSIÓN H



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	A
3120	375	375	500	500	DN80

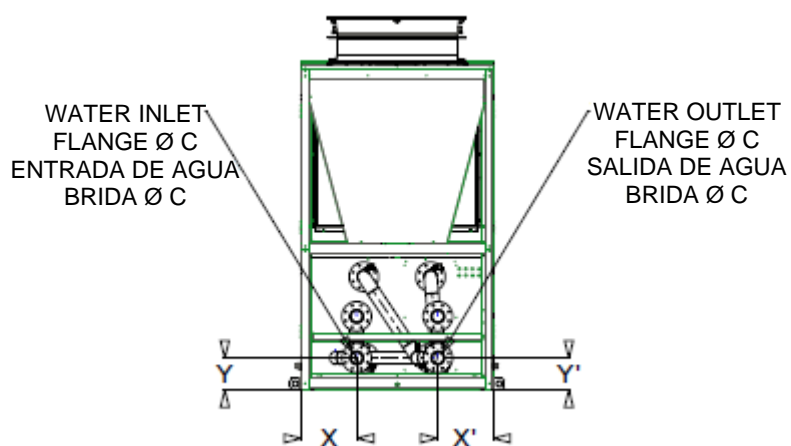


PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL



HYDRAULIC CONNECTIONS PARTIAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN PARCIAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	B
3120	150	150	500	500	1"

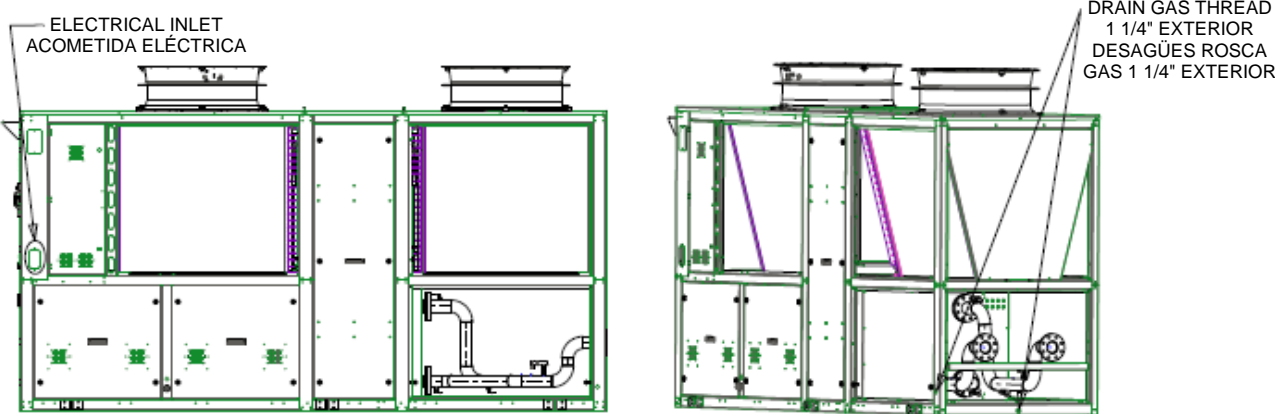
TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL



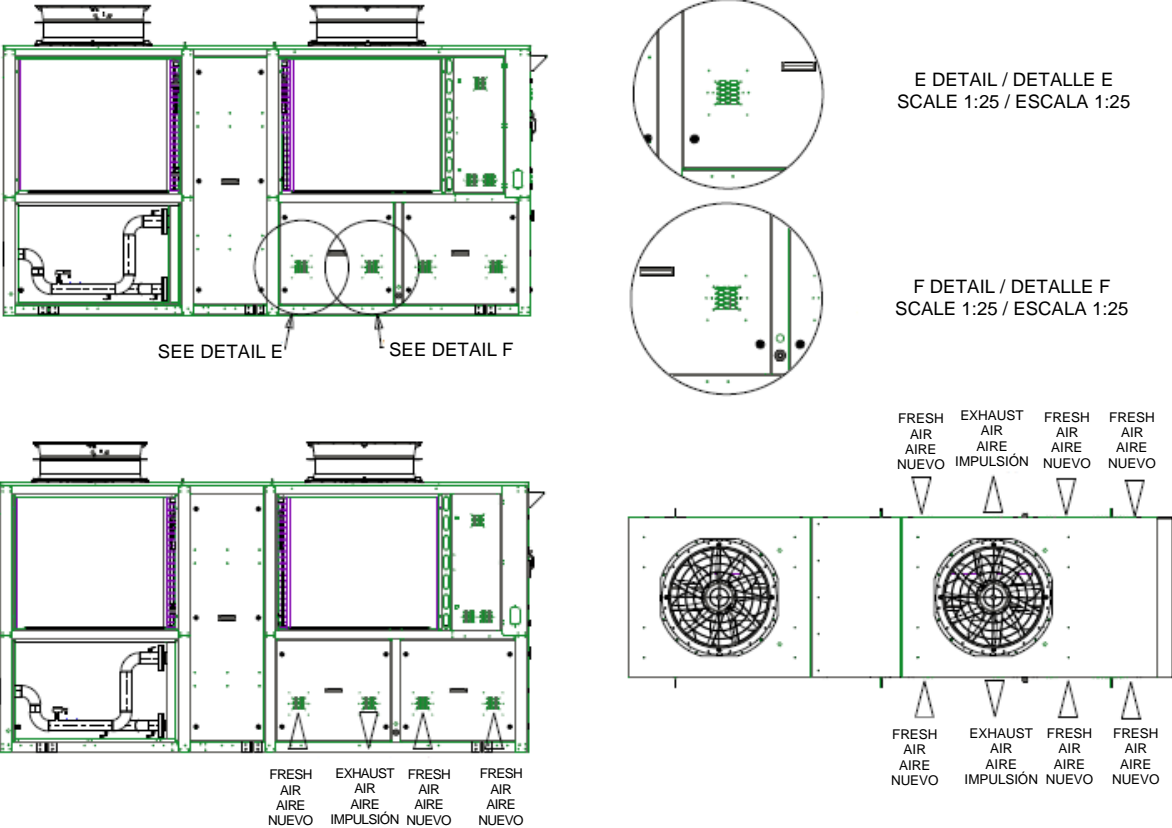
HYDRAULIC CONNECTIONS TOTAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN TOTAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	C
3120	375	375	220	220	DN80



ELECTRICAL SYSTEM DETAILS AND DRAINS

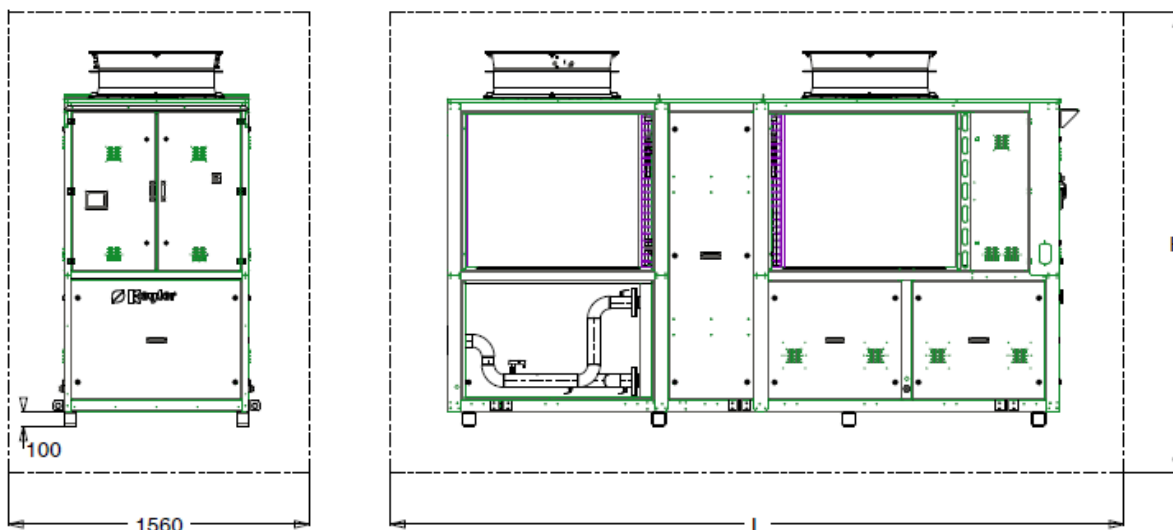


ATEX VENTILATION GRILLES





DIMENSIONS FOR TRANSPORT



OPTIONAL OPCIONAL	TRANSPORT HEIGHT ALTURA DE TRANSPORTE
	H (mm)
STANDARD/ESTÁNDAR	2750
AXITOP*	2880

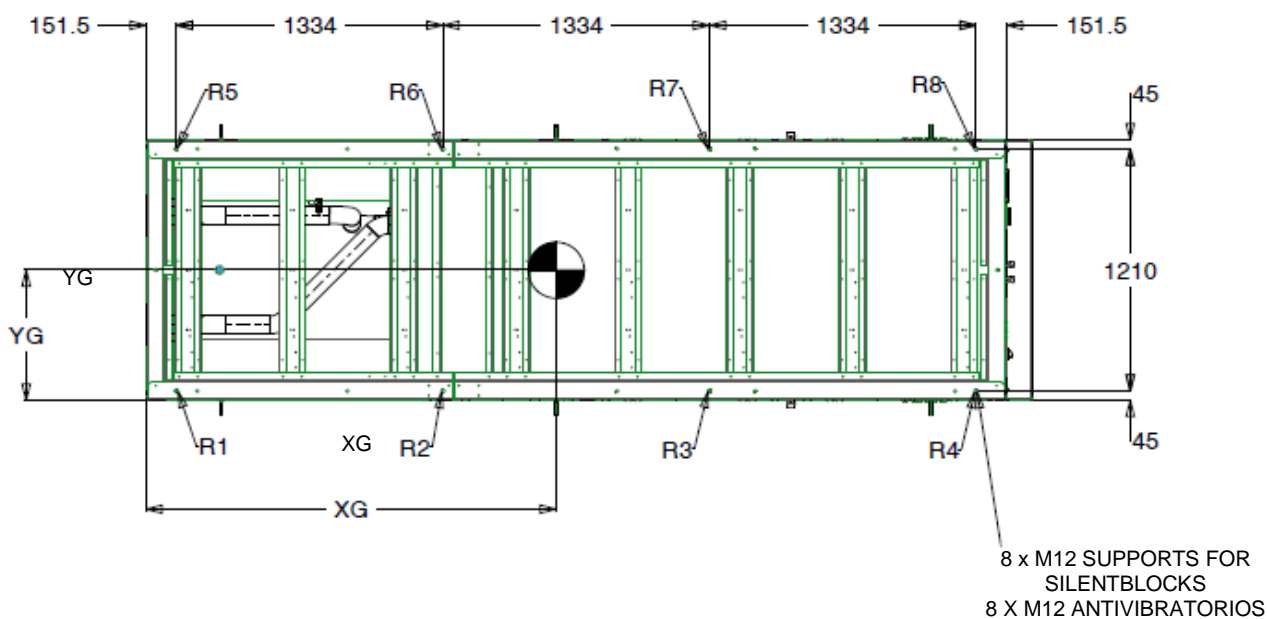
VERSION VERSIÓN	TRANSPORT LENGHT LONGITUD DE TRANSPORTE
	L (mm)
S/P VERSIONS / VERSIONES S/P	4440
H VERSION / VERSIÓN H	5040

(*) AxiTop is a removable part. / AxiTop es una pieza desmontable.



WEIGHT DISTRIBUTION

VERSION S

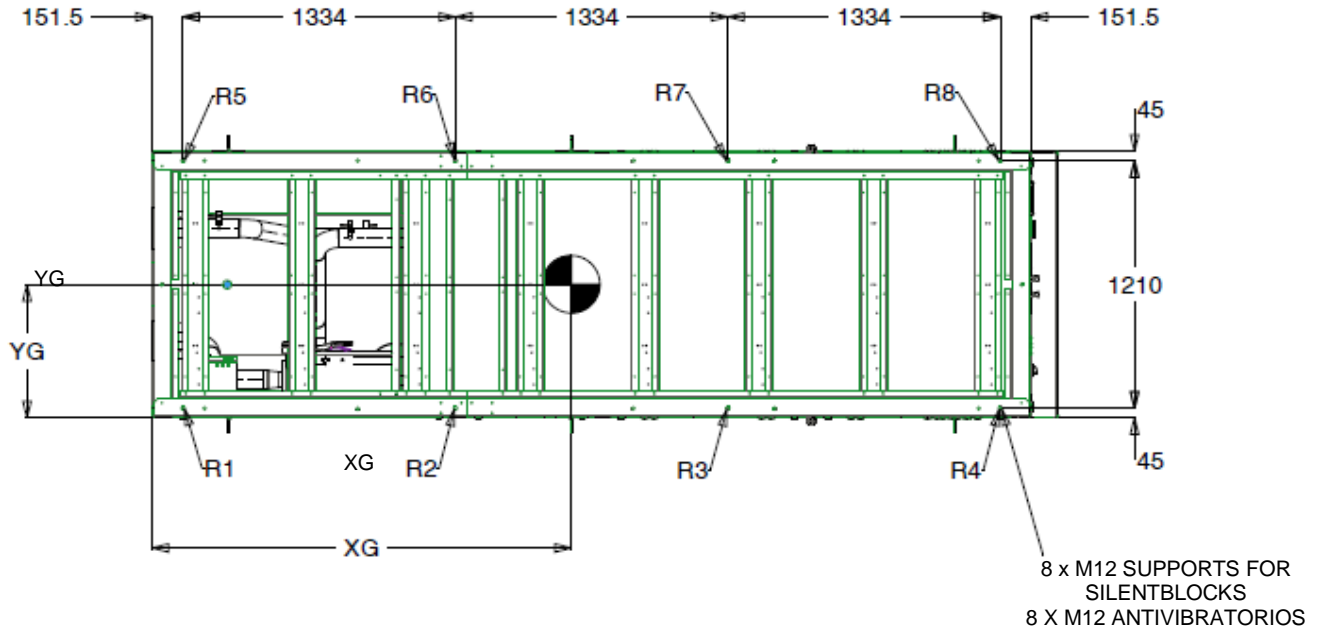


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
3120	2666.0	679.2	96.8	172.8	437.2	273.0	121.6	197.7	462.0	297.9	2059.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
3120	2664.1	679.1	97.8	174.5	439.5	274.4	122.7	199.4	464.3	299.4	2072.0



VERSION P

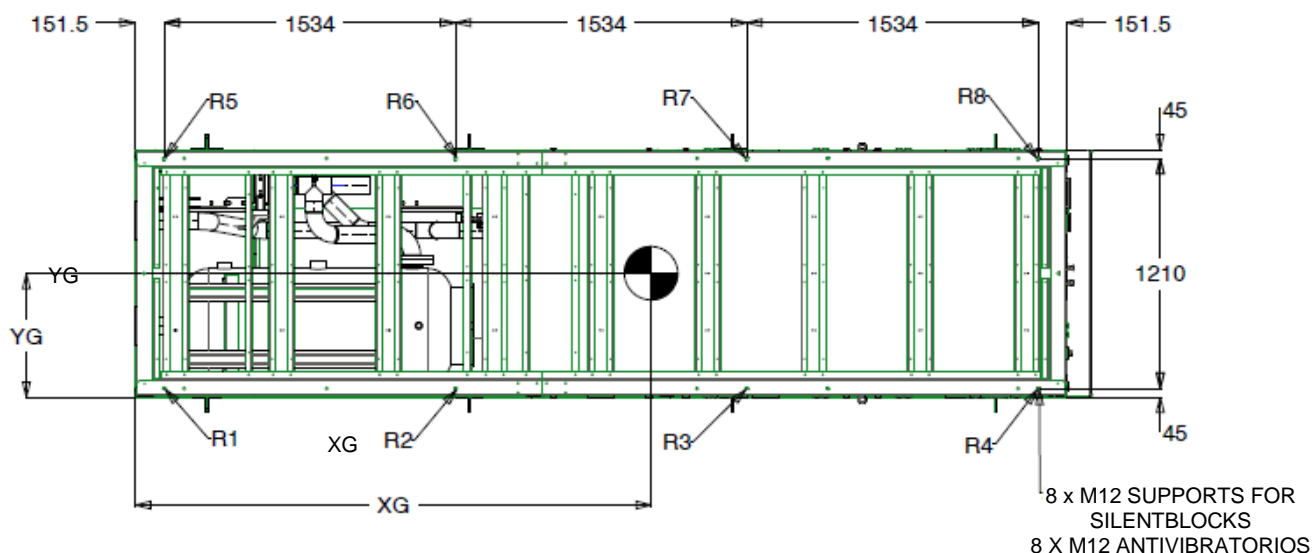


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
3120	2621.5	666.3	112.8	194.8	442.5	278.0	127.0	209.0	456.7	292.2	2113.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
3120	2619.9	666.3	113.8	196.4	444.8	279.4	128.1	210.7	459.1	293.7	2126.0



VERSION H

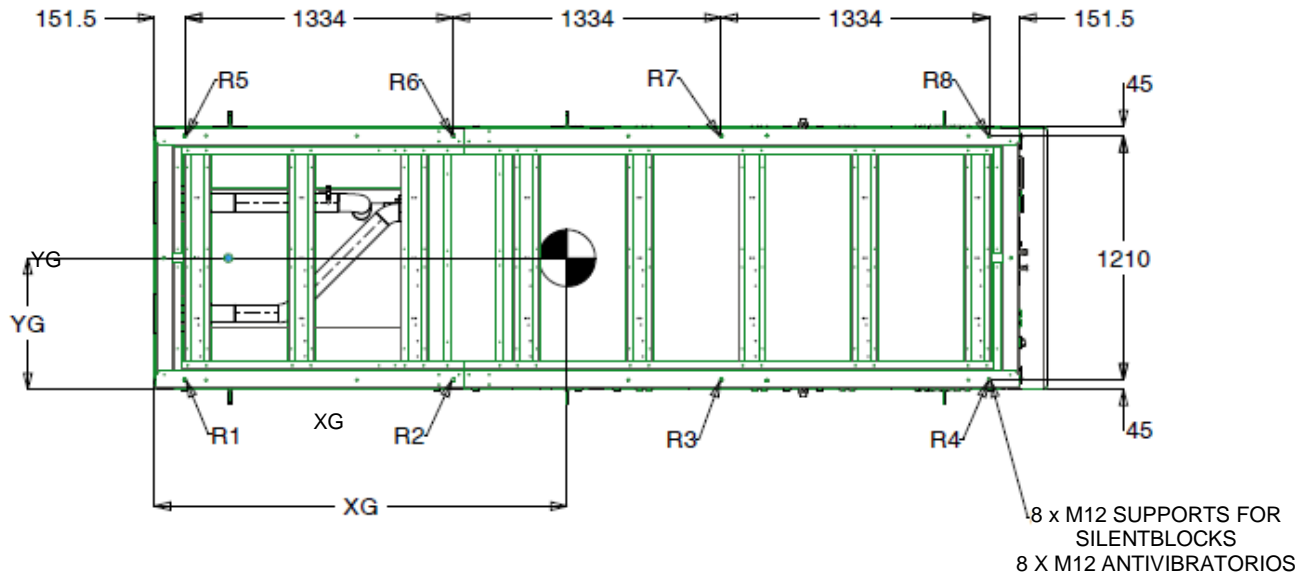


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
3120	2924.5	685.7	128.2	225.5	467.9	289.7	163.0	260.4	502.7	324.6	2362.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
3120	2649.5	641.5	228.9	369.6	487.3	307.4	219.3	360.0	477.7	297.8	2748.0



INCREASED WEIGHT DUE TO OPTIONAL ACCESSORIES INSTALLED

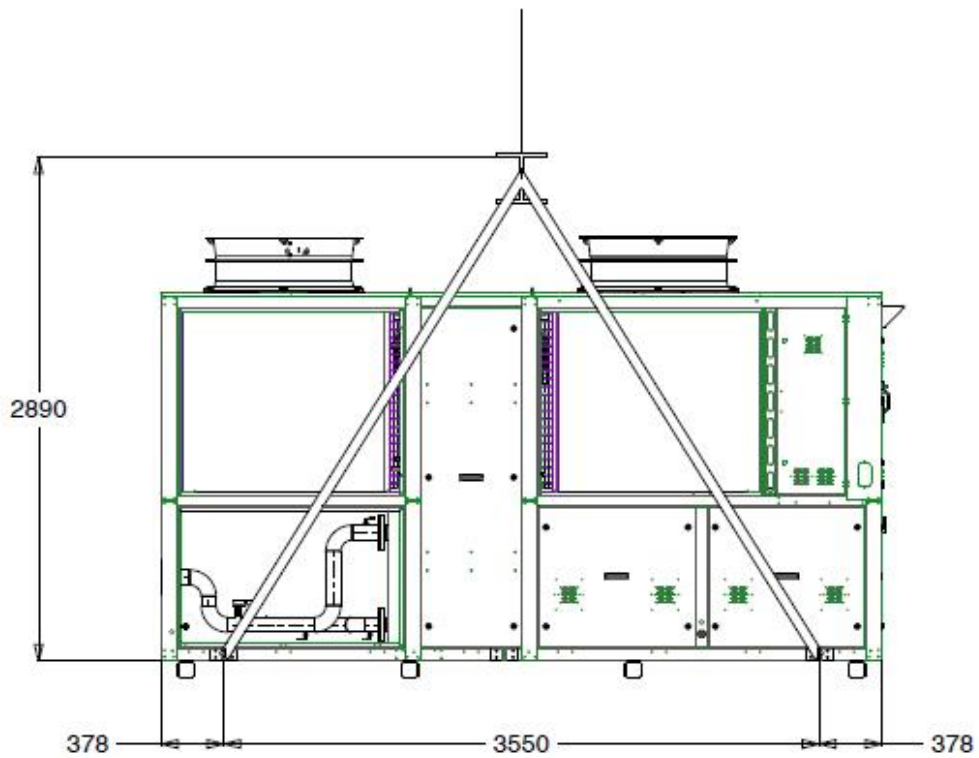


WEIGHT INCREASE BY OPTIONALS / INCREMENTO DE PESOS POR OPCIONALES									
OPTIONALS OPCIONALES	SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
AXITOP	+ 3.8	+6.0	+ 3.3	+ 2.0	+3.8	+5.9	+ 3.3	+ 1.9	+30.0
HIGH PRESSURE PUMP BOMBA DE ALTA PRESIÓN	+ 0.9	+1.2	+ 0.3	+ 0.2	+0.4	+0.7	-0.3	-0.4	+3.0
VERY HIGH PRESSURE PUMP BOMBA DE MUY ALTA PRESIÓN	+ 9.3	+12.6	+ 3.4	+ 3.0	+3.1	+6.5	-2.8	-3.1	+32.0
RESERVE PUMP - P VERSION BOMBA DE RESERVA - VERSIÓN P	+ 20.1	+ 28.0	+ 2.5	+ 3.0	+ 9.3	+ 17.2	-8.3	-7.8	+ 64.0
RESERVE PUMP - H VERSION BOMBA DE RESERVA - VERSIÓN H	+20.0	+ 36.5	+ 47.4	+ 27.4	+32.5	+48.8	+ 59.7	+39.7	+312.0
PARTIAL HEAT RECOVERY RECUPERACIÓN PARCIAL	+ 1.9	+3.1	+ 2.0	+ 1.3	+2.0	+3.2	+ 2.2	+1.3	+17.0
TOTAL HEAT RECOVERY RECUPERACIÓN TOTAL	+ 36.6	+53.3	+ 13.4	+10.1	+22.9	+39.5	-0.2	-3.6	+172.0
FREE-COOLING	+ 48.2	+ 77.2	+ 50.0	+30.0	+50.5	+79.5	+ 52.3	+32.3	+420.0



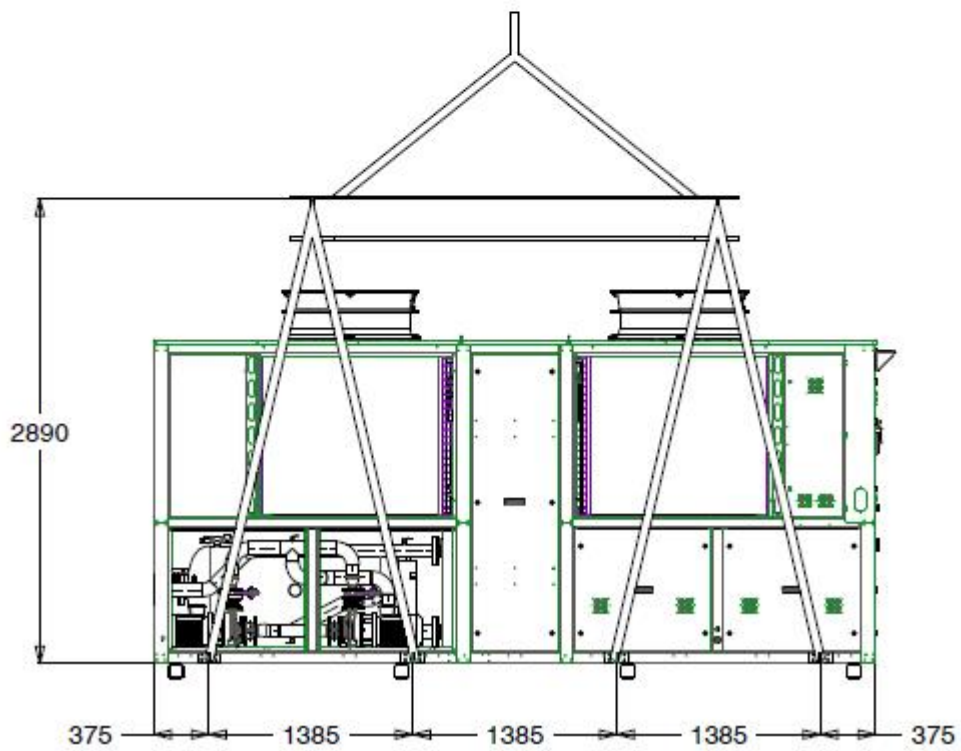
LIFTING STRUCTURE

VERSIONS S/P





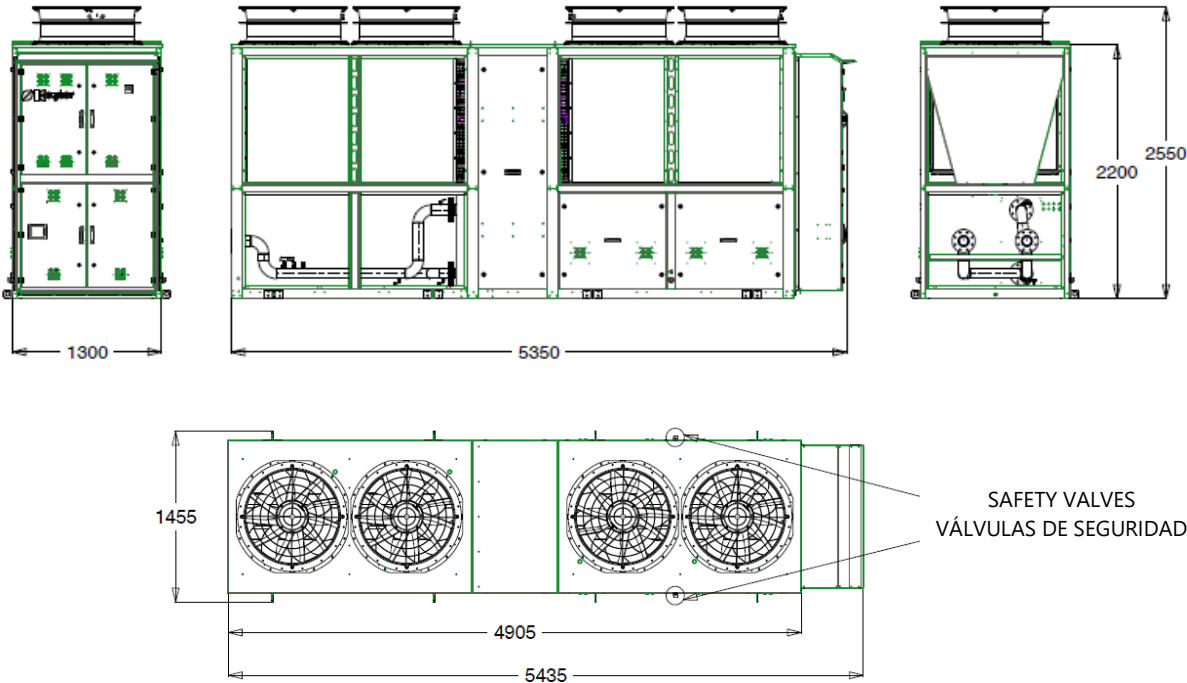
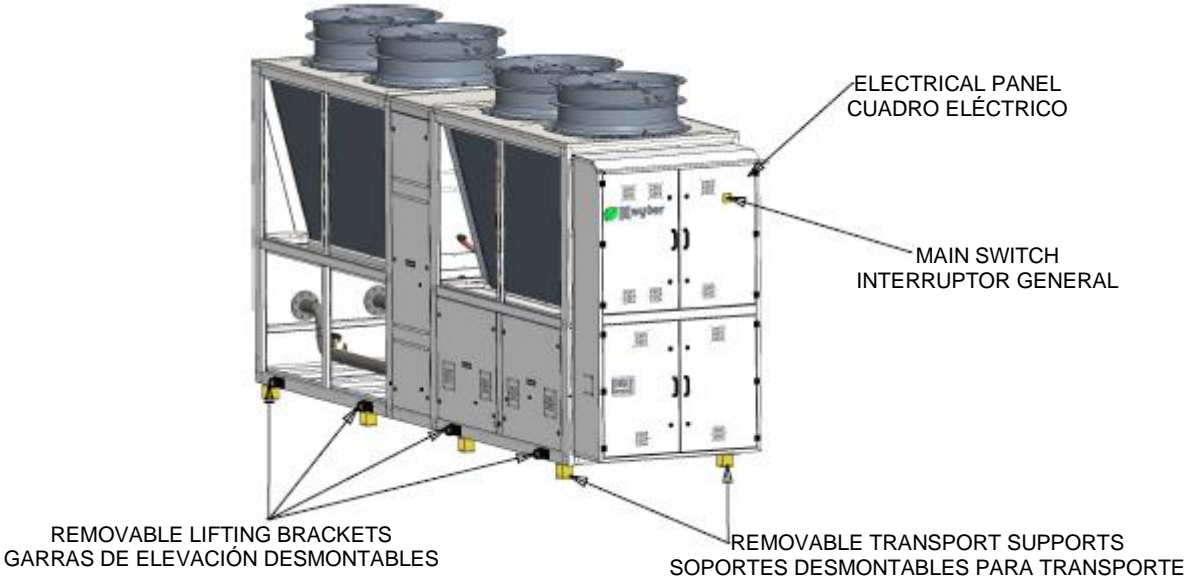
VERSION H





SERIES 4

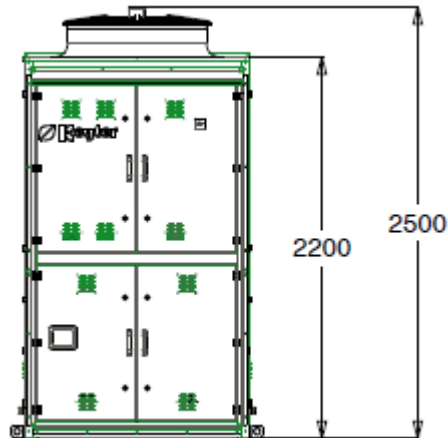
VERSIONS S/P/H



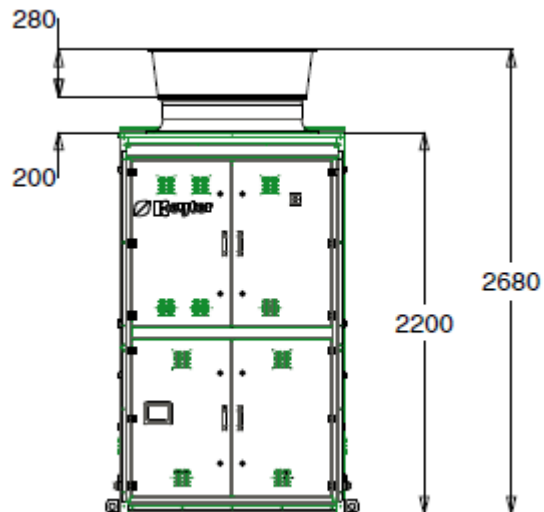


OPTIONS

SILENT RING
TOBERA EXTERIOR CURVA

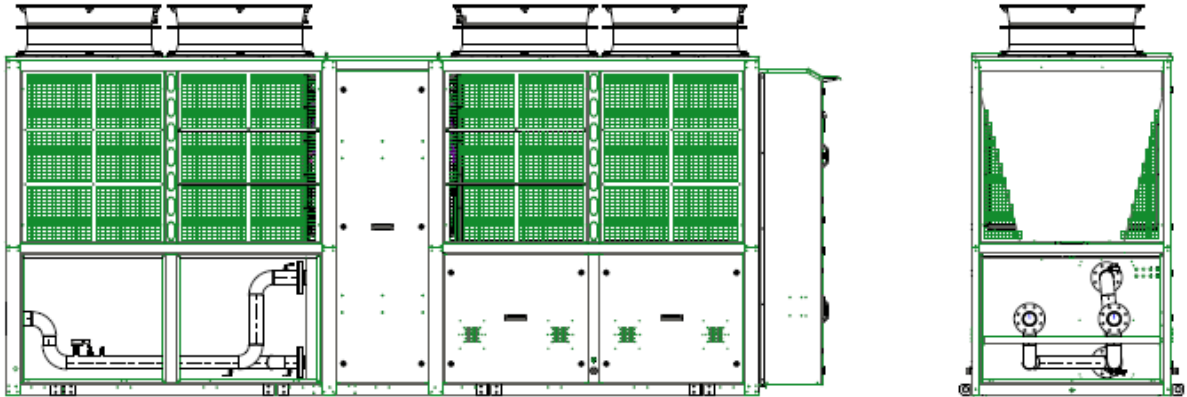


SILENT RING + AXITOP
TOBERA EXTERIOR CURVA + AXITOP

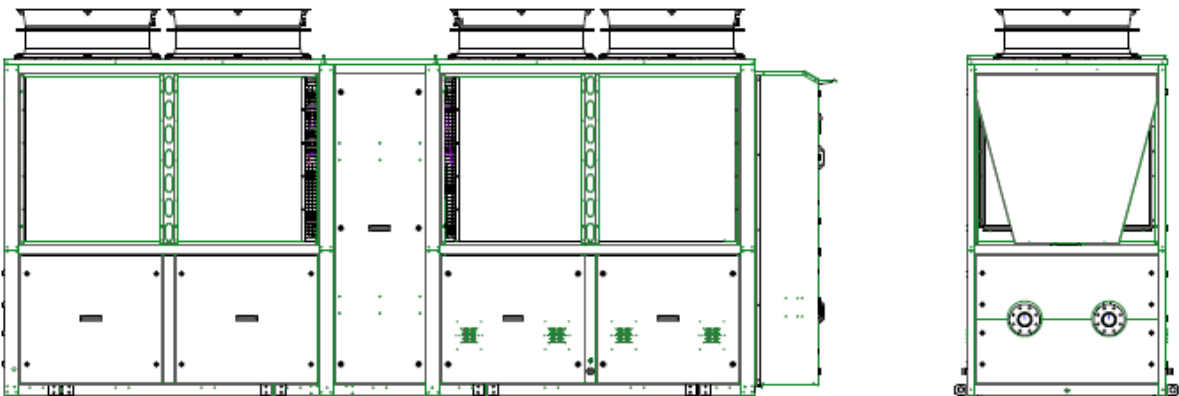




COIL PROTECTION GRID
REJILLAS DE PROTECCIÓN DE BATERÍA



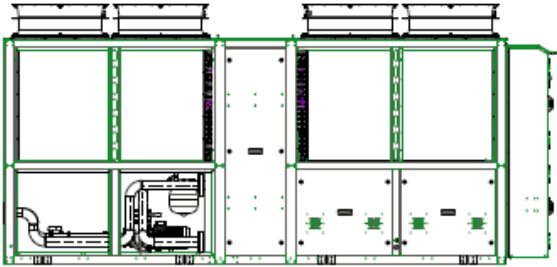
FULLY CLOSED SHEET COMPARTMENT
COMPARTIMENTO DE CHAPA COMPLETAMENTE CERRADO



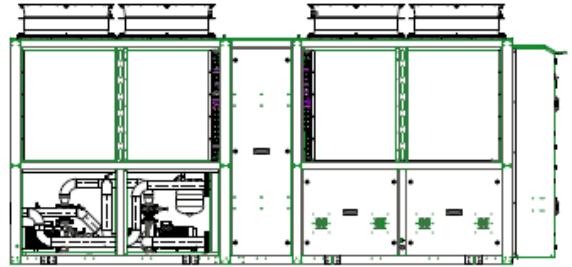


P HYDRAULIC VERSION
VERSIÓN HIDRÁULICA P

SINGLE PUMP
BOMBA SIMPLE



RESERVE PUMP
BOMBA DE RESERVA



H HYDRAULIC VERSION
VERSIÓN HIDRÁULICA H

SINGLE PUMP
BOMBA SIMPLE

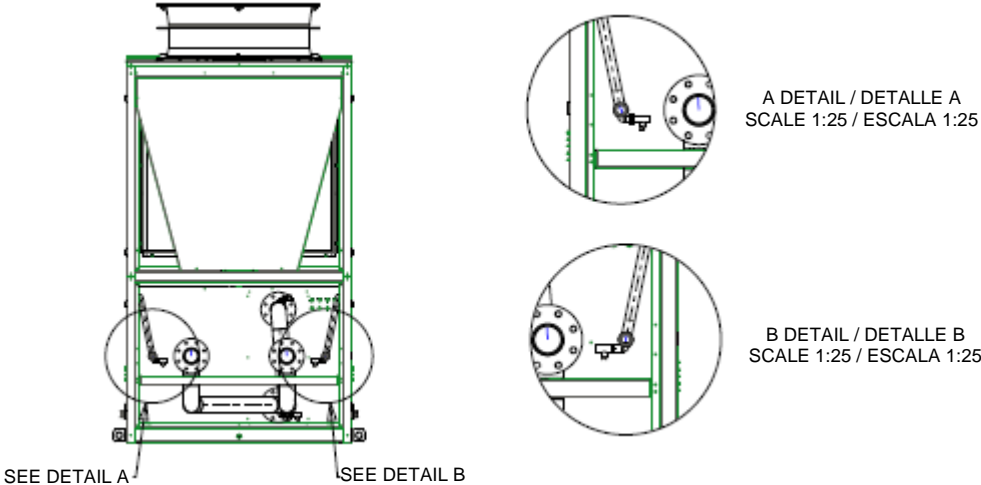


RESERVE PUMP
BOMBA DE RESERVA

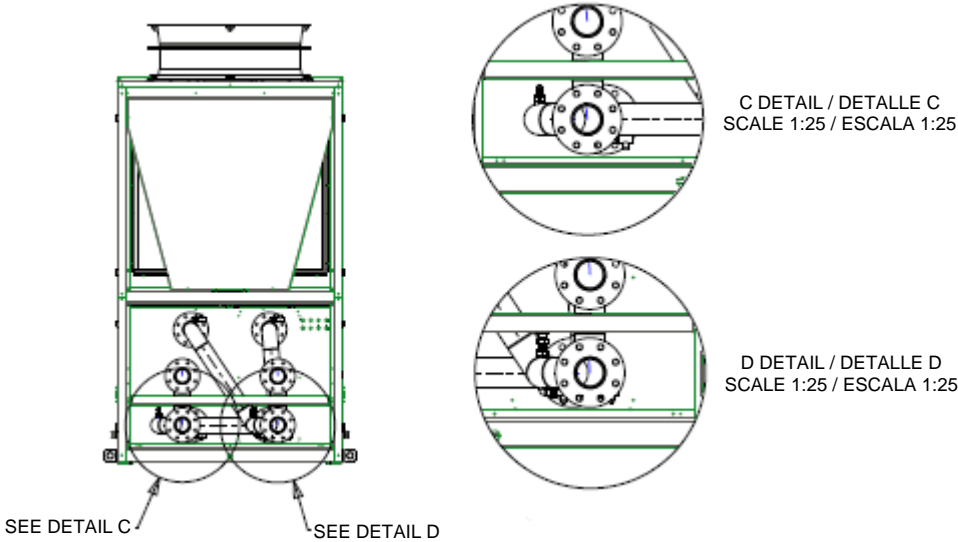




PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL

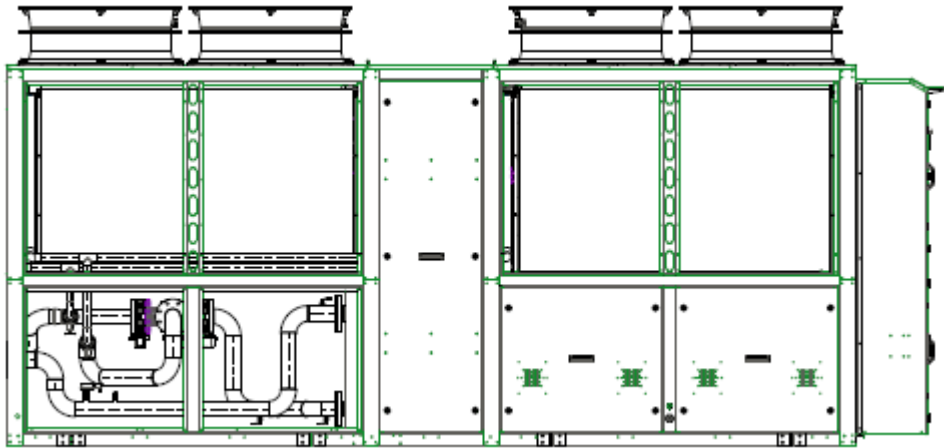


TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL

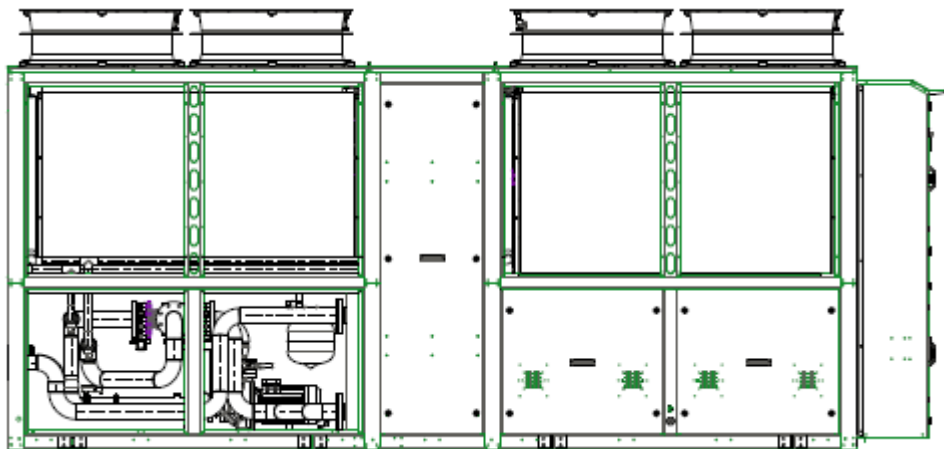




FREE-COOLING
S VERSION / VERSIÓN S



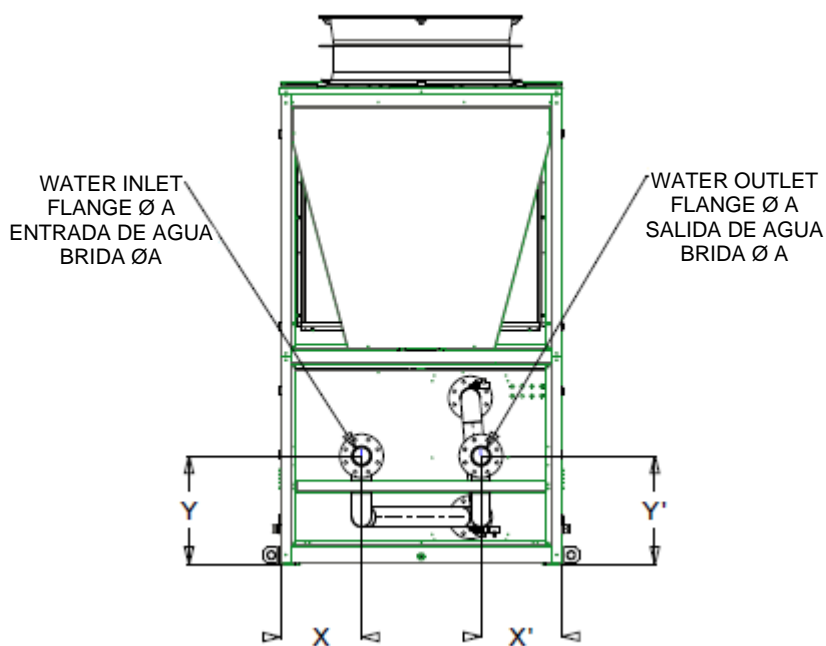
FREE-COOLING
P VERSION / VERSIÓN P





HYDRAULIC CONNECTION DETAILS

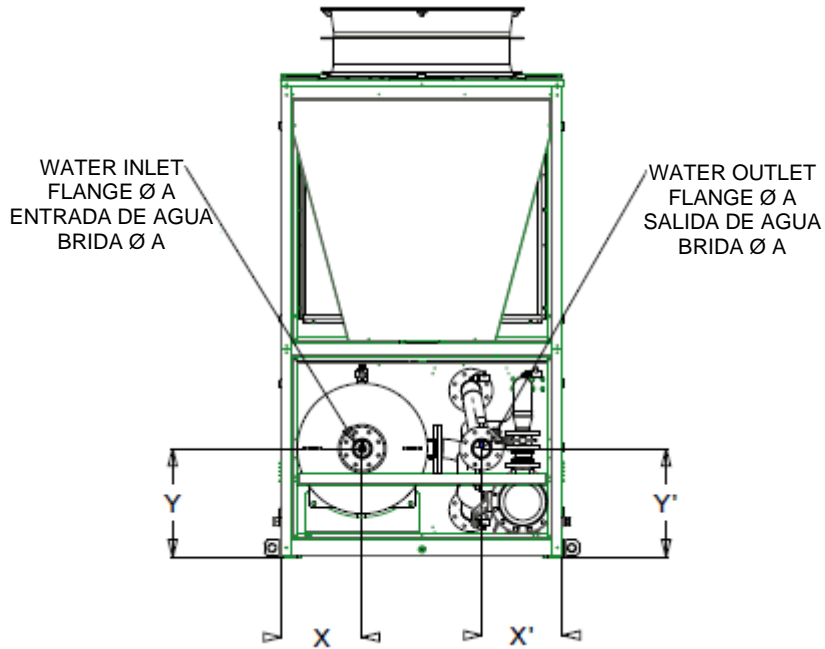
S/P VERSIONS / VERSIONES S/P



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	A
4140/4160/4200	375	375	500	500	DN80



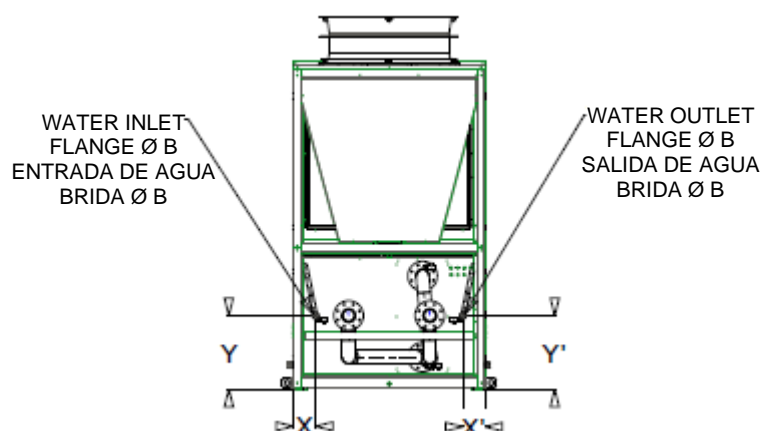
H VERSION / VERSIÓN H



HYDRAULIC CONNECTIONS MAIN CIRCUIT CONEXIONES HIDRÁULICAS CIRCUITO PRINCIPAL					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	
4140/4160/4200	375	375	500	500	DN80

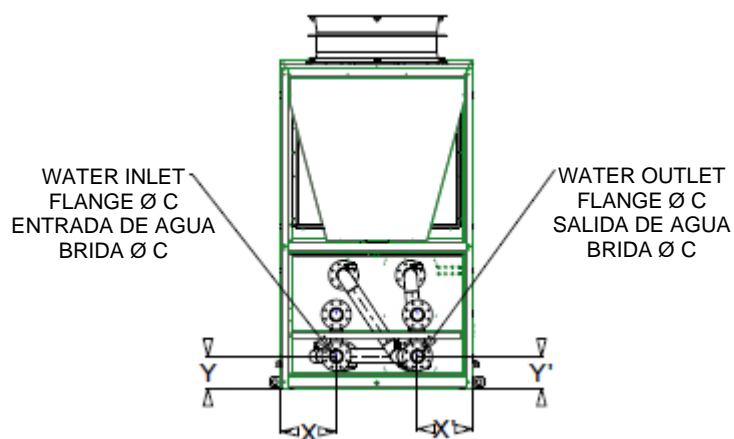


PARTIAL HEAT RECOVERY
RECUPERACIÓN PARCIAL



HYDRAULIC CONNECTIONS PARTIAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN PARCIAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	B
4140/4160/4200	150	150	500	500	1"

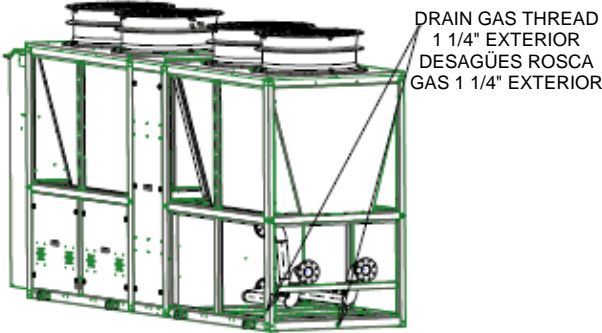
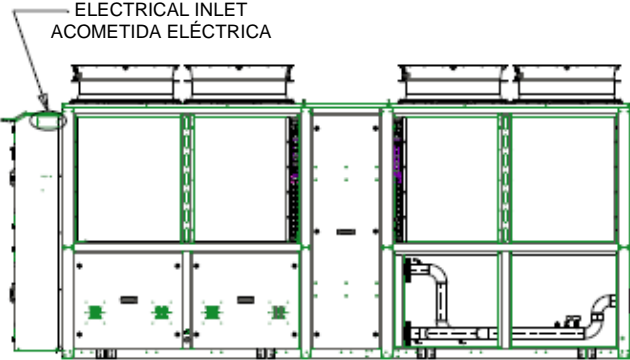
TOTAL HEAT RECOVERY
RECUPERACIÓN TOTAL



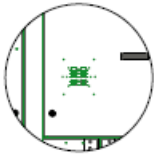
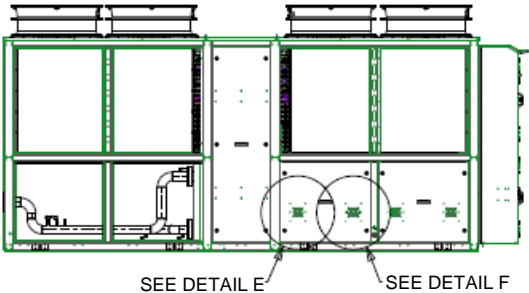
HYDRAULIC CONNECTIONS TOTAL HEAT RECOVERY CONEXIONES HIDRÁULICAS RECUPERACIÓN TOTAL DE CALOR					
MODEL MODELO	CONNECTION DIMENSIONS COTAS DE CONEXIONES				CONNECTIONS DIAMETER DIÁMETRO DE CONEXIONES
	X (mm)	X' (mm)	Y (mm)	Y' (mm)	C
4140/4160/4200	375	375	220	220	DN80



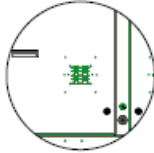
ELECTRICAL SYSTEM DETAILS AND DRAINS



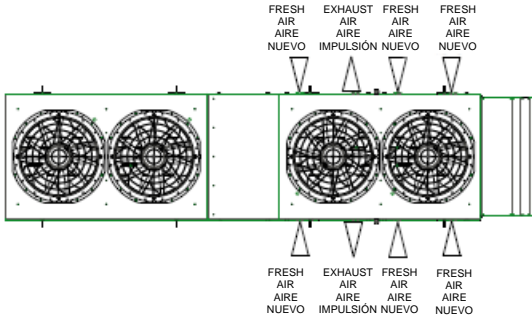
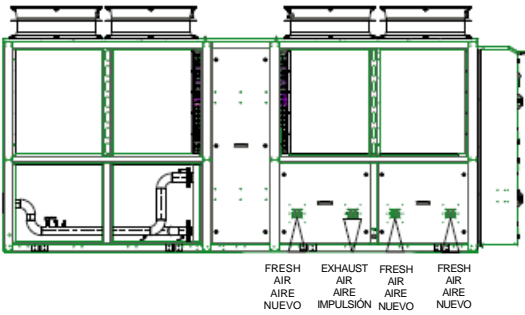
ATEX VENTILATION GRILLES



E DETAIL / DETALLE E
SCALE 1:25 / ESCALA 1:25

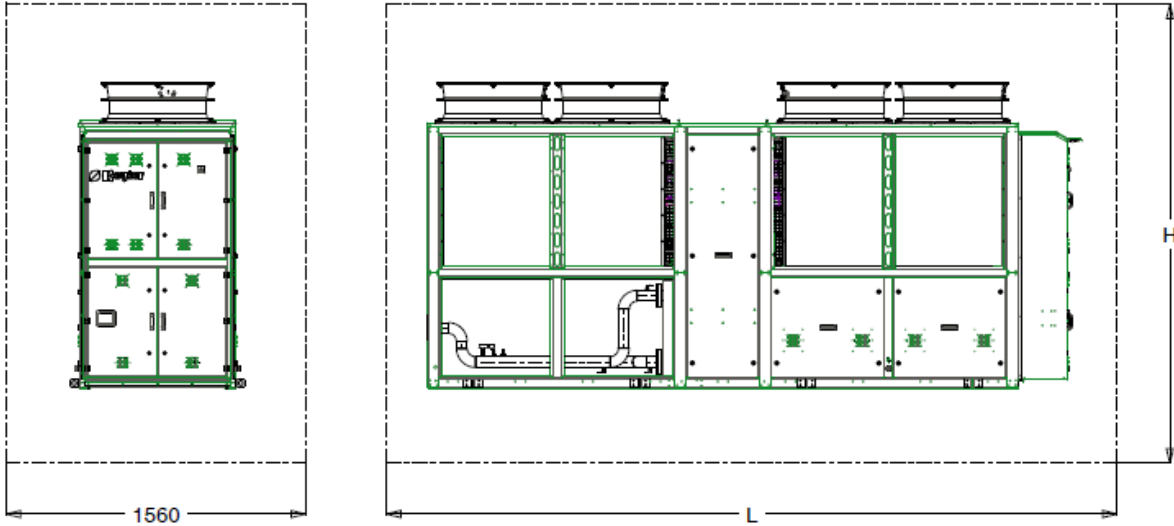


F DETAIL / DETALLE F
SCALE 1:25 / ESCALA 1:25





DIMENSIONS FOR TRANSPORT



OPTIONAL OPCIONAL	TRANSPORT HEIGHT ALTURA DE TRANSPORTE
	H (mm)
STANDARD/ESTÁNDAR	2750
AXITOP*	2880

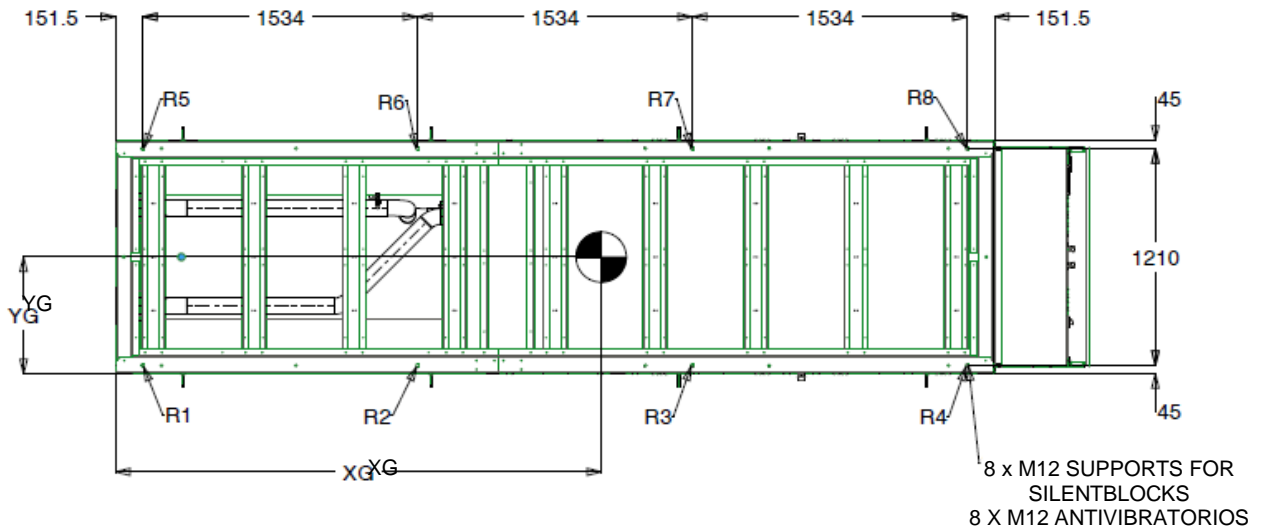
VERSION VERSIÓN	TRANSPORT LENGHT LONGITUD DE TRANSPORTE
	L (mm)
S/P/H VERSIONS / VERSIONES S/P/H	5450

(*) AxiTop is a removable part. / AxiTop es una pieza desmontable.



WEIGHT DISTRIBUTION

VERSION S

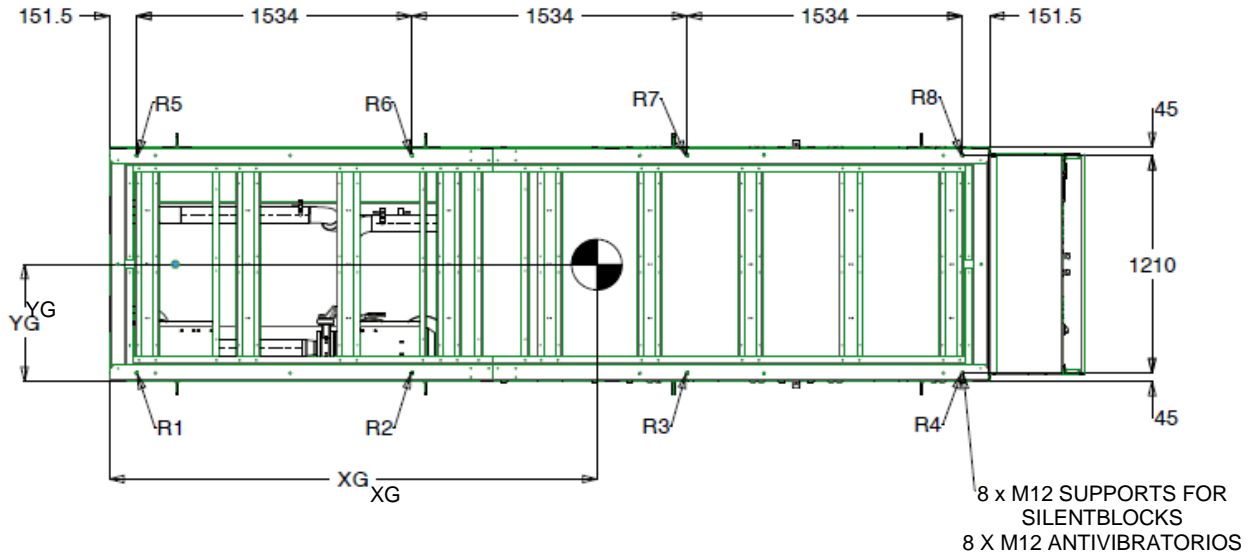


EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
4140	3182.5	664.0	95.2	170.9	547.6	346.3	108.9	184.6	561.4	360.1	2375.0
4160	3173.7	651.4	106.8	186.1	572.4	364.3	108.2	187.6	573.9	365.7	2465.0
4200	3231.3	664.1	90.4	165.1	584.2	369.9	104.9	179.5	598.7	384.3	2477.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
4140	3179.9	664.1	96.4	173.0	551.5	348.7	110.3	186.9	565.5	362.7	2395.0
4160	3170.6	651.5	108.2	188.5	576.2	366.7	109.6	190.0	577.7	368.1	2485.0
4200	3229.5	664.2	91.5	166.9	588.7	372.6	106.1	181.6	603.3	387.3	2498.0



VERSION P



EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO

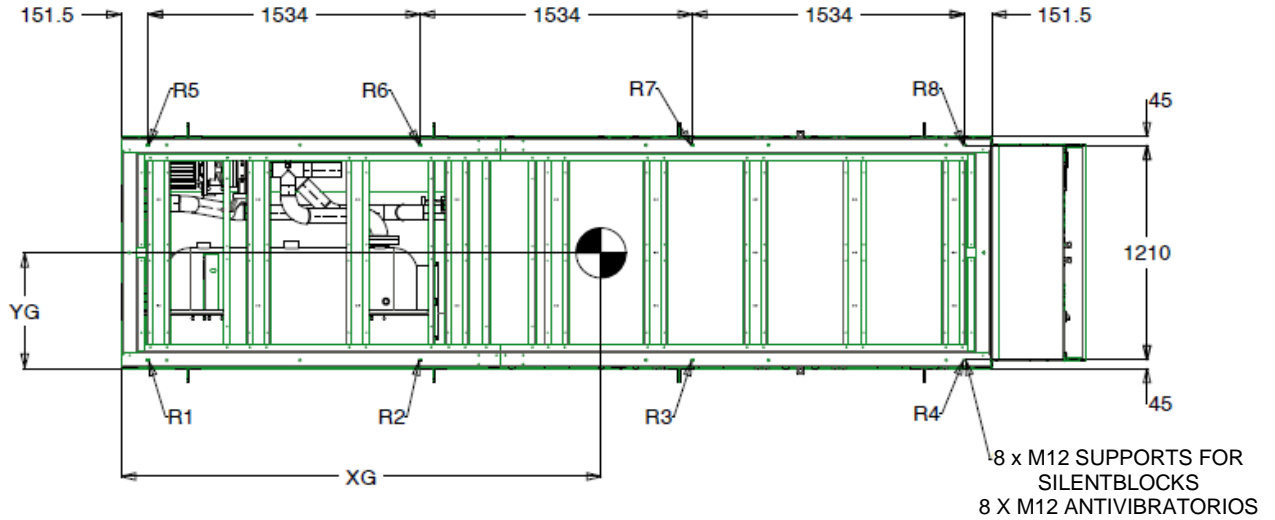
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
4140	3128.6	651.4	114.0	196.9	556.5	353.8	115.4	198.3	557.9	355.2	2448.0
4160	3108.8	648.5	124.3	212.7	577.5	367.5	122.8	211.2	576.0	366.0	2558.0
4200	3163.0	647.9	115.3	199.2	596.4	380.1	113.0	196.9	594.2	377.9	2573.0

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO

MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
4140	3126.6	651.6	115.2	198.8	560.2	356.0	116.8	200.5	561.8	357.7	2467.0
4160	3106.3	648.8	125.6	214.9	581.0	369.6	124.3	213.6	579.6	368.4	2577.0
4200	3161.7	648.1	116.3	201.0	600.4	382.7	114.3	199.0	598.6	380.7	2593.0



VERSION H



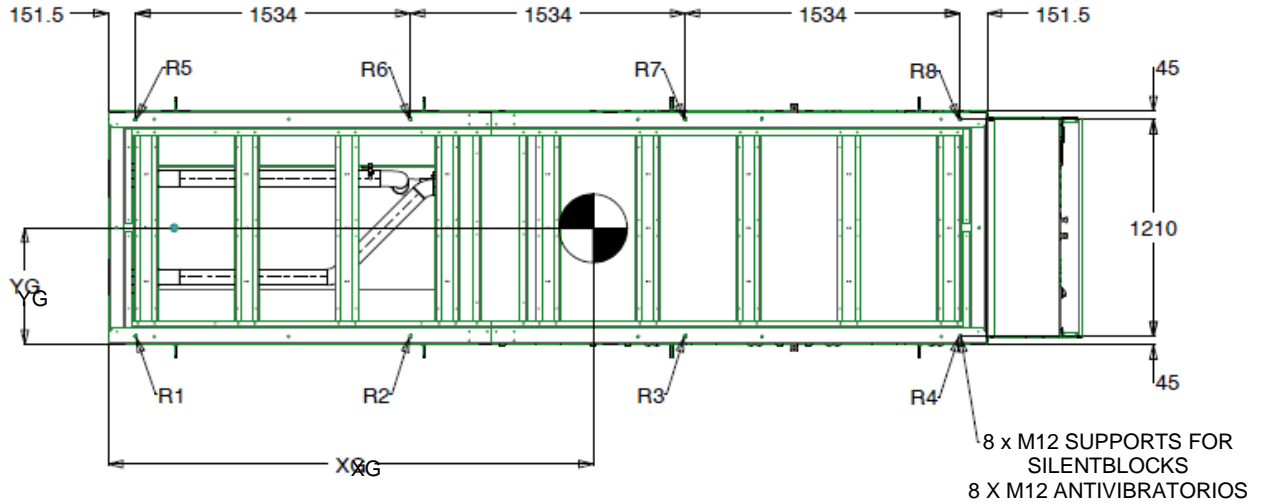
EMPTY WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN VACÍO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
4140	3022.1	668.6	129.9	226.5	543.5	341.2	149.6	246.2	563.2	360.9	2561.0
4160	2997.4	670.8	139.1	242.2	558.4	349.9	162.0	265.1	581.4	372.9	2671.0
4200	3048.6	670.8	129.9	228.6	576.5	361.8	153.0	251.7	599.6	384.9	2686.0

YG

SERVICE WEIGHT DISTRIBUTION / DISTRIBUCIÓN DE PESOS EN SERVICIO											
MODEL MODELO	GRAVITY CENTER CENTRO DE GRAVEDAD		SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	XG (mm)	YG (mm)	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
4140	2753.3	630.1	230.9	371.0	564.1	359.6	206.6	346.7	539.8	335.3	2954.0
4160	2741.4	633.4	240.1	386.8	579.2	368.4	219.1	365.8	558.2	347.4	3065.0
4200	2788.6	633.6	230.7	372.9	597.9	380.7	209.9	352.0	577.1	359.8	3081.0



INCREASED WEIGHT DUE TO OPTIONAL ACCESSORIES INSTALLED

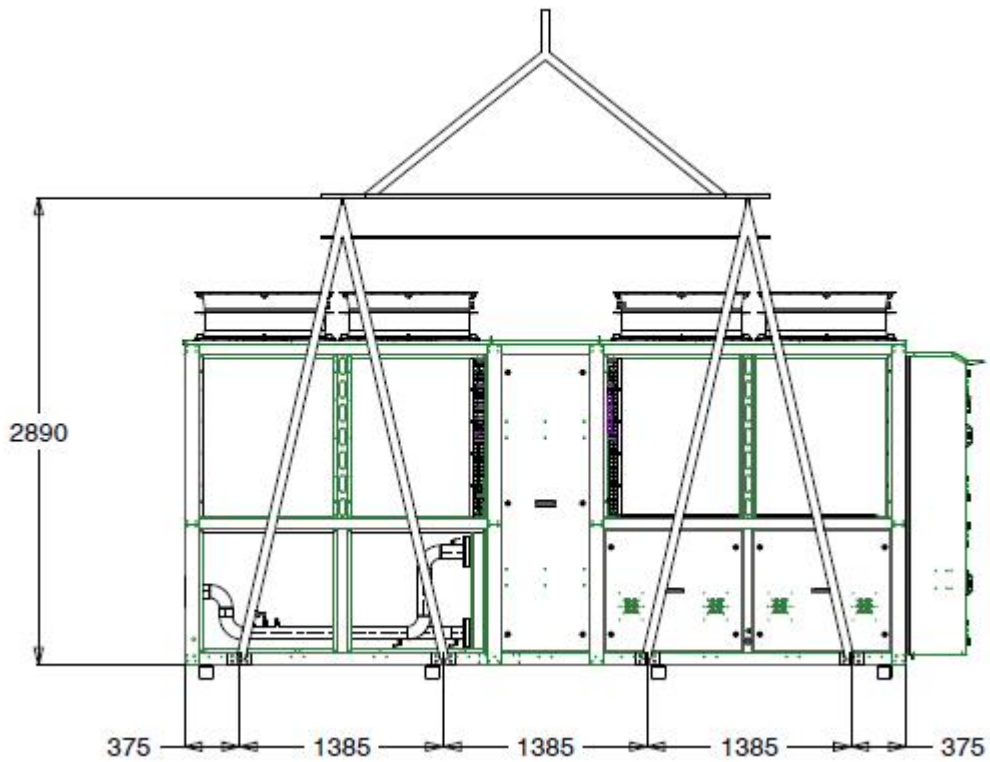


WEIGHT INCREASE BY OPTIONALS / INCREMENTO DE PESOS POR OPCIONALES									
OPTIONALS OPCIONALES	SUPPORTS (kg) REACCIONES (kg)								WEIGHT (kg) PESO (kg)
	R1	R2	R3	R4	R5	R6	R7	R8	TOTAL
AXITOP	+ 5.9	+9.4	+9.0	+5.7	+5.9	+9.5	+9.0	+5.6	+60.0
HIGH PRESSURE PUMP - 4140 MODEL BOMBA DE ALTA PRESIÓN - MODELO 4140	+ 0.8	+0.9	+0.5	+0.4	+0.2	+0.5	-0.1	-0.2	+3.0
HIGH PRESSURE PUMP - 4160 MODEL BOMBA DE ALTA PRESIÓN - MODELO 4160	+0.5	+0.6	+0.5	+0.4	+0.0	+0.1	+0.0	-0.1	+2.0
HIGH PRESSURE PUMP - 4200 MODEL BOMBA DE ALTA PRESIÓN - MODELO 4200	+ 2.3	+3.1	+1.3	+1.1	+0.7	+1.5	-0.4	-0.6	+9.0
VERY HIGH PRESSURE PUMP - 4140 MODEL BOMBA DE MUY ALTA PRESIÓN - MODELO 4140	+8.4	+11.2	+4.7	+3.9	+2.3	+5.2	-1.5	-2.2	+32.0
VERY HIGH PRESSURE PUMP - 4160 MODEL BOMBA DE MUY ALTA PRESIÓN - MODELO 4160	+6.2	+8.3	+3.8	+3.1	+1.5	+3.6	-0.9	-1.6	+24.0
VERY HIGH PRESSURE PUMP - 4200 MODEL BOMBA DE MUY ALTA PRESIÓN - MODELO 4200	+ 7.6	+10.3	+4.2	+3.6	+2.1	+4.7	-1.4	-2.1	+29.0
RESERVE PUMP - P VERSION - 4140 MODEL BOMBA DE RESERVA - VERSIÓN P - MODELO 4140	+18.0	+ 25.1	+ 2.1	+ 2.6	+ 8.3	+ 15.4	-7.4	-7.1	+57.0
RESERVE PUMP - P VERSION - 4160 MODEL BOMBA DE RESERVA - VERSIÓN P - MODELO 4160	+24.9	+34.6	+3.1	+3.8	+11.1	+21.0	-10.6	-9.9	+78.0
RESERVE PUMP - P VERSION - 4200 MODEL BOMBA DE RESERVA - VERSIÓN P - MODELO 4200	+26.0	+36.2	+2.9	+3.8	+11.8	+22.1	-11.3	-10.5	+81.0
RESERVE PUMP - H VERSION - 4140 MODEL BOMBA DE RESERVA - VERSIÓN H - MODELO 4140	+0.3	+1.8	-1.2	-1.7	+5.2	+6.7	+3.7	+3.2	+18.0
RESERVE PUMP - H VERSION - 4160 MODEL BOMBA DE RESERVA - VERSIÓN H - MODELO 4160	+0.2	+3.4	-2.1	-3.2	+10.9	+14.1	+8.5	+7.2	+39.0
RESERVE PUMP - H VERSION - 4200 MODEL BOMBA DE RESERVA - VERSIÓN H - MODELO 4200	+0.6	+4.1	-2.5	-3.7	+11.8	+15.4	+8.8	+7.5	+42.0
PARTIAL HEAT RECOVERY RECUPERACIÓN PARCIAL	+1.8	+2.8	+2.6	+1.7	+1.8	+3.0	+2.6	+1.7	+18.0
TOTAL HEAT RECOVERY RECUPERACIÓN TOTAL	+80.5	+96.5	+66.0	+59.9	-23.3	-7.0	-37.8	-43.8	+191.0
FREE-COOLING	+48.3	+77.6	+49.8	+29.7	+51.3	+80.7	+52.8	+32.8	+423.0



LIFTING STRUCTURE

VERSIONS S/P/H



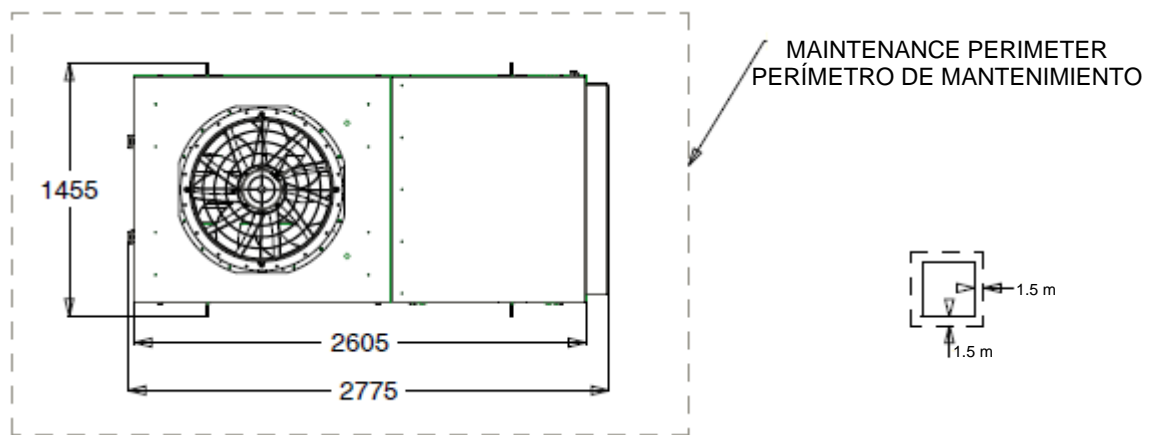


MINIMUM MAINTENANCE DISTANCE

Observe the safety distance to perform maintenance tasks or replace components.

 **Failing to observe the minimum safety distances for maintenance may result in malfunction of the unit.**

The minimum safety distances are shown in the image below:





CERTIFICATES

- **QUALITY CERTIFICATION ISO 9001:2015**
- **ENVIRONMENTAL MANAGEMENT CERTIFICATE ISO 14001:2015**
- **DECLARATION OF CONFORMITY**



Certificate

Standard **ISO 9001:2015**

Certificate Registr. No. 0.04.14166

Certificate Holder: **KEYTER TECHNOLOGIES, S.L.**
 Pol. Ind. Los Santos C/ Jose Estrada Orellana,2
 14900 Lucena (Córdoba)
 Spain

Scope: Design, manufacture, marketing and After-Sales Service of industrial air conditioning and refrigeration equipment

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2021-09-10 until 2024-09-09.
 First certification 2015

2021-09-23

TÜV Rheinland Ibérica Inspection,
 Certification & Testing S.A.
 Garrotxa, 10-12 – E-08820 El Prat de
 Llobregat

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Certificate

Standard **ISO 14001:2015**

Certificate Registr. No. 3.00.14061

Certificate Holder: **KEYTER TECHNOLOGIES, S.L.**
 Pol. Ind. Los Santos C/ Jose Estrada Orellana,2
 14900 Lucena (Córdoba)
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2021-09-23


 TÜV Rheinland Ibérica Inspection,
 Certification & Testing S.A.
 Garrotxa, 10-12 – E-08820 El Prat de
 Llobregat

www.tuv.com





**CE DECLARATION OF CONFORMITY
DECLARACION DE CONFORMIDAD CE
DÉCLARATION DE CONFORMITÉ CE
DICHIARAZIONE DI CONFORMITÀ CE
EC-CONFORMITEITSVERKLARING
EC-KONFORMITÄTSERKLÄRUNG**

The manufacturer / El fabricante / Le fabricant / Il fabbricante / De Fabrikant / Der Hersteller:

KEYTER TECHNOLOGIES S.L.

Pol. Ind. Los Santos s/n
14900 Lucena (Córdoba)

SPAIN / ESPAÑA / ESPAGNE / SPAGNA / SPANJE / SPANIEN

Declara bajo su responsabilidad, que el producto detallado / *Declares under its responsibility, that the following product / Déclare sous sa responsabilité, que le produit ci-dessous détaillé / Dichiaro sotto la propria responsabilità che il prodotto qui seguito citato / verklaart op eigen verantwoordelijkheid dat de hieronder genoemde producten / erklart unter eigener Verantwortung, dass die unten aufgeführten Produkte:*

Model / modelo / modèle / modello / model / Modell:

Year of manufacturing / año de construcción / année de fabrication / Anno

Serial number / Número de serie / Numéro de série / Numero di serie /

Seriennummer / Seriennummer:

Is in conformity with the provisions of the following Directives and standards/ *Es conforme a las disposiciones de las directivas y normas / Est conforme aux dispositions des directives et normes suivantes / É conforme alle disposizioni delle Direttive e standards / Voldoet aan de volgende Europese Richtlijnen en normen / Konform ist mit den Bestimmungen der Richtlinie und der standards:*

Machine directive / <i>Directiva de máquinas / Directive Machines / Direttiva Macchine / Machinerichtlijn / Maschinenrichtlinie:</i>	2006/42/CE		
Electromagnetic compatibility / <i>Compatibilidad electromagnética / sur la Compatibilité électromagnétique / Compatibilità elettromagnetica / Elektromagnetische compatibilität / Elektromagnetische Verträglichkeit:</i>	2014/30/UE		
Low tension / <i>Baja tensión / Basse tension / Bassa Tensione / Laagspanningsrichtlijn / Maschinenrichtlinie:</i>	2014/35/UE		
Ecodesign requirements / <i>Requisitos diseño ecológicos / Exigences en matière d'ecoconception / Specifiche per la progettazione ecocompatibile / Festlegung von Anforderungen an die umweltgerechte gestaltung / Eisen intake ecologisch ontwerp:</i>	2009/125/CE EU/2016/2281		
Pressure Equipment / <i>Equipos a presión / Equipment sous pression / Apparecchi a pressione / Richtlijn Drukapparatuur / Richtlinie über Druckgeräte:</i>	2014/68/EU	Cat.	Tipo
NoBo 1027 TÜV Rheinland Ibérica Inspection Certification & Testing SA. C/La Garrotxa (P.N. Mas blau ed oceano, 10-12. 8820 El Prat de Llobregat (Barcelona))	Mod. B		Familia
NoBo 0035 TÜV Rheinland Industrie Service GmbH. Am Grauen Stein, 51105 Köln (Germany)	Mod. D		
RoHS Restriction of certain Hazardous Substances in electric and electronic equipment / <i>Directiva RoHS / Directive RoHS / Direttiva RoHS / RoHS Richtlijn / RoHS Richtlinie:</i>	2011/65/CE		
Substances that deplete the ozone layer / <i>Sustancias que agotan la capa de ozono / Substances qui appauvrissent la couche d'ozone / Sostanze che riducono lo strato di ozono / Stoffe die zum Abbau der Ozonschicht führen / Ozonlaag afbrekende stoffen:</i>	1005/2009/CE		
Fluorinated greenhouse gases / <i>Gases fluorados de efecto invernadero / Gaz à effet de serre fluorés / Gas fluorurati a effetto serra / Fluorierte Treibhausgase / Gefluoreerde broeikasgassen:</i>	517/2014/UE		
Refrigerating systems and heat pumps - safety and environmental requirements - part 2: design, construction, testing, marking and documentation / <i>Sistemas de refrigeración y bombas de calor / Systèmes de refroidissement et pompes à chaleur / Sistemi di raffreddamento e pompe di calore / Koelsystemen en warmtepompen / Kühlsysteme und Wärmepumpen:</i>	EN 378-2:2017		
Household and similar electrical appliances - part 2: safety / <i>Aparatos electrodomésticos y análogos / Appareils électroménagers et appareils électriques similaires / Eletrodomestici e apparecchi elettrici simili / Huishoudelijke en soortgelijke elektrische apparaten / Haushaltsgeräte und ähnliche elektrogeräte:</i>	EN 60335-2-40:2005		
Certified on the / <i>Certificado el día / Certifié le jour / Certificado il / Certificaat op / Zertifikat auf:</i>			

Antonio Blanco Luque
Director General / *Chief Executive Officer*



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