Zeta Rev HE FC

46÷149 kW

R410A

General
High efficiency, air-condensed free cooling water chiller unit, with scroll compressors and plate heat exchanger.

Configurations
LN: low noise unit

NG: unit without glycol on user circuit

Strengths
- Patented free cooling system
- Reduced refrigerant charge
- Advanced Bluethink controller with integrated web server
- Multilogic/Multifree functionality for multi-unit systems
- Blueye supervision system
- Flowzer: system with variable water flow rate
- Glycol-free version available

WESTERN™ AIRCONDITIONING WARMTEPOMPEN

BlueBox by Swegon

APPLICATION AND OPERATING PRINCIPLE

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

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

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

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

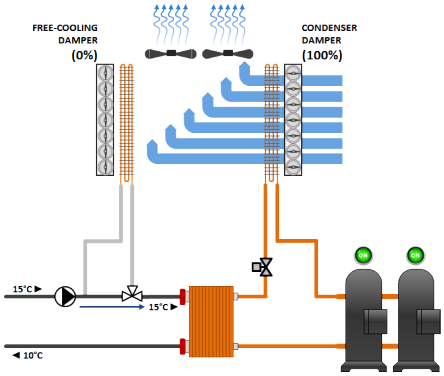
When the TFT (Total Free-cooling Temperature) is reached, the free cooling section will be able to fully meet the cooling capacity requirement and therefore the compressors can be switched off. In this condition, the unit will be able to provide the system with a cooling capacity equal to that required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

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

ZETA REV HE FC

Chiller only mode

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

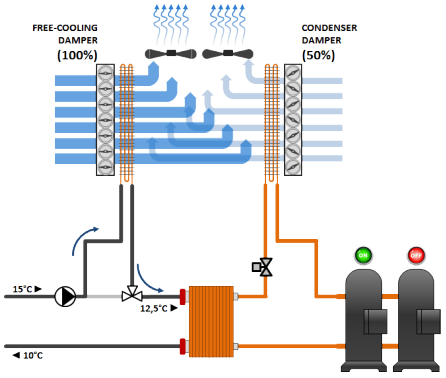


In this mode, the damper that controls the air flow rate at the free cooling coil is fully closed, whereas the one in front of the condensing coil is fully open.

The 3-way valve bypasses the free cooling coil (to prevent unnecessary head losses) and condensation control is done, when necessary, through modulation of the fans.

Mixed mode

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



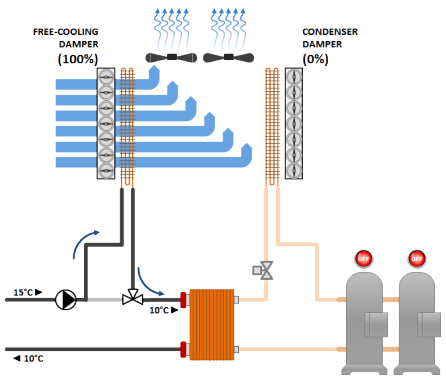
The controller switches over the 3-way valve to put the free cooling coil in series with the evaporator, fully opens the free cooling damper and pushes the fans to maximum speed. In this way, extraction of maximum cooling capacity from the outside air is ensured.

The water leaving the free cooling coil will be the water that enters the evaporator. Since the water is "pre-cooled", the amount of capacity required of the chiller section will be lower and therefore this will be able to operate with reduced capacity.

Since the fans must be kept at 100% to ensure the maximum capacity at the water coil, condensation control is done by modulating the opening of the damper situated in front of the condensing coil.

Free cooling only mode

Below a certain outside air temperature, the unit operates exclusively in free cooling mode.



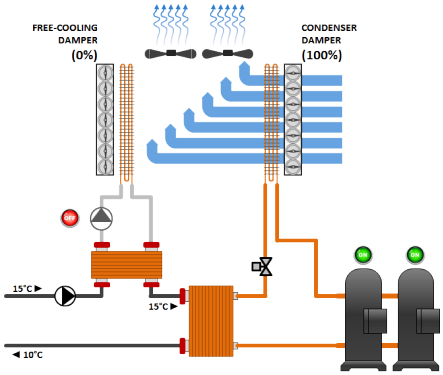
The capacity given by the water coil fully meets the requirement of the system, and therefore the damper in front of the condenser is fully closed and the compressors are kept switched off.

Also, through fan speed modulation, the controller of the unit will manage the capacity given by the free cooling section that, with the lowering of the outside air temperature, could be excessive.

ZETA REV HE FC/NG

Chiller only mode

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

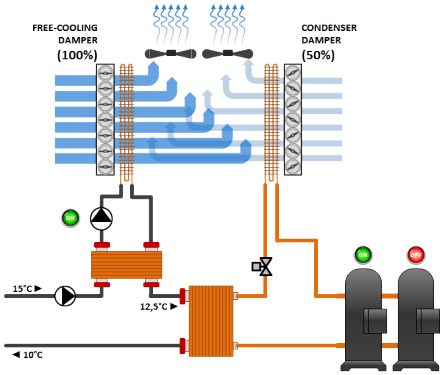


In this mode, the damper that controls the flow rate at the free cooling coil is fully closed, whereas the one in front of the condensing coil is fully open.

The circulation pump on the free cooling circuit remains switched off, whereas condensation control is done, when necessary, through modulation of the fans.

Mixed mode

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



The controller switches on the circulation pump of the free cooling circuit, fully opens the free cooling damper and pushes the fans to maximum speed. In this way, extraction of maximum cooling capacity from the outside air is ensured.

The cooling capacity of the free cooling coil is transferred to the system water through a decoupling exchanger. This allows the glycol water circulating in the free cooling circuit to be separated from the system water that therefore does not need the addition of antifreeze.

The water leaving the decoupling exchanger will be the water that enters the evaporator. Since the water is "pre-cooled", the amount of capacity required of the chiller section will be lower and therefore this will be able to operate with reduced capacity.

Since the fans must be kept at 100% to ensure the maximum capacity at the water coil, condensation control is done by modulating the opening of the damper situated in front of the condensing coil.

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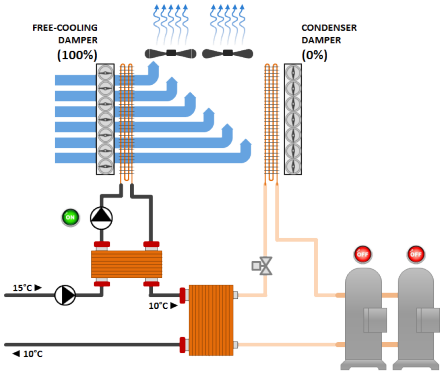

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Also, through fan speed modulation, the controller of the unit will manage the capacity given by the free cooling section that, with the lowering of the outside air temperature, could be excessive.

Zeta Rev HE FC

High efficiency, air-condensed free cooling water chiller unit, with scroll compressors and plate heat exchanger.

PRODUCT DESCRIPTION

BODY

The structure of the unit is made of galvanized sheet-iron coated with polyester powder in RAL 5017/7035 at 180°C, which makes it highly resistant to weather conditions.

The structure is a load-bearing frame, with removable panelling lined with sound absorbing expanded polyurethane matting.

All screws and bolts are stainless steel.

COMPRESSORS

The compressors are hermetic orbiting spiral scroll compressors connected in tandem, fitted with oil level sight glass, oil equalization line, crankcase heater and electronic protection.

The compressors, enclosed in a soundproof compartment and separated from the air flow, can be accessed through special panelling that allows maintenance operations to be carried out even with units running.

SOURCE-SIDE HEAT EXCHANGER

The exchangers are made with microchannel aluminium coils.

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

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

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

FREE COOLING COIL

The free cooling exchanger consists of a row coil with copper tubes and aluminium fins.

Refer to chapters "Installation advice" and "Description of accessories" for assessment of any options or treatments based on the place of installation.

This exchanger is put in series with the user-side heat exchanger by means of a 3-way valve. When the unit is not working in free cooling mode, the valve allows the coil to be bypassed to prevent unnecessary hydraulic head losses.

For /NG version units, the free cooling coil is connected to a decoupling exchanger situated in series with the evaporator. The coil is supplied by a dedicated circulation pump that will be switched on only with free cooling active.

The free cooling coil is positioned on the opposite side of the machine to the condensing coil so that it can be managed completely independently.

In front of the coil, there is a damper dedicated to controlling the air flow rate at the exchanger, complete with point servo control. Damper management is done by the controller following the logics of the patented free cooling system (patent n° IT1855070):

- in chiller mode, the 3-way valve is closed (for the /NG version, the circulation pump is off), the damper is fully closed, so ensuring the full air flow rate at the condensing coil alone
- in mixed mode (chiller + free cooling), the 3-way valve is open (for the /NG version, the circulation pump is on), the fans work at full speed and the damper is fully open, so allowing the maximum air flow rate at the free cooling coil
- in free cooling mode, the damper is fully open and control of the capacity given by the free cooling coil is done by the controller of the unit by modulating the speed of the fans

FANS

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

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

The fans are controlled as standard by a phase cutting speed adjuster managed by the controller.

USER-SIDE HEAT EXCHANGER

The exchanger is a braze-welded stainless steel plate heat exchanger, insulated with a shroud of closed-cell insulating material.

The exchanger is equipped with two temperature probes (one at the inlet and one at the outlet) for controlling the water temperature and the freeze protection.

The exchanger is protected as standard by an electric anti-freeze heater managed by the controller of the unit.

REFRIGERANT CIRCUIT

The refrigerant circuit of the basic unit comprises:

- shut-off valve in the liquid line
- 5/16" charging valves
- liquid sight glass
- replaceable solid cartridge dehydrator filter (except for sizes 3.2, 4.2 and 5.2 where the filter is a weld-on filter)
- thermostatic expansion valve with pressure equalization
- high and low pressure switches

The pipes of the circuit and the exchanger are insulated with extruded closed-cell expanded elastomer.

As an accessory, all the units can be fitted with an electronic expansion valve that allows machine stability to be reached more quickly and better superheating control than the mechanical expansion valve, to maximize the use of the evaporator in all load conditions.

ELECTRICAL CONTROL PANEL

The electrical control panel is made in a painted galvanized sheet-iron box with forced ventilation and IP54 protection rating.

The electrical control panel of the basic unit comprises:

- main disconnect switch
- automatic circuit breakers for compressors with fixed calibration
- fuses for protecting the fans and auxiliary circuits
- fan contactors
- phase-cutting fan speed adjuster
- thermal magnetic circuit breakers for pumps (if present)
- phase monitor
- potential-free general alarm contacts
- single potential free operating contacts for compressors, fans and pumps (when present)
- digital input for general ON/OFF
- external air temperature probe
- microprocessor controller with display accessible from the outside

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

Power supply: 400V/3~+N/50Hz for models from 3.2 to 10.2; 400V/3~/50Hz for models 12.2 and 13.2

CONTROL BLUETHINK

Main controller functions

The microprocessor control allows the following functions:

- water temperature adjustment, with outgoing water control
- freeze protection
- compressor timings
- automatic rotation of compressor starting sequence
- recording of the log of all machine inputs, outputs and states
- automatic rotation of compressor starting sequence
- recording of the alarm log
- digital input for general ON/OFF
- RS485 serial port with Modbus protocol
- Ethernet serial port with Modbus protocol and integrated web server preloaded web page
- USB port

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

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

Main functions of the webserver (only for units with advanced control)

As standard, the Bluethink controller integrates a webserver with a preloaded web page that is accessed via password.

The web page allows the following functions to be carried out (some of these are available only for users with advanced level rights):

- display of the main information on the unit, such as serial n°, size, type of refrigerant
- display of the general status of the machine: water inlet and outlet temperatures, external air temperature, operating mode, evaporating and condensing pressures, suction and discharge temperatures
- display of the status of compressors, fans, pumps, electronic expansion valves
- display in real time of the graphs of the main quantities
- display of the graphs of logged quantities
- display of alarm log
- display of the status of all the I/Os of the controller
- management of users on several levels
- remote ON/OFF
- remote set point change
- remote time band change

Human-Machine Interface

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

- water inlet and outlet temperature
- set temperature and differential set points
- description of alarms
- hour meter of operation and number of start-ups of the unit, the compressors and the pumps (if present)
- high and low pressure values, and relevant condensing and evaporating temperatures
- external air temperature
- superheating at compressor suction.

CONTROLS AND SAFETY DEVICES

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

- high pressure switch with manual reset
- high pressure safety device with automatic reset, for a limited number of occurrences, managed by the controller
- low pressure safety device with automatic reset and limited tripping managed by the controller
- high pressure safety valves
- antifreeze probe at the outlet of the user-side heat exchangers
- differential pressure switch already fitted on the user-side heat exchangers
- overtemperature protection for compressors and fans

TESTING

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

PACKAGING

The unit is made and shipped on a wooden pallet that allows the unit to be handled using a forklift truck.

The unit is wrapped in a protective transparent polyethylene stretch film.

VERSIONS

Zeta Rev HE FC/NG

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

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

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

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

OPTIONS

/LN: silenced unit

In the unit with /LN option, the technical compartment that houses the compressors is fully soundproofed with sound absorbing material and soundproofing material.

HYDRAULIC MODULES

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

- /1P: hydraulic module with one pump
- /2P: hydraulic module with two pumps
- /1PS: hydraulic module with one pump and buffer tank
- /2PS: hydraulic module with two pumps and buffer tank

All the above-mentioned modules have pumps with standard discharge head.

Hydraulic modules with one pump have:

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

Hydraulic modules with two pumps have:

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

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

Hydraulic modules with tank also have:

- a tank with drain valve and air valve

DESCRIPTION OF ACCESSORIES

Refrigerant circuit accessories

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

BK **Brine Kit**

This accessory is compulsory if a water temperature set point lower than +3°C is used (if the unit is provided with double set point or variable set point, the lower set point is considered).

The accessory consists of increased insulation and suitable sizing and calibration of some components.

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

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

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

MAFR **Pressure gauges**

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

RG **Fan speed adjuster (S)**

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

For units equipped with EC fans, the same function is carried out using the electronically commutated motor of the fans and is supplied as standard.

RIC **Liquid receiver**

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

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

With this accessory, a refrigerant leak detector is placed inside each compressor compartment. Detection of a refrigerant leak is managed by the control through a specific alarm and display of a specific icon on the display of the control. For all the circuits of the unit, the alarm also starts the machine stopping procedure with pump down, confining all the refrigerant in the coils.

The accessory includes the capacitive backup battery.

RPR **Refrigerant leak detector**

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

RUB **Compressor suction and delivery valves**

The valves situated on the delivery side and on the suction side of the compressors allow the compressor to be isolated from the rest of the refrigerant circuit, so making the maintenance operations quicker and less invasive

VS **Liquid line solenoid valve**

This accessory prevents refrigerant migration that could damage the compressor on starting.

VTE **Electronic expansion valve**

The use of this component is particularly advisable on units operating in very variable heat load or operating mode conditions, as in the case of joint management of air conditioning and high temperature water production. The use of an electronic thermostatic valve allows you to:

- maximize heat exchange at the evaporator
- minimize response times to changes in load and operating conditions
- optimize control of overheating
- ensure maximum energy efficiency

Fan accessories

VEC **EC fans**

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

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

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

VEM **Oversize EC fans**

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

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

Hydraulic circuit accessories

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

CORM **Connection for manual filling**

This accessory allows the system filling procedure to be carried out directly from the unit: on the fan holder cover, there is a 1'' filling valve and a 1/2'' air valve. Near the filling valve, there is also a pressure gauge for displaying the pressure in the hydraulic circuit. This accessory can be combined only with units provided with tank.

FVP **FLOWZER VP - Inverter for manual pump adjustment**

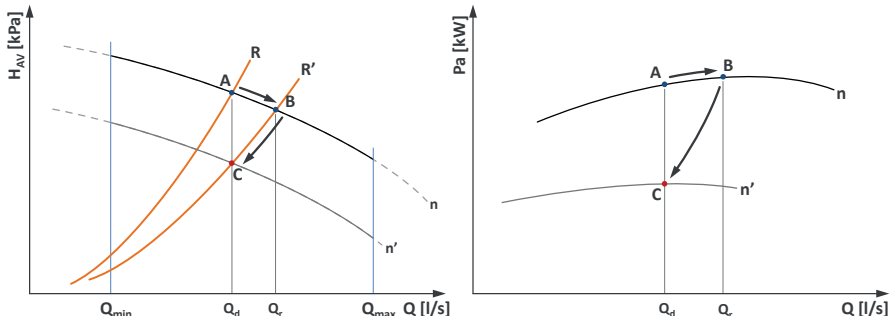
The accessory consists of inserting an inverter in the machine to manually adjust the speed of the pump (or pumps) in order to calibrate the pump flow rate on the head losses of the system.

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

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

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

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



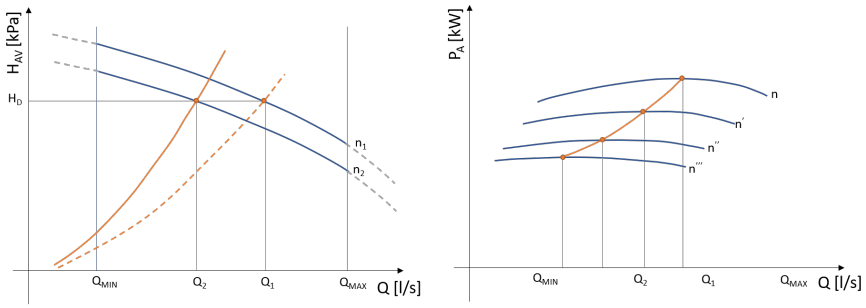
The use of the Flowzer VP allows the pump speed to be set manually (e.g. at speed n' instead of n) to obtain the design water flow rate and thermal gradient (point C). Once the adjustment procedure has been carried out, the pump will always work at a fixed flow rate.

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

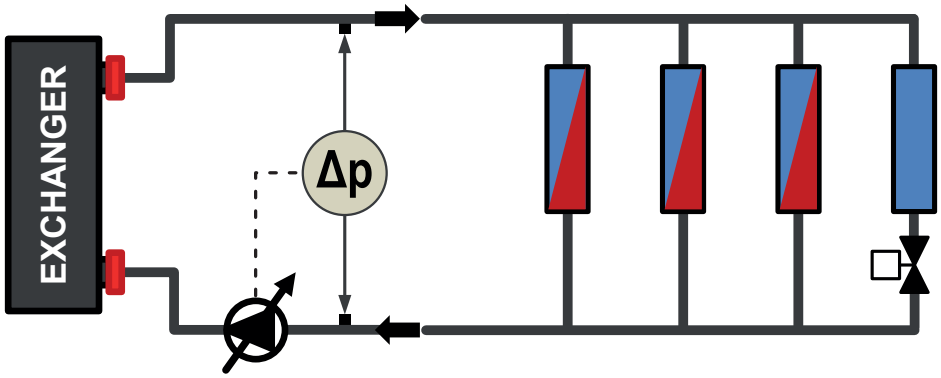
For the freecooling units the Flowzer VP is able to manage two different speeds of the pump automatically compensating the pressure drops of the water coil.

FVD **FLOWZER VD - Transducer for automatic adjustment**

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



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



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

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

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

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

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

RA **Antifreeze heater**

These are electric heaters inserted on the user-side heat exchanger, on the pumps and in the tank (depending on the configuration of the machine) to prevent damage to the hydraulic components due to ice formation during periods when the machine is stopped.

The antifreeze heater is present as standard on the user-side heat exchanger alone.

VSIW **Water-side safety valve (S)**

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

The safety valve is inserted as standard on both hydraulic circuits.

Electrical accessories

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

A41N 415/3+N/50 power supply
415/3+N/50 power supply. Available for the following units: for Zeta Rev and Zeta Rev LE from size 3.2 up to size 10.2, for HE and SLN configurations from size 3.2 up to size7.2.

A43N Power supply 400/3+N/50
Power supply present as standard in the following units: for Zeta Rev and Zeta Rev LE from size 3.2 to size 10.2, for HE and SLN configurations from size 3.2 to size 7.2.

A43 Power supply 400/3/50
The standard power supply of the unit

A41 Power supply 415/3/50
Power supply 415/3/50. Available for the following units: for Zeta Rev and Zeta Rev LE from size 12.2 up to size 24.4, for HE and SLN configurations from size 8.2 up to size16.4

DAA Double power supply with automatic switching
A motor-driven automatic switch to which to connect two separate power supply lines (for example, one from the mains power line and one from the uninterruptible power supply unit) is installed in the electrical control panel of the unit.
The switching from one line to another is automatic and obligatorily requires passing through the OFF position.
When this accessory is requested, the power supply of the unit must compulsorily include neutral.

DAM Double power supply with manual switching
A manual switch to which to connect two separate power supply lines (for example, one from the mains power line and one from the uninterruptible power supply unit) is installed in the electrical control panel of the unit.
The switching from one line to another is manual and obligatorily requires passing through the OFF position.
The connection between the master unit and the slave units made with a CAT cable. 5E/UTP (prepared by the customer) with RJ45 connectors. Maximum cable length 100m.
When other free cooling units are present, besides the master, in the same network of machines, it is possible to activate the Multifree function: this function allows the master to activate the free cooling sections of all the units in the network, even those whose compressors are off.
The Multifree function therefore makes it possible to have a free cooling section equivalent to the sum of the individual sections, thereby obtaining a reduction in the Total Free-cooling Temperature, an increase in the free cooling capacity and therefore less use of the compressors with consequent saving of absorbed energy.
For further details, please refer to the controller manual.

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

PBA BACnet protocol over IP (Ethernet)
The controller is set for use, in read and write mode, of the BACnet port on IP protocol.
By default, the programming gives read-only access to the control of the unit. Enabling of read/write access should be requested when ordering.

RE1P Relay for management of 1 external pump
This accessory can be requested for units without pumps and allows a pump outside the machine to be controlled.

RE2P Relay for management of 2 external pumps
This accessory can be requested for units without pumps and allows two pumps outside the machine to be controlled with a running/stand-by logic by implementing a rotation on the hours of operation.

RIF Power factor correction to cosφ ≥ 0.95
With this accessory, an electrical control panel, containing power factor correction capacitors to make the cosφ of the unit greater than or equal to 0.95, is supplied with the unit. The capacitors should be connected (by the customer) to the electrical control panel of the unit in the specially prepared terminal board.
Besides reducing the absorbed reactive power, the use of this accessory also allows the maximum absorbed current to be lowered.

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

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

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

SETD **Double set point from digital input**

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

The set point temperatures must be specified when ordering. For optimization of the unit, reference will be made to the lowest set point.

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

- set point 1 at 7°C
- set point 2 at 12°C

SETV **Variable set point with remote signal**

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

The set point temperatures and the type of signal to use for the adjustment must be specified when ordering. For optimization of the unit, reference will be made to the lowest set point.

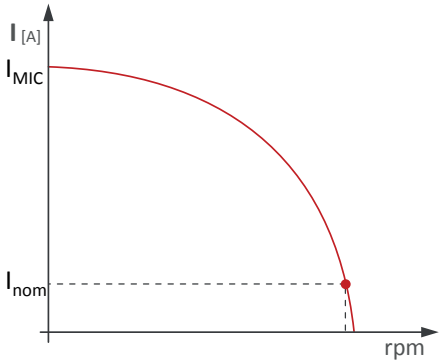
Unless otherwise specified in the order, the controller will be set at the factory with 0-10V analogue input and with the following temperatures:

- 0V will correspond to a set point of 7°C
- 10V will correspond to a set point of 12°C

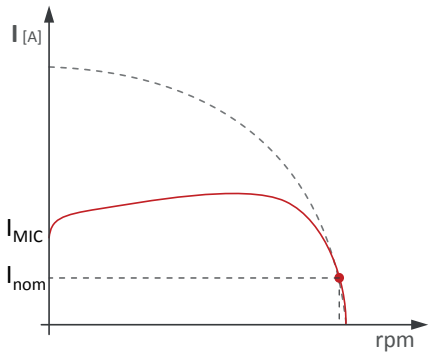
SOFT **Electronic soft-starter**

The scroll compressors have DOL (Direct On Line) starting and therefore the maximum inrush current IMIC will be 4/5 times its nominal current Inom.

If the unit is equipped with the electronic soft-starter accessory, the starting of each compressor is done with an acceleration ramp that allows the effective value (rms value) of the inrush current of the individual compressor to be lowered.



Current trend without accessory Electronic soft-starter



Current trend with accessory Electronic soft-starter

If the unit is equipped with accessory "Power factor correction to cosφ ≥ 0.95", this last will be electro-mechanically connected only at the end of the acceleration ramp of the soft-starter.

SUN **Heaters for operation with air below -25°C**

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

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

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

RMMT Maximum and minimum voltage relay

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

TERM Remote-controlled user terminal panel

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

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

For this accessory, there is a dedicated serial port.

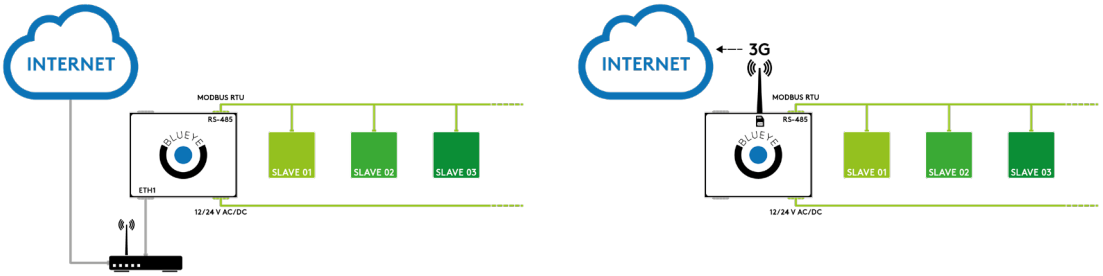
SQE Heater for electrical control panel

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

BERS **Blueye® via RS485**

This accessory requires use of the Blueye device, installed and wired in the unit through a RS485 serial port on the ModBus RTU protocol.

This option requires integration with one contract of the Blueye Cloud series. (Basic or Advanced one)



SW4P **Network switch with 4 ports**

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

SW8P **Network switch with 8 ports**

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

Requires Blueye via Ethernet.

PBA **BACnet protocol over IP (Ethernet)**

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

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

GLO **Modbus Lonworks Gateway**

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

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

SMAR **Smartlink**

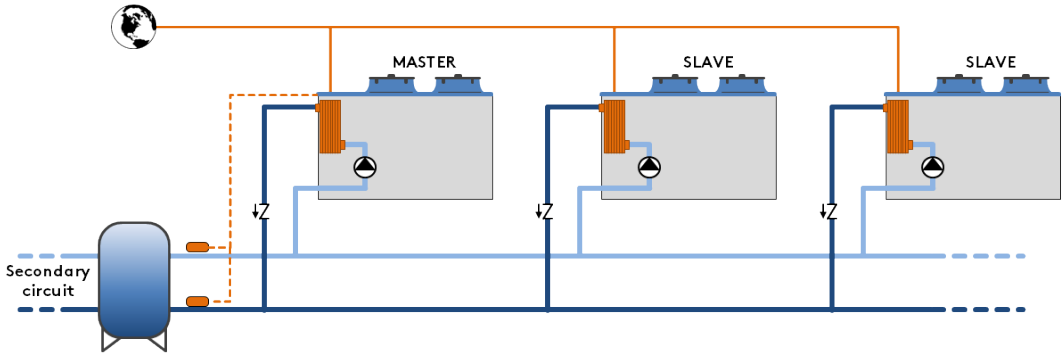
This accessory makes it possible to connect the controller of the unit with the controller of a Swegon GOLD™ air handling unit via a simple serial cable, so allowing their operating logi-cs to be merged into a single consciousness that pursues the maximum energy efficiency of the system. The RS485 serial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

The option is incompatible with:

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

FMx Multilogic Function

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



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

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

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

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

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

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

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

For the slave units, the accessory requires:

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

For the master units, the accessory requires:

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

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

For further details, please refer to the controller manual.

Other accessories

AG **Rubber anti-vibration mounts**

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

Accessory supplied loose.

FW **Water filter**

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

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

Accessory supplied loose.

GABB **Packaging in wooden crate**

The unit is protected by a custom-made wooden cage, including a wooden sled designed for loading into containers and a fixing system. The accessory can be used for container shipping. Loading on containers must be carried out at the factory. The accessory is incompatible with "Skid for shipping in containers".

RAAL **Cu/Al coils**

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

The unit is delivered so that it can be disassembled easily on site if this makes the installation operations easier.

A unit requested with this option is supplied:

- screwed instead of riveted
- with plugged and not welded pipes
- without refrigerant charge
- untested
- covered by the warranty only if reassembled and screwed together by personnel authorized by the factory

SLCO **Skid for shipping in container**

The accessory provides for the installation of a wooden sled for loading and a fixing system inside the container by a strap. The accessory must be used for shipping in container. Loading on containers must be carried out at the factory. The accessory is incompatible with "Packaging in wooden crate".

PREA **Unit suitable to be disassembled on site**

The unit is delivered so that it can be disassembled easily on site if this makes the installation operations easier.

A unit requested with this option is supplied:

- screwed instead of riveted
- with plugged and not welded pipes
- without refrigerant charge
- untested
- covered by the warranty only if reassembled and screwed together by personnel authorized by the factory

ANTC **Coil treated with anti-corrosion paints**

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

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

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

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

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

MCHE E-coated microchannel coil

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

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

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

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

BFAN Free cooling coil treated with anti-corrosion paints

Specific option for free-cooling batteries.

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

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

- the presence of corrosive phenomena on the metal surfaces exposed in the installation area is evident
- the installation is located close to the sea coast
- the prevailing winds come from the sea towards the unit
- the installation is located close to the sea coast
- the environment is industrial with a significant concentration of pollutants
- the environment is urban with a high population density
- the environment is rural with the presence of organic discharges and effluents

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

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

TECHNICAL SPECIFICATIONS

ZETA REV HE FC

			3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	12.2	13.2
Cooling (A30°C; EG30% 15/10°C)												
Refrigeration capacity	(1)	kW	46,3	53,0	62,8	67,5	77,2	92,2	106,4	119,7	137,4	149,0
Total absorbed power	(1)	kW	13,3	15,9	19,3	19,3	23,0	25,2	29,8	34,1	39,4	45,2
EER	(1)		3,48	3,32	3,26	3,50	3,35	3,66	3,57	3,51	3,49	3,29
ESEER			4,10	4,09	4,06	4,17	4,08	4,17	4,19	4,08	4,06	3,91
Free-Cooling (A5°C; EG30% 15/x°C)												
Refrigeration capacity	(2)	kW	34,2	35,3	36,8	45,9	46,9	69,2	70,7	71,9	88,4	89,6
Amount of free cooling	(2)		74%	67%	59%	68%	61%	75%	66%	60%	64%	60%
TFT - Total Free-cooling Temperature		°C	1,2	-0,2	-2,3	0,1	-1,6	1,5	-0,2	-1,8	-0,7	-1,7
Compressors												
Compressors/Circuits		n°/n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Minimum capacity reduction step	(6)	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Refrigerant charge (MCHX)	(7)	kg	3,7	5,5	5,5	6	6	9,5	10	10	11,5	11,5
Refrigerant charge (Cu/Al)	(7)	kg	6	7	8,8	10,5	10,5	16	17	17	18	18
Fans												
Diameter		mm	630	630	630	630	630	630	630	630	800	800
Quantity		n°	2	2	2	2	2	3	3	3	2	2
Total air flow rate		m³/h	18.000	18.000	17.000	19.000	19.000	28.000	28.000	28.000	39.000	39.000
User-side heat exchanger												
Quantity		n°	1	1	1	1	1	1	1	1	1	1
Water flow rate	(1)	m³/h	8,9	10,2	12,1	13,0	14,8	17,7	20,5	23,0	26,4	28,6
Total load losses with FC OFF		kPa	85	104	117	53	64	81	100	66	64	63
Total load losses with FC ON		kPa	96	118	135	73	87	95	117	86	89	93
Total internal volume	(3)	l	30	30	30	50	50	70	70	75	75	75
Noise levels												
Sound power lev.	(4)	dB(A)	78	79	79	80	81	82	83	84	86	87
Sound pressure lev.	(5)	dB(A)	46	48	48	48	49	50	51	52	54	55
Sound power lev. LN vers.	(4)	dB(A)	76	77	77	78	79	80	81	82	84	85
Sound pressure lev. LN vers.	(5)	dB(A)	44	46	46	46	47	48	49	50	52	53
Dimensions and weights**												
Length		mm	2.590	2.590	2.590	3.253	3.253	4.405	4.405	4.405	4.405	4.405
Depth		mm	1.337	1.337	1.337	1.337	1.337	1.437	1.437	1.437	1.437	1.437
Height		mm	1.488	1.488	1.488	1.788	1.788	1.788	1.788	1.788	1.882	1.882
Operating weight (MCHX)		kg	842	846	880	1.082	1.094	1.434	1.446	1.456	1.560	1.600

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

(1) Outside air temperature 30°C; inlet/outlet temperature of ethylene glycol 30% 15/10°C

(2) Outside air temperature 5°C; inlet/outlet temperature of ethylene glycol 30% 15/x°C

(3) Volume of water contained in the unit when it is working in free cooling mode. If present, the volume contained in the tank should also be considered.

(4) Unit operating at nominal operating capacity, without any accessories, with external air temperature of 30°C and user-side heat exchanger water inlet-outlet temperature of 15-10°C. Binding values. Values obtained from measures taken according to standard ISO 3744.

(5) Values obtained from the sound power level (conditions: note 4), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

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

(7) The indicated refrigerant charge is calculated. The refrigerant charge can vary according to different versions/accessories and product updates.

** Basic unit without included accessories

ZETA REV HE FC /NG

			3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	12.2	13.2
Cooling (A30°C; EG30% 15/10°C)												
Refrigeration capacity	(1)	kW	47,4	54,3	64,3	69,1	78,8	94,4	108,9	122,4	140,4	151,9
Total absorbed power	(1)	kW	13,4	16,0	19,3	19,5	23,3	25,4	29,9	34,5	39,9	45,9
EER	(1)		3,55	3,39	3,33	3,55	3,39	3,72	3,64	3,55	3,52	3,31
ESEER			4,12	4,11	4,08	4,19	4,10	4,19	4,21	4,10	4,08	3,93
Free-Cooling (A5°C; EG30% 15/x°C)												
Refrigeration capacity	(2)	kW	23,7	24,5	25,6	31,9	32,6	48,3	49,3	50,2	61,7	62,5
Amount of free cooling	(2)		50%	45%	40%	46%	41%	51%	45%	41%	44%	41%
TFT - Total Free-cooling Temperature		°C	-1,9	-3,4	-5,5	-3,0	-4,7	-1,5	-3,3	-4,8	-3,7	-4,8
Compressors												
Compressors/Circuits		n°/n°	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 1
Minimum capacity reduction step	(6)	%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Refrigerant charge (MCHX)	(7)	kg	3,7	5,5	5,5	6	6	9,5	10	10	11,5	11,5
Refrigerant charge (Cu/Al)	(7)	kg	6	7	8,8	10,5	10,5	16	17	17	18	18
Fans												
Diameter		mm	630	630	630	630	630	630	630	630	800	800
Quantity		n°	2	2	2	2	2	3	3	3	2	2
Total air flow rate		m³/h	18.000	18.000	17.000	19.000	19.000	28.000	28.000	28.000	39.000	39.000
User-side heat exchanger												
Quantity		n°	1	1	1	1	1	1	1	1	1	1
Water flow rate	(1)	m³/h	8,2	9,4	11,2	12,0	13,6	16,4	18,9	21,2	24,3	26,3
Total load losses with FC OFF		kPa	81,2	99,7	97,9	56,0	66,5	89,9	78,0	78,5	84,8	90,0
Total load losses with FC ON		kPa	96	118	135	73	87	95	117	86	89	93
Total internal volume	(3)	l	30	30	30	50	50	70	70	75	75	75
Noise levels												
Sound power lev.	(4)	dB(A)	78	79	79	80	81	82	83	84	86	87
Sound pressure lev.	(5)	dB(A)	46	48	48	48	49	50	51	52	54	55
Sound power lev. LN vers.	(4)	dB(A)	76	77	77	78	79	80	81	82	84	85
Sound pressure lev. LN vers.	(5)	dB(A)	44	46	46	46	47	48	49	50	52	53
Dimensions and weights**												
Length		mm	2.590	2.590	2.590	3.253	3.253	4.405	4.405	4.405	4.405	4.405
Depth		mm	1.337	1.337	1.337	1.337	1.337	1.437	1.437	1.437	1.437	1.437
Height		mm	1.488	1.488	1.488	1.788	1.788	1.788	1.788	1.788	1.882	1.882
Operating weight (MCHX)		kg	842	846	880	1.082	1.094	1.434	1.446	1.456	1.560	1.600

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

(1) Outside air temperature 30°C; inlet/outlet temperature of ethylene glycol 30% 15/10°C

(2) Outside air temperature 5°C; inlet/outlet temperature of ethylene glycol 30% 15/x°C

(3) Volume of water contained in the unit when it is working in free cooling mode. If present, the volume contained in the tank should also be considered.

(4) Unit operating at nominal operating capacity, without any accessories, with external air temperature of 30°C and user-side heat exchanger water inlet-outlet temperature of 15-10°C. Binding values. Values obtained from measures taken according to standard ISO 3744.

(5) Values obtained from the sound power level (conditions: note 4), related to a distance of 10 m from the unit in free field with directivity factor Q=2. Non-binding values See NOISE LEVELS section.

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

(7) The indicated refrigerant charge is calculated. The refrigerant charge can vary according to different versions/accessories and product updates.

** Basic unit without included accessories

ECODESIGN

INTRODUCTION

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

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

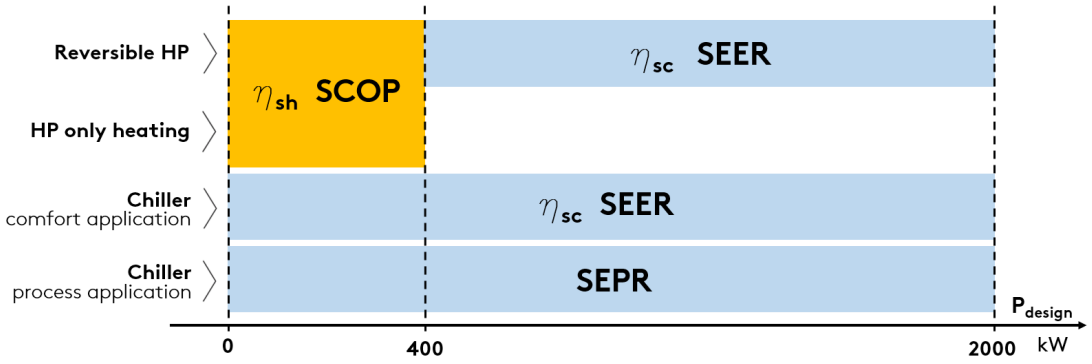
- Regulation 2013/813, for small heat pumps (Pdesign ≤ 400 kW)
- Regulation 2016/2281, for chillers and heat pumps with Pdesign > 400 kW
- Regulation 2013/811, for heat pumps with Pdesign ≤ 70 kW.

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

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

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

The figure below schematically illustrates the correspondence between product and reference energy ratio.



Some notes and clarifications:

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

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

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

Regulation 2013/813 distinguishes two different types: at low temperature and at medium temperature.
The following refer to the application at low temperature: (low temperature application) all heat pumps whose maximum delivery temperature for heating purposes is lower than 52°C with source at temperature of -7°C and -8°C wet bulb (air-water unit) or inlet 10°C (water-water unit), at the reference design conditions for an average climate.For these, the efficiency ratio is "low temperature application" (outlet water temperature 35°C).
For all the other heat pumps, the efficiency ratio is related to "medium temperature application" (outlet water temperature 55°C).
The ratios must be calculated according to the reference European heating season in average climatic conditions.

The minimum efficiency requirements set by the regulations are indicated below.

REGULATION 2016/2281, comfort application

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

REGULATION 2016/2281, process application

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

REGULATION 2013/813

SOURCE	APPLICATION	MINIMUM REQUIREMENT	
		ηsh [%]	**SCOP**
air	low temperature application	125	3,2
water	low temperature application	125	3,325
air	medium temperature application	110	2,825
water	medium temperature application	110	2,95

The conformity of the product must be checked according to the type of application, whether comfort or process, and at the required outlet water temperature.

The two schematic tables below, respectively for comfort application and for process application, indicate the reference of the required conformity according to the type of product and the set point temperature (reference to regulations 2016/2281 and 2013/813).

Important note: for mixed comfort and process applications, the reference application for conformity is the comfort application.

COMFORT APPLICATION

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

- = exemption from Ecodesign

PROCESS APPLICATION

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

- = exemption from Ecodesign

Some specifications and notes follow.

Partly completed machinery

The term partly completed machinery refers to all units without a user-side or source-side heat exchanger, and therefore to all LC, LE, LC/HP and LE/HP versions. Since these are "non-complete" machines, conformity with Ecodesign depends on combination with the remote heat exchanger.

All the partly completed machinery is CE marked and accompanied by a declaration of conformity. Installation in European Union countries is therefore allowed; correct selection and installation of the remote heat exchanger must be ensured, in accordance with the above cases.

EC fans:

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

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

ZETA REV HE FC RANGE

As specifically regards the Zeta Rev HE FC range, the regulations of interest for the various units in various configurations are indicated below.

Zeta Rev HE FC Zeta Rev HE FC /NG :

- chiller version: regulation 2016/2281

The tables below give information on the conformity of the units and the seasonal energy performance ratios with regard to the reference regulation.

ZETA REV HE FC - ZETA REV HE FC /NG

			3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	12.2	13.2
REGULATION 2016/2281												
Pdesign	(1)	kW	46,3	53,0	62,8	67,5	77,2	92,2	106,4	119,7	137,4	149,0
COMFORT												
Standard units												
ηsc (12/7)	(1)	%	139,0	135,1	136,1	155,4	147,6	156,6	156,6	151,8	147,1	139,4
SEER (12/7)	(1)		3,55	3,45	3,48	3,96	3,77	3,99	3,99	3,87	3,75	3,56
Compliance Tier 1	(1)		N	N	N	Y	N	Y	Y	Y	N	N
Compliance Tier 2 (2021)	(1)		N	N	N	N	N	N	N	N	N	N
ηsc (23/18)	(2)	%	167	154,9	157,2	183,5	170,9	186,1	183,5	177,4	174,4	165
SEER (23/18)	(2)		4,25	3,95	4,00	4,66	4,35	4,73	4,66	4,51	4,43	4,20
Compliance Tier 1	(2)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Compliance Tier 2 (2021)	(2)		Y	N	N	Y	Y	Y	Y	Y	Y	Y
Units with EC fans (VEC)												
ηsc (12/7)	(1)	%	149,0	149,0	149,0	157,4	149,0	159,8	159,4	153,0	149,4	149,0
SEER (12/7)	(1)		3,80	3,80	3,80	4,01	3,80	4,07	4,06	3,90	3,81	3,80
Compliance Tier 1	(1)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Compliance Tier 2 (2021)	(1)		N	N	N	N	N	N	N	N	N	N
PROCESS												
SEPR	(3)		5,49	5,29	5,39	5,75	5,38	5,75	5,64	5,6	5,29	5,03
Compliance Tier 1	(3)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Compliance Tier 2 (2021)	(3)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

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

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

(2) User-side heat exchanger water inlet/outlet temperature 23/18°C (medium temperature application), with reference to regulation 2016/2281 and standard EN 14825.

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

ELECTRICAL SPECIFICATIONS

ZETA REV HE FC - ZETA REV HE FC/NG

			3.2	4.2	5.2	6.2	7.2
General electrical specifications							
Max. absorbed power (FLI)	(1)	kW	18	21	24	27	30
Max. absorbed current (FLA)	(1)	A	38	47	49	55	67
Nominal current (Inom)	(2)	A	32	36	41	44	49
cosφ standard unit	(2)		0,80	0,80	0,80	0,82	0,81
Nominal current with power factor correction (Inom)	(2)	A	27	30	34	38	41
cosφ unit with power factor correction	(2)		0,96	0,96	0,96	0,95	0,96
Maximum inrush current (MIC)	(3)	A	122	137	145	148	176
Maximum inrush current with soft-starter (MIC)	(4)	A	82	93	98	101	120
Power supply		V/ph/Hz	400V / 3ph+N / 50Hz				
Power supply for auxiliary circuits		V/ph/Hz	230V-24V / 1ph / 50 Hz				
Suggested line section	(5)	mm²	10	16	16	16	16
Suggested line protection	(6)		NH00gG 50A	NH00gG 63A	NH00gG 63A	NH00gG 80A	NH00gG 80A
Electrical specifications for fans							
Rated power of standard fan		n° x kW	2 x 0,6	2 x 0,6	2 x 0,6	2 x 0,6	2 x 0,6
Rated current of standard fan		n° x A	2 x 2,6	2 x 2,6	2 x 2,6	2 x 2,6	2 x 2,6
Rated power of EC fan		n° x kW	2 x 0,8	2 x 0,8	2 x 0,8	2 x 0,8	2 x 0,8
Rated current of EC fan		n° x A	2 x 1,4	2 x 1,4	2 x 1,4	2 x 1,4	2 x 1,4
Rated power of oversize EC fan		n° x kW	2 x 1,0	2 x 1,0	2 x 1,0	2 x 1,0	2 x 1,0
Rated current of oversized EC fan		n° x A	2 x 1,6	2 x 1,6	2 x 1,6	2 x 1,6	2 x 1,6

			8.2	9.2	10.2	12.2	13.2
General electrical specifications							
Max. absorbed power (FLI)	(1)	kW	36	41	47	54	59
Max. absorbed current (FLA)	(1)	A	76	82	88	97	106
Nominal current (Inom)	(2)	A	62	66	71	76	83
cosφ standard unit	(2)		0,78	0,81	0,83	0,84	0,85
Nominal current with power factor correction (Inom)	(2)	A	50	56	61	67	74
cosφ unit with power factor correction	(2)		0,96	0,95	0,96	0,95	0,95
Maximum inrush current (MIC)	(3)	A	216	267	273	321	329
Maximum inrush current with soft-starter (MIC)	(4)	A	146	177	183	212	220
Power supply		V/ph/Hz	400V / 3ph+N / 50Hz				
Power supply for auxiliary circuits		V/ph/Hz	230V-24V / 1ph / 50 Hz				
Suggested line section	(5)	mm²	25	25	35	50	50
Suggested line protection	(6)		NH00gG 100A	NH00gG 100A	NH00gG 125A	NH00gG 160A	NH00gG 160A
Electrical specifications for fans							
Rated power of standard fan		n° x kW	3 x 0,6	3 x 0,6	3 x 0,6	2 x 2,0	2 x 2,0
Rated current of standard fan		n° x A	3 x 2,6	3 x 2,6	3 x 2,6	2 x 4,3	2 x 4,3
Rated power of EC fan		n° x kW	3 x 0,8	3 x 0,8	3 x 0,8	2 x 1,9	2 x 1,9
Rated current of EC fan		n° x A	3 x 1,4	3 x 1,4	3 x 1,4	2 x 2,9	2 x 2,9
Rated power of oversize EC fan		n° x kW	3 x 1,0	3 x 1,0	3 x 1,0	2 x 3,0	2 x 3,0
Rated current of oversized EC fan		n° x A	3 x 1,6	3 x 1,6	3 x 1,6	2 x 4,5	2 x 4,5

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

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

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

(4) Maximum effective RMS value of the current when the last compressor starts (FLA of the entire unit - FLA of the largest compressor + 0.6 x LRA of the largest compressor)

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

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

PUMP DATA

Model	Rated power	Rated current	Qmin	Qmax
	kW	A	m³/h	m³/h
P1	1,9	4,2	7	18
P2	3,0	6,1	12	42

USER-SIDE EXCHANGER FLOW RATE FIELDS

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

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

- the design condition falls within the operating limits specified below
- the flow rate at design conditions (that is, of the specific application) must always come within the allowed flow rate ranges specified below. If the design conditions require a water flow rate that does not come within the allowed operating range, you must contact our sales department that will identify the most suitable solution for the specific application.

ZETA REV HE FC

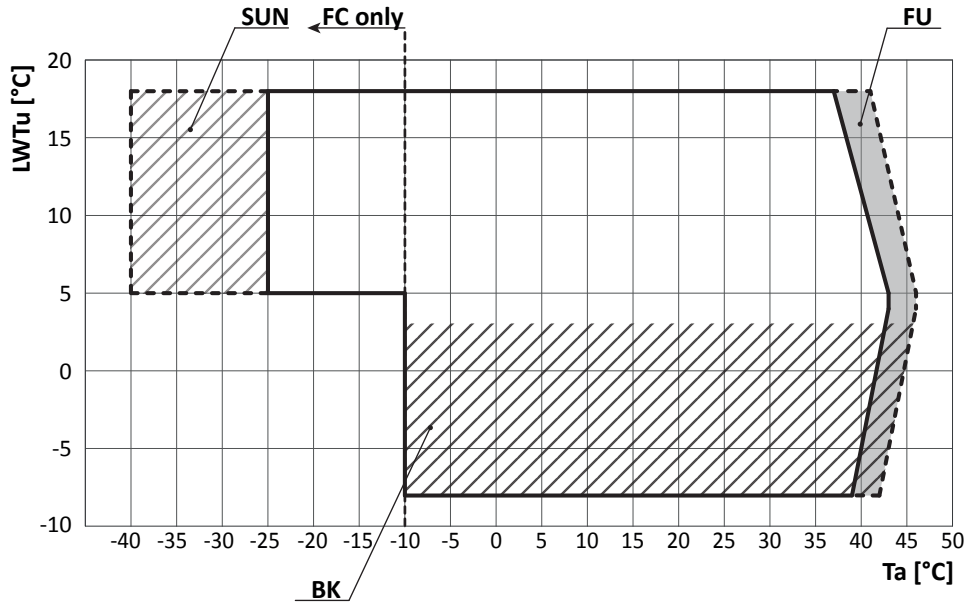
	Qmin	Qmax
	m³/h	m³/h
3.2	4,5	13,4
4.2	5,1	15,3
5.2	6,1	18,2
6.2	6,5	19,5
7.2	7,4	22,3
8.2	8,9	26,6
9.2	10,2	30,7
10.2	11,5	34,5
12.2	13,2	39,6
13.2	14,3	42,9

ZETA REV HE FC/NG

	Qmin	Qmax
	m³/h	m³/h
3.2	4,1	12,4
4.2	4,7	14,2
5.2	5,6	16,8
6.2	6,0	18,0
7.2	6,8	20,5
8.2	8,2	24,6
9.2	9,4	28,3
10.2	10,6	31,8
12.2	12,2	36,5
13.2	13,2	39,5

OPERATING LIMITS

COOLING



Ta: external air temperature

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

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

FC only: in the area indicated by the arrow, the switching on of the compressors is disabled and therefore the unit can work only in free cooling mode

SUN: to work in the indicated area, there must be no wind and the unit must be equipped with accessory "SUN Heaters for operation with air below -25°C". In this area, operation of the unit is guaranteed only by AC fans

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

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

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

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

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

NOISE LEVELS

ZETA REV HE FC - ZETA REV HE FC/NG

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_ tot	Lp_ tot
3.2	79	48	78	47	70	38	73	41	72	41	71	39	69	38	64	32	**78**	**46**
4.2	79	48	78	47	70	39	74	42	73	42	74	42	70	39	65	34	**79**	**48**
5.2	79	48	78	47	70	38	74	43	74	43	73	41	70	38	65	33	**79**	**48**
6.2	79	47	78	46	69	37	72	40	75	43	75	43	71	39	67	35	**80**	**48**
7.2	79	47	78	46	70	38	75	43	75	43	75	43	72	40	67	35	**81**	**49**
8.2	81	49	80	48	71	39	75	43	76	44	77	45	73	41	68	36	**82**	**50**
9.2	79	47	78	46	74	42	75	43	76	44	79	47	72	40	65	33	**83**	**51**
10.2	80	48	78	46	76	44	77	45	77	45	81	49	73	41	64	32	**84**	**52**
12.2	84	52	74	42	77	45	78	46	80	48	82	50	75	43	69	37	**86**	**54**
13.2	84	52	74	42	77	45	78	46	81	49	83	51	76	44	71	39	**87**	**55**

ZETA REV HE FC /LN - ZETA REV HE FC/NG /LN

	Octave bands [dB]																Total [dB(A)]	
	63 Hz		125 Hz		250 Hz		500 Hz		1000 Hz		2000 Hz		4000 Hz		8000 Hz			
	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw	Lp	Lw_tot	Lp_tot
3.2	77	45	76	45	68	36	71	39	70	39	69	37	67	36	62	31	**76**	**44**
4.2	77	45	76	45	68	37	72	40	71	40	71	40	68	37	63	32	**77**	**46**
5.2	77	45	76	45	68	36	72	41	72	41	71	39	68	36	63	32	**77**	**46**
6.2	77	46	76	45	68	36	70	39	73	41	73	41	69	37	66	34	**78**	**46**
7.2	77	46	76	45	68	36	73	41	73	42	73	42	70	38	65	34	**79**	**47**
8.2	79	47	78	46	70	38	73	41	74	43	75	43	71	39	66	35	**80**	**48**
9.2	77	46	76	44	72	41	73	42	74	42	77	45	70	39	64	32	**81**	**49**
10.2	78	47	76	45	75	43	75	44	75	44	79	47	71	40	62	31	**82**	**50**
12.2	82	51	72	41	75	44	76	44	78	46	80	48	73	42	67	35	**84**	**52**
13.2	82	50	72	41	75	44	76	45	79	48	81	49	75	43	69	37	**85**	**53**

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

Lw: sound power levels.

Lw_tot is the only binding value.

Values obtained from measures taken according to standard ISO 3744.

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

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

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

INSTALLATION ADVICE

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

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

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

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

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

Water characteristics

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

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

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

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

Glycol mixtures

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

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

The quantity of antifreeze should be considered as % on weight

Minimum water content in the system

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

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

The following experimental formula allows the minimum water volume of the system to be calculated:

$$V_{min} = \frac{P_{tot} \cdot 1.000}{N} \cdot \frac{300}{\Delta T \cdot \rho \cdot c_p} + P_{tot} \cdot 0{,}25$$

where

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

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

N: number of capacity reduction steps

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

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

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

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

$$V_{min} = \frac{P_{tot}}{N} \cdot 17{,}2 + P_{tot} \cdot 0{,}25$$

N is equal to the number of compressors installed in the unit.

Installation site

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

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

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

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

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

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

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

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

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

Installations that require the use of treated coils

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

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

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

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

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

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

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

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

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

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

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

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

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

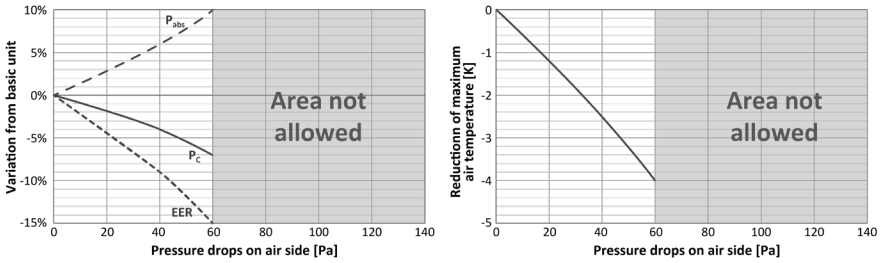
Aeraulic head losses and options available for the ventilating section

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

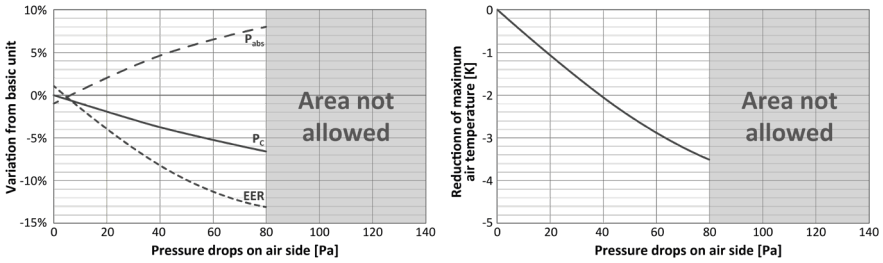
If there are obstacles to free air flow, you should consider the additional aeraulic head losses that will cause a reduction of the air flow rate and a consequent deterioration of performance.

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

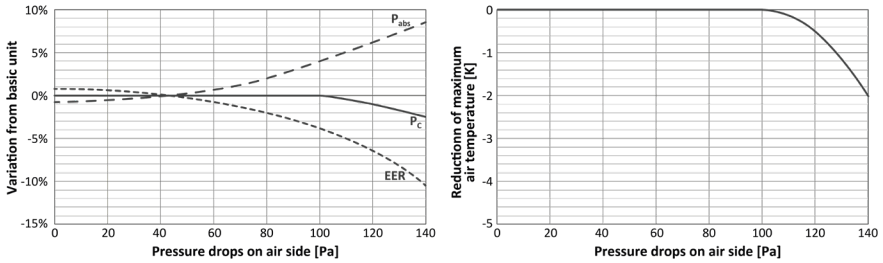
AC fans (Ø 630)



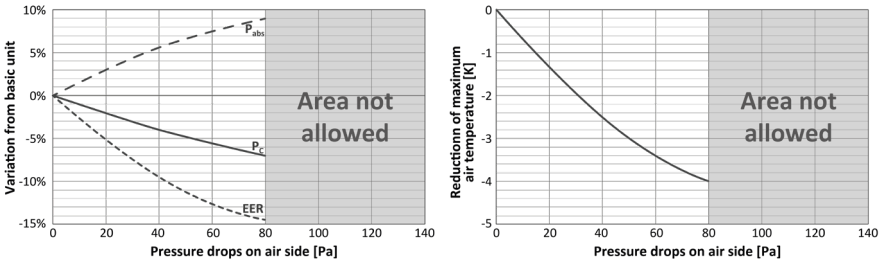
EC fans (Ø 630)



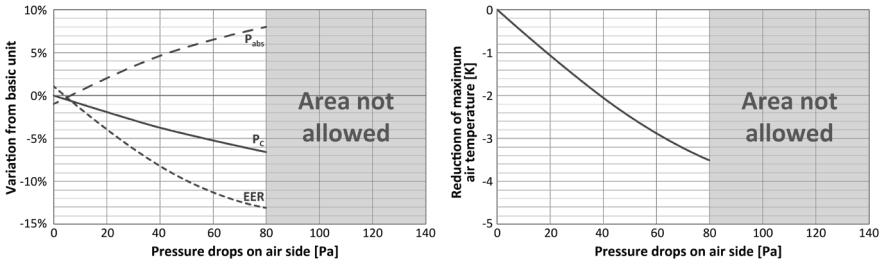
Oversize EC fans (Ø 630)



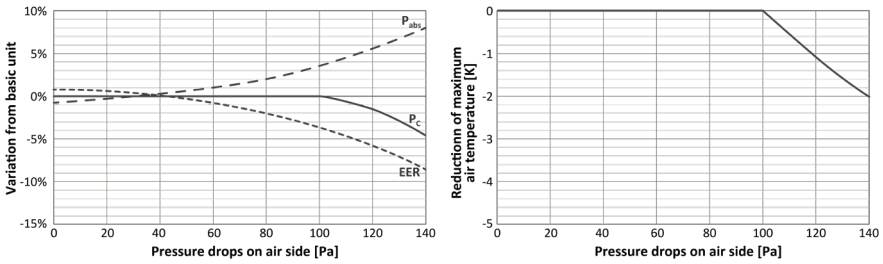
AC fans (Ø 800)



EC fans (Ø 800)



Oversize EC fans (Ø 800)



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

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

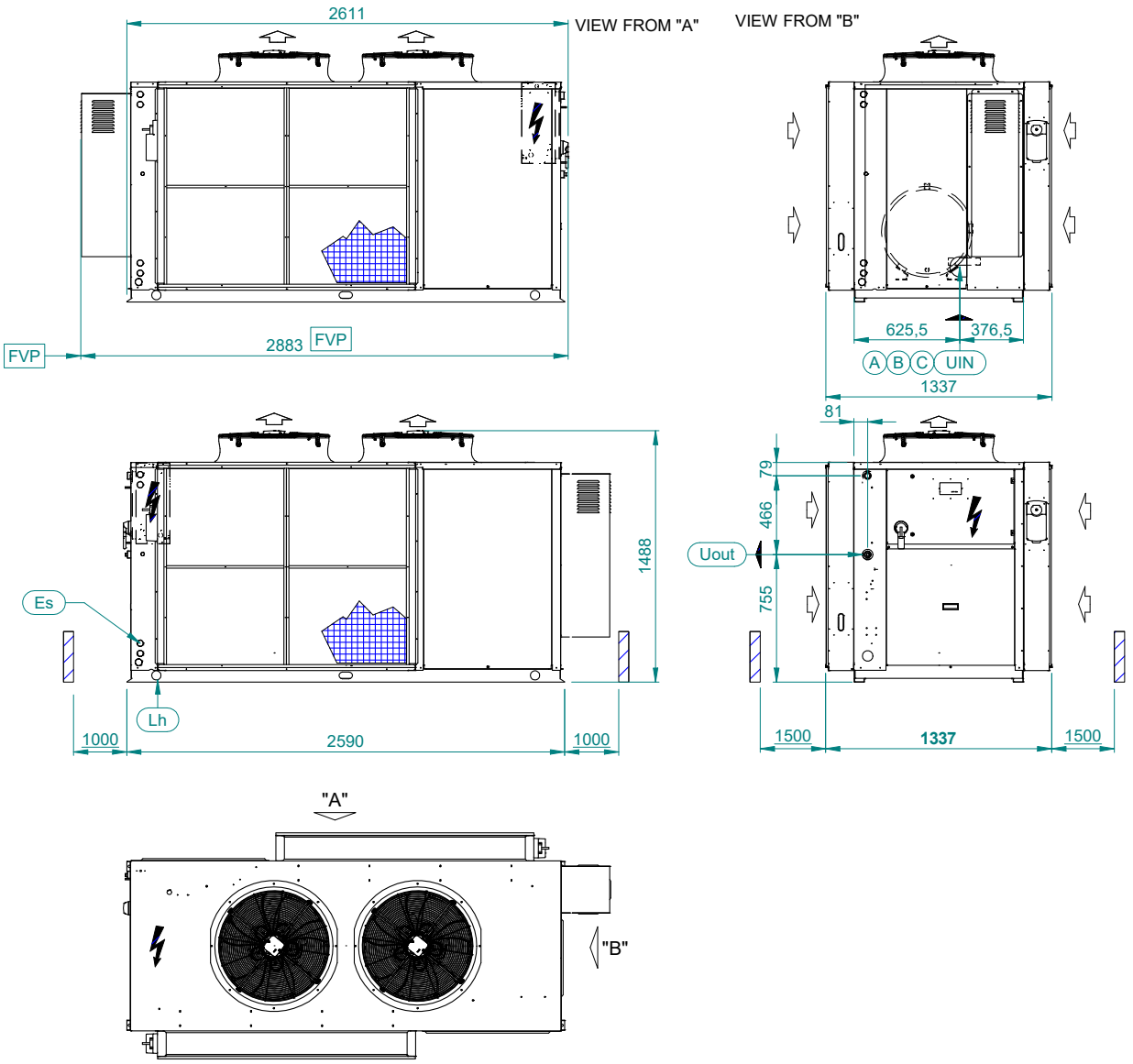
- use the unit with standard AC fans: compared to ideal conditions, the output power will be reduced by about 5.5%, the total absorbed power will increase by about 7.5%, the EER will be reduced by about 12.5% and the maximum allowed external air temperature for operation at 100% will be reduced by about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

It is emphasized that, as indicated in the diagrams and based on the diameter and type of fan, for aeraulic head losses higher than 60 or 80Pa, only the use of oversize EC fan is allowed.

DIMENSIONAL DIAGRAMS

ZETA REV HE FC 3.2-5.4

A4G879C



Uin		Uout
(A)	(B)-(C)	
G 1 1/4"F	G 2"F	G 1 1/4"M

HYDRAULIC CONFIGURATIONS

(A) WITHOUT HYDRAULIC MODULE

(B) HYDRAULIC MODULE ST1P-ST2P

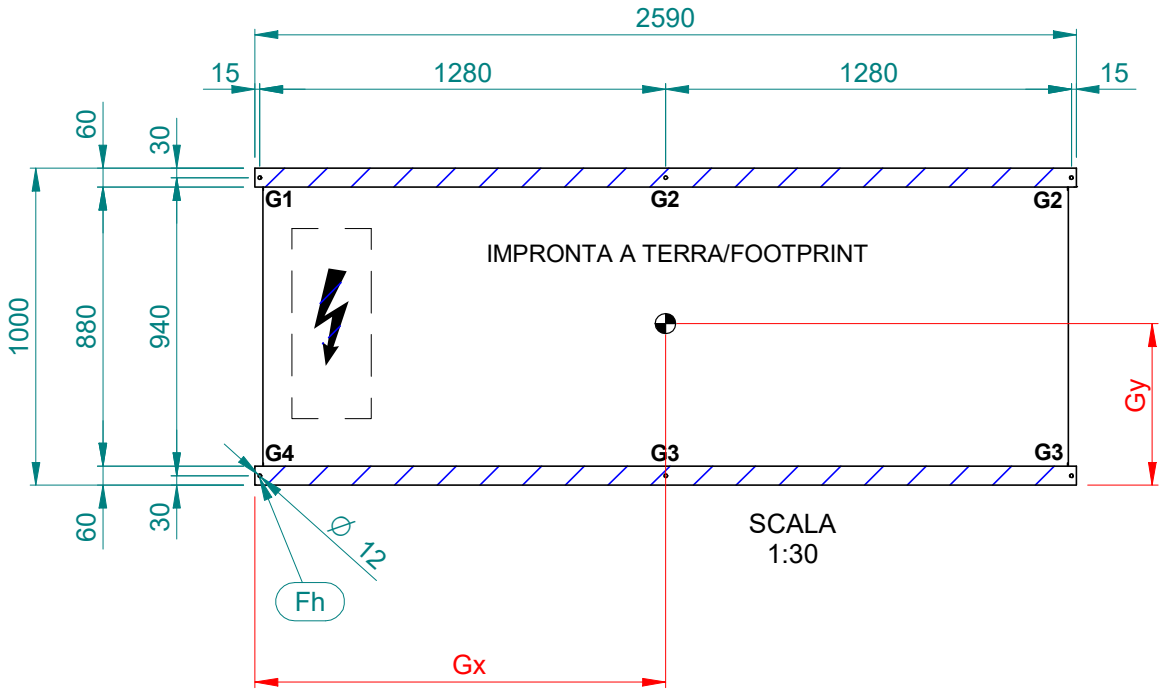
(C) HYDRAULIC MODULE ST1PS-ST2PS-STS

SAP CODE OF OPTIONS

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

ZETA REV HE FC 3.2-5.4

A4G879C

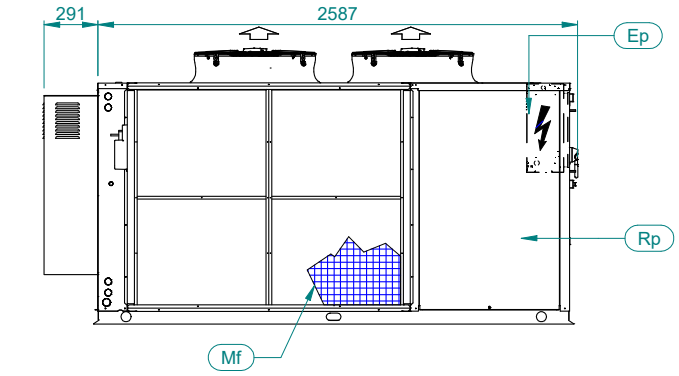


MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)	GX	GY
3.2 LN	789	842	263	119	81	179	929	558
4.2 LN	792	846	264	118	82	182	924	556
5.2 LN	826	880	278	119	84	196	901	553
3.2 1P-2P_LN	831	889	260	132	92	181	982	556
4.2 1P-2P_LN	837	896	262	132	93	184	977	554
5.2 1P-2P_LN	868	927	276	132	95	197	953	551
3.2 1PS-2PS_LN	882	1105	289	164	130	228	1001	549
4.2 1PS-2PS_LN	886	1110	291	164	130	231	997	547
5.2 1PS-2PS_LN	917	1141	304	164	132	245	973	545

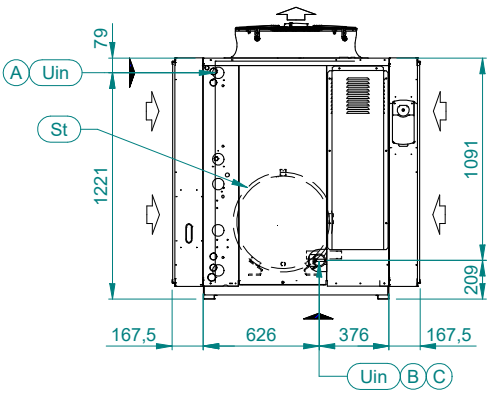
Note: These drawings are not contractually binding. For the installation design, refer to the specific dimensional drawing available on request.

ZETA REV HE FC/NG 3.2-5.4

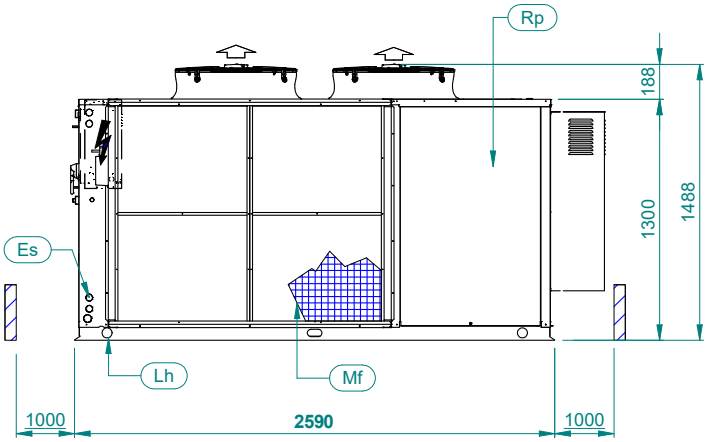
A4G925A

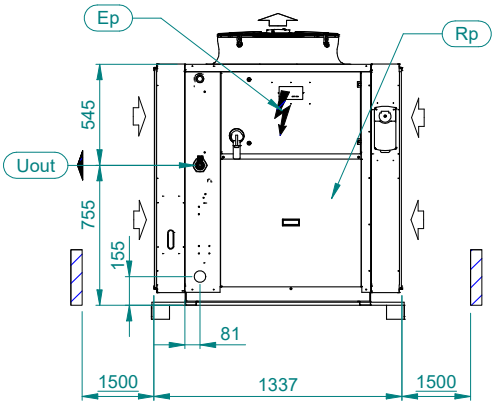


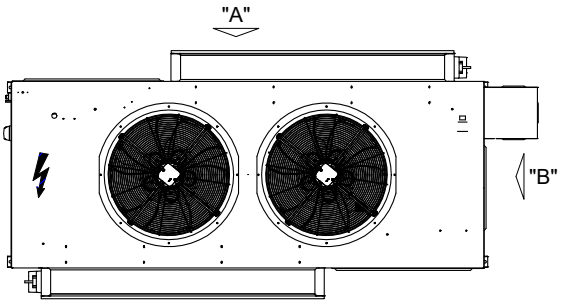
VIEW FROM "B"



VIEW FROM "A"







Uin		Uout
(A)	(B)-(C)	
G 1 1/4" M	G 2"F	G 1 1/4"M

HYDRAULIC CONFIGURATIONS

(A) WITHOUT HYDRAULIC MODULE

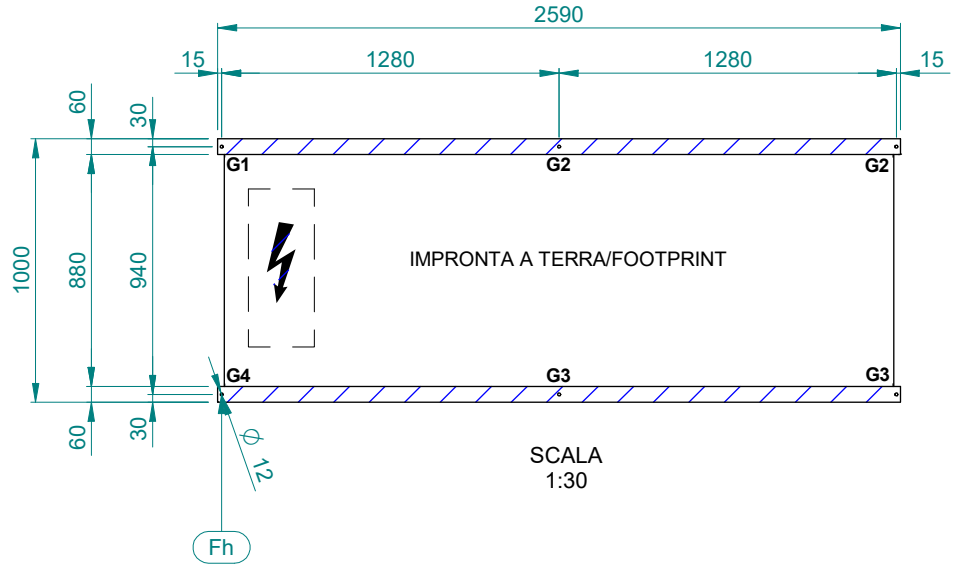
(B) HYDRAULIC MODULE ST1P-ST2P

(C) HYDRAULIC MODULE ST1PS-ST2PS-STS

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

ZETA REV HE FC/NG 3.2-5.4

A4G925A

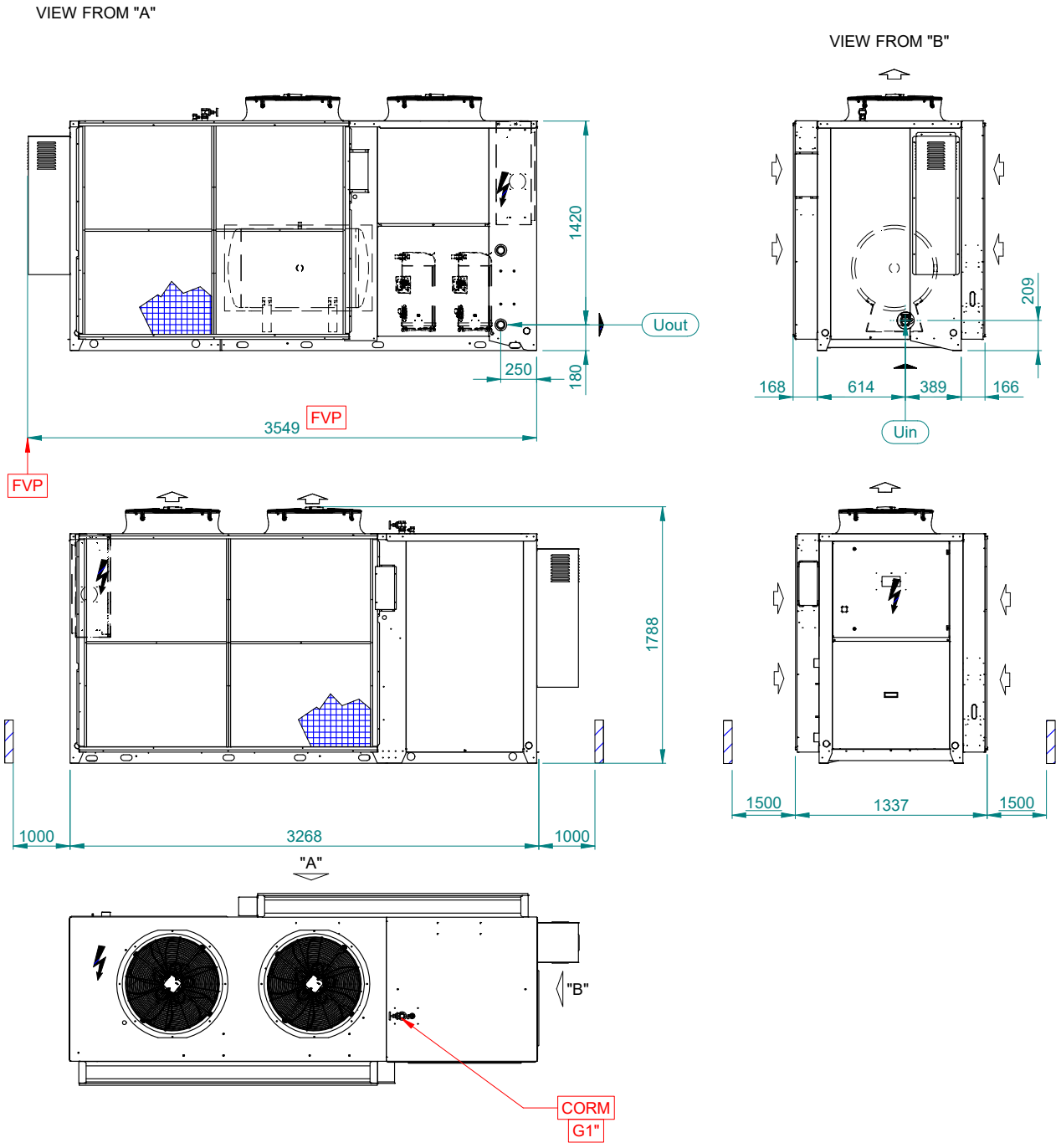


MODELLOMODEL	PESO (kg) WEIGHT(kg)	PESO IN FUNZIONE (kg) OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)
ZETA REV HE 3.2 FC-NG	920	977	245	135	121	220
ZETA REV HE 4.2 FC-NG	927	984	246	135	123	222
ZETA REV HE 5.2 FC-NG	961	1019	259	137	125	236
ZETA REV HE 3.2 FC-NG_1P-2P	961	1023	237	141	137	230
ZETA REV HE 4.2 FC-NG_1P-2P	970	1032	238	141	139	234
ZETA REV HE 5.2 FC-NG_1P-2P	1002	1065	251	142	141	248
ZETA REV HE 3.2 FC-NG_1PS-2PS	1008	1235	268	171	175	275
ZETA REV HE 4.2 FC-NG_1PS-2PS	1014	1241	269	171	176	278
ZETA REV HE 5.2 FC-NG_1PS-2PS	1049	1277	282	172	179	293

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

ZETA REV HE FC (NG) 6.2-7.4

A4G878B

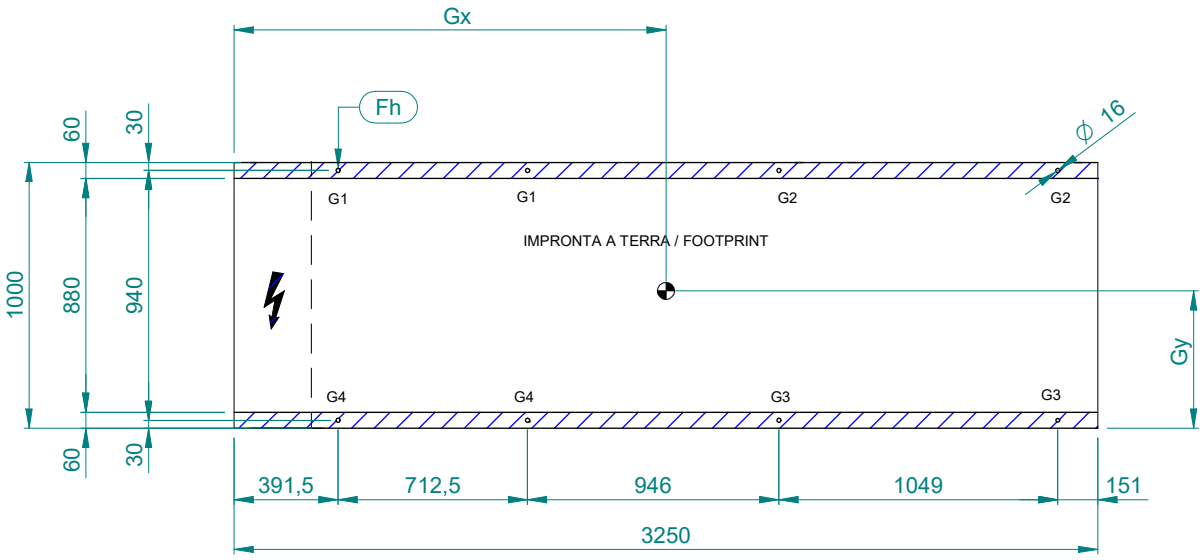


Uin	Uout
G 2"F	G 2"M

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

ZETA REV HE FC (NG) 6.2-7.4

A4G878B



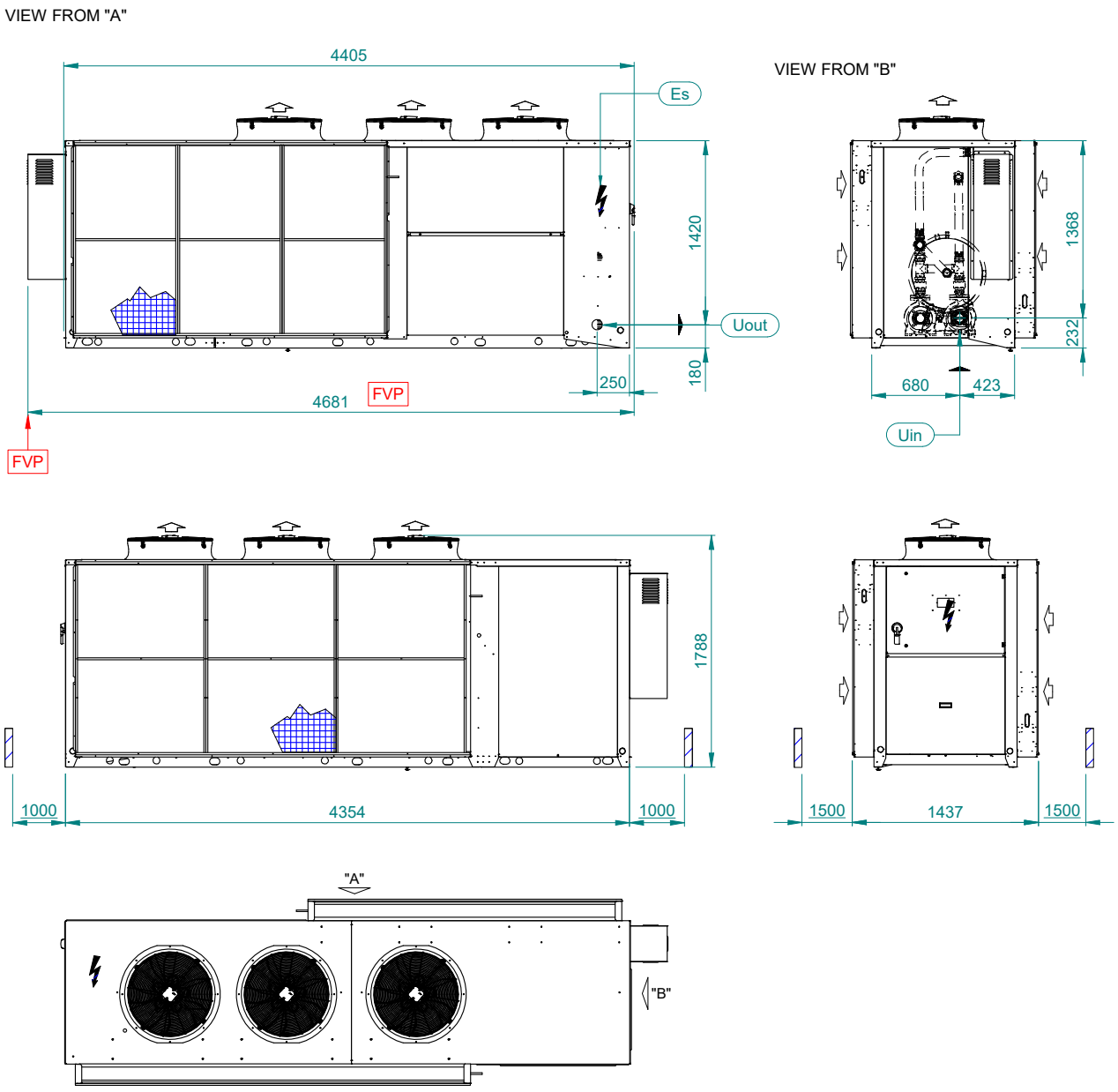
SCALA
1:30

MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)	Gx	Gy
6.2 LN	1026	1082	217	91	69	164	1309	537
7.2 LN	1038	1094	219	90	69	169	1300	533
6.2 1P-2P_LN	1068	1132	214	109	82	161	1379	540
7.2 1P-2P_LN	1084	1148	217	108	83	166	1369	536
6.2 1PS-2PS_LN	1154	1410	259	148	108	190	1387	552
7.2 1PS-2PS_LN	1168	1424	262	147	109	194	1378	549
6.2 NG_LN	1087	1152	213	101	84	178	1351	519
7.2 NG_LN	1100	1166	215	100	85	183	1343	514
6.2 1P-2P_NG_LN	1131	1204	211	119	98	174	1416	522
7.2 1P-2P_NG_LN	1148	1222	214	118	99	180	1407	517
6.2 1PS-2PS_NG_LN	1217	1482	257	157	124	203	1421	535
7.2 1PS-2PS_NG_LN	1230	1496	259	156	125	208	1412	531

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

ZETA REV HE FC (NG) 8.2-10.4

A4G863B



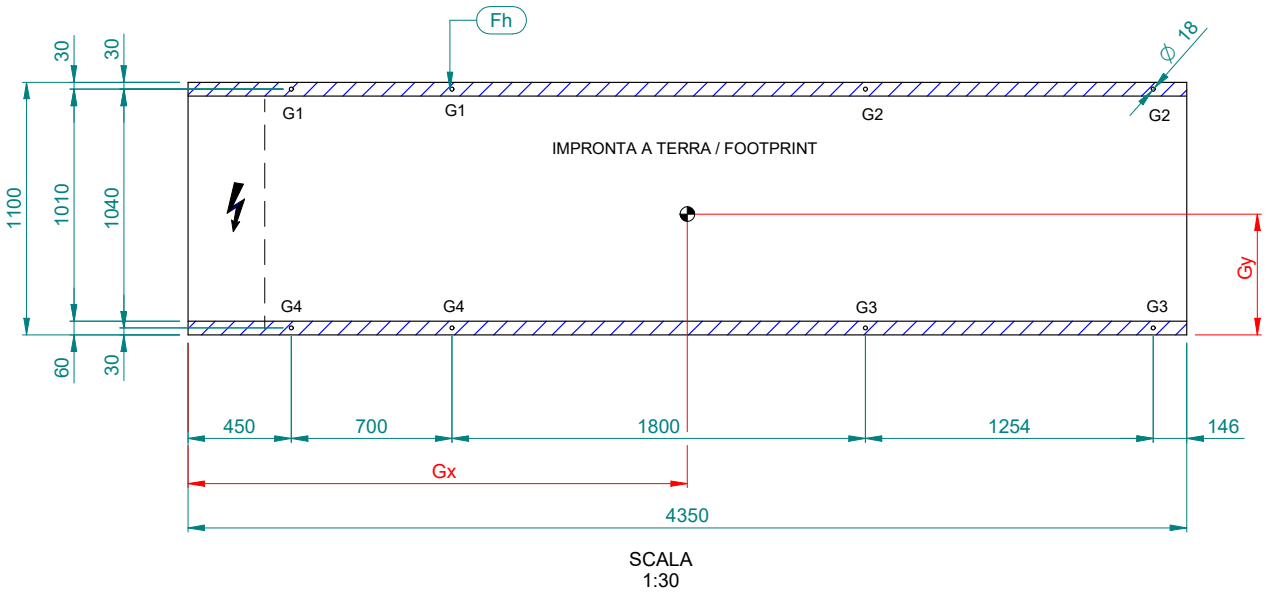
Uin 8.2-9.2	Uin 10.2	Uout
G 2"F	G 2 1/2"F	G 2"M

SAP CODE OF OPTIONS

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

ZETA REV HE FC (NG) 8.2-10.4

A4G863B

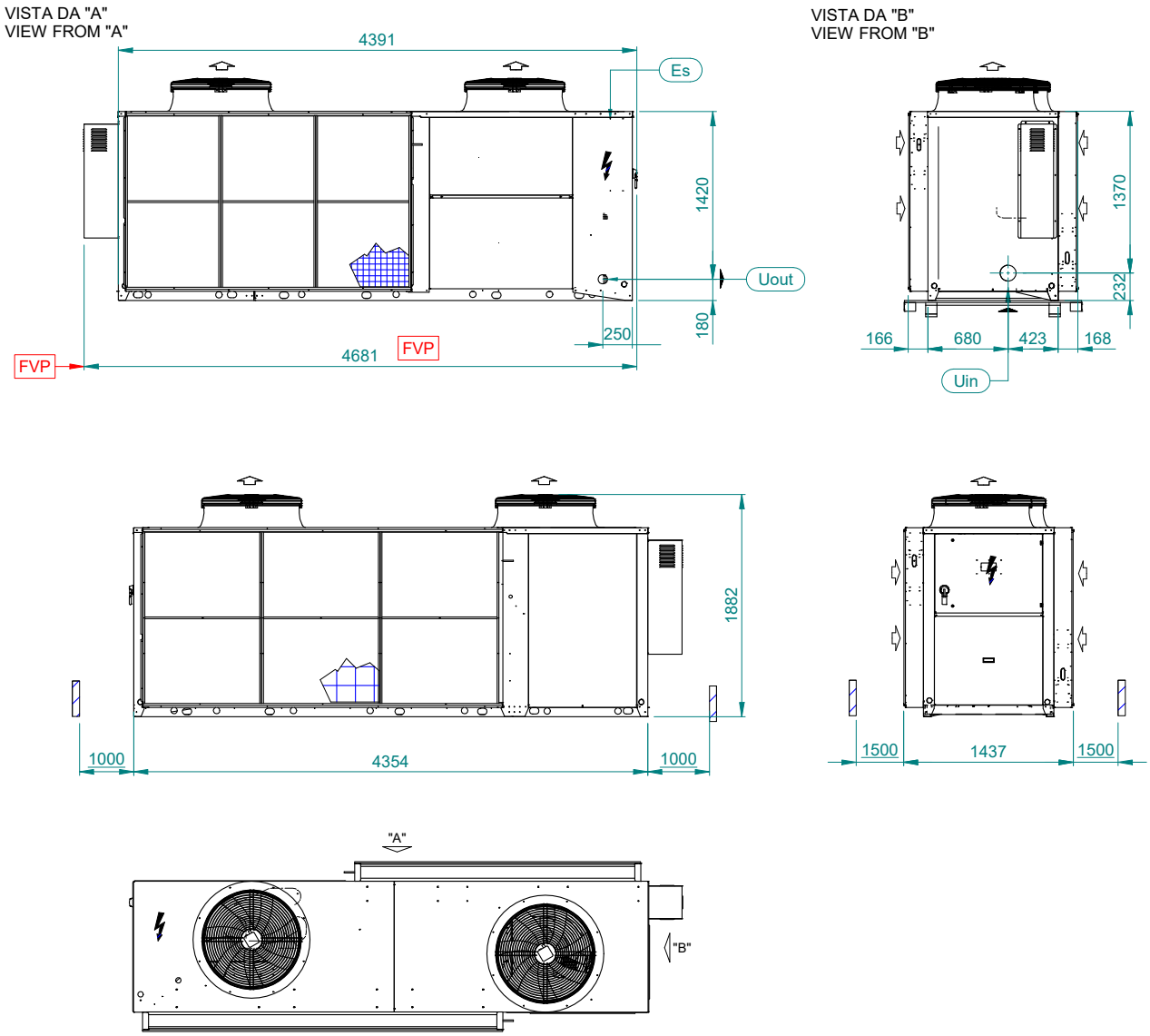


MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)	Gx	GY
8.2 LN	1368	1434	241	118	118	240	1727	576
9.2 LN	1379	1446	245	119	117	242	1718	578
10.2 LN	1388	1456	249	119	116	244	1710	580
8.2 1P-2P_LN	1469	1560	239	156	152	233	1882	579
9.2 1P-2P_LN	1480	1572	243	157	151	235	1873	581
10.2 1P-2P_LN	1499	1592	247	160	153	236	1878	583
8.2 1PS-2PS_LN	1551	1842	268	201	194	258	1915	582
9.2 1PS-2PS_LN	1551	1842	268	201	194	258	1915	582
10.2 1PS-2PS_LN	1564	1856	273	202	193	260	1906	585
8.2 NG_LN	1583	1876	276	205	195	262	1910	586
9.2 NG_LN	1443	1520	242	123	133	262	1743	556
10.2 NG_LN	1460	1540	247	124	133	266	1736	557
8.2 1P-2P_NG_LN	1544	1646	241	160	168	254	1889	560
9.2 1P-2P_NG_LN	1559	1664	246	160	168	258	1881	561
10.2 1P-2P_NG_LN	1584	1692	249	164	172	261	1886	561
8.2 1PS-2PS_NG_LN	1626	1928	271	204	210	279	1920	565
9.2 1PS-2PS_NG_LN	1643	1948	276	205	210	283	1912	565
10.2 1PS-2PS_NG_LN	1665	1972	279	208	213	286	1917	566

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

ZETA REV HE FC (NG) 12.2-13.4

A4G864B



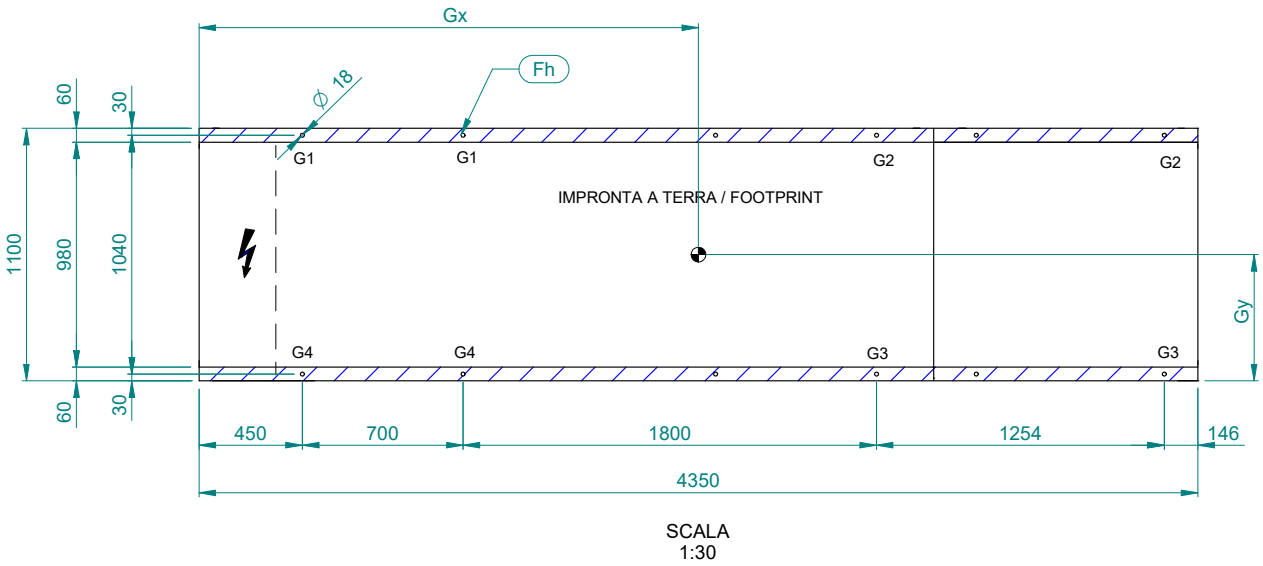
Uin	Uout
G 2"1/2F	G 2"M

SAP CODE OF OPTIONS

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

ZETA REV HE FC (NG) 12.2-13.4

A4G864B



MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)	Gx	GY
12.2 LN	1491	1560	276	130	120	254	1699	594
13.2 LN	1530	1600	291	130	117	262	1668	600
12.2 1P-2P_LN	1611	1710	272	176	160	247	1871	596
13.2 1P-2P_LN	1650	1750	287	177	157	254	1838	602
12.2 1PS-2PS_LN	1684	1978	304	216	195	274	1879	600
13.2 1PS-2PS_LN	1733	2028	319	220	194	281	1860	606
12.2 NG_LN	1584	1668	260	153	156	265	1826	569
13.2 NG_LN	1630	1716	274	155	155	274	1799	574
12.2 1P-2P_NG_LN	1704	1818	257	198	197	257	1979	573
13.2 1P-2P_NG_LN	1748	1864	271	200	196	265	1951	577
12.2 1PS-2PS_NG_LN	1781	2090	290	238	233	284	1983	578
13.2 1PS-2PS_NG_LN	1833	2144	303	243	234	292	1967	582

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

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