ZETA REV .Ei

29÷84 kW

R410A

General
Chillers with DC inverter-controlled brushless compressor.

Configurations
SEi: Compact unit

HEi: High efficiency unit

LN: Low noise unit

Optional hydronic module

Strengths
- Chiller with low refrigerant charge
- Night Shift function for noise control (option)
- Hydraulic module tank (option) to guarantee a minimum volume of water in the system
- BlueThink advanced control with integrated web server. Multilogic function and Blueye® supervision system. (options)
- Flowzer: inverter driven pumps (options)
- Conformity with Ecodesign, Regulation 2016/2281 Tier 2 (2021)

WESTERN™ AIRCONDITIONING WARMTEPOMPEN

BlueBox

ZETA REV .Ei

EFFICIENCY IS SYNONYMOUS WITH INVERTER

The global push to increase the energy efficiency of buildings and systems is driving the development of all technologies that can make a contribution.

In the HVAC sector, this is realized in the development of technologies that enable the maximum energy saving to be obtained in partial load conditions.

The technology that, more than any other technology, enables considerable efficiency improvements in operation at partial loads is inverter technology applied to compressors. This allows the maximum efficiency to be obtained while maintaining the same operating limits of conventional units.

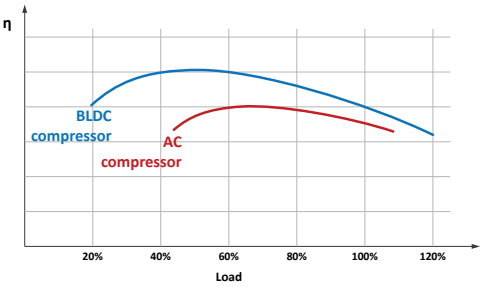
The more variable the load (as in comfort applications), or the longer the operating cycle where source temperatures are variable (as for combined air-water units in industrial applications), the stronger this advantage becomes.

The need to comply with the energy efficiency targets set by environmentally friendly design will increasingly push the adoption of units equipped with this technology.

Zeta Rev *Ei

All the units use a hermetic orbiting spiral scroll compressor with brushless motor controlled by a DC inverter. In the models with two or three compressors, this is connected in tandem or trio with hermetic scroll compressors with asynchronous ON/OFF motor.

In comparison to a compressor with asynchronous motor, a compressor with brushless motor (BLDC motor or PMDC motor) has a rotor containing permanent magnets. These make it intrinsically more efficient thanks to the magnetization energy saving of the rotor and to the fact that there are no rubbing parts.



As can be seen in the diagram, a brushless motor is more efficient than a normal asynchronous motor and its efficiency reaches its maximum when the compressor is working under partial load conditions.

It can also be seen that, since it is specially built to also operate at low speeds, a BLDC compressor has a wider speed adjustment range than a conventional compressor controlled through an AC inverter.

The inverter-controlled compressor can modulate its speed between about 30 and 105 rps.

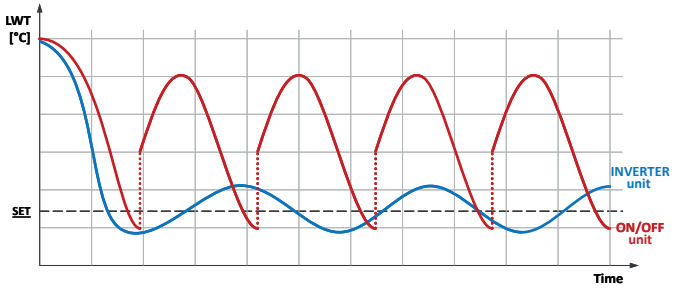
Considering the efficiency performance of the brushless motor and the overall efficiency performance of the unit, we find that the unit can express its best efficiency performance level at a speed of 90rps.

Therefore, if required, the unit can develop a capacity higher than the nominal capacity with a slightly lower efficiency level. This capacity is particularly interesting in all situations where it is necessary to satisfy short load peaks.

The BLDC compressor cannot be powered directly, and must be controlled through a DC inverter that manages the acceleration and deceleration ramps and its starting without inrush currents and ensures that the compressor always works in safe conditions and stays within the allowed operating limits. This is essential to preserve the efficiency and reliability of the compressor.

Management of a variable capacity machine

In addition to the advantage of greater efficiency, the use of a modulating compressor allows the unit to adapt its cooling capacity to the actual heat load to be met.



Normally, the capacity supplied by the unit exceeds the capacity actually required by the system.

In this condition, a machine with ON/OFF compressors will go through a sequence of ON and OFF cycles in an attempt to keep the water temperature within a set differential.

At each subsequent restart, the refrigerant circuit must find the best balance condition and this phase requires a time that ranges from 1 to 3 minutes during which the unit undergoes irreversible energy losses and has a very low energy efficiency.

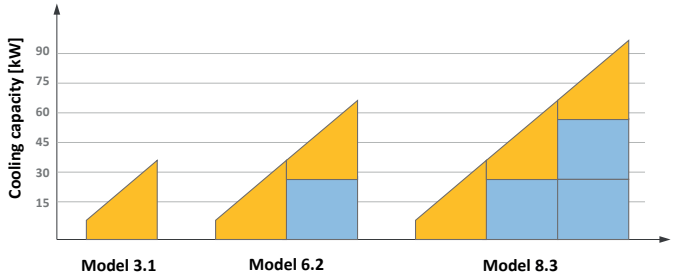
In a different way, a machine with inverter-controlled compressor will be able to modulate its cooling capacity and adapt to the load.

Through control of the water outlet temperature and its variation over time, the controller of the unit can determine the capacity level required by the system and therefore adjust the speed of the compressor through an analogue signal supplied to the inverter.

The further away the water outlet temperature is from the set point, the greater the capacity that will be required by the controller. As the outlet temperature approaches the set point temperature, the controller will slow down the compressor and limit temperature oscillation as much as possible.

In this way, as far as possible, the controller keeps the compressor always running in modulating mode, thereby avoiding the irreversible energy losses of the starts and exploiting the condition in which the brushless compressor works with its maximum efficiency.

For multi-compressor models, the flexibility of multiscroll units is added to the modulation precision of the inverter-controlled compressor.



The controller uses the ON/OFF compressors to come near the required load, and modulates the capacity of the inverter compressor in order to carry out fine control.

ZETA REV .Ei

PRODUCT DESCRIPTION

Chillers with DC inverter-controlled brushless compressor.

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.

REFRIGERANT

The unit is charged with refrigerant R410A, with GWP=2088 (value at 100 years).

COMPRESSORS

The compressors are hermetic orbiting spiral scroll compressors, each fitted with oil level sight glass.

Depending on the model, there are the following compressor configurations:

- models with just one compressor (x.1) use a single modulating compressor
- models with two compressors (x.2) use one modulating compressor connected in tandem with one ON/OFF compressor
- models with three compressors (x.3) use one modulating compressor connected in trio with two ON/OFF compressors

The modulating compressors are hermetic scroll compressors with permanent-magnet brushless motor and are fitted with oil level sight glass.

The speed of the modulating compressor is varied, depending on the total heat load, roughly between 30 and 105 rps. 30rps and 105rps Its nominal capacity relates to a speed of 90rps. 90rps.

The speed of rotation of the compressor is variable in the range 1.800÷6.300 rpm.

The modulating compressors are controlled through DC inverter. This also has the following functions:

- management of acceleration and deceleration ramps
- management of the operating envelope of the modulating compressor
- management of the alarms and safety devices of the modulating compressor

The use of a modulating compressor allows the total inrush current to be reduced because it is always started with an acceleration ramp. For models with two or three compressors, the starting of the ON/OFF compressors will always take place with the modulating compressor running at low speed, again in order to reduce the inrush current of the unit to a minimum.

The ON/OFF compressors are hermetic orbiting spiral scroll compressors and are fitted with oil level sight glass.

The technical compartment enclosing the compressors is soundproofed by sound absorbing material with interposed soundproofing material. The compressors can be accessed through special panelling that allows maintenance operations to be carried out even with units running.

For units with two or three compressors, there is also an oil equalization line.

All the compressors are fitted with crankcase heating device.

SOURCE-SIDE HEAT EXCHANGER

For the cooling only units, the exchangers are made with microchannel aluminium coils.

The 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. The entire coil is also subjected to SilFLUX coating processes (or equivalent) or has zinc added to further increase its corrosion resistance.

E-coated microchannel coils are available as an option. This option is strongly recommended for applications in coastal or highly industrialized areas.

The use of microchannel coils compared to conventional copper/aluminium coils reduces the total weight of the unit by about 10% and gives a reduction in refrigerant charge of at least 30%.

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.

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 also equipped with thermostat-controlled anti-freeze heater to protect it from ice formation when the unit is not running.

REFRIGERANT CIRCUIT

Unit provided with a refrigerant circuit that comprises:

- valve on the liquid line
- charging valves
- liquid sight glass
- welded dehydrator filter on sizes 3.1 and 6.2
- replaceable solid cartridge dehydrator filter on size 8.3
- electronic expansion valve
- high and low pressure switches

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

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
- thermal magnetic circuit breakers for the pumps (if present)
- contactors for compressors, fans and pumps (if present)
- phase-cutting speed adjuster
- phase monitor
- potential-free general alarm contacts
- single potential free operating contacts for compressors, fans and pumps (if present)
- 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.

The power supply of the unit is 400V/3~+N/50Hz.

CONTROL BLUETHINK

Main controller functions

The microprocessor control allows the following functions:

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

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

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

Main functions of the webserver

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 functions of the unit such as unit serial n°, size, refrigerant
- display of the general status of the machine: water inlet and outlet temperatures, outside air temperature, evaporating and condensing pressures, suction and discharge temperatures
- display of the status of compressors, fans, pumps, thermostatic valves
- display in real time of the graphs of the main quantities
- display of the graphs of logged quantities
- display of alarm log
- management of users on several levels
- remote ON/OFF
- remote set point change
- remote time band change

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

- chilled water temperature probe
- antifreeze probe at outlet of each user-side heat exchanger
- high pressure switch (with manual reset)
- low pressure safety device (with manual reset managed by the controller)
- compressor overtemperature protection
- fan overtemperature protection
- water differential pressure switch

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.

VERSIONS

ZETA REV SEi: compact unit

In this version, the unit combines the high seasonal efficiency of a unit with modulating capacity with a small footprint

ZETA REV HEi: high efficiency unit

In this version, the unit uses oversize coils in order to increase efficiency, especially at reduced capacity.

OPTIONS

/LN: silenced unit

The unit with this option has a soundproof casing inserted on the modulating compressor.

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.

The following are also available:

- modules /1PM, /2PM, /1PMS and /2PMS that have pumps with increased available 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 gate valve at the inlet of the pump or the suction manifold
- a tank with drain valve and air valve

Refer to the table of configurations that are not possible to check for availability of specific set-ups.

DESCRIPTION OF ACCESSORIES

Refrigerant circuit accessories

BC **Capacitive backup battery for electronic expansion valve**

When the compressors stop, the controller always closes the electronic expansion valve to prevent dangerous refrigerant migration. The presence of the backup battery ensures that the electronic valve is kept in closed position even when there is no power supply

This accessory uses a condenser, and not an ordinary battery, as energy storage: this allows it to be unaffected by the memory effect of normal batteries and eliminates its need for maintenance.

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.

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.

This accessory is standard on DC and HP units.

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.

The accessory can be applied only to units in LN or SLN set-up.

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.

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

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**

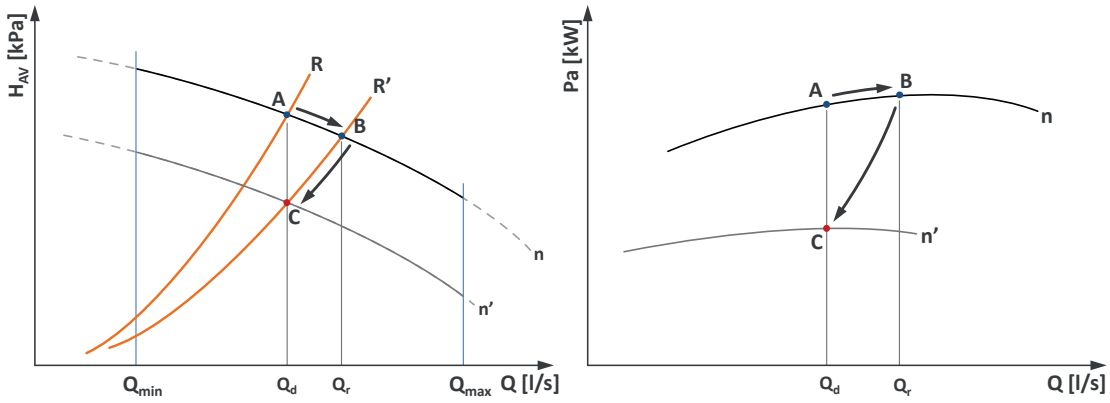
The accessory consists of inserting an inverter in the machine to manually adjust the speed of the pump (or pumps) in order to calibrate the pump flow rate on the head losses of the system.

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.

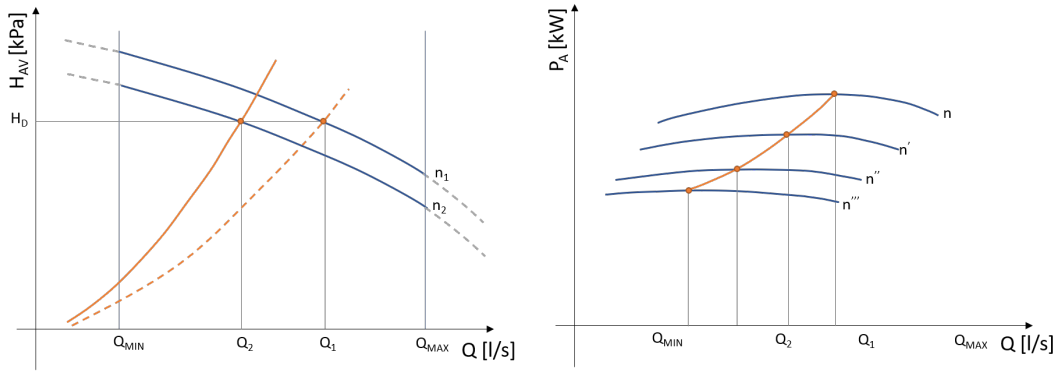


The use of the Flowzer VP allows the pump speed to be set manually (e.g. at speed n' instead of n) to obtain the design water flow rate and thermal gradient (point C). Once the adjustment procedure has been carried out, the pump will always work at a fixed flow rate.

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%.

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).

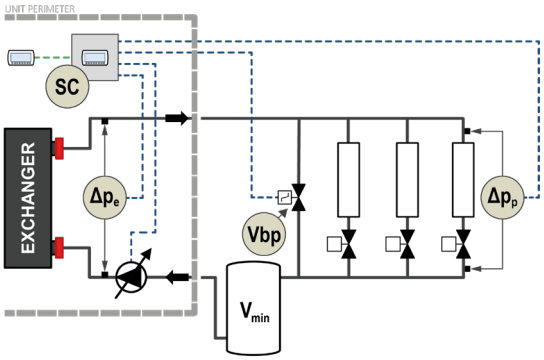
The use of this accessory also allows the pump speed to be adapted to possible fouling of the filter on the hydraulic circuit.

FVF FLOWZER VFPP – Kit for variable flow rate primary circuit pump with bypass valve included

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

Flowzer VFPP includes:

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



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

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

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

In particular, the unit includes an additional control system, equipped with an advanced algorithm, which interacts with the main advanced Bluethink controller.

Flowzer VFPP has the advantage of:

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

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

The capex of the system is also reduced thanks to:

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

The operating principle can be summarized as follows:

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

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

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

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

Further details can be found in the relevant manual.

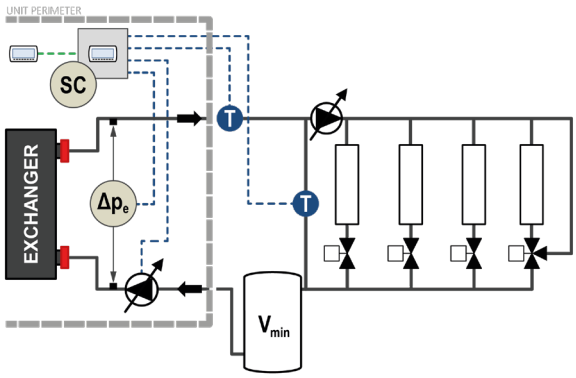
Bypass valve diameter	ZETA REV SEi	ZETA REV HEi
3.1		1"1/4
6.2	1"1/2	2"
8.3	2"	2"

FVPS FLOWZER VPS – Kit for variable flow rate pump with temperature sensors

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

Flowzer VPS includes:

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



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

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

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

In particular, the unit includes an additional control system, equipped with an advanced algorithm, which interacts with the main advanced Bluethink controller.

Flowzer VPS has the advantage of:

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

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

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

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

The operating principle can be summarized as follows:

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

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

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

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

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

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

IPS Condensation control with source-side pump inverter

In order to keep the condensing temperature above the minimum allowed, the control of the unit modulates the flow rate of water to the heat exchanger through the inverter that drives the source-side pump.

If the unit is in HP set-up, when it is working in heat pump mode, the pump always operates at maximum speed to guarantee the maximum flow rate of water to the source-side heat exchanger.

The accessory can be applied only to units provided with integrated source-side hydraulic module.

PFP User-side pump with Pulse function

As standard, the unit is set to keep the system-side circulation pump on all the time, even when the set point temperature is reached.

But when the unit is provided with this accessory, on reaching the set point, the controller will switch off the pump and start it again at regular intervals for a sufficient time to measure the water temperature. If the controller verifies that the water temperature is still in set point condition, it will switch off the pump again. Otherwise the controller will start the compressors again to meet the requirements of the system.

This accessory therefore allows electrical absorption due to pumping to be drastically reduced, especially in spring and autumn when the load is extremely low.

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.

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

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.

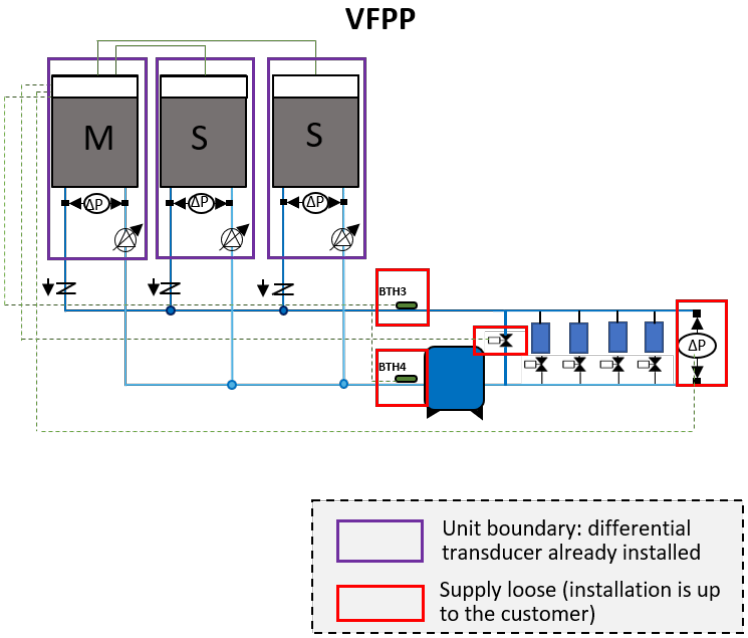
Based on normal operating conditions and the percentage of glycol in the system, an appropriate "antifreeze alarm" temperature is set in the control. When a temperature that is 1K higher than the antifreeze alarm threshold is detected at the outlet from the exchanger, the pump (if present) and the antifreeze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

VSIW **Water-side safety valve**

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

HFx **HYZER E VFPP function**

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



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

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

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

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

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

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

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

The HYZER E function requested with the unit can be:

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

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

For the slave units, the accessory requires:

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

For the master units, the accessory requires:

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

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

For further details, please refer to the controller manual.

VBx VFPP bypass valve for HYZER E

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

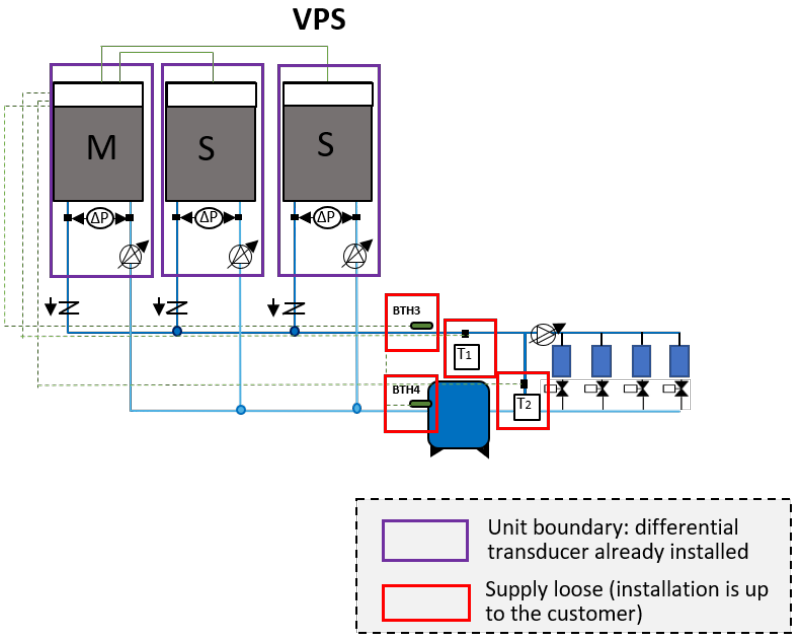
This option must be selected with either the "HYZER E VFPP function for Master unit to manage up to 2 Slave units" or "HYZER E VFPP function for Master unit to manage up to 6 Slave units".

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

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

HSx HYZER E VPS function

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



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

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

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

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

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

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

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

The HYZER E function requested with the unit can be:

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

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

For the slave units, the accessory requires:

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

For the master units, the accessory requires:

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

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

For further details, please refer to the controller manual.

PVX **Variable flow setup for HYZER X**

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

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

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

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

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

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

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

FLMX **User-side flow meter for HYZER X**

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

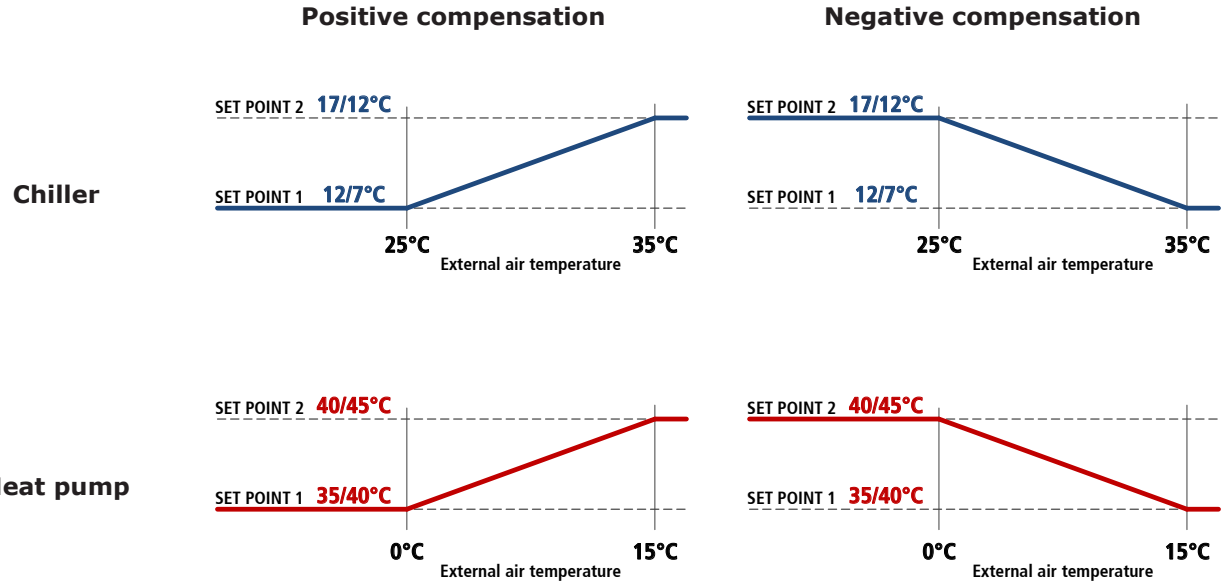
The option is supplied with the system for installation on the user side (installation by customer).

Electrical accessories

CSP Set point compensation depending on external air temperature

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

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



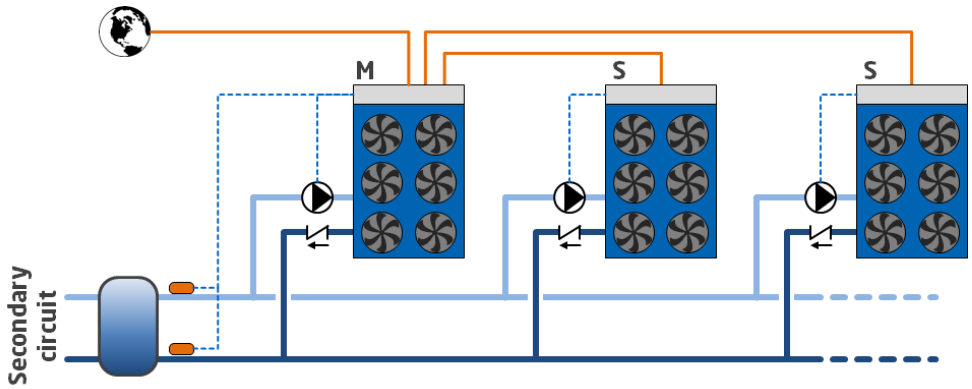
GLO Modbus Lonworks Gateway

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

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

FMx Multilogic Function

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



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

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

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

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

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

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

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

For the slave units, the accessory requires:

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

For the master units, the accessory requires:

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

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

For further details, please refer to the controller manual.

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.

NSS Night Shift System

This accessory is applied to high efficiency /LN version units with speed adjuster or to SLN units.

In the day time slot, which is normally the one with the highest heat load, priority is given to efficiency and therefore the machine works with a fan control curve that maximises the EER. In this time slot, therefore, the unit is a high efficiency low noise machine (equivalent to HE/LN)

In the night time band (or in any case from time band decided by the customer), the priority changes to limiting the noisiness of the machine and therefore the controller carries out an adjustment of the control ramp of the condensing fans, thereby reducing the air flow rate and consequently the noise emission level. So, in this time band, the unit is a super low noise machine (equivalent to SLN).

In any case, if there is a need for additional cooling capacity, the controller will manage the demand, if necessary, by accelerating the fans and keeping condensation within the correct operating limits.

The time slots can be set from the control depending on installation requirements.

When the unit is working in heat pump mode, in order to maximise the COP and to obtain the widest possible operating limits, the control of the unit forces the fans to the maximum speed also during the night time bands.

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.

RMMT Maximum and minimum voltage relay

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

SETD Double set point from digital input

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

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

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

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

If the difference between set point 1 and set point 2 is greater than 5K, it is compulsory to ask for the accessory "Electronic expansion valve".

SETV Variable set point with remote signal

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

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

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

- in chiller mode, 0V will correspond to a set point of 7°C and 10V will correspond to a set point of 12°C

If the difference between the minimum set point and the maximum set point is greater than 5K, it is compulsory to ask for the accessory "Electronic expansion valve".

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.

TERM Remote-controlled user terminal panel

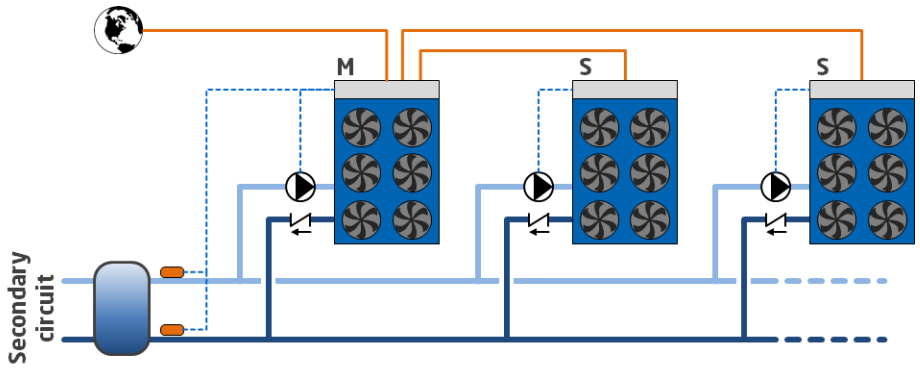
This accessory allows the terminal normally situated on the machine to be replicated on a support situated at a distance. It is particularly suitable when the unit is placed in an area that is not easily accessible.

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.

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.

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

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
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- **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.

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.

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.

SERI RS485 serial connection with Modbus protocol

RS485 serial connection with Modbus protocol

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.

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.

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.

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".

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".

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".

RAAL Cu/Al coils

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

RETE Coil protection mesh with metal filter

Coil protection mesh with hail-proof metal filter

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".

TECHNICAL SPECIFICATIONS

ZETA REV SEi

			6.2	8.3
Cooling (A35°C; W7°C; 90Hz)				
Refrigeration capacity	(1)	kW	58	84
Total absorbed power	(1)	kW	20	28
EER	(1)		2,93	2,95
EER energy class (Eurovent)	(1)		B	B
ESEER			4,47	4,47
Compressors				
Compressors/Circuits		n°/n°	2/1	3/1
Capacity modulation range	(4)	%	17% / 108%	11% / 106%
Refrigerant charge (MCHX)		kg	5	8,5
Refrigerant charge (Cu/Al)		kg	10	17
Fans				
Diameter		mm	630	630
Quantity		n°	2	3
Total air flow for chiller		m³/h	17.000	25.500
User-side heat exchanger				
Quantity		n°	1	1
Water flow (A35°C; W7°C; 90Hz)	(1)	m³/h	10,0	14,5
Pressure drop (A35°C; W7°C; 90Hz)	(1)	kPa	29	27
Noise levels				
Sound power lev.	(2)	dB(A)	85	86
Sound pressure lev.	(3)	dB(A)	54	54
Sound power lev. LN vers.	(2)	dB(A)	83	84
Sound pressure lev. LN vers.	(3)	dB(A)	52	52
Dimensions and weights**				
Length		mm	2.247	3.258
Depth		mm	1.028	1.135
Height		mm	1.788	1.788
Operating weight		kg	486	699

(1) External air temperature 35°C; user-side heat exchanger inlet-outlet water temperature 12-7°C. Values compliant with standard EN 14511.

(2) Unit operating at nominal operating capacity, without any accessories, with external air temperature of 35°C and user-side heat exchanger water inlet-outlet temperature of 12-7°C. Binding values. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable.

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

(4) 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.

** Basic CH unit without included accessories

ZETA REV HEi

			3.1	6.2	8.3
Cooling (A35°C; W7°C; 90Hz)					
Refrigeration capacity	(1)	kW	32	61	91
Total absorbed power	(1)	kW	10	19	29
EER	(1)		3,12	3,28	3,11
EER energy class (Eurovent)	(1)		A	A	A
ESEER			4,69	4,67	4,71
Compressors					
Compressors/Circuits		n°/n°	1/1	2/1	3/1
Capacity modulation range	(4)	%	33% / 117%	17% / 108%	11% / 106%
Refrigerant charge (MCHX)		kg	3	7	9
Refrigerant charge (Cu/Al)		kg	5,5	16	17
Fans					
Diameter		mm	630	630	800
Quantity		n°	2	3	2
Total air flow for chiller		m³/h	17.000	25.500	41.000
User-side heat exchanger					
Quantity		n°	1	1	1
Water flow (A35°C; W7°C; 90Hz)	(1)	m³/h	5,5	10,5	15,7
Pressure drop (A35°C; W7°C; 90Hz)	(1)	kPa	24	24	35
Noise levels					
Sound power lev.	(2)	dB(A)	84	85	86
Sound pressure lev.	(3)	dB(A)	52	53	54
Sound power lev. LN vers.	(2)	dB(A)	82	83	84
Sound pressure lev. LN vers.	(3)	dB(A)	50	51	52
Dimensions and weights**					
Length		mm	1.750	3.258	3.258
Depth		mm	1.045	1.135	1.135
Height		mm	1.450	1.788	1.900
Operating weight		kg	355	660	754

(1) External air temperature 35°C; user-side heat exchanger inlet-outlet water temperature 12-7°C. Values compliant with standard EN 14511.

(2) Unit operating at nominal operating capacity, without any accessories, with external air temperature of 35°C and user-side heat exchanger water inlet-outlet temperature of 12-7°C. Binding values. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable.

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

(4) 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.

** Basic CH 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:

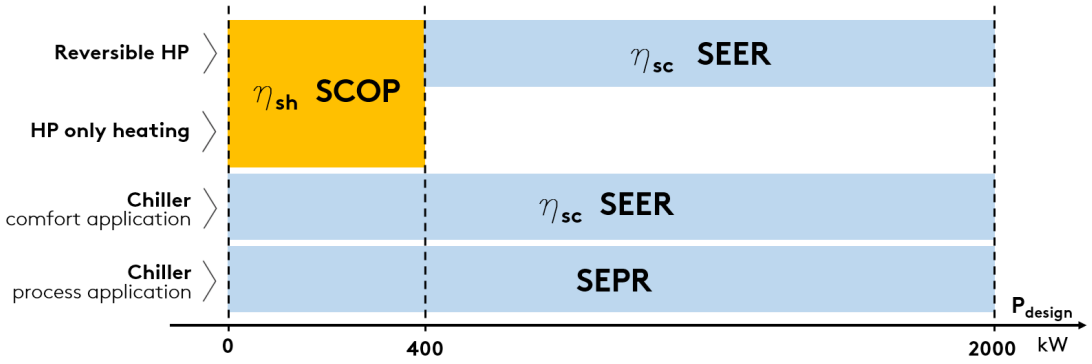
- Regulation 2013/813, for small heat pumps (Pdesign ≤ 400 kW)
- Regulation 2016/2281, for chillers and heat pumps with Pdesign > 400 kW
- Regulation 2013/811, for heat pumps with Pdesign ≤ 70 kW.

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 .EI RANGE

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

Zeta Rev SEi:
- regulation 2016/2281

Zeta Rev HEi:
- 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 SEi

			6.2	8.3
REGULATION 2016/2281				
Pdesign	(1)	kW	58	84
Compliance 12/7				
Compliance	(1)		Y	Y
ηsc	(1)	%	163	161,4
SEER	(1)		4,15	4,12
Compliance Tier 2 (2021)	(1)		Y	Y
Compliance 12/7 unit with EC fans				
Compliance	(1)		Y	Y
ηsc	(1)	%	176,7	176,7
SEER	(1)		4,49	4,49
Compliance Tier 2 (2021)	(1)		Y	Y
Compliance 23/18				
Compliance	(2)		Y	Y
ηsc	(2)	%	-	-
SEER	(2)		-	-
Compliance SEPR				
Compliance	(3)		Y	Y
SEPR	(3)		5,53	5,59

ZETA REV HEi

			3.1	6.2	8.3
REGULATION 2016/2281					
Pdesign	(1)	kW	32	61	91
Compliance 12/7					
Compliance	(1)		Y	Y	Y
ηsc	(1)	%	165,2	174,8	161,4
SEER	(1)		4,21	4,45	4,11
Compliance Tier 2 (2021)	(1)		Y	Y	Y
Compliance 12/7 unit with EC fans					
Compliance	(1)		Y	Y	Y
ηsc	(1)	%	178,8	188,6	176,7
SEER	(1)		4,54	4,79	4,49
Compliance Tier 2 (2021)	(1)		Y	Y	Y
Compliance 23/18					
Compliance	(2)		Y	Y	Y
ηsc	(2)	%	-	-	-
SEER	(2)		-	-	-
Compliance SEPR					
Compliance	(3)		Y	Y	Y
SEPR	(3)		6,43	6,17	5,86

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

(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 SEi

			6.2	8.3
General electrical specifications				
Max. absorbed power		kW	28	40
Max. absorbed current		A	50	75
Max. inrush current		A	150	174
Power supply			400V / 3ph+N / 50Hz	
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz	
Electrical specifications for fans				
Rated power of standard fan		n° x kW	2 x 0,6	3 x 0,6
Rated current of standard fan		n° x A	2 x 2,6	3 x 2,6
Rated power of EC fan		n° x kW	2 x 0,8	3 x 0,8
Rated current of EC fan		n° x A	2 x 1,4	3 x 1,4
Rated power of oversize EC fans		n° x kW	2 x 1,0	3 x 1,0
Rated current of oversize EC fans		n° x A	2 x 1,6	3 x 1,6

ZETA REV HEi

			3.1	6.2	8.3
General electrical specifications					
Max. absorbed power		kW	16	28	42
Max. absorbed current		A	29	53	74
Max. inrush current		A	7	153	174
Power supply			400V / 3ph+N / 50Hz		
Power supply for auxiliary circuits			230V-24V / 1ph / 50Hz		
Electrical specifications for fans					
Rated power of standard fan		n° x kW	2 x 0,6	3 x 0,6	2 x 1,8
Rated current of standard fan		n° x A	2 x 2,6	3 x 2,6	2 x 3,9
Rated power of EC fan		n° x kW	2 x 0,8	3 x 0,8	2 x 1,9
Rated current of EC fan		n° x A	2 x 1,4	3 x 1,4	2 x 2,9
Rated power of oversize EC fans		n° x kW	2 x 1,0	3 x 1,0	2 x 3,0
Rated current of oversize EC fans		n° x A	2 x 1,6	3 x 1,6	2 x 4,5

HYDRAULIC MODULES

Type	Rated power	Rated current	Min. flow rate	Max. flow rate
	kW	A	m³/h	m³/h
P2	0,9	2,1	3,6	9,6
P4	1,1	2,5	7,0	18,0
P5	1,5	3,2	7,0	18,0
P6	1,9	4,2	7,0	18,0
P8	3,0	6,1	6,0	20,0
P15	1,5	3,2	7,0	18,0
P16	1,9	4,2	7,0	18,0
P17	2,2	4,6	12,0	31,2

USER-SIDE EXCHANGER FLOW RATE FIELDS

The water flow to the heat exchangers must be between Qmin and Qmax

ZETA REV SEi

	Qmin	Qmax
	m³/h	m³/h
6.2	5,0	14,9
8.3	7,3	21,8

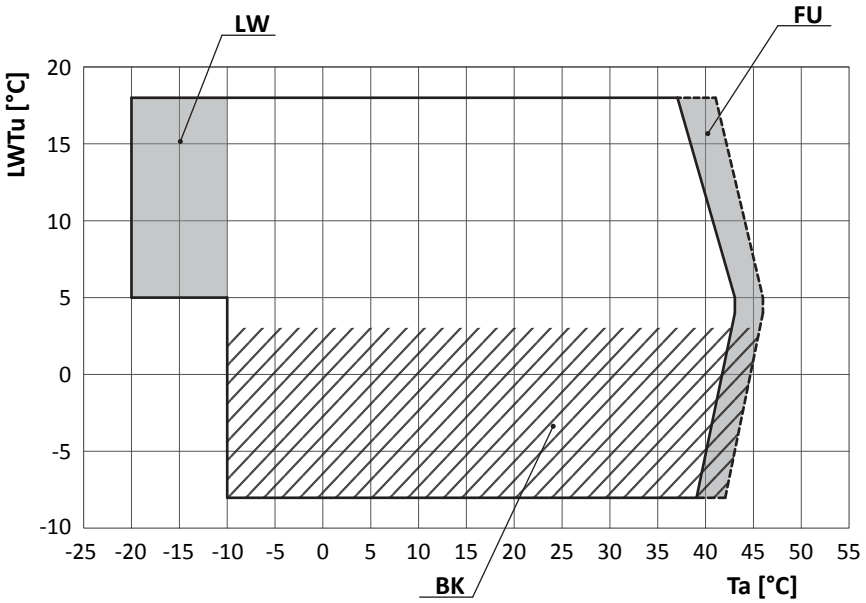
ZETA REV HEi

	Qmin	Qmax
	m³/h	m³/h
3.1	2,7	8,2
6.2	5,2	15,7
8.3	7,9	23,6

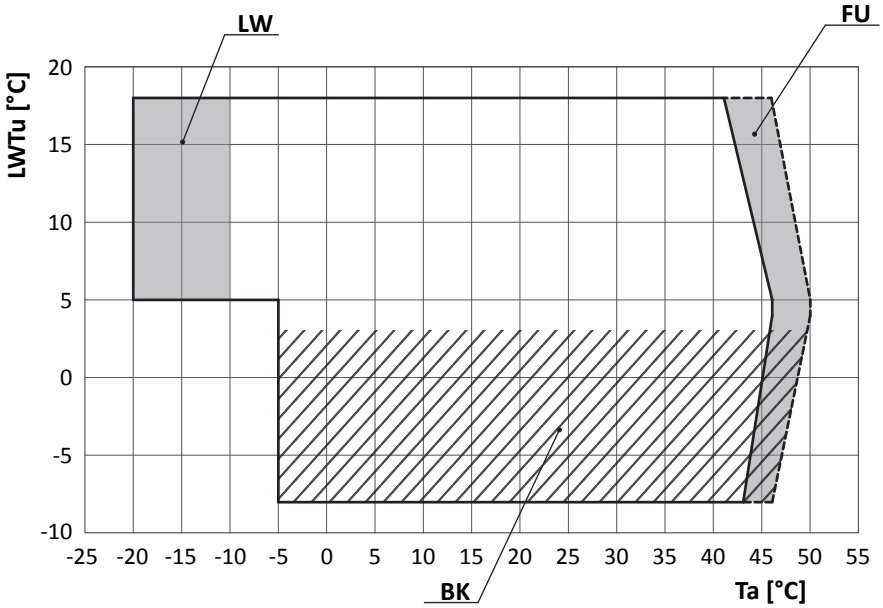
OPERATING LIMITS

COOLING

ZETA REV SEI



ZETA REV HEI



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

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

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 SEi

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
6.2	82	50	78	47	76	44	78	47	79	48	79	48	77	46	72	40	**85**	**54**
8.3	83	51	80	48	77	45	79	47	80	48	80	48	79	47	73	41	**86**	**54**

ZETA REV SEi/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
6.2	80	48	76	45	74	42	76	45	77	46	77	46	76	44	70	38	**83**	**52**
8.3	81	50	78	47	75	44	77	46	78	47	78	47	77	45	71	40	**84**	**52**

ZETA REV HEi

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
3.1	81	49	77	46	74	43	77	46	78	47	78	47	76	45	71	39	**84**	**53**
6.2	83	51	80	48	76	44	78	46	79	47	79	47	77	45	72	40	**85**	**53**
8.3	87	55	77	45	78	46	80	48	80	48	80	48	78	46	73	41	**86**	**54**

ZETA REV HEi /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
3.1	79	47	75	44	72	41	75	44	76	45	76	45	74	43	69	37	**82**	**50**
6.2	80	49	77	46	74	42	76	45	77	46	77	46	75	44	70	38	**83**	**51**
8.3	85	53	75	43	76	44	78	46	78	47	78	47	76	45	71	39	**84**	**52**

The acoustic data are related to standard conditions (source on a reflective surface in free field) in referable and reproducible operating conditions. The environment and the installation conditions, as well as the operating modes, can alter the sound emissions. 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.

Reference conditions: external air temperature 35°C; water input/output temperature from/to heat exchanger and user 12-7°C; unit operating at rated capacity, without any accessory

Lw: Values taken by measurements made in accordance with standard ISO 3744 and the Eurovent certification programme where applicable. Lw_tot is the only binding value.

Lp: Values calculated starting from noise power levels referred to a distance of 10 m from the unit; source installed on a reflective surface and in ideal free field conditions with directivity factor Q=2. No Lp value is binding.

Noise data refer to the standard conditions illustrated above, in reference and reproducible operating conditions.All data, excluding Lw_tot, are provided for the sake of exemplification and must not therefore be used for forecasting purposes or for the verification of mandatory 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. Any assessment concerning these conditions falls within the area of competence of the plant designer and/or the fitter.

CONFIGURATIONS THAT ARE NOT POSSIBLE

Zeta Rev SEi

	Basic	/1Px /2Px	/1PxS	/2PS	/2PMS	/2PGS
6.2				n.a.	n.a.	n.a.
8.3					(1)	(1)

ZETA REV HEi

	Basic	/1Px /2Px	/1PxS	/2PS	/2PMS	/2PGS
3.1						
6.2						
8.3					(1)	(1)

n.a. Configuration not available

(1) The unit is built on a larger frame than the standard

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 can assume the following values:

- N=3 for units with just one inverter-controlled compressor (model 3.1)
- N=6 for units with 2 compressors of which one is controlled by inverter (model 6.2)
- N=9 for units with 3 compressors of which one is controlled by inverter (model 8.3)

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
- coils with anti-corrosion treatment (accessory available only for units with Cu/Al coil)

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 installations between 1 and 20 km from the coast of units with microchannel coil, we strongly recommend using the accessory "E-coated microchannel coils"
- for installations between 1 and 20 km from the coast of units with Cu/Al coils, we strongly recommend using the accessory "Coil treated with anti-corrosion paints"
- for distances within a kilometre of the coast, we strongly recommend using the accessory "Coil treated with anti-corrosion paints" for all units.

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.

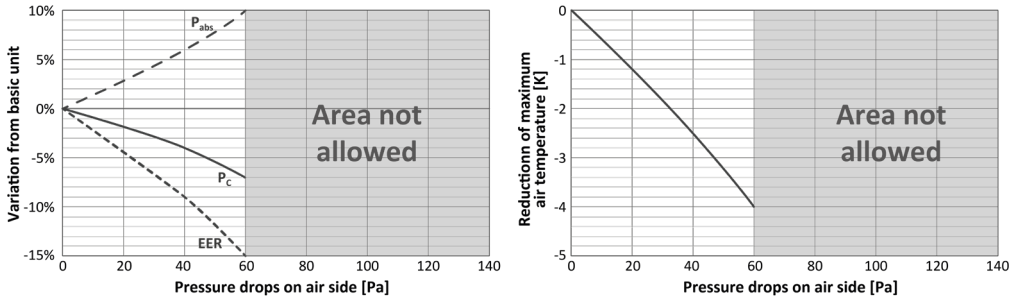
Aeraulic head losses and options available for the ventilating section

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.

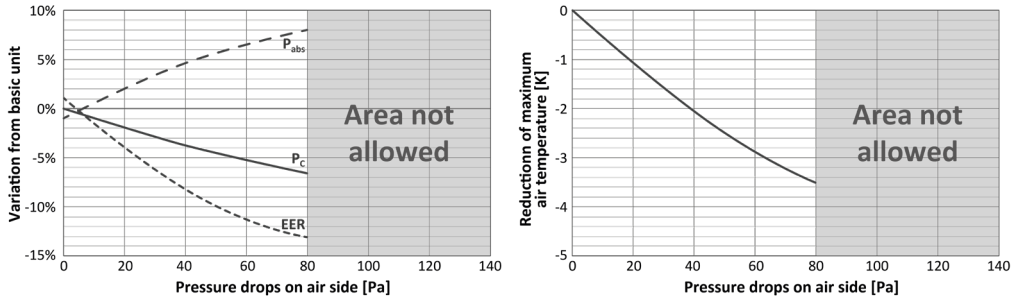
If there are obstacles to free air flow, you should consider the additional aeraulic head losses that will cause a reduction of the air flow rate and a consequent deterioration of performance.

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.

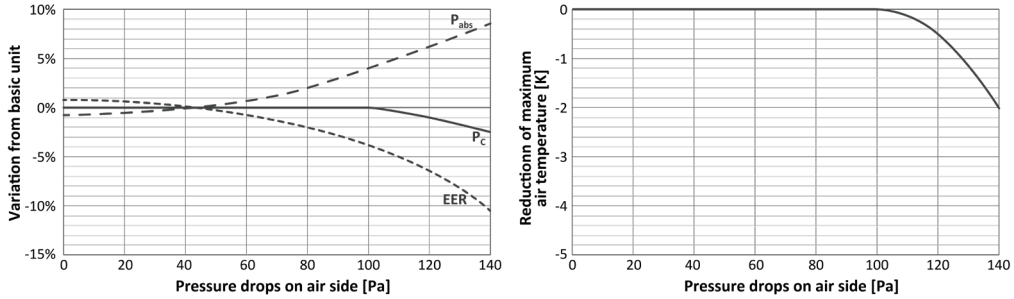
AC fans (Ø 630)



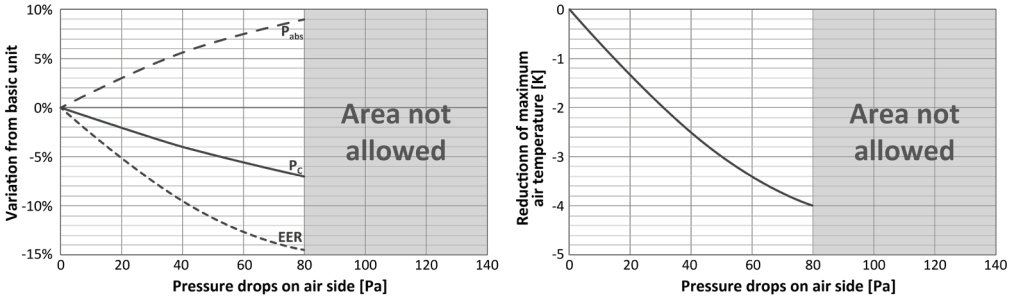
EC fans (Ø 630)



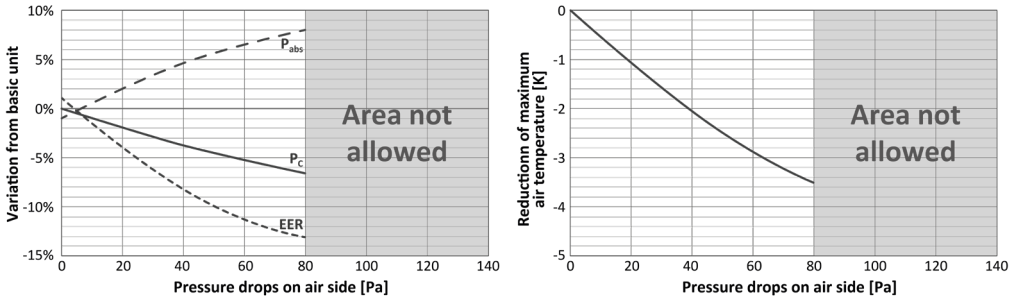
Oversize EC fans (Ø 630)



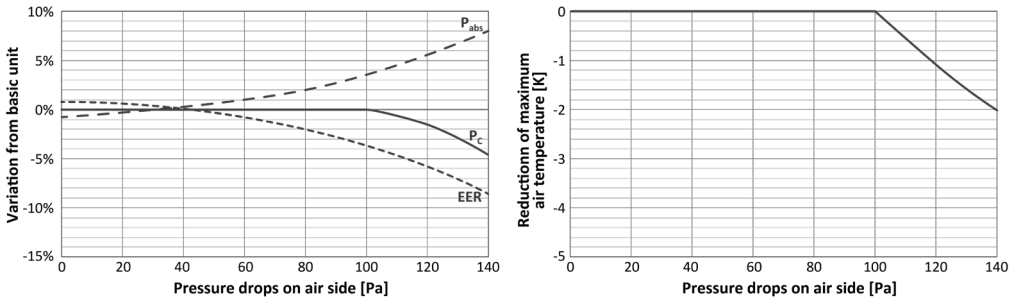
AC fans (Ø 800)



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.

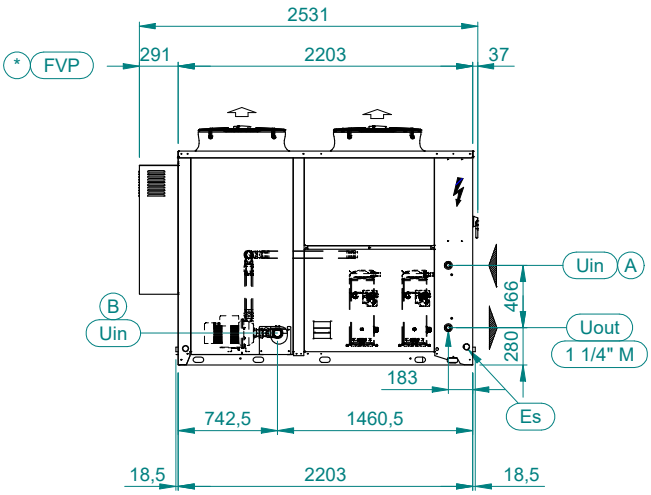
It is emphasized that, as indicated in the diagrams and based on the diameter and type of fan, for aeraulic head losses higher than 60 or 80Pa, only the use of oversize EC fan is allowed.

DIMENSIONAL DIAGRAMS

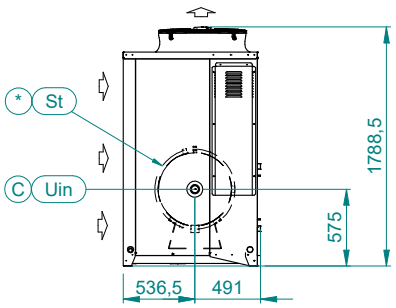
ZETA REV SEI 6.2

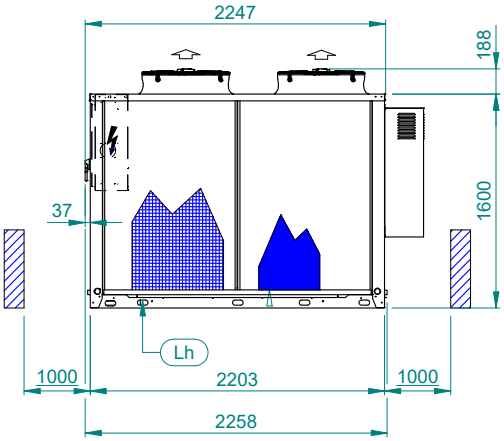
A4G740B

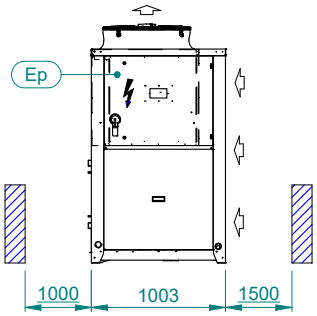
VIEW FROM "A"

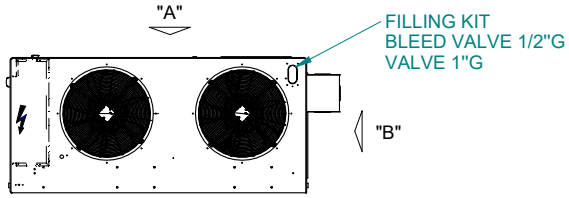


VIEW FROM "B"









Uin		
A	B	C
G 1 1/4" M	G 2" F	G 2" M

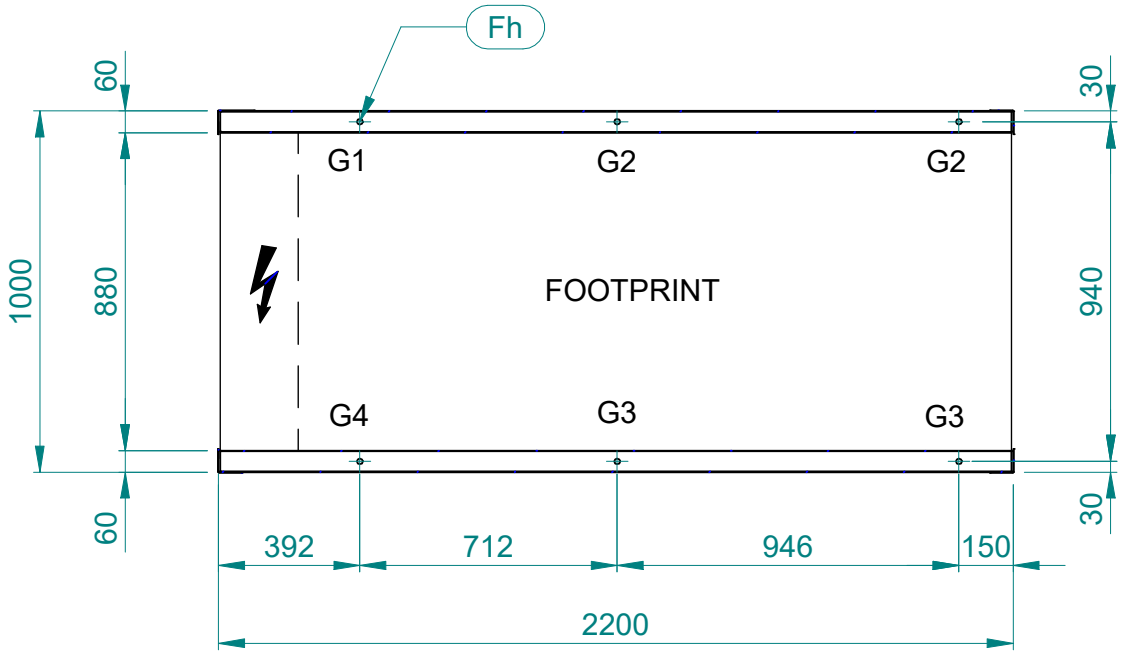
HYDRAULIC CONNECTIONS

- A WITHOUT HYDRAULIC MODULE
- B HYDRAULIC MODULE ST1P-2P
- C HYDRAULIC MODULE ST1PS

*	OPTIONAL

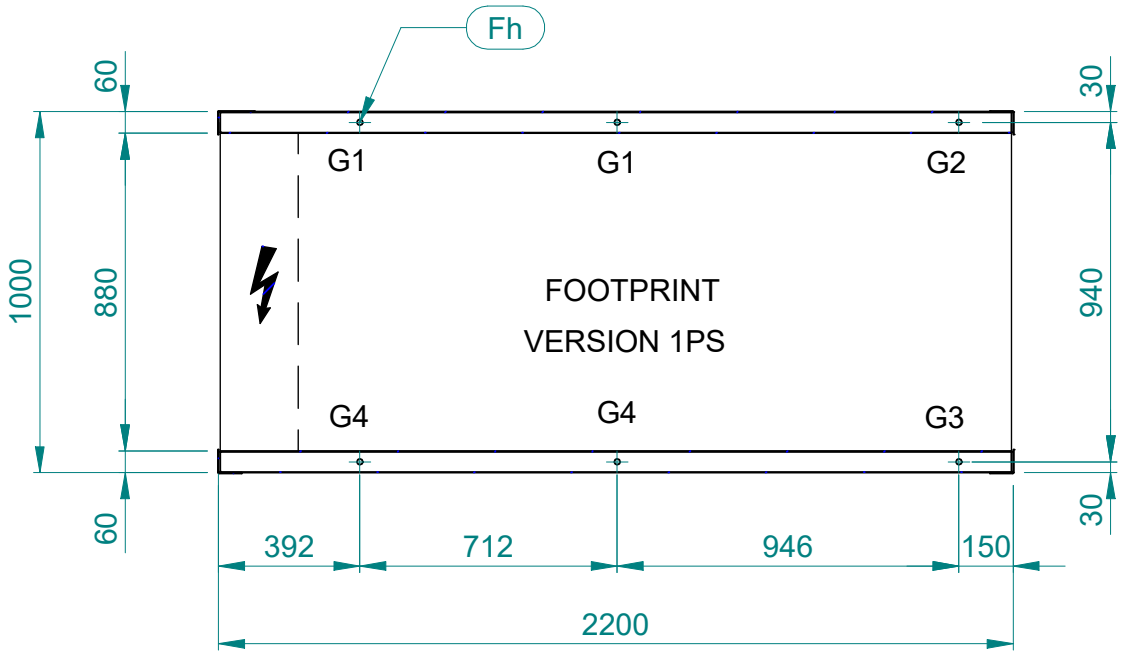
ZETA REV SEI 6.2

A4G740B



SCALE
1:30

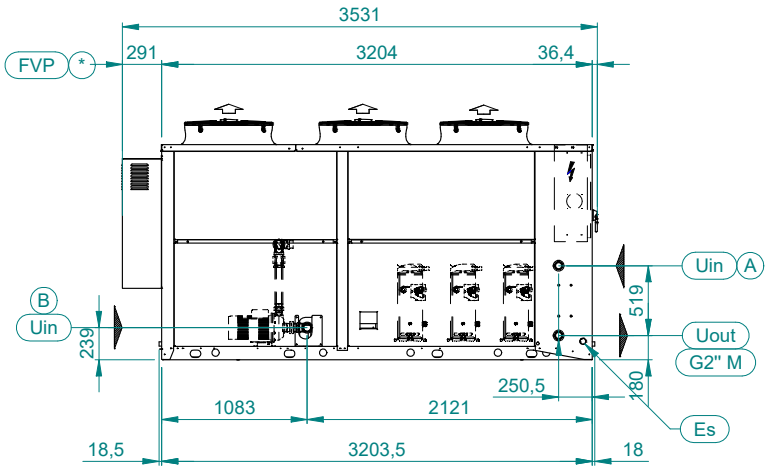
MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)
ZETA REV 6.2	486	490	175	47	39	143
ZETA REV 6.2 1P-2P	540	544	174	64	51	140



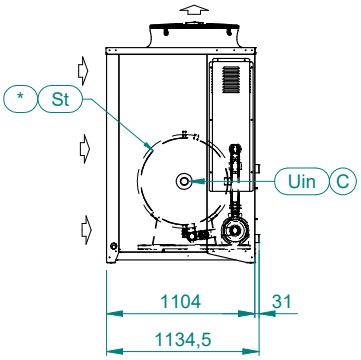
ZETA REV SEI 8.3

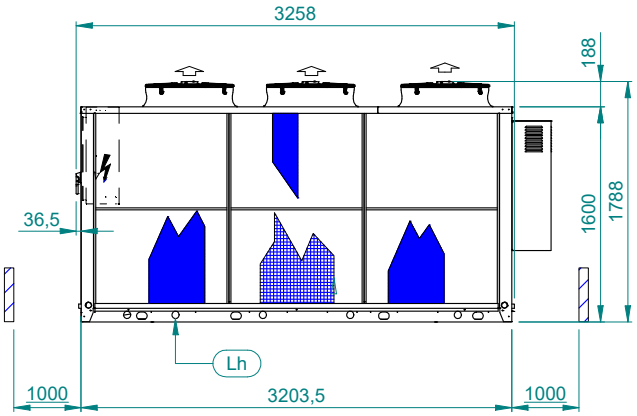
A4G741B

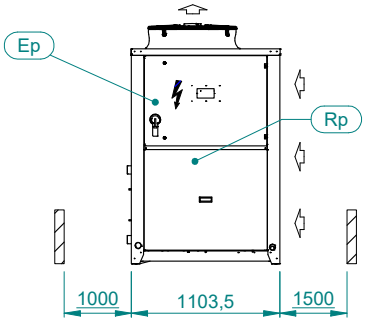
VIEW FROM "A"

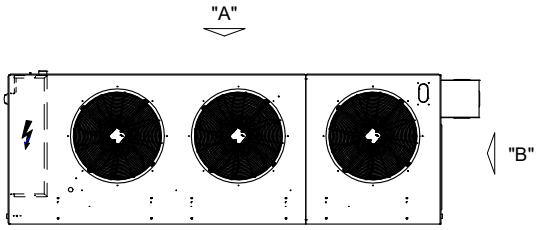


VIEW FROM "B"









HYDRAULIC CONNECTIONS

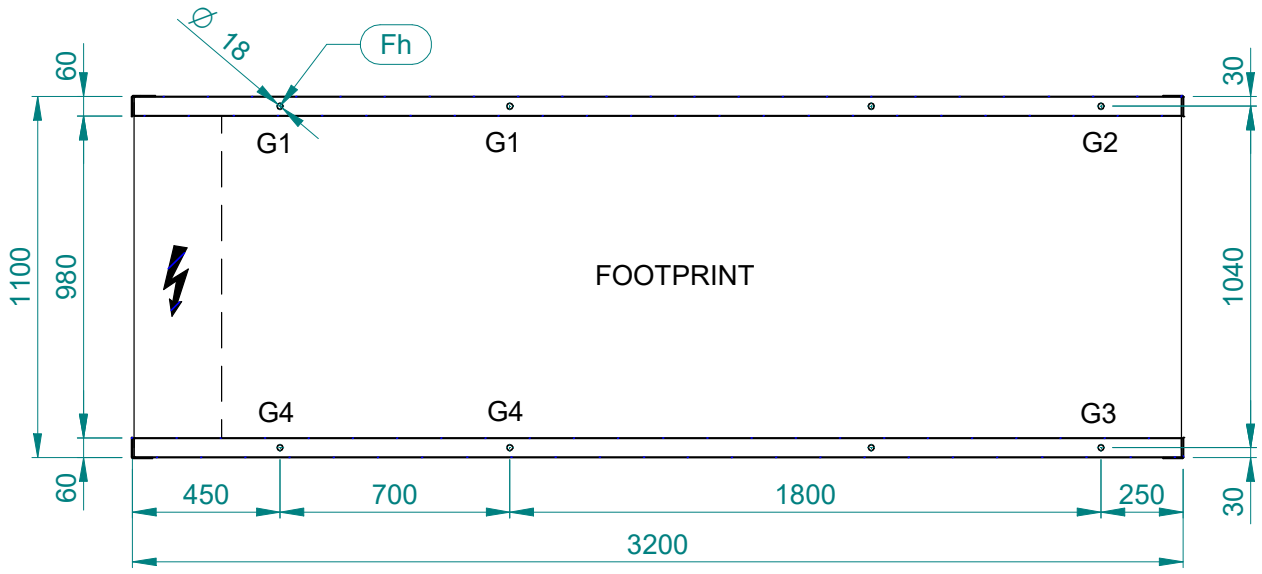
- (A) WITHOUT HYDRAULIC MODULE
- (B) HYDRAULIC MODULE ST1P-2P
- (C) HYDRAULIC MODULE ST1PS-2PS

Uin		
(A)	(B)	(C)
G 2" M	G 2" F	G 2" M

*	OPTIONAL

ZETA REV SEI 8.3

A4G741B



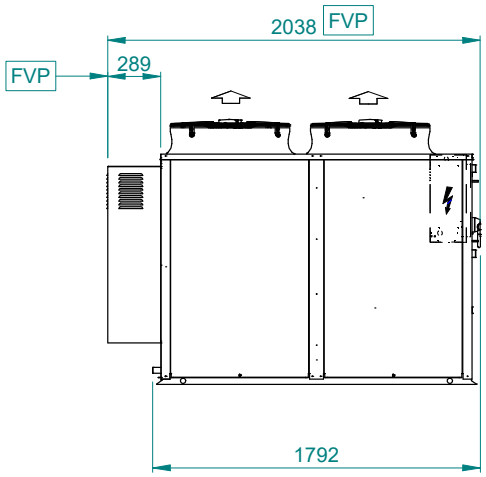
SCALE
1:30

MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)
ZETA REV SEi 8.3	699.3	705	157	80	63	124
ZETA REV SEi 8.3 1P-2P	746.3	752	162	99	77	126
ZETA REV SEi 8.3 1PS-2PS	824.3	1180	184	273	229	155

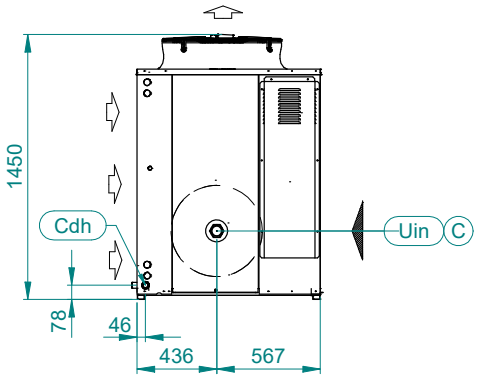
ZETA REV HEI 3.1

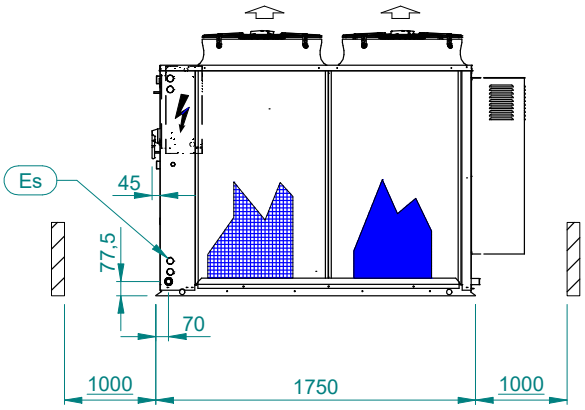
A4G742C

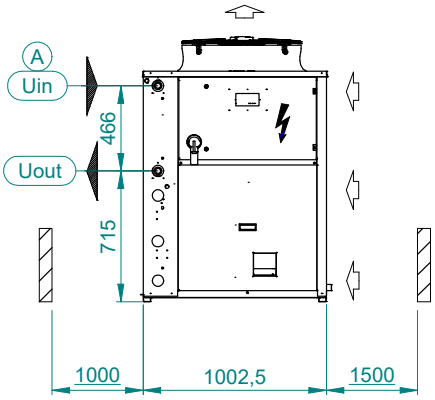
VIEW FROM "A"

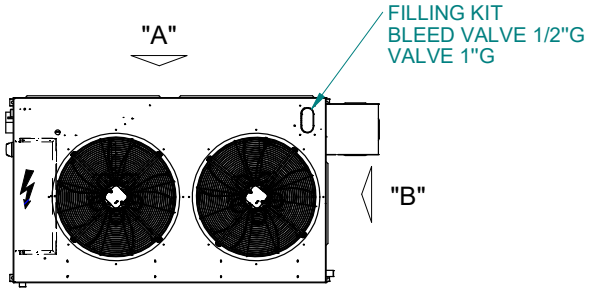


VIEW FROM "B"









A	B	C
G 1 1/4" M	G 2" F	G 2" M

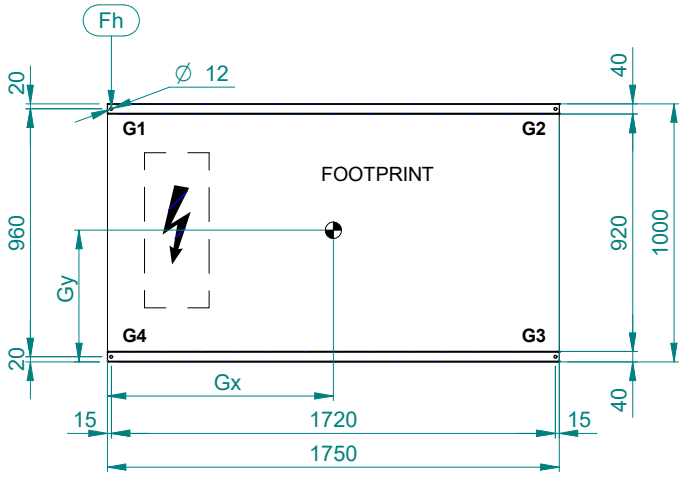
HYDRAULIC CONNECTIONS

- (A) WITHOUT HYDRAULIC MODULE
- (B) HYDRAULIC MODULE ST1P-2P
- (C) HYDRAULIC MODULE ST1PS-2PS

SAP CODE OF OPTIONS

ZETA REV HEI 3.1

A4G742C



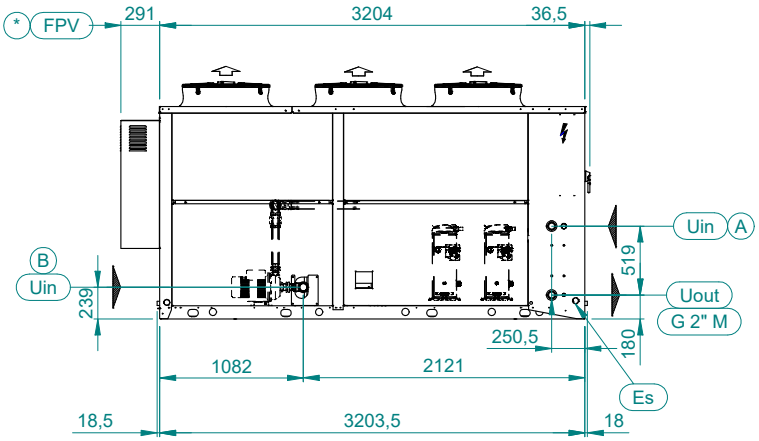
SCALE
1:30

MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)	Gx	Gy
HEi 3.1	355	358	114	67	65	112	653	523
HEi 3.1 1P-2P	405	408	131	91	76	110	722	564
HEi 3.1 1PS-2PS	459	632	154	160	162	156	772	550

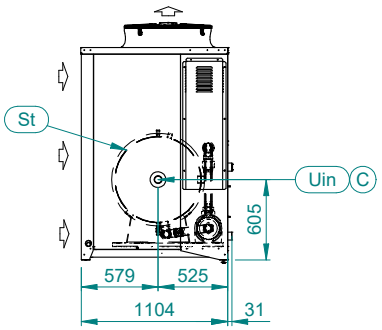
ZETA REV HEI 6.2

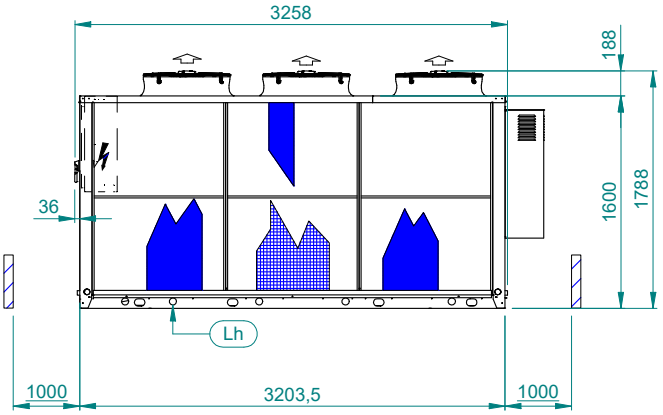
A4G743B

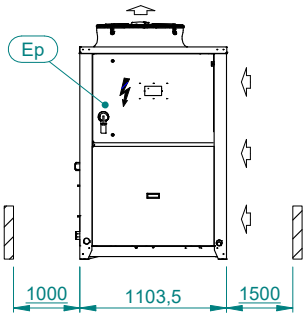
VIEW FROM "A"



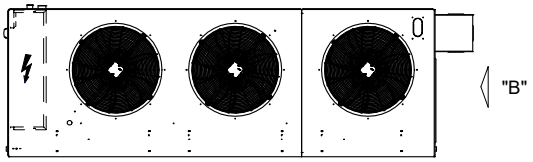
VIEW FROM "B"







"A"



Uin		
A	B	C
G 2" M	G 2" F	G 2" M

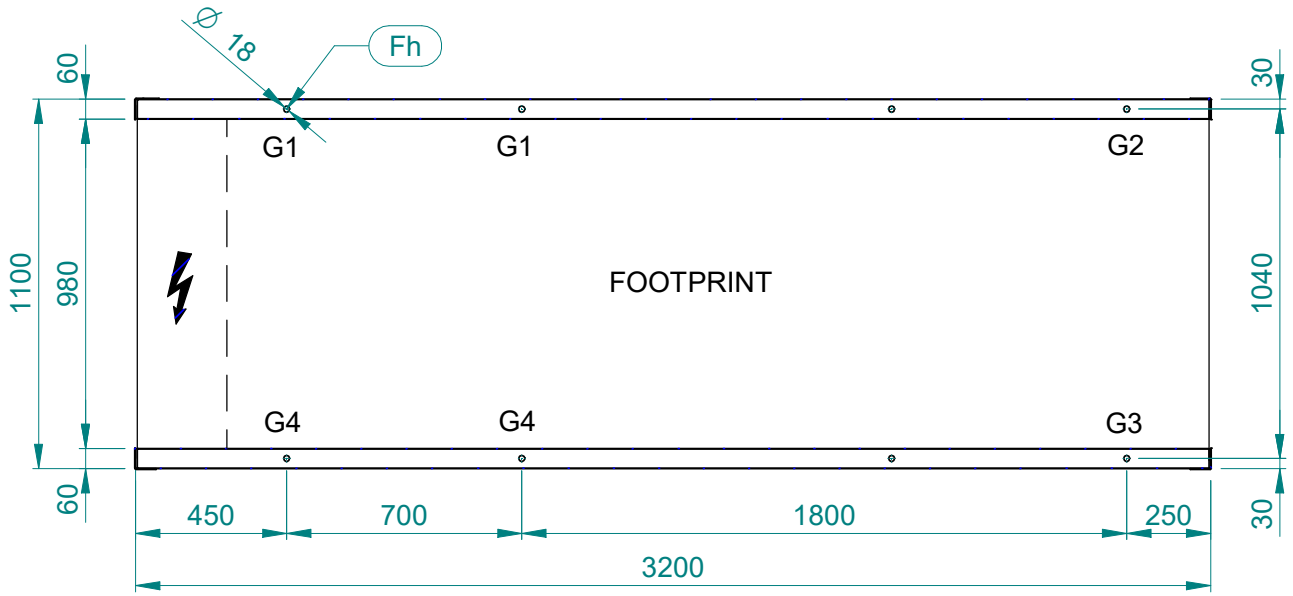
HYDRAULIC CONNECTIONS

- A WITHOUT HYDRAULIC MODULE
- B HYDRAULIC MODULE ST1P-2P
- C HYDRAULIC MODULE ST1PS-2PS

*	OPTIONAL

ZETA REV HEI 6.2

A4G743B



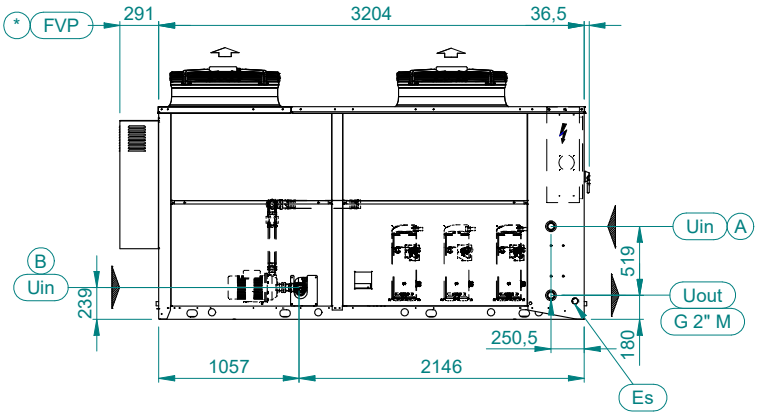
SCALE
1:30

MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)
ZETA REV HEi 6.2	660	666	145	76	62	119
ZETA REV HEi 6.2 1P-2P	706	712	150	94	76	121
ZETA REV HEi 6.2 1PS-2PS	784	1140	173	267	229	149

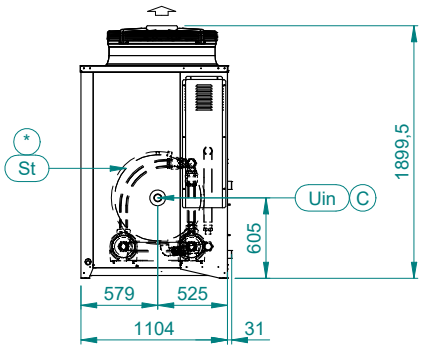
ZETA REV HEI 8.3

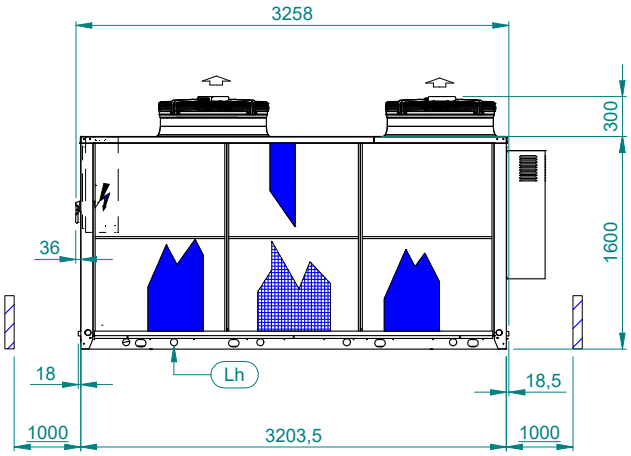
A4G744B

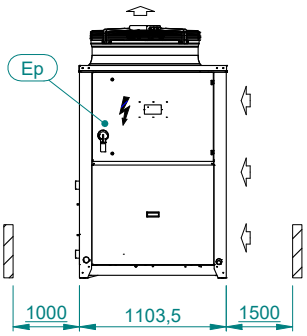
VIEW FROM "A"

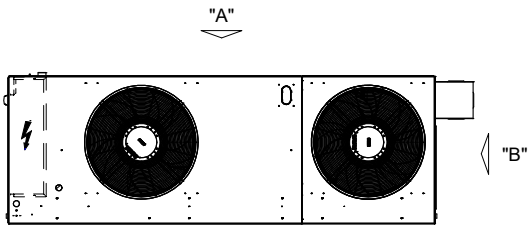


VIEW FROM "B"









Uin		
A	B	C
G 2" M	G 2" F	G 2" M

HYDRAULIC CONNECTIONS

A WITHOUT HYDRAULIC MODULE

B HYDRAULIC MODULE ST1P-2P

C HYDRAULIC MODULE ST1PS-2PS

*	OPTIONAL

ZETA REV HEI 8.3

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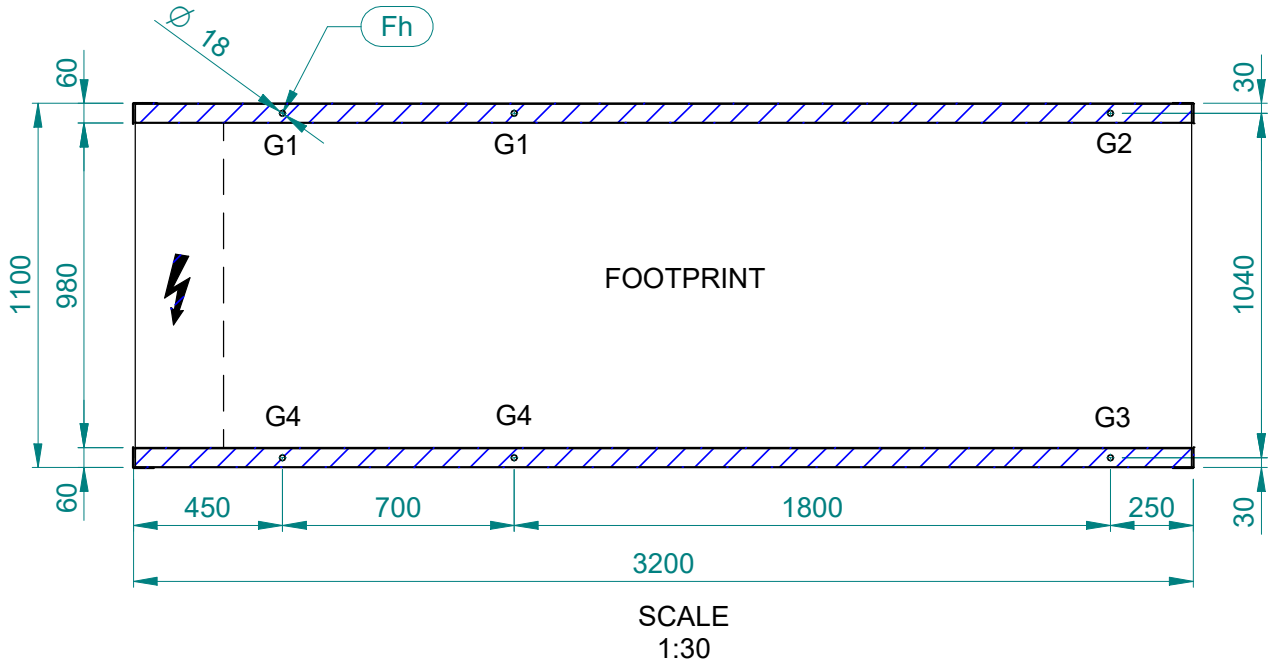

SCALE
1:30

MODEL	WEIGHT(kg)	OPERATING WEIGHT (kg)	G1 (kg)	G2 (kg)	G3 (kg)	G4 (kg)
ZETA REV HEi 8.3	754	760	166	94	74	130
ZETA REV HEi 8.3 1P-2P	800	806	171	113	87	132
ZETA REV HEi 8.3 1PS-2PS	879	1235	193	288	239	161

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