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Thermal power (A7;W45) $35 \div 60$ kW
Cooling power (A35;W7) $32 \div 56$ kW

High efficiency and high temperature air/water heat pump with axial fans and scroll compressors





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CLASS A



MULTI-PURPOSE



SUPER SILENT



R134A



WATER
UP TO 80°



HORIZONTAL AIR
DISCHARGE



SUPERVISION
VIA WEB



MANAGEMENT
OF UP TO
8 UNITS
WITH MINIBOSS

New series of dedicated heat pumps with Scroll compressors.

Standard version in 6 sizes

Thermal power (A7;W45) 35 ÷ 60 kW
Cooling power (A35;W7) 32 ÷ 56 kW

BLACK is a series of heat pumps that covers power from 35 to 60 kW in R134a, with the possibility of having water at 80°.

STRENGTHS

- > High temperature of the produced water: up to 80°C
- > Extended limits of operation in heat: air up to -20°
- > Automatic management of DHW
- > DWS always available (multi-purpose)
- > Intelligent management of defrosts
- > Subcooler and increased fin pitch
- > SLN Super Silent version
- > Supervision via web
- > Management of up to 8 units with proprietary control

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STANDARD UNIT

STRUCTURE

In galvanised sheet metal and painted at 180°C with RAL7035 polyester powder, that gives high resistance against atmospheric agents.

The panels can be easily removed for complete access to the internal components. All structures are equipped with two condensation collection trays with relative drain (one for each coil).

COMPRESSOR

Semi-hermetic compressor, complete with thermal protection included in the windings of the electric motor, crankcase heater and rubber vibration damper supports. The compressors used in this series are specifically designed to work in heat pump at very high temperatures. The optimisation of the high value compression ratio allows higher efficiencies if compared with traditional scroll compressors. In the HT version the compressor is cooled by a system inside the unit. This cooling system allows an outlet water temperature of 80°C and improvement of the COP of the refrigerant cycle.

INTERNAL EXCHANGER (SYSTEM SIDE)

Brazed plates made of AISI 316 stainless steel, insulated with closed cell foam cladding that reduces heat loss and prevents the formation of condensation. The exchanger is equipped with a temperature probe for ice protection, a probe for detecting the inlet and outlet water temperature and a pallet flow switch supplied as standard.

EXTERNAL EXCHANGER (SOURCE SIDE)

Consists of two coils with copper pipes and high exchange surface aluminium finning with fin pitch dimensioned to maximise heat exchange and reduce noise. The fin clearance of the exchanger was increased to allow the unit to work at very low outdoor temperatures and at high concentrations of humidity. At the base of the exchanger is the subcooler, a further refrigerant circuit that prevents the formation of ice in the lower part of the coil and facilitates the flow of condensation during defrosts. The effects of the subcooler are: the reduction of number of defrosts and the certainty of having a clean exchanger at the end of defrost.

FANS

Helicoidal fan directly coupled with electric motor, made of plastic with the blade profile with WINGLET, a special mould in the end part of the blades that allows noise reduction and an increase in ventilation performances. The control manages the fan speed through a phase-cut speed regulator, in order to optimise the operating conditions, efficiency, and allow the unit to work in heat pump, even with high outdoor temperatures.

This adjustment also reduces the level of noise of the unit, in fact, the typical conditions in which the control will modulate the fan speed are the night-time and spring and autumn. This ensures that, whenever there is the opportunity, the machine decreases the fan speed to minimum and, therefore, noise.

The fans are helicoidal type, directly coupled with 6-pole electric motor, with IP 54 protection degree, with shaped nozzles and accident prevention grille according to UNI EN 294.

REFRIGERANT CIRCUIT

Includes:

- > inlet valve in the liquid and suction line
- > liquid and humidity warning light
- > solenoid valve
- > 4-way reverse valve
- > check valve
- > drier filter
- > electronic expansion valve
- > high pressure transducer
- > low pressure transducer
- > high and low pressure switches
- > safety valve
- > liquid receiver
- > suction separator
- > subcooler

ELECTRIC PANEL

The electric panel consists of:

- > main cut-out switch
- > Main circuit breaker and fuses to protect the auxiliary and power circuits
- > compressor contactor
- > fan revolution regulator for condensation and evaporation control
- > contactor and pump overload cut-out (version 1P, 2P and 1R)
- > general alarm dry contacts
- > microprocessor controller

The standard power supply is 400V/3~/50Hz for all sizes.

CONTROL

Microprocessor control for managing the following functions:

- > Water temperature adjustment with inlet control
- > Ice protection
- > Compressor timing
- > High pressure pre-alarm management
- > Compressor high flow temperature alarm management
- > Alarm signal
- > Alarm reset
- > Digital input for external ON-OFF
- > Digital input for summer/winter selection

The control allows display of the following information:

- > Outlet water temperature
- > Inlet water temperature
- > Condensation pressure
- > Evaporation pressure
- > Outdoor air temperature
- > Set differential and temperature set
- > Description of alarms
- > Pump and compressor operation counter
- > Alarm history

Some functions are only available with the unit properly configured. Some functions must be enabled from the control.

CONTROLS AND SAFETY DEVICES

- > Utility water temperature control probe (located at exchanger inlet)
- > Antifreeze probe that activates the antifreeze alarm (manual reset)
- > High pressure switch (automatic reset with limited interventions)
- > Low pressure switch (automatic reset with limited interventions)
- > Standard supplied mechanical pallet flow switch (manual reset)
- > Condensation pressure control via speed regulator for operation with low outdoor temperatures
- > Evaporation pressure control via speed regulator for operation with high outdoor temperatures in DHW production or recovery
- > High pressure safety valve
- > Compressor over-temperature protection

TESTING

The units are tested in both summer and winter operation at the factory and are despatched filled with oil and coolant.

STANDARD EQUIPMENT

- > Sliding defrost management
- > Compressor stop for outdoor air temperature below the operating limits
- > Main disconnecting device
- > Power and auxiliary circuit protection
- > Microprocessor control
- > Counter for compressors and pumps
- > Alarm History
- > Condensation and evaporation control with fan revolution regulator
- > Flow switch (supplied)
- > Directive 97/23/EEC (PED) Certification
- > Remote On/Off from standard digital input
- > Summer/Winter from standard digital input

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OPTIONS

CONSTRUCTIVE CONFIGURATIONS

/HT Version unit with high water temperature

The unit allows production of hot water up to 80° (non-continuously). In this version there is an innovative cooling system of the compressor that allows its use also in harsh conditions. In addition to allowing a high water outlet temperature, the cooling system also improves the COP of the refrigerant cycle, realising an intermediate heat exchange.

/LN Version silenced unit

The unit, in addition to the basic version components, includes the compressor compartment acoustically insulated with sound-absorbing and soundproof material. The choice of coupling of the materials has allowed the removal of the frequencies generated by compressors and pumps.

/SLN Version Super silent unit

The unit provides for the following changes:

- > increased external exchanger (evaporating/condensing coil)
- > fan with low number of revolutions
- > full soundproofing of the compressor/pump compartment
- > LOW noise setting of fans

For further decrease of noise, we recommend the Soft Starter accessory.

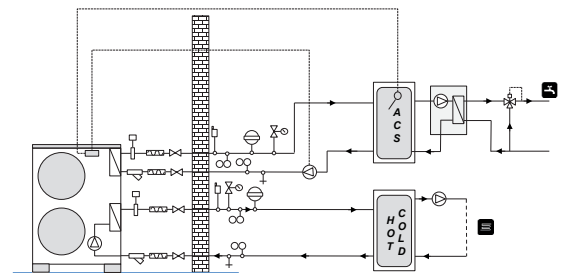
/OD Version unit with horizontal discharge

The unit in this version has horizontal air discharge. This version allows reduction of the unit height or installation where vertical discharge is not admitted for logistical reasons or noise. If equipped with EC fan, it is possible to convey the air flow for discharge through ducts.



/DWS Version multi-purpose heat pump

In this set-up, the unit is equipped with two utility exchangers: one on the system side for air conditioning and heating, and one exclusively for the production of DHW.



On the system side exchanger, the unit is able to produce hot or cold water to meet, depending on the seasons, the heating and cooling requirements of the building. On the sanitary exchanger, the unit produces high temperature water to be sent to the storage tank outside the machine, selected and dimensioned according to the system requirements. Depending on the season, the unit works with different modes: the passage through various modes of operation (within the season) is automatic through the reading of the temperature probes and of the set-points set. Switching logics and times are designed to ensure maximum system efficiency and reliability.

It is compulsory to associate this configuration to a suitably sized boiler in which to store high temperature water; we recommend a volume of at least 20÷25 l per thermal kW of the unit. The boiler must be provided with sump for the insertion of the DHW operating probe, located in the top part, through which the unit controller monitors the need to produce DHW.

SUMMER OPERATION

There are three summer modes of operation:

- > **Chiller mode:** the unit only produces chilled water for the system.
- > **Chiller mode with simultaneous production of DHW:** the unit produces chilled water for the system and DHW, simultaneously. The recovered power for the production of DHW is total.
- > **Heat pump mode for the production of DHW:** without cold load and on call of the DHW operating probe, the unit heats the water inside the DHW storage tank, using the finned tube bundle coil as evaporator. The use of the external hot air as a source of heat ensures extremely high COP.

Switching from one mode to another is entirely automatic based on a logic of priority in the production of DHW and, when there is contemporaneity of loads, recovering condensation energy for the production of DHW.

WINTER OPERATION

There are two winter modes of operation:

- > **Heat pump mode for heating:** the unit produces hot water to system side exchanger for heating
- > **Heat pump mode for the production of DHW:** produces high temperature hot water to the connected exchanger of the DHW storage.

Switching from one mode to another is entirely automatic based on a logic of priority in the production of DHW.

In addition to the basic version components, the /DWS version includes:

- > dedicated exchanger for the production of DHW
- > recovery exchanger inlet and outlet probes
- > temperature probe to be placed on the DHW storage tank.

HYDRAULIC MODULE OPTIONS

/1P unit with pump

The unit includes a circulation pump on the unit. The pump is centrifugal type, with body and impeller in AISI 304 steel. The mechanical seal is designed to work with up to 40% concentration of ethylene glycol. The electric motor is three-phase with IP 55 degree of protection. The pump is complete with thermoformed insulating shell. The different models available differ for useful head to system.

/2P unit with two pumps, one in reserve to the other

The unit includes two circulation pumps on the unit, one in reserve to the other, managed in rotation on an hourly basis and with automatic switching in case of failure. The pump is of centrifugal type, with body and impeller in AISI 304 steel. The mechanical seal is designed to work with up to 40% concentration of ethylene glycol. The electric motor is three-phase with IP 55 degree of protection. The pump is complete with thermoformed insulating shell. The different models available differ for useful head to system.

/1R unit with DHW side pump

The unit is equipped with a DHW side pump installed inside the unit.

The pump is centrifugal type, with body and impeller in AISI 304 steel. The mechanical seal is designed to work with up to 40% concentration of ethylene glycol. The electric motor is three-phase with IP 55 degree of protection. The pump is complete with thermoformed insulating shell.

This module can be combined only with the /DWS version units and can be combined with modules /1P or /2P. The /DWS version units without the /1R module are equipped with a consent for the management of an external pump.

The different models available differ for useful head to system.

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ACCESSORIES

All units can be configured with various accessories to better meet the requirements of the specific application in which they will be inserted. To verify availability and compatibility of the accessories with size and configuration, refer to the price list or selection software.

HYDRAULIC CIRCUIT ACCESSORIES

- > Filling unit with pressure gauge supplied
- > Antifreeze heater
 - basic version: electric heater on utility exchanger
 - /1P, /2P and /1R version: electric heater on utility exchanger and heating cable on piping
- > 3-way valve for DHW management (supplied)
- > System pump with Pulse function
- > Water filter for system
- > Water filter for DWS version

ELECTRIC ACCESSORIES

- > Maximum and minimum voltage relay
- > Double set-point from digital input
- > RS485 Serial interface
- > Remote user terminal
- > Electronic soft starter
- > EC Electronic fans
- > Compensation of set-point based on the outdoor air temperature
- > DHW Automatic management
- > DHW operating probe (standard on /DWS unit)
- > Anti-legionella function
- > Auxiliary heat source management
- > DHW production with timer
- > Single operation dry contacts
- > Management relay for external pump
- > Miniboss S
- > Miniboss M
- > Supervision via WEB

VARIOUS ACCESSORIES

- > Rubber vibration dampers
- > Packaging in wooden crate

MAIN DESCRIPTION FUNCTIONALITY/ACCESSORIES

Remote ON/OFF from digital input (standard)

Remote ON/OFF from digital input (standard). This function is standard on all units and consists of a remote contact for the switching on and off of the machine via a signal that can be brought inside the building or controlled by a BMS (Building Management System) system.

Summer/winter selection from digital input (standard)

This function is standard on all heat pumps. When turning on the unit, it is always necessary to set a mode of operation that can either be heat pump or chiller. Through this remote contact it is possible to change this mode of operation also from inside the building and without the need to directly access the microprocessor control.

Sliding defrosting (standard)

The control manages the defrost according to a variable intervention threshold, based on the pressures inside the unit and the outdoor air temperature. By cross-referencing this information, the control is able to identify the presence of ice on the coil, activating the defrosting sequence only when necessary, so as to maximise the energy efficiency of the unit. The dynamic management of the defrost threshold ensures that for outdoor air temperatures below -5°C, when the absolute humidity of the air is very low, defrosting is only carried out when the ice on the coil degrades its performance.

Auxiliary heat source management (accessory)

The controller is able to manage an external heat source which, depending on the type of hydraulic connection, can be integration or back-up. The auxiliary heat source is activated when the outdoor air temperature falls below a threshold settable from control and when only the heat pump proves to be insufficient to meet the load. Activation is through the closure of a dry contact.

It is also possible to set the unit so that the controller turns off the compressors when the unit works in heat pump mode and the outdoor air temperature falls below an established minimum temperature: the controller stops the compressors before the unit goes into low pressure alarm, thus avoiding having to manually reactivate the machine. This function is particularly useful when the heat pump is installed in an area where the outdoor air temperature definitely falls below the minimum temperature admitted by the operating limits (in agreement with the set-point set). When the outdoor air temperature returns above the set threshold temperature, the unit automatically starts working again without the need for any intervention.

For units equipped with integrated pump, this will always be kept running in order to avoid the formation of ice and guarantee, at any moment, the correct reading of the antifreeze safety and temperature probes. The stop temperature must be set according to the highest set-point temperature and in agreement with that admitted by the operating limits of the machine. A stop temperature can be set different to the default one, as long as it is

compatible with the unit's operating limits. The standard programming provides that:

- > the standard units have the set-point in heating set at 30/35° with a stop temperature of -16°C
- > the /HT units have the set-point in heating set at 40/45° with a stop temperature of -20°C

Should the unit be used also for the production of DHW, the stop temperature must consider the highest water set, and the operating limits allowed.

DHW Automatic management (accessory)

This feature allows the unit, through a DHW operation probe (accessory), to control the temperature inside the DHW storage tank and manage a 3-way valve (accessory) outside the unit. The priority is always for the production of DHW.

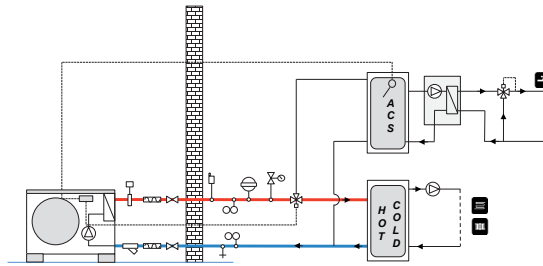
Activation of the function must be requested when ordering, but it can also be configured subsequently (by qualified and authorised technical personnel), as long as the unit is connected to an appropriate hydraulic circuit. The request when ordering accessories for managing the DHW automatically involves enabling the "DHW automatic management" function.

The heat pump normally operates on the system to meet the building's comfort needs, but when the temperature of the water inside the tank drops below an established threshold, the control manages the DHW production: if the unit is operating as heat pump for heating, the 3-way valve will be switched and the set-point modified; whereas, if the unit is producing chilled water for air conditioning, the control switches the unit to heat pump mode, assigns it the set-point for DHW (normally higher than the system set-point) and turns the 3-way valve to the appropriate position. Once the temperature inside the DHW tank has reached the set value, the unit automatically goes back to producing water for the heating and air conditioning system.

Description of winter operation

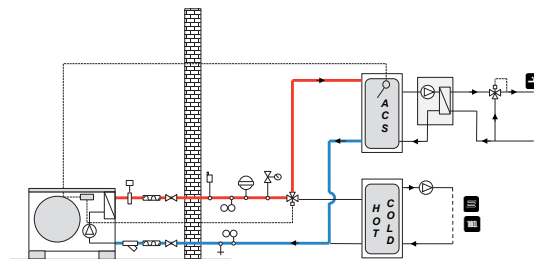
The following situations occur during the winter season:

- > Heating request: the temperature of the inlet water to the unit, coming from the system, is lower than expected, so the control turns on the compressor and the unit will operate until the set-point temperature is reached.



Once the wanted temperature is reached, the compressor stops and only the circulation pump remains in operation, continuing to circulate water in the system. The unit waits in this condition until the inlet water temperature drops again.

DHW request: suppose that the unit is working for the production of hot water for the heating system (45°C) and it receives a call from the DHW operating probe located inside the storage tank to produce high temperature water, since the DHW temperature has dropped. As the set limit (e.g. 55°C). Being the DHW is managed with the logic of priority, the control will change the set-point to 55°C and will switch the 3-way valve.



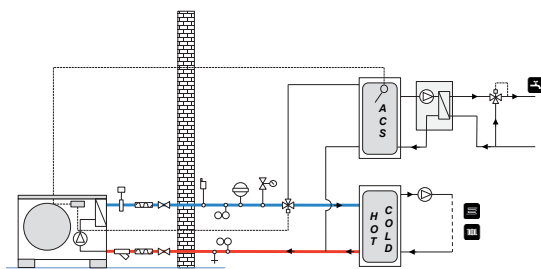
As soon as the water inside the tank reaches the requested 55°C, the control will again switch the 3-way valve to operate on the system and will bring the set-point back to 45°C.

Should it be necessary to defrost, in any mode the unit is operating, it will force the 3-way valve to be switched to system which, given the greater inertia, is less sensitive to the lowering of the temperature.

Description of summer operation

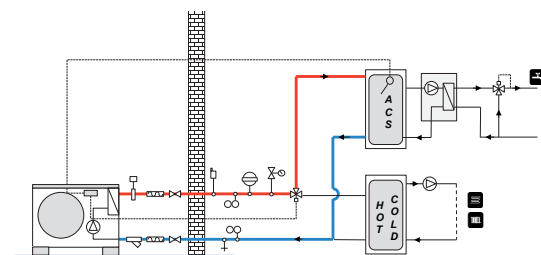
The following situations occur during the summer season:

- > Cooling only: the temperature of the inlet water to the unit, coming from the system, is higher than expected, the control turns on the compressor and the unit will operate until the set-point temperature is reached.



At that point, the compressor stops and only the circulation pump remains in operation, continuing to circulate water in the system. The unit waits in this condition until the inlet water temperature rises again.

- > DHW request: suppose that the unit is working for the production of chilled water for the air conditioning system (7°C) and it receives a call from the DHW operating probe located inside the storage tank to produce high temperature water, since the DHW temperature has dropped below the set limit (e.g. 55°C). As the DHW is managed with the logic of priority, the control will change the unit mode from chiller to heat pump, set the set-point at 55°C and switch the 3-way valve.



As soon as the water inside the tank reaches the requested 55°C, the control will again switch the unit to chiller mode, will turn the 3-way valve to operate on the system and will bring the set-point back to 7°C.

DHW operating probe (accessory)

For the production of DHW, the controller requires this accessory: it is a temperature probe with 6 m cable located in an appropriate sump of the tank for the production of DHW. For proper positioning, read the "Advice for installing a heat pump" section. Standard on units in DWS version.

Anti-legionella function (accessory)

Depending on the type of tank chosen for the production of DHW, the management of anti-legionella cycles may be necessary. The controller is able to manage them by activating, according to scheduled timing with a weekly timer, an auxiliary heat source that will perform the thermal shock on the DHW tank.

The anti-legionella function is realised exclusively through an external source (e.g. electric heater).

System pump with Pulse function (accessory)

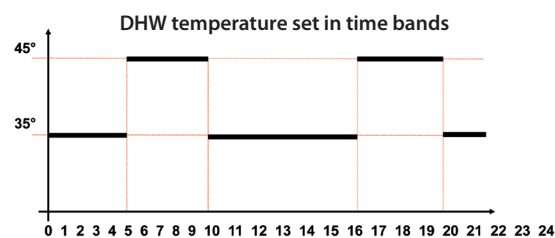
As standard, the unit is set to maintain the system side circulation pump always on, even when the set temperature is reached. Whereas, when the unit is equipped with this accessory, when the set-point is reached, the controller turns off the pump, reactivating it periodically, long enough to detect the water temperature. If the controller verifies that the water temperature is still in set-point conditions, it will turn off the pump again. Otherwise, the controller re-activates the compressors to meet the system requirements. This accessory allows to drastically reduce the electric absorptions due to pumping, especially during spring and autumn, when the load is extremely low.

The application of this accessory requires the compulsory presence of the "Antifreeze heaters" accessory.

DHW production with timer (accessory)

With this accessory present, it will be possible to associate two different temperatures for the DHW to different times of the day: Normal and Saving. This allows you to decide at what time of the day the heat pump must concentrate the production of DHW, always keeping the minimum level of Saving temperature, and always managed with the logic of priority.

For example, by concentrating the production of water at Normal temperature during night-time, the best electricity rates will be exploited and production of DHW will be ensured before the time of greater consumption.



With this system, the unit never stops controlling the temperature inside the DHW tank and if hot water is occasionally used outside the regular times, the unit will give the production of DHW priority until it brings the water in the tank to a temperature equal to the Saving set-point.

Electronic thermostatic valve (standard)

Using this accessory is particularly suitable on units having to operate in very variable heat load conditions, with strong differences of outdoor air temperature or with frequent change of operating mode, like in joint management of air conditioning, heating and production of high temperature water.

The use of the electronic thermostatic valve allows:

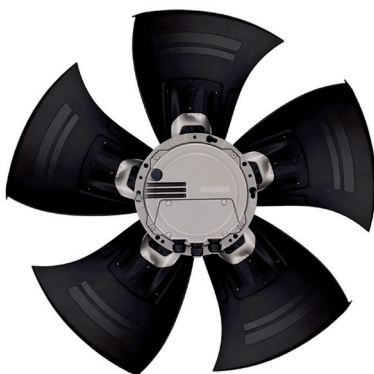
- > maximisation of the heat exchange to the utility exchanger
- > minimisation of the response times of the refrigerant circuit to the variations of the operating conditions and load
- > optimisation of the superheat adjustment
- > maximisation of energy efficiency



EC Fans (accessory)

The units can be requested with EC fans, with electronic switching brushless motor. These motors with permanent magnet rotor ensure very high levels of efficiency for each working condition and allow a 15% saving on the power absorbed by each fan.

Furthermore, the microprocessor, through a 0-10V analogue signal sent to each fan, controls the condensation/evaporation through continuous adjustment of the air flow rate upon variation of the outdoor air temperature, with a further decrease of electric absorptions and a reduction of sound emissions.



MINIBOSS S (accessory)

The Miniboss S allows connection of up to 4 units in parallel: management allows activation and deactivation of them at power steps and makes them rotate, thus allowing an identical use of all units.

The connected units must all be the same. The Miniboss S cannot control units with the DHW management active. Directly from the Miniboss S panel it is possible to manage:

- > the system set-point
- > the summer/winter selection of all machines
- > the ON/OFF of the single units or of the entire system

This accessory is supplied in an electrical panel with the unit (to be installed in a technical compartment); it must be provided on only one machine connected in parallel and all connected units must have the same configuration. When ordering, it is compulsory to specify the number of units that must be managed to allow for proper programming of the supervisor. Furthermore, the hydraulic circuit connecting the units must compulsorily respect one of the following diagrams. For more information on the use, refer to the specific documentation.

MINIBOSS M (accessory)

The Miniboss M allows management of up to 8 units in parallel. The main functions are:

- > Manage units with DWS configurations
- > Manage units with the "DHW automatic management" logic
- > Manage systems with a hot/cold tank for heating/air conditioning and a hot tank for the production of DHW

In addition to that also carried out by the Miniboss S:

- > the system set-point
- > the DHW set-point
- > use a compensation climate of the system set-point
- > the summer/winter selection of all machines
- > the ON/OFF of the single units or of the entire system
- > the switching of three-way valves
- > manage the operation of pumps outside the units

This accessory is supplied in an electrical panel with the unit (to be installed in a technical compartment), it must be provided on only one machine connected in parallel and all connected units must have the same configuration. When ordering, it is compulsory to specify the number of units that must be managed to allow for proper programming of the supervisor. For more information on the use, refer to the specific documentation.

Filling unit with pressure gauge (accessory)

This accessory allows automatic loading of the hydraulic system, adjustment of the correct working pressure, always verifiable through the pressure gauge, and continuously maintains this pressure by reintegrating the missing water.

Antifreeze heater (accessory)

This accessory consists in heaters inserted on the utility exchanger, on the pump and in the tank (based on the machine configuration) to prevent damaging the hydraulic components following the formation of ice during machine downtime. The power of the antifreeze heaters is only of a few tens of watts, depending on the unit model, meaning sufficient enough to avoid failure of the components. The control monitors (even when the unit is in stand-by) the outlet pump from the exchanger and when this detects a water temperature below or equal to 5°C (or 2°C below set-point temperature, with differential of 1°C), it turns on the pump (if present) and makes the antifreeze heaters intervene.

If the outlet water temperature reaches 4°C (or 3°C below set-point), the antifreeze alarm will also trigger, stopping the compressor, keeping the heaters active. The antifreeze heaters are present in the evaporator and on any recovery exchangers.

Double set-point from digital input (accessory)

The double set-point allows two different working temperatures to be set: one for heating operation and one for cooling operation. Should a double set-point be required for both modes, it will be compulsory to provide the electronic thermostatic valve. The set-point temperatures must be specified when ordering. The set-point can be changed from keyboard or from digital input.

RS485 Serial interface (accessory)

The growing diffusion of home automation systems and BMS (Building Management System) has led to the need to integrate all plant components under a single supervision. To meet this requirement, the unit can be equipped with a RS485 serial board with MODBUS protocol.

Remote user terminal (accessory)

This accessory consists in a copy of the remote control panel, from where it is possible to fully configure the unit and display all its parameters. Access to the masks is via passwords that enable the different levels of modification.

Soft-starter (accessory)

The units adopt all necessary measures to minimise start-up currents, but should a further reduction be needed, the unit can be equipped with the soft-starter accessory that allows, through an electronic control of the electric motors' start-up, a 40% reduction of the normal start-up current of the compressor.

DHW 3-way valve (accessory)

It is an on/off type three-way valve that, combined with the automatic management of DHW function, allows the machine to manage two separate circuits for comfort and DHW production, automatically switching from one to the other based on the system need. The DHW 3-way valve must be installed in a technical compartment.

Compensation of set-point depending on the outdoor temperature (accessory)

The controller allows modification of the unit set-point both in chiller operation and in heat pump, depending on the outdoor temperature. Compensation can be positive or negative: with positive compensation, upon outdoor air temperature increase, the summer temperature set-point will also increase, while with the negative compensation, upon air temperature increase, the temperature set-point decreases. Should the unit be used also for the production of DHW, the adjustment climate will not affect the DHW temperature set-point.

Maximum and minimum voltage relay (accessory)

This device continuously controls the unit's power supply voltage, ensuring it is always within an admissible range. Should the voltage value be above or below that range, the device stops the unit to avoid damaging the electric motors. The same device also controls the phase sequence.

Condensation/evaporation control with revolution regulator (standard)

The microprocessor control of the unit controls all operating parameters of the unit and continuously adjusts the speed of the fans through a revolution regulator, in order to optimise the operating conditions and the efficiency of the unit.

This adjustment also reduces the level of noise of the unit, in fact, the typical conditions in which the control will modulate the fan speed are the night-time and spring and autumn. This ensures that, whenever there is the opportunity, the machine decreases the fan speed to minimum and, therefore, noise.

Water filter (accessory)

The water filter, located at the unit's water inlet, aims at preventing sludge, processing residues or other, from clogging the unit exchangers. It is compulsory that at the inlet of each circuit: source, utility and recovery, there is a filter with a 0.4 or 0.5 mm mesh. The absence of the filter automatically voids the warranty.

Condensation collection tray (standard)

The condensation collection tray is designed to collect and convey water from the melting of ice during defrosting. A connection for connecting the drain pipe is present in the tray. The accessory is compulsory when the unit is installed in passageways.

Web supervision (accessory)

The units can be remotely managed in 2 different ways:

- > via web through LAN
- > via web through modem and telephone board (integrated in supervision)

The unit can be controlled totally through the connection.

The display possibilities are:

- > Inlet water temperature
- > Outlet water temperature
- > Air temperature
- > Condensation pressure
- > Evaporation pressure
- > Status of the unit
- > Presence of alarms
- > Compressor operation
- > Pump operation
- > Inverter operation percentage
- > Fan operation percentage

The modification possibilities are:

- > Power on and off of the unit
- > Switching of status: summer/winter or vice-versa
- > Reset of alarms. All unit alarms can be reset without physically reaching the installation
- > Modification of all set-points
- > Modification of climates

It is also possible to view a history of the operation of all variables (temperatures and pressures) detected by the control. This allows a view of the effective behaviour of the unit and of the system.

This function is essential to correctly set the system.

Relay for outdoor pump management

If the unit is purchased without pumps, the customer is entrusted with the start and stop of the pump in accordance with the instructions in the installation, operation and maintenance manual. This accessory is necessary if the unit needs to control one or more external pumps. It allows control of an external pump with the same logic as a pump integrated in the unit. The accessory consists in the supply of a dry contact only usable for controlling the start and stop. The customer is responsible for the protection and power.

INSTALLATION

The following instructions are intended to improve use of the heat pumps in systems and to prevent installation problems.

1. Heat Pumps are often combined with radiant heating systems. If the radiant system is in areas with control of the individual manifold head, it is compulsory to provide at least 20 litres of water per kW of heat yield of the unit, in condition of minimum water content, or with all heads closed. This is necessary because it is possible that a situation arises where almost all heads are closed and the heat pump works with an extremely reduced water volume. In this case, during defrosting, it is possible that the safety devices intervene due to excessive cooling of the water.
2. In the DWS version or with use of the "DHW automatic management" function, it is compulsory to work the recovery exchanger on technical water and not on pipe coil. In fact, the coupling of heat pumps with pipe coils has repeatedly proven to be a problem due to an incorrect dimensioning of the pipe coil surface.
3. In the DWS version or with use of the "DHW automatic management" function, installation of the temperature probe supplied is essential. The DHW storage tank must have a sump in its top part, long enough to reach almost the centre of the tank. The probe supplied with the unit must be inserted in the sump with conductive paste in order to allow the probe to accurately read the tank temperature. The incorrect reading of the temperature, caused by an unsuitable positioning, may lead to the intervention of the safety devices or blocking of the unit.
4. When using the "DHW automatic management" logic, it is necessary to use a three-way valve which, during switching, allows the water to flow and never presents the situation of blocked or reduced flow. The Installation, Operation and Maintenance Manual contains guidelines for selecting the valve.
5. The possible integration of water from the aqueduct must never be inserted in the inlet piping of the heat pump. The cold water made to abruptly enter the "hot" exchanger may cause the safety devices to intervene. If using a tank, the inlet of the water integration from the aqueduct must not directly flow in the inlet piping of the heat pump.
6. For the following reasons, it is not advisable to position the unit set-points on the operating limits:
 - a. Modification of the room temperature. The room temperature varies and may lead the unit to work outside the limits.
 - b. Presence of the water filter. The water filter must always be present at the unit's water inlet, under penalty of voiding the warranty. The filter will certainly get dirty over time. A dirty filter will increase load losses and consequently the flow rate. The DT increases and can go from 4/5° to 9°, 10°, causing the safety devices to intervene.
 - c. If the hydraulic circuit provides more areas, it may happen that when a circuit closes the pump has to operate on the remaining hydraulic circuit. This increases the load losses, decreases the flow rate and increases the DT with possible intervention of the safety devices.
 - d. In summer, the unit will be subject to solar radiation. Assuming air at 35°, the coil (in copper and aluminium, so very good conductor) will be at a very high temperature. When turning on the unit, even with fans at stand-still, the evaporation will be very high thus certainly producing the intervention of the high pressure switch.
 - e. Recirculation of air can create a micro-environment with a lower temperature of even 4/5°, leading the unit to operate outside the limits.
 - f. Clearances are very important, the upstream or downstream obstruction of the fan causes load losses that reduce the air flow rate. This reduction may cause the operating temperatures to drop. This drop may cause the unit to be outside the operating limits.
 - g. Air in the circuit. The air in the system, even if well-vented, creates a heat exchange coefficient loss with possible consequential intervention of the high pressure safety devices.

7. Use of unit to dry the screed. When building a house large amounts of water are used for the mortar, plaster, screed, which then evaporate from the building very slowly. Also, rain may significantly increase the humidity content of the construction. Due to the high humidity content in the whole building, during the first two heating periods, the heat requirement of the building is much higher. The masonry work must be dried using special equipment. If the heat power of the heat pump was calculated to be sufficient for the home and drying takes place in the autumn or winter, we recommend installing an additional electric heater to compensate the higher heat requirement.

8. Starting the system with low outdoor temperatures. The safety devices may intervene when starting the system during winter, with the temperature of the system water particularly cold and outside the unit's operating limits. To bring the system up to speed, just reduce the heat load by isolating part of the system. When the temperature of the partial system water is within the operating limits, it will be possible to also connect the previously isolated part of the system.

9. During defrosting, the unit cools the system water in order to eliminate the ice in the coil. To eliminate any problem, it is appropriate to insert a storage of at least 20÷25 litres of water per thermal kW of the unit.

INSTALLATION

For proper unit installation, keep the following in mind:

- > Installation of the unit near walls or other creates reverberation phenomena that increase the input of noise in the environment, even by 16 dBA
- > Bear in mind the possible sensitive receptors when installing the unit; avoid installing units near bedrooms
- > Check the noise regulation of the municipality where the unit will be installed to verify its absolute and differential limit
- > Bear in mind that, regardless of the acoustic class of the territory (Italian Prime Ministerial Decree 14 November 1997), there is a differential day and night-time criterion
- > In the event of critical installations, contact a Competent Technician in Acoustics for a preliminary evaluation

Italian Prime Ministerial Decree 14 November 1997

The Italian Prime Ministerial Decree 14/11/97, which entered into force on 1st January 1998, determines the limit values of the sound sources, in particular it sets:

- > **Emission limit values** maximum noise that can be emitted by a source;
- > **Input limit values** maximum noise that can be input by one or more sound sources in the house or in the external environment, divided into absolute and differential;
- > **Attention values** of noise that signal the presence of a potential risk to health or for the environment;
- > **Quality values** of noise to achieve as a target in the short-, medium- and long-term.

The Italian Prime Ministerial Decree 14/11/97, like the Italian Prime Ministerial Decree 1/3/91, sets the absolute input limits for the outdoor environment for all types of sources. The decree also defines the limit values of emissions to be understood as "emission levels for a specific source evaluated at the receiver". These values, with the exception of the transport infrastructures, must be complied with by all sound sources. The limit values are set by acoustically dividing the territory in six classes. In particular, it is very important to know the "differential criterion" present and described in the decree. It is this criterion that most technicians do not know and which is the most restrictive.

DIFFERENTIAL CRITERION

The differential noise level is the difference between the ambient noise level (i.e. that present when the noise source causing the disturbance is in operation) and the residual noise level (i.e. background noise). The differential noise level must not exceed the following input differential limit values (art. 4, comma 1 of Italian Prime Ministerial Decree 14/11/97):

- > 5 dB(A) for the daytime period (from 6.00-to 22.00)
- > 3 dB(A) for the night-time period (from 22.00-to 6.00)

ETHYLENE GLYCOL CORRECTIVE COEFFICIENTS

Correction factors for the presence of Ethylene Glycol

ETHYLENE GLYCOL % IN WEIGHT		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2.0	-3.9	-6.5	-8.9	-11.8	-15.6	-19	-23.4
Safety temperature	°C	3.0	1.0	-1.0	-4.0	-6.0	-10.0	-14.0	-19.0
Cooling Power Coefficient	-	0.995	0.990	0.985	0.981	0.977	0.974	0.971	0.968
Absorbed Power Coefficient	-	0.997	0.993	0.990	0.988	0.986	0.984	0.982	0.981
Mass flow rate coefficient	-	1.003	1.010	1.020	1.033	1.050	1.072	1.095	1.124
Load losses coefficient	-	1.029	1.060	1.090	1.118	1.149	1.182	1.211	1.243

The maximum admitted percentage of glycol per standard unit is 40%. For higher values, contact the sales department.

PERFORMANCE ACCORDING TO EN14511 STANDARD

Data is provided according to the requirements of EN14511.

This set of rules redefines the method for calculating the performances of the heat pump chillers.

According to EN14511-2011, on the unit performance calculation, also add the power required to overcome the hydronic load losses of the circuit.

Method of calculation of the performance as follows.

$$P_{cooling, EN14511} = P_{cooling} - P_{abs, \Delta p}$$

$$P_{heating, EN14511} = P_{heating} + P_{abs, \Delta p}$$

$$P_{abs, EN14511} = P_{abs} + P_{abs, \Delta p}$$

$$EER_{EN14511} = \frac{P_{cooling, EN14511}}{P_{abs, EN14511}}$$

$$COP_{EN14511} = \frac{P_{heating, EN14511}}{P_{abs, EN14511}}$$

$$ESEER_{EN14511} = 0.003 \times EER_{100\%, EN14511} + 0.33 \times EER_{75\%, EN14511} + 0.41 \times EER_{50\%, EN14511} + 0.23 \times EER_{25\%, EN14511}$$

With:

$P_{cooling}$: cooling power

$P_{heating}$: heating power

$P_{cooling, EN14511}$, $P_{heating, EN14511}$, $EER_{EN14511}$, $COP_{EN14511}$, $ESEER_{EN14511}$: data provided in compliance with EN14511

P_{abs} : electric power absorbed (compressors and fan section) [kW]

$P_{abs, \Delta p}$: electric power absorbed by the pump to overcome load losses of water in the heat exchanger

TECHNICAL SPECIFICATIONS

UNIT SIZE			40	45	50	55	60	65
Heating (EN14511 values)								
Nominal heat power (A7;W45)	(1), (7)	kW	35.1	41.6	48.4	52.3	57.2	60.5
Total absorbed power in heating	(1), (2), (7)	kW	11.7	13.4	15.1	16.1	17.8	18.4
COP	(1), (7)		3.22	3.30	3.39	3.41	3.38	3.44
Efficiency class			A	A	A	A	A	A
Heating (EN14511 values)								
Nominal heat power (A7;W75)	(8)	kW	24.7	30.5	33.0	33.3	39.6	40.3
Total absorbed power in heating	(2), (8)	kW	12.5	15.0	16.5	16.1	19.6	19.9
COP	(8)		1.97	2.03	2.00	2.06	2.02	2.02
Cooling (EN14511 values)								
Nominal cooling power (A35;W7)	(3), (7)	kW	32.2	38.4	44.8	48.9	52.6	56.5
Total absorbed power in cooling	(3), (2), (7)	kW	11.8	13.7	15.6	16.9	18.9	19.6
EER	(3), (7)		2.73	2.81	2.87	2.90	2.79	2.89
Efficiency class			C	C	C	C	C	C
Compressor								
Type			Semi-hermetic	Semi-hermetic	Semi-hermetic	Semi-hermetic	Semi-hermetic	Semi-hermetic
Quantity/Refrigerant circuits		no./no.	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Capacity steps		no.	2	2	2	2	2	2
Total oil charge		kg	4.0	4.5	4.5	4.8	4.5	4.8
Coolant total charge		kg	11.3	13.5	15.8	17.1	18.7	19.8
Fans								
Type			Axial	Axial	Axial	Axial	Axial	Axial
Quantity		no.	1	1	1	1	1	1
Air flow rate		m3/h	21,000	21,000	21,000	20,000	20,000	20,000
Utility side exchanger								
Type			Plates	Plates	Plates	Plates	Plates	Plates
Water content		l	2.3	2.7	3.2	3.4	3.7	4.0
Water flow rate (A35;W7)	(3)	l/h	5,572	6,638	7,756	8,461	9,097	9,768
Load loss (A35;W7)	(3)	kPa	35	36	34	36	37	37
Water flow rate (A7;W45)	(1)	l/h	5,840	6,954	8,126	8,803	9,627	10,212
Load loss (A7;W45)	(1)	kPa	38	40	37	39	41	40
Hydraulic module								
Pump model			P1	P1	P1	P1	P1	P1
Pump Nominal Power		kW	1.1	1.1	1.1	1.1	1.1	1.1
Pump working head (A35;W7)	(3)	kPa	166	162	161	157	154	152
Pump working head (A7;W45)	(1)	kPa	162	158	157	153	148	147
Hydraulic connections								
Connections		"	1" 1/2	1" 1/2	1" 1/2	1" 1/2	1" 1/2	1" 1/2
Base unit noise								
Level of sound power	(4), (6)	dB(A)	83	83	83	84	85	85
Level of sound pressure	(5), (6)	dB(A)	55	55	55	56	57	57
LN Noise								
Level of sound power	(4), (6)	dB(A)	81	81	81	82	83	83
Level of sound pressure	(5), (6)	dB(A)	53	53	53	54	55	55
SLN Noise								
Level of sound power	(4), (6)	dB(A)	78	78	78	79	-	-
Level of sound pressure	(5), (6)	dB(A)	50	50	50	51	-	-
Base unit weights and dimensions								
Length		mm	1,408	1,408	1,408	1,408	1,408	1,408
Depth		mm	1,208	1,208	1,208	1,208	1,208	1,208
Height		mm	2,390	2,390	2,390	2,390	2,390	2,390
Shipping weight		kg	585	592	602	630	635	648
Weight in operation		kg	590	597	608	637	642	656
SLN unit weights and dimensions								
Length		mm	1,408	1,408	1,408	1,408	-	-
Depth		mm	1,208	1,208	1,208	1,208	-	-
Height		mm	2,390	2,390	2,390	2,390	-	-
Weight in operation		kg	592	602	630	635	-	-

- (1) Outdoor air temperature 7°C BS, 6°C BU; condenser inlet-outlet water temperature 40-45°C
(2) The total power is the sum of power absorbed by the compressors and by the fans and of the portion relating to pumps and necessary to overcome the load losses for fluid (water) circulation inside the exchanger
(3) Outdoor air temperature 35°C; evaporator inlet-outlet water temperature 12-7°C
(4) Sound power levels calculated according to ISO 3744
(5) Sound pressure levels referred to 10 metres of distance from unit in free field
(6) Sound levels referred to conditions: chiller operation, water 12°/7°C, outside air 35°C.
(7) Values compliant with Standard EN 14511-3:2011
(8) Outdoor air temperature 7°C BS, 6°C BU; condenser inlet-outlet water temperature 70-75°C
This sheet shows the characteristic data of the basic and standard versions of the series; for details, refer to the specific documentation.

The technical specifications contained in the documentation are not binding. Enerblue reserves the right to make any modifications it deems necessary at any time for product improvement.

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TECHNICAL
SPECIFICATIONS

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ELECTRIC DATA

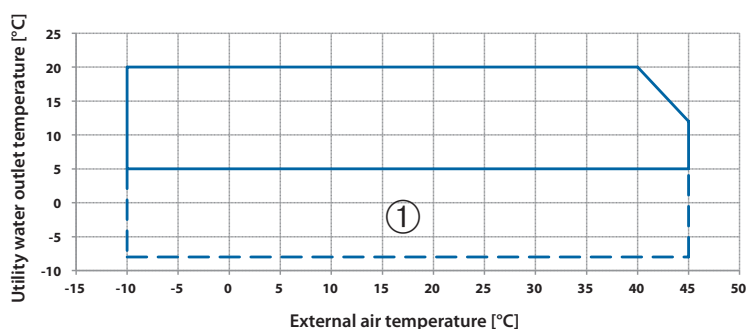
UNIT SIZE			40	45	50	55	60	65
Maximum absorbed power	(1),(3)	kW	22.6 (23.7)	26.6 (27.7)	29.6 (30.7)	31.6 (32.7)	36.6 (37.7)	37.6 (38.7)
Maximum absorbed current	(2),(3)	A	41.1 (43.8)	47.9 (50.6)	55.1 (57.8)	57.1 (59.8)	66.0 (68.7)	68.3 (71.0)
Maximum start-up current	(4)	A	199.1 (201.8)	258.9 (261.6)	288.1 (290.8)	332.1 (334.8)	299.0 (301.7)	343.3 (346.0)
Maximum start-up current with soft-starter	(4)	A	119.5 (121.1)	155.3 (157.0)	172.9 (174.5)	199.3 (200.9)	179.4 (181.0)	206.0 (207.)
Fan nominal power		no. x kW	1.6	1.6	1.6	1.6	1.6	1.6
Fan nominal current		no. x A	3.9	3.9	3.9	3.9	3.9	3.9
Pump motor nominal power		kW	1.10	1.10	1.10	1.10	1.10	1.10
Pump motor nominal current		A	2.70	2.70	2.70	2.70	2.70	2.70
Power supply		V/ph/Hz	400/3N~/50 ±5%	400/3N~/50 ±5%	400/3N~/50 ±5%	400/3N~/50 ±5%	400/3N~/50 ±5%	400/3N~/50 ±5%
Auxiliary power supply		V/ph/Hz	230/1~/50 ±5%	230/1~/50 ±5%	230/1~/50 ±5%	230/1~/50 ±5%	230/1~/50 ±5%	230/1~/50 ±5%

Notes

- > Voltage unbalance: max 2%
- > "The standard power supply voltage (see specific wiring diagram) must not vary by more than ±5%"
- > Electric data refers to standard unit. Data may change based on the installed accessories

(1) Electric power that must be available from the mains for unit operation
(2) Current at which the protection devices intervene within the unit. It is the maximum current absorbed by the unit. This value is never exceeded and must be used for sizing the line and relative protection devices (refer to the wiring diagram provided with the units).
(3) The values in brackets refer to the units in version with pump.
(4) Maximum start-up current calculated considering the start-up of the compressor with greater power and the maximum current absorbed by all the other devices

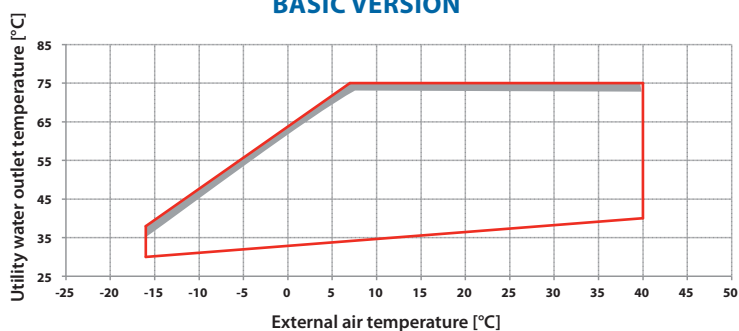
OPERATION IN COOLING



Notes

- > The thermal head to the utility side exchange must be between 3°C and 6°C
- > ① : in this area the unit can only work with evaporator side glycoled water
- > Operating outside the operating limits may cause the safety devices to intervene or serious malfunctions
- > Within the operating limits, the fan section may be subject to modulation

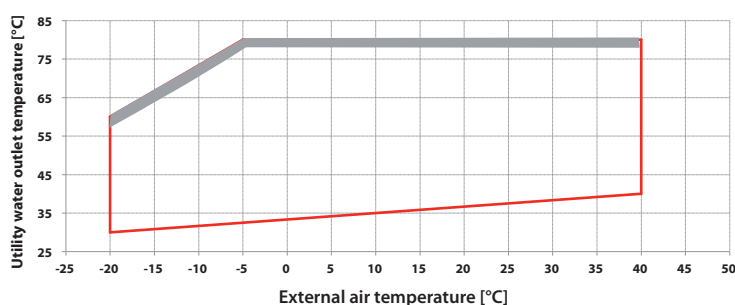
HEATING AND RECOVERY OPERATION BASIC VERSION



Notes

- > The thermal head to the utility side exchange must be between 3°C and 6°C
- > Operating outside the operating limits may cause the safety devices to intervene or serious malfunctions
- > The temperature of inlet water to utility side exchanger cannot be less than 25°C
- > ■ The unit can work within this field but NOT CONTINUOUSLY
- > Within the operating limits, the fan section may be subject to modulation
- > Within the operating limits, to limit the flow temperature, the unit may be subject to choking

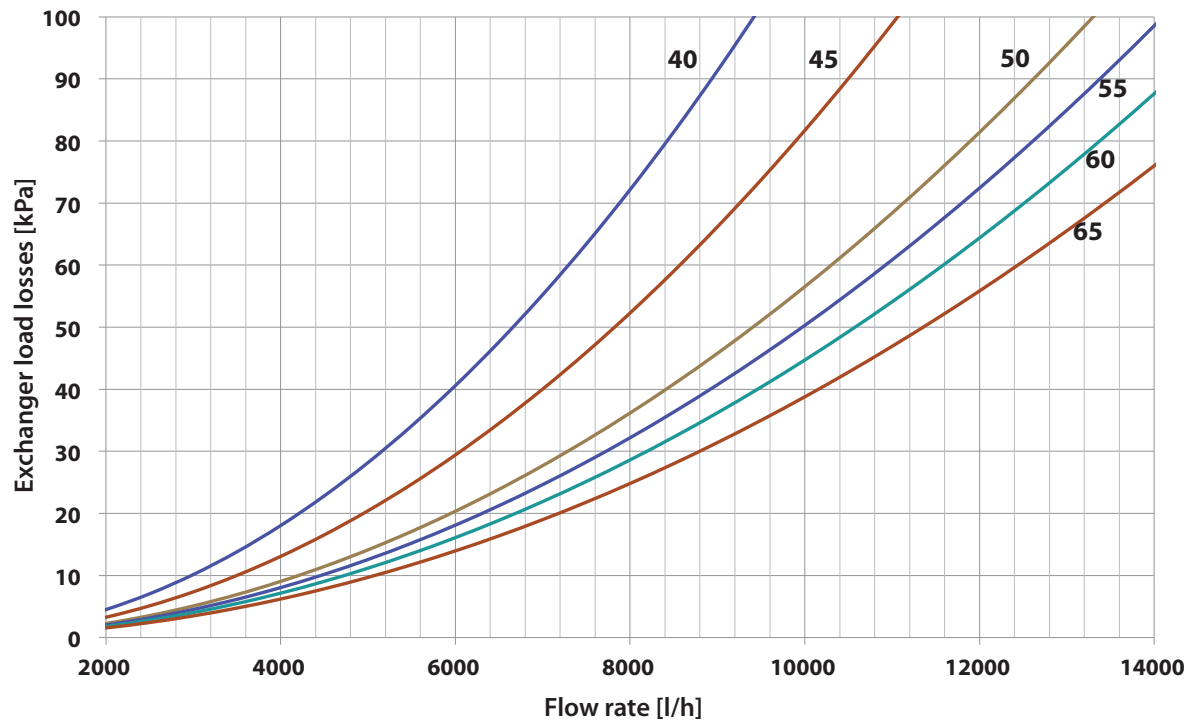
HEATING AND RECOVERY OPERATION HT VERSION



Notes

- > The thermal head to the utility side exchange must be between 3°C and 6°C
- > Operating outside the operating limits may cause the safety devices to intervene or serious malfunctions
- > The temperature of inlet water to utility side exchanger cannot be less than 25°C
- > ■ The unit can work within this field but NOT CONTINUOUSLY
- > Within the operating limits, the fan section may be subject to modulation
- > Within the operating limits, to limit the flow temperature, the unit may be subject to choking

EXCHANGER LOAD LOSSES DIAGRAM



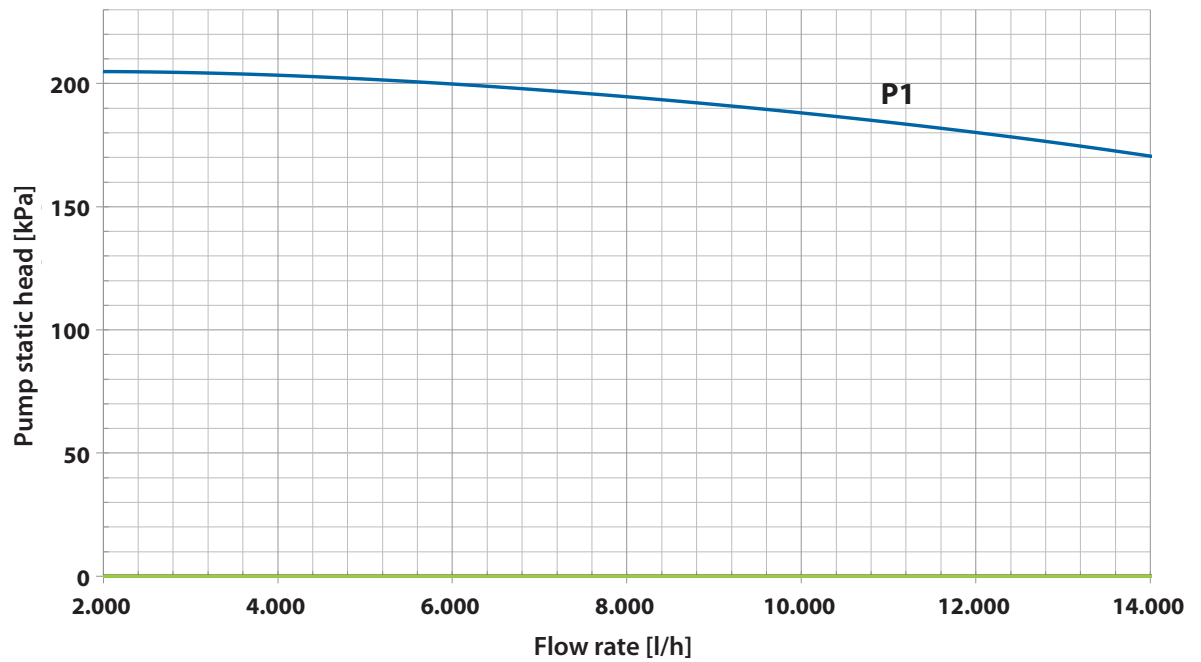
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EXCHANGER DATA

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PUMP HEAD DIAGRAM



SOUND LEVELS

UNIT SIZE	Standard Version		/LN Version		/SLN Version	
	Total [dB(A)]		Total [dB(A)]		Total [dB(A)]	
	Lw	Lp	Lw	Lp	Lw	Lp
40	83	55	81	53	78	50
45	83	55	81	53	78	50
50	83	55	81	53	78	50
55	84	56	82	54	79	51
60	85	57	83	55	-	-
65	85	57	83	55	-	-

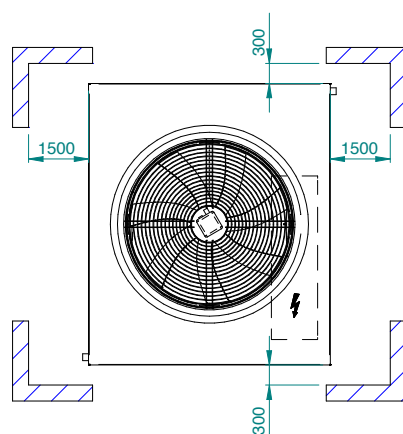
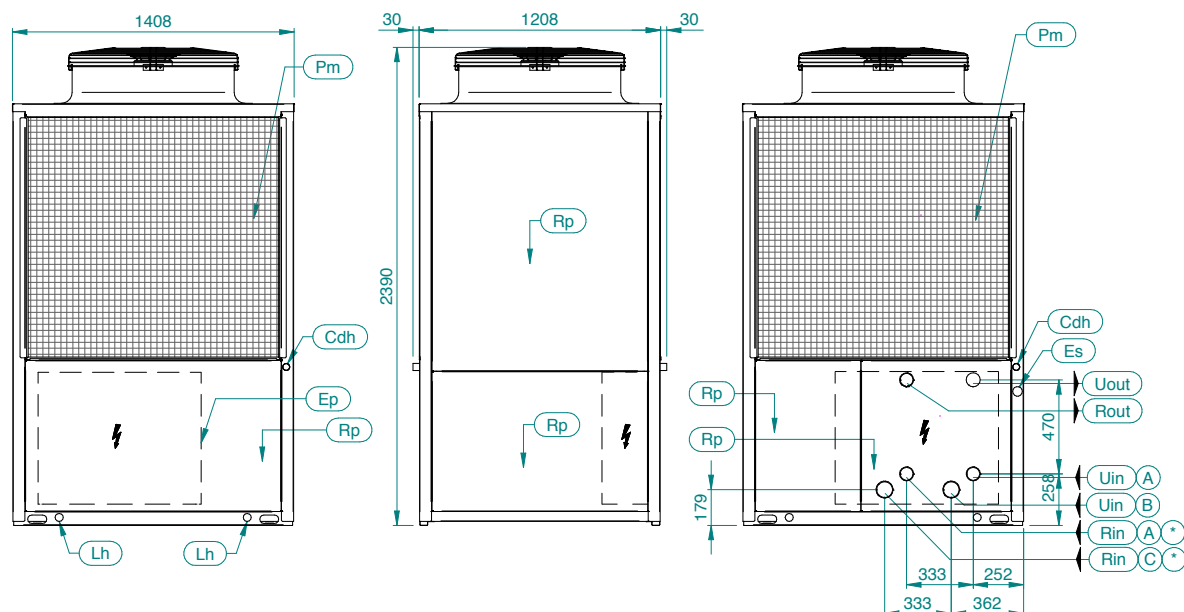
- > **Lw:** sound power values in free field calculated according to ISO 3744, unit in chiller operation (A35;W7)
- > **Lp:** sound pressure values detected at 10 m from the unit in free field according to ISO 3744, unit in chiller operation (A35;W7)
- > Operating conditions other than nominal may have a different pressure level
- > The sound pressure level may increase depending on the type of installation, due to reverberation phenomena even of 16 dBA
- > Therefore, pay attention and consult a specialist in acoustics if necessary

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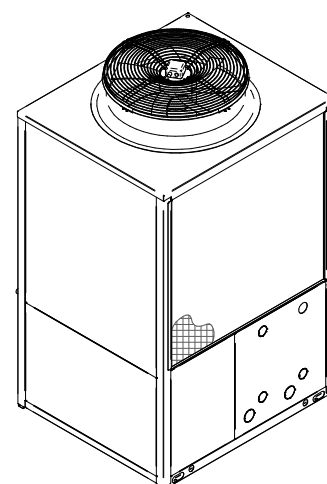
6

SOUND
LEVELS

23



SPAZI DI INSTALLAZIONE \ CLEARANCES

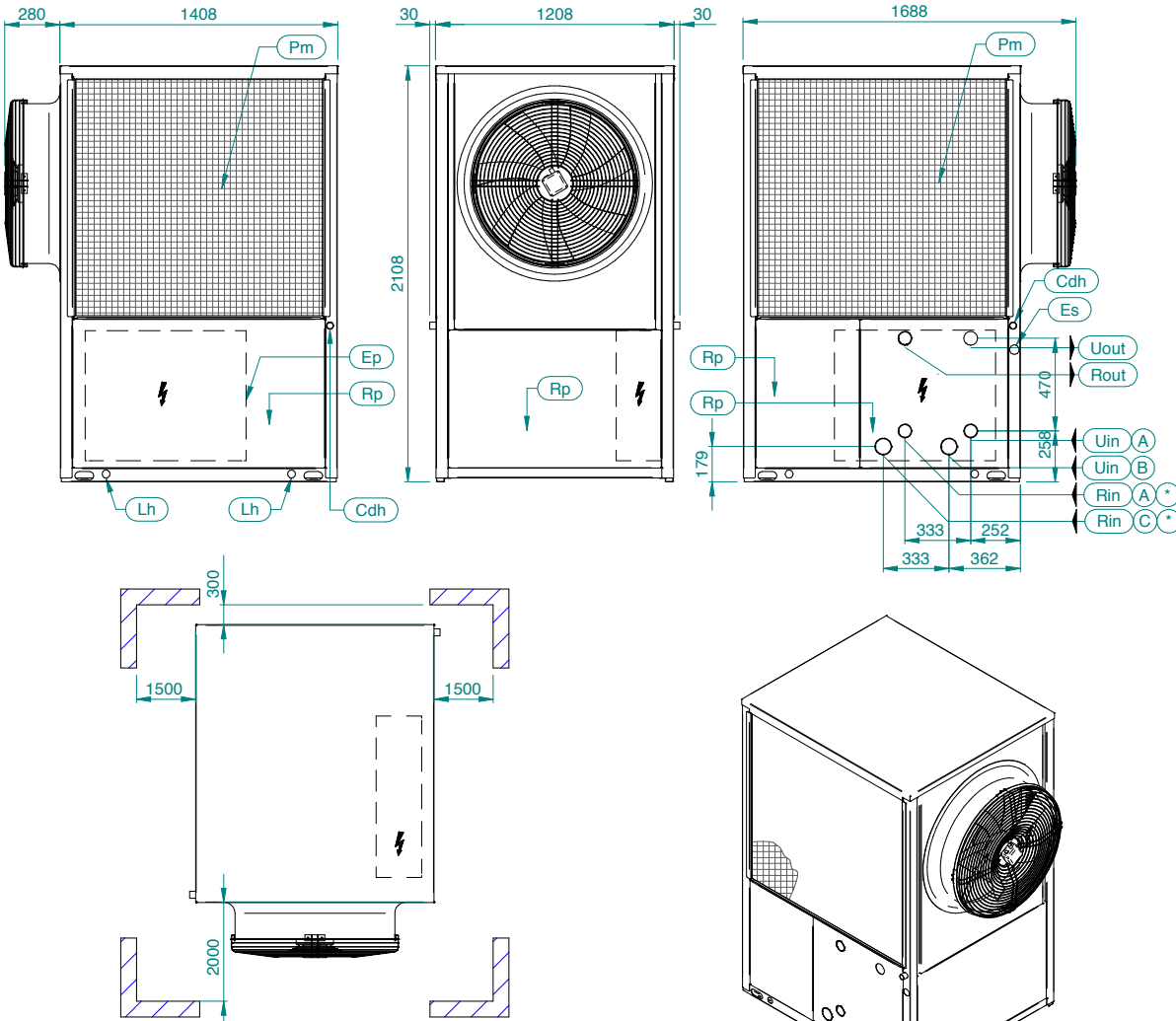
* SOLO PER VERSIONE DWS
ONLY DWS VERSION

Ep	QUADRO ELETTRICO ELECTRICAL PANEL	Cdh	SCARICO CONDENSA CONDENSATE DRAIN	ø35
Es	INGRESSO ALIMENTAZIONE ELETTRICA ELECTRICAL SUPPLY INLET	Uin	INGRESSO ACQUA UTILIZZO USER WATER INLET	1"1/2 BSPM (A) 2" BSPM (B)
Lh	FORI DI SOLLEVAMENTO LIFTING HOLES	Uout	USCITA ACQUA UTILIZZO USER WATER OUTLET	1"1/2 BSPM
Pm	GRIGLIE DI PROTEZIONE PROTECTIVE METAL MESH	Rin	USCITA ACQUA RECUPERO RECOVERY WATER OUTLET	1"1/2 BSPM (A) 2" BSPM (C)
Rp	PANNELLO ASPORTABILE REMOVABLE PANEL	Rout	USCITA ACQUA RECUPERO RECOVERY WATER OUTLET	1"1/2 BSPM

CONNESSIONI IDRAULICHE / HYDRAULIC CONNECTION

- (A) ACQUA UTILIZZO/RECUPERO SENZA MODULO IDRAULICO
USER/RECOVERY WATER WITHOUT HYDRAULIC MODULE
- (B) ACQUA UTILIZZO CON MODULO IDRAULICO 1P-2P
USER WATER WITH HYDRAULIC MODULE 1P-2P
- (C) ACQUA RECUPERO CON MODULO IDRAULICO 1P
RECOVERY WATER WITH HYDRAULIC MODULE 1P

DIMENSIONI / DIMENSIONS		
LUNGHEZZA WIDTH	PROFONDITA' DEPTH	ALTEZZA HEIGHT
1408	1208	2390



SPAZI DI INSTALLAZIONE \ CLEARANCES

* SOLO PER VERSIONE DWS
ONLY DWS VERSION

Ep	QUADRO ELETTRICO ELECTRICAL PANEL	Cdh	SCARICO CONDENSA CONDENSATE DRAIN	ø35
Es	INGRESSO ALIMENTAZIONE ELETTRICA ELECTRICAL SUPPLY INLET	Uin	INGRESSO ACQUA UTILIZZO USER WATER INLET	1"1/2 BSPM (A) 2" BSPM (B)
Lh	FORI DI SOLLEVAMENTO LIFTING HOLES	Uout	USCITA ACQUA UTILIZZO USER WATER OUTLET	1"1/2 BSPM
Pm	GRIGLIE DI PROTEZIONE PROTECTIVE METAL MESH	Rin	USCITA ACQUA RECUPERO RECOVERY WATER OUTLET	1"1/2 BSPM (A) 2" BSPM (C)
Rp	PANNELLO ASPORTABILE REMOVABLE PANEL	Rout	USCITA ACQUA RECUPERO RECOVERY WATER OUTLET	1"1/2 BSPM

CONNESSIONI IDRAULICHE / HYDRAULIC CONNECTION

- (A) ACQUA UTILIZZO/RECUPERO SENZA MODULO IDRAULICO
USER/RECOVERY WATER WITHOUT HYDRAULIC MODULE
- (B) ACQUA UTILIZZO CON MODULO IDRAULICO 1P-2P
USER WATER WITH HYDRAULIC MODULE 1P-2P
- (C) ACQUA RECUPERO CON MODULO IDRAULICO 1P
RECOVERY WATER WITH HYDRAULIC MODULE 1P

DIMENSIONI / DIMENSIONS		
LUNGHEZZA WIDTH	PROFONDITA' DEPTH	ALTEZZA HEIGHT
1688	1208	2108





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