# ELFOEnergy Ground Medium

HIGH-EFFICIENCY WATER-CONDENSED COOLER FOR INDOOR INSTALLATION

**WSH-XEE 82-802 SERIE**

- **HIGH SEASONAL EFFICIENCY:**
  The combination of compressors of different sizes allows to create several adjustment steps in order to only provide the energy actually required by the system, reduce consumption and achieve high seasonal efficiency.
- **GROUNDWATER OR GEOTHERMAL WATER VERSION**
- **COOLING-ONLY OR HEATING-ONLY OPERATION**
- **TOTAL OR PARTIAL ENERGY RECOVERY**
- **PRE-ASSEMBLED UNIT**
  The main components of the system are supplied on the unit, ensuring maximum reliability and ease of installation.

Tax Credit*

Nominal cooling capacity (Operation Cooling-only)
**(W35/W18)** from **40** to **328 kW**

Nominal heating capacity (Operation Heating-only)
**(W10/W35)** from **35** to **302 kW**

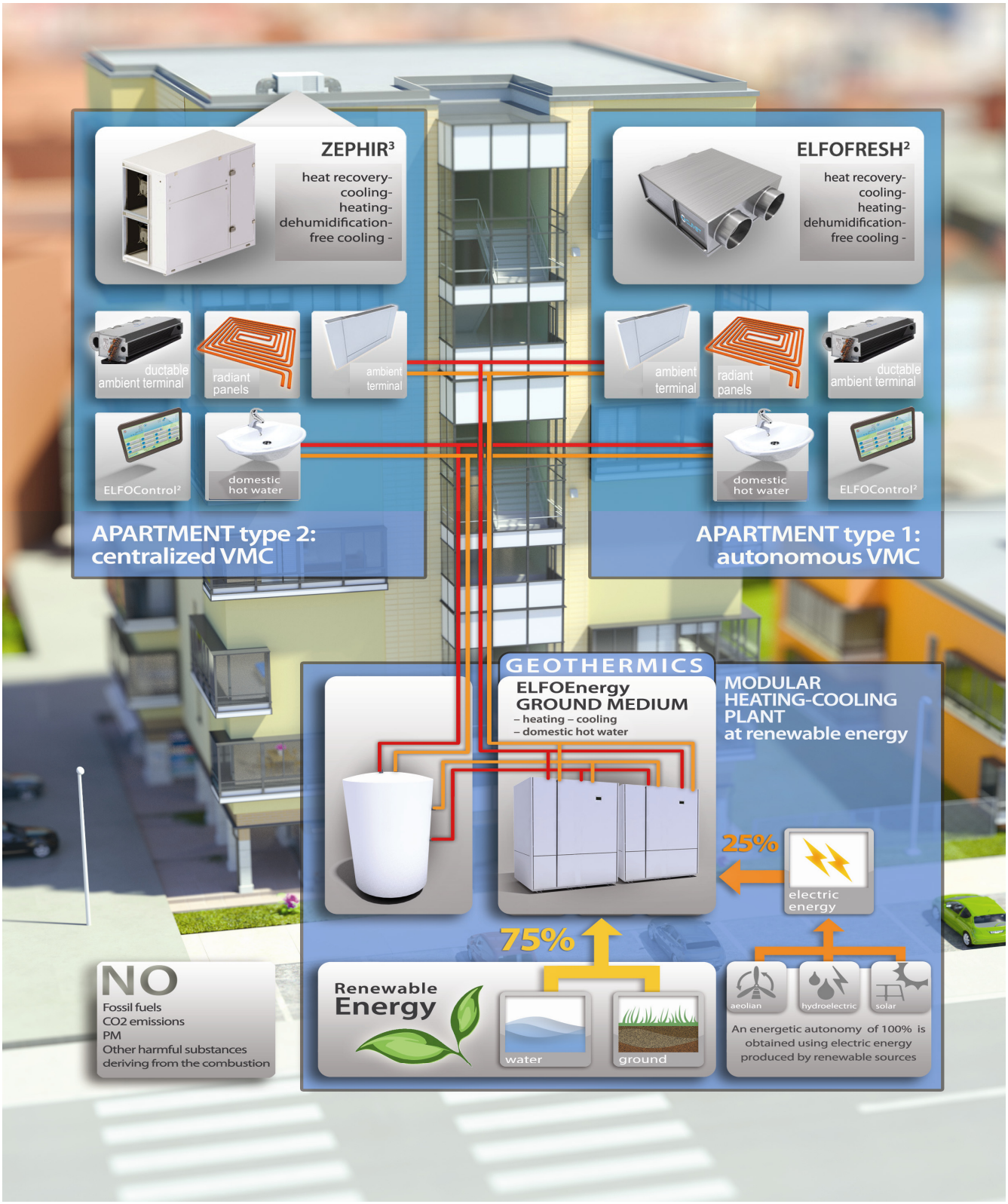
* Due to its high efficiency, "WSH XEE 82-802" may be eligible for heat pump subsidies in Your Country. Please contact Your tax office or utility.

# ELFOSystem BUILDING

## ELFOEnergy Ground Medium

is the heart of the all-inclusive **ELFO**System

**Clivet** designed for multi-family and business premises.



# ELFOSystem BUILDING

## Just one intelligent system
with all the elements that generate **comfort all year round:**

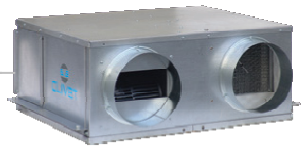
- **Heating (Operation Heating-only)**
- **Cooling (Operation Cooling-only)**
- **Fresh air renewal and purification**
- **Domestic hot water production**

### ENERGY SOURCE

Chiller
**AUTONOMOUS**

Modular heating-cooling system
**CASCADE MANAGEMENT OF SEVERAL UNITS**

### CONTROLLED MECHANICAL VENTILATION



**ELFOFresh²**
**AUTONOMOUS** air renewal and purification unit

**ZEPHIR³**
**CENTRALISED** air renewal and purification unit

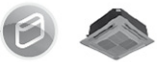
### CENTRALISED AIR RENEWAL AND PURIFICATION UNIT

**ELFOControl²**

**Ambient thermostat**

**Radiant panels**

**ELFORoom²**



**ELFOSpace Box2**

**ELFOSpace**

**ELFODuct**

### Simpler system
- Industrialised solution that allows for fast and quality installation.
- No installation and adjustment errors.
- Wirings and connections are clear and preconfigured
- Smaller clearances

### Energy efficiency
The system's specific adjustment logic allows:
for a high energy efficiency with partial load;
- to use resources suited to the building's requirements;
- for an optimised production of domestic hot water with partial or total recovery.

### Lower boiler capacity demand
By using the heating capacity generated by the air renewal and purification units with thermodynamic recovery, ELFOFresh² or Zephir3 reduce the power required from the boiler and, as a result, its cost.

### A system that looks toward the future
- It favours the combined use of renewable energies from water and the ground.
- Substantially contributes toward reaching the European targets of 20-20-20 by 2020 (reduction of $CO_2$ emissions, primary energy and use of renewable energy).

# ELFOSystem BUILDING
## is based on the following elements:

## Production
## ELFOEnergy Ground Medium

### High-efficiency cooler to generate cold and heat

- Modular scroll technology for maximum efficiency with partial loads
- Pre-assembled plant that makes the system simpler
- Operation Heating or Cooling only
- Multiple configurations
- Modularity and management of several units

**PREASSEMBLED UNIT**

ELFOEnergy Ground Medium contains all the necessary elements to provide water correctly to the climate control and domestic hot water system. This means it:

- Drastically reduces installation times, the unit just needs to be connected to the water pipes
- Eliminates unnecessary clearances, 70% less space compared to traditional solutions
- Ensures 100% reliability, as it uses components assembled and tested professionally by Clivet.

## Fresh air renewal and purification

## Zephir$^3$

### Centralised room ventilation and purification system with energy recovery

- Packaged unit that makes the system simpler
- High efficiency active thermodynamic recovery
- Control of constant supply temperatures
- Fulfil up to 50% of the building's heating requirements
- Electronic filtering with H10 equivalent efficiency
- Summer dehumidification ideal for the coupling with the radiant cooling
- FREE COOLING

# ELFOSystem BUILDING

## si basa sui seguenti componenti:

## Fresh air renewal and purification

### ELFOFresh²

**Autonomous room ventilation and purification system with energy recovery**

- Summer and winter active thermodynamic recovery
- Fulfil up to 50% of the building's heating requirements
- Electronic filtering: PM10, bacteria, pollen
- Summer dehumidification ideal for the coupling with the radiant cooling
- FREE COOLING

## Controllo e gestione completi del comfort

### ELFOControl²

**Advanced control system to manage the operation of the whole flat**

ELFOControl² controls and manages all the elements of the flat, by distributing the right amount of energy required, only where and when needed and ensuring maximum efficiency.

The management of each individual element and the option of fully customising the settings also allows to achieve the perfect comfort for any kind of need.

- High seasonal efficiency thanks to the control over the whole flat
- Optimisation of performance and operation
- Comfort improvement (temperature, humidity, air quality, domestic hot water)
- Ease of use and full management of the distribution system

## Distribution

### ELFODistribution

**Heat diffusion systems with "room by room" temperature adjustment**

- Humidity and temperature thermostats room-by-room
- Dedicated hydronic terminal units
  - design and reduced sizes
  - continuous speed modulation
  - homogeneous temperature
  - reduced consumptions
- Management of radiant systems or radiators

# ELFOSystem BUILDING
## benefits:

## Renewable Energy

The future of our planet depends on how we can reduce the use of fossil fuels and switch to renewable sources.

The European Commission defined the "ambient heat" contained in the air, water and ground as a renewable source.
This Directive 2009/28/EC dated 23 April 2009, known as the RES directive, promotes the use of energy from renewable sources,

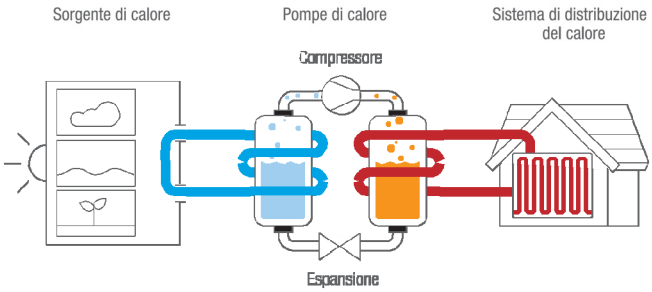
By using the heat pump principle, the ELFOSystem uses ambient heat to generate comfort all year long in buildings.

## The Heat Pump

More than 75% of the energy that Heat Pump uses is free and unlimited because stored up by air, water and ground warmed by the sun. With only the 25% of electrical energy, the renewable sources is raised to an optimum level for winter comfort.

A single system for heating and cooling. In winter, the heat pump takes energy from outside and transfers it inside the building. In summer, the heat pump can invert its operation and transfer the building's energy outside, cooling the rooms.

Il principio della pompa di calore



## Comfort 365 days a year

ELFOSystem ensures the ideal climate year-round, as if in the house time stops to allow relax, which is not depending on external factors.

ELFOSystem GAIA Edition is a single intelligent system with all the elements that generate year-round the comfort:
- heating
- cooling
- domestic hot water
- fresh air renewal and purification.

## Fresh and clean air

You cannot speak of true comfort without air renewal, because odours and harmful elements accumulate into the rooms. The current trend of increasing thermal insulation in homes requires a controlled mechanical renewal of the ambient air. The blow of external air is not always healthy and imply high energy costs.

ELFOSystem expels the air inside the building and introduces fresh air using a recovery system that is based on the principle of the heat pump.

# ELFOSystem BUILDING
## benefits:

## More value for your building

With Directive (2002/91/EC), the European Union foresees the obligation of a certificate that documents the energy efficiency of buildings, considering the primary energy. The value of a building also depends on this.

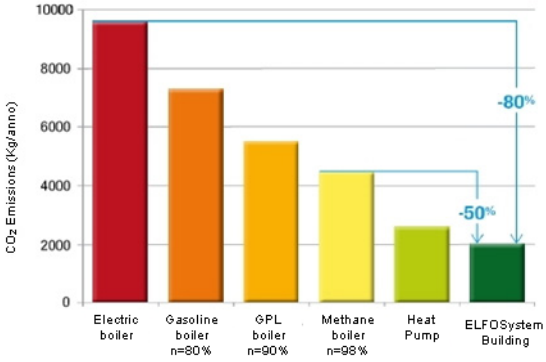
ELFOSystem, with consumption of primary energy that is 50% lower than traditional solutions with boilers, with equal buildings, permits higher energy efficiencies.

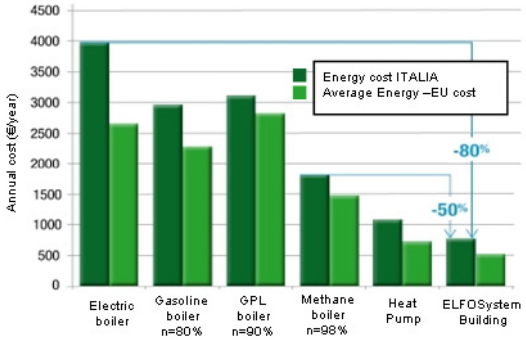
ELFOSystem contributes towards energy efficiency and therefore towards the value of the building, with an average return on investment of 3-4 years.

## Reduction in $CO_2$ emissions

Heat pump systems do not use fossil resources such as natural gas or diesel, therefore they do not produce direct $CO_2$ where they are installed.

Also considering equivalent $CO_2$ generated by the producer of the electric energy, the indirect $CO_2$ emissions are on average 50% lower than combustion systems and 80% lower than electric heating.




Cost of electricity: Italy 0.18 €/kWh, EU average 0.12 €/kWh Gas Oil, LPG, Methane prices taken from www.energy.eu

## Savings cost up to 80%

The average seasonal COP of modern heat pumps reaches up to 4 if are considered the most efficient air-water units.
As the average efficiency of an Italian electric system is equal to 0.46, it is understood that the performance of a heat pump, in reference to primary energy, is equal to 180%, therefore greater than any traditional combustion or electric generator and results in savings in operating costs between 50% and 80%.

## Reliability

ELFOSystem is a complete system for air conditioning buildings. All of its components have been completely developed by Clivet, from the thermostat to the heat pump that "talk to each other" intelligently through a simple twisted pair cable.

The centralized management of the system optimizes efficiency and guarantees correct system operation. This also eliminates all adjustments and interaction problems associated with traditional installations, where different elements are placed in communication with each other.

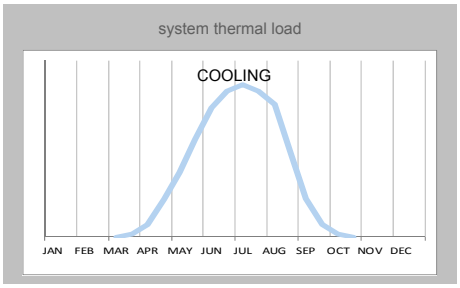
The components, which are designed and tested by Clivet, allow possible to create high quality systems that guarantee prefixed energy savings and comfort levels with the guarantee of perfect operation.

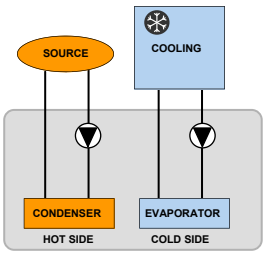
# ELFOSystem BUILDING

## system solutions: 2 PIPES - Operation cooling only

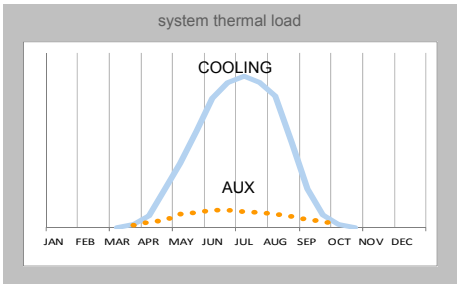
2 PIPES System solutions – operation cooling only

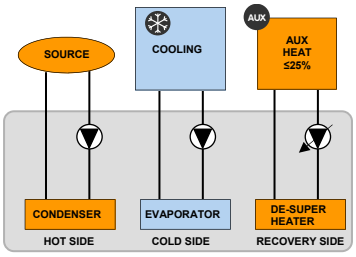
### Production of chilled water (Operation Cooling-only)



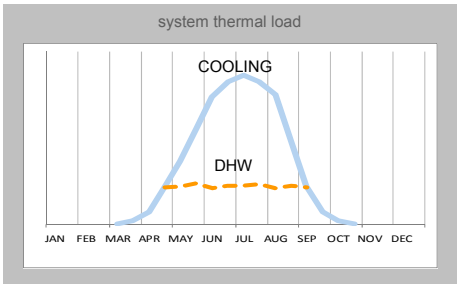

### Production of chilled water (Operation Cooling-only)
### Production of domestic hot water from partial recovery (example post-heat)

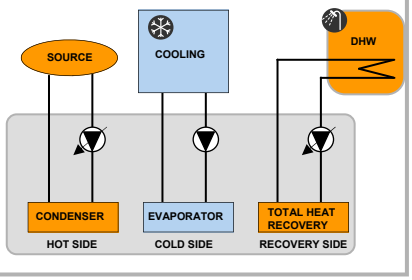



### Production of chilled water (Operation Cooling-only)
### Production of domestic hot water from total recovery

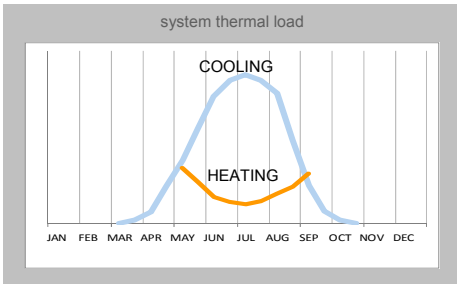
**Warning: Heat capacity supplied only if the cooling capacity is requested**

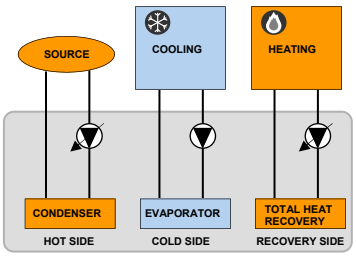



### Production of chilled water (Operation Cooling-only)
### Production of hot water from total recovery

**Warning: Heat capacity supplied only if the cooling capacity is requested**



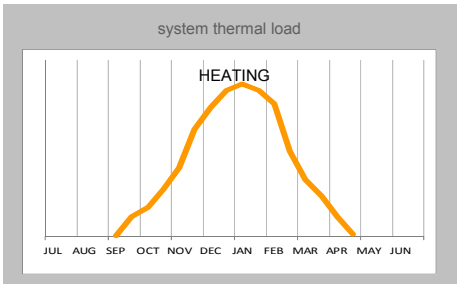



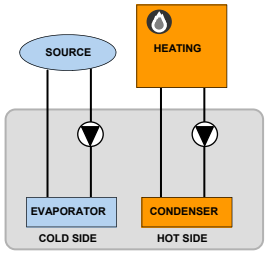
# ELFOSystem BUILDING

## system solutions: 2 PIPES - Operation heating only

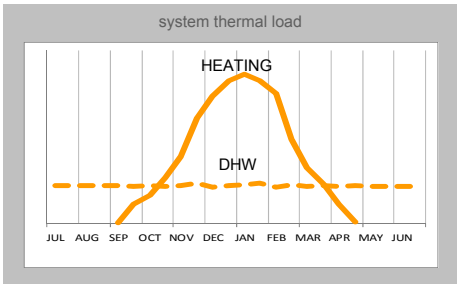
2 PIPES System solutions – operation heating only

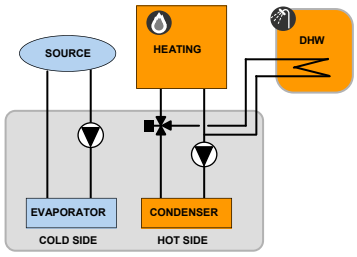
- Production of chilled water (Operation Heating-only)



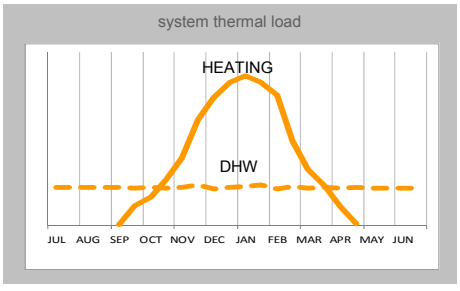



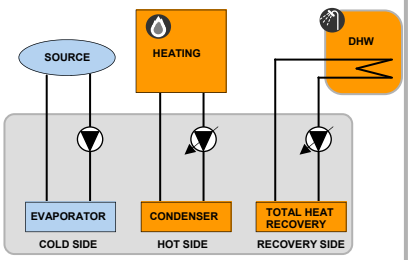

- Production of chilled water (Operation Heating-only)
- Production of domestic hot water with 3-way valve
- Alternated production for the System or the DHW circuit




- Production of chilled water (Operation Heating-only)
- Production of domestic hot water from total recovery
- Simultaneous production for the System and DHW circuit



# ELFOEnergy Ground Medium

## ongoing commitment in research and development

## All of CLIVET's technological evolution in medium capacity hydronic systems

Scroll Compressors high efficiency, heat exchangers, high performance, fully automatic operation, are some of the **available technologies within ELFOEnergy Ground Medium**, in a range of models ideal for air-conditioning :

- local commercial,
- residential and
- industrial media power.

## ELFOEnergy Ground Medium

## With its many configurations construction is complete with built in main system components installed

# ELFOEnergy Ground Medium

## benefits:

## Preassembed Unit

ELFOEnergy Ground Medium can be supplied equipped with components that are often provided separately.

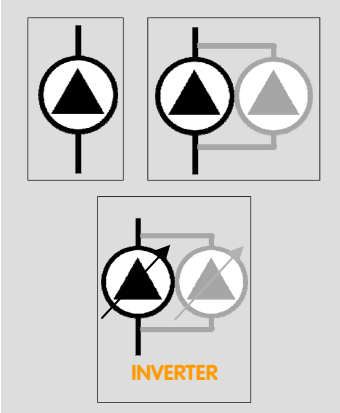
- **Reduces design times:** all accessories are made to ensure the best overall efficiency;
- **Reduces installation costs:** the accessories that are already mechanically connected, electrically wired and tested are ready to be used immediately;
- **Reduces clearances:** if the heating capacity demand is very high, the design and vertical arrangement of the hydraulic components allows to combine several units, thereby considerably reducing technical areas, increasing the space available for other uses and making maintenance operations easier.

## Application versatility

ELFOEnergy Ground Medium is suited to all types of ambient terminals, fan coils, radiant systems and radiators on the utility side. It is available in the groundwater or closed-loop geothermal version on the source side. It offers multiple configurations:

- **Partial or total energy recovery** also for the free domestic hot water production;
- **Hydronic units on the heating and cooling** side with 1 or 2 standard or inverter pumps or, alternatively, 2-way on/off or modulating valve or 3-way modulating valve;
- **Three-way valve** to prepare domestic hot water.

## Cooling, heating and recovery side hydronic unit




The available solutions are:

- **standard pump;**
- **standard pump with standby pump.** The built-in microprocessor balances the operation hours and, in the event of malfunctions, it indicates the failure and automatically activates the standby pump;
- **inverter pump with or without standby pump.** The low energy consumption solution. The energy consumed to move the water is anything but a negligible element. This solution allows for considerable savings on operating costs. It automatically reduces the water flow in critical conditions, thereby preventing jams due to overloading, requiring the subsequent intervention of specialised technical personnel. It is very useful during start-ups, when restarting after operating breaks (e.g. at the weekend) or after a long period of inactivity. In the event of a fault, the electronic control automatically activates the standby pump. If the fault is not solved (problem caused by the inverter), the inverter is turned off and the pump is operated in on-off mode;
- **2-way on-off valve** for use in loop systems;
- **2-way modulating valve** managed by the electronic control that allows to extend the unit's operating range by modulating the water flow rate on the source side in relation to the temperature;
- **3-way modulating valve** managed by the electronic control that allows to extend the unit's operating range by modulating the water flow rate in relation to the temperature on the source side exchanger and maintaining constant the output water flow rate.

## Prepares and produces domestic hot water

ELFOEnergy Ground Medium can be set up with various configurations to prepare domestic hot water:

- **the three-way valve** to divert the flow from the system's circuit to the domestic circuit;
- the **partial energy recovery** that recovers about **25%** of the available condensation heat (desuperheater);
- **the total recovery** that recovers **100%** of the available condensation heat, **producing free domestic hot water.**

An advanced control allows to activate the production of domestic hot water at the desired temperature with priority over the system request (standard operating). This priority is settable through the setting of a parameter.

# ELFOEnergy Ground Medium

## benefits:

## High energy efficiency
## in the annual cycle

ELFOEnergy Ground Medium reduces yearly energy consumption thanks to its high partial load efficiency, i.e., by far the most frequent condition throughout the system's life-cycle, which also increases the value of the property served. The main components are manufactured on an industrial scale, with maximum manufacturing reliability.

## The highest efficiency is always important, but particulary important between 25% and 75% of the system load

ELFOEnergy Ground Medium's technology is the energy reference for heat pumps. Indeed, the unit can offer scroll modular technology, ideal for partial loads, an electronic expansion valve that adapts quickly and precisely to the actual load required for use and the high performance heat exchangers. Its high efficiency levels with partial loads makes ELFOEnergy Ground Medium much more competitive and efficient compared to traditional solutions.

| | OPERATION COOLING-ONLY | OPERATION HEATING-ONLY |
|---|---|---|
| 100% | EER = 5,89 | COP = 5,34 |
| 66% | EER = 6,01 | COP = 5,53 |
| 33% | EER = 6,15 | COP = 5,65 |

EER and COP values for application with radiant panels in accordance with Eurovent refer to size 452.

## The modular scroll ideal for partial loads

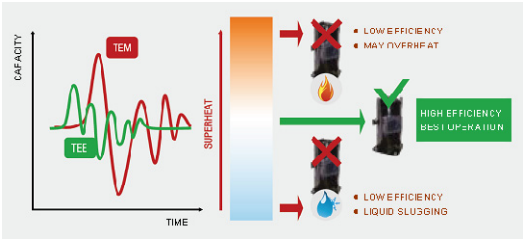
ELFOEnergy Ground Medium employs highly efficient Scroll compressors, with spirals optimised for this type of use.

- Compressors manufactured in large numbers on an industrial scale, with strict quality checks and highest reliability thanks to the high scale mass production volumes.
- The two sizes of Scroll compressors allow for several adjustment steps. This way, only the necessary energy is supplied.
- Efficiency increase that can exceed 50% of the operation with partial load, thanks to the larger thermal exchange surfaces available.

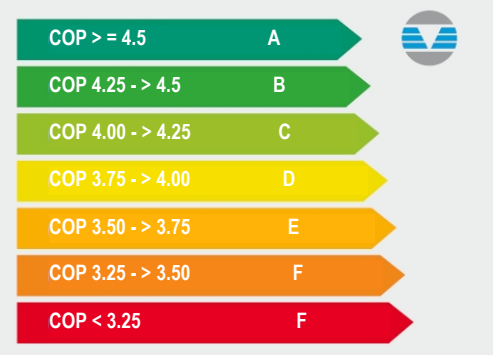
## Thermostatic Electronic

The thermostatic electronic expansion valve (TEE) adapts quickly and precisely to the effective load required for use, permitting a stable and accurate adjustment and **optimal operation of the compressor.**

There is also an additional increase in efficiency in comparison to traditional thermostatic mechanical valves (TEM) and a longer compressor life.




## Eurovent Class A Energy Efficiency




Thanks to its structural features, all the available sizes of **ELFOEnergy Ground Medium** were given the **Eurovent Class A Energy Efficiency** rating both in heating (Heating-only operation) and in cooling mode (Cooling-only operation) in systems with radiant panels.

| OPERATION COOLING-ONLY | OPERATION HEATING-ONLY |
|---|---|
| EER > 5.29 | COP > 5.17 |

# ELFOEnergy Ground Medium

## benefits:

## 100% silent operation

**Silent operation** is one of the most requested aspects for this type of unit designed for indoor installation.
Clivet has always placed a special focus on this aspect, which helps generate ideal comfort levels all year round. **The use of special design features and specific materials for the acoustic insulation of the whole structure** (panelling, base, piping, antivibrating dampers) **allowed to increase the level of silence.**

## Simplified maintenance

The constant research in the industrialisation of the product to **ensure increasingly high quality standards** allowed to create a rationalised structure in which it is possible to access all the components by just removing the front panel.

All internal and external hydraulic connections have been made with Victaulic couplings.

These solutions allow for **simpler, easier and faster maintenance.**

## Condensation and evaporation control

ELFOEnergy Ground Medium can **optimise the condensation temperature** in summer (Cool only), and evaporation temperature in winter (Heat only). it acts on the flow modulation on the source side using the control of the **modulating valve** or the **inverter pump.**

The **modulating valve** and the **inverter pump** can be installed inside the unit.

## Multifunction phase monitor

As well as controlling the presence and correct sequence of the power supply phases, the device can control voltage unbalance by setting a maximum and minimum tolerance.

If the voltage value exceeds or drops below the set limits, the monitor stops the unit and activates the alarm. It automatically restarts the unit as soon as the correct power supply is restored.

This control allows to:

- **protect components** inside the unit, as they are powered by a faulty voltage they may operate incorrectly or break;
- **quickly identify, among the alarms of the unit's components**, the real cause of the malfunction due to the sudden change in voltage.

# ELFOEnergy Ground Medium

## benefits:

### Control

### Built-in display

**The electronic device installed built-in allows to produce energy only where and when needed, in the most efficient and effective possible way depending on the building's requirements.**

The control manages:

- **set-point configuration**
- **time schedule**
- **cool-only and heat-only mode management**
- **management and production of domestic hot water**
- **set-point compensation in relation to the temperature outside,** allowing for greater comfort and energy savings
- **management of on/off times of the compressors** to avoid frequent ON/OFF cycles
- **alarm management and alarm log**
- **condensation/evaporation control** managed by modulating the speed of the circulating pumps
- **management of the pump on the cool and on the heat side**
- **anti-freeze management:** the microprocessor blocks the compressor if the temperature detected by the temperature probe at the exchanger outlet is less than +4°C. If this alarm is triggered, the compressor is blocked, while the pump remains active
- **MODBUS communication port** to connect the supervision system
- **Master Slave management** for an optimised management of up to 6 units in a local network

# ELFOEnergy Ground Medium
## benefits:

## Complete heating-cooling system

ELFOEnergy Ground Medium has been designed to comprise all the elements **to fully respond to the functional requirements of a heating and cooling system,** even in terms of high power demands, thanks to the option of combining several units in the same system.

Each individual unit can meet the needs of every type of system:

- **system with two pipes**, production of cold fluid (WSH-XEE series - Cool only);
- **system with two pipes**, production of hot fluid (WSH-XEE series - Heat only)
- **reversible system with two pipes**, production of hot or cold fluid (WSHN-XEE series - reversible heat pump);
- **four-pipe system that produces cold and hot fluid simultaneously and separately** (WSHN-XEE - reversible heat pump);
- **hot water free production with partial recovery** for auxiliary applications such as to power post-heating batteries in air treatment units (WSH-XEE or WSHN-XEE series);
- **production of domestic hot water alternated** to the operation of the system ( WSH-XEE or WSHN-XEE series);
- **production of domestic hot water simultaneously** to the operation of the system ( WSH-XEE or WSHN-XEE series with total recovery).

## Modularity and cascade management of several units - ECOSHARE

The manufacturing and arrangement of ELFOEnergy Ground Medium's components **allows to combine several units** if the heating or cooling capacity demand is very high.

Vertical arrangement of the hydraulic connections allows to place several units next to each other, allowing for **considerably smaller clearances** and making installation and maintenance operations easier.

Microprocessor control automatically manages operation according to the **maximum efficiency** criterion, allows to coordinate up to 6 units on a **local network** (ECOSHARE function) and includes a number of **safety and alarm management functions.**

# ELFOEnergy Ground Medium

## HIGH-EFFICIENCY WATER-CONDENSED COOLER FOR INDOOR INSTALLATION

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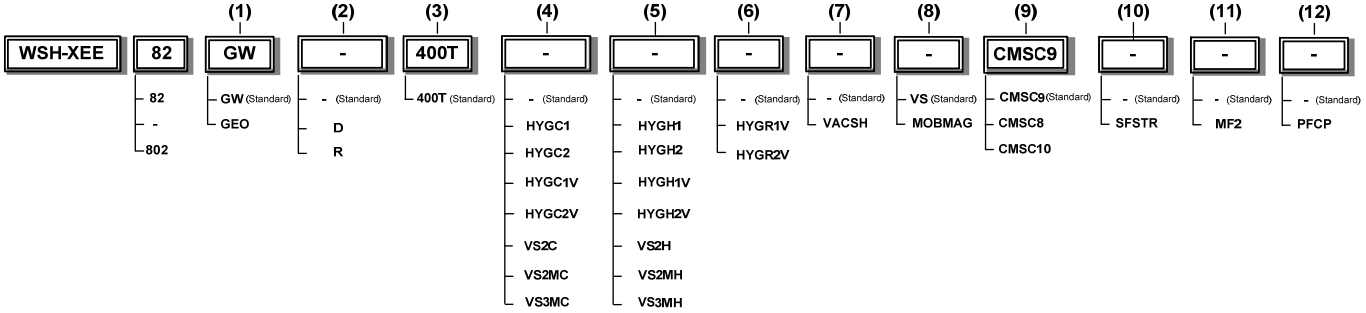
## Unit Configuration




**(1) VERSION**
GW = Groundwater version
GEO = Version for Geothermal application

**(2) ENERGY RECOVERY**
not required (-) = Standard version
D = Partial energy recovery
R = Total energy recovery
**The Configuration with full energy recovery requires an element to control the flow rate on the heating side. If the heating side is the source side, you need to choose either a hydronic unit with 1 pump or 2 inverter pumps or a 2 or 3-way modulating valve. If the heating side is the utility side, you need to choose a hydronic unit with 1 pump or 2 inverter pumps.**

**(3) VOLTAGE**
400T = Standard version

**(4) COOLING SIDE HYDRONIC UNIT**
not required (-) = Standard version
HYGC1 Cooling side hydronic unit with an on-off pump (available only with MOBMAG option)
HYGC2 Cooling side hydronic unit with two on-off pumps (available only with MOBMAG option)
HYGC1V Cooling side hydronic unit with an inverter pump (available only with MOBMAG option)
HYGC2V Cooling side hydronic unit with two inverter pumps (available only with MOBMAG option)
VS2C Cooling side two-way on-off valve.This configuration is possible only if the cooling side is used as a source and is not compatible with other hydronic units on the cooling side. (available only with MOBMAG option)
VS2MC Cooling side two-way modulating valve This configuration is possible only if the cooling side is used as a source and is not compatible with other hydronic units on the cooling side. (available only with MOBMAG option)
VS3MC Cooling side three-way modulating valve This configuration is possible only if the cooling side is used as a source and is not compatible with other hydronic units on the cooling side. (available only with MOBMAG option)

**(5) HEATING SIDE HYDRONIC UNIT**
not required (-) = Standard version
HYGH1 = Heating side hydronic unit with an on-off pump (available only with MOBMAG option)
HYGH2 = Heating side hydronic unit with two on-off pumps (available only with MOBMAG option)
HYGH1V = Heating side hydronic unit with an inverter pump (available only with MOBMAG option)
Heating side hydronic unit with two inverter pumps (available only with MOBMAG option)
VS2H = Heating side two-way on-off valve
This configuration is possible only if the heating side is used as a source and is not compatible with other hydronic units on the heating side. (available only with MOBMAG option)
VS2MH = Heating side two-way modulating valve
This configuration is possible only if the heating side is used as a source and is not compatible with other hydronic units on the heating side. (available only with MOBMAG option)
VS3MH = Heating side three-way modulating valve
This configuration is possible only if the heating side is used as a source and is not compatible with other hydronic units on the heating side. (available only with MOBMAG option)

**(6) HYDRONIC UNIT RECOVERY SIDE**
not required (-) = Standard version
HYGR1V Recovery side hydronic unit with 1 inverter pump (available only with MOBMAG option)
HYGR2V Recovery side hydronic unit with 2 inverter pumps

**(7) DHW SWITCHING VALVE**
not required (-) = Standard version
VACSH = Heating side DHW switching valve
Configuration not compatible with a hydronic unit on the heating side with 2 ON/OFF pumps or 2 inverter pumps.
(available only with MOBMAG option)

**(8) CONSTRUCTIONAL CONFIGURATION**
not required (-) = Standard version
MOBMAG = Larger units

**(9) SERIAL COMMUNICATION MODULE**
CMSC9 = Serial communication module to MODBUS supervisor Standard Version
CMSC8 = Serial communication module to BACnet supervisor
CMSC10 = Serial communication module to LonWorks supervisor

**(10) SOFT STARTER**
not required (-) = Standard version
SFSTR = Power factor correction capacitors

**(11) MULTI-FUNCTION PHASE MONITOR**
not required (-) = Standard version
MF2 = Multi-function phase monitor

**(12) POWER FACTOR CORRECTION CAPACITORS**
not required (-) = Standard version
PFCP = power factor correction capacitors

**The WSH-XEE units are designed to operate both in cooling and in heating mode, with no need for additional components. The operating mode can be set via a parameter.**
**We recommend using a device to modulate the flow rate on the SOURCE side to manage any temporary operating mode changes outside the operating limits. (See pages 25 and 26)**

## STANDARD UNIT SPECIFICATIONS

**COMPRESSOR**
Hermetic Scroll compressors with orbiting spiral, equipped with motor protective device for over-temperatures, over-currents and excessive temperatures of the supply gas. They are mounted on rubber antivibration mounts and comes with a full oil charge. The compressors come with a thermal and acoustic insulation jacket. An automatic oil heater prevents the oil from being diluted by the refrigerant when the compressor stops. The compressors are connected in TANDEM on a single refrigerating circuit and have a biphasic oil equalisation.

**STRUCTURE**
Supporting structure realised in galvanised steel sheet able to supply excellent mechanical features and long-lasting resistance to corrosion. The base has rubber supports to reduce vibrations.

**PANELLING**
external panelling of unit in sheet metal painted RAL 9003 covered on inside with thermally insulating, sound absorbing material. All panelling can easily be removed to allow complete accessibility to internal components.

**COOLSIDE EXCHANGER**
direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate insulation. The exchanger comes with an antifreeze heater to protect the water side exchanger to prevent ice from forming if the water temperature drops below a pre-set value. The exchanger has Victaulic hydraulic connections.

**HEAT SIDE EXCHANGER**
direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate insulation. The exchanger comes with an antifreeze heater to protect the water side exchanger to prevent ice from forming if the water temperature drops below a pre-set value. The exchanger has Victaulic hydraulic connections.

**REFRIGERANT CIRCUIT**
*The circuit is complete with:*
- replaceable anti-acid solid cartridge dehydrator filter
- sight glass with moisture indicator
- electronic expansion valve
- high pressure switch
- low pressure transducer
- high pressure transducer
- high pressure safety valve
- refrigerant charge

Note: The unit can operate in cooling-only or in heating-only mode. To be able to operate in both modes, the system must be designed with a reversible hydraulic circuit.

**ELECTRICAL PANEL**
*The Capacity Section includes:*
- main door lock isolator switch
- isolating transformer for auxiliary circuit power supply
- compressor circuit breaker
- compressor control contactor

The control section includes:
- interface terminal with graphic display
- display of the set values, the error codes and the parameter index
- ON/OFF keys and alarm reset
- antifreeze protection on the water side
- compressor overload protection and timer
- pre-alarm function for water anti-ice and high refrigerant gas pressure
- self-diagnosis system with immediate display of the error code
- compressor operating hour display
- remote ON/OFF control
- dry contact for summer / winter change
- free contacts for compressor state
- dry contacts to control the cumulative alarm signal remotely
- inlet for demand limit (absorbed capacity limitation according to a 0÷10V external signal)
- ECOSHARE function up to 6 units
- serial port RS485 with MODBUS protocol
- double set-point enabling
- set point compensation with outside temperature probe (supplied separately)
- enabling of DHW preparation in relation to remote consent
- compensation of set point with signal 0-10 V
- set point compensation with 4-20 mA signal
- designed for natural cooling management (provided by the customer)
- designed for control of a single on/off pump for the circuit
- can be fitted with system minimum load pressure switch
- 0÷10V signal output for

**HYDRAULIC CIRCUIT**
COOL SIDE
- victaulic connection joints
- drain valve
- differential pressure switch, water side

HEAT SIDE
- Victaulic connection joints
- drain valve
- differential pressure switch, water side

**CONFIGURATION**
VERSION
GW = Groundwater version
GEO = Version for Geothermal application

ENERGY RECOVERY
not required (-) = Standard version
D = Partial energy recovery
R = Total energy recovery
Note: The Configuration with full energy recovery requires an element to control the flow rate on the heating side. If the heating side is the source side, you need to choose either a hydronic unit with 1 pump or 2 inverter pumps or a 2 or 3-way modulating valve. If the heating side is the utility side, you need to choose a hydronic unit with 1 pump or 2 inverter pumps.

COOLING SIDE HYDRONIC UNIT
- not required (-) = Standard version
- HYGC1 Cooling side hydronic unit with an on-off pump
- HYGC2 Cooling side hydronic unit with two on-off
- HYGC1V Cooling side hydronic unit with an inverter pump
- HYGC2V Cooling side hydronic unit with two inverter pumps
- VS2C Cooling side two-way on-off valve.
- VS2MC Cooling side two-way modulating valve
- VS3MC Cooling side three-way modulating valve

Note: This configuration is possible only if the cooling side is used as a source and is not compatible with other hydronic units on the source side.

HEATING SIDE HYDRONIC UNIT
- not required (-) = Standard version
- HYGH1 = Heating side hydronic unit with an on-off pump
- HYGH2 = Heating side hydronic unit with two on-off pumps
- HYGH1V = Heating side hydronic unit with an inverter pump
- HYGH2V = Heating side hydronic unit with two inverter pumps
- VS2H = Heating side two-way on-off valve
- VS2MH = Heating side two-way modulating valve
- VS3MH = Heating side three-way modulating valve

Note: This configuration is possible only if the heating side is used as a source and is not compatible with other hydronic units on the source side. .

HYDRONIC UNIT RECOVERY SIDE
- not required (-) = Standard version
- HYGR1V Recovery side hydronic unit with 1 inverter pump
- HYGR2V Recovery side hydronic unit with 2 inverter pumps

Note: With Energy recovery it is possible to use inverter pump/s only

DHW SWITCHING VALVE
- not required (-) = Standard version
- VACSH = Heating side DHW switching valve

LARGER UNIT CONFIGURATION
- not required (-) = Standard version
- MOBMAG = larger unit

Note: Larger unit is a configuration automatically selected in combined to any hydronic unit (cool side, heat side recovery), to each source side valve and to DHW switching valve.

POWER FACTOR CORRECTION CAPACITORS
not required (-) = Standard version
PFCP = power factor correction capacitors

SOFT STARTER
not required (-) = Standard version
SFSTR = Power factor correction capacitors

MULTI-FUNCTION PHASE MONITOR
not required (-) = Standard version
MF2 = Multi-function phase monitor

SERIAL COMMUNICATION MODULE
- CMSC9 = Serial communication module to MODBUS supervisor Standard Version
- CMSC8 = Serial communication module to BACnet supervisor
- CMSC10 = Serial communication module to LonWorks supervisor

**ACCESSORIES**
- IFWX = Water Steel-mesh filter
- SPCX = set point compensation with outside temperature probe
- VS2CX = Cooling side 2-way ON/OFF valve
- VS2MCX = Cooling side 2-way Modulating valve
- VS3MCX = Cooling side 3-way Modulating valve
- VS2HX = Heating side 2-way ON/OFF valve
- VS2MHX = Heating side 2-way Modulating valve
- VS3MHX = Heating side 3-way Modulating valve
- VACSHX = Heating side Domestic Hot Water switching valve

**TEST**
All the units are factory-tested in specific steps, before shipping them. After the approval, the moisture contents present in all circuits are analyzed, in order to ensure the respect of the limits set by the manufacturers of the different components

# GROUNDWATER APPLICATION

## GENERAL TECHNICAL SPECIFICATIONS

| Size | | | 82 | 102 | 122 | 162 | 182 | 222 | 262 | 302 |
|---|---|---|---|---|---|---|---|---|---|---|
| **RADIANT PANELS** | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | |
| Heating capacity | 1 | kW | 34,8 | 40,8 | 49,5 | 57,6 | 68,0 | 81,9 | 93,5 | 112 |
| Total input power | 2 | kW | 6,69 | 7,90 | 9,46 | 11,0 | 12,8 | 15,6 | 17,8 | 20,5 |
| COP Eurovent | 3 | | 5,21 | 5,17 | 5,24 | 5,22 | 5,30 | 5,25 | 5,26 | 5,46 |
| COP (EN 14511:2008) | 4 | | 5,24 | 5,14 | 5,16 | 5,16 | 5,19 | 5,10 | 5,10 | 5,31 |
| **OPERATION COOLING ONLY** | | | | | | | | | | |
| Cooling capacity | 7 | kW | 38,8 | 45,6 | 55,5 | 63,6 | 75,5 | 89,4 | 98,2 | 127 |
| Total input power | 2 | kW | 6,65 | 8,21 | 9,94 | 11,5 | 13,3 | 16,1 | 18,5 | 20,7 |
| EER Eurovent | 8 | | 5,83 | 5,55 | 5,58 | 5,52 | 5,67 | 5,56 | 5,29 | 6,13 |
| EER (EN 14511:2008) | 9 | | 5,87 | 5,51 | 5,48 | 5,44 | 5,52 | 5,34 | 5,08 | 5,85 |
| Water flow-rate (Utility Exchanger) | 7 | l/s | 1,86 | 2,19 | 2,67 | 3,05 | 3,63 | 4,30 | 4,72 | 6,08 |
| Pressure drops (Utility Exchanger) | 7 | kPa | 30 | 40 | 46 | 40 | 45 | 54 | 53 | 38 |
| Water flow-rate (Source Exchanger) | 7 | l/s | 2,16 | 2,56 | 3,11 | 3,57 | 4,22 | 5,01 | 5,55 | 7,01 |
| Pressure drops (Source Exchanger) | 7 | kPa | 39 | 54 | 61 | 53 | 60 | 71 | 70 | 74 |
| **ELFOROOM ED ELFOSPACE TERMINAL UNITS** | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | |
| Heating capacity | 5 | kW | 32,1 | 37,6 | 45,4 | 52,6 | 62,1 | 75,3 | 86,8 | 101 |
| Total input power | 2 | kW | 8,47 | 9,89 | 11,7 | 13,5 | 15,8 | 19,0 | 21,9 | 24,6 |
| COP Eurovent | 3 | | 3,79 | 3,80 | 3,90 | 3,89 | 3,93 | 3,97 | 3,97 | 4,09 |
| **OPERATION COOLING ONLY** | | | | | | | | | | |
| Cooling capacity | 10 | kW | 28,3 | 33,1 | 40,4 | 46,8 | 55,5 | 65,5 | 72,0 | 91,0 |
| Total input power | 2 | kW | 6,47 | 7,59 | 9,07 | 10,6 | 12,3 | 15,1 | 17,5 | 19,8 |
| EER Eurovent | 8 | | 4,37 | 4,36 | 4,45 | 4,41 | 4,50 | 4,34 | 4,12 | 4,58 |
| Water flow-rate (Utility Exchanger) | 10 | l/s | 1,35 | 1,59 | 1,93 | 2,24 | 2,66 | 3,14 | 3,45 | 4,35 |
| Pressure drops (Utility Exchanger) | 10 | kPa | 17 | 23 | 26 | 23 | 26 | 31 | 31 | 20 |
| Water flow-rate (Source Exchanger) | 10 | l/s | 1,66 | 1,94 | 2,35 | 2,74 | 3,23 | 3,83 | 4,26 | 5,28 |
| Pressure drops (Source Exchanger) | 10 | kPa | 25 | 33 | 36 | 33 | 37 | 44 | 46 | 43 |
| **RADIATORS** | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | |
| Heating capacity | 6 | kW | 33,7 | 38,7 | 46,8 | 54,3 | 64,1 | 77,0 | 86,9 | 99,0 |
| Total input power | 2 | kW | 10,7 | 12,5 | 14,8 | 17,0 | 20,1 | 23,5 | 27,4 | 29,6 |
| COP Eurovent | 3 | | 3,16 | 3,10 | 3,16 | 3,20 | 3,18 | 3,28 | 3,17 | 3,34 |
| Water flow-rate (Utility Exchanger) | 6 | l/s | 1,01 | 1,15 | 1,40 | 1,62 | 1,91 | 2,30 | 2,59 | 2,95 |
| Pressure drops (Utility Exchanger) | 6 | kPa | 11 | 14 | 15 | 14 | 15 | 18 | 19 | 15 |
| Water flow-rate (Source Exchanger) | 6 | l/s | 1,85 | 2,11 | 2,57 | 3,00 | 3,53 | 4,30 | 4,78 | 5,55 |
| Pressure drops (Source Exchanger) | 6 | kPa | 30 | 38 | 43 | 39 | 43 | 54 | 56 | 32 |
| **COMPRESSOR** | | | | | | | | | | |
| Type of compressors | | | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll |
| No. of compressors | | Nr | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Std Capacity control steps | | Nr | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| Oil charge | | l | 3 | 3 | 3,4 | 5,8 | 5,8 | 5,8 | 6,6 | 6,6 |
| Refrigerant circuits | | Nr | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **CONDENSER** | | | | | | | | | | |
| Type of condensers | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 11,0 | 12,6 | 15,0 | 15,0 | 16,6 | 18,2 | 18,2 | 19,8 |
| Minimum flow | | l/s | 0,62 | 0,65 | 0,8 | 0,9 | 1 | 1,2 | 1,5 | 1,8 |
| **EVAPORATOR** | | | | | | | | | | |
| Type of evaporators | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 7,8 | 9,4 | 9,4 | 11,0 | 11,0 | 12,6 | 14,2 | 15,8 |
| Minimum flow | | l/s | 0,62 | 0,65 | 0,8 | 0,9 | 1 | 1,2 | 1,5 | 2,6 |
| **HYDRAULIC CIRCUIT** | | | | | | | | | | |
| Max water side pressure | 12 | kPa | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| **POWER SUPPLY** | | | | | | | | | | |
| Standard power supply | | | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 |

Note :The unit can operate either in cooing or in heating only. Note: The unit can operate in cooling-only or in heating-only mode. To be able to operate in both modes, the system must be designed with a reversible hydraulic circuit.

(1) inlet/outlet water utility side 30/35°C, inlet water source side 10°C. The water flow rate in external exchanger is the same of the operating cooling only water flow rate.

(2) The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit in accordance with EN 14511:2011.

(3) COP EUROVENT: Performance coefficient in heating . Ratio between heating power delivery and power absorption in compliance with EUROVENT EN14511:2011. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit in accordance with EN 14511:2011.

(4) COP (EN 14511:2008) Performance coefficient in heating. Ratio between heating power delivery and power absorption in compliance with EN 14511:2008. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit.

(5) inlet/outlet water utility side 40/45°C, inlet water source side 10°C. The water flow rate on external exchanger is the same of the operating cooling only water flow rate.

(6) inlet/outlet water utility side 47/55°C, inlet water source side 10/7°C

(7) inlet/outlet water utility side 23/18°C, inlet/outlet water source side 30/35°C

(8) EER EUROVENT: Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EUROVENT EN14511:2011. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit in accordance with EN 14511:2011.

(9) EER (EN 14511:2008) Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EUROVENT EN14511:2011. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit .

(10) inlet/outlet water utility side 12/7°C, inlet/outlet water source side 30/35°C

(11) PHE = Plate exchanger

(12) Source side and utility side circuit conditions. In configurations with hydronic circuit the water side max. pressure is of 600 kPa.

# GROUNDWATER APPLICATION

## GENERAL TECHNICAL SPECIFICATIONS

| Size | | | 352 | 402 | 432 | 452 | 502 | 552 | 602 | 702 | 802 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RADIANT PANELS** | | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | | |
| Heating capacity | 1 | kW | 126 | 143 | 156 | 168 | 186 | 205 | 232 | 263 | 302 |
| Total input power | 2 | kW | 23,2 | 26,8 | 29,5 | 31,5 | 34,6 | 38,2 | 42,9 | 48,7 | 55,6 |
| COP Eurovent | 3 | | 5,45 | 5,35 | 5,27 | 5,34 | 5,39 | 5,36 | 5,41 | 5,40 | 5,43 |
| COP (EN 14511:2008) | 4 | | 5,31 | 5,12 | 5,10 | 5,12 | 5,14 | 5,10 | 5,11 | 5,10 | 5,10 |
| **OPERATION COOLING ONLY** | | | | | | | | | | | |
| Cooling capacity | 7 | kW | 145 | 165 | 183 | 193 | 216 | 234 | 265 | 295 | 328 |
| Total input power | 2 | kW | 24,1 | 28,1 | 31,1 | 32,7 | 36,5 | 40,6 | 45,6 | 51,4 | 58,4 |
| EER Eurovent | 8 | | 6,05 | 5,88 | 5,87 | 5,89 | 5,91 | 5,77 | 5,81 | 5,74 | 5,62 |
| EER (EN 14511:2008) | 9 | | 5,75 | 5,52 | 5,57 | 5,55 | 5,51 | 5,32 | 5,31 | 5,30 | 5,10 |
| Water flow-rate (Utility Exchanger) | 7 | l/s | 6,98 | 7,94 | 8,77 | 9,26 | 10,4 | 11,2 | 12,7 | 14,2 | 15,8 |
| Pressure drops (Utility Exchanger) | 7 | kPa | 45 | 48 | 41 | 45 | 50 | 54 | 63 | 58 | 64 |
| Water flow-rate (Source Exchanger) | 7 | l/s | 8,07 | 9,19 | 10,2 | 10,7 | 12,0 | 13,0 | 14,7 | 16,5 | 18,3 |
| Pressure drops (Source Exchanger) | 7 | kPa | 69 | 89 | 72 | 79 | 87 | 103 | 107 | 94 | 115 |
| **OOM ED ELFOSPACE TERMINAL UNITS** | | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | | |
| Heating capacity | 5 | kW | 114 | 129 | 144 | 151 | 168 | 186 | 211 | 236 | 268 |
| Total input power | 2 | kW | 27,8 | 31,9 | 35,4 | 37,5 | 41,1 | 45,6 | 51,0 | 57,0 | 64,6 |
| COP Eurovent | 3 | | 4,10 | 4,05 | 4,07 | 4,01 | 4,09 | 4,08 | 4,14 | 4,14 | 4,16 |
| **OPERATION COOLING ONLY** | | | | | | | | | | | |
| Cooling capacity | 10 | kW | 103 | 118 | 130 | 137 | 153 | 166 | 187 | 211 | 236 |
| Total input power | 2 | kW | 22,6 | 26,2 | 28,9 | 30,4 | 33,4 | 37,0 | 41,4 | 47,4 | 54,1 |
| EER Eurovent | 8 | | 4,59 | 4,50 | 4,49 | 4,51 | 4,57 | 4,50 | 4,52 | 4,44 | 4,37 |
| Water flow-rate (Utility Exchanger) | 10 | l/s | 4,95 | 5,65 | 6,20 | 6,56 | 7,31 | 7,96 | 8,97 | 10,1 | 11,3 |
| Pressure drops (Utility Exchanger) | 10 | kPa | 23 | 25 | 31 | 23 | 25 | 27 | 32 | 30 | 32 |
| Water flow-rate (Source Exchanger) | 10 | l/s | 6,01 | 6,86 | 7,55 | 7,98 | 8,86 | 9,68 | 10,9 | 12,3 | 13,8 |
| Pressure drops (Source Exchanger) | 10 | kPa | 40 | 51 | 41 | 45 | 48 | 57 | 60 | 53 | 66 |
| **RADIATORS** | | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | | |
| Heating capacity | 6 | kW | 114 | 128 | 144 | 152 | 168 | 186 | 212 | 239 | 268 |
| Total input power | 2 | kW | 34,0 | 39,0 | 43,6 | 45,9 | 50,6 | 56,1 | 62,7 | 70,7 | 80,1 |
| COP Eurovent | 3 | | 3,34 | 3,29 | 3,29 | 3,31 | 3,32 | 3,31 | 3,38 | 3,38 | 3,34 |
| Water flow-rate (Utility Exchanger) | 6 | l/s | 3,39 | 3,83 | 4,29 | 4,53 | 5,01 | 5,55 | 6,31 | 7,12 | 8,00 |
| Pressure drops (Utility Exchanger) | 6 | kPa | 14 | 17 | 14 | 16 | 17 | 21 | 21 | 19 | 23 |
| Water flow-rate (Source Exchanger) | 6 | l/s | 6,37 | 7,15 | 8,02 | 8,47 | 9,40 | 10,4 | 11,9 | 13,5 | 15,0 |
| Pressure drops (Source Exchanger) | 6 | kPa | 37 | 40 | 35 | 38 | 41 | 47 | 56 | 53 | 55 |
| **COMPRESSOR** | | | | | | | | | | | |
| Type of compressors | | | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll |
| No. of compressors | | Nr | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Std Capacity control steps | | Nr | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 |
| Oil charge | | l | 8 | 10,1 | 11,5 | 11 | 11 | 13,1 | 12,6 | 12,6 | 12,6 |
| Refrigerant circuits | | Nr | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **CONDENSER** | | | | | | | | | | | |
| Type of condensers | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 11,0 | 12,6 | 15,0 | 15,0 | 16,6 | 18,2 | 18,2 | 19,8 | 19,8 |
| Minimum flow | | l/s | 2,3 | 2,3 | 2,8 | 2,8 | 3,1 | 3,4 | 3,8 | 4,4 | 5 |
| **EVAPORATOR** | | | | | | | | | | | |
| Type of evaporators | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 7,8 | 9,4 | 9,4 | 11,0 | 11,0 | 12,6 | 14,2 | 15,8 | 18,2 |
| Minimum flow | | l/s | 2,8 | 3,3 | 3,5 | 3,7 | 3,9 | 4,1 | 4,5 | 4,6 | 5 |
| **HYDRAULIC CIRCUIT** | | | | | | | | | | | |
| Max water side pressure | 12 | kPa | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| **POWER SUPPLY** | | | | | | | | | | | |
| Standard power supply | | | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 |

Note :The unit can operate either in cooing or in heating only. Note: The unit can operate in cooling-only or in heating-only mode. To be able to operate in both modes, the system must be designed with a reversible hydraulic circuit.

(1) inlet/outlet water utility side 30/35°C, inlet water source side 10°C. The water flow rate in external exchanger is the same of the operating cooling only water flow rate.

(2) The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit in accordance with EN 14511:2011.

(3) COP EUROVENT: Performance coefficient in heating . Ratio between heating power delivery and power absorption in compliance with EUROVENT EN14511:2011. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit in accordance with EN 14511:2011.

(4) COP (EN 14511:2008) Performance coefficient in heating. Ratio between heating power delivery and power absorption in compliance with EN 14511:2008. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit.

(5) inlet/outlet water utility side 40/45°C, inlet water source side 10°C. The water flow rate on external exchanger is the same of the operating cooling only water flow rate.

(6) inlet/outlet water utility side 47/55°C, inlet water source side 10/7°C

(7) inlet/outlet water utility side 23/18°C, inlet/outlet water source side 30/35°C

(8) EER EUROVENT: Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EUROVENT EN14511:2011. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit in accordance with EN 14511:2011.

(9) EER (EN 14511:2008) Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EUROVENT EN14511:2011. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit .

(10) inlet/outlet water utility side 12/7°C, inlet/outlet water source side 30/35°C

(11) PHE = Plate exchanger

(12) Source side and utility side circuit conditions. In configurations with hydronic circuit the

# GEOTHERMAL

## GENERAL TECHNICAL SPECIFICATIONS

| Size | | | 82 | 102 | 122 | 162 | 182 | 222 | 262 | 302 |
|---|---|---|---|---|---|---|---|---|---|---|
| **RADIANT PANELS** | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | |
| Heating capacity | 1 | kW | 27,7 | 32,6 | 38,1 | 44,8 | 52,9 | 63,7 | 73,3 | 85,4 |
| Total input power | 2 | kW | 6,50 | 7,45 | 8,77 | 10,4 | 12,1 | 14,6 | 16,9 | 19,2 |
| COP Eurovent | 3 | | 4,27 | 4,38 | 4,35 | 4,33 | 4,37 | 4,35 | 4,34 | 4,44 |
| COP (EN 14511:2008) | 4 | | 4,30 | 4,40 | 4,34 | 4,33 | 4,35 | 4,30 | 4,33 | 4,40 |
| **OPERATION COOLING ONLY** | | | | | | | | | | |
| Cooling capacity | 7 | kW | 39,7 | 47,3 | 56,1 | 65,6 | 77,6 | 88,2 | 113,9 | 132 |
| Total input power | 2 | kW | 6,80 | 8,52 | 10,21 | 11,9 | 13,7 | 16,5 | 19,7 | 21,6 |
| EER Eurovent | 8 | | 5,84 | 5,55 | 5,49 | 5,51 | 5,67 | 5,35 | 5,78 | 6,10 |
| EER (EN 14511:2008) | 9 | | 5,84 | 5,47 | 5,36 | 5,39 | 5,52 | 5,11 | 5,44 | 5,74 |
| Water flow-rate (Utility Exchanger) | 7 | l/s | 1,91 | 2,27 | 2,70 | 3,15 | 3,73 | 4,24 | 5,46 | 6,31 |
| Pressure drops (Utility Exchanger) | 7 | kPa | 29 | 32 | 42 | 33 | 40 | 50 | 27 | 30 |
| Water flow-rate (Source Exchanger) | 7 | l/s | 2,21 | 2,65 | 3,15 | 3,68 | 4,34 | 4,97 | 6,34 | 7,27 |
| Pressure drops (Source Exchanger) | 7 | kPa | 51 | 72 | 75 | 68 | 66 | 86 | 116 | 103 |
| **ELFOROOM ED ELFOSPACE TERMINAL UNITS** | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | |
| Heating capacity | 5 | kW | 27,5 | 31,8 | 36,9 | 44,3 | 51,5 | 62,9 | 70,3 | 82,8 |
| Total input power | 2 | kW | 8,37 | 9,64 | 11,2 | 13,1 | 15,2 | 18,1 | 21,1 | 23,5 |
| COP Eurovent | 3 | | 3,28 | 3,30 | 3,30 | 3,37 | 3,38 | 3,48 | 3,34 | 3,53 |
| **OPERATION COOLING ONLY** | | | | | | | | | | |
| Potenza frigorifera | 10 | kW | 28,9 | 34,6 | 40,9 | 48,2 | 56,8 | 64,7 | 82,4 | 94,6 |
| Potenza assorbita totale | 2 | kW | 6,54 | 7,81 | 9,25 | 10,9 | 12,6 | 15,3 | 18,1 | 20,4 |
| EER Eurovent 2012 | 8 | | 4,42 | 4,44 | 4,42 | 4,43 | 4,51 | 4,22 | 4,54 | 4,64 |
| Water flow-rate (Utility Exchanger) | 10 | l/s | 1,39 | 1,66 | 1,96 | 2,31 | 2,72 | 3,10 | 3,94 | 4,52 |
| Pressure drops (Utility Exchanger) | 10 | kPa | 16 | 18 | 21 | 18 | 22 | 27 | 13 | 17 |
| Water flow-rate (Source Exchanger) | 10 | l/s | 1,69 | 2,02 | 2,38 | 2,81 | 3,31 | 3,81 | 4,78 | 5,47 |
| Pressure drops (Source Exchanger) | 10 | kPa | 31 | 43 | 45 | 40 | 40 | 52 | 69 | 60 |
| **RADIATORS** | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | |
| Heating capacity | 6 | kW | 26,1 | 31,0 | 36,2 | 42,8 | 50,2 | 60,1 | 68,9 | 79,6 |
| Total input power | 2 | kW | 10,7 | 12,6 | 14,2 | 16,6 | 19,4 | 22,6 | 26,6 | 28,7 |
| COP Eurovent | 3 | | 2,43 | 2,46 | 2,54 | 2,57 | 2,58 | 2,66 | 2,59 | 2,77 |
| Water flow-rate (Utility Exchanger) | 6 | l/s | 0,78 | 0,93 | 1,08 | 1,28 | 1,50 | 1,79 | 2,06 | 2,38 |
| Pressure drops (Utility Exchanger) | 6 | kPa | 8 | 10 | 10 | 10 | 11 | 12 | 14 | 10 |
| Water flow-rate (Source Exchanger) | 6 | l/s | 1,32 | 1,58 | 1,89 | 2,25 | 2,65 | 3,23 | 3,62 | 4,36 |
| Pressure drops (Source Exchanger) | 6 | kPa | 19 | 21 | 26 | 23 | 26 | 42 | 17 | 20 |

**COMPRESSORS**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type of compressors | | | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll |
| No. of compressors | | Nr | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Std Capacity control steps | | Nr | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| Oil charge | | l | 3 | 3 | 3,4 | 5,8 | 5,8 | 5,8 | 6,6 | 6,6 |
| Refrigerant circuits | | Nr | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**CONDENSER**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type of condensers | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 11,0 | 12,6 | 15,0 | 15,0 | 16,6 | 18,2 | 18,2 | 19,8 |
| Minimum flow | | l/s | 0,62 | 0,65 | 0,8 | 0,9 | 1 | 1,2 | 1,5 | 1,8 |

**EVAPORATORE**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type of evaporators | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 7,8 | 9,4 | 9,4 | 11,0 | 11,0 | 12,6 | 14,2 | 15,8 |
| Minimum flow | | l/s | 0,8 | 0,9 | 1,1 | 1,2 | 1,3 | 1,3 | 2,3 | 2,5 |

**CIRCUITO IDRAULICO**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Max water side pressure | 12 | kPa | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

**POWER SUPPLY**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Standard power supply | | | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 |

**Data refer to operation with a mix of water and propylene glycol at 30% on the source side, both in cooling and in heating operating mode.**

Note: The unit can operate in cooling-only or in heating-only mode. To be able to operate in both modes, the system must be designed with a reversible hydraulic circuit.

(1) inlet/outlet water utility side 30/35°C, inlet /outlet water source side 0/-3°C. The water flow rate in external exchanger is the same of the operating cooling only water flow rate. (in compliance with Eurovent).

(2) The total input is given by the compressor input + auxiliary electric circuit

(3) COP EUROVENT: Performance coefficient in heat. Ratio between heating power delivery and power absorption in compliance with EUROVENT. The total input is given by the compressor input + auxiliary electric circuit .

(4) COP (EN 14511:2008) Performance coefficient in heat. Ratio between heating power delivery and power absorption in compliance with EN 14511:2008. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit

(5) inlet/outlet water utility side 40/45°C, inlet /outlet water source side 0/-3°C The water flow rate on external exchanger is the same of the operating cooling only water flow rate.

(6) inlet/outlet water utility side 50/55°C, inlet /outlet water source side 0/-3°

(7) inlet/outlet water utility side 23/18°C, inlet /outlet water source side 30/35°C

(8) EER EUROVENT: Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EUROVENT . The total input is given by the compressor input + auxiliary electric circuit

(9) EER (EN 14511:2008) Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EN 14511:2008. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit .

(10) inlet/outlet water utility side 12/7°C, inlet /outlet water source side 30/35°C

(11) PHE = Plate exchanger

(12) Source side and utility side circuit conditions. In configurations with hydronic circuit the water side max. pressure is of 600 kPa.

# GEOTHERMAL

## GENERAL TECHNICAL SPECIFICATIONS

| Size | | | 352 | 402 | 432 | 452 | 502 | 552 | 602 | 702 | 802 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **RADIANT PANELS** | | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | | |
| Heating capacity | 1 | kW | 94,2 | 112 | 123 | 131 | 143 | 158 | 177 | 202 | 229 |
| Total input power | 2 | kW | 21,7 | 25,4 | 27,9 | 29,5 | 32,2 | 35,8 | 40,0 | 45,6 | 51,7 |
| COP Eurovent | 3 | | 4,34 | 4,41 | 4,42 | 4,44 | 4,42 | 4,42 | 4,42 | 4,43 | 4,44 |
| COP (EN 14511:2008) | 4 | | 4,31 | 4,34 | 4,36 | 4,37 | 4,34 | 4,31 | 4,30 | 4,32 | 4,31 |
| **OPERATION COOLING ONLY** | | | | | | | | | | | |
| Cooling capacity | 7 | kW | 151 | 172 | 193 | 205 | 225 | 245 | 278 | 310 | 339 |
| Total input power | 2 | kW | 25,0 | 29,4 | 32,5 | 34,4 | 38,2 | 42,6 | 47,9 | 53,6 | 61,2 |
| EER Eurovent | 8 | | 6,04 | 5,85 | 5,94 | 5,97 | 5,90 | 5,75 | 5,80 | 5,78 | 5,54 |
| EER (EN 14511:2008) | 9 | | 5,69 | 5,40 | 5,56 | 5,52 | 5,42 | 5,19 | 5,18 | 5,24 | 4,92 |
| Water flow-rate (Utility Exchanger) | 7 | l/s | 7,24 | 8,25 | 9,26 | 9,84 | 10,8 | 11,7 | 13,3 | 14,9 | 16,3 |
| Pressure drops (Utility Exchanger) | 7 | kPa | 34 | 40 | 33 | 37 | 40 | 46 | 56 | 49 | 60 |
| Water flow-rate (Source Exchanger) | 7 | l/s | 8,35 | 9,54 | 10,7 | 11,4 | 12,5 | 13,6 | 15,4 | 17,2 | 18,9 |
| Pressure drops (Source Exchanger) | 7 | kPa | 96 | 124 | 102 | 116 | 122 | 145 | 152 | 132 | 160 |
| **ELFOROOM ED ELFOSPACE TERMINAL UNITS** | | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | | |
| Heating capacity | 5 | kW | 93,3 | 109 | 119 | 127 | 138 | 153 | 172 | 195 | 225 |
| Total input power | 2 | kW | 26,6 | 31,0 | 34,1 | 36,3 | 39,6 | 44,0 | 49,2 | 55,1 | 61,5 |
| COP Eurovent | 3 | | 3,50 | 3,50 | 3,50 | 3,51 | 3,49 | 3,49 | 3,49 | 3,54 | 3,66 |
| **OPERATION COOLING ONLY** | | | | | | | | | | | |
| Cooling capacity | 10 | kW | 108 | 123 | 137 | 146 | 160 | 174 | 197 | 222 | 245 |
| Total input power | 2 | kW | 23,1 | 26,9 | 29,6 | 31,4 | 34,4 | 38,2 | 42,7 | 48,8 | 55,9 |
| EER Eurovent | 8 | | 4,66 | 4,56 | 4,64 | 4,65 | 4,65 | 4,56 | 4,62 | 4,54 | 4,38 |
| Water flow-rate (Utility Exchanger) | 10 | l/s | 5,15 | 5,89 | 6,57 | 6,99 | 7,64 | 8,34 | 9,43 | 10,6 | 11,7 |
| Pressure drops (Utility Exchanger) | 10 | kPa | 15 | 23 | 18 | 19 | 22 | 23 | 22 | 26 | 31 |
| Water flow-rate (Source Exchanger) | 10 | l/s | 6,22 | 7,13 | 7,95 | 8,45 | 9,24 | 10,10 | 11,4 | 12,9 | 14,3 |
| Pressure drops (Source Exchanger) | 10 | kPa | 55 | 71 | 58 | 65 | 68 | 79 | 85 | 75 | 91 |
| **RADIATORS** | | | | | | | | | | | |
| **OPERATION HEATING ONLY** | | | | | | | | | | | |
| Heating capacity | 6 | kW | 90,6 | 105 | 116 | 124 | 135 | 149 | 168 | 190 | 219 |
| Total input power | 2 | kW | 32,7 | 38,1 | 42,1 | 44,6 | 49,1 | 53,9 | 60,7 | 67,7 | 75,4 |
| COP Eurovent | 3 | | 2,77 | 2,77 | 2,76 | 2,77 | 2,74 | 2,77 | 2,76 | 2,81 | 2,91 |
| Water flow-rate (Utility Exchanger) | 6 | l/s | 2,71 | 3,14 | 3,47 | 3,69 | 4,02 | 4,46 | 5,01 | 5,68 | 6,55 |
| Pressure drops (Utility Exchanger) | 6 | kPa | 9 | 12 | 10 | 11 | 12 | 16 | 15 | 13 | 16 |
| Water flow-rate (Source Exchanger) | 6 | l/s | 4,96 | 5,76 | 6,34 | 6,77 | 7,33 | 8,2 | 9,2 | 10,5 | 12,4 |
| Pressure drops (Source Exchanger) | 6 | kPa | 23 | 27 | 22 | 24 | 26 | 30 | 35 | 33 | 41 |
| **COMPRESSORS** | | | | | | | | | | | |
| Type of compressors | | | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll | Scroll |
| No. of compressors | | Nr | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Std Capacity control steps | | Nr | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 |
| Oil charge | | l | 8 | 10,1 | 11,5 | 11 | 11 | 13,1 | 12,6 | 12,6 | 12,6 |
| Refrigerant circuits | | Nr | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **CONDENSER** | | | | | | | | | | | |
| Type of condensers | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 11,0 | 12,6 | 15,0 | 15,0 | 16,6 | 18,2 | 18,2 | 19,8 | 19,8 |
| Minimum flow | | l/s | 2,3 | 2,3 | 2,8 | 2,8 | 3,1 | 3,4 | 3,8 | 4,4 | 5 |
| **EVAPORATORE** | | | | | | | | | | | |
| Type of evaporators | 11 | | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE | PHE |
| Water content | | l | 7,8 | 9,4 | 9,4 | 11,0 | 11,0 | 12,6 | 14,2 | 15,8 | 18,2 |
| Minimum flow | | l/s | 3 | 3,2 | 3,7 | 3,8 | 4 | 4,2 | 4,4 | 4,6 | 4,6 |
| **HYDRAULIC CIRCUIT** | | | | | | | | | | | |
| Max water side pressure | 12 | kPa | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| **POWER SUPPLY** | | | | | | | | | | | |
| Standard power supply | | | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 | 400/3~/50 |

**Data refer to operation with a mix of water and propylene glycol at 30% on the source side. both in cooling and in heating operating mode.**

Note: The unit can operate in cooling-only or in heating-only mode. To be able to operate in both modes, the system must be designed with a reversible hydraulic circuit.

(1) inlet/outlet water utility side 30/35°C, inlet /outlet water source side 0/-3°C. The water flow rate in external exchanger is the same of the operating cooling only water flow rate. (in compliance with Eurovent).

(2) The total input is given by the compressor input + auxiliary electric circuit

(3) COP EUROVENT: Performance coefficient in heat. Ratio between heating power delivery and power absorption in compliance with EUROVENT. The total input is given by the compressor input + auxiliary electric circuit .

(4) COP (EN 14511:2008) Performance coefficient in heat. Ratio between heating power delivery and power absorption in compliance with EN 14511:2008. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit

(5) inlet/outlet water utility side 40/45°C, inlet /outlet water source side 0/-3°C The water flow rate on external exchanger is the same of the operating cooling only water flow rate.

(6) inlet/outlet water utility side 50/55°C, inlet /outlet water source side 0/-3°

(7) inlet/outlet water utility side 23/18°C, inlet /outlet water source side 30/35°C

(8) EER EUROVENT: Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EUROVENT . The total input is given by the compressor input + auxiliary electric circuit

(9) EER (EN 14511:2008) Performance coefficient in cooling. Ratio between cooling power delivery and power absorption in compliance with EN 14511:2008. The total input is given by the compressor input + auxiliary electric circuit + percentage of power absorbed by the pump to prevent pressure drops inside the unit .

(10) inlet/outlet water utility side 12/7°C, inlet /outlet water source side 30/35°C

(11) PHE = Plate exchanger

(12) Source side and utility side circuit conditions. In configurations with hydronic circuit the water side max. pressure is of 600 kPa.

## ELECTRICAL DATA

| Size | | | 82 | 102 | 122 | 162 | 182 | 222 | 262 | 302 |
|---|---|---|---|---|---|---|---|---|---|---|
| **F.L.A. - FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS** | | | | | | | | | | |
| F.L.A. - Total | | A | 19,6 | 23,5 | 28,6 | 32,9 | 38,4 | 46,2 | 53,8 | 61,6 |
| **F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION** | | | | | | | | | | |
| F.L.I. - Total | | kW | 12,2 | 14,3 | 17,1 | 19,8 | 23,1 | 26,8 | 31,2 | 34,9 |
| **M.I.C. MAXIMUM INRUSH CURRENT** | | | | | | | | | | |
| M.I.C. - Value | | A | 73,2 | 110 | 115 | 126 | 133 | 189 | 197 | 205 |

| Size | | | 352 | 402 | 432 | 452 | 502 | 552 | 602 | 702 | 802 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **F.L.A. - FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS** | | | | | | | | | | | |
| F.L.A. - Total | | A | 67 | 75 | 81 | 90 | 96 | 104 | 119 | 133 | 147 |
| **F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION** | | | | | | | | | | | |
| F.L.I. - Total | | kW | 40,3 | 45,3 | 50,7 | 53,8 | 59,2 | 64,2 | 72,7 | 81,5 | 90,3 |
| **M.I.C. MAXIMUM INRUSH CURRENT** | | | | | | | | | | | |
| M.I.C. - Valor | | A | 256 | 303 | 308 | 341 | 346 | 355 | 369 | 467 | 482 |

Voltage unbalance: max 2 %
Power supply: 400/3/50 Hz +/-10%

Electrical data refer to standard units; according to the installed accessories, the data can suffer light variations.

## SOUND LEVELS

| Size | Sound Power Level (dB) | | | | | | | | Sound pressure level | Sound power level |
|---|---|---|---|---|---|---|---|---|---|---|
| | Octave band (Hz) | | | | | | | | | |
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dB(A) | dB(A) |
| **82** | 78 | 70 | 62 | 52 | 52 | 43 | 41 | 40 | 44 | 60 |
| **102** | 78 | 69 | 62 | 56 | 52 | 44 | 43 | 38 | 44 | 60 |
| **122** | 78 | 67 | 61 | 57 | 54 | 46 | 44 | 39 | 45 | 60 |
| **162** | 78 | 71 | 66 | 63 | 53 | 49 | 46 | 41 | 49 | 64 |
| **182** | 78 | 73 | 67 | 63 | 55 | 51 | 47 | 42 | 49 | 65 |
| **222** | 78 | 73 | 65 | 62 | 55 | 52 | 47 | 42 | 49 | 64 |
| **262** | 78 | 73 | 66 | 62 | 56 | 54 | 49 | 44 | 49 | 64 |
| **302** | 78 | 74 | 63 | 60 | 56 | 54 | 48 | 44 | 49 | 64 |
| **352** | 81 | 83 | 80 | 67 | 61 | 61 | 52 | 45 | 58 | 74 |
| **402** | 81 | 79 | 80 | 67 | 65 | 63 | 55 | 50 | 58 | 74 |
| **432** | 81 | 83 | 83 | 69 | 66 | 65 | 56 | 49 | 60 | 77 |
| **452** | 81 | 78 | 80 | 69 | 66 | 62 | 55 | 48 | 58 | 74 |
| **502** | 81 | 83 | 83 | 70 | 67 | 64 | 56 | 47 | 60 | 77 |
| **552** | 81 | 80 | 83 | 70 | 68 | 65 | 57 | 50 | 60 | 77 |
| **602** | 81 | 80 | 83 | 71 | 69 | 65 | 57 | 50 | 61 | 77 |
| **702** | 82 | 80 | 85 | 73 | 72 | 68 | 60 | 51 | 63 | 79 |
| **802** | 82 | 80 | 85 | 73 | 74 | 70 | 61 | 52 | 63 | 80 |

Sound levels refer to units with full load under nominal test conditions.

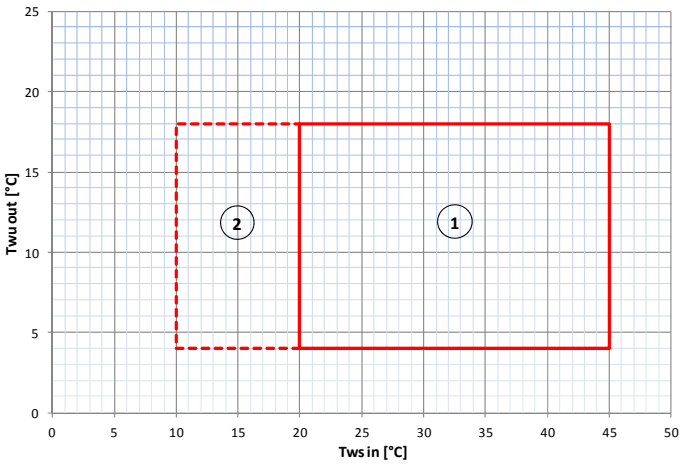
The sound pressure is measured at 1 m from the external surface of the unit in open field conditions.

Noise levels are determined using the tensiometric method (UNI EN ISO 9614-2)

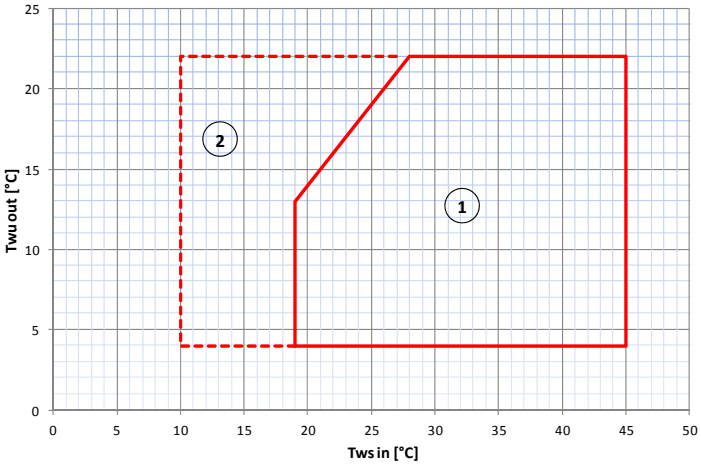
Data referred to the following conditions:
- exchanger Inlet / outlet water utility side 12/7°C
- exchanger Inlet / outlet water source side 30/35°C

## OPERATING RANGE (COOLING)

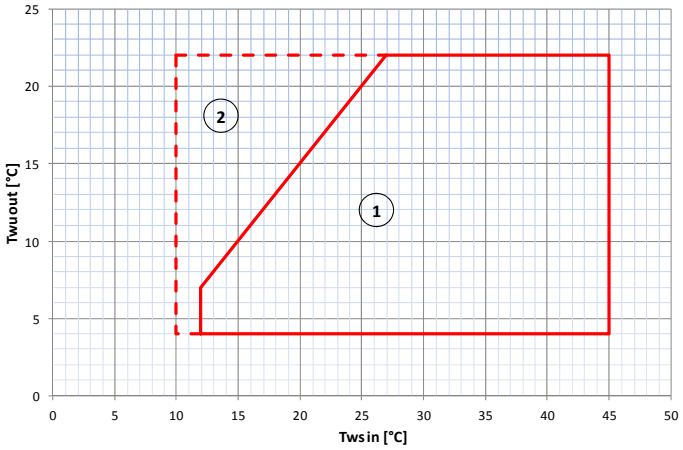
### Size 82-102-122



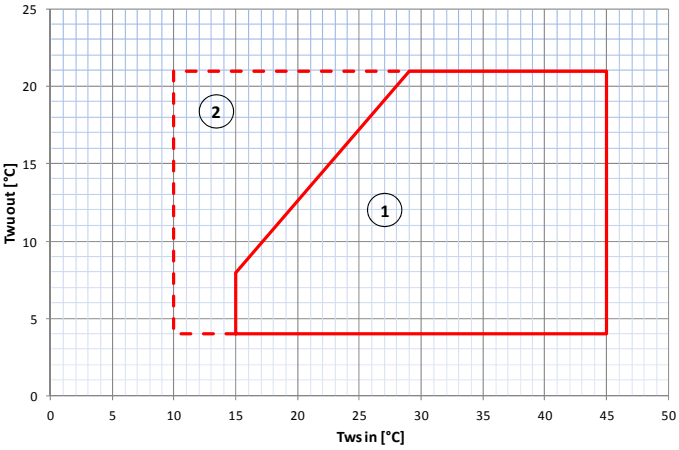

### Size 162




### Size 182-222-262-302-352-402-452



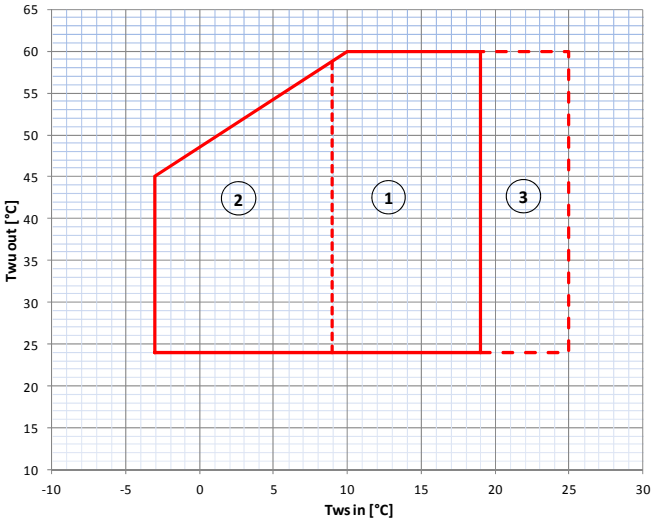

### Size 432-502-552-602-702-802



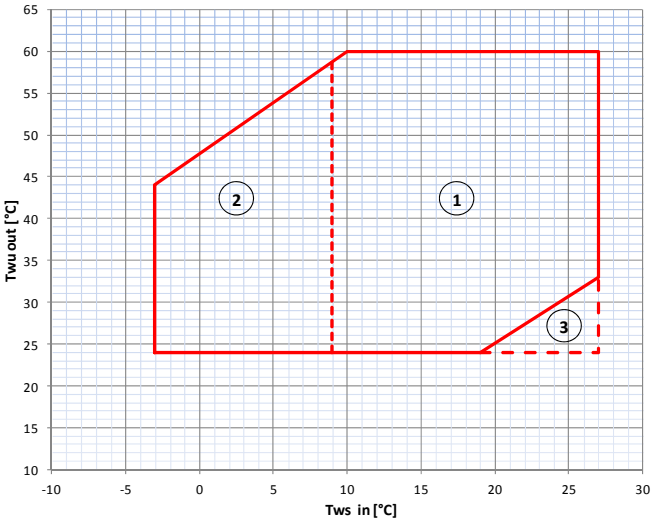

Twu out [°C] = outlet temperature utility side
Tws in [°C] = inlet water temperature source side with a difference of temperature between inlet and outlet of 5 k
(1) Normal operating range
(2) Operating range with modulating valve or side source inverter pump (optional configurations)

## OPERATING RANGE (HEATING)

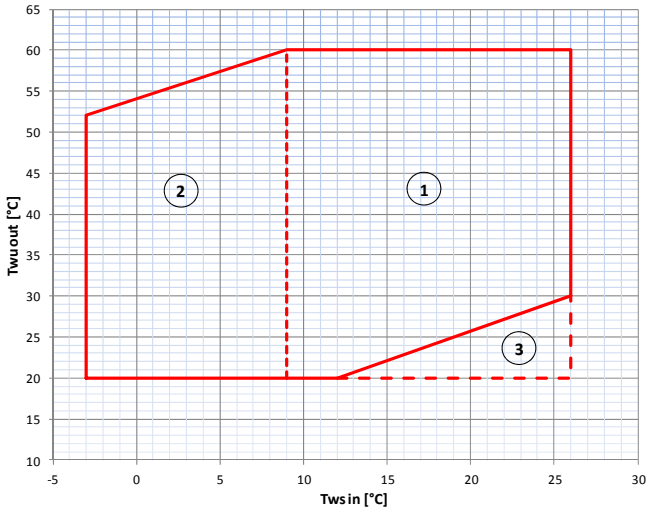
### Size 82-102-122



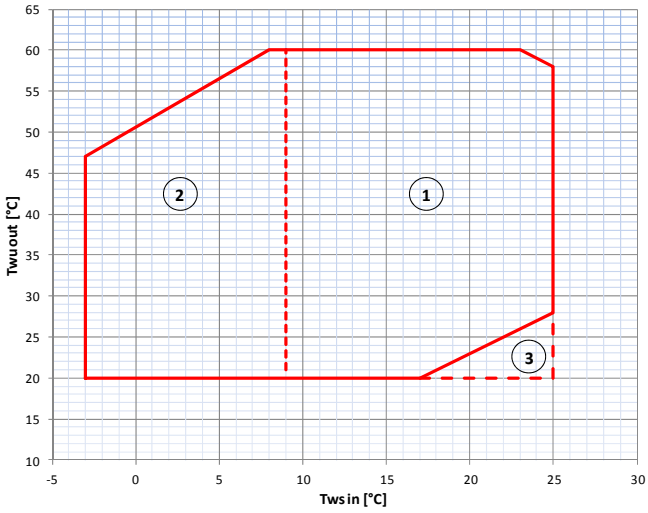

### Size 162




### Size 182-222-262-302-352-402-452



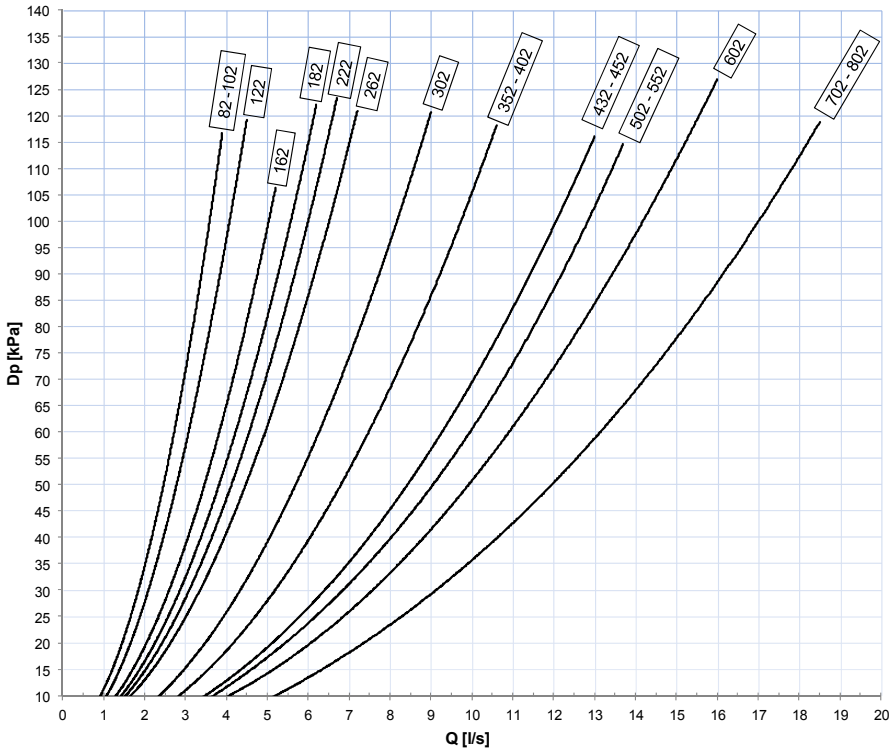

### Size 432-502-552-602-702-802




Twu out [°C] = outlet water temperature utility side
Tws in [°C] = inlet water temperature source side with a difference of temperature between inlet and outlet of 5k
(1) Normal operating range
(2) Operating range where it is obligatory the use of water and glycol mixture depending on the outlet water temperature from the heat exchanger source side
(3) Operating range with modulating valve or inverter pump source side in setting (optional configurations)

**PRESSURE DROPS - HEAT SIDE**

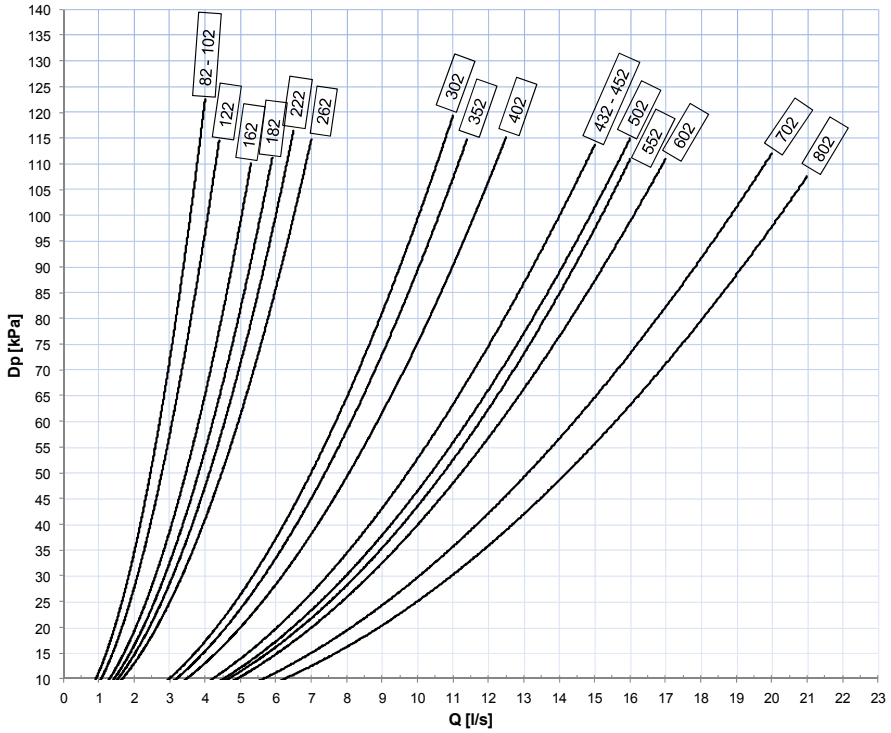
The standard version of ELFOEnergy Ground Medium is supplied without hydronic unit on the heating side. The heating side hydronic group, with one or two standard pumps or inverter, is a configuration that is described in the following pages.




Q = water flow l/s
DP = pressure drops [kPa]

**PRESSURE DROPS - COOL SIDE (Configuration for Groundwater application)**

The standard version of ELFOEnergy Ground Medium is supplied without hydronic unit on the heating side. The heating side hydronic group, with one or two standard pumps or inverter, is a configuration that is described in the following pages.




Q = water flow l/s
DP = pressure drops [kPa]

THE WATER FLOW-RATE CAN BE CALCULATED WITH THE FOLLOWING FORMULA

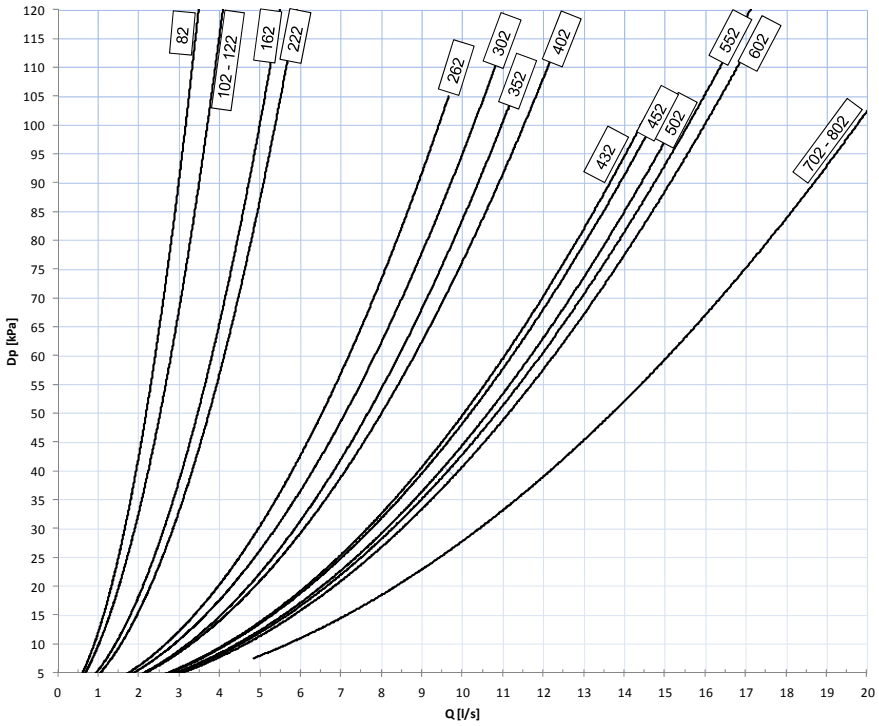
$$Q\ [l/s] = kWf / (4{,}186 \times DT)$$

kWf = Cooling capacity [kW]
DT = Difference temperature between inlet/outlet water

**PRESSURE DROPS - COOL SIDE (Configuration for Geothermal application)**

The standard version of ELFOEnergy Ground Medium is supplied without hydronic unit on the heating side. The heating side hydronic group, with one or two standard pumps or inverter, is a configuration that is described in the following pages.

In the geothermal version the evaporator is increased to optimize the capacity of heat exchange between refrigerant and mixture of water and glycol.
The graph represents the evaporator side pressure drops in geothermal and mixture of water and propylene glycol at 30% units configuration.




Q = water flow l/s
DP = pressure drops [kPa]

The graph is valid only for mixture of water and propylene glycol at 30%

The flow rate of the mixture of water and propylene glycol at 30%, at temperatures close to 0° C can be calculated with the following formula:

$$Q\ [l/s] = kWf / (4{,}12 \times DT) \times 1{,}08$$

kWf = Cooling capacity [kW]
DT = Difference temperature between inlet/outlet water

## CORRECTION FACTOR FOR ANTIFREEZE SOLUTIONS

| % ethylene glycol by weight | | | 5% | 10% | 15% | 20% | 25% | 30% | 35% | 40% |
|---|---|---|---|---|---|---|---|---|---|---|
| Freezing temperature | | °C | -2,0 | -3,9 | -6,5 | -8,9 | -11,8 | -15,6 | -19,0 | -23,4 |
| Safety temperature | | °C | 3,0 | 1,0 | -1,0 | -4,0 | -6,0 | -10,0 | -14,0 | -19,0 |
| Cooling Capacity Factor | | Nr | 0,995 | 0,990 | 0,985 | 0,981 | 0,977 | 0,974 | 0,971 | 0,968 |
| Compressor input Factor | | Nr | 0,997 | 0,993 | 0,990 | 0,988 | 0,986 | 0,984 | 0,982 | 0,981 |
| Internal exchanger Glycol solution flow Factor | | Nr | 1,003 | 1,010 | 1,020 | 1,033 | 1,050 | 1,072 | 1,095 | 1,124 |
| Pressure drop Factor | | Nr | 1,029 | 1,060 | 1,090 | 1,118 | 1,149 | 1,182 | 1,211 | 1,243 |

The correction factors shown refer to water and glycol ethylene mixes used to prevent the formation of frost on the exchangers in the water circuit during inactivity in winter.

The correction factors are used both for the utility and for the source side.

The data provided in the tables and the general technical specifications in geothermal operation already include the corrections required when using glycol.

## FOULING CORRECTION FACTOR

| | UTILITY SIDE EXCHANGER | | SOURCE SIDE EXCHANGER | |
|---|---|---|---|---|
| m²°C/W | F1 | FK1 | F2 | FK2 |
| 0.44 x 10^(-4) | 1,00 | 1,00 | 1,00 | 1,00 |
| 0.88 x 10^(-4) | 0,97 | 0,99 | 0,97 | 1,08 |
| 1.76 x 10^(-4) | 0,94 | 0,98 | 0,92 | 1,05 |

The cooling performance values provided in the tables are based on the external exchanger having clean plates (fouling factor 1). For different fouling factor values, multiply the performance by the coefficients shown in the table.

F1 = Cooling capacity correction factors
FK1 = Compressor power input correction factor
F2 = Cooling capacity correction factors
FK2 = Compressors input power correction factors

## OVERLOAD AND CONTROL DEVICE CALIBRATION

| | | | OPEN | CLOSED | VALUE |
|---|---|---|---|---|---|
| High pressure switch | | kPa | 4050 | 3300 | - |
| Low pressure switch | | kPa | 450 | 600 | - |
| Low pressure switch (Brine) | | kPa | 200 | 350 | - |
| Antifreeze protection | | °C | 3,0 | 5,5 | - |
| High pressure safety valve | | kPa | - | - | 4500 |
| Low pressure safety valve | | kPa | - | - | 3000 |
| Max no. of compressor starts per hour | | Nr | - | - | 10 |

## EXCHANGER OPERATING LIMITS

| | INTERNAL EXCHANGER | |
|---|---|---|
| | DPr | DPw |
| | kPa | kPa |
| CLIVET (C) | 4500 | 1000 |
| PED (CE) | 4500 | 1000 |

DPr = Maximum operate pressure refrigerant gas side
DPw = Maximum operate pressure water side (use)

## GROUNDWATER APPLICATION

### COOLING PERFORMANCE

| SIZE | To (ºC) | EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | |
| | | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt |
| 82 | 5 | 27,6 | 5,49 | 33,1 | 26,6 | 6,18 | 32,8 | 25,4 | 7,04 | 32,4 | 23,9 | 8,07 | 31,9 | 22,1 | 9,28 | 31,4 |
| | 7 | 29,5 | 5,47 | 35,0 | 28,4 | 6,18 | 34,6 | 27,1 | 7,04 | 34,1 | 25,6 | 8,06 | 33,7 | 24,0 | 9,23 | 33,2 |
| | 10 | 32,5 | 5,46 | 37,9 | 31,2 | 6,18 | 37,3 | 29,8 | 7,04 | 36,8 | 28,3 | 8,04 | 36,4 | 26,8 | 9,19 | 36,0 |
| | 12 | 34,4 | 5,45 | 39,9 | 33,0 | 6,17 | 39,2 | 31,6 | 7,04 | 38,7 | 30,2 | 8,04 | 38,2 | 28,7 | 9,18 | 37,9 |
| | 15 | 37,4 | 5,44 | 42,8 | 36,0 | 6,16 | 42,1 | 34,5 | 7,03 | 41,5 | 33,0 | 8,04 | 41,1 | 31,5 | 9,20 | 40,7 |
| | 18 | 40,4 | 5,45 | 45,9 | 39,0 | 6,15 | 45,2 | | | | | | | | | |
| 102 | 5 | 32,3 | 6,31 | 38,6 | 31,0 | 7,15 | 38,1 | 29,5 | 8,17 | 37,7 | 27,8 | 9,38 | 37,2 | 26,0 | 10,8 | 36,7 |
| | 7 | 34,7 | 6,32 | 41,0 | 33,2 | 7,19 | 40,4 | 31,6 | 8,23 | 39,9 | 29,9 | 9,42 | 39,3 | 27,9 | 10,8 | 38,7 |
| | 10 | 38,2 | 6,38 | 44,6 | 36,6 | 7,27 | 43,9 | 34,9 | 8,31 | 43,2 | 32,9 | 9,49 | 42,4 | 30,9 | 10,8 | 41,7 |
| | 12 | 40,6 | 6,44 | 47,0 | 38,9 | 7,33 | 46,2 | 37,1 | 8,36 | 45,4 | 35,0 | 9,54 | 44,6 | 32,8 | 10,9 | 43,7 |
| | 15 | 44,1 | 6,56 | 50,6 | 42,4 | 7,42 | 49,8 | 40,4 | 8,44 | 48,8 | 38,1 | 9,63 | 47,8 | 35,6 | 11,0 | 46,6 |
| | 18 | 47,5 | 6,73 | 54,2 | 45,9 | 7,52 | 53,4 | | | | | | | | | |
| 122 | 5 | 39,6 | 7,55 | 47,2 | 38,0 | 8,51 | 46,5 | 36,2 | 9,67 | 45,8 | 34,1 | 11,0 | 45,1 | 31,9 | 12,6 | 44,4 |
| | 7 | 42,3 | 7,63 | 49,9 | 40,6 | 8,59 | 49,1 | 38,6 | 9,74 | 48,4 | 36,5 | 11,1 | 47,5 | 34,1 | 12,6 | 46,7 |
| | 10 | 46,3 | 7,76 | 54,1 | 44,5 | 8,71 | 53,2 | 42,5 | 9,86 | 52,3 | 40,1 | 11,2 | 51,3 | 37,5 | 12,7 | 50,2 |
| | 12 | 49,1 | 7,85 | 57,0 | 47,3 | 8,79 | 56,1 | 45,1 | 9,94 | 55,0 | 42,6 | 11,3 | 53,9 | 39,8 | 12,8 | 52,7 |
| | 15 | 53,5 | 7,99 | 61,5 | 51,5 | 8,93 | 60,4 | 49,2 | 10,1 | 59,2 | 46,5 | 11,4 | 57,9 | 43,5 | 13,0 | 56,4 |
| | 18 | 57,9 | 8,14 | 66,1 | 55,9 | 9,08 | 64,9 | 53,4 | 10,2 | 63,6 | 50,5 | 11,6 | 62,1 | 47,3 | 13,1 | 60,4 |
| 162 | 5 | 45,8 | 9,01 | 54,8 | 44,0 | 10,0 | 54,0 | 42,0 | 11,3 | 53,3 | 39,6 | 12,8 | 52,4 | 36,9 | 14,6 | 51,5 |
| | 7 | 48,9 | 9,08 | 58,0 | 47,0 | 10,1 | 57,1 | 44,8 | 11,4 | 56,2 | 42,3 | 12,9 | 55,2 | 39,6 | 14,6 | 54,2 |
| | 10 | 53,8 | 9,20 | 63,0 | 51,6 | 10,3 | 61,8 | 49,2 | 11,5 | 60,7 | 46,5 | 13,0 | 59,5 | 43,6 | 14,7 | 58,3 |
| | 12 | 57,0 | 9,28 | 66,3 | 54,6 | 10,4 | 65,0 | 52,1 | 11,6 | 63,7 | 49,3 | 13,1 | 62,4 | 46,3 | 14,8 | 61,2 |
| | 15 | 62,0 | 9,42 | 71,4 | 59,3 | 10,5 | 69,8 | 56,4 | 11,8 | 68,2 | 53,5 | 13,3 | 66,8 | 50,5 | 15,0 | 65,5 |
| | 18 | 67,0 | 9,57 | 76,5 | 63,9 | 10,6 | 74,6 | 60,9 | 11,9 | 72,8 | 57,8 | 13,5 | 71,3 | 54,8 | 15,2 | 70,0 |
| 182 | 5 | 54,3 | 10,5 | 64,8 | 52,2 | 11,6 | 63,9 | 49,7 | 13,1 | 62,9 | 46,9 | 14,9 | 61,8 | 43,6 | 17,1 | 60,7 |
| | 7 | 58,0 | 10,6 | 68,6 | 55,8 | 11,7 | 67,5 | 53,2 | 13,2 | 66,4 | 50,1 | 15,0 | 65,2 | 46,7 | 17,2 | 63,8 |
| | 10 | 63,7 | 10,7 | 74,4 | 61,2 | 11,9 | 73,1 | 58,4 | 13,4 | 71,7 | 55,1 | 15,2 | 70,2 | 51,3 | 17,3 | 68,6 |
| | 12 | 67,5 | 10,8 | 78,3 | 64,9 | 12,0 | 76,8 | 61,8 | 13,5 | 75,3 | 58,4 | 15,2 | 73,6 | 54,5 | 17,3 | 71,8 |
| | 15 | 73,3 | 11,0 | 84,3 | 70,4 | 12,1 | 82,5 | 67,1 | 13,6 | 80,7 | 63,4 | 15,4 | 78,8 | 59,3 | 17,5 | 76,8 |
| | 18 | 79,3 | 11,1 | 90,4 | 76,0 | 12,3 | 88,3 | 72,4 | 13,7 | 86,1 | 68,5 | 15,5 | 84,0 | 64,3 | 17,6 | 81,9 |
| 222 | 5 | 63,6 | 12,8 | 76,4 | 61,5 | 14,2 | 75,8 | 58,9 | 15,9 | 74,8 | 55,6 | 17,9 | 73,5 | 51,7 | 20,2 | 71,8 |
| | 7 | 68,2 | 12,8 | 81,0 | 65,8 | 14,3 | 80,1 | 62,8 | 16,0 | 78,9 | 59,3 | 18,0 | 77,4 | 55,3 | 20,3 | 75,6 |
| | 10 | 75,0 | 12,9 | 87,9 | 72,2 | 14,4 | 86,7 | 68,9 | 16,2 | 85,1 | 65,1 | 18,3 | 83,3 | 60,8 | 20,5 | 81,3 |
| | 12 | 79,6 | 12,9 | 92,5 | 76,6 | 14,5 | 91,1 | 73,0 | 16,4 | 89,4 | 69,0 | 18,4 | 87,4 | 64,5 | 20,7 | 85,2 |
| | 15 | 86,5 | 12,9 | 99,4 | 83,2 | 14,6 | 97,8 | 79,4 | 16,5 | 95,9 | 75,1 | 18,6 | 93,7 | 70,2 | 20,9 | 91,2 |
| | 18 | 93,4 | 12,9 | 106,3 | 89,9 | 14,7 | 104,7 | 85,9 | 16,7 | 102,6 | 81,3 | 18,9 | 100,1 | 76,1 | 21,2 | 97,3 |
| 262 | 5 | 70,0 | 14,8 | 84,8 | 68,0 | 16,6 | 84,6 | 65,1 | 18,6 | 83,7 | 61,2 | 21,1 | 82,2 | 56,2 | 23,9 | 80,1 |
| | 7 | 74,9 | 14,9 | 89,8 | 72,4 | 16,6 | 89,0 | 69,1 | 18,7 | 87,8 | 65,1 | 21,2 | 86,3 | 60,2 | 24,0 | 84,3 |
| | 10 | 82,2 | 15,0 | 97,2 | 79,2 | 16,8 | 95,9 | 75,5 | 18,9 | 94,4 | 71,2 | 21,4 | 92,6 | 66,3 | 24,3 | 90,5 |
| | 12 | 87,2 | 15,0 | 102 | 83,8 | 16,8 | 100,7 | 79,9 | 19,0 | 98,9 | 75,4 | 21,5 | 97,0 | 70,3 | 24,4 | 94,7 |
| | 15 | 94,5 | 15,1 | 110 | 91,1 | 17,0 | 108,1 | 87,0 | 19,2 | 106 | 82,1 | 21,8 | 104 | 76,4 | 24,7 | 101 |
| | 18 | 102 | 15,2 | 117 | 98,8 | 17,1 | 115,9 | 94,5 | 19,4 | 114 | 89,0 | 22,0 | 111 | 82,5 | 24,9 | 107 |

kWf = Cooling capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
kWt = Heating capacity to the exchanger - source side (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side

## GROUNDWATER APPLICATION

### COOLING PERFORMANCE

| SIZE | To (ºC) | EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | |
| | | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt |
| 302 | 5 | 89,0 | 16,9 | 106 | 85,7 | 18,9 | 105 | 81,3 | 21,1 | 102 | 75,8 | 23,5 | 99,3 | 69,2 | 26,1 | 95,3 |
| | 7 | 95,2 | 16,9 | 112 | 91,3 | 19,0 | 110 | 86,5 | 21,2 | 108 | 81,1 | 23,6 | 105 | 74,8 | 26,2 | 101 |
| | 10 | 105 | 16,8 | 122 | 100 | 19,1 | 119 | 95,0 | 21,5 | 116 | 89,3 | 23,9 | 113 | 83,1 | 26,4 | 110 |
| | 12 | 112 | 16,7 | 128 | 107 | 19,1 | 126 | 101 | 21,6 | 123 | 95,1 | 24,1 | 119 | 88,7 | 26,7 | 115 |
| | 15 | 122 | 16,5 | 139 | 117 | 19,2 | 136 | 111 | 21,8 | 132 | 104 | 24,4 | 129 | 97,2 | 27,0 | 124 |
| | 18 | 133 | 16,3 | 150 | 127 | 19,1 | 146 | 121 | 21,9 | 143 | 114 | 24,7 | 138 | 106 | 27,5 | 133 |
| 352 | 5 | 102 | 19,4 | 121 | 97,2 | 21,5 | 119 | 91,9 | 23,8 | 116 | 86,2 | 26,5 | 113 | 80,1 | 29,6 | 110 |
| | 7 | 109 | 19,5 | 129 | 104 | 21,6 | 125 | 98,2 | 24,0 | 122 | 92,2 | 26,7 | 119 | 85,9 | 29,7 | 116 |
| | 10 | 120 | 19,6 | 140 | 114 | 21,9 | 136 | 108 | 24,3 | 133 | 102 | 27,1 | 129 | 95,0 | 30,1 | 125 |
| | 12 | 128 | 19,7 | 148 | 122 | 22,0 | 144 | 115 | 24,5 | 140 | 109 | 27,3 | 136 | 101 | 30,3 | 132 |
| | 15 | 140 | 19,7 | 160 | 134 | 22,2 | 156 | 127 | 24,8 | 151 | 119 | 27,6 | 147 | 111 | 30,6 | 142 |
| | 18 | 153 | 19,8 | 173 | 146 | 22,3 | 169 | 139 | 25,1 | 164 | 130 | 27,9 | 158 | 122 | 31,0 | 153 |
| 402 | 5 | 116 | 22,5 | 138 | 111 | 24,8 | 136 | 105 | 27,6 | 133 | 98,8 | 30,7 | 129 | 91,4 | 34,2 | 126 |
| | 7 | 124 | 22,6 | 146 | 118 | 25,0 | 143 | 112 | 27,8 | 140 | 105 | 31,0 | 136 | 97,9 | 34,4 | 132 |
| | 10 | 137 | 22,7 | 160 | 130 | 25,3 | 156 | 123 | 28,1 | 151 | 116 | 31,3 | 147 | 108 | 34,8 | 143 |
| | 12 | 146 | 22,8 | 169 | 139 | 25,4 | 164 | 131 | 28,4 | 159 | 123 | 31,6 | 155 | 115 | 35,0 | 150 |
| | 15 | 160 | 22,9 | 183 | 152 | 25,7 | 178 | 144 | 28,7 | 172 | 135 | 31,9 | 167 | 126 | 35,4 | 162 |
| | 18 | 174 | 23,1 | 197 | 166 | 25,9 | 192 | 157 | 29,0 | 186 | 148 | 32,3 | 180 | 138 | 35,8 | 174 |
| 432 | 5 | 128 | 25,0 | 152 | 121 | 27,4 | 149 | 115 | 30,4 | 145 | 108 | 33,9 | 142 | 100 | 37,8 | 138 |
| | 7 | 137 | 25,2 | 162 | 130 | 27,7 | 158 | 123 | 30,6 | 154 | 116 | 34,1 | 150 | 108 | 38,0 | 146 |
| | 10 | 151 | 25,5 | 176 | 144 | 28,0 | 172 | 136 | 31,0 | 167 | 128 | 34,4 | 162 | 119 | 38,4 | 158 |
| | 12 | 161 | 25,7 | 187 | 153 | 28,3 | 181 | 145 | 31,2 | 176 | 136 | 34,7 | 171 | 127 | 38,6 | 166 |
| | 15 | 176 | 26,1 | 203 | 168 | 28,6 | 197 | 159 | 31,6 | 191 | 150 | 35,1 | 185 | 140 | 39,0 | 179 |
| | 18 | 193 | 26,5 | 219 | 184 | 29,1 | 213 | 174 | 32,1 | 206 | 163 | 35,5 | 199 | 153 | 39,4 | 192 |
| 452 | 5 | 135 | 26,2 | 161 | 128 | 29,0 | 157 | 122 | 32,3 | 154 | 114 | 35,9 | 150 | 106 | 39,9 | 146 |
| | 7 | 144 | 26,4 | 171 | 138 | 29,2 | 167 | 130 | 32,5 | 163 | 123 | 36,1 | 159 | 114 | 40,2 | 154 |
| | 10 | 159 | 26,6 | 186 | 152 | 29,5 | 181 | 144 | 32,9 | 177 | 135 | 36,5 | 172 | 126 | 40,6 | 167 |
| | 12 | 169 | 26,8 | 196 | 162 | 29,8 | 192 | 153 | 33,1 | 187 | 144 | 36,8 | 181 | 134 | 40,9 | 175 |
| | 15 | 186 | 27,0 | 213 | 177 | 30,1 | 207 | 168 | 33,5 | 202 | 158 | 37,3 | 196 | 147 | 41,4 | 189 |
| | 18 | 203 | 27,2 | 230 | 194 | 30,4 | 224 | 184 | 34,0 | 218 | 173 | 37,8 | 211 | 161 | 42,0 | 203 |
| 502 | 5 | 152 | 28,8 | 180 | 143 | 31,8 | 175 | 135 | 35,2 | 170 | 126 | 39,2 | 166 | 118 | 43,8 | 162 |
| | 7 | 161 | 29,1 | 190 | 153 | 32,0 | 185 | 145 | 35,5 | 180 | 136 | 39,5 | 175 | 126 | 44,0 | 171 |
| | 10 | 177 | 29,5 | 206 | 169 | 32,5 | 201 | 160 | 36,0 | 196 | 151 | 40,0 | 190 | 140 | 44,5 | 184 |
| | 12 | 188 | 29,8 | 218 | 180 | 32,8 | 213 | 171 | 36,3 | 207 | 161 | 40,3 | 201 | 149 | 44,8 | 194 |
| | 15 | 207 | 30,2 | 237 | 198 | 33,3 | 231 | 187 | 36,8 | 224 | 176 | 40,8 | 217 | 164 | 45,4 | 209 |
| | 18 | 228 | 30,7 | 258 | 217 | 33,8 | 250 | 205 | 37,4 | 242 | 192 | 41,5 | 234 | 179 | 46,0 | 225 |
| 552 | 5 | 163 | 31,9 | 195 | 156 | 35,1 | 191 | 147 | 38,9 | 186 | 138 | 43,4 | 182 | 129 | 48,4 | 177 |
| | 7 | 175 | 32,2 | 207 | 167 | 35,4 | 202 | 158 | 39,2 | 197 | 148 | 43,7 | 192 | 138 | 48,7 | 187 |
| | 10 | 193 | 32,6 | 226 | 184 | 35,9 | 220 | 174 | 39,7 | 214 | 164 | 44,2 | 208 | 152 | 49,2 | 201 |
| | 12 | 206 | 32,9 | 239 | 196 | 36,2 | 232 | 186 | 40,1 | 226 | 174 | 44,6 | 219 | 162 | 49,6 | 212 |
| | 15 | 226 | 33,4 | 259 | 215 | 36,8 | 252 | 204 | 40,7 | 244 | 191 | 45,1 | 236 | 178 | 50,2 | 228 |
| | 18 | 247 | 34,0 | 281 | 235 | 37,3 | 273 | 223 | 41,2 | 264 | 209 | 45,7 | 255 | 194 | 50,9 | 245 |

kWf = Cooling capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
kWt = Heating capacity to the exchanger - source side (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side

## GROUNDWATER APPLICATION

### COOLING PERFORMANCE

| SIZE | To (°C) | EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | |
| | | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt |
| 602 | 5 | 184 | 35,7 | 220 | 175 | 39,3 | 214 | 166 | 43,6 | 209 | 156 | 48,6 | 204 | 146 | 54,3 | 200 |
| | 7 | 197 | 36,0 | 233 | 188 | 39,6 | 228 | 178 | 43,9 | 222 | 167 | 48,9 | 216 | 156 | 54,6 | 210 |
| | 10 | 218 | 36,5 | 255 | 208 | 40,1 | 248 | 197 | 44,4 | 241 | 185 | 49,5 | 234 | 171 | 55,3 | 227 |
| | 12 | 233 | 36,9 | 269 | 222 | 40,5 | 262 | 210 | 44,8 | 255 | 197 | 49,9 | 247 | 183 | 55,7 | 238 |
| | 15 | 255 | 37,5 | 293 | 244 | 41,1 | 285 | 231 | 45,5 | 276 | 216 | 50,6 | 267 | 200 | 56,4 | 257 |
| | 18 | 279 | 38,1 | 317 | 266 | 41,8 | 308 | 252 | 46,2 | 298 | 236 | 51,3 | 288 | 219 | 57,3 | 276 |
| 702 | 5 | 210 | 41,4 | 251 | 198 | 45,3 | 243 | 186 | 49,8 | 236 | 176 | 55,0 | 231 | 167 | 60,9 | 228 |
| | 7 | 223 | 41,9 | 265 | 211 | 45,6 | 257 | 200 | 50,1 | 250 | 188 | 55,4 | 243 | 176 | 61,6 | 238 |
| | 10 | 244 | 42,6 | 287 | 233 | 46,0 | 279 | 220 | 50,5 | 271 | 207 | 56,0 | 263 | 192 | 62,6 | 255 |
| | 12 | 259 | 43,0 | 302 | 248 | 46,4 | 294 | 235 | 50,8 | 286 | 220 | 56,4 | 277 | 204 | 63,1 | 267 |
| | 15 | 284 | 43,5 | 327 | 271 | 46,9 | 318 | 257 | 51,4 | 309 | 241 | 57,0 | 298 | 224 | 63,7 | 288 |
| | 18 | 310 | 43,9 | 354 | 296 | 47,5 | 344 | 281 | 52,1 | 333 | 264 | 57,6 | 322 | 246 | 64,0 | 310 |
| 802 | 5 | 233 | 48,0 | 281 | 222 | 51,5 | 274 | 210 | 56,2 | 266 | 197 | 62,1 | 259 | 183 | 69,2 | 252 |
| | 7 | 250 | 48,2 | 298 | 237 | 51,8 | 289 | 224 | 56,5 | 281 | 211 | 62,5 | 273 | 197 | 69,7 | 267 |
| | 10 | 275 | 48,6 | 324 | 261 | 52,2 | 313 | 246 | 57,0 | 303 | 232 | 63,1 | 295 | 218 | 70,3 | 288 |
| | 12 | 293 | 48,9 | 341 | 277 | 52,5 | 329 | 262 | 57,3 | 319 | 247 | 63,4 | 310 | 232 | 70,7 | 302 |
| | 15 | 319 | 49,3 | 368 | 303 | 53,0 | 356 | 286 | 57,8 | 344 | 270 | 63,9 | 334 | 253 | 71,2 | 324 |
| | 18 | 346 | 49,9 | 396 | 330 | 53,5 | 383 | 312 | 58,4 | 371 | 294 | 64,4 | 358 | 274 | 71,5 | 346 |

kWf = Cooling capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
kWt = Heating capacity to the exchanger - source side (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side

## GROUNDWATER APPLICATION

### HEATING PERFORMANCE

| SIZE | To (°C) | INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | | 55 | | 60 | |
| | | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe |
| 82 | 5 | 33,4 | 5,42 | 32,7 | 6,24 | 31,9 | 8,15 | 31,8 | 10,4 | 32,1 | 11,7 |
| | 7 | 34,6 | 5,40 | 34,7 | 6,23 | 34,4 | 8,14 | 33,6 | 10,4 | 33,1 | 11,6 |
| | 10 | 37,2 | 5,38 | 37,5 | 6,22 | 37,4 | 8,14 | 36,4 | 10,3 | 35,6 | 11,6 |
| | 12 | 39,5 | 5,39 | 39,4 | 6,22 | 38,9 | 8,13 | 38,3 | 10,3 | 38,0 | 11,5 |
| | 15 | 43,8 | 5,42 | 42,1 | 6,23 | 40,4 | 8,10 | 41,3 | 10,3 | 42,7 | 11,5 |
| | 17 | 47,2 | 5,46 | 43,8 | 6,24 | 41,0 | 8,08 | | | | |
| 102 | 5 | 39,0 | 6,24 | 38,4 | 7,22 | 37,4 | 9,47 | 36,8 | 12,1 | 36,7 | 13,6 |
| | 7 | 41,3 | 6,29 | 40,6 | 7,26 | 39,4 | 9,51 | 38,6 | 12,1 | 38,3 | 13,6 |
| | 10 | 44,8 | 6,36 | 44,0 | 7,34 | 42,5 | 9,57 | 41,3 | 12,1 | 40,9 | 13,6 |
| | 12 | 47,2 | 6,41 | 46,4 | 7,40 | 44,7 | 9,63 | 43,2 | 12,2 | 42,6 | 13,6 |
| | 15 | 50,9 | 6,50 | 50,0 | 7,50 | 48,1 | 9,72 | 46,2 | 12,2 | | |
| | 17 | 53,4 | 6,56 | 52,4 | 7,57 | 50,4 | 9,79 | | | | |
| 122 | 5 | 47,6 | 7,6 | 46,6 | 8,6 | 45,2 | 11,1 | 44,5 | 14,3 | 44,5 | 16,2 |
| | 7 | 50,2 | 7,6 | 49,2 | 8,7 | 47,7 | 11,2 | 46,7 | 14,4 | 46,5 | 16,2 |
| | 10 | 54,3 | 7,8 | 53,3 | 8,8 | 51,5 | 11,3 | 50,1 | 14,5 | 49,6 | 16,3 |
| | 12 | 57,1 | 7,9 | 56,0 | 8,9 | 54,1 | 11,4 | 52,4 | 14,6 | 51,7 | 16,4 |
| | 15 | 61,4 | 8,0 | 60,2 | 9,0 | 58,1 | 11,5 | 56,0 | 14,7 | 55,0 | 16,6 |
| | 17 | 64,3 | 8,1 | 63,1 | 9,1 | 60,8 | 11,6 | 58,5 | 14,8 | 57,3 | 16,7 |
| 162 | 5 | 55,0 | 9,00 | 53,9 | 10,1 | 52,4 | 13,0 | 51,6 | 16,5 | 51,4 | 18,5 |
| | 7 | 58,6 | 9,08 | 57,3 | 10,2 | 55,3 | 13,0 | 54,2 | 16,5 | 54,0 | 18,5 |
| | 10 | 63,8 | 9,21 | 62,2 | 10,4 | 59,8 | 13,2 | 58,3 | 16,6 | 57,9 | 18,6 |
| | 12 | 67,1 | 9,30 | 65,4 | 10,5 | 62,8 | 13,3 | 61,1 | 16,7 | 60,7 | 18,7 |
| | 15 | 72,0 | 9,44 | 70,2 | 10,6 | 67,3 | 13,4 | 65,5 | 16,9 | 65,0 | 18,9 |
| | 17 | 75,1 | 9,55 | 73,2 | 10,7 | 70,3 | 13,6 | 68,5 | 17,1 | 68,0 | 19,2 |
| 182 | 5 | 65,0 | 10,5 | 63,8 | 11,8 | 61,8 | 15,1 | 60,6 | 19,5 | 60,3 | 22,1 |
| | 7 | 69,2 | 10,6 | 67,7 | 11,9 | 65,3 | 15,2 | 63,9 | 19,6 | 63,5 | 22,2 |
| | 10 | 75,1 | 10,7 | 73,4 | 12,0 | 70,6 | 15,3 | 68,7 | 19,7 | 68,2 | 22,2 |
| | 12 | 79,0 | 10,8 | 77,2 | 12,1 | 74,1 | 15,4 | 71,9 | 19,7 | 71,1 | 22,3 |
| | 15 | 84,7 | 11,0 | 82,7 | 12,3 | 79,3 | 15,6 | 76,5 | 19,8 | 75,3 | 22,3 |
| | 17 | 88,3 | 11,1 | 86,4 | 12,4 | 82,8 | 15,6 | 79,5 | 19,9 | 78,0 | 22,4 |
| 222 | 5 | 77,3 | 12,7 | 76,7 | 14,3 | 74,9 | 18,1 | 72,2 | 22,6 | 70,5 | 25,1 |
| | 7 | 82,6 | 12,8 | 81,4 | 14,4 | 79,1 | 18,3 | 76,9 | 22,7 | 75,7 | 25,2 |
| | 10 | 90,0 | 12,8 | 88,4 | 14,6 | 85,5 | 18,5 | 83,4 | 22,9 | 82,5 | 25,3 |
| | 12 | 94,8 | 12,8 | 92,9 | 14,7 | 89,8 | 18,7 | 87,4 | 23,1 | 86,4 | 25,4 |
| | 15 | 101,5 | 12,8 | 99,7 | 14,8 | 96,3 | 18,9 | 92,9 | 23,3 | 91,1 | 25,5 |
| | 17 | 105,7 | 12,8 | 104,2 | 14,9 | 100,6 | 19,1 | 96,2 | 23,4 | 93,6 | 25,6 |
| 262 | 5 | 87,1 | 14,4 | 87,5 | 16,3 | 86,3 | 20,9 | 82,5 | 26,4 | 79,6 | 29,6 |
| | 7 | 92,9 | 14,5 | 93,0 | 16,5 | 91,1 | 21,1 | 86,7 | 26,6 | 83,6 | 29,7 |
| | 10 | 101 | 14,6 | 101 | 16,6 | 98,0 | 21,3 | 93,0 | 26,8 | 89,7 | 29,9 |
| | 12 | 107 | 14,7 | 106 | 16,7 | 102 | 21,4 | 97,2 | 27,0 | 94,0 | 30,0 |
| | 15 | 115 | 14,7 | 113 | 16,9 | 108 | 21,7 | 103 | 27,2 | | |
| | 17 | 120 | 14,8 | 117 | 16,9 | 112 | 21,8 | 107 | 27,4 | | |

kWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side

## GROUNDWATER APPLICATION

### HEATING PERFORMANCE

| SIZE | To (°C) | INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | | 55 | | 60 | |
| | | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe |
| 302 | 5 | 107 | 17,0 | 105 | 19,1 | 100 | 23,7 | 93,8 | 28,8 | 90,1 | 31,5 |
| | 7 | 114 | 17,0 | 111 | 19,2 | 106 | 23,9 | 98,8 | 29,0 | 94,7 | 31,6 |
| | 10 | 123 | 16,9 | 121 | 19,3 | 115 | 24,2 | 107 | 29,2 | 102 | 31,8 |
| | 12 | 129 | 16,8 | 127 | 19,3 | 121 | 24,4 | 112 | 29,4 | 106 | 32,0 |
| | 15 | 137 | 16,6 | 136 | 19,3 | 130 | 24,7 | 120 | 29,8 | 114 | 32,3 |
| | 17 | 142 | 16,4 | 142 | 19,3 | 136 | 24,9 | 126 | 30,0 | 119 | 32,5 |
| 352 | 5 | 120 | 19,5 | 119 | 21,7 | 114 | 26,9 | 107 | 33,1 | 104 | 36,6 |
| | 7 | 128 | 19,6 | 126 | 21,9 | 120 | 27,1 | 113 | 33,3 | 109 | 36,7 |
| | 10 | 140 | 19,7 | 137 | 22,1 | 130 | 27,4 | 122 | 33,5 | 118 | 36,9 |
| | 12 | 149 | 19,8 | 145 | 22,2 | 137 | 27,6 | 128 | 33,7 | 124 | 37,1 |
| | 15 | 162 | 19,8 | 157 | 22,4 | 146 | 27,9 | 138 | 34,0 | 134 | 37,3 |
| | 17 | 172 | 19,9 | 165 | 22,5 | 153 | 28,1 | 145 | 34,2 | 142 | 37,5 |
| 402 | 5 | 136 | 22,3 | 134 | 24,8 | 129 | 30,7 | 122 | 37,8 | 117 | 41,9 |
| | 7 | 146 | 22,4 | 143 | 25,0 | 136 | 30,9 | 128 | 38,1 | 124 | 42,0 |
| | 10 | 159 | 22,6 | 155 | 25,2 | 147 | 31,3 | 138 | 38,4 | 133 | 42,3 |
| | 12 | 168 | 22,7 | 164 | 25,4 | 155 | 31,5 | 145 | 38,6 | 139 | 42,6 |
| | 15 | 180 | 22,8 | 177 | 25,6 | 167 | 31,9 | 156 | 39,0 | 149 | 42,9 |
| | 17 | 188 | 22,8 | 185 | 25,8 | 176 | 32,2 | 163 | 39,3 | 155 | 43,1 |
| 432 | 5 | 149 | 25,1 | 148 | 27,7 | 143 | 34,2 | 136 | 42,5 | 132 | 47,4 |
| | 7 | 155 | 25,3 | 155 | 27,9 | 152 | 34,5 | 144 | 42,8 | 138 | 47,6 |
| | 10 | 169 | 25,6 | 169 | 28,3 | 164 | 34,8 | 155 | 43,1 | 148 | 47,9 |
| | 12 | 181 | 25,9 | 179 | 28,5 | 172 | 35,1 | 163 | 43,3 | 157 | 48,1 |
| | 15 | 203 | 26,3 | 197 | 28,9 | 185 | 35,5 | 175 | 43,7 | 170 | 48,4 |
| | 17 | 221 | 26,6 | 210 | 29,2 | 193 | 35,7 | 183 | 43,9 | 180 | 48,6 |
| 452 | 5 | 161 | 26,4 | 157 | 29,3 | 150 | 36,3 | 144 | 44,7 | 141 | 49,4 |
| | 7 | 170 | 26,5 | 167 | 29,5 | 161 | 36,5 | 151 | 44,9 | 146 | 49,6 |
| | 10 | 184 | 26,8 | 182 | 29,9 | 175 | 37,0 | 163 | 45,3 | 155 | 50,0 |
| | 12 | 194 | 26,9 | 192 | 30,1 | 184 | 37,3 | 171 | 45,7 | 163 | 50,3 |
| | 15 | 211 | 27,1 | 207 | 30,4 | 196 | 37,7 | 184 | 46,2 | 177 | 50,9 |
| | 17 | 224 | 27,3 | 216 | 30,6 | 203 | 38,0 | 193 | 46,6 | 189 | 51,4 |
| 502 | 5 | 178 | 29,0 | 175 | 32,1 | 167 | 39,6 | 159 | 49,2 | 155 | 54,7 |
| | 7 | 189 | 29,3 | 186 | 32,4 | 177 | 39,9 | 168 | 49,5 | 163 | 55,0 |
| | 10 | 207 | 29,7 | 202 | 32,8 | 192 | 40,4 | 181 | 49,9 | 174 | 55,4 |
| | 12 | 219 | 30,0 | 214 | 33,1 | 203 | 40,7 | 190 | 50,2 | 182 | 55,7 |
| | 15 | 237 | 30,4 | 232 | 33,6 | 219 | 41,3 | 204 | 50,8 | 195 | 56,2 |
| | 17 | 250 | 30,7 | 244 | 33,9 | 230 | 41,7 | 213 | 51,1 | 203 | 56,5 |
| 552 | 5 | 194 | 32,0 | 191 | 35,5 | 183 | 43,9 | 174 | 54,5 | 169 | 60,5 |
| | 7 | 205 | 32,3 | 202 | 35,7 | 194 | 44,2 | 184 | 54,8 | 177 | 60,8 |
| | 10 | 223 | 32,8 | 219 | 36,2 | 210 | 44,7 | 198 | 55,3 | 190 | 61,4 |
| | 12 | 236 | 33,1 | 232 | 36,6 | 221 | 45,1 | 207 | 55,7 | 199 | 61,7 |
| | 15 | 258 | 33,6 | 252 | 37,1 | 238 | 45,6 | 222 | 56,3 | 213 | 62,4 |
| | 17 | 275 | 34,0 | 266 | 37,5 | 249 | 46,0 | 231 | 56,7 | 222 | 62,8 |

kWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side

## GROUNDWATER APPLICATION

### HEATING PERFORMANCE

| SIZE | To (ºC) | INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | | 55 | | 60 | |
| | | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe |
| 602 | 5 | 222 | 35,7 | 218 | 39,6 | 210 | 49,1 | 200 | 60,8 | 195 | 67,4 |
| | 7 | 233 | 36,0 | 231 | 39,9 | 223 | 49,4 | 211 | 61,1 | 204 | 67,7 |
| | 10 | 253 | 36,5 | 251 | 40,5 | 242 | 50,0 | 227 | 61,6 | 218 | 68,3 |
| | 12 | 269 | 36,9 | 266 | 40,9 | 255 | 50,4 | 238 | 62,1 | 228 | 68,7 |
| | 15 | 295 | 37,5 | 290 | 41,5 | 274 | 51,1 | 255 | 62,9 | 243 | 69,6 |
| | 17 | 315 | 38,0 | 307 | 41,9 | 288 | 51,6 | 266 | 63,5 | 254 | 70,2 |
| 702 | 5 | 254 | 41,7 | 247 | 45,2 | 235 | 55,1 | 227 | 68,6 | 224 | 76,8 |
| | 7 | 270 | 42,0 | 262 | 45,5 | 248 | 55,4 | 238 | 69,0 | 234 | 77,2 |
| | 10 | 294 | 42,5 | 284 | 46,0 | 268 | 56,0 | 256 | 69,6 | 251 | 77,8 |
| | 12 | 311 | 42,8 | 300 | 46,4 | 282 | 56,3 | 269 | 70,0 | 263 | 78,2 |
| | 15 | 337 | 43,3 | 325 | 46,9 | 304 | 56,9 | 288 | 70,7 | 282 | 78,9 |
| | 17 | 356 | 43,6 | 342 | 47,3 | 318 | 57,3 | 301 | 71,1 | 295 | 79,4 |
| 802 | 5 | 283 | 48,0 | 278 | 51,5 | 267 | 62,1 | 255 | 77,7 | 248 | 87,4 |
| | 7 | 311 | 48,3 | 300 | 51,8 | 282 | 62,5 | 267 | 78,2 | 262 | 87,9 |
| | 10 | 345 | 48,8 | 328 | 52,3 | 303 | 63,0 | 287 | 78,9 | 283 | 88,7 |
| | 12 | 363 | 49,1 | 344 | 52,6 | 316 | 63,4 | 301 | 79,3 | 298 | 89,2 |
| | 15 | 383 | 49,5 | 363 | 53,0 | 335 | 63,8 | 321 | 79,8 | 320 | 89,7 |
| | 17 | 392 | 49,8 | 373 | 53,3 | 347 | 64,1 | 335 | 80,1 | 335 | 90,0 |

kWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side

## GEOTHERMAL APPLICATION

### COOLING PERFORMANCE

| SIZE | To (ºC) | EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | |
| | | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt |
| 82 | 5 | 28,3 | 5,50 | 33,8 | 27,1 | 6,22 | 33,4 | 25,8 | 7,09 | 32,9 | 24,4 | 8,10 | 32,5 | 22,7 | 9,26 | 32,0 |
| | 7 | 30,3 | 5,49 | 35,8 | 29,0 | 6,22 | 35,3 | 27,7 | 7,08 | 34,8 | 26,2 | 8,09 | 34,3 | 24,6 | 9,24 | 33,8 |
| | 10 | 33,3 | 5,48 | 38,8 | 31,9 | 6,21 | 38,1 | 30,5 | 7,08 | 37,6 | 29,0 | 8,08 | 37,1 | 27,5 | 9,22 | 36,7 |
| | 12 | 35,3 | 5,48 | 40,8 | 33,9 | 6,21 | 40,1 | 32,5 | 7,08 | 39,6 | 31,0 | 8,08 | 39,1 | 29,6 | 9,22 | 38,8 |
| | 15 | 38,5 | 5,48 | 44,0 | 36,9 | 6,22 | 43,2 | 35,5 | 7,09 | 42,6 | 34,1 | 8,09 | 42,2 | 32,8 | 9,22 | 42,0 |
| | 18 | 41,6 | 5,47 | 47,1 | 39,9 | 6,24 | 46,2 | 38,4 | 7,10 | 45,5 | 37,2 | 8,10 | 45,3 | 36,0 | 9,21 | 45,3 |
| 102 | 5 | 34,0 | 6,45 | 40,4 | 32,5 | 7,32 | 39,8 | 30,9 | 8,36 | 39,2 | 29,1 | 9,59 | 38,6 | 27,1 | 11,0 | 38,1 |
| | 7 | 36,3 | 6,50 | 42,8 | 34,8 | 7,38 | 42,1 | 33,0 | 8,42 | 41,4 | 31,1 | 9,64 | 40,7 | 29,0 | 11,0 | 40,0 |
| | 10 | 39,8 | 6,59 | 46,4 | 38,2 | 7,47 | 45,6 | 36,3 | 8,51 | 44,8 | 34,1 | 9,72 | 43,9 | 31,8 | 11,1 | 42,9 |
| | 12 | 42,2 | 6,65 | 48,8 | 40,4 | 7,54 | 47,9 | 38,4 | 8,58 | 47,0 | 36,2 | 9,78 | 45,9 | 33,7 | 11,1 | 44,8 |
| | 15 | 45,6 | 6,75 | 52,4 | 43,7 | 7,64 | 51,4 | 41,6 | 8,69 | 50,3 | 39,2 | 9,88 | 49,0 | 36,6 | 11,2 | 47,8 |
| | 18 | 59,6 | 6,87 | 56,5 | 47,6 | 7,77 | 55,3 | 45,1 | 8,82 | 53,9 | 42,8 | 10,0 | 52,8 | 39,7 | 11,3 | 51,1 |
| 122 | 5 | 40,2 | 7,68 | 47,9 | 38,4 | 8,65 | 47,1 | 36,5 | 9,84 | 46,3 | 34,3 | 11,3 | 45,5 | 31,9 | 12,9 | 44,8 |
| | 7 | 42,8 | 7,78 | 50,6 | 41,1 | 8,74 | 49,8 | 39,0 | 9,93 | 49,0 | 36,7 | 11,3 | 48,0 | 34,1 | 13,0 | 47,1 |
| | 10 | 46,9 | 7,92 | 54,8 | 45,1 | 8,88 | 54,0 | 43,0 | 10,1 | 53,0 | 40,4 | 11,5 | 51,9 | 37,5 | 13,1 | 50,6 |
| | 12 | 49,7 | 8,02 | 57,7 | 47,9 | 8,98 | 56,9 | 45,6 | 10,2 | 55,8 | 43,0 | 11,6 | 54,5 | 39,9 | 13,2 | 53,1 |
| | 15 | 54,1 | 8,17 | 62,3 | 52,1 | 9,13 | 61,2 | 49,7 | 10,3 | 60,0 | 46,8 | 11,7 | 58,5 | 43,6 | 13,3 | 56,9 |
| | 18 | 58,7 | 8,33 | 67,1 | 56,5 | 9,29 | 65,8 | 53,8 | 10,5 | 64,3 | 50,8 | 11,9 | 62,6 | 47,4 | 13,5 | 60,8 |
| 162 | 5 | 47,3 | 9,18 | 56,4 | 45,3 | 10,3 | 55,6 | 43,1 | 11,6 | 54,6 | 40,6 | 13,1 | 53,7 | 37,9 | 14,8 | 52,7 |
| | 7 | 50,5 | 9,27 | 59,7 | 48,4 | 10,4 | 58,7 | 46,0 | 11,7 | 57,7 | 43,4 | 13,2 | 56,6 | 40,6 | 14,9 | 55,5 |
| | 10 | 55,4 | 9,41 | 64,8 | 53,0 | 10,5 | 63,5 | 50,4 | 11,8 | 62,3 | 47,7 | 13,3 | 61,0 | 44,6 | 15,0 | 59,7 |
| | 12 | 58,7 | 9,50 | 68,2 | 56,2 | 10,6 | 66,8 | 53,5 | 11,9 | 65,4 | 50,5 | 13,4 | 64,0 | 47,4 | 15,2 | 62,6 |
| | 15 | 63,8 | 9,66 | 73,5 | 61,0 | 10,8 | 71,8 | 58,0 | 12,1 | 70,1 | 54,9 | 13,6 | 68,6 | 51,7 | 15,4 | 67,1 |
| | 18 | 69,0 | 9,83 | 78,9 | 65,9 | 11,0 | 76,9 | 62,7 | 12,3 | 75,0 | 59,4 | 13,9 | 73,3 | 56,1 | 15,7 | 71,7 |
| 182 | 5 | 55,7 | 10,7 | 66,4 | 53,5 | 11,9 | 65,4 | 50,8 | 13,4 | 64,3 | 47,8 | 15,3 | 63,1 | 44,3 | 17,5 | 61,8 |
| | 7 | 59,5 | 10,8 | 70,2 | 57,1 | 12,0 | 69,1 | 54,3 | 13,5 | 67,8 | 51,0 | 15,4 | 66,4 | 47,4 | 17,6 | 65,0 |
| | 10 | 65,2 | 10,9 | 76,2 | 62,6 | 12,1 | 74,7 | 59,5 | 13,7 | 73,2 | 56,0 | 15,5 | 71,6 | 52,1 | 17,7 | 69,8 |
| | 12 | 69,2 | 11,0 | 80,2 | 66,3 | 12,3 | 78,6 | 63,1 | 13,8 | 76,9 | 59,4 | 15,6 | 75,1 | 55,3 | 17,8 | 73,1 |
| | 15 | 75,2 | 11,2 | 86,4 | 72,1 | 12,4 | 84,5 | 68,6 | 14,0 | 82,5 | 64,6 | 15,8 | 80,4 | 60,2 | 17,9 | 78,1 |
| | 18 | 81,4 | 11,4 | 92,7 | 78,0 | 12,6 | 90,6 | 74,2 | 14,1 | 88,3 | 69,9 | 15,9 | 85,9 | 65,1 | 18,1 | 83,2 |
| 222 | 5 | 63,4 | 13,0 | 76,4 | 60,8 | 14,4 | 75,2 | 57,8 | 16,2 | 74,0 | 54,5 | 18,2 | 72,7 | 50,9 | 20,5 | 71,3 |
| | 7 | 67,6 | 13,0 | 80,6 | 65,0 | 14,5 | 79,5 | 61,9 | 16,3 | 78,2 | 58,4 | 18,3 | 76,7 | 54,4 | 20,6 | 75,0 |
| | 10 | 74,0 | 13,1 | 87,1 | 71,4 | 14,7 | 86,1 | 68,1 | 16,5 | 84,7 | 64,3 | 18,6 | 82,9 | 59,8 | 20,9 | 80,6 |
| | 12 | 78,3 | 13,1 | 91,4 | 75,7 | 14,8 | 90,5 | 72,3 | 16,7 | 89,0 | 68,2 | 18,7 | 87,0 | 63,4 | 21,0 | 84,5 |
| | 15 | 85,0 | 13,2 | 98,2 | 82,2 | 14,9 | 97,1 | 78,6 | 16,9 | 95,4 | 74,2 | 19,0 | 93,2 | 69,0 | 21,3 | 90,3 |
| | 18 | 91,8 | 13,3 | 105 | 88,7 | 15,1 | 103 | 84,9 | 17,1 | 102 | 80,2 | 19,3 | 99,4 | 74,7 | 21,6 | 96,3 |
| 262 | 5 | 81,5 | 15,2 | 96,7 | 77,4 | 17,1 | 94 | 72,6 | 19,2 | 92 | 67,2 | 21,7 | 88,9 | 61,0 | 24,5 | 85,5 |
| | 7 | 86,9 | 15,3 | 102 | 82,6 | 17,2 | 100 | 77,5 | 19,4 | 97 | 71,7 | 21,9 | 93,6 | 65,2 | 24,7 | 89,9 |
| | 10 | 95,4 | 15,5 | 111 | 90,7 | 17,4 | 108 | 85,1 | 19,7 | 105 | 78,8 | 22,2 | 101 | 71,7 | 25,0 | 96,7 |
| | 12 | 101 | 15,6 | 117 | 96,3 | 17,6 | 114 | 90,4 | 19,8 | 110 | 83,7 | 22,4 | 106 | 76,3 | 25,2 | 101 |
| | 15 | 111 | 15,7 | 126 | 105 | 17,8 | 123 | 98,7 | 20,1 | 119 | 91,4 | 22,7 | 114 | 83,4 | 25,6 | 109 |
| | 18 | 120 | 15,8 | 136 | 114 | 18,0 | 132 | 107 | 20,4 | 128 | 99,5 | 23,0 | 123 | 90,8 | 25,9 | 117 |

kWf = Cooling capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
kWt = Heating capacity to the external exchanger (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side
Performance consider a solution with propylene glycol at 30% - source side

## GEOTHERMAL APPLICATION

### COOLING PERFORMANCE

| SIZE | To (ºC) | EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | |
| | | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt |
| 302 | 5 | 93,4 | 17,2 | 111 | 88,9 | 19,3 | 108 | 83,9 | 21,6 | 106 | 78,3 | 24,0 | 102 | 72,2 | 26,6 | 98,8 |
| | 7 | 99,6 | 17,2 | 117 | 94,8 | 19,4 | 114 | 89,5 | 21,8 | 111 | 83,6 | 24,2 | 108 | 77,1 | 26,8 | 104 |
| | 10 | 109 | 17,1 | 127 | 104 | 19,5 | 124 | 98,3 | 22,0 | 120 | 91,9 | 24,6 | 116 | 84,9 | 27,2 | 112 |
| | 12 | 116 | 17,0 | 133 | 111 | 19,6 | 130 | 105 | 22,2 | 127 | 97,7 | 24,8 | 123 | 90,3 | 27,4 | 118 |
| | 15 | 127 | 16,9 | 144 | 121 | 19,7 | 141 | 114 | 22,4 | 137 | 107 | 25,2 | 132 | 99,0 | 27,8 | 127 |
| | 18 | 139 | 16,7 | 156 | 132 | 19,8 | 152 | 125 | 22,7 | 147 | 117 | 25,6 | 142 | 108 | 28,3 | 136 |
| 352 | 5 | 106 | 19,7 | 126 | 101 | 21,9 | 123 | 95 | 24,4 | 119 | 88,8 | 27,2 | 116 | 82,2 | 30,2 | 112 |
| | 7 | 114 | 19,8 | 133 | 108 | 22,1 | 130 | 102 | 24,6 | 126 | 95,1 | 27,4 | 122 | 88,1 | 30,4 | 118 |
| | 10 | 125 | 20,0 | 145 | 119 | 22,3 | 141 | 112 | 24,9 | 137 | 105 | 27,7 | 133 | 97 | 30,8 | 128 |
| | 12 | 133 | 20,1 | 153 | 127 | 22,5 | 149 | 119 | 25,1 | 145 | 112 | 28,0 | 140 | 104 | 31,0 | 135 |
| | 15 | 146 | 20,2 | 166 | 139 | 22,7 | 161 | 131 | 25,5 | 156 | 123 | 28,3 | 151 | 114 | 31,4 | 145 |
| | 18 | 160 | 20,3 | 180 | 151 | 23,0 | 174 | 143 | 25,8 | 169 | 134 | 28,8 | 163 | 124 | 31,8 | 156 |
| 402 | 5 | 122 | 22,9 | 144 | 115 | 25,4 | 141 | 109 | 28,3 | 137 | 102 | 31,5 | 133 | 94,0 | 35,0 | 129 |
| | 7 | 130 | 23,0 | 153 | 123 | 25,6 | 149 | 116 | 28,5 | 145 | 109 | 31,7 | 140 | 101 | 35,3 | 136 |
| | 10 | 143 | 23,2 | 166 | 136 | 25,9 | 162 | 128 | 28,9 | 157 | 120 | 32,2 | 152 | 111 | 35,7 | 147 |
| | 12 | 152 | 23,3 | 176 | 145 | 26,1 | 171 | 136 | 29,1 | 165 | 127 | 32,4 | 160 | 118 | 36,0 | 154 |
| | 15 | 167 | 23,5 | 190 | 158 | 26,4 | 185 | 149 | 29,5 | 179 | 140 | 32,9 | 172 | 129 | 36,5 | 166 |
| | 18 | 182 | 23,7 | 206 | 173 | 26,7 | 199 | 163 | 29,9 | 193 | 152 | 33,4 | 186 | 141 | 37,0 | 178 |
| 432 | 5 | 136 | 25,5 | 161 | 129 | 28,1 | 157 | 121 | 31,1 | 152 | 113 | 34,7 | 148 | 105 | 38,7 | 144 |
| | 7 | 145 | 25,7 | 171 | 138 | 28,3 | 166 | 130 | 31,4 | 161 | 121 | 34,9 | 156 | 112 | 39,0 | 151 |
| | 10 | 160 | 26,1 | 186 | 152 | 28,7 | 181 | 143 | 31,8 | 175 | 134 | 35,4 | 169 | 124 | 39,4 | 163 |
| | 12 | 171 | 26,4 | 197 | 162 | 29,0 | 191 | 152 | 32,1 | 185 | 143 | 35,7 | 178 | 132 | 39,7 | 172 |
| | 15 | 187 | 26,8 | 214 | 177 | 29,5 | 207 | 167 | 32,6 | 200 | 156 | 36,1 | 193 | 145 | 40,1 | 185 |
| | 18 | 205 | 27,3 | 232 | 194 | 30,0 | 224 | 183 | 33,1 | 216 | 171 | 36,7 | 208 | 159 | 40,6 | 199 |
| 452 | 5 | 144 | 26,8 | 171 | 137 | 29,8 | 167 | 129 | 33,1 | 162 | 121 | 36,8 | 157 | 112 | 40,9 | 153 |
| | 7 | 154 | 27,0 | 181 | 147 | 30,0 | 177 | 138 | 33,4 | 171 | 129 | 37,1 | 166 | 119 | 41,2 | 161 |
| | 10 | 170 | 27,3 | 197 | 162 | 30,4 | 192 | 152 | 33,8 | 186 | 142 | 37,6 | 180 | 132 | 41,8 | 173 |
| | 12 | 181 | 27,4 | 208 | 172 | 30,6 | 203 | 162 | 34,2 | 196 | 152 | 38,0 | 190 | 140 | 42,2 | 182 |
| | 15 | 198 | 27,7 | 226 | 189 | 31,1 | 220 | 178 | 34,7 | 212 | 166 | 38,6 | 205 | 153 | 42,8 | 196 |
| | 18 | 217 | 28,0 | 245 | 206 | 31,5 | 237 | 194 | 35,3 | 229 | 181 | 39,3 | 221 | 167 | 43,6 | 211 |
| 502 | 5 | 158 | 29,4 | 188 | 150 | 32,5 | 182 | 141 | 36,1 | 177 | 131 | 40,2 | 172 | 122 | 44,8 | 167 |
| | 7 | 169 | 29,7 | 199 | 160 | 32,8 | 193 | 151 | 36,4 | 187 | 141 | 40,5 | 181 | 130 | 45,1 | 175 |
| | 10 | 187 | 30,2 | 217 | 177 | 33,3 | 210 | 166 | 36,9 | 203 | 155 | 41,0 | 196 | 144 | 45,7 | 190 |
| | 12 | 199 | 30,5 | 230 | 189 | 33,7 | 222 | 177 | 37,3 | 215 | 166 | 41,4 | 207 | 153 | 46,1 | 199 |
| | 15 | 218 | 31,0 | 249 | 207 | 34,3 | 241 | 195 | 37,9 | 233 | 182 | 42,1 | 224 | 168 | 46,7 | 215 |
| | 18 | 239 | 31,6 | 270 | 226 | 34,9 | 261 | 213 | 38,6 | 251 | 199 | 42,8 | 241 | 183 | 47,5 | 231 |
| 552 | 5 | 172 | 32,6 | 205 | 163 | 36,0 | 199 | 154 | 39,9 | 194 | 144 | 44,5 | 188 | 133 | 49,7 | 183 |
| | 7 | 184 | 32,9 | 217 | 175 | 36,3 | 211 | 165 | 40,3 | 205 | 154 | 44,9 | 199 | 142 | 50,1 | 192 |
| | 10 | 203 | 33,5 | 237 | 193 | 36,9 | 230 | 182 | 40,9 | 222 | 169 | 45,5 | 215 | 157 | 50,7 | 207 |
| | 12 | 216 | 33,9 | 250 | 205 | 37,3 | 243 | 193 | 41,3 | 235 | 180 | 45,9 | 226 | 167 | 51,1 | 218 |
| | 15 | 237 | 34,5 | 272 | 225 | 37,9 | 263 | 212 | 42,0 | 254 | 198 | 46,6 | 244 | 183 | 51,9 | 234 |
| | 18 | 259 | 35,1 | 294 | 246 | 38,6 | 284 | 231 | 42,7 | 274 | 216 | 47,4 | 263 | 199 | 52,7 | 252 |

kWf = Cooling capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
kWt = Heating capacity to the external exchanger (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side
Performance consider a solution with propylene glycol at 30% - source side

## GEOTHERMAL APPLICATION

### COOLING PERFORMANCE

| SIZE | To (ºC) | EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | | 35 | | | 40 | | | 45 | | | 50 | | |
| | | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt | kWf | kWe | kWt |
| 602 | 5 | 194 | 36,4 | 231 | 185 | 40,1 | 225 | 174 | 44,6 | 218 | 162 | 49,7 | 212 | 150 | 55,7 | 205 |
| | 7 | 208 | 36,8 | 245 | 198 | 40,5 | 238 | 186 | 44,9 | 231 | 174 | 50,1 | 224 | 160 | 56,0 | 216 |
| | 10 | 230 | 37,4 | 267 | 218 | 41,1 | 259 | 205 | 45,6 | 251 | 192 | 50,8 | 242 | 176 | 56,8 | 233 |
| | 12 | 245 | 37,8 | 282 | 232 | 41,6 | 274 | 219 | 46,1 | 265 | 204 | 51,3 | 255 | 188 | 57,3 | 245 |
| | 15 | 268 | 38,5 | 307 | 255 | 42,3 | 297 | 240 | 46,9 | 287 | 224 | 52,2 | 276 | 206 | 58,2 | 264 |
| | 18 | 293 | 39,2 | 332 | 279 | 43,1 | 322 | 263 | 47,7 | 310 | 244 | 53,1 | 298 | 224 | 59,3 | 284 |
| 702 | 5 | 220 | 42,5 | 262 | 208 | 46,2 | 255 | 196 | 50,9 | 247 | 183 | 56,5 | 240 | 170 | 63,1 | 233 |
| | 7 | 234 | 42,8 | 277 | 222 | 46,5 | 269 | 209 | 51,2 | 261 | 196 | 56,9 | 253 | 181 | 63,5 | 245 |
| | 10 | 258 | 43,4 | 301 | 245 | 47,1 | 292 | 230 | 51,8 | 282 | 215 | 57,5 | 273 | 199 | 64,2 | 264 |
| | 12 | 274 | 43,7 | 318 | 260 | 47,5 | 308 | 245 | 52,3 | 297 | 229 | 58,0 | 287 | 212 | 64,7 | 277 |
| | 15 | 300 | 44,3 | 344 | 285 | 48,2 | 333 | 268 | 53,0 | 321 | 251 | 58,8 | 310 | 232 | 65,5 | 297 |
| | 18 | 328 | 45,0 | 373 | 311 | 48,9 | 360 | 293 | 53,7 | 347 | 274 | 59,6 | 333 | 253 | 66,4 | 319 |
| 802 | 5 | 243 | 49,0 | 292 | 230 | 52,7 | 283 | 217 | 57,7 | 275 | 203 | 64,0 | 267 | 188 | 71,7 | 259 |
| | 7 | 259 | 49,3 | 308 | 245 | 53,0 | 298 | 231 | 58,1 | 289 | 216 | 64,5 | 281 | 200 | 72,2 | 272 |
| | 10 | 284 | 49,8 | 334 | 269 | 53,5 | 323 | 254 | 58,7 | 312 | 237 | 65,2 | 302 | 220 | 73,0 | 293 |
| | 12 | 302 | 50,1 | 352 | 286 | 53,9 | 340 | 270 | 59,1 | 329 | 252 | 65,6 | 318 | 233 | 73,5 | 307 |
| | 15 | 329 | 50,7 | 380 | 313 | 54,5 | 367 | 294 | 59,7 | 354 | 275 | 66,3 | 342 | 255 | 74,2 | 329 |
| | 18 | 359 | 51,3 | 410 | 341 | 55,2 | 396 | 321 | 60,4 | 381 | 300 | 67,0 | 367 | 277 | 74,9 | 352 |

kWf = Cooling capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
kWt = Heating capacity to the external exchanger (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side
Performance consider a solution with propylene glycol at 30% - source side

## GEOTHERMAL APPLICATION

### HEATING PERFORMANCE

| SIZE | To (°C) | INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | | 55 | | 60 | |
| | | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe |
| 82 | -6 | 26,1 | 5,50 | 24,1 | 6,18 | 25,4 | 8,12 | | | | |
| | -3 | 28,4 | 5,48 | 27,6 | 6,17 | 27,4 | 8,07 | 26,1 | 10,6 | | |
| | -1 | 30,0 | 5,46 | 29,7 | 6,16 | 28,8 | 8,03 | 27,7 | 10,6 | | |
| | 0 | 30,9 | 5,45 | 30,7 | 6,15 | 29,6 | 8,02 | 27,8 | 10,5 | | |
| | 1 | 31,8 | 5,44 | 31,6 | 6,14 | 30,4 | 8,01 | 28,3 | 10,5 | | |
| | 3 | 33,7 | 5,43 | 33,2 | 6,13 | 32,1 | 7,98 | 30,7 | 10,4 | 30,0 | 11,9 |
| 102 | -6 | 30,2 | 6,19 | 29,9 | 7,00 | 29,3 | 9,27 | | | | |
| | -3 | 32,9 | 6,21 | 32,5 | 7,03 | 31,7 | 9,28 | 30,9 | 12,4 | | |
| | -1 | 34,9 | 6,24 | 34,4 | 7,06 | 33,4 | 9,30 | 32,4 | 12,3 | | |
| | 0 | 35,9 | 6,25 | 35,3 | 7,07 | 34,3 | 9,31 | 33,2 | 12,3 | | |
| | 1 | 36,9 | 6,27 | 36,4 | 7,09 | 35,2 | 9,32 | 34,0 | 12,3 | | |
| | 3 | 39,2 | 6,31 | 38,5 | 7,13 | 37,1 | 9,35 | 35,7 | 12,3 | 34,9 | 14,1 |
| 122 | -6 | | | 36,4 | 8,20 | 33,1 | 10,7 | | | | |
| | -3 | 38,6 | 7,25 | 37,9 | 8,25 | 36,7 | 10,8 | 36,1 | 14,0 | | |
| | -1 | 40,3 | 7,29 | 40,2 | 8,31 | 39,5 | 10,8 | 38,3 | 14,0 | | |
| | 0 | 41,8 | 7,32 | 41,7 | 8,35 | 41,0 | 10,9 | 39,7 | 14,0 | | |
| | 1 | 43,6 | 7,37 | 43,4 | 8,39 | 42,6 | 10,9 | 41,2 | 14,1 | | |
| | 3 | 48,5 | 7,48 | 47,7 | 8,50 | 46,0 | 11,0 | 44,3 | 14,1 | 43,5 | 15,9 |
| 162 | -6 | 40,7 | 8,71 | 40,9 | 9,79 | 40,7 | 12,7 | 39,7 | 16,5 | | |
| | -3 | 44,6 | 8,74 | 44,6 | 9,85 | 44,1 | 12,7 | 42,7 | 16,4 | | |
| | -1 | 47,7 | 8,78 | 47,5 | 9,90 | 46,5 | 12,7 | 44,9 | 16,3 | 43,8 | 18,4 |
| | 0 | 49,4 | 8,81 | 49,0 | 9,93 | 47,8 | 12,7 | 46,0 | 16,3 | 44,9 | 18,3 |
| | 1 | 51,3 | 8,83 | 50,6 | 9,96 | 49,1 | 12,8 | 47,1 | 16,3 | 46,0 | 18,3 |
| | 3 | 55,2 | 8,90 | 54,0 | 10,0 | 51,7 | 12,8 | 49,5 | 16,3 | 48,4 | 18,3 |
| 182 | -6 | 48,8 | 10,2 | 48,2 | 11,4 | 47,2 | 14,6 | 46,5 | 19,1 | | |
| | -3 | 53,4 | 10,3 | 52,7 | 11,4 | 51,3 | 14,7 | 50,2 | 19,1 | | |
| | -1 | 56,7 | 10,3 | 56,1 | 11,5 | 54,6 | 14,7 | 52,7 | 19,1 | 51,7 | 21,8 |
| | 0 | 58,4 | 10,3 | 57,9 | 11,5 | 56,3 | 14,8 | 54,1 | 19,2 | 52,7 | 21,8 |
| | 1 | 60,1 | 10,4 | 59,8 | 11,6 | 58,2 | 14,8 | 55,5 | 19,2 | 53,6 | 21,8 |
| | 3 | 63,7 | 10,4 | 63,8 | 11,6 | 62,3 | 14,9 | 58,3 | 19,2 | 55,4 | 21,8 |
| 222 | -6 | 57,9 | 12,4 | 58,7 | 13,6 | 58,5 | 17,2 | 55,9 | 22,0 | | |
| | -3 | 63,1 | 12,5 | 63,4 | 13,8 | 62,7 | 17,3 | 60,0 | 22,1 | | |
| | -1 | 66,8 | 12,6 | 67,0 | 13,9 | 66,0 | 17,4 | 62,9 | 22,1 | 60,6 | 24,9 |
| | 0 | 68,7 | 12,6 | 69,0 | 14,0 | 67,8 | 17,5 | 64,4 | 22,1 | 61,9 | 24,9 |
| | 1 | 70,7 | 12,7 | 71,0 | 14,0 | 69,7 | 17,6 | 66,0 | 22,2 | 63,3 | 24,9 |
| | 3 | 74,8 | 12,7 | 75,3 | 14,1 | 73,9 | 17,7 | 69,4 | 22,2 | 65,9 | 24,9 |
| 262 | -6 | 68,7 | 14,4 | 66,9 | 16,0 | 64,5 | 20,3 | 63,9 | 26,1 | | |
| | -3 | 75,1 | 14,6 | 73,0 | 16,2 | 70,0 | 20,5 | 68,8 | 26,3 | | |
| | -1 | 79,9 | 14,7 | 77,4 | 16,3 | 73,9 | 20,6 | 72,3 | 26,4 | | |
| | 0 | 82,3 | 14,7 | 79,7 | 16,4 | 75,9 | 20,7 | 74,2 | 26,4 | | |
| | 1 | 84,9 | 14,8 | 82,1 | 16,4 | 78,0 | 20,7 | 76,1 | 26,5 | 75,9 | 29,9 |
| | 3 | 90,3 | 14,9 | 87,0 | 16,5 | 82,3 | 20,9 | 80,0 | 26,6 | 79,7 | 30,0 |

kWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side
Performance consider a solution with propylene glycol at 30% - source side

## GEOTHERMAL APPLICATION

### HEATING PERFORMANCE

| SIZE | To (°C) | INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | | 55 | | 60 | |
| | | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe |
| 302 | -6 | 79,2 | 16,5 | 78,2 | 18,2 | 76,2 | 22,5 | 74,1 | 28,2 | | |
| | -3 | 86,2 | 16,7 | 85,0 | 18,4 | 82,4 | 22,8 | 79,5 | 28,3 | | |
| | -1 | 91,3 | 16,8 | 90,1 | 18,6 | 87,1 | 23,0 | 83,5 | 28,4 | 81,5 | 31,5 |
| | 0 | 94,1 | 16,8 | 92,8 | 18,6 | 89,6 | 23,0 | 85,7 | 28,5 | 83,4 | 31,5 |
| | 1 | 96,9 | 16,9 | 95,5 | 18,7 | 92,1 | 23,1 | 87,9 | 28,5 | 85,5 | 31,6 |
| | 3 | 103 | 16,9 | 101 | 18,8 | 97,6 | 23,3 | 92,7 | 28,7 | 89,8 | 31,6 |
| 352 | -6 | 89,5 | 18,7 | 88,2 | 20,7 | 85,9 | 25,7 | 84,3 | 32,1 | | |
| | -3 | 93,7 | 18,9 | 93,9 | 20,9 | 93,0 | 25,9 | 90,5 | 32,2 | | |
| | -1 | 99,3 | 19,0 | 99,5 | 21,0 | 98,3 | 26,1 | 95,1 | 32,3 | 92,8 | 36,0 |
| | 0 | 103 | 19,1 | 103 | 21,1 | 101 | 26,1 | 97,6 | 32,4 | 95,2 | 36,0 |
| | 1 | 107 | 19,1 | 106 | 21,2 | 104 | 26,2 | 100 | 32,5 | 97,7 | 36,1 |
| | 3 | 117 | 19,3 | 115 | 21,4 | 110 | 26,4 | 106 | 32,6 | 103 | 36,2 |
| 402 | -6 | 104 | 21,7 | 103 | 24,0 | 100 | 29,8 | | | | |
| | -3 | 113 | 21,9 | 112 | 24,2 | 108 | 30,0 | 105 | 37,5 | | |
| | -1 | 120 | 22,1 | 118 | 24,4 | 114 | 30,2 | 110 | 37,7 | | |
| | 0 | 124 | 22,1 | 122 | 24,5 | 118 | 30,3 | 113 | 37,7 | 111 | 42,1 |
| | 1 | 127 | 22,2 | 125 | 24,6 | 121 | 30,4 | 116 | 37,9 | 114 | 42,1 |
| | 3 | 135 | 22,3 | 133 | 24,7 | 128 | 30,6 | 122 | 38,1 | 119 | 42,3 |
| 432 | -6 | 115 | 24,1 | 113 | 26,6 | 110 | 33,0 | | | | |
| | -3 | 125 | 24,3 | 123 | 26,8 | 119 | 33,2 | 116 | 41,5 | | |
| | -1 | 133 | 24,5 | 130 | 27,0 | 126 | 33,4 | 122 | 41,7 | 120 | 46,7 |
| | 0 | 137 | 24,6 | 134 | 27,0 | 129 | 33,5 | 125 | 41,9 | 123 | 46,8 |
| | 1 | 141 | 24,7 | 138 | 27,1 | 133 | 33,6 | 128 | 42,0 | 126 | 46,9 |
| | 3 | 151 | 24,9 | 147 | 27,3 | 141 | 33,8 | 136 | 42,2 | 133 | 47,2 |
| 452 | -6 | 122 | 25,3 | 120 | 28,1 | 117 | 35,0 | 115 | 43,9 | | |
| | -3 | 133 | 25,6 | 131 | 28,3 | 127 | 35,2 | 123 | 44,0 | | |
| | -1 | 141 | 25,8 | 139 | 28,5 | 134 | 35,4 | 130 | 44,1 | 128 | 49,1 |
| | 0 | 145 | 25,9 | 143 | 28,6 | 138 | 35,5 | 133 | 44,1 | 131 | 49,1 |
| | 1 | 150 | 26,0 | 147 | 28,8 | 142 | 35,6 | 136 | 44,2 | 134 | 49,2 |
| | 3 | 159 | 26,2 | 156 | 29,0 | 150 | 35,8 | 143 | 44,4 | 140 | 49,3 |
| 502 | -6 | 132 | 27,7 | 130 | 30,7 | 127 | 38,3 | | | | |
| | -3 | 145 | 28,0 | 142 | 30,9 | 138 | 38,5 | 134 | 48,4 | | |
| | -1 | 154 | 28,2 | 151 | 31,1 | 146 | 38,7 | 141 | 48,5 | 139 | 54,4 |
| | 0 | 159 | 28,3 | 156 | 31,2 | 150 | 38,8 | 145 | 48,6 | 143 | 54,4 |
| | 1 | 164 | 28,5 | 160 | 31,3 | 154 | 38,9 | 149 | 48,7 | 146 | 54,5 |
| | 3 | 175 | 28,7 | 171 | 31,6 | 164 | 39,1 | 157 | 48,9 | 154 | 54,7 |
| 552 | -6 | 146 | 30,4 | 144 | 33,9 | 141 | 42,4 | | | | |
| | -3 | 160 | 30,8 | 157 | 34,2 | 153 | 42,6 | 149 | 53,1 | | |
| | -1 | 170 | 31,0 | 167 | 34,4 | 162 | 42,8 | 157 | 53,3 | | |
| | 0 | 175 | 31,1 | 172 | 34,5 | 166 | 42,9 | 161 | 53,4 | 158 | 59,4 |
| | 1 | 181 | 31,3 | 177 | 34,7 | 171 | 43,0 | 165 | 53,5 | 162 | 59,5 |
| | 3 | 192 | 31,5 | 188 | 34,9 | 181 | 43,3 | 174 | 53,8 | 170 | 59,8 |

kWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side
Performance consider a solution with propylene glycol at 30% - source side

## GEOTHERMAL APPLICATION

### HEATING PERFORMANCE

| SIZE | To (°C) | INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | | 35 | | 45 | | 55 | | 60 | |
| | | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe | kWt | kWe |
| 602 | -6 | 163 | 34,1 | 161 | 37,9 | 157 | 47,4 | | | | |
| | -3 | 179 | 34,5 | 176 | 38,2 | 171 | 47,6 | 167 | 59,7 | | |
| | -1 | 190 | 34,8 | 187 | 38,4 | 181 | 47,8 | 176 | 59,8 | | |
| | 0 | 196 | 34,9 | 193 | 38,6 | 186 | 47,9 | 180 | 59,9 | 178 | 66,9 |
| | 1 | 202 | 35,1 | 199 | 38,7 | 191 | 48,0 | 185 | 60,0 | 182 | 67,0 |
| | 3 | 215 | 35,4 | 211 | 39,0 | 203 | 48,3 | 194 | 60,2 | 191 | 67,2 |
| 702 | -6 | 189 | 40,1 | 185 | 43,6 | 180 | 53,2 | | | | |
| | -3 | 205 | 40,4 | 201 | 43,9 | 195 | 53,5 | 190 | 66,7 | | |
| | -1 | 218 | 40,6 | 213 | 44,1 | 205 | 53,8 | 200 | 67,0 | | |
| | 0 | 224 | 40,7 | 219 | 44,2 | 211 | 53,9 | 205 | 67,2 | 202 | 75,2 |
| | 1 | 231 | 40,8 | 226 | 44,3 | 217 | 54,1 | 210 | 67,4 | 207 | 75,4 |
| | 3 | 245 | 41,1 | 239 | 44,6 | 229 | 54,4 | 221 | 67,7 | 217 | 75,8 |
| 802 | -6 | 212 | 46,1 | 211 | 49,2 | 208 | 59,0 | 204 | 73,2 | | |
| | -3 | 231 | 46,3 | 229 | 49,5 | 224 | 59,4 | 219 | 74,1 | | |
| | -1 | 244 | 46,4 | 241 | 49,7 | 236 | 59,8 | 230 | 74,6 | | |
| | 0 | 251 | 46,5 | 248 | 49,8 | 242 | 59,9 | 236 | 74,9 | 233 | 84,2 |
| | 1 | 258 | 46,6 | 255 | 49,9 | 248 | 60,1 | 242 | 75,2 | 239 | 84,6 |
| | 3 | 273 | 46,8 | 269 | 50,1 | 262 | 60,4 | 254 | 75,7 | 250 | 85,2 |

kWt = Heating capacity (kW)
kWe = Total Electrical power absorbed (compressor + Auxiliary Circuit) (kW)
To = exchanger outlet water temperature utility side (°C)

Performances referred to a DT= 5°C both for utility and source side
Performance consider a solution with propylene glycol at 30% - source side

# CONFIGURATIONS

## MOBMAG - LARGER UNIT

A larger unit is a configuration that is automatically selected in conjunction with any hydronic unit (cooling, heating, recovery side), with any source valve (cooling or heating side) and with any DHW switching valve (heating side).

## D - PARTIAL ENERGY RECOVERY

The configuration with partial energy recovery includes:
- heat exchanger with 316 stainless steel braze-welded plates;
- water side differential pressure switch;
- water side temperature probe on the heat exchanger outlet;
- water side temperature probe on the heat exchanger inlet.

This configuration allows to produce hot water for free when running in cooling mode, thanks to the recovery of part of the condensation heat. This option is also called "desuperheater".

The partial recovery system is not managed and controlled by the unit's modulation, but it is activated by an external signal. If the flow rate on the recovery side needs to the adjusted, it is necessary to use 1 or 2 inverter pumps, whose speed must be set in relation to the pressure drops and the water temperature. (See page 44-45-46)

Thanks to the partial energy recovery it is possible to recover about 1/4 of the unit's heating capacity (equal to the sum of the cooling capacity and the electrical power absorbed by the compressors).

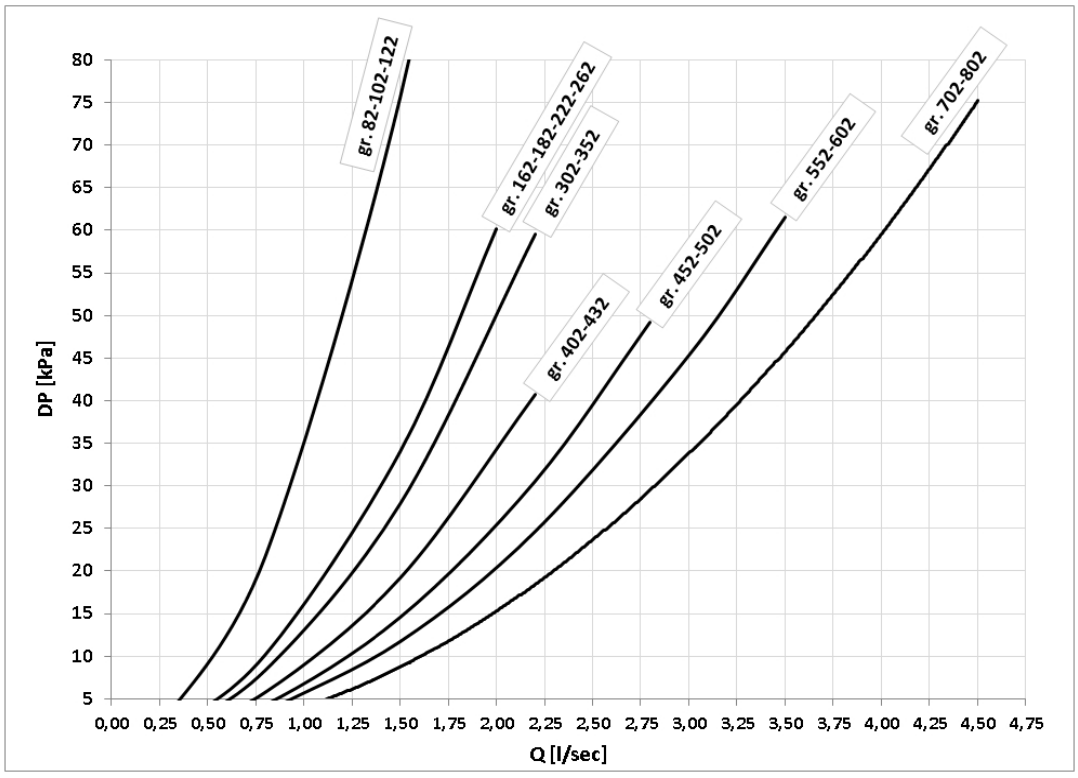
Take special care when the temperature of the water that needs to be heated up is below 40°C. To prevent malfunctions affecting the cooling circuit, it is advisable to adopt all the necessary precautions, such as keeping the outlet temperature of the partial recovery above 35°C and ensure there is no water flowing through the exchanger when the cooling circuit is stationary to prevent the refrigerant from condensing in the partial energy recovery device.

### CONFIGURATIONS AVAILABLE WITH PARTIAL ENERGY RECOVERY

Hydronic unit recovery side
not required (-) = standard version
HYGR1V = Recovery side hydronic unit with 1 inverter pump
HYGR2V = Recovery side hydronic unit with 2 inverter pumps

**Note: with partial energy recovery, it is necessary to use 1 pump or 2 inverter pumps.**

#### PARTIAL ENERGY RECOVERY EXCHANGER PRESSURE DROP




Q = WATER FLOW l/s
DP = PRESSURE DROPS [kPa]

# R - TOTAL ENERGY RECOVERY

The configuration with total energy recovery includes:
- heat exchanger with 316 stainless steel braze-welded plates;
- water side differential pressure switch;
- water side temperature probe on the heat exchanger outlet;
- water side temperature probe on the heat exchanger inlet.

**The Configuration with full energy recovery requires an element to control the flow rate on the heating side.**
If the heating side is the source side, you need to choose either a hydronic unit with 1 pump or 2 inverter pumps or a 2 or 3-way modulating valve. If the heating side is the utility side, you need to choose a hydronic unit with 1 pump or 2 inverter pumps.
If these devices are not supplied with Clivet units, they must be fitted in the system and managed by the control device of the unit itself.

**Unit - Operating cooling only :**
This configuration allows to produce hot water for free when running in cooling mode, thanks to the total recovery of the condensation heat that would otherwise be disposed on the external thermal source.
This solution increases the system's overall efficiency in all cases where large amounts of hot water need to be generated. The free heating capacity that can be recovered is equal to the sum of the cooling capacity and the electric power absorbed by the compressors.
The amount of power that can be obtained on the recovery side depends on the capacity demand in cooling mode on the utility side and the capacity step employed by the unit.
If there is no demand for cold water, the unit cannot produce hot water on the recovery side.

Example of how the unit operates:
With the unit operating in cooling mode and a heating capacity demand below 20%, it is possible to use the total recovery as a “desuperheater” and recover approximately 20% of the cooling capacity free of charge.
When the unit is operating in cooling mode and there is a heating capacity demand exceeding 20%, the unit activates the total recovery by disabling the source side exchanger and setting the pump's capacity on the recovery side to the maximum. Once the set-point on the recovery side (heating) has been reached, the source exchanger is activated again and the capacity of the utility and source pumps is modulated based on the gap (positive or negative) from the set-point.

The demand for heating capacity can be activated:
- By reading the water inlet temperature (if the set-point has been reached, the pump is stationary, the gap between the temperature and the set-point is detected based on a periodical procedure)
- Through the enabling input from a digital contact (if there is no signal the pump remains stationary)

**Unit - Operating heating only**
This configuration allows to produce hot water simultaneously on the utility and on the recovery side, thanks to the modulation of the water flow rate via the inverter pumps fitted on both circuits.
The unit can produce hot water at two different temperatures. We recommend setting the utility with a higher temperature on the recovery side exchanger (usually dedicated to producing domestic hot water) and the utility with a lower temperature on the utility exchanger (usually dedicated to the system).
The overall heating capacity that can be provided simultaneously to both utilities cannot exceed the overall power of the nominal heating capacity of the machine. Priority is always given to Domestic Hot Water.
Only if the latter is not active, it is possible to define to which utility the priority is given if there is a demand coming simultaneously from both sides.
The unit will manage the capacity steps by taking into account both loads and by automatically modulating the flow rate it will meet the demand of the priority utility first and leave the residual capacity for the secondary utility.

Example of how the unit operates:
If the exchanger on the recovery side is dedicated to the production of domestic hot water (DHW) and the exchanger on the utility side is dedicated to the resid system, we recommend assigning priority to the demand to produce DHW.
When the unit is operating in heating mode for the system and there is no demand for DHW, the unit will employ the capacity steps to meet the system's load.
When the unit is operating in heating mode for DHW and there is no demand from the system, the unit will employ the capacity steps to meet the DHW load.
When the unit is operating in heating mode for DHW and there is a demand from the system, the unit will employ the capacity steps to meet both the loads, thereby meeting the production of DHW first and reserving the residual ual capacity to the system.

The DHW demand can be activated:
- By reading the water inlet temperature (if the setpoint has been reached, the pump is stationary, the gap between the temperature and the setpoint is detected based on a periodical procedure)
- Through the enabling input from a digital contact (if there is no signal the pump remains stationary)

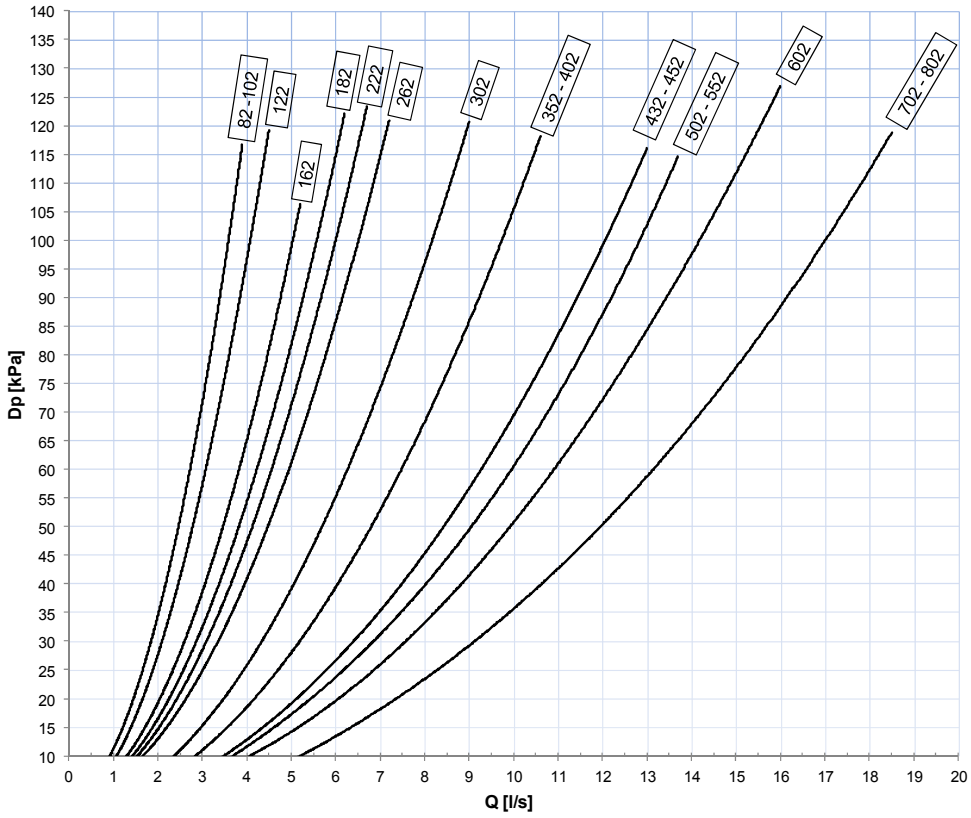
## CONFIGURATIONS AVAILABLE WITH TOTAL ENERGY RECOVERY

Hydronic unit recovery side
not required (-) = standard version
HYGR1V = Recovery side hydronic unit with 1 inverter pump
HYGR2V = Recovery side hydronic unit with 2 inverter pumps
2 pompe ad inverter

**Note: 1 - with total energy recovery, it is necessary to use 1 pump or 2 inverter pumps.**
**2 - when the unit is operating in cooling-only mode, it requires a control device on the heating side (source).**
**3 - when the unit is operating in heating-only mode, it requires a control device on the heating side (utility).**

⚠ To prevent constant switching in the unit's cooling circuit, it is necessary to install a storage tank with an adequate capacity in the recovery's hot water circuit.

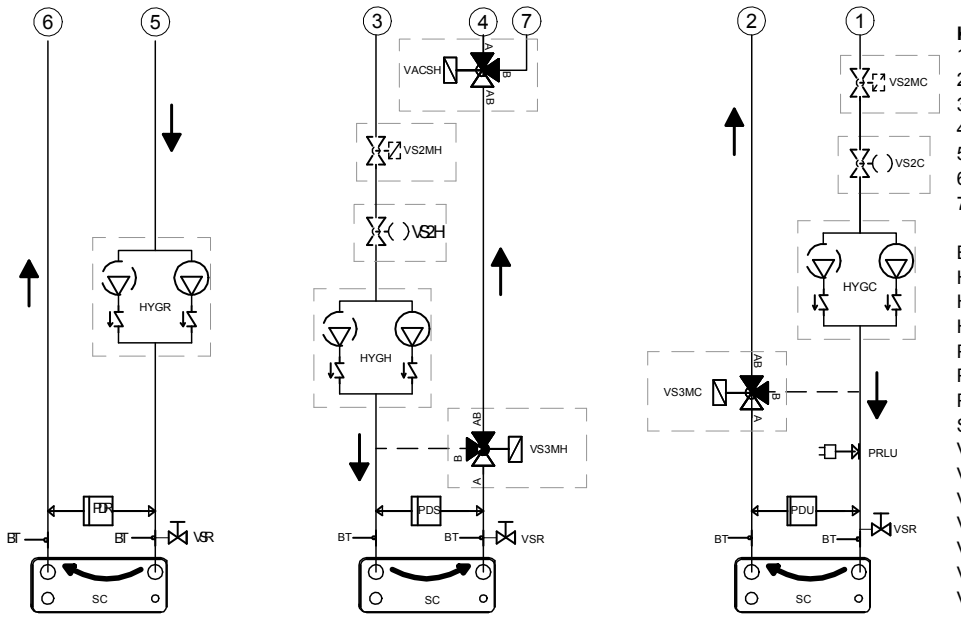
### TOTAL ENERGY RECOVERY EXCHANGER PRESSURE DROPS




Q = WATER FLOW l/s
DP = PRESSURE DROPS [kPa]

## HYDRONIC UNITS

**Available with LARGER UNIT configuration only (MOBMAG)**




**KEY:**
1.Cooling side inlet
2.Cooling side outlet
3.Heating side inlet
4.Heating side outlet
5.Recovery side inlet
6.Recovery side outlet
7.DHW side outlet

BT Temperature probes
HYGC Cooling side hydronic units
HYGH Heating side hydronic units
HYGR Recovery side hydronic units
PDU Utility side differential pressure switch
PDS Source side differential pressure switch
PRLU Minimum pressure switch set to 0.7 bar
SC plate heat exchangers
VACSH 3-way DHW valve
VS2C Cooling side 2-way ON/OFF valve
VS2MC Cooling side 2-way Modulating valve
VS3MC Cooling side 3-way Modulating valve
VS2H Heating side 2-way ON/OFF valve
VS2MH Heating side 2-way Modulating valve
VS3MH Heating side 3-way Modulating valve

**HYGC1 - COOLING SIDE HYDRONIC UNIT WITH AN ON-OFF PUMP**
**HYGH1 - HEATING SIDE HYDRONIC UNIT WITH AN ON-OFF PUMP**

Option supplied on the unit. Centrifugal electric pump with body and impeller made with AISI 304 steel. Mechanical seal by means of components made of ceramics, carbon and EPDM elastomers. Three-phase electric motor with IP55 protection rating. Complete with a thermoformed insulating casing and Victaulic quick couplings.

**HYGC2 - COOLING SIDE HYDRONIC UNIT WITH 2 ON-OFF PUMPS**
**HYGH2 - HEATING SIDE HYDRONIC UNIT WITH 2 ON-OFF PUMPS**

Option supplied on the unit. Two centrifugal electric pumps, one of which in stand-by, with body and impeller made with AISI 304 steel. Mechanical seal by means of components made of ceramics, carbon and EPDM elastomers.
Three-phase electric motor with IP55 protection rating. Complete with a thermoformed insulating casing, Victaulic quick couplings and a check valve.
The microprocessor control balances the hours of operation and, in the event of malfunctions, it indicates the failure and automatically activates the backup pump.

**HYGC1V - COOLING SIDE HYDRONIC UNIT WITH AN INVERTER PUMP**
**HYGH1V - HEATING SIDE HYDRONIC UNIT WITH AN INVERTER PUMP**
**HYGR1V - RECOVERY SIDE HYDRONIC UNIT WITH 1 INVERTER PUMP**

Option supplied on the unit. Centrifugal electric pump with body and impeller made with AISI 304 steel. Mechanical seal by means of components made of ceramics, carbon and EPDM elastomers. Three-phase electric motor with IP55 protection rating. Complete with a thermoformed insulating casing and Victaulic quick couplings.

**HYGC2V - COOLING SIDE HYDRONIC UNIT WITH TWO INVERTER PUMPS**
**HYGH2V - HEATING SIDE HYDRONIC UNIT WITH TWO INVERTER PUMPS**
**HYGR2V - RECOVERY SIDE HYDRONIC UNIT WITH 2 INVERTER PUMPS**

Option supplied on the unit. Two centrifugal electric pumps, one of which in stand-by, with body and impeller made with AISI 304 steel. Mechanical seal by means of components made of ceramics, carbon and EPDM elastomers. Three-phase electric motor with IP55 protection rating.
Complete with a thermoformed insulating casing, Victaulic quick couplings and a check valve. The microprocessor control balances the hours of operation and, in the event of malfunctions, it indicates the failure and automatically activates the backup pump.

**Note: none of the configurations with pump/s on the source side is compatible with configurations with ON/OFF or modulating valve on the SOURCE side.**

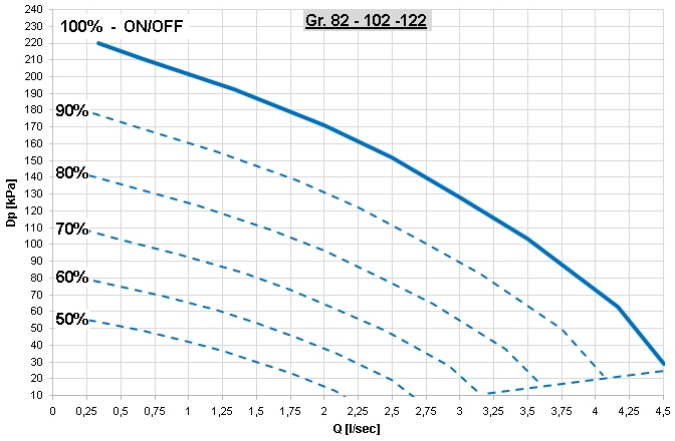
## AVAILABLE PRESSURE CURVES AND ON/OFF AND INVERTER PUMPS ABSORBED POWER

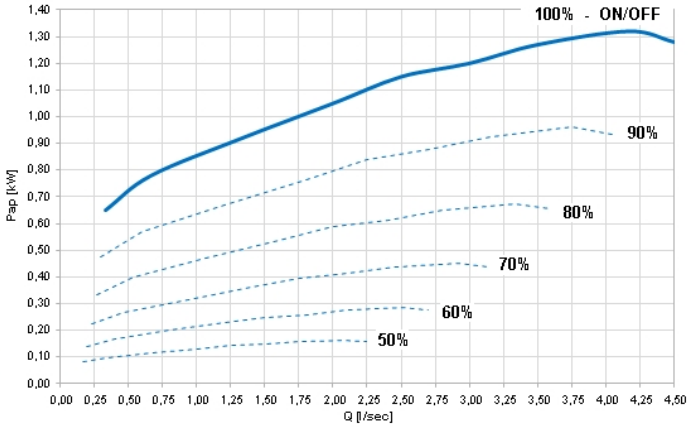
The curves reported below represent the available pressure on the pump's supply and the power absorbed by the electric motor of each pump.

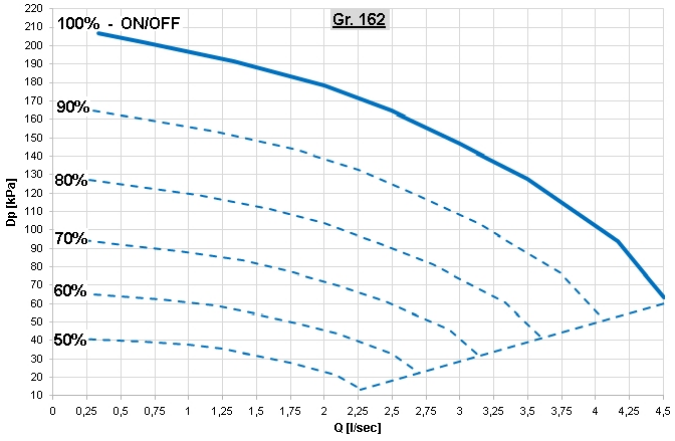
Warning: to calculate the available pressure on the unit's couplings, it is necessary to subtract the pressure drops of the exchanger at the same capacity from the head provided by the pump at the capacity envisioned in the project.

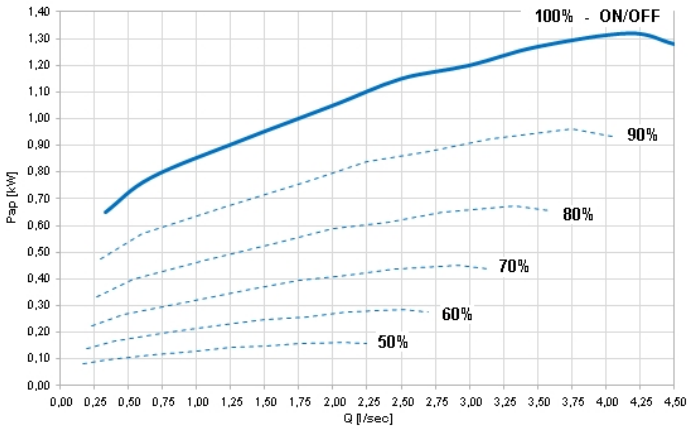
The pressure drop charts are reported in this technical leaflet in the sections below:
- utility side pressure drops
- Source side pressure drops
- Partial Energy recovery
- Total Energy recovery

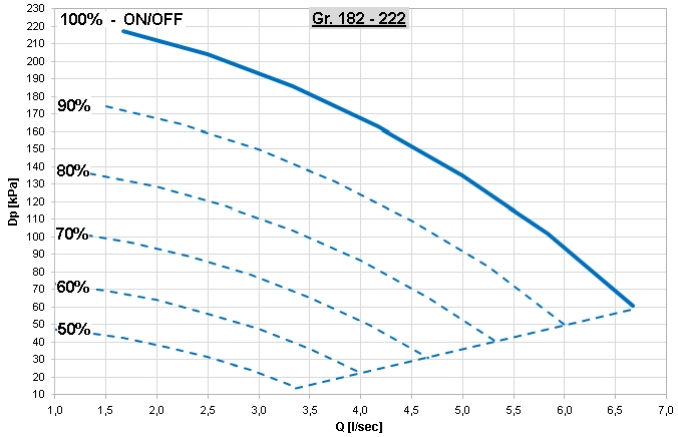
The charts report data related to the performance of the inverter pumps as the operating load varies.
The curves of the ON/OFF pumps correspond to the curves of the inverter pumps at full load.

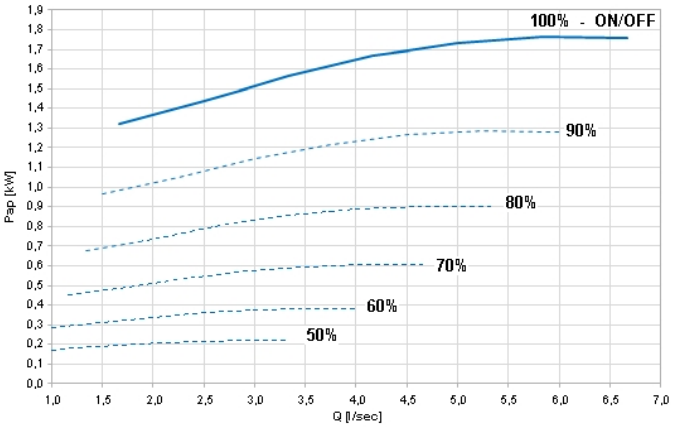



Dp [kPa] = AVAILABLE PUMP PRESSURE (PLATE EXCHANGER PRESSURE DROPS TO BE SUBTRACTED)
Pap [kW] = SYSTEM PUMP ABSORBED POWER
Q[l/s]= WATER-FLOW RATE

## AVAILABLE PRESSURE CURVES AND ON/OFF AND INVERTER PUMPS ABSORBED POWER

The curves reported below represent the available pressure on the pump's supply and the power absorbed by the electric motor of each pump.

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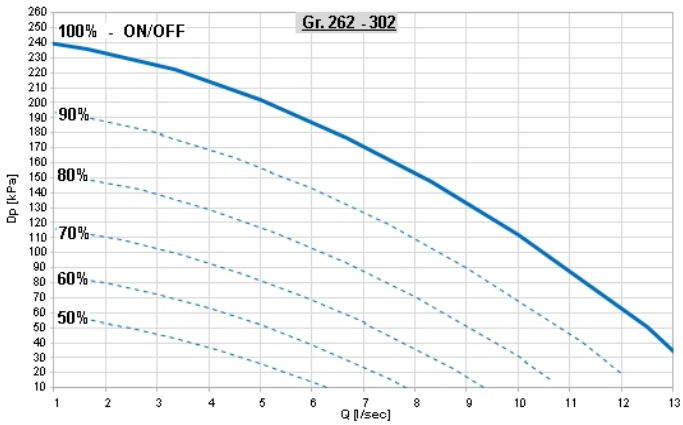


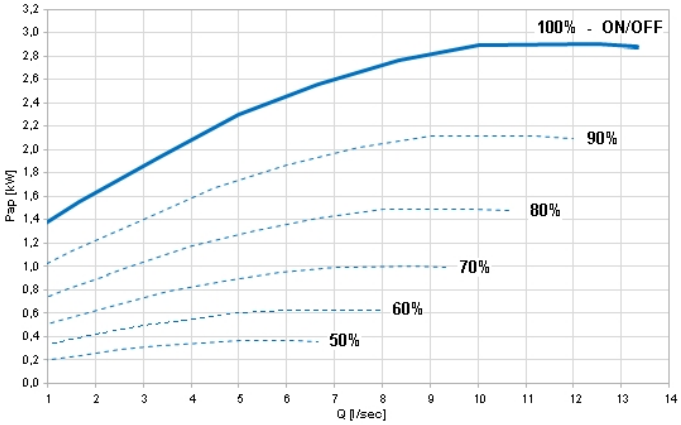


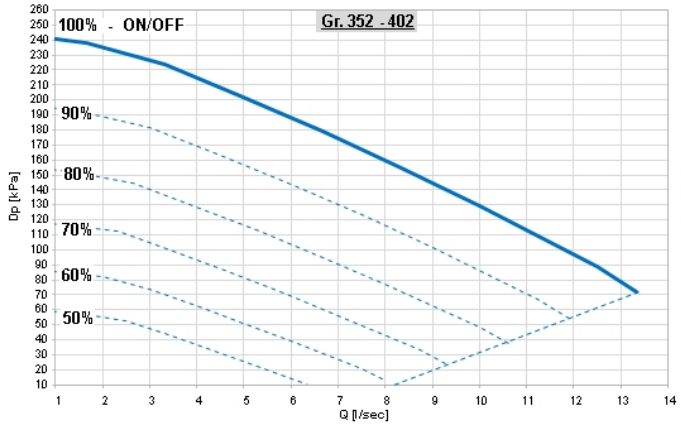


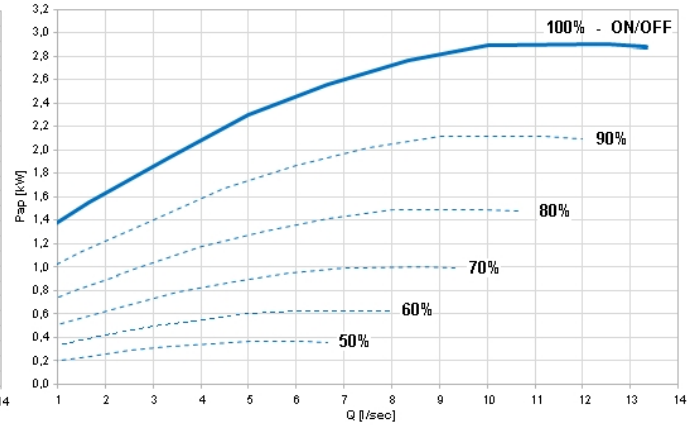


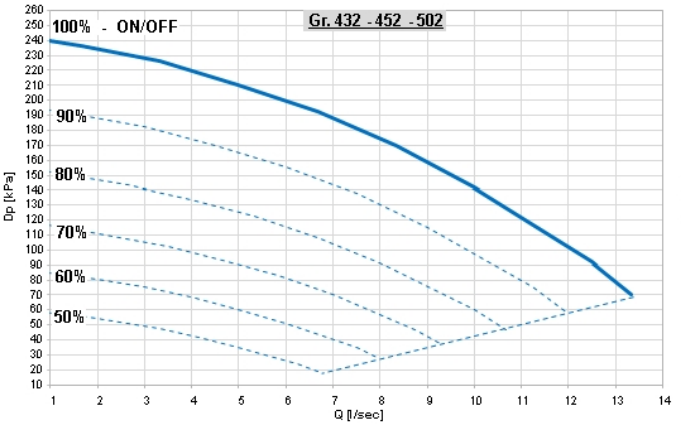


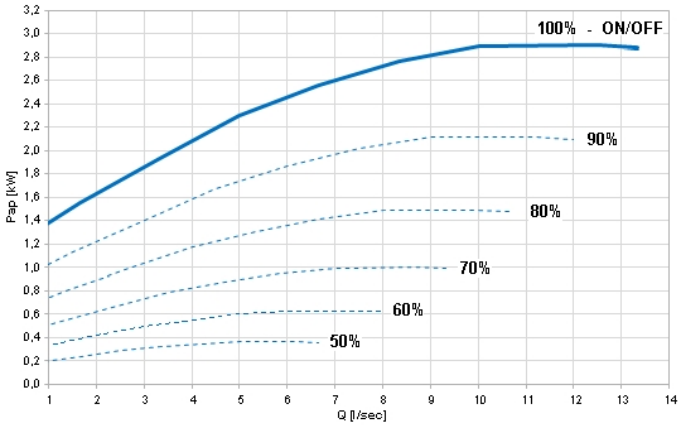


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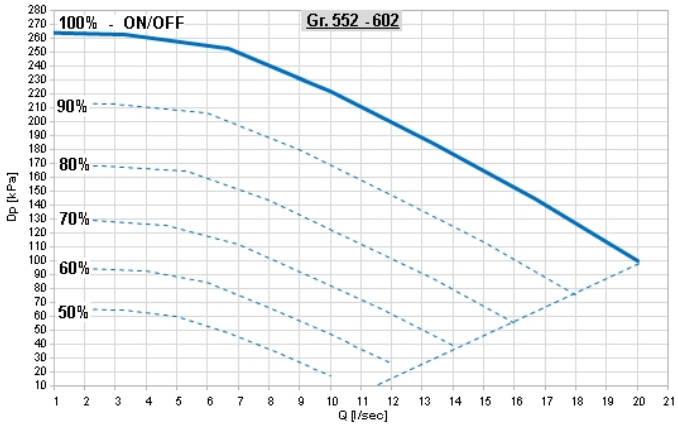


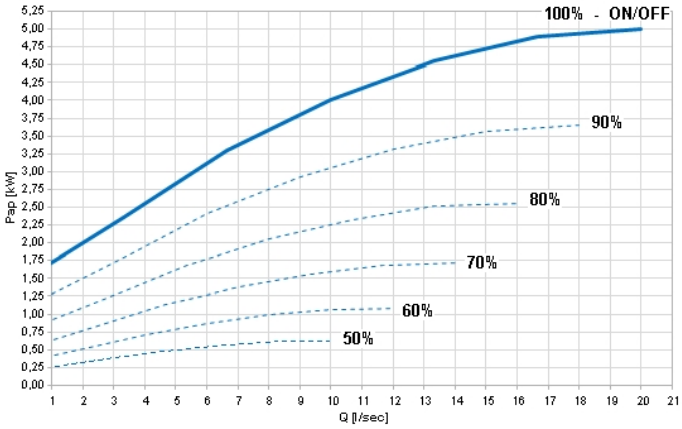


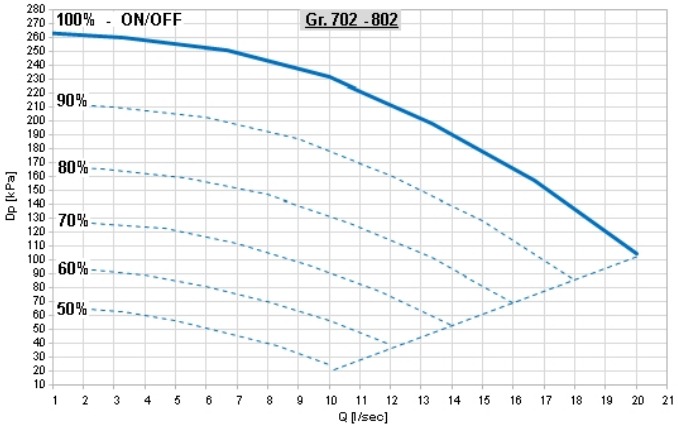


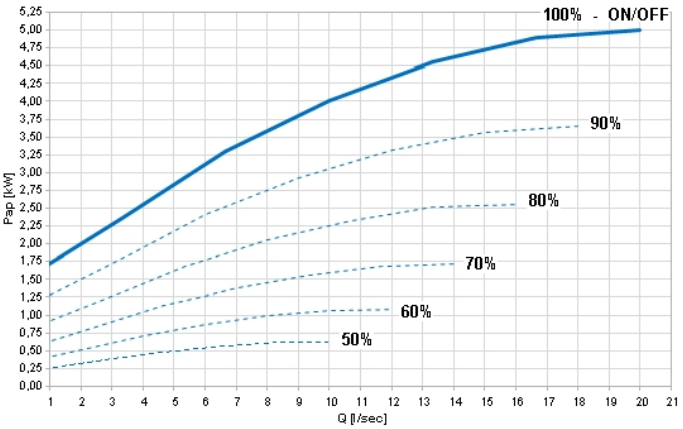


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Pap [kW] = SYSTEM PUMP ABSORBED POWER
Q[l/s]= WATER-FLOW RATE

# CONFIGURATIONS

**Available only with LARGER UNIT configuration (MOBMAG)**

## VS2C / VS2H - COOL / HEAT SIDE 2-WAY ON/OFF VALVE

The cooling side or heating side motorised two-way valve is located at the inlet of the exchanger on the source side. The valve operates is conjunction with the cooling circuit. When the compressor is stationary, the valve is closed; when the compressor is in operation, the valve is open.

Note: configuration not compatible with configurations with ON/OFF / inverter single pump or ON/OFF / inverter duble pump or other valves.

## VS2MC / VS2MH - COOL / HEAT SIDE 2-WAY MODULATING VALVE

If the water temperature at the inlet of the source side exchanger is outside the unit's operating range, it is advisable to reduce the water flow rate to allow it to operate properly.
The two-way modulating valve on the cooling or heating side, installed at the inlet of the exchanger on the source side, modulates the water flow rate via a 0-10V signal generated by the unit's electronic control.

Note: configuration not compatible with configurations with ON/OFF / inverter single pump or ON/OFF / inverter duble pump or other valves.

## VS3MC / VS3MH - COOL / HEAT SIDE 3-WAY MODULATING VALVE

If the water temperature at the inlet of the source side exchanger is outside the unit's operating range, it is advisable to reduce the water flow rate to allow it to operate properly.
The two-way modulating valve on the cooling or heating side, installed at the inlet of the exchanger on the source side, modulates the water flow rate via a 0-10V signal generated by the unit's electronic control.

Note: configuration not compatible with configurations with ON/OFF / inverter single pump or ON/OFF / inverter duble pump or other valves.

## VACSH - HEAT SIDE DOMESTIC HOT WATER SWITCHING VALVE

The unit is supplied with a 3-way on/off valve to divert the water flow at the outlet of the exchanger on the HEAT side towards a domestic hot water heating storage tank.
The 3-way valve is activated with the closure of a potential-free contact in the unit's electrical panel.
When this function is enabled, the unit's set-point is brought to the value pre-set by the designated parameter set in the electronic control.

Note: configuration not compatible with configurations with a double ON/OFF pump or a double inverter pump on the HEAT side.

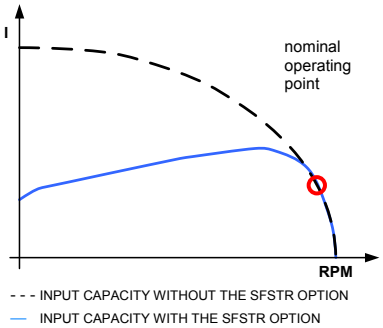
# CONFIGURATIONS

## PFCP - POWER CAPACITORS

The component is necessary to lower the phase difference between current and voltage in the electromagnetic components of the machine, such as asynchronous motors.
By re-phasing it is possible to reduce the intensity of the line current by reducing a part of the power of the mains (reactive power).
This leads to an economic benefit which the energy provider grants to the final user. The component makes it possible to bring the cosfi power factor to values which on average are greater than 0.9.

**The device is built-in installed.**

## SFSTR - DISPOSAL FOR INRUSH CURRENT REDUCTION




This option is also known as "Soft starter". An electronic device which automatically starts up the compressors gradually, reducing the start-up amps for the unit by around 40% in comparison with the nominal value.
This results in the electrical capacity system and the related protection devices being sized with lower parameters, thus having a lower initial investment cost.

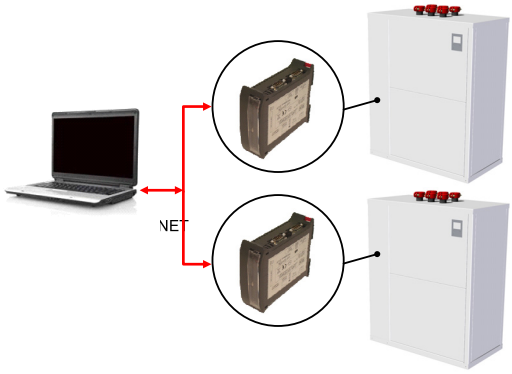
**The device is built-in installed.**

## MF2 - MULTI-FUNCTION PHASE MONITOR

The multifunction phase monitor:
- controls the presence and exact sequence of the phases
- verifies voltage anomalies (+/-10%)
- automatically restarts the unit as soon as the proper power supply is restored.

This control allows to:
- protect components inside the unit, as if they are powered by an anomalous voltage they may operate incorrectly or break;
- quickly identify, among the alarms of the unit's components, what really caused the malfunction due to the sudden change of voltage.

## CMSC8 - SERIAL COMMUNICATION MODULE TO BACNET SUPERVISOR



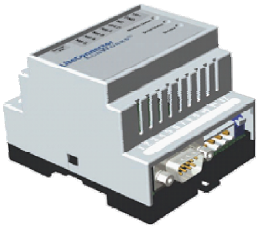
Allows the serial connection to the supervision systems that use the BACnet or SNMPv3.0 communication protocol.
Provides access to a list of operating variables, controls and alarms.

The device has the following communication ports:
- 2 serial ports that can be configured as RS232 or RS485, available for MODBUS and BACnet MSTP protocols;
- 1 RJ45 Ethernet port for BACnet IP, SNMPv3 and TCP/IP protocols.

The device is configured through the integrated Linux Web Server and can be carried out from a PC connected to the network

The configuration and management activities for the BACnet networks are the responsibility of the client.

## CMSC10 - SERIAL COMMUNICATION MODULE TO LONWORKS SUPERVISOR



Consente il collegamento seriale ai sistemi di supervisione che utilizzano il protocollo di comunicazione LonWorks. Permette l'accesso ad un elenco di variabili di funzionamento, comandi ed allarmi conforme allo standard Echelon®.

The configuration and management activities for the LonWorks networks are the responsibility of the client.

LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.

## ACCESSORIES SUPPLIED SEPARATELY

Every accessory is marked with a configuration code, for instance CMSC8X. When the letter X is placed at the end, this means that the accessory is supplied separately. If there is no X in the code, the accessory is mounted in the factory.

### IFWX - STEEL MESH FILTER ON THE WATER SIDE

The device prevents any impurity in the hydraulic circuit from soiling the exchanger. The stainless steel mesh mechanical filter must be placed on the water inlet line. It needs to be easy to remove for periodical maintenance and cleaning operations. It can be used on the utility, source and recovery side.

Installation is the responsibility of the client, externally to the unit.

Check for the presence of the required hydraulic shut-off valves in the system, in order to undertake periodical maintenance.

Separately supplied accessories

### SPCX - SET POINT COMPENSATION WITH OUTSIDE TEMPERATURE PROBE

The setpoint compensation with air probe changes the calibration of the setpoint in relation to the temperature of the air outside and this reduces energy costs. The probe is connected to the unit's main control module and the maximum length of the connection cable is 20 meters. The sensor must not be influenced by factors that might affect its reading (for instance direct sunlight,contact with external heat sources, etc.) and therefore must be placed in a sheltered place.

Installation is the responsibility of the client, externally to the unit.

Separately supplied accessories

## ACCESSORIES SUPPLIED SEPARATELY

**Available without LARGER UNIT configuration (MOBMAG)**

### VS2CX / VS2HX - HEAT / COOL SIDE 2-WAY ON/OFF VALVE

The cool / heat side 2-way ON/OFF valve is also supplied as a separate accessory.
For a description of its features, see the section of Constructive Configurations on page 47.

Installation is the responsibility of the client, externally to the unit.

Separately supplied accessories

### VS2MCX / VS2MHX - COOL / HEAT SIDE 2-WAY MODULATING VALVE

The cool / heat side 2-way ON/OFF valve is also supplied as a separate accessory.
For a description of its features, see the section of Constructive Configurations on page 47.

Installation is the responsibility of the client, externally to the unit.

Separately supplied accessories

### VS3MCX / VS3MHX - COOL / HEAT SIDE 3-WAY MODULATING VALVE

The cool / heat side 3-way ON/OFF valve is also supplied as a separate accessory.
For a description of its features, see the section of Constructive Configurations on page 47.

Installation is the responsibility of the client, externally to the unit.

Separately supplied accessories

### VACSHX - HEATING SIDE DOMESTIC HOT WATER SWITCHING VALVE

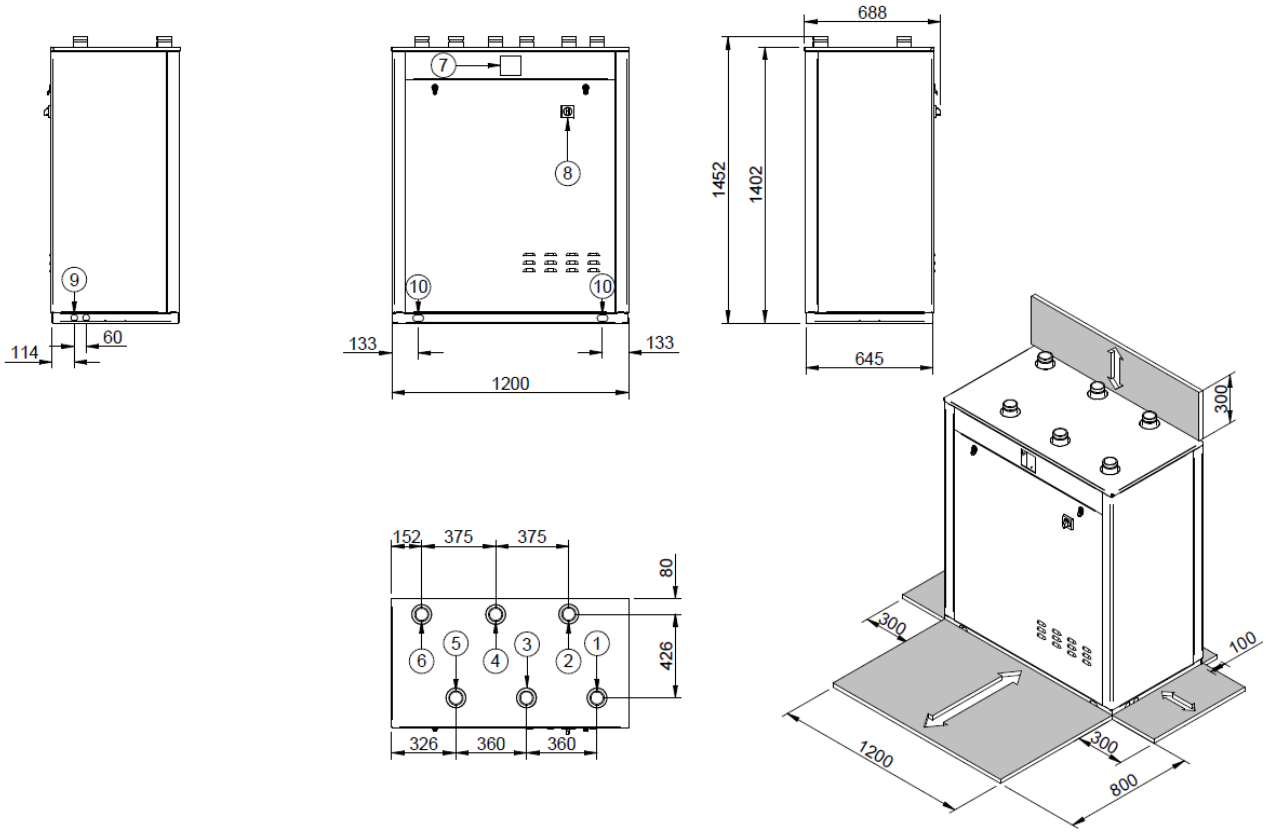
The heating side DHW switching valve is also supplied as a separate accessory.
For a description of its features, see the section of Constructive Configurations on page 47.

Installation is the responsibility of the client, externally to the unit

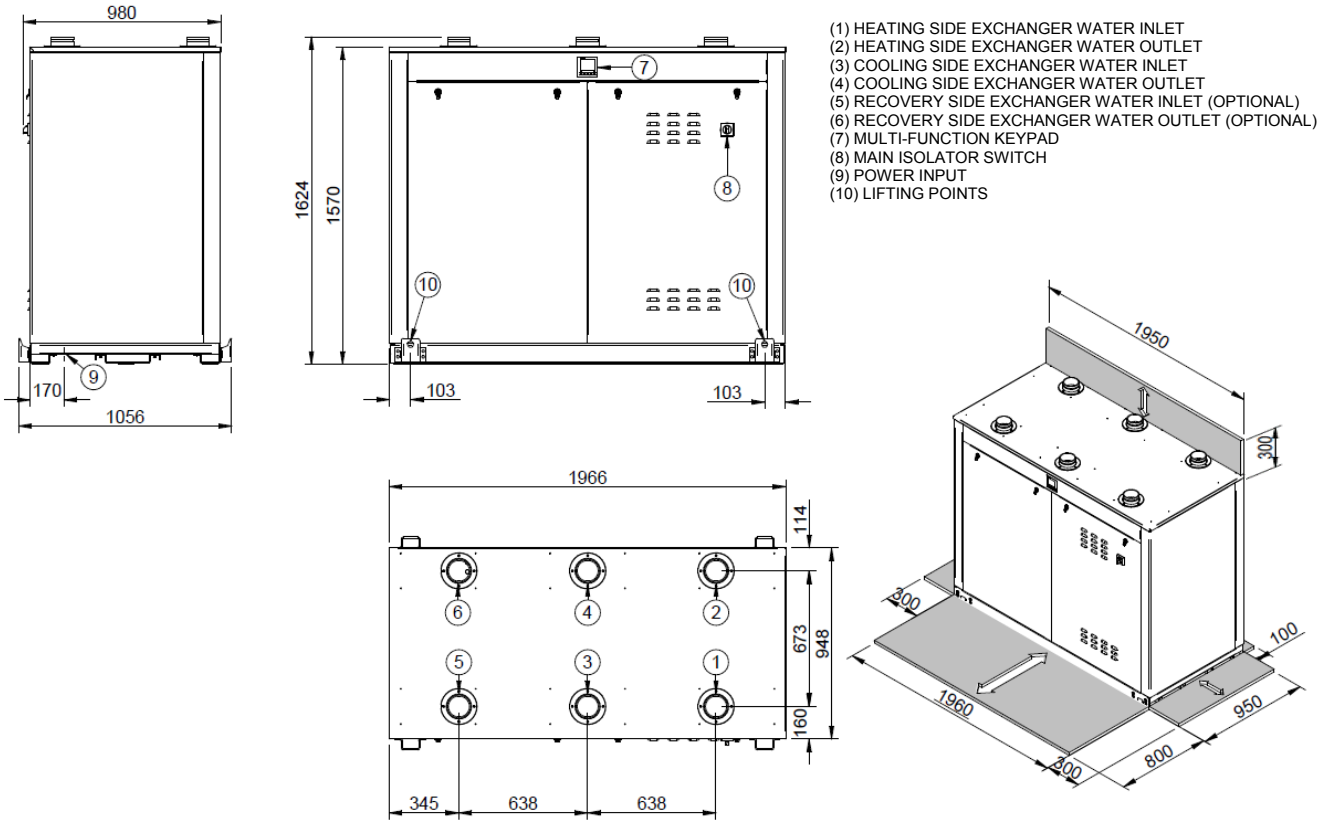
Separately supplied accessories

## DIMENSIONAL DRAWING : STANDARD VERSION WITHOUT HYDRONIC UNIT

### WSH-XEE SIZE 82 - 102 - 122 - 162 - 182 - 222 - 262 - 302




### WSH-XEE SIZE 352 - 402 - 432 - 452 - 502 - 552 - 602 - 702 - 802



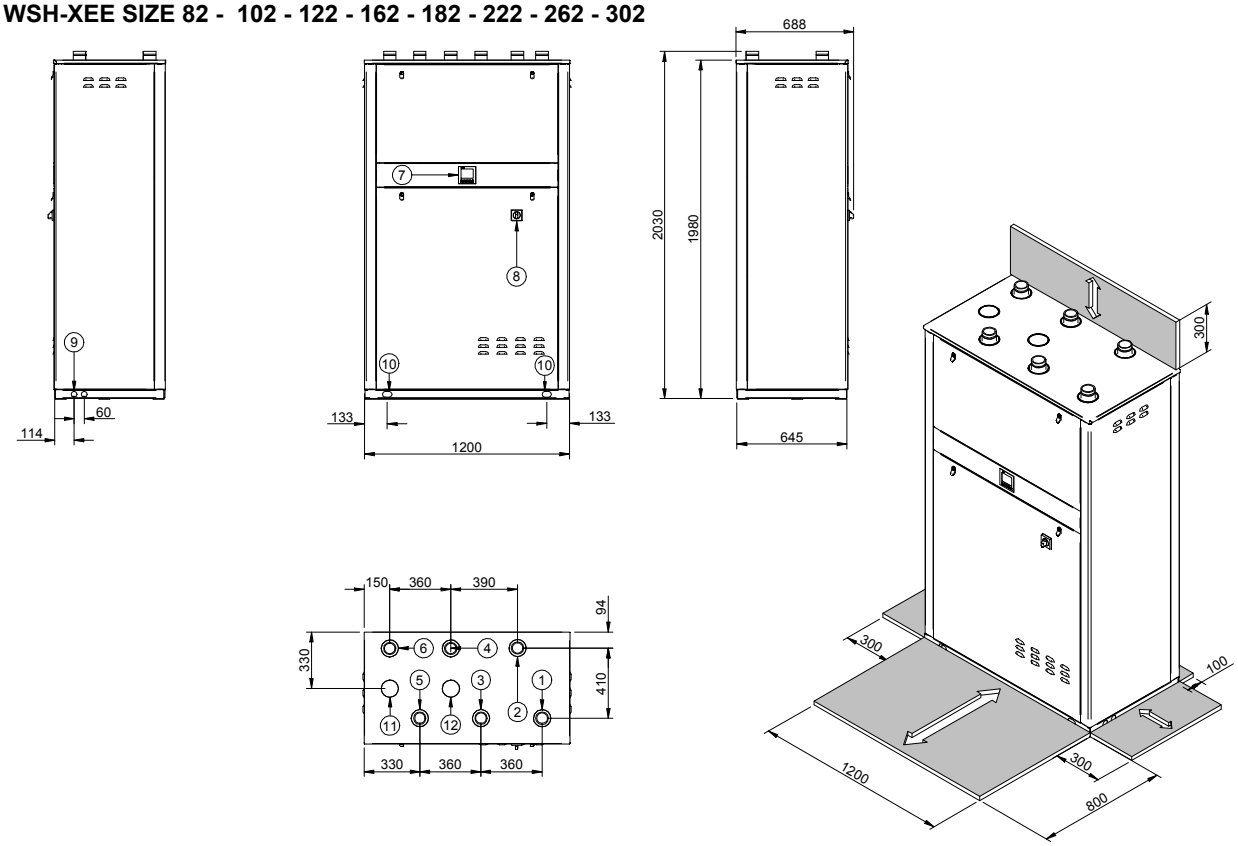

(1) HEATING SIDE EXCHANGER WATER INLET
(2) HEATING SIDE EXCHANGER WATER OUTLET
(3) COOLING SIDE EXCHANGER WATER INLET
(4) COOLING SIDE EXCHANGER WATER OUTLET
(5) RECOVERY SIDE EXCHANGER WATER INLET (OPTIONAL)
(6) RECOVERY SIDE EXCHANGER WATER OUTLET (OPTIONAL)
(7) MULTI-FUNCTION KEYPAD
(8) MAIN ISOLATOR SWITCH
(9) POWER INPUT
(10) LIFTING POINTS

| SIZE | | | 82 | 102 | 122 | 162 | 182 | 222 | 262 | 302 | 352 | 402 | 432 | 452 | 502 | 552 | 602 | 702 | 802 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length | **A** | mm | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 |
| High | **B** | mm | 1452 | 1452 | 1452 | 1452 | 1452 | 1452 | 1452 | 1452 | 1624 | 1624 | 1624 | 1624 | 1624 | 1624 | 1624 | 1624 | 1624 |
| Deep | **C** | mm | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 980 | 980 | 980 | 980 | 980 | 980 | 980 | 980 | 980 |
| Pipe diameter (1) | | | 1”1/2 | 1”1/2 | 1”1/2 | 2” | 2” | 2” | 2”1/2 | 2”1/2 | 2”1/2 | 2”1/2 | 3” | 3” | 3” | 3” | 3” | 4” | 4” |
| Operating weight | | kG | 382 | 400 | 427 | 476 | 489 | 503 | 513 | 579 | 977 | 1007 | 1132 | 1142 | 1156 | 1186 | 1216 | 1260 | 1288 |
| Shipping weight | | kG | 370 | 388 | 413 | 459 | 469 | 481 | 488 | 546 | 940 | 968 | 1083 | 1093 | 1103 | 1132 | 1157 | 1185 | 1208 |

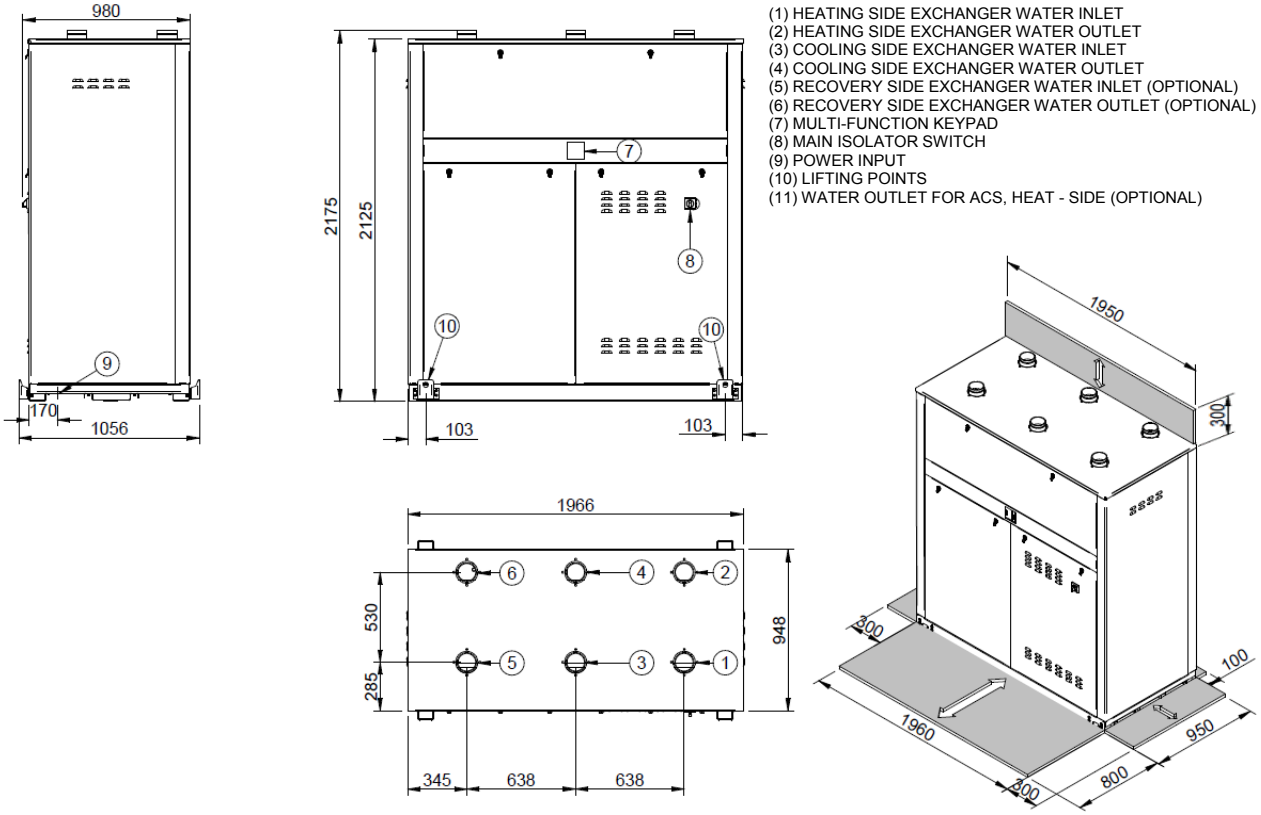
(1) The diameters of the pipes are the same user side, source side and side recovery. All water connections have the same diameter and are of the type Victaulic

## DIMENSIONAL DRAWING : STANDARD VERSION WITH HYDRONIC UNIT

### WSH-XEE SIZE 82 - 102 - 122 - 162 - 182 - 222 - 262 - 302




### WSH-XEE SIZE 352 - 402 - 432 - 452 - 502 - 552 - 602 - 702 - 802




(1) HEATING SIDE EXCHANGER WATER INLET
(2) HEATING SIDE EXCHANGER WATER OUTLET
(3) COOLING SIDE EXCHANGER WATER INLET
(4) COOLING SIDE EXCHANGER WATER OUTLET
(5) RECOVERY SIDE EXCHANGER WATER INLET (OPTIONAL)
(6) RECOVERY SIDE EXCHANGER WATER OUTLET (OPTIONAL)
(7) MULTI-FUNCTION KEYPAD
(8) MAIN ISOLATOR SWITCH
(9) POWER INPUT
(10) LIFTING POINTS
(11) WATER OUTLET FOR ACS, HEAT - SIDE (OPTIONAL)

| SIZE | | | 82 | 102 | 122 | 162 | 182 | 222 | 262 | 302 | 352 | 402 | 432 | 452 | 502 | 552 | 602 | 702 | 802 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length | **A** | mm | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 | 1966 |
| High | **B** | mm | 2030 | 2030 | 2030 | 2030 | 2030 | 2030 | 2030 | 2030 | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |
| Deep | **C** | mm | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 688 | 980 | 980 | 980 | 980 | 980 | 980 | 980 | 980 | 980 |
| Pipe diameter (1) | | | 1”1/2 | 1”1/2 | 1”1/2 | 2” | 2” | 2” | 2”1/2 | 2”1/2 | 2”1/2 | 2”1/2 | 3” | 3” | 3” | 3” | 3” | 4” | 4” |
| Operating weight | | kG | 602 | 620 | 647 | 699 | 742 | 756 | 770 | 894 | 1302 | 1333 | 1462 | 1472 | 1486 | 1651 | 1680 | 1737 | 1765 |
| Shipping weight (2) | | kG | 587 | 605 | 630 | 676 | 716 | 728 | 735 | 850 | 1254 | 1283 | 1397 | 1407 | 1417 | 1581 | 1606 | 1634 | 1657 |

(1) The diameters of the pipes are the same user side, source side and side recovery. All water connections have the same diameter and are of the type Victaulic
(2) Weights refer to the units with hydronic group wih 4 pumps

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**CLIVET SPA**
Via Camp Lonc 25, Z.I. Villapaiera - 32032 Feltre (BL) - Italy
Tel. + 39 0439 3131 - Fax + 39 0439 313300 - info@clivet.it

**CLIVET UK LTD**
4 Kingdom Close, Segensworth East - Fareham, Hampshire - PO15 5TJ - United Kingdom
Tel. + 44 (0) 1489 572238 - Fax + 44 (0) 1489 573033 - info@clivet-uk.co.uk

**CLIVET ESPAÑA S.A.**
Parque Empresarial Villapark, Avda. Quitapesares 50 - 28670, Villaviciosa de Odón, Madrid - España
Tel. + 34 91 6658280 - Fax + 34 91 6657806 - info@clivet.es

**CLIVET GmbH**
Hummelsbütteler Steindamm 84, 22851 Norderstedt - Germany
Tel. + 49 (0) 40 32 59 57-0 - Fax + 49 (0) 40 32 59 57-194 - info.de@clivet.com

**CLIVET NEDERLAND B.V.**
Siliciumweg 20a, 3812 SX Amersfoort - Netherlands
Tel. + 31 (0) 33 7503420 - Fax + 31 (0) 33 7503424 - info@clivet.nl

**CLIVET RUSSIA**
Elektrozavodskaya st. 24, office 509 - 107023, Moscow, Russia
Tel. + 74956462009 - Fax + 74956462009 - info.ru@clivet.com

**CLIVET MIDEAST FZC**
Rep Office: PO Box 28178 - Light industrial unit #10 -Dubai Silicon Oasis - Dubai,UAE
Tel. + 97 14 3208499 - Fax + 97 14 3208216 - info@clivetme.com

**CLIVET AIRCONDITIONING SYSTEMS (P) LTD**
3C3, Gundecha Onclave,
Kherani Road, Saki Naka, Andheri (East), Mumbai 400 072 (INDIA)
Tel. + 91 - 22 - 6193 7000 - Fax + 91 - 22 - 6193 7001 - sales.india@clivet.com