ecoFOREST
biomasa - bomba de calor - solar


Gama ecoGEO HP GEN3

**EN** # TECHNICAL MANUAL

**MODELO:**

**CONTACTO DEL SAT:**

# Contents

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# 1. General Information

This manual contains the necessary information to install the heat pump. Read this manual carefully before installing the equipment. Keep this manual handy for future reference.

This manual contains two different kinds of warnings that should be heeded.

**NOTE**

- Indicates a situation that may cause material damage or malfunctioning of the equipment. May also be used to indicate practices which are recommended or not recommended for the equipment.

**DANGER!**

- Warning of imminent or potential danger which, if not avoided, may result in injury or even death. May also be used to warn of unsafe practices.

ecoGEO heat pumps are designed to function within heating systems, cooling systems, for the production of domestic hot water (DHW), pool heating or other similar uses. The manufacturer is not responsible for any material damage and/or personal injury resulting from improper use or incorrect installation of the equipment.

The heat pump must be installed by a licensed installer in accordance with applicable local regulations and in accordance with the installation instructions described in this manual.

## 1.1. Safety considerations

The detailed instructions in this section cover important aspects for your safety; as such they must be strictly complied with.

**DANGER!**

- All the installation and maintenance work described in this manual must be performed by an authorised engineer.
- Children shall not play with the heat pump.
- Cleaning and user maintenance shall not be made by children without supervision.
- Improper installation or use of the equipment could cause electrocution, short circuits, leakage of working fluids, fire or other personal injury and/or material damage.
- If you are unsure of the procedures for installation, maintenance or use of the equipment, contact your local dealer or technical support for advice.
- If you detect a malfunction in the unit, contact your local dealer or technical support to answer any questions.
- When carrying out installation, maintenance or commissioning of the heat pump, always use appropriate personal protective equipment.
- Keep the plastic bags included in the packaging out of the reach of children, as they could result in injury through asphyxia.

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**Refrigerant**

The heat pump uses R410A refrigerant as operating fluid. This refrigerant is not harmful to the environment as it does not contain chlorine, and therefore does not contribute to the destruction of the ozone layer. Under normal operation of the heat pump the toxicity of the refrigerant is nil and there is no risk of explosion. However, the following precautions should be taken in the event of refrigerant leakage.

**DANGER!**

- The refrigerant contained in the heat pump should not be released in the atmosphere, since it contributes to global warming of the planet (GWP = 1725).
- The refrigerant should be recovered for recycling or elimination according to current legislation.
- Do not directly touch the area where the leak has occurred, as this could result in severe frostbite injuries.
- Ventilate the area immediately.
- Anyone who has come into contact with refrigerant vapour must evacuate the area immediately and breathe fresh air.
- Direct exposure of the refrigerant to a flame produces toxic gas. However, this gas can be detected by its odour when at concentrations well below the permitted limits.

**Hydraulic installation**

Installation and subsequent interventions on the heating, brine or DHW circuits must only be performed by authorised personnel in accordance with applicable local regulations and the instructions provided in this manual.

**DANGER!**

- Do not touch any of the internal components during or immediately after heat pump operation; this can result in burns caused by cold or heat. If these components need to be touched, allow sufficient time for the temperatures to stabilise and wear protective gloves to avoid injury.

**Water quality**

Be aware of how the DHW circuits and tank of the heat pump react to corrosion. If you are not sure about the quality of the water available for filling the system, analyse it. In the following tables you can check the water quality level requirements for the production and brine circuit.

| Water components | Concentration in mg/l | Water components | Concentration in mg/l |
|---|---|---|---|
| Alkalinity | $HCO_3^-$ < 70 | Free carbon dioxide | $CO_2$ < 5 |
| Sulphur | $SO_4^{2-}$ < 70 | Nitrate | $NO_3^-$ < 100 |
| Alkalinity / Sulphur | $HCO_3^-/SO_4^{2-}$ > 1 | Iron | Fe < 0.2 |
| Ammonium | $NH_4$ < 2 | Aluminium | Al < 0.2 |
| Free chlorine | $Cl_2$ < 1 | Manganese | Mn < 0.1 |
| Hydrogen sulphur | $H_2S$ < 0.05 | Chloride | $Cl^-$ < 300 |

**Table 1.1.** Concentration limits of water elements for production and brine circuits.

| Water properties | Limit values |
|---|---|
| pH | 7.5 < pH < 9 |
| Hardness | 4 < °dH < 8.5 |
| Electrical conductivity | 10 < µS/cm < 500 |

**Table 1.2.** Water property limits for production and brine circuits.



**DANGER!**

- Risk of damage due to unsuitable water.
- Deposits caused by the use of unsuitable water can damage the brine source, the pipes, the heat exchangers and the DHW tank of the heat pump.
- The use of sea water is not permitted.
- The quality of the drinking water must comply with the applicable regional regulations and the instructions in this manual.

**Electrical system**

Any intervention on the electrical system must only be performed by an authorised electrician in accordance with applicable local regulations and the instructions provided in this manual.

**DANGER!**

- Remember that the heat pump has multiple external power supply.
- The heat pump must be supplied with an external switch that can shut off all the circuits. Ecoforest recommend installing one external automatic breaker in each external power supply (control, internal auxiliary equipment and drive).
- Before performing any operation on the electrical panel, disconnect the power supply.
- During installation and maintenance of the equipment never leave the electrical panel unattended while it is exposed.
- Do not touch any component of the electrical panel with wet hands as this could cause an electric shock.

## 1.2. Disposal

This device should not be treated as household waste.
At the end of its useful life, dispose of the device properly in accordance with local regulations and in an environmentally friendly way.

The heat pump uses R410A refrigerant in its circuit. This refrigerant is not harmful to the environment, but once its useful life cycle has finished, the refrigerant must be recovered and recycled or disposed of according to current regulations.

The heat pump cannot be disposed of with household waste when its useful life ends. Carry out the elimination of the appliance in accordance with the pertinent local regulations, in a correct and respectful way with the environment. Put the product at the end of its useful life in the hands of the waste manager authorized by the local authorities for transport to an appropriate treatment plant.

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# 2. Heat pump installation

## 2.1. Transport and handling

The heat pump must be transported vertically and not exposed to adverse weather conditions. It can be lain carefully on its rear side to facilitate transportation to the installation site.

**NOTE**

- Do not tilt the heat pump more than 45º, since this could impair proper equipment operation.
- Due to its heavy weight, the heat pump should be handled by two workers using a forklift for heavy loads.

## 2.2. Dimensions and connections

The overall dimensions and hydraulic connections of the ecoGEO HP 12-40 and ecoGEO HP 15-70 heat pumps are described below.

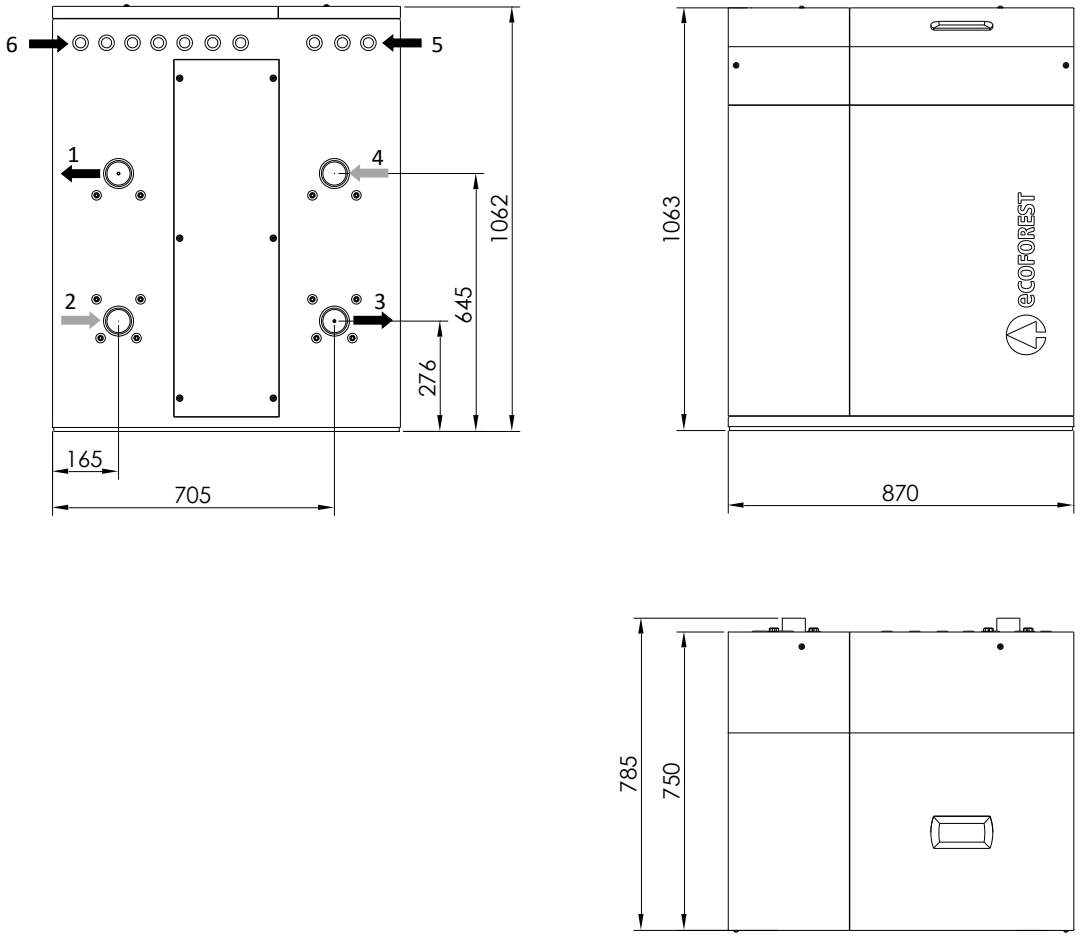


**Figure 2.1.** Overall dimensions and hydraulic connections of the ecoGEO HP 12-40 and ecoGEO HP 15-70 models (Amounts in mm).

The overall dimensions and hydraulic connections of the ecoGEO HP 25-100 heat pump are described below.

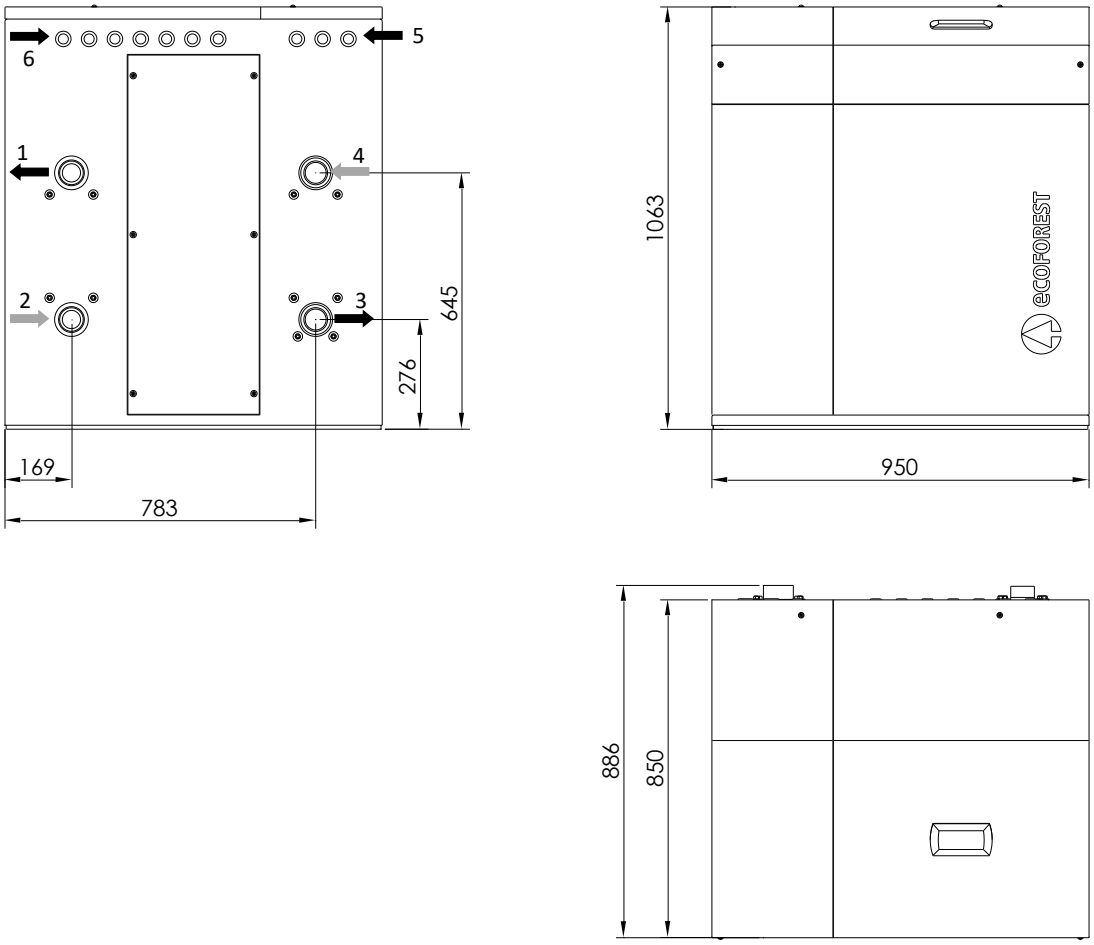


**Figure 2.2.** Overall dimensions and hydraulic connections of the ecoGEO HP 25-100 model (Amounts in mm).

| No | ecoGEO HP1 | ecoGEO HP3 |
|---|---|---|
| 1 | Heating supply / heat dissipation | Heating / cooling supply |
| 2 | Heating return / heat dissipation | Heating / cooling return |
| 3 | Brine / cooling supply | Brine supply / heat dissipation |
| 4 | Brine / cooling return | Brine return / heat dissipation |
| 5 | Power cables inlet | |
| 6 | Control cables inlet | |

| No | ecoGEO HP 12-40 | ecoGEO HP 15-70 | ecoGEO HP 25-100 |
|---|---|---|---|
| 1 | G2” Male | G2” Male | G2-1/2” Male |
| 2 | | | |
| 3 | | | |
| 4 | | | |

**Table 2.1.** Overall hydraulic connections of the ecoGEO HP.

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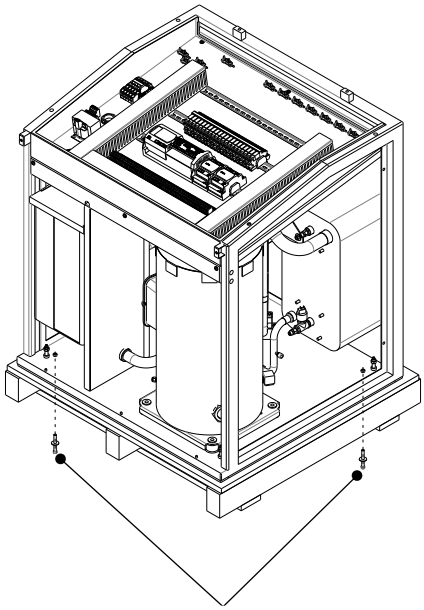
## 2.3. Unpacking

To unpack the heat pump, remove the wooden box carefully, remove the pallet anchoring screws and perform a check to make sure the heat pump has not been damaged during transportation.



Anchoring studs to the pallet

**Figure 2.3.** Removing the screws fastening the heat pump to the pallet.

## 2.4. Assembly and disassembly of the covers

A 4 mm allen wrench is needed to assemble and disassemble the covers.

**ecoGEO HP Models**

1. Disassemble the top front cover. Remove the front and top screws. Pull the cover upwards.
2. Disassemble the bottom front cover. Remove the screws located at the upper part and pull upwards.
3. Disassemble the side covers. Remove the fastening screws and remove the cover.

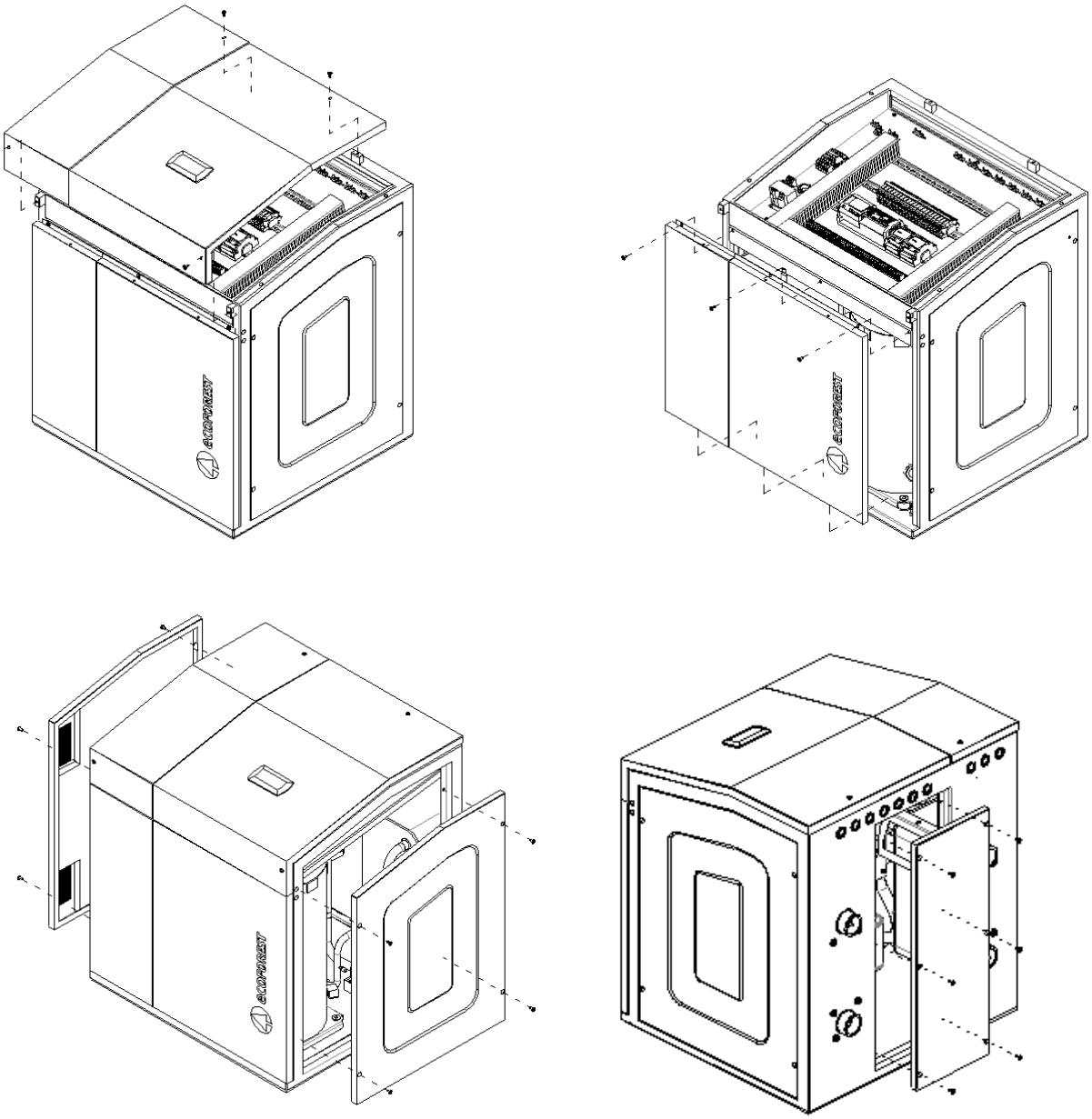


**Figure 2.4.** Disassembly of the covers of the ecoGEO HP models.

**NOTE**

- During cover disassembly, take care to remove the control panel cable without damaging it.

## 2.5. Recommended positioning

Choose a dry place where there is no risk of frost. Avoid installation against bedroom walls or walls of other rooms where noise emissions can be annoying. If possible, install the heat pump with the rear part pointed toward an exterior wall. Avoid installation near a corner, since this can amplify noise emission levels.

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The heat pump should be installed on a stable base that can support the total weight of the equipment and the operating fluids in its interior. Use the adjustable legs to compensate for possible irregularities on the supporting surface.

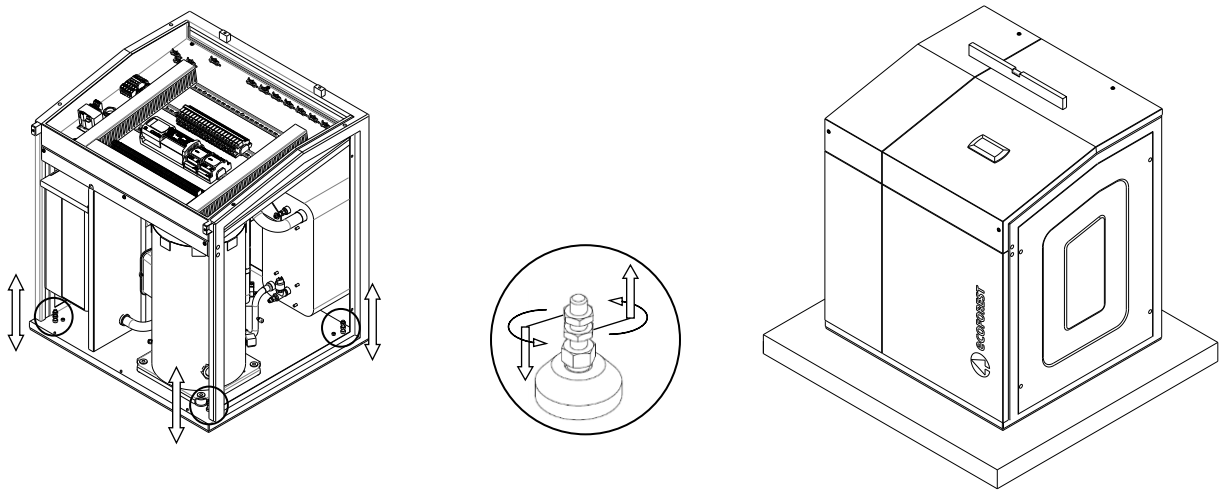

**Figure 2.5.** Positioning and levelling the heat pump.

**NOTA**

- Use the eyebolts provided with the heat pump to move the equipment to its final destination.

**DANGER!**

- Advertising: The ecoGEO heat pumps are IP20. This means its installation in high humidity conditions (laundries, saunas, ...) is forbidden.

## 2.6. Service areas

The minimum recommended distances to be left around the heat pump to facilitate installation, start-up and maintenance work are indicated below.

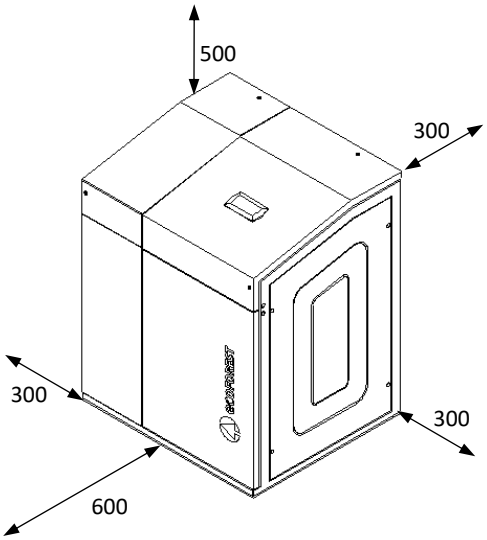


**Figure 2.6.** Minimum recommended service areas around the heat pump (amounts in mm).

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# 3. Hydraulic installation

**NOTE**

- The installation schemes included from here on should be considered simply as a guide.
- The design of the hydraulic installation must be performed by qualified personnel and in accordance with applicable local regulations.
- The design of the hydraulic system must ensure at all times the minimum required flow through the heat pump, otherwise, could cause malfunction of the equipment and even rupture.

## 3.1. General instructions

The following recommendations should be taken into consideration for proper hydraulic installation.

- Avoid excessive strain between the pipes and the heat pump connections to prevent leaks and/or transmission of vibrations. Flexible hoses should be used for heat pump connections.
- Install cut-off valves at all the hydraulic connections to facilitate future maintenance tasks.
- Install traps at all the installation points where air pockets can form.
- Place heat insulation on all circuit pipes to prevent unnecessary heat loss. Pay special attention to the heating insulation on the brine circuit pipes, since these can reach temperatures below 0ºC, causing condensation and/or frost.

**DANGER!**

- During installation work on the hydraulic circuits, take special care to prevent liquid from spilling on the internal electrical heat pump components, which could cause personal injury due to electrocution and/or poor equipment operation.
- Do not install components that might cover the inlet or outlet of the safety valves; this could lead to a risk of some of its components breaking and cause injuries and/or material damage.

## 3.2. Brine circuit

The ecoGEO heat pumps can be used with horizontal or vertical (A) geothermal brine systems or by using groundwater (B).

**DANGER!**

Carefully check the antifreeze concentration of the working fluid. Do not use automatic fill valves or other items that can change the concentration of the working fluid. Inadequate concentration of the working fluid could cause malfunction of the equipment and even rupture.

**Geothermal brine systems**

Brine systems with more than one circuit must be connected in parallel, so the flow rate through each one is similar.

**Groundwater brine systems**

Groundwater brine systems must use a midway exchanger to prevent the heat pump evaporator from corrosion, freezing or getting dirty.

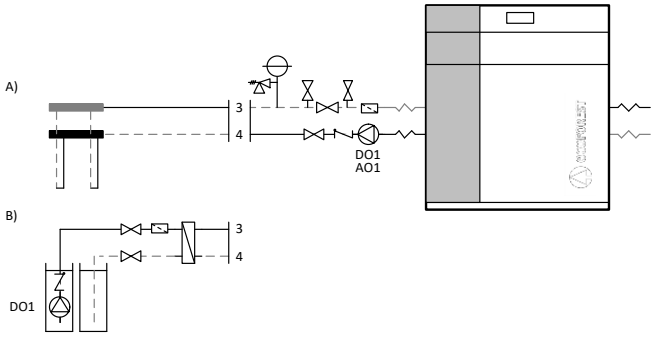

**Figure 3.1.** Brine circuit connection options.

**Installation instructions**

Follow the instructions below to wire the brine circuit.

- Install the necessary components to carry out the filling/discharge of the return pipe.
- Install a particulate filter in the return pipe with a mesh size no greater than 1 mm. It is recommended to install shut off valves immediately before and after the filter to make it easier to clean or replace.
- Install a safety unit (expansion vessel + safety valve) in the suction part of the circulator pump to protect the circuit from overpressure.
- Adjust the pressure of the expansion vessel to make sure that the circuit remains pressurised at all points.
- Brine circuit pressure should be between 0,7 and 5 bar (pressure gauge) (70 and 500 kPa).
- Use a working fluid with a freezing point of at least 10ºC below the minimum nominal working temperature of the equipment.
- Configure the equipment with a protection of at least 5ºC above the freezing temperature of the working fluid.



## 3.3. Heating / Cooling circuit

The ecoGEO HP heat pumps can be connected to various types of heating / cooling systems, both directly and by separating buffer storage tanks. On the other hand, these enable control over several devices that are external to the heating / cooling system directly from the heat pump's electrical panel.

**Heating / cooling system**

The ecoGEO HP heat pumps are designed to be used with heating systems with nominal outlet temperatures of up to 55ºC; such as underfloor heating systems, low temperature radiators or convectors. They are not recommended for use in heating systems that require higher temperatures.

The ecoGEO HP heat pumps can be used with cooling systems with nominal outlet temperatures of up to 7ºC, such as convectors and underfloor cooling systems.

Special care should be taken in the design and control in installations with underfloor cooling, to prevent problems of condensation on floors.

All the models allow control over external passive cooling units.

**Direct installation**

In simple heating / cooling systems, ecoGEO HP heat pumps can be installed directly into the distribution system, in systems with underfloor heating, low temperature radiators and convectors.

This configuration makes it possible to simplify the hydraulic installation, reduce costs and space, while optimizing the energy efficiency of the equipment. However, the design of the hydraulic installation must guarantee the minimum required flow at all times through the heat pump. For this, the necessary elements must be planned to protect the heat pump in the event of a low flow situation in the emission system. For this, the installation can be planned to operate with at least one of the emission circuits open continuously. If all the emission circuits can be closed, it is recommended to install a differential pressure valve between the outlet and inlet pipes of the heat pump. Other solutions can also be considered, such as the installation of a hydraulic separator between the heat pump and the emission system, as long as the minimum required flow is guaranteed (see section 10).

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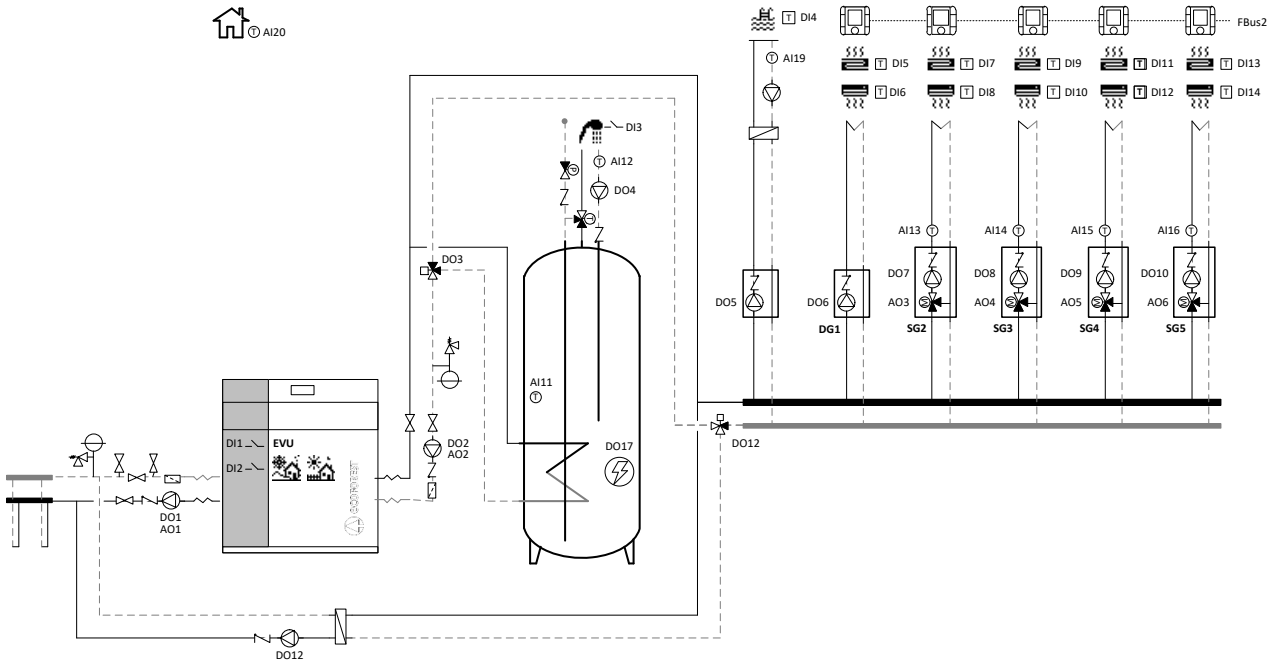


**Figure 3.2.** Wiring scheme directly to the heating / cooling system (ecoGEO HP3 models).

**Installation using buffer storage tanks**

If required by the application, the heat pump can also be connected to the heating / cooling system using a buffer separator tank. To do so, it is equipped with two temperature probes that are used to control a buffer storage tank for heating and a buffer storage tank for cooling. In installations where there is only one buffer storage tank for heating and cooling, both probes have to be installed in the storage tank. Install the temperature probes at the points where heating / cooling production begins. Heating / cooling production is stopped by the return temperature probe installed inside the heat pump.

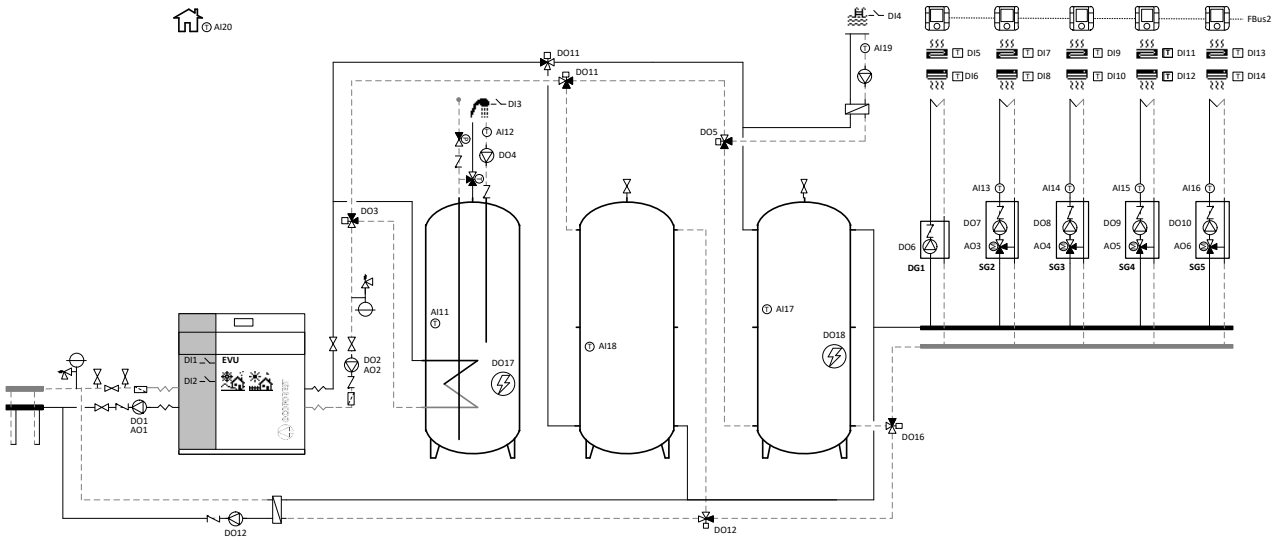


**Figure 3.3.** Wiring scheme using two buffer storage tanks (ecoGEO HP3 models).

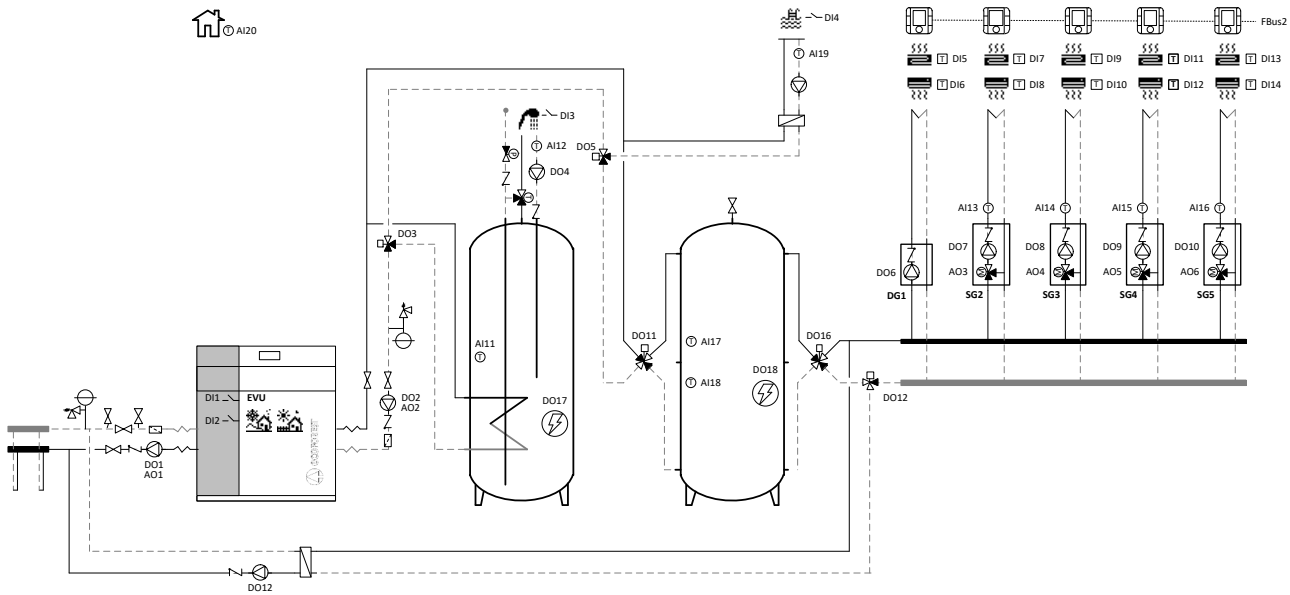


**Figure 3.4.** Wiring scheme using one buffer storage tanks (ecoGEO HP3 models).

**Outlet units**

These can manage as many as five different outlet temperatures. This is done by managing one direct outlet unit and four combined outlet units. The combined outlet units have to use modulating 3-way valves with an analogue signal of 0-10Vdc. Each outlet unit has independent terminals for heating and cooling demands. These signals are supplied with 24Vac voltage.

**DHW Recirculation**

This is used to control activation of the DHW recirculation pump, depending on the temperature recorded in the recirculation line and the established time schedule.

**Pool**

This is used to control pool heating production through an intermediate heat exchanger. Pool production can be enabled / disabled with an external digital input.

**Auxiliary equipment integrated in the heating buffer storage tank**

This is used to control an auxiliary unit integrated in the heating buffer storage tank. It can be used for normal heat production or as emergency equipment.

**Auxiliary boiler**

This is used to control start-up / stop of an auxiliary boiler and regulate final temperature downstream from the boiler by a 0-10 Vdc modulating 3-way valve. The heat pump can use the boiler to assist in normal heat production or as emergency equipment.

**NOTE**

- The hydraulic installation must ensure that while the boiler is operation, the temperature through the heat pump never exceeds 65ºC, since this could cause serious damage to the refrigerant circuit.

**Simultaneous production**

This is used to control systems that product heat and cold simultaneously. In these types of installations, the heat pump moves energy from the cold production system to the various heat production systems and controls both the hot and cold outlet temperature. On the other hand, it uses modulating valves to detour part of the cold or heat production to the brine system, there by maintaining the energy balance.

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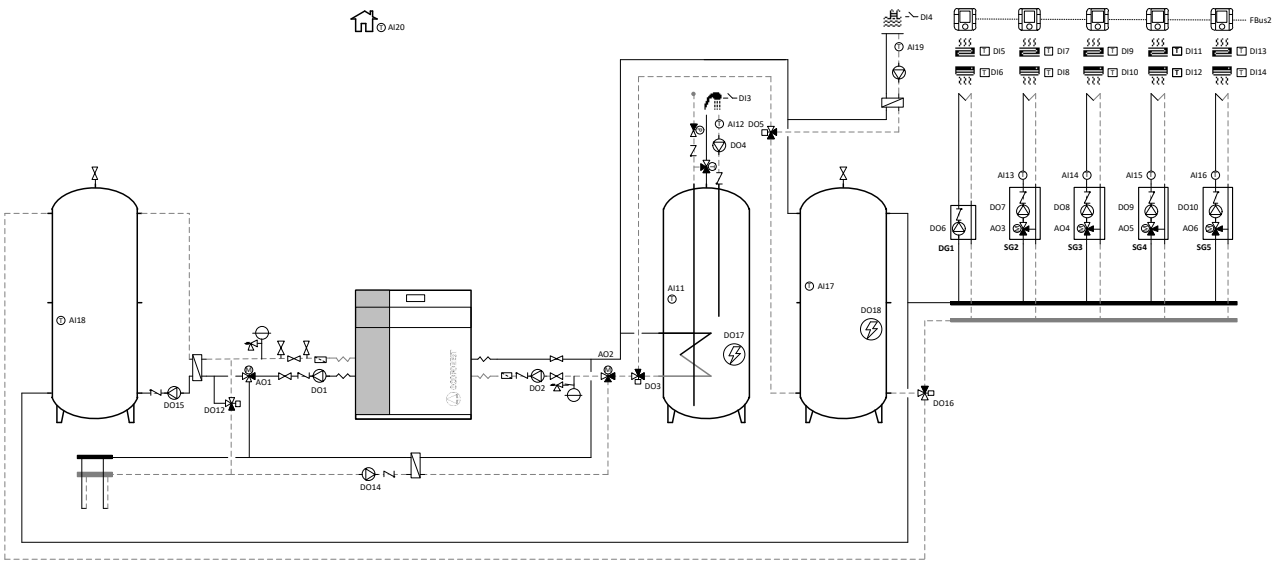


**Figure 3.5.** Wiring scheme using two buffer storage tanks with simultaneous production (ecoGEO HP1 models).

**Installation instructions**

Follow the instructions below to connect the heating / cooling circuit.

- Install a particulate filter in the return pipe with a mesh size no greater than 1 mm. It is recommended to install shut off valves immediately before and after the filter to make it easier to clean or replace.
- Check that the volume of the expansion vessel integrated in the heat pump is capable of absorbing any overpressures from the circuit. If this volume is not enough, install a supplementary external expansion vessel.
- If necessary, adjust the pressure of the expansion vessel integrated in the heat pump to guarantee that the circuit remains pressurised at all points.
- If there is an auxiliary system integrated in the heating storage tank, install a safety valve to protect it from any overpressures.
- Heating / cooling circuit pressure should be between 0,7 and 2 bar (pressure gauge) (70 and 200 kPa).

# 4. Filling and discharge circuits

**DANGER!**

- During filling work on the hydraulic circuits, take special care to prevent liquid from spilling on the internal electrical heat pump components, which could cause personal injury due to electrocution and/or poor equipment operation.

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## 4.1. Filling the production circuit (heating, cooling, DHW and pool)

Take the following steps to fill the circuit.

1. Open all the valves of the production circuits.
2. Fill the circuit through the filling valve until the target pressure is reached. Make sure that the pressure does not exceed 3 bar (pressure gauge) under any circumstance.
3. Remove the air from the circuit using the traps installed for that purpose.
4. Check the circuit pressure and repeat the filling process if necessary.

## 4.2. Filling the brine circuit

The brine system temperature can fall below 0°C, so a mixture of water/antifreeze must be used. It is recommended to use propylene glycol as an antifreeze additive or ethylene glycol with a corrosion inhibitor. Please check local regulations before using any type of antifreeze mixture.

When preparing the mixture, be careful to calculate the volume of antifreeze necessary to reach the desired degree of antifreeze protection. It is recommended to use a mixture with a freezing point at least 10ºC below the nominal minimum temperature.

Brine circuit filling should be done with the filling unit installed in the return pipe and an external circulation pump, taking the following steps.

1. Prepare the appropriate proportions of antifreeze mixture in external tank A.
2. Connect the external recirculation pump outlet to valve D.
3. Connect a transparent hose from valve E to antifreeze mixture tank A.
4. Close valve C and open filling valves D and E.
5. Start the external recirculation pump and keep it running until the return is completely free of air and the antifreeze mixture is mixed perfectly.
6. Open valve C and keep the external pump connected to remove the air between valves D and E.
7. Close valve E and pressurise the circuit to target pressure. Make sure that the pressure does not exceed 3 bar (pressure gauge) under any circumstance.
8. Close valve D.

After completing the brine circuit filling process, it is recommended to check the concentration of antifreeze mixture again using a refractometer.

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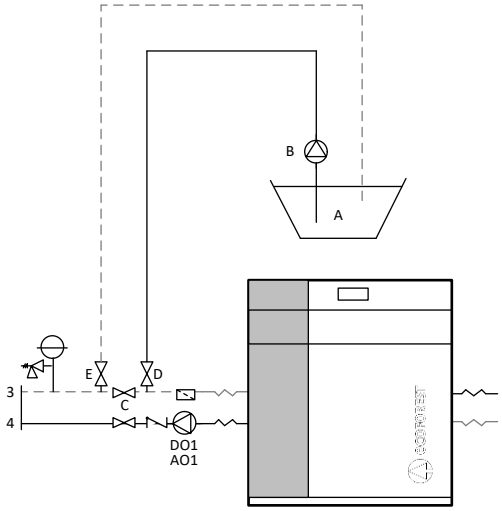


**Figure 4.1.** Filling the brine circuit.

# 5. Electrical system

**DANGER!**

- Before performing any operation on the electrical panel, disconnect the power supply.
- Remember that the heat pump has multiple external power supply.
- Ecoforest recommend installing one external automatic breaker in each external power supply (control, internal auxiliary equipment and drive).
- All the installation and maintenance work must be performed by an authorized technician following local regulations and according to the instructions described in the heat pump installation manual.
- The cables used to connect the heat pump must comply with the applicable national regulations.

## 5.1. General instructions

The locations of the main electrical panel components are shown below.

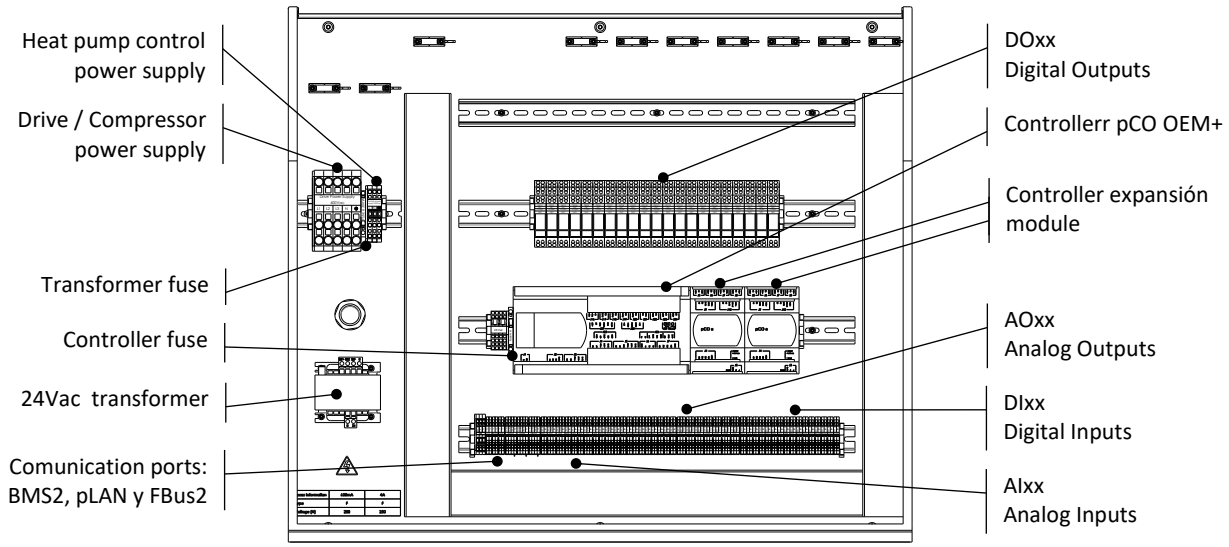


**Figure 5.1.** Location of the components in the electrical panel.

Several installation devices are controlled from the heat pump electrical panel. Some are internal and other are installed externally. The internal components are connected to the electrical panel in the factory. Depending on the installation that the heat pump is going to be connected to, in addition to the power supply, it may be necessary to connect various temperature probes (analogue inputs AIxx), control signals from thermostats or other external equipment (digital inputs DIxx) on/off switching of pumps and/or valves (digital outputs DOxx) or regulation of pumps and/or valves (analogue outputs AOxx).

The figure below shows a sample installation with the options for connecting external components to the heat pump.

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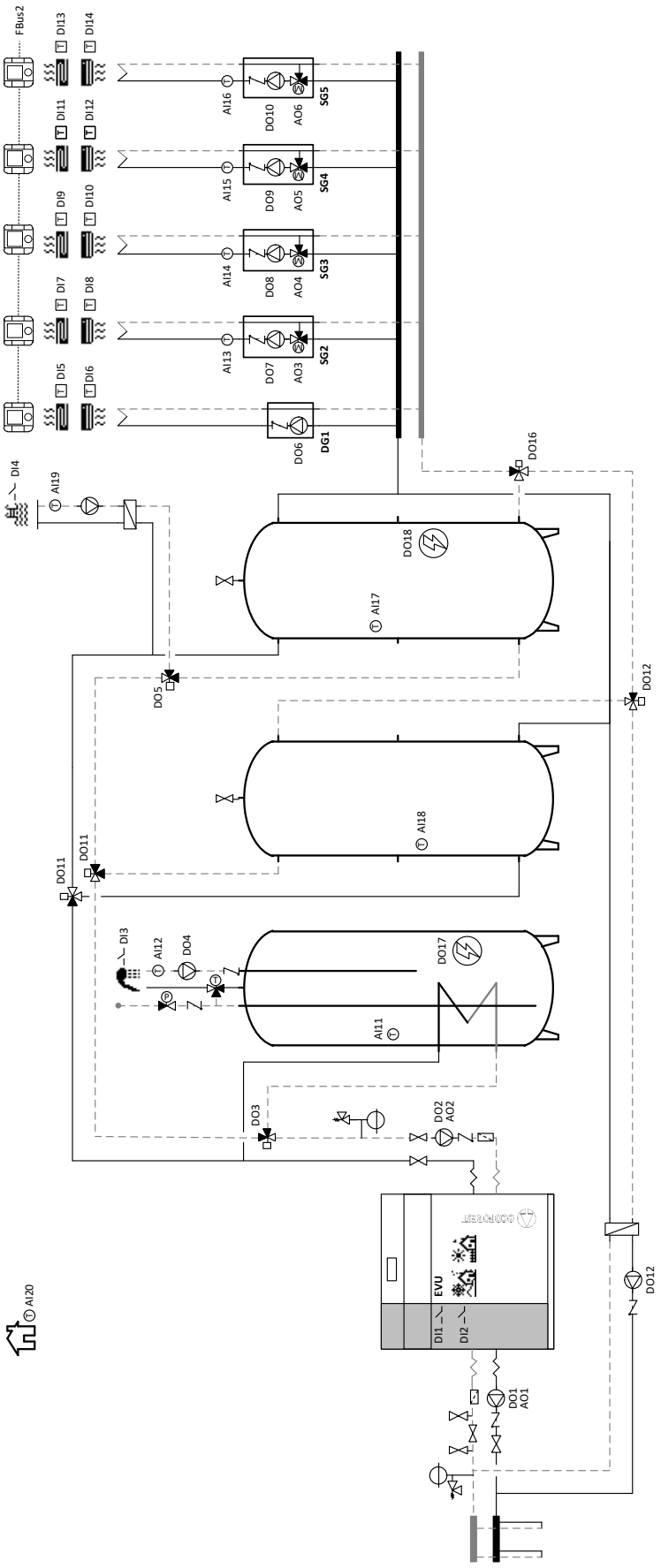


**Figure 5.2.** General electrical connections scheme of the heat pump.

**Analogue inputs (AIxx)**

These terminals are used to connect external temperature probes. Only passive NTC temperature probes can be connected, so cable connection polarity is not important.

If necessary, use extension cables with a maximum length of 50 m and a minimum diameter of 0,75 $mm^2$. For greater lengths (up to 120 m) it is recommended to use cable with a section of 1.5 $mm^2$.

**NOTE**

- Use original temperature probes only; other types of components could cause poor heat pump operation and/or cause heat pump component breakdowns.

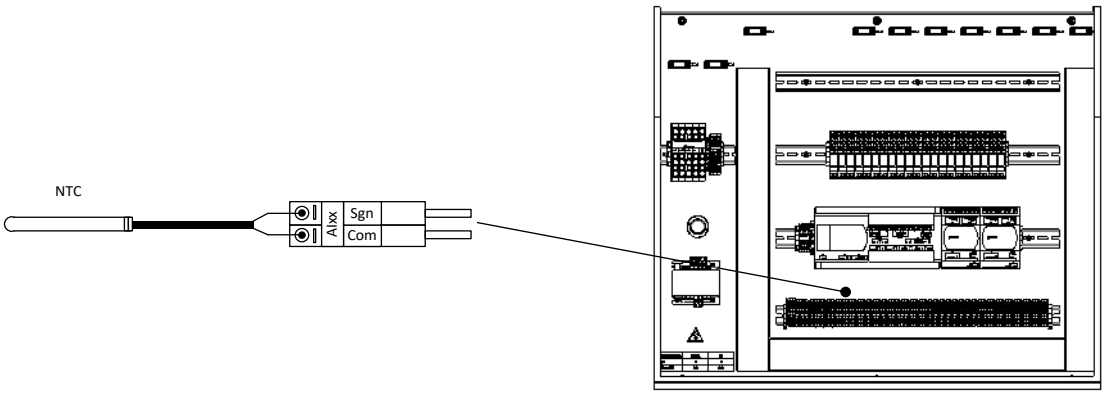


**Figure 5.3.** Example of temperature probe connections.

**Digital control inputs (DIxx)**

Digital signals from thermostats or other external devices can be connected to these terminals to control heat pump production functions.

**NOTE**

- Take special care with the working voltage of each digital input; improper handling could cause poor heat pump operation and/or heat pump component breakdowns. Some digital inputs require voltage-free signals, while others require 24Vac signals, 24Vac are powered by the terminal block connection.
- Do not combine free signal with 24Vac signal.

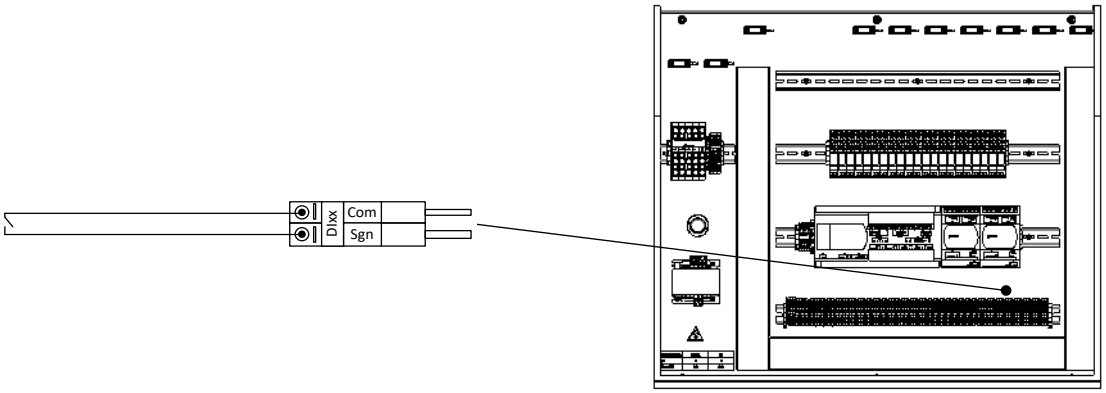


**Figure 5.4.** Example of voltage-free digital input connections.

**NOTE**

- Heat pump provides 24Vac connection from the electrical panel, all the devices connected to the heat pump cannot exceed 48VA or 2A. Exceed these limits could cause poor heat pump operation and/or heat pump component breakdowns.

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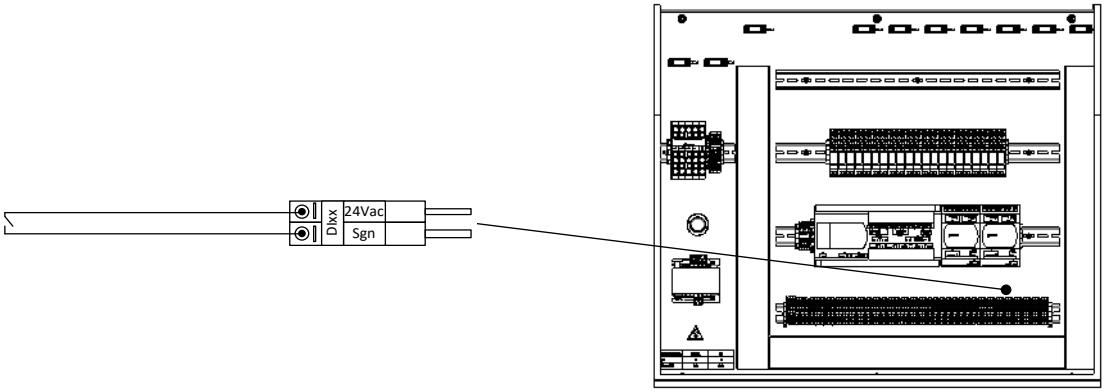


**Figure 5.5.** Example of digital input connections with 24Vac voltage.

**Analogue outputs (AOxx)**

These terminals send analogue 0-10Vdc regulation signals to modulate the control of outlet units with mixture, aerothermal brine units with variable speed fan, external auxiliary boilers, etc. On the other hand, these connectors have a 24Vac power supply terminal to supply the modulating valve motor.

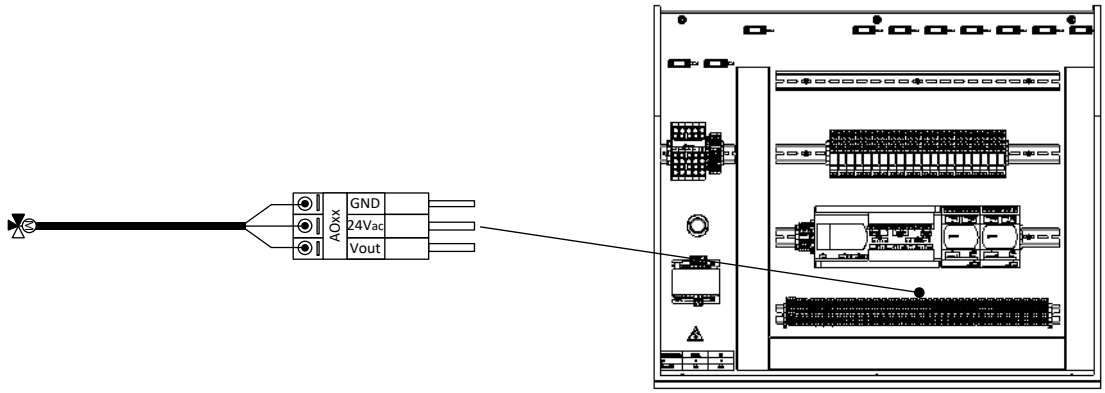


**Figure 5.6.** Example of 0-10Vdc modulating regulation signal connections.

**Digital outputs to relay (DOxx)**

The relay terminal block provides digital outputs to control external equipment, such as circulator pumps or open / closed valves. Each relay should be powered externally with the operating voltage of the component to be controlled. Power is supplied to each relay separately, so different operating voltages can be used in each. The following figure shows an example of an installation of a relay power supply.

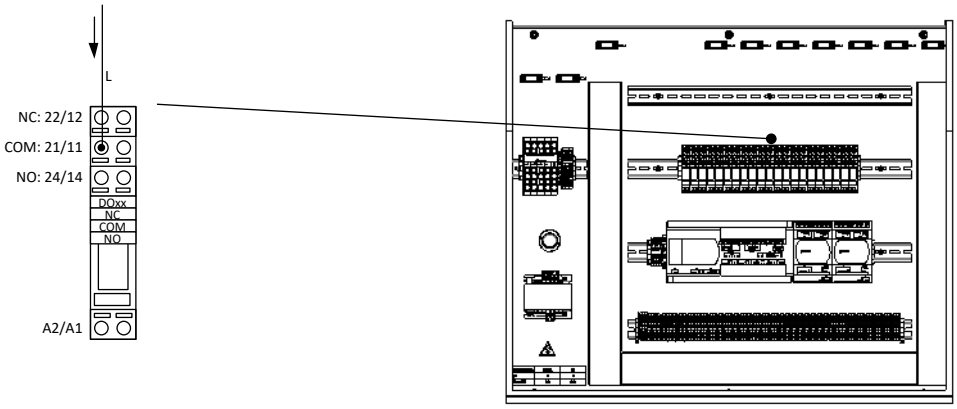


**Figure 5.7.** Example of digital output relay power supply connections.

Each relay allows independent pole switching; it can thus control the switching on/off of the units, including those powered with a different voltage. The capacity of the relays is 8A/250Vac per pole. If the equipment to be controlled exceeds this capacity, an external relay or contactor must be installed. Shown below are examples of connections between circulator pumps and 3-way valves with controls at 2 or 3 points.

**NOTA**

- Pay special attention to the maximum consumption allowed by each relay. Use an intermediate relay for the connection, if necessary.

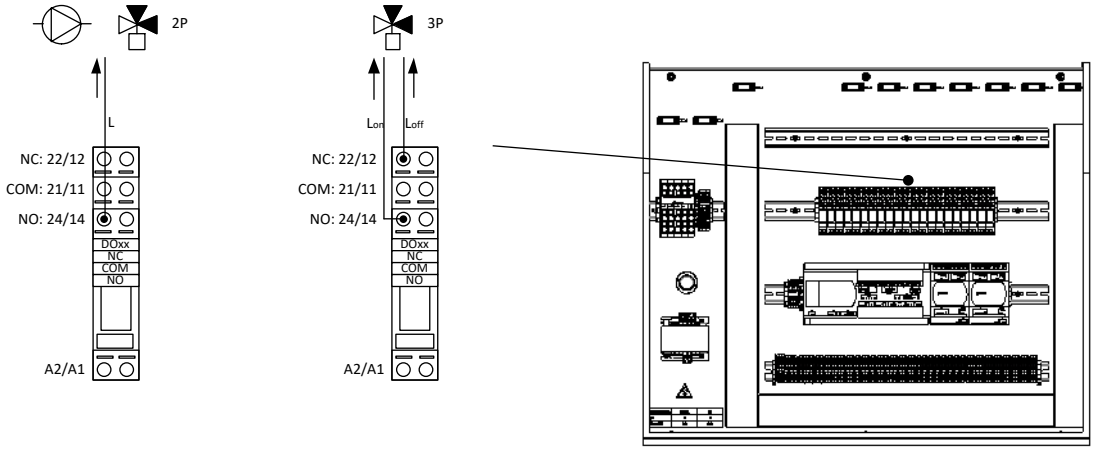


**Figure 5.8.** Example of digital output connections.

**ModBus RS485 (FBus2) Communication Port**

Internal terminals with thT bus communication data can be connected to this terminal.

## 5.2. Heat pump power supply

Ecoforest ecoGEO HP heat pumps require two power supply points. One for the power supply of the control panel; this unit includes the power supply of the internal and external valves and also that of the regulation signals and the digital and analogue inputs. The other power supply is exclusively dedicated to the compressor. Heat pumps must be powered via an automatic external differential switch which switches off all the circuits and which detects at least alternating or pulsating leakage currents with or without a continuous component, i.e. a type A or A HI component ( ). In addition to the differential switch mentioned above, the heat pump must be protected by an external thermal-magnetic switch.

To carry out the electrical installation, insert the power cables through the cable grommet holes at the back of the heat pump. Continue by connecting the cables to the power terminal block of the heat pump, as described in figures 5.9 and 5.10.

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**Power supply of the control panel**

The control panel power supply is always single-phase; the following table shows the characteristics of the necessary electrical connection:

| Type of power supply | Type of protection | Cut-off current | Recommended cable section |
|---|---|---|---|
| 1/N/PE 230 V / 50-60 Hz | Magnetic, thermal and differential protection | 1 A | 1 $mm^2$ |

**Table 5.1.** Characteristics of the control panel's power supply.

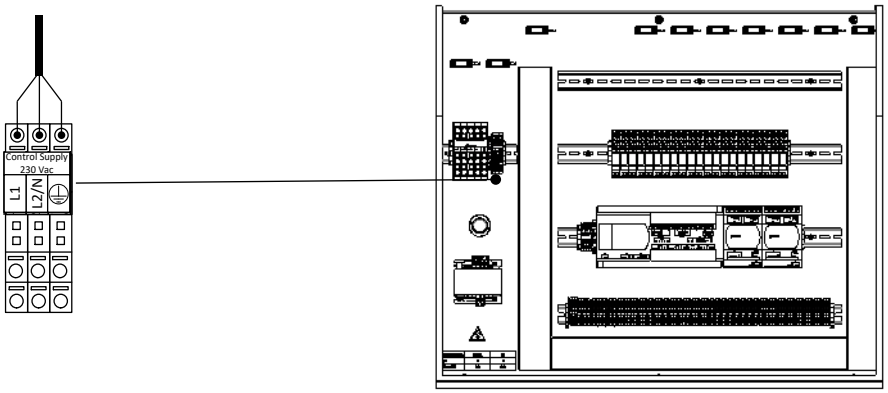


**Figure 5.9.** Connection scheme of the control panel's power supply.

**Power supply of the compressor**

The compressor power supply is always three-phase. The following table shows the characteristics of the necessary electrical connection.

| Type of power supply | Type of protection | Cut-off current | Recommended cable section |
|---|---|---|---|
| 3/PE 400V / 50-60Hz | Magnetic, thermal and differential protection | 25 A | 6 $mm^2$ |
| | | 32 A | 10 $mm^2$ |
| | | 50 A | 16 $mm^2$ |

**Table 5.2.** Characteristics of the electrical power supply of the compressor.

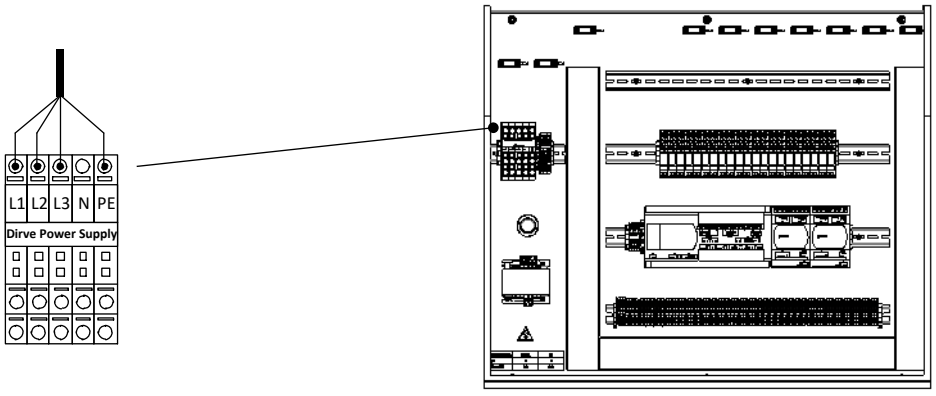


**Figure 5.10.** Connection scheme of the power supply of the compressor.

## 5.3. External protections

It is equipped with a connector that can be connected to various types of external mechanical protections, such as flow switches, pressure switches, thermostats, etc.

The ESS connector is used to connect these protections. The external protection devices are powered from the heat pump connector.

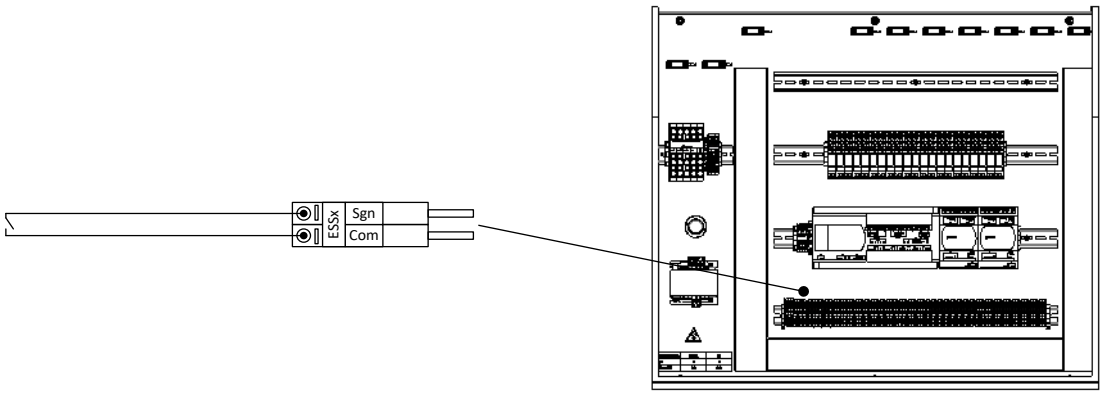


**Figure 5.11.** Connection scheme of the external protection devices.

## 5.4. Outside temperature probe

The outside temperature probe, supplied with the heat pump, has to be installed for the heat pump to work properly. Follow the instructions below to install it.

- Install the outside probe in a well ventilated area, but protected from wind and rain.
- Do not install the outside probe at a distance of less than 1 m from windows or doors to avoid the effect of possible currents of warm air.
- Use a shielded 2-pole cable to prevent interferences.

| Description | Signal | Type | Connector |
|---|---|---|---|
| Outside temperature probe | Analogue input | NTC 10K 25ºC Probe | AI20 |

**Table 5.3.** Outside temperature probe connection terminal.

## 5.5. External storage systems

These can be used to control DHW storage, heating and cooling temperatures using temperature probes.

| Description | Signal | Type | Connector |
|---|---|---|---|
| DHW inter-accumulator | Analogue input | NTC 10K 25ºC Probe | AI11 |
| Heating buffer storage tank | Analogue input | NTC 10K 25ºC Probe | AI17 |
| Cooling buffer storage tank | Analogue input | NTC 10K 25ºC Probe | AI18 |

**Table 5.4.** Connection terminals for outlet units.

## 5.6. External production equipment

These are used to control production equipment handling of the various services, such as bypass valves or circulatory pumps.

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| Description | Signal | Type | Connector |
|---|---|---|---|
| Source pump | Digital output | Activation 230Vac / 8A maximum | DO1 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO1 |
| Production pump | Digital output | Activation 230Vac / 8A maximum | DO2 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO2 |
| DHW production | Digital output | Activation 230Vac / 8A maximum | DO3 |
| DHW Recirculation | Analogue input | NTC 10K 25ºC Probe | AI12 |
| | Digital output | Activation 230Vac / 8A maximum | DO4 |
| Pool production | Analogue input | NTC 10K 25ºC Probe | AI19 |
| | Digital output | Activation 230Vac / 8A maximum | DO5 |
| Active cooling production | Digital output | Activation 230Vac / 8A maximum | DO11 |
| Passive cooling production | Digital output | Activation 230Vac / 8A maximum | DO12 |
| Auxiliary brine pump | Digital output | Activation 230Vac / 8A maximum | DO14 |
| Auxiliary cooling pump | Digital output | Activation 230Vac / 8A maximum | DO15 |
| Heating / cooling consumption | Digital output | Activation 230Vac / 8A maximum | DO16 |

**Table 5.5.** Auxiliary equipment connection terminals.

## 5.7. Simultaneous production

In installations with simultaneous production, the 0-10Vdc regulation signals of the cooling and heating circuit circulator pumps are used to control the modulating 3-way valves that bypass to the support collector. As a result, only the digital activation signal is used for the circulator pumps.

| Description | Signal | Type | Connector |
|---|---|---|---|
| Cooling pump | Digital output | Activation 230Vac / 2A maximum | DO1 |
| Heating pump | Digital output | Activation 230Vac / 2A maximum | DO2 |
| Cooling valve | Analogue output | Regulation 0 – 10Vdc | AO1 |
| Heating valve | Analogue output | Regulation 0 – 10Vdc | AO2 |

**Table 5.6.** Connection terminals for installations with simultaneous production.

## 5.8. DG1 – SG5 Outlet Units

The heat pump can control a direct outlet unit (DG1) and three outlet units with mixture (SG2, SG3, SG4 and SG5). Unit activation can be controlled according to heating or cooling demand. In addition, the units with mixture can measure the unit's outlet temperature and generate a regulation signal for the 3-way modulating valve.

| Description | Signal | Type | Connector |
|---|---|---|---|
| DG1 direct unit | Digital output | Activation 230Vac / 2A maximum | DO6 |
| SG2 unit with mixture | Analogue input | NTC 10K 25ºC Probe | AI13 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO3 |
| | Digital output | Activation 230Vac / 2A maximum | DO7 |
| SG3 unit with mixture | Analogue input | NTC 10K 25ºC Probe | AI14 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO4 |
| | Digital output | Activation 230Vac / 2A maximum | DO8 |
| SG4 unit with mixture | Analogue input | NTC 10K 25ºC Probe | AI15 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO5 |
| | Digital output | Activation 230Vac / 2A maximum | DO9 |
| SG5 unit with mixture | Analogue input | NTC 10K 25ºC Probe | AI16 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO6 |
| | Digital output | Activation 230Vac / 2A maximum | DO10 |

**Table 5.7.** Connection terminals for outlet units.

**NOTE**

- Heat pump provides 24Vac connection from the electrical panel, remember that all the devices connected to the heat pump cannot exceed 48VA or 2A. Exceed these limits could cause poor heat pump operation and/or heat pump component breakdowns.

## 5.9. External auxiliary equipment

This is used to control the activation of the auxiliary equipment integrated in the DHW heating buffer storage tanks via outputs to relays. They are also used to control activation of the all / nothing external auxiliary boiler. If modulating boilers are installed, it is also used to control the temperature downstream from the boiler, so the heat pump and the boiler can function simultaneously.

The connection terminals of the SG5 outlet unit are used to manage the auxiliary boilers, so this one cannot be used.

| Description | Signal | Type | Connector |
|---|---|---|---|
| Auxiliary heating buffer storage tank equipment | Digital output | Activation 230Vac / 8A maximum | DO18 |
| DHW inter-storage tank auxiliary equipment | Digital output | Activation 230Vac / 8A maximum | DO17 |
| Auxiliary boiler | Analogue input | NTC 10K 25ºC Probe | AI16 |
| | Analogue output | Valve regulation 0 – 10Vdc | AO6 |
| | Digital output | Activation 230Vac / 8A maximum | DO10 |

**Table 5.8.** Auxiliary equipment connection terminals.

## 5.10. Alarm signal

If the heat pump cannot start up the compressor because of an active alarm, the heat pump will generate an alarm signal.

| Description | Signal | Type | Connector |
|---|---|---|---|
| Alarm signal | Relay digital output | Activation 230Vac / 8A maximum | DO13 |

**Table 5.9.** Alarm signal connection terminal.

## 5.11. Remote services production control

The heat pump is equipped with digital inputs for remote control of production services.

| Description | Signal | Type | Connector |
|---|---|---|---|
| Control of electrical consumption (EVU) | Digital input | Voltage-free (0V) | DI1 |
| WINTER / SUMMER program selection | Digital input | Voltage-free (0V) | DI2 |
| Enable / disable DHW production | Digital input | Voltage-free (0V) | DI3 |
| Pool production | Digital input | Voltage-free (0V) | DI4 |
| 1 SG signal | Digital input | 24Vdc / 24Vac signal | DI15 |
| 2 SG signal | Digital input | 24Vdc / 24Vac signal | DI16 |

**Table 5.10.** Connection terminals for digital inputs that control service production.

**Heat pump start-up control (EVU signal)**

Enables / disables energy production with both the compressor and the auxiliary equipment. In any event, circulator pumps, valves and other components can be activated to consume energy from the storage systems.

**Remote WINTER / SUMMER program selection**

Used for remote selection of the heat pump operation program.

**DHW production**

Enables / disables the DHW production function. If the function is enabled, DHW production is governed by the DHW configuration in the heat pump controller.

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**Pool production**

Activates / deactivates pool production demand. If the signal is requested, pool production is governed by the pool configuration in the heat pump controller.

**SMART GRID**

Enables / disables the SG states of the heat pump. Depending on the value of the digital inputs, there are four SG operating statuses:

SG1 [0 0] (Normal state): The heat pump is operating normally, as per its configuration.

SG2 [0 1] (Reduced tariff): As we are in a reduced tariff period, we will take advantage of the lower price of electricity to use the pump to produce heat or cold.

SG3 [1 0] (Block status): Signal for compressor blocking to the heat pump.

SG4 [1 1] (Forced state): The heat pump will force the maximum possible consumption in the installation to help balance the network.

These external signals can be sent by the electricity company itself to endeavor to keep the distribution network balanced at all times.

## 5.12. Inside environment control

The heating and cooling functions can be controlled by digital signals from relay thermostats, by interior terminals with thT bus communication, by a combination of both or not using any interior control terminal.

**Relay thermostats**

Each outlet unit, from DG1 to SG5, has two 24Vac or 24Vdc digital signals to activate heating or cooling requests from the interior thermostats or other external control devices.

| Description | Signal | Type | Connector |
|---|---|---|---|
| DG1 direct unit heating request | Digital input | 24Vdc / 24Vac signal | DI5 |
| DG1 direct unit cooling request | Digital input | 24Vdc / 24Vac signal | DI6 |
| SG2 mix unit heating request | Digital input | 24Vdc / 24Vac signal | DI7 |
| SG2 mix unit cooling request | Digital input | 24Vdc / 24Vac signal | DI8 |
| SG3 mix unit heating request | Digital input | 24Vdc / 24Vac signal | DI9 |
| SG3 mix unit cooling request | Digital input | 24Vdc / 24Vac signal | DI10 |
| SG4 mix unit heating request | Digital input | 24Vdc / 24Vac signal | DI11 |
| SG4 mix unit cooling request | Digital input | 24Vdc / 24Vac signal | DI12 |
| SG5 mix unit heating request | Digital input | 24Vdc / 24Vac signal | DI13 |
| SG5 mix unit cooling request | Digital input | 24Vdc / 24Vac signal | DI14 |

**Table 5.11.** Connection terminals for digital inputs that control outlet units DG1 - SG4.

A single thermostat or several thermostats connected in parallel can be used for each outlet unit, as shown below.

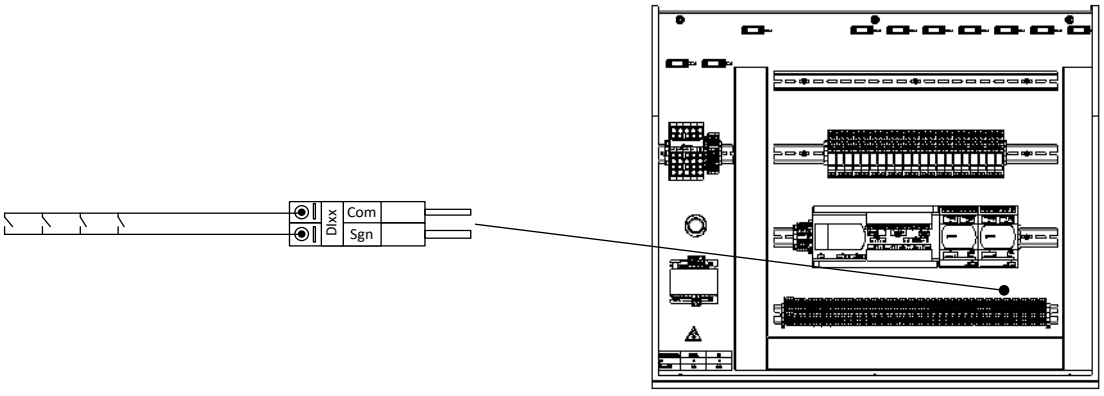


**Figure 5.12.** Example of connection of several thermostats in parallel.

**thT bus terminals**

In addition to digital input control (interior thermostats) interior terminals with thT data bus communication can also be used. These terminals capture the inside temperature and humidity of the area associated with each outlet unit, DG1 – SG5, using a serial cable over a Modbus protocol. They also have a digital output to control a valve for the area. A single thT terminal can be connected per outlet unit.

Read the assembly instructions carefully before installing the terminals.

| Description | Signal | Connector |
|---|---|---|
| thT terminal communication bus | ModBus RS485 | FBus2 |

**Table 5.12.** Data bus connection terminals for the thT terminals.

Follow the recommendations below to connect the thT terminals to the heat pump.

- Use a three-pole, shielded AWG 20-22 cable for the connection.
- Connect the terminals in series for installations with more than one terminal in the network. The maximum length of the circuit assembly should not exceed 500 metres. For connection networks with more than two thTs, it is necessary to install a 120 Ohm heater between Rx+/Tx+ and Rx-/Tx- in the first and last terminal to prevent possible communication problems.
- Configure the terminal address according to the settings of the controller following the steps described in the thT terminal manual.

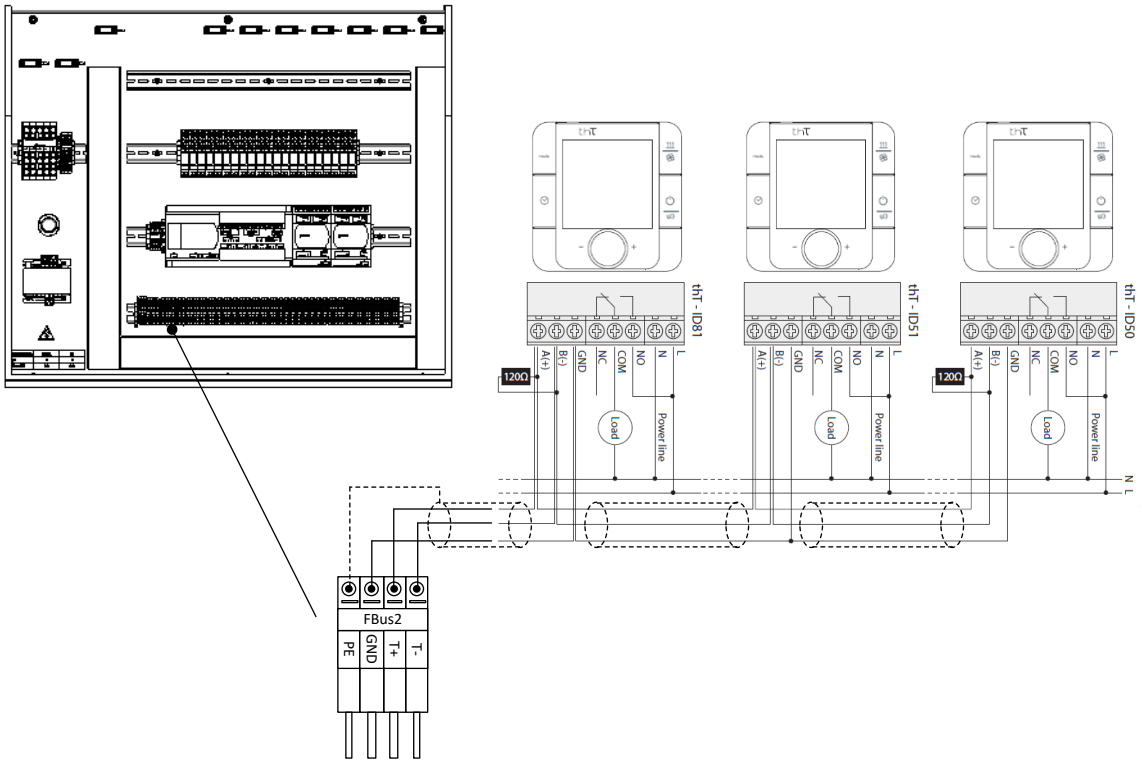


**Figure 5.13.** Example of connection of thT terminals.

**Installation without interior terminals**

The ecoGEO heat pumps can also be used in installations that do not have any type of interior terminal to generate request signals. In these cases, a continuous request can be imposed at the digital input of the unit to activate by selecting the appropriate control logic in the controller. As a result, the heat pump will run the start / stop cycles according to the temperature control of the circuit and the outside cut-off temperatures of each service.

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## 5.13. Remote control by BUS

The heat pump allows MODBUS communication. Signals can be sent to switch the heat pump on and off, activate the demand for DHW, pool or heating or cooling services for each configured outlet unit and vary the setpoints for DHW, pool and for both heating and cooling in each unit.

| Description | Signal | Connector |
|---|---|---|
| MODBUS read and write | ModBus RS485 | BMS2 |

**Table 5.13.** Read and write data bus connection terminals.

Follow the recommendations below for connecting the converters.

- Use a three-pole, shielded AWG 20-22 cable for the connection.
- For installations with more than one heat pump, connect the terminals in series. The maximum length of the circuit assembly should not exceed 500 metres.
- Configure the BMS2 terminal address on the controller following the steps laid out in the technical service manual.

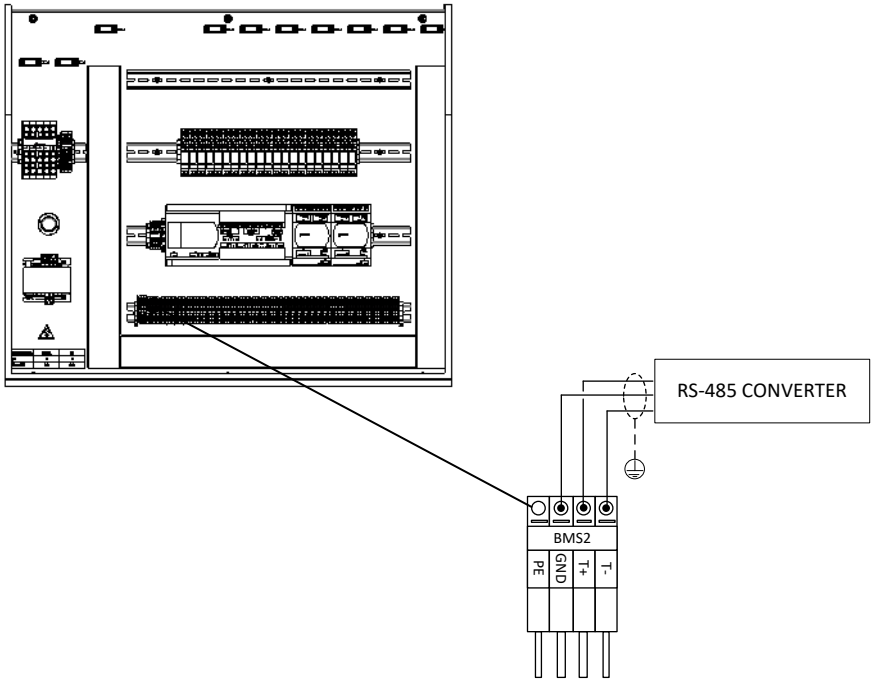


**Figure 5.14.** Example shown: an RS-485 converter connection for read write data on the heat pump.

**NOTE**

- For more information about BUS connections, please contact your distributor.

## 5.14. Energy meter

The heat pump allows MODBUS communication with energy meters supplied by Ecoforest. Before installing the energy meter, carefully read its assembly instructions.

| Description | Signal | Connector |
|---|---|---|
| Energy meter BUS communication | ModBus RS485 | FBus2 |

**Table 5.14.** Data bus connection terminals for the energy meter.

Follow the recommendations below to connect the energy meter to the heat pump.

- Use a three-pole, shielded AWG 20-22 cable for the connection.
- Connect the terminals in series for installations with more than one terminal in the network. The maximum length of the circuit assembly should not exceed 500 metres. For connection networks with more than two thTs, it is necessary to install a 120 Ohm heater between Rx+/Tx+ and Rx-/Tx- in the first and last terminal to prevent possible communication problems.
- To install the device supplied by Ecoforest, follow the steps in the manufacturer's installation manual included with the equipment. It is necessary to configure a 100 address on the measurement device for proper communication with your heat pump (See control applications manual).



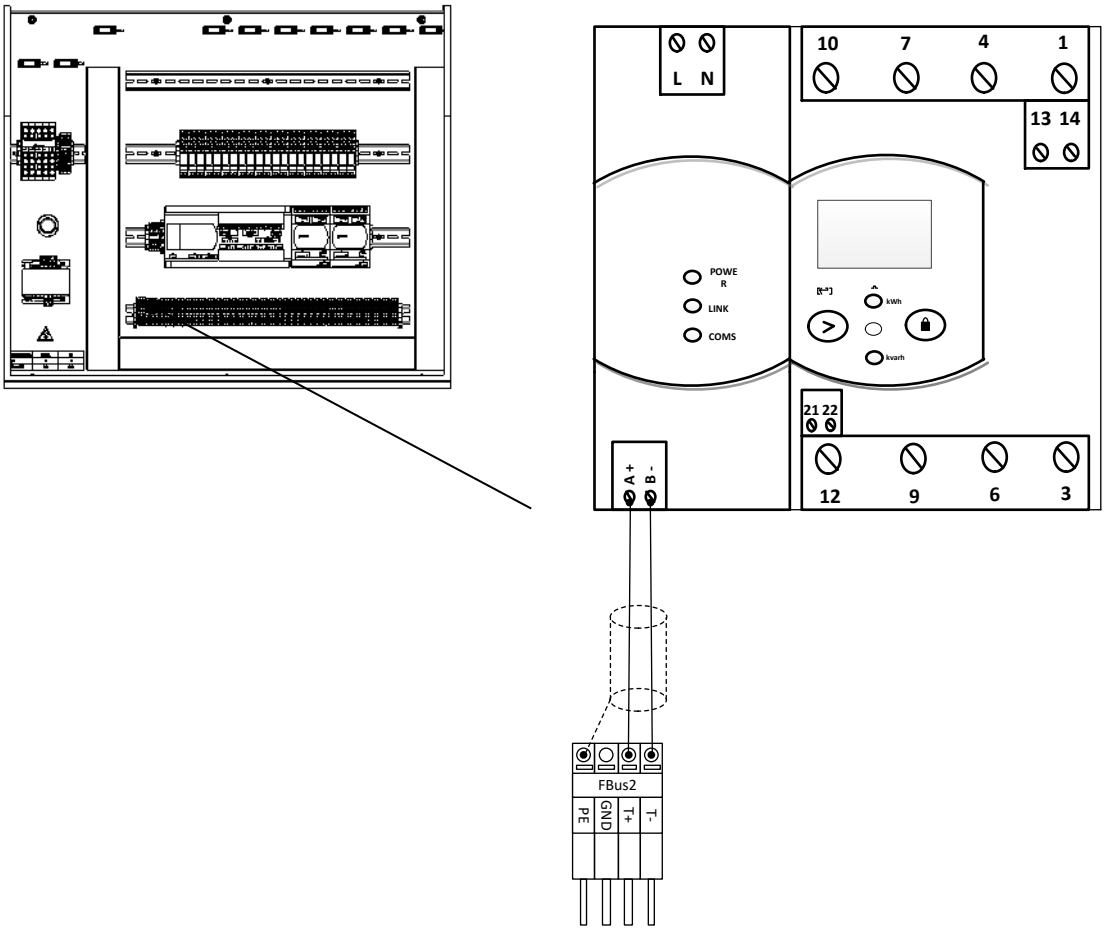


**Figure 5.15**. Example of connection of energy meter.

## 6. Start-up

Check the following items before starting up the heat pump. Not doing so could result in poor heat pump operation and/or serious heat pump damage.

1. All the hydraulic circuits of the installation have been properly filled and bled.
2. The cut-off valves of the hydraulic brine and production circuits are open.
3. An external switch has been installed to cut off all the power supply circuits of the heat pump.
4. The heat pump power supply has the proper voltage and allows sufficient consumption to start up the compressor.
5. The inside room temperature of the home is at least 18ºC. Otherwise, the temperature has to be increased by auxiliary equipment.

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# 7. Technical specifications

## 7.1. Component location

| No. | Description | No. | Description |
|---|---|---|---|
| 1 | Production outlet | 14 | Brineinlettemp. probe |
| 2 | Production return | 15 | Production outlet temp. probe |
| 3 | Brine outlet | 16 | Productioninlettemp. probe |
| 4 | Brine return | 17 | Suctionpressuretransducer |
| 5 | Evaporator (direct cycle) | 18 | Dischargepressuretransducer |
| 6 | Condenser (direct cycle) | 19 | Brinepressuretransducer |
| 7 | Compressor | 20 | Productionpressuretransducer |
| 8 | Electronic expansionvalve | 22 | Dischargemini-pressureswitch |
| 9 | Filter dryer | 23 | Electrical panel |
| 10 | Cycleinversionvalve | 24 | Service outlet |
| 11 | Compressor suction temp. probe | 25 | Liquid level glass |
| 12 | Compressordischargetemp. probe | 26 | Compressor oil display |
| 13 | Brine outlet temp. probe | 27 | Oil solenoid valve |

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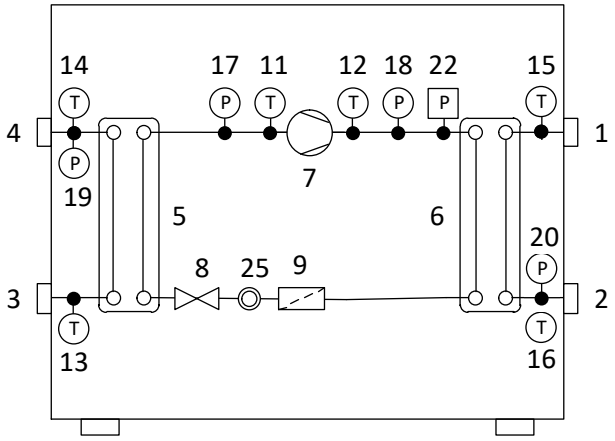
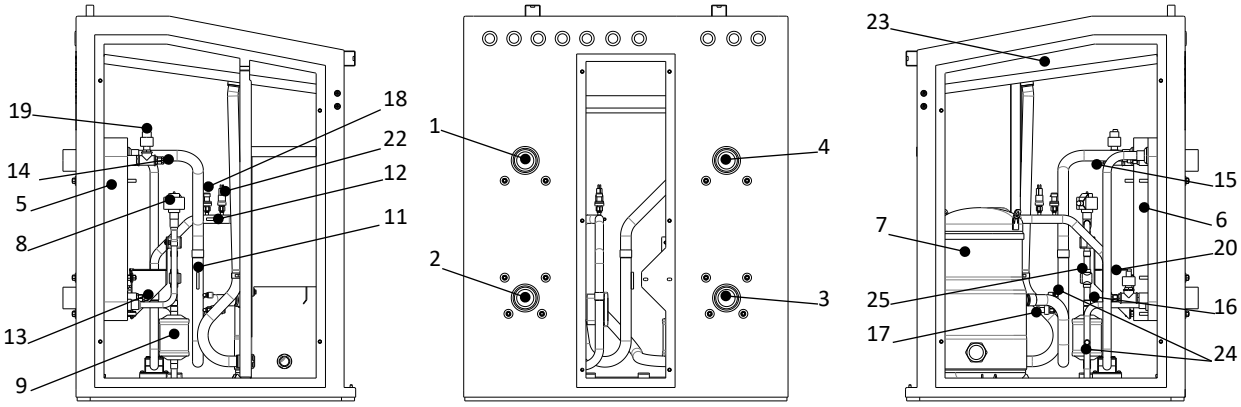
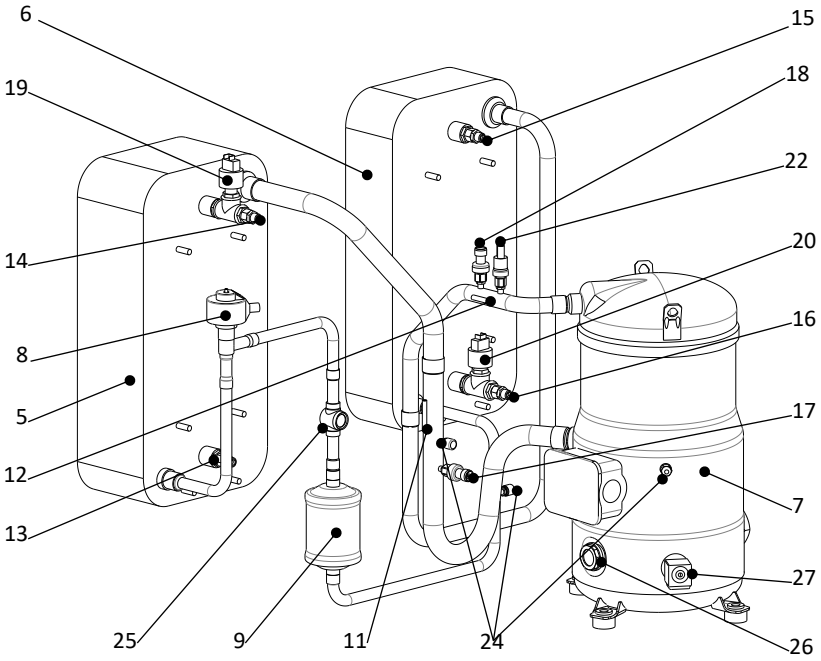
**ecoGEO HP1 12-40 / ecoGEO HP1 15-70 / ecoGEO HP1 25-100**



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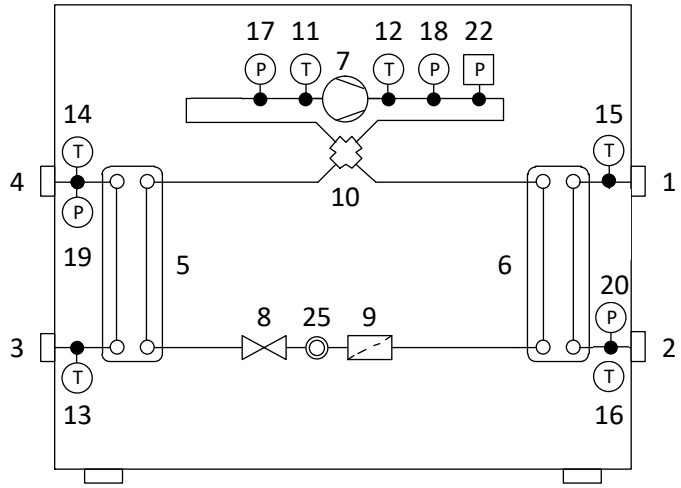
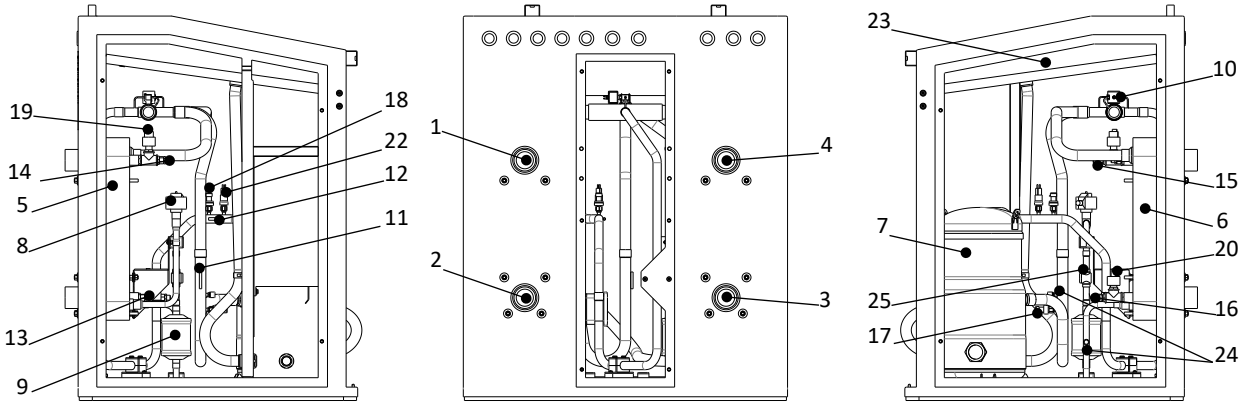
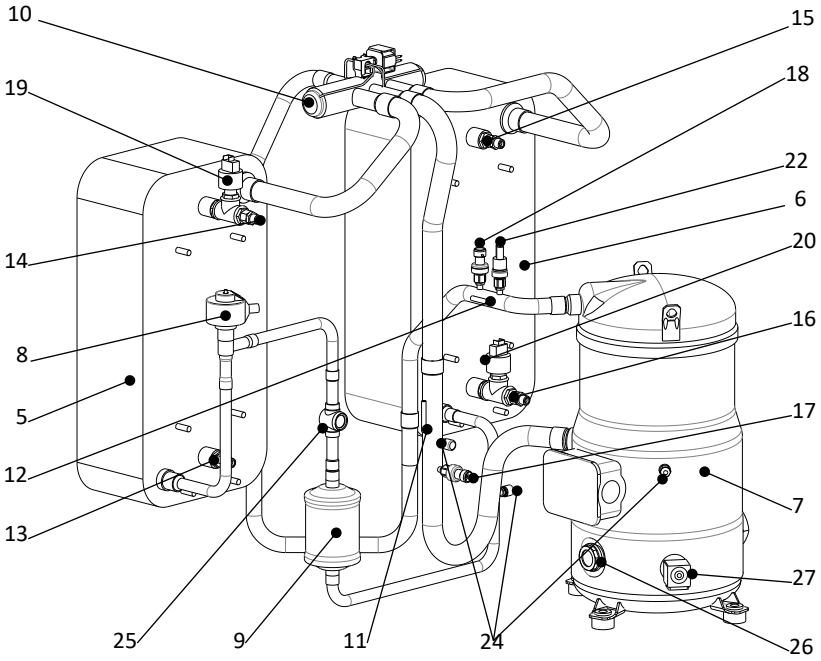
**ecoGEO HP3 12-40 / ecoGEO HP3 15-70 / ecoGEO HP3 25-100**



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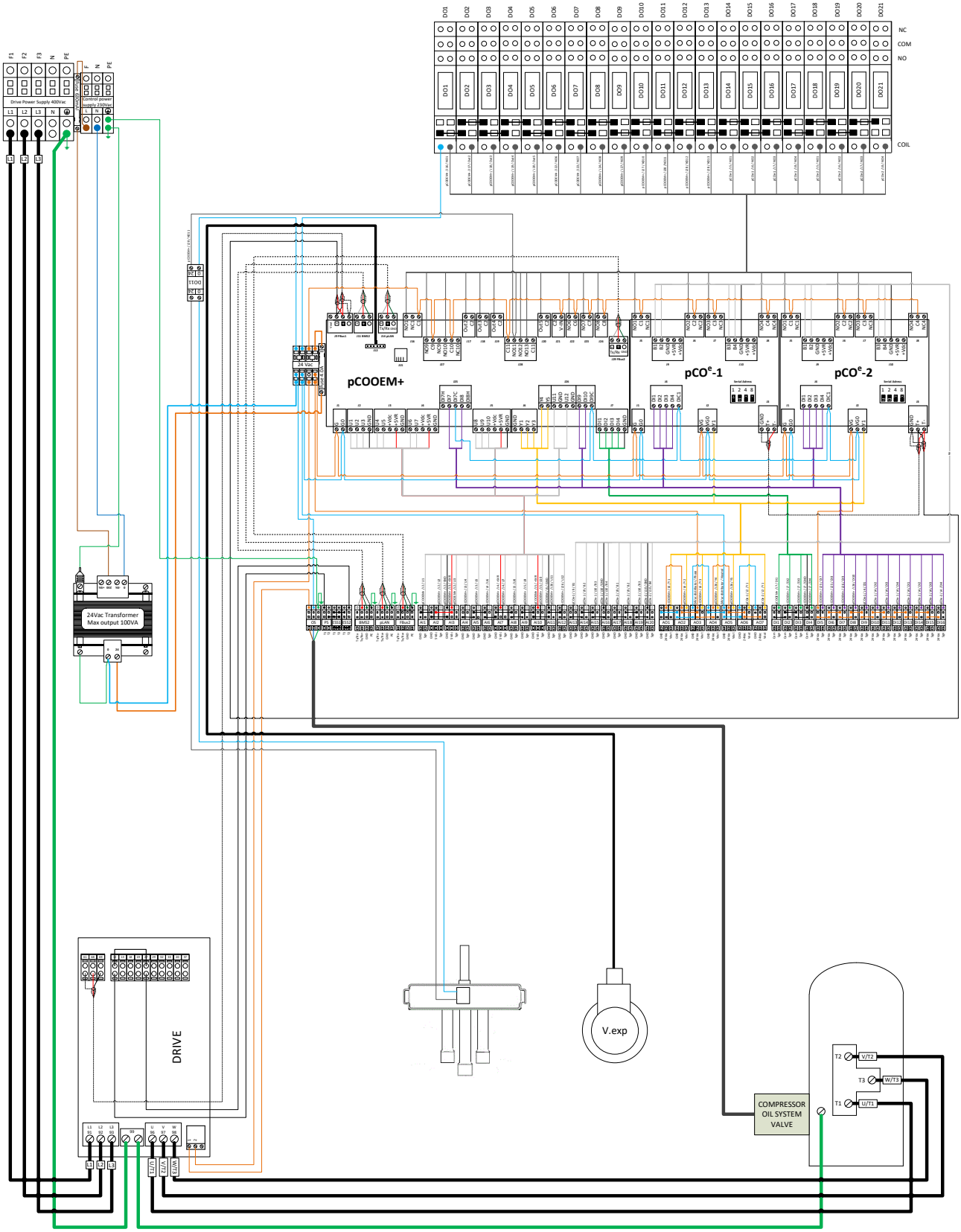
## 7.2. Powercircuit diagram



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## 7.3. Electrical connection tables

| DIGITAL OUTPUTS | | | |
|---|---|---|---|
| **CONNECTIONS** | | **DESCRIPTION** | |
| **Connection terminal** | **Controller terminal** | **Type** | **Signal** |
| Block I / DO1 | pCOOEM+ / J16 / NO1 | Activation 230Vac / 8A max | Brine circulation pump |
| Block I / DO2 | pCOOEM+ / J17 / Out2 | Activation 230Vac / 8A max | Productioncirculation pump |
| Block I / DO3 | pCOOEM+ / J18 / Out3 | Activation 230Vac / 8A max | DHW production |
| Block I / DO4 | pCOOEM+ / J19 / Out4 | Activation 230Vac / 8A max | DHW Recirculation |
| Block I / DO5 | pCOOEM+ / J20 / Out5 | Activation 230Vac / 8A max | Pool production |
| Block I / DO6 | pCOOEM+ / J22 / NO6 | Activation 230Vac / 8A max | DG1 group production |
| Block I / DO7 | pCOOEM+ / J23 / NO7 | Activation 230Vac / 8A max | SG2 group production |
| Block I / DO8 | pCOOEM+ / J24 / NO8 | Activation 230Vac / 8A max | SG3 group production |
| Block I / DO9 | pCOOEM+ / J27 / NO9 | Activation 230Vac / 8A max | SG4 group production |
| Block I / DO10 | pCOOEM+ / J27 / NO10 | Activation 230Vac / 8A max | SG5 group production |
| Block I / DO11 | pCOOEM+ / J28 / NO11 | Activation 230Vac / 8A max | Active cooling production |
| Block I / DO12 | pCOOEM+ / J28 / NO12 | Activation 230Vac / 8A max | Passive cooling production |
| Block I / DO13 | pCOOEM+ / J28 / NO13 | Activation 230Vac / 8A max | Alarm signal |
| Block I / DO14 | pCOe-1 / J5 / NO1 | Activation 230Vac / 8A max | Auxiliarybrine circulation pump |
| Block I / DO15 | pCOe-1 / J6 / NO2 | Activation 230Vac / 8A max | Coolingauxiliary circulator pump |
| Block I / DO16 | pCOe-1 / J7 / NO3 | Activation 230Vac / 8A max | Heating / coolingconsumption |
| Block I / DO17 | pCOe-1 / J8 / NO4 | Activation 230Vac / 8A max | DHW inter-accumulator resistor |
| Block I / DO18 | pCOe-2 / J5 / NO1 | Activation 230Vac / 8A max | Buffer storage tank resistor |
| Block I / DO19 | pCOe-2 / J6 / NO2 | Activation 230Vac / 8A max | Not used |
| Block I / DO20 | pCOe-2 / J7 / NO3 | Activation 230Vac / 8A max | Not used |
| Block I / DO21 | pCOe-2 / J8 / NO4 | Activation 230Vac / 8A max | Not used |

| PROTECTIONS | | |
|---|---|---|
| **CONNECTIONS** | **DESCRIPTION** | |
| **Connection terminal** | **Type** | **Signal** |
| Block II / PS1 | Safety switch | High pressure switch |
| Block II / ESS1 | Safety switch | External safety switch |
| Block II / ESS2 | Safety switch | External safety switch |

| COMMUNICATIONS | | | |
|---|---|---|---|
| **CONNECTIONS** | | **CONNECTIONS** | |
| **Connection terminal** | **Serial port** | **Serial port** | **Serial port** |
| Block II / BMS2 | pCOOEM+ / J11 BMS2 | RS485 ModBus RTU | Remote access through bus |
| -- | pCOOEM+ / BMS card | Card communicationconnector | |
| Block II / pLAN | pCOOEM+ / J14 pLAN | RS485 ModBus RTU | Controller network connector |
| Block II / FBus2 | pCOOEM+ / J29 FBus2 | RS485 ModBus RTU | Indoor terminals thT y th-Tune |

| ANALOGUE INPUTS | | | |
|---|---|---|---|
| CONNECTIONS | | DESCRIPTION | |
| Connection terminal | Controller terminal | Type | Signal |
| Block II / AI1 | pCOOEM+ / J2 / U1 | NTC 10K 25°C | Compressor suction temperature |
| Block II / AI2 | pCOOEM+ / J2 / U2 | Radiometer 0-5Vdc | Compressor suction pressure |
| Block II / AI3 | pCOOEM+ / J2 / U3 | Radiometer 0-5Vdc | Compressor discharge pressure |
| Block II / AI4 | pCOOEM+ / J3 / U4 | NTC 50K 25°C | Compressor discharge temperature |
| Block II / AI5 | pCOOEM+ / J3 / U5 | NTC 10K 25°C | Brine outlet temperature |
| Block II / AI6 | pCOOEM+ / J4 / U6 | NTC 10K 25°C | Brine inlet temperature |
| Block II / AI7 | pCOOEM+ / J4 / U7 | Radiometer 0-5Vdc | Brine circuit pressure |
| Block II / AI8 | pCOOEM+ / J5 / U8 | NTC 10K 25°C | Production outlet temperature |
| Block II / AI9 | pCOOEM+ / J5 / U9 | NTC 10K 25°C | Production inlet temperature |
| Block II / AI10 | pCOOEM+ / J5 / U10 | Radiometer 0-5Vdc | Production circuit pressure |
| Block II / AI11 | pCOOEM+ / J26 / U11 | NTC 10K 25°C | DHW inter-accumulatortemperature |
| Block II / AI12 | pCOOEM+ / J26 / U12 | NTC 10K 25°C | DHW recirculation temperature |
| Block II / AI13 | pCOe-1 / J9 / B1 | NTC 10K 25°C | Mixture group 2 temperature |
| Block II / AI14 | pCOe-1 / J9 / B2 | NTC 10K 25°C | Mixture group 3 temperature |
| Block II / AI15 | pCOe-1 / J10 / B3 | NTC 10K 25°C | Mixture group 4 temperature |
| Block II / AI16 | pCOe-1 / J10 / B4 | NTC 10K 25°C | Mixture group 5 temperature |
| Block II / AI17 | pCOe-2 / J9 / B1 | NTC 10K 25°C | Heating buffer temperature |
| Block II / AI18 | pCOe-2 / J9 / B2 | NTC 10K 25°C | Cooling buffer temperature |
| Block II / AI19 | pCOe-2 / J10 / B3 | NTC 10K 25°C | Pool temperature |
| Block II / AI20 | pCOe-2 / J10 / B4 | NTC 10K 25°C | Outside temperature |

| ANALOGUE OUTPUTS | | | |
|---|---|---|---|
| CONNECTIONS | | DESCRIPTION | |
| Connection terminal | Controller terminal | Type | Signal |
| Block II / AO1 | pCOOEM+ / J6 / Y1 | 0-10Vdc | Brinepumpadjustment |
| Block II / AO2 | pCOOEM+ / J6 / Y2 | 0-10Vdc | Production pump adjustment |
| Block II / AO3 | pCOOEM+ / J6 / Y3 | 0-10Vdc | Regulation of mixture group 2 |
| Block II / AO4 | pCOOEM+ / J26 / Y4 | 0-10Vdc | Regulation of mixture group 3 |
| Block II / AO5 | pCOOEM+ / J26 / Y5 | 0-10Vdc | Regulation of mixture group 4 |
| Block II / AO6 | pCOe-1 / J2 / Y1 | 0-10Vdc | Regulation of mixture group 5 |
| Block II / AO7 | pCOe-2 / J2 / Y1 | 0-10Vdc | Not used |

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| DIGITAL INPUTS | | | |
|---|---|---|---|
| CONNECTIONS | | DESCRIPTION | |
| Connection terminal | Controller terminal | Type | Signal |
| Block II / DI1 | pCOOEM+ / J7 / DI1 | Voltage free (0V) | Electrical consumption control (EVU) |
| Block II / DI2 | pCOOEM+ / J7 / DI2 | Voltage free (0V) | WINTER / SUMMER selection |
| Block II / DI3 | pCOOEM+ / J7 / DI3 | Voltage free (0V) | DHW production |
| Block II / DI4 | pCOOEM+ / J7 / DI4 | Voltage free (0V) | Pool production |
| Block II / DI5 | pCOOEM+ / J25 / DI7 | 24Vdc / 24Vac | DG1 heating request |
| Block II / DI6 | pCOOEM+ / J25 / DI8 | 24Vdc / 24Vac | DG1 cooling request |
| Block II / DI7 | pCOOEM+ / J26 / DI9 | 24Vdc / 24Vac | SG2 heating request |
| Block II / DI8 | pCOOEM+ / J26 / DI10 | 24Vdc / 24Vac | SG2 cooling request |
| Block II / DI9 | pCOe-1 / J4 / DI1 | 24Vdc / 24Vac | SG3 heating request |
| Block II / DI10 | pCOe-1 / J4 / DI2 | 24Vdc / 24Vac | SG3 cooling request |
| Block II / DI11 | pCOe-1 / J4 / DI3 | 24Vdc / 24Vac | SG4 heating request |
| Block II / DI12 | pCOe-1 / J4 / DI4 | 24Vdc / 24Vac | SG4 cooling request |
| Block II / DI13 | pCOe-2 / J4 / DI1 | 24Vdc / 24Vac | SG5 heating request |
| Block II / DI14 | pCOe-2 / J4 / DI2 | 24Vdc / 24Vac | SG5 cooling request |
| Block II / DI15 | pCOe-2 / J4 / DI3 | 24Vdc / 24Vac | Smart Grid 1 |
| Block II / DI16 | pCOe-2 / J4 / DI4 | 24Vdc / 24Vac | Smart Grid 1 |

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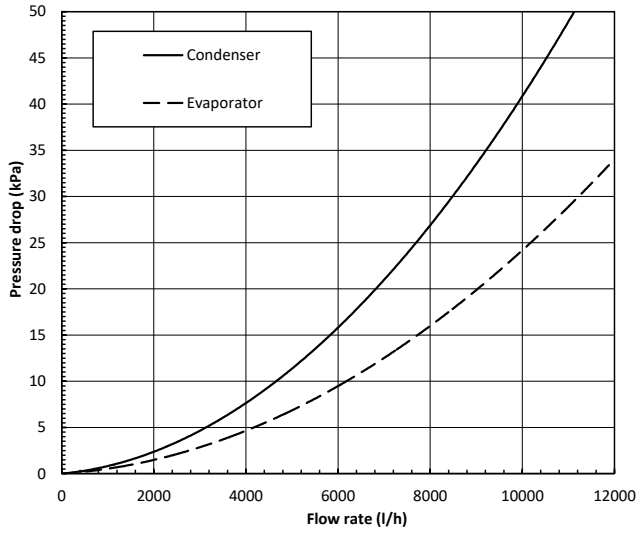
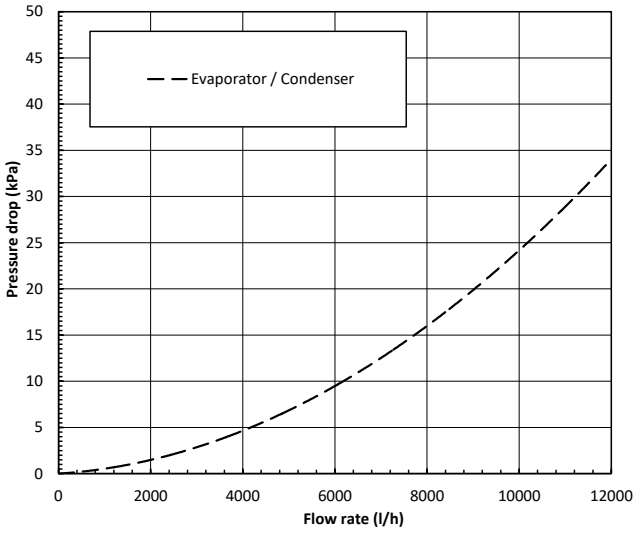
## 7.4. Load losses

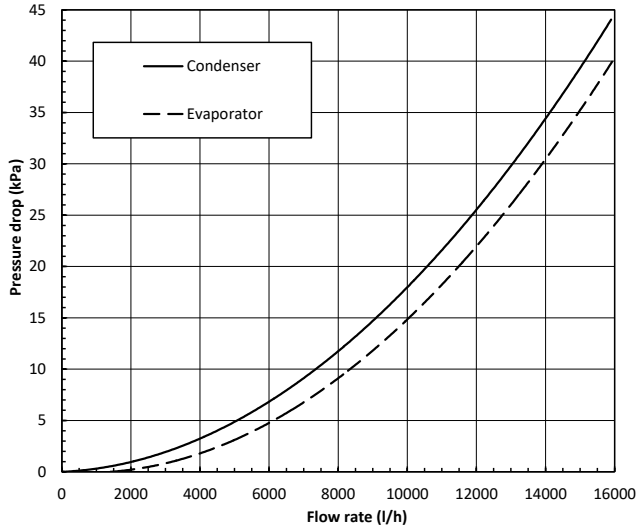
**ecoGEO HP1 12-40 kW**



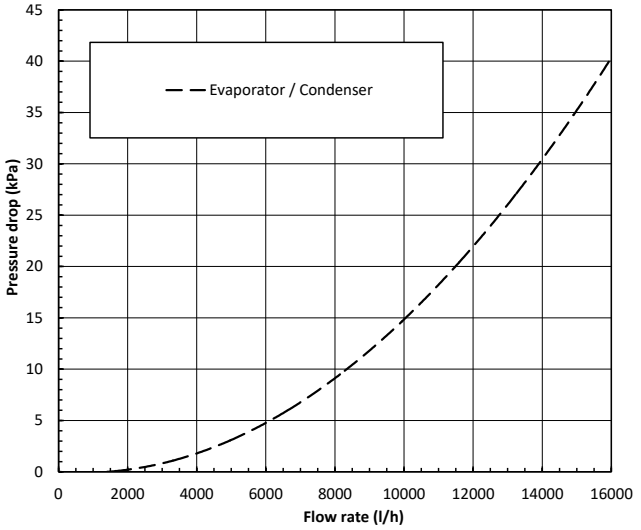

**ecoGEO HP3 12-40 kW**



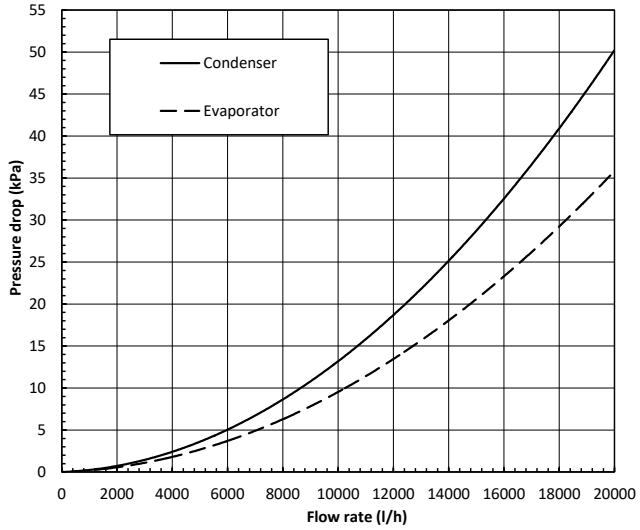

**ecoGEO HP1 15-70 kW**



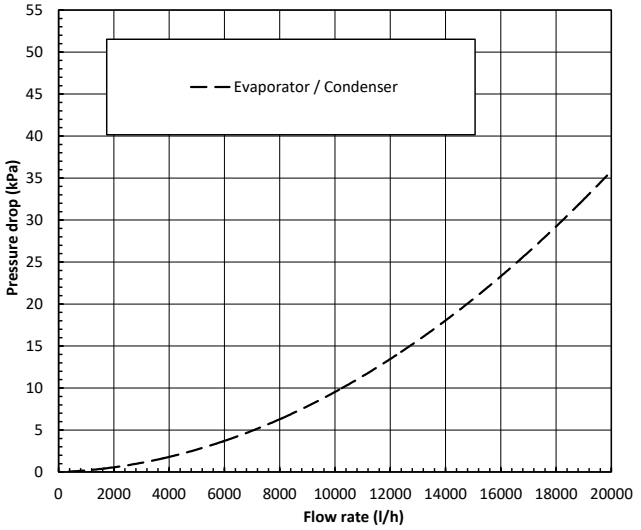

**ecoGEO HP3 15 70 kW**




**ecoGEO HP1 25-100 kW**




**ecoGEO HP3 25-100 kW**



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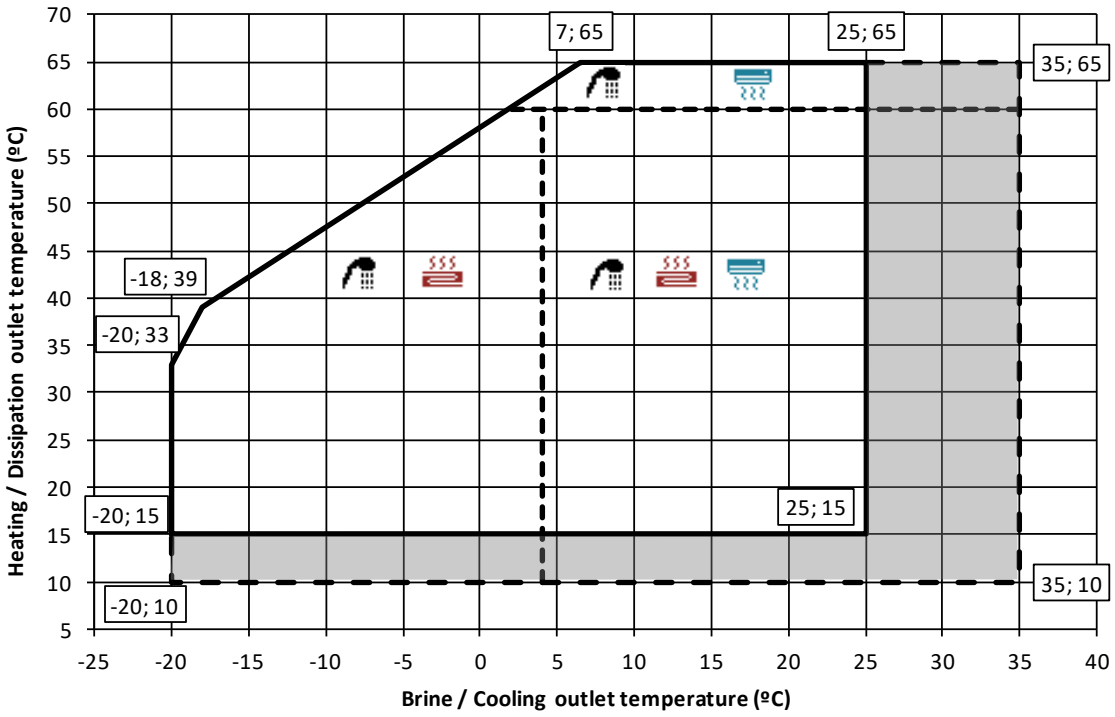
# 8. Operation map

**ecoGEO HP1 12-40 kW / HP3 12-40 kW / HP1 15-70 kW / HP3 15-70 kW / HP1 25-100 kW / HP3 25-100 kW**




- Map area for use with variable speed circulating pumps, managed by the ecoGEO HP heat pump.

**NOTE**

- Maximum speed of compressor is not able in all the areas of the operation map.

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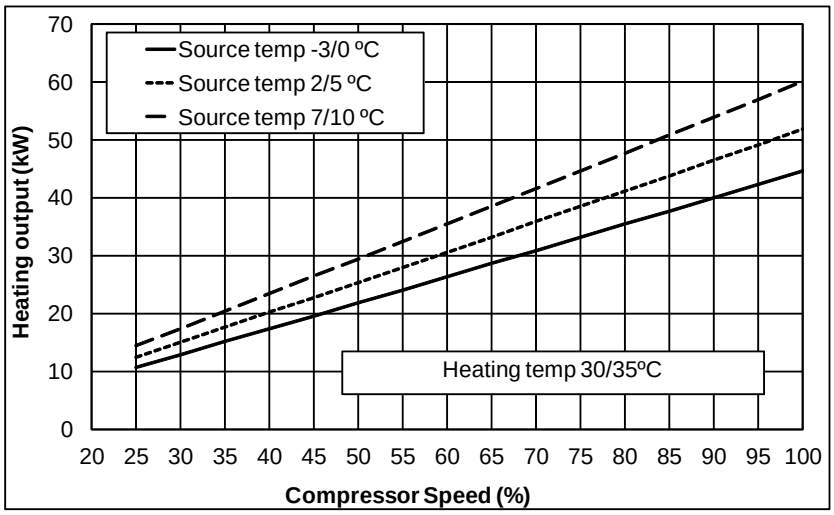
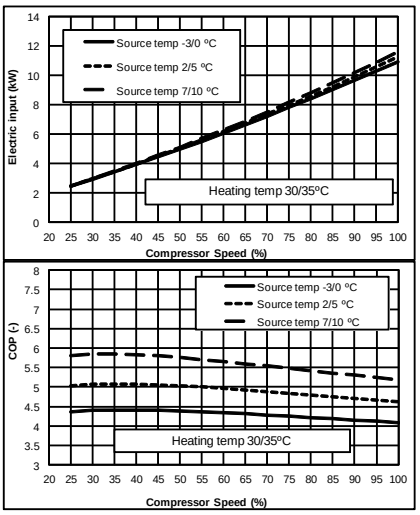
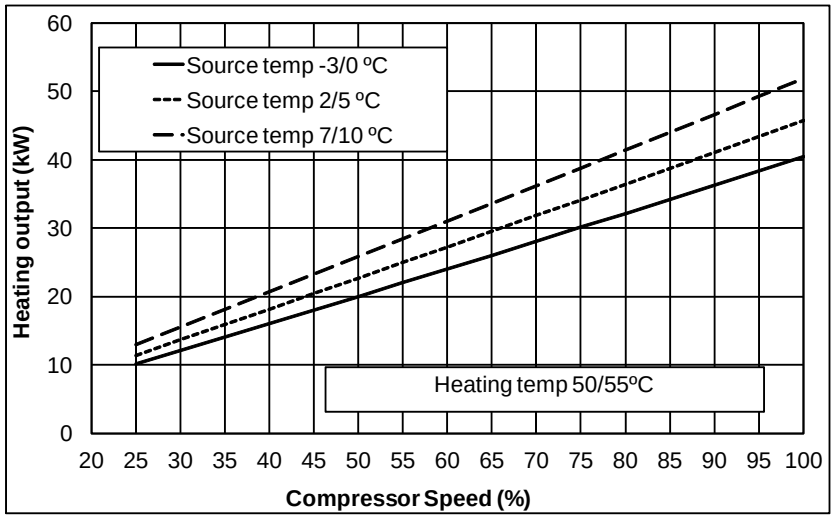
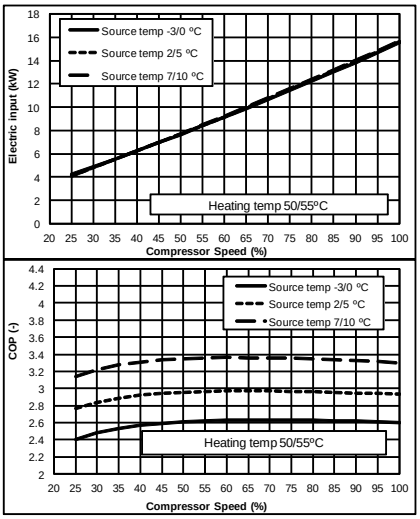
# 9. Operation curves

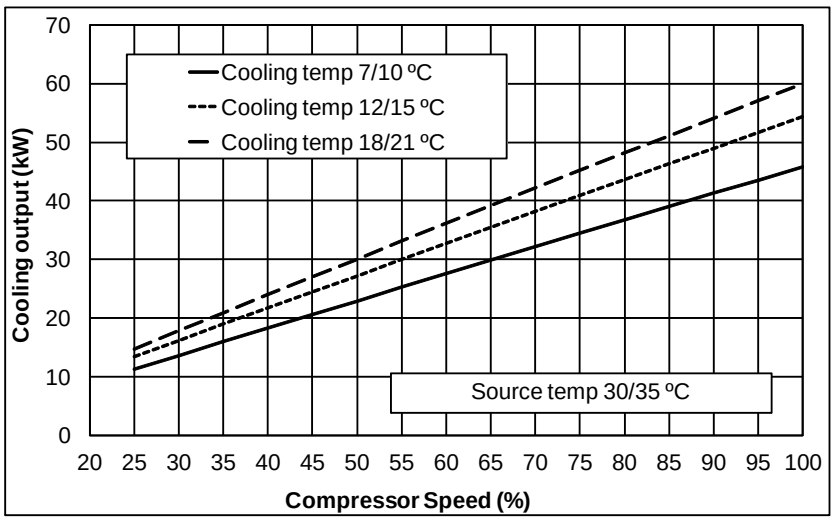
**ecoGEO HP1 12-40 / HP3 12-40**

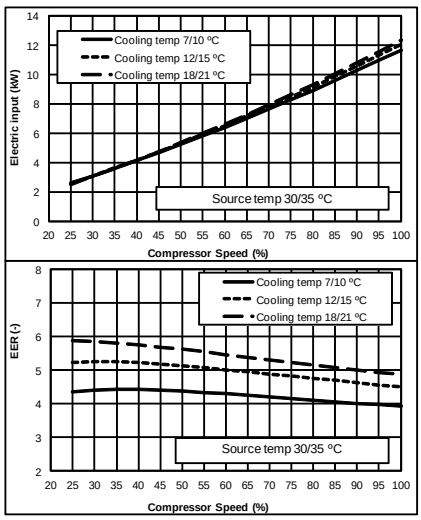


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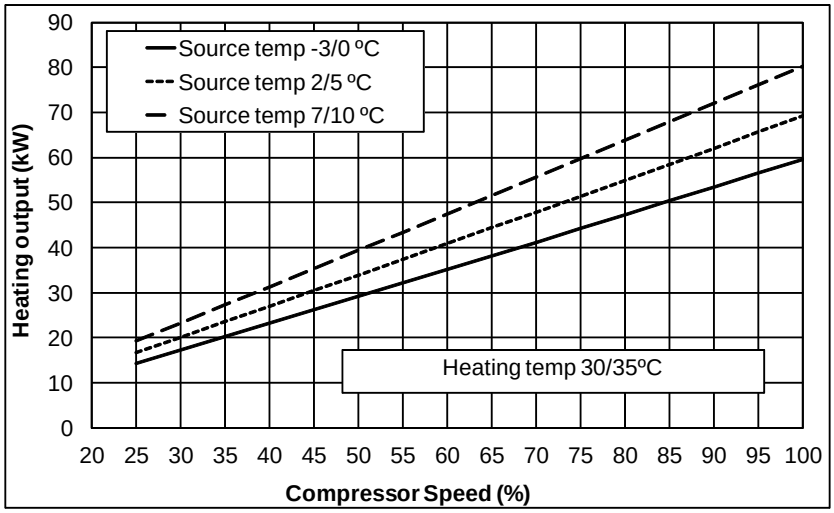
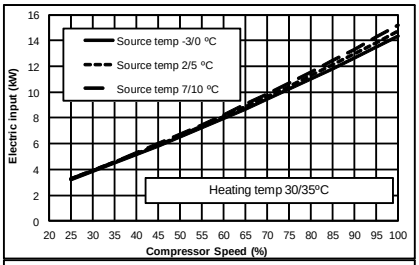
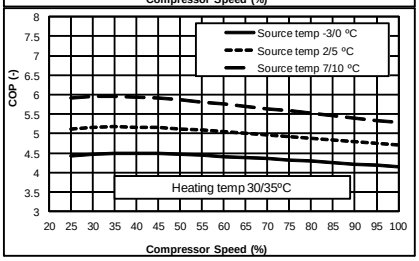
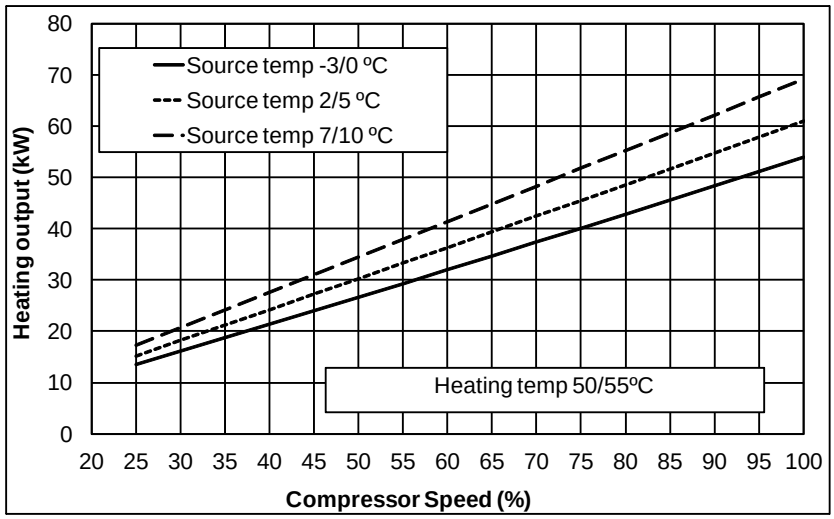
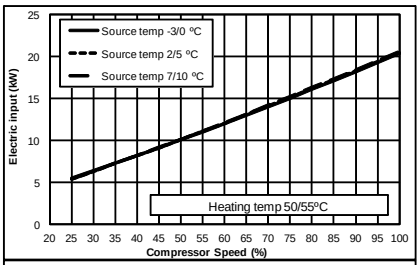
**ecoGEO HP1 15-70 / HP3 15-70**

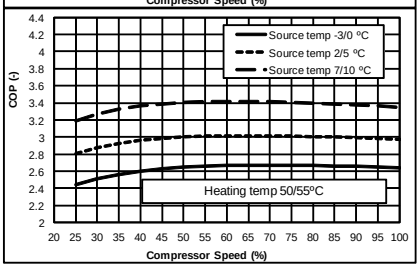


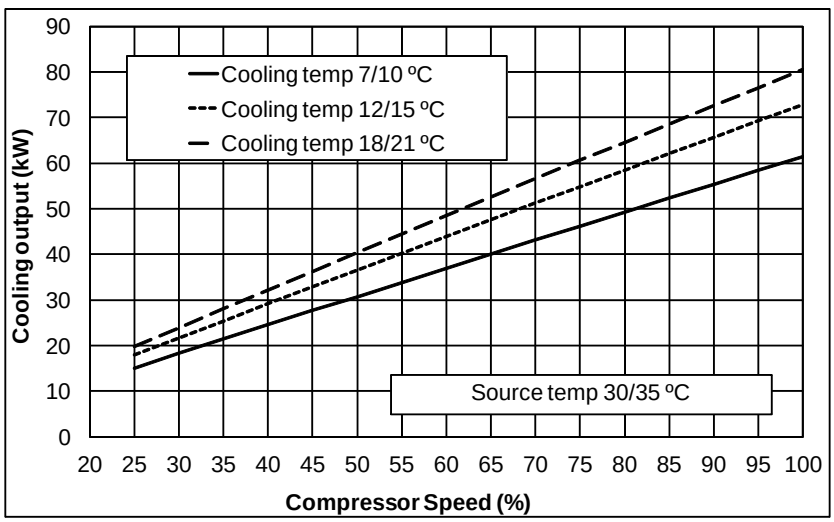



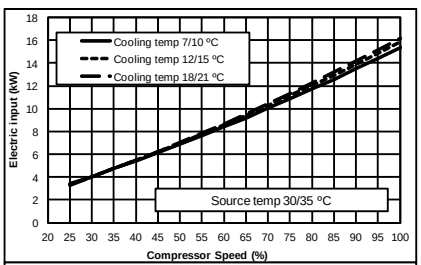



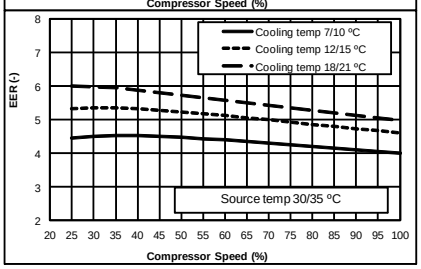



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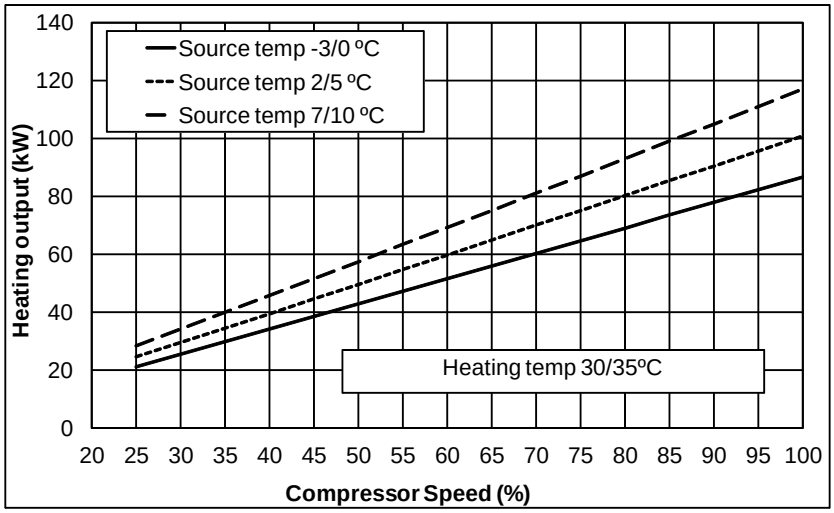
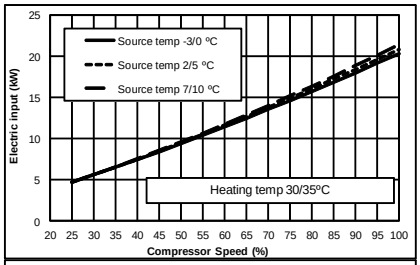
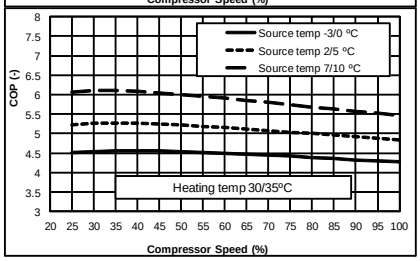
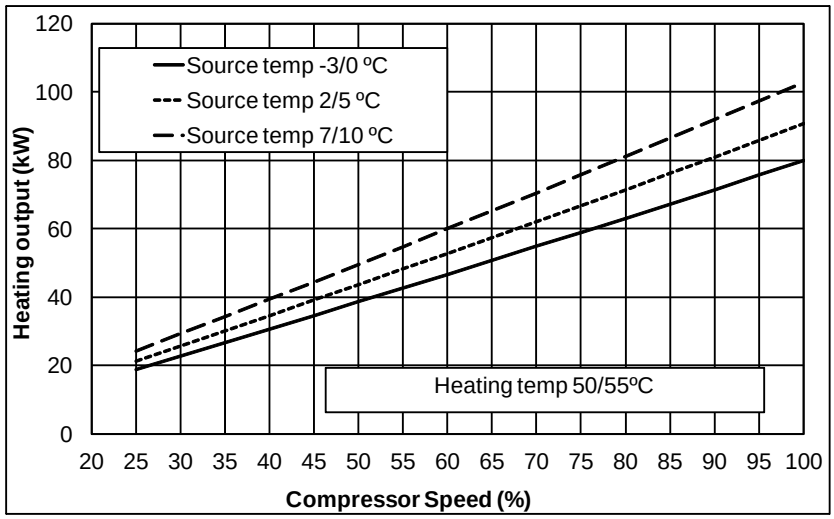
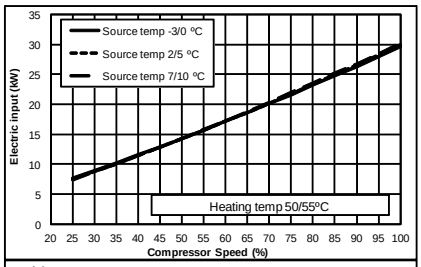
**ecoGEO HP1 25-100 / HP3 25-100**

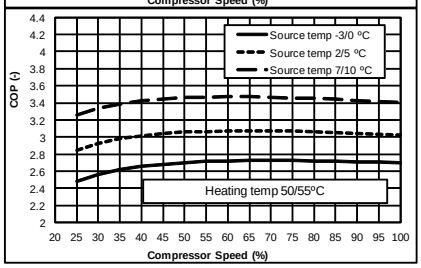


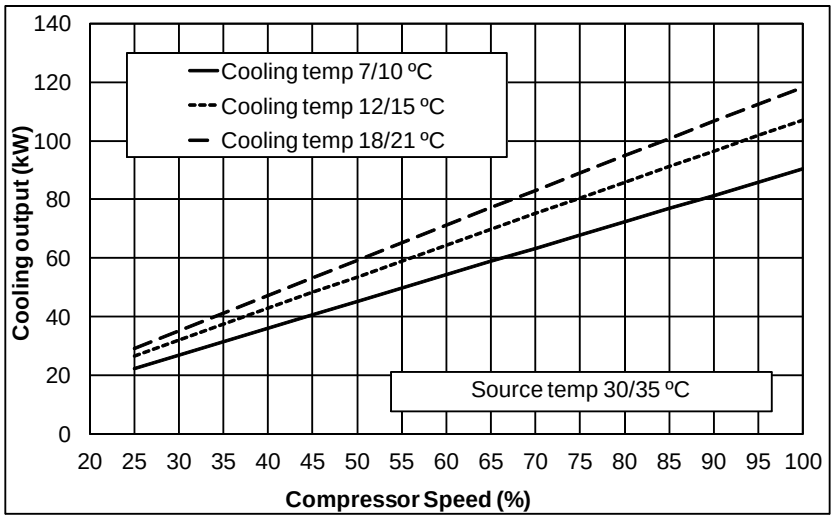



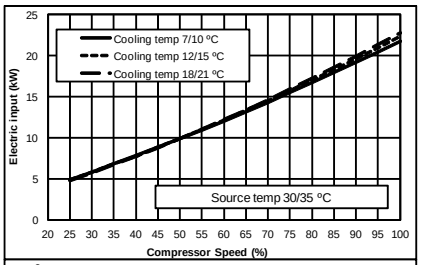



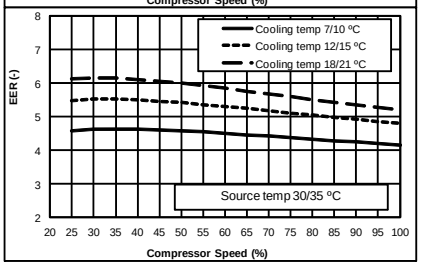



# 10. Technical data table

**NOTE**

- In the technical data tables you will find a series of numbers in superscript format, the meaning of which is explained below:

  1. In compliance with EN 14511, this includes the consumption of the circulation pumps and the compressor driver.
  2. With variable speed circulating pumps, managed by the ecoGEO HP heat pump.
  3. In compliance with EN 12102.
  4. Starting current depends on working condition of the hydraulic circuits.
  5. Maximum consumption can vary significantly according to working conditions, or if the compressor's range of operation is restricted.
  6. The installation must be carried out in the way that guarantees the nominal flows, which will be calculated for the maximum powers with a temperature differential of 5°C. on the other hand, for the correct start-up of the compressor the installation must guarantee a higher flow rate than that resulting from the formula:

     $Q \geq 1.2 \times Pref$, where:

     - Q= Flow rate in liters per minute.
     - Pref = Colling capacity at 25% of compressor speed, see operation curves.

EN

| Specification ecoGEO HP1 12-40 kW / HP3 12-40 kW | | Units | HP1 12-40 | HP3 12-40 |
|---|---|---|---|---|
| **Application** | Place of installation | | Indoors | |
| | Type of brine system | | Geothermal | |
| | Heating, DHW with external storage tank and pool | | ✓ | |
| | Integrated active cooling | | -- | ✓ |
| | Passive cooling control (External installation) | | ✓ | |
| **Performance** | Compressor range of modulation | % | 25 - 100 | |
| | Heating power, B0W35[1,6] | kW | 10,7 - 44,6 | |
| | COP, B0W35[1,6]maximum | -- | 4,6 | |
| | Active cooling power, B35W7[1,6] | kW | -- | 11,3 - 45,8 |
| | EER, B35W7[1,6]maximum | -- | -- | 4,4 |
| | Maximum DHW temperature (without external heater) | °C | 60 | |
| | Sound power level[3] | dBA | 53 - 71 | |
| | Energy label / $\eta_s$ with average temperature control | -- | A+++ / 179% | |
| **Operation limits** | Heating temperatures / Maximum setpoint | °C | 10 - 60 / 60 | |
| | Cooling temperatures / Min. setpoint | °C | -20 – 35 / -15 | 5 – 35 / 7 |
| | Brine heating temperatures | °C | -20 - +35 | |
| | Dissipation cooling temperatures | °C | 10 - 60 | |
| | Cooling circuit pressure min / max | bar | 2 / 45 | |
| | Heating/cooling circuit pressure | bar | 0,5 to 5 | |
| | Brine circuit pressure | bar | 0,5 to 5 | |
| **Working fluids** | Refrigerant type / GWP | -- | R410A / 2088 | |
| | Charge / T $CO_2$ eq | Kg/ton | 4,1 / 8,56 | 4,4 / 9,19 |
| | Compressor oil type / amount | l | POE 160SZ / 3,3-3,8 | |
| | Brine nominal flow, B0W35[1] (ΔT = 3 °C) [6] | l/h | 2405 - 9830 | |
| | Production nominal flow, B0W35[1] (ΔT = 5 °C) [6] | l/h | 1845 - 7685 | |
| **Electrical data: Controller** | 1/N/PE 220-240V / 50-60 Hz | - | ✓ | |
| | Maximum recommended external protection | A | C1A | |
| | Transformer primary circuit fuse | A | 0,630 | |
| | Transformer secondary circuit fuse | A | 4 | |
| **Electrical data: Compressor** | 3/PE 380-415V / 50-60Hz | -- | ✓ | |
| | Maximum recommended external recommended [5] | A | C40A | |
| | Maximum consumption, B0W35[1] | kW/A | 10,9/17,7 | |
| | Maximum consumption, B0W55[1] | kW/A | 15,5/24,6 | |
| | Maximum consumption | kW/A | 18,1/28,6 | |
| | Starting current min/max [4] | A | 5,6/9 | |
| | Correction of cosine ϕ | -- | 0,96-1 | |
| **Dimensions and weight** | Height x width x depth | mm | 1063x870x785 | |
| | Empty weight (without assembly) | kg | 295 | 307 |

EN

| Specification ecoGEO HP1 15-70 kW / HP3 15-70 kW | | Units | HP1 15-70 | HP3 15-70 |
|---|---|---|---|---|
| **Application** | Place of installation | | Indoors | |
| | Type of brine system | | Geothermal | |
| | Heating, DHW with external storage tank and pool | | ✓ | |
| | Integrated active cooling | | -- | ✓ |
| | Passive cooling control (External installation) | | ✓ | |
| **Performance** | Compressor range of modulation | % | 25 to 100 | |
| | Heating power, B0W35[1,6] | kW | 17,1 to 59,6 | |
| | COP, B0W35[1,6]maximum | -- | 4,5 | |
| | Active cooling power, B35W7[1,6] | kW | -- | 15,1 a 61,5 |
| | EER, B35W7[1,6]maximum | -- | -- | 4,5 |
| | Maximum DHW temperature (without external heater) | °C | 60 | |
| | Sound power level[3] | dBA | 53 to 71 | |
| | Energy label / $\eta_s$ with average temperature control | -- | A++ / 184% | |
| **Operation limits** | Heating temperatures / Maximum setpoint | °C | 10 - 60 / 60 | |
| | Cooling temperatures / Min. setpoint | °C | -20 – 35 / -15 | 5 – 35 / 7 |
| | Brine heating temperatures | °C | -20 - +35 | |
| | Dissipation cooling temperatures | °C | 10 - 60 | |
| | Cooling circuit pressure min / max | bar | 2 / 45 | |
| | Heating/cooling circuit pressure | bar | 0,5 to 5 | |
| | Brine circuit pressure | bar | 0,5 to 5 | |
| **Working fluids** | Refrigerant type / GWP | -- | R410A / 2088 | |
| | Charge / T $CO_2$ eq | Kg/to n | 4,7 / 9,81 | 5,5 / 11,48 |
| | Compressor oil type / amount | l | POE 160SZ / 3,6-4,1 | |
| | Brine nominal flow, B0W35[1] (ΔT = 3 °C) [6] | l/h | 3230 - 13195 | |
| | Production nominal flow, B0W35[1] (ΔT = 5 °C) [6] | l/h | 2465 - 10265 | |
| **Electrical data: Controller** | 1/N/PE 220-240V / 50-60 Hz | - | ✓ | |
| | Maximum recommended external protection | A | C1A | |
| | Transformer primary circuit fuse | A | 0,630 | |
| | Transformer secondary circuit fuse | A | 4 | |
| **Electrical data: Compressor** | 3/PE 380-415V / 50-60Hz | -- | ✓ | |
| | Maximum recommended external recommended [5] | A | C50A | |
| | Maximum consumption, B0W35[1] | kW/A | 14,3/23,2 | |
| | Maximum consumption, B0W55[1] | kW/A | 20,4/32,3 | |
| | Maximum consumption | kW/A | 23,7/37,0 | |
| | Starting current min/max [4] | A | 7,5/11,8 | |
| | Correction of cosine ϕ | -- | 0,96-1 | |
| **Dimensions and weight** | Height x width x depth | mm | 1063x870x785 | |
| | Empty weight (without assembly) | kg | 322 | 336 |

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| Specification ecoGEO HP1 25-100 kW / HP3 25-100 kW | | Units | HP1 25-100 | HP3 25-100 |
|---|---|---|---|---|
| **Application** | Place of installation | | Indoors | |
| | Typeof brine system | | Geothermal | |
| | Heating, DHW with external storage tank and pool | | ✓ | |
| | Integrated active cooling | | -- | ✓ |
| | Passive cooling control (External installation) | | ✓ | |
| **Performance** | Compressor range of modulation | % | 25 to 100 | |
| | Heating power, B0W35[1,6] | kW | 21,1 to 86,7 | |
| | COP, B0W35[1,6]maximum | -- | 4,5 | |
| | Active cooling power, B35W7[1,6] | kW | -- | 22,3 a 90,3 |
| | EER, B35W7[1,6]maximum | -- | -- | 4,6 |
| | Maximum DHW temperature (without external heater) | °C | 60 | |
| | Sound power level[3] | dBA | 59 to 72 | |
| | Energy label / $\eta_s$ with average temperature control | -- | A+++ / 183% | |
| **Operation limits** | Heating temperatures / Maximum setpoint | °C | 10 - 60 / 60 | |
| | Cooling temperatures / Min. setpoint | °C | -20 – 35 / -15 | 5 – 35 / 7 |
| | Brine heating temperatures | °C | -20 - +35 | |
| | Dissipation cooling temperatures | °C | 10 - 60 | |
| | Cooling circuit pressure min / max | bar | 2 / 45 | |
| | Heating/cooling circuit pressure | bar | 0,5 to 5 | |
| | Brine circuit pressure | bar | 0,5 to 5 | |
| **Working fluids** | Refrigerant type / GWP | -- | R410A / 2088 | |
| | Charge / T $CO_2$ eq | Kg/ton | 8,5 / 17,75 | 9,1 / 19 |
| | Compressor oil type / amount | l | POE 160SZ / 6,7-7,7 | |
| | Brine nominal flow, B0W35[1] (ΔT = 3 °C) [6] | l/h | 4765 - 19360 | |
| | Production nominal flow, B0W35[1] (ΔT = 5 °C) [6] | l/h | 3625 - 14935 | |
| **Electrical data: Controller** | 1/N/PE 220-240V / 50-60 Hz | - | ✓ | |
| | Maximum recommended external protection | A | C1A | |
| | Transformer primary circuit fuse | A | 0,630 | |
| | Transformer secondary circuit fuse | A | 4 | |
| **Electrical data: Compressor** | 3/PE 380-415V / 50-60Hz | -- | ✓ | |
| | Maximum recommended external recommended [5] | A | C63A | |
| | Maximum consumption, B0W35[1] | kW/A | 20,3/31,8 | |
| | Maximum consumption, B0W55[1] | kW/A | 29,6/45,1 | |
| | Maximum consumption | kW/A | 33,7/52,9 | |
| | Starting current min/max [4] | A | 10,8/16,7 | |
| | Correction of cosine ϕ | -- | 0,96-1 | |
| **Dimensions and weight** | Height x width x depth | mm | 1063x950x886 | |
| | Empty weight (without assembly) | kg | 450 | 465 |

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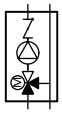
## 11. Symbols

| | | | |
|---|---|---|---|
|  | DHW circuit |  | 3-way valve open/closed |
|  | Pool |  | 3-way thermostatic valve |
|  | Heating system |  | 3-way modulating valve 0-10Vdc |
|  | Cooling system |  | Check valve |
|  | NTC temperature probe |  | Cut-off valve |
|  | Relay thermostat |  | Safety valve |
|  | Data bus communication terminal |  | Differential pressure valve |
|  | Circulator pump |  | Particulate filter |
|  | Direct outlet unit |  | Heat exchanger |
|  | Outlet unit with mixture | | Outlet pipe |
|  | Electrical resistance | | Return pipe |
|  | Drain defrost heater |  | Flexible hose |
|  | Expansion vessel |  | Drain |

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