gorenje

HEAT PUMPS

2012

INTRODUCTION

A closer look at nature reveals new technologies for a cosy and warm home.

Heat is energy, and energy is all around us. Nature is one of the key resources that provide the foundations of our future. Renewable energy sources like air, water, and heat stored in the ground can be made available with modern advanced technology at any time. And sometimes one moment can decide the fate of the future. A decision to use a heat pump will improve living conditions for us and the generations to come. Let us cut energy consumption and heating costs, let us alleviate the negative effects on the environment, and let the warmth of our homes never fade.

A synergy of tradition, know-how, and innovation.
Gorenje for over 60 years.

For 60 years, Gorenje's innovation and technical perfection have co-created the pinnacle of the cooling appliance industry. In these years, the brand has become a synonym of quality, reliability and creative boldness. Synergy between cooling and heat pump technologies has been promoted and developed at Gorenje for 30 years as we were one of the first to launch the manufacture of sanitary heat pumps. Today, development of heat pump technology includes all our top experts who have been creating the Gorenje brand products for a number of years. This very synergy of tradition, know-how, and innovation is the best warranty of the quality of Gorenje heat pumps which are also tested according to the most stringent European standards and which will reliably heat your home even in the coldest days.

CONTENT

HEAT PUMPS
AQUAGOR, TERRAGOR AND AEROGOR

Heating systems with a heat pump boast reliability and economical operation. As much as 3/4 of energy is generated free of any charge or cost, from the environment, which reduces your heating bill by 60 to 75 percent. Do not shy away from the initial investment – it will be repaid in 3 to 7 years!

60 to 75 % lower heating costs

Heat pumps obtain 3/4 of required energy free of any charge, from the environment in which you live. Soil, groundwater, and outside air store huge amounts of thermal energy which can be transformed into heating energy using heat pumps. The savings are considerable compared to other conventional heating systems. The amount of power consumed by heat pumps is notably lower than the amount of heat they generate.

Proven and reliable heating system with a heat pump

The principle of heat pump operation has been known for a long time. Take the example of a refrigerator in your home, which operates by removing the heat from the inside and transferring it to the environment, thus heating the room. In the case of heat pumps, the process is merely reversed. The pump uses electric power driving a compressor to remove heat from the environment and turn it into valuable thermal energy that can be used for heating or cooling of rooms. Simple and effective, isn't it?

New construction, refurbishment, or heating system replacement

A heat pump is an ideal solution for heating and cooling of newly constructed or refurbished buildings, or when replacing an existing heating system. Since it operates on the principles of low-temperature heating, it is suitable for both underfloor heating and heating with wall-mounted radiators, as well as a combination of both. Heat pumps are also appropriate for rebuilt or refurbished buildings with radiator heating. If heating water temperature of 55°C suffices even in the coldest days, then heat pumps are the most economical source of heating.

Warm in the winter, cool in the summer

Unique heat pump technology allows your heating system to heat your home during the winter and cool it during the summer. Remarkable thermodynamic characteristics and the capacity of transferring a maximum amount of thermal energy from the environment allow, in addition to economical heating of rooms, heating sanitary water throughout the year. Moreover, without additional work or investment, the system can be used for cooling regardless of whether you use wall-mounted hot air heaters or underfloor heating.

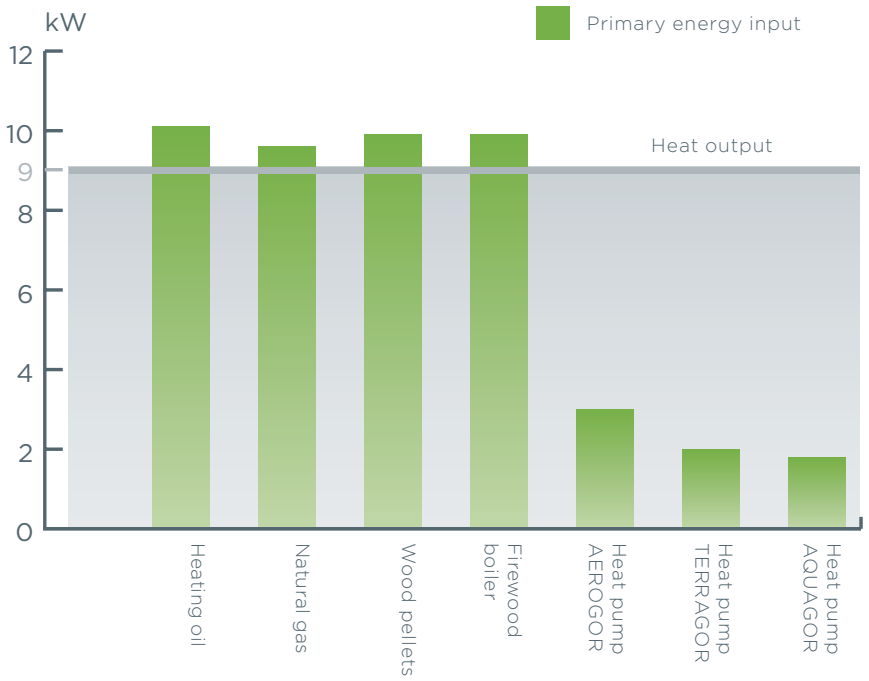
An investment into the future

If you decide to install a heat pump today, you should be aware you are making an investment in the next medium term period. Its true value lies in many measurable and non-measurable aspects. In addition to the safety of investment, flexibility, low heating costs, comfort, and many economic and ecological benefits, a heat pump is actually an investment in your future and the future of your children.

Simple control

Heating with heat pumps will save you time, worries, additional work, and money for supply of other fuels. All systems allow highly convenient and simple operation. A full system will also allow remote control.

MINIMUM
HEATING COSTS



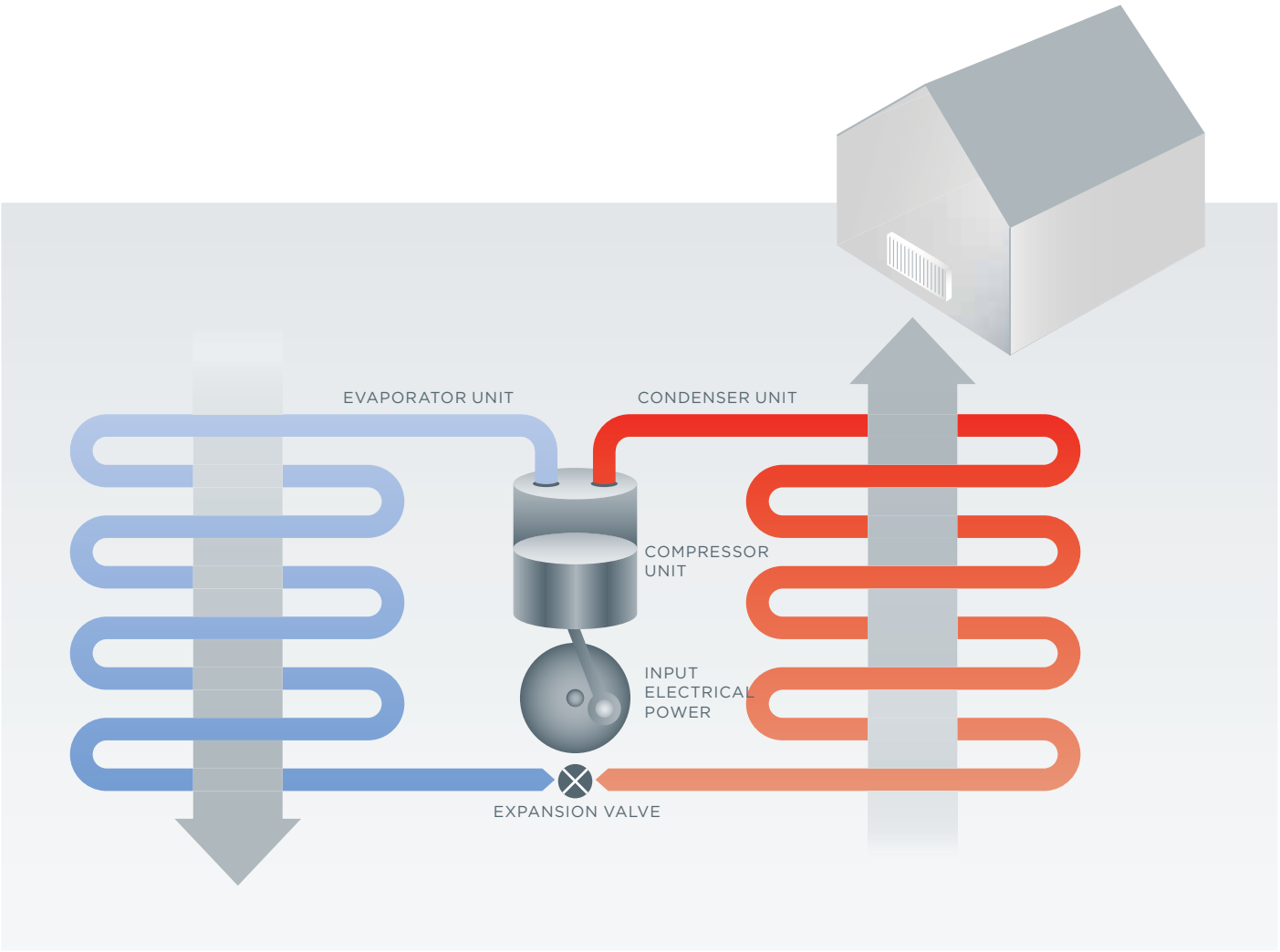
Comparison of primary energy input for 9 kW of heat output in different heating systems

Compared to other heating systems, heat pumps are highly economical as they use up to three times less of primary energy than, for example, gas or oil burners. Approximately 75 percent of their energy is recovered from the environment free of charge and thus, they only require about 25 percent in the form of electric power to generate 100 percent output heating power. Investment costs of heat pumps, too, are comparable to those of other systems as they do not require a heating oil or gas tank, or chimney, while maintenance costs are considerably lower.

Purchasing a heat pump makes sense because:

- it cuts heating costs by up to 75%;
- it causes no pollution at the location where it is installed;
- it is remarkably silent;
- it is both a heating and an economical air conditioning/cooling device;
- it requires no heating oil tank, solid fuel storage, natural gas pipeline connection, or chimney;
- it is simple to maintain.

HOW DOES A HEAT PUMP WORK?



Heat pump is a technologically advanced system adjusted to make use of renewable energy sources. Its advantage is the ability to recover heat from the air, groundwater, or soil in your immediate environment. There are three types of heat pumps, differing in the energy source they employ: air/water, water/water, and brine/water heat pumps.

A heat pump consists of an evaporator that recovers heat from the environment (water, air, soil). In the **evaporator**, a refrigerant passes from liquid to gaseous state and then travels to the **compressor**. There, the vapours are compressed to increase pressure and temperature. Hot vapours are liquefied in the **condenser unit**, emitting the condensation heat to the heating medium. Then the refrigerant passes through an **expansion valve** where its pressure is again lowered, and continues back to the evaporator where the process is repeated. All heat acquired from the environment is free. Raising its temperature requires some energy. Hence, **electric power** is required for heat pump operation to power the aggregate/ motor.

There are three basic versions of heat pumps according to the medium (environment) being cooled and the medium being heated: water/water, brine/water and air/water. When designating the type of heat pump, the sources from which the heat is taken away is indicated first, followed by the medium being heated.

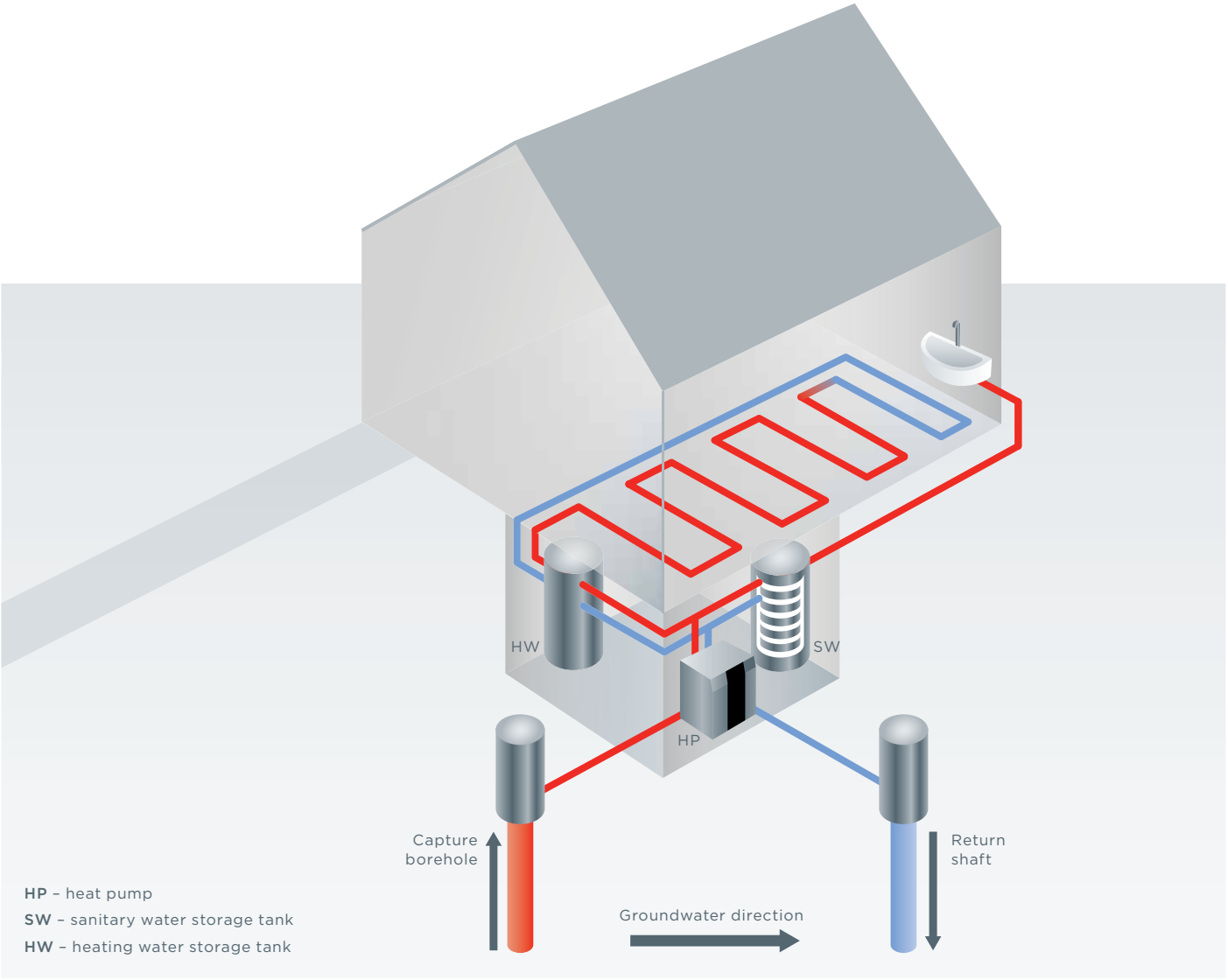
Coefficient of performance - COP

The ratio between input power (electrical energy) and output heat (thermal energy) is normally between 1/3 and 1/5. The ratio between input energy and output heat is called Coefficient of Performance (COP). The value of COP depends on the type of heat pump and source of thermal energy in the environment. On average, annual COP for heat pumps is between 3 and 5 or more.

AQUAGOR
HEAT PUMP
WATER|WATER

Water/water heat pumps are among the most efficient heating energy systems. The temperature of ground water is a very reliable and constant energy source since its temperature is between 7°C and 13°C.

Diagram of a water/water heat pump system:



Actual water temperature depends on the location where it is pumped. The ratio between input power and output heat (Coefficient of Performance, or COP) is very favourable in water/water systems, often exceeding the figure of 5, considering the annual average.

One of the key components of AQUAGOR heat pumps is the spiral heat exchanger made of stainless steel that offers excellent protection from corrosion and sedimentation on the heat exchanger walls.

Implementation of a AQUAGOR heat pump requires drilling two boreholes into the ground: primary borehole (well) for pumping the water and secondary borehole for returning the water to the ground. Based on experience, optimum distance between the primary and secondary borehole is approximately 15 meters. A part of the energy stored in the water pumped from the ground is recovered and the water is returned to the ground, cooled by 2°C to 4°C, without causing any chemical change to the water whatsoever. Before using water as the primary heat source, a pump test must be conducted to check the amount of water and its quality. Water right permit is required for pumping ground water.

In the AQUAGOR heat pump system, minor adjustments can also be made to allow **passive cooling**. In this case, relatively low ground water temperature is used to cool the rooms. During passive cooling, the heat pump is not in operation, which allows minimum energy consumption for cooling and thus, compared to conventional air conditioning, much lower electricity bill.

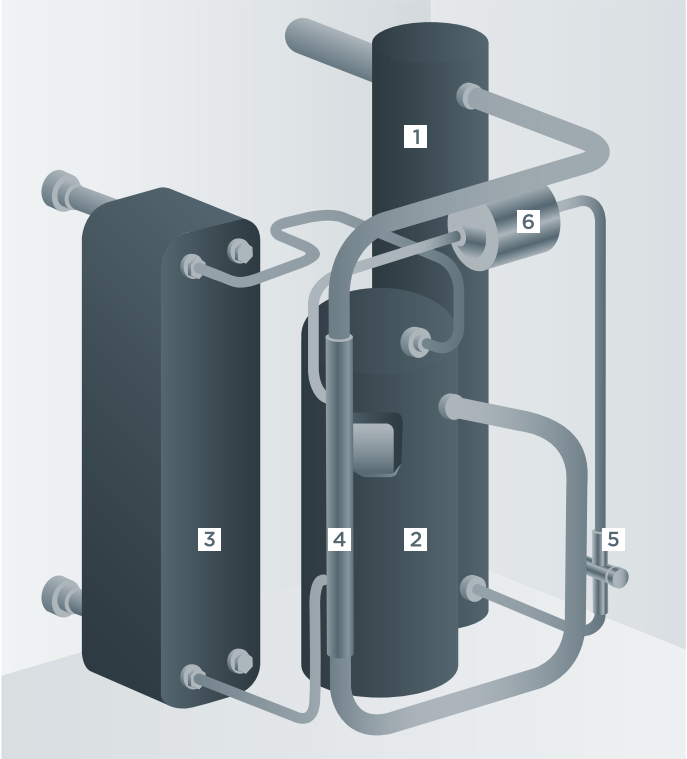
HEAT PUMP
AQUAGOR

- Minimum temperature of ground water 7°C
- Installation of heat pump in a dry room with temperature above 0°C
- Option of heating and heating of sanitary water
- Availability of energy source throughout the year
- Monovalent operation mode
- Simple electronic control of the system
- Allows two independent hydraulic circuits
- Passive cooling option

Technical characteristics of heat pumps AQUAGOR

MODEL		HP 7 WW	HP 9 WW	HP 12 WW	HP 14 WW	HP 18 WW
Dimensions (HxWxD)	mm	935x654x580	935x654x580	935x654x580	935x654x580	935x654x580
Weight	kg	86	97	121	137	142
Heating water temperature	°C	55	55	55	55	55
Heating power*	kW	6,4	8,4	11,6	14,2	17,7
Rated power*	kW	1,21	1,56	2,15	2,63	3,16
Coefficient of Performance COP*	/	5,3	5,4	5,4	5,4	5,6
Refrigerant / mass	/kg	R407C/1,4	R407C/1,6	R407C/1,7	R407C/1,8	R407C/2,1
Heat source temperature	°C	7 do 25	7 do 25	7 do 25	7 do 25	7 do 25
Internal unit noise	dB (A)	52	52	52	52	52
Water flow – heat source	m^3/h	1,5	1,98	2,71	3,34	4,18
WATER FLOW - HEATING	m^3/h	1,11	1,46	2,01	2,46	3,06
Power supply / fuse	V/A	400/10	400/10	400/10	400/16	400/16

*Measured for parameters water-water W10/W35, according to standard EN 14511.



1 **Evaporator unit**
Spiral evaporator - developed especially for the water/water heat pump. Resistant to oxidation, corrosion and protected against accumulation of impurities.

2 **Compressor unit**
Through years of use, the "scroll" technology proved an excellent choice as it delivers higher efficiency rates as well as silent and reliable operation.

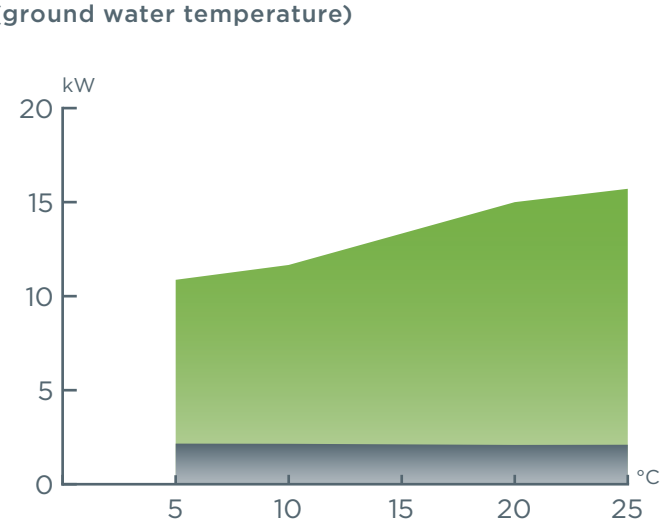
3 **Condenser unit**
Efficient transfer of thermal energy:
Highly efficient panel condenser unit with low flow resistance.

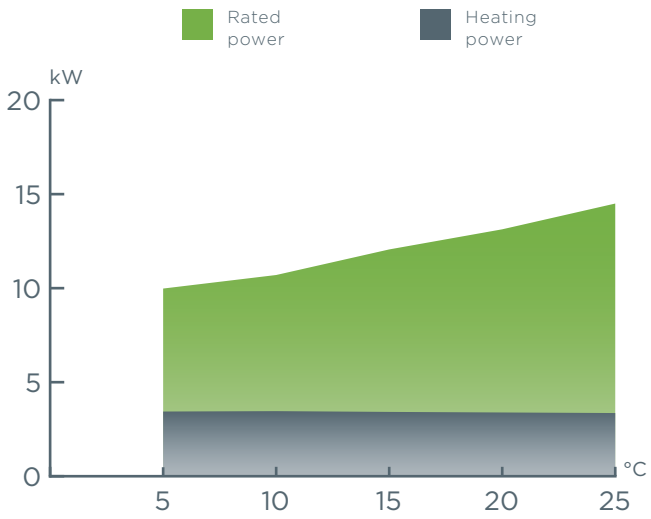
4 **Internal heat exchanger**
Returns the energy that would be dissipated into the environment, back to the cooling system and protects the compressor from influx of liquid refrigerant.

5 **Expansion valve**
Reduces the temperature and pressure of the refrigerant to the level allowing its evaporation and entering into the evaporator unit.

6 **Drying filter**
Prevents corrosion of the system's elements by removing water from the refrigerant.

HP 12 WW - comparison of rated power and heating power at different source temperatures (ground water temperature)





12 kW | heating water up to 35°C

Source temperature [°C]	°C	7	10	15	20	25
Rated power	kW	2,2	2,2	2,1	2,1	2,1
Heating power	kW	10,8	11,6	13,3	15,0	15,7
COP	/	5,0	5,4	6,3	7,2	7,5

12 kW | heating water up to 55°C

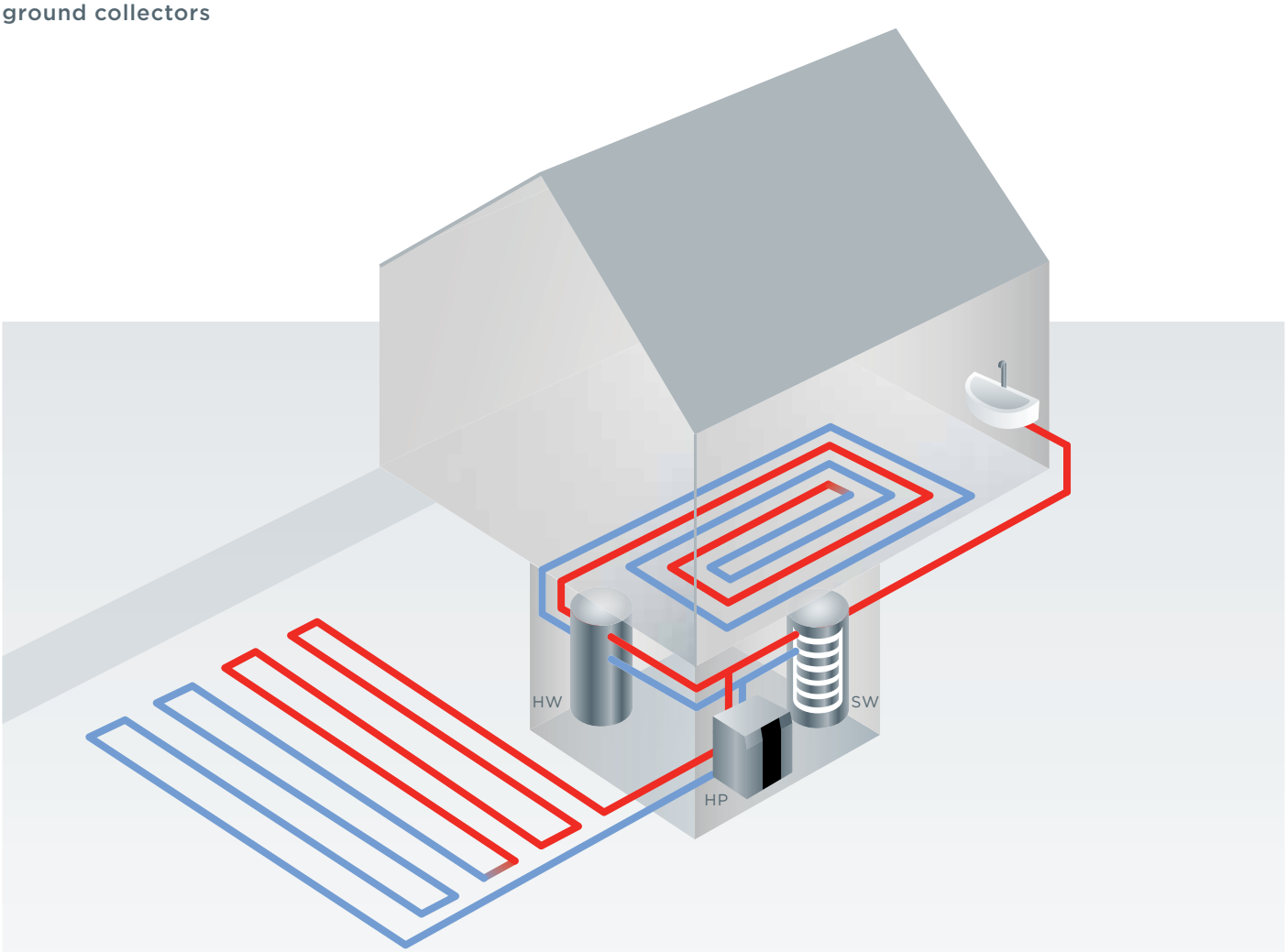
Source temperature [°C]	°C	7	10	15	20	25
Rated power	kW	3,4	3,5	3,4	3,4	3,4
Heating power	kW	9,9	10,6	12,0	13,1	14,5
COP	/	2,9	3,1	3,5	3,9	4,3

TERRAGOR

HEAT PUMP BRINE|WATER

Brine/water heat pumps use the heat stored in the ground as the source of energy. A huge amount of energy is stored in the ground, generated by precipitation and sunlight. Two systems are available for continuous recovery of heat from the ground: ground heat collectors, and borehole heat exchangers.

Diagram of a brine/water heat pump system with ground collectors



HP – heat pump
SW – sanitary water storage tank
HW – heating water storage tank

TERRAGOR heat pumps are highly economical and they reach COP values over 4.5. The difference between input temperature of the medium (water + glycol) and output temperature at the collector is approximately 4°C. In the brine/water heat pump system, minor adjustments can also be made to allow **passive cooling**.

Horizontal ground collector

Brine/water heat pumps make use of the energy accumulated in the soil. The energy is recovered from the soil using a ground heat collector laid over an adequately sized surface. For optimum operation, the collector surface must be approximately twice the size of the heated area. The amount of energy retrievable from the soil depends on soil composition and position. It is important that the surface on which the ground collector is laid is not built on or asphalted; in other words that nothing obstructs the passage of precipitation through the surface.
The required size of the collector can be roughly calculated as follows: heating pump heating power (in kW) × 40.
Required cross-section of PE pipe is 1" and they must be laid approximately 120 cm below ground surface level, with a gap of 0.7 to 0.8 meters between the pipes.

Vertical heat exchanger

If the surface available to build a horizontal ground collector is not sufficient, a vertical/borehole heat exchanger can be drilled to make use of the geothermal energy. Approximate required depth of the borehole can be calculated as follows: heat pump heating power (kW) × 14 = borehole depth (m).

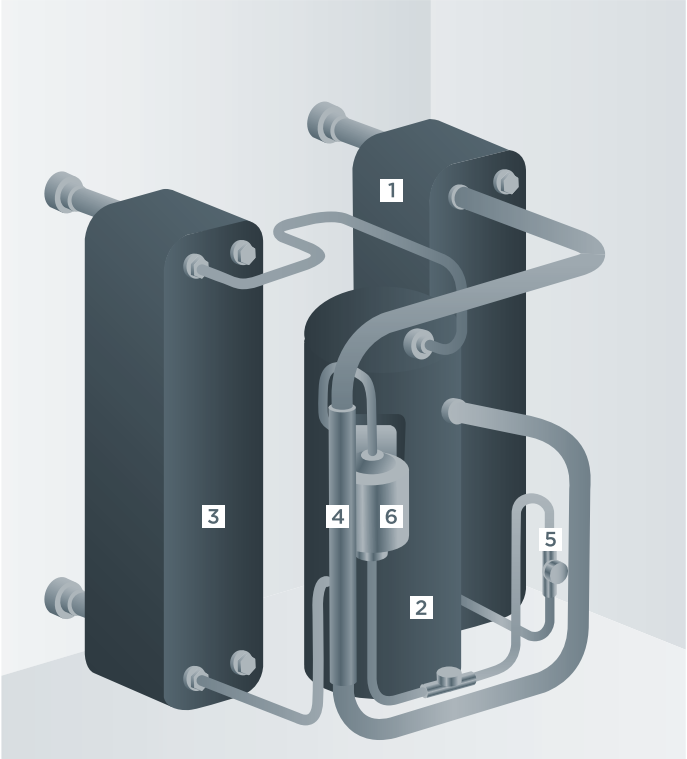
HEAT PUMP
TERRAGOR

- Geothermal energy recovered by a ground collector or vertical/borehole heat exchanger
- Temperature at a depth of over 1.2 meters does not fall below 0°C
- Installation of heat pump in a dry room with temperature above 0°C
- Option of heating and heating of sanitary water
- Availability of energy source throughout the year
- Monovalent operation mode
- Simple electronic control of the system
- Allows two independent hydraulic circuits
- Passive cooling option

Technical characteristics of heat pumps TERRAGOR

MODEL		HP 6 BW	HP 9 BW	HP 11 BW	HP 14 BW	HP 17 BW
Dimensions	mm	815x654x580	815x654x580	815x654x580	815x654x580	815x654x580
Mass	kg	82	91	113	124	128
Heating water temperature	°C	55°C	55°C	55°C	55°C	55°C
Heating power*	kW	6,5	9,2	11,7	14,4	17
Rated power*	kW	1,5	2,04	2,6	3,2	3,7
Coefficient of Performance COP*	/	4,3	4,5	4,5	4,5	4,6
Refrigerant / mass	/kg	R407C/2,0	R407C/2,1	R407C/2,5	R407C/2,3	R407C/2,7
Heat source temperature	°C	-5 do 25	-5 do 25	-5 do 25	-5 do 25	-5 do 25
Internal unit noise	dB (A)	55	55	55	55	55
Water flow – heat source	m^3/h	1,54	2,2	2,79	3,46	4,13
WATER FLOW - HEATING	m^3/h	1,12	1,59	2,03	2,49	2,95
Power supply / fuse	V/A	400/10	400/10	400/16	400/16	400/16

*Measured at parameters brine-water B0/W35, according to standard EN 14511.



1 **Evaporator unit**
An efficient flat heat exchanger:
• integrated distributor for constant injection of refrigerant,
• low flow resistance on the water side of the heat exchanger.

2 **Compressor unit**
Through years of use, the "scroll" technology proved an excellent choice as it delivers higher efficiency rates as well as silent and reliable operation.

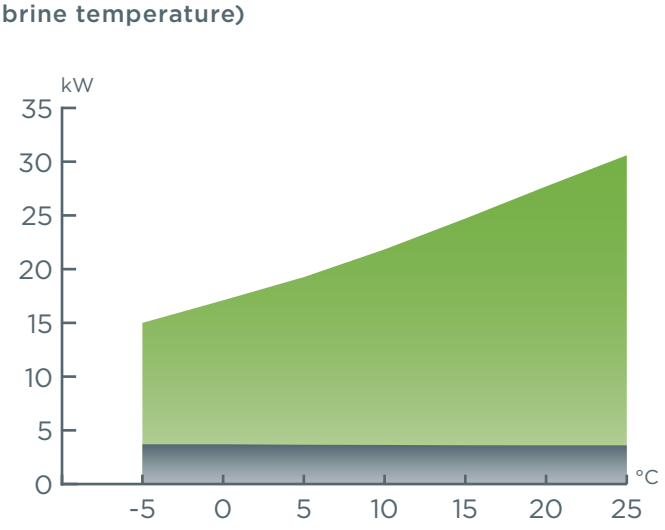
3 **Condenser unit**
Efficient transfer of thermal energy:
Highly efficient panel condenser unit with low flow resistance.

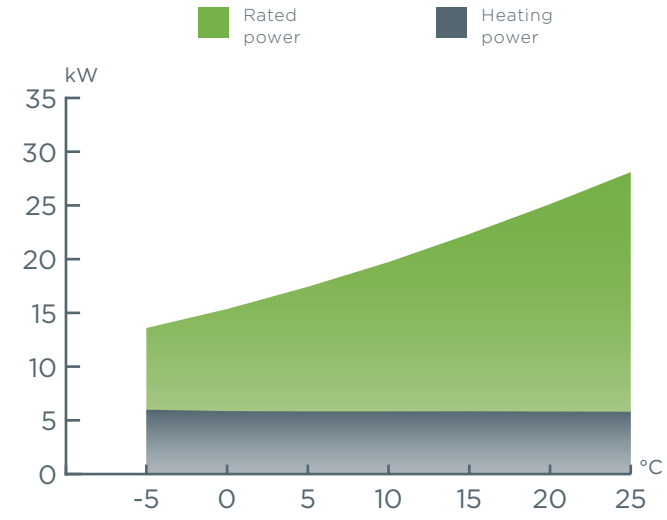
4 **Internal heat exchanger**
Returns the energy that would be dissipated into the environment, back to the cooling system and protects the compressor from influx of liquid refrigerant.

5 **Expansion valve**
Reduces the temperature and pressure of the refrigerant to the level allowing its evaporation and entering into the evaporator unit.

6 **Drying filter**
Prevents corrosion of the system's elements by removing water from the refrigerant.

HP 17 BW - comparison of electric and heating powers at different source temperatures (brine temperature)





17 kW | heating water up to 35°C

Source temperature [°C]	°C	-5	0	5	10	15	20	25
Rated power	kW	3,7	3,7	3,7	3,6	3,6	3,6	3,6
Heating power	kW	14,9	17,0	19,2	21,8	24,7	27,7	30,6
COP	/	4,0	4,6	5,2	6,0	6,8	7,7	8,5

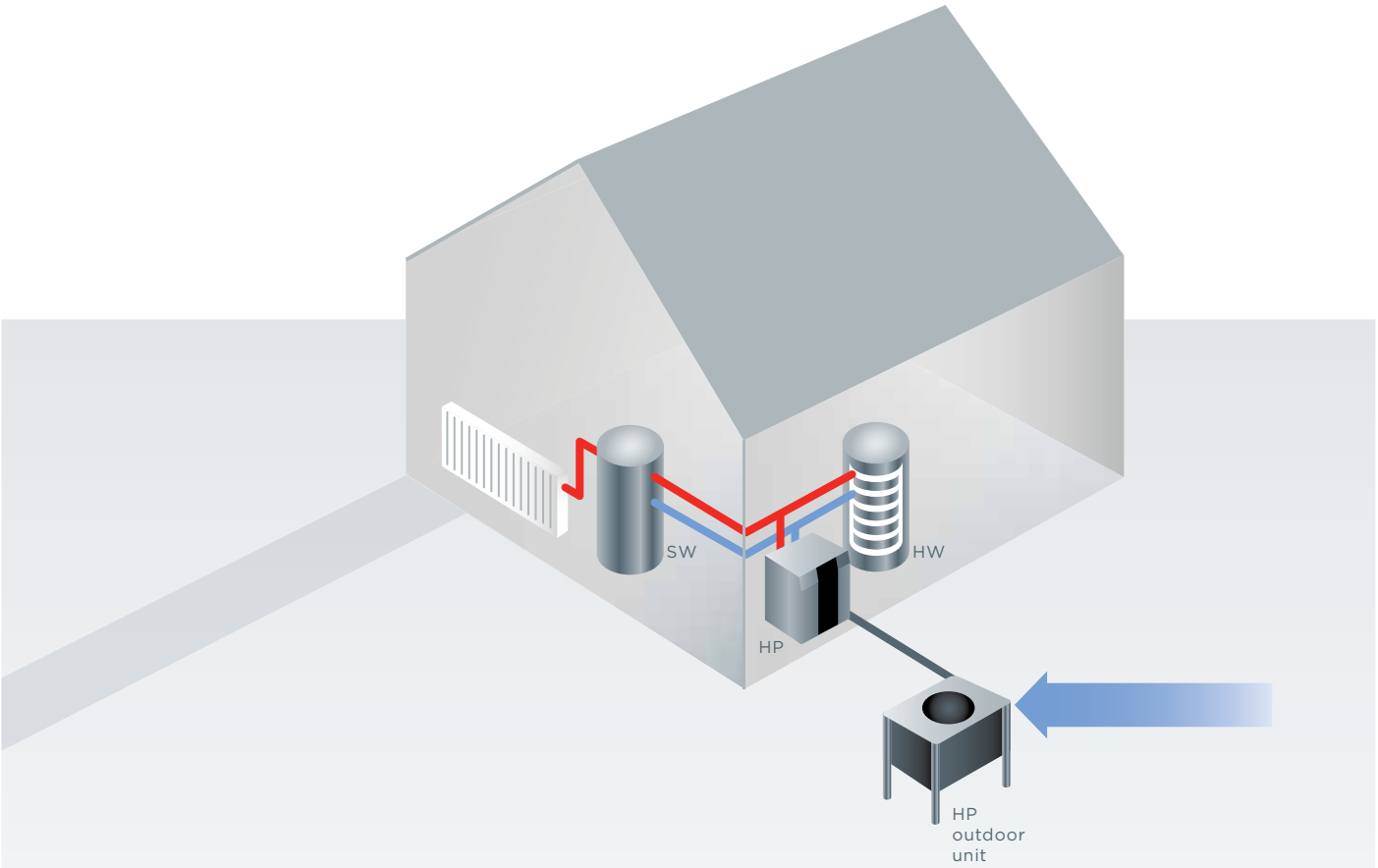
17 kW | heating water up to 55°C

Source temperature [°C]	°C	-5	0	5	10	15	20	25
Rated power	kW	6,0	5,9	5,8	5,8	5,8	5,8	5,8
Heating power	kW	13,4	15,3	17,4	19,7	22,3	25,1	28,1
COP	/	2,2	2,6	3,0	3,4	3,8	4,3	4,8

AEROGOR
HEAT PUMP AIR|WATER

Air/water heat pumps make use of the energy accumulated in the air in the environment. They can operate at temperatures down to -20°C. Since the temperature is easily recovered from the air, installation of the external unit is straightforward, simple and fast.

Diagram of an air/water heat pump system



HP – outdoor unit
HP - heat pump
SW - sanitary water storage tank
HW- heating water storage tank

The quality of make and cutting-edge technology allow high energy efficiency of these devices. A silent axial fan pumps large amounts of air through the evaporator which is installed outdoors, separately from the heat pump aggregate. Combination of evaporator and fan allow operation that is not disturbing for the environment, and generates high yields.

Internal (indoor) heat pump unit is installed within the building. Such system prevents any freezing danger to the external unit even in cases of prolonged power supply failure. The heat pump evaporator unit and aggregate are connected with copper pipes that carry the refrigerant transferring the heat from the evaporator to the condenser unit. Advanced regulation allows running several heating circuits through outdoor temperature and provides optimum defrosting of the outdoor unit. Heat pumps AEROGOR are ideal for use in bivalent systems with two heating sources and coordinated operation. The refrigerant used is R 407 C which is non-flammable and environmentally friendly.

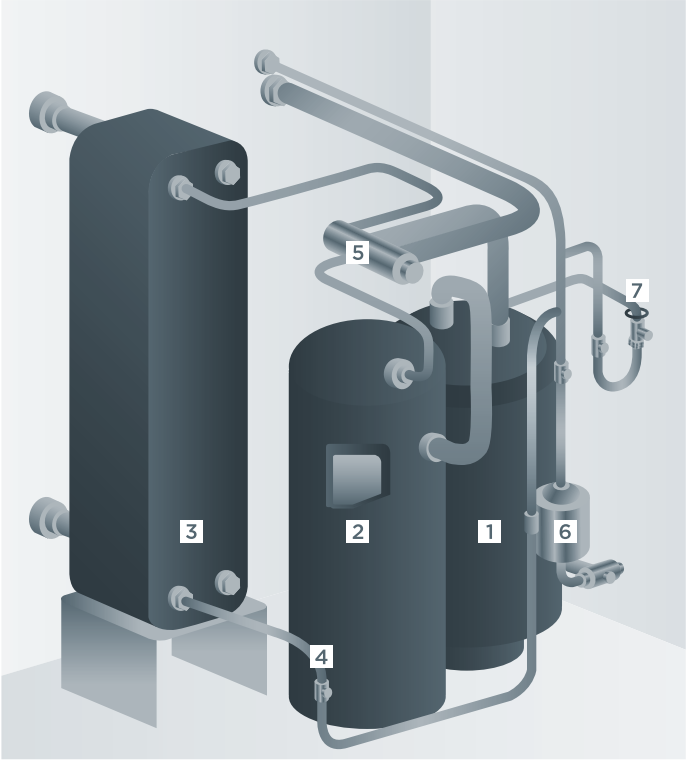
HEAT PUMP
AEROGOR

- Heat pump has a separate outdoor evaporator unit while all other vital parts are installed in the building, protected from freezing
- Operating range: -20°C to 40°C
- Optimum evaporator defrosting procedure is controlled by a high-performance control unit
- Allows heating of rooms and sanitary water
- Energy source is available throughout the year
- Highly appropriate for bivalent use
- Distance between the evaporator and the heat pump motor is up to 10 meters
- Connection pipes require good thermal insulation.
- Active cooling option

Technical characteristics of heat pumps AEROGOR

MODEL		HP 9 AW	HP 12 AW	HP 14 AW	HP 17 AW
Internal unit dimensions (H x W x D)	mm	935x654x580	935x654x580	935x654x580	935x654x580
External unit dimensions (H x W x D)	mm	1250x1060x1250	1250x1060x1250	1250x1060x1250	1250x1060x1250
Internal unit mass	kg	110	127	132	164
External unit mass	kg	85	85	85	85
Heating water temperature (max.)	°C	55°C	55°C	55°C	55°C
Heating power (A2/W35)*	kW	8,0	9,2	10,7	12,1
Coefficient of Performance COP (A2/W35)*	/	3,7	3,7	3,6	3,4
Heating power (A7/W35)*	kW	10,1	11,3	13,1	14,8
Coefficient of Performance COP(A7/W35)*	/	4,5	4,3	4,1	3,8
Refrigerant / mass	/kg	R407C/8	R407C/8	R407C/8	R407C/8
Heat source temperature	°C	-20 do 35	-20 do 35	-20 do 35	-20 do 35
Internal unit noise	dB (A)	55	55	55	55
External unit noise	dB (A)	60	60	60	60
Air flow – heat source	m^3/h	4800	4800	4800	5100
Water flow - heating	m^3/h	1,89	2,14	2,4	2,83
Power supply / fuse	V/A	400/10	400/10	400/10	400/16

*Measured according to standard EN 14511.



1 **Heat exchanger**
Works as a suction accumulator to protect the compressor from influx of liquid refrigerant. Works as an interior heat exchanger and improves the efficiency of the cooling system.

2 **Compressor unit**
Through years of use, the "scroll" technology proved an excellent choice as it delivers higher efficiency rates as well as silent and reliable operation.

3 **Condenser unit**
Efficient transfer of thermal energy:
Highly efficient panel condenser unit with low flow resistance.

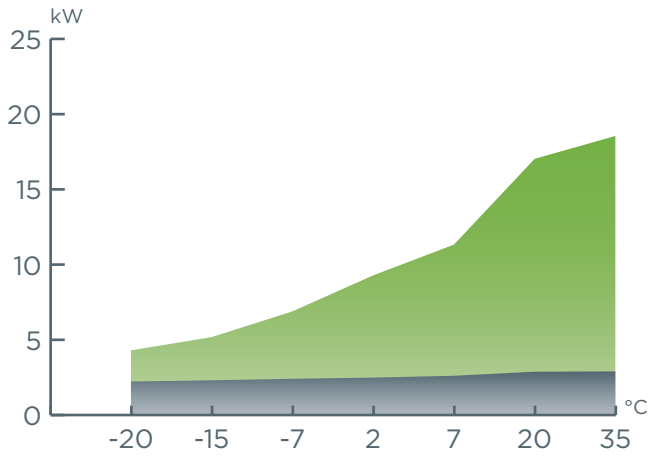
4 **Expansion valve**
Its function is to reduce the temperature and pressure of the refrigerant to the level allowing its evaporation and entering into the evaporator unit.

5 **Four-way reversing valve**
Allows active cooling in summer months and defrosting of the external unit.

6 **Drying filter**
An element in the cooling system intended for removal of water from the refrigerant in order to prevent corrosion of the system's elements.

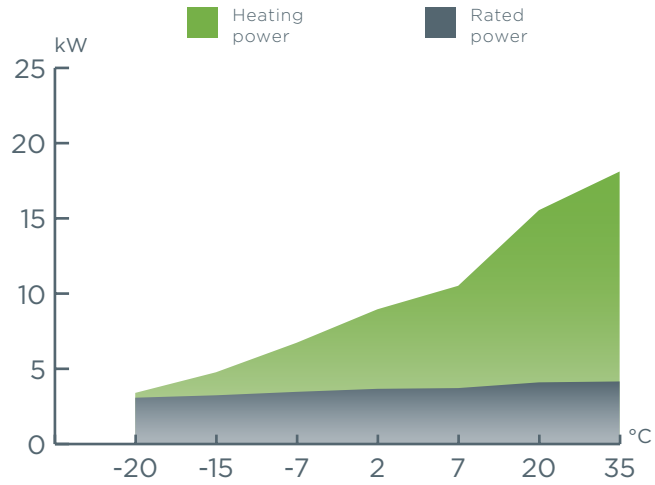
7 **Refrigerant injection valve**
Allows heat pump operation in extreme temperature conditions and protects the compressor from overloads.
Adjustable for different operating conditions.

HP 12 AW - comparison of electric and heating powers at different source temperatures (temperature of surrounding air)



12 kW | heating water up to 35°C

Source temperature [°C]	°C	-20	-15	-7	2	7	20	35
Rated power	kW	2,2	2,3	2,4	2,5	2,6	2,9	2,9
Heating power	kW	4,3	5,1	6,8	9,2	11,3	17,0	18,5
COP	/	1,9	2,2	2,8	3,7	4,3	5,9	6,4



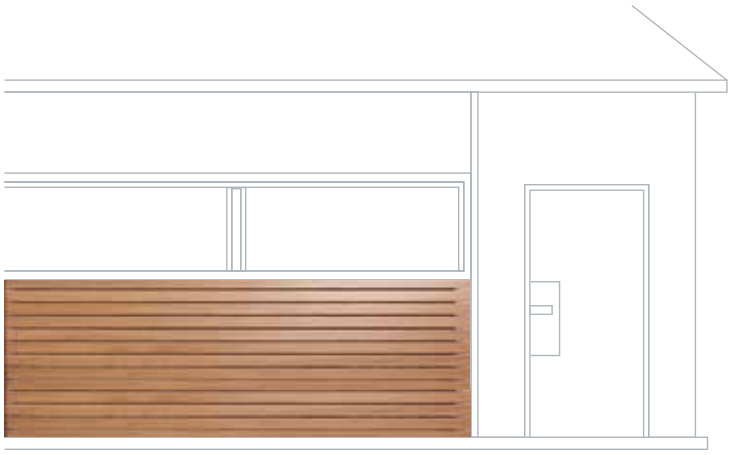
12 kW | heating water up to 55°C

Source temperature [°C]	°C	-20	-15	-7	2	7	20	35
Rated power	kW	3,1	3,2	3,5	3,7	3,7	4,1	4,2
Heating power	kW	3,4	4,7	6,7	8,9	10,5	15,5	18,1
COP	/	1,1	1,5	1,9	2,4	2,8	3,8	4,3

HEAT PUMP
AEROGOR

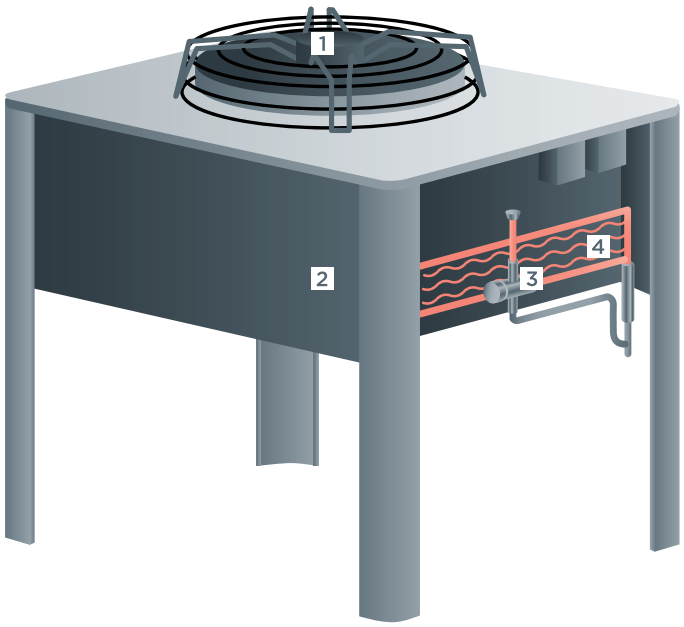
External/outdoor unit, installed outdoors, consists of an evaporator and a fan, mounted in a weather-resistant housing. Various designs of outer housings allow the outdoor unit to match the appearance of your home in the best possible way. Available in three designs: facade panel, sheet metal and wood.

Facade panel



Wood

Sheet metal



1 Fan
2 Housing
3 Electronic expansion valve
4 Evaporator

Advantages of a split type heat pump compared to a compact air/water heat pump or a vertical outdoor unit:

- The compressor is installed in the internal unit, allowing it **to operate** in **an optimal temperature range**. Moreover, it does not require an additional electric heater for compressor oil, which reduces electricity consumptions and increases the heat pump COP;
- Allows installation of a larger evaporator resulting in a larger surface for heat exchange and a **higher evaporator power**;
- With the compressor installed in the internal unit, it ensures **lower noise levels**. The noise emitted from the fan spreads out evenly in all directions, and is therefore not disturbing to the surroundings;
- Compared to the compact type, it has **lower thermal losses**; thermal losses in the compact type are higher due to the condenser being exposed to lower temperatures and due to a larger distance between the storage tank and heat pump;
- **Various design solutions** for external units, i.e. metal, facade or wooden panels, allow design adaptability to the surroundings;
- The electric heater used for defrosting the condensate drain pipe, which is installed in some compact external units, can reduce the heat pump COP;
- In bivalent heating mode, **the heat pump can be turned off**, e.g. during our absence, as it can remain in a standstill state if not needed. Such turning off is not possible in the compact type with water connection, due to the risk of freezing of the pipeline.
- An electronic expansion valve is installed in the external unit, covering a very wide range of operating range (2 – 18 kW). Compared to a thermostatic expansion valve, an electronic expansion valve functions faster and more accurately, providing **better regulation of the heat pump**.
- Horizontal installation allows **different settings of fan operation**; the heat pump operates optimally even with lower air intake, only the warm-up time is longer. If we wish to reduce the noise level of the external unit with a lower power setting of the fan, we can achieve adequate operation of the heat pump despite a lower air intake;

HIGH TEMPERATURE
HEAT PUMPS AQUAGOR AND TERRAGOR

Heating of older buildings constructed in accordance with different standards (dimensioning, radiator heating system, insulation thickness) requires higher heating water temperatures. This is particularly true for the buildings which, before rehabilitation, had a high temperature heating system (using oil, gas or wood) as the main heating source, and radiator heating.

High temperature pumps are particularly useful in the following:

- older buildings, insulated in accordance with the then-applicable standards, where the insulation does not entirely meet the requirements for low-temperature heat pumps and the cost of additional insulation would be economically unjustified;
- buildings where installation of oversized radiators is either not possible or not economical;
- buildings under monument protection;
- buildings which cannot have proper rehabilitation of the insulation system for various other reasons (unified appearance of the street, large glass surfaces, etc.).

In principle, high temperature heat pumps operate in the same manner as low temperature heat pumps, both in terms of thermal energy capture (ground water, brine) and from the point of view of energy and economic efficiency of the heat pump operation (COP brine/water: 4-5, water/water: 5-6). The main difference is that a high temperature heat pump allows the heating water temperature to rise to 65°C, allowing proper operation of a radiator heating system as well.

In high temperature heat pumps, higher temperatures of heating water (65°C) are reached by using special "heating" compressors with refrigerant injected into the compressor head.

Technical characteristics of high temperature heat pumps AQUAGOR

MODEL		HP 13 WW HT	HP 15 WW HT	HP 18 WW HT
Dimensions (HxWxD)	mm	935x654x580	935x654x580	935x654x580
Heating water temperature (max.)	°C	65	65	65
Heating power	kW	13,2	15,4	18,3
Rated power	kW	2,27	2,66	3,16
Coefficient of Performance COP *	/	5,8	5,8	5,8
Refrigerant / kg /	/	R407C	R407C	R407C
Heat source temperature °C	°C	7 do 25	7 do 25	7 do 25

Technical characteristics of high temperature heat pumps TERRAGOR

MODEL		HP 12 BW HT	HP 15 BW HT	HP 17 BW HT
Dimensions (HxWxD)	mm	815x654x580	815x654x580	815x654x580
Heating water temperature (max.)	°C	65	65	65
Heating power	kW	11,7	14,7	17,1
Rated power	kW	2,5	3,12	3,64
Coefficient of Performance COP *	/	4,7	4,7	4,7
Refrigerant / kg /	/	R407C	R407C	R407C
Heat source temperature °C	°C	-5 do 25	-5 do 25	-5 do 25

INTELLIGENT
ELECTRONIC CONTROL

Energy-efficient operation of a heating system depends above all on an effective control system that the heat pump is fitted with. Intelligent electronic control units in Gorenje heat pumps monitor the operation of the equipment according to the external input-output parameters, steering the circulation pumps, mixing valves, immersion pumps, shut-off valves, etc.

Basic regulation

Basic regulation supports two independent heating circuits – one direct and one mixing circuit. For each circuit, the heating curve is set independently. Basic regulation also supports heating of sanitary water with anti-Legionella program, as well as alternative sources such as solar panels or wood-fired furnaces. It also allows hassle-free regulation of additional sources such as a heating oil or gas burner. Electronic controls are universal for all types of heat pumps and heating methods. In case of major systems, upgrading the basic regulation unit is quite straightforward. In most cases, heating circuit regulation depends on the exterior temperature. The heating curve depends on the characteristics of the building being heated, which is the only warranty that the heat pump, regardless of the outdoor temperature, will always heats the water to the lowest acceptable temperature. The level of temperature thus defines the efficiency of the heating system. The lower the heating temperature, the higher the Coefficient of Performance.

BASIC ROOM CONTROL UNIT

Allows basic settings like: regime, temperature level, temperature settings, and switching the unit on and off.

Easy control

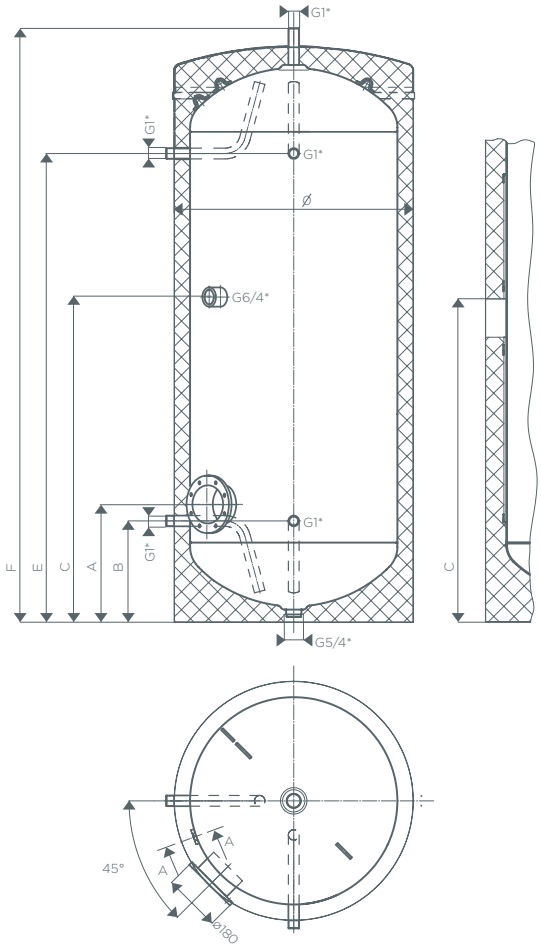
Menu navigation is plain and simple. Each screen is indicated with a consecutive number so that the user is aware at all times which page of the menu is currently open. Commands are indicated with appropriate wording. The unit can be controlled via user keyboard on the heat pump, or through an additional room control unit. Basic functions are available through keys on the control unit and heating system temperature is easily set with a rotating dial located in the middle of the control unit. For advanced users, controls can also be routed through interfaces to a personal computer or even to an intelligent home system.

ADVA NCED ROOM CONTROL UNIT

Allows all the settings that can also be made on the control unit on the heat pump.

HEATING WATER
STORAGE TANKS

For optimum performance, a heating system with an integrated heat pump requires a heating water storage tank. The purpose of the storage tank in the system is to accumulate energy and provide even heating water temperature. Its function is also to reduce the number of heat pump activation cycles which prolongs the compressor's useful life.



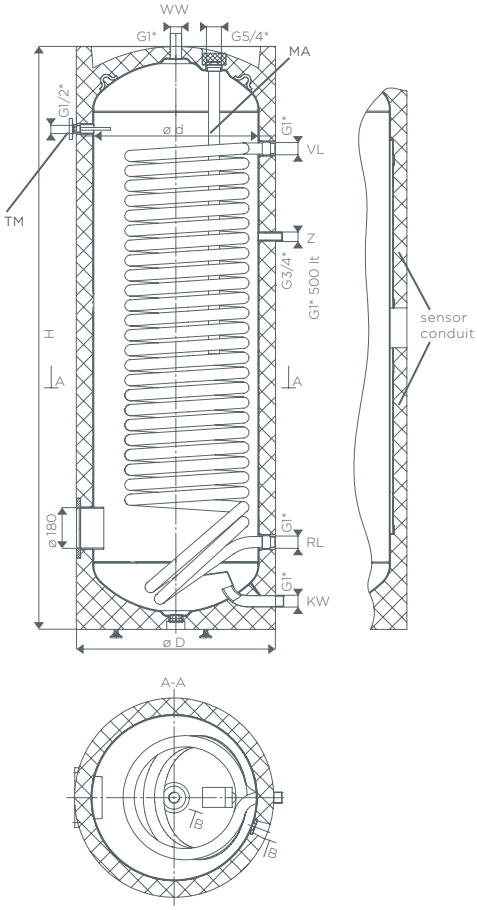
- Inner layer made of high quality sheet metal
- Working pressure 6 bar
- High quality PU-insulation, 50 mm thick
- Powder coated outer layer made of steel sheet metal in silver grey colour (other colours optional)
- Flange (D = 180 mm) with a blind flange and insulation lid cover (can also be used for a ribbed heat exchanger or a built-in heater)
- Connecting bushing (6/4“) for installation of an electric heater „SH“ or as an additional connection
- Groove for variable installation of sensors
- All connections with a 1" outer thread
- Outer body with reinforced rims
- A 6/4“ clamp for installation of an electric heater „SH“ or as an additional connection
- Working pressure 6 bar.

Technical characteristics for heating water storage tanks ZV A

MODEL		ZV 200 A	ZV 300 A	ZV 400 A
Dimensions				
• Ø	mm	600	600	670
• A	mm	305	305	345
• B	mm	246	246	272
• C	mm	803	983	1035
• D	mm	710	1000	970
• E	mm	1057	1514	1525
• F	mm	1340	1797	1832
Incline height	mm	1400	1835	1885
Mass kg	kg	118	125	135

HOT WATER
STORAGE TANKS

Sanitary hot water storage tank is a part of any modern heating system with an integrated heat pump. It is especially important that each tank is fitted with an adequately sized tubular heat exchanger to allow transferring the energy from the heat pump to the sanitary water.



- KGVG water storage tanks are distinguished for generously large heating surfaces and exceptional capacity. They were developed especially for the combination of tanks and heat pumps.
- Inner layer enamelled in compliance with DIN 4753
- Working pressure: maximum 10 bar
- Operating temperature: maximum 95°C
- Heat exchanger with particularly large heating surface
- Energy saving PU-insulation, 50 mm thick
- Circulation: 3/4 AG
- Variable sensor position (sensor tube)
- High quality thermometer
- Magnesium protection anode according to DIN 4753

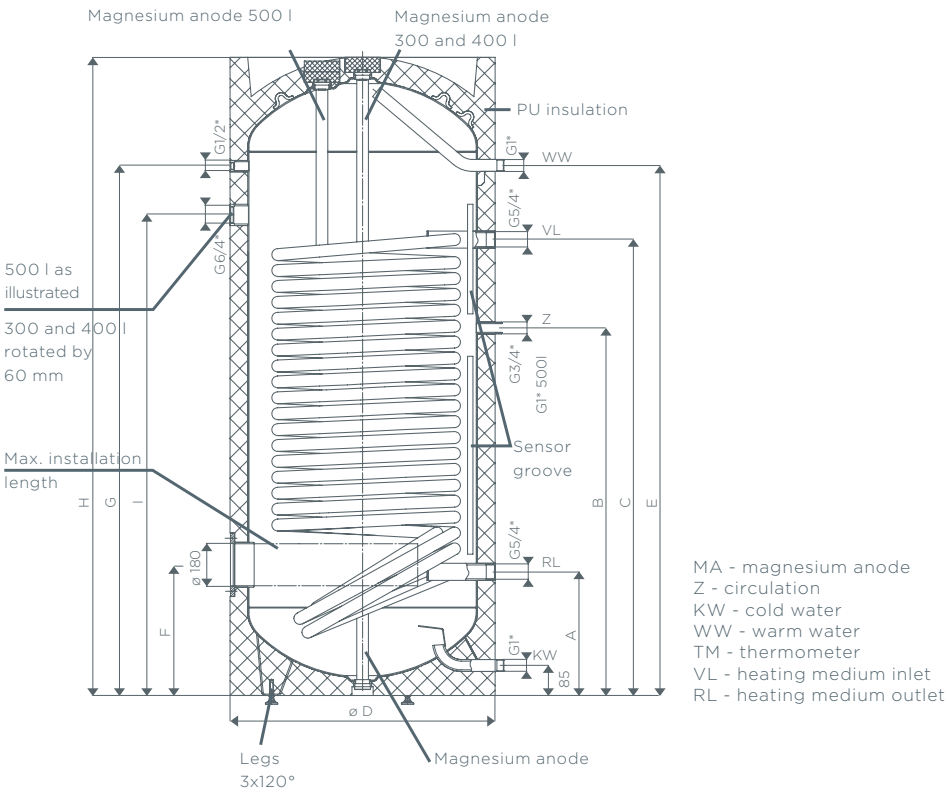
MA - magnesium anode
Z - circulation
KW - cold water
WW - warm water
TM - thermometer
VL - heating medium inlet
RL - heating medium outlet

Technical characteristics hot water storage tanks KGVG

MODEL		KGVG 300	KGVG 400
Dimensions			
• A	mm	263	320
• C	mm	983	1000
• D	mm	610	680
• H	mm	1797	1832
• d	mm	500	507
Incline height	mm	1870	1930
Heat exchanger surface	m^2	2,6	3,8
Heat exchanger volume	l	17,0	24,0
Weight	kg	140	182

HOT WATER
STORAGE TANKS

The KGVG S water storage tank is distinguished for its extra large heating surfaces. Double wrap of a smooth pipe heat exchanger provides a particularly high transmission effect, making it the best choice for all customers who seek energy efficient solutions.



Technical characteristics hot water storage tanks KGVG S

MODEL		KGVG 300 S	KGVG 400 S
Dimensions			
• H	mm	1435	1800
• D	mm	680	680
• A	mm	320	320
• B	mm	840	1000
• V	mm	990	1260
• E	mm	1160	1525
• F	mm	345	345
• G	mm	1156	1521
• I	mm	1050	1330
Incline height	mm	1595	1930
Maximum installation height mm	mm	450	450
Exchanger surface	m^2	3,5	5,0
Exchanger volume	l	22,6	32,2
Mass	kg	170,0	212,0

- Inner tank enamelled in compliance with DIN 4753 T3 and T6
- Working pressure: maximum 10 bar
- Operating temperature: maximum 95°C
- Heat exchanger with particularly large heating surface
- Energy saving PU-insulation (50 mm)
- Circulation: 3/4 AG
- Variable sensor position (sensor groove)
- High quality thermometer
- Magnesium protection anode
- Connecting bushing 6/4" for an additional electric heater
- Adjustable legs

ADDITIONAL COMPONENTS

CIRCULATION AND WELL PUMPS

A properly sized heat pump operating in coordination with all other elements of a heating system is a prerequisite for proper functioning of the system and represents an important part in achieving high COP values of the system it is integrated into. In water/water heat pumps, proper water consumption at the source side must be provided by means of an appropriate well pump.
Based on our experience, we gladly recommend Wilo circulation and well pumps to be used with Gorenje heat pumps.

Tale of recommended well and circulation pumps for AQUAGOR heat pumps

HEAT PUMP	HP 9 WW	HP 12 WW	HP 14 WW	HP 17 WW
Well pump	Wilo-Sub TWU 4-0405-EM-C	Wilo-Sub TWU 4-0407-EM-C	Wilo-Sub TWU 4-0407-EM-C	Wilo-Sub TWU 4-0409-EM-C
Circulation pump for HC* with constant rotation number	Wilo Star-RS 25/4	Wilo Star-RS 25/6	Wilo Star-RS 25/6	Wilo Star-RS 25/7
Circulation pump for HC* with regulated rotation number	Wilo Stratos PICO-25/1-4-(ROW)	Wilo Stratos PICO-25/1-6-(ROW)	Wilo Stratos PICO-25/1-6-(ROW)	Wilo Stratos 25/1-6 PN6/10

Tale of recommended well and circulation pumps for TERRAGOR heat pumps

HEAT PUMP	HP 6 BW	HP 9 BW	HP 11 BW	HP 14 BW	HP 17 BW
Circulation pump for a ground collector - OP1*	Wilo TOP-S 25/7 EM PN6/10	Wilo TOP-S 25/7 EM PN6/10	Wilo TOP-S 25/7 EM PN6/10	Wilo TOP-S 25/7 EM PN6/10	Wilo TOP-S 30/10 EM PN6/10
Circulation pump for a ground collector - OP1*	Wilo Star-RS 25/7	Wilo Star-RS 25/7	Wilo Star-RS 25/7	Wilo Star-RS 25/8-H12	WILO TOP-S 30/7 EM PN6/10
Circulation pump for HC* with constant rotation number	Wilo Star-RS 25/6	Wilo Star-RS 25/4	Wilo Star-RS 25/6	Wilo Star-RS 25/6	Wilo Star-RS 25/7 EM PN10
Circulation pump for HC* with regulated rotation number		Wilo Stratos PICO 25/1-6-(ROW)	Wilo Stratos PICO 25/1-6-(ROW)	Wilo Stratos PICO 25/1-6-(ROW)	Wilo Stratos 25/1-6 PN6/10

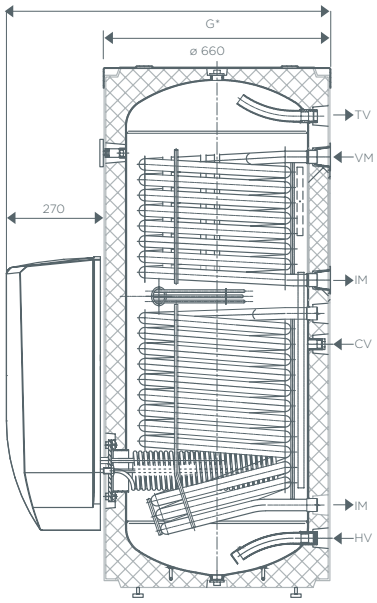
*OP1 - option 1 OP2 - option 2 OK - heating cycle (HC)

HEAT PUMP WATER HEATERS

▽

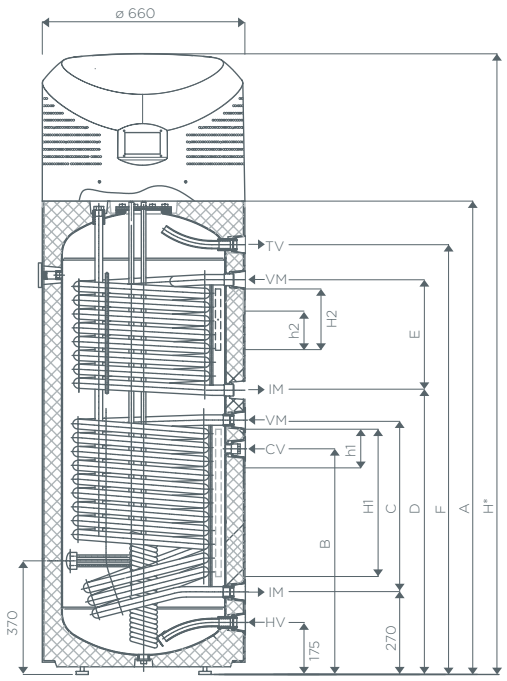
Gorenje has developed a product, which saves money and contributes to a cleaner environment. The heat pump is by all means the most energy efficient and cost effective way of water heating. The pump is mounted on the storage tank and draws from the ambient, using that extra energy source to heat the water up to 55°C. The pump is equipped with a system for thermal disinfection in order to prevent Legionella growth, by extra heating of the system in intervals, up to 65°C. At the same time, the pump can be used for cooling smaller rooms, like cellars or store rooms. Compared to fuel oil heating or gas heating, the investment pays for itself in a few years.

HEAT PUMP
WATER HEATERS



Heat pump – side version

- Volumes: 200, 300, 400, 500 l.
- Upright floor version.
- Compact version (heat pump and water tank in one unit).
- Additional one or two tubular heat exchangers for combination with other energy sources (central heating system, solar energy,...).
- Tank made of high quality steel sheet, enamel coated at 850°C.
- Mg anode for additional anticorrosion protection of the tank.
- Digital controller of heat pump with the following functions:
- Water temperature adjustment in tank,
- Display of water temperature in tank,
- Legionella Control Programme.
  - Excellent heat insulation - lower heat loss
  - Coating colour of your choice.

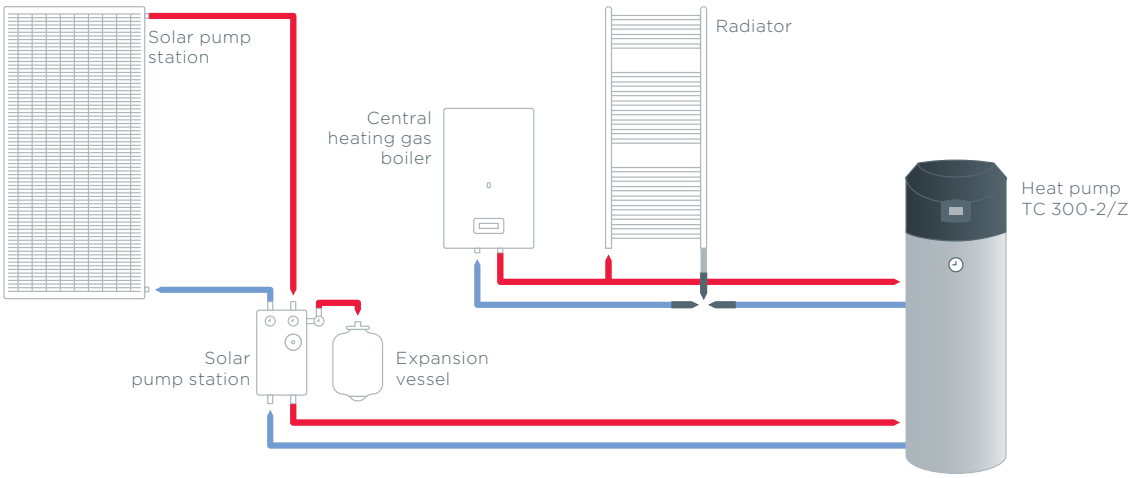


Heat pump – top version

MODEL		TC 200-1/Z-S	TC 300-1/Z-S	TC 300-2/Z-S	TC 400-2/S	TC 500-2/S
A	mm	1150	1550	1550	1835	1835
B	mm	560	740	740	1000	1095
C	mm	380	560	560	560	560
D	mm	-	-	930	110	1195
E	mm	-	-	360	360	270
F	mm	1010	1410	1410	1835	1835
G*	mm	960	960	960	970	1050
H*	mm	1550	1950	1950	1839	1853
HV	inch	G 1	G 1	G 1	G 1	G 1
IM	inch	G 1	G 1	G 1	G 1	G 1
CV	inch	G 3/4	G 3/4	G 3/4	G 3/4	G 1
VM	inch	G 1	G 1	G 1	G 1	G 1
TV	inch	G 1	G 1	G 1	G 1	G 1
H1	mm	300	480	480	560	560
H2	mm	-	-	300	370	310
h1	mm	100	155	155	185	185
h2	mm	-	-	210	260	220

HV - Cold water inlet
IM - Heat exchanger medium outlet
CV - Circulation conduit
VM - Heat exchanger medium inlet
TV - Hot water outlet
H1, H2 - Canal for palps
h1, h2 - Position for palps

Heat pump in combination with central heating gas boiler and solar collector



Technical characteristics for heat pumps TC Z/S

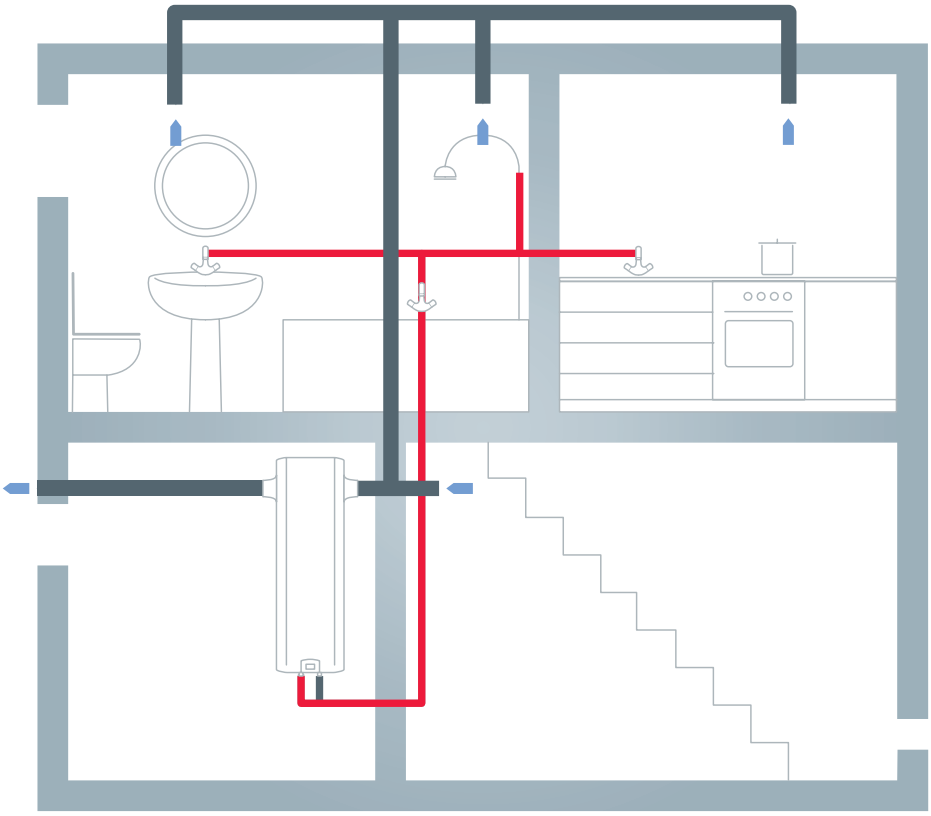
MODEL		TC 200-1/Z	TC 300-1/Z	TC 300-1/S	TC 300-2/Z	TC 300-2/S	TC 400-2/Z	TC 500-2/Z
• Volume	l	200	285	285	280	280	395	500
DIMENSIONS OF CONNECTIONS								
• Height	mm	1550	1950	1550	1950	1550	1839	1853
• Width (side version)	mm	-	-	980	-	980	1010	1010
• Diameter of storage tank	mm	660	660	660	660	660	680	680
• Connections to the supply network		G 1	G 1	G 1	G 1	G 1	G 1	G 1
• Net/gross weight/with water	kg	112/120/312	142/150/472	42/150/472	64/172/444	64/172/444	188/196/553	188/196/553
HEAT PUMP								
• Heating power	W	1850	1850	1850	1850	1850	3000	3000
• Rated power output	W	600	600	600	600	600	1080	1080
• Cooling power	W	1310	1310	1310	1310	1310	1920	1920
• COP*		3	3	3	3	3	3	3
• Cooling medium		R134a	R134a	R134a	R134a	R134a	R404a	R404a
• Max. temperature	°C	55	55	55	55	55	55	55
• Legionella control programme	°C	65	65	65	65	65	-	-
• Voltage/Frequency	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50	230/50
STORAGE TANK								
• Enamelled steel tank		+	+	+	+	+	+	+
• Protective magnesium anode		+	+	+	+	+	+	+
• Average thickness of insulation	mm	57	57	57	57	57	50	50
• Degree of protection against humidity		IP 21	IP 21	IP 21	IP 21	IP 21	IP 21	IP 21
HEAT EXCHANGER - BOTTOM								
• Dimension of connection		G 1	G 1	G 1	G 1	G 1	G 1	G 1
• Exchanger area	m^2	0,85	1,45	1,45	1,45	1,45	1,76	1,95
• Volume	l	5,3	9,1	9,1	9,1	9,1	11,1	12,2
• Heating power**	kW*	28,7	42,7	42,7	42,7	42,7	49,4	58,1
HEAT EXCHANGER - TOP								
• Dimension of connection		-	-	-	G 1	G 1	G 1	G 1
• Exchanger area	m^2	-	-	-	0,9	0,9	0,93	0,96
• Volume	l	-	-	-	5,7	5,7	5,8	6
• Heating power**	kW*	-	-	-	26,9	26,9	27,5	28,2
WORKING PRESSURE								
• Water reservoir	bar	6	6	6	6	6	10	10
• Heat exchanger	bar	12	12	12	12	12	10	10
MAX. TEMPERATURE								
• Water reservoir	°C	85	85	85	85	85	95	95
• Heat exchanger	°C	120	120	120	120	120	110	110
TRANSPORTATION DATA								
• Packaging dimensions	mm	750x 750x1700	750x 750x2100	750x 1050x1700	750x 750x2100	750x 1050x1700	940x 1000x1920	980x 1060x1920

*Heating of sanitary water up to 45°C with temperature of surrounding air 15°C, humidity 71% and inlet water temperature 15°C. According to standard EN255-3.

** Heating of sanitary water from 10°C to 45°C with temperature of inlet heating medium 80°C and heating medium flow 3000 l/h.

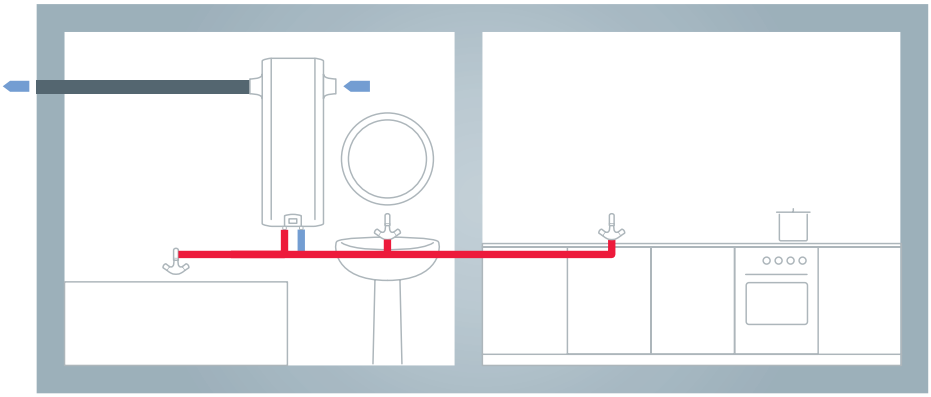
HEAT PUMP

WATER HEATERS – AIR DUCTED



Concurrent ventilation and domestic hot water preparation

Modern buildings are characterized by tightly sealed windows and doors, and superior wall insulation. The Gorenje wall-mounted heat pump makes it possible to ventilate the home while using the exhaust hot air for the heating of domestic water at the same time. Cool air can be piped out of the building or into any part of the home that requires cooling. Wall-mounted unit design further serves to preserve the functionality of the room in which it the heat pump is installed.



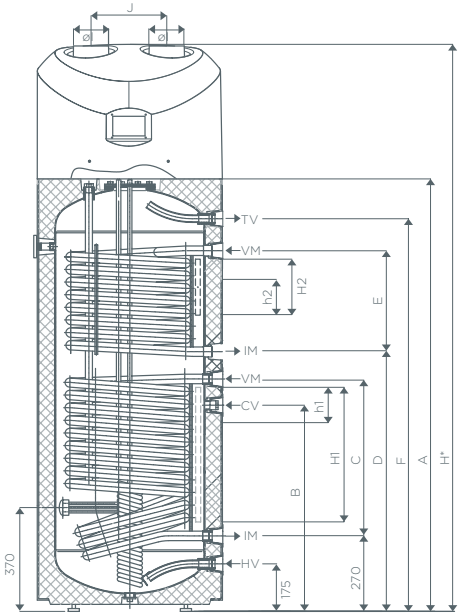
Laundry drying room

The unit can be effectively used for clothes drying: in addition to heat it also absorbs and condenses moisture, which can then be used for ironing.

- possibility of connecting air ducts to the heat pump,
- possibility of selecting in and outlet air points
- air drawn from the room can be used for ventilation
- cooled air from the heat pump can be used for efficient cooling of rooms or spaces such as storage rooms or sunrooms

Bathroom

The wall-mounted unit takes up warm, moist air, cools it down and pumps it outside the bathroom.



- Volumes: 200, 300 l.
- Upright floor version.
- Compact version (heat pump and storage tank in one unit).
- Additional one or two tubular heat exchangers for combination with other energy sources (central heating system, solar energy,...).
- Tank made of high quality steel sheet, enamel coated at 850°C.
- Mg anode for additional anticorrosion protection of the tank.
- Digital controller of heat pump with the following functions:
- Water temperature adjustment in tank,
- Display of water temperature in tank,
- Legionella Control Programme.
- Excellent heat insulation – lower heat loss.

Technical characteristics for heat pumps TC ZC

MODEL		TC 200-1/ZC	TC 300-1/ZC	TC 300-2/ZC
• Volume	l	200	285	280
DIMENSIONS OF CONNECTIONS				
• Height	mm	1550	1950	1950
• Diameter	mm	660	660	660
• Connections to the supply network		G 1	G 1	G 1
• Net/gross weight/with water	kg	112/120/312	142/150/472	164/172/444
HEAT PUMP CHARACTERISTICS				
• Heating power	W	1850	1850	1850
• Rated electric power	W	600	600	600
• Cooling power	W	1310	1310	1310
• COP*		3,3	3,3	3,3
• Cooling medium		R134a	R134a	R134a
• Max. temperature - heat pump	°C	55	55	55
• Legionella control program	°C	65	65	65
• Voltage / Frequency	V/Hz	230/50	230/50	230/50
STORAGE TANK				
• Enamelled steel tank		+	+	+
• Protective magnesium anode		+	+	+
• Average thickness of insulation	mm	65	65	65
• Degree of protection against humidity		IP 21	IP 21	IP 21
HEAT EXCHANGER - BOTTOM				
• Dimension of connection		G 3/4	G 3/4	G 3/4
• Exchanger area	m^2	0,85	1,45	1,45
• Volume	l	5,3	9,1	9,1
• Heating power**	kW*	28,7	42,7	42,7
HEAT EXCHANGER - TOP				
• Dimension of connection		-	-	G 3/4
• Exchanger area	m^2	-	-	0,90
• Volume	l	-	-	9,1
• Heating power**	kW*	-	-	42,7
WORKING PRESSURE				
• Water reservoir	bar	6	6	6
• Heat exchanger	bar	12	12	12
MAX. TEMPERATURE				
• Water reservoir	°C	85	85	85
• Heat exchanger	°C	120	120	120
TRANSPORTATION DATA				
• Packaging dimensions	mm	750x 750x1700	750x 750x2100	750x 1050x2100

*Heating of sanitary water up to 45°C with temperature of surrounding air 15°C, humidity 71% and inlet water temperature 15°C. According to standard EN255-3.

** Heating of sanitary water from 10°C to 45°C with temperature of inlet heating medium 80°C and heating medium flow 3000l/h.

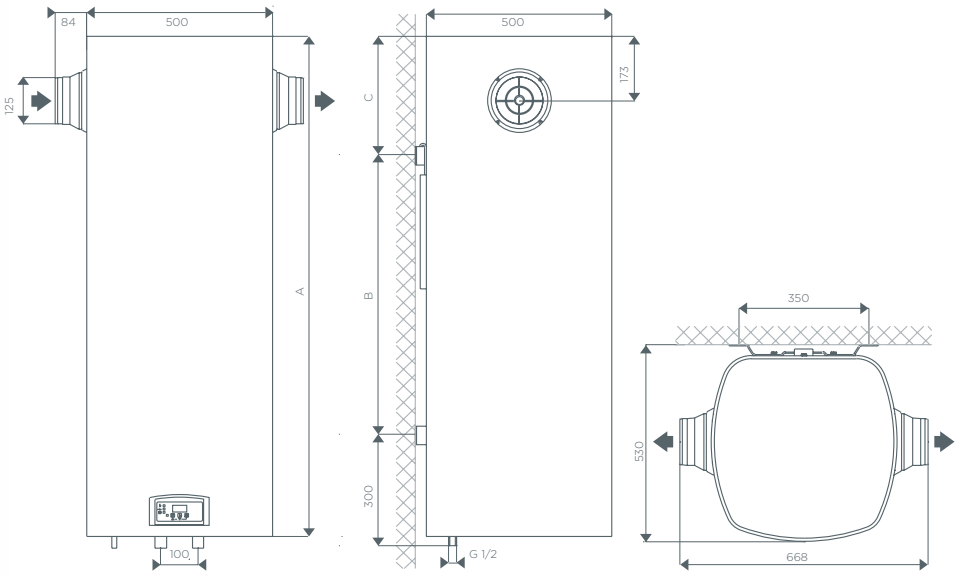
HV – Cold water inlet
IM – Heat exchanger medium outlet
CV – Circulation conduit
VM – Heat exchanger medium inlet
TV - Hot water outlet
H1, H2 – Canal for palps
h1, h2 – Position for palps

MODEL		TC 200-1/ZC	TC 300-1/ZC	TC 300-2/ZC
A	mm	1150	1550	1550
B	mm	560	740	740
C	mm	380	560	560
D	mm	-	-	930
E	mm	-	-	360
F	mm	1010	1410	1410
H*	mm	1350	1750	1750
I	mm	Ø 150	Ø 150	Ø 150
J	mm	450	450	450
HV	inch	G 1	G 1	G 1
IM	inch	G 1	G 1	G 1
CV	inch	G 3/4	G 3/4	G 3/4
VM	inch	G 1	G 1	G 1
TV	inch	G 1	G 1	G 1

HEAT PUMP

WATER HEATERS – WALL MOUNTED

Aiming for maximum energy savings, Gorenje's new medium tank volume air-to-water heat pump is the product of longstanding experience in the design and manufacture of heat pumps and electric water heaters. The highly energy efficient 80/100/120 litres air-to-water heat pump has been designed as a perfect replacement for the electric water heater. The conventional medium tank volume has been augmented with a heat pump generator, which delivers superior energy performance. The air-to-water heat pump design with air ducts enables the selection of inlet and outlet points of the air, which allows use of the in various parts of the home (kitchen, bathroom, sunrooms...).



Technical characteristics for heat pumps TC E

MODEL		TC 80 E	TC 100 E	TC 120 E
• Volume	l	80	100	120
DIMENSIONS OF CONNECTIONS				
• A	mm	1090	1229	1345
• B	mm	455	555	705
• C	mm	365	404	370
• D	mm	173	182	173
• Connections to the supply network		G 1/2	G 1/2	G 1/2
• Air ducts connection		Ø 125/6	Ø 125/6	Ø 125/6
• Air flow	m^3/h	400	400	400
• Net / gross weight / with water	kg	70/74/150	75/79/175	80/84/200
HEAT PUMP CHARACTERISTICS				
• Heating power	W	1410	1410	1316
• Rated electric power input	W	470	470	470
• COP*		3	3	2,8
• Cooling medium		R134a	R134a	R134a
• Max. temperature – heat pump	°C	55	55	55
ELECTRICAL CONNECTION				
• Voltage/Frequency	V/Hz	230/50	230/50	230/50
• Degree of protection		IP 24	IP 24	IP 24
• Number of heating elements x power	W	2 x 1000	2 x 1000	2 x 1000
• Nominal current – only electric heating	A	8,7	8,7	8,7
STORAGE TANK				
• Enamelled steel tank		+	+	+
• Protective magnesium anode		9,1	9,1	9,1
• Average thickness of insulation	mm	25-60	25-60	25-60
• Working pressure	MPa (bar)	0,6 (6)	0,6 (6)	0,6 (6)
• Max. water temperature – electric heating	°C	65	65	65
TRANSPORTATION DATA		575x	575x	575x
• Packaging dimensions	mm	600x1300	600x1439	600x1555

*Heating of sanitary water up to 45°C with temperature of surrounding air 15°C, humidity 71% and inlet water temperature 15°C. According to standard EN255-3.

- Volumes: 80, 100, 120 l
- Vertical wall mounting
- Combination of heat pump, electric heating and by TCK also heating from another source via tubular heat exchanger (RN/right or LN/left side heat exchanger inlet)
- Indirect air heating element.
- Bimetal thermometer.
- Indicator of electric heating element operation.
- Tank made of high quality steel sheet, enamel coated at 850°C.
- Magnesium anode for additional anti-corrosion protection of the tank.
- High quality heat insulation - lower heat loss.
- Control for optional setting of water temperature up to 75°C.
- Option for selecting economical water temperature setting or freeze prevention temperature setting.
- Large diameter of heating flange (100 mm) allows simple cleaning and maintenance.
- Simple installation and maintenance.

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