



Heating your home with a heat pump, saving your money, keeping life cozy

Just imagine. You can get 75% of your energy consumption for free whilst heating your home, and at the same time get the highest possible level of comfort. This is made possible by our heat pumps,

collecting stored solar energy from the ground beneath your home or from the air. It is a sustainable energy solution that can provide your home with heating, cooling and all the hot water you need.

up to **75%**
savings

on heating bills by replacing your old oil or gas boiler with a ground source heat pump from Danfoss.





Good for your wallet and good for the environment

Heat pumps are the technology of the future

Just imagine. You can get 75% of your energy consumption for free whilst heating your home, and at the same time get the highest possible level of comfort. This is made possible by our heat pumps, collecting stored solar energy from the ground beneath your home or from the air. It is a sustainable energy solution that can provide your home with heating, cooling and all the hot water you need.

With gas and oil prices rising, people are looking for a reliable and reasonably priced source of energy. At the same time, environmental consideration is an

increasingly important factor. We have an acute need for sustainable, energy-efficient solutions in all areas. Everyone realizes that we can't keep polluting the air while burning up the Earth's energy reserves.

Sustainable heating comfort

Heat pumps collect CO₂ emission-free solar energy, converting it to an environmentally sustainable indoor climate for your home. By choosing a heat pump you're choosing to be a part of the solution for a better climate.

In Scandinavia, heat pumps are common technology that has been developed for the tough Nordic climate over decades – guaranteeing a reliable

solution. Today people all over Europe have discovered the benefits, and in the beginning of 2009 the European Parliament classified heat pumps as a renewable energy source.

Comfort with big savings

Heat pumps are highly energy-efficient and can cover up to 75% of your energy consumption using energy from your own land. In fact, savings can be so high that the cost of investment is paid back in just a few years. Another major advantage of a heat pump is that it requires almost no maintenance or attention. Once installed, you can almost forget about it. It will work every day, all year round, making your home warm and comfortable.



Making modern living possible

Modern living is as much about quality of life as it is about sustainability. At Danfoss Heat Pumps we develop solutions that combine the highest quality of life with an energy source that is truly sustainable: the sun.

Creating energy efficient, high performance long-life heat pumps requires advanced technology. Danfoss looks back on several decades' of experience in

developing and manufacturing heat pumps. Our global Research and Development team is at the forefront of advances, focusing on creating high-tech, energy-efficient solutions for tomorrow. In order to do this we have top class equipment, for example one of the most modern climate chambers in Europe. Here climate conditions from all over the world can be reproduced, ranging all the way from the tropics to the arctic – helping us achieve peak performance in all types of climates.

Service

If your heat pump is to function optimally, it requires high levels of expertise from the installer. Danfoss' installers are specially trained to provide the best service. This includes how big the system should be for your home and what type of heat pump you should choose. The system should also be finely adjusted after installation so that it provides the best possible operational economy.



The benefits of a Danfoss heat pump

- » **Reliable, tried and tested technology**
- » **Up to 75% of the energy consumption is free – using stored solar energy**
- » **Renewable and sustainable energy source**
- » **Easy care, no maintenance**
- » **Provides both heating and hot water**
- » **Can also provide comfort cooling**
- » **Compact, footprint of around half a square metre**



You can collect the heat from the air, water, bedrock or ground

Energy is stored around your home. It is a source that is constantly replenished by the heat of the sun. The energy is stored in the bedrock, the ground, the ground water, lake water and the air. We offer five different heat pump principles to capture the stored energy and heat your home. Our installers will help you find the right one for you and your home.

Bedrock

A bedrock heat pump uses the solar energy stored in the bedrock. Pipes are lowered through one or more bore holes (50-200 metres) into the bedrock.



Advantages

- » No great size of plot required
- » The hole in the rock maintains an even temperature throughout the year
- » Little impact on your plot

Ground

Ground heat pumps retrieve the solar energy stored in the ground via a hose that is dug down under your plot.

At a depth of approximately one metre the hose is coiled around your plot and the energy is then received from the ground in a similar way to the bedrock heat.



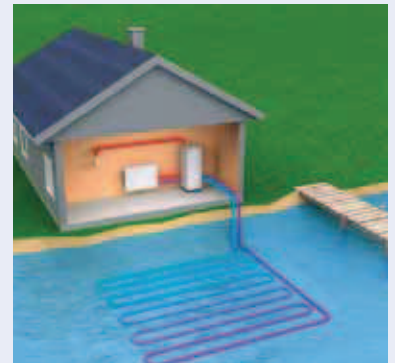
Advantages

- » No drilling needed
- » Lower installation costs
- » The coil in the ground maintains an even temperature throughout the year

Lake water

With a lake water heat pump you retrieve the solar energy stored in the lake water through a hose that is lowered to the bottom of the lake watercourse, where weights hold it in place.

The principle is the same as for ground heat.



Advantages

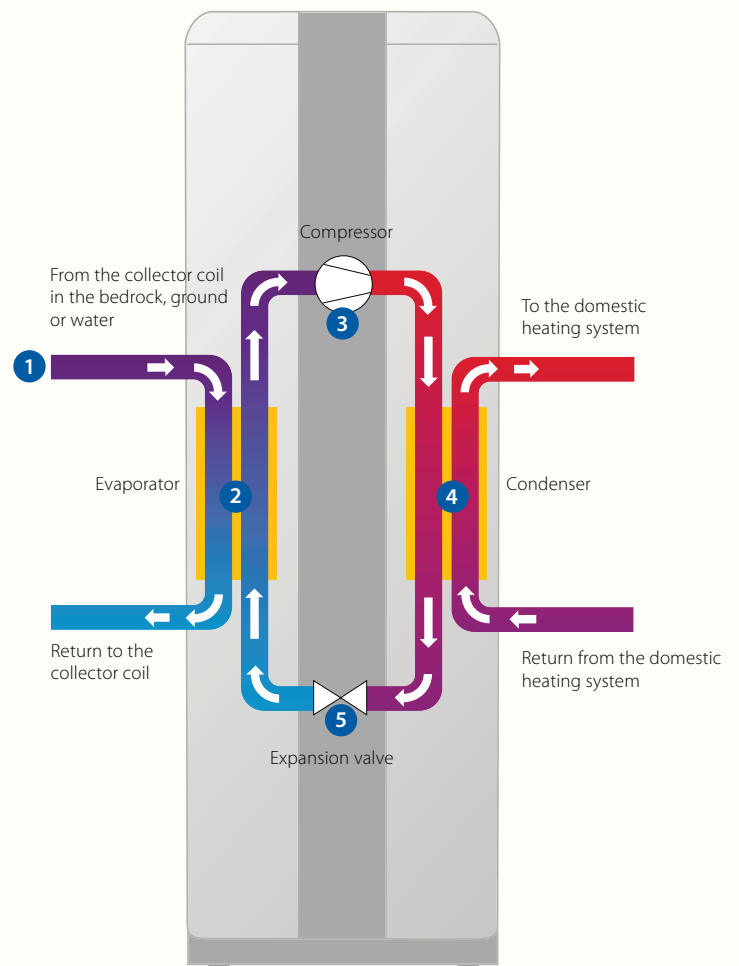
- » No drilling needed
- » Little impact on your plot
- » The lake coil holds an even temperature throughout the year

How heat pumps work

- 1 Brine* circulates in a collector coil and absorbs the heat energy from bedrock, ground, air or water.
- 2 At the heat exchanger (evaporator) the tepid brine in the collector coil meets the ice-cold refrigerant** in the heat pump, which is then heated a few degrees and condenses.
- 3 Then, a compressor compresses the now gaseous refrigerant. When the pressure exceeds the temperature rises. The heat that is then generated is transferred via a heat exchanger (condenser) to to your home's heating system.
- 4 Via a condenser, the refrigerant releases the heat to the heating system of your home. In connection with this the refrigerant is cooled.
- 5 The refrigerant circulates and an expansion valve lowers the pressure and the refrigerant becomes cold again. The process begins again when the refrigerant meets the tepid brine from the collector coil.

* The brine is a mixture that cannot freeze, for example alcohol or glycol.

** Modern environmentally sound refrigerant are used, e.g. hydrocarbons and carbon dioxide. Formerly, freon was used.



Groundwater

A groundwater heat pump collects energy from the groundwater. The water is pumped up from a groundwater bore hole to a heat exchanger, where the energy is recovered. The water is then discharged back through another bore hole.



Advantages

- » No great size of plot required
- » Little impact on your plot
- » The coil in the water maintains an even temperature throughout the year

Air

With an air heat pump you neither need to dig or drill. Instead, you retrieve the energy directly from the surrounding air using an air module. The heat pump is located indoors or outdoors, depending on which model you choose.



Advantages

- » Lower investment costs
- » No drilling needed
- » No impact on the ground
- » Normally no obligation to report installation to municipal environmental health boards

Heat pumps are built around the fact that gas that is compressed gets hot, and gas that expands cools. Remember a bicycle pump that compresses air, creating heat.

Three decisive issues

when choosing a heat pump

1 Annual efficiency

As a buyer, of course you want to know how effective a heat pump is. The most important is to rate the function over a complete calendar year – both the heat of summer and the cold of winter. This is called annual efficiency and shows the average relationship between consumed and supplied energy over a comparison period of one year.

Presenting a heat pump's efficiency at a particular measurement conditions is not sufficient.

2 Hot water production

Hot water production makes up an ever greater proportion of a home's energy requirements, and it is essential that the hot water is produced as efficiently as possible. At the same time fast water heater recharging is important to ensure hot water comfort. At the lowest possible cost. It is also extremely important that the heat pump has a system that minimizes the risk of legionella bacteria.

3 Comfort and cooling

When investing in a heat pump it's essential to look at the needs of your home before choosing a model. Some heat pumps can both heat and cool your house, providing a good and comfortable indoor climate all year round. This should be done as efficiently as possible, without unnecessary energy consumption.

Our solutions for maximum efficiency

The brain of the heat pump

The controller coordinates and controls the heating system and Danfoss heat pumps work with complete precision to give your home the best possible indoor climate at the lowest possible cost.

Our controller is very easy to use. You raise or lower the temperature at the touch of a button.

The heart of the heat pump

Danfoss heat pumps feature scroll compressors as standard. Scroll compressors have fewer moving parts than conventional compressors, which increase their lifetime and reduce noise levels. Scroll compressors also provide high efficiency for production of heat and hot water over 40°C. Which means it increases both the efficiency and the lifetime of the heat pump.

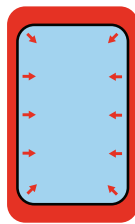


Exceptional hot water production

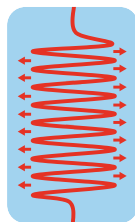
TWS technology

Danfoss Heat Pumps has developed a unique and patented method of water heating, TWS* technology. This function results in more effective heat transfer and more effective layering of the water in the hot water tank. The method supplies plenty of hot water quickly and with low operating costs. But it does not produce unnecessarily hot water. This allows a TWS equipped heat pump to retain its phenomenal efficiency.

* Tap Water Stratificator



A traditional immersion heater provides a slow heat transfer. The hot water from the pump surrounds the immersion heater. A technology that requires twice as long time to heat a heater that is empty, compared with the TWS technology.



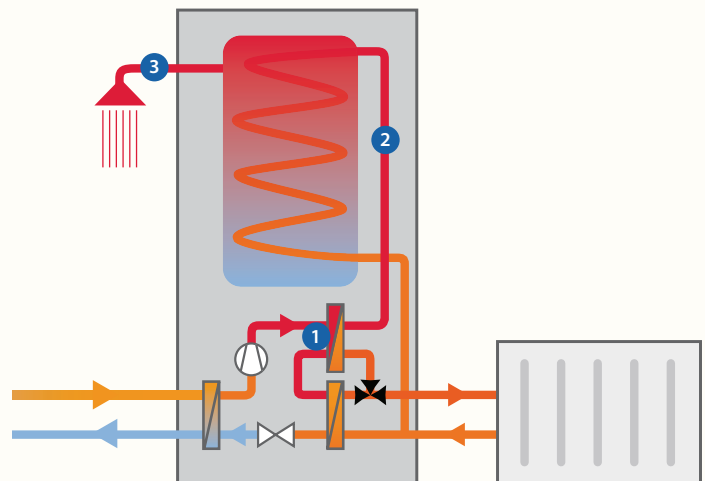
A TWS water heater uses a technique where the hot water from the heat pump is led through a coil in the water to be heated. The water in the heater is also split so that some of the water reaches the correct temperature more quickly. TWS provides more efficient heat transfer and more warm water.

Danfoss heat pumps are factory set to heat up the water above 65°C every seventh day. This is to minimize the risk of legionella bacteria. The normal temperature is sufficiently high to protect the growth but this system provides extra safety.

HGW technology

Our new, patented HGW** technology utilizes existing home heating to produce hot water at the same time. That means that you get hot water as a bonus when you heat your home. The result is a higher annual efficiency combined with unbeatable hot water comfort.

** Hot Gas Water heater



- 1 A small proportion of the heated water that is routed out into the house's heating system, passes the extra de-superheater
- 2 It is then heated up further to between 50–90°C before going into the water heater.
- 3 The result is that you get extra and even hotter water during the months of the year your home needs heating.

Opti technology

Our Opti function equipped heat pumps are full of innovative solutions for a high annual efficiency. This is the primary choice for anyone looking for an unbeatable level of comfort with the highest level of cost-efficiency.

Opti technology incorporates an intelligent control system that via speed controlled circulation pumps ensures that the performance is always adjusted to the prevailing requirements and conditions of the heating system. This makes the heat

pump always work under the most ideal conditions available. The customer gains maximum efficiency and minimum energy consumption, second by second, hour by hour.



Danfoss Vent

The Danfoss Vent is a heat recycling unit that can be combined with your Danfoss heat pump. It helps you capture and reuse the indoor heat that is extracted from your home, increasing the efficiency of your heat pump.

The Danfoss Vent uses your home's exhaust air to heat the coolant in your heat pump.

This means that heat is recycled instead of being wasted. All in all, it's a win-win situation for our environment and your economy.

Remote control your heat pump – everywhere, anytime

OnLine is an accessory that can be applied to your Danfoss heat pump. It can then be controlled and monitored from anywhere in the world.

Danfoss OnLine monitors the heat pump through the Internet either via PC, tablet or smartphone.

This reliable and easy-to-use tool provides added control and efficiency.

Control

Keep an eye on the inside and outside temperature and see the current operating status.

Safety

Danfoss OnLine monitors the heat pump system round-the-clock. If anything unexpected occurs, OnLine activates an alarm. The alarm can be sent

via e-mail to the user or you. This means that any fault can be quickly rectified – in some cases remotely.

Economy

Danfoss OnLine delivers optimal performance and cost-saving benefits by allowing users to regularly control the operation of the heat pump system. And with the calendar function it is easy to adjust the temperature according to specific needs.

Visit our website to learn more about OnLine service: heating.danfoss.com



Additional heater as standard

If the solar energy at any given time is insufficient the heat pump can utilize an additional heater to heat your home and your hot water. That's why we have a built-in additional heater in every model. The heat pump should always be correctly sized for your needs, but this provides extra safety.

Advanced domestic hot water storage.

Danfoss DWH water heater

The Danfoss DWH is designed to be perfectly compatible with the Danfoss DHP-L and DHP-L Opti. It is very efficient, and when used with our heat pump it provides optimum heating and hot water comfort. The patented TWS technology (see page 9) provides hot water quickly at low operating costs. The Danfoss DWH is available in two sizes, 200 and 300 litres, and with a copper-lined steel or stainless steel tank.



Heat pumps which heat and cool your home, dwelling or property

Danfoss recognise that when it is cold outside you want heating indoors and when it is hot outside you want a cooling system. A Danfoss heat pump can do both; providing heat in the coldest winters and comfort cooling in the hottest summers, ensuring the perfect indoor climate all year round.

With all of our ground source heat pumps, it is possible to cool your home or property using passive cooling consuming less energy than a turning on a couple of standard lights. When the outside weather is particularly warm and you require a cool temperature indoors, the compressor within the heat

pump can be placed into reverse mode, increasing the output of low temperatures. Active cooling is a more efficient alternative to traditional climate systems and air conditioning.

Passive cooling

Gently cooling a property can be achieved via a passive cooling module connected to a Danfoss heat pump. Coolant is circulated through the ground loops or energy wells depositing heat extracted from the property, thus ensuring the indoor temperature provides the desired comfort levels. The passive cooling module is an optional extra (except DHP-C, where it is in built as standard).

Active cooling

Passive cooling is normally sufficient, but if necessary, extra cooling can be obtained. Active cooling from the heat pump is more efficient than traditional air conditioning because of its lower energy consumption.

Heat your swimming pool

If you have a swimming pool you can heat it with a heat pump using a special accessory. By using all of the advantages of a heat pump you can utilize cooling, heating and hot water all at the same time. And that is beneficial for both your wallet and the environment.



Our range assortment

Danfoss offers a range of heat pumps that can be tailored to your needs. The guide below offers a quick look at how our models differ from each other, to help ensure you choose the right heat pump for your home.

| Heat pump | DHP-H Opti Pro+ | DHP-H | DHP-L Opti Pro+ | DHP-L Opti | DHP-L | DHP-C Opti | DHP-AQ | DHP-A Opti | |
|----------------|-----------------|----------|-----------------|--|--|--|--------|-------------------------------------|---|
| Energy sources | Bedrock | ● | ● | ● | ● | ● | ● | | |
| | Ground | ● | ● | ● | ● | ● | ● | | |
| | Lake water | ● | ● | ● | ● | ● | ● | | |
| | Groundwater | ● | ● | ● | ● | ● | ● | | |
| | Air | | | | | | | ● | ● |
| Functions | Opti technology | ● | | ● | ● | | ● | ● | ● |
| | HGW technology | ● | | ● | | | | | |
| | TWS technology | ● | ● | incorporated in the separate hot water tank (optional) | incorporated in the separate hot water tank (optional) | incorporated in the separate hot water tank (optional) | ● | incorporated in the Maxi indoor kit | ● |
| | Cooling | optional | optional | optional | optional | optional | ● | ● | |
| Accessories | OnLine | ● | ● | ● | ● | ● | ● | ● | ● |
| | Pool heating | ● | ● | ● | ● | ● | ● | ● | ● |

Danfoss heat pump range



*DHP-AQ Mini
(heat pump and indoor control unit)*



*DHP-AQ Midi
(heat pump, controller, auxiliary heater,
exchange valve, Opti circulation pump)*



*DHP-AQ Maxi
(heat pump, controller, hot water tank,
auxiliary heater, exchange valve,
Opti circulation pump)*

Danfoss DHP-AQ

*DHP-AQ utilises energy from the outdoor air.
Consisting of two units: an outdoor air unit
with integrated heat pump and an indoor
control panel.*

Special features

- » Provides heating, cooling and domestic hot water.
- » The DHP-AQ stands out with its superior ability to perform at temperatures as low as -20°C
- » The flexible solution of this heat pump is available in three different indoor kits: Mini, Midi and Maxi.
- » Opti technology guarantees maximum efficiency, second by second, hour by hour (see page 10).
- » TWS (Tap Water Stratification) a patented Danfoss technology, that ensures extremely fast production of hot tap water (see page 9).
- » The unique acoustic design of the DHP-AQ gives you the lowest noise level on the market.
- » Clean, Scandinavian design stands out from the crowd whilst complimenting its surroundings.



Danfoss DHP-A Opti

*DHP-A Opti utilizes energy from
the outdoor air.*

*Consisting of two units: a heat pump with
an integrated hot water tank and an outdoor
air unit.*

Special features

- » The air source heat pump that provides heating and hot water.
- » Effective even at -20°C
- » Opti technology guarantees maximum efficiency, second by second, hour by hour (see page 10).
- » Integrated hot water tank ensures hot water production that is faster and at higher temperatures than with traditional technology, thanks to our patented technology TWS (see page 9).



Danfoss DHP-H Opti Pro+

DHP-H Opti Pro+ utilizes energy from the bedrock, the ground or the water.

Consists of one unit: a heat pump with an integrated hot water tank.



Danfoss DHP-L Opti Pro+

Consists of two units: a heat pump and a separate hot water tank.

Special features

- » Opti technology guarantees maximum efficiency, second by second, hour by hour (see page 10).
- » Integrated hot water tank ensures an unbeatable hot water comfort thanks to our two patented technologies HGW and TWS (see page 9).
- » When combined with our hot water tank (Danfoss DWH, see page 11), hot water is produced faster and at higher temperatures than traditional heating system.
- » Can produce both passive and active cooling (see page 12).



Danfoss DHP-H

DHP-H utilizes energy from the bedrock, the ground or the water.

Consists of one unit: a heat pump with an integrated hot water tank.

Special features

- » Integrated hot water tank ensures hot water production that is faster and at higher temperatures than with traditional technology, thanks to our patented technology TWS (see page 9).
- » Can produce both passive and active cooling (see page 12).



Danfoss DHP-L

DHP-L utilizes energy from the bedrock, the ground or the water.

Consists of one or two units: a heat pump and a hot water tank.

Shares the same properties as DHP-H, but the hot water tank is not integrated which makes it lower and therefore ideal if you have a low ceiling or limited space. The DHP-L can be combined with a separate hot water tank.

Special features

- » Can produce both passive and active cooling (see page 12).
- » When combined with our hot water tank (Danfoss DWH, see page 11), the hot water production is faster and at higher temperatures than with traditional heating systems, thanks to our patented technology TWS (see page 9).



Danfoss DHP-C Opti

DHP-C Opti utilizes energy from the bedrock, the ground or the water.

Consists of one unit: a heat pump with an integrated hot water tank.

Special features

- » Integrated cooling (see page 12).
- » Opti technology guarantees maximum efficiency, second by second, hour by hour (see page 10).
- » Integrated hot water tank ensures hot water production thanks to our patented technology TWS (see page 9).



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About Danfoss

The Danfoss Group is a global leader in development and production of mechanical and electronic products and controls. Our products help to heat and cool homes and offices, refrigerate food and control production lines.

We have established a knowledge and competence centre for heat pump technology near the Swedish factory and are in the process of consolidating our position within the entire European heat pump market.

Our basic principle can be summarized as follows: "We make a modern living possible". Danfoss' vision is to express the option of combining the various requirements and interests that we as a company must meet and respect.