Danfoss Heat Pumps

Heating your home with stored solar energy, a more sustainable way to save money and increase your quality of life

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 CO_2 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.

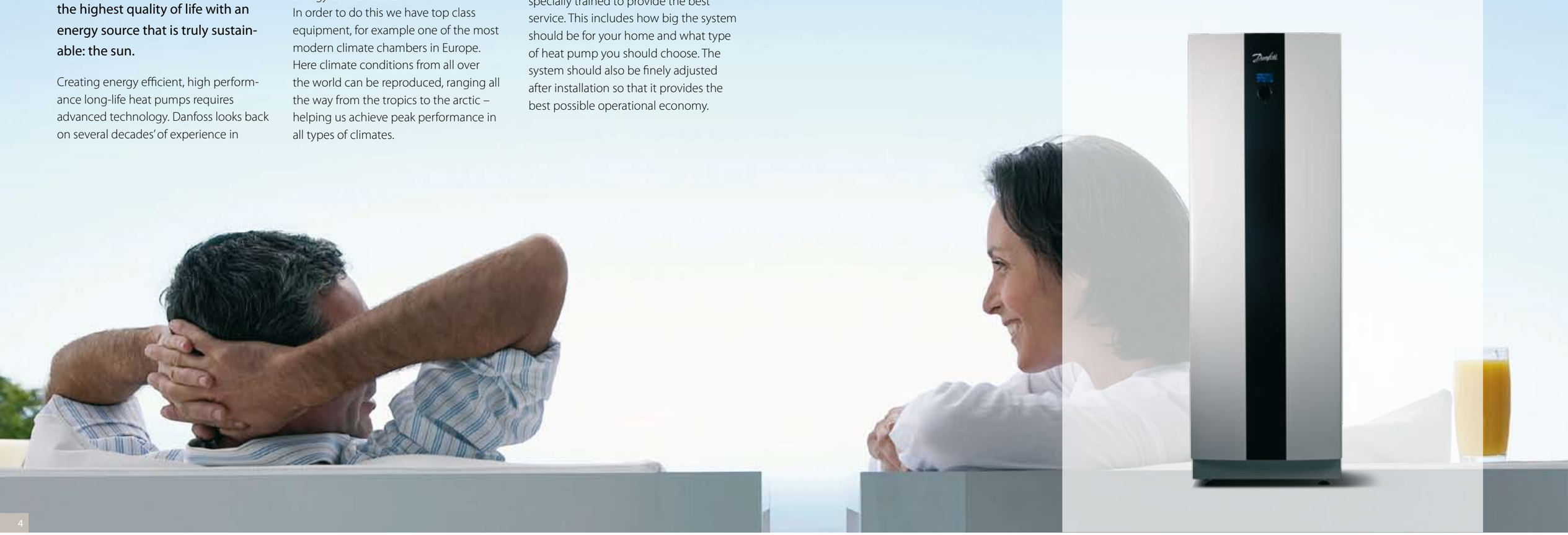
Creating energy efficient, high performance long-life heat pumps requires advanced technology. Danfoss looks back on several decades' of experience in developing and manufacturing heat pumps. Our global Research and Development team is at the forefront of advances, focusing on creating high-tech, energy-efficient 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

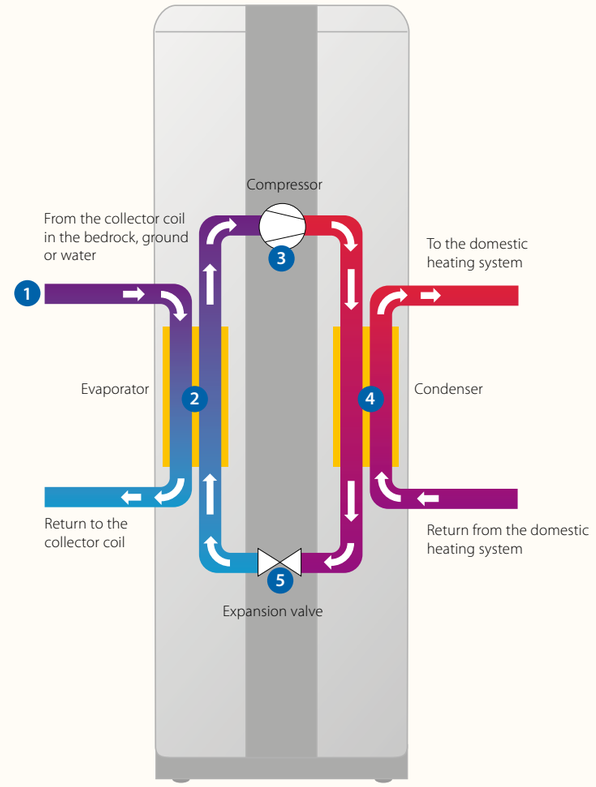
Energy is stored around your home. It is a source that is constantly replenished by the heat of the sun. The energy is stored in the bedrock, the ground, the ground water, lake water and the air. We offer five different heat pump principles to capture the stored energy and heat your home. Our installers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

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.



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

Groundwater

A groundwater heat pump collects energy from the groundwater. The water is pumped up from a ground-water 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.

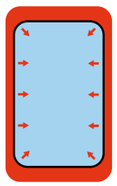
Exceptional

hot water production

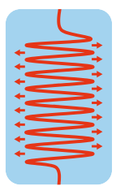
TWS technology

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.



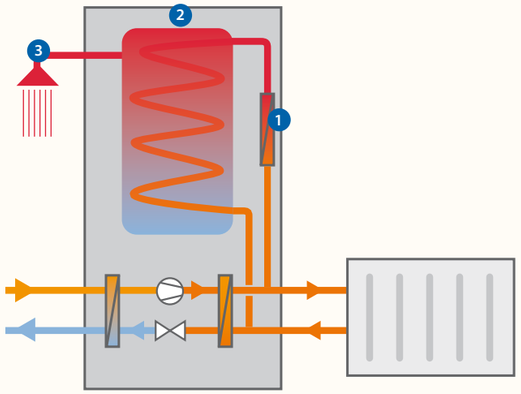
A TWS water heater uses a technique where the hot water from the heat pump is led through a coil in the water to be heated. The water in the heater is also split so that some of the water reaches the correct temperature more quickly. TWS provides more efficient heat transfer and more warm water.

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.

Control your heat pump via the Internet

Danfoss OnLine allows you to control and monitor your heating system via the Internet. This reliable and easy-to-use tool provides added assurance and increased efficiency.

Control

Danfoss OnLine gives you complete control of your heat pump system. You can keep a regular check on the temperature inside and outside your home and see the current operating status. Adjusting the settings is a simple procedure. Simply log on to *heatpumps.online.danfoss.com* with your personal code and password.

Security

Danfoss OnLine monitors your heat pump system round-the-clock. In the unlikely event that a fault occurs, the pump itself activates an alarm. The alarm message can be sent via text message and/or email to you or your installer. This means that any faults can be quickly rectified, in some cases remotely by your installer.

Economy

Danfoss OnLine delivers optimal performance and cost-saving benefits by allowing you to regularly control the operation of your heat pump system. Danfoss OnLine also presents valuable statistics that can be used to optimise the settings and thus increase savings.

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.

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 (except for DHP-AX where it comes as an optional extra). 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 , DHP-L Opti and DHP-AX. 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.

The heat pump can both heat and cool your house

When it is cold outside you want heat, when it is warm outside you want cooling, naturally! Danfoss heat pumps can do both. The heat pump can naturally enough provide heat, but also comfort cooling. This provides the perfect indoor climate, all year round.

With all of our heat pumps, with the exception of the air heat pumps, it is possible to cool the house using passive cooling at a very low cost. It actually requires less energy than a couple of light bulbs.

When you need extra cooling, the compressor can be started and increase the effect, and this is called active cooling. Even this is a more efficient system than traditional climate systems/ air conditioning.

Passive cooling

During the summer, cool houses are comfortable to be in. Why not use your heat pump? The coolant is circulated through the ground loop, cooling the house at a cost equivalent to the energy consumption of a couple of light bulbs. This technique can be used with all heat pump systems apart from air heat pumps. The passive cooling module is an optional extra (except DHP-C, where it is standard).

Active cooling

Passive cooling is normally sufficient, but if necessary, extra cooling can be obtained by using the compressor. Active cooling from the heat pump is more efficient than traditional air conditioning, because of its lower energy consumption. This technique can be used with all heat pump systems apart from air heat pumps. It requires an extra accessory in the form of a cooling module (passive/active).

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

Which heat pump will be the perfect fit for your home? Use this guide to get a quick look at how our models differ.

	Heat pump	DHP-H Opti Pro	DHP-H	DHP-L Opti	DHP-L	DHP-C	DHP-A Opti	DHP-AL Opti	DHP-AX
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)
	Cooling	optional	optional	optional	optional	●			
Accessories	OnLine	●	●	●	●	●	●	●	
	Pool heating	●	●	●	●	●	●	●	●

Restrictions apply to option combinations.

Danfoss heat pump range

Danfoss DHP-H Opti Pro

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

Consist of one unit: heat pump with integrated 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).
- Can produce both passive and active cooling (see page 12).

Danfoss DHP-L Opti

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

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

Does not have an integrated hot water tank which makes it lower and therefore ideal if you have a low ceiling. Can be combined with a separate hot water tank.

Special features

- Opti technology guarantees maximum efficiency, second by second, hour by hour (see page 10).
- 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 technology, thanks to our patented technology TWS (see page 9).
- 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.

Consist of one unit: heat pump with 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.

Consist of one or two units: heat pump and 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. 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 technology, thanks to our patented technology TWS (see page 9).

Danfoss DHP-C

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

Consist of one unit: heat pump with integrated hot water tank.

Special features

- Integrated cooling (see page 12).
- 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-A Opti

DHP-A Opti utilizes energy from the outdoor air.

Consist of two units: heat pump with integrated hot water tank and outdoor air unit.

Special features

- 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-AL Opti

DHP-A Opti utilizes energy from the outdoor air.

Consist of three units: heat pump, hot water tank and outdoor air unit

Has a separate hot water tank which makes it lower and therefore ideal if you have a low ceiling.

Special features

- Opti technology guarantees maximum efficiency, second by second, hour by hour (see page 10).
- The separate 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).

- Use Danfoss OnLine to control and monitor your heat pump via the Internet from anywhere in the world (see page 11).

Indoor control unit

Danfoss DHP-AX

DHP-AX utilizes energy from the outdoor air.

Consist of two units: outdoor air unit with integrated heat pump and indoor control panel.

Can be combined with a specilly adapted indoor kit to provide both heating and hot water.

Special features

- The flexible solution of this heat pump enables it to be combined with parts of your existing heating solution. It can also be supplemented with hot water tank, additional heater, pool unit, sun panels etc. for a complete solution.
- No indoor space needed since the heat pump is located outdoors.
- 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 technology, 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.