

RENEWABLE ENERGY

# HEATING SOLUTIONS FOR AN OPTIMAL INDOOR CLIMATE

Thermia Heat Pumps

[thermia.com](https://thermia.com)





# What exactly is a heat pump? How does it work?

The basic principle is as simple as it is brilliant: take the free energy that exists in the air and ground, and convert it into heating for a house.

But things are rarely this straightforward. As the popularity of heat pumps has grown, so has the number of options. Today homeowners who have decided to do something about their heating costs can find it difficult to get an overview of the world of heat pumps.

At Thermia's R&D centre in Sweden we work continuously to take the heat pump technology to the next level, even though we have produced many of the market's very best heating systems for years. This also means that we possess invaluable knowledge about every aspect of the heat pump. And that's what this booklet is about.

Of course we want to present our solutions, but most of all we want to offer you a convenient forum to get the knowledge you need, so you can make the right decisions based on your specific needs.


I hope you will take a few minutes to look through this booklet. We trust you will find it both informative and enjoyable.



**Hans Wreifält**

*Sales Director, Export  
Thermia Heat Pumps*





The sun sends the earth 174,000 terawatts of free energy – every day. It makes sense to use this gift of nature to heat our homes.

### **Heat pumps – the basics**

A heat pump extracts stored solar energy and converts this into heating and hot water for your home.

There are two four types of heat pumps:

**Air source heat pump** converts the energy in the outdoor air into heating for a water based heating system (radiator or floor heating). Some models function at outdoor temperatures as low as minus 25 °C. Can also produce hot water and cooling.

**Ground source heat pump** collects energy from the ground or ground water

by circulating brine fluid in a loop in the ground. The heat is then transferred to a water-based heating system (radiator or floor heating). Can also produce hot water and can cooling. This type provides a complete and flexible heating solution and is more efficient than air source heat pumps at low outdoor temperatures.

Heat pumps use approximately one part electrical energy to extract four parts solar energy stored in the air or the ground.

High-quality heat pump systems can be equipped with an electric heating element for extra safety. The heating element provides extra high tempera-

tures to the hot water, to prevent the formation of legionella bacteria.

### **Service life and operation**

The service life of a heat pump varies for different types and brands, but in general an air or ground source heat pump from a good manufacturer can last between 20 and 30 years.

### **Renewable Energy and Energy labels**

In 2009 the EU classified heat pumps as a renewable source of energy since the amount of solar energy it extracts is much greater than the amount of energy it consumes.



## Heat pumps – a smarter use of energy

A heat pump from Thermia creates a comfortable indoor climate in your home. While it's supplying your home with heating, hot water and cooling, you can reduce your energy consumption by up to 75 per cent. When it's time to select a new source of energy for your home, a heat pump from Thermia means you're also contributing your share to help the environment.

### **Economical**

Solar power generates large amounts of free energy that is stored in the air, ground and ground water. A heat pump will help you unlock this free energy. By extracting this heat efficiently you

can reduce your energy consumption considerably. The savings are often large enough to pay for the investment in just a few years.

### **Comfortable**

A heat pump requires virtually no maintenance or refilling of fuel, and it's very easy to operate. You can adjust your indoor temperature with just a touch of a button. The heat pump does not take up much space, normally only about as much as a fridge.

### **Eco-friendly**

By choosing a heat pump you help to reduce the impact on the environment.

The technology is well-tested and the EU classifies heat pumps as a renewable source of energy. The amount of solar energy the heat pump extracts is much greater than the amount of energy it consumes.

### **Reliable**

Buying a heat pump is a long-term investment; it will just run and run. After more than 35 years of developing and supplying heat pumps for the European markets, including the severe Nordic climate, Thermia can guarantee a reliable and cost efficient solution.

# Four ways to collect energy

The air, bedrock, soil, and groundwater all contain stored solar energy which can be used for heating. A heat pump extracts this unlimited, eco-friendly energy and converts it into heating for your home.

## Air source heat pumps

### Air source



With an air source heat pump there is no need to dig or drill. Instead the energy is sourced straight from the surrounding air.

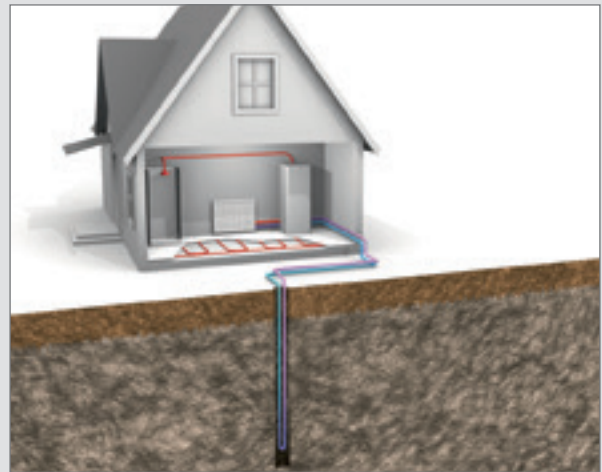
For a complete system that covers all your heating requirements, including hot water, you need an air/water heat pump. In comparison, an air/air heat pump is only capable of supplying partial heating, not hot water.

#### Benefits:

- Lower investment cost.
- No impact on the ground.
- No large plot needed.

## Ground source heat pumps

### Vertical ground loop



The vertical ground loop collects solar energy stored in the bedrock. A hole is drilled into the bedrock and a pipe is installed to a depth of between 100 and 200 metres. The exact depth depends on the house, size of heat pump and surrounding conditions.

A common myth about heat pumps is that they will not work if several homes in the neighbourhood have already drilled down to the bedrock. This is definitely not true! The earth's ability to store heat is almost endless – there's enough heat for everyone.

#### Benefits:

- A large plot is not necessary.
- Small impact on the plot.

Every day the sun heats our air, ground and waterways. A heat pump extracts this free source of energy very efficiently.

## Horizontal ground loop



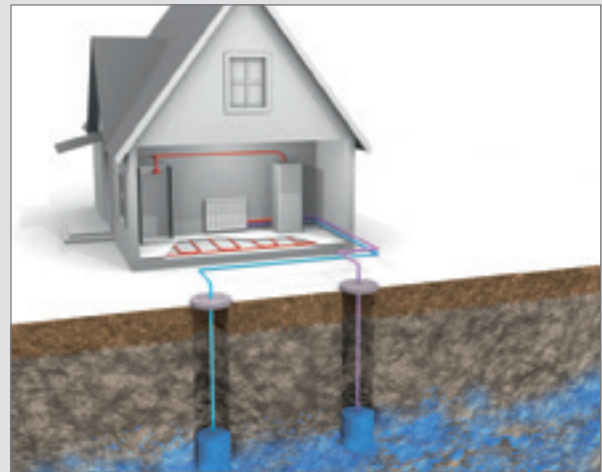
The horizontal ground loop collects solar energy stored in the ground, near the surface. If the bedrock is too deep down, or if you don't want to drill for other reasons, this is a good option.

The loop is buried about one metre below the surface, and energy is extracted from the ground. The length of the loop depends on the house, the size of the heat pump and local ground conditions.

### Benefits:

- Lower installation cost compared to vertical ground loop.
- Can also be used to extract heat from lakes.

## Groundwater



A groundwater heat pump collects energy from the groundwater. The water is pumped up from a water borehole to a heat exchanger, where the energy is recovered.

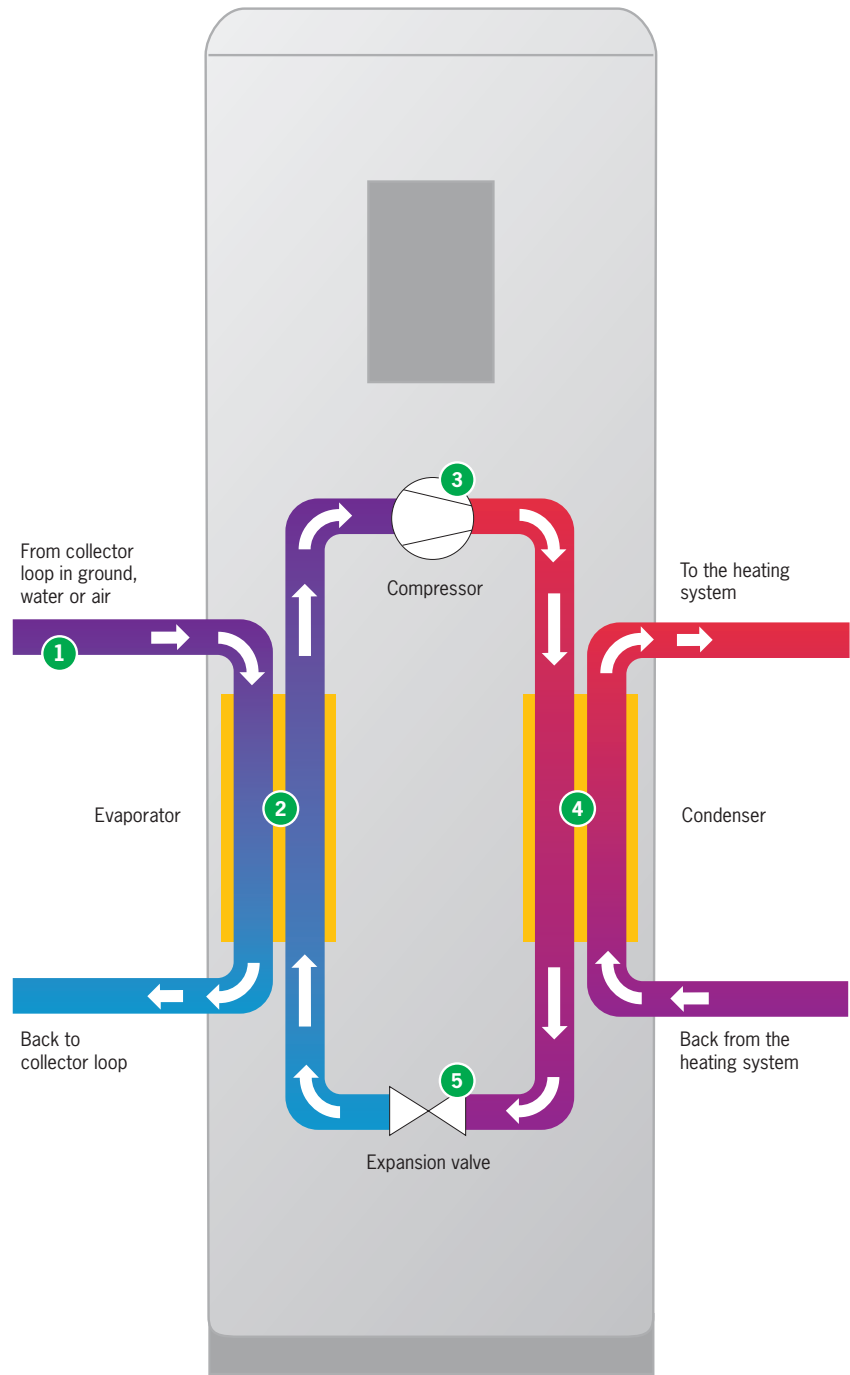
The water is then discharged back through another well. This solution can be the best choice when groundwater is readily available.

### Benefits:

- Groundwater maintains a relatively high, even temperature, year round.

# How a heat pump works

- 1 A brine\* circulates in a collector loop and absorbs heat energy from the bedrock, ground, air or water.
- 2 In a heat exchanger (evaporator) the tepid brine in the collector loop meets the refrigerant\*\* circulating in the refrigerant loop. The refrigerant absorbs energy, heats up and turns into gas.
- 3 A compressor increases the pressure of the refrigerant, and by doing so the temperature climbs to a required heating level.
- 4 In a second heat exchanger (condenser) the refrigerant releases its heat to the heating system in the house. As this occurs the refrigerant is cooled down.
- 5 The refrigerant continues to circulate. In an expansion valve its pressure falls. This reduces the temperature and the refrigerant returns to liquid form. The process recommences when the refrigerant again meets the brine.



\* Brine is a fluid that cannot freeze, such as a mixture of water and alcohol or glycol.

\*\* These days eco-friendly refrigerants such as carbon dioxide and hydrocarbons are used. Previously freon was used

Heat pumps are based on the principle that as a gas is compressed it heats up, while gas that expands becomes colder.





# Heat pump – a profitable investment for everyone

**Investing in a heat pump pays off, whether you're building a new house or renovating an existing one. You reduce your energy consumption while also increasing the value of your house. Plus, you help cut carbon dioxide emissions, a benefit for future generations.**

## **May pay for itself twice**

With a good heat pump, up to 75 per cent of your energy consumption for heating and hot water is for free. This saving means that the heat pump will pay for itself in time. Moreover you increase the value of your house when you install a heat pump which may mean that it pays for itself twice: firstly you recover the investment cost and secondly there is a good chance the sales price of the house will be higher the day you sell it.

The future volatile market situation of the earth's limited oil and gas resources

is another strong reason for choosing a renewable energy solution.

## **New construction**

When building a new house there are lots of decisions to make, and choosing the correct heating solution is one of the most important ones. With the right heat pump you can cover a range of applications, for instance heating, cooling and pool heating, in a single system. As a result you avoid investing in, and maintaining, separate solutions. Moreover, many countries have energy efficiency requirements for new construction, making it extra important to choose a future-secure energy source.

## **Replacement and renovation**

The savings a heat pump can provide will depend on the house, existing heating system and geographical location. To find out how high the savings can be in your specific case, contact an authorized installer, who can help

you with a calculation showing your savings based on your situation and requirements.

The heat pump can also be adapted to an existing heating system you may already have and be combined with different types of supplementary energy sources, such as solar, gas, wood or pellets.

## **Subsidies**

Both within and outside the EU, considerable efforts are underway to reduce environmental impacts and increase the proportion of renewable energy used. In line with this, more and more countries make subsidies available to those who choose a renewable energy source. As the EU has classified the heat pump as a renewable energy source, these subsidies may be available to you. To find out which subsidies are available in your area, contact an authorized heat pump installer.



## Three decisive issues when choosing a heat pump

Installing a heat pump is a long-term investment. You can rely on it to provide a comfortable indoor climate with the largest possible cost savings. Year after year, day by day, minute by minute.

When you choose a heat pump it's important to understand the basics.

The following pages will guide you through the three areas you need knowledge about to make the right decision.

- ① Annual efficiency
- ② Hot water production
- ③ Flexibility





Some heat pump manufacturers cite a COP (Coefficient of Performance) based on for instance an average spring day in April. This doesn't give a correct picture of the heat pump's total efficiency. It's more accurate to measure the efficiency over a whole year.

Here is a good way to see the difference between COP and annual efficiency: COP is similar to a car's fuel consumption at a particular speed and rpm, e.g. 72 km/h and 3,000 rpm, while annual efficiency resembles the average fuel consumption at different speeds and rpm's during a full year.

## 1 Annual efficiency

### **COP – efficiency in specific conditions**

As a buyer it's important that you find out how efficient a heat pump is. Most manufacturers present this information in terms of COP (Coefficient of Performance). In specific test conditions, an assessment is made of the heat pump's ability to supply heat, relative to the amount of electricity required to extract it. If a heat pump has a COP of 4, this means that in the specified test conditions it produces four times more energy than it consumes. Consequently the extracted energy makes up three quarters.

### **Be careful when comparing values**

It's important to be conscious when comparing a heat pump's efficiency. Measuring the COP in specified test conditions, without calculating the

energy consumption for all the components in the system (e.g. circulation pumps), can produce what seems to be very good values. But a measurement should not be done just to support a manufacturer's marketing. It should give homeowners like you a more correct picture of how efficient the heat pump is, over time.

### **Annual efficiency – the real measure**

A far more accurate measure of a heat pump's performance is its annual efficiency (seasonal performance factor). This incorporates the whole year, including the warmest and the coldest periods, as well as the production of hot water. Other factors that affect the overall result include house size, geographical location and number of residents.

The annual efficiency is unique to every heating system's specific conditions. Therefore, it is not possible to specify a seasonal performance factor value as part of a standard technical data. This value must be calculated by an authorized Thermia installer on a case by case basis and based on your specific home's location and conditions.



## 2 Hot water production a key component

**Roughly 20 per cent or more of the energy consumed by a heat pump is used to produce hot water. The availability of the hot water must be sufficient to meet the needs of the whole household, therefore it's important to choose a heat pump that can meet the demand.**

As our water consumption is increasing and our homes are better insulated, the hot water production represents a growing share of a home's energy needs. Therefore it becomes more and more important that the hot water is produced with the highest possible annual efficiency. At the same time the hot water tank must be replenished quickly to maintain the hot water comfort. It's also vital that the heat pump has a system that minimizes the risk of legionella bacteria breeding in the water.

- A good heat pump should produce sufficient hot water while maintaining a high annual efficiency. (That is, costs are kept as low as possible.)
- It's important not to focus excessively on how hot the hot water gets. The key is how quickly the hot water is produced in order to meet the needs of the entire household.





### 3 Flexibility

**When investing in a new heating system it is important to examine the requirements of the entire house, before making a final decision. With a heat pump you can customize a solution that meets all your demands and requirements, including heating, cooling, pool heating, and additional heating sources.**

Once you have decided to install a heat pump, it's important to select a supplier who can provide you with all the climate solutions you and your home would require. Ask yourself what you want your heat pump to supply, besides heating and hot water. For instance do you also want cooling? Perhaps you have a swimming pool that needs heating or a wine cellar that you want to cool. With a heat pump it's possible to combine

these types of solutions with the basic heat pump functions. This means you don't have to invest in separate systems such as air conditioning or a cooling unit. Moreover, it's fully possible to combine a heat pump with other heating sources like solar panels, wood- or pellet-burning furnaces. In order to have all this flexibility, make sure you choose a supplier that can offer these more comprehensive solutions.



## Thermia – a safe investment

**Installing a heat pump is a long term investment that must provide a convenient and comfortable indoor climate with the maximum cost savings year by year, day by day, and minute by minute. A Thermia heat pump provides just that, with a minimum of attention required.**

When you choose one of our products, you get more than a heat pump. More than 35 years ago we produced the very first heat pump with a built-in warm water heater, and ever since we have taken upon ourselves to be more than just a supplier of heat pumps. As a Thermia heat pump owner you can expect the highest possible performance at the maximum savings, expert support when the unexpected happens, the safety of always having a home that is warm and comfortable, and enough hot water for the whole family.

On the following pages you can read more about what makes our heat pumps repeatedly receive top test results and how you proceed to choose the heat pump that is right for your needs.





# Technology for highest annual efficiency

To ensure you get maximum performance and functionality, Thermia has developed a number of technologies,

all contributing to increased annual efficiency, comfort, reliability and cost savings.

## **Controller for optimal operation**

The controller coordinates all the various parts of the heating system to provide the best possible indoor climate and hot water production at the lowest possible cost. The controller also integrates any other functions that may have been added to the system, such as cooling or pool heating.

Thermia's controller manages the supply of heat at the source rather than in the heating system itself. This solution, called floating condensation, can result in up to 15 per cent energy savings compared to traditional technologies.

## **Demand-controlled defrosting for air source heat pumps**

Outdoor air units require defrosting at low temperatures to ensure an unrestricted air flow through the fin coil. Thermia has developed a technology for defrosting that operates only when and as long as required, in contrast to standard solutions used by other brands which defrost even when it is not needed. Demand-controlled defrosting minimizes the energy consumption.



## **Optimum technology for highest annual efficiency**

Optimum technology keeps the heat pump working in ideal conditions at all times. This means maximum efficiency and minimum energy consumption, second by second.

Thermia's Optimum technology uses automatic variable speed controlled circulation pumps to optimize conditions for the heat pump by controlling delta T in heating system and brine collector. The temperature difference between supply line water and return line water is kept constant between 7–10 °C. For the collector a difference of 3 °C between inlet and outlet is optimal. The Optimum technology reduces energy consumption and thus improves annual efficiency.

## **Inverter technology**

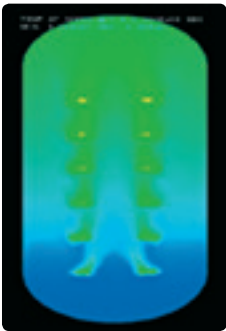
At the heart of the Thermia heat pump is an inverter-controlled compressor. The inverter technology, which continuously adjusts the heat pump's output to the current heat demand, means that the heat pump can supply 100 per cent of your energy requirements without the need for auxiliary heating.

Thermia's Research & Development department works continuously to develop, improve and refine heat pump technology. With TWS and HGW we have created market-leading technologies for hot water production. Here you can read more about these technologies, how they work and their benefits.

## TWS technology for exceptional hot water production

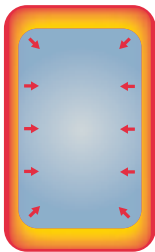
Thermia's heat pumps produce hot tap water using the patented TWS (Tap Water Stratificator) technology. TWS provides more effective heat transfer and more efficient layering of the water in the hot water tank. The results are impressive. Heat pumps equipped with TWS are the best on the market, in terms of hot water production. TWS ensures a plentiful supply of hot water,

quickly and at low operating cost, which means that a heat pump with TWS increases your annual efficiency. Thermia's heat pumps are factory-set to increase the water temperature to above 65 °C once a week. This is to eliminate the risk of legionella bacteria. The normal temperature is sufficiently high to prevent bacteria growth, but this system provides extra safety.



TWS hot water tanks are specially designed for heat pumps. The technology layers the hot water in the hot water tank so that the heat can be used in the best way. (In the photograph, the hot water is represented by the green colouring and cool water by the blue.) The amount of energy used to create hot water by TWS could only create lukewarm water in a conventional hot water tank.

### Traditional technology



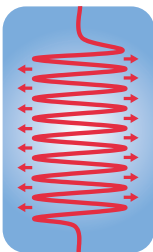
In a traditional water heater for heat pumps the heater is surrounded by the hot water from the heat pump. The resulting heat transfer is both poor and slow.



After a consumption peak that has drained the hot water tank, with traditional technology it takes 50 minutes\* to refill the tank with hot water.

\*Time calculated when heating from 40 °C.

### TWS technology



In a TWS hot water tank, the hot water is led from the heat pump in a coil through the water that is to be heated. This delivers more effective heat transfer and more hot water.



After a consumption peak that has drained the hot water tank, it takes just 21 minutes\* to refill the tank with hot water.




\*Time calculated when heating from 40 °C.

# Boosting annual efficiency with HGW technology

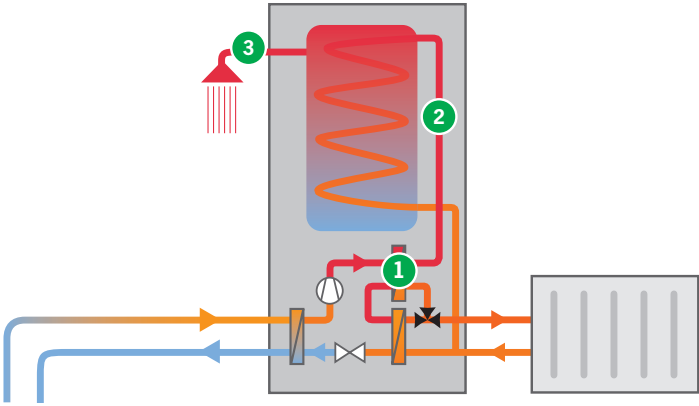
With HGW (Hot Gas Water heater), Thermia has developed a unique patent pending method for producing hot water. With this new technology we have solved a seemingly impossible equation: higher annual efficiency in combination with hot water production at higher temperatures and increased volumes. At the same time as water is heated for distribution through the house’s heating system, hot water is produced at very high temperature through an extra de-superheater.

This means that during the part of the year when the house is heated, you get lots of hot water at a very low cost. The result is up to 20 percent higher annual efficiency. The COP for hot water production can be as high as five, which means that the production of hot water is five times as high as the supply of energy.

HGW technology is used in the Thermia Diplomat Inverter and Diplomat Optimum G3 models.

	Thermia Diplomat G3 & Thermia Inverter with a 180-liter hot water tank supported by HGW and TWS technology.	Showers 
Other brand	A typical heat pump with a 200-liter traditional hot water tank.	

HGW technology



With HGW technology, the temperature in the hot water tank can reach 90 °C. This radically increases the volume of usable tap water.

- 1 A small portion of the heated water that is on the way to the house's heating system passes the extra de-superheater.
- 2 There it is heated up further, to between 50 °C and 90 °C, before going into the water heater.
- 3 The result is that, at no additional cost, you get more, and hotter hot water during the months of the year that the house is heated.

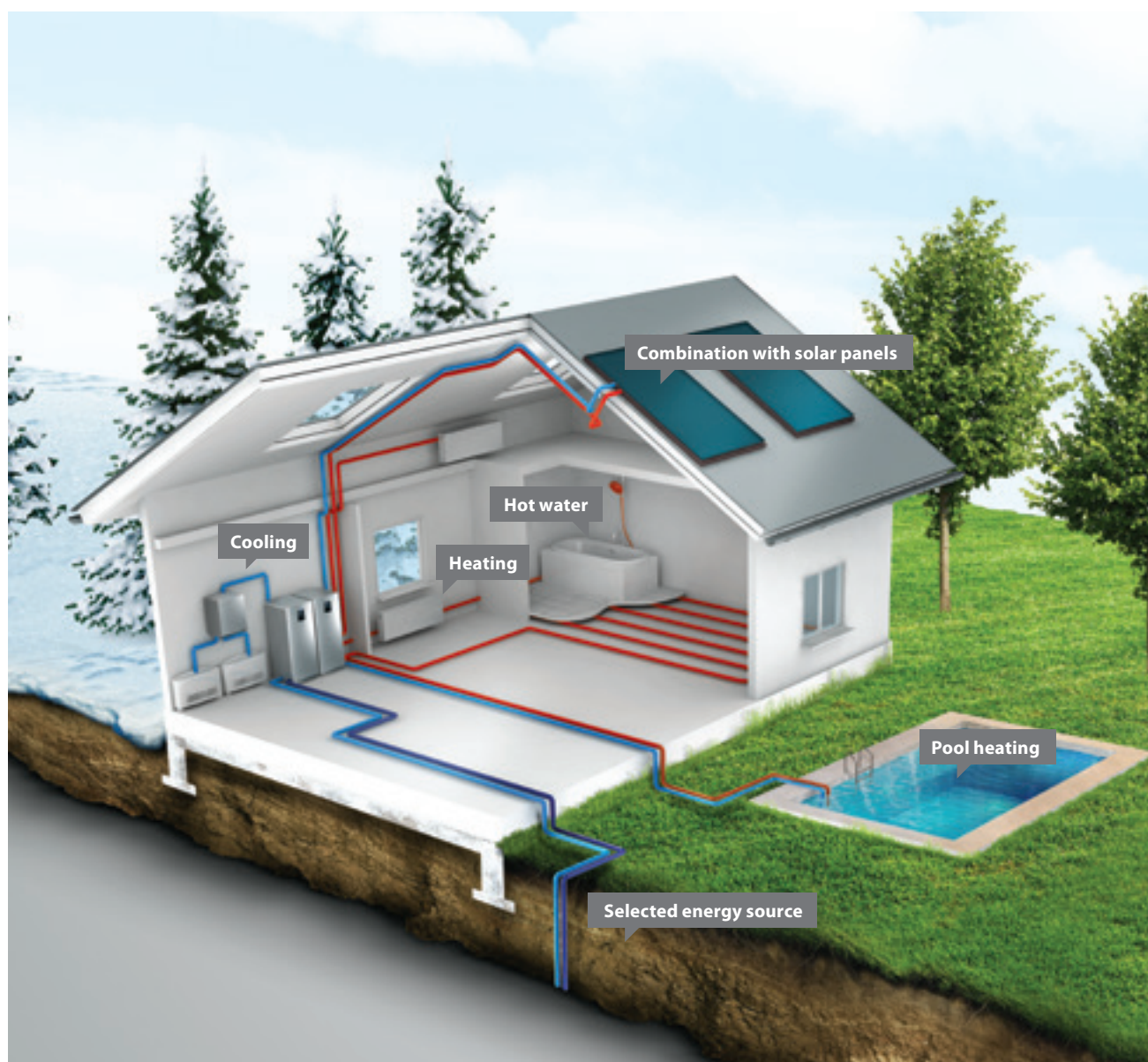


The Thermia Inverter model gives you 545 liters of hot water on tap at any time. To put this into context, it means you have enough hot water for up to nine people to shower at once.



# One system – multiple functions

With a Thermia heat pump you get a flexible solution that can satisfy all your heating and cooling requirements in a single system.





## Cool your house with a heat pump

**A Thermia heat pump is a complete solution that provides a comfortable indoor climate all year round. Heat is produced during the cold season and you can get comfort cooling when it is hot outside.**

By adding a cooling unit to your heat pump you get a comprehensive climate comfort system that gives you a perfect indoor climate all year round. It's also more economical both in terms of investment and running costs, compared to traditional solutions. There are two ways to cool your home with a heat pump: passive and active cooling.

### **Passive cooling**

By taking advantage of the cool brine in the ground loop, cooling is created at

a cost corresponding to the energy consumption of a couple of light bulbs. Passive cooling comes as standard on Thermia Comfort and is optional on all other Thermia ground source heat pumps by adding a separate passive cooling module. (Note: passive cooling is not available on air source heat pumps).

### **Active cooling**

Passive cooling is normally sufficient, but if necessary, extra cooling can be achieved by using active cooling where cooling is produced using the compressor system. With this method, cooling produced by a ground source heat pump is more cost efficient than traditional air conditioning.

Active cooling is standard on Thermia Atec, and optional on Thermia ground source heat pumps.



Passive cooling can be used to cool a certain room or area, such as a wine cellar.



## Let the heat pump heat your pool

The Thermia heat pumps can easily be supplemented to heat also your pool all year round. This way you can substantially lower the heating costs for the pool.

### Indoor pool

For indoor pools the heat pump is dimensioned to heat the pool all year round. The heat pump then coordinates the heating of the pool with the home's current heating and/or cooling needs and ensures that the cost is kept at a minimum.

### Outdoor pool

Many outdoor pools are used only during the summer and since the need for heating the house is low during this period there's plenty of capacity to heat the pool. By leveraging this unused capacity, the pool can be heated at a significantly lower cost than traditional pool heating systems.

### Leverage the excess energy to heat your pool

When a house is cooled using an active cooling module, heating is produced as a bi-product. This excess energy is usually dumped back into the ground, but if you have a pool you can instead use this energy to heat the water.

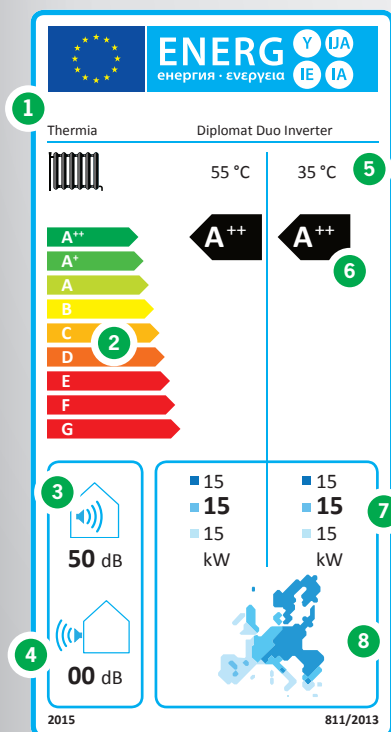
## All Thermia heat pumps fully comply with the Ecodesign Directive

The Energy Related Products Directive (ErP) is a piece of European legislation setting minimum efficiency standards for energy using equipment. In September 2015, this was extended to include heat pumps and other heating sources.

The energy efficiency categories for heating heat pumps are based on a seasonal coefficient of performance (SCOP). This depends firstly on the climatic region and secondly on the potential heating system. Europe is divided for this purpose into three climatic regions. For radiators and underfloor heating systems, the different flow temperatures and possible energy efficiency categories are shown on the Energy Labels.

The rating system for heating heat pumps classifies them into nine efficiency categories. The best energy efficiency category is A++ and A+++. The labels are applied to heat pumps as single source of heating, and combined with domestic hot water preparation as well as the whole integrated system, including solar thermal power, domestic hot water preparation, temperature control, etc.

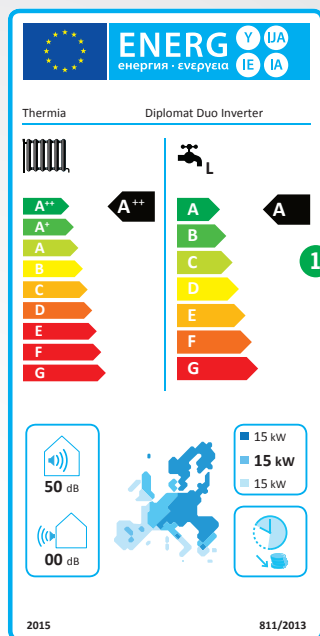
### Stand-alone heat pump



- 1 Brand name, trademark or supplier model number.
- 2 Efficiency scale.
- 3 Sound level indoors.
- 4 Sound level outdoors.
- 5 Performance of heat pump at low temperature only (35 °C) or also at medium temperature (55 °C).
- 6 Energy efficiency class for medium- and low-temperature applications.
- 7 Nominal heat output for average, colder and warmer climate conditions, and for medium-and low-temperature applications.
- 8 Temperature map of Europe, with three temperature zones for orientation.



# Heat pump combined with domestic hot water cylinders



- 1 For combination appliances: Energy efficiency of domestic hot water preparation.

Did you know? Stand-alone heat pumps are rated a maximum of A++ and as part of integrated system can be rated as an A+++. Heating boilers (oil, gas, bio-mass) on the other hand are rated A at best, and in some cases as low as C or D.

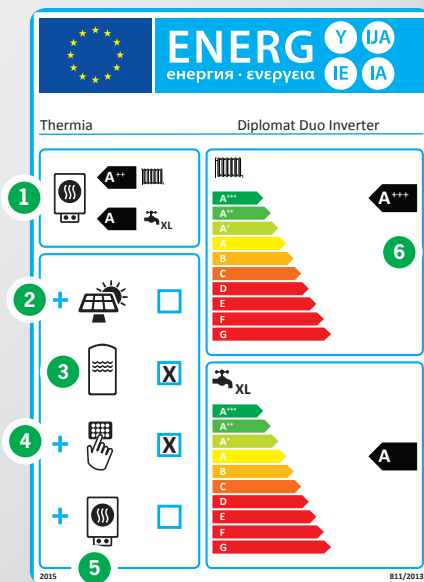
The entire range of our domestic Thermia air and ground source heat pumps come with the highest possible rating from A+ up to A+++ depending on the model, heat receivers and integrated system.

Energy class information you will find on each product.

If the end user is interested in top efficiency that is an A+++ Energy Class rating then they should look at a heat pump as part of an intergrated system.

The entire range of Thermia air and ground source heat pumps sits at the highest possible rating from A+ up to A+++ depending on model, heat receivers and integrated system.

## Heat pump as part of integrated system



- 1 Energy efficiency class of heat pump.
- 2 Solar thermal system?
- 3 Domestic hot water cylinder?
- 4 Room temperature controllers?
- 5 Additional heat source?
- 6 Energy efficiency class of integrated system.



# Which heat pump is best for you?

These tables provide an overview of the different technologies used in Thermia's products. On the following pages you can learn more about each product and determine which one is right for you.





All models are also available with a separate hot water tank, perfect for areas with low ceilings or if you need extra volume of hot water.

To read about how the technologies works, see the following pages:



- Optimum, page 15
- TWS, page 16
- HGW, page 17
- Cooling, page 19

Air source heat pumps					
Product		Feature			
		Inverter technology	Optimum	TWS	Cooling
	iTec	●	●	Optional	●
	Atec		●	Optional	●

## Ground source heat pumps

Product	Feature				
	Inverter technology	TWS	HGW	Optimum	Cooling
 Diplomat Inverter	●	●	●	●	Optional
 Diplomat Optimum G3		●	●	●	Optional
 Comfort Optimum		●		●	●
 Diplomat Optimum		●		●	Optional

## Ground source heat pumps – Large capacity

Product	Feature			
	Inverter technology	Cascade option	Cooling	Online – remote control
 Mega	●	● up to 1400 kW	● Heating and cooling simultaneously	●
 Solid Eco			Optional	Optional





**iTec**  
**NEW**  
**INVERTER**  
air source  
heat pump

- Air source heat pump
- Inverter-driven
- The best annual efficiency on the market
- Active cooling function
- Efficient energy savings down to -25 °C
- Low sound level
- Class-A circulation pumps



THERMIA iTec

## Maximum performance and comfort, year round

Thermia iTec is an air source heat pump with inverter technology. The inverter-controlled compressor adjusts the heat load constantly according to the current heat demand. You never use more energy than is needed, and this of course reduces your energy bills further. Energy is collected from the outdoor air, and is used to heating of hot water and hydronic heating systems, delivering efficient energy savings at temperatures as low as -25 °C.

By a unique acoustic design, it is very quiet in operation. The cooling function assures a pleasant indoor climate also during the hottest period of the year. And if you have a swimming pool, you can reduce the heating cost significantly as Thermia iTec is prepared for heating of

pools. With a superior seasonal performance Thermia iTec allows you to reduce your energy consumption by up to 75%.

Thermia iTec is available in three output sizes: 5 kW, 9 kW and 16 kW. It consists of two parts: the heat pump

itself, which is installed outdoors, and an indoor unit. You can choose from four versions of the indoor unit, each with different features. The choice of unit depends on the set-up of your heating system, to ensure you never pay for more than you actually need.

### Indoor unit

Each iTec is delivered with an indoor unit. Depending on your requirements, you can select one of four different indoor units and customize your installation.



Available in output sizes: 1-5 kW, 2-9 kW, 4-16 kW  
 Electrical connections: 230V 1N or 400V 3N (only iTec 9 and iTec 16)  
 Dimensions outdoor unit (DxWxH): iTec 5 880 x 310 x 798 mm  
 iTec 9 940 x 330 x 998 mm  
 iTec 16 940 x 330 x 1420 mm

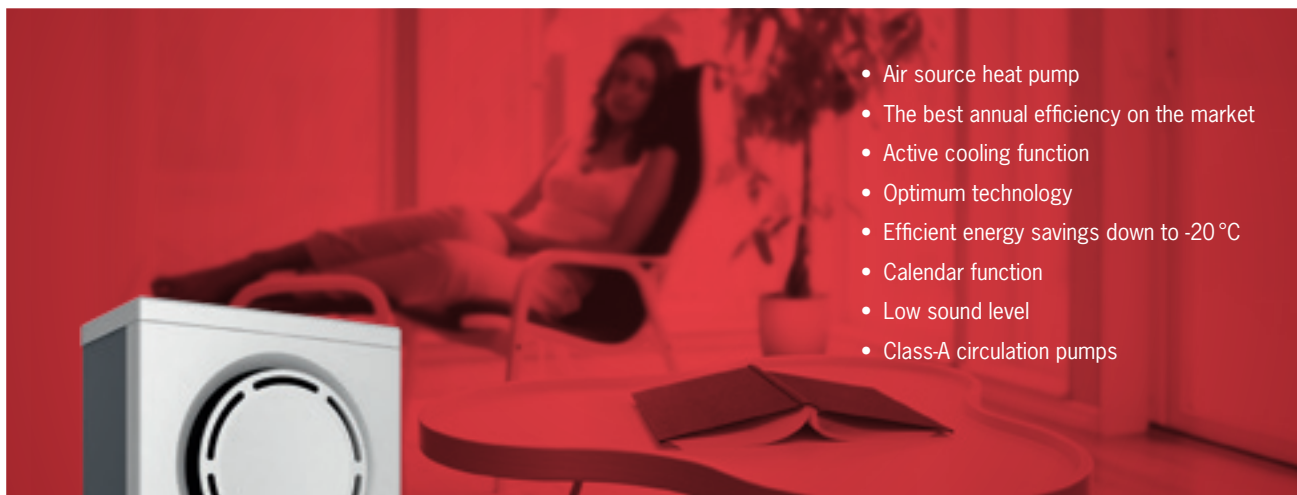
**A+++**

- energy class when heat pump is part of integrated system

**A++**

- energy class when heat pump is single heat generator

Energy class according to the Eco-design Directive 811/2013



- Air source heat pump
- The best annual efficiency on the market
- Active cooling function
- Optimum technology
- Efficient energy savings down to -20 °C
- Calendar function
- Low sound level
- Class-A circulation pumps



## THERMIA ATEC

# Optimum performance and comfort, year round.

Thermia Atec sets a new standard for air source heat pumps. With a superior annual efficiency Thermia Atec delivers maximal energy savings. By a unique acoustic design, it is developed to be the quietest on the market. The cooling function assures a pleasant indoor climate also during the hottest period of the year.

And if you have a swimming pool, you can reduce the heating cost significantly as Thermia Atec is prepared for heating of pools.

Thermia Atec is developed using the latest technology. The energy consumption is put to a minimum by continuously optimizing the three key perfor-

mance parameters of air flow (variable-speed EC fan), heating circuit flow (electronic expansion valve) and heat distribution flow (Optimum technology). Energy is extracted from the outdoor air, and is used for heating

of hot water and hydronic heating systems, delivering efficient energy savings at temperatures as low as -20 °C. This means you can reduce your energy consumption for heating by up to 75 percent.

## Indoor unit

Each Atec is delivered with an indoor unit. Depending on your requirements, you can select one of four different indoor units and customize your installation.



Available in output sizes: 6, 9, 11, 13, 16, 18 kW  
(up to 36 kW through cascading)

Electrical connections: 230V 1N ( $\leq 16$  kW) or 400V 3N

Dimensions outdoor unit (DxWxH):

Atec 6 and 9: 856 x 510 x 1272 mm

Atec 11 and 13: 1016 x 564 x 1477 mm

Atec 16 and 18: 1166 x 570 x 1557 mm

A++

• energy class when the heat pump is part of an integrated system, applies to Atec 13

A++

• energy class when the heat pump is the sole heat generator, applies to Atec 13

Energy class according to Eco-design Directive 811/2013



- Pre-fabricated indoor units with clean, aesthetic Scandinavian design
- No individual parts placed outside the cabinet
- Smooth installation and a flexible solution
  - four versions of the indoor unit, each with different features

Indoor package for Atec and iTec

## Choose your indoor unit for the air source heat pump



The Thermia air source heat pump (iTec and Atec) is a flexible solution that is easy to adapt to existing equipment – and you never need to buy more capacity than you actually need. We have put together four complete indoor packages – all you need to do is choose the one that best meets the circumstances in your home.

### Standard

- Intelligent controller

### Plus

- Intelligent controller
- Optimum controlled circulation pump Class A
- Immersion heater (3/6/9/12/15 kW 3~400 V; 1,5/3/4,5 kW 1~230 V)
- Three-way valve for heating or hot water production

### Total compact

- Intelligent controller
- Hot water tank, 180-liter
- Optimum controlled circulation pump Class A
- Immersion heater (3/6/9/12/15 kW 3~400 V; 1,5/3/4,5 kW 1~230 V)
- Three-way valve for heating or hot water production

### Total / Total +60

- Intelligent controller
- Hot water tank, 180-liter
- Optimum controlled circulation pump Class A
- Immersion heater (3/6/9/12/15 kW 3~400 V; 1,5/3/4,5 kW 1~230 V)
- Three-way valve for heating or hot water production
- Additional free space in the lower part of the unit might be used for the extra 60 liters volume tank (available as an accessory) or for the expansion vessel or/and hydraulic connections

Dimensions indoor unit (WxDxH):

Standard	380 x 204 x 600 mm
Plus	420 x 255 x 625 mm
Total Compact	596 x 690 x 1538 mm
Total	596 x 690 x 1845 mm



- Ground source heat pump
- Inverter-driven compressor
- Optimum technology
- Newly designed color touchscreen
- Plug and Play software update via USB
- HGW and TWS technology
- Can be controlled over the Internet
- Low sound level

## DIPLOMAT INVERTER

### Superior performance in all aspects

The Diplomat Inverter is a new domestic ground source heat pump with the highest energy savings and the best seasonal performance on the market. The Diplomat Inverter is a heat pump with an inverter-controlled compressor, modulated heating capacity and a completely new control system.

The inverter technology, which continuously adjusts the heat pump's output to the current demand, means that the heat pump can supply 100% of your energy requirements without the need for auxiliary heating. The new controller in the Inverter heat pump boasts a touchscreen color display in addition to user friendly iconic symbols that are easily understandable giving the user stress free control.

Thermia's patent-pending HGW technology utilizes regular heating space to also produce hot water. The result is that when the heat pump heats your home, it also generates hot water at the same time. This leads to a higher annual efficiency and you can reduce your heat pump's energy consumption by an additional 20% (see page 17).

The hot water tank features Thermia's patented TWS technology and together with the HGW function takes this solution one step further. The HGW and TWS technologies allows even quicker replenishing of the hot water tank, the higher temperatures achieved by HGW results in the additional volume of hot tap water. The Diplomat Inverter supplies you with more hot water than any other heat pump on the market.



## Diplomat Duo Inverter

The Diplomat Duo Inverter is also available with a separate hot water tank, perfect if you need that extra amount of volume of hot water.

Available in output size: 3–12 kW, 5–17 kW  
Electrical connections: 230V 1N or 400V 3N  
Dimensions (DxWxH): 690x596x1845 mm

**A+++**

• energy class when the heat pump is part of an integrated system

**A++**

• energy class when the heat pump is the sole heat generator

Energy class according to Eco-design Directive 811/2013

**NEW!**  
Diplomat  
**INVERTER**







## DIPLOMAT OPTIMUM G3

# Optimum performance and unbeatable hot water comfort

Diplomat Optimum G3 is a ground source heat pump that produces more and hotter water than traditional heat pumps, while also consuming less energy.

Thermia's patent-pending HGW technology utilizes the regular space heating to also produce hot water. The result is that when the heat pump heats your home, it generates hot water at the same time. This leads to a higher annual efficiency and you can reduce your heat pump's energy consumption by an additional 20 per cent (see page 17).

Thermia's Optimum technology uses automatic variable speed controlled circulation pumps, which optimizes operation in accordance with the current temperature and conditions. The Optimum technology

reduces the amount of electricity used, and ensures that the heat pump is always running at maximum efficiency.

The hot water tank features Thermia's patented TWS technology, and Optimum technology together with the HGW function takes this solution one step further. By controlling the circulation pump (warm side) during hot water production, the Optimum technology will allow even quicker replenishing of the hot water tank and a completely controlled stratification of the hot water. The higher temperatures achieved by HGW results in additional volumes of hot tap water.



## Diplomat Duo Optimum G3

Diplomat Duo Optimum G3 is also available with a separate hot water tank, perfect for areas with low ceilings or if you need extra volume of hot water.

Available in output sizes: 6, 8, 10, 13, 17 kW  
Electrical connections: 230V 1N ( $\leq 12$  kW) or 400V 3N  
Dimensions (DxWxH): 690x596x1754 mm

**A+++**

• energy class when the heat pump is part of an integrated system, low temperature applications

**A++**

• energy class when the heat pump is the sole heat generator

Energy class according to Eco-design Directive 811/2013



- Ground source heat pump
- Passive cooling function
- TWS technology
- Can be controlled over the Internet
- Low sound level
- Class-A circulation pumps

## COMFORT OPTIMUM

# The complete climate control system

The Comfort ground source heat pump is a complete climate solution that delivers the best possible indoor comfort – heating in winter, cooling in summer and hot water all year round.

### Integrated cooling

Cooling is possible as a result of the passive cooling module built into the unit. By circulating the cool brine in the ground loop, cooling is produced at a cost corresponding to the energy consumption of a couple of light bulbs.

Installation is simple thanks to the system's capability to distribute both heating and cooling in a single system. Normally there is no need for a separate cooling system.

### Optimum technology

Thermia's Optimum technology uses automatic variable speed controlled circulation pumps, which optimizes operation in accordance with the current temperature and conditions. The Optimum technology reduces the amount of electricity used, and ensures that the heat pump is always running at maximum efficiency.

### TWS technology

The built-in hot water tank features Thermia's patented TWS technology, which means that the hot water is produced faster and at higher temperatures than with traditional technologies.

Available in output sizes: 4, 6, 8, 10 kW  
Electrical connections: 400V 3N  
Dimensions (DxWxH): 690x596x1754 mm

**A++**

• energy class when the heat pump is part of an integrated system

**A++**

• energy class when the heat pump is the sole heat generator

Energy class according to Eco-design Directive 811/2013



- Ground source heat pump
- Optimum technology
- TWS technology
- Can be controlled over the Internet
- Low sound level
- Class-A circulation pumps



## DIPLOMAT OPTIMUM

# Minimum energy consumption thanks to automatic speed control

Thermia Diplomat Optimum is a ground source heat pump that includes the same features as Thermia Diplomat, with the addition of the Optimum technology with automatic variable speed controlled circulation pumps. The Optimum technology continuously adjusts the heat pump to work optimally at all times. This leads to maximum efficiency and minimum energy consumption – at all times, all year round.

### Brings TWS technology one step further

The hot water tank features Thermia's patented TWS technology, and Optimum

technology takes this solution one step further. By controlling the circulation pump (warm side) during hot water production, the Optimum technology will allow even quicker replenishing of the hot water tank and a completely controlled stratification of the hot water.

### Annual efficiency

Thanks to the lower energy consumption of the circulation pumps and the efficient hot water production you get an improved annual efficiency compared to our base-line models.



## Diplomat Duo Optimum

Diplomat Optimum is also available with a separate hot water tank, perfect for areas with low ceilings or if you need extra volume of hot water.

Available in output sizes: 4, 6, 8, 10, 12, 16 kW  
Electrical connections: 230V 1N ( $\leq 12$  kW) or 400V 3N  
Dimensions (DxWxH): 690x596x1754 mm

**A++**

- energy class when the heat pump is part of an integrated system

**A++**

- energy class when the heat pump is the sole heat generator

Energy class according to Eco-design Directive 811/2013



- Separate hot water tanks with capacities of 200 or 300 liters.
- Cooling (passive and active) ensures a perfect indoor climate, all year round.



## THERMIA MBH

### Separate hot water tank

Thermia MBH is a hot water tank for those who require larger volumes of hot water, or who prefers a separate tank. MBH is compatible with Thermia's Duo models as well as the rest of the heat pump range.

Just like Thermia's built-in tanks, MBH is equipped with TWS technology (see page 16). This means

it can produce high volumes of hot water, quickly and efficiently. Energy consumption is low and the hot water supply can handle high demands.

The tank is available with capacities of 200 or 300 litres with stainless steel tank. The cabinet design can be selected to match the corresponding heat pump.

## THERMIA COOLING MODULE

### Turns the heat pump into a climate control unit

Thermia Cooling module Passive/Active enables your heat pump to also produce cooling, cost- and energy-efficiently. You get a complete climate control system that delivers a comfortable indoor climate all year round – heat in the winter, cooling in the summer and hot water throughout the year.

Thermia Cooling module Passive/Active has a compact design and can be installed right next to the heat pump. It is compatible with all Thermia ground source heat pumps.

For those who only require passive cooling there is a solution with only this function: Thermia Cooling module Passive.





**NEW!  
MEGA**

- Ground source heat pump for commercial properties
- Advance inverter-driven compressor
- Newly designed color touchscreen
- Plug and Play software update via USB
- Cascade function with sequential alternated operation of up to 16 units
- Can produce heating and cooling simultaneously
- Can control up to five separate heating systems
- Can be controlled over the Internet
- Can communicate with BMS (Building Management Systems) via the Modbus



## THERMIA MEGA

# Superior performance with advanced features

Mega is a new, commercial ground source heat pump that is the pinnacle of innovation, not only for the highest energy savings, but for the best total cost of ownership for a high number of applications in the commercial sector. Mega is a heat pump with an inverter-controlled compressor, with a total output of up to 88 kW and one of the highest SCOP on the market.

### Inverter technology - adjusting precisely to your demand

Our inverter technology makes Mega an extremely flexible and versatile product, which can be installed and used in all types of property, whatever the conditions. Each solution can be tailored to meet your full heating, cool-

ing and hot water needs. The inverter technology, which continuously adjusts the heat pump's output to the current demand, means that the heat pump can supply 100 per cent of your energy requirements.

### Cascade-connecting and capacity up to 1400 kW

Connecting 16 Mega units together, the customer can achieve a total heating effect of up to 1400 kW. Cascade connected pumps start one after the other depending on the energy need, thus ensuring minimum energy consumption regardless of the output.

### New control system and touchscreen color display

Our main aim when developing Mega was to create a new powerful control system. The new controller in the Mega heat pump boasts a touchscreen color display in addition to user friendly iconic symbols that are easily understandable giving the user stress free control, additionally on the Mega control board below the display can be found a USB port for the updating of software.

The new controller features different functions often used in large heating systems like: Passive/Active cooling, Water Charging System (WCS), Tap Water Control (TWC), heat pump on/off via power grid (EVU) and energy measurement.

Available in output sizes:

Mega <sup>S</sup> 10–33 kW, Mega <sup>M</sup> 11–44 kW,  
Mega <sup>L</sup> 14–59 kW, Mega <sup>XL</sup> 21–88 kW  
(up to 1400 kW through cascading)

Electrical connections:

400V 3N

Dimensions (DxWxH):

850x900x1744 mm

**A+++**

• energy class when the heat pump is part of an integrated system

**A++**

• energy class when the heat pump is the sole heat generator

Energy class according to Eco-design Directive 811/2013





- Ground source heat pump for larger buildings
- Can be controlled over the Internet
- Low sound level

## THERMIA SOLID ECO

### Optimum performance at a low investment cost

Thermia Solid Eco is a large capacity heat pump for those seeking optimum performance and access to the most important functions. The perfect solution for larger buildings without the need for special applications.

#### **Keeps costs at a minimum**

With Thermia Solid Eco you get a complete solution to cover basic needs that is perfectly suited for larger buildings, such as schools, churches, mansions, business premises, sports halls etc., without the need for advanced extra functions.

#### **Controls for maximum output**

Thermia Solid Eco can control two separate heating systems in the same building at the same time. The intelligent controls also make it easy to monitor and control other parts of the system, such as additional heater, tap hot water, cooling and shunt groups. This means that the system can be fine tuned at all times to suit prevailing needs and conditions, giving optimum efficiency and energy saving.

Available in output sizes: 22, 26, 33, 42 kW  
Electrical connections: 400V 3N  
Dimensions (DxWxH): 690x596x1488 mm

**A+++**

- energy class when the heat pump is part of an integrated system, low temperature applications

**A++**

- energy class when the heat pump is the sole heat generator

Energy class according to Eco-design Directive 811/2013



## THERMIA ONLINE

# Control your heat pump remotely no matter where you are



With the Thermia Online accessory, you can control and monitor your heat pump from any smartphone, computer or tablet, wherever you are in the world. For example, you can lower the temperature when you are on holiday, and increase it for when you come back. If you come home earlier than expected; no problem – using Online, you can easily ensure that your house is warm and comfortable whenever you need it to be.

At any time of day, you can use Online to check that your heating system is working properly and what temperature your home is at. If anything unexpected comes up and needs to be fixed, you – or your installation engineer, where agreed – will immediately receive this informa-

tion via Online. You can also control and monitor several locations if you need to; for example, if you have a holiday cottage with a heat pump or have relatives who need assistance.

Thermia Online connects the heat pump to your existing home broadband. If there is no internet connection available, it is possible to connect using a mobile 3G/4G modem (provided by your local mobile service provider). The Online app is available for both Android and iPhone.



Take a demo and see how it works:

**[www.online.thermia.se](http://www.online.thermia.se)**

Username : thermiademo  
Password: demo

**[www.thermia.com/online](http://www.thermia.com/online)**

# This is Thermia

**Thermia's history starts back in 1889 with the development and production of energy-efficient kitchen stoves. Ever since, Thermia's core business has been energy-saving heating solutions. As a result we're now one of Europe's leading heat pump producers.**

## **Pioneers in the heat pump business**

In 1973 Thermia manufactured the very first heat pump with an integrated hot water tank. Over the years Thermia has continued to develop new solutions in its quest to create better and more efficient heat pumps, providing a more comfortable life in thousands and thousands of households around Europe.

## **Thermia and Danfoss**

Today Thermia is owned by Danfoss, a global company headquartered in Denmark with more than 20,000 employees. Thermia is the core of Danfoss' heat pump division, with a plant and research centre in Arvika, Sweden. Here, work is constantly underway to create the heating solutions of the future for customers all over the world.







Testing in one of the R&D climate chambers, set to severe weather conditions.



## One of Europe's foremost R&D centres

**Thermia's facility in Sweden includes the company's 3,000 square metres global R&D centre for heat pumps. Here, engineers and technicians work to meet future global demands for high-tech, energy-efficient heating solutions.**

The centre has a state-of-the-art climate chambers where conditions varying all the way from tropical to arctic can be simulated. This enables the heat pumps to be tested in all types of climates, which is necessary when the aim is to

develop heat pumps of the future, for use worldwide.

When planning the climate chambers, Thermia sent the tender request documentation to recipients all over Europe. However no company could match Thermia's strict requirements on machinery and equipment. As a result, Thermia decided to build the climate chambers themselves.

Achieving low noise levels are a crucial part of the R&D work. The R&D centre has special sound rooms where the

heat pumps' noise levels are tested. It's important to analyze and minimize the noise levels, and to remove all low-frequency noise.

Design is another important feature of heat pumps used in household settings, therefore Thermia's engineers collaborate with designers to ensure that the products have the best possible balance between form and function.

# Driven by innovation

Thermia's history starts with its founder, Per Andersson, born 1861. Just ten years old he started his career as an apprentice black smith, and he later began his own production of kitchen stoves. The driving force behind his business was his desire to always develop better and better products. The stoves had to be more efficient, easier to use and more fuel efficient. When one model was ready, work began immediately to develop one that was even better.

## The same core values

In time the range expanded to include wood-burning boilers, coke-fired boilers, hot water tanks, radiators and numerous other products used for heating. Always with the same basic philosophy: to have the market's best products. Or in the words of Per Andersson himself:

"The products one releases must be not only the best of their time, but before their time, over time."

To this day, long after Per Andersson's passing in 1942, this philosophy is alive and well at Thermia. And even if Thermia's focus since 1973 has been on heat pump production, the same drive and passion still inspire the company to advance – to constantly develop, with the aim of continuous improvements.

## Milestones in Thermia's heat pump development

This timeline demonstrates Thermia's pioneering role in the evolution of the heat pump over the past four decades.

### 1977

Thermia's training school for retailers is started. No one is permitted to be a Thermia retailer without having documented product knowledge. All to ensure quality and reliability for the customers.

### 1984

Control computer for fully automatic control of the heat pump, hot water and additional heater is introduced in the Thermia range.

### 1994

A scroll compressor with high efficiency, great reliability and low noise level is introduced in Thermia products.

### 2005

The launch of the first air/water heat pump, Thermia Atria, which operates efficiently at temperatures down to -20 °C. This ground-breaking technology, that makes air source a viable option, is introduced during the spring.

The Thermia Diplomat Optimum is introduced. It is the first ground source heat pump with automatic variable speed control, which adjusts the operation of the circulation pumps according to the prevailing heating requirements.

### 1973

The very first heat pump with integrated hot water tank is developed by Thermia as a result of a collaboration project.



### 1980

A revolutionary heat exchanger is developed, with significantly increased heat transfer and reduced amounts of refrigerant. The latter is a benefit from an environmental point of view. One of the key persons behind the innovation is Thermia's head of development.

### 1993

Thermia presents the first heat pump with all the functional components combined in a single module. Heating, hot water, electrical heating element and control computer are combined in a practical and space saving "package" which takes up only 60 x 60 cm of floor area.

### 2000

Remote control/monitoring of the heat pump becomes possible. This lays the foundation for the Internet-based service that we today call Thermia Online.



Arvika

*The products one releases must be  
not only the best of their time,  
but before their time, over time.*

Per Andersson (1861–1942), Thermia's founder.

## 2011

Thermia Atec is launched, instantly setting a new standard for air/water heat pumps.



## 2012

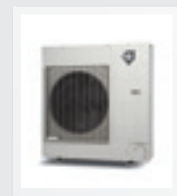
With a new and more efficient compressor, new refrigerant and the latest generation of heat exchanger, the G3 is now more efficient than its predecessor the G2.

With the Thermia Online accessory, you can control and monitor your heat pump from any smartphone, computer or tablet.



## 2017

Thermia launch iTec, a new inverter-driven air source heat pump. Thanks to its superior annual efficiency, it achieves maximum energy savings.



## 2007

Thermia's heat pump R&D centre in Arvika is opened by the Swedish prince Carl Philip. The centre develops heat pumps for climates ranging from tropical to arctic, allowing Thermia to satisfy demands from around the world.

The Thermia museum in Arvika opens. Boilers, ovens and wood-fired water heaters from the last century sit alongside modern heat pumps in the premises used by Thermia between 1923 and 1968.

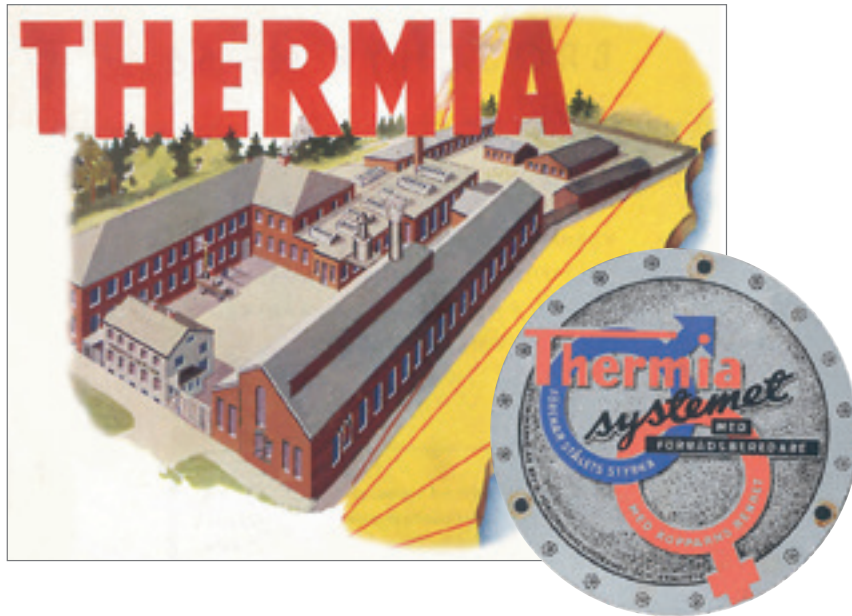


## 2015

Thermia launch Mega, a new commercial ground source heat pump and The Diplomat Inverter – domestic heat pump. Both heat pumps feature inverter technology, a completely new control system and a newly designed color touchscreen.







*The Thermia factory from the 1940's together with the original symbol that is the foundation of today's Thermia logotype. The colour blue represents the "strength of steel" and red represents the "purity of copper".*





## THERMIA THE ULTIMATE ENERGY PROVIDER SINCE 1923



### Pioneering heat pumps

For the last 50 years, we have dedicated all our resources and knowledge to developing and endlessly refining one product: the heat pump. Our focus on geothermal energy has given us world leading knowledge in heat pump technology.



### Engineered with passion

Developing truly sustainable renewable energy solutions can only be achieved with passionate, dedicated, and uncompromising experts. Some of Europe's most highly qualified engineers can be found in our own R&D center.



### Born in Sweden

All our products are designed, manufactured, and tested in Sweden using the latest technology and the highest quality components. We are proud to count world-leading industry specialist, Danfoss, among our technology partners.

Thermia Heat Pumps reserves the right to make any changes to our range and technical solutions after publication of this brochure.  
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