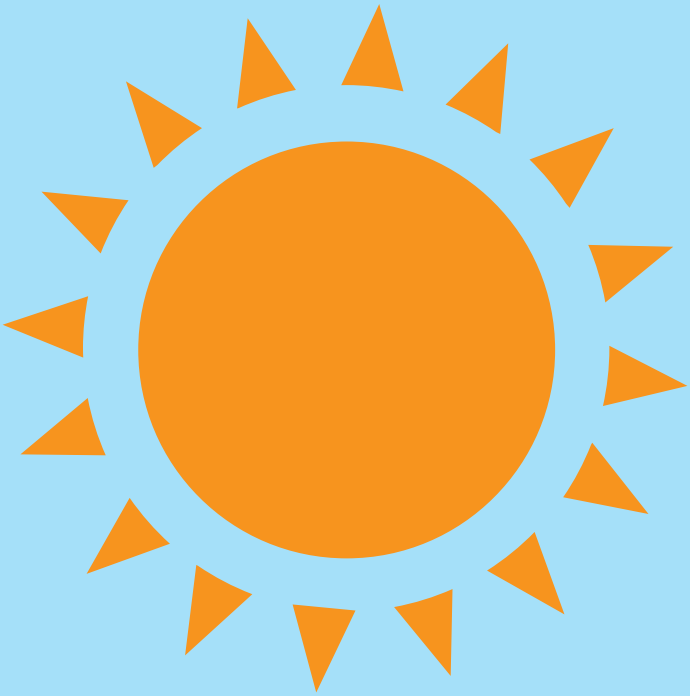
free energy

BUILDING SMART TECHNOLOGY



## Increase your profitability and care for the environment

# - become a HYSS reseller

HYSS - A unique heating system powered by the sun – all year round

Free Energy was established in 2009 and now has companies in Norway, Sweden and Denmark.

## POWERED BY THE SUN

The HYSS heating system – "Hybrid Solar System" – has been developed for an optimal interplay between solar heating, heat pump and energy storage. HYSS can deal with all temperature levels of the solar heating, and this gives not only free hot tap water but also efficient use of the heat pump, through an increased brine temperature. This gives a exceptional high COP/SCOP and very low operating costs.

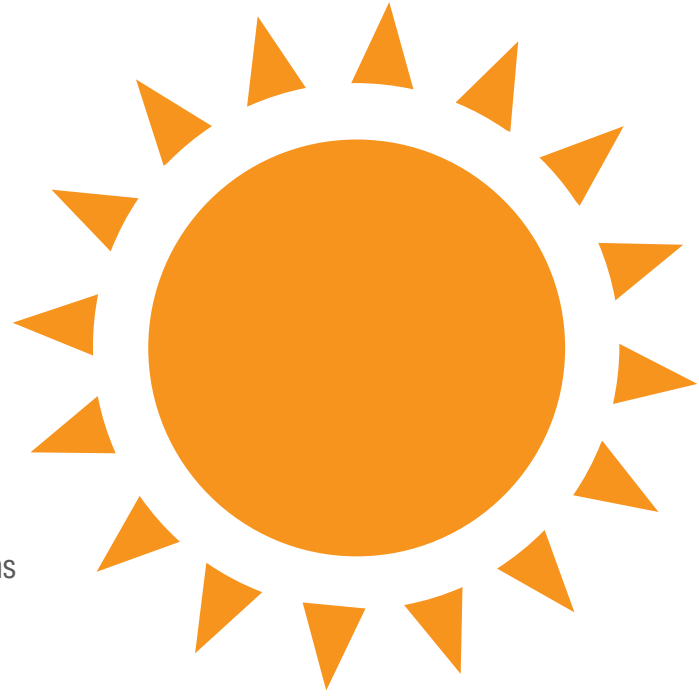
**FACT 1:** If 0.2% of the surface of Norway was covered with solar panels (with an efficiency of 50%) and solar cells (with an efficiency of 12.5%), this would correspond to the annual energy consumption of the whole country.

**FACT 2:** The roof of a normal house in Norway can receive 4-5 times more solar energy during a year that the household consumes.

**FACT 3:** The global radiative input from the sun during 1 hour corresponds to the Earth's annual energy consumption.

# MISSION

Free Energy's mission is to contribute to a world of more sustainable environment and reduced energy cost in buildings, by maximum utilisation of solar energy.



# VISION

Free Energy's vision is to offer solar-based energy systems capable of providing all the energy buildings need.

## SHORT DISTRIBUTION CHAIN AND AN EFFICIENT SALES PROCESS

Free Energy → HYSS-reseller → End-user

As a HYSS reseller you gain access to user-friendly online software that deals with everything from enquiries, calculations, quotations and orders. Once the heating system has been installed, the programme automatically transfers information about the end-user and project-specific data, such as the heating curve, into the iPad mini delivered with the heating system.

# Short supply chain

## Free Energy

- Innovative energy solutions – based on solar energy
- A close dialogue with the HYSS-installer – and strong sales tools
- A 10-year guarantee for the heat pump compressor, storage tank and solar panels
- An efficient service concept – online alarm notification with specific and easy-to-understand error messages
- The heat pump achieved the highest result (A+++), according to the European directive for ecodesign and energy labelling (EN14825). The directive will come into force in 2015.

## HYSS reseller

- Increased sales – a unique product that gives new sales opportunities
- Good profitability – larger projects, with respect to both materials and labour
- A simple sales procedure – online calculation, quotation and ordering
- Factory-assembled system solution – standardised and complete
- Rapid installation – an integrated iPad that down-loads project and end-user information
- High end-user satisfaction – online access gives rapid fault finding and repair
- Efficient service routines – modular exchange system to replace components.

## End-user

- Optimal operating economy – the highest annual heat factor on the market, with an SCOP of 6-8
- High security – 10-year guarantee for all main components
- Simple service – an online control system and an accompanying iPad mini can be used at any time and from any location
- Tools to ensure correct calculation – integrated measurement equipment that displays COP and SCOP
- Minimal space requirement – an elegant design with all components inside a cabinet of dimensions 60x60 cm
- Always up-to-date – the most recent and best software using an automatic update procedure
- Immersion heater – used solely as back-up in case of service of the heat pump.


Purchase 1 unit
of electrical energy
and receive 5-7 times the
heat energy in return
with HYSS-Hybrid
Solar system

# HYSS
# Hybrid Solar System

## A new heating system powered by the sun – all year round

The HYSS system makes possible the short-term storage of solar energy underground. Even if the sun alone normally cannot cover full heating requirements, HYSS creates the best conditions for a marked improvement in heat pump efficiency (COP). The solar heating is integrated with the heat pump right from the start, and the system comprises also the storage of solar heat underground – in either an energy well or a ground loop. Other components of the system are an optimised storage tank and an integrated control system. The user achieves good operating economy without an excessively large investment.

The use of solar heating can be maximised by using a correctly dimensioned number of solar panels, combined with the highly efficient speed-controlled (inverter-controlled) heat pump. Even during the winter, the solar heating will contribute by preheating the incoming brine, resulting in higher efficiency of the heat-pump and less power consumption. This gives a shorter payback time for the heating system, since the solar panels are used not only to produce hot water, but also to increase the efficiency of the heat pump. Assembly and start-up of the heating system are simple, and the user-friendly control system makes HYSS a heating system that is truly “fit for use”, supplying the full requirement for hot tap water and room heating without additional sources of heat.

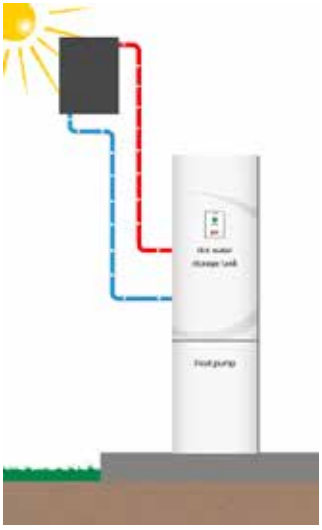
HYSS is delivered with integrated measurement equipment with high accuracy. In this way, the user can continuously monitor the performance of the system both in real time (COP) and over longer periods of time (SCOP). The user can check at any time that the system is actually delivering what the calculations promised.

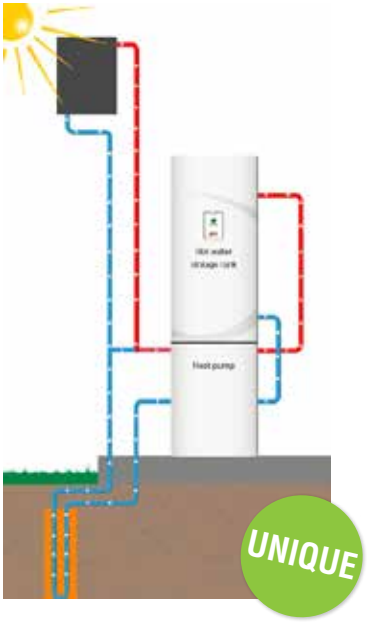
The system is connected to a webserver. This makes it possible to carry out rapidly any necessary fault finding and repair, and automatically ensures that the user always has the most recent and best software.

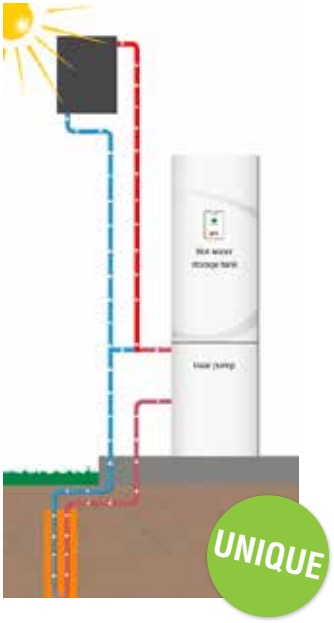

free energy
BUILDING SMART TECHNOLOGY
HYSS - Hybrid Solar System
– maximum energy from the sun
All OK
LOGIN

# What's unique about HYSS

High-temperature solar heating is stored directly in the storage tank, but what is unique about HYSS is that low and medium-temperature solar heating are used to increase the efficiency of the heat pump by pre-heating the brine instead of being stored in the tank. Intelligent control of the priorities given to using low, medium and high temperatures from the solar heating, results increased annual heat factor (SCOP).






### High temperatures (40-75 °C)

With high-temperature solar heating and an suitable storage tank, the sun can often heat the water to more than 60 ºC during 4-6 months of the year, without supplementary energy from the heat pump.

### Medium temperatures (15-40 °C)

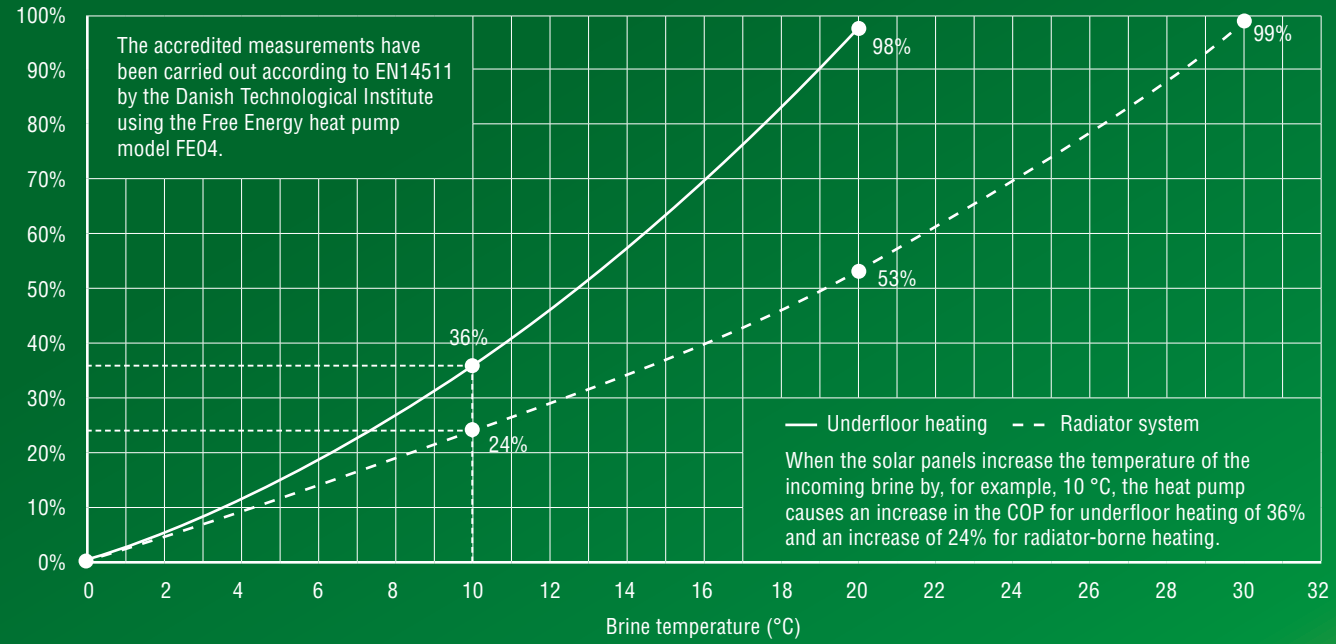
Medium and low-temperature solar heating is used to pre-heat the brine for the heat pump in order to increase the heat factor (COP) and the annual heat factor (SCOP).

### Low temperatures (5-15 °C)

Medium and low temperature solar heating is also used to recharge the mass around the borehole or ground loop. Also this energy contributes to increasing the heat factor (COP) and the annual heat factor (SCOP).

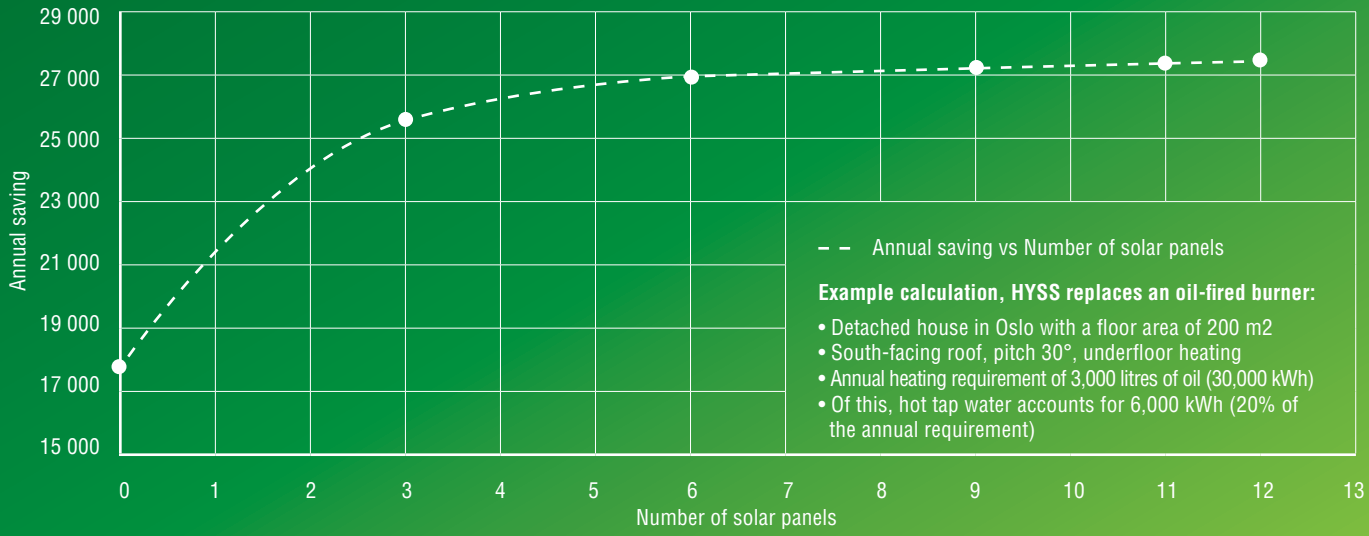
Solar heating increases the efficiency of the heat pump

## Percentage increase in the COP of the heat pump as a function of brine temperature




This halves the pay-back time for the solar panels in combination with HYSS, since solar heating is used both for hot tap water and to increase the efficiency of the heat pump.

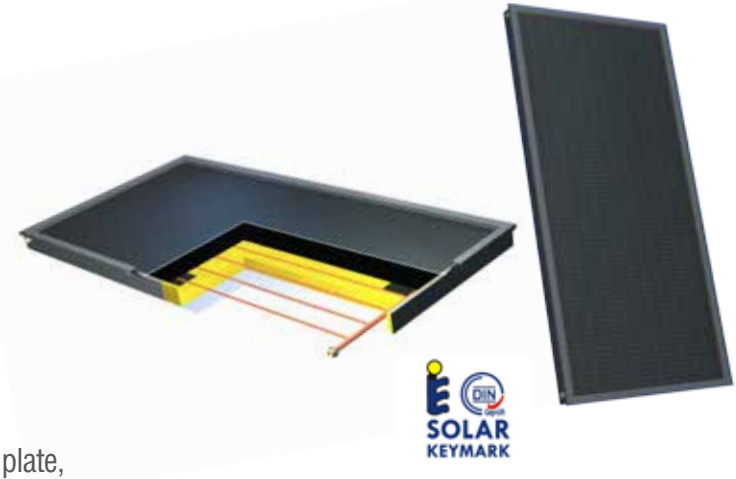
## Annual saving as a function of the number of solar panels



# Principal system components

## Solar panels

The solar panels are supplied by one of the most innovative and leading producers in Europe. The ISO certification of the producer and the high demands on quality that are applied, allow us to offer a 10-year guarantee for the solar panels.




- High performance, Solar Keymark approval
- Collector surface 2 m x 1 m, weight 39 kg
- Copper pipes welded by ultrasound onto copper plate, giving high heat transfer and a robust construction
- Security glass with a matt surface, to avoid troublesome reflections from the solar panels
- Black-coated surface for discrete mounting onto the roof, with long-term stable performance
- 50 mm of Rockwool insulation with good insulation properties and high density
- Elegant and easily-mounted cover, also for double rows of solar panels
- Developed for Nordic conditions with respect to wind, hail and snow loading

# Cabinet with heat pump and storage tank

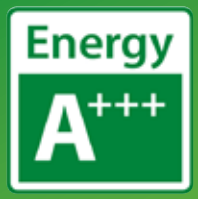
The cabinet contains an integrated solar heating and heat pump solution that can cope with both the pool and passive cooling. The cabinet also contains a filling arrangement for brine, measurement equipment for COP/SCOP and three circulation pumps of the highest energy class. Three expansion vessels (for solar heat/brine, heating, hot tap water) are mounted inside tall cabinet model, making it unnecessary to mount these on the wall outside of the cabinet. With its external dimensions of 60 cm x 60 cm, the cabinet can be placed into any available space and become a natural part of the interior.

Two designs of the storage tank are available, a stainless steel tank of capacity 200 litres and an enamel tank of capacity 190 litres (with an electronic titanium anode). The choice between the two depends on the local water quality. Both tanks are of the highest quality and are delivered with a 10-year guarantee.

The heat pump is of inverter type (speed-controlled), with a compressor that has been specially adapted to withstand high incoming temperatures. This makes it possible for the system to use solar energy most efficiently. The control system selects automatically the best way of using the solar energy; for storage, for making the heat pump more efficient, or for short-term storage in the energy well (or in a ground loop where this has been chosen instead of an energy well). All components of the heat pump have been carefully chosen to achieve the highest possible SCOP (annual heat factor) and to be able to offer a 10-year guarantee for the compressor.

All components inside the cabinet are delivered fully connected and have been pressure-tested at our assembly plant in Sweden, where we also have our warehouse.

The heat pump has been tested at the Danish Technological Institute for compliance with EN14825, and satisfies the highest rating level ($A^{+++}$) specified by the European directive for ecodesign and energy, which will come into force in 2015.




*Testresults at Danish Technological Institute (TI)*

# Borehole with thermal storage material

In order to ensure efficient use of the capacity of the borehole (energy well), we recommend, in cases where the water table is low, that the borehole is filled completely with our thermal borehole material. The thermal material contributes to a better transfer of heat into and out from the energy well. The storage capacity will be higher, since the material will make the complete borehole active, increase the possibility of retaining the excess heat that is supplied to the borehole, and reduce the loss of heat by sealing cracks and cavities.

# Web-based control system

The system is delivered with a web-based control system that can run on any platform (tablet computer, smartphone and PC/ Mac). An iPad mini is delivered with the system as standard, with a docking and charging station nicely integrated into the front of the cabinet. Automatic update to the most recent and best software. HYSS supplies energy and stores operational data even if the internet connection is not functioning.

## The web-based control system includes the following functions:

- A service module for the installer that shows all sensors and their locations, together with all measured values and a menu for system configuration
- The installer can log in to the end-user system and make adjustments or troubleshoot from the office/car/home
- The end-user can control and monitor the system from any location
- Comparison of operating costs with those of other energy systems and energy forms
- Display the maximum power developed and the total energy consumption for different periods
- Display of COP (current) and SCOP (historical data)
- Set to ecomode or holiday mode
- Show when service should be carried out

# HYSS all-in-one

## – your tool from first contact with the end-user to commissioned system


**1** The end-user carries out a preliminary calculation at www.free-energy.com. This rapidly reveals a potential for making savings.

1. Choose your current waterborne system:

Radiators | Floor heating | Radiators and floor heating

2. State your energy cost or energy consumption per year:

| | | | | |
|---|---|---|---|---|
| Oil: | 25025 | NOK | 2500 | ltr/year |
| Propan: | 0 | NOK | 0 | kg/year |
| NG: | 0 | NOK | 0 | m³/year |
| Firewood: | 0 | NOK | 0 | ltr/year |
| Pellet: | 0 | NOK | 0 | kg/year |
| District heating: | 0 | NOK | 0 | kWh/year |
| Electricity: | 6560 | NOK | 8000 | kWh/year |

Your heating cost today:
27 485 NOK

Your new heating cost:
2 878 NOK

Economic savings during one year with HYSS:
24 607 NOK

Compare heat pump solutions

3. State type of current heat pump:

None | Air to air | Air to water | Liquid to water | Exhaust air

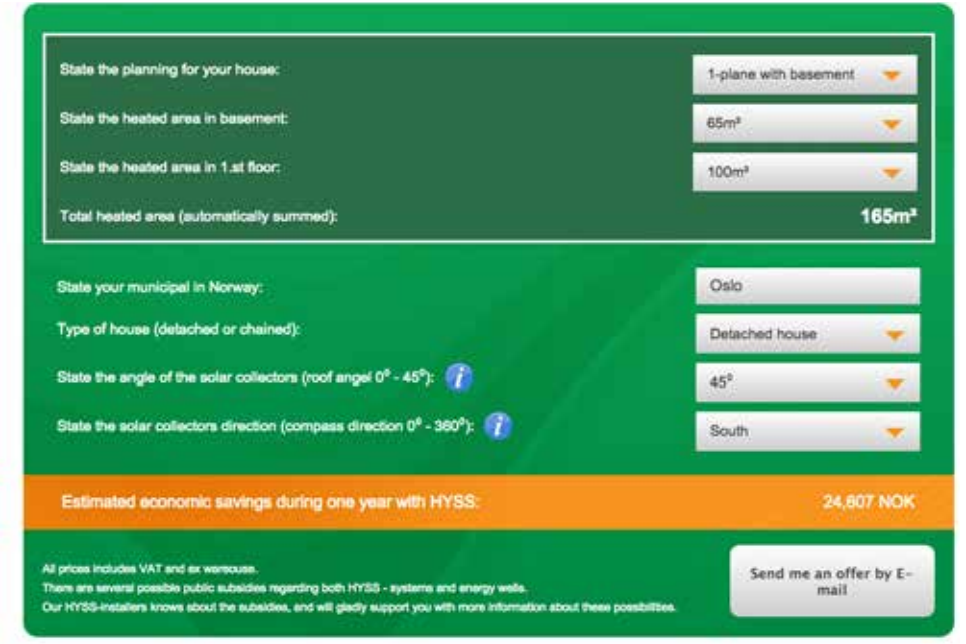
4. Do you want to calculate the HYSS-system also for heating up a pool:

Yes | No

Press here to go to Online-offer

*www.free-energy.com*

2 The end-user enters information about the property and the use of energy, and receives an online quotation. The information is then sent directly to the installer who gains access to all information through the Free Energy web-based CRM (customer relationship management) system.




3 The installer follows up the online quotation given to the user and ensures its quality, using our tailor-made CRM system. Alternatively the installer or the one designing the project initiates new projects from the beginning. The system generates complete BOM list describing all the component that the end-user needs for the HYSS system. In the CRM the installer rapidly can obtain an overview of the companies projects and their status.

4 The order is placed online by converting a quotation to an order, with a simple click.

5 After the HYSS heating system has been installed, relevant information about the end-user and the project are automatically downloaded. This ensures a rapid commissioning with a correctly set heating curve.

# The first step

Free Energy offers courses for both HYSS-installers and HYSS-project planners which will give you access to a web-based CRM system with software for project planning, drawing up quotations, and placing orders. This system enables you to rapidly, easily and accurately design a HYSS system for the needs of the end-user.

The end-users provide information through the website and an online quotation is generated. This will often be the basis that the installer carries forward to quality assurance, and modification. It is also possible to plan a project and obtain a complete quotation from scratch.

If you think that this sounds interesting, Free Energy can contribute to profitable growth that creates added value for you and your company.

You can apply to become a HYSS-installer or HYSS-project planner at www.free-energy.com

# The course covers:

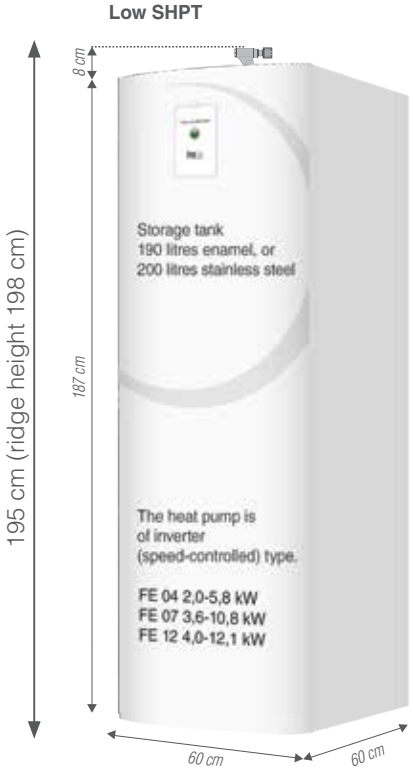
- Description of components (solar panels, storage tank, heat pump and control system) and how to install them
- System design and conditions that lead to a high annual heat factor (SCOP)
- Assembly, start-up and functional control of the system
- Calculation software
- Order management and logistic system
- Information and sales material for end-users
- Guarantee conditions, sales and delivery terms
- Establishing good relationships and mutual trust

*Course duration: 1 day.*
*More information is available at www.free-energy.com*

# Model program

**MODULE DESCRIPTION**

**SHPT** (**S** = Solar, **HP** = Heat pump **T** = Tank)
**190E** = Enamel tank of capacity 190 litres
**200S** = Stainless steel tank of capacity 200 litres




*The cabinet has adjustable wheels at the rear to make it easy and simple to place it in its location.*

Expansion vessels for solar/brine, heating system and storage tank are included in the HYSS system. The vessels are integrated into the module for the high SHPT. The vessels are included in the delivery for the low SHPT, to be mounted on the wall.

The heat pump has been tested at the Danish Technological Institute and awarded the highest rating level (A+++) specified by the European directive for ecodesign and energy labelling requirements (EN14825).

Energy A+++

| Article number: | HYSS-model: | Weight (kg): |
|---|---|---|
| 5507 | Low SHPT-200S 4 KW | 204 |
| 5508 | Low SHPT-200S 7 KW | 215 |
| 5509 | Low SHPT-200S 12 KW | 223 |

**DATA / CONTENTS**

Heat pump: Speed-controlled (inverter). Cooling agent R410A

Power supply: **Single phase, 16 A**

Circulation pumps: Highest energy class with pulse width modulation (PWM)

Web-based control system

iPad mini – WiFi as display

Integrated COP/SCOP measurement equipment with high accuracy

3 KW electrical heating element as back-up, solely in association with service (not for use during peak load)

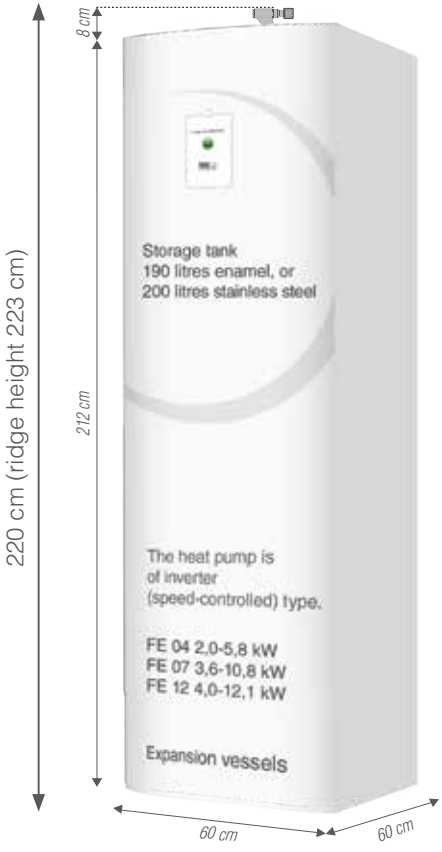
All modules have integrated functionality for solar energy, pool, and extraction for passive cooling.

Filling valves for brine are included in the module.

10-year guarantee covers:

- heat pump compressor
- storage tank
- solar panels

**High SHPT**




| Article number: | HYSS-model: | Weight (kg): |
|---|---|---|
| 5501 | High SHPT-200S 4 KW | 218 |
| 5502 | High SHPT-200S 7 KW | 230 |
| 5503 | High SHPT-200S 12 KW | 238 |

# Do you find the content of this brochure as interesting as we do?

Do you want to become a reseller of the HYSS system?

Or are you simply curious, and want more information?

Please feel free to contact us at Free Energy Innovation AS.