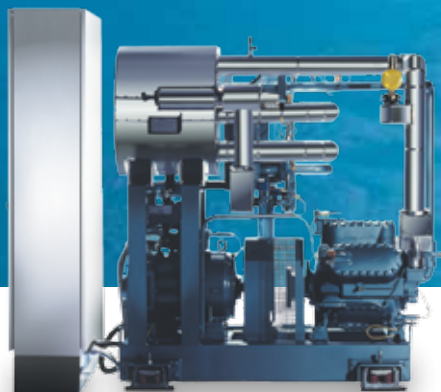


Heat pump systems

On the road to sustainability

GEA Refrigeration



GEA Refrigeration

GEA Refrigeration is a division of the GEA Group (250 companies active in process technology across the world) offering refrigeration, heat transfer solutions and services to a global customer base. The organization was founded more than 150 years ago, and today we have a network of 45 manufacturing, component sales and installation & service companies with more than 3800 employees.

Sustainable heat pump technology

As a manufacturer of components for refrigeration and heat transfer systems (i.e. Grasso, Goedhart, AWP) GEA Refrigeration can provide heat pump systems with higher heating delivery temperatures than other products available on the market. Our environmentally friendly heat pump systems use natural refrigerants, such as ammonia and butane. These substances are non-ozone depleting, (zero ODP), and have a 'zero' Global Warming Potential (GWP). GEA heat pump systems can be offered as standard packages, or can be customized to match customer specifications.

Why heat pump systems?

- 25% of the primary energy consumed in West European countries is used for cooling and heating applications
- Oil and gas reserves are in decline
- Electricity prices are rising at a slower rate than gas prices (European trend)
- Help to achieve reduction targets for CO₂ and other green house gases (Kyoto protocol)
- Help to achieve EU target: sustainable energy consumption needs to be 20% of the total in 2020 (8.5% in 2008)

On the road to sustainability

High efficiency

The use of natural refrigerants allows more efficient and sustainable heat pump systems to be designed, thereby reducing the primary energy consumption. In the particular case of large heating capacity demands combined with a need for high heat delivery temperatures, reductions of up to 50% can be achieved. Using heat pumps not only improves the environment by reducing direct emissions (due to zero ODP and GWP), but because they are more efficient they save indirect emissions of CO₂ by reducing the electrical power needed to drive them - and save money at the same time! Good for you and good for the environment!

How does it work?

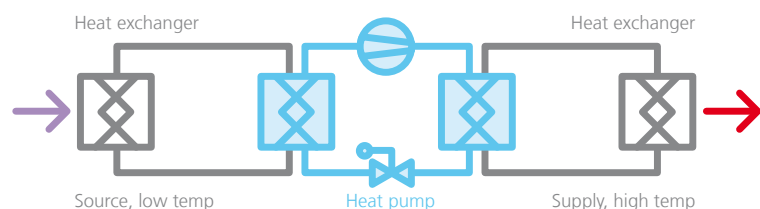
A heat pump transfers heat from a low temperature source to a higher temperature by means of a volatile fluid which is put through a continuous cycle of expansion, compression and condensation – known as a 'vapour compression cycle'. The 'driving force' for this heat transfer process is the electric drive motor of the vapour compressor, acting as the 'pump' in the system – hence 'heat pump'. A heat pump operates in an identical manner to a standard vapour compression refrigeration system.

The heat pump system is completed with heat exchangers on the source and supply side. A sophisticated control system ensures the system can function reliably and efficiently.

What is the benefit?

For a wide variety of applications heat pump systems offer an attractive high efficiency solution due to the inherent efficient nature of the used vapour compression cycle.

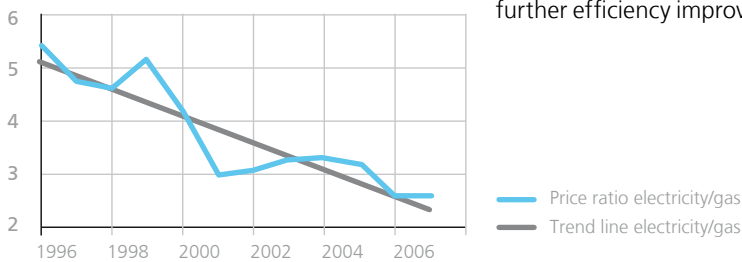
There are for example many industrial process applications – particularly in food processing – that require both cooling and heating within the same 'production line'. In such applications booster heat pumps offer a high efficiency solution to the heating requirement by utilizing the low grade waste heat from the refrigeration (cooling) process, and 'boosting' it to the required higher temperature level. In these kinds of applications a booster heat pump is always more efficient than a gas-fired boiler – and can be anywhere between 300% and 700% more efficient.



The right choice

The ratio between the electricity and gas price is an important criterion in the investment decision for a heat pump system. The electricity price has been showing a slower rate of increase than the gas price over recent years. This development in combination with often available government subsidies means the investment/payback decision in a heat pump system becomes more and more attractive.

Based on 15 EU countries



Which applications are suitable?

The field of application for heat pump systems is very diverse. Two fundamental applications can be distinguished:

- Simultaneous demand for heat and cold (ready meals, slaughter houses, dairy plants, etc.)
- Seasonal requirement for heat and cold (large buildings, district heating, horticulture in green houses)

Seasonal heating/cooling can often utilize underground (aquifer) thermal storage for further efficiency improvements.

Examples

- Hot water supply for industrial processes
- Hot water supply for cleaning activities in for instance slaughter houses
- Pasteurization process in the dairy industry
- Central heating / hot tap water supply in utility buildings
- District heating (including hot tap water supply) and cooling
- Horticulture in green houses (cooling, heating and humidity control)
- Sports facilities with a combined need for heat and cold

Increasing process efficiency

When GEA?

When high supply temperatures are required, GEA Refrigeration can help with ammonia heat pump systems achieving delivery temperatures of 80°C - and 120°C if butane is used. Especially when high source temperatures (>35°C) are available, the Grasso heat pump systems offer a unique and efficient solution.

Below several source and supply types are displayed

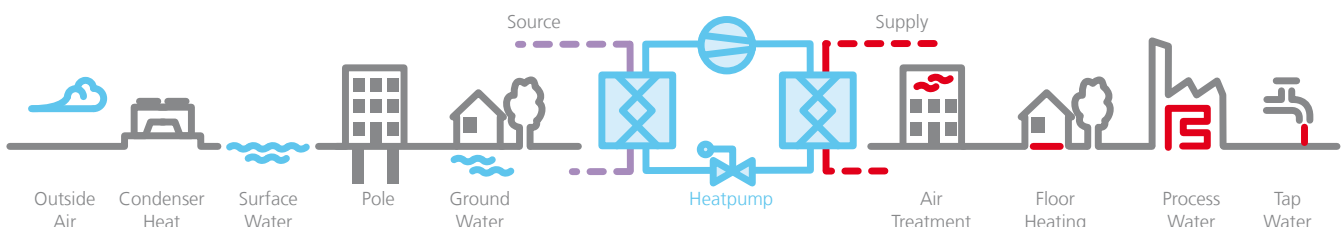
Advantages

- Low energy consumption (COP values of 3 -7 possible)
- High supply temperatures in combination with high capacities
- Environmentally friendly with the use of ammonia and butane
- Helps to achieve CO₂ reduction targets
- Life time more than 20 year
- Short payback time of investment
- Low "Total Cost of Ownership"

Summary

The sustainable, reliable solutions offered by heat pump systems are rapidly improving in efficiency and payback periods. The trend of decreasing electricity prices (compared to gas) and available subsidies make the choice to select a heat pump system more attractive.

GEA Refrigeration is the right partner to design, build and install standard and customized heat pump systems.





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