GEA Red Heat Pumps
High-performance low-charge ammonia industrial heat pumps
The future of industrial heating belongs to eco-friendly technologies such as heat pumps. They use a wide variety of existing heat sources and combine performance and energy efficiency with sustainability and low costs.

GEA Red heat pumps combine the potential of heat pump technology with the natural refrigerant ammonia. The result? Industrial heat pumps that are extremely environmentally friendly and efficient. And there is more: accurately, configured high-end components ensure high availability, reliability and longevity. This makes them a future-proof investment, especially in the face of ever-stricter guidelines on energy consumption, environmental compatibility and greenhouse gases.
GEA Red heat pumps: one solution, twice the efficiency

GEA Red heat pumps provide supply temperatures of up to 80 °C with zero GWP - the #1 sustainable solution capable of meeting all your future heating needs.

The refrigerant makes all the difference
There are lots of heat pumps out there. But the combination of the refrigerant ammonia with a wide range of waste heat source options makes GEA Red Heat Pumps particularly attractive. Offering zero GWP (Global Warming Potential) and the highest volumetric efficiencies, the natural refrigerant ammonia complements the environmentally friendly and economic properties of a heat pump system – ensuring that GEA Red Heat Pumps score very high in ecology and very low for your total life cycle costs.

Convenience meets safety
Thanks to their extremely compact design, GEA Red Heat Pumps are very easy to install and maintain. Carefully selected components, such as efficient compressors, welded plate heat exchangers or 3D-bent tubes, provide maximum safety and availability. Thanks to minimal weld seams in the refrigerant circuit, maximum safety is guaranteed even under demanding conditions.

Flexibility is the best argument
All series models offer maximum choice when it comes to liquid waste heat source options. This makes them suitable for a wide variety of applications and ensures they always provide the right heating performance. GEA Red Heat Pumps are particularly effective in combination with a Blu Chiller, the standard liquid chiller from GEA. Using both systems together provides a perfectly matched solution for cooling and heating.

Significant efficiency increase (up to 20 % or more)
GEA Red Heat Pumps can now be configured with an \( \text{NH}_3 \) cascade evaporator to "add-on" to an existing chiller system. This makes an extra heat exchanger and liquid cycle redundant, hence reducing the equipment complexity while increasing the efficiency thanks to lower approach temperatures – once again making the GEA Red Heat Pumps more eco-friendly with lower total costs.
F-Gas regulation, BREEAM and other sustainability labels

GEA takes environmental protection and sustainability seriously.

- **F-Gas regulation**: Key to the European regulation adopted in 2014 is Global Warming Potential (GWP). This represents an internationally accepted environmental benchmark for the use of refrigerants. Based on their CO₂ equivalent, the use of various refrigerants will be severely restricted around the world in the coming years. Ammonia, a natural refrigerant, has a GWP of 0 and is not affected by any restrictions.

- **Sustainability labels**: In accordance with leading certification systems such as BREEAM, DGNB and LEED, GEA heat pumps can increase the performance rating for the sustainability of construction projects, buildings and infrastructure projects.
Strong solution for a range of applications

Powerful, compact and low-maintenance, GEA Red heat pumps are used worldwide across a wide variety of industries. And there are always new areas of application for which ammonia-cooled heat pumps are perfectly suited.

Heat pumps in a nutshell
GEA’s heat pump technology relies on our successful screw and reciprocating compressors. Using electrical energy, the process follows the same thermodynamic cycle as refrigeration systems to allow the transmission of heat from a source at a lower temperature to a higher temperature level, the supply or 'heat sink'.

Suitable heat sources include
• Condensation heat from refrigeration plants
• Groundwater and surface water
• Wastewater from processes
• Heat created during industrial processes

In contrast to refrigeration systems, heat pumps typically focus on higher heat sink supply temperatures and therefore are executed at higher design pressures. The heat generated through the condensing process and, depending on the application and execution, with additional external desuperheating/subcooling and oil cooling is transferred to a (liquid) heat carrier supplying the heat consumer.

GEA Red Heat Pumps provide supply temperatures between 50°C and 80°C and are suitable for a wide variety of applications.
GEA Red heat pumps are used successfully in multiple applications, such as:

• **Providing process heat (production processes)**
  GEA Red heat pumps are often used in combination with chillers to provide both heat and cold. Process heat is used in production processes such as food production, chemical process engineering or drying processes such as wood processing.

• **Hot water supply** for washing, showering, cleaning and underfloor heating etc.

• **District heating**
  District heating is already widespread in many countries. GEA Red Heat Pumps ensure constant flow temperatures for heating a wide range of buildings. Usage temperatures range between approx. +55°C and +80°C.
Six reasons to choose GEA Red heat pumps

GEA Red heat pumps are used across a wide range of industries and applications. As well as being economical and ecological, they are easy to use, require little maintenance and are very safe. Perfect for the growing demand for reliable, long-lasting and future-proof heat pumps.

1. Highest efficiency
   - Industry-leading compressor and controller technology
   - Use of ammonia with high volumetric efficiency
   - State-of-the-art heat exchangers in the most efficient, project-specific set-up
   - Optimized components for reduced pressure losses
   - Variable speed operation for maximum efficiency in all loads

2. Maximum reliability
   - Well proven, industry-tested components
   - Custom-build heat pump design
   - Sophisticated safety-chain against excess pressure
   - Modular components and smart pipe layout for minimized leakage risks
   - GEA on site service

3. Minimum footprint
   - GEA patented combined evaporator/liquid separator technology
   - Modular components with high integration level
   - Smart design based on successful GEA Blu chiller series
   - Plug-and-play unit in one piece: easy to install and operate

4. Flexibility
   - Reciprocating as well as screw compressor technology for wide application and capacity range
   - Stand-alone units for combined cooling & heating
   - Heat pumps suited for cascade applications – also available with ammonia cascade evaporator for a direct "add-on" set-up

5. Sustainability
   - Replace fossil-fueled heating systems
   - Future-proof refrigerant ammonia (R717) with zero global warming potential at highest availability
   - Smart GEA design ensures lowest ammonia and oil charges, reduced service expenses and energy input

6. GEA know-how
   - More than 100 years of experience with ammonia
   - Pioneer in reciprocating as well as screw compressor technology and development
   - Countless heat pump projects and reference projects since the mid-2000s
   - Commissioning and service support on site
Global customers rely on GEA Red heat pumps

More and more corporations seek to replace expensive and harmful fossil heating with modern heat pumps. Those who already did now reap the benefits of GEA heat pumps. Two examples.

Groundwater cooling & facility heating at an international airport
Two GEA RedAstrum units are installed at a major hub in Northern Europe. Previously, local authorities were forced to act against rising groundwater temperatures. When the airport operators defined the demand for heating, too, it became clear that the new GEA heat pump would do the perfect job. And now it does: the groundwater is used as the heat source which the GEA RedAstrum cools down from 15 to 5°C (coolant cycle). At the heat sink the two heat pumps transfer their heat emitted from the condensers, external subcoolers and oil coolers to a glycol heat carrier up to a temperature level of 72°C. Together the two GEA RedAstrum units provide 1.4 MW cooling and over 2 MW heating capacity.

GEA Red heat pumps firing up the food industry
The food industry traditionally uses boilers to cook or heat up the food which is subsequently transferred to a refrigerator to cool down. In 2016 a major producer of fresh prepared foods and chilled ready-meals approached GEA about a solution that could replace both, the boiler and the out-dated chiller. The customer’s objectives together with the analysis of cooling and heating capacity and temperature requirements quickly tipped the scale in favor of GEA Red heat pumps. The first unit was installed in 2017 providing chilled glycol at -6°C (470 kW cooling capacity) and simultaneously 760 kW heating capacity at a supply temperature of +67°C. The result: boilers were turned off leading to massive cost savings and reduction of CO₂ emissions. The success is also exemplified by several follow-up projects realized during the last three years.
GEA RedAstrum revised: the second generation of screw compressor heat pumps offers an optimized design, a new NH₃ cascade evaporator option and an extended model range. GEA RedAstrum now provides seven screw compressor types based on the successful GEA Grasso M and LT series in a specific high-pressure design execution.

GEA RedAstrum heats water or similar suited fluids to temperature levels between 55 and 80 °C and can be utilized in industrial processes or for local and district heating networks.

Thanks to its innovative compact design, GEA RedAstrum can also be installed where space is in short supply. Adapted from the highly successful GEA BluAstrum chillers series, the GEA RedAstrum range provides identical advantages: industry-leading efficiency and heat exchanger approach temperatures, low oil and ammonia charges, high reliability and an exceptionally small footprint.

Benefits at a glance:
• Heating capacity between approx. 600 kW and 2,900 kW
• Hot water temperature up to +80 °C
• Liquid heat source between −10 and +50 °C
• NH₃ cascade evaporator (option) for evaporation temperatures up to +45 °C
• Compact footprint, one-piece design, indoor installation

GEA RedAstrum – high performance with a small footprint

GEA’s RedAstrum is the standard screw compressor ammonia heat pump featuring high-end components and a sophisticated design. The benefits? Maximum efficiency, flexibility and reliability with an exceptionally small footprint.
1 High-efficiency screw compressor
   • High-pressure version – 52 bar
   • Proprietary 5/6 rotor profile – industry-leading COP
   • Specific heat pump design
   • Pressure-activated suction check valve for smooth operation

2 Sophisticated GEA Omni control
   • User-friendly industrial PC
   • 15.6” high-definition touch screen
   • All common communication protocols
   • Remote access via web browser
   • Maintenance logs and full data history

3 Stepless capacity control
   • Capacity control via frequency converter and capacity slide for infinitely variable capacity
   • Smart sequence control for several units

4 Optimized hot water circuit
   • Optimized degree of heat transfer and minimal temperature approach and pressure loss
   • Individual and optimal set-up of condenser, oil cooler and optional subcooler
   • Completely pre-piped, only one inlet/one outlet connection required
   • All common fluids supported

5 Combined evaporator/liquid separator unit
   • Fully welded vessel suitable for all common fluids
   • New option NH₃ cascade heat exchanger for efficient “add-on” implementation to an existing refrigeration plant
   • Minimized ammonia charge
   • Electronic Condensate Drain (ECD) system for optimized capacity adjustment

Highest plant safety
   • Multi-stage safety chain against excess pressure
   • Double safety valve with shuttle valve and PED approval
   • Reduced welding seams and leakage risks
   • Insulated hot and optionally cold side, touch protection and minimized heat losses

Minimized service and maintenance
   • Continuous vibration surveillance of the bearings
   • Easy access to worn-out parts for servicing
GEA RedGenium is a compact industrial heat pump for small to medium heat loads. It includes high-end components and modules which are project-specifically configured offering the best concept for your individual requirements.

GEA RedGenium transfers heat to a liquid heat carrier providing temperatures between 50 and 70°C for any heat consumer in industrial processes or for heating networks.

The heart of the GEA RedGenium is the extremely reliable and efficient GEA Grasso V HP reciprocating compressor. Each at 39 bar design pressure, a compact range of three compressor models are available within the GEA RedGenium scope.

Combined with efficient heat exchangers in the well-proven concept, they are key to providing the extra performance that RedGenium stands for.

Benefits at a glance

- Heating capacity between approx. 500 kW and 1,100 kW
- Hot water temperature up to +70°C
- Liquid heat source between approx. +10 and +40°C
- NH3 cascade evaporator (option) for evaporation temperatures up to +34°C
- Compact footprint, one-piece design, indoor installation
1 High-pressure reciprocating compressor
- High-pressure version – 39 bar
- GEA reciprocating technology for highest volumetric efficiency
- Simplified design without oil separator and cylinder head cooling
- Motor valve for safe shut-off on the suction side at standstill
- External oil pump for safe oil supply in all operating states
- Integrated air-cooled oil cooler

2 Sophisticated GEA Omni control
- User-friendly industrial PC
- 15.6” high-definition touch screen
- All common communication protocols
- Remote access via web browser
- Maintenance logs and full data history

3 Stepless capacity control
- Speed control via a frequency converter and cylinder switch-off
- Continuous capacity adjustment between 500 and 1500 rpm

4 Optimized hot water circuit
- Optimized degree of heat transfer and minimal temperature approach and pressure loss
- Individual and optimal set-up of desuperheater, condenser and optional subcooler
- Completely pre-piped, only one inlet/one outlet connection required
- All common fluids supported

Simple service and minimal maintenance cost
- Maintenance monitor (via GEA Omni)
- Easy access to worn-out parts for servicing

5 Combined evaporator/liquid separator unit
- Fully welded vessel suitable for all common fluids
- New option NH₃ cascade heat exchanger for efficient “add-on” implementation to an existing refrigeration plant
- Minimized ammonia charge
- Electronic Condensate Drain (ECD) system for optimized capacity adjustment

Highest plant safety
- Multi-stage safety chain against excess pressure
- Double safety valve with shuttle valve and PED approval
- Reduced welding seams and leakage risks
- Insulated hot and optionally cold side, touch protection and minimized heat losses
**TECHNICAL DATA – EVAPORATOR CHARGED WITH LIQUID COOLANT**

<table>
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<tr>
<th>Series</th>
<th>Type</th>
<th>Secondary refrigerant temperature (^{1}) (°C)</th>
<th>Heat carrier (^{2}) (°C)</th>
<th>Heating capacity (^{1}) (kW)</th>
<th>COP (^{2})</th>
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1) GEA RedAstrum speed 3,600 rpm (RM, RN, RR types limited to 3,300 rpm), GEA RedGenium speed 2,500 rpm
2) COP (coefficient of performance) = heating capacity/power consumption at net, GEA RedAstrum types EE/GG/HH/LL/MM/NN/RR COP combined = cooling and heating capacity/power consumption at net
3) Dimensions and weights are based on standard exemplary applications. Values can differ depending on the specific operating conditions! Motor sizes above 450 kW capacity require an extra panel for the frequency inverter (L x W x H 2,000 x 600 x 2,200 mm).
### TECHNICAL DATA – EVAPORATOR AS AMMONIA CASCADE HEAT EXCHANGER

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"Engineering for a better world" is the driving and energizing principle connecting GEA's workforce. As one of the largest systems suppliers, GEA makes an important contribution to a sustainable future with its solutions and services, particularly in the food, beverage and pharmaceutical sectors. Across the globe, GEA's plants, processes and components contribute significantly to the reduction of CO₂ emissions, plastic use as well as food waste in production.

GEA is listed on the German MDAX and the STOXX® Europe 600 Index and also included in the DAX 50 ESG and MSCI Global Sustainability indexes.

We live our values.
Excellence • Passion • Integrity • Responsibility • GEA-versity