Engineering for a better world.

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GEA RED HEAT PUMPS.

High-performance low-charge ammonia industrial heat pumps

GOOD FOR YOUR SAVINGS, GOOD FOR THE ENVIRONMENT.

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, the need for environmental compatibility and independence from fossil energy supplies.

GEA RED HEAT PUMPS: ONE SOLUTION, TWICE THE EFFICIENCY.

GEA Red heat pumps provide supply temperatures of up to +95 °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.

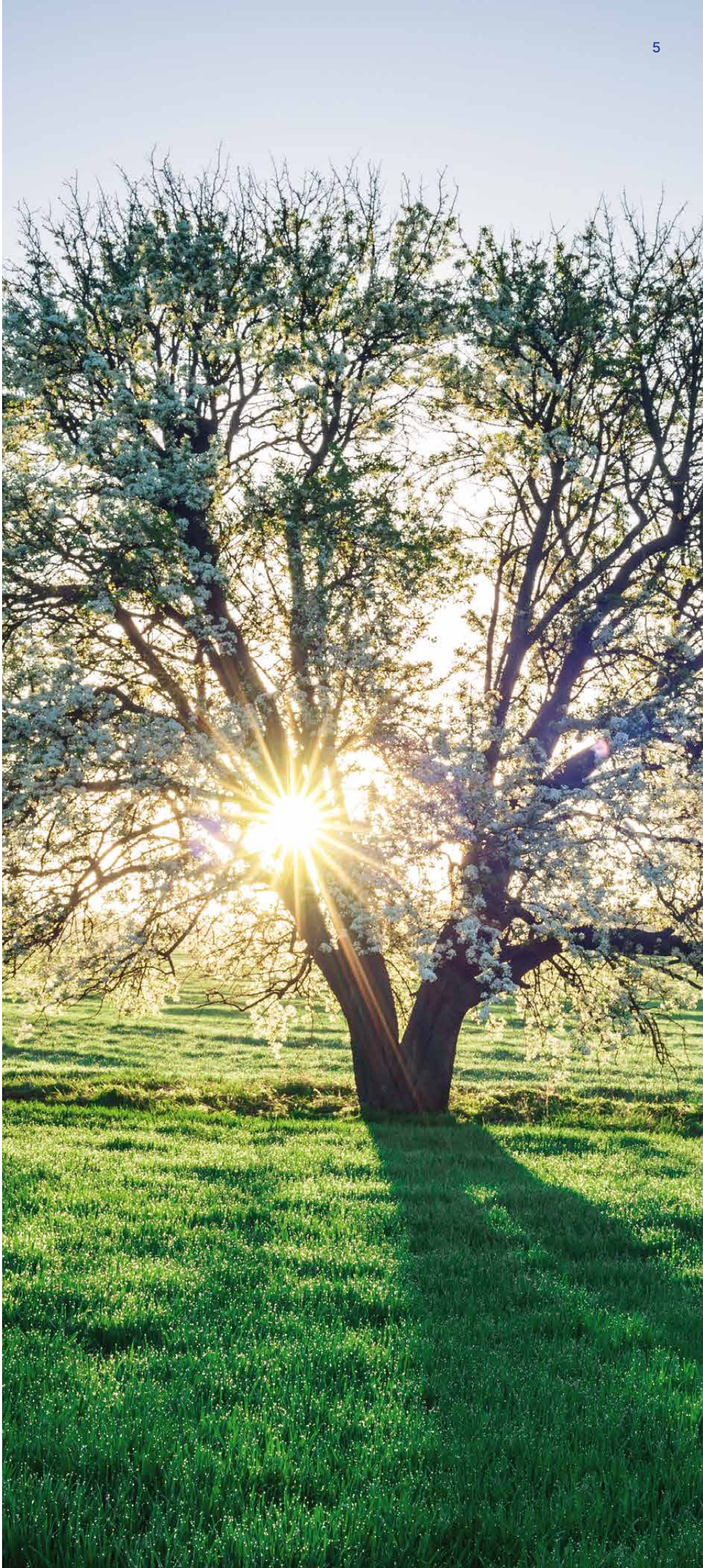
Significant efficiency increase (up to 20 % or more)
GEA Red heat pumps can now be configured with an NH_3 cascade evaporator to “add-on” to an existing chiller system. This makes an extra heat exchanger and liquid cycle redundant, hence reducing the equipment complexity while increasing the efficiency 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.

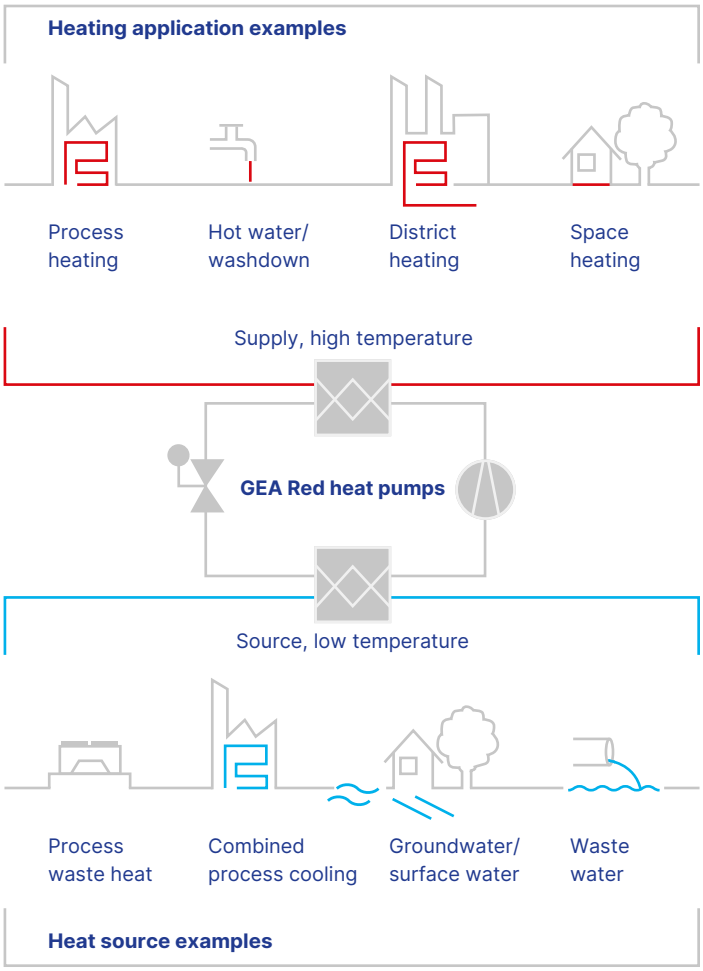
- **F-Gas regulation:** Key to the European regulation adopted in 2014 is Global Warming Potential (GWP). This represents an internationally accepted environmental benchmark for the use of refrigerants. Based on their CO_2 equivalent, the use of various refrigerants will be severely restricted around 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.

NH_3
natural refrigerant

F-Gas
2015



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 communities. And there are always new areas of application for which ammonia 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 low temperature level (heat source) to a consumer at a high temperature level (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 generating heat at higher temperatures and therefore are engineered at higher design pressures. The heat from the condensation process is transferred to a heat carrier liquid supplying the consumer. Depending on the application and conditions, a smart, high-efficient heat exchanger set charges the heat carrier with additional heating capacity from external de-superheating, subcooling and oil cooling of the process.

GEA Red heat pumps provide supply temperatures between +50 °C and +95 °C and are suitable for a wide variety of applications.

DECARBONIZE YOUR HEATING SUPPLY.

Heat pumps are an integral component to decarbonize thermal energy supply by replacing fossil-fueled heating devices such as boilers. GEA Red heat pumps are used successfully in multiple applications.

Process heat
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, beverage and dairy production, for chemical process engineering or drying, for example in the wood processing.

Hot water supply
Hot water for washing and showering, cleaning, washdown, and underfloor heating for example.

District heating
District heating grids are widespread in many countries. GEA Red heat pumps ensure constant flow temperatures for heating a wide range of buildings, facilities and community heating networks.

SEVEN REASONS TO CHOOSE GEA RED HEAT PUMPS.

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

1. Best-in-class efficiency
- Industry-leading compressor and GEA Omni 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. Sustainability and decarbonization
- Replacement and independence of fossil-fueled heating systems
- Future-proof refrigerant ammonia (R717) with zero global warming potential at highest availability
- Reduced energy input and resource consumption thanks to smart GEA design ensuring low ammonia and oil charges, reduced service expenses and energy input

3. Minimized total cost of ownership
- Reduced energy consumption and costs through high efficiencies
- Smart and robust GEA design for low service and maintenance expenses
- Minimum usage and costs of operating utilities like ammonia and oil

4. Compact design
- GEA patented combined evaporator/liquid separator technology
- Modular components with high integration level
- Smart design based on successful GEA Blu chiller series

5. Maximum reliability
- Well proven, industry-tested components
- Project-individual heat pump configuration and component calculation
- Sophisticated safety-chain against excess pressure
- Modular components and smart pipe layout for minimized leakage risks
- Plug-and-play design
- GEA on site service

6. Flexibility
- Reciprocating as well as screw compressor technology for wide application and capacity range
- Stand-alone units for combined cooling & heating
- Suited for a wide range of heat sources and temperatures
- Suited for cascade applications and “add-on” set-ups (Red heat pump directly charged with ammonia from the refrigeration plant)

7. 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 references for decades
- 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.

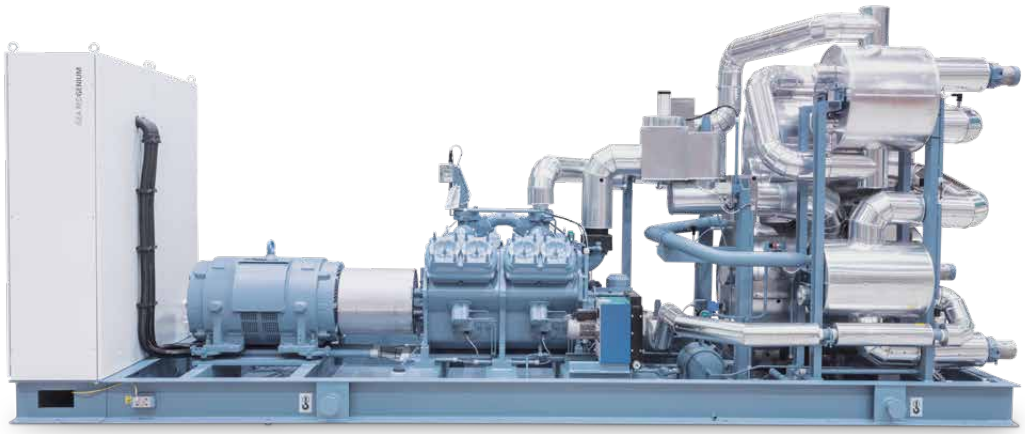
Groundwater cooling & facility heating at an international airport

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 CO_2 emissions. The success is also exemplified by several follow-up projects realized during the last three years.

GEA RedGenium – The most efficient solution for temperatures up to +95 °C.



Industry-leading efficiency, best-in-class reciprocating compressors and the lowest refrigerant charges characterize the RedGenium series. The first choice when it comes to maximum efficiency.

GEA RedGenium is an efficient industrial heat pump for a wide range of 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 °C and +95 °C for any heat consumer in industrial processes or for heating networks.

The heart of each GEA RedGenium is the extremely reliable and efficient GEA Grasso V HP reciprocating compressor. Three different compressor lines are now available within the GEA RedGenium scope.

- GEA Grasso 5 HP at 50 bar(g) design pressure for small heating capacities and temperatures up to +85 °C
- GEA Grasso V HP at 38 bar(g) design pressure for medium heating capacities and temperatures up to +70 °C
- GEA Grasso V XHP at 63 bar(g) design pressure for medium heating capacities and temperatures up to +95 °C

Combined with efficient heat exchangers in the well-proven concept and the state-of-the-art GEA Omni controller, they are key to providing the extra performance that GEA RedGenium stands for.

Highlights at a glance

- Heating capacity between approx. 200 kW and 3,000 kW
- Hot water temperature up to +95 °C
- Liquid heat sources between approx. –10 °C and +60 °C
- NH_3 cascade evaporator (option) for refrigeration plant condensing temperatures up to +60 °C
- Compact footprint, one-piece design, indoor installation

1. High-pressure reciprocating compressor
- GEA reciprocating technology for highest efficiency
- Three different high-pressure lines available – 38 to 63 bar(g)
- 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

2. Sophisticated GEA Omni control panel
- Intuitive, user-friendly industrial PC
- Advanced control and protection of equipment
- 15.6” high-definition, multi-touch screen
- Supports common communication protocols
- Remote access via OmniLink using VNC technology
- Maintenance logs and full data history
- Deep-dive data analysis via OmniHistorian

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

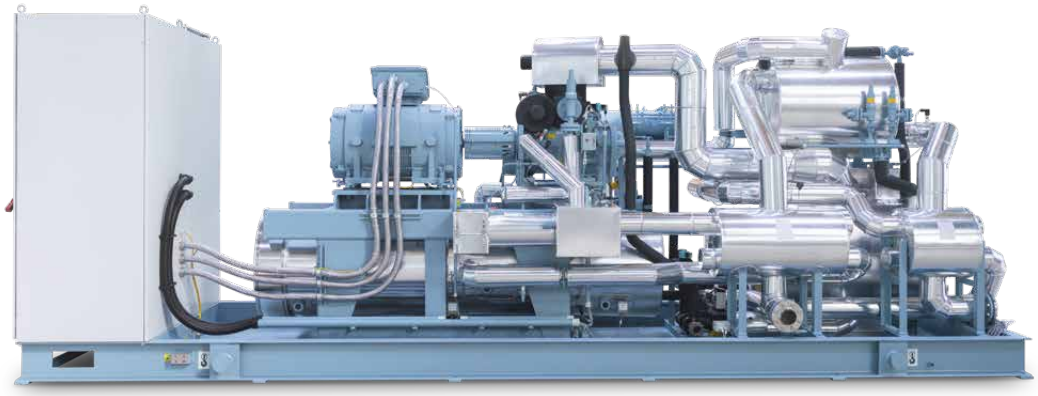
4. Optimized hot water circuit
- Optimized degree of heat transfer and minimal temperature approach and pressure loss
- Individual and optimal set-up of desuperheater, condenser and optional subcooler
- Completely pre-piped, only one inlet/one outlet connection required
- All common fluids supported

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 NH_3 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

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.

GEA RedAstrum revised: the second generation of screw compressor heat pumps offers an optimized design, a new NH_3 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 °C and +85 °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.

Highlights at a glance:

- Heating capacity between approx. 600 kW and 2,900 kW
- Hot water temperature up to +85 °C
- Liquid heat source between –10 °C and +50 °C
- NH_3 cascade evaporator (option) for refrigeration plant condensing temperatures up to +50 °C
- Compact footprint, one-piece design, indoor installation

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 panel
- Intuitive, user-friendly industrial PC
- Advanced control and protection of equipment
- 15.6” high-definition, multi-touch screen
- Supports common communication protocols
- Remote access via OmniLink using VNC technology
- Maintenance logs and full data history
- Deep-dive data analysis via OmniHistorian

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 NH_3 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

Technical data – evaporator charged with liquid coolant

Series	Type	Secondary refrigerant temperature (°C) in/out	Heat carrier (°C) in/out	Heating capacity (kW)[1]	COP[2] line	Dimensions[3] (mm) L	W	H	Weight (kg) incl. motor
GEA RedAstrum (W)	EC	40/35	40/70 70/80	745 650	5.36 3.64	6,000	1,600	2,250	7,200 8,500
	ED	40/35	40/70 70/80	875 780	5.64 3.70	7,000	1,800	2,350	7,500 8,700
	HE	40/35	40/70 70/80	1,095 980	5.51 3.71	7,000	1,800	2,350	7,700 9,100
	HG	40/35	40/70 70/80	1,295 1,155	5.79 3.84	7,000	1,800	2,350	8,200 9,500
	MH	40/35	40/70 70/80	1,690 1,510	5.72 3.89	7,300	1,800	2,350	8,900 11,200
	ML	40/35	40/70 70/80	1,935 1,730	5.95 3.94	7,600	1,800	2,350	9,900 11,900
	RM	40/35	40/70 70/80	2,365 2,170	5.89 4.10	7,900	2,000	2,450	11,200 12,400
	RN	40/35	40/70 70/80	2,900 2,645	5.83 4.12	7,900	2,000	2,450	12,500 13,700
	EE	12/6	40/65	510	5.47	6,000	1,600	2,250	6,800
	GG	12/6	40/65	590	5.73	6,000	1,600	2,250	7,200
	HH	12/6	40/65	760	5.72	6,000	1,600	2,250	7,500
	LL	12/6	40/65	870	5.95	6,000	1,600	2,350	7,700
	MM	12/6	40/65	1,140	5.84	7,300	1,800	2,350	8,500
	NN	12/6	40/65	1,405	5.86	7,300	1,800	2,350	9,700
	RR	12/6	40/65	1,580	6.10	7,900	2,000	2,450	11,000
GEA RedGenium (W)	35	27/22 37/32	50/70 70/80	190 240	4.84 4.70	4,500	1,600	2,250	5,000 5,300
	45	27/22 37/32	50/70 70/80	255 325	4.92 4.76	4,500	1,600	2,250	5,100 5,450
	55	27/22 37/32	50/70 70/80	320 400	4.94 4.82	4,700	1,600	2,250	5,300 5,700
	65	27/22 37/32	50/70 70/80	380 480	4.97 4.79	4,700	1,600	2,250	5,400 5,850
	300	27/22	50/70	555	5.13	4,900	1,600	2,200	5,600
	450	27/22	50/70	835	5.12	5,300	1,600	2,300	6,600
	600	27/22	50/70	1,120	5.15	5,700	1,600	2,400	7,300
	350	27/22 37/32 47/42	50/70 70/90 70/95	730 905 1,195	5.06 4.33 5.05	5,900	1,600	2,250	6,900 7,500 7,700
	550	27/22 37/32 47/42	50/70 70/90 70/95	1,090 1,350 1,775	5.09 4.33 5.07	6,100	1,800	2,450	7,200 7,850 8,100
	750	27/22 37/32 47/42	50/70 70/90 70/95	1,440 1,795 2,385	5.04 4.34 5.10	6,900	1,800	2,450	7,900 8,900 9,500
	950	27/22 37/32 47/42	50/70 70/90 70/95	1,800 2,200 2,995	5.08 4.27 5.17	7,200	1,800	2,450	8,900 10,200 11,000

1) GEA RedAstrum speed 3,600 rpm (RM, RN, RR types limited to 3,300 rpm), GEA RedGenium speed 1,500 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

Series	Type	Condensation heat source[1] (°C)	Heat carrier (°C)	Heating capacity (kW)[2]	COP[3]	Dimensions[4] (mm)			Weight (kg)
			in/out		line	L	W	H	incl. motor
GEA RedAstrum (K)	EC	35.0 35.0	40/70 70/80	705 620	5.02 3.47	6,000	1,600	2,250	7,500 9,100
	ED	35.0 35.0	40/70 70/80	830 735	5.25 3.55	7,000	1,800	2,350	8,400 9,300
	HE	35.0 35.0	40/70 70/80	1,045 935	5.22 3.49	7,000	1,800	2,350	8,900 9,500
	HG	35.0 35.0	40/70 70/80	1,225 1,095	5.54 3.69	7,000	1,800	2,350	9,600 10,300
	MH	35.0 35.0	40/70 70/80	1,620 1,450	5.40 3.70	7,000	1,800	2,350	10,200 12,400
	ML	35.0 35.0	40/70 70/80	1,850 1,650	5.57 3.78	7,300	1,800	2,350	11,100 13,000
	RM	35.0 35.0	40/70 70/80	2,255 2,065	5.54 3.88	7,900	2,000	2,450	12,200 14,300
	RN	35.0 35.0	40/70 70/80	2,705 2,520	5,56 3,89	7,900	2,000	2,450	13,200 15,300
GEA RedGenium (K)	35	30.0 35.0	50/70 70780	235 250	5.67 4.84	4,500	1,600	2,250	5,200 5,500
	45	30.0 35.0	50/70 70780	315 335	5.78 4.89	4,500	1,600	2,250	5,300 5,650
	55	30.0 35.0	50/70 70780	395 420	5.81 4.95	4,700	1,600	2,250	5,500 5,900
	65	30.0 35.0	50/70 70780	465 495	5.70 4.89	4,700	1,600	2,250	5,650 6,100
	300	30.0	50/70	665	5.90	5,000	1,600	2,200	6,500
	450	30.0	50/70	1,000	5.96	5,300	1,600	2,300	8,000
	600	30.0	50/70	1,330	5.93	5,700	1,600	2,400	9,800
	350	30.0 30.0 48.0	50/70 70/90 70/95	875 805 1,345	5.84 3.99 5.60	6,100	1,600	2,250	7,200 7,800 8,000
	550	30.0 30.0 48.0	50/70 70/90 70/95	1,300 1,200 2,000	5.87 4.01 5.62	6,300	1,800	2,450	7,500 8,150 8,400
	750	30.0 30.0 48.0	50/70 70/90 70/95	1,740 1,585 2,635	5.89 4.03 5.56	7,100	1,800	2,450	8,250 9,400 10,500
	950	30.0 30.0 48.0	50/70 70/90 70/95	2,170 1,975 3,230	6.02 4.00 5.50	7,500	1,800	2,450	9,500 11,000 12,000

1) Condensing temperature of an existing refrigeration plant (relates to the Red heat pump evaporation temperature levels of approx. 2 Kelvin below the chiller condensing).
2) GEA RedAstrum speed 3,600 rpm (RM, RN types limited to 3,300 rpm), GEA RedGenium speed 1,500 rpm.
3) COP (coefficient of performance) = heating capacity / power consumption at net
4) 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).

Engineering for a better world.

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