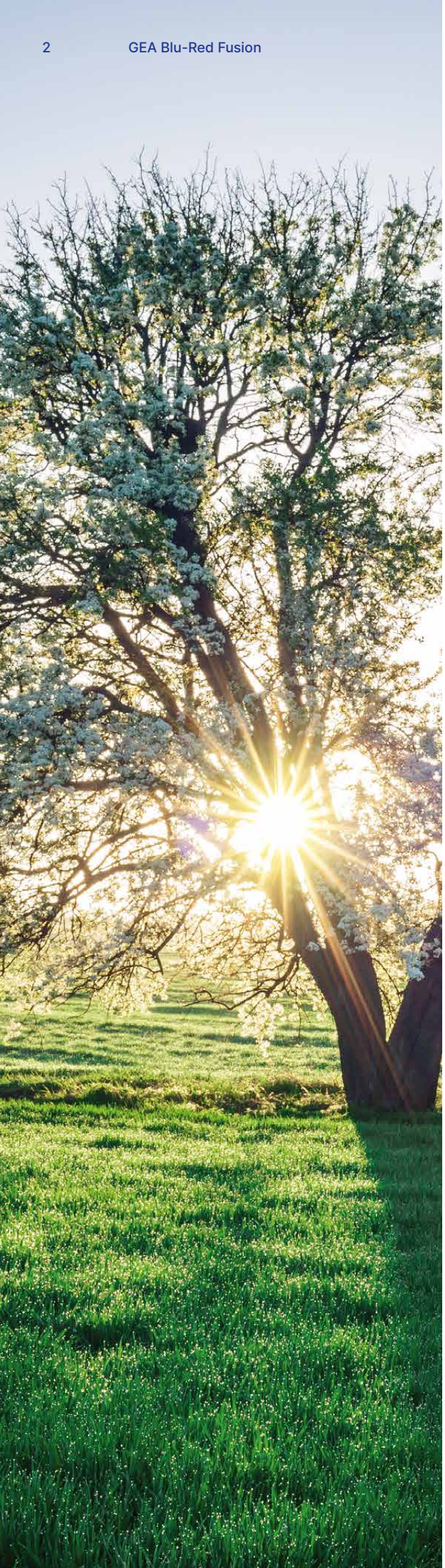
Engineering for a better world.

GEA.com

GEA BLU-RED FUSION.

The best of both – combined cooling and heating with NH_3



SAVES TOTAL COSTS, SAVES GREENHOUSE GASES.

The global need for successive decarbonization also requires the industrial energy supply to become more sustainable. Process and district heating demands in particular will have to be fulfilled without using fossil fuels in the near future.

The GEA Blu-Red Fusion is the perfect solution to meet those sustainability expectations. Of course, not only that: The chiller-heat pump combination offers flexible and efficient cooling and heating with one compact product that reduces the total costs of ownership compared with conventional systems. Based on the successfully proven GEA Blu chillers and Red heat pumps, the GEA Blu-Red Fusion ensures reliability and longevity. A future-proof investment, especially in the face of ever-stricter guidelines on energy consumption and environmental compatibility.

GEA Blu-Red Fusion: combined cooling and heating with ammonia for zero global warming potential.

NH_3
natural refrigerant

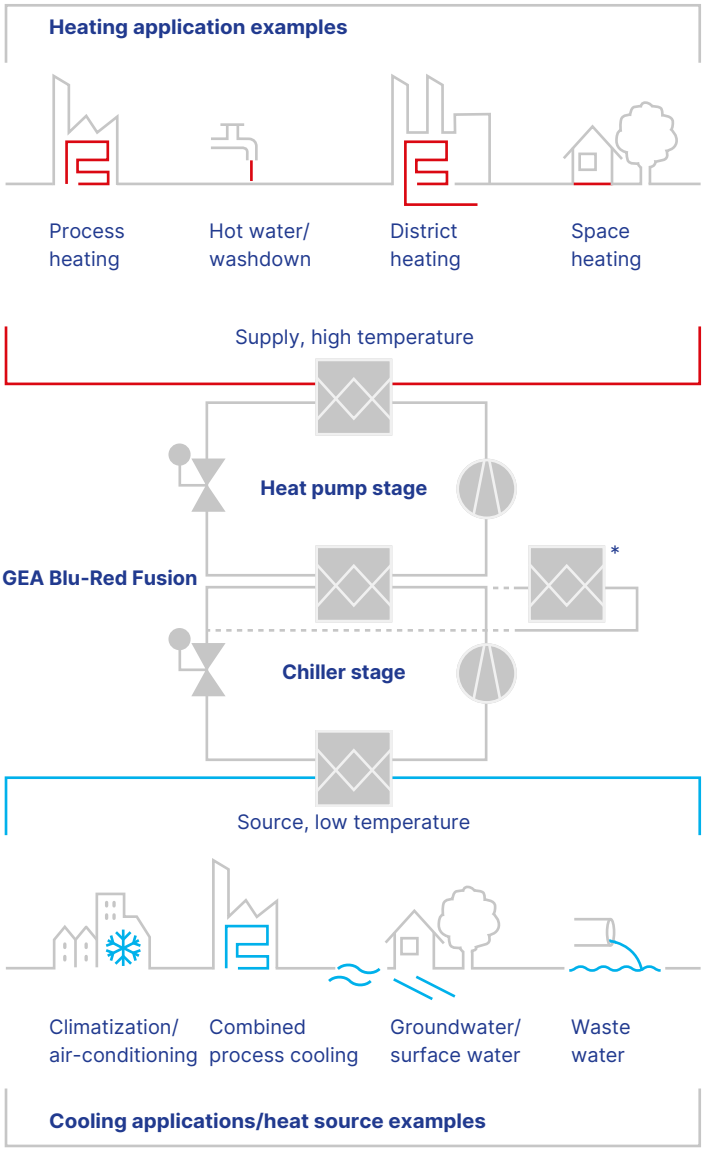
F-Gas
2015

Offering zero GWP (Global Warming Potential) and the highest volumetric efficiencies, the natural refrigerant ammonia complements environmentally friendly and economic properties.

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.

EFFICIENT AND FLEXIBLE SOLUTION FOR A RANGE OF APPLICATIONS.



*) Optional configuration: Reduced heating demands or cooling-only operation with chiller heat rejection via external condensing device (external condenser not part of the Fusion scope of supply)

Combined cooling and heating in a nutshell

A heat pump process follows the same thermo-dynamic 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“.

The GEA Blu-Red Fusion operates the process in two-stages, a low-pressure “chiller” stage and a high-pressure “heat pump” stage combined with an efficient “cascade” intermediate heat exchanger which minimizes the electric energy input.

The low-stage part is designed as a GEA Blu chiller (reciprocating compressor based GEA BluGenium or screw compressor based GEA BluAstrum) and is joined with a GEA Red heat pump which forms the high-stage module.

Powerful, efficient and low-maintenance, the GEA Blu-Red Fusion provides the perfect solutions for all industries and users with heating demands at low source temperatures or combined cooling and heating requirements.

1. Process cooling

2. Air conditioning/climatization

3. Process heating

4. District heating

Flexible operating modes for scores of applications
Whether efficient heating at low source temperatures, simultaneous cooling and heating, or refrigeration while recovering heat whenever necessary at high supply temperatures – the GEA Blu-Red Fusion does it all:

- Simultaneous cooling and heating in full or part-load capacity
- Simultaneous cooling and "reduced" heating (heat pump stage can be economically designed for lower heating capacity requirements)[1]
- Cooling only operation (heat pump stage off)[1]

Heat source options / refrigeration applications – customers rely on GEA technologies for decades
GEA is a pioneer in the refrigeration business, and the GEA Blu chiller technology has been successfully proven ever since 2010. Forming the low-stage module of the GEA Blu-Red Fusion, it can serve any (industrial) refrigeration process or use any available heat source:

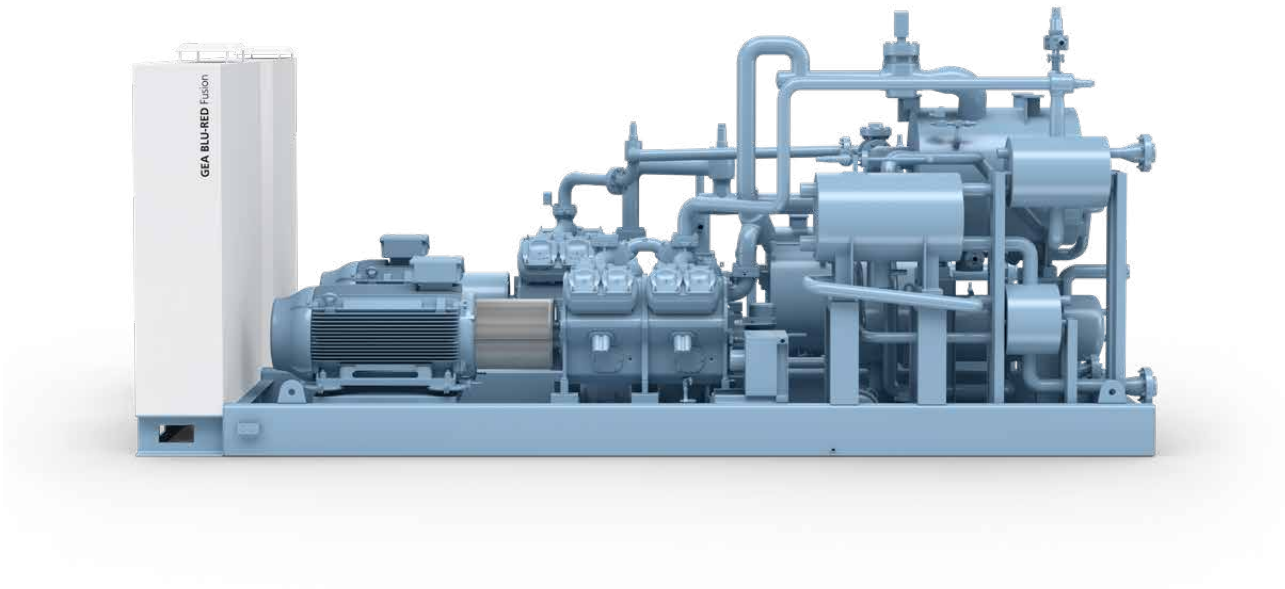
- Process cooling wherever refrigeration capacity is needed: the whole cold chain in the food, dairy and beverage industry from production to storage and distribution, pharmaceutical and chemical industries, or leisure and sports facilities – you name it!
- Air conditioning/climatization for any types of facilities, or server cooling for example.
- Groundwater, surface water, wastewater or low-temperature waste heat are possible heat sources in case the application does not include a refrigeration process.

Well-proven GEA heat pumps for all common industrial heating applications
The GEA Blu-Red Fusion's high-stage module is designed as a GEA Red series heat pump. Benefit from long lasting experience in numerous areas:

- Providing process heat used in various production processes such as food production, chemical process engineering or hot drying treatments.
- Hot water supply for washing, cleaning, facility and ground/floor heating.
- District heating networks which need to become independent from fossil fuels and therefore are becoming more and more relevant for heat pump technologies.

1) Requires surplus heat from the low-stage chiller operation to be rejected by a secondary, external condensation facility (not part of the GEA Blu-Red Fusion cope of supply).

GEA Blu-Red Fusion – reciprocating compressors for best efficiencies and temperatures up to +95 °C.



The GEA Blu-Red Fusion series based on the GEA BluGenium low-stage part and GEA RedGenium high-stage part is characterized by efficient piston compressors and the lowest refrigerant charges. The first choice when it comes to maximum efficiency.

The combination of GEA BluGenium low-stage with GEA RedGenium heat pump modules ensures optimum efficiency for a wide capacity and temperature range. Thanks to a brand-new reciprocating series, heat sink temperatures up to +95 °C can be provided making the piston-based Blu-Red Fusion well suited for a lot of applications requiring high supply temperatures.

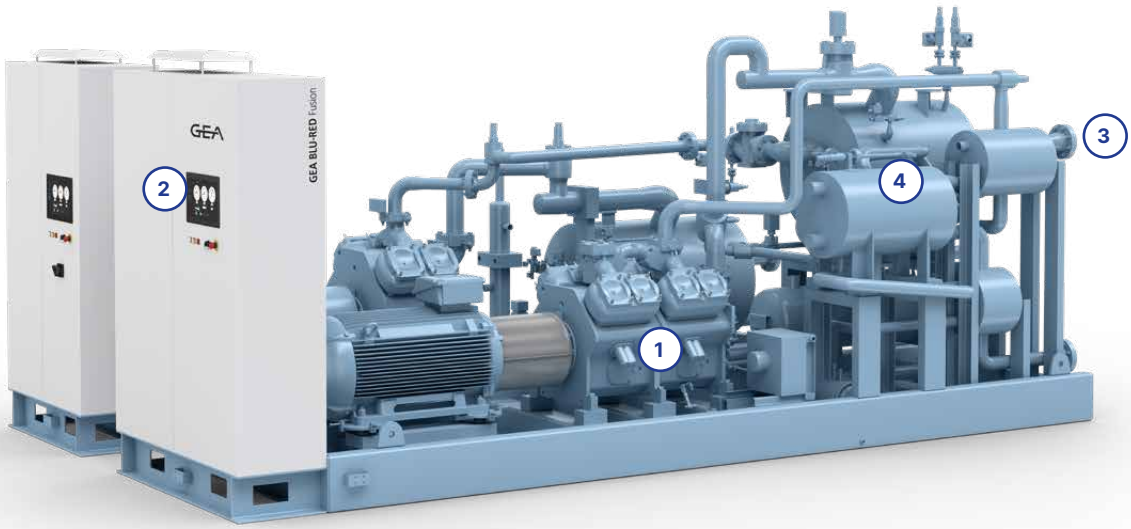
The GEA Blu-Red Fusion features the state-of-the-art heat exchanger concept of the GEA Blu and Red products including the GEA-patented evaporator/liquid receiver combination and the efficiency-optimizing set-up at the hot side.

Low-stage chiller and high-stage heat pump are combined with a “cascade” heat exchanger: evaporator/ liquid separator for the heat pump stage and condenser for the chiller stage in one compact vessel that minimizes the temperature difference of condensing and evaporation and thus the driving power of the compressors.

The heart of the GEA Blu-Red Fusion based on reciprocating compressors is the extremely efficient GEA Grasso V series in the low-temperature stage. The high-temperature stage can now be equipped with three different, high-efficient compressor lines. Depending on the temperature and capacity demand, the Blu-Red Fusion is equipped either with the GEA Grasso 5 HP, GEA Grasso V HP or the new GEA Grasso V XHP series.

Performance at a glance

- Heating capacity between approx. 300 and 2,675 kW
- Hot water supply temperature up to +95 °C
- Refrigeration capacity between approx. 225 and 2,015 kW
- Secondary refrigerant outlet temperatures between -15 and +15 °C



1. Best-in-class reciprocating compressors
- GEA reciprocating technology for highest volumetric efficiency
- Three different high-pressure comp-ressor lines available suited for a wide application range
- Simplified design without oil separator and cylinder head cooling
- Specific high-stage compressor design, functions and components for maximum reliability

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

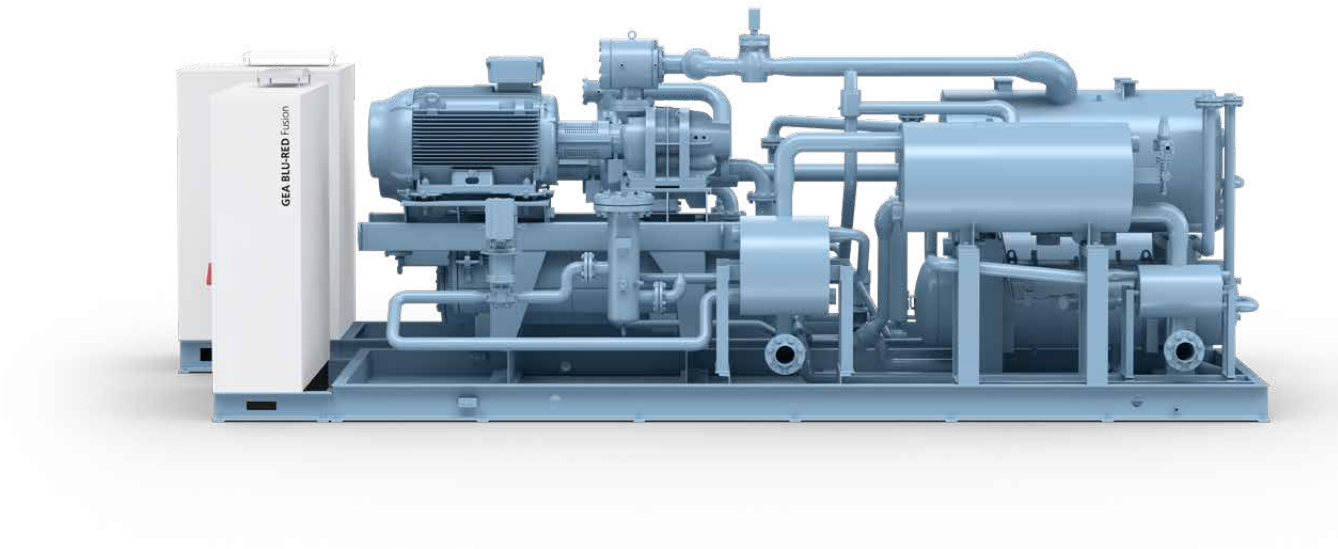
4. Industry-leading heat exchanger
- Fully welded vessels suitable for all common fluids
- GEA-patented combined evaporator /liquid separator units
- Combined cascade heat exchanger for minimal approach temperatures and maximum efficiency
- Minimized ammonia charge
- Electronic Condensate Drain (ECD) system for optimized capacity adjustment at each stage

Maximum flexibility
- Combined cooling and heating in full-load and part-loads
- Cooling mode only, heat pump stage switched off (option)
- Full-load cooling with simultaneous part-load heating (option)
- Combination of reciprocating compressor based low-stage with screw technology based high-stage possible and vice versa

Highest plant safety
- Multi-stage safety chain against excess pressure for each stage
- Double safety valve with shuttle valve and PED approval in each stage
- Reduced welding seams and leakage risks
- Insulation (option) for minimal thermal losses and touch protection

Minimized service and maintenance
- Maintenance monitor via GEA Omni
- Easy access to wear-out parts for servicing

GEA Blu-Red Fusion – screw compressors for higher capacities and temperatures up to +85 °C.



The Blu-Red Fusion series based on the GEA BluAstrum low-stage part and GEA RedAstrum high-stage part includes high-end screw compressors. The most reliable solution for highest capacities and supply temperatures.

The combination of GEA BluAstrum low-stage with GEA RedAstrum heat pump modules is suited for high capacity and high heat carrier temperature demands. The low-stage GEA BluAstrum can be replaced with a reciprocating compressor based GEA BluGenium for low to medium capacities and to further improve the efficiency.

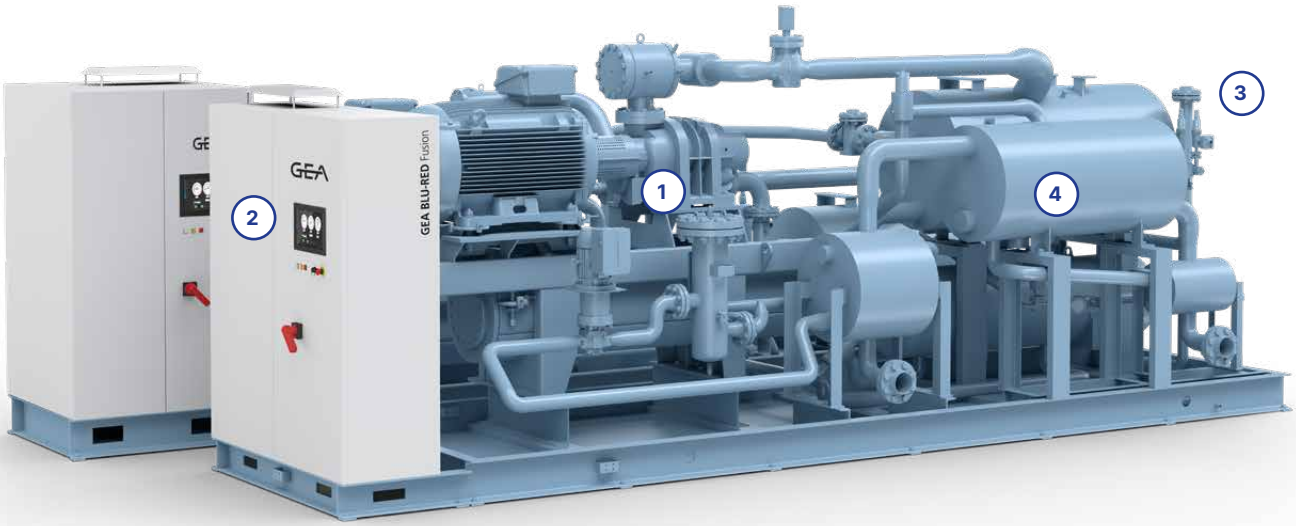
The GEA Blu-Red Fusion features the state-of-the-art heat exchanger concept of the GEA Blu and Red products including the GEA-patented evaporator/liquid receiver combination and the efficiency-optimizing set-up at the hot side.

Low-stage chiller and high-stage heat pump are combined with a “cascade” heat exchanger: evaporator / liquid separator for the heat pump stage and condenser for the chiller stage in one compact vessel that minimizes the temperature difference of condensing and evaporation and thus the driving power of the compressors.

The heart of the GEA Blu-Red Fusion based on screw compressors is the successful, robust GEA Grasso M and LT series. Available are the compressor types D to R at 28 bar design pressure (low-stage) and E to R (frame size) at 52 bar respectively (high-stage).

Performance at a glance

- Heating capacity between approx. 570 and 2,425 kW
- Hot water supply temperature up to +85 °C
- Refrigeration capacity between approx. 395 and 1,725 kW
- Secondary refrigerant outlet temperatures between –15 and +15 °C



1 High-efficiency screw compressors
- Proprietary 5/6 rotor profile – industry-leading COP
- Specific heat pump design, 52 bar design pressure of the high-stage compressor
- Pressure-activated, springless suction check valve for smooth operation and increased efficiency
- Stepless capacity control via speed regulation and additional capacity slide for infinitely variable capacity

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

4. Industry-leading heat exchanger
- Fully welded vessels suitable for all common fluids
- GEA-patented combined evaporator / liquid separator units
- Combined cascade heat exchanger for minimal approach temperatures and maximum efficiency
- Minimized ammonia charge
- Electronic Condensate Drain (ECD) system for optimized capacity adjustment at each stage

Maximum flexibility
- Combined cooling and heating in full-load and part-loads
- Cooling mode only, heat pump stage switched off (option)
- Full-load cooling with simultaneous part-load heating (option)
- Combination of reciprocating compressor based low-stage with screw technology-based high-stage possible and vice versa

Highest plant safety
- Multi-stage safety chain against excess pressure for each stage
- Double safety valve with shuttle valve and PED approval in each stage
- Reduced welding seams and leakage risks
- Insulation (option) for minimal thermal losses and touch protection

Minimized service and maintenance
- Continuous vibration surveillance of the high-stage compressor bearings
- Easy access to wear-out parts for servicing

SEVEN REASONS TO CHOOSE THE GEA BLU-RED FUSION.

GEA Blu chiller and Red heat pumps are used across a wide range of industries and applications. The GEA Blu-Red Fusion combines the best of both – efficient cooling and heating with one economical and ecological product which is easy to use, reliable and requires little maintenance. A future proof-installation.

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
- Efficiency optimized intermediate temperature/pressure level
- 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 costs through highest efficiency
- Reduced energy cost thanks to flexible operation and part-load options
- Minimized maintenance expenses
- Economic heat pump stage design in case of steady reduced heating capacity demands

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 modules, combination of successful GEA Blu chillers and GEA Red heat pumps
- Sophisticated safety-chain against excess pressure
- Modular components and smart pipe layout for minimized leakage risks
- GEA on site service possible

6. Flexibility
- Serves all common application where combined cooling and heating is required
- Serves all common applications where heating at low heat source temperatures is required
- Combined cooling and heating in full and part load
- Cooling mode only while heat pump stage is switched off
- Full-load cooling and simultaneous part-load heating

7. GEA know-how
- More than 100 years of experience with ammonia
- Pioneer in reciprocating as well as screw compressor technology and development
- Decades of industrial chiller experience, many hundreds of successful GEA Blu chiller installations since 2010
- Countless heat pump projects and reference projects since the mid-2000s, GEA Red heat pumps successfully on the market for several years
- Commissioning and service support on site (optionally)

Technical data

Series	Type[1]	Secondary refrigerant (°C)	Heat carrier (°C)	Cooling capacity (kW)[2]	Heating capacity (kW)[2]	COP combined[3]	Dimensions[4] (mm)			Weight[4] (kg)
		in/out	in/out			line	L	W	H	incl. motor
GEA Blu-Red Fusion	BG300-RG35	12 / 6	40 / 70	205	275	6.40	4,600	3,500	2,350	7,800
	BG300-RG45	12 / 6	40 / 70	260	350	6.35	4,700	3,500	2,350	7,900
	BG450-RG55	12 / 6	40 / 70	335	450	6.38	4,800	3,750	2,350	8,200
	BG450-RG65	12 / 6	40 / 70	430	575	6.44	4,900	3,750	2,350	8,500
	BG450-RG300	12 / 6	40 / 70	480	625	6.86	5,300	3,780	2,350	10,900
	BG600-RG450	12 / 6	40 / 70	670	875	6.84	5,900	3,780	2,350	13,600
	BG900-RG450	12 / 6	40 / 70	840	1,100	6.78	5,900	3,780	2,350	13,900
	BG1200-RG600	12 / 6	40 / 70	1,275	1,670	6.80	6,300	3,850	2,500	15,900
	BA1500-RG750	12 / 6	40 / 70	1,395	1,850	6.56	6,500	3,750	2,500	16,900
	BA1800-RG950	12 / 6	40 / 70	1,770	2,350	6.54	7,900	3,750	2,500	19,000
	BA1800-RARN	12 / 6	40 / 70	1,730	2,425	5.47	7,900	3,800	2,450	21,100
	BG300-RG35	12 / 6	70 / 80	195	275	5.34	4,600	3,500	2,350	8,300
	BG300-RG45	12 / 6	70 / 80	250	350	5.45	4,700	3,500	2,350	8,450
	BG450-RG55	12 / 6	70 / 80	315	450	5.31	5,000	3,500	2,350	9,100
	BG600-RG65	12 / 6	70 / 80	390	550	5.34	5,600	3,500	2,350	9,900
	BG600-RG350	12 / 6	70 / 80	600	850	5.41	5,800	3,750	2,350	12,500
	BG900-RG350	12 / 6	70 / 80	710	1,000	5.41	5,800	3,750	2,350	13,000
	BG900-RG550	12 / 6	70 / 80	850	1,200	5.44	5,900	3,750	2,450	15,500
	BG1200-RG550	12 / 6	70 / 80	1,070	1,500	5.49	6,200	3,750	2,500	16,500
	BG1200-RG750	12 / 6	70 / 80	1,245	1,750	5.46	7,900	3,900	2,500	19,000
	BA1500-RG950	12 / 6	70 / 80	1,505	2,125	5.39	7,900	3,550	2,500	18,500
	BA1800-RG950	12 / 6	70 / 80	1,695	2,400	5.33	7,900	3,550	2,500	19,500
	BA1800-RARN	12 / 6	70 / 80	1,605	2,425	4.53	7,900	4,000	2,500	25,800
	BG450-RG350	12 / 6	70 / 95	340	500	4.80	5,500	3,500	2,350	9,500
	BG600-RG350	12 / 6	70 / 95	510	750	4.86	5,600	3,500	2,350	10,500
	BG900-RG350	12 / 6	70 / 95	680	1,000	4.86	5,600	3,500	2,350	13,000
	BG1200-RG550	12 / 6	70 / 95	1,125	1,650	4.86	7,000	3,500	2,500	17,000
	BA1500-RG750	12 / 6	70 / 95	1,380	2,050	4.70	7,900	3,500	2,500	18,500
	BA1800-RG950	12 / 6	70 / 95	1,680	2,550	4.50	7,900	3,500	2,500	21,500

1) Blu Chiller – Red Heat Pump type connotation: BG = BluGenium, BA = BluAstrum, RG = RedGenium, RA = RedAstrum, BG/BA/RG numbers refer to model size, RA letters refer to compressor housing and swept volume size.
2) BG/RG reciprocating compressor speed max. 1,500 rpm, BA screw compressor speed max. 4,500 rpm, RA screw compressor speed max. 3,600 rpm (RM, RN, RR types limited to 3,300 rpm).
3) COP combined = cooling plus 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!

Engineering for a better world.

GEA.com

GEA Refrigeration Technologies GmbH
Holzhauser Str. 165
13509 Berlin, Germany
Phone +49 30 43592-600

RT-002-0596-US-EU 05/22