



Refrigeration technology for the power industry

In touch – efficient solutions
for the power sector



GEA fuel gas booster



*GEA screw compressor:
oil-injected*



GEA fuel gas booster

Compression for greater efficiency

Our solutions for your market

GEA Refrigeration Technologies manages the complexity of its customers' needs by providing innovative products and solutions to engineering challenges in selected power industries. We deliver stakeholder value by:

- Offering our shareholders reliable long-term returns
- Providing compressor and gas-treatment solutions for all GEA applications
- Giving our employees leeway to make a difference
- Seeking partnerships with our important suppliers
- Acting responsibly toward our environment

GEA Refrigeration Technologies provides the world with innovative solutions for smart applications and for more efficient use of energy resources. GEA Refrigeration Technologies is a global component and engineering provider in the field of power. It is internationally recognized for its excellent technologies, its dedication to providing optimal solutions to its customers, and its management principles. We want to be



known among our customers for providing innovative solutions that help them to be even more successful. We are the company where highly committed employees have leeway for the creativity and the entrepreneurship required to make our GEA Segment unique. We focus on businesses and markets where we will be leaders. We will remain the architect of our future Segment as a result of our continued success.

GEA applies decades of experience in the energy field to design and manufacture rugged, efficient, and reliable custom-engineered packaged systems for an extensive range of applications. These include power, chemistry and petrochemistry, pharmaceuticals, oil refining, natural gas processing, industrial gases, liquefied gas storage, and related applications. Count on us – no matter how tough the specifications.

Design flexibility

GEA design capabilities, manufacturing processes, products, and engineering services are versatile enough to meet virtually any specification. You are never locked into off-the-shelf components from catalog offerings. GEA can evaluate your process, provide engineering assistance in selecting the most suitable, most cost-effective equipment – and can then custom-design and build a packaged system to meet your exact requirements, codes, and specifications.

Upstream

- Gas gathering
- Gas lift
- Associated gas re-injection
- CO₂ and N₂ injection

Midstream

- Gas storage
- Gas transportation
- Coal seam gas
- Coal seam methane (pipeline)

Downstream

- Gas treatment
- Carbon capture storage
- Refineries
- Liquefied Gas Plant
- Loading/unloading facilities
- Boil-off systems
- Industrial facilities
- Cooling-down processes
- Reliquefaction processes
- Condensation processes
- Cooling of chemical reactions
- Cold utilities
- Nitrogen instrumentation
- Off-gas compression



In touch with your requirements

Solutions for the power sector

On the mainland or on the high seas: with products from GEA Refrigeration Technologies you can efficiently and safely extract, transport, and refine raw materials. In many applications, we assure that you maintain the required pressures and precise temperatures.



Fertilizer plants

GEA Refrigeration Technologies designs and delivers chillers for industrial processes and for plant-water utilities, as well as key components for ammonia boil-off systems.

Environmental systems

GEA compressors and process chillers are used for flare gas recovery by liquefaction, as well as for separation into the various light ends. Such units can also be applied in propylene and ethylene boil-off systems.

Petrochemical plants

GEA Refrigeration Technologies offers systems for process refrigeration and for plant-water refrigeration facilities. These units are typically used for overhead condensers in the separation train. Typical applications are for TDI, LDPE, and HDPE – as well as for hydrocarbon and ammonia boil-off.

Air separation

For air separation, GEA customers benefit from our know-how and long experience with CO₂ applications.

Gas separation

GEA Refrigeration Technologies provides refrigeration plants for gas liquefaction (LPG, GLT, and LNG) and for separation of the constituents into light-end fractions: e.g., butane, and light gasoline. In addition, GEA equipment is widely used in related plants and storage systems: for example, for recovery of hydrocarbon boil-off.

LNG plants

GEA Refrigeration Technologies provides refrigeration plants for gas liquefaction as well as for gas separation in LNG facilities.

Steel mills

Customers benefit from GEA solutions for SO₂ emission abatement and from our long experience with these applications.

Offshore applications (FPSO)

GEA Refrigeration Technologies provides solutions for chilling with utilities facilities and for gas liquefaction. GEA compressor skids for use in these applications are designed and manufactured not only according to the customer's needs, but also conform to strict API standards and relevant design codes. In addition, GEA offshore equipment is optimized in size and weight.

Power plants

Our solutions for power generation include compressors for fuel gas boosting, gas turbine inlet cooling systems, gas treatment, and carbon capture storage.

Refineries

GEA Refrigeration Technologies designs and supplies gas boosting systems for refineries.



In touch with efficient solutions

GEA Refrigeration Technologies for power industries

Compressors

These include primarily heavy-duty, positive-displacement, oil-injected screw compressors characterized by output control, smooth rotary motion, high efficiency, and reliable operation.

Reliability

Packages are ruggedly constructed and easy to install. All are piped, wired, and mounted on a structural steel base – ready for process and utility connections. All system components are easily accessible for servicing and adjustments. High-efficiency oil separation is assured. Estimated operating time between overhauls is a minimum of 20,000 hours.

Power sources

A broad choice of compressor drives is available, including electric motors, steam turbines, natural gas engines, diesel engines – with ratings from 25 to 6,000 kW.

Microprocessor control

The solid-state microprocessor control panels for the compressors are enhanced to monitor and control all package components, including operating parameters, first-out annunciators of alarms and shut-downs, system interlocks, vibration sensors, and external inputs/outputs. These control panels are capable of communicating with other plant control interfaces, computers, terminals, and PLCs.

Environment

Packages are available for outdoor operation in hazardous areas for NEC Divisions 1 or 2 and IEC Zones 1 or 2.

Application fields

Applications include all situations requiring fuel gas boosting for gas turbines, gas compression, turbine inlet chilling, gas treatment, carbon sequestration, as well as refining and separation of hydrocarbons. For all of these cases, GEA Refrigeration Technologies designs and manufactures an industrial refrigeration or gas compression system to meet your business requirements.

In touch with your requirements

GEA power applications

Gas turbine and engine fuel boosters

Compressors are used in gas turbine fuel-booster applications for compressing natural gas from various sources and, in turn, for assuring constant discharge pressures. Such pressures are required, for example, by combustion turbine-generators, fired by natural gas, for generating electricity. Fuel-gas booster compressors ensure continuous supply of fuel gas at constant specified discharge pressures to the turbine-generators, where the volume of fuel gas required is determined by the electric power demand on the system.



Carbon capture storage

CO₂ and the control of emissions have developed into an important aspect of the oil and gas industry. CO₂ can be liquefied and pumped, as well as compressed and injected into oil fields for enhanced oil recovery.



Chiller unit packages and gas-turbine inlet cooling systems

GEA Refrigeration Technologies designs and manufactures chilling systems for turbine air inlet. This technology is utilized with both simple and combined-cycle gas turbines in the power generation industry.



Gas gathering

GEA screw compressors are used in natural gas extraction for compressing and liquifying the gas, for assuring pipeline-quality gas, and for providing effective gas transport.

Carbon capture and storage (CCS)

GEA screw compressors are applied in sequestration and storage of CO₂ that is released from fossil fuel in power generation.

Turbine-inlet air cooling systems (TIAC)

GEA chillers are used to significantly increase gas turbine power output by cooling air inlet during periods of warm ambient temperatures.

Biogas and landfill

Biogas and landfill gas are generated by decomposing organic waste. The purified fermentation gas can then be collected in gas storage facilities and compressed for further use in heating, production of electricity, and direct feed into the natural gas mains.

Flare gas recovery

Compressors enable the recovery of flare gas that is generated in crude-oil extraction and chemical plants. The gas is compressed to recover hydrocarbons for further use. Our gas compressors perfectly match the requirements of flare gas recovery systems to meet future demands for higher efficiency and sustainability.

Process gas

GEA screw compressors are highly effective for the efficient use of process gas produced as a by-product during manufacturing processes in chemical plants in other industries. Process gas – e.g., propane, hydrogen, and carbon dioxide – are examples of gas that can be collected and compressed according to specific requirements.

In touch with our products

GEA rotary process screw compressors



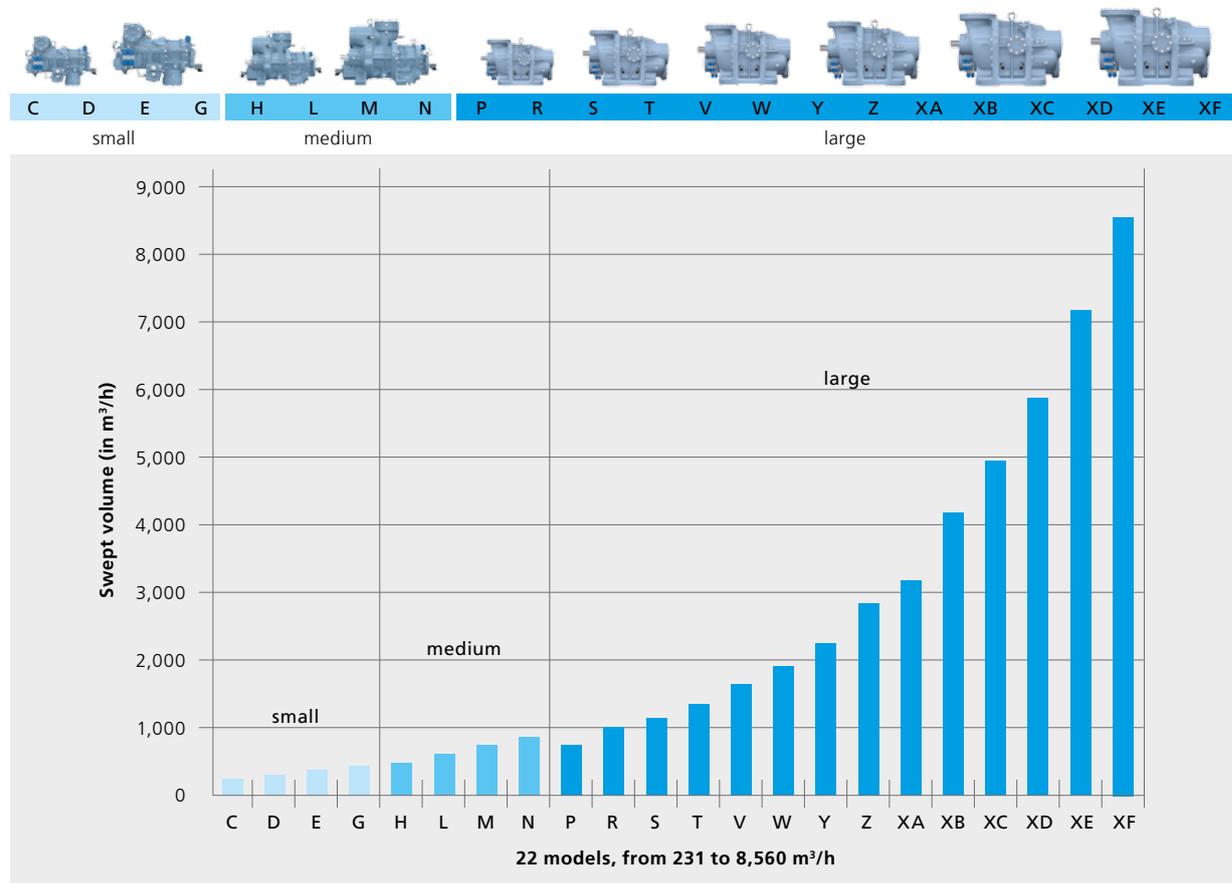
Rotary process screw compressors operate by drawing gas into the spaces between the lobes of twin screws. As the rotors turn, the gas is forced by the profile of the screws into a continuously decreasing space until it reaches the outlet port at high pressure.

These GEA screw compressors are capable of handling extremely problematic gases in the most challenging environments. Because they operate by positive displacement, they can cope with the changing molecular weights encountered in applications such as flare gas recovery, and can even handle liquid slugs in the gas stream. And because they do not generate out-of-balance forces, they need significantly less foundation strength than do piston compressors.

Range performance of GEA oil-injected screw compressors

- Pressure range: 28, 52, and 63 bar (63 bar for certain large models)
- Power: up to 3 MW
- Process fluid: natural gas, biogas, landfill gas, sour gas, associated gas, coal seam methane, CO₂, refrigerants
- Flow rate: 8,560 m³/h (at 50 Hz)
- Speed: small up to 4,500 rpm, medium up to 4,500 rpm, large up to 3,600 rpm

GEA screw compressor range





In touch with our products

GEA screw compressors

Advantages of GEA screw packages

- Maximum energy efficiency
- Great reliability
- Long product lifetime
- Low operating costs
- Broad range of screw packages
- Application in industrial cooling and air conditioning

Scope of delivery

- Screw compressors with drive motor (electric motor, gas engine, gas turbine)
- Primary and secondary oil separator with level indication, oil heater, and ultrafine separation stage
- Oil cooler
- Complete oil circuit with oil filtering and automatic monitoring and operation
- Safety devices for pressure relief
- Stop and check valves
- All components ready-mounted and wired on a common base frame

Options

- Capacity control via frequency inverter
- Dual oil filter
- Dual oil pump
- Oil and gas cooler (refrigerant-cooled, water-cooled).
- Noise-attenuation casing
- Power supply panel
- Explosion-proof design
- Certification according to customer's requirements

GEA screw compressors: optimally suited for gas turbine fuel boosting – great reliability

- No surging
- No external gear
- No seal gas unit (no N₂ required)
- No exceeding of critical speed
- Very few required interlocking systems
- Virtually no influence by changes in molecular weights
- Continuation of operation after pipeline pressure drop

Low power consumption

- Power reduction proportional to pipeline pressure increase and gas turbine load change
- Great efficiency

Easy operation

- Quick start
- Automatic pressure and capacity control

In touch – one single-source responsibility from plant design to maintenance: one team, one crew.
One line from design to spare parts, maintenance, and optimization.

In touch with our customers

Support and service

Remote monitoring and diagnostics – how it works

- Weekly batch e-mail transmission from user to GST of on-board instrumentation readings (by preset electronic form)
- Analysis of data and issues
- Reports per month with diagnosis and operating suggestions
- Immediate highlighting of possible critical situations that could demand fast maintenance actions, with an urgent alarm sent to the client
- Proposals for portable diagnostics inspection in case troubleshooting intervention is considered necessary
- Issuing of reliability improvement plans within a proactive maintenance program

An extensive and international service network of GEA customer service representatives is always close to you. We provide prompt and reliable services based on many years of experience gained in maintenance of power generation and cogeneration installations.

- Spare parts supply
- Pre-shut-down activities
- Maintenance visits and plant performance analysis
- Unit inspection
- Scheduled spare parts supply
- Emergency supply
- Expert teams at site for turnaround and pre-turnaround
- Plant and equipment enrollment in maintenance services and support plans

Service technology

We optimize system lifetime value, to help you get the most from it. Our advanced service and world-class processes keep your compressor running smoothly. Around the clock, anywhere in the world, highly trained technicians provide assistance from the service location closest to you.

Monitoring and diagnostics

GEA Refrigeration Technologies performs simple and very reliable remote monitoring of the performance of compressors based upon on-board instrumentation. It allows monitoring of key performance indicators essential for proactive maintenance of machinery – for reduction of machine downtime and maintenance costs.

What is included:

- Analysis of compressor thermodynamic and mechanical behavior
- Vibration analysis of the various compressor components (e.g., frame, cylinders, motor, piping) and evaluation of their trend over time.
- Analysis of the frame lubrication system (oil pressure and filter pressure drop) and scheduling of relevant maintenance.



You can extend the useful life of an existing fixed asset by:

- Adapting the machine to a new or different use (e.g., new operating conditions or service)
- Restoring it after damage
- Upgrading the technology of the most critical parts to achieve better performance
- Upgrading the entire unit to achieve greater throughput

Field support and troubleshooting

Field inspection:

- Field measurements (vibrations, pulsations, power, throughput, telemetry, thermography, acoustic emissions, etc.)
- Portable diagnostics
- Problem-solving with root-cause failure analysis
- Machinery-process interface

Analysis:

- Analysis of recurrent mechanical faults
- Analysis of performance problems
- Asset lifecycle management
- Feasibility studies to meet new operating conditions
- Updating of machine instrumentation and supervision systems
- Installation of diagnostic systems
- Predictive maintenance consultancy

*Visit **GEA Refrigeration Technologies** at www.gea.com to learn more about us and our solutions.*

Original spare part components

A practical and fast-reaction spare parts organization has been established to supply the required spare parts worldwide. To further shorten delivery times, distribution centers have been created at GEA offices throughout the world. GEA Refrigeration Technologies has an extensive stock of spare parts covering new as well as phased-out compressor packages.

Gas compressor package overhauling

Overhauling represents the core activity for plant revamping. It includes the inspection, testing, and repair or replacement of gas compressor components. During a major overhaul, the bare compressor is completely disassembled, inspected, reassembled, and tested to ensure that original performance is restored. At the time of overhaul, any package components that require attention can also be refurbished. Each overhauled, zero-hour compressor incorporates the latest in technology.

Modifications and plant expansion

To meet the customer's changing requirements, service is constantly engaged in supplying the required assistance for development and proposal – within the short and specified lead times – of plant modification and expansion of any size.

Long-term service

The level and extent of maintenance agreements can be individually tailored to meet your requirements. We provide you with fast, flexible maintenance service around the clock and customized to your needs. From on-call repairs to the most comprehensive long-term service agreement, GEA is available with green number 24/7 to guarantee the efficient and reliable operation of your gas compressor package.

Training

Service at GEA organizes extensive training courses for the customer's engineers and managerial staff entrusted with plant operation. Stages are also provided either indoors or on site to implement the latest improvements and acquired experience for each individual plant.



We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 Index.