Process Compressors

Designed to optimize your business

siemens.com/energy/compression
Siemens offers a full range of turbocompressors to meet the needs of the oil and gas and process industries: centrifugal, axial or axial-radial, and integrally geared compressors can be matched with all kinds of mechanical drives – steam turbine, gas turbine, VSDS system or electric motor – in a solution to match each unique customer.

A wide range of products and a wealth of experience
With our unrivalled competence in complete compressor train solutions from a single source, the Siemens portfolio offer an extensive range of standardized and tailor-made compression solutions (Siemens Turbo Compressors – STC™). The portfolio comprises both standardized and tailor-made compression solutions. Our standard units with predefined engineering options ensure low investment costs and short delivery times. For the more complex processes such Gas- or Coal-to-Liquids (G/CTL), production of purified terephthalic acid (PTA), Liquefaction of natural gas (LNG), sour gas or integrated gasification combined cycle plants (IGCC), we provide uniquely tailored solutions.

Coal Bed Methane and Shale gas, air separation, petrochemical plants and refineries, catalyst regeneration and synthetic fiber production are amongst the most common applications for our compression solutions.

Catering for mega-scale applications
As a technology of the future, CTL is worth a mention in its own right. This complex process demands a considerable variety of very large rotating machinery.

Siemens offers compression and power generation packages for air separation, the syngas processes and the refinery processes with its own steam turbine, gas turbine or electric motor drive.

Siemens has successfully supplied the largest air compressors and the largest mechanical drive steam turbines ever made. This experience makes Siemens the partner of choice for all compression and power requirements in all sections of the CTL process up to a complete power island.

One of the recent innovations is the STC-ECO motor-compressor which is 100% emission free. Unlike a conventional compressor, it is hermetically sealed and canned. Canned means that contaminated gasses can not come in contact with the electrical components. As a result, the service requirements of this product are lower and the operator benefits from long maintenance intervals.

Oil & gas applications have either suffered from poor seal reliability – notably upstream of the glycol dehydrator – or involve hazardous and toxic gases, containing H₂S, mercury, CO₂, etc. The STC-ECO has been specially designed to meet the most demanding upstream requirements!

With our comprehensive experience and portfolio on compressors and drives we can recommend the best possible configuration to perfectly suit your project requirements.
**STC-GC**

The compact solution for air separation

The STC-GC is an integrally geared compact turbocompressor available in 9 frame sizes and with a wide range of options packaged as a compact single-lift unit. The STC-GC product line is the compact and standardized version of the customized integrally geared compressor series STC-GV, the trusty workhorse of the air separation and process industries.

This range of compact integrally geared compressors is also available as high pressure version STC-GC (H).

**Technical data**

- Flow rates from 3,600 to 120,000 m³/h (2,120 to 70,680 cfm)
- Pressure ratio up to 20
- Electric motor drive (fixed speed)

**Fields of application**

- Air separation
- Compression of process air
- Compression of nitrogen

**Features**

- Compact, single-lift unit
- Maximum performance due to pre-designed gears, highest efficiency impellers, tailored aerodynamics and pre-defined auxiliaries
- Up to four compressor stages

**STC-GC (pre-engineered)**

Highest efficiencies and highly pre-engineered

The existing STC-GC compressor range has been extended by the introduction of a new pre-engineered series covering the 120,000-400,000 m³/h capacities with five casing sizes. 80% of the machine is pre-engineered for consistency and repeatability. 20% of the machine can be customized for specific customer process needs.

This design means lean processes, minimizes lead time and reduced costs of the compression system with at the time highest efficiency levels, guarantees the use of well proven components, enhancing plant reliability and availability.

**Technical data**

- Flow rates from 120,000 to 400,000 m³/h (70,680 to 235,600 cfm)
- Pressure ratio up to 6.5
- Electric motor drive (fixed speed, synchronous/asynchronous)

**Fields of application**

- Air separation (main air compressor)

**Features**

- Highest efficiency through use of well proven flow components
- Efficiency as high as with customized compressor series STC-GV
- Highest flexibility deriving from large number of fixed options
**STC-GV/STC-GVT**

**The robust multitalent**
The STC-GV integrally geared centrifugal compressors feature a multi-shaft arrangement with different speeds and up to eight compressor stages around a central bull gear, forming a compact unit for the multi-stage compression of a wide range of gases. These trains are typically supplied as complete packages, including all rotating equipment, intercoolers and oil console. The STC-GVT is an integrally geared multi-stage compressor comprising expander stages, designed in accordance with both API 617 and API 672.

**Technical data**
- Flow rates from 800 to 580,000 m³/h (471 to 341,620 cfm)
- Discharge pressure up to 200 bar (2,901 psi)
- Driver of your choice

**Fields of application**
- Air separation
- Carbon capture and storage
- Ethylene oxide
- Refineries
- Ammonia
- Synthetic fibers
- Petrochemicals
- Metal making

**Features STC-GV**
- High efficiency due to tailored aerodynamics
- Wide operating range due to adjustable guide vane units
- Multi-service capability due to finely-graded standard components
- Package design significantly reduces on-site installation time

**Features STC-GVT**
- Inlet guide vane unit in front of each stage
- Interheating between each stage

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**STC-GT**

**Proven concept for direct power recovery**
The STC-GT is an integrally geared process gas radial turbine enhancing power supply in processes with off-gas or process gas as byproducts. Medium or high-temperature gas can be used directly to drive a compressor or electric generator without additional heat exchange or steam generation equipment. STC-GT’s design is in accordance with both API 617 and API 672.

For economic part-load operation, the STC-GT can be fitted with an adjustable nozzle vane unit. This unit is normally located in front of the first stage, offering very good turn-down and part-load efficiencies.

**Technical data**
- Discharge volume from 3,000 to 600,000 m³/h (1,766 to 353,160 cfm)
- Expansion ratio 4
- Power recovery up to 45,000 kW
- Gas inlet temperature up to 550 °C (1,022 °F)

**Fields of application**
- Synthetic fibers, especially
  - Pure Terephthalic Acid (PTA)
  - Dimethyl Terephthalate (DMT)
- Nitric acid

**Features**
- Adjustable inlet guide vane for economic part-load operation
- Uses many of the proven components from the integrally geared centrifugal compressor concept
- Radial inlet to each stage
- Long life due to process-optimized materials
STC-ECO

Hermetically sealed and canned

Based on Siemens field-proven hermetically sealed technology, the STC-ECO is a compact, fully integrated, and mobile seal-less motor-compressor of low complexity. It has been specifically designed to meet the requirements of the most demanding applications in the upstream business.

Integrated hermetically sealed motor-compressor

Technical data

- Flow rates from 250 to 40,000 m³/h (147 to 23,544 cfm)
- Design pressure up to 220 bar (3,191 psi)
- Electric motor drive (canned, variable speed)

Fields of application

- Dirty-gas applications on-shore, offshore, and subsea
- Field depletion
- Gas and oil separation
- Gas gathering
- Gas lift
- Gas storage
- Gas transmission

Features

- Increases uptime due to absence of seals, and minimal number of sub systems
- Environmentally friendly due to low noise and zero emissions
- Allows for a smaller compressor building due to a footprint reduction of > 40 percent compared to a conventional motor driven compressor with intermediate gear
- Easy to install as a single integrated solution
- Less maintenance due to reduced number of auxiliary systems
- Operating range varying from 30 to 105% speed
The STC-SV is a single-shaft centrifugal compressor with vertically split barrel-type casing to cover higher pressures, designed in accordance with API 617. All compressor internals are assembled into one bundle for easy installation and maintenance. The STC-SV allows for perfect matching of compressor performance and rotor dynamics and is the perfect solution to compress gases of any molecular weight.

Technical data
- Flow rates from 250 to 480,000 m³/h (147 to 282,528 cfm)
- Discharge pressure up to 1,000 bar (14,501 psi)
- Driver of your choice

Fields of application
- On/offshore oil and gas
- Refineries
- Petrochemicals
- General chemicals
- Fertilizers
- Dry chlorine gas
- Methanol
- Natural gas distribution and storage
- FPSO

Features
- Wide variety of sealing systems
- Can be operated with any drive system
- High part-load efficiencies
- Suitable for light gases and high pressures
- Can be designed for up to four process stages and with up to 10 impellers
**STC-SX**

The optimum solution for blast furnace air

The STC-SX series are axial-flow compressors designed to handle large volume air flows and other clean gases within relatively small casings.

This axial-flow turbocompressor is typically an uncooled straight-through compressor, designed for discharge temperatures up to 350 °C/662 °F. Outstanding blading technology and unique material usage result in optimized performance and reliability.

**Technical data**
- Flow rates from 50,000 to 1,300,000 m³/h (29,430 to 765,700 cfm)
- Pressure ratio between 1.9 and 7.0
- Driver of your choice

**Fields of application**
- Blast furnace air
- FCC air (Fluid Catalytic Cracking)
- PDH (Propane Dehydrogenation)

**Features**
- Excellent efficiency
- Modular design principle
- Extended operation range
- Highest quality standards
- Casings with axial inlets
- Up to 19 axial compression stages

**STC-SR**

The perfect match for large air volume flows

Siemens STC-SR axial-radial isothermal turbocompressors are the perfect solution to handle large volume air flows whilst maintaining excellent efficiencies.

The STC-SR series is ideal for applications requiring higher pressure ratios and intercooling. The design incorporates an axial process stage followed by one or more centrifugal process stages. STC-SR compressors combine excellent efficiency with highest quality due to proven components and compliance with API standards.

**Technical data**
- Flow rates from 50,000 to 1,300,000 m³/h (29,430 to 765,700 cfm)
- Pressure ratio between 5.8 and 16
- Driver of your choice

**Fields of application**
- Large-volume air separation plants e.g. for
  - GTL (Gas-to-Liquids)
  - CTL (Coal-to-Liquids)
  - Methanol

**Features**
- Highest degree of efficiency
- Modular design principle
- Also available with overhung design
- Up to 10 axial and 3 radial compression stages
Industrial steam turbines – the ideal drive for process industry
Siemens steam turbines (SST™) are the ideal driver for process industries with exothermic processes where the heat can be used to generate steam. Steam turbines can be used in a multitude of ways to generate electrical energy or to drive compressors, blowers and pumps. Some fifty percent of the compressors used in cracking and refining processes are driven by steam turbines.

As a solution provider for the petrochemical industry, Siemens satisfies more customers of high power mechanical drive steam turbines than any other manufacturer.

We offer not only the steam turbine, but also the associated field-proven high-tech products, including instrumentation and controls and various auxiliary systems.

Industrial gas turbines – reliable and flexible pipeline drivers
Siemens gas turbines (SGT™) are the obvious choice of driver where natural gas is available to fuel the turbine. The gas turbine is thus the driver of choice for pumping and compression for pipe-line gas transportation. It also has the advantages of being compact and lightweight for installation on offshore platforms. The gas turbine also can be used to generate electricity to power an electric motor, as is frequently the case on Floating Production, Storage and Off-loading (FPSO) vessels.

Electric motors – the individual drive solution
Where energy has to be purchased – i.e. there is no source of natural gas or steam arising from the process – electric motors are the clean and economical alternative. The increasing significance of power saving, environmental requirements and the desire for a wide variable speed band have led to the application of electric motors. This has resulted in our individual drive solution for specific customer requirements in the industry sector.

An important application for this variable speed electric drive is for refrigeration compressors in Liquefied Natural Gas (LNG) plants, the first such “all-electric” drive system having been successfully built and tested in 2003. Electric drive systems of this class are always engineered for the customer’s specific application, allowing the compressor to be optimized in capacity and speed for the process on hand.

From our comprehensive portfolio of compressors and drives we can recommend the exact configuration that best suits your project requirements.
References

Melkøya Island, off Hammerfest, Norway
The world’s first all-electric LNG plant. Designed for flawless operation at arctic temperatures and rapidly changing operating conditions.
- The world’s largest variable speed drive systems (VSDS) rated 65 MW at 3,600 rpm for the pre-cooling and sub-cooling compressors
- VSDS-driven compressor string for the methane mix train
- 32-MW VSDS for the liquefaction compressor
- CO₂ re-injection compressor
- Harmonic study
- Load commutated inverter (LCI) frequency converter units, drive control and fault diagnosis systems
- Transformers
- Containerized harmonic filters
- Converter cooling systems and auxiliary equipment

Groningen Longterm (GLT), The Netherlands
The GLT project includes the renovation and maintenance of 29 production locations of NAM in the north of the Netherlands. Siemens offered the client higher availability by applying magnetic bearings for compressor and motors giving them a competitive advantage.
- 22x high speed VSD driven compressor trains STC-SV (12-5/8-A)
- The world’s first electrical high-speed variable-speed drive
- Complete rotating string with active magnetic bearings; harmonic filter plant and all auxiliaries; fan
- Motors for cooling banks; system integration; conceptual and detail engineering
- Network analysis and vibration studies

Leuna 2000
Europe’s largest refinery relies on Siemens technologies.
- Twelve e-motor driven air compressors, three oxygen compressors, three hydrogen rich gas compressors, one compressor train for hydrocarbon mixture
- Various drive systems
- 110 kV gas-insulated switchgear; power transformers; mediumvoltage switchgear
- Integrated local control panels for high-voltage switchgear with fieldlevel automation, incl. substation control and protection systems and redundant battery system
- Integrated solution of compression, power generation and distribution, automation, and telecom
- Plant engineering for total scope
- Reduced overall life cycle cost

Sengkang LNG
The four 0.5 MTPA liquefaction trains will provide LNG to meet the growing demand in Southeast Asia, primarily in Indonesia and the Philippines. The power gen sets will generate electricity for the LNG plant and to the local grid.
- 4 refrigeration trains for 4×0.5 MTPA
- VSDS, gear and STC-SV(14-7-B)
- Power gen set unit 1 with 60 MW Power gen set unit 2 with 120 MW and STG
- Integrated power distribution: 150/11 kV outdoor sub-station
- Integrated solution of compression, power generation and distribution, automation, and telecom
- Plant engineering for total scope
- Reduced overall life cycle cost