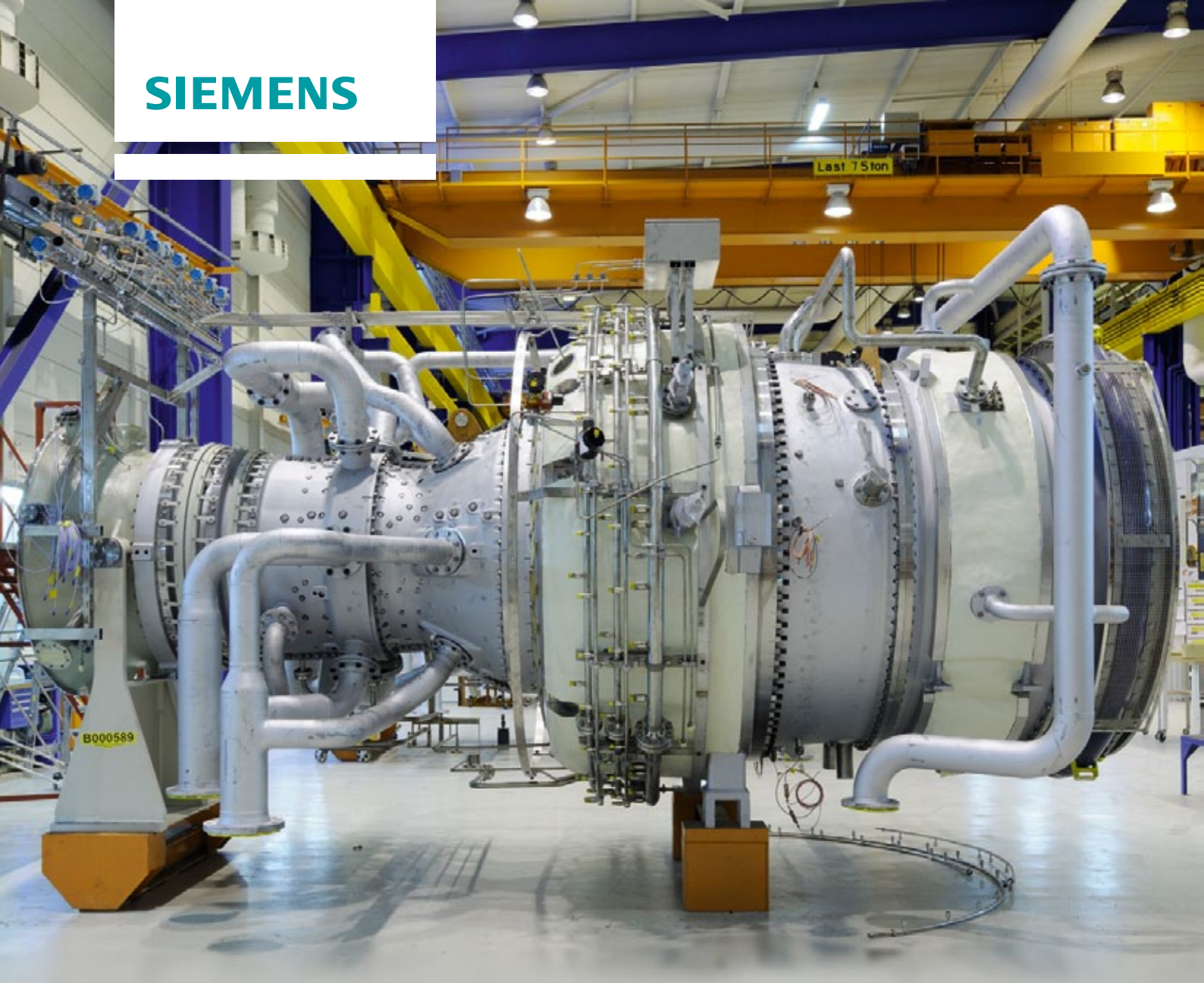




SIEMENS



Industrial Power

SGT-800 Gas Turbine

Power Generation:

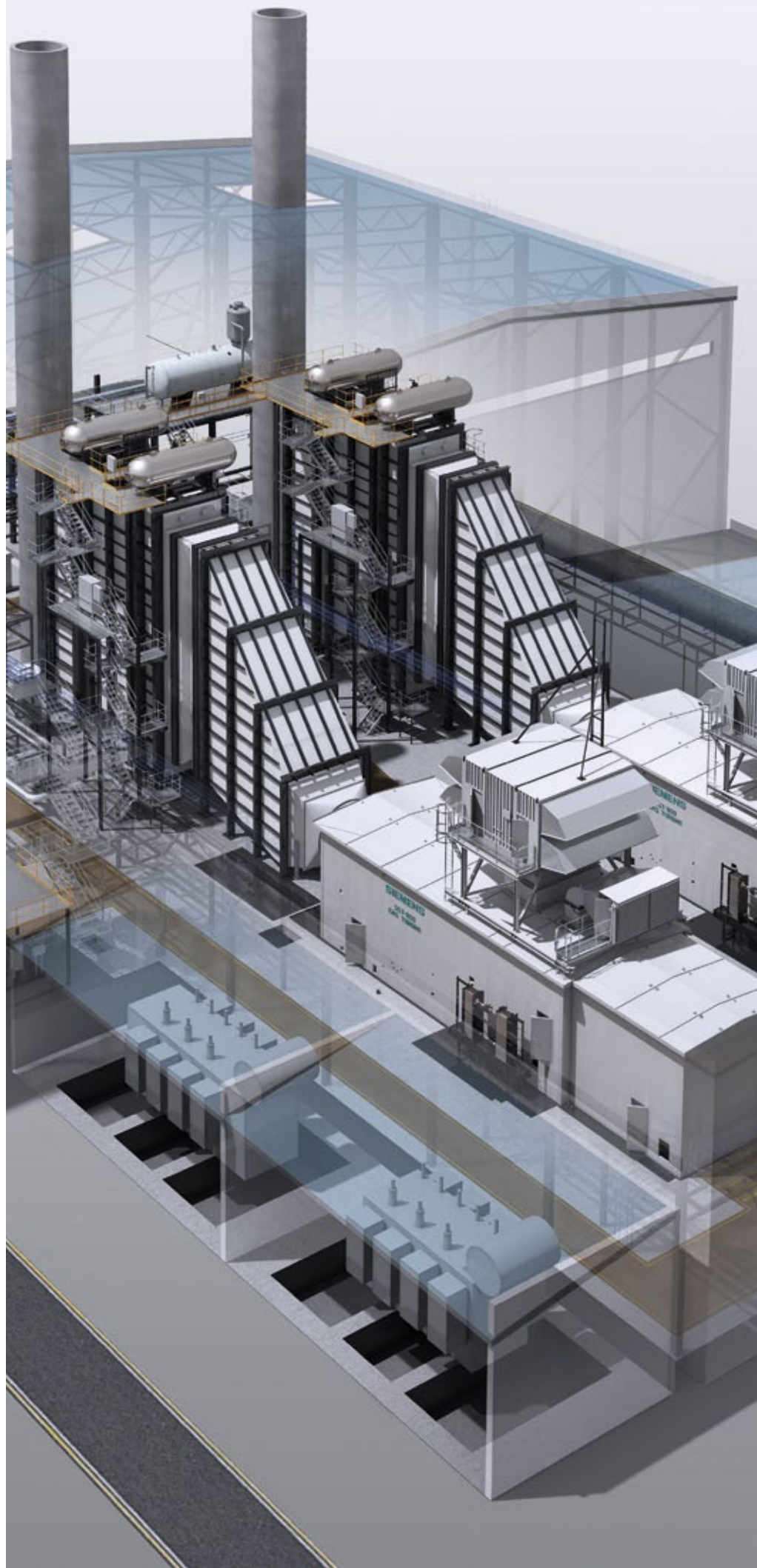
Simple Cycle (ISO) 47.5 MW(e) / 50.5 MW(e)

Combined Cycle 2x1 (ISO) 135.4 MW(e) / 143.6 MW(e)

www.siemens.com/energy

Nomenclature

- SC: Simple cycle
- CC: Combined cycle
- SCC: Siemens combined cycle
- DLE: Dry Low Emissions
- HRSG: Heat recovery steam generator
- PMG: Permanent magnet synchronous generator
- EOH: Equivalent operating hours
- OEM: Original equipment manufacturer



SGT-800 Industrial Gas Turbine

The Siemens SGT-800 industrial gas turbine combines a reliable robust design with high efficiency and low emissions. The turbine offers broad flexibility in fuels, operation conditions, maintenance concepts, package solutions and ratings to meet current and future market needs.

The SGT-800 affords very competitive economy for a variety of industrial power generation customers such as energy companies, independent power producers, utilities and municipalities.

Excellent capabilities for different needs

The excellent efficiency and steam-raising capability of the SGT-800 makes it outstanding in cogeneration and combined cycle installations, including process industries and district heating schemes. The robust design and proven high reliability also makes the SGT-800 an excellent choice for refineries and for other oil and gas customers.

The SGT-800 is available in two versions with ISO ratings from 47.5 MW(e) to 50.5 MW(e) and with a flexibility in between. For excellent performance at high ambient temperatures (>33°C) a hot match compressor option is available with increased power output and efficiency.

Gas Turbine Key Features

Robust industrial design

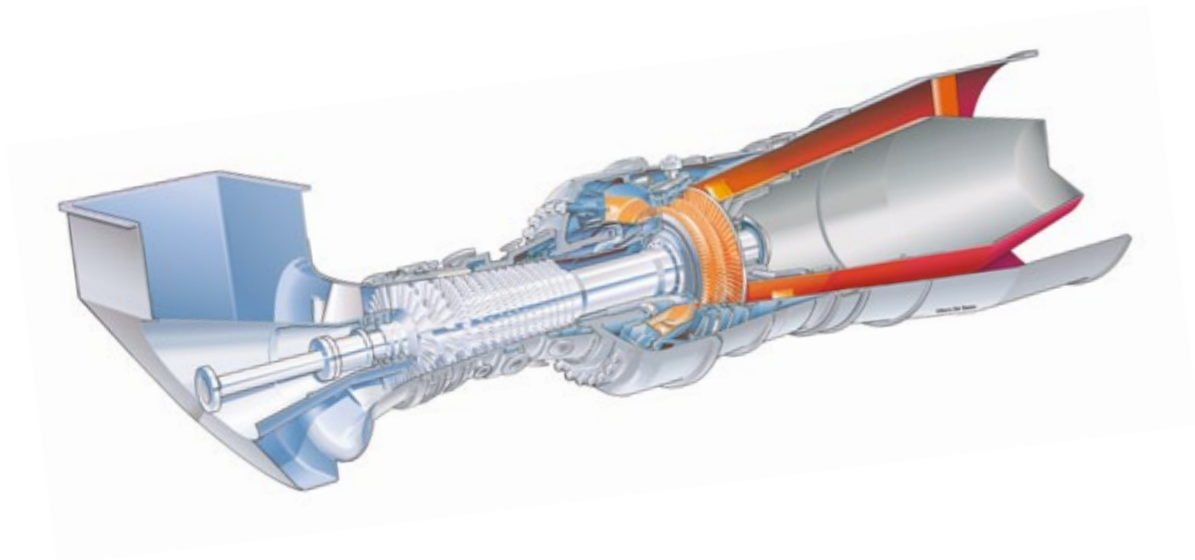
- Simple and robust dual-fuel DLE technology
- Excellent operational availability and reliability
- High electrical efficiency with low deterioration
- Cold-end drive enabling straight and simple fit with HRSG
- Stable load-rejection capability with < 5 % overspeed
- Low gas-supply pressure required
- Long time between overhauls and long total operation life

Flexible in operation, fuels and applications

- Hot and cold climate variants using standard options
- Adaptable to different operational schemes and transients
- Grid code compliance standard options
- Wide range of gas fuel compositions
- On-load fuel-changeover capability
- Optimized package solutions
- High exhaust energy, giving excellent cogeneration/combined cycle characteristics

SGT-800 package for power generation





SGT-800 Technical Specifications

Axial Compressor

- 15-stage axial-flow compressor
 - 3 stages variable guide vanes
- Electron-beam welded rotor
- Cr-steel blades and vanes
- Abradable seals
- Controlled diffusion airfoils

Combustor and Emissions Control

- DLE combustion system
- 30 dual-fuel DLE burners in damped combustor
- Welded annular sheet metal design
- Thermal-barrier-coated inner surface

Fuel System

- Gas only or dual-fuel (gas/diesel)
- On-load fuel changeover capability
- Load-rejection capability
- Gas-supply pressure requirement:
27-30 bar(a) (390-435 psi(a))

Turbine

- Single-module high-efficiency 3-stage turbine
 - two first stages and stator flanges are air-cooled
 - third stage with interlocking shrouds

Bearings

- Tilting-pad radial and thrust bearings
- Vibration and temperature monitoring

Speed Reduction Gearbox

- Double helical design
- Cold-end-driven generator

- Speeds of 1,500 rpm and 1,800 rpm to suit 50 Hz or 60 Hz operation

Generator

- Four-pole design
- Rated voltage: 10.5 kV/11.0 kV/13.8 kV
- 50 Hz or 60 Hz
- Protection IP54
- PMG for excitation power supply
- Complies with -IEC/EN 6034-1 standard

Lubrication

- Lubricating oil system placed on separate skid (Classic Package), or integrated on GT-skid (Single Lift Package)
- 3x50% AC-driven lube oil pumps with DC backup
- Oil cooler and oil heaters

Starting

- Electric VSD start-motor connected to the gearbox

Control System

- Siemens Simatic control system
- Distributed Inputs/Outputs

Other

- Straight axial exhaust
- Fire and gas detection equipment
- Compressor cleaning options
- Combustion air inlet filtration with options for static, pulse cleaning and HEPA
- Enclosure in carbon or stainless steel. Noise level options (85dB(A) standard)

Flexible Maintenance, High Availability

The structural arrangement of the SGT-800 offers a flexible and financially beneficial maintenance concept. This maintainability combined with the turbine's robust, single-shaft arrangement, ensures its high operational availability.

Maintenance

- Flexible standardized maintenance concepts
 - Time-based and cycle-based maintenance concepts
 - Up to 60,000 EOH between major overhauls
 - On-site maintenance or modular overhaul, no need for special workshop maintenance
- Option for off-site maintenance with quick engine exchange for maximized availability
- Designed for maintenance
 - Compact, modular build-up for easy maintenance
 - Removable burners for quick and easy inspection
 - Vertically split compressor casing enables easy access
 - Gas turbine can be removed on rollers through the enclosure door
- Multiple boroscope-inspection ports

Customer Support

- Global support network of Authorized Service Centers
- 24/7 Siemens support including emergency service and specialist helpdesk
- Full field service
- Full diagnostic support, remote monitoring
- OEM modernizations and upgrades
- In-house or on-site training programs in operation and maintenance
- Range of maintenance and service contracts available

Performance Specifications

Power Generation	47.5 MW Version	50.5 MW Version
Simple Cycle		
Power output	ISO 47.5 MW(e)	ISO 50.5 MW(e)
Frequency	50/60 Hz	50/60 Hz
Electrical efficiency	37.7%	38.3%
Heat rate	9,557 kJ/kWh (9,058 Btu/kWh)	9,407 kJ/kWh (8,916 Btu/kWh)
Turbine speed	6,608 rpm	6,608 rpm
Compressor pressure ratio	20.4:1	21.1:1
Exhaust gas flow	132.8 kg/s (292.8 lb/s)	134.2 kg/s (295.8 lb/s)
Exhaust temperature	541 °C (1,006 °F)	553 °C (1,027 °F)
NO _x Emissions (with DLE, corrected to 15% O ₂ dry)	≤ 15 ppmV	≤ 15 ppmV

Combined Cycle SCC-800 1x1*		
Net Plant Output	ISO 66.6 MW(e)	ISO 71.4 MW(e)
Net Plant Efficiency	53.8%	55.1%
Net Plant Heat Rate	6,693 kJ/kWh (6,344 Btu/kWh)	6,530 kJ/kWh (6,189 Btu/kWh)

Combined Cycle SCC-800 2x1*		
Net Plant Output	ISO 135.4 MW(e)	ISO 143.6 MW(e)
Net Plant Efficiency	54.7%	55.4%
Net Plant Heat Rate	6,583 kJ/kWh (6,239 Btu/kWh)	6,494 kJ/kWh (6,155 Btu/kWh)

*The combined cycle plant SCC-800 is also available based on more than two SGT-800.



Two 50.5 MW(e) SGT-800, installed at the industrial site Industriepark Frankfurt-Höchst, Germany. The machines are used for cogeneration and produce power as well as 130 t of high pressure steam, 30 t of low pressure steam and 135 t of hot water per hour. The low pressure steam is fed into the site's supply system and used by nearby chemical and pharmaceutical manufacturers.

SGT-800 for Power Generation

(ISO) 47.5 MW(e), 50.5 MW(e)

The high exhaust gas temperature of the SGT-800 makes it especially suitable for cogeneration and combined-cycle applications. The performance of the SGT-800 in combined cycle is best in class for its size. With up to 60,000 EOH between major overhauls, low maintenance cost and excellent heat rate, the Life Cycle Cost is very competitive. The high power-to-footprint ratio results in short installation time and low construction costs and allows for convenient siting in harsh and/or remote locations and in restricted industrial areas.

Stable and flexible operation

All SGT-800 units are equipped with a DLE combustion system to minimize NO_x and CO emissions and ensure that the turbine complies with both global and regional regulations. It can operate on both gas and diesel with on-load switchover between fuels. The SGT-800 DLE system is recognized for its robust design without complicated burner

staging or controls. The combustor has a passive damping design for reliable operation. In combination with the single-shaft industrial design, the DLE system gives high stability and capability to handle different load transients.

Industrial Power Generation

- Simple-cycle and combined-cycle power plants for base load, intermediate load, standby power and peak operation
- Cogeneration for industrial plants with high heat load and district heating schemes

Oil and Gas industry

- Simple-cycle, combined-cycle and cogeneration applications
- Onshore: for oil field service, refinery application, emergency and standby power generation
- Offshore: on oil platforms and floating installations

SGT-800 Packages

SGT-800 Classic Package

The SGT-800 is available as a skid-mounted package which incorporates the gas turbine and gearbox on a single base frame, or with gearbox placed directly on the foundation together with generator. It is easily transported, installed and maintained at site. Mechanical auxiliary systems are mounted on an external skid placed close to the gas turbine.

Turbine controls, generator control panel, motor control center for package motors and variable-speed drive for starter motor are normally supplied in an external control module or as separate items.

SGT-800 Single Lift Package

The SGT-800 is also available as a complete skid-mounted package with single-lift capacity of the complete train, i.e. gas turbine, gearbox, generator and mechanical auxiliary systems. This package enables features such as string test, quick engine exchange, small footprint and shorter erection time at site when required.

Turbine controls, generator control panel, motor control center for package motors and variable-speed drive for starter motor are normally supplied in an external control module or as separate items.

SGT-800 Classic Package

- 1 – Air intake
- 2 – Generator ventilation
- 3 – Generator
- 4 – Ventilation inlet
- 5 – Enclosure
- 6 – Turbine
- 7 – Ventilation outlet

Width enclosure: 7,290mm

Height enclosure: 6,825mm

Length enclosure: 15,773mm

Width (enclosure to generator air outlet): 8,012mm

Height (from ground to top of air intake (not including piping structure)): 13,402mm

Length (from exhaust to air inlet generator): 26,178mm



SGT-800 Single Lift Package

- 1 – Air intake
- 2 – Ventilation inlet
- 3 – Generator
- 4 – Baseframe
- 5 – Terminal box
- 6 – Enclosure
- 7 – Turbine
- 8 – Ventilation outlet

Width enclosure: 4,500mm

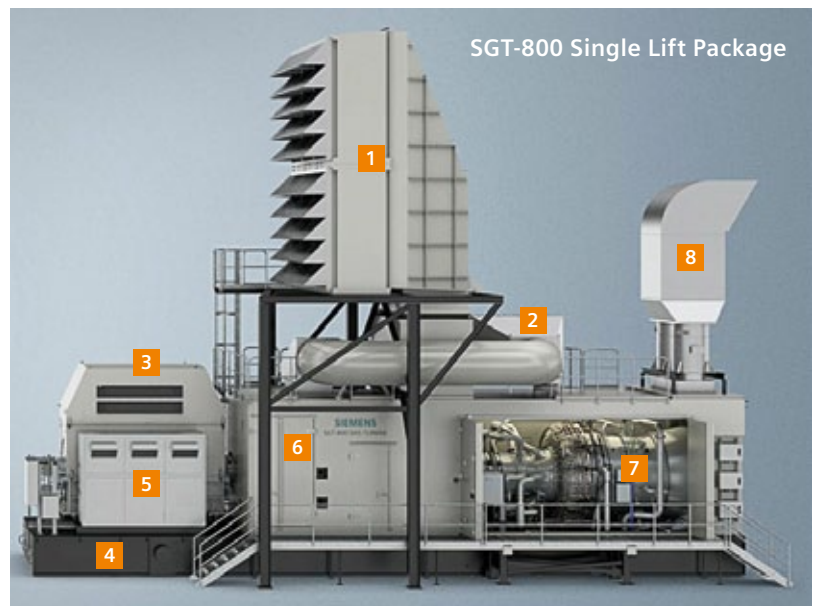
Height enclosure: 3,730mm

Length enclosure: 12,591mm

Width (enclosure to generator): 4,705mm

Height (from ground to top of air intake (not including piping structure)): 12,235mm

Length (baseframe end to exhaust): 24,510mm





Dalmine, Italy – SCC-800 2x1

SGT-800 for Industrial Power Plants

SCC-800 1x1: (ISO) 66.6 MW(e), 71.4 MW(e)

SCC-800 2x1: (ISO) 135.4 MW(e), 143.6 MW(e)

Siemens offers industrial power plant solutions based on the SGT-800 for power generation or cogeneration in simple or combined cycle modes, with a variety of plant configurations and business models. Siemens has the capability to offer scope varying from GT and ST only delivery to full EPC solutions, where the SGT-800 gas turbine provides the core of a reliable, efficient and powerful SCC-800 combined cycle plant. This variation provides both scope flexibility and optimization potential to suit the Customer's specific requirements.

Experience from many operating plants and longstanding relations with key suppliers are some of the advantages in the delivery of SCC-800 plants. Using single-source pre-engineered modules provides a solid basis for the engineering, procurement, installation and commissioning phases, saving both time and money. Siemens offers well proven technical solutions which also offer individual high-value solutions in every case. Particular attention is paid to the specific purpose of the plant and the specific site conditions.

Optimization of plant performance and configuration

- Reduced project risk due to proven plant concepts and experienced organization
- High plant reliability using in-house power trains, proven system designs and intelligent redundancy concepts
- Optimized power train and balance of plant for excellent efficiency
- Low emissions per generated MWh
- Multiple gas turbine plant solutions with extended load range, part-load efficiency and generation security
- Optimized plant layout combining high maintainability with a small footprint
- Configuration and supply of control system for the entire power plant directly from the OEM of the GT and ST



Rya, Gothenburg, Sweden – SCC-800 3x1

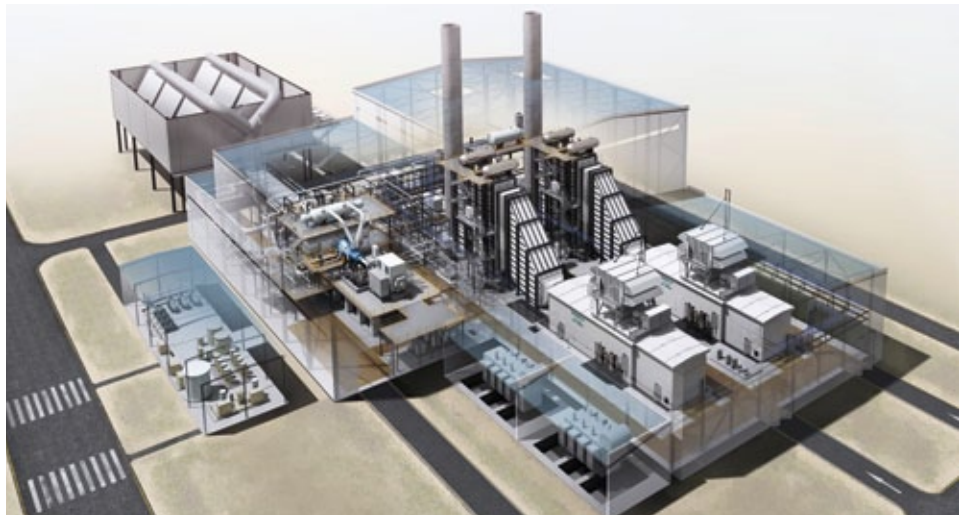
Photo courtesy of Göteborg Energi AB ©. All rights reserved.

In addition to standard plant configurations, a number of options are possible, for example:

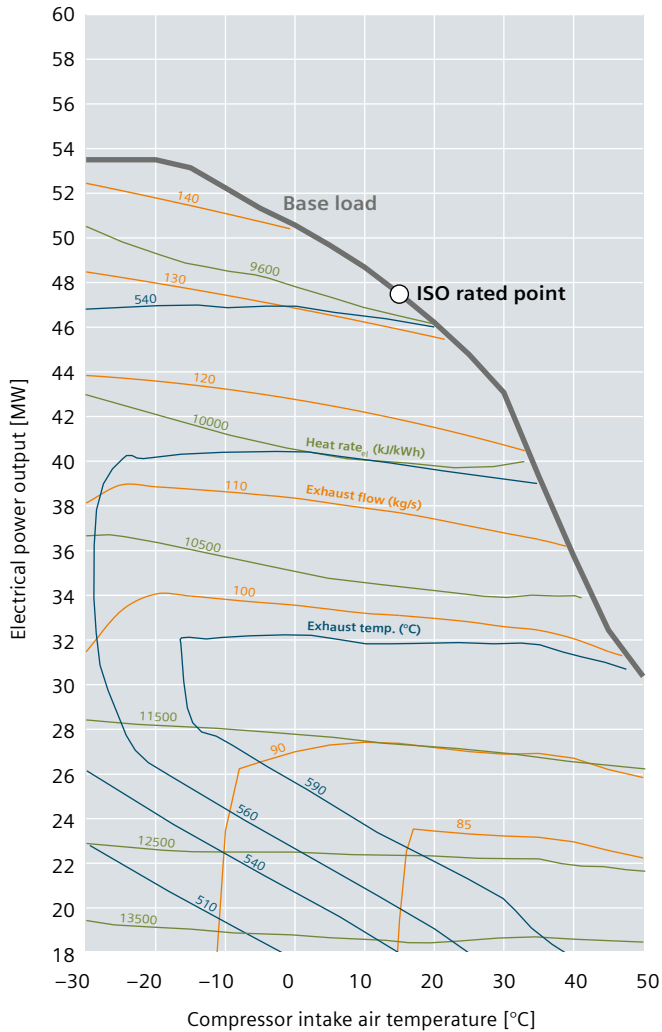
- Flexible operation with frequent starts and stops, suitable as back-up to renewable power sources in the grid.
- Island operation for remote locations within local utility grid, or in locations where there is a weak grid with frequent power cuts.
- Multiple power blocks within one power plant, providing both generation security and operational flexibility without losing focus on efficiency and environmental compatibility.
- Staged construction, increased degree of modularization and pre-testing may also be favored depending on the construction schedule of the specific industry and to minimize site work.

Combined Cycle Products

- Power Train
- Thermal Equipment
- Power Island
- Power Block
- Complete Power Plant



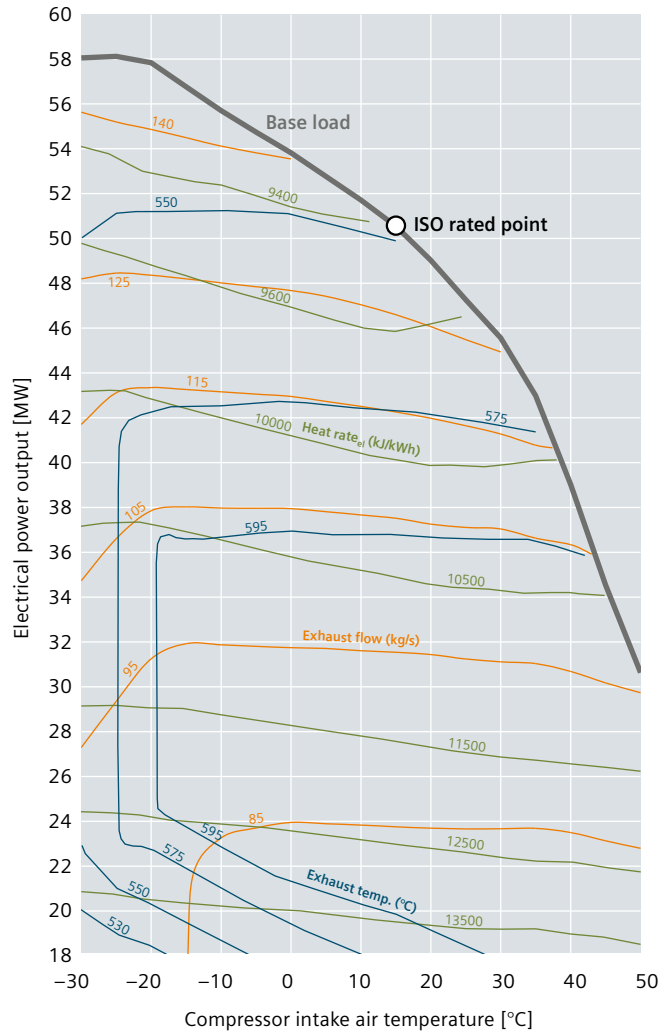
SGT-800 Power Generation Performance



SGT-800, 47.5 MW
Nominal Power Generation Performance

Operating conditions:

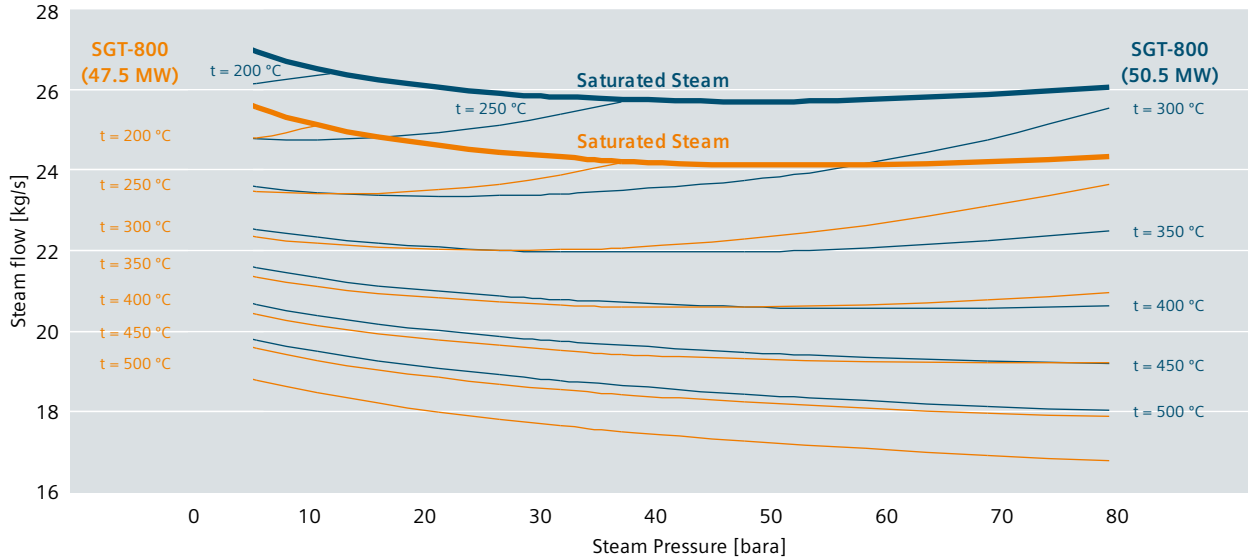
Ambient pressure: 1.013 bar (a)
 Relative humidity: 60%
 Power turbine speed: 6.600 rpm
 Gas: 100% CH₄



SGT-800, 50.5 MW
Nominal Power Generation Performance

Inlet duct pressure loss: 0 mbar
 Outlet duct pressure loss: 0 mbar
 Generator frequency: 50 Hz
 Power factor: 0.9

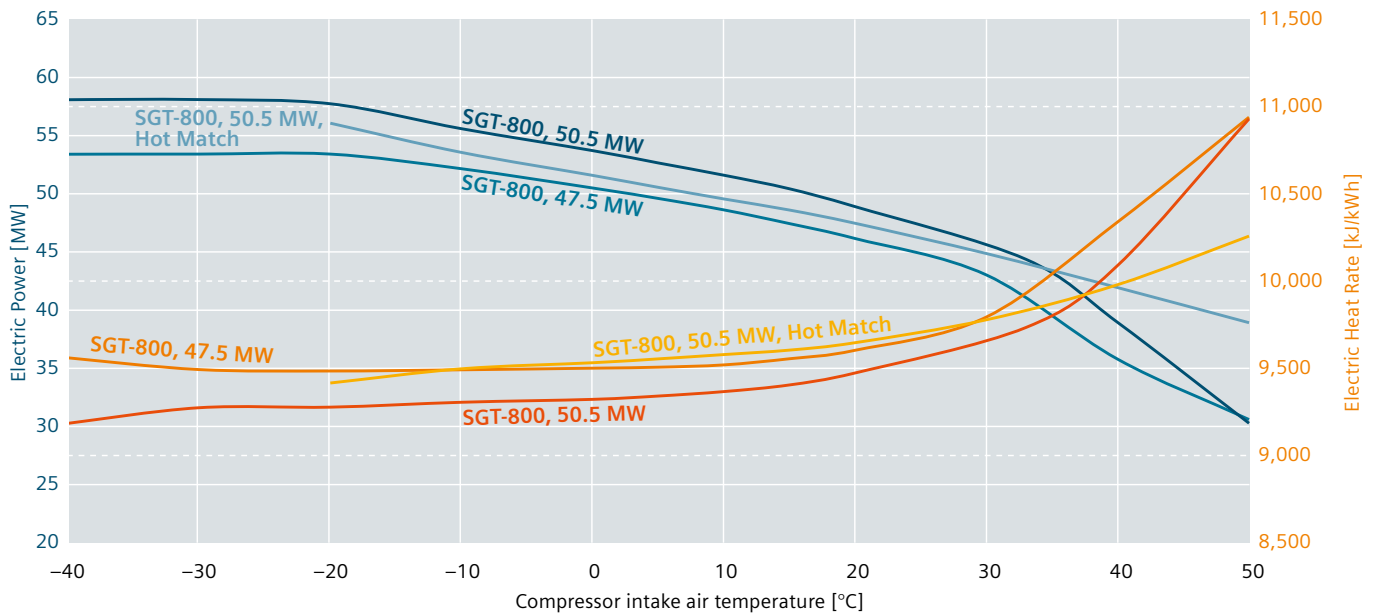
Steam Generation & Hot Climate Capability



SGT-800 Unfired Heat-recovery Steam Generation Capability

Operating conditions:

Ambient temperature:	15°C	Pinch-point:	8 °K	Return condensate fraction:	20%
Ambient pressure:	1,013 bara	Approach Point:	5 °K	Make up water temperature:	15 °C
Gas:	100% CH ₄	Return condensate temperature:	80 °C		



SGT-800 High Ambient Temperature Capability

Operating conditions:

Ambient pressure:	1,013 bara
Gas:	100% CH ₄

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