

SGT-400 Industrial Gas Turbine

Power Generation: (ISO) 12.90 MW(e)

The SGT-400 combines very high efficiency (nominal 35 %) with excellent emissions performance in a rugged industrial design. This makes it the ideal choice for a wide variety of power generation applications.

The Siemens twin-shaft industrial gas turbine SGT-400 features a compact gas generator and a two-stage power turbine, incorporating the latest aerodynamic and combustion technologies. The turbine has a simple-cycle efficiency of nominally 35 %.

For industrial cogeneration, the high steam-raising capability of more than 27 tonnes per hour contributes towards achieving overall plant efficiencies of 80 % or higher. In addition, the compact arrangement, on-site maintainability and inherent reliability of the SGT-400 have made it an ideal gas turbine for the demanding oil and gas industry.

Incorporating proven gas turbine technology, the SGT-400 offers cost-effective power for a wide range of duties, including:

Industrial Power Generation

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

Power Generation in the Oil and Gas Industry

- Offshore: on oil platforms and FPSO (Floating Production, Storage & Offloading) vessels
- Onshore: for oil field service, refinery application, emergency and standby power generation,
- Including highly efficient cogeneration solutions for oil and gas applications

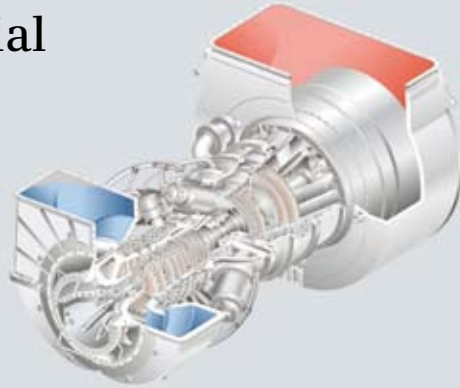


Industrial Gas Turbines

Answers for energy.

SIEMENS

SGT-400 Industrial Gas Turbine



SGT-400 core engine test facility.

Technical specifications

Overview

- Twin-shaft, industrial
- Power generation: 12.90 MW(e)
- Frequency: 50 or 60 Hz
- Electrical efficiency: 34.8 %
- Heat rate: 10,355 kJ/kWh (9,815 Btu/kWh)
- Compressor pressure ratio: 16.8:1
- Exhaust gas flow: 39.4 kg/s (86.8 lb/s)
- Exhaust temperature: 555°C (1,031°F)
- Typical emissions: NO_x <15 ppmV and CO <10 ppmV (corrected to 15% O₂ dry)
- Medium-calorific value fuels capability (>25 MJ/Nm³ Wobbe index)

Axial Compressor

- 11-stage with variable inlet guide vanes
- Air flow: (ISO) 38.9 kg/s
- Nominal speed: 14,100 rpm

Combustion

- 6 reverse-flow cannular combustion chambers
- Dry Low Emissions (DLE) system
- High-energy ignitor system

Turbine

- 2-stage overhung compressor turbine
 - Both stages are air-cooled
- 2-stage high-efficiency power turbine
 - Rotor blades have interlocking shrouds for mechanical integrity

Bearings

- Tilt-pad radial and thrust
- Standard vibration- and temperature-monitoring

Main reduction gearbox

- Speeds of 1,500rpm and 1,800rpm

Generator

- Voltages: 6 to 13.8 kV
- Frequency: 50 or 60 Hz

Package

- Fabricated steel underbase
 - Integral oil tank
 - Multi-point mounting
 - Optional 3-point mounting
- Modular fluid systems incorporating:
 - Lubricating oil system
 - Auxiliary gearbox-driven main pump
 - AC motor-driven auxiliary pump
 - DC motor-driven emergency pump
- Oil cooler and oil heater
- Electrically driven hydraulic start system
- Hydrocarbon drains tank on package
- Control system
 - Siemens SIMATIC PLC-based with distributed control and processing capability installed on package
 - Optional Allen-Bradley system
 - Optional off-package systems
- Vibration monitoring system
 - BN1701: Standard
 - BN3500: Optional
- Fire and gas detection equipment
- Fire suppression equipment
- On- and off-line compressor cleaning options available
- Combustion-air inlet-filtration options:
 - Simple static
 - Pulse cleaning
 - HEPA
- Enclosure
 - Painted carbon steel or stainless steel
 - Noise level options (85 dB(A) standard)

Gas turbine

Key features

- High simple-cycle and cogeneration efficiencies, cutting fuel costs
- Dual-fuel Dry Low Emissions (DLE) combustion system, meeting stringent legislation
- Twin-shaft arrangement for both power generation and mechanical drive, allowing commonality of parts in mixed duty installations

Maintenance

- Site maintainability or optional rapid core exchange as required by customer
- Designed for maintenance:
 - Horizontally split compressor casing
 - Horizontally and vertically split inlet casing
 - Combustion chambers, flame tubes and ignitors easily accessible for inspection
 - Large side-doors on enclosure for equipment change-out
 - Gas generator and power turbine removal on either side of package
- Multiple boroscope-inspection ports



SGT-400 package.



Sewage-sludge drying plant for the City of Athens, on Psytalia island.

Package

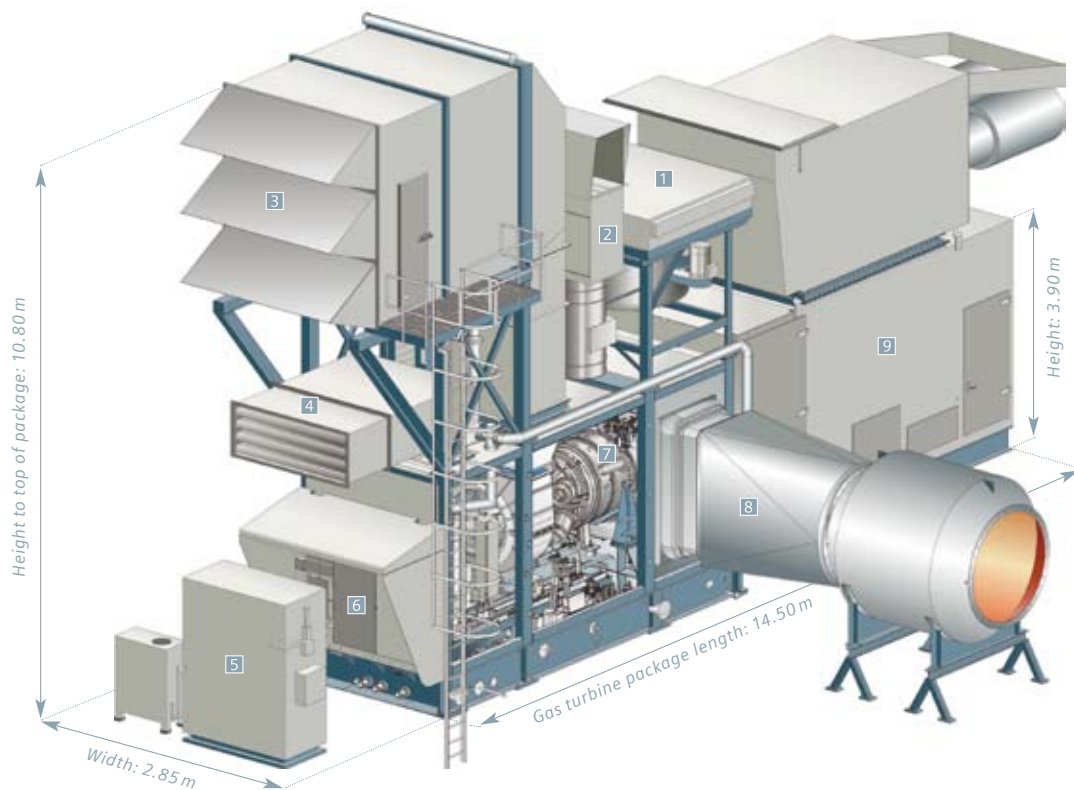
Key features

- Short installation time
- Compact package size, high power-to-weight ratio
- Factory testing:
 - Core engine
 - Functional testing of modules as standard
 - Pre-commissioning of package
 - Optional core customer-witness test
 - Optional complete package test
- Minimized customer interfaces

Customer Support

Key features

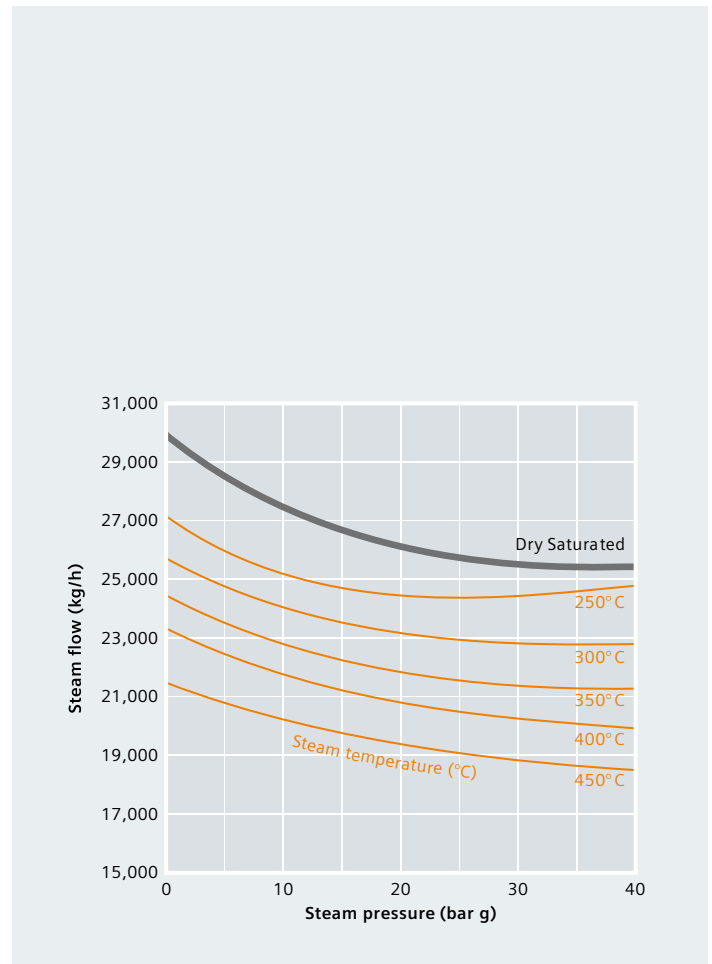
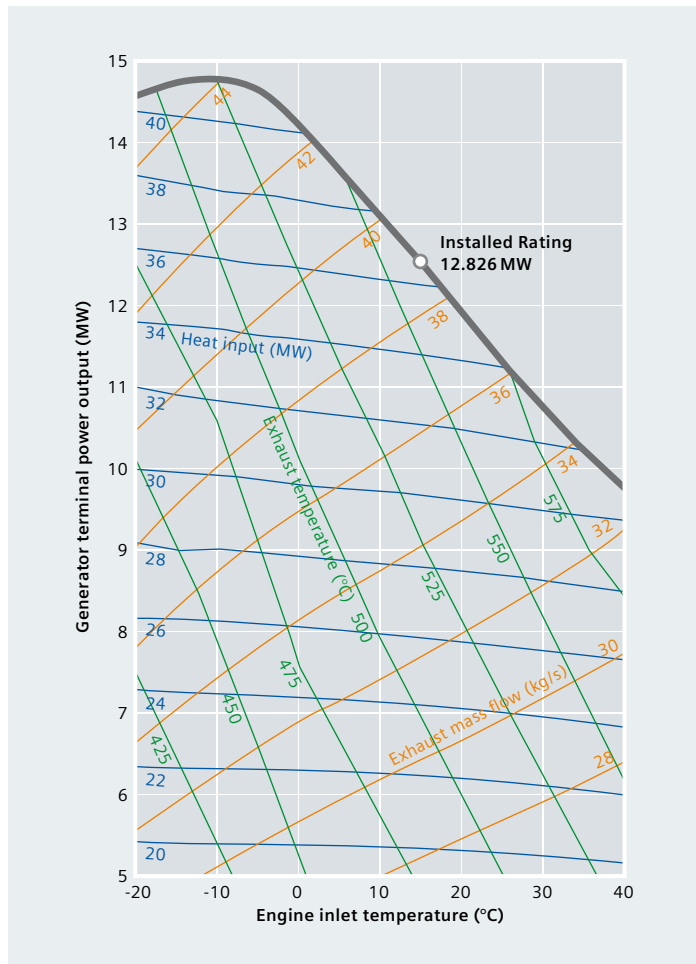
- Global support network of Authorized Service Centers
- Emergency service – 24/7 specialist helpdesk
- Full field service
- Full diagnostic support, remote monitoring
- OEM modernizations and upgrades
- In-house or on-site training programs
- Range of maintenance and service contracts available



SGT-400 standard package

- | | | |
|------------------------|-----------------------|----------------------|
| 1 Lube oil cooler | 4 Enclosure air inlet | 7 Core engine |
| 2 Enclosure air outlet | 5 Fire and gas system | 8 Combustion exhaust |
| 3 Combustion air inlet | 6 On-package controls | 9 AC generator |

SGT-400 Performance



Nominal generator output and heat rate

Conditions/assumptions:

Altitude:	Sea level	Natural gas fuel only.	
Ambient pressure:	101.3 kPa	Gearbox efficiency:	99.0%
Inlet ducting loss:	1.0 kPa	Generator efficiency:	97.2%
Exhaust ducting loss:	2.0 kPa	Relative humidity:	60%
(assumes waste-heat recovery)		No CO-turndown bleed in operation	

High ambient PT nozzle – A high ambient temperature (30°C) rating is available to provide higher power at elevated site temperatures using an alternative power-turbine nozzle configuration.

Unfired heat-recovery steam generation

Conditions/assumptions:

Exhaust gas mass flow:	39.5 kg/s
Gas temperature leaving boiler:	120°C
Assumed feed water temperature:	100°C
Exhaust gas temperature:	573°C

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