

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

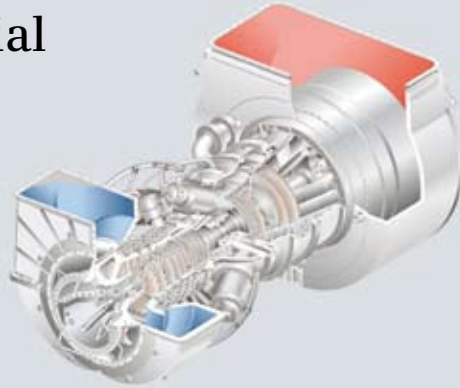


Industrial Gas Turbines

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

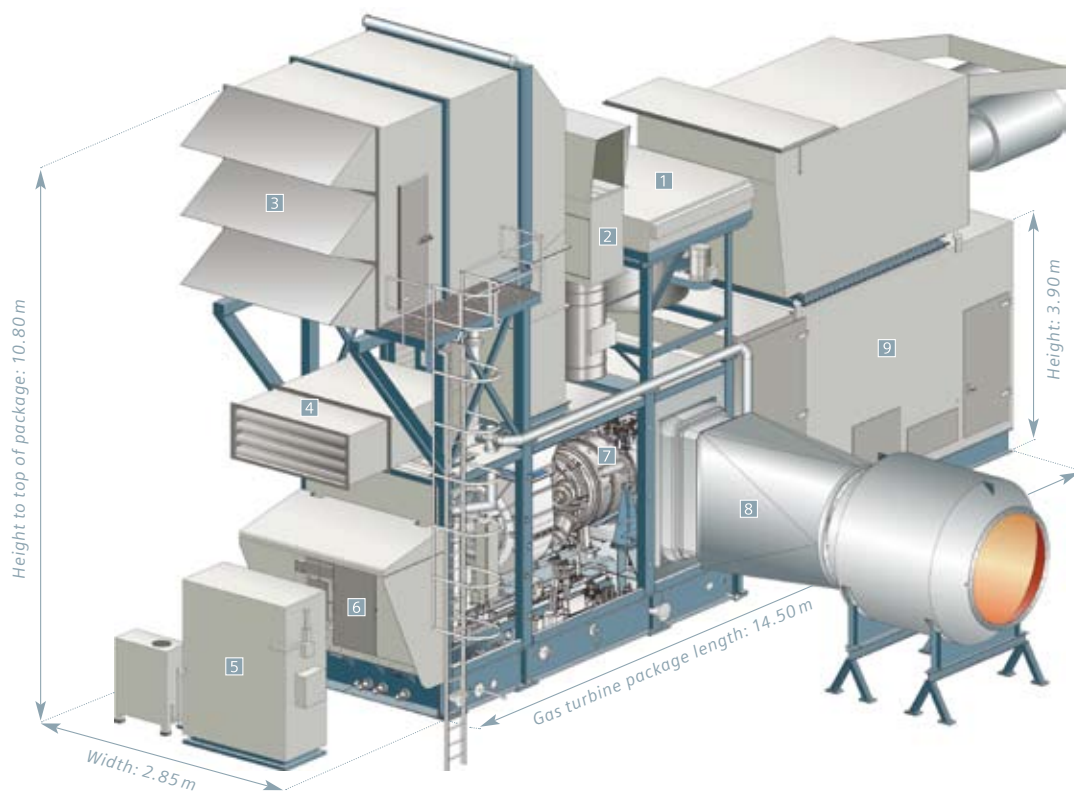
Key features

- 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

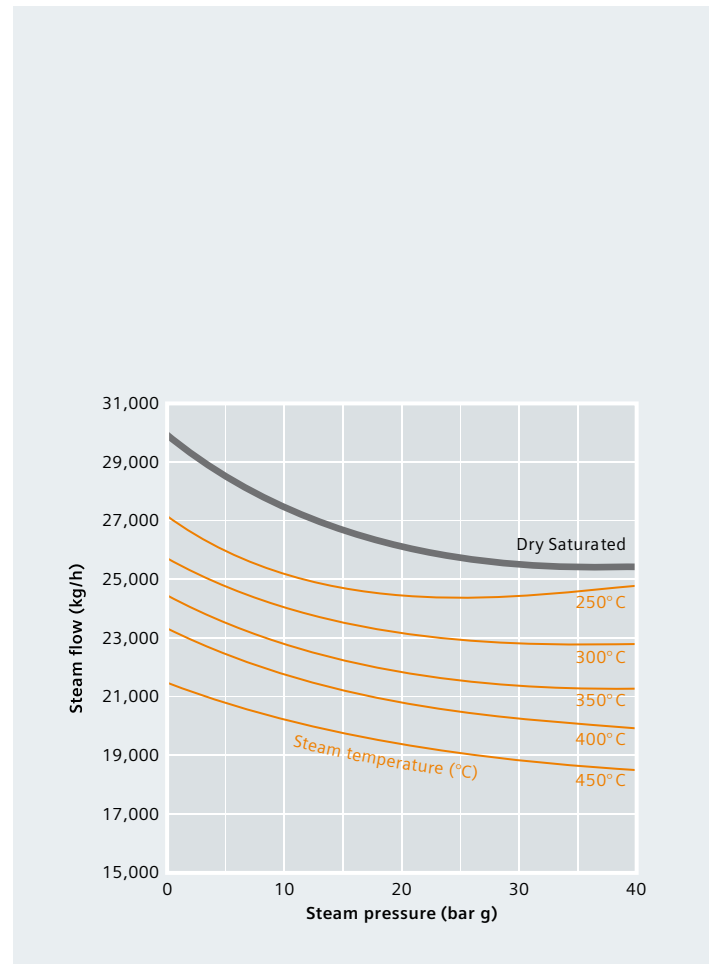
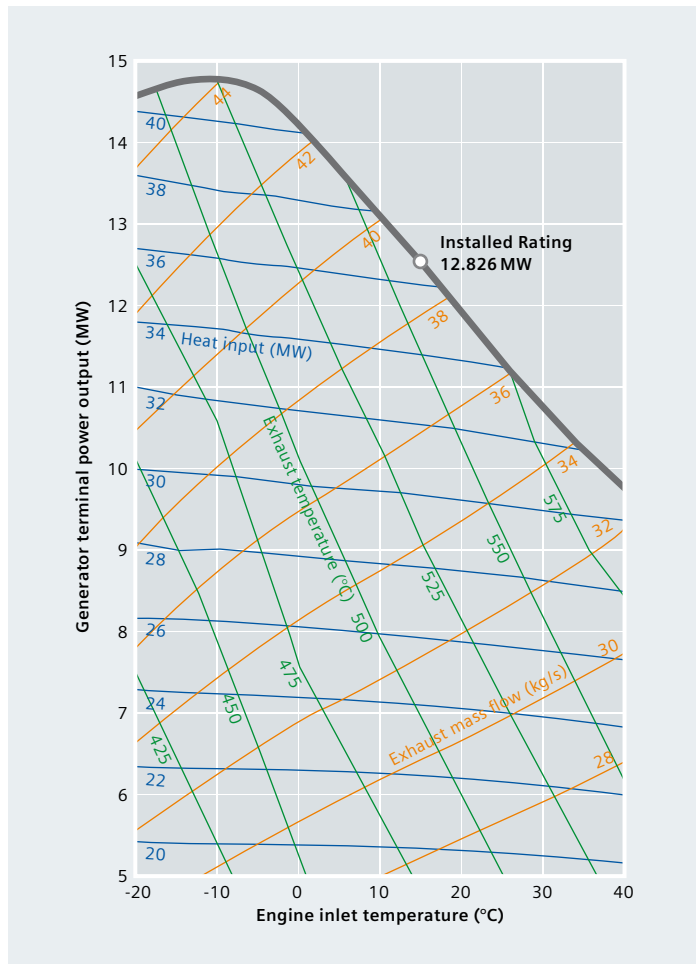
- Global support network of Authorized Service Centers
- Emergency service – 24/7 specialist helpdesk
- Full field service
- Full diagnostic support, remote monitoring
- OEM modernizations and upgrades
- In-house or on-site training programs
- Range of maintenance and service contracts available



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

Published by and copyright © 2009:
Siemens AG
Energy Sector
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens AG
Energy Sector
Oil & Gas Division
Wolfgang-Reuter-Platz
47053 Duisburg, Germany

Siemens Energy, Inc.
10730 Telge Road
Houston, Texas 77095, USA

Siemens Industrial Turbomachinery Ltd.
Ruston House, Waterside South
Lincoln LN5 7FD, United Kingdom

For more information, please contact
our Customer Support Center.
Tel: +49 180 524 70 00
Fax: +49 180 524 24 71
(Charges depending on provider)
E-mail: support.energy@siemens.com

Oil & Gas Division
Order No. E50001-W430-A103-X-4A00
Printed in Germany
Dispo 34806, c4bs 7447 P WS 06092.5

Printed on elementary chlorine-free bleached paper.

All rights reserved. Trademarks mentioned in this document are the property of Siemens AG, its affiliates, or their respective owners.

Subject to change without prior notice. The information in this document contains general descriptions of the technical options available, which may not apply in all cases. The required technical options should therefore be specified in the contract.