



Industrial Applications

SGT-200 Industrial Gas Turbine

Power Generation: (ISO) 6.75 MW(e)

The Siemens SGT-200-1S single-shaft industrial gas turbine (*formerly known as the Tornado single-shaft*), is a proven unit for all electrical power generation and cogeneration applications. It offers high efficiency and reliability and operates on a wide range of gaseous and liquid fuels.

The SGT-200-1S is available with a Dry Low Emissions (DLE) combustion system, providing extremely low NO_x levels with gas and liquid fuels and a full dual fuel capability.

The gas turbine design is uniquely simple, employing a single twin bearing rotor with heavy duty casings. This allows full site maintenance to be carried out.

The generator set package is very compact, providing a small footprint and a high power-to-weight ratio. The single-shaft configuration provides excellent load acceptance and rejection characteristics, allowing robust and reliable operation in all applications.



Industrial Power Generation

The SGT-200-1S is the ideal unit for industrial power generation, particularly in cogeneration or combined heat and power.

In such applications where the gas turbine's high temperature exhaust is passed through a waste heat recovery unit or boiler, overall thermal efficiencies of up to 95% can be achieved.

Steam or hot water generated is used in industrial process or district heating schemes. The steam raised may also be used in small scale combined cycle applications in conjunction with a steam turbine. Alternatively, exhaust heat may be utilised for drying of industrial products.

Power Generation in the Oil and Gas Industry

The compact arrangement, on-site maintainability and inherent reliability of the SGT-200-1S have made it the gas turbine of choice for the oil and gas industry. It is employed on offshore platforms and Floating Production Storage and Off-loading (FPSO) vessels world-wide. Onshore the unit is the ideal power generator for oil field service, refinery application, emergency and standby power generation.

Cogeneration in the oil and gas industry provides highly efficient solutions for crude oil and glycol heating as well as steam generation. The gas generator is interchangeable between single and twin-shaft packages. This provides a high degree of flexibility for operators using the gas turbine for power generation and mechanical drive.



General Specifications

Axial Compressor

- 15-stage axial flow subsonic design
- Variable inlet guide vane and stators
- Pressure ratio: (ISO) 12.3:1
- Airflow: (ISO) 29.0 kg/s
- Nominal speed: 11,050 rpm

Combustion

- 8 reverse flow tubular combustion chambers
- Conventional combustion system option
 - 2 retractable high energy ignitors
 - Cross lighting between chambers
- Dry Low Emissions (DLE) combustion system option
 - Single high energy ignitor in each chamber
- Steam injection option for power augmentation

Turbine

- 2-stage overhung compressor turbine
 - First stage is air-cooled
- 2-stage high efficiency power turbine
 - Mechanically coupled to compressor turbine

Fuel System

- Natural gas - Liquid fuel - Dual fuel
- Other fuels capability available on request
- Automatic changeover from primary to secondary fuel at any load

Emissions Control

- Single and dual fuel Dry Low Emissions (DLE) combustion system
 - VGV modulation for part load emissions control
- DLE NO_x levels of sub 25 ppmVd and 60 ppmVd on gas and liquid fuel respectively
- Steam or water injection for emissions control on conventional combustion

Bearings

- Plain and tilting pad journal and thrust bearings
- Vibration and temperature monitoring

Gearbox - Power Generation

- Hot-end drive via a speed reducing epicyclic gearbox
- Output speeds of 1500 rpm and 1800 rpm to suit 50 Hz or 60 Hz operation

Lubrication

- Integral lubricating oil system
- Gearbox driven main pump
- AC motor driven auxiliary pump
- DC motor driven emergency pump

Starting

- Direct via variable speed AC motor

Compressor Cleaning

- On-line and off-line high pressure cleaning

Control System

- PLC based with local distributed control and processing capability installed on the underbase

Principal Features

- *Dual fuel Dry Low Emissions (DLE) combustion system, meeting the latest legislation*
- *Site maintainability*
- *Alternate rapid core engine exchange option*
- *Compressor cleaning both on and off-line*
- *Compact size with low weight-to-power ratio*
- *Highly competitive cost-to-power ratio with very low installation costs*

Maintenance and Service

- *Maintenance on or off site*
- *Multiple borescope inspection ports*
- *Vertically and horizontally split intake casing*
- *Horizontally split compressor casing*
- *Combustion chambers, flame tubes and ignitors easily accessible for inspection*
- *Hot section inspection on condition*
 - typically after 24,000 hours
- *General overhaul on condition*
 - gas generator typically after 48,000 hours
 - power turbine typically after 48,000 hours

Customer Support

Utilising our global support network, customer support managers and a round-the-clock specialist help desk, we are able to provide first class support to our customers. In addition, remote monitoring and troubleshooting are available on-line via our Electronic Data Exchange Network (EDEN) system. This allows full diagnostic support from our world-wide service centres.

Training programmes are designed for both in-house or on-site application. We can supply spare parts and service exchange items from regional distribution centres or electronically via the on-line 'Sparesfinder' service. We are committed to providing OEM retrofits, upgrades and refurbished packages to our customers' specifications.

We offer a combination of maintenance contracts, overhauls (using lease or exchange engines) and technical field support with our world-wide pool of over 200 field staff.



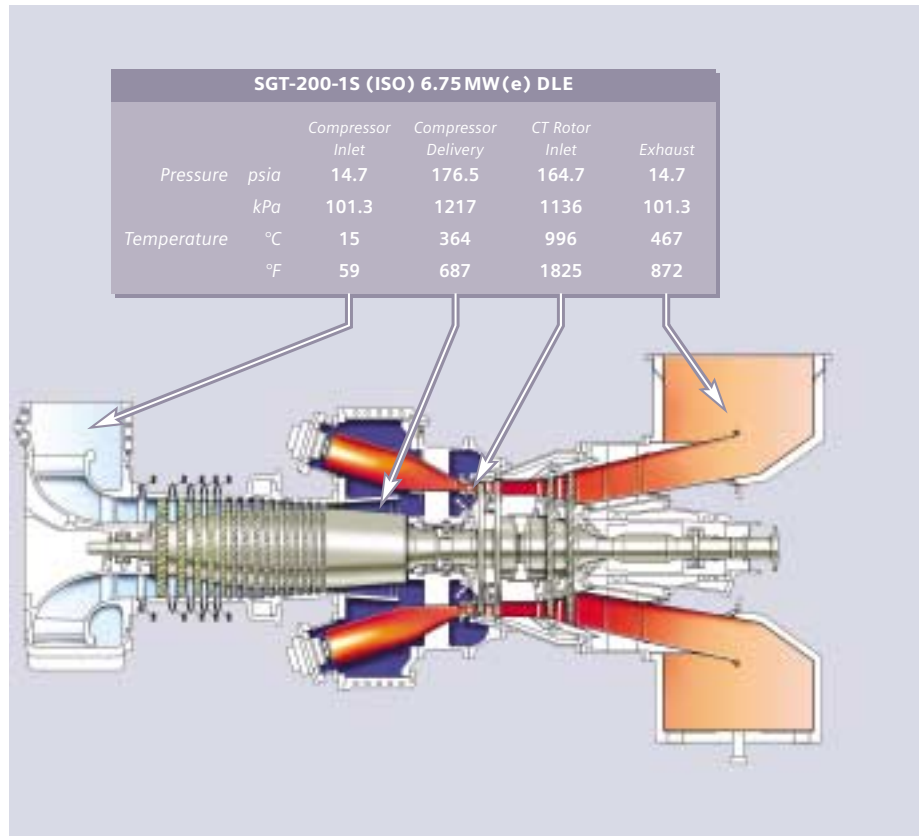
Package

The SGT-200-1S is available as a factory assembled packaged power plant for utility and industrial power generation applications. It is easily transported, installed and maintained at site. The package incorporates the gas turbine, gearbox, generator and all systems mounted on a single underbase.

Turbine controls, generator control panel, motor control centre for package motors and variable speed drive for starter motor can also be package mounted.

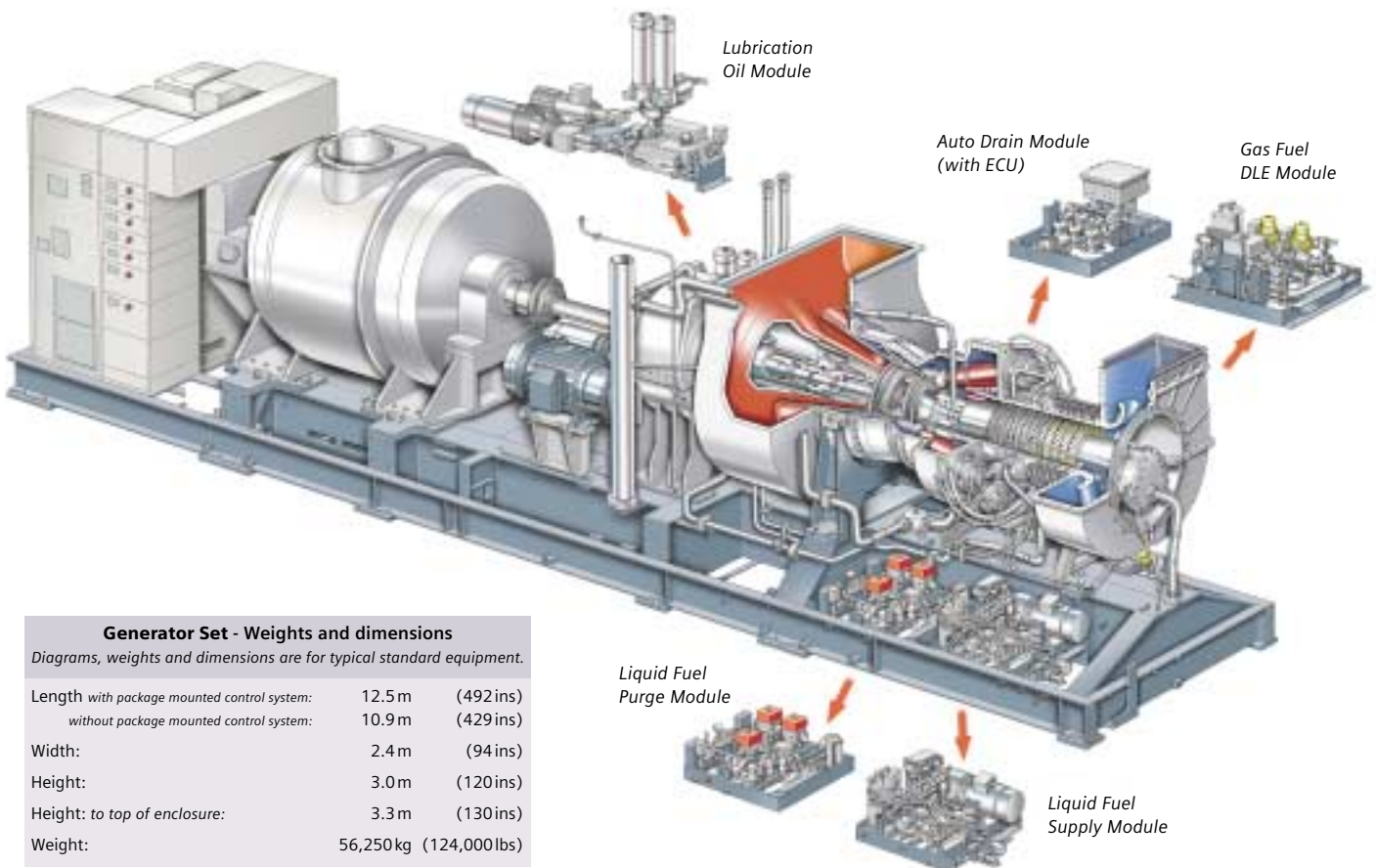
A common modular package design concept is used with the appropriate system pre-assembled and tested in modular form and installed into a standard underbase design. The modules are easily accessible for maintenance. Distributed input/output collection modules are used on the package to reduce the amount of site cabling to any off-skid control equipment.

The package is available for either multi-point or three-point mounting for onshore or offshore use as required. An option for acoustic treatment reduces noise levels to 80dB(A) and is available in carbon steel or stainless steel. Doors and panels are incorporated to provide access for servicing.



Flow Diagram

Modular Package - Generator Set

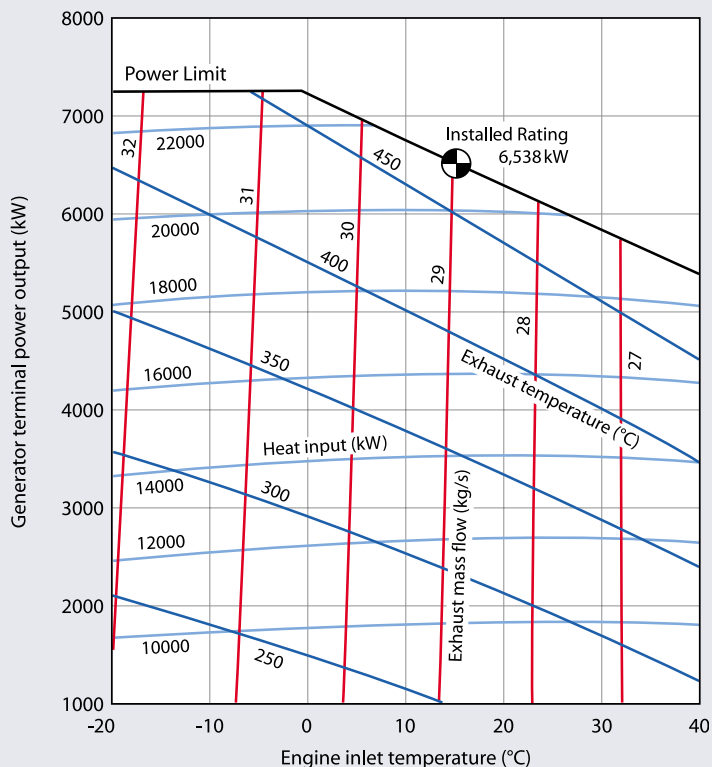


Generator Set - Weights and dimensions

Diagrams, weights and dimensions are for typical standard equipment.

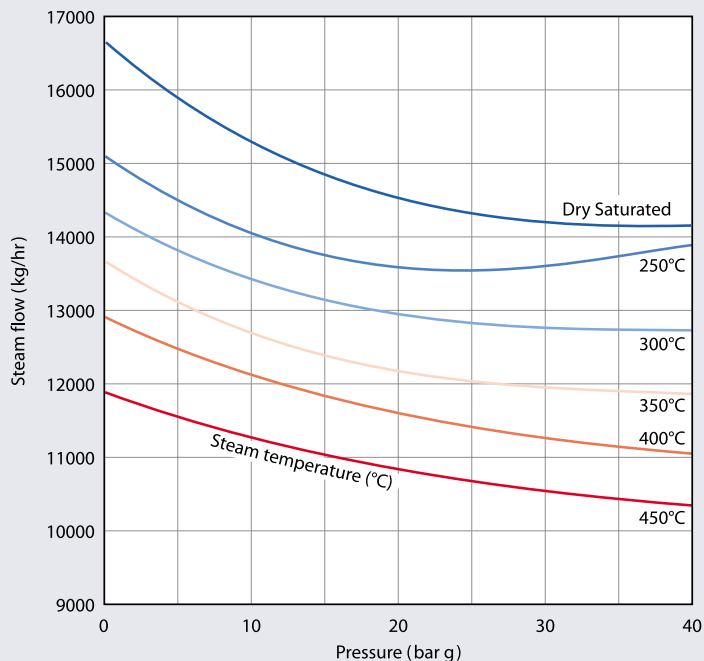
Length with package mounted control system:	12.5 m	(492 ins)
without package mounted control system:	10.9 m	(429 ins)
Width:	2.4 m	(94 ins)
Height:	3.0 m	(120 ins)
Height: to top of enclosure:	3.3 m	(130 ins)
Weight:	56,250 kg	(124,000 lbs)

Generator Set - Nominal performance



Altitude:	Sea level
Ambient pressure:	101.3 kPa
Relative Humidity:	60%
Inlet ducting Loss:	1.0 kPa
Exhaust ducting Loss:	2.0 kPa
<i>(assumes waste heat recovery)</i>	
Gearbox efficiency:	98.5%
Generator efficiency:	97.0%

Unfired heat recovery steam generation



Exhaust gas mass flow:	29.0 kg/sec
Mean specific heat:	0.26 kcal/kg/°C
Gas temperature leaving boiler:	120°C
Assumed feed water temperature:	100°C
Exhaust gas temperature:	472°C

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The information in this document contains general descriptions of the technical options available which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.

