

Fuel Gas System

A typical gas fuel configuration employs shutoff valves for safety reasons and metering valves to control the machine load and CO/NO_x emissions.

Depending on the level of DLN performance requested, two or three metering valves are needed in order to control gas injection in the various parts of the combustion chamber.

Unit Control Panel

The GE10-2 control system is standardized to assure a high degree of integration between the turbine and the driven equipment.

The system is based on the GE Mark VI platform.

The Bently Nevada 3500 is installed for seismic probes acquisition and humming detection.

The control, monitoring and tuning of unit parameters can be performed remotely. Remote data acquisition does not interfere with normal site operations.

Air Filter

The air filtration system consists of a "self-cleaning" horizontal cartridges filter house, an inlet duct and a silencer.

This system also provides an anti-icing function without any additional hardware. Filter inspection is facilitated by gangways and ladders that are included as part of the scope of supply.

A multi-stage static filter can be provided upon customer request.

Package Arrangement

The GE10-2 package has been developed for hazardous area installation in accordance with API standards and is specifically designed for mechanical drive applications. The gas turbine enclosure consists of a separate structure with panels that is mounted on a base plate. Access doors are included for normal maintenance operations and inspections. Engine removal can be performed without cranes. The ventilation system for internal cooling of the package consists of two 100% axial fans (one main and the other stand-by). The enclosure includes fire & gas detection systems and an automatic CO₂ type fire fighting system. An H₂O type fire fighting system can be provided on customer request. The enclosure guarantees a sound pressure level lower than 85 dBA at 1m.; an 80 dBA version is available on request.

Available Options

- Dual Fuel DLN version (liquid + gas fuel)
- 80 dBA sound pressure level package
- Indoor version
- H₂O type fire fighting system
- Static air filter system
- H₂O oil cooler system
- Gas expansion turbine starting system



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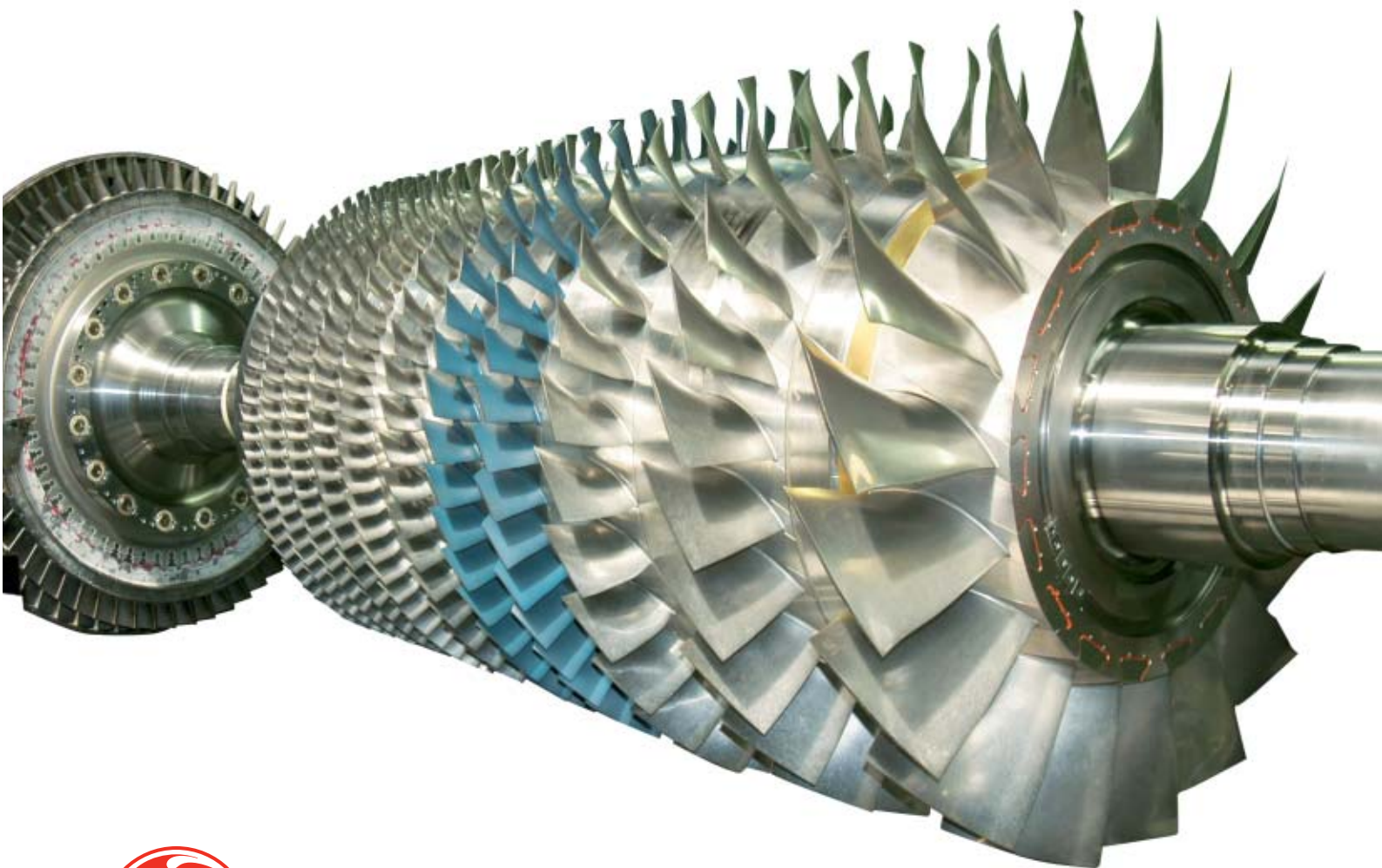
GE imagination at work

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GE
Oil & Gas

GE10-2

Gas Turbine



Axial Compressor

The compressor is a high Performance, eleven-stage axial flow design with a 15.5:1 pressure ratio derived from GE Aircraft Engine transonic flow aero design technology. The rotational speed is 11000 rpm with a mass flow of 47 kg/s. The antisurge margin exceeds 25%. Advanced 3D airfoils are used for vanes and blades, and the first three rows of stator blades are adjustable to optimize operability. The compressor rotor cold side (the fixed point of the gas turbine) accommodates the load flange. This configuration guarantees reduced flange movement during gas turbine thermal transients. A patented GECC-1 aluminum ceramic coating is provided for application in marine environments.

Combustion System and Emissions

The combustion system consists of a single, slot-cooled combustion chamber assembly that permits easy maintenance of the hot gas path. This combustion chamber is able to burn a wide range of fuels, from liquid distillates to residuals, to all gaseous fuels, including low BTU gas. The broad fuel capability of this combustor is due to the variable geometry design patented by GE. Guaranteed NO_x levels of 15 ppmvd and 25 ppmvd @ 15% O₂ over a wide load range are available.

Mechanical Drive — Two Shaft Version.

The GE10-2 is the two shaft version of the GE10 intended for mechanical drive applications. The turbine consists of four reaction stages. The first two stages or High Pressure Turbine (HPT) which are used to drive the axial compressor are common with the GE10-1 model. They are cooled by air bled from the axial compressor. The low pressure shaft is a double stage, high-energy turbine with variable first stage nozzles which provide maximum flexibility for mechanical drive applications. These third and fourth stages which make up the Low Pressure Turbine (LPT) are coupled to the power shaft driving the load.

Lubrication & Starting Systems

The on-base integrated lubrication system feeds the gas turbine and the driven equipment. The lube oil tank is integral with the gas turbine baseplate.

The main lube oil pump is driven by the auxiliary gearbox. The auxiliary oil pump is an AC electric motor-driven pump, while a DC electric motor-driven pump is provided for emergency backup.

The whole system is API 614 compliant with some exceptions. In the standard package configuration, the oil is cooled with an air cooler; a water cooler can be provided upon customer request.

The standard starting system is an electric motor and a torque converter system.

A gas expansion turbine system can be provided upon customer request.

Turbine

The two-shaft version of the GE10 is optimized for mechanical drive applications. It consists of two air-cooled high pressure reaction stages and two low pressure reaction stages coupled to the power shaft.

To optimize the behavior at partial speed/load a variable geometry Nozzle Guide Vane (NGV) is installed between the HP and LP sections.

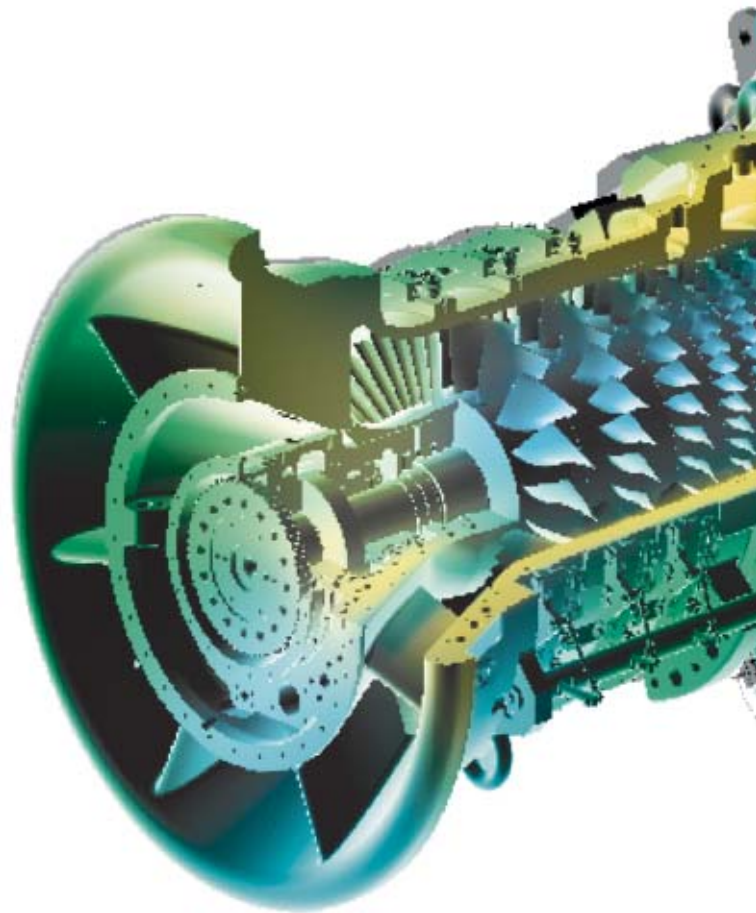


The GE10-2 is a heavy-duty gas turbine in the 12MW range, available in either a single or a two-shaft configuration. It is the evolution of the field proven PGT10 and incorporates the latest in aerodynamic design and versatile package arrangements.

The GE10 engine design has been highly refined based on the extensive experience gained in operating in all types of environments.

There are over two hundred PGT10/GE10 units running under conditions ranging from the cold of Alaska and Siberia to the heat of the desert and the humidity of the tropics.

Its efficiency and operational flexibility make the GE10 a cost-effective choice for all applications.



GE10-2 Gas Turbine

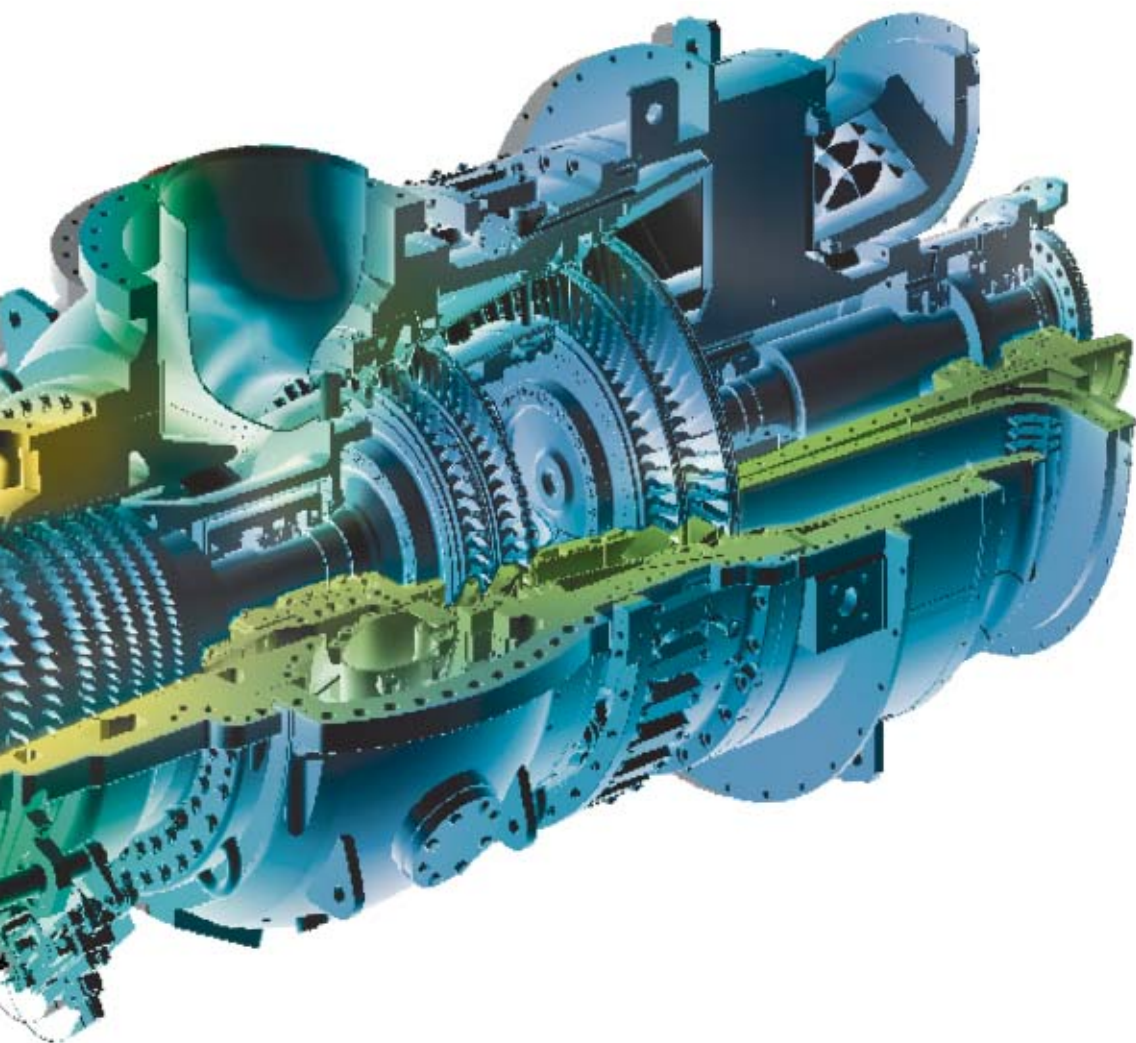
Engine Characteristics

The gas turbine is the well proven GE10-2 engine, a heavy duty double shaft engine that has accumulated a very large number of fired hours, and has leveraged the experience of the previous PGT10.

The cases are horizontally split and the rotor has a disk architecture.

The combustion system consists of a horizontally positioned single can; the GE10-2 is available in both Diffusion Combustion System and DLN (Dry Low NOx) versions and is able to burn a wide range of liquid and gas fuels, including Low BTU gas and hydrogen.

For all GE10-2 gas turbines, the 15 ppm combustion system is available and for current users, existing 25 ppm can easily be upgraded.



GE10-2 Gas Turbine SPECIFICATIONS

Axial Compressor

- 11-Stage Axial Flow
- 15.5:1 Pressure Ratio

Combustion Chamber

- Single Can Combustor
- Pollution prevention:
 - DLN Gas Fuel at 25 ppmvd NOx
 - DLN Gas Fuel at 15 ppmvd NOx
 - DLN Dual Fuel Gas Fuel at 25 ppmvd NOx
 - DLN Dual Fuel Liquid Fuel at 85 ppmvd NOx

Turbine

2 Stages HPT (11000) + 2 Stages LPT (7900)

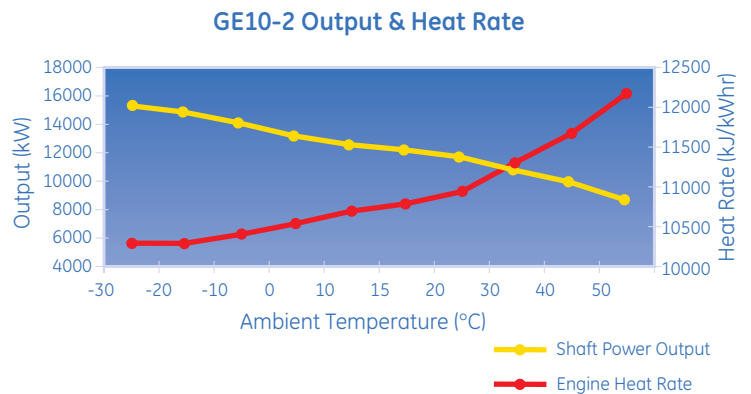
Nominal Rating - ISO

At 15 °C, Sea Level, No External Pressure Losses, Relative Humidity 60%, Natural Gas Fuel with LHV = 32 to 44 MJ/Nm³. STD Combustor

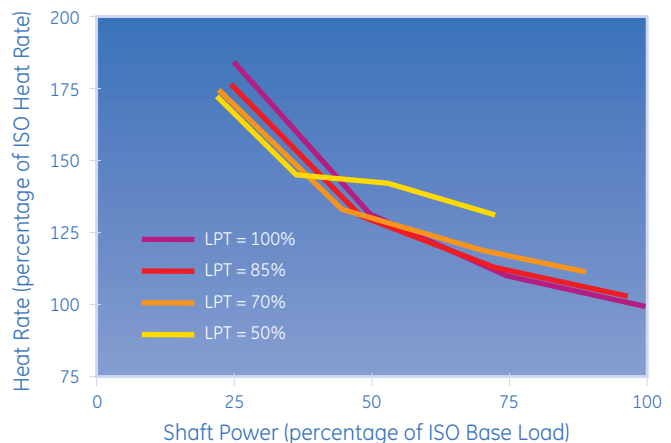
ELECTRICAL OUTPUT (kW)	11982
ELECTRICAL EFFICIENCY (%)	33.3
EXHAUST FLOW (kg/sec)	47.0
EXHAUST TEMPERATURE (°C)	480

GE10-2 Gas Turbine PERFORMANCE CURVES

Standard Combustor
Zero Losses
60% RH
Natural Gas



Standard Combustor
Zero Losses
60% RH
Natural Gas



Maintainability

GE10 maintenance can be carried out either “on-site” or at an authorized shop.

An engine exchange maintenance approach can be adopted to maximize the unit availability.

Enclosure doors, flexible piping and electrical connectors permit the engine to be easily removed, and a back-up engine quickly installed to minimize the plant down time.

The engine is provided with borescope holes for periodic inspection of the internals, and the combustion chamber can be disassembled without removal of any of the engine casings. GE gives the highest priority to engineering and field assistance and offers continuous technological improvements, tailored solutions and support for each machine.

The Global Services Portfolio includes:

- Comprehensive training by highly qualified experts using a combination of traditional and modern interactive training materials and tools supplemented by manufacturing, testing and repair facilities.
- Remote Monitoring and Diagnostics (RM&D) for accurate and continuous assessment of equipment condition and for maintenance planning to maximize plant output. This is the equivalent to having a team of experts on site 24 hours a day, 7 days a week.
- A Customer Care Center as a direct link to GE’s Oil & Gas experts. Customer can call any time to get technical support or information about products, offerings and orders.
- An Inventory of GE Oil & Gas capital parts available to satisfy emergency needs, including complete modules.
- Qualified GE regional service shops guaranteeing quality repairs and reducing turnaround time.
- Contractual Service Agreements to provide maintenance services at a predetermined cost and on a priority basis.

