

archive.org

DECLARATION OF MINA CHING

1. I am a Records Request Processor at the Internet Archive. I make this declaration of my own personal knowledge.

2. The Internet Archive is a website that provides access to a digital library of Internet sites and other cultural artifacts in digital form. Like a paper library, we provide free access to researchers, historians, scholars, and the general public. The Internet Archive has partnered with and receives support from various institutions, including the Library of Congress.

3. The Internet Archive has created a service known as the Wayback Machine. The Wayback Machine makes it possible to browse more than 450 billion pages stored in the Internet Archive's web archive. Visitors to the Wayback Machine can search archives by URL (i.e., a website address). If archived records for a URL are available, the visitor will be presented with a display of available dates. The visitor may select one of those dates, and begin browsing an archived version of the Web. Links on archived files in the Wayback Machine point to other archived files (whether HTML pages or other file types), if any are found for the URL indicated by a given link. For instance, the Wayback Machine is designed such that when a visitor clicks on a hyperlink on an archived page that points to another URL, the visitor will be served the archived file found for the hyperlink's URL with the closest available date to the initial file containing the hyperlink.

4. The archived data made viewable and browseable by the Wayback Machine is obtained by use of web archiving software that automatically stores copies of files available via the Internet, each file preserved as it existed at a particular point in time.

5. The Internet Archive assigns a URL on its site to the archived files in the format http://web.archive.org/web/[Year in yyyy][Month in mm][Day in dd][Time code in hh:mm:ss]/[Archived URL] aka an "extended URL". Thus, the extended URL http://web.archive.org/web/19970126045828/http://www.archive.org/ would be the URL for the record of the Internet Archive home page HTML file (http://www.archive.org/) archived on January 26, 1997 at 4:58 a.m. and 28 seconds (1997/01/26 at 04:58:28). The date indicated by an extended URL applies to a preserved instance of a file for a given URL, but not necessarily to any other files linked therein. Thus, in the case of a page constituted by a primary HTML file and other separate files (e.g., files with images, audio, multimedia, design elements, or other embedded content) linked within that primary HTML file, the primary HTML file and the other files will each have their own respective extended URLs and may not have been archived on the same dates.

INTERNET ARCHIVE

archive.org

6. Attached hereto as Exhibit A are true and accurate copies of browser screenshots of the Internet Archive's records of the archived files for the URLs and the dates specified in the attached coversheet of each screenshot.

7. Attached hereto as Exhibit B are true and accurate copies of the Internet Archive's records of the archived files for the URLs and the dates specified in the attached coversheet of each file.

8. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

DATE: August 5, 2025

Mina Ching

EXHIBIT A

https://web.archive.org/web/20171001044253/https://www.gepower.com/gas/gas-turbines/tm2500

INTERNET ARCHIVE Wayback Machine
https://www.gepower.com/gas/gas-turbines/tm2500
Go
11 captures
1 Oct 2017 - 6 Aug 2024
SEP 2016 OCT 01 2017 FEB 2018
About this capture



TM2500 MOBILE POWER PLANT

Power whenever and wherever it's needed

Get the power you need any time with GE's TM2500 mobile aeroderivative gas turbine generator set - it is like a power plant on wheels.

WHY TM2500 | PRODUCT SPECIFICATION | TM2500 CASE STUDIES

Fast, Reliable, and Flexible Power

With installation and commissioning in as few as 11 days, a TM2500 can help you respond quickly to emergency situations—or help generate back up power during natural disaster relief, plant shutdowns or grid instability. Getting a power project online faster means extra days of revenue—and with easy plug & play installation, it's virtually worry-free. Use the TM2500 to bridge the power gap for short- and long-term energy planning, stabilize the grid, or reach and power remote locations.

Not only do you get fast power, you get reliable power with TM2500. Whether it's more homes seeing their lights come on after an outage, or your organization quickly connecting to the grid and generating more money, the power of the TM2500 lies in its ability to get online—and stay online.

34-37 MW
wheels.

Power now
first trailer to commissioning.

High efficiency
37% efficiency—higher than most grids.

Scalable power
Able to add 34-37 MW blocks of power as demand increases.

Fuel flexibility
Can operate on gas and/or distillate liquid fuel.

Fast start
10 minutes to ramp up to full power.

Project experience
More than a decade of experience in providing emergency power.

Financing options
GE can facilitate and potentially make financing available.

Mobility
Can be transported via land, sea or air to remote locations and redeployed to other sites.

Proven technology
More than 300 units deployed with over 5 million operating hours of experience.

Contact GE today

*First Name:

*Last Name:

*Email Address:

*Phone (Please include Area Code):

*Company Name:

Job Title:

*How much capacity do you need?
Select...

*Location:
Select...

Comments:

I wish to receive future marketing communications from GE Vernova's Power Businesses, and I understand and agree to the privacy policy.

CONTACT US NOW

Learn what makes TM2500 powerful →

Featured case study: GE in Indonesia

Bringing 500 MW of power on-line, at eight different sites scattered across six different islands in the Indonesian Archipelago.



Working with GE offers you complete peace of mind.

In the Republic of Indonesia, the world's fourth most populous nation, close to one-third or more of the population can be without electricity in rural areas. The government has made it a priority to upgrade power while also boosting the economy, helping to meet the need of providing reliable power to 225 million residents spread across 18,000 islands.

GE is working with PLN Batam to advance the electrification of the country. Instead of building conventional power plants, which can take years, they have deployed "fast power" TM2500 units to eight sites on six different islands. Despite some unique challenges that rural islands present—like the need to build a temporary jetty to offload the units—the TM2500 power plants were generating 500 MW of power, enough to supply about 4 million homes, by the end of the first year.

Want to learn more about TM2500? Contact Us Now →

© 2017 GENERAL ELECTRIC

https://web.archive.org/web/20171001044253/https://www.gepower.com/gas/gas-turbines/tm2500

Note: After loading the page, I clicked on the tab labeled "PRODUCT SPECIFICATION" to display the view shown here.

INTERNET ARCHIVE Wayback Machine
https://www.gepower.com/gas/gas-turbines/tm2500
Go
11 captures
1 Oct 2017 - 6 Aug 2024
SEP OCT FEB
01
2016 2017 2018
About this capture



Power whenever and wherever it's needed

Get the power you need any time with GE's TM2500 mobile aeroderivative gas turbine generator set - it is like a power plant on wheels.

WHY TM2500 | PRODUCT SPECIFICATION | TM2500 CASE STUDIES

TM2500 Product Specifications

Contact GE today

The TM2500 is packaged on a two-trailer system with steerable axles to minimize individual trailer weight and improve maneuverability, making the TM2500 easily transportable by ship, air, or road—even to the most remote locations around the globe.



34-37 MW
POWER RANGE

99%
RELIABILITY

13.8 KV
VOLTAGE

35%-37%
EFFICIENCY

3600 rpm
TURBINE SPEED

27.7 m x 8.2 m
(91 ft x 27 ft)
SMALL FOOTPRINT

TM2500 Efficiency and Heat Rates

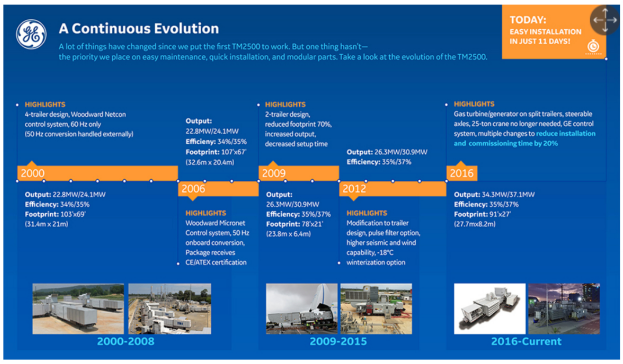
Model	Output (MW)	Heat Rate Btu/kWh, LHV	Heat Rate kJ/kW-hr, LHV	Efficiency, LHV
TM2500 (50Hz)	33.6	9,794	10,333	34.8%
TM2500 (60Hz)	35.9	9,330	9,844	36.6%

NOTE: Performance calculated at ISO conditions.

Download TM2500 mobile gas turbine brochure (w/ detailed technical specifications)

A Continuous Evolution

A lot of things have changed since we put the first TM2500 to work. But one thing hasn't—the priority we place on easy maintenance, quick installation, and modular parts. Take a look at the evolution of the TM2500.



+ Click to expand

See how countries all over the world are getting power—fast →

Featured case study: GE in Indonesia

Bringing 500 MW of power on-line, at eight different sites scattered across six different islands in the Indonesian Archipelago.



Working with GE offers you complete peace of mind.

In the Republic of Indonesia, the world's fourth most populous nation, close to one-third or more of the population can be without electricity in rural areas. The government has made it a priority to upgrade power while also boosting the economy, helping to meet the need of providing reliable power to 225 million residents spread across 18,000 islands.

GE is working with PLN Batam to advance the electrification of the country. Instead of building conventional power plants, which can take years, they have deployed "fast power" TM2500 units to eight sites on six different islands. Despite some unique challenges that rural islands present—like the need to build a temporary jetty to offload the units—the TM2500 power plants were generating 500 MW of power, enough to supply about 4 million homes, by the end of the first year.

Want to learn more about TM2500? Contact Us Now →

LIBERTY EXHIBIT 1012, Page 9

© 2017 GENERAL ELECTRIC



PRIVACY TERMS ACCESSIBILITY COOKIES

https://web.archive.org/web/20171001044253/https://www.gepower.com/gas/gas-turbines/tm2500

Note: After loading the page, I clicked on the tab labeled "TM2500 CASE STUDIES" to display the view shown here.

INTERNET ARCHIVE Wayback Machine
https://www.gepower.com/gas/gas-turbines/tm2500
Go
11 captures
1 Oct 2017 - 6 Aug 2024
SEP OCT FEB
2016 01 2017 2018
About this capture



TM2500 MOBILE POWER PLANT

Power whenever and wherever it's needed

Get the power you need any time with GE's TM2500 mobile aeroderivative gas turbine generator set - it is like a power plant on wheels.

WHY TM2500 | PRODUCT SPECIFICATION | TM2500 CASE STUDIES

TM2500 Case Studies

Contact GE today

Algeria—Sustaining power throughout the hot summer months

Algeria has faced a drastic need for more power, particularly during the hot summer months. Over the last three years, SPE, the power generation subsidiary of Sonelgaz, has partnered with GE and Power Projects Company (an affiliate of METKA) on contracts providing 38 trailer-mounted TM2500+ aeroderivative gas turbine generators and associated Balance of Plant to provide reliable and fast power to all regions in Algeria. The first contract in 2012 supplied 6 TM2500+ units and a second contract provided an additional 24 TM2500+ units—the largest order GE has ever received for its TM2500 technology. More units were contracted or sold in late 2013.



The TM2500+ gas turbines produce more than 760 megawatts of power, and were commissioned, delivered and operational in time to meet the 2013 and 2014 summer peak electricity demand. It was a challenging project but the GE team's commitment took a massive project from four months to four weeks.

Mexico—Bringing power back to Baja

Hurricane Odile hit Mexico's Baja Peninsula in September 2014, and was one of the most destructive storms in the country's history. Odile caused mudslides, flooding, and damaged 100,000 utility poles—leaving the entire peninsula without power.





But with the help of four TM2500s, GE was able to work together with Mexico's Federal Electricity Commission (CFE) to get emergency power up and running in less than two weeks. On October 1, just two days after the contract was signed, GE began shipping the TM2500s to Mexico's San Jose del Cabo Airport. On October 15, the first TM2500 mobile gas turbine was up and running, helping the CFE restore power to full capacity for the thousands of people impacted by the hurricane.

Ecuador—Fast-tracking power after drought

In 2009, Ecuador experienced its worst drought in 40 years. Coupled with the country's dependence on hydropower generation, the drought set off a chain reaction, resulting in 30% of the country's thermal power plants becoming non-operational, and daily power cuts in the country—up to five hours per day at their height in November.



Ecuador had to act fast. After the country signed a contract with GE in November (fewer than 24 hours after they had contacted GE) things moved quickly. With the help of seven TM2500 gas turbines, the country was able to commission 160MW of power in just 12 weeks. The first TM2500 brought Ecuadorian lights on by Christmas, and power cuts ended in January.

Featured case study: GE in Indonesia

Bringing 500 MW of power on-line, at eight different sites scattered across six different islands in the Indonesian Archipelago.



Working with GE offers you complete peace of mind.

In the Republic of Indonesia, the world's fourth most populous nation, close to one-third or more of the population can be without electricity in rural areas. The government has made it a priority to upgrade power while also boosting the economy, helping to meet the need of providing reliable power to 225 million residents spread across 18,000 islands.

GE is working with PLN Batam to advance the electrification of the country. Instead of building conventional power plants, which can take years, they have deployed "fast power" TM2500 units to eight sites on six different islands. Despite some unique challenges that rural islands present—like the need to build a temporary jetty to offload the units—the TM2500 power plants were generating 500 MW of power, enough to supply about 4 million homes, by the end of the first year.

Want to learn more about TM2500? Contact Us Now →

Software
Industries & applications
Case studies
GE Energy Ecosystem

© 2017 GENERAL ELECTRIC



PRIVACY TERMS ACCESSIBILITY COOKIES

https://web.archive.org/web/20160508192056/https://mysolar.cat.com/en_US/products/power-generation.html

INTERNET ARCHIVE WayBackMachine
https://mysolar.cat.com/en_US/products/power-generation.html
Go
1 capture
8 May 2016
APR MAY JUN
2015 08 2016 2017
About this capture

PRODUCTS AND SOLUTIONS

POWER GENERATION

Gas Turbine Power Generation Packages

Solar builds complete turbomachinery packages that are ready to go to work...no matter where the job might be worldwide. Solar designs and manufactures gas turbines and packages under various quality systems ensuring the highest reliability.

LEARN MORE

Environmental Information

Visit our new Environmental Information section to help answer your initial air quality/emissions questions. We have compiled Solar product emission profiles, an emissions calculator, permitting flow charts, links and more.

LEARN MORE

FINANCIAL SERVICES ›

INDUSTRY SOLUTIONS ›

SPECIFY A PROJECT ›

BROCHURES

Powering Your Future With Confidence

Power Generation Product Selection Guide

Clean and Reliable Power for China

OTHER MEDIA

Solar Turbines Provide Mobile Gas Turbine Power for Remote Mining Town in Australia (video)

Sustainable Development in China from Coke Oven Gas (video)

Titan 130 Mobile Power Unit (video)

University of Massachusetts Medical Center Cogeneration Plant (video)

Combustion Gas Turbines for Combined Heat and Power (video)

Turning Landfill Gas Into Energy (video)

© 2013 Solar Turbines Incorporated

https://web.archive.org/web/20160508213125/https://mysolar.cat.com/en_US/products/oil-and-gas.html

INTERNET ARCHIVE
WayBackMachine
https://mysolar.cat.com/en_US/products/oil-and-gas.html
Go
1 capture
8 May 2016
APR MAY JUN
2015 08 2016 2017
About this capture

PRODUCTS AND SOLUTIONS

OIL AND GAS

Gas Turbine Packages for the Oil and Gas Industry

Solar builds complete turbomachinery packages that are ready to go to work...no matter where the job might be worldwide. Solar designs and manufactures gas turbines and packages under various quality systems ensuring the highest reliability.

LEARN MORE



Construction Services

Solar's Construction Services Organization offers a comprehensive range of equipment and services to help you meet your total power system requirements onshore and offshore anywhere in the world, using Solar's family of gas turbines.

LEARN MORE



Gas Compressor Products

Solar manufactures a family of 11 centrifugal gas compressors - the most extensive line in the industry. Depending on the model, the compressors have from 1- 12 stages to handle a variety of inlet flows and pressure ratios.

LEARN MORE



BROCHURES

Construction Services

Spartan Electric Motor Drives for Gas Compression

Turbomachinery Systems for Oil and Gas Applications

Pipeline Compressors

Production Compressors

DATASHEETS

Scalable LNG Production - Refrigeration Solutions for Small Scale LNG

LIBERTY EXHIBIT 1012, Page 18

© 2013 Solar Turbines Incorporated

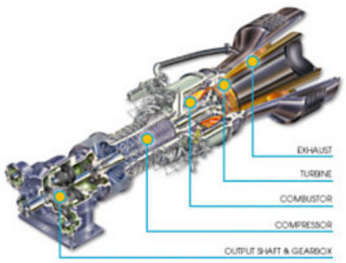
https://web.archive.org/web/20170920065616/https://mysolar.cat.com/en_US/products/gas-turbine-overview.html

INTERNET ARCHIVE
WayBackMachine
https://mysolar.cat.com/en_US/products/gas-turbine-overview.html
Go
MAY SEP OCT
2016 20 2017 2018
2 capture
8 May 2016
About this capture

Gas Turbine Overview

A gas turbine engine is a type of internal combustion engine. Essentially, the engine can be viewed as an energy conversion device that converts energy stored in the fuel to useful mechanical energy in the form of rotational power. The term “gas” refers to the ambient air that is taken into the engine and used as the working medium in the energy conversion process.

This air is first drawn into the engine where it is compressed, mixed with fuel and ignited. The resulting hot gas expands at high velocity through a series of airfoil-shaped blades transferring energy created from combustion to turn an output shaft. The residual thermal energy in the hot exhaust gas can be harnessed for a variety of industrial processes.



Titan 130
Single Shaft Gas Turbine for Power Generation Applications

Basic Components

Compressor

The compressor takes in outside air and then compacts and pressurizes the air molecules through a series of rotating and stationary compressor blades.

Combustor

In the combustor, fuel is added to the pressurized air molecules and ignited.
The heated molecules expand and move at high velocity into the turbine section.

Turbine

The turbine converts the energy from the high velocity gas into useful rotational power though expansion of the heated compressed gas over a series of turbine rotor blades.

Output Shaft & Gearbox

Rotational power from the turbine section is delivered to driven equipment through the output shaft via a speed reduction gearbox.

Exhaust

The engine’s exhaust section directs the spent gas out of the turbine section and into the atmosphere.

GAS TURBINE ADVANTAGES ›
SOLAR'S MARKET DEFINITIONS ›
GAS TURBINE PACKAGES ›

OTHER MEDIA

How Industrial Gas Turbines Work

Combustion Gas Turbines for Combined Heat and Power (video)

DATASHEETS

Product Ratings

SOCIAL MEDIA

LinkedIn

YouTube

Twitter

Login | Site Map | Site Registration | Contact Us | Data Privacy Policy

© 2016 Solar Turbines Incorporated

EXHIBIT B

https://web.archive.org/web/20170205064503/https://powergen.gepower.com/content/dam/gepower-pgdp/global/en_US/documents/product/gas%20turbines/Fact%20Sheet/2017-prod-specs/tm2500-power-plants.pdf

TM2500 POWER PLANTS (50/60 Hz)

The TM2500 is ideal for providing a baseload bridge to permanent power installations or for generating backup power in the wake of natural disasters, plant shutdowns, or grid instability. Our complete solutions—including trailer-mounted gas turbine generator set and containerized balance of plant—can put power on the grid within 30 days of the contract signature; this fast power provides up to two times the power density (MW/ft2) of other gas turbine trailer-mounted offerings.

CAPABILITY

5-minute start from cold metal to full power output

VERSATILITY

All units are natural gas/liquid fuel capable across a wide range of fuels, including propane and naphtha

SUSTAINABILITY

10X lower emissions than reciprocating technology; exceeds World Bank requirements



DID YOU **KNOW**?

Plants are highly scalable and adding just 5 MW of additional power means up to $5 million in value for power producers.

LIBERTY EXHIBIT 1012, Page 25

HOT DAY PERFORMANCE

31 MW AT 30°C

		TM2500	
Gas Turbine Rating	Frequency	50	60
	ISO Base Rating (MW)	34.3	37.1
	Gross Heat Rate (Btu/kWh, LHV)	9,665	9,171
	Gross Heat Rate (kJ/kWh, LHV)	10,197	9,676
	Gross Efficiency (%, LHV)	35.3%	37.2%
	Exhaust Temperature (°F)	962.7	950.0
	Exhaust Temperature (°C)	517.1	510.0
	Exhaust Energy (MM Btu/hr)	187	185
	Exhaust Energy (MM kJ/hr)	197	195
Gas Turbine Parameters	Compression Pressure Ratio (X:1)	24.5	24.7
	GT Generator Type (Cooling)	Air	Air
	Number of Compressor Stages	17	17
	Number of Turbine Stages	6	6
	GT Turndown Minimum Load (%)	50%	50%
	GT Ramp Rate (MW/min)	30	30
	NO_X (ppmvd) at Baseload (@15% O_2)	25	25
	CO (ppm) (@15% O_2)[1]	15/275	15/275
	Wobbe Variation (%)	+/-20%	+/-20%
	Startup Time (Hot, Minutes)	10	10
SC Plant Performance	SC Net Output (MW)	33.6	35.9
	SC Net Heat Rate (Btu/kWh, LHV)	9,794	9,330
	SC Net Heat Rate (kJ/kWh, LHV)	10,333	9,844
	SC Net Efficiency (%, LHV)	34.8%	36.6%
1x1 CC Plant Performance	CC Net Output (MW)	48.4	50.5
	CC Net Heat Rate (Btu/kWh, LHV)	6,851	6,703
	CC Net Heat Rate (kJ/kWh, LHV)	7,229	7,072
	CC Net Efficiency (%, LHV)	49.8%	50.9%
	Plant Turndown – Minimum Load (%)	35%	36%
	Ramp Rate (MW/min)	30	30
	Startup Time (Hot, Minutes)	30	30
1x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH
	Condenser Type	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	930/499	915/490
	ST Configuration (Type)	—	—
	GT Generator Type (Cooling)	Air	Air
	ST Generator Type (Cooling)	Air	Air
2x1 CC Plant Performance	CC Net Output (MW)	97.2	101.3
	CC Net Heat Rate (Btu/kWh, LHV)	6,827	6,681
	CC Net Heat Rate (kJ/kWh, LHV)	7,203	7,049
	CC Net Efficiency (%, LHV)	50.0%	51.1%
	Plant Turndown – Minimum Load (%)	35%	35%
	Ramp Rate (MW/min)	60	60
	Startup Time (Hot, Minutes)	30	30
2x1 CC Power Plant Features	Bottoming Cycle Type	2PNRH	2PNRH
	Condensor Type	Once-Through	Once-Through
	Condenser Pressure (in.Hga)	1.2	1.2
	HP Throttle Press. (psia/bar)	900/62.1	900/62.1
	HP Throttle Temp. (°F/°C)	930/499	915/490
	ST Configuration (Type)	—	—
	GT Generator Type (Cooling)	Air	Air
	ST Generator Type (Cooling)	Air	Air

CUSTOMER HIGHLIGHT

In the Republic of Indonesia, 20 "fast power" TM2500 gas turbines are providing 500 MW of power, helping to meet the nation's need to efficiently provide reliable power to 225 million residents spread across 18,000 islands. Four additional TM2500 units in Gorontalo, North Sulawesi will provide 100 MW of power generation capacity, the equivalent power needed to supply approximately 800,000 Indonesian homes.

LIBERTY EXHIBIT 1012, Page 26

https://web.archive.org/web/20160512094159/http://s7d2.scene7.com/is/content/Caterpillar/C10550166



POWER GENERATION PRODUCT SELECTION GUIDE

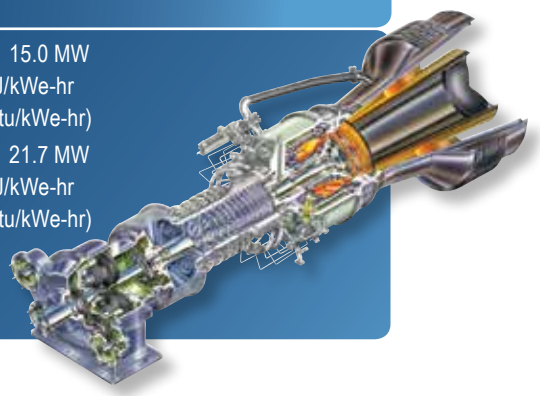
Solar® Turbines

A Caterpillar Company

INDUSTRIAL GAS TURBINE PRODUCT LINE AND PERFORMANCE

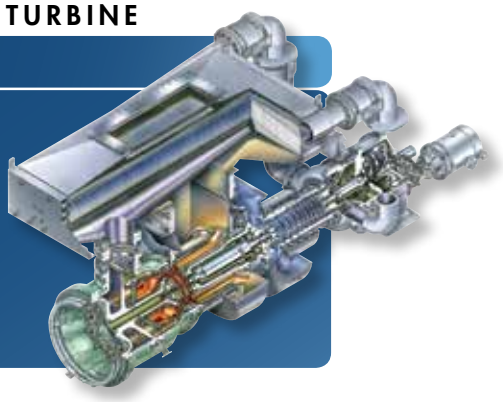
INDUSTRIAL GAS TURBINE PRODUCT LINE

Saturn®	Centaur®	Taurus™	Mars®	Titan™
Saturn 20 1.2 MW 14 795 kJ/kWe-hr (14,025 Btu/kWe-hr)	**Centaur 40** 3.5 MW 12 910 kJ/kWe-hr (12,240 Btu/kWe-hr) **Centaur 50** 4.6 MW 12 270 kJ/kWe-hr (11,630 Btu/kWe-hr)	**Taurus 60** 5.7 MW 11 430 kJ/kWe-hr (10,830 Btu/kWe-hr) **Taurus 65** 6.3 MW 10 945 kJ/kWe-hr (10,375 Btu/kWe-hr) **Taurus 70** 8.0 MW 10 505 kJ/kWe-hr (9955 Btu/kWe-hr)	**Mars 100** 11.4 MW 10 935 kJ/kWe-hr (10,365 Btu/kWe-hr)	**Titan 130** 15.0 MW 10 230 kJ/kWe-hr (9695 Btu/kWe-hr) **Titan 250** 21.7 MW 9260 kJ/kWe-hr (8775 Btu/kWe-hr)



RECUPERATED GAS TURBINE

Mercury™
Mercury 50 4.6 MW 9350 kJ/kWe-hr (8865 Btu/kWe-hr)





Mercury 50 Generator Set
Cogeneration and Distributed Energy
Austin, Texas

HEAT RECOVERY PERFORMANCE DATA

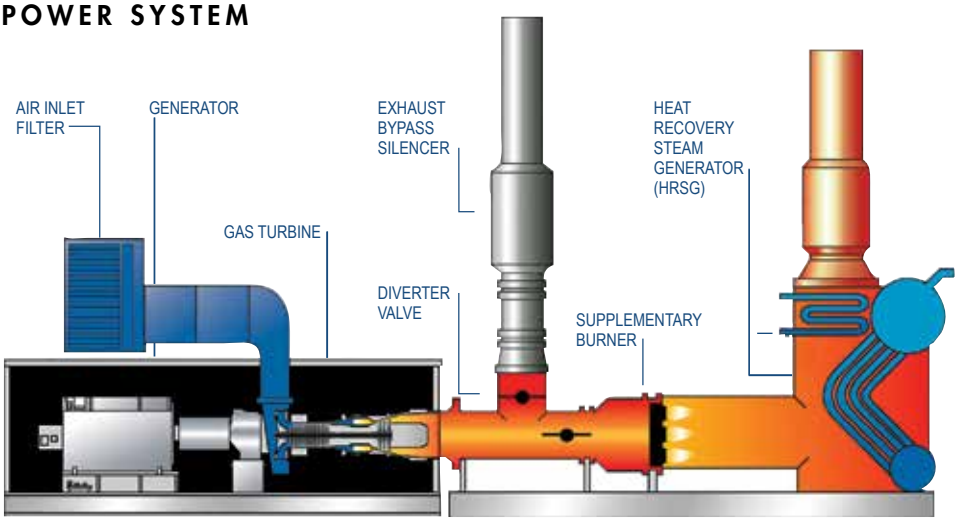
		Saturn 20	Centaur 40	Centaur 50	Mercury 50	Taurus 60	Taurus 65	Taurus 70	Mars 100	Titan 130	Titan 250
ISO - No Losses	Exhaust Temperature, °C (°F)	505 (940)	445 (830)	510 (950)	365 (690)	510 (950)	550 (1020)	505 (945)	485 (905)	495 (925)	465 (865)
	Exhaust Mass Flow, thousand kg/hr (thousand lbs/hr)	23.5 (51.9)	68.4 (150.7)	68.7 (151.4)	64.1 (141.4)	78.4 (172.8)	76.0 (167.4)	96.8 (213.4)	153.2 (337.9)	179.3 (395.2)	245.6 (541.4)
	Turbine Fuel Input, GJ/hr (MMBtu/hr)	17.8 (16.9)	45.3 (43.0)	56.4 (53.5)	43.0 (40.8)	64.8 (61.4)	69.0 (65.4)	83.7 (79.3)	124.1 (117.6)	153.4 (145.4)	201.3 (190.8)
Site Assumptions	**Process Steam Production (Unfired)**										
	Steam Output, tonnes/hr (thousand lbs/hr)	4.0 (8.7)	8.9 (19.6)	11.5 (25.3)	6.0 (13.1)	13.5 (29.8)	14.7 (32.4)	16.5 (36.4)	23.7 (52.3)	29.2 (64.5)	35.2 (77.6)
	Process Steam Production with Supplemental Firing, 871°C (1600°F)										
	Steam Output, tonnes/hr (thousand lbs/hr)	8.4 (18.5)	24.1 (53.0)	23.9 (52.7)	22.3 (49.2)	28.1 (61.9)	27.2 (60.0)	34.4 (75.8)	54.1 (119.3)	63.9 (140.9)	87.4 (192.8)
	Additional Fuel to Burner, GJ/hr (MMBtu/hr)	10.4 (9.9)	35.5 (33.6)	30.4 (28.8)	39.4 (37.3)	34.6 (32.8)	30.0 (28.4)	43.0 (40.8)	72.6 (68.8)	82.4 (78.1)	122.7 (116.3)
	Process Steam Production with Maximum Supplemental Firing										
	Steam Output, tonnes/hr (thousand lbs/hr)	17.7 (39.1)	50.9 (112.2)	50.4 (111.2)	47.1 (103.9)	58.9 (129.8)	57.1 (125.9)	72.3 (159.5)	113.8 (250.9)	134.1 (295.7)	190.5 (420.0)
	Additional Fuel to Burner, GJ/hr (MMBtu/hr)	32.7 (31.0)	100.1 (94.9)	95.6 (90.6)	100.4 (95.2)	109.1 (103.4)	102.2 (96.9)	135.3 (128.2)	218.4 (207.0)	253.3 (240.1)	235.0 (222.7)

TYPICAL COMBINED HEAT AND POWER SYSTEM

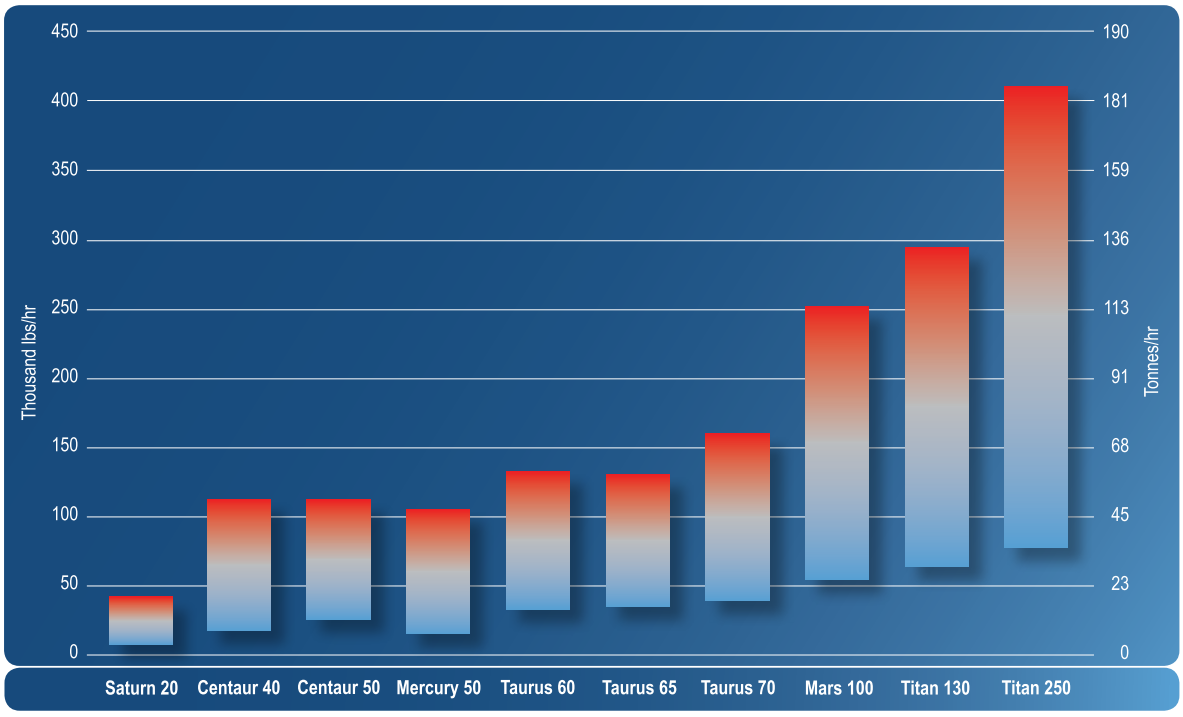
ASSUMPTIONS:

Site Conditions		
Elevation	0 m	(0 ft)
Temperature	15°C	(59°F)
Fuel	Natural Gas	
Load	100%	
Inlet Pressure Loss, H_2O	100 mm	(4 in.)
Exhaust Pressure Loss, H_2O	254 mm	(10 in.)
Mercury 50	175 mm	(7 in.)
HRSG/Steam Data:		
Steam Pressure	10.3 bar Gauge (150 psig)	
Steam Conditions	Dry and Saturated	
Boiler Inlet	110°C	(230°F)

Notes:
1. Alternative steam pressures and temperatures available upon request.
2. Minimum stack temperature with gas fuel = 135°C (275°F), liquid fuel = 163°C (325°F).

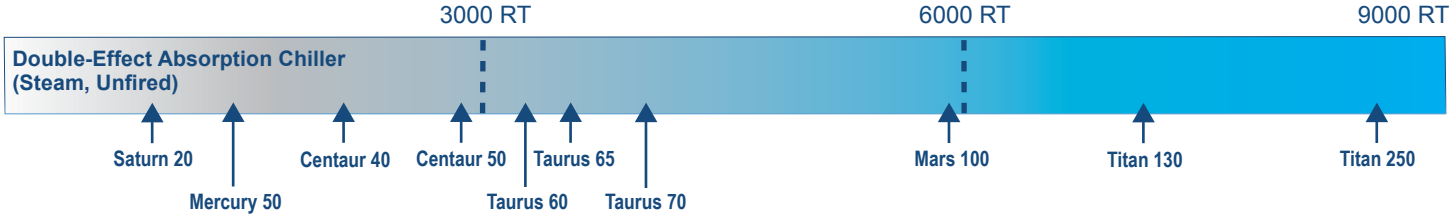


TYPICAL STEAM OUTPUT RANGES



Note: Steam output ranges from an unfired basis ■ to a max-fired rate ■ .

CHILLED WATER PRODUCTION

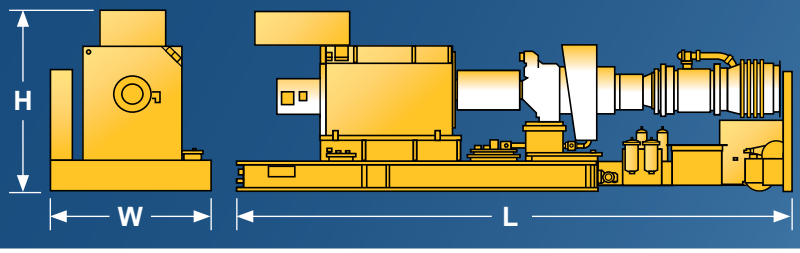


CONVERSION FACTORS FOR CHILLING APPLICATIONS:
Older Mechanical Chiller: 0.8 kW/hr = 1 Ton of Refrigeration, Newer Mechanical Chiller: 0.6 kW/hr = 1 Ton of Refrigeration
Single-Effect Absorption Chiller: 18.7 lb/hr of Steam = 1 Ton of Refrigeration, Double-Effect Absorption Chiller: 9 lb/hr of Steam = 1 Ton of Refrigeration
Alternative chiller configurations are also available including single effect, hot water and indirect-fired absorption.

APPROXIMATE PACKAGE DIMENSIONS AND WEIGHTS*

Generator Set Model	Length m (ft-in)	Width m (ft-in)	Height m (ft-in)	Dry Weight kg (lb)
Titan 250	18.2 (59' 6")	3.4 (11' 1")	3.9 (12' 9")	141 150 (311,100)
Titan 130	14.2 (46' 6")	3.2 (10' 11")	3.2 (10' 7")	94 395 (208,100)
Mars 100	14.2 (46' 6")	2.8 (9' 2")	3.8 (12' 6")	82 145 (181,000)
Taurus 70	11.1 (36' 3")	2.9 (9' 2")	3.7 (12' 1")	61 775 (136,215)
Taurus 65	9.8 (32' 2")	2.6 (8' 6")	3.3 (10' 9")	39 600 (87,300)
Taurus 60	9.8 (32' 2")	2.6 (8' 6")	3.2 (10' 5")	37 920 (83,600)
Mercury 50	11.2 (36' 6")	3.2 (10' 5")	3.7 (12' 3")	45 660 (100,700)
Centaur 50	9.8 (32' 2")	2.6 (8' 6")	3.2 (10' 5")	37 785 (83,300)
Centaur 40	9.8 (32' 2")	2.6 (8' 6")	3.2 (10' 5")	30 460 (67,150)
Saturn 20	6.7 (22' 0")	2.4 (8' 0")	2.7 (8' 11")	10 205 (22,500)

** Actual values vary with customer options specified, such as type of generator.*



Solar Turbines offers a complete solution for your power needs. We can help with your requirements for combined heat and power, base-load electricity, dispersed power, combined cycle, peak shaving, district heating/cooling, distributed generation and standby power for a wide variety of facilities, including industrial/processing facilities, buildings and institutions, and distributed power plants.

Solar has been a pioneer in the design, manufacture and packaging of gas turbine systems for more than 50 years and is a world leader in the mid-range industrial gas turbine business.

Customers in more than 100 nations spanning the globe know they can rely on Solar Turbines to provide rugged, reliable Solar® turbomachinery systems. These systems are backed by Solar's Customer Services global network of 50 field offices around the world providing responsive field service, package overhaul and upgrades, technical training and genuine Solar certified service parts.

InSight System™, Solar's comprehensive online approach to equipment health management, includes the industry's most advanced remote monitoring and predictive diagnostics capabilities. Using InSight System, maintenance is based on equipment condition rather than time intervals. This saves time and money on repair and maintenance resulting in more uptime, greater productivity, and optimized life cycle.

For more information about how Solar can provide you with an effective solution to meet your energy needs, contact:

Solar Turbines Incorporated
P.O. Box 85376
San Diego, California 92186-5376
Telephone: +1 (619) 544-5352
email: powergen@solarturbines.com

www.solarturbines.com

Cat and Caterpillar are trademarks of Caterpillar Inc.
Solar, Saturn, Centaur, Mercury, Taurus, Mars, Titan and InSight System are trademarks of Solar Turbines Incorporated. Specifications subject to change without notice. Printed in the U.S.A.
© 2016 Solar Turbines Incorporated. All rights reserved.
BPGPSG/116

Solar® Turbines
A Caterpillar Company

https://web.archive.org/web/20160512100652/http://s7d2.scene7.com/is/content/Caterpillar/C10550151

Solar® Turbines
A Caterpillar Company

POWERING THE GLOBAL ENERGY DEMAND

Turbomachinery Systems

For Oil and Gas Applications



Compressor Sets



Mechanical Drive Sets



Generator Sets



Centrifugal Gas Compressors

LIBERTY EXHIBIT 1012, Page 83

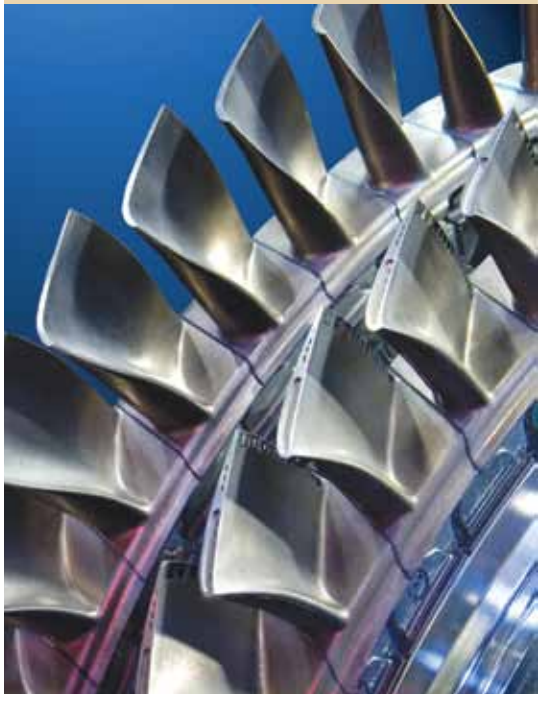
Performance to Power the Oil and Gas Industry

Since Solar Turbines entered the industrial gas turbine business in 1960, the fleet of Solar gas turbines installed worldwide has grown to more than 13,900 units and those turbines have logged well over 1.7 billion hours in 98 countries.

In 1980, Solar introduced its first electric motor drive package. There are now more than 110 electric motor drive units installed worldwide.

Customers are operating Solar turbomachinery in the toughest, most challenging environments, including remote arctic, desert, tropical and offshore areas. Our rugged, robust, highly reliable gas turbines and electric motor drives offer competitive efficiencies in their power class with the most durable products available.

Solar offers factory packaged gas turbine or electric motor driven compressor sets, mechanical-drive packages and generator sets in the 1-to-22 MW output range.



Single-Source Advantages

Solar Turbines Incorporated designs and manufactures its gas turbines, electric motor drives (EMDs) and turbomachinery packages to ensure maximum systems compatibility and integration, plus high performance, reliability, availability, efficiency and long life in the most demanding applications. As the customer's single source, Solar can also provide:

- Commissioning
- Technical training
- Field service
- Certified parts
- Repairs, overhauls, upgrades
- Complete project operation and maintenance
- Engineering, procurement, and construction (EPC)
- Contract power and leasing
- Financing programs

Efficiency

Solar® turbines are designed for efficient, simple-cycle operation, and they can provide overall system thermal efficiencies from 70-80% when both their shaft power and exhaust heat energy are harnessed.

Transportability

Solar turbine packages are lightweight and compact for easy transportation and installation.

A gas turbine package's high power density, ease of transport by standard conveyances, and easy installation can pay off in lower installed cost per horsepower.

Availability

Durability and reliability are only part of the *Solar* turbine availability story. The units have many built-in features for temperature and vibration instrumentation, rapid component removal, and easy inspection to speed maintenance and maximize availability.

Customized Packages

Solar builds complete turbomachinery packages that are ready to go to work... no matter where the job may be. From pre-engineered designs to highly specialized requirements, Solar can provide the solution for your needs. Solar designs and manufactures its gas turbines and turbomachinery packages under quality management systems, maintaining ISO 9001 certification since 1992.



Pipeline Compression
Titan 130
Mississippi, USA



Gas Transmission
Titan 250
Tennessee, USA

Compressor sets, which utilize Solar's family of centrifugal gas compressors, are designed for applications in the oil and gas industry such as:

- Natural gas gathering
- Transmission
- Storage/withdrawal
- Gas lift
- Export sales gas

Mechanical drive packages are ideally suited for driving:

- Centrifugal compressors manufactured by other suppliers for air, process and refrigeration applications.
- Reciprocating compressors

The versatile mechanical drives also power pumps for:

- Transporting crude oil
- Transporting liquid products
- Waterflood

Generator sets, rated from 1-to-21.7 MWe, are used worldwide for a variety of applications including:

- Offshore platform and FPS power generation
- Gas production and process facility power generation
- Cogeneration

Whether designed in constant-speed single-shaft, or variable-speed two-shaft configuration, Solar's line of industrial gas turbines is designed with:

- Axial-flow air compressors
- Single annular combustors
- Axial-flow gas generator turbines and power turbines

The two-shaft configurations are designed especially for mechanical drive applications. Their power turbine is mechanically independent of the gas generator to provide optimal control over a wide range of speeds and loads.

The single-shaft configurations are designed specifically for power generation and use an epicyclic speed-reduction gearbox to couple the gas turbine to the generator.

The *Mars* and *Titan* 250 gas turbines are available only in a two-shaft configuration for all applications.



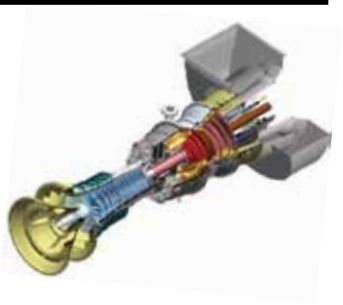


Power Generation
Mars 100
Offshore Nigeria

Performance Coverage

Titan™ 250 Mechanical Drive Performance

ISO Continuous Duty Output	23 370 kW 30,000 hp
Heat Rate	9000 kJ/kW-hr 6360 Btu/hp-hr
Exhaust Flow	245 660 kg/hr 541,590 lb/hr
Exhaust	465 °C 865 °F



Titan 250 Generator Set Performance

ISO Continuous Duty Output	21 745 kWe
Heat Rate	9260 kJ/kWe-hr 8775 Btu/kWe-hr
Exhaust Flow	245 660 kg/hr 541,590 lb/hr
Exhaust	465 °C 865 °F



Titan 130 Mechanical Drive Performance

ISO Continuous Duty Output	15 290 kW 20,500 hp
Heat Rate	9940 kJ/kW-hr 7025 Btu/hp-hr
Exhaust Flow	180 050 kg/hr 396,940 lb/hr
Exhaust	505 °C 940 °F



Titan 130 Generator Set Performance

ISO Continuous Duty Output	15 000 kWe
Heat Rate	10 230 kJ/kWe-hr 9695 Btu/kWe-hr
Exhaust Flow	179 250 kg/hr 395,180 lb/hr
Exhaust	495 °C 925 °F



Mars® 100 Mechanical Drive Performance

ISO Continuous Duty Output	11 860 kW 15,900 hp
Heat Rate	10 465 kJ/kW-hr 7395 Btu/hp-hr
Exhaust Flow	153 245 kg/hr 337,850 lb/hr
Exhaust	485 °C 905 °F



Mars 100 Generator Set Performance

ISO Continuous Duty Output	11 350 kWe
Heat Rate	10 935 kJ/kWe-hr 10,365 Btu/kWe-hr
Exhaust Flow	153 245 kg/hr 337,850 lb/hr
Exhaust	485 °C 905 °F



Mars 90 Mechanical Drive Performance

ISO Continuous Duty Output	9690 kW 13,220 hp
Heat Rate	10 830 kJ/kW-hr 7655 Btu/hp-hr
Exhaust Flow	144 585 kg/hr 318,755 lb/hr
Exhaust	465 °C 870 °F



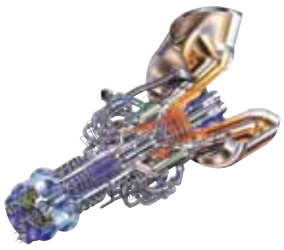
Mars 90 Generator Set Performance

ISO Continuous Duty Output	9450 kWe
Heat Rate	11 300 kJ/kWe-hr 10,710 Btu/kWe-hr
Exhaust Flow	144 590 kg/hr 318,760 lb/hr
Exhaust	465 °C 870 °F



Taurus™ 70 Mechanical Drive Performance

ISO Continuous Duty Output	8140 kW 10,915 hp
Heat Rate	10 195 kJ/kW-hr 7205 Btu/hp-hr
Exhaust Flow	97 770 kg/hr 215,545 lb/hr
Exhaust	510 °C 945 °F



Taurus 70 Generator Set Performance

ISO Continuous Duty Output	7965 kWe
Heat Rate	10 505 kJ/kWe-hr 9955 Btu/kWe-hr
Exhaust Flow	96 775 kg/hr 213,350 lb/hr
Exhaust	510 °C 945 °F



Taurus 60 Mechanical Drive Performance

ISO Continuous Duty Output	5740 kW 7700 hp
Heat Rate	11 265 kJ/kW-hr 7965 Btu/hp-hr
Exhaust Flow	77 880 kg/hr 171,690 lb/hr
Exhaust	510 °C 950 °F



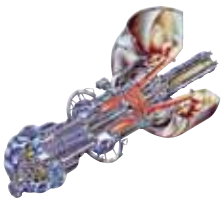
Taurus 60 Generator Set Performance

ISO Continuous Duty Output	5670 kWe
Heat Rate	11 430 kJ/kWe-hr 10,830 Btu/kWe-hr
Exhaust Flow	78 385 kg/hr 172,810 lb/hr
Exhaust	510 °C 950 °F



Centaur® 50 Mechanical Drive Performance

ISO Continuous Duty Output	4570 kW 6130 hp
Heat Rate	12 030 kJ/kW-hr 8500 Btu/hp-hr
Exhaust Flow	67 760 kg/hr 149,380 lb/hr
Exhaust	515 °C 960 °F



Centaur 50 Generator Set Performance

ISO Continuous Duty Output	4600 kWe
Heat Rate	12 270 kJ/kWe-hr 11,630 Btu/kWe-hr
Exhaust Flow	68 680 kg/hr 151,410 lb/hr
Exhaust	510 °C 950 °F



Centaur 40 Mechanical Drive Performance

ISO Continuous Duty Output	3500 kW 4700 hp
Heat Rate	12 905 kJ/kW-hr 9125 Btu/hp-hr
Exhaust Flow	68 185 kg/hr 150,320 lb/hr
Exhaust	445 °C 835 °F



Centaur 40 Generator Set Performance

ISO Continuous Duty Output	3515 kWe
Heat Rate	12 910 kJ/kWe-hr 12,240 Btu/kWe-hr
Exhaust Flow	68 365 kg/hr 150,715 lb/hr
Exhaust	445 °C 835 °F



Saturn® 20 Mechanical Drive Performance

ISO Continuous Duty Output	1185 kW 1590 hp
Heat Rate	14 670 kJ/kW-hr 10,370 Btu/hp-hr
Exhaust Flow	23 410 kg/hr 51,615 lb/hr
Exhaust	520 °C 970 °F



Saturn 20 Generator Set Performance

ISO Continuous Duty Output	1210 kWe
Heat Rate	14 795 kJ/kWe-hr 14,025 Btu/kWe-hr
Exhaust Flow	23 540 kg/hr 51,890 lb/hr
Exhaust	505 °C 940 °F



The information shown is for mechanical-drive packages and generator sets at full load under ISO conditions: 15°C (59°F), sea level, natural gas fuel, 60% relative humidity, zero inlet and exhaust losses. Power and efficiency ratings are nominal and generator set power is at the generator terminals.

Performance in Product Development

Solar gas turbines are a sustainable power source. They produce low exhaust emissions levels that meet virtually all emissions standards around the world. Solar offers gas turbine engines with pollution-prevention SoLoNOx™ dry lean pre-mixed combustion technology. This advanced combustion system offers the most cost-effective and environmentally friendly approach to significantly lower emissions since it does not consume water or require complex and costly add-on emissions control devices to attain low NOx and CO emissions levels. More than 2300 gas turbines with SoLoNOx technology have been installed worldwide and are designed to deliver the same ruggedness, reliability and operating flexibility for which Solar gas turbines are known. For areas requiring zero on-site emissions, Solar offers EMDs.



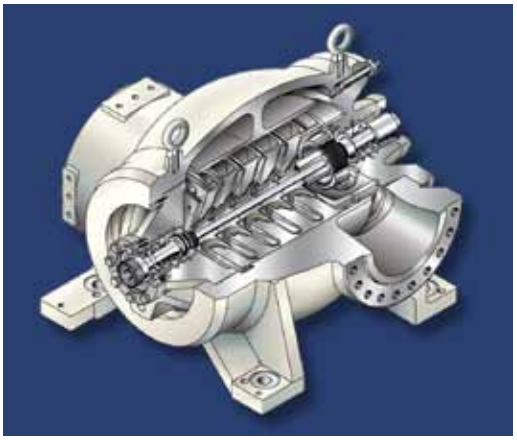
Pipeline Compression
Mars 90
Idaho, USA



SoLoNOx Technology

Centrifugal Natural Gas Compressors

Solar manufactures several API 617 compliant centrifugal natural gas compressor families, which incorporate many American Petroleum Institute (API) required features. Our fleet of more than 5000 installed compressors have a proven record of outstanding ruggedness, reliability and operational flexibility. They have pre-engineered, standardized components for maximum interchangeability and enhanced availability. Rapid field restaging is made possible because of their modular designs. *Solar* gas compressors have from 1 to 10 stages to handle flows from 4.25 to 1274 m^3/min (150 to 45,000 ft^3/min) and discharge pressures to 25 855 kPa (3750 psi).



Pipeline Compressors		Production Compressors	
	Number of Stages		Number of Stages
C40	1-2	C16	1-10
C45	1-3	C33	1-9
C65	1-2	C40	1-6
C85	1-2	C41	1-10
		C50	1-5
		C51	1-10
		C61	1-10

Customer Choices

Solar has designed, installed and supported packages worldwide. Additionally, we have extensive experience meeting code requirements such as API, ATEX, CENELEC, CSA and NEC. Typical package options include:

Start Systems

- AC direct-drive - VFD
- Pneumatic (mechanical drive/compressor sets)

Fuel Systems

- Natural gas
- Associated gas
- Distillates
- Natural gas liquids (NGL)
- Liquefied petroleum gases (LPG)
- Hydrogen blends
- Medium-Btu gases (such as coalbed methane, landfill, etc.)
- Dual- and tri-fuel systems

Lube Oil Systems

Oil system pump supply

- Engine-driven
- AC-motor driven

Integral lube oil tank reservoir

- Carbon steel
- Stainless steel

Lube oil cooling exchanger

- Water-to-oil
- Air-to-oil
- Low noise

Lube oil filters

- Dual with transfer valve



Complete Station Control Systems

Control and Monitoring Systems

- *Turbotronic*® microprocessor-based
- Onskid control
- Remote console option

Monitoring

- Remote
- Vibration
- Temperature
- Trending
- History

Displays

- Remote console
- Onskid digital displays

Skid Mounting Systems

- Multiple-point
- Three-point for offshore duty
- Floating platform capability

Mechanical Drives/Compressor Sets

Controls

- Process
- Surge control
- Sequencing of multiple units

Generator Sets

Generators

- 50 Hz standard voltages
- 60 Hz standard voltages

Controls

- Kilowatt control
- Auto start and synchronizing

Fast Delivery

World-class manufacturing facilities, processes and skilled personnel enable Solar to provide the shortest possible lead times for fully engineered packages tested to fulfill specific customer requirements.



Control Console



Package Assembly



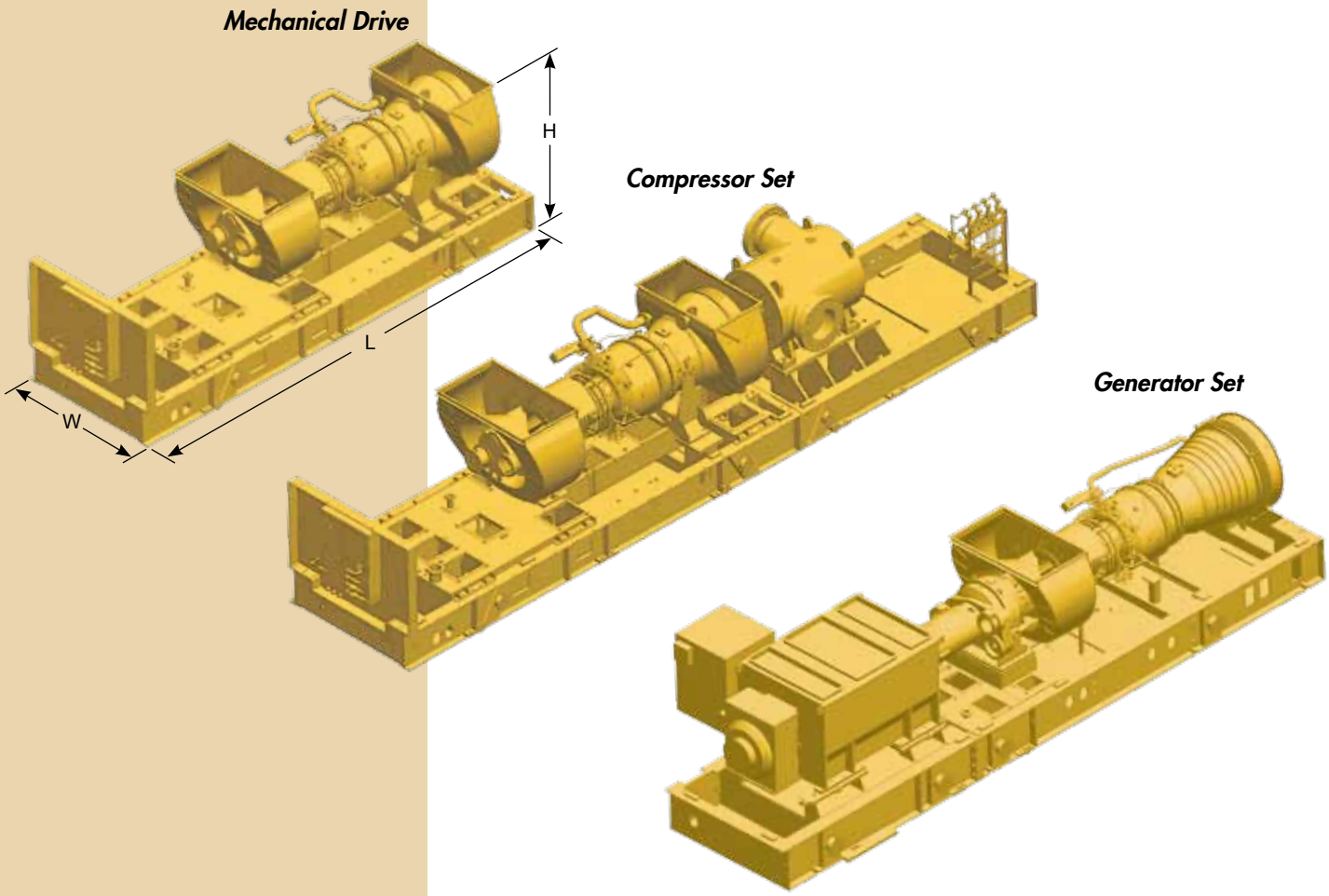
Rotor Assembly

Package Dimensions

GAS TURBINE MODEL	Titan 250	Titan 130	Mars 100	Mars 90	Taurus 70	Taurus 65	Taurus 60	Centaur 50	Centaur 40	Saturn 20
GENERATOR SETS										
Length, m (ft, in.)	18.1 (59' 6")	15.9 (52' 0")	14.5 (47' 8")	14.5 (47' 8")	11.3 (37' 0")	9.8 (32' 0")	9.8 (32' 0")	9.8 (32' 0")	9.8 (32' 0")	5.8 (18' 11")
Width, m (ft, in.)	3.7 (12' 0")	3.2 (10' 5")	2.8 (9' 2")	2.8 (9' 2")	2.8 (9' 2")	2.5 (8' 2")	2.4 (8' 0")	2.4 (8' 0")	2.4 (8' 0")	1.7 (5' 5")
Height, m (ft, in.)	4.2 (13' 6")	3.1 (10' 3")	3.1 (10' 0")	3.1 (10' 0")	2.8 (9' 2")	2.9 (9' 8")	2.8 (9' 4")	2.8 (9' 4")	2.8 (9' 4")	2.0 (6' 7")
Weight, kg (lb)	140 520 (310,000)	77 100 (170,000)	67 570 (160,000)	67 570 (160,000)	56 885 (125,405)	33 045 (72,700)	30 300 (66,900)	27 080 (59,700)	23 755 (52,370)	9980 (22,000)
MECHANICAL DRIVES										
Length, m (ft, in.)	10.3 (33' 9")	9.8 (32' 0")	9.0 (29' 6")	9.0 (29' 6")	7.9 (25' 3")	N/A	6.2 (19' 10")	6.2 (19' 10")	6.2 (19' 10")	4.0 (13' 2")
Width, m (ft, in.)	3.7 (12' 0")	3.0 (10' 0")	2.8 (9' 2")	2.8 (9' 2")	2.7 (9' 0")	N/A	2.5 (8' 2")	2.5 (8' 2")	2.5 (8' 2")	1.8 (5' 10")
Height, m (ft, in.)	4.2 (13' 6")	3.1 (10' 3")	3.0 (9' 6")	3.0 (9' 6")	3.1 (10' 3")	N/A	2.7 (8' 11")	2.7 (8' 11")	2.7 (8' 11")	2.2 (7' 5")
Weight, kg (lb)	50 620 (116,000)	34 020 (75,000)	27 200 (60,000)	27 200 (60,000)	20 140 (45,000)	N/A	15 880 (35,000)	14 970 (33,000)	12 700 (28,000)	4540 (10,000)

COMPRESSOR SKIDS - TYPICAL ADDITIONAL DIMENSIONS	ONE BODY	TWO BODY	THREE BODY
Length, m (ft, in.)	4.0 (13' 0")	5.8 (19' 0")	7.9 (26' 0")
Weight, kg (lb)	16 783 (37,000)	23 587 (52,000)	30 391 (67,000)

APPROXIMATE DIMENSIONS (unenclosed)



Typical Applications



Oil Field Power Generation
Taurus 60
Siberia, Russia



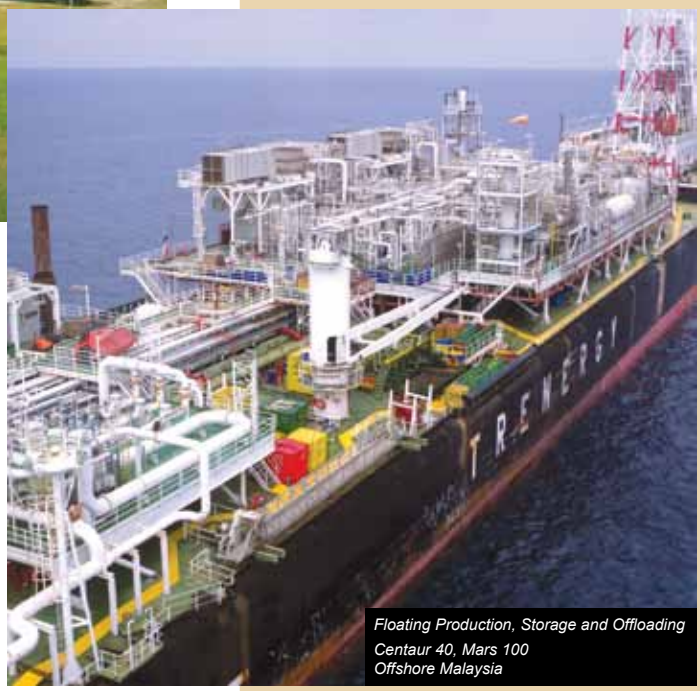
Gas Compression
Titan 130
Istanbul, Turkey



SPAR
Taurus 60
Gulf of Mexico, USA



LPG Production
Centaur 50, Mars 100
Kwinana, Australia



Floating Production, Storage and Offloading
Centaur 40, Mars 100
Offshore Malaysia



Gas Compression
EMDs
Shanghai, China

Expertise at a Project Level

Because we are totally focused on the industrial gas turbine market, Solar Turbines leads the industry in offering a multitude of application choices. We provide several key services that help facilitate the success of your project. From designing complete turnkey modular installations to providing customized financial services, Solar is your single source solution provider.



TurboFab Facility

Construction Services

Solar can provide single-source capability to design, build and commission a complete compressor station, power plant or offshore module for any number of fixed or floating platforms.



Single-Lift Module
Mars 90
Offshore India



Financial Services

Prefabricated Modules

Solar turbine packages are available in compression, mechanical-drive and power generation modules that can be installed and commissioned with a minimum of on-site work. Fully pre-engineered and prefabricated, these single- or multiple-unit modularized stations are self-contained, weatherproof and acoustically lined, and are especially well-suited for offshore and remote installations.

Financial Services

Working in conjunction with Caterpillar, Financial Services, other third party financial institutions and Export Import Bank, Solar offers a full array of financing products as options to customer direct purchase. Financing can be arranged for the gas turbine package or structured to include an entire turnkey plant, and terms can range from 1 through 15 years. Available financing options include discounted forfeiting transactions, loans, finance leases, operating leases, tax-exempt qualified leases, project financing and Ex-Im supported programs.

Worldwide Support Services



Field Service
Taurus 70

Field Service

- 43 strategic locations worldwide
- Fast response - around the clock
- Ready access to Solar's technical experts

Parts Support

- 7 days a week/24 hours a day ordering and shipment
- *Solar* certified service parts stocked at 9 depots worldwide
- 20 parts order locations, and 6 remanufacturing parts locations

Overhauls/Repairs/Upgrades/Uprates

- 8 overhaul facilities worldwide
- 8 exchange engine fleet locations worldwide - minimizing downtime
- 14 repair/overhaul facilities
- Remanufactured parts

Training

- All aspects of *Solar* turbomachinery systems
- More than 30 courses available
- At one of Solar's training facilities or your field site

Machinery Renewal and Upgrades

- Compressor restage and repair
- Power uprates
- Package refurbishment
- Controls retrofits



Exchange Engine
Titan 130

Machinery Management Services

Solar has developed a broad range of services we can customize to fit your needs including:

- Full-service operation and maintenance
- Fleet management
- Maintenance management
- Equipment health management
- Contract maintenance
- Consulting services
- Compression services
- Condition assessment
- Remote monitoring and diagnostics
- e-Collaboration



Remote Monitoring

Solar Turbines provides one-stop, full service OEM solutions through our global network of overhaul centers, parts depots, field service offices and training facilities. With support centers and knowledgeable personnel located around the world, Solar's Customer Services organization brings an uncompromising commitment to customer satisfaction by ensuring maximum productivity, extended equipment life cycle and reduced operating costs.

InSight System™, Solar's comprehensive online approach to equipment health management, includes the industry's most advanced remote monitoring and predictive diagnostics system. Using InSight System, maintenance is based on equipment condition rather than traditional time intervals. This saves time and money on maintenance and repair, resulting in more uptime, greater productivity, and optimized life cycle.



Solar® Turbines

A Caterpillar Company

Solar has been a pioneer in the design, manufacture and packaging of gas turbine systems for more than 60 years and is a world leader in the mid-range industrial gas turbine business. As a result, customers spanning the globe know they can rely on Solar to provide rugged, reliable turbomachinery systems, responsive service and unrivalled technical assistance and service parts availability anywhere in the world.



Solar Turbines Headquarters
San Diego, California



Packaging and Assembly
Kearny Mesa, California

www.solarturbines.com

For more information about *Solar* gas turbine-driven compressor sets, mechanical-drive packages, generator sets, and compressors or our broad range of customer support services, please contact your nearest Solar representative or visit us on the web at www.solarturbines.com

Solar Turbines Incorporated
P.O. Box 85376
Mail Zone B-3
San Diego, CA 92186-5376 U.S.A.
Telephone: [+1] 619-544-5352

Caterpillar is a registered trademark of Caterpillar Inc.
Solar, *Saturn*, *Centaur*, *Taurus*, *Mars*, *Titan*, *InSight System*, *Turbotronic*, *SoLoNOx* and *TurboFab* are trademarks of Solar Turbines Incorporated.
Specifications subject to change without notice. Printed in U.S.A.
© 2011 Solar Turbines Incorporated. All rights reserved.
BO&G/811/10M - 1011/EO

https://web.archive.org/web/20170920205857/http://s7d2.scene7.com/is/content/Caterpillar/CM20161012-56856-02360

turn 20	1185	1590	1210[1]
ntaur 40	3500	4700	3515[1]
ntaur 50	4570	6130	4600[1]
ercury 50	N/A	N/A	4600[1]
urus 60	5740	7700	5670[1]
urus 65	N/A	N/A	6300[1]
urus 70	8320	11,150	7965[1]
ars 90	9860	13,220	9450
ars 100	11 860	15,900	11 350
an 130	16 770	22,490	16 450[1]
an 250	22 370	30,000	21 745

v.solarturbines.com

conditions, gas fuel. [1] Single shaft.

Solar® Turbines

LIBERTY EXHIBIT 1012, Page 46

	(°F-32)5/9	°C	°C	(°Cx1.8)+32	°F
	25.4	mm	ft	0.3048	m
l. (US)	3.7854	L	qt	0.9463	L
	0.4536	kg	kg	2.2046	lb
ort ton	2000	lb	metric ton	1000	kg
	0.7457	kW	kW	1.341	hp
mBtu/hr	1.0549	GJ/hr	Btu/hr	0.252	kcal/hr
u/scf	39.3694	kJ/Nm^3	Btu/lb	2.326	kJ/kg
r	14.5037	psi	kg/cm^2	14.223	psi
i	27.705	in. H_2O	psi	6.8948	kPa
/min	35.315	cfm	mmscfd	694.44	scfm
mscfd	18.62	Nm^3/min	mmscfd	1178	sm^3/hr
lb_f/lb_m	0.002989	kJ/kg	$m\text{-}kg_f/kg_m$	3.281	$ft\text{-}lb_f/lb_m$
13/Btu/kW-hr) x 100 = effy,%			(2545 / Btu/hp-hr) x 100 = effy,%		

DSRC/316

LIBERTY EXHIBIT 1012, Page 47