



PRODUCT HANDBOOK FOR POWER GENERATION

Solar[®] Turbines
A Caterpillar Company

SOLAR TURBINES POWERING THE FUTURE

For more than 65 years, Solar Turbines has designed and manufactured products essential to powering industries and communities. Solar's products and services help meet the growing demand for energy, playing a critical role in power generation projects and the development and production of oil and natural gas around the world.

As an energy solutions provider, Solar's entire organization is dedicated to work towards one goal — producing energy solutions that provide maximum availability, reliability and value throughout your equipment's life cycle.

Powering the future through sustainable, innovative energy solutions.



OPTIMIZE EQUIPMENT VALUE WITH LIFECYCLE SERVICE SOLUTIONS

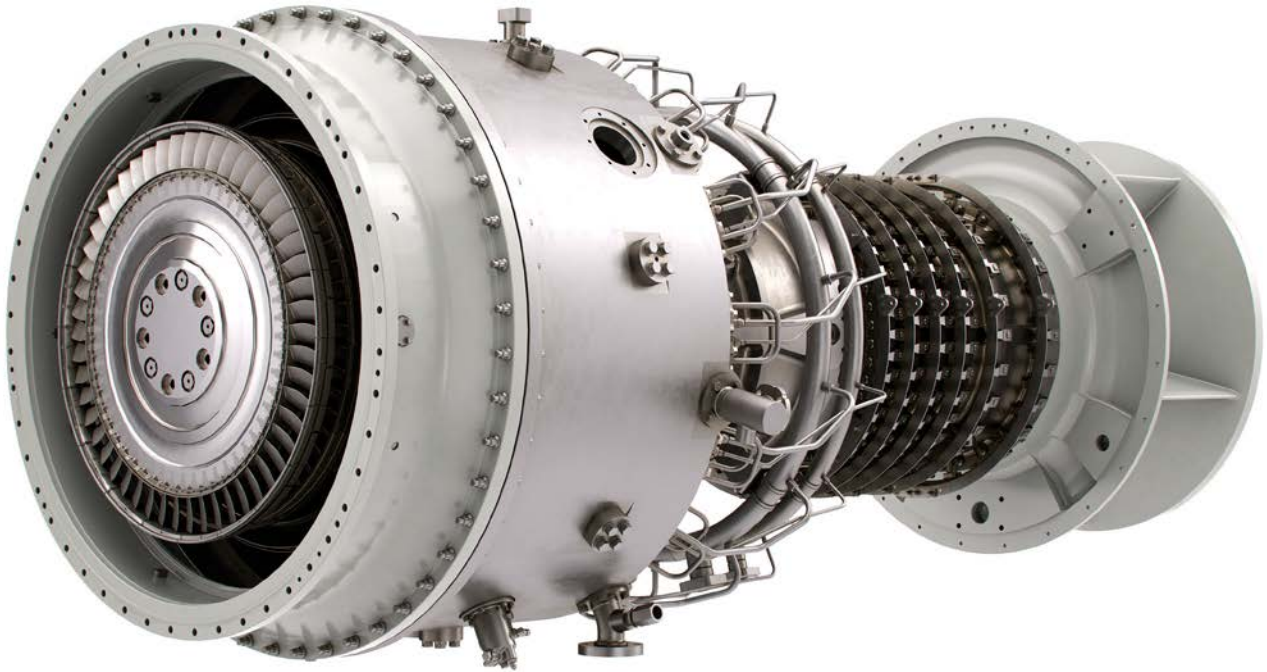
Solar's service, upgrades and training help support your business goals throughout your equipment's life cycle. Our lifecycle service solutions include Solar® parts, gas turbine overhaul, field service, flexible service agreements, digital solutions, and technical training.

The worldwide service organization is committed to your success, providing the highest quality experience from your initial inquiry throughout your equipment's life. As part of that commitment, Solar offers complete solutions beyond maintenance and repairs that will enhance performance and safety, extend equipment life, and prevent obsolescence.

Solar's proprietary InSight Platform™ technology provides a comprehensive, online approach to equipment health management, including advanced remote web-based monitoring and predictive diagnostics capabilities. With InSight, servicing is optimized based on real-time equipment conditions. This saves customers time and money on repair and maintenance resulting in more uptime, greater productivity, and optimized product life-cycle costs.



GENERATOR TURBINE RATINGS



		SATURN® 20	CENTAUR® 40	CENTAUR® 50	MERCURY™ 50	TAURUS™ 60	TAURUS™ 65	TAURUS™ 70	MARS® 100	TITAN™ 130	TITAN™ 250
ISO¹⁾ Output Power	MW	1.2	3.5	4.6	4.6	5.7	6.5	8.2	11.4	16.5	23.1
ISO¹⁾ Heat Rate	kJ/kWe-hr	14 795	12 910	12 270	9350	11 430	10 860	10 470	10 935	10 130	9260
	Btu/kWe-hr	14,025	12,240	11,630	8865	10,830	10,295	9920	10,365	9,605	8775
Fuel Input	MJ/s	5.0	12.6	15.7	12.0	18.0	19.6	23.2	34.5	46.3	58.6
	MMBtu/hr	17.1	43.0	53.6	40.9	61.4	66.9	79.2	117.7	158.0	200.0
Electrical Efficiency	%	24.3	27.9	29.3	38.5	31.5	33.1	34.3	32.9	35.5	39.3
Exhaust Gas Flow	kg/s	6.5	18.9	18.9	17.7	21.6	21.2	26.7	42.2	55.8	70.1
	lb/s	14.3	41.6	41.8	39.0	47.6	46.7	58.8	93.1	123.1	154.4
Exhaust Gas Temp	°C	505	445	510	365	510	540	515	485	490	465
	°F	945	830	950	690	950	1,000	960	905	915	865

1) ISO conditions: sea level, 15°C (59°F), no gas path losses

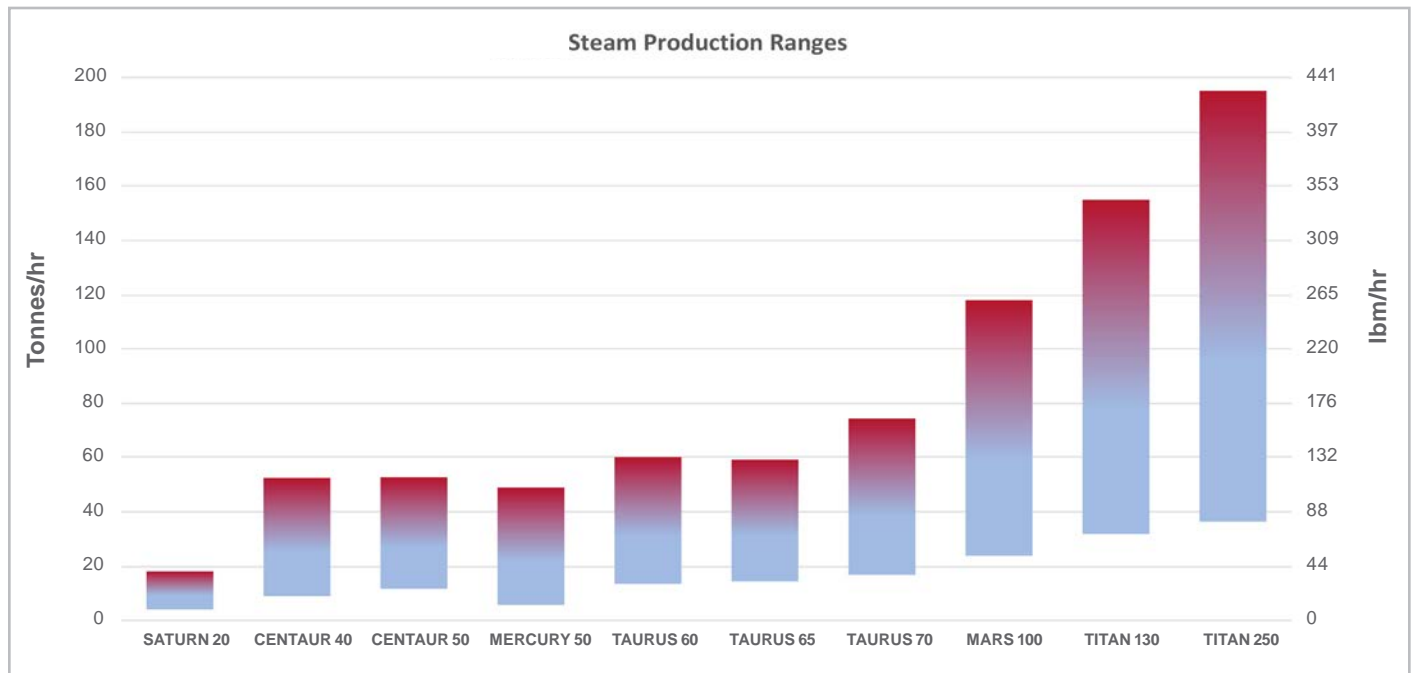
2) Site conditions for steam production: Sea level, 15°C (59°F), 75 mmH2O inlet loss, 250 mmH2O exhaust loss. Natural gas fuel; full load; feed water temperature 105°C (221°F), 100% condensate return, no deaerator, no blowdown

3) Chilling capacity is calculated based on two stages - exhaust chiller with exhaust temperature in/out approx. 500/170°C (932/338°F), chilled water outlet/inlet temperature 7/12°C (45/54°F). Condensation temperature 26°C (79°F) maximum

4) Single stage exhaust chiller

All specifications are for reference only, subject to change without notice.

COMBINED HEAT AND POWER PERFORMANCE



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

SATURN® 20 CENTAUR® 40 CENTAUR® 50 MERCURY™ 50 TAURUS™ 60 TAURUS™ 65 TAURUS™ 70 MARS® 100 TITAN™ 130 TITAN™ 250

Generator Voltage	kV	0.4	6.3,11	6.3,11	6.3,11	6.3,11	6.3,11	6.3,11	6.3,11	6.3,11	11
Steam Production ²⁾ @ 10 bar(a) Saturated (145 psi)	t/hour	4.0	9.0	11.6	5.7	13.5	14.4	16.8	23.8	31.8	36.4
	lb/hr	8820	19,840	25,570	12,570	29,760	31,750	37,040	52,470	70,110	80,250
Steam Production ²⁾ @ 10 bar(a) Saturated (145 psi), Fired to 800°C (1470°F)	t/hour	7.7	22.5	22.6	20.6	25.8	25.4	32.0	50.5	66.6	83.6
	lb/hr	16,980	49,600	49,820	45,420	56,880	56,000	70,550	111,330	146,830	184,310
Additional Fuel Input to Reach 800°C (1470°F)	MW	2.3	8.3	6.8	9.5	7.8	6.9	9.4	16.6	21.5	29.2
	MMBtu/hr	7.8	28.3	23.2	32.4	26.6	23.5	32.1	56.6	73.4	99.6
Steam Production ²⁾ @ 10 bar(a) Saturated (145 psi), Fired to 1100°C (2010°F)	t/hour	11.8	34.4	34.9	32.1	39.9	39.1	48.8	77.2	101.8	127.9
	lb/hr	26,010	75,840	76,940	70,770	87,960	86,200	107,580	170,200	224,430	281,970
Additional Fuel Input to Reach 1100°C (2010°F)	MW	5.1	16.2	14.8	17.0	16.9	15.9	20.7	34.4	45.0	58.7
	MMBtu/hr	17.4	55.3	50.5	58.0	57.7	54.3	70.6	117.4	153.5	200.3
Chilling Capacity ³⁾	kW	3380	7670	9930	5100	11 370	12 500	13 970	20 700	25 700	31 220
	RT	980	2200	2840	1400 ⁴	3310	3530	4120	5830	7790	8920

POWER GENERATION MODULE (PGM)

Solar’s modular concept for gas turbine generator sets has been optimized for transportation and minimized for civil works resulting in shorter installation and commissioning times, and reducing overall costs for our customers.

Our mobile power plants solutions, whether trailer-mounted or in single-lift containers, are easily relocated at any time with optimum power dispatch time.

PGM Scope

- Package Ventilation Filters
- Turbine Air Inlet Filters
- Package Exhaust
- PGM Core Module
- Inlet Fans
- Engine Removal
- Enclosure Structure
- Ladders And Platforms
- EEC And On-skid Control Box

Available Power Generation Module	
PGM40	Powered by Centaur 40
PGM50	Powered by Centaur 50
PGM55	Powered by Mercury 50
PGM60	Powered by Taurus 60
PGM65	Powered by Taurus 65
PGM70	Powered by Taurus 70
PGM130	Powered by Titan 130



MODULAR POWER PLANT (MPP)

Solar’s extensive experience in plant engineering made possible the standardization of complete modular power plants. Using reputable international suppliers, we are capable of delivering plants anywhere around the globe. Solar’s modular power plants are equipped with everything you need to get up and running quickly.

MPP Modules

- Power Generation Module (PGM)
- Air Filtration & Ventilation Module
- Exhaust Module
- Electrical Equipment Module (EEM)
- Service Air Module
- Black Start Module
- Fuel Gas Condition Skid
- Plant Supervisory Console (PSC)
- Interconnection

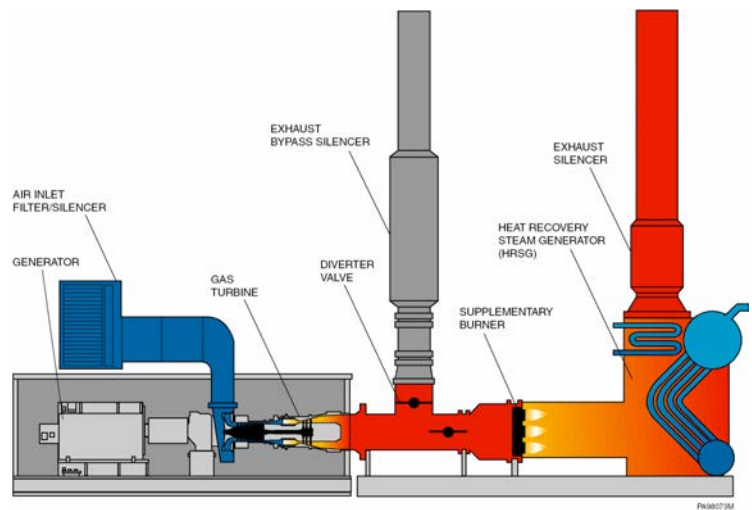
Available Modular Power Plant		
MPP40	(4 MW)	Powered by Centaur 40
MPP50	(5 MW)	Powered by Centaur 50
MPP55	(5 MW)	Powered by Mercury 50
MPP60	(6 MW)	Powered by Taurus 60
MPP65	(6.5 MW)	Powered by Taurus 65
MPP70	(8 MW)	Powered by Taurus 70
MPP130	(16 MW)	Powered by Titan 130



COMBINED HEAT AND POWER – YOUR COMPETITIVE EDGE

If you need electricity and thermal energy simultaneously, a combined heat and power (CHP) system is your solution, offering a favorable return on investment. CHP allows you to benefit from two or three forms of energy for the price of one, with minimal environmental impact. These systems can turn clean-burning natural gas into cost-effective and reliable electricity, use steam for production processes, and provide heat for water and building space or seasonal/process cooling.

With turbine-based generation in place, you can reduce risks from volatile market power prices, increase power reliability, lessen risk process downtime, and create opportunities to sell surplus power.



POWER GENERATION RELIABLE, CLEAN, COST EFFECTIVE

Imagine ... all the reliable and stable electric power you need at a competitive price generated with a clean-burning fuel you choose and backed by a performance guarantee. This is why so many leading companies choose energy solutions using a Solar® gas turbine.

Solar's products are used for combined heat and power (CHP), base-load electricity, distributed power, combined-cycle, peak shaving, district heating/cooling, mobile, and standby power. Solar's turbines are installed in a wide variety of facilities, including colleges and universities, hospitals, industrial/processing facilities, commercial buildings, government facilities, rural and electric cooperatives, and mobile or distributed power plants.

Powering your future with confidence.



POWER GENERATION APPLICATIONS

From foods to fabrics, colleges to hospitals, airports to military bases, Solar Turbines powers the industries and institutions that make our world work with more than 8,000 power generation systems installed worldwide.

Solar offers complete systems that are modular, easy to install and delivered on time — with power output ranges ideally suited for your midrange to larger-scale power and CHP projects. Because of their small footprint and light weight, Solar's turbines are ideally suited for mobile and distributed power applications that bring power closer to the point of use. Thoroughly proven designs and high-quality manufacturing and testing ensure maximum efficiency and return on investment.



Ceramics

Heat from dry exhaust gas from turbines is ducted directly to heating equipment that dries wet ceramic products.



Healthcare

CHP systems provide hospitals with electricity and thermal energy from the same fuel, reducing air pollution and the amount of fuel burned.



Pulp and Paper

CHP systems provide paper and tissue industries with steam and hot air for drying needs while conserving energy and reducing emissions.



Universities

Power from gas turbines results in reduction of carbon dioxide emissions while still providing power and heat throughout university campuses.



Coke Oven Gas

Solar offers a CHP solution where waste product is captured, treated and used as a fuel for gas turbines – producing electricity and thermal energy, and reducing air pollution.



Utilities

Reliable and affordable power generation for peaking, baseload or emergency applications.

POWERING THE FUTURE

The worldwide sales and service organization at Solar Turbines is dedicated to your success. Our culture of customer care is the foundation for our commitment to the highest quality customer experience — from your initial inquiry throughout the life of your equipment. Our customer support personnel make up the world's largest, well trained and most experienced turbomachinery service team.

Solar Turbines - Sales and Service Locations



CONTACT US

For more information and to locate the office nearest you:
visit solarturbines.com;
call +1-619-544-5352 (US) or +41 91 851 1511 (Europe);
email infocorp@solarturbines.com.



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