MHPS Gas Turbine

H-100

MITSUBISHI HITACHI POWER SYSTEMS, LTD.

Mitsubishi Hitachi Power Systems, Ltd. ····· http://www.mhps.com/en/
Mitsubishi Hitachi Power Systems Americas, Inc. ····· https://www.mpshq.com/
Mitsubishi Hitachi Power Systems Europe, Ltd. ····· http://www.emea.mhps.com/

MIX
Paper from responsible sources
FSC® C023704

To protect the environment, this catalog is printed on FSC-certified paper, using a waterless printing method that generates no harmful wastewater.

PSB0-01GT13E1-D-0, (4.0) 16-12, F

Printed in Japan

MHPS Gas Turbine

H-100

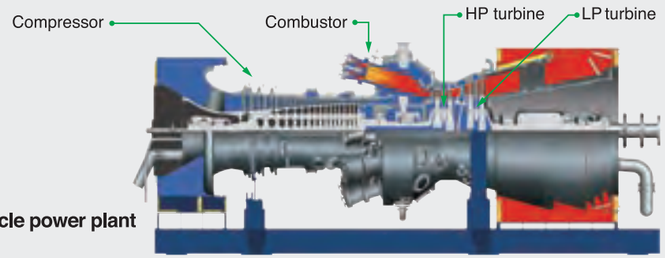
MITSUBISHI HITACHI POWER SYSTEMS

Introduction

H-100 is a 100-120MW class, heavy duty, high efficiency gas turbine.
The H-100 utilizes state-of-the-art technology, based on MHPS's proven track records which show superior quality and reliability.
The H-100 was specifically designed for middle sized power generation and large sized cogeneration power plant.
To be Suitable for numerous applications, including a 150MW class combined cycle power plant (1-1-1 configuration),
a 300MW class combined cycle power plant (2-2-1 configuration) or a cogeneration power plant of 200 t/h level
steam generation (6MPa/300deg.C), the H-100 incorporates efficiency, reliability and flexibility,
together with low life cycle costs. Whatever the application, MHPS's renowned reputation for superior performance,
together with outstanding reliability, and our ability to adapt to our customers needs,
means customers are always assured of the optimum solution.

Features

- **Reliable heavy duty design**
- **High efficiency**
- **No–reduction gear**
- **Replacement of old gas turbine**
- **On-site maintenance**
- **Applicable for mechanical drive**
- **Suitable system for cogeneration and combined cycle power plant**
- **Environmentally friendly combustion system**



Specification

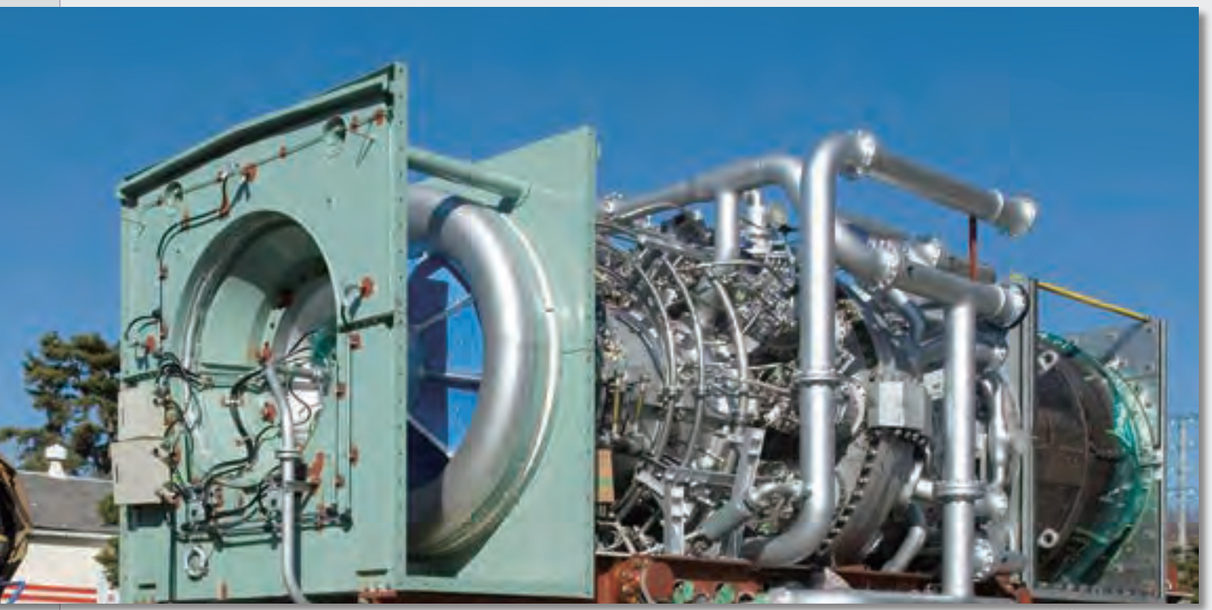
Item		Specification
Gas Turbine	Type	Heavy duty, 2 shafts
		Horizontal split casing
	Rotating Speed	HP turbine & compressor: 4,580 min^{-1}
		LP turbine: 3,600 min^{-1} (60Hz) / 3,000 min^{-1} (50Hz)
Compressor	Type	17 stages, axial type
Turbine	Type	HP turbine : 2 stages
		LP turbine: 2 stages
	Cooling	Air cooled 1st, 2nd & 3rd stage nozzles
		Air cooled 1st & 2nd stage buckets
Combustor	Type	Reverse flow type
		Low NOx type
		10 cans

Performance – Simple Cycle

The H-100 provides a high efficiency power plant for the middle sized power generation sector.

Item	H-100	
	50Hz	60Hz
Output, MW	118.0	105.7
Efficiency, %(LHV)	38.3	38.2
Heat Rate, kJ/kWh	9,409	9,421
Heat Rate, Btu/kWh	8,919	8,930
Exhaust Flow, kg/s	315	293
Exhaust Temperature, deg.C	552	534
NO_X Emission, ppm@15%O_2	≤9-25	

• All ratings are defined at ISO standard reference conditions: 101.3 kPa, 15 deg.C and 60%RH
• All ratings are at the generator terminals and based on the natural gas fuel



H-100 Gas Turbine on Trailer

Modular Package Design

Package Design

Package design offers the following benefits:

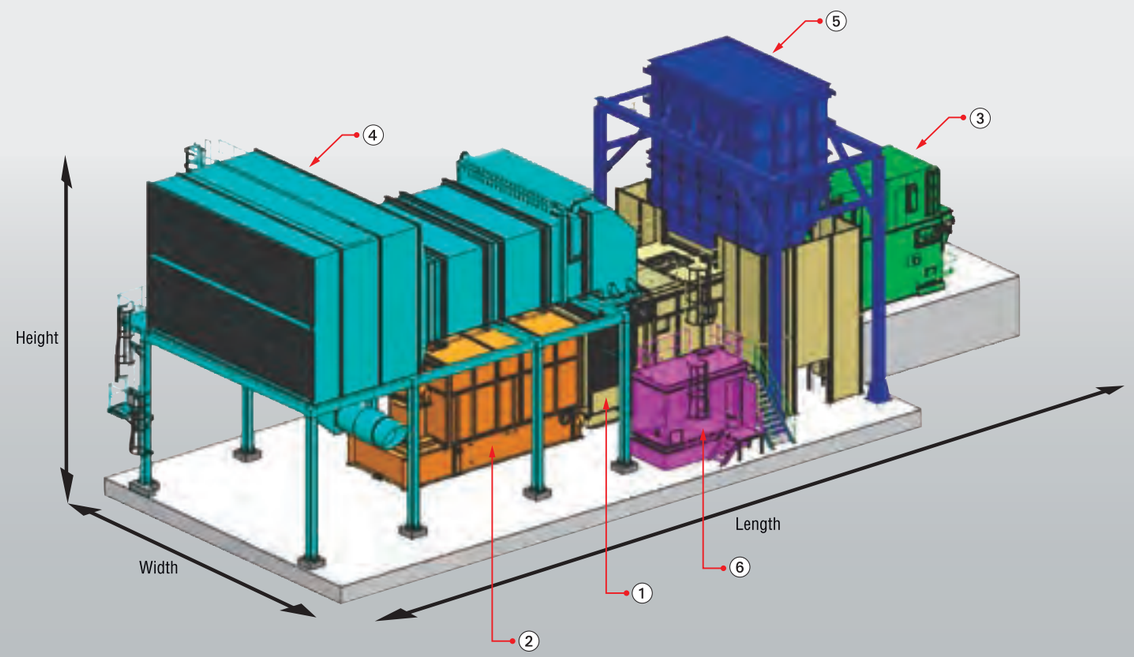
- Minimized site installation work and period
- Flexible site layout
- Economical and delivery-time benefit to customer

Dimensions

Package	H-100
Width	12.2 m
Length	37.0 m
Height	15.5 m

Mass

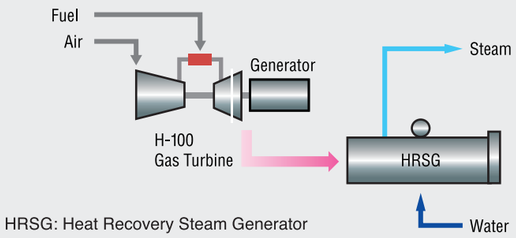
No.	Package	H-100	
		50Hz	60Hz
①	Gas turbine + base	216 t	175 t
②	Lube oil tank, starting means and auxiliaries	95t	
③	Generator	180 t	
④	Air intake system	125 t	
⑤	Exhaust system	33 t	
⑥	Gas valve compartment	5 t	



Cogeneration Power Plant

Cogeneration power plant with the H-100 provides large capacity of steam production as well as high thermal efficiency of the heat and power generation. Applicable to various cogeneration systems, MHPS provides system engineering to meet various heat and power requirements to optimize the design.

System Configuration



HRSG: Heat Recovery Steam Generator

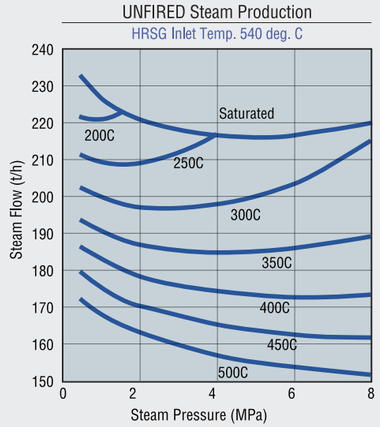
Performance

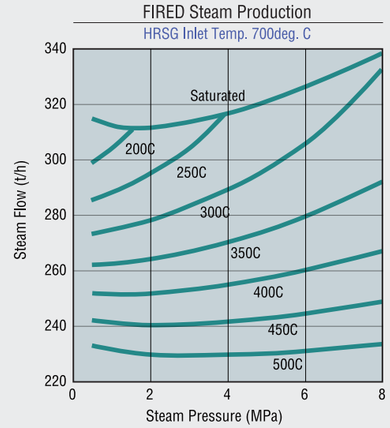
Item	H-100	
	50Hz	60Hz
Power Output, MW	114.6	102.5
Heat Output, t/h (6 MPa/300 deg.C)	203	175
Overall Efficiency, %(LHV)	More than 80	

- All ratings are defined at ISO standard reference conditions: 101.3 kPa, 15 deg. C and 60%RH
- All ratings are at the generator terminals and based on the natural gas fuel

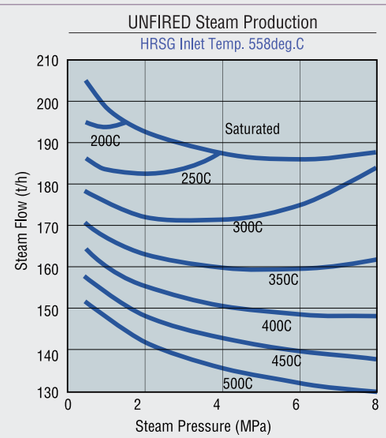
Typical Steam Production Quantity for Cogeneration System

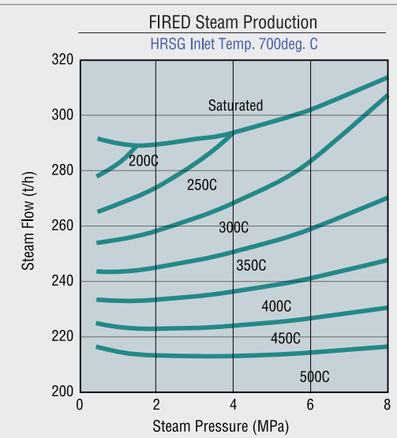
H-100 50Hz

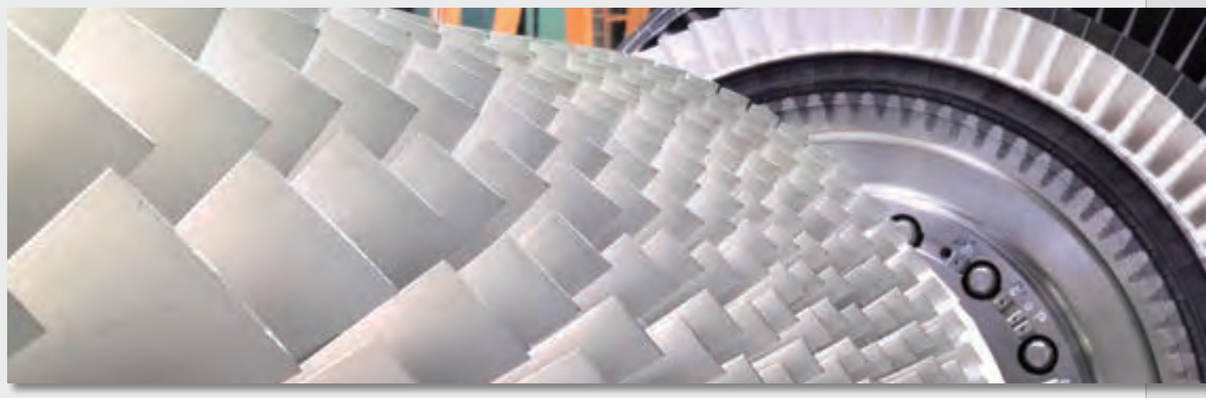




H-100 60Hz







Combined Cycle Power Plant

The power plant of 1-1-1 configuration (one MHPS H-100, one HRSG and one steam turbine) provides approximately 150-170MW power output.

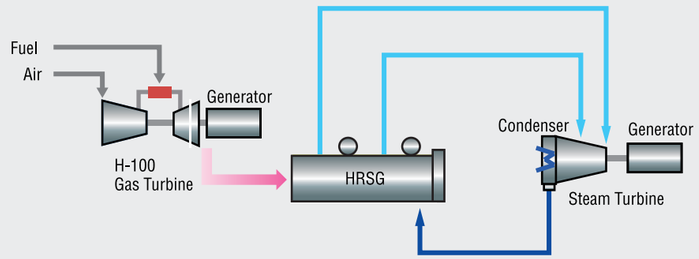
Combined Cycle Power Plant(1-1-1)

Performance

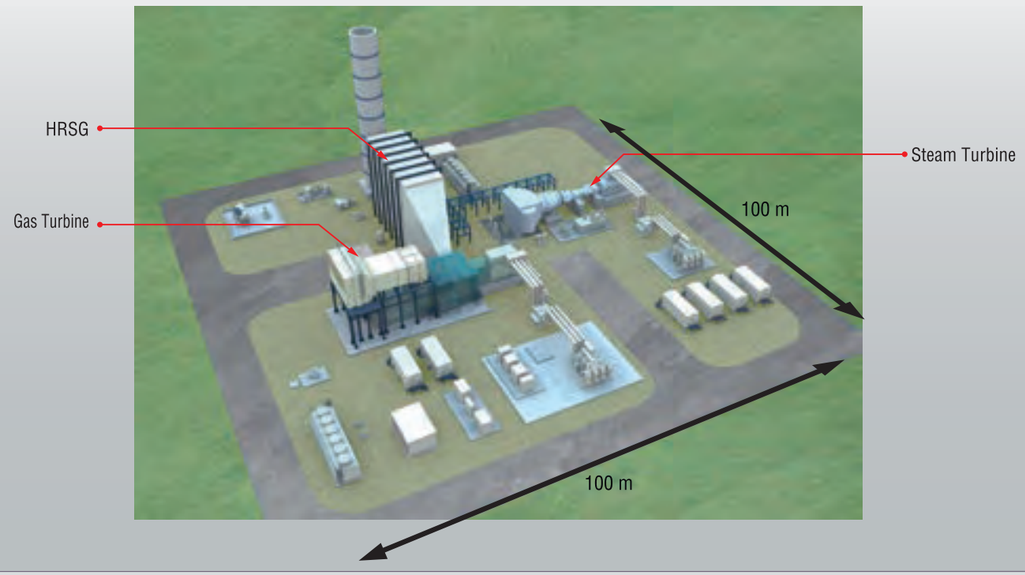
Item	H-100	
	50Hz	60Hz
Total Plant Output, MW	169.6	150.0
Gas Turbine Output, MW	114.6	102.5
Steam Turbine Output, MW	55.0	47.5
Gross Efficiency, %(LHV)	55.8	55.1

- All ratings are defined at ISO standard reference conditions: 101.3 kPa, 15 deg.C and 60%RH
- All ratings are at the generator terminals and based on the natural gas fuel
- Non-Reheat, Dual Pressure

System Configuration



Example of Arrangement



The power plant of 2-2-1 configuration(two MHPS H-100, two HRSGs and one steam turbine) provides approximately 300-340MW power output. This configuration gives operational flexibility to meet various power demands.

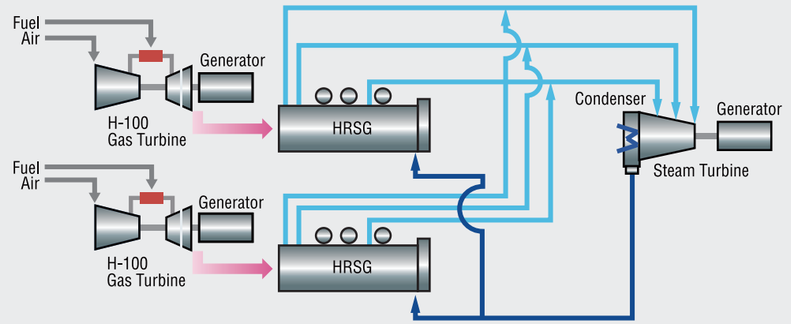
Combined Cycle Power Plant(2-2-1)

Performance

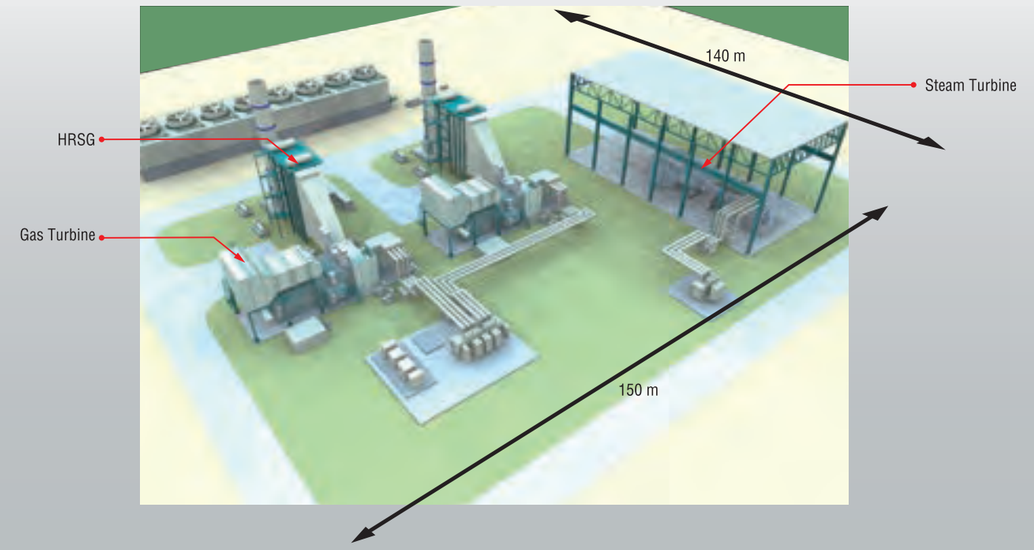
Item	H-100	
	50Hz	60Hz
Total Plant Output, MW	344.5	305.7
Gas Turbine Output, MW	114.6x2	102.5x2
Steam Turbine Output, MW	115.3	100.7
Gross Efficiency, %(LHV)	56.7	56.1

- All ratings are defined at ISO standard reference conditions: 101.3 kPa, 15 deg.C and 60%RH
- All ratings are at the generator terminals and based on the natural gas fuel
- Non-Reheat, Triple Pressure

System Configuration



Example of Arrangement



Replace

As global environmental problem has come under closer scrutiny in recent years, the replacement of old gas turbine with the H-100 provides a benefit to reduce NO_x and CO_2 level and fuel consumption by improving the efficiency of existing power plant, not only in simple cycle but also in combined cycle, using existing facilities as much as possible.

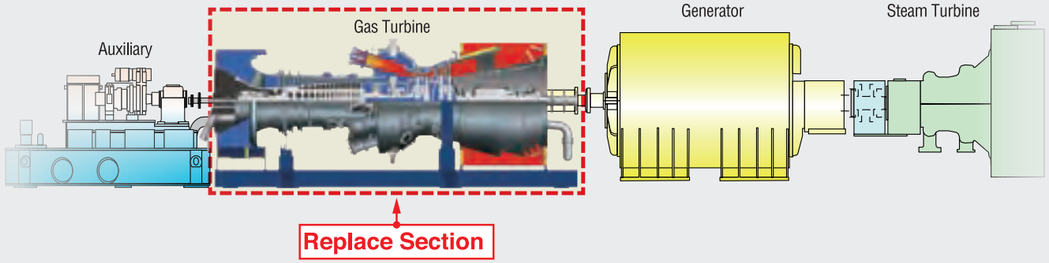
Example of Replacement of Existing Old Combined Cycle

Reused Major Components

- **Generator**
- **HRSG**
- **Steam Turbine**
- **Electrical System**

Performance Improvement evaluation

Item	Existing old 1 on 1 GTCC	H-100 1on1 GTCC	
		50Hz	60Hz
Output	Base	-3%	+13%
Efficiency	Base	+11%	+7 %

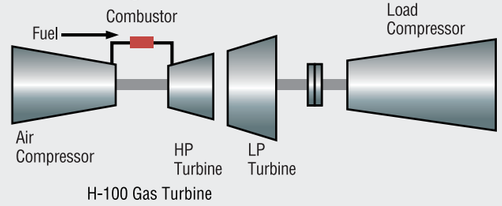


Mechanical Drive

The H-100 is also applicable for Mechanical Drive applications, especially compressor drive for large size of LNG Plant.

- **Variable speed operation (70-105% speed) is available.**
- **Full pressure starting is available.**
- **No requirement for Helper motor, Variable Frequency Drive panel and associated electric equipment.**

System Configuration

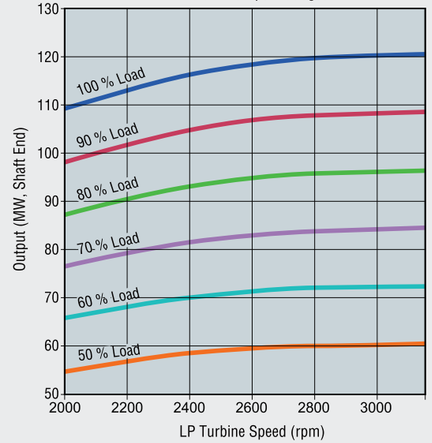


H-100 Gas Turbine

Mechanical Drive Performance

Item	H-100	
Output [hp]	160,780	144,350
Rotating Speed[rpm]	3,000(2,100-3,150)	3,600(2,520-3,780)
Efficiency [%-LHV]	38.9	38.9
Heat Rate[kJ/kWh]	9,266	9,256
Heat Rate [Btu/hp-hr]	6,549	6,542

H-100 Rated LP Turbine Speed 3,000 rpm
Ambient Temp.: 15deg.C



H-100 Rated LP turbine Speed 3,600 rpm
Ambient Temp.: 15deg.C