



Mitsubishi Gas Engine

MEGANINJA

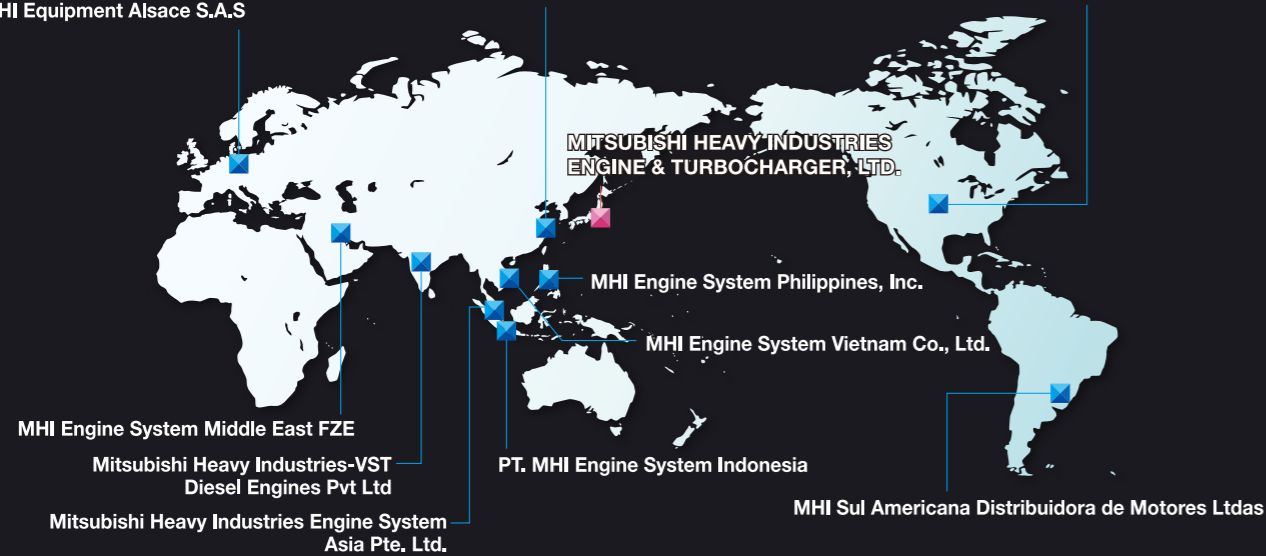
Mitsubishi Energy Gas Package NINJA Series

Quick Mobility
Quick Installation
Quick Commissioning



World Wide Service Network

Mitsubishi Turbocharger and Engine Europe B.V. MHI Equipment Alsace S.A.S. Mitsubishi Heavy Industries (Shanghai) Co., Ltd. Mitsubishi Turbocharger and Engine America, Inc.



⚠ Please read the accompanying instruction manual and all caution labels before operating equipment.

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Mitsubishi Gas Engine

MITSUBISHI HEAVY INDUSTRIES ENGINE & TURBOCHARGER, LTD.

Our Technologies, Your Tomorrow

Natural-gas cogeneration systems are both fuel-efficient and eco-friendly. On-site generation to keep your lights on and your process moving.

Organizations Benefit from On-Site Generation:

- **Highly efficient & reliable** electricity & thermal energy
- More **redundancy and stability** than the “grid” provides
- Thermal energy from **emission compliant** sources
- **Located remotely**; away from traditional “grid” supply
- **Can incorporate renewable** electricity sources
- Rapid **frequency control** to manage grid stability

Take advantage of:

Rapid Implementation and Payback

Shorter time to commercial operation and ROI

Reduced Operational and Capital Risk

Reliable technology & experienced project execution

Low Overall Energy Costs

Efficient use of electrical and thermal energy

Enhanced Energy Security

Insulated from impacts to the “grid” (weather/man-made)

Increased Responsiveness and Flexibility

Faster dispatch and operational flexibility

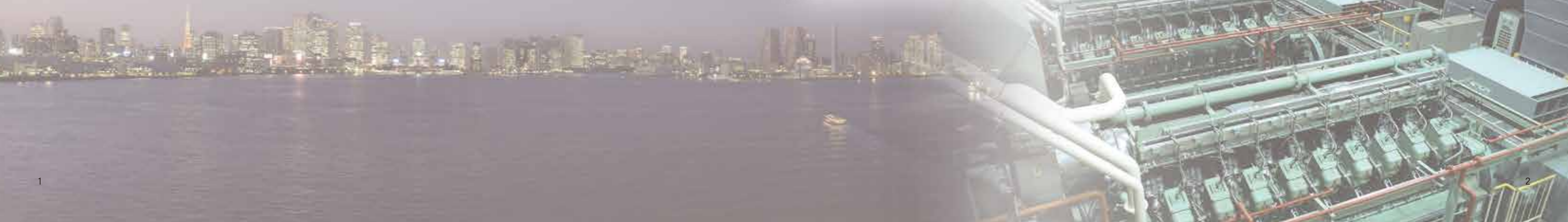
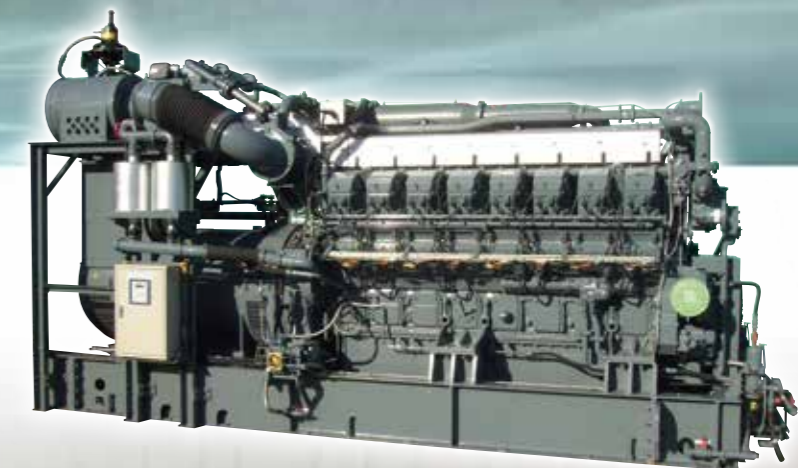
Reduced Carbon Footprint

Benefit to local community with lower emissions

Clean
Eco-Friendly
Mitsubishi Gas Engine
Energy Efficient



Cogeneration Package



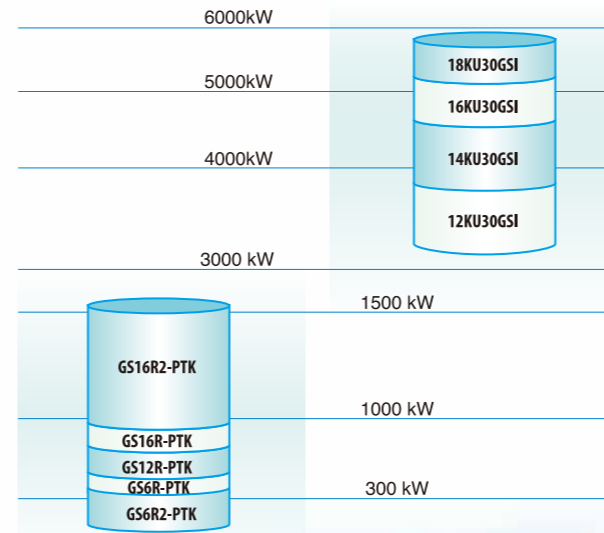
Mitsubishi Gas Engine Line-Up



Mitsubishi Miller Cycle Gas Engine MGS-G series

	GS6R2-PTK		GS6R-PTK		GS12R-PTK		GS16R-PTK		GS16R2-PTK				
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	
Output (kW)	315	380	450	320	305	700	610	930	815	1000	1000	1500	1200
RPM (min ⁻¹)	1000	1200	1200	1500	1200	1500	1200	1500	1200	1000	1200	1500	1200
Fuel consumption* (m ³ N/h)	74.5	89.6	104.1	79.8	73.0	170.1	143.3	226.1	190.6	230.0	233.3	352.3	275.2
Voltage (kV)	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6

* Fuel consumption is based on the following conditions.
 (1) Initial performance of the rated load
 (2) Generator power factor: 0.9
 (3) Under standard atmospheric (par ISO 3046)
 (4) Tolerance: +5%
 (5) Methane number: 80 or higher, fuel gas lower heating value: 36.47 MJ/m³N
 (6) Exhaust gas backpressure: 5.0 kPa or lower



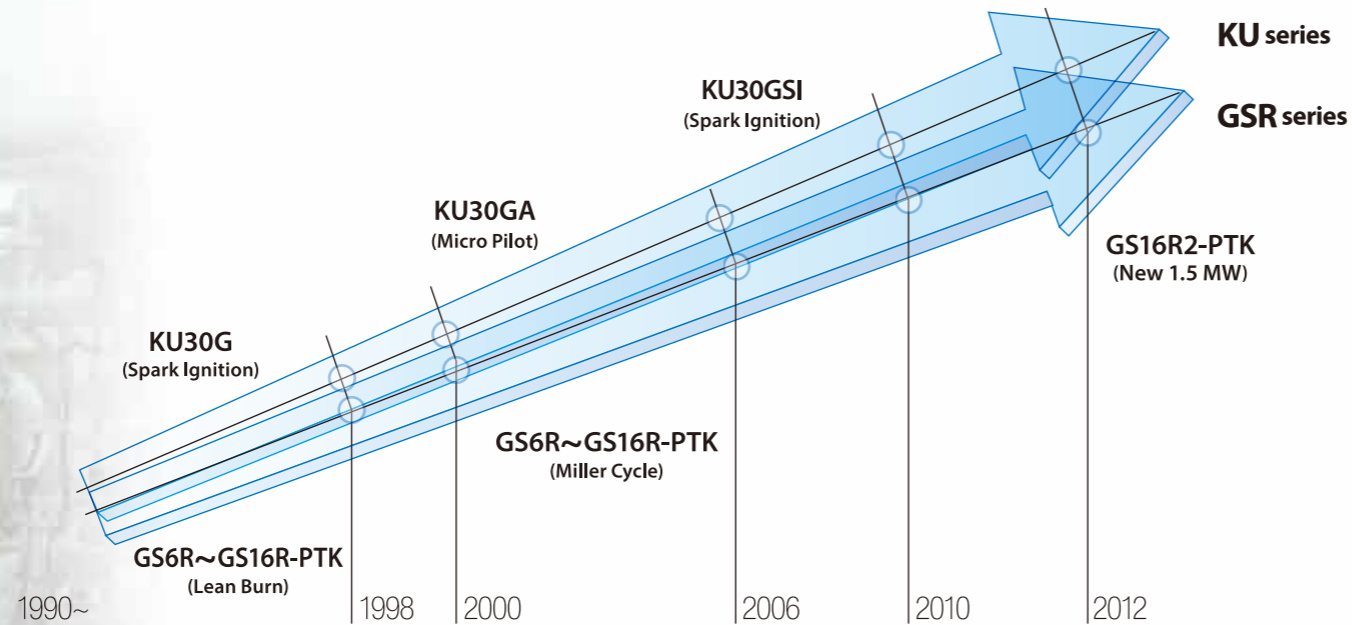
Mitsubishi KU30GSI series

	12KU30GSI		14KU30GSI		16KU30GSI		18KU30GSI	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Output (kW)	3800	3650	4450	4250	5100	4900	5750	5500
RPM (min ⁻¹)	750	720	750	720	750	720	750	720
Fuel consumption* (m ³ N/h)	680	653	796	761	913	877	1029	984
Voltage (kV)	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6	11/6.6

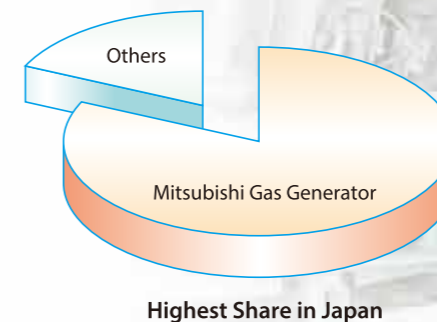
* Fuel consumption is based on the following conditions.
 (1) Initial performance of the rated load
 (2) Generator power factor: 0.9 or higher (lagging)
 (3) Under standard atmospheric (par ISO 3046)
 (4) Tolerance: +5%
 (5) Methane number: 65 or higher, fuel gas lower heating value: 40.63 MJ/m³N
 (6) NOx emission: 500 mg/m³N@5% O₂
 (7) Exhaust gas backpressure: 2.5 kPa or lower



Mitsubishi Gas Engine History and Share



Mitsubishi Gas Generator has more than 70% share in domestic market of over 1000kW class.



MGS-G Cogeneration system

50Hz

Item	Model	GS6R2-PTK	GS6R-PTK	GS12R-PTK	GS16R-PTK	GS16R2-PTK								
Generation efficiency*	%	41.8	39.6	40.6	40.6	42.9	42.0							
Generator output	kW	315	320	700	930	1000	1500****							
Heat recovery	Hot water supply	MJ/h	487.5	1000.2***	558.7	1113.3***	1126.7	2311.7***	1496.9	3071.2***	1622.5	3283.3***	1632.9	4243.3***
	Steam supply**	MJ/h	459.2	—	497.2	—	1061.3	—	1410.0	—	1487.4	—	2337.9	—
	Steam flow**	kg/h	182	—	197	—	421	—	559	—	590	—	928	—
Total efficiency	%	77.6	78.5	76.6	78.6	76.6	78.6	76.6	78.6	80.0	82.0	73.1	75.2	

60Hz

Item	Model	GS6R2-PTK	GS6R-PTK	GS12R-PTK	GS16R-PTK	GS16R2-PTK										
Generation efficiency*	%	41.9	42.7	41.3	42.0	42.2	43.1									
Generator output	kW	380	450****	305	610	815	1200****									
Heat recovery	Hot water supply	MJ/h	583.9	1175.3***	811.5	1570.2***	486.2	996.9***	935.1	1925.6***	1243.4	2550.9***	1196.9	2797.8***	1235.7	3394.5***
	Steam supply**	MJ/h	527.3	—	681.0	—	457.8	—	887.9	—	1171.0	—	1433.8	—	1946.0	—
	Steam flow**	kg/h	209	—	270	—	182	—	352	—	465	—	569	—	772	—
Total efficiency	%	75.9	77.9	82.7	84.8	77.0	79.0	76.9	78.8	76.9	78.9	73.2	75.2	74.9	77.0	

* Generation efficiency is based on the following conditions.

- (1) Initial performance of the rated load
- (2) Generator power factor : 0.9 or higher (lagging)
- (3) Under standard atmospheric (par ISO 3046)
- (4) Tolerance: +5%

- (5) Methane number: 80 or higher, fuel gas lower heating value: 36.47 MJ/m³N
- (6) Exhaust gas backpressure : 5.0kPa or lower
- (7) NOx emission:

- (8) Exhaust gas backpressure : 5.0kPa or lower
- (9) NOx emission:

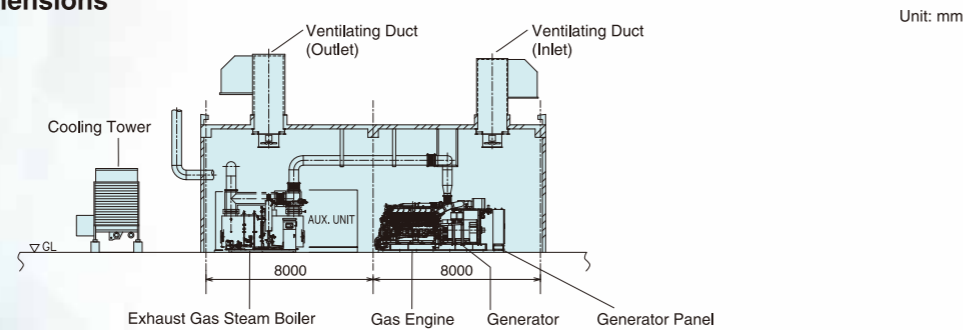
****, applicable 500 mg/m³N@5% O₂ without de-NOx system

All models are possible to reduce below 500 mg/m³N@5% O₂ with de-NOx system

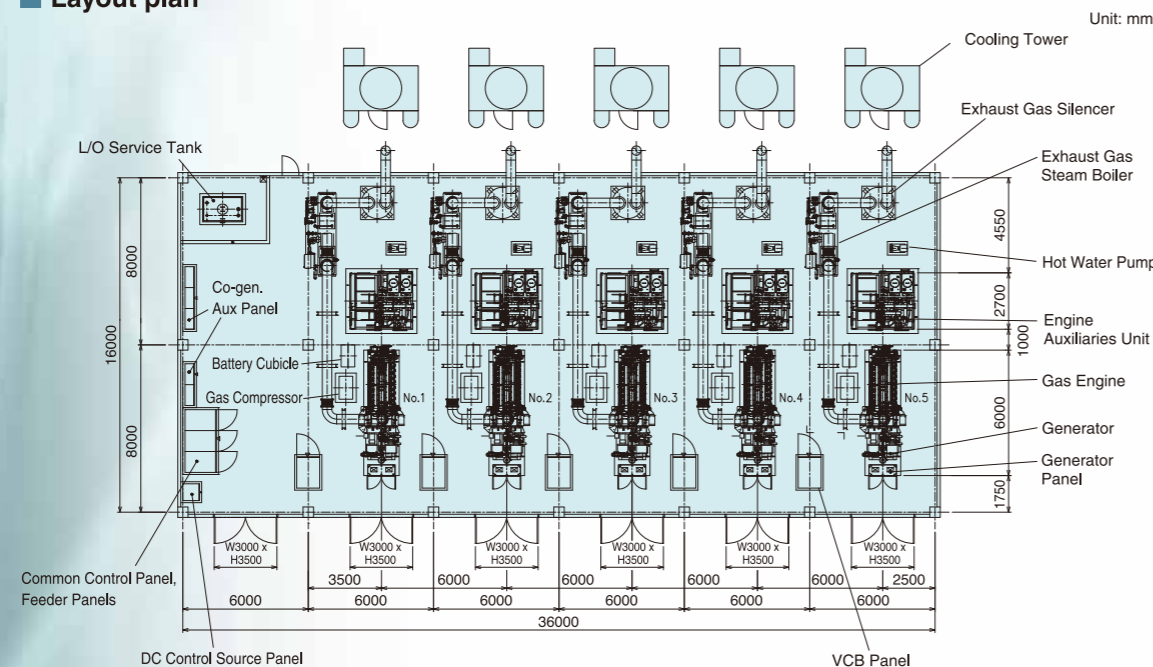
** Heat output from exhaust (exhaust cooling to 150°C)

*** Heat output from exhaust (exhaust cooling to 120°C)

Outline dimensions



Layout plan



7.5MW Class Cogeneration System Plant

KU30GSI Cogeneration system

Item	Model	12KU30GSI		14KU30GSI		16KU30GSI		18KU30GSI		
		50	60	50	60	50	60	50	60	
Generator frequency	Hz	50	60	50	60	50	60	50	60	
Number of cylinders		12		14		16		18		
Bore×stroke	mm	300×380								
RPM	min ⁻¹	750	720	750	720	750	720	750	720	
Generator rated output	kW	3800	3650	4450	4250	5100	4900	5750	5500	
Generation efficiency*	%	49.5								
Heat recovery	Hot water supply**	kW	1778	1708	2083	1988	2386	2293	2691	2574
	Steam supply***	kW	1120	1078	1324	1268	1520	1457	1709	1639
	Steam flow***	kg/h	1600	1540	1890	1810	2170	2080	2440	2340
Total efficiency	%	>87								
Engine weight	ton	40		48		54		60		

* Generation efficiency is based on the following conditions.

- (1) Initial performance of the rated load
- (2) Generator power factor: 0.9 or higher (lagging)
- (3) Under standard atmospheric (par ISO 3046)
- (4) Tolerance: +5%
- (5) Methane number: 65 or higher, fuel gas lower heating value : 40.63 MJ/m³N
- (6) NOx emission: 500 mg/m³N@5% O₂
- (7) Exhaust gas backpressure: 2.5 kPa or lower

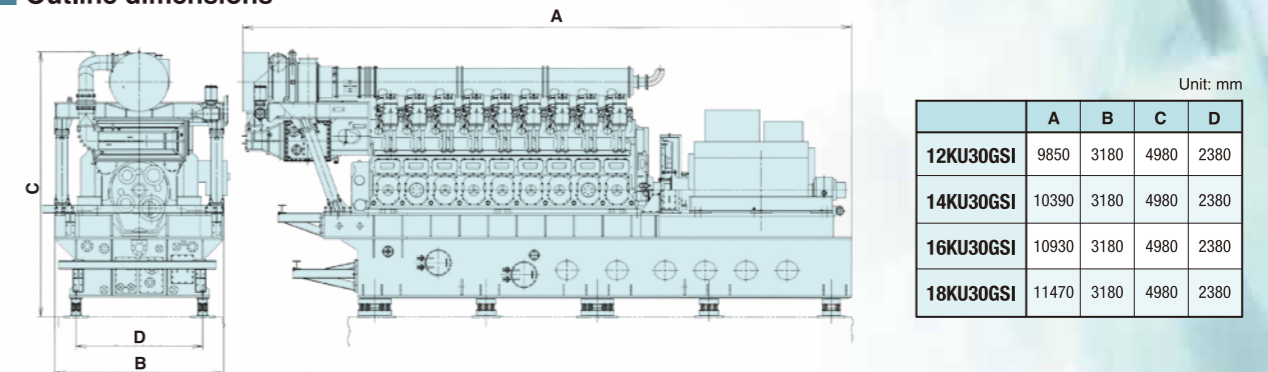
** Hot water supply value is based on the following conditions.

- (1) Hot water recovered from P.C.W.: 83°C to 88°C
- (2) Hot water recovered from L.O and S.C.W.: 20°C to 60°C

*** Steam generation is based on the following conditions.

- (1) Pressure: 0.78 MPaG, saturated steam
- (2) Feed-water temperature: 60°C (It is heated by the cooling system of the engine)
- (3) Continuous blow rate: 0%

Outline dimensions



Layout plan

