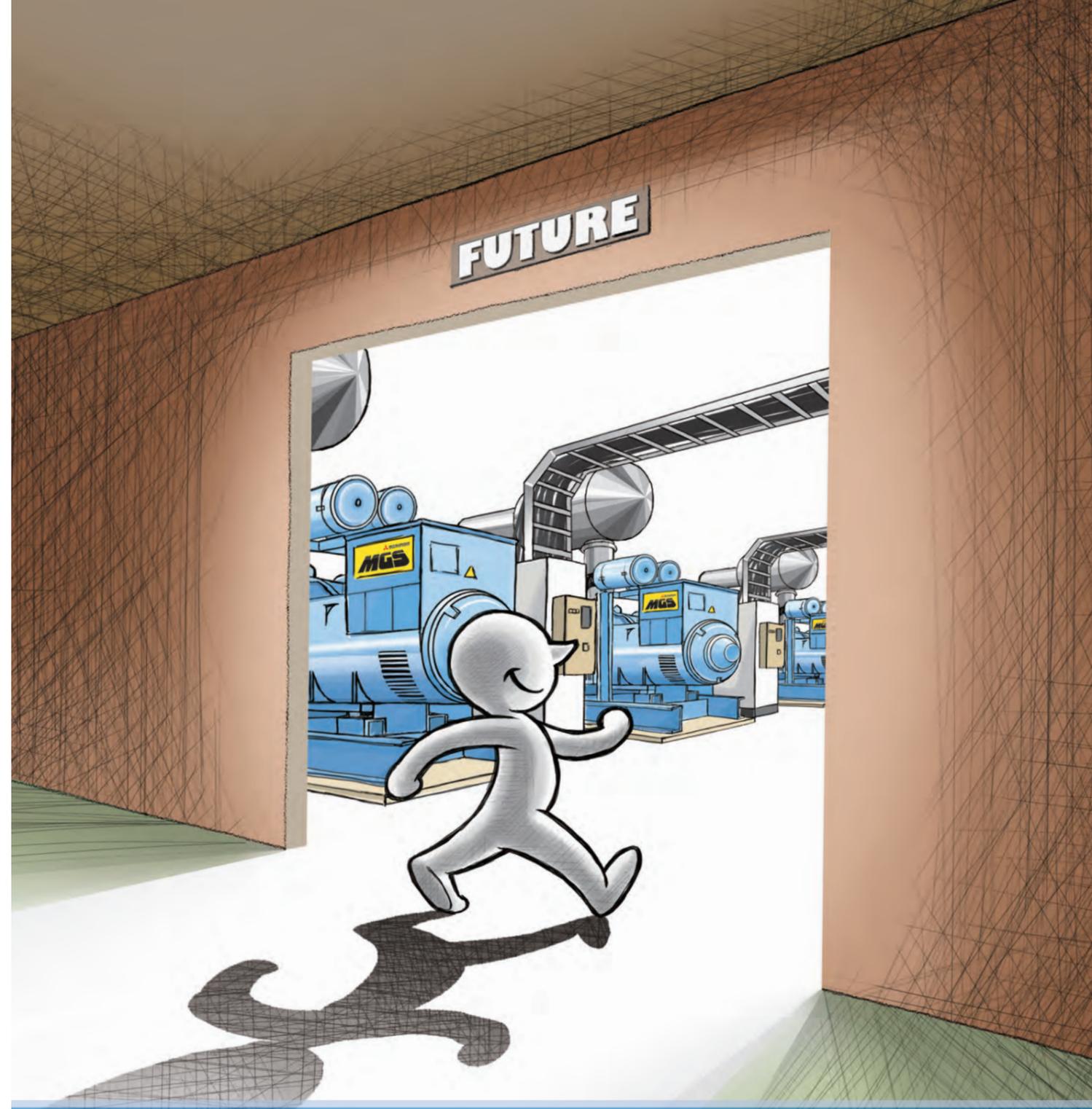


**MITSUBISHI GENERATOR SETS**



**MITSUBISHI GENERATOR SETS**

 All information contained within this document was correct at time of printing and may be subject to change.

**MITSUBISHI HEAVY INDUSTRIES ENGINE & TURBOCHARGER, LTD.**

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# MHI Group Represent the Cutting Edge of Technological Innovation

We at MHI Group believe in tomorrow.  
That's why we strive to create a more affluent future society

In 1917, Mitsubishi Heavy Industries became the first Japanese company to develop and build a diesel engine, and since then has steadfastly pioneered technologies for various types of Diesel and Gas engines. The prime movers (engines) are designed to meet the general and specific applications of customers.

MHI Group's advanced research and development and production technology is highly regarded in Japan and abroad.

It is used in a variety of applications, including continuous operation and emergency (stand-by) as well as combined heat and power (CHP) for a wide range of clients including IPPs, industrial heavyweights and commercial centers.

Through supplying the international market with Diesel and Gas generating systems, MHI Group hope to create future societies with a higher quality of life.

MHI Group's corporate philosophy of "Our Technologies, Your Tomorrow" is based on applying the company's advanced technology to improving the lives of people everywhere.



Stand-by Power

Prime & Continuous Power

Embedded Power Generation



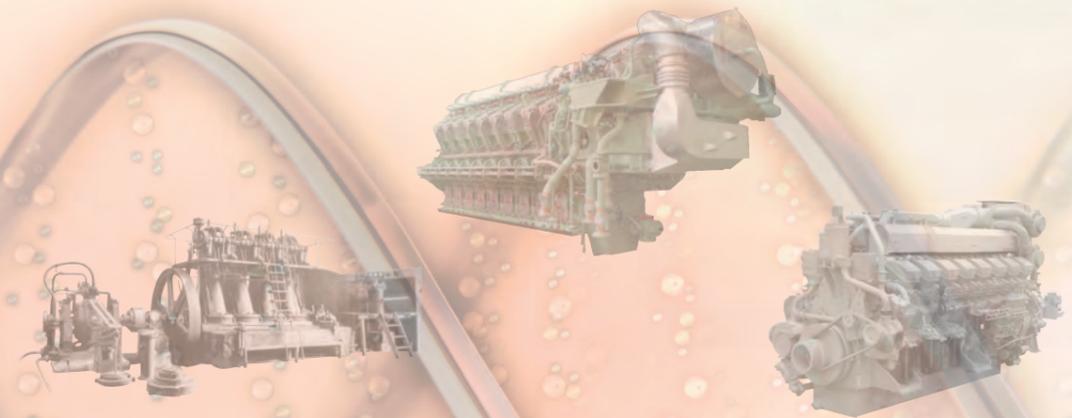
Independent Power Producer

Combined Heat and Power (CHP)



Commercial Plant

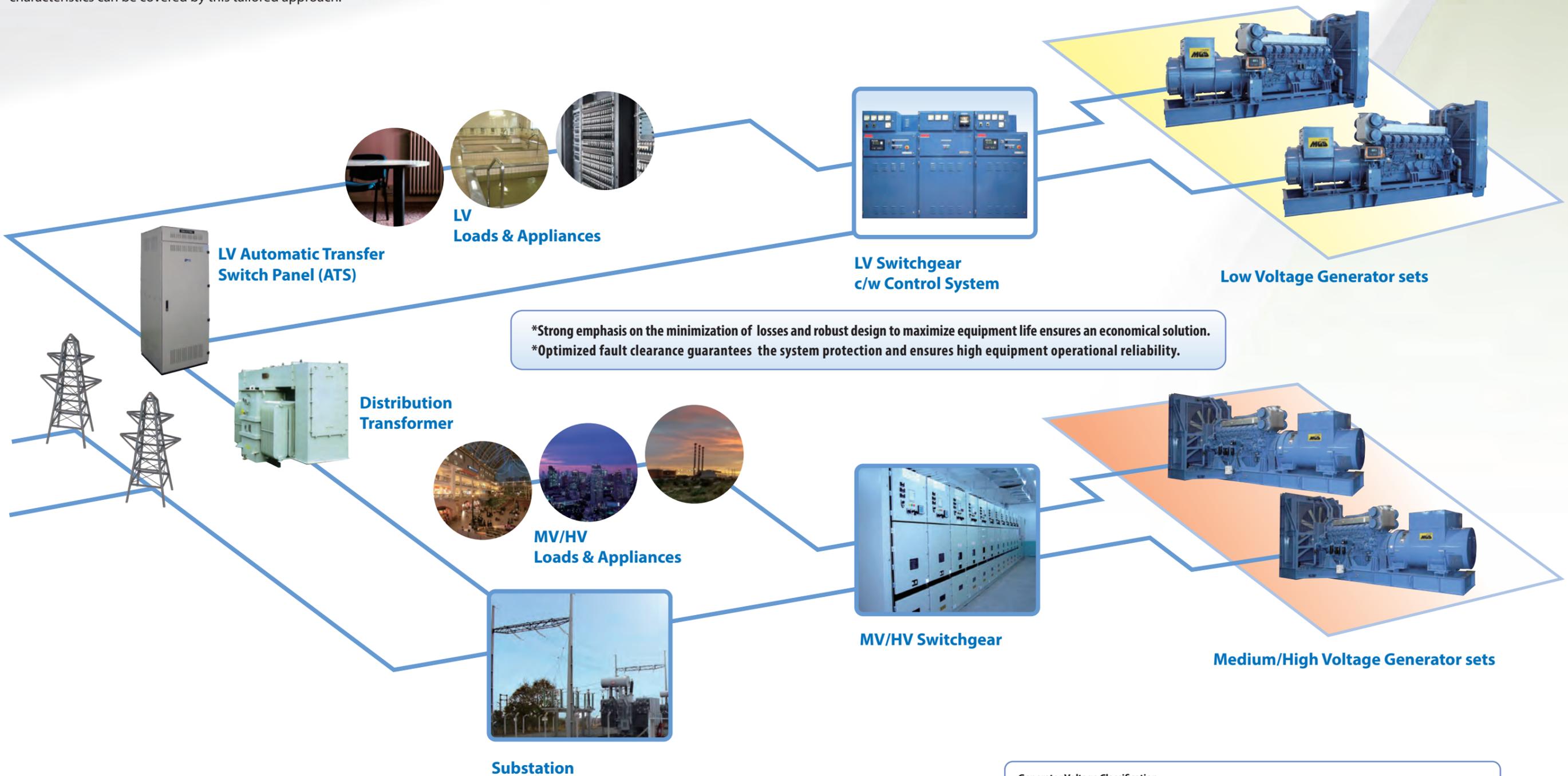
Uninterruptible Power Supply



Fuel	Gen-set Model	Output (kW)									
		0	300	500	1,000	1,500	3,000	5,000	10,000	15,000	20,000
Diesel	MGS										
	MU-G										
	KU										
Gas	MGS-G										
	KU										

# Power System Integration

Close Collaboration with clients dealing directly with Mitsubishi's high experienced engineers ensures a customized solution certain to exceed expectations. All load requirements and characteristics can be covered by this tailored approach.

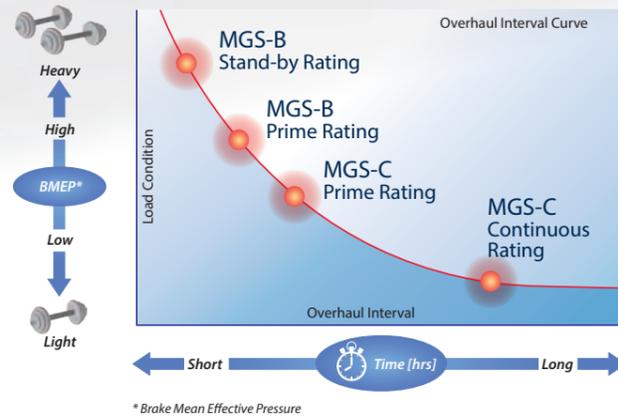


**Generator Voltage Classification**  
 LV: Low Voltage (Below 690 VAC)    MV: Medium Voltage above 1000 V, up to 4160 V    HV: High Voltage above 6600 V, up to 13800 V

# MGS-B, MITSUBISHI GENERATOR SERIES



The MITSUBISHI GENERATOR SERIES MGS, comprises an extensive range of modular designed diesel generator sets. With a wide array of power outputs, operational applications and plenty of customizable features, MGS is the solution for every client's requirements.



## Features

- (1) Low initial investment
- (2) Rapid product delivery and simple installation
- (3) Easy operation and quick start
- (4) Proven reliability and operational flexibility
- (5) High performance and low running cost
- (6) Black start capability for uninterruptible power supply
- (7) Containerized application
- (8) Wide range of optional features available
  - (a) Parallel operation with commercial power supply
  - (b) Oversized radiator for high temperature (up to 50°C)
  - (c) Remote cooling system
  - (d) Compliance with emission standards
- (9) Oil & gas field application (MOG)

**MGS-B**  
(For Stand-by Power Supply)



**MGS-B**  
(For Prime Power Supply)



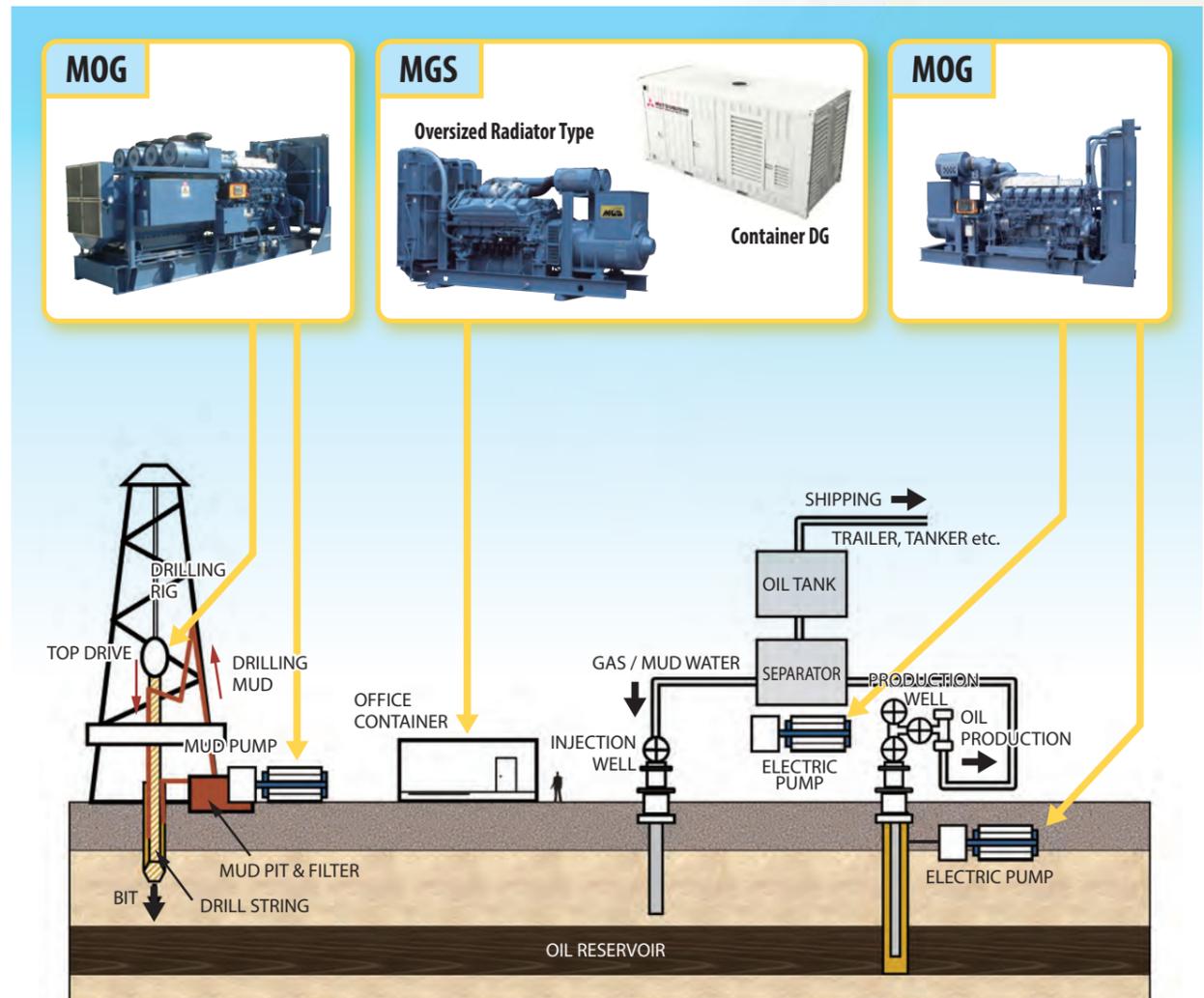
**MGS-C**  
(For Prime & Continuous Power Supply)



**MGS-HV**  
(For High Voltage Power Supply)



## Customized Application



# MGS, MITSUBISHI GENERATOR SERIES / Rating Table



## Low Voltage (MGS-B, C)

## High Voltage (MGS-HV)

### 50 Hz/1500 min<sup>-1</sup>/380-415 V

Model	Engine	Alternator	MGS-B		MGS-C	
			Stand-by Code: S (kVA)	Prime Code: P (kVA)	Prime Code: CP (kVA)	Continuous Code: C (kVA)
MGS2800	S16R2-PTAW2-S	P80512	2750	2500	2375	-
MGS2700	S16R2-PTAW	KT84	2500	2250	2187.5/2250*	1900
		L51V9	2500	2250	2150/2250*	1900
MGS2500	S16R-PTAA2	KT83	2290	2035	2000	-
		L51L7	2275	2020	2000	-
MGS2000	S16R-PTA2-S	KT83	2235	2030	1935	-
		L51L7	2220	2015	1925	-
MGS1500	S16R-PTA-S	7PF	2000	1800	1735	-
		7PE	-	-	-	1550
		L51M6	2000	1810	1735	1550
		L50V1	1680	1600	-	-
		7PD	1675	1600	-	-
		7PD	1600	1450	1390	-
MGS1400	S12R-PTA2-S	L50V1	1600	1450	1390	-
		7PD	1500	1362.5	1287.5	-
MGS1200	S12R-PTA-S	7PB	-	-	-	1130
		L50L8	1500	1362.5	1287.5	1140
		7PC	1250	1125	1055	-
MGS1000	S12H-PTA-S	H6K	-	-	-	950
		H6J	1050	1000	900	900
MGS0900	S12A2-PTA2-S	H6J	1000	900	870	-
		H6G	-	-	-	750
MGS0700	S6R2-PTAA-S	H6H	880	800	750	-
MGS0650	S6R2-PTA-S	H6G	780	700	665	-
		H5F	-	-	-	550
MGS0600	S6R-PTA-S	H5F	690	625	560	-
		H5E	-	-	-	500
MGS0500	S6A3-PTAA-S	H5E	580	530	500	-
MGS0450	S6A3-PTA-S	H5D	515	480	450	-
		H5C	-	-	-	385

Voltage Range: 50 Hz 190-220 V & 380 V-440 V  
 \*MGS2700C (SCP-KT84/L51V9)  
 Rated output on its name plate: 2,250 kVA  
 2,250 kVA under temperature rise H (125°C at 40°C ambient)

**Stand-by:** Code: S  
 Applicable for supplying emergency power at varying load in the event of normal utility power interruption. Fuel stop power in accordance with ISO15550, ISO3046/1, JIS8002-1, DIN6271 and B5514.

**Prime:** Code: P  
 Applicable for supplying emergency power at varying load in the event of normal utility power interruption. +10% overload in accordance with ISO3046/1. Overload power in accordance with ISO15550, ISO3046/1, JIS8002-1, DIN6271 and B5514.

**Prime:** Code: CP  
 Applicable for supplying power with varying load instead of the utility for an unlimited time. Prime power in accordance with ISO8528 (PRP). +10% overload is available. (Engine rating in accordance with ISO3046/1)

**Continuous:** Code: C  
 Applicable for supplying power continuously. Continuous power in accordance with ISO8528(COP), ISO15550, ISO3046/1, JIS8002-1 and B5514.

**Conditions:**  
 Engine ratings are based on SAE J1349 standard conditions and also apply to ISO3046/1, DIN6271 & B5514 standard conditions.  
 Fuel rates: based on ASTM D975, B52869 and on fuel oil of 35° API (16°C or 60°F) gravity having a LHV of 42,780 kJ/kg (18,390 Btu/lb.) when used at 29°C (85°F) and weighing 838.9 g/liter (7.001 lbs./U.S. gal.).

### 60 Hz/1800 min<sup>-1</sup>/380 V

Model	Engine	Alternator	MGS-B		MGS-C	
			Stand-by Code: S (kW)	Prime Code: P (kW)	Prime Code: CP (kW)	Continuous Code: C (kW)
MGS2500	S16R-PTAA2	73PF	2000	1800	1800	-
		L51M68	2000	1810	1720	-
MGS2000	S16R-PTA2-S	73PF	1900	1730	1640	-
		L51M68	1900	1730	1650	-
MGS1500	S16R-PTA-S	73PF	1700	1550	1470	-
		L51S58	1700	1550	1470	-
		73PD	-	-	-	1240
MGS1400	S12R-PTA2-S	L51S58	-	-	-	1250
		73PD	1415	1280	1220	-
MGS1200	S12R-PTA-S	L50V18	1420	1280	1220	-
		73PD	1265	1145	1080	-
		L50L78	1265	1145	1080	-
MGS1000	S12R-PTA	73PD	-	-	-	920
		L50L78	-	-	-	920
MGS1000	S12H-PTA-S	73PD	1070	970	920	-
MGS0900	S12A2-PTA2-S	H6K	-	-	-	830
		H6J	860	785	740	-
MGS0600	S6R-PTA-S	H6G	-	-	-	580
		H6G	620	560	520	-
MGS0500	S6R-PTA	H5F	-	-	-	455
		H5E	500	460	430	-
MGS0450	S6A3-PTAA-S	H5E	480	435	410	-
		H5C	-	-	-	345

### 60 Hz/1800 min<sup>-1</sup>/480 V

Model	Engine	Alternator	MGS-B		MGS-C	
			Stand-by Code: S (kW)	Prime Code: P (kW)	Prime Code: CP (kW)	Continuous Code: C (kW)
MGS2500	S16R-PTAA2	7PF	2012	1820	1820	-
		L51M6	2010	1810	1800	-
MGS2000	S16R-PTA2-S	7PE	1900	1730	1650	-
		L51M6	1900	1730	1650	-
MGS1500	S16R-PTA-S	7PD	1680	1550	1470	-
		L51S5	1700	1550	1470	-
		7PD	-	-	-	1250
MGS1400	S12R-PTA2-S	L51S5	-	-	-	1250
		7PC	1420	1280	1220	-
MGS1200	S12R-PTA-S	L50L8	1420	1280	1220	-
		7PB	1260	1150	1080	-
		L50L7	1260	1150	1080	-
MGS1000	S12R-PTA	H6J	-	-	-	910
		L50L7	-	-	-	920
MGS1000	S12H-PTA-S	H6J	1070	960	920	830
MGS0900	S12A2-PTA2-S	H6H	870	790	740	-
		H5F	-	-	-	600
MGS0600	S6R-PTA-S	H5F	630	570	540	-
		H5D	-	-	-	460
MGS0500	S6A3-PTAA-S	KSD	500	460	430	-
MGS0450	S6A3-PTA-S	H5C	480	435	410	-
		H4F	-	-	-	345

Voltage Range: 60 Hz 200-240 V & 380 V-480 V

### 50 Hz/1500 min<sup>-1</sup>

Model	Engine	Stand-by Code: S (kVA)			Prime Code: P (kVA)				Prime Code: CP (kVA)			Continuous Code: C (kVA)					
		3.3 kV	6.6 kV	10 kV	11 kV	3.3 kV	6.6 kV	10 kV	11 kV	3.3 kV	6.6 kV	10 kV	11 kV	3.3 kV	6.6 kV	10 kV	11 kV
MGS2800HV	S16R2-PTAW2-S	2750	2750	2750	2750	2500	2500	2500	2500	2375	2375	2375	2375	-	-	-	-
MGS2700HV	S16R2-PTAW	2500	2500	2500	2500	2250	2250	2250	2250	2250	2250	2250	2250	1900	1900	1900	1900
MGS2500HV	S16R-PTAA2	2250	2250	2250	2250	2010	2010	2010	2005	2000	2000	2000	2000	-	-	-	-
MGS2000HV	S16R-PTA2-S	2200	2200	2200	2200	2000	2000	2000	2000	1900	1900	1900	1900	-	-	-	-
MGS1500HV	S16R-PTA-S	2000	2000	2000	2000	1810	1810	1800	1800	1700	1725	1725	1725	1560	1550	1540	1540
MGS1400HV	S12R-PTA2-S	1575	1600	1600	1600	1450	1450	1450	1450	1380	1380	1380	1380	-	-	-	-
MGS1200HV	S12R-PTA-S	1475	1475	1475	1475	1350	1350	1340	1340	1280	1280	1270	1270	1140	1140	1130	1130
MGS1000HV	S12H-PTA-S	1225	1225	1225	1225	1060	1100	1100	1100	1050	1050	1040	1040	940	945	935	935

### 60 Hz/1800 min<sup>-1</sup>

Model	Engine	Stand-by Code: S (kW)				Prime Code: CP (kW)				Continuous Code: C (kW)			
		3.3 kV	4.16 kV	6.6 kV	13.8 kV	3.3 kV	4.16 kV	6.6 kV	13.8 kV	3.3 kV	4.16 kV	6.6 kV	13.8 kV
MGS2500HV	S16R-PTAA2	2000	2000	2000	2000	1800	1800	1800	1800	-	-	-	-
MGS2000HV	S16R-PTA2-S	1850	1920	1850	1850	1650	1650	1640	1640	-	-	-	-
MGS1500HV	S16R-PTA-S	1575	1700	1575	1575	1460	1470	1460	1460	-	-	-	-
	S16R-PTA	-	-	-	-	-	-	-	-	1250	1250	1240	1240
MGS1400HV	S12R-PTA2-S	1420	1420	1410	1410	1225	1230	1220	1220	-	-	-	-
MGS1200HV	S12R-PTA-S	1270	1270	1260	1260	1080	1080	1070	1070	-	-	-	-
	S12R-PTA	-	-	-	-	-	-	-	-	920	920	910	900
MGS1000HV	S12H-PTA-S	1070	1070	1070	1060	930	920	920	910	830	830	820	810

**Notice:**

Outputs are based on the following standard conditions  
 -Ambient temperature: 40°C  
 -Altitude above sea level: Below 1,000 meters

For alternative voltages, overload requirements, extreme climate conditions, strict emissions requirements or additional rating requirements, please consult with your nearest Mitsubishi dealer.

Specifications and some materials may be changed without notice.



# MU-G Series

The MU-G Series is a fully customizable range of diesel generator sets dedicated to fulfilling every client's requirement. With our comprehensive support from the design stage to after-sales service, you can select the most appropriate power generation system to meet your needs.

## Features

- (1) Wide range of output from 735 kVA to 4500 kVA
- (2) A variety of control systems to suit all the user's requirement
- (3) Appropriate for continuous operation with its excellent fuel efficiency
- (4) Compact yet powerful systems. The minimum space are required for installation
- (5) From low to high voltage available
- (6) Black start capability for uninterruptible power supply



## MU-G/50 Hz

Model		Stand-by (kVA)		Prime (kVA)		Continuous (C) (kVA)		Continuous (D) (kVA)	
		1000 min <sup>-1</sup>	750 min <sup>-1</sup>						
M16U-G	PTK	4280	3075	4100	2800	3685	2560	3385	2300
	PTA	4000	2820	3850	2560	3450	2300	3170	2075
M12U3-G	PTK	4315	-	4315	-	3750	-	3750	-
	PTA	3750	-	3440	-	3250	-	3250	-
M12U-G	PTK	3200	2300	3075	2115	2765	1900	2535	1700
	PTA	3000	2115	2885	1920	2600	1730	2375	1555
M8U-G	PTK	2140	1535	2050	1400	1845	1280	1690	1150
	PTA	2000	1410	1920	1275	1725	1150	1585	1035
M6U2-G	PTK	1760	1325	1650	1200	1500	1080	1375	970
	PTA	1655	1235	1550	1125	1405	1015	1290	915
M6U-G	PTK	1600	1150	1540	1055	1380	960	1270	865
	PTA	1500	1055	1440	960	1300	865	1190	775

Voltage Range : 50 Hz 190-220 V, 380-440 V, 3.3 kV, 6.6 kV, 10 kV, 11 kV

## MU-G/60 Hz

Model		Stand-by (kVA)			Prime (kVA)			Continuous (C) (kVA)			Continuous (D) (kVA)		
		1200 min <sup>-1</sup>	900 min <sup>-1</sup>	720 min <sup>-1</sup>	1200 min <sup>-1</sup>	900 min <sup>-1</sup>	720 min <sup>-1</sup>	1200 min <sup>-1</sup>	900 min <sup>-1</sup>	720 min <sup>-1</sup>	1200 min <sup>-1</sup>	900 min <sup>-1</sup>	720 min <sup>-1</sup>
M16U-G	PTK	4500	3865	2900	4335	3700	2660	3900	3375	2400	3500	3000	2175
	PTA	4280	3570	2660	4075	3455	2420	3635	3115	2175	3275	2800	1960
M12U3-G	PTK	-	3940	-	-	3750	-	-	3375	-	-	3375	-
	PTA	-	3625	-	-	3315	-	-	3125	-	-	3125	-
M12U-G	PTK	3375	2900	2175	3250	2800	2000	2920	2500	1815	2630	2280	1630
	PTA	3200	2675	2000	3060	2600	1815	2725	2335	1630	2455	2100	1470
M8U-G	PTK	2250	1930	1450	2165	1855	1330	1950	1685	1210	1750	1520	1090
	PTA	2140	1785	1330	2035	1725	1200	1815	1560	1085	1635	1400	980
M6U2-G	PTK	-	1600	1250	-	1515	1140	-	1400	1035	-	1270	930
	PTA	-	1500	1175	-	1400	1065	-	1275	955	-	1200	860
M6U-G	PTK	1685	1450	1085	1625	1395	1000	1460	1265	900	1315	1140	815
	PTA	1600	1340	1000	1530	1300	900	1365	1170	815	1225	1050	735

Voltage Range : 60 Hz 200-240 V, 380-480 V, 3.3 kV, 4.16 kV, 6.6 kV, 13.8 kV

•MHI Group use the following conditions to determine the rated output of generator sets :

### Stand-by:

No overload, average load of approximately 70%, annual operation hours of approximately 500 hours;

### Prime:

Overload of 10%, average load of approximately 80%, annual operation hours of approximately 3000 to 4000 hours, hours of operation at 80% or higher not exceeding 20% of annual operation hours;

### Continuous(C):

Overload of 10%, average load of approximately 90 to 100%, unlimited annual operation;

### Continuous(D):

Connection to utility grid, no overload, unlimited annual operation.

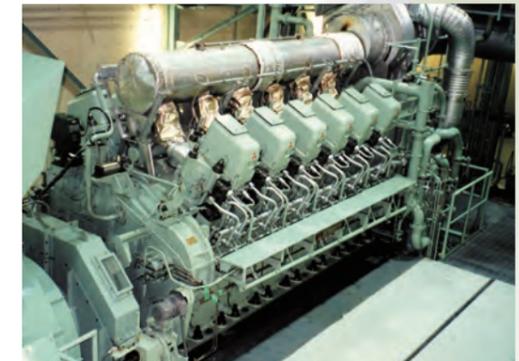
•Indicated output figures calculated in compliance with the standard ambient conditions specified by ISO3046-1 (atmospheric pressure: 100 kPa, ambient temperature: 25°C, relative humidity: 30%, cooling water temperature at inlet of intake air cooler : 25°C) and based on generator efficiency of 95% at operating speed between 750 min<sup>-1</sup> and 1200 min<sup>-1</sup> and efficiency of 94% at 720 min<sup>-1</sup>.

# KU Diesel Series

The KU diesel engines were developed for those clients with major power demand requirements. With its high fuel efficiency, it minimizes the energy cost in the long term.

## Features

- (1) High outputs power from 3760 kW to 15400 kW
- (2) Low fuel cost due to high fuel efficiency
- (3) Long planned maintenance interval
- (4) Responsive load following
- (5) Extraordinary durability & reliability
  - Over 250 delivery record since 1985
  - Max over 120000 operation hours including HFO operation
- (6) Wide fuel flexibility (Diesel, HFO, etc)
- (7) Low emission, low noise, and low vibration



Model	Output (kW)		
	50 Hz 500 min <sup>-1</sup>	60 Hz 514 min <sup>-1</sup>	
KU44	18KU44	15000	15400
	16KU44	13350	13700
	14KU44	11650	12000
	12KU44	10000	10300



Model	Output (kW)		
	50 Hz 750 min <sup>-1</sup>	60 Hz 720 min <sup>-1</sup>	
KU34	18KU34	9250	8900
	16KU34	8200	7900
	14KU34	7200	6900
	12KU34	6150	5900
KU30B	18KU30B	8100	7780
	16KU30B	7200	6910
	14KU30B	6300	6050
	12KU30B	5400	5180
KU30A	18KU30A	5880	5650
	16KU30A	5230	5020
	14KU30A	4570	4390
	12KU30A	3920	3760

Voltage Range : 50 Hz 3.3 kV, 6.6 kV, 10 kV, 11 kV 60Hz 3.3 kV, 4.16 kV, 6.6 kV, 13.8 kV  
\*Based upon ISO3046 Standard Conditions & Configuration

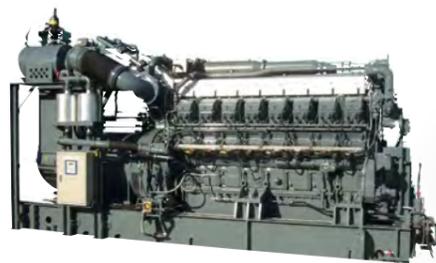


# MGS-G

The MGS-G exhibits high performance while maintaining eco-friendly characteristics through the Miller Cycle gas engine generator sets. Their compact design but powerful output attracts a large variety of industrial and commercial clients.

## Features

- (1) World class fuel efficiency, 43.1%
- (2) Proven reliability and excellent performance
- (3) Meets rigorous quality requirements
- (4) From low to high voltage available
- (5) Both fuel-efficient and eco-friendly
- (6) Various gas types acceptable
- (7) High performance heat recovery system available
- (8) Black start capability for uninterruptible power supply



GS16R2-PTK



Low Noise Level 75 dB(A)

## 50Hz

Model	Engine	Output (kW)	RPM (min <sup>-1</sup> )	Efficiency (%) *	Heat Recovery		Total Efficiency (%)	
					Hot Water (MJ/h)	Steam (kg/h)		
MGS-G	GS16R2	1500****	1500	42.0	1632.9	928**	73.1	
					4243.3***	-	75.2	
		1000	1000	42.9	1622.5	590**	80.0	
					3283.3***	-	82.0	
		GS16R	930	1500	40.6	1496.9	559**	76.6
						3071.2***	-	78.6
	GS12R	700	1500	40.6	1126.7	421**	76.6	
					2311.7***	-	78.6	
	GS6R2	315	1000	41.8	487.5	182**	77.6	
					1000.2***	-	78.5	
	GS6R	320	1500	39.6	558.7	197**	76.6	
					1113.3***	-	78.6	

## 60Hz

Model	Engine	Output (kW)	RPM (min <sup>-1</sup> )	Efficiency (%) *	Heat Recovery		Total Efficiency (%)	
					Hot Water (MJ/h)	Steam (kg/h)		
MGS-G	GS16R2	1200****	1200	43.1	1235.7	772**	74.9	
					3394.5***	-	77.0	
		1000	1200	42.3	1196.9	569**	73.2	
					2797.8***	-	75.2	
		GS16R	815	1200	42.2	1243.4	465**	76.9
						2550.9***	-	78.9
	GS12R	610	1200	42.0	935.1	352**	76.9	
					1925.6***	-	78.8	
	GS6R2	450	1200	42.7	811.5	270**	82.7	
					1570.2***	-	84.8	
	GS6R	380	1200	41.9	583.3	209**	75.9	
					1175.3***	-	77.9	
GS6R	305	1200	41.3	486.2	182**	77.0		
				996.9***	-	79.0		

\* Generation efficiency and fuel consumption are 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/m<sup>3</sup>N  
 (6) Exhaust gas backpressure: 5.0 kPa or lower  
 \*\* Heat output from exhaust (exhaust cooling to 150°C)  
 \*\*\* Heat output from exhaust (exhaust cooling to 120°C)  
 (7) NOx emission:  
 \*\*\*\*: applicable 500 mg/m<sup>3</sup>N@5% O<sub>2</sub> without de-NOx system  
 All models are possible to reduce below 500 mg/m<sup>3</sup>N@5% O<sub>2</sub> with de-NOx system

# MEGANINJA

## Mitsubishi Energy Gas Package NINJA Series

### Features

- (1) Generation within 24 hours of delivery
  - (a) ISO 40 foot container
  - (b) Quick connector for external piping/wiring
- (2) Very quick and efficient maintenance possible
  - (a) Just replace with another container generator set
- (3) High performance heat recovery system available
  - (a) Additional ISO 20 foot high cube container
  - (b) Supplying both hot water and/or steam



### Gas Engine

With an in-built radiator cooling system and the option to apply low NOx operation, the unit generates an impressive 1.5 MW



### Generator Set

Achieves 42.0% electrical generation efficiency with methane number 80 and above



### Generator Control Panel

Ability to handle black start in emergencies as well as for standard start-stop activity in both mono and co-generation mode



### Radiator

The air-cooled radiator is ideal for emergency situations where water is unavailable



### Piping & Wiring

One-touch connectors make piping and wiring works a breeze



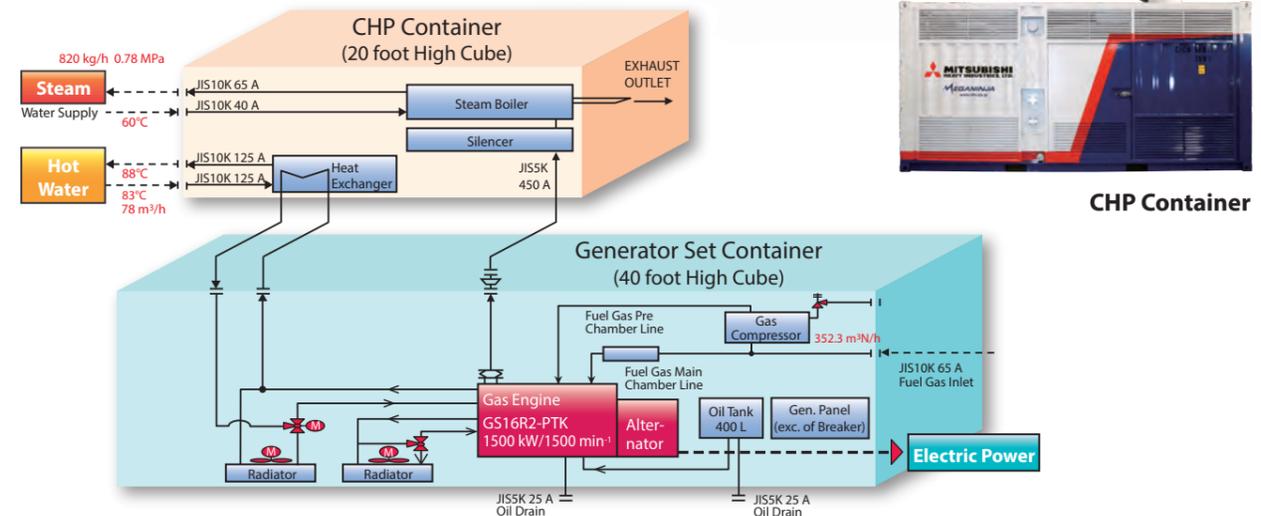
### For Multi-Power Demands

Totally enclosed within a standard ISO 40 foot container with the additional option of a separate co-generation system housed within a standard ISO 20 foot container  
 Multiple units can be easily installed to ensure greater power and heat supply



Model	Output (kW)	Frequency (Hz)	RPM (min <sup>-1</sup> )	Efficiency (%) *	Heat Recovery		Total Efficiency (%)
					Hot Water (MJ/h)	Steam (kg/h)	
MEGANINJA	1500	50	1500	42.0	1632.9	820	70.8
	1200	60	1200	43.1	1235.7	736	74.0

## Flow Diagram of GS16R2 Generator Sets (50 Hz)



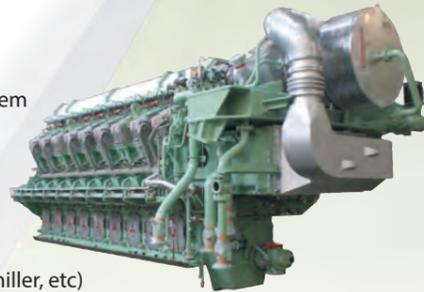
\* Generation efficiency is based on the following conditions.  
 (1) Initial performance of the rated load  
 (2) Generator power factor: 0.9  
 (3) Under standard atmospheric (par ISO 3046)  
 (4) Tolerance: +5%  
 (5) Methane number: 80 or higher, fuel gas lower heating value: 36.47 MJ/m<sup>3</sup>N  
 (6) NOx emission: 500 mg/m<sup>3</sup>N@5% O<sub>2</sub>

# KU-Gas Series

The KU gas engines are world class efficient medium speed generator sets which is typically applied to IPP power station and large-scale industrial applications. The optimized design will deliver solutions to all clients' needs.

## Features

- (1) 49.5% electrical efficiency (World highest level)
- (2) Long planned maintenance interval
- (3) Responsive load following
- (4) World's fastest quick start capability (Start to 100% load within 5 min)
- (5) Advanced combustion control M-RICS: Mitsubishi Real-time Intelligent Control System
  - Monitoring individual cylinder's pressure and knocking of each combustion
  - Electronic control of air fuel mixture, ignition timing and combustion
- (6) Extraordinary durability & reliability
  - Over 200 delivery record since 1990
- (7) Low emissions, low noise, and low vibration
- (8) High performance heat recovery system available (Exhaust gas boiler, absorption chiller, etc)
- (9) Remote monitoring and control system



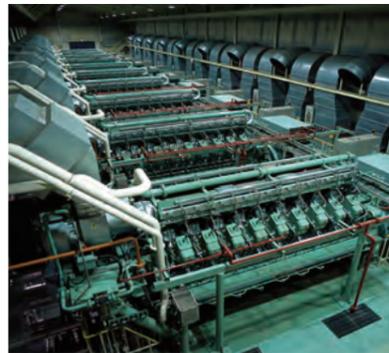
## 50 Hz/750 min<sup>-1</sup>

Model	Engine	Output (kW)	Efficiency (%) *	Heat Recovery		Total Efficiency (%)
				Hot Water (MJ/h)***	Steam (kg/h) **	
KU30GSI (High electric efficiency ver.)	18KU30GSI	5750	49.5	8906	2440	85.5
	16KU30GSI	5100	49.5	7898	2170	85.5
	14KU30GSI	4450	49.5	6894	1890	85.5
	12KU30GSI	3800	49.5	5886	1600	85.4
KU30GSI (High heat recovery ver.)	18KU30GSI	5750	46.5	8478	3500	85.3
	16KU30GSI	5100	46.5	7520	3110	85.4
	14KU30GSI	4450	46.5	6562	2720	85.4
	12KU30GSI	3800	46.5	5605	2320	85.4
KU30GA	18KU30GA	5750	46.0	8428	3270	83.0
	16KU30GA	5100	46.0	7474	2920	83.1
	14KU30GA	4450	46.0	6523	2510	82.9
	12KU30GA	3800	46.0	5569	2160	83.0



## 60 Hz/720 min<sup>-1</sup>

Model	Engine	Output (kW)	Efficiency (%) *	Heat Recovery		Total Efficiency (%)
				Hot Water (MJ/h)***	Steam (kg/h) **	
KU30GSI (High electric efficiency ver.)	18KU30GSI	5500	49.5	8518	2340	85.5
	16KU30GSI	4900	49.5	7589	2080	85.5
	14KU30GSI	4250	49.5	6584	1810	85.6
	12KU30GSI	3650	49.5	5652	1540	85.4
KU30GSI (High heat recovery ver.)	18KU30GSI	5500	46.5	8111	3360	85.4
	16KU30GSI	4900	46.5	7225	2980	85.3
	14KU30GSI	4250	46.5	6268	2600	85.4
	12KU30GSI	3650	46.5	5382	2240	85.5
KU30GA	18KU30GA	5500	46.0	8060	3130	83.0
	16KU30GA	4900	46.0	7182	2800	83.1
	14KU30GA	4250	46.0	6228	2390	82.8
	12KU30GA	3650	46.0	5350	2070	83.0



\* 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: 65 or higher, fuel gas lower heating value: 40.63 MJ/m<sup>3</sup>N
- (6) NOx emission: 500 mg/m<sup>3</sup>N@5% O<sub>2</sub>
- (7) Exhaust gas backpressure: 2.5 kPa or lower

\*\* 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%

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

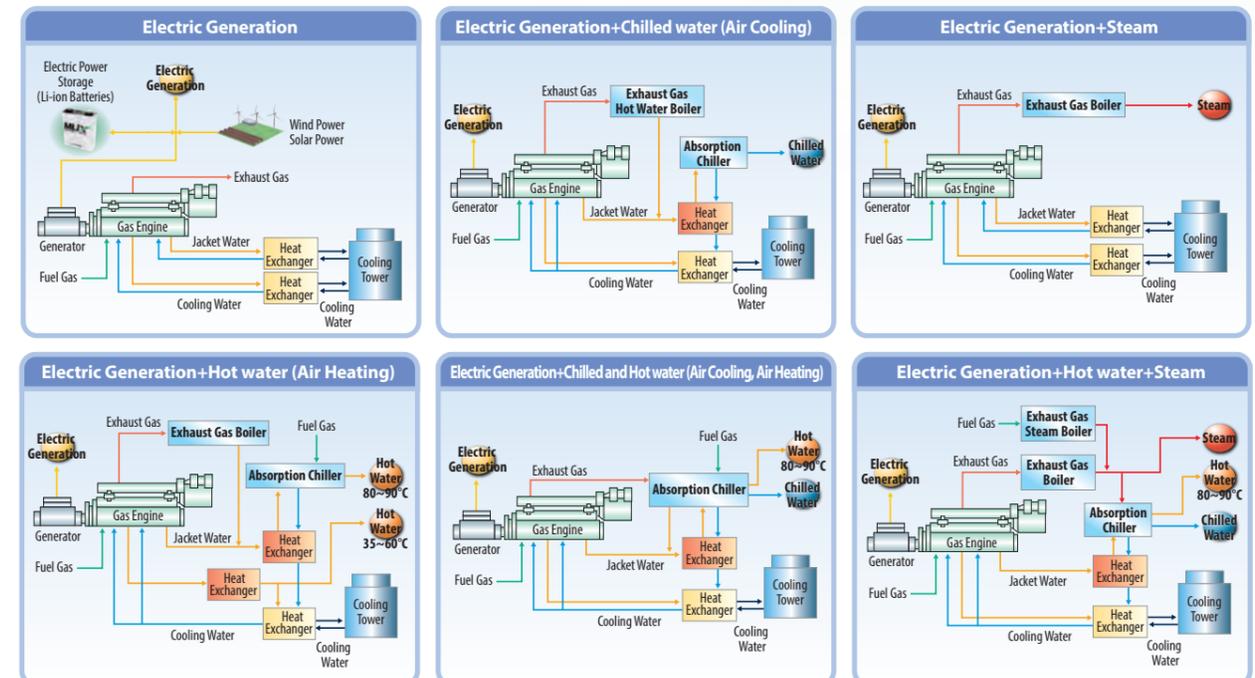
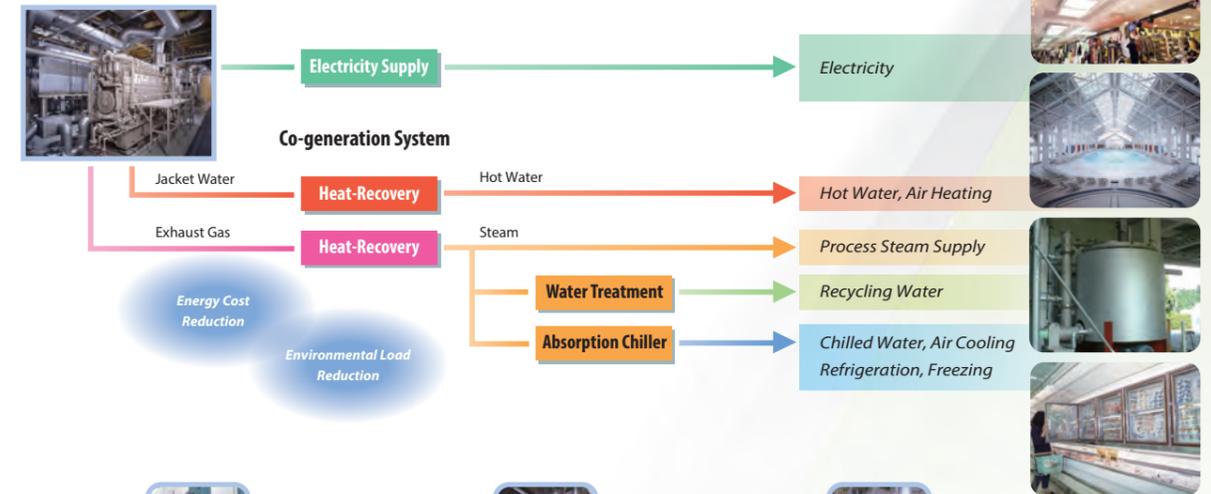
- (1) Hot water recovered from P.C.W. : 83°C to 88°C
- (2) Hot water recovered from L.O. : 20°C to 60°C

# CHP Application

The addition of combined heat and power(CHP) systems optimize the efficiency of the Mitsubishi generator sets. By recovering the waste heat from such as exhaust gas and jacket water, fuel consumption and CO<sub>2</sub> emissions are dramatically reduced.

## Combined heat and power (CHP) application

Gas Generator Set



# Power Supply System Control



## Medium & High Voltage Switchgear



### Technical Data

- In-door Type
- Design flexibility for future expansion
- Internal and external protection -IP3X -IEC60529
- IEC62271, ANSI C37.06 and GB3906\*
- Metal clad and partitioned design
- Rated voltage -12 kV, 28 kV for Power-frequency withstand voltage
- Impulse voltage level -75 kV peak
- Rated Frequency -50 & 60 Hz
- RAL7052 finished color and Zinc coated interior
- Cable access from base of unit
- The generator and feeder switching devices are with drawable Vacuum Circuit Breakers(VCB)\*\*
- Breaking capacity and current ratings from 630 A and 1250 A are 25 kA and 3 Seconds
- KEMA Type test Certificate
- Separate Generator control system with DGICS-MII Module will be applied
- Optional NGR grounding system design

### Notice:

- \* 42 kV Power Frequency Test for GB
- \*\* GCB Application applicable with Option



VCB :  
Electrical and Manual charged  
Stored energy type  
Draw-out model



Custom-made power generation systems are manufactured to suit project load requirements. Electric power distribution systems which include circuit and generator protectors are also made-to-order.



Whenever operating multiple generator sets in parallel, the prime mover and electrical systems should be protected to ensure stable load sharing characteristics, frequency stabilization, voltage stabilization and the synchronized closing of the circuit breaker.



ATS Panel

Low Voltage  
Switchgear



for Specific Project

The systems are all designed to maximize the safe distribution of electrical power to optimize operating efficiencies.

## Low Voltage Switchgear



### Technical Data

- In-door Type
- Design flexibility for future expansion
- Internal IP2X protection, external IP42 of IEC60529
- IEC60890, IEC61439, IEC60439, IEC60947, NEMA250
- TN-S distribution system design applied
- Rated insulation voltage -690 V
- Rated operation voltage -600 V
- Rated frequency -50 & 60 Hz
- Finished stove enameled blue to RAL5023 -semi gloss
- Access to the cable entry is from the rear with either top or bottom
- The generator and feeder switching devices are withdrawable air circuit breakers (ACB)
- Breaking capacity and current ratings from 800 A @ 65 kA up to 6300 A @ 120 kA
- ASTA busbar certification utilizing 'Termate Design' busbar supports
- Load supply feeder section with current switching device are designated under IEC60439 standard as PTTA Partial Type tested assembly to form 3 Type 2



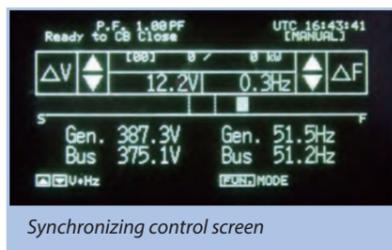
ACB :  
Electrical and Manual charged  
Stored energy type  
Built-in generator protection type OCR  
Draw-out model

# Communication and Control with Data Analysis Facilities



## MITSUBISHI DGICS Mark-II Generator Control Module

The Mitsubishi DGICS control system module combines both the generator and engine control systems in one easy-to-use digital display. The module incorporates automatic/manual synchronization circuit (patented) and a load sharing system for generator sets and power systems. The module is powered by TORON real time operating system nucleus stable and secure operation for use in any application.

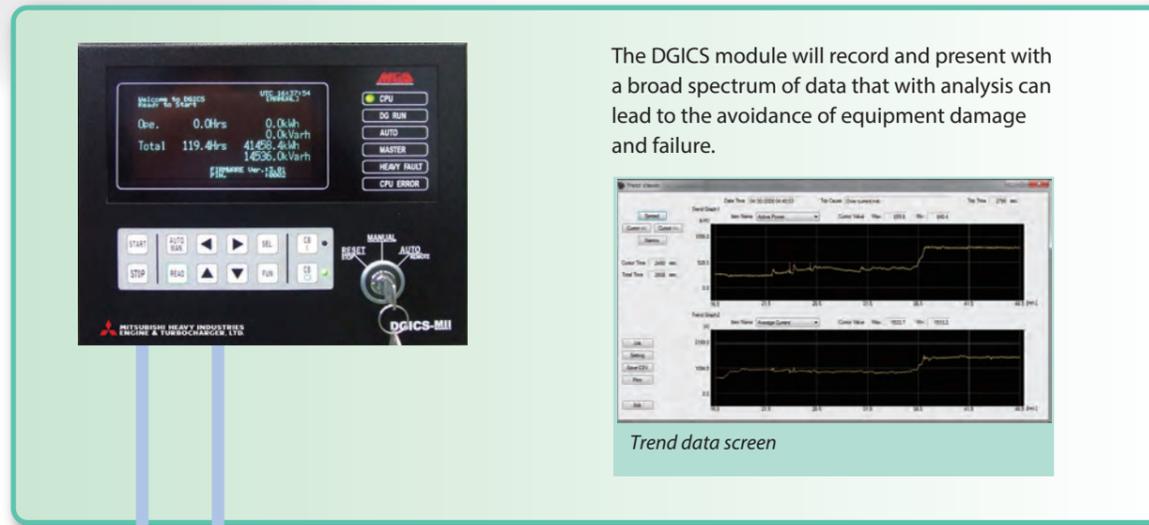


Synchronizing control screen

\* Modbus/TCP is standard Option board required.  
And CC-Link or Device Net option board with special option order with system coordinated arrangements.

How can we protect our equipment from failure?  
How will data analysis lead to more secure system?

The DGICS module will record and present with a broad spectrum of data that with analysis can lead to the avoidance of equipment damage and failure.



Trend data screen



Monitoring system screen

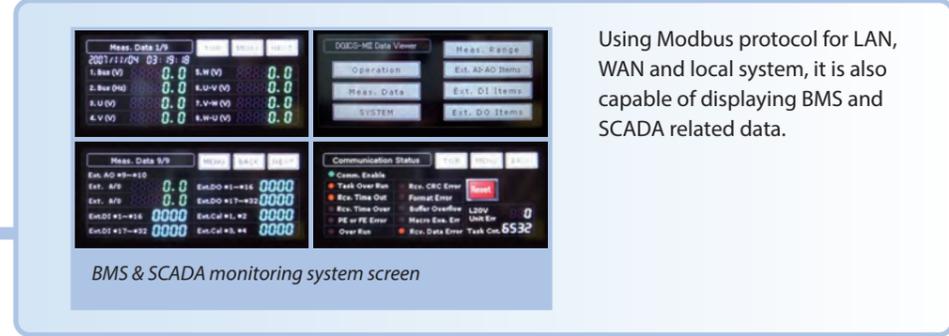
Current operating conditions can be monitored through an ethernet and/or RS-422 connection.

RS-422

Ethernet

Communication Facilities

RS-485 / Modbus\*



BMS & SCADA monitoring system screen

Using Modbus protocol for LAN, WAN and local system, it is also capable of displaying BMS and SCADA related data.

## Remote Monitoring System / DIASYS (Digital Intelligent Automation System) Netmation

Service Center

Browser Monitoring

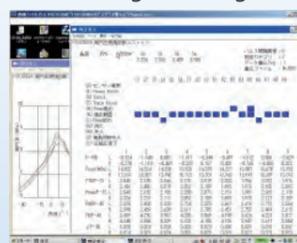
KU Gas Engine Plant



Monitoring of all customers



Management log



Real-time monitoring

