

MGS-EU 1600-C - RADIATOR

MITSUBISHI GENERATOR SET

EU MADE (France)

Quality, reliability, performance, and partnership - Mitsubishi Heavy Industries Group.

RATING	
Generating set model	MGS-EU 1600-C
Generator voltage	400 V
Frequency	50 Hz
Generator output PRP	1200 kWe 1500 KVA
Power factor - min	0.8
Duty	Unlimited
Rating	PRP – Prime Power
Average load factor for 24h	80% or lower >90% for max 3h/24h
Overload	110% for 1h/12h
Installation location	Indoor



DESIGN CONDITIONS	
Ambient temp - avg/max	25/40°C
Ambient temp – min	o°C
Altitude (maxi)	1000 m a.s.l
Relative humidity (maxi)	85%
Fuel oil LHV	42700kJ/kg
Fuel oil	Diesel
Fuel oil gravity at 15°C	o.83 to o.87
Fuel oil sulfur content max	0.2% by weight
Fuel oil viscosity min(60°C)/max(50°C)	2.0/8.0 cSt
Fuel oil cetane number – min	45
Lube oil capacity - max	180 liters
Emissions-other version available	unregulated

ALTERNATOR DATA		
Enclosed, self ventilated, self-regulated, brushless		
Bearing configuration	Single	
Insulation class	Н	
Temperature rise class	Н	
Cooling method	Air ICo1	
Protection	IP23	
Excitation system	Digital	
PT100 for bearing and stator winding		
AVR for single and parallel operation		
Space heater		
Set of CT's for measure or protection		

Engine brake output	1314 kWm
Cylinder configuration	12 V
Total displacement	49.03 liters
Bore x Stroke	170 x 180 mm
Compression ratio	13.5:1
Turbocharged	4 cycles
Governor	Electric
Cooling method (engine driven pump)	Air + Water
Starting method	Electrical 24 V DC

CE COMPLIANCE

2006/42/EC : machinery

LANGUAGE – UNITS

Drawings, documents, nameplates in English

 ${\sf SI\ metric\ system}$

ENGINE DATA

Engine model Engine speed S₁₂R PTAA₂

1500 Rpm



PERFORMANCES @ PRIME (LV : 400V)					
Generator output	1200 kWe				
Specific consumption – ISO3046/1 : 0/+5%	215 g/kWh				
Fuel oil consumption @ 100%	306 L / h				
Fuel oil consumption @ 75%	234 L / h				
Exhaust gas temperature	550° C				
Exhaust gas flow rate	312 m3/min				
Air intake flow rate	118 m3/min				
Noise level@ 1m (onen skid)	10E 0 dB (A)				

RADIATOR DATA	
Heat rejection	530/424 kW
Air on temperature by 1000m a.s.l	45°C
Coolant	MEG 30%
Max external pressure drop	250Pa
Max outlet temperature (air)	81.3°C
Air flow	26.6 m ₃ /s
Coolant capacity incl. engine	336 liters

TOLERANCES AND CONDITIONS

Efficiency data for average conditions (avg) – derating above 1000 m asl or 40°C intake air temperature

Fuel input: 0/+5% (ISO3046/1). Submitted to fuel oil specification confirmation

Heat rejection data: +/- 12%. Add 17% margin for remote dry air cooler design

Exhaust gas flow / temperature: +/- 6% - +/- 8%

Pictures are not contractual and may include optional accessories

These data are not contractual. They can be modified by MTEE without prior notice

STANDARDS

I.S.O.: International Standard Organization

C.E.N.: European Standard Committee

I.E.C: International Electric Commission

J.I.S: Japanese Industrial Standards (for engine)

J.E.C: Japan. Electrotechnical committee (engine)

J.E.M: Japan Elec. Manufacturers Association (Eng.)

Manufacturers standards

GENERATOR SET EMBEDDED CONTROL PANEL

Manual start and stop by push buttons on the (CGC) Compact Genset Controller (DEIF made)

Automatic start and stop sequence (AMF)

Automatic engine and alternator protection

Automatic control of engine auxiliaries and power supply:

- Jacket water heater (if applicable)
- Alternator space heater

Lube oil priming pump (if applicable)

24 V DC energy block to supply control system and panel equipment

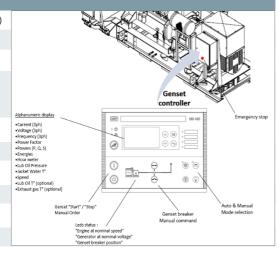
24 V DC charger to supply engine starting batteries

Display and monitoring of operating data, alarms and history logs

Optional functions for parallel operation with other genset or grid

Optional functions for power management, peak shaving, etc...

 ${\sf Modbus\,RS485} \ - \ {\sf Optional\,ethernet\,TCP/IP\,com\,port\,for\,internet\,remote\,access}$



GENERATOR SET EMBEDDED CIRCUIT BREAKER PANEL (OPTION FOR CE MARKING)

Air circuit breaker (ACB)

Motorized - 3 poles - 2500 amp - 400 VAC (4 poles on request)

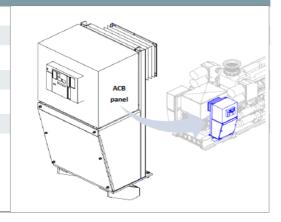
Electric protection relay

Command coil 24 V DC

Auxiliary contacts

Key lock, On/Off button lock, Safety labels

Downstream side protected by cover case for easy cable connection with no free access to live parts

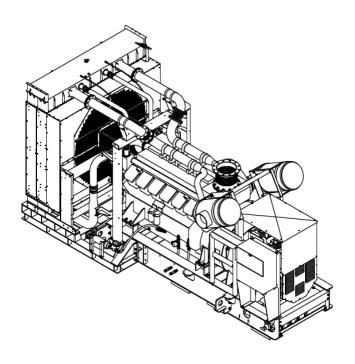


MOVE THE WORLD FORW→RD MITSUBISHI

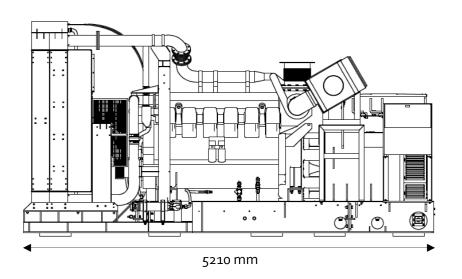
MITSUBISHI HEAVY INDUSTRIES GROUP

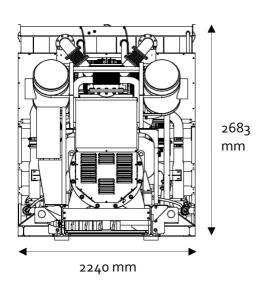


MGS-EU 1600 GENSET (S12R PTAA2 / ECO46 1S/4) LAYOUT



Dry Weight = 12100Kg









SCOPE OF SUPPLY

- Standard item
- o Option

Elastic suspensions of the generating set Elastic suspensions of the generating set Elastic suspensions of the generating set Starting batteries and cables High voltage (HV) alternator 3 to 1k V with 100V VTs Jacket water heating Alternator space heater Pump for lube oil priming, filling and draining O O O O O O O O O O O O O O O O O O O	- Not included or not applicable	Open skid set		Containerized set	
Elastic suspensions of the generating set Starting batteries and cables High voltage (HV) alternator 3 to 11 kV with 100V VTS Jacket water heating Alternator space heater Pump for lube oil priming, filling and draining Oil mist separator Oil		LV	HV	LV	HV
Starting batteries and cables High voltage (HV) alternator 3 to 1 kV with 100V VTS Jacket water heating High voltage (HV) alternator 3 to 1 kV with 100V VTS Jacket water heating High voltage (HV) alternator 5 pace heater O O O O O O O O O O O O O O O O O O O	Steel base frame with engine-alternator-radiator	•	•	•	•
Starting batteries and cables High voltage (HV) alternator 3 to 1 kV with 100V VTS Jacket water heating High voltage (HV) alternator 3 to 1 kV with 100V VTS Jacket water heating High voltage (HV) alternator 5 pace heater O O O O O O O O O O O O O O O O O O O	Elastic suspensions of the generating set	•	•	•	•
High voltage (HV) alternator 3 to 1 kV with 100V VTS - 0 - 0 Jacket water heating -		•	•	•	•
Alternator space heater Pump for lube oil priming, filling and draining O OI mist separator O OI mist separator O OI mist separator O OO Dry air filter, high efficiency on turbocharger Engine driven jacket water pump (mounted on engine) Engine driven jacket water pump (mounted on engine) Engine driven lacker water (with by-pass, mounted on engine) Enemote external dry air cooler (removal of radiator on base frame) Enemote external dry air cooler (with by-pass, mounted on engine) Enemote deanest Control Panel, including auxiliaries power supply Enembedded Generating set protection Gircuit Breaker Panel (LV) Enemote control panel, including auxiliaries power supply, with Harness Assy Enemote Generating set protection Gircuit Breaker Panel (LV, HV) Enemote Generating set protection Gircuit Breaker Panel (LV, HV) Enemote Generating set factory tests (standard program) Enemating set finishing color. Blue RAL 500 Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) Exhaust bellow on turbocharger orulet Exhaust bellow on turboc	High voltage (HV) alternator 3 to 11 kV with 100V VTs	-	0	-	0
Alternator space heater Pump for lube oil priming, filling and draining O OI mist separator O OI mist separator O OI mist separator O OO Dry air filter, high efficiency on turbocharger Engine driven jacket water pump (mounted on engine) Engine driven jacket water pump (mounted on engine) Engine driven lacker water (with by-pass, mounted on engine) Enemote external dry air cooler (removal of radiator on base frame) Enemote external dry air cooler (with by-pass, mounted on engine) Enemote deanest Control Panel, including auxiliaries power supply Enembedded Generating set protection Gircuit Breaker Panel (LV) Enemote control panel, including auxiliaries power supply, with Harness Assy Enemote Generating set protection Gircuit Breaker Panel (LV, HV) Enemote Generating set protection Gircuit Breaker Panel (LV, HV) Enemote Generating set factory tests (standard program) Enemating set finishing color. Blue RAL 500 Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) Exhaust bellow on turbocharger orulet Exhaust bellow on turboc	Jacket water heating	•	•	•	•
Oil mist separator Dry air filter, high efficiency on turbocharger Engine driven jacket water pump (mounted on engine) Engine driven jacket water (with one		•	•	•	•
Oil mist separator Dry air filter, high efficiency on turbocharger Engine driven jacket water pump (mounted on engine) Engine driven jacket water (with one	Pump for lube oil priming, filling and draining	0	0	0	0
Engine driven lacket water pump (mounted on engine) Engine driven Intercooler pump (mounted on engine) Engine driven Intercooler (premoval of radiator on base frame) O O O O O Thermostatic valve for jacket water (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Intercooler (with by-pass, mounted on engine) Thermostatic valve for Intercooler (with by-pass, mounted on engine) Thermostatic valve for Intercooler (with by-pass, mounted on engine) Thermostatic valve for Intercooler (with by-pass, mounted on engine) Thermostatic valve for Intercooler (with by-pass, mounted on engines) The mount of the valve for intercooler (with by-pass, mounted on engine) The mount of the valve for intercooler (Livit Breaker Panel (LV) Thermostatic valve for intercooler (Livit breaker Livit Panel Valve) Thermostatic valve for intercooler (Livit breaker Livit Panel Valve) Thermostatic valve for intercooler (Livit breaker Livit Valve) Thermostatic va		0	0	0	0
Engine driven Intercooler pump (mounted on engine) Remote external dry air cooler (removal of radiator on base frame) Remote external dry air cooler (removal of radiator on base frame) Remote external dry air cooler (removal of radiator on base frame) Remote control packet water (with by-pass, mounted on engine) Remostatic valve for jacket water (with by-pass, mounted on engine) Remote control panel, including auxiliaries power supply Remote control panel, including auxiliaries power supply, with Harness Assy OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO	Dry air filter, high efficiency on turbocharger	•	•	•	•
Engine driven Intercooler pump (mounted on engine) Remote external dry air cooler (removal of radiator on base frame) Remote external dry air cooler (removal of radiator on base frame) Remote external dry air cooler (removal of radiator on base frame) Remote control packet water (with by-pass, mounted on engine) Remostatic valve for jacket water (with by-pass, mounted on engine) Remote control panel, including auxiliaries power supply Remote control panel, including auxiliaries power supply, with Harness Assy OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		•	•	•	•
Remote external dry air cooler (removal of radiator on base frame) Thermostatic valve for jacket water (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Remote Control Panel, including auxiliaries power supply Remote control panel, including auxiliaries power supply, with Harness Assy O O O O Remoted Generating set protection Circuit Breaker Panel (LV, HV) O O O O O Remote Generating set protection Circuit Breaker Panel (LV, HV) O O O O O O O O O O O O O O O O O O O		-	-	-	-
Thermostatic valve for jacket water (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Thermostatic valve for Inter cooler (with by-pass, mounted on engine) Embedded Generatin Panel, including auxiliaries power supply Remote control panel, including auxiliaries power supply, with Harness Assy O O O O Embedded Generating set protection Circuit Breaker Panel (LV) O O O O Embedded Generating set protection Circuit Breaker Panel (LV) O O O O O O O Embedded Generating set protection Circuit Breaker Panel (LV, HV) O O O O O O O O O O O O O O O O O O O		0	0	0	0
Themostatic valve for Inter cooler (with by-pass, mounted on engine) Embedded Genset Control Panel, including auxiliaries power supply, with Harness Assy OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		•	•	•	•
Embedded Genset Control Panel, including auxiliaries power supply, with Harness Assy Remote control panel, including auxiliaries power supply, with Harness Assy Remote Control panel, including auxiliaries power supply, with Harness Assy Remote Generating set protection Circuit Breaker Panel (LV, HV) Remote Generating set protection Circuit Breaker Panel (LV, HV) Remote Generating set factory tests (standard program) Remote Generating set factory tests (standard progra		-	-	-	-
Remote control panel, including auxiliaries power supply, with Harness Assy o o o o o o o o o o o o o o o o o o		•	•	•	•
Embedded Generating set protection Circuit Breaker Panel (LV)		0	0	0	0
Remote Generating set protection Circuit Breaker Panel (LV, HV) Generating set factory tests (standard program) Generating set factory tests (standard program) Generating set finishing color: Blue RAL 5010 Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) O Exhaust bellow on turbocharger outlet Automatic lube oil level regulator on engine sump O O O O O O O O O O O O O O O O O O O		0	0	•	•
Generating set factory tests (standard program) Generating set finishing color: Blue RAL 5010 Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) O Exhaust bellow on turbocharger outlet Automatic lube oil level regulator on engine sump O Lube oil service tank 200 liter capacity (loose supply for open skid) O Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) O Fuel oil flexible for engine Engine standard tools for routine maintenance O C Set of fuel oil flexible for routine maintenance O C Step up transformer LV / HV 15 to 20 kV C C V connection busbar from alternator to transformer Sound proofed generating set container Elbow pipe between the engine and the silencer Water pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from alternator to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O C Scada system, connected to genset control panel (remote desktop PC) O On site assistance for supervisory, commissioning and training O O On site assistance for supervisory, commissioning and training		0	0	•	•
Generating set finishing color: Blue RAL 5010 Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) Exhaust bellow on turbocharger outlet Automatic lube oil level regulator on engine sump OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO	Generating set factory tests (standard program)	•	•	•	•
Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) Exhaust bellow on turbocharger outlet Automatic lube oil level regulator on engine sump Lube oil service tank 200 liter capacity (loose supply for open skid) Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) Set of fuel oil flexible for engine Engine standard tools for routine maintenance OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		•	•	•	•
Exhaust bellow on turbocharger outlet Automatic lube oil level regulator on engine sump Lube oil service tank zoo liter capacity (loose supply for open skid) OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		0	0	•	•
Automatic lube oil level regulator on engine sump Lube oil service tank 200 liter capacity (loose supply for open skid) O Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) O Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) O Fuel oil flexible for engine Engine standard tools for routine maintenance O Set of tuel oil flexible for engine Engine standard tools for routine maintenance O Step up transformer LV / HV 15 to 20 kV C C C C C C C C C C C C C C C C C C C		•	•	•	•
Lube oil service tank 200 liter capacity (loose supply for open skid) Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) Set of fuel oil flexible for engine Engine standard tools for routine maintenance O Step up transformer LV / HV 15 to 20 kV LV connection busbar from alternator to transformer Sound proofed generating set container Elbow pipe between the engine and the silencer Water pipes from engine to remote dry air cooler Lube oil pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe Neavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) O On site assistance for supervisory, commissioning and training		0	0	•	•
Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) Set of fuel oil flexible for engine Engine standard tools for routine maintenance O Step up transformer LV / HV 15 to 20 kV Connection busbar from alternator to transformer LV connection busbar from alternator to transformer CO CO Sound proofed generating set container Elbow pipe between the engine and the silencer Water pipes from engine to remote dry air cooler Cube oil pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O Co Heavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) O Oversized dry air cooler for high ambient temp O On site assistance for supervisory, commissioning and training O O O O O O O O O O O O O	Lube oil service tank 200 liter capacity (loose supply for open skid)	0	0	•	•
Set of fuel oil flexible for engine Engine standard tools for routine maintenance O O O O O O O O O O O O O O O O O O		0	0	•	•
Engine standard tools for routine maintenance OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		•	•	•	•
Step up transformer LV / HV 15 to 20 kV LV connection busbar from alternator to transformer		0	0	0	0
LV connection busbar from alternator to transformer - 0 - 0 - 0 Sound proofed generating set container		-	0	-	0
Elbow pipe between the engine and the silencer Water pipes from engine to remote dry air cooler Lube oil pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O O Heavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) Fuel oil centrifugal unit (separator) for water and sludge removal O Oversized dry air cooler for high ambient temp O O o o o o o o o o o o o		-	0	-	0
Elbow pipe between the engine and the silencer Water pipes from engine to remote dry air cooler Lube oil pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O O Heavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) Fuel oil centrifugal unit (separator) for water and sludge removal O Oversized dry air cooler for high ambient temp O O o o o o o o o o o o o	Sound proofed generating set container	-	-	•	•
Water pipes from engine to remote dry air cooler Lube oil pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O Heavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) Fuel oil centrifugal unit (separator) for water and sludge removal Oversized dry air cooler for high ambient temp O On site assistance for supervisory, commissioning and training		-	-	•	•
Lube oil pipes from service tank to engine lube oil level regulator LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O Heavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) Fuel oil centrifugal unit (separator) for water and sludge removal Oversized dry air cooler for high ambient temp O On site assistance for supervisory, commissioning and training		-	-	0	0
LV cables from alternator to protection circuit breaker HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe O Heavy duty oil bath air filter for dust/sand ambient condition Scada system, connected to genset control panel (remote desktop PC) Fuel oil centrifugal unit (separator) for water and sludge removal Oversized dry air cooler for high ambient temp O On site assistance for supervisory, commissioning and training		-	-	•	•
HV cables from transformer to protection circuit breaker Fuel oil mass flow meter fitted on genset baseframe		-	-	•	-
Fuel oil mass flow meter fitted on genset baseframe 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		-	-	-	•
Heavy duty oil bath air filter for dust/sand ambient condition 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0	0
Scada system, connected to genset control panel (remote desktop PC) o o o o o o o o o o o o o o o o o o o		0	0	0	0
Fuel oil centrifugal unit (separator) for water and sludge removal 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0	0
Oversized dry air cooler for high ambient temp 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0	0
On site assistance for supervisory, commissioning and training o o o o		0	0	0	0
		0	0	0	0
	Alternator according to specific country grid code	0	0	0	0

CONTACTS DETAILS

MITSUBISHI TURBOCHARGER AND ENGINE EUROPE B.V. 70 rue Jean Jaurès 59 770 MARLY France

Phone: + 33 3 27 32 48 48 Fax: + 33 3 27 32 48 49

e-mail: mteef@mtee.eu

More information

Contact your local dealer for more information regarding Mitsubishi Generator Sets and optional equipment or, visit engine-genset.mhi.com

MOVE THE WORLD FORW➤RD MITSUBISHI

MITSUBISHI HEAVY INDUSTRIES GROUP