

MGS-EU 2000-C - RADIATOR

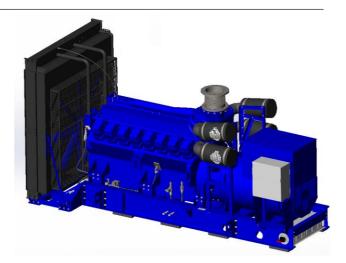
MITSUBISHI GENERATOR SET

EU MADE (France)

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

RATING

| Generating set model | MGS-EU 2000-C |
|--------------------------------|-------------------------------------|
| Generator voltage | 400 V |
| Frequency | 50 Hz |
| Generator output PRP | 1520 kWe 1900 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 25/40°C Ambient temp - avg/max Ambient temp – min o°C Altitude (maxi) 1000 m a.s.l Relative humidity (maxi) 85% Fuel oil LHV 42700kJ/kg Fuel oil Diesel 0.83 to 0.87 Fuel oil gravity at 15°C 0.2% by weight Fuel oil sulfur content max Fuel oil viscosity min(60°C)/max(50°C) 2.0/8.0 cSt Fuel oil cetane number – min 45 Lube oil capacity - max 230 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 | | | |

CE COMPLIANCE

2006/42/EC : machinery

ENGINE DATA Engine model S16R PTA2 Engine speed 1500 Rpm Engine brake output 1480 kWm Cylinder configuration 16 V 65.37 liters Total displacement Bore x Stroke 170 x 180 mm Compression ratio 13.5:1 Turbocharged 4 cycles Governor Electric Cooling method (engine driven pump) Water (radiator) Electrical 24 V DC Starting method

LANGUAGE – UNITS

Drawings, documents, nameplates in English

SI metric system

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| PERFORMANCES (a) PRIME (LV : 400V) |
|------------------------------------|
|------------------------------------|

| Generator output | 1520 kWe |
|--|--------------|
| Specific consumption – ISO3046/1 : 0/+5% | 215 g/kWh |
| Fuel oil consumption @ 100% | 391 L / h |
| Fuel oil consumption @ 75% | 306 L / h |
| Exhaust gas temperature | 550° C |
| Exhaust gas flow rate | 366 m3/min |
| Air intake flow rate | 138 m3/min |
| Noise level@ 1m (open skid) | 110.5 dB (A) |

RADIATOR DATA

| Heat rejection | 1045 kW |
|-----------------------------------|------------|
| Air on temperature by 1000m a.s.l | 45°C |
| Coolant | MEG 30% |
| Max external pressure drop | 100Pa |
| Max outlet temperature (air) | 80.58°C |
| Air flow | 32.24 m3/s |
| Coolant capacity incl. engine | 151 liters |

STANDARDS

TOLERANCES AND CONDITIONS

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

Fuel input: o/+5% (ISO_3046/1). 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

GENERATOR SET EMBEDDED CONTROL PANEL

| GENERATOR SET EMBEDDED CONTROLTANCE | |
|---|--|
| 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 | Alphanumeric display |
| Lube oil priming pump (if applicable) | •Current (3ph) •Voltage (3ph) •Frequency (3ph) |
| 24 V DC energy block to supply control system and panel equipment | Power Factor Powers (P, Q, S) Energies Hour meter |
| 24 V DC charger to supply engine starting batteries | Lub Oil Pressure Jacket Water T* Speed Lub Oil T* (optional) Exhaust gas T* (optional) |
| 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 | |
| | |

Modbus RS485 - 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 – 3200 amp – 400 VAC (4 poles on request)

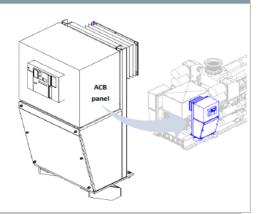
Electric protection relay

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



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| J.E.M: Japan Elec. Manufacturers Association (Eng.) |
|---|
| Manufacturers standards |
| |
| Genset |
| Alghanumric daday Beregency stop Beregency stop -voltage (pip) -0 0 |
| George "Start" ("Stop" Auto & Manual |

I.S.O. : International Standard Organization

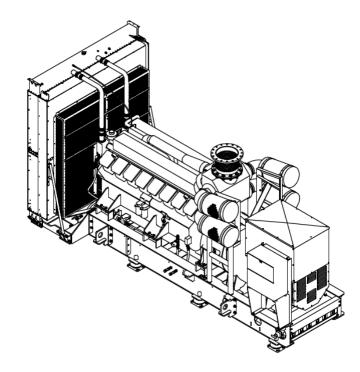
C.E.N. : European Standard Committee

I.E.C: International Electric Commission

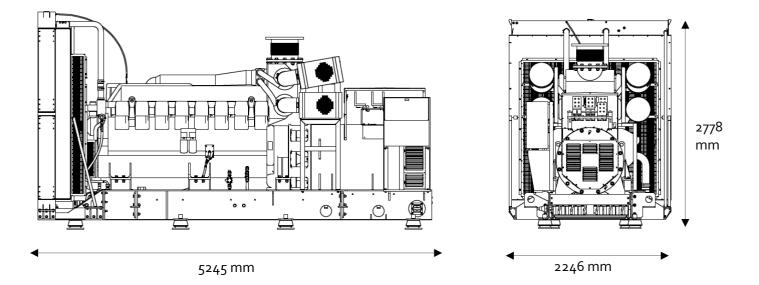
J.I.S : Japanese Industrial Standards (for engine) J.E.C: Japan. Electrotechnical committee (engine)



MGS-EU 2000 GENSET (S16R PTA2 / ECO46 1L/4) LAYOUT



Dry Weight = 13250Kg







SCOPE OF SUPPLY

- Standard item
- o Option
- Not included or not applicable

| Elastic suspensions of the generating set••••Starting batteries and cables•• </th <th>- Not included or not applicable</th> <th colspan="2">Open skid set</th> <th colspan="2">Containerized set</th> | - Not included or not applicable | Open skid set | | Containerized set | |
|---|---|---------------|----|-------------------|----|
| Elastic suspensions of the generating set••••Starting batteries and cables•• </td <td></td> <td>LV</td> <td>HV</td> <td>LV</td> <td>HV</td> | | LV | HV | LV | HV |
| Starting batteries and cables • • • High voltage (HV) alternator 3 to 1 kV with 100V VTs - 0 0 0 Alternator space heater • | Steel base frame with engine-alternator-radiator | • | • | • | ٠ |
| High voltage (HV) alternator 3 to 11 kV with 100V VTs-000lacket water heating00000Numerator space heater00 | Elastic suspensions of the generating set | • | • | • | ٠ |
| Jacket water heating Alternator space heater Pump for lube oil priming, filling and draining ODI mist separator DOI mist separator Sender external dry air cooler (removal of radiator on base frame) Sender external dry air cooler (removal of radiator on base frame) Sender external dry air cooler (removal of radiator on base frame) Sender external dry air cooler (removal of radiator on base frame) Sender external dry air 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 Braek Panel (LV) Senterating set protection Circuit Breaker Panel (LV) Senterating set protection Circuit Breaker Panel (LV) Senterating set factory tests (standard program) Senterating set factory tests (standard program) Set of fuel oil flexible for engine Set of fuel oil flexible for engine atometen Set of fuel oil flexible for atternator to transformer Sound prorofed | Starting batteries and cables | • | • | • | • |
| Alternator space heiter••••Prump for lube oil priming, filling and drainingooooOlimist separatoroooooDry air filter, high efficiency on turbocharger•• </td <td>High voltage (HV) alternator 3 to 11 kV with 100V VTs</td> <td>-</td> <td>0</td> <td>-</td> <td>0</td> | High voltage (HV) alternator 3 to 11 kV with 100V VTs | - | 0 | - | 0 |
| Pump for lube oil priming, filling and drainingoooO'll mist separatorOOOD'll mist separatorOOODry air filter, figh efficiency on turbochargerImage: SeparatorImage: SeparatorImage: SeparatorEngine driven jacket water pump (mounted on engine)Image: SeparatorImage: SeparatorImage: SeparatorEngine driven jacket water (with by-pass, mounted on engine)Image: SeparatorImage: SeparatorImage: SeparatorThermostatic valve for inter cooler (with by-pass, mounted on engine)Image: SeparatorImage: SeparatorImage: SeparatorThermostatic valve for inter cooler (with by-pass, mounted on engine)Image: SeparatorImage: SeparatorImage: SeparatorRemote external dry air cooler (with by-pass, mounted on engine)Image: SeparatorImage: SeparatorImage: SeparatorRemote Generating set protection Circuit Breaker Panel (LV)Image: SeparatorImage: SeparatorImage: SeparatorRemote Generating set protection Circuit Breaker Panel (LV, HV)Image: SeparatorImage: SeparatorImage: SeparatorGenerating set finishing coin: Blue RAL 50:0Image: SeparatorImage: SeparatorImage: SeparatorSchaust billow on turbocharger outletImage: SeparatorImage: SeparatorImage: SeparatorLube oil service tank zoo litter capacity (loose supply for open skid)Image: SeparatorImage: SeparatorImage: SeparatorSet of the oil flexible for engineImage: SeparatorImage: SeparatorImage: SeparatorImage: SeparatorIm | Jacket water heating | 0 | 0 | 0 | 0 |
| Oil miss separatoroooooDry air filter, high efficiency on turbocharger••• <t< td=""><td>Alternator space heater</td><td>•</td><td>•</td><td>•</td><td>•</td></t<> | Alternator space heater | • | • | • | • |
| Dry air filter, high efficiency on turbacharger•••Engine driven jacket water pump (mounted on engine)Remote external dry air cooler (removal of radiator on base frame)oooRemote 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)••••Remote control panel, including auxiliaries power supply•••••Remote control panel, including auxiliaries power supply, with Harness Assyoo | Pump for lube oil priming, filling and draining | 0 | 0 | 0 | 0 |
| Dry air filter, high efficiency on turbacharger•••Engine driven jacket water pump (mounted on engine)Remote external dry air cooler (removal of radiator on base frame)oooRemote 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)••••Remote control panel, including auxiliaries power supply•••••Remote control panel, including auxiliaries power supply, with Harness Assyoo | Oil mist separator | 0 | 0 | 0 | 0 |
| Engine driven jacket water pump (mounted on engine)••••Engine driven Intercooler pump (mounted on engine)< | | • | • | • | • |
| Engine driven intercooler pump (mounted on engine)Remote external dry air cooler (removal of radiator on base frame)oooooThermostatic valve for inter cooler (with by-pass, mounted on engine)Thermostatic valve for inter cooler (with by-pass, mounted on engine) </td <td>Engine driven jacket water pump (mounted on engine)</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> | Engine driven jacket water pump (mounted on engine) | • | • | • | • |
| Remote external dry air cooler (removal of radiator on base frame)ooooThermostatic 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)Remote control panel, including auxiliaries power supply, with Harness Assyoooo0Remote Generating set protection Circuit Breaker Panel (LV, HV)oooGenerating set frishing color: Blue RAL 5010 <t< td=""><td>Engine driven Intercooler pump (mounted on engine)</td><td>-</td><td>-</td><td>-</td><td>-</td></t<> | Engine driven Intercooler pump (mounted on engine) | - | - | - | - |
| Thermostatic valve for Inter cooler (with by-pass, mounted on engine)< | Remote external dry air cooler (removal of radiator on base frame) | 0 | 0 | 0 | 0 |
| Thermostatic valve for Inter cooler (with by-pass, mounted on engine)< | | • | • | • | • |
| Embedded Genset Control Panel, including auxiliaries power supply••••Remote control panel, including auxiliaries power supply, with Harness AssyooooRemote control panel, including auxiliaries power supply, with Harness AssyooooRemote Generating set protection Circuit Breaker Panel (LV, HV)oooooGenerating set factory tests (standard program)eeeeeoGenerating set finishing color: Blue RAL 500oo< | Thermostatic valve for Inter cooler (with by-pass, mounted on engine) | - | - | - | - |
| Remote control panel, including auxiliaries power supply, with Harness AssyooooEmbedded Generating set protection Circuit Breaker Panel (LV, HV)oooooGenerating set protection Circuit Breaker Panel (LV, HV)ooooooGenerating set factory tests (standard program)oo <td>Embedded Genset Control Panel, including auxiliaries power supply</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> | Embedded Genset Control Panel, including auxiliaries power supply | • | • | • | • |
| Embedded Generating set protection Circuit Breaker Panel (LV)oooRemote Generating set protection Circuit Breaker Panel (LV, HV)oooGenerating set factory tests (standard program)Generating set finishing color: Blue RAL 5010Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid)ooExhaust bellow on turbocharger outlet </td <td></td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> | | 0 | 0 | 0 | 0 |
| Remote Generating set protection Circuit Breaker Panel (LV, HV)oooGenerating set factory tests (standard program)••••Generating set factory tests (standard program)•••••Generating set finishing color: Blue RAL 5010••• <td></td> <td>0</td> <td>0</td> <td>•</td> <td>•</td> | | 0 | 0 | • | • |
| Generating set finishing color: Blue RAL 5010•••••Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid)00•• | Remote Generating set protection Circuit Breaker Panel (LV, HV) | 0 | 0 | • | ٠ |
| Generating set finishing color: Blue RAL 5010•••••Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid)00•• | Generating set factory tests (standard program) | • | • | • | • |
| Exhaust bellow on turbocharger outlet••• <td>Generating set finishing color: Blue RAL 5010</td> <td>•</td> <td>•</td> <td>•</td> <td>٠</td> | Generating set finishing color: Blue RAL 5010 | • | • | • | ٠ |
| Automatic lube oil level regulator on engine sumpoooLube oil service tank 200 liter capacity (loose supply for open skid)oooFuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid)oooSet of fuel oil flexible for engine•••Engine standard tools for routine maintenanceoooStep up transformer LV / HV 15 to 20 kV-oooLV connection busbar from alternator to transformer-o-oSound proofed generating set containero-oElbow pipe between the engine and the silencero-UV cables from alternator to gense lube oil level regulator0-Lube oil pipes from service tank to engine lube oil level regulatorLV cables from transformer to protection circuit breakerLUC cables from transformer to protection circuit breaker <td< td=""><td>Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid)</td><td>0</td><td>0</td><td>•</td><td>٠</td></td<> | Exhaust silencer 30 to 50 dB(A) attenuation (loose supply for open skid) | 0 | 0 | • | ٠ |
| Lube oil service tank 200 liter capacity (loose supply for open skid)000Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid)0000Set of fuel oil flexible for engine00000Engine standard tools for routine maintenance000000Step up transformer LV / HV 15 to 20 kV-0-000 | Exhaust bellow on turbocharger outlet | • | • | • | • |
| Fuel oil daily tank soo liter capacity, up to 6000 liter (loose supply for open skid)000••Set of fuel oil flexible for engine•• </td <td>Automatic lube oil level regulator on engine sump</td> <td>0</td> <td>0</td> <td>•</td> <td>٠</td> | Automatic lube oil level regulator on engine sump | 0 | 0 | • | ٠ |
| Set of fuel oil flexible for engine••••••Engine standard tools for routine maintenanceooooooStep up transformer LV / HV 15 to 20 kV-o-oo | Lube oil service tank 200 liter capacity (loose supply for open skid) | 0 | 0 | • | • |
| Engine standard tools for routine maintenanceooooStep up transformer LV / HV 15 to 20 kV-o-oLV connection busbar from alternator to transformer-o-oSound proofed generating set container•••Elbow pipe between the engine and the silencer••••Water pipes from engine to remote dry air cooler•• <td>Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid)</td> <td>0</td> <td>0</td> <td>•</td> <td>•</td> | Fuel oil daily tank 500 liter capacity, up to 6000 liter (loose supply for open skid) | 0 | 0 | • | • |
| Step up transformer LV / HV 15 to 20 kV-0-0LV connection busbar from alternator to transformer-0-0Sound proofed generating set container00Elbow pipe between the engine and the silencer000Water pipes from engine to remote dry air cooler000< | Set of fuel oil flexible for engine | • | • | • | ٠ |
| LV connection busbar from alternator to transformer-o-oSound proofed generating set container••• <td>Engine standard tools for routine maintenance</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> | Engine standard tools for routine maintenance | 0 | 0 | 0 | 0 |
| Sound proofed generating set container•••Elbow pipe between the engine and the silencer••• <td< td=""><td>Step up transformer LV / HV 15 to 20 kV</td><td>-</td><td>0</td><td>-</td><td>0</td></td<> | Step up transformer LV / HV 15 to 20 kV | - | 0 | - | 0 |
| Elbow pipe between the engine and the silencer•••Water pipes from engine to remote dry air cooler00Lube 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 baseframe00 <t< td=""><td>LV connection busbar from alternator to transformer</td><td>-</td><td>0</td><td>-</td><td>0</td></t<> | LV connection busbar from alternator to transformer | - | 0 | - | 0 |
| Water pipes from engine to remote dry air cooler00Lube 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•• | Sound proofed generating set container | - | - | • | • |
| 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••< | Elbow pipe between the engine and the silencer | - | - | • | • |
| LV cables from alternator to protection circuit breaker•-HV cables from transformer to protection circuit breaker•Fuel oil mass flow meter fitted on genset baseframeooooHeavy duty oil bath air filter for dust/sand ambient conditionooooScada system, connected to genset control panel (remote desktop PC)ooooFuel oil centrifugal unit (separator) for water and sludge removalooooOversized dry air cooler for high ambient tempooooOn site assistance for supervisory, commissioning and trainingoooo | Water pipes from engine to remote dry air cooler | - | - | 0 | 0 |
| HV cables from transformer to protection circuit breaker•Fuel oil mass flow meter fitted on genset baseframeooooHeavy duty oil bath air filter for dust/sand ambient conditionoooooScada system, connected to genset control panel (remote desktop PC)ooooooFuel oil centrifugal unit (separator) for water and sludge removaloo< | Lube oil pipes from service tank to engine lube oil level regulator | - | - | • | • |
| Fuel oil mass flow meter fitted on genset baseframeoooooHeavy duty oil bath air filter for dust/sand ambient conditionoooooScada system, connected to genset control panel (remote desktop PC)oooooFuel oil centrifugal unit (separator) for water and sludge removalooooooOversized dry air cooler for high ambient tempoooooooOn site assistance for supervisory, commissioning and trainingoooooo | LV cables from alternator to protection circuit breaker | - | - | • | - |
| Heavy duty oil bath air filter for dust/sand ambient conditionoooooScada system, connected to genset control panel (remote desktop PC)oooooFuel oil centrifugal unit (separator) for water and sludge removalooooooOversized dry air cooler for high ambient tempoooooooOn site assistance for supervisory, commissioning and trainingoooooo | HV cables from transformer to protection circuit breaker | - | - | - | • |
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| Fuel oil centrifugal unit (separator) for water and sludge removalooooOversized dry air cooler for high ambient tempoooooOn site assistance for supervisory, commissioning and trainingooooo | Heavy duty oil bath air filter for dust/sand ambient condition | 0 | 0 | 0 | 0 |
| Fuel oil centrifugal unit (separator) for water and sludge removalooooOversized dry air cooler for high ambient tempoooooOn site assistance for supervisory, commissioning and trainingooooo | Scada system, connected to genset control panel (remote desktop PC) | 0 | 0 | 0 | 0 |
| Oversized dry air cooler for high ambient tempoooooOn site assistance for supervisory, commissioning and trainingooooo | Fuel oil centrifugal unit (separator) for water and sludge removal | 0 | 0 | 0 | 0 |
| On site assistance for supervisory, commissioning and training o o o o | Oversized dry air cooler for high ambient temp | 0 | 0 | 0 | 0 |
| | On site assistance for supervisory, commissioning and training | 0 | 0 | 0 | 0 |
| | Alternator according to specific country grid code | 0 | 0 | 0 | 0 |

CONTACTS DETAILS

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More information

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