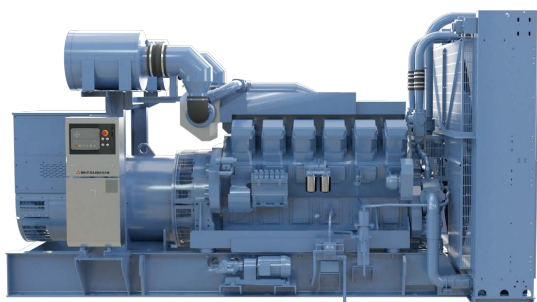




# MGS1600R

S12R-PTAR | 60 Hz

## MITSUBISHI DIESEL GENERATOR

\*image is for illustration purpose. It may not reflect actual product

| MGS Model                                               |      | MGS1600R                                   |                     |                 |                                     |
|---------------------------------------------------------|------|--------------------------------------------|---------------------|-----------------|-------------------------------------|
| Frequency (Hz)                                          |      | 60                                         |                     |                 |                                     |
| Voltage (V)                                             |      | 380 / 480                                  |                     |                 |                                     |
| Duty                                                    |      | Standby (ESP)                              | Critical Power (CP) | Prime (PRP/LTP) | Data Center Continuous Power (DCCP) |
| Rated Output <sup>1</sup> (kVA)                         |      | 1575                                       |                     | 1425            |                                     |
| (kW)                                                    |      | 1260                                       |                     | 1140            |                                     |
| Engine Model                                            |      | S12R-PTAR                                  |                     |                 |                                     |
| Fuel Consumption <sup>2</sup><br>(liter/hr)<br>(% load) | 25%  | 116                                        |                     | 110             |                                     |
|                                                         | 50%  | 186                                        |                     | 172             |                                     |
|                                                         | 75%  | 262                                        |                     | 240             |                                     |
|                                                         | 100% | 342                                        |                     | 311             |                                     |
| Generator <sup>3</sup>                                  | MG-  | S63H / S6H                                 |                     |                 |                                     |
| Cooling System                                          | Type | Closed looped circuit by integral radiator |                     |                 |                                     |
| Length                                                  | (mm) | 4485                                       |                     |                 |                                     |
| Width                                                   | (mm) | 2215                                       |                     |                 |                                     |
| Height                                                  | (mm) | 2515                                       |                     |                 |                                     |
| Weight (Dry)                                            | (kg) | 9900                                       | 10080               | 9900            | 10080                               |
| (Wet)                                                   | (kg) | 10430                                      | 10610               | 10430           | 10610                               |

## STANDARD & CERTIFICATIONS

- Certified to standards ISO 9001:2015
- Complies to G3 ISO8528-(1,3,5) sections, IEC60034-1 / BS EN60034-1, BS5000 Part 3, VDE00530, NEMA MG1-32, CSA22-2-100, AS1359 and UL1446
- Fully compliant with the NFPA110 Standard for Emergency and Standby Power
- Provides 100% load acceptance in one step to meet these demands

## ENVIRONMENT PARAMETER

- Relative Humidity : 85%
- Altitude above sea level: 1000m
- Ambient Temperature: 5°C - 40°C (Please approach our authorized dealer/distributor for other requirements.)

## ADVANCED CONTROL PANEL

- Rugged metal sheet with anti-vibrator isolator
- Operator-friendly interface and navigation
- Complete instrument and control accessories to meet a wide range of installation requirements
- Expansion module and custom programming are available for specific customer requirements

1: Output at 40°C, 1000m ASL with fan

2: Fuel consumption based on fuel density of 0.84 kg/L.

Fuel oil consumption may differ subject to site condition and specification of fuel. Not guaranteed value.

3: S63H (380V) / S6H (480V)

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## COMPLETE RANGE OF ACCESSORIES

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- Power Panel
  - Fuel System
  - Exhaust System
  - Starting/Charging System
  - Mechanical Driven Radiator
  - Engine Protection Synchronize Module
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## APPLICABLE CODES AND STANDARDS

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MGS is designed in accordance with JIS, JEC, JEM, IEC, ISO (ISO15550, ISO 8528- (1,3,5) sections, ISO3046/1, JISB8002-1, DIN627, BS5514, BS5000, VDE00530, NEMA MG1-32, IEC60034, CSA (C22.2-100, AS1359) and manufacturer's standards unless otherwise specified.

Telephone Influence Factor (TIF): Less than 50

Telephone Harmonic Factor (THF): Less than 2%

Radio Interference: Suppression is in line with the provision of BS800 and VDE Class 0875G and 0895N

JIS: Japanese Industrial Standards

JEC: Japanese Electrotechnical Committee

JEM: Standards of Japan Electrical Manufacturer's Association

IEC: International Electrotechnical Commission

ISO: International Standard Organization

Codes may not be available in all model configurations. Please consult local MGS dealer for availability

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## FUEL RATES

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Based on ASTM D975, BS2869, and on fuel oil of 35°C API (16°C or 60°F) gravity having a LHV of 42,780kJ./kg (18,390 Btu/lb.) when used at 29°C (85°F) and weighing 838.9 g/liter (7.001lbs./U.S.gal.).

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## DIESEL ENGINE

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|                                                      |         | Standby<br>(ESP)                                          | Critical Power<br>(CP) | Prime<br>(PRP/LTP) | Data Center<br>Continuous<br>Power (DCCP) |
|------------------------------------------------------|---------|-----------------------------------------------------------|------------------------|--------------------|-------------------------------------------|
| Gross Engine Power (w/o fan basis)                   | (kWm)   | 1386                                                      |                        | 1260               |                                           |
| Engine Type                                          |         | 4 cycle, direct injection, turbocharged with after cooler |                        |                    |                                           |
| Speed                                                | (RPM)   | 1800                                                      |                        |                    |                                           |
| Brake mean effective pressure                        | (MPa)   | 1.9                                                       |                        | 1.7                |                                           |
| Regenerative Absorption                              | (kW)    | 144                                                       |                        |                    |                                           |
| No.of cylinder                                       |         | 12                                                        |                        |                    |                                           |
| Broke / stroke                                       | (mm)    | 170 / 180                                                 |                        |                    |                                           |
| Total displacement                                   | (liter) | 49.03                                                     |                        |                    |                                           |
| Compression ratio                                    |         | 14.0:1                                                    |                        |                    |                                           |
| Piston Speed                                         | (m/sec) | 10.8                                                      |                        |                    |                                           |
| Noise Level at 1m (Excluding: intake, exhaust & fan) | (dB(A)) | 106                                                       |                        |                    |                                           |
| Governor                                             | Type    | Digital Electrical type                                   |                        |                    |                                           |
| Frequency Regulation                                 |         | G3 Class                                                  |                        |                    |                                           |
| Steady State Frequency Band                          |         | ±0.25%                                                    |                        |                    |                                           |
| Heat Rejection to coolant                            | (kW)    | 904                                                       |                        | 822                |                                           |
| Heat Rejection to exhaust                            | (kW)    | 1217                                                      |                        | 1106               |                                           |
| Heat Rejection to atmosphere from engine             | (kW)    | 109                                                       |                        | 99                 |                                           |

## LUBRICATION SYSTEM

|                          |      |                                          |
|--------------------------|------|------------------------------------------|
| Lubricating Oil Capacity | L    | 180                                      |
| Lubricating System       | Type | Forced lubricating by gear pump wet sump |
| Lubricating Oil Filter   | Type | Paper element                            |
| Lubricating Oil Cooler   | Type | Water cooled corrugated                  |

## COOLING SYSTEM

|                                               |         |           |
|-----------------------------------------------|---------|-----------|
| Coolant Capacity w/o Radiator / with Radiator | L       | 125 / 302 |
| Coolant Pump External Resistance              | kgf/cm2 | 0.35      |
| Coolant Pump Flow Rate                        | L/min   | 1850      |
| Cooling Fan Airflow Rate                      | m³/min  | 1800      |
| Cooling Fan Airflow Restriction               | kPa     | 0.1       |

## ELECTRICAL SYSTEM

|                                               |     |                          |
|-----------------------------------------------|-----|--------------------------|
| System Voltage                                | VDC | 24                       |
| Starting System                               |     | Electric Starting        |
| Starter Motor Capacity                        |     | 7.5kW x 2                |
| Max. Allowable Resistance of Cranking Circuit | mΩ  | 1.5                      |
| Recommended Minimum Battery Capacity          | Ah  | 400 (5°C & above)        |
|                                               |     | 500 (Below 5°C to - 5°C) |

## GENERATOR

|                         |              | Standby<br>(ESP)                                            | Critical Power<br>(CP) | Prime<br>(PRP/LTP) | Data Center<br>Continuous<br>Power (DCCP) |
|-------------------------|--------------|-------------------------------------------------------------|------------------------|--------------------|-------------------------------------------|
| Generator               | Type         | Brushless, self-excited, self-ventilated and rotating field |                        |                    |                                           |
| Configuration           |              | 3 Phase 4 Wire                                              |                        |                    |                                           |
| Protection              |              | IP23                                                        |                        |                    |                                           |
| Power Factor            |              | 0.8 Lagging                                                 |                        |                    |                                           |
| No of Poles             |              | 4 Poles                                                     |                        |                    |                                           |
| Insulation Class        |              | Class H                                                     |                        |                    |                                           |
| Temperature Rise        |              | Class H Peak                                                |                        | Class H            |                                           |
| AVR                     | Type         | DAVR                                                        |                        |                    |                                           |
| Voltage Regulation      | Steady State | ± 0.25%                                                     |                        |                    |                                           |
| Wave Form Distortion    |              | 5% (Non-Distorting Balanced Linear Load)                    |                        |                    |                                           |
| Unbalanced Loading      |              | Maximum 25%                                                 |                        |                    |                                           |
| Negative Phase Sequence |              | Maximum 8%                                                  |                        |                    |                                           |
| Overspeed               |              | Maximum 125% of nominal speed                               |                        |                    |                                           |

## INLET AND EXHAUST SYSTEM

|                                         |        | Standby<br>(ESP) | Critical Power<br>(CP) | Prime<br>(PRP/LTP) | Data Center<br>Continuous<br>Power (DCCP) |
|-----------------------------------------|--------|------------------|------------------------|--------------------|-------------------------------------------|
| Air Cleaner                             | Type   | Turbo Filter     | Paper Element          | Turbo Filter       | Paper Element                             |
| Combustion Air Inket Flow Rate          | m³/min | 124              |                        | 113                |                                           |
| Exhaust Flow Rate                       | m³/min | 328              |                        | 298                |                                           |
| Max. Exhaust Gas Temperature            | °C     | 550              |                        |                    |                                           |
| Exhaust Flange Size (Internal Diameter) |        | 300A             |                        |                    |                                           |
| Allowable Exhaust Back Pressure         | mm H2O | 600              |                        |                    |                                           |

## RATING DEFINITION IN ACCORDANCE WITH ISO8528-1

| Duty                                               | Overload      | Load / Operating Hour |                   |                                                                                                                                                                      |
|----------------------------------------------------|---------------|-----------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    |               | Avg. Load Factor/yr   | Operating Hr/yr   | Avg. Load Factor / 24hr                                                                                                                                              |
| Standby (ESP)                                      | Not Available | Maximum 70%           | Maximum 500 hours | 1. Maximum 80%<br>2. 100% in emergency                                                                                                                               |
| Prime (PRP)                                        | +10% Overload | Maximum 70%           | Unlimited         | 1. Maximum 80%<br>2. Overload operation ( $\leq 110\%$ ) is limited to a maximum of 1hr per 12 hrs<br>3. Over 90% load operation limited to a maximum of 3 hrs/24hrs |
| Prime (LTP)                                        | +10% Overload | Maximum 100%          | Maximum 500 hours | 1. Maximum 100%<br>2. Overload operation ( $\leq 110\%$ ) is limited to a maximum of 1hr per 12 hrs                                                                  |
| Continuous (COP)                                   | Not Available | Maximum 100%          | Unlimited         | Maximum 100%                                                                                                                                                         |
| Critical Power (CP) <sup>4</sup>                   | Not Available | Maximum 100%          | Unlimited         | Maximum 100%                                                                                                                                                         |
| Data Center Continuous Power (DCCP) <sup>4,5</sup> | +10% Overload | Maximum 100%          | Unlimited         | 1. Maximum 100%<br>2. Overload operation ( $\leq 110\%$ ) is limited to a maximum of 1hr per 12 hrs                                                                  |

4: UPTIME compliant: This DCCP rating meets the requirement of a Tier III and Tier IV data center site with no runtime limitation when the operation is loaded to 'N' demand for the engine generator set.

5: +10% overload is not recognized by Uptime for Tier Certification.

Mitsubishi Heavy Industries Engine System Asia Pte. Ltd. serves customers with products that are continually improved. Therefore, specifications and some materials may be changed without notice. The International System of units (SI) is used in this publication.

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