REOZM Series

905-2500 kVA

KOHLER.
Power Systems

Introduction

Introduction

- Using the latest generation heavy duty engines, designed for both prime and standby operation in very harsh environment
- Equipped with highly efficient electronic control systems which enable them to respond to strict stability requirements in terms of frequency, voltage and waveform
- Generator sets also comply with ISO 8528-5, Class G3 requirements for transient performance
- Modular design enables quick and versatile customization to meet different project requirements and demands

Standard Features

- 905 kVA to 2500 kVA for 50 Hz
- 724 kW to 2000 kW for 60 Hz
- 4P, brushless, permanent-magnet pilot exciter alternator
- Unit mounted radiator for 40ºC ambient
- Electronic isochronous governor
- Standard duty air intake system
- Low height radiator option available

2000REOZM

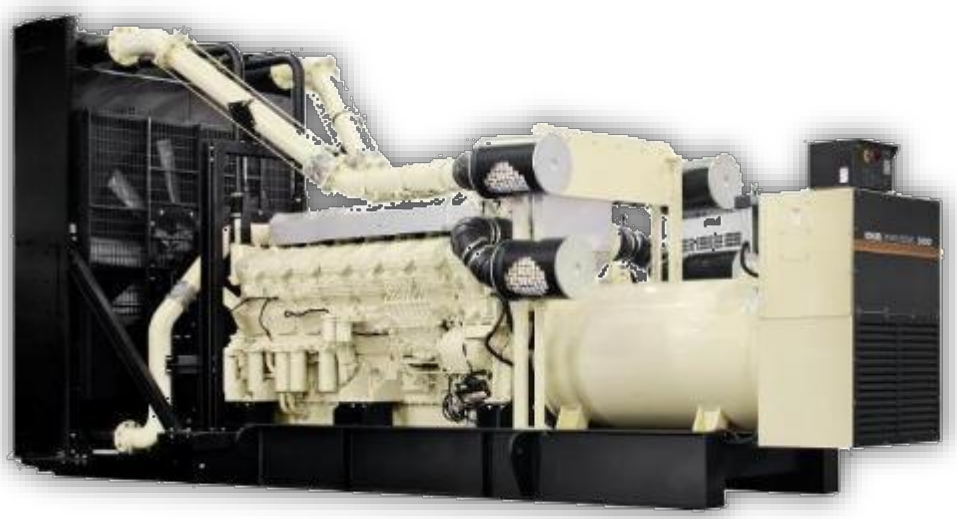
Standard Features

- Class H alternator insulation
- Structural skid
- Oil drain extension
- Low coolant level shutdown (for radiator cool only)
- Unit mounted controller
- Customizable with endless options
- 1 step loading capability
- EPA Tier 1 certified (60 Hz Models)
- EPA Tier 2 certified available as Engineering Special model

800REOZM

Key Features

Key Features



- Data Center Continuous Ratings
- Digital Electric Powered Governor Systems
- PMG Excitation
- Lower Fuel Consumption
- Low Height Radiator

Data Center Failure Cost

Average Downtime* = 90 minutes

1 minute = US$5,600*

90 minutes = US$504,000

KOHLER. Power Systems

Financial Cost of Downtime

Mobile Network Service Disruption

singapore

M1 fined record S$1.5 million for service disruption

M1 mobile telephone services were affected in the south-western and north-west parts of Singapore during the disruption in January. TODAY file photo

IDA to implement new audit framework to review resiliency of mobile networks regularly

Related news

SINGAPORE
M1 mobile service disruption caused by upgrading work

David Gledhill, Managing Director and Group Head of Technology and Operations at DBS said, "DBS has taken steps to improve the bank's internal escalation process and the speed and manner in which it reaches out to customers during periods of service disruptions. The bank is defining specific 'red alert' scenarios that will automatically trigger group-wide crisis management procedures, including specific actions to be taken for each of the red alert scenarios identified. DBS is also implementing additional modes of internal alerts and implementing new processes to expedite escalation."

Today, MAS announced that it requires DBS to apply a multiplier of 1.2 times to its risk-weighted assets for operational risk, which translates to the bank setting aside an additional amount of approximately SGD 230 million in regulatory capital on a group basis based on numbers as at 30 June 2010. DBS' Tier 1 capital and total capital adequacy ratio (CAR) as at 30 June 2010 was 13.1% and 16.5%, respectively. The sanction would result in DBS having proforma Tier 1 capital of 12.9% and total CAR of 16.3%.

Piyush Gupta, DBS Chief Executive Officer said, "The system outage is of grave concern to us and we acknowledge MAS' censure. DBS would like to assure customers that taking into account the regulatory capital charge, our total capital adequacy ratio is still comfortably above the required levels. Measures to strengthen our technology and risk management controls are also well underway. Twelve months ago, DBS commenced a two-year programme to further enhance our system reliability and resilience and we are accelerating the implementation of these initiatives. DBS is deeply sorry for the outage and once again, my apologies to our customers for all the inconvenience caused."

ATM Breakdown

bank setting aside an additional amount of approximately SGD 230 million

Data Center Continuous Ratings

- Data centers have strict requirement for generating sets use in Data centers applications
- Uptime Institute has Tier 1 to Tier 4 standards and requirements for generator sets used in different types of data centers. With Tier 4 having the most stringent requirements
- REOZM series are specially designed to meet the strict requirements of Uptime Institute Tier 4 standard

Data Center Continuous Ratings

- Uptime Institute Requirements include:

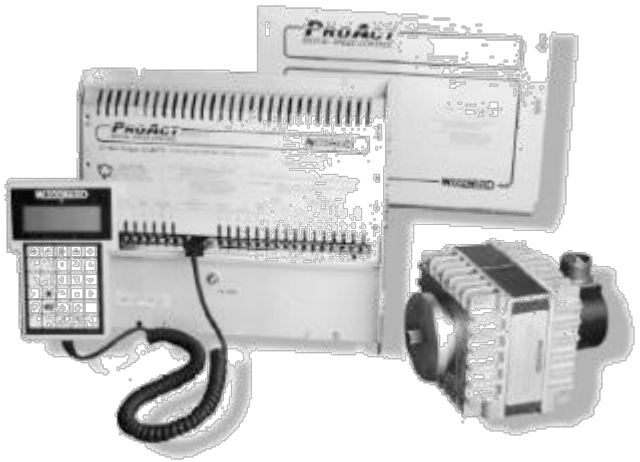
No runtime limitations (following standard maintenance schedule and TBO)

"N" rating is defined as continuous rating

Standard maintenance schedule and time before overhaul (TBO) of must follow as per maintenance manual

Digital Electric Powered Governor Systems

- Engine performance is further enhanced by fitted with advance digital control system which is an electric powered governor system designed to provide precision electronic control
- Governor systems allow optimize settings for
  - Engine speed for rated, idle, raise limit and lower limit
  - Fuel limits for no load, full load, start up and idle
  - Two slope torque limit
  - Separate ramp times
- Having the best settings allows engine to perform at optimal level
  - Enhance and faster engine response
  - Better fuel economy and emission



PMG Excitation

Advantages

Enhances Transient Performance
PMG provides a constant AC voltage input to the AVR regardless of the alternator's terminal voltage

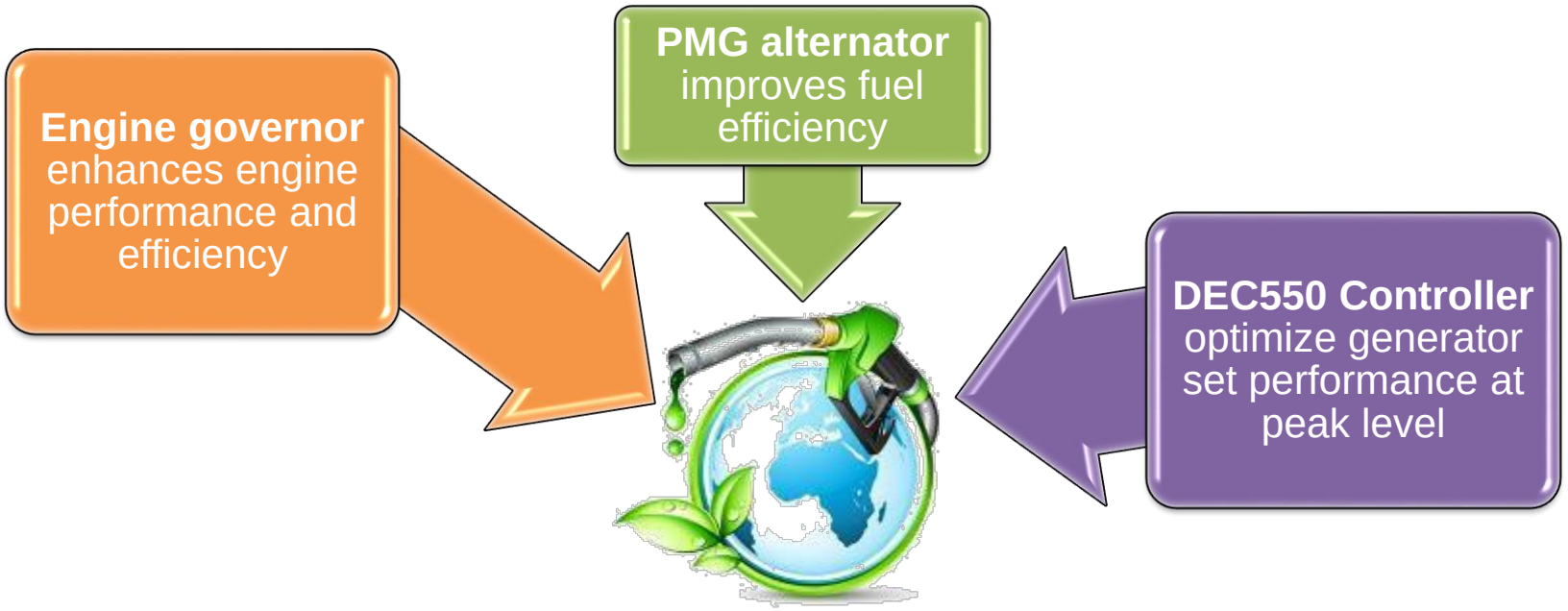
Up to 300% Short Circuit Support For 10s
Without addition of current boost/series boost systems

Eliminates Voltage Instability
When fitted with PMG, input power to AVR is isolated from terminal voltage disturbance caused by misfiring of power rectifiers

Eliminates Need For Field Flashing
Field flashing is sometimes necessary with shunt type synchronous alternators As PMGs are constructed using permanent magnet rotors. Permanent magnets provide very strong magnetic field

Fuel Consumption

- Several engineering innovations help the REOZM to achieve a lower fuel consumption even with competitors using similar engines



Fuel Consumption

- Comparison on fuel consumption with competitor's product using similar engine

	Kohler 2000REOZM	Brand M
Standby		
Rated Power	2250kVA	2235kVA
Fuel Consumption (100%)	462 L/Hr	478 L/Hr
Fuel Consumption (75%)	338 L/Hr	355 L/Hr
Prime		
Rated Power	2044kVA	2030kVA
Fuel Consumption (100%)	415 L/Hr	428 L/Hr
Fuel Consumption (75%)	309 L/Hr	322 L/Hr

SAVE US$19,380 PER YEAR *

* Assume genset running at 75% load, standby, 2000Hrs/Yr.
2015 Diesel price as projected by EIA @ US$0.57/L

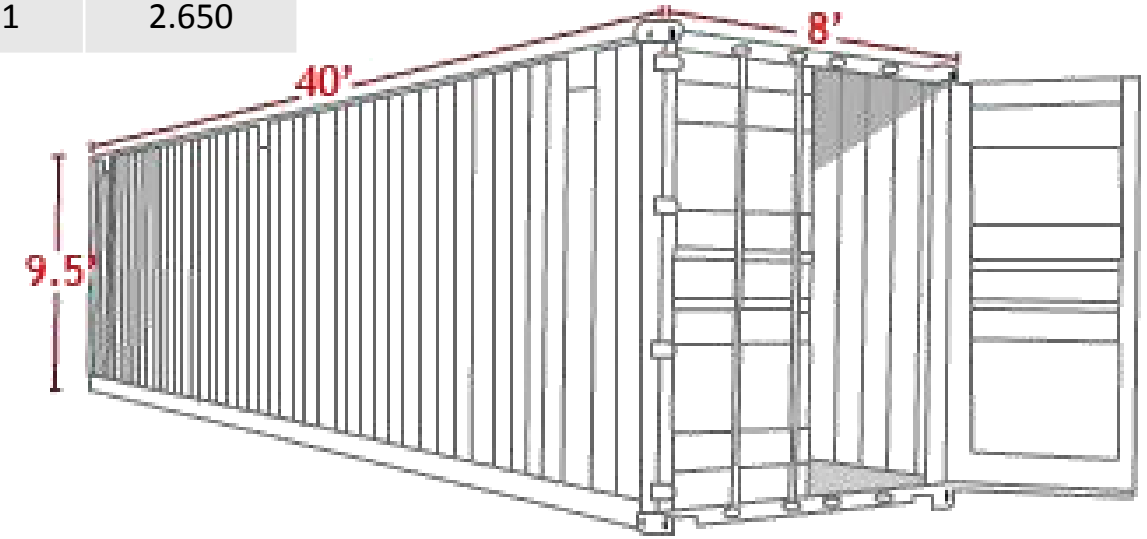
Rated Voltage 50 Hz : 220/380V, 3-Phase, 1500RPM

KOHLER. Power Systems

Low Height Radiator
Standard Container Dimensions

- Standard 40’ high-cube container dimensions

	Length (m)	Width (m)	Height (m)
External	12.192	2.438	2.896
Internal	12.000	2.311	2.650

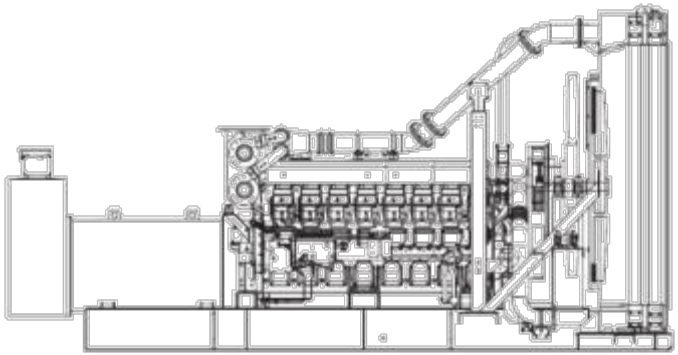


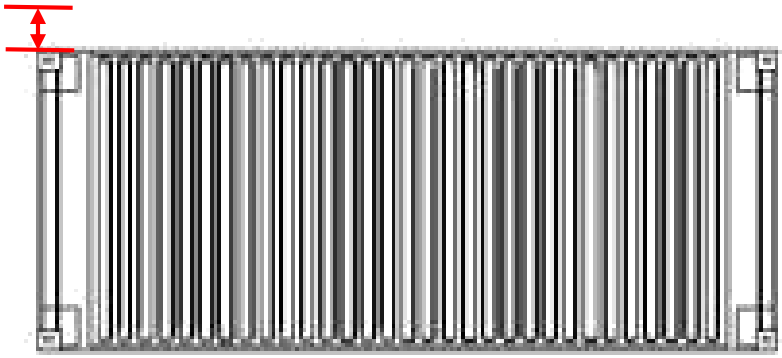
Standard Height Radiator

- 2000REOZM with standard height radiator dimensions

Length (m)	Width (m)	Height (m)
6.296	2.222	3.253

- Will not fit into cargo container
- Radiator need to be flat-shipped separately
- Additional shipping costs



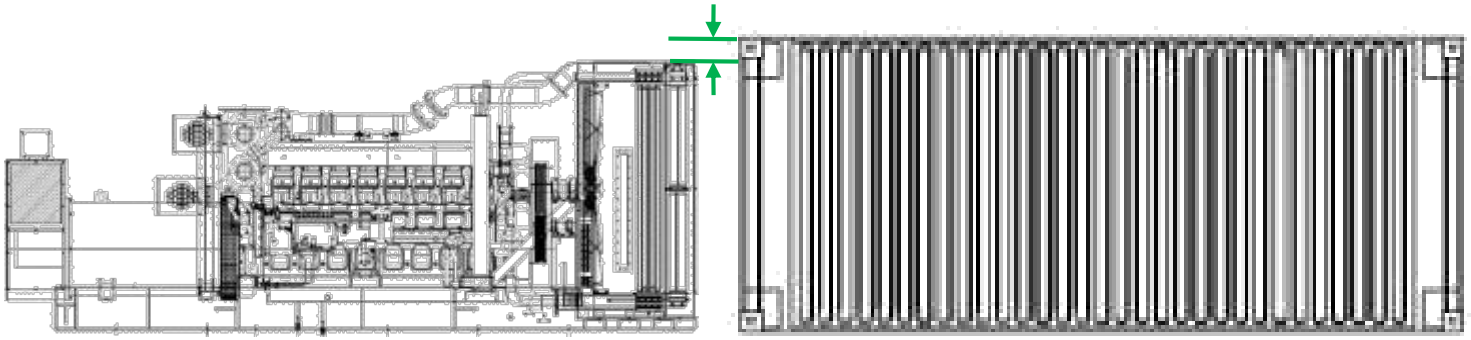


Low Height Radiator

- 2000REOZM with low height radiator dimensions

Length (m)	Width (m)	Height (m)
6.485	2.216	2.507

- Fit into cargo container with clearance
- Save on shipping costs
- No separate assembly of radiator on site
- Can be containerized (Contenergy)



Low Height Radiator

- Comparison on generator set height with competitor's product (Similar power rating)

40' High Cube Container (Internal)	Kohler 2000REOZM	Brand M	Brand Cu	Brand Ca
2650mm	2507mm	2835mm	2537mm	2958mm
Fits into container	✓	✗	✓	✗

Comparisons based on 2000kW, Standby Models

Benefits

Features	Benefits
Complies to ISO8528-5, class G3 requirement for transient performance	Faster response to loading
Woodward ProAct II engine governor	Higher engine specifications allow faster response
PMG generator	Better motor starting capability and short circuit capability
Electronic isochronous governor	Precise frequency regulation
Digital solid state volts per hertz voltage regulator (with 0.25% no load to full load regulation)	Precise voltage regulation
Conforms to EPA Certification for 60 Hz	Cleaner emission to the environment
Versatility with KOHLER non-standard solutions	Flexible and creative customized solutions to meet customers' needs

Controllers

KOHLER. Power Systems

DEC550 Controller

- Compatible with all ECM and non-ECM engines, 12 or 24 volt
- User-friendly digital display and keypad for local view and adjustments
- Measurements in metric or English units
- Integrated voltage regulator provides 0.25% regulation
- Communicates directly with a personal computer via a network or modem configuration
- Built-in alternator thermal overload protection
- Supports Modbus protocol
- Meets NFPA-99 and NFPA-110

DEC550 Controller - NFPA 110, Common Alarms

- Engine Functions:
  - Over crank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - Low fuel (level or pressure) *
  - Low coolant level
  - Over speed
  - EPS supplying load
  - High battery voltage *
  - Low battery voltage *
- General Functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence switch
  - Remote emergency stop

* Function requires optional input sensors or kits and is engine dependent

Thank You