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HYUNDAI
HEAVY INDUSTRIES CO.,LTD.
ENGINE & MACHINERY

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HiMSEN Engine Programme



2012

Building a better future
Global Leader

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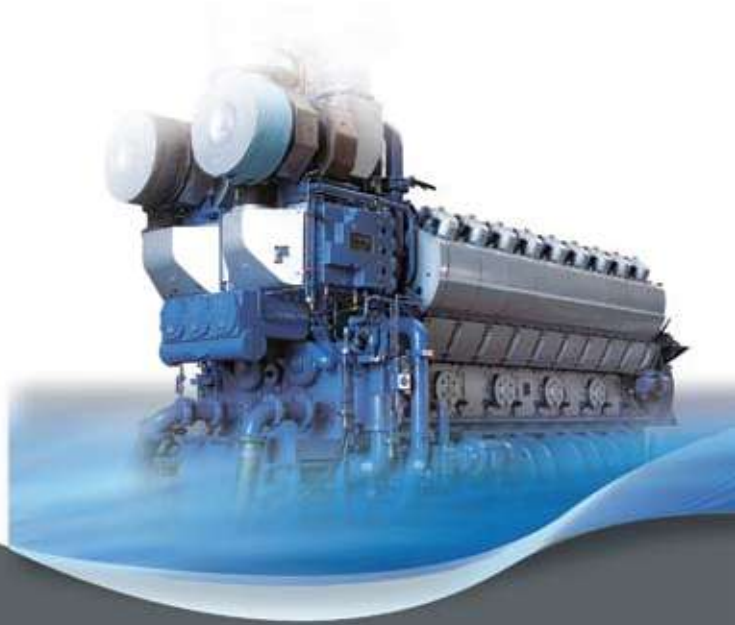
# HiMSEN Engine

## Hi-touch Marine & Stationary ENgine

## IMO Tier Ⅱ Programme 2012



Marine & Offshore GenSets
Marine Propulsion System
Stationary GenSets

HYUNDAI | ENGINE & MACHINERY
HEAVY INDUSTRIES CO.,LTD.



HYUNDAI HIMSEN

Hi-touch Marine & Stationary ENgine

## Key to Components



1 Common base frame
2 Resilient mounting
3 Engine block
4 Cylinder liner
5 Flywheel cover
6 Crank case cover
7 Cylinder head
8 Rocker arm
9 Camshaft
10 Piston
11 Connecting rod
12 Crankshaft
13 Counter weight
14 Lub.oil priming pump
15 Lub.oil pump
16 Lub.oil cooler
17 Lub.oil filter
18 Cooling water pump
19 Intake air duct
20 Turbocharger
21 Air cooler
22 Engine control panel
23 Fuel pump cover
24 Exhaust gas pipe
25 Alternator

HYUNDAI HiMSEN Engine
Hi-touch Marine & Stationary ENgine



General Information

## HiMSEN Family

**Design Philosophy**

Hyundai's HiMSEN Family have simple and smart design suitable for marine applications with high reliability and performance.
The key features are:

**Heavy Fuel Engine** with same fuel of main engine (Uni-Fuel concept).
Hence, the diesel fuel and heavy fuel oil of the viscosity of upto 700 cSt at 50 °C is acceptable.



**Economical and Ecological Engine** with low fuel consumption, NOx emission, and Smoke, etc. , which is based on the below specific designs;

- Optimized Supercharging with Miller Cycle
- High Fuel Injection Pressure

**Reliable and Practical Engine** with simple, smart and robust structure.

- Number of engine components are minimized with Pipe-Free design
- Most of the components are directly accessible for easier maintenance
- 'Individual Part' maintenance concept is provided
- Feed System is fully modularized with direct accessibility

## Main Features

**Performance characteristics**
- High output in the similar range engines
- Low fuel oil consumption
- Quick acceleration & load response

**Maintenance**
- Easier maintenance by modularized design
- Minimal number and kind of components

**Earth-friendly engine**
- Low NOx emissions
- Compliance with IMO NOx Tier II
- Low vibration & noise

## Major Application

**Marine**
- Propulsion system
- Generating sets

**Offshore**
- Drill ship
- FPSO

**Stationary**
- Stationary diesel power plants
- Packaged power stations
- Gas engine power plants
- Pre-fabricated power plants
- Barge-mounted diesel power plants
- Emergency diesel generator (EDG) for nuclear power plants


Jack-up Platform/Drilling Rig






FPSO


Drill ship


Car Ferry & Passenger Vessel


Container ship


Diesel Power Plant


Emergency GenSets for Nuclear Power Plant

## General

This programme provides necessary information and recommendations for the application of HYUNDAI's HiMSEN engines.

'HiMSEN'® is the registered brand name of HYUNDAI's own design engine and the abbreviation of '**Hi-touch Marine & Stationary ENgine**'.

***Please note that all data and information prepared in this programme are for guidance only and subject to change without notice. Therefore, please contact Hyundai Heavy Industries Co., Ltd. before actual applications of the data. Hyundai Heavy Industries Co., Ltd. will always provide the data for the installation of specific project.***

## Engine Model Designation

**18 H 32 / 40 _ V**

- No. of Cylinders
- HYUNDAI's HiMSEN
- Cylinder Bore in cm
- Piston Stroke in cm
- (empty): Oil
  G: Gas
- (empty): In-line type
  V: Vee type







## Reference Condition

General definition of diesel engine rating is specified in accordance with ISO 3046/1:2002, ISO 15550:2002.
However the engine outputs are available within tropical conditions without de-rating.

## Tropical Conditions

- Turbocharger air inlet pressure: 1,000 mbar
- Turbocharger air inlet temperature: 318 K (45 °C)
- Charge air coolant temperature: 309 K (36 °C)*

* Valid for central cooling system up to 36 °C normally, 38 °C specially.

## Specific Fuel Oil Consumption (SFOC) & Heat Rate

The stated consumption figures refer to the following ISO reference conditions:

- Turbocharger air inlet pressure: 1,000 mbar
- Turbocharger air inlet temperature: 298 K (25 °C)
- Charge air coolant temperature: 298 K (25 °C)

- Lower calorific value of fuel 42,700 kJ/kg
- Without engine driven pumps
- Tolerance +5 %
- At 100 % load

## Specific Lube Oil Consumption (SLOC)

The stated consumption is given with a tolerance of +25% depending on the operating conditions.

## Engine Power

The engine brake power is stated in kW. For conversion between kW and metric horsepower, please note that 1 bhp = 75 kg·m/s = 0.7355 kW.
Ratings are given according to ISO 3046/1:2002, ISO 15550:2002.

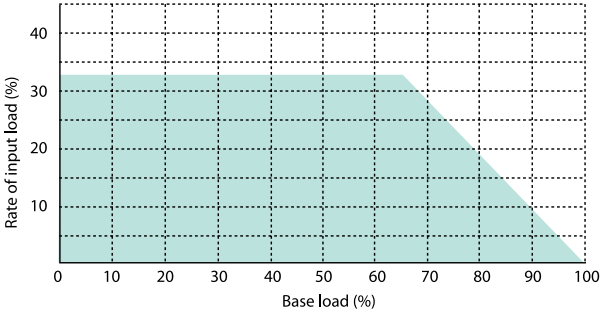
In case of HR(Higher Rating) version, no overload is permissible except for 10 % overload during official factory test.

## Power Management of Gensets

When making power management system of multi-Gensets for marine application, a proper load balance is to be considered by shipyard.

In case of a failure of one engine, its output has to be made up for by the remaining engines or by reducing/switching off electric consumers.

No overload of remaining engine is allowed for such a case and the electric power scheme of the ship can be derived from the following load characteristics.








## Continuous Load-Up

The quickest way to load-up from 0 % to 100 % load can be achieved by increasing the load continuously and gradually.

## Step by Step Load-Up

Considering the time required for stabilizing the frequency deviation due to sudden load-up, it is recommended to load up from idle to full load by more than three steps IACS (especially for GenSets of 720rpm or 900rpm due to higher BMEP of over 24 bar).

HiMSEN GenSets fulfill the requirements of classification societies concerning the frequency deviation and recovery time when loading up by 3 steps from 0 % to 100 %.

## Information for Fuel oil control by EU Directive 2005-33-EC and California Code of Regulations

All HiMSEN engines are suitable and developed for continuous operation on HFO as well as MDO/MGO. There is no lower limit for the sulfur content of fuel oil. In connection to the low viscosity of MGO, (Marine Gas Oil, DMA as defined in ISO 8217) the viscosity at engine inlet should be kept within the value of 2 ~ 14 cSt in order to avoid possible wear or sticking of fuel injection pump due to low lubricity and in order to maintain the suitable hydrodynamic film between fuel injection pump plunger and barrel.

- Recommended stable viscosity at engine inlet: Min. 3 cSt
- Recommended minimum viscosity at engine inlet: Min. 2 cSt

So, a proper cooling device (D.O cooler or chiller etc.) is to be considered, if needed, to keep the above mentioned viscosity (2 ~ 14 cSt) at engine inlet.

When the MGO is to be used only for temporary engine operation (e.g. in port), higher BN lube oil used for residual fuel (HFO) should not present any problems in case of short periods of running.
When engine is not operated continuously with low sulfur fuel such as MGO, lube oil should be chosen according to the highest sulfur contents of the fuel with normal operation.

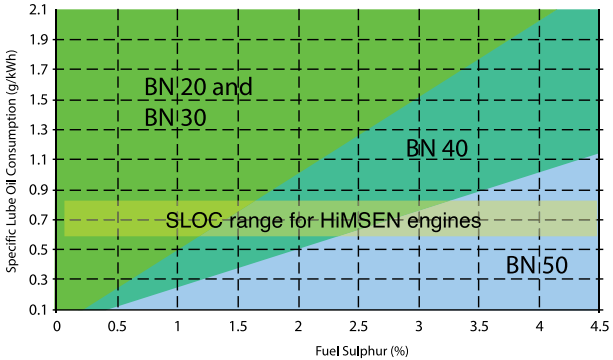




## Guideline for Lube Oil

Base Number (BN) must be carefully selected depending on fuel grade and sulfur contents.
Following are guidance values for initial filling.

## Typical recommended BN depending on the fuel sulfur contents and SLOC (g/kWh)




Reference: CIMAC recommendation number 29/2008 'Guidelines for the lubrication of medium speed diesel engine'

## IMO NOx EMISSION AND HiMSEN ENGINES

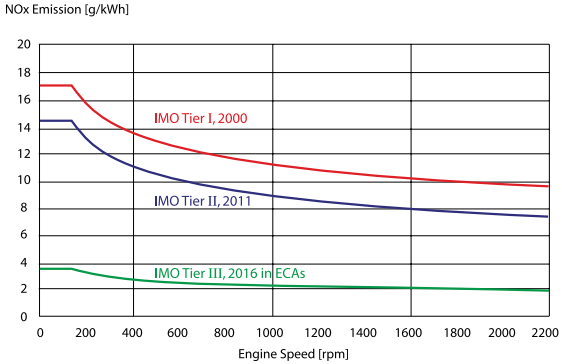
Annex VI of the MARPOL 73/78 convention entered into force 12 May 2005. All HiMSEN engines included in this booklet comply with the NOx Limits specified in the IMO regulation.

The exhaust emission regulations in Annex VI were referred to as IMO Tier I, MARPOL Annex VI regulations were amended at the MEPC (Marine Environment Protection Committee) in October 2008. These specify further NOx emission limits to be known as IMO Tier II and Tier III.

IMO Tier II regulations were entered into force on 1 January 2011 based on keel laying, according to a speed dependent function, with reduction of about 20 % in comparison with IMO Tier I (refer to chart).

Under IMO Tier III, the NOx emission limits for marine engines will become effective on 1 January 2016 based on keel laying, according to a speed dependent function, with reduction of 80 % in comparison with IMO Tier I when the ship is operated in a designated Emission Control Areas (so called ECAs).

All types of HiMSEN engine are complied with the new upcoming NOx emission regulations, and do its best to satisfy further request if any from customers.



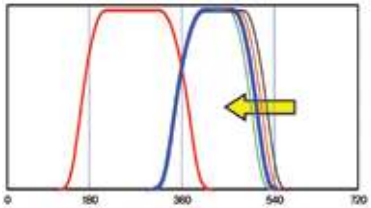





## HYUNDAI ENVIRONMENTAL TECHNOLOGIES against IMO Tier II

HYUNDAI is introducing technologies to meet IMO Tier II regulation with internal engine measures only such as:

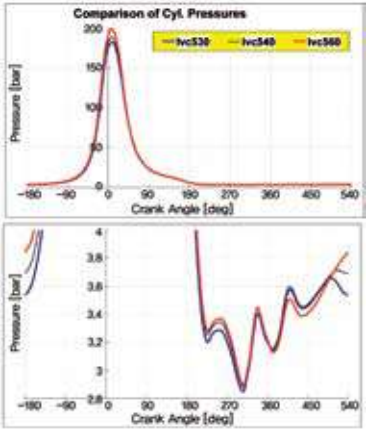
- Miller valve timing requiring increased charger air pressure by applying the high pressure ratio turbocharger
- Optimised combustion by applying the combustion control technologies with optimising the piston bowl shape and the fuel injection valve nozzle etc.




Various Intake Valve Closing Timing for 1-D Cycle Simulation

### Miller valve timing

This technology is very useful to reduce the NOx emission by optimising the intake valve's closing timing especially, result in changing the effective compression and expan sion ratio. In order to apply this technology, the high pressure ratio turbocharger is required to increase the charge air pressure and new devel oped T/C with high pre ssure ratio is mounted on HiMSEN engine.

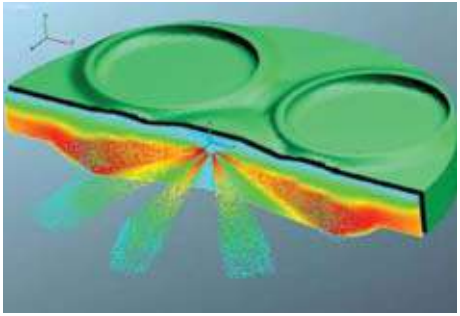



Combustion pressure depending on IVC timing from 1-D Cycle Simulation

## Optimized combustion

The NOx emission can be reduced by the combustion control technologies with the optimum combination of the piston bowl shape and the fuel injection valve nozzle etc.

The piston bowl shape and the fule injection valve nozzle's specification are optimized to meet the IMO Tier II regulation, which are evaluated by 3-D combustion analysis and verified by the measurement at HiMSEN Techno Center.



3-D Combustion Analysis

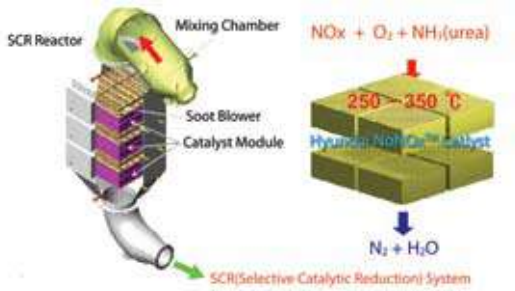




## HYUNDAI ENVIRONMENTAL TECHNOLOGIES against IMO Tier III as one of solutions

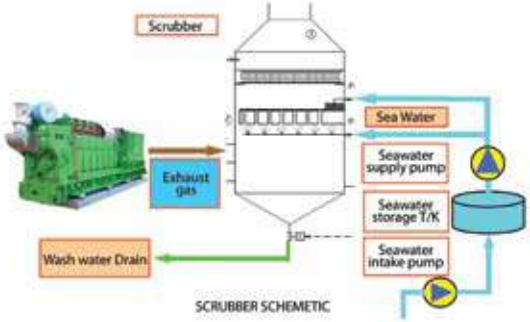
## HD NoNOx™ SCR (SELECTIVE CATALYTIC REDUCTION) SYSTEM

HYUNDAI can offer NoNOx™ SCR technology that can reduce NOx emissions by 95 %, designed for Tier III limits. HYUNDAI is optimizing the whole installation, performance and engine in order to achieve low cost of production and give benefits to the customers.




## SCRUBBER

Exhaust gas scrubbing is an alternative solution to low sulphur content fuels for reducing SOx emissions. SCRUBBER has been developed by HYUNDAI for much better quality.



HYUNDAI HIMSEN

Hi-touch Marine & Stationary ENgine



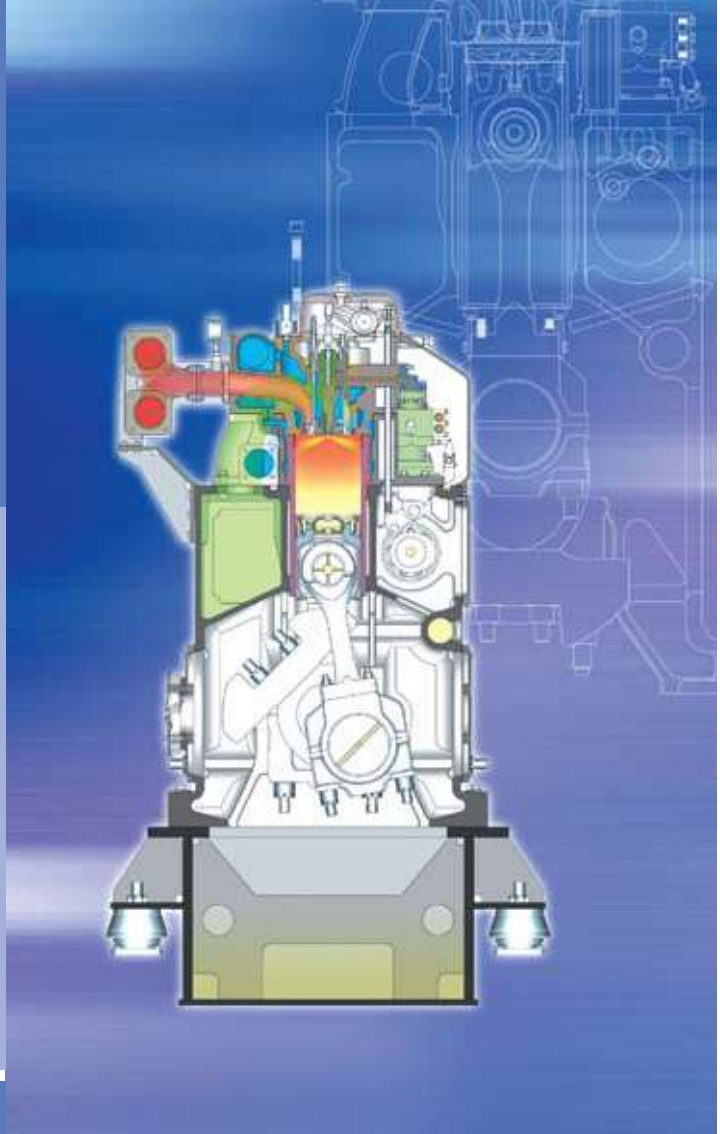
# Marine & Offshore GenSets

## for Tier II

### Power Range

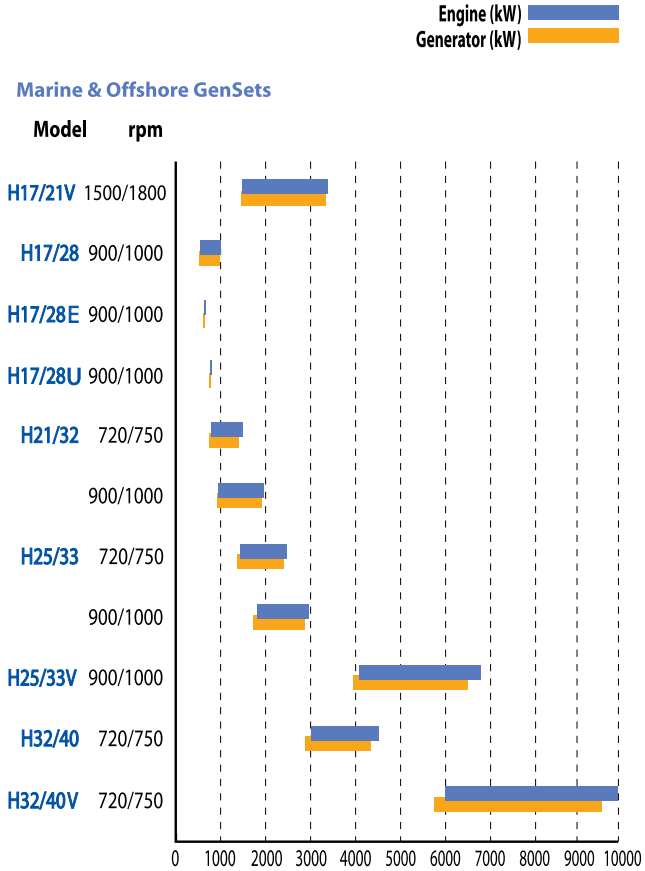
| | |
|---|---|
| H17/21V | 1,680~3,200 kW |
| H17/28 | 575~1,000 kW |
| H17/28E | 660 kW |
| H17/28U | 805 kW |
| H21/32 | 800~1,980 kW |
| H25/33 | 1,440~2,970 kW |
| H25/33V | 4,080~6,800 kW |
| H32/40 | 3,000~4,500 kW |
| H32/40V | 6,000~10,000 kW |

Marine & Offshore GenSets








Engine (kW)
Generator (kW)
Marine & Offshore GenSets
Model
rpm
H17/21V 1500/1800
H17/28 900/1000
H17/28E 900/1000
H17/28U 900/1000
H21/32 720/750
900/1000
H25/33 720/750
900/1000
H25/33V 900/1000
H32/40 720/750
H32/40V 720/750
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

Bore: 170 mm, Stroke: 210 mm

## Main Data

| Speed | 1500 rpm | | 1800 rpm | |
|---|---|---|---|---|
| Frequency | 50 Hz | | 60 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 12H17/21V | 1,680 | 1,613 | 1,920 | 1,843 |
| 16H17/21V | 2,240 | 2,150 | 2,560 | 2,458 |
| 18H17/21V | 2,520 | 2,419 | 2,880 | 2,765 |
| 20H17/21V | 2,800 | 2,688 | 3,200 | 3,072 |

Based on alternator efficiency of 96 %.

## Specific Fuel Oil Consumption at 100% Engine Load

| Load | 1500 rpm | 1800 rpm |
|---|---|---|
| 100 % | 192 g/kWh | 197 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



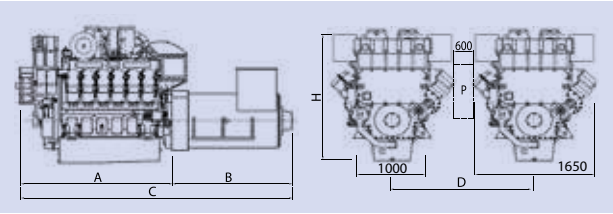


Bore: 170 mm, Stroke: 210 mm

## Dimensions

| 1500 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 12 | 2,200 | 2,050 | 4,250 | 2,100 | 6.7 | 13.2 |
| | 16 | 2,600 | 2,050 | 4,650 | 2,100 | 8.0 | 15.2 |
| | 18 | 2,800 | 2,680 | 5,480 | 2,100 | 8.9 | 16.8 |
| | 20 | 3,100 | 2,680 | 5,780 | 2,100 | 9.8 | 18.0 |

| 1800 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 12 | 2,200 | 2,050 | 4,250 | 2,100 | 6.7 | 13.2 |
| | 16 | 2,600 | 2,050 | 4,650 | 2,100 | 8.0 | 15.2 |
| | 18 | 2,800 | 2,680 | 5,480 | 2,100 | 8.9 | 16.8 |
| | 20 | 3,100 | 2,680 | 5,780 | 2,100 | 9.8 | 18.0 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,450 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 170 mm, Stroke: 280 mm

## Main Data

| Speed | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 5H17/28 | 575 | 538 | 600 | 561 |
| 6H17/28 | 690 | 645 | 720 | 673 |
| 7H17/28 | 805 | 757 | 840 | 790 |
| 8H17/28 | 920 | 865 | 960 | 902 |

Based on alternator efficiency of 93.5 ~ 94 %.

## Specific Fuel Oil Consumption at Engine

| Load | 900 rpm | 1000 rpm |
|---|---|---|
| 100 % | 188 g/kWh | 188 g/kWh |

## Main Data (for Higher Power Rating)

| Speed | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H17/28 | 750 | 701 | 750 | 701 |
| 7H17/28 | 875 | 823 | 875 | 823 |
| 8H17/28 | 1,000 | 940 | 1,000 | 940 |

Based on alternator efficiency of 93.5 ~ 94 %.

## Specific Fuel Oil Consumption at Engine (for Higher Power Rating)

| Load | 900 rpm | 1000 rpm |
|---|---|---|
| 100 % | 191 g/kWh | 191 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



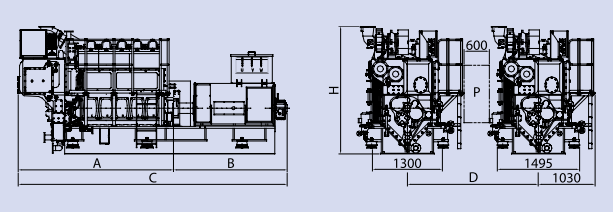


Bore: 170 mm, Stroke: 280 mm

## Dimensions

| 900 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 5 | 2,791 | 2,200 | 4,991 | 2,314 | 7.7 | 13.6 |
| | 6 | 3,071 | 2,200 | 5,271 | 2,314 | 8.5 | 14.5 |
| | 7 | 3,351 | 2,200 | 5,551 | 2,314 | 9.4 | 15.6 |
| | 8 | 3,631 | 2,320 | 5,951 | 2,314 | 10.4 | 16.7 |

| 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 5 | 2,791 | 2,200 | 4,991 | 2,314 | 7.7 | 13.6 |
| | 6 | 3,071 | 2,200 | 5,271 | 2,314 | 8.5 | 14.5 |
| | 7 | 3,351 | 2,200 | 5,551 | 2,314 | 9.4 | 15.6 |
| | 8 | 3,631 | 2,320 | 5,951 | 2,314 | 10.4 | 16.7 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,552 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 170 mm, Stroke: 280 mm

## Main Data

| Speed | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H17/28E | 660 | 618 | 660 | 618 |
| 6H17/28U | 805 | 750 | 805 | 750 |

Based on alternator efficiency of 93.2 ~ 94 %.

## Specific Fuel Oil Consumption at Engine

| | Load | 900 rpm | 1000 rpm |
|---|---|---|---|
| 6H17/28E | 100 % | 189 g/kWh | 190 g/kWh |
| 6H17/28U | 100 % | 191 g/kWh | 191 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*

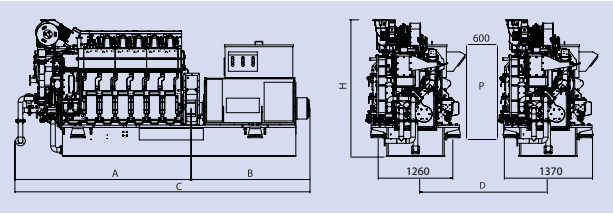




Bore: 170 mm, Stroke: 280 mm

## Dimensions

| 900 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 6H17/28E | 2,774 | 1,939 | 4,713 | 2,323 | 6.9 | 13.0 |
| | 6H17/28U | 2,774 | 2,069 | 4,843 | 2,393 | 7.1 | 13.8 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min distance between engines 2,445 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

### This type of engine is optimized as planning products.

1. Optimized capacity for front module (pump, cooler, filter, valve, etc) .
2. Only 6cyl. for pump cover.
3. Optimized design for crankshaft, engine module.
4. Reducing of weight, simplification, etc.

Bore: 210 mm, Stroke: 320 mm

## Main Data

| Speed | 720 rpm | | 750 rpm | | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 5H21/32 | 800 | 752 | 800 | 752 | 960 | 910 | - | - |
| 6H21/32 | 960 | 902 | 960 | 902 | 1,200 | 1,140 | 1,200 | 1,140 |
| 7H21/32 | 1,120 | 1,064 | 1,120 | 1,064 | 1,400 | 1,330 | 1,400 | 1,330 |
| 8H21/32 | 1,280 | 1,216 | 1,280 | 1,216 | 1,600 | 1,520 | 1,600 | 1,520 |
| 9H21/32 | 1,440 | 1,368 | 1,440 | 1,368 | 1,800 | 1,710 | 1,800 | 1,710 |

Based on alternator efficiency of 94 ~ 95 %.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|
| 100 % | 182 g/kWh | 182 g/kWh | 183 g/kWh | 185 g/kWh |

Exceptionally, 5H21/32 × 900 rpm is 190 g/kWh

## Main Data (for Higher Power Rating)

| Speed | 720 rpm | | 750 rpm | | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H21/32 | 1,050 | 987 | 1,050 | 987 | 1,320 | 1,254 | 1,320 | 1,254 |
| 7H21/32 | 1,225 | 1,164 | 1,225 | 1,164 | 1,540 | 1,463 | 1,540 | 1,463 |
| 8H21/32 | 1,400 | 1,330 | 1,400 | 1,330 | 1,760 | 1,672 | 1,760 | 1,672 |
| 9H21/32 | 1,575 | 1,496 | 1,575 | 1,496 | 1,980 | 1,881 | 1,980 | 1,881 |

Based on alternator efficiency of 94 ~ 95 %.

## Specific Fuel Oil Consumption at Engine (for Higher Power Rating)

| Load | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|
| 100 % | 184 g/kWh | 184 g/kWh | 185 g/kWh | 187 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



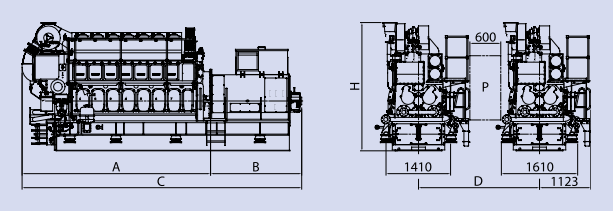


Bore: 210 mm, Stroke: 320 mm

## Dimensions

| 720 / 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 5 | 3,405 | 1,926 | 5,331 | 2,712 | 14.0 | 22.4 |
| | 6 | 3,781 | 1,977 | 5,758 | 2,712 | 15.6 | 23.5 |
| | 7 | 4,111 | 1,977 | 6,088 | 2,781 | 17.1 | 26.5 |
| | 8 | 4,453 | 2,175 | 6,628 | 2,781 | 18.5 | 29.1 |
| | 9 | 4,783 | 2,265 | 7,048 | 2,911 | 19.9 | 31.7 |

| 900 / 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 5 | 3,411 | 2,097 | 5,508 | 2,712 | 13.4 | 22.9 |
| | 6 | 3,781 | 1,977 | 5,758 | 2,781 | 15.1 | 26.1 |
| | 7 | 4,235 | 1,977 | 6,212 | 2,781 | 16.7 | 28.6 |
| | 8 | 4,453 | 2,175 | 6,628 | 2,911 | 18.4 | 29.1 |
| | 9 | 4,783 | 2,265 | 7,048 | 2,911 | 19.8 | 31.7 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,613 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 250 mm, Stroke: 330 mm

## Main Data

| Speed | 720 rpm | | 750 rpm | | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H25/33 | 1,440 | 1,368 | 1,500 | 1,425 | 1,800 | 1,710 | 1,800 | 1,710 |
| 7H25/33 | 1,680 | 1,596 | 1,750 | 1,663 | 2,100 | 1,995 | 2,100 | 1,995 |
| 8H25/33 | 1,920 | 1,824 | 2,000 | 1,900 | 2,400 | 2,280 | 2,400 | 2,280 |
| 9H25/33 | 2,160 | 2,052 | 2,250 | 2,138 | 2,700 | 2,565 | 2,700 | 2,565 |

Based on alternator efficiency of 95 %.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|
| 100 % | 180 g/kWh | 180 g/kWh | 181 g/kWh | 181 g/kWh |

## Main Data (for Higher Power Rating)

| Speed | 720 rpm | | 750 rpm | | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H25/33 | 1,560 | 1,482 | 1,650 | 1,568 | 1,890 | 1,796 | 1,980 | 1,881 |
| 7H25/33 | 1,820 | 1,729 | 1,925 | 1,829 | 2,205 | 2,095 | 2,310 | 2,195 |
| 8H25/33 | 2,080 | 1,976 | 2,200 | 2,090 | 2,520 | 2,394 | 2,640 | 2,508 |
| 9H25/33 | 2,340 | 2,223 | 2,475 | 2,351 | 2,835 | 2,693 | 2,970 | 2,822 |

Based on alternator efficiency of 95 %.

## Specific Fuel Oil Consumption at Engine (for Higher Power Rating)

| Load | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|
| 100 % | 182 g/kWh | 182 g/kWh | 183 g/kWh | 183 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



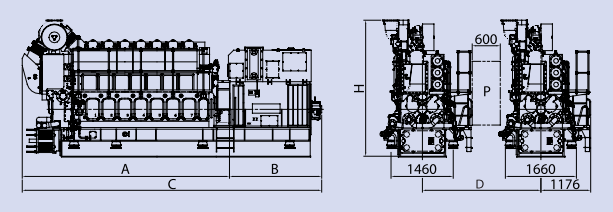


Bore: 250 mm, Stroke: 330 mm

## Dimensions

| 720 / 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 6 | 4,414 | 2,262 | 6,676 | 2,961 | 20.2 | 29.8 |
| | 7 | 4,794 | 2,262 | 7,056 | 2,961 | 22.5 | 33.9 |
| | 8 | 5,311 | 2,262 | 7,573 | 3,241 | 24.1 | 39.5 |
| | 9 | 5,691 | 2,262 | 7,953 | 3,371 | 26.2 | 45.0 |

| 900 / 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 6 | 4,414 | 2,262 | 6,676 | 2,961 | 20.2 | 29.8 |
| | 7 | 4,794 | 2,262 | 7,056 | 3,241 | 22.5 | 33.9 |
| | 8 | 5,311 | 2,340 | 7,651 | 3,371 | 24.1 | 39.5 |
| | 9 | 5,691 | 2,490 | 8,181 | 3,371 | 26.2 | 45.0 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,844 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 250 mm, Stroke: 330 mm

## Main Data

| Speed | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 12H25/33V | 4,080 | 3,917 | 4,080 | 3,917 |
| 14H25/33V | 4,760 | 4,570 | 4,760 | 4,570 |
| 16H25/33V | 5,440 | 5,222 | 5,440 | 5,222 |
| 18H25/33V | 6,120 | 5,875 | 6,120 | 5,875 |
| 20H25/33V | 6,800 | 6,528 | 6,800 | 6,528 |

Based on alternator efficiency of 96 %.

## Specific Fuel Oil Consumption at Engine

| Load | 900 rpm | 1000 rpm |
|---|---|---|
| 100 % | 183 g/kWh | 183 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*

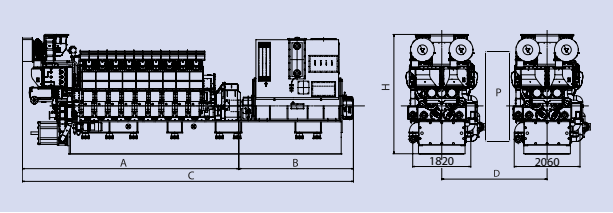




Bore: 250 mm, Stroke: 330 mm

## Dimensions

| 900 / 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B 1) | C 1) | H | Engine 2) | GenSet 1), 3) |
| | 12 | 5,524 | 3,334 | 8,858 | 3,750 | 33.5 | 58.2 |
| | 14 | 5,944 | 3,504 | 9,448 | 3,750 | 36.5 | 63.4 |
| | 16 | 6,364 | 3,682 | 10,046 | 3,750 | 39.5 | 69.6 |
| | 18 | 6,784 | 3,772 | 10,556 | 3,750 | 42.5 | 77.5 |
| | 20 | 7,204 | 3,727 | 10,931 | 3,750 | 45.5 | 79.5 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,840 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

## Main Data

| Speed | 720 rpm | | 750 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H32/40 | 3,000 | 2,880 | 3,000 | 2,880 |
| 7H32/40 | 3,500 | 3,360 | 3,500 | 3,360 |
| 8H32/40 | 4,000 | 3,840 | 4,000 | 3,840 |
| 9H32/40 | 4,500 | 4,320 | 4,500 | 4,320 |

Based on alternator efficiency of 96 %.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm |
|---|---|---|
| 100 % | 179 g/kWh | 181 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.7 g/kWh*

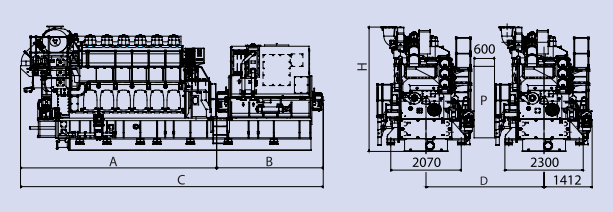




## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 6 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| | 7 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| | 8 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| | 9 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 6 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| | 7 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| | 8 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| | 9 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,408 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

## Main Data

| Speed | 720 rpm | | 750 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 12H32/40V | 6,000 | 5,760 | 6,000 | 5,760 |
| 14H32/40V | 7,000 | 6,720 | 7,000 | 6,720 |
| 16H32/40V | 8,000 | 7,680 | 8,000 | 7,680 |
| 18H32/40V | 9,000 | 8,640 | 9,000 | 8,640 |
| 20H32/40V | 10,000 | 9,600 | 10,000 | 9,600 |

Based on alternator efficiency of 96 %.

## Specific Fuel Oil Consumption at 100 % Engine Load

| Load | 720 rpm | 750 rpm |
|---|---|---|
| 100 % | 179 g/kWh | 181 g/kWh |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.7 g/kWh*

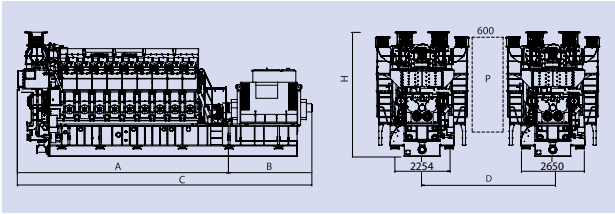




## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 12 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| | 14 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| | 16 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| | 18 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| | 20 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 12 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| | 14 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| | 16 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| | 18 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| | 20 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 4,405 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

**HiMSEN...**

The best solution for all types of marine vessels and offshore applications with proven reliability, low emission, low operation cost, multi-fuel capability...

Our extensive R&D facilities enable HHI to provide the customers with high quality and excellent services in all phases of designing, production, assembly and commissioning of HiMSEN propulsion packaged system.



# Marine Propulsion System

## Power Range

| | |
|---|---|
| H21/32P | 1,200~1,800 kW |
| H25/33P | 1,740~2,610 kW |
| H32/40P | 2,880~4,320 kW / FPP<br>3,000~4,500 kW / CPP |

## Long Term Commitment...

To provide the market with reliable, cost effective and earth-friendly solution

## Optimized Matching of HiMSEN Propulsion Package

- HiMSEN H21/32P, H25/33P and H32/40P engine
- C.P./F.P. propeller with shafting
- Pitch and speed control
- Load control
- Reduction gear
- Shaft generator
- Auxiliary machinery

## Application

- Controllable pitch propulsion
- Fixed pitch propulsion
- Azimuth thruster propulsion
- Pump drive

## Excellent Performance of HiMSEN Propulsion Engine

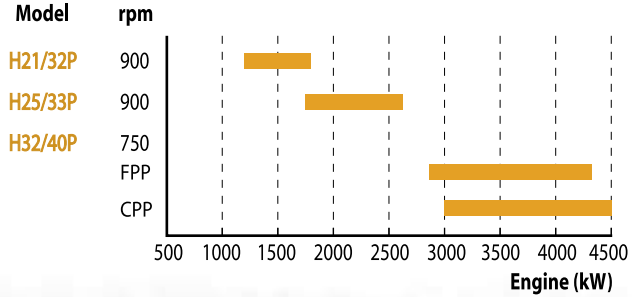
- Improved transient operation with pulse charging turbocharger
- Invisible smoke with pulse charging turbocharger by part load matching
- Lower thermal load engine with lower exhaust gas temperature
- Low fuel consumption
- Low NOx emission







## Marine Propulsion



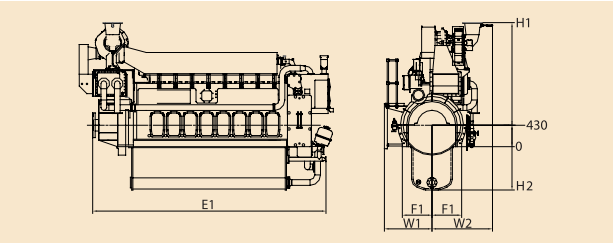

Bore: 210 mm, Stroke: 320 mm

## Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

## Fixed Pitch Propeller

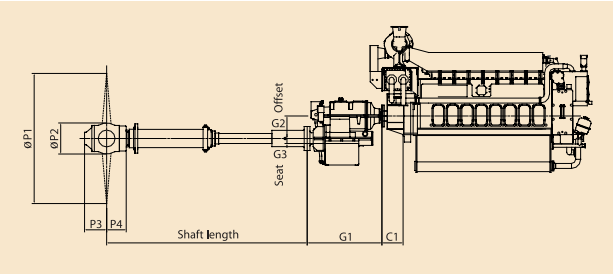
Guarantee optimum thrust, minimal noise and vibration level.




## Dimensions

| 900 rpm | cyl. | Rated Output at Engine (kW) | Engine dimension (mm) & dry weight (ton) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | E1 | H1 | H2 | F1 | W1 | W2 | Dry Weight |
| | 6 | 1,200 | 3,904 | 2,287 | 1,120 | 595 | 955 | 1,126 | 18.0 |
| | 8 | 1,600 | 4,634 | 2,541 | 1,300 | 595 | 955 | 1,214 | 21.0 |
| | 9 | 1,800 | 4,994 | 2,541 | 1,300 | 595 | 955 | 1,214 | 23.0 |

Specific Fuel Oil Consumption at 100 % Engine Load: 183 g/kWh










Bore: 210 mm, Stroke: 320 mm

| Engine Type | CPP Package System | Gear ratio | Propeller speed | Propeller Diameter (without nozzle) P1(mm) | | |
|---|---|---|---|---|---|---|
| | Type | (i:1) | (rpm) | Optim. | Min | Max |
| 6H21/32P 900 rpm 1200 kW | ACG 52/450 | 3.22 | 279.5 | 2,300 | 2,200 | 2,400 |
| | ACG 52/450 | 3.38 | 258.6 | 2,400 | 2,300 | 2,500 |
| | ACG 56/450 | 3.76 | 239.4 | 2,500 | 2,400 | 2,600 |
| | ACG 56/450 | 4.03 | 223.3 | 2,550 | 2,450 | 2,650 |
| | ACG 56/450 | 4.17 | 215.8 | 2,600 | 2,500 | 2,700 |
| 8H21/32P 900 rpm 1600 kW | ACG 56/450 | 3.22 | 279.5 | 2,450 | 2,350 | 2,550 |
| | ACG 56/450 | 3.48 | 258.6 | 2,550 | 2,450 | 2,650 |
| | ACG 62/450 | 3.76 | 239.4 | 2,650 | 2,550 | 2,750 |
| | ACG 62/525 | 3.95 | 227.8 | 2,750 | 2,650 | 2,850 |
| | ACG 62/525 | 4.22 | 213.3 | 2,800 | 2,700 | 2,900 |
| 9H21/32P 900 rpm 1800 kW | ACG 62/525 | 3.16 | 284.8 | 2,450 | 2,350 | 2,550 |
| | ACG 62/525 | 3.40 | 264.7 | 2,600 | 2,500 | 2,700 |
| | ACG 62/525 | 3.66 | 245.9 | 2,700 | 2,600 | 2,800 |
| | ACG 62/525 | 3.95 | 277.85 | 2,800 | 2,700 | 2,900 |
| | ACG 62/525 | 4.22 | 213.27 | 2,900 | 2,800 | 3,000 |

| Engine Type | Hub Dimension (mm) | | | Gear box & coupling dimension (mm) & dry weight (kg) | | | | |
|---|---|---|---|---|---|---|---|---|
| | P2 | P3 | P4 | G1 | G2 | G3 | C1 | Dry Weight |
| 6H21/32P 900 rpm 1200 kW | 520 | 367 | 327 | 1,493 | 450 | 100 | 396 | 3,284 |
| | 520 | 367 | 327 | 1,493 | 450 | 100 | 396 | 3,284 |
| | 560 | 410 | 228 | 1,493 | 450 | 100 | 396 | 3,284 |
| | 560 | 410 | 228 | 1,493 | 450 | 100 | 396 | 3,284 |
| | 560 | 410 | 228 | 1,493 | 450 | 100 | 396 | 3,284 |
| 8H21/32P 900 rpm 1600 kW | 560 | 410 | 228 | 1,493 | 450 | 100 | 420 | 3,321 |
| | 560 | 410 | 228 | 1,493 | 450 | 100 | 420 | 3,321 |
| | 620 | 441 | 254 | 1,493 | 450 | 100 | 420 | 3,321 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 420 | 4,521 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 420 | 4,521 |
| 9H21/32P 900 rpm 1800 kW | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |

Remarks: Typical ship parameters, Speed: 16.0 knots

# Marine Propulsion System



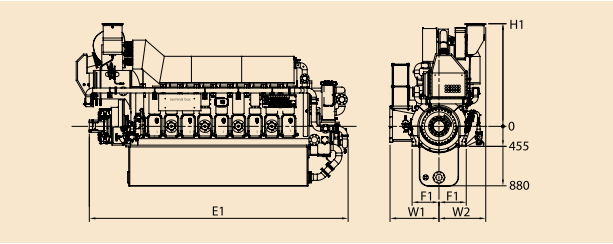
Bore: 250 mm, Stroke: 330 mm

## Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

## Fixed Pitch Propeller

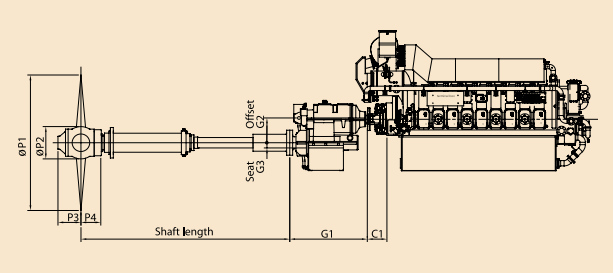
Guarantee optimum thrust, minimal noise and vibration level.




## Dimensions

| 900 rpm | cyl. | Rated Output at Engine (kW) | Engine dimension (mm) & dry weight (ton) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | E1 | H1 | F1 | W1 | W2 | Dry Weight |
| | 6 | 1,740 | 3,830 | 1,924 | 610 | 1,035 | 1,073 | 23.0 |
| | 8 | 2,320 | 4,590 | 2,331 | 610 | 1,035 | 1,073 | 26.9 |
| | 9 | 2,610 | 4,970 | 2,331 | 610 | 1,035 | 1,073 | 29.3 |

Specific Fuel Oil Consumption at 100 % Engine Load: 181 g/kWh








Marine Propulsion System

Bore: 250 mm, Stroke: 330 mm



| Engine Type | CPP Package System | Gear ratio | Propeller speed | Propeller Diameter (without nozzle) P1(mm) | | |
|---|---|---|---|---|---|---|
| | Type | (i:1) | (rpm) | Optim. | Min | Max |
| 6H25/33P 900 rpm 1740 kW | ACG 56/450 | 3.15 | 286 | 2,450 | 2,350 | 2,550 |
| | ACG 62/450 | 3.49 | 258 | 2,600 | 2,500 | 2,700 |
| | ACG 62/450 | 3.65 | 247 | 2,650 | 2,550 | 2,750 |
| | ACG 62/525 | 3.95 | 228 | 2,750 | 2,650 | 2,850 |
| | ACG 62/525 | 4.22 | 213 | 2,850 | 2,750 | 2,950 |
| 8H25/33P 900 rpm 2320 kW | ACG 62/525 | 3.16 | 285 | 2,600 | 2,500 | 2,700 |
| | ACG 68/525 | 3.40 | 265 | 2,700 | 2,600 | 2,800 |
| | ACG 68/525 | 3.66 | 246 | 2,850 | 2,750 | 2,950 |
| | ACG 68/600 | 3.95 | 228 | 2,950 | 2,850 | 3,050 |
| | ACG 68/600 | 4.24 | 212 | 3,050 | 2,950 | 3,150 |
| 9H25/33P 900 rpm 2610 kW | ACG 68/525 | 3.16 | 285 | 2,650 | 2,550 | 2,750 |
| | ACG 68/525 | 3.40 | 265 | 2,800 | 2,700 | 2,900 |
| | ACG 68/600 | 3.65 | 247 | 2,900 | 2,800 | 3,000 |
| | ACG 75/600 | 3.95 | 228 | 3,050 | 2,950 | 3,150 |
| | ACG 75/600 | 4.24 | 212 | 3,150 | 3,050 | 3,250 |

| Engine Type | Hub Dimension (mm) | | | Gear box & coupling dimension (mm) & dry weight (kg) | | | | |
|---|---|---|---|---|---|---|---|---|
| | P2 | P3 | P4 | G1 | G2 | G3 | C1 | Dry Weight |
| 6H25/33P 900 rpm 1740 kW | 560 | 410 | 228 | 1,493 | 450 | 100 | 470 | 3,382 |
| | 620 | 441 | 254 | 1,493 | 450 | 100 | 470 | 3,382 |
| | 620 | 441 | 254 | 1,493 | 450 | 100 | 470 | 3,382 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |
| | 620 | 441 | 254 | 1,727 | 525 | 105 | 470 | 4,582 |
| 8H25/33P 900 rpm 2320 kW | 620 | 441 | 254 | 1,727 | 525 | 105 | 500 | 4,658 |
| | 695 | 530 | 442 | 1,727 | 525 | 105 | 500 | 4,658 |
| | 695 | 530 | 442 | 1,727 | 525 | 105 | 500 | 4,658 |
| | 695 | 530 | 442 | 1,970 | 600 | 200 | 500 | 6,858 |
| | 695 | 530 | 442 | 1,970 | 600 | 200 | 500 | 6,858 |
| 9H25/33P 900 rpm 2610 kW | 695 | 530 | 442 | 1,727 | 525 | 105 | 500 | 4,658 |
| | 695 | 530 | 442 | 1,727 | 525 | 105 | 500 | 4,658 |
| | 695 | 530 | 442 | 1,970 | 600 | 200 | 500 | 6,858 |
| | 765 | 580 | 478 | 1,970 | 600 | 200 | 500 | 6,858 |
| | 765 | 580 | 478 | 1,970 | 600 | 200 | 500 | 6,858 |

Remarks: Typical ship parameters, Speed: 16.0 knots

## Marine Propulsion System



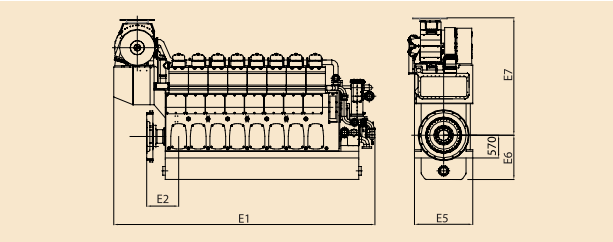
Bore: 320 mm, Stroke: 400 mm

### Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

### Fixed Pitch Propeller

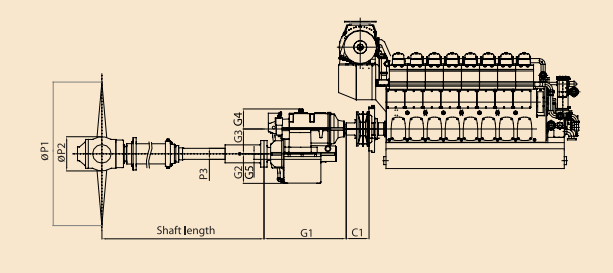
Guarantee optimum thrust, minimal noise and vibration level.




### Dimensions

| 750 rpm | cyl. | Engine dimension (mm) & dry weight (ton) | | | | | |
|---|---|---|---|---|---|---|---|
| | | E1 | H1 | F1 | W1 | W2 | Dry Weight |
| | 6 | 5,515 | 800 | 1,460 | 1,110 | 3,295 | 35.7 |
| | 8 | 6,545 | 800 | 1,460 | 1,110 | 3,495 | 43.5 |
| | 9 | 7,085 | 800 | 1,460 | 1,110 | 3,495 | 46.6 |

Specific Fuel Oil Consumption at 100 % Engine Load: 181 g/kWh








## Marine Propulsion System

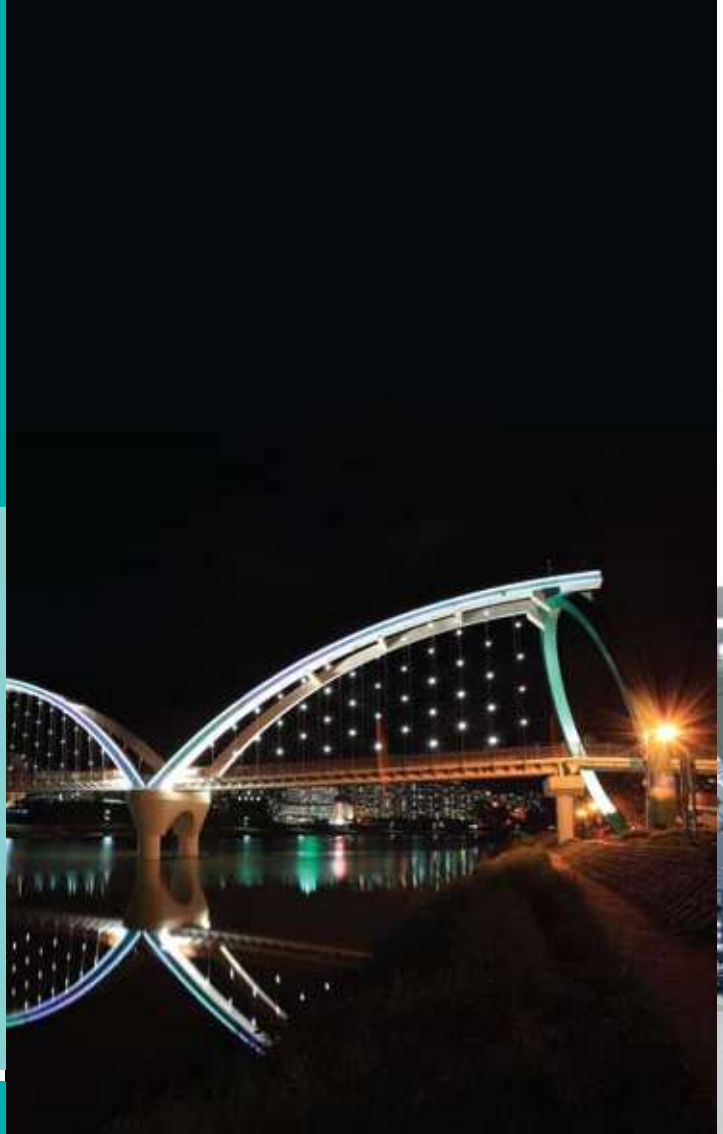


Bore: 320 mm, Stroke: 400 mm

| Engine Type | CPP Package System | | Gear ratio | Propeller speed | Propeller & Hub Dimension (mm) | | |
|---|---|---|---|---|---|---|---|
| | Gear box mode vertical offset | Hub model | n:1 | rpm | P1 | P2 | P3 |
| 6H32/40P 750 rpm 2,880 kW / FPP 3,000 kW / CPP | ACG750 | ECP85 | 4.65 | 155 | 3,900 | 865 | 280 |
| 8H32/40P 750 rpm 3,840 kW / FPP 4,000 kW / CPP | ACG950 | ECP105 | 5.33 | 135 | 4,400 | 1,065 | 330 |
| 9H32/40P 750 rpm 4,320 kW / FPP 4,500 kW / CPP | ACG950 | ECP105 | 5.76 | 125 | 4,800 | 1,065 | 330 |

| Engine Type | Gear box & coupling dimension (mm) & dry weight (kg) | | | | | | | Typical Vessel(DWT) |
|---|---|---|---|---|---|---|---|---|
| | G1 | G2 | G3 | G4 | G5 | C1 | Gear Dryweight | 14 Knots |
| 6H32/40P 750 rpm 2,880 kW / FPP 3,000 kW / CPP | 2,710 | 850 | 750 | 540 | 220 | 622 | 13,000 | 7,000 ton Tanker |
| 8H32/40P 750 rpm 3,840 kW / FPP 4,000 kW / CPP | 2,710 | 1,030 | 950 | 540 | 220 | 622 | 16,500 | 9,000 ton Tanker |
| 9H32/40P 750 rpm 4,320 kW / FPP 4,500 kW / CPP | 2,710 | 1,030 | 950 | 540 | 220 | 690 | 16,500 | 10,000 ton Tanker |

Remarks: Typical ship parameters, Speed: 14.0 knots

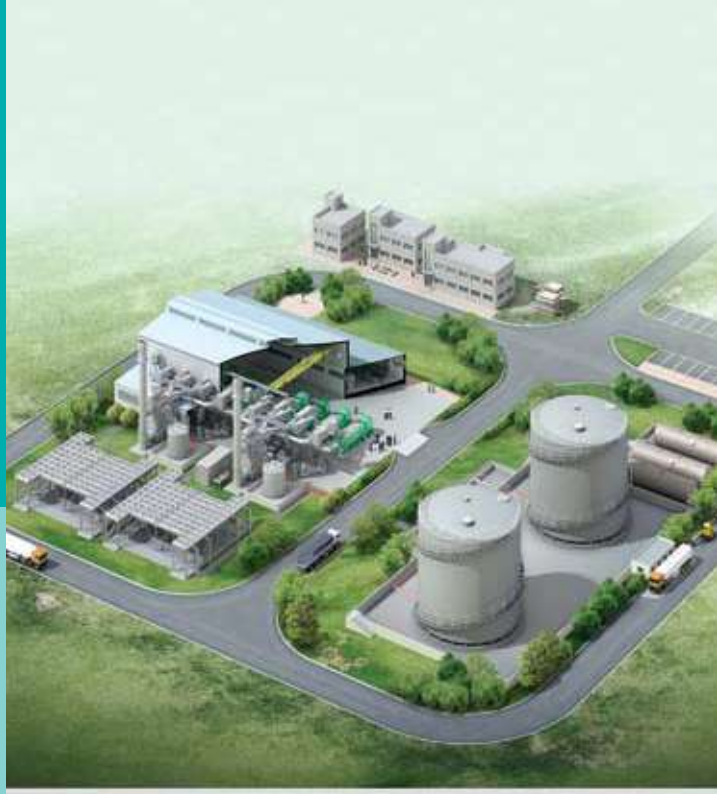


# Stationary GenSets

## Power Range

| | |
|---|---|
| H17/21V | 1,680~3,200 kW |
| H17/28 | 575~960 kW |
| H21/32 | 800~1,800 kW |
| H25/33 | 1,440~2,700 kW |
| H25/33V | 3,840~6,400 kW |
| H32/40 | 2,850~4,275 kW |
| H32/40V | 5,700~9,500 kW |
| H17/24G | 455~880 kW |
| H35/40G | 2,880~4,320 kW |
| H35/40GV | 5,760~9,600 kW |

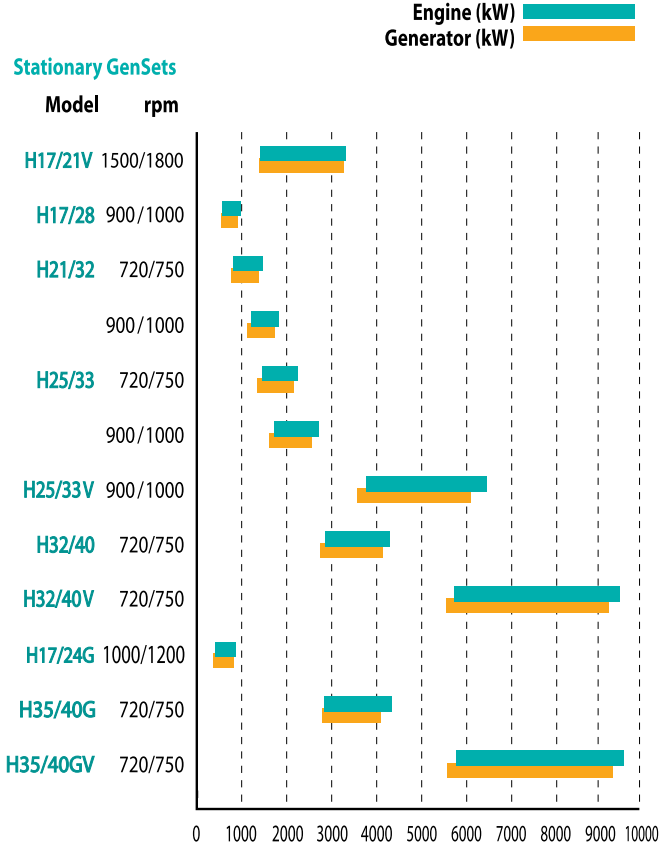
Stationary GenSets



20 MW HiMSEN Engine Diesel Power Plant (9H25/33 x 8 Sets)







Bore: 170 mm, Stroke: 210 mm

## Main Data

| Speed | 1500 rpm | | 1800 rpm | |
|---|---|---|---|---|
| Frequency | 50 Hz | | 60 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| Continuous power | | | | |
| 12H17/21V | 1,512 | 1,452 | 1,728 | 1,659 |
| 16H17/21V | 2,016 | 1,935 | 2,304 | 2,212 |
| 18H17/21V | 2,268 | 2,177 | 2,592 | 2,488 |
| 20H17/21V | 2,520 | 2,419 | 2,880 | 2,765 |
| Prime power | | | | |
| 12H17/21V | 1,680 | 1,613 | 1,920 | 1,843 |
| 16H17/21V | 2,240 | 2,150 | 2,560 | 2,458 |
| 18H17/21V | 2,520 | 2,419 | 2,880 | 2,765 |
| 20H17/21V | 2,800 | 2,688 | 3,200 | 3,072 |
| Standby power | | | | |
| 12H17/21V | 1,848 | 1,774 | 2,112 | 2,028 |
| 16H17/21V | 2,464 | 2,365 | 2,816 | 2,703 |
| 18H17/21V | 2,772 | 2,661 | 3,168 | 3,041 |
| 20H17/21V | 3,080 | 2,957 | 3,520 | 3,379 |

Based on alternator efficiency of 96 %.

## Specific Fuel Oil Consumption at 100% Engine Load

| Load | 1500 rpm | 1800 rpm |
|---|---|---|
| 100 % | 192 g/kWh | 197 g/kWh |

## Heat Rate

| Load | Unit | 1500 rpm | 1800 rpm |
|---|---|---|---|
| 100 % | kJ/kWhm | 8,198 | 8,412 |
| | kJ/kWhe | 9,165 | 8,762 |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



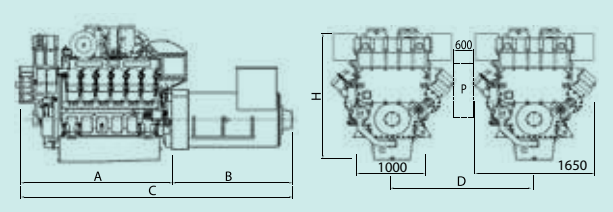


Bore: 170 mm, Stroke: 210 mm

## Dimensions

| 1500 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 12 | 2,200 | 2,050 | 4,250 | 2,100 | 6.7 | 13.2 |
| | 16 | 2,600 | 2,050 | 4,650 | 2,100 | 8.0 | 15.2 |
| | 18 | 2,800 | 2,680 | 5,480 | 2,100 | 8.9 | 16.8 |
| | 20 | 3,100 | 2,680 | 5,780 | 2,100 | 9.8 | 18.0 |

| 1800 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 12 | 2,200 | 2,050 | 4,250 | 2,100 | 6.7 | 13.2 |
| | 16 | 2,600 | 2,050 | 4,650 | 2,100 | 8.0 | 15.2 |
| | 18 | 2,800 | 2,680 | 5,480 | 2,100 | 8.9 | 16.8 |
| | 20 | 3,100 | 2,680 | 5,780 | 2,100 | 9.8 | 18.0 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,450 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 170 mm, Stroke: 280 mm

## Main Data

| Speed | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 5H17/28 | 575 | 538 | 600 | 561 |
| 6H17/28 | 690 | 645 | 720 | 673 |
| 7H17/28 | 805 | 757 | 840 | 790 |
| 8H17/28 | 920 | 865 | 960 | 902 |

Based on alternator efficiency of 93.5 ~ 94 %.

## Specific Fuel Oil Consumption at Engine

| Load | 900 rpm | 1000 rpm |
|---|---|---|
| 100 % | 189 g/kWh | 189 g/kWh |

## Heat Rate

| Load | Unit | 900 rpm | 1000 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 8,070 | |
| | kJ/kWh$_e$ | 8,631 | |

Based on alternator efficiency 93.5 %.

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



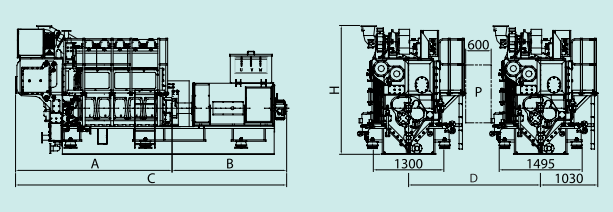


Bore: 170 mm, Stroke: 280 mm

## Dimensions

| 900 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 5 | 2,791 | 2,200 | 4,991 | 2,314 | 7.7 | 13.6 |
| | 6 | 3,071 | 2,200 | 5,271 | 2,314 | 8.5 | 14.5 |
| | 7 | 3,351 | 2,200 | 5,551 | 2,314 | 9.4 | 15.6 |
| | 8 | 3,631 | 2,320 | 5,951 | 2,314 | 10.4 | 16.7 |

| 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 5 | 2,791 | 2,200 | 4,991 | 2,314 | 7.7 | 13.6 |
| | 6 | 3,071 | 2,200 | 5,271 | 2,314 | 8.5 | 14.5 |
| | 7 | 3,351 | 2,200 | 5,551 | 2,314 | 9.4 | 15.6 |
| | 8 | 3,631 | 2,320 | 5,951 | 2,314 | 10.4 | 16.7 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,552 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 210 mm, Stroke: 320 mm

## Main Data

| Speed | 720 rpm | | 750 rpm | | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 5H21/32 | 800 | 752 | 800 | 752 | 960 | 910 | - | - |
| 6H21/32 | 960 | 902 | 960 | 902 | 1,200 | 1,140 | 1,200 | 1,140 |
| 7H21/32 | 1,120 | 1,064 | 1,120 | 1,064 | 1,400 | 1,330 | 1,400 | 1,330 |
| 8H21/32 | 1,280 | 1,216 | 1,280 | 1,216 | 1,600 | 1,520 | 1,600 | 1,520 |
| 9H21/32 | 1,440 | 1,368 | 1,440 | 1,368 | 1,800 | 1,710 | 1,800 | 1,710 |

Based on alternator efficiency of 94 ~ 95 %.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|
| 100 % | 182 g/kWh | 182 g/kWh | 183 g/kWh | 185 g/kWh |

Exceptionally, 5H21/32 × 900 rpm is 190 g/kWh.

## Heat Rate

| Load | Unit | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 7,771 | 7,771 | 7,814 | 7,899 |
| | kJ/kWh$_e$ | 8,267 | 8,267 | 8,313 | 8,404 |

Based on alternator efficiency 94 %.

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*



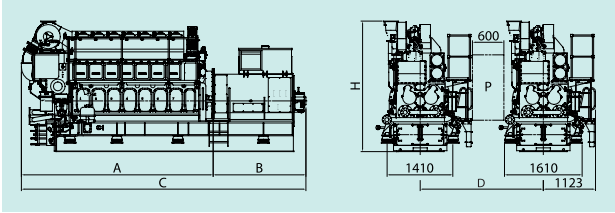


Bore: 210 mm, Stroke: 320 mm

## Dimensions

| 720 / 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1)] | C[1)] | H | Engine[2)] | GenSet[1), 3)] |
| | 5 | 3,405 | 1,926 | 5,331 | 2,712 | 14.0 | 22.4 |
| | 6 | 3,781 | 1,977 | 5,758 | 2,712 | 15.6 | 23.5 |
| | 7 | 4,111 | 1,977 | 6,088 | 2,781 | 17.1 | 26.5 |
| | 8 | 4,453 | 2,175 | 6,628 | 2,781 | 18.5 | 29.1 |
| | 9 | 4,783 | 2,265 | 7,048 | 2,911 | 19.9 | 31.7 |

| 900 / 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1)] | C[1)] | H | Engine[2)] | GenSet[1), 3)] |
| | 5 | 3,411 | 2,097 | 5,508 | 2,712 | 13.4 | 22.9 |
| | 6 | 3,781 | 1,977 | 5,758 | 2,781 | 15.1 | 26.1 |
| | 7 | 4,235 | 1,977 | 6,212 | 2,781 | 16.7 | 28.6 |
| | 8 | 4,453 | 2,175 | 6,628 | 2,911 | 18.4 | 29.1 |
| | 9 | 4,783 | 2,265 | 7,048 | 2,911 | 19.8 | 31.7 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,613 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

## Main Data

| Speed | 720 rpm | | 750 rpm | | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H25/33 | 1,440 | 1,368 | 1,500 | 1,425 | 1,740 | 1,653 | 1,800 | 1,710 |
| 7H25/33 | 1,680 | 1,596 | 1,750 | 1,663 | 2,030 | 1,929 | 2,100 | 1,995 |
| 8H25/33 | 1,920 | 1,824 | 2,000 | 1,900 | 2,320 | 2,204 | 2,400 | 2,280 |
| 9H25/33 | 2,160 | 2,052 | 2,250 | 2,138 | 2,610 | 2,480 | 2,700 | 2,565 |

Based on alternator efficiency of 95 %.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm | 900 rpm | 1000 rpm |
|---|---|---|---|---|
| 100 % | 180 g/kWh | 180 g/kWh | 181 g/kWh | 181 g/kWh |

## Heat Rate

| Load | Unit | 720 rpm / 750 rpm | 900 rpm / 1000 rpm |
|---|---|---|---|
| 100 % | kJ/kWhm | 7,686 | 7,729 |
| | kJ/kWhe | 8,090 | 8,135 |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*

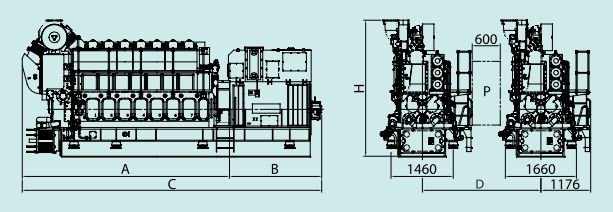




## Dimensions

| 720 / 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 6 | 4,414 | 2,262 | 6,676 | 2,961 | 20.2 | 29.8 |
| | 7 | 4,794 | 2,262 | 7,056 | 2,961 | 22.5 | 33.9 |
| | 8 | 5,311 | 2,262 | 7,573 | 3,241 | 24.1 | 39.5 |
| | 9 | 5,691 | 2,262 | 7,953 | 3,371 | 26.2 | 45.0 |

| 900 / 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 6 | 4,414 | 2,262 | 6,676 | 2,961 | 20.2 | 29.8 |
| | 7 | 4,794 | 2,262 | 7,056 | 3,241 | 22.5 | 33.9 |
| | 8 | 5,311 | 2,340 | 7,651 | 3,371 | 24.1 | 39.5 |
| | 9 | 5,691 | 2,490 | 8,181 | 3,371 | 26.2 | 45.0 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,844 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 250 mm, Stroke: 330 mm

## Main Data

| Speed | 900 rpm | | 1000 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 12H25/33V | 3,840 | 3,686 | 3,840 | 3,686 |
| 14H25/33V | 4,480 | 4,301 | 4,480 | 4,301 |
| 16H25/33V | 5,120 | 4,915 | 5,120 | 4,915 |
| 18H25/33V | 5,760 | 5,530 | 5,760 | 5,530 |
| 20H25/33V | 6,400 | 6,144 | 6,400 | 6,144 |

Based on alternator efficiency of 96 %.

## Specific Fuel Oil Consumption at Engine

| Load | 900 rpm | 1000 rpm |
|---|---|---|
| 100 % | 183 g/kWh | 183 g/kWh |

## Heat Rate

| Load | Unit | 900 rpm | 1000 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 7,814 | |
| | kJ/kWh$_e$ | 8,140 | |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.6 g/kWh*

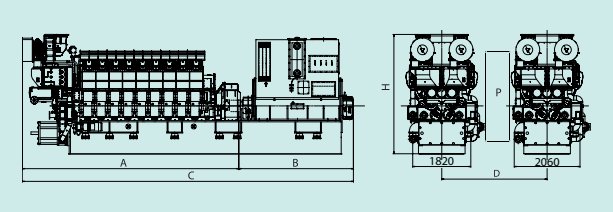




Bore: 250 mm, Stroke: 330 mm

## Dimensions

| 900 / 1000 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 12 | 5,524 | 3,334 | 8,858 | 3,750 | 33.5 | 58.2 |
| | 14 | 5,944 | 3,504 | 9,448 | 3,750 | 36.5 | 63.4 |
| | 16 | 6,364 | 3,682 | 10,046 | 3,750 | 39.5 | 69.6 |
| | 18 | 6,784 | 3,772 | 10,556 | 3,750 | 42.5 | 77.5 |
| | 20 | 7,204 | 3,727 | 10,931 | 3,750 | 45.5 | 79.5 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,840 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

## Main Data

| Speed | 720 rpm | | 750 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H32/40 | 2,850 | 2,750 | 2,850 | 2,750 |
| 7H32/40 | 3,325 | 3,209 | 3,325 | 3,209 |
| 8H32/40 | 3,800 | 3,667 | 3,800 | 3,667 |
| 9H32/40 | 4,275 | 4,125 | 4,275 | 4,125 |

1) Based on alternator efficiency of 96.5 %.
2) In case of diesel oil (Distillate Fuels ISO 8217 DM Grade) operation continuously, 500 kW/cyl, is available.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm |
|---|---|---|
| 100 % | 178 g/kWh | 180 g/kWh |

## Heat Rate

| Load | Unit | 720 rpm | 750 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 7,600 | 7,686 |
| | kJ/kWh$_e$ | 7,876 | 7,965 |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.7 g/kWh*

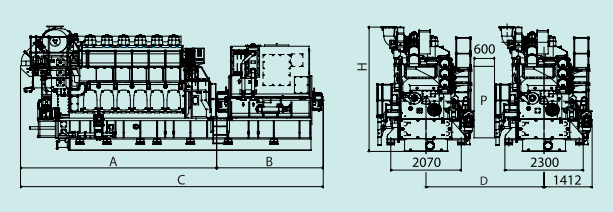




## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 6 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| | 7 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| | 8 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| | 9 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 6 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| | 7 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| | 8 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| | 9 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,408 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 320 mm, Stroke: 400 mm

## Main Data

| Speed | 720 rpm | | 750 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 12H32/40V | 5,700 | 5,529 | 5,700 | 5,529 |
| 14H32/40V | 6,650 | 6,450 | 6,650 | 6,450 |
| 16H32/40V | 7,600 | 7,372 | 7,600 | 7,372 |
| 18H32/40V | 8,550 | 8,243 | 8,550 | 8,243 |
| 20H32/40V | 9,500 | 9,215 | 9,500 | 9,215 |

1) Based on alternator efficiency of 97 %.
2) In case of diesel oil (Distillate Fuels ISO 8217 DM Grade) operation continuously, 500 kW/cyl, is available.

## Specific Fuel Oil Consumption at Engine

| Load | 720 rpm | 750 rpm |
|---|---|---|
| 100 % | 179 g/kWh | 181 g/kWh |

## Heat Rate

| Load | Unit | 720 rpm | 750 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 7,643 | 7,729 |
| | kJ/kWh$_e$ | 7,880 | 7,968 |

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.7 g/kWh*



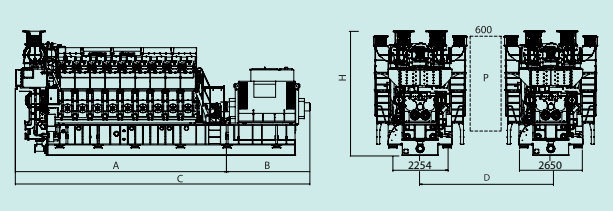


Bore: 320 mm, Stroke: 400 mm

## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 12 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| | 14 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| | 16 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| | 18 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| | 20 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B1) | C1) | H | Engine 2) | GenSet1), 3) |
| | 12 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| | 14 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| | 16 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| | 18 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| | 20 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 4,405 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 170 mm, Stroke: 240 mm

## Main Data

| Speed | 1000 rpm | | 1200 rpm | |
|---|---|---|---|---|
| Frequency | 50 Hz | | 60 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 5H17/24G | 455 | 428 | 550 | 517 |
| 6H17/24G | 546 | 513 | 660 | 620 |
| 7H17/24G | 637 | 599 | 770 | 724 |
| 8H17/24G | 728 | 684 | 880 | 827 |

Based on alternator efficiency of 94 %.

## Heat Rate

| Load | Unit | 1000 rpm | 1200 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 8,746 | |
| | kJ/kWh$_e$ | 9,305 | |

Fuel gas based on LNG, LCV 35 MJ/Nm$^3$, Methane No. 80.

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.3 g/kWh*



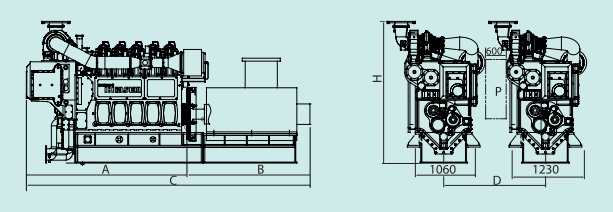


Bore: 170 mm, Stroke: 240 mm

## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine [2] | GenSet[1), 3)] |
| | 5 | 2,772 | 2,045 | 4,817 | 2,891 | 6.4 | 11.6 |
| | 6 | 3,052 | 2,045 | 5,097 | 2,891 | 7.2 | 13.4 |
| | 7 | 3,332 | 2,045 | 5,377 | 2,891 | 8.0 | 14.5 |
| | 8 | 3,612 | 2,045 | 5,657 | 2,958 | 8.8 | 15.6 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine [2] | GenSet[1), 3)] |
| | 5 | 2,772 | 2,045 | 4,817 | 2,891 | 6.4 | 11.6 |
| | 6 | 3,052 | 2,045 | 5,097 | 2,891 | 7.2 | 13.4 |
| | 7 | 3,332 | 2,045 | 5,377 | 2,891 | 8.0 | 14.5 |
| | 8 | 3,612 | 2,045 | 5,657 | 2,958 | 8.8 | 15.6 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,425 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 350 mm, Stroke: 400 mm

## Main Data

| Speed | 720 rpm | | 750 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 6H35/40G | 2,880 | 2,779 | 2,880 | 2,779 |
| 7H35/40G | 3,360 | 3,242 | 3,360 | 3,242 |
| 8H35/40G | 3,840 | 3,706 | 3,840 | 3,706 |
| 9H35/40G | 4,320 | 4,169 | 4,320 | 4,169 |

Based on alternator efficiency of 96.5 %.

## Heat Rate

| Load | Unit | 720 rpm | 750 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 7,371 | |
| | kJ/kWh$_e$ | 7,638 | |

Fuel gas based on LNG, LCV 35 MJ/Nm$^3$, Methane No. 80.
Power factor 0.8.

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.4 g/kWh*



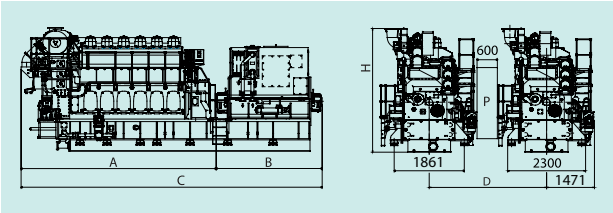


Bore: 350 mm, Stroke: 400 mm

## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1)] | C[1)] | H | Engine[2)] | GenSet[1), 3)] |
| | 6 | 6,534 | 3,366 | 9,900 | 3,759 | 33.7 | 65.2 |
| | 7 | 7,024 | 3,366 | 10,390 | 3,882 | 38.6 | 72.6 |
| | 8 | 7,514 | 3,661 | 11,175 | 4,132 | 41.5 | 78.6 |
| | 9 | 8,004 | 3,761 | 11,765 | 4,132 | 44.6 | 82.7 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1)] | C[1)] | H | Engine[2)] | GenSet[1), 3)] |
| | 6 | 6,534 | 3,366 | 9,900 | 3,759 | 33.7 | 65.2 |
| | 7 | 7,024 | 3,366 | 10,390 | 3,882 | 38.6 | 72.6 |
| | 8 | 7,514 | 3,661 | 11,175 | 4,132 | 41.5 | 78.6 |
| | 9 | 8,004 | 3,761 | 11,765 | 4,132 | 44.6 | 82.7 |




### Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,037 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 350 mm, Stroke: 400 mm

## Main Data

| Speed | 720 rpm | | 750 rpm | |
|---|---|---|---|---|
| Frequency | 60 Hz | | 50 Hz | |
| | Eng. kW | Gen. kW | Eng. kW | Gen. kW |
| 12H35/40GV | 5,760 | 5,587 | 5,760 | 5,587 |
| 14H35/40GV | 6,720 | 6,518 | 6,720 | 6,518 |
| 16H35/40GV | 7,680 | 7,450 | 7,680 | 7,450 |
| 18H35/40GV | 8,640 | 8,381 | 8,640 | 8,381 |
| 20H35/40GV | 9,600 | 9,312 | 9,600 | 9,312 |

Based on alternator efficiency of 97 %.

## Heat Rate

| Load | Unit | 720 rpm | 750 rpm |
|---|---|---|---|
| 100 % | kJ/kWh$_m$ | 7,371 | |
| | kJ/kWh$_e$ | 7,599 | |

Fuel gas based on LNG, LCV 35 MJ/Nm$^3$, Methane No. 80.
Power factor 0.8.

## Specific Lubricating Oil Consumption

*Lub. Oil: 0.4 g/kWh*



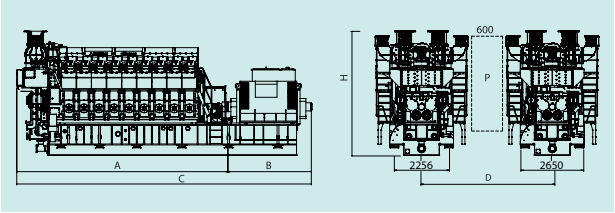


Bore: 350 mm, Stroke: 400 mm

## Dimensions

| 720 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 12 | 7,165 | 3,760 | 10,925 | 4,725 | 56.0 | 108.8 |
| | 14 | 7,835 | 3,860 | 11,695 | 4,725 | 63.3 | 121.3 |
| | 16 | 8,455 | 3,480 | 11,935 | 4,725 | 69.1 | 130.9 |
| | 18 | 9,365 | 3,860 | 13,225 | 4,995 | 76.3 | 141.2 |
| | 20 | 10,125 | 3,660 | 13,785 | 4,995 | 84.0 | 153.9 |

| 750 rpm | cyl. | Dimension (mm) | | | | Dry Mass (ton) | |
|---|---|---|---|---|---|---|---|
| | | A | B[1] | C[1] | H | Engine[2] | GenSet[1), 3)] |
| | 12 | 7,165 | 3,760 | 10,925 | 4,725 | 56.0 | 108.8 |
| | 14 | 7,835 | 3,860 | 11,695 | 4,725 | 63.3 | 121.3 |
| | 16 | 8,455 | 3,480 | 11,935 | 4,725 | 69.1 | 130.9 |
| | 18 | 9,365 | 3,860 | 13,225 | 4,995 | 76.3 | 141.2 |
| | 20 | 10,125 | 3,660 | 13,785 | 4,995 | 84.0 | 153.9 |




### Remarks

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2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

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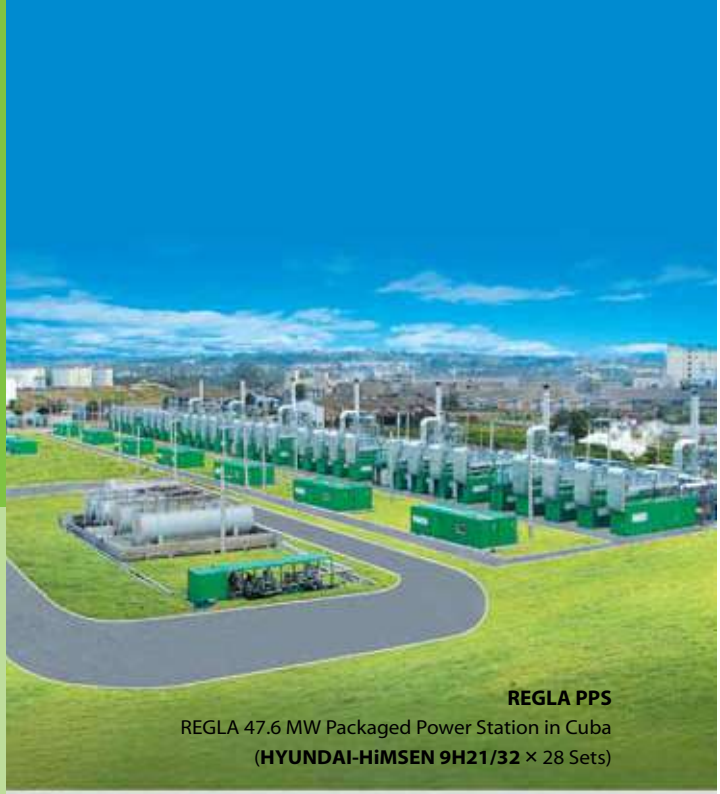
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.



**REGLA PPS**
REGLA 47.6 MW Packaged Power Station in Cuba
(**HYUNDAI-HiMSEN 9H21/32** × 28 Sets)

## Features
- Base load operation
- Diesel oil / Heavy fuel oil / Nature gas use
- Compact 40-feet container size
- Mobile type (option)
- Environmentally comfortable
- Low cost of operating and maintenance

## Application
- Captive power
- Construction site
- Isolated area
- Rental business
- Pumping station
- Independent power producer





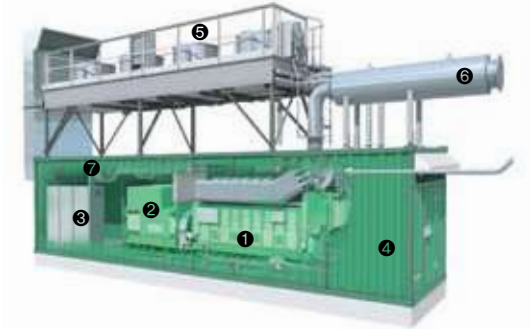
## General Specifications

| Engine Model | 6H17/28 | 8H17/28 | 6H21/32 | 8H21/32 | 9H21/32 |
|---|---|---|---|---|---|
| Engine (kW) | 690/720 | 920/960 | 1,200 | 1,600 | 1,800 |
| Generator (kW) | 645/673 | 865/902 | 1,140 | 1,520 | 1,710 |
| Total Weight (ton) | 24 | 30 | 42 | 48 | 50 |
| Dimension (W × H × L) | 2.4 m × 3.4 m × 12 m (Container Size) | | | | |
| Cooling Method | Radiator / Cooling Tower | | | | |
| Speed | 900 rpm / 1,000 rpm | | | | |
| Fuel | Diesel oil / Heavy fuel oil | | | | |

## General Specifications

| Engine Model | 5H17/24G | 6H17/24G | 7H17/24G | 8H17/24G | 9H17/24G |
|---|---|---|---|---|---|
| Engine (kW) | 455/550 | 546/660 | 637/770 | 728/880 | 819/990 |
| Generator (kW) | 428/817 | 513/620 | 599/723 | 684/827 | 770/930 |
| Total Weight (ton) | 22 | 24 | 25 | 26 | 28 |
| Dimension (W × H × L) | 2.4 m × 2.9 m × 12 m (Container Size) | | | | |
| Cooling Method | Radiator / Cooling Tower | | | | |
| Speed | 1,000 rpm / 1,200 rpm | | | | |
| Fuel | Natural Gas | | | | |

※ The MCR will be based on ISO condition.




① Engine
② Generator
③ Control panel
④ Enclosure
⑤ Radiator
⑥ Exhaust gas silencer
⑦ Ventilation air exhaust fan

## Approval Status of Quality Management System

| Product or Service Ranges | Certifying Agency |
|---|---|
| Design and Manufacture of Two-stroke Diesel Engines, Four-stroke Diesel Engines, Marine Propellers, Pumps & Valves, Press, Conveyor, Robots for Industrial Purposes, Steam Turbine, Gas Turbine, Diesel Power Plants and Engine Components including Turbochargers, Crankshafts, Cylinder Liners, Forged Steel, Shafting | ISO 9001:2000,<br>KS A 9001:2001<br>ISO 14001:2004,<br>KS A 14001:2004<br>OHSAS 18001:1999<br>(DNV) |
| Nuclear Diesel Generator (Class 1E), Pump and Butterfly Valve | Qualification Approval (KEPIC) |
| Forging Shop | Works Approval (ABS, BV, CCS, DNV, GL, KR, LR, NK, RINA) |
| Casting Shop | |
| Propeller | |
| Semi built-up Crankshaft | |
| Solid Crankshaft (TR Forging Crankshaft) | |
| Welding Workshop & Overlay Welding on Cylinder Cover | Works Approval (GL) |





## Engine *Hi*-service system setup

Our target is to provide quickest and most precious technical support and parts supply towards the customers.
We do utmost to minimize the trouble and inconvenience from the ship owners which might be occurred due to the damage caused by the accident.

## Easy Access to Engine CS Department

Regardless of the guarantee period whether it is over or not, HHI will make it a rule to support the clients with immediate service in the order of the receipt by e-mail or through homepage. But, considering its seriousness of the damage or the schedule of the vessel, the provision timing of our technical support including repair may be adjusted.

## Genuine Spare Parts Purchase Guide

HHI's authorized sales agents will supply the clients with the original genuine spare parts at the competitive condition in aspect of price, delivery time and quality etc. Please do not hesitate to contact our sales agent with the inquiry or questionnaire.

## Technical Support

After the guarantee period is expired or in case that the free support is limited even during the guarantee period due to special reason, we also provide the technical support including supervision, reconditioning, conversion, retrofit of alpha cylinder lubricator and technical consultancy etc.

## Global Service Network

HHI is very proud of its well organized global service network which is efficiently and systematically designed to meet every requirement of the clients. HHI°Øs direct service centers are established at Rotterdam, Singapore, Dubai, Panama and Havana in Cuba.

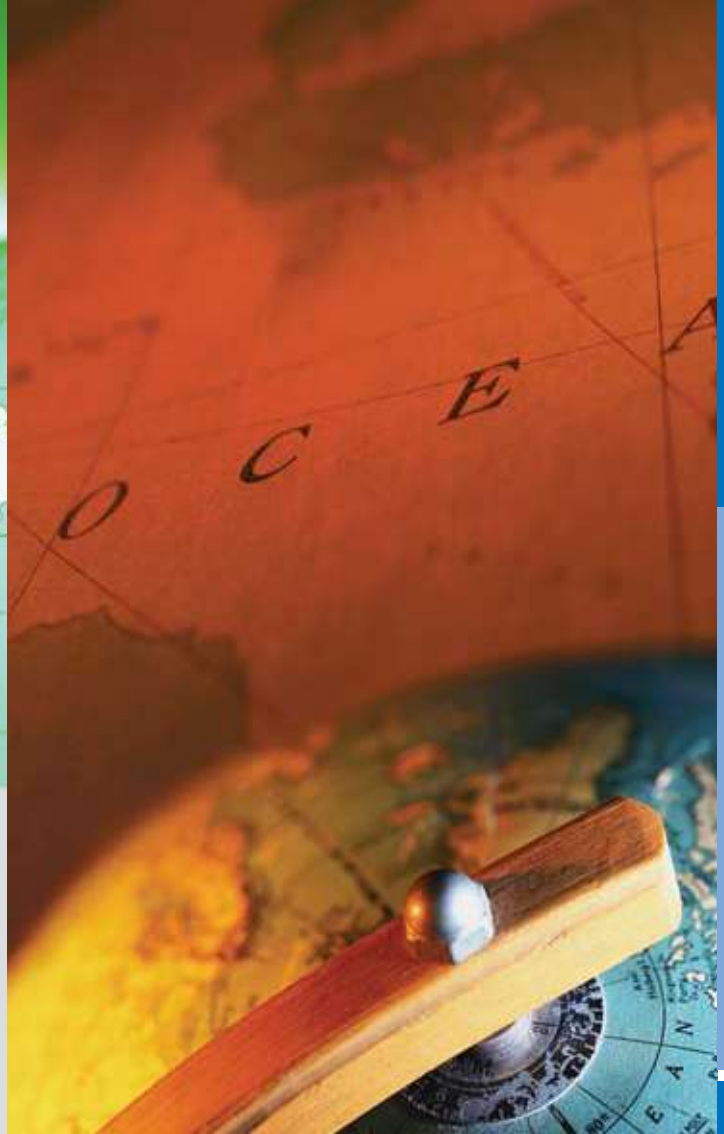
HYUNDAI

HIMSEN

Hi-touch Marine & Stationary ENgine



Global Service Network



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## Authorized Repairer / America

### USA — Country Code: +1

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## Cooperative Repairer / Asia

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## Cooperative Repairer / Europe

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## Cooperative Repairer / South America, Africa, Oceania

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## Spare Parts Sales Agent

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**DAE HWA Engineering Service Co., Ltd.**
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**Ocean Marine Services Co., Ltd.**
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### Republica Dominicana — Country Code: +1

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- **HHI-EMD Direct Service Center**
- **Authorized Repairer**
- **Cooperative Repairer**
- **Spare Parts Depot**
- **Parts Sales Agent**



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Note

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