

# MARINE GENSETS ENGINE

General Catalog



DAIHATSU

InfiniEarth

# Next Stage

## Advancing toward a New Horizon

Our clean and powerful "e-Diesel" is packed with top-level quality and technologies that we have accumulated and refined over many years since the foundation of the company in 1907.

Our history is marked by relentless challenges toward achieving the engine performance demanded by the changing times and meeting new needs.

This challenging spirit is unchanged today and will continue into the future.

Our e-Diesel is constantly advancing in order to deliver the ultimate performance that only the continually evolving company can attain.



# Since 1907





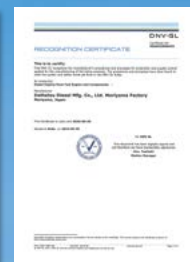
ABS



BV



CCS



DNV-GL



KR



LRS



NK



RS

## Certified by eight classification societies in the world

ABS(American Bureau of Shipping)

BV(Bureau Veritas)

CCS(China Shipping Classification Association)

DNV-GL(Det Norske Veritas-Germanischer Lloyd)

KR(Korean Register of shipping)

LRS(Lloyd's Register of Shipping)

NK(Nippon Kaiji Kyokai)

RS(Russian Maritime Register of Shipping)



8DE-33

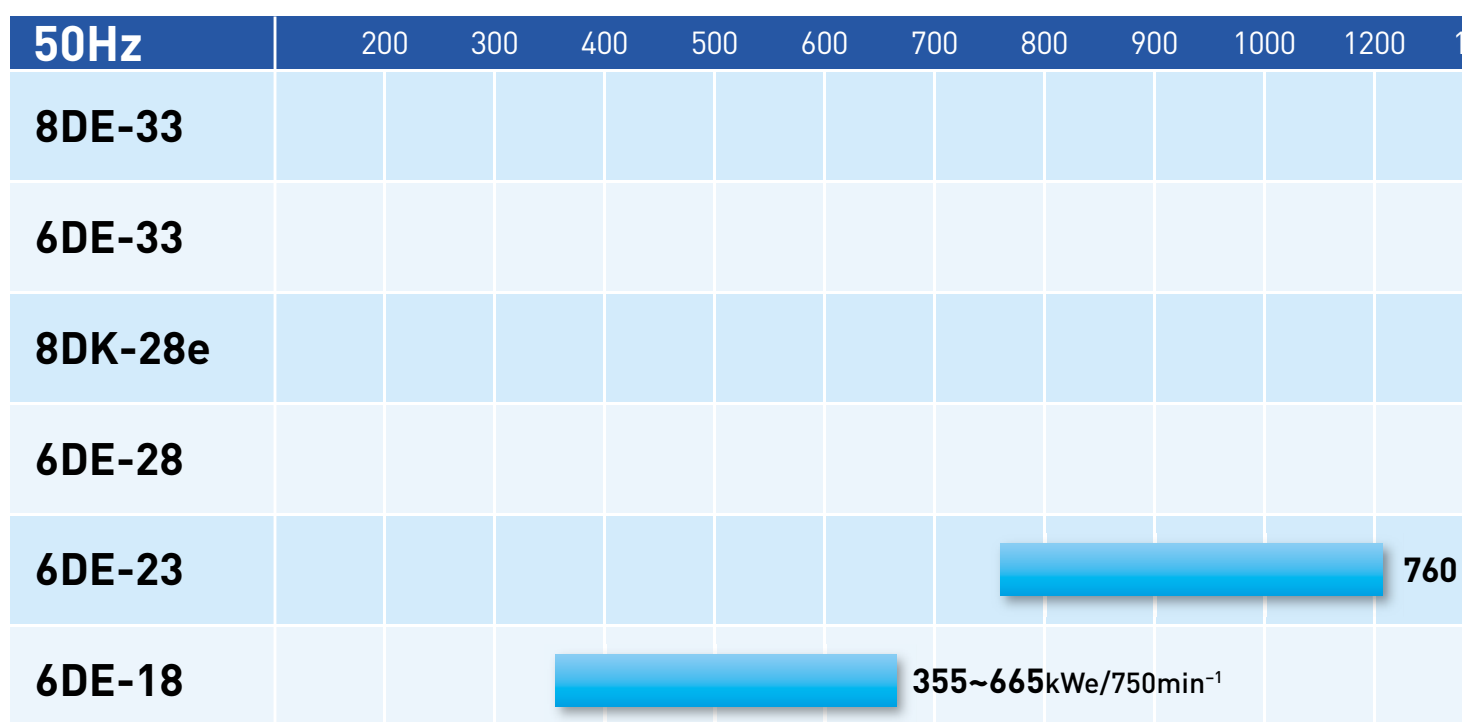
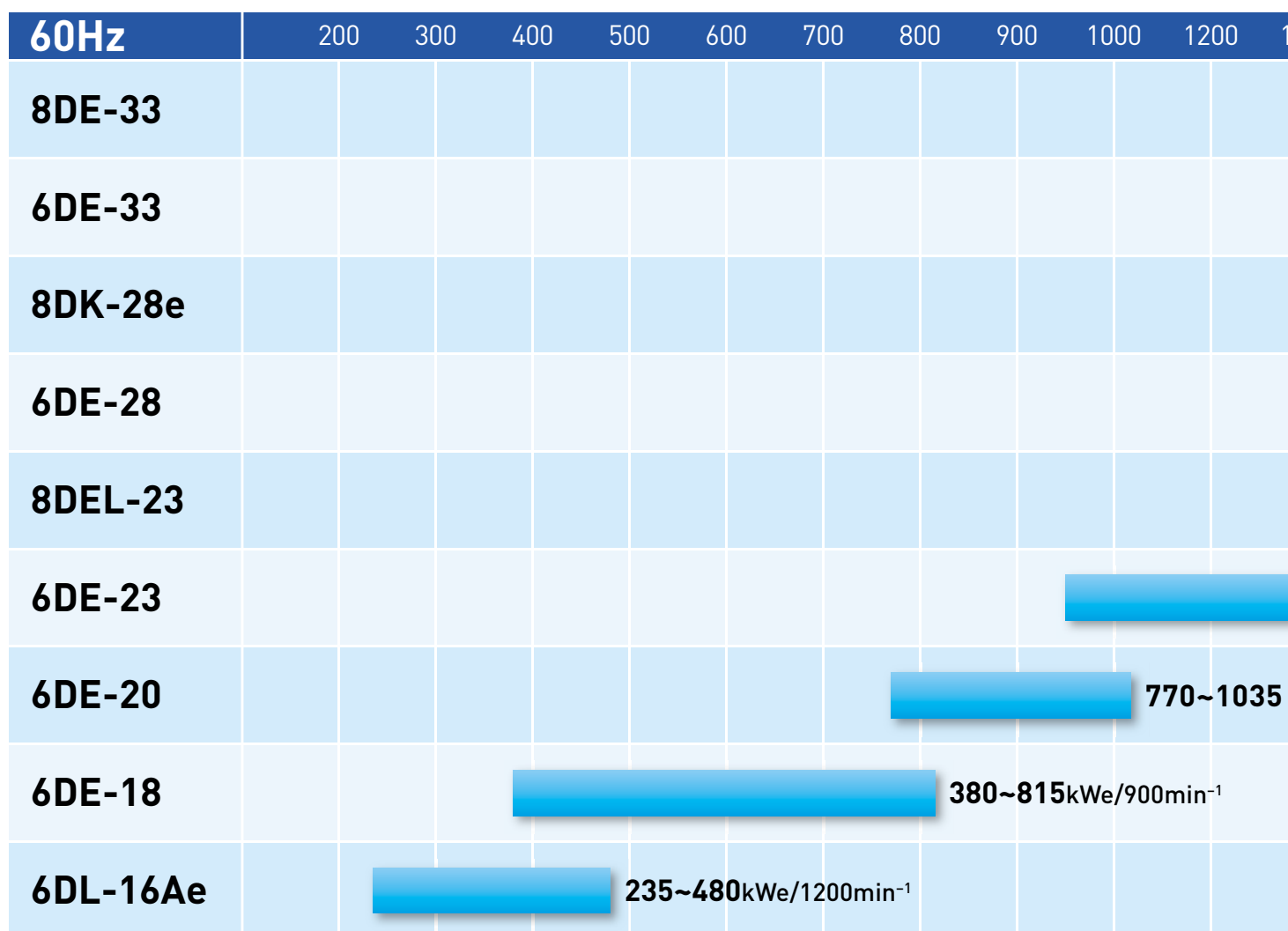


## Clean & Powerful

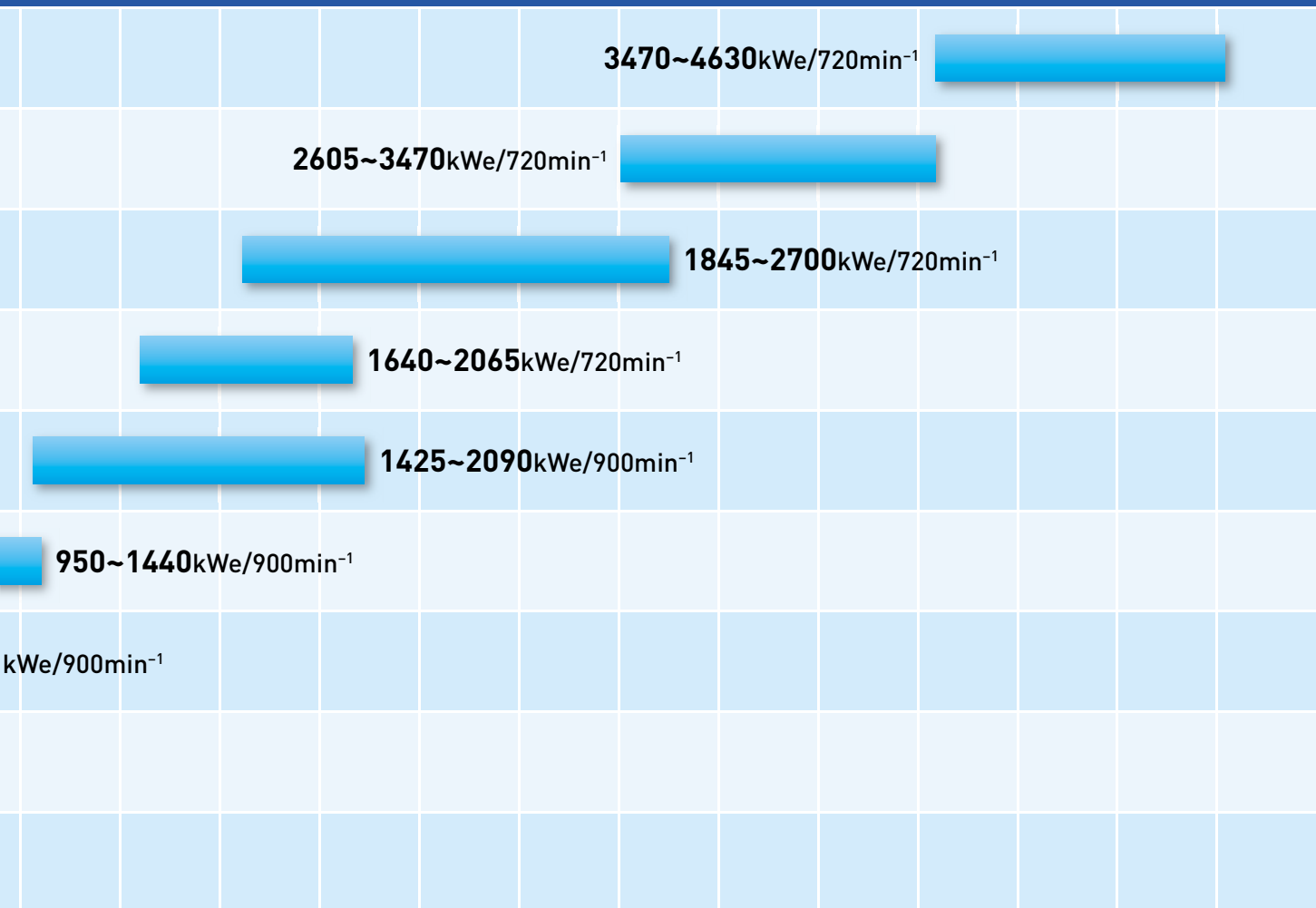
e-Diesel engines are gentle to the earth's environment.

They boast reduced NO<sub>x</sub> emissions as well as high fuel efficiency for reduced CO<sub>2</sub> emissions.

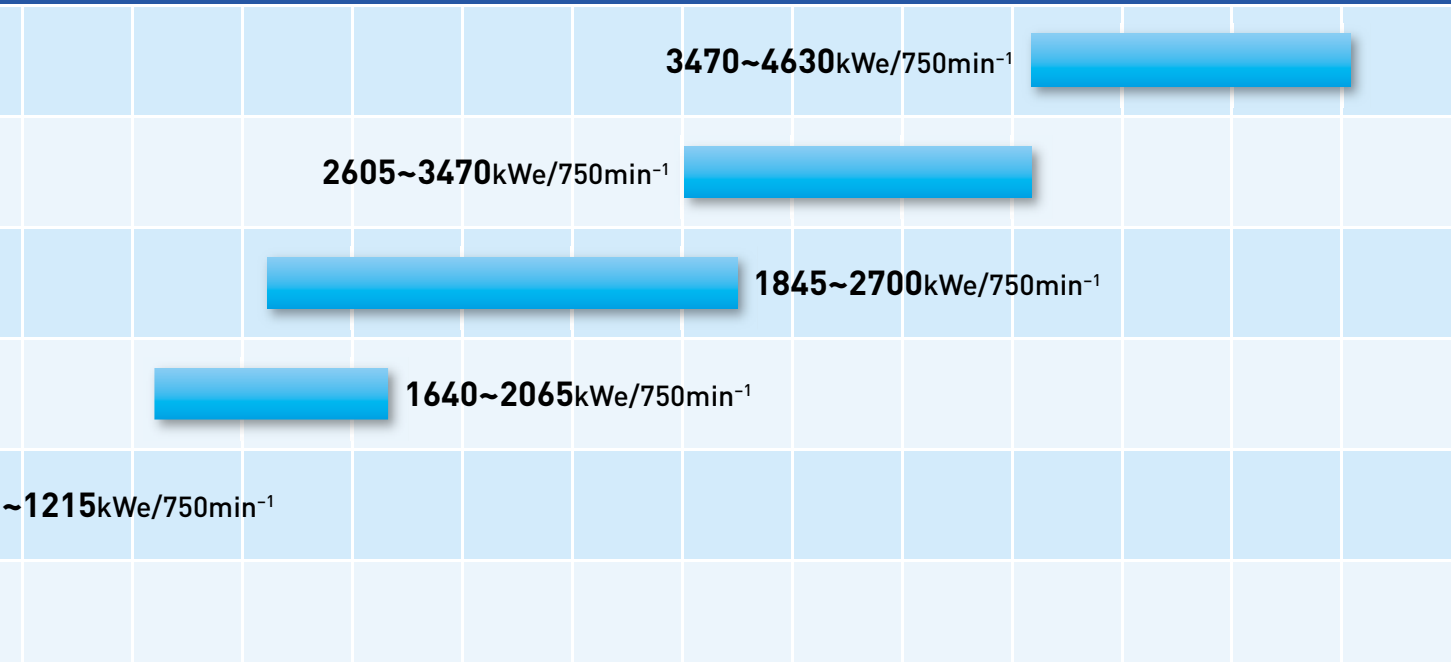
## ■ Generator output chart



400 1600 1800 2000 2200 2400 2600 2800 3000 3400 3800 4200 4600 (kWe)



400 1600 1800 2000 2200 2400 2600 2800 3000 3400 3800 4200 4600 (kWe)



Output

DE series

DF series

Equipment

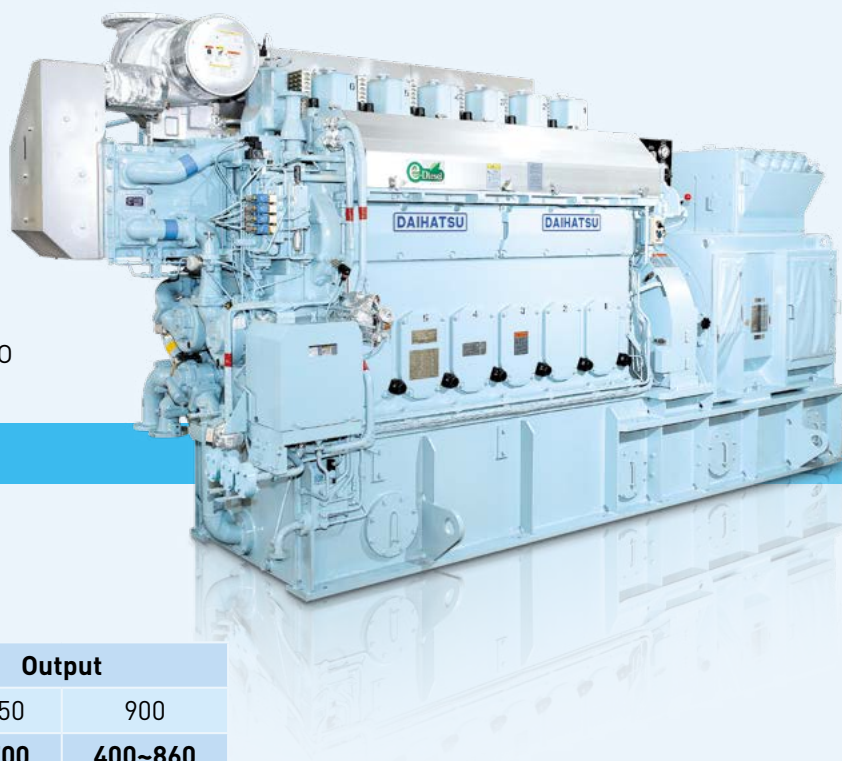
Factories

Network

# DE-18

## Main data

Cylinder bore : 185mm  
Piston stroke : 280mm  
No. of cylinder : 6  
Pme : 2.54MPa  
Piston speed : 8.40m/sec.(at 900min<sup>-1</sup>)  
7.00m/sec.(at 750min<sup>-1</sup>)  
6.72m/sec.(at 720min<sup>-1</sup>)  
Fuel oil : MDO~up to 700mm<sup>2</sup>/s/50°C HFO



## Main specifications

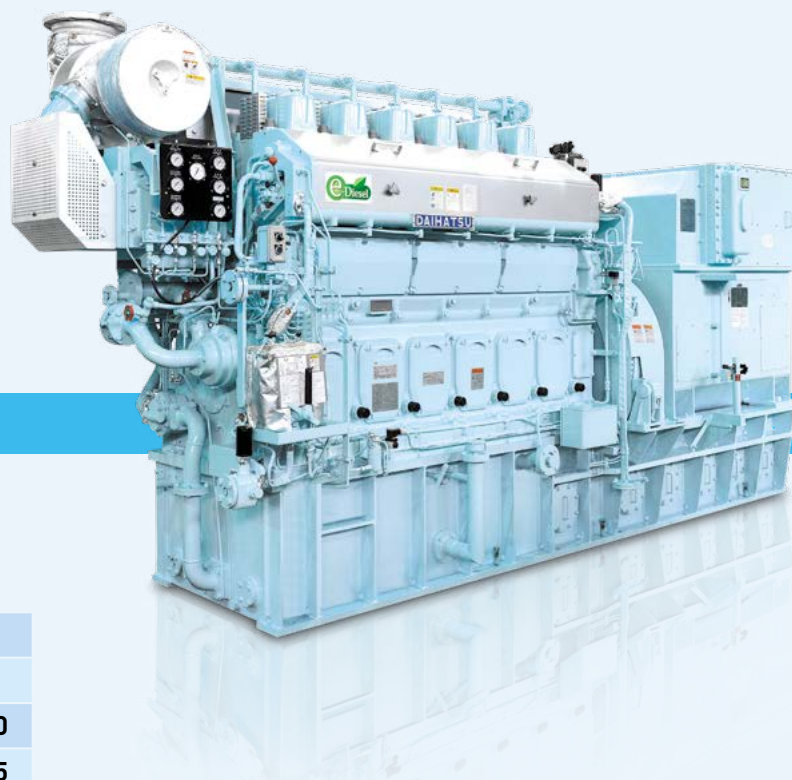
Model			Output	
	Engine speed (min <sup>-1</sup> )		720/750	900
6DE-18	Engine	kWm	375~700	400~860
	Generator	kWe	355~665	380~815

The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.

# DE-20

## Main data

Cylinder bore : 205mm  
Piston stroke : 300mm  
No. of cylinder : 6  
Pme : 2.45MPa  
Piston speed : 9.00m/sec.(at 900min<sup>-1</sup>)  
Fuel oil : MDO~up to 700mm<sup>2</sup>/s/50°C HFO



## Main specifications

Model			Output	
	Engine speed (min <sup>-1</sup> )		900	
6DE-20	Engine	kWm	811~1090	
	Generator	kWe	770~1035	

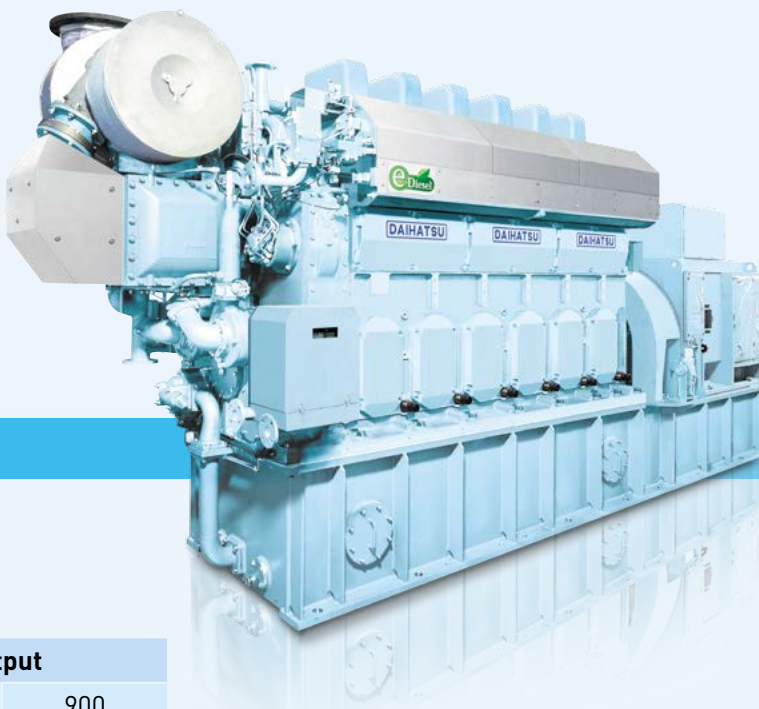
The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.



# DE-23

## Main data

Cylinder bore : 230mm  
 Piston stroke : 320mm  
 No. of cylinder : 6  
 Pme : 2.53MPa  
 Piston speed : 9.60m/sec.(at 900min<sup>-1</sup>)  
                     8.00m/sec.(at 750min<sup>-1</sup>)  
 Fuel oil : MDO~up to 700mm<sup>2</sup>/s/50°C HFO



## Main specifications

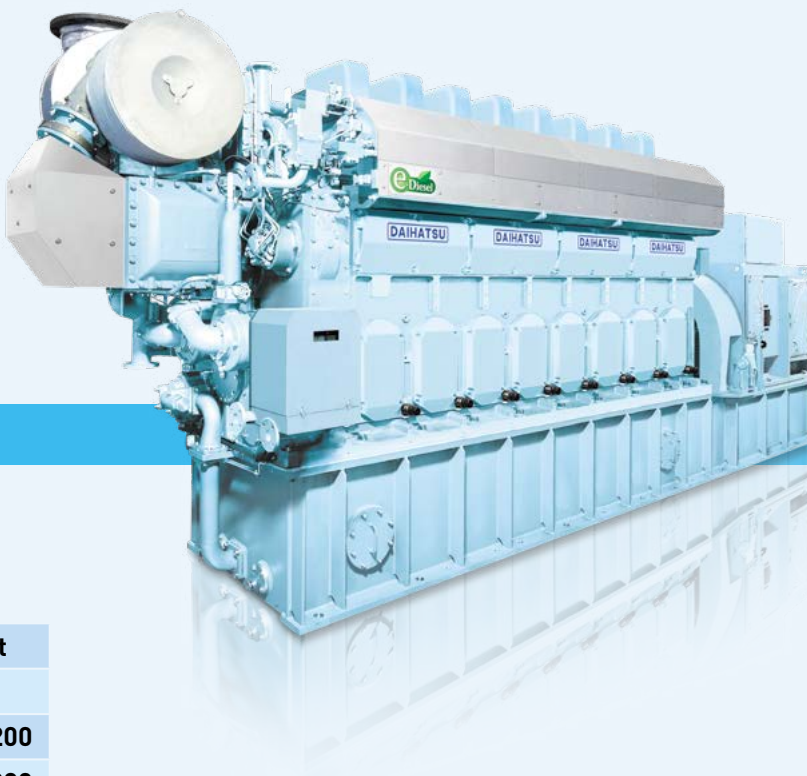
Model			Output	
	Engine speed (min <sup>-1</sup> )		750	900
6DE-23	Engine	kWm	800~1280	1000~1516
	Generator	kWe	760~1215	950~1440

The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.

# DEL-23

## Main data

Cylinder bore : 230mm  
 Piston stroke : 350mm  
 No. of cylinder : 8  
 Pme : 2.52MPa  
 Piston speed : 10.50m/sec.(at 900min<sup>-1</sup>)  
 Fuel oil : MDO~up to 700mm<sup>2</sup>/s/50°C HFO



## Main specifications

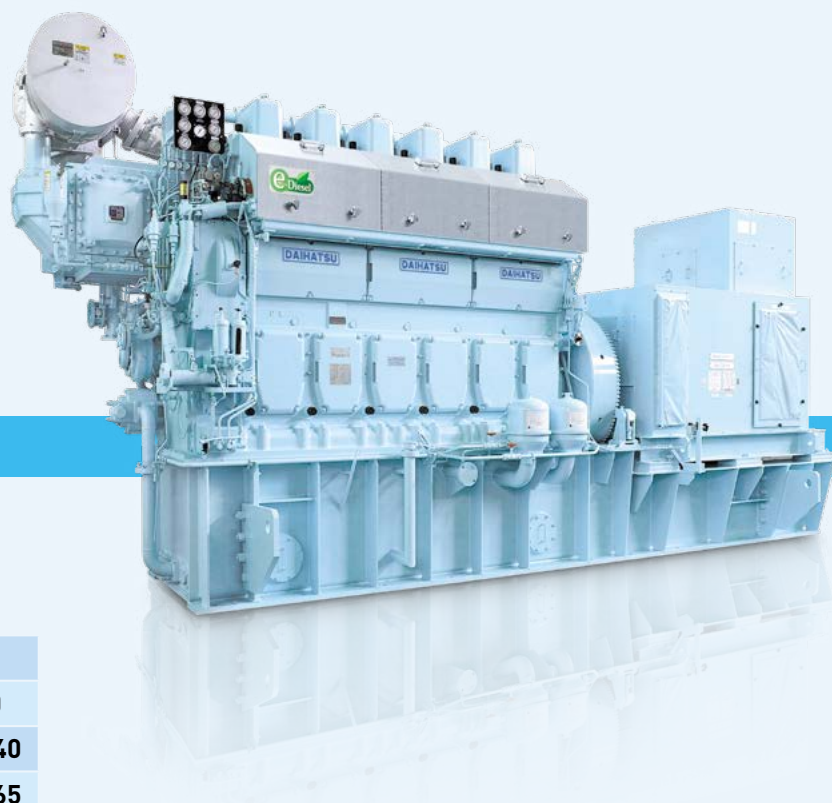
Model			Output
	Engine speed (min <sup>-1</sup> )		900
8DEL-23	Engine	kWm	1500~2200
	Generator	kWe	1425~2090

The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.

# DE-28

## Main data

Cylinder bore : 285mm  
 Piston stroke : 390mm  
 No. of cylinder : 6  
 Pme : 2.39MPa  
 Piston speed : 9.36m/sec.(at 720min<sup>-1</sup>)  
                   9.75m/sec.(at 750min<sup>-1</sup>)  
 Fuel oil : MDO~up to 700mm<sup>2</sup>/s/50°C HFO



## Main specifications

Model	Engine speed (min <sup>-1</sup> )		Output
	720/750		
6DE-28	Engine	kWm	1701~2140
	Generator	kWe	1640~2065

The generator output values are based on power generation efficiency of approximately 96.5%. They may vary depending on generator efficiency.

## Specifications / Dimensions and Mass

### 60Hz

Engine model	Engine revs. min <sup>-1</sup>	Output kWm	Output kWe	Bore mm	Stroke mm	No. of cylinders
6DE-18	900	400 ~ 860	380 ~ 815	185	280	6
	720	375 ~ 700	355 ~ 665			
6DE-20	900	811 ~ 1090	770 ~ 1035	205	300	6
	720	1000 ~ 1516	950 ~ 1440			
6DE-23	900	800 ~ 1280	760 ~ 1215	230	320	6
	720	1500 ~ 2200	1425 ~ 2090			
8DEL-23	900	1701 ~ 2140	1640 ~ 2065	285	390	6
6DE-28	720	2700 ~ 3600	2605 ~ 3470	330	440	6
6DE-33	720	3600 ~ 4800	3470 ~ 4630	330	440	8
8DE-33	720	260 ~ 530	235 ~ 480	165	210	6
6DL-16Ae	1200	1915 ~ 2800	1845 ~ 2700	280	390	8
8DK-28e	720					

### 50Hz

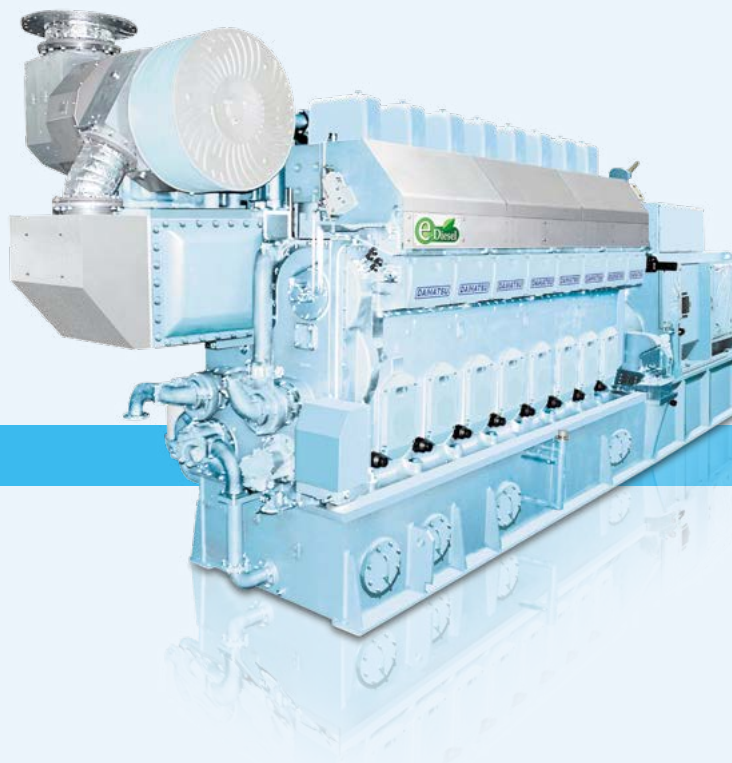
Engine model	Engine revs. min <sup>-1</sup>	Output kWm	Output kWe	Bore mm	Stroke mm	No. of cylinders
6DE-18	750	375 ~ 700	355 ~ 665	185	280	6
6DE-23	750	800 ~ 1280	760 ~ 1215	230	320	6
6DE-28	750	1701 ~ 2140	1640 ~ 2065	285	390	6
6DE-33	750	2700 ~ 3600	2605 ~ 3470	330	440	6
8DE-33	750	3600 ~ 4800	3470 ~ 4630	330	440	8
8DK-28e	750	1915 ~ 2800	1845 ~ 2700	280	390	8



# DE-33

## Main data

Cylinder bore : 330mm  
Piston stroke : 440mm  
No. of cylinder : 6, 8  
Pme : 2.66MPa  
Piston speed : 10.56m/sec.(at 720min<sup>-1</sup>)  
11.00m/sec.(at 750min<sup>-1</sup>)  
Fuel oil : MDO~up to 700mm<sup>2</sup>/s/50°C HFO



Output

DE series

DF series

Equipment

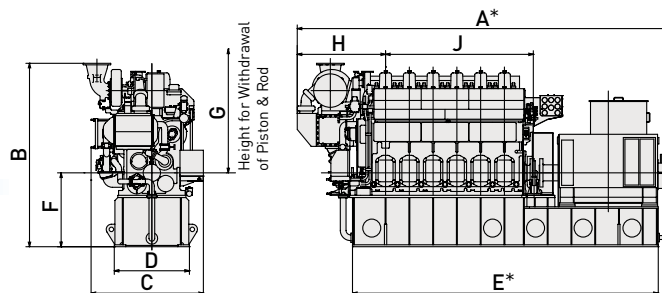
Factories

Network

## Main specifications

Model	Engine speed (min <sup>-1</sup> )		Output
	720/750		
6DE-33	Engine	kWm	2700~3600
	Generator	kWe	2605~3470
8DE-33	Engine	kWm	3600~4800
	Generator	kWe	3470~4630

The generator output values are based on power generation efficiency of approximately 96.5%. They may vary depending on generator efficiency.



Dimension mm									Dry Mass* ton
A	B	C	D	E	F	G	H	J	
4850	2400	1540	1070	3820	900	1400	1200	1810	13
5480	2890	1800	1040	4430	1000	1545	1240	2035	16
6100	2860	1780	1020	5040	1150	1660	1400	2300	23
7390	3160	1900	1110	6140	1150	1780	1440	3050	30
6825	3710	2235	1230	6100	1300	2065	1605	2580	35
9110	3950	2410	1780	7520	1350	2570	2050	3270	69
10390	4150	2410	1780	8800	1350	2570	2050	4330	84
3700	1870	1230	960	3260	750	1195	645	1418	5.9
7865	3830	2235	1230	6780	1300	2065	1605	3440	46

Dimension mm									Dry Mass* ton
A	B	C	D	E	F	G	H	J	
4850	2400	1540	1070	3820	900	1400	1200	1810	13
6100	2860	1780	1020	5040	1150	1660	1400	2300	23
6825	3710	2235	1230	6100	1300	2065	1605	2580	35
9110	3950	2410	1780	7520	1350	2570	2050	3270	69
10390	4150	2410	1780	8800	1350	2570	2050	4330	84
7865	3830	2235	1230	6780	1300	2065	1605	3440	46

The values above are reference values. \*Actual dimensions and mass may vary depending on the specifications of the generator unit.

## High Environmental Performance through Precise and Detailed Control

Dual-fuel engines that operate on both environmentally friendly natural gas and conventional petroleum fuel require precise control and must offer high safety and durability. We have incorporated the results of extensive research on the internal combustion engine into the development of our dual-fuel engines.

Our dual-fuel engines offer accurate and stable operation on natural gas while incorporating the excellent environmental performance inherited from the company's diesel engines, which boast features such as a fuel injection system with high control precision, superb fuel efficiency, and outstanding engine durability.

- 1 Complies with IMO NOx Tier III emissions regulations (when operating on gas fuel)**
  - Complies with IMO NOx regulation Tier III in gas operation, and Tier II in diesel operation.
- 2 No change to engine rotation speed when switching to gas mode or diesel mode**
  - Output is not interrupted when switching to either gas or diesel.
- 3 Utilizes a variable valve timing mechanism**
  - Optimal control of valve open/close timing maintains stable output.
- 4 Utilizes twin nozzles**
  - Fine fuel injection control achieves high combustion efficiency.



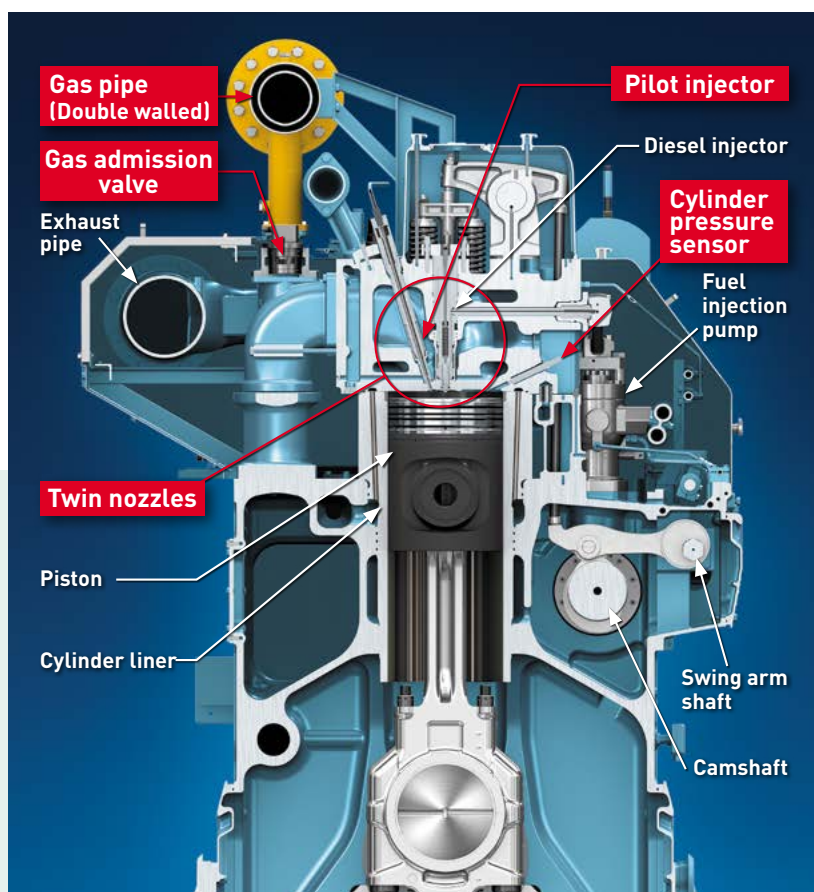
Type approval certificate

### Generator output chart

Engine model	Bore×Stroke(mm)	Rotation speed(min <sup>-1</sup> )	500	1000	1500	2000	2500	3000
<b>6DE20DF</b>	Φ205×300	900		730~840kWe				
<b>6DE23DF</b>	Φ230×320	900		840~1140kWe				
<b>6DE28DF</b>	Φ280×390	720			1220~1640kWe			
<b>6DE35DF</b>	Φ350×440	720						
<b>8DE35DF</b>	Φ350×440	720					2950~3940kWe	

### Main Specifications

Engine model		6DE20DF	6DE23DF	6DE28DF	6DE35DF	8DE35DF
Bore x Stroke	mm	Φ205×300	Φ230×320	Φ280×390	Φ350×440	
Number of cylinders	–	6	6	6	6	8
Rotation speed	min <sup>-1</sup>	900	900	720	720	
Max. engine output	kWm	890	1200	1730	3060	4080
Max. generator output	kWe	840	1140	1640	2950	3940
NOx emission rate	–	≤ Tier III (gas mode) / ≤ Tier II (diesel mode)				
Fuel	–	Natural gas (gas mode) / MDO, MGO, (HFO) (diesel mode)				
Pilot fuel	–	MDO or MGO				

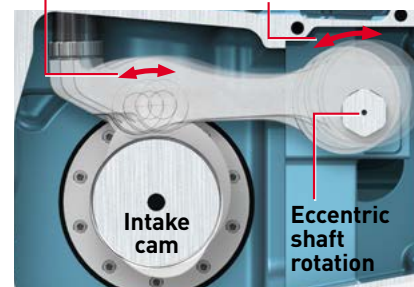


\* The parts indicated with the red background [   ] are designed exclusively for the DF engine; other parts are modified from existing parts of conventional diesel engines.

## Variable valve timing mechanism

Change in roller position

Swing arm shaft  
Operated by rotary drive actuator

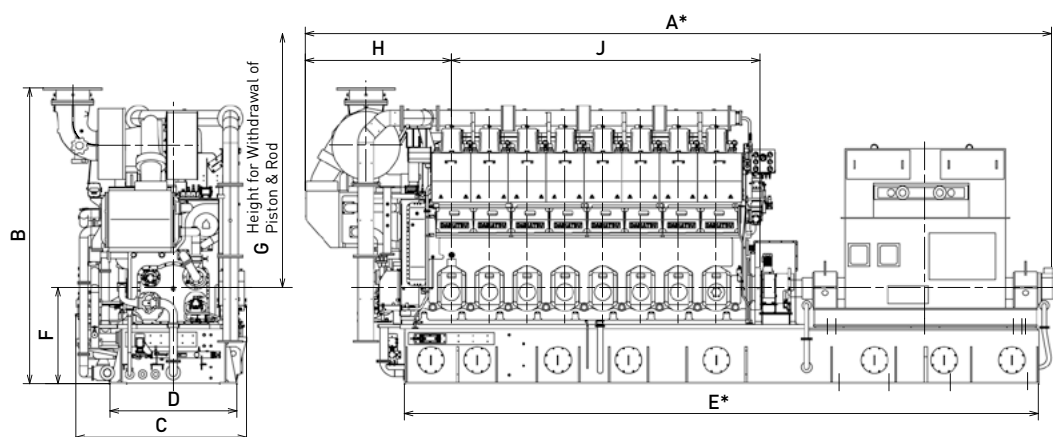


## Accurate fuel injection using a common rail

A precise amount of high-pressure fuel is injected at the optimal timing according to the operating condition, thus helping to improve fuel economy and reduce NOx.



00	3500	4000 (kWe)
2565~2950kWe		



## Dimensions and Mass

Engine model	Dimensions (mm)									Dry Mass* (ton)
	A	B	C	D	E	F	G	H	J	
6DE20DF	5510	3245	1830	1040	4290	1000	1530	1240	2035	20
6DE23DF	6000	3150	2200	1170	4600	1150	1720	1460	2300	27
6DE28DF	7190	3645	2230	1380	5600	1300	2065	2020	2580	40
6DE35DF	9065	3950	2570	1780	7460	1350	2555	2050	3270	81
8DE35DF	10470	4150	2570	1780	8895	1350	2555	2050	4330	98

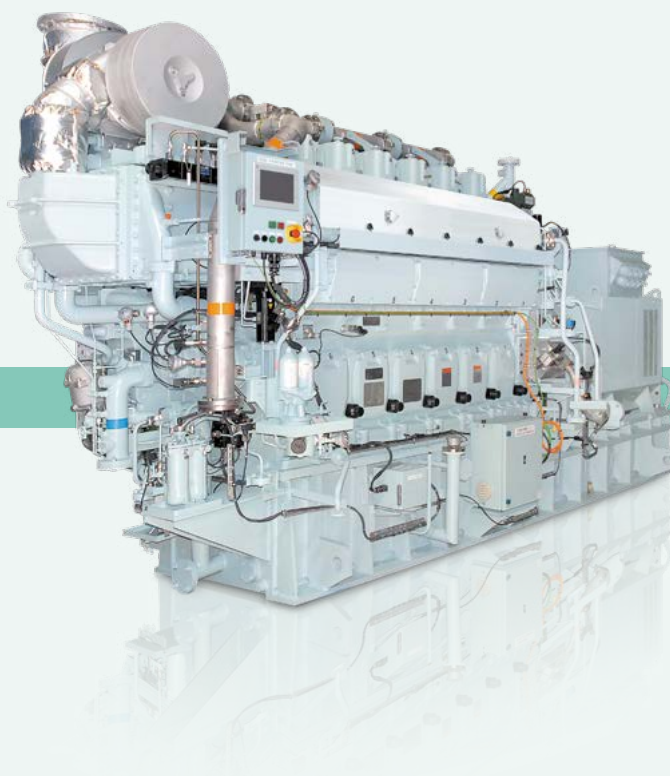
\* Actual dimensions and mass may vary depending on the specifications of the generator unit.



# DE20DF

## Main data

Cylinder bore : 205mm  
 Piston stroke : 300mm  
 No. of cylinder : 6  
 Pme : 2.00MPa  
 Piston speed : 9.00m/sec.(at 900min<sup>-1</sup>)  
 Fuel oil : Natural gas, MGO·MDO~  
 up to 380mm<sup>2</sup>/s/50°C HFO



## Main specifications

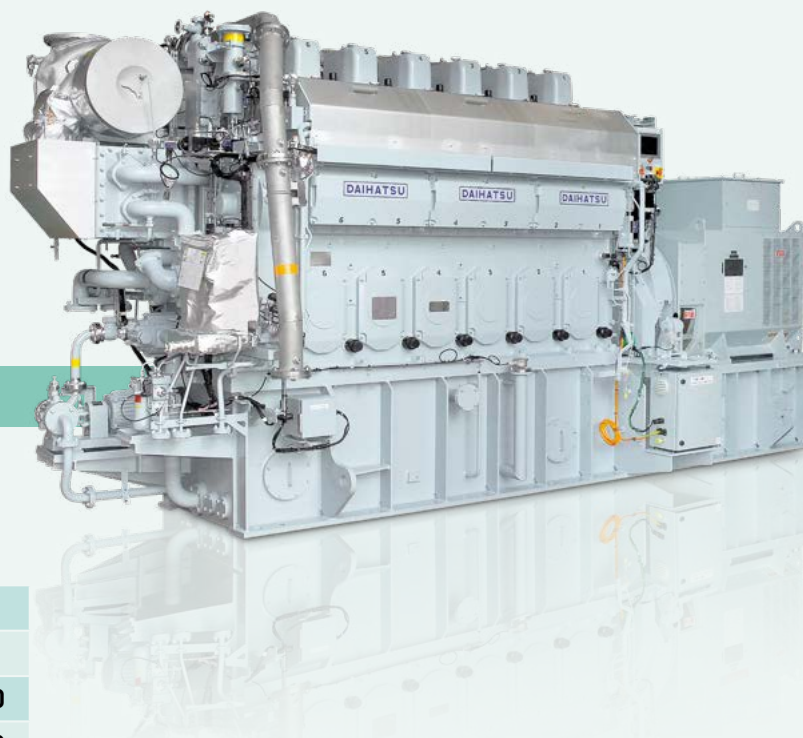
Model			Output
	Engine speed (min <sup>-1</sup> )		900
<b>6DE20DF</b>	Engine	kWm	<b>771~890</b>
	Generator	kWe	<b>730~840</b>

The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.

# DE23DF

## Main data

Cylinder bore : 230mm  
 Piston stroke : 320mm  
 No. of cylinder : 6  
 Pme : 2.00MPa  
 Piston speed : 9.60m/sec.(at 900min<sup>-1</sup>)  
 Fuel oil : Natural gas, MGO·MDO~  
 up to 380mm<sup>2</sup>/s/50°C HFO



## Main specifications

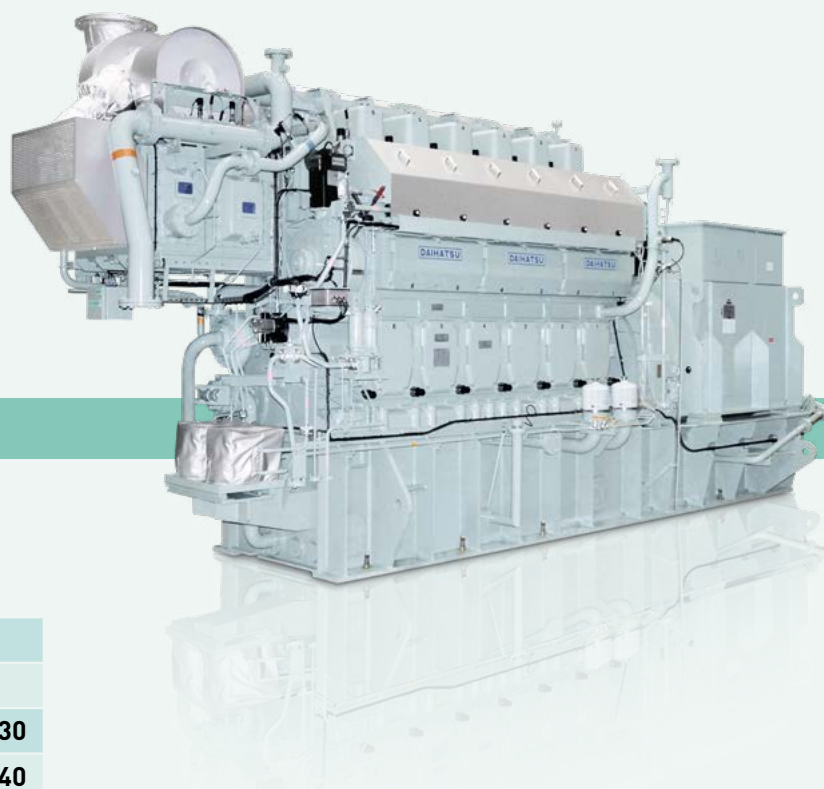
Model			Output
	Engine speed (min <sup>-1</sup> )		900
<b>6DE23DF</b>	Engine	kWm	<b>890~1200</b>
	Generator	kWe	<b>840~1140</b>

The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.

# DE28DF

## Main data

Cylinder bore : 280mm  
 Piston stroke : 390mm  
 No. of cylinder : 6  
 Pme : 2.00MPa  
 Piston speed : 9.36m/sec.(at 720min<sup>-1</sup>)  
 Fuel oil : Natural gas, MGO-MDO~  
 up to 380mm<sup>2</sup>/s/50°C HFO



## Main specifications

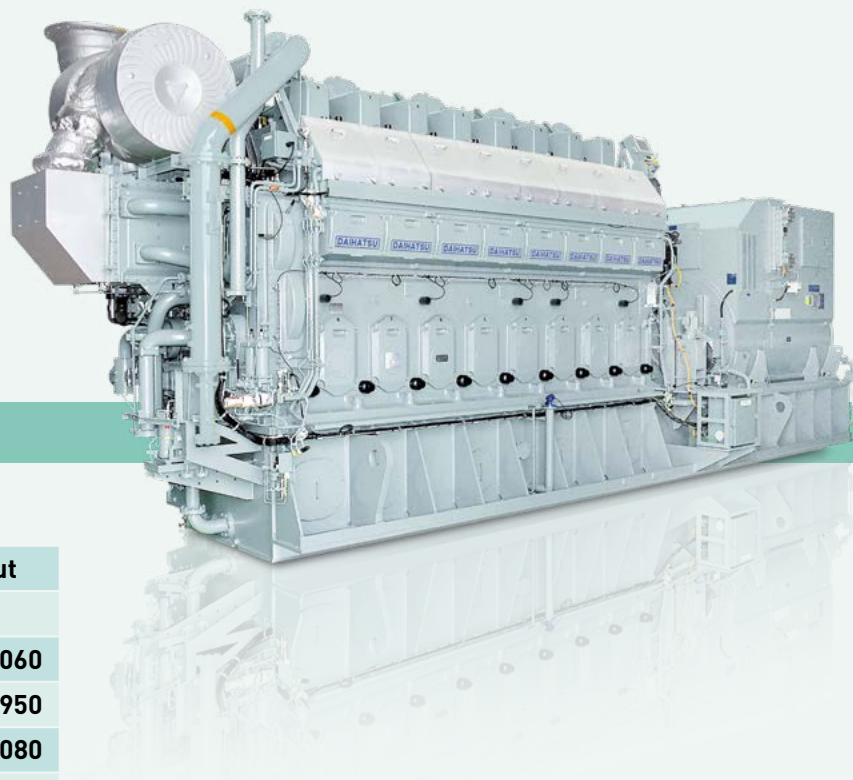
Model			Output
Engine speed (min <sup>-1</sup> )			720
6DE28DF	Engine	kWm	1300~1730
	Generator	kWe	1220~1640

The generator output values are based on power generation efficiency of approximately 95%. They may vary depending on generator efficiency.

# DE35DF

## Main data

Cylinder bore : 350mm  
 Piston stroke : 440mm  
 No. of cylinder : 6, 8  
 Pme : 2.01MPa  
 Piston speed : 10.56m/sec.(at 720min<sup>-1</sup>)  
 Fuel oil : Natural gas, MGO-MDO~  
 up to 380mm<sup>2</sup>/s/50°C HFO



## Main specifications

Model			Output
Engine speed (min <sup>-1</sup> )			720
6DE35DF	Engine	kWm	2701~3060
	Generator	kWe	2565~2950
8DE35DF	Engine	kWm	3061~4080
	Generator	kWe	2950~3940

The generator output values are based on power generation efficiency of approximately 96.5%. They may vary depending on generator efficiency.

## The DAIHATSU-DEC Marine SCR System engineered to achieve the highest levels of space saving and running cost reduction

Marine diesel engines installed on ocean navigating ships must be gentle to the global environment at all times. Daihatsu SCR system decomposes NO<sub>x</sub> contained in the engine exhaust gas using chemical reaction and makes the exhaust gas clean. We adopted a patented bypass-integrated structure and optimized the electronic control and operation devices to enable easy onboard installation, save installation space and reduce running cost.

### 1 NO<sub>x</sub> removal performance compliant with IMO NO<sub>x</sub> Tier III standards

### 2 Compact design for easy onboard installation

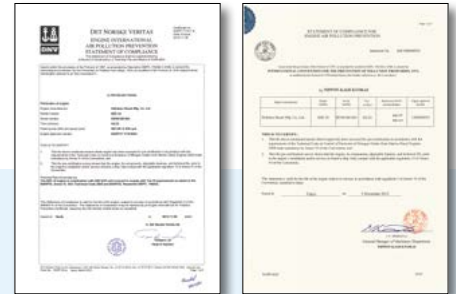
- The SCR reactor can be mounted vertically or horizontally.  
(\*Horizontal mounting is possible for models up to SCR81B.)
- A unique nozzle sprays urea aqueous microparticles to reduce the vaporization distance.
- A built-in auto-switching bypass damper reduces duct connection to only two locations: inlet and outlet.

### 3 Low running cost

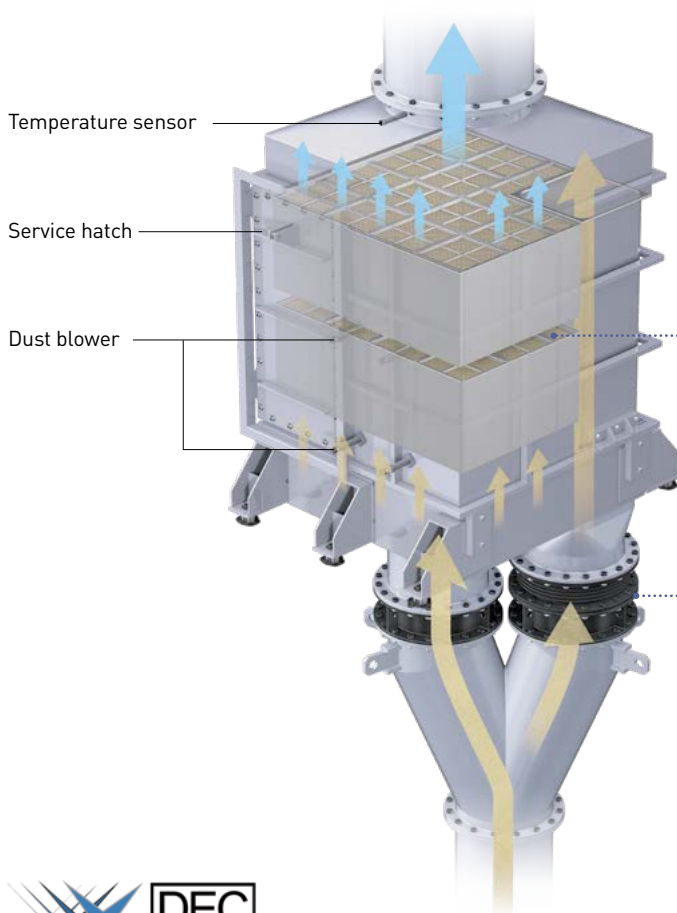
- The unique nozzle and electronically controlled auto-operation optimize the amount of urea aqueous spraying.

### 4 High vibration resistance

- Anti-vibration support for the SCR reactor.



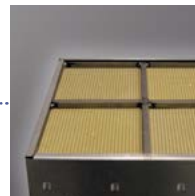
Statement of Compliance for IMO NO<sub>x</sub> Tier III



Temperature sensor

Service hatch

Dust blower



#### Catalyst

The catalyst causes chemical reaction between ammonia and NO<sub>x</sub> to eliminate harmful NO<sub>x</sub>.



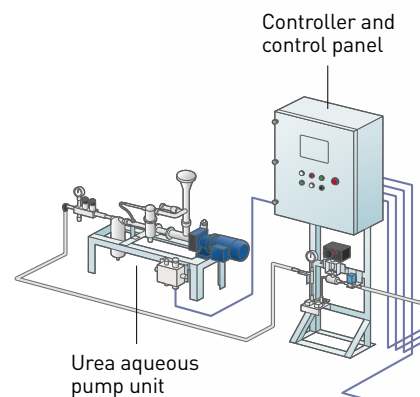
#### Bypass damper

The bypass damper performs switching operations automatically according to the operating condition of the SCR system. The bypass damper is installed immediately before the SCR reactor to enable the use of only one existing duct.

Connection of single duct to SCR reactor

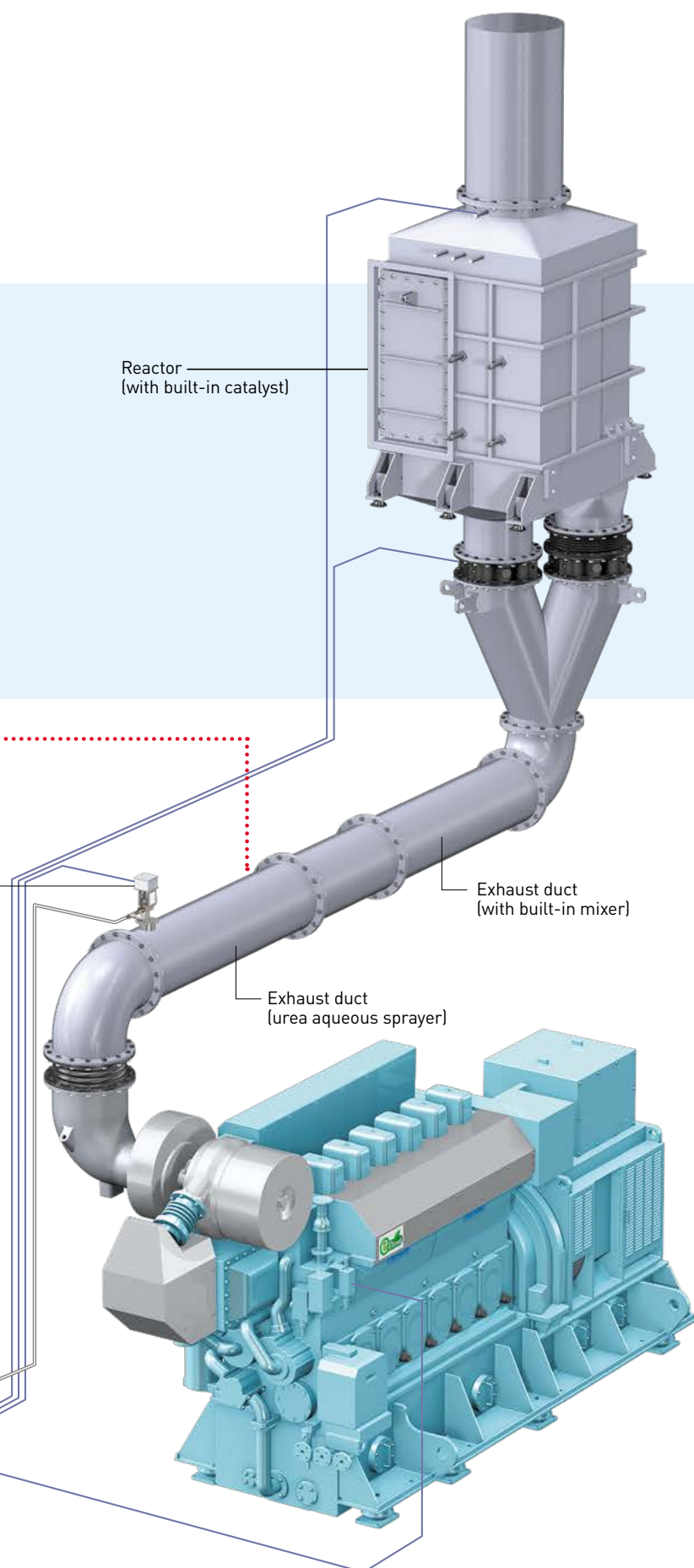
Urea aqueous spraying nozzle

Controller and control panel



Urea aqueous pump unit





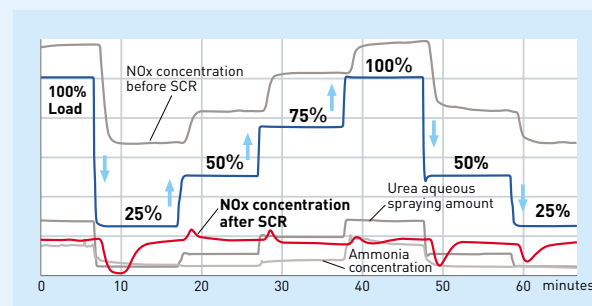
Aqueous urea spraying pump unit



Controller and control panel

## Low running cost

The unique aqueous urea nozzle and electronically controlled auto-operation optimize the amount of aqueous spraying and maintain NOx below the regulation value at all times.



## SCR Model Selection Table for Gensets Engine

Engine model	Engine output		SCR model
	min <sup>-1</sup>	kWm	
6DL-16Ae	1,200	442~530	25B
6DE-18	720/750	375~700	30B
	900	400~660	
6DE-18	900	661~860	36B
6DE-20	900	811~1,090	49B
6DE-23	720/750	800~1,280	64B
	900	1,000~1,516	
8DEL-23	900	1,500~2,200	100B
6DE-28	720/750	1,701~2,140	100B
6DE-33	720/750	2,700~3,600	169B
8DE-33	720/750	3,600~4,800	240B
8DK-28e	720/750	1,915~2,800	144B

\* Compatible models are added from time to time. For gensets engine models/ specifications not listed in the above table, please contact our company.

\* Please inquire separately for propulsion engine models with SCR compatibility.

\* Even when the SCR system is in non-operational (bypass operation), air supply is still used at a rate of 0.1 to 0.3 Nm<sup>3</sup>/h for the cooling of the spraying nozzle while the engine is running.

## Inboard production of high-purity urea water from urea powder and pure water

A device that produces on-board the aqueous urea solution that is required as a reducing agent for the SCR (Selective Catalytic Reduction) system has been developed. Since it generates only the necessary amount of aqueous urea solution at the necessary time from pure water and urea powder, there are no concerns about degradation, and a solution of consistently stable quality can be supplied. Also, because there is no need for large tanks to store the solution in liquid form, it offers space-saving storage, and the procurement of urea powder is economical.

### 1 Dispense with large, space-consuming AUS storage tanks

- Large on-board tanks storing the entire voyage's quota of AUS are no longer needed. Although a buffer tank will be required to provide AUS this tank is far smaller than the aforementioned storage tanks.

### 2 Save money on your AUS

- AUS produced from urea powder is cheaper than buying AUS already in its liquid form.

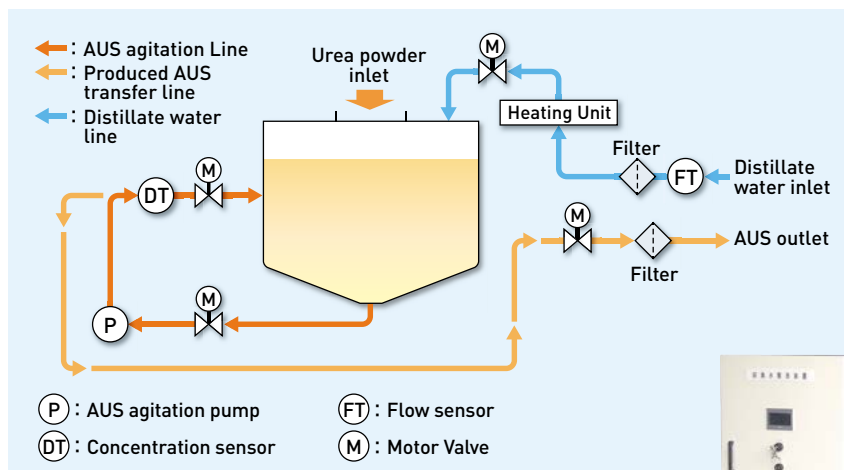
### 3 Loading urea powder is easier than loading AUS

- In order to load AUS, an Intermediate Bulk Container (IBC) and pump are required to transfer the AUS from the container to the tank. With powder these are not needed.

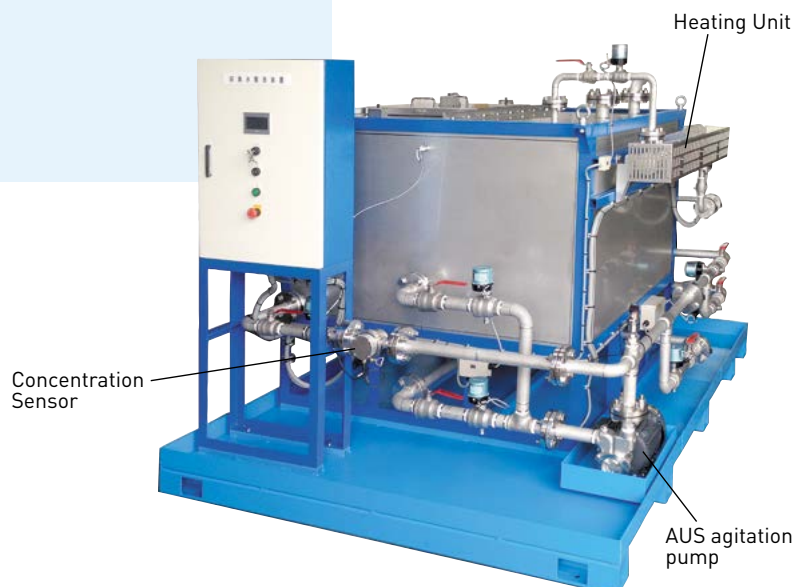
### 4 The same high quality AUS every time

- Storing AUS for extended periods risks exposing it to temperature fluctuations that decrease its quality and shelf-life. Producing AUS from powdered urea when it is needed maintains the AUS quality and helps to prevent the SCR's catalyst from becoming stained or obstructed.

#### Structure



The material of pipe, valve, and fittings shall be made of stainless steel from urea solution outlet to shipyard storage tank.



## Cloud-based engine condition monitoring and diagnostic solution

CMAXS LC-A is an abnormality diagnosis and maintenance assist system with a multiple capability for monitoring the main engine, power generator and auxiliary equipment in the main engine room. It achieves early detection of abnormal trends and prevents malfunctions by promoting proper maintenance. By utilizing cloud services, it makes it possible to grasp engine conditions at sea or on land.

### 1 Self-contained onboard engine support

- Early identification of potential faults through continuous engine diagnosis prevents serious engine failures.
- Troubleshooting guides assist with the customer's own maintenance work.

### 2 Simple and easy operation

- Integrated operation of the main engine, auxiliary engine and auxiliary devices.
- User-friendly operation through photographs, graphs, image data, alarm monitoring functions and an intuitive user interface.

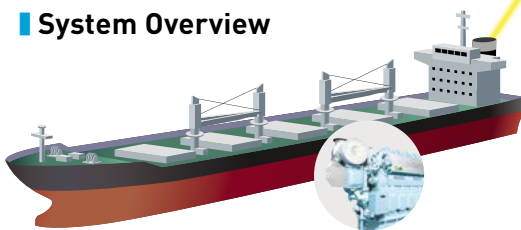
### 3 Onboard and onshore engine "visualization"

- Fleet overviews and targeted vessel monitoring through the CMAXS Web Service.
- Ascertain a vessel's condition and activate any measures necessary via the onshore "Ship Data Center".
- Retrieve a target vessel's data at any time thanks to safe Cloud storage.

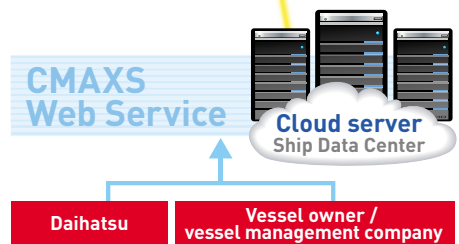
### 4 A total support solution

- Direct analysis of engine data allows DAIHATSU to provide quick and relevant support.
- Periodic diagnostic reports provide reassurance for customers.

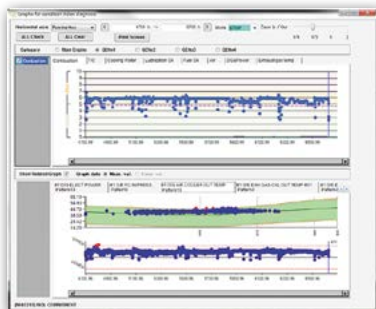
#### System Overview



Data is obtained from sensors mounted to the engines and used to automatically diagnose the engine condition. This allows appropriate maintenance to be provided quickly to prevent engine trouble.

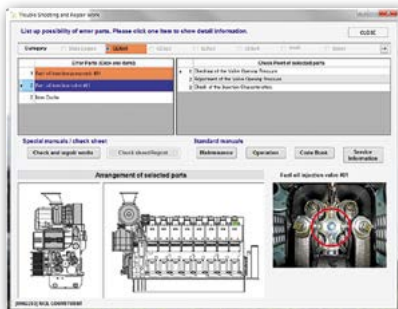


#### Diagnosis function



Check details of an engine's condition via the diagnosis screen.

#### Troubleshooting function

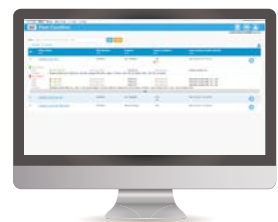


Displays the part that is most likely to have caused a failure, as well as measures to be taken.

Parts Lists  
Manuals  
Service Info.

#### CMAXS Web Service

The CMAXS Web Service home page can be accessed over the internet, enabling the ship's status to be determined from virtually anywhere in the world.



#### CMAXS provides service as a member of the NK-CMAXS Alliance

CMAXS LC-A/e-GICSX alliance members: ClassNK Consulting Service Co., Ltd., Ship Data Center Co., Ltd., IHI Power Systems Co., Ltd., Mitsui E&S Machinery Co., Ltd., Makita Corporation, Hitachi Zosen Corporation, IMC Co., Ltd., and our company. (As of January 2023.)



# Engine Controller

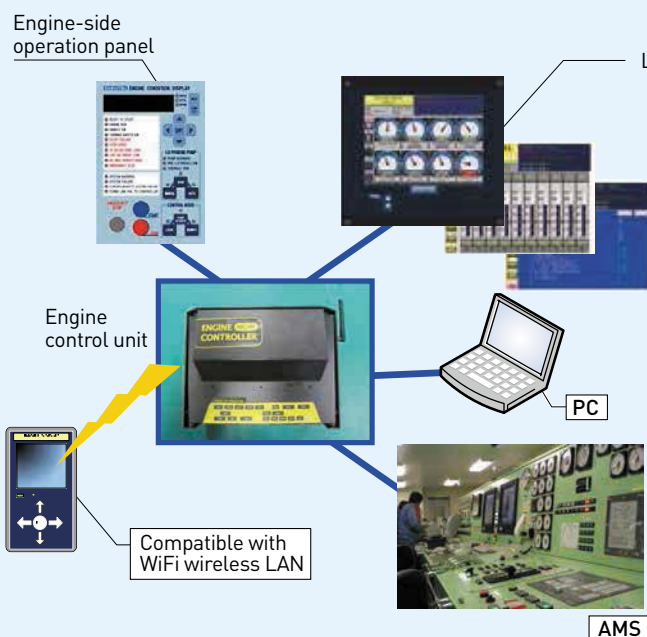
## Improving engine reliability

## An engine safety/control system for next-generation engines

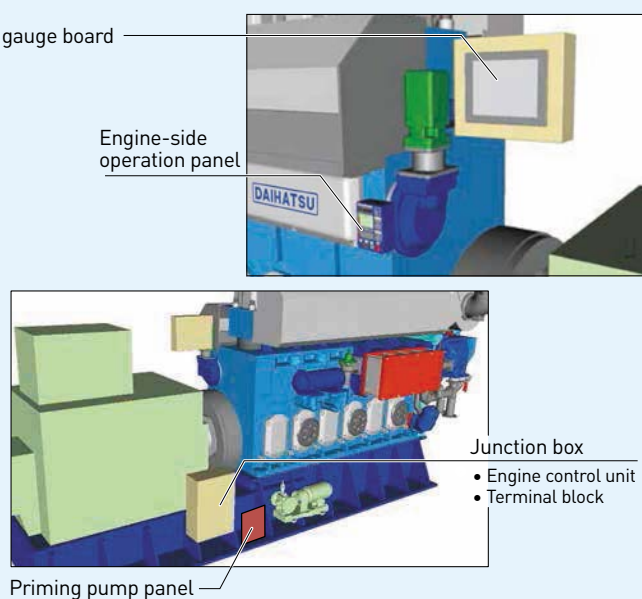
The engine safety/control system ensures safe and reliable engine operation based on the control/safety sequence verified by Daihatsu. The circuits are protected so as to prevent faulty operation even if a mistake is made in the installation. The system automatically saves the record of engine control device operations (events) and the trend data. This enables accurate understanding of symptoms when engine trouble occurs, thus allowing swift and efficient investigation of the problem causes.

Since the product was developed for a long-term use, there is no need for replacement parts.

### Links between the engine control unit and other devices



### Example installation on engine



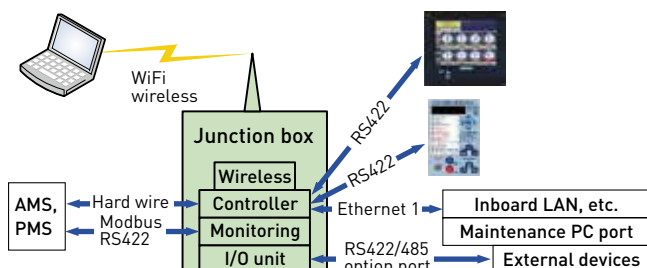
## Pursuit of safety, security, and ease of use for the owner and the crew

1. Ease of operation and safety circuits ensure security during engine operation.
2. If a problem occurs with the controller, recovery is simple and quick. Simply replace the main assembly and insert a new memory card.
3. A web server is provided as a standard feature. Connect a browser to the server for easy checking of the engine condition.
4. Engine condition data can be downloaded easily in the event of an engine problem. Sending the data to Daihatsu allows our service personnel to conduct a preliminary investigation before visiting the site.

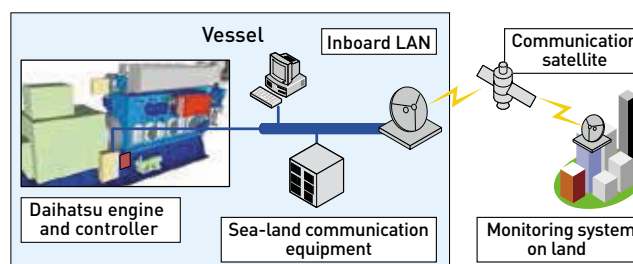
## Meeting the users' needs

1. The engine controller has an industry standard Modbus-RTU/RS422 communication port to connect to the Alarm Monitoring System (AMS) to reduce wiring.
2. The priming pump control panel is engine-mounted as a standard feature to eliminate the need for separate procurement.
3. The safety and control functions provided on the engine controller simplify commissioning. Simplified generator panels cut costs and reduce the installation space required.
4. An Ethernet port is provided as a standard feature to flexibly meet future needs of shipbuilders, such as connection with onboard LAN and server and interaction with sea-land communication systems.

### Engine controller input/output features

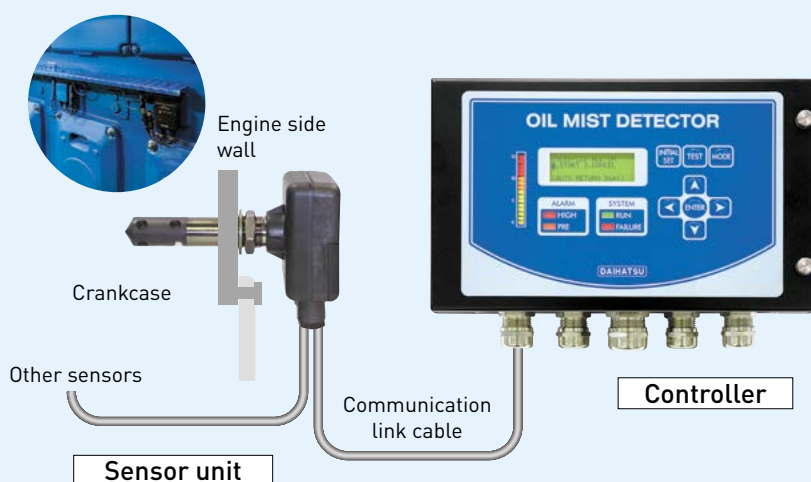


### Connection to inboard system



**Oil mist detector****MD-SX (Sensor type)**

Oil mist detectors for crankcase monitoring are required by classification societies as devices for the protection of internal combustion engines. Daihatsu's MD-SX oil mist detector is type-approved by NK, DNV GL, BV, LR, ABS, CCS, KR and LINA. The MD-SX responds better and is easier to install and maintain than the conventional pipe type. The standard model can be connected with up to 16 sensor points. The MD-SX II (connection of up to 9 sensor points) is designed exclusively for 4-stroke engines and provides excellent protection using a fewer sensor units.

**MD-SX II**

This product estimates the mist level in a crankcase not installed with a sensor unit from the data obtained from the sensors installed in the adjacent crankcases on both sides. Since it is highly responsive even with a reduced number of sensor units, installation costs can be minimized. The MD-SX II is also equipped with a self-diagnosis function to facilitate maintenance and provide extra safety assurance.

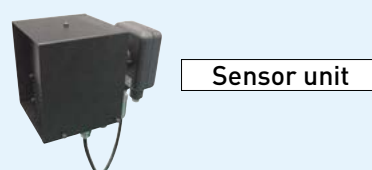
The optional sensor checker enables confirmation of the effectiveness of cleaning during maintenance and verification of proper operation of sensors. It is also possible to add a logging function to record oil mist concentration. Consequently, the MD-SX oil mist detector not only raises an alarm in a conventional manner when the oil mist concentration increases, but also enables the diagnosis and prediction of failure using log data.

**Oil mist monitor****DOMM**

The DOMM installed in an engine room detects oil mist leakage at an early stage. It helps prevent fire resulting from the ignition of oil mist and also helps keep inboard environment safe and clean by preventing oil mist from adhering to equipment and walls to cause oil stains. The International Organization for Standardization (ISO) established the inspection standard for inboard oil mist detectors, "Atmospheric oil mist detectors for ship," in August 2012.



The DOMM can also be used any place in a ship where oil mist is generated. Since the sensors and controller are equipped with a self-diagnosis function just like our oil mist detector, the DOMM facilitates maintenance and provides extra safety assurance.







Moriyama Factory

## From Moriyama and Himeji to the world

Daihatsu's Moriyama Factory manufactures products using a production system that takes full advantage of our expertise and experience accumulated over many years, in order to assure high levels of quality and performance in engines that will set out on journeys around the world. On the environmental front, we take all possible environmental measures commensurate with our environmentally friendly engines, such as the use of gas engines for generating the electricity used inside the factory and complete recycling of factory water. The high quality of the factory underlies the high quality of our products. The same quality has been inherited by a new factory in Himeji that faces the Seto Inland Sea and is being crowned as Daihatsu's Himeji Factory.



Photovoltaic power generation  
(Moriyama Factory)



Technology Development Center  
(Moriyama Factory)



Logistics Center  
(Moriyama Factory)



A view of the factory  
(Himeji Factory)

## The Training Center — Supporting Our Technologies

Mechanics in Training Centers worldwide conduct training in environments that allow trainees to disassemble and assemble actual engines in response to customer requests.



Training Scene (Moriyama Second Factory)



Reduction Gear (Moriyama Second Factory)



Training Room (Moriyama Second Factory)



Training Center (Himeji)





Himeji Factory



Shipping Port (Himeji Factory)



Assembly Shop (Himeji Factory)



Trial Area (Himeji Factory)



Painting Area (Himeji Factory)



Himeji Factory)



Singapore Training Center



Hamburg / Germany Training Center



Dubai / UAE Training Center

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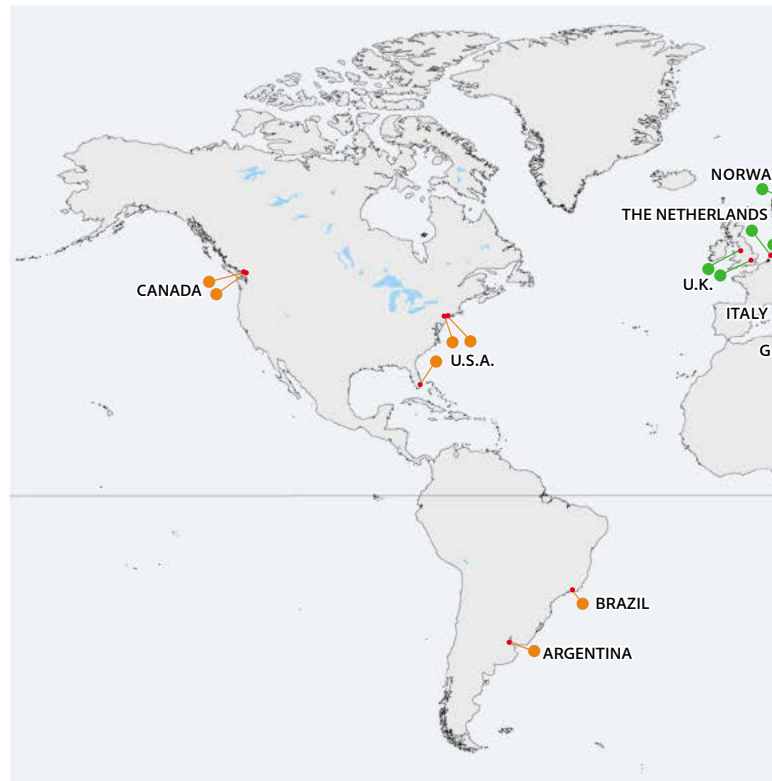
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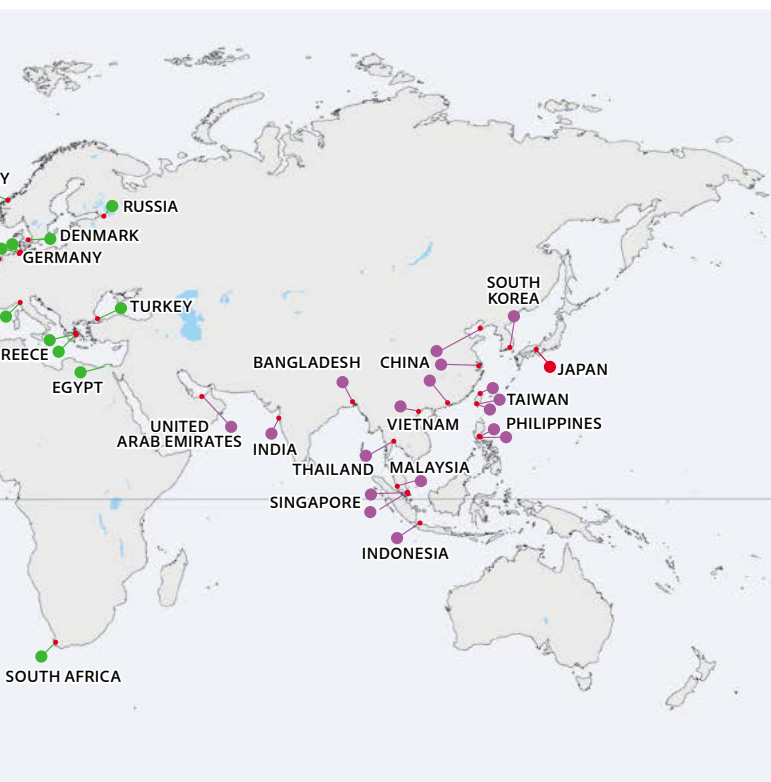
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