

MARINE ENGINE

# MARINE DIESEL ENGINE

**DAIHATSU**

Daihatsu Diesel Mfg. Co., Ltd.

# DAIHATSU

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## Since 1907

Over a century ago, in 1907, we began constructing engines under the company name of Hatsudoki Manufacturing Co., Ltd. (HATSUDOKI is the Japanese term for engine). Since then, Daihatsu Diesel has consistently built engines that are essential for the industrial sector. For all this time, we have continually worked on technological development and the manufacturing spirit to support it. Providing our customers with the best engine systems has allowed us to earn their trust which is the core of the Daihatsu brand. Daihatsu Diesel is, and will be, committed to meeting customer needs by drawing on its many years of experience.



# 1907

In 1907, Hatsudoki Manufacturing Co., Ltd., forerunner of Daihatsu Diesel, was founded in Osaka prefecture. At that time, Japan was in the midst of rapid industrial modernization, and industrial equipments were in urgent need. While Japan was heavily relying on Western technologies, the company set its mission to produce engines in Japan. Daihatsu developed various breakthrough products to establish a “Made in Japan” brand and lead the Japanese industrial sector.



# 1969

In 1969, three years after the founding of Daihatsu Diesel Mfg. Co., Ltd., our manufacturing site moved from Osaka to Moriyama in Shiga prefecture to expand the factory and boost production. The factory is in the vicinity of Lake Biwa, an area known for its pristine natural environment.



To cater for the growing industrial segment, the internal combustion engine division was separated from the automotive division. Specializing in marine and general-purpose diesel engines, Daihatsu Diesel Mfg. Co., Ltd. was founded for further growth.

In 2006, the company’s cumulative production reached 30 million horsepower. Demonstrating the high quality of production, our factories are certified by eight major classification societies.



\* World's first holder of an LR certificate as an engine manufacturer

# 2006

# 1966

# Ingenuity

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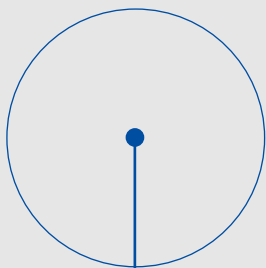
## Power for the future supported by history

Daihatsu Diesel has a rich history of technological development based on ingenuity. We build custom designed engines using our wealth of experience and skill to fulfill customer demand. We make full use of our creativity and flexible thinking to provide our customers with future oriented total solutions.

To that end, Daihatsu Diesel also develops control devices and peripheral systems, as well as offering consultations for safe engine operation and control.





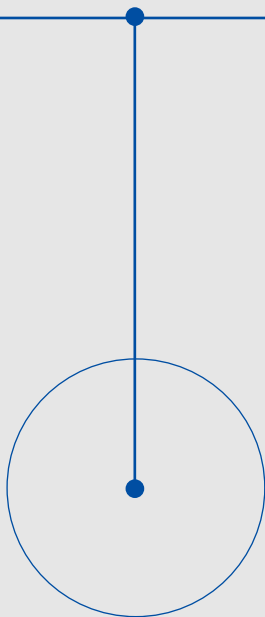


# Technology

Our technology has been developed and refined for over a century. This ensures a high level of product performance and efficiency in various maintenance and repair situations.

To offer quality products, Daihatsu Diesel runs an integrated production system in its factories. The original engines produced here are designed to be lightweight and compact to meet the needs of the next generation.



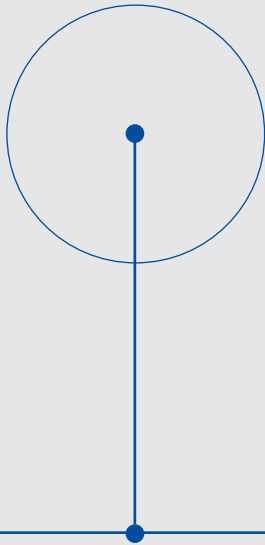


# Reliability

The most important aspect of an engine is reliability. Daihatsu Diesel has built engines with great durability to withstand extended use, supported by our after-sales service and genuine spare parts.

Our customers' trust is based on the reliability of our products. The effort we put in from the design stage ensures trouble-free operation and long maintenance cycles, benefiting our customers economically. We also ensure that our product development data, quality assurance information, and safety information is readily available to all our customers.

With proven durability and stable performance in varying environments world-wide, our products have built solid customer trust.



## Quality

It is of vital importance to supply products of stable quality as well as performance. Daihatsu Diesel operates a strict system of quality control and assurance for each individual component. We provide our suppliers with strict guidance on quality and conduct continuous monitoring to meet customers' quality and performance requirements.

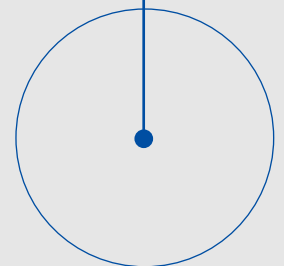
Our commitment to quality over the years has built customer trust. The entire process from design development, manufacturing, assembly, prototyping and testing takes place in-house. This integrated production system enables us to ensure Daihatsu Diesel's dependable quality.



## Environment

Being harmonious with the environment is a common theme throughout Daihatsu Diesel's product development. Our effort to reduce the environmental burden of our products starts at the development stage, and continues all the way to the manufacturing and after-service stages. Specifically, we place strong priority on selecting environmentally-friendly materials and reducing the environmental impact of our manufacturing and treatment methods.

Our engines are rated in the highest efficiency class for reduced CO<sub>2</sub> emissions. We also have various solutions to make our products low-vibration, low-noise, and compatible with increasingly strict environmental regulations.



# Economy

Daihatsu Diesel's technology shapes the future from the perspective of economy. We achieve high fuel efficiency and low lubricant consumption while meeting the strict regulations on exhaust gas. Daihatsu Diesel engines can also reduce running costs with their ability to run on heavy fuel oil.

Optimal design using the latest technology achieves a remarkable level of durability of parts and of the entire engine. Reduction of parts and optimal placement of devices, with workability taken into consideration, reduce disassembly and maintenance man-hours, thereby leading to a reduced cost for our customers.



Daihatsu Diesel is committed to building an affluent society, with its superb technology full of ingenuity and originality growing in harmony with the people around us.



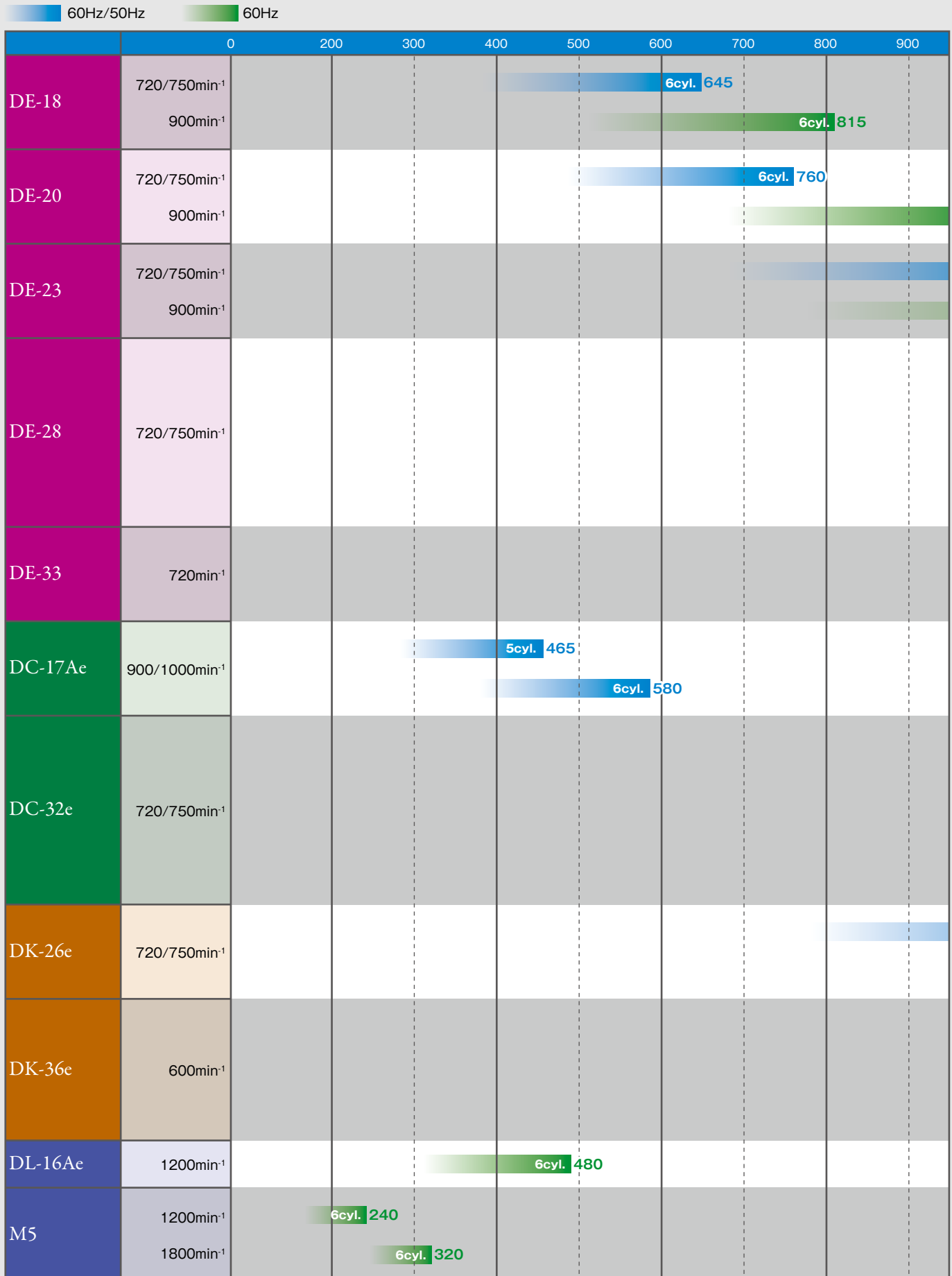


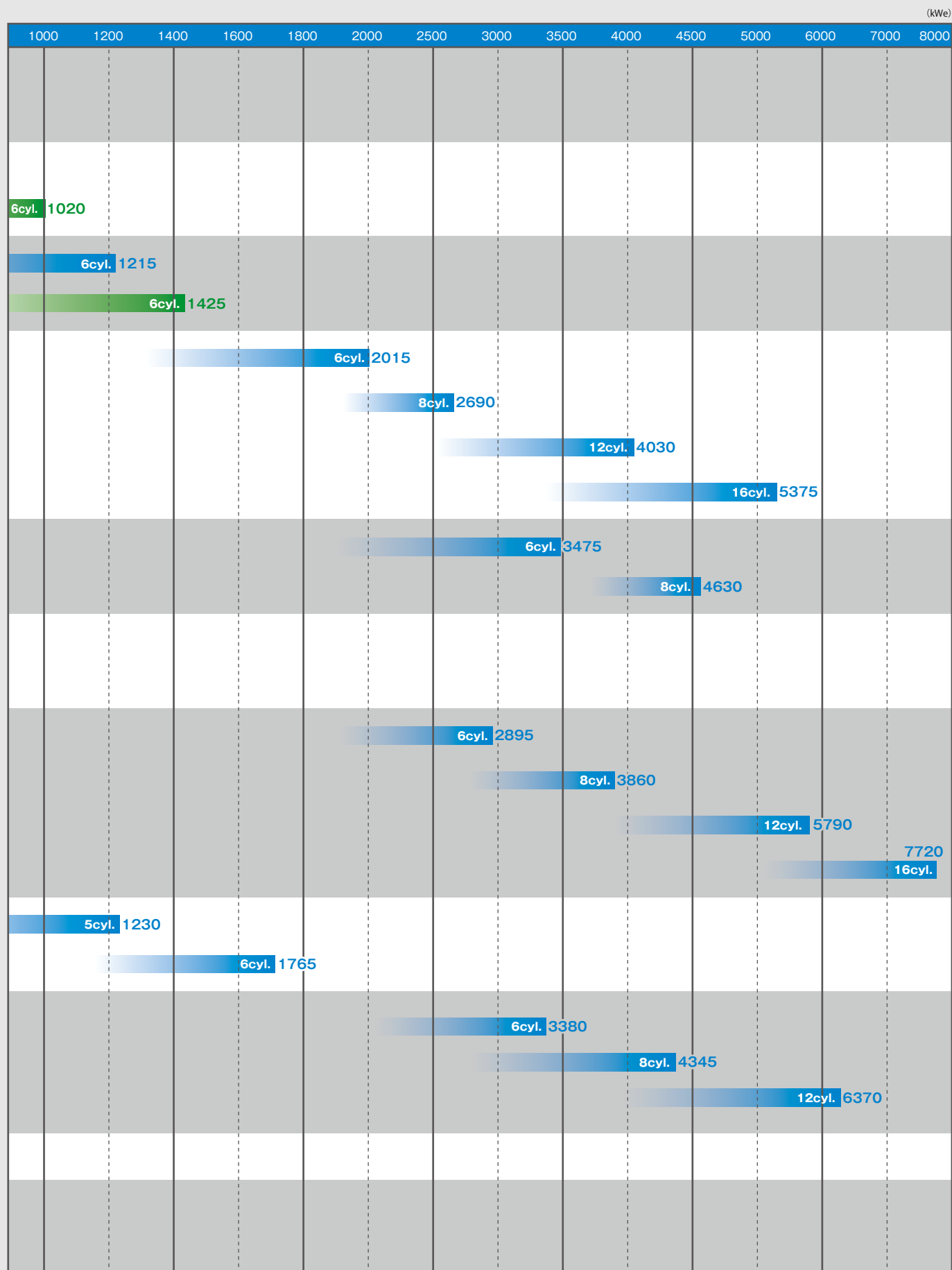
## Diesel Engines For Marine Gensets





# Generator capacity





\* The generator output figures shown above may change depending on the actual generator efficiency.







# DE-18

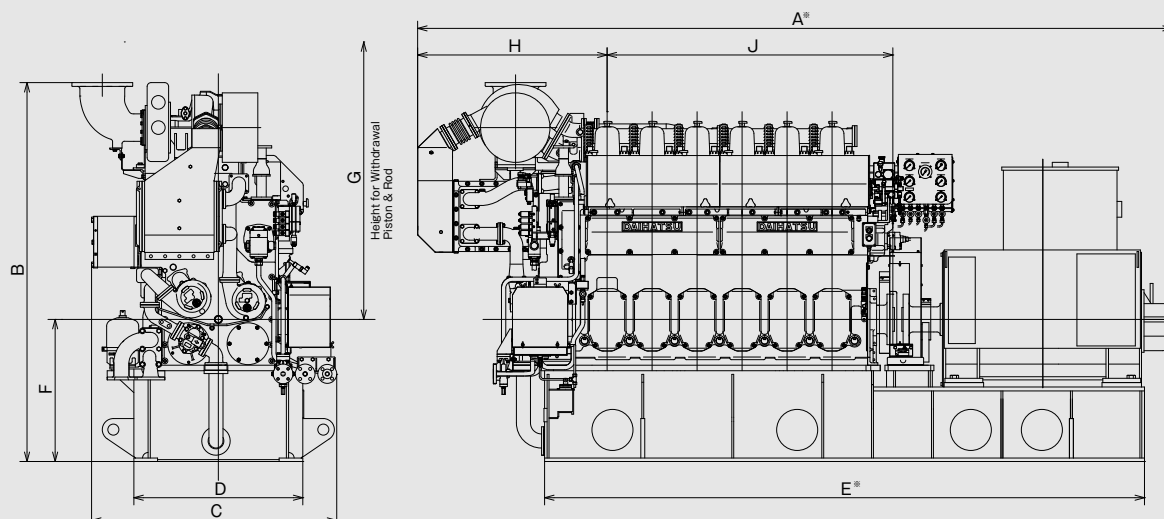
## Main data

Cylinder bore: 185 mm

Piston stroke: 280 mm

No. of cylinders: 6

Pme: 2.5 MPa

Fuel oil: MDO ~ up to 700 mm<sup>2</sup>/s/50°C HFO

## ■ Ratings

Model	Output		Rev.(min <sup>-1</sup> )	
			720/750	900
6DE-18	Engine	kW	680	860
	Generator	kW	645	815

The generator output figures assume that the generator efficiency is approximately 95%.

## ■ Dimensions/Weight

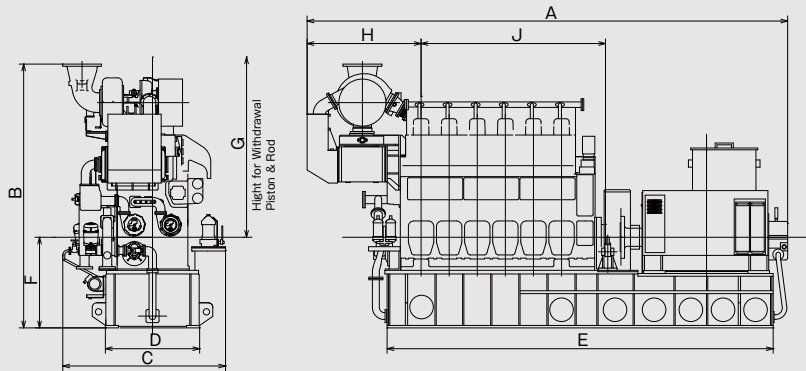
Model	Mark									Dry Weight	
	A	B	C	D	E	F	G	H	J	Total*	
6DE-18	4850	2400	1540	1070	3820	900	2300	1200	1810	13.0	

The figures shown above are subject to change depending on generator specifications.

# DE-20

## Main data

Cylinder bore: 205mm  
 Piston stroke: 300mm  
 No. of cylinder: 6  
 Pme: 2.16 ~ 2.45MPa  
 Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO



## ■ Ratings

Model	Output		Rev.(min <sup>-1</sup> )	
			720/750	900
6DE-20	Engine	kW	800	1090
	Generator	kW	760	1020

The generator output figures assume that the generator efficiency is approximately 95%.

## ■ Dimensions/Weight

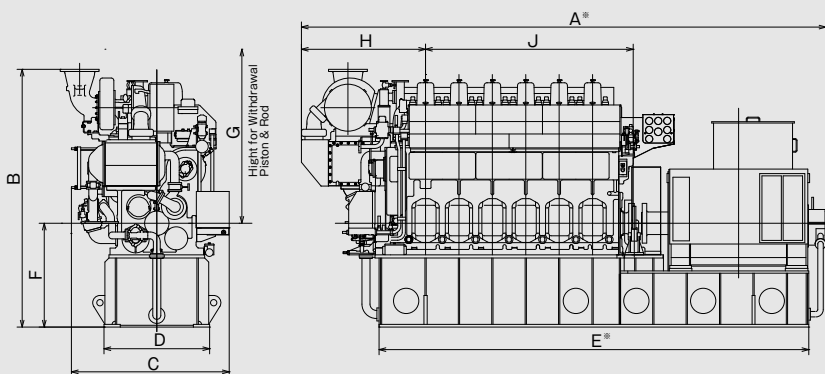
Model	Mark									(mm)	(ton)
	A	B	C	D	E	F	G	H	J	Total*	
6DE-20	5480	2890	1800	960	4430	1000	1575	1240	2035	16.0	

The figures shown above are subject to change depending on generator specifications.

# DE-23

## Main data

Cylinder bore: 230mm  
 Piston stroke: 320mm  
 No. of cylinder: 6  
 Pme: 2.5MPa  
 Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO



## ■ Ratings

Model	Output		Rev.(min <sup>-1</sup> )	
			720/750	900
6DE-23	Engine	kW	1280	1500
	Generator	kW	1215	1425

The generator output figures assume that the generator efficiency is approximately 95%.

## ■ Dimensions/Weight

Model	Mark									(mm)	(ton)
	A	B	C	D	E	F	G	H	J	Total*	
6DE-23	6100	2840	1780	1020	5040	1150	2860	1400	2300	23.0	

The figures shown above are subject to change depending on generator specifications.

## DE-28

## Main data

Cylinder bore: 285mm

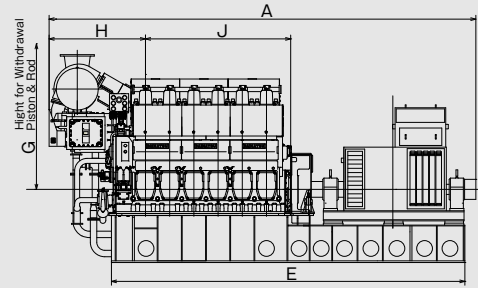
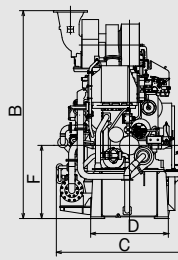
Piston stroke: 390mm

No. of cylinder: 6, 8, 12, 16

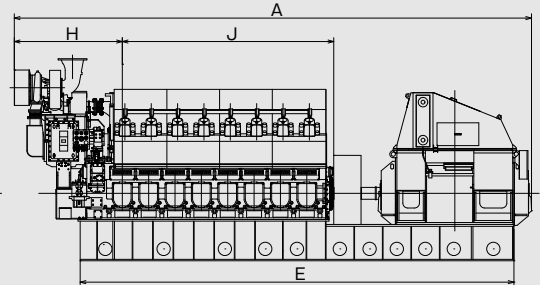
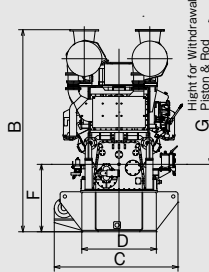
Pme: 2.33 ~ 2.43MPa

Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO

6, 8DE-28



12, 16DE-28



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )
			720/750
6DE-28	Engine	kW	2100
	Generator	kW	2015
8DE-28	Engine	kW	2800
	Generator	kW	2690
12DE-28	Engine	kW	4200
	Generator	kW	4030
16DE-28	Engine	kW	5600
	Generator	kW	5375

The generator output figures assume that the generator efficiency is approximately 96%.

## Dimensions/Weight

Model	Mark									Dry Weight	
	A	B	C	D	E	F	G	H	J	Total*	
6DE-28	6825	3710			6100				2580	35.0	
8DE-28	7865	3830	2235	1230	6780	1300	2065	1095	3440	45.5	
12DE-28	9710				8280				3288	65.5	
16DE-28	10820	4268	2670	1800	9390	1400	2600	2439	4398	75.5	

The figures shown above are subject to change depending on generator specifications.

## DE-33

## Main data

Cylinder bore: 330mm

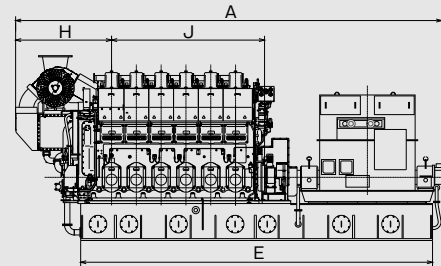
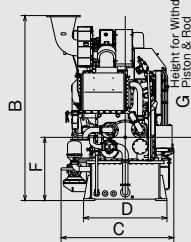
Piston stroke: 440mm

No. of cylinder: 6, 8

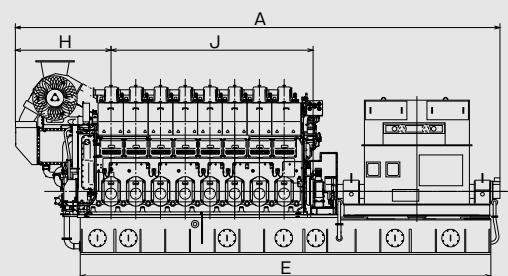
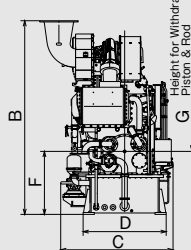
Pme: 2.66MPa

Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO

6DE-33



8DE-33



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )
			720
6DE-33	Engine	kW	3600
	Generator	kW	3475
8DE-33	Engine	kW	4800
	Generator	kW	4630

The generator output figures assume that the generator efficiency is approximately 96.5%.

## Dimensions/Weight

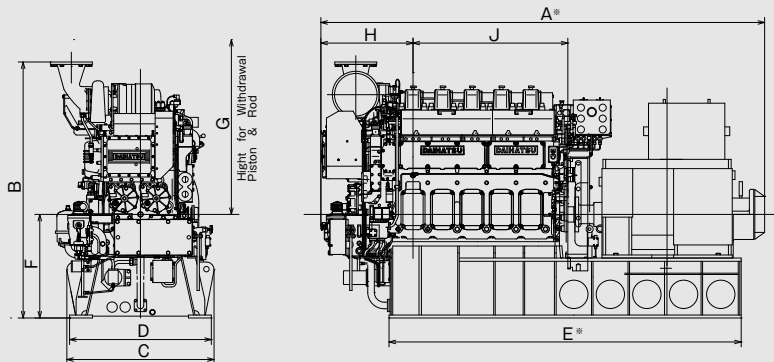
Model	Mark									Dry Weight	
	A	B	C	D	E	F	G	H	J	Total*	
6DE-33	9110	3950			7520				3270	69.1	
8DE-33	10390	4150	2410	1780	8800	1350	2570	2050	4330	83.7	

The figures shown above are subject to change depending on generator specifications.

# DC-17Ae

## Main data

Cylinder bore: 170mm  
 Piston stroke: 270mm  
 No. of cylinder: 5, 6  
 Pme: 2.13~2.21MPa  
 Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )
			900/1000
5DC-17Ae	Engine	kW	490
	Generator	kW	465
6DC-17Ae	Engine	kW	610
	Generator	kW	580

The generator output figures assume that the generator efficiency is approximately 95%.

## Dimensions/Weight

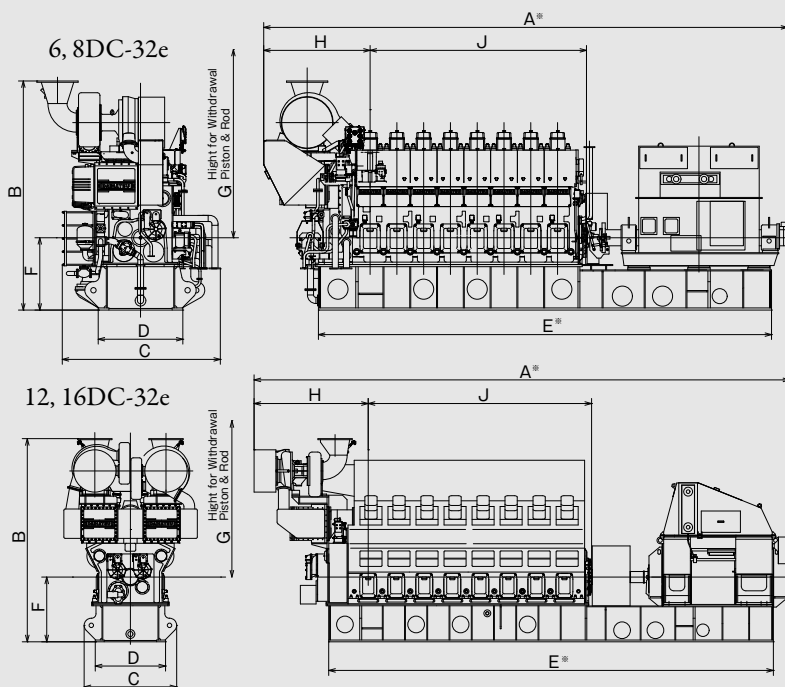
Model	Mark (mm)									(ton)
	A	B	C	D	E	F	G	H	J	Dry Weight Total*
5DC-17Ae	4070	2250	1350	950	3230	950	1435	845	1420	10.0
6DC-17Ae	4510				3565				1690	11.0

The figures shown above are subject to change depending on generator specifications.

# DC-32e

## Main data

Cylinder bore: 320mm  
 Piston stroke: 400mm  
 No. of cylinder: 6, 8, 12, 16  
 Pme: 2.59MPa  
 Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )
			720/750
6DC-32e	Engine	kW	3000
	Generator	kW	2895
8DC-32e	Engine	kW	4000
	Generator	kW	3860
12DC-32e	Engine	kW	6000
	Generator	kW	5790
16DC-32e	Engine	kW	8000
	Generator	kW	7720

The generator output figures assume that the generator efficiency is approximately 96.5%.

## Dimensions/Weight

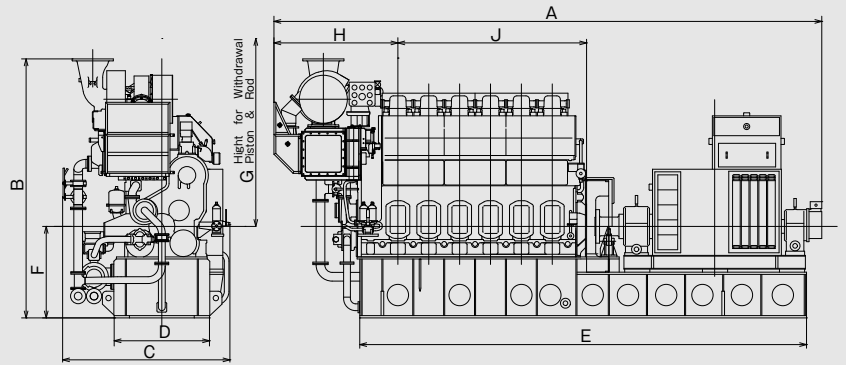
Dimensions/Weight										(mm)	(ton)
Model	Mark									Dry Weight	
	A	B	C	D	E	F	G	H	J	Total*	
6DC-32e	8295	3820	2345	1350	7275	1350	2295	1685	3040	58.0	
8DC-32e	9580	4020			8700				4040	67.0	
12DC-32e	10350	4735	2400	1480	9500	1550	2830	2500	4000	115	
16DC-32e	12000	4735			10500			3000	5000	140	

The figures shown above are subject to change depending on generator specifications.

# DK-26e

## Main data

Cylinder bore: 260mm  
 Piston stroke: 380mm  
 No. of cylinder: 5, 6  
 Pme: 2.11 ~ 2.43MPa  
 Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )
			720/750
5DK-26e	Engine	kW	1280
	Generator	kW	1230
6DK-26e	Engine	kW	1840
	Generator	kW	1765

The generator output figures assume that the generator efficiency is approximately 96%.

## Dimensions/Weight

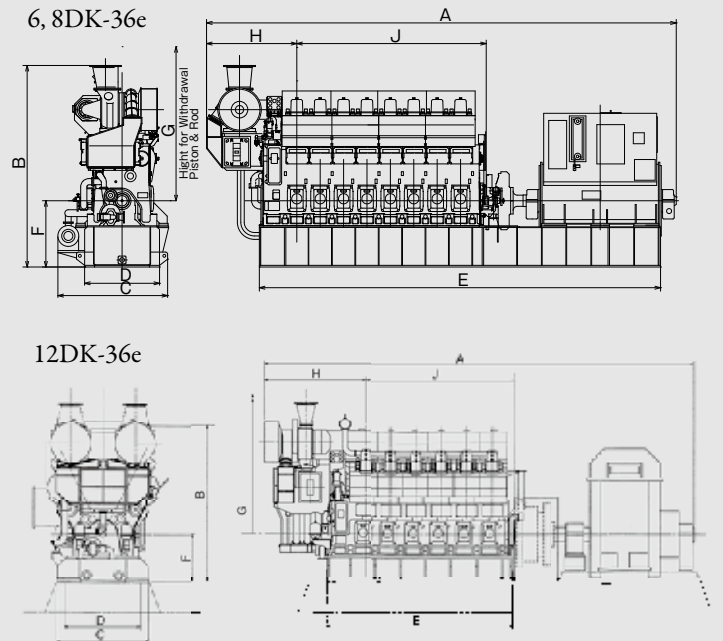
Model	Mark (mm)									Dry Weight (ton)
	A	B	C	D	E	F	G	H	J	Total*
5DK-26e	5770	3250	1990	1190	4700	1200	1970	1580	2065	24.0
6DK-26e	6465	3310			5400				2470	30.0

The figures shown above are subject to change depending on generator specifications.

# DK-36e

## Main data

Cylinder bore: 360mm  
 Piston stroke: 6,8DK; 480mm, 12DK; 460mm  
 No. of cylinder: 6, 8, 12  
 Pme: 2.30 ~ 2.39MPa  
 Fuel oil: MDO ~ up to 700mm<sup>2</sup>/s/50°C HFO



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )
			600
6DK-36e	Engine	kW	3500
	Generator	kW	3380
8DK-36e	Engine	kW	4500
	Generator	kW	4345
12DK-36e	Engine	kW	6600
	Generator	kW	6370

The generator output figures assume that the generator efficiency is approximately 96.5%.

## Dimensions/Weight

Model	Mark									Dry Weight
	A	B	C	D	E	F	G	H	J	Total*
6DK-36e	7500	3818	3360	2300	7400	1800	2930	1965	3445	73.0
8DK-36e	9430	4280	2500		7900				4575	95.0
12DK-36e	11728				5065 Eng only	1325	2710	2764	4074	85.0 Eng only

The figures shown above are subject to change depending on generator specifications.

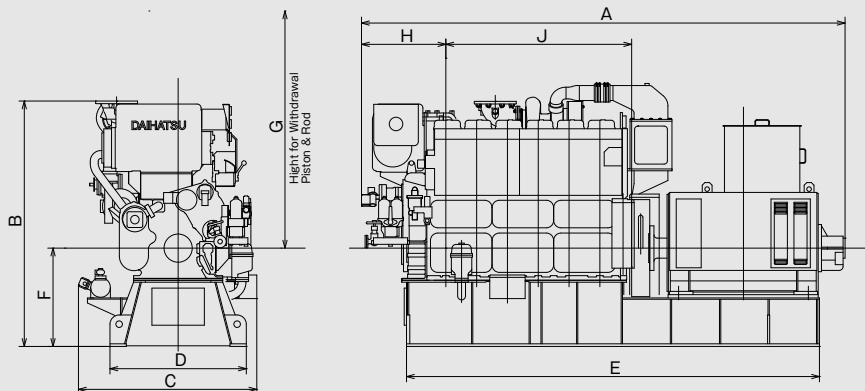


## MARINE DIESEL ENGINE

## DL-16Ae

## Main data

Cylinder bore: 165mm  
 Piston stroke: 210mm  
 No. of cylinder: 6  
 Pme: 1.97MPa  
 Piston speed: 8.40m/sec.  
 Fuel oil: MDO



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )	
			1200	
6DL-16Ac	Engine	kW	530	
	Generator	kW	480	

The generator output figures assume that the generator efficiency is approximately 91%.

## Dimensions/Weight

Model	Mark									Dry Weight	
	A	B	C	D	E	F	G	H	J	Total*	
6DL-16Ac	3700	1800	1230	960	3260	750	1195	645	1418	5.9	

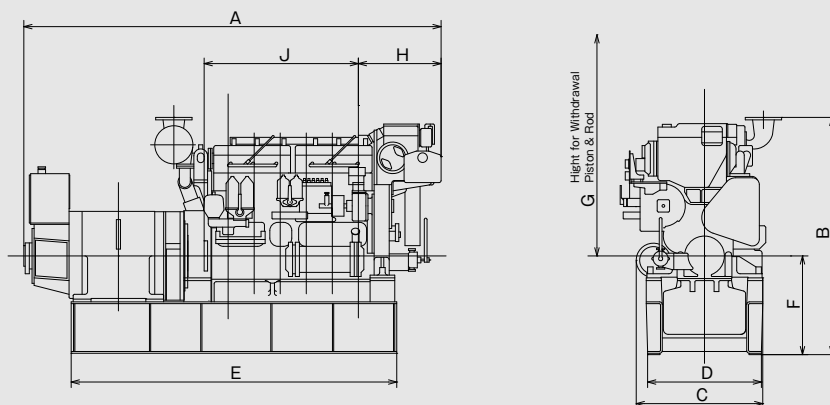
The figures shown above are subject to change depending on generator specifications.

## MARINE DIESEL ENGINE

## M5

## Main data

Cylinder bore: 145mm  
 Piston stroke: 160mm  
 No. of cylinder: 6  
 Pme: 1.97MPa  
 Piston speed: 8.40m/sec.  
 Fuel oil: MDO



## Ratings

Model	Output		Rev.(min <sup>-1</sup> )	
			1200	1800
M5	Engine	kW	265	355
	Generator	kW	240	320

The generator output figures assume that the generator efficiency is approximately 91%.

## Dimensions/Weight

Model	Mark									Dry Weight	
	A	B	C	D	E	F	G	H	J	Total*	
M5	3210	1711	1135	840	2550	720	1130	628	1125	4.2	

The figures shown above are subject to change depending on generator specifications.





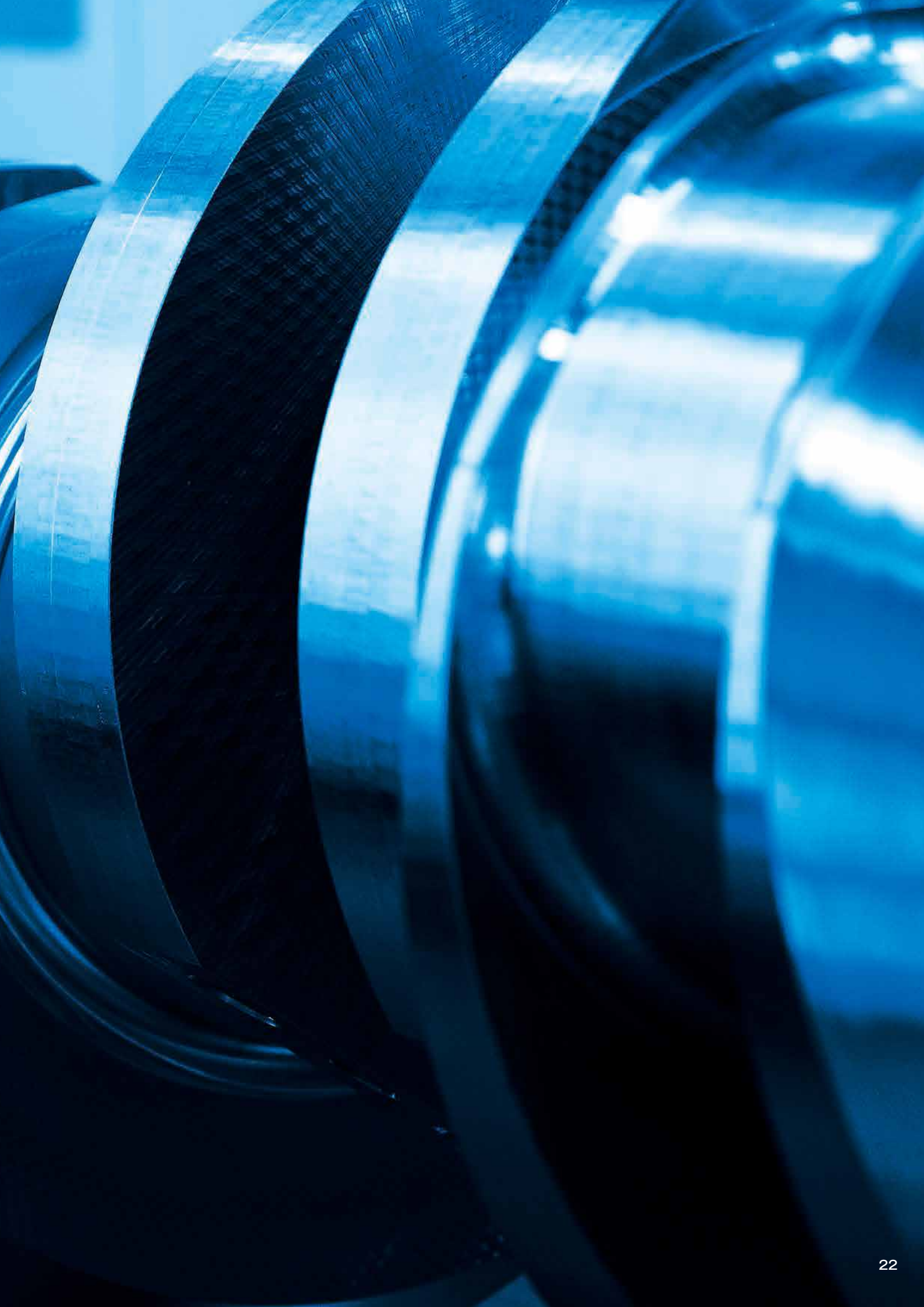
ENGINES FOR GENSETS				ENGINES FOR PROPULSION				MARINE APPLICATIONS			
Generator capacity				Output capacity				SCR Oil Mist Detector			
DE-18				Reduction gears				Diesel Electric Propulsion System Engine Controller			
DE-20/23/28/33				Specifications				Company Factories			
DC-17/32 DK-26/36				Dimensions				Service network			
DL-16/M6				Proof of success							





# Diesel Engines For Marine Propulsion

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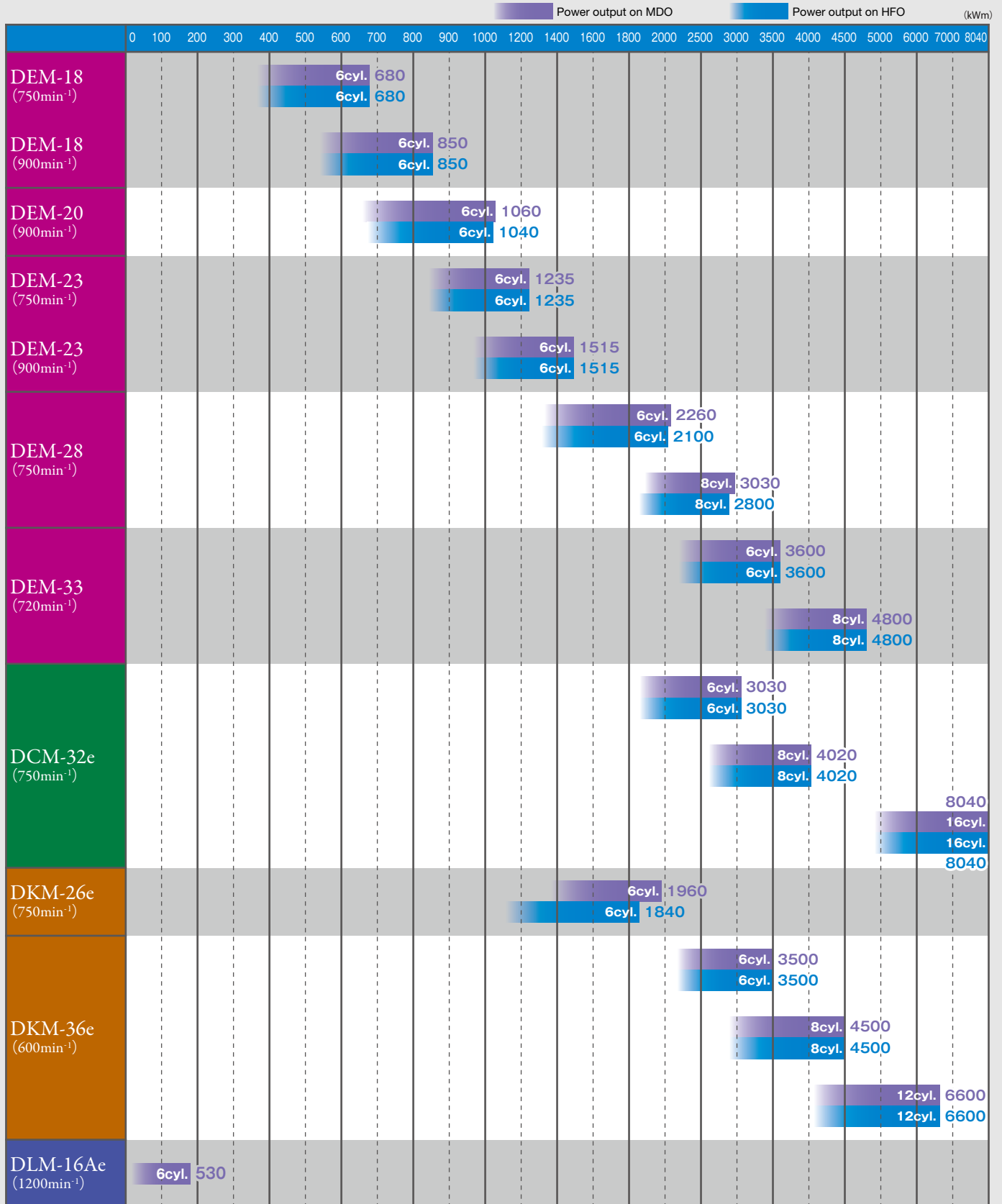


# Output capacity

## A broad range of models to meet diverse needs

Daihatsu's geared diesel engines come in a wide line-up from single-engine single-shaft systems to large multiple-input systems.

Customers can choose the best system based on ship size, fuel, usage and other needs.

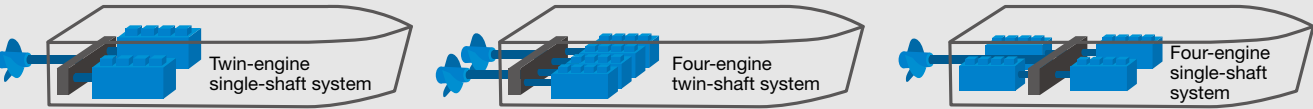


Single-engine single-shaft system



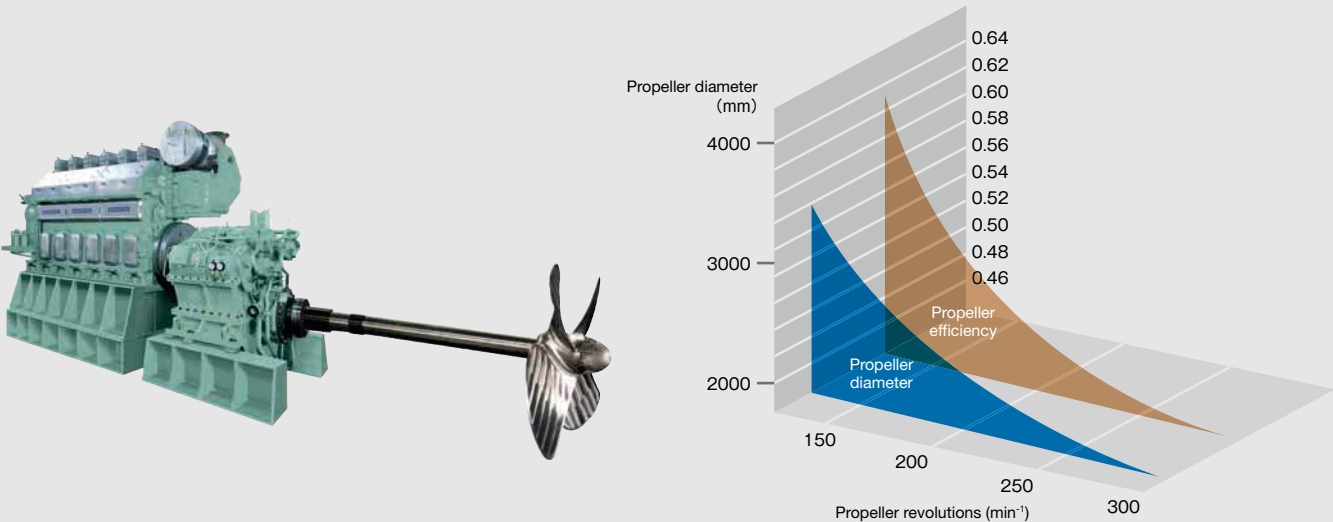
Multiple-Geared configuration

Daihatsu Diesel's multiple-geared configuration is ideal for ships with twin-shaft propellers or low ceiling engine rooms. We offer a wide selection to choose from including the twin-engine single-shaft system, single-engine twin-shaft system, four-engine twin-shaft system, four-engine single-shaft system, and eight-engine twin-shaft system. Selective engine cut-off is also possible for various power requirements.



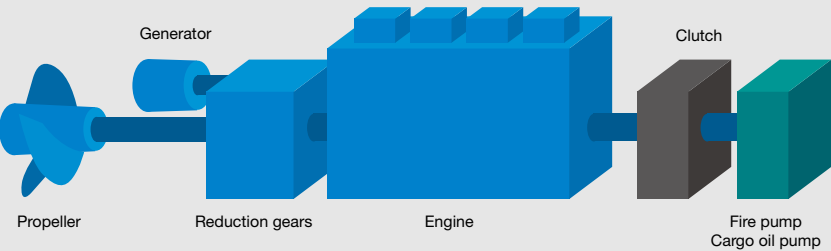
Optimal propeller for various hull designs

With an optimal sized propeller rotating at an rpm 10% lower than conventional propellers, fuel consumption can be decreased by as much as 3%. Daihatsu Diesel's geared diesel engine sets can utilize the propeller that best matches the hull design thus offering greatly improved propulsion efficiency.



Flexible engine layout

With Daihatsu Diesel's geared diesel engine sets, generators, cargo oil pumps, and other machinery can be driven using power drawn from the engine's front end outlet or the reduction gear. This system greatly reduces fuel consumption and on-board equipment, which enables more effective use of engine room space, in addition to reducing initial and maintenance costs.

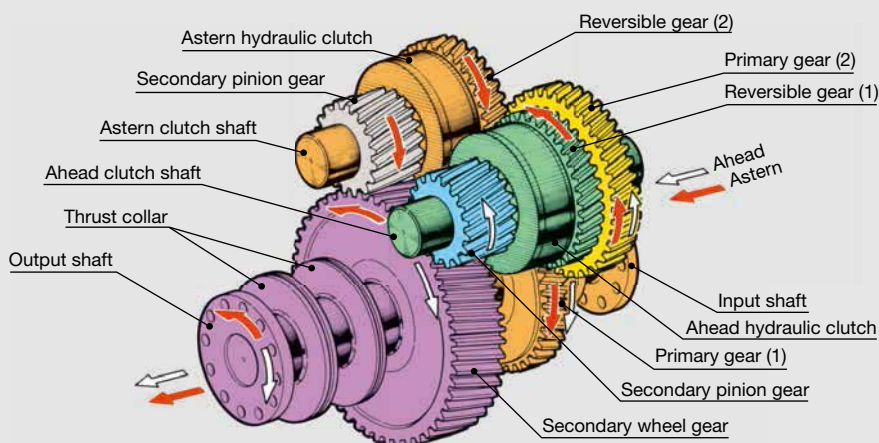
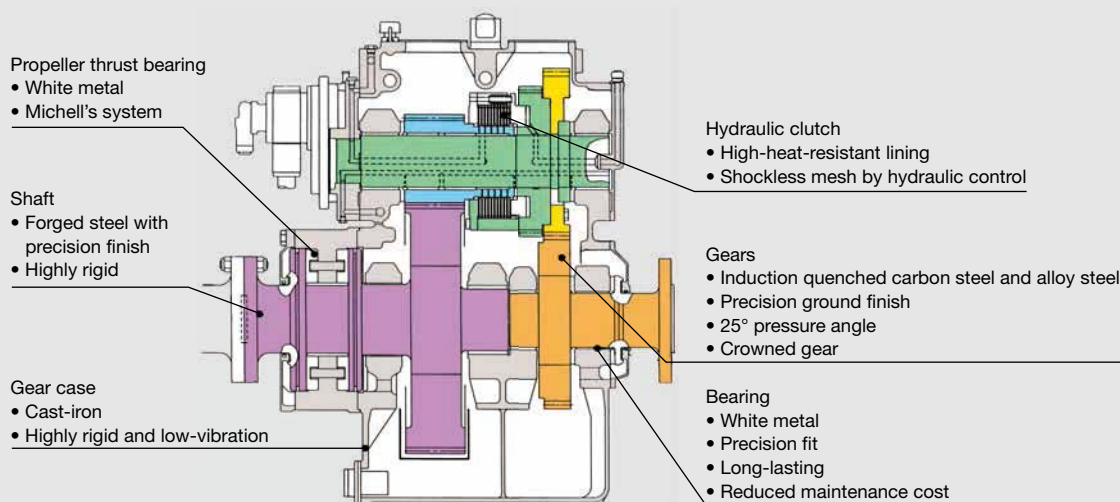


# Reduction gears

## Daihatsu Reduction Gear—One supporting element for high engine reliability

Our reduction gears have a built-in main thrust bearing and wet hydraulic clutch, and can incorporate the crash astern system.

We also have a wide selection of speed-increasing and reduction gears for driving machines attached to the engine front end outlet.

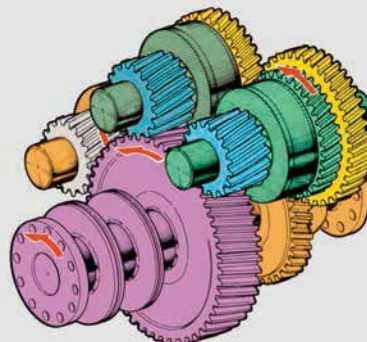


		Model
Single-engine single-shaft	Coaxial	Reversible reduction gear
		2-speed reversible reduction gear (2-speed ahead, 1-speed astern)
		Non-reversible reduction gear
	Offset (vertically/horizontally offset)	Reversible reduction gear
		2-speed reversible reduction gear (2-speed ahead, 1-speed astern)
		Non-reversible reduction gear
Multiple-engine single shaft		Reversible reduction gear
		Non-reversible reduction gear
		DRD (Twin-engine single-shaft)
		DRF (Four-engine single-shaft)
Special speed-increasing/reduction gear		RCD (Twin-engine single-shaft)
		RCF (Four-engine single-shaft)
		Clutchless reduction gear
		Front-end speed-increasing/reduction gear
		Orthogonal speed-increasing/reduction gear
		RG
		FG
		AGP

### Two-Speed Reduction Gear

To meet both requirements of low speed/high thrust for port navigation and high-speed cruising performance for open seas, a two-speed reduction gear configuration is available.

Daihatsu Diesel has developed a two-speed system (2-step ahead, 1-step astern) to maximize efficiency, gaining wide acceptance by our customers as it is suited to all kinds of vessels from freighters to fishing trawlers.

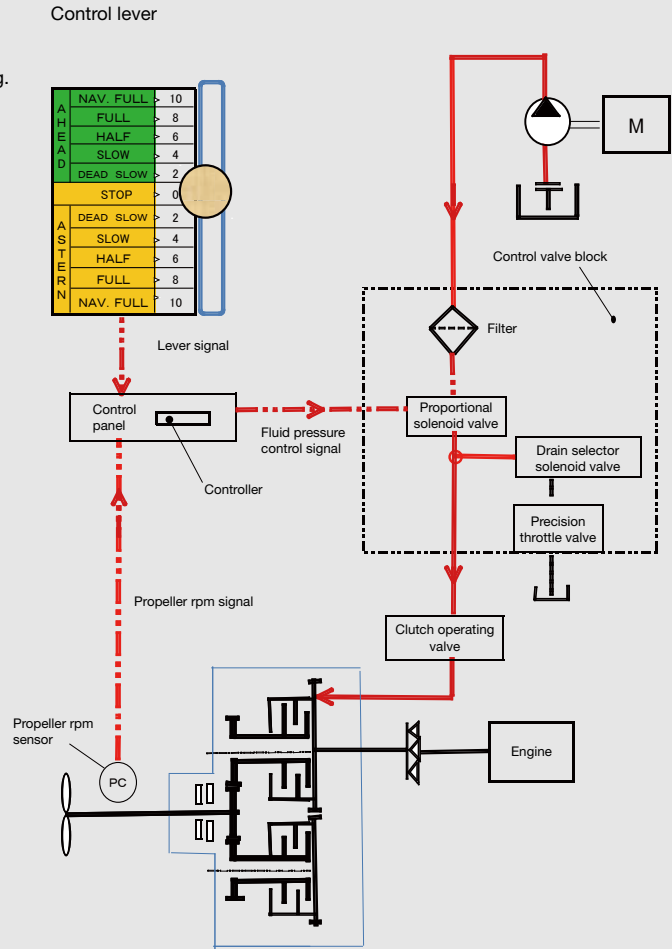


## Electronic clutch control system

The electronic clutch control system performs optimal control of the clutch fluid to achieve shockless clutch meshing and to slip the clutch for dead-slow sailing.

### Features

1. Raises the clutch fluid pressure in an optimal pattern for clutch meshing to reduce shocks and black smoke formation during transient stages of the main engine.
2. Slips the clutch to enable dead-slow sailing and improved navigation at a desired propeller rpm below the idling rpm.

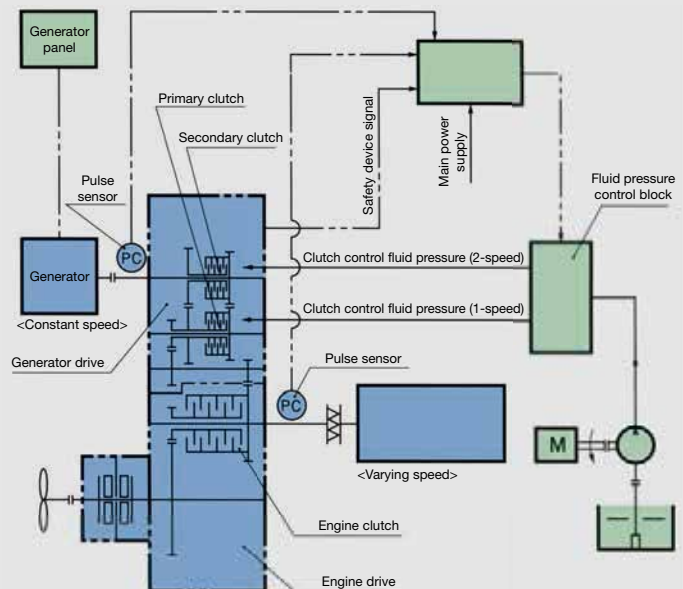


## Constant speed shaft generator output

A constant-speed shaft generator output can be built into the reduction gear. Its electronic governor automatically controls the clutch fluid pressure to slip the clutch, thereby ensuring that the generator revolves at a constant speed against varying engine rpm.

### Features

1. An electronic governor keeps constant generator revolutions, thus ensuring a stable power supply.
2. The two-speed slipping clutch allows the generator to operate in a wide engine revolution range from idling to rated rpm.
3. Generator revolutions and droop can be adjusted easily during generator operation. Load switching to other independent generators and parallel operation can be readily achieved.



# Specifications

Engine model			Output		Engine revs. min <sup>-1</sup>
			MDO kWm (PS)	HFO kWm (PS)	
DEM-18	6DEM-18	750min <sup>-1</sup>	680 (925)	680	750
		900min <sup>-1</sup>	850 (1155)	850	900
DEM-20	6DEM-20	900min <sup>-1</sup>	1060 (1440)	1040 (1410)	900
DEM-23	6DEM-23	750min <sup>-1</sup>	1235 (1680)	1235	750
		900min <sup>-1</sup>	1515 (2060)	1515	900
DEM-28	6DEM-28	750min <sup>-1</sup>	2260 (3070)	2100 (2855)	750
	8DEM-28		3030 (4120)	2800 (3805)	750
DEM-33	6DEM-33	720min <sup>-1</sup>	3600 (4914)	3600	720
	8DEM-33		4800 (6522)	4800	720
DCM-32e	6DCM-32e	750min <sup>-1</sup>	3030 (4120)	3030	750
	8DCM-32e		4020 (5465)	4020	750
	16DCM-32e		8040 (10930)	8040	750
DKM-26e	6DKM-26e	750min <sup>-1</sup>	1960 (2665)	1840 (2490)	750
DKM-36e	6DKM-36e	600min <sup>-1</sup>	3500 (4755)	3500	600
	8DKM-36e		4500 (6115)	4500	600
	12DKM-36e		6600 (8970)	6600	600
DLM-16Ac	6DLM-16Ac	1200min <sup>-1</sup>	530 (720)	—	1200



6DEM-23

Bore mm	Stroke mm	No. of cylinders	R/G model	Gear ratio (typ.)	Propeller revolutions
185	280	6	DRA-11J	2.188	343
			DRB-11J	2.147	349
185	280	6	DRA-11J	2.615	344
			DRB-11J	2.690	335
200	300	6	DRA-19J	3.022	298
			DRB-16J	2.941	306
230	320	6	DRA-25J	2.840	264
			DRB-19J	2.703	277
230	320	6	DRA-25J	3.198	281
			DRB-25J	3.258	276
285	390	6	DRA-40J	3.266	230
			DRB-45J	3.294	228
285	390	8	DRA-80J	3.720	202
			DRB-50J	3.343	224
330	440	6	DRA-100J	3.544	212
			DRB-100J	3.014*	249*
330	440	8	DRA-120J	4.256	176
			DRB-120J	3.722	202
320	400	6	DRA-80J	3.720	202
			DRB-50J	3.343	224
320	400	8	DRA-100J	3.995	188
			DRB-100J	2.972	252
320	400	16V	DRAM-150J	4.692	160
			DRBN-150J		
260	380	6	DRA-30J	2.837	264
			DRB-35J	3.030	248
360	480	6	DRA-80J	3.023	198
			DRB-80J	3.273	183
360	480	8	DRA-100J	3.188	188
			DRB-100J	2.972	202
360	460	12V	DRA-150J	3.175	189
			DRB-150J	3.026	198
165	210	6	DRB-6J	3.192	376

Output figures are as measured at the crankshaft end.  
The asterisk denotes a reference value.



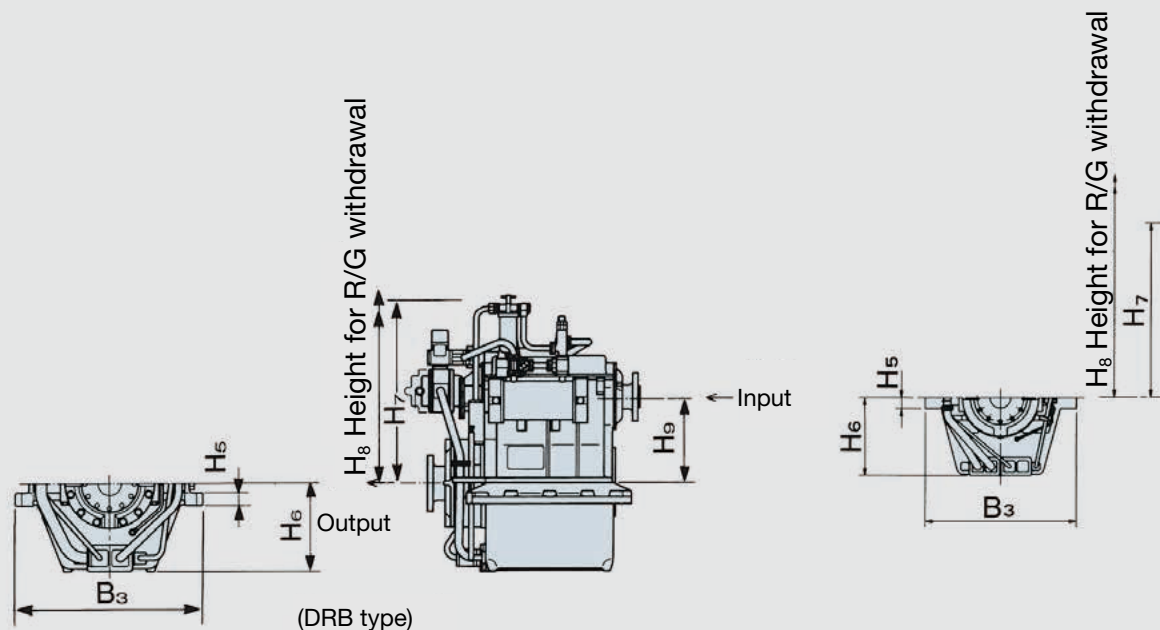
6DCM-32e



6DKM-26e

# Dimensions

Engine model			R/G model	L	L1	L2	B	B1	H1	H2
DEM-18	6DEM-18	750min <sup>-1</sup>	DRA-11J	4759	3019	1740	1590	840	1500	290
			DRB-11J	4619		1600				
DEM-20	6DEM-20	900min <sup>-1</sup>	DRA-11J	4759	3019	1740	1590	840	1500	290
			DRB-11J	4619		1600				
DEM-23	6DEM-23	750min <sup>-1</sup>	DRA-19J	4790	2860	1930	1737	960	1860	365
			DRB-16J	4560		1700				
DEM-23	6DEM-23	750min <sup>-1</sup>	DRA-25J	5303	3233	2070	1727	1050	1870	350
			DRB-19J	5098		1865				
DEM-23	6DEM-23	900min <sup>-1</sup>	DRA-25J	5303	3233	2070	1727	1050	1870	350
			DRB-25J	5253		2020				
DEM-28	6DEM-28	750min <sup>-1</sup>	DRA-40J	5985	3545	2440	2002	1220	2532	430
	8DEM-28		DRB-45J	5980		2435				
DEM-28	6DEM-28	750min <sup>-1</sup>	DRA-80J	7502	4467	3035	2018	1220	2532	430
	8DEM-28		DRB-80J	7437		2970				
DEM-33	6DEM-33	720min <sup>-1</sup>	DRA-100J	9240	5540	3700	2830	1420	2950	500
	8DEM-33		DRB-100J	8800		3260				
DEM-33	6DEM-33	720min <sup>-1</sup>	DRA-120J	8350	4480	3870	2680	1420	2750	500
	8DEM-33		DRB-120J	8150		3670				
DCM-32c	6DCM-32c	750min <sup>-1</sup>	DRA-80J	7054	4189	2865	1993	1450	3042	500
	8DCM-32c		DRB-80J	6889		2700				
DCM-32c	8DCM-32c	750min <sup>-1</sup>	DRA-100J	8852	5189	3663	2669	1450	3077	500
	16DCM-32c*		DRB-100J	8164		2975				
DKM-26e	6DKM-26e	750min <sup>-1</sup>	DRAM-150J	12169	7469	4700	3133	1750	3185	605
	6DKM-26e		DRBM-150J	11669		4200				
DKM-26e	6DKM-26e	750min <sup>-1</sup>	DRA-30J	5735	3395	2340	1961	1180	2338	400
	6DKM-26e		DRB-35J	5485		2090				
DKM-36e	6DKM-36e	600min <sup>-1</sup>	DRA-80J	7895.5	4595	3300.5	1994	1680	3070	605
	8DKM-36e		DRB-80J	7845		3250				
DKM-36e	6DKM-36e	600min <sup>-1</sup>	DRA-100J	9422.5	5722	3700.5	2245	1680	3267	605
	8DKM-36e		DRB-100J	8982		3260				
DKM-36e	12DKM-36e*	600min <sup>-1</sup>	DRA-150J	11878	7378	4500	3224	1920	3372	605
	12DKM-36e*		DRB-150J	11378		4000				
DLM-16Ac	6DLM-16Ac*	1200min <sup>-1</sup>	DRB-6J	3020	1978	1042	1359	880	1050	295



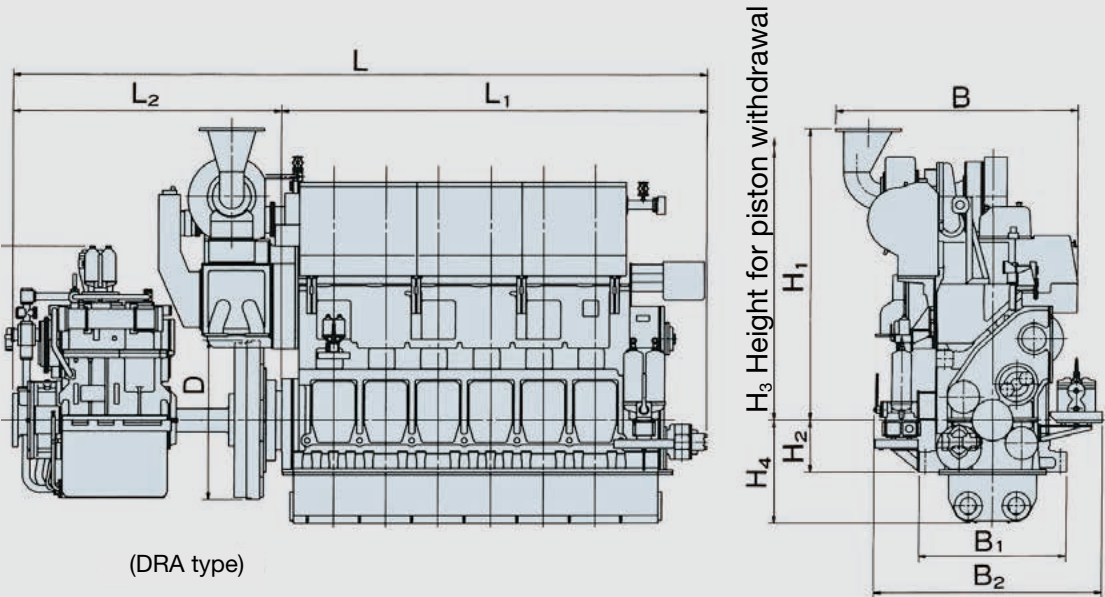


(mm)

H3	H4	D	H5	H6	H7	H8	H9 (Offset)	B2	B3
1400	750	1020	70 55	453 440	1046 921	1100 1100	— 378	1455	990 1190 445+675
1400	750	1020	70 55	453 440	1046 921	1100 1100	— 378	1455	990 1190 445+675
1575	745	1090	80 120	500 485	1198 1280	1500 1400	— 475	1605	1200 1240 520+720
1660	820	1050	120 80	565 600	1224 1255	1580 1300	— 553	1620	1300 1455 595+860
1660	820	1050	120 200	565 630	1224 1096	1580 1250	— 600	1620	1300 1580 650+930
2065	875	1310	100 260	680 800	1387 1321	1740 1470	— 741	1820	1360 1600
2065	875	1170	250	800 830	1532 1583	1800 1880	— 860	1820	1600 2000
2570	1030	1580	250	850 900	1695 1750	2250 2500	— 871	1770	1870
2570	1030	1580	250 300	900 1000	1750 1920	2300 2500	— 1002	1770	2650 2300
2295	1030	910	250	800 830	1532 1583	1800 1880	— 860	2020	1600 2000
2295	1030	910	250 250	850 900	1696 1648	2250 2500	— 871	2020	1870 2250
2820	1065	1330	300 350	1200 1300	1700 1850	2400 2600	— 1150	3133	2500 2700
1970	830	1200	90 200	640 640	1279 1286	1350 1530	— 609	1950	1240 1400
2930	1065	1300	250	800 830	1532 1583	1800 1880	— 860	2060	1600 2000
2930	1065	960	250 250	850 900	1696 1648	2250 2500	— 871	2060	1870 2250
2710	1305	1400	300 350	1200 1300	1700 1850	2400 2600	— 1150	2645	2500 2700
1195	650	590	90	350	720	985	330	1359	940

Weight (ton)	
Engine	Reduction gears
8.0	2 1.8
8.0	2 1.8
11.0	2.8 2.3
14.0	3.8 3
14.0	3.8 3.9
22.0	7 8.8
28.0	12 11
38	21
47	23
35.0	12 11
42.0	18 17
82.0	27 25
18.0	5.5 5.5
51.0	12 11
67.0	18 17
80.0	25 23
3.4	1

The above values may differ depending on specifications and should therefore be considered as reference values.



# Proof of success



Nippon Maru, training ship, National Institute for Sea Training,  
Ministry of Land, Infrastructure, Transport and Tourism  
6DSMB-28NS × 2, Sumitomo Heavy Industries, Ltd.



Hayabusa, ferry, Kyoei Unyu Co., Ltd.  
6DKM-36e(L) × 2, Hakodate Dock Co., Ltd.



Akatsuki Maru, ferry, Uwajima Unyu Ferries  
6DKM-36e(L) × 2, Naikai Zosen Corporation



Tachibana Maru, ferry, Tokai Kisen Co., Ltd.  
6DE-23 × 3, Shimonoeki Shipyard & Machinery  
Works, Mitsubishi Heavy Industries, Ltd.



Hagioshima, ferry, Hagi City  
6DEM-18(L) × 2, Mitsubishi Heavy Industries, Ltd.



Tokuyama Maru, cement tanker, Tokuyama Kairiku  
Unso K.K.  
6DEM-23L × 1, Yamanaka Shipbuilding Co., Ltd.



Ferry Ryukyu, ferry, Kume-Shousen Co., Ltd.  
8DKM-28e(L) × 2, Usuki Shipbuilding Co., Ltd.



Asakaze 21, ferry, Seikan-Ferry Co., Ltd.  
6DKM-36 × 2, Yamanishi Corporation



Suou and Amakusa, support vessels, Ministry of Defense  
6DKM-28 × 2, Keihin Shipyard, Universal  
Shipbuilding Co., Ltd.



Ryofu Maru, research vessel, Japan Meteorological Agency  
6DLM-40AL × 1, Ishikawajima-Harima Heavy  
Industries Co., Ltd.



Taiko, ferry, Nomo Shosen K.K.  
6DCM-32e(L) × 2, Usuki Shipbuilding Co., Ltd.



Saipila Soya, ferry, Heart Land Ferry Co., Ltd.  
8DKM-28(L) × 2, Naikai Zosen Corporation



Kaiyo, research vessel, Japan Coast Guard  
6DLM-24S(L) × 2, Shimonoeki Shipyard &  
Machinery Works, Mitsubishi Heavy Industries, Ltd.



Mirai, research vessel, Japan Marine Science & Technology Center  
6DKM-28F(L) × 4, Shimonoeki Shipyard &  
Machinery Works, Mitsubishi Heavy Industries, Ltd.



Hamayu, ferry, Kampu Ferry Co., Ltd.  
8DLM-40A(L) × 2, Shimonoeki Shipyard &  
Machinery Works, Mitsubishi Heavy Industries, Ltd.



Ferry Iheya, ferry, Iheya village office, Okinawa  
6DKM-28(L) × 2, Yamanaka Shipbuilding Co., Ltd.



Hokuo Maru, fishery control boat, Hokkaido  
Government  
6DKM-28(L) × 2, Narasaki Shipbuilding Co., Ltd.



Fukae Maru, training ship, Kobe University  
6DLM-26S × 1, Mitsui Engineering & Shipbuilding  
Co., Ltd.



Emerald Karatsu, ferry, Kyushu Yusen K.K.  
8DKM-28 × 2, Kumamoto Dock Co., Ltd.



Ferry Tokashiki, ferry, Tokashiki village office, Okinawa  
6DKM-28e(L) × 2, Watanabe Shipbuilding Co., Ltd.



Shioji Maru, training ship, Tokyo University of Marine Science  
and Technology  
6DLM-26SL × 1, Tokyo Works, Ishikawajima-Harima Heavy  
Industries Co., Ltd.



Yuge Maru, training ship, Yuge National College of  
Maritime Technology  
6DLM-24SL × 1, Mitsui Engineering & Shipbuilding Co., Ltd.



Ieshima, ferry, Ie village office, Okinawa  
6DKM-28e(L) × 2, Kumamoto Dock Co., Ltd.



Manyo, ferry, Kyushu Shosen Co., Ltd.  
6DCM-32(L) × 2, Naikai Zosen Corporation



Kumamoto Maru, training ship, Kumamoto  
Prefectural Reiyo High School  
6DKM-26F × 1, Nagasaki Shipyard Co., Ltd.



Mizunagi, training ship, Kyoto Prefectural Marine  
High School  
6DEM-23FL × 1, Niigata Shipbuilding & Repair, Inc.



Ferry Oki, ferry, Oki Kisen Co., Ltd.  
6DKM-36(L) × 2, Shimonoeki Shipyard & Machinery  
Works, Mitsubishi Heavy Industries, Ltd.



New Koshiki, ferry, Koshikishima Shosen Co., Ltd.  
6DKM-26(L) × 2, Kanda Shipbuilding Co., Ltd.





Kinryo Maru No. 15, LPG tanker, Tada Shipping Co., Ltd.  
6DKM-26eL × 1, Hakata Shipbuilding Co., Ltd.



Ryunan III, cargo, MKKLINE Co., Ltd.  
6DKM-28eL × 1, Yamanaka Shipbuilding Co., Ltd.



Koyo Maru, ocean salvage tug boat, Japan Ocean Tug Co., Ltd.  
& Nippon Salvage Co., Ltd.  
8DLM-40A(L) × 2, Shimonoseki Shipyard & Machinery Works,  
Mitsubishi Heavy Industries, Ltd.



Subaru, cable laying ship (electric propulsion), Nippon Telegraph  
& Telephone Corp.  
8DK-32 × 4, Shimonoseki Shipyard & Machinery Works,  
Mitsubishi Heavy Industries, Ltd.



Fukko Maru, liquid tanker, Nakaei Marine Co., Ltd.  
6DEM-23L × 1, Sasaki Shipbuilding Co., Ltd.



Koryu Maru, liquid tanker, Koryu Shipping Co., Ltd.  
6DKM-28eL × 1, Sasaki Shipbuilding Co., Ltd.



Hua Cai, supply boat, Shanghai Maritime Rescue and  
Salvage Bureau  
8DKM-28(L) × 2, Tung Hai Shipbuilding, China



Tianjing Hao, 4,500 m³ self-propelling dredger,  
Tianjing Waterway Bureau  
8DKM-36(L) × 2, pump-driving 8DK-36 × 2



Koshu Maru No. 8, tanker, Fujitsuna Kaiun K. K.  
6DCM-32 × 1, Yamanaka Shipbuilding Co., Ltd.



Yamatani, heavy cargo ship, NYK Bulk & Projects Carriers Ltd.  
6DKM-36e(L) × 2, Nagasaki Shipyard & Machinery Works,  
Mitsubishi Heavy Industries, Ltd.



Chang Jin 2, 8,000 m³ dredger, Chang Jiang  
Waterway Bureau  
12DKM-36 × 2



Ri You 668, offshore purse seiner, Ri You Fishery  
Corporation  
8DKM-28e × 1, Zhong Xin Shipbuilding Corporation



Risshin Maru, cement tanker, Wakamiya Kisen K.K.  
6DKM-36F × 1, Miura Shipbuilding Co., Ltd.



Kosei Maru, chemical tanker, Tabuchi Kaiun K.K.  
6DKM-28L × 1, Maehata Shipbuilding Co., Ltd.



Feng Guo 869, purse seiner, Feng Guo Fishery Corporation  
8DKM-28e × 1, Qing Fu Shipbuilding Corporation



Houkou Maru, tug boat, Yoshinaga Kaiun Ltd.  
6DEM-23L × 1, Kanbara Shipbuilding Co., Ltd.



Tensho Maru #2, tanker, Tanba Kisen K.K.  
6DKM-26L × 1, Maehata Shipbuilding Co., Ltd.



Daiko Maru 21, pure car carrier, Kokoku Kaiun K.K.  
6DKM-36 × 1, Hashihama Dockyard, Co., Ltd.



Jin Gang Shu 26, tug boat, Tianjin Shipping Co., Ltd.  
8DKM-28eF × 2, Shanghai Fuxing Shipping Service  
Company



Yungang 16, tug boat, Lianyungang Port Group Co., Ltd.  
6DKM-26 × 2, Jiangsu Zhengjiang Dockyard LLC



Seiyo Maru, tug boat, Shoyo Kisen K.K.  
6DKM-32(L) × 2, Kanagawa Dockyard Co., Ltd.



Hakuho Maru, tug boat, Nitto Tugboat Co., Ltd.  
6DKM-26(L) × 2, Kanagawa Dockyard Co., Ltd.



Tenno Maru #81, purse seiner, Daiyu Fishery Co., Ltd.  
6DKM-28F × 1, Izutsu Shipyard Co., Ltd.



Genpuku Maru #81, offshore purse seiner, Kanei  
Bussan Co.  
6DKM-32 × 1, Miho Shipyard Co., Ltd.



Morning Breeze, LNG tanker, Toda Kisen K.K.  
6DKM-36 × 1, Nakatani Shipbuilding Co., Ltd.



Takasago, container carrier, Imoto Line, Ltd.  
6DKM-28(L) × 1, Yamanaka Shipbuilding Co., Ltd.



Ikitsuki, fishery control boat, K.K. Taishu  
8DKM-28L × 1, Izutsu Shipyard Co., Ltd.



Soho Maru #83, purse seiner, Fukushima Fishery Co., Ltd.  
6DKM-36L × 1, Miho Shipyard Co., Ltd.

ENGINES FOR GENSETS	Generator capacity	DE-18	DE- 20/23/28/33	DC-17/32 DK-26/36	DL-16/M6	ENGINES FOR PROPULSION	Output capacity	Reduction gears	Specifications	Dimensions	Proof of success	MARINE APPLICATIONS	SCR Oil Mist Detector	Diesel Electric Propulsion System Engine Controller	Company Factories	Service network

# Control Devices and Peripheral Systems

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# SCR SYSTEM

## Daihatsu-DEC Marine SCR system to meet new environmental standards

Expected to be applied in and after 2016, the IMO NOx Tier III Regulations demand an 80% reduction in NOx emissions compared to Tier I levels.

As a solution to the strict requirements of the new regulations, Daihatsu Diesel employs a selective catalytic reduction (SCR) system. This compact highly reliable and durable system performs aftertreatment of exhaust gases. Daihatsu Diesel delivers the SCR system together with a diesel engine as a package and also offers after-sales service to ensure the system's reliability and durability in marine usage.

### Features of the Daihatsu-DEC Marine SCR system

#### 1. Denitrification performance compliant with IMO NOx Tier III Regulations

- Use of SCR technology under license of DEC Marine, the company that has shipped more than 350 units of SCR.

#### 2. Structure with built-in bypass duct (patented)

- The built-in bypass duct eliminates the need for the space and labor required for installing a dedicated bypass tube.
- A self-controlled SCR/bypass select damper is included.

#### 3. Compact design facilitates onboard placement

- A vertical or horizontal SCR reactor is available for even a silencer-integrated structure.
- A special urea solution nozzle reduces the vaporization distance.

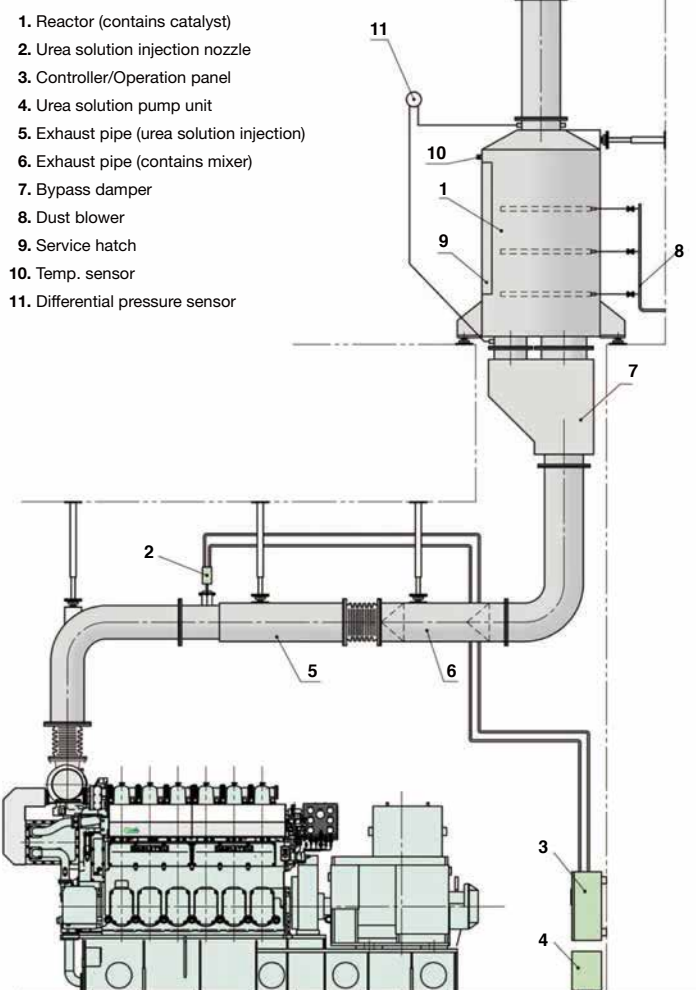
#### 4. Low running cost

- The special urea solution nozzle and electronically controlled automatic operation achieve the optimal amount of urea solution injection.

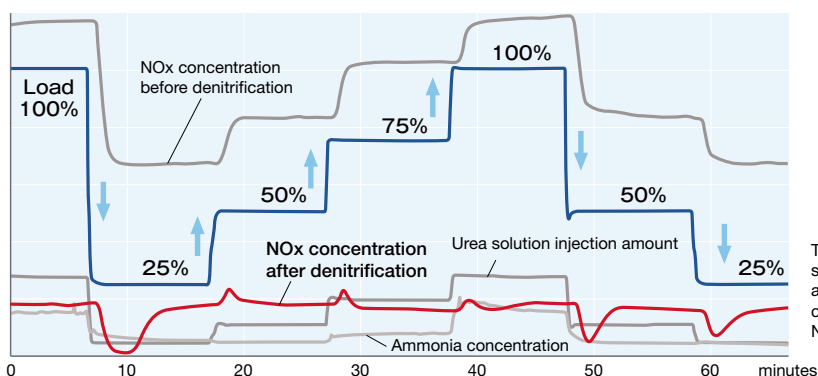
#### 5. High resistance to vibration

- Vibration-isolating supports for SCR reactor.
- Sufficient degree of Ample catalyst strength.

#### SCR system (vertical)



### Measurement data (example of automatic operation)



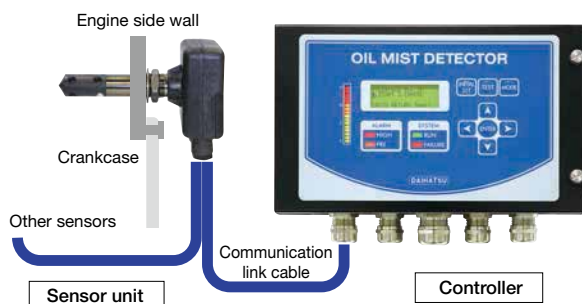
The optimal amount of injected urea solution is automatically controlled according to the engine load, to consistently meet the regulatory NOx limit.



Classification societies demand that an oil mist detection device must be installed in the crankcase as a protective device for internal combustion engines. The MD-SX oil mist detector complies with their requirements and has already gone through type approval certificate tests by the following classification societies: NK, DNV GL, BV, LR, ABS, CCS, KR and LINA.

The standard controller can connect up to 16 sensors. To pursue cost-effectiveness by reducing the number of sensors, the MD-SX II (connecting up to nine sensors) is available exclusively for four-stroke engines. The response of this device is comparable to the standard type even with fewer sensors. The key is that it estimates the mist level of a sensor-less crankcase from data from sensors installed in the crankcases on either side of the sensor-less crankcase. This controller ensures improved security in terms of maintenance since it has a self-diagnosis capability.

### MD-SX (Sensor Type)



Oil Mist Monitor is a trade name of Daihatsu Diesel Mfg. Co., Ltd. for inboard oil mist detectors. In recent years, one increasing trend on oil and chemical tankers has been the installation of indoor oil mist detectors. The purpose is to maintain safety and cleanliness at an improved level by detecting oil mist leakage in proximity to an inboard high-pressure fluid-driven pump at an early stage, preventing the ignition of oil mist and resultant fire, and avoiding oil mist contamination of equipment and walls near the pump. Likewise, oil mist detectors have been increasingly installed at other inboard locations similarly subject to the formation of oil mist. In line with this trend, in August 2012, the International Organization for Standardization (ISO) established "Atmospheric oil mist detectors for ships" as an inspection standard for inboard oil mist detectors.



Sensor checker



# DOMM



# Diesel Electric Propulsion System

## Electric propulsion system from Daihatsu Diesel

The electric propulsion system differs from the systems on conventional ships in that it turns the propeller via an electric motor rather than using the diesel engine to directly turn the propeller. It is an economical and reliable system that can reduce CO<sub>2</sub> emissions.

### Design Friendly

- Distributed placement of small equipment facilitates optimal hull form design.
- Versatile propulsion motors are suitable for all types of propeller.

### People Friendly

- Medium-speed engines are easy to insulate against vibration and sound ensuring improved onboard quietness.
- Multiple engine configurations enhance safety and redundancy.
- Use of an optimal propeller improves navigation.
- Compact and lightweight components facilitate onboard work.

### Environment Friendly

- Optimal hull form improves propulsion efficiency.
- Optimal control of electric power reduces fuel consumption.
- Medium-speed engine reduces NOx emissions.

### Customer Friendly

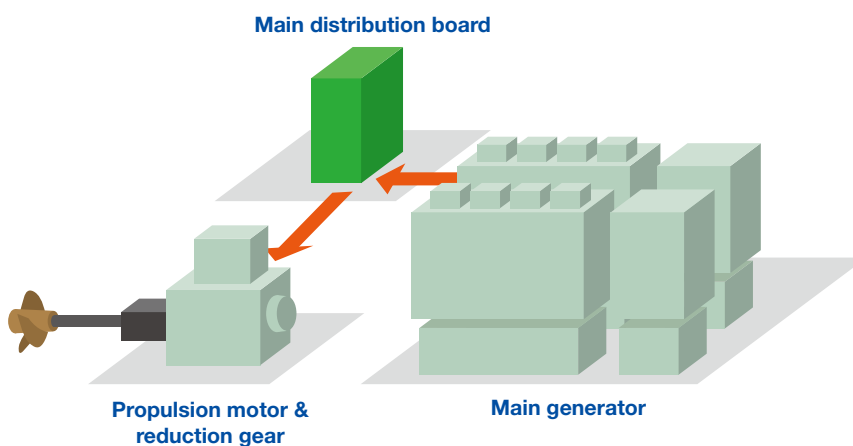
Daihatsu Diesel can provide customers with total solutions covering propellers, electric equipment and generators. We can also provide:

- Navigation plans
- Equipment placement plans
- Determination of equipment specifications and procurement



"MV CBO ATLANTICA" (PX-106 model)

## Overall system flow



Bridge Interior



Engine room: 6DK-26 × 3

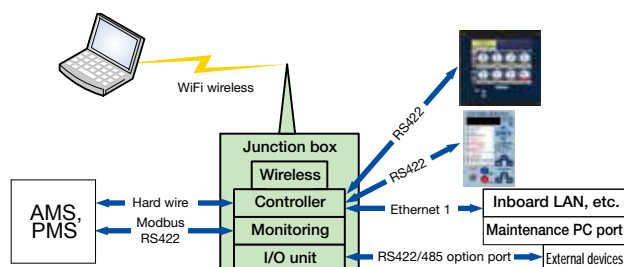
### Improved engine reliability

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

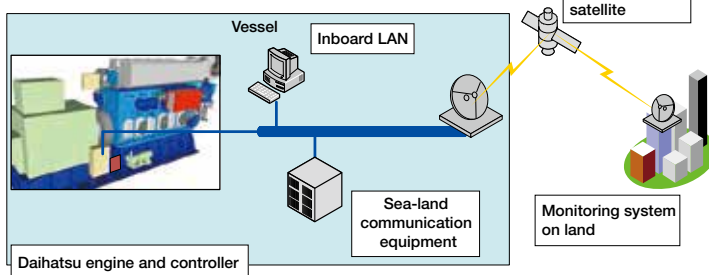
- ### Example installation on engine



- ### Engine controller input/output features



### Connection to inboard system





# Company Information

**Daihatsu Diesel has technology backed by over 100 years of experience and know-how, enabling us to respond to changes in the environment and meet the challenges ahead.**

The diesel engine has the highest energy efficiency of any internal combustion engine. Daihatsu Diesel provides the global market with a stable source of mechanical energy. At the same time, we are diligent in our efforts to minimize air and marine pollution. We look at the environment with a deep love and make the best use of our technology.

## Company history

- Mar 1907: Hatsudoki Manufacturing Co., Ltd. was founded at Oyodo Naka 1-chome, Kita-ku, Osaka.
- Apr 1922: Commenced the manufacture and sale of super diesel engines.
- Dec 1951: The company name changed to Daihatsu Motor Co., Ltd.
- May 1966: The Osaka business division, which was building marine and general-purpose diesel engines, was separated from Daihatsu Motor Co., Ltd. to form Daihatsu Diesel Mfg. Co., Ltd.
- Aug 1969: Moriyama Factory (Shiga Prefecture) commenced operation.
- Nov 1977: Listed on the Second Section of the Osaka Securities Exchange.
- Jan 1979: Moriyama Second Factory (Shiga Prefecture) commenced operation.
- Jan 1982: Technology licensing agreement concluded with the China State Shipbuilding Corporation.
- Oct 1988: Aluminum Manufacturing Plant constructed at Moriyama Second Factory.
- Sep 1990: Head Office moved from Kita-ku, Osaka to Chuo-ku, Osaka.
- Mar 1993: Umeda Sky Building completed as a joint development project at the former Head Office site.
- Jan 1994: Became ISO 9001 certified.
- Feb 1999: Sales agreement on small gas turbines concluded with Toyota Turbine and Systems Inc.
- Dec 2000: Commenced sale of food waste treatment systems.
- Dec 2000: Moriyama Factory became ISO 14001 certified.
- Oct 2001: Technology Development Center and Historical Literature Museum were built at Moriyama First Factory.
- Dec 2001: Diesel engine technical tie-up agreement concluded with HSD Engine Co., Ltd. of Korea.
- Jan 2003: Commenced development of a large dimethyl ether (DME)-fired diesel engine generation system jointly with NKK Corporation (present JFE Engineering Corporation) and Iwatani Corporation.
- Apr 2004: Opened Taiwan Office.
- Oct 2004: Gas engine technical tie-up agreement concluded with Mitsui Engineering & Shipbuilding Co., Ltd.
- Jul 2005: Head Office moved from Chuo-ku, Osaka to Kita-ku, Osaka.
- Jun 2006: 40th anniversary of Daihatsu Diesel Mfg. Co., Ltd.
- Aug 2006: Company's cumulative diesel engine production reached 30 million horsepower.
- May 2008: R&D Center built at Moriyama Second Factory.
- Jul 2010: Licensing agreement concluded with Doosan Engine Co., Ltd. of Korea.
- Sep 2010: Founded joint capital venture MD Engineering Co., Ltd. with Mitsui Engineering & Shipbuilding Co., Ltd.
- Jul 2011: Licensing agreement concluded with Kilroskar Oil Engines Limited of India.
- Mar 2012: Licensing agreement concluded with a Chinese technical partner on the MD-G series of gas engines jointly developed with Mitsui Engineering & Shipbuilding Co., Ltd.
- Mar 2013: Design completed for a lineup of marine selective catalytic reduction (SCR) systems.  
Became the world's first holder of a Statement of Compliance with the IMO Tier III NOx emission limits.
- Jul 2013: Listed on the Second Section of the Tokyo Stock Exchange due to merger between Tokyo Stock Exchange and Osaka Securities Exchange.
- Jun 2014: Asia Headquarters opened in Singapore. Offices opened in Jakarta and Manila.

# Factories

**The factory, the sacred birthplace of the engine, must be functional and comfortable and be a place of ecological progress.**

To produce ecological engines, the production site must be comfortable for operators and friendly to the environment. With this belief, Daihatsu Diesel, while meeting the challenge of never-ending production efficiency improvement, is striving for environmental conservation so that the factory becomes a place of ecological progress.



## Facilities/Equipment



Training Center



Technology Development Center



Research building



Photovoltaic power generation



Logistics Center



Historical Literature Museum



Power recovery system



ABS



BV



CCS



DNV



GL



KR



LR



NK

## Quality certificates

Daihatsu Diesel factories have been approved by the world's eight major classification societies (ABS, BV, CCS, DNV GL, KR, LR and NK).

# Service network

**Daihatsu Diesel promises our customers a comprehensive range of after-sales service.**

We run a computer-controlled inventory management system to enable prompt and accurate maintenance services in response to customer requests.



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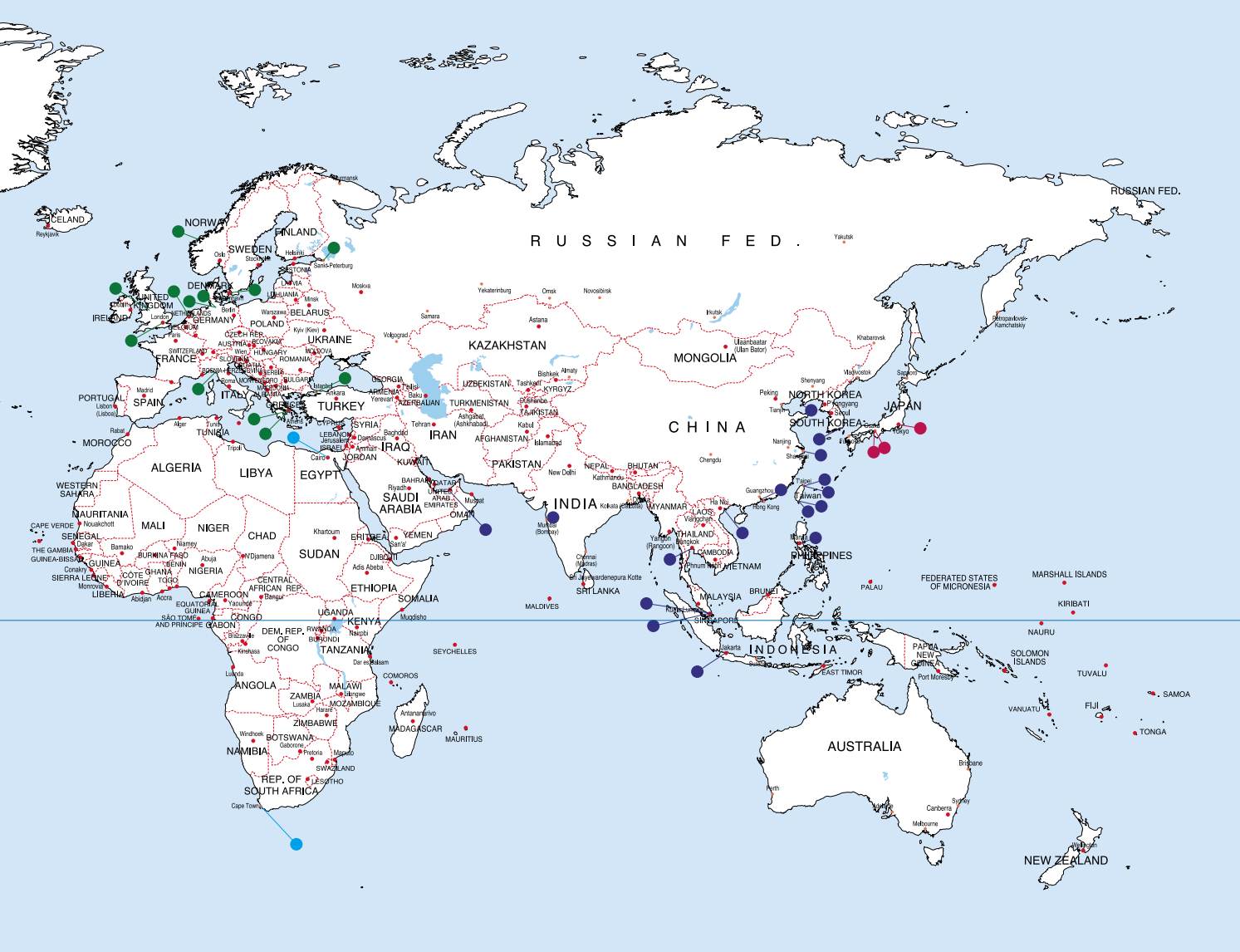
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● All information contained in this Pamphlet is corrected at the time of printing, but will be subject to change without notice.