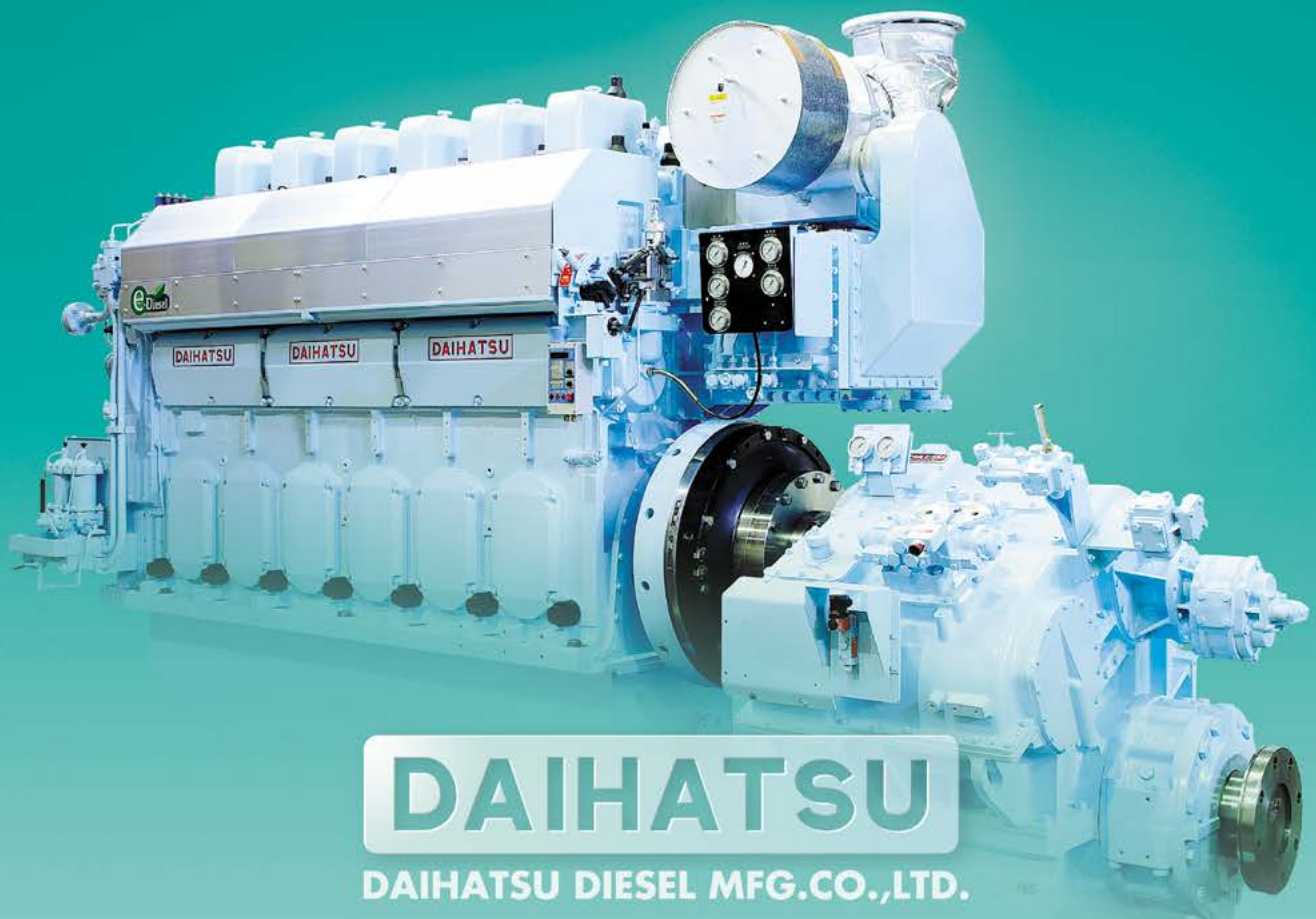


# MARINE PROPULSION DIESEL ENGINE

General Catalog



**DAIHATSU**  
DAIHATSU DIESEL MFG.CO.,LTD.

# Next Motion

## Creating next-generation propulsion systems

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

Daihatsu Diesel's 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.

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



6DEM-23

DAIHATSU DIESEL  
Since 1907



Output chart	Output chart
Advantages of geared diesel engines	Geared diesel
Reduction gear	Reduction gear
Specifications	Specifications
Dimensions chart	Dimensions
Examples of delivered products	Examples
Marine equipment	Equipment
Moriyama/Himeji factory	Factories
Service network	Network



## Continually refining technologies All for achieving higher reliability

Daihatsu Diesel continually verifies accumulated knowhow and data and reflects them in products with the aim of ensuring safe and worry-free operation.

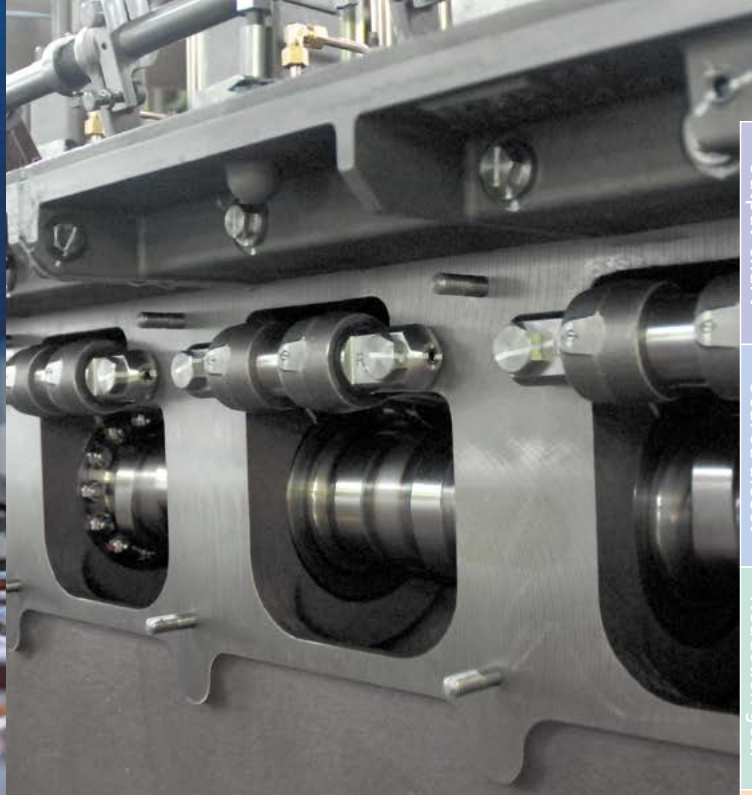
One of the most important performance factors, "reliability," achieved through these efforts is bolstered by all the parts and components that comprise the diesel engine.

Our diesel engines are at work even at this very moment to help provide safe and worry-free operation of ships on all the seas and oceans around the world.



### Clean & Powerful

e-Diesel engines are gentle to the earth's environment. They boast reduced NOx emissions as well as high fuel efficiency for reduced CO<sub>2</sub> emissions.



Output chart

Geared diesel

Reduction gear

Specifications

Dimensions

Examples

Equipment

Factories

Network



ABS



BV



CCS



DNV-GL



KR



LRS



NK

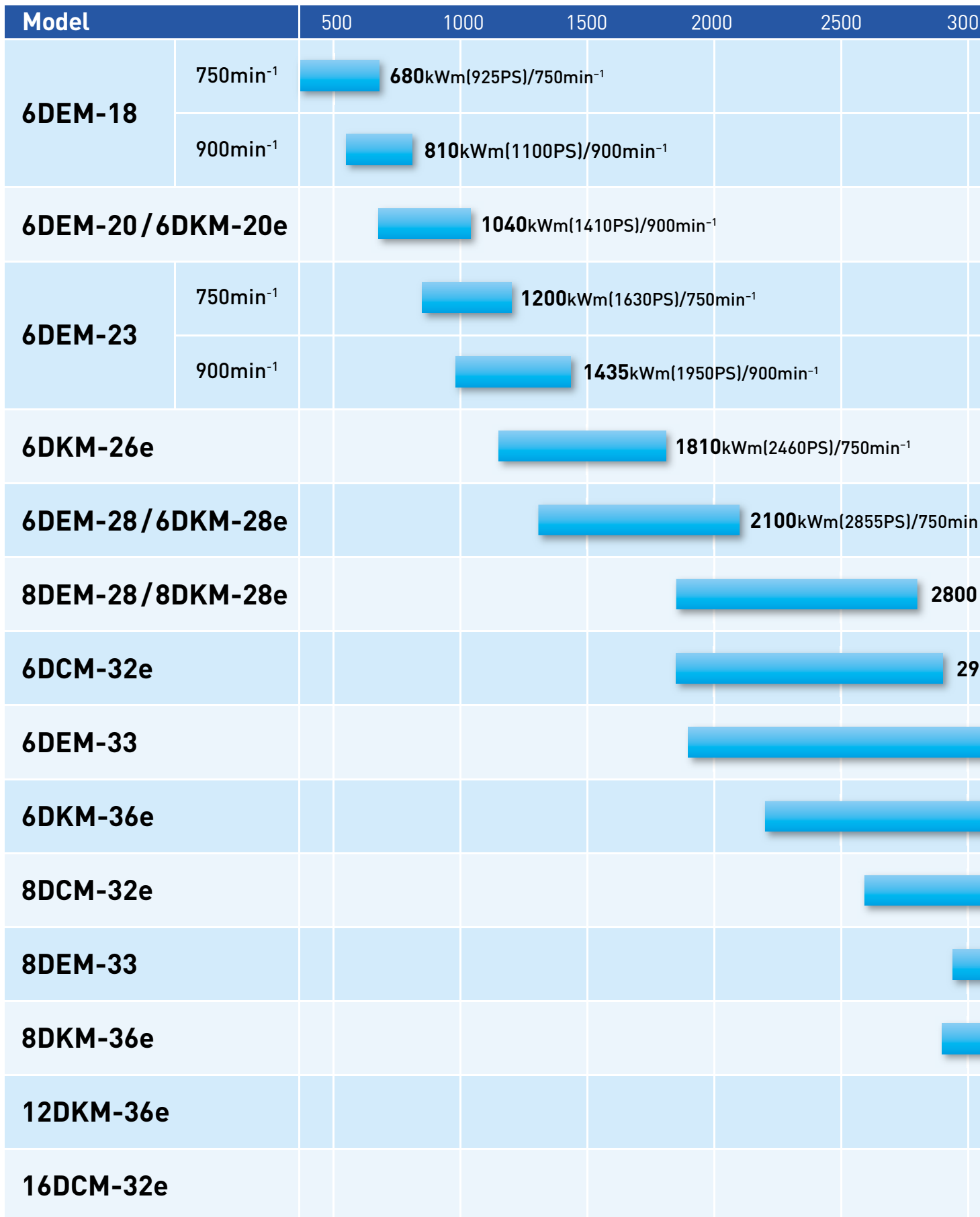


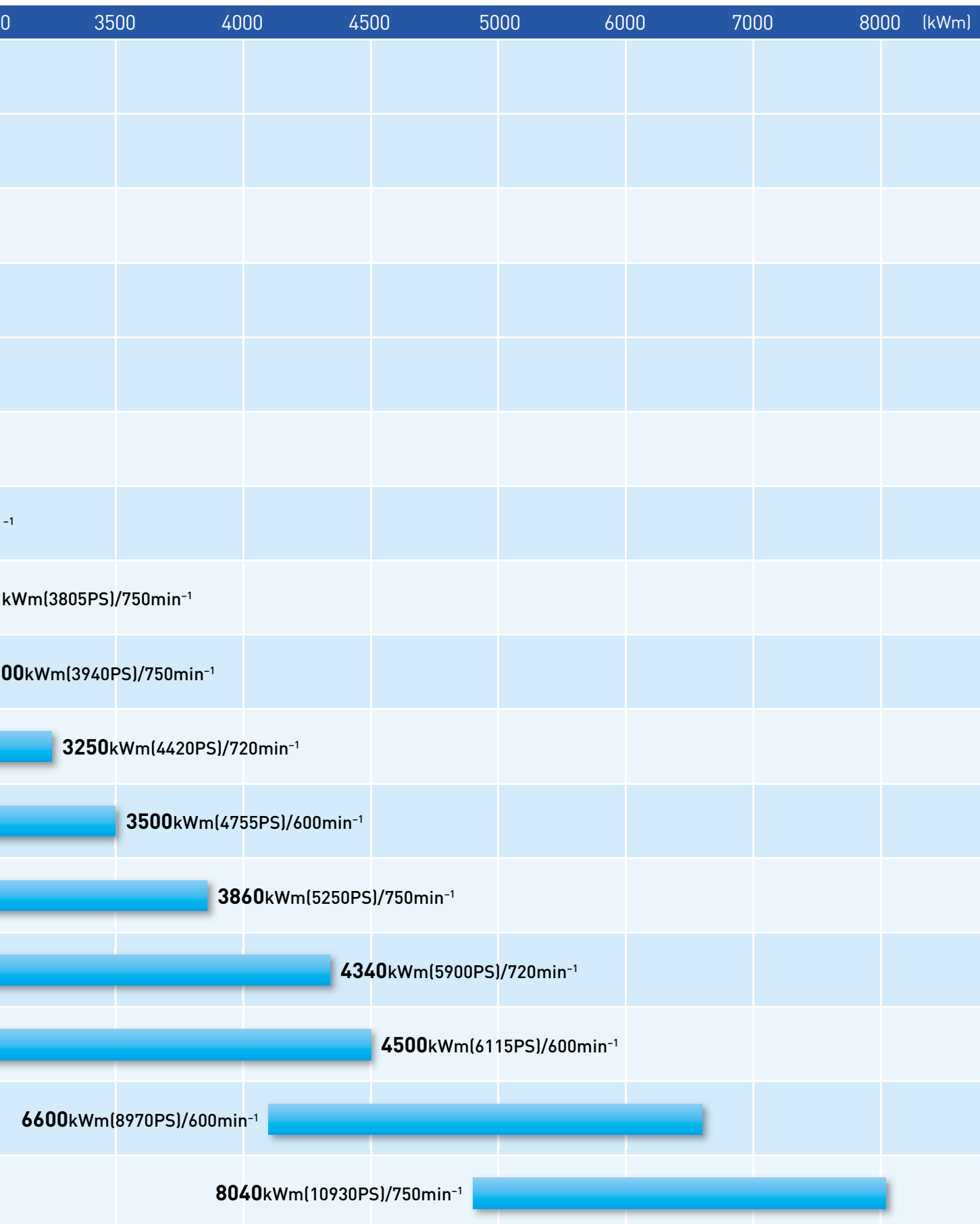
RS



ABS(American Bureau of Shipping), BV(Bureau Veritas),  
 CCS(China Shipping Classification Association),  
 DNV-GL, KR(Korean Register of shipping),  
 LRS(Lloyd's Register of Shipping),  
 NK(Nippon Kaiji Kyokai),  
 RS(Russian Maritime Register of Shipping)

# Output chart





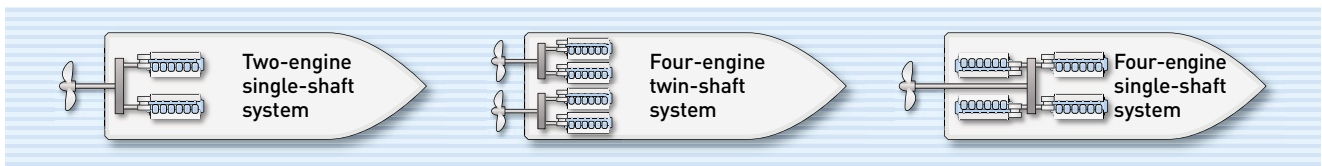
# Multiple-Geared Diesel Engine

## A Wide Variation to Meet a Wide Range of 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, etc.

### 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.

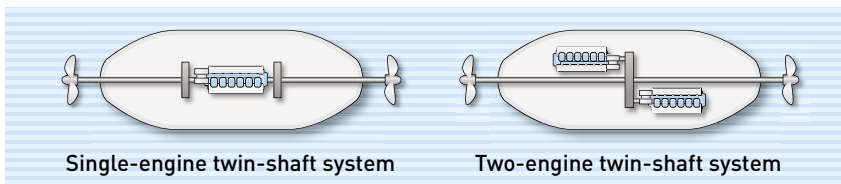


### Single-Engine Twin-Shaft System for Double-Bow Ships

Daihatsu Diesel engines are at work onboard double-bow ships navigating narrow channels or short routes, or which operate as sightseeing boats on river cruises, etc. A single engine drives the propellers on the bow and stern. Any combination of single-engine twin-shaft system and Daihatsu's remote control system can be selected according to steering demands and guarantees improved navigation.

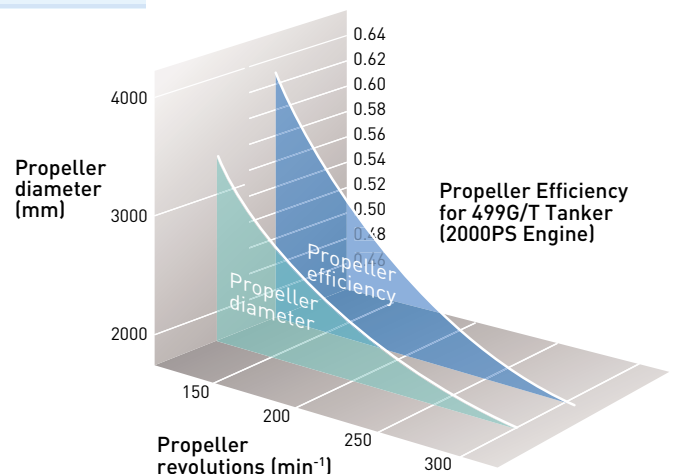


6DKM-20e



### 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.



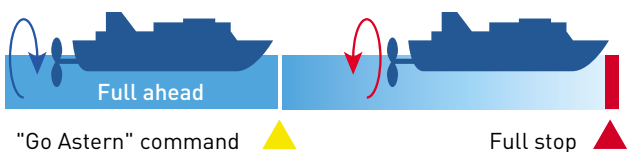


- Output chart
- Geared diesel
- Reduction gear
- Specifications
- Dimensions
- Examples
- Equipment
- Factories
- Network

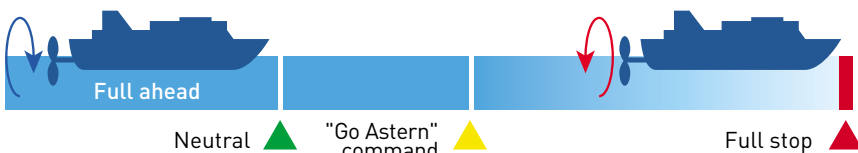
## CRASH ASTERN System

With a low-rpm large-diameter propeller, engine stalling is always a problem when moving astern because of increased torque and engine overload. For this reason, Daihatsu geared diesel engines employ our own CRASH ASTERN system. It can also be effectively operated from the bridge.

### Ship equipped with CRASH ASTERN system



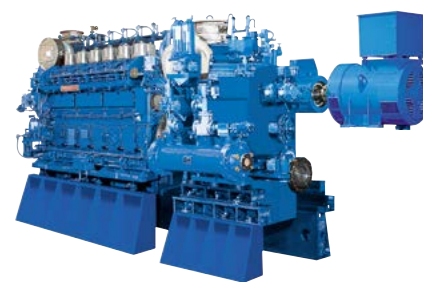
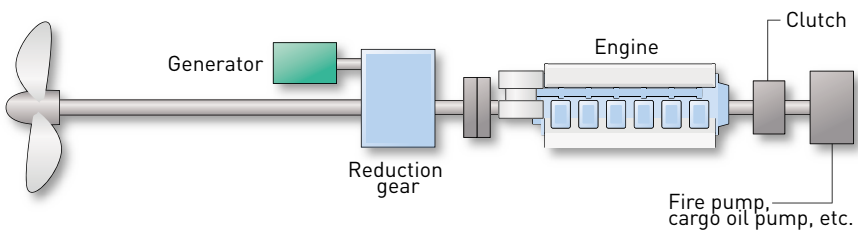
### Ship not equipped with CRASH ASTERN system



\* Performance will vary according to ship speed, type of vessel and sea conditions.

## Power Take-Off & Engine Layout

With Daihatsu's geared diesel engines, generators, cargo oil pumps and other machinery can be driven using power drawn through the front engine block and reduction gear. This system greatly reduces fuel consumption. What's more, one of the generators used in conventional systems can be omitted, which enables more effective use of dead space. In addition, this kind of system reduces labor and costs in running and maintenance.



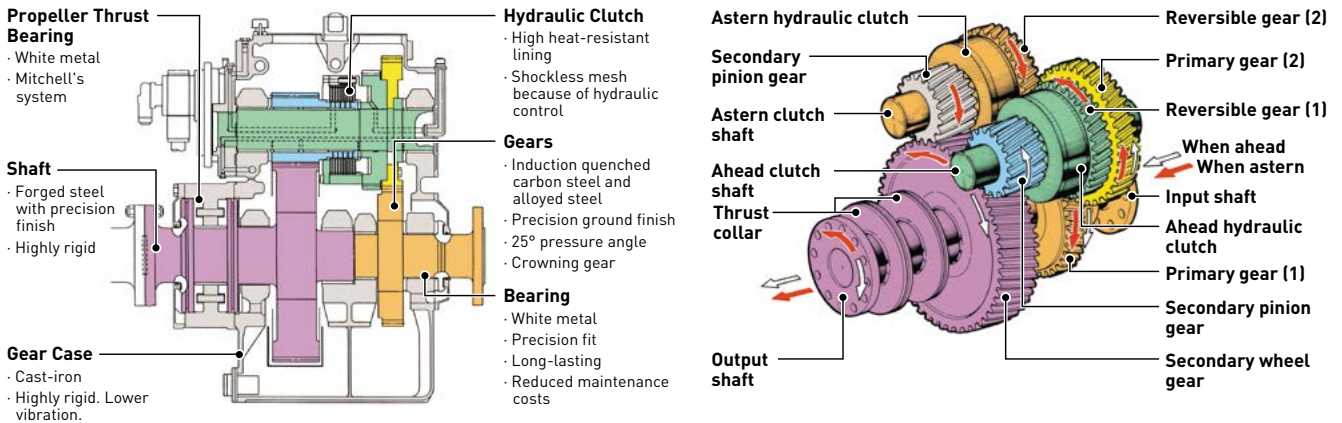
6DKM-20e

# Daihatsu's Reduction Gears

## One Supporting Element of High-Reliability Engines

Our reduction gears have a built-in main thrust bearing and wet hydraulic clutch, and can be incorporated in the CRASH ASTERN system. We also have a wide selection of speed-increasing and reduction gears for driving any type of machinery, which can be used on the engine front end block.

### DRA Type Reversible Reduction Gear



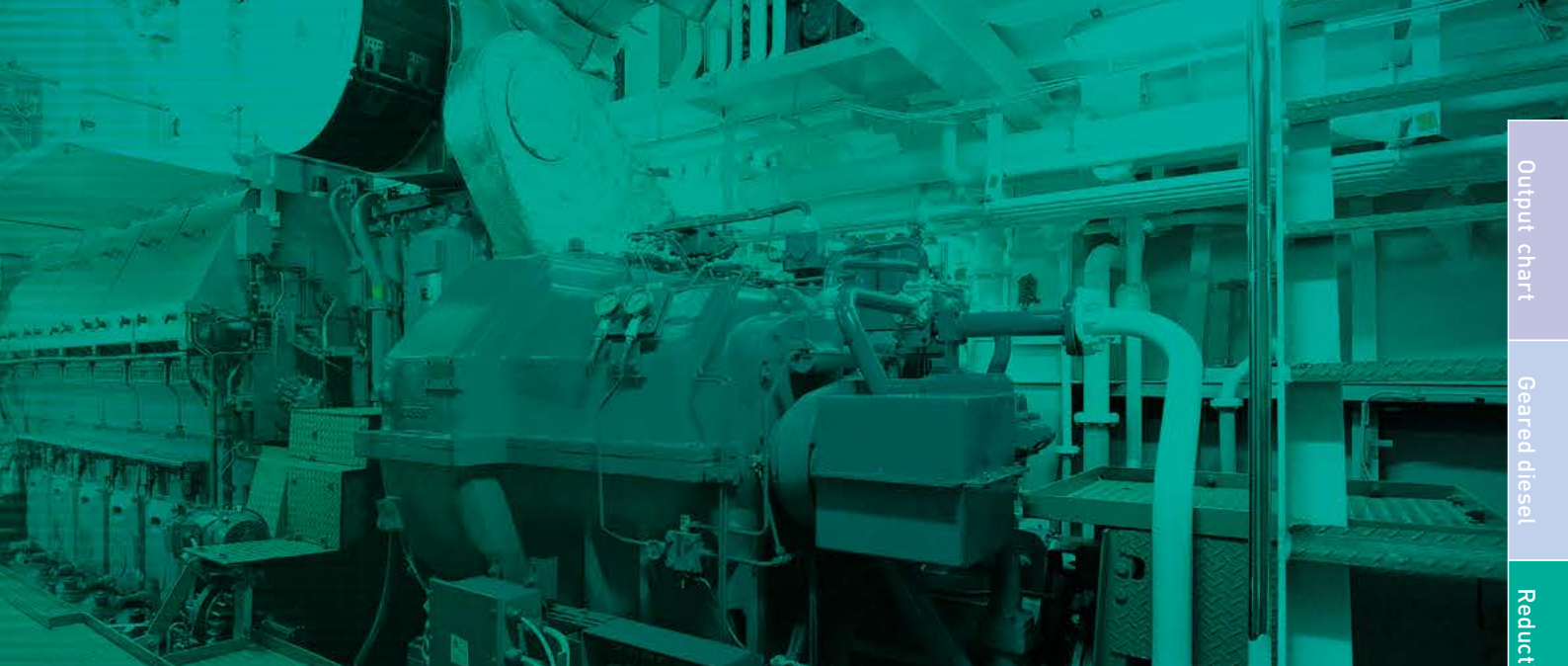
		Model	
Single-engine single-shaft	Coaxial	Reversible reduction gear	DRA
		2-speed reversible reduction gear (2-speed ahead, 1-speed astern)	DR2A
	Offset (Vertically offset, Horizontally offset)	Non-reversible reduction gear	RCA
		Reversible reduction gear	DRB, DRBH
Multiple engine single-shaft	Coaxial	2-speed reversible reduction gear (2-speed ahead, 1-speed astern)	DR2B
		Non-reversible reduction gear	RCB, RCBH
	Offset (Vertically offset, Horizontally offset)	Reversible reduction gear	DRD (Two-engine single-shaft) DRF (Four-engine single-shaft)
		Non-reversible reduction gear	RCD (Two-engine single-shaft) RCF (Four-engine single-shaft)
Special speed-increasing/reduction gear		Clutchless reduction gear	RG
		Front-end speed-increasing/reduction gear	FG
		Front-end off set type	AGP



DRA-80F

### 2-Speed Reduction Gears

The 2-speed reduction gear enables ordinary high-speed ocean travel when both low-speed power and high propulsion are required. Meeting these two conditions, Daihatsu offers a line-up of 2-speed reduction gears (2 speeds forward, 1 speed reverse) that provide highly efficient operation. A special handle for smooth clutch switching of these gears is also available for single-lever, 1 or 2-speed forward or reverse operation. Combined with an electronic clutch control system, this enables shockless clutch operation. These speed reducers are extremely popular for various ships, including merchant and fishing vessels.

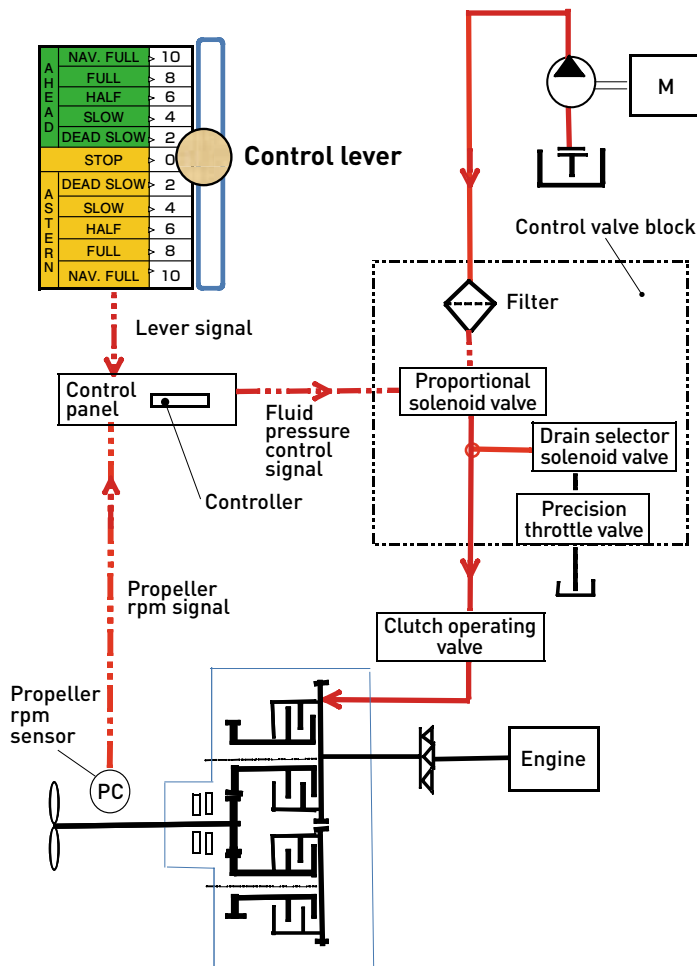


## Electronic clutch control system

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.



## Main Engine Vibration Reduction

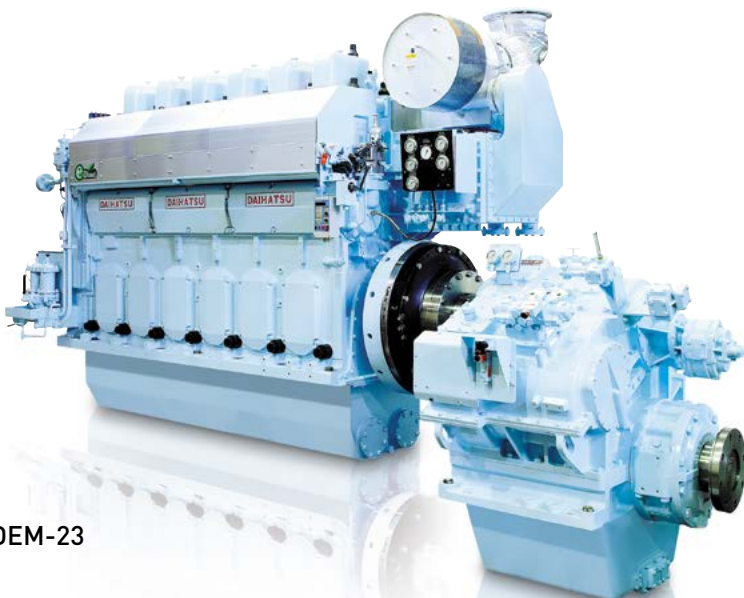
Daihatsu began the in-house development and marketing of main engine vibration reduction systems in the 1970s. In addition to lowering noise in the ship's crew quarters and reducing vibration in various sections, we aimed to reduce underwater sound radiation. Rather than ordinary single-layer vibration resistance, we offer a variety of vibration-reducing systems, including 2-layer systems. Vessels using these systems presently include research ships, training ships, fishing ships, and ferries. The systems are highly acclaimed.



## Specifications

Engine model		Output kWm(PS)	Engine revs. min <sup>-1</sup>	Bore mm	Stroke mm
<b>6DEM-18</b>	750min <sup>-1</sup>	<b>680 (925)</b>	750	185	280
	900min <sup>-1</sup>	<b>810 (1100)</b>	900	185	280
<b>6DEM-20 / 6DKM-20e</b>		<b>1040 (1410)</b>	900	205 / 200	300
<b>6DEM-23</b>	750min <sup>-1</sup>	<b>1200 (1630)</b>	750	230	320
	900min <sup>-1</sup>	<b>1435 (1950)</b>	900	230	320
<b>6DKM-26e</b>		<b>1810 (2460)</b>	750	260	380
<b>6DEM-28 / 6DKM-28e</b>		<b>2100 (2855)</b>	750	285 / 280	390
<b>8DEM-28 / 8DKM-28e</b>		<b>2800 (3805)</b>	750	285 / 280	390
<b>6DCM-32e</b>		<b>2900 (3940)</b>	750	320	400
<b>8DCM-32e</b>		<b>3860 (5250)</b>	750	320	400
<b>16DCM-32e</b>		<b>8040 (10930)</b>	750	320	400
<b>6DEM-33</b>		<b>3250 (4420)</b>	720	330	440
<b>8DEM-33</b>		<b>4340 (5900)</b>	720	330	440
<b>6DKM-36e</b>		<b>3500 (4755)</b>	600	360	480
<b>8DKM-36e</b>		<b>4500 (6115)</b>	600	360	480
<b>12DKM-36e</b>		<b>6600 (8970)</b>	600	360	460

Maximum output varies depending on usage conditions.



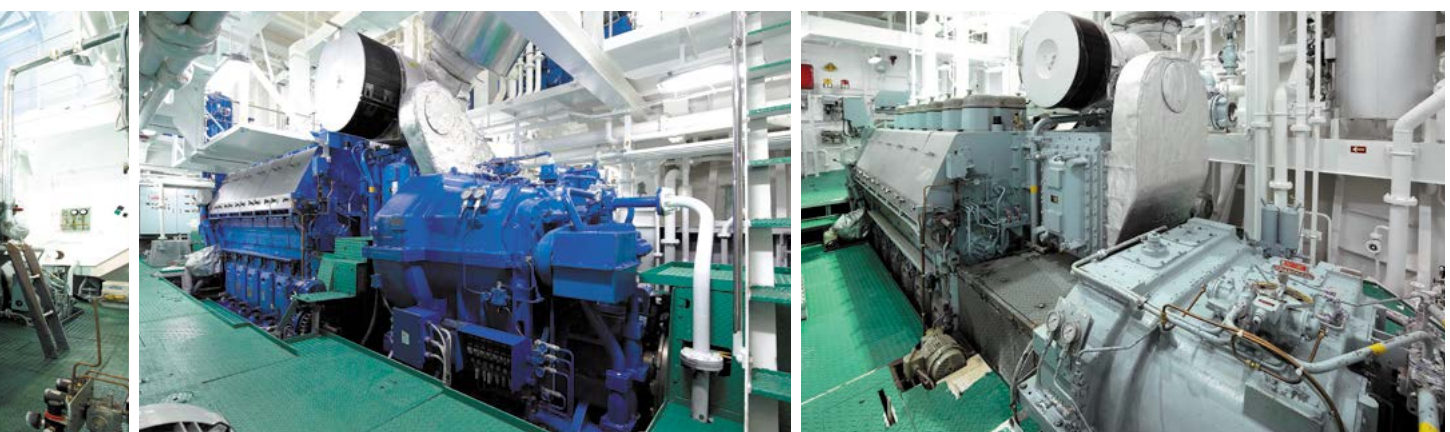
6DEM-23



6DKM-26e

No. of cylinders	R/G model	Gear ratio *1	Propeller revs. min <sup>-1</sup>	Propeller diam. (4-blade) mm	Propeller diam. (5-blade) mm	Intermediate shaft diam. mm	Propeller shaft diam. mm
6	DRA-11J	2.188	343	1890	1840	120	155
	DRB-11J	2.147	349	1870	1820		
6	DRA-11J	2.615	344	1970	1920	130	165
	DRB-11J	2.690	335	2010	1950		
6	DRA-19J	3.022	298	2260	2190	145	185
	DRB-16J	2.941	306	2220	2150		
6	DRA-25J	2.840	264	2500	2420	155	200
	DRB-19J	2.703	277	2420	2350		
6	DRA-25J	3.198	281	2500	2430	165	210
	DRB-25J	3.258	276	2530	2460		
6	DRA-30J	2.837	264	2740	2660	180	230
	DRB-35J	3.030	248	2850	2760	185	235
6	DRA-40J	3.266	230	3070	2970	200	255
	DRB-45J	3.294	228	3080	2990		
8	DRA-80J	3.720	202	3510	3410	230	290
	DRB-50J	3.343	224	3290	3200	220	280
6	DRA-80J	3.720	202	3510	3410	230	290
	DRB-50J	3.343	224	3290	3200	220	280
8	DRA-100J	3.995	188	3880	3770	255	325
	DRB-100J	2.972	252	3250	3150	230	295
16V	DRAM-150J	4.692	160	4600	4400	345	440
	DRBM-150J						
6	DRA-100J	3.544	212	3350	3200	245	310
	DRB-100J	3.014 <sup>*2</sup>	249 <sup>*2</sup>	3050	2900	235	290
8	DRA-120J	4.256	176	3950	3750	285	360
	DRB-120J	3.722	202	3650	3450	275	340
6	DRA-80J	3.023	198	3670	3560	245	310
	DRB-80J	3.273	183	3850	3740	250	315
8	DRA-100J	3.188	188	3990	3870	270	340
	DRB-100J	2.972	202	3820	3710	260	335
12V	DRA-150J	3.175	189	4290	4170	305	385
	DRB-150J	3.026	198	4170	4050	300	380

Reduction ratios marked with \*1 are examples. Inquire about other reduction ratios.  
Values marked with \*2 are reference values.



6DCM-32eF

6DCM-32e

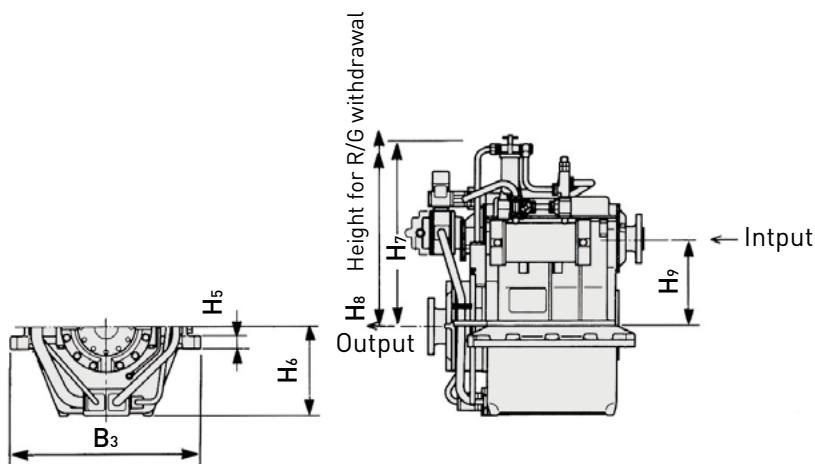
# Dimensions and Weights

Engine model		R/G model	L	L1	L2	B	B1	H1	H2	H3
<b>6DEM-18*1</b>	750min <sup>-1</sup>	DRA-11J	4759	3019	1740	1590	840	1500	290	1400
		DRB-11J	4619	3019	1600	1590	840	1500	290	1400
	900min <sup>-1</sup>	DRA-11J	4759	3019	1740	1590	840	1500	290	1400
		DRB-11J	4619	3019	1600	1590	840	1500	290	1400
<b>6DEM-20 / 6DKM-20e</b>		DRA-19J	4790	2860	1930	1737	960	1860	365	1575
		DRB-16J	4560	2860	1700	1737	960	1860	365	1575
<b>6DEM-23</b>	750min <sup>-1</sup>	DRA-25J	5203	3233	2070	1727	1050	1870	350	1660
		DRB-19J	5098	3233	1865	1727	1050	1870	350	1660
	900min <sup>-1</sup>	DRA-25J	5303	3233	2070	1727	1050	1870	350	1660
		DRB-25J	5253	3233	2020	1727	1050	1870	350	1660
<b>6DKM-26e</b>		DRA-30J	5735	3395	2340	1961	1180	2338	400	1970
		DRB-35J	5485	3395	2090	1961	1180	2338	400	1970
<b>6DEM-28 / 6DKM-28e</b>		DRA-40J	5985	3545	2440	2002	1220	2532	430	2065
		DRB-45J	5980	3545	2435	2002	1220	2532	430	2065
<b>8DEM-28 / 8DKM-28e</b>		DRA-80J	7502	4467	3035	2018	1220	2532	430	2065
		DRB-80J	7437	4467	2970	2018	1220	2532	430	2065
<b>6DCM-32e</b>		DRA-80J	7054	4189	2865	1993	1450	3042	500	2295
		DRB-80J	6889	4189	2700	1993	1450	3042	500	2295
<b>8DCM-32e</b>		DRA-100J	8852	5189	3663	2669	1450	3077	500	2295
		DRB-100J	8164	5189	2975	2669	1450	3077	500	2295
<b>16DCM-32e</b>		DRAM-150J	12169	7469	4700	3133	1750	3185	605	2820
		DRBM-150J	11669	7469	4200	3133	1750	3185	605	2820
<b>6DEM-33</b>		DRA-100J	8350	4480	3870	2680	1550	2750	500	2570
		DRB-100J	8150	4480	3670	2680	1550	2750	500	2570
<b>8DEM-33</b>		DRA-120J	9240	5540	3700	2830	1550	2950	500	2570
		DRB-120J	8800	5540	3260	2830	1550	2950	500	2570
<b>6DKM-36e</b>		DRA-80J	7895.5	4595	3300.5	1994	1680	3070	605	2930
		DRB-80J	7845	4595	3250	1994	1680	3070	605	2930
<b>8DKM-36e</b>		DRA-100J	9422.5	5722	3700.5	2245	1680	3267	605	2930
		DRB-100J	8982	5722	3260	2245	1680	3267	605	2930
<b>12DKM-36e*1</b>		DRA-150J	11878	7378	4500	3224	1920	3372	605	2710
		DRB-150J	11378	7378	4000	3224	1920	3372	605	2710

Values marked with an asterisk (\*) are reference values. Engine models indicated by the "\*1" mark are forward turbine models.

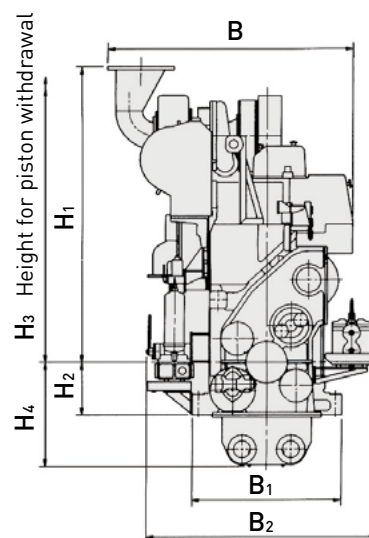
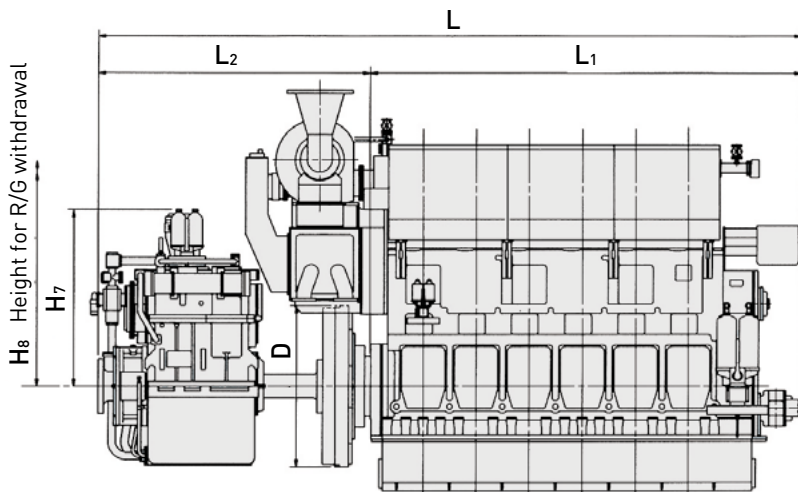
## DRB Type

## DRA Type



H4	D	H5	H6	H7	H8	H9	B2	B3	Engine weight	R/G weight
750	1020	70	453	1046	1100	—	1455	990	8.0	2.0
750	1020	55	440	921	1100	378	1455	1190 / 445+675		1.8
750	1020	70	453	1046	1100	—	1455	990	8.0	2.0
750	1020	55	440	921	1100	378	1455	1190 / 445+675		1.8
745	1090	80	500	1198	1500	—	1605	1200	11.0	2.8
745	1090	120	485	1280	1400	475	1605	1240 / 520+720		2.3
820	1050	120	565	1224	1580	—	1620	1300	14.0	3.8
820	1050	80	600	1225	1300	553	1620	1455 / 595+1860		3.0
820	1050	120	565	1224	1580	—	1620	1300	14.0	3.8
820	1050	200	630	1096	1250	600	1620	1580 / 650+930		3.9
830	1200	90	640	1279	1350	—	1950	1240	18.0	5.5
830	1200	200	640	1286	1530	609	1950	1400		5.5
875	1310	100	680	1387	1740	—	1820	1360	22.0	7.0
875	1310	260	800	1321	1470	741	1820	1600		8.8
875	1170	250	800	1532	1800	—	1820	1600	28.0	12.0
875	1170	250	830	1583	1880	860	1820	2000		11.0
1030	910	250	800	1532	1800	—	2020	1600	35.0	12.0
1030	910	250	830	1583	1880	860	2020	2000		11.0
1030	910	250	850	1696	2250	—	2020	1870	42.0	18.0
1030	910	250	900	1648	2500	871	2020	2250		17.0
1065	1330	300	1200	1700	2400	—	3133	2500	82.0	27.0
1065	1330	350	1300	1850	2600	1150	3133	2700		25.0
1030	1580	250	850	1695	2250	—	1770	1870	38.0	21.0
1030	1580	250*	900*	1750*	2500*	871*	1770	1870*		21.0*
1030	1580	250	900	1750*	2300*	—	1770	2050	47.0	23.0*
1030	1580	300*	1000*	1920	2500*	1002*	1770	2300*		23.0*
1065	1300	250	800	1532	1800	—	2060	1600	51.0	12.0
1065	1300	250	830	1583	1880	860	2060	2000		11.0
1065	960	250	850	1696	2250	—	2060	1870	67.0	18.0
1065	960	250	900	1648	2500	871	2060	2250		17.0
1305	1400	300	1200	1700	2400	—	2645	2500	80.0	25.0
1305	1400	350	1300	1850	2600	1150	2645	2700		23.0

Please ask your dealer about the L1 and L2 dimensions for these models.



## Examples of delivered products



Nippon Maru, training ship, Japan agency of Maritime Education and Training for Seafarers  
6DSM-28N(L) × 2, Sumitomo Heavy Industries, Ltd.



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



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



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



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



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



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.



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



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



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



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



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



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



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



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



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



New Koshiki, ferry, Koshikishima Shosen Co., Ltd.  
6DKM-28(L) × 2, Kanda Shipbuilding Co., Ltd.



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



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



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



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



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



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



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

## Examples of delivered products



Mikage, container carrier, Imoto Lines, Ltd.  
6DKM-28eL × 1, Koike Shipbuilding & Shipping.CO.,Ltd.



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



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



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



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



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



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



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



Shouzan Maru, Ube-Mitsubishi Cement Corporation private ship, Yamaki trasportation Ltd.  
6DKM-36eF × 1, Miura Shipbuilding Co., Ltd.



Kiyoyasu Maru, Ube-Mitsubishi Cement Corporation private ship, Ube Shipping & Logistics, Ltd.  
8DKM-36eF × 1, Kyokuyo Shipyard Corporation



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



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



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



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.



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



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



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



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



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



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



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



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



Hayato, fishery control boat, Taishu Co., Ltd.  
6DKM-28e × 1, Miho Shipyard Co., Ltd.

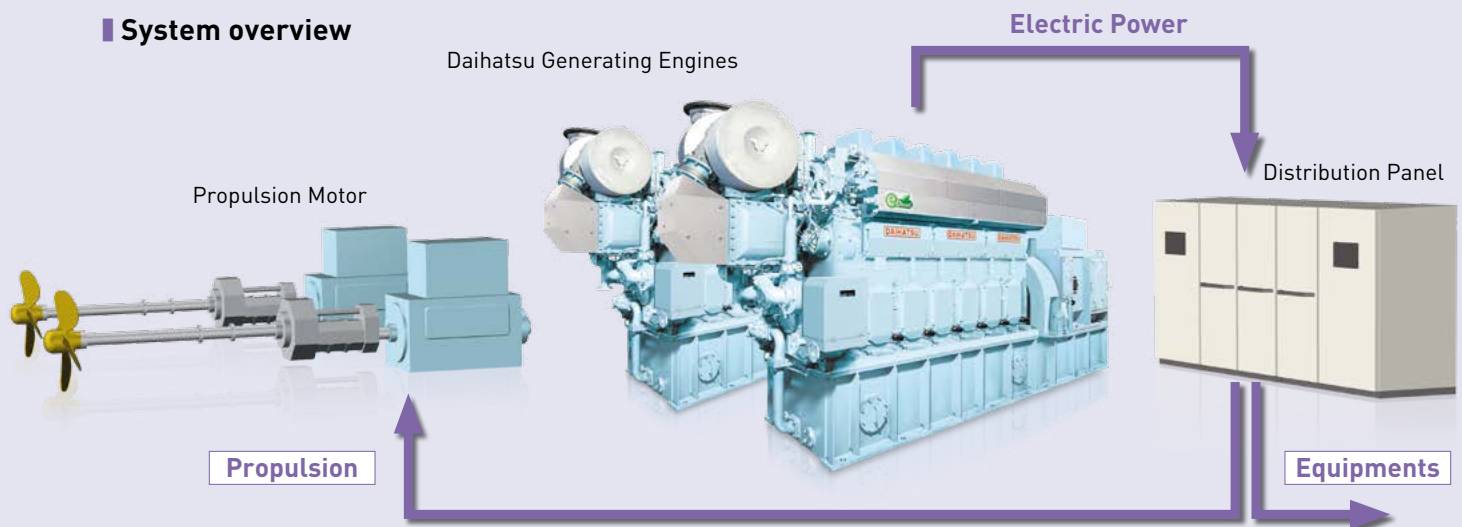


Daishimaru #11, seine accessory carrier,  
Daishimaru Fishery Co., Ltd., Nagashima Ltd.  
8DCM-32eL × 1, Izutsu Shipyard Co., Ltd.

## Environmentally friendly electric propulsion system — A proposal from Daihatsu Diesel

The electric propulsion system uses electric motors to drive the propellers, unlike the conventional system, which uses diesel engines to directly drive propellers. Thus, the electric propulsion system is superior in terms of economical efficiency, steerability and safety, and also boasts high energy-saving performance. The electric propulsion system proposed by Daihatsu Diesel is gentle to the ship, people and the global environment.

### System overview



### Examples of delivered electric propulsion systems



MV CBO ATLANTICA – PSV



Kaimei – Research Vessel



Tachibana-maru – Ferry/Hybrid system

### 749 Gross Tonnage Type Electric Propulsion System Container Ship “Futaba”

This ship was selected for the “Innovative Energy-Saving Marine Transport System Verification Project” by Agency for Natural Resources and Energy.

**Awardee, Small Cargo Ship Category, Ship of the Year 2014**



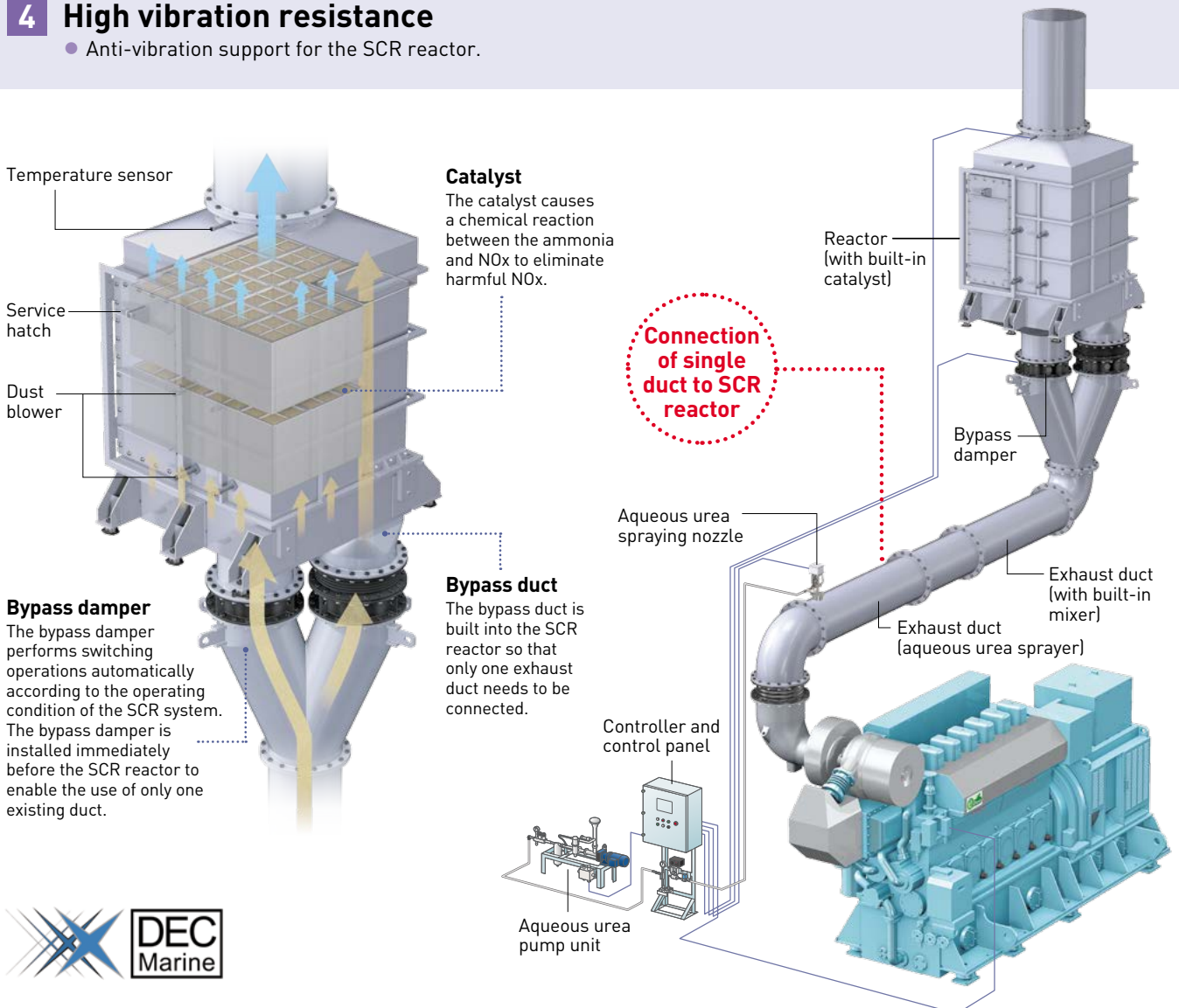
# SCR System Patented

## 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-going vessels must be gentle to the global environment at all times. Daihatsu SCR system reduces NOx contained in the engine exhaust gas through chemical reactions, to produce a clean exhaust. Daihatsu Diesel 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 NOx removal performance compliant with IMO NOx 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 aqueous urea 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 aqueous urea spraying.
- 4 High vibration resistance**
  - Anti-vibration support for the SCR reactor.



## 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.
- The space of urea powder up less than half the space of AUS.

### 2 Save money on your AUS

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

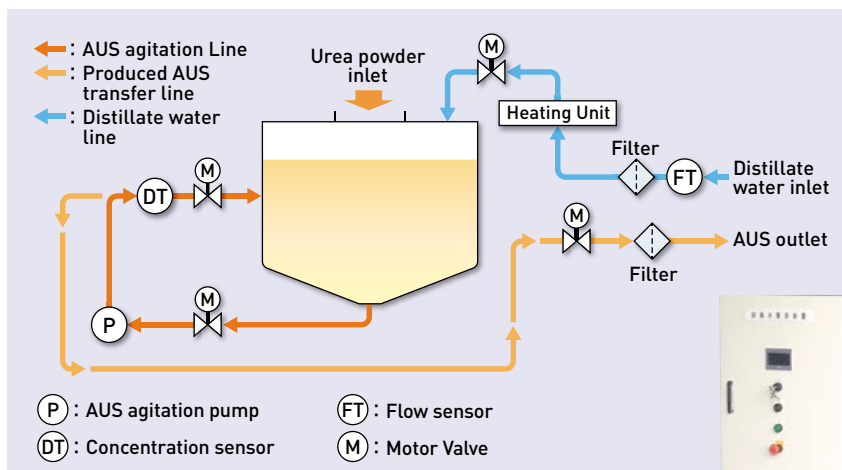
### 3 Loading urea powder is easier than loading AUS

- 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.

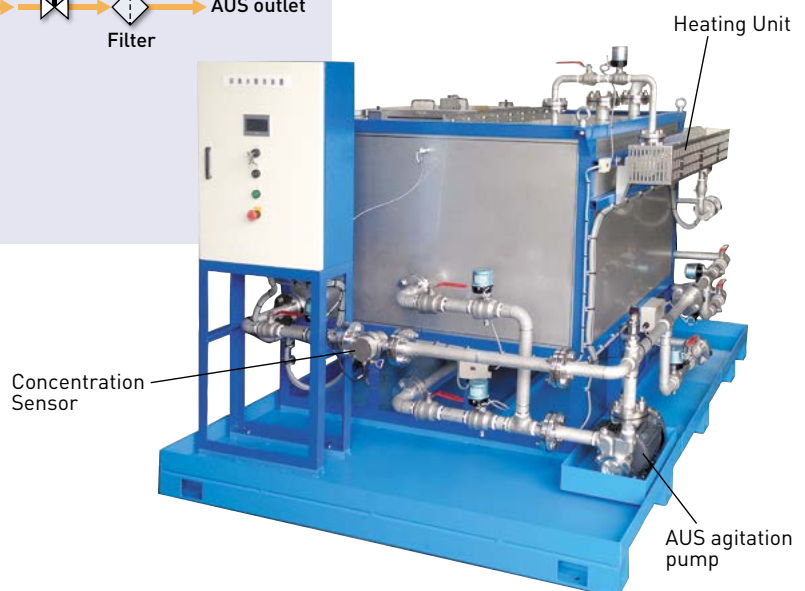
### 4 The same high quality AUS every time

- 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.



# Engine Controller

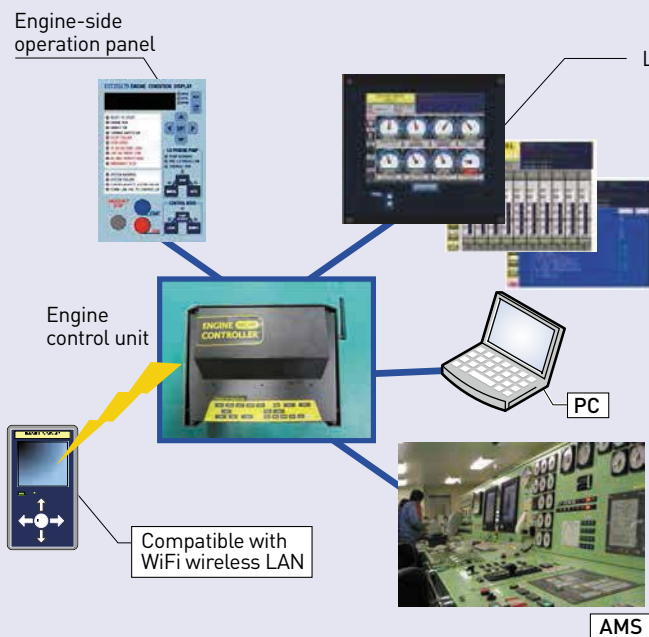
## Improving engine reliability

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

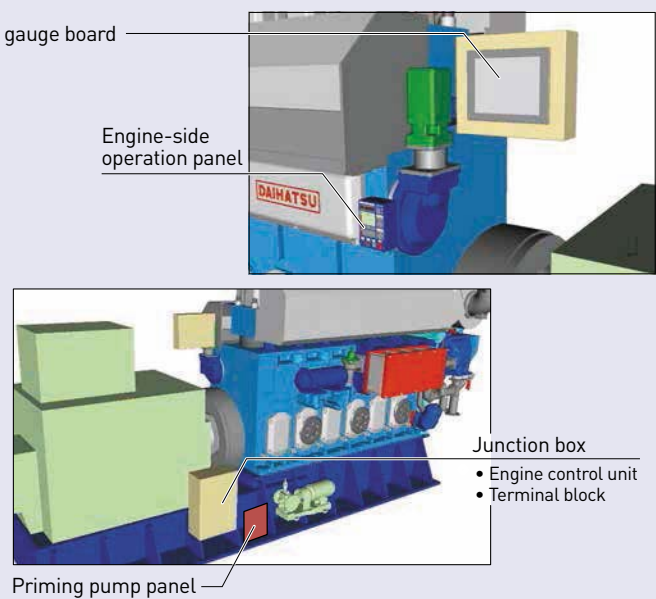
The engine safety/control system ensures safe and reliable engine operation based on the control/safety sequence verified by Daihatsu. The circuits are protected so as to prevent faulty operation even if a mistake is made in the installation. The system automatically saves the record of engine control 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



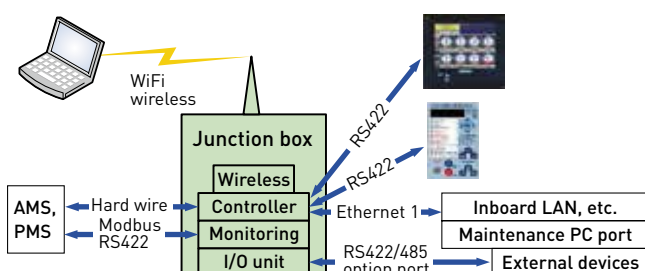
#### Pursuit of safety, security, and ease of use for the owner and the crew

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.

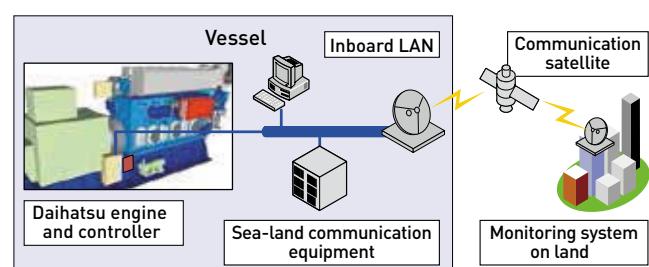
#### Meeting the users' needs

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

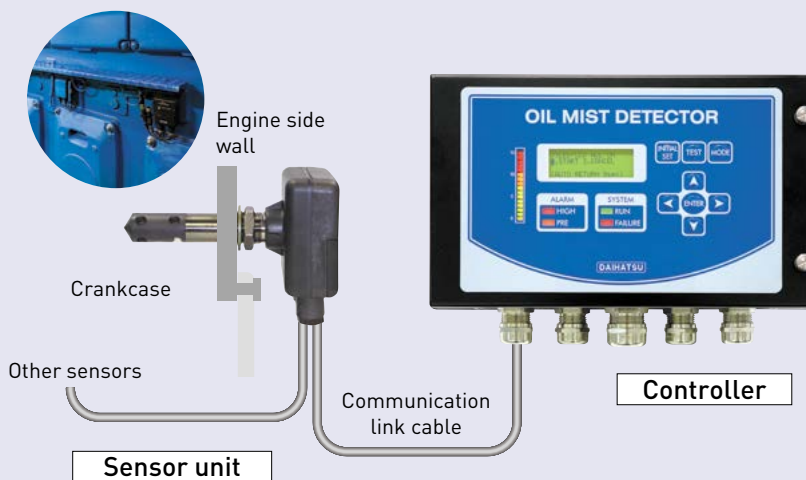




## Oil mist detector

### 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 Diesel'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

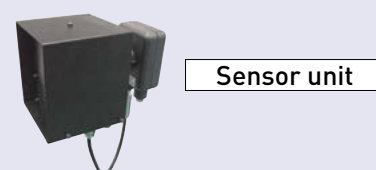
### DOMM



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.



# From Moriyama and Himeji to the world

Daihatsu Diesel's Moriyama Factory manufactures products using the 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 use of gas engines for the generation of 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 high quality underpins the new manufacturing facility under construction.

Daihatsu Diesel is building a new factory in Himeji that faces the Seto Inland Sea, where a new page in the history of Daihatsu Diesel will begin.



Moriyama Factory

## Facilities/Equipment



Training Center



Technology Development Center



Research building



Photovoltaic power generation



Logistics Center



Historical Literature Museum



Power recovery system



New Himeji Factory Scheduled to commence operation in October 2018

# 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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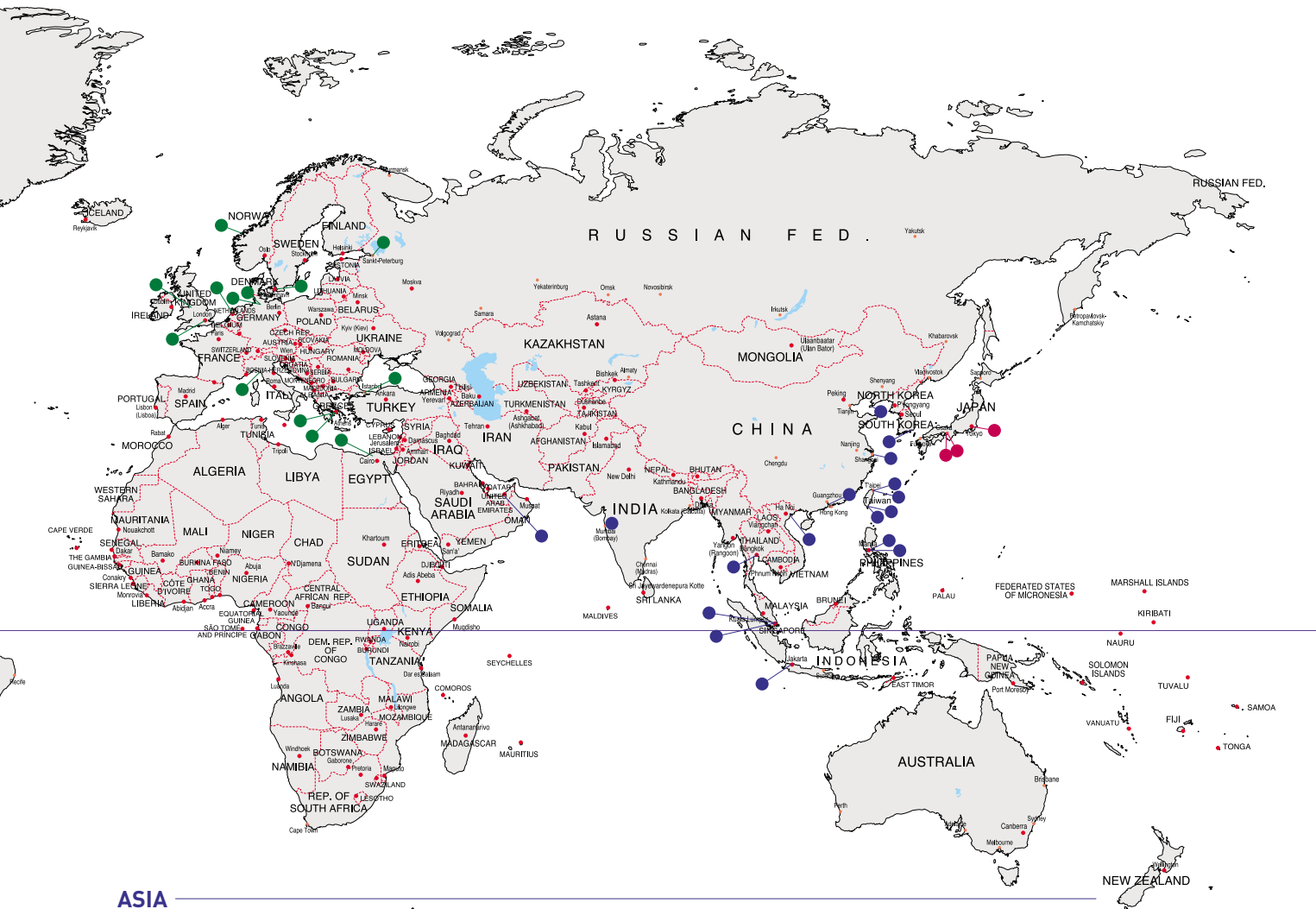
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