MOVE THE WORLD FORWARD

MITSUBISHI HEAVY INDUSTRIES GROUP

MARINE MACHI-NERY

COMPANY PROFILE

PRODUCT INFORMATION

— ENGLISH —

Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.

MITSUBISHI HEAVY INDUSTRIES

Mitsubishi Heavy Industries Marine Machinery & Equipment is of advanced marine machinery around the world. Our expertise Mitsubishi Heavy Industries Group's reputation as a trusted

Toshiaki Hori

President & CEO

My first, as President and CEO of Mitsubishi Marine Machinery & Equipment Co.,Ltd.(MHI-MME), I want to take this opportunity to reach out and let each of all associates with our business look back over the trail of MHI-MME and future managerial strategies.

The first objective of launching MHI-MME was to attain outstanding competitive strength and high-end customer satisfaction by quicker and more flexible business management.
Aiming to receive satisfaction from customers, we established a strategy to enhance solution providing business which combines strengths in our product portfolio and technical background. Furthermore, we also heighten global after sales network as well as licensees aiming to accomplish the objective.

We have a certain confidence that our strategical movement have gained positive feedbacks from our customers, especially in terms of quick response to cope with their demands which come from fab-less business style and further concentration of R&D and sales activity.

Besides, we enhance global offices, intensify solution service menus and make organizational improvement and it resulted in rising business result.

Our good licensees in Korea and China proceed with step especially in terms of improving their quality as well as production efficiency in the present market environment which is less unfavorable and we expect that their sales will be extended once the market turns to positive.

Our two main business division, Marine Machinery and Turbocharger, have each own task.

In addition to our traditional product, Marine Machinery business has a task to provide new solution product like waste heat recovery systems so as to enhance our competitive strength in terms of technological innovation and reliability, quality of lifecycle services and cost aspects.

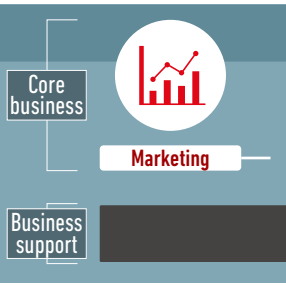
Turbocharger business which main market is for 2 stroke engine and we have already got more than one-third(1/3) share in the market and also have a new challenge to increase the market for 4stroke main engines, auxiliary engines and also land use engines.

We will keep design concept of easy maintainability and structure, which are well received by our customers. In addition to providing high efficient and reliable products, we will enhance more our after sales service activities, to provide more reliability to our customers.

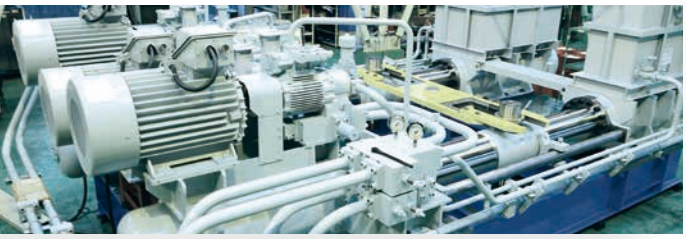
Through the foreseeable future, the economic environment is not expected to be very favorable. We strongly believe that customer comes first and we are obligated to be an innovative partner as well as a reliable provider of good products and sophisticated service. This is not only to sustain in our own corporate growth but, more importantly, to continue contributing to all clients and market development.

High-quality products and services provided through collaboration with MHI Group.

MHI Group is not only a leading Japanese heavy industries manufacturer, but also a leading company in the global arena. MHI Group manufacture many types of world-class products across a broad range of fields, from launch vehicles and aircraft, to power generators, ships, industrial machinery and even household electrical goods. We at MHI-MME provide high quality, valuable products and services to our customers through close mutual collaboration with MHI Group in product development, manufacturing, sales and marketing, procurement and services.



the leading provider is based on shipbuilder.



Mitsubishi Heavy Industries Marine Machinery & Equipment creates customer's value through:

Valuable after-sales service

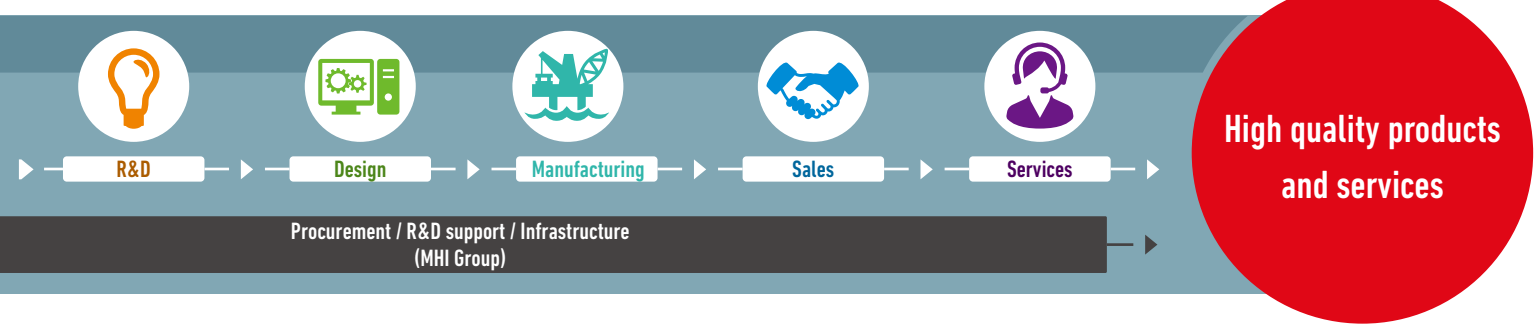
- Authorized Repair Agents (ARA) Global network
- Development and implementation of added value maintenance programmes

Collaboration with Mitsubishi Heavy Industries Group

- R&D support
- Procurement and production by MHI Group.

Solution to meet customer's needs

- Providing eco-friendly and high efficiency technologies



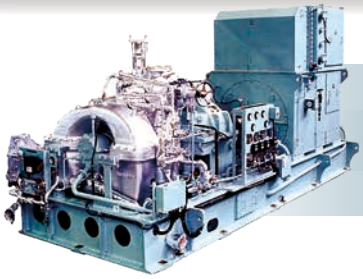
A varied product line-up that meets the diverse needs of our customers.

Mitsubishi Heavy Industries, Ltd. offers a varied product line up made possible through proprietary design, cutting-edge technology and the fusion of the trust and track record nurtured over more than 130 years. The marine products offered by MHI-MME are characterized by the reliability, high performance and superior maintainability that only MHI and its long history can provide. They bring together MHI's advanced technology to turbochargers, boilers, turbines and propellers, deck cranes and even winches. These products are manufactured at the Nagasaki Shipyard, the cradle of Japanese shipbuilding, and other production bases, and are being actively used worldwide.

MET Turbochargers

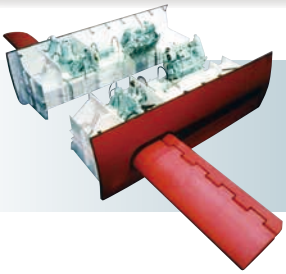
WHRS

Boilers



Turbines

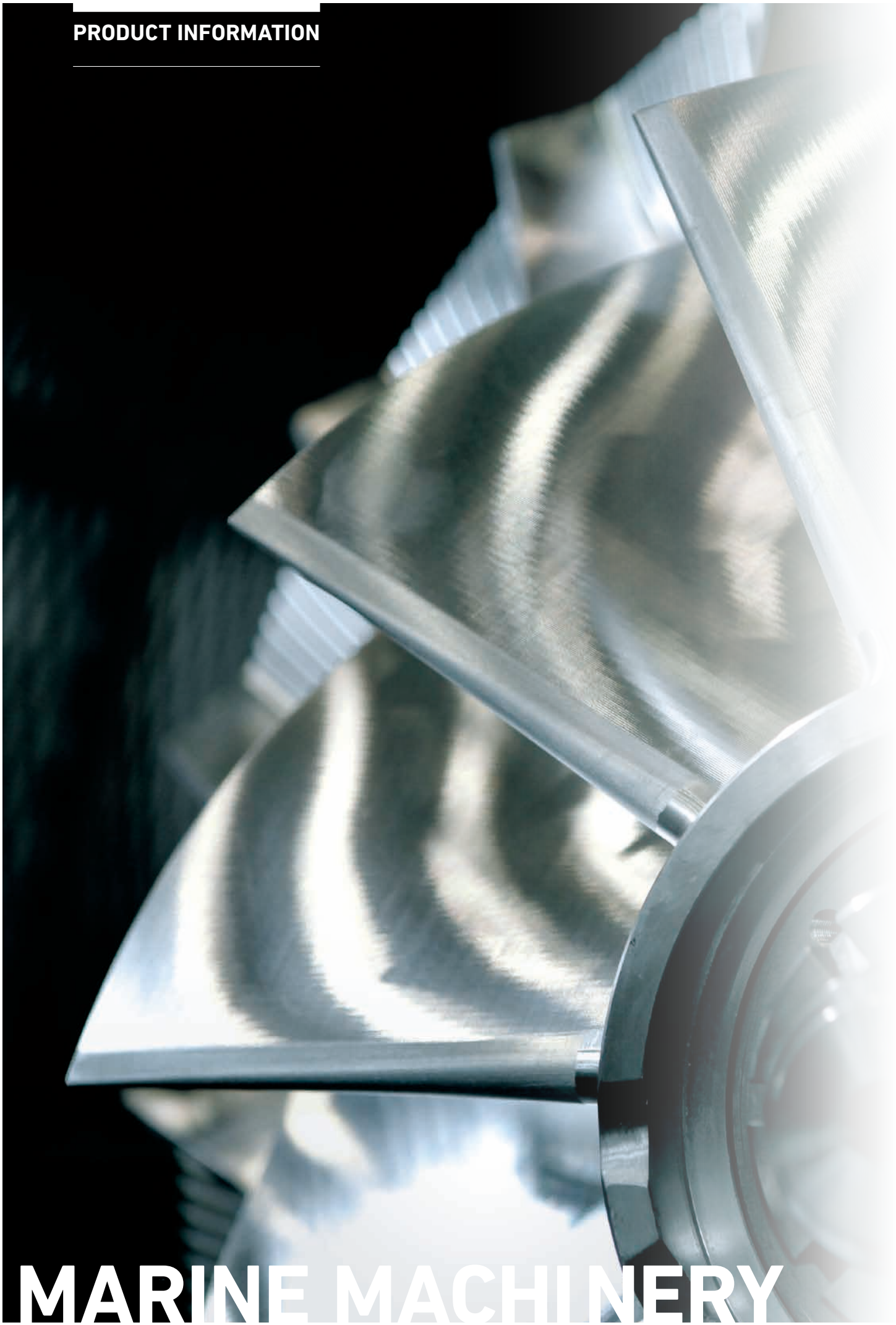
Propellers



Fin Stabilizers

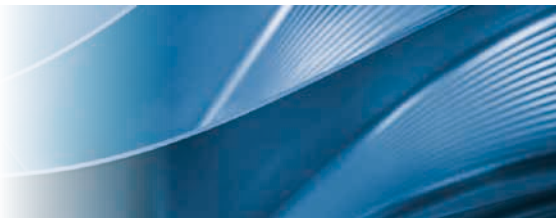
Steering Gear

PRODUCT INFORMATION



MARINE MACHINERY

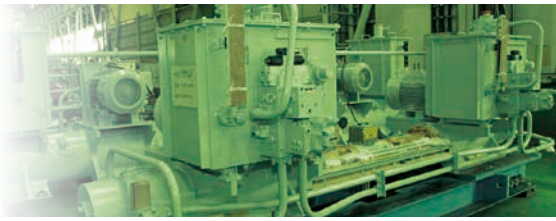
01 MET Turbochargers



02 WHRS / Boilers / Turbines

03 Propellers / Fin Stabilizers

04 Steering Gear



05 Deck Cranes / Deck Machinery

06 Water Jet Propulsion System

MET Turbochargers

Global standard exhaust gas turbochargers used widely for marine and stationary engines.

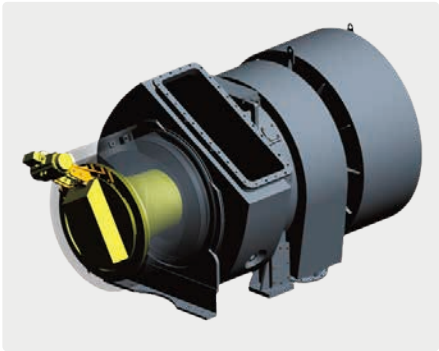
Features

- Applicable to all major engines (MAN ES, WinGD and J-ENG)
- Advanced aerodynamic design based on numerous tests and analysis results
- Long lifetime and High reliability
- Low noise silencer application
- Simple and compact
- High robustness of bearing pedestal type structure

MET Turbochaegers Option

MET-VTI Also Available for Retrofitting

Improve engine performance at low load operation by changing the nozzle area.



Features

Economical
- Improve the engine performance at low loads
- Reduce the operating time of auxiliary blowers
- Almost no increase in maintenance costs and time compared with standard turbochargers - no sealing air or cooling air required
- Highly reliable butterfly valve

Easy maintenance

Simple design
- Two step open-close control
- Fixed-pitch nozzle ring with inner gas flow control passage

Retrofit ready
- Use the same gas inlet interface as standard turbochargers
- Gas inlet casing interchangeable with standard products

Integrated EGB Turbochargers Also Available for Retrofitting

Ordinary, exhaust bypass line has been installed between exhaust gas receiver and exhaust gas duct of the engine. Integrated EGB enables to bypass the exhaust gas by integrating the bypass pipe and open/close valve on turbocharger in between gas inlet casing and outlet gas casing. Integrated EGB is also available by retrofitting from standard MET turbocharger by just changing several parts. Also, this system could be applicable to temperature increment procedure at 2-stroke engine with Low Pressure SCR system.

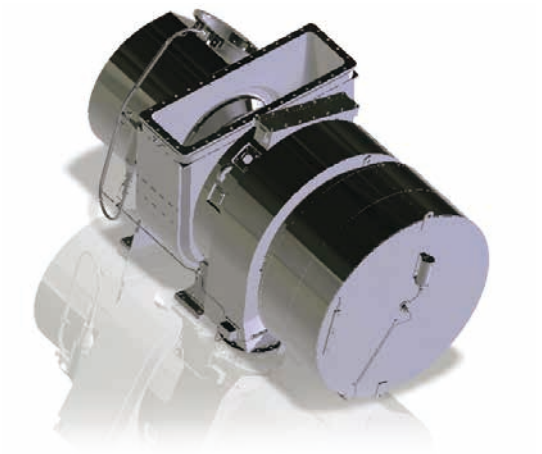
Features

- Connected directly to turbocharger
- No EGB pipe (engine side)

01 MET TURBOCHARGERS

MET-MBII Series

MET-MBII Series, the latest type of axial turbocharger for achieving a further increase in air flow volume while maintaining the reliability and ease of maintenance of the MET-MB turbocharger.
The MBII turbocharger provides 16% larger air flow volume than the MET-MB Series, which leads one models more compact compared to previous models.



Features

- MET-MBII takes advantage of MET-MB features
- Increased air-flow rate by 16%
- Downsizing by increasing air flow

Type		MET33MBII	MET37MBII	MET42MBII	MET48MBII	MET53MBII	MET60MBII	MET66MBII	MET71MBII	MET83MBII
Max. Pressure Ratio	-	5.0								
Engine Output Range per Turbocharger	kW	3,400 - 6,000	4,600 - 7,600	5,600 - 9,300	7,200 - 11,900	9,000 - 14,900	11,200 - 18,400	14,000 - 23,100	16,400 - 27,100	22,500 - 37,100
Maximum Continuous Gas Temperature before Turbine	℃	580								
Momentary Maximum Gas Temperature before Turbine	℃	610								
Length	mm	1,870	2,080	2,190	2,400	2,610	2,960	3,200	3,290	3,940
Breadth	mm	899	998	1,094	1,255	1,390	1,530	1,718	1,820	2,233
Height	mm	945	1,095	1,171	1,330	1,439	1,570	1,780	1,865	2,225

＊対応機関出力は圧力比 4.0 の目安値

MET-MB Series

Global standard turbochargers for marine and stationary engines for MAN Energy Solutions, WinGD and J-ENG.

Features

- Applicable to all major engines(MAN ES, WinGD, J-ENG)
- Advanced aerodynamic design based on numerous tests and analysis results
- Easy overhaul
- Crew-maintainable design
- Condition based maintenace
- High reliability
- High efficiency
- Applicable to heavy fuel oil

Type		MET33MB	MET37MB	MET42MB	MET48MB	MET53MB	MET60MB	MET66MB	MET71MB	MET83MB	MET90MB
Max. Pressure Ratio	-	5.0									
Engine Output Range per Turbochaeger	kW	2,600 - 4,600	3,800 - 6,300	4,700 - 7,700	6,000 - 10,000	7,500 - 12,500	9,300 - 15,500	11,700 - 19,400	13,700 - 22,700	18,800 - 31,100	22,900 - 37,900
Maximum Continuous Gas Temperature before Turbine	℃	580									
Momentary Maximum Temperature before Turbine	℃	610									
Length	mm	1,661	1,851	1,944	2,280	2,504	2,825	3,065	3,143	3,771	4,241
Breadth	mm	899	998	1,134	1,255	1,417	1,530	1,785	1,820	2,233	2,465
Height	mm	945	1,095	1,155	1,330	1,435	1,540	1,720	1,865	2,180	2,410

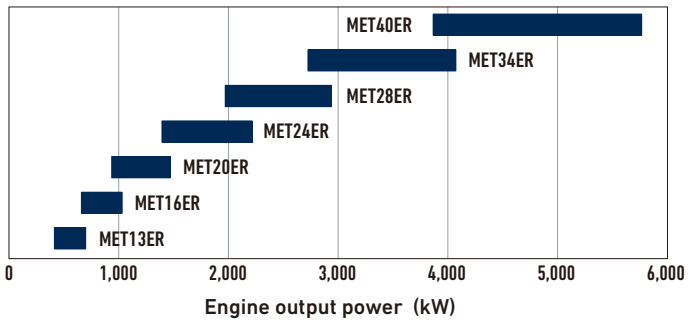
＊Engine Output Range is the reference values subject to pressure ratio 4.0.

MET-ER Series (in development)

MET-ER Series, a new type of radial turbocharger succeed the high reliability and maintainbility of MET-SRC series. This new turbocharger has improved it's responsiveness and reduces the number of parts to achieve a more compact design and high maintainability.
MET-ER Series has been developed based on high pressure ratio requirements for turbochargers, in order to improve the performance of and reduce the NOx emissions of engines.

Features

- MET-ER takes advantage of MET-SCR features
- Compact design (about 40%)
- Optimized to engine power range
- Applicable to high pressure ratio
- Reduced number of parts
- Excellent performance and better transient response



MET-SRC Series

Developed to meet the demand for higher performance and reliability, well proven by the excellent service records of axial type MET turbochargers.

Features

- Applicable to high pressure ratio
- Non-water cooling
- Easy overhaul
- Crew-maintainable design
- Condition based maintenace
- High reliability
- High efficiency
- Applicable to heavy fuel oil

Type		MET18SRC	MET22SRC	MET26SRC	MET30SRC	MET37SRC
Max. Pressure Ratio	-	5.5				
Engine Output Range per Turbochaeger	kW	400 - 1,100	650 - 1,600	850 - 2,200	1,150 - 3,300	2,000 - 4,400
Maximum Continuous Gas Temperature before Turbine	℃	610				
Momentary Maximum Temperature before Turbine	℃	640				
Length	mm	712	835	1,075	1,368	1,661
Breadth	mm	510	605	735	860	1,070
Height	mm	510	605	735	860	1,070

∗ Engine Output Range is the reference values subject to pressure ratio 3.5.

Tier III Application for 2 Stroke Engine

MET Turbocharger is applicable for all 2 stroke Engine Designer's applications.

Tab. Tier III and Duel fuel application for MET turbocharger

	SCR		EGR		Dual Fuel
	HP	LP	HP	LP	
J-ENG		○		○	
MAN ES	○	○	○		○ (ME-GI, GA, GIE, LGIP, LGIM, LGIA)
WinGD	○	○		○ (iCER)	○ (X-DF)
MET Turbocharger	Applicable	Applicable	Applicable	Applicable	Applicable

License Production

Licensee		Hyundai Heavy Industries (Korea)	HSD Engine (Korea)	STX Heavy Industries (Korea)	Mitsui E&S (Japan)
License start		2002	2011	2011	2022
TC Type	SE	○			
	SEII	○			
	MA	○			
	MB	○	○	○	○
	MBII		○	○	○

WHRS (Waste Heat Recovery System)

WHRS is a revolutionary energy-saving power generation system that recovers and reuses energy from the main engine's exhaust gas. WHRS optimizes thermal efficiency by automatically adjusting the output according to on-board electricity demand.

Features

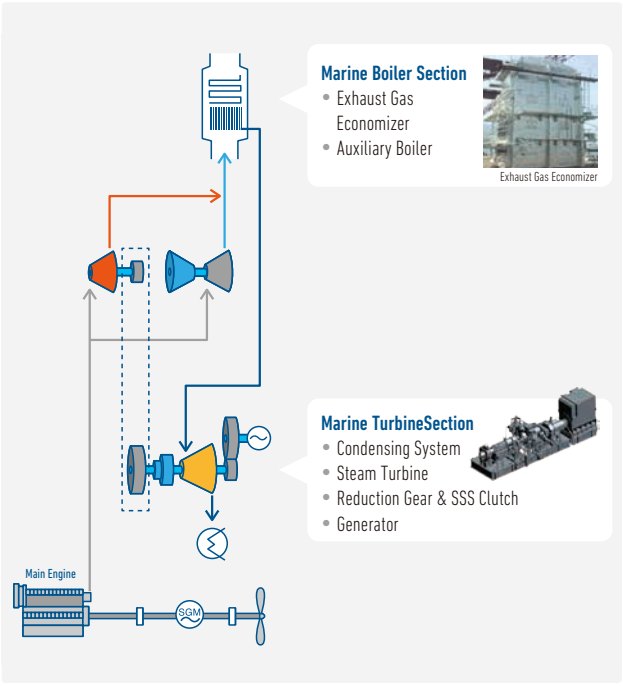
Easy operation
- Fully remote automation

Easy installation
- Packaged unit arranged on a common bed

High reliability
- Plant monitoring system
- Performance diagnosis

Compact design

Economical and environmentally friendly
- Reduces diesel generator fuel consumption and in some cases allows diesel generators to be stopped
- Optimizes thermal efficiency by controlling the output and load balance of the steam and power turbines

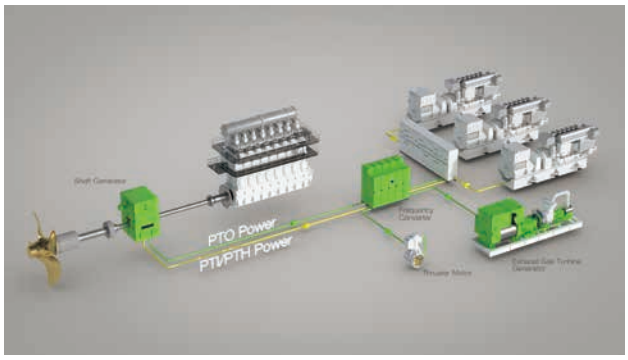


Integration of shaft generation and WHRS

This solution combines MHI-MME's energy-saving power generation system with Wärtsilä SAM Electronics's operational control technology for shaft generator systems.

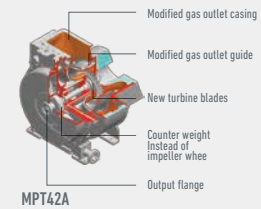
Features

- Shaft generator output is amplified by integration with WHRS.
- This solution enable to produce greater power generation capacity and higher propeller propulsion and improve Energy Efficiency Design Index (EEDI).



Power Turbine

Type	Max. output
MPT26R	800kW
MPT30R	1,200kW
MPT33A	1,400kW
MPT42A	2,200kW
MPT48R	3,000kW
MPT53A	3,500kW



Economizers

Steam Pressure	Single Pressure	0.6 ～ 2.2MPa
	Dual Pressure	0.6 ～ 2.2MPa、0.3 ～ 1.0MPa
Steam Temperature		Saturated ～ 400℃

Type		system
1	Single Pressure Type	Superheater + Evaporator
2		Superheater + Evaporator + Preheater
3	Dual Pressure Type	Superheater + HP Evaporator + LP Evaporator
4		Superheater + HP Evaporator + LP Evaporator + Preheater
5		HP Superheater + HP Evaporator + LP Superheater + LP Evaporator + Preheater

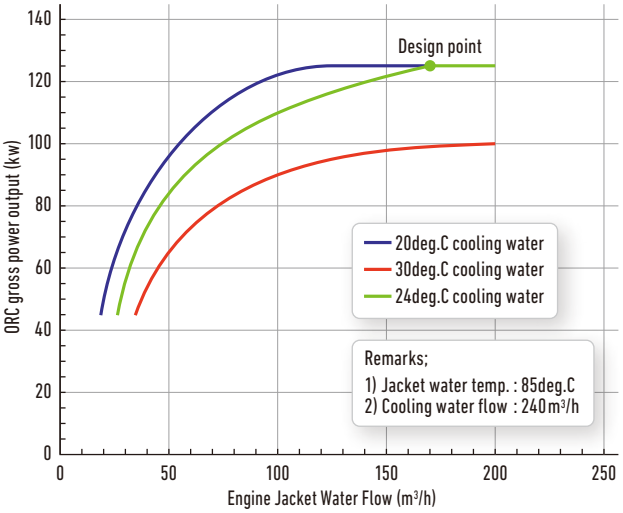
Organic Rankin Cycle (ORC)

Mitsubishi new waste heat recovery system uses synthetic organic working fluid, instead of water, and it has low flush point of 15 degree C. Therefore, the working fluid can be vaporized by waste heat from engine room, and can drive turbine generator to make electric power.

Features

- Rated Power 125kW (gross)
- no lubricating device / no external cooling device
- Unique Integrated Power Module
- Optimized Layout
- Excellent Peformance / High reliability / Safety

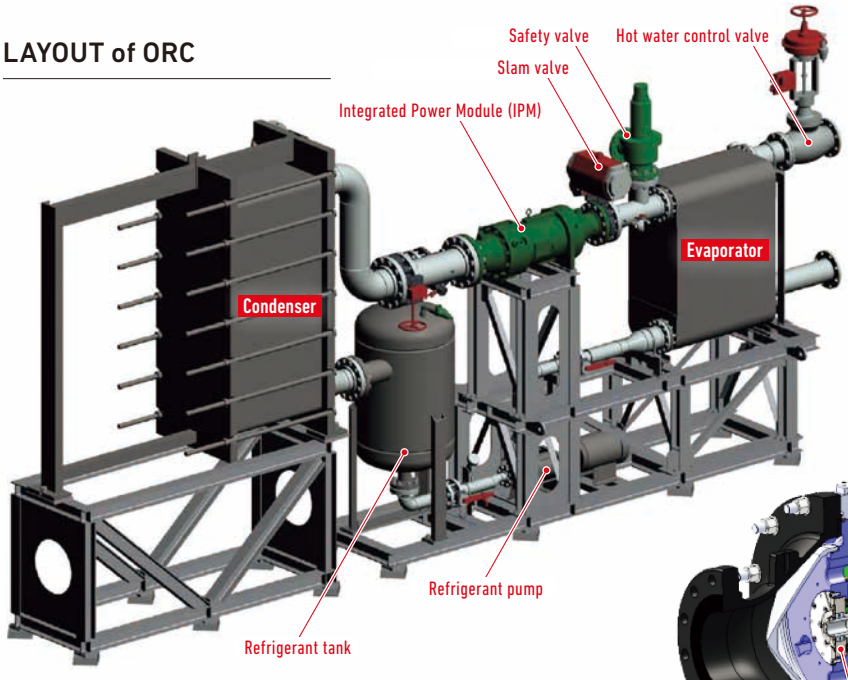
ESTIMATED OUTPUT POWER



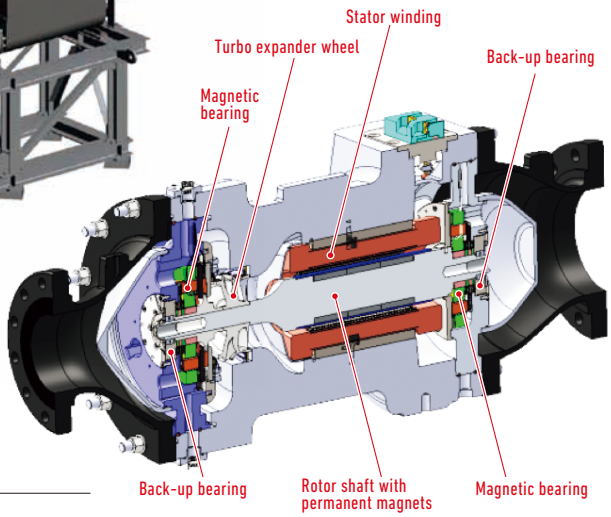
PARTICULARS

Rated power (kW)	125 (gross)
Output voltage (V)	380 to 480
Frequency (Hz)	50/60
Width x Length x Height (m)	1.3 x 7.3 x 3.5
Dry weight (kg)	8,000
Cooling water	Sea water or fresh water
Working fluid (Refrigerant)	R245fa
Hot water temperature (°C)	75 to 95
Hot water amount (t/h)	150 to 200
Cooling water temperature (°C)	5 to 30
Cooling water amount (t/h)	150 to 250
Rated alternator speed (rpm)	24,500
Bearing type	Active controlled magnetic
Alternator type	Permanent magnet synchronous
Expander type	Single stage radial

LAYOUT of ORC

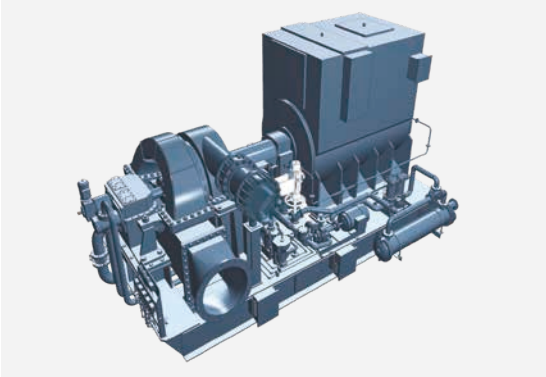


Cross section of IPM



Turbine Generator for Cryogenic Power Generation System

One of FSRU(Floating Storage & Regasfication Unit) roll is to regasify minus 160 degree C liquified natugal gas (LNG) through heat exchange. Cryogenic power generation system is a new initiative that aims to reduce the environmental impact of FSRU by utilizing LNG cold energy – which up to now has been dumped into the ocean – for power generation. The new technology is expected to significantly reduce the fuel consumption and CO_2 emissions of FSRU during regasification.



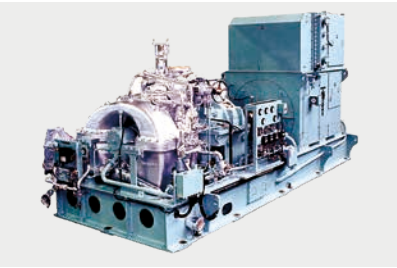
Particulars	Specifications
Expander type	Axial impulse turbine
Turbine driving medium	Organic heating medium
Output range	Up to 4,000 kW
Turbine speed	1,800 rpm
Seal structure	Mechanical seal

Steam Turbine Generators (AT-Type)

Highly reliable AT-type steam turbine generators have been developed using our original and innovative technology, and feature excellent durability and cost performance.

Features

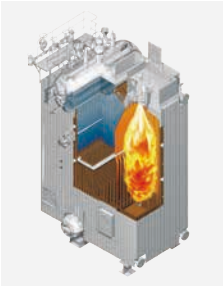
- High reliability and durability
- Environmentally friendly
- Easy operation and maintenance
- Compact design



Particulars		AT34C	AT42C	AT52C	AT64C	AT76C	AT92C / AT100C	AT112C
Turbines	Type	Horizontal, multi-stage impulse condensing turbine						
	No. of stages	4 to 8 Rateau			4 to 14 Rateau			12 to 16 Rateau
	Power range (kW)	200~2,000	1,000~4,000	1,500~6,000	3,000~15,000	5,000~18,000	15,000~27,000	20,000~50,000
	Speed range (rpm)	11,000~15,000	8,500~11,700	6,500~9,500	5,000~7,500	5,000~6,000	4,000~4,500	3,600
	Steam inlet pressure (MPa)	0.4 to 12.3						
	Steam inlet temperature (°C)	Saturated temperature to 540						
	Exhaust pressure (mmHgv)	400 to 722						
Reduction gears	Type	Single or Double helical, single reduction gear						
	Output shaft speed (rpm)	1,800 to 3,600						
Dimensions	Width (mm)	1,600	1,800	2,000	2,300	4,000	4,000	5,600
	Length (mm)	3,785	4,075	4,390	4,750	6,800	7,400	8,500
	Height (mm)	1,635	1,890	2,185	2,500	3,000	3,100	4,500
Approximate weights (kg) (excluding driven equipment)		6,000	7,100	8,400	10,500	30,000	38,000	60,000

Auxiliary Boilers MAC-B/SB/HB/BF SERIES

These are two-drum water tube boilers that supply steam for driving cargo oil pump turbines and inert gas for tanks. High pressure and a wide variety of burners are used to save fuel consumption. In addition, MAC-BF type is compatible with fuel oil and gas.
In addition, the high-efficiency MAC-HB series is also available in the evaporation rate range of 35 -60 ton/h.



▶MAC-B

Boiler Type		MAC-20B	MAC-25B	MAC-30B	MAC-35B	MAC-40B	MAC-45B	MAC-50B	MAC-55B	MAC-60B	MAC-70B	MAC-80B	MAC-90B	MAC-100B
Evaporation	kg/h	20,000	25,000	30,000	35,000	40,000	45,000	50,000	55,000	60,000	70,000	80,000	90,000	100,000
Boiler design Press.	MPa	1.77												
Working steam pressure	MPa	1.57												
Weight	ton	28	34	36	42	44	50	52	58	67	76	77	78	95
Water content	ton	10	11	12	13	19	20	21	22	30	31	34	35	40
Width (W)	mm	3,880	4,160	4,540	4,610	5,000	5,000	5,000	5,350	5,810	5,810	5,530	5,530	5,810
Depth (D)	mm	3,410	3,410	3,600	3,800	4,520	4,520	4,520	4,710	6,250	6,252	6,820	6,820	7,250
Height (H)	mm	6,140	6,520	6,850	7,320	7,670	8,170	8,970	9,210	8,510	9,210	7,980	8,280	8,910

▶MAC-SB

Boiler Type		MAC-S25B	MAC-S30B	MAC-S35B	MAC-S40B	MAC-S45B	MAC-S50B
Evaporation	kg/h	25,000	30,000	35,000	40,000	45,000	50,000
Boiler design Press.	MPa	2.20					
Working steam pressure	MPa	1.57~2.0					
Weight	ton	26	29	32	37	44	46
Water content	ton	10	11	12	12	18	18
Width (W)	mm	6,340	7,040	7,740	8,440	8,400	8,900
Depth (D)	mm	4,360	4,360	4,360	4,360	5,190	5,190
Height (H)	mm	3,460	3,460	3,460	3,460	4,400	4,400

MAC-HB

Boiler Type		MAC-H35B	MAC-H40B	MAC-H45B	MAC-H50B	MAC-H55B	MAC-H60B
Evaporation	kg/h	35,000	40,000	45,000	50,000	55,000	60,000
Boiler design Press.	MPa	2.2					
Working steam pressure	MPa	1.57~2.0					
Weight	ton	42	47	50	54	56	62
Water content	ton	9.9	10.4	11.4	12.7	19.1	19.7
Width (W)	mm	4,682	5,013	5,013	5,013	5,013	5,386
Depth (D)	mm	3,800	4,445	4,445	4,822	4,822	4,947
Height (H)	mm	7,440	7,950	8,350	8,750	9,150	9,450

MAC-BF

Boiler Type		MAC-20BF	MAC-25BF	MAC-30BF	MAC-35BF	MAC-40BF	MAC-45BF	MAC-55BF	MAC-60BF	MAC-70BF	MAC-80BF	MAC-90BF	MAC-100BF
Evaporation	kg/h	20,000	25,000	30,000	35,000	40,000	45,000	55,000	60,000	70,000	80,000	90,000	100,000
Boiler design Press.	MPa	2.2											
Working steam pressure	MPa	2.0											
Weight	ton	30	32	34	39	47	49	62	80	81	81	82	83
Water content	ton	10	11	12	13	19	20	24	31	35	35	36	40
Width (W)	mm	3,872	4,300	4,585	4,682	5,013	5,013	5,385.8	5,783.6	5,524	5,564	5,564	5,897
Depth (D)	mm	2,454	2,454	2,639	2,847	3,063.2	3,063.2	3,249.6	4,318	4,895	4,955	4,955	5,324
Height (H)	mm	6,740	7,090	7,340	8,040	8,200	8,600	9,700	9,210	8,280	8,930	9,230	9,730

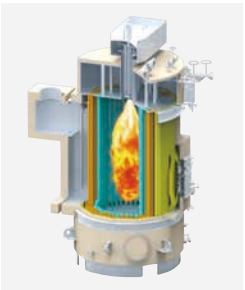
Auxiliary Boilers MAC-D/DS SERIES

MAC-D is a cylindrical boiler that supplies steam for driving cargo oil pump turbines and inert gas for tanks. MAC-DS is a cylindrical low-pressure boiler mainly used on tankers such as product carriers.

Boiler Type		MAC-20D	MAC-25D	MAC-30D	MAC-35D	MAC-20DS	MAC-25DS
Evaporation	kg/h	20,000	25,000	30,000	35,000	20,000	25,000
Boiler design Press.	MPa	1.8				1.0-1.8	
Working steam pressure	MPa	1.6				0.7-1.6	
Weight	ton	30	34	41	46	26	30
Water content	ton	16	18	22	23	16	18
Width (W)	mm	3,448	3,448	3,770	3,884	3,448	3,448
Depth (D)	mm	5,371	5,371	5,822	5,869	5,371	5,371
Height (H)	mm	6,782	7,582	7,724	8,392	6,782	7,582

Auxiliary Boilers MC-EF SERIES

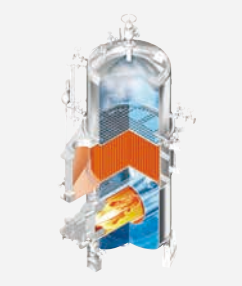
MC-EF is water tube type boiler for containers, bulk and LNG carriers. It has a simple structure and uses a bare tube for easy maintenance. MC-EF is compatible with fuel oil and gas.



Boiler Type		MC-50EF	MC-60EF	MC-70EF	MC-80EF
Evaporation	kg/h	5,000	6,000	7,000	8,000
Boiler design Press.	MPa	0.9			
Working steam pressure	MPa	0.7			
Weight	ton	16	17	18	19
Water content	ton	8	9	10	10
Width (W)	mm	3,977	3,977	4,177	4,177
Depth (D)	mm	2,490	2,490	2,690	2,690
Height (H)	mm	5,100	5,500	5,642	6,042

Auxiliary Boilers MC-D SERIES

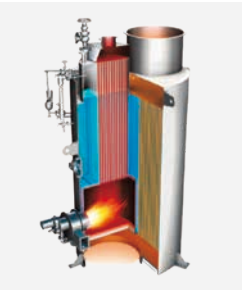
MC-D is water tube type boiler that supplies general service steam for containers, bulk and LNG carriers. The furnace is completely water-cooled, highly reliable and requires little maintenance.



Boiler Type			MC-20D	MC-30D	MC-45D
Evaporation	Integrates oil firing section	kg/h	2,000	3,000	4,500
	exhaust gas economizer section	kg/h	-		
Boiler design Press.		MPa	0.69-0.98		
Working steam pressure		MPa	0.59-0.88		
Weight		ton	7	8	11
Water content		ton	5	7	12
Width (W)		mm	2,395	2,730	3,175
Depth (D)		mm	1,730	1,970	2,320
Height (H)		mm	4,371	4,420	4,850

Auxiliary Boilers MJC SERIES

MJC is a composite boiler that integrates oil firing section and exhaust gas economizer section for container and bulk carriers.
Simple smoke tube type and compact for easy installation.
Waste heat from multiple engines can be recovered by a single composite boiler.



Boiler Type			MJC-210	MJC-250	MJC-280	MJC-340	MJC-360
Evaporation	Integrates oil firing section	kg/h	2,000	2,000	2,000	3,000	5,000
	exhaust gas economizer section	kg/h	According to exhaust gas condition				
Boiler design Press.		MPa	0.69-0.98				
Working steam pressure		MPa	0.59-0.88				
Weight		ton	18	21	27	41	45
Water content		ton	9	12	15	22	25
Width (W)		mm	2,290	2,700	2,990	3,630	3,790
Depth (D)		mm	2,290	2,700	2,990	3,630	3,790
Height (H)		mm	5,500	5,400	5,500	6,000	5,500

Auxiliary Boilers MJE SERIES

MJE is smoke tube type exhaust economizer that generates steam using waste heat from engine exhaust gas. Used to supply general service steam.
Waste heat from multiple engines can be recovered by one economizer.

Boiler Type		MJE-B300	MJE-E250	MJE-E300
Evaporation	kg/h	According to exhaust gas condition		
Boiler design Press.	MPa	1.0		
Working steam pressure	MPa	0.8		
Weight	ton	32	21	32
Water content	ton	17	12	17
Width (W)	mm	3,210	2,720	3,210
Depth (D)	mm	3,210	2,720	3,210
Height (H)	mm	5,300	4,900	5,300

UST Series (for Steam Propulsion Vessels)

Using the latest reheat-regenerative cycle system and state-of-the art technologies to improve plant efficiency, our Ultra-Steam Turbine Plant (UST) delivers the best economic and environmental performance to all customers. UST, the environmental-friendly propulsion system, contributes to our customers' good service with high reliability and safety.

UST Turbine

UST Boiler

Features

Greater plant efficiency

- Higher plant efficiency which achieves about 15% reduction in fuel oil consumption compared with CST (Conventional Steam Turbine plant) series

High reliability and safety

- Proven design based on established marine and land technologies

Environmentally friendly

- Low NOx, SOx and CO_2 emissions

Flexibility of fuel selection

- Oil, gas and dual firing

Extremely long life

- Extremely long life due to the robust design and appropriate safety margins

Main Boiler(UST)

Series No.		MBR-1E	MBR-2E	MBR-3E	MBR-4E	MBR-5E	MBR-6E	MBR-7E
Maximum evaporation	kg/h	40,000	45,000	50,000	55,000	60,000	65,000	70,000
Firing System	-	Roof firing for Main Burner, Horizontal firing for RH Burner						
Furnace construction	-	Welded wall						
Steam Press. at S.H.O	MPa	10						
Steam Temp. at S.H.O	℃	560						
Feed water temp.	℃	138						
Boiler design Press.	MPa	12						
Boiler efficiency	%	88.5 based on the H.H.V. of fuel						
Air Heater	-	Steam air heater						
Number of burners	NOS.	2			3			

Main Turbine(UST)

Output in MW	13~15 MW (18~20kps)	15~18 MW (20~24kps)	18~23 MW (24~32kps)	23~26 MW (32~36kps)	26~30 MW (36~40kps)	30~33 MW (40~45kps)	33~37 MW (45~50kps)
Main Frame	MR21- II	MR24- II	MR32- II	MR36- II	MR40- II	MR45- II	MR50- II
HP/IP Turbine Frame	HR-20			HR-22		HR-26	HR-28
LP Turbine Frame	LR-14		LR-16	LR-18		LR-20	LR-23
Reduction Gear Frame	Single Tandem Articulated Type			Single Tandem Articulated Type/ Dual Tandem Articulated Type		Dual Tandem Articulated Type	
Main Thrust Frame	T-8	T-9	T-11	T-13	T-15	T-17	T-19

HR-22: High-intermediate pressure turbine with 20- to 22-inch base-diameter
LR-18: Low pressure turbine with 18-inch last blade
T-13: Main thrust bearing with 13×10^3 cm^2 nominal surface areas

Deck Boilers and Steam Turbine Generators for FPSO/FSO/FSRU/FLNG

Our deck boilers and steam turbine generator are compact size and low maintenance cost.
And we have a lot of reference records. In addition, we can propose and supply the best heat efficiency combination unit according to the plant operation requirement.

Features

High reliability and availability
- Robust and proven design with experiences of marine and land use application

Fuel flexibility
- Associated gas, VOC (Volatile Organic Compounds) gas, heavy fuel, diesel oil and crude oil is available

Low maintenance cost
- No hot parts overhaul is required for both boiler and turbine

Easy installation
- Equipment is supplied as module unit for easy installation and this meets the project requirement tight schedule

Automatically operation
- Safely and user friendly operation is available with our automatic control system

1.6MPa Class Boiler

Type		MAC-40BF	MAC-50BF	MAC-60BF	MAC-70BF	MAC-80BF	MAC-90BF	MAC-100BF
Maximum evaporation	kg/h	40,000	50,000	60,000	70,000	80,000	90,000	100,000
Steam pressure	MPa	1.6 (up to 2.5)						
Steam temperature	℃	Saturated temperature to 280						

6MPa Class Large Size Boiler

Type		MBF-120	MBF-160	MBF-220
Maximum evaporation	kg/h	120,000	160,000	220,000
Steam pressure	MPa	6.0		
Steam temperature	℃	Up to 515		

6MPa Class Medium Size Boiler

Type		MB-1E	MB-2E	MB-3E	MB-4E-NS	MB-4E	MB-4E-KS
Maximum evaporation	kg/h	36,000	45,000	55,000	60,000	65,000	70,000
Steam pressure	MPa	6.0					
Steam temperature	℃	Up to 515					

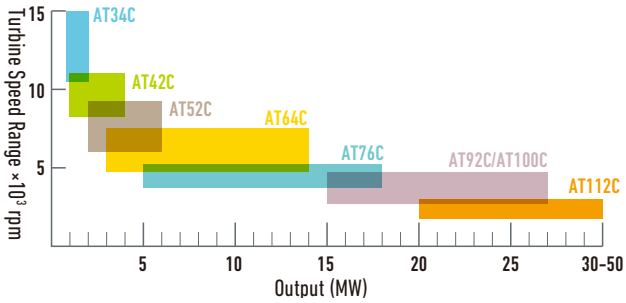
Deck Boiler

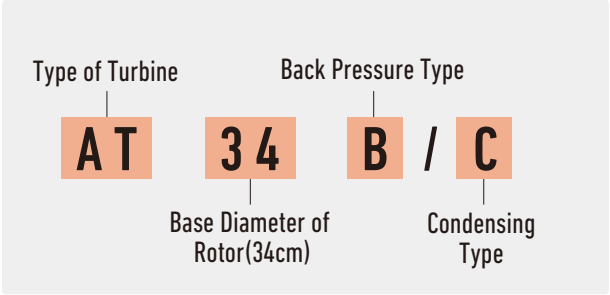
Steam turbine

Selection of Turbine Frames

CONDENSING TYPE

Main Steam: 12.3 MPa x 540°C max.
Exhaust Vacuum: 722 mm Hgvac max.





Propeller MAP Mark-W

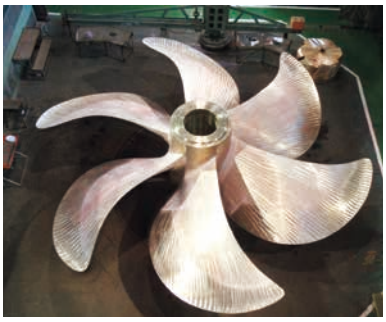
MAP Mark-W (Mitsubishi Advanced Propeller Mark-W) is designed with latest Mitsubishi technology and has outstanding advantage in both superior cavitation performance and improved propeller efficiency. It is not only for delivery to new ships but also for retrofit purpose to vessels in service and contributs to reducing fuel consumption and environmental impact.

Features

Economical
- High propulsion efficiency

Compact design
- Lower propeller mass and moment of inertia

High reliability
- Maintains excellent propeller strength
- Excellent cavitation performance with streamlined tips and reduced blade area

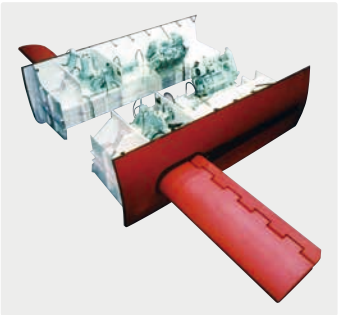

MAP Mark-W

Propeller Retrofit

Slow steaming of ships are widly adopted for energy saving and replacing to retrofit propeller re-designed optimally for slow steaming condition will improve fuel efficiency significantly. It is also useful when engine power limitation is necessary to comply with EEXI. More than 8% fuel efficiency improvement could be measured by propeller retrofit to some container vessels in our past reference. Value of propeller originally equipped with vessel is refunded to ship owner and it leads to minimize initial cost and enhance investment effect.

Retractable Fin Stabilizers

This is highly reliable anti-rolling system backed with plenty delivery reference records mainly for ferries and RORO vessels. Renewing interface to touch screen panel and new funtionality such as data storage was added to control system by upgrading done in 2021.



Features

High reliability
- High sealing properties
- Excellent anti-rolling performance
- Highly responsive hydraulic system

Easy maintenance
- High maintainability due to hydraulic cylinder drive and simple onboard layout

New control system
- Touch screeen interface on control panel making available both less space and data enrichment
- Full of useful data recording function
- Simplification of electrical wiring

Type		MR-S	MR-1	MR-2	MR-3	MR-4
Fin area	m²/side	3	5	7	9	12
Weight	ton/side	15	26	39	56	77
Motor output	kW/side	15	22	37	45	75

Steering Gear

Our electro-hydraulic steering gear has a simple, compact design and employs an extremely responsive hydraulic system, with high reliability and durability fitling to a wide range of vessels, including commercial ships, naval ships and specialized ships.

Features

High reliability and durability
- Employ a Rapson slide type actuator and streamlined pump
- Excellent reliability due to hydraulic locking alarm

Excellent response

Simple and compact design
- Hydraulic pump attached to oil tank on cylinder
- Pipeless configuration

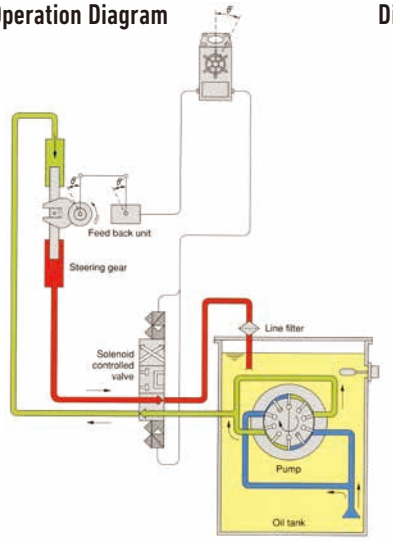
Easy operation
- Can be operated both manually and remotely

Safe
- Dual control system
- Higher safety through an automatic isolating control system

ACTUATOR TYPE		CONTROL METHODS		TYPE	TORQUE (kN-m)
Rapson Slide Type S:1 RAM, 2 CYLINDER D:2 RAM, 4 CYLINDER	Fork Type	Single Loop Control	Solenoid Control Valve:C	SFC	314 to 1,030
			Torque Motor : T	SFT DFT	706 to 1,726 726 to 11,307

SFC type

Operation Diagram



Dimensions

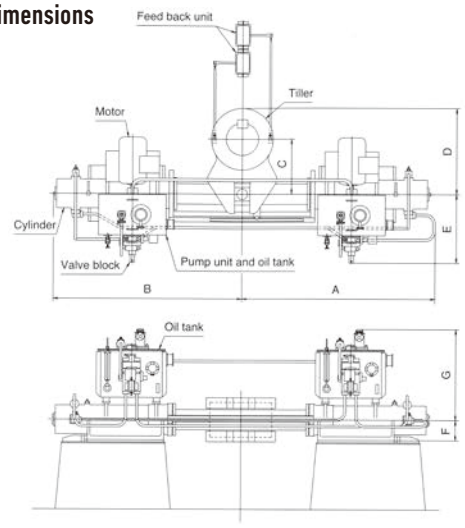


FIG.1

	Type			SFC-30	SFC-40	SFC-50	SFC-60	SFC-80		SFC-105
	Torque at maximum working oil pressure		kN-m	314	441	520	618	706	844	1,030
	Rudder turning speed		deg/sec	65/28						
With main and auxiliary pumps	Motor	Output × number	kW	11×2	15×2		18.5×2	22×2	25×2	32×2
		number of revolution	min^{-1}	1,800						
		Overload	%/sec	200/60						
	Pump type × Number			T6C-B06×2	T6C-B10×2		T6C-B14×2	T6C-B17×2		T6C-B25×2
Without auxiliary pumps	Motor	Output × number	kW	—	7.5×2		11×2			—
		number of revolution	min^{-1}	—	1,800					—
		Overload	%/sec	—	200/60					—
	Pump type × Number			—	T6C-B05×2		T6C-B06×2	T6C-B08×2		—
Dimensions		A	mm	1,716	1,860	1,945	2,080	2,260		2,475
		B	mm	1,685	1,845	1,945	2,020	2,225		2,475
		C	mm	470	520	560	580	650		690
		D	mm	740	815	880	910	1,015		390
		E	mm	815	815	815	1,000	1,000		825
		F	mm	190	205	215	220	240		255
		G	mm	1,030	1,040	1,050	1,200	1,220		1,540
Attached figure				FIG.1						

NOTE: The above list is complied for rudder turning angle of ±35 deg. and electric source of 60Hz. Steering geers for special particulars are available with us under high workmanship design.

SFT type / DFT type

Dimensions

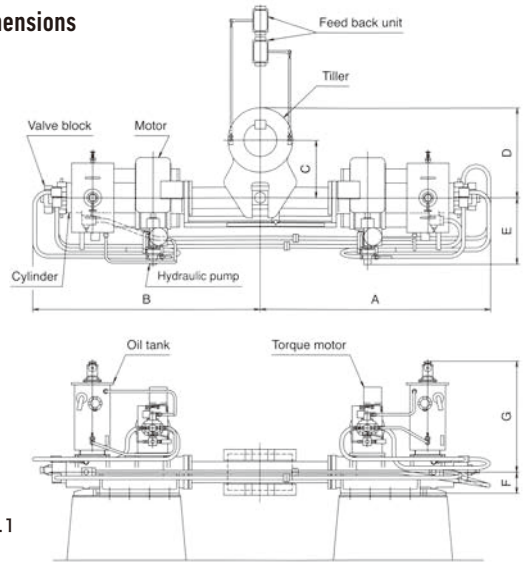
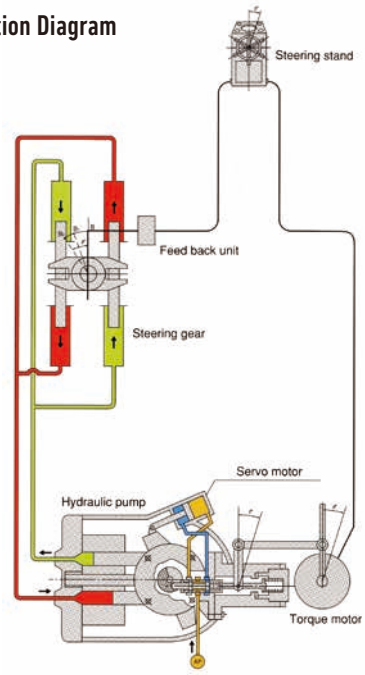


FIG.1

Operation Diagram



	Type			SFT-80		SFT-125		SFT-170		DFT-80		DFT-125		DFT-170	
	Torque at maximum working oil pressure		kN-m	706	844	1,030	1,196	1,402	1,726	726	892	1,030	1,236	1,373	1,687
	Rudder turning speed		deg/sec	65/28						65/28					
With main and auxiliary pumps	Motor	Output × number	kW	22×2	25×2	30×2	37×2	45×2	50×2	22×2	25×2	30×2	37×2	45×2	50×2
		number of revolution	min^{-1}	1,800						1,800					
		Overload	%/sec	200/60						200/60					
	Pump type × Number			06V-FH2MK×2		1V-FH2MK×2				06V-FH2MK×2		1V-FH2MK×2			
Without auxiliary pumps	Motor	Output × number	kW	15×2		15×2	18.5×2	22×2	25×2	11×2	15×2	15×2	18.5×2	22×2	25×2
		number of revolution	min^{-1}	1,800						1,800					
		Overload	%/sec	200/60						200/60					
	Pump type × Number			06V-FH2MK×2						06V-FH2MK×2					
Dimensions		A	mm	2,600		2,900		3,225		2,000		2,190		2,380	
		B	mm	2,565		2,865		3,200		1,845		2,020		2,225	
		C	mm	650		730		850		520		580		650	
		D	mm	1,015		1,140		1,315		970		1,080		1,150	
		E	mm	760		910		910		1,625		1,715		1,800	
		F	mm	240		260		285		205		220		240	
		G	mm	1,260		1,395		1,415		1,370		1,370		1,370	
Attached figure				FIG.1						FIG.2					

NOTE: The above list is complied for rudder turning angle of ±35 deg. and electric source of 60Hz. Steering geers for special particulars are available with us under high workmanship design.

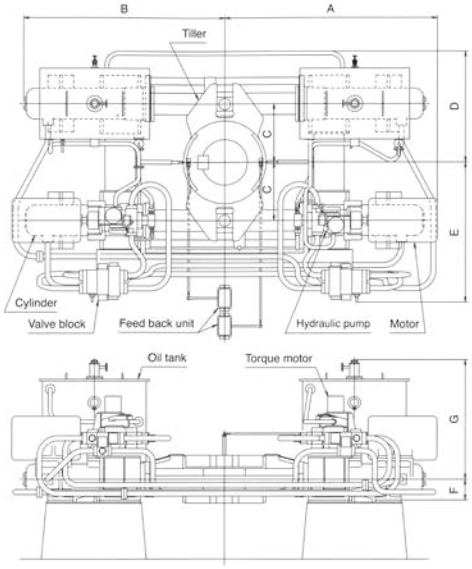


FIG.2

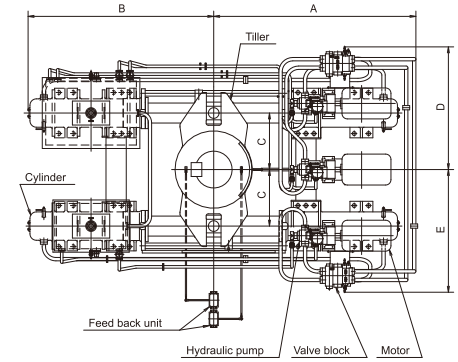


FIG.4

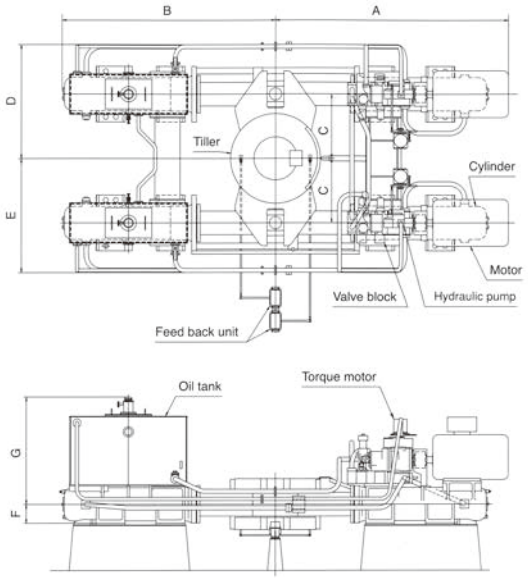


FIG.3

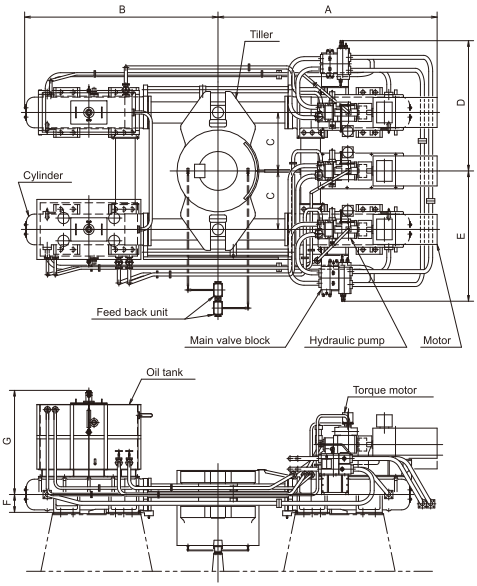


FIG.5

DFT-200	DFT-250	DFT-300	DFT-335	DFT-400	DFT-475	DFT-530	DFT-600	DFT-670	DFT-760	DFT-870	DFT-1000	DFT-1150
2,030	2,393	2,854	3,442	3,923	4,756	5,394	6,031	6,721	7,532	8,552	9,807	11,307
65/28												
55×2	75×2	80×2	90×2	110×2	160×2		—	—	—	—	—	—
1,200							—	—	—	—	—	—
200/60							—	—	—	—	—	—
3V-FH2MK×2				6V-FH2MK×2			—	—	—	—	—	—
30×2	37×2	45×2	50×2	55×2	75×2	75×2	90×3	100×3	110×3	125×3	150×3	160×3
1,800				1,200								
200/60												
06V-FH2MK×2	1V-FH2MK×2			3V-FH2MK×2			3V-FH2MK×3		6V-FH2MK×3			
2,580	2,650	2,920	2,990	3,265	3,460	3,505	3,665	3,825	4,120	4,240	4,400	4,600
2,390	2,505	2,655	2,845	2,970	3,125	3,230	3,325	3,480	3,645	3,740	4,040	4,140
715	730	780	850	900	940	970	1,000	1,060	1,100	1,130	1,180	1,240
1,375	1,385	1,440	1,510	1,645	1,685	1,715	2,240	2,300	2,570	2,520	2,530	2,630
1,870	1,885	1,935	2,005	1,645	1,685	1,715	2,240	2,300	2,570	2,520	2,530	2,630
255	260	275	285	260	275	285	325	330	335	345	355	365
1,480	1,500	1,510	1,540	1,585	1,600	1,610	1,705	1,730	2,000	2,010	2,030	2,045
FIG.2				FIG.3			FIG.4		FIG.5			

Deck Cranes

The SMART UP-GRADE menu helps clients respond to diversifying risks while actualizing stable management and a reduction of lifecycle costs. Mitsubishi Heavy Industries Machinery Systems, Ltd. (MHI-MS) deck cranes contribute to global marine transport through achievement of both high functionality and economic efficiency.

SMART UP-GRADE

Next-generation cranes with **Data Logging Functions** × Responding to individual needs (also available for retrofitting) **Proposal of Optimal Customization**

Synchronized Crane (50tons × 3)

Electric Hydraulic Deck Crane

Features

High reliability and Easy Maintenance

- Uses a mechanical link control system, with main equipment placed at the base of the crane in a simple yet easy-to-maintain design
- All component devices and parts used have been carefully checked for quality, ensuring high reliability

Reliable cutting-edge technology

- A programmable logic controller (PLC) offers a flexible control program. The alarm display function has also been enhanced
- A data logging system automatically records, on an SD card, a history of the alarm being triggered as well as operation modes, hours of operations and other information
- Equipped with an overload test mode for overload testing
- Synchronized-control deck cranes, which enable multiple cranes to be operated simultaneously, are also available

Standard Crane (30t)

Heavy duty Crane (100t)

Standard crane

Type	Hoisting load (t)	Working radius Max. (m)	Working radius Mim. (m)	Winding height (m)	Hoisting Load (t) Speed(m/min.)	Lowering Load (t) Speed(m/min.)	Luffing time (sec.)	Slewing speed (rpm)	Electric motor for pump unit (kW) Cont.	Electric motor for pump unit (kW) Intermittent	Total weight (t)
3020	30	20	4	35	30/12/5 18.5/37/63	30/12/5 63	41	0.75	105	240 ED 15%	34
3022		22	4				41	0.75			35
3024		24	4.5				48	0.7			36
3026		26	4.5		* 30/12/5 25/50/63	* 30/12/5 63	49	0.6	* 132	* 320 ED 15%	40
3028		28	5				50	0.55			45
3030		30	5				52	0.5			48
3620	36	20	4	35	36/14/5 16/32/55	36/14/5 55	43	0.7	105	240 ED 15%	40
3622		22	4				48	0.65			41
3624		24	4.5				51	0.6			43
3626		26	4.5		* 36/14/5 22/44/55	* 36/14/5 55	54	0.6	* 132	* 320 ED 15%	45
3628		28	5				55	0.55			47
3630		30	5				58	0.5			50
4020	40	20	4	35	40/16/5 12.5/25/42	40/16/5 42	56	0.65	105	240 ED 15%	45
4022		22	4				59	0.6			46
4024		24	4.5				63	0.55			48
4026		26	4.5		* 40/16/5 18.5/37/42	* 40/16/5 42	67	0.5	* 132	* 320 ED 15%	51
4028		28	5				72	0.45			53
4030		30	5				80	0.4			56

＊: High speed type (Optional item)

Heavy duty crane

Type	Hoisting load (t)	Working radius Max. (m)	Working radius Mim. (m)	Winding height (m)	Hoisting Load (t) Speed(m/min.)	Lowering Load (t) Speed(m/min.)	Luffing time (sec.)	Slewing speed (rpm)	Electric motor for pump unit (kW) Cont.	Electric motor for pump unit (kW) Intermittent	Total weight (t)
MHD5028	50	28	5	35	50/20/5 15/30/38	50/20/5 38	95	0.4	132	320 ED 15%	69
MHD5030		30	5				100	0.35			72.5
MHD5032		32	5				110	0.35			73
MHD10028	100	28	6	35	100/40 10/20	100/40 20	135 145	0.2 0.2	132 ×2	240 ED 25% ×2	122 127
MHD10030		30	6								

＊ MHI-MME is sales representation in Japanese domestic market.

Load meter in the operator cab

Offline filter unit

Sample image recorded by the surveillance camera

Extensive UP-GRADE Item

SMART UP-GRADE

Upgrade Menu Examples

- Data Logging Advance (DLA)
  Adds on pressure and speed sensors and enables the regular monitoring of equipment performance (self-test mode) and the swift identification of causes when problems occur
- Load meter in the operator cab
- Offline filter unit
- Surveillance camera

A diverse menu that offers many other customizations is available

Electric Deck Crane

Newly Developed

The clean and green electric deck crane merges the expertise accumulated through many years of experience in electro-hydraulic deck cranes with regenerative power and other energy-saving technologies in the newly developed next-generation deck crane. It contributes to global marine transport through high functionality, economic efficiency and environmental performance.

Features

High Efficiency

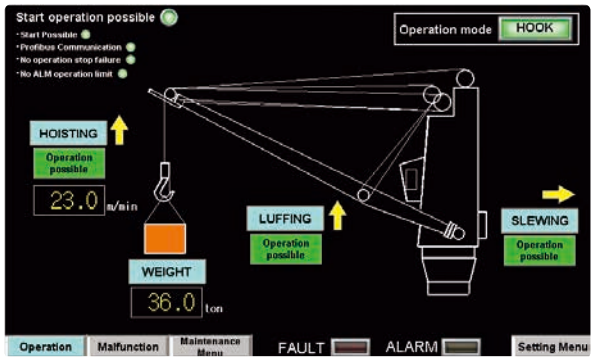
- Uses the variable frequency drive (VFD) system and high-efficiency motor and invertor
- Regenerative power supply reduces consumed power by about 40% as compared with electro-hydraulic deck cranes

High Reliability and Easy Maintenance

- The optimal layout of the electric motor and reducer, and the placement of main equipment at the base of the crane achieve a simple yet easy-to-maintain superior design
- All component devices and parts used have been carefully checked for quality, ensuring high reliability

User Friendly

- The operator cab is equipped with a touchscreen display that has excellent visibility and operability.
  Combined with the data logging function,
  it allows crane operating data and the status of the crane to be confirmed at hand if problems occur



Example of content shown on the touchscreen sensor display

Operator cab interior

Electric Crane (36t)

Deck Machinery

MHI-MS has been delivering hydraulic deck machinery to satisfied customers for more than half a century. MHI-MS provide a wide range of windlasses, winches and pumps that are highly reliable, durable, and high performing, making marine operations both faster and safer.

Features

High Reliability

- Its highly reliable design leverages more than a half-century of experience in in-house electro-hydraulic deck cranes

High Efficiency

- Utilizes a compact and highly efficient high-pressure hydraulic system

Extensive Line-up

Extensive lineup for various ship types and applications

- Mooring winch lated load: 100kN ~250kN
- Windlass chain diameter: ϕ 60MM ~ over ϕ 100MM
- Central circuit and Series circuit are supported

Windlass

Mooring winch

* MHI-MME is sales representation in Japanese domestic market.

Water Jet Propulsion System (MWJ-A Model Series)

Water Jet Propulsion System is installed as a part of fast vessel for express marine transportation. Mitsubishi Heavy Industries, Ltd. has been a leader in this field and has a good track records in delivery. Mitsuibishi Water Jet was developed based on the experience of the design and manufacturing of Pumps
which have a considerable number of delivery records with a long history as well as the know-how established as a ship building manufacturer. Using the strength of such integrated technical capabilities Mitsuibishi Water Jet can contribute to the performance of vessels in all aspects such as acceleration, downsized design, durability and so on.

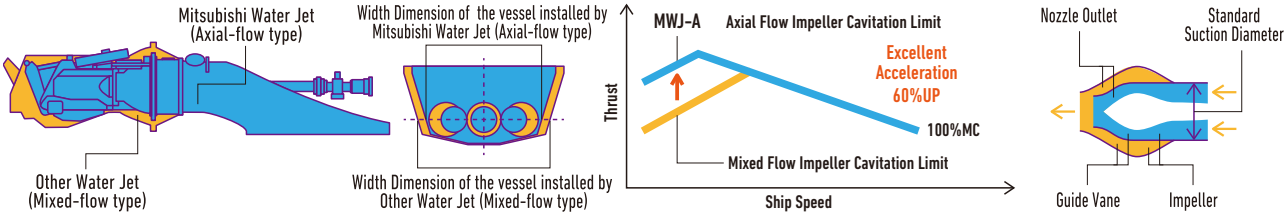
Features

Lightweight & Compact Design
- Adopting axial flow impeller for smaller and ligher in design
- Simplified structure at mechanical portion
- Much further lightweight solution can be proposed (ex.Double-Stage Blade Impeller)

Excellent Acceleration & Propulsion Performance
- MHI Axial-flow type impeller enables high efficiency and superior performance against cavitation

High Performance in Ship Maneuverability
- Flexible handling by quick and smooth astern performance
- Applicable to Dynamic Positioning System (DPS)

Provide Good After-sales Service
- Short delivery of the parts for maintenance
- Skillful engineers, Technical Advisors, and organized support



Range of Output Power

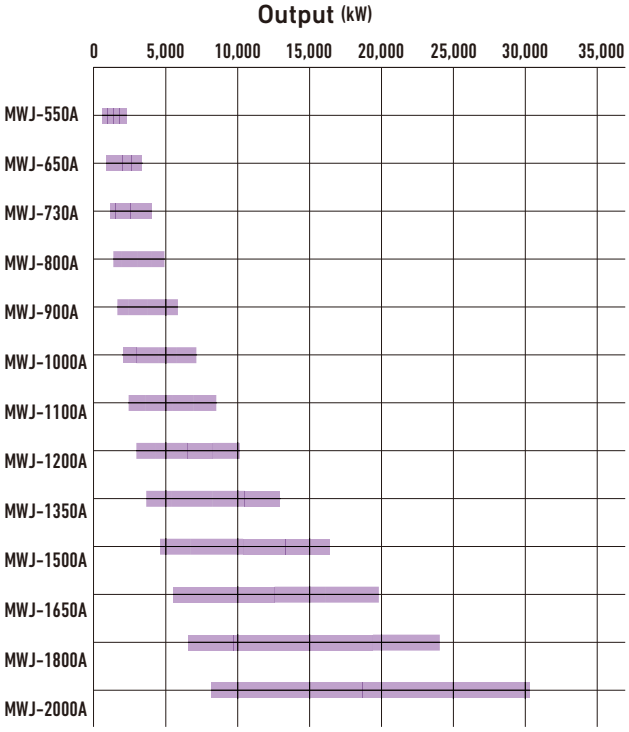
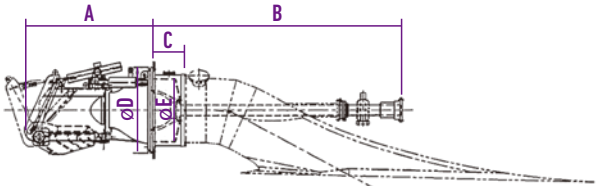


Table for Major Dimensions



Type	Dimensions (mm)				
	A	B	C	D	E
MWJ-550A	1,300	2,350	300	ϕ 820	ϕ 550
MWJ-650A	1,500	2,800	355	ϕ 950	ϕ 650
MWJ-730A	1,640	3,150	400	ϕ 1,050	ϕ 730
MWJ-800A	1,760	3,450	435	ϕ 1,130	ϕ 800
MWJ-900A	2,000	3,850	490	ϕ 1,230	ϕ 900
MWJ-1000A	2,200	4,300	550	ϕ 1,375	ϕ 1,000
MWJ-1100A	2,500	4,900	580	ϕ 1,470	ϕ 1,100
MWJ-1200A	2,660	5,160	660	ϕ 1,630	ϕ 1,200
MWJ-1350A	2,950	5,750	750	ϕ 1,850	ϕ 1,350
MWJ-1500A	3,300	6,400	830	ϕ 2,050	ϕ 1,500
MWJ-1650A	3,600	7,050	910	ϕ 2,250	ϕ 1,650
MWJ-1800A	3,950	7,700	990	ϕ 2,350	ϕ 1,800
MWJ-2000A	4,400	8,600	1,100	ϕ 2,600	ϕ 2,000

∗ MHI-MME is sales representation in Japanese domestic market.

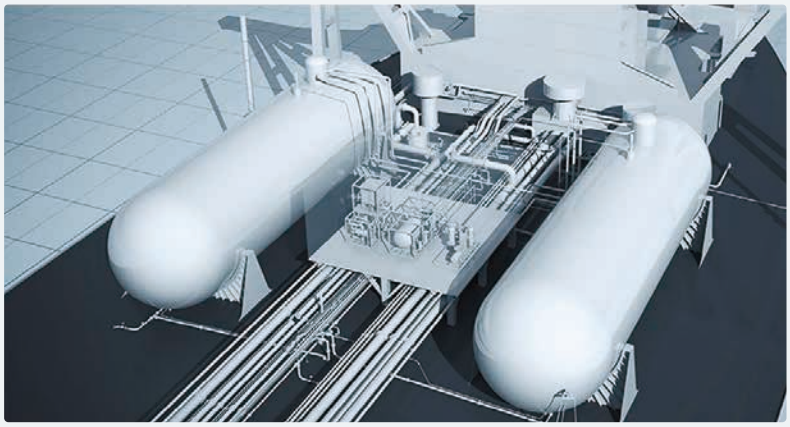
Contact for Mitsubishi Marine Machinery of Group Company

LNG Fuel Gas Supply System "LNG FGSS"

"LNG FGSS" is an LNG fuel-gas supply system for marine engines.

Mitsubishi Shipbuilding Co., Ltd.
Marine Engineering Center

Address: Mitsubishijuko Yokohama Bldg., 3-1
Minatomirai 3-chome, Nishi-ku, Yokohama,
Kanagawa, 220-8401, Japan
URL: https://www.mhi.com/jp/products/ship/fgss.html



DIA-SOX

DIA-SOX is a device that removes sulfur oxides from the exhaust gas of the main engines and power generators on board ships.

Mitsubishi Shipbuilding Co., Ltd.
Marine Engineering Center

Address: Mitsubishijuko Yokohama Bldg., 3-1
Minatomirai 3-chome, Nishi-ku, Yokohama,
Kanagawa, 220-8401, Japan
URL: https://www.mhi.com/jp/products/ship/dia-sox.html

Contact for Mitsubishi Marine Machinery of Group Company

4st Marine Engines

Mitsubishi Heavy Industries Engine & Turbocharger, Ltd.
Engine Sales Department Engine & Energy Division

Address: 3000 Tana Chuo-ku, Sagamihara, Kanagawa 252-5293 Japan
Tel: +81-42-763-7854 Fax:+81-42-761-1994
URL:http://www.mhi.com/group/mhiet/

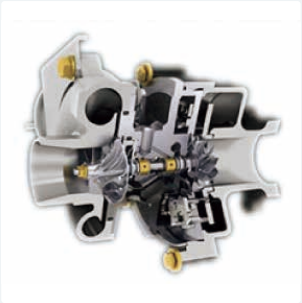
SR Series

SA Series

TD / TF Type Turbocharger

Mitsubishi Heavy Industries Engine & Turbocharger, Ltd.
Sales Department of Turbo Division

Address: 3000 Tana Chuo-ku, Sagamihara, Kanagawa 252-5293 Japan
Tel: +81-42-763-1685
URL:http://www.mhi.com/group/mhiet/



Contact for Other Product

In April 2017, our 2 stroke engine business was consolidated as Japan Engine Corporation.

2st Marine Low Speed Engine

Japan Engine Corporation (Headquarters)

Address: 1, Minamifutami, Futami-cho, Akashi, Hyogo 674-0093
[Main] Tel:+81-78-949-0800 Fax: +81-78-949-0810
[Engine sales] Tel:+81-78-672-3794
[After-sales sales service] Tel:+81-78-949-0801
[After-sales technical service] Tel:+81-78-672-3819
Email: (Sales) sales@j-eng.co.jp
(After-sales service) service@j-eng.co.jp
URL:http://www.j-eng.co.jp/

UEC Engine

After-Sales Services (Contact Details)

For Customers Worldwide

General inquiries for after sales services

- MHI Marine Engineering Ltd.
  Sin-Tamachi Building 34-6 Shiba 5-Chome Minato-ku, Tokyo 108-0014, Japan
  Tel:+81-3-3798-5941 Fax:+81-3-3798-5943
  E-mail:afterservice.me@mhi.com
- Overseas bases listed on page 29

For Customers in Japan

MET Turbochargers, Propellers, Boilers and Turbines, Steering Gear – Spare parts and service engineers

- Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.
  1-1 Akunoura-Machi, Nagasaki, 850-8610, Japan
  TEL.+81-70-7892-4456 FAX.+81-95-828-6015
  Email: marine.machinery.service@mhi.com

Fin Stabilizers, Deck Cranes, Deck Machinery, Water-Jet Propulsion Unit – Spare parts and service engineers

- Samayu Co., Ltd.
  4-31 Ohgi-machi Chofu, Shimonoseki, Japan 752-0927
  Tel:+81-83-248-3411 Fax:+81-83-248-2771
  URL:http://www.samayu.co.jp/english/index.html

Licensees

MET Turbochargers

Mitsui E&S Machinery Co., Ltd.

6-4, Tsukiji 5-chome, Chuo-ku, Tokyo, 104-8439, Japan
Tel:+81-3-3544-3475 Fax:+81-3-3544-3055
URL:https://www.mes.co.jp/machinery/english
E-mail:meshp_diesel@mes.co.jp

HSD Engine Co., Ltd.

67 (Sinchon-dong), Gongdan-ro, Seongsan-gu, Changwon-si,
Gyeongsangnam-do, 642-370, South Korea
Tel:+82-55-260-6000 Fax:+82-55-283-2233
URL:http://www.hsd.com

Hyundai Heavy Industries Co., Ltd.

1000 Bangeojinsunhwan-doro, Dong-gu, Ulsan, 682-792, South Korea
Turbochargers: Tel:+82-52-202-2114 Fax:+82-52-202-2347
URL:https://english.hhi.co.kr

STX Heavy Industries Co., Ltd.

381, Nammyeon-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do, 642-050,
South Korea
Tel:+82-55-280-0727 Fax:+82-55-282-1938
URL:http://www.stxhi.com

Auxiliary Boilers

CSSC Jiujiang Boiler Co., Ltd.

No.79 Jiurui Avenue Jiujiang, Jiangxi, China
Tel:+86-792-810-7296 Fax:+86-792-810-7299
URL:http://www.csscboiler.com

Turbines

Mitsubishi Hitachi Power Systems Jieneng(Qingdao) Steam Turbine Co., Ltd.

16F D&D Cai fu Building,
No.182-6 Haier Road, Laoshan-District, Qingdao, China, 266100
Tel:+86-532-5573-0797
URL:https://www.mhi.com/network/area/china.html

Propellers

Changzhou Zhonghai Marine Propeller Co., Ltd.

Jiangsu Changzhou Wujin District Industrial Park No.38, China
Tel:+86-519-88708276 Fax:+86-519-88703698
URL:http://en.china-propeller.com.cn

Steering Gear

Jiangsu Masada Heavy Industries Co., Ltd.

No.118, Huanghai road, Gangzha Development Area, Nantong, Jiangsu, China
Steering Gears: Tel:+86-513-8530-6818 Fax:+86-513-8530-6811
URL:http://en.masada.cn

Yoowon Industries Ltd.

23, Eulsukdo-daero 677 beon-gil, Saha-gu, Busan, Korea
Tel:+82-51-205-8541 Fax:+82-51-205-8540
URL: http://www.yoowonind.com

Authorized Representative Technical Consultant

Denmark

Turbo Marine Consult Aps

Service Partners

Europe

Denmark

Harris Pye Scandinavia	B

Italy

SAMOS s.r.l.	FS

Netherlands

Fuji Trading (Marine) B.V.	SG
IHI Marine B.V.	SG

Portugal

Harris Pye Portugal	B

United Kingdom

Harris Pye United Kingdom Ltd.	B
Naiad Dynamics UK Ltd.	FS

Germany

Taknas Marine Engineering GmbH	B
Turbo-Technik GmbH & Co.KG	T

Asia

China

IMCS Marine(Shanghai)Co., Ltd.	SG
Shanghai Fance Jidian Shebei Gongcheng Co.,Ltd.	T
Suzhou Harris Pye Equipment Repair Co., Ltd.	B

Japan

AMCO Engineering Corporation		B
Harris Pye Japan Co., Ltd.		B
Toyo Dengyo Co., Ltd.		B
Samayu Co., Ltd.	FS	SG
General Engineering Co., Ltd.		FS
Tamoto Corporation		FS
Sansei Service		FS

South Korea

DINTEC Co.,Ltd.	T
Jonghap Maritime Engineering Inc.	T

Singapore

AC Marine Pte Ltd.		T
Daikai Engineering Pte Ltd.		SG
Harris Pye Singapore Pte Ltd.		B
Shinsei Engineering Pte Ltd.		SG
Samayu Co., Ltd.	FS	SG
Polestar Marine Engineering Pte Ltd.		T
Taknas Engineering Pte. Ltd.		B

Middle East

UAE

Harris Pye Gulf L.L.C.	B
Middle East Fuji L.L.C.	SG

North America

United States of America

Far East Marine Service Inc.	SG

South America

Brazil

Harris Pye Brasil LTDA	B
Fuji Metalock Brasil Ltda	SG

Oceania

Australia

Hydraulic Distributors Pty Ltd	SG
Harris Pye Australia Pty	B

T Turbine　B Bolier
FS Fin Stabilizer　SG Steering Gear

MET Authorized Repair Agents (ARA)

(as of Apr. 2023)

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Noorderlaan 181, 2030 Antwerp, Belgium
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Skudehavnsvej 14 DK-2150 Nordhavn Copenhagen, Denmark
Tel:+45-39 29 15 53 Fax:+45-39 27 10 54
E-mail: Service@pjdiesel.dk

Nippon Diesel Service GmbH
Hermann-Blohm-Str. 1, D-20457 Hamburg, Germany
Tel:+49-40-317-71-00 Fax:+49-40-31-15-98
E-mail: info@nds-intl.com

Scan Turbo Handels und Service GmbH
Kleiner Westring 15, 27572 Bremerhaven, Germany
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2 Ilias & Tripoleos Str. 188-63 Perama, Piraeus, Greece
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Calata Gadda 16128 Genova, Italy
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E-mail: mtd@mtd.it

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Kiotoweg 603 3047 BG, Rotterdam, the Netherlands
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E-mail: turbo@trumarine.nl

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E-mail: info@cassiopeia-service.com

PPUH Nauta Turbo Sp.z O.O.
Ul. Boleslawa Krzywoustego 4, 81-035 Gdynia, Poland
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E-mail: primeserv-vlc@man-es.com

Talleres Sanper, S.L.
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Poi igono Industrial Pelagatos c/del Progreso, Percela 17A-20AES 11130 Chiclana de la Frontera (Cadiz), Spain
Tel:+34-956-407 949 Fax:+34-956 407 951
E-mail: tc@turbocadiz.com

GTS Turbo Diesel Service Ltd.
Organize Deri Sanayii BÖlgesi, 12. Yol L1/6 Parsel 34944 Tuzla, Istanbul, Turkey
Tel:+90-216-591-0723 Fax:+90-216-519-0727
E-mail: info@gtsturbo.co.tr

Master Makina Ltd.
Organize Deri Yan San.Bölgesi,19.Parsel, EtlemeSk., No:20,34956, Tuzla, Istanbul, Turkey
Tel:+90-216-591-0370 Fax:+90-216-591-0373
E-mail: master@mastermakina.com

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Abbey House, Abbey Street, Priory Trading Estate, Birkenhead CH41 5JU, U.K.
Tel:+44-151-647-8141 Fax:+44-151-666-2143
E-mail: info@marineturbo.co.uk

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E-mail: service@majestic-turbo.com

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Tel:+974-4015-9150 Fax:+974-4015-9152
E-mail: primeserv-qatar@man-es.com

Albwardy Marine Engineering LLC
Dubai Maritime City P.O.Box 6515 Dubai U.A.E.
Tel:+971-4-324-1001 Fax:+971-4-324-1252
E-mail: sales@albwardymarine.com

Gulf Turbo Repair & Service FZC
P.O.Box 9148, A4-72, SAIF Zone, Sharjah, U.A.E.
Tel:+971-6-557-3134 Fax:+971-6-557-3135
E-mail: gt.sales@gulfturbo.com

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Drydocks World Dubai Jumeirah Beach Road P.O.Box 57091, Dubai, U.A.E.
Tel:+971-4-345-4045 Fax:+971-4-345-4048
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Nico International U.A.E.
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Tel:+971-4-309-0100 Fax:+971-4-338-1832
E-mail: nicouae@nicouae.com

Tru-Marine Turbocharger Service L.L.C.
P.O.Box 125837, WS#120B, Dubai Maritime City (DMC) Dubai, U.A.E
Tel:+971-4-874-7785 Fax:+971-6-5349356
E-mail: turbo@trumarinedubai.ae

Wartsila Ships Repairing & Maintenance LLC
Dubai Investment Park 2, P.O.Box 32785, Dubai U.A.E
Tel:+971-4-8857-222 Fax:+971-4-8857-020
E-mail: WAEServicesales@wartsila.com

GULF TURBO W.L.L.
PO BOX 50917, HIDD, KINGDOM OF BAHRAIN
Tel:+973-1746-4134 Fax:+973-1767-1259
E-mail: gt.bahrain@gulfturbo.com

MET Authorized Repair Agents (ARA)

Asia

Agile Engineering Ltd.
Block 4, No.669, Nanfenggong Road, Fengxian, Shanghai 201411, China
Tel;+86-21-58430786 Fax:+86-21-58430786
E-mail: info@agileeng.cn

COSCO Shipping Maritime Technology (Dalian) Co., Ltd.
No. 37 Dong Bei Road, E.T.D.Z. District, Dalian, 116600, China
Tel:+86-411-3922-6509 Fax:+86-411-3922-6300
E-mail: cai.dongxiong@coscoshipping.com

Fischer Engineering Co., Ltd.
No. 1 Dadong Road, Chongming, Shanghai, 202155, China
Tel:+86-21-5969-8104 Fax:+86-21-5969-8102
E-mail: info@fischer-sh.com.cn

Shanghai Mazar Technology Co., Ltd.
Room806,No.2 Building,Lane 2005,Huangxing Rd,Shanghai,200433,China
Tel:+86-21-5506-1663 Fax:+86-21-5509-7869
E-mail: service@mazartubo.com

Tru-Marine Cosco (Tianjin) Engineering Co., Ltd.
No. 26 Lushan Road, Tanggu, Binhai New Area, Tianjin 300451, China
Tel:+86-22-2521-2086 Fax:+86-22-2521-2300
E-mail: turbo@trumarinetianjin.cn

Tru-Marine Machinery Engineering Guangzhou Co., Ltd.
No. 1168 Kangnam Road, Yunpu Industrial Park, Huangpu District P.C 510760, Guangzhou, China
Tel:+86-20-8222-7678 Fax:+86-20-8222-7578
E-mail: turbo@trumarineguangzhou.cn

Tru-Marine Machinery Engineering Shanghai Co., Ltd.
No. 318 Chengyin Road Shanghai 200444, China
Tel:+86-21-6520-4220 Fax:+86-21-6520-6639
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COMPANY DATA

Corporate Overview

Trade Name	Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.
Head Office	1-1 Akunoura-Machi, Nagasaki, 850-8610, Japan TEL.+81-95-828-7185 FAX.+81-95-828-6633 URL:http://mhimme.mhi.com/ Email: info-meet@mhi.com
President	Toshiaki Hori
Capital	1 billion Japanese Yen
No. of Employees	220 (As of Mar 2023)
Business Activities	Development, design, manufacture, marketing, after-sales service and licensing of marine machinery

Corporate History

July 1884	Yataro Iwasaki, founder of Mitsubishi, leased the Nagasaki Shipyard owned by the Japanese Ministry of Industry. Naming it the Nagasaki Shipyard & Machinery Works it began full-scale shipbuilding work.
1885	Completed production of its first marine boiler. Since then, it has successively expanded manufacturing activities to include engines, turbines, turbochargers, propellers, fin stabilizers, steering gears, deck cranes and deck machinery.
	Manufactured first marine boiler
1904	Manufactured first propeller
1908	Manufactured first marine turbine
1920	Manufactured first fin-type stabilizer
1935	Manufactured first electro-hydraulic steering gear
1953	Manufactured first steam winch
1965	Manufactured first non-water cooled exhaustgas turbocharger
1972	Manufactured first electro-hydraulic deck crane and electric crane
October 1977	Established MHI Diesel Service Co., Ltd. as a wholly owned subsidiary of MHI Group, with a capital of 25 million yen, to handle the design of MHI marine engines, etc., as well as carry out after-sales services.
April 2011	The Marine Machinery & Engine Division was established within the Power Systems Headquarters consolidating MHI's marine machinery and engine businesses.
October 2013	Successfully accomplished the development, design, sales, after-sales service and licensing of MHI's marine machinery and engines. Capital increased to 1 billion yen, and the trade name changed to Mitsubishi Heavy Industries Marine Machinery & Engine Co.,Ltd.
April 2017	Transferred engine business to Kobe Diesel Co.,Ltd, which changed their name to Japan Engine Corporation. Company name changed to Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.

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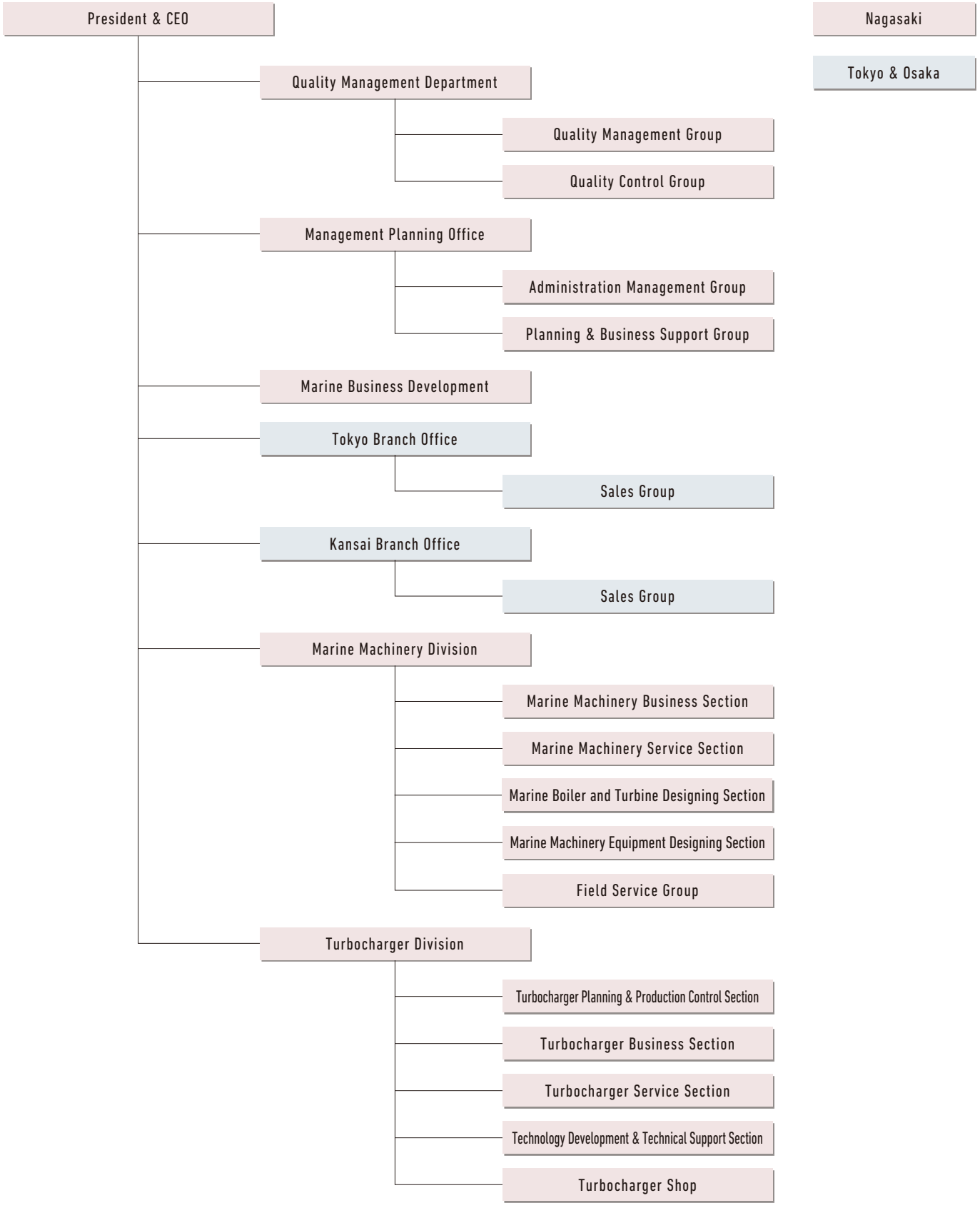
Structure of MHI-MME

(as of Apr 1, 2023)



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