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Marine Defense

We move you.
With agility and power.

Power. Passion. Partnership.

Contents

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1 **Technological leader**
As a supplier of high-quality, performance propulsion solutions, MTU stands for the highest level of technological expertise.

2 **Power**
MTU meets even the most demanding propulsion requirements with powerful and reliable engines and propulsion systems.

3 **Passion**
MTU is passionate about fulfilling the needs of its customers with the utmost professionalism and precision.

4 **Partnership**
MTU is a reliable and trend-setting partner which acts with foresight in a results-oriented manner.

I

A customer-oriented technology leader.

MTU supplies its customers with technologically-advanced products that are proven in the field. MTU's range of products and services for off-highway applications is extensive and includes both standard and customized solutions.

MTU is the core brand of Rolls-Royce Power Systems AG, which is a world-leading provider of high- and medium-speed diesel and gas engines, complete drive systems, distributed energy systems and fuel injection systems for the most demanding requirements.

The product range of MTU is one of the widest and most modern in the sector. We offer comprehensive, powerful and reliable engine solutions for yachts, commercial ships and naval vessels, construction and industrial vehicles, agricultural machinery, mining, rail and military vehicles as well as for the oil and gas industry. We also provide a full line of service products to help you maximize uptime and performance.

For over 100 years, MTU has been known for cutting-edge innovation and technological leadership. That same spirit of innovation inspires our sustainability efforts. Today and in the future, our focus is on developing and implementing system solutions to maximize efficiency and meet emissions standards.

An expert in technology
MTU has always set standards in technological expertise for customized product and system solutions. To deliver you maximum power density, we concentrate our innovation on the continuous advancement of our core competencies: fuel injection, turbo charging, exhaust aftertreatment and electronics.

A passionate engine specialist
We spend every day working together with you, our customers, to deliver engines and systems that best fit your needs. Whether a standard system or a customized solution – we are passionate about the art of engine creation.

A reliable partner
We understand the specific demands for diverse applications. In collaboration with you, we look for the solutions which are best suited to your individual requirements. Every step of the way – from the start of project planning, during the design of your integrated system solution, at the point of delivery and commissioning and continuing through the care of your product – we are there with you for the entire lifecycle.

You secure your country. We secure your mission.

MTU engines and propulsion systems are a permanent part of many countries' armed forces. For more than half a century, we have been as much at home on the sea as you are. It is this experience and expertise that makes us such a strong partner – worldwide, whatever mission you are on.

At home anywhere on the water
To provide uncompromising security is the daily mission of navies, coast guards, police forces and other authorities – around the world, 24 hours a day. MTU provides individual solutions tailored to these complex needs.
For decades we have developed, produced and overseen complete propulsion and on-board power systems for navy and governmental vessels. Since 1950, more than 30.000 units in total have been supplied to navies around the world and put into operation. And today, the same is true as back then: MTU is the right partner for those with the highest demands for propulsion systems.

Ready for your missions
Our navy propulsion systems are based on MTU commercial shipping engines, thousands of which operate successfully all over the world. They are modified according to the special requirements of military and governmental vessels. High power density, low weight, compact design, and mechanical and thermal stability characterize MTU engines, just as much as simple operation, straightforward maintenance and low life-cycle costs.
To ensure maximum performance and lasting value, rely on MTU **Value**Care – our complete portfolio of service and support solutions. We offer full logistic support through a wide range of products and services including analysis, spare parts, training and technical documentation. Each package is customized to match your specific needs, helping you reduce costs.

Tailored for major challenges.

Corvettes, frigates and destroyers have an impressive presence through their enormous versatility, their wide spectrum of use and their extraordinary propulsion systems. With MTU engines and propulsion systems, they are superbly equipped for their demanding tasks.

Diverse responsibilities
Today's navies have to cover a broad spectrum of operations. Corvettes, frigates and destroyers – which can be deployed anywhere – play a dominant role. Whether fulfilling missions for a nation or in UN operations, their main responsibilities are to protect territorial waters and to participate in international peacekeeping measures as well as crisis management.
They must be able to confront threats from submarines, airplanes and ships. Ship reliability and availability are the highest priorities. Just as indispensable are the extensive patrol ranges and high speeds for quick coverage of long distances.

Complex requirements – tailor-made solutions
MTU meets all these complex requirements, which form the basis of the propulsion systems. Our customized solutions for large military vessels correspond to strict navy standards and guarantee:
- High reliability and availability
- A broad engine characteristic map and unlimited low load capability
- High power concentration at low weight
- Excellent maneuverability and acceleration
- Low acoustic, optical and infrared signatures
- Substantial shock-proofing
- Low fuel consumption over the entire operating range
- Long maintenance intervals

Propulsion concepts – customized
Combined propulsion systems offer high levels of redundancy, flexibility and availability.
If your application requires it, we can design a combined propulsion system. We will gladly advise you as to which system best meets your needs. Upon request, we can act as general contractors in the configuration and implementation of the entire propulsion system.

The integration of MTU ship automation systems also makes an extensive automatic operation of the propulsion system and further ship areas possible – including damage control – as well as complete control of the vessel.

1 **FREMM**
CODELAG 16V 4000 M43B Gensets

2 **Turkish Navy – Milgem Corvette**
CODAG 2 x 16V 595 TE90 + LM2500

3 **German Navy – F125**
CODELAG 20V 4000 M53B Gensets

© NAVYPIX

1 **Oman Corvette**
2 x 20V 8000 M91

2 **Indian Coast Guard – Vishwast Class**
2 x 20V 8000 M90

3 **Korean Coast Guard – 3000t**
4 x 20V 1163 TB93

Propulsion Systems for Offshore Patrol Vessels

Security and vigilance.

Uneventful patrols at high sea can suddenly turn into serious operations. All the more reason to install a robust propulsion system which keeps going – whatever the situation.

Built-in reliability
Offshore patrol vessels significantly contribute to safeguarding sovereignty within national waters. They serve a broad spectrum of tasks – from fishery protection, law enforcement and maritime surveillance to protection and defense of national assets against low and medium threats. Because these units can stay at sea for long periods, they demand a lot from their propulsion systems. The greatest possible reliability and availability are required. Our robust, economical diesel engines fulfill the requirements of every type of use: for patrolling, for fast intervention and for missions under the most difficult conditions.

Tailored to special needs
Low manning requirements call for a highly integrated, automated propulsion system with self-diagnostic features. Our diesel engines and wide range of commercial off-the-shelf ship automation systems allow for highly automated, unmanned machinery spaces – tailored to your needs. Navies and coast guards around the globe rely on MTU.

Power for rapid reaction.

Patrol and fast patrol vessels complement and support offshore patrol vessels in fulfilling their varied missions. They are indispensable for safeguarding national security in littoral waters. And with powerful MTU engines, they are perfectly equipped to do so.

Superior agility
High availability of the vessel accompanied by high agility and ship speed allows you to respond to asymmetric threats immediately, or to a distress call in bad weather and high seas. Speed and flexibility are the principal characteristics of inshore patrol vessels – whether on a quiet patrol, a sudden mission or under difficult conditions. Propulsion systems based on our compact, powerful diesel engines ensure the reliability and availability of important units – wherever and whenever they are needed.

Comprehensive expertise from the reliable system partner
Perfectly integrated engines and ship automation systems can facilitate automatic operation of the propulsion system and other ship areas – even the entire ship. Our many years of experience and well-known systems expertise make us the reliable partner.

1 **UAE – Ghannatha Class**
2 x 12V 2000 M90

2 **US Coast Guard – FRC**
2 x 20V 4000 M93L

3 **Korea Coast Guard – 1000 t**
3 x 20V 1163 TB93

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1 **German Navy combat support vessel, Class 702 – second lot**
After "Berlin" and "Frankfurt am Main", the third combat support vessel "Bonn" was built in Emden, Germany. While the first two vessels are equipped with medium speed engines, the MTU Series 8000 was selected as the main propulsion engine and five MTU Series 4000 as onboard power generator sets for the new ship. The "Bonn" was handed over to the Navy in June 2013.

2 **Joint High Speed Vessel**
For the future high speed catamaran, the Joint High Speed Vessel (JHSV), the U.S. Army and Navy rely on MTU products. The JHSV is powered by four 20V MTU Series 8000 M71L diesel engines with a total power output of 36400 kW (48812 bhp). It can reach speeds in excess of 35 knots.

3 **ATS 2**
Among many other vessels of the Korean Navy, also the second batch of the selvage and rescue ship is equipped with MTU engines. Two CPPs will be driven by four engines of the MTU Series 1163 (12V 1163 TB93) with a total power of 13320 kW (almost 18000 hp).

Propulsion Systems for Large Amphibious and Support Vessels

Strengthening the backbone of your fleet.

Although not active on the front, support vessels are vitally important: they supply the fleet with vital supplies and transport troops and equipment where it is needed. That's reason enough to give support vessels the best propulsion systems that are always dependable – wherever they operate.

Support for your logistics
Whether it be a RoRo fast troop transporter or a task group supply ship that form the logistical backbone of every navy, support vessels are optimally equipped with our propulsion systems. Powerful, robust and absolutely reliable, our engines help make your missions successful.

By specialists – for specialists
As a long-term partner of navies and coast guards, we know your needs and deliver tailormade propulsion solutions. Our engines meet requirements including low life-cycle costs, long maintenance intervals and low manning – MTU meets even the most demanding requirements. Whether all mechanical or diesel-electric, you specify your requirements and we deliver the solution. Our reliable state-of-the-art engines conform to the highest safety standards.

Complete systems – fully secured
The integration of MTU ship automation systems also makes extensive automatic operation of the propulsion system and other ship areas possible, as well as complete control of the ship. In order to ensure total security, we provide preventive services and integrated logistics support. Our factory experts ensure fast, efficient support – anywhere in the world – 24 hours a day.

Landing. On time.

Landing troops for an amphibious operation or supplies for disaster relief – you want them to be on time, with reliable delivery like a Swiss train. Our propulsion systems help you to keep the time table, everywhere.

Small but vital

Landing crafts are getting more and more important in today's modern naval fleets and are vital for a wide range of operations.

- Transporting troops to and from the beach
- Delivering equipment and supplies to remote places during military, civilian and humanitarian operations
- Supply of smaller bases lacking harbor facilities

Ship-to-shore connectors are increasingly demanded to complement the larger landing ships behind the horizon.

Strong background support

In order to meet their background responsibilities, landing crafts have to operate with the greatest reliability. Our drives' high availability significantly contributes to this task. The exceptional, MTU-typical power-to-weight ratio enables the ships' fast acceleration as well as high speed rates. The strong bollard pull ensures best performance.
Due to its robust and user-friendly custom solutions, MTU is the perfect partner for all applications requiring drives that meet not only the current demands but also increasing future requirements such as simple design, mechanical propulsion systems and waterjet propulsion.

1

2

3

1 **Pacscat**
2 x 16V 4000 M90

2 **LCT Turkey**
2 x 16V 4000 M70

3 **E-Craft**
4 x 12V 4000 M90

Mission. Enabled.

MTU has always made propulsion systems for applications that require highly specialized knowledge and expertise. Our propulsion solutions for mine countermeasure vessels demonstrate this perfectly.

1 Katanpää
The Finnish Navy selected a propulsion system with two 8V MTU Series 396 diesel engines, each providing 970 kW sustained power including gearboxes and couplings. For onboard power generation, two 8V MTU Series 396 diesel engines deliver 680 kW to the included generators. The MTU supplied automation consists of a remote control for main and loitering propulsion system, fire detection system, power management system as well as the ship's overall monitoring and control system.

2 Oksøy Class minehunter
The Royal Norwegian Navy selected a propulsion system with two 12V MTU Series 396 diesel engines, each providing 2700 kW (3621 bhp) sustained power. MTU supplied two lift diesel engines, type 8V MTU Series 396 with cardan shafts. The three onboard gensets are powered by 6R MTU Series 183 engines, including generator and base frame.

Leading technology to meet the strictest requirements
Modern sea mines are incredibly sensitive, selective and intelligent. They can only be outflanked by platforms specially developed for this purpose, such as mine countermeasure vessels (MCMVs) and drones. They secure areas of fleet operations and keep passages open for commercial shipping. Operating conditions place the most rigorous demands both on the ship and its propulsion system. MTU has expertise in the lowest emissions, shock qualified design and low magnetic signatures. We've always been a leader in the development of propulsion systems with low magnetic and acoustic signatures. The specially developed MTU-MRK method makes it possible to reduce the magnetism emitted from all of the ferromagnetic parts to a stable minimum. With this method, we are capable of magnetically treating components like crankcases, connecting rods, transmission parts, drive shafts, etc., as well as ranging engines, transmissions, generators and complete propulsion systems. MTU also provides this magnetic treating for other MCMV component suppliers.

Engines and systems – all from MTU
Of course, our engines include all of the other features that are in demand: compact designs, excellent power-to-weight ratios, reliability and dynamic responsiveness. As system specialists, we integrate MTU ship automation systems that facilitate automatic operation of the propulsion system, or even the entire ship. Every magnetic requirement is met – even down to the construction of the cases and consoles.

Silent Force. Silent Power.

The more specific and complex the demands, the more important and valuable expertise and experience are. For decades, MTU has been setting quality and performance standards for submarine engines.

Leading competence
Submarines are highly specialized, fascinating underwater vessels. As an indispensable component of nearly every fleet, they take on numerous tasks – from protecting territorial waters to gathering information across international boundaries. The technical demands placed on submarine engines are extremely high – and only a few manufacturers are in the position to meet them. With our years of experience, MTU has been a leader in the development and construction of submarine propulsion systems for decades. Most conventional submarines around the world use MTU engines.

Specialized power generation for snorkel operations
The MTU Series 396 SE is precisely designed for use in submarines. We also deliver complete charging units with dedicated DC generators and mounting systems. All components are also available with magnetic controlled compensation. Our engines and complete power-generating units including mounting systems are optimized for the customer with regard to shock, acoustics, EMC, etc.

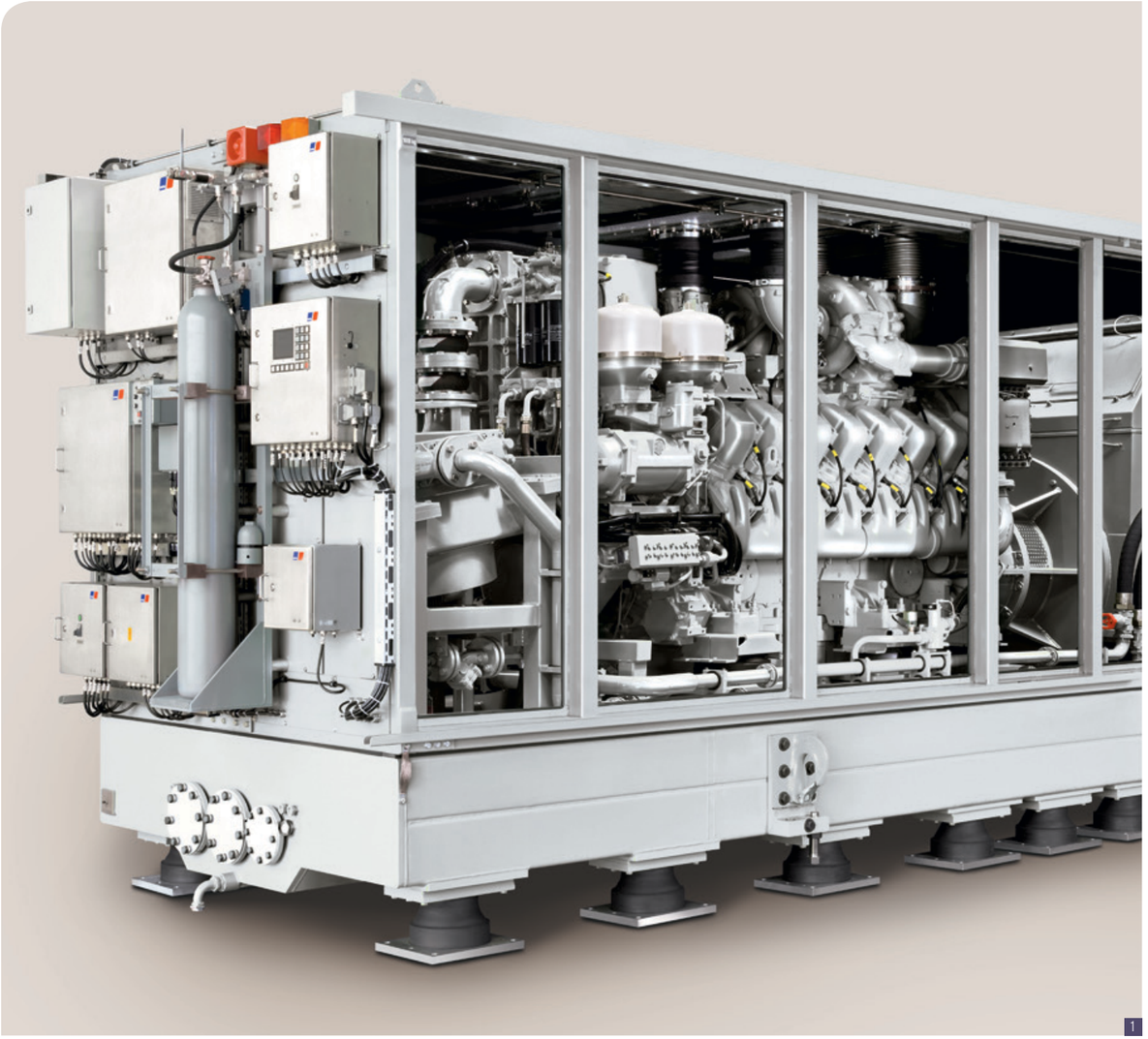
Modern engine design for advanced submarine requirements
Following customer requirements for more powerful and otherwise advanced charging units, MTU has utilized their huge experience gained with Series 4000 as a reliable and commercially viable basis for the development of the next generation of submarine engines.

The MTU Series 4000 U increases the power range for the submarine application engines and adds new functionalities like different operation modes. A state-of-the-art engine governor and injection system ensure the improvement of fuel consumption and allow emission compliance in surface operation without compromising the well known low noise characteristics as selectable operating modes. The fourth boost-mode operation in combination with an improved generator design allows accellerated battery charging when required.

MTU: Much more than just a manufacturer of engines
The integration of MTU ship automation systems makes the reliable automatic operation of charging units possible, while taking the details defined by the customer into account.

As a proven partner of shipyards, shipbuilders and operators, we are making significant contributions to the development of submarine technology – today and in the future.

© BAE Systems – Astute Class



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1 **A competitive edge. From MTU.**
As a leader in high-quality propulsion systems innovation, we are constantly researching and working on new trendsetting technologies. We bundle all relevant core competencies within our company right from the beginning, and over the years we have continually made advancements to them. Thus, we can provide you with a decisive competitive egde.

2 **Gas turbine modules**
High power outputs and unrivaled power-to-weight ratios are characteristic of gas turbines. They are the optimum choice to extend the combined power output of a propulsion plant. In combined propulsion systems, gas turbines complement the excellent life-cycle costs of diesel engines. They also allow even large frigates and destroyers to achieve or exceed speeds of 28 knots. MTU is one of the very few certified packagers of the proven GE LM2500 gas turbines. Our own lightweight and highly integrated gas turbine module – designed and assembled in Germany – has gone into a range of commercial ferry operators and navies, including the US Navy.

Systems Solutions

Unrivaled expertise. Unrivaled system engineering.

We are system partners. Our expertise in ship applications encompasses every possible propulsion configuration, including engineering services, hardware and software which these configurations require.

Complete system engineering from MTU
For you that means: no matter how extraordinary your requirements, we can supply you with a complete, fully integrated propulsion system. Diesel engine, gas turbine and gearbox, on-board power supply and ship automation – all these form a single system which is both reliable and cost-effective.

With reliable and proven suppliers, we develop, deliver and support tailor-made solutions for small patrol boats to destroyers, consisting of:
- Diesel engines, stand-alone or packaged in propulsion modules
- Gensets for service power and propulsion
- Integrated ship automation, including complete propulsion control systems
- Shaftlines, propellers and water jets
- Gas turbines
- Gearboxes

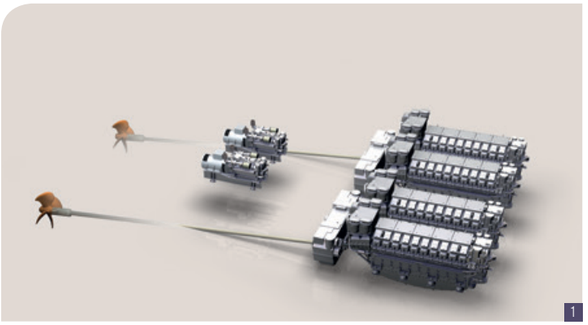
System support from a single source
Naval customers have complex and highly specialized demands. For decades, we have been meeting these demands with great success for one simple reason: we provide a complete service solution. We start at the beginning of the project and continue throughout the entire life cycle of your MTU propulsion system.

Our service solutions include:
- Project management
- Propulsion system evaluation and layout
- Selection of suitable components
- System integration of mechanical, electrical and electronic interfaces
- Installation supervision
- Supervision of commissioning and trials
- Integrated logistics and entire life cycle support
- Repowering

Upon request, we can act as general contractors to take on complete technical and commercial responsibility for the entire propulsion, power generation and automation systems – from project engineering and management to support and service. Consolidating these responsibilities reduces the number of interfaces – and, therefore, the number of potential complications.

In modern vessels, it is a decisive advantage to have fault-free interaction between the various subsystems which influence the efficiency of the ships' operation considerably. Allow MTU, an experienced complete partner, to select and design the systems resulting in greater reliability, sustained operations and optimum cost effectiveness. In short: successful missions.

Combined propulsion systems – customized.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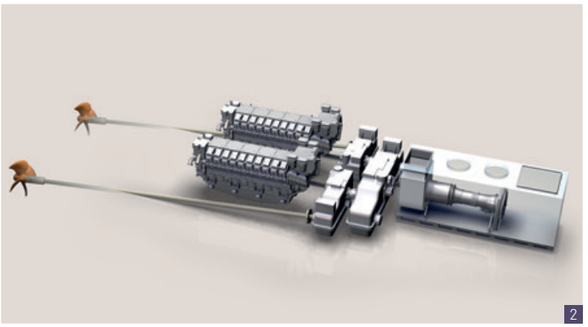
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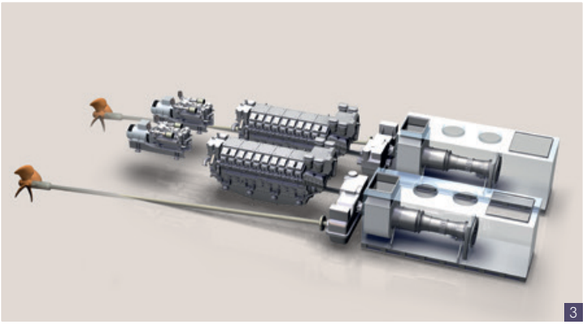
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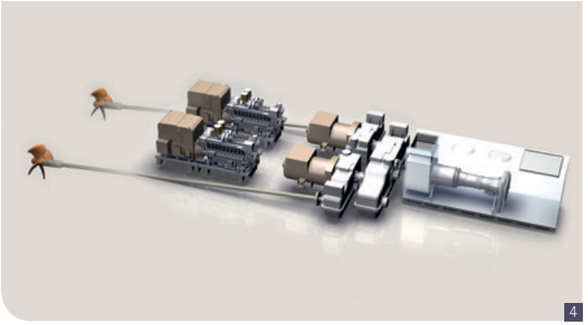
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Always the best possible propulsion system
Combined systems involving diesel engines and/or gas turbines are now the propulsion solution of choice for corvettes and frigates. As a general supplier, we can configure the best possible complete propulsion system for your needs – whether CODOG, CODAG, CODAD, CODELAG or CODELOG.
All the components – engines, gas turbines and gearboxes including auxiliary power units – come from one source and are combined into an integrated complete system.

1 **CODAD (Combined Diesel And Diesel)**
The basic idea: four diesel engines power two controllable pitch propellers (CPP) through two main gearboxes. In normal operation, one diesel engine powers one axle; for maximum speed the other two diesel engines are also switched on.

2 **CODAG (Combined Diesel And Gas Turbine)**
The basic idea: two diesel engines and a gas turbine power both CPP through two main gearboxes and a cross-connect gearbox. If only the diesel engine or the gas turbine is running, both CPP are equally powered through the cross-connect gearbox. If both diesel engines are running, this gearbox can be declutched.
Through the use of a two-stage gearbox, one diesel engine can bring the vessel to cruising speed.

3 **CODOG (Combined Diesel Or Gas Turbine)**
The basic idea: two diesel engines and two gas turbines alternatively power two controllable pitch propellers through two main gearboxes. The gas turbines are connected via self-synchronizing clutches. The diesel engines power the vessel in cruising speed; both gas turbines bring the vessel to top speed.

4 **CODELAG (Combined Diesel Electric And Gas Turbine)**
CODELOG (Combined Diesel Electric Or Gas Turbine)
The basic idea: two diesel engines drive generators which produce electricity for two electric propulsion motors. A gas turbine drives two propeller shafts with CPP via a gearbox either alone or in combination. The diesel-electric propulsion units ensure cruising speed of the vessel. Maximum speed is reached when the propulsion system of the vessel runs in combined mode, i.e. diesel-electric plus gas turbine.

Proven system integration. Powerful solutions.

MTU delivers a complete propulsion system for a corvette-sized fighting ship. Designed and built in-house, the navy relied on MTU expertise in laying out, designing and integrating the complete propulsion system. Our engineers provided extensive analysis, documentation and risk-reduction services, as well as integrated mechanical, electrical and electronic interfaces.

The MTU CODAG propulsion system includes:
– Two MTU diesel engines, packaged in a propulsion module for high shock survivability and acoustic signature reduction
– An MTU/GE LM2500 gas turbine module
– A combining gearbox
– Controllable pitch propellers and shafting

The automated control of the system is performed by an MTU Callosum_MC integrated propulsion control and monitoring system.

The MTU propulsion system demonstrates excellent reliability and flexibility. Our on-site engineers supervise the installation of the system, ensuring efficient propulsion system commissioning and trials.

Modernization of Propulsion and Automation Systems

MTU re-power solutions. At sea while others maintain.

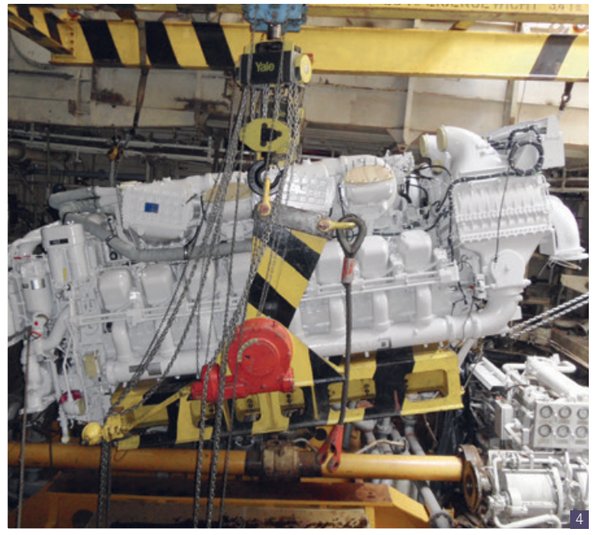
More and more navies and coast guards consider a modernization a cost effective way to preserve and improve their fleet. For very good reasons, since a new heart for the ship makes it fit for a decade and beyond.

Modernizations of propulsion and automation systems of still valuable ships have many benefits:
- Reduced through-life costs
- Ship availability
- Exhaust gas emissions
- Ship operational behaviour
- Installation of more or less power
- Avoidance of obsolescence
- Conversion from a naval combatant to a patrol vessel.

From supplying propulsion engines to planning and realisation of the complete modernization, MTU has successfully proven itself in a wide range of different modernization programs. MTU with its in-depth engineering expertise can also make your project a success.
Latest references include patrol boats, FAC and frigates in Algeria, Colombia, Germany, India and Indonesia.

With MTU Callosum - Integrated Ship Automation System, MTU offers a competent partnership for a successful project solution, customized and ideal for governmental and naval vessel repowering, covering all ship subsystems including Battle Damage Control System.

MTU provides extensive assistance during the entire modernization project having engineers on-site to supervise the yard during the installation, setting to work, HAT and SAT.

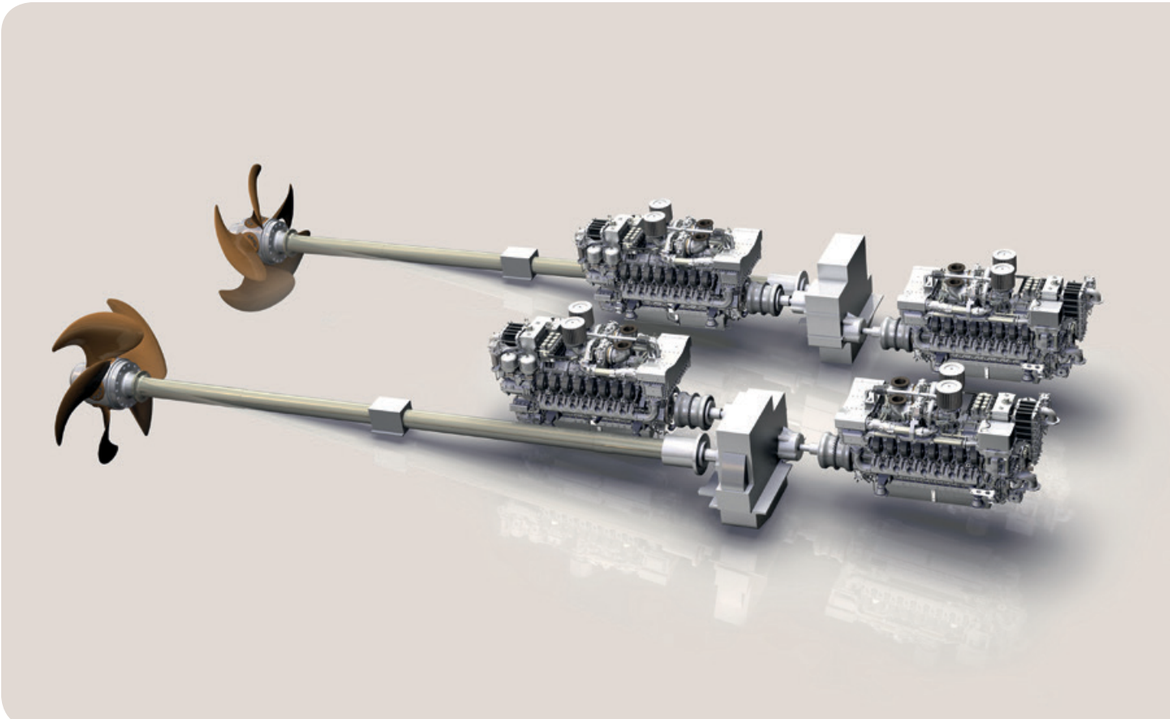


1 **Repower in 2010/2011 of frigate size vessels**
commissioned in the early 1980s

2 **MTU Callosum**
Integrated Ship Automation System

3, 4 **New propulsion system**
4 x 16V 1163 TB73L

5 **New on-board power generation**
4 x 8V 2000 M50B



Innovation and Affordability

Redundant Power. Flexible and robust.

MTU has been the undisputed technological leader in naval propulsion systems for decades. Our innovative solutions help our customers and the whole industry move forward.

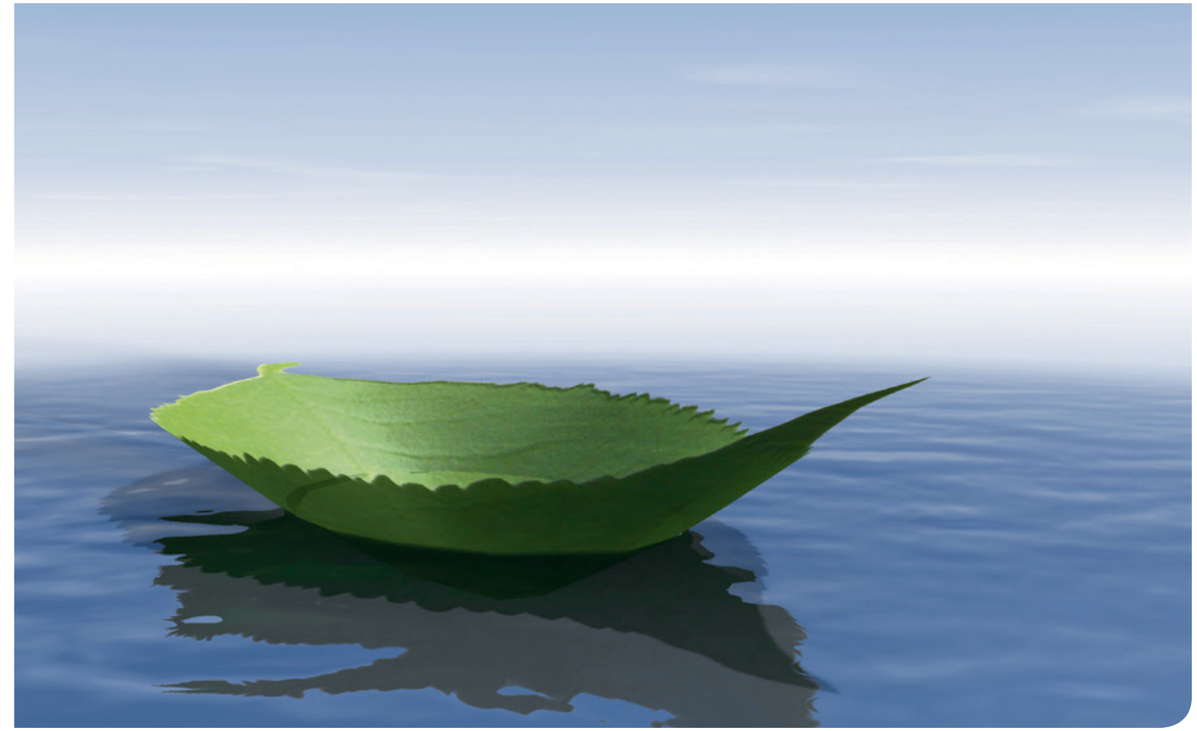
Offshore patrol vessels (OPV) cover an extensive range of tasks and challenges in today's navies. That is why many navies are increasingly interested in OPVs. Beside technical requirements such as high redundancy, wide low-load capabilities and flexibility, low cost of ownership and an easy integration are key decision factors for an OPV propulsion system. The MTU OPV PowerPack is a Combined Diesel And Diesel (CODAD) propulsion system featuring the most esteemed Series 4000, that serves all these requirements perfectly.

It offers convincing advantages for shipyards and end users alike:
- Simplified logistics
- High level of redundancy by four prime movers
- TBO of up to 32,000 hours
- IMO II certification of engines
- Power range from 3000 to 8000 kW per shaft

The OPV PowerPack comes with MTU Callosum_MC – integrated propulsion monitoring and control system for safe control of propulsion modes.

A more integrated solution is available with 12V and 16V MTU Series 4000 M73/M73L engines and covers power requirements from 3840 kW (5149 bhp) to 5760 kW (7724 bhp) per PowerPack, 7860 kW (10540 bhp) to 11520 kW (15448 bhp) per ship with a two-shaft line design.

It integrates the following into one common steel frame:
- Two MTU Series 4000 high-speed diesel engines
- A Renk Reduction Gear ASL 2x104
- Local Control Panels
- All pumps, filters, heat exchangers and control systems necessary for operation, as well as a replenishment oil tank including all piping and wiring.



Emissions Reduction Technologies

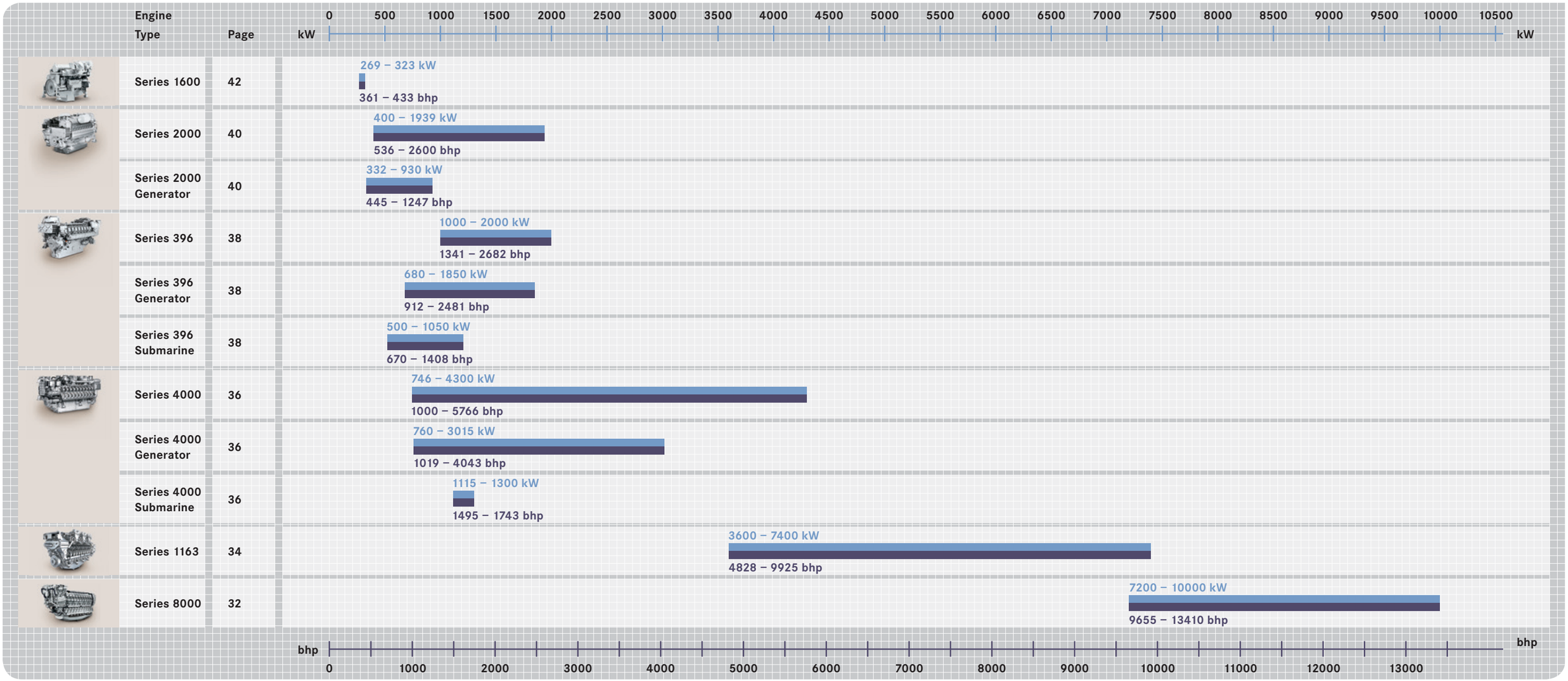
On mission with a clear conscience.

MTU – a leader in assuming responsibility
Operating on the water means working in a sensitive environment. Assuming responsibility for protecting the water and air and keeping them clean is second nature to us. MTU has always played a leading role in developing environmentally friendly engines and, in particular, solutions for reducing emissions. Since we have all the relevant key technologies bundled within our company in addition to our core business of building engines, we have been and will always be leaders in this space.
MTU engines are an embodiment of the most state-of-the-art technology available. Running at above 2000 rpm, they are, in comparison to engines with lower rpm ranges, generally more environmentally friendly and emit less nitrogen oxides. The greenest engines are high-speed engines – and so it is logical that MTU engines comply with all current emission regulations.

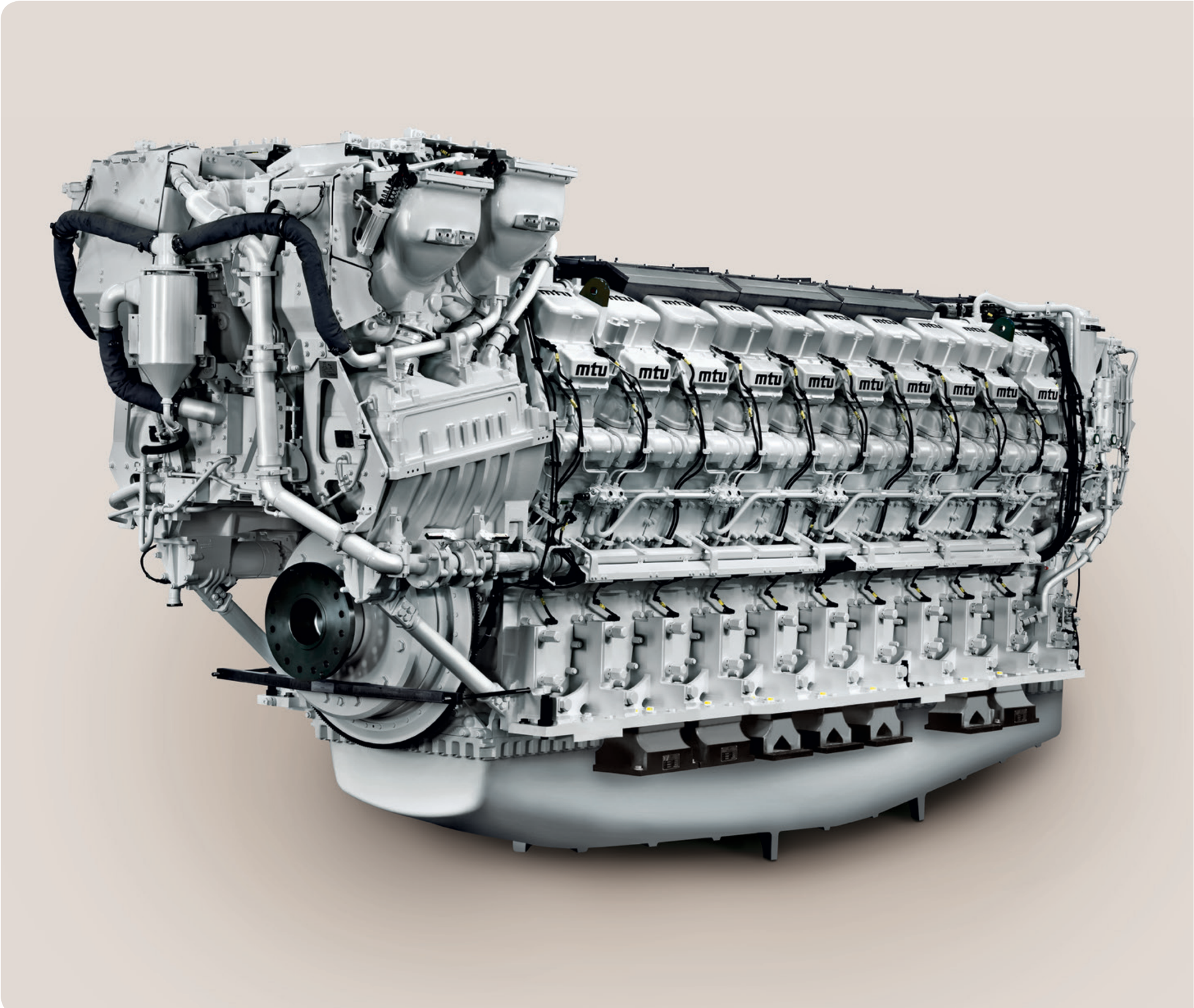
Optimizing the combined package
In addition to low emission diesel engines, MTU offers customized exhaust aftertreatment systems such as:
- Diesel particle filters (DPF) with active or passive regeneration
- Selective catalytic reduction (SCR) units
- Combined DPF+SCR

All engines at a glance. We move you. With agility and power.

The higher the requirements and the more specific the application, the more the need for an MTU engine. That's because we develop the optimum drive solutions for all individual tasks. The large range of MTU engines contains the right answer for the highest demand for propulsion systems. Solutions including the highest performance, greatest reliability and availability as well as superior agility.



Series 8000



The most powerful highspeed engine meeting maximum demands

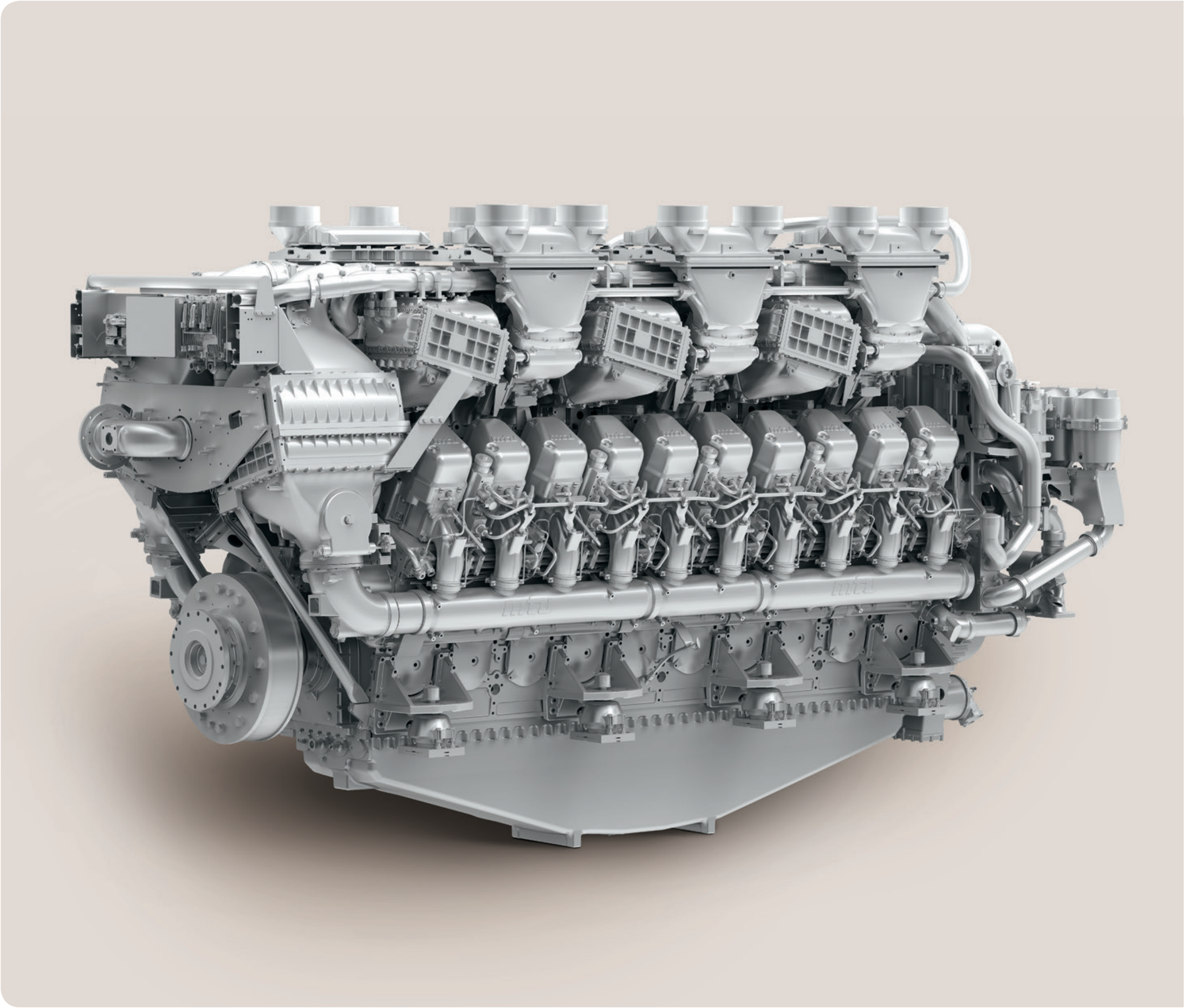
If power and endurance for long range missions are what you need:

- MTU Series 8000 combines industry-leading naval capabilities with the durability and reliability of one of the most successful heavy-duty industrial engines.
- MTU Series 8000 delivers unrivaled operational flexibility whether loitering or sailing at full speed – without questions.
- MTU Series 8000 engines with demonstrated and attested qualifications and features – such as thermal and acoustic signatures, EMV capabilities and shock resistance – are the first choice for navies.
- Many MTU engines are in operation with numerous of load cycles. We can provide a qualified engine platform with demonstrated capabilities in inherent availability rate, MTBF and service intervals.
- The inherent qualifications of the MTU Series 8000 engine family enable us to fulfill demanding requirements such as German Navy BV, US Navy MILSTD and NATO STANAG specifications.
- Designed and built according to all major classification society rules as well as to the highest SOLAS requirements.

Dedicated marine propulsion and power generation products tailored to the needs of the professional marine industry is our obligation and heritage.

Engine model		Series 8000
20V		
Power output	kW	7200–10000
	(bhp)	(9655–13410)
Speed	rpm	1150
Emission Certification		All engines comply with emission regulations in accordance with IMO II and in part also EPA 2

Series 1163

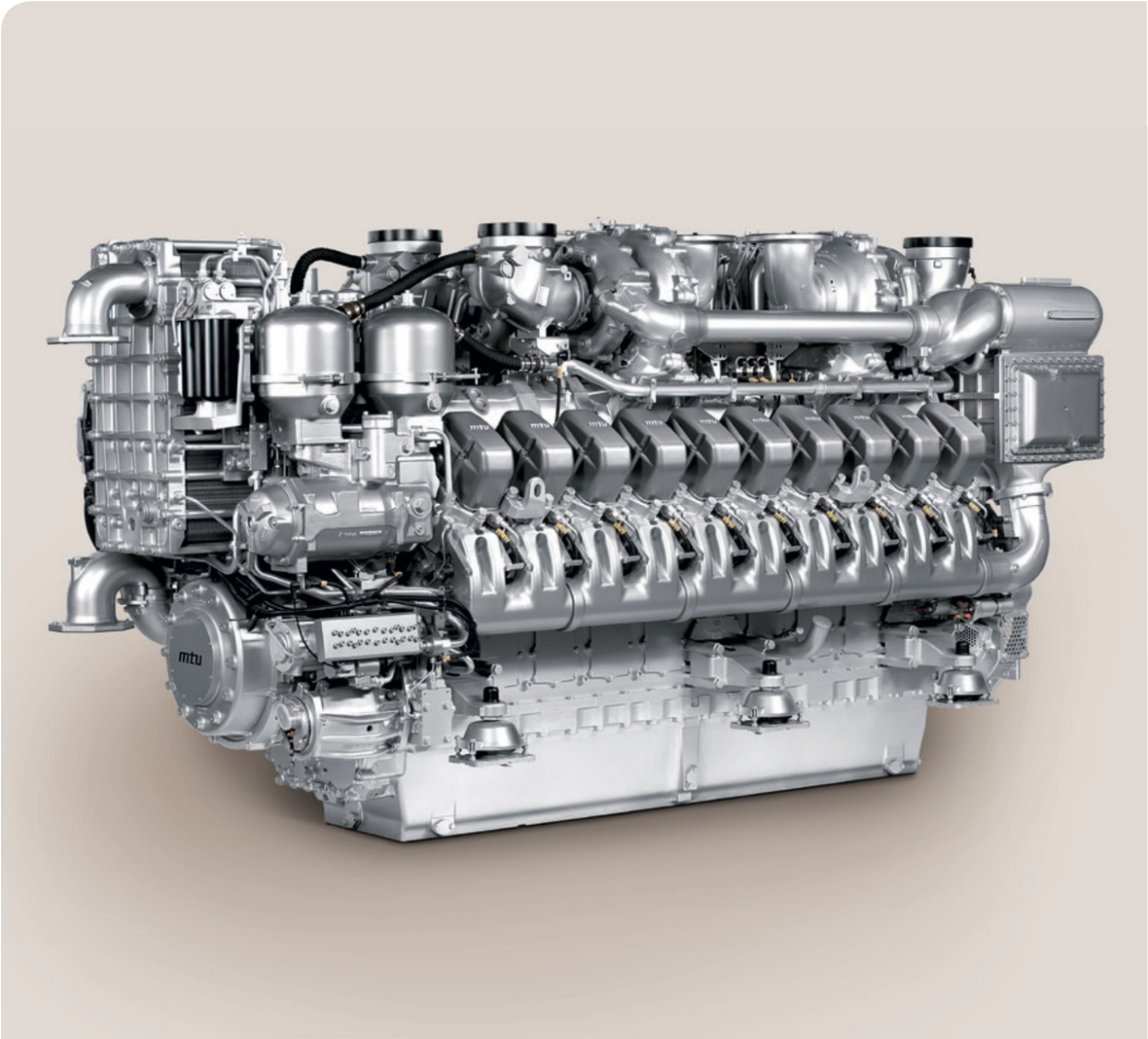


The proven, evolved engine for the naval industry
If patrol and small governmental vessels are what you need:
- MTU Series 1163 combines industry-leading naval capabilities with the durability and reliability of one of the most successful heavy-duty industrial engines.
- MTU Series 1163 delivers unrivaled operational flexibility whether loitering or sailing at full speed – without questions.
- MTU Series 1163 engines with demonstrated and attested qualifications and features – such as thermal and acoustic signatures, EMV capabilities and shock resistance – are the first choice for navies.
- MTU Series 1163 combines best-in-class power-to-weight ratio with the effortless unfolding of power and bottom end torque.
- Many MTU engines are in operation with numerous of load cycles. We can provide a qualified engine platform with demonstrated capabilities in inherent availability rate, MTBF and service intervals.
- The inherent qualifications of the MTU Series 1163 engine family enable us to fulfill demanding requirements such as German Navy BV, US Navy MILSTD and NATO STANAG specifications.
- Designed and built according to all major classification society rules as well as to the highest SOLAS requirements.

Dedicated marine propulsion and power generation products tailored to the needs of the professional marine industry is our obligation and heritage.

Engine model		Series 1163
12V, 16V, 20V		
Power output	kW	3600–7400
	(bhp)	(4828–9925)
Speed	rpm	1200–1325
Emission Certification		All engines comply with emission regulations in accordance with IMO I and IMO II

Series 4000



One of the most successful heavy-duty engines ever
If long-term platform strategies and enlarged power range requirements are what you need:

- MTU Series 4000 combines industry-leading naval capabilities with the durability and reliability of one of the most successful heavy-duty industrial engines.
- MTU Series 4000 delivers unrivaled operational flexibility whether loitering or sailing at full speed – without questions.
- MTU Series 4000 engines are the first choice for navies, with demonstrated qualifications and features such as thermal, acoustic and magnetic signatures, EMV capabilites and shock resistance.
- MTU Series 4000 combines best-in-class power-to-weight ratio with the effortless unfolding of power and bottom end torque.
- Many MTU engines are in operation with numerous of load cycles. We can provide a qualified engine platform with demonstrated capabilities in inherent availability rate, MTBF and service intervals.
- The inherent qualifications of the MTU Series 4000 engine family enable us to fulfill demanding requirements such as German Navy BV, US Navy MILSTD and NATO STANAG specifications.
- Designed and built according to all major classification society rules as well as to the highest SOLAS requirements.

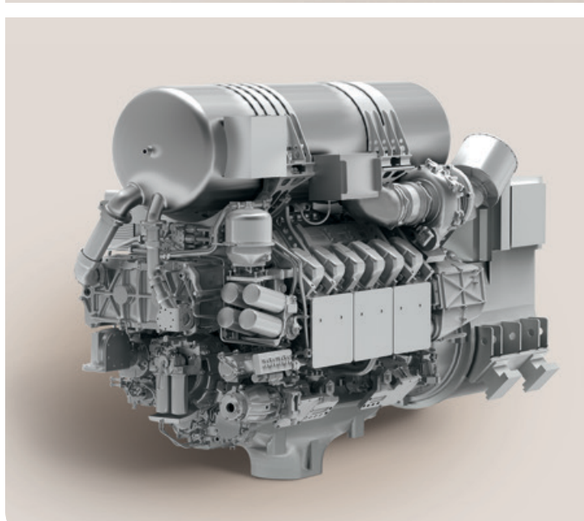
Dedicated marine propulsion and power generation products tailored to the needs of the professional marine industry is our obligation and heritage.

Engine model		Series 4000
8V, 12V, 16V, 20V		
Power output	kW	746–4300
	(bhp)	(1000–5766)
Speed	rpm	1600–2100
Emission Certification		All engines comply with emission regulations in accordance with IMO II and in part also EPA 3 and EU IIIA (including RheinSchUO II)

Engine model		Series 4000 for onboard power generation, diesel-electric drives	
8V, 12V, 16V		50 Hz	60 Hz
Power output	kW	760–1760	920–3015
	(bhp)	(1019–2360)	(1234–4043)
Speed	rpm	1500	1800
Emission Certification		IMO II	IMO II, EPA 3

Engine model		Series 4000 for Submarine charging unit
12V		
Power output	kW	1115–1300
	(bhp)	(1495–1743)
Power output (Boost-mode*)	kW	up to 1500
	(bhp)	(up to 2100)
Speed	rpm	1800
Emission Compliance		IMO II surface operation

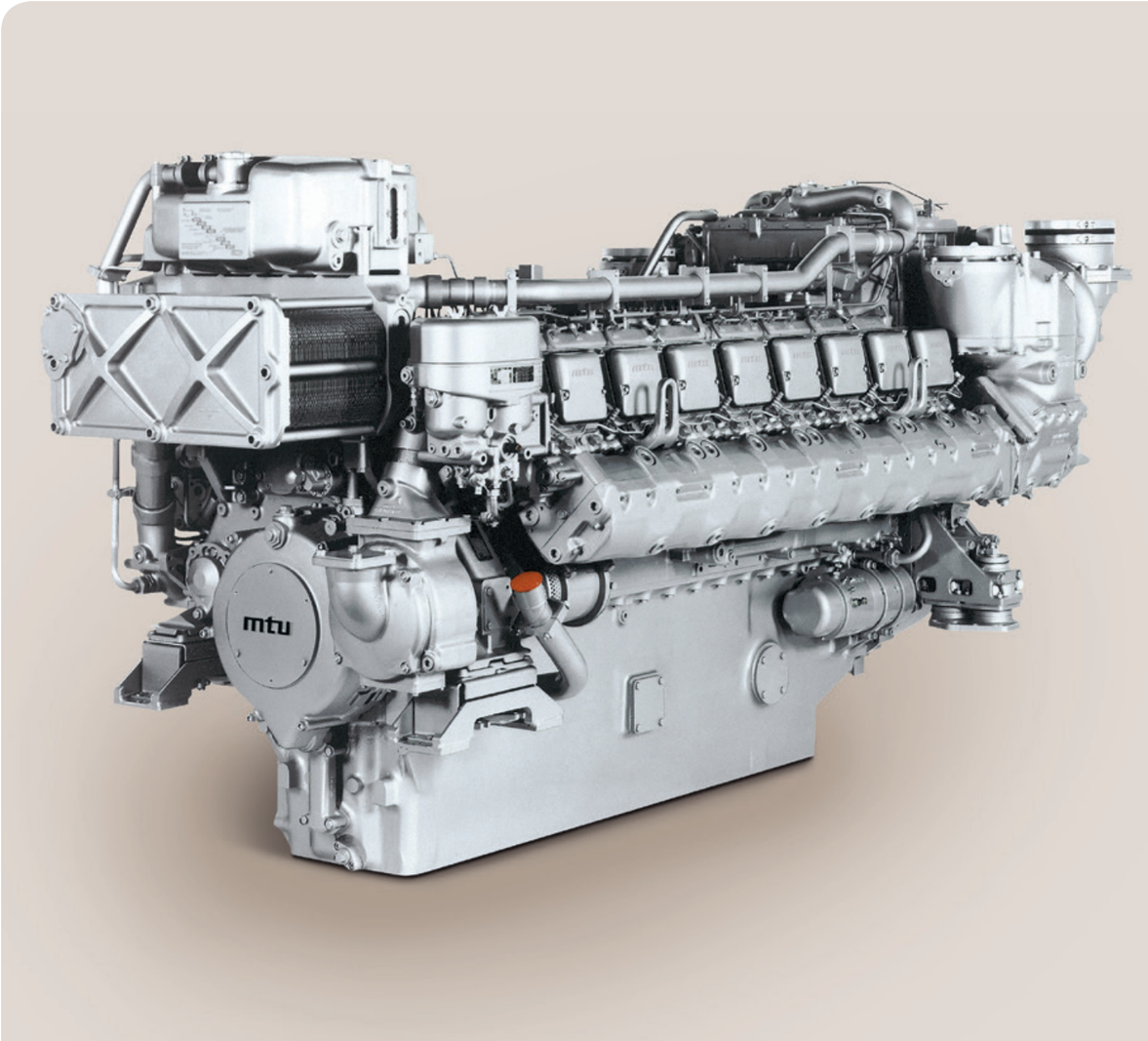
* Boost-mode available for up to 10% of total operating hours without restrictions on maintenance schedule; available power may vary with operating conditions.

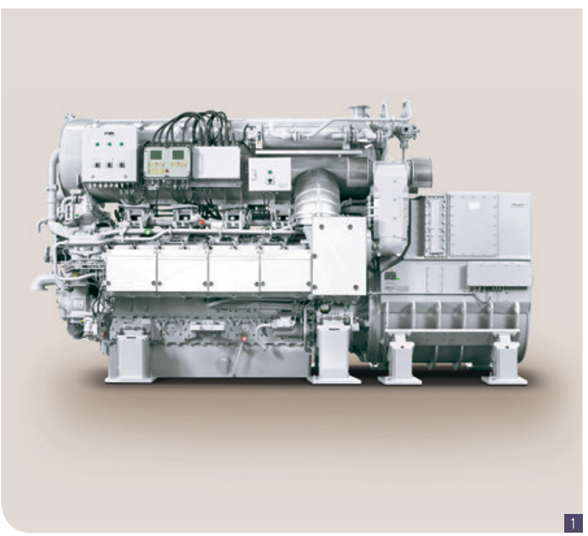


1

1 MTU Series 4000 charging unit for submarines
MTU's 12V 4000 based battery charging unit is designed to improve the well-known submarine engine characteristics of the MTU Series 396 SE. Next to the ability to operate in different modes (acoustic optimised, fuel consumption optimised, emission optimised, boost-mode), a modern charge air system leads to improved engine performance under snorkelling conditions. The combination of an exhaust gas turbocharger with a governor controlled waste gate allows precise turbo charger matching for snorkelling conditions that result in backpressure operation close to mechanically charged engine designs with clearly improved fuel consumption characteristics.

Considering maintenance requirements in early design stages has led to a notable advancement with regard to maintenance efforts as well as operational availability. Engine and generator are integrated further, allowing wearless starting of the engine via generator as well as controlled load limitation defined by actual environmental operating conditions in boost-mode operation.





1 **MTU Series 396 charging unit for submarines**
In 1988, MTU started using turbocharged Series 396 engines for this type of application – a first in the submarine sector. Various additional acoustic measures also ensure that engine noise and vibration are kept to a minimum, while the integral exhaust cooling system reduces the thermal signature.

Series 396

The proven, evolved engine for the naval industry
If uncompromising naval requirements are mandatory for your missions:

- MTU Series 396 combines industry-leading naval capabilities with the durability and reliability of one of the most successful heavy-duty industrial engines.
- MTU Series 396 delivers unrivaled operational flexibility whether loitering or sailing at full speed – without questions.
- MTU Series 396 engines are the first choice for navies, with demonstrated qualifications and features such as thermal, acoustic and magnetic signatures, EMV capabilites and shock resistance.
- MTU Series 396 combines best-in-class power-to-weight ratio with the effortless unfolding of power and bottom end torque.
- Many MTU engines are in operation with numerous of load cycles. We can provide a qualified engine platform with demonstrated capabilities in inherent availability rate, MTBF and service intervals.
- The inherent qualifications of the MTU Series 396 engine family enable us to fulfill demanding requirements such as German Navy BV, US Navy MILSTD and NATO STANAG specifications.
- Designed and built according to all major classification society rules as well as to the highest SOLAS requirements.

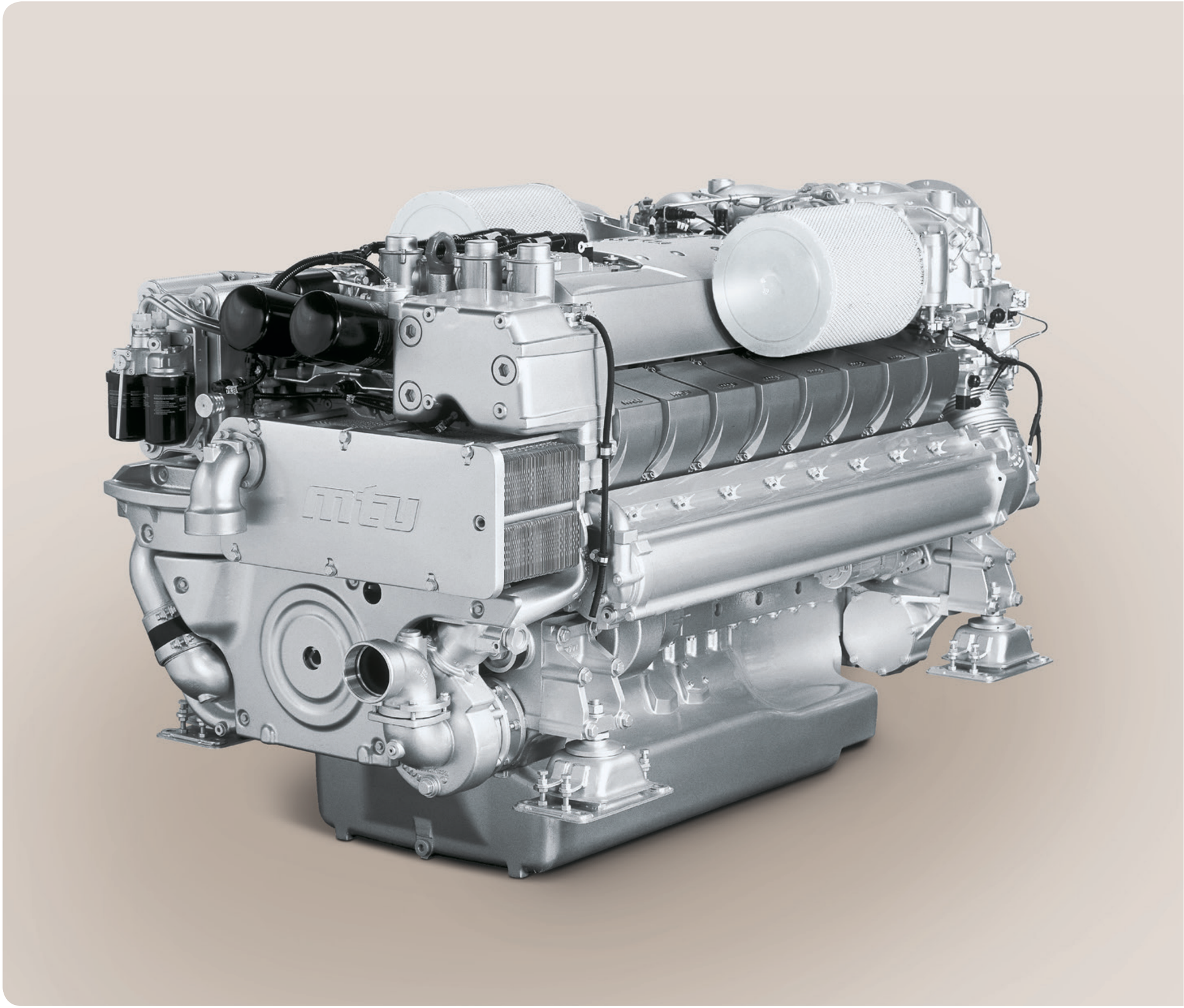
Dedicated marine propulsion and power generation products tailored to the needs of the professional marine industry is our obligation and heritage.

Engine model		Series 396
8V, 12V, 16V		
Power output	kW	1000–2000
	(bhp)	(1341–2682)
Speed	rpm	1900
Emission Certification		Engines comply with emission regulations in accordance with IMO II

Engine model		Series 396 for onboard power generation, diesel-electric drives	
8V, 12V, 16V		50 Hz	60 Hz
Power output	kW	680–1030	790–1850
	(bhp)	(912–1382)	(1059–2481)
Speed	rpm	1500	1800
Emission Certification		IMO II	IMO II

Engine model		Series 396 for Submarine charging unit
8V, 12V, 16V		
Power output	kW	520–1200
	(bhp)	(697–1609)
Speed	rpm	1800

Series 2000



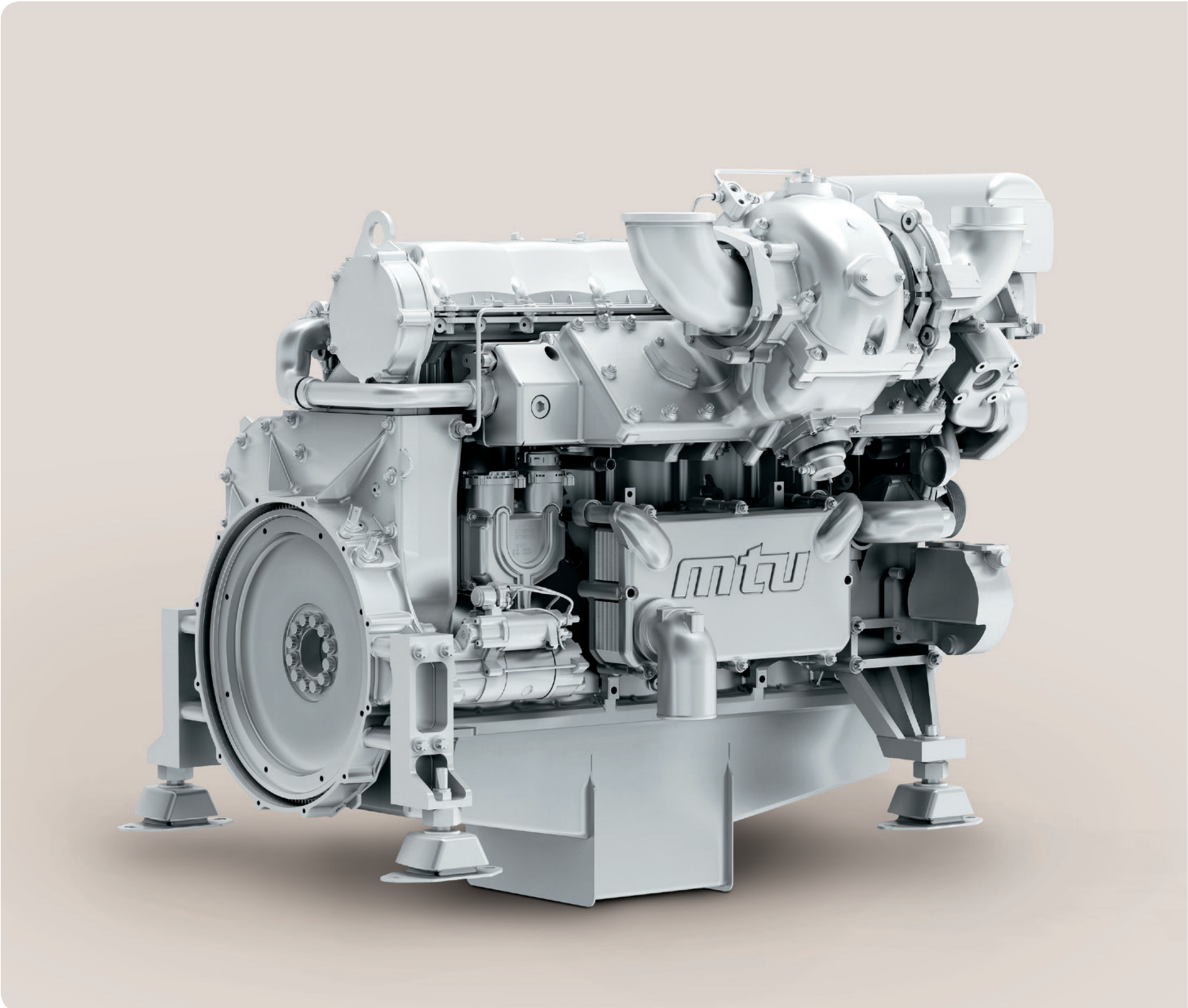
The powerful heart for maximum agility
If patrol and small governmental vessels are what you need:
- MTU Series 2000 combines industry-leading naval capabilities with the durability and reliability of one of the most successful heavy-duty industrial engines.
- MTU Series 2000 delivers unrivaled operational flexibility whether loitering or sailing at full speed – without questions.
- MTU Series 2000 combines best-in-class power-to-weight ratio with the effortless unfolding of power and bottom end torque.
- Many MTU engines are in operation with numerous of load cycles. We can provide a qualified engine platform with demonstrated capabilities in inherent availability rate, MTBF and service intervals.
- Designed and built according to all major classification society rules as well as to the highest SOLAS requirements.

Dedicated marine propulsion and power generation products tailored to the needs of the professional marine industry is our obligation and heritage.

Engine model		Series 2000
8V, 10V, 12V, 16V		
Power output	kW	400–1939
	(bhp)	(536–2600)
Speed	rpm	1800–2450
Emission Certification		All engines comply with emission regulations in accordance with IMO II, EPA 2 and in part also EU IIIA (including RheinSchUO II)

Engine model		Series 2000 for onboard power generation, diesel-electric drives	
8V, 12V, 16V		50 Hz	60 Hz
Power output	kW	332–770	400–930
	(bhp)	(445–1033)	(536–1247)
Speed	rpm	1500	1800
Emission Certification		IMO II	IMO II

Series 1600



The “little” one, completing MTU’s Marine Genset portfolio

If availability and reliability are what you need:

- MTU Series 1600 combines industry-leading naval capabilities with the durability and reliability of one of the most successful heavy-duty industrial engines.
- MTU Series 1600 engines are the first choice for navies, with demonstrated qualifications and features such as thermal, acoustic and magnetic signatures, EMV capabilites and shock resistance.
- The inherent qualifications of the MTU Series 1600 engine family enable us to fulfill demanding requirements such as German Navy BV, US Navy MILSTD and NATO STANAG specifications.
- Designed and built according to all major classification society rules as well as to the highest SOLAS requirements.

Dedicated marine propulsion and power generation products tailored to the needs of the professional marine industry is our obligation and heritage.

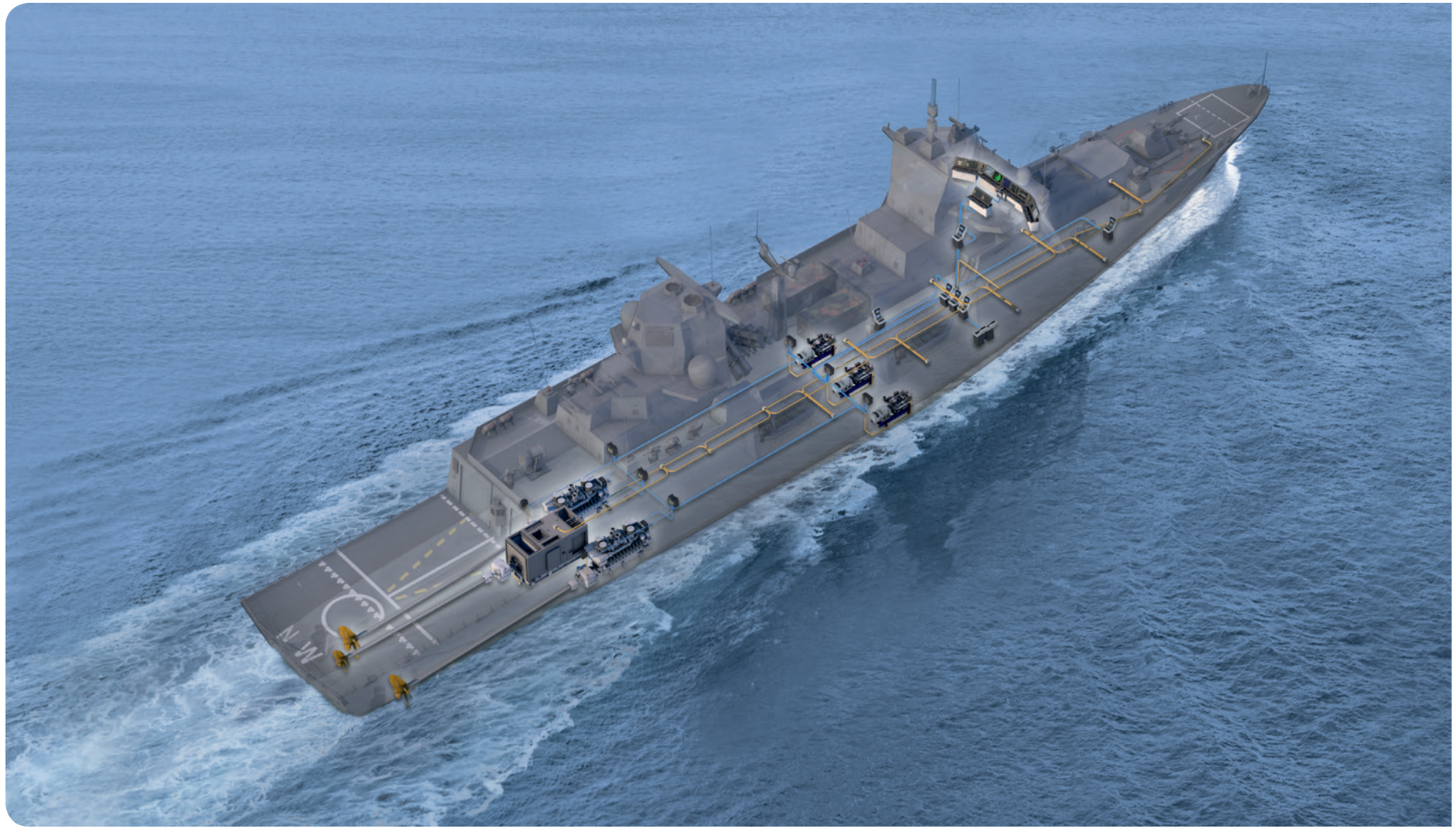
Engine model		Series 1600 for onboard power generation, diesel-electric drives	
6R		50Hz	60Hz
Power output	kW	269	323
	(bhp)	(361)	(433)
Speed	rpm	1500	1800
Emission Certification		IMO II	IMO II, EPA 3

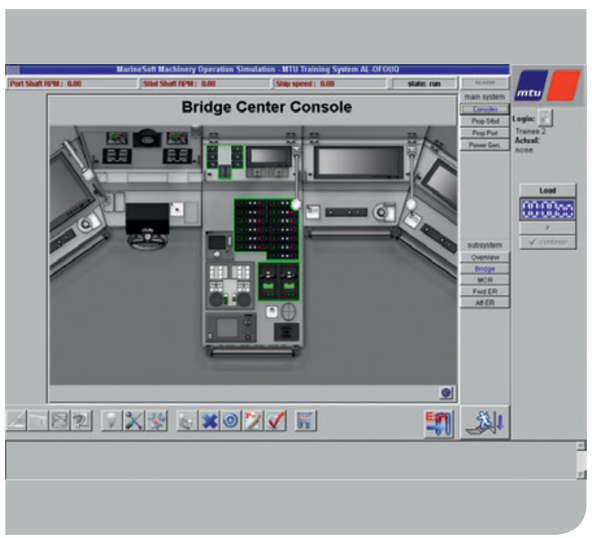
MTU Callosum - the general nervous system for your entire vessel.

With Callosum, MTU delivers the automation system of the future and integrates all of the various subsystems of a vessel into a single, intelligent overall system.

With Callosum, MTU delivers the automation system of the future – today. MTU Callosum combines many decades of MTU automation experience. The complete modular automation system integrates various self-sufficient subsystems into an intelligent overall structure. It gathers all of the ship's data and displays it clearly and simply on color monitors. It can be customized with incredible flexibility for each type of governmental and naval vessel and for any use.

MTU offers four Callosum modules that can be used individually or in combination. A customized network of sensors monitors and controls all areas and functions of the ship's equipment. With MTU Callosum, every action can be carried out with only three mouse clicks from any networked monitor. An ideal, customized solution for governmental and naval vessels: MTU Callosum.





Challenges grow. Missions change. MTU Callosum is ready.

MTU Callosum bundles many decades of MTU automation experience. The intelligent system optimizes process sequences onboard by professionally collecting and processing data as well as displaying them visually in perfect form.

Your demands – fulfilled systematically
Our well-engineered and operator-friendly automation system is fully integrated and designed to meet your specific operational requirements. That is how MTU Callosum helps to increase security, dependability and operational readiness. The four MTU Callosum system modules can be used separately or in combination, depending on your needs and requirements.

Four modules. Three clicks.
The integrated ship automation system Callosum has four system modules. A network of sensors, which is set up individually based on the respective vessel, monitors and controls all areas and functions of the ship's electronics. Every action can be carried out with only three mouse clicks from any networked monitor.

Callosum_MC – integrated monitoring and control system
- Callosum_MC enables crews to monitor and control the entire propulsion system, the on-board power supply and all of the ship's subsystems.
- Measured data is collected from the various areas of the ship by the integrated alarm system and can be viewed by the crew on color displays at several operator stations.
- The flexible, user-friendly automation system considerably improves operational confidence and the safety of the ship.
- The Callosum_MC hardware and software for data acquisition and processing make the ideal system for all kinds of governmental and military vessels.

Callosum_MC

Callosum_DC – battle damage control system
- The Callosum_DC ship security system prevents and limits damage such as leakages, fire damage and system failures.
- In the event of an incident, alarm signals and warnings are given and reported at the various operating stations providing a quick overview.
- Callosum_DC provides decision-making assistance for every type of vessel and, with its MTU 3-click system, it enables the crew to handle any situation securely and quickly.

Callosum_DC

Callosum_MT – maintenance support system
- Callosum_MT utilizes information and reports collected from Callosum_MC and Callosum_DC.
- Callosum_MT provides support for maintenance and upkeep on board.
- The system guides the user reliably and intuitively while using support tools such as electronic documentation and 3D videos, which offer detailed component and maintenance support.

Callosum_MT

Callosum_TS – onboard and land-based training system
- Callosum_TS offers system-specific training software which simulates a range of training scenarios with different levels of difficulty. If the crew has to re-establish the security of the vessel quickly in the event of damage, expert knowledge of all MTU Callosum's functions will be needed.
- Training performance can be assessed for individual, team and classroom training supported by recognized methods and tools.
- Training scenarios with predefined faults along with a choice of repair options are available for all technicians.

Callosum_TS

BlueVision_Advanced | New Generation. The new automation standard for small governmental vessels.

More conventient than ever before: easy to customize, easy to integrate, easy to operate.

BlueVision_Advanced | NewGeneration is an MTU "classifiable" monitoring and remote control system for small governmental vessels, offering a comprehensive standard automation system solution. It is available for MTU Series 2000 and 4000 engines.

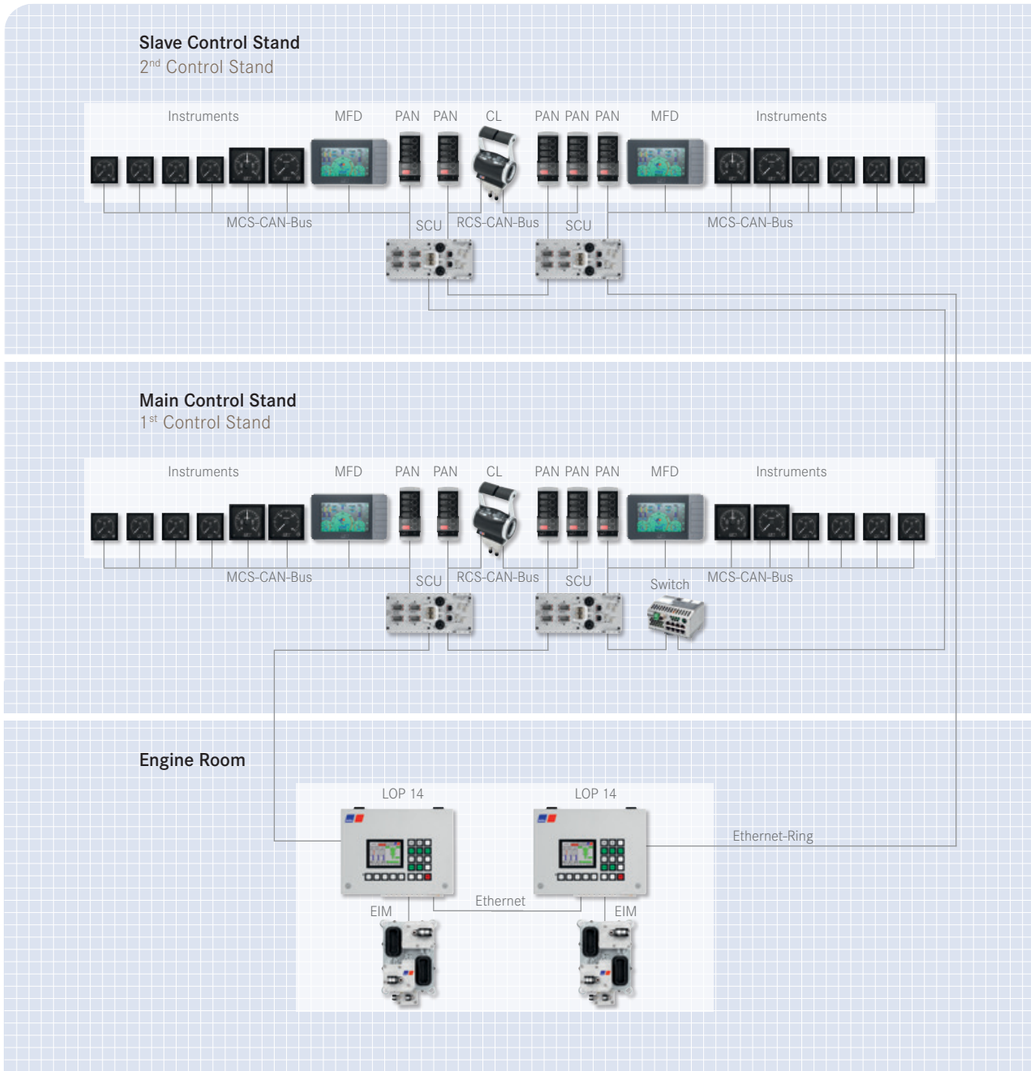
An elementary feature of BlueVision_Advanced | NewGeneration is the system bus. The data transmission between the LOP and the commanding control stands is carried out via a redundant Ethernet based field bus. This ensures an absolutely secure communication on the one hand and highest flexibility of the overall system – also with regard to future upgrading – on the other.

This version is delivered with the Color Graphic Display MFD as standard, which has been optimized for the operation in classifiable ships. Besides various dashboard pages, the MFD also offers the possibility to show all of the propulsion system's relevant measured values. All active alarms are comprehensively displayed on a separate page.

BlueVision_Advanced | NewGeneration is a classifiable system in line with major classification societies.

Key features:
- Type-approved components, such as LOP, control lever, display and instruments
- Designed according to all major classification societies
- Local Operating Panels (LOP) with color display and advanced functionalities like clutch and speed control
- Data communication via redundant Ethernet ring bus

1



2

3

1 Typical scope of supply for BlueVision_Advanced | NewGeneration

2 Operating Panel (PAN) Control Lever (CL)

3 Multi Function Display (MFD)

MTU **Value**Care

Keep going.

VI

We have a strong commitment to our marine defense customers. With MTU **Value**Care, this focus extends beyond the commissioning of MTU engines and systems. From maintenance and overhaul to spare parts to remanufactured products, MTU offers a diverse portfolio of products and services to ensure high availability, reliability and efficiency.

Designed to ensure maximum performance, uptime and value, MTU **Value**Care includes three product lines:

- **Value**Service: Extensive service and support from MTU's global service network
- **Value**Spares: Genuine spare parts and top-quality consumables designed specifically for MTU engines and systems
- **Value**Exchange: Remanufactured parts, engines and systems, engineered with the same high-quality standards as new products

ValueService
Reliable, expert assistance is essential to achieving and maintaining high levels of performance and unconditional reliability throughout your engine's or system's life-cycle. Provided through MTU's global service network, **Value**Service is a full line of maintenance, repair and service solutions to help you get the most out of your equipment.

With a wide range of maintenance and repair options, MTU is your true partner. You can count on MTU's reliability and expertise – around the world and around the clock. Our staff of trained professionals know all about MTU engines and systems, and are committed to helping you maximize their performance. And when it's time to give your original equipment a powerful new life, MTU individual overhaul solutions provide proven MTU quality and performance.

We also offer a variety of other services. Technical Documentation provides complete information for the operation and maintenance of MTU products. Training programs make your service personnel proficient with MTU engines and systems. And transportable service units – integrated workshop, storage and office facilities – can be set up in virtually any location to ensure optimal maintenance and service intervals.

ValueSpares
To keep your equipment running at optimum efficiency, choose from a full line of **Value**Spares genuine parts and consumables. They're designed, tested and approved specifically for MTU engines and systems. Only MTU can guarantee genuine quality, with parts and consumables that are designed to work seamlessly with your product.

ValueSpares products help you get maximum performance from your equipment. And putting our parts and consumables to work is easy. From spare parts to oils, coolants and filters, **Value**Spares products are available worldwide through MTU's global service network.

ValueExchange
Whether replacing a single component or an entire engine, quality is essential. **Value**Exchange provides a full range of genuine remanufactured MTU products, engineered to ensure robust, reliable performance. Choose from remanufactured parts, or engines and systems that utilize genuine new and remanufactured MTU parts. A rigorous reconditioning process ensures the same high standards of performance, service life, warranty coverage and quality as new products – including design and model-related updates. As a result, **Value**Exchange products feature technological advancements similar to new products.

The **Value**Exchange process is designed to save you time and money, while benefiting the environment through the reuse of existing materials. When you choose **Value**Exchange products, you get genuine MTU quality, speed and peace of mind while lowering costs. To help you work more efficiently, **Value**Exchange parts and engines are readily available. And for your convenience, they're offered worldwide from our MTU service network.

Integrated Logistics Support (ILS)

One source.
Many advantages.

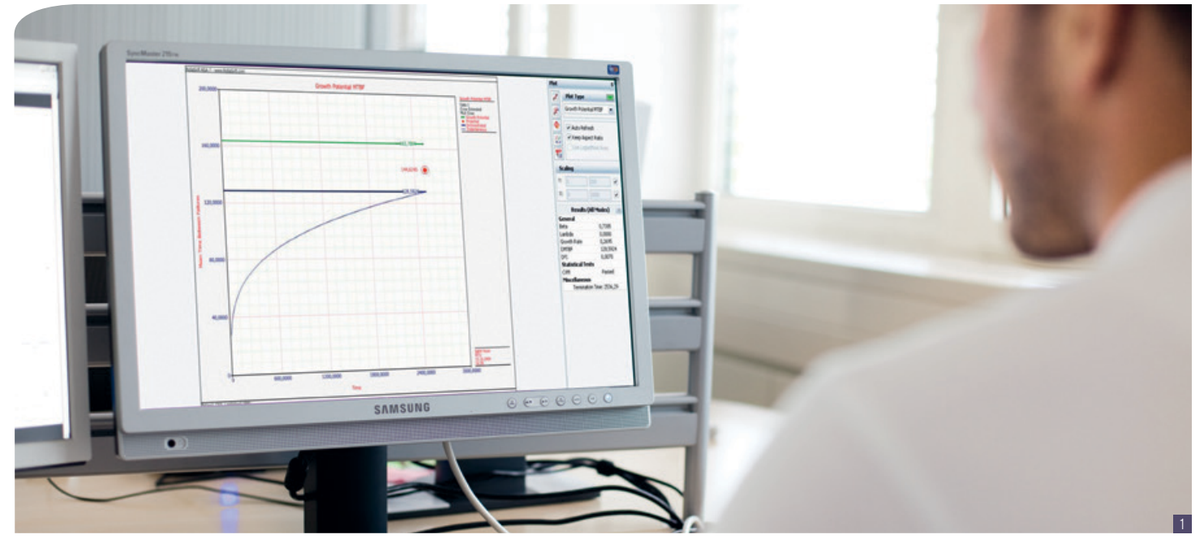
Naval operations are unique – equipment and supplies must be available at a moment's notice. To meet these challenges, MTU provides you with Integrated Logistics Support (ILS) to keep your engines and systems up and running. ILS is a customized package of products and services including analysis, spare parts, training and technical documentation. Each package is customized to match your specific needs, helping you reduce costs.

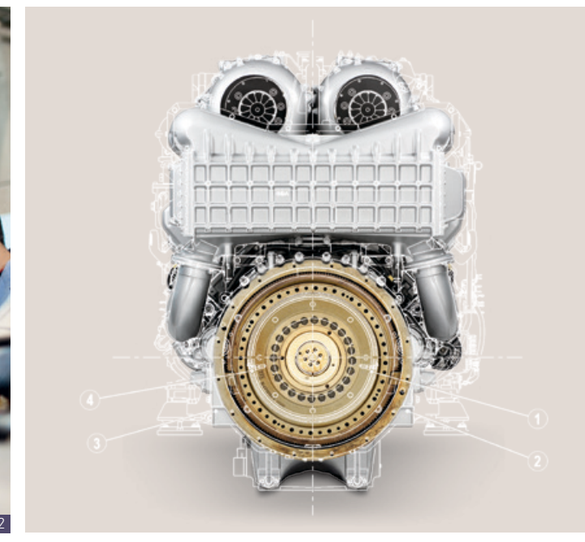
RAMS LCC Analysis
From a simple lifecycle cost analysis to a complete RAMS (reliability, availability, maintainability and safety) analysis, MTU has the expertise to understand your needs:
– In-depth cost calculations for maintenance contracts
– Risk management
– Customized spare parts and tools planning

Training
Training courses on all MTU engines and systems (complete propulsion systems) are available, and can be customized to meet your unique needs.
– Complete maintenance independence
– Cost reduction due to in-house repair and overhaul capabilities
– Implementation of MTU overhaul philosophy

Technical Documentation
Comprehensive technical documentation, customized according to your needs, to help you maximize the performance of MTU products. Documentation is organized according to specific maintenance Qualification Levels (QLs):
QL1: Operational monitoring and maintenance that can be carried out during out-of-service periods without disassembling the engine
QL2: Component exchange (corrective only)
QL3: Maintenance work requiring partial disassembly of the engine
QL4: Maintenance work requiring complete disassembly of the engine

Spare Parts
MTU offers complete supply chain management, to help optimize the process of ordering and receiving **Value**Spares replacement parts. We'll work with you to develop plans that ensure adequate spare parts stocks, based on recommendations from MTU or a classification society. By working together, in close partnership, you can be confident in the effectiveness of your spare parts plan, and assured that all **Value**Spares replacement parts are fully compatible with your MTU engines and systems.





1 **RAMS LCC Analysis**
From a simple lifecycle cost analysis to a complete RAMS analysis, MTU has the expertise to understand your needs.

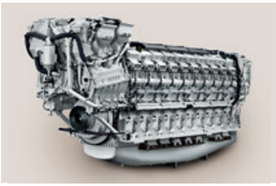
2 **Training**
Training courses on all MTU engines and systems are available, and can be customized to meet your unique needs.

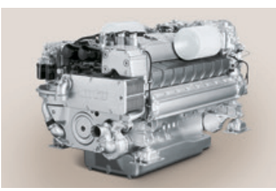
3 **Technical Documentation**
We provide comprehensive technical information, tailored to the unique and specific needs of each engine or system.

4 **Spare Parts**
MTU offers complete supply chain management, to help optimize the process of ordering and receiving **Value**Spares replacement parts.

Overview of MTU Engines.

VII





Engine Model	Corvettes	Frigates and Destroyers	Offshore and Inshore Patrol Vessel	Amphibious Crafts	Large Amphibious and Support Vessels	Mine Counter-measure Vessels	Submarines	Diesel Engines for Onboard Power Generation and Diesel-Electric Drive
Series 8000								
20V		■	■		■			
Series 1163								
12V	■	■	■	■	■			
16V	■	■	■		■			
20V	■	■	■		■			
Series 4000								
8V	■	■	■	■	■			■
12V	■	■	■	■			■	■
16V	■	■	■	■	■			■
20V	■	■	■	■	■			■
Series 396								
8V		■	■	■	■	■	■	■
12V		■	■	■	■	■	■	■
16V		■	■	■	■	■	■	■
Series 2000								
8V			■	■	■			■
10V			■	■	■			■
12V			■	■	■			■
16V			■	■	■			■
Series 1600								
6R								■
Automation								
MTU Callosum	■	■	■	■	■	■	■	■
BlueVision_Advanced | NewGeneration blue*vision*			■	■				
geno*line* (for Series 2000 and 4000)			■	■				■

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