



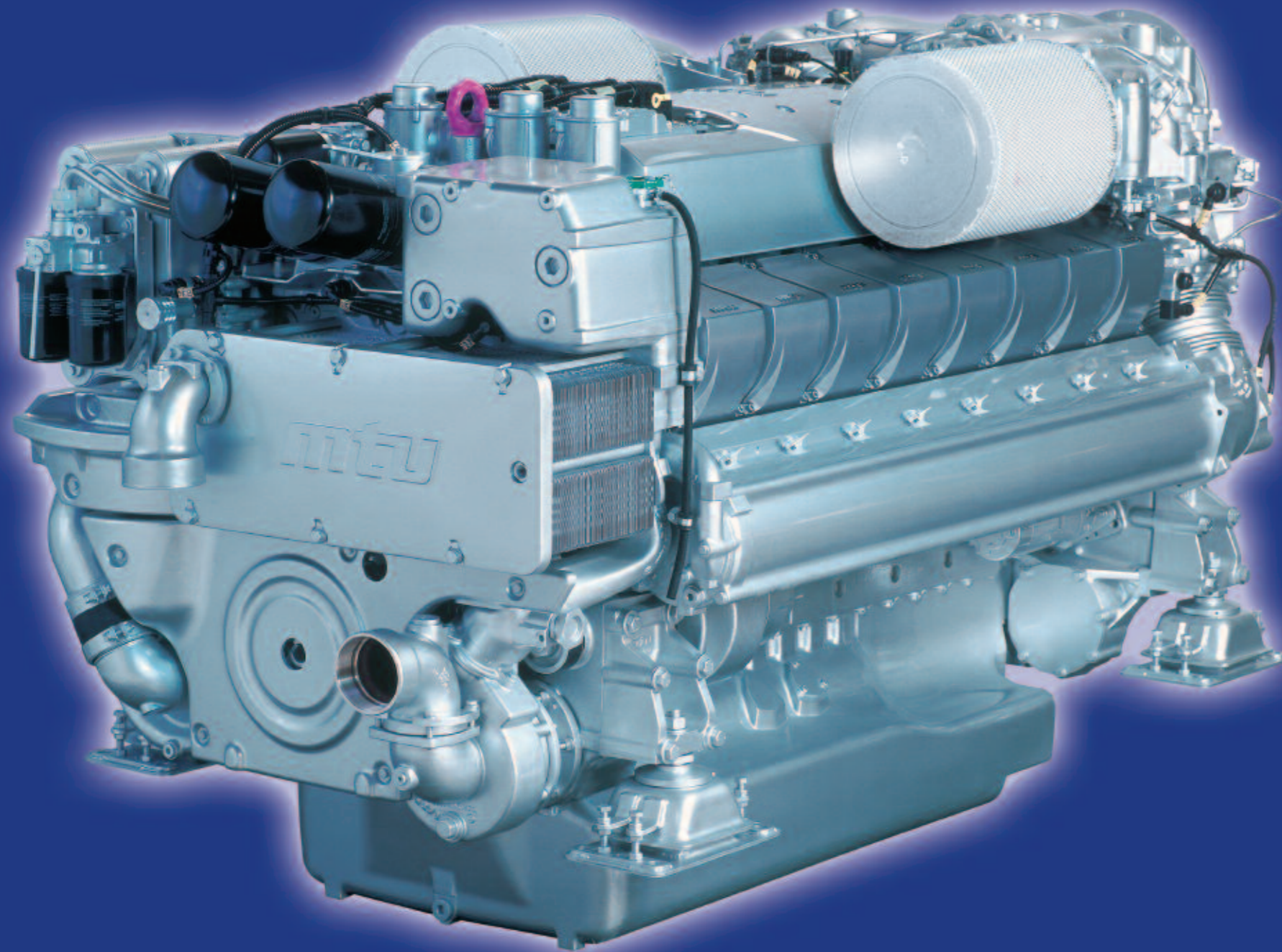
Series 2000 Diesel Engines
for Marine Applications



Top of the Class.

The Series 2000 engines stand out for numerous reasons: They are not only **compact, quiet and light**, but also **reliable, easy to service** and **highly efficient**. The engines also fulfill the SOLAS safety requirements and the IMO and EPA Tier II exhaust emissions specifications.

The spectrum of applications ranges from yachts and passenger vessels to police craft, patrol boats and government vessels.



Your Benefits:

Engine characteristics

- > High performance
- > Excellent acceleration behavior
- > Perfect operational behavior over the entire speed range

Installation and dimensions

- > Excellent power-to-weight ratio
- > Compact design
- > Integrated accessories
- > Reduced number of interfaces

Economy

- > Low life-cycle costs
- > Long service life
- > Ease of maintenance

Environmental safety

- > Low fuel consumption
- > Low exhaust and noise emissions

Qualifications

- > EPA Tier II, IMO
- > SOLAS
- > Classification of all leading classification societies

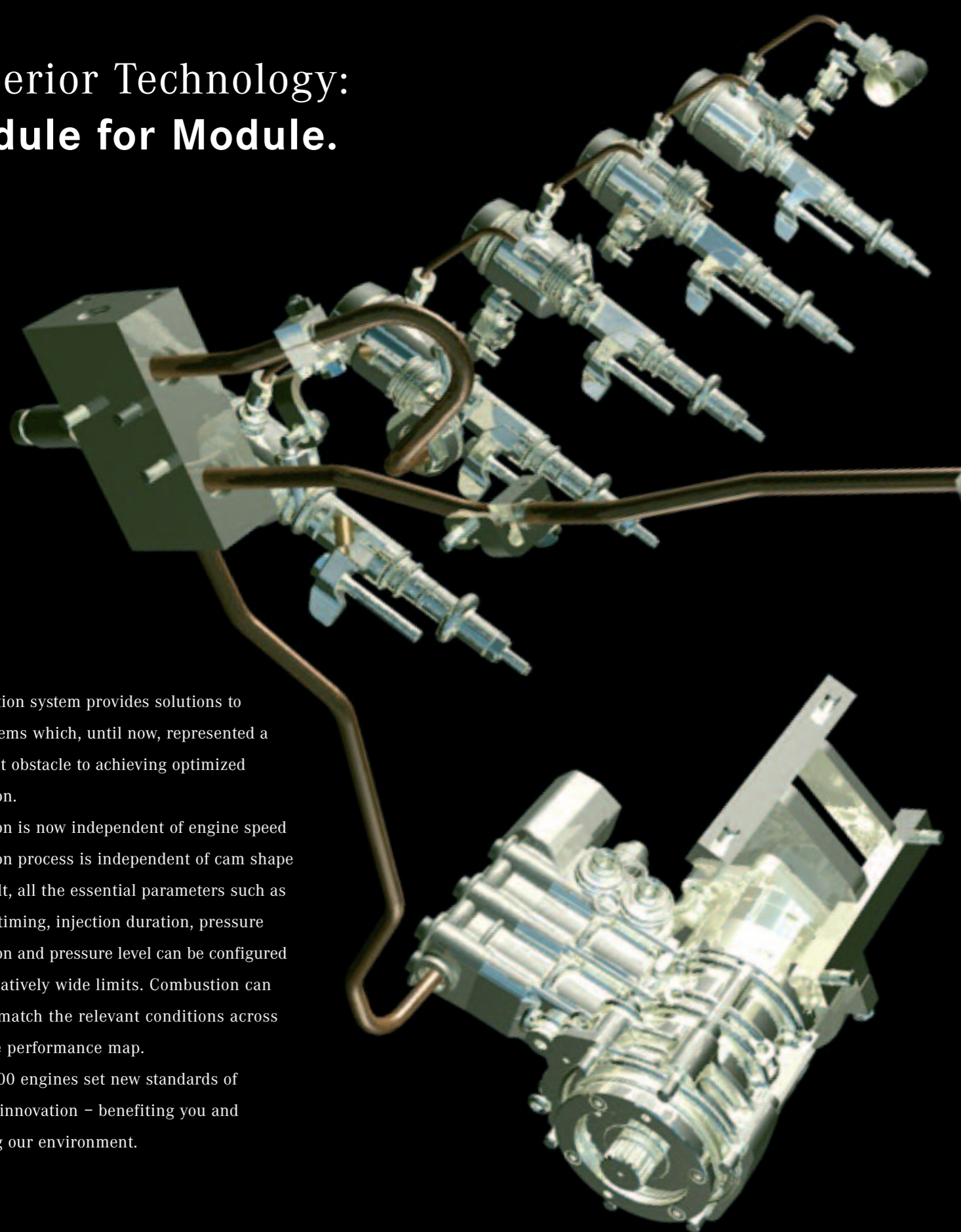
Safety

- > Electronic monitoring and control system for engine, gearbox and shipside installations
- > Double-walled HP-fuel-system with leak-off fuel monitoring
- > Triple-walled watercooled exhaust gas routing and watercooled turbocharger housing

Service

- > Round the clock
- > Worldwide

Superior Technology: Module for Module.

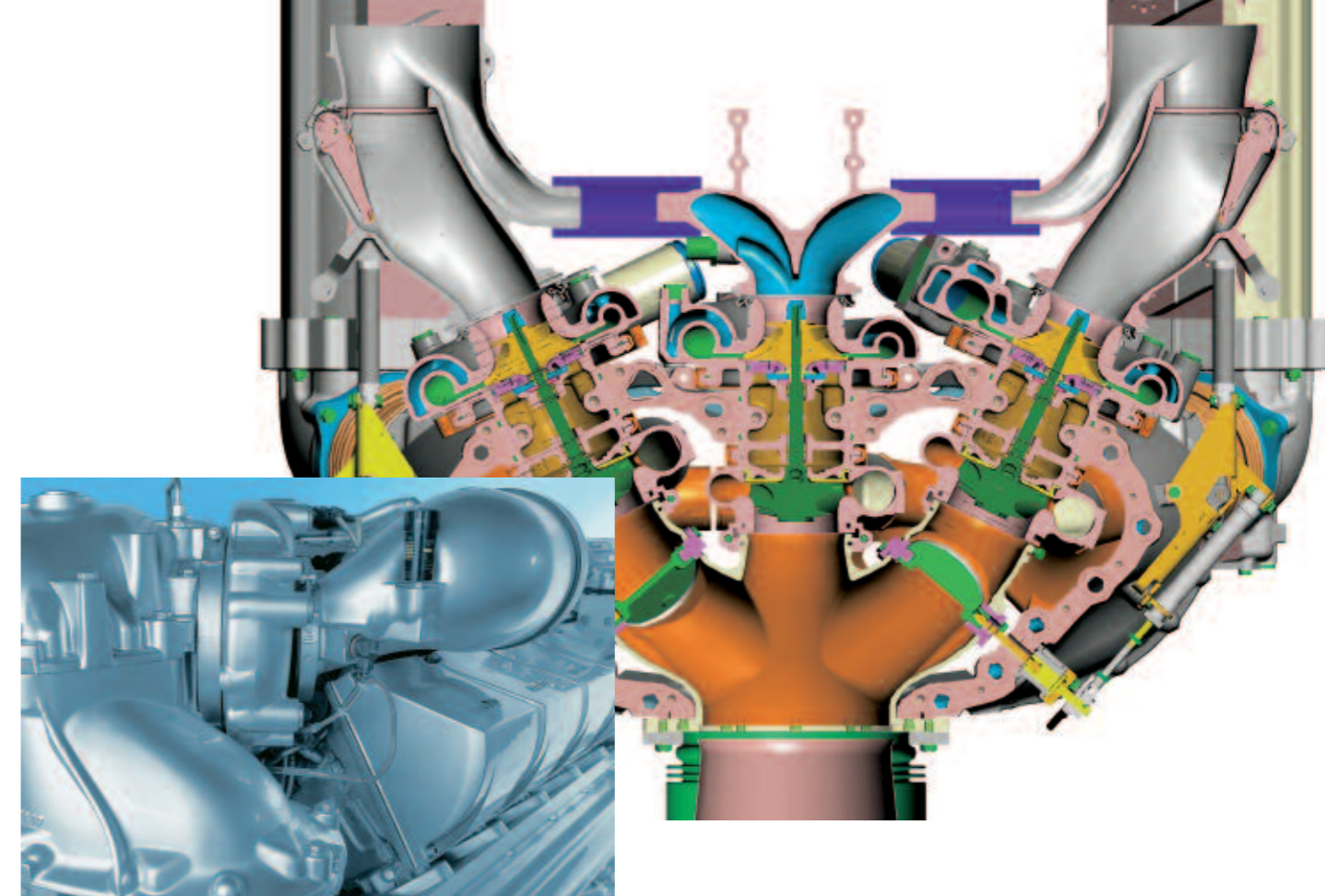


The injection system provides solutions to two problems which, until now, represented a significant obstacle to achieving optimized combustion.

1. Injection is now independent of engine speed
2. Injection process is independent of cam shape

As a result, all the essential parameters such as injection timing, injection duration, pressure progression and pressure level can be configured within relatively wide limits. Combustion can be set to match the relevant conditions across the whole performance map.

Series 2000 engines set new standards of technical innovation – benefiting you and benefiting our environment.



Service Module

Service components grouped at free end of engine with easily-accessible interfaces for fuel and raw water and integrated accessories (pumps, filters, coolant header tank, PTOs, HP pumps)

Benefits:

- > Easy servicing of filters and pumps
- > Easy access
- > Additional PTOs

Piston

Heat-treated high alloy aluminum with cast-in oil cooling gallery

Benefits:

- > High thermal load capability and long life
- > Low piston ring wear
- > Low oil consumption

Exhaust System

Triple-wall water-cooled manifold

Benefits:

- > Low surface temperatures
- > Reduced heat transfer to cooling system
- > Absolutely gas-tight
- > One exhaust gas outlet through internal gas merging system

Turbocharging System

Sequential turbocharging with charge air cooling (turbocharger cut-in and cut-out)

Benefits:

- > Turbochargers can more closely match and respond to the engine airflow requirements
- > High engine torque at low speed
Improved acceleration
- > Water-cooled turbocharger for enhanced
- > Efficiency

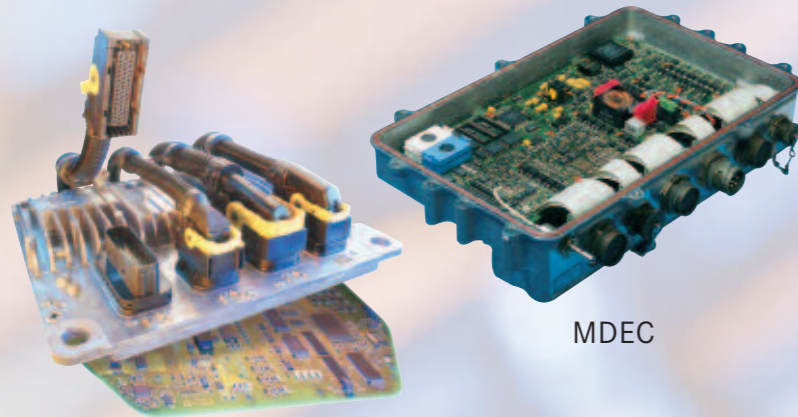
Cooling System

Split-circuit cooling system using heat exchanger with titanium plates

Benefits:

- > Keeps engine coolant, oil and intake air at optimum temperature under all operating conditions
- > Complete combustion of fuel because of higher temperature during idle or low-load operation
- > No seawater in the engine

Control, Monitoring and Management.



ADEC

MDEC

Engine-Management System

For governing, monitoring and control with integrated safety and test system and interfaces to Remote Control System (RCS) and Monitoring and Control System (MCS).

Technical Data

Diesel Engine Series 2000		
Configuration	12V, 16V	8V, 10V, 12V, 16V*
Bore/Stroke	mm (in) 130/150 (5,1/5,9)	135/156 (5,3/6,1)
Swept volume	l/Cyl. 1,99	2,23
Fuel specification	EN 590, ISO 8217, DMX-DMA	EN 590, ISO 8217, DMX-DMA

Application group	Marine Main Propulsion Rated Power Output ICFN												
	1A			1B				1DS		3A		3B	
								50Hz	60Hz	50Hz	60Hz		
Designation	M60	M70	M72*	M90	M91	M92*	M93*	M50A	M50B	M40A	M40B		
Speed (speed margin)	rpm 1800	2100	2250 (+50)	2300	2350 (+50)	2450 (+50)	2450 (+50)	1500	1800	1500	1800		
Rated Power 8V	kW -		720	kW -		810	895	kW -		kW -			
	bhp -		(965)	bhp -		(1085)	(1200)	bhp -		bhp -			
Rated Power 10V	kW -		900	kW -		1015	1120	kW -		kW -			
	bhp -		(1205)	bhp -		(1360)	(1500)	bhp -		bhp -			
Rated Power 12V	600	788	1080	1007	1119	1220	1340	498	600	575	695		
	(805)	(1055)	(1450)	(1350)	(1500)	(1635)	(1800)	(670)	(805)	(771)	(932)		
Rated Power 16V	800	1050	1440	1343	1492	1630	1790	664	800	770	930		
	(1070)	(1410)	(1930)	(1800)	(2000)	(2185)	(2400)	(890)	(1075)	(1033)	(1247)		

* with Common Rail Fuel Injection System

Power definitions by DIN/ISO 3046 intake air temperature 25°C / Sea water temperature 25°C

Power reduction at Intake air temperature 45°C / Sea water temperature 32°C:

M60/70/72: none

M90: 1.5%

M91: 4%;

M92/93: none

Rating definitions:

1A: Diesel engines for Vessels with unrestricted continuous operation

1B: Diesel engines for fast Vessels with high load factors

1DS: Diesel engines for fast Vessels with low load factors

3A: Diesel engines for onboard power generation - continuous operation

3B: Diesel engines for onboard power generation - continuous operation with variable load

ICFN

I = Power to ISO

C = Continuous power output

F = Fuel stop power

N = Available power

Accessories necessary for operation, engine driven

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