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 – benefitting 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

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

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

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.

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

<table>
<thead>
<tr>
<th>Configuration</th>
<th>12V, 16V</th>
<th>8V, 10V, 12V, 16V*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore/Stroke</td>
<td>mm (in)</td>
<td>130/150 (5.1/5.9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>135/156 (5.3/6.1)</td>
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<tr>
<td>Swept volume</td>
<td>1/Cyl.</td>
<td>1.99</td>
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<td></td>
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<td>2.23</td>
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<td>Fuel specification</td>
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<td>EN 590, ISO 8217, DMX-DMA</td>
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<td></td>
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<td>EN 590, ISO 8217, DMX-DMA</td>
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<table>
<thead>
<tr>
<th>Designation</th>
<th>M60</th>
<th>M70</th>
<th>M72</th>
<th>M90</th>
<th>M91</th>
<th>M92</th>
<th>M93</th>
<th>M50A</th>
<th>M50B</th>
<th>M40A</th>
<th>M40B</th>
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<tbody>
<tr>
<td>Speed (rpm)</td>
<td>1800</td>
<td>2100</td>
<td>2350</td>
<td>2300</td>
<td>2450</td>
<td>2450</td>
<td>1500</td>
<td>1800</td>
<td>1500</td>
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<tr>
<td>(speed margin)</td>
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<td>(+50)</td>
<td>(+50)</td>
<td>(+50)</td>
<td>(+50)</td>
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<td>(+50)</td>
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<tr>
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<td>810</td>
<td>895</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>bhp</td>
<td>(965)</td>
<td>(1085)</td>
<td>(1200)</td>
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<tr>
<td>Rated Power 10V kW</td>
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<td>900</td>
<td>1015</td>
<td>1120</td>
<td>-</td>
<td>-</td>
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<td>(1500)</td>
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<td>(1800)</td>
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<td>770</td>
<td>930</td>
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</table>

* 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