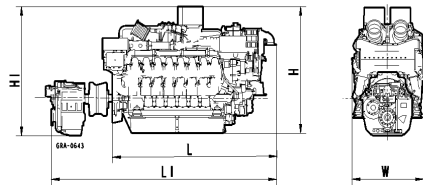
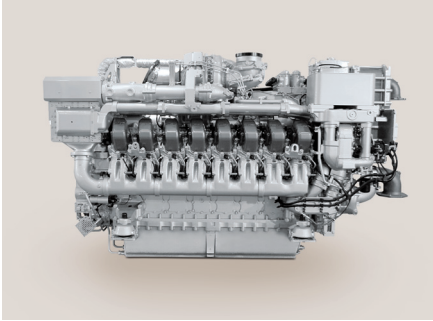


Marine

Diesel Engines 16V 4000 M93/M93L

for Fast Vessels with Low Load Factors (1DS)



Dimensions and Masses

16V 4000	Dimensions (LxWxH) mm (in)	Mass, dry kg (lbs)
M93	3480x1465x2450 (137.0x57.7x96.5)	9600 (21164)
M93L	3480x1465x2450 (137.0x57.7x96.5)	9600 (21164)
16V 4000 - with Gearbox type	Dimensions (L ₁ xWxH ₁) mm (in)	Mass, dry kg (lbs)
M93 - ZF 9000	4645x1465x2605 (182.9x57.7x102.6)	11085 (24438)
M93L - ZF 9050	4645x1465x2605 (182.9x57.7x102.6)	10985 (24218)

Typical applications: Fast yachts, fast patrolboats, police craft and fire-fighting vessels

Engine Model	16V 4000 M93	16V 4000 M93L
Rated power ICFN kW (bhp)	3120 (4185)	3440 (4615)
Speed rpm	2100	2100
No. of cylinders	16	16
Bore/stroke mm (in)	170/190 (6.7/7.5)	170/190 (6.7/7.5)
Displacement, total l (cu in)	69.0 (4211)	69.0 (4211)
Flywheel housing	SAE 00	SAE 00
Gearbox type ²⁾	ZF 9000	ZF 9050
Optimization of exhaust emissions ¹⁾	IMO 2/EPA 2	IMO 2/EPA 2

¹⁾ IMO - International Maritime Organization (MARPOL)

EPA - US marine directive 40 CFR 94

²⁾ gearbox variants "Down Angle (A)" and "V-Drive" available on request



Fuel Consumption *		16V 4000 M93	16V 4000 M93L
at rated power	g/kWh	224	230
	l/h	842.0	953.3
	gal/h	222.5	251.9

* Tolerance +5% per ISO 3046, Diesel fuel to DIN EN 590 with a min L.H.V. of 42800kJ/kg (18390 BTU/lb)

Standard Equipment	
Starting system	Electric starter 24 V, 2 pole
Oil system	Gear driven lube oil pump, duplex lube oil filter with diverter valve, automatic lube oil filter with centrifuge lube oil heat exchanger, pump for lube oil extraction
Fuel system	Fuel delivery pump, duplex lube fuel filter with diverter valve, common rail fuel injection system with high-pressure pump, pressure accumulator and electronic fuel injection with cylinder cutout system, jacketed HP fuel lines, flame- proof hose lines, leak-off fuel tank level monitoring, fuel pre-filter with water separator
Cooling system	MTU-split-circuit coolant system, electronically controlled thermostats, coolant-to-raw water plate core heat exchanger, self priming centrifugal raw water pump, engine mounted coolant expansion tank, gear driven coolant circulation pump, raw-water connection for gearbox cooling
Combustion air system	Water cooled charge air manifolds, engine coolant temperature-controlled intercooler, sequential turbocharging with 2 water-cooled turbochargers , on-engine seawater-resistant air filters
Exhaust system	Triple-walled, liquid-cooled, on-engine exhaust manifolds, exhaust bellows, horizontal discharge
Mounting system	Resilient mounts
Auxiliary PTO	Charging generator, 120A, 28V, 2 pole
Engine management system	Engine control and monitoring system (ADEC), interface to gearbox control, interface to remote control and monitoring system, local operating panel (LOP)
Engine safety system	The scope of delivery for the engine fulfills SOLAS requirements for admissible surface temperature without additional insulation

Optional Equipment	
Starting system	Coolant preheating system, air starter
Oil system	Lube oil priming system, oil level monitoring, automatic oil replenishment system, automatic lube oil filter, main and connecting rod bearing temperature monitoring
Cooling System	Engine version for sealed engine coolant system in conjunction with ship`s side recooling system
Exhaust System	Vertical discharge
Auxiliary PTO	Bilgepump, PTOs at free end of engine
Engine management system	Expansion In compliance with classification society regulations
Monitoring / Control system	Fuel consumption measurement device, MTU-monitoring and control systems MCS, remote control systems RCS
Gearbox Options	Various reserve reduction gearbox models, elec. actuated, gearbox mounts, PTO for hydraulic pump at driving shaft or at mediate shaft, trolling, trailing pump, propeller shaft flange
Classification	ABS, BV, CCS, CR, DNV, GL, KR, LR, NK, RINA including necessary extensions to scope of supply.

> Power definition according ISO 3046

> Intake air depression 15 mbar/Exhaust back pressure 30 mbar

> Power reduction at 45°C/32°C: 3%

We reserve the right to change technical data. All data represent approximate values, refer to the installation drawing for full details. Contact your MTU or MTU Detroit Diesel distributor/ dealer for more information.

> Intake air temperature: 25°C/Sea water temperature: 25°C;

> Barometric pressure 1000 mbar