Dopo la presentazione a Genova del nuovo D190

BMW MARINE IN PROGRESSO

di Lucio Petrone

A quanto sembra, il gruppo BMW, attraverso la società BMW Marine creata nel '78 è intenzionato a conquistarsi una consistente fascia di mercato anche nel campo dei motori marini. Vi sono dei programmi a lunga scadenza, con notevoli investimenti sul piano tecnologico in funzione dell'automazione degli impianti e del controllo della produzione, e, nonostante la congiuntura tutt'altro che favorevole alla nautica da diporto nel mondo, arrivano già i primi risultati.

Parlare della BMW Marine è quasi d'obbligo dopo aver provato, in una recente presentazione alla stampa a Sestri Levante, alcune barche motorizzate con i suoi entrobordo ed entrofuoribordo ed essere rimasti realmente soddisfatti della loro potenza e silenziosità. Dopo il Salone di Genova ci siamo nuovamente incontrati con Klauss Wiese, responsabile delle vendite e del marketing della BMW Marine e l'occasione è stata utile per rifare il punto della situazione e porgli alcune domande. "Allora come va il mercato per la vostra azienda?" — gli abbiamo chiesto.

"È noto il pesante andamento del mercato nautico in tutto il mondo — ci ha risposto — in Europa si sono salvati solo la Norvegia e in misura minore la Finlandia; negli USA un leggero miglioramento all'inizio della primavera non ha avuto poi riscontro nei mesi successivi. Sono perciò lieto di poter dire che in questo clima di generale depressione la BMW Marine ha raggiunto alcuni rimarchevoli risultati. Le vendite dei nostri entrobordo sono aumentate nei primi 10 mesi dell'82 del 20% in unità e del 27% in valore, rispetto allo scorso anno. La produzione del motore diesel D 150 lanciato nell'ottobre dell'81 è stata incrementata due volte per rispondere alle richieste, risultando uno dei maggiori fattori di questi sorprendenti risultati. La nostra quota di mercato è stata ampliata significativamente in tutti i paesi in cui siamo rappresentati: 40 nazioni con più di 600 rivenditori".

La seconda è stata in questo caso una domanda di prammatica: "Quanto influisce il marchio BMW sul vostro successo?"

"Certo influisce — ha ammesso — perché l'acquirente si aspetta

Il BMW D 190 è derivato dal diesel sovralimentato D 150, a 6 cilindri verticali in linea presentato dalla BMW nell'ottobre '81 che, con una cilindrata di 3590 cc, sviluppa una potenza di 100 kW (136 HP). Grazie a un sistema di raffreddamento dell'aria compressa si è ottenuto dal precedente un nuovo motore, appunto il D 190, con un incremento di potenza del 20% e quindi di 121 kW (165 HP) a 3800 giri/min. La turbina messa in funzione dai gas di scarico mette in moto un compressore che manda l'aria compressa nei cilindri. Il raffreddamento di quest'aria compressa aumenta ancora la densità di quest'ultima ed offre così una maggiore quantità di ossigeno da miscelare col carburante. Il risultato è un incremento notevole della potenza ed altri vantaggi per la durata del motore. Con 3,18 kg/kW si dispone di un rapporto peso-potenza particolarmente vantaggioso ed eguale a quello di un motore a benzina. Un peso basso (422 kg), dimensioni ridotte ed un'ottima equilibratura delle masse comportano oltre al funzionamento silenzioso del motore anche un carico inferiore per l'imbarcazione.

È disponibile sia con trasmissione a Z BMW - dotata, di serie, di un controllo d'assetto - che con trasmissione tradizionale ad albero.

SPECCHIETTO DEI MOTORI MARINI BMW

Motori entrobordo	Potenza KW (CV) a giri/min.	cilindri	cilindrata cc	peso
B 220 W	140 (190) - 5500	6	3205	275
B 190 W	121 (165) - 5500	6	2788	275
D 190 W	121 (165) - 3800	6	3590	422
D 150 W	100 (136) - 3800	6	3590	402
D 50 IM	33 (45) - 3000	3	2124	294/313
D 35 IM	22 (30) - 3000	2	1416	240/258
D12	7,5 (10) - 3000	1	528	108
D7	4,5 (6) - 3600	1	280	68

Motori con azionamento a Z BMW

B 220 Z	140 (190) - 5500	6	3205	327
B 190 Z	121 (165) - 5500	6	2788	327
B 130 Z	88 (120) - 5500	4	1990	260
D 190 Z	121 (165) - 3800	6	3590	470
D 150 Z	100 (136) - 3800	6	3590	450

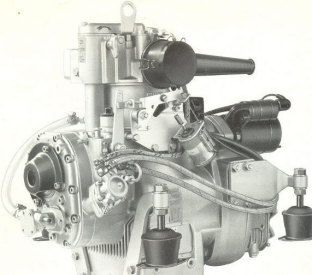
Motori con azionamento a getto

B 220 J	140 (190) - 5500	6	3205	338	230*
B 190 J	122 (165) - 5500	6	2788	338	230*
B 130 J	88 (120) - 5500	4	1990	260	164*

* senza azionamento a getto

Abbreviazioni:

B motore a benzina - **D** motore a gasolio - **J** azionamento a getto - **W** invertitore - **Z** azionamento a Z - **I** raffreddamento a circuito semplice - **II** raffreddamento a circuito doppio



Engine shown with optional electrical stop.

The BMW D 12 Marine Engine: 7.5 kW (10 bhp). Particularly suitable for sailing yachts and motor sailers up to approx 9 metres (30') and 3 tons.

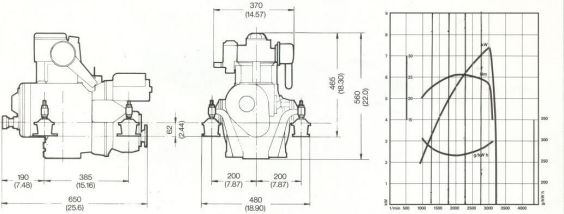
This highly efficient marine diesel is ideally suited for medium-size sailing yachts. With its compact dimensions and sophisticated design with no exterior moving parts the BMW D12 is particularly safe and functional. Its high standard of fuel economy gives it an above-average cruising range, and with its outstanding running smoothness and the compensation shaft to neutralize vibrations, it makes even long voyages a real pleasure. The patented lubrication system allows permanent operation of the engine at an angle of heel of up to 25°. Another important advantage is the positive power-to-weight ratio, which in many cases dispenses with the need for a more powerful engine.

Special features:

- Extremely low weight thanks to cast aluminium crankcase
- Compact dimensions – well fit into virtually any boat
- Operation at a permanent angle of heel of up to 25°
- No moving parts on the outside – and, therefore optimum safety against injuries
- Simple, inexpensive maintenance
- Optimum corrosion-proofing through two-component paintwork and two zinc anodes
- Bosch fuel injection pump with mechanical control and self bleeding – optimum combustion and clean exhaust emission
- Additional supression of vibration by compensation shaft
- Flexible four-point engine mounts to minimize vibrations conveyed to the boat's hull
- Alternator (integrated in flywheel) and a heavy duty starter
- Easy-to-operate manual starter with starting handle and automatic decompression
- Reduction-ratio reverse gearbox for a wide range of different applications
- Thermostat-controlled salt water cooling to provide a constant operating temperature
- Low fuel consumption: 2.2 ltr/0.48 Imp gals per operating hour at maximum output
- Fuel filter with water separator
- Air filter with air intake silencer
- Electrical wiring complying with the strict US Coast Guard regulations, resetable fuses to provide extra safety against overload
- Engine and gear box prepared by the factory for single-lever remote control of throttle and gear shift

Conclusion:

The D12 has a wide range of exceptional advantages. This applies not only to the D12 alone, but to all marine engines that bear the symbol of progressive engineering. BMW's complete range of marine engines for sailing boats and motor yachts offers all kinds of options and a wide choice of diesel and petrol units. You can choose from a wide range of optional extras and accessories to meet your personal requirements. And to make sure that you enjoy sheer boating pleasure for a long time to come, BMW Marine's international dealer organization has trained marine technicians at your service as well as a reliable and quick supply of parts.



Specifications D12

Displacement and output (DIN 6270 B)	Displacement 528 cc (32.2 cu in) Stroke 100 mm (3.94"), bore 82 mm (3.23")
	Max continuous output 7.5 kW (10 bhp) at 3000 rpm
	Compression ratio 22 :1
Design and installation	Water-cooled single-cylinder four-stroke engine in up-right position, swirl chamber process; forged-steel crankshaft with counter balance shaft
	Operation at a permanent angle of heel of up to 25°
	Flexible four-point engine mounts
Weight	Dry weight of the complete engine 108 kg (238 lb)
Valves	Valve drive: via rocker arms and tappet rods
Lubrication	Centrifugal forced-feed lubrication (splash lubrication)
Fuel supply system	Bosch fuel injection pump
	Optimum fuel/air mixture provided by flat-bottom swirlaction combustion chamber
	Air filter with air intake silencer
	Fuel supply by mechanical fuel pump with additional manual control
Engine cooling	Single-circuit cooling with camshaft driven water pump
Electrical system	350 W, 14 V, 25 A alternator
	1.1 kW starter
Power transmission	Torsion damper between engine and gearbox
Reversing-type gearbox	Reversing-type gearbox with neutral position, forward and reverse
	Direction of rotation: clockwise in forward gear, on connection flange of reversing-type gearbox
	Gear ratio: forward 2.7 :1
Standard fittings	Manual starter with starting handle and automatic decompression, zinc anodes
	Fuel filter with water separator
	Engine with complete wiring loom and multi-pin plug, instrument panel with starter switch, battery charge indicator, coolant temperature indicator and two blank holes for additional instruments
Optional fittings	Single-lever control with cable, complete stern gear and exhaust system, various additional instruments, electrical stop
	Subject to change in design and technical features

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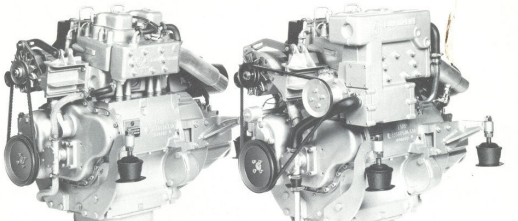


The BMW D 35-1/D 35-2 Marine Engine: 22 kW (30 bhp). Particularly suitable for sailing yachts and motor sailers up to approx 10.5 metres (34') and 8 tons – and for displacement motor boats up to approx 3 tons.

The BMW D 35 is a robust and compact 2-cylinder marine diesel with an extremely low power-to-weight ratio. The compensation shaft reduces vibrations when running to an absolute minimum. The special mounts developed for sailing boats incorporate extra-large silent blocks and allow installation of the engine with a low centre of gravity. The lubrication system provides for perfect running conditions with the engine at a permanent angle of heel of up to 30°. Also available with twin-circuit cooling (D 35-2).

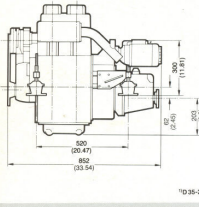
Special features:

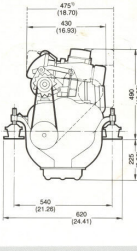
- Exceptional smooth running due to compensation shaft
- Low power-to-weight ratio
- Thermostat-controlled salt water cooling of the D 35-1 to provide a constant operating temperature
- New compact twin-circuit cooling system of the D 35-2 with integrated header tank and heat exchanger to provide optimum corrosion-proofing. Warm water supply capability
- Low fuel consumption: 6.8 ltr/1.5 Imp gals per operating hour at maximum output
- Salt water impeller pump driven directly by the camshaft – no need for additional V-belt
- Bosch single-element fuel injection pump with mechanical control and self bleeding, inexpensive maintenance
- Engine runs perfectly even with an angle of heel of up to 30°
- High-output alternator and starter
- Optimum corrosion-proofing through three zinc anodes and two-component paintwork
- Electrical wiring complying with the strict US Coast Guard regulations, resetable fuses to provide extra safety against overload
- Wide range of instruments
- Reversing-type gearbox with various reduction ratio gears for all applications
- Engine and gear box prepared by the factory for single-lever remote control of throttle and gear shift
- Fuel filter with water separator
- Electrical engine cut-off switch fitted as standard

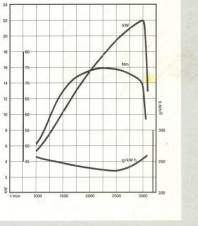
Conclusion:

The D 35 has a wide range of exceptional advantages. This applies not only to the D 35 but to all marine engines that bear the symbol of progressive engineering.

BMW's complete range of marine engines for sailing boats and motor yachts offers all kinds of options and a wide choice of diesel and petrol units. You can choose from a wide range of optional extras and accessories to meet your personal requirements. And to make sure that you enjoy sheer boating pleasure for a long time to come, BMW Marine's international dealer organization has trained marine technicians at your service as well as a reliable and quick supply of parts.







[1] D 35-2

Specifications D 35-1 (single-circuit cooling) D 35-2 (twin-circuit cooling)

Displacement and output (DIN 6270 B)	Displacement 1416 cc (86.4 cu in) Stroke 100 mm (3.94"), bore 95 mm (3.74")
	Max continuous output 22 kW (30 bhp) at 3000 rpm
	Max torque 75 Nm (53 ft/lb) at 2250 rpm
	Compression ratio 19:1
	Wide open throttle neutral 3200 rpm
Design and installation	Four-stroke diesel engine with direct fuel injection
	2-cylinder inline in upright position, forged-steel crankshaft. Additional compensation shaft to prevent engine vibrations
	Max installation angle 15°
	Engine supported by four flexible mounts
Weight	Dry weight of the complete engine (including reversing-type gearbox) D 35-1 240 kg (528 lb) D 35-2 258 kg (568 lb)
Valve drive	Camshaft, tappets, tappet rods and rocker arms located next to engine block; inclined valves in vertical, parallel arrangement
Lubrication	Forced-feed lubrication via gear-type pump, replaceable filters and oil cooler
Fuel supply system	Bosch fuel injection, automatic self bleeding system
	Ultra-fine filters with water separator, fuel supply pump with additional manual control
	Air filter with air intake silencer
Engine cooling	D 35-1 Impeller water pump connected directly to the crankshaft
	D 35-2 Water pump for freshwater circuit and connection for warm water supply through calorifier, if desired
Electrical system	14 V, 75 A alternator
	1.9 kW, 12 V starter
Power transmission	Torsion damper between engine and gearbox
Reversing-type gearbox	Reversing-type gearbox with neutral position, forward and reverse, right hand rotation
	Gear ratios: ZF BW 7.2.0:1 and 2.5:1
Standard fittings	Fuel system with automatic self bleeding; zinc anodes; complete wiring and multi-pin plug connection; wiring harness; instrument panel with starter switch, voltmeter, rev counter with hour meter, indicator lights for water temperature, oil pressure and battery charge; rheostat for instrument panel illumination; electrical engine cut-off switch; instrument fuses; toolkit
	Additional fittings on D 35-2: Water temperature gauge; blank holes for additional instruments; warning buzzer for water temperature and oil pressure
Optional fittings	Single-lever gear shift and throttle control with cables complete stern gear and exhaust system; various additional instruments
	Subject to change in design and technical features

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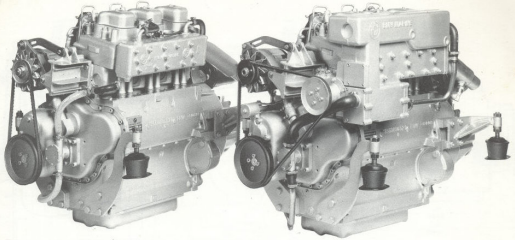


The BMW D 50-1/D 50-2 Marine Engine: 33 kW (45 bhp). Particularly suitable for sailing yachts and motor sailers up to approx 12 metres (40') and 12 tons – and for displacement motor boats up to approx 4 tons.

With its numerous merits, this marine diesel is virtually beyond comparison: Three cylinders and an additional compensation shaft give a standard of running smoothness similar to that of a 6-cylinder power unit. Designed from the very beginning for marine applications, this engine saves space and weight and may be operated at a permanent angle of heel of up to 30°. The special combustion chamber design combined with direct fuel injection gives an optimum combustion process and minimum consumption (only 9.5 ltr/2.1 Imp gals per hour at maximum output). The special mounts developed for sailing boats in particular incorporate extra-large silent blocks and allow installation of the engine with a low centre of gravity. Also available with twin-circuit cooling (D 50-2).

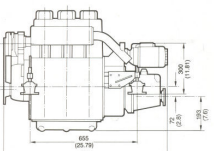
Special features:

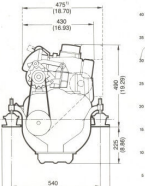
- Exceptional smooth running due to compensation shaft
- Low power-to-weight ratio
- Thermostat-controlled salt water cooling of the D 50-1 to provide a constant operating temperature
- New compact twin-circuit cooling system of the D 50-2 with integrated header tank and heat exchanger to provide optimum corrosion-proofing. Warm water supply capability
- Low fuel consumption: 9.5 ltr/2.1 Imp gals per operating hour at maximum output
- Salt water impeller pump driven directly by engine, no V-belt required
- Bosch single-element fuel injection pump with mechanical control and self bleeding, inexpensive maintenance
- Engine runs perfectly even with heel angle of 30°
- High-output alternator and starter
- Optimum corrosion-proofing through three zinc anodes and two-component paintwork
- Electrical wiring complying with the strict US Coast Guard regulations, resetable fuses to provide extra safety against overload
- Wide range of instruments
- Reversing-type gearbox with various reduction-ratio gears for all applications
- Engine and gear box prepared by the factory for single-lever remote control of throttle and gear shift
- Fuel filter with water separator
- Electrical engine cut-off switch fitted as standard

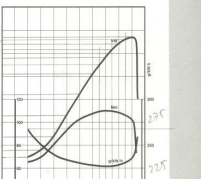
Conclusion:

The D 50 has a wide range of exceptional advantages. This applies not only to the D 50 but to all marine engines that bear the symbol of progressive engineering.

BMW's complete range of marine engines for sailing boats and motor yachts offers all kinds of options and a wide choice of diesel and petrol units. You can choose from a wide range of optional extras and accessories to meet your personal requirements. And to make sure that you enjoy sheer boating pleasure for a long time to come, BMW Marine's international dealer organization has trained marine technicians at your service as well as a reliable and quick supply of parts.







Specifications D 50-1 (single-circuit cooling) D 50-2 (twin-circuit cooling)

Displacement and output (DIN 6270 B)	Displacement 2124 cc (129.6 cu in) Stroke 100 mm (3.94"), bore 95 mm (3.74") Max continuous output 33 kW (45 bhp) at 3000 rpm Max torque 110 Nm (81 ft/lb) at 2500 rpm Compression ratio 19:1 Wide-open throttle neutral 3200 rpm
Design and installation	Four-stroke diesel engine with direct fuel injection 3-cylinder inline engine in upright position, forged-steel crankshaft. Additional compensation shaft to prevent engine vibrations Max installation angle 15° Engine supported by four flexible mounts
Weight	Dry weight of the complete engine (including reversing-type gearbox) D 50-1 294 kg (646 lb) D 50-2 313 kg (689 lb)
Valve drive	Camshaft, tappets, tappet rods and rocker arms located next to engine block; inclined valves in vertical, parallel arrangement
Lubrication	Forced-feed lubrication via gear-type pump, replaceable filters and oil cooler
Fuel supply system	Bosch fuel injection, automatic self bleeding system Ultra-fine filters with water separator, fuel supply pump with additional manual control Air filter with air intake silencer
Engine cooling	D 50-1 Impeller water pump connected directly to the crankshaft D 50-2 Water pump for freshwater circuit and connection for warm water supply through calorifier, if desired
Electrical system	14 V, 74 A alternator 1.9 kW, 12 V starter Complete wiring and multi-pin plug
Power transmission	Torsion damper between engine and gearbox
Reversing-type gearbox	Reversing-type gearbox with neutral position, forward and reverse, right hand rotation Gear ratios: HBW 150 1.9:1, HBW 250 2.7:1
Standard fittings	Fuel system with automatic self bleeding; zinc anodes; wiring harness; instrument panel with starter switch, voltmeter, rev counter with hour meter, indicator lights for water temperature, oil pressure and battery charge; rheostat for instrument panel illumination; electrical engine cut-off switch; instrument fuses; toolkit Additional fittings on D 50-2: Water temperature gauge; blank holes for additional instruments; warning buzzer for water temperature and oil pressure
Optional fittings	Single-lever gear shift and throttle control with cables complete stern gear and exhaust system; various additional instruments

Subject to change in design and technical features

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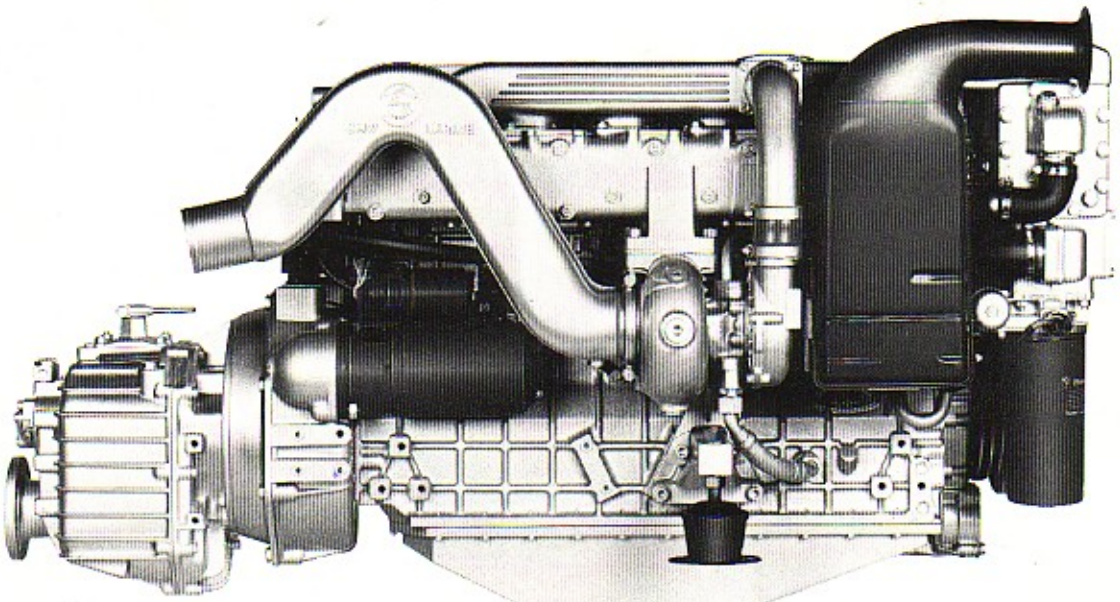

The BMW D 150 W Marine Engine with reversing-type gearbox: 100 kW (136 bhp). Particularly suitable for displacement boats and fast planing cruisers through its compact dimensions and extremely low weight: 60 kg/132 lb less than most of its competitors.

This turbocharged diesel also excels with its exceptional combination of technical features: 6 cylinders inline for particular smooth running free of vibrations. Turbocharging to provide powerful torque and flexibility at all engine speeds. Twin-circuit cooling fitted as standard for better corrosion-proofing and freedom of maintenance. Weight including gearbox 402 kg (885 lb).

Special features:

- One piece crankcase of cast iron built to the "tunnel" design, with transverse sections. Giving maximum stability and low weight
- 6 individual lightweight aluminium cylinder heads: better sealing properties with easy inexpensive maintenance
- Very quiet exhaust gas turbocharger providing a smooth power curve throughout a wide engine speed range
- Extra-large air filter for fresh air and a low noise level
- Water jacketed exhaust manifold made of V4A stainless steel
- Bosch distributor-type fuel injection pump with fuel supply geared to turbocharger pressure, maximum efficiency, improved fuel economy and considerably reduced exhaust emissions. Efficient combustion to provide optimum running smoothness free of vibrations
- All fuel pipes made of steel for maximum safety
- Compact twin-circuit cooling system with integrated header tank, heat exchanger and thermostat, oil cooler and thermostat
- Maintenance-free direct drive salt water pump by the camshaft and single-belt drive of the circulation pump and alternator by the crankshaft
- Extra pulley for driving additional components
- Complete corrosion-proofing by the application of a special two-component paintwork in the advance and main painting process

Conclusion:

The D 150 W has a wide range of exceptional advantages. This applies not only to the D 150 W but to all marine engines that bear the symbol of progressive engineering.
BMW's complete range of marine engines for motor yachts and sailing boats offers all kinds of options and a wide choice of diesel and petrol units. You can choose from a wide range of optional extras and accessories to meet your personal requirements. And to make sure that you enjoy sheer boating pleasure for a long time to come, BMW Marine's international dealer organization has trained marine technicians at your service as well as a reliable and quick supply of parts.

Neuer Turbo-Dieselmotor D 150 von BMW Marine GmbH

Grundsätzlich beschränkt sich die BMW Marine GmbH auf die Entwicklung und Fertigung von Motoren und eventuell notwendiger Antriebe, z. B. dem BMW-Z-Antrieb. Im Rahmen des Produktprogramms cooperiert BMW mit den Firmen Hatz, Hurth und VM, wobei die gesamte Marinisierung der Motoren von BMW entwickelt und zum großen Teil auch gefertigt wird. Die Fertigungsanlagen sind auf spezifische Kleinserien ausgelegt und beinhalten viele numerisch gesteuerte Werkzeugmaschinen.

Das Produktprogramm besteht aus zwei Modellreihen: den Benzin- und Dieselmotoren. Die Benzinmotoren basieren auf den bekannten Automobilmotoren und werden aus Einzelteilen verschiedener Serienmotoren zu spezifischen Bootsmotoren zusammengebaut. So sind z. B. alle Marinemotoren im Gegensatz zu den Automobilmotoren mit Normalkraftstoff zu betreiben. Erreicht wird dies durch die Verwendung von Kolben aus dem US-Motorenprogramm.

Von den Benzinmotoren stehen derzeit ein Vierzylinder-Aggregat mit 85 kW (120 PS) und zwei Sechszylinder-Motoren mit 122 kW (166 PS) bzw. 140 kW (190 PS) zur Verfügung. Die Motoren werden hauptsächlich mit Z-Antrieben ausgerüstet, die Sechszylinder sind auch mit Bootswendegetriebe erhältlich.

Das Dieselmotorenprogramm erstreckt sich vom kleinen Einzylindermotor mit 4,5 kW (6-PS-Motor) bis hin zum Sechszylinder-Turbomotor D 150 mit 100 kW (136 PS), der erstmals am 1. 10. 81 in Juan-Les-Pins (Südfrankreich) vorgestellt wurde. Ingesamt bestehen damit fünf Dieselmotoren-Modelle, die folgende Leistungen abdecken: Einzylinder 4,5 und 7,5 kW (6 PS und 10 PS), Zweizylinder 22 kW (30 PS), Dreizylinder 33 kW (45 PS) und Sechszylinder 100 kW (136 PS).

Die Modelle D 35 und 50 gibt es ab diesem Herbst in zwei Versionen, mit direkter Kühlung und Zweikreiskühlung. Die noch bestehenden Leistungslücken im Programm werden in den nächsten Jahren mit neuen Modellen ausgefüllt.

Der neue BMW-Dieselmotor D 150

Mit dem neuen Typ D 150 wurde ein speziell für den maritimen Einsatz vorgesehener 6-Zylinder-Dieselmotor mit Turboaufladung modernster Konstruktion auf den Markt gebracht. Er leistet aus einem Hubraum von 3590 cm³ bei 3800 1/min 100 kW (136 PS). Entwickelt wurde er in Zusammenarbeit mit einem bekannten ausländischen Hersteller und den BMW-Entwicklungsingenieuren. Weitere technische Daten können aus *Tafel 1* entnommen werden.

Die spezifischen konstruktiven Merkmale sind der in einem Stück gegossene Motorblock, der dadurch eine hohe Festigkeit erhält und trotzdem ein geringes Gewicht aufzuweisen hat. Einzelne Zylinderköpfe, hergestellt aus einer hochfesten Aluminiumlegierung, garantieren wirkungsvolle Abdichtung und können natürlich auch einzeln bei einem Defekt ausgetauscht werden.

Für die Servicefreundlichkeit sprechen noch weitere Konstruktionsmerkmale. Zuerst die kompakte Kühleinheit mit Wärmetauscher für die Zweikreiskühlung und Ölkühlung sowie der Sammler und Ölfilter. Alle Teile sind auch hier bei einem Defekt einzeln austauschbar. Die Seewasserpumpe ist am Motor angeflanscht und wird von demselben Keilriemen angetrieben wie die 75 A-Lichtmaschine. Eine Ölabsaugpumpe ist serienmäßig vorhanden, der Ölwechsel ist wegen der geringen thermischen Belastung des Motors jedoch nur alle 100 Stunden erforderlich, *Bild 1*.

Alle Maßnahmen zusammen ergeben eine gute Zugänglichkeit zum Motor bei besonders günstigen Einbaubemessungen. Besonders bei Booten mit kleinem Motorraum wird man diesen Vorteil zu schätzen wissen.

Der Kraftstoffverbrauch ist über den gesamten Drehzahlbereich sehr niedrig, *Bild 2*. Zurückzuführen ist das auf die erstmals im Bootseinsatz verwandte Bosch-Einspritzpumpe, welche die Kraftstoffzufuhr abhängig von der Ladeluft regelt.

Bild 1. BMW-Marine-Turbodieselmotor D 150

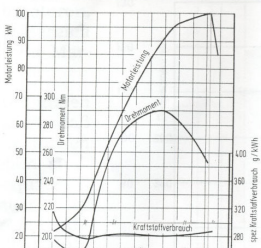

Bild 2. Leistung, Drehmoment und Kraftstoffverbrauch des BMW-Turbodieselmotors D 150 mit 3590 cm³ Hubraum

Die Verbrennung verläuft sehr weich und ist Ursache für den auffallend ruhigen Rundlauf dieses Motors.

Der D 150 ist von der BMW Marine GmbH sowohl auf dem Prüfstand, wie auch in der Praxis sorgfältig entwickelt wor-

Tafel 1. Technische Daten des BMW-Marine-Turbo-Dieselmotors D 150

Gewicht	Trockengewicht des Motors 365 kg Gewicht des Antriebes mit Spiegelplatte 74 kg Gewicht des kompletten Antriebsaggregates 439 kg
Bauart und Lagerung	6-Zyl.-Reihenmotor mit stehenden Zylindern und parallel hängenden Ventilen, Kurbelwelle aus Stahl geschmiedet und vergütet, Zweikreiskühlsystem, Motor- und Seewasserkreislauf arbeiten unabhängig voneinander, Dreipunktaufhängung: vorn einstellbar, hinten Ringformlager
Hubraum (cm³)	3590
Hub (mm)	90
Bohrung (mm)	92
Leistung bei 1/min (kW) (PS)	100/3800 136/3800
Drehmoment bei 1/min (Nm)	290/3000
Verdichtung	22:1
Drehzahlbegrenzung bei	4000/min
Arbeitsverfahren	Viertakt-Dieselmotor mit wassergekühltem Abgas-Turboauflader
Ventiltrieb	Seitliche Nockenwelle, Stößelstange, Kipphebel, parallel im Kopf hängende Ventile
Schmierung	Druckumlaufschmierung über Eatonpumpe, austauschbarer Ölfilter, thermostatisch geregelte Ölkühlung
Kraftstoffanlage	Feinstfilter mit Wasserabscheider, Kraftstoffförderpumpe mit zusätzlicher Handbetätigung, Bosch Einspritzpumpe, Einspritzdüsen, Luftfilter
Motorkühlung	Zweikreiskühlsystem mit wassergekühlter Auspuffanlage

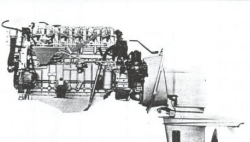

Bild 3. BMW-Marine-Dieselmotor D 150 mit Z-Antrieb

den. Moderne Technik, Zuverlässigkeit, Servicefreundlichkeit und Wirtschaftlichkeit zeichnen ihn aus. Mit dem bewährten BMW Z-Antrieb, *Bild 3*, mit serienmäßigem Power Trim (ein Wendegetriebe kommt im Laufe 1982) dürfte sich hier eine zeitgemäße Antriebseinheit für Besitzer von Kajütkreuzern, Motoryachten und schnellen Sportbooten anbieten.

Der Vertrieb der BMW Marine GmbH erfolgt durch Tochtergesellschaften, Importeure und in einigen Ländern direkt durch BMW. In diesem Jahr werden ca. 3000 Motoren verkauft. Dabei sollte erwähnt werden, daß sich Organisation und Vertrieb im volumenstarken US-Markt noch im Aufbaustadium befinden und in absehbarer Zeit die Geschäftstätigkeit auf dem US-Markt zu einer erheblichen Ausweitung des Volumens führen wird. Trotz der allgemein bekannten schwierigen Lage auf den traditionellen Bootsmärkten konnten seit dem Beginn des Verkaufs von BMW-Marine-Motoren Mitte 1978 in einer Reihe von Ländern beachtliche Marktanteile erzielt werden.

Elektrische Anlage	Drehstromlichtmaschine: MOTOROLA 1000 W, 14 V, 75 A. Anlasser: BOSCH 12 V, 3 kW Elektrischer Motorstop, Glühstiftkerzen mit Vorglühzeitautomatik
Kraftübertragung	Großvolumige, elastische Gummikupplung, Welle mit Doppelkreuzgelenk
Außenbordaggregat Z-Antrieb	Untersetzung 1,61:1 Größter Propellerdurchmesser 16" (400 mm) Max. Einschlagwinkel ± 30°, Ausbebewinkel für Transportentstellung 48° Elektro-hydraulische Hebe- und Trimmanlage, trimmbar bis zur max. Motorbetriebsdrehzahl von 3800/min.
Ausstattung	Motor komplett mit Vielfachsteckverbindung. Verbindungskabelbaum 6 m lang. Instrumententafel: zweiteilig 1. Drehzahlmesser mit Betriebsstundenzähler, Voltmeter, Instrument für Kühlwassertemperatur, Trimmanzeige mit Warnlampe, Zündanlaßschalter, Ladekontrolleuchte, Öldruckkontrolleuchte, Vorglühkontrolle, Instrumentenlichtschalter, elektr. Motorstop, akustisches Warnsignal für Öltemperatur, Kühlwassertemperatur u. Trimmkontrolle, Sicherung für Anlasser und Instrumentenlicht, Größe 264 × 149 mm 2. Instrument für Öldruck, Instrument für Öltemperatur, Größe 76 × 149 mm Ölabsaugpumpe serienmäßig am Motor montiert, Bordwerkzeug, Seewasserfilter inkl. aller Anschlüsse und Schläuche
Sonderausstattung	Schalt- und Lenkanlage, Propeller, diverse Zusatzinstrumente