# AD31L

## Pleasure duty (PD), Light Duty (LD)

### 4-cylinder, 4-stroke, direct injected, turbo-charged marine diesel engine with aftercooler and Duoprop®-drive – crankshaft power* 95 kW (130 hp)

* Power rating – see General Data

## Reliable marine engine

AD31L is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft. With its compact dimensions, it is ideal for twin installation.

***Turbo-charging***

The engine is turbo-charged for efficient operation with high powerfuel consumption ratio. The turbo-charging contributes to reduced exhaust emission levels. The turbo-charger also acts as an additional silencer on both induction and exhaust sides of the engine.

***Direct injection***

Direct injection (DI) results in low thermal load and low fuel consumption compared to swirl chamber engines (IDI) of the same cylinder volume. Direct injected engines also have a longer service life.

***Aftercooler***

The aftercooler cools the compressed and heated air, thus raising its oxygen content. This enables the engine to use the fuel more efficiently.

***Low exhaust emission levels***

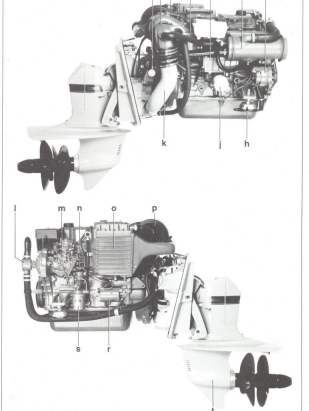
The advanced combustion system minimizes noxious exhaust emissions. The engine is certified for use on lake Constance – where exhaust emission regulations are probably the toughest in the world.

***DP drive***

The DP drive with its twin counter-rotating propellers produces a harmonious drive unit with unbeatable characteristics in terms of speed, acceleration and fuel economy. It also produces less noise and vibrations, better steering and manoeuvering characteristics, better grip in the water and a shorter time to planing compared with single propeller systems.

***Comprehensive service network***

Volvo Penta has a well established network of authorized service agents in more than 100 countries throughout the world. These service centers offer Original Volvo Penta parts as well as skilled personnel to ensure the best possible service.




*The engine shown may vary from the standard unit.*

a. Power trim pump
b. Exhaust elbow, wet type
c. Turbo-charger
d. Freshwater cooled exhaust manifold
e. Oil cooler
f. Fresh water cooling
g. Alternator
h. Flexible engine mounting
i. Full flow oil filter
k. Exhaust system
l. Sea water pump
m. Injection pump
n. Feed pump with hand pump
o. Sea water cooled aftercooler
p. Air filter
r. Starter motor 3.0 kW
s. Fine filter with water separator
t. DP drive

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## General data

| | |
|---|---|
| Type designation | AD31L (PD/LD) |
| No of cylinders | 4 |
| Configuration | 4-stroke, direct injected, turbo-charged, aftercooled, diesel engine |
| Fuel grade EN590 | 1D or 2D |
| Bore, mm (in) | 92 (3.62) |
| Stroke, mm (in) | 90 (3.54) |
| Displacement, litres ($m^3$) | 2.4 (146) |
| Compression ratio | 17.5:1 |
| Crankshaft power [1] | |
| PD/LD (3800 r/min) kW (hp) | 95 (130) |
| Propeller shaft power [1] | |
| PD/LD (3800 r/min) kW (hp) | 88 (120) |
| Outboard drive DP ratio | 1.95:1 |
| Dry weight, kg (lb) | 385 (849) |
| Dry weight incl DP drive, kg (lb) | 440 (970) |

1) Technical data in accordance with ISO 8665 and ISO 3046 Standard Fuel Stop power. Fuel temp 40°C (104°F), lower calorific value of 42700 kJ/kg and density of 840 g/litre.






## Engine equipped with

Freshwater cooled turbo-charger
Freshwater cooling, thermostat controlled with tubular heat exchanger
Seawater strainer
Seawater pump with rubber impeller
Seawater cooled aftercooler
Seawater cooled tubular oil cooler
Prewired el.system for connection to instrument panel
Alternator 14 V/60 A
Starter motor 12 V/3.0 kW
Engine brackets in front
Flexible engine mounts
Flywheel housing, rear AQ type
Exhaust elbow, wet type

## Technical description

### Engine and block

- Cylinder block and cylinder head are made of cast iron alloy for good corrosion resistance and long service life.
- Replaceable valve seatings and cylinder linings.
- Oil-cooled, forged aluminium pistons with two compression rings and one oil scraper ring.
- Nitrocarbonized crankshaft with five bearings.

### Fuel system

- Rotor-type injection pump with a mechanical governor and smoke limiter.
- Fuel feed pump with hand primer.
- Fine fuel filter with water separator.
- Electrically operated stopping device.

### Cooling system

- Thermostatically controlled freshwater cooling, prepared for hot water outlet.
- Tubular heat exchanger with separate transparent expansion tank.
- Gear-driven seawater pump with rubber impeller.

### Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine.
- Tubular, cleanable oil cooler.

### Inlet system

- Inlet silencer with replaceable filter.
- Freshwater cooled turbo-charger and seawater-cooled charge air cooler.

### Exhaust system

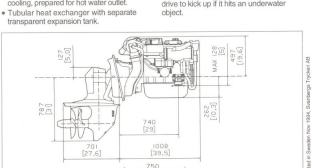
- Seawater-cooled exhaust elbow, made of cast iron with stainless steel insert. Complete connection for exhaust outlet through the drive.

### Electrical system

- 12 V corrosion-protected electrical system, complete with instrumentation and 14 V/60 A marine alternator. The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits.
- Charging regulator with battery sensor for voltage drop compensation.
- Automatic 40 A fuse with reset button.
- Starter motor power 3.0 kW.

### Drive

- Transom shield with power trim and installation components. The drive can be tilted up by 42°.
- Protective zinc anodes prevent corrosion.
- Cooling water intake at the front of the drive for reliable cooling water supply.
- A hydraulic protection function allows the drive to kick up if it hits an underwater object.




Dimensions in mm (in)



Ref. No. 7736965-8 Eng AB Ola Lindvall AB, Vaxjo. Printed in Sweden Nov 1994. Gardtryckeri Tryckeri AB

**AB Volvo Penta**
S-405 08 Göteborg, Sweden

# AD31P/DP

## Pleasure Duty (PD)

### 4-cylinder, 4-stroke, direct-injected turbocharged marine diesel engine with aftercooler and Duoprop®-drive. 110 kW (150 hp)*

*Crankshaft power according to ISO 8665

### Economic marine engine

AD31P is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft. With its compact dimensions, it is excellent for twin installation.

### Direct injection

Direct injection (DI) results in a low thermal load and low fuel consumption compared with swirl chamber engines (IDI) with the same cylinder capacity. The engines also have a longer service life.

The advanced combustion system minimizes noxious exhaust emissions and enhances overall enjoyment of boating.

### Turbocharging

The engine is turbocharged with an exhaust-driven turbocompressor. More air can be forced into the cylinder in this way with the result that more fuel can be injected and the engine runs more efficiently. Since combustion takes place in a turbo engine with excess air, the exhaust gases are cleaner than in a naturally-aspirated engine.

The turbo also acts as an additional silencer both on the induction side and on the exhaust side.

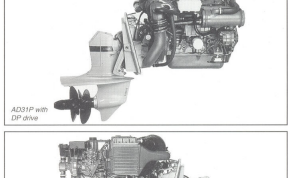
### Aftercooler

The air heats up and expands when it is compressed. In other words, it takes up more space. The aftercooler cools the compressed and heated air and raises its oxygen content so that the engine can use the fuel more efficiently.

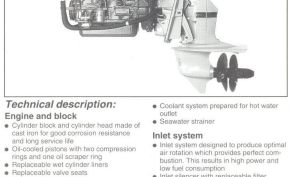
### DP drive

The DP drive with its twin counter-rotating propellers produces a harmonious drive unit with unbeatable characteristics in the boat in terms of speed, acceleration and fuel economy.

It also produces less noise and vibrations, better steering and maneuvering characteristics, better grip in the water and a shorter time to planing compared with single propeller systems.



AD31P with DP drive



## Technical description:

### Engine and block

- Cylinder block and cylinder head made of cast iron for good corrosion resistance and long service life
- Oil-cooled pistons with two compression rings and one oil scraper ring
- Replaceable wet cylinder liners
- Replaceable valve seats
- Five-bearing crankshaft

### Fuel system

- Rotor-type injection pump with a mechanical governor for accurate speed control
- Smoke limiter
- Fine filter with water separator
- Feed pump with hand primer
- Electrically-operated stopping device

### Cooling system

- Thermostatically regulated fresh water cooling
- Tubular heat exchanger with separate transparent expansion tank
- Gear-driven seawater pump with rubber impeller
- Coolant system prepared for hot water outlet
- Seawater strainer

### Inlet system

- Inlet system designed to produce optimal air rotation which provides perfect combustion. This results in high power and low fuel consumption
- Inlet silencer with replaceable filter
- Closed crankcase vent system

### Exhaust system

- Seawater-cooled exhaust elbow of cast iron with a stainless steel insert
- Complete connection for exhaust outlet through the drive

### Turbocharging system

- Exhaust-driven fresh water-cooled turbocharger

### Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine
- Tubular oil cooler that can be cleaned

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# AD31P/DP

## Engine mounting

- Flexible mounting which provides sound and vibration insulation. The engine has two adjustable rubber mounts in front of the engine and rubber suspension between flywheel housing and transom shield

## Drive

- Complete with transom shield, flywheel cover and installation components
- The drive can be tilted up by 42°
- Protective zinc anodes prevent corrosion
- The coolant water inlet at the front of the drive provides a reliable coolant water supply to the engine
- Hydraulic protection function allows the drive to kick up if it hits an underwater object

## Power Trim

- Power Trim is an electrically-operated hydraulic system for trimming the drive angle while in use. The actual trim angle is indicated with five LEDs and a digital display on the CD Trim instrument
- An analog instrument is also available

## Electrical system

- 12V corrosion-protected electrical system, complete with instrumentation
- 14V/60A marine alternator
- Charging regulator with battery sensor for voltage drop compensation
- The alternator is prepared for a bulk-head-mounted double-diode set which automatically distributes the charge current to two separate battery circuits
- Automatic 40 A fuse with reset button
- Starter motor power 3.0 kW

## Instrument panel:

Complete panel or separate instruments fitted with:

- Key switch
- Temperature gauge
- Instrument lighting
- Oil pressure gauge
- Alarm for temperature, oil pressure and charging
- Voltmeter
- Rev counter
- Hour meter
- Fuses
- Alarm test

## Miscellaneous

- 3, 5 or 7 m extension cable for the instrument panel with plug-in connector

## Accessories

An extensive range of accessories for:

- Fuel system
- Cooling system
- Control system
- Steering system
- Instruments
- Electric system
- Comfort & Safety
- Propeller & Drive
- Maintenance

For detailed information, please see Accessory catalogues.

*Contact your local Volvo Penta dealer for further information.*

*Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice.*

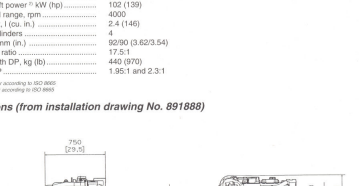
*The engine illustrated may not be entirely identical to production standard engines.*

## Technical Data

| | AD31P |
|---|---|
| Engine designation | |
| Crankshaft power [1] kW (hp) | 110 (150) |
| Propeller shaft power [2] kW (hp) | 102 (139) |
| Engine speed range, rpm | 4000 |
| Displacement, l (cu. in.) | 2.4 (146) |
| Number of cylinders | 4 |
| Bore/stroke, mm (in.) | 92/90 (3.62/3.54) |
| Compression ratio | 17.5:1 |
| Dry weight with DP, kg (lb) | 440 (970) |
| Drive ratio DP | 1.95:1 and 2.3:1 |

1) Crankshaft power according to ISO 8665
2) Prop shaft power according to ISO 8665

## Dimensions (from installation drawing No. 891888)




*Not for installation*



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# VOLVO PENTA AQUAMATIC

# AD31/SX

## 4-cylinder, 4-stroke, direct-injected turbocharged marine diesel engine with aftercooler. 96–110 kW (130–150 hp)*

* Crankshaft power according to ISO 8665

## Reliable marine engine

AD31L/P is a reliable and economic marine engine with considerable power resources, developed for planing craft. With its compact dimensions, it is excellent for twin installation.

## Direct injection

Direct injection (DI) results in a low thermal load and low fuel consumption compared with swirl chamber engines (IDI) with the same cylinder capacity.

## Turbocharging

The engine is turbocharged with an exhaust-driven turbocompressor. More air can be forced into the cylinder in this way with the result that more fuel can be injected and the engine runs more efficiently. Since combustion takes place in a turbo engine with excess air, the exhaust gases are cleaner than in a naturally-aspirated engine.

The turbo also acts as an additional silencer both on the induction side and on the exhaust side.

## Aftercooler

The air heats up and expands when it is compressed. In other words, it takes up more space. The aftercooler cools the compressed and heated air and raises its oxygen content so that the engine can use the fuel more efficiently.

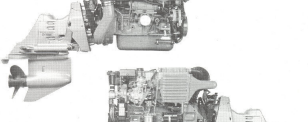
## Low exhaust emission levels

The direct injection, turbocharging and aftercooler contribute to minimizing noxious exhaust emissions and enhancing overall enjoyment of boating.

## Aquamatic

The SX single propeller drive is of the most modern design with exhaust through the propeller hub for quiet and efficient operation. Cone clutch for easy and smooth shifting. Pattern-matched spiral bevel gears for optimum strength and minimum gear whine. Break-away shaft coupling to prevent costly drivetrain repairs.

Hydrodynamic design of the lower drive housing ensures excellent course stability



AD31L/P with SX Aquamatic drive

both at high speed and when maneuvering at low speeds and reverse.

## Comprehensive service network

Volvo Penta has a well-established network of authorized service dealers in more than 100 countries throughout the world. These service centers offer Genuine Volvo Penta Parts as well as skilled personnel to ensure that you enjoy the best possible service.

## Technical description:

### Engine and block

- Cylinder block and cylinder head made of cast iron for good corrosion resistance and long service life
- Oil-cooled pistons with two compression rings and one oil scraper ring
- Replaceable wet cylinder liners
- Replaceable valve seats
- Five-bearing crankshaft

### Engine mounting

- Flexible mounting which provides sound and vibration insulation. The engine has two adjustable rubber mounts in front of the engine and rubber suspension between flywheel housing and transom shield

### Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine
- Tubular oil cooler that can be cleaned

### Fuel system

- Rotor-type injection pump with a mechanical governor for accurate speed control
- Smoke limiter
- Fine filter with water separator
- Feed pump with hand primer
- Electrically operated stopping device

### Inlet and exhaust system

- Inlet system designed to produce optimal air rotation which provides perfect combustion. This results in high power and low fuel consumption
- Inlet silencer with replaceable filter
- Closed crankcase vent system
- Seawater-cooled exhaust elbow of cast iron with a stainless steel insert
- Complete connection for exhaust outlet through the drive
- Exhaust-driven freshwater-cooled turbocharger

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# AD31/SX

### Cooling system
- Thermostatically regulated freshwater cooling
- Tubular heat exchanger with separate transparent expansion tank
- Gear-driven seawater pump with rubber impeller
- Coolant system prepared for hot water outlet
- Seawater strainer

### Electrical system
- 12V corrosion-protected electrical system, complete with instrumentation
- 14V/60A marine alternator
- Charging regulator with battery sensor for voltage drop compensation
- The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits
- Automatic fuse with manual reset
- Starter motor power 3.0 kW
- Extension cable harness with plug-in connection available in various lengths

### Instrument panel:
Separate instruments and harness or complete panel fitted with:
- Key switch
- Temperature gauge
- Instrument lighting
- Alarm for temperature, oil pressure and charging
- Voltmeter
- Rev counter
- Hour meter
- Oil pressure gauge
- Alarm test

### Drive
- Single propeller drive which can be run with both right- and left-hand propellers
- Cone clutch
- Coolant water intake for the engine located at the lower part of the drive
- Pattern-matched spiral bevel gears
- Through-hub exhaust
- Overload protection sleeve (break-away coupling)
- The drive can be tilted 55°
- The drive can be turned 28° in each direction
- Built-in kick-up function to reduce possible damage, in the event the drive strikes an underwater object
- Belt-driven power steering pump (option)
- Active corrosion protection as accessory

### Power Trim
- Electrically operated hydraulic system for trimming the drive for best driving comfort
- An analog instrument for indication of trim angle

## Accessories
An extensive range of accessories for:
- Fuel system
- Cooling system
- Control system
- Steering system
- Instruments
- Electric system
- Comfort & Safety
- Propeller & Drive
- Maintenance

For detailed information, please see Accessory catalogues.

Contact your local Volvo Penta dealer for further information.

Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice.

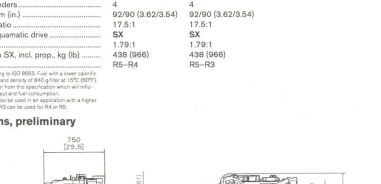
The engine illustrated may not be entirely identical to production standard engines.

## Technical Data

| | AD31P | AD31L |
|---|---|---|
| Engine designation | | |
| Crankshaft power, kW (hp) | 110 (150) | 96 (130) |
| Propeller shaft power, kW (hp) | 104 (141) | 90 (122) |
| Engine speed, rpm | 3900 | 3800 |
| Displacement, l (in³) | 2.4 (146) | 2.4 (146) |
| Number of cylinders | 4 | 4 |
| Bore/stroke, mm (in.) | 92/90 (3.62/3.54) | 92/90 (3.62/3.54) |
| Compression ratio | 17.5:1 | 17.5:1 |
| Volvo Penta Aquamatic drive | SX | SX |
| Ratio | 1.79:1 | 1.79:1 |
| Dry weight with SX, incl. prop., kg (lb) | 438 (966) | 438 (966) |
| Duty rating | R5–R4 | R5–R3 |

Technical data according to ISO 8665. Fuel with a lower calorific value of 42,700 kJ/kg and density of 840 g/l for at 15°C (60°F). Merchant fuel may differ from this specification which will influence engine power output and fuel consumption.
R5: The product is also used in a fixed installation with a higher rating than stated, e.g. R3 can be used for R4 or R5.

## Dimensions, preliminary
Not for installation




VOLVO PENTA

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Ref. nr. 7730706-4 eng

# MD31A

## 4-cylinder, 4-stroke, direct-injected marine diesel – crankshaft output* 46 kW (62 hp).

A compact 2.4 litre direct-injected marine diesel. Direct injection means lower thermal stresses and simultaneously lower fuel consumption and longer engine service life. Fuel consumption is lower throughout the entire engine speed range.

The high torque of the engine, together with the Volvo Penta MS2B or MS4A reverse gear, make up a combination giving excellent performance. The torque curve shows very good acceleration resources. Since the torque rise occurs as engine speed drops under increasing load, speed losses caused by mounting seas etc, are reduced.

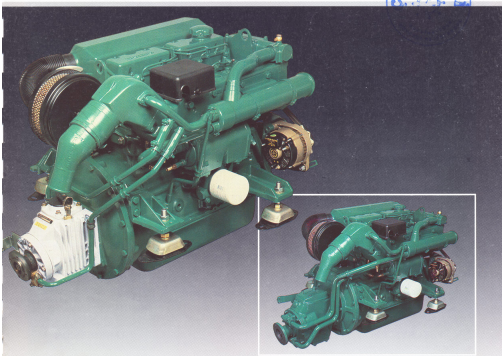
Engine block and cylinder head of cast iron, aluminium-alloy pistons and replaceable, wet cylinder liners extend service life and facilitate servicing.

The 12-volt electrical system has a brushless alternator with integral electronic regulator for high charging capacity (14V/50A) and high reliability. The regulator is equipped with a sensor cable which can be used to compensate for voltage-drop in the battery cables. In most installations, this means a significantly improved charging capacity.

To the benefit of lower installation height, the output shaft is angled 7° downwards on the MS2B reverse gear and 8° on the MS4A.

Volvo Penta has a well-established service network in more than 100 countries. Authorized workshops, with genuine parts and staffed by qualified personnel, make sure you get the best service.

*** Crankshaft ISO 3046 standard fuel stop power. Usable power will be reduced by transmission or gearbox losses. This power cannot be exceeded.**



VOLVO PENTA

## ENGINE MOUNTS

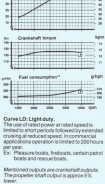
Flexible mounting consisting of 4 adjustable rubber blocks (17) for insulation from noise and vibration.

## ELECTRICAL SYSTEM

12V corrosion-protected electrical system complete with instrument panel. Alternator (18) with 14V/50A charging capacity. Designed for marine operation. Automatic fuse with resetting button mounted on engine. Starter motor output 2.6 kW (3.5 hp) (19).

## INSTRUMENT PANEL

("Extra equipment" on selective markets)
Equipped with key-operated switch tachometer, temperature gauge, o pressure gauge, and voltmeter. Control displays for low oil pressure, high engine temperature and charging. Acoustical alarm for oil pressure and coolant temperature. Test button for alarm and switch for instrument lighting. Cable, length 5 m (16.4 ft), complete with plug-in contacts for connection of engine and instrument panel.



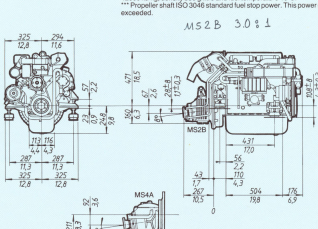

**Curve LD: Light duty.**
The use of rated power at rated speed is limited to short periods, followed by extended cruising at reduced speed. In commercial applications operation is limited to 250 hours per year.
Ex: Pleasure boats, fireboats, certain patrol boats and rescue boats.

*Mentioned outputs are crankshaft outputs.*
*The propeller shaft output is approx 5% lower.*

# *DATA*

Type designation ..... MD31A
Configuration ..... 4-stroke, direct-injected diesel engine. Light duty
Crankshaft output* ..... 46 kW (62 hp)
Propeller shaft output*** ..... 43,5 kW (59 hp)
Engine speed r/min ..... 3500
Number of cylinders ..... 4
Bore/stroke mm (in) ..... 92/90 (3.62/3.54)
Displacement, litres (in³) ..... 2,4 (146)
Valve system ..... Overhead
Dry weight, engine with MS2B reverse gear approx kg (lb) ..... 335 (739)
Dry weight, engine with MS4A reverse gear approx kg (lb) ..... 360 (794)

* Crankshaft ISO 3046 standard fuel stop power. Usable power will be reduced by transmission or gearbox losses. This power cannot be exceeded.
** ISO 3046 specific fuel consumption referred to crankshaft ISO standard fuel stop power.
Power, torque and fuel consumption ratings are based on run in engine at ISO standard atmospheric conditions, 27°C, 100 kPa and 60% relative humidity. The same data apply to DIN 6271, BS 5514 and SAE J 1228. SAE J 1349 uses slightly different conditions, 25°C, 100 kPa wherein1 kPa vapour pressure, but the difference is negligible in most cases. Ratings are based on diesel fuel having LHV 42000 kJ/kg, density 835 g/litre and fuel temperature 40°C.
*** Propeller shaft ISO 3046 standard fuel stop power. This power cannot be exceeded.



Ref. nr. 7730712-2 eng

# TMD31A

## 4-cylinder, 4-stroke, direct-injected turbocharged marine diesel – crankshaft output* 74 kW (100 hp).

A compact 2.4 litre direct-injected marine diesel. Direct injection means lower thermal stresses and simultaneously lower fuel consumption and longer engine service life. Noteworthy characteristics of the engine also include good fuel economy as a consequence of its high volumetric efficiency. Up to 15% lower fuel consumption throughout the entire engine speed range.

The high torque of the engine, together with the Volvo Penta MS4A reverse gear, make up a combination giving excellent performance. The torque curve shows very good acceleration resources. Since the torque rise occurs as engine speed drops under increasing load, speed losses caused by mounting seas etc. are reduced.

The engine block and cylinder head of cast iron, aluminium-alloy pistons and replaceable, wet cylinder liners lengthen service life and facilitate servicing. The pistons are oil-cooled to minimize the risk of deposits, particularly on the top piston ring, thereby increasing engine service life.

The injection pump has a smoke limiter to reduce black fumes when accelerating.

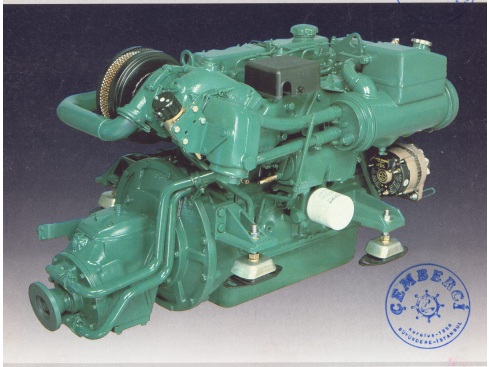
The 12-volt electrical system has a brushless alternator with integral electronic regulator for high charging capacity(14V-50A) and high reliability. The regulator is equipped with a sensor cable which can be used to compensate for voltage-drop in the battery cables. In most installations, this means a significantly improved charging capacity.

To give a lower installation height, the output shaft of the MS4A reverse gear has been angled 8° downwards.

Volvo Penta has a well-established service network in more than 100 countries. Authorized workshops, with genuine parts and staffed by qualified personnel, make sure you get the best service.

*** Crankshaft ISO 3046 standard fuel stop power. Usablepower will be reduced by transmission or gearbox losses. This power cannot be exceeded.**







VOLVO PENTA

## ENGINE MOUNTS

Flexible mounting consisting of 4 adjustable rubber blocks (15) for insulation from noise and vibration.

## ELECTRICAL SYSTEM

12V corrosion-protected electrical system complete with instrument panel. Alternator (16) with 14V 50A charging capacity. Designed for marine operation. Automatic fuse with resetting button mounted on engine. Starter motor output 2.6 kW (3.5 hp) (17).

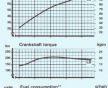
## INSTRUMENT PANEL

("Extra equipment" on selective markets)
Equipped with key-operated switch, tachometer, temperature gauge, oil pressure gauge, and voltmeter. Control displays for low oil pressure, high engine temperature and charging. Acoustical alarm for oil pressure and coolant temperature. Test button for alarm and switch for instrument lighting. Cable, length 5 m ( 16.4 ft), complete with plug-in contacts for connection of engine and instrument panel.

# DATA

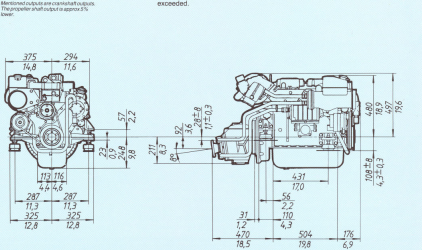
| | |
|---|---|
| Type designation | TMD31A |
| Configuration | 4-stroke, direct-injected diesel engine. |
| | Light duty |
| Crankshaft output* | 74 kW ( 100 hp) |
| Propeller shaft output*** | 69 kW ( 94 hp) |
| Engine speed r/min | 3800 |
| Number of cylinders | 4 |
| Bore/stroke mm (in) | 92/90 (3.62/3.54) |
| Displacement, litres (in³) | 2.4(146) |
| Valve system | Overhead |
| Dry weight, engine with MS4A reverse gear approx kg (lb) | 375 (827) |

* Crankshaft ISO 3046 standard fuel stop power. Usable power will be reduced by transmission or gearbox losses. This power cannot be exceeded.
** ISO 3046 specific fuel consumption referred to crankshaft ISO standard fuel stop power.
Power, torque and fuel consumption ratings are based on run in engine at ISO standard atmospheric conditions, 27°C, 100 kPa and 60% relative humidity. The same data apply to DIN 6271, BS 5514 and SAE J 1228. SAE J 1349 uses slightly different conditions, 25°C, 100 kPa whereof 1 kPa vapour pressure, but the difference is negligible in most cases. Ratings are based on diesel fuel having LHV 42000 kJ/kg, density 835 g/litre and fuel temperature 40°C.
*** Propeller shaft ISO 3046 standard fuel stop power. This power cannot be exceeded.




**Curve LD: Light duty.**
The use of rated power at rated speed is limited to short periods (cold weather, emergency, etc). Maximum load in continuous applications operation is limited to 200 hours per year.
Ex: Pleasure boats, fireboats, certain patrol boats and rescue boats.

*Mentioned outputs are crankshaft outputs. The propeller shaft output is approx 5% lower.*



# TMD 31 B

## 4-cylinder, 4-stroke, direct-injected and turbocharged marine diesel engine—crankshaft power* 74 kW (100 hp)

A compact 2.4 litre direct-injected marine diesel. Direct injection brings benefits in the form of lower thermal load, at the same time as fuel consumption is reduced and the engine's service life is extended. The outstanding characteristic of this engine is its excellent fuel economy, a result of the engine's high output ratio. Up to 15% lower fuel consumption throughout the engine's speed range.

The engine's high torque level in combination with Volvo Penta's MS4 reverse gear results in resounding performance when the unit is installed in a boat. The torque curve ensures excellent acceleration characteristics. Since torque increases if engine speed decreases from the maximum owing to added load, there is less speed reduction as a result of such factors as increased wave resistance.

The cast iron engine block and cylinder head, the aluminium pistons and the replaceable, wet cylinder linings all ensure a long service life and simple service. The pistons are oil-cooled so as to minimize the risk of deposits, particularly on the top-most piston ring. This increases the engine's service life.

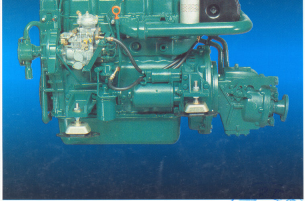
The engine produces extremely low exhaust emission levels during starts and at low load conditions. This has been achieved in a variety of ways, such as a new design of combustion chamber, higher compression ratio and a new type of six-hole nozzle with "minisack". As a result, the engine no longer needs to be equipped with either an exhaust pressure regulator or heater plugs.

The 12 volt electric system features a brushless alternator with an integrated electronic regulator. It offers a high charge capacity (14 V/50 A) and excellent operational reliability. The regulator is equipped with a sensor cable which can be used to compensate for voltage drops in the battery cables. In most installations, this results in significantly improved charge capacity.

The MS4 reverse gear has been angled 8° downwards so as to permit a lower installation profile.

Volvo Penta has a well developed service network in more than 100 countries. Authorized workshops manned by qualified personnel using genuine parts ensure that you get the best service.

*** Crankshaft output according to ISO 8665.**



### Technical description of the engine:

**Engine block:**
- Cylinder block and cylinder head of cast iron for excellent corrosion resistance and long service life.
- Replaceable wet cylinder liners.
- Oil-cooled pistons with two compression rings and one oil scraper ring.
- Replaceable valve seats rings in the cylinder head.
- Crankshaft with 5 main bearings.

**Fuel system:**
- Injection pump of rotor type with mechanical regulator for accurate engine speed regulation.
- Fine filter for filtering of water.
- Feed pump with manual pump.
- Flexible fuel pipe connections
- Electrically operated stop control.

**Cooling system:**
- Thermostat-regulated freshwater cooling with tubular heat exchanger, expansion tank and circulation pump.
- Cooling system prepared for hot water extraction.
- Seawater pump with pump rotors made of neoprene rubber.

**Lubrication system:**
- Pressurized lubrication system with full-flow oil filter of spin-on type.
- Cleanable tubular oil cooler.
- Filter for crankcase ventilation.

**Induction system:**
- Induction silencer with replaceable filter.

**Turbocharger:**
- Exhaust gas driven turbo-compressor with freshwater-cooled turbine housing.

**Exhaust system:**
- Freshwater-cooled exhaust system.
- Seawater-cooled exhaust elbow of cast iron with stainless steel insert.

**Transmission:**
- MS4 reverse gear, ratio 1.93:1 or 2.63:1.
- Seawater-cooled.
- Output shaft angled 8° downwards.
- Supplied with propeller shaft flange.

**Engine suspension:**
- Elastic suspension consisting of 4 rubber pads with adjustable anchorage plates for dampening of sound and vibration.

**Electrical system:**
- 12 V corrosion-protected electrical system with instruments.
- Alternator with 14 V/50 A charge capacity, designed for marine applications.
- Automatic fuse with reset button fitted to the engine.
- Starter motor output 2.6 kW (3.5 hp).

**Instrument panel:**
- ( " Extra equipment on certain markets ").
- Key-operated main switch.
- Tachometer.
- Temperature gauge.
- Oil pressure gauge and voltmeter.
- Display monitor for low oil pressure.
- High engine temperature and charge.
- Audible alarm for oil pressure and water temperature.
- Test button for alarm and switch for instrument illumination.
- 5 m long cable with pre-connected plug-in contacts for connection to engine and instruments.

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# TMD31B

## Extra equipment

**Cooling system:**
- Seawater inlet with tap.
- Hose for seawater inlet.
- Sea-water filter.
- Vacuum valve.
- Hose for vacuum valve.
- Hot water outlet.
- Water heater.
- Hose for water heater.
- Hull pass through for outlet cooling water (for dry exhaust systems).

**Fuel system:**
- Copper pipes for suction and return lines.
- Fuel filter with water separator.
- Fuel tap.
- Separate connection cover for fuel tank.
- Electrical fuel pump.

**Control system:**
- Single-lever control for single installation.
- Single-lever control for dual installation.
- Control cables.
- DS units (mechanical units which connect the control cables from two manoeuvre panels to one common outgoing control cable).
- Manual stop control.
- Steering wheel including cables.

**Electrical system:**
- Reversed instrument panel (main panel).
- Instrument panel for "Flying Bridge" upper control station.
- "Flying Bridge" T-connector.
- Display for alarm panel.
- Panel for extra instruments.

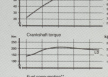
**Extra instruments:**
- Time gauge.
- Rudder indicator including sensor.
- Fuel tank gauge.
- Water tank gauge.
- Extension cable for instrument panel.
- Extra alternator.
- "Twin Diode" charge distributor.
- Main current cut-out switch.
- Battery.

**Power transmission:**
- Universal bracket at the front for extra power take-off.
- Extra crankshaft pulley.
- Propeller shaft joint with clamp connection.
- Propeller shaft joint with conical locking pin and V-groove.
- Flexible propeller shaft joint.
- Rubbergacklbox.
- Propellers.

**Exhaust system:**
- Rubber exhaust hose.
- Watercooled silencer.
- Exhaust elbow 45°, wet exhaust pipe.
- Hull pass through for wet exhaust hose.
- Silencer, dry.
- Compensator (for dry exhaust pipe).

**Miscellaneous:**
- Tool kit.
- On-board kit.
- Oil bilge pump.
- Bilge pump.
- Genuine factory-specification paint.
- Lubricating oils.

Please refer to the "Accessories Catalogue" for details of other accessories.




**Definition of LD: Light Duty operational conditions**
Engines with this power setting are intended for applications in which load and engine speed vary and full power is available for up to **1 hour per 12 hours** operational duty. Applies mainly to planing craft such as fire fighting vessels, rescue vessels, certain patrol boats, charter vessels.

*The stated power outputs refer to crankshaft output. Propeller shaft output is generally approximately 5 % lower.*

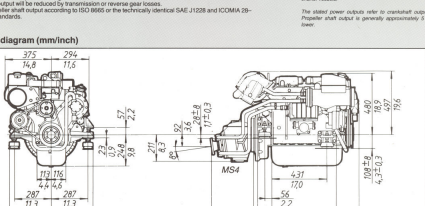
## Technical data for TMD31B

**ENGINE:**

| | |
|---|---|
| Type designation | TMD31B |
| Configuration: | 4-stroke direct-injected diesel engine Light Duty |
| Crankshaft output [1] | 74 kW (100 hp) |
| Propeller shaft output [2] | 70 kW (95 hp) |
| Engine speed, rpm | 3600 |
| No. of cylinders | 4 |
| Bore/stroke | 92/95 mm |
| Displacement, litres | 2,4 |
| Valve system | Overhead |
| Dry weight with MS4 reverse gear, approx. kg | 375 |

[1] Crankshaft output according to ISO 3046/1.
The output will be reduced by transmission or reverse gear losses.
[2] Propeller shaft output according to ISO 8665 or the technically identical SAE J1228 and ICOMIA 28–83 standards.

## Scale diagram (mm/inch)




Produkt i Gävle Tryk. 1999. Kataloganr. Trycksak AB 80 102

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AB Volvo Penta
405 08 Göteborg

Ref. no 7733523-0 Eng.

# TAMD 31 B

## 4-cylinder, 4-stroke, direct-injected, turbocharged and aftercooled marine diesel engine—crankshaft power* 96 kW (130 hp)

A compact 2.4 litre direct-injected marine diesel. Direct injection brings benefits in the form of lower thermal load, at the same time as fuel consumption is reduced and the engine's service life is extended. The outstanding characteristic of this engine is its excellent fuel economy, a result of the engine's high output ratio. Up to 15 % lower fuel consumption throughout the engine's speed range.

In order to achieve this excellent output ratio, the engine is equipped with an aftercooler which considerably reduces the temperature of the inlet air. The oxygen content of the inlet air increases and the result is more effective combustion of fuel, which in turn leads to a reduction in fuel consumption.

The torque curve ensures excellent acceleration characteristics. Since torque increases if engine speed decreases from the maximum owing to added load, there is less speed reduction as a result of such factors as increased wave resistance.

The cast iron engine block and cylinder head, the aluminium pistons and the replaceable, wet cylinder linings all ensure a long service life and simple service. The pistons are oil-cooled so as to minimize the risk of deposits, particularly on the top-most piston ring. This increases the engine's service life.

The engine produces extremely low exhaust emission levels during starts and at low load conditions. This has been achieved in a variety of ways, such as a new design of combustion chamber, higher compression ratio and a new type of six-hole nozzle with "minisack". As a result, the engine no longer needs to be equipped with either an exhaust pressure regulator or heater plugs.

There is a choice between a 12 volt and a 24 volt electric system which features a brushless alternator with an integrated electronic regulator, it offers a high charge capacity (14 V/50 A or 28 V/55 A) and excellent operational reliability.

Volvo Penta has a well developed service network in more than 100 countries. Authorized workshops manned by qualified personnel using genuine parts ensure that you get the best service.

*** Crankshaft output according to ISO 8665.**

## Technical description of the engine:

**Engine block:**
- Cylinder block and cylinder head of cast iron for excellent corrosion resistance and long service life.
- Replaceable wet cylinder liners.
- Oil-cooled pistons with two compression rings and one oil scraper ring.
- Replaceable valve seats rings in the cylinder head.
- Crankshaft with 5 main bearings.

**Fuel system:**
- Injection pump of rotor type with mechanical regulator for accurate engine speed regulation.
- Fine filter for filtering of water.
- Feed pump with manual pump.
- Flexible fuel pipe connections.
- Electrically operated stop control.

**Cooling system:**
- Thermostat-regulated freshwater cooling with tubular heat exchanger, expansion tank and circulation pump.
- Cooling system prepared for hot water extraction.
- Seawater pump with pump rotors made of neoprene rubber.
- Keel cooling: the engine can be supplied in a keel cooling variant.

**Lubrication system:**
- Pressurized lubrication system with full-flow oil filter of spin-on type.
- Cleanable tubular oil cooler.
- Filter for crankcase ventilation.

**Induction system:**
- Induction silencer with replaceable filter.

**Turbocharger:**
- Exhaust gas driven turbo-compressor with freshwater-cooled turbine housing.
- Seawater-cooled aftercooler for cooling of compressed air, which results in improved output ratio.

**Exhaust system:**
- Freshwater-cooled exhaust system.
- Seawater-cooled exhaust pipe elbow of cast iron with stainless steel insert.

**Transmission:**
- MS4 reverse gear, ratio 1.93:1 or 2.63:1.
- Seawater-cooled.
- Output shaft angled 8° downwards.
- Supplied without propeller shaft flange.
- Reverse gear PRM 302, 1.94:1 or 2.90:1
- Reverse gear PRM 402, ratio 3.95:1.
- Supplied with propeller shaft flange.

**Engine suspension:**
- Elastic suspension consisting of 4 rubber pads with adjustable anchorage plates for dampening of sound and vibration.

**Electrical system:**
- Corrosion-protected electrical system with instruments. 12 V or 24 V.
- Choice of alternator: 14 V/50 A or 28 V/55 A charge capacity.
- Automatic fuse with reset button fitted to the engine.
- Starter motor output 12 V/2.6 kW (3.5 hp) or 24 V/4 kw (5.4 hp).

**Instrument panel:**
- (" Extra equipment on certain markets").
- Equipped with Key-operated main switch, tachometer, temperature gauge, oil pressure gauge and voltmeter.

VOLVO PENTA

# TAMD31B

- Display monitor for low oil pressure, high engine temperature and charge.
- Audible alarm for oil pressure and water temperature.
- Test button for alarm and switch for instrument illumination.
- 5 m long cable with pre-connected plug-in contacts for connection to engine and instruments.

## Extra equipment

**Cooling system:**
- Seawater inlet with tap.
- Hose for seawater inlet.
- Sea-water filter.
- Vacuum valve.
- Hose for vacuum valve.
- Hot water outlet.
- Water heater.
- Hose for hot water outlet.
- Separately mounted expansion tank.
- Hull pass through for outlet cooling water (for dry exhaust systems).

**Fuel system:**
- Copper pipes for suction and return lines.
- Fuel filter with water separator.
- Fuel tap.
- Separate connection cover for fuel tank.
- Electrical fuel pump.

## Technical data for TAMD31 B

**ENGINE**

| | | |
|---|---|---|
| Type designation | TAMD31B | |
| Configuration | 4-stroke direct-injected diesel engine | |
| | Light Duty | Medium Duty |
| Crankshaft output [1] | 96 kW (130 hp) | 81 kW (110 hp) |
| Propeller shaft output [2] | 92 kW (125 hp) | 77 kW (105 hp) |
| Engine speed, rpm | 3800 | 3250 |
| No. of cylinders | 4 | |
| Bore/stroke | 92/90 mm | |
| Displacement, litres | 2.4 | |
| Valve system | Overhead | |
| Dry engine weight with MS4 reverse gear, approx. kg | 385 | |
| Dry engine weight with PRM 302 reverse gear, approx. kg | 418 | |
| Dry engine weight with PRM 402 reverse gear, ratio 3.95:1, approx. kg | 433 | |

[1] Crankshaft output according to ISO 3046/1.
[2] The output will be reduced by transmission or reverse gear losses.
[3] Propeller shaft output according to ISO 8665 or the technically identical SAE J1228 and ICOMIA 28–83 standards.

**Control system:**
- Single-lever control for single installation.
- Single-lever control for dual installation.
- Control cables.
- DS units (mechanical units which connect the control cables from two manoeuvre panels to one common outgoing control cable).
- Manual stop control.
- Steering wheel including cables.

**Electrical system:**
- Reversed instrument panel (main panel).
- Instrument panel for "Flying Bridge" upper control station.
- "Flying Bridge" T-connector.
- Display for alarm panel.
- Panel for extra instruments.

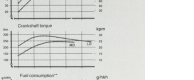
**Extra instruments:**
- Time gauge.
- Rudder indicator including sensor.
- Fuel tank gauge.
- Water tank gauge.
- Extension cable for instrument panel.
- Extra alternator.
- "Twin Diode" charge distributor.
- Main current cut-out switch.
- Battery.

**Power transmission:**
- Universal bracket at the front for extra power take-off.
- Extra crankshaft pulley.
- Propeller shaft joint with clamp connection.
- Propeller shaft joint with conical locking pin and V-groove.
- Flexible propeller shaft joint.
- Rubbersaddlock.
- Propellers.

**Exhaust system:**
- Rubber exhaust hose.
- Watercooled silencer.
- Exhaust elbow 45°, wet exhaust pipe.
- Hull pass through for wet exhaust hose.
- Silencer, dry.
- Compensator (for dry exhaust pipe).

**Miscellaneous:**
- Tool kit.
- On-board kit.
- Oil bilge pump.
- Bilge pump.
- Genuine factory-specification paint.
- Lubricating oils.

Please refer to the "Accessories Catalogue" for details of other accessories.

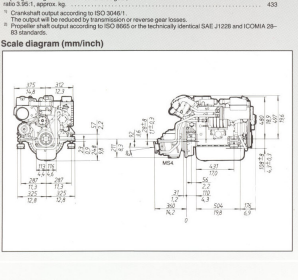



**Definition of LD: Light Duty operational conditions**
Engines with this power setting are intended for applications in which load and engine speed vary and full power is exploited no more than 1 **hour per** 12 hours operational duty.
Applies mainly to planing craft.
E.g. fire-fighting vessels, rescue vessels, certain patrol boats, charter vessels.

**Definition of MD: Medium Duty operational conditions**
Engines with this power setting are intended for applications in which load and engine speed vary and full power is exploited no more than 4 **hour per** 12 hours operational duty.
Applies to planing, semi-planing and displacement vessels.
E.g. Coastal fishing vessels, patrol boats, police boats, passenger ferries etc.

*The stated power outputs refer to crankshaft output. Propeller shaft output is generally approximately 5% lower.*

## Scale diagram (mm/inch)





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# TMD31L/HS1

## Pleasure Duty (PD)

### 4-cylinder, 4-stroke, direct-injected turbocharged marine diesel engine with HS1 reverse gear. 74 kW (100 hp)*

* Crankshaft power according to ISO 8665

### Economic marine engine

TMD31L is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft. With its compact dimensions, it is excellent for twin installation.

### Direct injection

Direct injection (DI) results in a low thermal load and low fuel consumption compared with swirl chamber engines (IDI) with the same cylinder capacity. The engines also have a longer service life.

### Turbocharging

The engine is turbocharged with an exhaust-driven turbocompressor. More air can be forced into the cylinder in this way with the result that more fuel can be injected and the engine runs more efficiently. Since combustion takes place in a turbo engine with excess air, the exhaust gases are cleaner than in a naturally-aspirated engine.

The turbo also acts as an additional silencer both on the induction side and on the exhaust side.

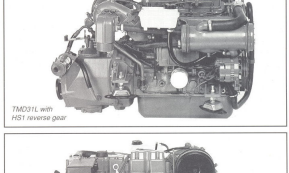
### HS1 reverse gear

Volvo Penta's hydraulically shifted reverse gear has been specially developed with a view to increasing the standard of comfort on board leisure craft in terms of quiet running, greater reliability and enhanced efficiency.

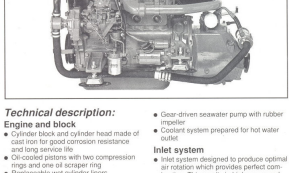
These benefits originate from a hydraulic shifting mechanism and advanced gear technology that uses spiral bevel gears throughout the gear train. Volvo Penta's new reverse gear is unique in this respect, resulting in an overall efficiency as high as 96%.

Another unique solution is the vertical shaft that together with an 8° down angle provides for both compact installation and the ability to run left- and right-hand rotation with the same ratio, efficiency and durability.

At Volvo Penta, focus is on developing the complete drive line ensuring perfectly matched engine/transmission packages for high torque, operational reliability, reduction of engine noise and vibrations. Standards of comfort unsurpassed giving the maximum of boating pleasure.



TMD31L with HS1 reverse gear



## Technical description:

### Engine and block

- Cylinder block and cylinder head made of cast iron for good corrosion resistance and long service life
- Oil-cooled pistons with two compression rings and one oil scraper ring
- Replaceable wet cylinder liners
- Replaceable valve seats
- Five-bearing crankshaft

### Fuel system

- Rotor-type injection pump with a mechanical governor for accurate speed control
- Smoke limiter
- Fine filter with water separator
- Feed pump with hand primer
- Electrically-operated stopping device

### Cooling system

- Thermostatically regulated freshwater cooling
- Tubular heat exchanger with separate transparent expansion tank
- Gear-driven seawater pump with rubber impeller
- Coolant system prepared for hot water outlet

### Inlet system

- Inlet system designed to produce optimal air rotation which provides perfect combustion. This results in high power and low fuel consumption.
- Inlet silencer with replaceable filter
- Closed crankcase vent system

### Exhaust system

- Seawater-cooled exhaust elbow of cast iron with a stainless steel insert

### Turbocharging system

- Exhaust-driven freshwater-cooled turbocharger

### Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine
- Tubular oil cooler that can be cleaned



VOLVO PENTA

# TMD31L/HS1

## Engine mounting

- Elastic suspension consisting of 4 rubber pads with adjustable anchorage plates for dampening of sound and vibration

## Reverse gear

- Spiral bevel gears which results in smooth running at all speeds
- Hydraulically operated clutch for smooth shifting
- Matched drop center and 8° down angle for compact installation and minimum propeller shaft angle
- Retrofit, fits into the same installation measurements as MS4-5 reverse gear and features integrated SAE4 adaptor flange
- When under sail propeller shaft can rotate 24 hours without engine start
- Seawater-cooled oilcooler

## Electrical system

- 12V corrosion-protected electrical system, complete with instrumentation
- 14V/60A marine alternator
- Charging regulator with battery sensor for voltage drop compensation
- The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits
- Automatic 40 A fuse with reset button
- Starter motor power 3.0 kW

## Instrument panel:

Complete panel or separate instruments fitted with:

- Key switch
- Temperature gauge
- Instrument lighting
- Oil pressure gauge
- Alarm for temperature, oil pressure and charging
- Voltmeter
- Rev counter
- Hour meter
- Fuses
- Alarm test

## Miscellaneous

- 3, 5 or 7 m extension cable for the instrument panel with plug-in connector

## Accessories

An extensive range of accessories for:

- Fuel system
- Cooling system
- Control system
- Instruments
- Electric system
- Comfort & Safety
- Propellers
- Maintenance

For detailed information, please see Accessory catalogues.

*Contact your local Volvo Penta dealer for further information.*

*Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice.*

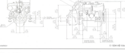
*The engine illustrated may not be entirely identical to production standard engines.*

## Technical Data

| | |
|---|---|
| Engine designation | TMD31L |
| Crankshaft power 1) kW (hp) | 74 (100) |
| Propeller shaft power 2) kW (hp) | 69 (94) |
| Engine speed range, rpm | 3700–3900 |
| Displacement, l (cu. in.) | 2.4 (146) |
| Number of cylinders | 4 |
| Bore/stroke, mm (in.) | 92/90 (3.62/3.54) |
| Compression ratio | 17.5:1 |
| Dry weight with HS1, kg (lb) | 390 (858) |
| Gear ratios HS1 | 1.96:1 and 2.62:1 |

1) Crankshaft power according to ISO 8665
2) Prop shaft power according to ISO 8665

## Dimensional Drawing (No. 891883)



Not for installation

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VOLVO PENTA

AB Volvo Penta
S-405 08 Göteborg, Sweden

# TAMD31P/HS1

## Pleasure Duty (PD)

### 4-cylinder, 4-stroke, direct-injected turbocharged marine diesel engine with aftercooler and HS1 reverse gear. 110 kW (150 hp)*

* Crankshaft power according to ISO 8665

### Economic marine engine

TAMD31P is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft. With its compact dimensions, it is excellent for twin installation.

### Direct injection

Direct injection (DI) results in a low thermal load and low fuel consumption compared with swirl chamber engines (IDI) with the same cylinder capacity. The engines also have a longer service life.

The advanced combustion system minimizes noxious exhaust emissions and enhances overall enjoyment of boating. The engine is certified for use on Lake Constance – where exhaust emission regulations are probably the toughest in the world.

### Turbocharging

The engine is turbocharged with an exhaust-driven turbocompressor. More air can be forced into the cylinder in this way with the result that more fuel can be injected and the engine runs more efficiently. Since combustion takes place in a turbo engine with excess air, the exhaust gases are cleaner than in a naturally-aspirated engine.

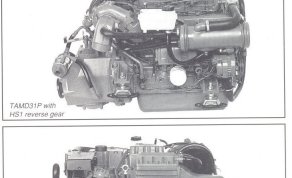
The turbo also acts as an additional silencer both on the induction side and on the exhaust side.

### Aftercooler

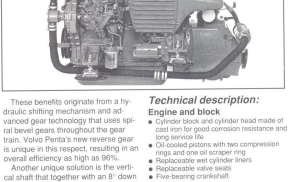
The air heats up and expands when it is compressed. In other words, it takes up more space. The aftercooler cools the compressed and heated air and raises its oxygen content so that the engine can use the fuel more efficiently.

### HS1 reverse gear

Volvo Penta's hydraulically shifted reverse gear has been specially developed with a view to increasing the standard of comfort on board leisure craft in terms of quiet running, greater reliability and enhanced efficiency.



TAMD31P with HS1 reverse gear



These benefits originate from a hydraulic shifting mechanism and advanced gear technology that uses spiral bevel gears throughout the gear train. Volvo Penta's new reverse gear is unique in this respect, resulting in an overall efficiency as high as 96%.

Another unique solution is the vertical shaft that together with an 8° down angle provides for both compact installation and the ability to run left- and right-hand rotation with the same ratio, efficiency and durability.

At Volvo Penta, focus is on developing the complete drive line ensuring perfectly matched engine/transmission packages for high torque, operational reliability, reduction of engine noise and vibrations. Standards of comfort unsurpassed giving the maximum of boating pleasure.

### Technical description:

#### Engine block and

- Cylinder block and cylinder head made of cast iron for good corrosion resistance and long service life
- Oil-cooled pistons with two compression rings and one oil scraper ring
- Replaceable wet cylinder liners
- Replaceable valve seats
- Five-bearing crankshaft

#### Fuel system

- Rotor-type injection pump with a mechanical governor for accurate speed control
- Smoke limiter
- Fine filter with water separator
- Fixed pump with hand primer
- Electrically-operated stopping device

#### Cooling system

- Thermostatically regulated freshwater cooling
- Tubular heat exchanger with separate transparent expansion tank
- Gear-driven seawater pump with rubber impeller
- Coolant system prepared for hot water outlet

VOLVO PENTA

# TAMD31P/HS1

### Inlet system
- Inlet system designed to produce optimal air rotation which provides perfect combustion. This results in high power and low fuel consumption.
- Inlet silencer with replaceable filter
- Closed crankcase vent system

### Exhaust system
- Seawater-cooled exhaust elbow of cast iron with a stainless steel insert

### Turbocharging system
- Exhaust-driven freshwater-cooled turbocharger

### Lubrication system
- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine
- Tubular oil cooler that can be cleaned

### Engine mounting
- Elastic suspension consisting of 4 rubber pads with adjustable anchorage plates for dampening of sound and vibration

### Reverse gear
- Spiral bevel gears which results in smooth running at all speeds
- Hydraulically operated clutch for smooth shifting
- Matched drop center and 8° down angle for compact installation and minimum propeller shaft angle
- Retrofit, fits into the same installation measurements as MS4-5 reverse gear and features integrated SAE4 adaptor flange
- When under sail propeller shaft can rotate 24 hours without engine start
- Seawater-cooled oilcooler

### Electrical system
- 12V corrosion-protected electrical system, complete with instrumentation
- 14V/55A marine alternator
- Charging regulator with battery sensor for voltage drop compensation
- The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits
- Automatic 40 A fuse with reset button
- Starter motor power 3.0 kW

### Instrument panel:
Complete panel or separate instruments fitted with:

- Key switch
- Temperature gauge
- Instrument lighting
- Oil pressure gauge
- Alarm for temperature, oil pressure and charging
- Voltmeter
- Rev counter
- Hour meter
- Fuses
- Alarm test

### Miscellaneous
- 3, 5 or 7 m extension cable for the instrument panel with plug-in connector

## Accessories
An extensive range of accessories for:

- Fuel system
- Cooling system
- Control system
- Instruments
- Electric system
- Comfort & Safety
- Propellers
- Maintenance

For detailed information, please see Accessory catalogues.

## Technical Data

| | |
|---|---|
| Engine designation | TAMD31P* |
| Crankshaft power 1) kW (hp) | 110 (150) |
| Propeller shaft power 2) kW (hp) | 102 (139) |
| Engine speed range, rpm | 3900–4100 |
| Displacement, l (cu. in.) | 2.4 (146) |
| Number of cylinders | 4 |
| Bore/stroke, mm (in.) | 92/90 (3.62/3.54) |
| Compression ratio | 17.5:1 |
| Dry weight with HS1, kg (lb) | 400 (881) |
| Gear ratios HS1 | 1.96:1 and 2.62:1 |

* Certified for Lake Constance
1) Crankshaft power according to ISO 8665
2) Prop shaft power according to ISO 8665

Contact your local Volvo Penta dealer for further information.

Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice.

The engine illustrated may not be entirely identical to production standard engines.

## Dimensional Drawing (No. 891885)

Not for installation

VOLVO PENTA
AB Volvo Penta
S-405 08 Göteborg, Sweden

# TAMD31L, TAMD31M

## Pleasure Duty (PD), Light Duty (LD), Medium Duty (MD)
## 4-cylinder, 4-stroke, direct injected, turbo-charged marine diesel engine with aftercooler – crankshaft power* 96 kW (130 hp)

* Power rating – see General Data

### Reliable marine engine

TAMD31 is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft. With its compact dimensions, it is ideal for twin installation.

***Turbo-charging***
The engine is turbo-charged for efficient operation with high power/fuel consumption ratio. The turbo-charging contributes to reduced exhaust emission levels. The turbo-charger also acts as an additional silencer on both induction and exhaust sides of the engine.

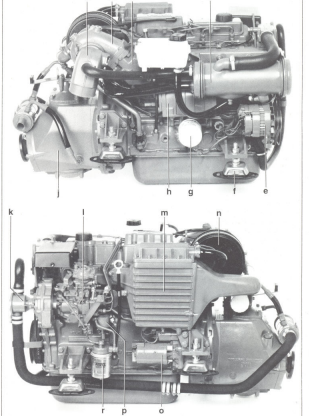
***Direct injection***
Direct injection (DI) results in low thermal load and low fuel consumption compared to swirl chamber engines (IDI) of the same cylinder volume. Direct injected engines also have a longer service life.

***Aftercooler***
The aftercooler cools the compressed and heated air, thus raising its oxygen content. This enables the engine to use the fuel more efficiently.

***Low exhaust emission levels***
The advanced combustion system minimizes noxious exhaust emissions. The engine is certified for use on lake Constance – where exhaust emission regulations are probably the toughest in the world.

***HS1 marine gearbox***
Volvo Penta's hydraulically shifted marine gearbox has been specially developed with a view to increasing the standard of onboard comfort in terms of quiet running, greater reliability and increased efficiency. PRM402 is available as a choice of marine gearbox.

***Comprehensive service network***
Volvo Penta has a well established network of authorized service agents in more than 100 countries throughout the world. These service centers offer Original Volvo Penta parts as well as skilled personnel to ensure the best possible service.




*The engine shown may vary from the standard unit.*

a. Exhaust elbow, wet type
b. Turbo-charger
c. Freshwater cooled exhaust manifold
d. Fresh water cooling
e. Alternator
f. Flexible engine mounting
g. Full flow oil filter
h. Oil cooler
i. Marine gearbox
j. Sea water pump
k. Injection pump
m. Sea water cooled aftercooler
n. Air filter
o. Starter motor 3.0 kW
p. Feed pump with hand pump
r. Fine filter with water separator

VOLVO PENTA

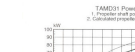
## General data

| | |
|---|---|
| Type designation | TAMD31M (PD/MD)<br>TAMD31L (PD/LD) |
| No of cylinders | 4 |
| Configuration | 4-stroke direct-injected turbo-charged aftercooled, diesel engine |
| Fuel grade EN590 | 1D or 2D |
| Bore, mm (in) | 92 (3.62) |
| Stroke, mm (in) | 90 (3.54) |
| Displacement, litres ($in^3$) | 2.4 (146) |
| Compression ratio | 17.5:1 |
| Crankshaft power [1] | |
| PD/MD (3250 r/min) kW (hp) | 81 (110) |
| PD/LD (3800 r/min) kW (hp) | 96 (130) |
| Propeller shaft power [1] | |
| PD/MD (3250 r/min) kW (hp) | 75 (102) |
| PD/LD (3800 r/min) kW (hp) | 88 (120) |
| Dry weight kg (lb) | 385 (718) |
| Dry weight with HS1 kg (lb) | 400 (881) |

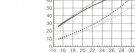
1) Technical data in accordance with ISO 8665 and ISO 3046 Standard Fuel Stop Power. Fuel 40°C (104°F), lower calorific value of 42700 kJ/kg and density of 840 g/litre.

TAMD31 Power
1. Propeller shaft power
2. Calculated propeller load


TAMD31 Torque
Torque measured at crankshaft




TAMD31 Fuel consumption
1. Propeller load
2. Based on calculated propeller load




## Engine equipped with

Freshwater cooled turbo-charger
Freshwater cooling, thermostat-controlled with tubular heat exchanger
Seawater pump with rubber impeller
Seawater cooled aftercooler
Seawater cooled tubular oil cooler
Prewired el.system for connection to instrument panel
Alternator 14 V/60 A
Starter motor 12 V/3.0 kW
Engine brackets in front
Engine brackets at rear
Flexible engine mounts
Flywheel housing, SAE 4 size
Flywheel, light type
Exhaust elbow, wet type

## Technical description

### Engine and block

- Cylinder block and cylinder head are made of cast iron alloy for good corrosion resistance and long service life.
- Replaceable valve seatings and cylinder linings.
- Oil-cooled, forged aluminium pistons with two compression rings and one oil scraper ring.
- Nitrocarbonized crankshaft with five bearings.

### Fuel system

- Rotor-type injection pump with a mechanical governor and smoke limiter.
- Fuel feed pump with hand primer.
- Fine fuel filter with water separator.
- Electrically operated stopping device.

### Cooling system

- Thermostatically controlled freshwater cooling, prepared for hot water outlet.
- Tubular heat exchanger with separate transparent expansion tank.
- Gear-driven seawater pump with rubber impeller.

### Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine.
- Tubular, cleanable oil cooler.

### Inlet system

- Inlet silencer with replaceable filter.
- Freshwater cooled turbo-charger and seawater-cooled charge air cooler.

### Exhaust system

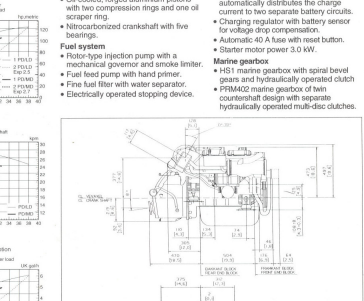
- Seawater-cooled exhaust elbow, made of cast iron with stainless steel insert.

### Electrical system

- 12 V corrosion-protected electrical system, complete with instrumentation and 14 V/60 A marine alternator. The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits.
- Charging regulator with battery sensor for voltage drop compensation.
- Automatic 40 A fuse with reset button.
- Starter motor power 3.0 kW.

### Marine gearbox

- HS1 marine gearbox with spiral bevel gears and hydraulically operated clutch
- PRM402 marine gearbox of twin countershaft design with separate hydraulically operated multi-disc clutches.




Dimensions in mm (in)



Ref. No. 7736582-5 Eng AdDok Document AB, Vipak. Printed in Sweden Nov 1994, Sandeboga Trycket AB

**AB Volvo Penta**
S-405 08 Göteborg, Sweden

# TAMD31L/HS1

## Pleasure Duty (PD)

### 4-cylinder, 4-stroke, direct-injected turbocharged marine diesel engine with aftercooler and HS1 reverse gear. 96 kW (130 hp)*

* Crankshaft power according to ISO 8665

## Economic marine engine

TAMD31L is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft. With its compact dimensions, it is excellent for twin installation.

## Direct injection

Direct injection (DI) results in a low thermal load and low fuel consumption compared with swirl chamber engines (IDI) with the same cylinder capacity. The engines also have a longer service life.

The advanced combustion system minimizes noxious exhaust emissions and enhances overall enjoyment of boating.

## Turbocharging

The engine is turbocharged with an exhaust-driven turbocompressor. More air can be forced into the cylinder in this way with the result that more fuel can be injected and the engine runs more efficiently. Since combustion takes place in a turbo engine with excess air, the exhaust gases are cleaner than in a naturally-aspirated engine.

The turbo also acts as an additional silencer both on the induction side and on the exhaust side.

## Aftercooler

The air heats up and expands when it is compressed. In other words, it takes up more space. The aftercooler cools the compressed and heated air and raises its oxygen content so that the engine can use the fuel more efficiently.

## HS1 reverse gear

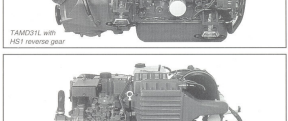
Volvo Penta's hydraulically shifted reverse gear has been specially developed with a view to increasing the standard of comfort on board leisure craft in terms of quiet running, greater reliability and enhanced efficiency.

These benefits originate from a hydraulic shifting mechanism and advanced gear technology that uses spiral bevel gears throughout the gear train. Volvo Penta's reverse gear is unique in this respect, resulting in an overall efficiency as high as 96%.

Another unique solution is the vertical shaft that together with an 8° down angle provides for both compact installation and the ability to run left- and right-hand rotation with the same ratio, efficiency and durability.

At Volvo Penta, focus is on developing the complete drive line ensuring perfectly matched engine/transmission packages for high torque, operational reliability, reduction of engine noise and vibrations. Standards of comfort unsurpassed giving the maximum of boating pleasure.

TAMD31L with HS1 reverse gear



## Technical description:

### Engine and block

- Cylinder block and cylinder head made of cast iron for good corrosion resistance and long service life
- Oil-cooled pistons with two compression rings and one oil scraper ring
- Replaceable wet cylinder liners
- Replaceable valve seats
- Five-bearing crankshaft

### Fuel system

- Rotor-type injection pump with a mechanical governor for accurate speed control
- Smoke limiter
- Fine filter with water separator
- Feed pump with hand primer
- Electrically-operated stopping device

### Cooling system

- Thermostatically regulated freshwater cooling
- Tubular heat exchanger with separate transparent expansion tank
- Gear-driven seawater pump with rubber impeller
- Coolant system prepared for hot water outlet

VOLVO PENTA

# TAMD31L/HS1

### Inlet system

- Inlet system designed to produce optimal air rotation which provides perfect combustion. This results in high power and low fuel consumption.
- Inlet silencer with replaceable filter
- Closed crankcase vent system

### Exhaust system

- Seawater-cooled exhaust elbow of cast iron with a stainless steel insert

### Turbocharging system

- Exhaust-driven freshwater-cooled turbocharger

### Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine
- Tubular oil cooler that can be cleaned

### Engine mounting

- Elastic suspension consisting of 4 rubber pads with adjustable anchorage plates for dampening of sound and vibration

### Reverse gear

- Spiral bevel gears which results in smooth running at all speeds
- Hydraulically operated clutch for smooth shifting
- Matched drop center and 8° down angle for compact installation and minimum propeller shaft angle
- Retrofit, fits into the same installation measurements as MS4-5 reverse gear and features integrated SAE4 adaptor flange
- When under sail propeller shaft can rotate 24 hours without engine start
- Seawater-cooled oilcooler

### Electrical system

- 12V corrosion-protected electrical system, complete with instrumentation
- 14V/60A marine alternator
- Charging regulator with battery sensor for voltage drop compensation
- The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits
- Automatic 40 A fuse with reset button
- Starter motor power 3.0 kW

### Instrument panel:

Complete panel or separate instruments fitted with:

- Key switch
- Temperature gauge
- Instrument lighting
- Oil pressure gauge
- Alarm for temperature, oil pressure and charging
- Voltmeter
- Rev counter
- Hour meter
- Fuses
- Alarm test

### Miscellaneous

- 3, 5 or 7 m extension cable for the instrument panel with plug-in connector

## Accessories

An extensive range of accessories for:

- Fuel system
- Cooling system
- Control system
- Instruments
- Electric system
- Comfort & Safety
- Propellers
- Maintenance

For detailed information, please see Accessory catalogues.

## Technical Data

| | | |
|---|---|---|
| Engine designation | TAMD31L | TAMD31M |
| Crankshaft power 1) kW (hp) | 96 (130) | 81 (110) |
| Propeller shaft power 2) kW (hp) | 88 (120) | 75 (102) |
| Engine speed range, rpm | 3700–3900 | 3100–3300 |
| Displacement, l (cu. in.) | 2.4 (146) | 2.4 (146) |
| Number of cylinders | 4 | 4 |
| Bore/stroke, mm (in.) | 92/90 (3.62/3.54) | 92/90 (3.62/3.54) |
| Compression ratio | 17.5:1 | 17.5:1 |
| Dry weight with HS1, kg (lb) | 400 (881) | 400 (881) |
| Gear ratios HS1 | 1.96:1 and 2.62:1 | 1.96:1 and 2.62:1 |

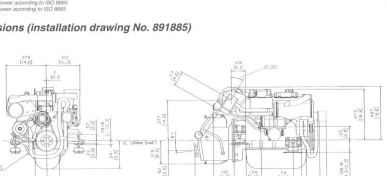
1) Crankshaft power according to ISO 8665
2) Prop shaft power according to ISO 8665

*Contact your local Volvo Penta dealer for further information.*

*Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice.*

*The engine illustrated may not be entirely identical to production standard engines.*

## Dimensions (installation drawing No. 891885)



Not for installation

VOLVO PENTA
AB Volvo Penta
S-405 08 Göteborg, Sweden

# MOTORDIAGRAM
# ENGINE DIAGRAM

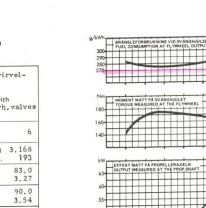
MARIN DIESELMOTOR
MARINE DIESEL ENGINE

Grupp nr
Group No.
20 125

Distr. M.L. | Date Dec. 74 | För motor / For Engine **MD 32 A**

## Allmänna data
## General data

| | | |
|---|---|---|
| Fyrtaks dieselmotor med virvelkammare & Toppventiler. | | |
| Four stroke diesel engine with swirl chamber, Overh. valves | | |
| Cylinderantal / No. of cylinders | | 6 |
| Slagvolym total / Displacement total | dm³/l<br>cu. in. | 3,168<br>193 |
| Slaglängd / Stroke | mm<br>in. | 83,0<br>3,27 |
| Cylinderdiameter / Bore | mm<br>in. | 90,0<br>3,54 |
| Kompressionsförhållande / Compression ratio | | 22,1:1 |
| Motorrotation sedd mot svänghjul | | Motsurs |
| Engine rotation viewed towards flywheel | | Anticlockwise |
| Max. tillåten lutning under gång | | 15° |
| Max. permissible inclination under way | | 15° |




Diagrammet anger prop.axeleffekt för inkörd motor med mekaniskt backslag enligt DIN 6270 Leistung B. Motorns svänghjulseffekt är ca. 3,5% högre. För beräkn. av prop.axeleffekt med hydrauliskt backslag typ BW skall angiven effekt reduceras med 12% vid max.varvtal. Motorn levereras för nöjesbåtar installd på 66,7 r/s (4000 r/m). För övriga installationer - lätt drift, levereras motorn installd på 50r/s (3000 r/m) enl. vidstående kurva.

The diagram indicates the propeller shaft output for a run-in engine with mechanical reverse gear according to DIN 6270 Leistung B. The engine flywheel output is approx 3,5% higher To calculate the propeller shaft output with a hydraulic reverse gear type BW, reduce the indicated output by 12% at maximum speed. The engine is delivered to be used for pleasure boats adjusted to 66.7 r/s (4000 rpm). For other installations - light operations, the engine is adjusted to 50 r/s (3000 rpm) according to the adjacent curve.

TA 14453

# Volvo Penta Aquamatic Duoprop

# KAD32P/DP

## 4-cylinder, direct-injected marine diesel engine with charge air compressor, turbocharger, aftercooler and Duoprop-drive. 125 kW (170 hp)*

* Crankshaft power according to ISO 8665

### Compressor-driven Hi-Tech engine

Volvo Penta's 4-cylinder KAD32P is a compressor-driven, turbocharged high performance engine with aftercooler producing high torque at low engine speeds. This means unique acceleration properties and excellent drivability.

### Economic marine engine

KAD32P is a reliable and economic marine engine with considerable power resources and is specially developed for planing craft.

The engine is compact and has an advantageous weight to power ratio making it excellent for both single and multi-engine installation.

### Direct injection

Direct injection (DI) results in a low thermal load and low fuel consumption compared with swirl chamber engines (IDI) with the same cylinder capacity. The engines also have a longer service life.

The advanced combustion system minimizes noxious exhaust emissions and enhances overall enjoyment of boating.

### Supercharging

The engine is supercharged with a mechanically driven compressor and an exhaust turbocharger. The compressor – fitted with silencers – supplies compressed air at low engine speeds and while accelerating. The turbo takes over when the charging pressure has reached the proper level.

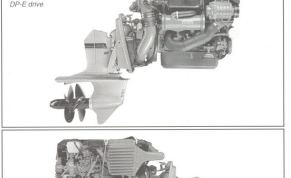
The interaction of compressor and turbo produces high torque over the whole speed range and this contributes to cleaner exhaust gases and fuel economy giving excellent acceleration and driving characteristics.

### Aftercooler

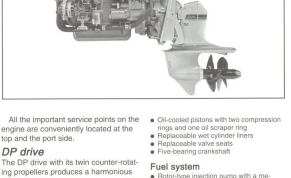
The air heats up and expands when it is compressed. In other words, it takes up more space. The aftercooler cools the compressed and heated air and raises its oxygen content so that the engine can use the fuel more efficiently.

### Easy to service

The engine is designed for easy maintenance and service.



KAD32P with DP-E drive



All the important service points on the engine are conveniently located at the top and the port side.

### DP drive

The DP drive with its twin counter-rotating propellers produces a harmonious drive unit with unbeatable characteristics in the boat in terms of speed, acceleration and fuel economy.

It also produces less noise and vibrations, better steering and maneuvering characteristics, better grip in the water and a shorter time to planing compared with single propeller systems.

The drive features standard power steering for maximum driving comfort.

## Technical description:

### Engine and block

- Cylinder block and cylinder head made of cast iron for good corrosion resistance and long service life
- Oil-cooled pistons with two compression rings and one oil scraper ring
- Replaceable wet cylinder liners
- Replaceable valve seats
- Five-bearing crankshaft

### Fuel system

- Rotor-type injection pump with a mechanical governor for accurate speed control
- Smoke limiter
- Fine filter with water separator
- Feed pump with hand primer
- Electrically operated stopping device

### Cooling system

- Thermostatically regulated freshwater cooling
- Tubular heat exchanger with separate transparent expansion tank
- Coolant system prepared for hot water outlet
- Seawater strainer and easily accessible impeller pump



VOLVO PENTA

# KAD32P/DP

## Inlet system

- Inlet system designed to produce optimal air rotation which provides perfect combustion. This results in high power and low fuel consumption.
- Inlet silencer with replaceable filter
- Crankcase vent system with filter
- Air silencer on inlet and outlet side of compressor

## Exhaust system

- Seawater-cooled exhaust elbow of cast iron with a stainless steel insert
- Complete connection for exhaust outlet through the drive

## Supercharger system

- Exhaust-driven freshwater-cooled turbocharger
- Mechanically driven compressor

## Lubrication system

- Pressure lubrication system with easily replaced full-flow oil filter on the side of the engine
- Tubular oil cooler that can be cleaned

## Engine mounting

- Flexible mounting which provides sound and vibration insulation. The engine has two adjustable rubber mounts in front and rubber suspension between flywheel housing and transom shield

## Drive

- Complete with transom shield, flywheel cover and installation components
- The drive can be tilted up by 42°
- Protective zinc anodes prevent corrosion
- Coolant water inlet at the front of the drive
- Built-in kick-up function to reduce possible damage, in the event the drive strikes an underwater object

## Power Trim

- Power Trim is an electrically-operated hydraulic system for trimming the drive angle while in use. The actual trim angle is indicated with five LEDs and a digital display on the CD Trim instrument
- An analog instrument is also available

## Electrical system

- 12V corrosion-protected electrical system, complete with instrumentation
- 14V/60A marine alternator
- Charging regulator with battery sensor for voltage drop compensation
- The alternator is prepared for a bulkhead-mounted double-diode set which automatically distributes the charge current to two separate battery circuits
- Automatic 8 A fuse with manual reset
- Starter motor power 3.0 kW

## Instrument panel:

Complete panel or separate instruments fitted with:

- Key switch
- Temperature gauge
- Instrument lighting
- Oil pressure gauge
- Alarm for temperature, oil pressure and charging
- Voltmeter
- Rev counter
- Hour meter
- Fuses
- Alarm test

## Miscellaneous

- 3, 5 or 7 m extension cable for the instrument panel with plug-in connector

## *Accessories*

An extensive range of accessories for:

- Fuel system
- Control system
- Instruments
- Comfort & Safety
- Maintenance
- Cooling system
- Steering system
- Electric system
- Propeller & Drive

For detailed information, please see Accessory catalogs.

## *Technical Data*

| | |
|---|---|
| Engine designation | **KAD32P** |
| Crankshaft power[1] kW (hp)* | 125 (170) |
| Propeller shaft power[2] kW (hp)* | 117 (159) |
| Engine speed range, rpm | 3700–3900 |
| Displacement, l (cu. in.) | 2.4 (146) |
| Number of cylinders | 4 |
| Bore/stroke, mm (in.) | 92/80 (3.62/3.54) |
| Compression ratio | 17.8:1 |
| Volvo Penta Duoprop® drive | **DP-E** |
| Ratio | 1.86:1 |
| Dry weight with DP, kg (lb) | 462 (1020) |

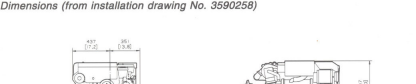
*1) Crankshaft power according to ISO 8665*
*2) Prop shaft power according to ISO 8665*
** Duty rating: Pleasure*

*Contact your local Volvo Penta dealer for further information.*

*Not all models, standard equipment and accessories are available in all countries. All specifications are subject to change without notice.*

*The engine illustrated may not be entirely identical to production standard engines.*

## *Dimensions (from installation drawing No. 3590258)*




*Not for installation*



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