

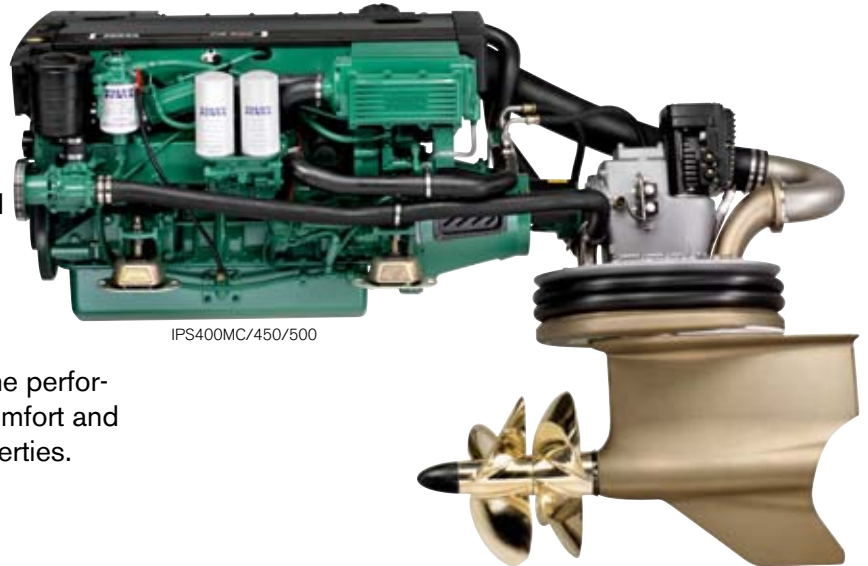
# VOLVO PENTA IPS 350/400MC/450/500 INBOARD PERFORMANCE SYSTEM

191/228/243/272 kW (260/310/330/370 hp) crankshaft power acc. to ISO 8665

## A revolutionary marine propulsion system

There is an ever-increasing demand for higher speed, improved handling, enhanced onboard comfort and reduced emissions. Buyers of patrol boats, police boats, fast fishing boats and other workboats with traditional inboard propulsion want speeds well above 30 knots. But this is where the efficiency of conventional shaft installations really starts to drop.

Something new is required to combine performance for driving pleasure, onboard comfort and reliability with good environmental properties.



### Overview

The Volvo Penta IPS propulsion system is now available in four versions for commercial applications ranging from 350 to 500 hp performance level, suitable for approx. 30 up to 45 feet planing hulls.

Volvo Penta IPS is setting a new standard:

- Much improved efficiency, higher top speed, reduced fuel consumption/extended range, and great acceleration
- Low-speed maneuvering is easier than ever before, and high speed handling is an easy task
- Onboard comfort is greatly enhanced thanks to much lower levels of sound and vibrations
- Installation is greatly simplified
- More space available for cargo
- Improved safety and quality
- Ease of service, and a complete system supported by one supplier
- Improved overall environmental care

All this is combined with the usual benefits of a traditional inboard such as a robust, high strength construction, excellent corrosion resistance and the propellers under the hull.

### Efficiency and performance

Around 30 knots, the conventional propeller shaft system starts to lose efficiency (see the lower curve in below diagram). Low efficiency means that more installed power is needed, which, in turn, results in increased fuel consumption, reduced cruising range and more exhaust emissions.

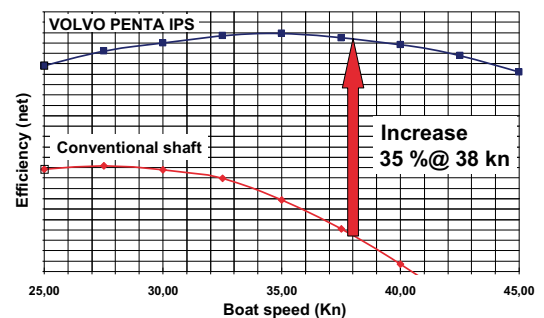
The Volvo Penta IPS offers a revolutionary solution to this, with outstanding efficiency over the whole speed range 25–45 knots (see the upper curve in below diagram).

Volvo Penta IPS has as much as 35% better efficiency at 38 knots. This means that engine power is transmitted much more efficiently into the water resulting in:

- Increased speed
- Reduced fuel consumption
- Faster acceleration
- Less emissions per nautical mile

In a comparison between two identical boats with the same installed diesel power we have achieved 6 knots faster top speed with Volvo Penta IPS, a reduced fuel consumption at 30 knots cruise by approx. 30%, and, finally, an improved acceleration by 15% quicker out of the hole.

Because of this superior efficiency, the product designations 350/400MC/450/500 communicate performance level compared to a conventional shaft installation.



**VOLVO  
PENTA**

# VOLVO PENTA IPS 350/400MC/450/500

## Why is Volvo Penta IPS so superior?

Part of the improvement in efficiency is due to the fact that the system has a state-of-the-art engine – the Volvo Penta D4 and D6 – but almost all is due to the propulsion unit. If we look at what happens beneath the surface, we get the explanation:

- Volvo Penta IPS patented propellers means increased blade area, half the load on each propeller, and smaller propeller diameter with minimized tip losses and cavitation.
- Furthermore, the propeller system prevents rotational losses and does not create any side forces.
- The thrust the propellers produce is horizontal with all the force driving the boat forward.
- The propellers are at the front of the propulsion unit, working in undisturbed water with a minimum of pressure pulses affecting the hull.

A conventional shaft system loses efficiency with the thrust angled downward and the propellers working in water disturbed by the propeller bracket and shaft.

Selecting propellers is also very easy, since Volvo Penta provides optimized gear ratios and a complete and systematic series of propellers developed for the Volvo Penta IPS system.

### Volvo Penta IPS propeller advantages

Conventional

New



- Increased blade area vs. output, smaller prop diameter and large gear ratio
- No side force



- Half prop loading, means half tip losses and minimized cavitation



- Horizontal shaft and thrust
- Counter-rotating creates no rotational losses

## Maneuvering and handling

Maneuvering, handling and driving pleasure is where Volvo Penta IPS truly sets a completely new standard. Forget everything you know about complicated docking maneuvers – with Volvo Penta IPS it is easy and safe even with one engine. At higher speeds you will enjoy immediate response to driver commands with safe and predictable handling. Driving the boat is both safe and fun!

The reason for this amazing maneuverability is:

- The propulsion units are steerable, turning and pointing the entire thrust in the desired direction. This results in much higher efficiency and far greater response to driver commands.
- Two counter-rotating propellers on each propulsion unit means that there are no lateral forces to consider and that tracking is completely straight.

- Electronic controls give a distinct and precise feeling, and shifting is immediate. Thanks to the progressive electronic steering, the wheel spins easier at low speed, further reducing driver effort.

## Comfort

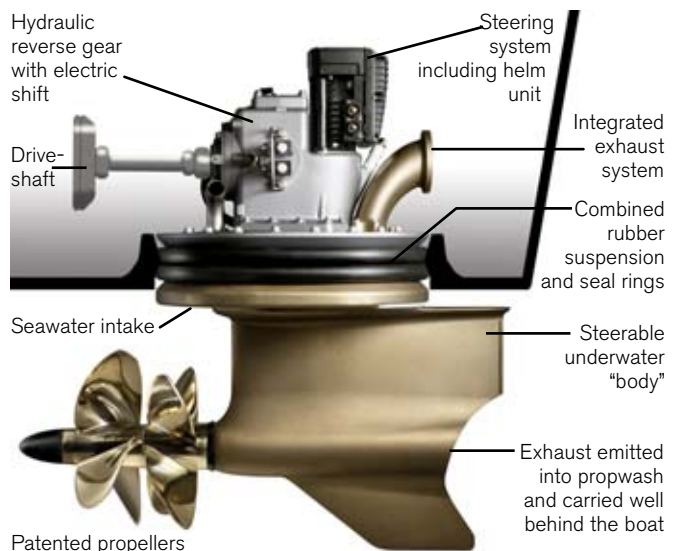
Onboard comfort is an important factor for the boat operator. Minimal amounts of sound, vibration and exhaust fumes make work aboard that much more pleasant. Volvo Penta IPS new technology leads to major improvements for all comfort enhancing factors.

- The propulsion forces and vibrations are absorbed by the combined rubber suspension and sealing.
- Engine vibrations are reduced thanks to a U-joint drive shaft, which makes it possible to have the engine soft suspended.
- The propellers are working in undisturbed water with no cavitation, and have good clearance from the hull.
- There is an increased number of propeller blades to distribute the forces. This means that the pressure pulses created by the propellers have very little effect on the hull.
- Exhaust fumes are truly minimized. First of all, the new engines have very low exhaust emissions, and secondly, the exhausts are emitted through the propulsion unit into the prop wash and carried well behind the boat.

A sound test has been carried out with two identical boats, one with Volvo Penta IPS and one with conventional shaft system – sound aboard the Volvo Penta IPS boat was much lower, reduced by up to 50%.

## Installation

“All included” in a robust design



The Volvo Penta IPS has been developed and is manufactured as a complete system with everything included – engine, propulsion unit incl. gear box, propellers, exhaust and seawater system, steering, and controls.

Installing the units is easy. Our own tests show reduced installation time by well over 50%.

# VOLVO PENTA IPS 350/400MC/450/500

The Volvo Penta IPS system can be installed in various ways, either as a compact system or with an extended jackshaft, giving opportunities for different boat designs.

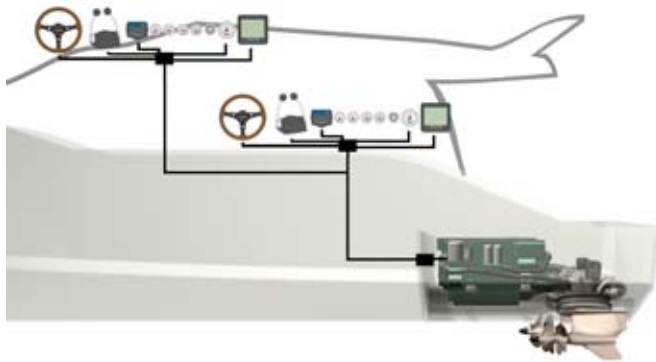
**The system is always installed in a twin or multiple engine configuration.**

A special mounting collar is integrated in the hull construction. The propulsion unit is lifted in place from beneath the hull, with the combined rubber suspension and sealing in place.

The clamp ring is positioned and attached with standard bolts.

No time-consuming alignment is needed.

Steering, shift and throttle plus instrumentation are connected in the simplest way possible.



## Safety and quality

Heavy duty material throughout means excellent corrosion resistance. Everything in contact with seawater is either made from a specially formulated nickel-aluminum-bronze alloy or stainless steel. Propulsion unit, bearings, couplings etc. are all robustly dimensioned to cope with the unexpected and ensure a really long and trouble-free service life.

Volvo Penta EVC, Electronic Vessel Control, links the system components together, as well as being the user interface. This CAN-bus based network has been developed by Volvo Penta for marine use with heavy duty connectors and cables. It is based on the same technology as is used in airplanes, ships and cars today. EVC handles all communication and monitoring including shift, throttle and steering. Several safety functions in the system minimize the risk of damage to engine or propulsion unit.

The Volvo Penta IPS system is designed with full redundancy, i.e. even if you have a total breakdown in one driveline, the remaining one will bring you home safely.

## Service

The Volvo Penta IPS has extremely low service requirements; actually, even lower than in the case of a traditional inboard installation – no need for shaft alignment. With the propulsion units placed under the hull, and all components exposed to seawater made of either nickel-aluminum-bronze or stainless steel, excellent corrosion resistance is achieved, and marine growth is minimized.

The yearly service only consists of conventional maintenance items, change of anode, and a visual inspection. The oil and filter in the propulsion unit is replaced every 400 hrs.

Since the installation is connected to EVC – Electronic Vessel Control – there is no need for cable adjustments. Diagnostics and fault tracing is easily performed by any authorized Volvo Penta service dealer.

## Environmental care

The Volvo Penta IPS has been developed as a complete system with excellent environmental performance as one of the main design targets. The very high efficiency of the Volvo Penta IPS system gives greatly reduced overall emissions.

Volvo Penta's new D4 and D6 in-line engines have been developed from the latest design in modern diesel technology. The engines have common rail fuel injection system, double overhead camshafts, 4 valves per cylinder, turbocharger, compressor (350 & 500) and aftercooler. The interaction of these and the EVC system results in exceptional diesel performance combined with low emissions.

The engines comply with IMO NO<sub>x</sub> limits and the comprehensive emission requirements EU RCD and US EPA Tier 2 (rating 5 Marine Leisure, rating 4 Marine Commercial).

## Engine technical description:

- Cylinder block and cylinder head made of cast-iron
- Ladder frame fitted to engine block
- 4-valve technology with hydraulic lash adjusters
- Double overhead camshafts
- Integrated cylinder liners
- Seven-bearing crankshaft (five-bearing on the 350)
- Flexible engine mounting
- Easily replaceable separate full-flow and by-pass oil filter
- Seawater-cooled tubular oil cooler
- Common rail fuel injection system
- Control unit for processing the injection
- Fine filter with water separator
- Belt-driven compressor with silencer on 350 & 500
- Air filter with replaceable insert
- Crankcase gases vented into the air inlet
- Exhaust elbow or exhaust riser
- Turbocharger, freshwater-cooled
- Thermostatically regulated freshwater cooling
- Tubular heat exchanger with separate large volume expansion tank
- Connections for hot water outlet
- Seawater strainer and easily accessible impeller pump
- 115A marine alternator with Zener-diodes to protect the system from peak voltage, and integrated charging regulator with battery sensor cable for maximum use of alternator
- Engine reset fuses
- Auxiliary stop button
- Complete instrumentation including key switch and interlocked alarm
- EVC monitoring panels
- Electronic remote control for throttle, shift and steering
- Plug-in connectors

# VOLVO PENTA IPS 350/400MC/450/500

## General Data

	IPS350	IPS400MC*	IPS450	IPS500
Volvo Penta IPS system designation	IPS350	IPS400MC*	IPS450	IPS500
Engine displacement, l (in <sup>3</sup> )	3.7 (224)	5.5 (336)	5.5 (336)	5.5 (336)
Configuration	in-line 4	in-line 6	in-line 6	in-line 6
Crankshaft power, kW (hp) @ 3500 rpm	191 (260)	228 (310)	243 (330)	272 (370)
Propshaft power, kW (hp) @ 3500 rpm	182 (248)	217 (295)	230 (314)	259 (352)
Aspiration	Turbo, aftercooler, Turbo, compressor	Turbo, aftercooler	Turbo, aftercooler	Turbo, aftercooler, compressor
Rating	5	4	4 & 5	5
Package weight, kg (lb)	780 (1720)	863 (1903)	863 (1903)	887 (1955)
Propeller series	T2-T10	T2-T10	T2-T10	T2-T10
Voltage	12V	12V or 24V	12V or 24V	12V or 24V
Application	Twin/multiple engine installation in planing hulls			
Speed range	25 to 45 knots			
Driveshaft	Compact (standard), jackshaft as option			

Technical data according to ISO 8665. With fuel having an LHV of 42,700 kJ/kg and density of 840 g/liter at 15°C (60°F). Merchant fuel may differ from this specification which will influence engine power output and fuel consumption.

\* Type approved by DNV.

The engines comply with IMO NOx and the comprehensive emission requirements EU RCD and US EPA Tier 2 (rating 5 Marine Leisure, rating 4 Marine Commercial).

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.

## The Joystick Revolution (option)

Crowded marina. Strong side wind. Tight berth. Situations that can make even the most seasoned skipper a little edgy.

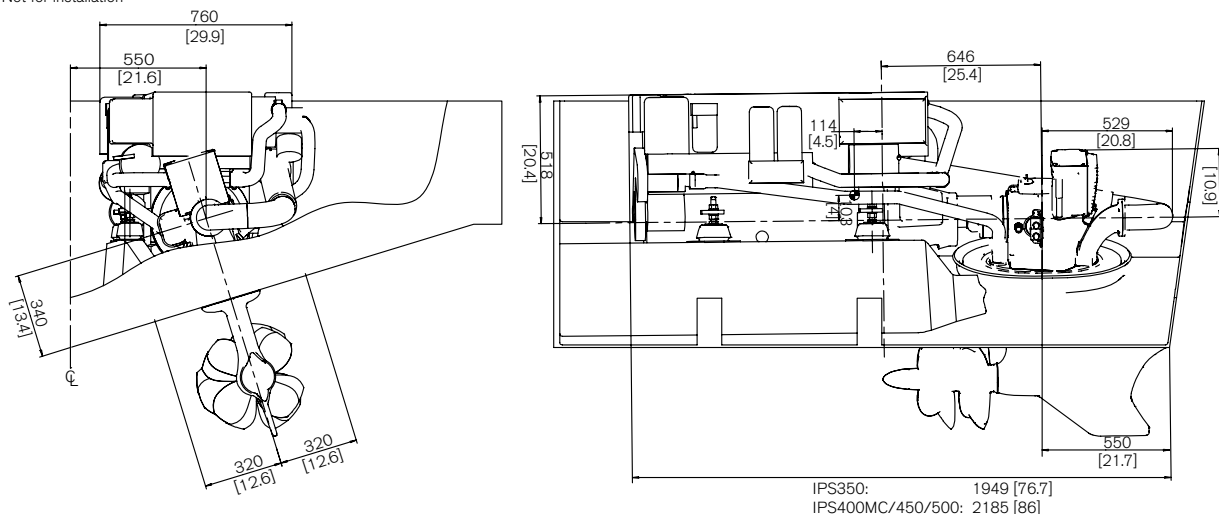
Not anymore. Volvo Penta IPS Joystick puts you in total control and lets you maneuver in any direction – sideways, diagonally, forward, backward or rotate – with just one hand.

Visit [volvopenta.com](http://volvopenta.com) to see for yourself!



## Dimensions

Not for installation



# VOLVO PENTA

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