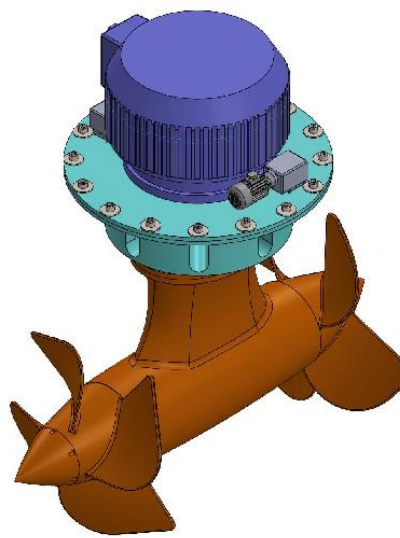




PT. Marine Propulsion Solutions

PT. Marine Propulsion Solutions (MPS) introduces the Dual Propeller – Contra Rotating E-Drives with Pancake Electric Motor design to minimize height requirements and maximize efficiency.

Full Azimuthing Control



The E-Drive for fast patrol vessels and luxury yachts

“Application with Azimuthing E-Drive POD on planning and semi-planning vessels”

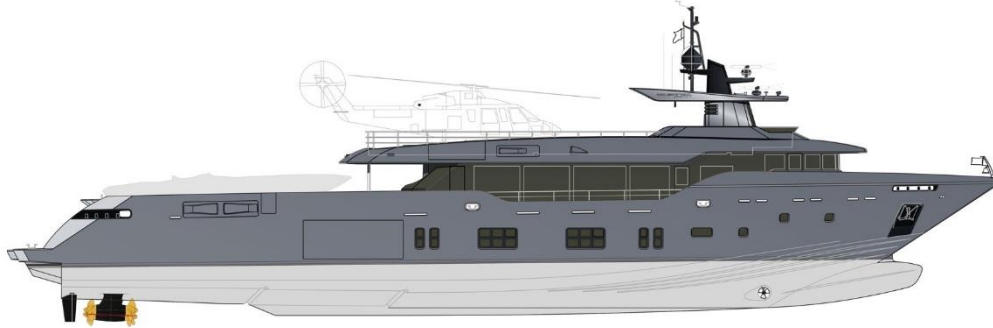
The market for fast naval patrol vessels and pleasure yachts especially in the power range above 750 kW per driveline is still dominated by standard propeller shaft solutions. For vessels in the speed range between 25 and 35 knots there is a strong demand for propulsion systems offering improvements in efficiency, speed, comfort and space-saving design.

The new E-Drive propulsion system from PT. Marine Propulsion Solutions fulfils the demands on efficiency, speed, comfort and space-saving designs. The E-Drive is a fully Azimuthing Pod-drive propulsion system in the power range of 500 to 2000 kW featuring an upper Electric “Pancake Motor” design as an integral part of the upper housing and an underwater gearbox for power distribution to the CR-propellers. The system is combined with a fully azimuthing design for excellent and stable maneuvering.

The optimized interaction between the ship’s hull design, and trim elements in combination with the E-Drive represents a propulsion system of extraordinary quality.



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All components are arranged within a compact and space saving design. The easy installation of the system is of special importance for the shipyard. An intermediate plate allows for a time saving and easy alignment of the system even before its main components are installed. The upper gearbox might then be installed at an early stage of building the vessel, whereas the gondola and the propeller might be installed just prior to the launch of the vessel.

The Counter Rotating Propellers (CRP) Push/Pull system with rigid asymmetrical strut can be used for all vessel designs (from 300 to 2,000 kW per pod).

Benifits

- Compact Installation
- More Thrust at high speeds
- Fully Azimuthing
- Maximum Efficiencies
- Reduced Cavitation Low Noise and Vibration
- Dual contra-rotating propellers
- Suitable for various hull shapes
- Fuel Savings
- Joy Stick Control compatible



The Mauritius Coast Guard's 75m Vigilant on trials.

1.0 General Description

1.1 Through-Hull "Well" Mounting

Marine Propulsion Solutions through-hull azimuthing E-Drives are designed for main propulsion of Yachts, Patrol Vessels and high speed applications. In most applications, two units are installed in wells located in the stern section of the vessel. They are directly driven by a special designed "Pancake" AC Induction motor and driving dual – Contra Rotating Propellers. The units are usually individually controlled by full follow-up combination joysticks that control electric motor speed, and steering angle all in the same handle.



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1.2 Design

MPS through-hull azimuthing E-drives are engineered products of European design based on the latest propeller technologies, ANSYS Finite Element Analysis and the most modern manufacturing technologies available. They are of very heavy duty design and incorporate many unique features to optimize reliability, longevity and easy maintenance.

1.3 Low Profile Design

MPS's unique design features a very low height requirement due to the special designed electric motor and the elimination of input shaft and couplings with less vibration in the event of minor inaccuracies in cardan shaft alignment.

1.4 Top Pull-Out Design

The E-drives are for installation in wells. The wells are large enough to allow top-side installation and removal of the completely assembled thruster unit. Installation and removal takes place through soft patches in the main deck. If practical, the top flange of the well is at an elevation slightly above waterline in light ship condition. This allows removal and installation of the Z-drive while the vessel remains in the water, i.e., without dry docking. The thruster mount is provided with a top flange for bolting to the well flange. It is also provided with bottom closure plating that follows the lines of the vessel bottom. The well flange is also provided, along with the flange gasket and bolting, allowing easy and accurate installation without the need for any machining on the vessel well structure.

2.0 Azimuthing E-Drives

2.1 Gear Transmissions in the Lower Gear Box

The lower right angle spiral bevel gears are HPG – machined or lapped in pairs Klingelnberg design Cyclo-palloid gears with crowned teeth. The gears are made of 17CrNiMo6 material and are designed for continuous operating at maximum torque condition.

They are either integrated with the shaft or keyless fitted to the shaft thus avoiding local stress concentrations.



3.0 Pancake Electric Motors

3.1 Electric Motor Ratings and designs

E-Drives utilize a special designed ac permanent magnet type pancake motor with units upto 1000Kw normally designed to operate at 400/440 Vac and units above 1000Kw designed to operate at 690Vac.....



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This to minimize the running currents and cut down on cabling costs. The 690Vac is for the drives and with the incorporation of a drop down transformer designed into the switchboard the vessel can operate off either 400 or 440 Vac circuits. Motors are available as water cooled or air cooled options.

4.0 Model Ratings

MPS E-Drives Specifications									
Model	Power Rating		Propeller Dia		Pod Length (mm)	Unit Heights		Basic Unit Weight	
	HP	KW	D1 (mm)	D2 (mm)		H1 (mm)	H2 (mm)	Lbs	Kgs
ED350	470	350	620	540	1425			1,958	890
ED500	670	500	630	565	1475			2,475	1,125
ED750	1005	750	696	608	1510			4,730	2,150
ED1000	1340	1000	890	695	1760	540	1380	6,589	2,995
ED1200	1608	1200	920	750	1925			7,040	3,200
ED1500	2010	1500	1070	930	2100			8,525	3,875
ED1800	2412	1800	1285	1120	2240			9,240	4,200
ED2000	2680	2000	1430	1250	2450			10,692	4,860

Applications for Yachts

Larger units available on request

The innovation

The new MPS azimuthing electric propulsion system has been developed to cope with the highest customers' demands and even exceed latest standards of excellence: Increased efficiency, lower noise/vibration and a maximum of comfort in a compact and space saving design These are only few of the advantages, PT. Marine Propulsion Solutions combines!

Competence & experience in propulsion technology

The Counter Rotating Propellers (CRP) Push/Pull system with the azimuthing asymmetrical strut can be used for all yacht designs (from 300 to 2,000 kW per pod). Moreover we can offer a "One Source Solution" providing complete control systems, Switchboards with Powermanagement Systems and motor speed controllers (air and watercooled).

Special Features

The electrical power (KW) is divided equally onto two counter rotating propellers which results in low propeller loads;

- Reduced cavitation and noise
- More thrust at high speeds
- Fully azimuthing
- No hydraulics required.... fully 100% electrical



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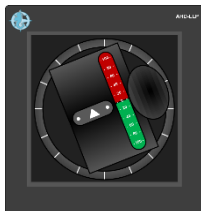
The azimuthing pod drive provides full steering at both low and high speed ranges. This allows for top manoeuvring performances at low speeds and keeps stability at high speeds.

Options

- Class approval and certification
- Joystick compatible
- 5 year Warrantee options

5.0 Controls

...Full Integrated Yacht Bridge Stations....



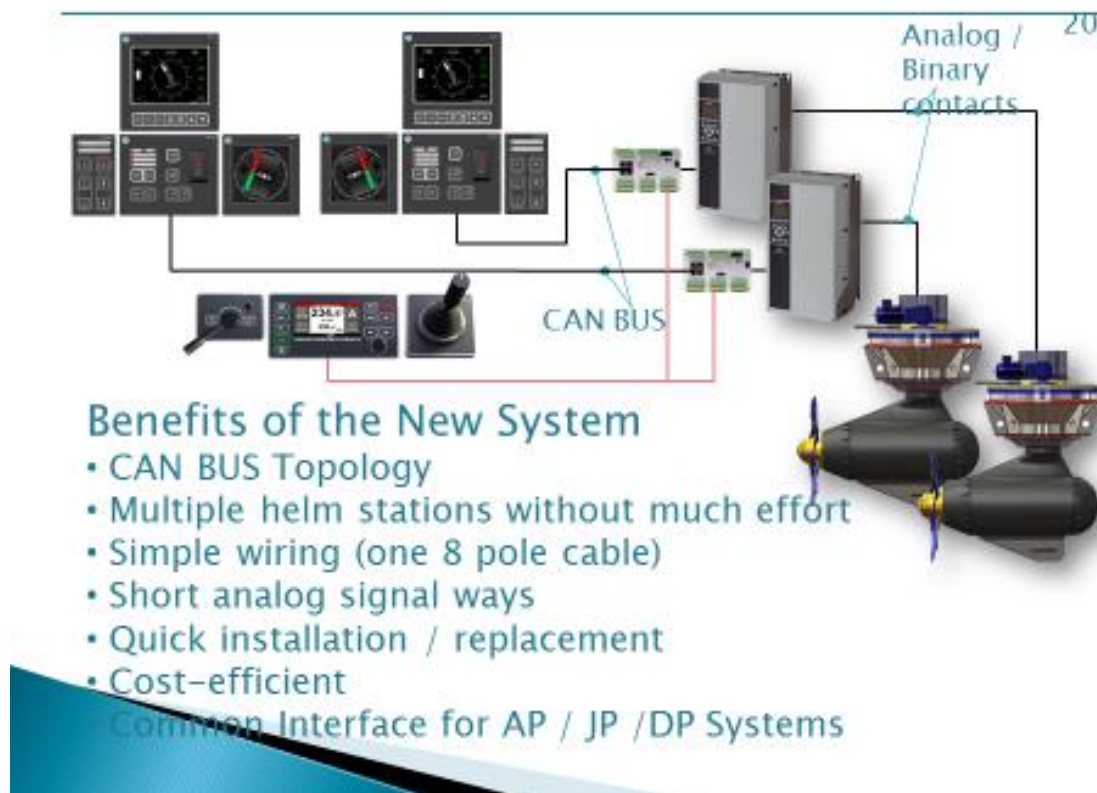
The Electronic remote control from the wheelhouse station is furnished. The panel comprises a full follow-up steering control and E-Pod Speed Joy Stick” controller with panel mounted thrust Position and Speed (rpm), current indicators and include a manual, non-follow-up "Joystick" system. The panels shall include “Start and Stop”, plus all required alarms with a "Power" pilot light and dimmer control.



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The bridge console shall consist of a panel mounted control console and interfacing Junction Module(s). The Control Panel shall include thruster controls for the following items:

- Azimuthing steering controller for E-Pod (Full Follow-Up)
- Jog-Switch Control for Non-Follow-Up Emergency Steering
- RPM output analog control.
- Steering Position Indicator
- Control Positions: Take Over Command
- Selector Switch: NFU / Follow Up
- Amp Meter
- Start Button
- Stop Button
- Emergency Stop
- All alarm functions



6.0 Joystick Control

The JP4000NAV is a new and innovative solution for mega-yachts (as well as for multi-purpose vessels) covering mooring, docking and low-speed maneuvering, to make operations more safe and comfortable.

The JP4000NAV has been designed especially for those ship owners who highly appreciate the safety of maneuvering and full control over vessel motion, irrespective of weather conditions and the area available for maneuvering.



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Modern technology, combined with the latest achievements in the field of dynamic positioning, make the JP4000NAV Joystick Autopilot system an ideal solution for your vessel, allowing you to discover the full potential of your super-yacht and to enjoy its maneuverability.

The JP4000NAV has been specifically designed for yacht and workboat applications when free maneuvering in limited space is required; it conforms to the requirements set for Dynamic Positioning Systems of ABS DPS-0, DPS-1 and DNV-AUT classes. Please note that the system is not intended for use on any DP (Dynamic Positioning) classed vessel as an approved solution for dynamic positioning. In such a case, the range of IVCS/NavDP4000 series products has to be considered.

The JP4000NAV is recommended for vessels of up to 70 meters in length (LOA).

When a yacht is moving forward at high speed, the JP4000NAV acts as the autopilot, providing the vessel heading control by using rudder (s) or track control by using an external track controller. In the autopilot mode the thrusters and the main propulsion are not affected. The AP4000 autopilot is an integral part of the JP4000NAV system

The joystick control modes of the JP4000NAV enable the ship's master to steer the yacht freely in any direction by manually setting the required fore-and-aft and transverse forces and rotation moment necessary with the help of the 3-axis joystick. The system calculates the amount of thrust to be allocated for every actuator, to replace conventional controls with the joystick at low speeds.

The JP4000NAV also provides semi-automatic heading control, which means that the system automatically holds the heading while the ship's master controls fore-and-aft and transverse vessel motion; in this case there is no need to compensate for possible vessel rotation, which can occur as a result of the operator's actions.

The 'Hold Position' and 'Anchor Watch' control modes are optional. In these modes the system automatically holds the vessel in a pre-set position, at the same time controlling its heading.

The main advantages of JP4000

- The system is very easy to learn and operate
- Precise ship dynamics algorithms are among the best in the market
- The system offers extensive functionality with a wide array of options
- Several hardware configurations are available
- The JP4000NAV can be connected to the majority of standard steering/thruster/engine control interfaces.
- The built-in 'Auto Tune' mode makes it possible to adapt the autopilot performance to the hydrodynamic parameters of any vessel, regardless of its displacement and dimensions.





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7.0 Switchboards

Main Switch Boards with breakers can be provided for upto six (6) Gen-sets. Design, Manufacturing & Supply of MSB - 400/440/690VAC options, designed to operate upto 6 Nos. XXXKW 400/440/690VAC, 50/60Hz Generator options with drop down transformers if required. Optional power management system (auto start, priority selection, synchronization & load sharing).



8.0 Power Management Systems

Marine Propulsion Solutions works with various Marine Designers of marine electrical power systems. We can provide electrical engineering services to define the vessel electrical distribution system and application of the Engtek furnished power management system & frequency converters. With over 50 years of experience and many satisfied customers, Marine Propulsion Solutions supplies products with a field proven history greater than all of its known competitors combined and is supported by a worldwide authorized service network

APPLICATION:

The Marine Propulsion Solutions (MPS) Series power management system provides breakthrough technology for marine electrical power systems.

Now, MPS Systems has made the Automated Power Management capability usually found on vessels 120' and above available to smaller vessels with limited space for power management controls.

Technology advancements in control components have allowed full power management controls to be placed in the same size enclosure as a manual switchboard. This results in a giant leap forward bringing smaller yachts in line with larger yachts

Automated power management simplifies the operation of the electrical power system by monitoring the electrical loads on the vessel and starting and stopping generators as needed. Generator paralleling is provided as well as seamless transfers between generators, and between generators and shore. This makes "dead ship" when transferring to shore and back a thing of the past.



Designed with ergonomics and ease of operation in mind, the PMS Series is very user-friendly and simple to operate, even for an inexperienced crew member. Likewise, owner-operated vessels will be easier to operate and more enjoyable.



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Automated power management often eliminates the need for additional crew to operate the electrical system and in addition, the resale value of the vessel will be higher.

POWER MANAGEMENT FEATURES:

- Auto start & seamless transfer to on-board generator when shore failure or shore overload occurs
- Automatic parallel of standby generator when loading increases Automatic rotation of generators on and off line to extend life Automatic seamless transfer to and from all power sources
- Dead bus transfer automatically connects a standby source to a dead bus
- Failing generator's pre-alarm automatically start & transfer to standby generator
- Generator pre-start alarm warns engine room personnel of imminent generator operation
- Load shed intelligently sheds & reconnects load to the bus as power availability permits

The switchboards, load management and power management configurations are offered with many individual features and options to select from, and will meet most requirements.



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