

# PT. Marine Propulsion Solutions Subsea Group



PT. Marine Propulsion Solutions, a member of the MPS Group introduces both as and syn submarine propulsion motor drives that are more compact and efficient for the new generation of Midget and SDV submarines and vehicles.

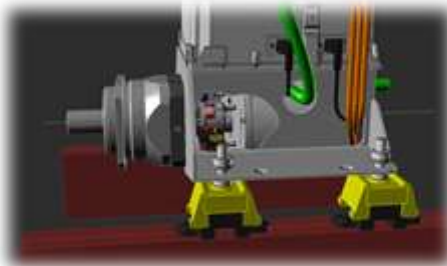
These MPS Propulsion Motors are smaller and lighter than conventional propulsion solutions, but achieve a significantly higher level of efficiency at very low signatures.

## Reliable..... Small and difficult to trace...

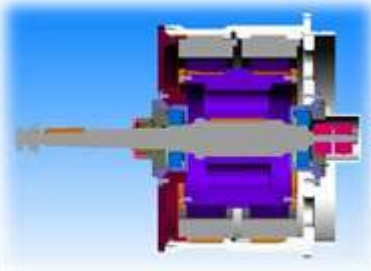
An especially high degree of reliability and availability is demanded from submarine motors and they must have low signatures to make them hard to trace. Additionally, the more efficient the propulsion system, the longer the submarine can remain submerged.

Low heat emission, economy of space and good accessibility to the components for maintenance purposes are criteria that additionally play a particularly important role in submarine design.

PT. Marine Propulsion Solutions offers the following equipment for Midget Submarine and Manned Naval Vehicles:



- Low RPM - AC Induction or Asynchronous Motors for inverter operation.
- Low RPM - AC Permanent Magnet Synchronous Motors for inverter operation.
- Low RPM - DC Brushless Permanent Magnet motors with controllers
- Hi RPM Electric Propulsion Torpedo Modules



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Power ranges offered: 25 to 800Kw

## AC Induction or Asynchronous Motors for Inverter Operation

An **induction** or asynchronous **motor** is an **AC** electric **motor** in which the electric current in the rotor needed to produce torque is obtained by electromagnetic **induction** from the magnetic field of the stator winding.

Electric Propulsion Slow Speed (rpm) air cooled - AC (400/50/3) Drives, mounted on shock absorbing frame including:

- Drive Shaft arrangement (length to be determined)
- Thru hull pressure compensating shaft/seal penetration assembly
- Propeller designed for silent running and low rpm (matl in NAB or Carbon fibre option).
- Electric Motor (Inverter) Controller (variable rpm control) with low harmonics.
- Bridge Controls for propulsion system
- Main Switch board

**Option 1** – Electric Motor designed to be mounted inside the vessel pressure hull.

**Option 2** – Electric Motor designed to be mounted outside the pressure hull and oil filled / pressure compensated.

## AC Permanent Magnet Synchronous Motors for Inverter Operation

### Innovative drives for Midget Submarine, Seal Delivery Vehicles (SDV), Auv and other Manned SubSea Vehicles

The reduction of CO<sub>2</sub>-emission is the big challenge of our time. Thus the reduction of energy consumption is the main topic in many applications. Especially modern speed-controlled electric drives offer the chance to save maximum energy. A solution with remarkable energy efficiency is offered by using permanent magnet ac synchronous motors (PM motors).

They are operated exclusively with frequency inverters and are characterized by a



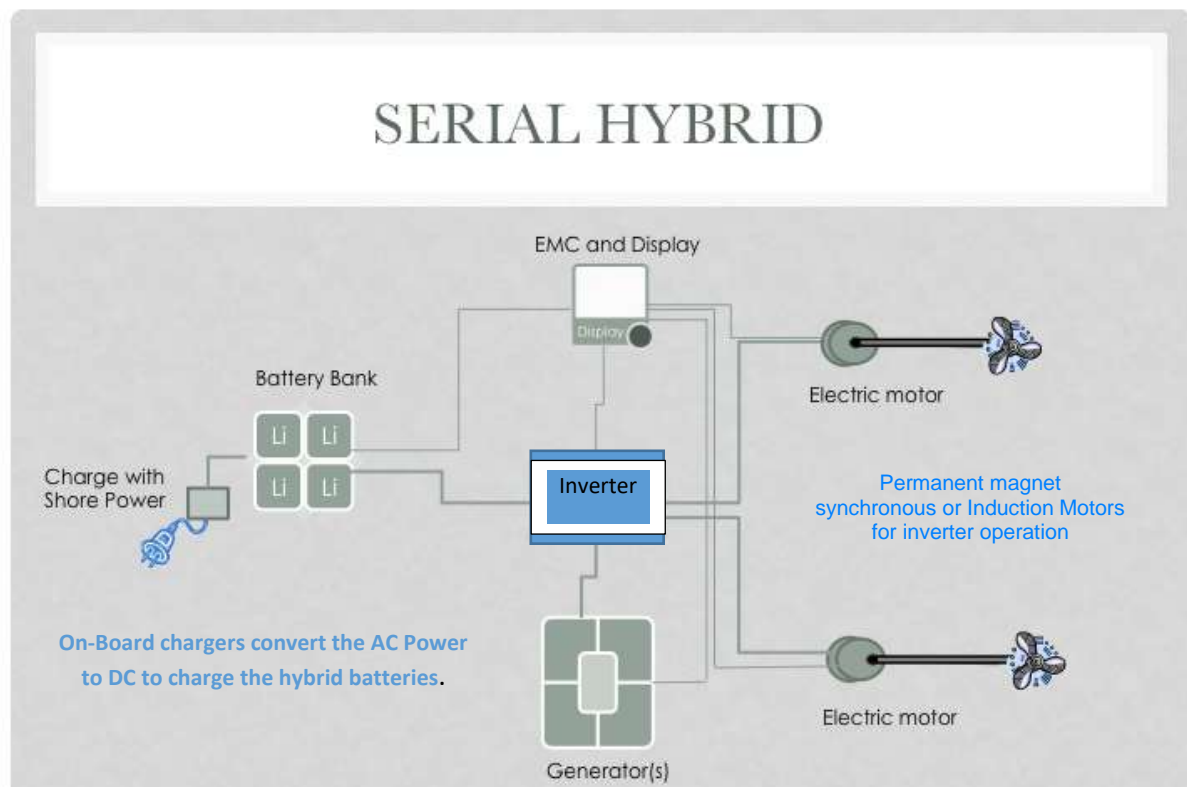
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significantly higher efficiency and an improved part load behavior than asynchronous motors.

In addition PM-motors can reach a higher output than asynchronous motors of the same size. Because of the rotor following exactly the rotating field, PM-motors can be used with several drives that are operated synchronously. All types of constructions and a multitude of modifications of standard motor design are available from Marine Propulsion Solutions Pte Ltd.

MPS Group has entered into technology of permanent magnet synchronous motors. These products combine the established design principles using this new technology.

## Advantages



- Highest energy efficiency
- Approved robust and low-vibration design
- Compact design with minimized dimensions
- Low-noise operation
- High operational reliability by modern production technologies



Power range 12 to 350 Kw  
4, 6, 8 and 12-pole designs  
200 to 3000 rpm options

## DC Permanent Magnet Motors with DC Control Modules

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## Electric Propulsion Systems

Upto 75 kW Light-Weight Electric Drive Systems

Over the past two years we have developed an electric drive system from extensive knowledge in the maritime sector, experience in proven technology and manufacturing and relationships with key partners.

Our new Electric Propulsion Systems offer an environmentally friendly solution and operational cost savings. They can be installed in new builds or retrofitted to provide sub-IMO boats with loiter/slow speed capability either using small diesel engines and/or batteries to improve environmental impact, fuel efficiency, layout options and reduce maintenance.

- Diesel Electric Drives - Battery Ready.
- 350VDC-75 kW basic output, expandable to higher ratings.
- Marine grade system components.
- System controlled by proprietary CAN Control Units.
- Perfect for low speed harbour operations and loiter.
- Battery option provides for silent running.

The excellent technology-ready system could provide the solution to many hybrid/electric propulsion initiatives for midget submarine, seal delivery vehicles and other submercible vehicles.

The innovative system is developed from our own vessel control unit and software resulting in a system capable of generating up to 75 kW from either small standalone generators or from the main propulsion unit, which is delivered through a safe, controlled and monitored system to drive electric drive motors.



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The system can either be used without batteries to provide the advantages of flexible power pack locations and/small loiter drives for use in harbour, or with batteries onto the 350V DC bus.

The system can either be used without batteries to provide the advantages of flexible power pack locations and/small loiter drives for use in harbour, or with batteries onto the 350V DC bus.

The generating system can be fitted to a stand-alone small diesel engine or fitted as an ancillary drive from the main engine. These options provide excellent flexibility in the system fit and allow it to be retro-fitted to existing vessels or fitted from new with options for parallel and series drive solutions. The system is 'battery-ready' and solutions can be offered to integrate electrical storage into the system.

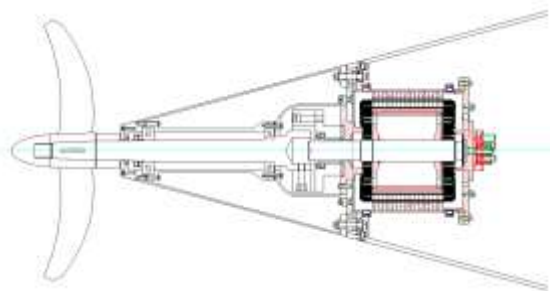
Over the past two years we have developed an electric drive system from extensive knowledge in the maritime sector, experience in proven technology and manufacturing and relationships with key partners.

## Lightweight Torpedo Propulsion Systems

### New Threats to Counter

*In today's changing high-tech world, new, more potent threats are emerging. Slow, quiet, diesel submarines, for example, are now operating in shallow-water, littoral areas.*

As a result, lightweight torpedoes designed to defeat high-speed, nuclear-powered submarines in open-ocean environments are ineffective. Navies now need a lightweight torpedo capable of delivering a devastating blow to submarine threats in both deep and shallow water — and in various acoustic environments..... MPS SubSea provides Torpedo Propulsion Systems to suit your requirements.





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**Designed for 12.75 inch (324mm) Light weight Torpedo Systems**

Hi Speed (rpm) Propulsion Modules dc and battery operated complete with Fin/Position Control – **Plug & Play Units**

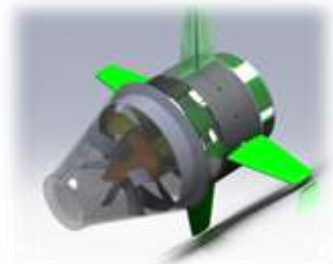


Hi-Speed (rpm) Dual Propeller / Contra Rotating Propulsion Modules and Fin/Position Control



Hi Speed (rpm) Pumpjet Propulsion Modules dc and battery operated complete with Fin/Position Control

Offered in 48vdc and 96 vdc configurations



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## Subsea Group

### Lithium Polymer Batteries

Fully Submersible Battery Pods. The pods are removable for rapid "Plug in/Remove" service for rapid turnaround – Fully chargeable. The pressure-tolerant subsea batteries and smart charger system provide a reliable, safe, high-energy-density power system for submerged systems. The underlying chemistry extends service life and reduces maintenance downtime.

The batteries include electronics that provide built-in protection, monitoring, power control and battery conditioning.

**High Performance** - The subsea batteries provide high energy capacity and support high discharge rates. Their integrated electronics continuously monitor the health of the battery and its remaining capacity, **Rapid Turn-around** - Operators can rapidly swap in a fresh battery module for a spent one, without ever opening a water-tight seal.

This enables rapid turn-around of the torpedo in the field and allows for full testing and recovery. **Submerged Operation** - These batteries are designed for use while directly immersed in sea water, to full-operational depths, without heavy pressure housings, and in any orientation.

***We provide energy conversion products at competitive prices.***

The battery bank is an integral part of any hybrid-electric system and can be recharged at low cost, either from shore power or through AC or DC generators. Today, it is just common sense to use the battery bank as a source for almost all power requirements of the vessel.

The new trend in midget & SDV manufacture is to power as many systems from the hybrid battery bank as possible, including propulsion, thrusters, stabilizers, gyros, hydraulic packs, and all other house loads. To achieve this, there are many devices that can be integrated in the system.

### VFDs

Variable frequency drives (VFDs) are used to convert the DC power from the battery to drive any three phase motors. They are very efficient variable-speed devices. Good examples, thrusters and hydraulic packs to name a few.

### Converters

These are used to convert the hybrid battery DC voltage to either 12 or 24 volts to maintain the charge in the small 12/24 Volt emergency batteries and to power the low-voltage dc loads. These converters are often water cooled and can also be bi-directional, meaning that they can convert both ways, hybrid battery to 12/24 Volt and 12/24 Volt to hybrid battery (if the vessel is equipped with large solar panels, for example).

### Inverters

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## Subsea Group

These are used to convert the DC from the hybrid battery to a fully sinusoidal wave form required by sensitive electronics and other vessel's AC requirements. These are also available in water cooled format and can be programmed to provide any of the world standards 120/240 Vac 60 Hz or 230 Vac and 50 Hz, single phase or three phases, as required.

### Shore Chargers

There are two types of shore chargers, on-board and on the dock. Both types will convert the shore AC power to DC to charge the hybrid battery. Most are fully electrically and galvanically insulated, and are also often water cooled. On hybrid vessels, they are often the only link to shore, and offer a great advantage of insulating the vessel from shore power variation in voltage, frequencies and installations.

## Simple Electric Solutions

### Electric Motors:

An electric motor is 20 times more reliable than a combustion engine, quiet, and requires almost no maintenance. Our motors are power-dense, high efficiency and are manufactured by a company with 35 years experience in the electric marine industry.

***We offer complete system configurations that include custom automation programming tailored to your submerciable design.***

We strive to choose the best system for your requirements. Custom automation control ensures that all aspects of energy use and energy storage are programmed to function seamlessly, efficiently and safely with on-board marine systems. Our dedicated team of engineers and technicians continuously ensures that new customers receive the best and most professional service.

### Other possible supply:

- Variable Ballast Systems
- Folding or retractable communications mast
- Transverse & Vertical Support Thrusters
- Rudder + Elevator Electric Actuators
- Main Shaft Pressure Hull Penetration Pressure Compensated Seal Module.

## PT. Marine Propulsion Solutions

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