



YANMAR

News Release

August 1, 2023

Yanmar Holdings Co., Ltd.

Yanmar to Commercialize Maritime Hydrogen Fuel Cell System to Decarbonize Ships



Maritime hydrogen fuel cell system

Osaka, Japan (August 1, 2023) – Yanmar Power Technology Co., Ltd. (YPT), a subsidiary of Yanmar Holdings, has successfully commercialized a maritime hydrogen fuel cell system towards decarbonization of the maritime industry. The company plans to propose the installation of this system on various ships, including passenger ships, work ships, and cargo ships operating in coastal areas where hydrogen refueling is relatively accessible.

In line with the International Maritime Organization's (IMO) revised target of achieving zero net greenhouse gas (GHG) emissions by around 2050, the maritime sector is pursuing decarbonization efforts. YPT has actively participated in the Ministry of Land, Infrastructure, Transport and Tourism's (MLIT) initiatives to establish safety guidelines for hydrogen fuel cell

ships and develop a roadmap for hydrogen utilization in the marine industry.

Furthermore, YPT has engaged in multiple initiatives, including navigational tests of demonstration ships equipped with hydrogen fuel cells and conducting high-pressure hydrogen refueling tests for ships. Leveraging their expertise and experience in the marine engine business, Yanmar aims to provide total solutions for decarbonization and digitalization of ships with comprehensive designs covering the entire powertrain of fuel cell ship, encompassing power storage, power management, propulsion, hydrogen storage systems and more. This comprehensive system will support the decarbonization and digitalization of the entire ship.

As part of the Yanmar Group's commitment to its YANMAR GREEN CHALLENGE 2050 initiative, the company aims to realize a sustainable society while addressing GHG reduction and minimizing environmental impact. By delivering customized solutions that meet customer needs, Yanmar strives to contribute to solving the challenges facing society.

Product Outline

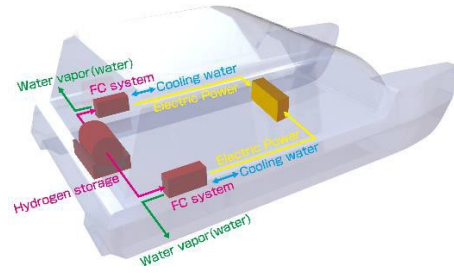
Order start date: August 1, 2023 (Tuesday) *Made-to-order

Main specifications:

| | |
|----------------|--|
| Rated output | 300kW (customizable) |
| Output voltage | Rated: 650Vdc (setting range: 450-700Vdc) |
| Output current | Rated: 462A |
| Dimensions | W3,400 × D1,100 × H1,700mm |
| Weight | 3,000kg |
| Fuel | Hydrogen (ISO14687 type I, Grade D) |
| Exhaust | Zero emission (no emissions of CO ₂ , NO _x , SO _x , PM) |

Main Features

- Zero emissions of CO₂, NO_x, SO_x, PM, etc.
- Low vibration, low noise, and no exhaust gas odor, provides a smooth and comfortable ride.
- Gas valve unit is built into the system housing for easy installation into ships.
- The system is equipped with a maritime hydrogen fuel cell module that has received an Approval in Principle (AiP) from ClassNK.
(System AiP is currently under application.)



Left: Test scene of the marine hydrogen fuel cell system*1; right: Image of installation into a ship

Hydrogen Fuel Cell System Technology Page

https://www.yanmar.com/global/about/technology/vision1/fuel_cell_system/

Yanmar Green Challenge 2050

<https://www.yanmar.com/global/about/ygc/>

*1 Location: National Institute of Technology and Evaluation (NITE) National Laboratory for advanced energy storage technologies (NLAB)

About Yanmar

With beginnings in Osaka, Japan, in 1912, Yanmar was the first ever to succeed in making a compact diesel engine of a practical size in 1933. A pioneer in diesel engine technology, Yanmar is a global innovator in a wide range of industrial equipment, from small and large engines, agricultural machinery and facilities, construction equipment, energy systems, marine, to machine tools, and components — Yanmar's global business operations span seven domains. On land, at sea, and in the city, Yanmar provides advanced solutions to the challenges customers face, towards realizing A Sustainable Future.

For more details, please visit the official website of Yanmar Holdings Co., Ltd.

<https://www.yanmar.com/global/about/>

Note: Information contained in the news release is valid at the time of publication and may differ from the most recently available information.

Inquiries

Corporate Communications, Yanmar

newsroom@yanmar.com