



**YANMAR**

News Release

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Yanmar Holdings Co., Ltd.

## Yanmar Develops Smart Hybrid Chiller for Optimal Control of Gas and Electric Air Conditioning

Osaka, Japan (December 7, 2022) – Yanmar Energy System Co., Ltd. (YES) a group company of Yanmar Holdings Co., Ltd. has developed a hybrid chiller system called the Smart Mix Chiller in cooperation with Tokyo Gas and Daikin Industries, Ltd. The system, which will go on sale in April 2023, realizes optimal control of gas and electric air conditioning. The Smart Mix Chiller is only available for the Japanese market.

In order to realize a carbon-neutral society by 2050, the buildings we work and live in will need to transform to become so called Zero-energy Buildings (ZEB) where the energy used in the building is created by renewable energy sources. Air-conditioning accounts for approximately 20-40% of energy consumption in commercial buildings\*<sup>1</sup> and ZEB buildings require energy-saving air conditioning equipment to achieve the necessary energy efficiencies. In addition, there is an urgent need to address social issues such as soaring energy prices. In response to this social need, the three companies have jointly developed the "Smart Mix Chiller," the first product in Japan that packages a GHP chiller and EHP chiller in a central air conditioning system to achieve energy savings, CO<sub>2</sub> reduction, and cost savings while maintaining comfort.

The system is a package product that combines YES's gas air-conditioning GHP chiller with its high peak-power reduction and winter heating performance and Daikin's highly efficient electric air-conditioning EHP chiller together with Tokyo Gas's cloud control service "ENESINFO" for optimal operation utilizing the advantages of both gas and electric air conditioning. The package optimizes operation by taking advantage of both gas and electric air conditioning, reducing running costs for general commercial facility air conditioning by approximately 15%\*<sup>2</sup> compared to an all-EHP chiller, while achieving peak-power reductions. It also offers high energy efficiency and contributes to the realization of a decarbonized society by supporting the realization of ZEB for commercial buildings.

Going forward, YES will continue its efforts to propose total energy solutions that contribute to energy conservation and CO2 reduction, aiming for a society that realizes energy-efficient lifestyles.

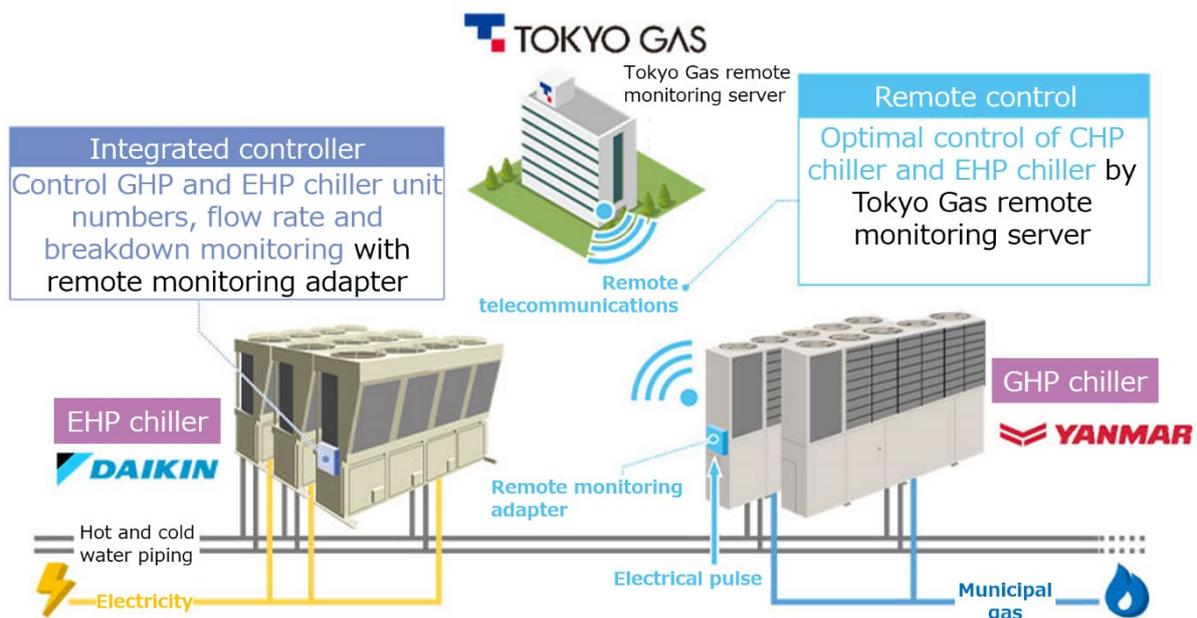
## System and Service Features

### 1. "Best of both worlds" hassle-free<sup>\*3</sup> operation of gas and electric air conditioning

The newly developed "integrated controller" controls the number of units, flow rate, and fault monitoring for the entire system including GHP and EHP chillers. Combined with optimal remote control by Tokyo Gas's cloud control service "ENESINFO", the system achieves a "best of both worlds" operation that maintains energy savings, CO2 emissions reduction, cost savings, and comfort.

("Best of both worlds" operation of gas air-conditioning and electric air-conditioning)

1. The EHP chiller is prioritized in normal operation, while the GHP chiller is activated when air conditioning is under heavy load.
2. When demand for electricity is tight, the system automatically switches to priority operation of the GHP chiller to avoid exceeding the power contract while maintaining the comfort of the indoor environment.
3. When defrost operation<sup>\*4</sup> of the EHP chiller is anticipated in winter, the system automatically switches to a mode that facilitates operation of the GHP chiller to avoid defrost operation as much as possible. This maintains the comfort of the indoor environment in winter without the hassle of employing a supervisor.



※ The remote monitoring adapter and integrated controller are wired together via the GHP controller built into the GHP chiller.

### 2. Standardized controllers to reduce design and construction burden<sup>\*3</sup>

The integrated controller eliminates the need to construct complex automatic control devices, reducing the burden of design and construction.



Yanmar GHP chiller (40 hp equivalent)

\*1: From the Ministry of the Environment's website ZEB PORTAL: Energy Consumption of Buildings

\*2 Calculation conditions

1. Commercial facility: 30,000 m<sup>2</sup>, only "store" air conditioning load is used out of the air sanitation society load (air conditioning scale: equivalent to 2,060 HP)
2. Assuming EHP chiller: GHP chiller = 50:50 installation case
3. Contract: (Electricity contract) Commercial holiday high-load electricity contract, (Gas contract) Dedicated contract for small air-conditioning
4. Maintenance and service charges: (EHP chiller) Estimated value based on Tokyo Gas research, (ENESINFO) Tokyo Gas set price (provisional price) including maintenance and control costs for EHP and GHP chillers

\*3 A service contract "ENESINFO" with Tokyo Gas is required.

\*4: During heating operation at low outdoor air temperatures, moisture in the air condenses on the heat exchanger of the chiller body and forms frost. Since the capacity and efficiency of the chiller decreases with frost adhering to the heat exchanger, defrost operation is

performed to melt the frost, but during defrost operation, the chiller cannot perform its normal heating capacity, resulting in lower hot water temperatures. GHP chillers are characterized by the fact that they are less likely to enter defrost operation due to engine exhaust heat, and GHP chiller operation can maintain indoor comfort as much as possible even during low outdoor air temperatures.

## **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/sports/>

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

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