

Hino and DENSO Jointly Develop the World's First Electric Refrigerator System for Heavy-duty Trucks Using a Hybrid Unit

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HINO & KARIYA (Japan)— Hino Motors, Ltd. (Hino) and DENSO Corporation (DENSO) have jointly developed the world's first electric refrigerator system for heavy-duty trucks using a hybrid unit. This system is used in the Hino Profia, which will be released on Feb. 1, in Japan.

With the combination of Hino's hybrid powertrain system technology and DENSO's electric refrigerator system technology, the two companies have developed a high-quality refrigerator system that helps improve fuel economy, improves refrigeration performance, and is quieter when operating.

Hybrid trucks conventionally use energy generated from hybrid systems to assist the vehicle's driving. However, this new truck uses energy from hybrid unit only for the new electric refrigeration system, which saves fuel.

Heavy-duty refrigerated trucks typically require an auxiliary engine or need to use their main engine power to operate the compressor of the refrigerator. The newly developed electric refrigerator system uses energy generated while driving or regenerated energy from the hybrid unit to operate the refrigerator's compressor. This substantially reduces the amount of fuel normally used to drive the engine to operate the compressor, thus reducing CO2 emissions as well.

Compared to refrigerated trucks that use an auxiliary engine to operate the compressor, the new system is quieter, and contributes to an approximately 150kg weight reduction because it does not need an auxiliary engine.

In addition, compared with those having the main engine-driven compressor system, the new truck can operate the refrigeration compressor at a constant rotational speed using the energy supplied from hybrid system, which stabilizes the refrigeration performance and quality regardless if the truck is moving or stopped.

Trucks with main engine-driven compressor systems need to have separate refrigerator components in the engine compartment, under the floor panel, and in other places. However, the new truck uses a new integrated refrigeration unit that includes an electric compressor, condenser, and other devices. This simplified structure uses fewer tubes and wires and also is easier to maintain.

The new refrigerator system includes a stand-by unit that can be connected to an external 200-volt power source so the refrigerator temperature can be maintained while the engine off for a long period of time. The stand-by unit also has a timer function, which can pre-freeze the refrigerator room without the driver's operation. This helps reduce fuel consumption and manpower costs.

The Hino Profia with an electric refrigerator system reduces the amount of fuel required to operate its refrigerator. The new truck's fuel efficiency exceeds Japan's 2015 fuel efficiency standards by 5 percent. Moreover, as standard features, the Hino Profia has advanced safety systems including an enhanced pre-crash safety system (PCS*1) designed to support drivers to prevent rear-end collision with vehicle in motion ahead, a lane-departure warning system that issues an alarm at a more appropriate timing, and a driver monitoring system that provides more precise detection. Thus, the Hino Profia is a heavy-duty truck that achieves greater environmental and safety performance.

The compact and light-weight hybrid unit, installed to the Hino Dutro Hybrid with proven results in the market, was optimized as an energy source for this new refrigerator. This enables improved eco-friendly performance, while minimizing effects to load capacity and maintaining economy performance for the heavy-duty truck.

Hino will continue to offer useful products that are environmentally safe and user- friendly. And DENSO will continue to develop products and technologies that help automakers increase the environmental performance of their vehicles to promote a more eco-friendly society.

*1: PCS is a registered trademark of Toyota Motor Corporation.

Hino Profia with an electric refrigerator system: FR1EXEG (the photo shows the FR1EXEG with a body made by Trantechs)

The truck in the photo is also equipped with a wind deflector (user's option)*2.

*2: This wind deflector is specifically designed for the Hino Profia with an electric refrigerator system not only to improve its aerodynamic performance, but also to optimally control airflow to increase the radiation performance of the condenser while reducing the air resistance while the truck is moving and increase the refrigeration efficiency.

Suggested retail prices in the Tokyo region

* The prices of the Hino Profia models with a cab-over chassis and an electric refrigerator system

Target annual sales

First year: 180 units

About Hino Motors,

Hino Motors, Ltd. is a leading Truck and Bus manufacturer in Japan. Hino brand vehicle sells in approx. 80 countries and regions worldwide, and achieved 154,700 unit sales in 2013. Hino has been committed to pursue advanced technologies, with more focus on environment and safety area, and Hino brand hybrid vehicles already sold more than 10,000 units globally since the launch of its hybrid bus in 1991. Headquartered in Hino city, Tokyo. Consolidated global sales for the fiscal year ending March 31, 2013, totaled JPY1,541 billion.

About DENSO Corporation

DENSO Corporation, headquartered in Kariya, Aichi prefecture, Japan, is a leading global automotive supplier of advanced technology, systems and components in the areas of thermal, powertrain control, electronics and information and safety. Its customers include all the world's major carmakers. Worldwide, the company has more than 200 subsidiaries and affiliates in 38 countries and regions (including Japan) and employs more than 130,000 people. Consolidated global sales for the fiscal year ending March 31, 2013, totaled US\$38.1 billion.

Currently, in North America, DENSO employs more than 17,000 people at 32 consolidated companies and affiliates. Of these, 28 are manufacturing facilities located in the U.S., Canada and Mexico. In the U.S. alone, DENSO employs more than 11,000 people in California, Michigan, North Carolina, South Carolina, Tennessee, Kentucky, Georgia, Iowa, Ohio, and Arkansas. DENSO's North American consolidated sales totaling US\$6.8 billion for the fiscal year ending March 31, 2013.

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