

MinebeaMitsumi and Renesas Collaborate on Development of Stepping Motor Solutions for Robots, OA Equipment, and Medical/Nursing Equipment

Jointly-Developed Stepping Motors with Resolver (Angle Sensor) and Resolver-Based Motor Control Solutions Feature Superlative Cost/Performance Characteristics

TOKYO, Japan, December 11, 2019 —MINEBEA MITSUMI Inc. (MinebeaMitsumi, TSE: 6479), the world's leading supplier of stepping motors (Note 1), and Renesas Electronics Corporation (TSE:6723), a premier supplier of advanced semiconductor solutions, today announced the joint development of resolver-based (angle sensor) stepping motor and motor control solutions optimized for use in robots, office automation (OA) equipment, and medical/nursing care equipment. These applications require motors with higher precision motor control, miniaturized form factors, and improved resistance to environmental influences. Working in collaboration, MinebeaMitsumi and Renesas have developed resolver sensor-based stepping motors and motor control solutions that address these application requirements.

MinebeaMitsumi has a strong track record with resolver sensors for automotive applications and, for the first time, has developed a new resolver for stepping motors to be used in consumer and industrial equipment applications such as robots, OA equipment, and medical/nursing care equipment. As the global 32-bit microcontroller (MCU) market leader (Note 2), Renesas has developed a new resolver-to-digital converter (RDC) that supports MinebeaMitsumi's new stepping motors, as well as control driver software for controlling the RDC with a 32-bit RX MCU. Renesas also provides a resolver-based stepping motor control kit, which includes development tools, including MinebeaMitsumi's stepping motor with resolver and an evaluation board with RDC, allowing users to jump-start application development.

"I am extremely pleased that we were able to develop superb products with the cooperation of Renesas, which provides superlative control technologies," **said Katsutoshi Suzuki, Technical Officer, Deputy Officer in charge of Electronics Engineering Development Div. at Engineering Headquarters at MinebeaMitsumi.** "I am hoping that this advance in product differentiation for our resolver stepping motors will allow us to acquire new markets."

"Our cooperative effort with MinebeaMitsumi will allow stepping motors to be used in a wider range of applications," **said Roger Wendelken, Senior Vice President and Head of the Broad-based MCU Business Division, IoT and Infrastructure Business Unit at Renesas.** "Our joint collaboration offers customers a solution with everything needed for resolver stepping motor development, including motors, RDCs, MCUs, software and tools, enabling them to accelerate their motor development and shorten their time-to-market."

Features of the New Resolver-Based Stepping Motor Solutions

Stepping motors with a resolver allow high-precision motor control even in harsh environments with heat, dust, or vibration. They also deliver superlative characteristics such as the ability to carry heavy loads without step-out. MinebeaMitsumi and Renesas have developed a new type of resolver stepping motor and resolver motor control solutions that provide superlative cost performance, which makes it possible to expand the range of applications for stepping motors. For example, in robots or automated guided vehicle (AGV) development, customers can achieve high-precision motion even in harsh environments such as warehouses or the outdoors, while reducing costs and further miniaturizing industrial equipment by using smaller motors.

Key features of MinebeaMitsumi's stepping motor with a resolver

- **High torque characteristics:** 2 to 3 times as much torque compared to existing products due to no step-out control
- **Control characteristics:** able to drive at broadband and ultra-low speeds
- **Low power consumption:** current optimization by servo control that responds to the actual load
- **High precision:** high position precision achieved by high resolution of 200,000 P/R
- **Environmental resistance:** highly resistant to heat, dust, and vibration due to its simple structure
- **Miniaturization:** the high torque of these motors makes miniaturizing application products possible

Key features of Renesas' RDC and RDC control driver software

- **Detection methods:** VR-type voltage detection, VR-type current detection
- **RX MCU support:** Renesas supplies RDC driver software for the RX24T (support for other MCUs planned)
- **Resistance to electromagnetic noise:** position detection is possible with a signal-to-noise ratio of 1/2 (noise twice the signal) due to the inclusion of filters

Renesas' resolver-based stepping motor control kit

- **Included items:** MinebeaMitsumi 42-mm square resolver stepping motor, control board, CPU board (includes the RDC and RX24T)
- **Development support tools:** Renesas Motor Workbench (includes real-time waveform display functions)
- **Included software:** RDC control driver software, stepping motor control software

Availability

MinebeaMitsumi plans to start sample shipments of the new resolver-based stepping motors in January 2020 with mass production starting in April 2020. Renesas' resolver-based stepping motor control kit will be available in January 2020.

MinebeaMitsumi will demonstrate the jointly developed products in booth W4-25 (West Hall 4F, Tokyo Big Sight) at the [International Robot Exhibition 2019](#) (iREX2019), December 18-21, 2019, in Tokyo. ([Link to Press release](#))

For more details on MinebeaMitsumi's stepping motors, visit:

<https://www.eminebea.com/en/product/rotary/steppingmotor/resolver/>

For more details on Renesas' stepping motor with resolver control solutions, visit:

<https://www.renesas.com/solutions/key-technology/motor-control/resolver-solution.html>

Note 1. Fuji Keizai Co., Ltd. Precision Micro Motor Market 2019: Comprehensive Survey 2018, (Annual unit sales basis)

Note 2: Gartner Market Share: Semiconductors by End Market, Worldwide, 2018, Andrew Norwood et al., 8 April 2019 (Microcontroller 32-bit in All Applications, vendor revenue basis.)

About MinebeaMitsumi

MinebeaMitsumi (TSE:6479) is a comprehensive precision components manufacturer that integrates a wide range of cutting-edge technologies, from ultra-precision machining technologies, such as miniature and small ball bearings, which boast the No.1* global market share, to motors, sensors, semi-conductors, wireless technologies. We create new value through difference and contribute to the age of IoT (Internet of Things) as an Electro Mechanics Solutions™** provider. One of the characteristics of MinebeaMitsumi is global operation: 171 bases in 27 countries.

Website : www.minebeamitsumi.com

* Ball bearing market external diameters of 22mm or less. According to our research.

** "Electro Mechanics Solutions" is a registered trademark in Japan of MinebeaMitsumi Inc. Its

registration No. is 5322479.

About Renesas Electronics Corporation

Renesas Electronics Corporation ([TSE: 6723](#)) delivers trusted embedded design innovation with complete semiconductor solutions that enable billions of connected, intelligent devices to enhance the way people work and live. A [global](#) leader in microcontrollers, analog, power, and SoC products, Renesas provides comprehensive solutions for a broad range of automotive, industrial, home electronics, office automation, and information communication technology applications that help shape a limitless future. Learn more at [renesas.com](#).

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