From keypads to HMIs

EAO is a family-owned company founded in 1947, offering switches, keyboards, control elements, and HMI (human machine interface) control units as well as systems. With over 600 employees, the CiA member has a global production and distribution network at its disposal.

With production sites in Switzerland, Germany, North America, and China, as well as 10 country sales companies and distributors in over 50 countries, worldwide availability of products is guaranteed. Besides off-the-shelf products, the company also offers customized devices.

Keypad with CANopen Safety interface

Wherever mobile machine bodies or attachments need to be moved and controlled automatically, safety, and reliability are of importance. For such applications, CiA member EAO offers the keypads of the Premium Series 09, featuring CANopen Safety connectivity.

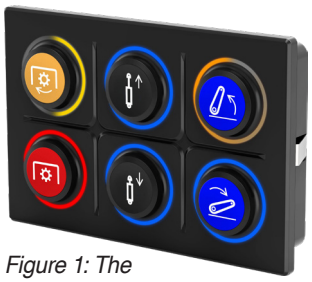

Figure 1: The Premium Series 09 keypads provide CANopen Safety interfaces (Source: EAO)

The keypads meet the safety requirements and are developed according to ISO 13849. They achieve Performance Level d (PL d), which is confirmed and certified by Dekra. The products implement the CANopen Safety protocol. They comply with international safety standards, in particular ISO 13849, and use various mechanisms for error detection and error correction. Redundancy in communication increases the reliability of the entire system. In addition to easy integration, the CANopen Safety protocol offers the same advantages as CANopen: flexibility, real-time capability, and scalability, stated the Swiss supplier.

The durable and low-maintenance keypads reduce downtimes due to an integrated safety architecture that helps to prevent errors. This not only ensures smooth operation and increased efficiency in use, but also minimizes the risks for original equipment manufacturers (OEMs) and mobile machine operators.

EAO presented the functional-safe keypads at the IVT Expo 2025 in Chicago. Stephan Hakuba, working with EAO, delivered a presentation on the critical role of functional safety in HMI system design. His presentation provided an overview of what functional safety is and why it is essential for manufacturers, outlining common functions, classification processes, and risk reduction strategies. He also addressed compliance with international standards such as ISO 26262, IEC 61508, and ISO 13849, along with best practices for mitigating systematic errors and ensuring safe operations.

"Functional safety is not only a technical requirement, it is a responsibility to ensure safe and reliable operation in heavy-duty applications," said Hakuba. "By combining compliance with international standards and innovative HMI product design, we can significantly reduce risk, enhance operator confidence, and deliver safer systems overall." In addition to the presentation, EAO showcased its keypads, designed specifically for heavy-duty and special vehicles.

Rotary encoder pushbutton modules

The Series 09 Rotary Cursor Controller (RCC) and Rotary Pushbutton (RPB) modules combine rotary control and push-button functions, with the RCC also featuring a digital joystick. Rotary controllers with joystick functions are suitable for navigation within a display or in a user menu. The required functions can be selected using the integrated push function of the control unit. The two additional pushbuttons enhance the RCC and RPB functionality and, like the Rugged Keypads, can be customized with individual ring and symbol illumination as well as application-specific symbols.

Figure 2: The rotary encoder pushbutton modules are part of the CAN-connectable Series 09 (Source: EAO)

According to Robert Davies from EAO, joystick controllers with push-button functionality are becoming increasingly popular in modern system control applications: "The RCC and RPB functionality provided by the new Series 09 joystick module can be selected directly using the rotary knob", Davies said, "and the two additional pushbuttons further enhance the module's functionality".

Typical applications include navigation in display menus or interfaces and adjustment of parameters and settings in harsh ambient conditions. The digital joystick capability of the RCC operates through a three-axis tilt mechanism. The tilt function in the X/Y direction has been designed with integrated protection against unintentional contact and triggering, so that safe operation is possible even under difficult conditions, for example when the vehicle is moving strongly. The products come in an IP6K9K-rated enclosure and a CAN interface. Like the existing Series 09 Rugged Keypads, the RCCs are available in variants, complying with the IATF 16949 automotive standard.

Brief news: CANopen Safety keypads

- ***Grayhill:*** The US company supplies keypads with optional CANopen Safety interfaces. The 3K keypads are available in form factors from six to 15 buttons with each button having three separately controllable LEDs (light-emitting diodes).
- ***Gessmann:*** The German CiA member offers customizable keypads with CANopen Safety connectivity. They are available in 2x3, 2x4, 2x5 and 4x5 sizes. The pushbuttons can be individually illuminated with 16 preset light settings. *hz*

Award for seat-reservation displays

EAO won this year the Railway Technology Excellence Award for its LED-based seat-reservation displays. The integration of the seat reservation system with the train's passenger information system ensures that reservation data is always up to date. The system stands out for its exceptional flexibility and adaptability, which are critical in a market characterized

Figure 3: The awarded seat-reservation displays come optionally with CAN connectivity (Source: EAO)

by diverse rolling stock and evolving service requirements. The system is built on a standardized platform that allows for seamless integration with existing passenger information systems via CAN and Ethernet connectivity. ◀ *hz*

CAN-FD-to-Ethercat gateway

ESD Electronics introduced the CAN-EtherCAT/2-FD gateway module supporting integration of CAN CC (up to 1 Mbit/s) and CAN FD (up to 8 Mbit/s) devices into Ethercat networks. This version builds on the company's practice-proven CAN-Ethercat/2 gateway. Both the CAN and Ethercat interfaces are galvanically isolated. The gateway supports the Ethercat Subdevice functionality in accordance with ETG.5001. The module can be configured as an Ethernet switch port, allowing integration of Ethernet devices into the Ethercat network.

(Source: ESD)

The device enables reduction of the data load by filtering the CAN (FD) frames internally in the gateway. Balancing of different timings between Ethercat and CAN is solved by queuing for RX and TX frames. Off-the-shelf configuration tools are available for the device. *of*

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