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CAN: Much more than just an interface

Megatron expands its range of CAN-capable products. First of all, more CAN sensors will be added to the range. They already preprocess the raw sensor signal inside the sensor housing, so no cost-intensive extra I/O or gateway modules are required to connect to a CAN network.

(Source: fotolia.com – Aleksey Stemmer)

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Megatron is continuously expanding its range of CAN-capable products, as more and more customers employ the reliable serial network system. Sensors and joysticks with CAN ensure more efficiency in the industry. First addition to the portfolio will be even more sensors with CAN. They already preprocess the raw sensor signal inside the sensor housing, so that no cost-intensive extra I/O or gateway modules are required to connect to a CAN network.

The CAN system was developed in the 1980s to facilitate the networking of control units in passenger cars. The engineers created a serial interface that offers high data transmission safety, is insensitive to electromagnetic interference, and enables a direct connection of numerous electronic components. As a result, significantly fewer cables are required and thus the total cable length is reduced drastically.

The advantages of bus systems are now appreciated in all areas of industry and medical technology. This is not least due to the extended overall function of the devices: Sensors with CAN feature built-in error checking and filtering. Customers therefore benefit from lower costs for the development of their own electronics or separate evaluation unit. Additional sensors and input devices can be integrated into the CAN network without a great deal of programming effort. This is supported by a modular system that can be optimally adapted to the application requirements.

Figure 1: The CAN rotary encoders of the HTB36E series are the new flag ship product in the Megatron portfolio (Source: Megatron Elektronik)

CAN sensor

Products with CAN-based higher-layer protocols such as CANopen and J1939 differ significantly from sensors with simple analog outputs. In the case of the former, the measurement signal is smartly processed in the housing of the sensor itself - before it is transmitted to the receiver. The raw signal of the sensor is not only stored, but also undergoes a check, filtering or averaging before it is sent via the CAN. These products are also flexible when it comes to the power supply. The sensors usually accept a wide input voltage range of up to 32 V. Thus, the sensors can be

supplied with power directly from the on-board power supply of a battery-operated machine, for example, without additional conversion or stabilization. This saves additional costs for development, integration, and material. In addition, CAN also allows the history of the device states to be recorded. Errors, alarms, and warnings can be logged and saved. This extended and improved functionality offers more safety, comfort, and information.

Figure 2: The fingertip joysticks of the TRY120 series are suitable for mobile applications. They are optionally available with CANopen or J1939 and are therefore predestined for use in mobile machines and vehicles (Source: Megatron Elektronik)

Signal processing and transmission with CANopen and J1939

Megatron's CAN products are supplied either according to CANopen or SAE J1939 standards. The CANopen interface is widely-used for applications in various areas of automation technology, in plant construction, and in mobile machines. The CAN J1939 higher-layer protocol is a standard for use in commercial and special vehicles. The advantages of CANopen can be demonstrated for the case of rotary encoders because various modes for smart signal transmission are available for CANopen. In the asynchronous operating mode, measured values are only transmitted via the network when an internal event occurs, for example only when there is a change of the measured value or after an internal timer has expired. In the synchronous operating mode, the measured value is regularly-transmitted to other network participants as a reply to an external SYNC command. In addition to measured values, these sensors can also output calculated values. In the case of rotary encoders such parameters may be rotational speed or angular velocity, calculated from the angular position.

Rotary encoders with CAN

In the rotary encoder product area, Megatron’s portfolio is constantly growing - the latest examples are the high-precision CAN rotary encoders HTB36E and FHB58. The digital interface ensures the reliable and digital transmission of the measured values to the application and guarantees smooth integration and monitoring of the rotary encoder. With their magnetic measurement value acquisition and digital signal processing, the sensors form the ideal basis for transmitting measurement signals via CAN. They are metal-housed and are therefore suited for use in harsh environments. In addition, the rotary encoders have a double ball-bearing for a particularly long lifespan and high bearing load and have a high IP protection class. They are available as a multiturn variant with an energy self-sufficient counter (without battery or gear, energy harvesting) for counting revolutions. In addition, due to the patented technology, these variants achieve remarkable system accuracy and repetition accuracy (better than ±0,09°) and can count to 243 revolutions (multiturn resolution up to 43 bits). Another advantage is the free choice of single and multiturn resolutions as well as the automatic detection of the bit rate.

HTB or FHB rotary encoders implement the CANopen device profiles for encoders (CiA 406, version 3.2). The CiA 406 profile series specifies the application interface for absolute rotary and linear encoders. The CANopen specifications were defined by the CiA. Concerning the HTB and FHB rotary encoders the following specifications are from special importance: CiA 301 (CANopen application layer and communication profile), CiA 106 (connector pin assignment), CiA 303 (cabling, representation of units, indicator specification), CiA 305 (configuration of bit rate and node-ID via LSS, CiA 306 (electronic data sheet), and CiA 406 (device profile for encoders).

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