The TBEN-L-PLC IP69K is a protocol converter that translates between CANopen or SAE J1939 and other serial communication protocols.

The automation sector is currently undergoing a major shakeup of old established practices. The change to digitally networked, highly flexible, and transparent industrial production, as described in recent years under the label Industry 4.0, is presenting designers and electrical planners with new tasks. One of the routines of mechanical engineering, and particularly in electrical planning, is the design of a control cabinet for protecting sensitive electrical and electronic equipment such as controllers, power supply units, or I/O solutions from the severe conditions present at the machine. With its robust portfolio of IP67/IP69K I/O solutions, Turck is also offering a smart alternative.

Potential of decentralized solutions

Decentralized I/O solutions in themselves are nothing new, but are becoming increasingly more important in the light of modern automation and machine concepts, which increasingly have a modular design. The trend is moving away from the control cabinet towards installation in the field. The use of robust I/O technology with protection to IP67 enables users to run the cables of the sensors directly in the field to a nearby I/O distributor, which can route the signals to the control cabinet, either as a passive multipole cable junction or actively as a fieldbus device. Compared to point-to-point wiring, this saves the user considerable costs for the connection technology and the wiring. There is also a time saving benefit when the machine is set up at the customer. Instead of running several individual cables to the control cabinet, it is normally only necessary with fieldbus or Ethernet systems to run one communication cable and power supply in order to connect the I/O level to the controller. The wiring of the periphery to the remote I/O technology can then be done in advance at the machine builder.

High performance

Turck takes the decentralization from the control cabinet to the field one step further. The TBEN-L-PLC Codesys-3 controller of the Muelheim automation specialist is a IP67 controller for use directly in the field. When used as a master, the device also supports Modbus RTU, in addition to CANopen and SAE J1939, as well as the industrial Ethernet protocols Profinet, EtherNet/IP, and Modbus TCP. The EIA-232 and EIA-485 serial interfaces can also be used as required in Codesys. The block I/O controller also offers eight universal I/O channels for the direct connection of sensors and actuators.

The TBEN-PLC can also be run as a slave (e.g. device) in the CANopen and Modbus RTU networks as well as in the three supported industrial Ethernet networks,
TBEN-L-PLC as protocol converter for CANopen

This is particularly of benefit to plant operators wishing to connect their plants and machinery to higher-level ERP or MES systems and therefore wish to network their machines to industrial Ethernet. Networking with Ethernet-capable components down to the lowest level of automation is not economically advisable necessarily and is rarely necessary in terms of automation. With the TBEN-L-PLC, existing valve blocks or drives which frequently talk in CANopen can also be used in industrial Ethernet thus enabling it to be used as a protocol converter. For example, the controller can operate as the CANopen manager of a machine module networked with CANopen and connect this module to a system running with Profinet. As part of the increasing digitization of industrial production processes, this enables existing machine concepts to be made fit for the challenges of closely networked, highly flexible production. Turck is thus providing an answer to the question of how existing machinery and plants can benefit from the increased efficiency and increased transparency as part of the evolution of Industry 4.0.

Figure 1: The TBEN-L-PLC can form the bridge between Ethernet and CANopen with its various master and device interfaces (Photo: Turck)

Figure 2: Turck offers inclination sensors, rotary encoders like the QR24 in this image, and angle sensors with a CAN interface (Photo: Turck)

TBEN-L-PLC as protocol converter for CANopen

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networks. The compact PLC then functions in a Profinet network as a Profinet slave and translates this communication as a CANopen Manager for the CANopen devices in the CAN network.

As CANopen is widely used in the field of drive engineering and pneumatics, this protocol converter option is particularly useful here. In most cases the technical benefits of a completely new installation of drive engineering and pneumatics with industrial Ethernet interfaces mostly does not justify the costs involved in a comprehensive Ethernet network. Many of the components are not at all available with Ethernet interfaces.

**Controller for mobile machinery**

Besides the protocol converter function, the TBEN-L-PLC also allows stand-alone control of complete machines. These can be conventional machines or machine modules, as well as mobile machinery. Thanks to its fully encapsulated housing, the TBEN-L-PLC is particularly suitable for the field of mobile machinery. It is very well protected against vibrations and shock and thus complies with degree of protection IP65/67/69K. The extended temperature range from -40 °C to +70 °C and the fully screwed plug-in connections are important features in the field of mobile machinery. The fact that most programmers in the mobile equipment sector master Codesys makes it ideal for use in this sector.

As an increasing volume of data is being networked with Ethernet, the use of TBEN-L-PLC as a protocol converter can also be helpful here. Particularly when the user wishes to use peripheral devices with a CAN interface which have proved successful in the past or for which there is not yet a counterpart with an Ethernet interface.

The Turck sensors with a CAN interface are often used in the mobile sector. Turck thus offers its B1N (single axis) and B2N (twin-axis) inclination sensors with CAN here. Customers from a wide range of different sectors are purchasing the QR24 rotary encoder as well as the smaller QR14 angle sensor with a CAN interface. Both sensors are fully encapsulated and detect rotary movements without contact.

Besides the block modules of the piconet and BLcompact product families, the BL20 and BL67 modular I/O systems are also available with a CANopen gateway. For example, Turck’s BL ident RFID system can also be connected to CANopen via BL20 or BL67 CAN gateways.

**Figure 3: In the mobile equipment sector, the PLC ensures optimum use (Photo: Fotolia)**

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**CAN Newsletter Online: Highlights**

The CAN Newsletter Online reports briefly about products and services. In August, the following news were published:

- **CAN transceiver**
  - **With ±60-V fault protection**
  - The MAX14683E transceiver is optimized for industrial applications. It features a ±60-V fault protection, a ±25-V functional common mode input range, and a ±10-kV ESD protection on the bus lines. Read on

- **Micro-controller**
  - **Cortex-M4 processor with two CAN FD ports**
  - Microchip has announced the SAM E5x micro-controller family. The 32-bit MCUs are intended for industrial applications. Read on

- **Liquid Crystal Display**
  - **Integrated into headlights**
  - Hella has developed LCD headlamps. In one approach, the pixel light distribution is calculated in an IC in the headlamp, which is connected optionally to CAN. Read on

- **Safety PLC**
  - **Supports J1939, CANopen, and CANopen Safety**
  - Ifm offers a SIL-2/PL-d-compliant host controller. The unit features four CAN interfaces. Read on

- **Multi-function sensor**
  - **Turns vehicles into driving weather stations**
  - Lufft has developed the Marwis weather-sensor detecting road and runway conditions. It comes optionally with CAN connectivity. Read on

- **Linux**
  - **Application service API for CAN**
  - Automotive Grade Linux (AGL) has released the Unified Code Base (UCB) 4.0 platform. It supports CAN. Read on

- **Remote attack**
  - **Security vulnerabilities on Tesla cars**
  - Recently, Keen Security Lab discovered another security vulnerabilities on Tesla cars and realized an attack to CAN-connected ECUs with latest firmware. Read on

- **Isobus**
  - **Autumn plugfest, pre-tests, and product releases**
  - In anticipation of the Agritechnica 2017, Isobus services and products are increasingly launched. Additionally, the AEF organizes its autumn plugfest. Read on

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