

The Beckhoff I/O Box module series are available in plastic, stainless steel, and die-cast zinc variants, each offering 8- and 16-channel versions.

Interview with Dirk Bechtel on the widening range of Beckhoff I/O box modules in IP 67 protection

Expanded range of machine-mountable I/O modules covers all industrial applications

With the long-standing IP series Fieldbus Box and the three different EtherCAT Box series (EP, EQ and ER), Beckhoff offers an extremely wide range of decentralized, machine-mountable I/Os with IP 67 or IP 69K ratings, depending on the housing type. In this interview, PC-Control editor Stefan Ziegler has a discussion with Dirk Bechtel, Product Manager Fieldbus Systems at Beckhoff, about how all industrial applications can be covered with the company's selection of I/O housing variants for harsh environments, the large variety of signal types, and openness with regard to many fieldbus systems.

How important is decentralized signal processing for modern machine building and plant engineering?

Dirk Bechtel: For a long time, there has been a clear trend toward minimizing control cabinet installation efforts and shifting more I/O devices directly into the field for signal acquisition. Apart from the obvious space and cable savings, there is a further advantage – especially in the processing of analog values – namely the short cable lengths between sensors and I/O box modules. This approach is in line with modular machine design; it facilitates simpler, error-proof wiring and reduces the frequency of plant commissioning mistakes.

What differentiates the Beckhoff range of IP 67 I/O modules from a practical point of view?

Dirk Bechtel: Our wide selection of housing and signal variants enables us to offer the ideal combination of functionality for each individual application. Apart from that, the modules are exceptionally compact, featuring a height of 126 mm, a depth of 26.5 mm, and a width of 30 mm (8-channel) or 60 mm (16-channel). If an analog signal is to be measured in an assembly machine, for example, a slim plastic module with four analog inputs is perfect. For the same signal in a press line, however, the I/O module in a die-cast zinc housing would be more appropriate. Supplemented by a total of 24 supported fieldbus systems, this level of variant availability is a particular competitive advantage for our portfolio.

To what extent can this portfolio be extended to comply with new market and application requirements?

Dirk Bechtel: We currently offer a rather broad selection of IP 67 box modules in varied case types. This covers digital I/Os through to more complex technologies such as stepper motor modules or the new EtherCAT Box for resistance bridge evaluation. In addition, the range can be extended very simply with new functions. On the one hand, this is a result of our comprehensive electronics knowledge and the thoughtfully planned electronic concept of the modules. The electronics, designed for a wide operating temperature range from -25 to +60 °C, are divided into a fieldbus segment and a signal segment. This functionality allows new signal forms to be implemented very quickly. On the other hand, we offer such new functionalities in all housing variants, i.e. as a durable plastic, stainless steel, or die-cast zinc box, because the design of the housing is standardized, irrespective of the material, and contains the same electronics for either the 8-channel or the 16-channel version.

What are the most important application areas for the different housing variants?

Dirk Bechtel: The proven plastic housings, used with the IP series Fieldbus Box and EP series EtherCAT Box Modules, are ideal for wet, dirty, or dusty environmental conditions. Industries needing this kind of robust protection include general mechanical engineering, assembly technology, as well as the

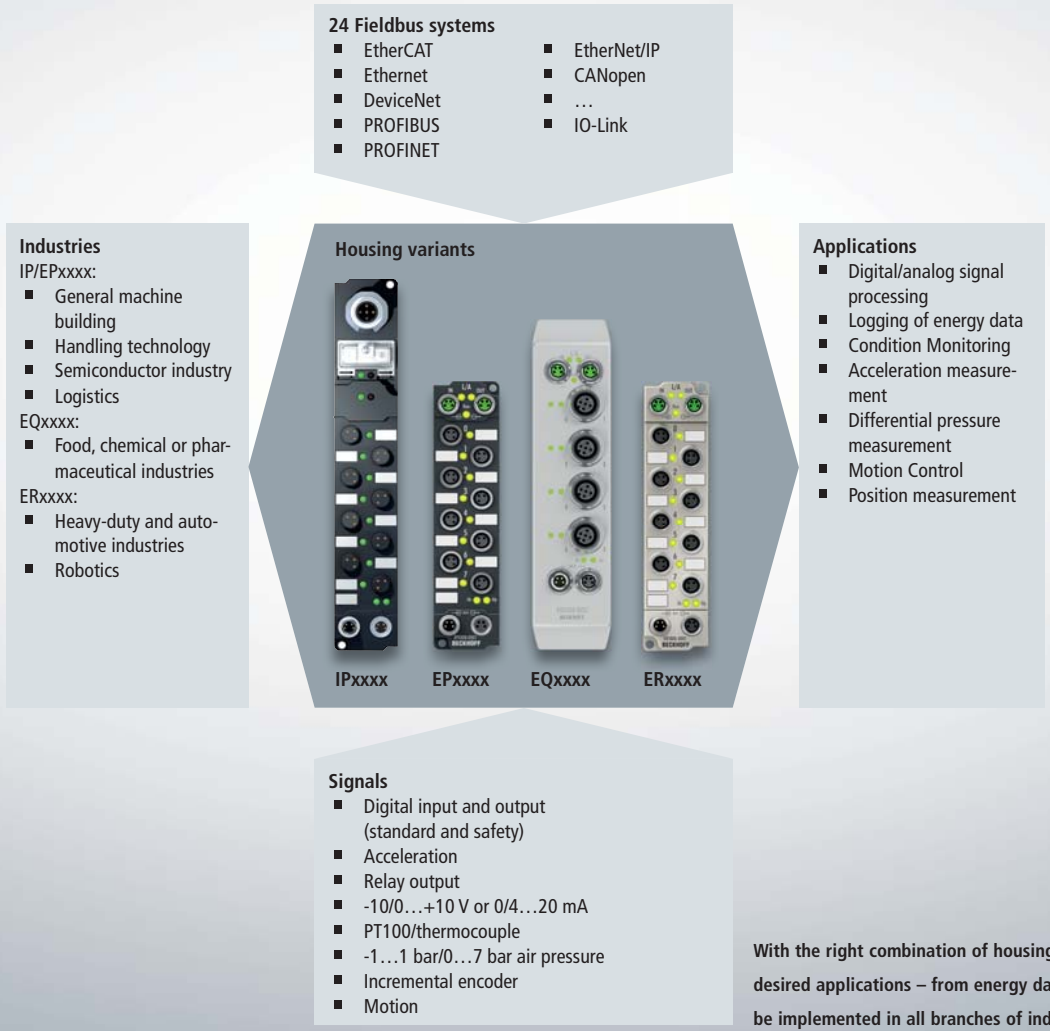


Dirk Bechtel, Product Manager Fieldbus Systems: "It will be a long time yet before every sensor is intelligent and web-enabled (smart sensors). With the decentralized IP 67 I/O modules, however, engineers can implement an intelligent technology migration as an intermediate step on the way to Industry 4.0."

semiconductor and logistics fields. The EQ module series, on the other hand, with stainless steel housings, and IP 69K protection, is designed for applications in the food & beverage, packaging, chemical, and pharmaceutical industries. The new and particularly robust I/O modules from the ER series are the latest additions to the Beckhoff EtherCAT Box lineup, and represent an ideal option for use in extremely harsh industrial and process environments. With fully die-cast zinc housings, they are ideally suited to areas that demand higher load capacity and resistance. Typical examples include: press lines and metal foundries, as well as automotive environments where die-cast zinc is the industry standard, or robotic applications where resistance to weld spatter is key. Of course, the modules from the ER series are fully compatible with the EP series and offer the same widespread I/O variety.

And what application challenges can be solved with such a broad range of I/O?

Dirk Bechtel: The wide range of applications is clearly evidenced in the comprehensive selection of I/O alone: digital inputs with various filters, combined with 3-axis acceleration sensors; digital outputs with output currents of 0.5 A to 2.8 A; and combination modules with freely selectable digital inputs



or outputs. Furthermore, analog input modules are available for the measurement of current, voltage, and differential pressure, as well as temperature measuring modules, serial interfaces, encoder inputs, and motion modules. These are supplemented with the necessary system components, such as an EtherCAT Box with ID switch, EtherCAT branch and star topology distributors, as well as power distribution, and an EtherCAT copper wire/fiber optic media converter. The range of applications accordingly extends from digital/analog signal processing and the measurement of displacement, angle, and acceleration through to Motion Control, Condition Monitoring, and energy data acquisition.

How important is the universality of the system while maintaining openness with regard to the bus systems?

Dirk Bechtel: Where decentralized signal acquisition is concerned, the universality of the system is very important. With support for, and the complete integration

of, 24 bus systems in total, the I/O box modules cater for every possibility, even in heterogeneous applications. However, the best performance by far is achieved with end-to-end EtherCAT communication, due to the high performance of EtherCAT and the elimination of the otherwise necessary protocol conversions. However, if the application stipulates different communication protocols, these can easily be integrated. An example of this is the new EPI and ERI IO-Link box modules, in plastic or die-cast zinc housings, which are implemented as IO-Link slaves.

For which specific applications are the new box modules for IO-Link suitable?

Dirk Bechtel: IO-Link is advantageous as a communication system where highly complex sensors have to be linked. Sensors designed for IO-Link could also be linked previously via the EP6224 IO-Link master. If such a master is present anyway, it can certainly make sense to acquire sensor signals decentrally in the



With the die-cast zinc modules from the ER series, the decentralized EtherCAT I/O system finds even more application possibilities in the most extreme and harsh environmental conditions.

field, e.g. with a 16-channel IO-Link box connected via a simple sensor cable, and then to transmit them to the IO-Link master. However, one should consider the disadvantages in relation to consistent EtherCAT networking: the topology, which is limited to point-to-point communication, and the considerably slower IO-Link communication.

What versions will be available with the introduction of the new module series at SPS IPC Drives 2014?

Dirk Bechtel: There are a total of 28 box modules in plastic and die-cast zinc versions available for IO-Link. The range includes both the 30 mm wide 8-channel and the 60 mm wide 16-channel EPI or ERI modules with digital inputs, digital outputs, and combined digital inputs and outputs, as well as with analog inputs and outputs. This provides users with maximum flexibility for their machine-mounted I/O system designs.

The EP3356 EtherCAT Box for resistance bridge evaluation mentioned earlier is also new. What are its main areas of application?

Dirk Bechtel: With the IP 67-rated EP3356, the functionality of the proven, IP 20-rated EL3356 eXtreme Fast Control (XFC) EtherCAT Terminal is now also available for decentralized installation in the field. It enables the direct connection of a resistor bridge (strain gauge) or a load cell with 4- or 6-wire connection technology. With automatic self-calibration (which can be deactivated if desired), dynamic filters, support for Distributed Clocks and a scanning rate of up to 100 μ s, the EtherCAT Box is ideal for the fast and precise acquisition of signals from torque or vibration sensors. Until now, this has been implemented, for example in weighing applications, by connecting together four sensors for strain gauge bridges in a small, local terminal box. The EP3356, with its integrated voltage supply, permits the omission of the terminal box, which simplifies installations considerably. In addition, the new EtherCAT Box represents a further element in a high protection class for the Scientific Automation approach we pursue, i.e. the integration of advanced measurement technology into standard automation systems for more streamlined and cost-effective control system architectures.

How important is the extensive range of accessories from Beckhoff for decentralized signal detection to be feasible?

Dirk Bechtel: In order for the company to reach its own goals as a complete I/O system supplier, Beckhoff also offers all necessary accessories with IP 67 protection. These encompass cables in different materials, including drag-chain-compatible versions, as well as corresponding M8 and M12 plug connectors, either straight or angled. Stainless-steel components are also available, for use in the food industry, for example. The user benefits from our profound expertise, in particular where core components are concerned, i.e. EtherCAT and power cabling for the I/O box modules. In addition, all the components for the connection of the sensors to the box modules are included. The user gains the advantage of having only one contact, a single-source supplier. In addition, the user can implement a system made up of pre-tested components, in the form of either prefabricated cables or field-configurable plug connectors.

Further information:

www.beckhoff.com/IP67