Flexible, independent and open

PSSuniversal I/O system uses Profinet to communicate between safe and conventional automation

Innovative automation concepts contribute to the productivity and cost efficiency of production plants in the automotive sector. Operators such as suppliers are only really interested in systems that offer greater functionality, while still providing a high security of investment. In other words: easy integration into existing plants, simple-to-use software, high scalability and flexible expansion. These are the requirements that formed the basis for development of the decentralised I/O system PSSuniversal.

As German automotive manufacturers had decided to use Profinet exclusively as the future communications protocol, PSSuniversal was fitted with a customised, certified interface for this communications protocol. To users, PSSuniversal is an open system, the structure of which presents some clear benefits.

With PSSuniversal, Pilz remains true to its philosophy to offer users open system platforms, free from any kind of communication restrictions. Consequently, head modules for the decentralised I/O system enable connection to the common standard fieldbus systems CANopen, DeviceNet, Profibus and Interbus, as well as to the safe bus system SafetyBUS p.

With the new communications interface for Profinet, Pilz has taken the first step towards Ethernet-based communication with an integrated safety protocol. All the company’s expertise and experience in the field of safety technology have been incorporated into the development of PSSuniversal. The result: there is now an alternative for seamless, safe integration of decentralised I/O systems into existing or new plant structures; an alternative that’s of interest both technically and economically.

During development, care was taken to ensure that existing program editors for process control systems such as the S7 Manager can still be used unchanged. With the appropriate GSDML files, PSSuniversal becomes part of the S7 Configurator and can be edited just like any other inherent system component. Users are even free to select the software tool. This is because Pilz uses the “tool calling interface” (TCI) available within the S7 Manager, which enables Pilz configuration software to be used, particularly in respect to safety functions.
Safety makes all the difference

In contrast to systems on which safety technology has been integrated retrospectively, PSSuniversal offers a system that’s been designed from the outset as a sophisticated, redundant safety system, with standard automation integrated in equal measure.

Both control philosophies - standard and safety – can be combined at will and are dovetailed logically without feedback, while remaining physically separate. This creates clear responsibilities, simplifies commissioning and engineering and enables short reaction times.

Right from the start, the I/O modules on the PSSuniversal were geared towards the needs of safety technology. As a result, users are not forced to consider additional application measures such as disconnection modules, specially shielded cable or special EMC filters for connecting field signals.

The I/O system can be assembled with total flexibility to suit the requirements of the application. A completely mixed structure is perfectly feasible, as is a purely standard or safety-related configuration. Connected periphery devices can be supplied separately. When supply modules are used, an independent supply group is formed. Even on Category 4 applications, I/O modules for safety and standard control functions can be used in the same supply group, reducing wiring and costs.

The integrated safety principle of the PSSuniversal is a key distinguishing feature when compared with existing solutions; it makes it easier for users to handle and address the safety technology.

What’s special about it: the head module alone represents the safety-related subscribers. That means all the necessary safety settings can be made at this one central point. One address is assigned per system header; this can be set directly on the head module via a touch-operated switch, or can also be set via the software. There is no need to assign awkward sub-addresses. Optimum utilisation of all the safety-related addresses on the Profinet Master is another factor, which means that the administrative work in assigning safety-related address ranges is substantially reduced. The fact that safety-related administration is organised exclusively in the head module makes the overall application more economical, as the more frequently used modules do not require complex, individual administration or intelligence. This is a huge benefit, particularly in applications where the proportion of safety is high.

Sophisticated functions save time

Ease of service was a particular focus for PSSuniversal, because in areas close to production as well as during maintenance, the way in which units operate increasingly determines whether or not system decisions are accepted.

Thanks to its modular design, the decentralised I/O system is not only scalable but also provides a number of additional benefits when exchanging units. Now even safety-related I/O modules can be hot-swapped, for example, without having to stop the system or dismantle it in any way. Individual
plug-in modules reduce the work involved and prevent errors, thus allowing the system to be recommissioned quickly.

The supply voltage for a group of standard outputs can be shutdown safely via the safe block switching function. In the case of danger, a complete plant section will be shut down safely while other plant sections can continue working. The relevant block shutdown module can be used at any point within the I/O system. If a safety-related switch command is received, all the standard modules positioned on the right-hand side are shut down safely. No additional external wiring is required. Another benefit is that integrated block switching, used in conjunction with the I/O modules for standard control technology, achieves Cat. 3 of EN 954 or PL d of EN 13849. As a result, costs can be optimised even further on those safety applications that are used most frequently.

Thanks to the function of the local, safe enable principle, response times can be up to 60 per cent faster. With increasing decentralisation it’s often necessary to link data from different sources. Based on the enable principle, the PSSuniversal compares the incoming switch signals from the process controller at field level with the safe enable information on a PSS programmable control system. The process controller can only switch an output if the safe enable is present.

As stated earlier, the configuration and service tools of the respective process control system, plus the Pilz software tools, can all be used. This makes for simple, fast commissioning of the decentralised I/O system.

**Connecting other systems**

PSSuniversal is not just a system for implementation of the I/O periphery: users apply it as a platform for their future automation. In addition to the processing of all the usual digital and/or analogue signals, Pilz is also focusing on networking with intelligent sensors such as the safe camera system SafetyEYE, and actuators such as the safe drives in the Pilz motion control (PMC) series.

Networking is based on the safe communications system SafetyNET p, which can be operated as a customised protocol for safety and standard applications on Ethernet. With the SafetyNET p RTFL version, Pilz supports the synchronised performance required to control the connected drive systems. This Ethernet technology is also the basis for simple, vertical integration of plant and machine data into networks and programs, for evaluation by the plant operator.

The combination of components - expandable into complete solutions if necessary - and safety-related consultancy gives users clear added value. In the field of safety technology, Pilz is a reliable partner for plant operators and suppliers alike; a partner that is continually expanding its product portfolio en route to becoming a system supplier.

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