Brain Gain

Compact HMI/PLC systems and robust IP67 block I/O solutions with a Codesys controller bring intelligence directly to the machine

Why do more and more people hold their smartphone in front of them when phoning? Because they can. It may seem strange to all those who grew up with a spiral cable at then end of a phone receiver, but you have to admit that holding the phone to your ear is nowadays no longer absolutely necessary. As soon as the loudspeaker function or headphone are used, the device can also be held in front of you and texts can even be read at the same time. Holding the device to your ear also makes the increasingly popular practice of exchanging sound recordings via messenger services more difficult. The irritation that this kind of behavior causes in other people is the pain of separation that arises when a regular social practice dies out. It makes the fact clear that a smartphone is simply not a basic telephone. The phone function is only one of the many functions of the device, and for many people not even the most important one.

Old routines are also being shaken up in automation technology. The change to digitally networked, highly flexible and transparent industrial production, which in recent years has been given the label Industry 4.0, is presenting designers and electrical planners with new tasks and challenges. One of the routines of mechanical engineering and particularly in electrical engineering 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 harsh conditions at the machine.

Potential of decentralized solutions

Decentralized I/O solutions in themselves are nothing new, but are becoming more and more interesting 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 IP67 degree of protection enables users to run the cables of the field devices 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

QUICK READ

The Codesys programmable TBEN-L-PLC block I/O module is another step by Turck towards the decentralization of machine intelligence. The compact IP67 controller offers sufficient performance to control several tasks autonomously. Master and slave interfaces also enable it to be used as a protocol converter so that it is possible to connect existing machines with modern Ethernet-based plants. For control tasks with operating and visualization requirements, Turck is offering the TX500 HMI/PLC series.

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-PLC Codesys-3 controller of the Mülheim automation specialist is a compact IP67 controller for use directly in the field. It is designed with three main scenarios in mind: The Codesys controller enables the customer to implement the fully autonomous control of small machines. The TBEN-L-PLC can control individual machine modules, which in turn are connected to a main controller, or it can be used as a protocol converter to interconnect machines with different Ethernet or fieldbus systems.

Multiple interfaces

These different application scenarios are made possible by the high performance and the number of communication interfaces offered by TBEN-L-PLC: When used as a master, the device also supports Modbus RTU, CANopen and SAE J1939 in addition to the industrial Ethernet protocols Profinet, EtherNet/IP and Modbus TCP. The RS232 and RS485 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 Ethernet networks Profinet, EtherNet/IP and Modbus TCP, as well as in Modbus RTU and CANopen networks, which enables 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 industry, 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, optimized transparency and production planning resulting from the evolution of Industry 4.0.

> The programmable IP67 I/O PLC modules, TBEN-L-PLC, are free of any control cabinet restrictions and make plants and machines fit for Industry 4.0 scenarios.

Turck has added TBEN-L-PLC and TX500 as new and robust high performers to its fieldbus team. With their decentralized intelligence, the devices support the trend towards machine modularization

The TBEN-PLC brings the controller to the field and enables the creation of modular machine concepts

Turck's new TX500 HMI series offers control, operation and visualization in a single device

Trend towards modularization

Another application scenario of the TBEN-L-PLC is the control of individual machine modules. The trend towards modularization has been driving some machine builders for several years. The value addition provided by smaller, autonomous units is created by the flexible combination of modules into a solution that best meets current requirements. Machine builders want to move away from one-off machine solutions, whilst still being able to provide solutions specifically tailored to customer requirements. The use of modularized machines and plants thus provides a compromise that satisfies both needs.

Particularly with machine modules, it is often necessary to decide according to the combination of modules, where the center of the machine is to be located and thus the location of the controller. With the TBEN-L-PLC, each module has its own controller on board, which can operate as a master or slave. The machine builder can thus decide from machine to machine where the intelligence of the machine is to be located. The hardware here does not present any limits. The linking of two modules only requires the connection of the two communication and power supply cables between them.

Even for these devices, a control cabinet is no longer necessary since the Turck portfolio also includes power supplies and safety technology in IP67 as well as I/O and controller technology. In its safety technology program, Turck has already presented its TBPN hybrid IP67 safety I/O module. Besides four safety I/Os for Profisafe, the module offers two universal I/Os which can be used as an input or output, as well as two I/O-Link master ports, which further increase the flexibility of the safety module.

HMI/PLC for operation and visualization

A solution is also available for machine operation: The TX500-HMI controllers with high quality touch displays and a high-speed processor offer a similar range of interfaces as the TBEN-L-PLC, and are ideal for use where the operation and visualization of processes are required as well as machine control. Each TX500 is equipped with a Profinet master and EtherNet/IP scanner, as well as a Modbus TCP and Modbus RTU master. The HMIs can also be run as slaves in both Modbus protocols.

Codesys 3 also allows the lean and straightforward programming of control and visualization functions in the TX500. The latest processor technology of the units guarantees the smooth handling of computing intensive processes right through to moving image visualizations. The high resolution TFT display with 64,000 colors enables the attractive and high performance display of graphics and animations. The front panel of the TX500 series is protected to IP66.

Two RJ45 Ethernet ports, a serial interface for RS232 or RS485 as well as two USB ports are provided on the terminal side. An additional SD card slot makes it possible to expand the 128 MB internal data memory. Turck is offering the TX500 series in three variants with different display sizes and resolutions: two 16:9 displays with 7" or 13" (TX507 and TX513) diagonals and one 10" device in 4:3 format (TX510). The two smaller displays offer 800 x 400 pixels, while the large TX513 comes with 1280 x 800 pixels.

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