Two at the Top

Turck is supporting the way towards Profinet integration in process automation with the world's first IP67 I/O module with Profinet S2 system redundancy – other product series will follow

Profinet has become the communication standard commonly used for factory automation. Many automobile manufacturers and suppliers are already experienced users in this area, and as early adopters have been demonstrating for many years the practicality of this communication system based on Industrial Ethernet. The number of users is increasing rapidly at present, as machine builders appreciate its powerful real-time transmission capabilities. The technology gives companies the benefits of the Profibus protocol as well as far greater flexibility in the design of their network structures. The upward trend is uninterrupted; the PNO user organization expects there to be more than 22 million nodes in the coming months.

This development is also expected to experience further tangible growth as Profinet is now being used in process automation. This area, however, has some special requirements which controllers and field devices have to fulfill. Turck's trend setting contribution to Profinet integration in the world of high

Plants in the chemical and pharmaceutical industry can be more reliably protected from downtimes with I/O systems in Profinet S2 system redundancy

Premier at the Hannover Messe: Turck's TBEN-L5-8IOL IP67 block module is the first IO-Link master module to support S2 system redundancy
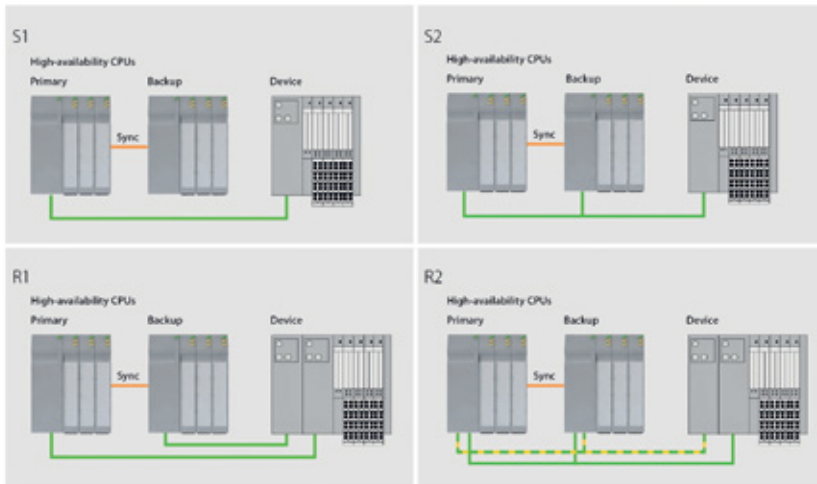
availability systems extensively increases the functionality of fieldbus products to support S2 system redundancy.

Protecting plants in the chemical and pharmaceutical industry from downtimes involves considerable effort. Compared to factory automation, where the focus is on higher unit quantities and short cycle times, the interruption of a continuous production process can lead to enormous financial losses. Furthermore, the handling of hazardous liquid or gaseous substances involves the observance of strict safety precautions – particularly in areas provided with explosion protection. As a preventative measure, companies therefore firstly invest in the safeguarding of potential ignition sources and secondly in a high availability system architecture. Controllers and I/O modules in the field
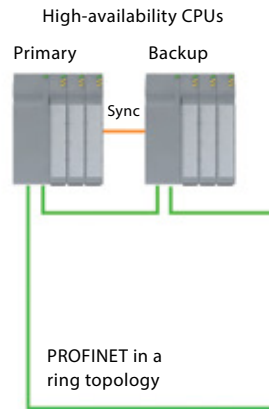
QUICK READ

Profinet is increasingly becoming more attractive to the process automation industry, also because the new profile for system redundancy establishes a concept for high availability plant operation in Ex and non-Ex areas. Turck is presenting at the Hannover Messe the TBEN-L5-8IOL as its first IO-Link master module in IP67 that supports S2 system redundancy. The master establishes a logical communication relation to more than one controller and combines high availability with a wide range of potential uses through IO-Link in the field. In the coming months, other I/O devices from Turck will be provided with the new profile extension, including products from the TBEN-L, TBEN-S, FEN20, BL20, BL67 as well as excom series.

Redundancy principles: S1 is a simple connection, i.e. no redundancy; if a Profinet device communicates with the primary controller and its backup via this connection, this is classified as S2 – very high and maximum availability is offered only with R1 and R2 system redundancy, which also require dual systems on the field side

Use of the profile for system redundancy enables Profinet field devices to communicate with high-availability controller systems

PROFINET in a ring topology

are normally provided with redundancy in order to ensure safe plant operation. If one device or connection fails, the otherwise inactive backup solution is activated. Planners implement these complex or limited redundant systems in accordance with the relevant requirements – both on the physical device level as well as in the underlying programming logic.

S2 system redundancy preferred
In the Profinet context, a new standard was created for this with system redundancy. The terminology used here is based on a gradation that reflects the degree of fail safety that an automation system is to provide. No redundancy is implemented (S1) if a controller and field device only communicate via a single connection. However, if a Profinet device supports communication relations to the primary controller as well as its backup via this single connection, this is classified as S2. In the event that the main controller fails, a bumpless switching to its physical twin is performed. For this the I/O system and I/O module in the field must maintain this logical dual connection to two entirely spatially separated controllers. These S2 solutions meet the requirements of many applications and are preferred in practical applications. The alternative term "simple system redundancy" should not obscure this fact.

Very high and maximum availability can only be achieved with R1 or R2 system redundancy. This involves the additional implementation on a field device of a redundant communication interface, and

is often used in conjunction with remote I/O. R2 with its four-way connection represents the highest level of complexity. Each of the two communication interfaces of a device here can establish communication relations – to the main controller and to its redundant copy. This crosswise protection from failures is used extremely rarely.
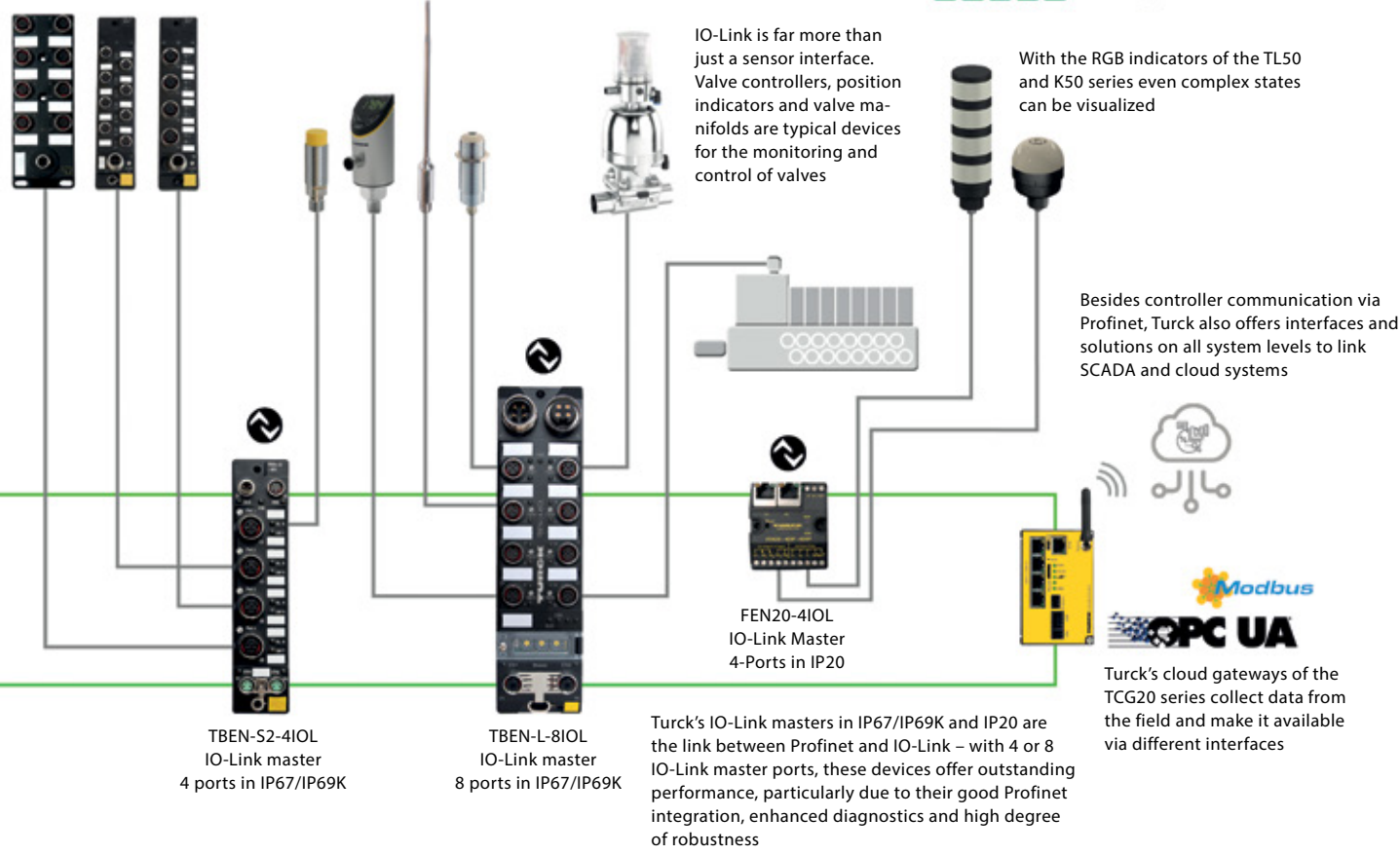
Turck brings high availability to the field
Siemens initiated the Profinet implementation of the redundancy profile and designed its controller systems to support redundant infrastructures. Profinet devices had previously not provided support for S2 system redundancy. Turck is now responding to this demand with an extensive expansion of functions.

The TBEN-L5-8IOL, presented to customers at the Hannover Messe, will be the first IO-Link master module that supports S2 system redundancy and offers protection to IP67 and IP69K, thanks to its fully potted electronic unit. This combination of Industrial Ethernet and IO-Link offers digitalization right through to the last meter. Furthermore, Turck's I/O modules come with an additional TCP/IP interface for read access to device data, so that all digital treasures can be gathered. Condition monitoring, asset management and predictive maintenance can thus be implemented without any limits.

Turck is also offering SIDI (Simple IO-Link Device Integration), probably the most user-friendly way of integrating IO-Link in Profinet projects. IO-Link masters

Standard signals are efficiently processed via IO-Link IO hubs from the TBIL-M and TBIL-S series

The range of IO-Link devices is enormous – RFID transceivers, pressure, temperature and level sensors are just some examples

IO-Link is far more than just a sensor interface. Valve controllers, position indicators and valve manifolds are typical devices for the monitoring and control of valves

With the RGB indicators of the TL50 and K50 series even complex states can be visualized

Besides controller communication via Profinet, Turck also offers interfaces and solutions on all system levels to link SCADA and cloud systems

FEN20-4IOL
IO-Link Master
4-Ports in IP20

Turck's cloud gateways of the TCG20 series collect data from the field and make it available via different interfaces

TBEN-S2-4IOL
IO-Link master
4 ports in IP67/IP69K

TBEN-L-8IOL
IO-Link master
8 ports in IP67/IP69K

Turck's IO-Link masters in IP67/IP69K and IP20 are the link between Profinet and IO-Link – with 4 or 8 IO-Link master ports, these devices offer outstanding performance, particularly due to their good Profinet integration, enhanced diagnostics and high degree of robustness

with SIDI give IO-Link devices the identity of a genuine Profinet module with their own GSDML entry. The function considerably simplifies the engineering of IO-Link devices in projects with Profinet controllers, since it allows access to all parameters and device properties from the engineering system without the need for additional software.

The first TBEN-L5-8IOL modules will soon be deployed in the USA in the plant of a biopharmaceutical manufacturer, which in future will manage its production with Profinet system redundancy and IO-Link. High availability is essential in the sector for the handling of mostly sensitive and cost-intensive products. An integrator in the pigging technology sector found the additional profile support for IP67 devices equally important. The company serves customers in the chemical, pharmaceutical and mineral oil sector. The high protection class of the TBEN field devices now simplifies the planning of systems in these sectors. Decentralized and modular network architectures can be designed so that the space required in the control cabinet is substantially reduced.

Rollout across multiple series
The IO-Link master is the first at the beginning of the major product upgrade to S2 system redundancy. Over the year, Turck will be providing other multiprotocol devices with the additional function, and block modules of the TBEN series will follow, as well as the IO systems for the control cabinet of the FEN20, BL20 and

MRP VS. SYSTEM REDUNDANCY

The subject of redundancy has been discussed in the context of Profinet for several years. However, two types must be distinguished here. The media redundancy that has been available for a long time – referred to as MRP due to the English name for the protocol – describes a connection between controller and Profinet device via a ring topology. All systems are simply provided once, however, plant operation in the event of a failure on one route is ensured by the spare route of the ring. System redundancy, on the other hand, refers to multiple communication relations between controller and Profinet module, which does not require an expansion of physical connections. With S2 system redundancy, the controller level is designed with redundancy by the addition of a backup controller. Thanks to the latest profile extension, Turck is supporting this logical dual connection with the TBEN-8IO-Link master. MRP and system redundancy therefore describe different concepts that can be optimally combined.

excom series. The changeover to Profinet with a wide range of signal types, both for the Ex and the non-Ex area can thus be completed without any obstacles.

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