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The Magazine for Turck Customers   Issue 2 | 2021

Control Cabinet in View

The distribution network operator e-netz Südhessen AG monitors the door position and temperature of its control cabinets with Turck's IM12-CCM

Fluid Sensors with Added Value

Flexible installation, intuitive operation, maximum robustness and a uniform look and feel – this is the promise of Turck's Fluid+ platform

The Bus is Coming

RFID applications with many read/write heads can now be implemented quickly and efficiently thanks to Turck's HF bus mode – right into the Ex area

»Back to the Future«

A year ago, we all lived through the first corona summer, marked by great uncertainty, austerity measures and short-time work. Today the situation is completely different: Immunization rates are on the rise, offices are filling up again, and new orders and sales have grown at an all-time high over the past twelve months. And now the first trade fairs are taking place live on site again – we are on our way back to normality. The SPS fair in Nuremberg, the traditional year-end trade fair for the automation industry, is now taking place again. We are delighted to finally be able to talk to you in person again about smart automation solutions and innovations for production and logistics, and to present these directly live.

We are presenting some of our innovations and trade fair highlights in this issue of your customer magazine: Starting on page 10, we present our Fluid+ sensor platform, which not only offers particularly flexible installation options and maximum robustness but offers a standard look and feel across all sensor variants. Another new addition to the Turck portfolio is the radar

sensor technology, which we use for level and distance sensors and present on page 24. The new radar sensors now bring the benefits of the technology to factory and logistics automation – including software support with the Turck Radar Monitor.

When we present new Turck solutions, IO-Link is usually included. Besides RFID, the communication standard is an important key technology for the smart factory and the IIoT, as it also allows the additional transmission of status data from sensors and thus condition monitoring and predictive maintenance. That›s why we have not only been involved since the beginning, but also have one of the most comprehensive IO-Link portfolios on the market today, from sensors to hubs and couplers to masters in IP67 and IP20 – and of course software tools for application support.

There is not enough space here to mention all the innovations. So why not take a good look at this issue of your customer magazine. If we have been able to attract your interest, we will look forward to meeting you at the SPS in Nuremberg. At our exhibition stand 250 in Hall 7 we will be glad to present the solutions on show in detail – and much more. You can find even more information on automation trends and innovations for smart production and logistics in the Digital Innovation Park, our »digital showcase« at www.turck.de/dip.

Regardless of how you get your information, we are there for you.

Yours sincerely

Christian Wolf, Managing Director

Content

Medal Winner Guest at Turck

At the 2020 Olympic Games in Tokyo, Jonathan Rommelmann won the silver medal in the double sculls together with his team partner Jason Osborne. The German champion, European champion and vice world champion thus crowned his athletic career to date. Turck congratulated the medal winner on this success during a visit to the company headquarters in Mülheim. "As an Olympic medalist you are a sporting hero for eternity, for this our deepest respect and warmest congratulations," said Turck managing director Christian Wolf during the visit. On his way to the Olympics, Turck has supported the athlete, who also comes from Mülheim, for years. Jonathan Rommelmann gave exciting insights into his preparations, the competitions and the challenging balancing act between competitive sports and medical studies. "For the past eight years, rowing has been my full-time job alongside my studies. On average, that was about 25 hours of training per week, with travel, preparation and follow-up not infrequently 35 to 40 hours – in addition to my studies. You have to want it and overcome a few hurdles. […] But the university also has to play its part," says Rommelmann. "It takes a lot of initiative and organization to make it all work out."


Linux-based Condition Monitoring Platform

The IM18-CCM50 is a compact condition monitoring control center for simple installation in the control cabinet. This enables the use of both the information of the integrated sensors for measuring door position, humidity and temperature, as well as the data from external sensors and measuring devices, which can be integrated via analog and digital interfaces. An add-on interface allows other devices such as the IM18-CCM51 to be connected for current measurement for 12 AC channels with up 600 A. This range of functions makes the IM18-CCM platform ideal for machine and plant builders wishing to use the open Linux operating system (Debian) for custom analysis programs. With its two independent Ethernet interfaces, the IM18-CCM provides an effortless connection between the OT and IT world.

M12 Power Portfolio

Turck now offers a fully comprehensive M12 Power portfolio in K, L, S and T codings. Besides the already available overmolded M12 Power cables, the M12 Power range now also includes field wireable male connectors, receptacles and junctions as well as M12-to-7/8" adapter cables. In addition to the connection technology, Turck is also offering its customers M12 Power technology in its robust I/O and RFID block modules as well as power supply units with IP67 protection. The wide range of possible combinations enable simple and efficient solutions for a structured and decentralized power supply – from the power supply unit to the control cabinet through to any end devices. Turck's robust M12 Power solutions are a match for the toughest conditions. The compact M12 male connectors are suitable for virtually any application.
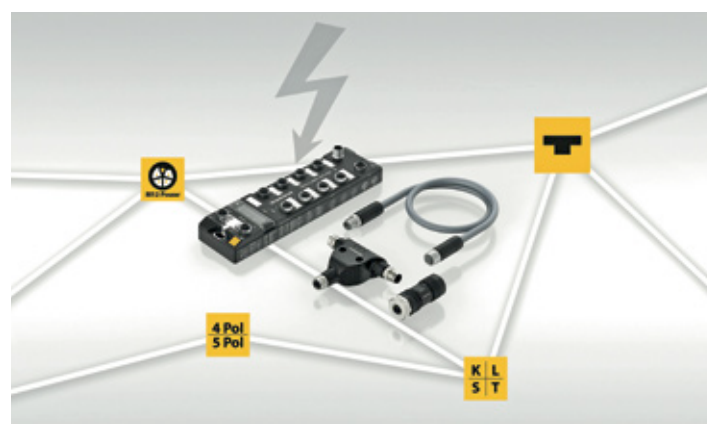
RFID Read/Write Head for Ex Zone 1/21

The TN-R42/TC-Ex is the world's only HF RFID read/write head certified for direct use in ATEX Zone 1/21. Turck is expanding its Industry 4.0 portfolio into explosion-protected areas and is thus underlining its commitment to being a supplier of end-to-end IIoT solutions in the process industry. The read/write head stands out from flameproof identification solutions for Zone 1/21 on account of its extremely compact dimensions and can therefore also be installed in applications where space is restricted. The slim-line TN-R42/TC-Ex is therefore ideal for the contactless identification of correct hose and flange connections, which ensure investment and product quality in the chemical and pharmaceutical industry.

EtherCAT Module with Eight IO-Link Masters

With the TBEC-LL-8IOL EtherCAT IO-Link master in protection class IP67/69K, Turck's entire IO-Link portfolio can now also be used for EtherCAT-based applications. The block I/O module in the robust TBEN-L housing offers eight IO-Link master ports, with four Class A and four Class B ports. Full galvanic insulation between the power supplies makes it possible to implement safety disconnections. Actuators such as IO-Link valve blocks, robot grippers or motors can be powered with up to 4 amperes. The power supply is implemented with future-proof M12-L coded connectors. The TBEC-LL-8IOLs are also provided with FLC logic (Field Logic Controller). This enables devices to take over simple controller tasks, pre-process data selectively and exchange it with higher-level controllers.

Fast RFID I/O Module for EtherCAT

The TBEC complements Turck's range of robust and compact RFID solutions with fast interfaces for EtherCAT networks. The TBEC module in the fully potted plastic housing comes with protection to IP67/IP69K and can be used in an extended temperature range from -40 to +70 °C. The EtherCAT RFID module enables HF and UHF read/write heads to run at the same time, thus simplifying applications with different bandwidths and reducing the range of inventory needed. Like all of Turck's Ethernet multi-protocol devices, the TBEC also supports the HF continuous bus mode by which up to 32 bus-capable HF read/write heads can be connected to each of the four RFID channels.

RFID Read/Write Devices with IO-Link

Turck is presenting three new RFID read/write devices with IO-Link in M18 and M30 threaded barrel and Q40 rectangular designs. Existing IO-Link applications can be effortlessly expanded with RFID using the new devices. With their fast COM3 interface and 32-byte process data width, the HF readers significantly improve the performance of IO-Link RFID systems. The devices also provide the option of password-protected access to data carriers and RSSI signal strength recording for permanent quality control. The read/write devices can be operated in IO-Link mode or in standard I/O mode (SIO mode).

Humidity/Temperature Sensor with IO-Link

With its first combined humidity/temperature sensor, Turck enables cost-efficient condition monitoring in the field and in the IIoT; very easy to integrate thanks to the IO-Link interface. The combination of the two measured variables air humidity and temperature in a single device makes the CMTH-M12 ideal for use in the condition monitoring systems of machines and plants or for monitoring the climatic conditions in production halls and warehouses in a wide range of sectors – from the automobile industry to the semiconductor and food industry, right through to agriculture. The sensor monitors two limit values ranges, each with a minimum and maximum value, for outputting a warning signal in the event of an out-of-range value. The bidirectional IO-Link interface can also be used for the transfer of cyclical user data as well as warning and status messages, such as operating hours. Conventional switching outputs are also provided as an alternative. When used in combination with Turck's multiprotocol I/O devices, user data and analysis data can be transferred over separate Ethernet protocols. While I/O modules transfer the user data to a higher-level controller via Ethernet/IP or Profinet, Modbus/TCP can be used as a parallel channel for analysis data. This information can also be provided for mobile access worldwide via Turck's edge gateways and cloud systems.

Simplified Handling of IO-Link Devices

With a comprehensive web server update for its I/O modules, Turck is once again optimizing the integration and handling of IO-Link devices. The new web server with optimized user guidance, an intuitive design, context-based help functions, as well as clever software components such as the IODD Configurator, simplifies commissioning and maintenance of IO-Link devices without additional software. The IODD configurator makes it possible for example to display relevant parameters in plain text or to graphically display the measurement curves of sensors. Via the manufacturer independent database »IODDfinder«, the user has access to all IO-Link devices available worldwide.
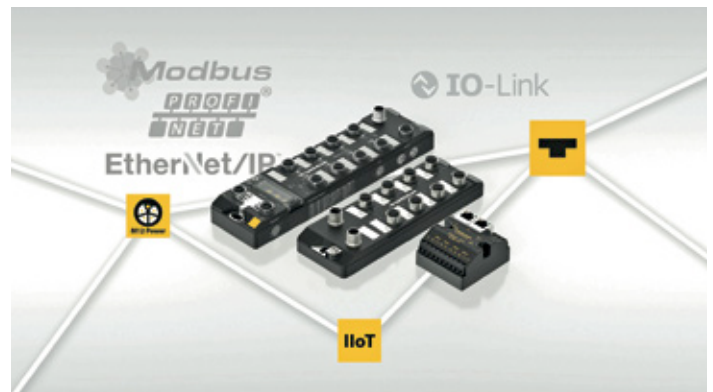
IO-Link Portfolio for Decentralized Automation

Turck is expanding its extensive IO-Link portfolio with a robust IO-Link master with an M12 power supply, a compact IO-Link master in IP20 and an I/O-Hub with an additional power supply. The TBEN-L-8IOL IO-Link master is now also available with an L-coded M12 power supply that enables currents of up to 16 A. The high power ports of the 8-port master enable power hungry equipment such as grippers to be fed with up to 4 A of power. As an IP69K device with an extended temperature range of -40 to 70 °C the rugged block module is ideal for installation at the machine. The IP20 FEN20-4IOL master for connecting four IO-Link devices is specially designed for use in restricted spaces.

SAVE THE DATE!

WIRELESS IOT
TOMORROW
2022

conference & exhibition

Wiesbaden
October 19–20, 2022

Encoders with an SAE J1939 Interface

Turck has extended its comprehensive encoder portfolio with new encoders featuring the SAE J1939 interface, which is particularly used in mobile equipment. The encoders are now available in Turck›s Industrial and Efficiency Line as single or multiturn encoders as well as the solid or hollow shaft devices in sizes 36, 46 and 58 mm. Two interlocked bearings ensure a robust mechanical design and offer protection from vibration or shock on the shaft.

High Dynamic Inclinometers

In its new generation of inclinometers Turck has combined accelerometer technology (MEMS) with gyroscope technology so that shocks and vibration can be masked out much more effectively than with conventional signal filters. The B1NF and B2NF single and two-axis inclinometers thus enable a previously unknown degree of dynamic measurement that even allows use in high-speed control circuits on moving or vibrating machines. The highly robust IP68/69K sensors output their signal via IO-Link COM3, the latest and fastest version of the digital interface.

Capacitive M8/M12 Sensors with IO-Link

Turck is presenting new capacitive sensors in the M8 and M12 metal housing for flush or non-flush mounting. The robust IO-Link devices with protection to IP67 are compact and offer versatile use, particularly for detecting objects in production, logistics or pharmaceutical applications. Their dynamic teach function simplifies setup during the ongoing process. The sensors can thus detect the extreme values of passing objects on conveyor lines and independently determine the ideal switch point. An integrated counter function enables the implementation of autonomous counting applications without the need for a PLC. The sensors provide a large amount of additional information for condition monitoring systems for the monitoring of machine states.

Flexible Drive Control of Roller Conveyors
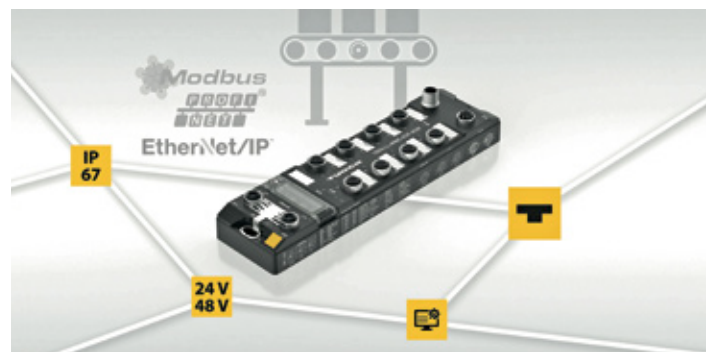
The TBEN-L Ethernet I/O family now also offers drive control modules for roller motors: The compact TBEN-LL-4RMC controls up to four RollerDrive EC5000 motors from Interroll with the special feature that 48 V motors can also be used. Four digital inputs and four universal digital channels, which can also be used as inputs or outputs, are used for direct integration of trigger signals or other actuators. The flexible TBEN module encapsulates the CAN protocol and enables simple parameterization and control of the roller motors as well as the actual communication. The support of other motor types with a CAN interface is planned with future device versions.
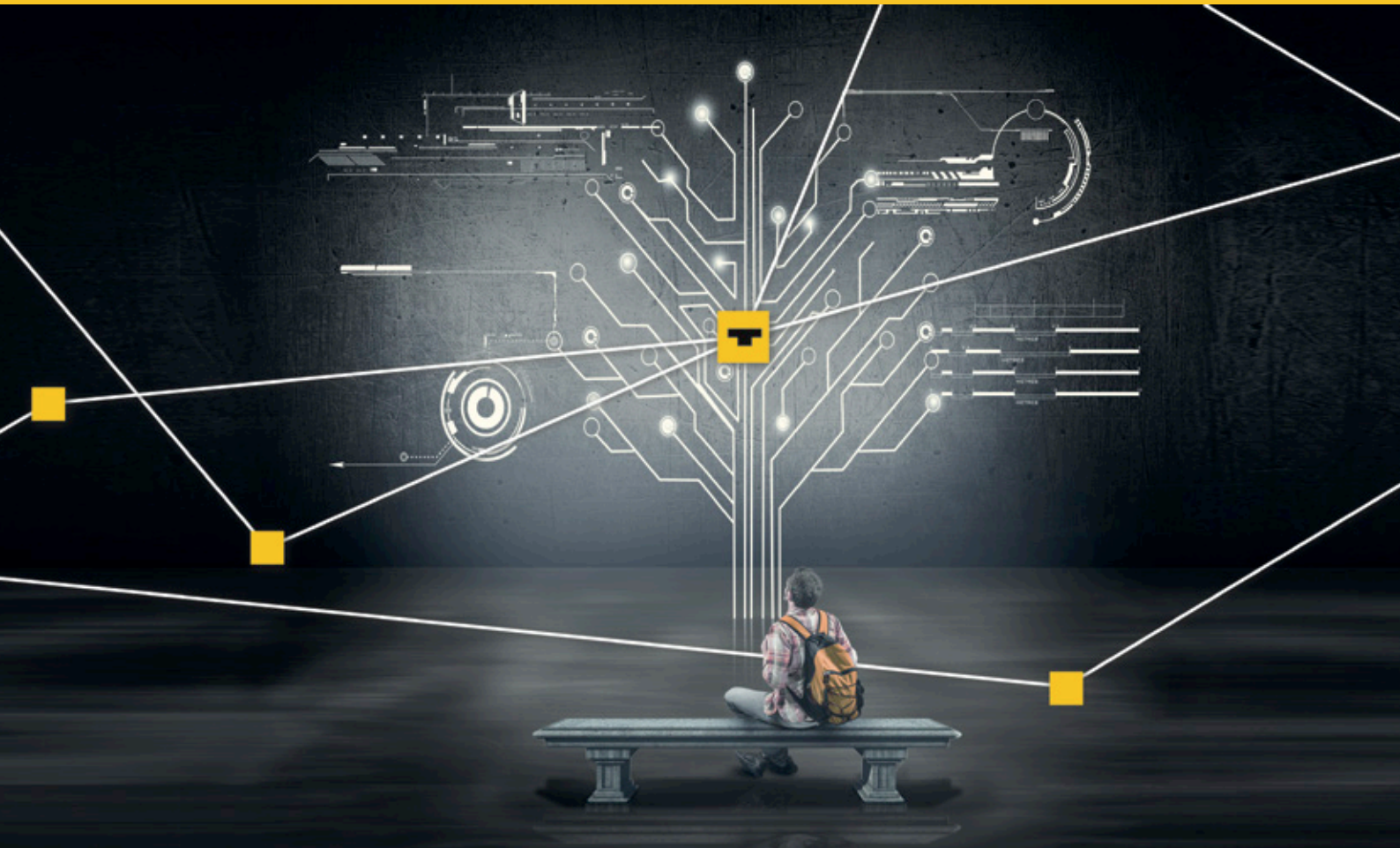
Generation Plus: Fluid Sensors with Added Value

Flexible installation options, intuitive operation, maximum robustness and a uniform look and feel – this is what Turck's Fluid+ platform promises across all sensor variants

Precise pressure, flow and temperature measurement as well as continuous level measurement and limit value detection require a wide range of customized solutions, resulting in increasingly complex fluid sensor portfolios. Logistic processes are becoming confusing, warehousing costly and delivery times are becoming increasingly longer. At the same time, ever shorter development cycles are presenting development departments with additional challenges: Speed, flexibility, scalability and efficiency are more than ever becoming critical success factors. This is exactly where Turck's modular Fluid+ series comes in.

Consolidation through platform strategy
The Fluid+ architecture divides the complex product series into its individual elements, which are assigned to specific modules. The interaction of the individual modules is limited to standard interfaces so that the modules can be developed independently of each other. The freely configurable concept of the Fluid+ platform helps in the creation of a wide range of devices, simplifies warehouse management and shortens delivery times, so that the specially requested sensors can already be made available within a few days.

Innovative design concept
Turck's Fluid+ platform is based on the simple strategy of providing the user with the same look and feel for the entire series. All Fluid+ sensors thus have a uniform appearance and also offer the same familiar handling irrespective of the application.

The key feature of the compact sensors is the sensor head, consisting of a stainless steel housing and a one-piece translucent front cap. The reduced sealing surfaces prevent the penetration of moisture or dust inside the devices since the sensors have no mechanical operating elements that have to be sealed. UV and salt spray resistant materials also offer maximum protection in outdoor applications. Users navigate function s in the same way as on a smartphone via wear-free, capacitive touchpads. This makes it possible to expand and maintain plants much more easily since employees only have to be trained for a single operating concept. The standard M18 x 1 coupling nut makes it possible to adapt different process connections to the particular application. The devices of the Fluid+ series thus offer a wide range of variants and combinations while having common key features at the same time. Both the standard look and feel and the input concept are unique in the industry.

IIoT

Fluid+ is Turck's uni-form sensor platform for pressure, differential pressure, flow, temperature as well as level via radar or ultrasound

Multiple awards

In 2019 the PS+ pressure sensor was the first sensor of the Fluid+ series to win the iF Design Award in the Industry/Tools category. The prize has been awarded every year since 1954 for outstanding achievements in product design. It was the innovative cross-platform operating concept of the sensor series that particularly impressed the jury.

However, Turck's Fluid+ sensors were not only able to impress the members of the expert panel. They were also well received by interested users. The fluid sensor series thus also won elektro AUTOMATION magazine's Automation Award in 2019. Visitors to the Nuremberg SPS – Smart Sensor Solutions trade fair voted the product series by majority as the winner of the Standard components & sensors section. The combination of a uniform technology concept and functional design impressed the specialist audience.

The readers of the Computer&Automation trade magazine voted Turck's FS+ smart flow sensor into second place in the Sensors & Measurement Technology category as "Product of the Year 2021". Over 6100 readers took part in the online survey and chose their favorites from over 500 products in a total of twelve categories.

Simple integration and commissioning

Straightforward installation and simple commissioning and operation were key criteria in the development of the Fluid+ series. This aimed to ensure that users can navigate quickly through the menu structure. Besides a standard operating concept throughout, the Fluid+ series thus also offers a large degree of flexibility for the installation, since the sensor head can be rotated freely around 340° and the display can be inverted for overhead installation. The sensors automatically detect whether the controller or fieldbus module expects PNP or NPN input signals. This same also goes for current

QUICK READ

With a multi award winning design, an operating concept that is unique in the industry and a look and feel that is uniform across all platforms, the IO-Link-capable sensors of the Fluid+ series set high standards and combine innovation, functionality, convenience and usability in one intelligent system – for the detection of pressure, temperature, flow or level.

and voltage when analog output signals have to be evaluated. Plug and play technology is thus being put to practical use.

Compared to other devices, the display of the Fluid+ sensors is larger and brighter, which allows easy visibility from any position when mounted appropriately. The innovative control unit's touch-sensitive keypads with smartphone haptics can also be operated with different types of gloves, without any effort or complicated gadgets. A locking mechanism initially prevents possible operating errors. The operation is only enabled by means of a swipe action on the display.

A user-friendly navigation guides the user intuitively through the plain text menu, which is based either on the Turck or the VDMA standard structure as required. Relevant settings are made simply and conveniently by touching the respective control panel. Advanced functions such as setting up password protection or the color change of the display as a mandatory action when defined switching points are exceeded can also be configured in this way.

Ensuring plant availability
When it comes to plant availability, reliability is the key factor. This is also where the capacitive touchpads prove their worth. The stainless steel housing in conjunction with the one-piece cover offers an extremely robust design. Eliminating the use of mechanical operating elements and the resulting reduced number of sealing surfaces ensures maximum protection from humidity and guarantees a high level of wear-free operation. The sealing concept enables the implementation of protection types IP66, IP67 as well as IP69K. Very good shock and vibration properties as

well as high pressure resistance ensure reliable operation and thus high system availability, even in the harshest environments.

Communication concept for Industry 4.0
Seamless operation throughout and transparency in the acquisition, transmission and processing of sensor data are central requirements for Industry 4.0. This is why the devices of the Fluid+ series support open standards like IO-Link 1.1, via which they can implement bidirectional communication with the controller. Besides process values, the IO-Link interface provides the user with a large volume of condition monitoring data for smart IIoT applications. This enables sensors to not only send digital process values but also receive parameters such as switch points. Diagnostic data can also be read out and evaluated via IO-Link in order to prevent machine failures. In this way, users can detect irregularities at an early stage and avert possible damage.

The devices of the Fluid+ series offer different IO-Link process data profiles, which allow the flexible integration of the sensor in existing system landscapes with a 1:1 replacement of existing devices – even from third party manufacturers. This eliminates the need for complex adaptions to the controller environment.

PS+ pressure sensors – maximum robustness
The robust and intuitive PS+ pressure sensors were the first devices in the Fluid+ series in 2019. These pressure sensors enable the reliable and reproducible measurement of process pressures in industrial applications. The large number of different pressure ranges and process connections results in a wide range of variants,

by which most applications can be implemented. Typical application fields are hydraulic applications, cooling circuits and lubricant applications.

PS+ pressure sensors are designed for pressure ranges up to 600 bar and are available with proven ceramic measuring cells (PS310) and also metal measuring cells (PS510). The measuring cells have a burst pressure of at least four times the maximum nominal pressure. The minimum/maximum pressure memory forms a digital "drag pointer", making an even better analysis of processes possible. The pressure sensors of the PS+ series guarantee hermetic tightness, even in the event of an overload.

FS+ flow sensors – one sensor, two data points
The compact flow sensors of the FS+ series can be integrated quickly and conveniently into machines or systems. They monitor fluid media according to the calorimetric principle and therefore offer the possibility to constantly measure the media temperature as well as the flow rate. This means that a single sensor can handle two tasks at the same time. Typical application fields are cooling circuits in welding applications, dry-running protection for pumps and process sequences in cleaning operations. Reliable monitoring of flow and temperature as well as seamless communication via IO-Link thus ensure plant operation and reduce downtimes. With their versatile mounting options and intuitive commissioning, the FS+ flow sensors also facilitate engineering.

In the FS100 product series users have the choice between devices with two output functions: either analog (4…20 mA) or with automatic PNP/NPN detection and communication via IO-Link 1.1. The switching behavior can be set between "normally open" (NO) and "normally closed" (NC). LED indication that is visible from all sides indicates the state of the outputs, while a bicolor LED strip on the user interface indicates either flow or temperature values.

The Quick Teach function offers considerable advantages in addition to simplified assembly and auto-detection of PNP/NPN signals. It allows a switching point to be set directly on the device in just a few seconds. Delta flow monitoring guarantees that the teach point is taught at the right time.

TS+ temperature sensors – maximum freedom
The sensors of the TS+ series enable the reliable and reproducible measurement of process temperatures in industrial applications. The large number of measuring ranges and process connections available produce a wide range of variants to easily meet the majority of application requirements. The TS+ sensors are available as both compact devices with an integrated temperature probe (TS700) as well as processing and display units (TS720) for connecting resistance thermometers or thermocouples. The devices automatically support and detect virtually all typical industrial temperature probes, such as resistance thermometers or thermocouples.

To simplify commissioning, the TS+ devices also offer automatic detection of the output type (PNP/NPN

The Fluid+ series simplifies commissioning with its particularly flexible mounting options, since the sensor head can be rotated freely around 340° and the display can be inverted for overhead installation

or current/voltage). The processing units of the TS720 series also detect the type of connected temperature probe (TC or Pt RTD), thus eliminating a frequent source of errors. If the TS+ has to be integrated in existing installations or replace existing sensors, the selection of different IO-Link process data profiles makes it possible to adapt the device quickly without the need for laborious modifications in the controller.

The TS+ sensors are typically used in machine and plant building applications as well as in the process

Like all devices of the Fluid+ series, the TS+ temperature sensor stands out on account of its high level of flexibility for process connections

industry. Compact TS700 devices operate in a measuring range from -50 to +150 °C. Depending on the temperature probe connected, type TS720 processing and display units can even cover temperature ranges between -200 and 1800 °C.

LS+ level sensors – efficient problem solvers

Turck offers two different sensor technologies in the LS+ series so that users can use the optimum measuring principle for different application scenarios: the LRS level sensors with radar technology for longer ranges and the LUS ultrasonic level sensors for smaller and medium-sized containers.

The IO-Link-capable radar sensors of the LRS series were developed for level measurement in tanks and silos in the range from 0.35 to 10 m. They solve problems where other sensor technologies reach their limits. The devices with protection to IP67 and IP69K are especially recommended for level applications in factory automation, where optical or ultrasonic sensors are unsuitable due to disturbance factors such as dust, wind or light. The freely radiating LRS radar sensors also offer extensive analysis functions which were previously only possible in the high-end radar sensors used in the process industry.

The touchpad of the LRS series with capacitive buttons and a translucent front cap is based on the same concept as the Fluid+ series and enables the output of distance, level and volume values. LRS sensors are available either with two switching outputs or with one switching output and one analog output. Thanks to their additional IO-Link interface and intelligent, decentralized signal pre-processing, all variants also offer a large quantity of additional information for processing in condition monitoring applications in IIoT. Besides signal strength, this includes temperature values, operating hours or switching cycles.
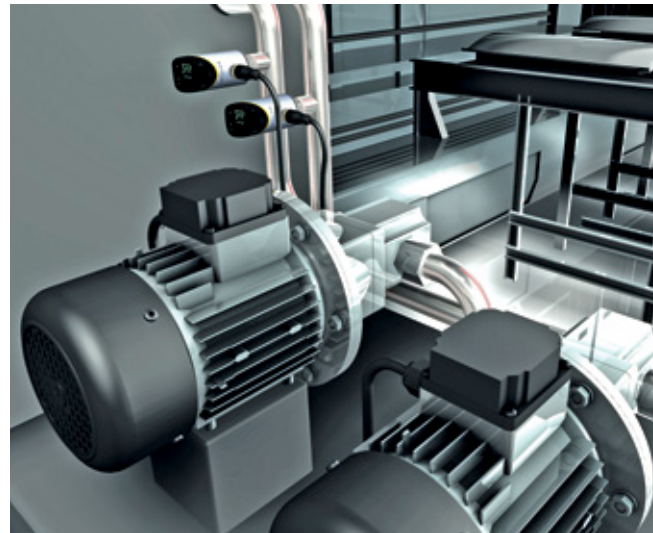
Robust PS+ sensors monitor the pressure at this hydraulic press

Users of Turck's IO-Link masters can call up the radar monitor via the IODD Configurator without any additional software. The browser-based configuration tool graphically displays the measurement curve of the sensor and offers plain text access to all relevant parameters. This makes it possible for example to mask out the interference signal of an agitator or grid, or to perfectly align with the real-time feedback of the sensor in order to maximize the reliability of level measurement. Typical application areas of the LRS sensors are machine and plant building applications, the automobile industry as well as the food and pharmaceutical industry.

The LUS ultrasonic level sensors are ideally suited for cost-effective level measurement in small and medium-sized tanks and can be operated at pressures from 0.5 to 5 bar at the process connection. The series is active with the standard G ¾ and NPT ¾ process

The LS+ LRS level sensor ensures a correct level in this dip painting tank thanks to radar monitoring
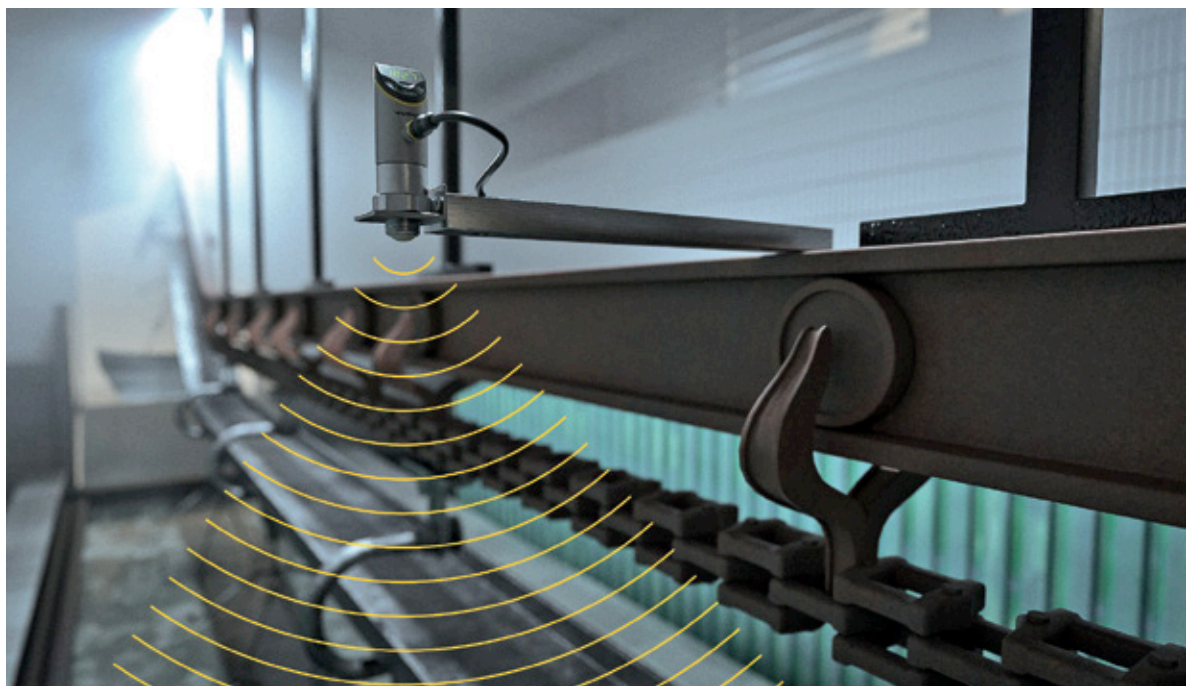
connections for a 40 and 130 cm range, either with two switching outputs or with one switching and one analog output. Thanks to their IO-Link interface and decentralized signal preprocessing, all variants are also suitable as smart data suppliers for IIoT. The sensors can also be parameterized with the existing container geometry data via IO-Link, so that this can directly output distance, level or volume as absolute or percentage values.

Due to the high IP67 and IP69K protection types, the devices can be used reliably even under severe conditions. The continuous signal strength evaluation and the recessed and thus protected sonic transducers furthermore ensure increased system availability. An air cushion prevents the medium from contacting the sonic transducer in the event of overfilling. Typical application areas of the LRS sensors are in machine and plant building, the automobile industry, and the food and pharmaceutical industry.

Conclusion

The modular and flexibly configurable mechanical concept of Turck's Fluid+ series helps in the creation of a wide range of product variants and shortens delivery times, so that the many sensor variants can already be made available within a few days. The modular design gives all Fluid+ series sensors a uniform look and feel. This enables users to expand and maintain their plants simply since employees only have to be trained for a single operating concept. Flexible mounting options,

smart system integration and the innovative touchpad with the haptic technology of smartphones guarantee fast and straightforward device commissioning. Besides process values, the IO-Link-capable devices provide the user with a large volume of diagnostic data for smart IIoT applications to ensure plant availability. The sealing concepts and the materials used make Turck's Fluid+ series extremely resistant to external influences.

Users benefit overall from a product series that is "commended" in the truest sense of the word, combining functionality, convenience, user-friendliness and innovation in an intelligent design.

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Further information: www.turck.com/fluid

»With Our Solution, the User Does Not Have to Go Deep into the IT World. Any Mechanical Engineer Can Work with It.«

Olaf Ophoff | Vice President Business Unit Automation Systems

In the era of Industry 4.0 and IIoT, automation providers must also address the issue of data communication. Turck has been doing this for a good three years. The technology buy-out of Beck IPC was virtually the birth of Turck Cloud Solutions. In an interview with Olaf Ophoff, etz editor Frank Nolte found out what's behind the cloud solution, how it has developed and what else can be expected from the sensor-to-cloud offering.

How has the Cloud Solutions area developed in recent years?
The cloud is the catalyst for automation technology and the convergence of the IT and OT worlds. Cloud solutions are now being used by our customers in an increasing number of applications, where they really come into their own. More and more companies are transforming their business models through IIoT and, for example, charging for the use of a machine by means of a pay-per-use system. The management required for this can be conveniently handled via the cloud. Convenient remote access to systems at various locations around the world is naturally also possible with a cloud. A recent example is the monitoring of pumps on a construction site to ensure that no damage is caused by rising groundwater. But we don't just provide cloud access. We see ourselves much more as consultants in finding applications.

There are now many different industrial cloud solutions on the market. What makes Turck Cloud Solutions different?
Our solution is specially tailored to machine building requirements. Many other solutions, for example from hyperscalers, typically rely on big data. We know from our customers that smart data is more in demand in the industry. It is not a matter of storing as much data as possible, but rather of intelligently pre-processing the data that comes from the sensor system and looking in the automation system to see if the behavior of this data is compliant. Only when deviations from normal behavior occur does the cloud come into play to report, warn and suggest solutions. With our solution, the user does not have to go deep into the IT world. Any mechanical engineer can work with it. They only need to define which data they want to process in the cloud. For this purpose, we offer

devices that do not require a separate gateway, such as our TBEN PLC in the block housing or our HMI. Customers tell us again and again that many cloud solutions are overloaded with functions that are not needed at all. Simple, manageable and straightforward: these are always the important features for us.

With the many clouds that exist in some plants, don't customers need cloud management?
If you need this, you probably need a better IT consultant. In any case, those who use our solution do not need cloud management. We focus on openness and tie ourselves to the system that the customer wants. With our cloud solution, we offer a data center as a service on request, which takes over all tasks. The costs involved remain manageable. This is guaranteed not least by our efficient data pre-processing.

Communication from the field level to the cloud can take different routes. What options do you offer?
Basically, everything that is required. This includes all devices in the field, i.e. sensors and actuators. The most direct way would be to transfer the raw data directly to the cloud. Transmission via gateways is another common route. Many of our customers have already installed machines in which a PLC is integrated, so that data is already available there. Decentralized data pre-processing is particularly important to us, because as a general rule: the less data that goes to the cloud, the more secure the data transfer. This pre-processing can take place in smart sensors, in the IO module or in decentralized controllers where the most important data is presorted. Also bear in mind that the route to the cloud is not a one-way street. An exciting point about sensor-to-cloud is also the reverse route.

Sensors should after all also be able to react to errors detected on the basis of the data transferred and rectify them. Condition monitoring or predictive maintenance are currently the order of the day.

Selecting, pre-processing and analyzing the right data is therefore of key importance. To what extent do you support your customers in this area?
We enable the customer to pre-process data with our Field Logic Controller via the intuitive Argee software or with the well-known Codesys 3.5 PLC platform. This allows users to find the optimal mix of data volume and pre-processing for themselves. However, we notice time and again that IT employees approach the problem differently than employees who are at home in the OT world. We therefore often act as interpreters and problem solvers between the two worlds.

Data analysis and evaluation in particular require special know-how. Do you have this in-house or do you work with partners on this?
Partnerships are always very important. You don't have to be able to do everything, but you do have to have the right partners or get them on board. Example: We acquired our former RFID turnkey solutions partner Vilant Systems in 2018. Today, as Turck Vilant Systems, the company is a 100 percent member of the Turck Group and supports our customers with its know-how in identification processes in production and logistics with the integration of RFID complete solutions up to their ERP systems.

It's not a big step from data analytics to the digital twin. Can you imagine offering these kinds of solutions as well?
As far as the necessary standardization goes, the IDTA (Industrial Digital Twin Asso-

In order to process data from machines and sensors specifically in the cloud, pre-processing and filtering in the edge, i.e. always very close to the process, is an important process

ciation) of ZVEI and VDMA is the key to success. We are one of its founding companies, have been involved from the beginning and can also imagine offering digital twins in the future. Only by means of a digital twin can machines be simulated efficiently, even without being physically present. The automotive industry is once again a pioneer and has been moving in this direction for some time. They simulate production lines in order to optimize plants and processes in advance.

In your strategy, you also rely heavily on IO-Link. Where can the benefits of cloud and IO-Link be seen?
Today, IO-Link is the industry standard for smart sensors and actuators. Almost every machine more or less now has IO-Link. Due to its advantages, this interface has now become established throughout the field. The sensors are becoming smarter and contain, for example, a lot of data on iden-

tification, process values and conditions. IO-Link as an interface acts as a data collector on site and users can even send the data partially pre-processed to the cloud. IO-Link is thus the basis for the efficient use of sensor-to-cloud communication. And without the sensor, the user is still unable to accurately interpret the state of the machine and transfer the necessary data to a cloud.

Not all sensors are always easily accessible. How do you get data from sensors in remote plant sections where a network connection is difficult to implement?
It depends on the circumstances. While wireless solutions are suitable for brownfield systems, wired transmission is generally recommended for greenfield systems. Since Turck has many gateways and products in its range, we can implement almost anything and use any transmission path, although wired transmission is always the more secure.

Data security is playing an increasingly important role. What security concepts do you have?
Security involves many aspects right through to the prevention of unauthorized access to machines and plants by hackers. Our Kolibri protocol is a lean and secure protocol. As it is also relatively rare, it's hardly worth attacking. Moreover, the data

is encrypted in the cloud, so that the data itself would be useless to a hacker. Added to this is the fact that the data is processed in a secure data center. We are further developing the issue of security constantly and we must not rest on our laurels. Our IEC 62443-based products thus guarantee a high degree of resilience, and optional updates will ensure in the future that they are always up to date in terms of security.

What are your goals with Turck Cloud Solutions?
We want to push the openness even further to be able to speak with even more cloud solutions – including customer-specific in-house developments. It is and always will be important to us to guarantee a simple connection directly in the devices. In addition, the topic of "anomaly detection" will also be expanded so that we can continue to offer our customers solutions that are tailored to their needs and yet easy to handle.

Further information: www.turck.com/s2c

»Efficient data stream: hand in hand right up to the cloud«

Application example hose coupling station: the TNR42/TC-EX RFID reader in the Ex area captures the RFID tags embedded in the caps and thus ensures safe production and traceability

The Bus is Coming – Right into the Ex Area!

Whether for coupling stations, paint cartridges, format or tool changes: Turck's HF bus mode makes it possible to implement RFID applications with many read/write heads at a very affordable price and quickly – with only one cable into ATEX Zone 1/21

A highly automated, highly flexible and closely networked industrial production system requires efficient technologies to identify systems, tools, workpieces and products. It also requires smart data, without which the migration toward the digital transformation of production plants would not be possible. The wireless-based RFID identification technology plays a major role here, in addition to sensors, ideally with IO-Link, and optical identification systems. RFID is a key technology for the Smart Factory and the Industrial Internet of Things IIoT since it enables the unique and contactless identification and localization of products, tool carriers or tools.

Robust block I/O modules as RFID interface
Implementing RFID in production processes is often a complicated and time consuming business. Turck offers its customers support here with its Ethernet RFID interfaces based on the TBEN-L, TBEN-LL, TBEN-S und TBEC-LL block I/O series. The multiprotocol devices enable HF or UHF read/write heads to be run simultaneously and bring data via Profinet, Ethernet/IP or Modbus TCP to the controller. The modules thus simplify applications with different requirements and reduce the range of inventory needed. Another RFID interface for EtherCAT (TBEC) was added to the range just recently. All RFID I/O modules come in the fully encapsulated plastic housing with protection to IP67/IP69K and can be used in an extended tempera-ture range from -40 to +70 °C. The robust modules can thus be used directly at the machine without the need for a control cabinet or switch box.

The highly compact TBEN-S RFID module – like the standard type of the TBEN-L module – enables simple implementation without any special programming or function blocks required. The UID or the memory areas of the tags can, for example, be read and transferred, when triggered by the read/write device, even without sending a command to the controller. The integrated web server allows function testing and commissioning without using a controller. The CODESYS programma-ble TBEN-L variant provides controller functions and can thus already filter and pre-process RFID data directly in the field, and even link it if required directly to control operations. Turck also offers the TBEN-L RFID interface with Linux in a version for system integrators. Another variant of the TBEN-L RFID interface is avail-able with an integrated OPC UA server which complies with the Auto-ID Companion Specification.

Besides four RFID ports, the TBEN-L modules also come with eight universal DXP I/O channels allowing the connection of sensors, signal lights or other actuators. All terminals are implemented as M12 male connectors, and the power supply of the L-coded versions is implemented with 7/8 inch M12 connectors. With the LL variants this is implemented with L-coded M12 male connectors for the future-proof M12 Power technology.

Bus mode allows 128 read/write heads per interface
Particularly in applications where several HF read/write heads are used in a restricted space, Turck's TBEN

Turck's HF bus mode and encapsulated RFID readers enable users to benefit for the first time from the advantages of a line topology, even in Atex Zone 1/21

interfaces, as well as the TBEC EtherCAT interface, come with a very special feature: HF bus mode. As this function, unlike IO-Link for example, does not require any point-to-point connection, it enables the user to connect up to 32 suitable HF read/write heads in series to each of the four RFID ports. This reduces the wiring effort and costs required in applications involving a large number of read and/or read positions.

The cabling is implemented very easily in a line topology. The read/write heads can be branched from the main line via 2 meter stub lines. The system can therefore be installed and extended easily. Each of the 32 read/write heads can be addressed individually in bus mode to perform a wide range of commands such as read, write or inventory. The read/write heads can be addressed both manually as well as automatically. In an exchange between individual read/write heads, addressing is carried out automatically in ascending order according to the order of connection. Thanks to the minimal use of modules and cables, the user not only benefits from cost savings but also from shorter mounting and commissioning times.

QUICK READ

RFID applications involving many read/write heads, such as coupling or hose stations, are often very expensive and time consuming to install and maintain due to the hardware required. With HF bus mode for its IP67 RFID interfaces, Turck has developed an efficient solution for this challenge. The function enables up to 32 HF read/write heads to be connected to each RFID input of an interface module. With four RFID channels per module, this means that up to 128 read points can be captured and parameterized centrally. Turck's TNR42/TC-EX encapsulated HF-RFID reader even enables the use of the line topology in the hazardous area (Zone 1/21).

Maximum performance in Continuous mode with track & trace

Continuous HF bus mode is similar to HF bus mode in its structure and cost benefits but enables all read/write heads to be activated at the same time. Thanks to its higher performance, Continuous mode is therefore suitable both for static as well as slow moving applications, in which, for example, tags can be read or written simultaneously. The individual read/write heads in this case store the read data in a buffer until the RFID interface queries it cyclically in sequence. The data is stored in the FIFO memory of the interface and can be fetched by the controller via the "Get data from buffer" command.

The "Track & Trace" function of Continuous HF bus mode opens up new application fields, such as in logistics or materials handling. This includes parallel detection in multi-track transfer/conveying systems, for products with different tag position heights in a line and applications with synchronized production machines. Several predefined commands and operating modes for the most common application scenarios also reduce the programming required in the PLC. The grouping of data and different data export options also often make any middleware unnecessary. The mixed operation of HF and UHF read/write heads is still possible even when using HF bus mode on the other RFID channels.

Using fully encapsulated readers right through to the ATEX Zone 1/21

Turck's TN-R42/TC-Ex is the world's only HF RFID read/write head available that is certified for direct use in ATEX Zone 1/21. Unlike the well-established flameproof solutions for identification in Zone 1/21, the very compact design of the encapsulated reader means that it can also be installed in restricted spaces. The slim-line TN-R42/TC-Ex is therefore ideal for the contactless identification of correct hose and flange connections in coupling stations. HF RFID tags with a password function are also available for applications with demanding requirements with regard to data security and access protection.

With the approval of bus mode for use in Zone 1/21, Turck can now offer a complete portfolio for non-Ex and Ex devices in bus mode. The interface of the TN-R42/TC-Ex behaves like a standard read/write head, so that the user can enjoy the same look and feel on the devices when connecting and configuring the entire system, regardless of whether it is intended for Ex or non-Ex operation. In Ex operation it is only necessary to remember that the last station in the bus line has to be a device with a bus terminating resistor. The number of connectable read/write heads in bus mode is also restricted in Ex operation: this is five readers per channel on the compact TBEN-S interface and ten readers per channel on the TBEN-L interface.

Protective housing enables use in ATEX Zone 2

In order to be able to reliably operate the IP67 RFID interfaces and I/O modules of the TBEN-L, TBEN-S and TBEC product families or the isolating switching amplifier IMC also in hazardous areas, Turck has developed a protective housing concept made of stainless steel. The protective housing encloses the module approved for this application as well as its connections and thus protects against mechanical damage or unintentional disconnection. In this way, all specifications for the use of the devices in ATEX Zone 2 are fulfilled.

Mechanical protection: The stainless steel housings allow the modules to be used in ATEX Zone 2.2
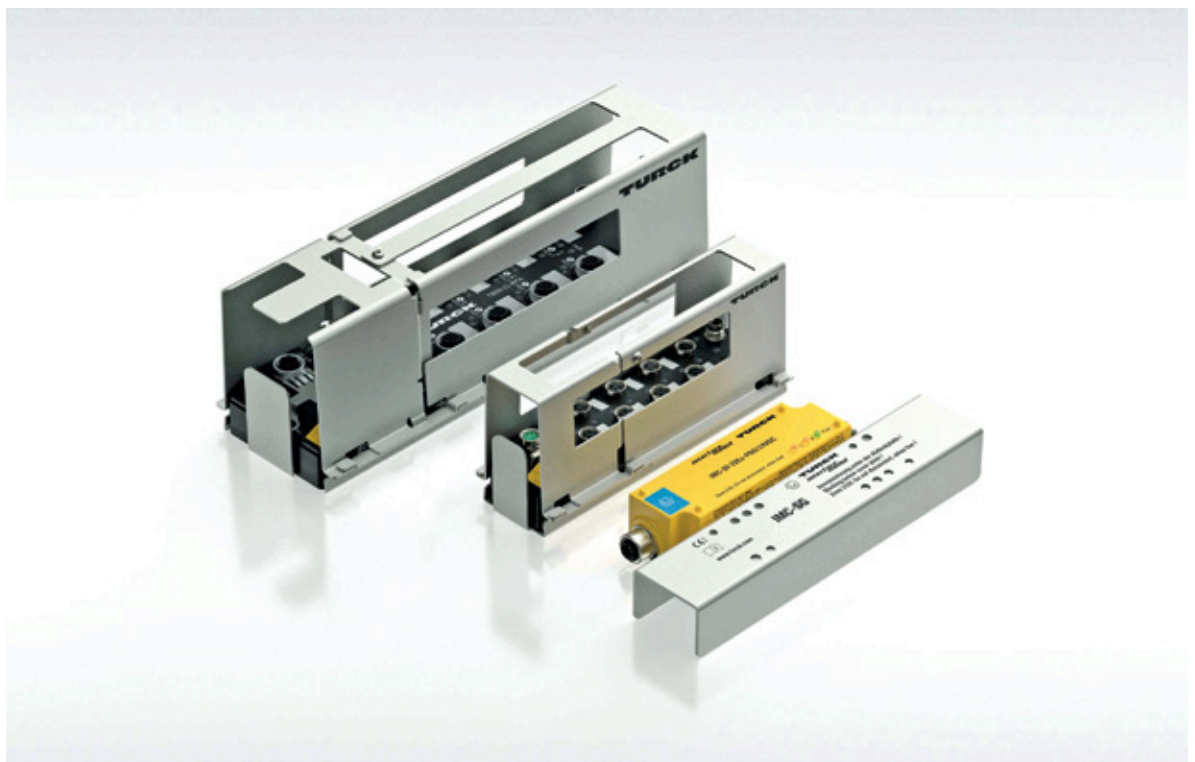
Up to 32 read/write heads can be connected to each RFID channel, with four channels up to 128 read/write heads per interface

Each conveyor line is equipped with a bus-capable read/write head that is easily installed in a line topology with T splitters

Reduced commissioning effort

Thanks to the integrated Turck RFID data interface with cyclical process data transmission, the user benefits from quick and easy access to HF and UHF functions such as Idle mode. The bus-capable HF-RFID read/write heads can also be addressed automatically by simply activating the read/write head addresses in the parameters of the data interface. Compared to the conventional method, this saves users considerable time since they can connect the read/write heads in succession and address them automatically. Bus addresses for bus-capable HF read/write heads can also be set and queried by the web server/PACTware via the TBEN-S-RFID. In this way, users can check the correct startup of bus mode without having to use an interface converter.

Hose stations, paint cartridges, format or tool changes

HF bus mode is already being successfully used in real applications, such as with coupling and hose stations in the chemical, pharmaceutical and food industry. Incorrectly connected or leaking media may have serious consequences for plant safety, product quality or the health of coworkers and customers. The entry of acid in the wrong tank can result in a serious potential hazard. In order ensure the correct connection between a hose and the corresponding connection point, Turck therefore offers an HF RFID complete solution, in which HF bus mode plays a key part in ensuring efficient operation. Only when the read/write heads have detected the correct hose connection, is the opening signal output at the valve and pump. Thanks to RFID, it is also possible to transfer information like the date or time of the last hose cleaning. Turck's TNR42/TC-Ex HF-RFID reader also enables use in the hazardous area (Zone 1/21). The solution package is rounded off by a range of different tag types adapted to specific application requirements, including a glass variant for aggressive media. RFID tags can also be embedded directly in a metal cap or attached with a clip.

Another application field is the identification of printer cartridges. In this application, the tanks are identified automatically by the read/write head in order to reliably prevent faulty print results and production downtimes. The system can also remind operators to change an ink in time. The system determines the timing of the message according to the time when the ink cartridge was fitted and its expiry date. The current ink consumption is used to approximate the level of each individual tank.

In many other applications users benefit from HF bus mode and the possibility to connect many HF read devices quickly and affordably. This includes for example machines with several format and change tools, which can detect and document in this way the correct tool for a particular operating step. Another aspect of this solution is brand protection. Both machine builders and users thus benefit from the safety and increased service life resulting from the use of original tools and original consumables such as oil or air filters. However, new and innovative business models are also conceivable if the machine is not sold but the use of the machine is monetized based on the calculation of the tools or format parts and consumables used. The machine builder can also set up an automatic consignment warehouse for the user. As soon as a component is inserted in the machine, a message is sent to initiate the replenishment of the item concerned. However, this concept only works if the exclusive use of original parts is ensured.

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The Perfect Wave

Turck radar sensors for level and distance measurement bring the benefits of the technology to factory and logistics automation – including visualization with the Turck Radar Monitor
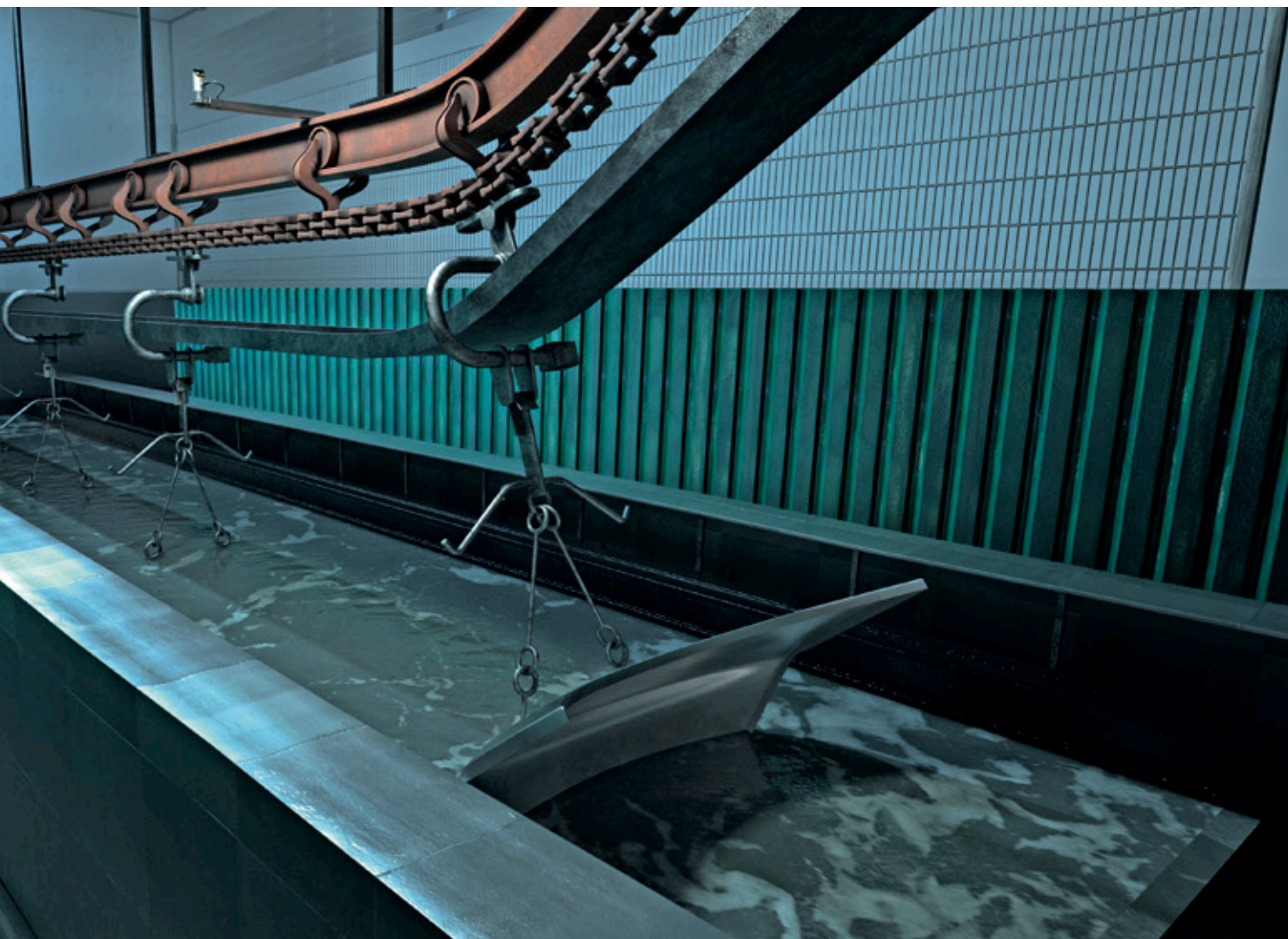
Most people associate radar technology with speed radar traps on the road. In the past decade, the technology has increasingly found use in the car itself. Adaptive cruise control systems, so-called ACC systems, use radars to determine the distance to vehicles in front and their speed.

For a long time, radars have been rather exotic devices in industrial automation. The process industry, on the other hand, has been using this technology for level measurement for some time. Since radars reliably detect levels even over long distances without media contact, they have clear advantages over ultrasonic, optical sensor or media-contacting technologies in many applications. In manufacturing automation,

The LRS+ radar level sensor shares many of its positive features with the other members of the Fluid+ sensor series. The alphanumeric bicolor display with capacitive buttons simplifies operation and commissioning of the sensors

Radar sensors are ideal for wear-free, non-contact level measurement in dip coating baths, interference signals such as from hooks and linkages can be suppressed

radars were for a long time mostly reserved for safety sensors to detect protective fields, for example on AGVs.

With the LRS+ level radar from the Fluid+ series, Turck launched its first in-house radar sensor on the market in 2021. The IO-Link-capable radar sensors were developed for level measurement in the range from

0.35 to 10 meters. The devices with IP67/69K protection are therefore suitable for longer ranges and offer more detailed options for suppressing interference signals than the LUS+ ultrasonic level sensor, which is also based on the Fluid+ sensor platform.

Additional data simplifies condition monitoring

A characteristic feature of the Fluid+ platform is the operating unit with capacitive touchpads and translucent front cap, via which the LRS+ displays distance, level and volume values. The absence of a metal guide probe enables the sensor to be used easily in hygiene applications and simplifies commissioning. LRS sensors are available either with two switching outputs or with one switching output and one analog output. Thanks to their additional IO-Link interface and intelligent, decentralized signal processing, all variants also offer a large quantity of additional information for processing in condition monitoring applications in IIoT: besides signal strength, this includes temperature values, operating hours or switching cycles.

Radar Monitor visualizes the signal curve

The Turck Radar Monitor is a browser-based configuration tool which displays the signal curve of the radar

QUICK READ

Whether for dip coating basins or container ports – radar technology offers clear benefits over alternative solutions using ultrasonic or optical sensor technology in many application fields. However, radar sensors have rarely been used to date for distance or level measurements in production and logistics. With its LRS+ and DR-M30 radar sensors, Turck now offers efficient solutions for demanding applications in these areas as well. The browser-based Turck Radar Monitor visualizes the signal curve for the precise adjustment of measuring ranges and sets new standards here.
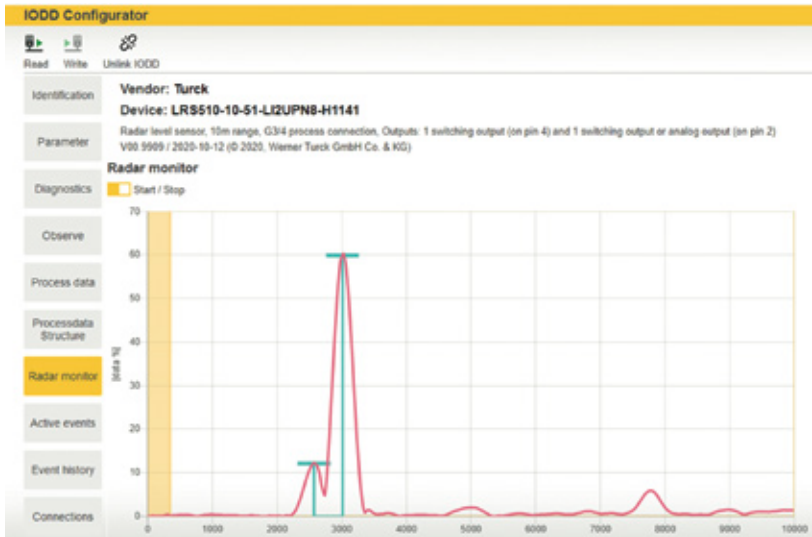
The browser-based Turck Radar Monitor enables the user to intuitively adjust the radar sensors and specifically mask out sources of interference

and provides plain text access to all relevant parameters as well as offering many other functions. These kinds of detailed analysis functions were previously reserved for high-end radar sensors used in the process industry. With the Radar Monitor and in particular the visualized signal curve, Turck also makes it easier for its customers to set up in factory automation. This makes it possible for example to mask out the interference signal of an agitator or grid, or to perfectly align with the real-time feedback of the sensor in order to maximize the reliability of level measurement in challenging applications.

Application: level measurement in the dip coating line

One application in which the advantages of radar-based level measurement come into their own is the measurement of the level in dip coating lines. This is used for coating car body parts by means of cathodic dip painting (KTL) – also called cataphoresis. This uses an electric field to help even workpieces with complex structures to achieve a uniform, durable surface coating.

In order to completely and safely immerse the workpiece attached to a conveyor belt in the coating medium, users need several items of information. On the one hand, it must be ensured that the conveyor belt is mounted at the correct height. At the same time, the correct level of the coating medium in the basin must be ensured. The high electric currents used in the coating process present another challenge. Since immersion sensors can only be used to a limited extent in the cataphoresis process due to the high currents, users usually measure the levels without contact. However, the conveyor linkage and other structures between the level sensor and the immersion bath can cause undesired signals and incorrect measurements of the immersion bath level.

The Turck Radar Monitor helps the user to suppress interference signals from metal carriers or the car body itself. The graph of the signal curve clearly shows a

large peak emitted by the main target, the immersion bath, as well as smaller peaks caused, for example, by the transport hooks on which the body parts are pulled through the immersion bath. These interference pulses can easily be masked out by defining the specific measuring window.

The easiest way to access the Turck Radar Monitor is via Turck's IO-Link master. This allows the Radar Monitor to be accessed via the IODD Configurator without the need for additional software. The IODD of the radar sensors is downloaded automatically by the Turck IO-Link masters.

The alphanumeric bicolor display, which the sensor shares with the other Fluid+ series members, is another helpful feature of the LRS+ radar level sensors. A color change of the display from green to red can be parameterized to improve the visibility of critical levels. This means that every employee in the field can see directly, even from a distance, when critical levels are reached.

### DR radar sensor for distance measurements in outdoor areas

After the development of the level radar sensor, the obvious next step was to adapt the technology for applications where a display and an operating menu on the sensor are not required, i.e. for distance measurements. Turck has thus now introduced the DR-M30-IOL distance radar sensor. With ranges from 0.35 to 15 meters, a stainless steel housing and shock resistance up to 100 g, it is also designed for use in extreme environmental conditions. The 122 GHz radio frequency of the FMCW radar as well as the IO-Link interface and IP67/IP69K protection type are features the sensor has in common with the LRS, its technology counterpart for level measurement.

The properties not only allow use in harsh applications in factory automation, but also in mobile or outdoor applications. This makes the sensors ideal for distance measurement in port logistics, for example, where optical or ultrasonic sensors are often ruled out due to their limited range or interference from dust, wind or light.

As with the level radar, the Turck Radar Monitor also simplifies the setup of the distance radar devices by means of the real-time display of the signal curve – especially when setting filters to suppress interfering signals or in complicated mounting situations. The IO-Link device parameters can also alternatively be set via an IODD interpreter such as Pactware. When mounted in direct proximity to each other, the FMCW measuring principle of the devices prevents any mutual interference between the signals. In addition to IO-Link, all DR-M30-IOL sensors have one analog and one switching output, and the analog output can also be configured as a second switching output.

Application: distance measurement on container gantry cranes in port logistics

This can be useful in industries such as port logistics, for example. In this sector, the sensors are ideal for distance measurement on container gantry cranes. The grippers used to transfer ISO containers from ships to
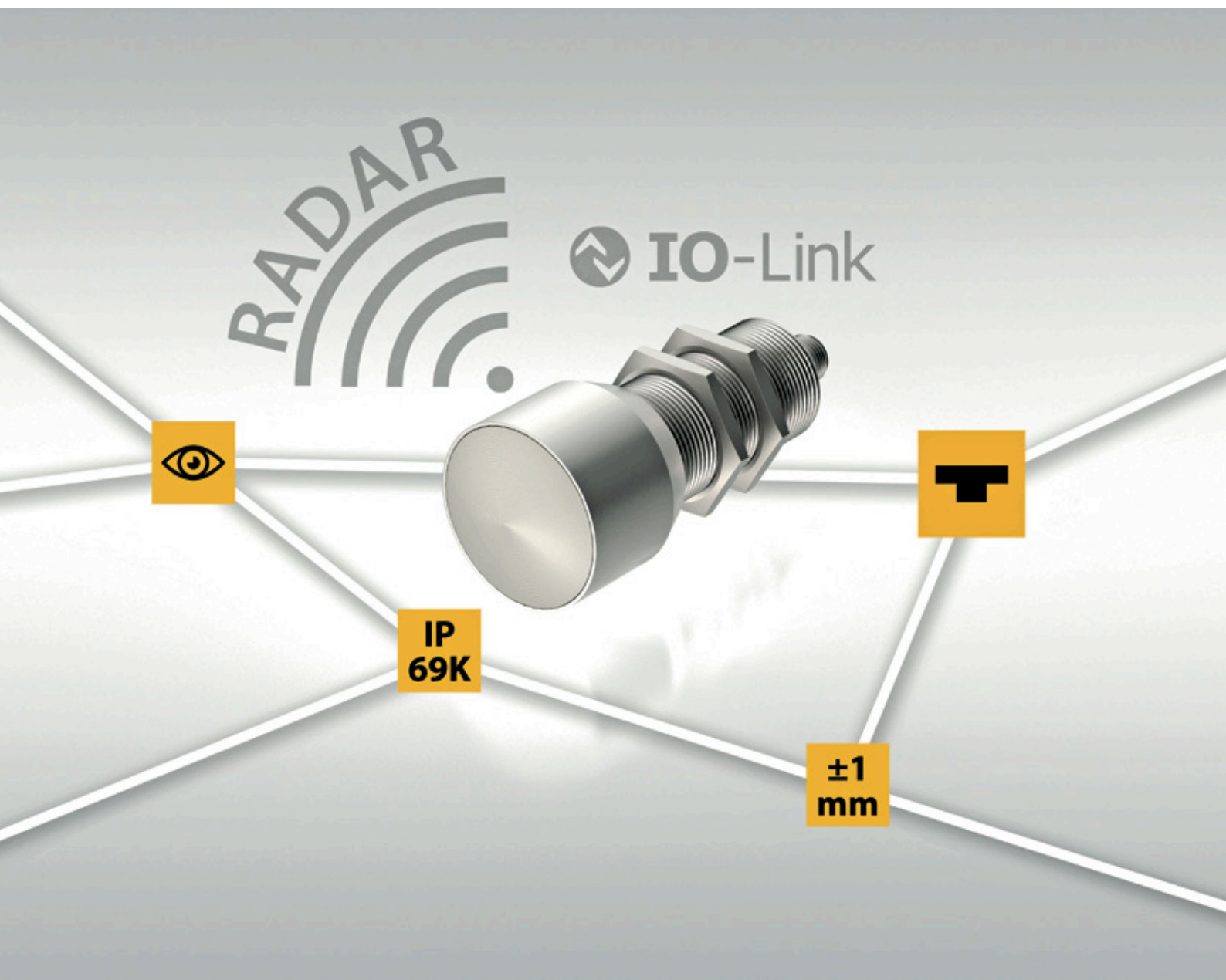
trucks or rail wagons are picked up by so-called spreaders. The distance between the spreader and the container must be continuously measured to prevent collisions and to control the speed. The DR-M30-IOL can withstand harsh, salty coastal air thanks to its stainless steel housing. And since things often get rough in port logistics, the 100 g shock resistance is particularly worthwhile in the application.

The spreaders target the container at close range with so-called flippers. These mechanical feeding guides ensure that the container can be docked precisely to the last few centimeters so that the spreader can reliably grip the lifting eyes. The dimensions of the container, however, are widened by the opened flippers. The plant controller must calculate this information with the distance signal of the sensors in order to also prevent collisions in narrow container bays. The distance sensor is also ideal for measuring the distance between the individual container gantries.

Variants with alternative lens configurations for longer distances

In addition to the DR-M30 now presented with a standard lens, Turck will add variants with alternative lens configurations in the coming months:
A sensor version with a long and narrow detection field is ideal for greater distances of up to 20 meters, as is also required in port facilities. Another lens configuration enables a wide field with a short range, as used for example for object detection in collision protection.

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IIoT ready: Turck's innovative radar distance sensors such as the DR-M30-IOL collect large amounts of data, but process it directly and only pass on the relevant data

Intelligent Doorman

Turck's IO-Link RFID system secures access to the high-voltage laboratory at the Belgian railroad SNCB/NMBS

"The risks of a 3000 V installation should not be underestimated," says Kristof Honee, in charge of the electronics department at the central workshop of Belgian Railways SNCB/NMBS in Mechelen. "Even when the power is off, there can still be charge in coils and capacitors. That's why the work must always be done systematically, in accordance with established procedures, and by people who are aware of the risks." In Belgium, the overhead lines for the trains carry a DC voltage of 3000 volts. Power converters in the trains convert the high voltage into lower voltages for the drives, air conditioning and other equipment.

Laboratory power supply delivers 3000 volts
"In the new lab, we have three test zones to test the converters after they have been overhauled or repaired," Honee explains. "Many components can

be tested at lower voltages, but for the final test we use a laboratory power supply that can deliver 3000 V, just like the overhead line." The tests must be carried out in accordance with strictly regulated procedures, paying close attention to safety risks.

SNCB asked the Belgian system integrator Dymotec – specialists in industrial electrical installations and automation – to develop a system capable of managing the test procedures in compliance with all the required safety aspects and to control access. The management of authorizations and the tracking of all processes are crucial here.

RFID system secures access to the test area
Type K50 LED indicators, which change color depending on the status of a zone, are installed at the entrance to the test areas in the laboratory. Each door as well as

The entrances to SNCB's high-voltage test room can only be opened by authorized employees using an RFID tag

The K50 LED indicator with an acoustic signal changes to red as soon as the test procedure is active

All entrances to the test room are reliably secured via Turck's RFID solution so that only authorized persons are granted access
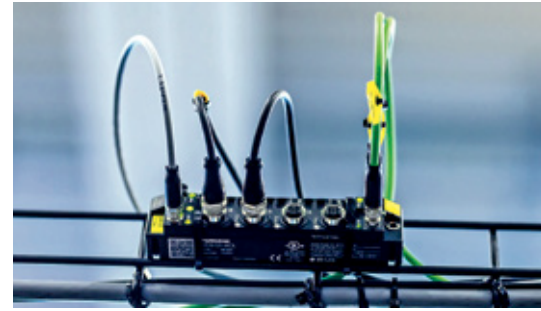
The LED indicators are connected via the particularly compact TBEN-S2 I/O module

The test procedure can be started after the RFID tag is scanned by the TN-M30-IOL-H1141 read/write head

the control desks is provided with an RFID reader, at which the operators must present for reading their ID card, an RFID data carrier, in order to gain access. "Our employees receive training to cover all the safety aspects of each type of converter," says Kristof Honee. "Dymotec's system ensures that all safety and security requirements are met at every step of the testing process."
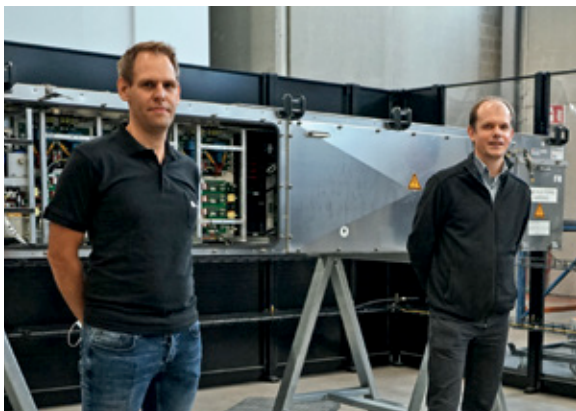
The RFID reader devices check who is logging in. The PLC checks whether this person is authorized to have access in a certain situation or to start the next step of an operation. Finally, the PLC controls the lab's power supply and ensures that the test setup is only turned on when the situation is safe. Operators must confirm each step so that nothing is overlooked.

RFID read/write heads and indicator lights

Dymotec uses the RFID system from Turck for this task. The RFID read/write heads read the ID of a pass and transmit it to the PLC via IO-Link. "The RFID system is very easy to implement," says Jimmy Volders, project manager at Dymotec. "The RFID readers and the signal indicators are connected to IO-Link masters via IO-Link. These also provide power, so there's not a lot of wiring involved."

The TBEN-L5-8IOL IO-Link masters communicate with the PLC via Profinet. The masters form a line topology via the integrated two-port switch of the IO-Link modules,so that only one Profinet line needs to be routed from access door to access door, which in turn saves wiring work.

The test areas are equipped with K50 indicators from Banner Engineering, which are actuated by the PLC to change their color. Unlike conventional color signal indicators in a rod design, one indicator per entrance door is therefore sufficient. Programming need not be limited to the selection of a single color. The LEDs in the light can be controlled individually. The control units were equipped with indicators with a sound function, so that the system can also issue acoustic warning signals.

Thanks to the automation of the test facility, all safety procedures are now implemented effectively – without slowing down the processes through manual procedures. The complete traceability of each action is ensured throughout.

Jimmy Volders (l.), Dymotec, and Kristof Honee, SNCB/NMBS, rely on Turck's RFID system for access control

QUICK READ

In order to guarantee safe working conditions, companies must reliably ensure that only persons with appropriate training are allowed access to certain areas and facilities. The Belgian railway company SNCB/NMBS uses an RFID system from Turck to monitor access to the high-voltage test areas of its central workshop in Mechelen. This is where train units are maintained, rebuilt and overhauled. In a new laboratory, SNCB/NMBS tests the converters of the trains at 3000 volts.

Everything Under Control

Turck's BL ident RFID system coordinates the robot-supported stock placement and stock removal of intermediates in semiconductor production in China

Digitalization and microelectronics are becoming part of all areas of life, with the result that the semiconductor industry has become a driver of the global economy within just a few years. In the midst of this boom, manufacturers are facing the challenge of meeting the ever-growing demand.

Semiconductor production is a highly complex process consisting of hundreds of work steps. Due to their size and complexity, it is barely possible to create integrated circuits manually. In addition, production places high demands on purity, cleanliness and functionality. Accordingly, semiconductor factories require highly automated, intelligently networked, modular and flexible production concepts.

One of the world's leading semiconductor manufacturers in China faced the challenge of storing the delicate silicon wafers safely between quality testing and packaging. These sensitive components must be stored in material racks until the next process step. In this process phase, the wafers were previously removed manually and the stock removal was documented on paper sheets. Not only was this time-consuming, but also prone to errors and provided only a poor overview of the material flow in the overall process. There was therefore a need for an automated solution that would guarantee a reliable and efficient process.

Consequently, the customer now uses RFID in warehouse management to achieve fault-free and transparent production throughout the entire process. RFID storage location identification uses RFID tags to monitor which wafer is stored at which storage location during stock placement and stock removal or transfer. All stored wafers can therefore be found immediately if necessary.

The RFID tag is located on top of the wafer carrier
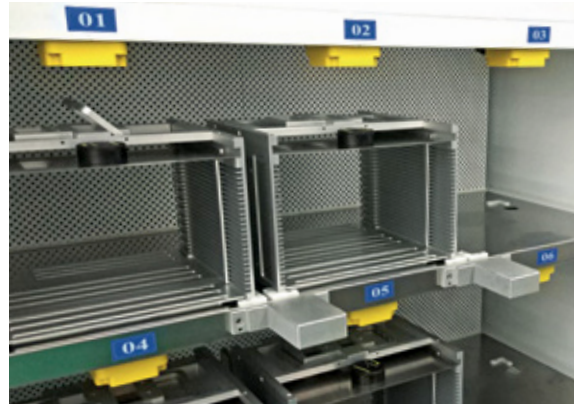
The RFID HF read/write heads on the top of the material racks read out the tags of the wafer carriers during stock placement and stock removal

The BL20 RFID and I/O system from Turck ensures reliable communication with the PLC

Robot-based RFID solution

Specialized high-performance handling robots play an important role in the automated processing of unprocessed wafers into integrated circuits. These Automated Guided Vehicles (AGVs) with integrated robotic arm navigate autonomously and guarantee reliable handling of the components between processes. In cooperation with a Chinese robotics company, Turck developed a complete RFID solution to use an AGV for material transport. The solution significantly reduces the supply time for the wafers and minimizes the work involved in this process step. The warehouse management system links the information from the RFID system with the information from the production control system (MES) and monitors all wafers in real time.

BL ident RFID solution convinces

Turck's BL20 gateway fits well into the clean and tidy production environment. It forwards the data collected by the RFID and I/O modules in the field to the higher-level controller. The RFID tags are attached to the upper end of the wafer carrier. RFID read/write heads installed on the top of the wafer shelves automatically recognize the carriers and thus guarantee their reliable identification during stock placement and stock removal by the AGV.

"The modular design of Turck's BL20 solution, which can be equipped with RFID modules as well as other I/O modules, allows sensors and LED displays to interact with the MES via the same gateway. This reduces the amount of work involved in field wiring,"

explains project manager Tao Zhang Yitao. "If a new read/write head is added, only the RFID module and the base plate need to be added, which significantly reduces hardware costs and construction effort.

LED displays provide clear information about the operating status of the read/write head and RFID module at all times. The large read distance of the read-write head allows the robot arm enough space to pick up and position the carrier. The epoxy resin carrier housing in protection class IP68 does not interfere with the reading process, nor does contamination on the surface. In addition, the tag can be reused, which is ideal in closed loop applications. And Tao Zhang Yitao was impressed by even more advantages: "The preassembled cables can be installed quickly and guarantee secure data transmission. Above all, Turck's RFID products can be replaced quickly during operation, which significantly reduces downtime and makes maintenance of the devices quick and easy."

Summary

With the rapid development of Industry 4.0 and IIoT, RFID technology will continue to play an important role in the semiconductor industry. By using Turck's RFID storage location identification solution, the user is able to significantly increase storage efficiency and further advance the paperless flow of materials and information. Not only has the delivery of materials been accelerated, but the complete traceability of the material data and thus a consistently transparent production process have been achieved.

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QUICK READ

A Chinese semiconductor manufacturer automates the stock placement and stock removal of wafers between production steps with RFID support, thereby ensuring a smooth process flow. Turck's BL ident RFID system was chosen — partly because the modular system can be easily integrated into existing plant configurations.

Cabinet Guards

To monitor access to control cabinets and keep an eye on temperature values, the distribution system operator e-netz Südhessen AG uses compact cabinet guards from Turck

In many households, the living room can be heated to a comfortable temperature within a few minutes – literally at the turn of a dial – and in almost every second home, it is done with the help of natural gas. However, the complex route that the energy source passes along between the point of production and its destination is generally of little interest to end users. Security of supply is also rarely a concern. Electricity, water and gas are considered to be constant in Germany, and disruptions to supply are the exception. This is due, among other things, to regional distribution system operators such as e-netz Südhessen AG,

which operates electricity and natural gas networks for electricity and gas suppliers. Since high plant availability is the priority for e-netz Südhessen, the Darstadt-based company itself monitors the condition of control cabinets in decentralized facilities such as transfer stations or biogas plants. There, Turck's IM12-CCM cabinet guards can detect when a door is opened or when temperatures are too high.

Strictly monitored gas pressure control
In e-netz Südhessen's network area, ten transfer stations allow natural gas to be fed into local networks at the appropriate pressure. e-netz Südhessen receives the gas at a pressure of 30 to 80 bar and reduces it to supply pressures of between 12 and 13 bar. This process, which is also called "expansion," has a cooling effect. Therefore, it is necessary not only to filter the gas, add an odor agent and perform pressure reduction, but also to preheat it. This is followed by a quantity measurement by the gas meter before the gas is transferred to the periphery and the pressure on site is finally reduced to 23 to 700 millibars by control systems. All pre-processing steps are carried out under strict monitoring, both by a central control center and by staff in technical field service.

Information security until the door is opened
As a network operator, e-netz Südhessen counts as part of the critical infrastructure (KRITIS). For these organizations and institutions deemed to be of great

QUICK READ

For the distribution system operator e-netz Südhessen AG, high information security also means monitoring the doors of control cabinets in its decentralized gas control stations. Since neither door contacts nor roller switches were suitable for easy retrofitting, the subsidiary of Entega AG now uses compact cabinet guards from Turck. Employees in the control center use the IM12 CCM devices to register any door openings – whether planned or unauthorized. In non-air-conditioned stations, the IM12-CCM also sends a signal when temperature values are exceeded.

The IM12-CCM is simply mounted on the DIN rail and then reliably monitors temperature, humidity and door closure

importance to the community, the Federal Ministry of the Interior has defined strategic content to ensure high availability and security – for example of IT systems. Based on this, the Entega subsidiary defined specific requirements for internal information security. "We wanted to be able to monitor entrance doors and control cabinets in all gas pressure control and

measuring stations," said Jürgen Nagel, who is responsible for the electrical system in the gas and water supply plants of e-netz Südhessen. When was a control cabinet door opened at which location? This information is expected to reach the control center without the need for complex electrotechnical expansions in the decentralized stations.

In the transfer station, e-netz Südhessen AG adapts the supplied natural gas to the conditions of the local pipelines

IM12-CCM replaces costly roller switches

"I did not think that door contact switches were reliable enough, and the costs would have been too high for roller switches," said Nagel, describing the selection process. "With these, you have to drill holes into the cabinets, bend the metal in part or work with small tools." The tests with Turck's IM12-CCM cabinet guard were more successful. This compact device for direct DIN rail mounting has internal sensors that measure three values: temperature, humidity and the distance to the door. "The device is ideal for our purposes: clip it in, apply two wires and voltage, route two wires to the PLC – and you're done."

e-netz Südhessen now uses three interconnected cabinet guards in its largest transfer station. Using reed contacts, the two downstream devices transmit their signals to the primary IM12 CCM, which in turn forwards the information to the PLC. This notifies the control center employees that a control cabinet door has been opened on site in the station. This simple possibility of retrofitting control cabinets with an internal monitor set a precedent at the Darmstadt-based company. In the meantime, the electricians are also using the devices in district heating and biogas plants.

Temperature measurement

Most gas transfer stations and district heating plants already have air conditioning technology, which prevents overheating of the electronic devices. Components installed in the control cabinet include frequency converters or power supplies for pressure

Simple retrofitting of control cabinets: The low installation and commissioning costs of the IM12-CCM convinced the specialists of e-netz Südhessen AG

Insecure door contacts or roller switches that were costly to install were not considered for retrofitting the cabinet guarding system

»The device is ideal for our purposes: clip it in, apply two wires and voltage, route two wires to the PLC – and you're done.«
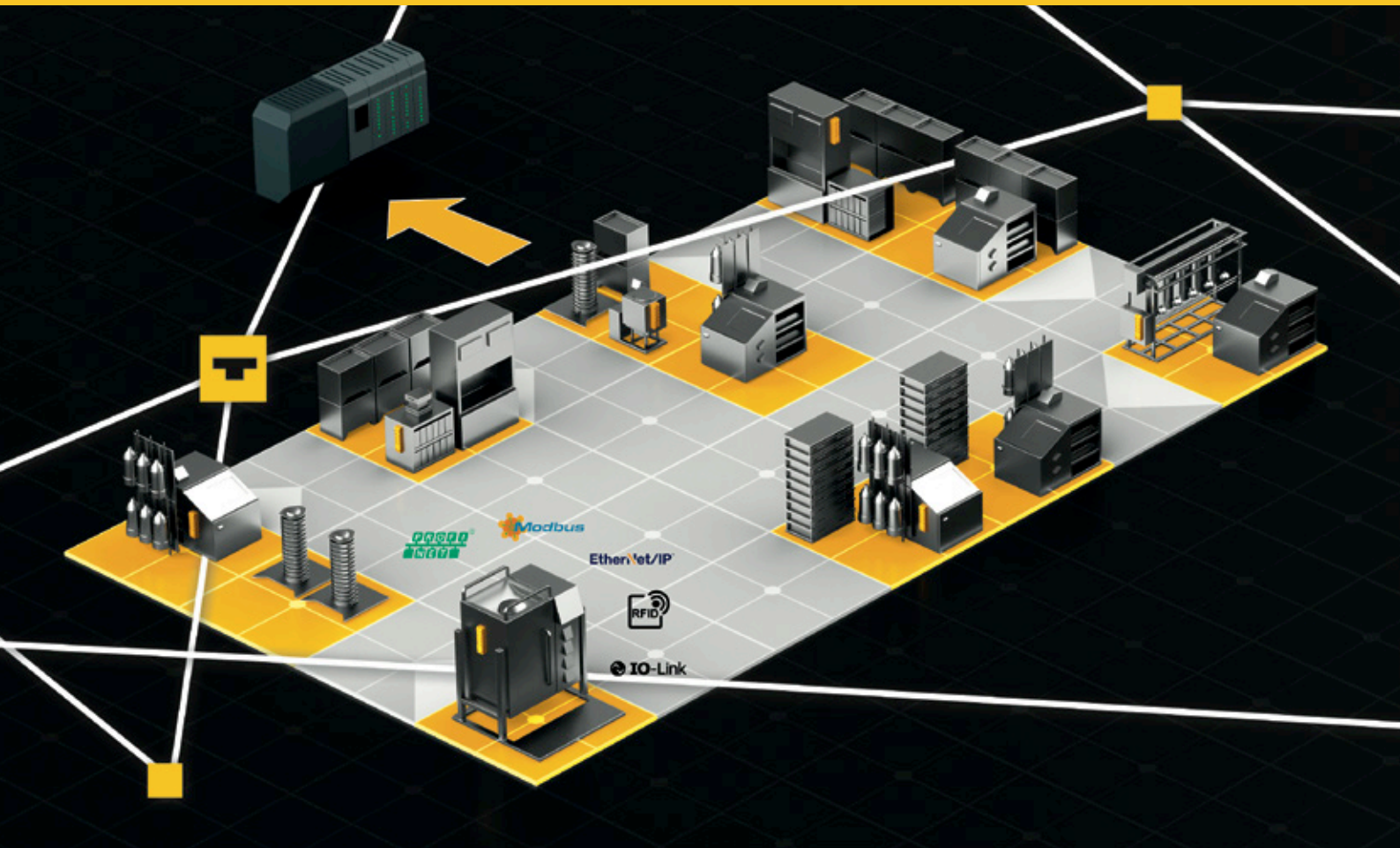
Jürgen Nagel | e-netz Südhessen AG

transmitters and temperature measurement. Isolation amplifiers are also present, and e-netz Südhessen has been relying on Turck for these for more than 30 years. Nevertheless, not all stations are air-conditioned yet. In one of the transfer stations, Jürgen Nagel therefore also uses the temperature measurement provided by the IM12-CCM. "The control cabinet is located in the heating room, where it can become very warm despite insulation. Especially with a PLC or a power supply, I prefer it to be a little cooler."

If the temperature exceeds 42 °C, the cabinet guard sends a signal to the PLC. Nagel has programmed this limit value into the IM12-CCM via an IO-Link USB adaptor.

Alternatively, the parameterization could have been carried out via FDT software such as PACTware or directly on the device using quick-teach. e-netz Südhessen also benefits from the internal data logger of the 12.5-mm-wide cabinet guard, which provides values with a time stamp and stores them for up to two years. This allows technicians to track the conditions under which abnormal temperature values have occurred at any time.

Easy retrofitting of condition monitoring

Condition monitoring is not only required for machines and storage areas, but also for control cabinets. This is demonstrated by the information security management system of e-netz Südhessen AG, which uses Turck's IM12-CCM to monitor the door closure of control cabinets in decentralized plants and thus to draw attention to unauthorized access. The sensors installed in the device for measuring temperature and humidity also pay off in cases where unstable climatic conditions jeopardize the availability of electronic devices. For the e-netz specialists, the effort involved in commissioning was an important factor in the retrofitting. Turck's IM12-CCM impressed them through its simple assembly and uncomplicated teach functions.

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Initial technical analysis is a standard process in Customer Service

Customer Service

Advise, support, solve problems — Turck's Customer Service Team ensures satisfied customers through its expertise and efficient processes

Within a business relationship, there are many points at which a customer interacts with the company, and every experience at one of these touchpoints leaves an impression. The fast and satisfactory handling of customer concerns is therefore essential. In the event of unforeseen failures or damage, the Customer Service Team provides the customer with access to qualified and experienced contact persons who can help them. "Prompt and competent problem-solving — that's our motto and the promise made by our entire team," says Turck Customer Service Manager Alfred Gelszat.

For decades, the Customer Service department has been contributing toward Turck's long-term business success. Customer Service has expanded gradually, both in terms of personnel and technology, and is now a team of ten. Whereas, in the early years of the company, complaints were recorded manually and processed individually, the main focus today is to establish standardized processes. This is the only way to ensure the team can always react quickly and flexibly — not only to meet today's expectations but, above all, to be able to work in an even more customer-friendly manner.

Professional complaint management
Complaints of any kind tie up resources, incur costs and, in the worst case, can even lead to reputation damage. Professional complaint management is therefore essential. The Customer Service team therefore registers, tracks and regulates all complaints in the SAP system using a systematic, logical process. This ensures the transparency and traceability of a complaint at all times. To enable complaints to be resolved quickly, comprehensively and to the satisfaction of the customer, information on the field of application and decontamination of returned parts are first required in order to protect the employees and equipment. This information is provided by the customer using a decontamination declaration, which notifies the Customer Service team whether and with which hazardous substances the product subject to a complaint has come into contact. It also enables important information about possible causes of a device problem to be identified at an early stage. The next step is usually an initial technical test, which either produces a result directly or leads to further analyses. For each complaint submitted, customers also receive the report form and processing details that correspond to their request. In addition to complaint processing, another of the team's tasks is quality assurance, with inventory tests, such as initial and intermediate sampling, being carried out on the basis of defined test characteristics.

Continuous process optimization
How efficient are the complaints processes? Are there alternative solutions that create added value for customers? Customer-oriented service is no accident. The customer experience can and must be controlled and continuously improved. This is why the Customer Service team develops concepts for optimizing its processes in a continuous adaptation process. The goal is no less than to take customer service to the next level. "It is conceivable, for example, for complaints to be tracked via the RFID system," says Alfred Gelszat. "Equipping each complaint box with an RFID tag then makes it easier, faster and even more effective to check the status of each complaint."

The big picture
Individual customer requirements and expectations make it clear that customers today are concerned by much more than just the product or the service — they

Working in close dialog with customers, Cathia Steidten and the Customer Service Team seek out quick and satisfactory solutions

must be impressed by the big picture. With comprehensive problem-solving expertise and broad technical know-how, the Customer Service Team provides automation specialist Turck with additional tools to fulfill its promise: to always offer the customer the best solution — quickly, flexibly and reliably.

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QUICK READ

With its digitally connectable solutions for automation systems, tailored to the most diverse applications and customer requirements, Turck stands for efficiency and reliability. But what if unexpected problems occur and something doesn't work as intended? Even when dealing with the unexpected, the company must act professionally in order to find solutions for the customer quickly and easily. The Customer Service Team has a high level of responsibility to build trust and maintain the company profile.

Digital Innovation Park

Turck promises exciting automation trends and current innovations for Industry 4.0 and IIoT with the new Digital Innovation Park at www.turck.com/dip - from IO-Link to Ethernet in the process industry and condition monitoring. Turck's "digital showcase" offers a quick overview of current automation topics and links to webinars, white papers and more as well as direct contact to your experts.

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Sites

With over 30 subsidiaries and more than 60 branch offices, Turck is always nearby, anywhere in the world. This guarantees fast contact to your Turck partners and direct support on site.

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