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Filling Perfection

Elopak uses compact IO-Link solutions from Turck for its Pure-Fill platform – thus increasing commissioning speed, flexibility and cost efficiency

IIoT Control Center

The TAS Turck Automation Suite offers efficient management in Ethernet automation networks – now also with a cloud extension

Pool Organizer

Recalo organizes its pool of returnable transport items (RTI) with a track and trace RFID solution from Turck Vilant Systems

Award for TAS Software

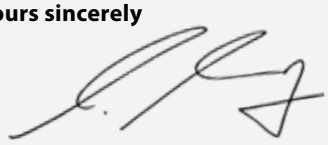
We are delighted to have received a very special award. While it is a fact that Turck products and solutions receive awards from time to time, it's nevertheless something special when the award winner isn't chosen by a jury but by people with practical experience, in this case, the readers of technical journal Computer & Automation. And when first place in the »Products of the Year 2024« category and moreover in the »Software & IT« section goes to an automation company like Turck, which has tended to be hardware-focused in the past, this clearly underlines the fact that we are obviously on the right track with the digital transformation.

The award was given for our TAS IIoT and service platform, the Turck Automation Suite. The toolset simplifies the management and configuration of Turck devices in industrial Ethernet networks for users. Batch functions, for example, speed up many operations as they can be executed simultaneously for several network devices. This saves a lot of time, for example, when updating firmware or assigning IP addresses. Even Codesys programs can be managed via TAS via the network and easily loaded, saved, executed and stopped using batch processing. This previously had to be done directly in Codesys on each individual device. TAS also gives users direct access to RFID demo tools and all the IO-Link functions of the Turck devices, from the IODD Configurator to the Radar Monitor.

We launched the IIoT and service platform a year ago and have been updating it regularly ever since. We are now taking the next big step and adding another module with TAS Cloud. You can read about how you can benefit from TAS and what else you can expect in the near future from page 6 onward. The toolset also supports you in commissioning our new 3D radar scanner, which we present on page 11. After the level and distance radar, the MR15-Q80 is the third sensor type with radar technology. With its large opening angles and robust design, the scanner is ideal for collision avoidance on mobile equipment or in intralogistics.

Our block I/O modules from the TBEN-S2 series are also robust and ultracompact. Several customers have spoken to us about why the 32 mm modules were the ideal choice for their applications. Elopak uses the entire series in its new Pure-Fill filling machine platform; our Belgian colleagues have implemented a smart, autonomous access control system for a truck parking lot for frozen food specialist Ardo using the TBEN-S2 and ARGEE logic software; and Siasun Robotics in China uses the module with CMVT vibration sensors to monitor the condition of its warehouse cranes.
I wish you an inspiring read.

Yours sincerely



Christian Wolf, Managing Director

Content

NEWS

INNOVATIONS for Automation Specialists 04

TECHNOLOGY

SOFTWARE: IIoT Control Center 06
The Turck Automation Suite TAS promises efficient device device management in Ethernet automation networks – now with additional cloud integration for location-independent real-time monitoring and troubleshooting

SENSOR TECHNOLOGY: Full Speed Ahead! 12
Turck's MR15-Q80 3D radar scanner ensures reliable object detection and collision avoidance – from mobile equipment to intralogistics

INSIDE

INTERVIEW: »Detect Cable Breakage at an Early Stage« 10
In an interview with Michael Corban, editor-in-chief of the trade journal KEM Konstruktion|Automation, Andreas Ix talks about condition monitoring of sensor-actuator cables. This is made possible by smart M12Plus connectors with voltage and current monitoring and Bluetooth data transmission

APPLICATIONS

SYSTEMS: Filling Perfection 16
Elopak relies on IO-Link and ultracompact block modules from Turck for a new filling machine platform Pure-Fill – thus increasing commissioning speed, flexibility and cost efficiency

30 Recalo organizes its pool of returnable transport items (RTI) with a track and trace RFID solution from Turck Vilant Systems

12 The robust MR15-Q80 radar scanner is available with SAE J1939 or IO-Link

20 Turck's multiprotocol IO-Link master with ARGEE logic controls the smart access control at Ardo directly on site via programmable LED lights

SYSTEMS: Parking Lot Organizer 20
Frozen food specialist Ardo optimizes loading traffic and safety on the company premises with Turck's multiprotocol I/O module and programmable LED lights

SYSTEMS: Fitness Tracker for Old Equipment 28
Turck's IMX12-CCM control cabinet monitor and Beckhoff's Edge Device enable simple retrofitting for vitality data acquisition from control cabinets in the NOA data model

RFID: Order in the Pool 30
Logistics services provider Recalo monitors its pool of returnable transport items (RTI) with a track and trace solution from Turck Vilant Systems and thus reduces its customers' CO2 footprint

SERVICE

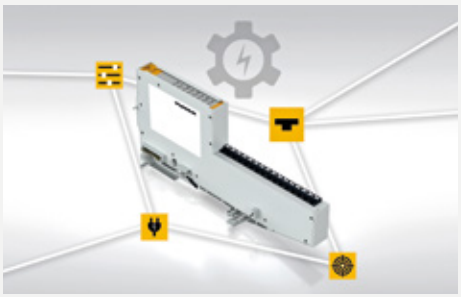
CONTACT: Your Fast Route to Turck 34
How, where and when to find us

CONTACT: Imprint 35

Inclinometer Sensors with Analog Output

QR20 inclinometer sensors with analog output complement the existing portfolio with IO-Link or switching output. The new sensors are available as single-axis devices for static (B1N) or moving applications (B1NF) as well as dual-axis sensors for static (B2N) or moving applications (B2NF). The QR20 inclinometers generate their signal from the fusion of two measuring principles: a gyroscope signal and an MEMS acceleration measurement (Micro-Electro-Mechanical Systems). The combination of measuring principles masks out shocks and vibrations much more effectively than devices with conventional signal filters.

Energy Measurement Module for BL20



The BL20 I/O system becomes a comprehensive energy management solution with the new 3-phase energy measurement modules for 1 A and 5 A current transformers. The modules enable continuous monitoring of the energy consumption of single-phase or three-phase systems and allow easy integration into existing systems via multiprotocol Ethernet (Profinet, EtherNet/IP, Modbus TCP), EtherCAT, OPC-UA or MQTT.

Compact UHF RFID Reader with EtherCAT

Turck is presenting the Q150 UHF RFID reader with an integrated Ethernet interface. The IP67 reader communicates directly with PC or PLC systems in Industrial Ethernet networks with the four most important protocols without the need for an additional interface. The Q150-EC is the only reader in its performance class with EtherCAT; the Q150-EN multi-protocol version works in Profinet, Ethernet/IP and Modbus TCP and requires no additional power supply thanks to Power over Ethernet (PoE). Integration in the control environment does not require the programming of a function block. Instead, the reader comes factory fitted with a U Interface as a simple data interface for easy use. RFID apps for visualization in the Turck Automation Suite (TAS) make it easier to select the optimum parameters.

3D Radar Scanner with IO-Link or J1939

With the MR15-Q80, Turck presents a robust radar scanner, that captures and outputs three-dimensional environmental data, for example for 3D object detection, collision avoidance, height control or blind spot monitoring. It is the only device with these features that is available with a J1939 interface for mobile equipment in addition to IO-Link. The 60 gigahertz radar scanner detects objects up to 15 meters away within the freely definable detection angles of 120° horizontally and 100° vertically. Thanks to its technology, radar technology is more robust than alternative solutions such as laser or ultrasonic sensors.

more info on page 12

TAS goes Cloud

Turck is expanding its Turck Automation Suite (TAS) IIoT and service software platform with the TAS Cloud industrial cloud service for remote maintenance and condition monitoring. Customers can put together their own individual cloud solution from six modules and thus also customize the billing of their services. Users only pay for services that they actually use. The Maintenance Manager enables users to create, schedule, carry out and document maintenance schedules for their machines without any programming. TAS Cloud communicates via the MQTT IIoT standard, which guarantees the best connectivity to other systems and services. Service technicians can monitor machine states and control functions remotely. The cloud service offers a convenient VPN connection for unrestricted access to all functions, just like in a company network. TAS Cloud is the second module set of the Turck Automation Suite after TAS Desktop. more on page 6

Monitoring Control Cabinet Climate

The IMX12-CCM control cabinet monitor is now available in a new version. The devices are now commissioned via haptic pushbuttons instead of light sensors, making them even more intuitive. The temperature range has also been improved to -25…70 °C, so the the devices can also be used in remote I/O control cabinets, which are frequently installed in areas where it can get hot due to neighboring systems or sunlight. Turck also improved compatibility with isolating transducers that supply power to the devices in the Ex area. The IMX12-CCM devices are also compatible with the isolating transducers of other companies as well as those from Turck.

Magnetic Field Sensor

The CMMT 3-axis magnetic field/temperature sensor with IO-Link is the third sensor type that Turck has developed specifically for easy-to-use and retrofittable condition monitoring applications. It complements the existing range consisting of the CMVT vibration/temperature sensor and the CMTH for humidity and temperature measurements. The combined measurement of magnetic field and temperature with the CMMT enables simple detection of faults on motors or in processes with magnetic components. The new sensor also opens up applications that were previously impossible, such as the contactless detection of the rotation and movement of metal objects without visual contact.

Inductive Sensors with IO-Link/Analog Output

Measuring inductive sensors are now also available with IO-Link and analog output for flush and non-flush mounting. Thanks to the integrated microprocessor, the BI11-CK40 and NI11-CK40 models offer significantly improved linearity and accuracy including temperature compensation over a wide temperature range from -25 to +75 °C. The devices are the only sensors of this type to have a standard adjustable 0 to 10 V voltage output as well as an additional switching output that can be freely parameterized via IO-Link, thus providing precise measurement data and extensive diagnostic functions for predictive maintenance.

IIoT Control Center

The TAS Turck Automation Suite promises efficient device management in Ethernet automation networks – now with other cloud integration for location-independent real-time monitoring and troubleshooting

In the constantly evolving world of industrial automation, the efficient management and monitoring of devices in industrial environments is becoming increasingly more important. The demands placed on software in automation technology are high, as it has to control and monitor complex processes. It must be reliable and secure, as any failure can involve considerable costs. At the same time, it must be flexible and adaptable in order to meet the changing requirements of production. Despite all its functionality, the software should nevertheless be simple and intuitive to use.

With the Turck Automation Suite, or TAS for short, Turck has developed a powerful IIoT and service platform that is increasingly establishing itself as an efficient toolbox for a host of different applications. The variety of functions goes hand in hand with a high level of user-friendliness, which makes it easier for users to manage and configure Turck devices in industrial Ethernet networks. With TAS, Turck is combining for the first time the configuration and parameterization tools of its smart sensor technology with the network management functions of its Ethernet devices centrally in a single software. The batch functions in particular speed up many operations since they can be run simultaneously for multiple network devices. This saves time, for example with firmware updates or the assignment of IP addresses. Even Codesys control programs can be managed via the network and easily loaded, saved, executed and stopped using batch processing.

Vendor-neutral support and monitoring of Profinet devices

The functionality of the IIoT and service tool increases with every update. For example, the latest release includes the Discovery and Configuration Protocol (DCP). This extends the capabilities of TAS by enabling for the first time the automatic detection and configuration of Profinet devices in a network, regardless of manufacturer, which further simplifies the setup and management of industrial automation systems. This open approach allows users to integrate a wide range of devices into their automated systems and also benefit from the advantages of the Turck Cloud.

Clear diagnostic view

The new Diagnostic View feature offers TAS users significant added value when monitoring and diagnosing faults in their systems. Specially designed for Turck devices, the Diagnostic View provides a comprehensive overview of the status of the network and displays all status messages clearly in a single view. Instead of manually checking individual devices, a single scan is all it takes to find out immediately which devices have problems. The clear display of all devices and their status messages in a single view simplifies troubleshooting considerably, especially in complex systems with many devices. With just one click, users can create a comprehensive diagnostic report that brings together in a PDF all the relevant information about a device. This report can then be sent to support for analysis and troubleshooting, further speeding up and simplifying the whole process of fault diagnosis and rectification.

QUICK READ

With the latest release of the TAS IIoT and service platform and the launch of TAS Cloud, the Turck Automation Suite has reached the next level. The easy-to-use toolkit for the installation, service and management of Turck devices in automation networks now also enables manufacturer-independent support and monitoring of Profinet devices thanks to new features such as the Discovery and Configuration Protocol (DCP). Profinet View allows users to recognize and configure their devices. The addition of TAS Cloud now enables continuous monitoring functions as well as cloud-based data storage and processing from any location.

TAS efficiency booster: The Turck Automation Suite becomes a comprehensive solution for device management and operation of automation solutions with TAS Cloud

Light Curtain Monitor and Radar Monitor
Similar to other monitor apps that are accessible via the TAS platform, the Light Curtain Monitor focuses specifically on the visualization and monitoring of light curtains on site at the customer's premises. It has been specially developed for the products of Turck's optical sensor partner Banner Engineering, reliably indicates blocked light beams and allows individual configuration for optimum system performance. This function allows users to monitor the status of their light curtains in real time and quickly identify potential problems. The Light Curtain Monitor offers efficient system monitoring with functions such as light curtain alignment and the option to hide or invert certain light beams, and thus makes a significant contribution to safety and efficiency.

The Turck Radar Monitor offers similar benefits: It graphically displays the measured values of the Turck radar sensors and simplifies setup with a real-time display of the signal curve – especially when setting filters to suppress interference signals or in complex mounting situations. Users can adjust filters, measuring windows and other parameters very easily to their particular application requirements.

Next step: TAS Cloud
The brand new TAS Cloud now complements the existing TAS desktop solution. As part of the TAS platform, TAS Cloud offers continuous monitoring functions as well as cloud-based data storage and processing. Integration with other TAS modules and tools creates a comprehensive solution for device management, commissioning and the efficient operation of automation solutions.

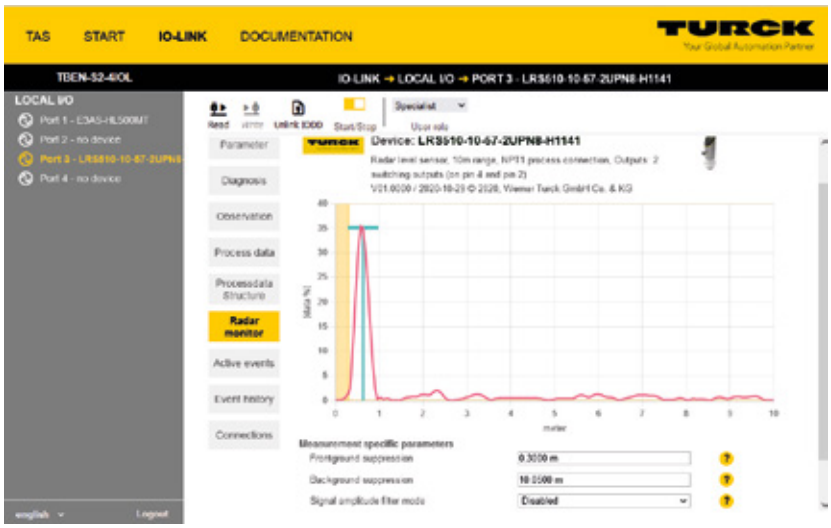
The functionalities of the new solution include remote access via VPN, condition monitoring and

a maintenance manager. These functions enable users to parameterize, configure and monitor their systems and devices remotely, detect maintenance requirements at an early stage and minimize downtimes. With the integration of cloud technologies, users can benefit from increased flexibility and scalability, as they can access their data anywhere and anytime.

The tenant structure of the TAS Cloud forms the foundation for highly secure and efficient data management. With up to five levels, it enables the flexible organization and categorization of data according to individual user requirements. The clear hierarchy ensures clear and organized management, allowing users to structure their data in a way that best suits their business processes. The data is physically separated strictly by client, which enables granular access control so that clients can be given specific authorizations to access their data. This protects sensitive information from unauthorized access and ensures compliance with data protection and industry-specific regulations.

TAS Cloud in the corporate design of the OEM

Machine builders and other OEMs who integrate TAS Cloud into their machines can design the look of the user interfaces to match their corporate design or adapt it to the corporate design of the machine purchaser. The domain and thus the URL can also be adapted to the customer's wishes.



TAS Desktop: Radar Monitor simplifies sensor setup through the real-time visualization of the signal curve

The values on the dashboard provide important insights into the system status monitored by the TX700S

ARGEE and BEEP View

The ARGEE logic software turns Turck's Ethernet I/O modules into IP67 logic controllers for cabinet-free operation directly in the field (field logic controller). This enables conditions and actions to be programmed very simply without any software installation required. ARGEE will not be able to replace every PLC, but the engineering software opens up new avenues in control technology, as it can relieve local networks and higher-level controllers by executing simple logic tasks. This function is unique on the market to date. TAS allows you to load ARGEE programs conveniently on a group of devices in a batch process and manage them centrally.

Backplane Ethernet Extension Protocol BEEP

TAS also simplifies the management of BEEP configurations. Turck's smart tool BEEP (Backplane Ethernet Extension Protocol) reduces the number of IP addresses required in industrial networks and simplifies the use of the TBEN and FEN20 multiprotocol block I/O modules. BEEP makes it possible to connect networks with up to 33 TBEN modules to the PLC via a single IP address in Profinet, Ethernet/IP and Modbus TCP networks. Through the reduction of the IP addresses, the user can quickly create high density I/O networks and also connect them with low cost controllers.

IO-Link apps: IODD Configurator and more

TAS also promises commissioning and management support for Turck's IO-Link apps such as IODD Configurator, Radar Monitor, Vibration Monitor, etc. The user can call up and execute the respective app directly in the special IO-Link View. The IODD Configurator, for example, can be used to parameterize IO-Link devices from all manufacturers. The app displays IO-Link process data in a graphical history curve, which is very helpful during setup. The user also has access to the plain text of all relevant parameters of the IO-Link devices used.

The Turck Radar Monitor offers similar benefits: It graphically displays the measured values of the Turck radar sensors and simplifies setup with a real-time display of the signal curve – especially when setting filters to suppress interference signals or in complex mounting situations. Users can adjust filters, measuring windows and other parameters very easily to their particular application requirements.

RFID apps: UHF demo tools

TAS also offers various tools for Turck's RFID devices, including three UHF demo tools. **Gate Applications** simulates bulk reading, in which several tags are read simultaneously in gate applications. The application ensures the reliable capture of all tags, saving time and effort that would normally be required for manual assessments. **Tag Trace** enables the determination of

Bild: Julia Bergmeister Fotografie / Computer&Automation

Product manager Daniel Kirch (left) and PR manager Klaus Albers are delighted to have won first prize in the "Software & IT" category of the Computer&Automation readers' poll in Munich

TAS product manager Christoph Schmermund (2nd from left) accepts the "IoT Product of the Year" award from the British trade magazine Instrumentation Monthly together with Tony Coughlan (3rd from left) from Turck Banner UK in London in November

optimum start and stop times for read and write processes in moving applications. **Tag Population** measures the read and write performance at different positions of static objects. The UHF reader continuously increases its performance and displays the minimum power required to reliably detect the tag.

For HF RFID solutions, the **Tag Actions HF** function promises particularly convenient handling of RFID tags. This allows a user to test and execute various functions with an HF reader. This includes creating a list of read HF tags, reading information from the tag memory and the simple editing, reading and writing of data in a user-defined memory area of the tag.

There's more to come: TAS Edge

The future of Turck's IIoT and service platform TAS promises a seamless integration of TAS Desktop, TAS Cloud and the upcoming TAS Edge, which will be launched later this year. This innovative triad will enable users to make their industrial processes even more efficient and gain comprehensive control over their devices. TAS Edge will add powerful edge computing capabilities to the platform, enabling local processing of data for faster responsiveness. With this integration of desktop, cloud and edge functionalities, users have a powerful toolkit to actively shape the digital transformation of industrial automation. To meet the requirements of an IIoT platform, TAS will also support the transfer of data via MQTT and OPC UA to higher-level systems, automatic configuration routines for service tasks and many other features. TAS will considerably increase the connectivity of your production system and thus combine OT data and IT data without any barriers.

Outstanding software solution

The fact that Turck's TAS Automation Suite offers users a smart toolset for efficiently driving forward the digital transformation of industrial automation, is also demonstrated by two awards that the software has already received in its first year. TAS was named "IoT Product of the Year" at the Instrumentation Excellence Awards in the UK at the end of 2023. The Instrumentation Monthly awards recognize the best experts, products, projects and companies in the fields of testing, measurement, sensor technology and control. The readers of the German trade magazine Computer & Automation were also evidently impressed by the functionality of the Turck solution and gave TAS first place in the "Software & IT" in the "Products of the Year 2024" category.

Authors | Christoph Schmermund and Daniel Kirch are product managers at Turck
Further information | www.turck.com/tas
Webcode | more12470e

»The user can identify in advance any cable that is at risk of failure via the individual MAC address of each connector and replace it immediately.«

Andreas Ix | Director Product Management Connectivity

To enable condition monitoring of sensor-actuator cables, Turck is equipping the new M12Plus connectors with voltage and current monitoring electronics as well as a Bluetooth chip that can transmit the measured values to a controller. This means that the condition of the cables can be continuously monitored in order, if necessary, to intervene in good time, says product manager Andreas Ix in an interview with Michael Corban, editor-in-chief of the trade journal KEM Konstruktion|Automation.

You have packed a Bluetooth transmitter into the connector – what's the idea behind that?
Andreas Ix: Our new M12Plus connectors are a pure, technology-driven development. The basic idea is to move the condition monitoring of highly stressed cables directly to the connection technology. We have integrated the necessary voltage and current monitoring electronics as well as a Bluetooth chip into the connector. In this way, the measured voltage and current values can be sent wirelessly to a controller continuously – currently once a second – or an alarm can be triggered depending on the application.

What happens to the measured values?
The information obtained is available directly and easily at the automation level via the Bluetooth connection to our IP67 PLC TBEN-PLC, for example. They can not only be individually pre-processed, evaluated and visualized here, but also exchanged with all other participants via multiprotocol. What's more, the TBEN-PLC also enables the condition values of the line to be transferred directly to the cloud if required, which supports IIoT applications. The Cable Monitor app in our Turck Automation Suite (TAS) can also be used in parallel. By comparing input and output values, problems such as cable kinks, cable breaks or power supply loss are detected early on, making it much easier to implement condition monitoring and predictive maintenance of the cables. This is a tremendous benefit, especially for applications with drag chains or in robotics.

Can individual cables also be uniquely identified via the connectors?
Yes, because in most cases several cables will be used. To do this, we can parameterize the connectors and assign a unique ID to each cable. This offers a number of benefits: The user can identify in advance any cable that is at risk of failure via the individual MAC address of each connector and replace it immediately. A QR code on the connector will make maintenance even easier.

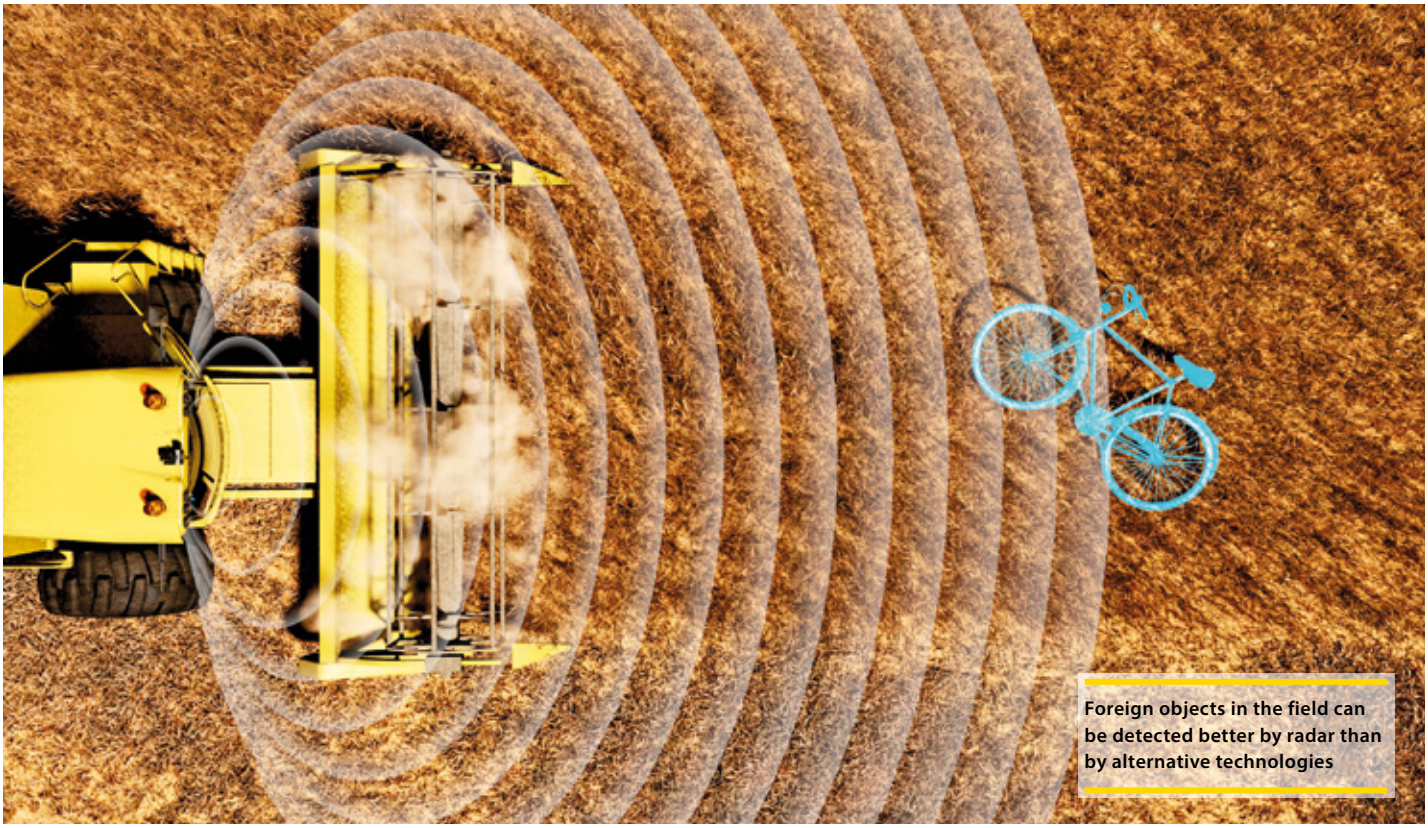
So the condition of the cables can be monitored – has monitoring of the connected actuators also been considered? For example, via the current and voltage values of a connected motor?
Our main focus is currently on monitoring the cables – but in principle it is possible to extend this to the connected devices. An application has already been implemented for preventing the unintentional shutdown of a conveyor system. The M12Plus cables with integrated condition monitoring detect increasing current con-

sumption of stopper motors and report this to the PLC via Bluetooth. The stoppers are designed to prevent material jams. However, the drives get dirty quickly and then no longer work correctly, resulting in the motor drawing more current. If a threshold value is exceeded, the safe shutdown of the conveyor system is triggered and maintenance can rectify the problem. This example illustrates the advantage of our technology-driven approach: Although the focus is initially on the cable and its condition, a variety of other applications can be implemented. We are always open to exciting new ideas.

Compared to a standard sensor-actuator cable: How much more expensive is the variant with the M12Plus connectors compared to the standard cable?
Of course, the smart connectors have to be more expensive, but the user still benefits because their use can prevent machine downtime, for example. The costs incurred in the event of an unplanned production shutdown would be much more relevant here. The following must also be taken into account: As the saying goes, contacts are the end of electrical engineering. In fact, the most common causes of faults are poor plug connections or a faulty cable. Both – including the quality of the plug connection – can now be monitored, as products such as M12Plus and the TBEN portfolio complement each other perfectly. This is a particular benefit with regard to IP67 technology. It offers immense advantages, but a major disadvantage is the time-consuming troubleshooting. While the voltage can be easily measured at a terminal in the control cabinet, this has so far involved considerable effort in the plug connector. This is now much easier with our solution.

What goals is Turck generally pursuing in the field of connection technology?
We are constantly expanding our extensive portfolio in this area – which includes couplings and connectors, flanges and bushings, connecting cables and fieldbus cables and distributors in numerous designs. Self-assembly plug connectors are also available. The range also includes inductive couplers – for example, the contactless inductive couplers in the NIC series transmit up to 16 switching signals via IO-Link and up to 18 W of power if required.

Author | The interview was conducted by Michael Corban, editor-in-chief of the trade journal KEM Design|Automation
Web | kem.industrie.de
Webcode | more12430e



Foreign objects in the field can be detected better by radar than by alternative technologies

Full Speed Ahead!

Turck's MR15-Q80 3D radar scanner ensures reliable object detection and collision avoidance – from mobile equipment to intralogistics

We usually associate radar technology either with speed checks in road traffic or with devices for flight monitoring. But since the 2000s, the technology has also been increasingly used in cars themselves. Active adaptive cruise control (ACC) systems use radar to determine the distance to cars in front and their speed. Radars have also become increasingly popular in industrial automation in recent years. Especially in level and conventional distance measurement, the advantages over ultrasonic, optical sensor or media-contacting technologies pay off in many applications.

In 2020, Turck had already presented its first radar sensors for level measurement with the LRS series, followed by the DR-M30 radar sensors for distance measurement in 2021. Both device series operate in the 120 GHz range, which is particularly beneficial in terms of range and resolution, i.e. the accuracy of the signal. Turck is now launching the MR15-Q80 radar sensor as the third member of its radar portfolio. The shape of the housing alone shows that a new device type has been added to the product range. Unlike the cylindrical devices for distances and levels, the MR15-Q80 has a flat, cuboid design. The underlying technology is also different: A 60 gigahertz antenna operates inside the robust IP69K housing. Compared to the 120 GHz frequency band, the lower frequency provides a lower resolution, but the beam angle is significantly wider. The MR15-Q80 detects objects with an opening angle of 120 degrees horizontally and 100 degrees vertically.

The sensor achieves a range of up to a remarkable 15 meters, although this maximum value can also be reduced depending on the material, angle and surface

QUICK READ

Many radar sensors for collision avoidance are limited to detecting the distance and thus only output one dimension as a measured value. Turck's new MR15-Q80 radar scanner, on the other hand, delivers genuine 3D data and thus significantly improves the mapping of objects and spaces, giving developers and system engineers a greater degree of freedom. Thanks to its robust design, which can withstand shocks of up to 100 g, and the SAE J1939 interface, the scanner is particularly suitable for use in mobile equipment, but also for AGVs or conventional industrial trucks in intralogistics.

properties of the objects. However, users do not have to worry about a lack of range as the target applications are primarily object detection and collision avoidance.

Collision control and object detection for mobile equipment

Turck's new radar scanner offers maximum IP69K protection against water and dust ingress and meets all requirements here in terms of robust component design for the mobile equipment sector. The M15-Q80 also stands out in terms of mechanical resistance, as it can withstand shocks and impacts of up to 100 g. This is where radar technology differs significantly from laser-based lidar technology. Lidar systems require movable mirrors to direct the laser beams into every corner of the area to be scanned. These moving mirrors are naturally susceptible to mechanical damage caused by impact and vibration.

Radars are therefore not only less sensitive to interference factors such as dust, fog or light reflections, but are also much more robust mechanically. Besides its resistance to severe shocks, the MR15-Q80 can also withstand supply voltages of 12 or 24 volts, which are used in the vehicle electrical systems of mobile equipment – the sensor can also withstand possible voltage peaks without damage. Turck is positioning the MR15-Q80 as a sensor for collision avoidance and object detection for all non-safety related tasks. It detects objects in its surroundings and – unlike comparable devices – outputs measured values for all three dimensions. For mobile equipment, the new radar scanner is currently the only device on the market that can output a three-dimensional measurement via the SAE J1993 communication protocol for the CAN bus.

Realistic space mapping thanks to 3D data

The MR15-Q80 provides distance and speed values for objects on all three spatial axes. This means that the surroundings and all the objects in them can be depicted much more precisely. Machines in particular with arms or booms at different heights receive valuable additional information about their surroundings. Thanks to the 3D information, the control system not only knows where an obstacle begins, but also where it ends and where the machine can operate with its arms. There are many other application areas where precise knowledge of the space in front of machines can be helpful, for example when recording topography and rocky outcrops in mining.

Identifying animals and objects in the field

Another application in the mobile equipment sector is the detection of animals and objects in fields. Turck's radar scanner can be mounted on the combine harvester directly on the threshing unit to monitor the field in front of it. Due to the different reflective properties of animals or objects and grain stalks, the sensor can detect foreign objects in the field that would either get damaged themselves or could damage the threshing unit. Thanks to the large

Turck's MR15-Q80 radar scanner is currently the only device with an SAE-J1993 interface for the CAN bus; an IO-Link version is also available

opening angles of 120 degrees horizontally and 100 degrees vertically and a range of up to 15 meters, the radar scanner can reliably detect whether the field in front of the combine harvester can be harvested without any problems.

Six adjustable warning radii and three signal spaces

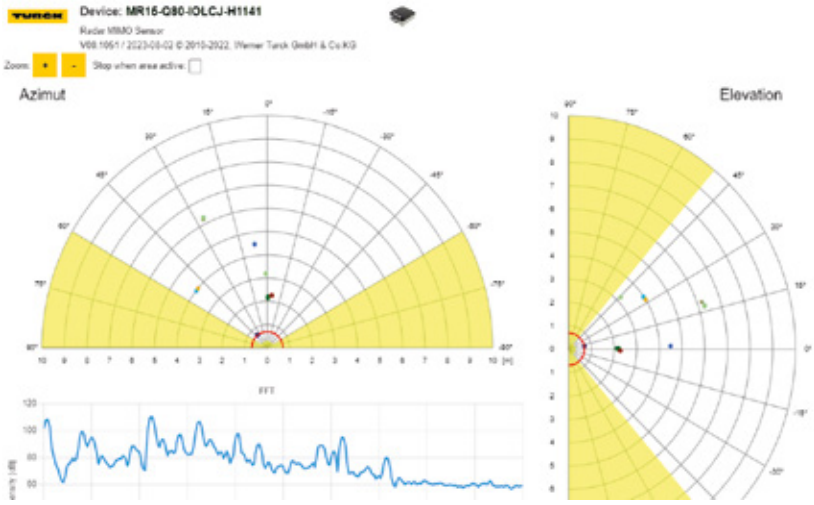
For these and other applications, users can define warning radii that trigger a switching signal as soon as an object is located within them. Switching signals can also be reliably triggered by certain intensity thresholds, which are important for distinguishing objects. However, the controller can also fully evaluate the IO-Link signal in order to utilize the entire information density. Up to six freely definable warning fields and three three-dimensional signal spaces can be taught and linked to one of the two switching outputs. If one of these warning fields is in the radar shadow because there is an object between the sensor and the field, the sensor also recognizes this and outputs an appropriate message.

Another possible application on mobile equipment is blind spot warning, i.e. the monitoring of areas on the machine that are difficult to see. The vehicle may be damaged if there are any objects located there. The warning radii and signal spaces are also helpful for these tasks in order to output warning signals in good time.

Collision avoidance in intralogistics

Alternative application fields are also emerging in intralogistics. Industrial trucks and automated guided vehicles (AGVs) in particular require sensor technology to navigate and avoid collisions. Lidar scanners are

Precision work: the radar scanner at the top of the stacker also records the height of the roller conveyor



The TAS Turck Automation Suite supports the user in parameterizing the scanner via the "Radar Monitor" app, which displays the raw signal in three graphs

normally used for safety-oriented environment monitoring. However, they are only suitable for the vertical monitoring of lift paths on autonomous forklift trucks to a limited extent, as they usually detect a small vertical opening angle. Special safety radars and scanners would also be oversized and therefore too expensive for the non-safety relevant function of height control.

Height control

Turck's 3D radar scanner provides the necessary information for all three spatial dimensions and thus detects obstacles and surroundings in their entirety. This information also facilitates the precise and safe control of lifting movements. The scanned data can also be used to ensure clearance heights and prevent damage to vehicles, goods and plant elements. Camera systems are often used for these tasks, but they are more expensive and usually much more complex to set up.

Simplified commissioning and real-time visualization in TAS

The parameterization of such complex sensors, which output more than just an analog signal or one or two switching signals, is often a challenge. Turck supports users with its TAS (Turck Automation Suite) configuration and IIoT software. The toolkit makes commissioning and optimum setting of signal and intensity filters, detection angles or warning radii much easier. The software visualizes all raw data from the sensor in virtual real time in the web browser. Objects are displayed as points and point clouds on two graphs, one for the vertical data and one for the horizontal detection angles.

Turck offers two variants of the 3D radar scanner: one with IO-Link and one with an SAE-J1939 interface, which is primarily used for mobile equipment. Besides the interface for the 3D data, both devices have two classic switching outputs that can be triggered by different threshold values.

Author | Raphael Penning is product manager for distance sensors at Turck
Webcode | more12471e

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Filling Perfection

Elopak relies on IO-Link and ultracompact block modules from Turck for its new Pure-Fill filling machine platform – thus increasing commissioning speed, flexibility and cost efficiency

Modular and compact: The new Elopak machine platform PureFill-60AL can be easily adapted to different product and customer requirements

Everyone has probably held it in their hands before: the "Pure-Pak" beverage carton from Elopak. As one of the world's leading system suppliers of carton packaging and filling machines, Elopak from Spikkestad, Norway, offers innovative packaging solutions made from renewable, recyclable and sustainably sourced materials. The German subsidiary Elopak GmbH develops and produces filling machines at its Mönchengladbach site. The highly specialized systems open out the carton, dose the liquid and fill it aseptically in order to finally seal the beverage cartons airtight. The systems are self-cleaning without the need for any dismantling. The beverage cartons are filled directly at the installation site in compliance with the highest hygiene standards.

New machine generation with a wide application range

The new Pure-Fill machine platform, based on the predecessor model E-PS120 A, is designed to be particularly flexible and adaptable to suit customer requirements. "Our primary goal was a modular machine that can be easily adapted to specific customer requirements while retaining the same overall design," explains Horst Klesse, manager electrical design, product & development at Elopak. The new filling machine platform must be flexible in order to cover a wide range of applications – beverages with a low acid content such as milk or those with a high acid content such as fruit juices, in different volumes such as one or two-liter cartons, at filling speeds of up to 14,000 beverage cartons per hour and production on two to five lanes.

More flexibility with the same footprint

When integrating IO-Link into the machine platform, the overall size of the system should remain the same despite the increased flexibility. Elopak already used IO-Link to some extent in the predecessor machine in order to reduce wiring and commissioning costs. IO-Link was used here in the so-called process node, which is located at the top of the machine and controls all media and product flows with 34 IO-Link enabled valve heads. Thanks to IO-Link, only eleven cables had to be connected to the control cabinet in the process node instead of the original 375 individual wires and 73 cables. "In the new platform, we wanted to use IO-Link consistently throughout the entire machine, but the size of the master modules previously used was a problem," says Horst Klesse, describing a challenge during development. "Devices without an IO-Link connection also had to be integrated into the system."

Communication problems with the control of the valve heads presented the team with a further challenge. "This previously led to considerable additional work for the software engineers during programming and commissioning," says Klesse. "As a result, we looked for an alternative solution." The diameter of the M12 supply cables of the IO-Link masters previously used meant that they were also too rigid to connect modules placed very close together.

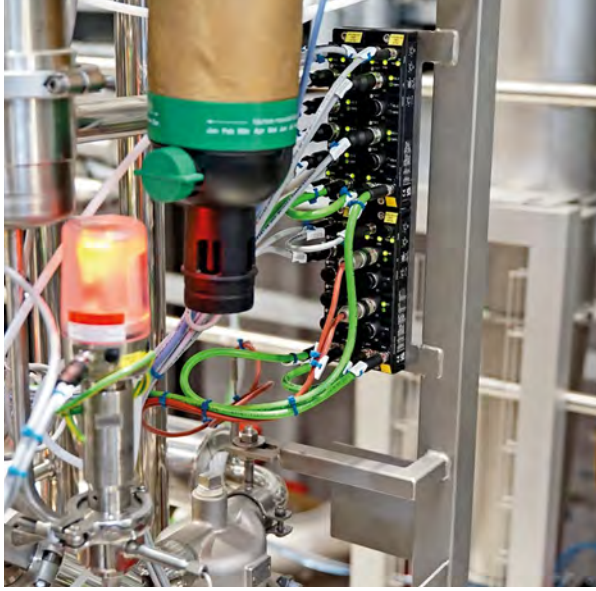
Compact IO-Link master: space-saving and combinable

Turck's TBEN-S2-4IOL, TBEN-S2-4AI and TBEN-S2-8DXP multiprotocol I/O modules and the IP67 8-port Ethernet/IP switch provided the solution. With a width of

QUICK READ

Elopak develops and produces filling machines for beverage cartons in Mönchengladbach. The packaging specialist uses IO-Link as the basic technology for the automation of its new Pure-Fill machine platform. The decision to choose Ethernet and network components from Turck was based on their flexibility as well as the simple wiring and seamless integration in the Profinet engineering. The ultracompact multiprotocol I/O modules TBEN-S2-4IOL, -4AI and -8DXP, as well as the TBEN-LL-SE-M2 Ethernet switch were particularly impressive.

Masterclass: Turck's IO-Link Master TBENS2-4IOL enables the efficient use of IO-Link and digital I/Os in an ultra-compact assembly group at the process node for cooling the machine



The I/O modules of the TBEN-S2 series are only 32 mm wide and allow flexible group mounting in a wide variety of locations

Turck's TBEN-LL-SE-M2 Ethernet switch (above) with eight 100 Mbit and two Gbit ports for fast and secure data transmission in the machine

just 32 millimeters, the ultracompact TBEN-S2 devices are ideal for systems with limited space. This means that module groups can be easily mounted at different points in the system – even directly on the profile rails. The use of smaller M8 connectors and thinner cables allows easy connection – even if the modules are mounted directly next to each other and connected with small bridges. "The requirements for the optimum IO-Link master for the filling machine platform were a compact design, multiprotocol capability, M8 power supply, Profinet connectivity, suitable connection options and a wide range of mounting options," Klesse explains. "The TBEN-S2 modules from Turck meet these requirements best of all."

The TBEN-S2-4IOL master module has four Class A IO-Link ports and digital I/Os. Despite its compact form factor, it offers a wide range of communication options and enables easy integration of IO-Link devices in the Profinet engineering without additional software, thanks to Turck's "Simple IO-Link Device Integration" SIDI. Up to four sensors or I/O hubs can be connected via the IO-Link master channels, enabling a total of up to 64 sensors to be connected. The two four-pole M8 Ethernet/fieldbus connections enable flexible communication via Profinet, EtherNet/IP and Modbus TCP, while the integrated Ethernet switch allows straightforward cabling using a line topology. The built-in web server simplifies diagnostics and commissioning, making the TBEN-S2-4IOL extremely versatile and considerably facilitating the integration of devices.

The identically designed TBEN-S2-4AI offers a powerful solution for applications that process analog signals. With four analog inputs that can be configured for voltage, current, RTD or thermocouples, it enables a versatile adaption to different requirements. Each analog input can be configured individually, allowing flexible use. The universal use of these analog modules is unique on the market. As only one type of module is required to process all common analog value types, this also simplifies spare parts inventory and ultimately machine maintenance. The integrated Ethernet switch simplifies cabling and optimizes communication.

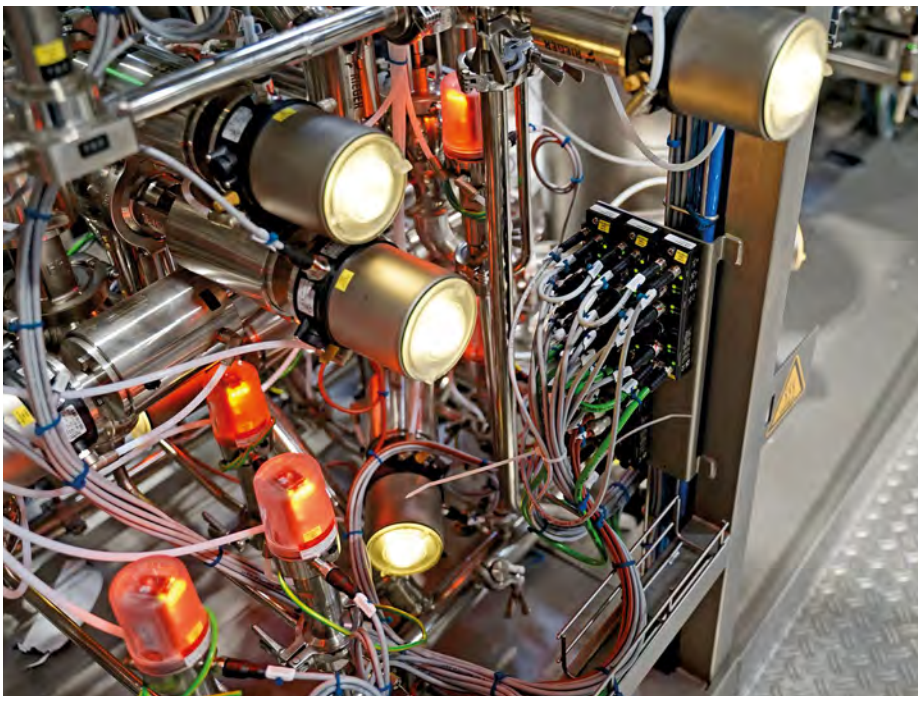
The TBEN-S2-8DXP is Turck's compact solution for applications that need to process digital signals. With eight universal, digital channels, configurable as PNP

SIDI – universal key for Profinet engineering

Turck's Simple IO-Link Device Integration, or SIDI for short, simplifies the handling of IO-Link devices in Profinet engineering systems. As the devices are already integrated in the GSDML file of the master, users can select the devices from the device library (for example in the TIA Portal) and integrate them in their projects via drop-down fields as if the devices are submodules on a modular I/O system. The user benefits from access to all device properties and parameters in plain text. Measuring ranges, switch points and pulse rates can be set directly from the engineering system – without any programming or additional software required.

input or 2 A output, this module also enables application-specific adaptions. The diagnostic functions of the supply per I/O port and the output diagnostics per channel ensure reliable monitoring and fast fault detection. "We can supply the machine with just three small modules that are identical in terms of shape, size and connections," emphasizes Klesse. "This makes it possible to install even simple sensors without IO-Link. Groups of four to six or even more devices can also be easily formed in the system and connected with the thinner M8 cables." As a special feature, the module offers a third switching output on each M12 port, i.e. a total of 12 switching signals. This enables lights with three segments, for example, to be connected and controlled via a standard cable.

The uniform design of the TBEN-S2 modules in terms of dimensions and connections allows the user to easily replace modules without having to make complex changes to the system – regardless of whether analog, digital or IO-Link devices are required. "We can mix and match modules without having to worry about power supply, connections or space requirements," Horst Klesse emphasizes. "This flexibility has simplified our planning and installation considerably. We can simply tell the mechanic how many modules we need without committing to a specific type in advance. This enables us to configure the system in an agile and efficient way."



The process node controls all media and product flows of the plant with 34 valve heads, Turck's compact TBEN-S modules ensure efficient communication paths

»The compact TBEN-S2 devices from Turck proved to be the ideal solution for our application, as there are no comparable alternatives.«

Horst Klesse | Elopak

Installation time reduced by more than 50 percent

One of the biggest advantages of the IO-Link solution is the reduction in installation time by over 50 percent and commissioning time by 30 percent. This considerable time saving not only reduces production time, but also overall costs. Offline parameterization of the IO-Link devices directly from the Profinet engineering considerably simplifies commissioning and ends time-consuming manual settings of sensors and actuators. Maintenance is also significantly simplified: As all device properties and parameters of masters and devices are directly available in the central project file of the controller, automatic device replacement in the event of damage can also be carried out easily without any problem – both for IO-Link masters as well as devices.

Outlook

By consistently integrating IO-Link technology, Elopak has been able to significantly increase the efficiency and flexibility of its machines. Rapid commissioning and simple device configuration improve competitiveness and profitability. The machine platform is moreover now equipped for future predictive maintenance solutions. "The decision to work with Turck has proven to be absolutely right," says Horst Klesse. "We were just as impressed by the competent contacts and reliable support as we were by the handling of the modules and the wide range of options. The compact TBEN-S2 devices from Turck have proven to be the ideal solution for our application, as there are no comparable alternatives."

Author | Damian Maslowski is a sales engineer at Turck
User | www.elopak.com
Webcode | more12450e

Parking Lot Organizer

Frozen food specialist Ardo optimizes loading traffic and safety on the company premises with Turck's multiprotocol I/O module and programmable LED lights

Ardo Foods NV, headquartered in Ardooie, Belgium, produces frozen vegetables, herbs and fruit. With 17 sites in eight countries, the family-run company supplies its customers in the retail, food service and industrial sectors with high-quality frozen food via a global distribution network. At the site in Koolskamp, Belgium, peas, beans, root vegetables, spinach and other vegetables are washed, blanched, frozen, packaged and stored. A newly designed truck and employee parking lot between the access road to the company premises and the loading ramps presented the company with major challenges, as transport vehicles were continually driving in and out. This situation in a limited maneuvering area presents several risks such as collisions, obstructed access and delays, which could endanger not only smooth operations but also the safety of people.

There was therefore a need for arriving truck drivers to know in good time whether the site is already full and how long they will have to wait before they can

The limited maneuvering space in the Ardo truck parking area requires smart access control

The WLS27 LED strip is waterproof and clearly visible even in daylight, making it perfect for outdoor use

enter. With drivers coming from different countries and often unable to communicate with each other or with the staff on site, the system had to be language-neutral. "We realized that there might be problems with the traffic between the loading ramp and the truck parking area," says Bart Nollet from Ardo's engineering department, describing the initial situation. "That's why it was important to ensure that long-distance drivers are warned of any bottlenecks and know that they have to wait at the barrier, regardless of their spoken language." A system to regulate the number of trucks in the loading area, including a waiting time display, was required to solve these problems.

Control, visualization and programming from a single source

"The Turck Multiprox team suggested using an LED strip light that counts down the time while the driver waits," says Nollet. "Besides the hardware, the team also took care of the programming, which helped us a lot." At the heart of the traffic control system is the compact TBEN-S2-4IOL multiprotocol I/O module for Ethernet with four IO-Link master channels. One of its key strengths is its flexibility with regard to the wide range of communication protocols such as Profinet, EtherNet/IP and Modbus-TCP, which enables easy

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As one of the leading frozen food manufacturers, Ardo operates 17 production sites in eight countries across Europe and supplies its markets with frozen vegetables, herbs and fruit. The company designed a new loading area in Koolskamp, Belgium, in order to prevent dangerous situations despite the constant arrival and departure of transport vehicles. Turck Multiprox developed a system for efficient truck navigation and access control in the limited maneuvering area.

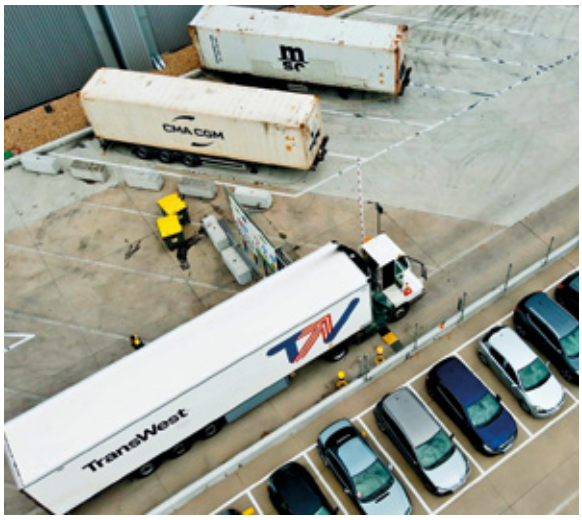
»We are very pleased with the solution. Barely two months after we had discussed the problem, the solution was ready for use thanks to the system engineers from Turck Multiprox. The fact that not a single dangerous situation has arisen proves that the system works perfectly.«

Bart Nollet | Ardo

integration into the existing infrastructure and ensures communication with IO-Link system components. The module enables fast processing of data streams and thus precise and in-time control of the traffic flow. The control functions of the TBEN-S2-4IOL are programmed via the browser-based ARGEE logic software, which enables easy adaptation and expansion of the system and rapid implementation of the Turck solution.

Improved driver guidance thanks to programmable WLS27 LED lights

The programmable WLS27 LED light from Turck's optical sensor partner Banner Engineering displays the estimated waiting time. The LED strip shines very brightly and is clearly visible even in daylight. The numerous colors and light modes can be parameterized via IO-Link. This allows the WLS27 to display a wide range of information clearly and intuitively.



Since the system was installed, there have been no more problems with international drivers or dangerous situations

The light points on the WLS27 LED strip visualize a timer that counts down the driver's waiting time

The TBEN-S2-4IOL multiprotocol I/O module is the heart of the traffic control system

Thanks to its unbreakable, waterproof and UV-resistant copolyester casing with IP69K protection, it is perfect for outdoor use. At the barrier, it uses different colors and flashing patterns to show truck drivers when they can enter, regardless of their spoken language. The clear visual signal prevents collisions and ensures a smooth flow of traffic while improving safety for people, vehicles and infrastructure.

Flexibility and control intelligence through ARGEE programming environment

The web-based ARGEE programming environment is important for straightforward programming of the TBEN-S2-4IOL module. It adds logic functions to the multiprotocol I/O module to create a field logic controller that can be configured without complicated software installations and programming languages. This makes it possible to adapt the LED display to the requirements of the traffic control system. One example of this is the programming of a dynamic timer that adjusts itself to the remaining waiting time. The timer regulates the speed at which the red LEDs are dimmed depending on the remaining waiting time.

Connection with the local parking guidance system

By communicating with the local Ardo parking guidance system, the TBEN-S2-4IOL receives real-time information about the occupancy of the loading ramps and the status of the barrier. This data on parking space occupancy enables the traffic control system to precisely control the WLS27 LED lights. Today, Turck's TBEN I/O module continuously records data on parking space availability and barrier status in order to indicate to the drivers of arriving trucks via light signals when they may enter or how long they have to wait. The opening of the barrier is also coordinated according to the availability of parking spaces. The simple integration of the local parking guidance system was a decisive factor in the overall efficiency of the new solution, which now makes delivery traffic at Ardo in Koolskamp much safer and more efficient.

"We are very satisfied with the Turck Multiprox solution," Bart Nollet sums up. "Barely two months after we discussed the problem, the solution was ready for use thanks to the system engineers from Turck Multiprox. The fact that we have not heard a single comment from a foreign driver since then and not a single dangerous situation has arisen proves that the system works perfectly."

Author | Bart Baert is sales manager at Turck Multiprox in Belgium
Customer | ardo.com
Webcode | more12451e

Fitness Tracker for Old Equipment

Turck's IMX12-CCM control cabinet monitor and Beckhoff's Edge Device enable simple retrofitting for vitality data acquisition from control cabinets in the NOA data model

Teamwork: The control cabinet vitality data is recorded by Turck's IMX12-CCM control cabinet monitor (left) and transmitted via HART to Beckhoff's edge device, which maps it into the NOA data model and transfers it to higher-level systems via OPC UA

The innovation cycles of IT and the process industry are fundamentally different. While the synthesis of standard chemicals such as ammonia, for example, has basically been the same for 100 years and has mainly been adapted in terms of scale and efficiency, innovation in IT advances over time in a continuous sequence of waves with the same consistency. However, the Industrial Internet of Things (IIoT) has now also reached the process industry – under the term "monitoring and optimization" (M+O) existing process plants in particular can benefit considerably from the possibilities of digitalization.

The measurement of additional variables that go beyond the data of the core processes is important firstly in order to optimize processes, increase efficiency, plan maintenance and avoid unplanned system downtimes. To achieve this, additional operating data must be recorded in existing systems and forwarded to the appropriate analysis tools. The challenge here is a standardized and secure transfer of this vitality data without affecting the existing process communication and control functionality.

NAMUR Open Architecture

With the NAMUR Open Architecture (NOA), NAMUR has developed a concept to expand the automation architecture in the process industry without making any changes to the existing control system. The purpose of the NOA is to provide information from the field level for higher-level applications. This so-called second channel can be established using additional hardware, as is particularly necessary, for example, in brownfield systems. In greenfield systems, NOA can also be implemented using software functions, provided that the communication technology used, such as Ethernet-APL, already allows additional sensor data to be read out. The specific data retrieved from the field level depends on the intended use of the information and the analysis tools. The focus here is on information about the device or system status or process quality.

Acquisition of control cabinet condition data

For a long time, the control cabinet was not the focus of availability testing or process optimization. A study

commissioned by NAMUR a few years ago now sheds a different light on this subject. Control cabinets are used to protect sensitive measurement and control equipment and enable it to be used even in harsh environmental conditions. If this protective function is no longer provided, for example due to defective locking mechanisms or seals, this can lead to the failure of the installed components and thus potentially to the failure of the system or machine.

Condition monitoring without effort: IMX12-CCM control cabinet monitor

Turck developed an easy to retrofit device for monitoring the most important vital parameters of a control cabinet, temperature, humidity and door closure, years ago: The IMX12-CCM control cabinet monitor can be mounted on a top-hat rail and, with a width of just 12.5 millimeters, fits into practically any gap in the control cabinet. The device is also approved as intrinsically safe equipment and can therefore also be used directly in potentially explosive atmospheres. The process data for temperature, relative humidity and door gap is transferred to the higher-level control system using the standardized HART protocol. The IMX12-CCM also has two settable switching contacts that can indicate if one or more parameters are exceeded. Following an update at the beginning of the year, the IMX12-CCM control cabinet monitor can now be operated more intuitively using haptic buttons and can also be used in a temperature range from +25 to 70 degrees Celsius. The device is therefore also suitable for remote I/O control cabinets, which are often installed in areas where it can get hot due to neighboring systems or sunlight.

Edge device communicates vitality data in the NOA data model

Beckhoff has developed edge devices for NOA to read the additional field devices – for example the CX8110. This consists of a controller, a software project installed on it and I/O modules to be connected. These are typically designed for communication with HART field devices but can be supplemented with communication modules for other protocols as required. Thanks to its compact and modular design, the edge device can also be easily retrofitted in existing control cabinets. The NOA edge device can read and provide vitality data from devices. It uses the HART protocol, which is widely used in the process industry. The device also maps the parameters to a defined NOA data model (PA-DIM). Depending on the connected device type, the mapping is automatically adapted to the OPC UA information model.

Retrofitting monitoring and optimization in legacy systems can be challenging: Turck and Beckhoff have had a solution tested with which vitality data from control cabinets can be transferred in parallel to process data communication in the NOA data model

Teamwork: Integration in the NOA concept successfully tested

The Turck control cabinet monitor provides the basic data for checking the vitality of a control cabinet with the specified parameters. With the help of the CCM's HART interface in combination with the Beckhoff edge device, this information can now be easily and securely extracted for monitoring and optimization in accordance with the NAMUR Open Architecture. The EL3182 HART input terminal and Beckhoff's OPC UA server for TwinCAT were used on the edge device to forward the information. This makes it possible to provide the control cabinet temperature and humidity data as well as the cabinet door gap data via OPC UA in accordance with the PA-DIM data model. The joint solution of the two automation specialists was successfully implemented and tested on the IDEA demo system of IGRT e.V. in the test laboratory of Bilfinger Engineering & Maintenance GmbH in Frankfurt.

Conclusion

The connection of the Turck IMX12-CCM control cabinet monitor to the Beckhoff edge device enables simple and convenient condition monitoring of control cabinets as part of the NOA model, even in hazardous areas. This makes it very easy to effectively monitor relevant parameters that influence the availability and safety of a system. The power supply and data transmission of the control cabinet monitor are implemented via a two-wire interface. This solution is therefore also suitable for retrofitting in already installed control cabinets.

Author | Klaus Ebinger is director product management interface technology at Turck

Webcode | more12454e

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To ensure that the transmission of condition data is separated from process communication, NAMUR has developed the Open Architecture (NOA) data model, which runs parallel to process communication and ensures its integrity. Together with Beckhoff, Turck demonstrates that this parallel channel can also be easily established in existing systems using a demo system in the test laboratory of Bilfinger Engineering & Maintenance GmbH. The IMX12-CCM control cabinet monitor transmits vitality data from a control cabinet via HART to an edge device, which transfers it to higher-level systems in the NOA model via OPC-UA.

The stacked RTIs are fully logged when the forklift passes through the gate when the truck is loaded

Order in the Pool

Logistics services provider Recalo monitors its pool of returnable transport items (RTI) with a track and trace solution from Turck Vilant Systems and thus reduces its customers' CO2 footprint.

German restaurants and catering businesses have been required by law since January 2023 to use reusable containers. Businesses that offer food and drinks to take away or as a delivery service must offer reusable packaging as an alternative to disposable plastic packaging. This regulation is not yet in force in industrial sectors. Disposable packaging and load carriers, whether made of wood, plastic, paper or metal, are often still the order of the day in this sector. The problems associated with the ecological consequences of this practice are obvious. Plastic packaging and stretch film in particular, which is wrapped around the load like oversized cling film, can rarely be recycled. Disposable packaging also often does not meet the hygiene requirements of the food and consumer goods industry.

Returnable load carriers as a sustainable logistics solution

You don't always need legislation to make things better. Recalo GmbH in Laatzen near Hannover is proof of this. "The core of our business is the pooling of returnable transport items," explains managing director Daniel van der Vorst. "Sustainability is the focus of our business model. This means that we ensure optimum utilization of our truck transports by using returnable load carriers that are optimized for the load capacities of the trucks. The aim is to achieve maximum output

»I immediately noticed that Turck Vilant Systems understood our processes and problems. It was important for us to have an international company as a partner, so that support for our overseas locations is also guaranteed.«

Daniel van der Vorst | Recalo

with minimum handling and transportation, i.e. to offer our customers the best possible service using as few resources as possible."

Efficiency benefit in the pooling system

In logistics, returnable load carriers are often referred to as returnable transport items or RTIs for short. Customers use the full service provided by Recalo. The pooling operator sends cleaned and reconditioned RTIs to its customers. These customers use the RTIs to ship their own supplier products and components. Once the RTIs have been dispatched, Recalo organizes the return of the load carriers and takes care of all further processes.

The customer therefore saves the investment in RTIs and has nothing to do with the management, cleaning and repair of returnable load carriers. Peaks in demand can also be bridged at short notice. The RTIs in the pooling system are always in circulation and never stand around unused for long. Thanks to its close network of logistics partners and customers, Recalo can organize the return of the pallets very efficiently and make optimum use of its trucks.

QUICK READ

Recalo offers its customers the possibility of pooling returnable load carriers, the so-called returnable transport items or RTIs. To always know where a particular load carrier is currently located in the cycle, the company relies on an RFID tracking system from Turck Vilant Systems, which ensures the transparency required for the exact provision of the service to each customer via interfaces to the ERP. To ensure maximum truck utilization, the system even shows employees how high the stacks of boxes need to be in order to make optimum use of the loading capacity. Thanks to this efficiency and the long service life of the RTIs, the Recalo solution effectively reduces its customers' carbon footprint.

Tailored transport solution

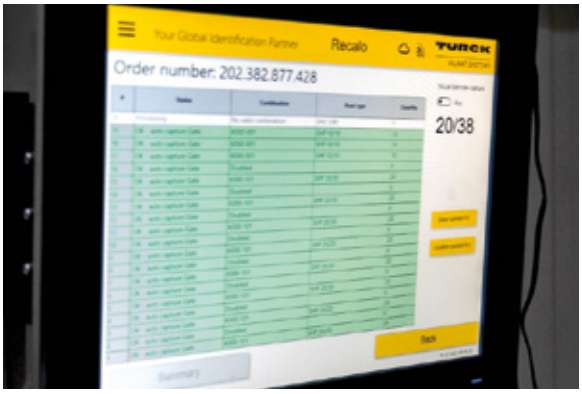
The company also develops specific load carriers for its customers, such as a collapsible plastic box with a divider shelf, which halves the pressure on the lower boxes and thus prevents unsightly deformation and problems with automatic removal. This box is based on the footprint of a Euro pallet and is almost one meter high when opened out. After unloading, it can be collapsed and is then only 30 centimeters high with the same footprint, including the divider shelf. The boxes are designed so that the transport space of the truck can always be filled up to the edge of the load – both with the boxes opened out and collapsed.

Another reason for the good CO2 footprint is the long service life of the boxes, which remain in use much longer than wooden pallets. Wood has also poor hygiene properties. This and the ambiguity about the previous use of a wooden pallet mean that they can only be used to a very limited extent in the hygiene and consumer goods sector. Recalo has once again increased the service life of its boxes with replaceable runners. These are the first elements to wear out and are then simply replaced instead of discarding the entire box. This increases the service life of the RTI and keeps the CO2 footprint of the entire service at a minimum.

RTI pooling reduces tied-up capital

Since its founding in 2017, Recalo has been at the nexus of the two global mega trends of sustainability and digitalization. RTI pooling is particularly attractive for retail chains or manufacturers of food, consumer goods and pharmaceuticals. In a typical application, a manufacturer of packaging trays for fresh meat places an order with Recalo. It receives the load carriers and uses them to supply its customer, the meat processor. The packaging manufacturer would now normally have to ensure that the load carriers are returned on time so that he can serve his next customer. This is time-consuming and also inefficient due to the limited quantities of load carriers – and would also tie up capital in the load carriers, which would be in the warehouse for a large part of the time, as the demand for RTIs can fluctuate greatly. In the pooling system, customers

The returnable load carriers are cleaned automatically in the washing system



The Turck Vilant Client shows directly whether the truck is filled with the correct boxes at the correct stacking height

only ever use as many load carriers as they currently need. When demand peaks, Recalo actively supports its customers with additional RTIs.

The packaging tray manufacturer orders the RTIs from Recalo, loads them and sends its goods to the meat producers, from whom Recalo collects the load carriers. However, as Recalo not only has a single producer of supplier products, but several customers, the company can organize and plan the return transport much more efficiently than each individual participant in this cycle could on their own. Recalo also cleans the load carriers, takes care of maintenance and ensures that only intact RTIs remain in the pool. Thanks to its broad customer base, the company can offer its RTI pool not only in Germany, but currently also in 13 other European countries.

The challenge of asset management

Recalo must constantly keep track of where its customers' RTIs are currently located. The company must ensure that every customer has enough containers to ship their goods. It is obvious that the RTI pool with more than 90,000 units can only be run economically if their logging is fully automated. Managing director Daniel van der Vorst was quick to rule out the sole use of barcode identification: "The most important decision criteria for an RFID system for us were high data quality, fast bulk recording and the ability to automate our processes." When hundreds of boxes are sent to customers, the items have to be recorded in bulk, which is virtually impossible with barcodes. On the other hand, barcodes have the advantage that targeted scanning of individual codes with barcode scanners is often easier than with RFID readers.

RFID system for complete process transparency

Recalo therefore uses a hybrid solution and equips its pallets with labels that combine barcodes and RFID UHF tags. The hybrid tag enables every Recalo load carrier to be clearly and efficiently identified by the system, regardless of which technology is used at the respective location. Van der Vorst spoke to the track and trace specialists from Turck Vilant Systems for the first time at a trade fair. "I noticed straight away that Turck Vilant really understood the processes and the problems we face. It was important for us to have an internationally based company as a partner, so that support for our overseas locations is also guaranteed," says the managing director, describing his reasons.

Turck Vilant Systems developed a complete system for Recalo consisting of RFID read/write points that are operated via the Turck Vilant Client middleware. They are used to carry out central tasks such as the checking in or out of an RTI in the pool. This data is processed by the Turck Vilant Visibility Manager. This server application provides fully automated loading control in close communication with Recalo's ERP system. This full integration of shipment verification with the ERP system was crucial to the success of the solution.

Seamless tracking throughout the entire logistics cycle

Recalo's processes, from shipping to the customer to tracking the boxes in the cycle to their return, are completely paperless. The RTIs are cleaned, temporarily stored and, if necessary, repaired at the Conditioning Center in Riedstatt near Frankfurt. When a truck is unloaded, the employees transport the stacks of boxes with forklift trucks through an RFID gate that captures their identification numbers. Employees can confirm directly at the gate whether all boxes have been recorded correctly. The employees in Riedstatt are able to load a complete truck in less than half an hour. Up to 20 compactly stacked boxes are simultaneously recorded with a forklift truck through the RFID gate and loaded into the trucks.

Recalo can respond to fluctuations in demand from its customers at any time and deliver in a short space of time

The boxes are designed in such a way that the loading volume of the trucks is always optimally utilized

The entire process was designed as a digital system. For example, the system knows how high the trailer of the loaded truck is and shows the employees how high the stacks of boxes should be in order to make optimum use of the loading capacity. When the requested boxes pass through the RFID gate, not only are all tags recorded, but the system also checks whether the required stack height has been reached. Using the direction gate algorithm, the system also determines the direction in which the boxes pass the gate. Anyone who has ever seen how full a truck can be filled with Recalo's standardized system boxes immediately realizes that this level of efficiency would be difficult to achieve manually.

RTI pool always in the "sweet spot"

To ensure that the entire process chain is recorded seamlessly, the receipt of RTIs by Recalo's customers must also be recorded. This data is transferred to Recalo's ERP system via interfaces so that the company always knows which box is currently in which customer's cycle. This information enables the RTI pool operator to keep their customers' stocks always at the ideal level and indicate impending bottlenecks early on or conversely, request the return of RTIs.

The journey towards the final tracking system, which today very reliably records the boxes in the entire cycle, was not easy, as Daniel van der Vorst emphasizes. "We also found that the implementation process was more complex than expected. Turck Vilant was the right partner for the job. The fact that we have different industrial trucks in operation and numerous combinations of products which we had to accommodate added to the complexity."

Outlook

Not every site in Europe has yet been fully equipped with the RFID track and trace solution from Turck Vilant Systems. This is set to change in the coming months and years in order to close the gaps in other European countries. "We will definitely continue to expand the system. It is essential for us to know where our returnable load carriers are at any given time. This means that we will also successively equip our overseas locations with RFID technology so that we have the greatest possible transparency in the flow of goods," concludes Daniel van der Vorst.

Author | Jessica Säilä is head of marketing at Turck Vilant Systems
Customer | www.recalo.com
Webcode | more12452e

Web and Social Media

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GERMANY
Headquarters Hans Turck GmbH & Co. KG | Witzlebenstraße 7 | Mülheim an der Ruhr | +49 208 4952-0 | more@turck.com

ARGENTINA | **Aumecon S.A.**
(+54) (11) 47561251 | ventas@aumecon.com.ar
AUSTRALIA | **Turck Australia Pty. Ltd.**
(+61) 1300132566 | australia@turck.com
AUSTRIA | **Turck GmbH**
(+43) (1) 4861587 | austria@turck.com
BAHRAIN | **Al Bakali General Trading**
(+973) 17 55 11 89 | albakali@albakali.net
BELGIUM | **Turck Multiprox N. V.**
(+32) (53) 766566 | mail@multiprox.be
BOLIVIA | **Centralmatic**
(+591) 7 7457805 | contacto@centralmatic.net
BOSNIA AND HERZEGOVINA | **Tipteh d.o.o.**
(+387) 33 452427 | info@tipteh.ba
BRAZIL | **Turck do Brasil Ltda.**
(+55) (11) 26769600 | brazil@turck.com
BRUNEI | **Turck Banner Singapore Pte Ltd**
(+65) 65628716 | singapore@turckbanner.com
BULGARIA | **Sensomat Ltd.**
(+359) (58) 603023 | info@sensomat.info
CANADA | **Turck Canada Inc.**
(+1) (905) 5137100 | salescanada@turck.com
CHILE | **Egaflow S.P.A.**
(+56) (2) 2887 0199 | info@egaflow.com
CHINA | **Turck (Tianjin) Sensor Co. Ltd.**
(+86) (22) 83988188 | china@turck.com
COLOMBIA | **Dakora S.A.S.**
(+57) (1) 883-7047 | ventas@dakora.com.co
COSTA RICA | **Tecnologia Interactiva**
(+506) 2572-1102 | info@tecnologiainteractiva.com
CROATIA | **Tipteh Zagreb d.o.o.**
(+385) (1) 80 53 628 | tipteh@tipteh.hr
CYPRUS | **AGF Trading & Engineering Ltd.**
(+357) (22) 313900 | agf@agfelect.com
CZECH REPUBLIC | **Turck s.r.o.**
(+420) 495 518 766 | turck-cz@turck.com
DENMARK | **Hans Følsgaard A/S**
(+45) 4320 8600 | denmark@folsgaard.com
DOMINICAN REPUBLIC | **Suplitek SRL**
(+809) 682-1573 | aortiz@suplitek.com.do
DOMINICAN REPUBLIC | **VZ Controles Industriales, CXA**
(+809) 530 5635 | vz.controles@codetel.net.do
ECUADOR | **Bracero & Bracero Ingenieros**
(+593) (2) 264 1598 | bracero@bracero-ingenieros.com
EGYPT | **Electric Technology**
(+20) 3 4248224 | electech@electech.com.eg
EL SALVADOR | **Elektro S.A. de C.V.**
(+503) 2243-8542 | info@elektroelsalvador.com
ESTONIA | **Osauhing "System Test"**
(+37) (2) 6405423 | systemtest@systemtest.eem
FINLAND | **Sarlin Oy Ab**
(+358) (10) 5504000 | info@sarlin.com
FRANCE | **Turck Banner S.A.S.**
(+33) (0)160436070 | info@turckbanner.fr
GEORGIA | **Formila Company LLC**
(+995) 555 554088 | formila.company@gmail.com
GREAT BRITAIN | **Turck Banner Ltd.**
(+44) (1268) 578888 | enquiries@turckbanner.co.uk
GREECE | **Athanassios Greg. Manias**
(+30) (210) 9349903 | info@manias.gr
GUATEMALA | **Prysa**
(+502) 2268-2899 | alvaro.monzon@prysaguatemala.com
HONDURAS | **Partes Industriales**
(+504) 2237-4564 | orlando@part-ind.com
HONG KONG | **Hilford Trading Ltd.**
(+852) 26245956 | hilford@netvigator.com
HUNGARY | **Turck Hungary Kft.**
(+36) (1) 4770740 | hungary@turck.com
ICELAND | **KM stál ehf**
(+354) 5678939 | kalli@kmstal.is
INDIA | **Turck India Automation Pvt. Ltd.**
(+91) 7768933005 | india@turck.com
INDONESIA | **Turck Banner Singapore Pte. Ltd**
(+65) 6206 5095 | singapore@turckbanner.com
IRELAND | **Tektron Electrical**
(+353) (21) 4313331 | webenquiry@tektron.ie
ISRAEL | **RDT**
(+972) 3 645 0780 | info@rdt.co.il
ITALY | **Turck Banner S.R.L.**
(+39) 2 90364291 | info@turckbanner.it
JAPAN | **Turck Japan Corporation**
(+81) (3) 52982128 | japan@turck.com
JORDAN | **Technology Integration**
(+962) 6 464 4571 | info@ti.jo
KENYA | **Westlink Limited**
(+254) (53) 2062372 | sales@westlinkltd.co.ke
KOREA | **Turck Korea Co. Ltd.**
(+82) (2) 69595490 | korea@turck.com
KUWAIT | **Warba National Contracting**
(+965) 24763981 | sales.wncc@warbagroup.com
LATVIA | **Will Sensors**
(+37) (1) 67718678 | info@willsensors.lv
LEBANON | **Industrial Technologies (ITEC)**
(+961) 1 491161 | info@iteclive.com
LITHUANIA | **Hidroteka**
(+370) (37) 352195 | hidroteka@hidroteka.lt
LUXEMBOURG | **Turck Multiprox N. V.**
(+32) (53) 766566 | mail@multiprox.be
MALAYSIA | **Turck Banner Malaysia Sdn Bhd**
(+60) 3 5569 7939 | malaysia@turckbanner.com
MEXICO | **Turck Comercial, S. de RL de CV**
(+52) 844 4116650 | mexico@turck.com
MYANMAR | **RobAioTric Co. Ltd.**
(+95) 1 572028 | zawta@robaiotric.com
NEW ZEALAND | **Turck New Zealand Ltd.**
(+64) (9) 300 6048 | newzealand@turck.com
NETHERLANDS | **Turck B. V.**
(+31) (38) 4227750 | netherlands@turck.com
NICARAGUA | **Iprocen S.A.**
(+505) 22442214 | ventas@iprocen.com
NIGERIA | **Milat Nigeria Ltd.**
(+234) (84) 485382 | commercial@milat.net
NORTH MACEDONIA | **Tipteh d.o.o. Skopje**
(+389) 231 74197 | info@tipteh.mk
NORWAY | **Hans Følsgaard A/S**
(+47) 37 090 940 | norway@folsgaard.com
OMAN | **Oman Oil Industry Supplies & Services Co. LLC**
(+968) 24117600 | info@ooiss.com
PAKISTAN | **Route One Engineering**
(+92) 051-5735181 | Info@route1.com.pk
PANAMA | **Accesorios Industriales, S.A.**
(+507) 230 0333 | accindsa@cableonda.net
PERU | **NPI Peru S.A.C.**
(+51) 1 2454501 | npiperu@npiperu.com
PERU | **Segaflow**
(+51) 966 850 490 | douglas.santamaria@segaflow.com
PHILIPPINES | **Turck Banner Singapore Pte Ltd**
(+65) 6206 5095 | singapore@turckbanner.com
POLAND | **Turck sp.z o.o.**
(+48) (77) 4434800 | poland@turck.com
PORTUGAL | **Bresimar Automação S.A.**
(+351) 234303320 | bresimar@bresimar.pt
PUERTO RICO | **Inseco Inc.**
(+1) (787) 781-2655 | sales@insecopr.com
PUERTO RICO | **Stateside Industrial Solutions**
(+1) (305) 301-4052 | sales@statesideindustrial.com
QATAR | **Doha Motors & Trading Company WLL**
(+974) 44651441 | dohamotor@qatar.net.qa
ROMANIA | **Turck Automation Romania SRL**
(+40) (21) 2300594 | romania@turck.com
SAUDI-ARABIA | **Codcon**
(+966) 13 38904510 | codconest@gmail.comom
SAUDI-ARABIA | **Salim M. Al Joaib & Partners Co.**
(+966) 3 8175065 | salim@aljoaibgroup.com
SERBIA | **Tipteh d.o.o. Beograd**
(+381) (11) 8053 628 | damir.office@tipteh.rs
SINGAPORE | **Turck Banner Singapore Pte. Ltd.**
(+65) 6206 5095 | singapore@turckbanner.com
SLOVAKIA | **Marpex s.r.o.**
(+421) (42) 4440010 | infox@marpex.sk
SLOVENIA | **Tipteh d.o.o.**
(+386) (1) 2005150 | info@tipteh.si
SPAIN | **Elion S.A.**
(+34) 932982000 | elion@elion.es
SOUTH AFRICA | **Turck Banner (Pty) Ltd.**
(+27) (11) 4532468 | sales@turckbanner.co.za
SWEDEN | **Turck AB**
(+46) 10 4471600 | sweden@turck.com
SWITZERLAND | **Bachofen AG**
(+41) (44) 9441111 | info@bachofen.ch
TAIWAN | **E-Sensors & Automation Int'l Corp.**
(+886) 7 7323606 | ez-corp@umail.hinet.net
TAIWAN | **Jach Yi International Co. Ltd.**
(+886) 2 27312820 | james.yuan@jachyi.com
THAILAND | **Turck Banner Trading (Thailand) co., Ltd.**
(+66) 2 116 5699 | thailand@turckbanner.com
TRINIDAD AND TOBAGO | **Control Technologies Ltd.**
(+1) (868) 658 5011 | sales@ctltech.com
TUNISIA | **Codaprint**
(+216) 95 66 6647 | info@codaprint.com.tn
TURKEY | **Turck Otomasyon Tic. Ltd. Şti.**
(+90) (216) 5722177 | turkey@turck.com
UKRAINE | **SKIF Control Ltd.**
(+380) 611 8619 | d.startsew@skifcontrol.com.ua
UNITED ARAB EMIRATES | **Experts e&i**
(+971) 2 5525101 | sales@experts-ei.com
UNITED ARAB EMIRATES | **Indulge Oil and Gas**
(+971) 2 4957050 | sales@indulgeglobal.com
URUGUAY | **Fidemar S.A.**
(+598) 2 402 1717 | info@fidemar.com.uy
USA | **Turck Inc.**
(+1) (763) 553-7300 | usa@turck.com
VENEZUELA | **Turck Inc.**
(+1) (763) 553-7300 | usa@turck.com
VIETNAM | **Viet Duc Automation co., Ltd.**
(+84) 8 3997 6678 | sales@vietducautomation.com.vn

TRACK & TRACE SOLUTIONS

Headquarters Turck Vilant Systems Oy
Sinimäentie 6C | 02630 Espoo | Finland
(+358) 10 2350 150 | info-finland@turckvilant.com

Your contact people in the Turck subsidiaries and agencies worldwide are available to support your inquiries for turnkey track and trace solutions.

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Publisher
Hans Turck GmbH & Co. KG
Witzlebenstraße 7
45472 Mülheim an der Ruhr, Germany
more@turck.com

Editorial Staff
Klaus Albers (klaus.albers@turck.com)
Simon Dames, Ilias Grigoriadis

Contributors to this Issue
Michael Corban, Hans De Craemer, Klaus Ebinger, Daniel Kirch, Qiang (Richard) Lin, Damian Maslowski, Raphael Penning, Jessica Säilä, Christoph Schmermund

Art Direction/Graphic Design
Arno Krämer, Britta Fehr

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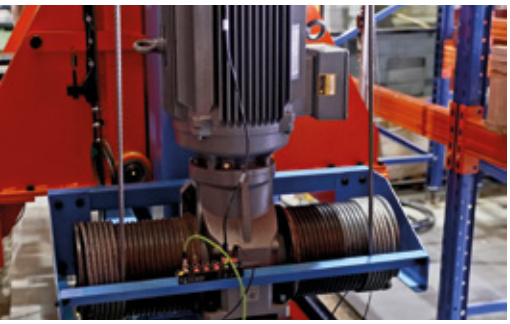

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