PROFINEWS

PROFINET and PROFIBUS News

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Drives Are the Muscles of Automation

Drives are the muscles of automation and they are used in all parts of factory automation, process industry, and infrastructure. Today with smart automation and distributed control systems, modern drives are fully integrated in industrial communication. At PI this integration is PROFIdrive.

The PROFIdrive profile offers a unique and standardized interface for all kinds of motion applications on PROFINET and PROFIBUS. With PROFIdrive it’s easy to run drives from different vendors on the same control system or to exchange drives without changing the application program. So PROFIdrive brings a lot of benefits and money saving to drive-based automation projects.

PROFIdrive is well established as “The Drive Profile” for frequency converters, positioning drives and high performance servo drives at PROFIBUS and PROFINET. Also PROFIdrive was the first drive profile supporting drive based safety functionality according to IEC 61800-5.

PROFIdrive based products are still used worldwide in PROFIBUS based automation projects and have been for more than 20 years. Since 2007 PROFIdrive is an international standard as part of IEC61800-7 and since 2014 Chinese National Standard GB/T 25740.

Current market studies show about 1.5 million new PROFIdrive devices per year for PROFIBUS and 150 thousand for PROFINET, growing fast. So far PROFIdrive is the leading drive profile in the industrial automation market, ahead of all other drive profiles used on other fieldbus technologies and other Ethernet based communication systems.

Andreas Uhl

Fast Access to the PROFIdrive World

PROFINET is being used increasingly as a drive bus. Drive manufacturers are looking for a cost- and time-efficient way to implement PROFINET in their devices. A Swiss drive manufacturer found just such a way to make its linear drive PROFINET-capable in minimum time while also implementing the PROFIdrive drive profile.

PROFINET, the universal communication system based on standard Ethernet technology, acts in combination with the PROFIdrive drive profile and other application profiles such as PROFIsafe and PROFIenergy to form an extremely powerful and future-proof solution for drive technology. With its six application classes, PROFIdrive seamlessly and scalably covers all applications from a simple frequency converter to a high-end servo drive. PROFIdrive can be used without modification in both PROFIBUS and PROFINET applications.

Easy implementation

PI offers drive manufacturers a powerful blend of technology for implementation of PROFINET and PROFIdrive in the form of a modular system. This includes PROFINET as the drive bus, the PROFIdrive drive profile as a proven, scalable device profile, and various tools and products that support fast and cost-effective implementation in drive devices. The modular system offers versatile support in the form of consulting, specific development support, free basic technology implementation, and numerous software and hardware components such as ASICs, starter kits, and modules.

PROFINET cycle times and drive applications: PROFINET with Real Time (RT) supports fast communication of process data with high determinism. The version with Isochronous Real Time (IRT) is used for clock-synchronized applications. Non-time-critical data are transmitted isochronously on the same cable using TCP/IP communication. Consequently, PROFINET is open for use of IT services and web tools as well as for communication with network components, such as for parameter assignment purposes.

This enables drive manufacturers to choose between full in-house development or the use of preconfigured methods and components – based on its business strategy, development capacity, know-how, and time-to-market goal. For fast and cost-effective implementation, in particular, of PROFIdrive in drive devices, the modular system, i.e. the PROFIdrive community, offers a free, source code-based basic technology that is already precertified. This source code is maintained by the Industrial NETworx Community. It supports drive device manufacturers by providing them with a well maintained standard PROFIdrive implementation free of charge as well as a platform for exchange of information and experience.

A finished solution in a few months

The Swiss company Jenny Science is an established provider of compact linear axes of various sizes and associated servo controllers. Its corporate plan includes responding quickly to current market demands with sound concepts. Machine builders are demanding higher speeds, shorter cycle times and jitter times, and end-to-end networking. Jenny Science has responded logically to this by implementing Ethernet-

based bus systems in its devices. During a recent project involving the implementation of PROFINET and PROFIdrive in the servo controller of its Xenax Xvi75V8 series, the company faced project-related time pressure to complete the changeover in just a few months. Jenny Science elected to maximize use of ready-made modules from PI's modular system and minimize in-house development. The servo controllers of the Xenax Xvi75V8 series already had an Ethernet interface and adaptations to various bus systems and drive profiles. PROFINET Conformance Class 3 (IRT) was chosen as the drive bus. For its implementation, the Ertec 200 Ethernet controller was used – a finished ASIC that handles the complete cyclic data processing for PROFINET IRT. The PROFIdrive drive profile and applications classes AK3 (single positioning) and AK4 (servo drives) were also used. The implementation of PROFIdrive made use of the modular system, that is, modules from the Community Project (in particular, parameter manager and frames), combined with in-house development. The previous implementation of an existing CANopen drive profile was left in the device; the integration of PROFIdrive was realized by means of a CiA-402 conversion. This ensured that the servo controller always sees one and the same profile.

> “One of our important machine construction customers had decided to use PROFINET and asked us to adapt our linear drive he was using to this new situation. But the amount of time he gave us for the project initially seemed unreasonable. After a more careful analysis, however, it was clear that we could complete the project on time and also very cost-effectively. The solution lay in the use of “ready made” modules that are available for implementation of PROFINET and PROFIdrive. Much of the solution already existed and we were able to fulfill the customer's expectations in just a few months. We see ourselves here in a pioneering role and are convinced that other drive manufacturers will follow the same path.”
>
> **Alois Jenny, Managing Director of Jenny Science AG**

PROFIdrive: Tell Me More

Want to learn more about PROFIdrive? There are many resources available including documentation, white papers, and videos.

For a quick introduction, view the MinutePROFINET video “MinutePROFINET: PROFINET and Drives.”

YouTube Video

PROFIdrive is one of many application profiles for PROFINET and PROFIBUS. An application profile is like an “object” in that it arranges data in a consistent way across vendors. So while the communication protocol determines how the data will be communicated, an application profile determines how the data will be arranged. For an understanding of application profiles in general, view “MinutePROFINET: PROFINET Application Profiles.”

YouTube Video

This 5-minute video has PI Chairman Karsten Schneider presenting drives and PROFIdrive:

YouTube Video

For longer videos, see these two webcasts: “PROFIdrive” and “Drive Safety.”

Documents available include (recommended to be read in this order):

- Marketing Flyer: Drives & PROFIdrive
- System Description: PROFIdrive Technology and Application
- White paper: Drives and Motion with PROFINET

Finally, this interactive PROFIdrive Slide Set allows exploration based on individual interests and questions.

IO-Link: Did You Know?

Did you know that every IO-Link device is delivered with a mandatory device description?
With IO-Link there are many enhanced functions available compared to conventional sensors and actuators. IO-Link devices can be uniquely identified and conveniently parameterized, and they supply diagnostics that open up new opportunities and potential for plant availability and predictive maintenance.

In order to make easy use of these functions worldwide and irrespective of the particular automation system used, a device description IODD = IO Device Description has been specified. The IODD is based on the XML technology widely used in connection with the Internet, which facilitates use in different system environments and thus also ensures worldwide acceptance. All properties of the IO-Link devices are described in the IODD. For example, not only the communication properties but also all parameters, error messages and diagnostics are described with their associated texts. The texts can be stored in multiple languages so that nothing stands in the way of the global use of IO-Link.

Probably the most important news about the IODD is that it is mandatory. An IODD exists for every IO-Link device. This is a requirement for issuance of the manufacturer's declaration, which all IO-Link device providers have committed themselves to provide. An IO-Link device without an IODD is not an IO-Link device!

IO-Link

Tech Tip: How Many Devices on a PROFIBUS Network?

In the PROFITech Certified PROFIBUS Engineer classes one of the more frequently asked questions is “How many devices can be on a PROFIBUS network?” The short answer is that up to 126 Masters and slaves can be on a single PROFIBUS network.

To find out the number of PROFIBUS devices we need to look a little deeper. PROFIBUS devices must be split into 2 categories, devices without addresses and devices with addresses.

Devices without addresses are either Bus Monitors (things that listen but do not participate in communication on the bus) or bus infrastructure devices. Examples of infrastructure devices are RS-485 repeaters and Fiber Optical Repeaters. All of these devices have RS-485 drivers.

PROFIBUS is an RS-485 network that conforms to RS-485 rules. RS-485 uses the concept of segmentation on the bus. A segment can be thought of as the maximum length of cable that can be used at a given baud rate before the signal has to be refreshed back to the standard voltage levels and reformed into a square wave. RS-485 stipulates that the maximum number of devices (entities with RS-485 drivers) on a segment is 32. So, we need to start a new segment for 2 reasons, either we have gone the max length for the given Baud rate or we have more than 32 devices with RS-485 drivers. When either of these occurs, we need to add a repeater.

And what are the allowable addresses?

Devices that have PROFIBUS addresses are Masters and Slaves. These devices also have RS-485 drivers. The maximum number of devices with addresses is 126. The available addresses for PROFIBUS devices are 0-126.

PROFIBUS Address	**Usage**
0	Reserved for Class 2 master/Engineering tool
1	Sometimes used for a programming tool, but available as a master or slave address.
2-125	Available for master or slave addressing
126	Reserved for use of slaves without address switches. The slave must be set to an address <126 before it can be used
127	Reserved as a broadcast address

We can have a total of 126 master and slave devices on the bus including an Engineering tool. To achieve that number we have to have a minimum of 4 RS-485 repeaters.

Segments, Networks, and Addresses

So the long answer is that to talk to 126 master and slave devices, we have to have 130 PROFIBUS devices total.

John Swindall
PROFIBUS Consulting Engineer
PROFI Interface Center

Training and Events

2015 is barely upon us and the calendar is already filling up. PI will have a presence at many tradeshows throughout the year. Additionally, training classes have been announced throughout the US, Germany, and the UK.

Tradeshows and Events

RTECC
Taking place on Jan 22nd at the Santa Clara Convention Center this event will combine technical presentations and hands-on labs with demonstrations and exhibits to provide a comprehensive tutorial on building optimized hardware and software products for the embedded marketplace, as well as forging new opportunities in the burgeoning markets of IoT and Cloud Computing.

Other tradeshows throughout the year include:

- embedded world (Feb 24-26)
- PI Konferenz (Mar 11-12)
- Hannover Messe (Apr 13-17)
- ACHEMA (Jun 15-16)
- SPS/IPC/Drives (Nov 24-26)

- FOR TRAINING AND EVENTS AROUND THE WORLD, CLICK HERE -

One Day PROFINET Training Classes

Dates and venues for PROFINET One-Day Training Classes have been finalized for the first half of the year. These classes, hosted by PI North America offer a brief but technical overview of the technology at no charge to the attendee.

City	Date
Los Angeles	Feb 3, 2015
Dallas	Feb 19, 2015
Atlanta	Mar 4, 2015
Houston	Mar 19, 2015
Richmond	Apr 2, 2015
St. Louis	Apr 16, 2015
Newark	Apr 28, 2015
Pittsburgh	May 14, 2015
Minneapolis	Jun 4, 2015

This list is not complete for 2015. Other cities with dates yet to be determined include: Chicago, Denver, Detroit, Louisville, Pittsburgh, Raleigh, Seattle, and Tampa. The definitive source is the PI North America PROFINET Training page.

Updates from PI

PI (PROFIBUS & PROFINET International) has updated the planning, installation, and commissioning guidelines for PROFINET networks to include acceptance test checklists. A new PROFINET System Description is also released. Meanwhile, in Social Media, the PROFIblogger muses on 'what is the Industrial Internet of Things'.

PROFINET Checklist for Acceptance Tests

For several years, PI (PROFIBUS & PROFINET International) has been providing guidelines for planning, installation, and commissioning of PROFINET networks. These were used in day-to-day activities of many plant and machine builders as well as end users. Experts from end user groups, especially from the automotive industry, were actively involved in the development of these guideline documents right from the beginning. This had a very positive effect on the quality of the documents.

Now, these commissioning guidelines have been expanded on some points to include experiences gained through active collaboration with acceptance test service providers, as well. Accordingly, the new edition includes a detailed checklist that additionally specifies easy to use criteria for acceptance tests of PROFINET networks. These criteria can be easily verified with commonly used tools. Of course, support for such acceptance tests is provided for this by the PI Competence Centers, established worldwide, as well.

All in all, PI offers integrated and coherent communication solution packages from the basic specification to system maintenance. This is achieved through the active and continuous collaboration of its members.

The new guidelines are available in English and German and can be downloaded free of charge by all interested parties at http://www.profibus.com/download/.

PROFINET System Description
This is the go-to resource for anybody looking to get an introduction to the PROFINET technology. It is comprehensive yet comprehensible. Recently updated, this is a highly recommended piece of literature. PROFINET System Description

Social Media

From the PROFIblog, come two posts: "How to spend your Christmas vacation" (Hint: still relevant after vacation) and "What is the Industrial Internet of Things?". It's a multiple choice question: A) Things that talk to each other. B) Just another buzzword. C) Ethernet-connected things. D) Where industrial automation has been headed all along.

Member News

PI members Balluff and Beamex have announcements in this issue. Balluff is announcing a free catalog app for iOS and Android. Beamex has released a video showing how to calibrate a PROFIBUS transmitter using their tool.

Free Balluff App

Balluff is one of the leading global providers of sensors and industrial RFID and networking solutions. A free app for iPads and Android tablets now provides access to all Balluff catalogs and brochures.

A convenient search function enables users to get the information they need quickly and efficiently. Thanks to the clear, transparent menu structure, users can navigate immediately and download and scroll through the documents as needed.

This app is available in the App Store (iOS) and on Google Play (Android).

Beamex Video

In this short video, Michael Frackowiak, a calibration expert, shows how to automatically calibrate a Profibus pressure transmitter using Beamex MC6 calibrator and Beamex POC6 pressure controller. Beamex has released a new video series, where Mike shows, in a hands-on manner, the best practices for advanced process instrument calibration.

YouTube Video

Regional News

PI Australia will be participating in the Fieldbus Forum in 2015 on the PACE Today website.

PI Middle East conducted a workshop in Kuwait.

PI UK announces its annual conference for June.

Here are the details:

Australia

Following the successful launch of the "Fieldbus Forum" concept at the Brisbane Profibus EXPO last year, Profibus Australia has approached the Australia Trade Media group, Cirrus Media with an opportunity to conduct a similar promotion online through their PACE Today website commencing in April 2015.

The formal title of the promotion will be the ‘Industrial Automation Protocols Forum’, but the shortened working title will be "Fieldbus Forum."

PACE has agreed to showcase a combined 12 Fieldbus and Industrial Ethernet technologies on their website over a nine month period. One webpage will be devoted to each protocol and will contain an extensive display of sales promotion and technical material supplied by participating sponsors including White Papers, Product Releases, Product brochures, Technical papers, Videos and Opinions.

PI Australia

Middle East

The PROFIBUS & PROFINET Competence & Training Center of Saudi Arabia conducted a DEMO DAY workshop on the importance of PROFIBUS & PROFINET in the metal industry in the city of KUWAIT. The workshop clearly explained that PLC programmers who are considered to be masters in programming, still need to learn about PROFIBUS or PROFINET in order to master them too. Training courses are given in the region.

PI Middle East

United Kingdom

The PROFIBUS Group (PI UK) was founded in May 1993. Twenty two years later, we’re still celebrating, this time with a two-day Conference with Workshops and Table Top Exhibition to be held 23-24 June 2015 at The Stratford Manor Hotel, Stratford-upon-Avon, where we have held our conferences for a number of years.

The conference is designed for engineers, managers and indeed anyone concerned with implementing fieldbus and/or industrial Ethernet technologies. The event will concentrate on the real issues of implementation, maintenance and management of PROFIBUS and PROFINET systems and will cover latest developments in PROFIBUS and PROFINET technology for factory and process automation including safety, motion control, wireless implementations, integration with MES and of course, IIoT – the Industrial Internet of Things.

Conference Details and Registration

New Products

New products this month include: push-pull IO-Link masters, Ethernet switches, programmable temperature transmitters, industrial embedded PCs, and laser based data transmission.

Push-Pull IO-Link Master Modules

Fiber-optic cables have now become established in industrial data communication also. Optical data transmission offers numerous advantages, particularly for data-intensive applications with a high demand on availability, such as are typical in the automotive industry. **Balluff** takes this into account with the new push-pull variants of its PROFINET IO-Link master modules. These are available with the choice of a fiber-optic cable or copper cable connection.

Ethernet Switches for Efficiency and Performance

High efficiency and performance, along with simple and quick operation – the new Ha-VIS eCon Unmanaged Ethernet Switches from **HARTING** place a premium on meeting these demands. Tested and optimized for industrial Ethernet, including PROFINET, and designed for jobs in harsh industrial environments, over 150 new unmanaged Ha-VIS eCon Ethernet Switches equally enable the cost-effective expansion of existing network infrastructures, as well as the development of new industrial networks.

Programmable Temperature Transmitters

To broaden the functionality of its temperature transmitters, **TURCK** expanded its TTM sensor line to include dynamic programmability and special features via IO-Link. These fully programmable sensors allow a user to program the temperature range required, rather than be constrained to specific ranges, for more specific temperature control. This new functionality also allows the sensor to be programmed and used as a temperature switch.

Machine Control plus Industrial Connectivity

With the new IXXAT Econ 100, **HMS** offers a stand-alone embedded PC for real-time Industrial Ethernet for many applications – from small material handling devices to complex robot-based systems for medical use. The Econ 100 combines the machine control expertise from IXXAT with the fieldbus and industrial Ethernet capabilities of HMS' Anybus technology.

Interference-Free Data Transmission

With the DDLS 500, **Leuze** electronic has developed a data transmission photoelectric sensor that, in addition to a high transmission rate of 100 Mbit/s, sets new standards – above all with respect to usability. The devices transmit all common Ethernet protocols without time delay up to a distance of 120 m, be it PROFINET, Ethernet TCP/IP, Ethernet UDP, or other Industrial Ethernets.

PROFINET: Push-pull IO-Link Master Modules from Balluff

Data transmission via fiber-optic or copper cables

Fiber-optic cables have now become established in industrial data communication also. Optical data transmission offers numerous advantages, particularly for data-intensive applications with a high demand on availability, such as are typical in the automotive industry. Balluff takes this into account with the new push-pull variants of its PROFINET IO-Link master modules. These are available with the choice of a fiber-optic cable or copper cable connection.

They all have the push-pull connection technology for fieldbus and power cables that is specified by AIDA (Automation Initiative of German Automobile Manufacturers). A special, third variant combines both worlds and provides both a fiber-optic (SCRJ) and a copper (RJ45) push-pull connection. The particular attraction is that this module can be used for converting from a copper to a fiber-optic cable right in the I/O module, without needing an additional, external converter module.

Like all Ethernet-based IO-Link master modules from Balluff, the push-pull modules also have an integrated display for information and additional diagnostics as well as an integrated switch for setting up a PROFINET line structure. All functions based on IO-Link specification 1.1 are made available by the 8 integrated IO-Link ports. The user is provided with a real-time display of the module with all current statuses for extended diagnostics through an integrated web server.

Balluff

Ha-VIS eCon Ethernet Switches Stand for High Efficiency and Performance

High efficiency and performance, along with simple and quick operation – the new Ha-VIS eCon Unmanaged Ethernet Switches place a premium on meeting these demands. Tested and optimized for industrial Ethernet, including PROFINET, and designed for jobs in harsh industrial environments, over 150 new unmanaged Ha-VIS eCon Ethernet Switches equally enable the cost-effective expansion of existing network infrastructures, as well as the development of new industrial networks. The compact, cost-effective Plug & Play switches can be easily and quickly put into operation. Two different compact, space-saving housing designs guarantee the best possible use of available space in the switch cabinet. With intelligent adjustments of power consumption, the new Ha-VIS eCon switches reduce the energy usage by up to 50% along with lower heat generation. Powerful Power over Ethernet Plus (PoE+), full Gigabit Ethernet and an industrial temperature range of -40°C to +70°C broaden the wide product portfolio with additional functionality. Thanks to their approval for use in industry as well as the maritime market and transportation technology, the switches can be optimally selected for each application.

HARTING

TURCK Adds Programmability to Compact Temperature Transmitters

New design and technology expand functionality of TTM family of sensors

To broaden the functionality of its temperature transmitters, TURCK expanded its TTM sensor line to include dynamic programmability and special features via IOLink. These fully programmable sensors allow a user to program the temperature range required, rather than be constrained to specific ranges, for more specific temperature control. This new functionality also allows the sensor to be programmed and used as a temperature switch.

The TTM sensor line includes several models, including remote-mount transmitters, transmitters with integral Class A RTDs (resistance temperature detector), as well as all stainless steel configurations to meet different measurement, space and material needs of applications. To eliminate problems associated with conventional transmitter assemblies, all of TURCK's compact temperature transmitters are factory assembled with an overmolded or welded housing, and come ready for installation.

"These additions to our TTM line are really about providing our customers with a wide variety of options so they can have exactly what their application needs," said Product Manager Rich Tallant. "This new offering provides a solution that is ready to plug in and play out of the box, with no terminal screws or wiring assembly needed."

The overmolded remote transmitters are ideal for applications with limited clearance because they ensure electronics stay out of harm's way. Remote versions can also be mounted separately from the RTD, for improved temperature readings by isolating the transmitter circuitry from the temperature being measured. The stainless version offers a more robust package without an overmolded housing, ideal for food and beverage applications.

Like others in the TTM line, these new sensors feature a 4-20 mA temperature transmitter. The sensors are pre-scaled 0 to 150 degrees Celsius but can easily be programmed to specific temperatures within those ranges with IO-Link.

To find out more about the TTM family of sensors, please visit www.turck.us.

Machine Control and Industrial Network Connectivity Combined in the New IXXAT Econ 100

With the new IXXAT Econ 100, HMS offers a stand-alone embedded PC for real-time Industrial Ethernet for many applications – from small material handling devices to complex robot-based systems for medical use. The Econ 100 combines the machine control expertise from IXXAT with the fieldbus and industrial Ethernet capabilities of HMS' Anybus technology.

The Econ 100 is an ARM-based embedded PC platform for top-hat rail mounting incorporating a Linux operating system and unique multi-protocol support. Customer-specific gateway and control solutions can be swiftly and simply implemented for a variety of different fieldbus and industrial Ethernet standards. From the "out-of-the-box" variant to specific OEM solutions, the Econ 100 comes with unique flexibility and performance.

New expansion board combines multi-protocol approach with local I/Os and enhanced data security

The IXXAT Econ 100 with an integrated Anybus CompactCom – in this example offering connectivity to PROFINET.

In addition to the on-board interfaces (two Ethernet, two CAN and two USB interfaces), the Econ 100 can be expanded by means of a new expansion board: Alongside analog and digital I/Os, the expansion card offers a slot for HMS Anybus CompactCom modules, a serial interface and 512 MB NVRAM.

The CompactCom modules are available for all popular fieldbus and Industrial Ethernet networks and can be easily interfaced from the Econ 100 application software by means of the common Anybus programming interface. The multi-protocol approach makes the Econ 100 an ideal and future-proof platform for customer-specific control solutions with communication included.

The expansion card also provides 24 inputs and outputs e.g. for direct connection to sensors and actuators. Thanks to an digital output current of up to 2 A and a 12-bit resolution for the analog channels, the Econ 100 is ideal for a wide variety of applications, and the RS232/RS485 interface makes the Econ 100 a perfect link between real-time Industrial Ethernet or CAN-based networks and proven serial applications.

With the NVRAM available on the expansion card, the Econ 100 covers data security for the user. Using this feature, it is suitable for critical applications such as automated handling technology, where the last operating state with all process variables must be retained in case of power failures.

Simplified programming with Soft-PLC

In addition to supporting programming in C/C++, HMS offers an intuitively operated Soft-PLC programming environment in collaboration with Copalp, which is consistent with IEC 61131-3 for simple programming and configuration of control applications. The software package supports all important protocols, including PROFINET.

In order to support a rapid and efficient implementation of complex applications, HMS offers various well-documented application development kits, ADKs, for the Econ 100. The ADKs include an extensive board support package incorporating all necessary interface drivers, sample applications, the respective protocol software package pre-installed on an SD card, and the Linux operating system.

Designed to be used in many fields

The combination of a powerful CPU, up to 1 GB RAM, the rugged metal casing as well as a fanless design with an extended temperature range of -40 °C to +60 °C, ensures that the Econ 100 matches requirements of various important application areas.

In addition to the standard version, the Econ 100 is also available as a board-level product which can be integrated in existing customer applications while taking up very little space. OEM versions with specific hardware adaptations and adapted application variants can be developed by HMS on request.

Further information is available at www.ixxat.com/econ.

Transmit Data Interference-free with Light

With the DDLS 500, Leuze electronic has developed a data transmission photoelectric sensor that, in addition to a high transmission rate of 100 Mbit/s, sets new standards – above all with respect to usability.

The devices transmit all common Ethernet protocols without time delay up to a distance of 120 m, be it PROFINET, Ethernet TCP/IP, Ethernet UDP, or other Industrial Ethernets. For quick inspection of the received signal level, they have a LED display that can be easily recognized at a distance of up to 120 m. This simplifies maintenance and diagnosis considerably. Through the modular basic design, the devices can be flexibly arranged. This applies to the operating ranges, heating and the integrated laser alignment aid, which greatly simplifies alignment over long distances. An integrated bubble level and the mounting plate with spring-loaded wobble elements also contribute to the simple alignment by just one person (patented single-hand adjustment process).

Leuze